ARMY TM 10-3930-675-24-2

MARINE CORPS TM 11078A-IN/4

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE MANUAL
(Includes Unit, Direct, and General Support)

FOR

ROUGH TERRAIN CONTAINER HANDLER (RTCH):
RT 240; 53,000 LB CAPACITY; 4 X 4
(NSN 3930-01-473-3998)

ROUGH TERRAIN CONTAINER HANDLER (RTCH):
RT 240; 53,000 LB CAPACITY; 4 X 4 (RESET)
(NSN 3930-01-473-3998)

ROUGH TERRAIN CONTAINER HANDLER (RTCH):
RT 240V2; 53,000 LB CAPACITY; 4 X 4
(NSN 3930-01-522-7364)





SUPERSEDURE NOTICE - This manual supersedes TM 10-3930-675-20-1, TM 10-3930-675-20-2, and TM 10-3930-675-34 dated 1 July 2001.

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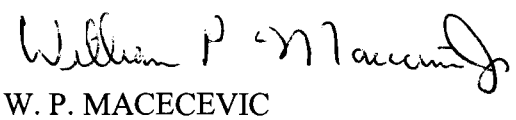
25 September 2006

1. This Technical Manual (TM), authenticated for Marine Corps use and effective upon receipt, provides maintenance instructions as determined by TM 11078-IN for Rough Terrain Container Handler (RTCH), National Stock Number (NSN) 3830-01-522-7364.

2. Submit notice of discrepancies or suggested changes on a NAVMC 10772. The NAVMC may be submitted via the Internet using website https://pubs.ala.usmc.mil/home.htm, scrolling down to the NAVMC 10772 Tracking Program and following instructions provided. It may also be submitted by electronic mail to mbmatcommarlogbases@logcom.usmc.mil, or by mailing paper copy NAVMC 10772 in an envelope addressed to Commander, Marine Corps Systems Command, Attn: Assistant Commander Acquisition and Logistics (LOG/TP), 814 Radford Blvd, Suite 20343, Albany, Georgia 31704-0343.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

OFFICIAL:



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WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.



BIOLOGICAL - abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



CHEMICAL - drop of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



ELECTRICAL - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



EYE PROTECTION - person with goggles shows that the material will injure the eyes.



FIRE - flame shows that a material may ignite and cause burns.



FLYING PARTICLES - arrows bouncing off face with face shield show that particles flying through the air will harm face.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm.



HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.



HOT AREA - hand over object radiating heat shows that part is hot and can burn.



RADIOACTIVE - identifies a material that emits radioactive energy and can injure human tissue or organs.



VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.



HYDRAULIC FLUID PRESSURE - hydraulic fluid spraying human figure shows that fluid escaping under great pressure can cause injury or death.

FOR INFORMATION ON FIRST AID, REFER TO FM 4-25.11.



WARNING

CARBON MONOXIDE (EXHAUST GASES) CAN KILL!

- **Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.**
- **Carbon monoxide occurs in exhaust fumes of internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of RTCH is operated.**

1. **DO NOT operate RTCH engine in enclosed areas.**
2. **DO NOT idle RTCH engine without adequate ventilation.**
3. **DO NOT drive RTCH with inspection plates or cover plates removed.**
4. **BE ALERT for exhaust poisoning symptoms. They are:**
   - **Headache**
   - **Dizziness**
   - **Sleepiness**
   - **Loss of muscular control**
5. **If you see another person with exhaust poisoning symptoms:**
   - **Remove person from area.**
   - **Expose to fresh air.**
   - **Keep person warm.**
   - **DO NOT permit physical exercise.**
   - **Administer cardiopulmonary resuscitation (CPR), if necessary.**
   - **Notify a medic.**
6. **BE AWARE. The field protective mask for nuclear-biological-chemical (NBC) protection will not protect you from carbon monoxide poisoning.**

The Best Defense Against Carbon Monoxide Poisoning Is Good Ventilation!




WARNING

BATTERIES



- **To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. DO NOT smoke, use open flame, make sparks, or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.**
- **Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.**
  - **a. Eyes. Flush with cold water for no less than 15 minutes and seek medical attention immediately.**
  - **b. Skin. Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.**
  - **c. Internal. If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek medical attention immediately.**
  - **d. Clothing/Equipment. Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.**

WARNING

CLEANING AGENTS

Improper cleaning methods and use of unauthorized cleaning agents can injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further instructions.



WARNING

COMPRESSED AIR

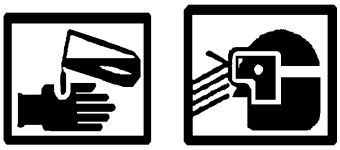
Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.



WARNING

DIESEL FUEL HANDLING

- **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.**
- **Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.**



WARNING



DRY CLEANING SOLVENT

Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.



WARNING

ELECTRICAL SYSTEM MAINTENANCE

Remove all jewelry, watches, rings, etc., prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.



WARNING

ETHER COLD START SYSTEM

- **Ether is extremely flammable and explosive. DO NOT perform ether cold start system checks, inspections or maintenance while smoking or near fire, flames or sparks. Failure to follow this warning may cause a fire and explosion, causing serious injury or death to personnel.**
- **Avoid breathing cold start system fluid vapors. Wear goggles and fuel-resistant gloves when handling fluid. Failure to follow this warning may cause serious injury or death to personnel.**



WARNING

FIRE EXTINGUISHER

Discharging large quantities of dry chemical fire extinguisher in cab may result in temporary breathing difficulty during and immediately after the discharge event. If at all possible, discharge fire extinguisher from outside the cab. Ventilate cab thoroughly prior to reentry.



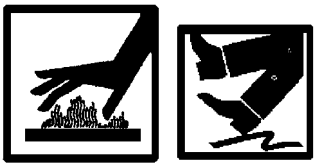
WARNING

HAZARDOUS WASTE DISPOSAL

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, hydraulic fluid, lubricants, battery acids or batteries, and CARC paint, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.



WARNING



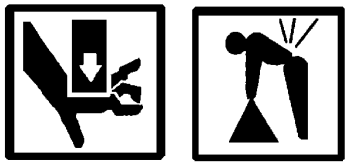
HYDRAULIC SYSTEM

- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

WARNING

IR LIGHTS

DO NOT look directly at IR source without eye protection and maintain a minimum of 12 in. from energized IR lights to prevent possible eye discomfort or damage.



WARNING



LIFTING HEAVY COMPONENTS

- **Hydraulic jacks are intended only for lifting RTCH, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Improper use of lifting equipment and improper attachment of cables to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.**



WARNING



NBC EXPOSURE

If NBC exposure is suspected, all air cleaner media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

WARNING

IF NBC EXPOSURE IS SUSPECTED ALL AIR FILTER MEDIA WILL BE HANDLED BY PERSONNEL WEARING FULL NBC PROTECTIVE EQUIPMENT. SEE OPERATOR/ MAINTENANCE MANUAL.

7690-01-114-3702

To order this NBC decal use:

National Stock Number (NSN) - 7690-01-114-3702
Part Number (PN) - 12296626
Commercial and Government Entity Code (CAGEC) - 19207



WARNING



PRESSURIZED COOLING SYSTEM

- **DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.**
- **DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.**
- **Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.**



WARNING

R-134A REFRIGERANT



- **Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness may result if you come in contact with liquid refrigerant.**
- **Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury.**



WARNING

SLAVE STARTING

- **When slave starting RTCH, use NATO slave cable that DOES NOT have loose or missing insulation.**
- **DO NOT proceed if suitable cable is not available.**
- **DO NOT use civilian-type jumper cables.**

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 10-3930-675-20-1, TM 10-3930-675-20-2, and TM 10-3930-675-34 dated 1 July 2001.

Date of issue for original manual is:

Original . . . . . 1 December 2006

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TECHNICAL MANUAL
TM 10-3930-675-24-2
TM 11078A-IN

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 1December 2006

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE MANUAL (Including Unit, Direct, and General Support)

FOR

ROUGH TERRAIN CONTAINER HANDLER (RTCH):
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SUPERSEDURE NOTICE - This manual supersedes TM 10-3930-675-20-1, TM 10-3930-675-20-2, and TM 10-3930-675-34 dated 1 July 2001.

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HOW TO USE THIS MANUAL

INTRODUCTION

1. This manual is designed to help you perform Organizational Maintenance and Troubleshooting on the RT 240 Rough Terrain Container Handler (RTCH) Army, Army RESET (hereafter "RESET"), and USMC configurations. For model-specific information, the configuration name (Army, RESET, or USMC) is specified in the task title in parentheses (for maintenance tasks) and in the table/errors code title in parentheses (for troubleshooting procedures). If there is no designation, the task/troubleshooting procedure applies to all three models.

2. The *Repair Parts and Special Tools List (RPSTL)*, TM 10-3930-675-24P, is to be used in conjunction with this manual, to locate and obtain the repair parts and special tools needed to maintain this equipment.

3. This manual is written in work package format:

    a. Chapters divide the manual into major categories of information (e.g., *Introductory Information with Theory of Operation, Troubleshooting Procedures, Organizational Maintenance Instructions, Direct Support Maintenance Instructions, General Support Maintenance Instructions*, and *Supporting Information*).

    b. Each chapter is divided into work packages, which are identified by a 6-digit number (e.g., 0001 00, 0002 00) located on the upper right-hand corner of each page. The work package page number (e.g., 0001 00-1, 0001 00-2) is located centered at the bottom of each page.

    c. If a Change Package is issued to this manual, added work packages use the 5^{th} and 6^{th} digits of their number to indicate new material. For instance, work packages inserted between WP 0001 00 and WP 0002 00 are numbered WP 0001 01, WP 0001 02, etc.

4. This manual is published in two volumes: Volume I covers Chapters 1 and 2, WP 0001 00 through WP 0048 00, and includes all troubleshooting. Volume II includes Chapters 3 through 6, WP 0049 00 through WP 0292 00.

5. Scan through this manual to become familiar with its organization and contents before attempting to maintain the equipment.

CONTENTS OF THIS MANUAL

1. A *Warning Summary* is located at the beginning of each volume of the manual. Become familiar with these warnings before operating or performing troubleshooting or maintenance on the vehicle.

2. A *Table of Contents* in Volume I lists the contents of Volumes I and II. The *Table of Contents* in Volume II lists the contents of Volume II only.

    a. The *Table of Contents* also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to the manual.

    b. If you cannot find what you are looking for in the *Table of Contents*, refer to the alphabetical *Index* at the back of the manual. The alphabetical *Index* for each volume lists only those work packages found in that volume.

3. Chapter 1, *Introductory Information with Theory of Operation*, provides general information on the manual and the equipment.

4. Chapter 2, *Troubleshooting Procedures*, contains all applicable troubleshooting and a complete listing of *Error Codes* resident on the RTCH.

    a. Before attempting to perform troubleshooting, carefully read the information in WP 0004 00, *Troubleshooting Introduction*. It explains how to perform both non-error code and error code-driven troubleshooting. Included at the end of WP 0004 00 are locator diagrams of all electrical and hydraulic components that may be hard to locate.

CONTENTS OF THIS MANUAL - CONTINUED

b. The *Troubleshooting Symptom Index* in WP 0006 00 is divided into three sections. The first is an alphabetical listing, by system, of non-error code-driven malfunctions. The second is a "Numerical Error Code Symptom Index". The third is an "Alphabetical Error Code Symptom Index".

c. The corrective action for certain malfunctions is to notify "SRA". Refer to Table 3 in the *Maintenance Allocation Chart (MAC)* (WP 0289 00) for further information about the Specialized Repair Activity for the RTCH.

5. Chapter 3 covers all *Organizational Maintenance Instructions*, Chapter 4 covers all *Direct Support Maintenance Instructions* and Chapter 5 covers all *General Support Maintenance Instructions*. In each chapter, work packages are organized in the same Functional Group Code (FGC) sequence as the MAC found in Chapter 6 of both volumes.
6. Chapter 6 includes *Supporting Information: References, MAC Introduction and MAC, Expendable and Durable Items List, Load Testing Procedure,* and *Foldouts of Hydraulic Systems*.
7. An alphabetical *Index* completes the manual.

FEATURES OF THIS MANUAL

1. WARNINGs, CAUTIONs, NOTEs, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

WARNING

A WARNING indicates a hazard which may result in death or serious injury.

CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may result in damage to equipment.

NOTE

A NOTE is a statement containing information that will make the procedures easier to perform.

2. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
3. In the INITIAL SETUP of a work package, if the number of personnel required to perform the procedure is not specified, only one person is required.
4. Within a procedural step, reference may be made to another work package in this manual or to another manual. These references indicate where you should look for more complete information.
   a. If you are told: "Replace engine ECU (WP 0079 00)", go to the first page of WP 0079 00 in Volume II of this manual for instructions on replacing the engine ECU. Be sure to read the "Initial Setup" on page 1 of the work package, to determine the contents of the work package, as well as information regarding tools and equipment, spare parts, and personnel required.
   b. If you are told: "Check coolant level (TM 10-3930-675-10)", go to TM 10-3930-675-10-1 for the Army vehicle or go to TM 10-3930-675-10-2 for the USMC or RESET vehicles for complete instructions on checking the coolant level. Use the *Table of Contents* or alphabetical *Index* in TM 10-3930-675-10 to find the procedure.
5. Illustrations are placed after, and as close as possible to, the procedural steps to which they apply. Callouts placed on the art may be text or numbers, or both; whichever method is easier for the soldier.
6. Numbers located at the lower right corner of art (e.g., 350-001, 434-0002), are art control numbers and are used for tracking purposes. Disregard these numbers.
7. Dashed leader lines used in illustrations indicate that called out items are not visible in the view depicted (i.e., they are located within or behind the structure).
8. Technical instructions include metric units as well as standard units. For your reference, a *Metric Conversion Chart* is located on the inside back cover of the manual.

NOTE

If at any time you are unsure how to use this manual or you cannot locate the information you need, notify your supervisor.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

SERVICE UPON RECEIPT 0049 00

GENERAL

1. When a new, used, or reconditioned RT 240 RTCH is first received, determine whether it has been properly prepared for service and is in condition to perform its mission.
2. Follow the inspection and servicing instructions below.

INSPECTION INSTRUCTIONS

1. Read and follow all precautions and instructions on DD Form 1397.
2. Remove all packing and shipping material, such as tape, tiedowns, protective covers, and shipping seals.
3. Inspect equipment for any damage incurred during shipment. Check if equipment has been modified.
4. Check equipment against packing slip to ensure shipment is complete. Report any discrepancies on SF Form 364.
5. Remove all Basic Issue Item (BII), Additional Authorization List (AAL), and Components of End Item (COEI) equipment and stow in accordance with TM 10-3930-675-10.

SERVICING INSTRUCTIONS

1. Service the vehicle in accordance with TM 10-3930-675-10 and *Preventive Maintenance Checks and Services (PMCS)* (WP 0051 00). Schedule the next PMCS on DA Form 5986-E.
2. Refer to TM 10-3930-675-10 and perform functional checks of all major vehicle systems.

END OF WORK PACKAGE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION 0050 00

GENERAL PMCS PROCEDURES

1. Always perform PMCS in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry. If any deficiency is discovered, perform the appropriate troubleshooting task in Chapter 2 of this manual. If any component or system is not serviceable, or if the given service does not correct the deficiency, notify your supervisor.

2. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare all tools needed to make all checks. Have several clean Rag, Wiping (Item 30, WP 0290 00) handy. Perform ALL inspections at the applicable interval.

   a. **Keep It Clean.** Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use Detergent (Item 15, WP 0290 00) and water when you clean.

   b. **Rust and Corrosion.** Check metal parts for rust and corrosion. If any bare metal or corrosion exists, clean and apply a light coat of Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00). Report it to your supervisor.

   c. **Bolts, Nuts, and Screws.** Check bolts, nuts, and screws for obvious looseness, and for missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a fastener you think is loose, tighten it.

   d. **Welds.** Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.

   e. **Electric Wires and Connectors.** Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and ensure wires are in good condition.

   f. **Hydraulic Hoses and Lines.** Look for wear, damage, and signs of leaks. Ensure clamps and fittings are tight. Wet spots indicate leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, correct it if authorized by the *Maintenance Allocation Chart* (MAC) (WP 0289 00). If not authorized, notify your supervisor.

   g. **Fluid Leakage.** It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn and be familiar with them, and remember: when in doubt, notify your supervisor.

Leakage Definitions for PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from item being checked/inspected.

CAUTION

Operation is allowable with Class I and Class II leakage. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR. When operating with Class I or Class II leaks, check fluid levels more frequently. Class III leaks must be reported immediately to your supervisor. Failure to do this will result in damage to vehicle and/or components.

PMCS INITIAL SETUP

1. **General.**
   a. This paragraph lists tools, materials, and personnel required for PMCS and lubrication.
   b. Mandatory replacement parts for PMCS and lubrication are listed after PMCS, in Table 2, WP 0051 00.
2. **Tools.**
   a. Tool Kit, General Mechanic's (Item 128, WP 0289 00)
   b. Shop Equipment, Common No. 1 (Item 107, WP 0289 00)
3. **Materials.**
   a. Antifreeze, Permanent (Item 4, WP 0290 00)
   b. Detergent (Item 15, WP 0290 00)
   c. Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)
   d. Oil, Lubricating, GO 80W/90 (Item 24, WP 0290 00)
   e. Oil, Lubricating, GO 85W/140 (Item 25, WP 0290 00)
   f. Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)
   g. Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)
   h. Oil, Lubricating, OEA, Arctic (Item 28, WP 0290 00)
   i. Rag, Wiping (Item 30, WP 0290 00)
4. **Personnel.**
   a. Driver/Operator
   b. Organizational Maintenance Mechanic

GENERAL

1. To ensure the RTCH is ready for operation at all times, it must be lubricated and inspected on a regular basis so defects may be found before they result in serious damage, equipment failure, or injury to personnel.
2. The types, amounts, and temperature ranges of the lubricants required for specified intervals are contained in this work package.
3. Table 1 in WP 0051 00 contains systematic instructions on lubrications, inspections, adjustments, and corrections to be performed by Organizational Maintenance to keep the vehicles in good operating condition and ready for their primary mission.
4. Table 2 in WP 0051 00 lists PMCS mandatory replacement parts, by interval.

EXPLANATION OF TABLE ENTRIES

1. **Item Number (Item No.) Column.** Numbers in this column are for reference. When completing DA Form 5988-E (*Equipment Inspection and Maintenance Worksheet*), include the item number for the check/service indicating a fault. Item numbers also appear in the order you must perform checks and services for the interval listed.
2. **Interval Column.** This column tells you when you must perform the procedure in the Procedure column. Intervals are based on calender dates and hours (in parentheses).
   a. *Quarterly* procedures must be done every three months.
   b. *Semiannual* procedures must be done once every six months.
   c. *Biennial* procedures must be done once every two years.
3. **Man-Hours Column.** This column identifies man-hour time required to complete all lubrication services.
4. **Item to Check/Service Column.** This column identifies the item to be checked or serviced.

EXPLANATION OF TABLE ENTRIES - CONTINUED

NOTE

The WARNINGs and CAUTIONs appearing in your PMCS table should always be observed. WARNINGs and CAUTIONs appear before applicable procedures. These WARNINGs and CAUTIONs must be observed to prevent serious injury to yourself and others or to prevent your equipment from being damaged.

5. **Procedure Column.** This column gives the procedure you must perform to check or service the item listed in the Item to Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must perform the procedure at the time stated in the Interval column.
6. **Equipment Not Ready/Available If: Column.** Information in this column tells you what fault will keep your equipment from being capable of performing its primary mission. If you perform PMCS procedures that show faults listed in this column, the equipment is not mission-capable. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

GENERAL LUBRICATION PROCEDURES



WARNING

Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical help. If solvent contacts eyes, wash your eyes and get medical aid immediately. Failure to comply may cause injury or death to personnel.

1. Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt, or other foreign material to mix with lubricants. Keep lubrication equipment clean and ready for use.
2. Clean area around lubrication points with dry cleaning solvent or equivalent before lubricating equipment. Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess lubricant to prevent accumulation of foreign matter.
3. Maintain record of lubrication performed and report any problems noted during lubrication.
4. Refer to FM 9-207 for lubrication instructions in cold weather.

GENERAL LUBRICATION PROCEDURES - CONTINUED

NOTE

DO NOT lubricate boom and tophandler wear plates.

Initial Break-in. Perform the following after the first 100 to 200 hours of operation:

- Change transmission fluid.
- Change transmission filters.
- Remove, clean, and reinstall transmission internal coarse filter.
- Check oil level in front/rear axle differential housings.
- Check oil level in front/rear axle differential housings.
- Check oil level in front/rear axle hub ends.
- Clean and lubricate boom support locking pins.
- Drain and refill tophandler spreader and slewing motors.

Man-Hour Times. The man-hour time specified is the time needed to perform all services prescribed for a particular interval. The man-hour times for the RTCH are as follows:

Interval	Man-Hour
Daily	0.5
Weekly	0.5
300 Hours	3.0
900 Hours	4.0

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED 0050 00

KEY

LUBRICANT/ COMPONENT	REFILL CAPACITY	EXPECTED TEMPERATURES*			INTERVALS
		+6°F TO +122°F (-14°C TO + 50°C)	-4°F TO +50°F (-20°C TO + 10°C)	+67°F TO +32°F (-55°C TO + 0°C)	
OE/HDO (MIL-PRF-2104) Lubricating Oil, Tactical					D - Daily W - Weekly HR - Hours OC - On Condition
OEA (MIL-L-46167) Lubricating Oil, ICE, Arctic					
Engine Crankcase w/ Filters	38.6 Qt (36.5 L)	See Chart A			
Transmission	36 Qt (34 L)	See Chart B			
Hydraulic System	180 Gal. (680 L)	See Chart C			
GO (MIL-L-2105) Lubricating Oil, Gear, Multipurpose					
Front Axle Differential Housing	15.9 Gal. (60 L)	See Chart D			
Front Axle Hub End	2.64 Gal. (10 L)	See Chart D			
Rear Axle Differential Housing	11.1 Gal. (42 L)	See Chart D			
Rear Axle Hub End	2.77 Gal. (10.5 L)	See Chart D			
GAA (MIL-G-10924) Grease, Automotive and Artillery		All Temperatures			
ANTIFREEZE (MIL-A-46153) Permanent, Ethylene Glycol, Inhibited, Heavy-Duty					
ANTIFREEZE (MIL-A-11755) Permanent, Arctic Grace					
Engine Radiator	23.7 Gal. (90 L)	See Chart E			
*For Arctic Operation, refer to FM 9-207.					

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED 0050 00

GENERAL LUBRICATION PROCEDURES - CONTINUED

CHART A—ENGINE.

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
OE/HDO (MIL-PRF-2104)	Lubricating Oil, Tactical																			
OEA (MIL-L-46167)	Lubricating Oil, ICE, Arctic																			
OE/HDO-15/40									—	—	—	—	—	—	—	—	—	—	—	—
OE/HDO-15/40							—	—	—	—	—	—	—							
OEA *	—	—	—	—	—	—	—	—	—	—	—	—	—							

*If OEA lubricant is required to meet the low expected-temperature range, OEA lubricant is to be used in lieu of OE/HDO-10 lubricant for all expected temperatures where OE/HDO-10 is specified.

CHART B—TRANSMISSION.

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
OE/HDO (MIL-PRF-2104)	Lubricating Oil, Tactical																			
OEA (MIL-L-46167)	Lubricating Oil, ICE, Arctic																			
OE/HDO-15/40									—	—	—	—	—	—	—	—	—	—	—	—
OEA	—	—	—	—	—	—	—	—	—	—	—	—	—							

CHART C—HYDRAULIC, STEERING, AND BRAKE SYSTEM.

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
OE/HDO (MIL-PRF-2104)	Lubricating Oil, Tactical																			
OEA (MIL-L-46167)	Lubricating Oil, ICE, Arctic																			
OE/HDO-10								—	—	—	—	—	—	—	—	—	—	—	—	—
OEA	—	—	—	—	—	—	—	—	—	—	—	—	—							

GENERAL LUBRICATION PROCEDURES - CONTINUED

CHART D—FRONT/REAR AXLE DIFFERENTIALS.

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
GO (MIL-L-2105)	Lubricating Oil, Gear, Tactical																			
GO 85W/140																				

CHART E—ANTIFREEZE.

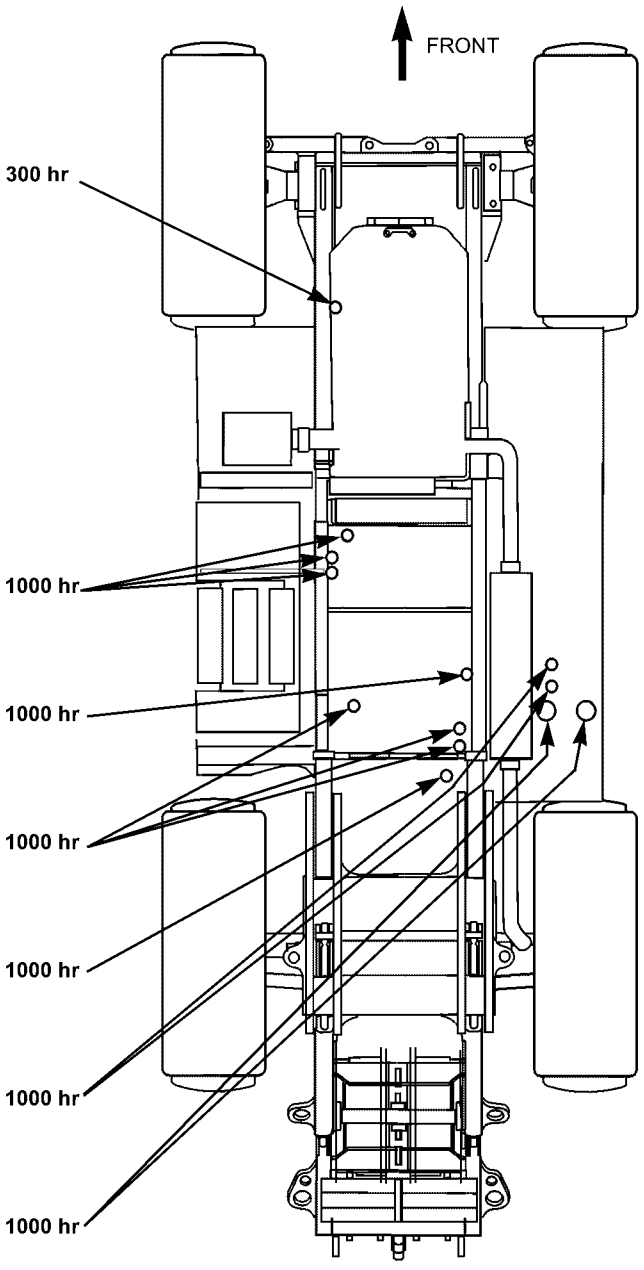
Lubricant	EXPECTED TEMPERATURES																			
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32
MIL-A-46153	Antifreeze, Ethylene Glycol, Inhibited, Heavy-Duty																			
MIL-A-11755	Antifreeze, Arctic Grade																			
MIL-A-46153																				
MIL-A-11755																				

GENERAL LUBRICATION PROCEDURES - CONTINUED

ARMY AND RESET MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

LUBRICANT • INTERVAL



Primary Fuel Filter Change Filter (Note 1 and View A)

Transmission Oil Filters (Note 2)

Pilot Pressure Filter (Note 3)

Hydraulic System Pressure Filters (Note 3)

Rear Brake Cooling Filter (Note 3)

Hydraulic Oil Breather Filters (Note 3)

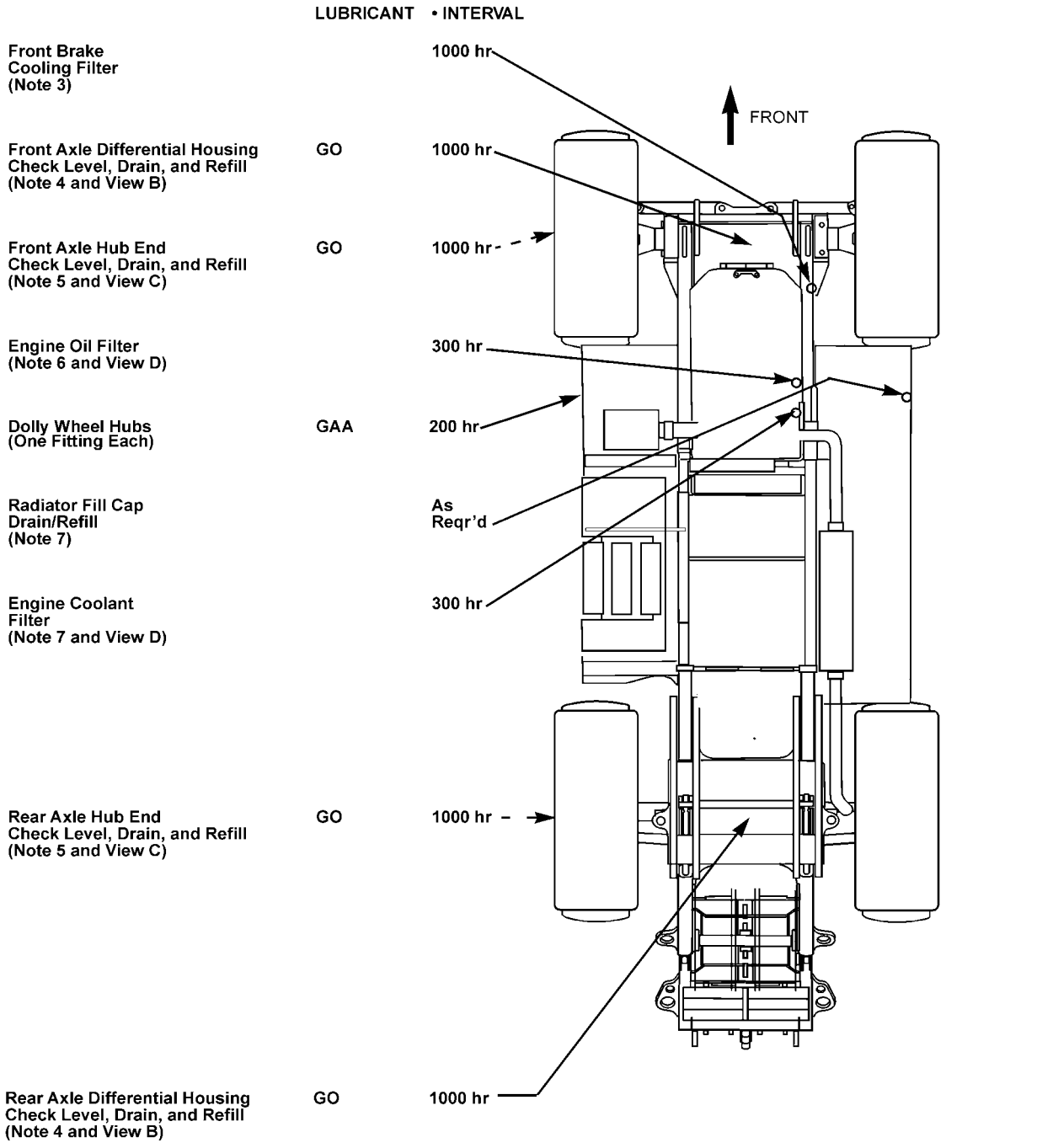
Hydraulic Oil Return Filters (Note 3)

434-40024

GENERAL LUBRICATION PROCEDURES - CONTINUED

ARMY AND RESET MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)



Dashed lines indicate lubrication points on BOTH sides of vehicle.

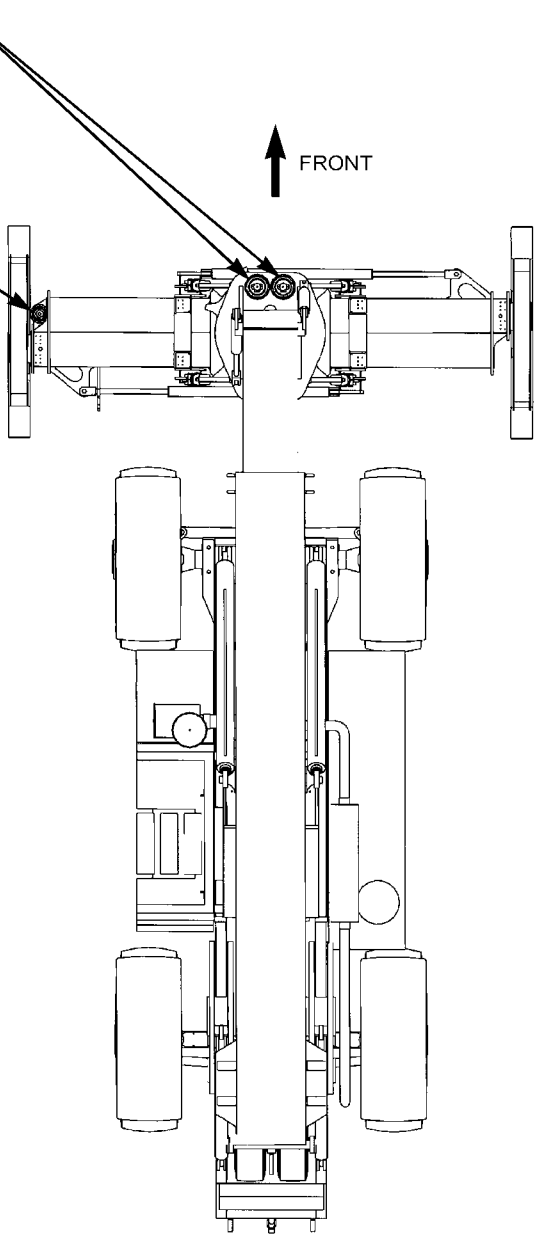
434-40025

GENERAL LUBRICATION PROCEDURES - CONTINUED

ARMY AND RESET MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

	LUBRICANT	• INTERVAL
Tophandler Hydraulic Slewing Motors Fill or Change (Note 6 and View E)	OE/HDO 10/GO	1000 hr
Tophandler Hydraulic Spreader Motor Fill or Change (Note 7 and View F)	OE/HDO 10	1000 hr



NOTE

DO NOT lubricate boom and tophandler wear plates.

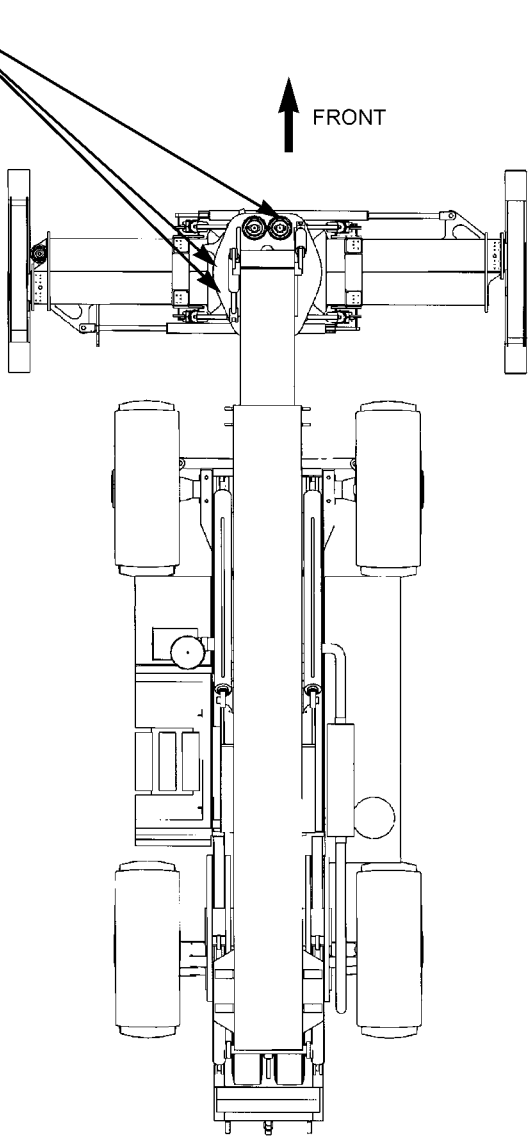
434-40026

GENERAL LUBRICATION PROCEDURES - CONTINUED

ARMY AND RESET MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

	LUBRICANT	• INTERVAL
Tophandler Pinion and Ring Gear Two Fittings Each Side (Note 8)	GAA	200 hr



NOTE

DO NOT lubricate boom and tophandler wear plates.

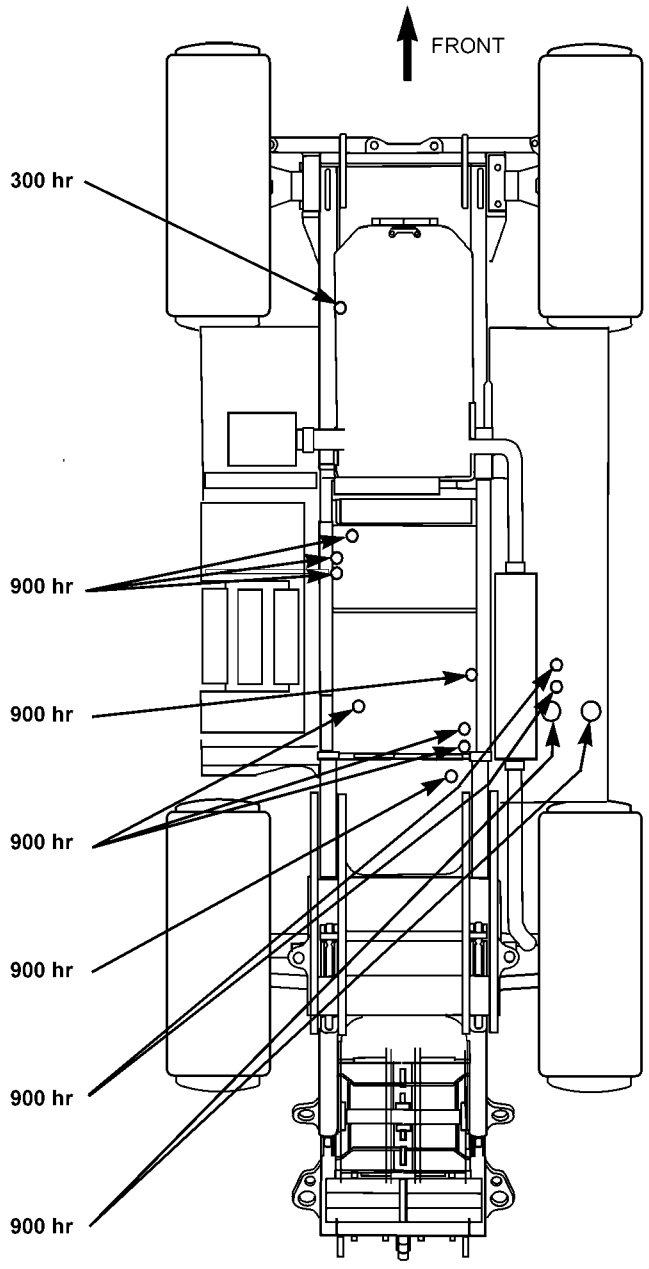
434-40027

GENERAL LUBRICATION PROCEDURES - CONTINUED

USMC MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

LUBRICANT • INTERVAL



Primary Fuel Filter Change Filter (Note 1 and View A)

Transmission Oil Filters (Note 2)

Pilot Pressure Filter (Note 3)

Hydraulic System Pressure Filters (Note 3)

Rear Brake Cooling Filter (Note 3)

Hydraulic Oil Breather Filters (Note 3)

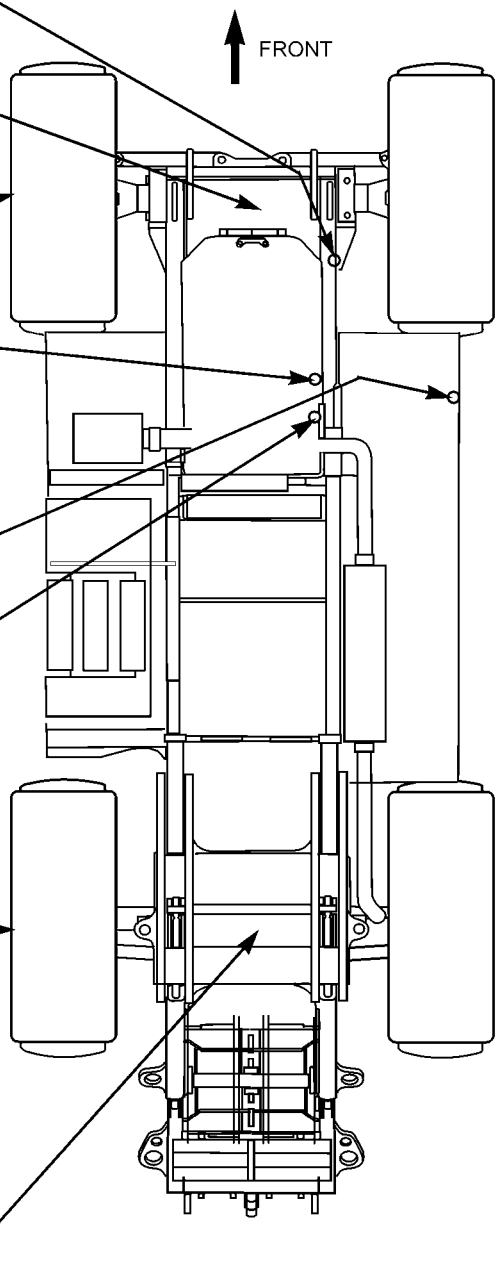
Hydraulic Oil Return Filters (Note 3)

GENERAL LUBRICATION PROCEDURES - CONTINUED

USMC MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

	LUBRICANT	• INTERVAL
Front Brake Cooling Filter (Note 3)		900 hr
Front Axle Differential Housing Check Level, Drain, and Refill (Note 4 and View B)	GO	900 hr
Front Axle Hub End Check Level, Drain, and Refill (Note 5 and View C)	GO	900 hr
Engine Oil Filter (Note 6 and View D)		300 hr
Radiator Fill Cap Drain/Refill (Note 7)		As Reqr'd
Engine Coolant Filter (Note 7 and View D)		300 hr
Rear Axle Hub End Check Level, Drain, and Refill (Note 5 and View C)	GO	900 hr
Rear Axle Differential Housing Check Level, Drain, and Refill (Note 4 and View B)	GO	900 hr



Dashed lines indicate lubrication points on BOTH sides of vehicle.

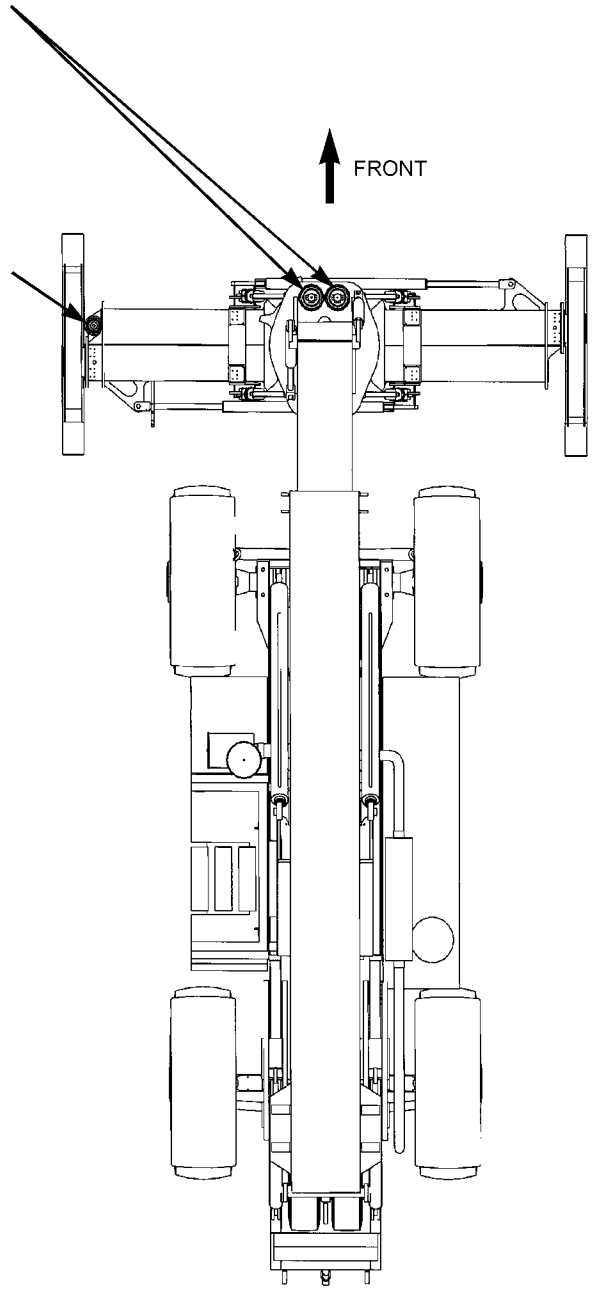
434-40029

GENERAL LUBRICATION PROCEDURES - CONTINUED

USMC MACHINES ONLY

(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

	LUBRICANT	• INTERVAL
Tophandler Hydraulic Slewing Motors Fill or Change (Note 6 and View E)	OE/HDO 10/GO	900 hr
Tophandler Hydraulic Spreader Motor Fill or Change (Note 7 and View G)	OE/HDO 10	900 hr



NOTE

DO NOT lubricate boom and tophandler wear plates.

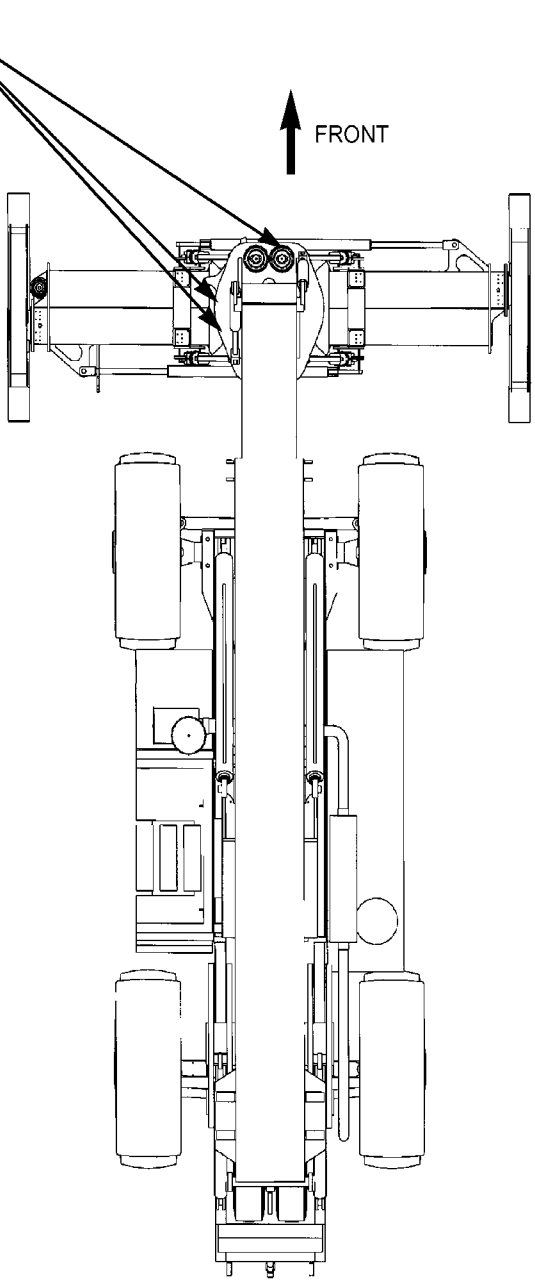
434-40030

GENERAL LUBRICATION PROCEDURES - CONTINUED

USMC MACHINES ONLY

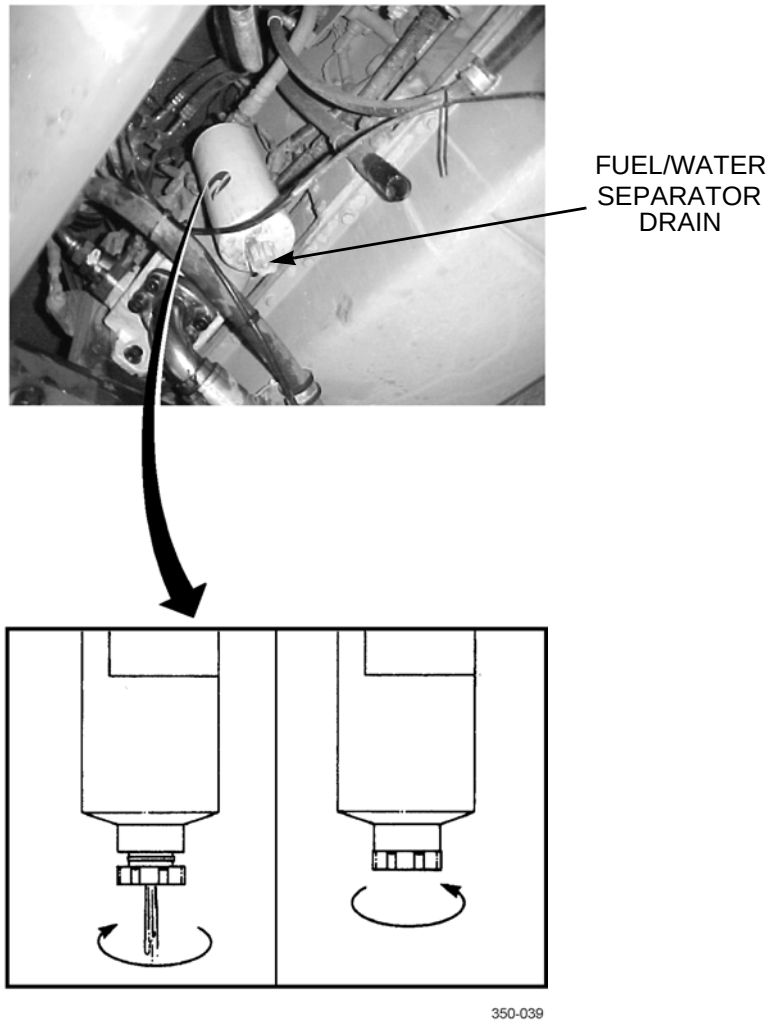
(Views start on WP 0050 00-16 and notes start on WP 0050 00-20.)

	LUBRICANT	• INTERVAL
Tophandler Pinion and Ring Gear Two Fittings Each Side (Note 8)	GAA	300 hr

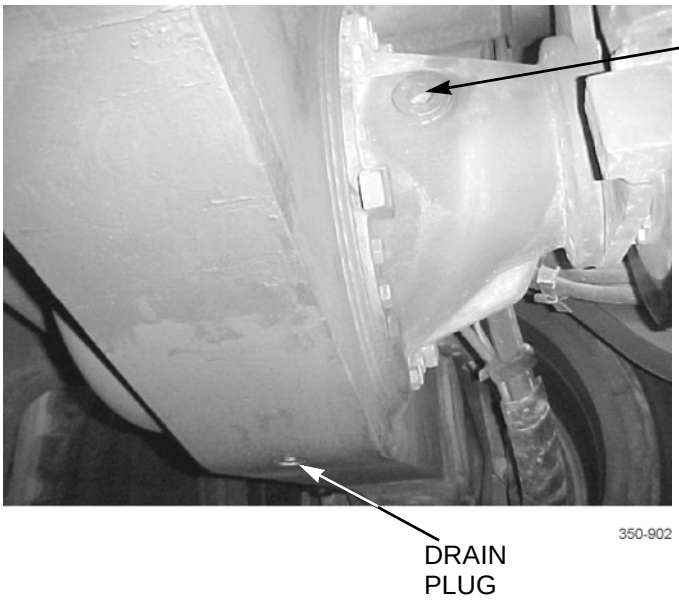


434-40031

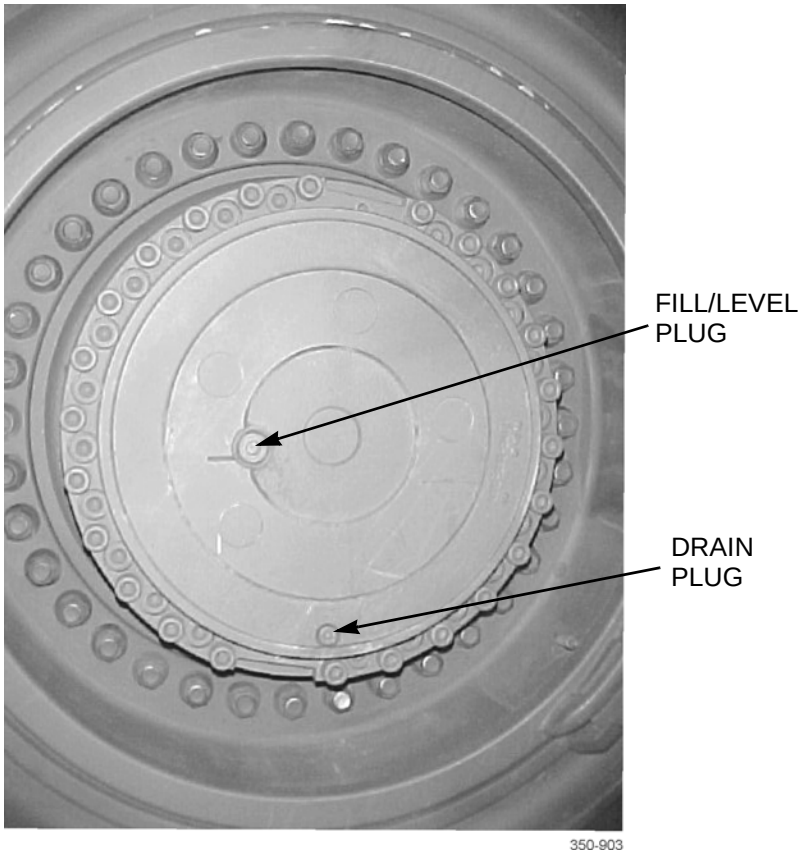
VIEW A — ENGINE (LEFT SIDE)



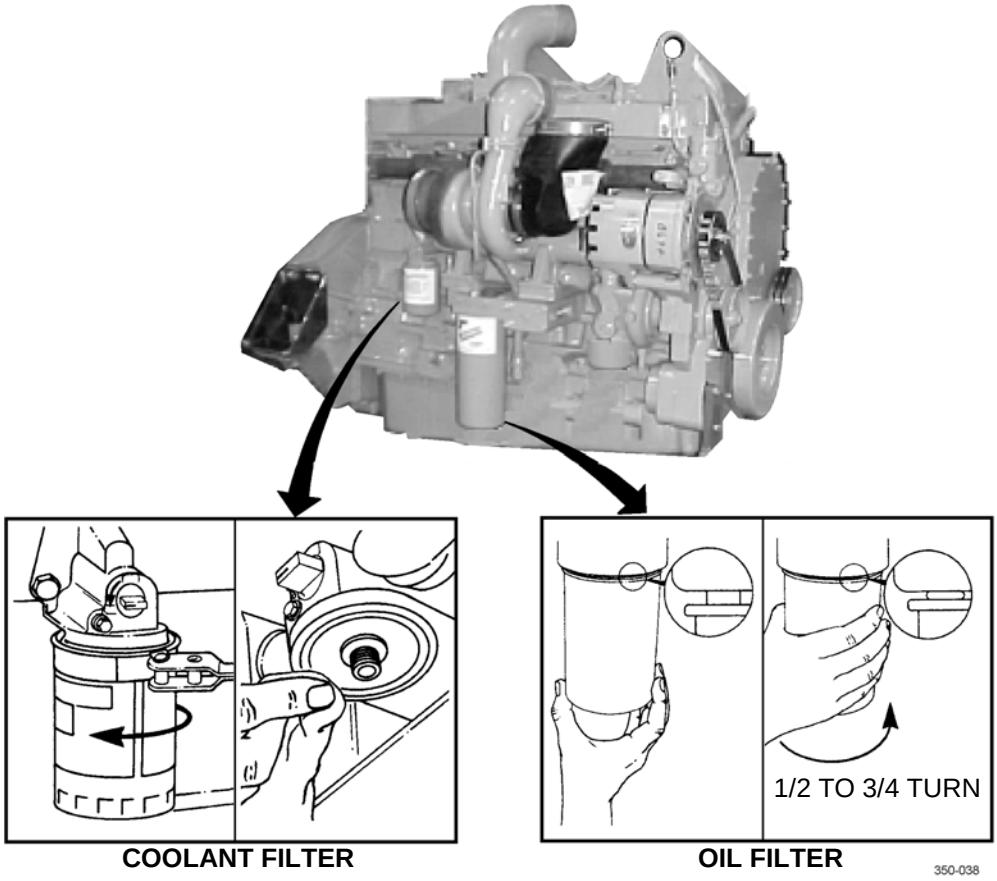
VIEW B — FRONT/REAR AXLE DIFFERENTIAL HOUSING



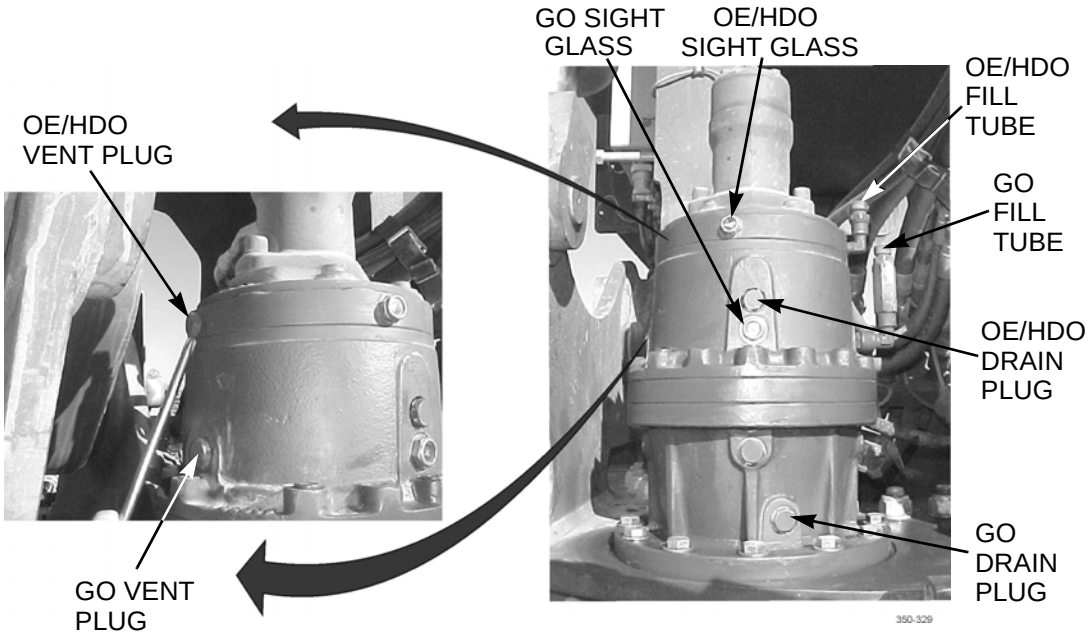
VIEW C — FRONT/REAR AXLE HUB END



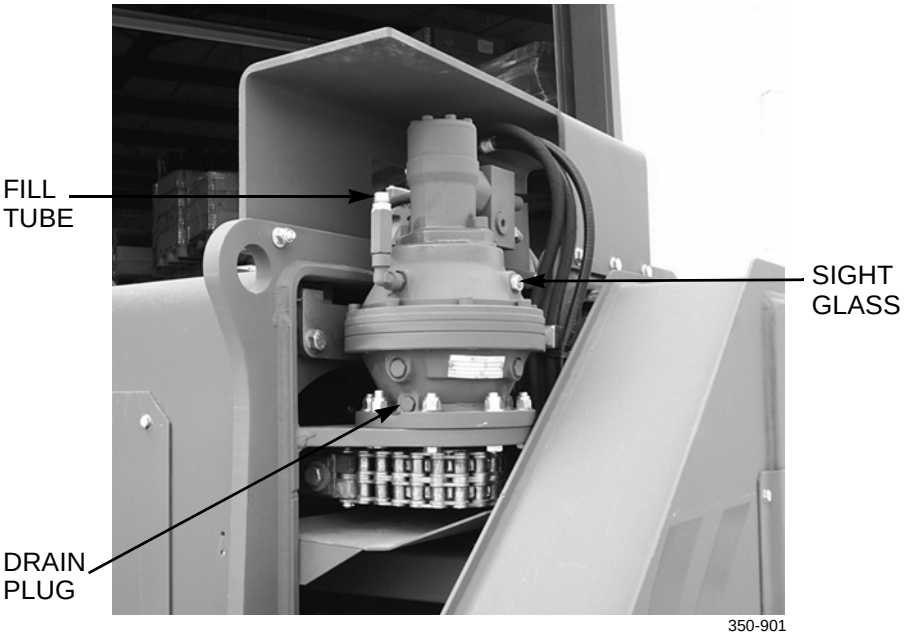
VIEW D — ENGINE (RIGHT SIDE)



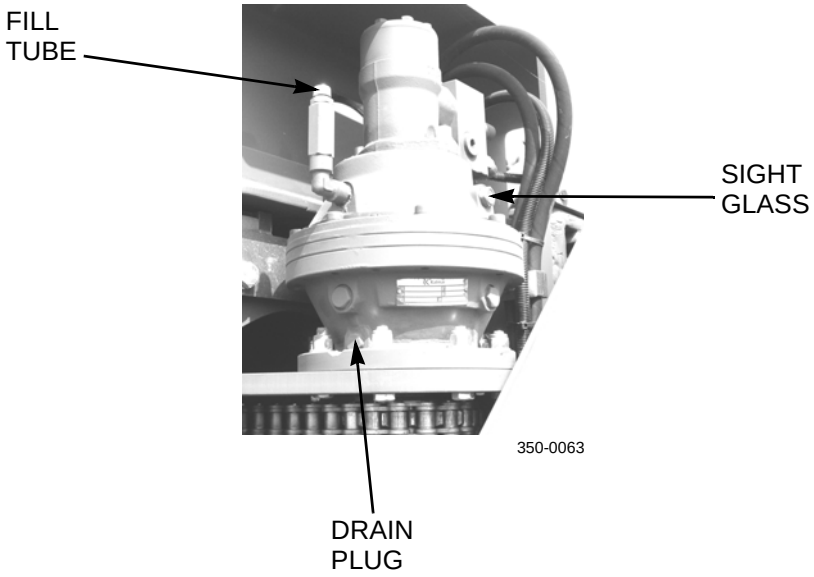
VIEW E — TOPHANDLER HYDRAULIC SLEWING MOTORS



VIEW F — TOPHANDLER HYDRAULIC SPREADER MOTOR (ARMY AND RESET ONLY)



VIEW G — TOPHANDLER HYDRAULIC SPREADER MOTOR (USMC ONLY)



NOTES

1. **Primary Fuel Filter.**
   a. Drain fuel/water separator weekly. Dispose of drained fluid properly.
   b. Replace fuel filter every 300 hours of operation.
2. **Transmission Oil and Filters.**
   a. After the first 100 to 200 hours of operation, replace transmission oil and external oil filters. Remove, clean, and reinstall the transmission internal coarse filter.
   b. At every 900 hours of operation, replace transmission oil and oil filters. Remove, clean, and reinstall the transmission internal coarse filter. Calibrate transmission after oil change.

NOTES - CONTINUED

3. **Hydraulic and Brake System Oil Filters.**



WARNING



- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before servicing hydraulic system. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Following any hydraulic system maintenance action that results in hydraulic system being opened, replacement of hydraulic reservoir return filters is required after 100 hours of operation.

Replace the hydraulic system and brake system filters at 900-hour intervals.

4. **Front/Rear Axle Differential Housing.**

   a. After initial 100 to 200 hours of operation, remove fill/level plug and check level of oil at plug opening. Wait a few minutes. If oil level falls, add oil until level remains constant.

NOTE

The first time engine oil is changed at 300 hours, front/rear axle differential housing oil must also be changed. Thereafter, change every 900 hours.

   b. Every 900 hours, drain oil and refill. Place vehicle on level ground and drain oil while it is still warm from operation. Refill through fill/level plug opening.

5. **Front/Rear Axle Hub End.**

   a. After initial 100 to 200 hours of operation, check level of oil in front/rear axle hub ends. Vehicle should be positioned with drain plug at bottom 6 o'clock position. Oil level should be even with bottom of fill/level plug opening.

NOTE

The first time engine oil is changed at 300 hours, front/rear axle hub end oil must also be changed. Thereafter, change every 900 hours.

   b. Every 900 hours, drain oil and refill. Place vehicle on level ground and drain oil while it is still warm from operation. Vehicle should be positioned with drain plug at bottom 6 o'clock position. Refill through fill/level plug opening until level is even with bottom of fill/level plug opening.

6. **Engine Oil and Filter.** Replace engine oil and oil filter every 300 hours of operation. Drain oil when engine is warm. Dispose of used oil properly.

NOTES - CONTINUED

7. **Engine Coolant and Filter.**



WARNING

DO NOT service cooling system unless engine has been allowed to cool down. DO NOT remove radiator cap. This is a pressurized system and escaping steam or hot coolant may cause serious burns.

NOTE

Always shut down engine before checking, adding, or draining coolant.

a. Drain and refill coolant as required. Dispose of drained engine coolant properly.

b. Replace coolant filter every 300 hours of operation.

8. **Tophandler Rotator.** Every 300 hours, remove ring and pinion gear protective cover and inspect ring and pinion gear lubrication. Clean and apply grease Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00) as required.

9. **Tophandler Hydraulic Slewing Motors.**

NOTE

- **Upper sight glass is for motor brake.**
- **Bottom sight glass is for motor planetary gear.**

a. Weekly, check level at upper and lower sight glasses. Level should be visible in sight glass.

NOTE

- **Procedure to fill either OE/HDO or GO is the same.**
- **Add OE/HDO 10 at upper fill tube.**
- **Add GO at bottom fill tube.**

b. As required, add Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00) or GO as follows:

(1) Remove cover from appropriate fill tube.

(2) Remove appropriate vent plug.

(3) Add oil through fill tube until level is visible in sight glass.

(4) Install vent plug. Install cover on fill tube.

c. Every 900 hours, drain fluid and refill. Replace drain plug copper washers each time drain plug is removed.

10. **Tophandler Hydraulic Spreader Motor.**

a. Weekly, check level of oil at sight glass. Level should be visible in sight glass.

b. As required, add Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00) oil as follows:

(1) Remove cover from fill tube.

(2) Remove vent plug, located on opposite side from fill tube.

(3) Add oil through fill tube until level is visible in sight glass.

(4) Install vent plug. Install cover on fill tube.

c. Every 900 hours, drain fluid and refill. Replace drain plug copper washers each time drain plug is removed.

NOTES - CONTINUED

11. **Autolube System (USMC Only).**
    a. Check the function by entering the diagnostic menu; choose the Diag. Extra Function menu and advance to screen 10 of 13. Press "+" on the keyboard to activate the power for the autolube system. Remove the plug on the autolube pump. Under the plug, two red lights should be on. Press the white button to start the pump. Ensure that the paddle in the clear bowl rotates and the small piston pump on the main distribution valve is pumping.
    b. Inspect the supply lines at: the boom and boom support pivot pins, each end of the boom support folding cylinders, front and rear upper and lower steering knuckle pins, each end of the rear axle pivot pin under the machine, and at each end of the front and rear steering cylinders. Repair any line that is damaged as necessary.

END OF WORK PACKAGE

Table 1. Preventive Maintenance Checks and Services (PMCS) for the RT 240 RTCH.

Item No.	Interval	Man-Hours	Item To Check/ Service	Procedure	Equipment Not Ready/ Available If:
				WARNING **Perform all lubrication and preventive maintenance checks and services with vehicle on level ground, transmission in N (Neutral), parking brake applied, and engine off. Failure to follow this warning may result in personnel injury.** **NOTE** **After initial 100 hours of operation, Organizational Maintenance must perform 100-hour initial break-in services as indicated in *PMCS Introduction* (WP 0050 00). Organizational Maintenance shall also check torque of wheel nuts [497 lb-ft (650 Nm)] and torque of boom wear plate mounting hardware (WP 0146 00).**	
1	**Quarterly (300 Hours)**		**Engine Oil and Filter**	Access engine compartment and change engine oil filter. a. Start engine and bring to operating temperature (TM 10-3930-675-10). b. Shut down engine (TM 10-3930-675-10). Drain engine oil and replace filter (WP 0050 00).  **WARNING** **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flame, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.**	

Table 1. Preventive Maintenance Checks and Services (PMCS) for the RT 240 RTCH - Continued.

Item No.	Interval	Man-Hours	Item To Check/ Service	Procedure	Equipment Not Ready/ Available If:
2	Quarterly (300 Hours)		Engine Fuel Filter/Water Separator	a. Replace fuel filter/water separator (WP 0059 00). b. Inspect fuel lines, fuel tank, and fuel system components for leaks and damage. If authorized, replace damaged components.  WARNING  • **DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.** • **DO NOT remove cooling system radiator cap/surge tank when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.** • **Wear effective eye, hand, and skin protection handling coolants. Failure to do so may cause injury.**	
3	Quarterly (300 Hours)		Engine Coolant Filter	a. Replace coolant filter (WP 0069 00). b. Inspect cooling system for leaks and damage. If authorized, replace damaged components.	
4	Quarterly (200 Hours)		Front and Rear Propeller Shafts	Lubricate front and rear propeller shafts (WP 0050 00).	
5	Quarterly (200 Hours)		Tophandler Pinion and Ring Gear	Lubricate pinion and ring gear (WP 0050 00).	
6	Semi-annual (1,000 Hours)		Transmission Oil Filter	Remove and replace transmission oil filters and oil (WP 0117 00 and WP 0050 00).	

Table 1. Preventive Maintenance Checks and Services (PMCS) for the RT 240 RTCH - Continued.

Item No.	Interval	Man-Hours	Item To Check/ Service	Procedure	Equipment Not Ready/ Available If:
7	Semi-annual		Transmission Vent Hose	Inspect for plugged hose and valve. Clean if necessary.	
8	Semi-annual (1,000 Hours)		Hydraulic System Servo Filter	Replace servo filter and top off hydraulic fluid (WP 0185 00 and WP 0050 00).	
9	Semi-annual (1,000 Hours)		Hydraulic System Pressure Filters	Replace pressure filters and top off hydraulic fluid (WP 0185 00 and WP 0050 00).	
10	Semi-annual (1,000 Hours)		Hydraulic System Breather Filters	Replace breather filters (WP 0185 00 and WP 0050 00).	
11	Semi-annual (1,000 Hours)		Hydraulic Reservoir Return Filters	Replace return filters and top off hydraulic fluid (WP 0185 00).	
12	Semi-annual		Hydraulic System Ball Valves	Open and close to ensure easy operation.	
13	Semi-annual (1,000 Hours)		Front Axle Brake Cooling Filters	Replace front axle brake cooling filters (WP 0128 00 and WP 0050 00).	
14	Semi-annual (1,000 Hours)		Front Axle Differential Housing and Hub End	Drain and refill front axle differential housing and hub end (WP 0050 00).	
15	Semi-annual (1,000 Hours)		Rear Axle Brake Cooling Filters	Replace rear axle brake cooling filters (WP 0128 00 and WP 0050 00).	
16	Semi-annual (1,000 Hours)		Rear Axle Differential Housing and Hub End	Drain and refill rear axle differential housing and hub end (WP 0050 00).	
17	Semi-annual		Front and Rear Axle Vent Hoses	Inspect for plugged hoses and valves. Clean if necessary.	

Table 1. Preventive Maintenance Checks and Services (PMCS) for the RT 240 RTCH - Continued.

Item No.	Interval	Man-Hours	Item To Check/ Service	Procedure	Equipment Not Ready/ Available If:
18	Semi-annual		Brake and Steering Accumulators	Check pre-charging pressure (WP 0188 00).	
19	Semi-annual		Parking Brakes	Perform parking brake checks (WP 0122 00).	
20	Semi-annual (1,000 Hours)		Tophandler Gear Motors	Drain and refill oil (WP 0050 00).	
21	Semi-annual (1,000 Hours)		Engine Bell Housing	Remove drain plug from bell housing and check for signs of oil or water. If water is noted, investigate source and correct. If oil is noted, notify Sustainment Maintenance.	
22	Semi-annual		Bogie Wheel Assembly	Exercise bogie wheel assembly (TM 10-3960-675-10). Inspect and clean as required.	
23	Semi-annual		Cab Tracks and Locking Bars	Place cab and boom in transport mode (TM 10-3930-675-10) and check for free movement of cab rollers in tracks. Clean and inspect for damage. Replace any damaged component (WP 0138 00).	
24	Semi-annual		Cab Drain Valves	Inspect two drain valves under cab. Press valve with two fingers to drain water.	
25	Semi-annual		Front and Rear Propeller Shafts	Inspect mounting studs and locknuts for looseness and damage.	
26	Semi-annual		Cab Air Filters	Service cab air filters (WP 0138 00).	
27	Semi-annual		Cab Air Conditioner	Remove plug from condenser fan box behind cab. With engine and air conditioner running, inspect sight gage on top of receiver-drier for bubbles. If bubbles are present, notify Direct Support Maintenance to charge air conditioning system.	
28	Biennial		Hydraulic System Oil	Drain and refill oil (WP 0050 00).	

Table 2. PMCS Mandatory Replacement Parts List.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
	Quarterly			
1	LF9001		Filter, Engine Oil	1
2	FS1000		Filter, Fuel	1
3	WF2071		Filter, Engine Coolant	1
	Semiannual			
4	923828.0610		Filter, Transmission Oil	2
5	923899.0289		Filter, Transmission Oil, Internal, Coarse	1
6	923071.0001		Filter, Servo, Hydraulic System	1
7	923071.0002		Filter, Pressure, Hydraulic System	2
8	921689.0009		Filter, Pressure, Hydraulic System	1
9	920130.009		Filter, Hydraulic Reservoir, Breather	2
10	923110.0668		Filter, Hydraulic Reservoir, Return	2
11	923110.0669		Filter, Brake Cooling, Front Axle	1
12	923110.0669		Filter, Brake Cooling, Rear Axle	1
13	923899.0684		Washer, Copper, Hydraulic Motor Drain Plug	2
14	923899.0685		Washer, Copper, Hydraulic Motor Drain Plug	3

END OF WORK PACKAGE

ROCKER ARM COVER AND GASKET REPLACEMENT 0052 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Materials/Parts

Gasket (P/N 3883220)

Isolator, Noise (P/N 3883223) (16)

Seal, Grommet (P/N 3042401)

Equipment Condition

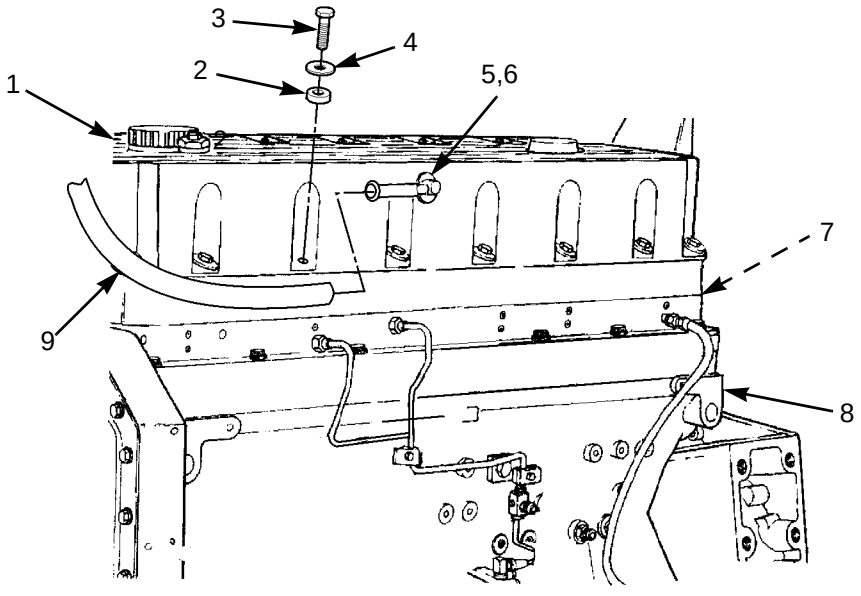
Air intake tubes and hoses removed from intake manifold (WP 0058 00)

REMOVAL

NOTE

For ease in removing rocker arm cover, wiring harness bracket may be removed from left front of engine and set aside.

1. Disconnect crankcase breather tube (9) from breather tube adapter (5).
2. Remove breather tube adapter (5) and grommet seal (6) from rocker arm cover (1). Discard seal.
3. Remove 16 screws (3), noise isolators (2), and spacers (4) from rocker arm cover (1). Discard noise isolators.
4. Remove rocker arm cover (1) and gasket (7) from engine (8). Discard gasket.



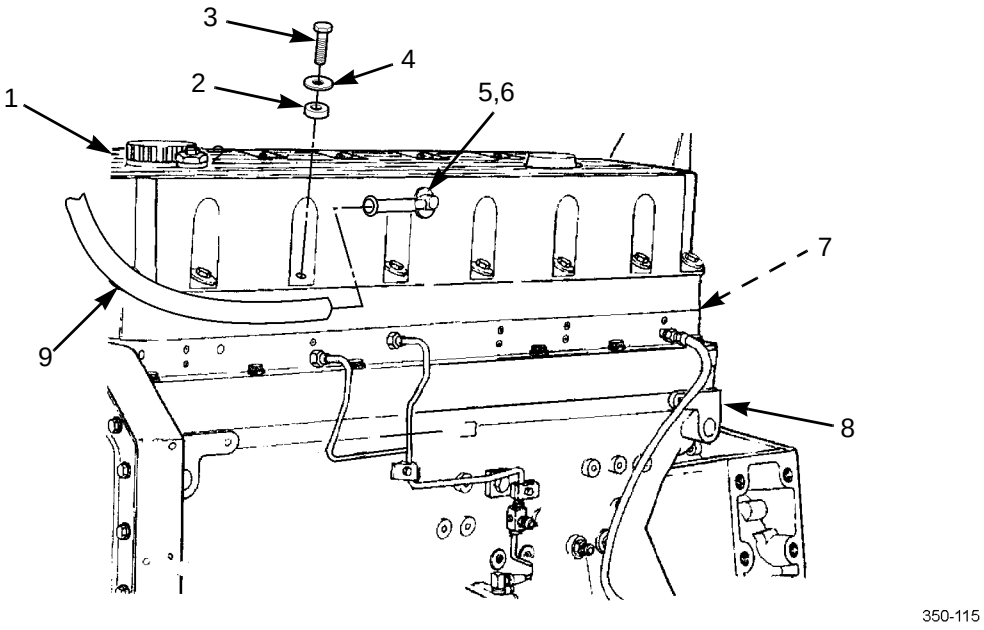
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INSTALLATION

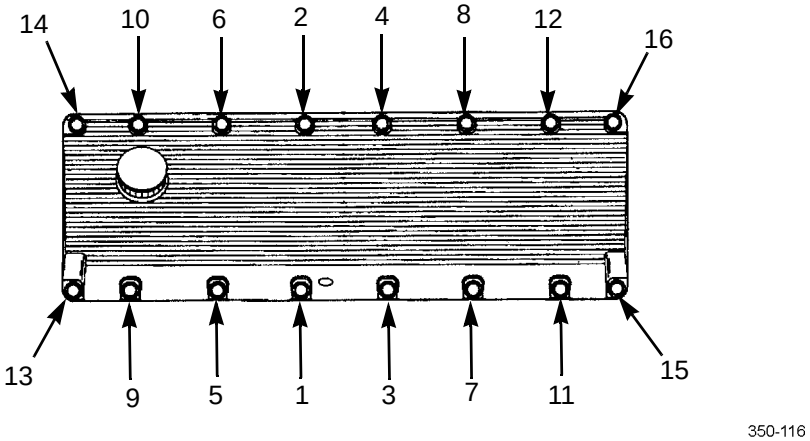
NOTE

Ensure all gasket material has been removed from rocker arm cover surface and rocker housing.

1. Install rocker arm cover (1) and new gasket (7) on engine (8).



2. Install 16 screws (3), new noise isolators (2), and spacers (4) on rocker arm cover (1). Tighten screws to 130 lb-in. (15 Nm) in sequence shown.



TIGHTENING SEQUENCE

INSTALLATION - CONTINUED

3. Install new grommet seal (6) and breather tube adapter (5) on rocker arm cover (1).
4. Connect crankcase breather hose (9) to breather tube adapter (5).
5. Install air intake tubes and hoses on intake manifold (WP 0058 00).

END OF WORK PACKAGE

ENGINE OIL AND OIL FILTER REPLACEMENT 0053 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Oil Filter (Item 138, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Filter, Lubricating, oil (P/N LF9001)

References

WP 0050 00

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

REMOVAL



WARNING

- **Hot oil can cause serious burns. Allow engine to cool before draining oil or changing oil filter element.**
- **Engine oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

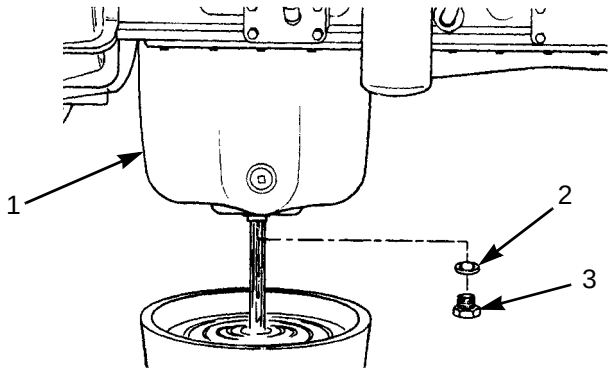
NOTE

Engine oil change and filter replacement should be performed on a warm engine.

ENGINE OIL AND OIL FILTER REPLACEMENT - CONTINUED 0053 00

REMOVAL - CONTINUED

1. Place suitable container under engine oil pan (1) to catch draining oil.
2. Remove plug (3) and washer (2) from bottom of engine oil pan (1) and allow oil to drain. Dispose of oil in accordance with standard operating procedures (SOP). Check condition of washer and plug.



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NOTE

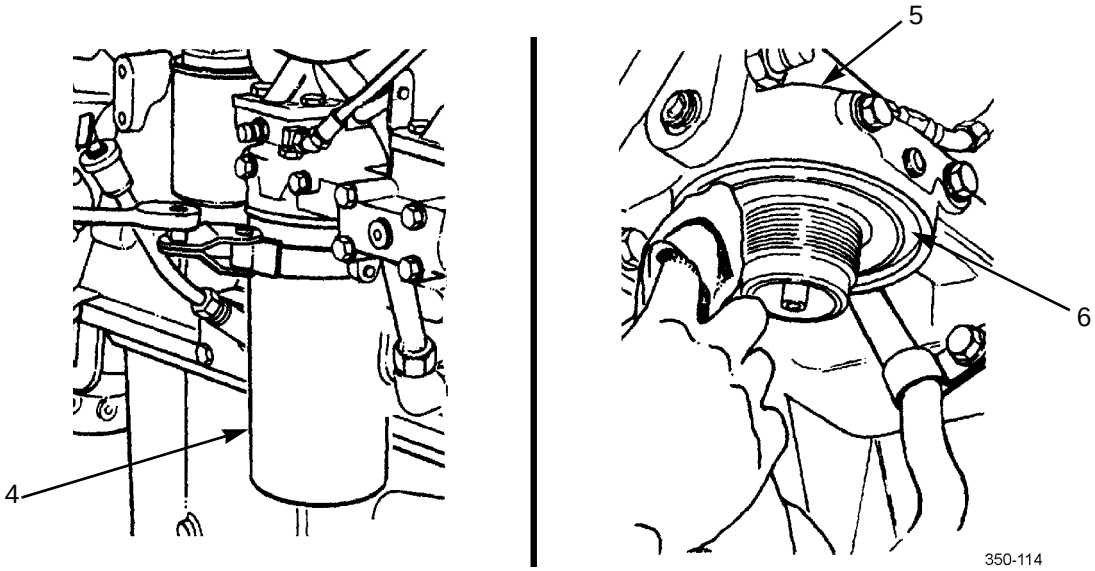
Ensure oil pan plug and oil pan threads are clean and free of deposits.

3. Install washer (2) and plug (3) in oil pan (1). Tighten plug to 65 lb-ft (88 Nm).

NOTE

Position drain pan to catch oil from oil filter head as needed.

4. Remove oil filter (4) and gasket from filter head (5) with strap wrench. Discard filter with gasket.
5. Clean filter head (5) with a rag.



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INSTALLATION

CAUTION

Ensure new oil filter is filled with clean engine oil prior to installation. Lack of lubrication to engine during delay to fill filter when starting engine may cause damage to engine.

1. Apply a light coat of clean engine oil to filter gasket and fill new oil filter (4) with clean engine oil.

NOTE

Ensure old gasket material has been removed from sealing surface on filter head.

2. Install oil filter (4) on filter head (5) and hand tighten until gasket contacts sealing surface (6).

CAUTION

Overtightening of filter can distort threads or damage filter element seal.

3. Tighten oil filter (4) ¼ turn with strap wrench.
4. Add engine oil to required level (WP 0050 00).
5. Start vehicle (TM 10-3930-675-10) and check for oil leaks.
6. Recheck oil level (WP 0050 00).
7. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ENGINE OIL DIPSTICK HOSE AND OIL FILL HOSE REPLACEMENT 0054 00

THIS WORK PACKAGE COVERS

Engine Oil Dipstick Hose: Removal, Installation

Oil Fill Hose: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Nut, lock (P/N 920076.003)

O-ring (P/N 920002.011)

Equipment Condition

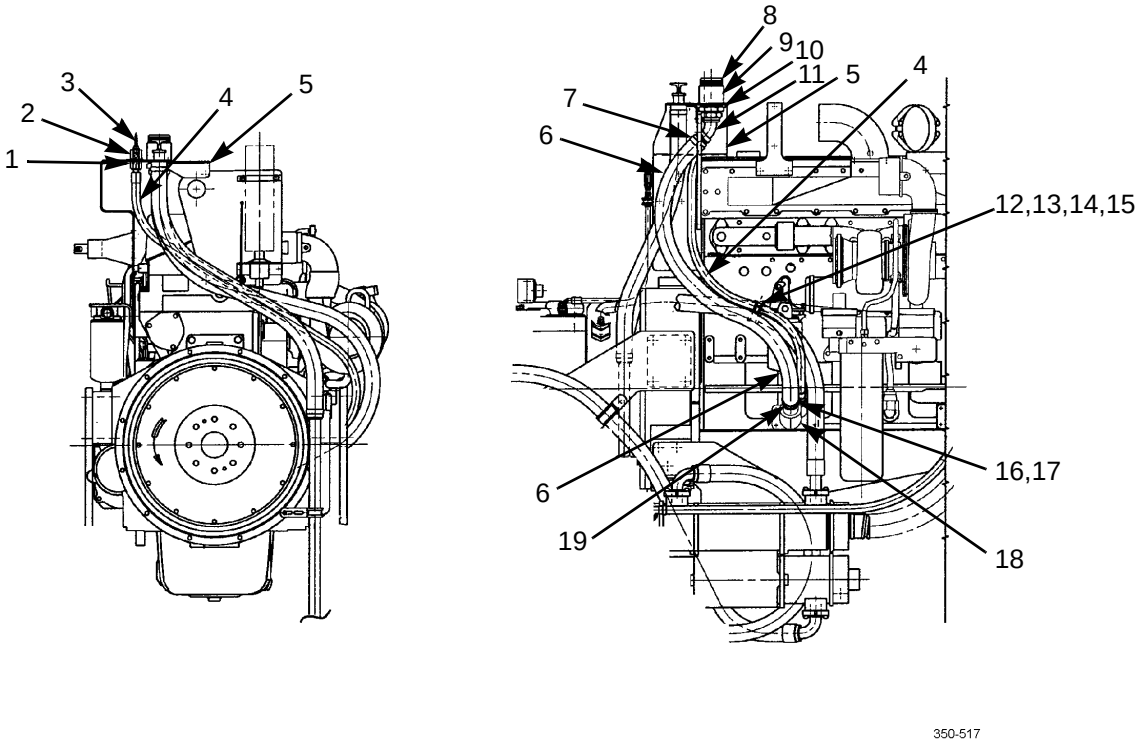
Engine cover removed (WP 0148 00)

NOTE

Engine oil dipstick hose and transmission oil dipstick hose are at same location. Engine oil dipstick is indicated by a data plate with an engine symbol.

ENGINE OIL DIPSTICK HOSE REMOVAL

1. Remove dipstick (3) from engine oil dipstick hose (4).
2. Remove upper end of dipstick hose (4), nipple (2), and washer (1) from bracket (5).
3. Remove lower end of dipstick hose (4) from adapter (16).
4. Remove locknut (12), screw (13), two washers (14), and release dipstick hose (4) from clamp (15). Discard locknut.
5. Remove dipstick hose (4) from vehicle.
6. Remove adapter (16) and O-ring (17) from cover (18). Discard O-ring.



ENGINE OIL DIPSTICK HOSE INSTALLATION

1. Install new O-ring (17) and adapter (16) on cover (18).
2. Position dipstick hose (4) on vehicle.
3. Connect lower end of dipstick hose (4) to adapter (16).
4. Connect upper end of dipstick hose (4) to bracket (5) with washer (1) and nipple (2).
5. Secure dipstick hose (4) with clamp (15), screw (13), two washers (14), and new locknut (12). Ensure clamp is positioned on hose so dipstick (3) can be installed into hose.
6. Install dipstick (3) into dipstick hose (4).
7. Install engine cover (WP 0148 00).

OIL FILL HOSE REMOVAL

1. Remove cap (8) from socket (9).
2. Loosen hose clamp (7) and disconnect upper end of oil fill hose (6) from fitting (11).
3. Remove fitting (11), fitting (10), and socket (9) from bracket (5).
4. Loosen hose clamp (19) and disconnect lower end of oil fill hose (6) from cover (18).
5. Remove remaining clamps and remove oil fill hose (6) from vehicle.

OIL FILL HOSE INSTALLATION

1. Position oil fill hose (6) on vehicle.
2. Connect lower end of oil fill hose (6) to cover (18) and tighten hose clamp (19).
3. Install socket (9), fitting (10), and fitting (11) on bracket (5).
4. Connect upper end of oil fill hose (6) to fitting (11) and tighten hose clamp (7).
5. Install cap (8) on socket (9).
6. Install remaining clamps to secure oil fill hose (6) to vehicle.
7. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

OIL SAMPLING VALVES AND HOSES REPLACEMENT 0055 00

THIS WORK PACKAGE COVERS

Oil Sampling Valve: Removal, Installation

Engine Oil Sampling Valve Hose: Removal, Installation

Transmission Oil Sampling Valve Hose: Removal, Installation

Hydraulic System Oil Sampling Valve Hose: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0284 00

Equipment Condition

Engine off (TM 10-3930-675-10)

Engine cover removed (WP 0148 00)

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Ensure controls are in neutral and vehicle engine is off prior to removal of oil sampling valves or hoses.**

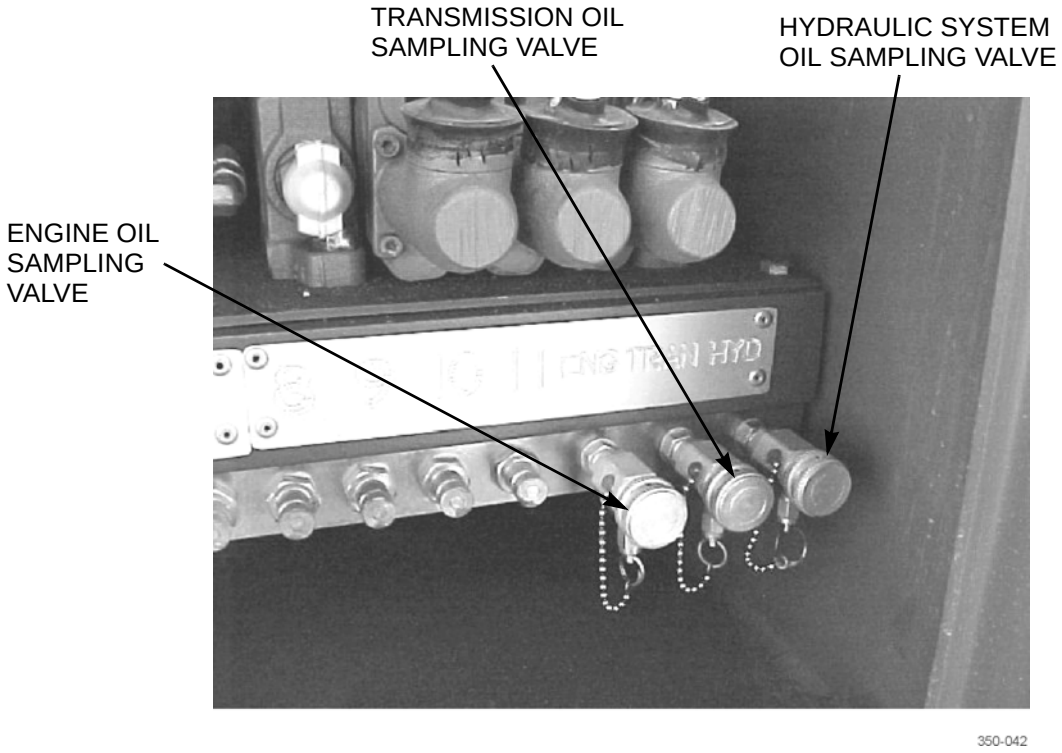
OIL SAMPLING VALVE REMOVAL

NOTE

Oil sampling valves for engine, transmission, and hydraulic system are located in remote hydraulic control compartment. Removal is the same for all three oil sampling valves. Engine oil sampling valve is detailed.

OIL SAMPLING VALVE REMOVAL - CONTINUED

1. Hold fitting jamnut in place and disconnect engine oil sampling valve from fitting.
2. Cap fitting with protective cap.



OIL SAMPLING VALVE INSTALLATION

1. Remove protective cap and install oil sampling valve.
2. Start engine (TM 10-3930-675-10) and check for oil leaks.

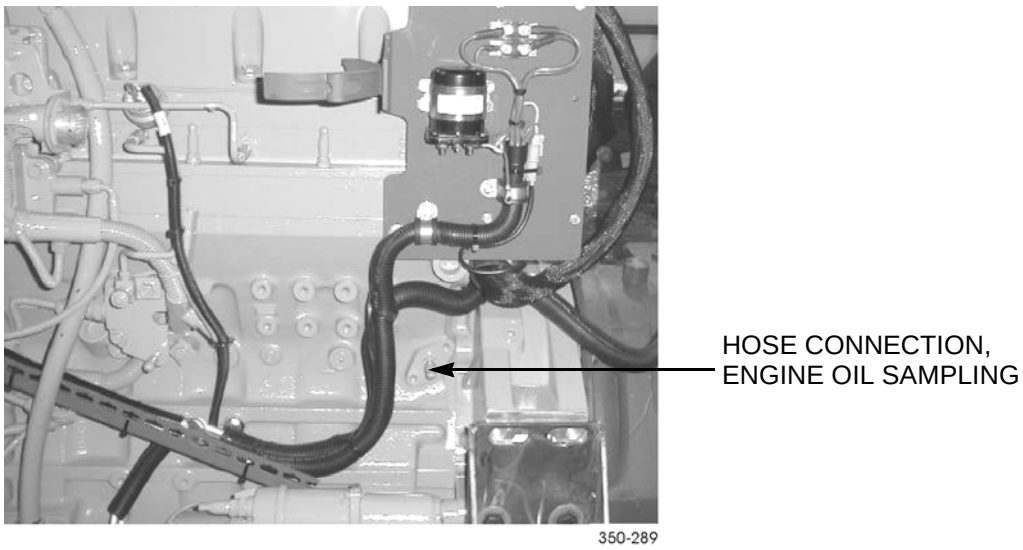
ENGINE OIL SAMPLING VALVE HOSE REMOVAL

NOTE

Tag and trace routing of oil sampling valve hose prior to disconnecting.

1. Remove tiedown straps and clamps as necessary. Discard tiedown straps.
2. Disconnect hose from oil sampling valve fitting and engine fitting. Remove hose.
3. Remove engine fitting.

ENGINE OIL SAMPLING VALVE HOSE REMOVAL - CONTINUED



ENGINE OIL SAMPLING VALVE HOSE INSTALLATION

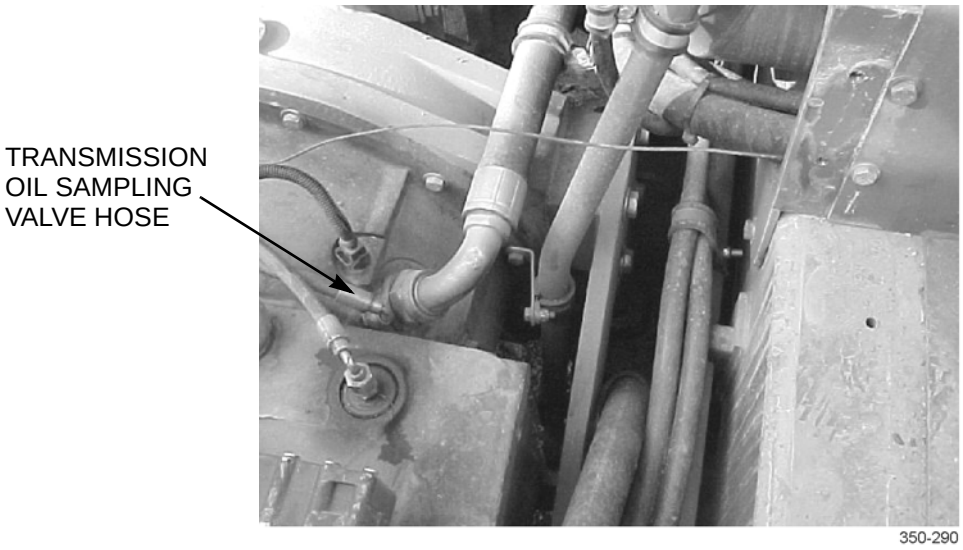
1. Install engine fitting.
2. Connect hose to engine fitting and route to oil sampling valve.
3. Connect hose to oil sampling valve fitting and secure hose with new tiedown straps and clamps as necessary.
4. Start engine (TM 10-3930-675-10) and check hose for oil leaks.
5. Install engine cover (WP 0148 00).

TRANSMISSION OIL SAMPLING VALVE HOSE REMOVAL

NOTE

Tag and trace routing of oil sampling valve hose prior to disconnecting.

1. Move cab to transport position (TM 10-3930-675-10).
2. Remove tiedown straps and clamps as necessary. Discard tiedown straps.
3. Disconnect hose from oil sampling valve fitting and transmission fitting. Remove hose.
4. Remove transmission fitting.



TRANSMISSION OIL SAMPLING VALVE HOSE INSTALLATION

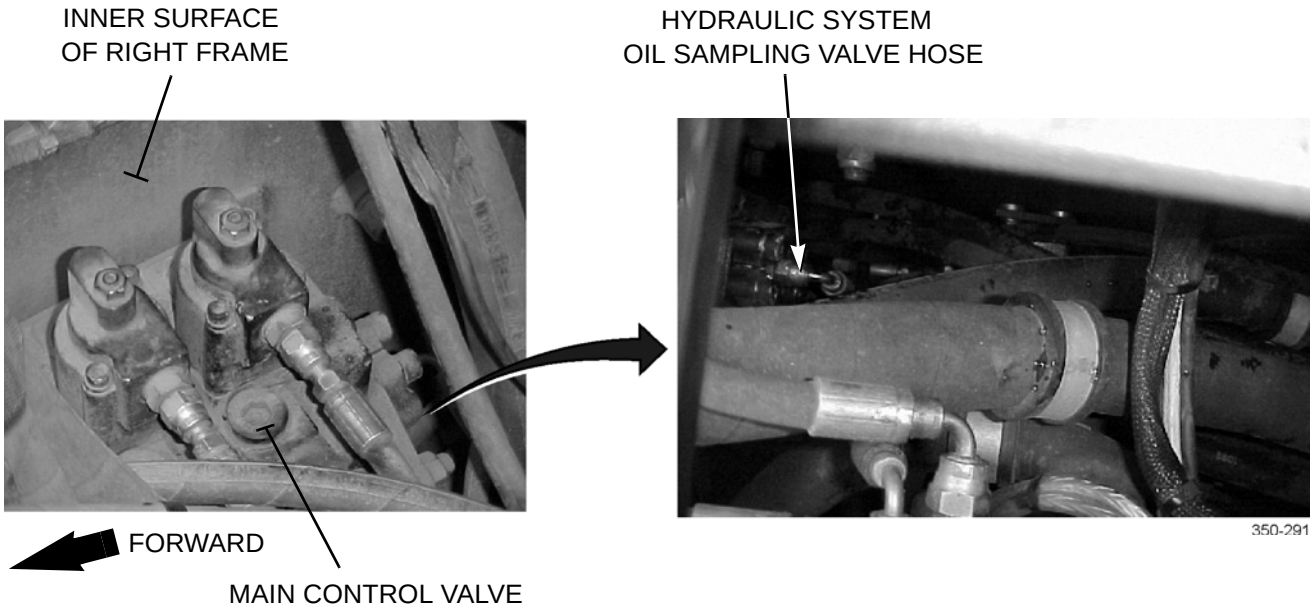
1. Install transmission fitting.
2. Connect hose to transmission fitting and route to oil sampling valve.
3. Connect hose to oil sampling valve fitting and secure hose with new tiedown straps and clamps as necessary.
4. Start engine (TM 10-3930-675-10) and check hose for oil leaks.
5. Return cab to operational position (TM 10-6930-675-10).
6. Install engine cover (WP 0148 00).

HYDRAULIC SYSTEM OIL SAMPLING VALVE HOSE REMOVAL

NOTE

Tag and trace routing of oil sampling valve hose prior to disconnecting.

1. Move cab to transport position (TM 10-3930-675-10).
2. Remove tiedown straps and clamps as necessary. Discard tiedown straps.
3. Disconnect hose from oil sampling valve fitting and hydraulic control valve fitting. Remove hose.
4. Remove hydraulic control valve fitting.



HYDRAULIC SYSTEM OIL SAMPLING VALVE HOSE INSTALLATION

1. Install hydraulic control valve fitting.
2. Connect hose to hydraulic control valve fitting and route to oil sampling valve.
3. Connect hose to oil sampling valve fitting and secure hose with new tiedown straps and clamps as necessary.
4. Start engine (TM 10-3930-675-10) and check hose for oil leaks.
5. Return cab to operation position (TM 10-3930-675-10).
6. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL SOLENOID SHUTOFF VALVE REPLACEMENT 0056 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Seal, O-ring (P/N 129888) (2)

References

TM 10-3930-675-10

Equipment Condition

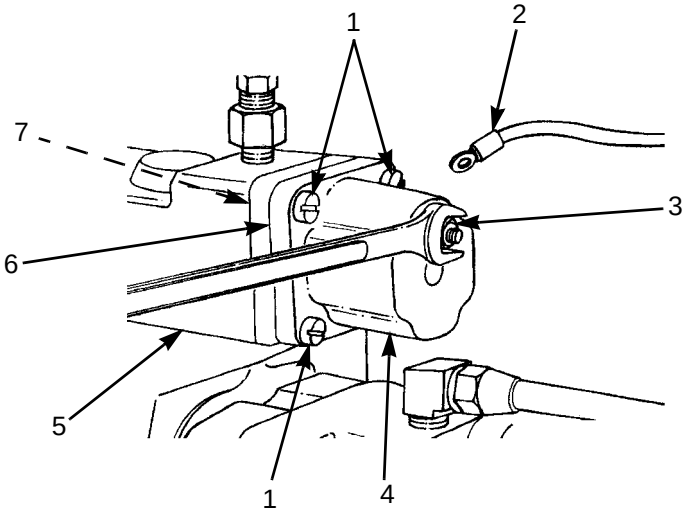
Engine cover removed (WP 0148 00)

WARNING

DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.

REMOVAL

1. Remove nut (3) and disconnect wire lead (2) from fuel shutoff valve (4). Replace nut hand-tight on terminal.
2. Remove four screws (1) securing coil and fuel shutoff valve (4) to fuel pump (5).
3. Remove coil and fuel shutoff valve (4), spacer (6), and O-ring seal (7) from fuel pump (5). Discard O-ring seal.

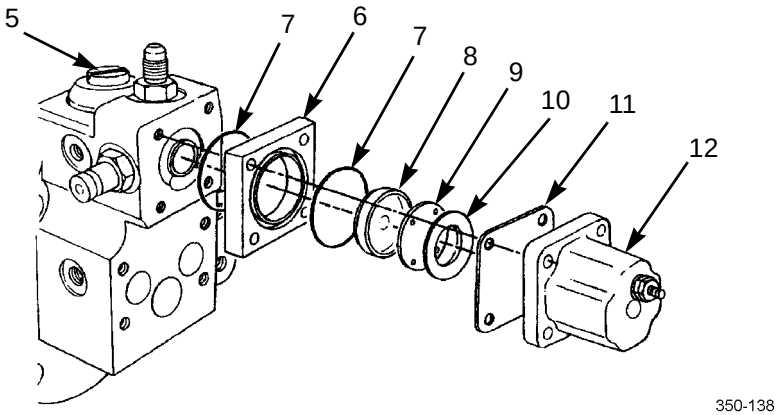


INSTALLATION

NOTE

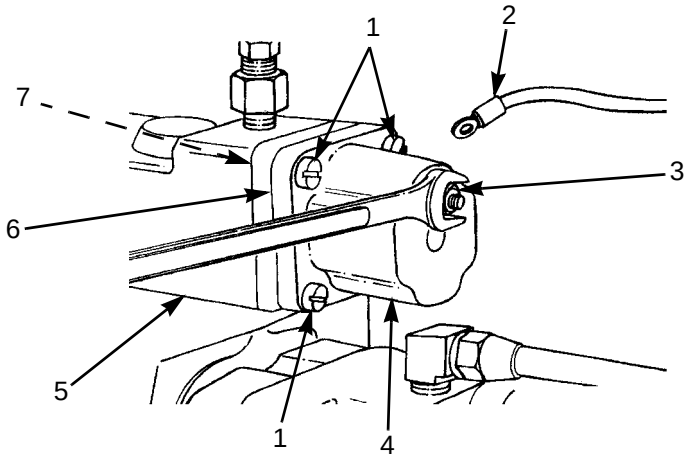
- **Assemble components of new fuel shutoff valve in the following order.**
- **Ensure coil is a single-terminal coil.**

1. Place spacer (6) with O-ring groove, coil side up, on clean surface and install new O-ring seal (7).
2. Install actuator disc (8) with cup side toward coil (12).
3. Install valve disc (9) with raised area up.
4. Install spring washer (10) with cup side toward coil (12).
5. Install fuel shield (11) and coil (12).
6. Hold assembly together and install with new O-ring seal (7) on fuel pump (5).



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7. Secure coil (12) and fuel shutoff valve (4) to fuel pump (5) with four screws (1). Tighten screws to 30 lb-in. (3.4 Nm).
8. Connect wire lead (2) to fuel shutoff valve (4) with nut (3). Tighten nut to 25 lb-in. (2.8 Nm).



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9. Start engine, run, and check for leaks (TM 10-3930-675-10).
10. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ENGINE AIR CLEANER MAINTENANCE 0057 00

THIS WORK PACKAGE COVERS

Filter Elements Replacement
Removal
Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Filter Element, Primary (P/N 923110.0588)

Filter Element, Secondary (P/N 923110.0589)

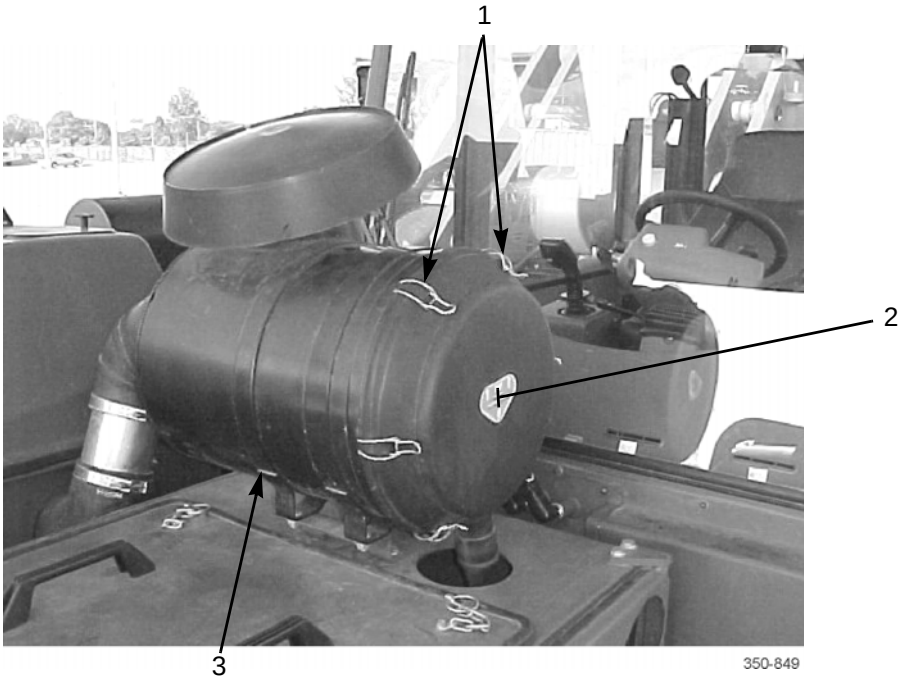
WARNING

NBC EXPOSURE

If NBC exposure is suspected, all air cleaner media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures. Failure to comply may cause injury or death to personnel.

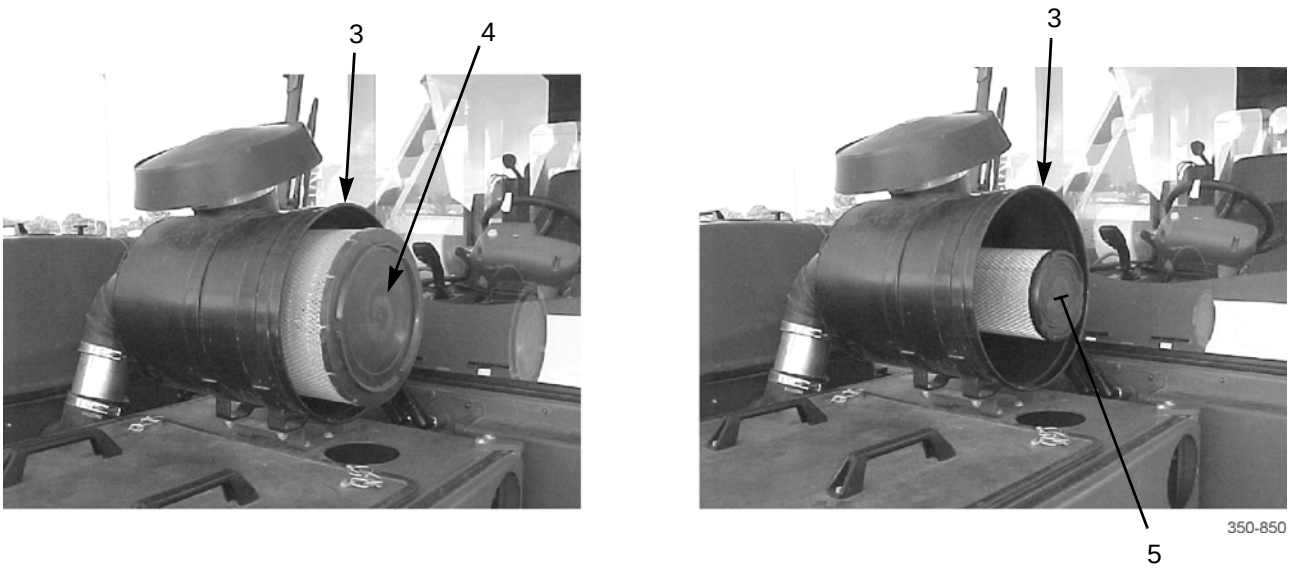
FILTER ELEMENTS REPLACEMENT

1. Open six spring clips (1) and remove cover (2) from end of engine air cleaner (3).



FILTER ELEMENTS REPLACEMENT - CONTINUED

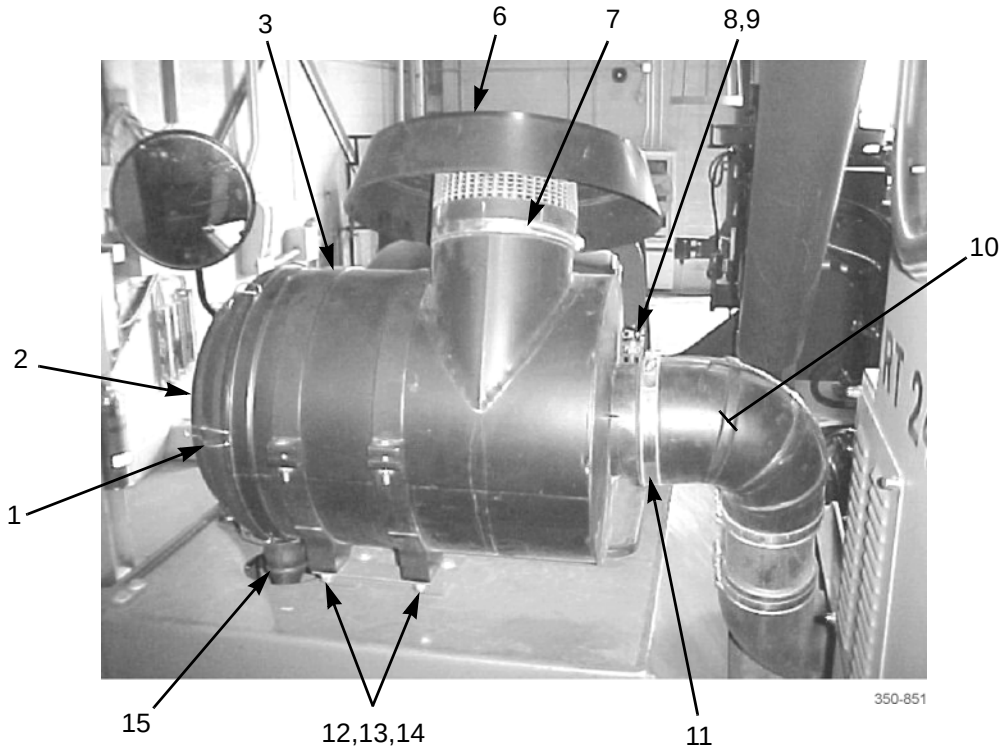
2. Remove primary filter element (4) and secondary filter element (5) from air cleaner (3). Discard filter elements.
3. Using rags, wipe interior of air cleaner (3) free of dust and dirt.
4. Install new secondary filter element (5) and new primary filter element (4) in air cleaner (3).
5. Install cover (2) on air cleaner (3) and close six spring clips (1).



REMOVAL

1. Loosen clamp (7) and remove cap (6) from air cleaner (3).
2. Remove vacuum indicator (8) and nipple (9) from air cleaner (3).
3. Loosen clamp (11) holding elbow (10) to air cleaner (3).
4. Remove four nuts (12), washers (13), screws (14), and air cleaner (3) from elbow (10) and top of vehicle.
5. Remove rubber dust vent (15) from cover (2).

REMOVAL - CONTINUED



INSTALLATION

1. Install rubber dust vent (15) on cover (2) of air cleaner (3).
2. Position air cleaner (3) on top of vehicle and elbow (10) and install four screws (14), washers (13), and nuts (12).
3. Tighten clamp (11) holding elbow (10) to air cleaner (3).
4. Install nipple (9) and vacuum indicator (8) in air cleaner (3).
5. Install cap (6) on air cleaner (3) and tighten clamp (7).

END OF WORK PACKAGE

ENGINE AIR INTAKE HOSES AND TUBES REPLACEMENT 0058 00

THIS WORK PACKAGE COVERS

Air Cleaner-to-Turbocharger Hoses and Tubes: Removal, Installation

Turbocharger-to-Charge Air Cooler Hoses and Tubes: Removal, Installation

Charge Air Cooler-to-Engine Air Intake Manifold Hoses and Tubes: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Clamp, Hose (P/N 920952.0030) (16)

References

WP 0143 00

WP 0144 00

Equipment Condition

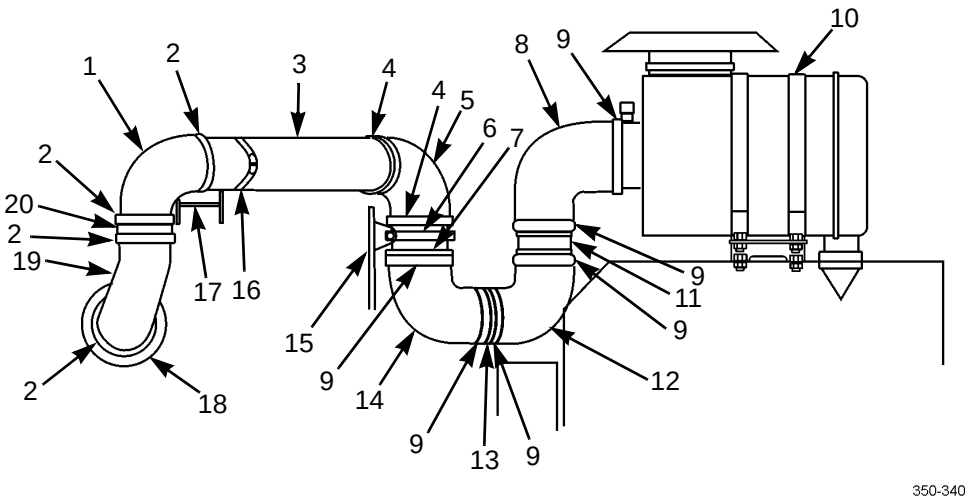
Engine cover removed (WP 0148 00)

NOTE

- **Note position of elbows and tubes to aid in installation.**
- **Remove and discard all hose clamps. Ensure new hose clamps are used on installation.**
- **Metal rings installed over hoses may be replaced as necessary.**

AIR CLEANER-TO-TURBOCHARGER HOSES AND TUBES REMOVAL

1. Loosen six hose clamps (9) and remove elbow (8), 7 ¼-in. tube (11), rubber elbow (12), 4 ½-in. tube (13), and rubber elbow (14) from air cleaner (10).
2. Remove clamp (6) holding 7 ¼-in. tube (7) to bracket (15).
3. Loosen two hose clamps (4) and remove 7¼-in. tube (7) and elbow (5) from 25-in. tube (3).
4. Remove clamp (16) holding 25-in. tube (3) to bracket (17).
5. Loosen four hose clamps (2) and remove 25-in. tube (3), rubber elbow (1), tube (20), and rubber elbow (19) from turbocharger (18).



SIDE VIEW

AIR CLEANER-TO-TURBOCHARGER HOSES AND TUBES INSTALLATION

1. Install rubber elbow (19), tube (20), rubber elbow (1), and 25-in. tube (3) to turbocharger (18) and tighten four hose clamps (2).
2. Install 25-in. tube (3) on bracket (17) with clamp (16).
3. Install elbow (5) and 7 ¼-in. tube (7) on 25-in. tube (3) and tighten two hose clamps (4).
4. Install 7 ¼-in. tube (7) on bracket (15) with clamp (6).

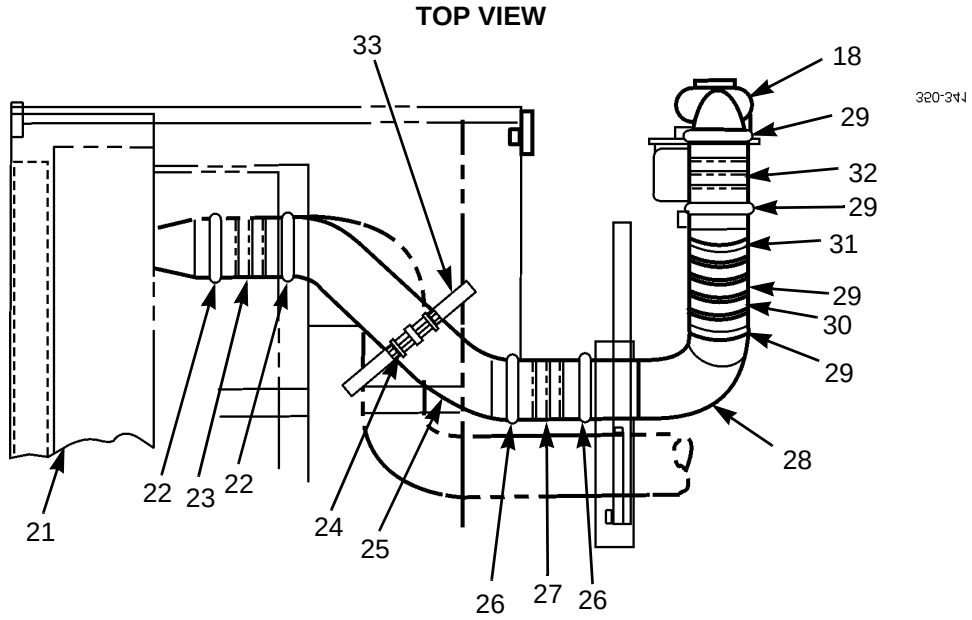
CAUTION

Ensure there is clearance between rubber elbow and sheet metal or a hole will develop in rubber elbow.

5. Install rubber elbow (14), 4 ½-in. tube (13), rubber elbow (12), 7 ¼-in. tube (11), and elbow (8) on air cleaner (10) and tighten six hose clamps (9).

TURBOCHARGER-TO-CHARGE AIR COOLER HOSES AND TUBES REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen four hose clamps (29) and remove hose (32), tube (31), and hose (30) from turbocharger (18) and tube (28).
3. Loosen two hose clamps (26) and remove hose (27) from tube (25) and tube (28).
4. Remove U-clamp (24) holding tube (25) to bracket (33).
5. Loosen two hose clamps (22) and remove tube (25) and hose (23) from charge air cooler (21).



TURBOCHARGER-TO-CHARGE AIR COOLER HOSES AND TUBES INSTALLATION

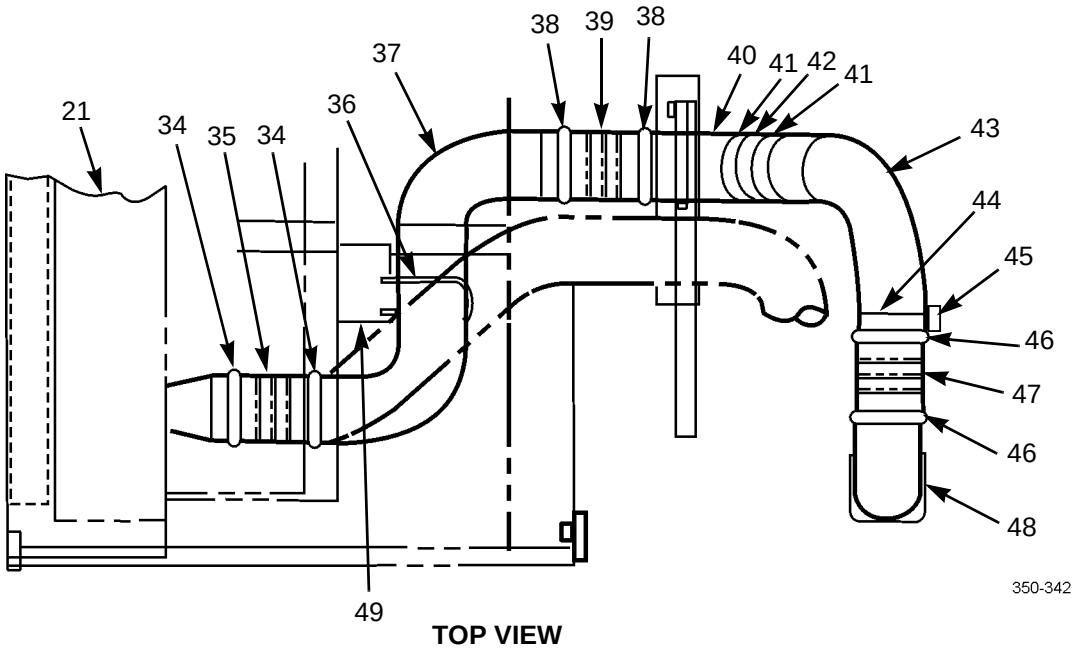
1. Install hose (23) and tube (25) on charge air cooler (21) and tighten two hose clamps (22).
2. Install tube (25) on bracket (33) with U-clamp (24).
3. Install hose (27) on tube (25) and tube (28) and tighten two hose clamps (26).
4. Install hose (30), tube (31), and hose (32) on tube (28) and turbocharger (18) and tighten four clamps (29).
5. Install radiator top grating (WP 0144 00).

CHARGE AIR COOLER-TO-ENGINE AIR INTAKE MANIFOLD HOSES AND TUBES REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Remove radiator splash shield (WP 0143 00).

CHARGE AIR COOLER-TO-ENGINE AIR INTAKE MANIFOLD HOSES AND TUBES REMOVAL - CONTINUED

3. Loosen two hose clamps (34) and remove hose (35) from charge air cooler (21) and tube (37).
4. Remove U-clamp (36) holding tube (37) to bracket (49).
5. Loosen two hose clamps (38) and remove tube (37) and hose (39) from tube (40).
6. Loosen two hose clamps (41) and remove hose (42) from tube (40) and tube (43).
7. Remove U-clamp (44) holding tube (43) to bracket (45).
8. Loosen two hose clamps (46) and remove tube (43) and hose (47) from air intake connector (48) of engine air intake manifold.



TOP VIEW

CHARGE AIR COOLER-TO-ENGINE AIR INTAKE MANIFOLD HOSES AND TUBES INSTALLATION

1. Install hose (47) and tube (43) on air intake connector (48) of engine air intake manifold and tighten two hose clamps (46).
2. Install tube (43) on bracket (45) with U-clamp (44).
3. Install hose (42) on tube (43) and tube (40) and tighten two hose clamps (41).
4. Install hose (39) and tube (37) on tube (40) and tighten two hose clamps (38).
5. Install tube (37) on bracket (49) with U-clamp (36).
6. Install hose (35) on tube (37) and charge air cooler (21) and tighten two hose clamps (34).
7. Install radiator splash shield (WP 0143 00).
8. Install radiator top grating (WP 0144 00).
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL FILTER/WATER SEPARATOR REPLACEMENT 0059 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Strap (Item 137, WP 0289 00)

Materials/Parts

Fuel, Diesel, DF-1 Grade, Winter (Item 17, WP 0290 00)

Materials/Parts - Continued

Fuel, Diesel, DF-2 Grade (Item 18, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Filter, Fuel (P/N FS1000)

References

TM 10-3930-675-10



WARNING

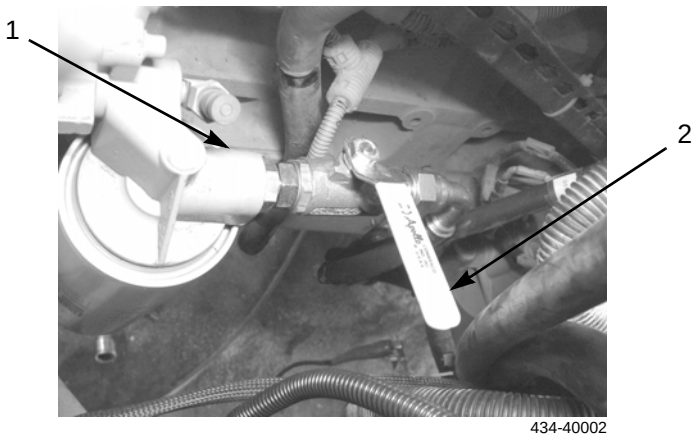
DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.

REMOVAL

NOTE

Step 1 applies to USMC and RESET vehicles only.

1. Close ball valve (2) on fuel pump (1).



434-40002

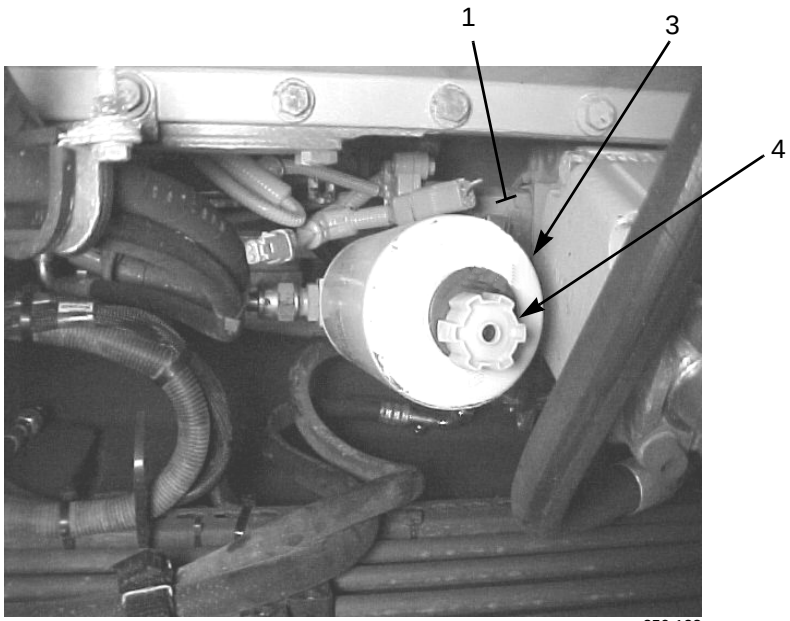
REMOVAL - CONTINUED

2. Open drain valve (4) on fuel filter (3) and drain fluid into a suitable container. Dispose of drained fluid into a suitable container. Dispose of drained fluid in accordance with SOP.

NOTE

For ARMY vehicle, fuel will drain from fuel pump as fuel filter is removed. Be prepared to install new fuel filter quickly to minimize fuel spillage.

3. Remove fuel filter (3) from fuel pump (1). Discard fuel filter.



350-123

4. Remove threaded adapter seal ring from fuel pump (1). Discard seal ring.

INSTALLATION

NOTE

Ensure fuel pump sealing surface is clean and free of old gasket material.

1. Install new threaded adapter seal ring, provided with new fuel filter, on fuel pump (1).

NOTE

Apply a light coat of lubricating oil to new filter gasket and fill fuel filter with correct fuel.

2. Install new fuel filter (3) on fuel pump (1) and tighten until gasket contacts fuel pump surface.

CAUTION

Overtightening of filter can distort threads and damage fuel filter seal.

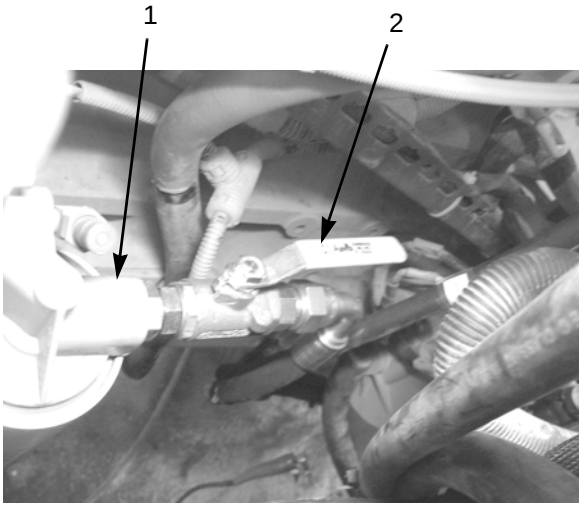
3. Tighten fuel filter (3) an additional ½ to ¾ turn.

INSTALLATION - CONTINUED

NOTE

Step 4 applies to USMC and RESET vehicles only.

4. Open ball valve (2) on fuel pump (1).



434-40003

5. Start engine and check for leaks (TM 10-3930-675-10).

END OF WORK PACKAGE

FUEL HOSES, LINES, AND FITTINGS REPLACEMENT 0060 00

THIS WORK PACKAGE COVERS

Cooling Plate-to-Cylinder Head Fuel Line: Removal, Installation

Fuel Pump-to-Cooling Plate Fuel Line: Removal, Installation

Engine Fuel Return Line: Removal, Installation

Fuel Supply Hose: Removal, Installation

Fuel Return Hose: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Compound, Sealing, Pipe (Item 14, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)



WARNING

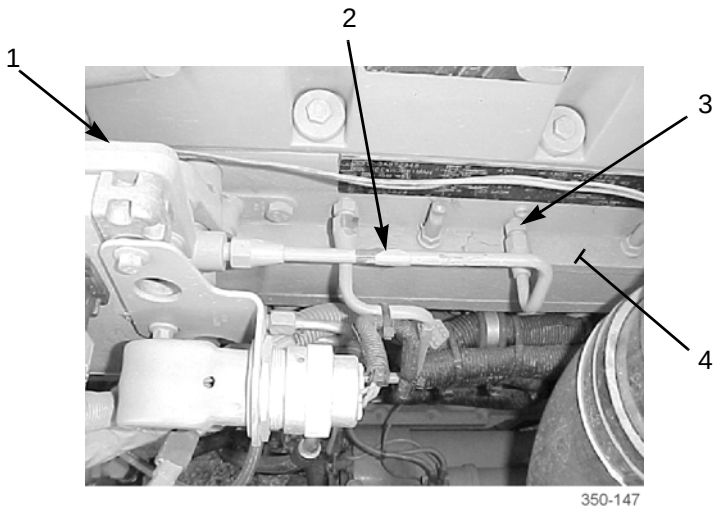
DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.

NOTE

- **Fuel lines and hoses may contain residual amounts of fuel which may be spilled when replacing fuel lines. Spilled fuel should be cleaned up immediately.**
- **Ensure all lines and fittings are clear of debris and excess pipe sealing compound does not enter lines or fittings.**

COOLING PLATE-TO-CYLINDER HEAD FUEL LINE REMOVAL

1. Disconnect fuel line (2) from cooling plate (1) and cylinder head fitting (3).
2. Remove fitting (3) from cylinder head (4).

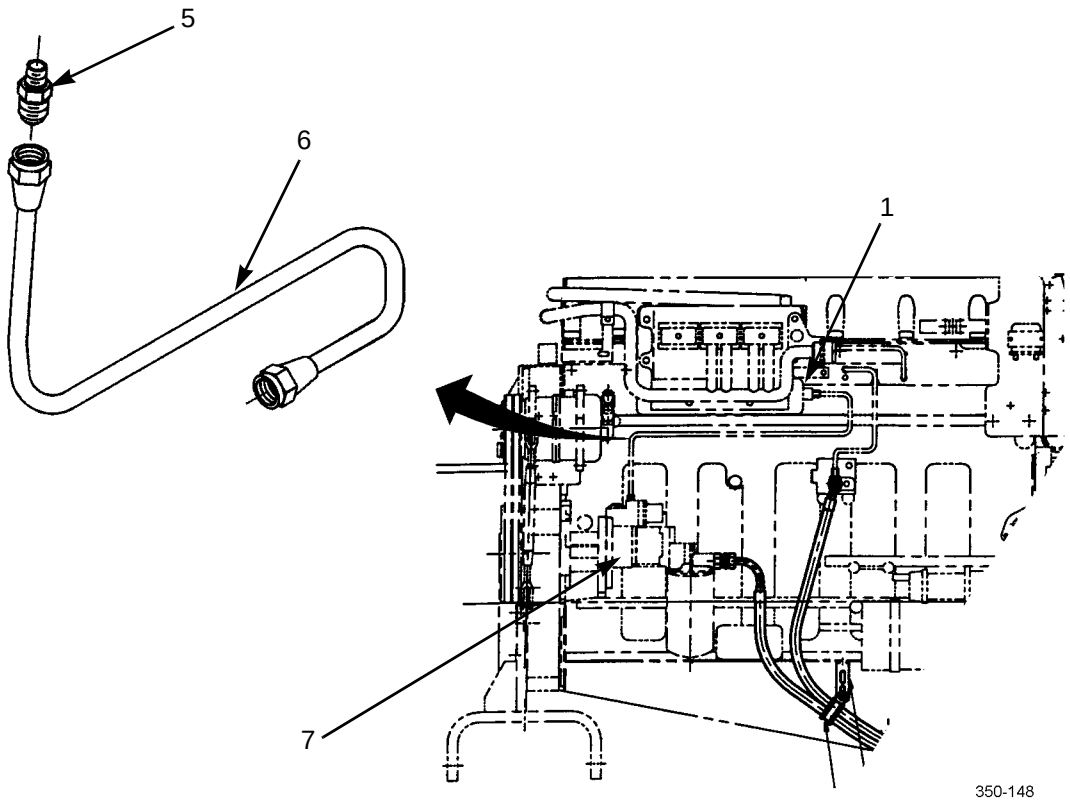


COOLING PLATE-TO-CYLINDER HEAD FUEL LINE INSTALLATION

1. Apply a light coat of sealing compound to fitting (3) and install in cylinder head (4).
2. Connect fuel line (2) to cylinder head fitting (3) and cooling plate (1).
3. Start engine (TM 10-3930-675-10) and check for fuel leaks.
4. Install engine cover (WP 0148 00).

FUEL PUMP-TO-COOLING PLATE FUEL LINE REMOVAL

1. Disconnect fuel line (6) from cooling plate (1) and fuel pump fitting (5).
2. Remove fitting (5) from fuel pump (7).

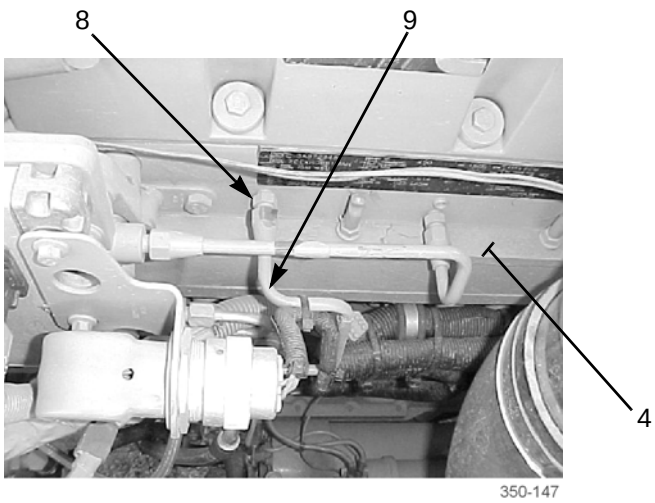


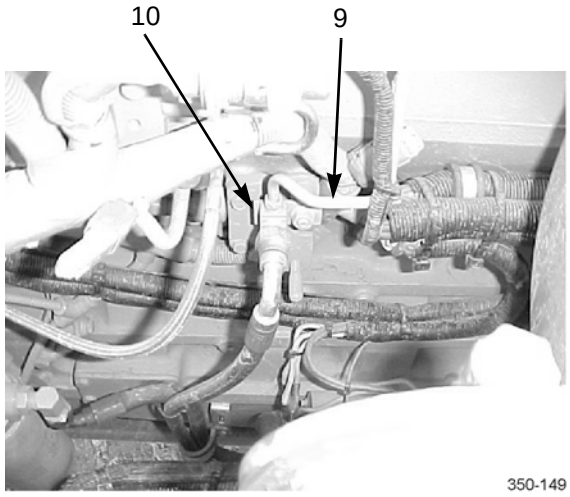
FUEL PUMP-TO-COOLING PLATE FUEL LINE INSTALLATION

1. Apply a light coat of sealing compound to fitting (5) and install in fuel pump (7).
2. Connect fuel line (6) to fuel pump fitting (5) and cooling plate (1).
3. Start engine (TM 10-3930-675-10) and check for fuel leaks.
4. Install engine cover (WP 0148 00).

ENGINE FUEL RETURN LINE REMOVAL

1. Disconnect fuel return line (9) from cylinder head fitting (8). Remove fitting from cylinder head (4).
2. Disconnect fuel return line (9) from elbow adapter fitting (10).





ENGINE FUEL RETURN LINE INSTALLATION

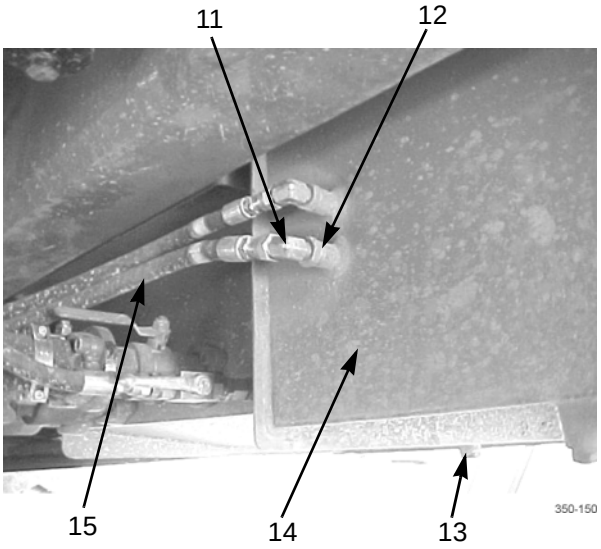
1. Apply a light coat of sealing compound to cylinder head fitting (8) and install fitting in cylinder head (4).
2. Connect fuel return line (9) to cylinder head fitting (8).
3. Connect fuel return line (9) to elbow adapter fitting (10).
4. Start engine (TM 10-3930-675-10) and check for leaks.
5. Install engine cover (WP 0148 00).

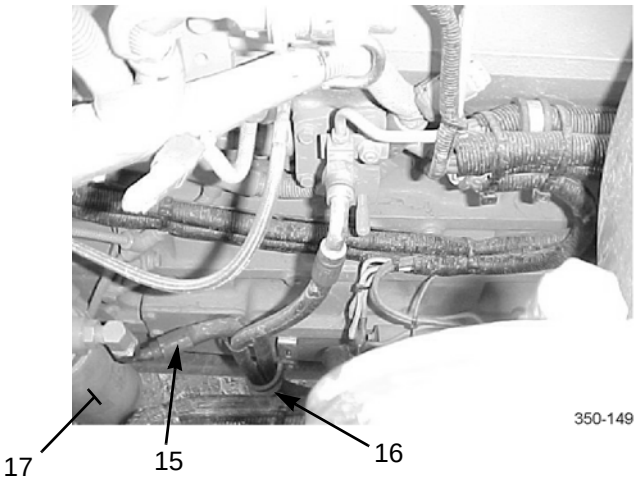
FUEL SUPPLY HOSE REMOVAL

NOTE

Fuel tank must be drained prior to removal of fuel supply hose. Fuel lines may retain small amounts of fuel.

1. Remove fuel tank drain plug (13) and drain fuel into a suitable clean container. Replace plug.
2. Disconnect fuel supply hose (15) and remove elbow (11) and adapter (12).
3. Trace and tag fuel supply hose (15) from fuel tank (14) to fuel filter (17).
4. Remove hose clamps (16) as required and disconnect fuel supply hose (15) from fuel filter (17).





FUEL SUPPLY HOSE INSTALLATION

1. Apply a thin coat of sealing compound to elbow (11) and adapter (12) and install in fuel tank (14).
2. Install fuel supply hose (15) on elbow (11).
3. Route fuel supply hose (15) and connect to fuel filter (17).
4. Secure fuel supply hose (15) in place with hose clamps (16) as needed.
5. Replace fuel in fuel tank, start engine, and check for fuel leaks (TM 10-3930-675-10).
6. Install engine cover (WP 0148 00).

FUEL RETURN HOSE REMOVAL

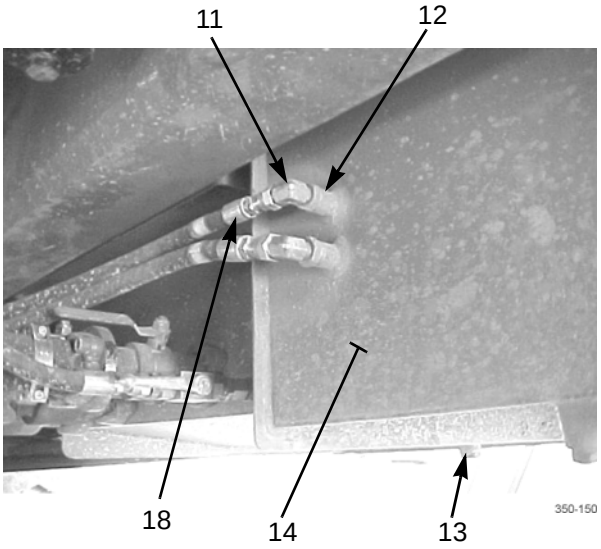
NOTE

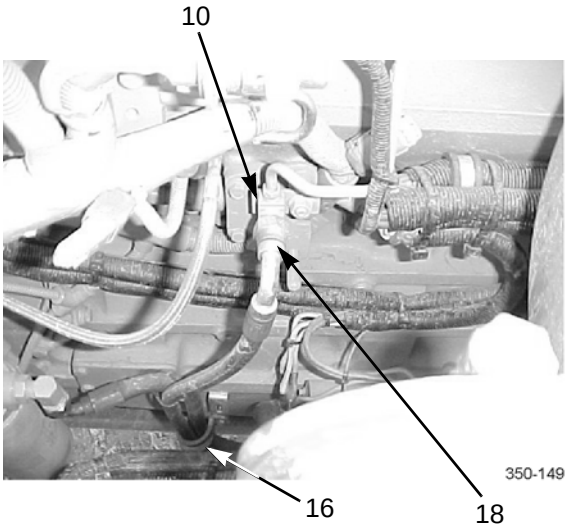
Fuel tank must be drained prior to removal of fuel return hose. Fuel lines may retain small amounts of fuel.

1. Remove fuel tank drain plug (13) and drain fuel into a suitable clean container. Replace plug.
2. Disconnect fuel return hose (18) and remove elbow (11) and adapter (12).
3. Trace and tag fuel return hose (18) from fuel tank (14) to elbow adapter fitting (10).
4. Remove hose clamps (16) as required and disconnect fuel return hose (18) from elbow adapter fitting (10).

FUEL RETURN HOSE INSTALLATION

1. Apply a thin coat of sealing compound to elbow (11) and adapter (12) and install in fuel tank (14).
2. Install fuel return hose (18) on elbow (11).
3. Route fuel return hose (18) and connect to elbow adapter fitting (10).
4. Secure fuel return hose (18) in place with hose clamps (16) as needed.





5. Replace fuel in fuel tank, start engine, and check for fuel leaks (TM 10-3930-675-10).
6. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ETHER COLD START SYSTEM MAINTENANCE 0061 00

THIS WORK PACKAGE COVERS

Ether Canister: Removal, Installation

Cold Start Activation Solenoid: Removal, Installation

INITIAL SETUP

Maitenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

Engine cover removed (WP 0148 00)

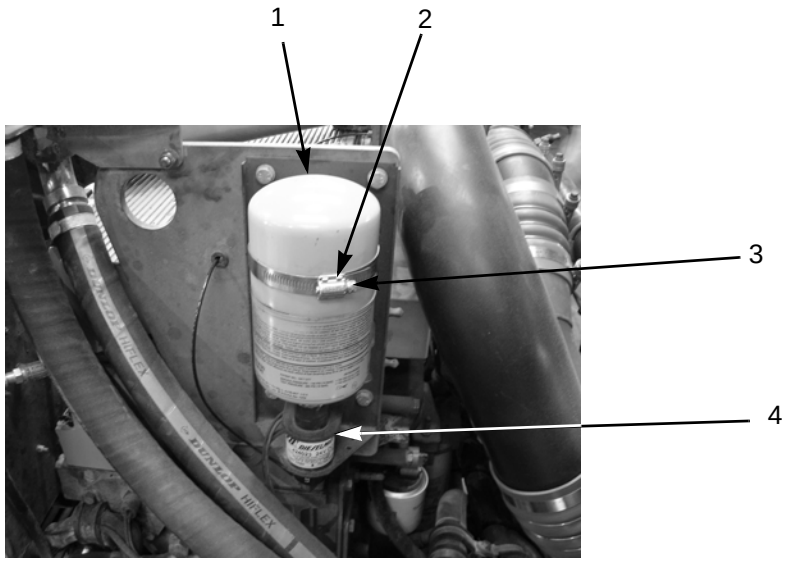


WARNING

Ether is extremely flammable and explosive. DO NOT perform ether cold start system checks, inspections or maintenance while smoking or near fire, flames or sparks. Failure to follow this warning may cause a fire and explosion, causing serious injury or death to personnel.

ETHER CANISTER REMOVAL

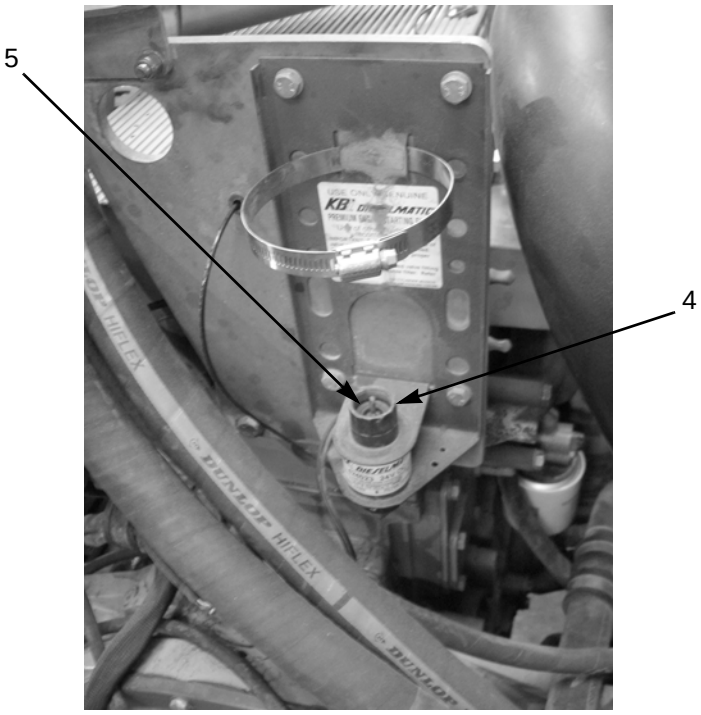
1. Loosen clamp screw (3) and turn canister (1) counterclockwise to remove from clamp (2) and solenoid (4).



434-4004

ETHER CANISTER REMOVAL - CONTINUED

2. Inspect gasket (5) for damage. Remove and discard only if damaged.



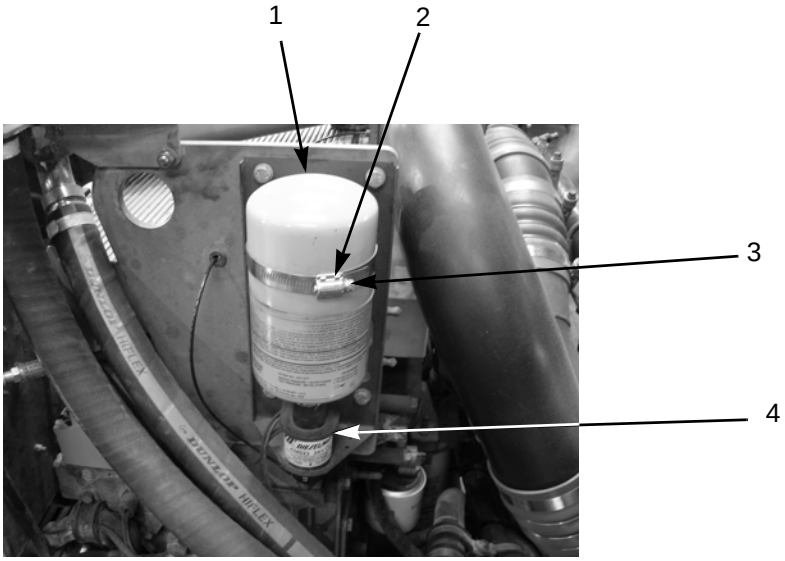
434-4005

ETHER CANISTER INSTALLATION

1. Ensure gasket (5) is positioned inside top of solenoid (4).

ETHER CANISTER INSTALLATION - CONTINUED

2. Position canister (1) inside clamp (2). Install on solenoid (4) by turning canister clockwise.
3. Tighten clamp screw (3).



434-4004

4. Install engine cover (WP 0148 00).

COLD START ACTIVATION SOLENOID REMOVAL

NOTE

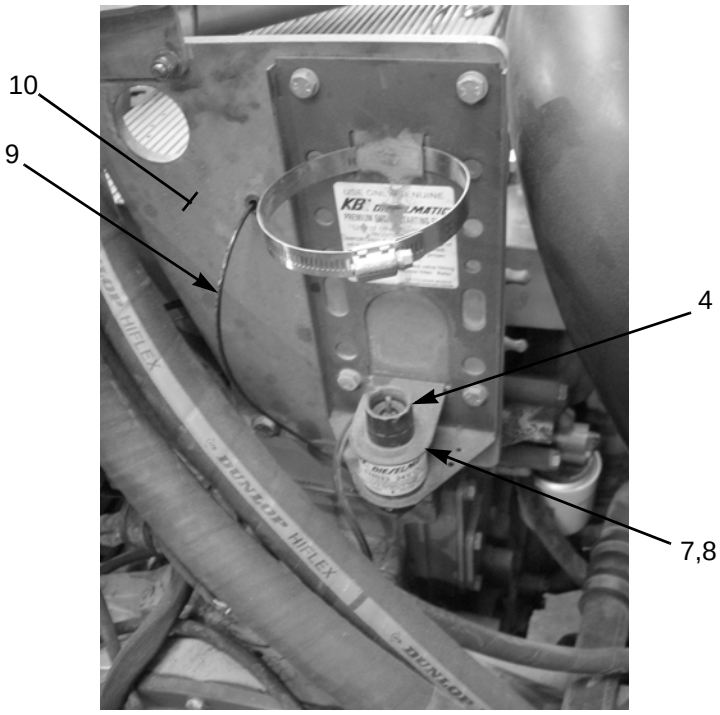
Remove and discard tiedown straps.

1. Remove canister (refer to *Ether Canister Removal*).
2. Disconnect connector (12) of solenoid harness from wiring harness connector (11).



COLD START ACTIVATION SOLENOID REMOVAL - CONTINUED

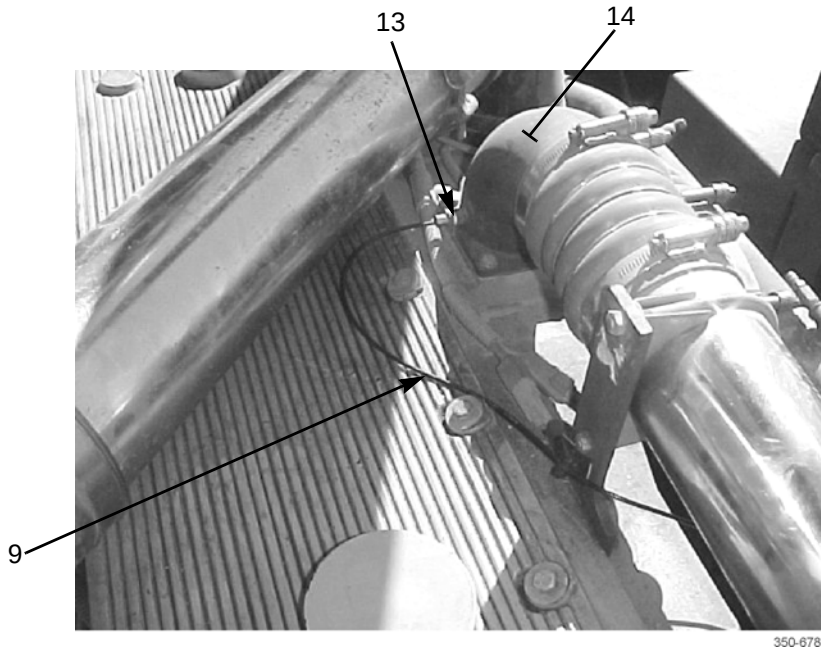
3. Disconnect ether supply tube (9) from elbow on underside of solenoid (4).
4. Remove two screws (7), washers (8), and solenoid (4) from mounting bracket (10).
5. Remove elbow from bottom of solenoid (4).



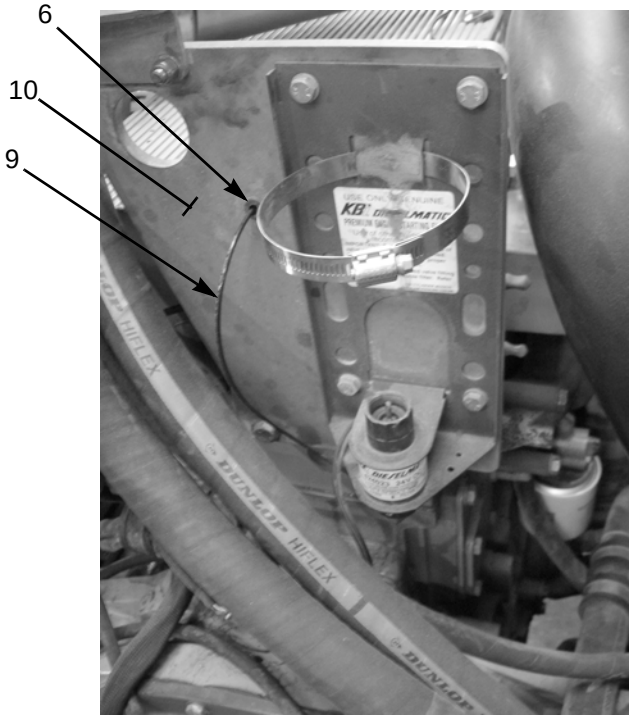
434-4005

COLD START ACTIVATION SOLENOID REMOVAL - CONTINUED

6. If replacing ether supply tube (9), disconnect tube from fitting (13) at air intake elbow (14).

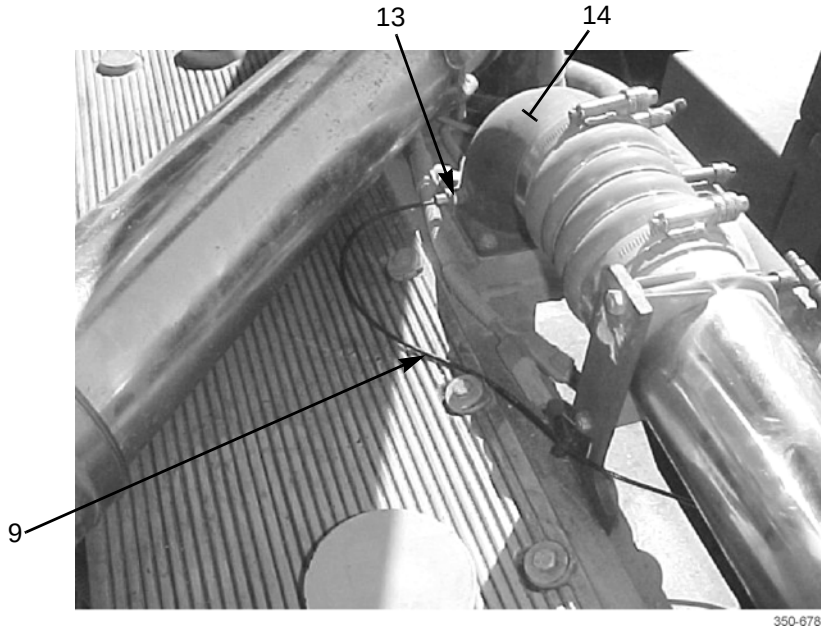


7. Remove ether supply tube (9) through grommet (6) in mounting bracket (10).



COLD START ACTIVATION SOLENOID INSTALLATION

1. If removed, feed ether supply tube (9) through grommet (6) in mounting bracket (10).
2. Connect ether supply tube (9) to fitting (13) at air intake elbow (14).



COLD START ACTIVATION SOLENOID INSTALLATION - CONTINUED

3. Install elbow on bottom of solenoid (4).
4. Connect other end of ether supply tube (9) to elbow.
5. Position solenoid (4) on mounting bracket (10) and install two washers (8) and screws (7).
6. Connect connector (12) of solenoid harness to wiring harness connector (11).



7. Install canister (refer to *Ether Canister Installation*).
8. Install new tiedown straps.
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

THROTTLE POSITION SENSOR (ACCELERATOR PEDAL) REPLACEMENT 0062 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

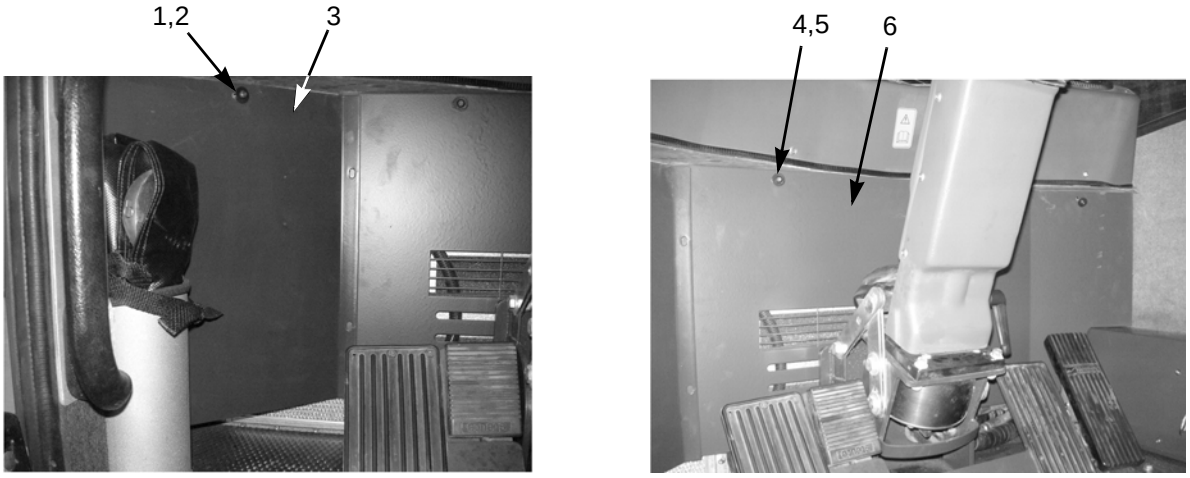
Equipment Condition

Master battery switch in OFF position

THROTTLE POSITION SENSOR (ACCELERATOR PEDAL) REPLACEMENT - CONTINUED 0062 00

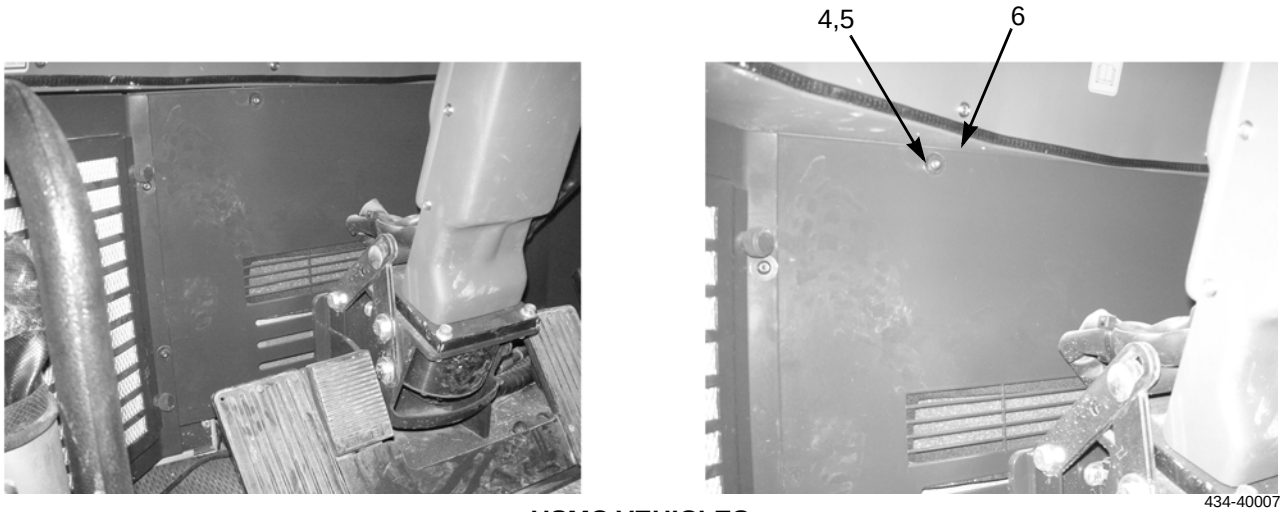
REMOVAL

1. Remove three screws (1), washers (2), and left lower panel (3) from vehicle.
2. Remove three screws (4), washers (5) and right lower panel (6) from vehicle.



434-40006

ARMY AND RESET VEHICLES



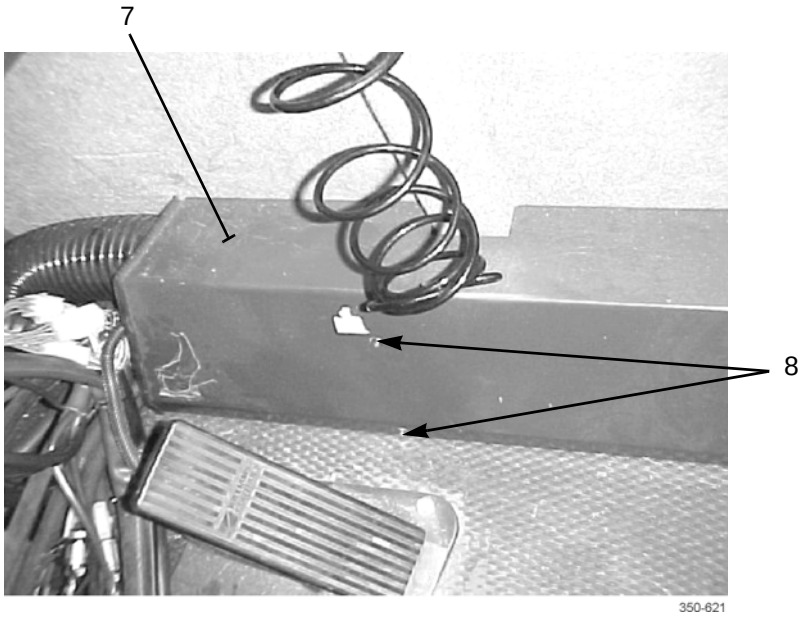
434-40007

USMC VEHICLES

THROTTLE POSITION SENSOR (ACCELERATOR PEDAL) REPLACEMENT - CONTINUED 0062 00

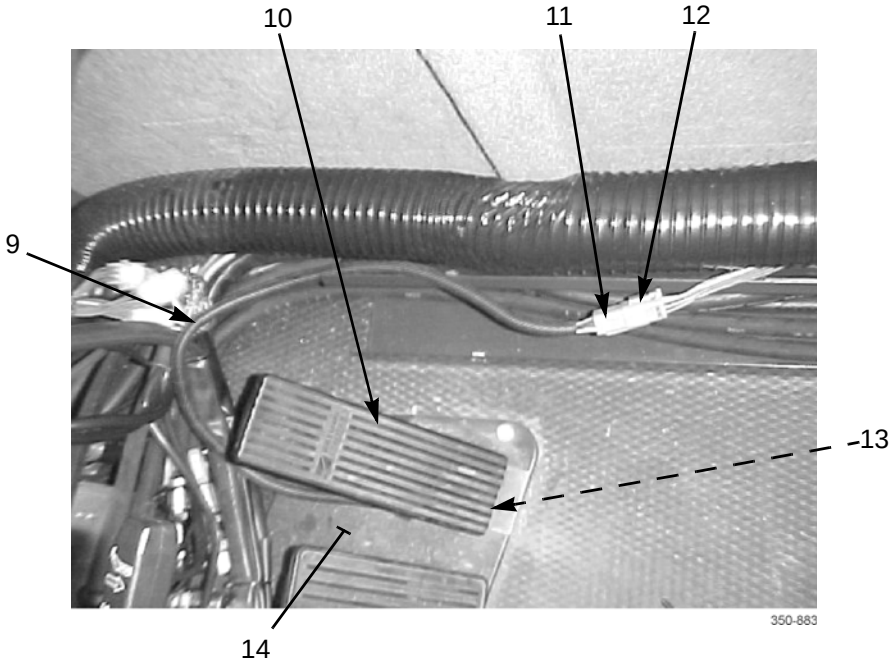
REMOVAL - CONTINUED

3. Remove four screws (8) and cover (7) from right side of cab floor.



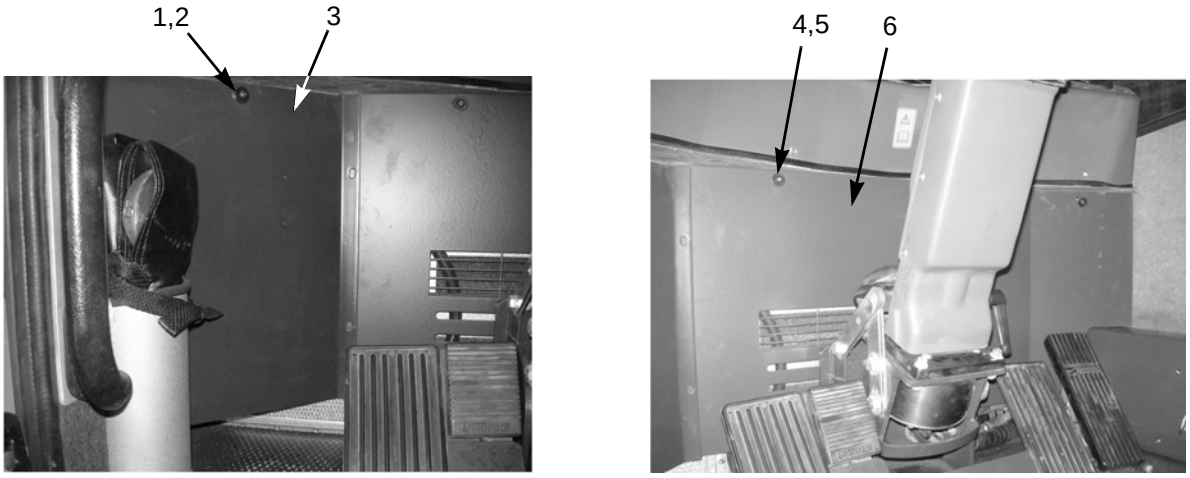
4. Disconnect connector (11) of throttle position sensor wiring harness (9) from electronic control module (ECM) wiring harness connector (12).

5. Remove two screws (13) and throttle position sensor assembly (10) from steering column base (14).



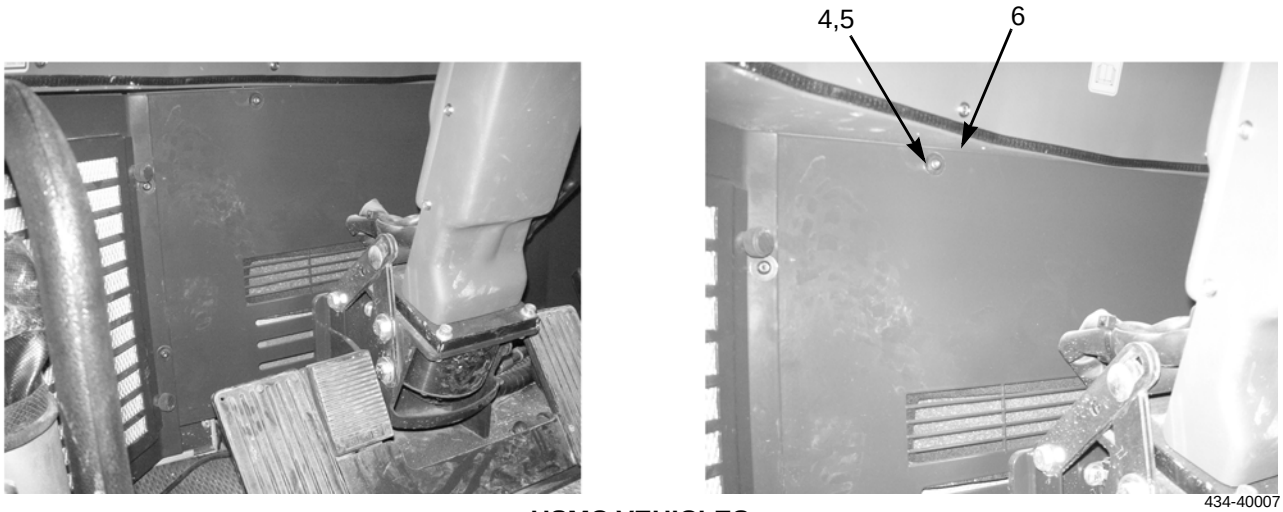
INSTALLATION

1. Install throttle position sensor assembly (10) on steering column base (14) with two screws (13).
2. Connect connector (11) of throttle position sensor wiring harness (9) to ECM wiring harness connector (12).
3. Install cover (7) on right side of cab floor with four screws (8).
4. Install right lower panel (6) in vehicle with three washers (5) and screws (4).
5. Install left lower panel (3) in vehicle with three washers (20) and screws (1).



434-40006

ARMY AND RESET VEHICLES



434-40007

USMC VEHICLES

END OF WORK PACKAGE

MUFFLER AND EXHAUST PIPE REPLACEMENT 0063 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Equipment Condition

Engine cover removed (WP 0148 00)

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

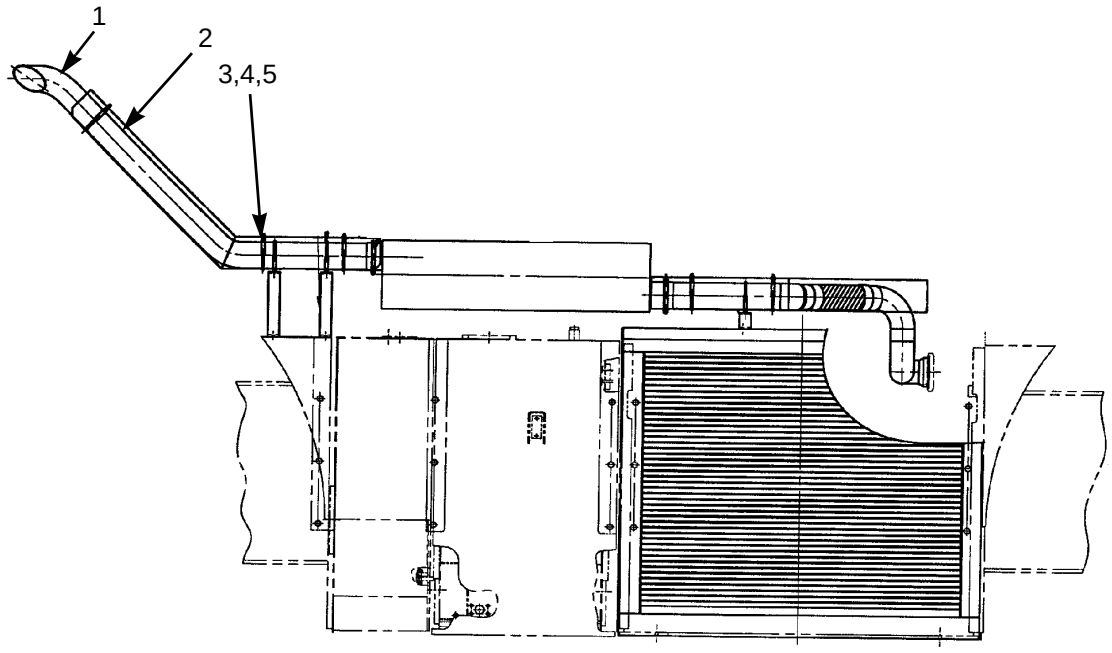
REMOVAL



WARNING

Exhaust system components may be hot to the touch. Avoid contact with any part of exhaust system until sufficiently cool. Failure to do so could result in injury to personnel.

1. Remove six nuts (3), washers (4), three U-bolts (5), and heat shield (2) from exhaust pipe (1).



350-349

MUFFLER AND EXHAUST PIPE REPLACEMENT - CONTINUED 0063 00

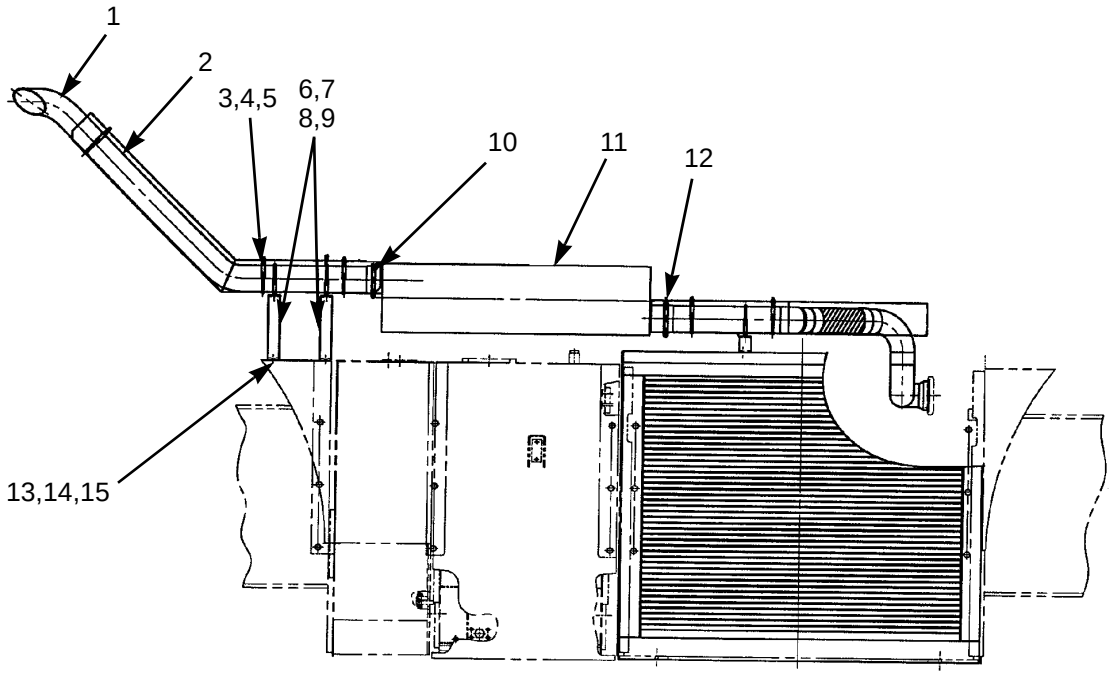
REMOVAL - CONTINUED

2. Remove four nuts (6), washers (7), and two U-bolts (8) holding exhaust pipe (1) to two brackets (9).
3. While supporting muffler (11), remove two clamps (10 and 12), exhaust pipe (1), and muffler from vehicle.

NOTE

Perform step 4 to remove support brackets.

4. Remove four nuts (13), washers (14), screws (15), and two brackets (9) from vehicle.



350-349

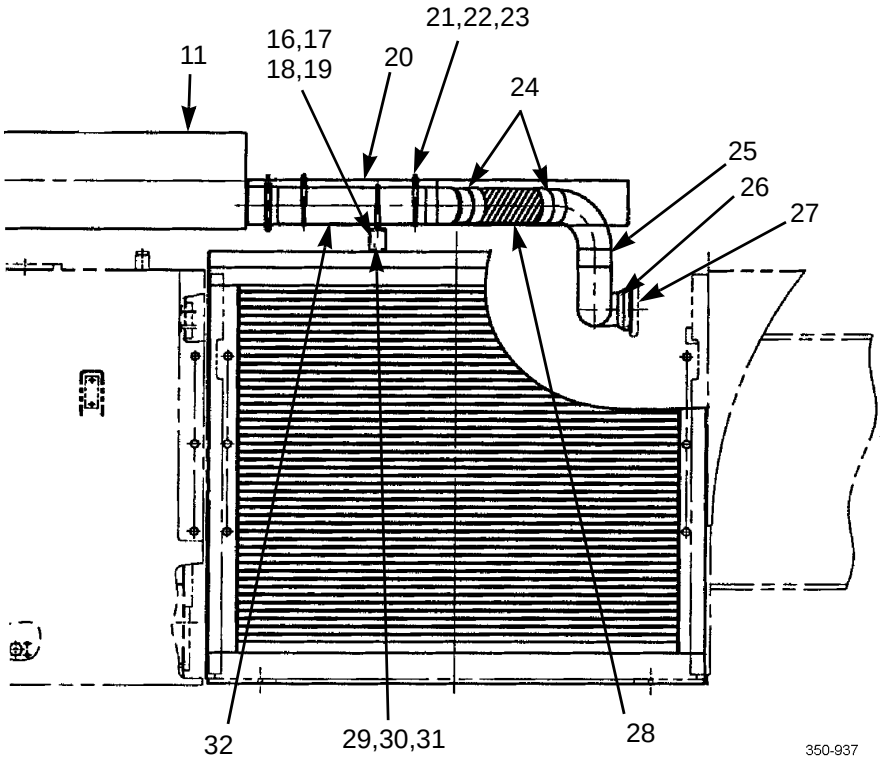
5. Remove six nuts (21) and washers (22), three U-bolts (24), and heat shield (20) from exhaust pipe (32) and exhaust hose (28).
6. Loosen two clamps (24) on exhaust hose (28).
7. Remove two nuts (16) and washers (17), U-bolt (18), exhaust pipe (32), and exhaust hose (28) from bracket (19).
8. Loosen clamp (26) and remove exhaust pipe (25) from turbocharger (27).

NOTE

Perform step 9 to remove exhaust system support bracket.

9. Remove two nuts (29), washers (30), screws (31), and bracket (19) from vehicle.

REMOVAL - CONTINUED



INSTALLATION

NOTE

Perform step 1 to install exhaust system support bracket, if removed.

1. Install bracket (19) on vehicle with two screws (31), washers (30), and nuts (29).
2. Install exhaust pipe (25) on turbocharger (27) and tighten clamp (26).
3. Install exhaust hose (28) and exhaust pipe (32) on bracket (19) with U-bolt (18), two washers (17), and nuts (16).
4. Tighten two clamps (24) on exhaust hose (28).
5. Install heat shield (20) on exhaust hose (28) and exhaust pipe (32) with three U-bolts (24), six washers (22), and nuts (21).

NOTE

Perform step 6 to install support brackets.

6. Install two brackets (9) on vehicle with four screws (15), washers (14), and nuts (13).
7. While supporting muffler (11), install muffler and exhaust pipe (1) on vehicle with two clamps (10 and 12).
8. Install exhaust pipe (1) on two brackets (9) with two U-bolts (8), four washers (7), and nuts (6).
9. Install heat shield (2) on exhaust pipe (1) with three U-bolts (5), six washers (4), and nuts (3).
10. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

DRAINING AND FILLING RADIATOR ASSEMBLY 0064 00

THIS WORK PACKAGE COVERS

Draining, Filling

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Antifreeze, Permanent: Arctic Grade (Item 3, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Hose, Radiator Drain, ½-in. I.D.

References

TM 10-3930-675-10

Equipment Condition

Radiator splash shield removed (WP 0143 00)



WARNING

DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.

DRAINING

NOTE

Bottom of radiator has two drain fittings. Fitting toward rear of vehicle is for draining coolant. Drain fitting toward front of vehicle is for draining possible condensation from engine air intake system.

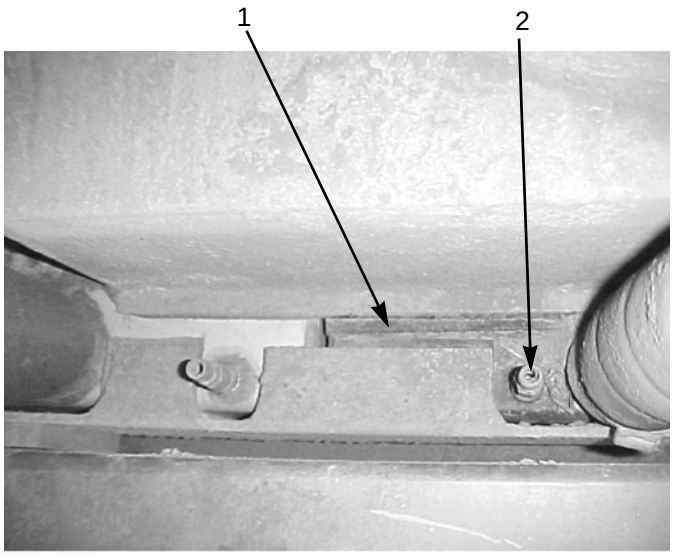
DRAINING - CONTINUED

1. Attach drain hose to drain fitting (2) at bottom of radiator assembly (1).

NOTE

Cooling system capacity is 23.7 gal. (90.1 L).

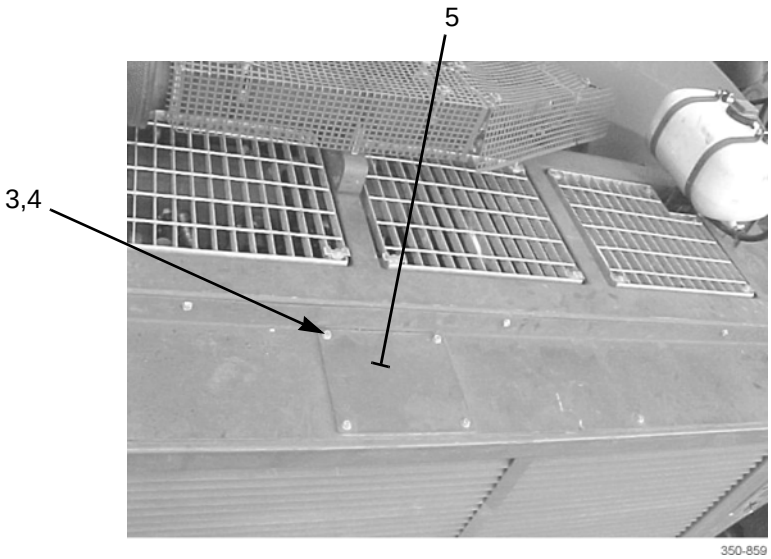
2. Open drain fitting (2) and allow coolant to drain into a suitable container.
3. Close drain fitting (2) and remove drain hose.



350-617

FILLING

1. Remove four screws (3), washers (4), and fill cover plate (5) from top of vehicle.



350-859

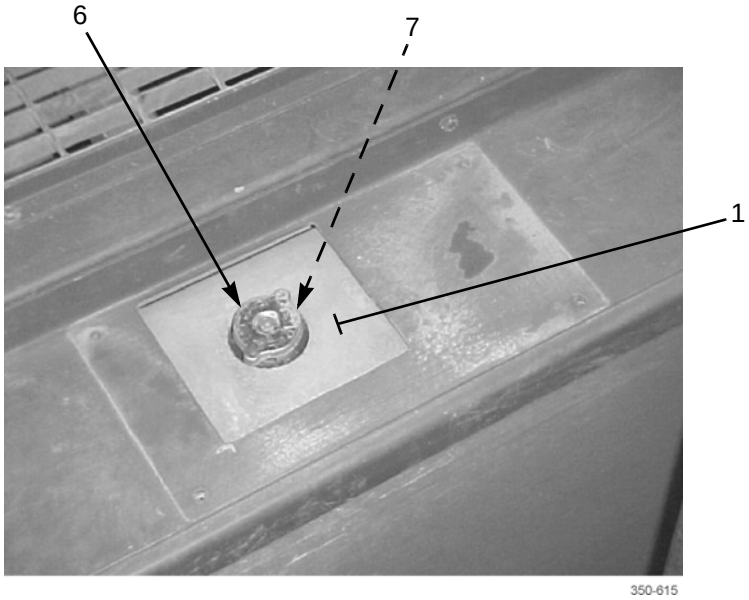
FILLING - CONTINUED

2. Remove radiator cap (6).

NOTE

Use type of coolant appropriate to the anticipated ambient temperature.

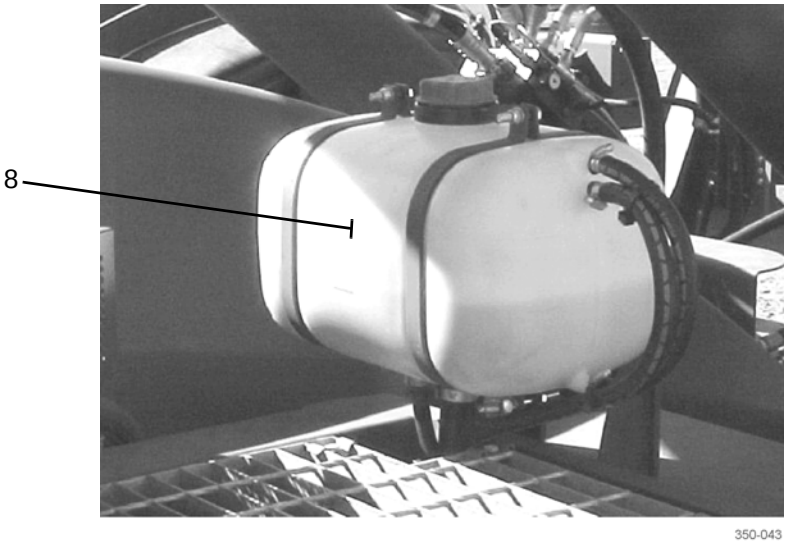
3. Add coolant through filler opening (7) at top of radiator assembly (1) until coolant level reaches bottom of filler opening.
4. Install radiator cap (6).



5. Install fill cover plate (5) on top of vehicle with four washers (4) and screws (3).

FILLING - CONTINUED

6. Start engine (TM 10-3930-675-10) and allow engine to reach operating temperature.
7. Note coolant level in expansion tank (8). Level should be between MIN and MAX lines on tank when engine is at operating temperature. Add coolant to expansion tank as needed.



8. Stop engine (TM 10-3939-675-10).
9. Install radiator splash shield (WP 0143 00).

END OF WORK PACKAGE

COOLING SYSTEM HOSES REPLACEMENT 0065 00

THIS WORK PACKAGE COVERS

Cab Interface Unit-to-Water Pump Hose: Removal, Installation

Cab Interface Unit-to-Engine Block Hose: Removal, Installation

Coolant Reservoir-to-Radiator Hose: Removal, Installation

Coolant Reservoir-to-Water Manifold Hose: Removal, Installation

Coolant Reservoir-to-Water Pump Hose: Removal, Installation

Transmission Oil Cooler-to-Radiator Hoses: Removal, Installation

Transmission Oil Cooler-to-Water Pump Hoses: Removal, Installation

Transmission Oil Cooler-to-Water Pump Return Hose: Removal, Installation

Transmission Oil Cooler U-Hose Replacement

Water Manifold-to-Radiator Hoses: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

References

WP 0142 00

WP 0144 00

Equipment Condition

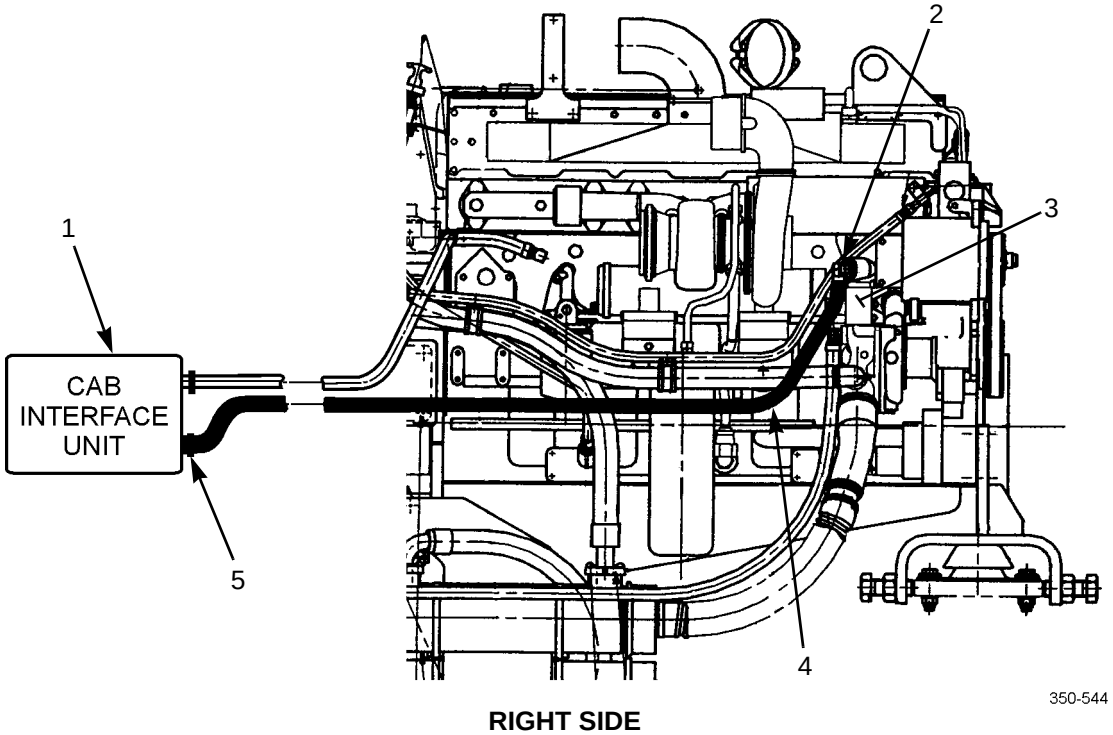
Cooling system drained (WP 0064 00)

NOTE

Note location of hose support clamps for installation. Remove hose support clamps, as necessary.

CAB INTERFACE UNIT-TO-WATER PUMP HOSE REMOVAL

1. Remove transmission access covers (WP 0142 00).
2. Loosen clamp (5) and disconnect hose (4) from cab interface unit (1) at rear of cab.
3. Loosen clamp (2) and remove other end of hose (4) from water pump (3).



RIGHT SIDE

CAB INTERFACE UNIT-TO-WATER PUMP HOSE

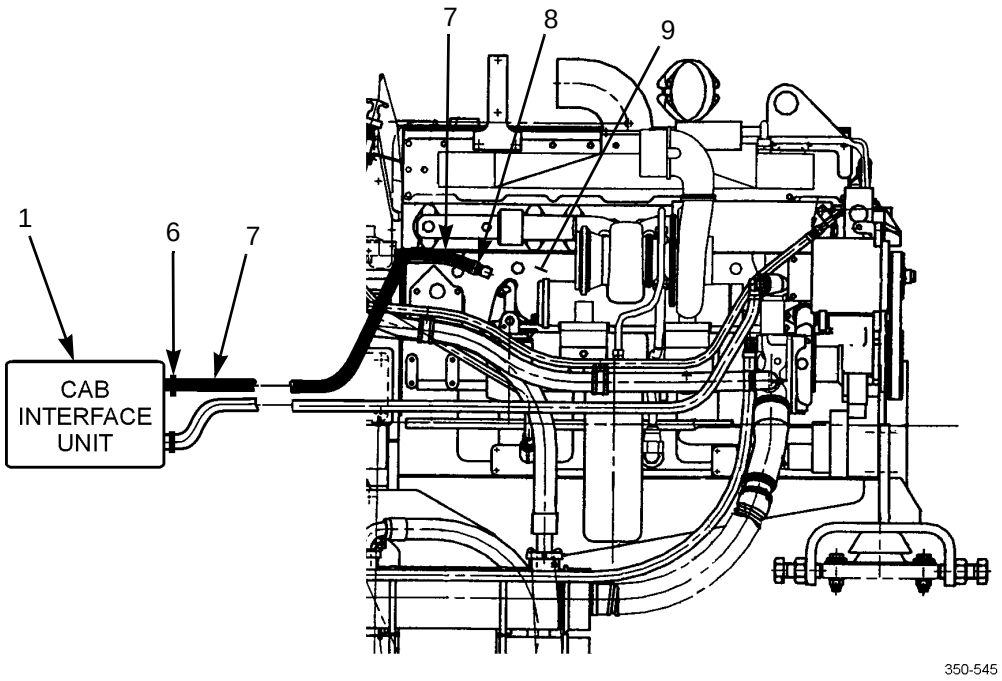
CAB INTERFACE UNIT-TO-WATER PUMP HOSE INSTALLATION

1. Install hose (4) on water pump (3) and tighten clamp (2).
2. Connect other end of hose (4) to cab interface unit (1) at rear of cab and tighten clamp (5).
3. Refill cooling system (WP 0064 00).
4. Install transmission access covers (WP 0142 00).

CAB INTERFACE UNIT-TO-ENGINE BLOCK HOSE REMOVAL

1. Remove transmission access covers (WP 0142 00).
2. Loosen clamp (6) and disconnect hose (7) from cab interface unit (1) at rear of cab.
3. Loosen clamp (8) and remove other end of hose (7) from engine block (9).

CAB INTERFACE UNIT-TO-ENGINE BLOCK HOSE REMOVAL - CONTINUED



RIGHT SIDE

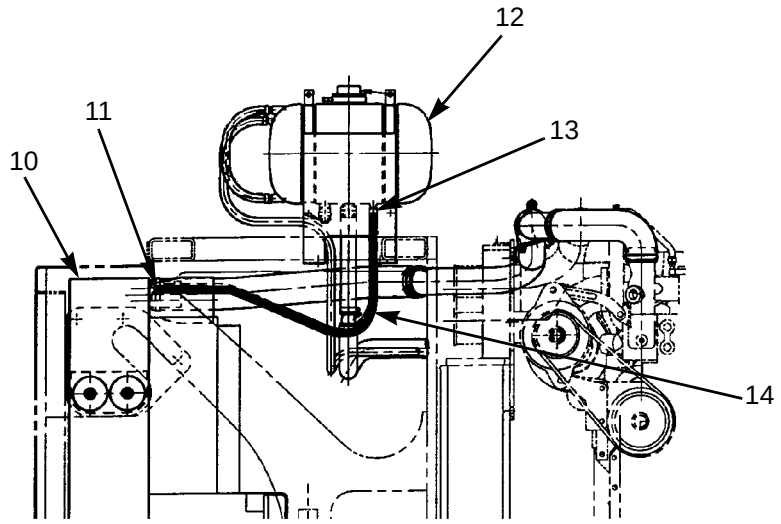
CAB INTERFACE UNIT-TO-ENGINE BLOCK HOSE

CAB INTERFACE UNIT-TO-ENGINE BLOCK HOSE INSTALLATION

1. Install hose (7) on engine block (9) and tighten clamp (8).
2. Connect other end of hose (7) to cab interface unit (1) and tighten clamp (6).
3. Refill cooling system (WP 0064 00).
4. Install transmission access covers (WP 0142 00).

COOLANT RESERVOIR-TO-RADIATOR HOSE REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen clamp (13) and disconnect hose (14) from coolant reservoir (12).
3. Loosen clamp (11) and remove other end of hose (14) from radiator (10).



FRONT VIEW 350-546

COOLANT RESERVOIR-TO-RADIATOR HOSE

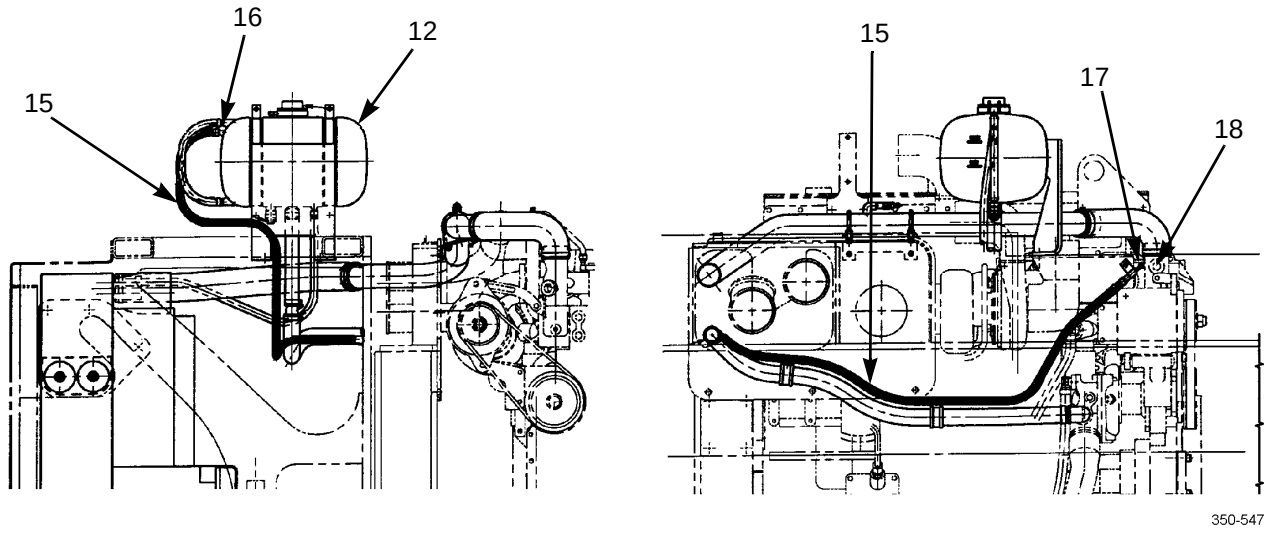
COOLANT RESERVOIR-TO-RADIATOR HOSE INSTALLATION

1. Install hose (14) on radiator (10) and tighten clamp (11).
2. Connect other end of hose (14) to coolant reservoir (12) and tighten clamp (13).
3. Refill cooling system (WP 0064 00).
4. Install radiator top grating (WP 0144 00).

COOLANT RESERVOIR-TO-WATER MANIFOLD HOSE REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen clamp (16) and disconnect hose (15) from coolant reservoir (12).
3. Loosen clamp (17) and remove other end of hose (15) from water manifold (18).

COOLANT RESERVOIR-TO-WATER MANIFOLD HOSE REMOVAL - CONTINUED



FRONT VIEW **RIGHT SIDE**

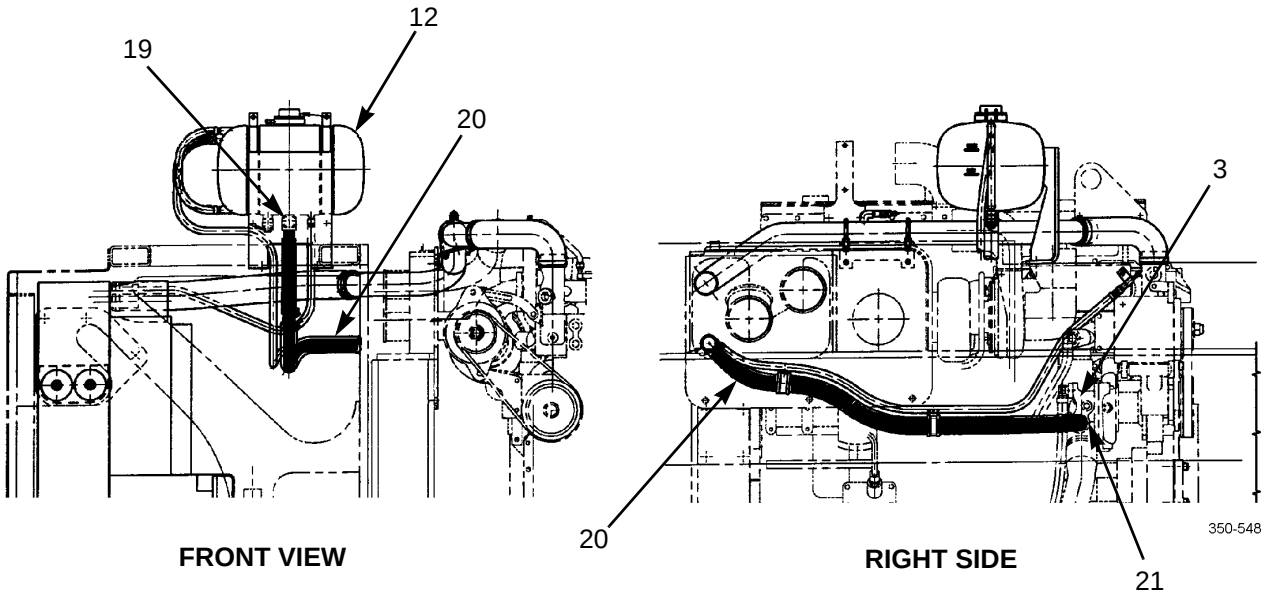
COOLANT RESERVOIR-TO-WATER MANIFOLD HOSE

COOLANT RESERVOIR-TO-WATER MANIFOLD HOSE INSTALLATION

1. Install hose (15) on water manifold (18) and tighten clamp (17).
2. Connect other end of hose (15) to coolant reservoir (12) and tighten clamp (16).
3. Refill cooling system (WP 0064 00).
4. Install radiator top grating (WP 0144 00).

COOLANT RESERVOIR-TO-WATER PUMP HOSE REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen clamp (19) and disconnect hose (20) from coolant reservoir (12).
3. Loosen clamp (21) and remove other end of hose (20) from water pump (3).



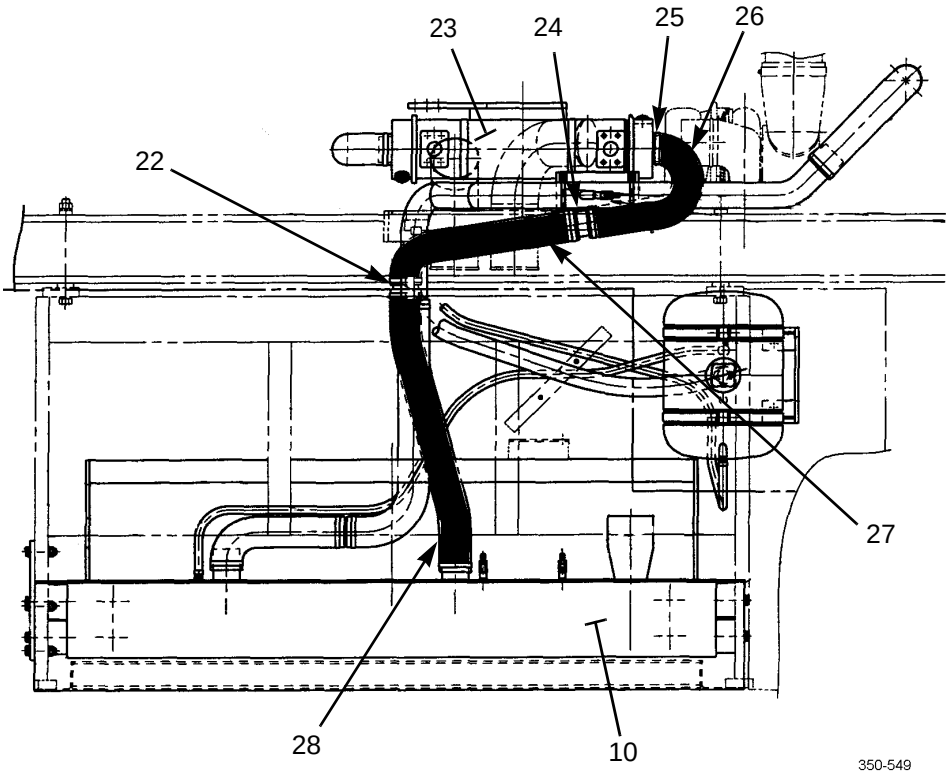
COOLANT RESERVOIR-TO-WATER PUMP HOSE

COOLANT RESERVOIR-TO-WATER PUMP HOSE INSTALLATION

1. Install hose (20) on water pump (3) and tighten clamp (21).
2. Connect other end of hose (20) to coolant reservoir (12) and tighten clamp (19).
3. Refill cooling system (WP 0064 00).
4. Install radiator top grating (WP 0144 00).

TRANSMISSION OIL COOLER-TO-RADIATOR HOSES REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen six clamps (24).
3. Remove three hoses (26, 27, and 28) and two cooling pipes (22 and 24) between transmission oil cooler (23) and radiator (10).



TOP VIEW

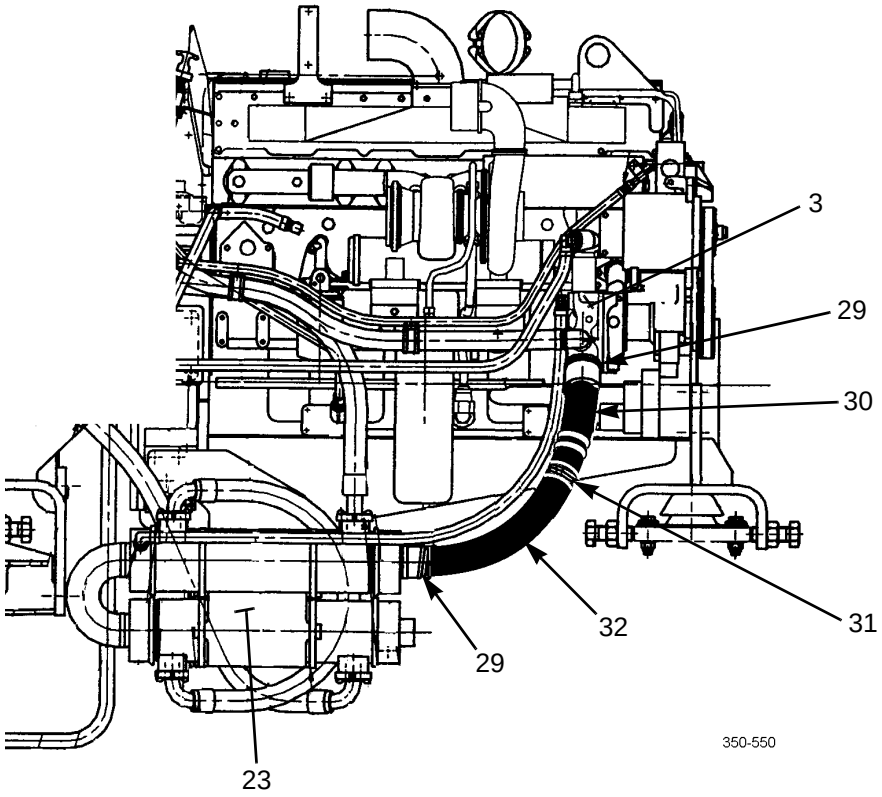
TRANSMISSION OIL COOLER-TO-RADIATOR HOSES

TRANSMISSION OIL COOLER-TO-RADIATOR HOSES INSTALLATION

1. Install two cooling pipes (22 and 24) and three hoses (26, 27, and 28) between radiator (10) and transmission oil cooler (23).
2. Tighten six clamps (25).
3. Refill cooling system (WP 0064 00).
4. Install radiator top grating (WP 0144 00).

TRANSMISSION OIL COOLER-TO-WATER PUMP HOSES REMOVAL

1. Loosen four clamps (29).
2. Remove two hoses (30 and 32) and pipe (31) between transmission oil cooler (23) and water pump (3).



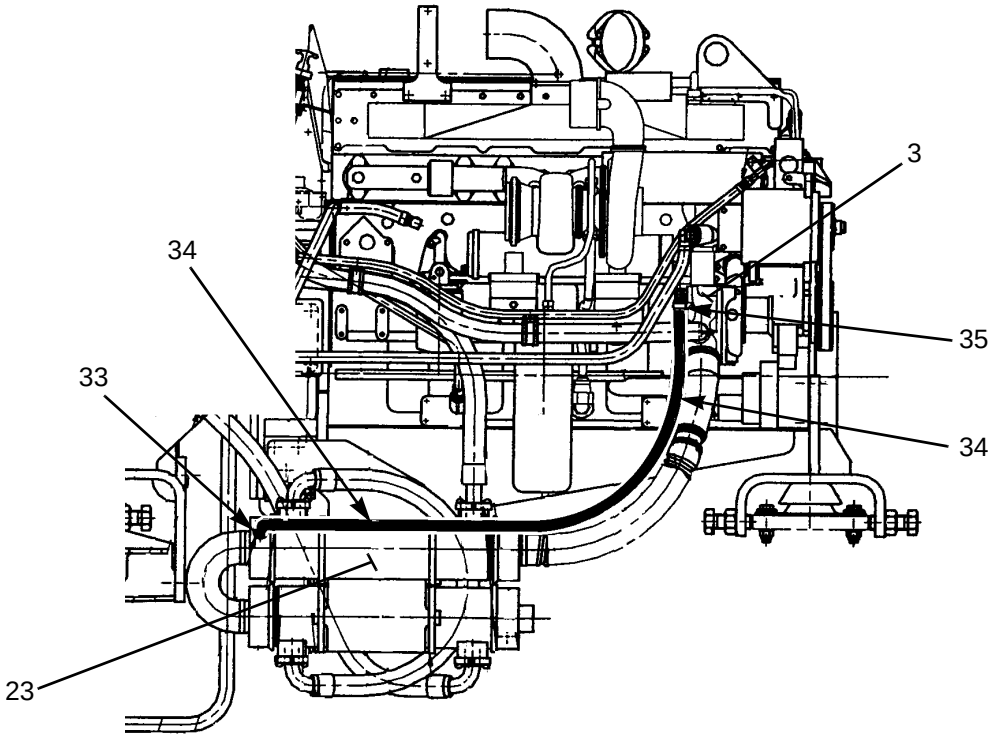
TRANSMISSION OIL COOLER-TO-WATER PUMP HOSES

TRANSMISSION OIL COOLER-TO-WATER PUMP HOSES INSTALLATION

1. Install pipe (31) and two hoses (30 and 32) between water pump (3) and transmission oil cooler (23).
2. Tighten four clamps (29).
3. Refill cooling system (WP 0064 00).

TRANSMISSION OIL COOLER-TO-WATER PUMP RETURN HOSE REMOVAL

1. Loosen clamp (33) and disconnect hose (34) from transmission oil cooler (23).
2. Loosen clamp (35) and remove other end of hose (34) from water pump (3).



RIGHT SIDE

350-551

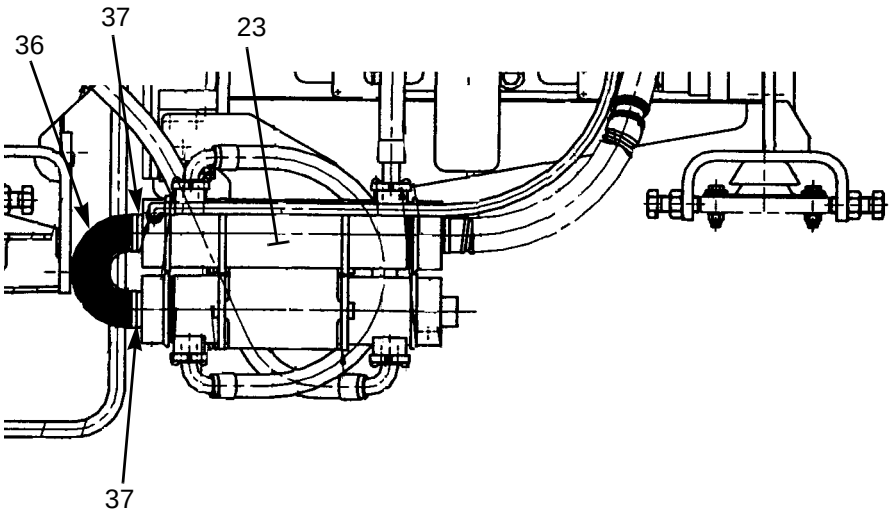
TRANSMISSION OIL COOLER-TO-WATER PUMP RETURN HOSE

TRANSMISSION OIL COOLER-TO-WATER PUMP RETURN HOSE INSTALLATION

1. Install hose (34) on water pump (3) and tighten clamp (35).
2. Connect other end of hose (34) to transmission oil cooler (23) and tighten clamp (33).
3. Refill cooling system (WP 0064 00).

TRANSMISSION OIL COOLER U-HOSE REPLACEMENT

1. Loosen two clamps (37) and remove U-hose (36) from transmission oil cooler (23).
2. Install U-hose (36) on transmission oil cooler (23) and tighten two clamps (37).
3. Refill cooling system (WP 0064 00).

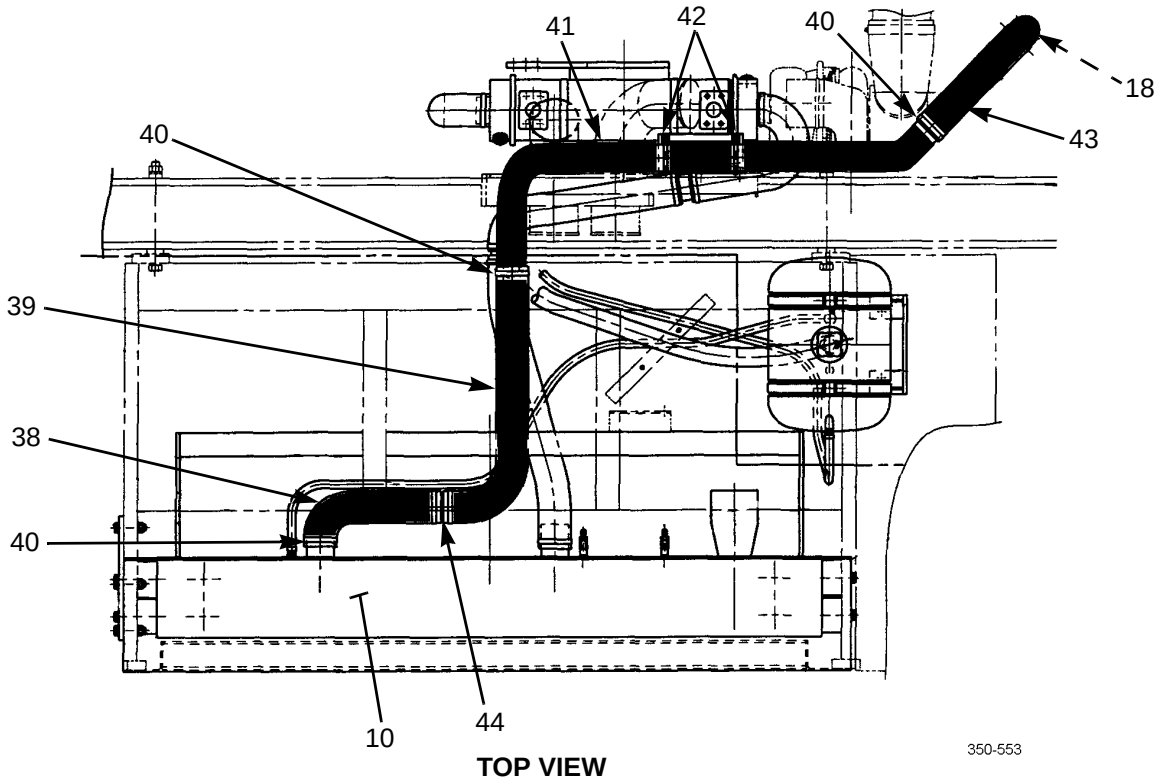


RIGHT SIDE 350-552

TRANSMISSION OIL COOLER U-HOSE

WATER MANIFOLD-TO-RADIATOR HOSES REMOVAL

1. Remove radiator top grating (WP 0144 00).
2. Loosen six clamps (40).
3. Remove two U-clamps (42) from cooling pipe (41).
4. Remove three hoses (38, 39, and 43) and two cooling pipes (41 and 44) from water manifold (18) and radiator (10).



TOP VIEW

WATER MANIFOLD-TO-RADIATOR HOSES

WATER MANIFOLD-TO-RADIATOR HOSES INSTALLATION

1. Install two cooling pipes (41 and 44) and three hoses (38, 39, and 43) between radiator (10) and water manifold (18).
2. Install two U-clamps (42) on cooling pipe (41).
3. Tighten six clamps (40).
4. Refill cooling system (WP 0064 00).
5. Install radiator top grating (WP 0144 00).

END OF WORK PACKAGE

COOLING SYSTEM EXPANSION TANK MAINTENANCE 0066 00

THIS WORK PACKAGE COVERS

Removal
Disassembly
Cleaning and Inspection
Assembly
Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)
Rag, Wiping (Item 30, WP 0290 00)
Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)
Gasket (P/N 920715.0007)
Nut, lock (P/N 920076.003) (4)
O-ring (P/N 920052.010)

References

WP 0064 00



WARNING

DO NOT perform maintenance on cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.

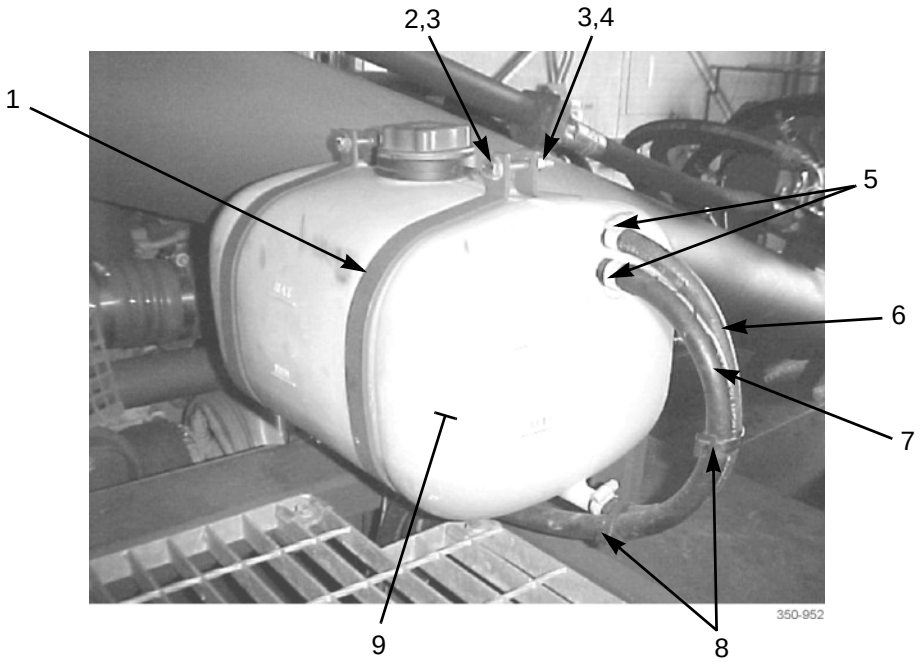
NOTE

- **Tag hoses to aid in installation.**
- **Use a suitable container to catch any draining coolant.**

COOLING SYSTEM EXPANSION TANK MAINTENANCE - CONTINUED 0066 00

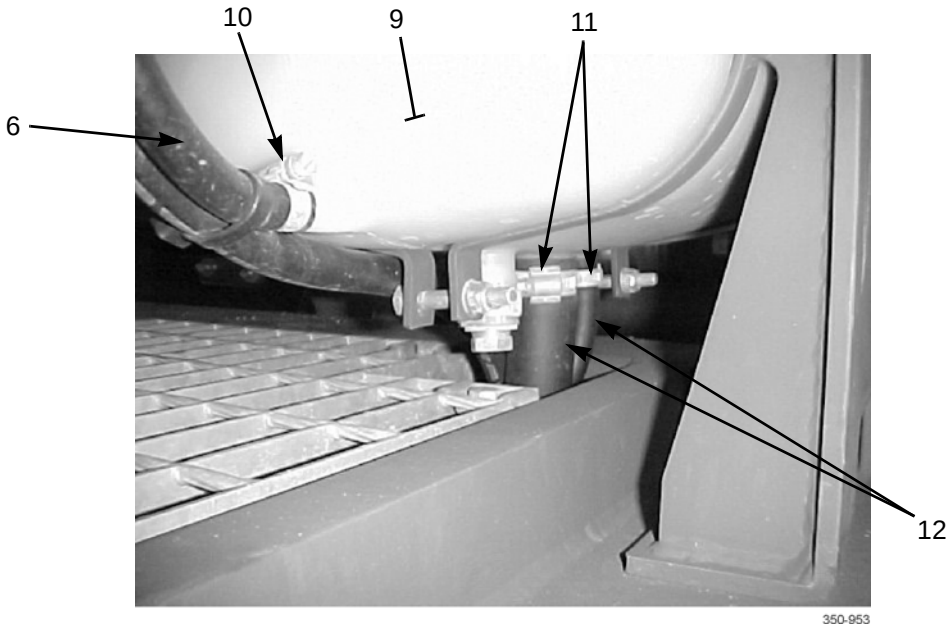
REMOVAL

1. Loosen two hose clamps (5) and disconnect two hoses (6 and 7) from top side of expansion tank (9).
2. Remove four locknuts (4), screws (2), eight washers (3), and two clamps (1) from expansion tank (9). Discard locknuts.
3. Empty coolant from expansion tank (9) by pouring coolant from two openings at top side of tank.
4. Release two hoses (6 and 7) by removing two tiedown straps (8). Discard tiedown straps.



5. Loosen two hose clamps (11) and disconnect two hoses (12) from underside of expansion tank (9).
6. Remove expansion tank (9).
7. Loosen clamp (10) and remove hose (6) from bottom side of expansion tank (9).

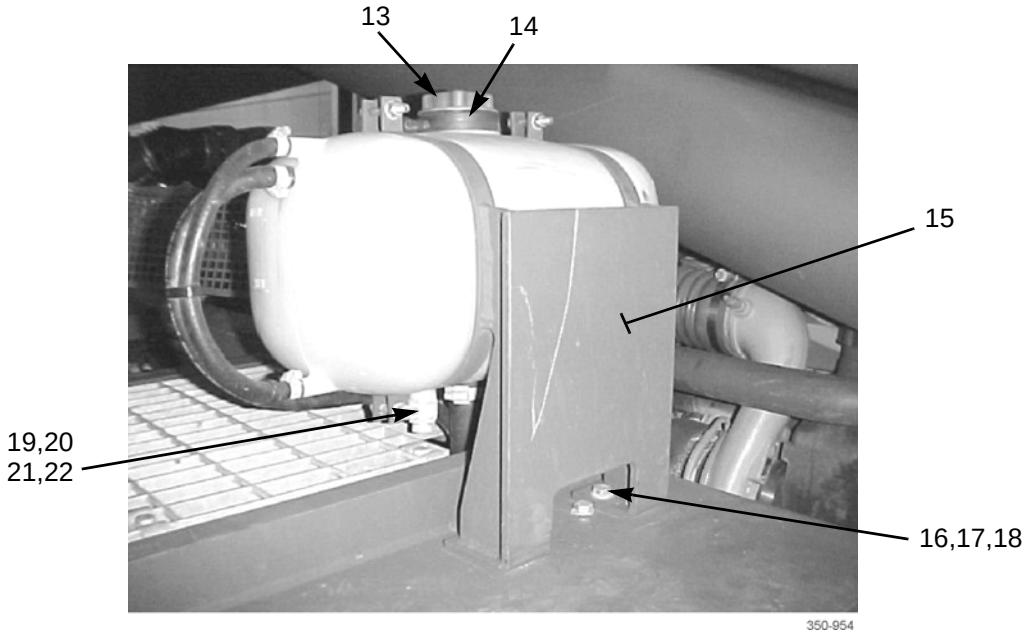
REMOVAL - CONTINUED



8. Remove two nuts (16), four washers (17), two screws (18), and expansion tank mounting bracket (15).

DISASSEMBLY

1. Remove cover (13) and rubber ring (14).
2. Remove nipple (19), O-ring (20), plug (21), and gasket (22) from underside of expansion tank (9). Discard O-ring and gasket.

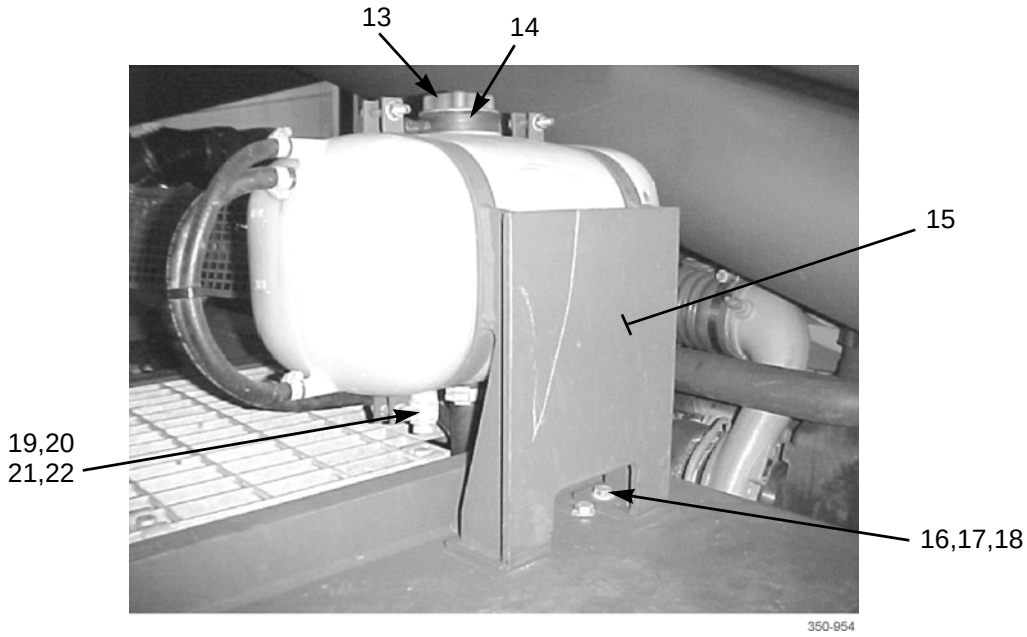


CLEANING AND INSPECTION

1. Wash expansion tank with soap and water. Rinse thoroughly.
2. Inspect expansion tank for cracks that could cause leaks. Replace if tank is cracked or otherwise damaged.
3. Inspect all other removed components for damage. Replace if damaged.

ASSEMBLY

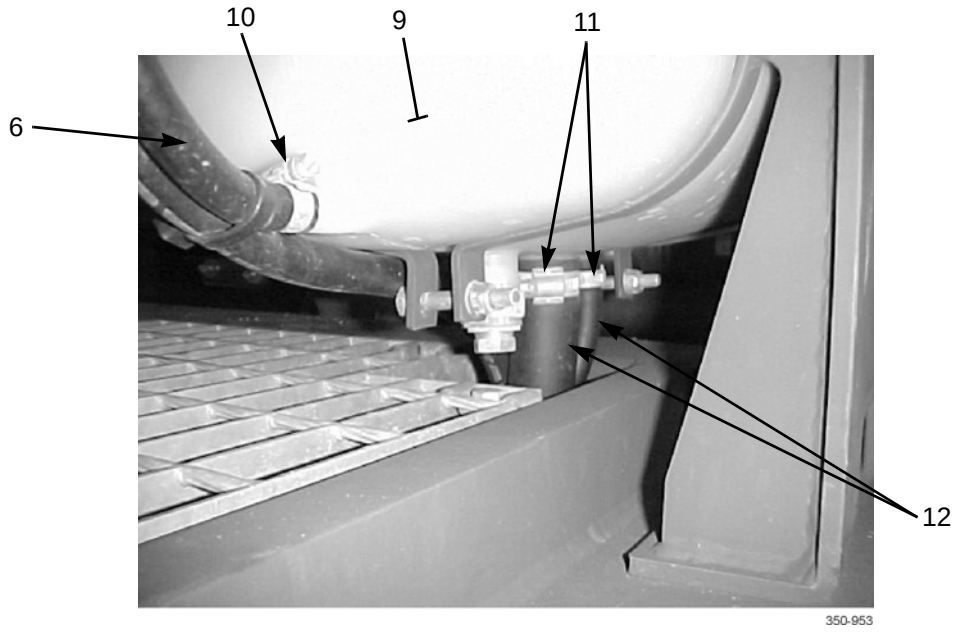
1. Install new gasket (22), plug (21), new O-ring (20), and nipple (19) on underside of expansion tank (9).
2. Install rubber ring (14) and cover (13).



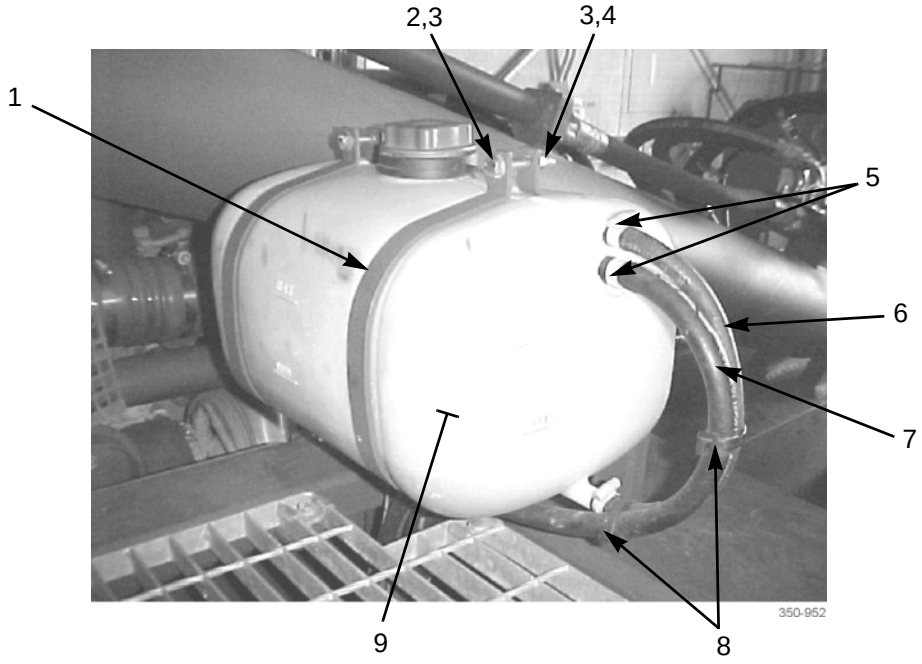
INSTALLATION

1. Install expansion tank mounting bracket (15) with two screws (18), four washers (17), and two nuts (16).
2. Install hose (6) on bottom side of expansion tank (9) and tighten clamp (10).
3. Position expansion tank (9) and connect two hoses (12) to underside of tank. Tighten two hose clamps (11).

INSTALLATION - CONTINUED



4. Secure expansion tank (9) to mounting bracket (15) with two clamps (1), four screws (2), eight washers (3), and four new locknuts (4).
5. Connect two hoses (6 and 7) to top side of expansion tank (9). Tighten two hose clamps (5).
6. Install two new tiedown straps (8) to secure hoses (6 and 7) together.



7. Check coolant level and add as necessary (WP 0064 00).

END OF WORK PACKAGE

THERMOSTAT REPLACEMENT 0067 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Seal, O-ring (P/N 186780)

References

TM 10-3930-675-10

WP 0064 00

Equipment Condition

Engine cover removed (WP 0148 00)

Radiator splash shield removed (WP 0143 00)

Alternator removed (WP 0070 00)

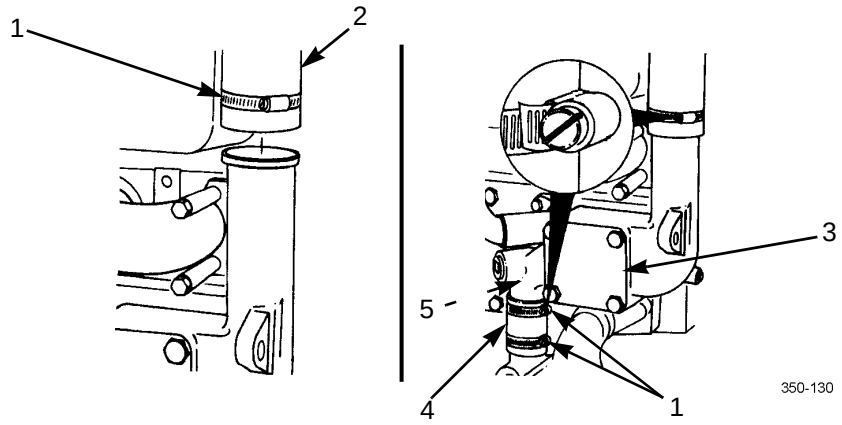
REMOVAL



WARNING

DO NOT perform maintenance on cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.

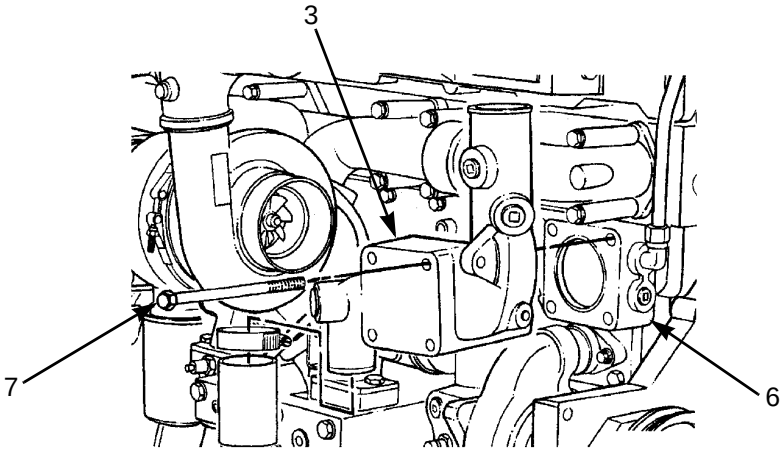
1. Position suitable container under radiator draincock. Open draincock and drain coolant. Retain coolant for filling cooling system.
2. Loosen coolant bypass hose clamps (1) on upper and lower hoses (2 and 4).
3. Remove upper hose (2) and lower hose (4) from thermostat housing (3). Ensure flow restriction disc (5) is retained for installation.



THERMOSTAT REPLACEMENT - CONTINUED 0067 00

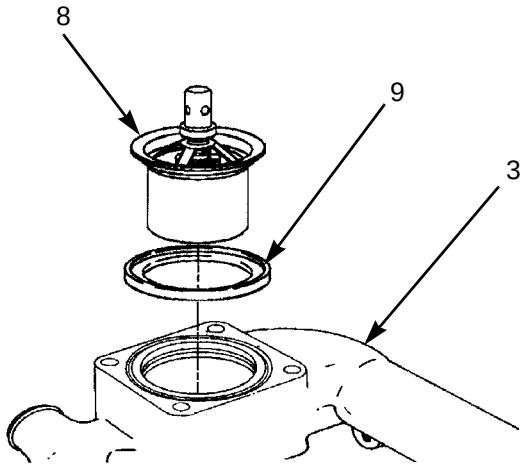
REMOVAL - CONTINUED

4. Remove four screws (7) securing thermostat housing (3) to housing support (6).
5. Remove thermostat housing (3) from housing support (6).



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6. Remove thermostat (8) and seal (9) from thermostat housing (3). Discard seal.



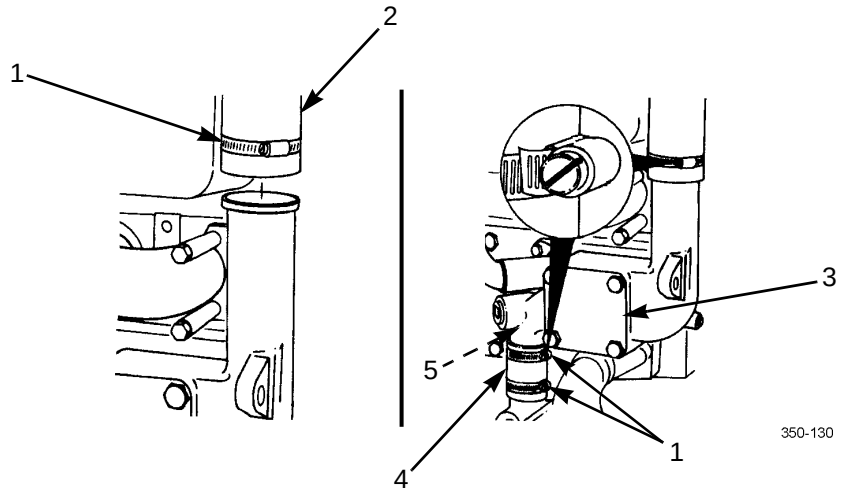
350-132

INSTALLATION

NOTE

Ensure sealing surfaces of thermostat housing and housing support are clean and free of all material.

1. Install thermostat (8) and new seal (9) in thermostat housing (3).
2. Position thermostat housing (3) on housing support (6) and secure with four screws (7). Tighten screws to 40 lb-ft (54 Nm).
3. Connect upper hose (2) and lower hose (4) to thermostat housing (3) and secure with hose clamps (1). Ensure flow restriction disc (5) is installed.



NOTE

Ensure radiator draincock is closed.

4. Replace coolant in system (WP 0064 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.
6. Top off coolant level as needed (WP 0064 00).
7. Install radiator splash shield (WP 0143 00).
8. Install alternator (WP 0070 00).
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

WATER PUMP REPLACEMENT 0068 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Puller, Mechanical (Item 98, WP 0289 00)

Puller, Mechanical (Item 99, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Materials/Parts - Continued

Gasket (P/N 3027924)

Gasket (P/N 3328759)

Seal, Dust (P/N 3895020)

Seal, Oil (P/N 3161772)

Seal, O-ring (P/N 3882774)

Seal, O-ring (P/N 3892095)

References

TM 10-3930-675-10

WP 0064 00

Equipment Condition

Engine cover removed (WP 0148 00)

Alternator drive belt removed (WP 0071 00)

Alternator removed (WP 0070 00)

Thermostat housing removed (WP 0067 00)

REMOVAL



WARNING

DO NOT perform maintenance on cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.

NOTE

Use a drain pan to catch any remaining coolant.

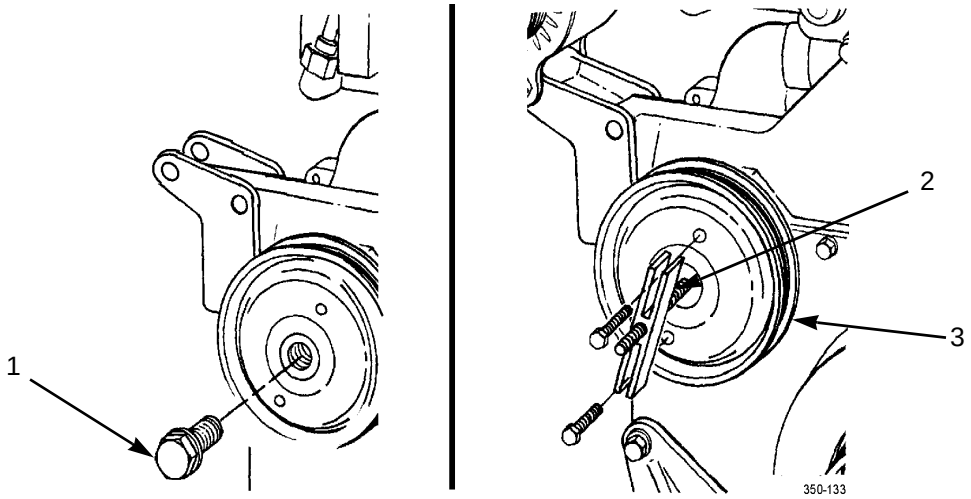
REMOVAL - CONTINUED

1. Remove water pump pulley retaining screw (1).

NOTE

Ensure puller mounting screws are threaded all the way through puller before applying pressure to puller screw.

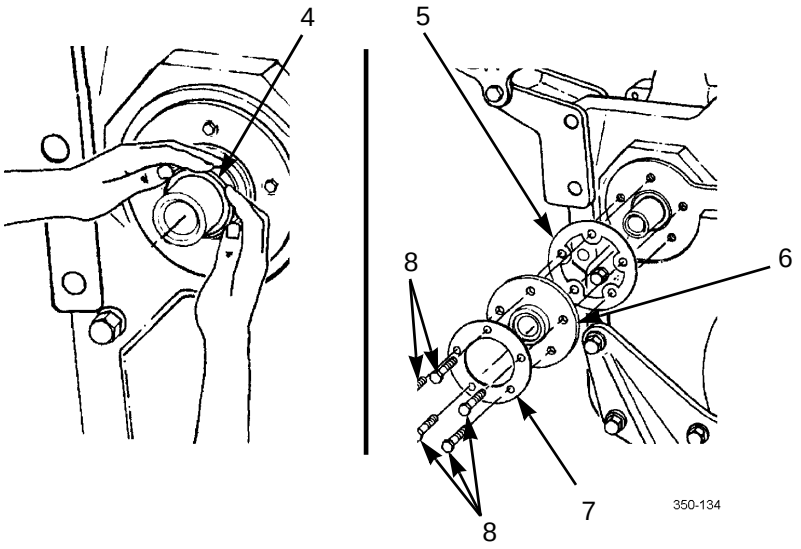
2. Use mechanical puller (2) to remove water pump pulley (3).



NOTE

Dust seal is removed as seal carrier is removed, or use a heel bar or similar tool to pry dust seal away from seal case, then remove by hand.

3. Remove dust seal (4). Discard dust seal.
4. Remove five screws (8), clamping ring (7), oil seal (6), and gasket (5). Discard oil seal and gasket.



REMOVAL - CONTINUED

5. Remove two water pump transfer connection screws (9).
6. Remove three water pump mounting screws (15).

NOTE

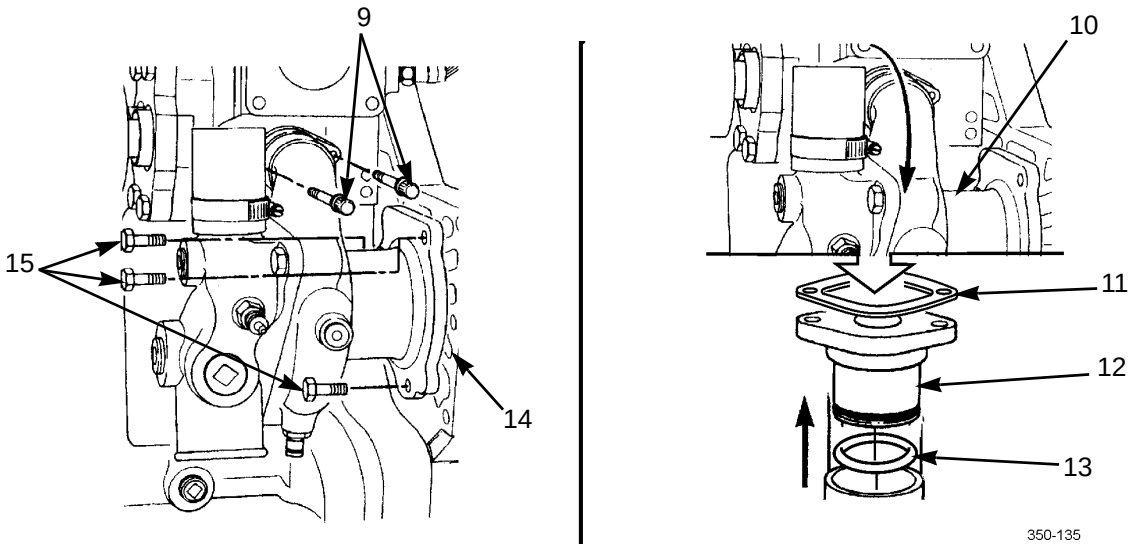
Rotate water pump outward to access transfer connection for removal.

7. Disconnect water transfer connection (12) and gasket (11) from engine and remove transfer connection and seal (13) from water pump (10). Discard gasket and seal.

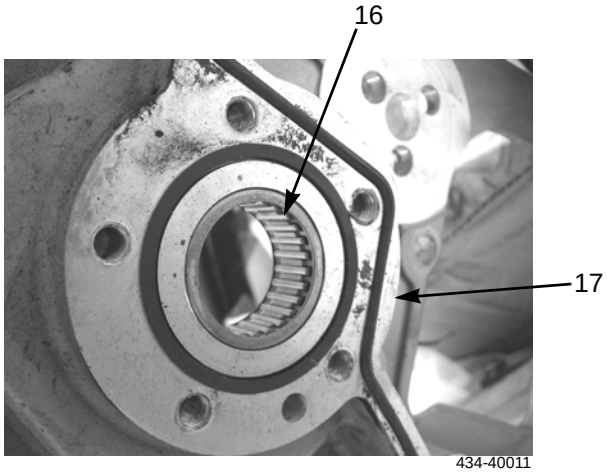
NOTE

Water pump must be rotated outward and angled downward while being removed to allow pump to pass thermostat housing support.

8. Remove water pump (10) and seal (14). Discard seal.



9. Inspect needle bearing (16) in front cover (17) for damage.

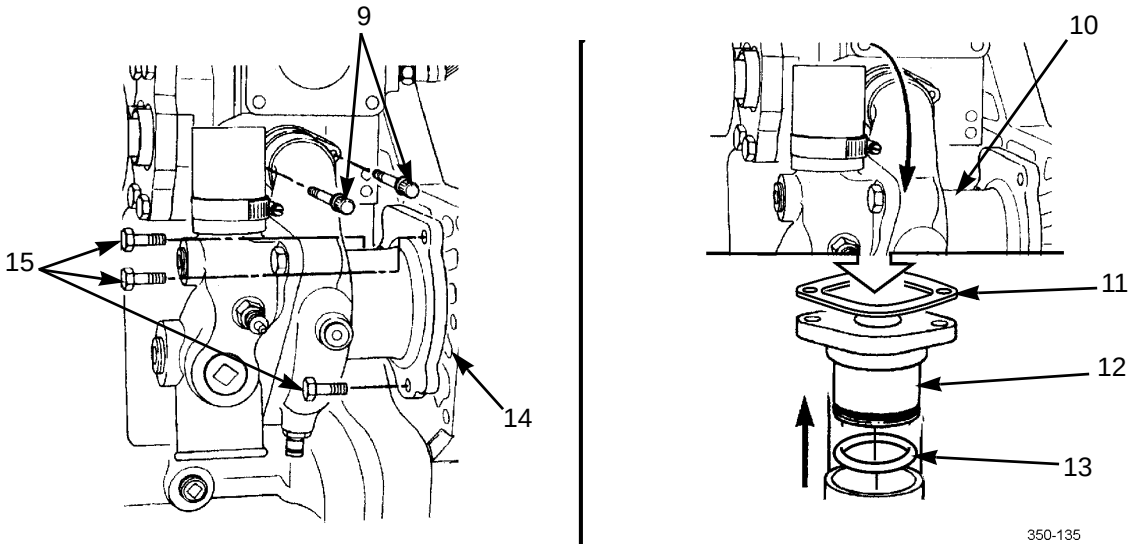


INSTALLATION

NOTE

Water pump must be rotated outward from the top until transfer outlet clears thermostat housing support during installation.

1. Install new seal (14) on water pump (10) and install water pump.
2. Install new seal (13) on transfer connection (12) and install transfer connection into water pump (10).
3. Rotate water pump (10) inward and install three water pump mounting screws (15). Tighten screws to 35 lb-ft (47 Nm).
4. Install new gasket (11) on water pump transfer connection (12).
5. Position transfer connection (12) and secure in place with two screws (9). Tighten screws to 18 lb-ft (24 Nm).



NOTE

Oil seal must be installed with lip of seal and shaft clean and dry. Yellow lip of seal must face out.

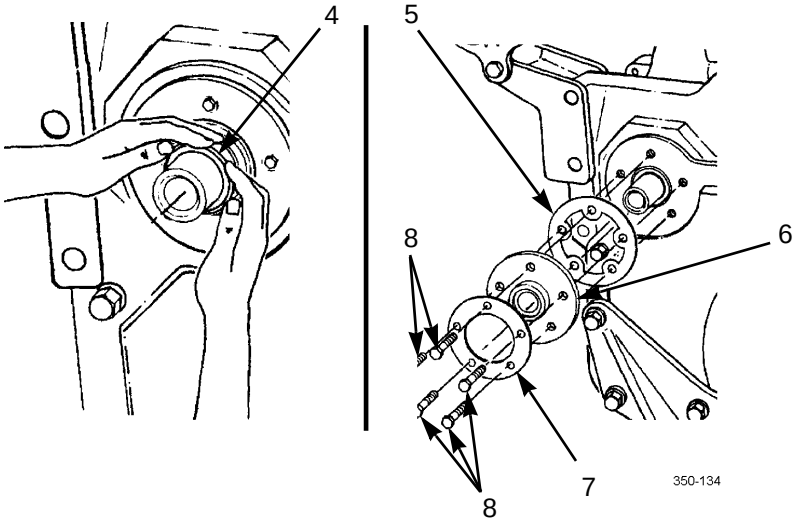
6. Install new gasket (5) and new oil seal (6).

INSTALLATION - CONTINUED

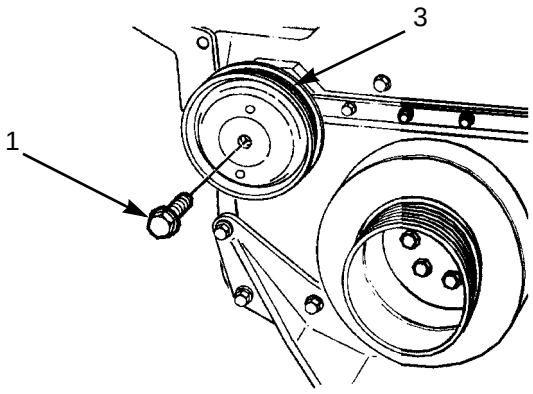
NOTE

To prevent oil leakage, use sealant on clamping ring mounting screws.

7. Install clamping ring (7) and secure in place with five screws (8). Tighten screws to 60 lb-in. (7 Nm). Repeat tightening screws to 180 lb-in. (20 Nm).
8. Apply a light coat of oil to inside of new dust seal (4) and install dust seal.



9. Using pusher adapter and pulley pusher, install water pump pulley (3).
10. Install water pump pulley retaining screw (1). Tighten screw to 55 lb-ft (75 Nm).



11. Install thermostat and thermostat housing (WP 0067 00).
12. Install alternator (WP 0070 00).
13. Install and adjust alternator drive belt (WP 0071 00).
14. Ensure cooling system is topped off (WP 0064 00).
15. Start engine and check for operation and leaks (TM 10-3930-675-10).
16. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

COOLANT FILTER REPLACEMENT 0069 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Filter, Coolant (P/N WF2071)

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

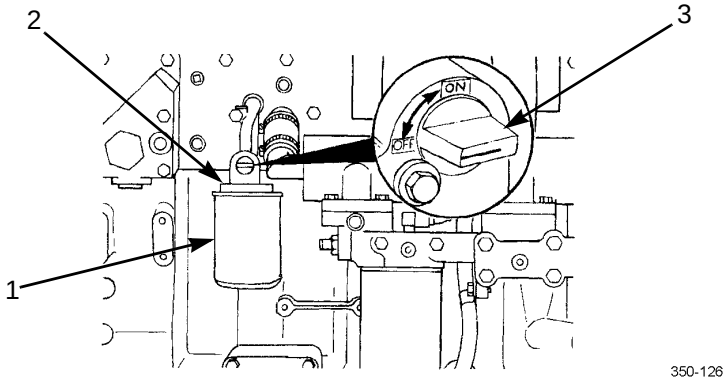
REMOVAL



WARNING

DO NOT perform maintenance on cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam, hot water, or coolant will cause serious burns.

1. Turn valve (3) on cooling filter head (2) to OFF position.
2. Remove and discard coolant filter (1).

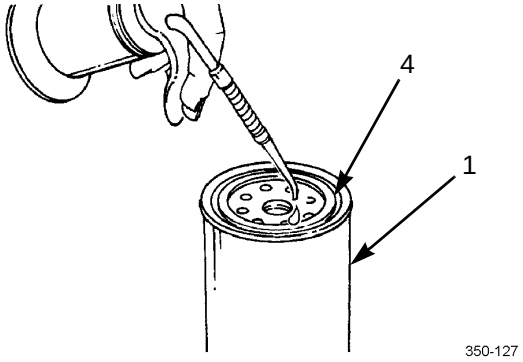


INSTALLATION

NOTE

Ensure coolant filter sealing surface is free of old gasket material.

1. Apply light coat of lubricating oil to gasket sealing surface (4) of new coolant filter (1).

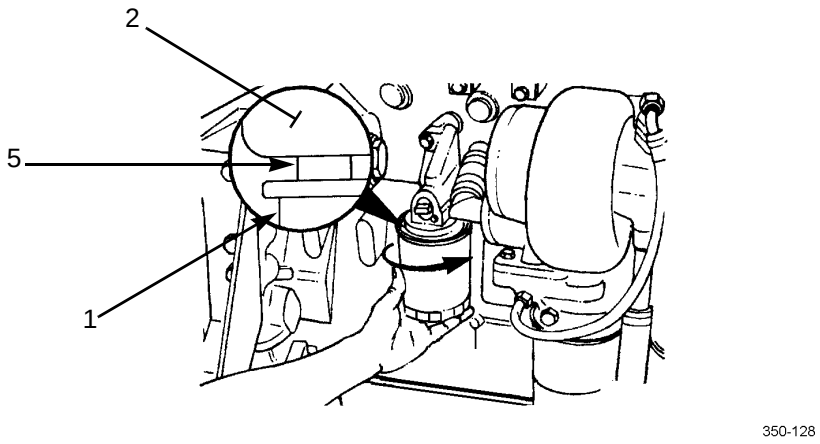


2. Install coolant filter (1) on filter head (2) and tighten until gasket (5) contacts filter head surface.

CAUTION

Overtightening can distort filter threads or damage filter head

3. Tighten coolant filter (1) an additional ½ to ¾ turn.

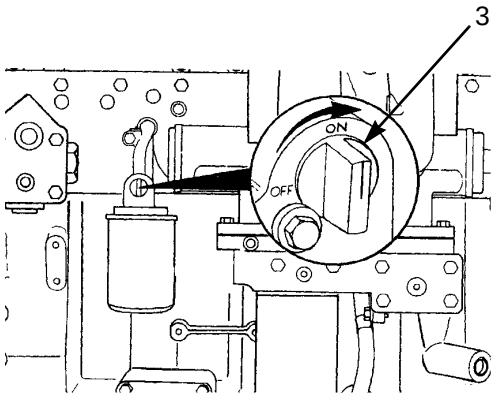


INSTALLATION - CONTINUED

CAUTION

Coolant filter head valve must be in ON position to prevent damage to engine.

4. Turn coolant filter head valve (3) to ON.



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5. Operate engine and check for leaks (TM 10-3930-675-10).
6. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ALTERNATOR REPLACEMENT 0070 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 7089)

Personnel Required

Two

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

Battery cables disconnected (WP 0110 00)

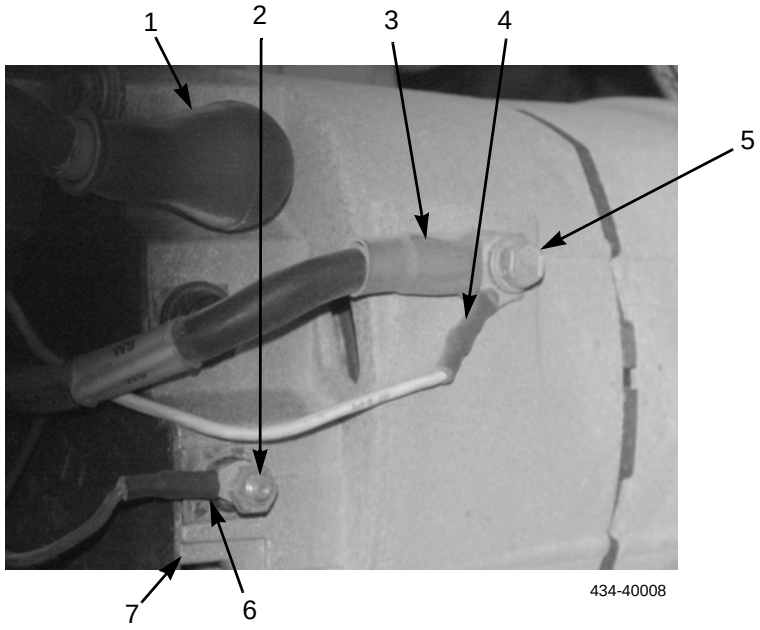
Alternator drive belt removed (WP 0071 00)

REMOVAL

NOTE

Tag wire leads prior to disconnection to ensure proper connection on installation.

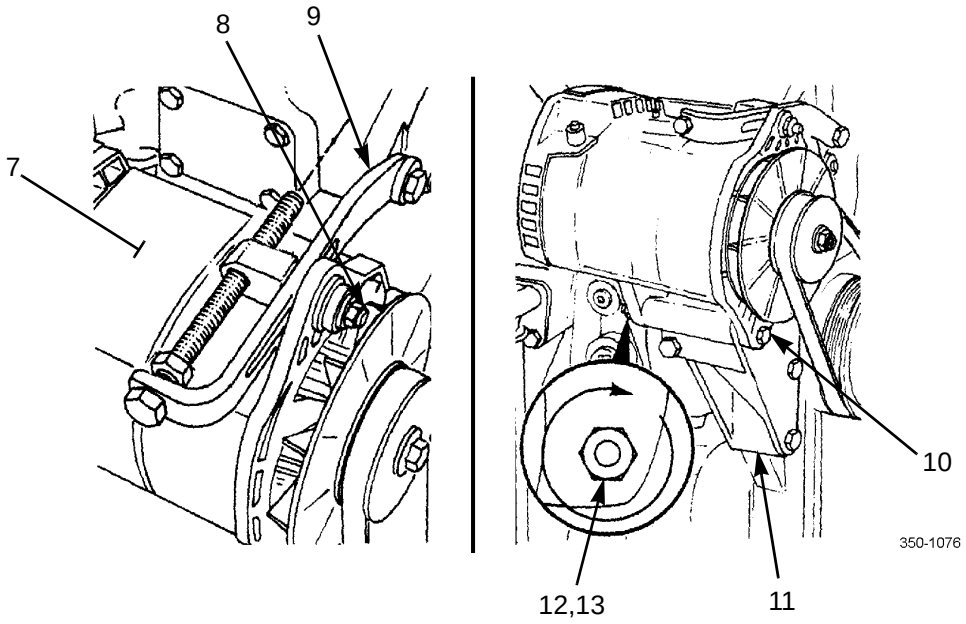
1. Remove two nuts (2) and bolt (5) and disconnect four wiring harness leads (1, 3, 4, and 6) from alternator (7). Replace hardware on alternator terminal.



ALTERNATOR REPLACEMENT - CONTINUED 0070 00

REMOVAL - CONTINUED

2. Remove adjusting link screw (8) securing alternator (7) to adjusting bracket (9).
3. With assistant holding alternator (7), remove mounting screw (10), locknut (12), and washer (13) securing alternator to mounting bracket (11). Remove alternator and discard locknut.

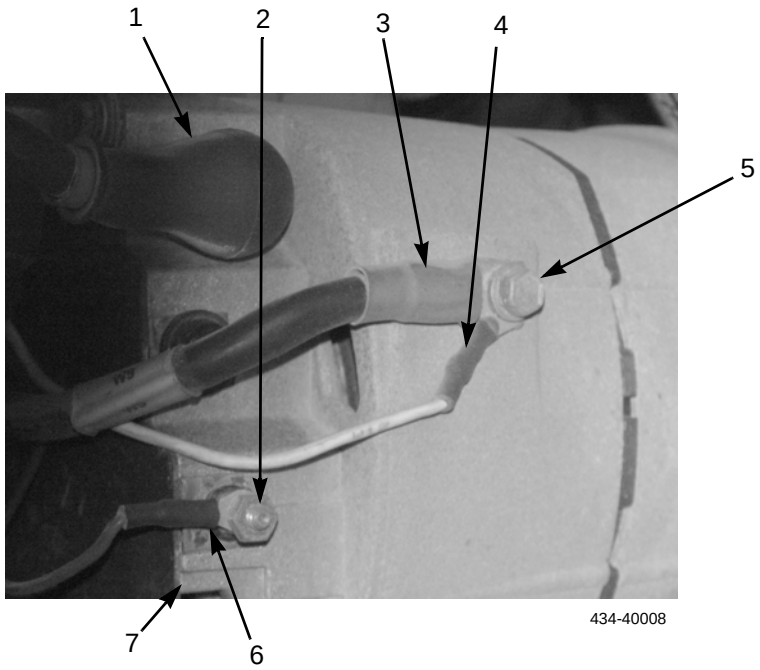


INSTALLATION

1. Position alternator (7) on mounting bracket (11) and secure with screw (10), washer (13), and new locknut (12). Tighten hand tight.
2. Install adjusting link screw (8). Tighten hand tight.
3. Install alternator drive belt (WP 0071 00).

INSTALLATION - CONTINUED

4. Connect four wiring harness leads (1, 3, 4, and 6) to alternator (7) and secure with two nuts (2) and bolt (5).



5. Connect battery cables (WP 0110 00).
6. Adjust alternator belt tension (WP 0071 00).
7. Start engine (TM 10-3930-675-10) and verify operation of alternator.
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ALTERNATOR DRIVE BELT MAINTENANCE 0071 00

THIS WORK PACKAGE COVERS

Removal, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Belt, Tension Gage (Item 9, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Torque (Item 144, WP 0289 00)

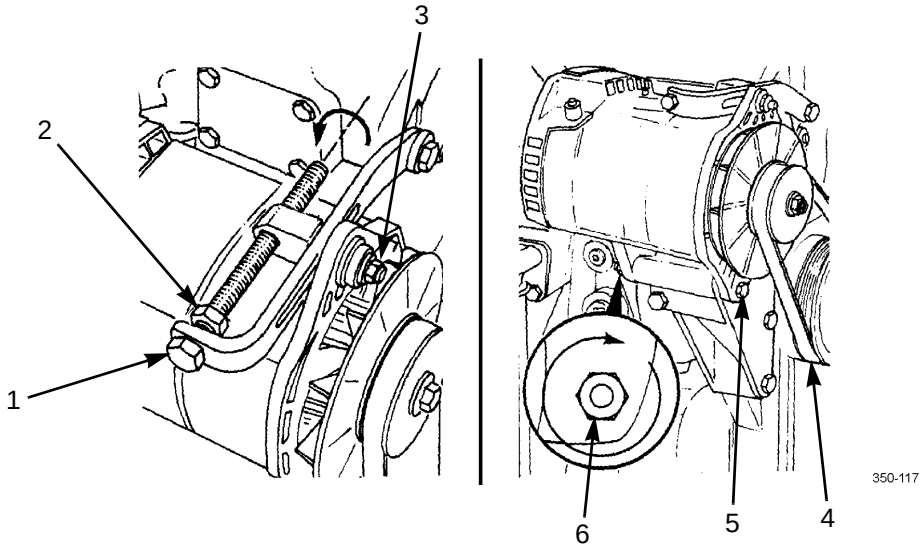
Equipment Condition

Engine cover removed (WP 0148 00)

Master battery switch in OFF position

REMOVAL

1. Loosen jamnut (2).
2. Loosen adjusting link retaining screw (3).
3. Loosen alternator mounting screw (5) and locknut (6).
4. Turn adjusting screw (1) counterclockwise to release alternator drive belt (4) tension.
5. Remove alternator drive belt (4).



INSTALLATION

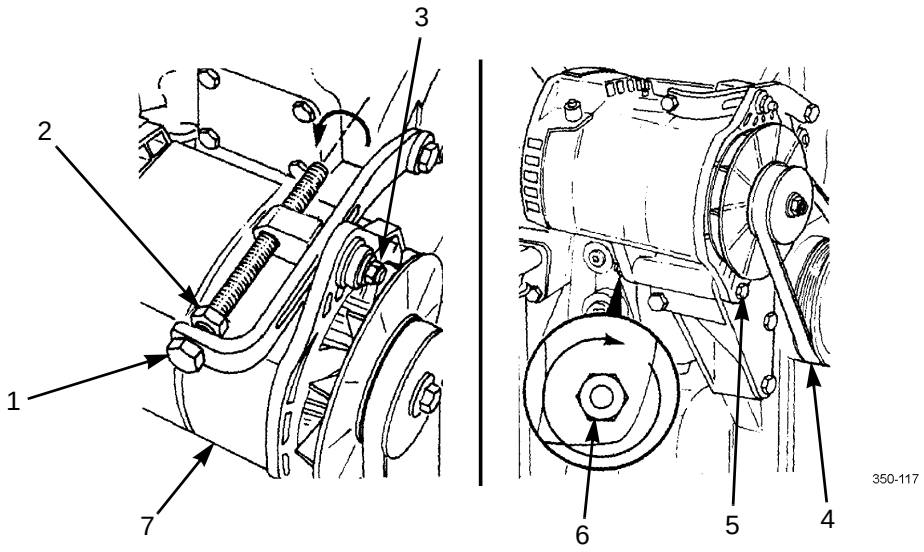
CAUTION

Do not roll drive belt over pulley or pry on drive belt with tools. Rolling or prying on belt can cause damage and shorten life of belt.

NOTE

Ensure sufficient slack adjustment has been allowed to install drive belt.

1. Install drive belt (4).
2. Position alternator (7) to remove slack in drive belt (4) and tighten adjusting link retaining screw (3) to hold alternator in place.
3. Turn adjusting screw (1) clockwise to increase belt tension and tighten jamnut (2) (refer to *Adjustment*).
4. Tighten retaining screw (3) to 60 lb-ft (81 Nm).
5. Tighten alternator mounting screw (5) and locknut (6) to 35 lb-ft (47 Nm).

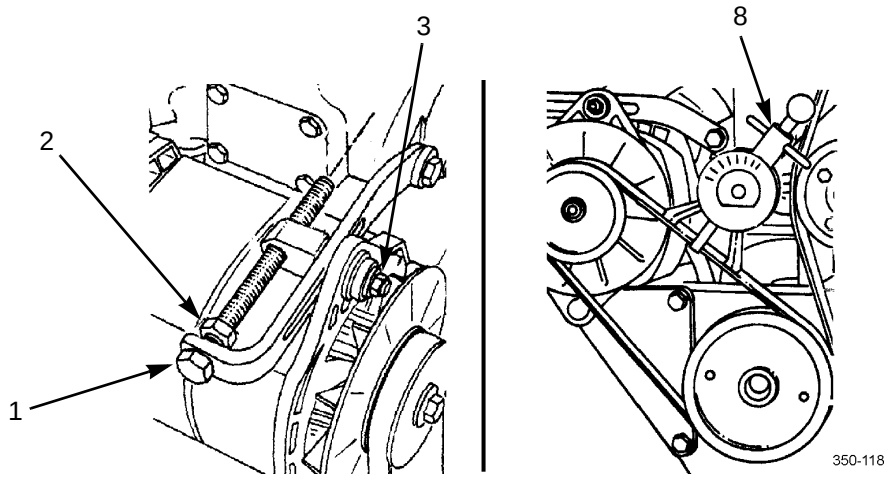


ADJUSTMENT

NOTE

- **Belt tension for new alternator drive belt should be 140 lb-ft (190 Nm). For a used belt, adjustment range on belt tension is 60-110 lb-ft (81-149 Nm).**
- **A drive belt which has been in service more than 10 minutes is considered a used belt.**

1. Measure belt tension with gage (8). If measurement is within specified range, no adjustment is required. If measurement is not as specified, proceed to next step.
2. Loosen jamnut (2).



NOTE

Turn adjusting screw clockwise to increase tension. Turn adjusting screw counterclockwise to decrease tension.

3. Turn adjusting screw (1) to obtain correct tension. Tighten jamnut (2).
4. Tighten retaining screw (3) to 60 lb-ft (81 Nm).
5. Tighten alternator mounting screw (5) and locknut (6) to 35 lb-ft (47 Nm).
6. Turn master battery switch to ON position.
7. Start engine (TM 10-3930-675-10) and run for approximately 10 minutes. Shut engine down and check belt tension. Readjust belt tension as required.
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

STARTER REPLACEMENT 0072 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Gasket (P/N 3031007)

Personnel Required

Two

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

Battery cables disconnected (WP 0110 00)

REMOVAL



WARNING

Remove all jewelry, watches, rings, etc., prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

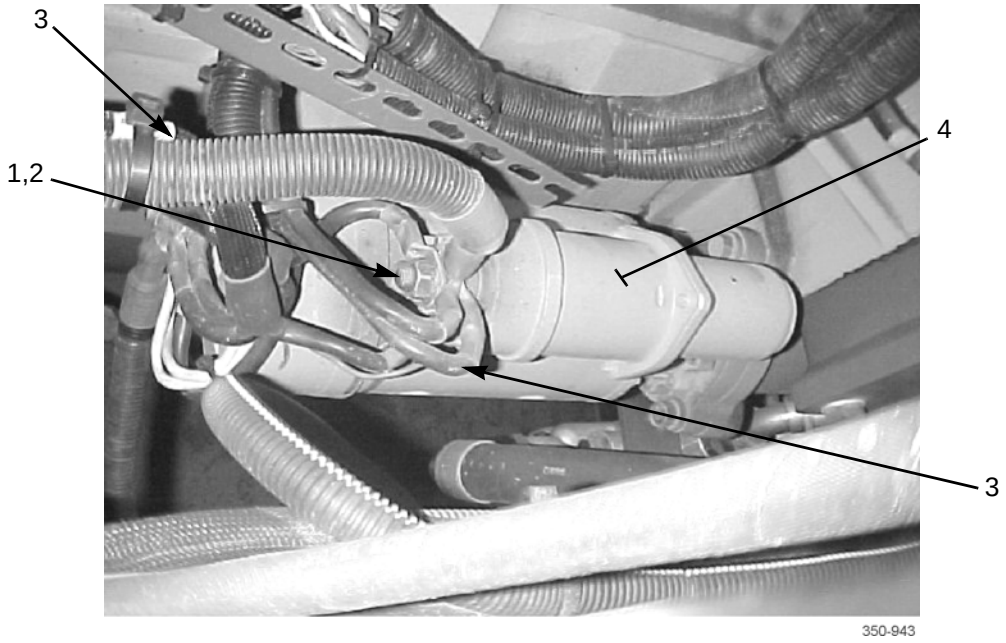
NOTE

- **Tag cables prior to disconnection to ensure proper connection on installation.**
- **Remove tiedown straps and discard.**
- **Perform step 1 at rear of starter solenoid.**

STARTER REPLACEMENT - CONTINUED 0072 00

REMOVAL - CONTINUED

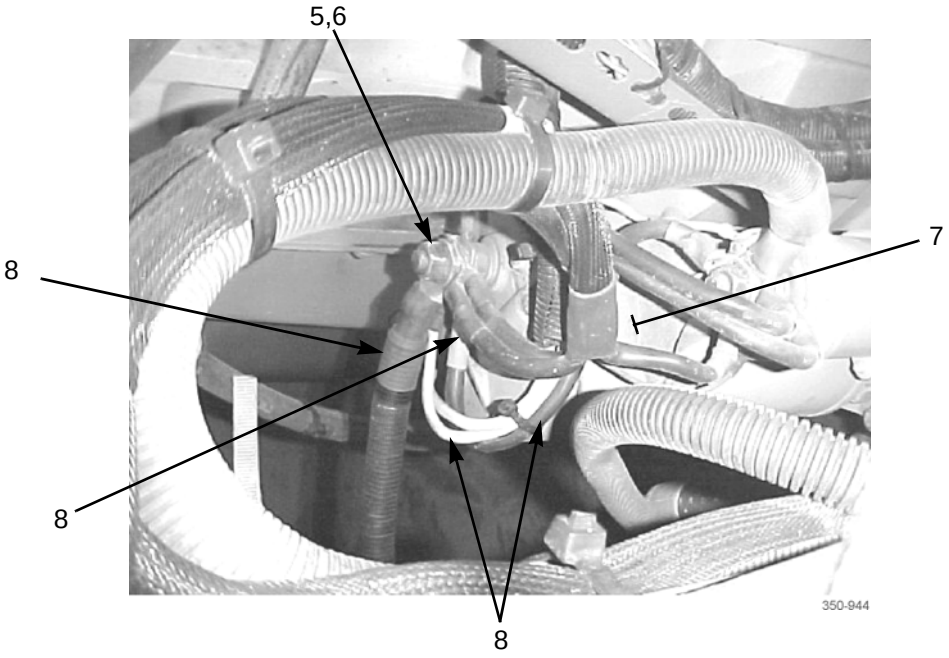
1. Remove nut (1), washer (2), and terminals of cables (3) from solenoid (4). Replace washer and nut.



NOTE

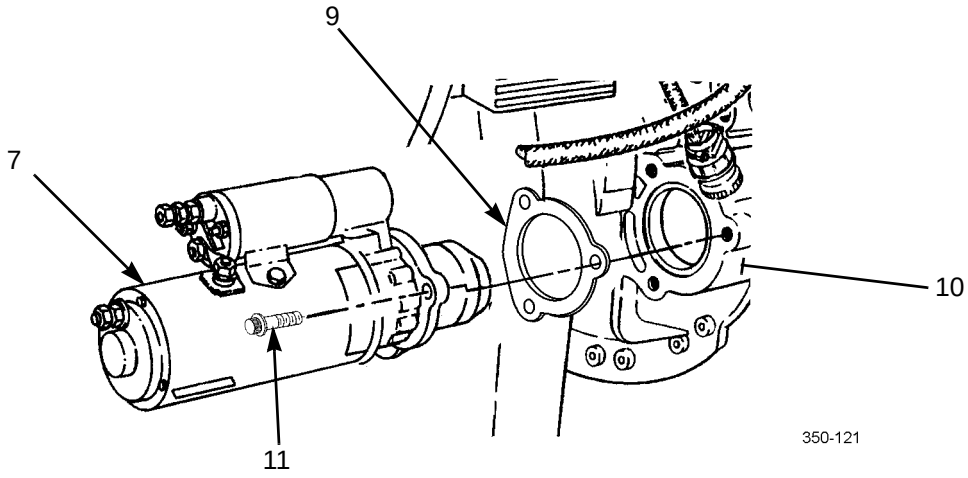
Perform step 2 at rear of starter.

2. Remove nut (5), washer (6), and terminals of cables (8) from starter (7). Replace washer and nut.



REMOVAL - CONTINUED

3. Remove three screws (11), starter (7), and gasket (9) from engine (10). Discard gasket.



INSTALLATION

NOTE

Ensure all old gasket material has been removed from mating surfaces.

1. Install new gasket (9) and starter (7) on engine (10) with three screws (11). Tighten screws to 140 lb-ft (190 Nm).

NOTE

Perform step 2 at rear of starter.

2. Install terminals of cables (8) to starter (7) with washer (6) and nut (5).

NOTE

Perform step 3 at rear of starter solenoid.

3. Install terminals of cables (3) on solenoid (4) with washer (2) and nut (1).
4. Connect battery cables (WP 0110 00).
5. Install new tiedown straps.
6. Perform operational check of engine (TM 10-3930-675-10).
7. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

INSTRUMENT PANEL SWITCHES, GAGES, AND PANEL LAMPS REPLACEMENT 0073 00

THIS WORK PACKAGE COVERS

Rocker Switch: Removal, Installation
Rotary Switch: Removal, Installation
Gage: Removal, Installation
Instrument Panel Lamp: Removal, Installation
12/24V Connector: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Key Set, Socket Head Screw (Item 67, WP 0289 00)

Tools and Special Tools - Continued

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

NOTE

- **Instrument panel switches, gages, and panel lamps are replaced the same way, except where minor differences are noted.**
- **Remove and discard tiedown straps as required. Use new tiedown straps on installation.**
- **Tag wires and connectors as required.**

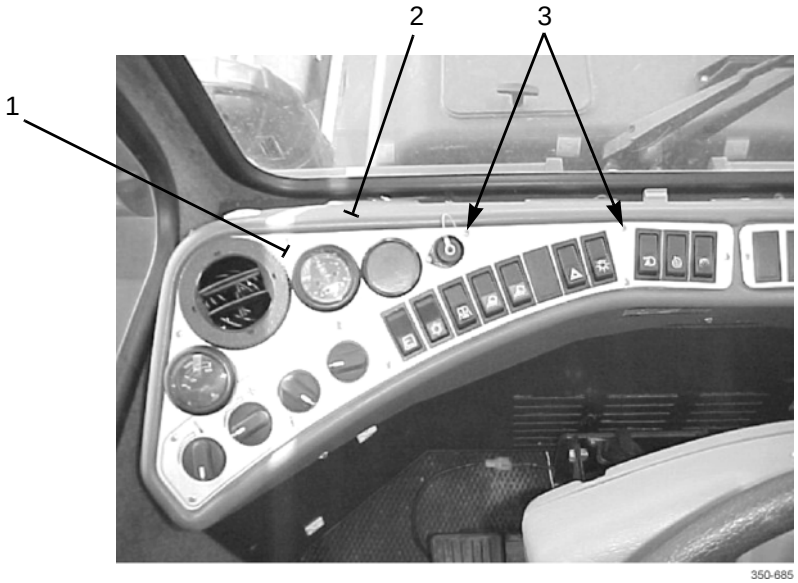
ROCKER SWITCH REMOVAL

NOTE

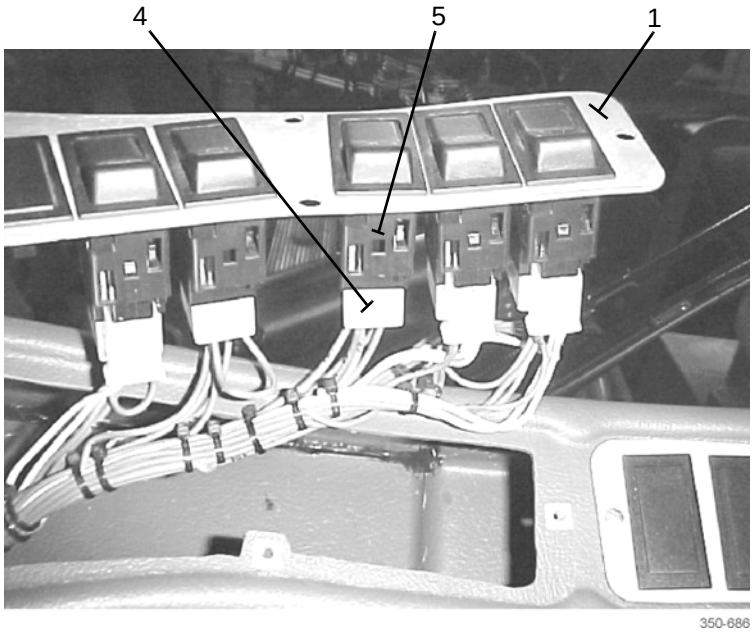
Perform step 1 for left or right switch/gage panel. Left panel (shown) has ten screws. Right panel has five screws.

ROCKER SWITCH REMOVAL - CONTINUED

1. Remove ten screws (3) from switch/gage panel (1).
2. Lift switch/gage panel (1) upward from instrument panel (2) to gain access to rear of panel.



3. Lift tab of instrument panel wiring harness connector (4) and disconnect connector from switch (5).
4. To remove switch lamp, refer to *Instrument Panel Lamp Removal*.
5. Depress tabs at sides of switch (5) and push switch upward and out of switch/gage panel (1).

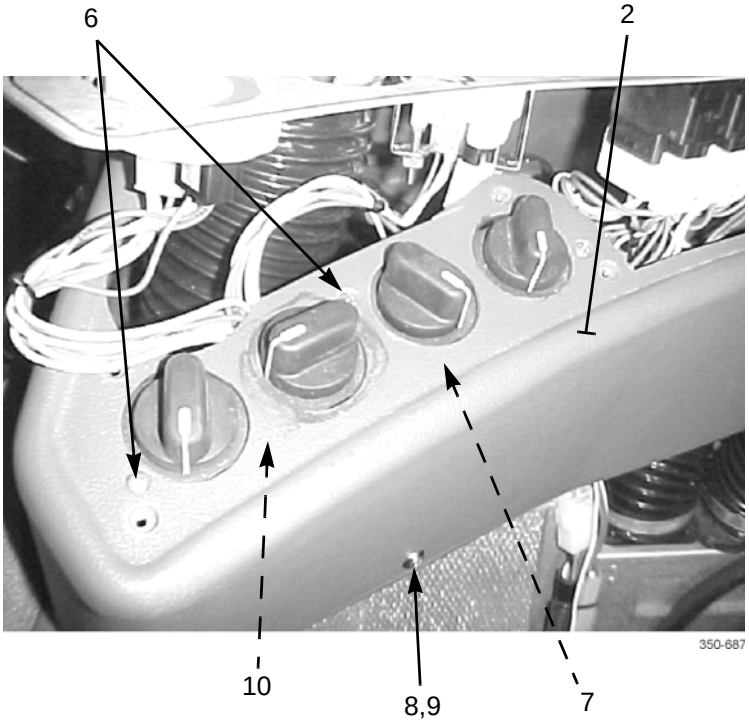


ROCKER SWITCH INSTALLATION

1. Push switch (5) down into switch/gage panel (1) until flush with panel.
2. To install switch lamp, refer to *Instrument Panel Lamp Installation*.
3. Connect instrument panel wiring harness connector (4) to switch (5).
4. Install switch/gage panel (1) on instrument panel (2) with ten screws (3).

ROTARY SWITCH REMOVAL

1. Remove ten screws (3) from switch/gage panel (1).
2. Lift switch/gage panel (1) upward from instrument panel (2).
3. Remove six screws (8) and washers (9) from instrument panel (2) to gain access to switches (7).
4. Remove three screws (6) to separate switch plate (10) from instrument panel (2) and pull switch plate downward for access to switches (7).



ROTARY SWITCH REMOVAL - CONTINUED

5. Loosen setscrew (13) and remove knob (11) from switch (7) to be replaced.
6. Remove nut (12) and switch (7) from switch plate (10).

NOTE

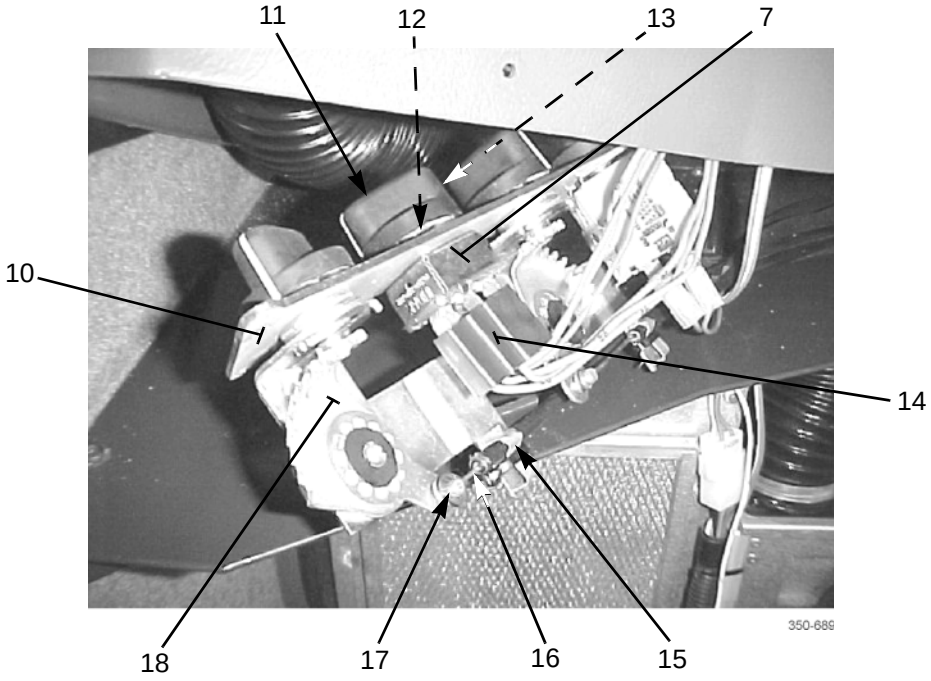
Perform step 7 for switches with electrical connectors.

7. Disconnect connector(s) (14) of instrument panel wiring harness from rear of switch (7).

NOTE

Perform steps 8 and 9 for switches with control cables.

8. Remove pushnut (17) and disconnect control cable (16) from rear of switch (18).
9. Remove tiedown strap, lift tab of clip (15), and remove clip and control cable (16) from switch (18). Discard tiedown strap.



ROTARY SWITCH INSTALLATION

NOTE

Perform steps 1 and 2 for switches with control cables.

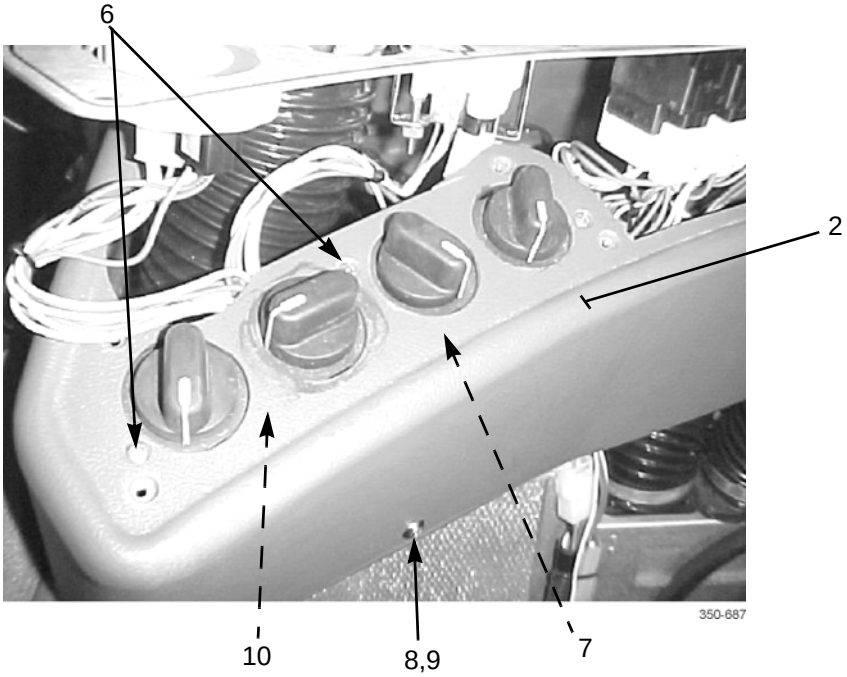
1. Install control cable (16) on switch (18) with clip (15) and install new tiedown strap.
2. Connect control cable (16) to rear of switch (18) and install pushnut (17).

ROTARY SWITCH INSTALLATION - CONTINUED

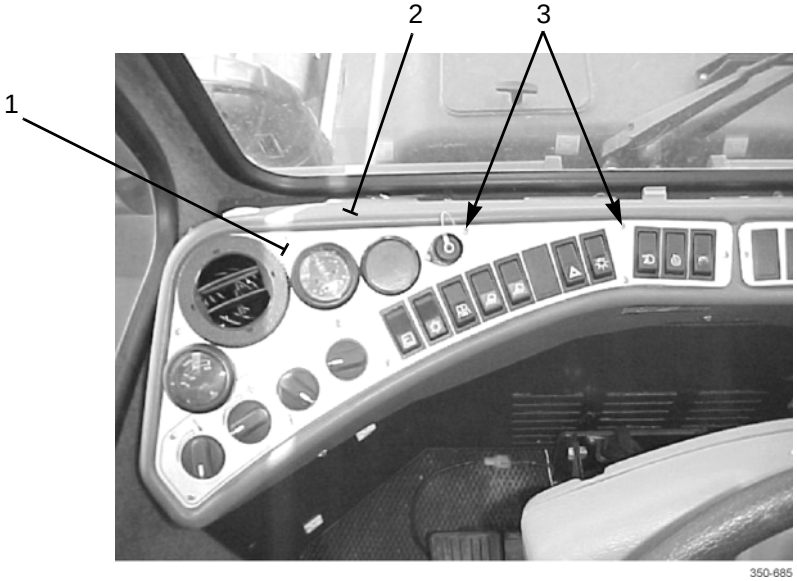
NOTE

Perform step 3 for switches with electrical connectors.

3. Connect instrument panel wiring harness connector(s) (14) to rear of switch (7).
4. Push switch (7) upward through hole in switch plate (10) and install nut (12).
5. Press knob (11) onto shaft of switch (7) and tighten setscrew (13).
6. Install switch plate (10) on instrument panel (2) with three screws (6).
7. Install instrument panel (2) with six washers (9) and screws (8).



8. Install switch/gage panel (1) on instrument panel (2) with ten screws (3).



GAGE REMOVAL

1. Perform steps 1 and 2 of *Rocker Switch Removal* to gain access to rear of gage.
2. To remove gage lamp, refer to *Instrument Panel Lamp Removal*.

NOTE

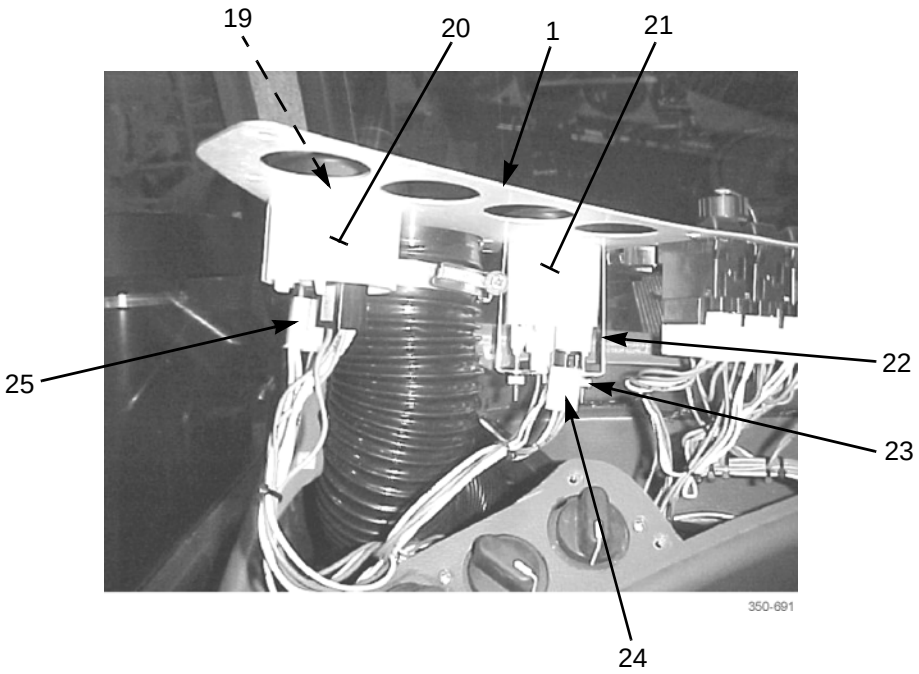
Perform steps 3 and 4 for fuel gage.

3. Disconnect instrument panel wiring harness connector (25) from rear of gage (19).
4. Remove retainer (20) and gage (19) from switch/gage panel (1).

NOTE

Perform steps 5 and 6 for hour meter gage.

5. Disconnect instrument panel wiring harness connector (24) from rear of gage (21).
6. Remove two nuts (23), retainer (22), and gage (21) from switch/gage panel (1).



GAGE INSTALLATION

NOTE

Perform steps 1 and 2 for hour meter gage.

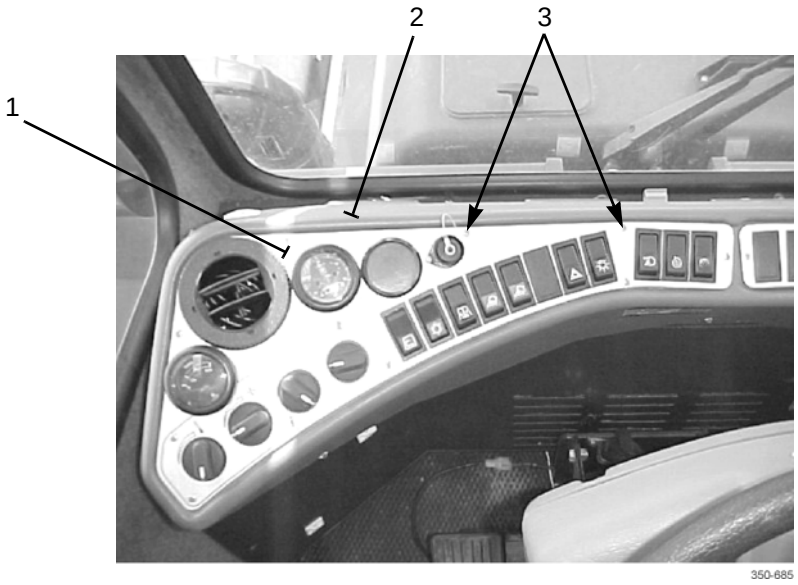
1. Install gage (21) on switch/gage panel (1) with retainer (22) and two nuts (23).
2. Connect instrument panel wiring harness connector (24) to gage (21).

NOTE

Perform steps 3 and 4 for fuel gage.

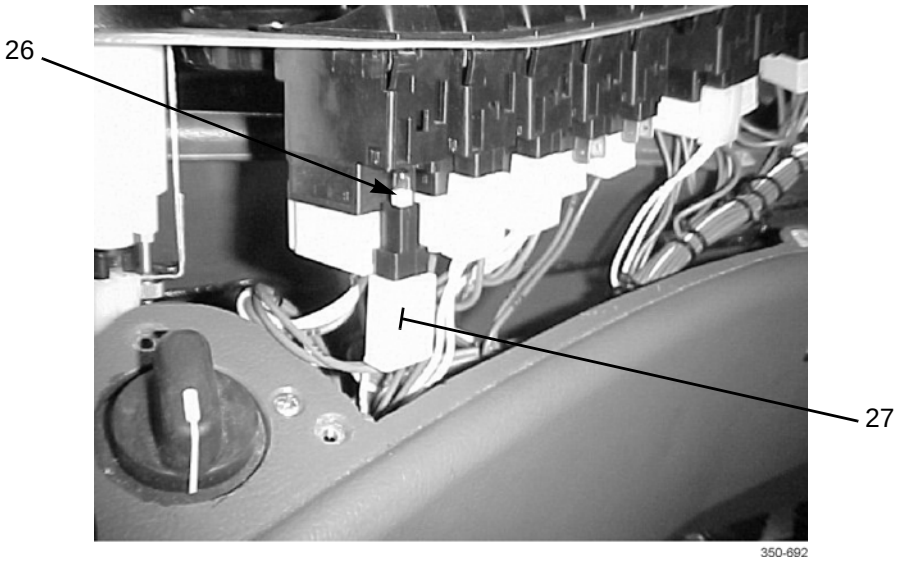
GAGE INSTALLATION - CONTINUED

3. Install gage (19) on switch/gage panel (1) with retainer (20).
4. Connect instrument panel wiring harness connector (25) to gage (19).
5. To install gage lamp, refer to *Instrument Panel Lamp Installation*.
6. Install switch/gage panel (1) on instrument panel (2) with ten screws (3).



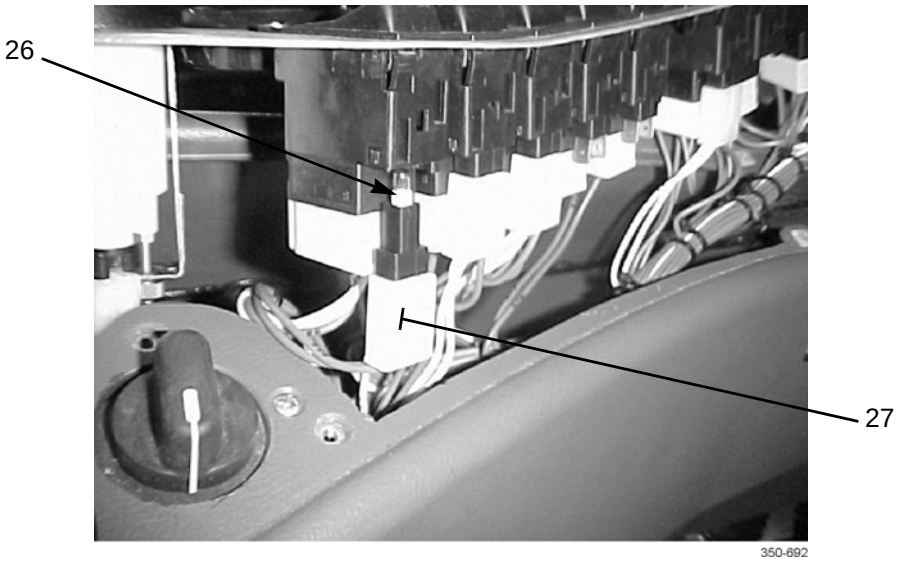
INSTRUMENT PANEL LAMP REMOVAL

1. Perform steps 1 and 2 of *Rocker Switch Removal* to gain access to instrument panel lamps.
2. Disconnect lamp (26), with connector (27) attached, from switch or gage.
3. Remove lamp (26) from connector (27).

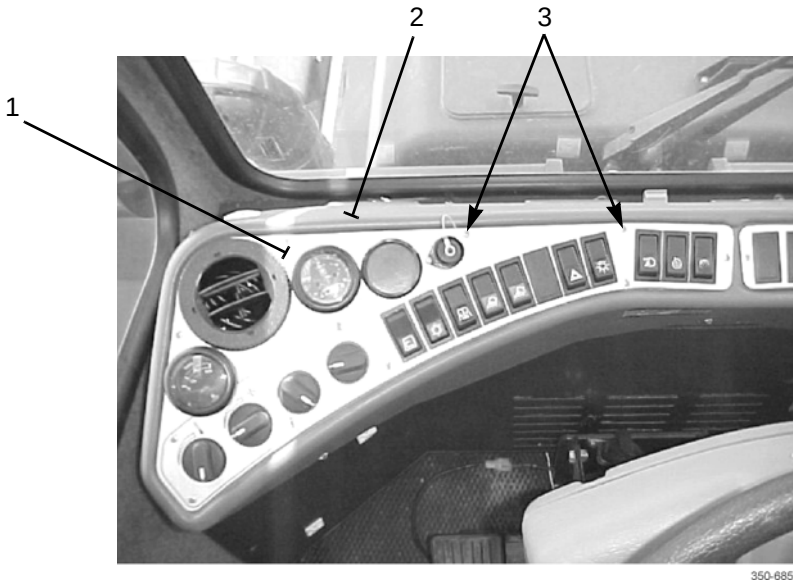


INSTRUMENT PANEL LAMP INSTALLATION

1. Install lamp (26) on connector (27).
2. Connect lamp (26), with connector (27) attached, to switch or gage.



3. Install switch/gage panel (1) on instrument panel (2) with ten screws (3).

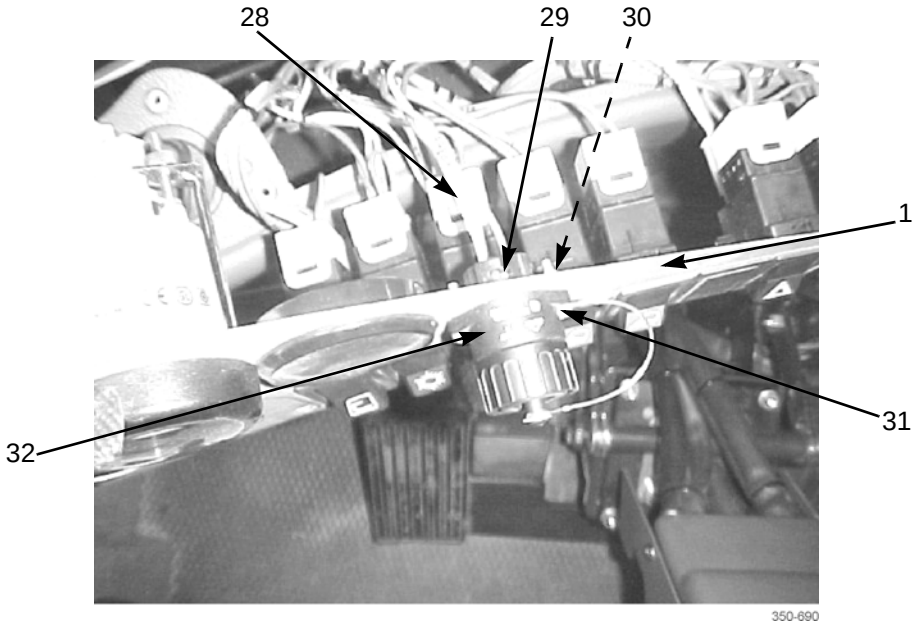


12/24V CONNECTOR REMOVAL

1. Perform steps 1 and 2 of *Rocker Switch Removal* to gain access to 12/24V connector (32).
2. Remove three nuts (30), two screws (31), and 12/24V connector (32) from switch/gage panel (1).

12/24V CONNECTOR REMOVAL - CONTINUED

3. Loosen three screws (29) and disconnect three wires (28) from rear of 12/24V connector (32).



12/24V CONNECTOR INSTALLATION

1. Thread three wires (28) through switch/gage panel (1).
2. Connect three wires (28) to rear of 12/24V connector (32) and tighten three screws (29).
3. Install 12/24V connector (32) on switch/gage panel (1) with two screws (31) and three nuts (30).
4. Install switch/gage panel (1) on instrument panel (2) with ten screws (3).

END OF WORK PACKAGE

CIRCUIT BREAKERS AND RELAYS REPLACEMENT 0074 00

THIS WORK PACKAGE COVERS

Cab Distribution Box Circuit Breakers and Relays: Removal, Installation

50A Circuit Breakers: Removal, Installation

Starter Relay: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

References

WP 0110 00

WP 0148 00

Equipment Condition

Master battery switch in OFF position

CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS REMOVAL

NOTE

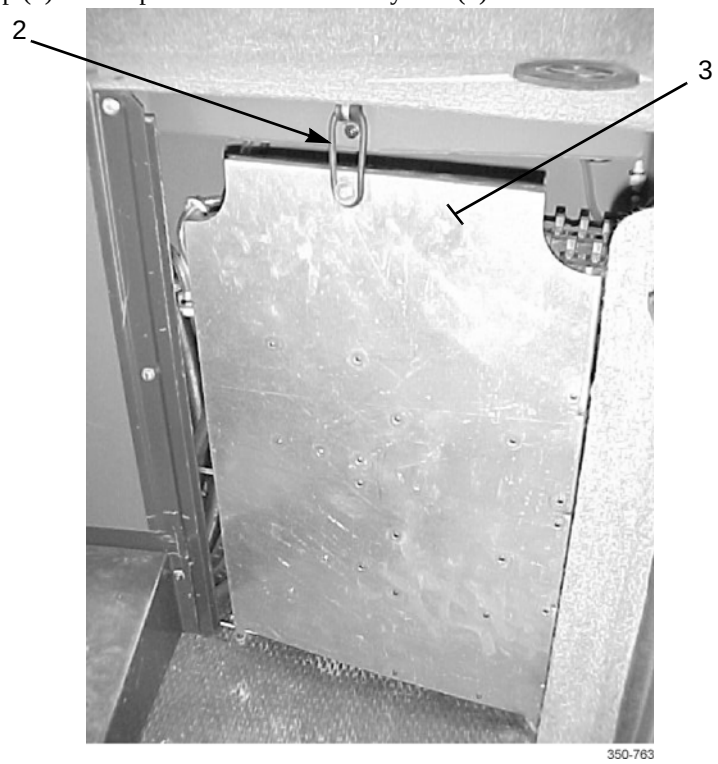
All circuit breakers and relays are replaced the same way, except where minor differences are noted.

1. Lift and remove access panel (1) from left rear of cab.

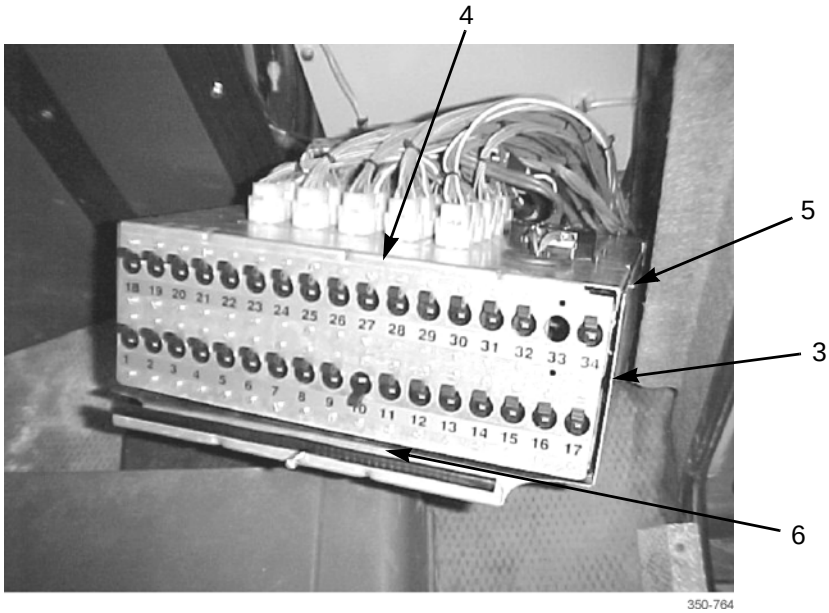


CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS REMOVAL - CONTINUED

2. Disconnect elastic loop (2) from top of circuit breaker/relay box (3). Tilt box forward.



3. Remove two screws (5) from side of circuit breaker/relay box (3) and separate circuit breaker panel (4) from relay panel (6).

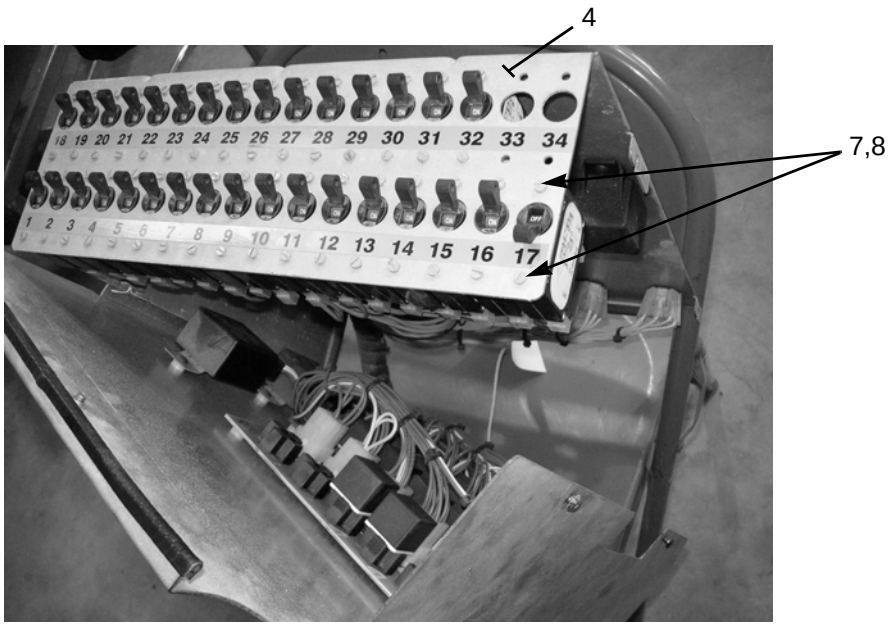


NOTE

Each of 34 circuit breakers is removed the same way.

CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS REMOVAL - CONTINUED

4. Remove two screws (7) and washers (8) from circuit breaker panel (4).

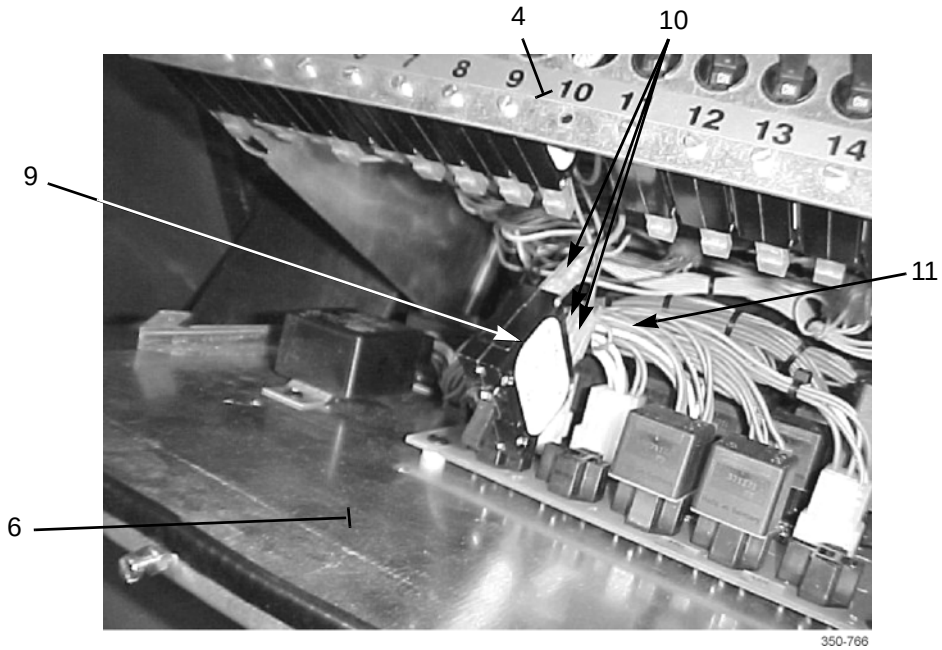


5. Push circuit breaker (9) downward through hole in circuit breaker panel (4).

NOTE

Tag connectors for installation.

6. Disconnect three connectors (10) of wiring harness (11) from rear of circuit breaker (9). Remove circuit breaker.

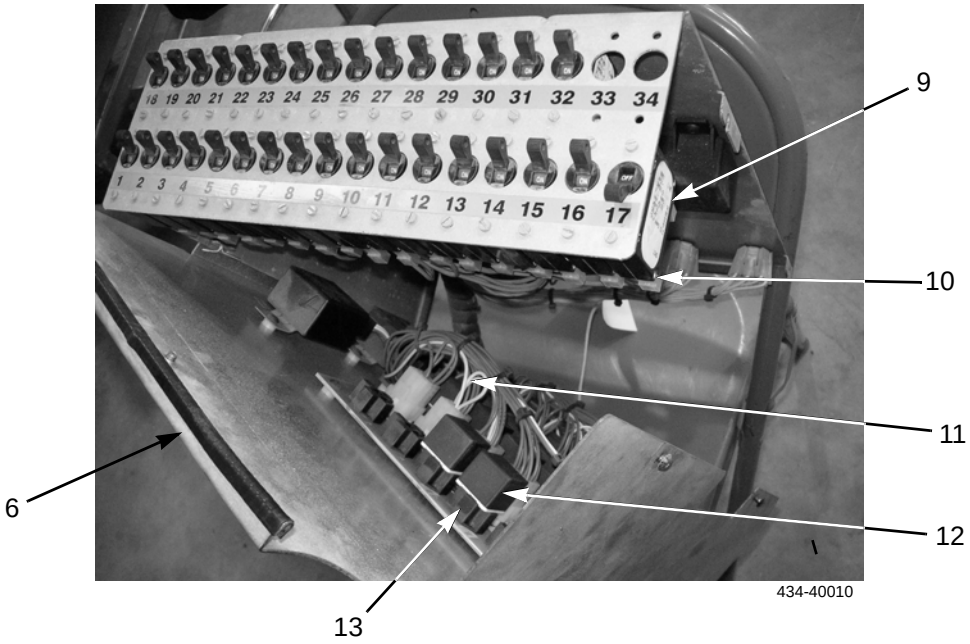


CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS REMOVAL - CONTINUED

NOTE

Perform step 7 to remove each of 15 relays.

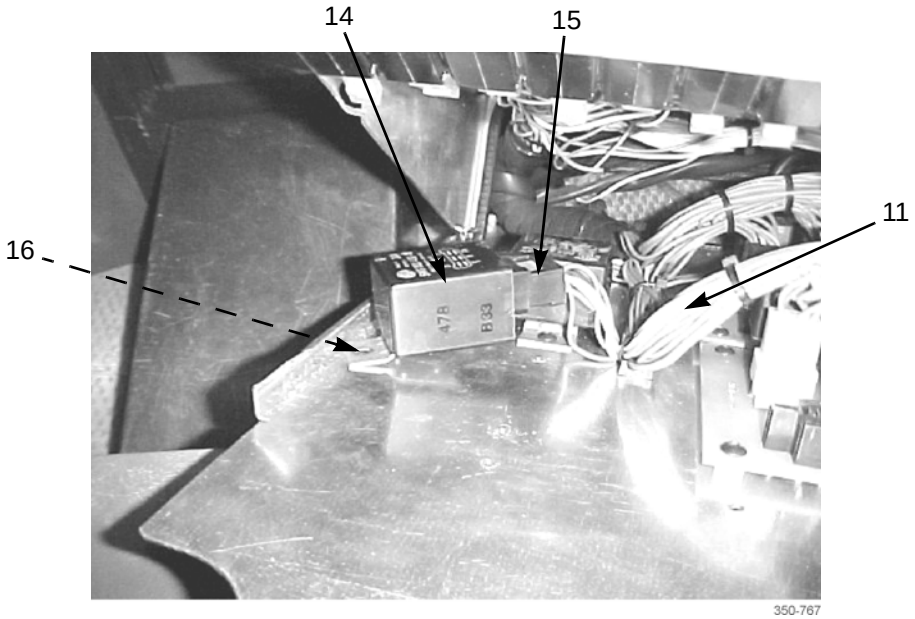
7. Disconnect relay (12) from terminal block (13) of relay panel (6).



NOTE

Perform step 8 to remove each of two relays.

8. Remove screw (16) and disconnect connector (15) of wiring harness (11) from relay (14).



CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS INSTALLATION

NOTE

Perform step 1 to install each of two relays.

1. Connector connector (15) of wiring harness (11) to relay (14) and install screw (16).

NOTE

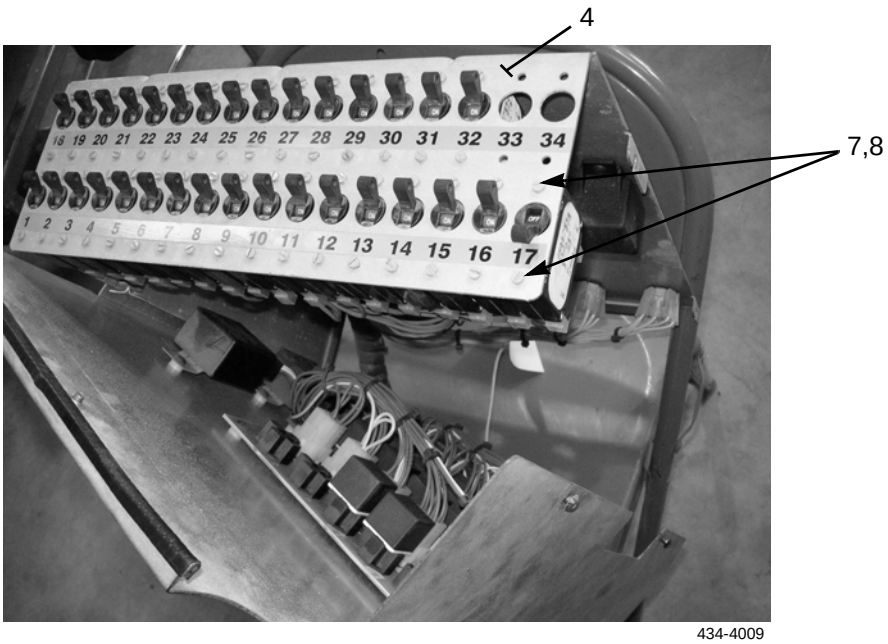
Perform step 2 to install each of 15 relays.

2. Connect relay (12) to terminal block (13) of relay panel (6).

NOTE

Each of 34 circuit breakers is installed the same way.

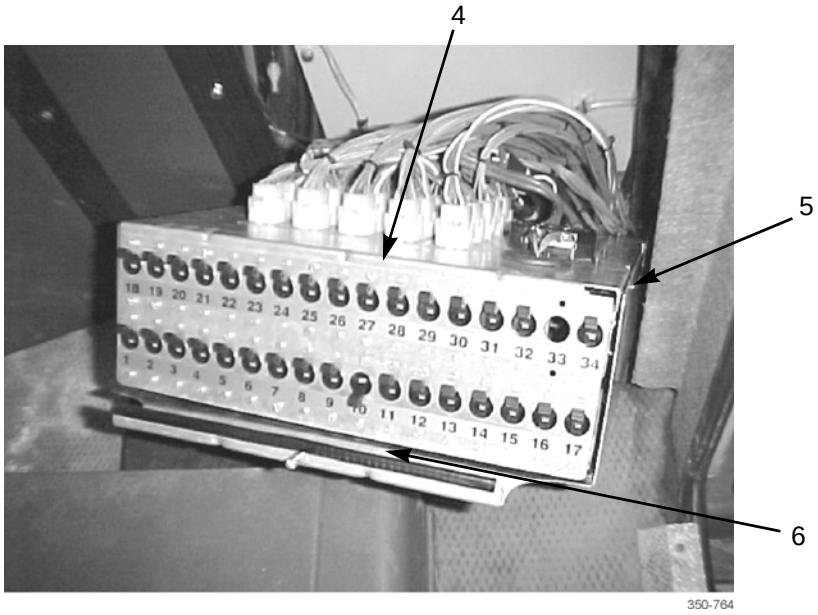
3. Connect three connectors (10) of wiring harness (11) to rear of circuit breaker (9).
4. Push circuit breaker (9) upward through hole in circuit breaker panel (4).
5. Install circuit breaker (9) with two washers (8) and screws (7).



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CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS INSTALLATION - CONTINUED

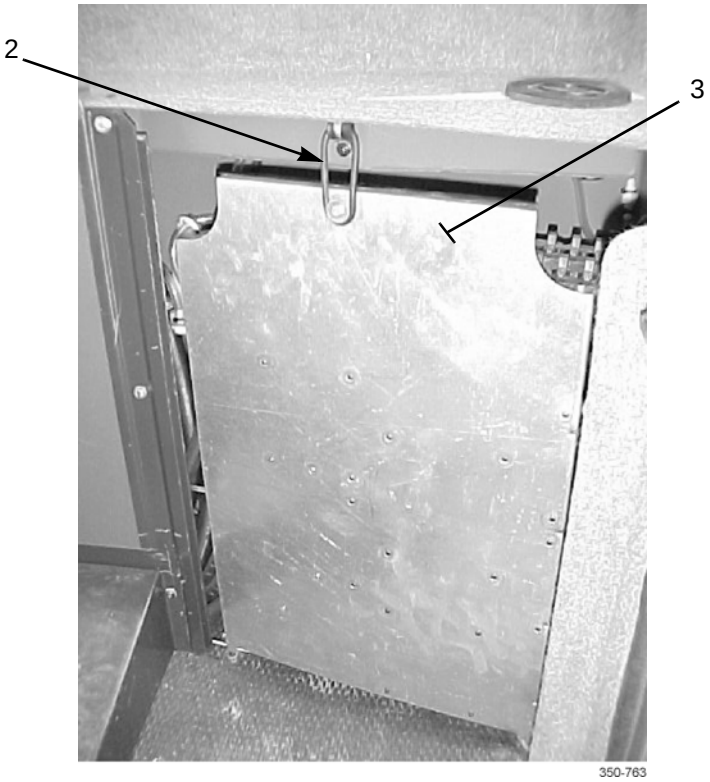
6. Position circuit breaker panel (4) on relay panel (6) and install two screws (5).



NOTE

Ensure all circuit breakers remain in ON position while circuit breaker/relay box is secured.

7. Tilt circuit breaker/relay box (3) rearward and connect elastic loop (2) to top of box.



CAB DISTRIBUTION BOX CIRCUIT BREAKERS AND RELAYS INSTALLATION - CONTINUED

8. Install access panel (1) on cab.



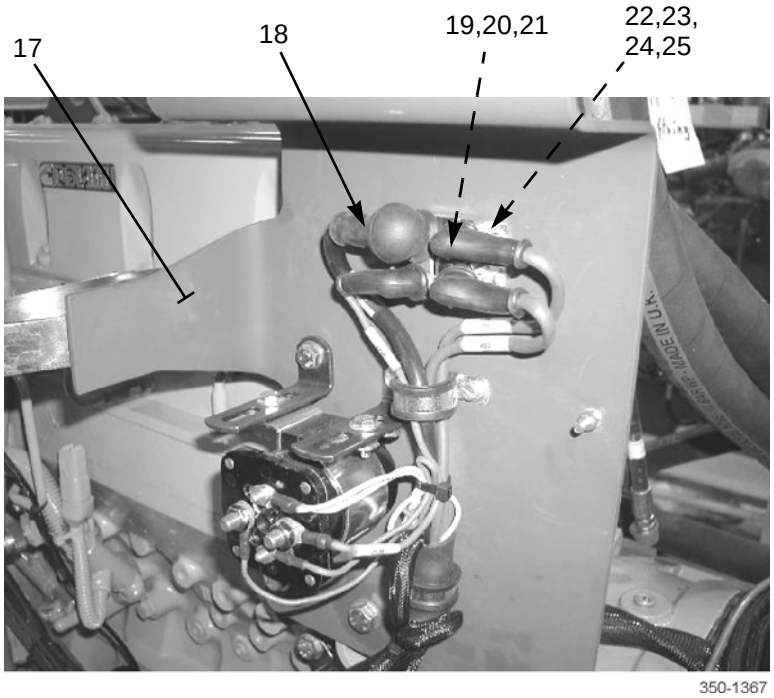
50A CIRCUIT BREAKERS REMOVAL

1. Remove engine cover (WP 0148 00).
2. Disconnect battery cables (WP 0110 00).

NOTE

Tag wires for installation.

3. Remove protective covers (18) from 50A circuit breaker terminals.
4. Remove nuts (19), washers (20), and terminal leads (21) from circuit breakers (22).
5. Remove screws (23), nuts (24), washers (25), and circuit breakers (22) from mounting plate (17).



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50A CIRCUIT BREAKERS INSTALLATION

1. Position 50A circuit breakers (22) on mounting plate (17) and secure with screws (23), nuts (24), and washers (25).
2. Connect terminal leads (21) to circuit breakers (22) and secure with nuts (19) and washers (20).
3. Place protective covers (18) over circuit breaker terminals.
4. Reconnect battery cables (WP 0110 00).
5. Install engine cover (WP 0148 00).

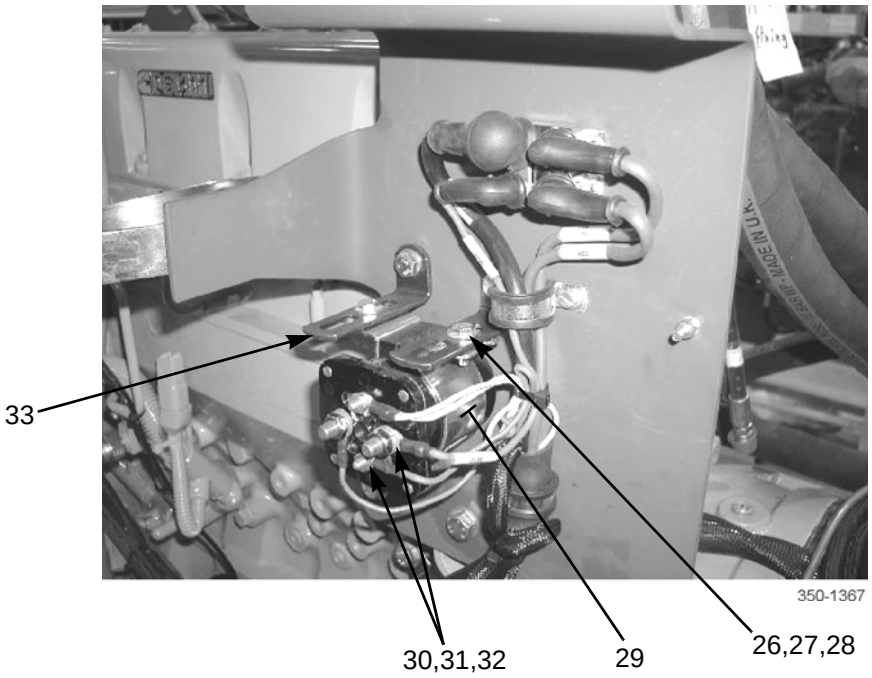
STARTER RELAY REMOVAL

1. Remove engine cover (WP 0148 00).
2. Disconnect battery cables (WP 0110 00).

NOTE

Tag wires for installation.

3. Remove nuts (30), washers (31), and terminal leads (32) from starter relay (29).
4. Remove screws (26), nuts (27), washers (28), and starter relay (29) from mounting brackets (33).



STARTER RELAY INSTALLATION

1. Position starter relay (29), on mounting brackets (33) and secure with screws (26), nuts (27), and washers (28).
2. Connect terminal leads (32) to starter relay (29) and secure with nuts (30) and washers (31).
3. Connect battery cables (WP 0110 00).
4. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

TOPHANDLER PROXIMITY SWITCHES REPLACEMENT 0075 00

THIS WORK PACKAGE COVERS

Twistlock Proximity Switch: Removal, Installation

Forklift Interlock Proximity Switch: Removal, Installation

Spreader Beam Proximity Switch: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Torque (Item 143, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

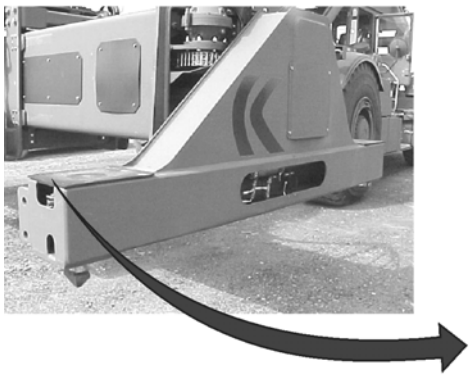
Master battery switch in OFF position

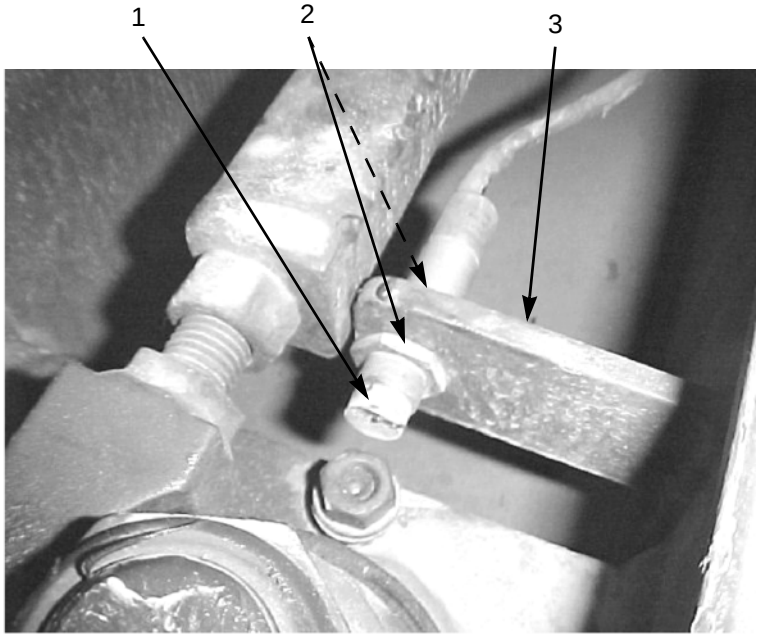
TWISTLOCK PROXIMITY SWITCH REMOVAL

NOTE

- **These steps cover eight twistlock proximity switches at middle and at each end of spreader beam.**
- **To aid in gaining access to junction box in step 3, spreader beam may be extended.**

1. Remove two jamnuts (2) and proximity switch (1) from mounting bracket (3).

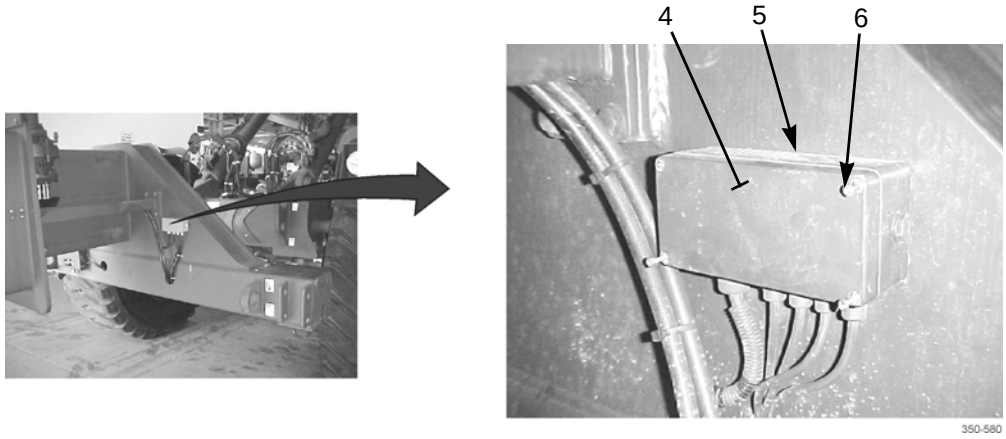




350-554

TWISTLOCK PROXIMITY SWITCH REMOVAL - CONTINUED

2. Loosen four screws (6) and remove cover (4) from junction box (5). Inspect rubber seal in groove of cover. Replace only if damaged.



3. Loosen cable nut (10) and slide cable nut and grommet (9) back on proximity switch (1) cable.

CAUTION

To avoid damage to junction box, a fine-tipped jeweler's screwdriver should be used when disconnecting proximity switch wires. DO NOT use a punch.

NOTE

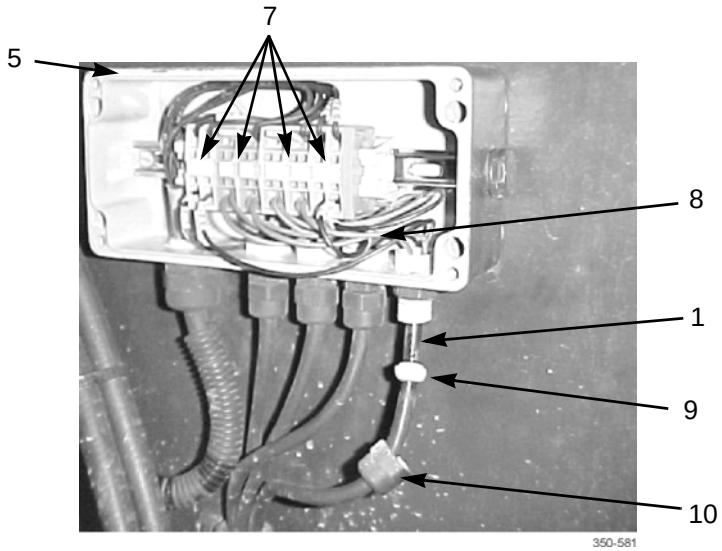
Tag wires for installation.

4. Using a jeweler's screwdriver, disconnect proximity switch wires (8) from terminal blocks (7).

NOTE

Remove cable clamps and tiedown straps as needed. Discard tiedown straps.

5. Remove proximity switch (1) with cable from tophandler.



TWISTLOCK PROXIMITY SWITCH INSTALLATION

1. Position proximity switch (1) with cable on tophandler.
2. Using a jeweler's screwdriver, connect proximity switch wires (8) to terminal blocks (7).
3. Install grommet (9) and cable nut (10) on junction box (5). Tighten cable nut.
4. Install cover (4) on junction box (5) and tighten four screws (6).
5. Loosely install proximity switch (1) and two jamnuts (2) on mounting bracket (3).

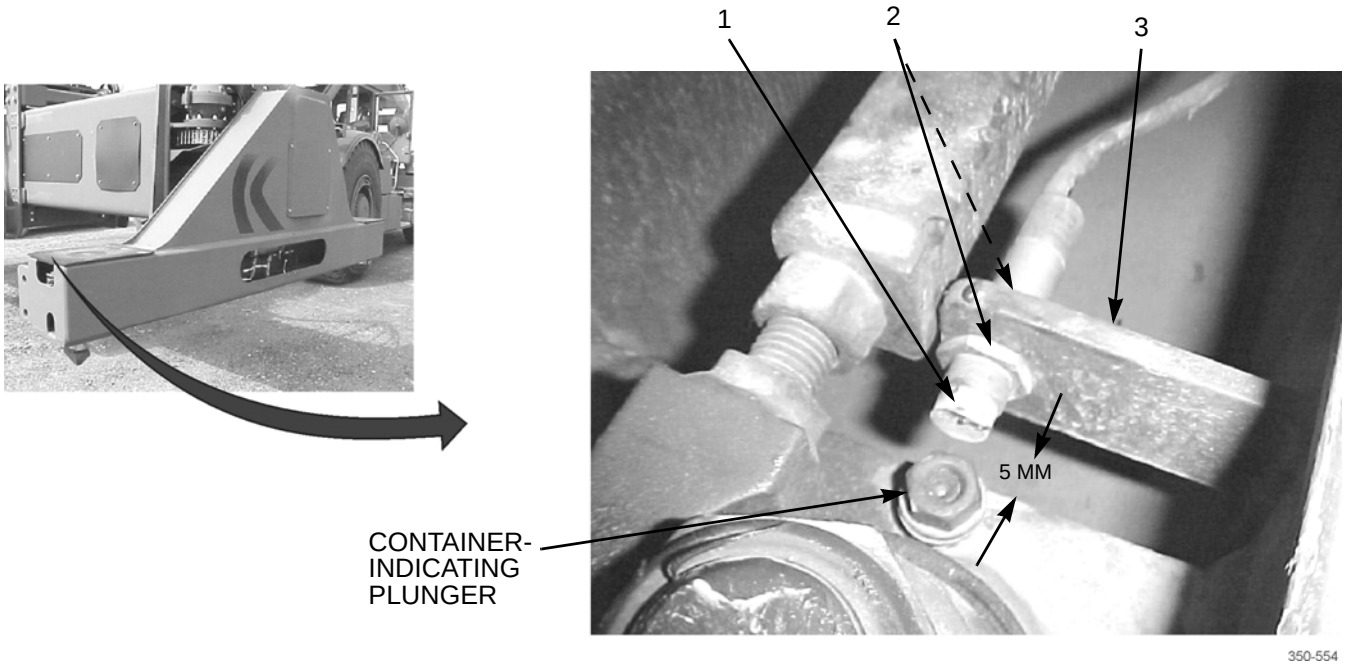
CAUTION

Overtightening jamnuts will damage proximity switch threads.

NOTE

Plunger must be raised in order to properly make adjustment.

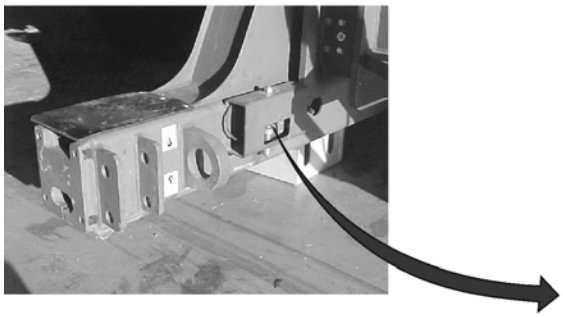
6. Position proximity switch (1) so a gap of 0.20 in. (5 mm) is obtained. Tighten two jamnuts to 177 lb-in. (20 Nm).

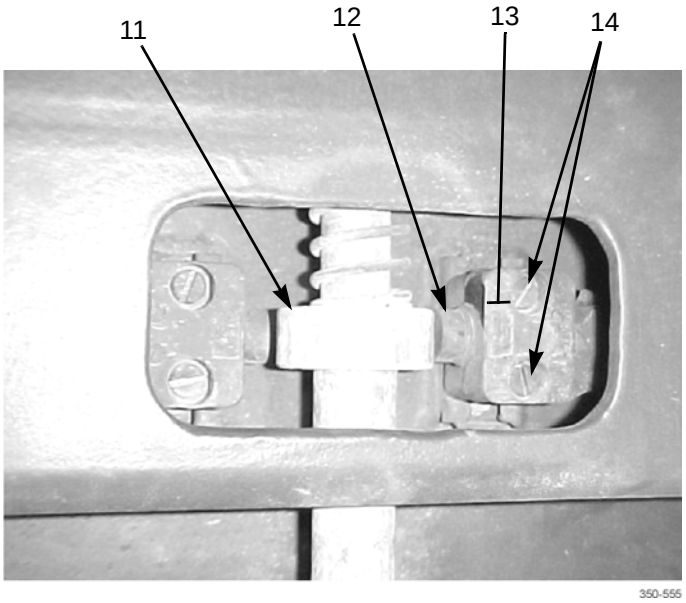


7. Install cable clamps and new tiedown straps as needed.

FORKLIFT INTERLOCK PROXIMITY SWITCH REMOVAL

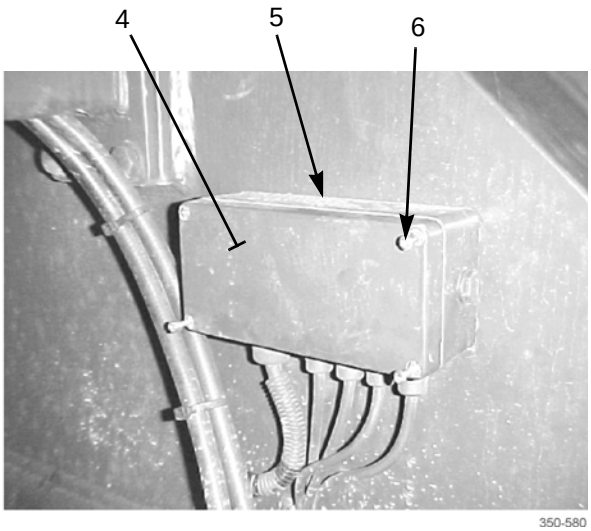
1. Remove two screws (14), plastic clamp (13), and proximity switch (12) from tophandler.





2. Loosen four screws (6) and remove cover (4) from junction box (5). Inspect rubber seal in groove of cover. Replace seal only if damaged.





3. Loosen cable nut (10) and slide cable nut and grommet (9) back on proximity switch (12) cable.

FORKLIFT INTERLOCK PROXIMITY SWITCH REMOVAL - CONTINUED

CAUTION

To avoid damage to junction box, a fine-tipped jeweler's screwdriver should be used when disconnecting proximity switch wires. DO NOT use a punch.

NOTE

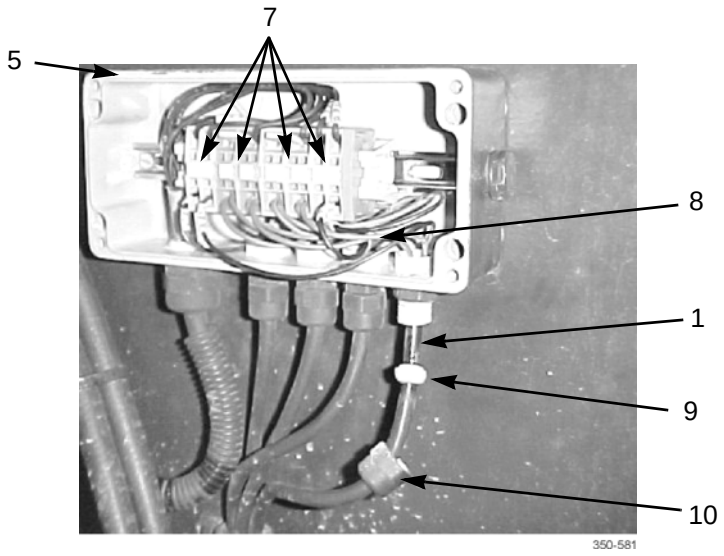
Tag wires for installation.

4. Using a jeweler's screwdriver, disconnect proximity switch wires (8) from terminal blocks (7).

NOTE

Remove cable clamps and tiedown straps as needed. Discard tiedown straps.

5. Remove proximity switch (12) with cable from tophandler.

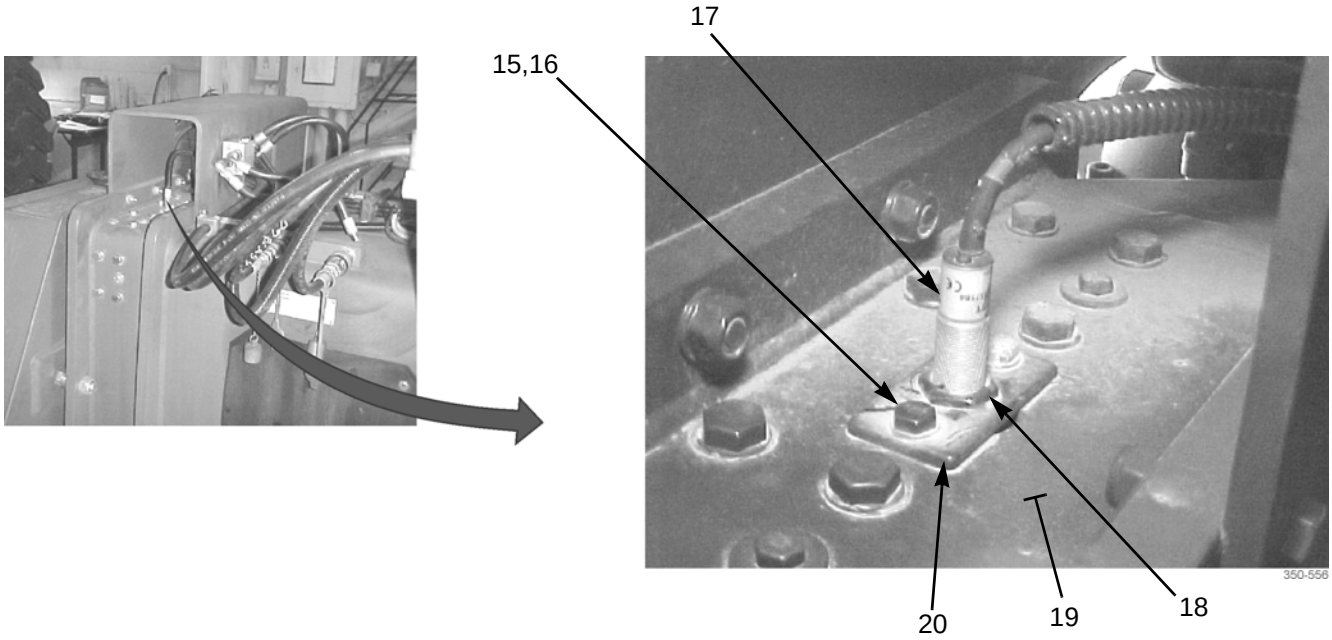


FORKLIFT INTERLOCK PROXIMITY SWITCH INSTALLATION

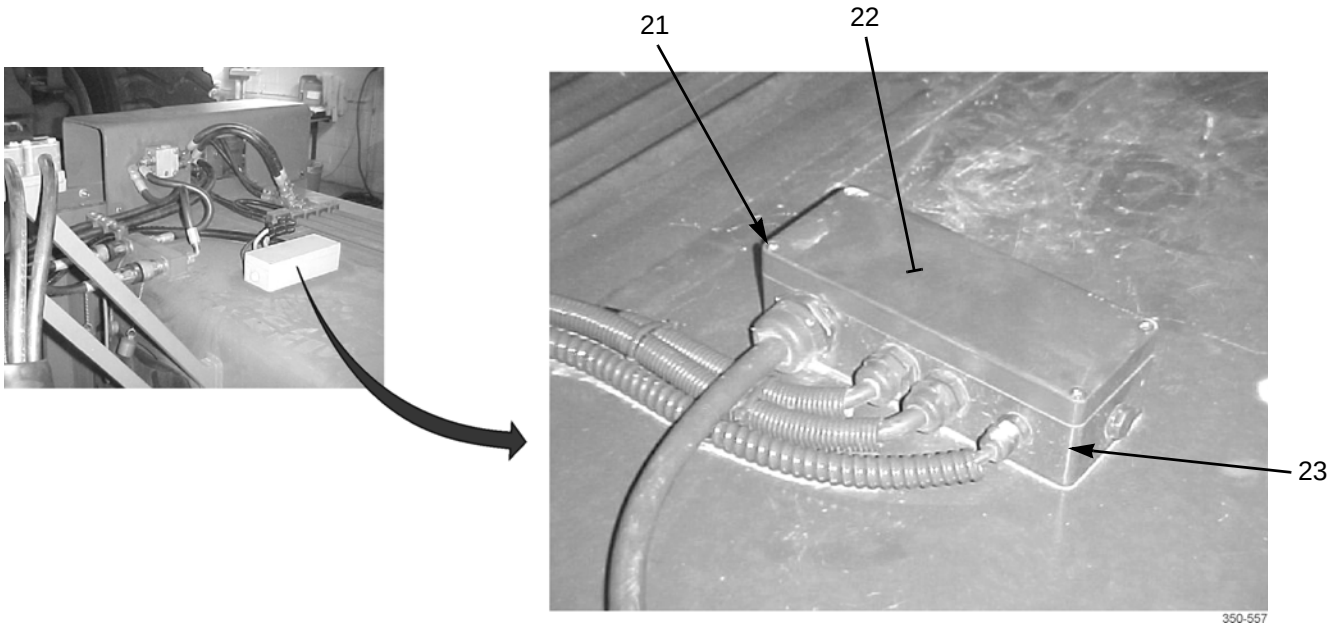
1. Position proximity switch (12) with cable on tophandler.
2. Using a jeweler's screwdriver, connect proximity switch wires (8) to terminal blocks (7).
3. Install grommet (9) and cable nut (10) on junction box (5). Tighten cable nut.
4. Install cover (4) on junction box (5) and tighten four screws (6).
5. Loosely install proximity switch (12) on tophandler with plastic clamp (13) and two screws (14).
6. Position proximity switch (12) so a gap of 0.20 in. (5 mm), between end of proximity switch and ring (11) of actuating plunger, is obtained. Tighten two screws (14).
7. Install cable clamps and new tiedown straps as needed.

SPREADER BEAM PROXIMITY SWITCH REMOVAL

1. Remove two screws (15), washers (16), and proximity switch plate (20) from top of tophandler spreader beam (19).
2. Measure position of proximity switch (17) in proximity switch plate (20), to ensure correct installation. Record measurement.
3. Remove two jamnuts (18) and proximity switch (17) from proximity switch plate (20).



4. Loosen four screws (21) and remove cover (22) from junction box (23). Inspect rubber seal in groove of cover. Replace seal only if damaged.



SPREADER BEAM PROXIMITY SWITCH REMOVAL - CONTINUED

5. Loosen cable nut (27) and slide cable nut and grommet (26) back on proximity switch (17) cable.

CAUTION

To avoid damage to junction box, a fine-tipped jeweler's screwdriver should be used when disconnecting proximity switch wires. DO NOT use a punch.

NOTE

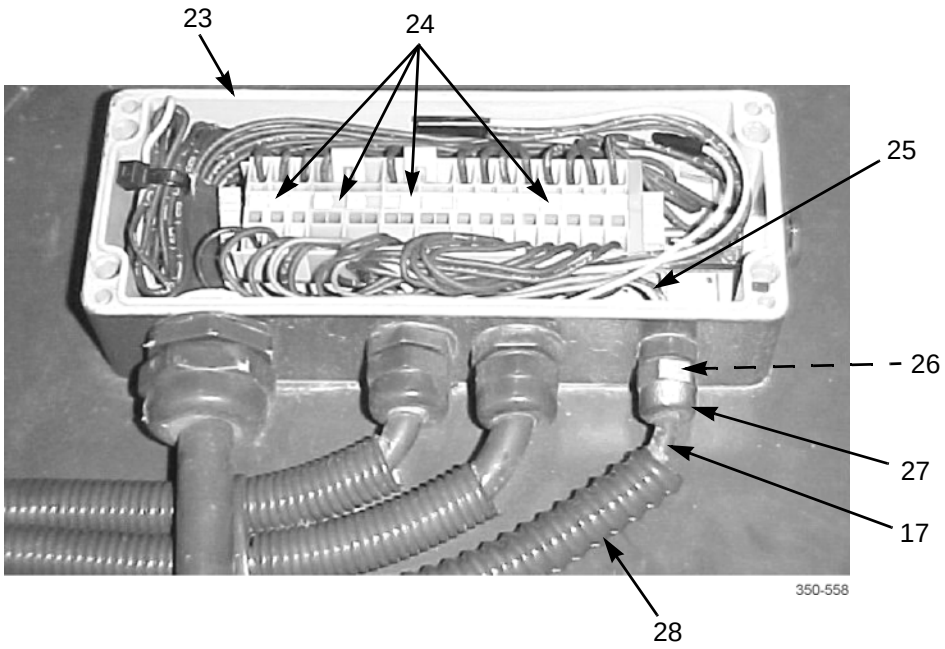
Tag wires for installation.

6. Using a jeweler's screwdriver, disconnect proximity switch wires (25) from terminal blocks (24).

NOTE

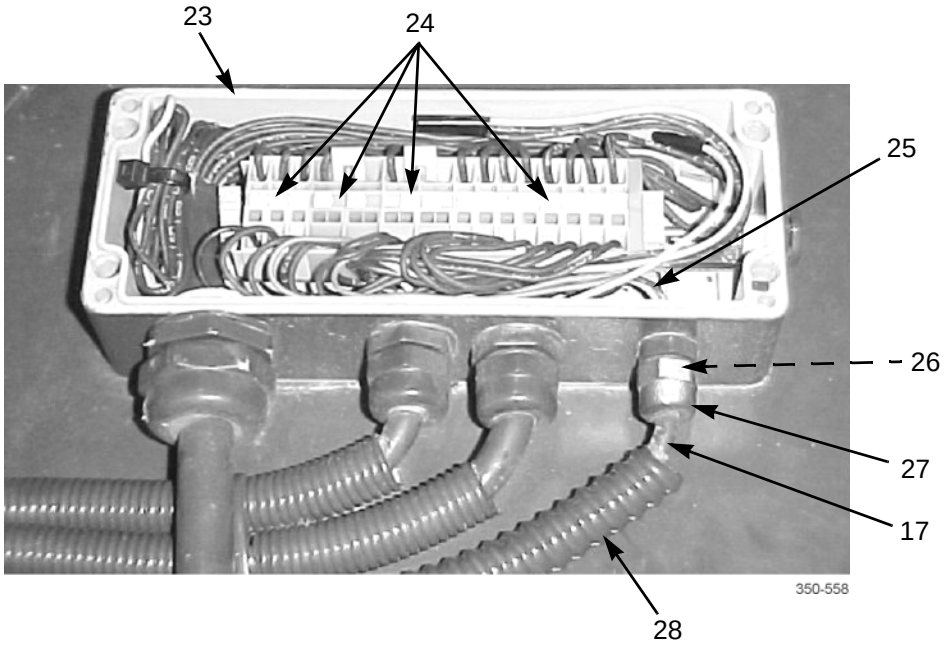
Remove tiedown straps as needed. Discard tiedown straps.

7. Remove proximity switch (17) with cable from tophandler.
8. Remove cable cover (28) from proximity switch (17) cable.

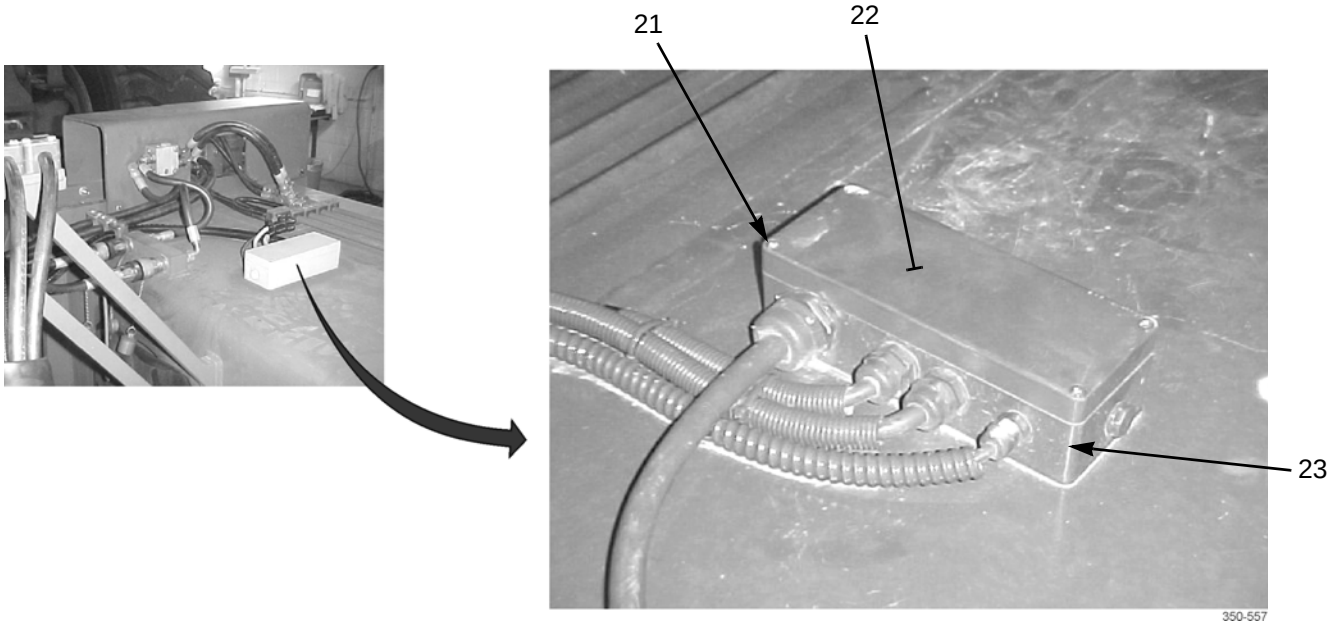


SPREADER BEAM PROXIMITY SWITCH INSTALLATION

1. Install cable cover (28) on proximity switch (17) cable.
2. Position proximity switch (17) with cable on tophandler.



3. Using a jeweler’s screwdriver, connect proximity switch wires (25) to terminal blocks (24).
4. Install grommet (26) and cable nut (27) on junction box (23). Tighten cable nut.
5. Install cover (22) on junction box (23) and tighten four screws (21).



SPREADER BEAM PROXIMITY SWITCH INSTALLATION - CONTINUED

6. Loosely install proximity switch (17) on proximity switch plate (20) with two jamnuts (18).

CAUTION

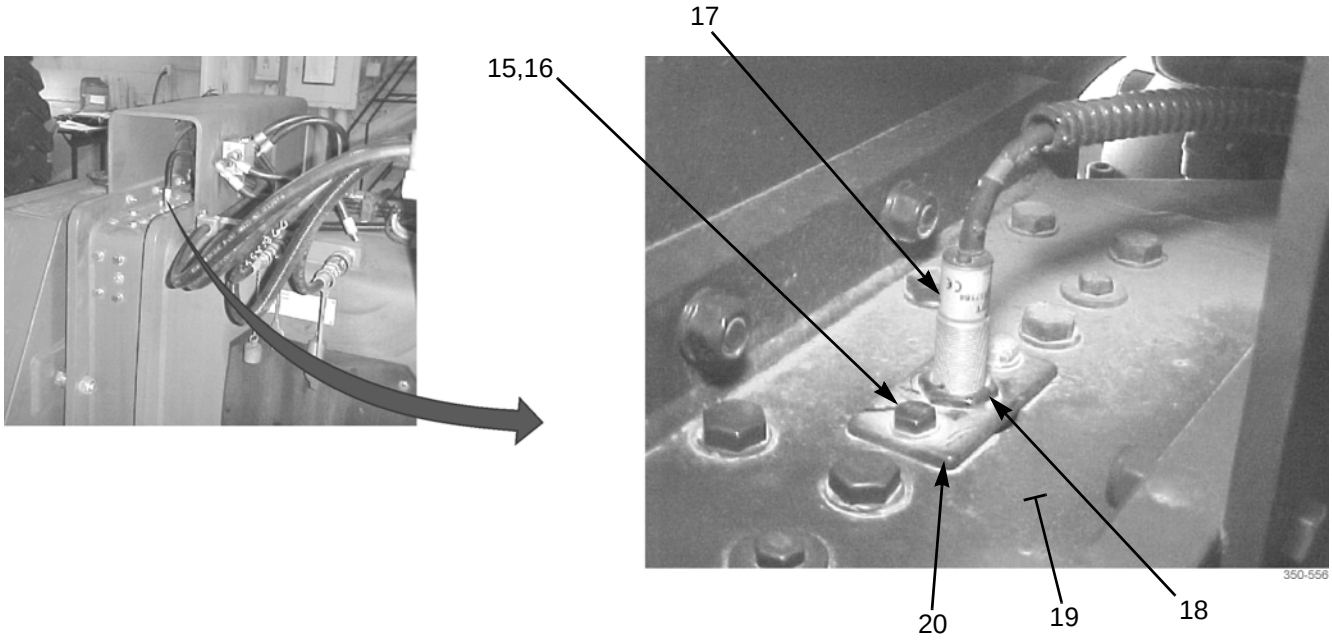
Overtightening jamnuts will damage proximity switch threads.

7. Place proximity switch (17) in same position measured during removal and tighten two jamnuts (18) to 177 lb-in. (20 Nm).

NOTE

Clearance between sensor end of proximity switch and flat rod below should be 0.20 in. (5 mm).

8. Install proximity switch (17) and proximity switch plate (20) on spreader beam (19) with two washers (16) and screws (15).



9. Install new tiedown straps.

END OF WORK PACKAGE

CAB POSITION PROXIMITY SWITCHES REPLACEMENT 0076 00

THIS WORK PACKAGE COVERS

Cab-Mounted Proximity Switch: Removal, Installation

Cab Support-Mounted Proximity Switch: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 920076.003) (2)

References

WP 0142 00

Equipment Condition

Cab in transport position, but not lowered (TM 10-3930-675-10).

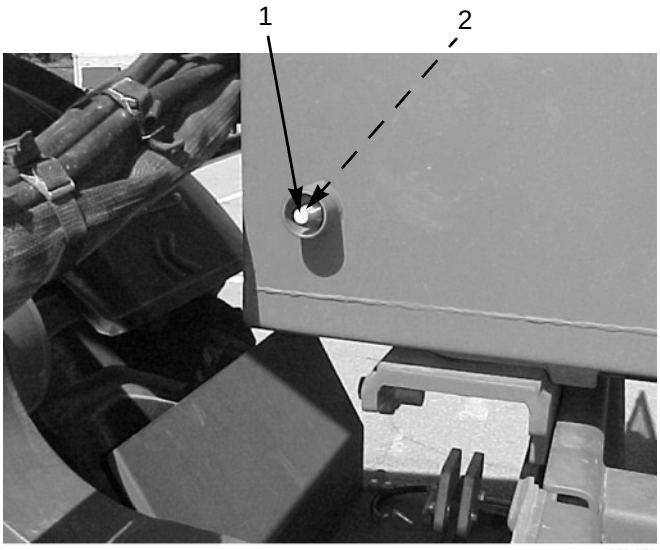
Master battery switch in OFF position.

CAB-MOUNTED PROXIMITY SWITCH REMOVAL

NOTE

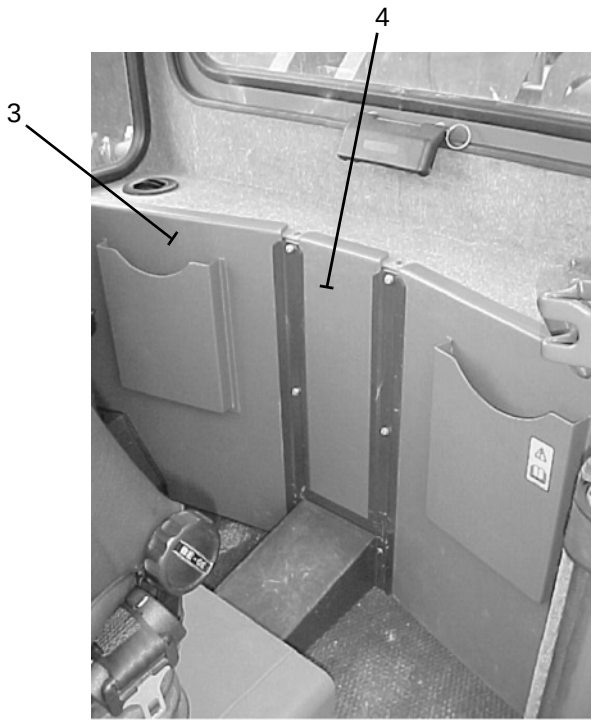
Note position of proximity switch relative to cab to ensure accurate installation.

1. From outside of cab, remove jamnut (2) from proximity switch (1).

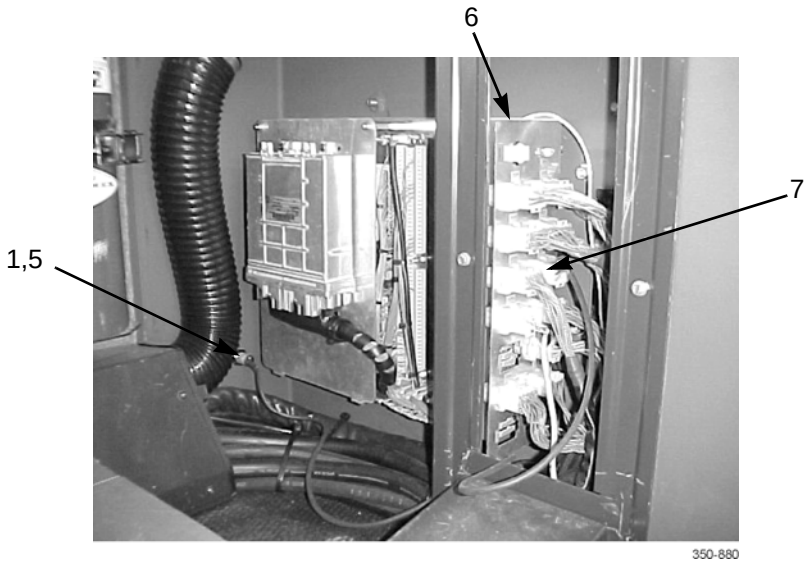


CAB-MOUNTED PROXIMITY SWITCH REMOVAL - CONTINUED

2. From inside rear of cab, remove right access panel (3) and middle access panel (4).

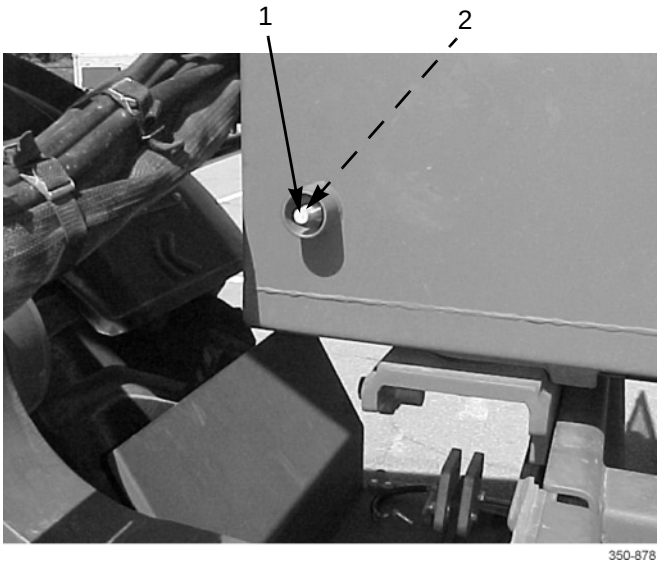


3. Pull proximity switch (1) out from side of cab and remove jamnut (5) from proximity switch.
4. Disconnect connector (7) of proximity switch (1) from electrical panel (6).
5. Remove proximity switch (1) from cab.



CAB-MOUNTED PROXIMITY SWITCH INSTALLATION

1. Position proximity switch (1) on cab.
2. Connect connector (7) of proximity switch (1) to electrical panel (6).
3. Install jamnut (5) on proximity switch (1) and push proximity switch outside of cab.
4. Outside of cab, install jamnut (2) on proximity switch (1). DO NOT fully tighten jamnut.



NOTE

Proximity switch should be positioned and adjusted flush with the end of protector collar.

5. Adjust position of proximity switch (1), as noted during removal, by adjusting position of jamnuts (2 and 5).
6. Tighten jamnut (2).

CAB SUPPORT-MOUNTED PROXIMITY SWITCH REMOVAL

1. Remove middle and rear transmission access covers (WP 0142 00).

CAB SUPPORT-MOUNTED PROXIMITY SWITCH REMOVAL - CONTINUED

NOTE

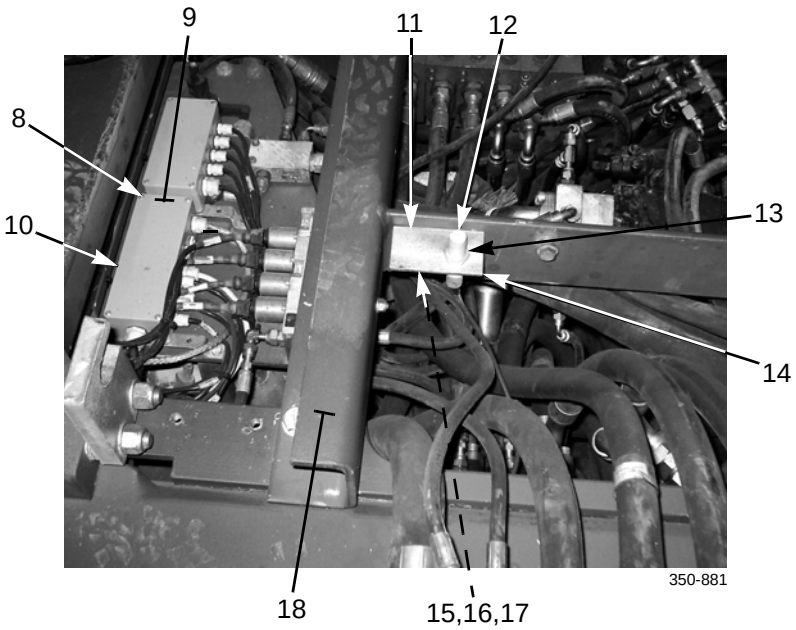
Note position of proximity switch relative to bracket to ensure accurate installation.

2. Remove upper jamnut (13) from proximity switch (12) and push proximity switch downward from bracket (11).
3. Remove jamnut (14) from proximity switch (12).

NOTE

Perform step 4 to remove bracket from cab support.

4. Remove two locknuts (15), screws (16), four washers (17), and bracket (11) from cab support (18). Discard locknuts.
5. Loosen four screws (8) and remove cover (9) from junction box (10).



NOTE

Tag wires for installation.

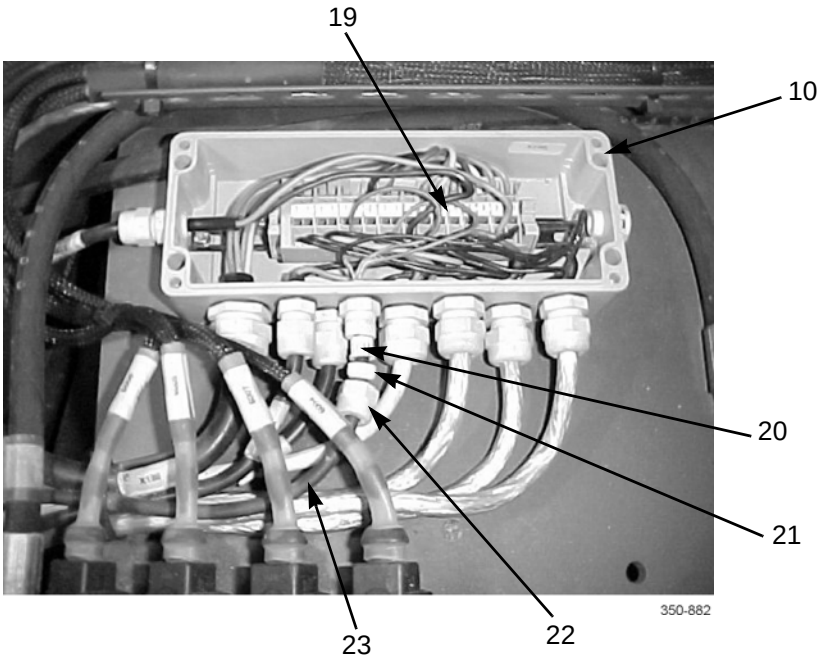
6. Using a jeweler’s screwdriver, disconnect three wires of cable (23) from terminal blocks (19) of junction box (10).
7. Loosen cable nut (22) and slide cable nut, grommet (21), and bushing (20) back on cable (23).

NOTE

Remove tiedown straps as needed. Discard tiedown straps.

8. Remove cable (23) from junction box (10).
9. Remove proximity switch (12) from vehicle.

CAB SUPPORT-MOUNTED PROXIMITY SWITCH REMOVAL - CONTINUED



CAB SUPPORT-MOUNTED PROXIMITY SWITCH INSTALLATION

1. Position proximity switch (12) on vehicle.
2. Feed cable (23) through cable nut (22), grommet (21), and bushing (20) and into junction box (10).
3. Using a jeweler’s screwdriver, connect three wires of cable (23) to terminal blocks (19) of junction box (10).
4. Install bushing (20), grommet (21), and cable nut (22) on junction box (10).
5. Install cover (9) on junction box (10) and tighten four screws (8).

NOTE

Perform step 6 to install bracket to cab support.

6. Install bracket (11) on cab support (18) with four washers (17), two screws (16), and new locknuts (15).
7. Loosely install jamnut (14) on proximity switch (12).
8. Position proximity switch (12) upward through bracket (11) and loosely install upper jamnut (13).
9. Adjust two jamnuts (13 and 14) to position proximity switch (12) as noted during removal and tighten jamnuts. Correct dimension is 1.20 in. (30 mm) from bracket to tip of sensor.
10. Install new tiedown straps as needed.
11. Install middle and rear transmission access covers (WP 0142 00).
12. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

TOPHANDLER JUNCTION BOX MAINTENANCE 0077 00

THIS WORK PACKAGE COVERS

Tophandler Electronic Control Unit (ECU): Removal, Installation

Relay: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

References

WP 0048 00

WP 0259 00

Equipment Condition

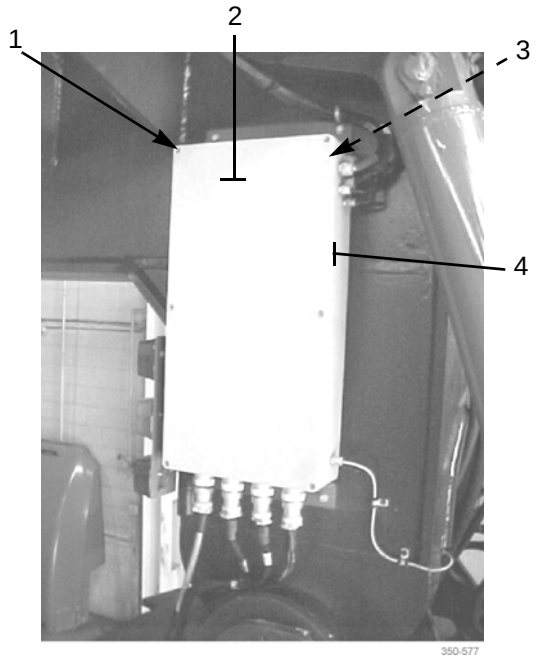
Master battery switch in OFF position

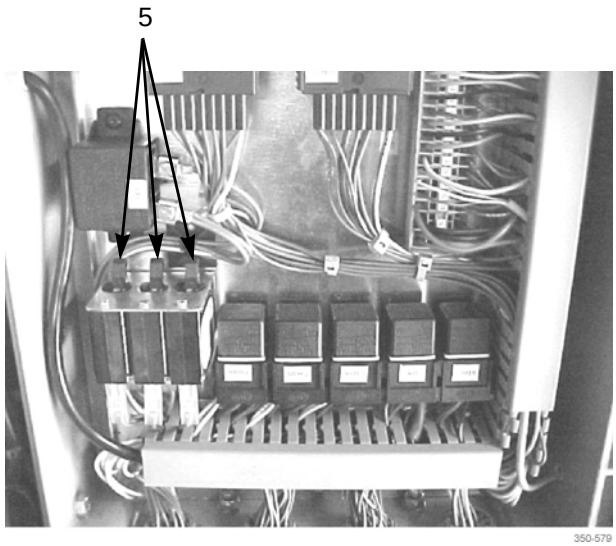
TOPHANDLER ELECTRONIC CONTROL UNIT (ECU) REMOVAL

NOTE

Tophandler ECU is located inside junction box at end of boom, above tophandler. Tophandler ECU is identified as no. 791 on system electrical diagrams (WP 0048 00).

1. Loosen six screws (1) and remove cover (2) from tophandler junction box (4). Three circuit breakers (5) should be in ON position.
2. Inspect rubber seal (3) on cover (2). Replace seal only if damaged.





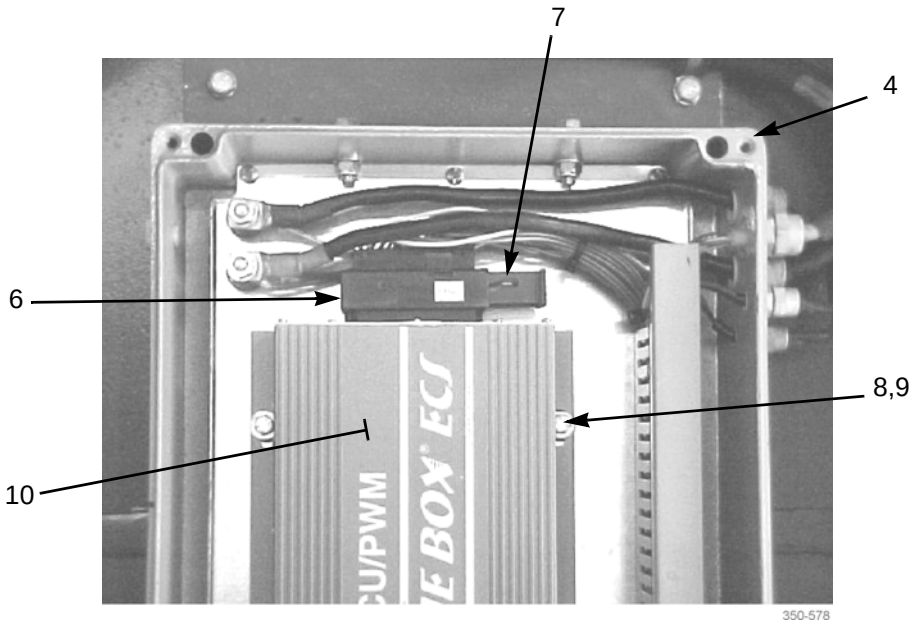
TOPHANDLER ELECTRONIC CONTROL UNIT (ECU) REMOVAL - CONTINUED

NOTE

- **Perform step 3 for each of three connectors.**
- **Tag connectors for installation.**

3. With a flat-tip screwdriver, slide red latch segment (7) on connector away from black connector (6) and remove connector from tophandler ECU (10).

4. Remove four screws (8), washers (9), and tophandler ECU (10) from tophandler junction box (4).



TOPHANDLER ELECTRONIC CONTROL UNIT (ECU) INSTALLATION

CAUTION

DO NOT overtighten screws or damage to screws will result.

1. Install tophandler ECU (10) in tophandler junction box (4) with four washers (9) and screws (8).

NOTE

Perform step 2 for each of three connectors.

2. Position black connector (6) on tophandler ECU (10) and connect connector by sliding red latch segment (7) of connector inward.

3. Install cover (2) on tophandler junction box (4) and tighten six screws (1).

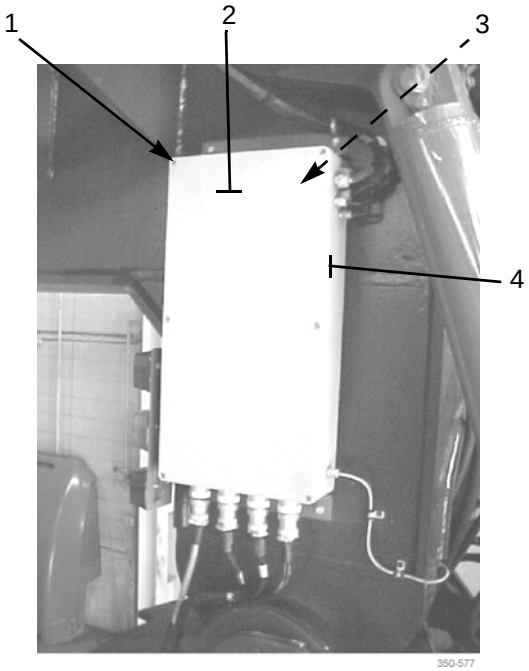
4. Perform boom and tophandler calibration (WP 0259 00).

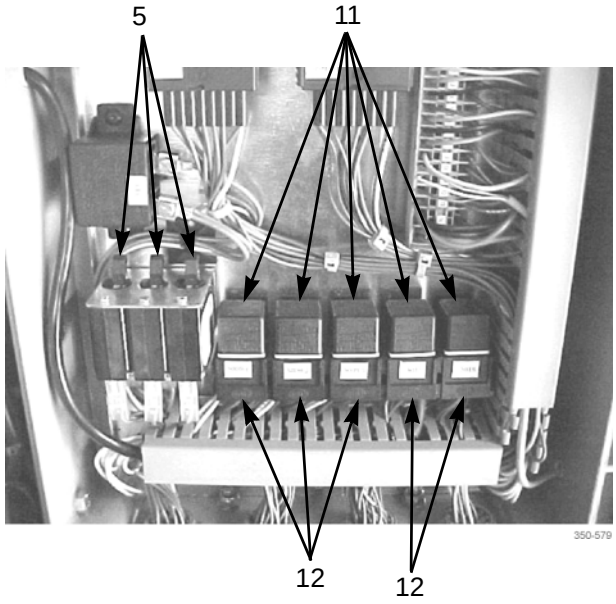
RELAY REMOVAL

NOTE

All five relays are removed the same.

1. Loosen six screws (1) and remove cover (2) from tophandler junction box (4). Three circuit breakers (5) should be in ON position.
2. Inspect rubber seal (3) on cover (2). Remove and discard seal only if damaged.
3. Remove relay (11) from relay holder (12).





RELAY INSTALLATION

NOTE

All five relays are installed the same.

1. Install relay (11) in relay holder (12).
2. If removed, install new rubber seal (3) on cover (2).
3. Install cover (2) on tophandler junction box (4) and tighten six screws (1).

END OF WORK PACKAGE

TOPHANDLER PROXIMITY SWITCH JUNCTION BOXES REPLACEMENT 0078 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/ Parts

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

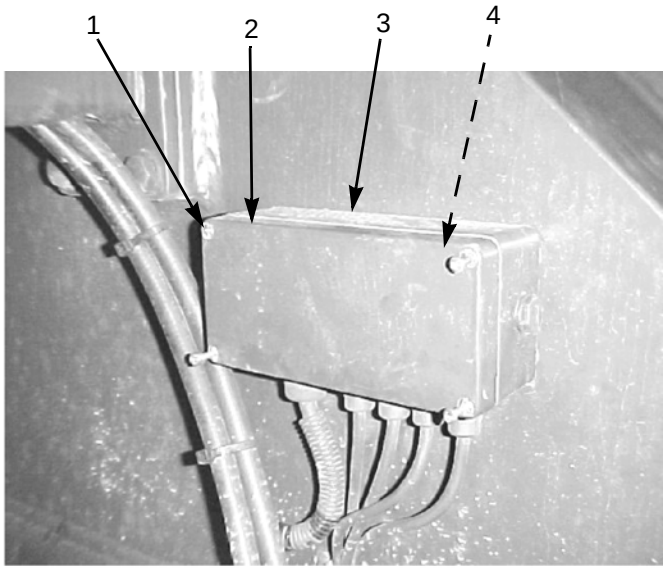
NOTE

The following procedure is for tophandler junction boxes. The procedure is identical for boom junction box.

REMOVAL

1. Loosen four screws (1) and remove cover (2) from junction box (3).
2. Inspect rubber seal (4) on cover (2). Replace seal only if damaged.





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REMOVAL - CONTINUED

NOTE

Perform steps 3 and 4 in five places.

3. Loosen cable nut (14) and slide cable nut and grommet (13) back on cable (12).

NOTE

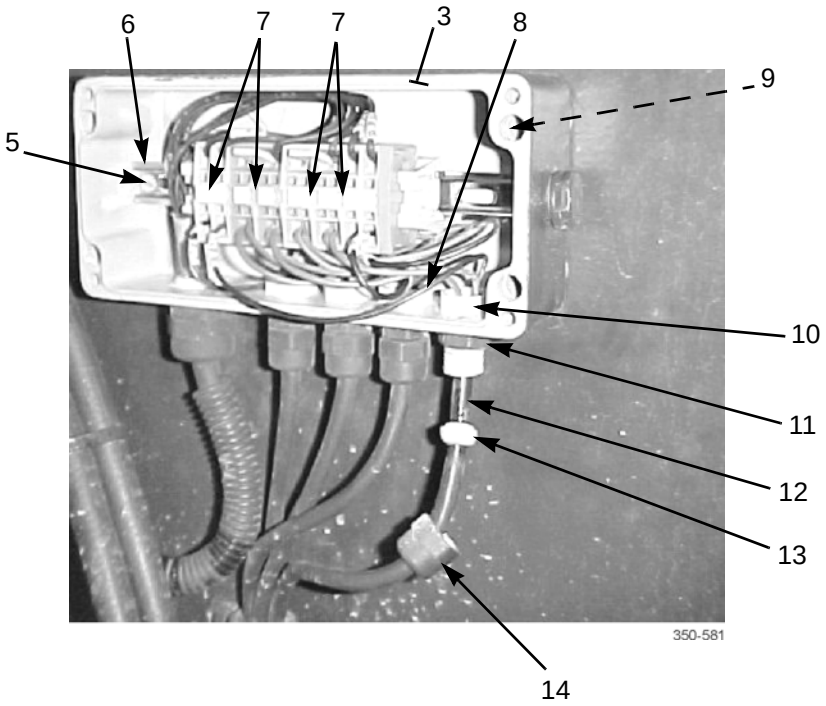
Tag wires for installation.

4. Using a jeweler's screwdriver, disconnect wires (8) from terminal blocks (7) and pull cables (12) with wires from junction box (3).
5. Remove two screws (5), terminal block holder (6), and terminal blocks (7) from junction box (3).

NOTE

Perform step 6 in five places.

6. Remove plastic nut (11) and fitting (10) from bottom of junction box (3).
7. Remove four screws (9) and junction box (3) from tophandler.



INSTALLATION

1. Install junction box (3) on tophandler with four screws (9).

NOTE

Perform step 2 in five places.

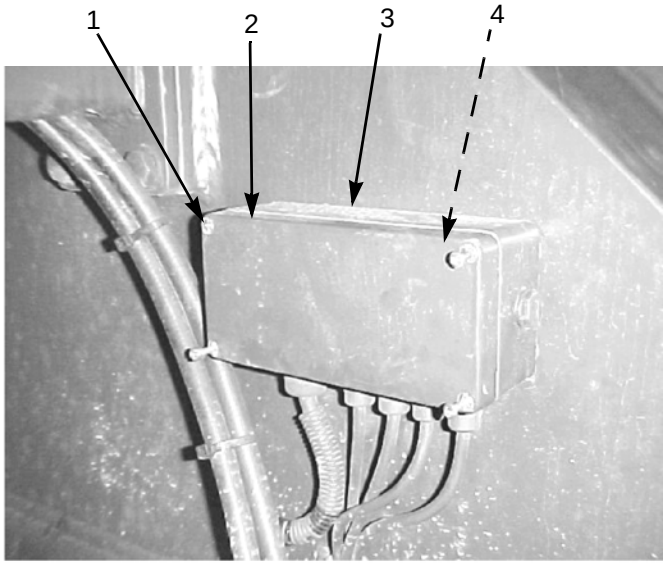
2. Install fitting (10) and plastic nut (11) on bottom of junction box (3).
3. Install terminal blocks (7) and terminal block holder (6) on junction box (3) with two screws (5).

NOTE

Perform steps 4 and 5 in five places.

4. Push cable (12) into junction box (3) and use jeweler's screwdriver to connect wires (8) to terminal blocks (7).
5. Install grommet (13) and cable nut (14) on junction box (3). Tighten cable nut.
6. Install cover (2) on junction box (3) with four screws (1).





350-580

END OF WORK PACKAGE

ENGINE ELECTRONIC CONTROL MODULE (ECM) REPLACEMENT 0079 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0048 00

Equipment Condition

Master battery switch in OFF position

Engine cover removed (WP 0148 00)

NOTE

Engine ECM is located on left side of engine. Engine ECM is identified as no. 794 on system electrical diagrams (WP 0048 00).

REMOVAL

NOTE

Tag wires prior to disconnection to ensure correct connection on installation.

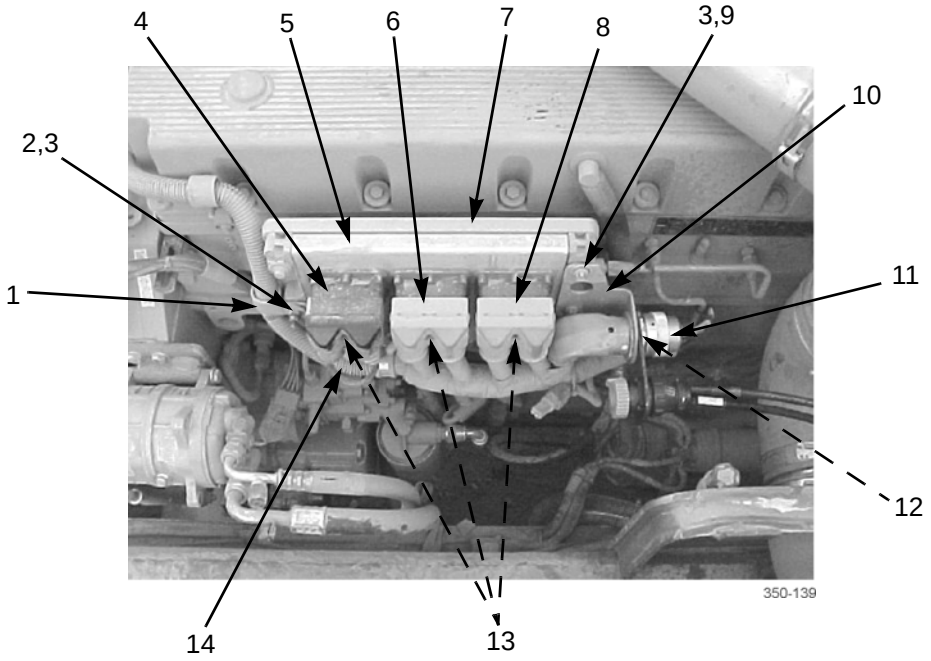
REMOVAL - CONTINUED

1. Loosen three connector captive screws (13) and disconnect actuator harness connector (6), sensor harness connector (8), and OEM harness connector (4) from ECM (5).
2. Disconnect wiring harness (11) from 32-pin connector (12).

NOTE

Note type and location of mounting hardware to aid in installation.

3. Remove screw (9) and washer (3) securing 32-pin connector (12) and bracket (10) to ECM (5).
4. Remove screw (2), washer (3), and cable clamp (1) securing engine wiring harness (14) to ECM (5). Reposition engine wiring harness and OEM wiring harness.
5. Remove remaining screws (2 and 9) and washers (3) securing ECM (5) to cooling plate (7).
6. Remove ECM (5) from cooling plate (7).



INSTALLATION

1. Position ECM (5) on cooling plate (7).

NOTE

- **If ECM is new, ensure it contains the correct program.**
- **Ensure mounting screws are installed as noted in removal.**

2. Temporarily secure ECM (5) to cooling plate (7) with screws (2 and 9) and washers (3).

NOTE

- **Ensure connectors are clean and dry prior to connection to ECM.**
- **Apply light coat of electrical grease to connectors prior to connecting.**

INSTALLATION - CONTINUED

3. Position actuator harness connector (6), sensor harness connector (8), and 32-pin connector (12) with bracket (10).
4. Install screw (9) and washer (3) to secure bracket (10) to ECM (5). Tighten captive screws (13) to 25 lb-in. (3 Nm) to secure connectors.
5. Position engine wiring harness (14) and OEM wiring harness. Secure engine wiring harness with cable clamp (1), screw (2), and washer (3). Tighten captive screw (13) on OEM wiring harness to 25 lb-in. (3 Nm).
6. Connect wiring harness (11) to 32-pin connector (12).
7. Fully tighten ECM screws (2 and 9) evenly to 180 lb-in. (20 Nm).
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ELECTRONIC CONTROL UNITS (ECU) REPLACEMENT 0080 00

THIS WORK PACKAGE COVERS

Transmission Electronic Control Unit (ECU): Removal, Installation

Steering System Electronic Control Unit (ECU): Removal, Installation

Hydraulic Servo System Electronic Control Unit (ECU): Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

References

WP 0048 00

References - Continued

WP 0225 00

WP 0238 00

WP 0259 00

Equipment Condition

Master battery switch in OFF position

TRANSMISSION ELECTRONIC CONTROL UNIT (ECU) REMOVAL

NOTE

Transmission ECU is located in cab behind driver's seat, behind right-rear panel. Transmission ECU is identified as no. 793 on system electrical diagrams (WP 0048 00).

1. Lift and remove two access panels (1 and 2) from rear of cab.



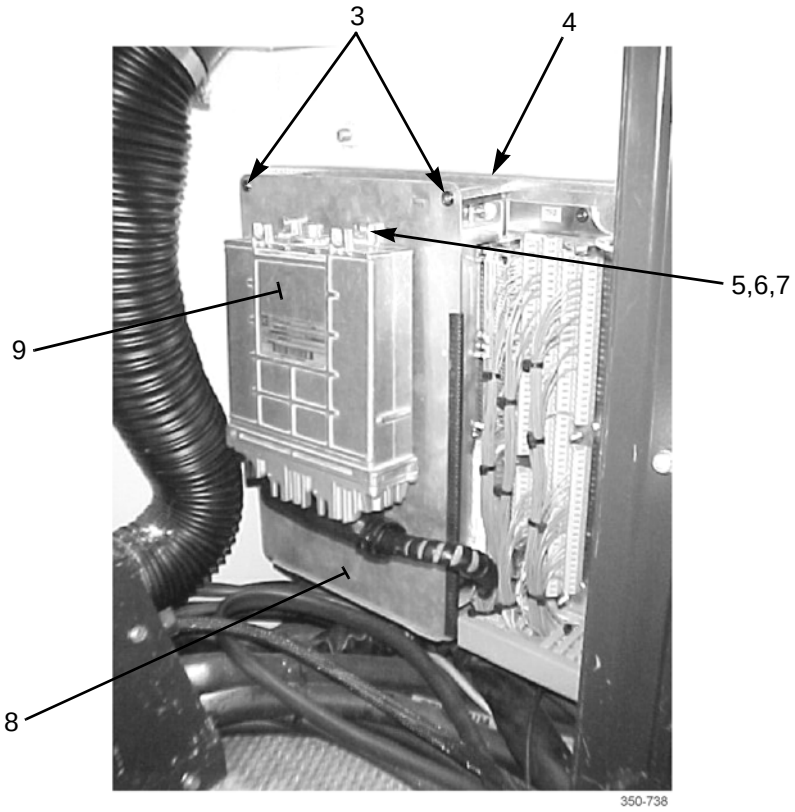
TRANSMISSION ELECTRONIC CONTROL UNIT (ECU) REMOVAL - CONTINUED

2. Remove two screws (3) and plate (8) with transmission ECU (9) from electrical panel (4).

NOTE

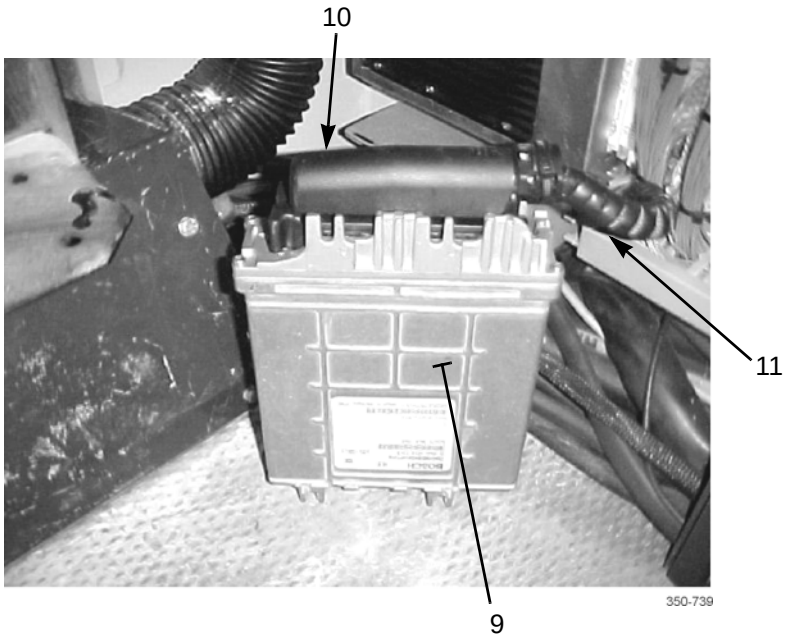
Heads of two screws at top of transmission ECU are not fully accessible. Hold slot of screw heads from the side with screwdriver when removing nuts.

3. Remove four nuts (5), screws (6), washers (7), and transmission ECU (9) from plate (8).



TRANSMISSION ELECTRONIC CONTROL UNIT (ECU) REMOVAL - CONTINUED

4. Disconnect connector (10) of wiring harness (11) from transmission ECU (9) by sliding out handle of connector.



TRANSMISSION ELECTRONIC CONTROL UNIT (ECU) INSTALLATION

1. Connect connector (10) of wiring harness (11) to transmission ECU (9) by sliding in handle of connector.

NOTE

Heads of two screws at top of transmission ECU are not fully accessible. Hold slot of screw heads from the side with screwdriver when installing nuts.

2. Install transmission ECU (9) on plate (8) with four washers (7), screws (6), and nuts (5).
3. Position plate (8) with transmission ECU (9) on electrical panel (4) and install two screws (3).

TRANSMISSION ELECTRONIC CONTROL UNIT (ECU) INSTALLATION - CONTINUED

4. Install two access panels (1 and 2) in rear of cab.



NOTE

If transmission ECU was removed only for access to steering system ECU, no transmission calibration is required.

5. Perform transmission calibration (WP 0225 00).

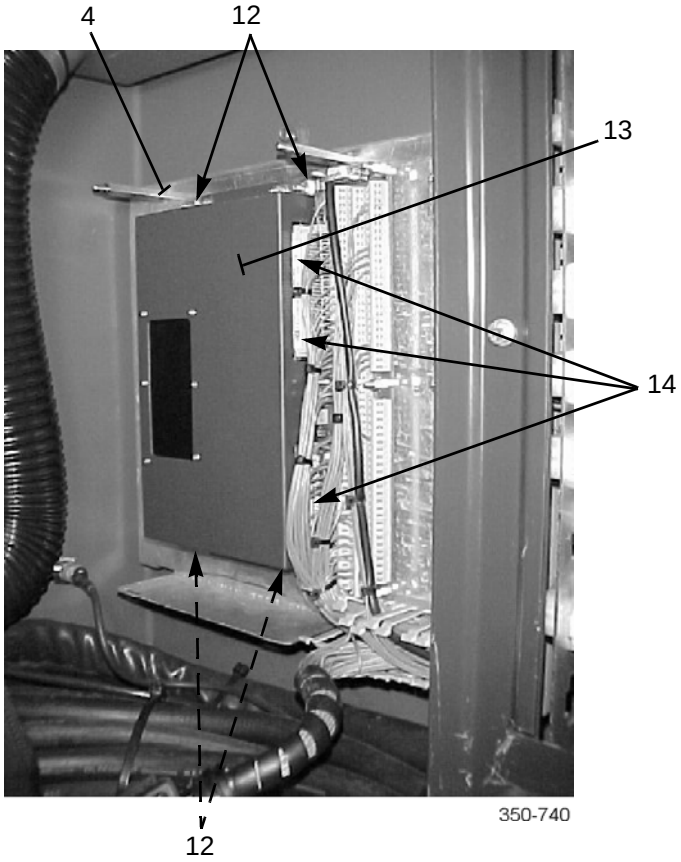
STEERING SYSTEM ELECTRONIC CONTROL UNIT (ECU) REMOVAL

NOTE

Steering system ECU is located in cab behind driver's seat, behind right-rear panel and behind transmission ECU. Steering system ECU is identified as no. 792 on system electrical diagrams (WP 0048 00).

1. Perform *Transmission Electronic Control Unit (ECU) Removal* for access to steering system ECU (13).
2. Loosen four flanged head nuts (12) to free steering system ECU (13).
3. Slide steering ECU (13) to right (toward passenger side of vehicle) and remove from panel (4) over four flanged head nuts (12).

STEERING SYSTEM ELECTRONIC CONTROL UNIT (ECU) REMOVAL- CONTINUED



STEERING SYSTEM ELECTRONIC CONTROL UNIT (ECU) INSTALLATION

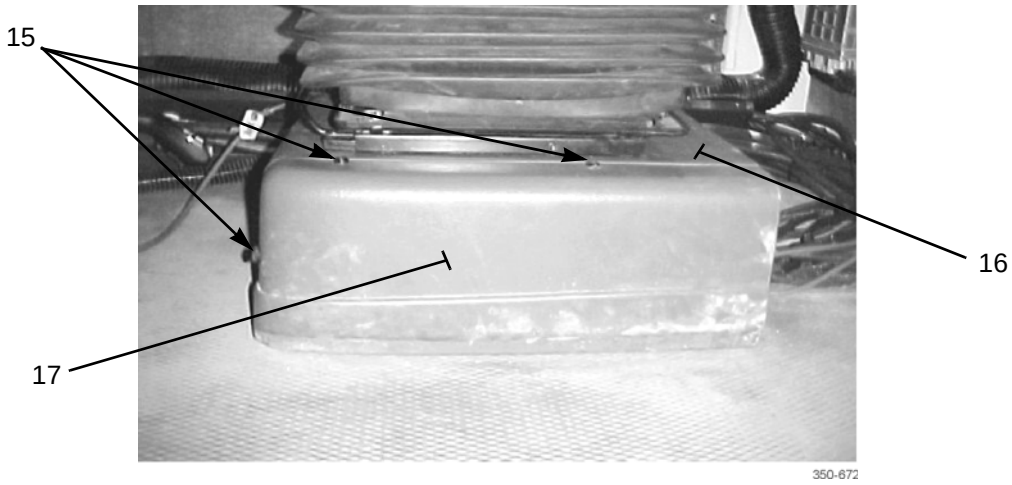
1. Position steering system ECU (13) over four flanged head nuts (12) and slide left (towards drivers side of vehicle).
2. Tighten four flanged head nuts (12) to secure steering system ECU (13).
3. Perform *Transmission Electronic Control Unit (ECU) Installation*.
4. Perform steering calibration (WP 0238 00).

HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) REMOVAL

NOTE

Hydraulic servo system ECU is located in cab under driver's seat. Hydraulic servo system ECU is identified as no. 790 on system electrical diagrams (WP 0048 00).

1. Rotate three turnbuttons (15) and remove cover (17) from seat base (16).

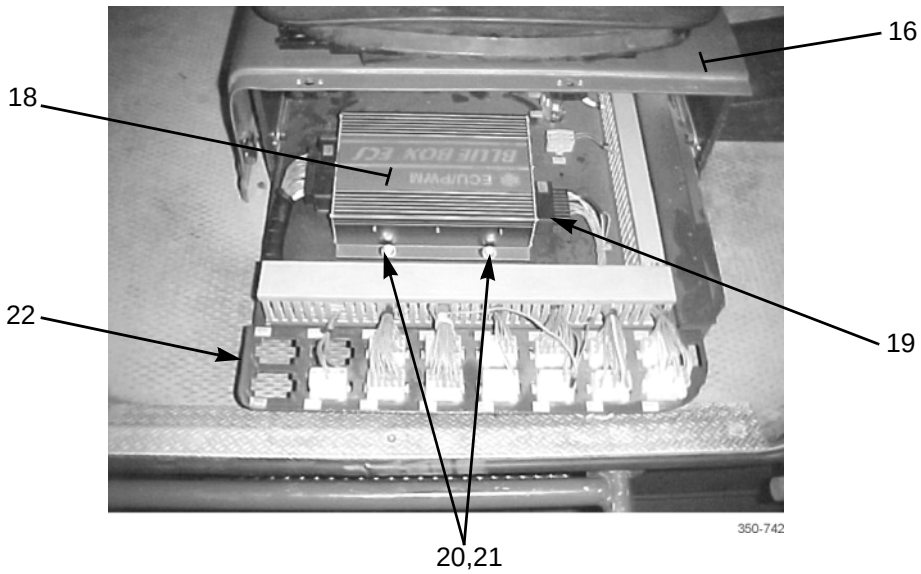


2. Slide electrical tray (22) outward from seat base (16).

NOTE

Perform step 3 for each of two connectors.

3. Disconnect connector (19) from hydraulic servo system ECU (18) by sliding out red latch of connector.
4. Remove four screws (20), washers (21), and hydraulic servo system ECU (18) from electrical tray (22).



HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) INSTALLATION

CAUTION

DO NOT overtighten screws or damage to screws will result.

1. Install hydraulic servo system ECU (18) on electrical tray (22) with four washers (21) and screws (20).

NOTE

Perform step 2 for each of two connectors.

2. Connect connector (19) to hydraulic servo system ECU (18) by sliding in red latch of connector.
3. Slide electrical tray (22) into seat base (16).
4. Install cover (17) on seat base (16) and rotate three turnbuttons (15).
5. Perform boom and tophandler calibration (WP 0259 00).

END OF WORK PACKAGE

ECS DISPLAY SCREEN REPLACEMENT 0081 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

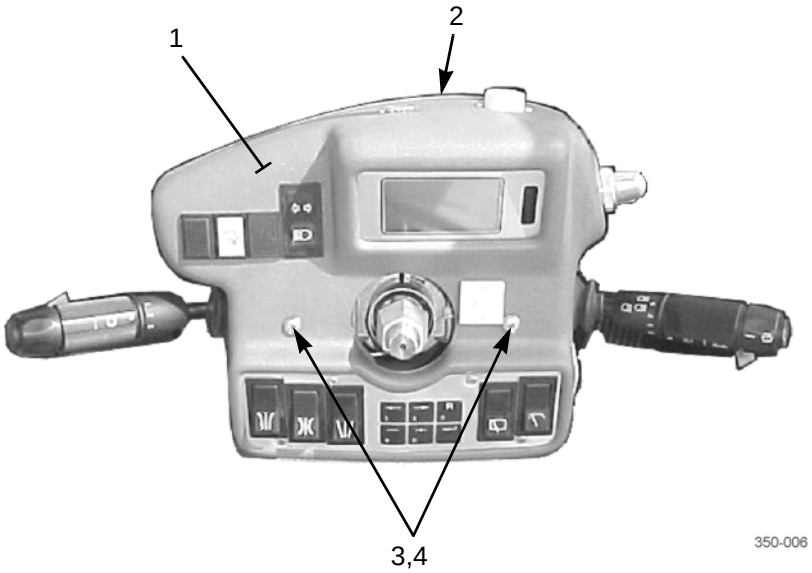
Equipment Condition

Master battery switch in OFF position

Steering wheel removed (WP 0131 00)

REMOVAL

1. Remove eight screws (3) and washers (4) to separate top plastic housing (1) from bottom plastic housing (2).



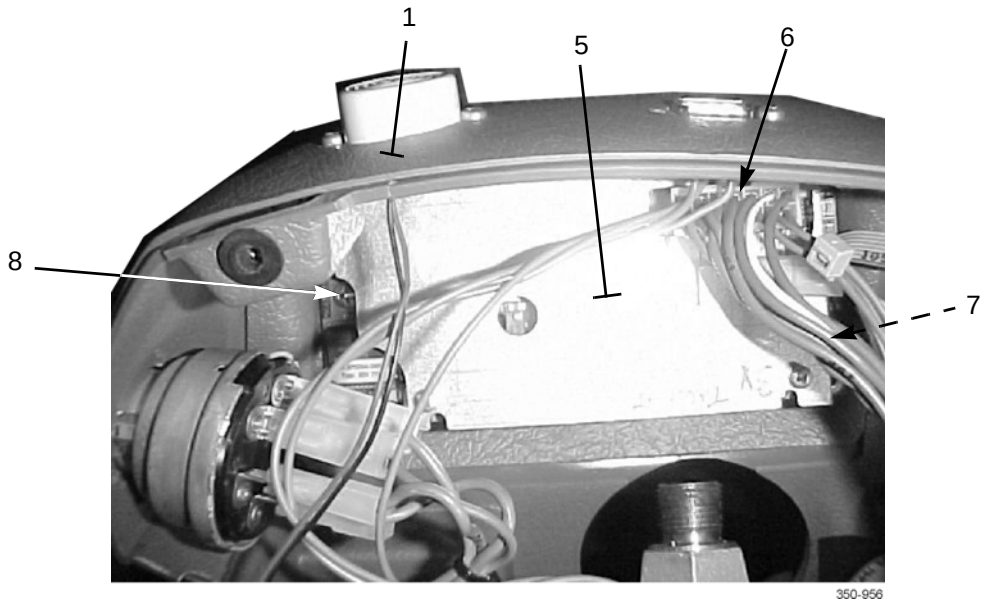
REMOVAL - CONTINUED

2. Raise front of top plastic housing (1) upward for access to display screen (5).
3. Disconnect two-wire ground connector (7) from display screen (5).
4. Disconnect multi-pin connector (6) from display screen (5).

NOTE

- **Display screen is a unit consisting of display screen, flat wire connector, and touch pad.**
- **Note position of display screen for installation.**

5. Remove two screws (8) and display screen (5) from top plastic housing (1).



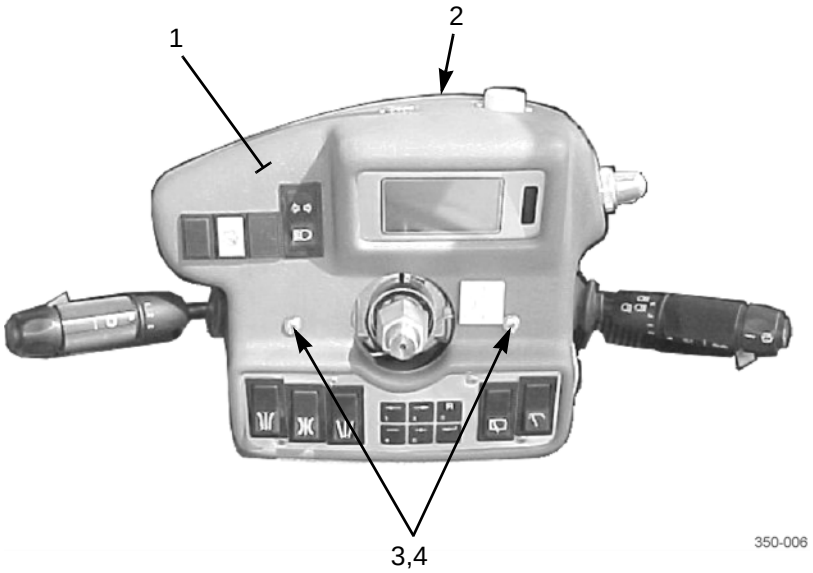
INSTALLATION

NOTE

Ensure four hexagonal studs are positioned against the display protective window before tightening display securing screws.

1. Install display screen (5) in top plastic housing (1) with two screws (8).
2. Connect multi-pin connector (6) to display screen (5).
3. Connect two-wire ground connector (7) to display screen (5).
4. Lower front of top plastic housing (1).
5. Install top plastic housing (1) on bottom plastic housing (2) with eight washers (4) and screws (3).

INSTALLATION - CONTINUED



6. Install steering wheel (WP 0131 00).

END OF WORK PACKAGE

ELECTRONIC JOYSTICK ASSEMBLY REPLACEMENT 0082 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

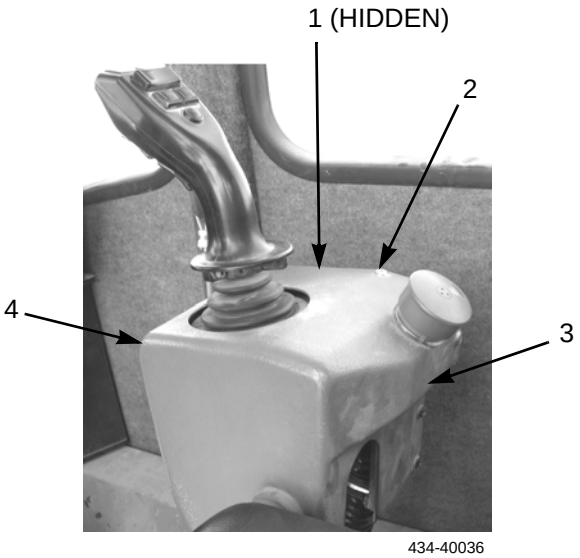
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

References

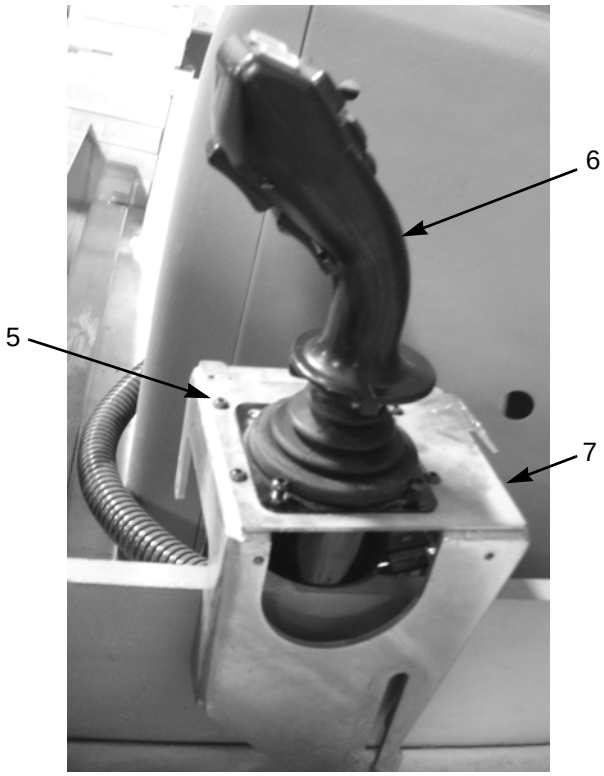
WP 0083 00

REMOVAL

1. Remove three socket screws (2), screws (3), and small half of joystick housing (1). Disconnect plug for override switch.
2. Remove emergency switch and wiring harness from joystick (WP 0083 00).
3. Remove large half of joystick housing (4) from joystick bracket (7).
4. Remove four screws (5) and joystick (6) from joystick bracket (7).



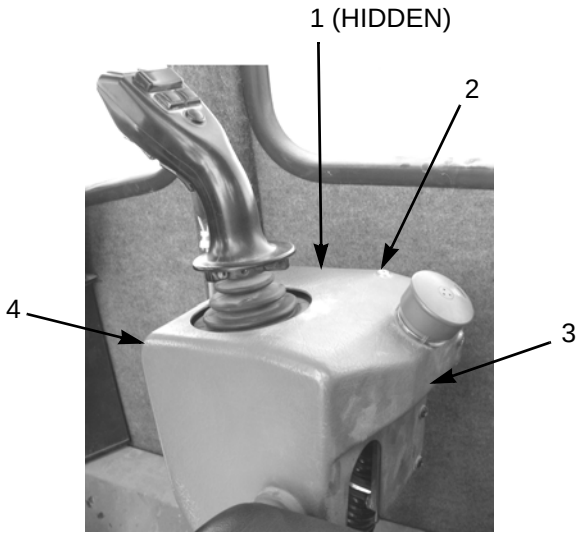
434-40036



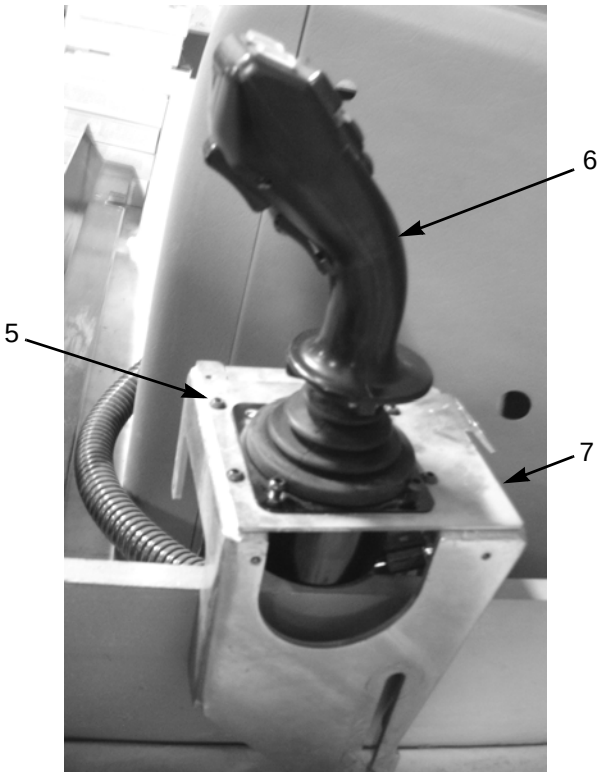
434-40037

INSTALLATION

1. Install joystick (6) on joystick bracket (7) with four screws (5).
2. Install large half of joystick housing (4) on joystick bracket (7).
3. Install emergency switch and wiring harness at joystick (WP 0083 00).
4. Connect plug for override switch and install small half of joystick housing (1) with three screws (3) and socket screws (2).



434-40036



434-40037

END OF WORK PACKAGE

ELECTRONIC JOYSTICK ASSEMBLY WIRING HARNESS REPLACEMENT 0083 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

References

WP 0048 00

Equipment Condition

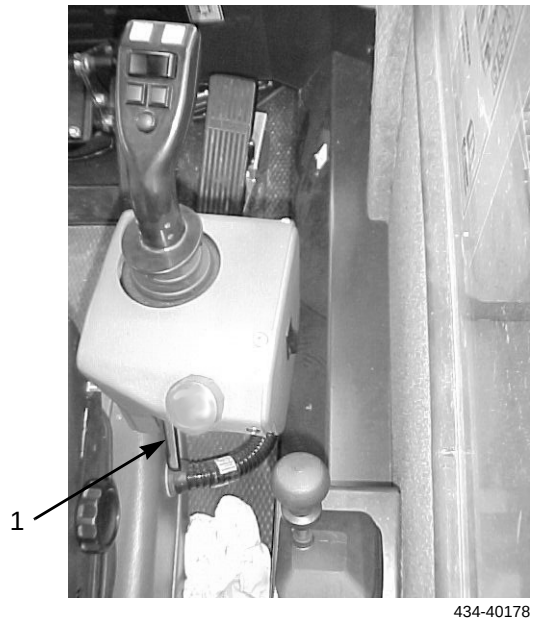
Master battery switch in OFF position

NOTE

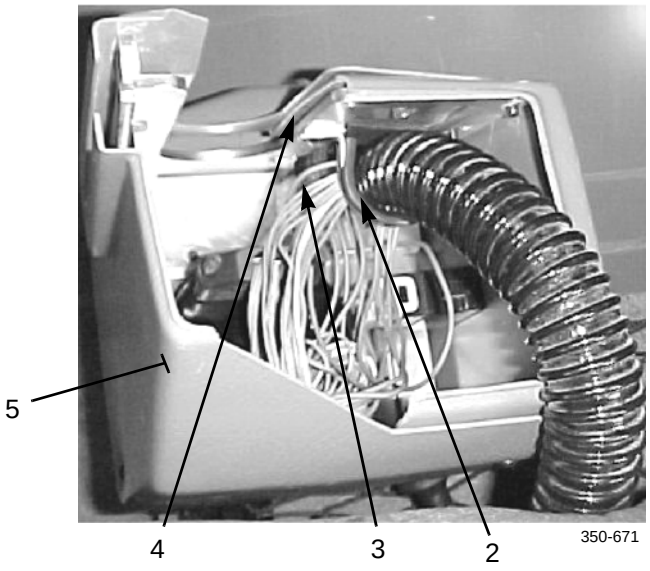
- **Refer to wiring diagrams in WP 0048 00 and use marker tags, as necessary, to ensure proper connection of connectors.**
- **Note position of washers on release lever to aid in installation.**

REMOVAL

1. Turn joystick positioning lever (1) counterclockwise and lift joystick assembly upward to free joystick assembly from seat.
2. Turn joystick housing (5) over for access to bottom of joystick housing.
3. Remove screw (4) and clamp (2) from protective cover of joystick wiring harness (3).



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REMOVAL - CONTINUED

4. Loosen two screws (7) and disconnect connector (10) of joystick wiring harness (3) from bottom of joystick (6).

NOTE

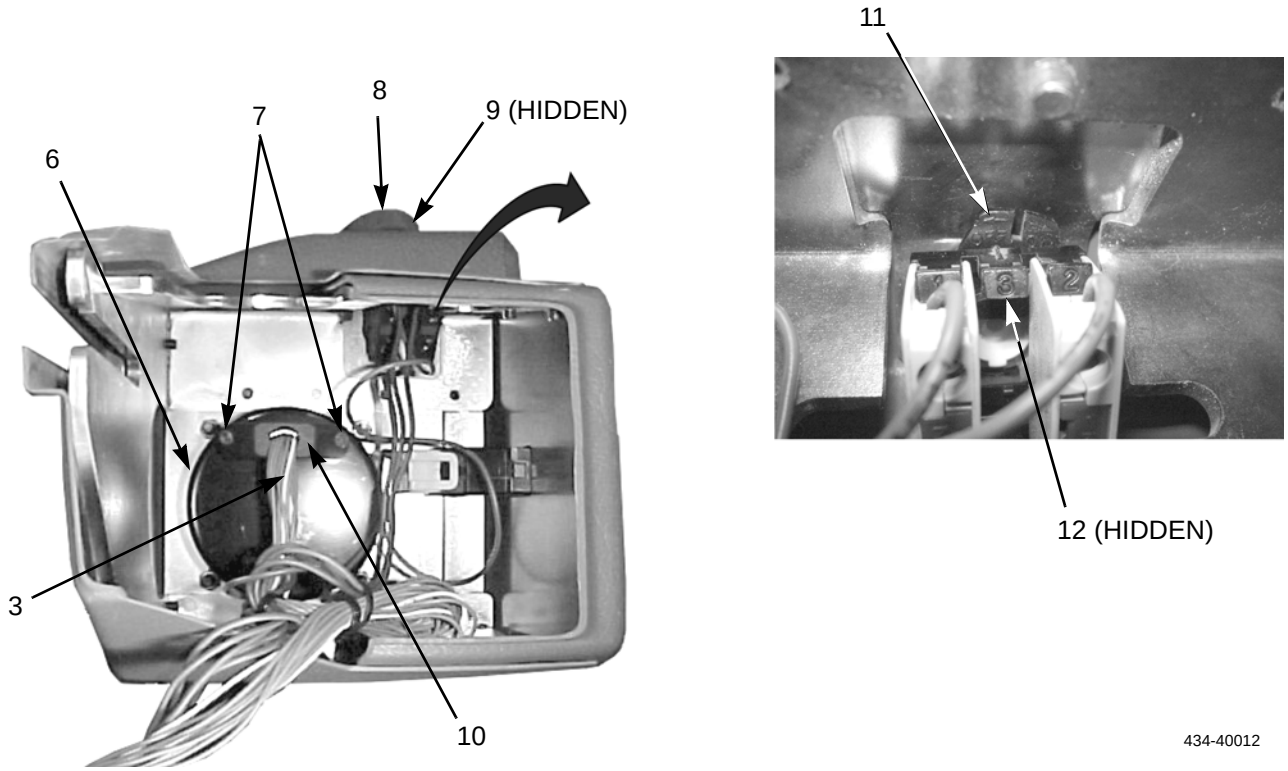
Remove emergency stop switch to allow remaining cover to be removed.

5. Move lever (11) on emergency stop switch (12) left to release switch from push button knob (8). Pull switch down and away from push button knob.

NOTE

Note position of the window on top of emergency stop switch before removing knob. Window should be toward right wall of cab.

6. Unscrew push button knob (8) from plastic nut (9).

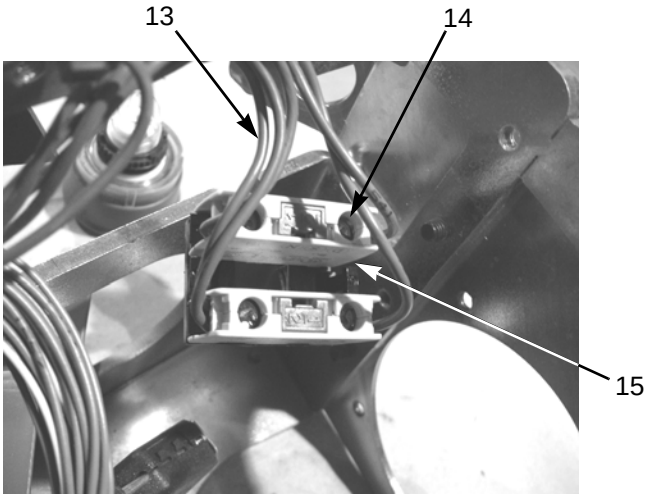


REMOVAL - CONTINUED

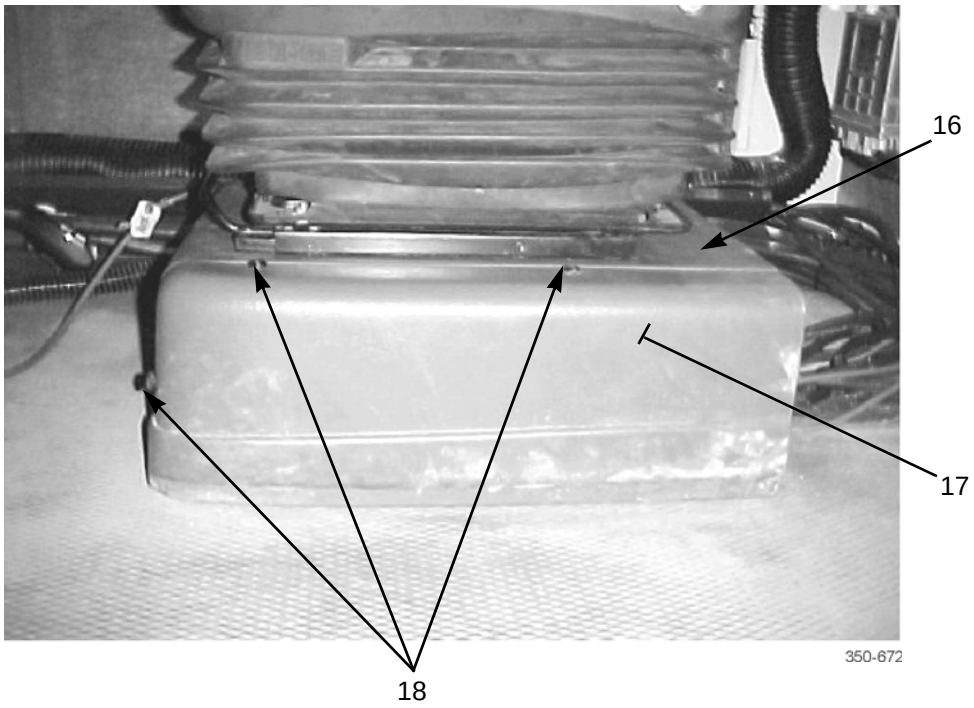
NOTE

- **If emergency stop switch is to be replaced, perform steps 7 and 8. If not, proceed to step 9.**
- **Mark or tag position of all wires on emergency stop switch.**

7. Loosen four screws (14) and disconnect wires (13) from connector (15).
8. Insert four wires (13) into new connector (15) and tighten four screws (14).



9. Loosen three turnbuttons (18) and remove cover (17) from seat base (16).



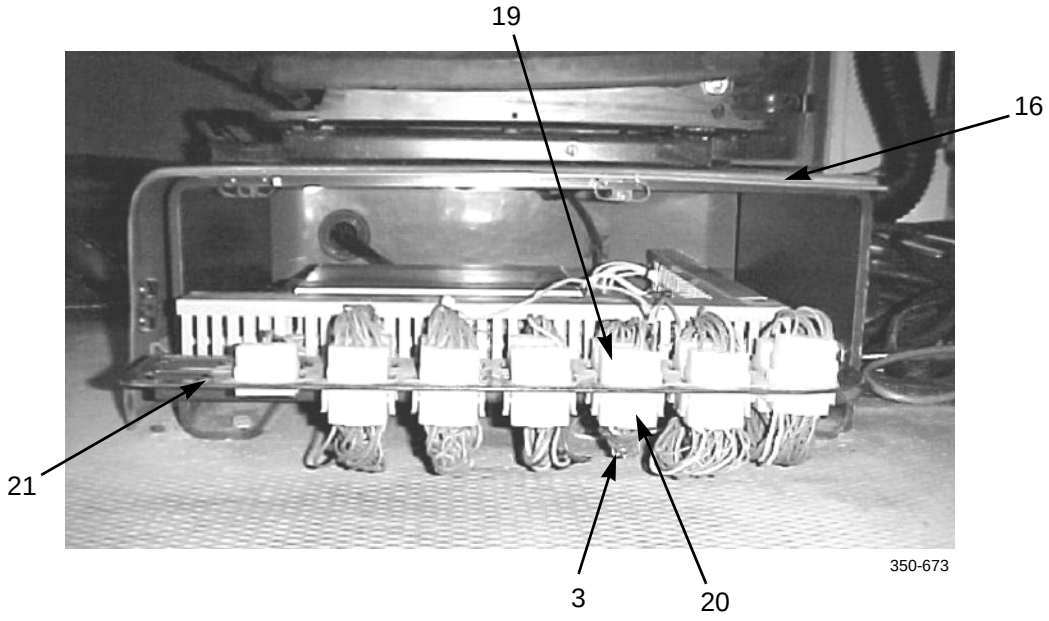
REMOVAL - CONTINUED

10. Slide electrical tray (21) out from seat base (16) for access to underside of tray.

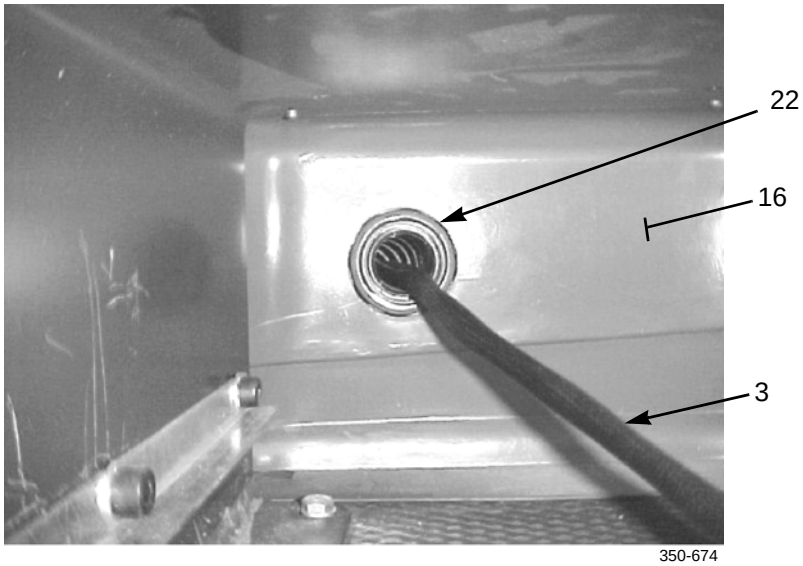
NOTE

Remove and discard tiedown straps as necessary.

11. Depress tabs of two connectors (20) and disconnect two connectors of joystick wiring harness (3) from two terminal blocks (19).



12. Remove nut (22) from inside seat base (16) and remove joystick wiring harness (3) from vehicle.



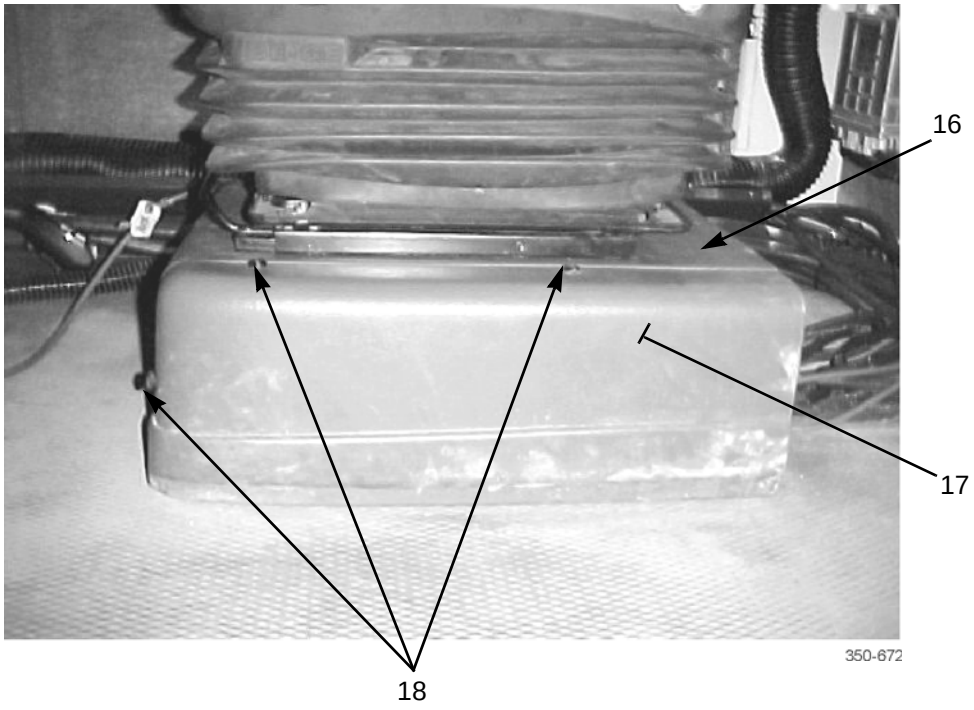
INSTALLATION

1. Position joystick wiring harness (3) inside seat base (16) and install nut (22).

NOTE

Install new tiedown straps as necessary.

2. Connect two connectors (20) of joystick wiring harness (3) to two terminal blocks (19).
3. Slide electrical tray (21) into seat base (16).
4. Install cover (17) on seat base (16) and tighten three turnbuttons (18).



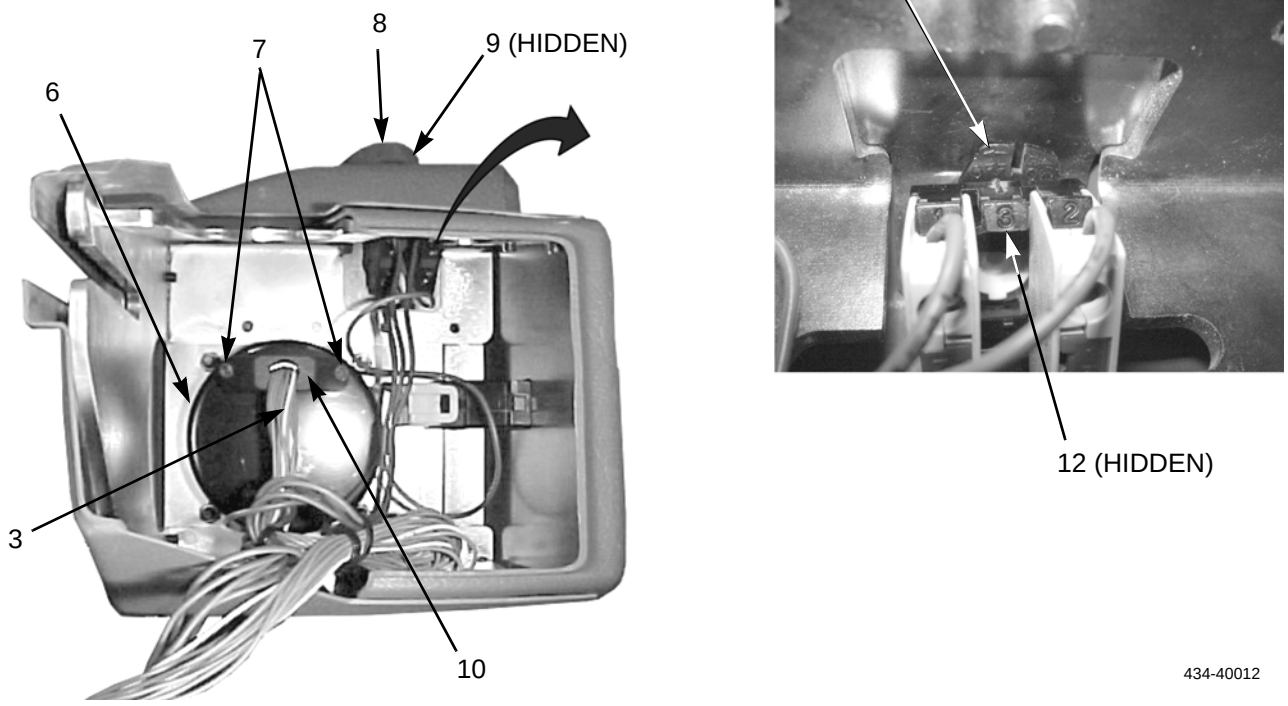
INSTALLATION - CONTINUED

5. Align push button knob (8) in housing (5).

NOTE

Ensure window of push button is in proper position when tight.

6. Install plastic nut (9) from bottom and rotate push button knob (8) to tighten.
7. Position emergency stop switch (12) over push button (8) shaft and slide lever (11) right to secure.
8. Connect connector (10) joystick wiring harness (3) to bottom of joystick (6) and tighten two screws (7).



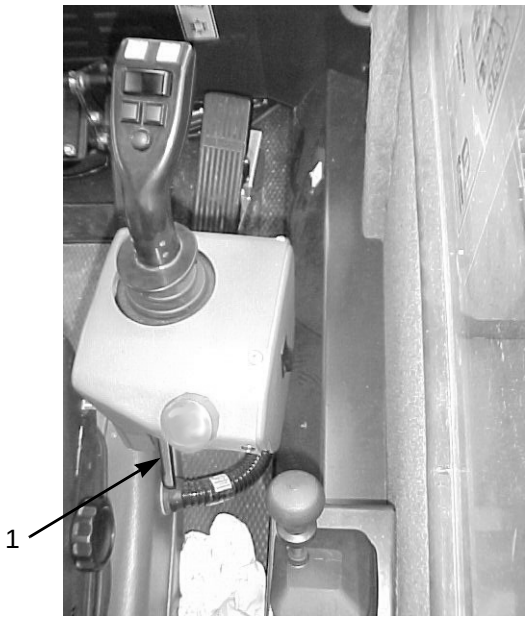
INSTALLATION - CONTINUED

9. Install clamp (2) on protective cover of joystick wiring harness (3) with screw (4).

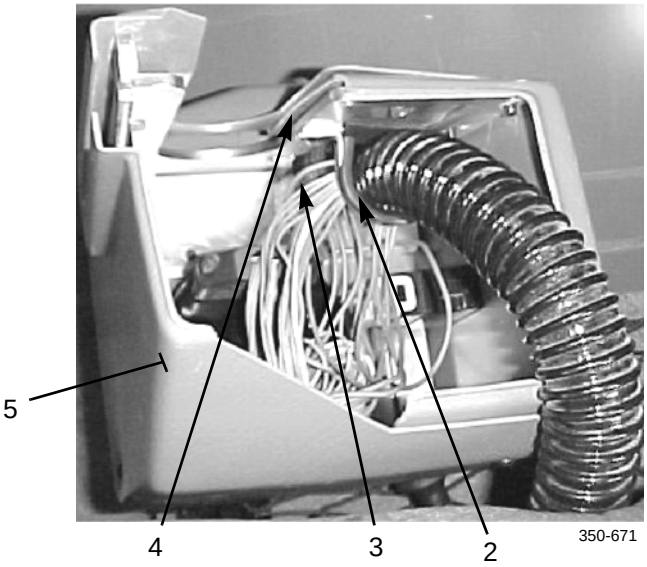
NOTE

Note position of washers on release lever when removed.

10. Position joystick housing (5) on seat and turn joystick positioning lever (1) clockwise to secure.



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END OF WORK PACKAGE

HEADLIGHT MAINTENANCE 0084 00

THIS WORK PACKAGE COVERS

Bulb Replacement

Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

References

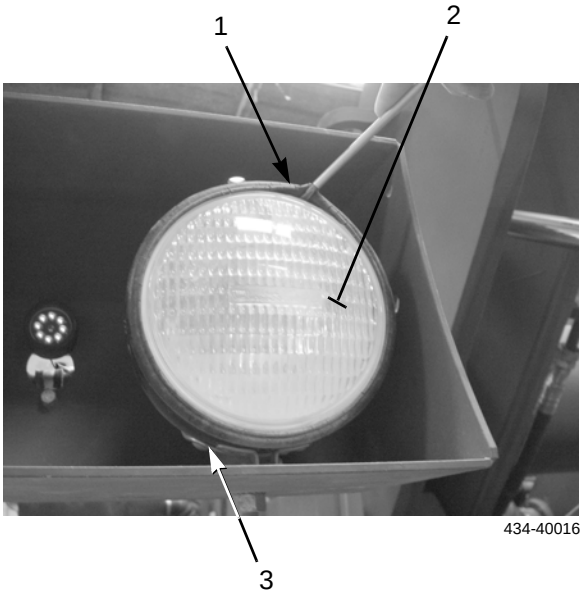
WP 0113 00

Equipment Condition

Master battery switch in OFF position

BULB REPLACEMENT

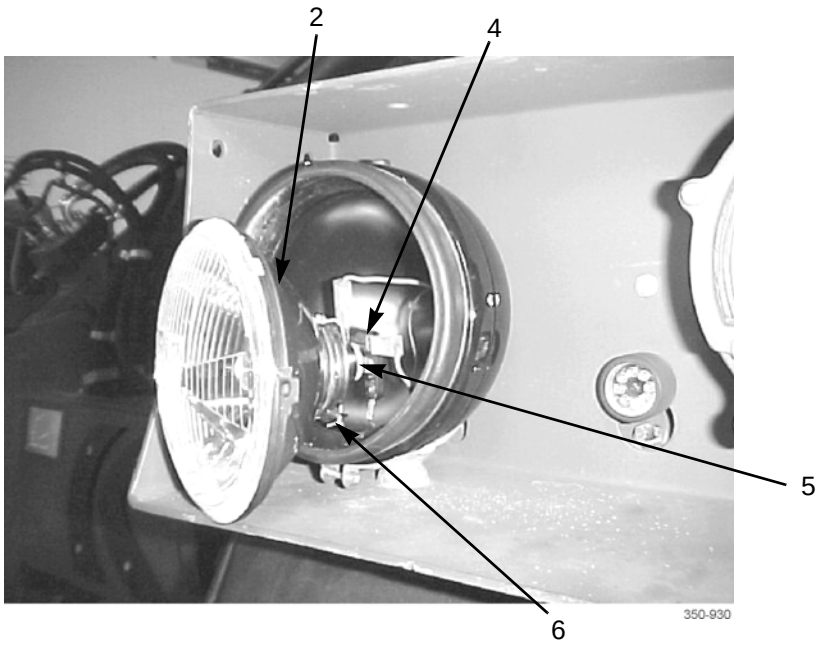
1. Remove reflector insert (2) from rubber ring (1) on light housing (3) with medium flat tip screwdriver.



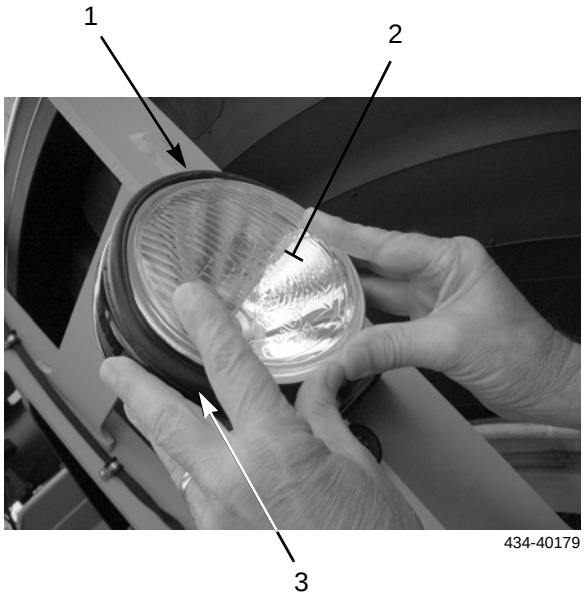
HEADLIGHT MAINTENANCE - CONTINUED **0084 00**

BULB REPLACEMENT - CONTINUED

2. Disconnect black plastic connector (4) from rear of bulb (5).
3. Release wire clip (6) at rear of reflector insert (2) and remove bulb (5).



4. Place new bulb (5) into rear of reflector insert (2) and fasten wire clip (6).
5. Connect black plastic connector (4) to rear of bulb (5).
6. Position reflector insert (2) on rubber ring (1) on light housing (3) and push into place.

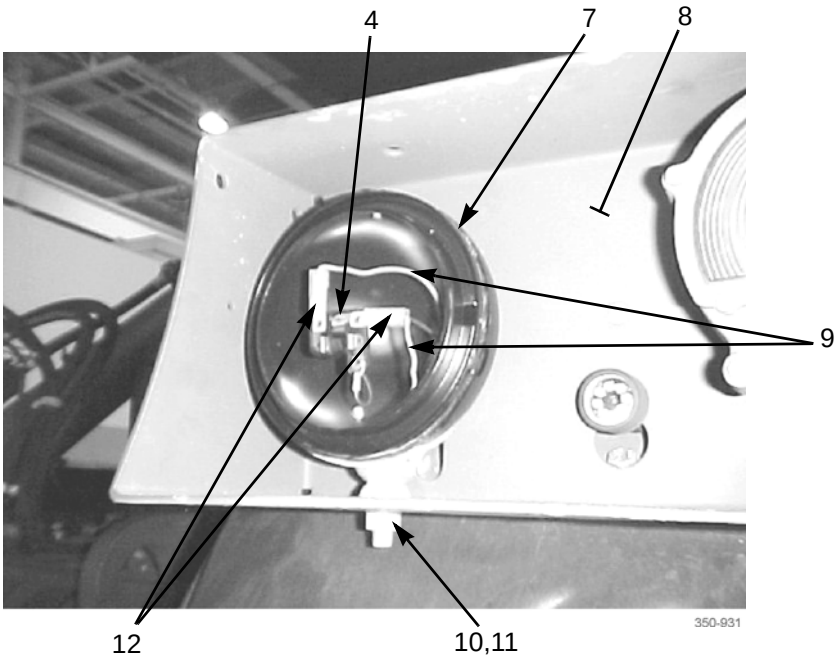


LIGHT REMOVAL

NOTE

- **Use marker tags to ensure proper connection of connectors.**
- **Electrical connectors of light may be repaired in accordance with WP 0113 00.**

1. Remove bulb (refer to *Bulb Replacement*).
2. Remove nut (10), lockwasher (11), and light assembly (7) from bracket (8).
3. Disconnect two connectors (12) from black plastic connector (4) and remove two wires (9) with connectors from rear of light assembly (7).



LIGHT INSTALLATION

1. Route two connectors (12) and wires (9) through rear of light assembly (7) and connect two connectors to black plastic connector (4).
2. Install light assembly (7) on bracket (8) with lockwasher (11) and nut (10).
3. Install bulb (refer to *Bulb Replacement*).

END OF WORK PACKAGE

BACKUP LIGHT AND WORK LIGHT MAINTENANCE 0085 00

THIS WORK PACKAGE COVERS

Bulb Replacement

Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

References

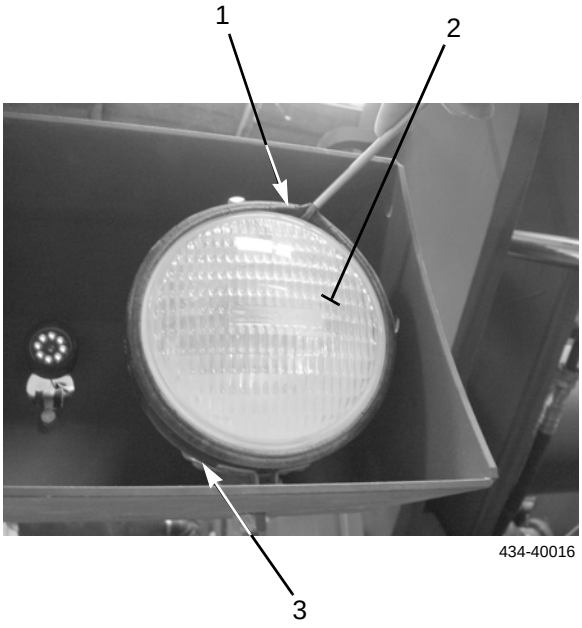
WP 0113 00

Equipment Condition

Master battery switch in OFF position

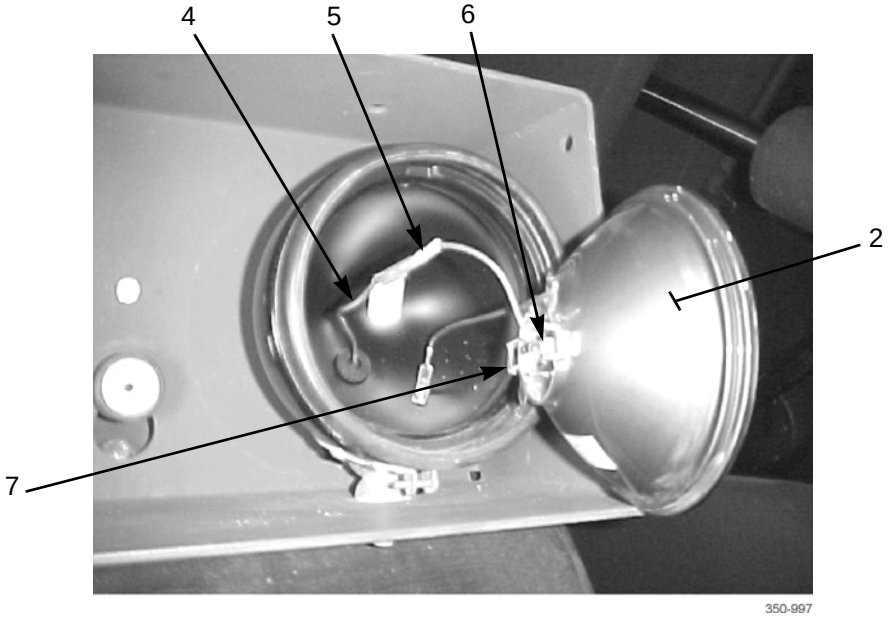
BULB REPLACEMENT

1. Remove reflector insert (2) from rubber ring (1) on light housing (3) with medium flat tip screwdriver.

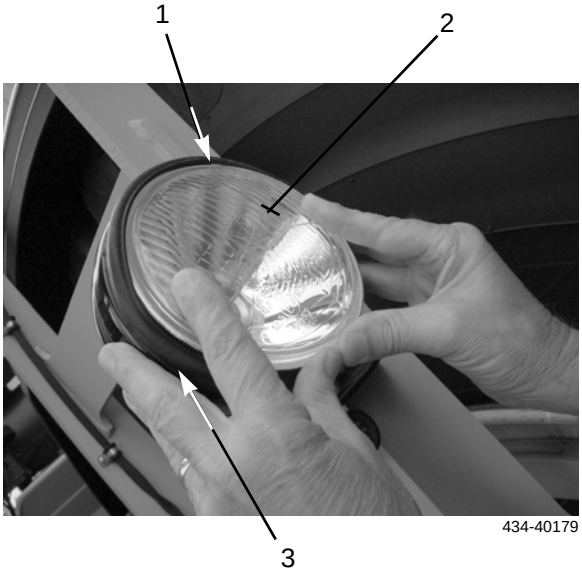


BULB REPLACEMENT - CONTINUED

2. Disconnect connector (5) of bulb (6) from connector of wiring harness (4).
3. Release wire clip (7) at rear of reflector insert (2) and remove bulb (6).



4. Place new bulb (6) into rear of reflector insert (2) and fasten wire clip (7).
5. Connect connector (5) of bulb (6) to connector of wiring harness (4).
6. Position reflector insert (2) on rubber ring (1) on light housing (3) and push into place.

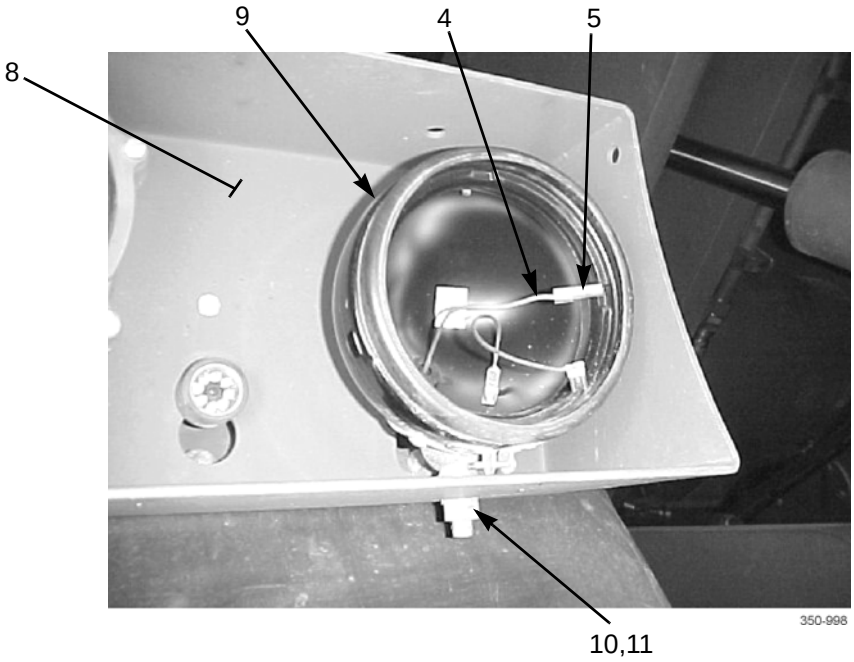


LIGHT REMOVAL

NOTE

Electrical connectors of light may be repaired in accordance with WP 0113 00.

1. Remove bulb (6) (refer to *Bulb Replacement*).
2. Remove nut (10), lockwasher (11), and light assembly (9) from bracket (8).
3. Remove wire of wiring harness (4) with connector (5) from rear of light assembly (9).



LIGHT INSTALLATION

1. Route connector (5) and wire of wiring harness (4) through rear of light assembly (9).
2. Install light assembly (9) on bracket (8) with lockwasher (11) and nut (10).
3. Install bulb (6) (refer to *Bulb Replacement*).

END OF WORK PACKAGE

DIRECTIONAL AND SIDE MARKER LIGHT MAINTENANCE 0086 00

THIS WORK PACKAGE COVERS

Directional Light: Bulb and LED Replacement, Removal, Installation

Side Marker Light: Bulb Replacement, Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.001) (2)

References

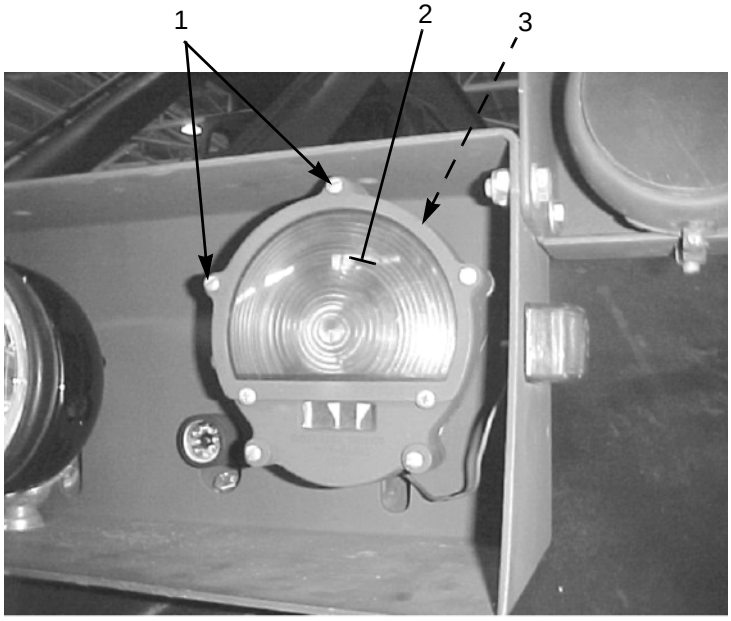
WP 0113 00

Equipment Condition

Master battery switch in OFF position

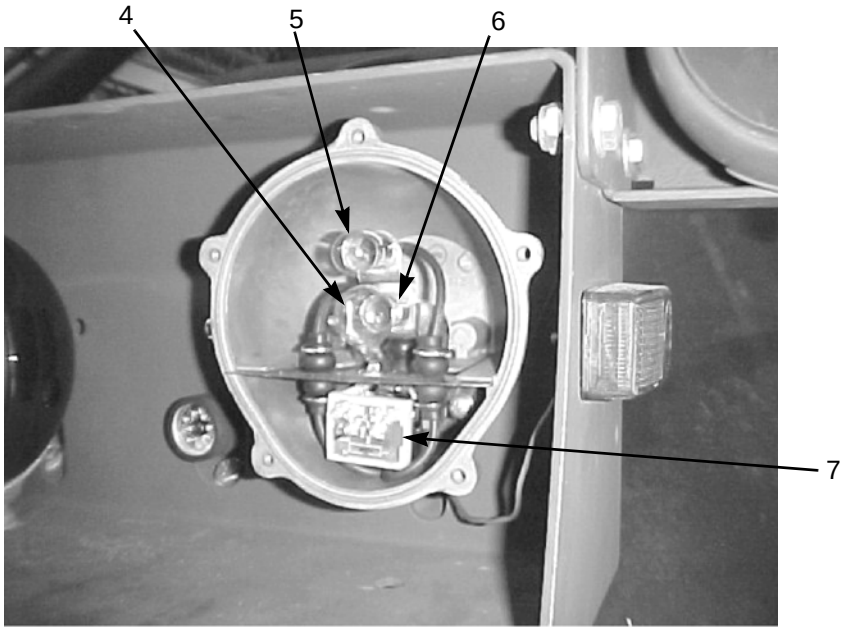
DIRECTIONAL LIGHT BULB AND LED REPLACEMENT

1. Loosen five screws (1) and remove lens assembly (2) from light housing (3).

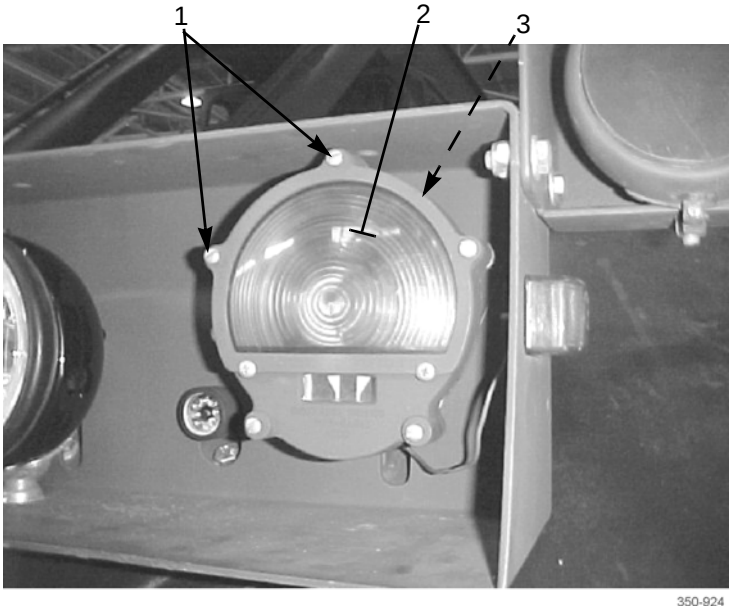


DIRECTIONAL LIGHT BULB AND LED REPLACEMENT - CONTINUED

2. Remove two bulbs (4 and 5) from lamp holder (6).
3. To remove LED (7), pull outward on LED panel until panel just separates from black plastic section of connector.
4. Grasp black plastic and push in and rotate connector slightly counterclockwise and remove LED (7) from socket.
5. To install LED (7), grasp black plastic section of connector and insert connector into socket. Push in and rotate slightly clockwise.
6. Push LED (7) panel over black plastic until fully seated.
7. Install two new bulbs (4 and 5) in lamp holder (6).



8. Install lens assembly (2) on light housing (3) and tighten five screws (1).

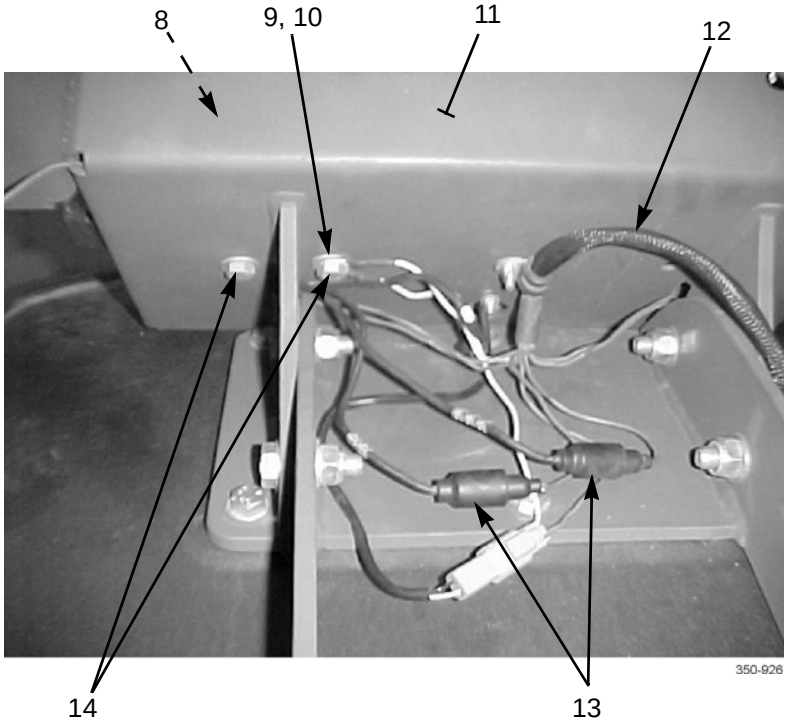


DIRECTIONAL LIGHT REMOVAL

NOTE

- **Front and rear directional lights are removed the same way.**
- **Use marker tags to ensure proper connection of connectors.**
- **Electrical connectors of light may be repaired in accordance with WP 0113 00.**

1. Remove directional light bulbs and LED(s) (refer to *Directional Light Bulb and LED Replacement*).
2. Disconnect two connectors (13) of directional light (8) from connectors of wiring harness (12).
3. Remove two screws (14), ground terminals (9) of wiring harness (12), washers (10), and directional light (8) from bracket (11).



DIRECTIONAL LIGHT INSTALLATION

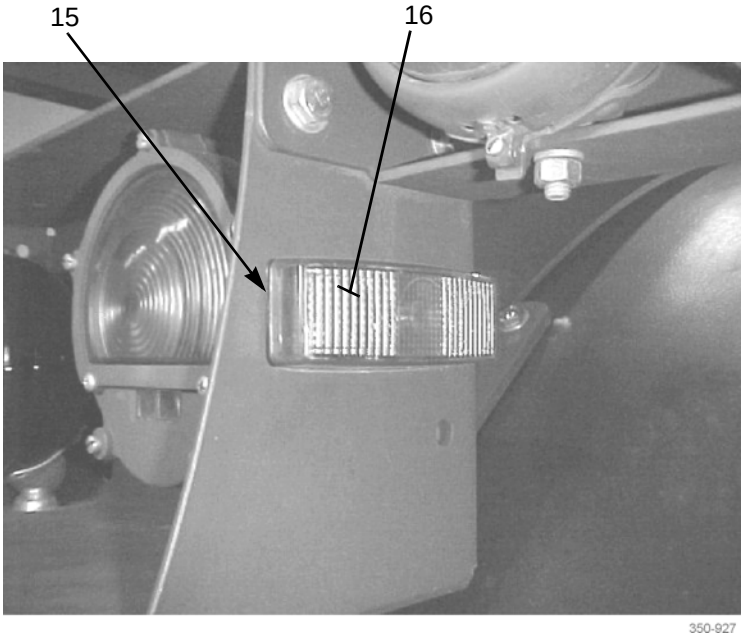
NOTE

Front and rear directional lights are installed the same way.

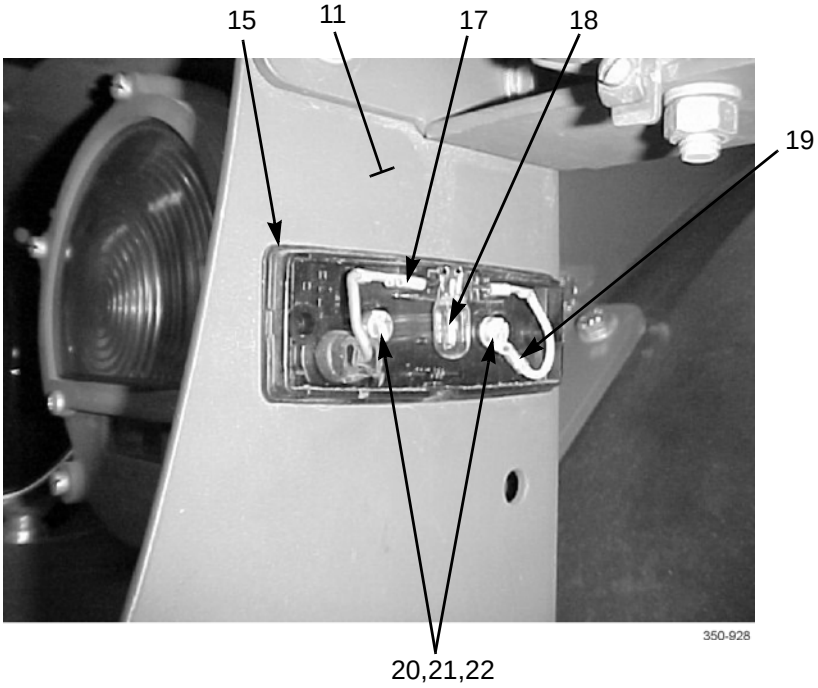
1. Install directional light (8) and ground terminals (9) of wiring harness (12) on bracket (11) with two washers (10) and screws (14).
2. Connect two connectors (13) of directional light (8) to connectors of wiring harness (12).
3. Install bulbs and LED(s) (refer to *Directional Light Bulb and LED Replacement*).

SIDE MARKER LIGHT BULB REPLACEMENT

1. Pry cover (16) of side marker light from lamp housing (15).



2. Remove bulb (18) from lamp housing (15).



3. Install new bulb (18) in lamp housing (15).
4. Install cover (16) on lamp housing (15).

SIDE MARKER LIGHT REMOVAL

NOTE

Front and rear side marker lights are removed the same way.

1. Remove side marker light bulb (refer to *Side Marker Light Bulb Replacement*).
2. Remove two locknuts (20), washers (21), screws (22), white wire terminal (19), and lamp housing (15) from bracket (11). Discard locknuts.
3. Remove black wire terminal (17) from lamp housing (15).

SIDE MARKER LIGHT INSTALLATION

NOTE

Front and rear side marker lights are installed the same way.

1. Install black wire terminal (17) on lamp housing (15).
2. Install lamp housing (15) and white wire terminal (19) on bracket (11) with two screws (22), washers (21), and new locknuts (20).
3. Install side marker light bulb (refer to *Side Marker Light Bulb Replacement*).

END OF WORK PACKAGE

BLACKOUT LIGHT MAINTENANCE 0087 00

THIS WORK PACKAGE COVERS

Bulb/Reflector Replacement

Blackout Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

References

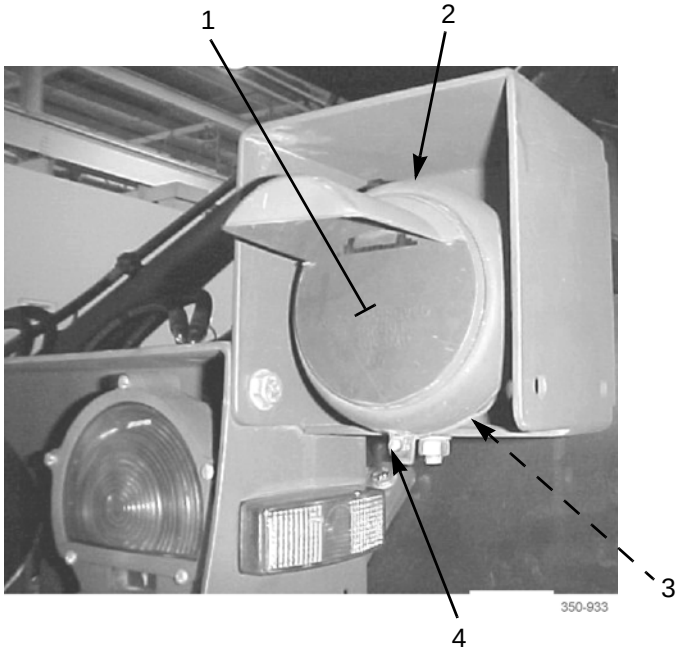
WP 0113 00

Equipment Condition

Master battery switch in OFF position

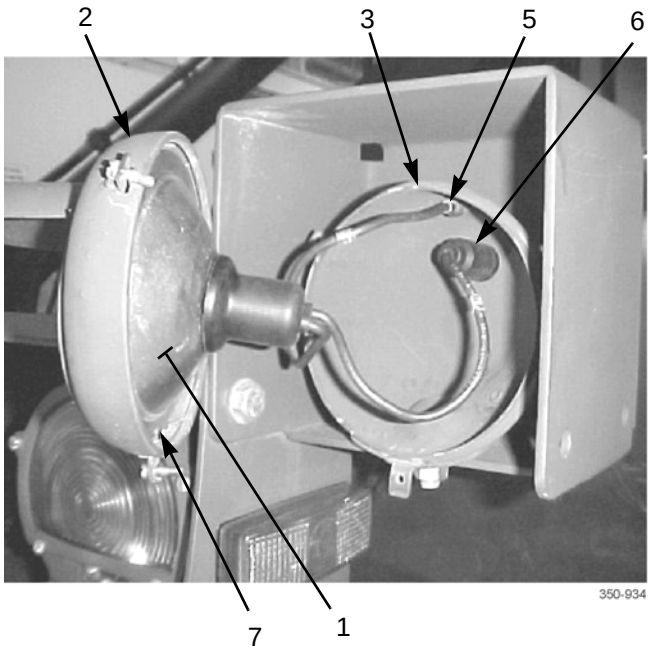
BULB/REFLECTOR REPLACEMENT

1. Loosen three screws (4) and remove bulb/reflector assembly (1) with ring (2) from blackout light housing (3).

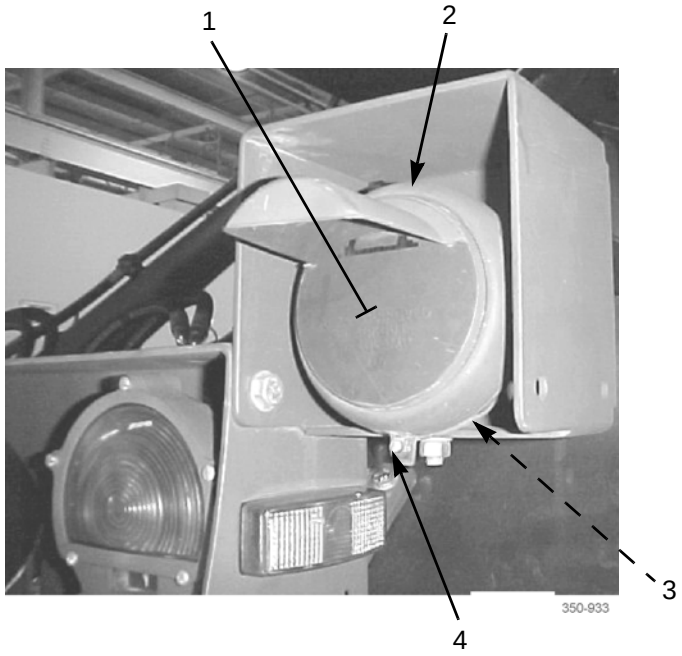


BULB/REFLECTOR REPLACEMENT - CONTINUED

2. Disconnect terminal plug (5) and connector (6) from inside blackout light housing (3).
3. Remove two spring clips (7) and remove bulb/reflector assembly (1) from ring (2).



4. Install new bulb/reflector assembly (1) on ring (2) and install two spring clips (7).
5. Connect connector (6) and terminal plug (5) inside blackout light housing (3).
6. Install bulb/reflector assembly (1) with ring (2) in blackout light housing (3) and tighten three screws (4).

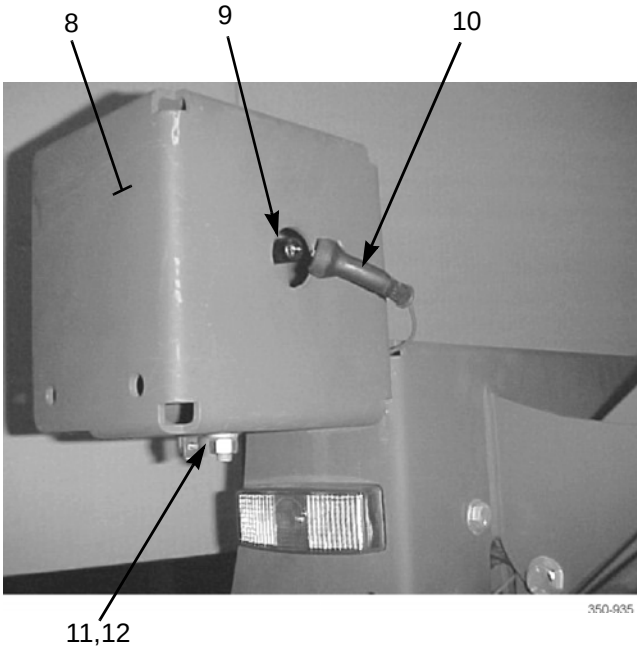


BLACKOUT LIGHT REMOVAL

NOTE

Electrical connectors of light may be repaired in accordance with WP 0113 00.

1. At rear of bracket (8), disconnect connector (10) of wiring harness from rear of blackout light (9).
2. Remove nut (11), washer (12), and blackout light (9) from bracket (8).



BLACKOUT LIGHT INSTALLATION

1. Install blackout light (9) on bracket (8) with washer (12) and nut (11).

NOTE

Apply electrically conductive grease to connector before connection is made.

2. At rear of bracket (8), connect connector (10) of wiring harness to rear of blackout light (9).

END OF WORK PACKAGE

TWISTLOCK INDICATOR LIGHTS MAINTENANCE 0088 00

THIS WORK PACKAGE COVERS

Twistlock Indicator Light Bulb Replacement

Twistlock Indicator Light: Removal, Installation

Twistlock Infrared (IR) Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.003) (2)

References

WP 0113 00

WP 0048 00

Equipment Condition

Master battery switch in OFF position

WARNING

DO NOT look directly at IR source without eye protection and maintain a minimum distance of 12 in. from energized IR lights to prevent possible eye discomfort or damage.

NOTE

Electrical connectors of lights may be repaired in accordance with WP 0113 00.

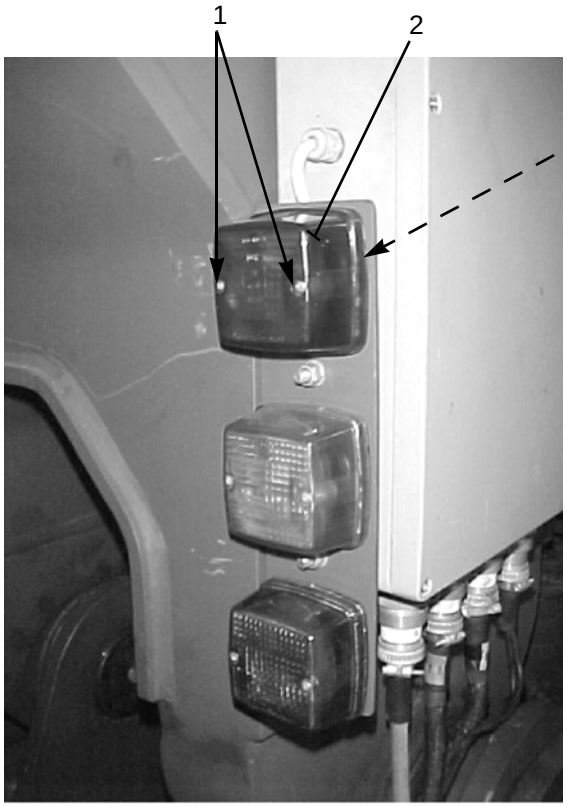
TWISTLOCK INDICATOR LIGHT BULB REPLACEMENT

NOTE

Each of three twistlock indicator light bulbs is replaced the same way.

TWISTLOCK INDICATOR LIGHT BULB REPLACEMENT - CONTINUED

1. Remove two screws (1) and lens (2) from lamp housing (3).



2. Remove bulb (4) from lamp housing (3).



TWISTLOCK INDICATOR LIGHT BULB REPLACEMENT - CONTINUED

3. Install new bulb (4) in lamp housing (3).
4. Install lens (2) on lamp housing (3) with two screws (1).

TWISTLOCK INDICATOR LIGHT REMOVAL

NOTE

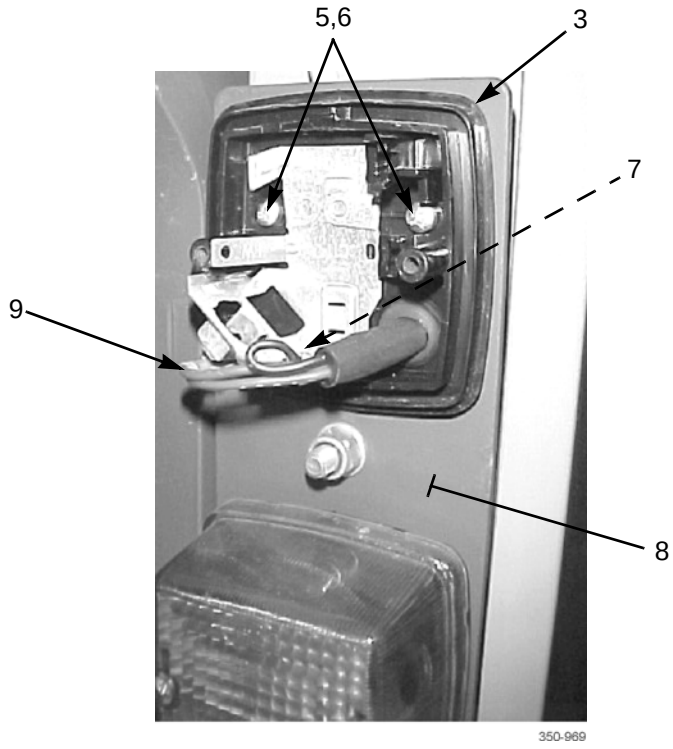
Each of three twistlock indicator lights is removed the same way. Top (red) indicator light is shown.

1. Remove bulb from indicator light (refer to *Twistlock Indicator Light Bulb Replacement*).
2. Disconnect connector (7) and connector (9) from lamp housing (3).

NOTE

Cable clamp at rear of top (red) indicator light housing will also be removed as screws and locknuts are removed.

3. Remove two locknuts (5), screws (6), and lamp housing (3) from light bracket (8). Discard locknuts.



TWISTLOCK INDICATOR LIGHT INSTALLATION

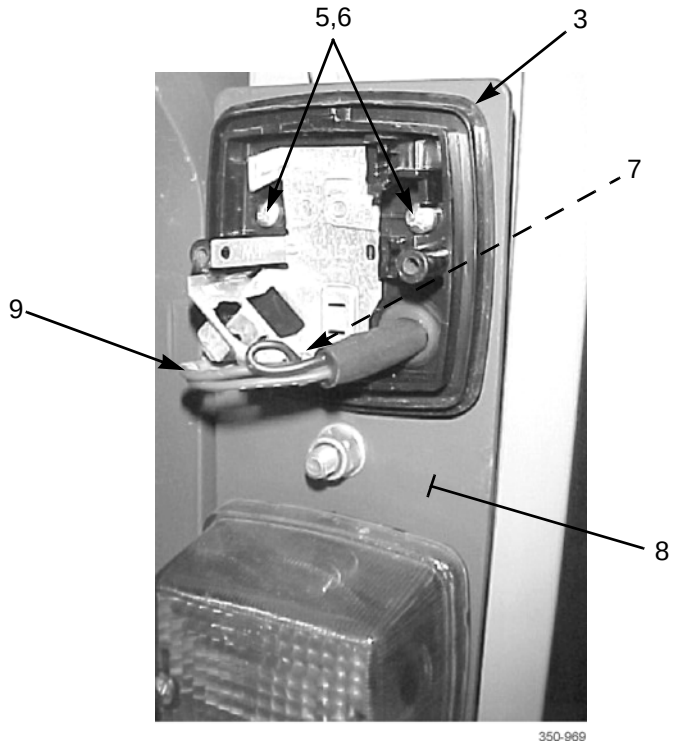
CAUTION

For proper operation of twistlock indicator light, bend two metal tabs at lamp housing mounting screws 180 degrees to prevent grounding lamp housing to light bracket.

NOTE

Cable clamp at rear of top (red) indicator light housing will also be installed as screws and new locknuts are installed.

1. Install lamp housing (3) on light bracket (8) with two screws (6) and new locknuts (5).
2. Connect connector (7) and connector (9) to lamp housing (3).
3. Install bulb on indicator light (refer to *Twistlock Indicator Light Bulb Replacement*).



TWISTLOCK INFRARED (IR) LIGHT REMOVAL

NOTE

- **If one IR light needs replacing, all six IR lights must be replaced.**
- **Remove tiedown straps as required and discard.**

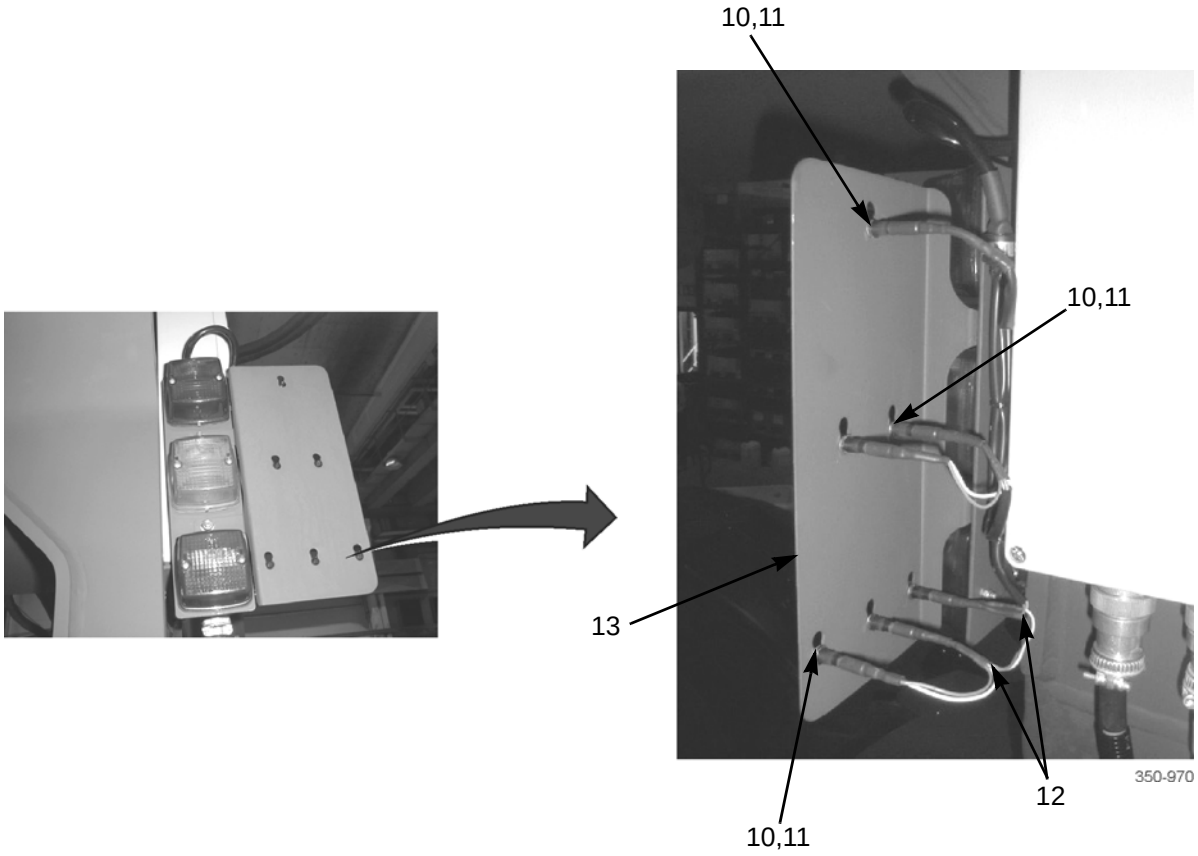
1. Loosen nut (11) and remove IR light (10) from IR light bracket (13).
2. Repeat step 1 for five remaining IR lights (10).

TWISTLOCK INFRARED LIGHT (IR) REMOVAL - CONTINUED

NOTE

Refer to wiring diagrams for assistance (WP 0048 00).

3. Trace wiring harness (12) for IR lights (10) to tophandler junction box and disconnect wires of wiring harness. Remove wiring harness from tophandler junction box. Remove IR lights from vehicle.



TWISTLOCK INFRARED (IR) LIGHT INSTALLATION

1. Position IR lights (10) on IR light bracket (13) and tighten nuts (11).

NOTE

Refer to wiring diagrams for assistance (WP 0048 00).

2. Position wiring harness (12) for IR lights (10) at tophandler junction box and connect wires of wiring harness.

3. Install new tiedowns straps as required.

END OF WORK PACKAGE

CAB INTERIOR LIGHT MAINTENANCE 0089 00

THIS WORK PACKAGE COVERS

Bulb Replacement

Cab Interior Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

References

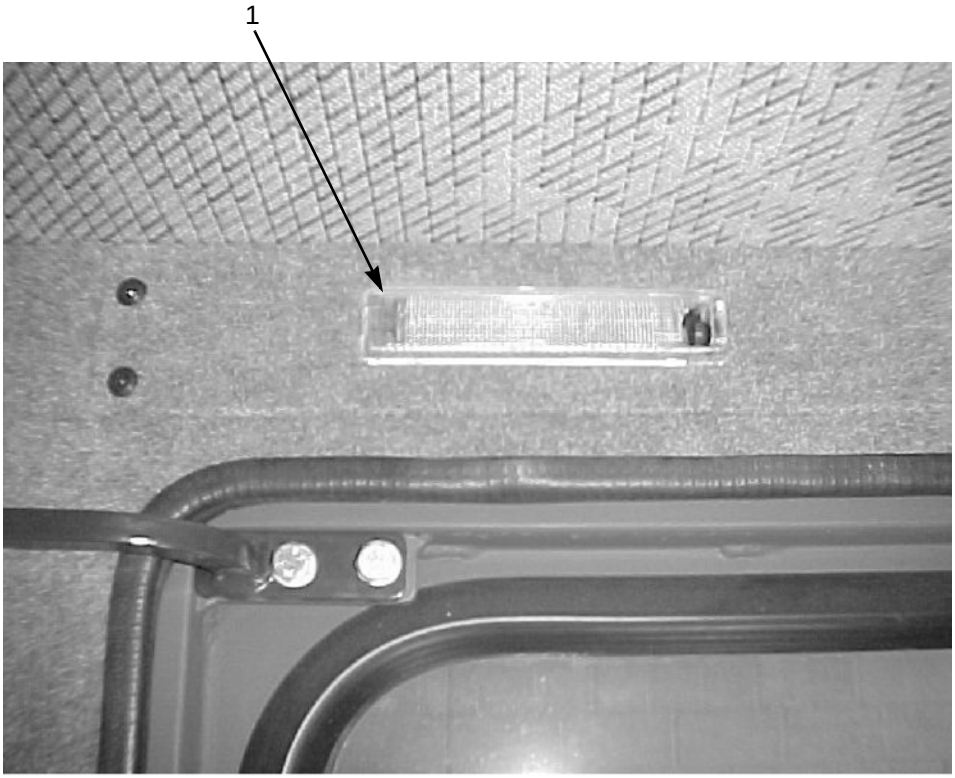
TM 10-3930-675-10

Equipment Condition

Master battery switch in OFF position

BULB REPLACEMENT

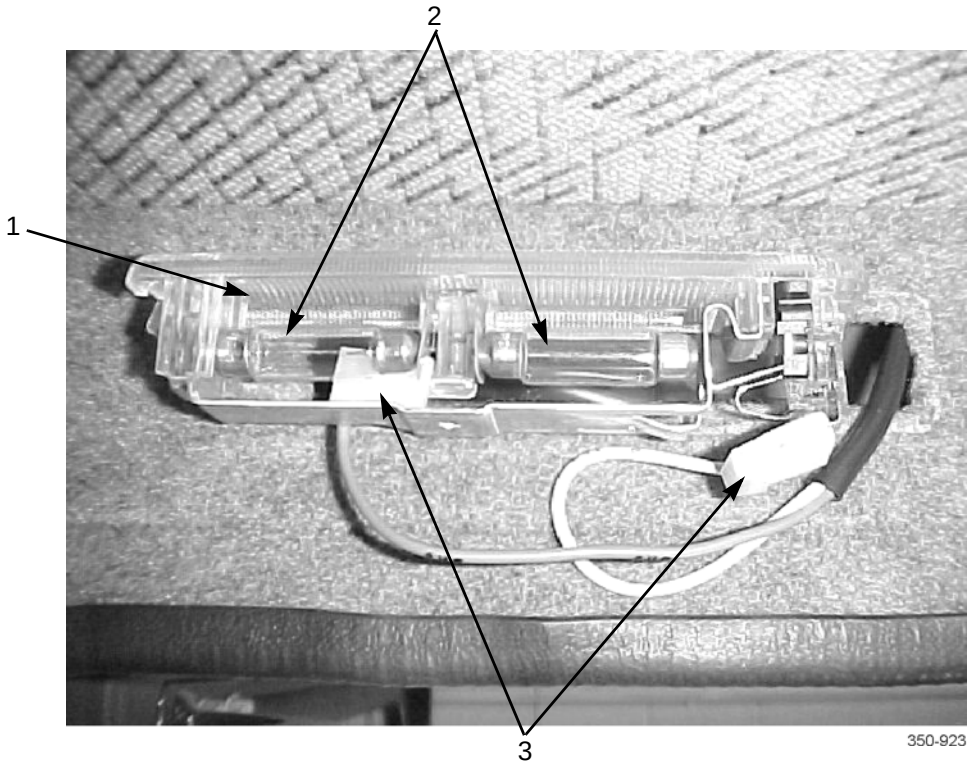
1. Remove interior light (1) from cab.



350-922

BULB REPLACEMENT - CONTINUED

2. Remove two bulbs (2) from interior light (1).



3. Install two bulbs (2) in interior light (1).
4. Install interior light (1) in cab.
5. Turn master battery switch to ON position.
6. Check operation of light (TM 10-3930-675-10).

CAB INTERIOR LIGHT REMOVAL

1. Remove interior light and two bulbs from cab (refer to *Bulb Replacement*).

NOTE

Tag wires prior to disconnection to ensure proper connection on installation.

2. Disconnect two wiring harness connectors (3) from interior light (1) and remove light.

CAB INTERIOR LIGHT INSTALLATION

1. Connect two wiring harness connectors (3) to interior light (1).
2. Install two bulbs and interior light in cab (refer to *Bulb Replacement*).
3. Turn master battery switch to ON position.
4. Check operation of light (TM 10-3930-675-10).

END OF WORK PACKAGE

INFRARED (IR) LIGHTS REPLACEMENT 0090 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Nut, lock (P/N 920076.003)

References

WP 0088 00

WP 0113 00

Equipment Condition

Master battery switch in OFF position

WARNING

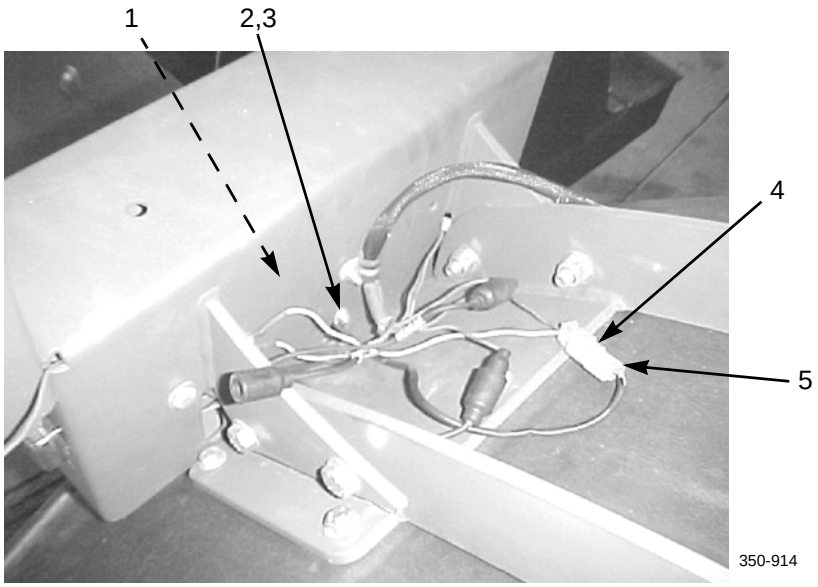
DO NOT look directly at IR source without eye protection and maintain a minimum distance of 12 in. from energized IR lights to prevent possible eye discomfort or damage.

NOTE

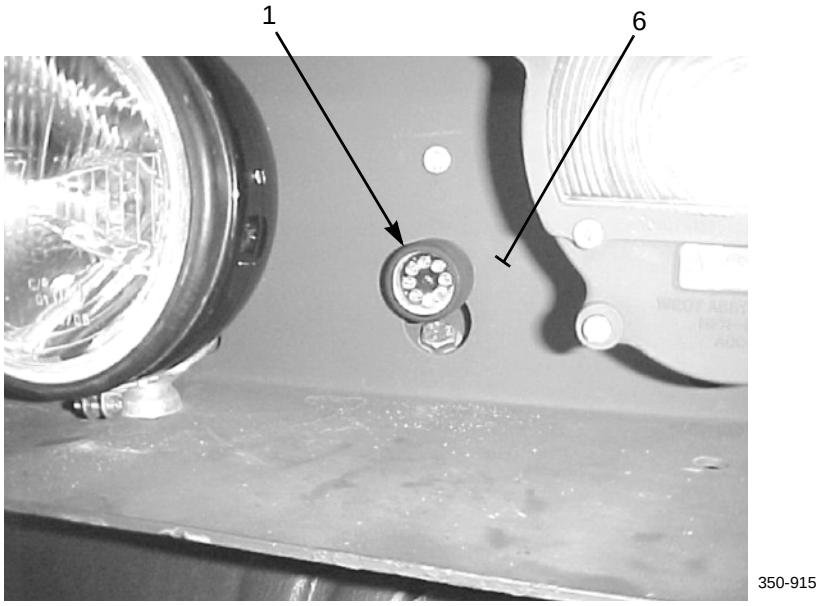
- **Twistlock indicator infrared (IR) lights are replaced in WP 0088 00.**
- **IR lights at front and rear of vehicle and on each side of boom are replaced the same way.**
- **Electrical connectors may be repaired in accordance with *Electrical General Maintenance Instructions* (WP 0113 00).**

REMOVAL

1. Disconnect connector (5) of IR light (1) from connector (4) of wiring harness.
2. Remove locknut (2) and washer (3) from rear of IR light (1). Discard locknut.



3. Remove IR light (1) from bracket (6).



INSTALLATION

1. Position IR light (1) on bracket (6).
2. Install washer (3) and new locknut (2) on rear of IR light (1).
3. Connect connector (5) of IR light (1) to connector (4) of wiring harness.

END OF WORK PACKAGE

FORDING WATER LEVEL SENSOR REPLACEMENT 0091 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

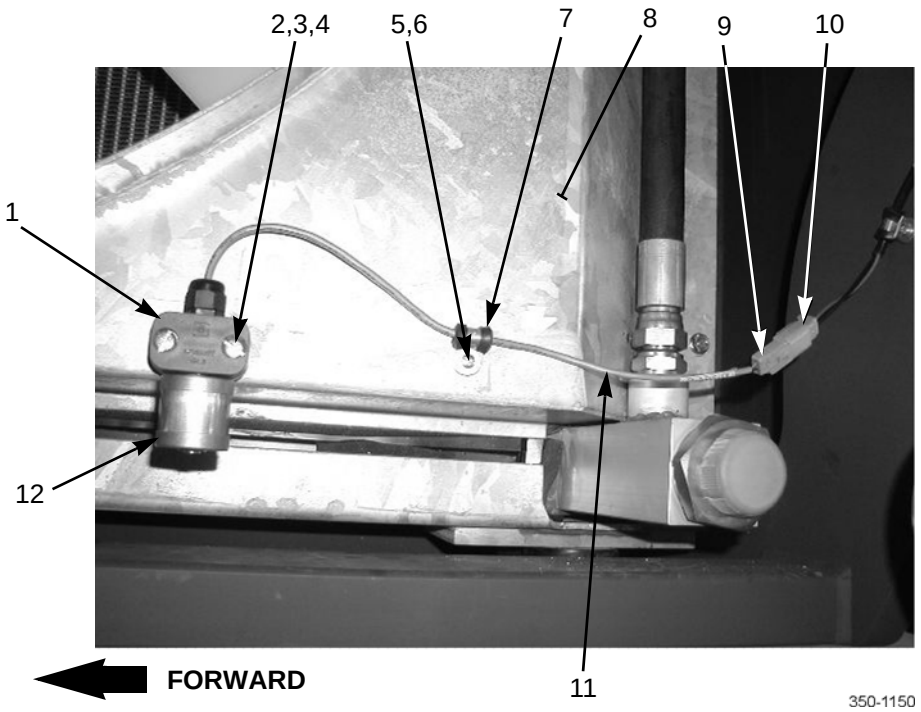
Nut, lock (P/N 920076.002) (2)

Equipment Condition

Master battery switch in OFF position

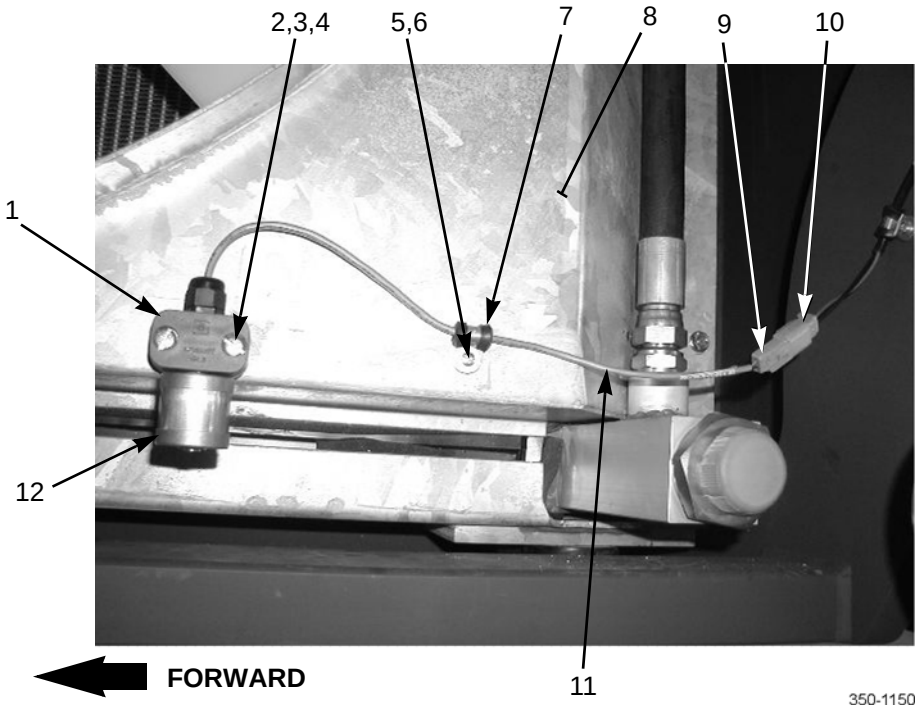
REMOVAL

1. Disconnect sensor connector (9) from wiring harness sensor (10).
2. Remove screw (5), washer (6), and clamp (7) from fan shroud (8) and sensor cable (11).
3. Remove two locknuts (2), washers (3), and screws (4), and remove clamp (1) and sensor (12) from fan shroud (8). Discard locknuts.



INSTALLATION

1. Install sensor (12) on fan shroud (8) with clamp (1), two screws (4), washers (3), and new locknuts (2).
2. Connect sensor connector (9) to wiring harness connector (10).
3. Secure sensor cable (11) to fan shroud (8) with clamp (7), washer (6), and screw (5).



END OF WORK PACKAGE

AMBIENT TEMPERATURE SENSOR REPLACEMENT 0092 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

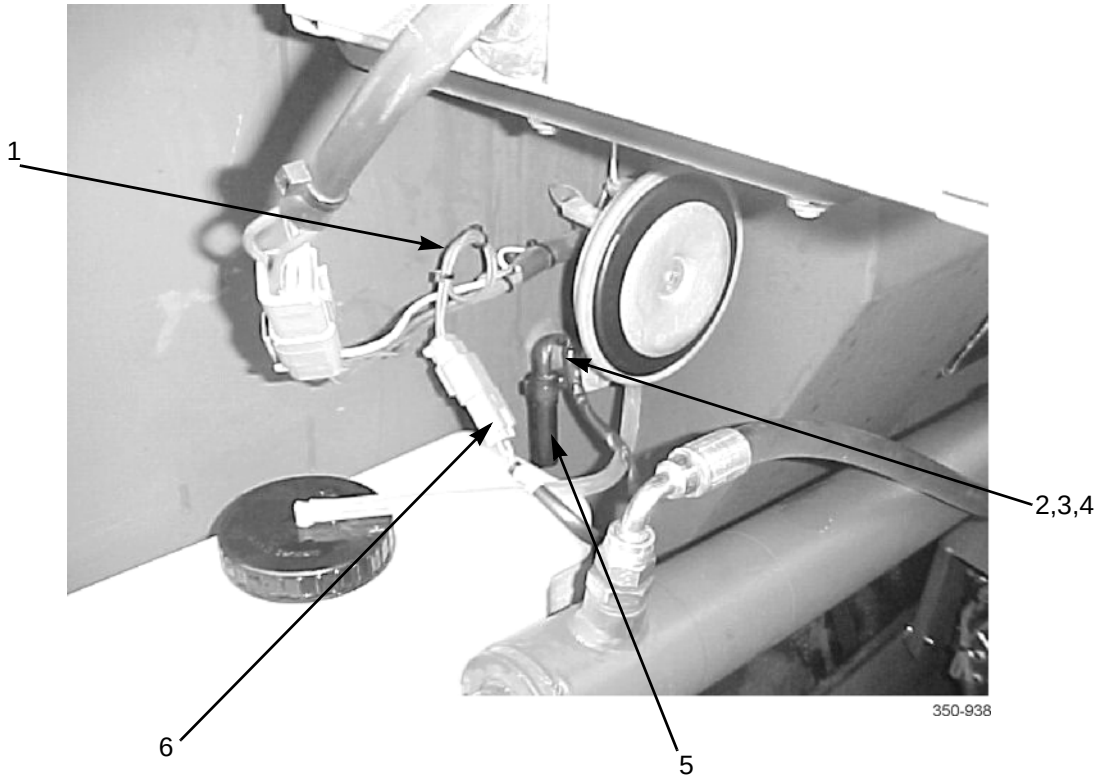
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Equipment Condition

Master battery switch in OFF position

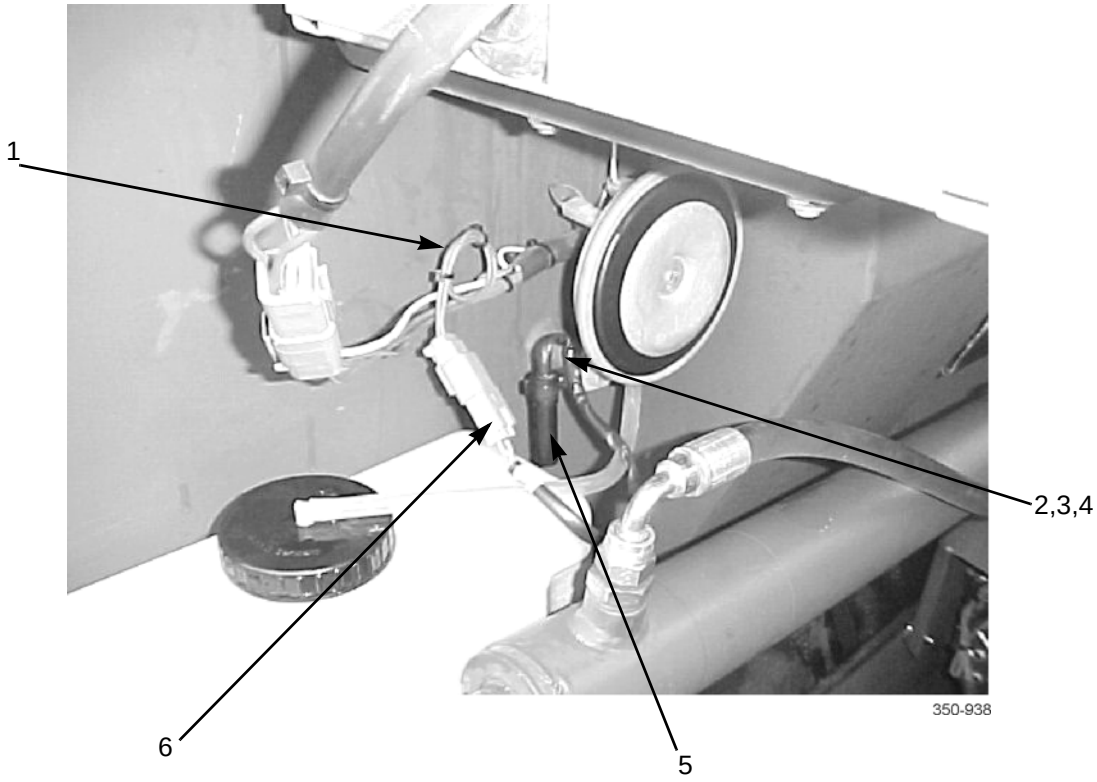
REMOVAL

1. Disconnect connector (6) of ambient temperature sensor (5) from connector of cab wiring harness (1).
2. Remove screw (2), clip (3), and ambient temperature sensor (5) from bracket (4).



INSTALLATION

1. Install ambient temperature sensor (5) on bracket (4) with clip (3). Install screw (2).
2. Connect connector (6) of ambient temperature sensor (5) to connector of cab wiring harness (1).



END OF WORK PACKAGE

WHEEL TEMPERATURE SENSOR REPLACEMENT 0093 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Equipment Condition

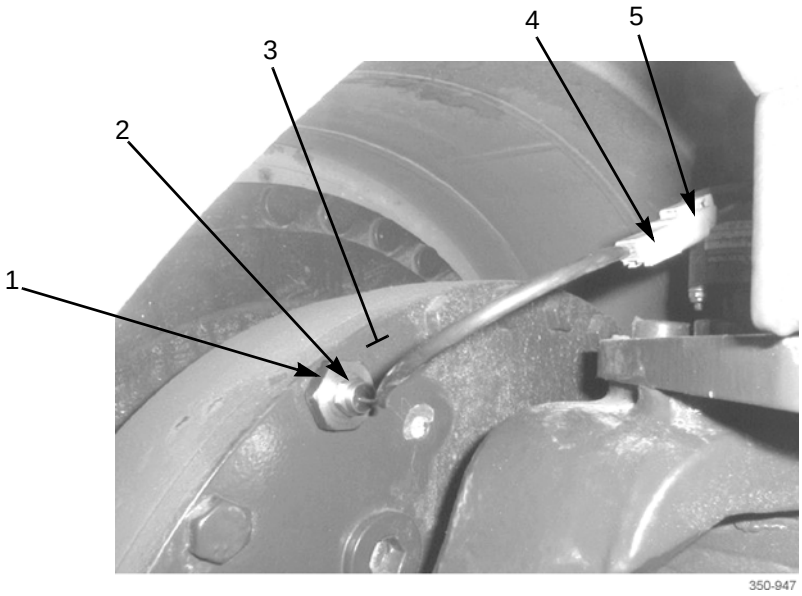
Master battery switch in OFF position

NOTE

Each of two wheel temperature sensors (left front and left rear) is replaced the same way.

REMOVAL

1. Disconnect connector (4) of wheel temperature sensor (2) from connector (5) of vehicle wiring harness.
2. Remove wheel temperature sensor (2) and copper washer from adapter (1) of brake housing (3).



INSTALLATION

1. Install copper washer and wheel temperature sensor (2) on adapter (1) of brake housing (3).
2. Connect connector (5) of vehicle wiring harness to connector (4) of wheel temperature sensor (2).

END OF WORK PACKAGE

ENGINE SENSORS REPLACEMENT 0094 00

THIS WORK PACKAGE COVERS

Coolant Temperature Sensor: Removal, Installation

Engine Position Sensor: Removal, Installation

Intake Air Temperature Sensor: Removal, Installation

Intake Manifold Pressure Sensor: Removal, Installation

Ambient Air Pressure Sensor Replacement

Oil Pressure/Temperature Sensor: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Installation Tool, EPS (Item 61, WP 0289 00)

Socket, Deep Well (Item 113, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 3037537) (2)

Seal, O-ring (P/N 3046201)

Seal, O-ring (P/N 3330159) (2)

References

WP 0064 00

Equipment Condition

Master battery switch in OFF position

Engine cover removed (WP 0148 00)

NOTE

- **Tag wiring harness leads to ensure correct installation.**
- **Use electrically conductive grease on all electrical connections before they are made.**

COOLANT TEMPERATURE SENSOR REMOVAL



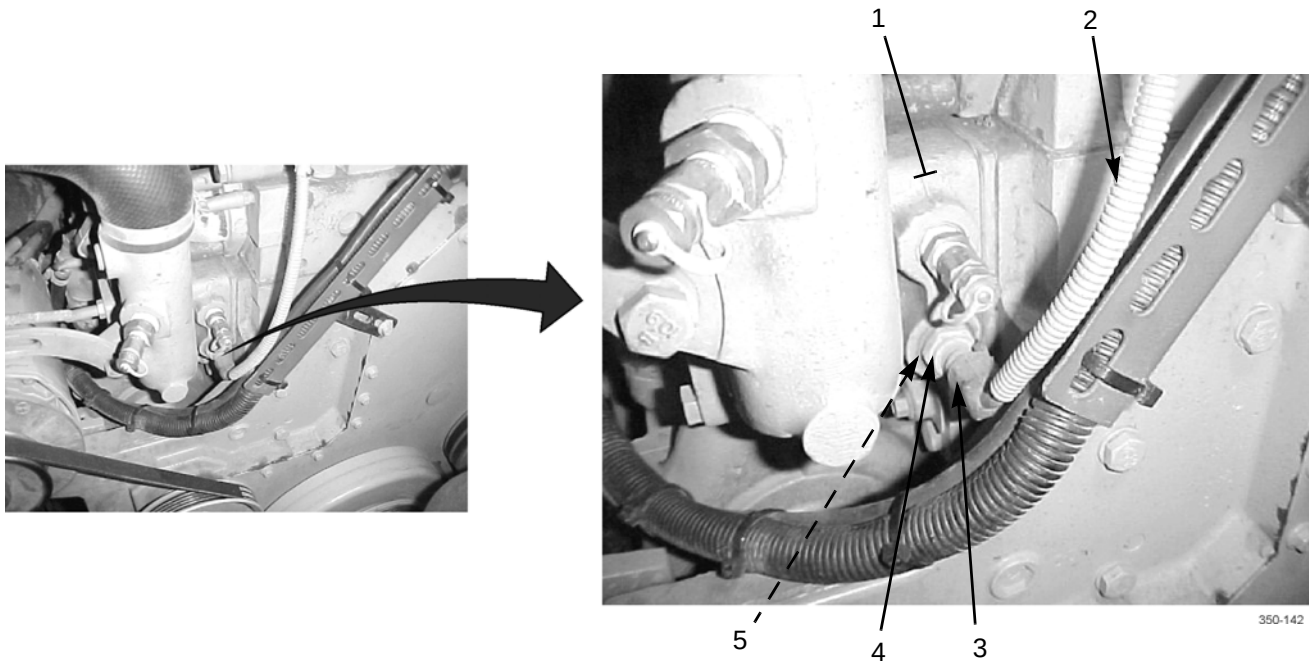
WARNING

DO NOT perform maintenance on cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam, hot water or coolant will cause serious burns.

1. Drain cooling system (WP 0064 00).

COOLANT TEMPERATURE SENSOR REMOVAL - CONTINUED

2. Disconnect connector (3) of engine wiring harness (2) from coolant temperature sensor (4).
3. Remove coolant temperature sensor (4) with O-ring seal (5) from engine (1). Discard O-ring seal.



COOLANT TEMPERATURE SENSOR INSTALLATION

NOTE

Ensure new sensor has O-ring seal installed.

1. Apply a light coat of lubricating oil to new O-ring seal (5).
2. Install O-ring seal (5) and coolant temperature sensor (4) on engine (1). Tighten sensor to 120 lb-in. (14 Nm).

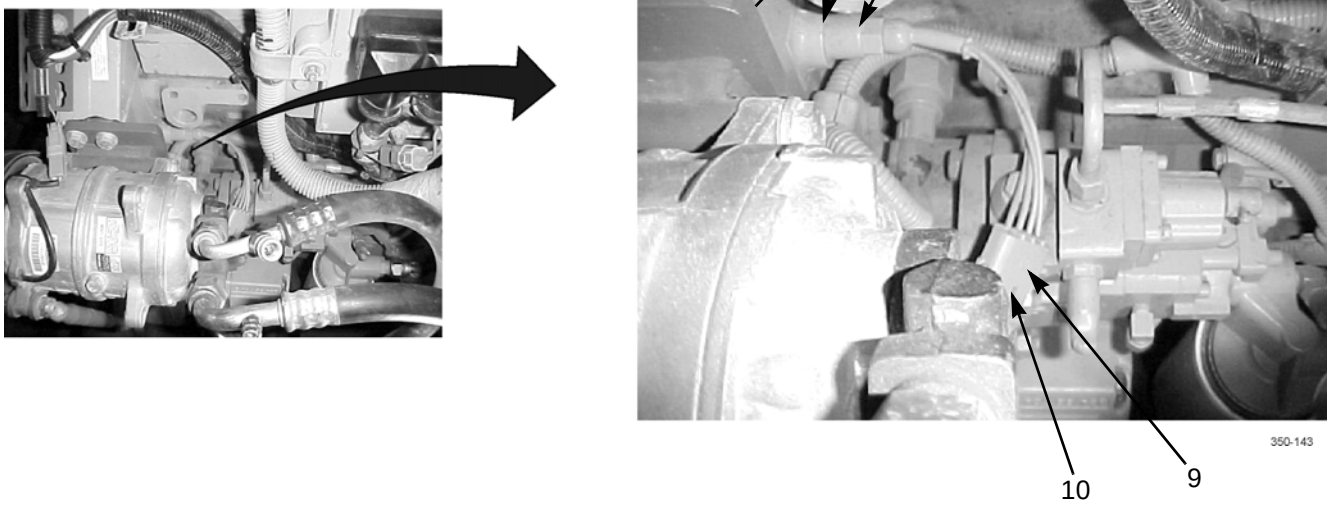
NOTE

Ensure locking tab on connector snaps in place.

3. Connect connector (3) of engine wiring harness (2) to coolant temperature sensor (4).
4. Fill cooling system and check for leaks (WP 0064 00).
5. Install engine cover (WP 0148 00).

ENGINE POSITION SENSOR REMOVAL

1. Disconnect connector (9) of engine position sensor (8) from connector (10) of engine wiring harness.
2. Remove engine position sensor (8) and O-ring seal (7) from engine front cover (6). Discard O-ring seal.



ENGINE POSITION SENSOR INSTALLATION

NOTE

Ensure sensor is free of debris and is not chipped, cracked, or damaged.

1. Install new O-ring seal (7) on engine position sensor (8).
2. Install engine position sensor (8) on engine front cover (6). Tighten sensor to 216 lb-in. (24 Nm).

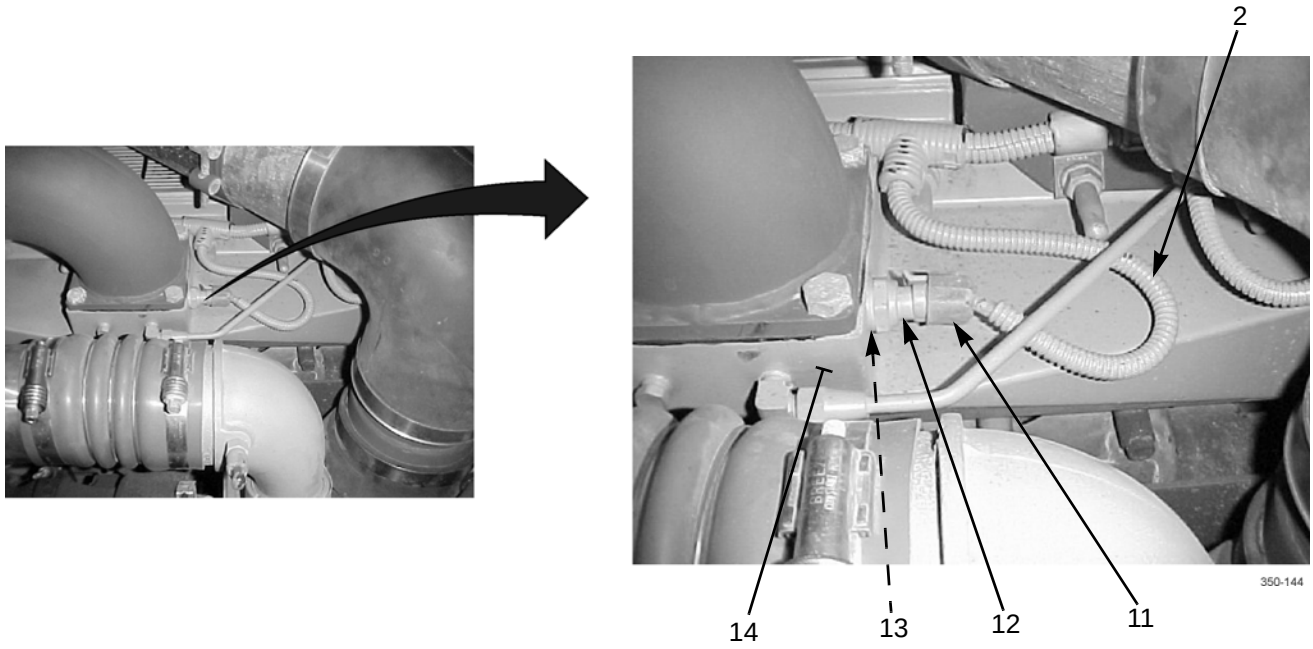
NOTE

Ensure locking tab on connector snaps in place.

3. Connect engine wiring harness connector (10) to connector (9) of engine position sensor (8).
4. Install engine cover (WP 0148 00).

INTAKE AIR TEMPERATURE SENSOR REMOVAL

1. Disconnect connector (11) of engine wiring harness (2) from intake air temperature sensor (12).
2. Remove intake air temperature sensor (12) and O-ring seal (13) from intake manifold (14). Discard O-ring seal.



INTAKE AIR TEMPERATURE SENSOR INSTALLATION

1. Install new O-ring seal (13) on intake air temperature sensor (12).
2. Install intake air temperature sensor (12) on intake manifold (14). Tighten sensor to 120 lb-in. (14 Nm).

NOTE

Ensure locking tab on connector snaps in place.

3. Connect connector (11) of engine wiring harness (2) to intake air temperature sensor (12).
4. Install engine cover (WP 0148 00).

INTAKE MANIFOLD PRESSURE SENSOR REMOVAL

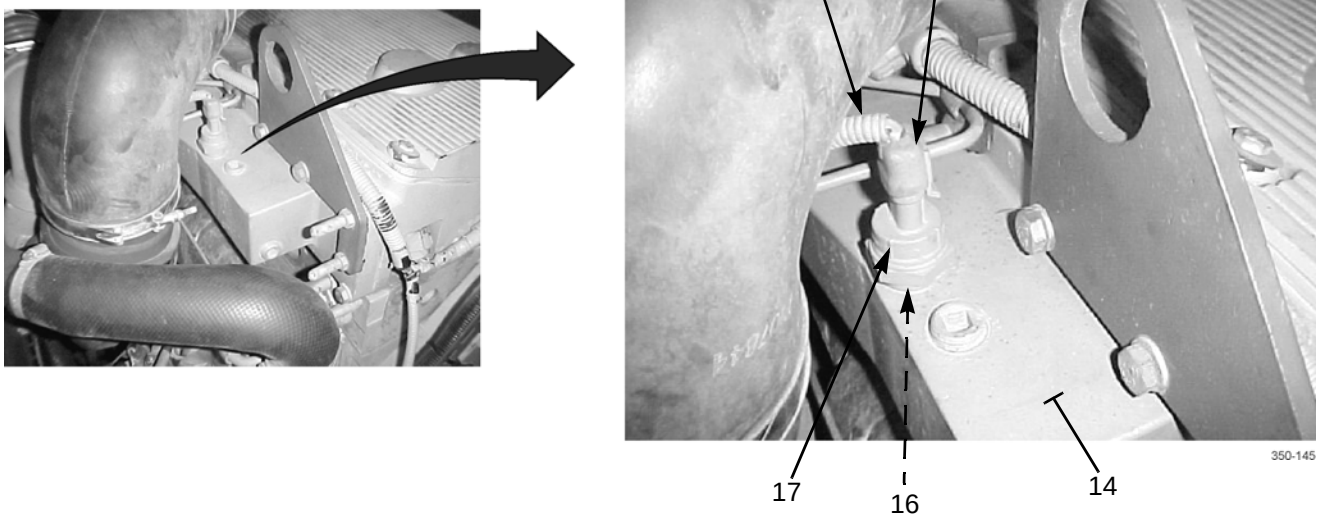
1. Disconnect connector (15) of engine wiring harness (2) from intake manifold pressure sensor (17).

NOTE

Ensure a 1-¼-in. deep well socket is used for removal and installation of intake manifold pressure sensor.

2. Remove intake manifold pressure sensor (17) and O-ring seal (16) from intake manifold (14). Discard O-ring seal.

INTAKE MANIFOLD PRESSURE SENSOR REMOVAL - CONTINUED



INTAKE MANIFOLD PRESSURE SENSOR INSTALLATION

1. Install new O-ring seal (16) on intake manifold pressure sensor (17).
2. Install intake manifold pressure sensor (17) on intake manifold (14). Tighten sensor to 120 lb-in. (14 Nm).

NOTE

Ensure locking tab on connector snaps in place.

3. Connect connector (15) of engine wiring harness (2) to intake manifold pressure sensor (17).
4. Install engine cover (WP 0148 00).

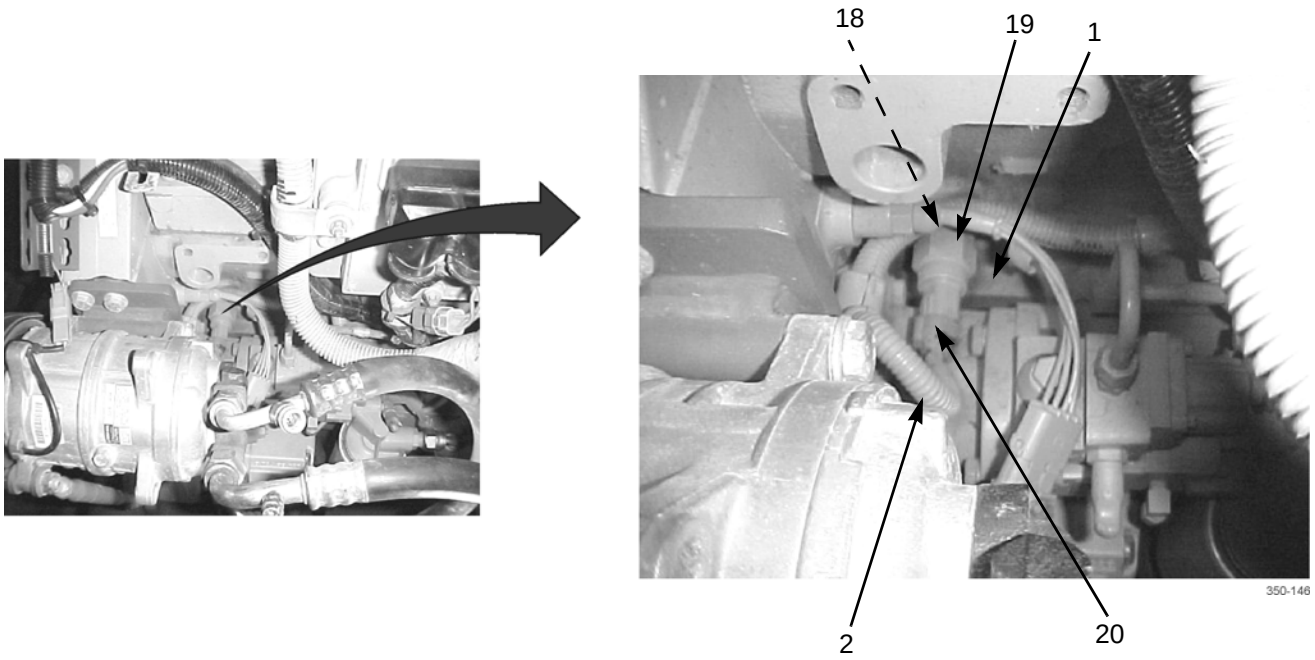
AMBIENT AIR PRESSURE SENSOR REPLACEMENT

NOTE

The ambient air pressure sensor is located on a bracket on the left side of the engine to the right-rear of the engine ECU. It is replaced in the same manner as the intake manifold pressure sensor.

OIL PRESSURE/TEMPERATURE SENSOR REMOVAL

1. Disconnect connector (20) of engine wiring harness (2) from oil pressure/temperature sensor (19).
2. Remove oil pressure/temperature sensor (19) and O-ring seal (18) from engine (1). Discard O-ring seal.



OIL PRESSURE/TEMPERATURE SENSOR INSTALLATION

1. Install new O-ring seal (18) on oil pressure/temperature sensor (19).
2. Install oil pressure/temperature sensor (19) on engine (1). Tighten sensor to 120 lb-in. (14 Nm).

NOTE

Ensure locking tab on connector snaps in place.

3. Connect connector (20) of engine wiring harness (2) to sensor (19).
4. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL LEVEL SENDING UNIT REPLACEMENT 0095 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Equipment Condition

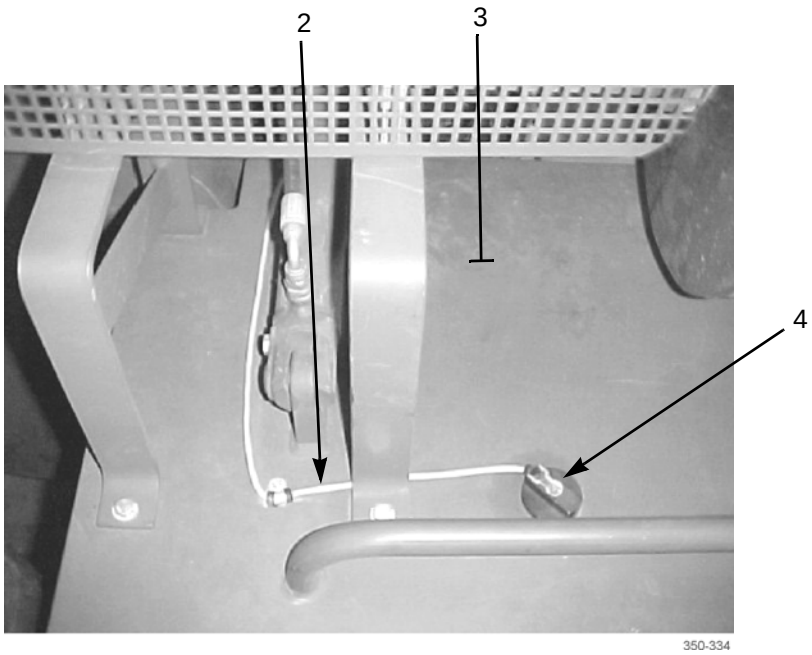
Master battery switch in OFF position

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

REMOVAL

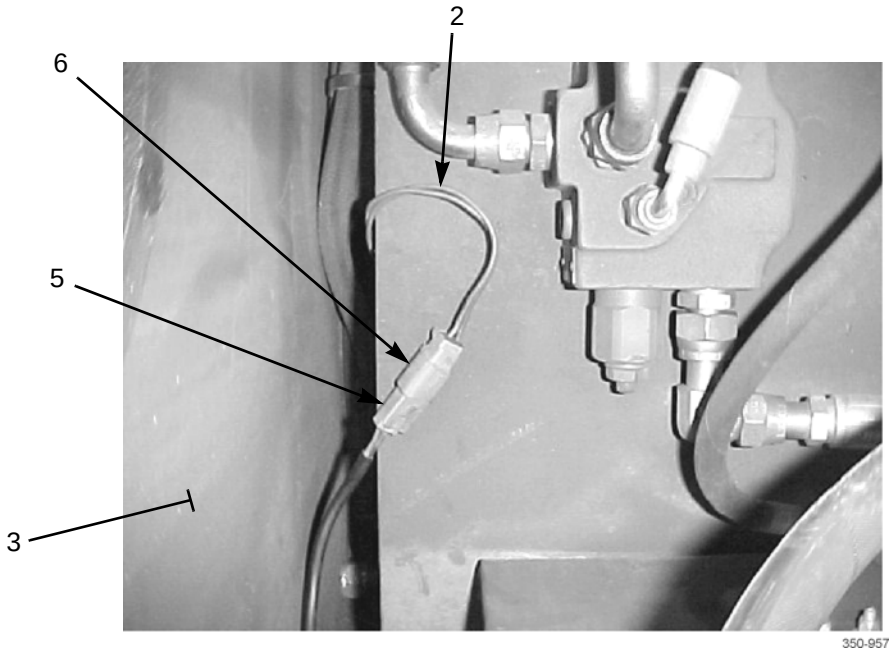
1. Trace cable (2) of fuel level sending unit (4) back to point of connection, at rear corner of fuel tank (3).



FUEL LEVEL SENDING UNIT REPLACEMENT - CONTINUED 0095 00

REMOVAL - CONTINUED

2. Disconnect connector (6) of fuel level sending unit (4) from wiring harness connector (5).



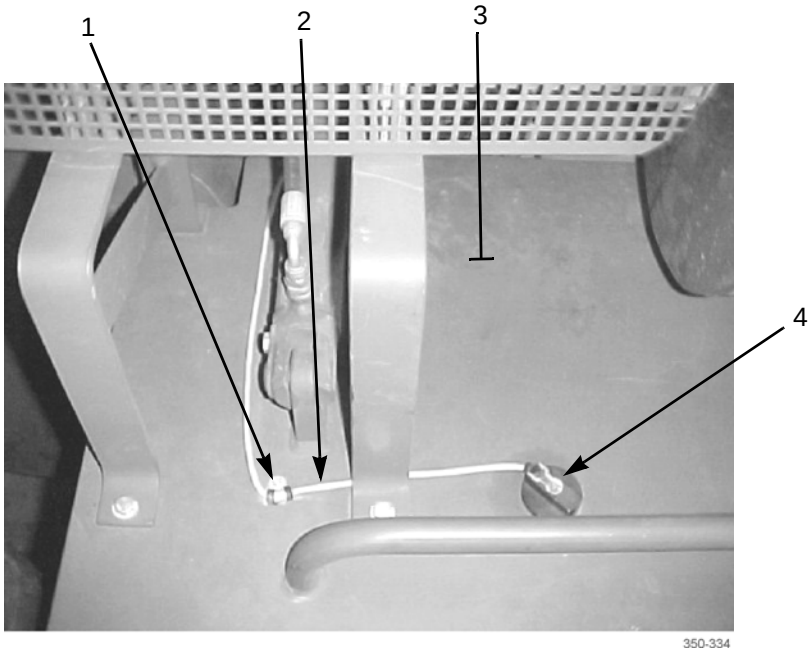
3. Remove two clamps (1) and release cable (2) from top of fuel tank (3).
4. Rotate fuel level sending unit (4) counterclockwise to remove from top of fuel tank (3). Remove and discard O-ring.

INSTALLATION

NOTE

Replacement fuel level sending unit comes with two new O-rings. During installation, ensure sending unit is positioned in pipe at bottom of fuel tank.

1. Install fuel level sending unit (4) with new O-ring in top of fuel tank (3).
2. Connect connector (6) of fuel level sending unit (4) to wiring harness connector (5).
3. Secure cable (2) to frame and fuel tank (3) with two clamps (1).



END OF WORK PACKAGE

TRANSMISSION SENSORS REPLACEMENT 0096 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 0634 306 524) (3)

Materials/Parts - Continued

Seal, O-ring (P/N 0634 313 366)

Seal, O-ring (P/N 0634 313 728)

References

WP 0225 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Master battery switch in OFF position

Transmission access covers removed (WP 0142 00)

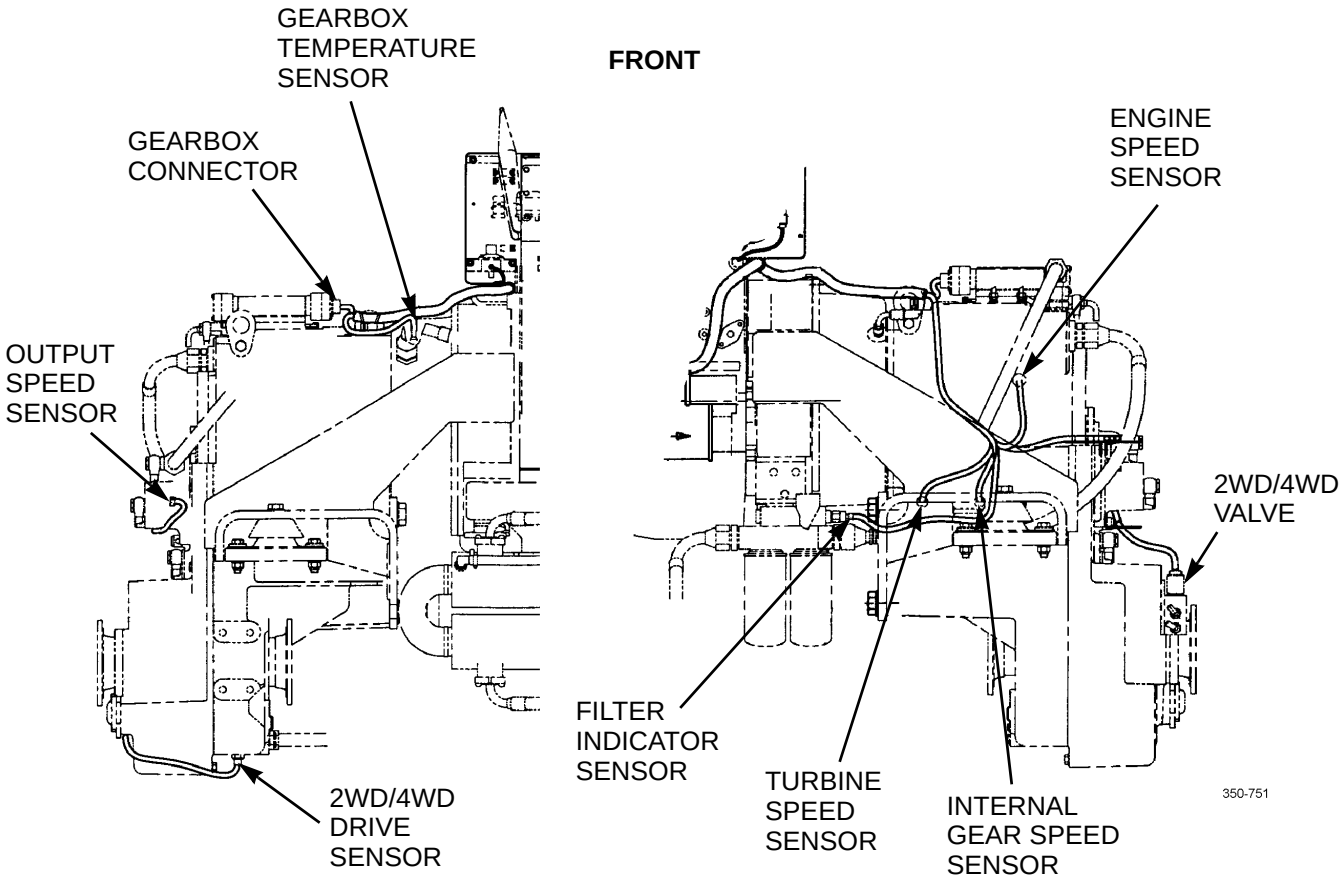
NOTE

- **Transmission has provisions for seven sensors: turbine speed, internal gear speed, engine speed, output speed, gearbox temperature, 2WD/4WD, and filter indicator sensor.**
- **Each sensor is replaced in the same manner. A locator diagram is provided to aid in locating each sensor. Procedures for gearbox temperature sensor are detailed as an example.**
- **Tag connectors to ensure correct connection on installation.**

TRANSMISSION SENSORS REPLACEMENT - CONTINUED **0096 00**

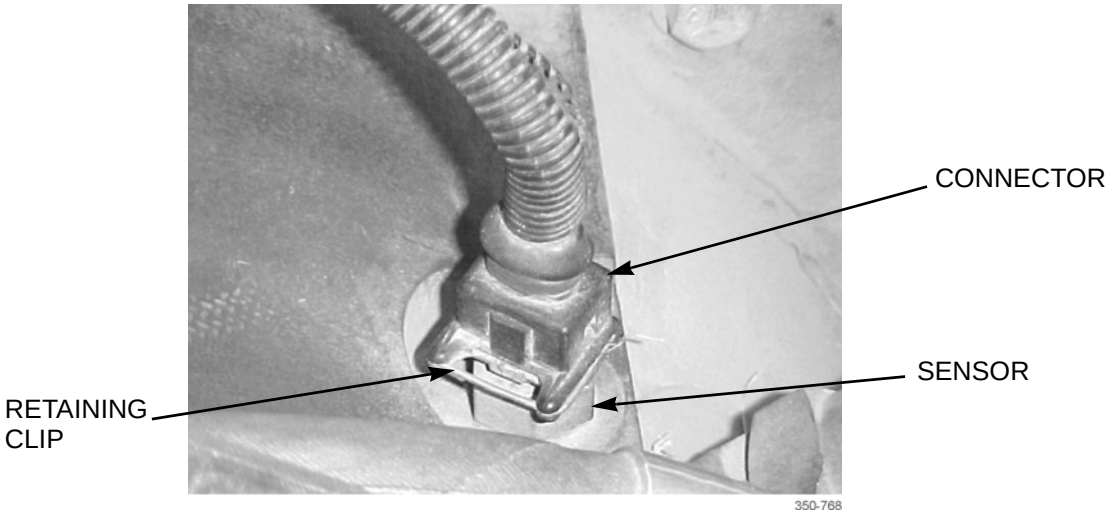
REMOVAL

1. Using locator diagram, locate sensor to be removed.



REMOVAL - CONTINUED

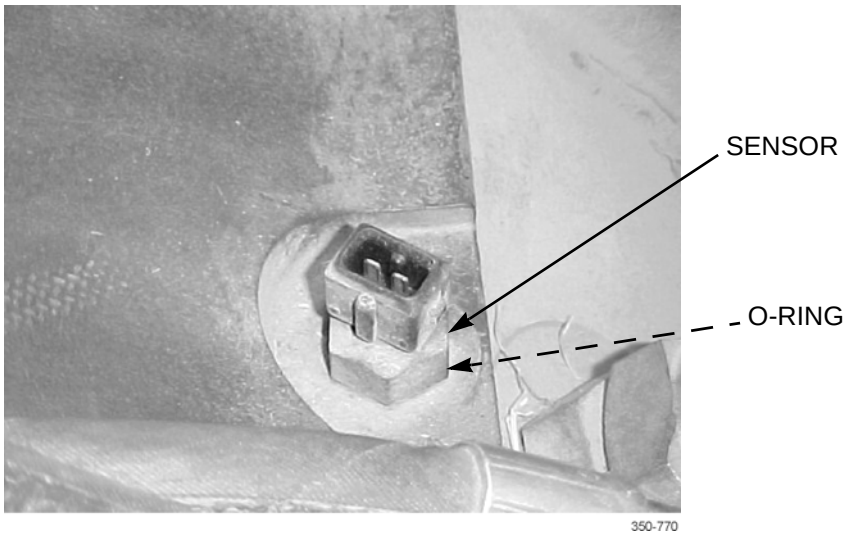
2. Press in on connector retaining clip and disconnect electrical connector from sensor.



CAUTION

Engine speed, internal gear speed, turbine speed, and output speed sensors are installed and positioned with spacers. Spacers are removed with their respective sensor and must be retained for installation. Failure to follow this caution may result in damage to equipment or improper sensor operation.

3. Remove sensor and O-ring from transmission. Discard O-ring.



INSTALLATION

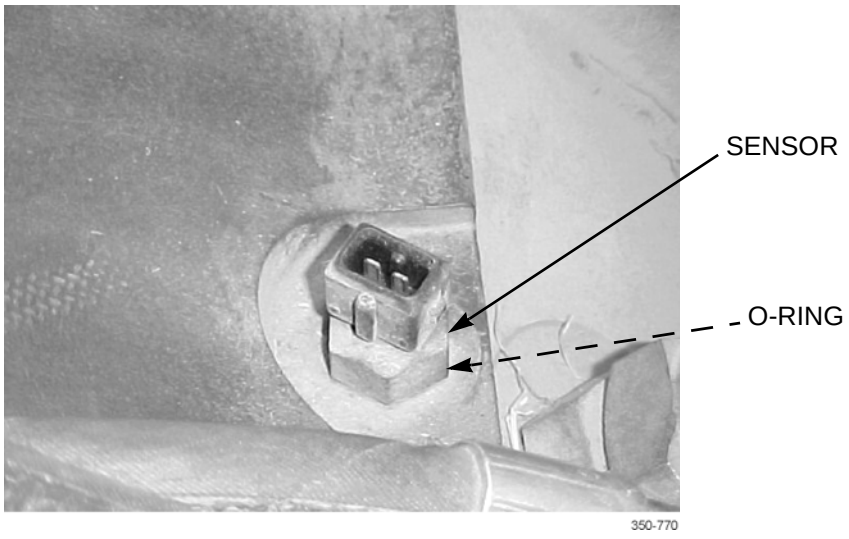
CAUTION

Spacers removed with sensors must be reinstalled with same sensor. If sensor is replaced, spacer must be replaced with the same type and quantity when installing sensor. Failure to follow this caution may result in damage to equipment or improper sensor operation.

NOTE

If reinstalling sensor, ensure new O-ring seal is used. If installing new sensor, ensure new O-ring provided is installed.

1. Install sensor with new O-ring in transmission. Tighten sensors as follows:
   a. Outspeed speed sensor: 204 lb-in. (23 Nm)
   b. All other sensors: 265 lb-in. (30 Nm)

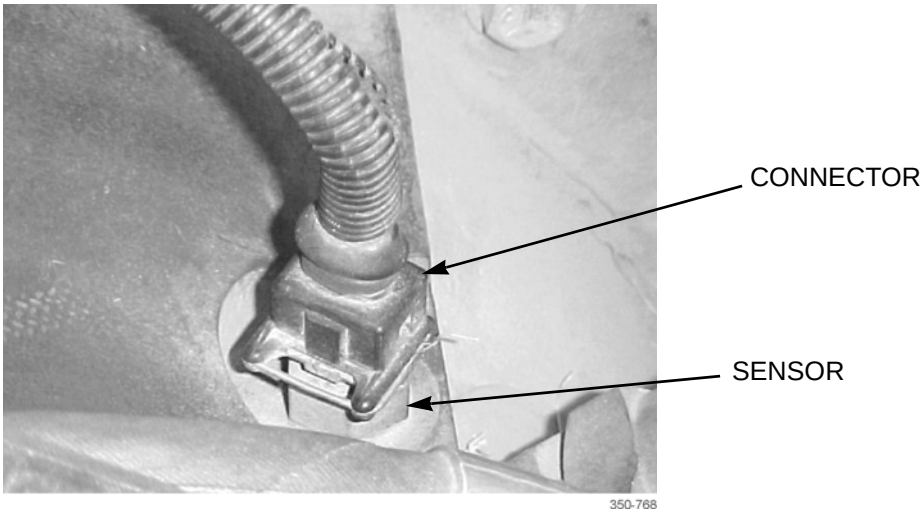


NOTE

Ensure connector and sensor key are aligned prior to connection.

2. Connect electrical connector to sensor.

INSTALLATION - CONTINUED



3. If any sensor except for gearbox temperature or filter indicator sensor was replaced, perform transmission calibration (WP 0225 00).
4. Perform operational check (TM 10-3930-675-10).
5. Install transmission access covers (WP 0142 00).
6. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

BRAKE INCHING SWITCH REPLACEMENT 0097 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

REMOVAL

NOTE

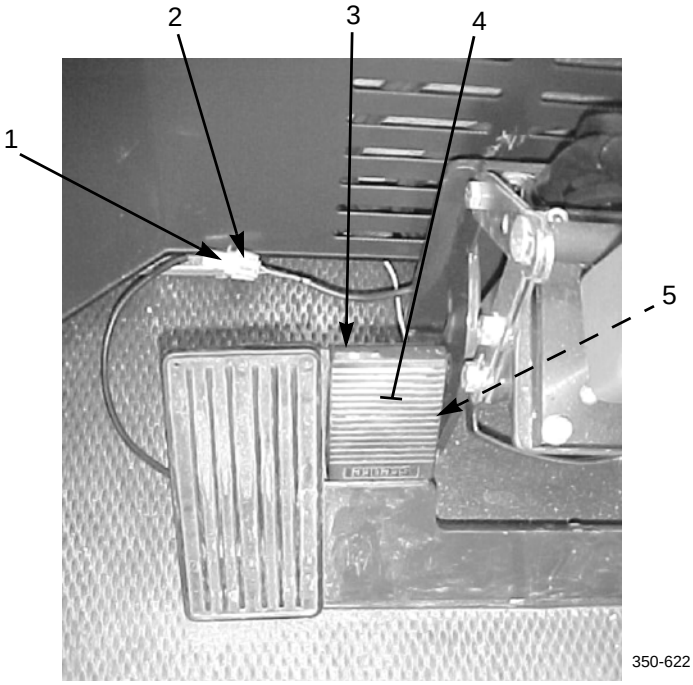
Remove and discard tiedown straps as necessary.

1. Disconnect brake inching switch connector (1) from wiring harness connector (2).

NOTE

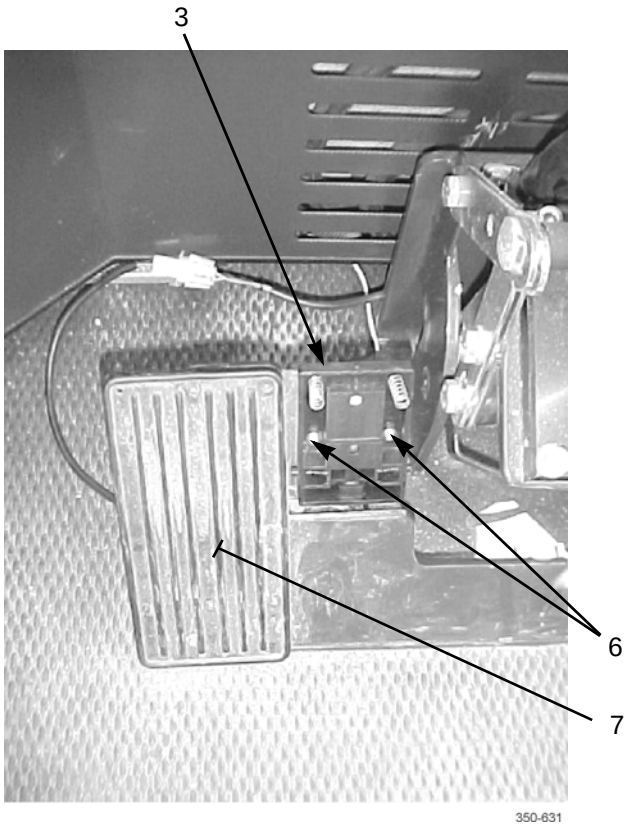
Pivot pin is under slight spring tension.

2. Press inward on two pivot pins (5) and remove cover (4) from brake inching switch (3).



REMOVAL - CONTINUED

3. Remove two screws (6) and brake inching switch (3) from brake pedal (7).



4. Replace cover (4) on brake inching switch (3).

INSTALLATION

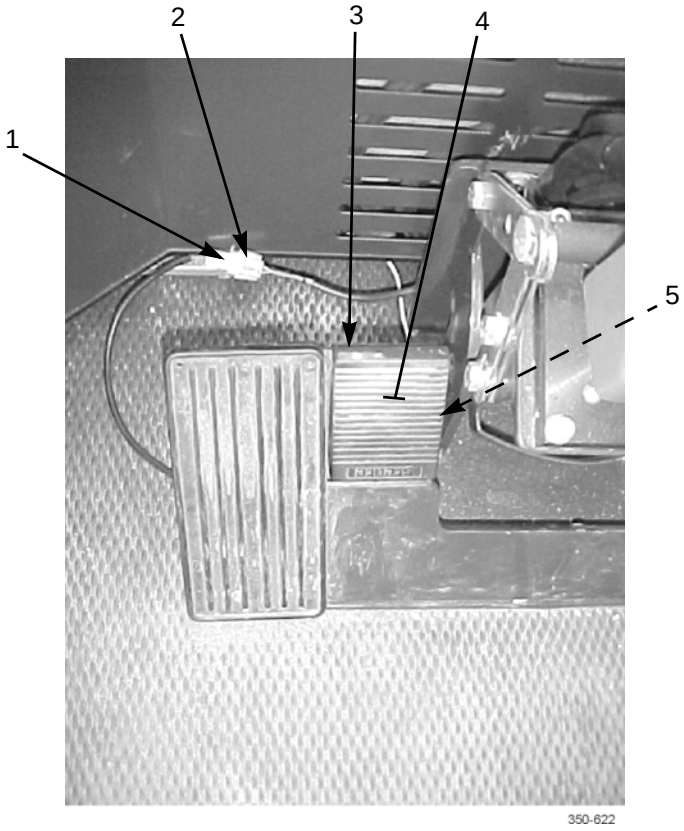
NOTE

Install new tiedown straps as necessary.

1. Press inward on two pivot pins (5) and remove cover (4) from brake inching switch (3).
2. Install brake inching switch (3) on brake pedal (7) with two screws (6).

INSTALLATION - CONTINUED

3. Replace cover (4) on brake inching switch (3).
4. Connect brake inching switch connector (1) to wiring harness connector (2).



END OF WORK PACKAGE

BRAKE LIGHT AND PRESSURE SWITCHES REPLACEMENT 0098 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Compound, Sealing, Pipe (Item 14, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING

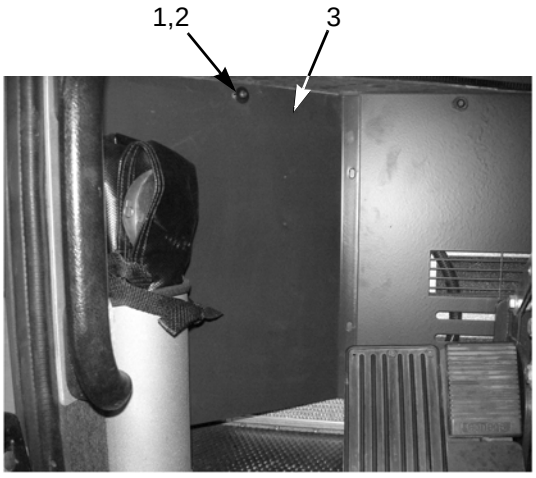


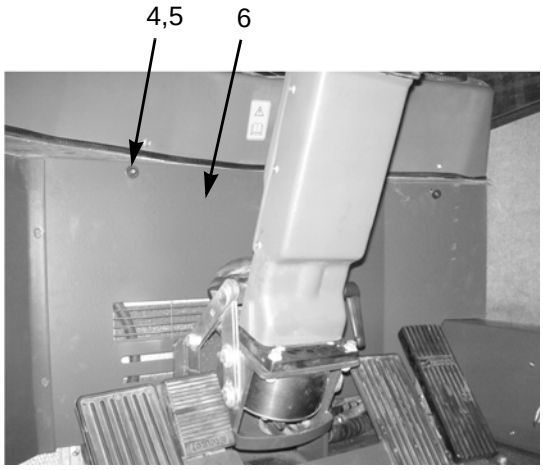


- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before removing switches.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

REMOVAL

1. Remove three screws (1), washers (2), and left lower panel (3).

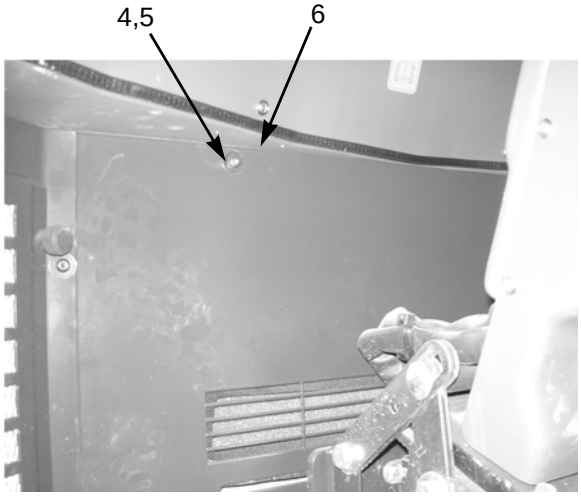




434-40006

2. Remove three screws (4), washers (5), and right lower panel (6).





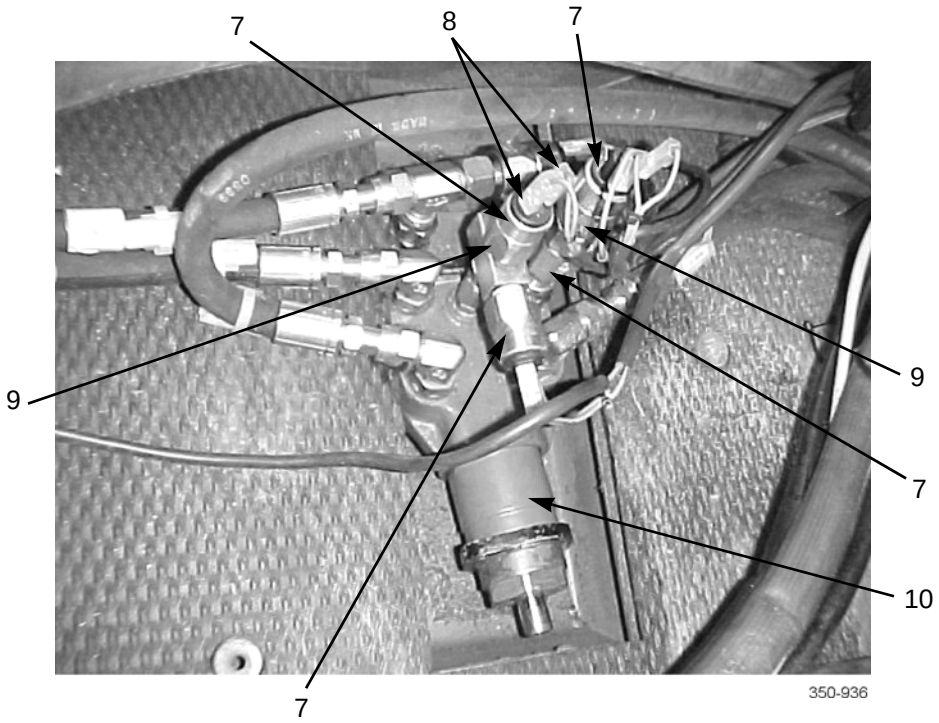
434-40007

REMOVAL - CONTINUED

NOTE

Tag connectors to ensure correct installation.

3. Disconnect two connectors (8) of cab wiring harness from each of three switches (7).
4. Remove each of four switches (7) from two fittings (9) of brake control valve (10).
5. Remove two fittings (9) from brake control valve (10).



INSTALLATION

1. Apply sealing compound to threads of two fittings (9).
2. Install two fittings (9) on brake control valve (10).
3. Install four switches (7) on two fittings (9).
4. Connect two connectors (8) of cab wiring harness to each of three switches (7).
5. Install right lower panel (6) with three screws (4) and three washers (5).
6. Install left lower panel (3) with three screws (1) and three washers (2).

END OF WORK PACKAGE

BOOM ANGLE SENSOR REPLACEMENT 0099 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

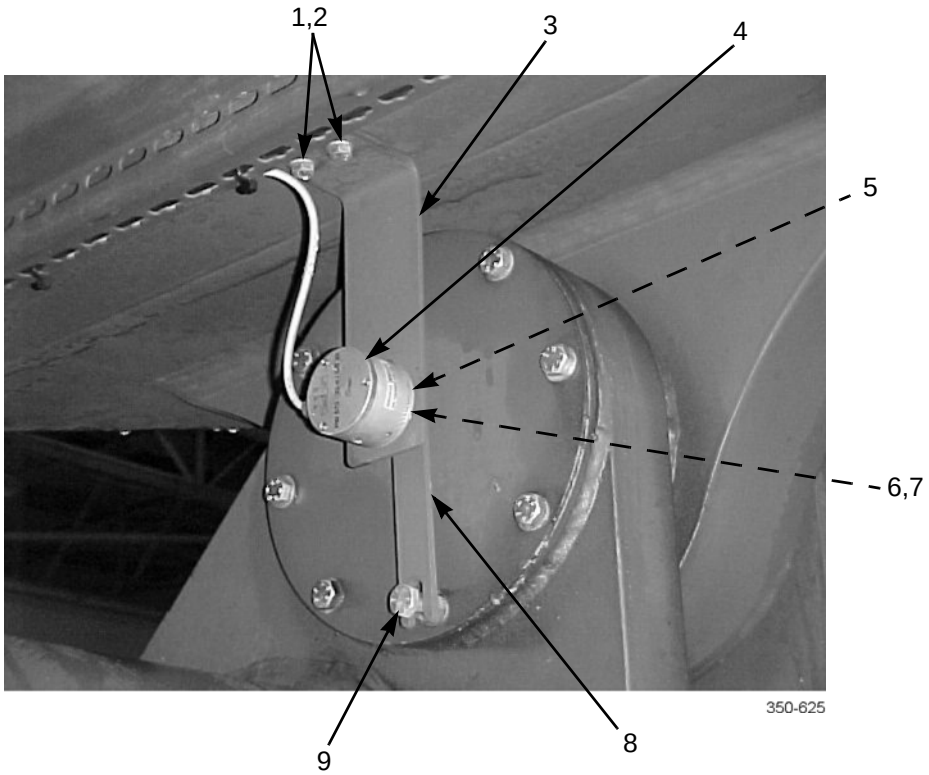
WP 0259 00

Equipment Condition

Master battery switch in OFF position

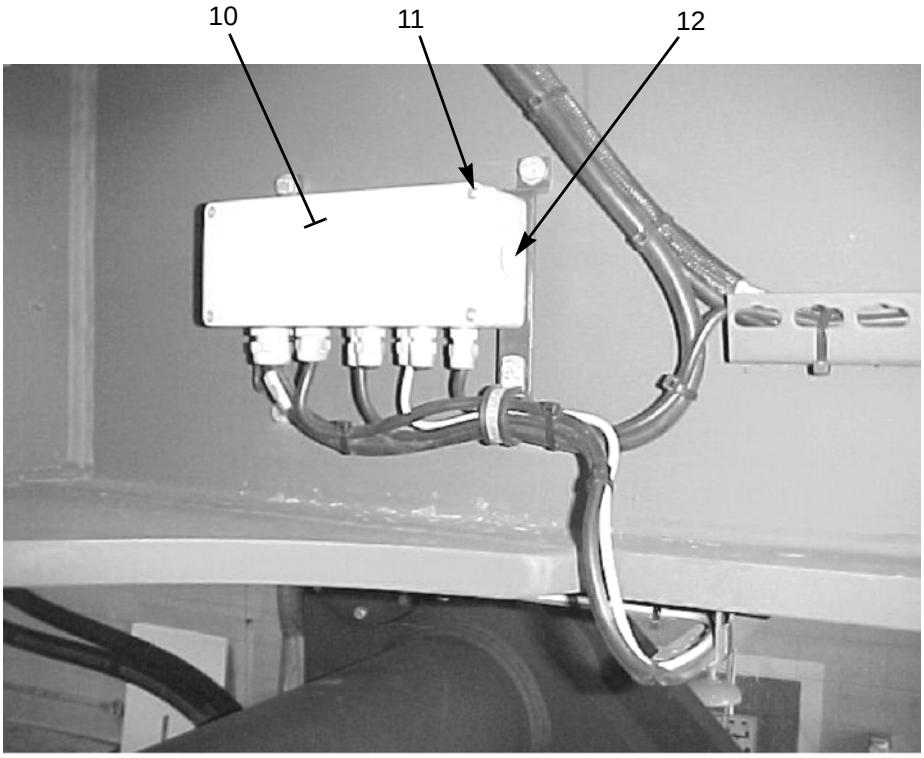
REMOVAL

1. Remove two screws (1), washers (2), and boom angle sensor (4) assembly from boom and bolt (9).
2. Loosen setscrew (5) of lever (8) and remove lever from boom angle sensor (4).
3. Remove three screws (6), washers (7), and bracket (3) from boom angle sensor (4).



REMOVAL - CONTINUED

4. Loosen four screws (11) and remove cover (10) from junction box (12), located on right side of boom. Inspect rubber seal in groove of cover. Replace seal only if damaged.



5. Loosen cable nut (15) and slide cable nut, grommet (16), and bushing (17) back on cable (14) of boom angle sensor (4).

CAUTION

To avoid damage to junction box, a fine-tipped jeweler's screwdriver should be used when disconnecting wires. DO NOT use a punch.

NOTE

Tag wires for installation.

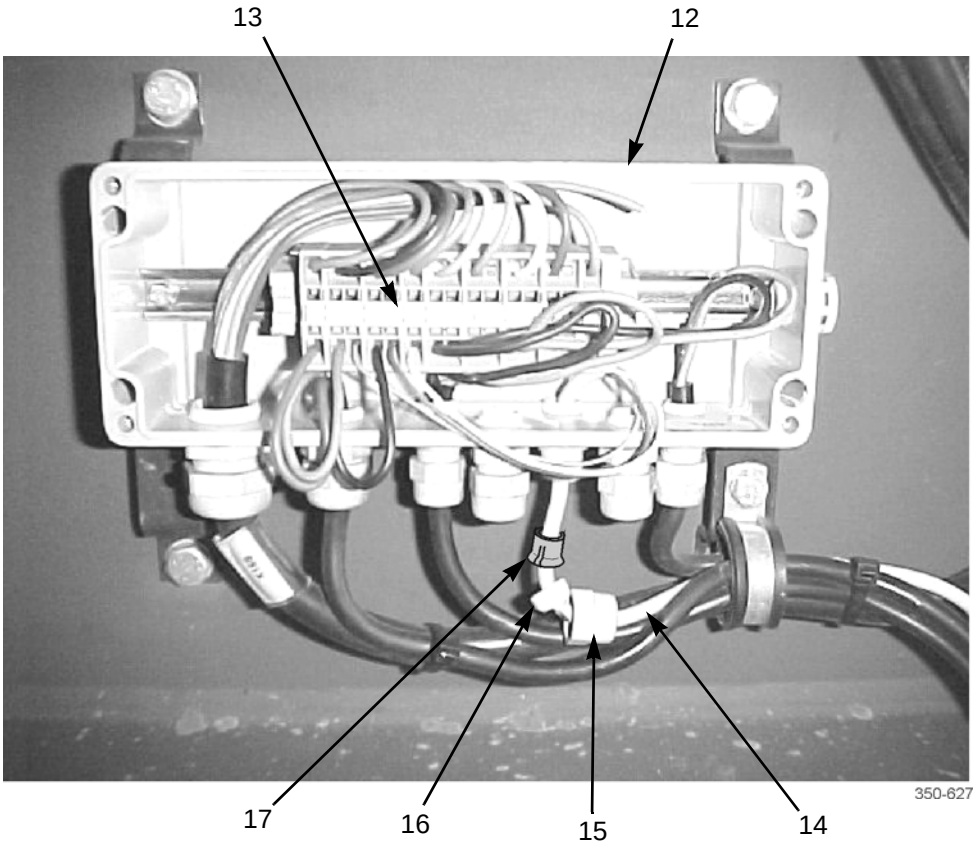
6. Using a jeweler's screwdriver, disconnect three wires of cable (14) from terminal blocks (13) of junction box (12).

NOTE

Remove tiedown straps as needed. Discard tiedown straps.

7. Remove boom angle sensor (4) with cable (14) from vehicle.

REMOVAL - CONTINUED



INSTALLATION

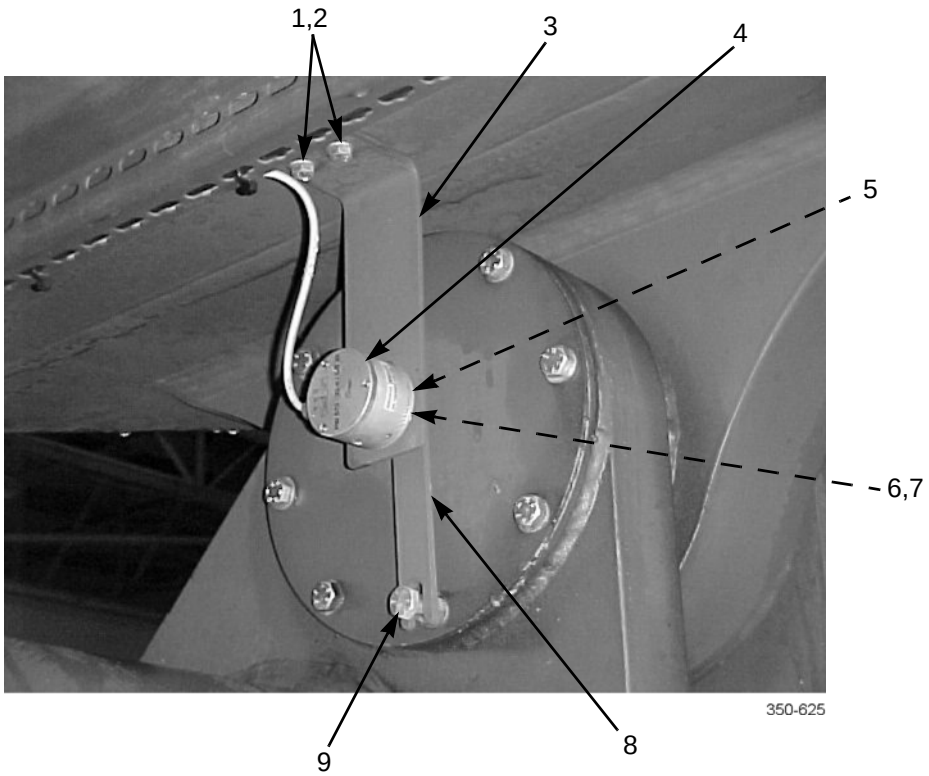
1. Position boom angle sensor (4) with cable (14) on vehicle.
2. Using a jeweler’s screwdriver, connect three wires of cable (14) to terminal blocks (13) of junction box (12).
3. Install bushing (17), grommet (16), and cable nut (15) on junction box (12).
4. Install cover (10) on junction box (12) and tighten four screws (11).

INSTALLATION - CONTINUED

NOTE

Position angle sensor wire and nut between six and nine o'clock position.

5. Install boom angle sensor (4) on bracket (3) with three washers (7) and screws (6).
6. Install lever (8) on boom angle sensor (4) and tighten setscrew (5).
7. Position boom angle sensor (4) assembly on bolt (9) and boom and install two washers (2) and screws (1). Tighten screws.
8. Install new tiedown straps.



9. Perform boom and tophandler calibration (WP 0259 00).

END OF WORK PACKAGE

BOOM EXTENSION SENSOR REPLACEMENT 0100 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

References

WP 0259 00

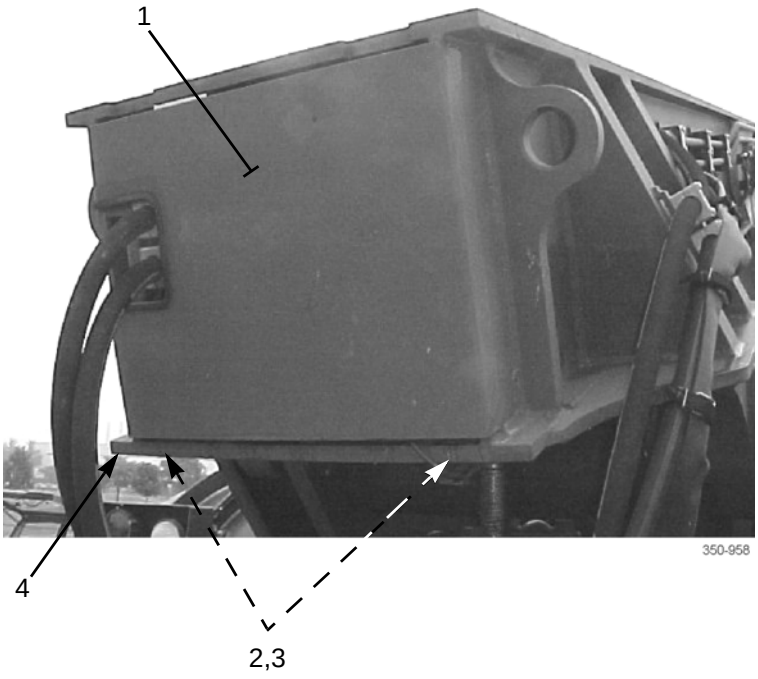
Equipment Condition

Boom fully retracted (TM 10-3930-675-10)

Master battery switch in OFF position

REMOVAL

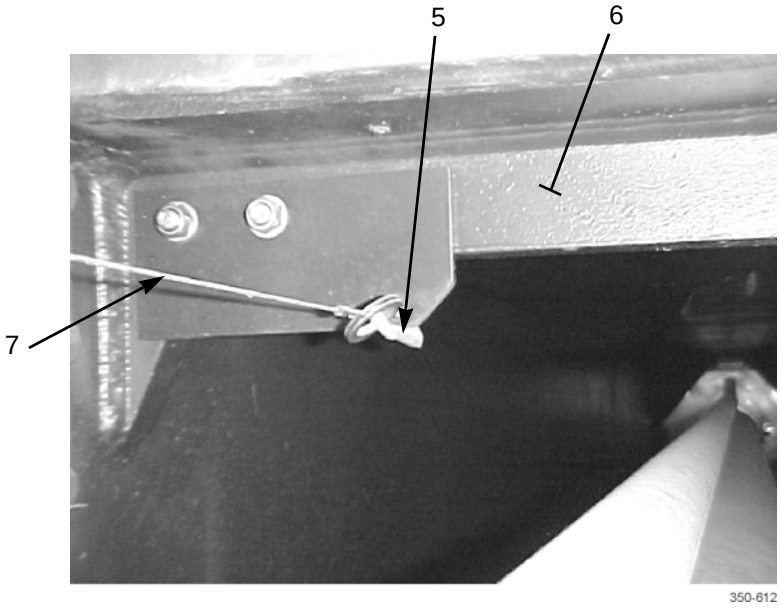
1. Remove two screws (2), washers (3), and cover plate (1) from rear of boom (4).



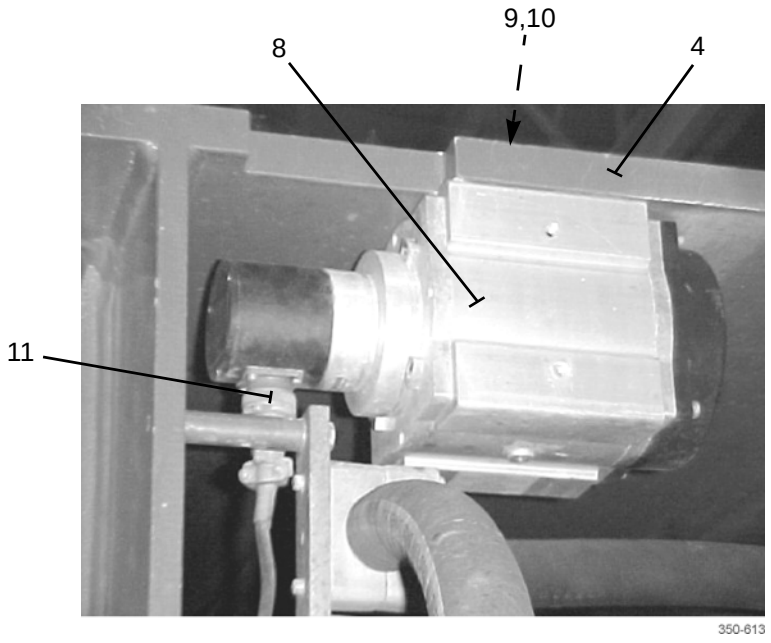
BOOM EXTENSION SENSOR REPLACEMENT - CONTINUED 0100 00

REMOVAL - CONTINUED

2. Open cable connector (5) and remove cable connector to disconnect ring of cable (7) from rear of extension boom (6).

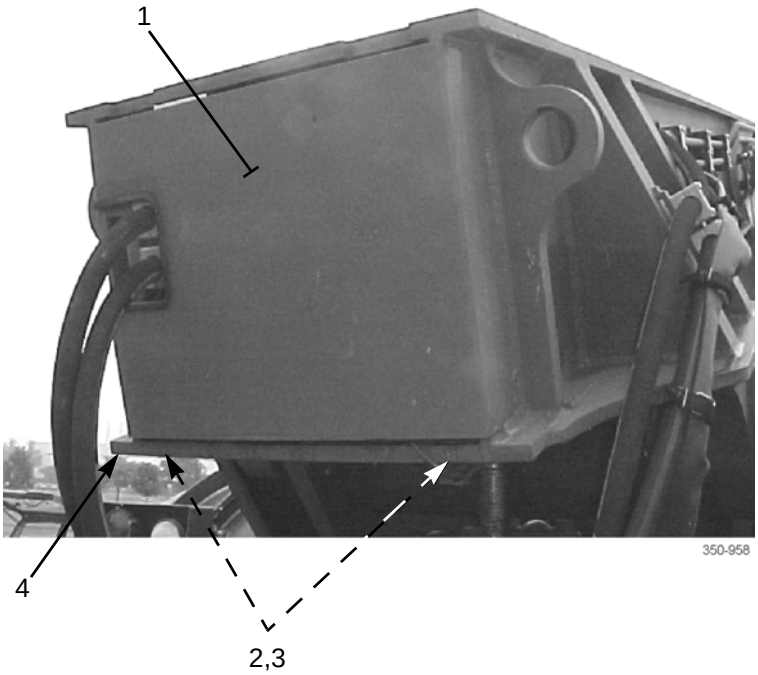


3. While holding ring of cable (7), allow cable to retract into boom extension sensor (8).
4. Disconnect connector (11) of wiring harness from boom extension sensor (8).
5. Remove two screws (9), washers (10), and boom extension sensor (8) from boom (4).



INSTALLATION

1. Install boom extension sensor (8) on boom (4) with two washers (10) and screws (9).
2. Connect connector (11) of wiring harness to boom extension sensor (8).
3. Extend ring of cable (7) from boom extension sensor (8).
4. Install ring of cable (7) on rear of extension boom (6) with cable connector (5). Close cable connector.
5. Install cover plate (1) on rear of boom (4) with two washers (3) and screws (2).



6. Perform boom and tophandler calibration (WP 0259 00).

END OF WORK PACKAGE

TOPHANDLER ANGLE SENSOR REPLACEMENT 0101 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

References

WP 0259 00

Equipment Condition

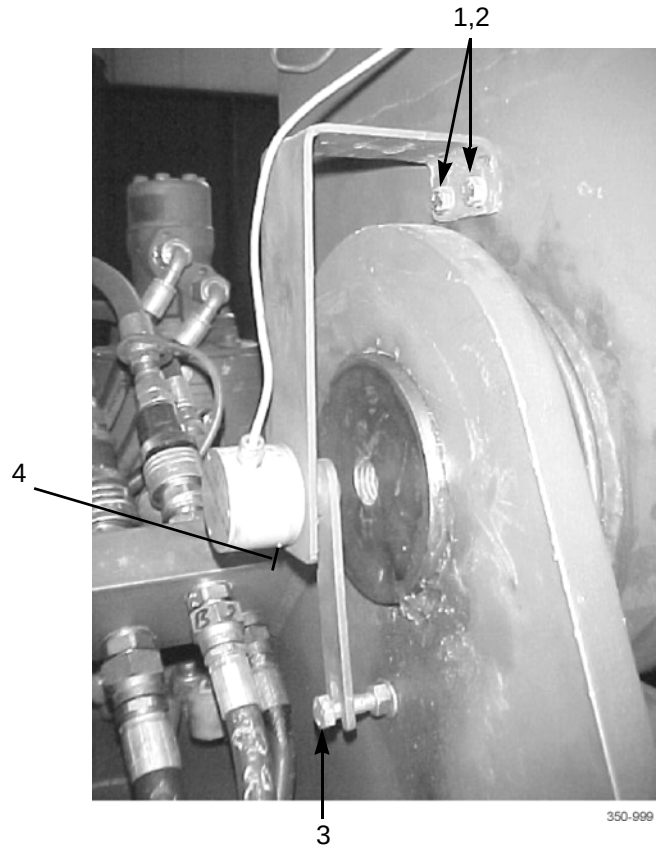
Master battery switch in OFF position

REMOVAL

NOTE

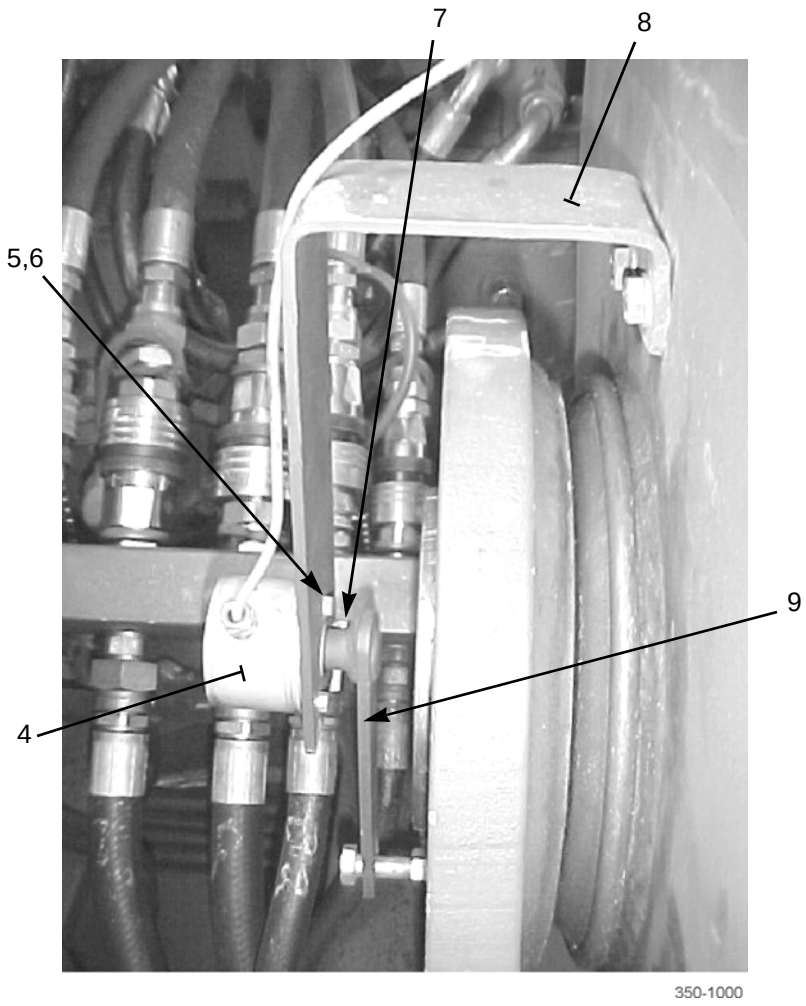
If removing tophandler, perform step 1 only.

1. Remove two screws (1), washers (2), and tophandler angle sensor (4) assembly from boom extension and bolt (3).



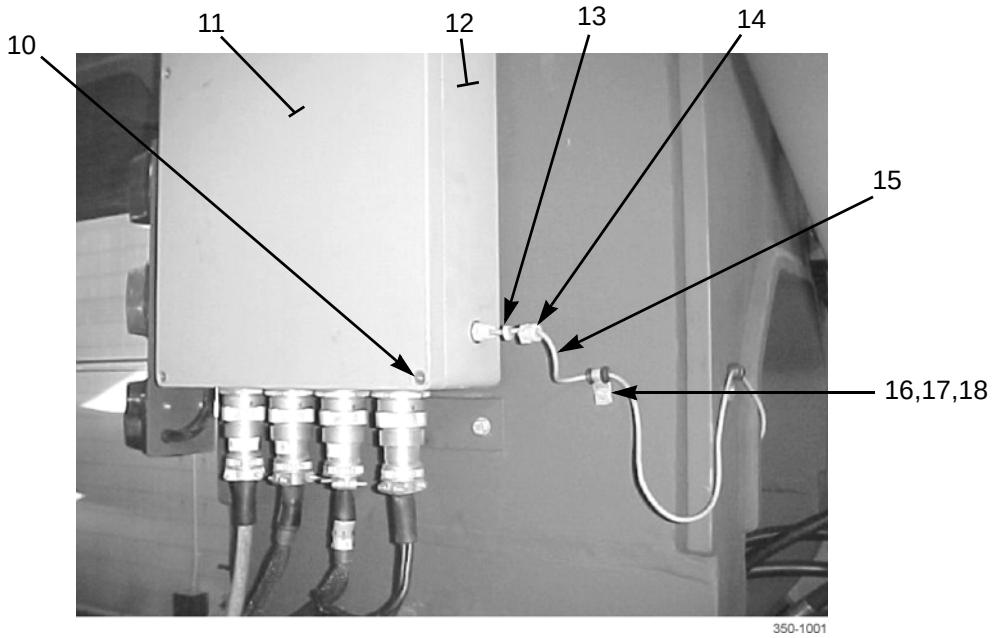
REMOVAL - CONTINUED

2. Loosen setscrew (7) of lever (9) and remove lever from tophandler angle sensor (4).
3. Remove three screws (5), washers (6), and bracket (8) from tophandler angle sensor (4).



4. Remove three screws (16), washers (17), cable (15), and three cable clamps (18) from boom extension.
5. Loosen cable nut (14) and slide cable nut and grommet (13) back on cable (15) of tophandler angle sensor (4).
6. Loosen six screws (10) and remove cover (11) from tophandler junction box (12). Inspect rubber seal in groove of cover. Replace seal only if damaged.

REMOVAL - CONTINUED

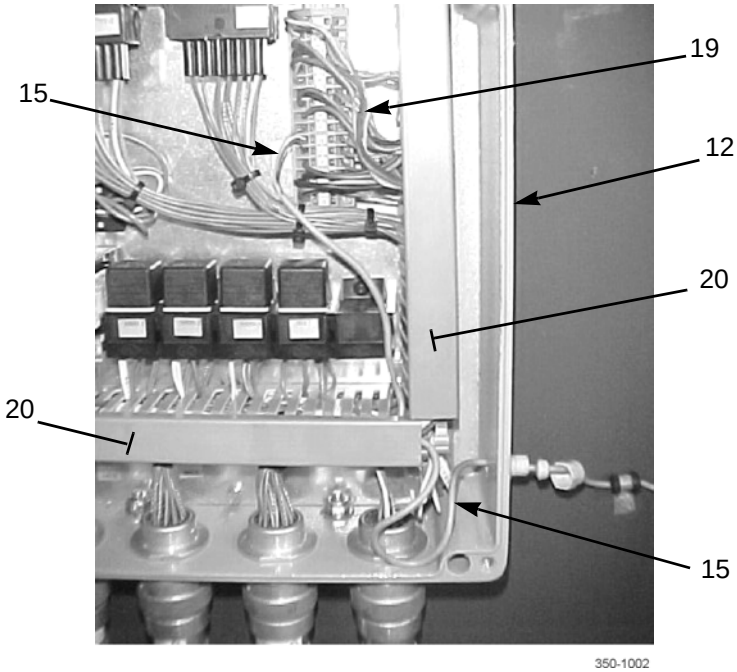


7. Remove plastic covers (20) to expose cable (15) of tophandler angle sensor (4).

NOTE

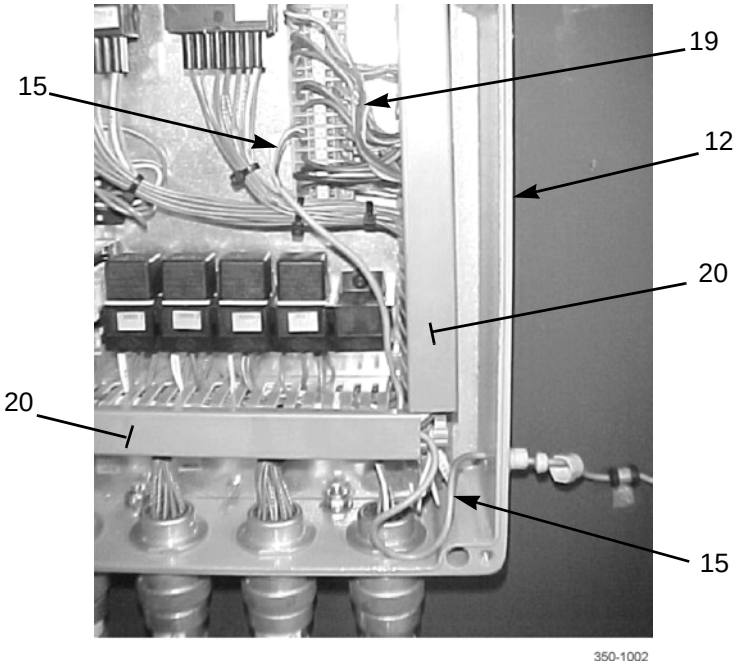
Tag wires for installation.

8. Using a jeweler’s screwdriver, disconnect three wires of cable (15) from terminal block (19) in tophandler junction box (12).
9. Remove tophandler angle sensor (4) with cable (15) from vehicle.

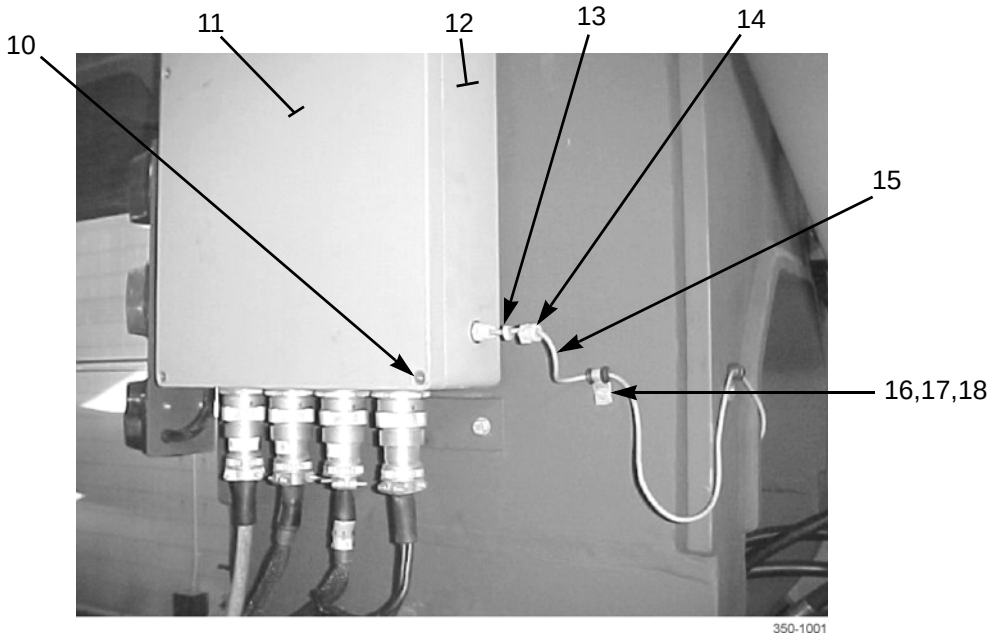


INSTALLATION

1. Position tophandler angle sensor (4) with cable (15) on vehicle.
2. Using a jeweler's screwdriver, connect three wires of cable (15) to terminal block (19) in tophandler junction box (12).
3. Install plastic covers (20) over excess cable (15) of tophandler angle sensor (4).



4. Install cover (11) on tophandler junction box (12) and tighten six screws (10).
5. Install grommet (13) and tighten cable nut (14).
6. Install cable (15) on boom extension with three cable clamps (18), washers (17), and screws (16).

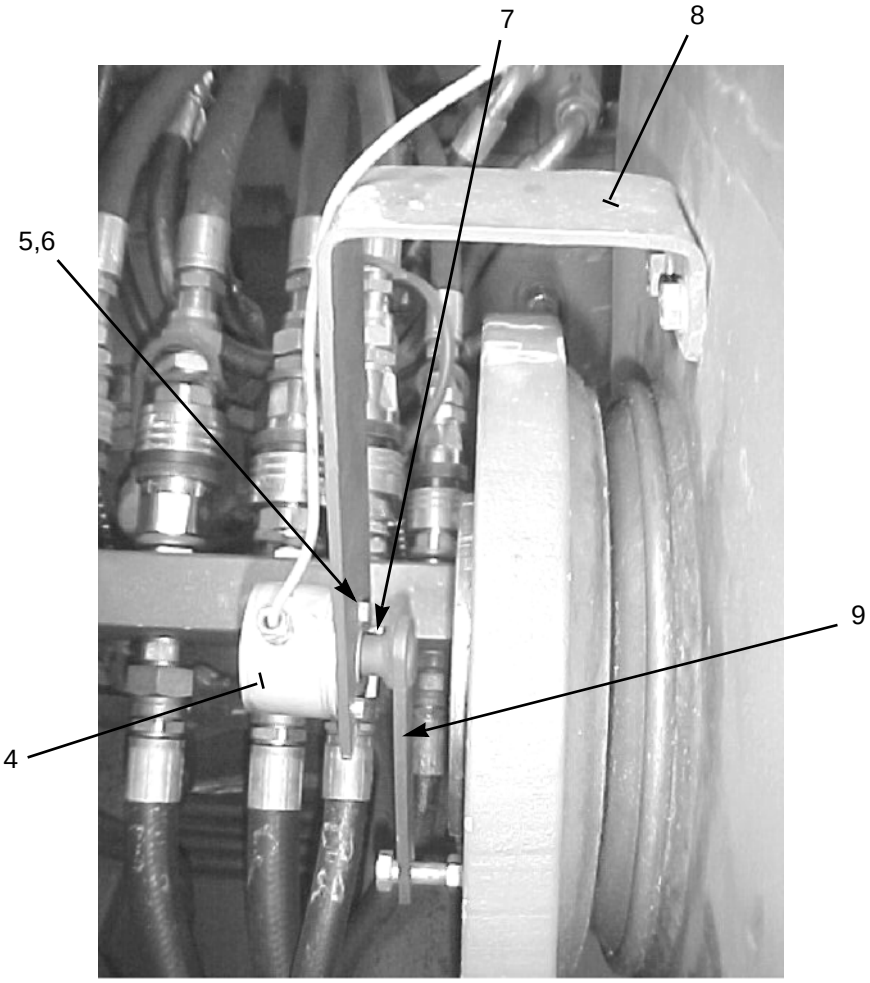


INSTALLATION - CONTINUED

NOTE

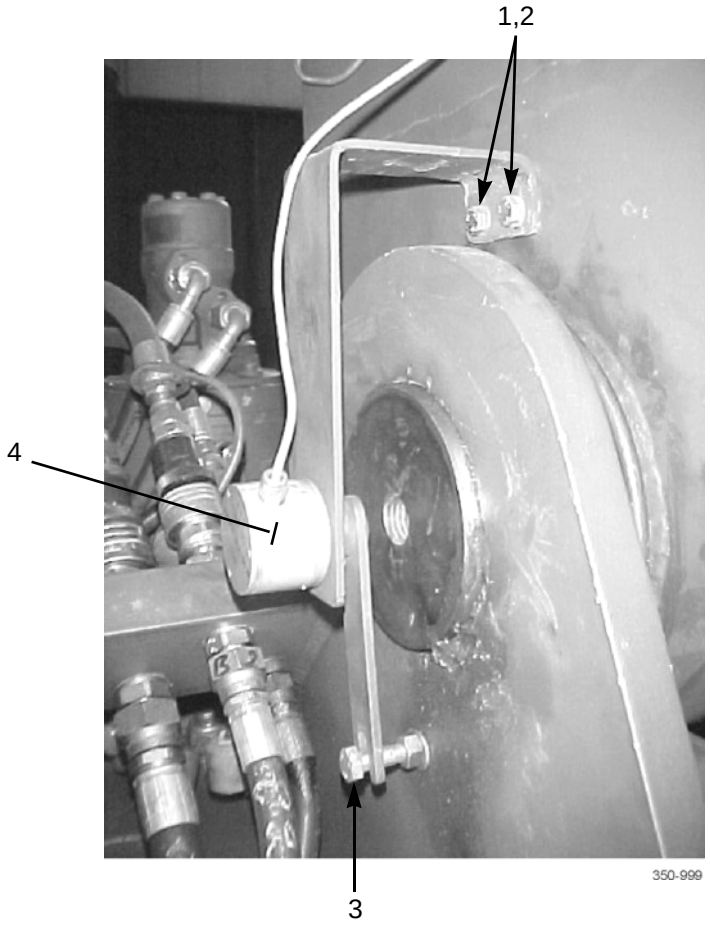
Position angle sensor wire and nut between three and six o'clock position.

7. Install tophandler angle sensor (4) on bracket (8) with three washers (6) and screws (5).
8. Install lever (9) on tophandler angle sensor (4) and tighten setscrew (7).



INSTALLATION - CONTINUED

9. Position tophandler angle sensor (4) assembly on bolt (3) and boom extension and install two washers (2) and screws (1). Tighten screws.



10. Perform boom and tophandler calibration (WP 0259 00).

END OF WORK PACKAGE

HYDRAULIC RESERVOIR AND LIFT CYLINDER SENSORS REPLACEMENT 0102 00

THIS WORK PACKAGE COVERS

Temperature Sensor Replacement

Pressure Sensor Replacement

Lift Cylinder Sensor Replacement

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Electrically Conductive (Item 21, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

References

WP 0186 00

WP 0259 00

Equipment Condition

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before removing switches.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

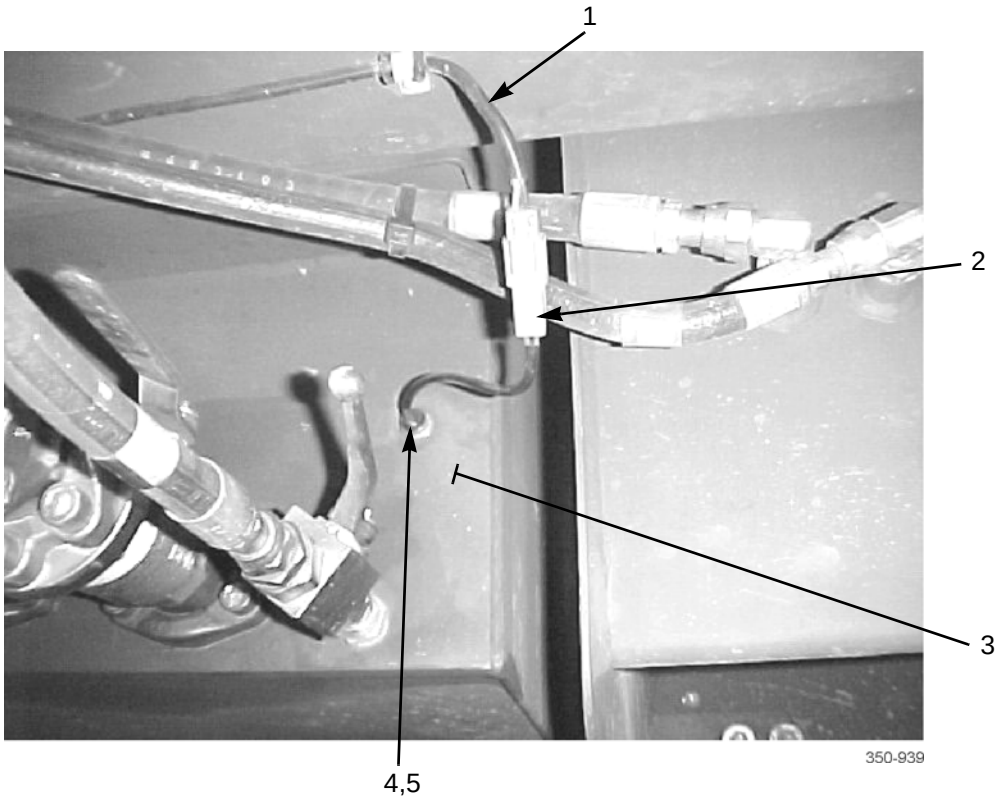
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Remove and discard tiedown straps.**
- **Apply electrically conductive grease to connectors before connections are made.**

TEMPERATURE SENSOR REPLACEMENT

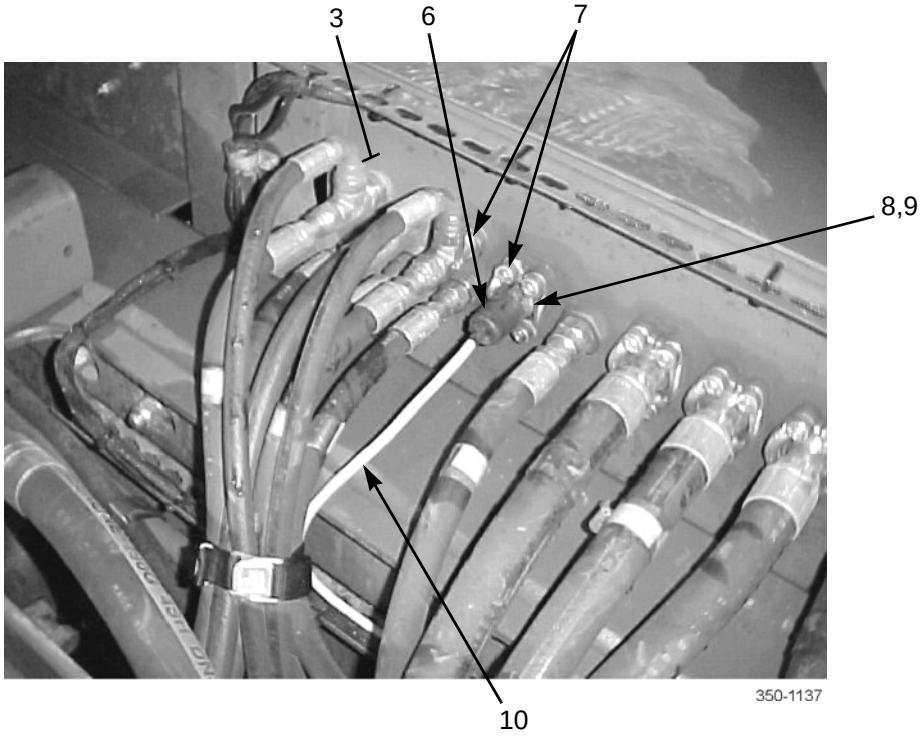
1. Drain hydraulic reservoir (WP 0186 00).
2. Disconnect connector (2) of temperature sensor (4) from wiring harness (1).
3. Remove temperature sensor (4) and copper washer (5) from hydraulic reservoir (3).



4. Install copper washer (5) and hydraulic temperature sensor (4) on hydraulic reservoir (3).
5. Connect connector (2) of temperature sensor (4) to wiring harness (1).
6. Fill hydraulic reservoir (WP 0186 00).

PRESSURE SENSOR REPLACEMENT

1. Remove four socket head screws (7) from flange (8).
2. Remove flange (8), sensor (6), and O-ring (9) from hydraulic reservoir (3). Discard O-ring.
3. Trace sensor cable (10) back to junction box. Disconnect wires of cable from terminal blocks. Remove cable from junction box.



NOTE

Replacement sensor comes with new O-ring.

4. Lubricate new O-ring (9) with lubricating oil. Install O-ring and sensor (6) on hydraulic reservoir (3) with flange (8) and four socket head screws (7).
5. Position sensor cable (10) in junction box. Connect wires of sensor cable to terminal blocks in junction box.
6. Secure sensor cable (10) with new tiedown straps.

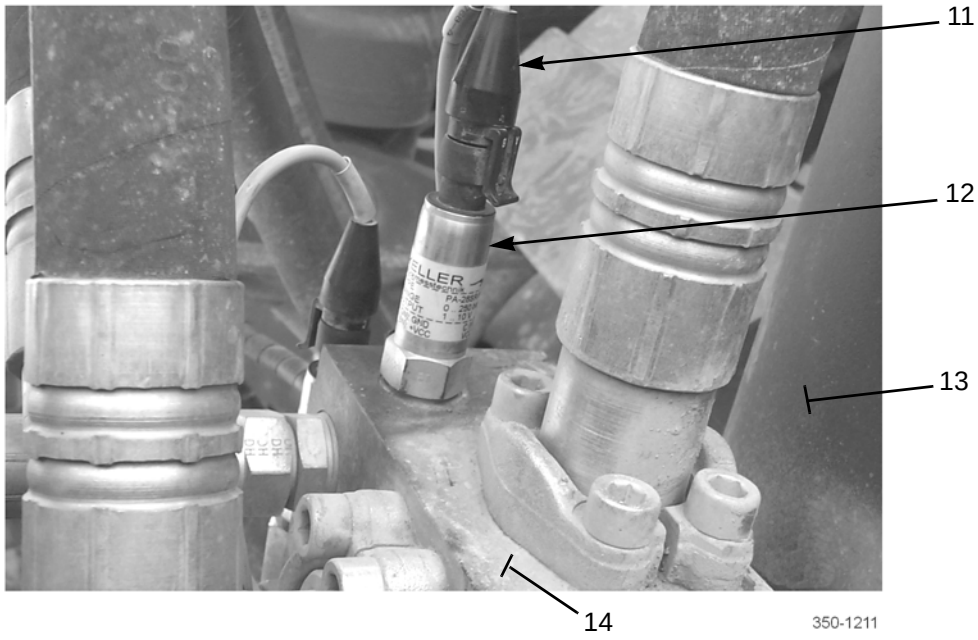
LIFT CYLINDER SENSOR REPLACEMENT

1. Disconnect electrical connector (11) from sensor (12).
2. Remove sensor (12) and O-ring from locking valve (14) at base of lift cylinder (13). Discard O-ring.

NOTE

Replacement sensor comes with new O-ring.

3. Lubricate new O-ring with lubricating oil. Install O-ring and sensor (12) to locking valve (14). Tighten sensor to 35 lb-ft (47 Nm).



4. Connect electrical connector (11) to sensor (12).
5. Calibrate boom and tophandler (WP 0259 00).

END OF WORK PACKAGE

HYDRAULIC FILTER INDICATOR SENSORS REPLACEMENT 0103 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Crowfoot Attachment Set (Item 24, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Transmission access cover(s) removed (WP 0142 00)

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





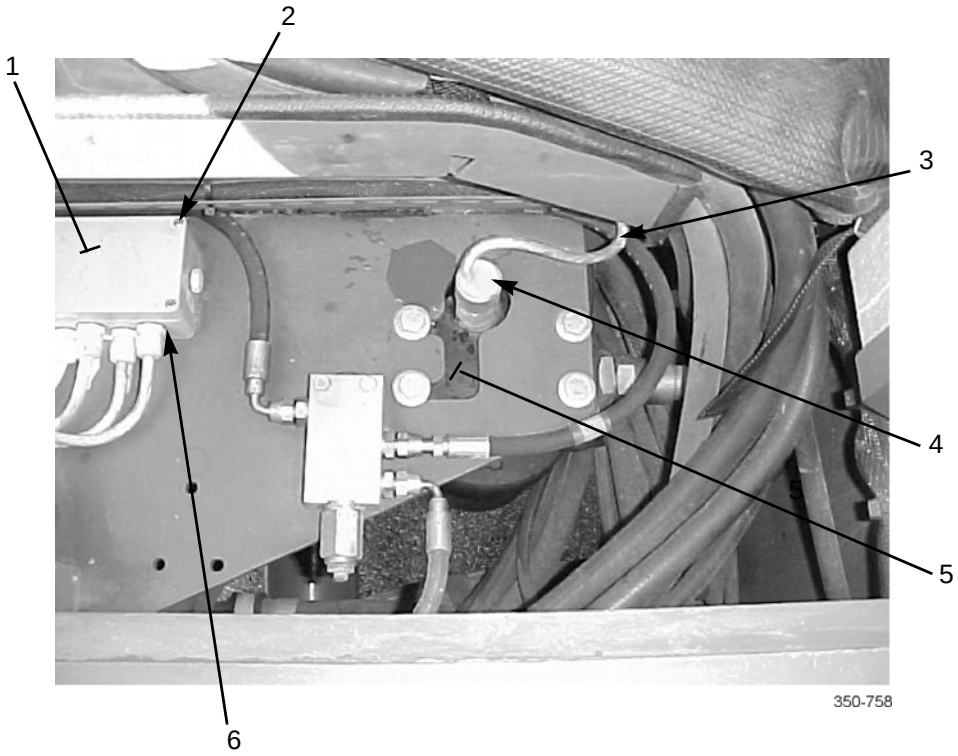
- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before removing switches.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

REMOVAL

NOTE

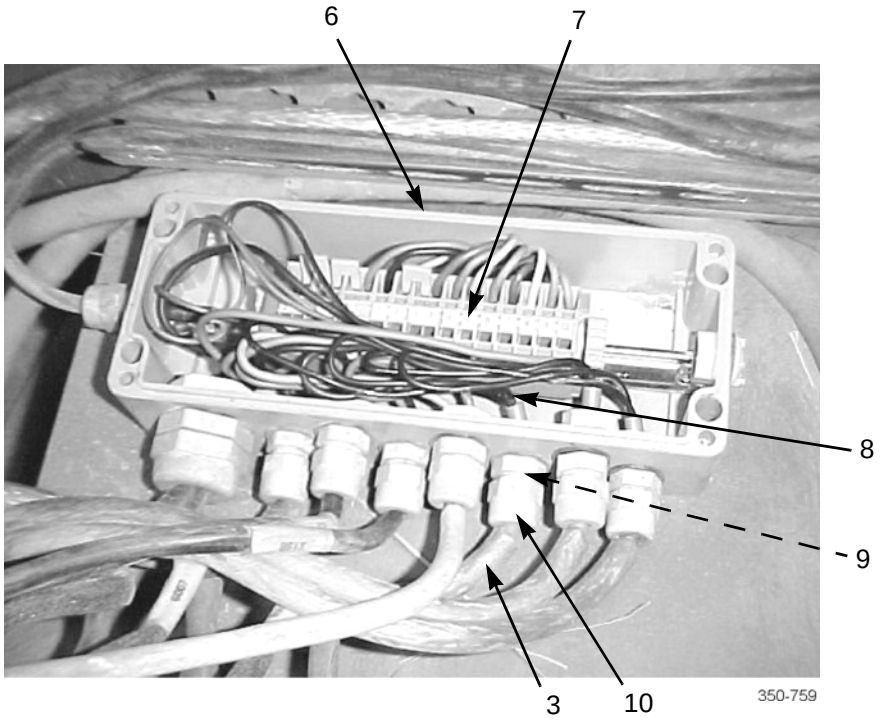
- **There are three filter indicator sensors located in filter heads of high-pressure hydraulic filters. Ease of access to remove these sensors varies. In some cases, it may be necessary to remove both filter and filter head to access sensor.**
- **Remove and discard tiedown straps.**
- **Tag wires to ensure correct installation.**

1. Trace electrical cable (3) from sensor (4) back to junction box (6).
2. Loosen four screws (2) and remove cover (1) from junction box (6). Inspect rubber seal in groove of cover. Replace seal only if damaged.



REMOVAL - CONTINUED

3. Loosen cable nut (10) and slide cable nut and grommet (9) back on cable (3).
4. Using a jeweler's screwdriver, disconnect cable wires (8) from terminal blocks (7). Remove cable (3) from junction box (6).



5. Remove sensor (4) with cable (3) from filter head (5).

INSTALLATION

NOTE

- **Use electrically conductive grease on wire connections before connections are made.**
- **Install new tiedown straps as necessary.**

1. Install sensor (4) on filter head (5).
2. Feed cable (3) through grommet (9) and cable nut (10) and into junction box (6).
3. Using a jeweler's screwdriver, connect cable wires (8) to terminal blocks (7).
4. Install grommet (9) and cable nut (10) on junction box (6). Tighten cable nut.
5. Install cover (1) on junction box (6) and tighten four screws (2).
6. Install transmission access cover(s) (WP 0142 00).
7. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

STEERING SYSTEM WHEEL SENSOR REPLACEMENT 0104 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.002) (3)

References

WP 0238 00

Equipment Condition

Master battery switch in OFF position

Steering hydraulic system pressure relieved (WP 0164 00)

Engine cover removed (to replace front wheel sensors) (WP 0148 00)

NOTE

Four steering system wheel sensors are replaced the same way. Left front sensor is shown.

REMOVAL

NOTE

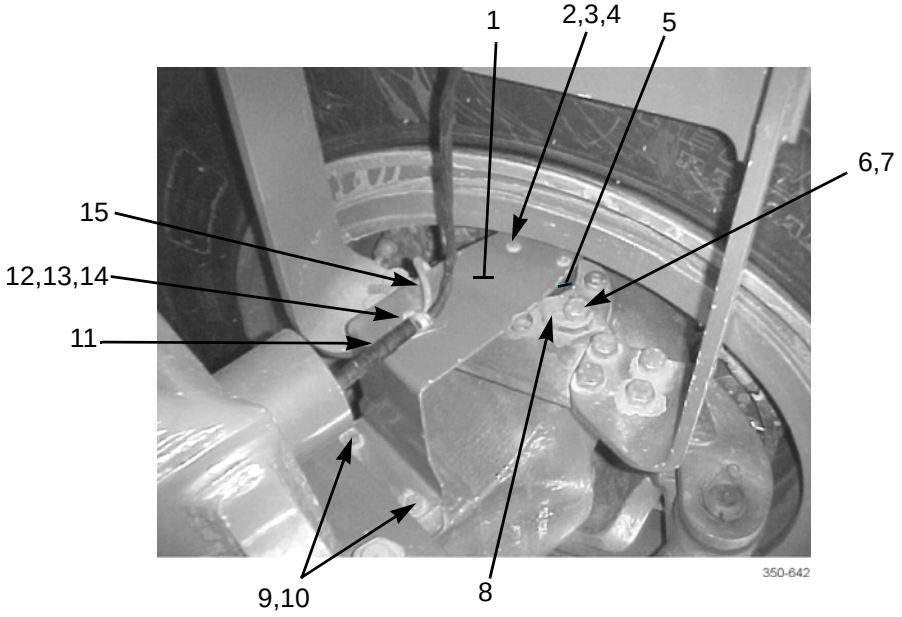
Remove and discard tiedown straps as needed.

1. Remove screw (12), washer (13), and clamp (14).
2. Remove two screws (9) and washers (10) to loosen bracket (1) from axle.
3. Remove two screws (6) and washers (7) from sensor mounting flange (8).

NOTE

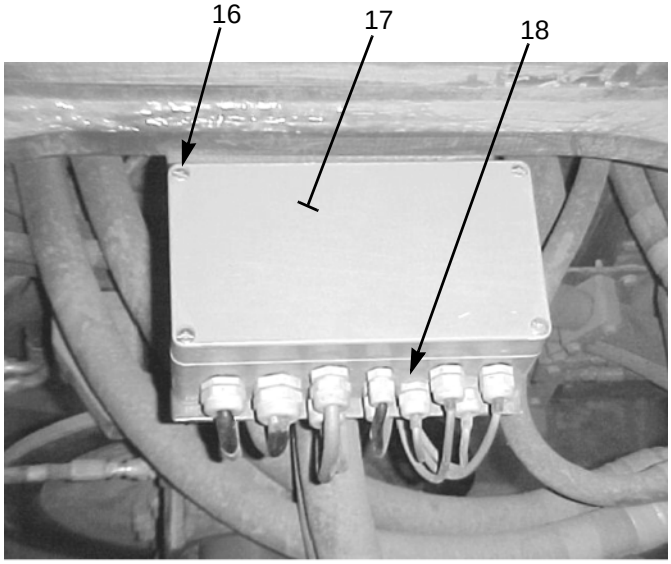
Note position of sensor assembly on bracket for installation.

4. Remove three locknuts (2), six washers (3), three screws (4), and sensor (5) assembly from bracket (1). Discard locknuts.
5. Remove protective covering (11) from cable (15) of sensor (5).



REMOVAL - CONTINUED

6. Loosen four screws (16) and remove cover (17) from front (or rear) junction box (18).



REMOVAL - CONTINUED

NOTE

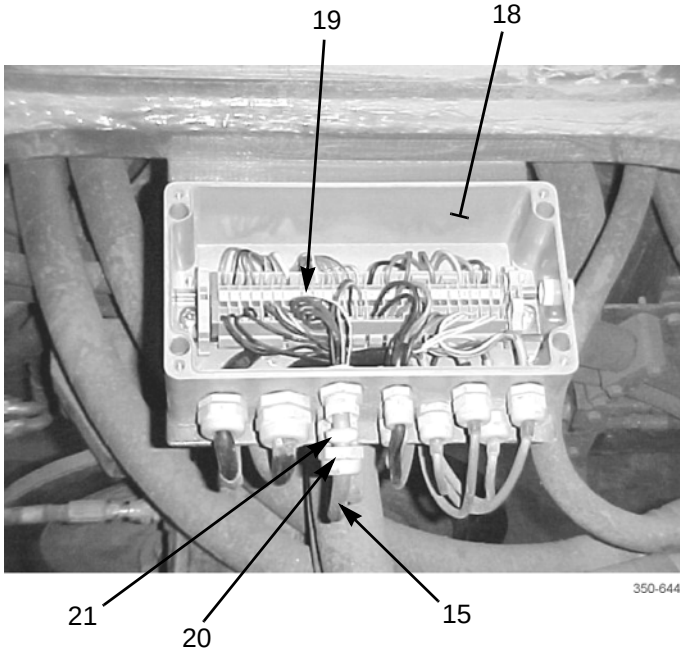
Tag wires for installation.

7. Using a jeweler’s screwdriver, disconnect seven wires of cable (15) from terminal blocks (19) in junction box (18).
8. Loosen cable nut (20) and slide cable nut and grommet (21) back on cable (15).
9. Remove cable (15) from junction box (18).

NOTE

Before removing, string may be tied to end of sensor cable to aid in installation.

10. Remove sensor (5) assembly with cable (15) from vehicle.



INSTALLATION

1. Position cable (15) with sensor assembly in vehicle.
2. Position cable (15) in junction box (18).
3. Install grommet (21) and cable nut (20) in junction box (18).

NOTE

Use electrically conductive grease on wire connections before connections are made.

4. Connect seven wires of cable (15) to terminal blocks (19) in junction box (18) as follows:

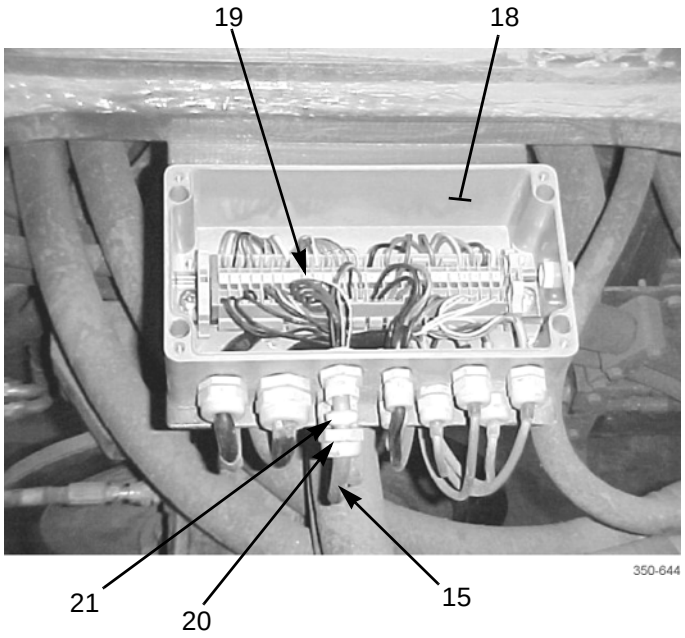


Table 1. Front Junction Box X167 Wire Connections.

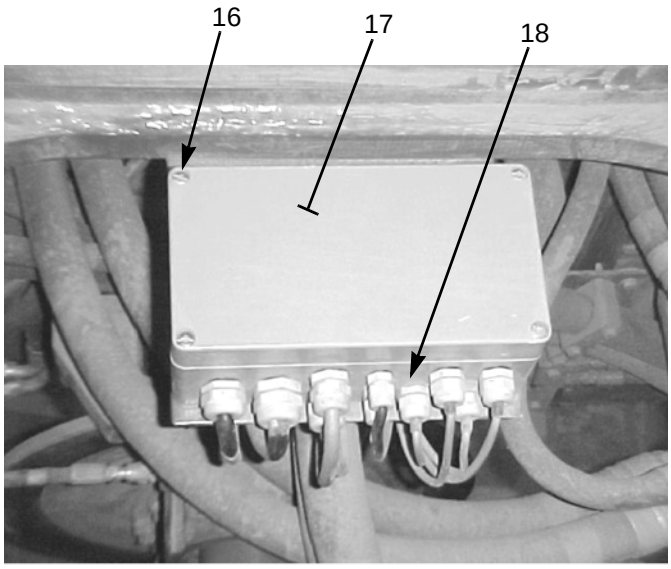
LEFT-FRONT SENSOR	RIGHT-FRONT SENSOR
Black No. 1 across from Brown	Black No. 1 across from Gray
Black No. 2 across from White	Black No. 2 across from Black
Black No. 3 across from Violet	Black No. 3 across from Red
Black No. 4 across from Orange	Black No. 4 across from Blue
Black No. 5 across from White/Black	Black No. 5 across from Yellow
Yellow/Green across from White/Red	Yellow/Green across from Green
Silver to Ground Terminal	Silver to Silver

INSTALLATION - CONTINUED

Table 2. Rear Junction Box X192 Wire Connections.

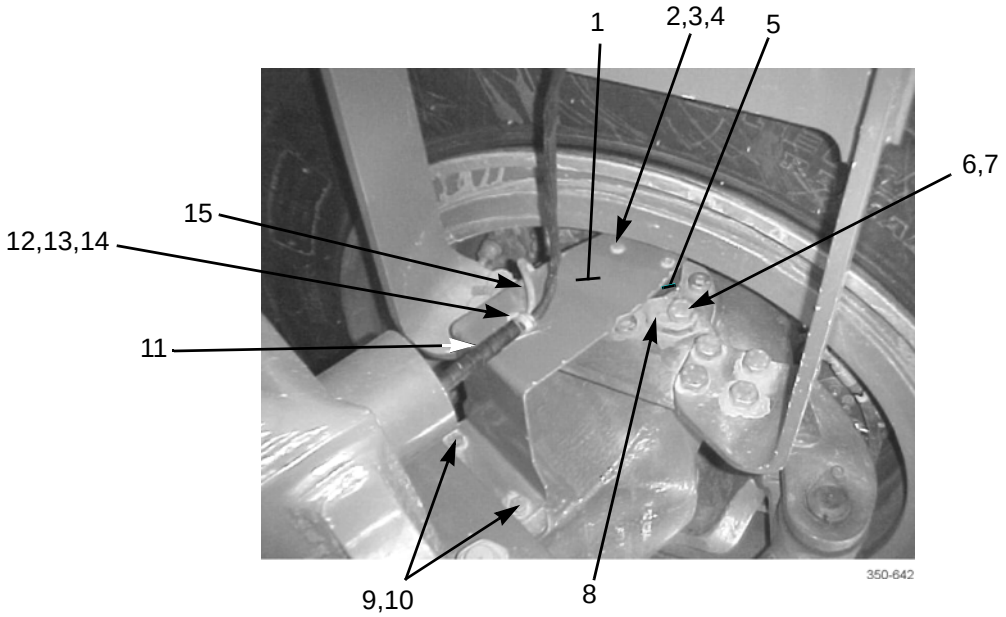
LEFT-REAR SENSOR	RIGHT-REAR SENSOR
Black No. 1 across from Brown	Black No. 1 across from Gray
Black No. 2 across from White	Black No. 2 across from Black
Black No. 3 across from Violet	Black No. 3 across from Red
Black No. 4 across from Orange	Black No. 4 across from Blue
Black No. 5 across from White/Black	Black No. 5 across from Yellow
Yellow/Green across from White/Red	Yellow/Green across from Green
Silver to Ground Terminal	Silver to Silver

5. Install cover (17) on front (or rear) junction box (18) and tighten four screws (16).



INSTALLATION - CONTINUED

6. Install protective covering (11) on cable (15).
7. Install sensor (5) assembly on bracket (1), in position noted during removal, with three screws (4), six washers (3), and three new locknuts (2).
8. Install sensor mounting flange (8) with two washers (7) and screws (6).
9. Install bracket (1) on axle with two washers (10) and screws (9).
10. Install clamp (14) with washer (13) and screw (12).



11. Install new tiedown straps as needed.
12. If removed, install engine cover (WP 0148 00).
13. Perform steering calibration (WP 0238 00).

END OF WORK PACKAGE

ELECTRIC HORN REPLACEMENT 0105 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

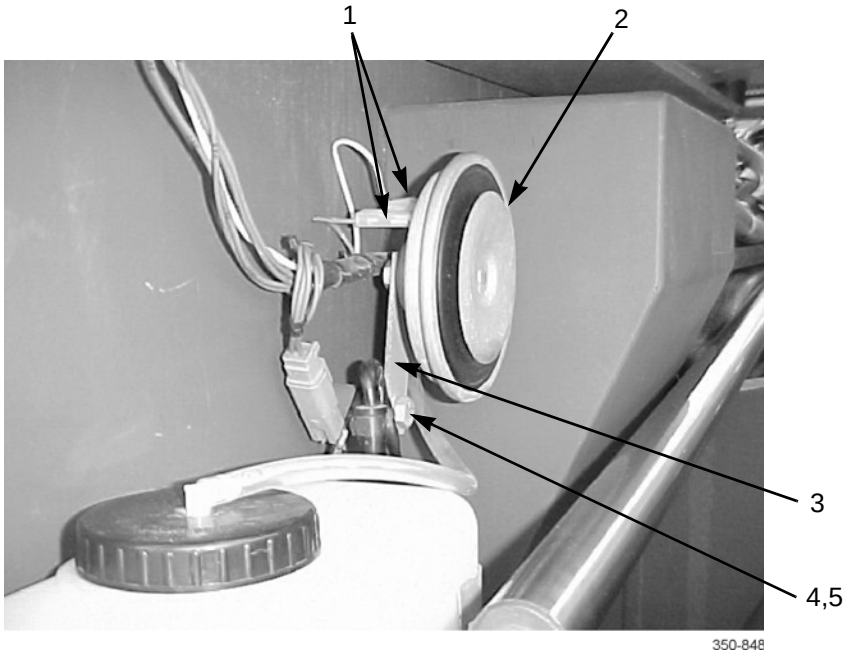
Master battery switch in OFF position

REMOVAL

NOTE

Tag wires for installation.

1. Disconnect two connectors (1) from rear of electric horn (2).
2. Remove screw (4), washer (5), and electric horn (2) with bracket (3) from vehicle.



INSTALLATION

1. Install electric horn (2) with bracket (3) on vehicle with washer (5) and screw (4).
2. Connect two connectors (1) to rear of electric horn (2).

END OF WORK PACKAGE

BACKUP ALARM REPLACEMENT 0106 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Nut, Self-locking (P/N 5957) (2)

References

TM 10-3930-675-10

Equipment Condition

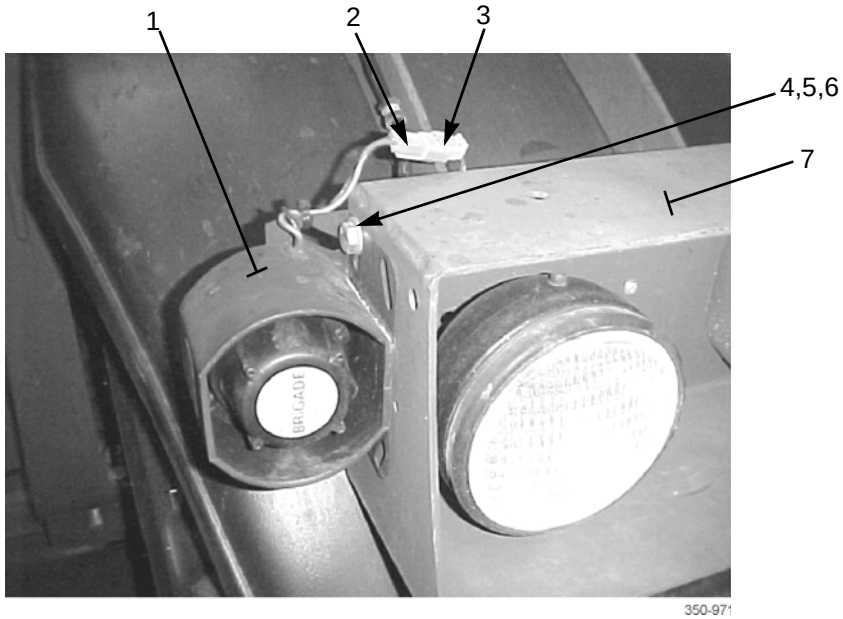
Master battery switch in OFF position

REMOVAL

NOTE

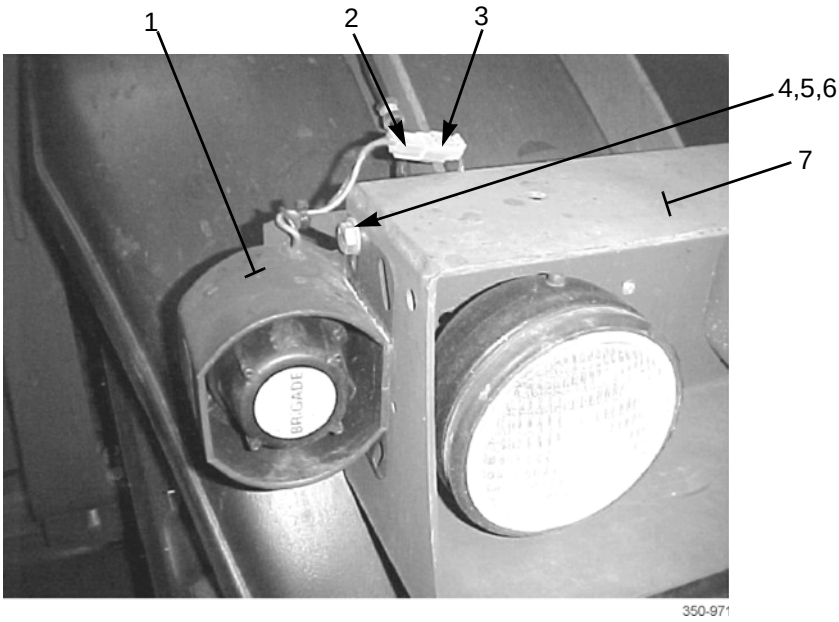
Remove and discard tiedown strap as necessary.

1. Disconnect connector (2) of backup alarm (1) from connector (3) of wiring harness.
2. Remove two locknuts (4), four washers (5), two screws (6), and backup alarm (1) from right rear light bracket (7). Discard locknuts.



INSTALLATION

1. Install backup alarm (1) on right rear light bracket (7) with two screws (6), four washers (5), and two new locknuts (4).
2. Connect connector (2) of backup alarm (1) to connector (3) of wiring harness.



3. Turn master battery switch to ON position.
4. Check operation of backup alarm (TM 10-3930-675-10).

END OF WORK PACKAGE

SEAT WARNING BUZZER REPLACEMENT 0107 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

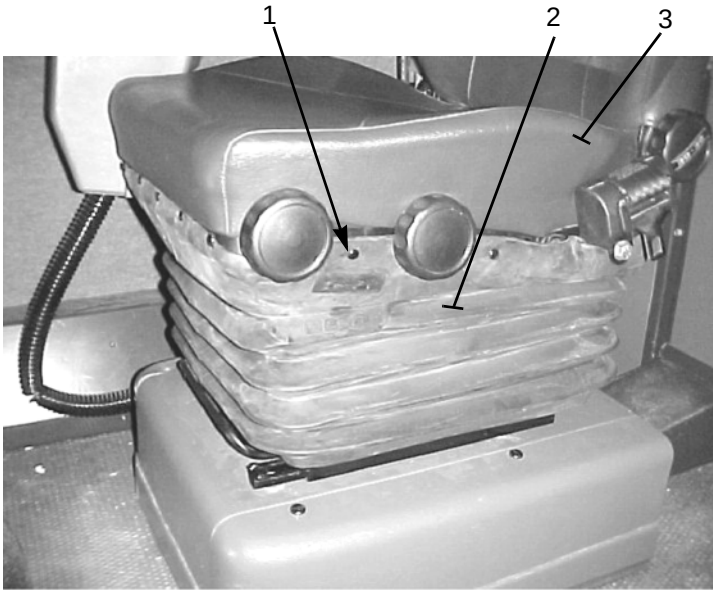
Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

REMOVAL

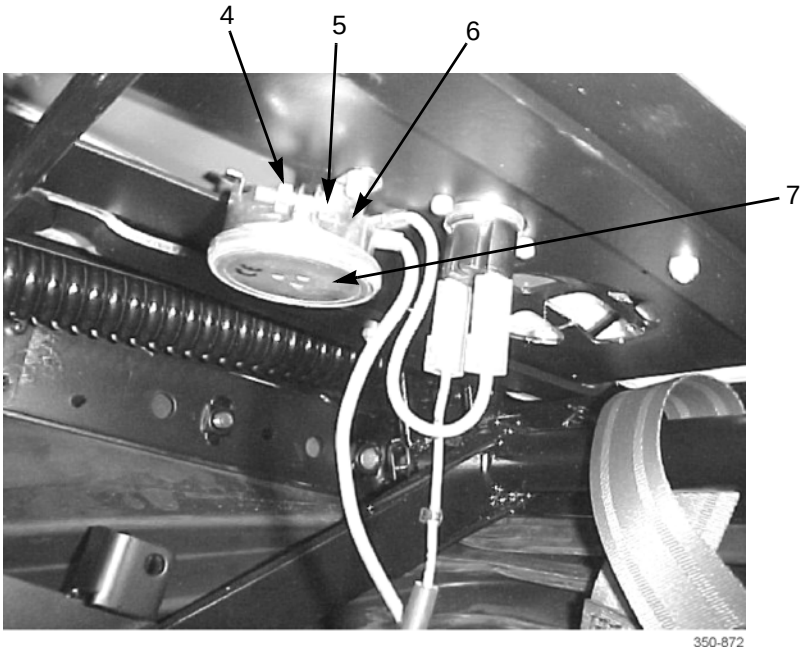
1. Remove approximately eight plastic rivets (1) from rubber bellows (2) under seat (3).
2. Pull rubber bellows (2) downward to access underside of seat (3).



SEAT WARNING BUZZER REPLACEMENT - CONTINUED 0107 00

REMOVAL - CONTINUED

3. Loosen nut (4) and screw (5) on seat warning buzzer holder (6).
4. Pull seat warning buzzer (7) downward from seat warning buzzer holder (6).



NOTE

Tag wires for installation.

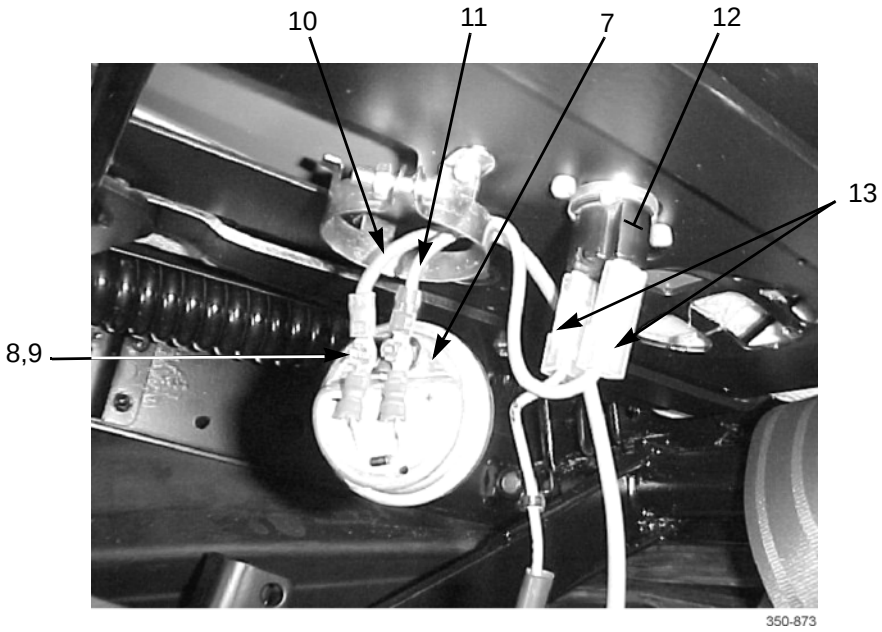
5. Remove two nuts (8) and washers (9) and disconnect two wires (10 and 11) from seat warning buzzer (7).

NOTE

Perform step 6 to disconnect two connectors from seat warning buzzer switch.

6. Disconnect two connectors (13) from seat warning buzzer switch (12).

REMOVAL - CONTINUED



INSTALLATION

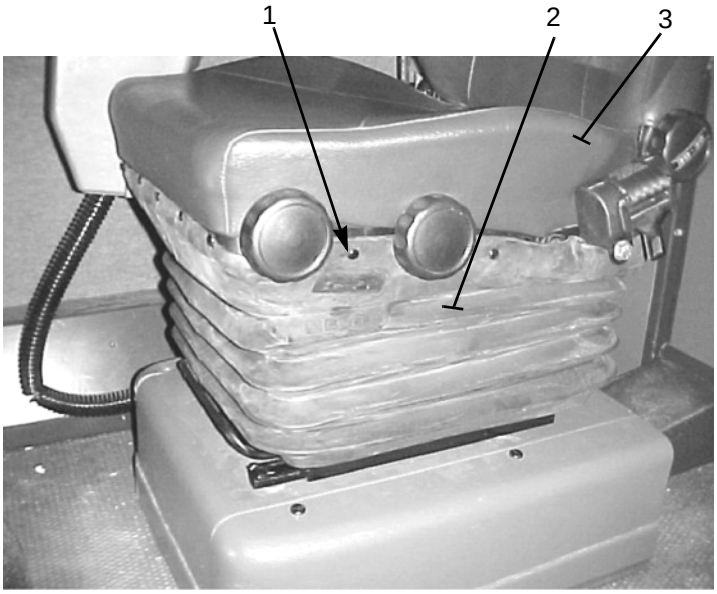
NOTE

Perform step 1 to connect two connectors to seat warning buzzer switch.

1. Connect two connectors (13) to seat warning buzzer switch (12).
2. Connect two wires (10 and 11) to seat warning buzzer (7) with two washers (9) and nuts (8).
3. Push seat warning buzzer (7) upward into seat warning buzzer holder (6).
4. Tighten screw (5) and nut (4) on seat warning buzzer holder (6).

INSTALLATION - CONTINUED

5. Pull rubber bellows (2) upward to seat (3).
6. Install rubber bellows (2) on seat (3) with approximately eight plastic rivets (1).



END OF WORK PACKAGE

BATTERY MAINTENANCE 0108 00

THIS WORK PACKAGE COVERS

Removal, Service, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Apron, Utility, Impermeable (Item 5, WP 0289 00)

Gloves, Chemical and Oil, Protective, Rubber (Item 47, WP 0289 00)

Tools and Special Tools - Continued

Goggles, Industrial (Item 49, WP 0289 00)

Materials/Parts

Nut, lock (P/N 5957) (4)

References

TM 9-6140-200-14

Equipment Condition

Battery cables removed (WP 0110 00)



- **To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. DO NOT smoke, use open flame, make sparks, or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.**
- **Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes, or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.**

  a. **Eyes. Flush with cold water for no less than 15 minutes and seek medical attention immediately.**

  b. **Skin. Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.**

  c. **Internal. If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek medical attention immediately.**

  d. **Clothing/Equipment. Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.**

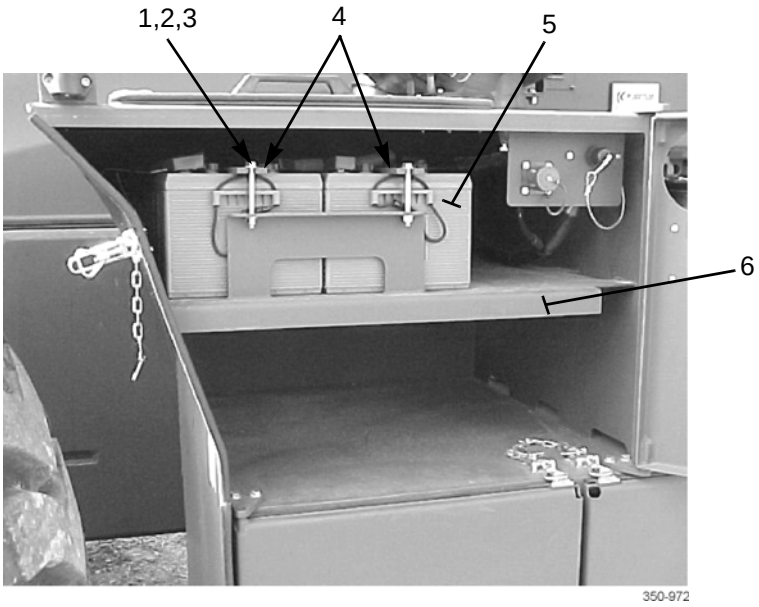
REMOVAL

1. Remove four locknuts (1), eight washers (2), four bolts (3), and two battery holddown straps (4) from across top of batteries (5). Discard locknuts.

NOTE

Note position of batteries in battery compartment for installation.

2. Remove four batteries (5) from battery compartment (6).



SERVICE

Service batteries in accordance with TM 9-6140-200-14.

INSTALLATION

1. Position four batteries (5) in battery compartment (6) as noted during removal.
2. Install two battery holddown straps (4) across top of batteries (5) with four bolts (3), eight washers (2), and four new locknuts (1).
3. Install battery cables (WP 0110 00).

END OF WORK PACKAGE

SOLAR CHARGER MAINTENANCE (USMC ONLY) 0109 00

THIS WORK PACKAGE COVERS

Removal, Service, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Fuse, 2-Amp (P/N 12J1437) (2)

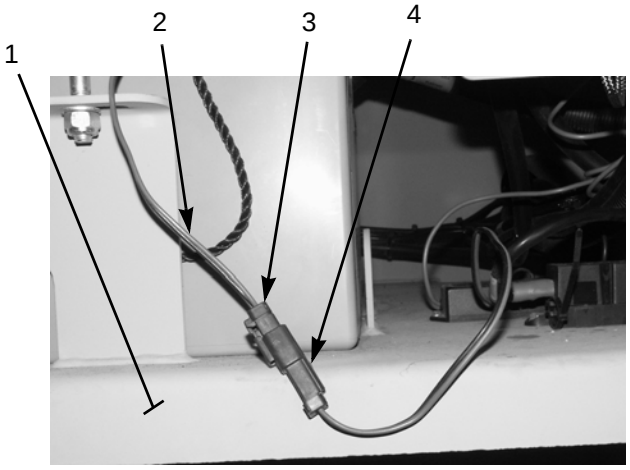
Nut, lock (P/N 920076.002) (4)

Equipment Condition

Battery compartment door open (TM 10-3930-675-10)

REMOVAL

1. Inside battery compartment (1), disconnect connector (3) and wire (2) of solar charger from connector (4).



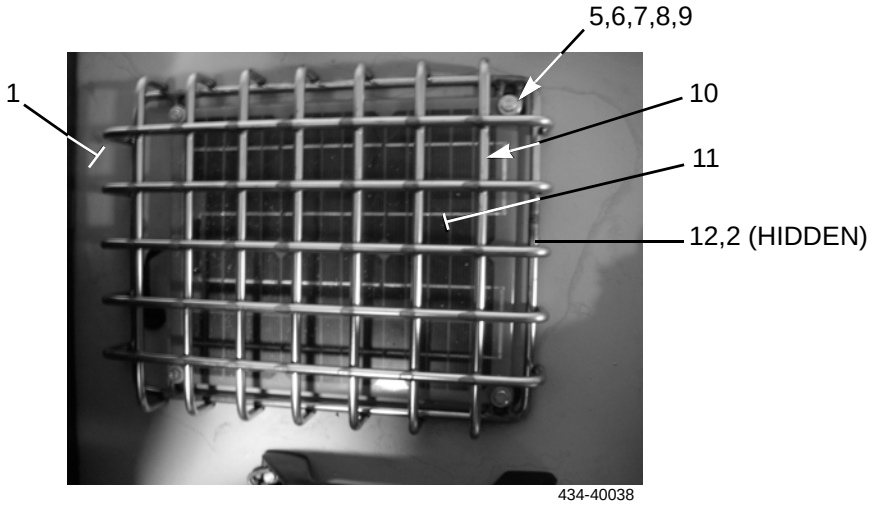
434-40040

REMOVAL - CONTINUED

2. At top of battery compartment (1), remove four locknuts (5), screws (6), and washers (7 and 8) to separate solar charger (11) and grating (10) from four grommets (9).

3. Remove large grommet (12), wire (2) of solar charger (11), grating (10), and solar charger from vehicle.

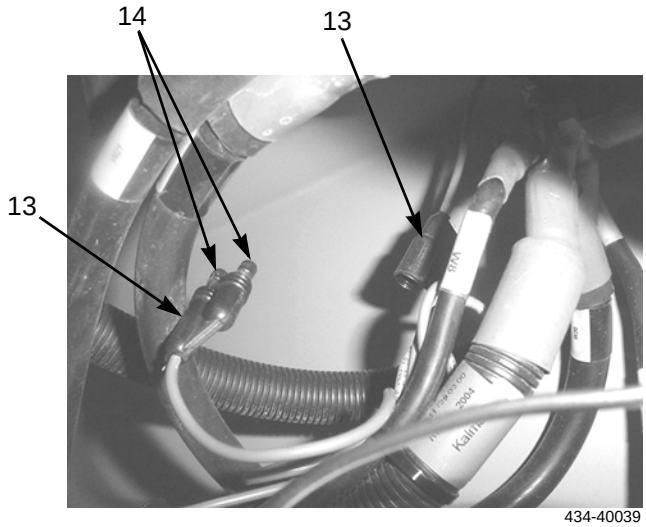
4. Remove four grommets (9) from top of battery compartment (1).



NOTE

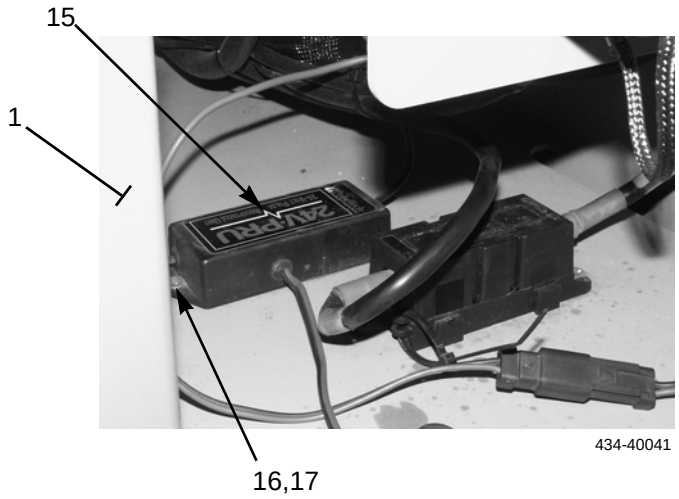
- **Perform steps 5 and 6 to remove pulse generator.**
- **Only one fuse completes circuit. Other fuse is a spare.**

5. Separate two halves of fuse holder (13) and remove two fuses (14).



REMOVAL - CONTINUED

6. Remove two bolts (16), washers (17), and pulse generator (15) from vehicle.

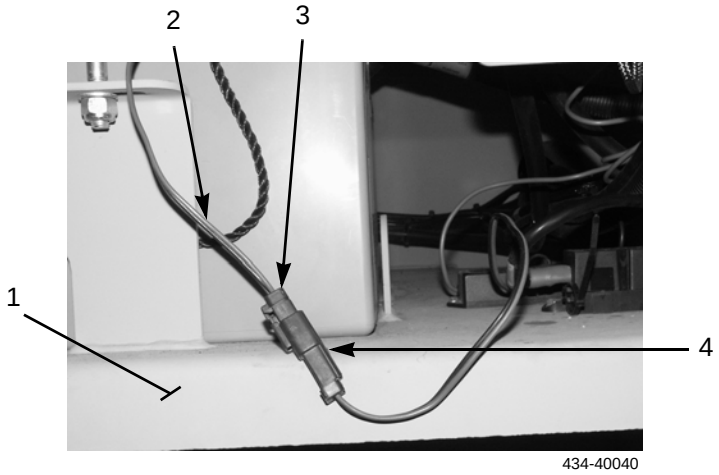


INSTALLATION

NOTE

Perform steps 1 and 2 to install pulse generator.

1. Install pulse generator (15) in battery compartment (1) with two washers (17) and bolts (16).
2. Install two fuses (14) and connect two halves of fuse holder (13).
3. Install four grommets (9) in top of battery compartment (1).
4. Install wire (2) of solar charger (11) and large grommet (12) on top of battery compartment (1) and position grating (10) and solar charger on four grommets (9).
5. Install grating (10) and solar charger (11) on four grommets (9) with four washers (8), washers (7), screws (6), and new locknuts (5).
6. Inside battery compartment (1), connect wire (2) and connector (3) of solar charger to connector (4).



END OF WORK PACKAGE

BATTERY CABLES REPLACEMENT 0110 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Apron, Utility, Impermeable (Item 5, WP 0289 00)

Puller, Battery Terminal (Item 93, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0111 00



WARNING

- **To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. DO NOT smoke, use open flame, make sparks, or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.**
- **Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.**

  a. Eyes. Flush with cold water for no less than 15 minutes and seek medical attention immediately.

  b. Skin. Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.

  c. Internal. If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek medical attention immediately.

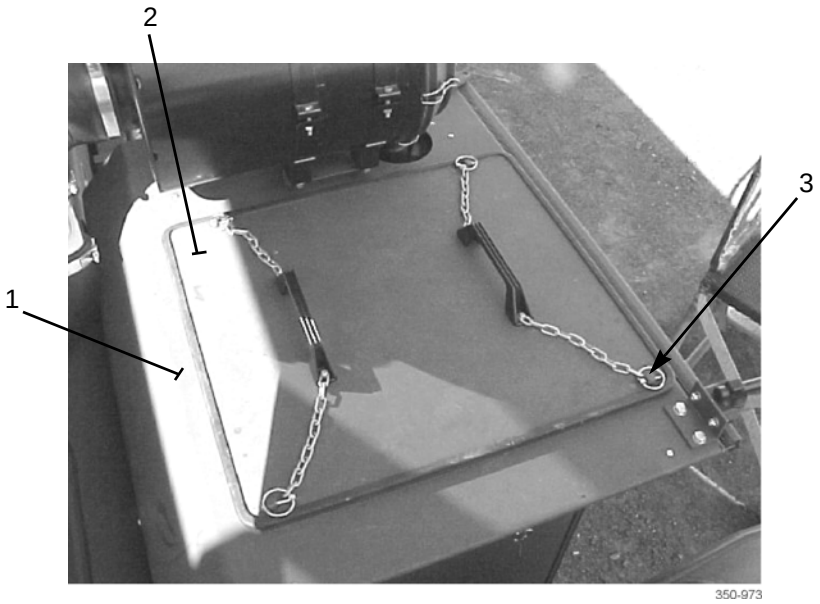
  d. Clothing/Equipment. Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.

REMOVAL

NOTE

- **Tag battery cables prior to removal to aid in installation.**
- **Cut tiedown straps and remove protective covering from battery cables as necessary.**
- **Perform steps 1 thru 5 only to disconnect battery cables when performing any electrical maintenance task on vehicle.**

1. Remove each of four locking pins (3) from studs of battery compartment (1).
2. Remove battery compartment cover (2) from battery compartment (1).



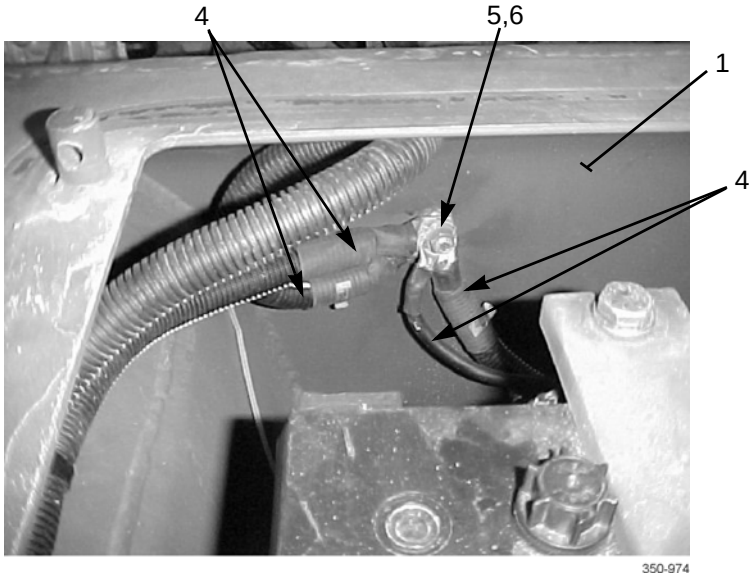


WARNING

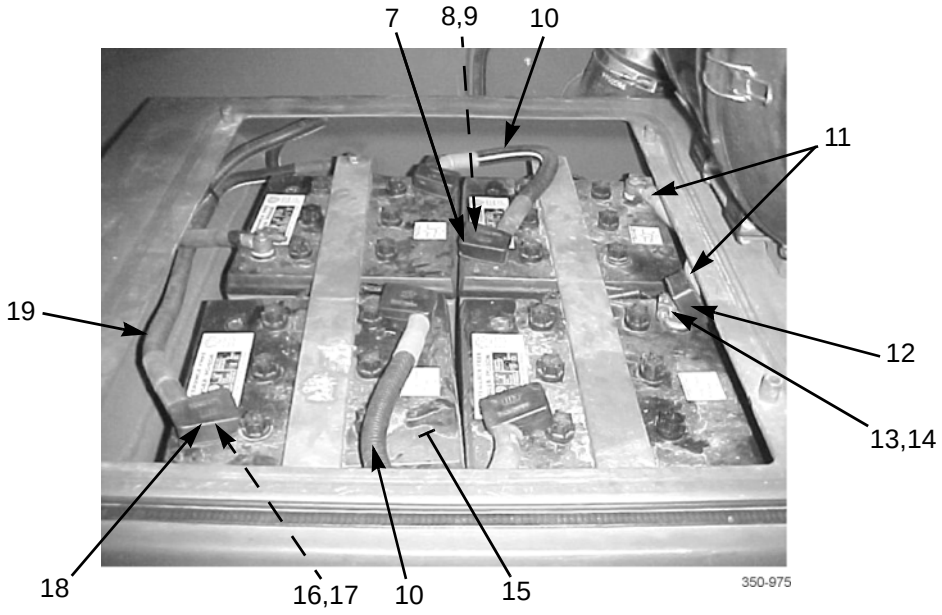
Disconnect NEGATIVE battery cables first to avoid electrical shock.

3. At end of two NEGATIVE battery cables (19), raise plastic cap (18) and loosen nut (16) and screw (17) on battery cable clamp.
4. Disconnect NEGATIVE battery cables (19) from two of four batteries (15) and remove cables.

REMOVAL - CONTINUED



5. Remove locknut (5) and washer (6) and disconnect four NEGATIVE cables (4) from side of battery compartment (1).
6. At ends of two battery cables (10), raise plastic cap (7) and loosen nut (8) and screw (9) on battery cable clamp.
7. Remove two battery cables (10) from four batteries (15).
8. At end of two POSITIVE battery cables (11), raise plastic cap (12) and loosen nut (13) and screw (14) on battery cable clamp.
9. Disconnect POSITIVE battery cables (11) from two of four batteries (15).
10. Disconnect POSITIVE battery cables (11) from master battery switch (WP 0111 00) and remove.

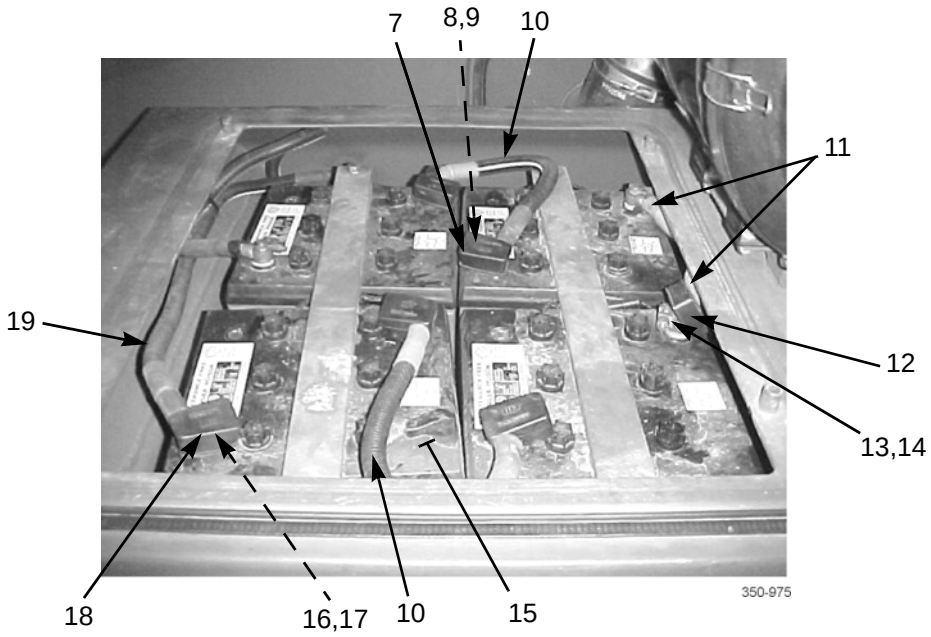


CLEANING AND INSPECTION

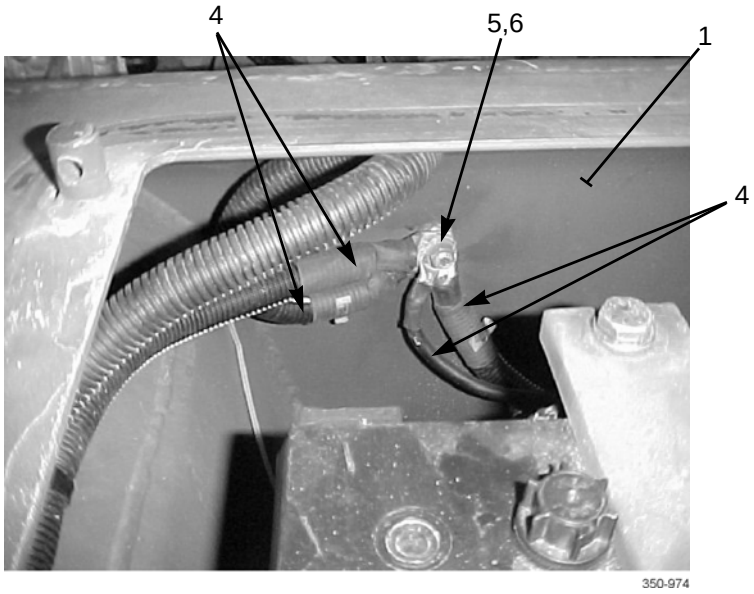
1. Clean batteries and battery posts with a wire brush. Wipe clean with rags.
2. Inspect for corrosion or other damage.
3. Apply a protective coating of grease to battery posts.

INSTALLATION

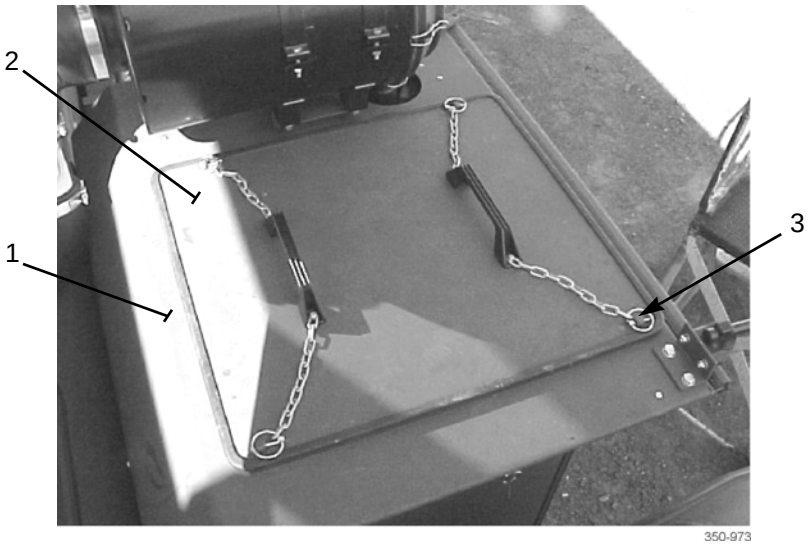
1. Connect two POSITIVE battery cables (11) to master battery switch (WP 0111 00).
2. Connect POSITIVE battery cables (11) to two of four batteries (15).
3. At end of two POSITIVE battery cables (11), raise plastic cap (12) and tighten screw (14) and nut (13) on battery cable clamp.
4. Install two battery cables (10) on four batteries (15).
5. At ends of two battery cables (10), raise plastic cap (7) and tighten screw (9) and nut (8) on battery cable clamp.
6. Connect four NEGATIVE cables (4) to side of battery compartment (1) with washer (6) and locknut (5).
7. Connect NEGATIVE battery cables (19) to two of four batteries (15).
8. At end of two NEGATIVE battery cables (19), raise plastic cap (18) and tighten screw (17) and nut (16) on battery cable clamp.



INSTALLATION - CONTINUED



9. Install battery compartment cover (2) on battery compartment (1).
10. Install each of four locking pins (3) on studs of battery compartment (1).



END OF WORK PACKAGE

MASTER BATTERY SWITCH REPLACEMENT 0111 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, Self-locking (P/N 920076.001) (2)

Equipment Condition

Battery compartment door open (TM 10-3930-675-10)

Battery cables disconnected (WP 0110 00)

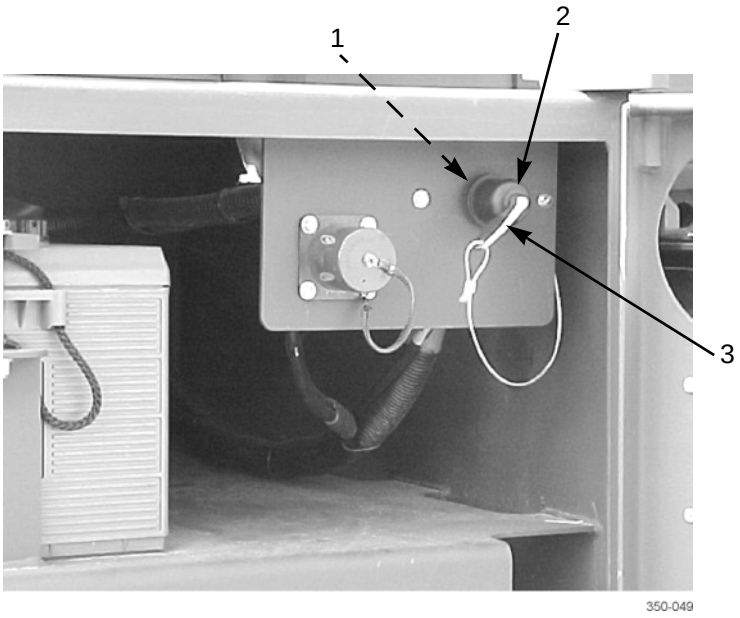


WARNING

Remove all jewelry, watches, rings, etc., prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

REMOVAL

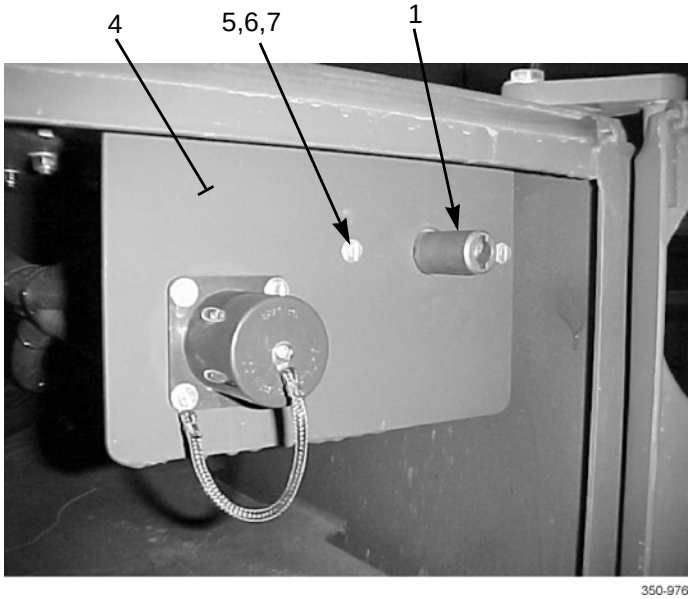
1. Remove handle (3) with boot (2) from master battery switch (1).



NOTE

Note orientation of master battery switch prior to removal to ensure correct installation.

2. Remove two locknuts (5), washers (6), screws (7), and master battery switch (1) from mounting plate (4). Discard locknuts.

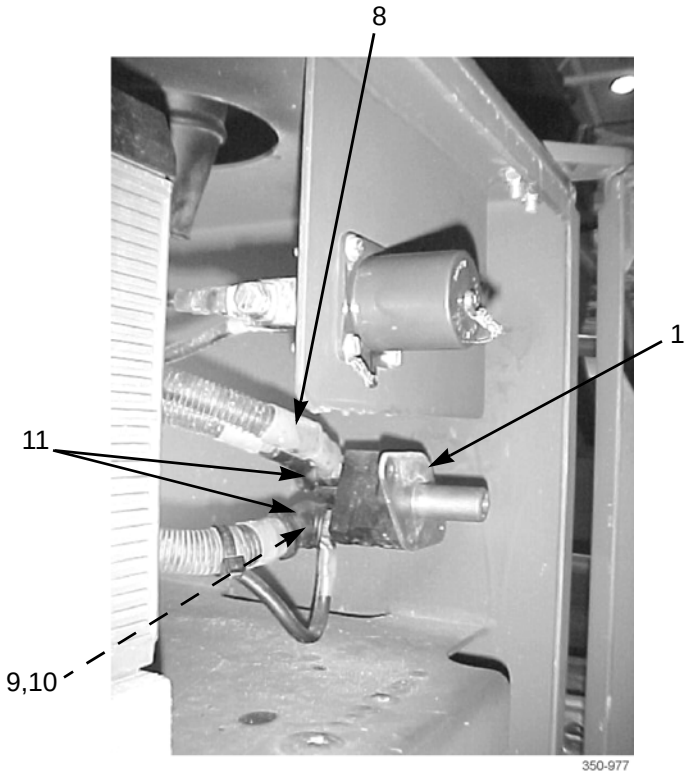


REMOVAL - CONTINUED

NOTE

Tag cables prior to disconnection to ensure proper connection on installation. Also note switch terminal to which cables are connected.

3. Pull back two rubber boots (11) and remove two nuts (9), washers (10), and four cables (8) from terminals of master battery switch (1).



INSTALLATION

1. Install four cables (8), two washers (10), and nuts (9) on terminals of master battery switch (1). Install two rubber boots (11).
2. Position master battery switch (1) with shaft through opening in mounting plate (4). Install two screws (7), washers (6), and new locknuts (5).
3. Install boot (2) and handle (3) on shaft of master battery switch (1).
4. Connect battery cables (WP 0110 00).
5. Close battery compartment door (TM 10-3930-675-10).

END OF WORK PACKAGE

SLAVE STARTING RECEPTACLE REPLACEMENT 0112 00

THIS WORK PACKAGE COVERS

Right Slave Starting Receptacle: Removal, Installation

Left Slave Starting Receptacle: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 920076.001) (8)

Nut, lock (P/N 920076.003) (4)

Equipment Condition

Master battery switch in OFF position

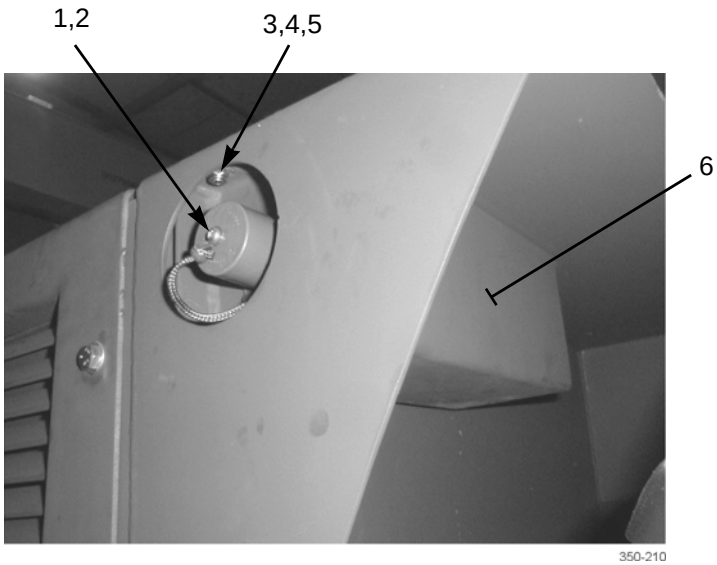
Battery cables disconnected (WP 0110 00)

NOTE

Tag cables to ensure correct installation.

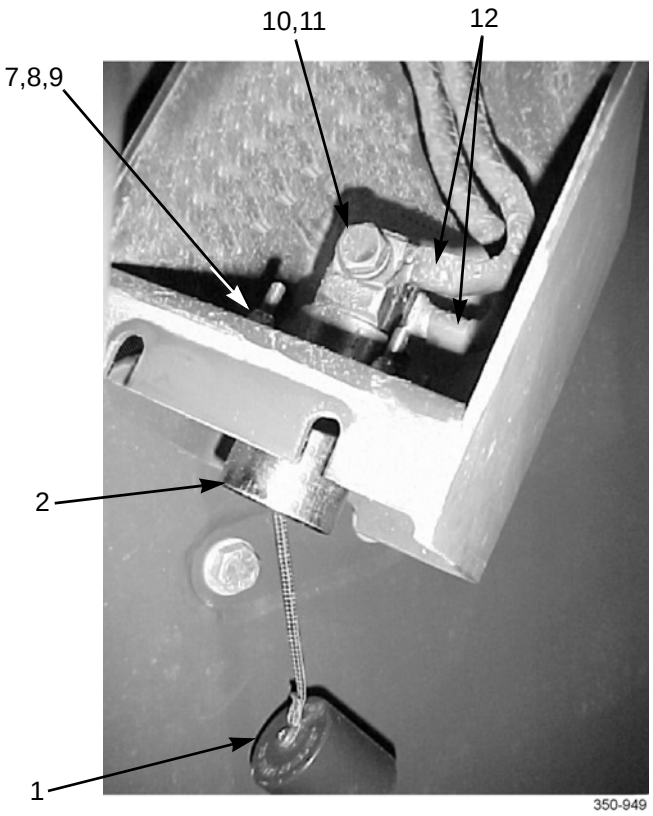
RIGHT SLAVE STARTING RECEPTACLE REMOVAL

1. Remove cap (1) from slave starting receptacle (2).
2. Remove four locknuts (3), eight washers (4), four screws (5), and bracket (6) from vehicle. Pull bracket downward to access rear of slave starting receptacle (2). Discard locknuts.



RIGHT SLAVE STARTING RECEPTACLE REMOVAL - CONTINUED

3. Remove four locknuts (7), eight washers (8), four screws (9), slave starting receptacle (2), and cord of cap (1) from bracket (6). Discard locknuts.
4. Remove two screws (10), lockwashers (11), and two cables (12) from rear of slave starting receptacle (2).



RIGHT SLAVE STARTING RECEPTACLE INSTALLATION

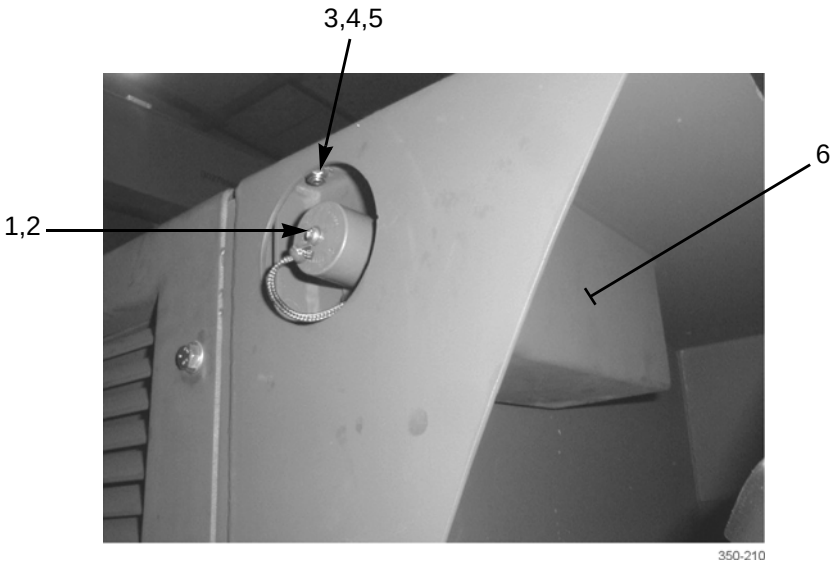
NOTE

New slave starting receptacle comes with new lockwashers.

1. Position slave starting receptacle (2) on bracket (6) and install two cables (12) on rear of slave starting receptacle with two new lockwashers (11) and screws (10).
2. Install slave starting receptacle (2) and cord of cap (1) on bracket (6) with four screws (9), eight washers (8), and four new locknuts (7).
3. Install bracket (6) on vehicle with four screws (5), eight washers (4), and four new locknuts (3).

RIGHT SLAVE STARTING RECEPTACLE INSTALLATION - CONTINUED

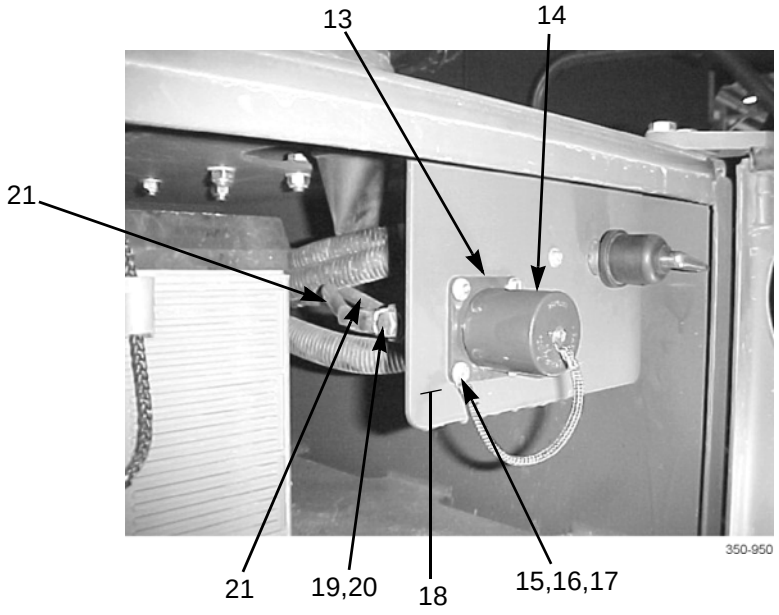
4. Install cap (1) on slave starting receptacle (2).



5. Connect battery cables (WP 0110 00).

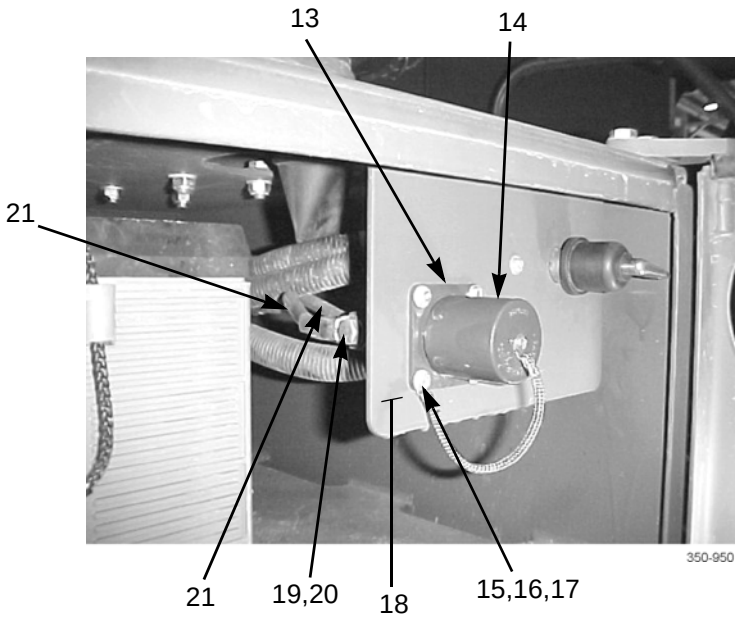
LEFT SLAVE STARTING RECEPTACLE REMOVAL

1. Remove two screws (19), lockwashers (20), and cables (21) from rear of slave starting receptacle (13). Discard lockwashers.
2. Remove cap (14) from slave starting receptacle (13).
3. Remove four locknuts (15), eight washers (16), four screws (17), slave starting receptacle (13), and cord of cap (14) from mounting plate (18). Discard locknuts.



LEFT SLAVE STARTING RECEPTACLE INSTALLATION

1. Install slave starting receptacle (13) and cord of cap (14) on mounting plate (18) with four screws (17), eight washers (16), and four new locknuts (15).
2. Install cap (14) on slave starting receptacle (13).
3. Connect two cables (21) to rear of slave starting receptacle (13) with two new lockwashers (20) and screws (19).



END OF WORK PACKAGE

ELECTRICAL GENERAL MAINTENANCE INSTRUCTIONS 0113 00

THIS WORK PACKAGE COVERS

Multiple-Pin Connector Identification Diagrams
Connector Repair
Sealed Connector Repair
Receptacle Connector Repair
Waterproof Connector Repair
Military Connector Repair
Ring Terminal Repair
Splicing Wires
Electrical Ground Points
Multimeter Usage
Relay Inspection and Test

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)
Heater, Gun (Item 56, WP 0289 00)
Multimeter, Digital (Item 73, WP 0289 00)
Tool Kit, Electrical Connector Repair (Item 127, WP 0289 00)

Materials/Parts

Cloth, Abrasive, Emery, Fine (Item 6, WP 0290 00)
Detergent (Item 15, WP 0290 00)
Grease, Electrically Conductive (Item 21, WP 0290 00)
Tag, Marker (Item 38, WP 0290 00)
Tubing: Heat Shrinkable (Item 41, WP 0290 00)

References

WP 0048 00

CAUTION

Splicing is prohibited on any wire within the RTCH electronic CAN-BUS system. Refer to WP 0048 00 for CAN-BUS system diagrams.

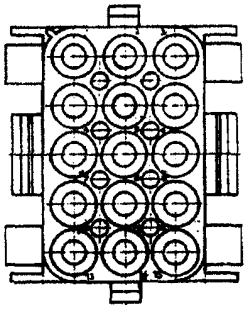
NOTE

Use electrically conductive grease on unprotected (exposed to weather) electrical connectors before connections are made.

MULTIPLE-PIN CONNECTOR IDENTIFICATION DIAGRAMS

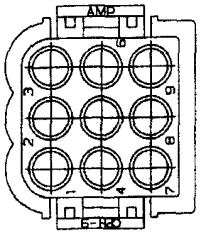
NOTE

The following diagrams illustrate typical multiple-pin connectors and identify pin numbers as viewed from wire side of connector.



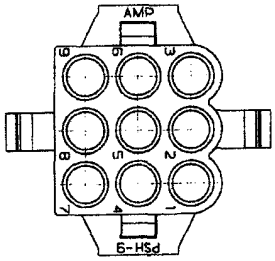
1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

350-1207



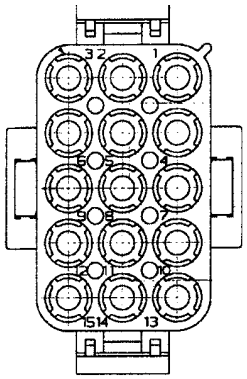
3	6	9
2	5	8
1	4	7

350-1208



9	6	3
8	5	2
7	4	1

350-1209



3	2	1
6	5	4
9	8	7
12	11	10
15	14	13

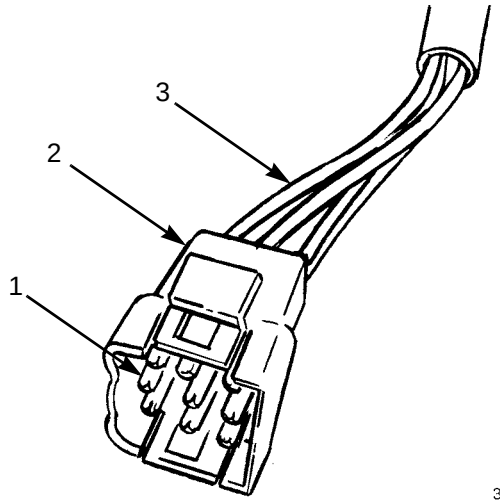
350-1210

CONNECTOR REPAIR

NOTE

- **Perform the following steps for each wire of connector.**
- **Tag wires for installation.**

1. Using pin removal tool, position tool over pin (1) and push inward to retract two barbs of pin.
2. Remove wire (3), with pin (1) attached, from rear of connector (2).
3. If defective, remove pin (1) from wire (3) by cutting through wire just behind pin.



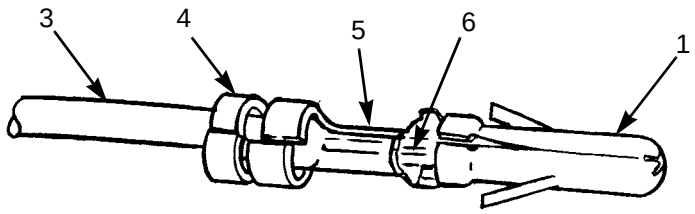
350-1061

4. Using wire stripping tool, strip insulation off wire (3) to expose proper length of metal strands (6).
5. Using crimping tool, securely crimp tabs (5) of pin (1) over metal strands (6) of wire (3).

NOTE

The other two tabs of pin may need to be crimped slightly in order to enter connector.

6. Using crimping tool, crimp tabs (4) at rear of pin (1) over insulation of wire (3).



350-1062

7. Push pin (1) into rear of connector (2) until fully seated.

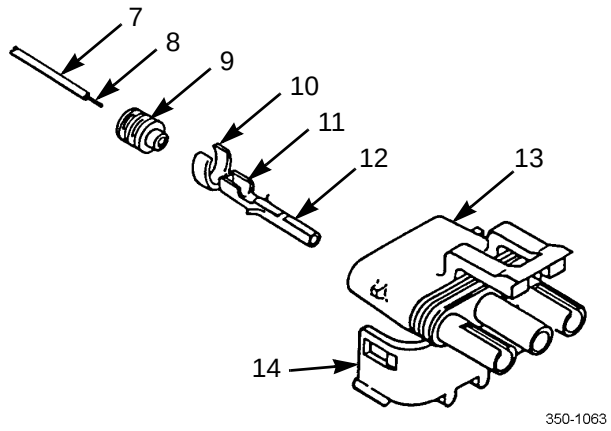
SEALED CONNECTOR REPAIR

1. Open hinged cover (14) of connector (13) for access to rear of connector.

NOTE

- **Perform steps 2 thru 9 for each wire of connector.**
- **Tag wires for installation.**

2. Using pin removal tool, position tool over pin (12) and push inward to retract two barbs of pin.
3. Remove wire (7), with pin (12) and seal (9) attached, from rear of connector (13).
4. If defective, remove pin (12) and seal (9) from wire (7) by cutting through wire just behind seal.

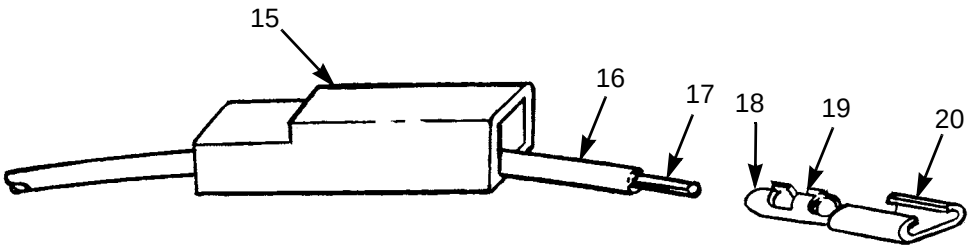


5. Position new seal (9) on wire (7).
6. Using wire stripping tool, strip insulation off wire (7) to expose 1/8-in. (3-mm) length of metal strands (8).
7. Using crimping tool, securely crimp tabs (11) of pin (12) over metal strands (8) of wire (7).
8. Slide seal (9) next to pin (12) and crimp tabs (10) of pin over end of seal.
9. Push pin (12) into rear of connector (13) until fully seated.
10. Close hinged cover (14) of connector (13).

RECEPTACLE CONNECTOR REPAIR

1. Using removal tool, insert tool into front of connector (15) and depress locking tab of receptacle (20).
2. Push wire (16), with receptacle (20) attached, through front of connector (15).
3. If defective, remove receptacle (20) from wire (16) by cutting through wire just behind receptacle.
4. Slide connector (15) back on wire (16).

RECEPTACLE CONNECTOR REPAIR - CONTINUED

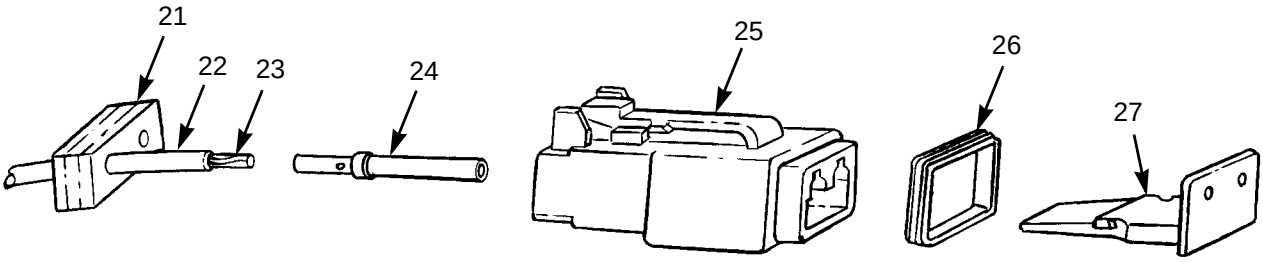


350-1064

5. Using wire stripping tool, strip insulation off wire (16) to expose ¼-in. (6-mm) length of metal strands (17).
6. Using crimping tool, securely crimp tabs (19) of receptacle (20) over metal strands (17).
7. Using crimping tool, crimp tabs (18) of receptacle (20) over insulation of wire (16).
8. Slide connector (15) forward over receptacle (20) until locking tab of receptacle snaps into place.

WATERPROOF CONNECTOR REPAIR

1. Remove end cover (27) and gasket (26) from front of connector (25).
2. Remove seal (21) from rear of connector (25) and slide seal back on wire (22).



350-1065

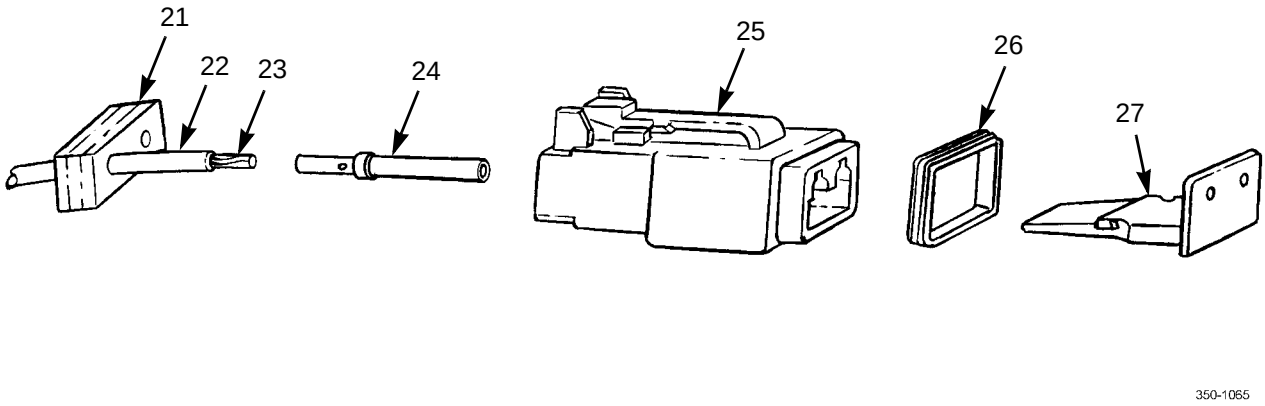
NOTE

- **Perform steps 3 thru 9 for each wire of connector.**
- **Tag wires for installation.**

3. Using pin removal tool, insert tool into front of connector (25) and depress locking tab of connector.
4. Remove wire (22) with pin (24) from rear of connector (25).
5. If defective, remove pin (24) from wire (22) by cutting through wire just behind pin.
6. Using wire stripping tool, strip insulation off wire (22) to expose ¼-in. (6-mm) length of metal strands (23).

WATERPROOF CONNECTOR REPAIR - CONTINUED

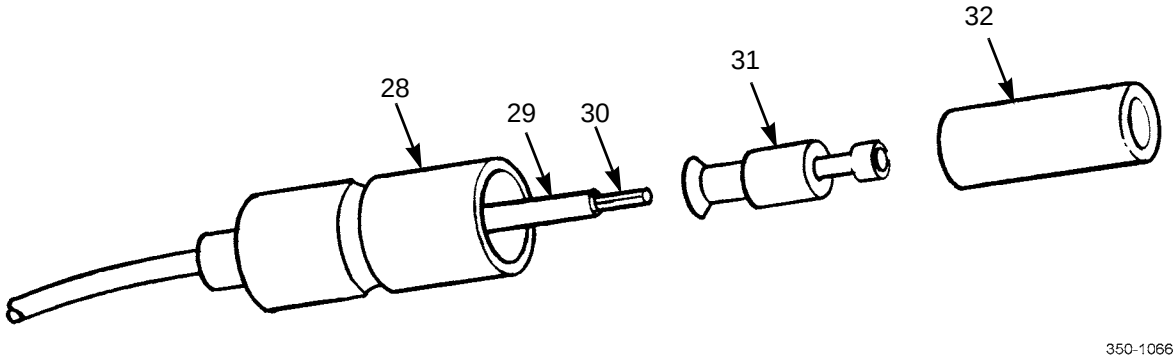
7. Insert metal strands (23) of wire (22) fully into rear of pin (24).
8. Using crimping tool, securely crimp pin (24) to metal strands (23) of wire (22).
9. Push pin (24) into rear of connector (25) until fully seated.
10. Install seal (21) on rear of connector (25).
11. Install gasket (26) and end cover (27) on front of connector (25).



350-1065

MILITARY CONNECTOR REPAIR

1. Slide shell (28) back on wire (29) to expose sleeve (32).
2. Remove sleeve (32) from terminal (31) by pulling sleeve forward.
3. If defective, remove terminal (31) from wire (29) by cutting through wire just behind terminal.



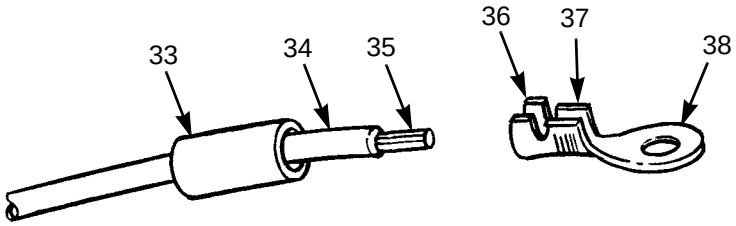
350-1066

4. Using wire stripping tool, strip insulation off wire (29) to expose length of metal strands (30) equal to depth of terminal (31).
5. Using crimping tool, securely crimp terminal (31) to metal strands (30) of wire (29).
6. Install sleeve (32) on terminal (31) by pushing sleeve over front of terminal until fully seated.
7. Slide shell (28) up wire (29) and over sleeve (32).

RING TERMINAL REPAIR

1. Remove ring terminal (38) from wire (34) by cutting through wire just behind heat shrink tubing (33).

RING TERMINAL REPAIR - CONTINUED



350-1067

2. Cut heat shrink tubing (33) to length sufficient to cover tabs (36 and 37) of ring terminal (38) and ¼-in. (6-mm) of wire (34).
3. Slide heat shrink tubing (33) back on wire (34).
4. Using wire stripping tool, strip insulation off wire (34) to expose proper length of metal strands (35).
5. Using crimping tool, securely crimp tabs (37) of ring terminal (38) over metal strands (35).
6. Using crimping tool, crimp tabs (36) of ring terminal (38) over insulation of wire (34).
7. Slide heat shrink tubing (33) over tabs (36 and 37) of ring terminal (38).
8. Using heater gun, apply heat to heat shrink tubing (33) until tubing snugly conforms to ring terminal (38) and insulation of wire (34).

SPLICING WIRES

NOTE

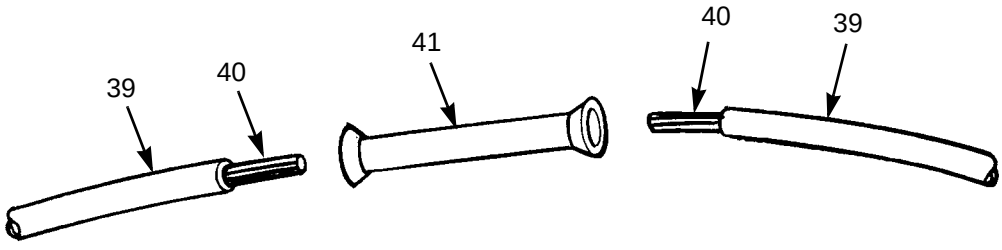
The selection of crimping tool and type of splice connectors is optional. High quality splice connectors can be expected to last the life of the vehicle.

1. Inspect each end of wire (39). Trim insulation and metal strands (40) of wire back, as necessary, to ensure integrity of wire.
2. Using wire stripping tool, strip each end of wire (39) to expose length of metal strands (40) to suit type of splice connector (41) used.

NOTE

Perform steps 3 and 4 at each end of splice connector.

3. Insert metal strands (40) of wire (39) fully into splice connector (41).
4. Using crimping tool, securely crimp splice connector (41) to metal strands (40) of wire (39).



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ELECTRICAL GROUND POINTS

Many electrical problems are the result of poor ground connections. Ensure ground connections are good by performing the following steps.



WARNING

Although master battery switch must be ON to test electrical circuit voltage, turn master battery switch to OFF position before performing resistance tests or replacing parts. Failure to follow this warning may result in injury to personnel and damage to parts or equipment.

a. Remove screw, lockwasher, nut, etc., connecting ground wire terminal to vehicle ground point.
b. If necessary, clean mounting hardware, wire terminal, and ground point with detergent and a scrub brush.
c. Remove any rust or corrosion from ground point with a wire brush and abrasive cloth.
d. Replace defective mounting hardware and wire terminal as necessary.
e. Install wire terminal to ground point with screw, lockwasher, nut, etc., and tighten securely.

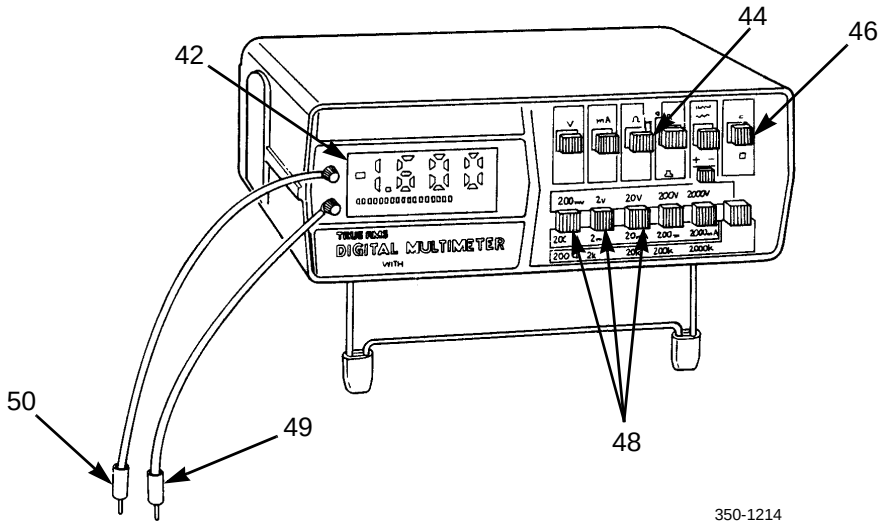
MULTIMETER USAGE

1. **General**. The Multimeter, Digital (Item 73, WP 0289 00) is used to troubleshoot the electrical system of the vehicle. The multimeter's Ohms scale is used to test for continuity, shorts, and resistance and the voltmeter scale is used to test voltage levels at any point in the electrical system.
2. **Continuity Tests**. Continuity tests are performed to check for breaks in a circuit (such as a fuse, switch, light bulb, or electrical cable).

NOTE

If digital readout will not zero properly, replace batteries and repeat zeroing procedure. If digital readout will not zero after batteries have been replaced, notify your supervisor.

a. **Zero the Multimeter**.
   (1) Set multimeter ON/OFF switch (46) to ON position.
   (2) Press OHMS FUNCTION switch (44).
   (3) Press LOWEST VOLTAGE/OHMS selector switch (48).
   (4) Touch black and red probes (49 and 50) together and check for a zero reading on digital readout (42).



MULTIMETER USAGE - CONTINUED

CAUTION

Before performing a continuity test, always turn master battery switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

b. **Testing for Continuity**.

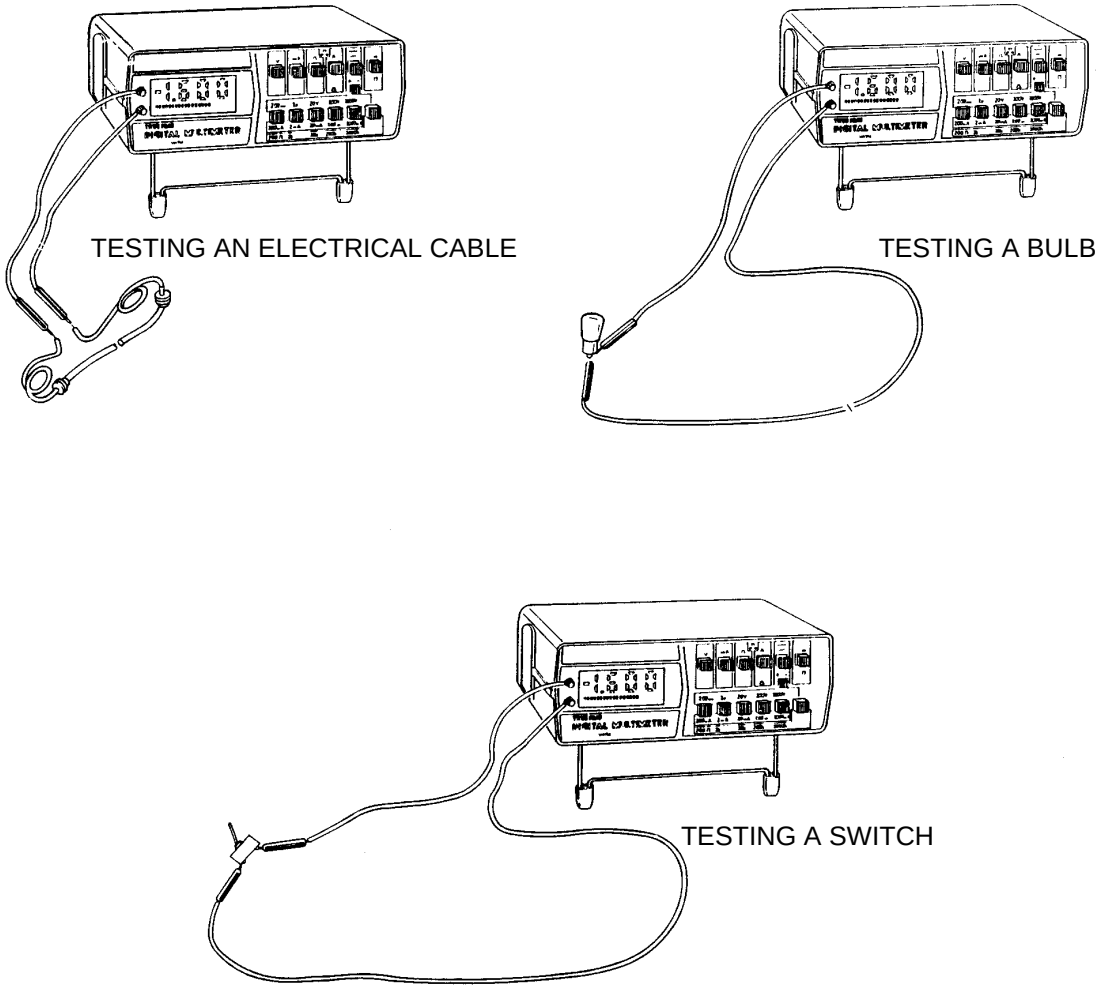
(1) Zero multimeter.

(2) Connect black and red probes (49 and 50) from both terminals to circuit being tested.

(3) Read digital readout (42) and interpret results as follows:

(a) If digital readout indicates 0 (zero), circuit has continuity.

(b) If digital readout indicates resistance, circuit is open.

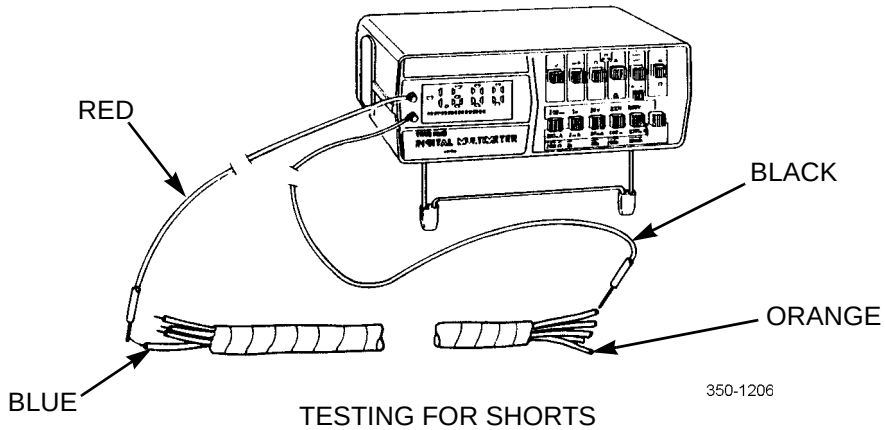


MULTIMETER USAGE - CONTINUED

CAUTION

Before performing a continuity test, always turn master battery switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

c. **Testing for Shorts**. A short (or short circuit) occurs when two circuits that should not be connected have metal-to-metal contact with each other. A short also occurs when a circuit that should not touch ground has metal-to-metal contact with ground.



TESTING FOR SHORTS

(1) Zero multimeter.

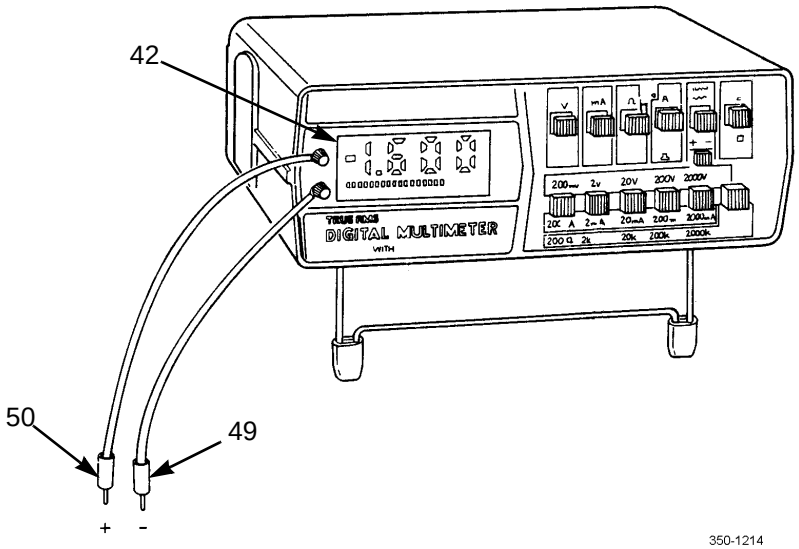
(2) Connect black probe (49) to one circuit and red probe (50) to either a ground or another circuit.

(3) Read digital readout (42) and interpret results as follows:

(a) If digital readout indicates 0 (zero), circuits are shorted or circuit is grounded if testing to ground.

(b) If digital readout does not indicate 0 (zero), circuits are not shorted.

(c) If digital readout jumps or flickers, circuits are shorted or grounded intermittently.



MULTIMETER USAGE - CONTINUED

CAUTION

Before performing a continuity test, always turn master battery switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

d. **Testing for Resistance**. Allowable resistance readings depend on circuit being tested. Refer to the particular section dealing with that circuit or component for allowable readings.

(1) Zero multimeter.

(2) Press OHMS FUNCTION switch (44).

(3) Press LOWEST VOLTAGE/OHMS selector switch (48). If test calls for Ohms range other than RX1, set RANGE SELECTOR switch (47) to required range.

(4) Connect black and red probes (49 and 50) across circuit to be tested.

(5) Read digital readout (42) and interpret results as circuit resistance.

3. **Measuring DC Voltage**.

a. Set multimeter ON/OFF switch (46) to ON position.

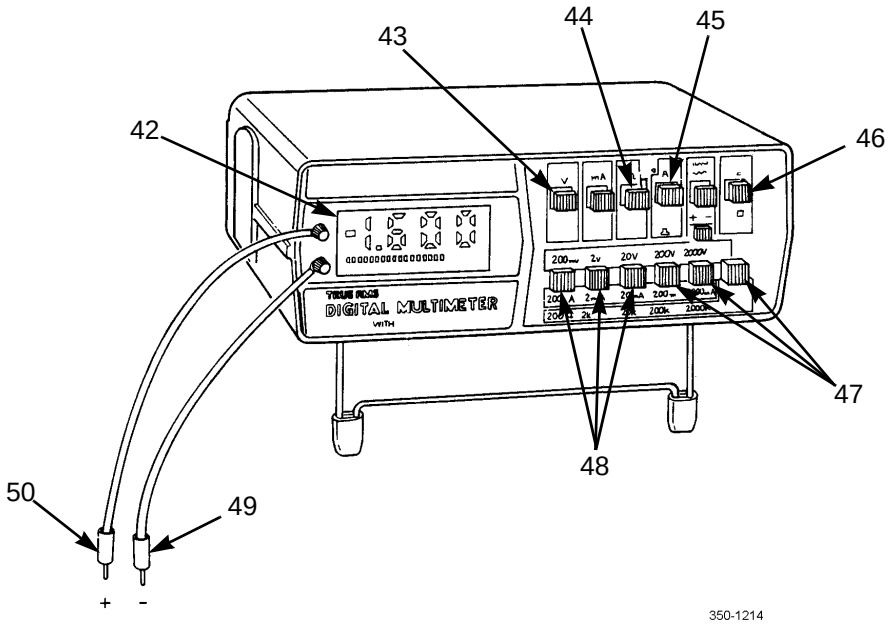
b. Press VOLTS FUNCTION switch (43).

c. Set AC/DC selector switch (45) to DC.

d. Select and press LOWEST VOLTAGE/OHMS selector switch (48) for voltage range higher than Volts to be measured.

e. Connect red probe (50) to positive (+) side of circuit and black probe (49) to negative (-) side of circuit.

f. Read digital readout (42) and interpret results as DC voltage in circuit being tested.



RELAY INSPECTION AND TEST

1. **Inspecting Relays.**
   a. Check for bent or damaged pins.
   b. Check for burned or damaged relay case.
2. **Testing Relays.**

NOTE

When testing relays, always refer to the circuit diagram printed or stamped on relay case.

   a. Using a multimeter, check for continuity across relay coil.
   b. Using a multimeter, check open or closed contacts within relay.

END OF WORK PACKAGE

TRANSMISSION AND ACCESSORY CONTROL LEVERS REPLACEMENT 0114 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

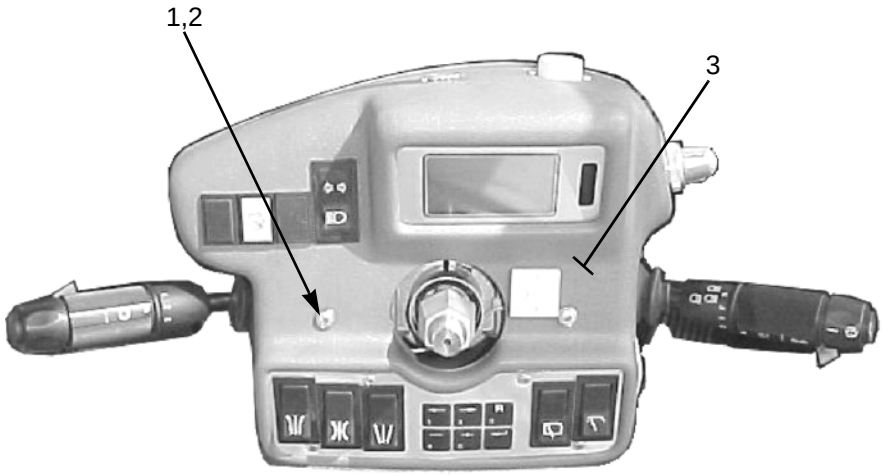
Equipment Condition

Steering wheel removed (WP 0131 00)

Master battery switch in OFF position

REMOVAL

1. Remove eight screws (1) and washers (2) and separate two halves of plastic housing (3).



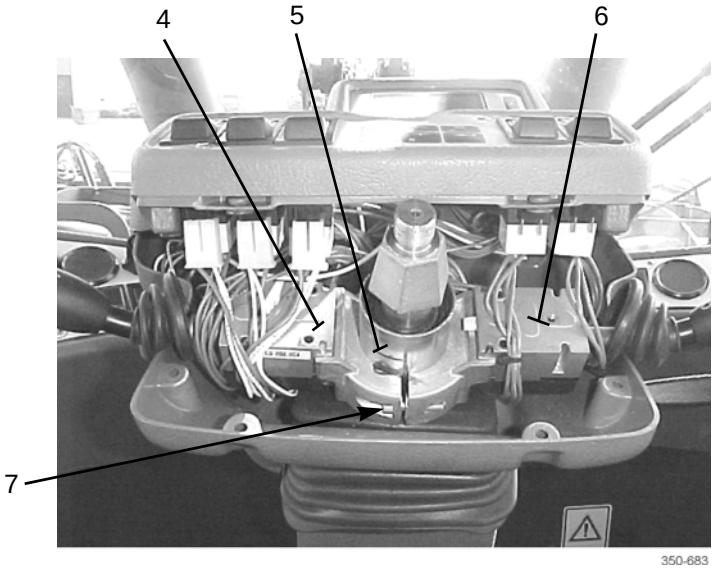
350-006

REMOVAL - CONTINUED

NOTE

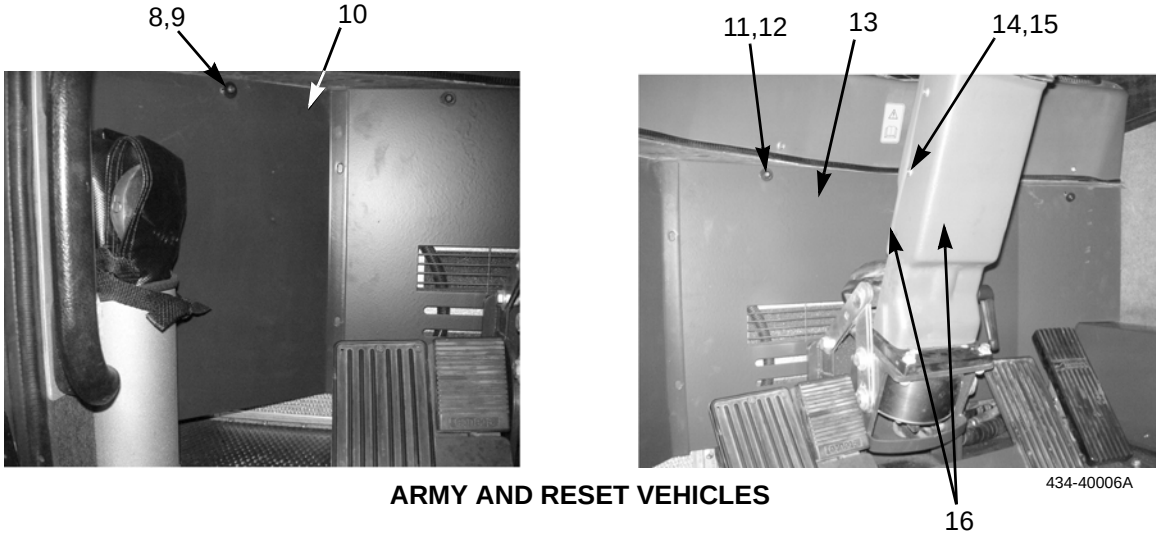
Mark position of transmission control lever and accessory control lever on steering column for installation.

2. Remove two screws (7) to free transmission control lever (4) and accessory control lever (6) from steering column (5).

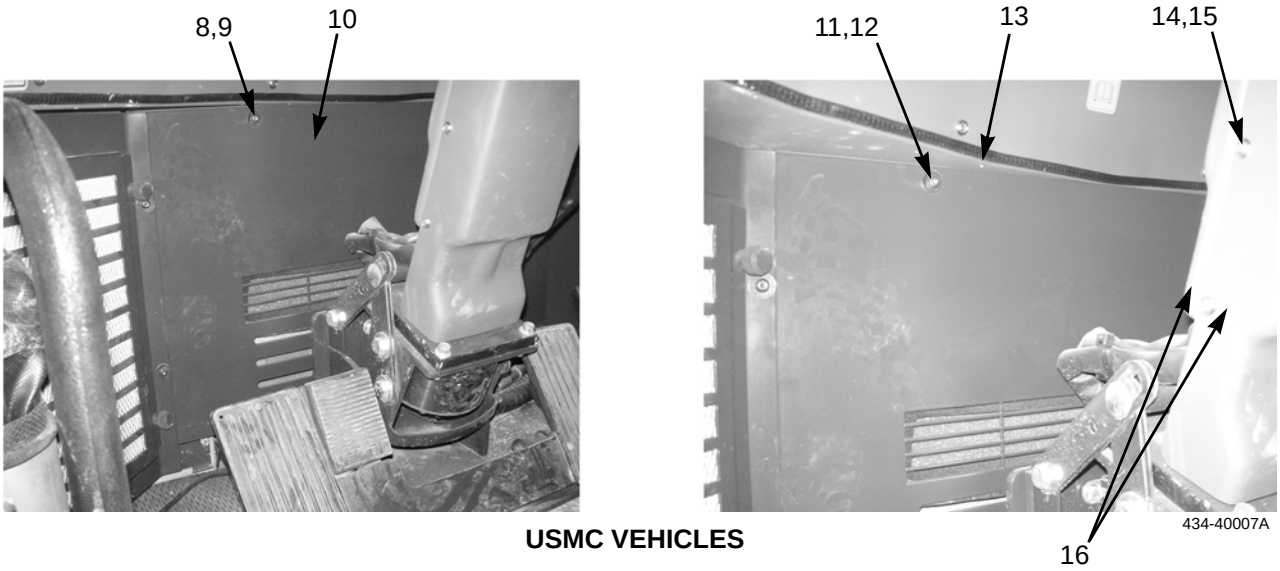


REMOVAL - CONTINUED

3. Remove seven screws (14), washers (15), and two halves of steering column housing (16).
4. Remove three screws (8), washers (9), and left lower panel (10).
5. Remove three screws (11), washers (12), and right lower panel (13).



ARMY AND RESET VEHICLES



USMC VEHICLES

REMOVAL - CONTINUED

NOTE

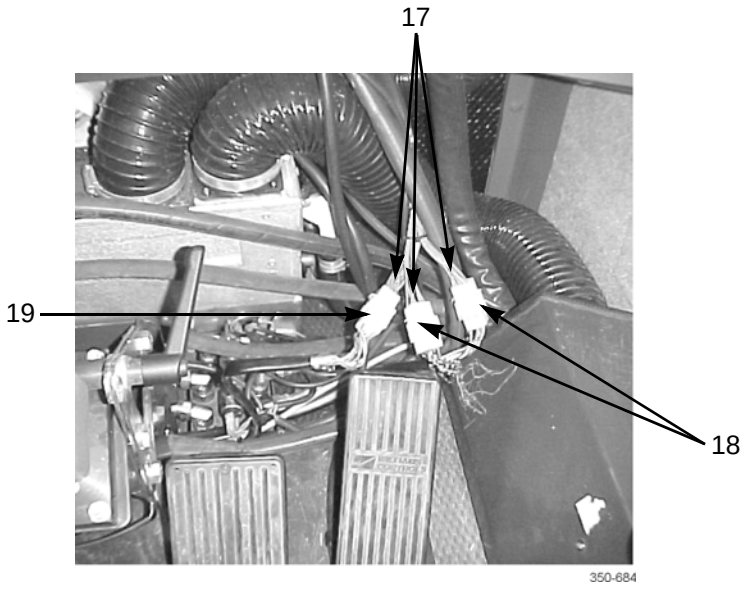
- **Perform steps 6 and 7 to remove transmission control lever.**
- **Remove and discard tiedown straps as necessary.**

6. Disconnect connector (19) of transmission control lever (4) from instrument panel wiring harness (17).
7. Remove transmission control lever (4) from steering column (5).

NOTE

- **Perform steps 8 and 9 to remove accessory control lever.**
- **Remove and discard tiedown straps as necessary.**

8. Disconnect two connectors (18) of accessory control lever (6) from instrument panel wiring harness (17).
9. Remove accessory control lever (6) from steering column (5).



INSTALLATION

NOTE

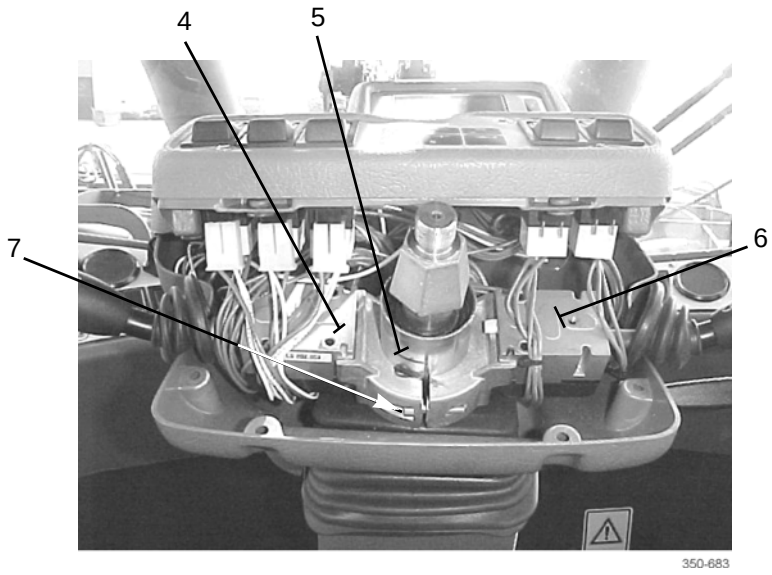
- **Perform steps 1 and 2 to install accessory control lever.**
- **Install new tiedown straps as necessary.**
- **Control lever bracket should be positioned 3/4-in. (20 mm) from bracket to top edge of column tube to which it secures.**

1. Install accessory control lever (6) on steering column (5).
2. Connect two connectors (18) of accessory control lever (6) to instrument panel wiring harness (17).

NOTE

- **Perform steps 3 and 4 to install transmission control lever.**
- **Install new tiedown straps as necessary.**
- **Control lever bracket should be positioned 3/4-in. (20 mm) from bracket to top edge of column tube to which it secures.**

3. Install transmission control lever (4) and accessory control lever (6) on steering column (5), in position marked, with two screws (7). Tighten screws.



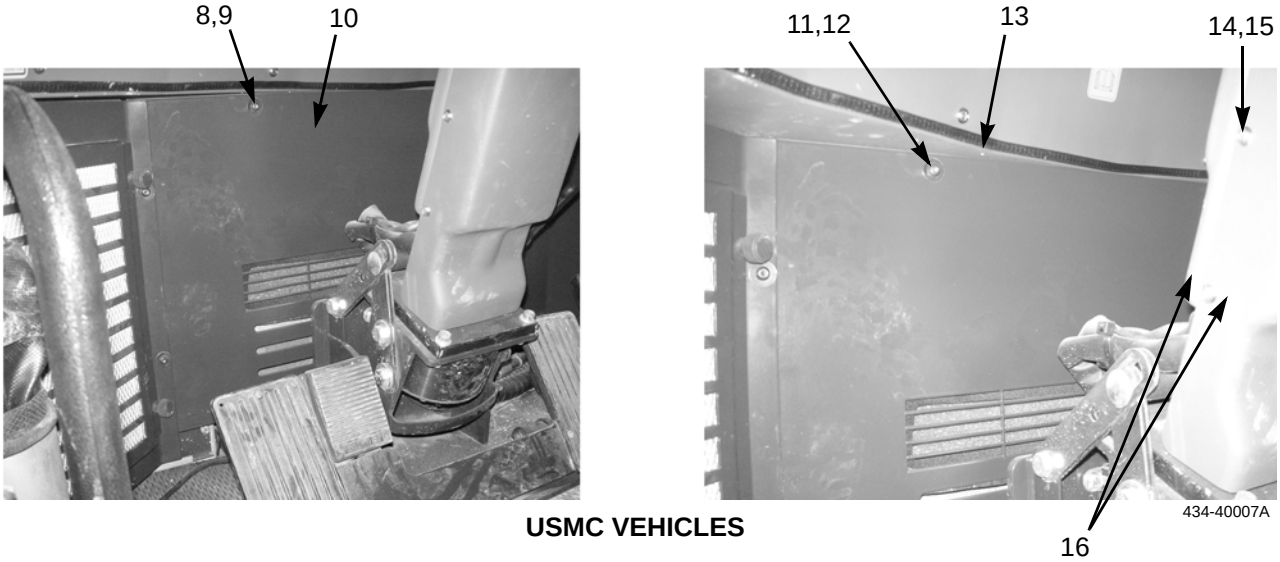
4. Connect connector (19) of transmission control lever (4) to instrument panel wiring harness (17).

INSTALLATION - CONTINUED

5. Install right lower panel (8) with three screws (9) and washers (10).
6. Install left lower panel (11) with three screws (12) and washers (13).



ARMY AND RESET VEHICLES



USMC VEHICLES

INSTALLATION - CONTINUED

7. Install two halves of steering column housing (16) with seven washers (15) and screws (14).
8. Install two halves of plastic housing (3) together with eight washers (2) and screws (1).



350-006

9. Install steering wheel (WP 0131 00).

END OF WORK PACKAGE

TRANSMISSION OIL FILTER AND OIL COOLER HOSES AND FITTINGS REPLACEMENT 0115 00

THIS WORK PACKAGE COVERS

Transmission-to-Oil Cooler Hoses: Removal, Installation

Transmission-to-Oil Filter Hoses: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Pipe (Item 33, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 920798.0002) (2)

References

WP 0050 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Engine cover removed (WP 0148 00)

Transmission access covers removed (WP 0142 00)

TRANSMISSION-TO-OIL COOLER HOSES REMOVAL



WARNING

At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.

NOTE

Tag all transmission hydraulic oil hoses.

TRANSMISSION OIL FILTER AND OIL COOLER HOSES AND FITTINGS REPLACEMENT - CONTINUED **0115 00**

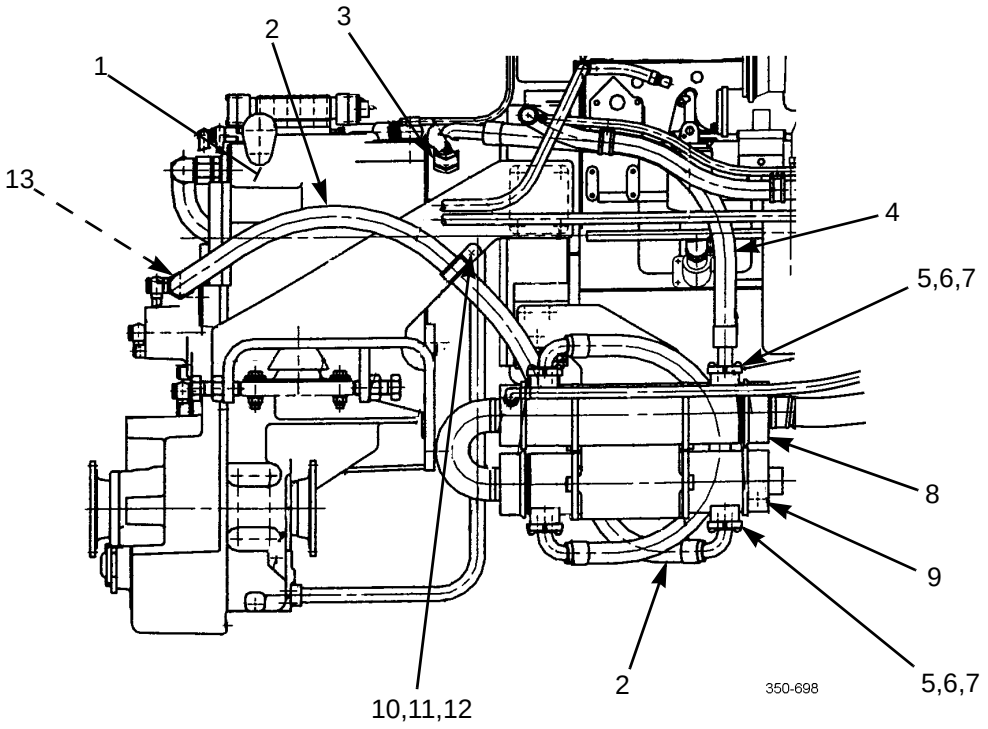
TRANSMISSION-TO-OIL COOLER HOSES REMOVAL - CONTINUED

1. Trace and tag hose (4) from transmission oil cooler upper unit (8) to transmission (1).
2. Trace and tag hose (2) from transmission oil cooler lower unit (9) to transmission (1).

WARNING

Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

3. Position suitable container to catch lubricating oil remaining in hoses (2 and 4).
4. Remove four screws (5), flange (6), O-ring seal (7), and disconnect hose (4) from transmission oil cooler upper unit (8). Discard O-ring seal.
5. Disconnect opposite end of hose (4) from transmission adapter fitting (3). Remove hose.
6. If damaged, remove adapter fitting (3) from transmission (1).
7. Remove four screws (5), flange (6), O-ring seal (7), and disconnect hose (2) from transmission oil cooler lower unit (9). Discard O-ring seal.
8. Remove screw (10), washers (11), and hose clamp (12) securing hose (2).
9. Disconnect opposite end of hose (2) from transmission adapter fitting (13). Remove hose.
10. If damaged, remove adapter fitting (13) from transmission (1).



TRANSMISSION-TO-OIL COOLER HOSES INSTALLATION

1. If removed, apply pipe sealant to threads of adapter fitting (13) and install fitting in transmission (1).
2. Connect hose (2) to adapter fitting (13) and route hose to transmission oil cooler lower unit (9).
3. Secure hose (2) to transmission oil cooler lower unit (9) with new O-ring seal (7), flange (6), and four screws (5).
4. Install hose clamp (12), screw (10), and washers (11) on hose (2).
5. If removed, apply pipe sealant to adapter fitting (3) and install fitting in transmission (1).
6. Connect hose (4) to adapter fitting (3) and route hose to transmission oil cooler upper unit (8).
7. Secure hose (4) to transmission oil cooler upper unit (8) with new O-ring seal (7), flange (6), and four screws (5).
8. Check transmission oil level and add oil as needed (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.
10. Install transmission access covers (WP 0142 00).
11. Install engine cover (WP 0148 00).
12. Return cab to operational position (TM 10-3930-675-10).

TRANSMISSION-TO-OIL FILTER HOSES REMOVAL



WARNING

At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.

NOTE

Tag all transmission hydraulic oil hoses.

TRANSMISSION OIL FILTER AND OIL COOLER HOSES AND FITTINGS REPLACEMENT - CONTINUED **0115 00**

TRANSMISSION-TO-OIL FILTER HOSES REMOVAL - CONTINUED

1. Trace and tag three hoses (14, 16, and 17) from transmission oil filter head (22) to transmission (1).
2. Cut tiedown straps as needed to release hoses (14, 16, and 17).
3. Remove screw (19), nut (20), washer (21), and two clamps (18) from hoses (14 and 16).

WARNING

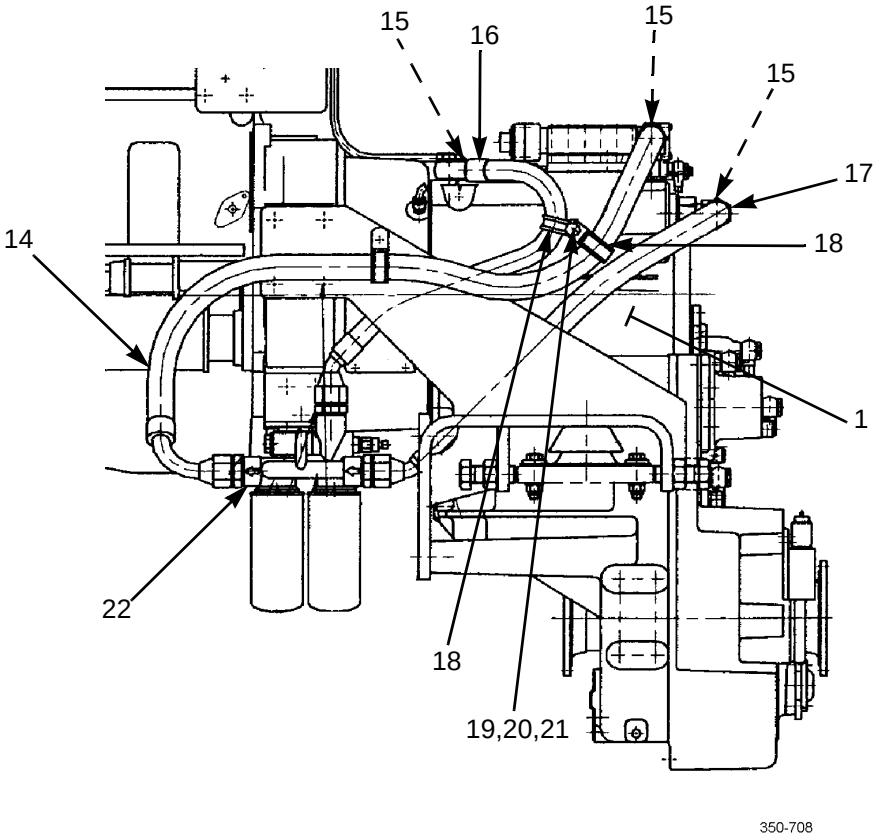
Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

4. Position suitable container to catch lubricating oil contained in hoses (14, 16, and 17).

NOTE

Note hose routing when removing hoses to aid in installation of hoses.

5. Disconnect hoses (14, 16, and 17) from transmission oil filter head (22).
6. Disconnect opposite ends of hoses (14, 16, and 17) from three adapter fittings (15). Remove hoses.
7. If damaged, remove adapter fittings (15) from transmission (1).



TRANSMISSION-TO-OIL FILTER HOSES INSTALLATION

1. If removed, apply pipe sealant to threads of adapter fittings (15) and install fittings in transmission (1).
2. Connect hoses (14, 16, and 17) to three adapter fittings (15).
3. Route hoses (14, 16, and 17) as noted in removal and connect opposite ends of hoses to transmission oil filter head (22).
4. Install two hose clamps (18), screw (19), washer (21), and nut (20) on hoses (14 and 16).
5. Check transmission oil level and add oil as needed (WP 0050 00).
6. Start engine (TM 10-3930-675-10) and check for leaks.
7. Install transmission access covers (WP 0142 00).
8. Install engine cover (WP 0148 00).
9. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

TRANSMISSION ASSEMBLY HYDRAULIC HOSES AND PIPES REPLACEMENT 0116 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Seal, O-ring (P/N 0634 304 523)

Seal, O-ring (P/N 0634 306 202) (7)

Seal, O-ring (P/N 0634 306 522)

Materials/Parts - Continued

Seal, O-ring (P/N 0634 306 523) (12)

Seal, O-ring (P/N 0634 801 074) (4)

Seal, O-ring (P/N 0634 801 151) (8)

References

WP 0050 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

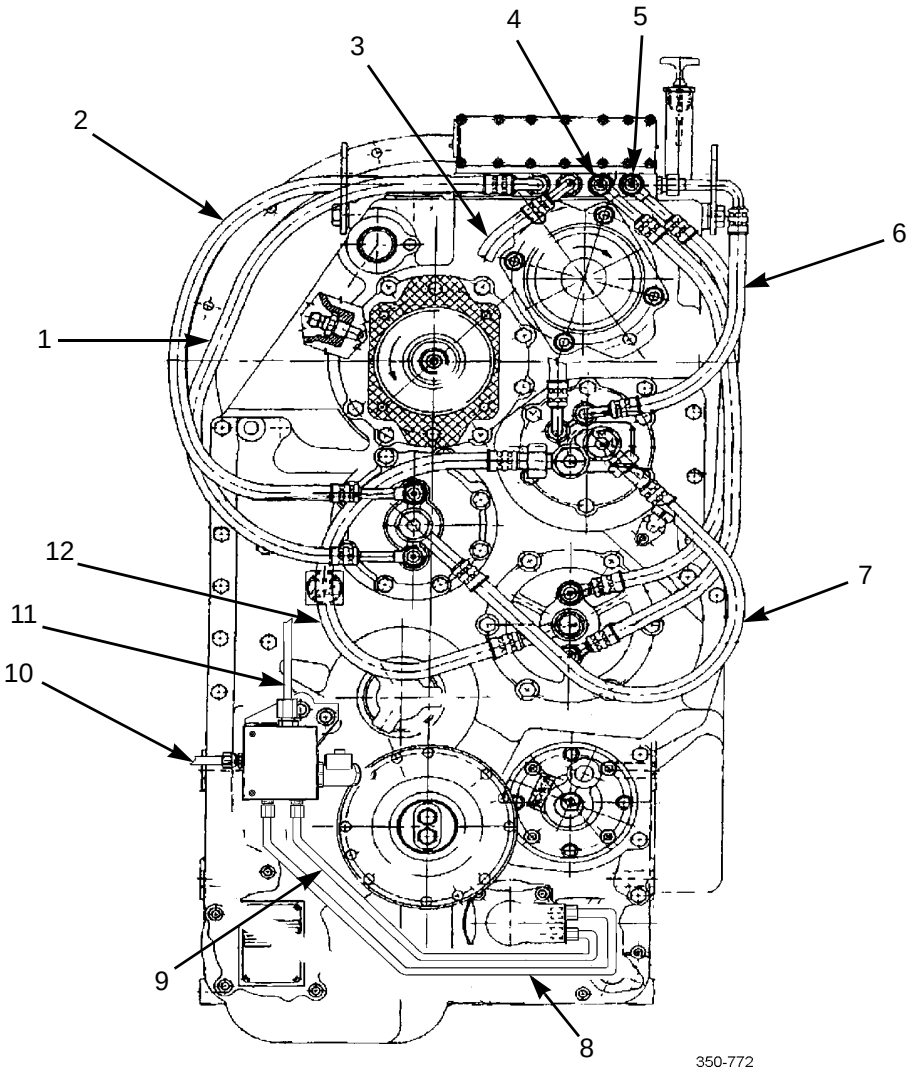
Transmission access covers removed (WP 0142 00)

NOTE

- **Hydraulic hoses and pipes are used to interconnect transmission clutches, valve body, and other internal components of transmission. A location diagram is provided to aid in locating and routing hydraulic hoses and pipes.**
- **Four basic types of hydraulic hoses and one type of pipe are used on transmission assembly. An identification chart is provided to aid in identifying type of hose and connections.**
- **The following procedures detail replacement of hoses and pipes.**

REMOVAL

1. Refer to location diagram and find hydraulic hose or pipe to be removed.



TRANSMISSION ASSEMBLY HOSE AND PIPE LOCATION DIAGRAM

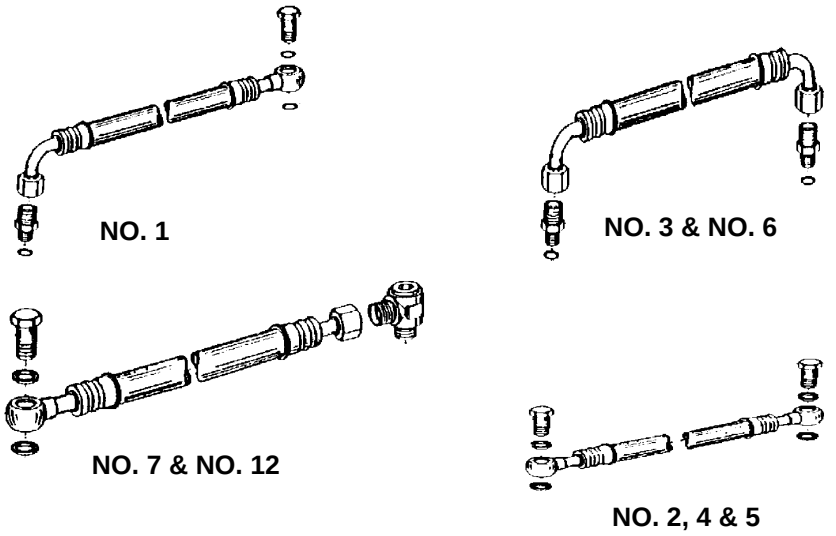
2. Remove and discard tiedown straps, as needed, to release hydraulic hose.

NOTE

Remove adapter fitting and O-ring seal only if damaged or leaking.

3. Position suitable container to catch hydraulic oil retained in hose or pipe and disconnect hose or pipe from adapter fitting.
4. Remove fluid passage bolt, hose connection, and two O-ring seals from transmission. Discard O-rings.
5. Loosen each of two fitting nuts and remove pipe (8, 9, 10, or 11) from transmission.

REMOVAL - CONTINUED



TRANSMISSION ASSEMBLY HOSE AND PIPE LOCATION DIAGRAM

350-773

INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and pipes and applying proper torque.**
- **If adapter fitting and O-ring seal have been removed, perform steps 1 and 2. If not, proceed to step 3.**

1. Apply lubricating oil to new O-ring seal and install on adapter fitting.
2. Install adapter fitting on transmission.
3. Connect hose to adapter fitting and route hose to opposite end as indicated on location diagram.
4. Apply lubricating oil to two new O-rings.
5. Install hose connection and two O-rings on transmission and secure with fluid passage bolt.
6. Secure hydraulic hose with new tiedown straps as needed.
7. Position pipe (8, 9, 10, or 11) on transmission and tighten each of two fitting nuts.
8. Operate vehicle and check for leaks (TM 10-3930-675-10).
9. Replace transmission access covers (WP 0142 00).
10. Return cab to operational position (TM 10-3930-675-10).
11. Check transmission oil level and add as needed (WP 0050 00).

END OF WORK PACKAGE

TRANSMISSION OIL, OIL FILTERS, AND OIL FILTER HEAD REPLACEMENT 0117 00

THIS WORK PACKAGE COVERS

Transmission Oil: Draining, Filling

Transmission Oil Filters: Removal, Installation

Transmission Oil Filter Head: Removal, Installation

Transmission Internal Coarse Oil Filter: Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Oil Filter (Item 138, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Materials/Parts

Compound, Gasket Forming, Silicone (Item 10, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Sealant, Pipe (Item 33, WP 0290 00)

O-ring (P/N 0634 303 719)

Filter, Transmission Oil (P/N 923828.0610)

Filter, Internal, Coarse (P/N 923899.0289)

References

TM 10-3930-675-10

WP 0142 00

WP 0225 00

Equipment Condition

Vehicle parked on level surface

Master battery switch in OFF position

TRANSMISSION OIL DRAINING



WARNING

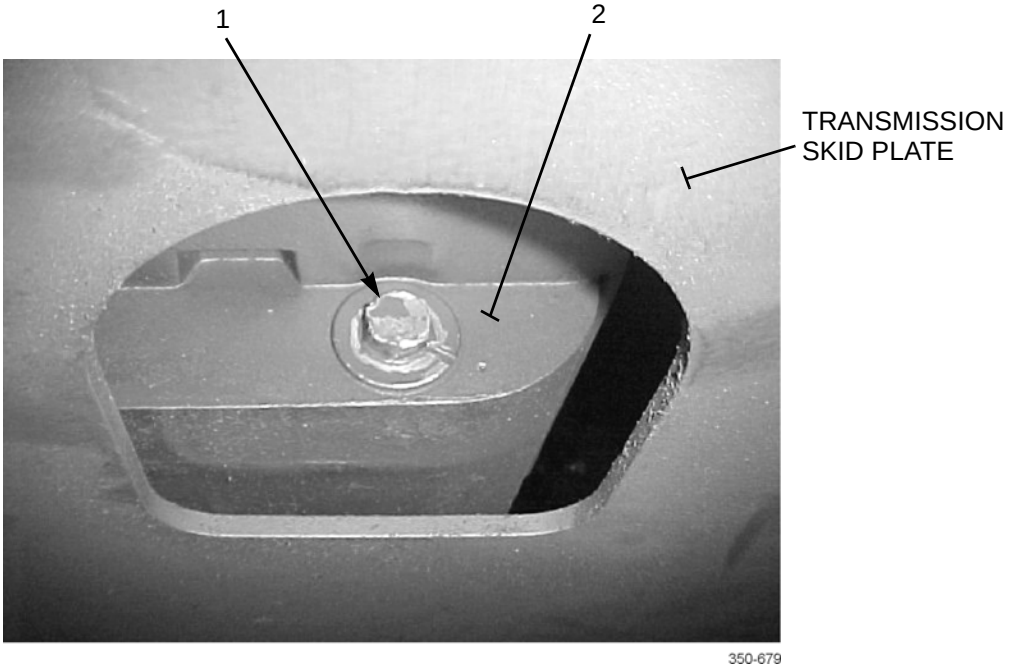
At operating temperature, transmission oil is hot. Allow transmission to cool before draining. Failure to do so could result in injury to personnel.

NOTE

- **Transmission capacity is approximately 36 qt (34 L) with filter.**
- **Dispose of old transmission oil in accordance with local policy.**

TRANSMISSION OIL DRAINING - CONTINUED

1. Position a suitable container under transmission.
2. Remove plug (1) from transmission (2) and allow oil to drain into container.



TRANSMISSION OIL FILLING

1. Apply pipe sealant to threads of plug (1) and install plug in transmission (2).
2. Fill transmission with oil (TM 10-3930-675-10).
3. Start engine (TM 10-3930-675-10) and check for leaks.
4. Check transmission oil level with engine idling in neutral and parking brake applied after engine reaches operating temperature (TM 10-3930-675-10).
5. Shut down engine and check transmission oil level (TM 10-3930-675-10). Add oil as necessary to obtain proper level.
6. Perform transmission calibration (WP 0225 00).

TRANSMISSION OIL FILTERS REMOVAL



WARNING

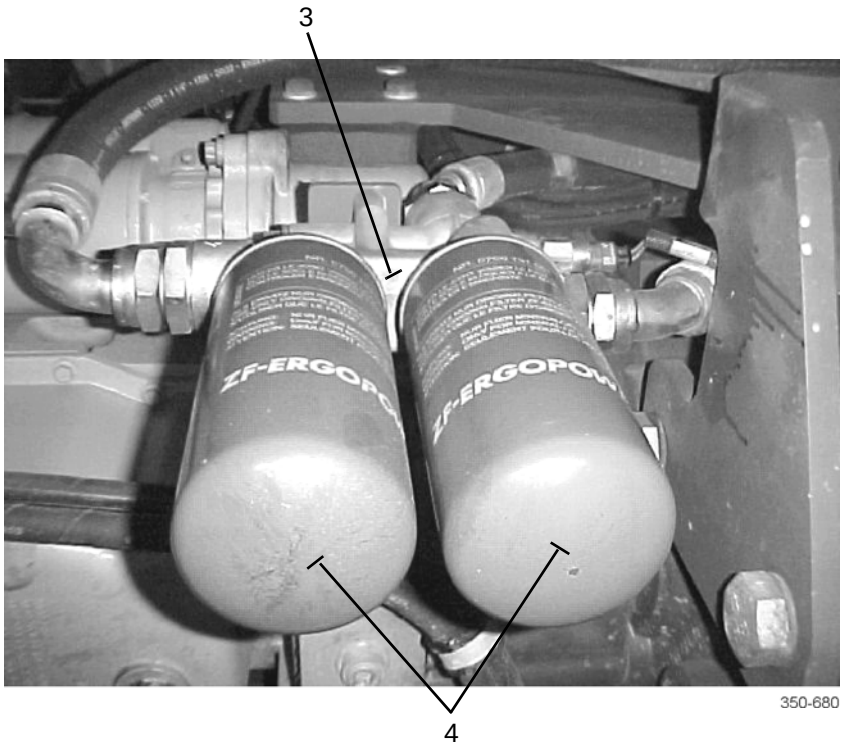
At operating temperature, transmission oil is hot. Allow transmission to cool before performing maintenance on transmission or transmission system components. Failure to do so could result in injury to personnel.

NOTE

Ensure suitable container is placed under oil filters. Filters will contain transmission oil and can spill.

TRANSMISSION OIL FILTERS REMOVAL - CONTINUED

1. Use a strap wrench to loosen oil filter (4).
2. Unscrew oil filter (4) from oil filter head (3) by hand. Discard filter.
3. Repeat steps 1 and 2 for second oil filter (4).



TRANSMISSION OIL FILTERS INSTALLATION

NOTE

Ensure oil filter head is clean and free of old oil.

1. Apply a thin coat of lubricating oil to filter seal.
2. Fill new oil filter (4) with clean lubricating oil.

CAUTION

DO NOT overtighten oil filter. Overtightening filter may cause damage to filter or filter head which will result in oil leaks.

3. Install oil filter (4) on oil filter head (3) and hand tighten.
4. Use strap wrench to tighten oil filter (4) an additional ½ to ¾ turn.
5. Repeat steps 1 thru 4 for second oil filter (4).
6. Start engine (TM 10-3930-675-10) and check for leaks.
7. Check transmission oil level with engine idling in neutral and parking brake applied after engine reaches operating temperature (TM 10-3920-675-10). Add oil as needed.

TRANSMISSION OIL FILTER HEAD REMOVAL



WARNING

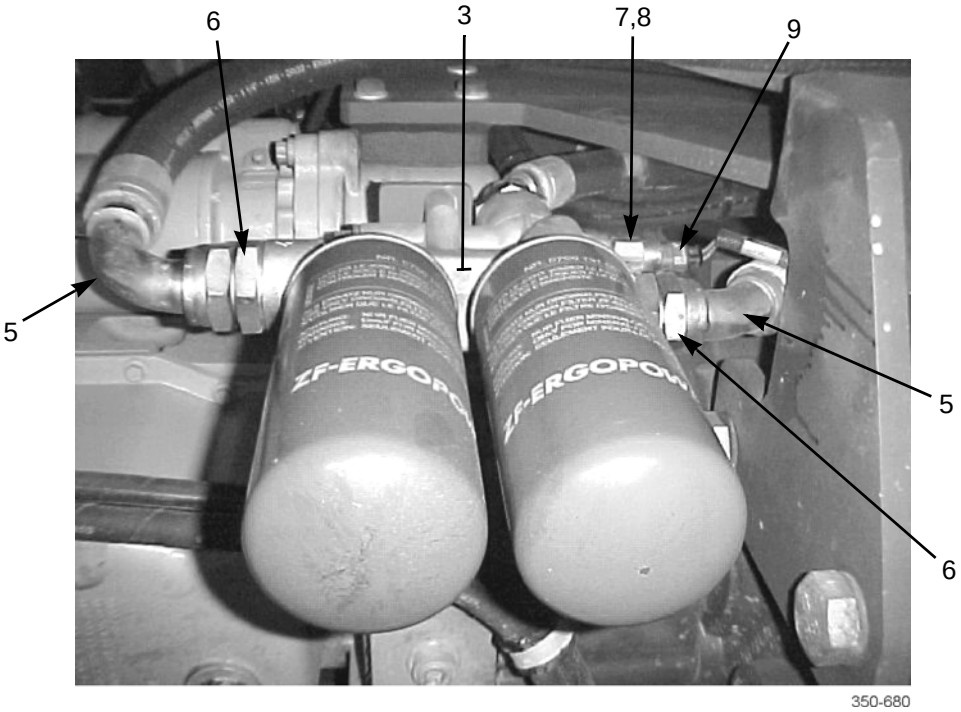
At operating temperature, transmission oil is hot. Allow transmission to cool before performing maintenance on transmission or transmission system components. Failure to do so could result in injury to personnel.

1. Remove two oil filters from oil filter head (refer to *Transmission Oil Filters Removal*).

NOTE

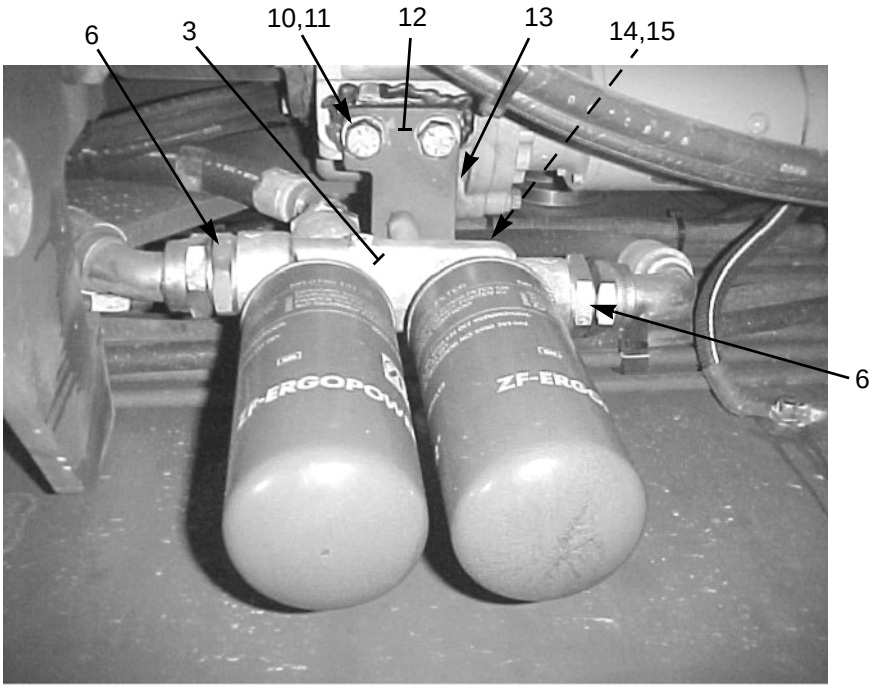
Tag hoses to ensure correct installation.

2. Disconnect two hoses (5) from filter head fittings (6).
3. Disconnect connector (9) from oil filter sensor (8).
4. Remove oil filter sensor (8) and O-ring (7) from oil filter head (3).



5. Remove two screws (10) and washers (11) securing bracket (12) with oil filter head (3) to flywheel housing (13).
6. Remove bracket (12) with oil filter head (3).
7. Remove two screws (14), washers (15), and oil filter head (3) from bracket (12).
8. Remove two fittings (6) from oil filter head (3).

TRANSMISSION OIL FILTER HEAD REMOVAL - CONTINUED



TRANSMISSION OIL FILTER HEAD INSTALLATION

1. Apply pipe sealant to threads of two fittings (6) and install in oil filter head (3).
2. Position bracket (12) on oil filter head (3) and secure with two screws (14) and washers (15).

NOTE

Ensure mounting surface of flywheel housing is clean and free of old gasket forming compound.

3. Apply gasket forming compound to mounting surface on flywheel housing (13) and install bracket (12) with oil filter head (3) on flywheel housing with two screws (10) and washers (11).
4. Install O-ring (7) and oil filter sensor (8) to oil filter head (3).
5. Connect connector (9) to oil filter sensor (8).
6. Connect two hoses (5) to fittings (6).
7. Install two oil filters to oil filter head (refer to *Transmission Oil Filters Installation*).
8. Operate vehicle (TM 10-3930-675-10) and check for leaks.
9. Check transmission oil level with engine idling in neutral and parking brake applied after engine reaches operating temperature (TM 10-3930-675-10). Add oil as needed.

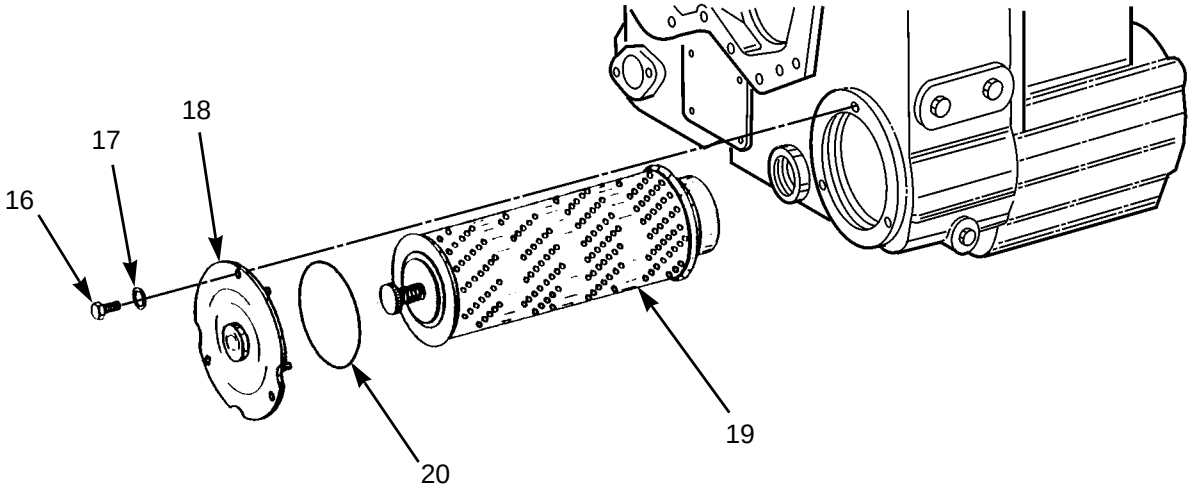
TRANSMISSION INTERNAL COARSE OIL FILTER REMOVAL

1. Remove transmission skid plate (WP 0142 00).
2. Drain transmission oil (refer to *Transmission Oil Draining*).

CAUTION

Ensure no dirt or oil sludge enters transmission. Failure to comply may cause equipment damage.

3. Remove three screws (16), washers (17), and cover (18). Remove and discard O-ring (20) from cover.
4. Remove internal coarse oil filter (19) from transmission.



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TRANSMISSION INTERNAL COARSE OIL FILTER CLEANING AND INSPECTION



WARNING

- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. Do not use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

1. Use solvent to clean internal coarse oil filter.
2. Dry internal coarse oil filter with compressed air.
3. Inspect filter for damage. If not damaged, filter may be reused.

TRANSMISSION INTERNAL COARSE OIL FILTER INSTALLATION

1. Install new O-ring (20) in cover (18).
2. Coat gasket sealing surface of oil filter (19) with lubricating oil and install in transmission.
3. Screw in oil filter (19) by hand until contact with sealing surface is obtained. Tighten by hand an additional 1/3 to 1/2 turn.
4. Install cover (18) with three washers (17) and screws (16). Tighten screws to 203 lb-in. (23 Nm).
5. Fill transmission with oil (TM 10-3930-675-10).
6. Start engine and check for leaks (TM 10-3930-675-10).
7. Check transmission oil level with engine idling in neutral and parking brake applied after engine reaches operating temperature (TM 10-3930-675-10).

END OF WORK PACKAGE

TRANSMISSION OIL DIPSTICK HOSE AND PIPE REPLACEMENT 0118 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Nut, x (P/N 920076.003)

Materials/Parts - Continued

Seal (P/N 923899.0292)

Equipment Condition

Engine cover removed (WP 0148 00)

Cab moved to the left, but not lowered (TM 10-3930-675-10)

Transmission oil drained, if replacing pipe (WP 0117 00)

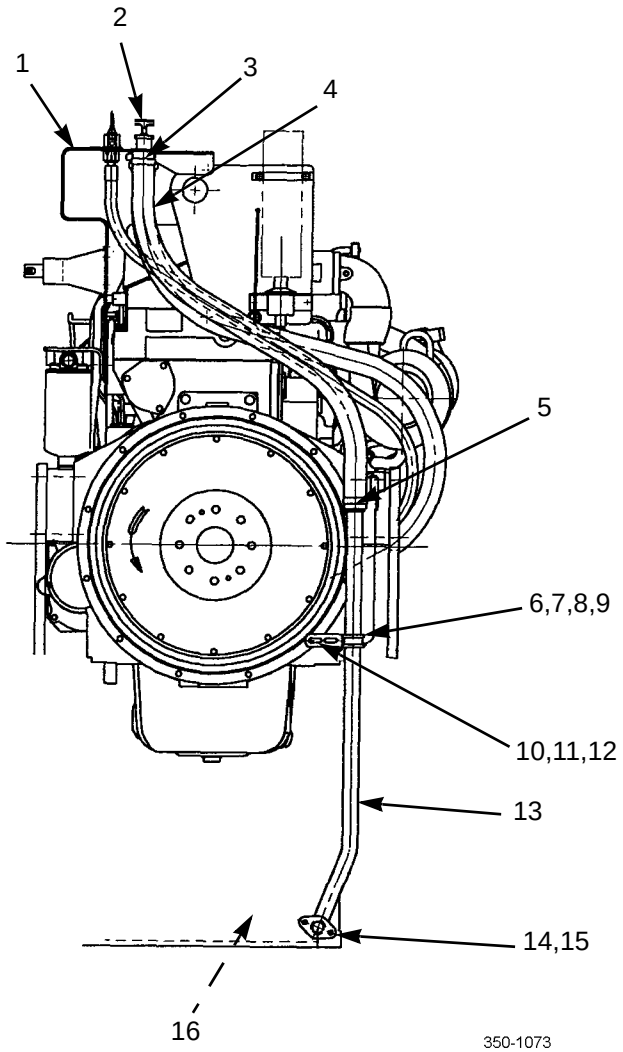
NOTE

Transmission oil dipstick hose and engine oil dipstick hose are at same location. Transmission oil dipstick is indicated by a data plate with a transmission symbol.

TRANSMISSION OIL DIPSTICK HOSE AND PIPE REPLACEMENT - CONTINUED 0118 00

REMOVAL

1. Remove transmission dipstick (2) from transmission oil dipstick hose (4).
2. Loosen hose clamp (3) and disconnect hose (4) from bracket (1). Remove hose clamp from hose.
3. At other end of hose (4), loosen hose clamp (5) and remove hose from pipe (13). Remove hose clamp from hose.
4. From underneath vehicle, remove locknut (6), two washers (7), screw (8), and clamp (9) from bracket (10). Remove clamp from pipe (13).
5. Remove screw (11), washer (12), and bracket (10) from transmission (16).
6. Remove two screws (14), pipe (13), and seal (15) from transmission (16). Discard seal.



INSTALLATION

1. Install new seal (15) and pipe (13) on transmission (16) with two screws (14).
2. Install bracket (10) on transmission (16) with washers (12) and screw (11). Tighten screw to 38 lb-ft (52 Nm).
3. Position clamp (9) on pipe (13) and install clamp on bracket (10) with screw (8), two washers (7), and new locknut (6).

INSTALLATION - CONTINUED

4. From top of vehicle, position hose clamp (5) on transmission oil dipstick hose (4) and install hose on pipe (13). Tighten hose clamp.
5. At other end of hose (4), position hose clamp (3) on hose and connect hose to bracket (1). Tighten hose clamp.
6. Install transmission dipstick (2) on transmission oil dipstick hose (4).
7. If drained, fill transmission oil (WP 0117 00).
8. Install engine cover (WP 0148 00).
9. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

TRANSMISSION AND FRONT AND REAR AXLE VENT HOSES REPLACEMENT 0119 00

THIS WORK PACKAGE COVERS

Front Axle Vent Hose: Removal, Installation

Rear Axle Vent Hose: Removal, Installation

Transmission Vent Hose: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Compound, Sealing (Item 12, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 920076.001) (1) (transmission vent hose)

Nut, lock (P/N 920076.002) (1) (front axle vent hose)

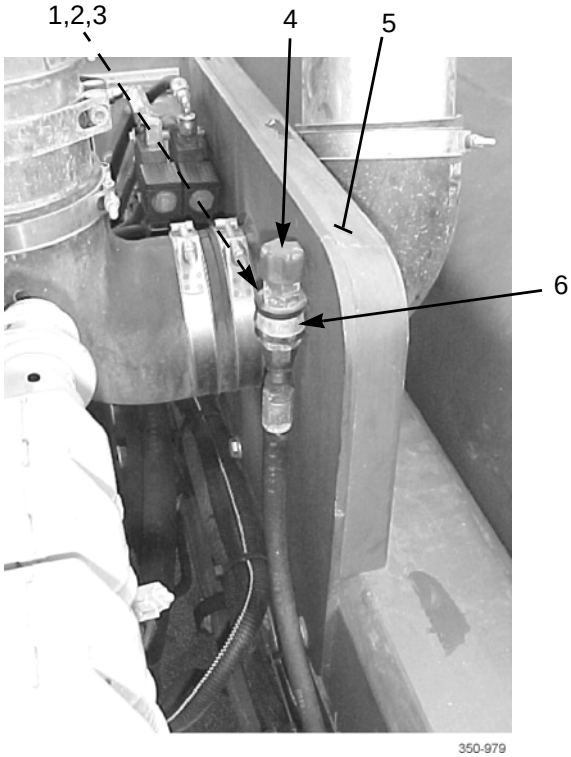
References

WP 0142 00

WP 0148 00

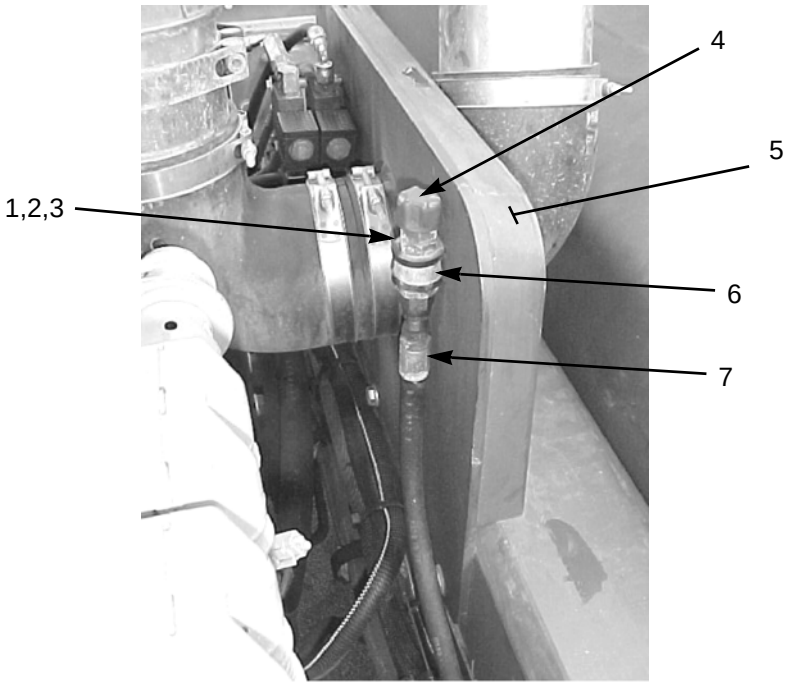
FRONT AXLE VENT HOSE REMOVAL

1. Remove engine cover (WP 0148 00).
2. Remove locknut (1), two washers (2), screw (3), and clamp (6) holding front axle vent (4) to plate (5). Discard locknut.

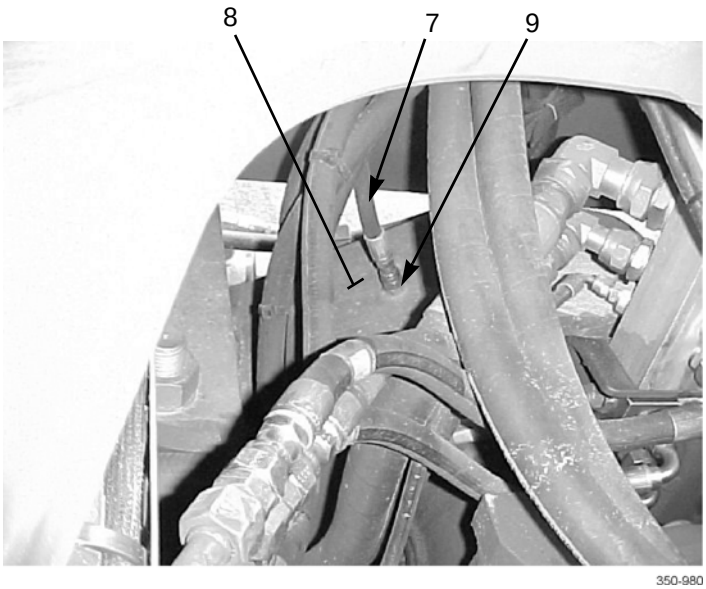


FRONT AXLE VENT HOSE REMOVAL - CONTINUED

3. Remove clamp (6) from front axle vent (4).
4. Remove front axle vent (4) from vent hose (7).



5. At top-left of front axle (8), disconnect other end of vent hose (7) from adapter (9).
6. Remove adapter (9) from front axle (8).
7. Remove tiedown straps as necessary and remove front axle vent hose (7) from vehicle. Discard tiedown straps.

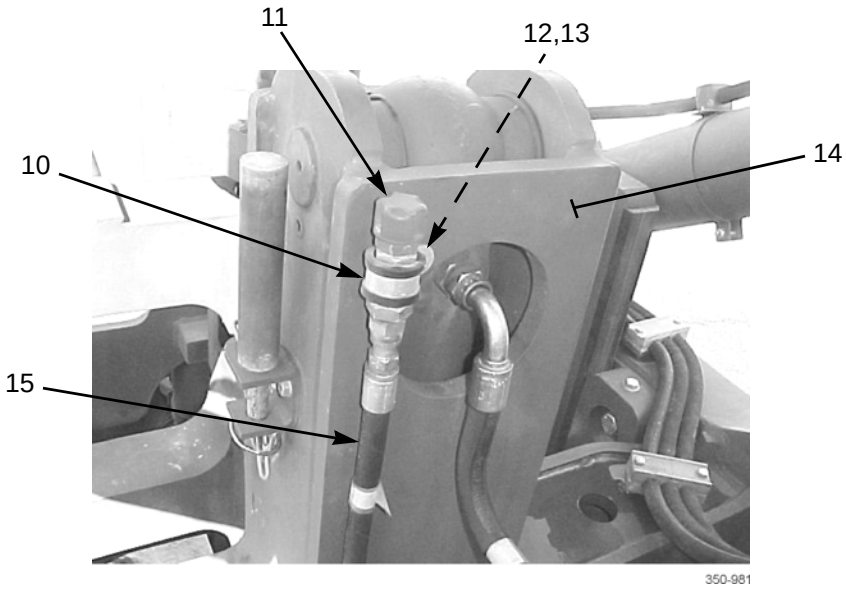


FRONT AXLE VENT HOSE INSTALLATION

1. Position front axle vent hose (7) on vehicle.
2. Apply sealing compound to threads of adapter (9) and install adapter in front axle (8).
3. Connect end of vent hose (7) to adapter (9).
4. At other end of vent hose (7), install front axle vent (4).
5. Install clamp (6) around front axle vent (4).
6. Install clamp (6) on plate (5) with screw (3), two washers (2), and new locknut (1).
7. Install new tiedown straps.
8. Install engine cover (WP 0148 00).

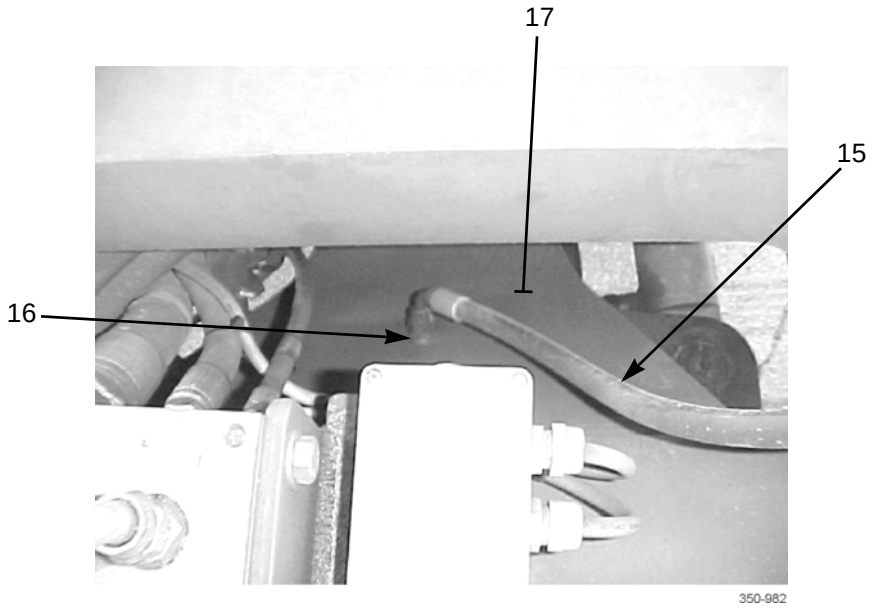
REAR AXLE VENT HOSE REMOVAL

1. Remove screw (12), washer (13), and clamp (10) holding rear axle vent (11) to frame (14) of vehicle.
2. Remove clamp (10) from rear axle vent (11).
3. Remove rear axle vent (11) from vent hose (15).



REAR AXLE VENT HOSE REMOVAL - CONTINUED

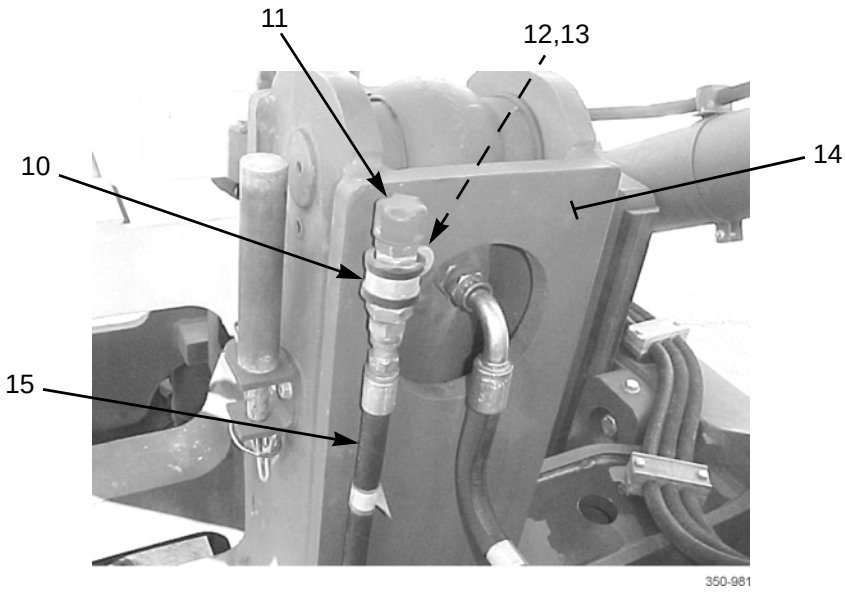
4. At top right of rear axle (17), disconnect other end of vent hose (15) from adapter (16).
5. Remove adapter (16) from rear axle (17).
6. Remove tiedown straps as necessary and remove rear axle vent hose (15) from vehicle. Discard tiedown straps.



REAR AXLE VENT HOSE INSTALLATION

1. Position rear axle vent hose (15) on vehicle.
2. Apply sealing compound to threads of adapter (16) and install adapter in rear axle (17).
3. Connect end of vent hose (15) to adapter (16).
4. At other end of vent hose (15), install front rear axle vent (11).
5. Install clamp (10) around rear axle vent (11).
6. Install clamp (10) on frame (14) of vehicle with washer (13) and screw (12).
7. Install new tiedown straps.

REAR AXLE VENT HOSE INSTALLATION - CONTINUED

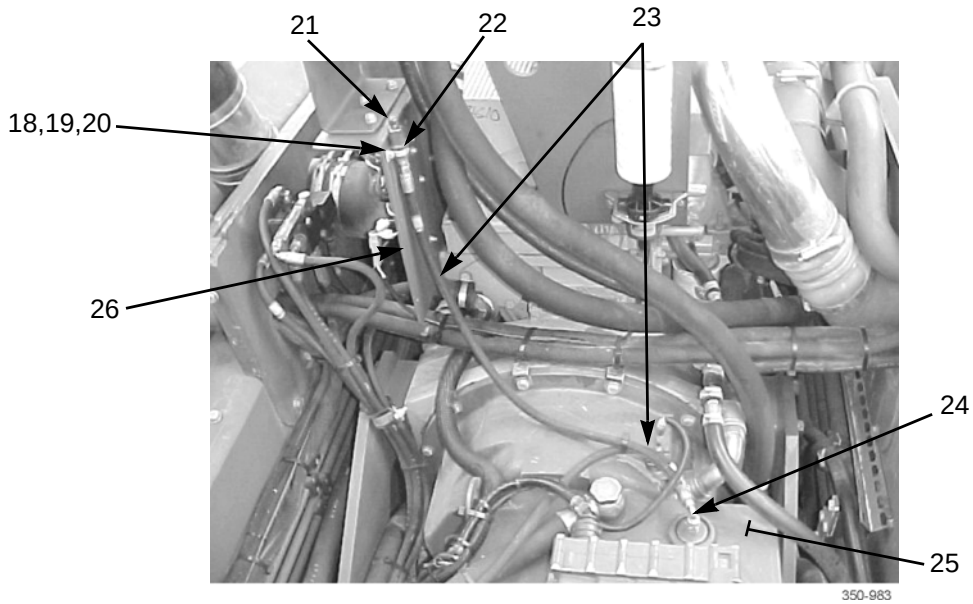


TRANSMISSION VENT HOSE REMOVAL

1. Remove engine cover (WP 0148 00).
2. Remove transmission front access cover (WP 0142 00).

TRANSMISSION VENT HOSE REMOVAL - CONTINUED

3. Remove locknut (18), two washers (19), screw (20), and clamp (22) holding transmission vent (21) to bracket (26). Discard locknut.
4. Remove clamp (22) from transmission vent (21).
5. Remove transmission vent (21) from vent hose (23).
6. At top of transmission (25), disconnect other end of vent hose (23) from adapter (24).
7. Remove adapter (24) from transmission (25).
8. Remove tiedown strap and remove transmission vent hose (23) from vehicle. Discard tiedown strap.



TRANSMISSION VENT HOSE INSTALLATION

1. Position transmission vent hose (23) on vehicle.
2. Apply sealing compound to threads of adapter (24) and install adapter in top of transmission (25).
3. Connect end of vent hose (23) to adapter (24).
4. At other end of vent hose (23), install transmission vent (21).
5. Install clamp (22) around transmission vent (21).
6. Install clamp (22) on bracket (26) with screw (20), two washers (19), and new locknut (18).
7. Install new tiedown strap.
8. Install transmission front access cover (WP 0142 00).
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FRONT AND REAR PROPELLER SHAFTS REPLACEMENT 0120 00

THIS WORK PACKAGE COVERS

Front Propeller Shaft: Removal, Installation

Rear Propeller Shaft: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Nut, lock (P/N 922974.0004) (48)

Materials/Parts - Continued

Washer, lock (P/N 923657.0004) (48)

Personnel Required

Two

Equipment Condition

Vehicle wheels chocked

Transmission shift lever set to N (TM 10-3930-675-10)



WARNING

Propeller shafts are heavy; they weigh 121 lb (55 kg) each. Support end of propeller shaft as nuts or screws are removed to prevent shaft from falling. Failure to follow this warning may cause serious injury to personnel.

CAUTION

Place witness marks at slip joint and propeller shaft housing to aid in reassembly, in the event propeller shaft becomes separated. Failure to follow this caution may cause excessive vibration in propeller shaft and transmission damage.

NOTE

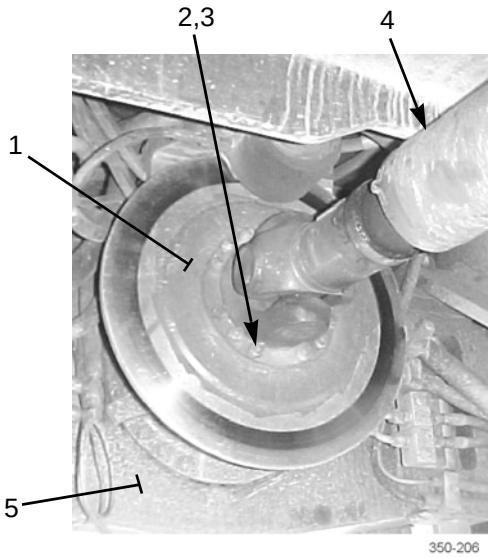
Note position of propeller shaft on vehicle to aid in installation.

FRONT PROPELLER SHAFT REMOVAL

NOTE

Perform the following steps at front of front propeller shaft.

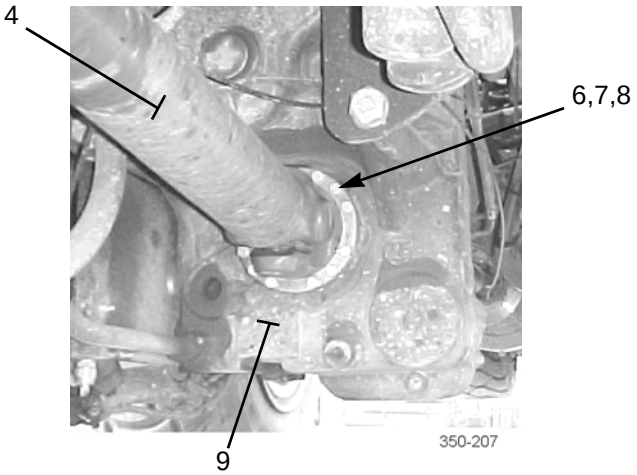
1. Remove 12 locknuts (3) and lockwashers (2) from flange of propeller shaft (4). Discard locknuts and lockwashers.
2. Remove propeller shaft (4) from studs of parking brake disc (1) on front axle (5).



NOTE

Perform the following steps at rear of front propeller shaft.

3. Remove 12 screws (6), lockwashers (7), and locknuts (8) from flange of propeller shaft (4). Discard lockwashers and locknuts.
4. Remove propeller shaft (4) from flange of transmission (9) and remove propeller shaft from vehicle.



FRONT PROPELLER SHAFT INSTALLATION

NOTE

- **Perform the following steps at rear of front propeller shaft.**
- **Ensure witness marks are aligned.**

1. Position propeller shaft (4) on flange of transmission (9).
2. Install 12 screws (6), new lockwashers (7), and new locknuts (8). Tighten locknuts to 85 lb-ft (115 Nm).

NOTE

Perform the following steps at front of front propeller shaft.

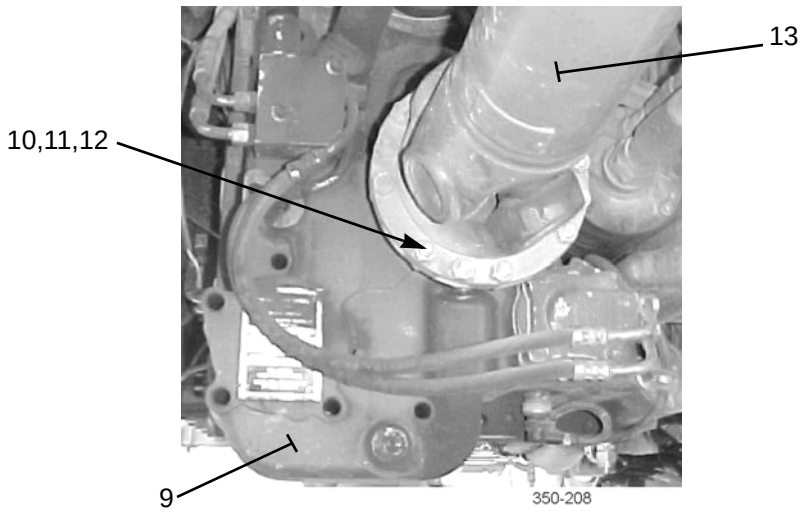
3. Position propeller shaft (4) on studs of parking brake disc (1) on front axle (5).
4. Install 12 new lockwashers (2) and new locknuts (3). Tighten locknuts to 85 lb-ft (115 Nm).

REAR PROPELLER SHAFT REMOVAL

NOTE

Perform the following steps at front of rear propeller shaft.

1. Remove 12 screws (10), lockwashers (11), and locknuts (12) from flange of propeller shaft (13). Discard lockwashers and locknuts.
2. Remove propeller shaft (13) from flange of transmission (9).

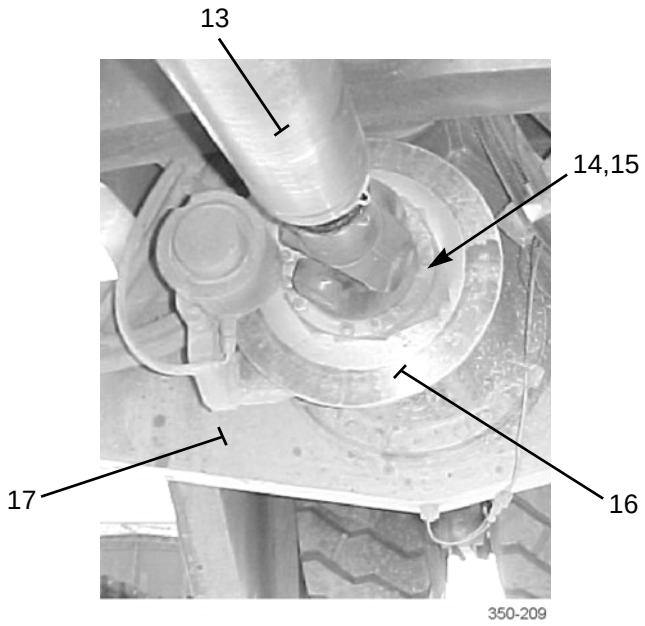


REAR PROPELLER SHAFT REMOVAL - CONTINUED

NOTE

Perform the following steps at rear of rear propeller shaft.

3. Remove 12 locknuts (14) and lockwashers (15) from flange of propeller shaft (13). Discard locknuts and lockwashers.
4. Remove propeller shaft (13) from studs of parking brake disc (16) on rear axle (17) and remove propeller shaft from vehicle.



REAR PROPELLER SHAFT INSTALLATION

NOTE

- **Perform the following steps at rear of rear propeller shaft.**
- **Ensure witness marks are aligned.**

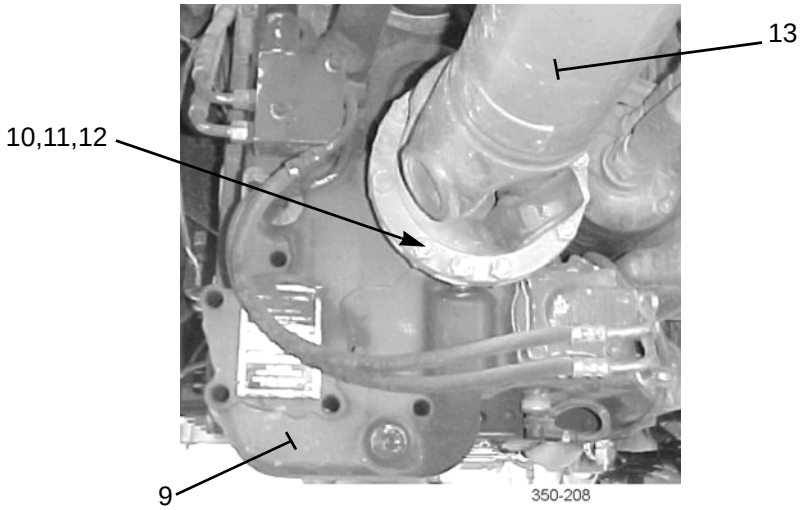
1. Position propeller shaft (13) on studs of parking brake disc (16) on rear axle (17).
2. Install 12 new lockwashers (15) and new locknuts (14). Tighten locknuts to 85 lb-ft (115 Nm).

NOTE

Perform the following steps at front of rear propeller shaft.

3. Position propeller shaft (13) on flange of transmission (9).
4. Install 12 screws (10), new lockwashers (11), and new locknuts (12). Tighten locknuts to 85 lb-ft (115 Nm).

REAR PROPELLER SHAFT INSTALLATION - CONTINUED



END OF WORK PACKAGE

PROPELLER SHAFT UNIVERSAL JOINT REPLACEMENT 0121 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Clamp, C- (Item 21, WP 0289 00)

Vise, Machinist's (Item 130, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

References

WP 0050 00

Equipment Condition

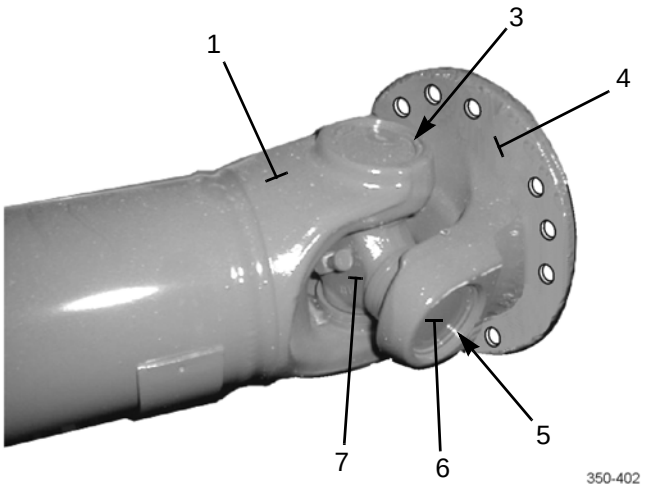
Propeller shaft removed (WP 0120 00)

NOTE

Universal joint at each end of propeller shaft is replaced the same way.

REMOVAL

1. Remove two retaining rings (5) from flanged yoke (4) of propeller shaft.
2. Using C-clamp, push downward on one bearing cap (6) to remove opposite bearing cap from flanged yoke (4).
3. Rotate flanged yoke (4) 180 degrees and push downward on end of tee (7) to remove other bearing cap (6).
4. Remove flanged yoke (4) from tee (7).
5. Remove two retaining rings (3) from yoke (1) of propeller shaft.



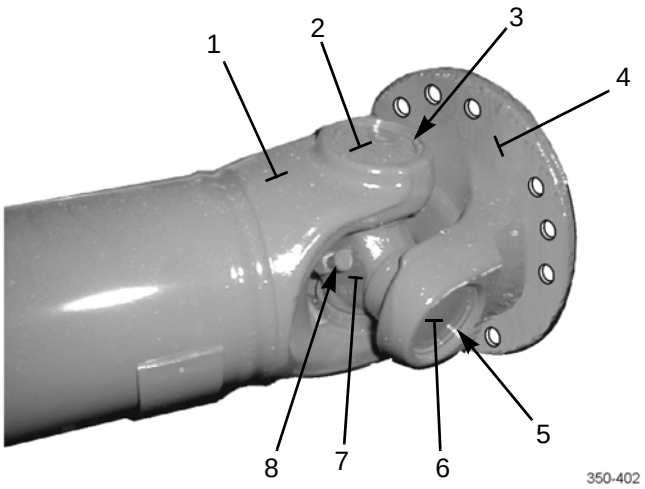
REMOVAL - CONTINUED

6. Using C-clamp, push downward on one bearing cap (2) to remove opposite bearing cap (2) from yoke (1) of propeller shaft.
7. Rotate propeller shaft 180 degrees and press downward on end of tee (7) to remove other bearing cap (2).

NOTE

Note position of tee and grease fitting for installation.

8. Remove tee (7) from yoke (1) of propeller shaft.
9. Remove grease fitting (8) from tee (7).



INSTALLATION

1. Install grease fitting (8) in tee (7).
2. Position tee (7) loosely into yoke (1) of propeller shaft.
3. Install bearing cap (2) into one side of yoke (1) of propeller shaft.
4. Rotate propeller shaft 180 degrees and install other bearing cap (2) in other side of yoke (1). Ensure bearing caps and tee (7) are centered.
5. Install two retaining rings (3) on propeller shaft.
6. Position flange yoke (4) loosely on tee (7).
7. Install bearing cap (6) into one side of flanged yoke (4).
8. Rotate flanged yoke (4) 180 degrees and install other bearing cap (6) in other side of flanged yoke. Ensure bearing caps and tee (7) are centered.
9. Install two retaining rings (5) on flanged yoke (4).
10. Lubricate grease fitting (8) (WP 0050 00).
11. Install propeller shaft (WP 0120 00).

END OF WORK PACKAGE

PARKING BRAKE PADS MAINTENANCE 0122 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Pipe (Item 139, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Brake Pad Kit (P/N 923828.0497)

Pin, Cotter (P/N 923726.0433)

Equipment Condition

Wheels chocked

Parking brake released (TM 10-3930-675-10)

Brake hydraulic system pressure relieved (WP 0164 00)

NOTE

Maintenance of parking brake pads at front and rear parking brake cylinders is performed the same way.

REMOVAL

NOTE

A strap wrench may be required to remove cover.

1. Remove cover (6) from pressure ring (4). Remove and discard O-ring (8) only if damaged.
2. Loosen jamnut (5) and remove adjusting screw (7) and jamnut from piston (9).
3. Retract adjustment cylinder (2) into piston (9) by prying between adjustment cylinder and one brake pad (10).

NOTE

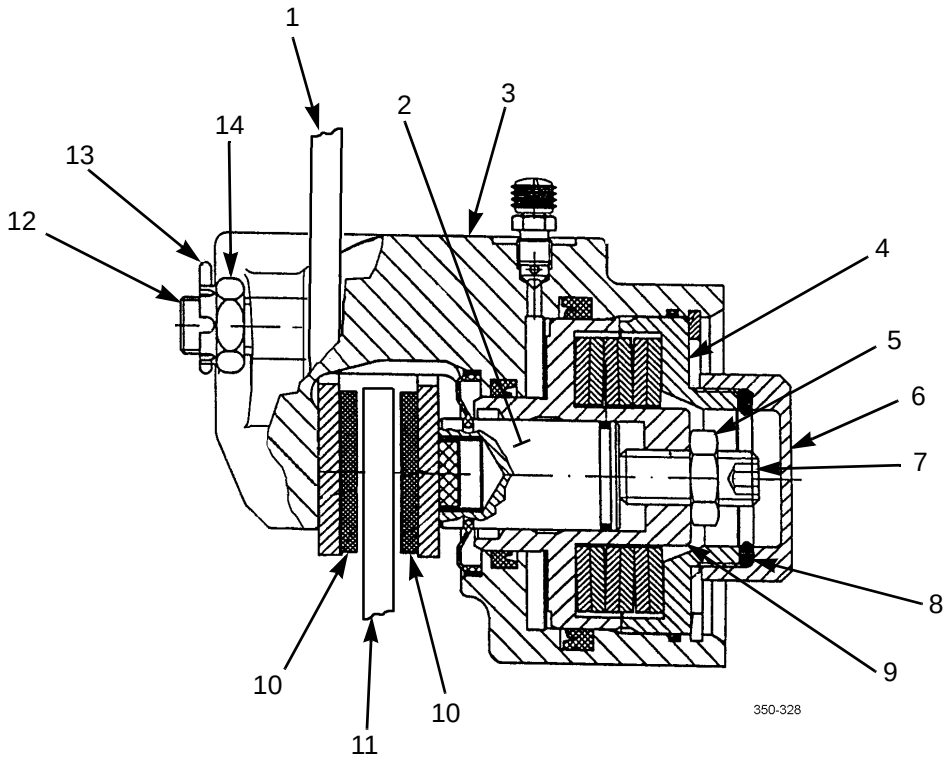
Only one of two bolts needs to be removed in order to remove brake pads.

4. Remove cotter pin (13) from one of two castle nuts (14). Discard cotter pin.
5. Remove castle nut (14) and bolt (12) from parking brake housing (3) and parking brake bracket (1).

NOTE

One brake pad is held in place by a magnet.

6. Remove two brake pads (10) from parking brake housing (3) and parking brake rotor (11).



CLEANING AND INSPECTION

1. Clean brake pads with detergent, clear water, and rags. Rinse with clear water and dry surfaces with rags.
2. Check for damage to brake pads. Replace if damaged.
3. Check thickness of brake lining of each brake pad, using a feeler gage as a basis for comparison. Brake lining must be at least 0.080 in. (2 mm) thick. If brake lining thickness is less than required, discard brake pad.

INSTALLATION

NOTE

One brake pad will be held in place by a magnet.

1. Position two brake pads (10) in parking brake housing (3) and on parking brake rotor (11).
2. Install bolt (12) through parking brake housing (3) and parking brake bracket (1). Install castle nut (14).
3. Install new cotter pin (13) in castle nut (14).
4. Install adjusting screw (7) partially into piston (9) and install jamnut (5) loosely onto adjusting screw.

ADJUSTMENT

NOTE

Ensure brake accumulator evacuation valves are closed.

1. Start engine (TM 10-3930-675-10) and run approximately 30 seconds to provide hydraulic pressure. Stop engine.
2. Rotate adjusting screw (7) clockwise until both brake pads (10) contact parking brake rotor (11).
3. Back off adjusting screw (7) by rotating screw counterclockwise 4/5th turn. Gap should be 0.04 to 0.08 in. (1 to 2 mm).
4. While holding adjusting screw (7), tighten jamnut (5).
5. If removed, install new O-ring (8) in cover (6).
6. Install cover (6) on pressure ring (4).

END OF WORK PACKAGE

CAGING AND UNCAGING PARKING BRAKE 0123 00

THIS WORK PACKAGE COVERS

Caging, Uncaging

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Pipe (Item 139, WP 0289 00)

Equipment Condition

Wheels chocked

Parking brake released (TM 10-3930-675-10)

Brake hydraulic system pressure relieved (WP 0164 00)

NOTE

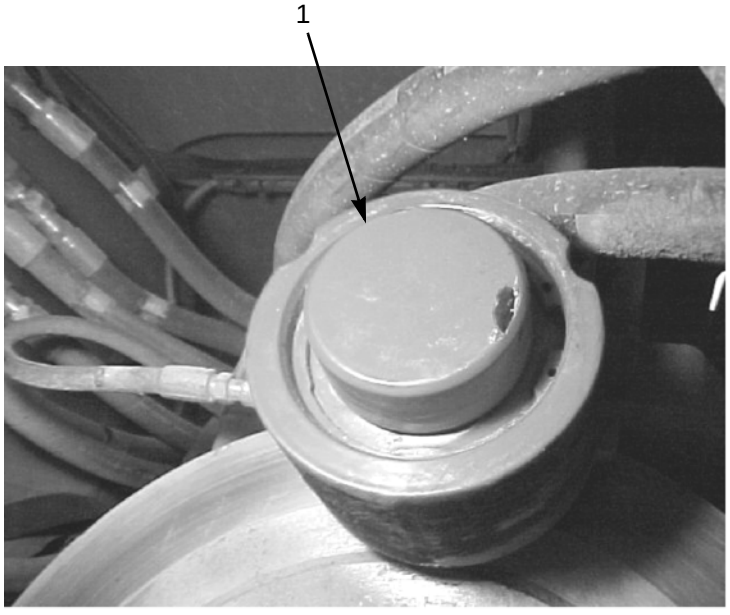
- **Caging/uncaging procedures at front and rear parking brake are the same.**
- **In order to tow a disabled RTCH, the following procedure must be performed at front and rear parking brakes to cage/uncage parking brakes.**

CAGING

NOTE

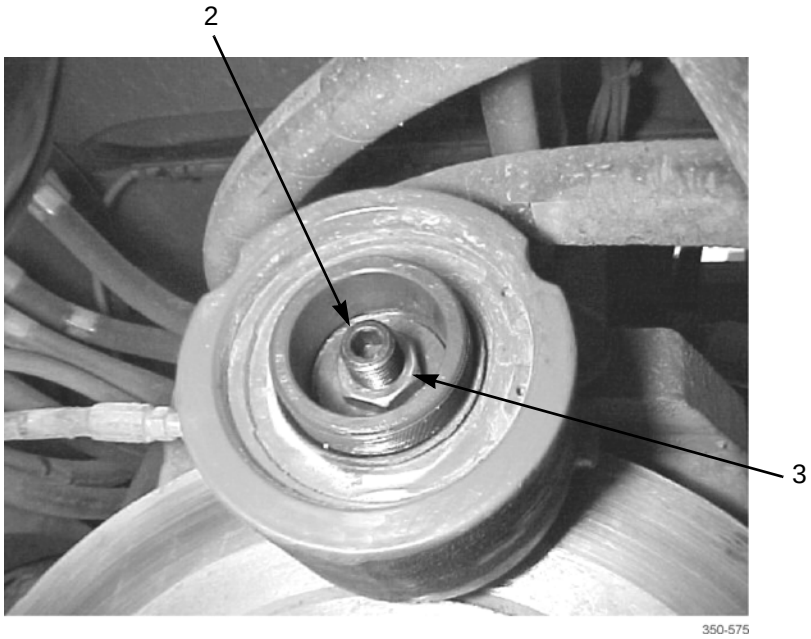
A strap wrench may be required to remove cover.

1. Remove cover (1).

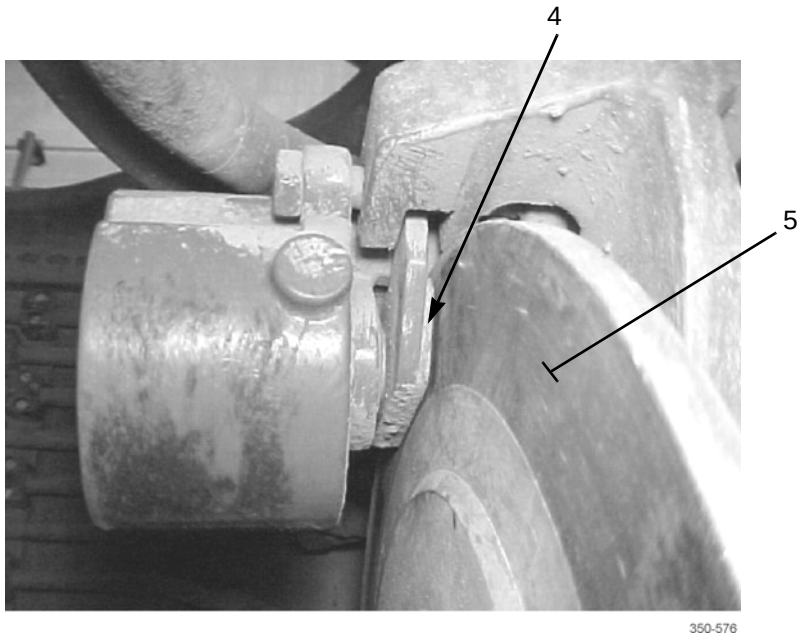


CAGING - CONTINUED

2. Loosen jamnut (3).



3. Loosen adjusting screw (2) until brake disk pad (4) moves freely.

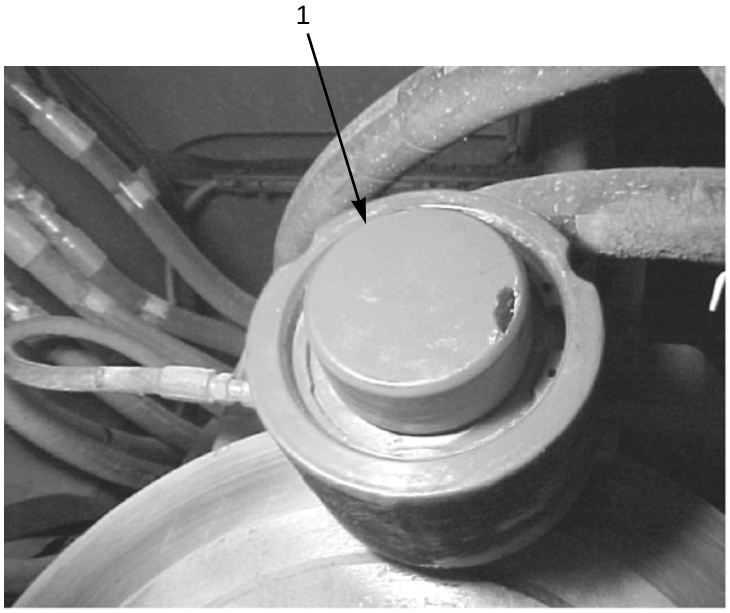


4. Hand-tighten jamnut (3). Reinstall cover (1).

CAGING AND UNCAGING PARKING BRAKE - CONTINUED 0123 00

UNCAGING

1. Remove cover (1).
2. Loosen jamnut (3). Tighten adjusting screw (2) until brake disk pad (4) contacts rotor (5). Retighten jamnut.
3. With parking brake released in cab, ensure there is a gap between brake disk pad (4) and rotor (5).
4. Loosen jamnut (3). Tighten adjusting screw (2) until contact is made between brake disk pad (4) and rotor (5), then back off adjusting screw 4/5 turn. Gap should be 0.04 to 0.08 in. (1 to 2 mm).
5. Tighten jamnut (3).
6. Replace cover (1) O-ring only if damaged. Install cover hand-tight.



350-574

7. Apply parking brake (TM 10-3930-675-10).
8. Remove wheel chocks.

END OF WORK PACKAGE

PARKING BRAKE CONTROL VALVE REPLACEMENT 0124 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 923899.0455) (4)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

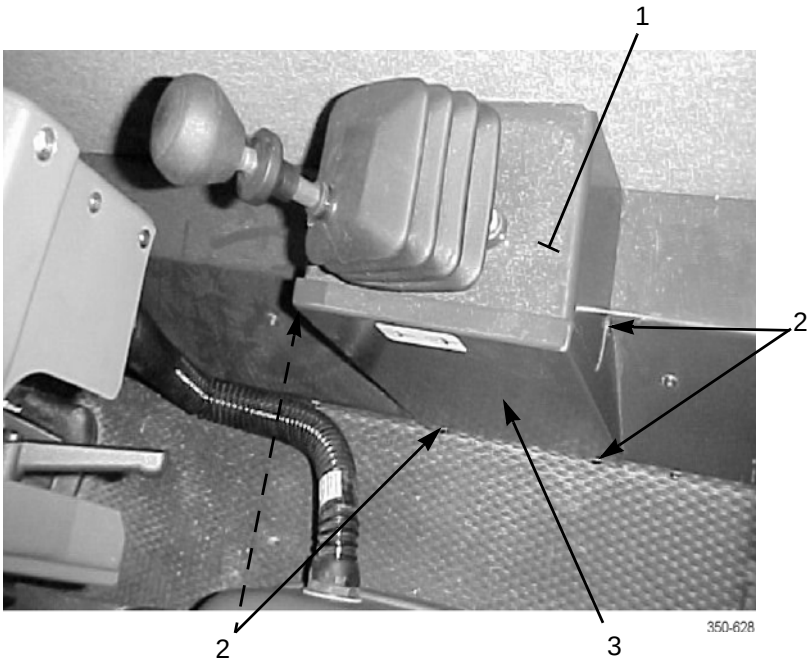
Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position

REMOVAL

1. Remove four screws (2) and cover (3) from control valve bracket (1).



REMOVAL - CONTINUED



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

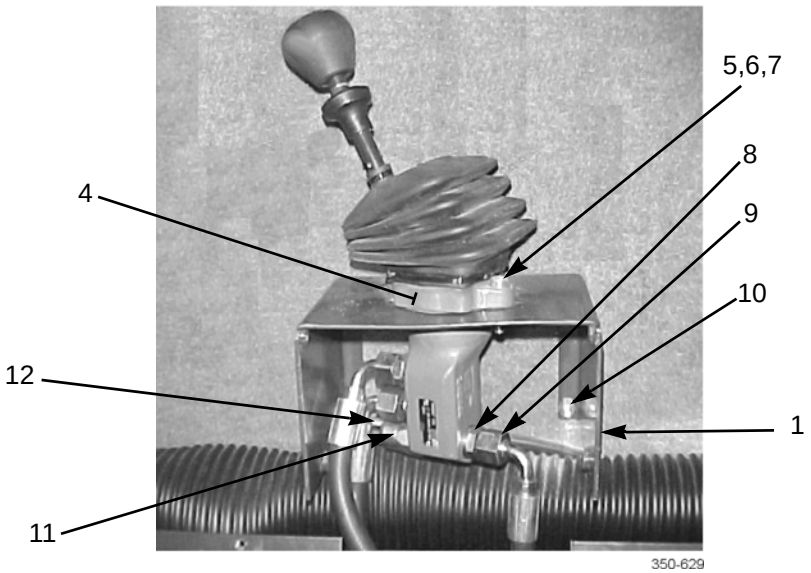
CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag hoses and connectors for installation.

2. Disconnect three hydraulic hoses (9) and remove three fittings (8) from control valve (4).
3. Disconnect two connectors (12) of wiring harness from switch (11).
4. Remove switch (11) from control valve (4).
5. Remove two locknuts (5), washers (6), screws (7), and control valve (4) from control valve bracket (1). Discard locknuts.
6. If control valve bracket (1) is damaged, remove two locknuts (10) and control valve bracket from cab. Discard locknuts.

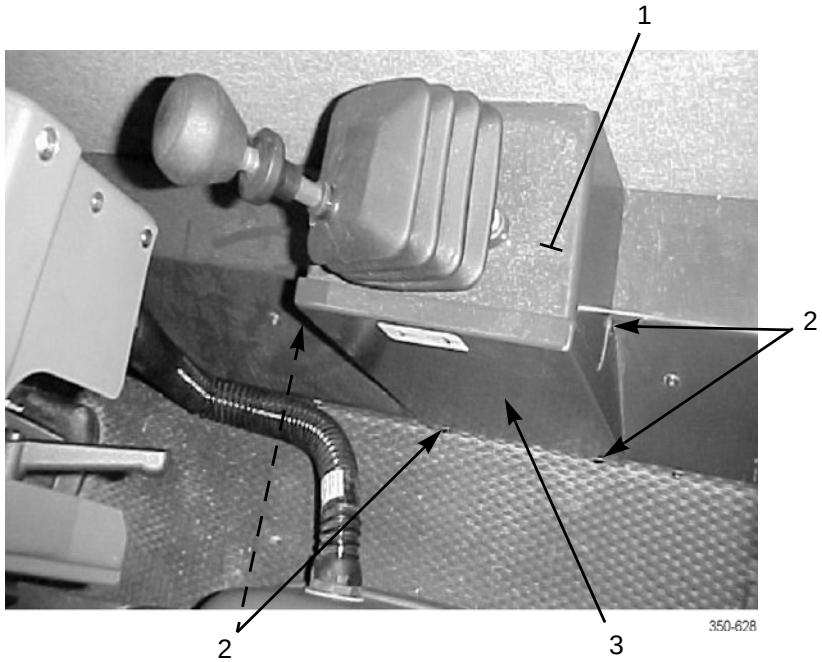


INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. If removed, install control valve bracket (1) on cab with two new locknuts (10).
2. Install control valve (4) on control valve bracket (1) with two screws (7), washers (6), and new locknuts (5).
3. Install switch (11) on control valve (4).
4. Connect two connectors (12) of wiring harness to switch (11).
5. Install three fittings (8) on control valve (4).
6. Connect three hydraulic hoses (9) to fittings (8).
7. Check level of oil in hydraulic reservoir and add oil as needed (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.
9. Install cover (3) on control valve bracket (1) with four screws (2).



NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

PARKING BRAKE SYSTEM HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0125 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-1) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
3. Discard O-ring(s) removed.

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

SERVICE BRAKE CONTROL VALVE REPLACEMENT 0126 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

TM 10-3930-675-10

WP 0050 00

References - Continued

WP 0185 00

WP 0188 00

WP 0284 00

Equipment Condition

Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)

Steering column base and brake pedal disconnected from mounting and moved aside (WP 0132 00)

Brake light switch and pressure sensors removed (WP 0098 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

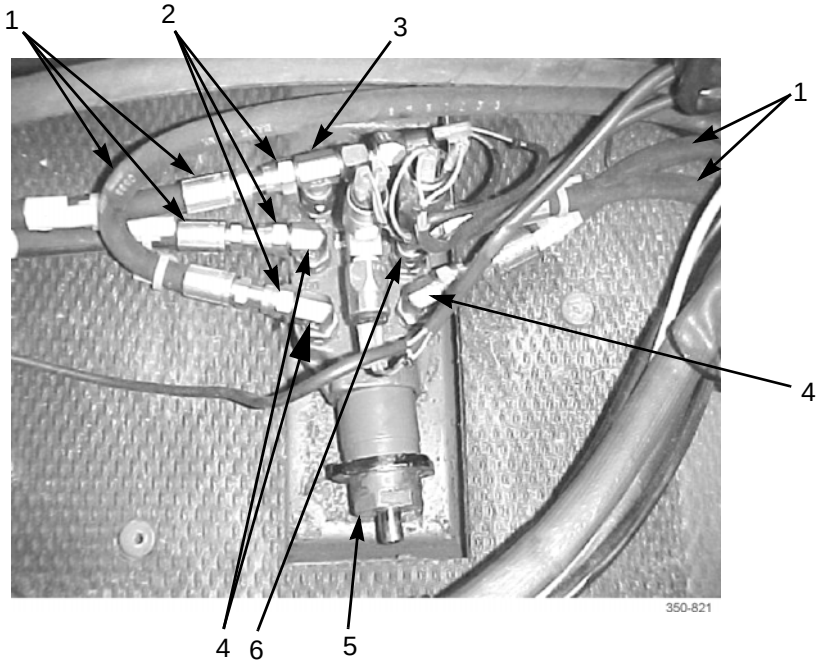
REMOVAL

1. Loosen fitting nut (2) of each hydraulic hose (1) and disconnect hydraulic hoses.

NOTE

Note position of tee fitting, adapter fittings, and elbow fittings to aid in installation.

2. Remove service brake control valve (5) from floor of cab.
3. Remove tee fitting (3), adapter fittings (6), and elbow fittings (4) from service brake control valve (5).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Install elbow fittings (4), adapter fittings (6), and tee fittings (3) on service brake control valve (5).
2. Position service brake control valve (5) on floor of cab.
3. Connect hydraulic hoses (1) and tighten fitting nuts (2).
4. Install brake light switch and pressure sensors (WP 0098 00).
5. Install steering column base and brake pedal (WP 0132 00).
6. Check level of oil in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10) and check for leaks.
8. Check pressure at hydraulic system test points (WP 0188 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

SERVICE BRAKE SYSTEM HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0127 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

SERVICE BRAKE SYSTEM HYDRAULIC HOSES AND FITTINGS REPLACEMENT - CONTINUED 0127 00

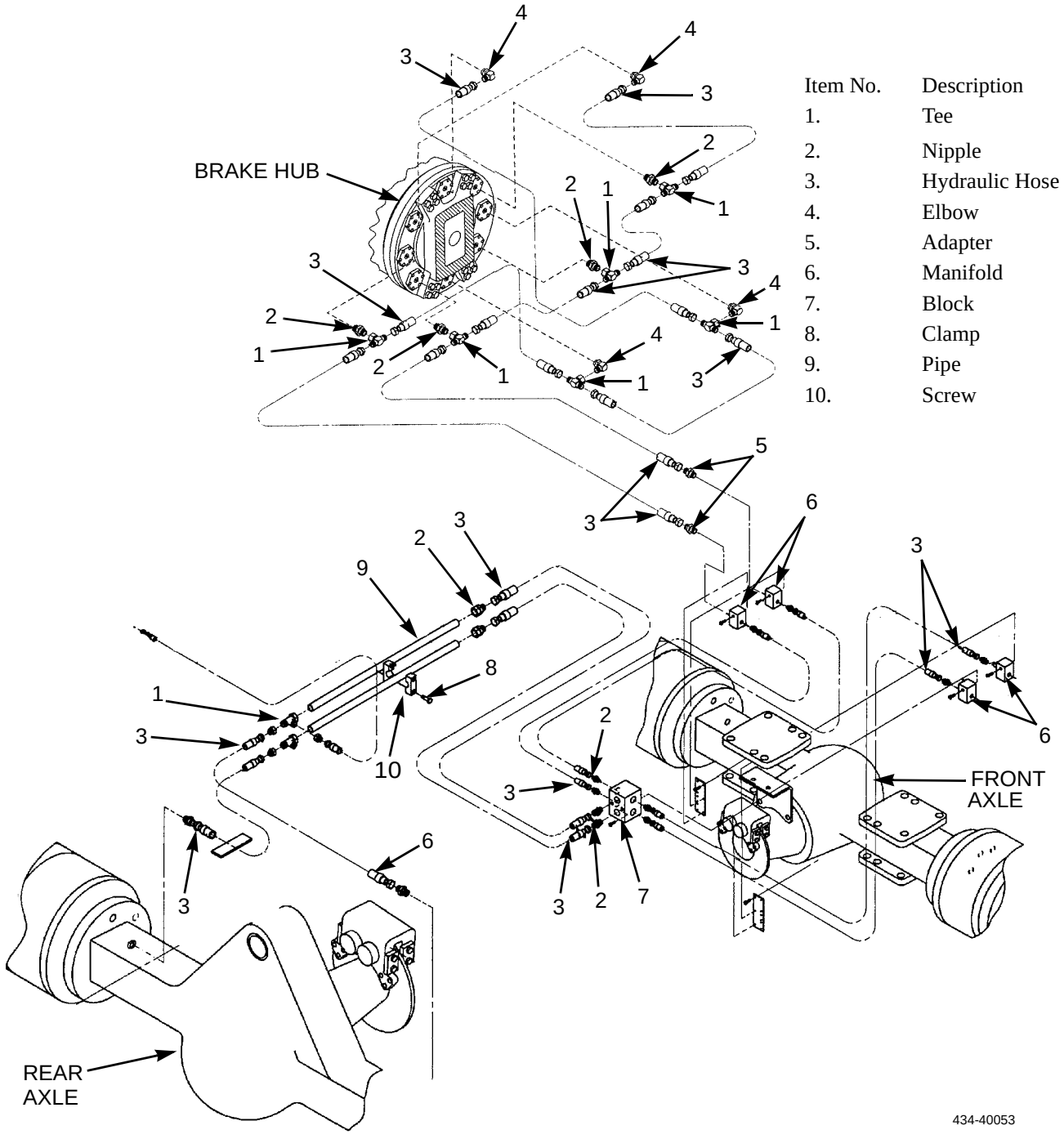
REMOVAL

1. Using illustration in this work package and foldout FO-2 as guides, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
3. Discard O-ring(s) removed.



Item No.	Description
1.	Tee
2.	Nipple
3.	Hydraulic Hose
4.	Elbow
5.	Adapter
6.	Manifold
7.	Block
8.	Clamp
9.	Pipe
10.	Screw

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BRAKE COOLING FILTER AND FILTER HEAD REPLACEMENT 0128 00

THIS WORK PACKAGE COVERS

Brake Cooling Filter: Removal, Installation

Brake Cooling Filter Head: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Oil Filter (Item 138, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Pipe (Item 33, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Filter, Brake Cooling (P/N 920130.0100) (2)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

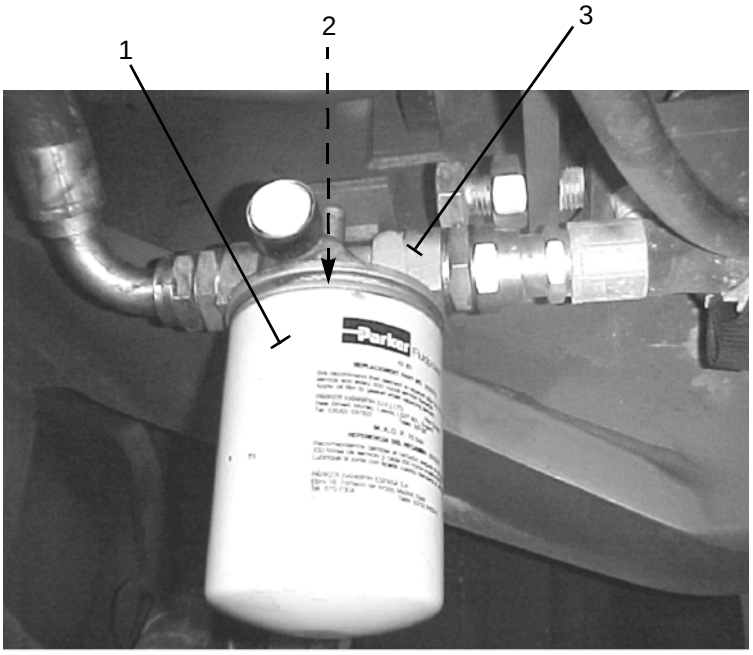
Wipe filter and surrounding area clean prior to removal. After filter removal, immediately install replacement filter or cover area with a clean rag. Contaminated hydraulic system could cause equipment failure.

BRAKE COOLING FILTER REMOVAL

NOTE

Two brake cooling filters are installed on vehicle: one at front and one at rear. Both are replaced in a similar manner. Front brake cooling filter is detailed below.

1. Position suitable container to catch hydraulic oil from lines.
2. Use a filter strap wrench to loosen brake cooling filter (1) and remove from filter head (3) by hand. Discard filter.



350-948

BRAKE COOLING FILTER INSTALLATION

NOTE

Ensure filter head mating surface is clean and free of residue.

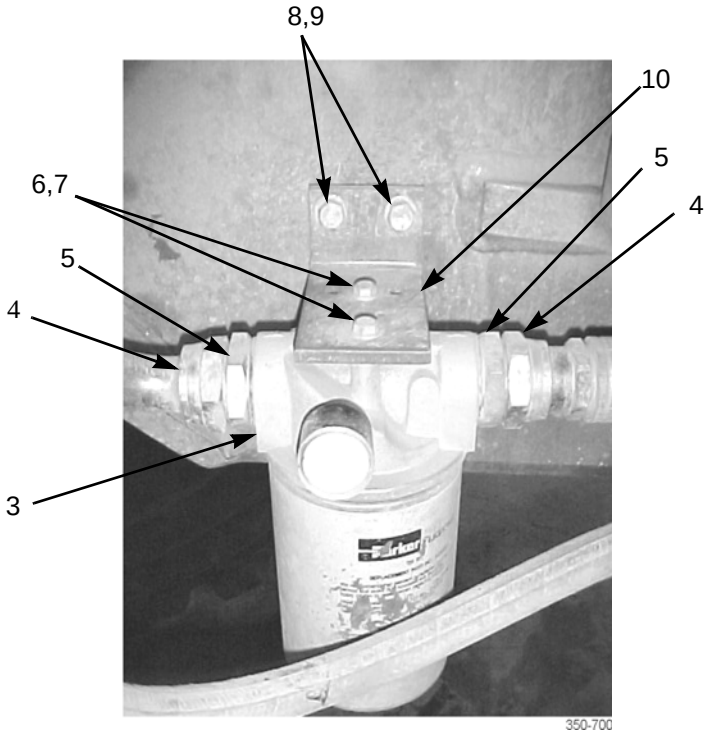
1. Apply a coat of lubricating oil to brake cooling filter seal (2) and fill filter with clean lubricating oil.
2. Install new brake cooling filter (1) on filter head (3) and tighten by hand.
3. Use a strap wrench to tighten brake cooling filter (1) an additional ½ to ¾ turn.
4. Check hydraulic oil level and add oil as needed (WP 0051 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.

BRAKE COOLING FILTER HEAD REMOVAL

NOTE

Tag all hydraulic lines.

1. Remove and discard brake cooling filter (refer to *Brake Cooling Filter Removal*).
2. Disconnect two hydraulic hoses (4) from filter head (3).
3. Remove two adapter fittings (5) from filter head (3).
4. Remove two screws (6) and washers (7) securing filter head (3) to mounting bracket (10).
5. If damaged, remove two screws (8), washers (9), and mounting bracket (10) from vehicle.

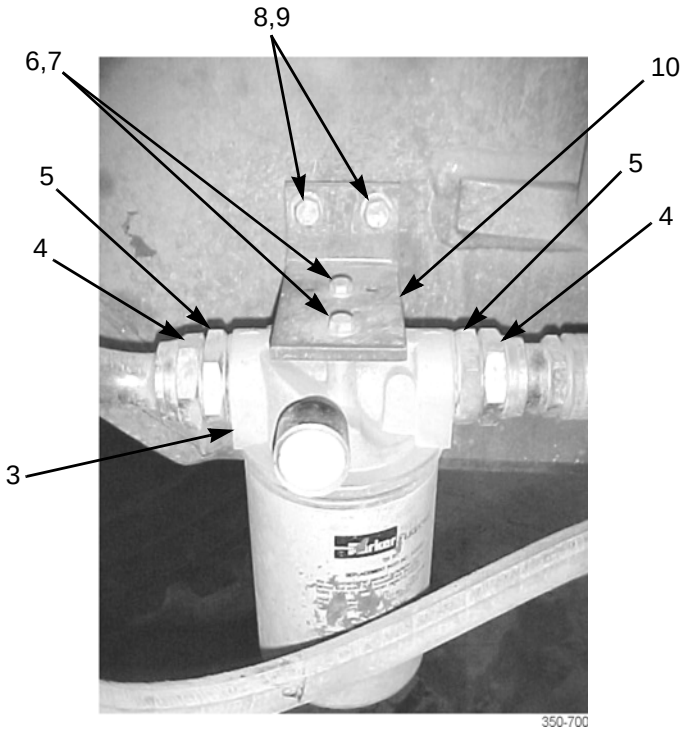


BRAKE COOLING FILTER HEAD INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. If mounting bracket (10) was removed, install bracket on vehicle with two washers (9) and screws (8).
2. Position filter head (3) on mounting bracket (10) and secure with two washers (7) and screws (6).
3. Apply pipe sealant to threads of two adapter fittings (5) and install in filter head (3).
4. Connect two hydraulic hoses (4) to filter head (3).



5. Install new brake cooling filter (refer to *Brake Cooling Filter Installation*).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10) and check for hydraulic oil leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BRAKE SYSTEM CHARGING VALVE PRESSURE ADJUSTMENT 0129 00

THIS WORK PACKAGE COVERS

Adjustment: Brake Circuit No. 1, Brake Circuit No. 2

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

Two

References

WP 0164 00

WP 0188 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

ADJUSTMENT, BRAKE CIRCUIT NO. 1

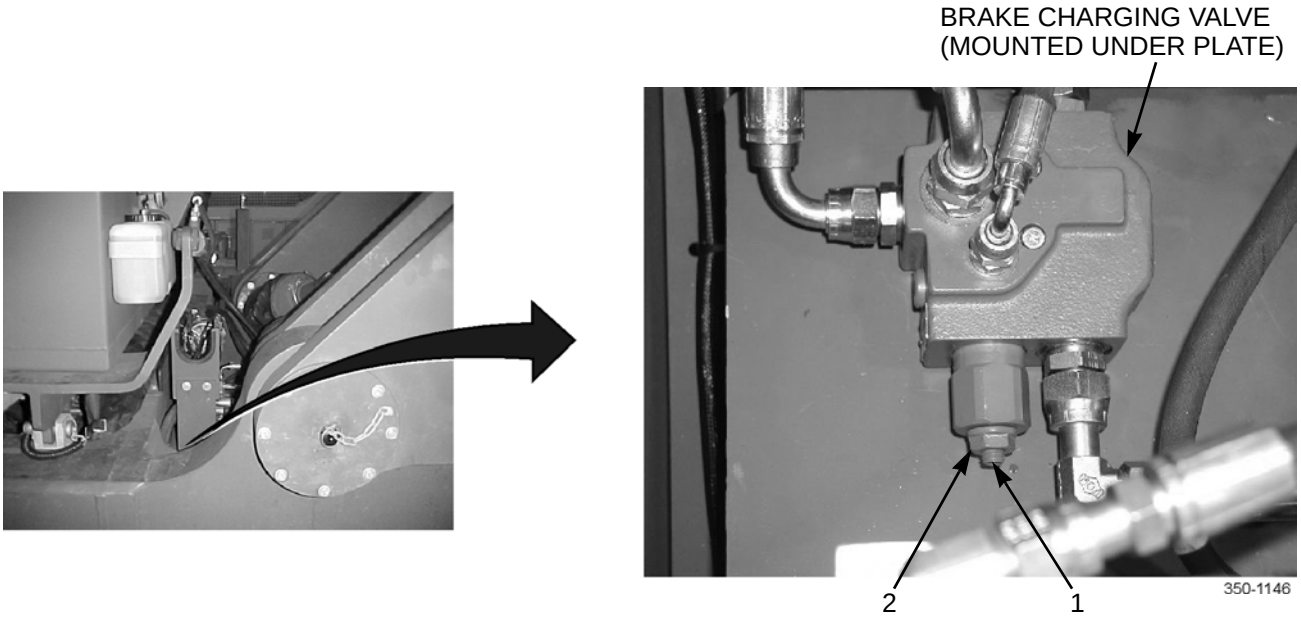
1. Relieve brake system hydraulic pressure by opening evacuation valves, then return valves to CLOSED position (WP 0164 00).
2. Connect hydraulic pressure test gage to hydraulic test point no. 1 (WP 0188 00).
3. Start engine (TM 10-3930-675-10).
4. Test gage indicator will jump to pre-charged accumulator pressure of 1,305 psi (90 bar), then slowly increase to system pressure. If system pressure reaches 2,900 psi (200 bar), OPEN evacuation valves (WP 0188 00).

ADJUSTMENT, BRAKE CIRCUIT NO. 1 - CONTINUED

WARNING

While adjusting brake charging valve, DO NOT remove adjusting screw from charging valve assembly. The system is under pressure and failure to follow this warning may cause serious injury to personnel.

5. Loosen adjusting screw jamnut (2) and slowly turn adjusting screw (1) until test gage indicates 1,956 to 2,538 psi (135 to 175 bar). Secure adjusting screw by tightening jamnut.



6. Shut down engine.
7. Relieve brake system hydraulic pressure by opening brake system evacuation valves (WP 0164 00).
8. Disconnect test gage from hydraulic test point no. 1 (WP 0188 00).
9. Close brake system evacuation valves (WP 0164 00).

ADJUSTMENT, BRAKE CIRCUIT NO. 2

1. Relieve brake system hydraulic pressure by opening evacuation valves, then return valves to CLOSED position (WP 0164 00).
2. Connect hydraulic pressure test gage to hydraulic test point no. 2 (WP 0188 00).
3. Start engine (TM 10-3930-675-10).
4. Test gage indicator will jump to pre-charged accumulator pressure of 1,305 (90 bar), then slowly increase to system pressure. If system pressure reaches 2,900 psi (200 bar), OPEN evacuation valves (WP 0188 00).

WARNING

While adjusting brake charging valve, DO NOT remove adjusting screw from charging valve assembly. The system is under pressure and failure to follow this warning may cause serious injury to personnel.

5. Loosen adjusting screw jamnut (2) and slowly turn adjusting screw (1) until test gage indicates 1,956 to 2,538 psi (135 to 175 bar). Secure adjusting screw by tightening jamnut.

ADJUSTMENT, BRAKE CIRCUIT NO. 2 - CONTINUED

6. Shut down engine.
7. Relieve brake system hydraulic pressure by opening brake system evacuation valves (WP 0164 00).
8. Disconnect test gage from hydraulic test point no. 2 (WP 0188 00).
9. Close brake system evacuation valves (WP 0164 00).

END OF WORK PACKAGE

DOLLY WHEEL MAINTENANCE 0130 00

THIS WORK PACKAGE COVERS

Disassembly, Cleaning and Inspection, Assembly

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

O-ring (P/N 923873.0008) (2)

Personnel Required

Two

References

TM 9-2610-200-14

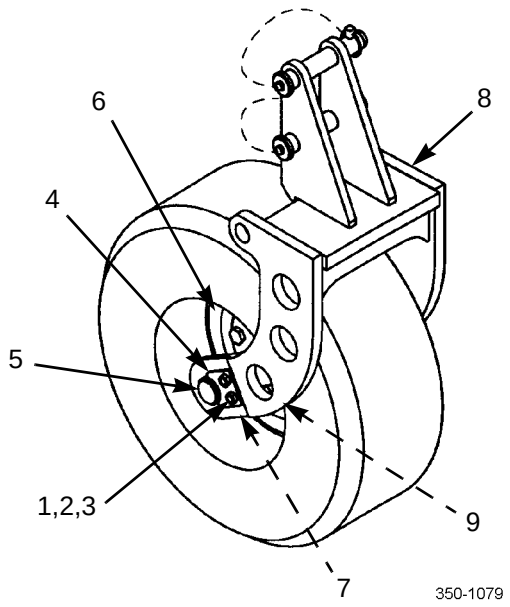
WP 0050 00

Equipment Condition

Dolly wheel removed from battery and dolly wheels storage compartment (TM 10-3930-675-10)

DISASSEMBLY

1. Remove two nuts (1), washers (2), screws (3), and retainer (4) from each end of axle shaft (5).
2. Remove axle shaft (5), wheel (6), and two O-rings (7) from bracket (8). Discard O-rings.
3. Remove grease fitting (9) from hub of wheel (6).



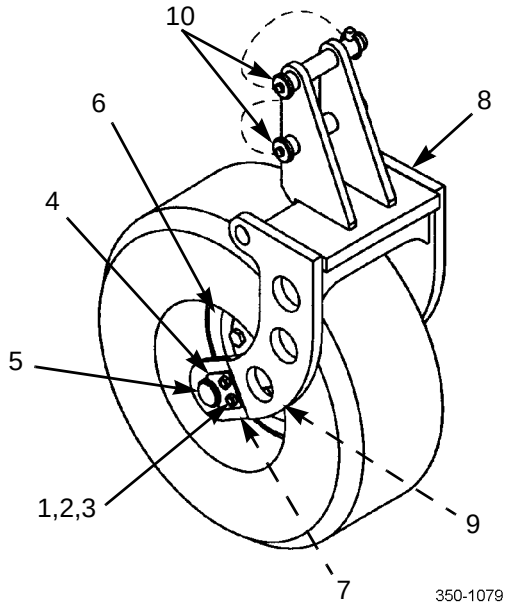
DOLLY WHEEL MAINTENANCE - CONTINUED **0130 00**

CLEANING AND INSPECTION

1. Clean tire, wheel, axle shaft, bracket, and two mounting pins (10) with detergent and water. Dry with clean rags.
2. Inspect components for excessive corrosion and damage. Replace defective components.
3. For tire maintenance, refer to TM 9-2610-200-14.

ASSEMBLY

1. Install grease fitting (9) in hub of wheel (6).
2. Apply a thin coat of grease to two new O-rings (7) and position one O-ring on each side of hub of wheel (6).
3. Apply a thin coat of grease to bearing surface of axle shaft (5) and install axle shaft through bracket (8) and wheel (6). Rotate axle shaft, as necessary, until fully seated.
4. Install retainer (4) on each end of axle shaft (5) with two screws (3), washers (2), and nuts (1).
5. Position each of two O-rings (7) against surface of bracket (8).



6. Lubricate dolly wheel (WP 0050 00).
7. Return dolly wheel to battery and dolly wheels storage compartment (TM 10-3930-675-10).

END OF WORK PACKAGE

STEERING WHEEL REPLACEMENT 0131 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

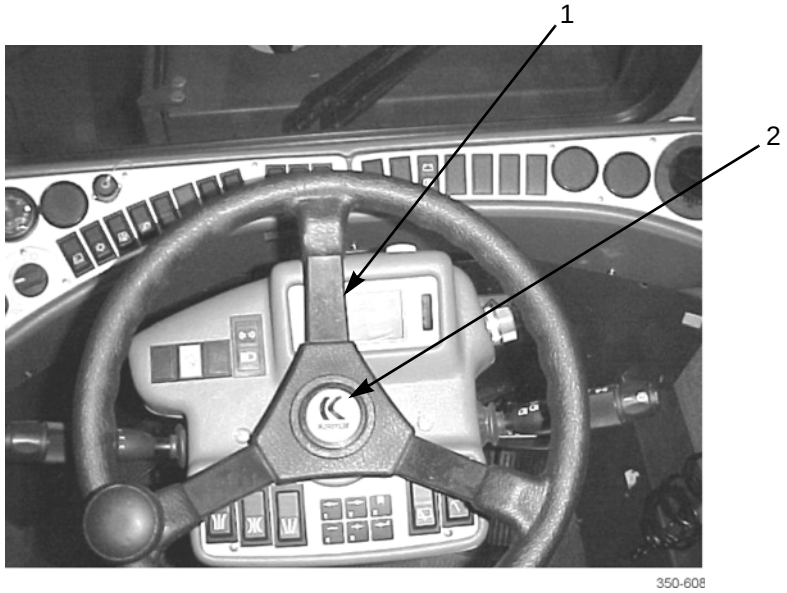
Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

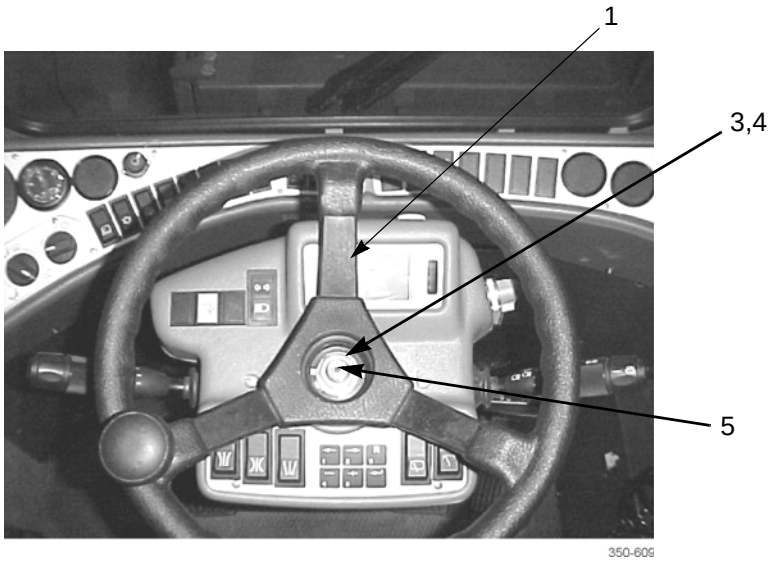
REMOVAL

1. Lift insert (2) from center of steering wheel (1).



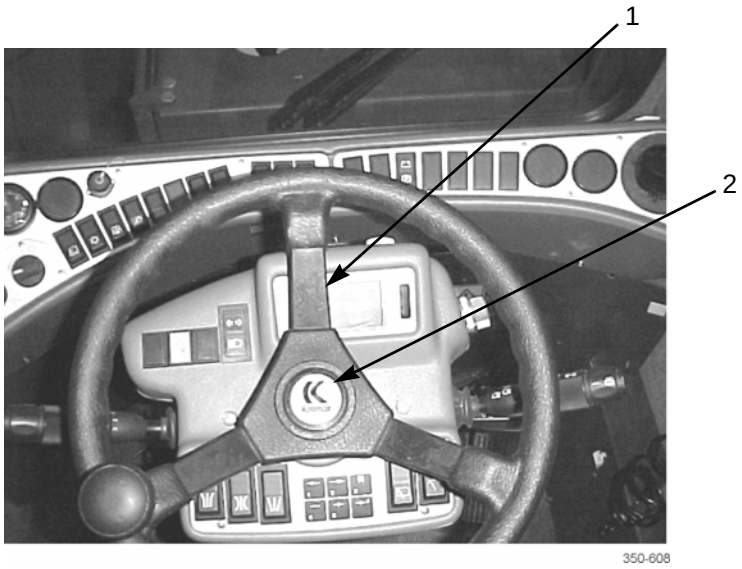
REMOVAL - CONTINUED

2. Remove nut (3) and washer (4) from steering shaft (5).
3. Remove steering wheel (1) from steering shaft (5).



INSTALLATION

1. Position steering wheel (1) on steering shaft (5).
2. Install washer (4) and nut (3) on steering shaft (5).
3. Press insert (2) into center of steering wheel (1).



END OF WORK PACKAGE

STEERING COLUMN BASE AND BRAKE PEDAL MAINTENANCE 0132 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

References

WP 0062 00

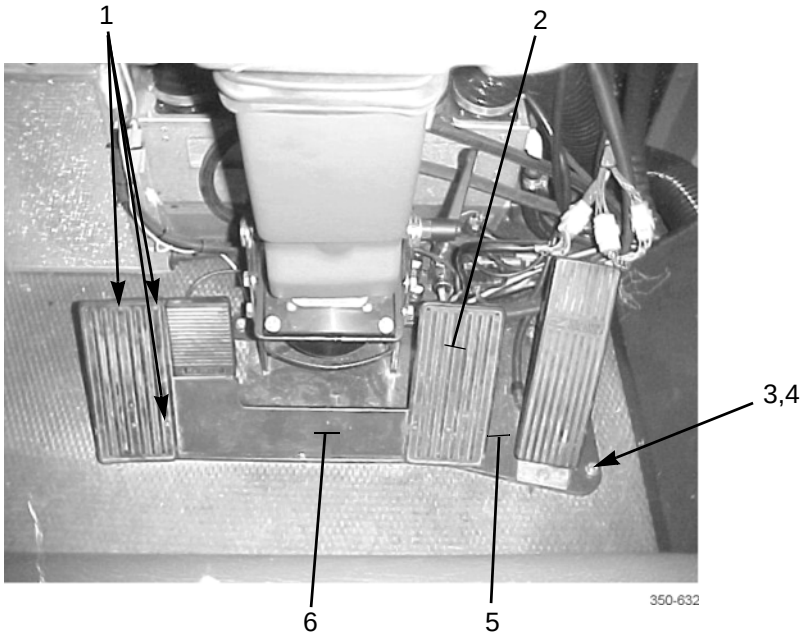
WP 0097 00

Equipment Condition

Steering column removed (WP 0133 00)

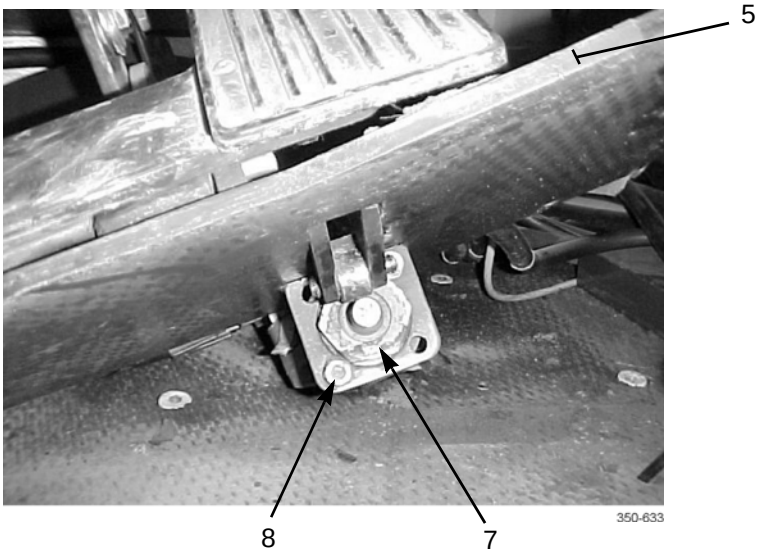
REMOVAL

1. Remove six screws (1) and two extension plates (2) from brake pedal (6).
2. Remove five screws (3) and washers (4) to separate steering column base (5) from floor of cab.



REMOVAL - CONTINUED

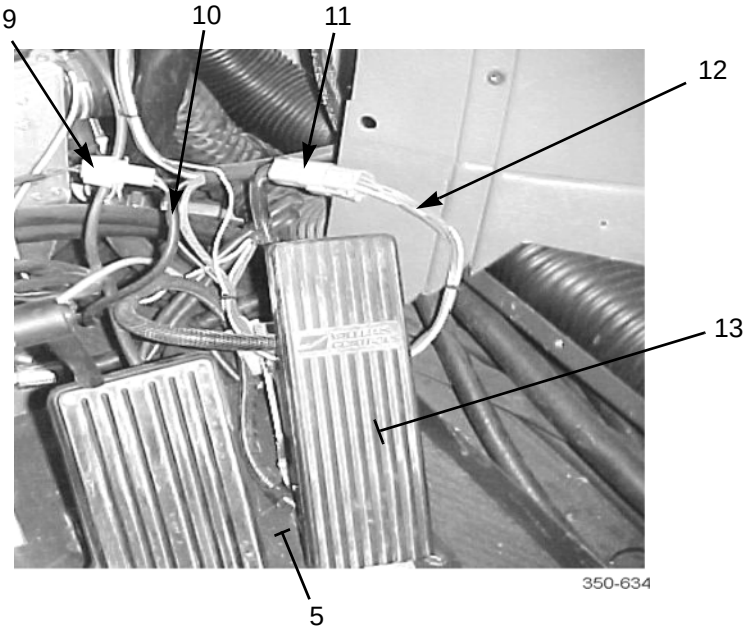
3. Pull up on steering column base (5) and support in upward position to access brake valve (7) underneath.
4. Remove two screws (8) and separate steering column base (5) from brake valve (7).



NOTE

Remove and discard tiedown straps as necessary.

5. Disconnect connector (11) of throttle position sensor (13) from wiring harness (12).
6. Disconnect connector (9) of brake inching switch from wiring harness (10).
7. Remove steering column base (5) from vehicle.



DISASSEMBLY

1. Remove brake inching switch from brake pedal (WP 0097 00).
2. Remove throttle position sensor (13) from steering column base (WP 0062 00).



WARNING

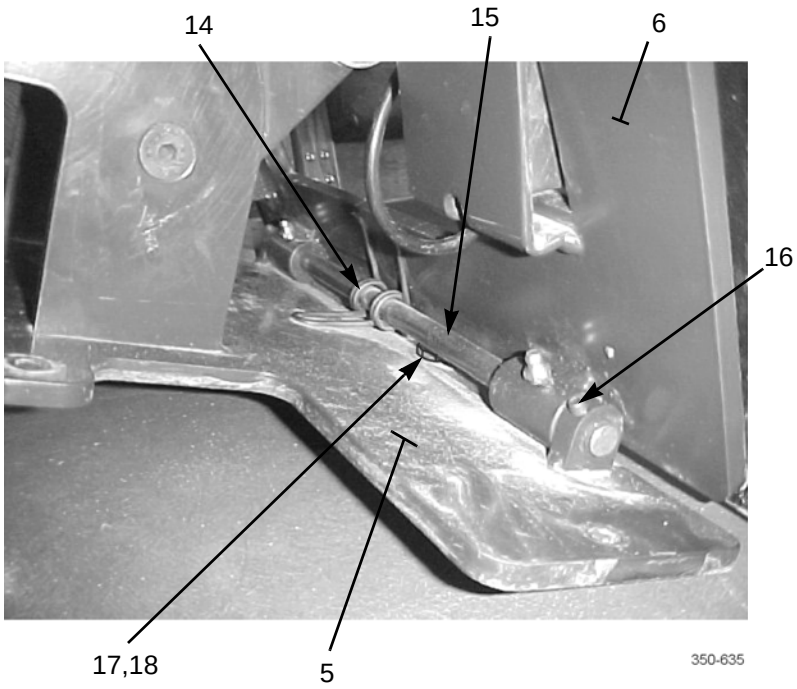
Spring is under tension. Take care when removing spring. Wear protective eyewear to prevent injury to personnel.

3. Remove two setscrews (16), pivot rod (15), spring (14), and brake pedal (6) from hinges of steering column base (5).

NOTE

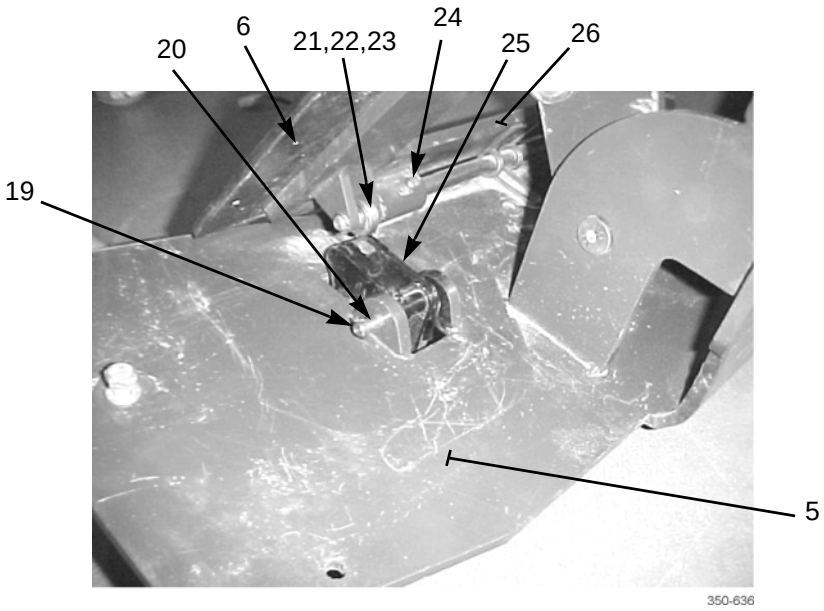
Note position of screw and jamnut for ease in assembly.

4. Remove screw (17) and jamnut (18) from steering column base (5).

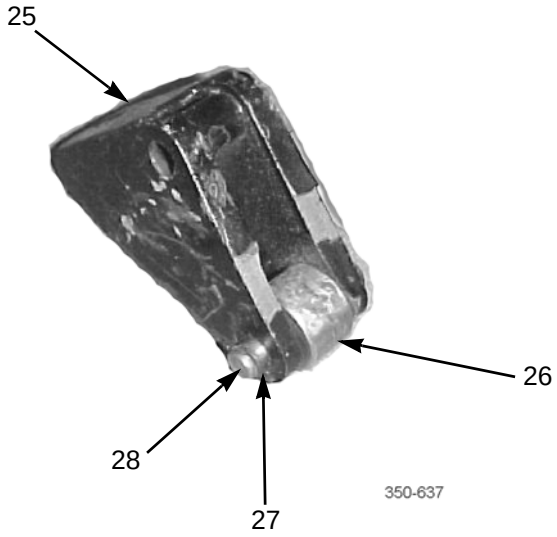


DISASSEMBLY - CONTINUED

5. Remove two retaining rings (19), shaft (20), and lever (25) from steering column base (5).



6. Remove two retaining rings (27), shaft (28), and roller (26) from lever (25).



7. Remove two retaining rings (21), shaft (22), and roller (23) from brake pedal (6).
8. Remove two grease fittings (24) from brake pedal (6).

ASSEMBLY

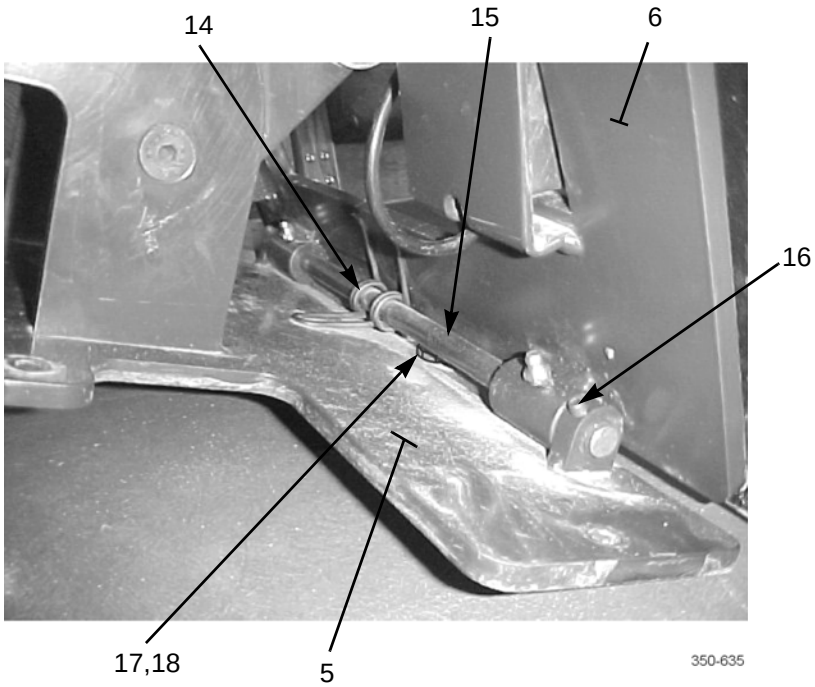
1. Install two grease fittings (24) on brake pedal (6).
2. Install roller (23) and shaft (22) on brake pedal (6) with two retaining rings (21).
3. Install roller (26) and shaft (28) on lever (25) with two retaining rings (27).
4. Install lever (25) and shaft (20) on steering column base (5) with two retaining rings (19).
5. Install jamnut (18) and screw (17) on steering column base (5) in position noted during disassembly.



WARNING

Spring must be placed under tension. Take care when installing spring. Wear protective eyewear to prevent injury to personnel.

6. Install brake pedal (6) and spring (14) on steering column base (5) with pivot rod (15) and two setscrews (16).



7. Install throttle position sensor on steering column base (WP 0062 00).
8. Install brake inching switch on brake pedal (WP 0097 00).

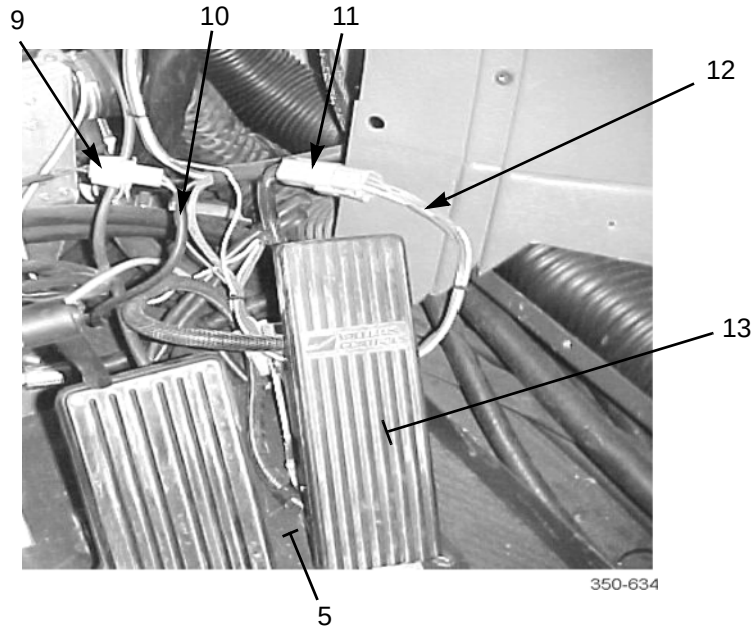
INSTALLATION

1. Position steering column base (5) on floor of cab.

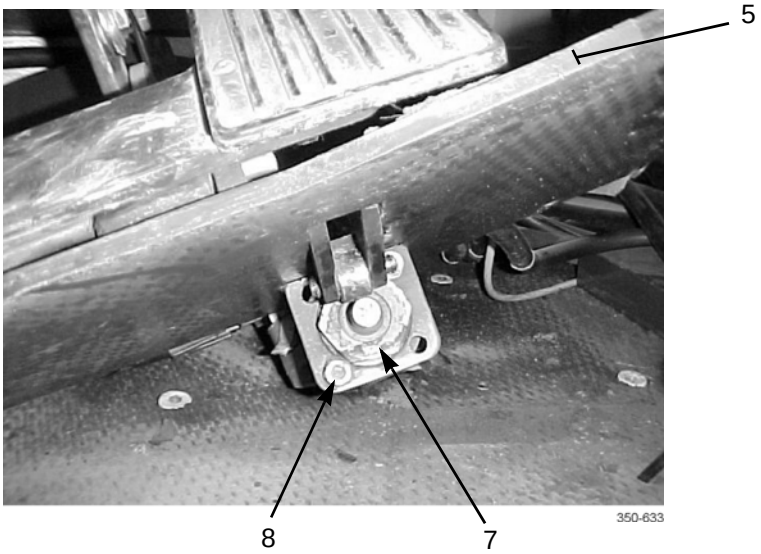
NOTE

- **Use electrically conductive grease on connectors before connection is made.**
- **Install new tiedown straps as necessary.**

2. Connect connector (9) of brake inching switch to wiring harness (10).
3. Connect connector (11) of throttle position sensor (13) to wiring harness (12).

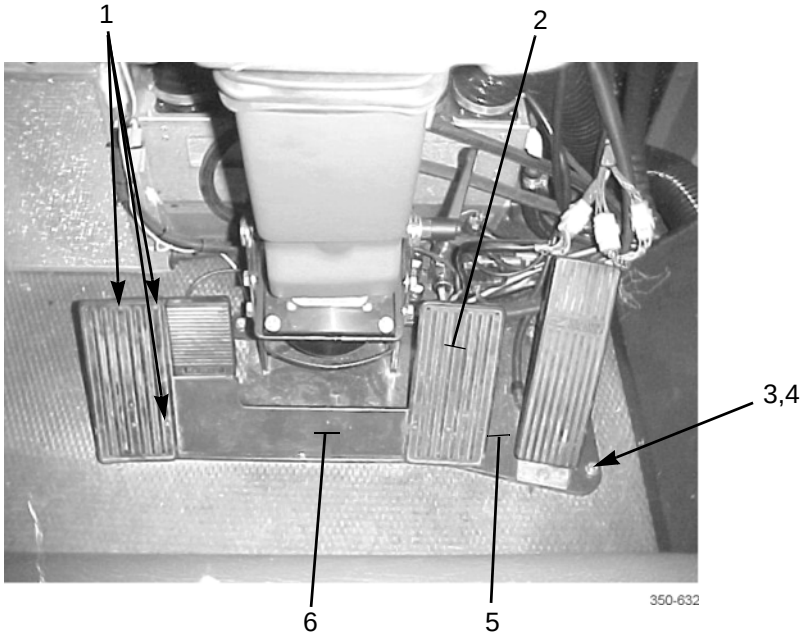


4. Install steering column base (5) on brake valve (7) with two screws (8).



INSTALLATION - CONTINUED

5. Install steering column base (5) on floor of cab with five washers (4) and screws (3).
6. Install two extension plates (2) on brake pedal (6) with six screws (1).



7. Install steering column (WP 0133 00).

END OF WORK PACKAGE

STEERING COLUMN REPLACEMENT 0133 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Grease, Electrically Conductive (Item 21, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 923828.0657) (4)

Equipment Condition

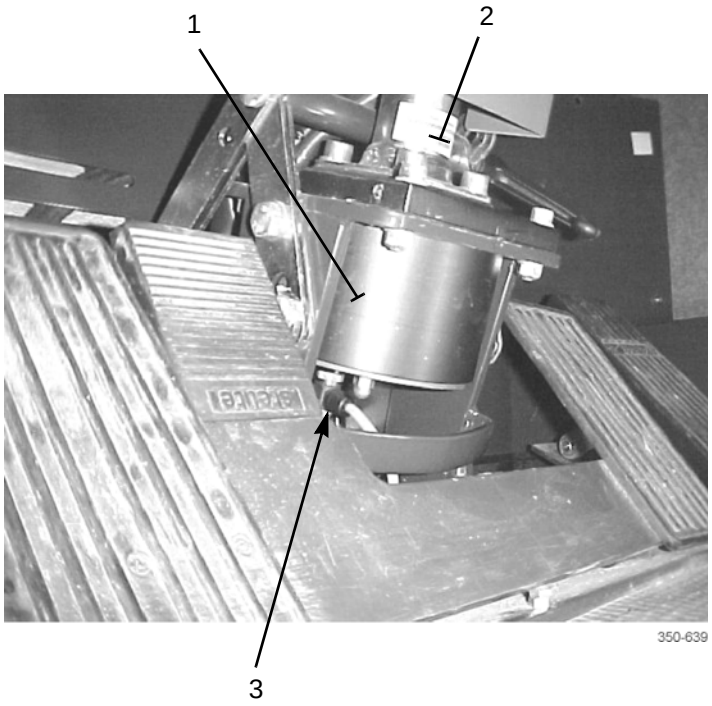
Transmission and accessory control levers removed (WP 0114 00)

REMOVAL

NOTE

Tag wires and connectors for installation.

1. Disconnect connector (3) of cable from steering column sensor (1) at lower end of steering column (2).



REMOVAL - CONTINUED

NOTE

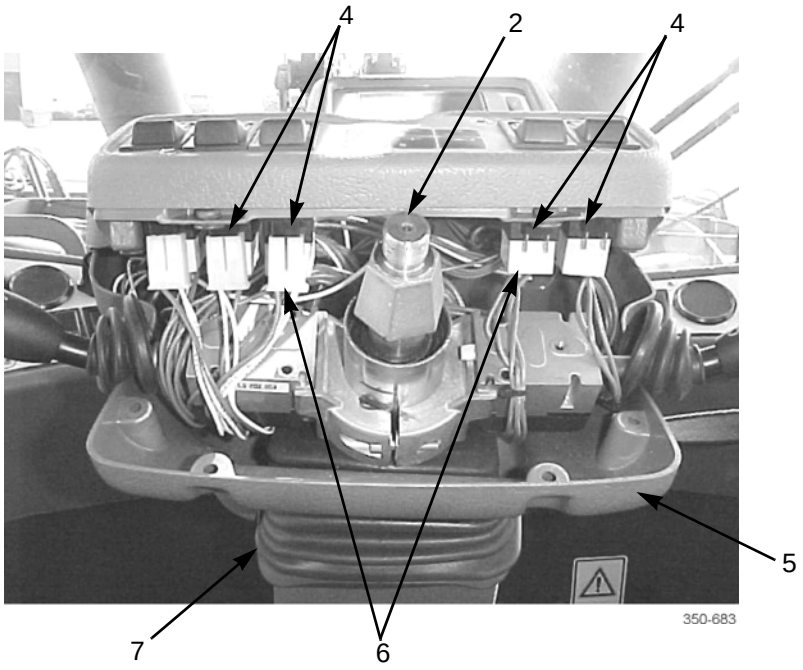
Perform steps 2 and 3 at rear of top plastic housing.

2. Disconnect eight connectors (6) from five switches (4).

NOTE

Remove and discard tiedown straps as necessary.

3. Pull each of eight connectors (6) down through bottom plastic housing (5), rubber bellows (7), and away from steering column (2).



NOTE

Perform steps 4 thru 7 at front of top plastic housing.

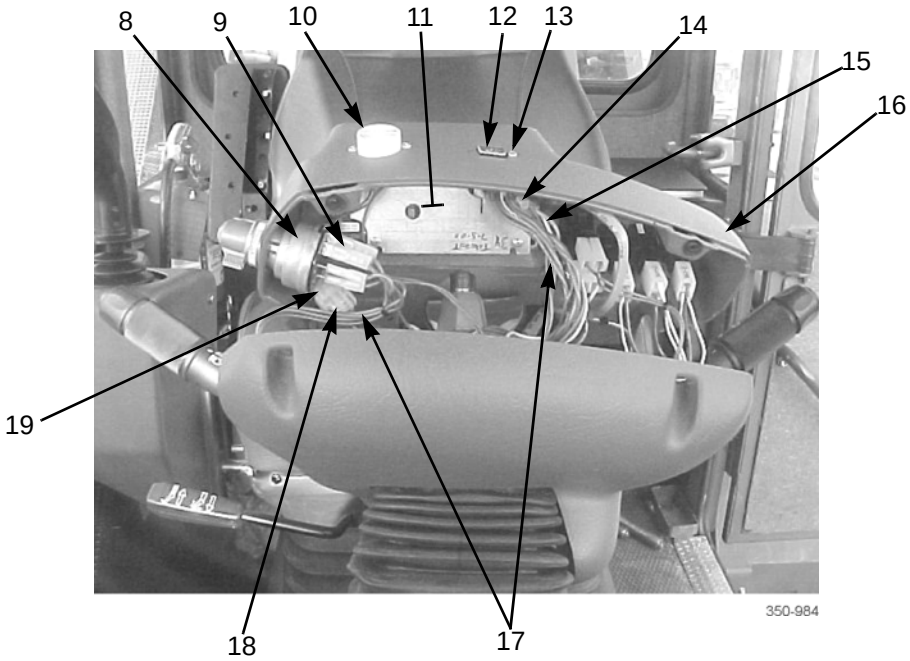
4. At top plastic housing (16) of steering column, disconnect four connectors (9) of steering column wiring harness (17) from rear of ignition switch (8).

5. Disconnect connector (18) of steering column wiring harness (17) from connector (19) of warning buzzer (10).

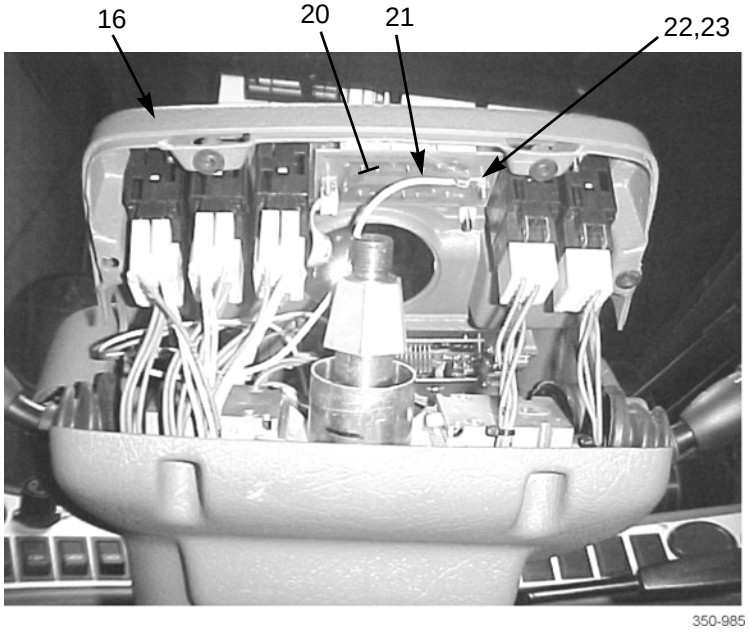
6. Remove two screws (13) and remove test connector (12).

7. Disconnect ground connector (15) and connector (14) of steering column wiring harness (17) from rear of ECS display screen (11).

REMOVAL - CONTINUED



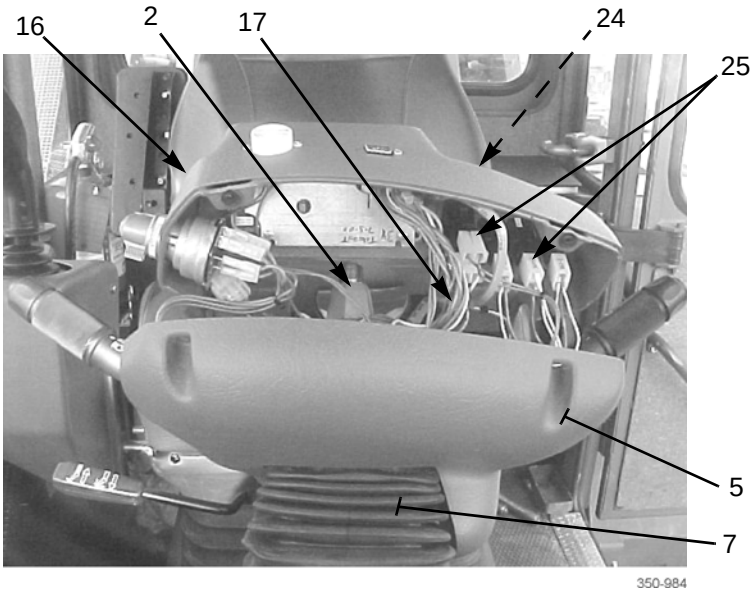
8. Trace one of two ground wires (21) down to transmission indicator light panel (20) at rear of top plastic housing (16).
9. Remove nut (22), lockwasher (23), and ground wire (21) from transmission indicator light panel (20).



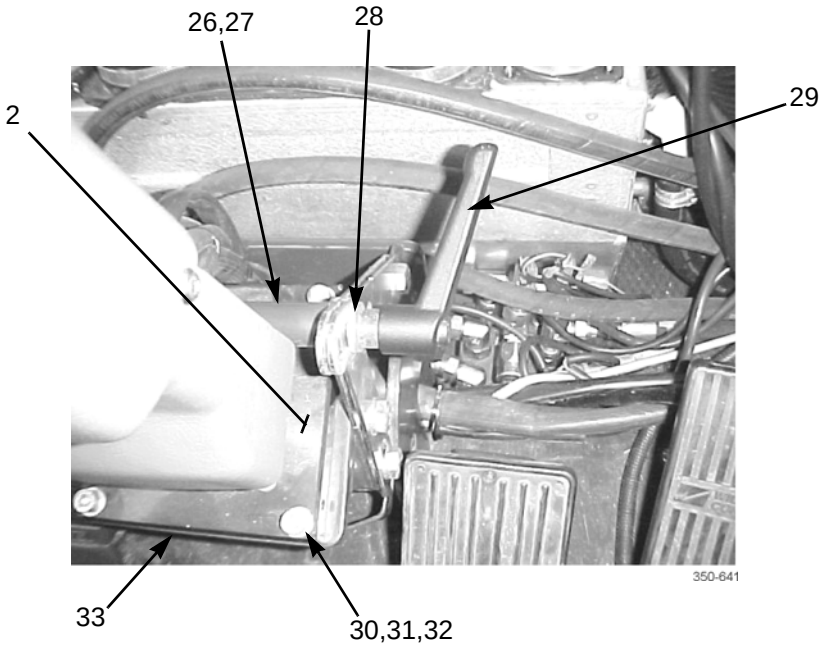
STEERING COLUMN REPLACEMENT - CONTINUED 0133 00

REMOVAL - CONTINUED

10. Disconnect five connectors (25) of steering column wiring harness (17) from five indicator lights (24).
11. Pull each of 13 connectors at front of top plastic housing (16) down through bottom plastic housing (5), rubber bellows (7), and away from steering column (2).
12. Remove top plastic housing (16) and bottom plastic housing (5) from steering column (2).



13. Remove lever (29), washer (28), bolt (27), and tube (26) from steering column base (33).
14. Remove four locknuts (30), screws (31), eight washers (32), and steering column (2) from steering column base (33). Discard locknuts.



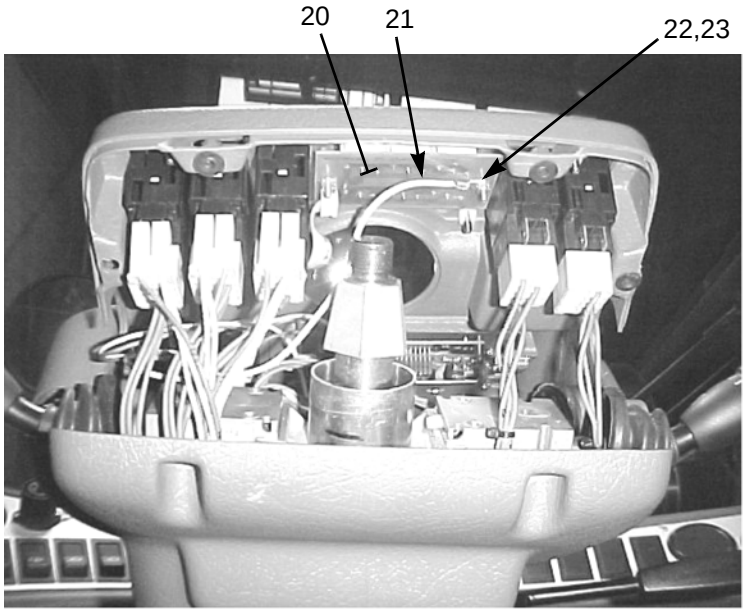
INSTALLATION

1. Install steering column (2) on steering column base (33) with eight washers (32), four screws (31), and new locknuts (30).
2. Install tube (26), bolt (27), washer (28), and lever (29) on steering column base (33).
3. Position bottom plastic housing (5) and top plastic housing (16) on steering column (2).
4. Route each of 13 connectors to steering column (2), through rubber bellows (7), and up through bottom plastic housing (5) to front of top plastic housing (16).

NOTE

- **Perform steps 5 thru 10 at front of top plastic housing.**
- **Apply electrically conductive grease to connectors before connections are made.**

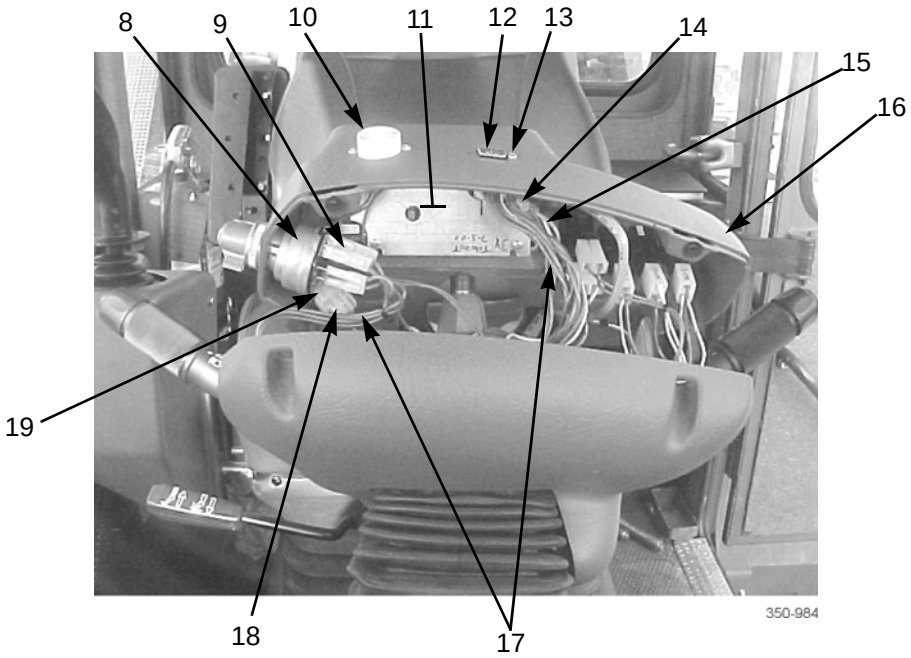
5. Connect five connectors (25) of steering column wiring harness (17) to five indicator lights (24).
6. Connect ground wire (21) to transmission indicator light panel (20) with lockwasher (23) and nut (22).



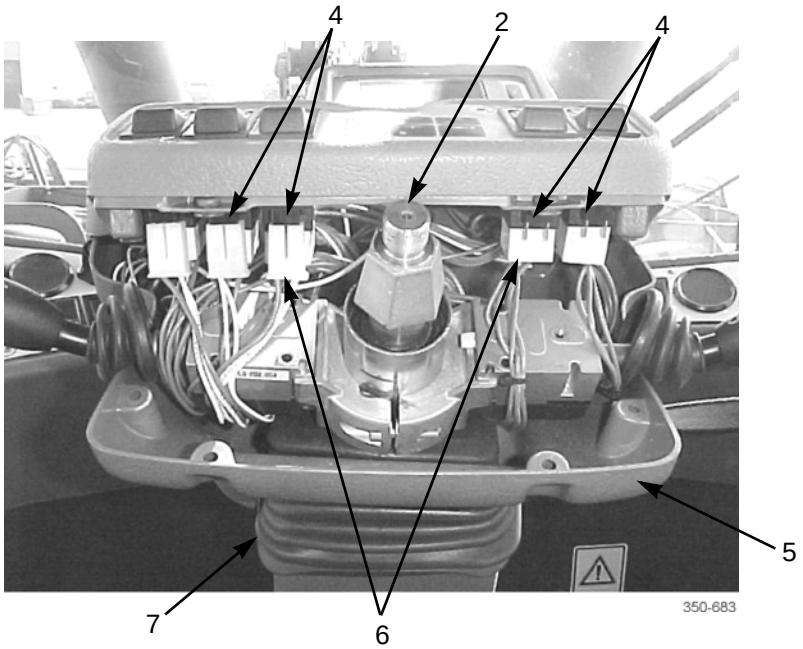
350-985

INSTALLATION - CONTINUED

7. Connect connector (14) and ground connector (15) of steering column wiring harness (17) to rear of ECS display screen (11).
8. Install test connector (12) with two screws (13).
9. Connect connector (18) of steering column wiring harness (17) to connector (19) of warning buzzer (10).
10. Connect four connectors (9) of steering column wiring harness (17) to rear of ignition switch (8).



11. Position each of eight connectors (6) on steering column (2), through rubber bellows (7), and up through bottom plastic housing (5).

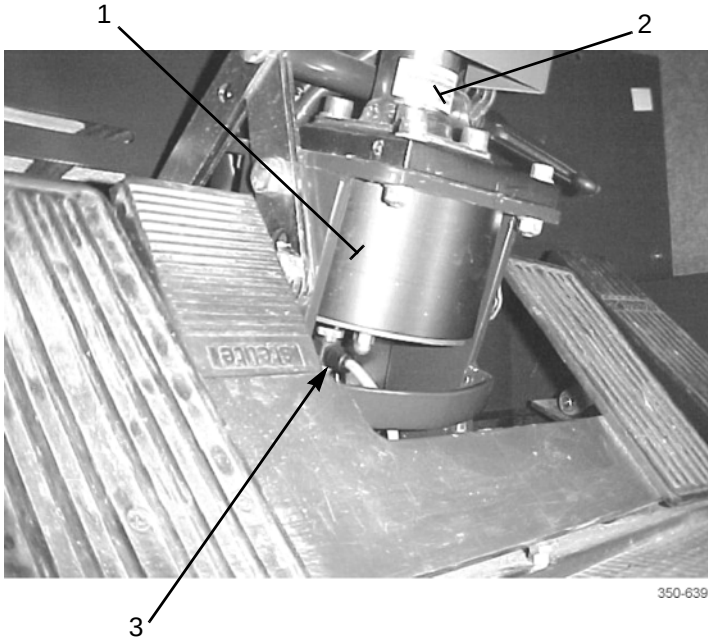


INSTALLATION - CONTINUED

NOTE

- **Install new tiedown straps as necessary.**
- **Perform step 12 at rear of top plastic housing.**

12. Connect eight connectors (6) to five switches (4).
13. Connect connector (3) of cable to steering column sensor (1) at lower end of steering column (2).



14. Install transmission and accessory control levers (WP 0114 00).

END OF WORK PACKAGE

STEERING SYSTEM HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0134 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

Steering hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Close hydraulic reservoir ball valve (25) (refer to foldout, FO-3).
2. Using illustration (foldout, FO-3) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

3. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
4. Discard O-ring(s) removed.

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Open hydraulic reservoir ball valve (25).
5. Check oil level in hydraulic reservoir (WP 0050 00).
6. Start engine (TM 10-3930-675-10), operate steering, and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

FRONT AND REAR AXLE STEERING CYLINDERS REPLACEMENT 0135 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Compound, Antiseize (Item 7, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

O-ring (P/N 923873.0001) (front) (2)

O-ring (P/N 923873.0007) (rear) (2)

References

WP 0050 00

WP 0185 00

WP 0238 00

WP 0284 00

Equipment Condition

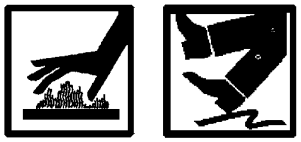
Parking brake applied (TM 10-3930-675-10)

Steering hydraulic system pressure relieved (WP 0164 00)

Hydraulic reservoir ball valve in closed position (WP 0134 00)



WARNING



- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

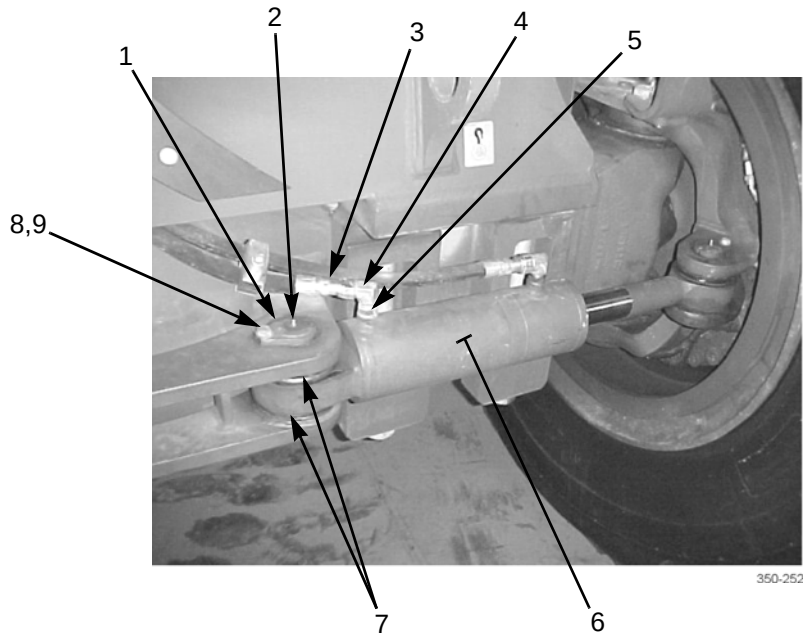
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Front and rear steering cylinders are replaced in the same manner, but are NOT interchangeable.**
- **Tag all hydraulic lines.**

REMOVAL

1. Disconnect two hydraulic hoses (3) from two elbows (4).
2. Cap/plug both hydraulic hoses (3).
3. Loosen jamnuts (5) and remove two elbows (4).
4. Remove bolt (8) and washer (9).
5. Using a hammer, tap out shaft (1) and remove grease fitting (2).
6. Remove and discard two O-rings (7).
7. Repeat steps 4 thru 6 for opposite end of cylinder (6).
8. Remove cylinder (6).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate two new O-rings (7) with lubricating oil.
2. Apply antiseize compound to shaft (1).
3. Align cylinder (6) end and two O-rings (7) on mounting bracket so shaft (1) can be installed.
4. Tap shaft (1) into place using hammer and install grease fitting (2).
5. Install washer (9) and bolt (8).
6. Repeat steps 1 thru 5 for opposite end of cylinder (6).
7. Install two elbows (4) and tighten jamnuts (5).
8. Remove cap/plug from two hydraulic hoses (3) and install hoses on two elbows (4).

INSTALLATION - CONTINUED

9. Open hydraulic reservoir ball valve (WP 0134 00).
10. Check oil level in hydraulic reservoir (WP 0050 00).
11. Lubricate two grease fittings (2) with GAA (WP 0050 00).
12. Start engine (TM 10-3930-675-10), check steering operation, and check for leaks.
13. Perform steering calibration (WP 0238 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

STEERING COLUMN SENSOR REPLACEMENT 0136 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

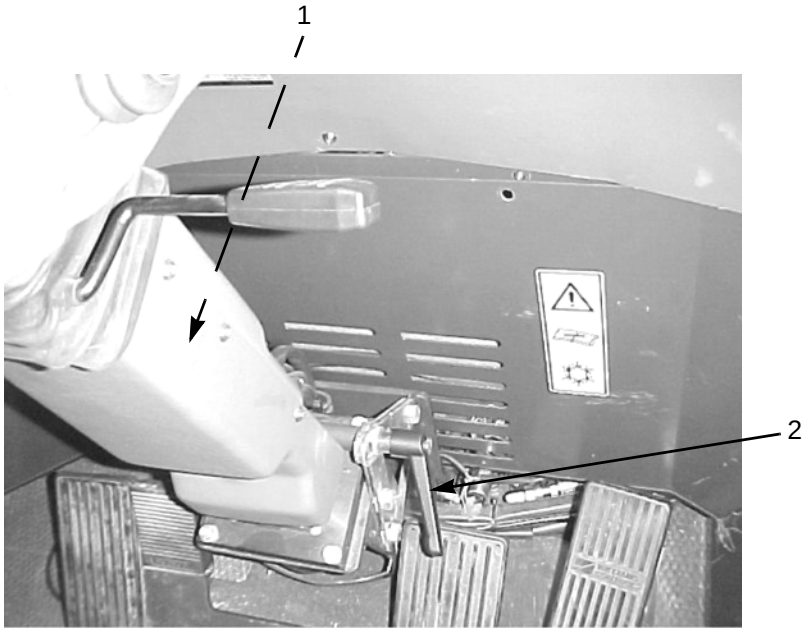
Nut, lock (P/N 923828.0657) (4)

Equipment Condition

Master battery switch in OFF position

REMOVAL

1. Using steering column tilt/extend lever (2) on right side of steering column (1), extend steering column fully up and out.

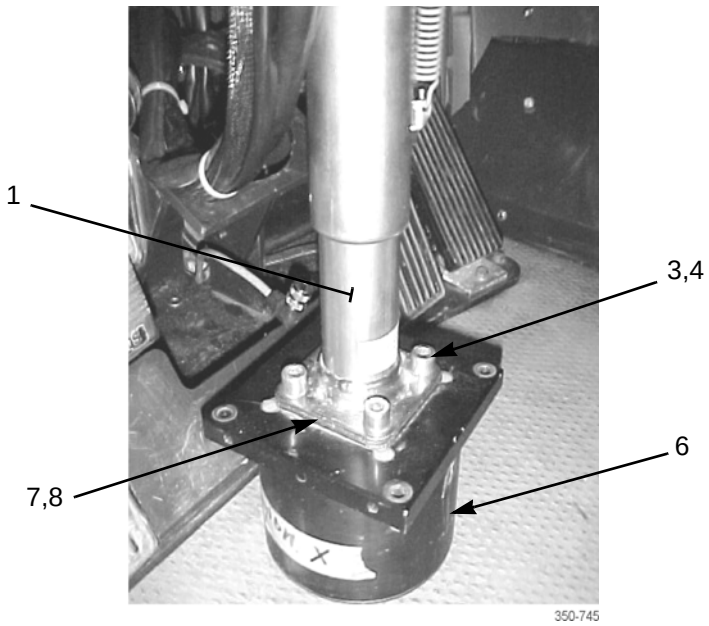


STEERING COLUMN SENSOR REPLACEMENT - CONTINUED 0136 00

REMOVAL - CONTINUED

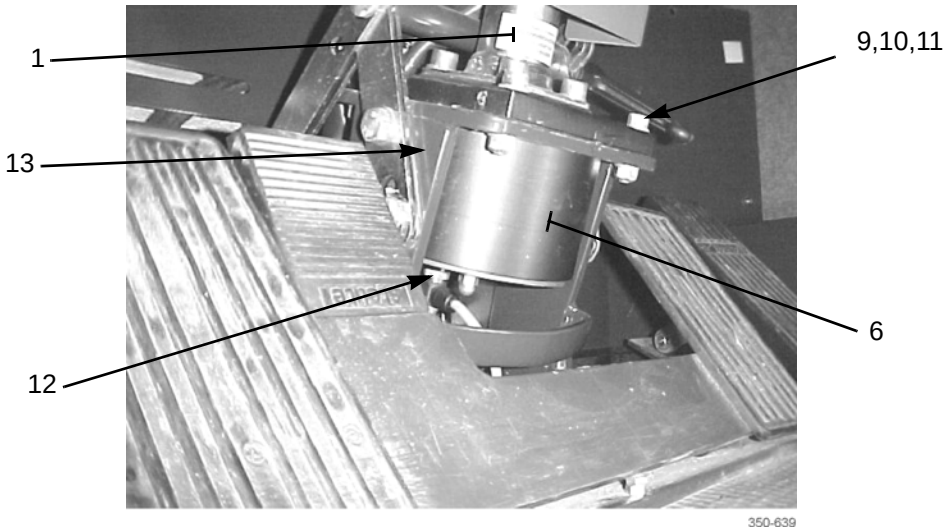
2. Remove four screws (3) and washers (4) from steering column base (13) and slide steering column (1) away from steering column sensor (6).

3. Slide steering column (1) off to one side and remove paper gasket (7) and metal plate (8) from steering column sensor (6).



4. Remove four locknuts (9), screws (10), and eight washers (11). Discard locknuts.

5. Lift steering column sensor (6) up from steering column base (13) and disconnect cable connector (12) from steering column sensor.

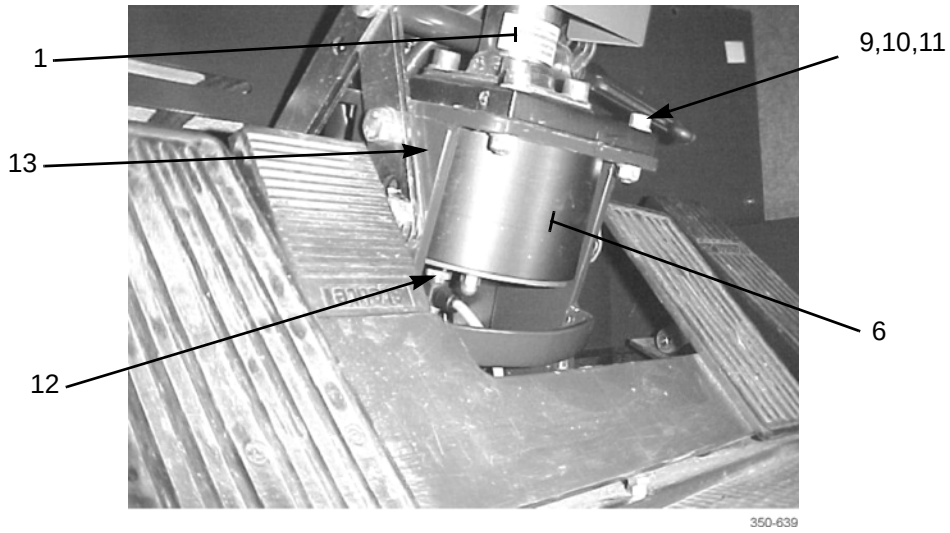


INSTALLATION

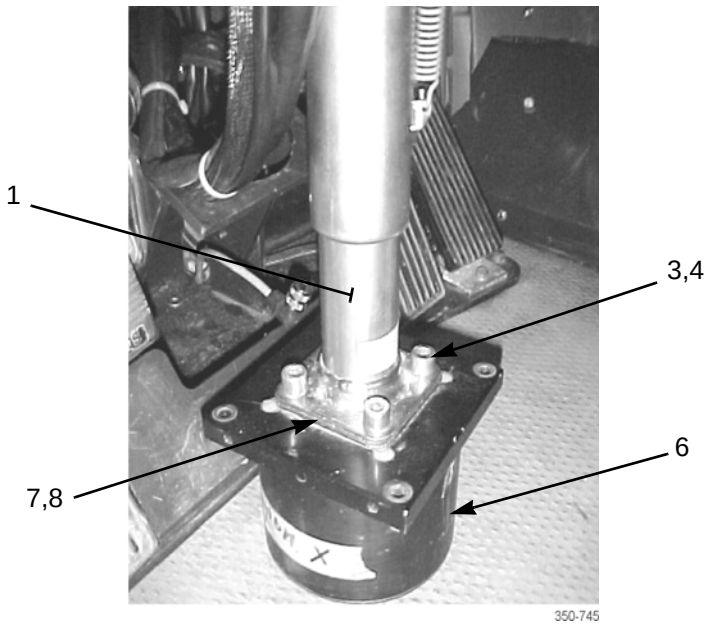
NOTE

Position flange with TOP mark on steering column sensor facing forward with connector in lowest possible position.

1. Connect cable connector (12) to steering column sensor (6).
2. Position steering column sensor (6) in steering column base (13).
3. Install four screws (10), eight washers (11), and four new locknuts (9).



4. Position metal plate (8), paper gasket (7), and steering column (1) on steering column sensor (6).
5. Install four washers (4) and screws (3) on steering column (1).



INSTALLATION - CONTINUED

6. Using steering column tilt/extend lever (2), place steering column (1) in operating position.



END OF WORK PACKAGE

TOW PINTLE REPLACEMENT 0137 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tools and Special Tools - Continued

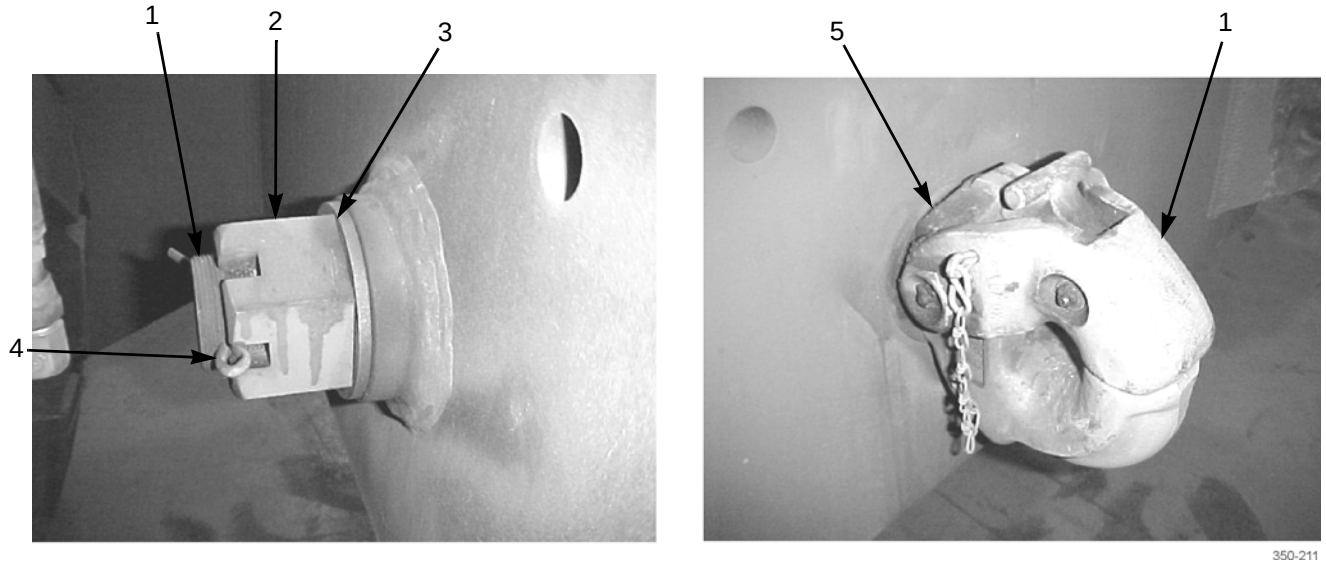
Wrench, Adjustable (Item 135, WP 0289 00)

Materials/Parts

Pin, Cotter (P/N XB-773)

REMOVAL

1. Remove cotter pin (4), nut (2), and washer (3) from threaded shaft of tow pintle (1). Discard cotter pin.
2. Remove tow pintle (1) and washer (5) from rear of vehicle.



INSTALLATION

1. Position washer (5) and tow pintle (1) at rear of vehicle. Install washer (3) on threaded shaft.
2. Install nut (2) on threaded shaft hand-tight, until nut contacts washer (3), then back off nut 1/6 turn. Install new cotter pin (4).

END OF WORK PACKAGE

CAB TRANSPORT LIFT MAINTENANCE 0138 00

THIS WORK PACKAGE COVERS

Cab Transport System: Inspection
Cab Transport System: Adjustment
Cab Transport Lift: Removal, Installation
Cab Transport Lift Structure: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)
Shop Equipment, Common No. 1 (Item 107, WP 0289 00)
Sling, Nylon (Item 112, WP 0289 00)
Truck, Forklift, 4,000-lb capacity

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)
Nut, lock (P/N 920076.003) (4)
Nut, lock (P/N 920076.007) (8)
Nut, lock (P/N 5957) (9)
Pin, Cotter (P/N 3293) (2)
Washer (P/N 98154) (32)

Personnel Required

Two

References

TM 10-3930-675-10
WP 0142 00
WP 0155 00
WP 0156 00
WP 0173 00
WP 0174 00
WP 0181 00

Equipment Condition

Wheels chocked
Left-side stair assembly removed (WP 0140 00)



WARNING

DO NOT perform maintenance under cab when it is elevated on the cab transport lift. Fully move the cab to the operational position when the procedure indicates a cab movement. Failure to follow this warning may result in injury or death to personnel.

CAUTION

Always move cab slowly between operational and transport positions to prevent moving receptacles out of position.

NOTE

Thoroughly inspect cab transport system for wear and damage before attempting any adjustment or replacement procedures.

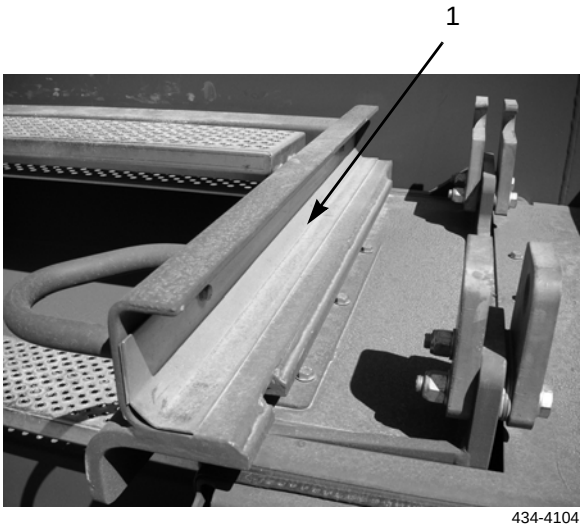
CAB TRANSPORT SYSTEM INSPECTION

1. In operational position, inspect rail guides (1) for excessive wear or damage.

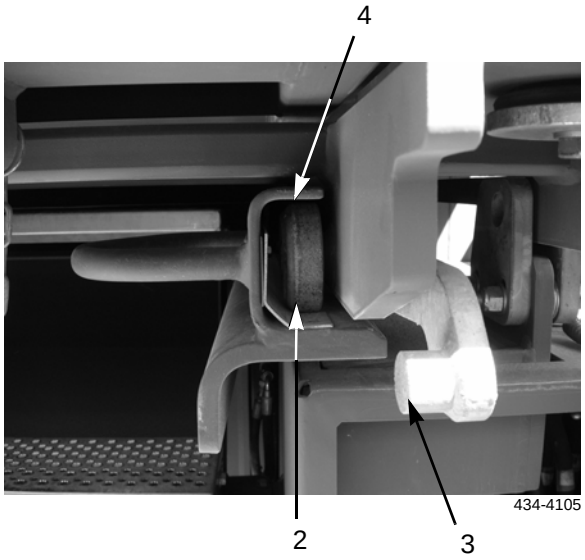
CAUTION

Excessive clearance between the tapered part of the cab rollers and the taper of the rail guides can cause binding of cab during cab movement.

2. Move cab to transport position (TM 10-3930-675-10) and check for smooth movement of cab on rail guides (1). Support frame assembly (4) and inspect rail guides for excessive wear or damage.
3. Check cab rollers (2) and locking bars (3) for proper operation, excessive wear, or damage.
4. Replace cab transport system components, as needed (refer to *Cab Transport Lift Removal and Installation*).



434-4104



434-4105

5. Inspect and replace, as needed, cab sliding cylinder (WP 0174 00), cab lifting cylinder (WP 0173 00), and/or hydraulic hoses and fittings (WP 0181 00).
6. Return cab to operational position (TM 10-3930-675-10) and fully raise cab transport lift. Check cab transport lift for height alignment with cab support frame (4).
7. Visually check alignment of rail guides (1) at tapered edge of rail guides, and alignment between cab transport lift and cab support frame (4).

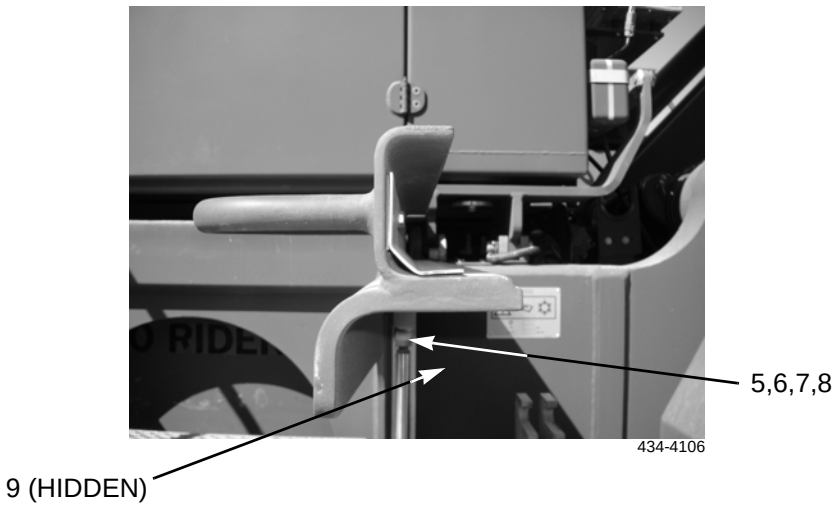
NOTE

Each cab lifting cylinder has an adjustable clevis on the rod of cylinder.

CAB TRANSPORT SYSTEM INSPECTION - CONTINUED

8. Check for cab transport lift height alignment.

   a. If cab transport lift height is not aligned, adjust cab lifting cylinder height (WP 0173 00). Properly support cab lift transport and remove pin (5) from cylinder clevis (6) to lower cylinder (7). Loosen jamnut (8) below clevis and turn clevis to adjust height alignment of wear plates (9).



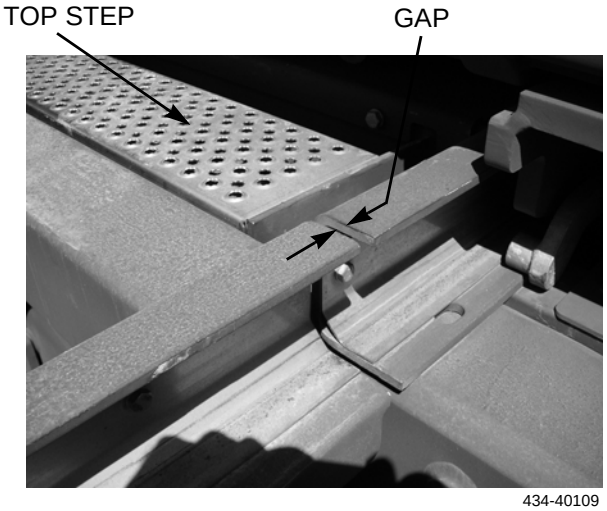
   b. If cab lift transport and cab support frame (4) are not aligned, check cab lift transport for worn plates (refer to *Cab Lift Structure Removal*). Raise cab lift transport and check gap between cab lift transport and cab support frame. Maximum allowable gap is 0.75 in. (19 mm) as shown.

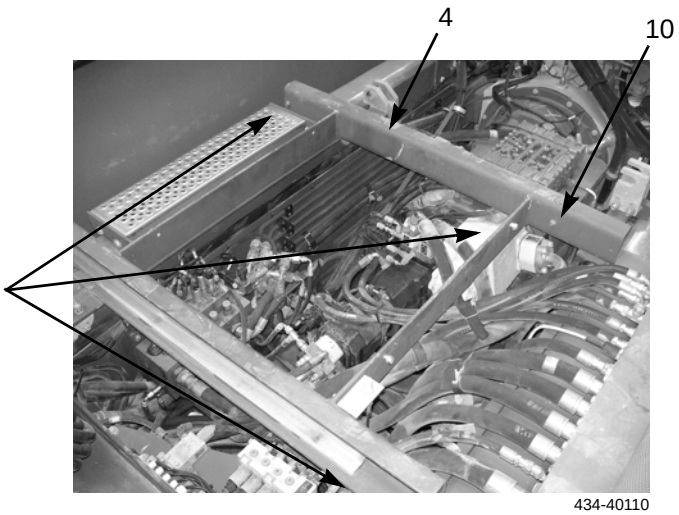
9. Move cab to transport position (TM 10-3930-675-10).

10. Loosen four bolts (10) on cab support frame (4) and make small alignment adjustments.

11. Tighten four cab support frame bolts (10).

12. Move cab back and forth several times to check for proper operation.



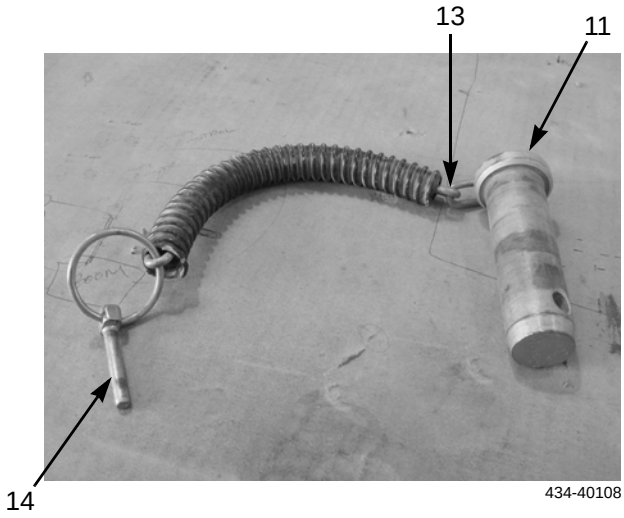


CAB TRANSPORT SYSTEM INSPECTION - CONTINUED

13. Inspect cab pins (11) and receptacles (12) for wear, damage, or rust. Clean pins and lightly lubricate with lubricating oil.
14. Check for missing retaining pins (14) and attachment chains (13).



434-40107



434-40108

CAB TRANSPORT SYSTEM ADJUSTMENT

NOTE

- **Before performing any adjustment procedures, check clearances and alignment of cab pin receptacles with the cab in both operational and transport positions. Check for pin alignment in the U-shaped receptacles (at right side of cab, front, and rear) and at receptacles on cab left side.**
- **A light source, a mirror, and a stiff wire approximately 3 ft (1 m) long with a 2-in. (5-cm) right angle bend will aid in checking for clearances in hard to reach areas.**

CAB ADJUSTMENT: OPERATIONAL POSITION

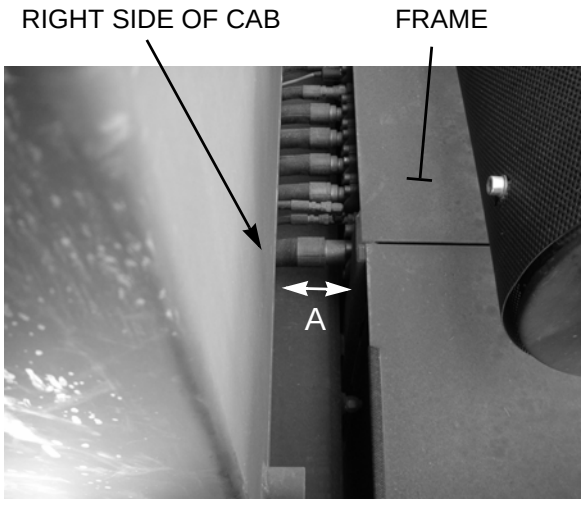
1. Remove cab pins (11). Turn auxiliary pump on and move cab fully to operational position. Turn auxiliary pump off (TM 10-3930-675-10).

NOTE

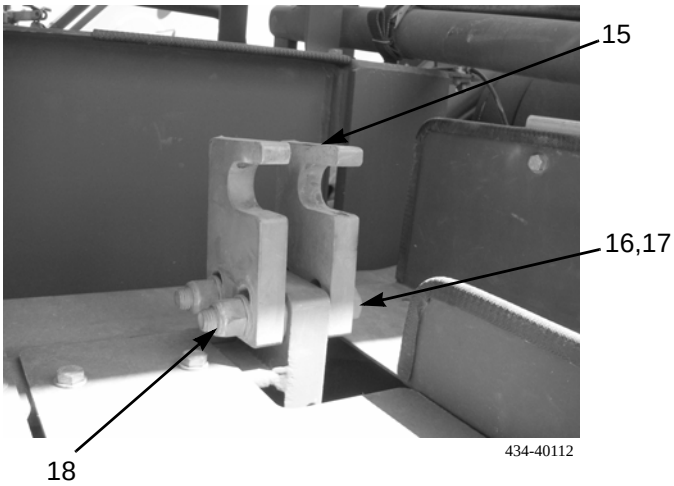
- **Tag or mark shims, nuts, and washers to ensure the same order of replacement during installation.**
- **Mark position of receptacle before loosening nuts.**
- **Use one of the cab pins as a guide for aligning the two halves when tightening the bolts.**

2. Measure distance (A), between right-side cab wall and hydraulic mounting support. Starting point measurement should be 4-9/16 ± 1/8 in. (11.6 ± 3.2 cm) as shown.
3. Move cab to transport position (TM 10-3930-675-10).
4. Remove front and rear access cover plates (WP 0142 00) to access right side cab pin receptacles.
5. Loosen bolts (16), washers (17), and nuts (18) enough to adjust receptacles (15).
6. Tighten bolts enough to allow for adjustment.
7. Slowly move cab back to operational position, stopping at (A) (4-9/16-in. measured position).

CAB ADJUSTMENT: OPERATIONAL POSITION - CONTINUED

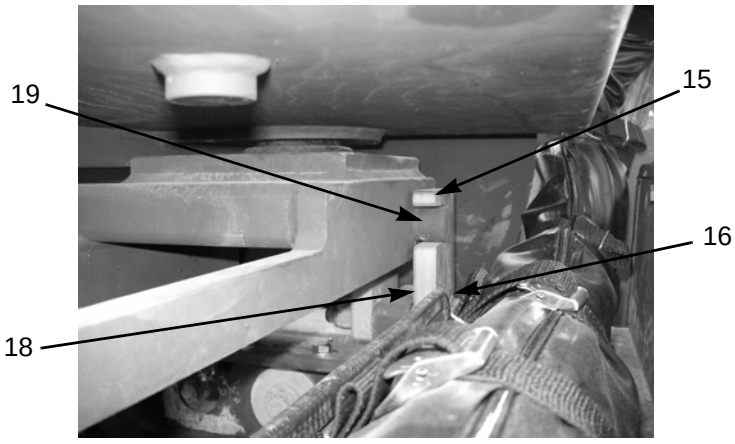


434-40111



434-40112

8. Tap right rear receptacle (15) into place around pin frame (19).
9. Keep U-shaped receptacle slot level and center pin (19) in slot.
10. Raise cab lift transport and move cab to transport position to access adjusted receptacle (15).
11. Tighten receptacle bolts (16) and nuts (18) to 180 lb-ft (244 Nm).



434-40113

CAB ADJUSTMENT: OPERATIONAL POSITION - CONTINUED

12. Move cab slowly back to operational position. Operate cab side movement control until right rear pin (20) is seated in receptacle (23) and until cab stops.
13. Tap right front receptacle in place around frame pin (20).
14. Keep U-shaped receptacle slot level and center pin (20) in slot.
15. Raise cab lift transport and move cab to transport position to access adjusted receptacle (23). Tighten two receptacle bolts (22) and nuts (21) to 180 lb-ft (244 Nm).
16. Move cab back and forth several times and check adjustments of two right receptacles to cab maintains 4-9/19-in. gap. Cab should stop at same position each time, and receptacles should not move when pins are fully seated or until cab stops.

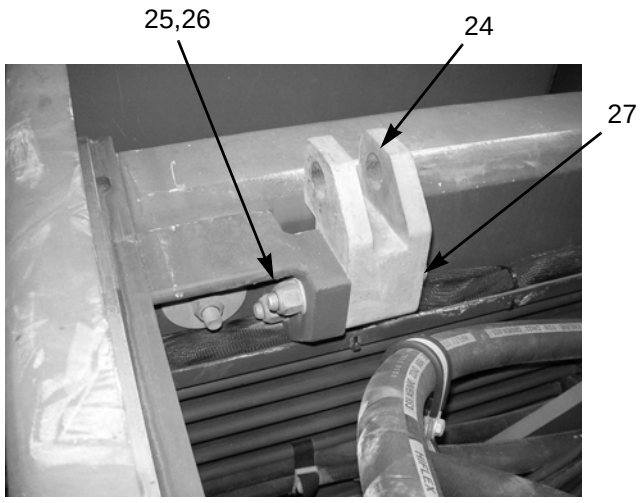


434-40114

17. Move cab to transport position. Remove and discard two nuts (25) and washers (26) on two left, front, and rear receptacles (24).
18. Install two new nuts (25) and washers (26) and tighten bolts (27) just enough to allow for adjustment.
19. Move cab back to operational position and ensure cab is fully seated in right-side receptacles.



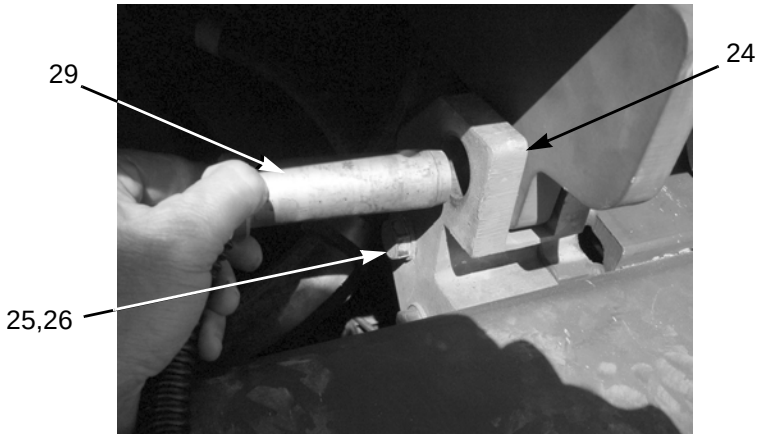
434-40115



434-40116

CAB ADJUSTMENT: OPERATIONAL POSITION - CONTINUED

20. Tap left-side receptacles (24) in place to receive cab pins (28). Ensure receptacles (24) are as level as possible and insert pin (28) into hole to center receptacles as closely as possible.
21. Slowly move cab to transport position. Tighten receptacle bolts (27) and nuts (25) to 180 lb-ft (244 Nm).



434-40117

22. Move cab back and forth several times to check pin alignment and proper operation.
23. Install front and rear access covers (WP 0142 00).

CAB ADJUSTMENT: TRANSPORT POSITION

WARNING

DO NOT perform maintenance under cab when it is elevated on the cab transport lift. Fully move the cab to the operational position when the procedure indicates a cab movement. Failure to follow this warning may result in injury or death to personnel.

CAUTION

- **Always move cab slowly between operational and transport positions to prevent moving receptacles out of position.**
- **Damage to the proximity switch can occur if it projects beyond the proximity switch guard.**

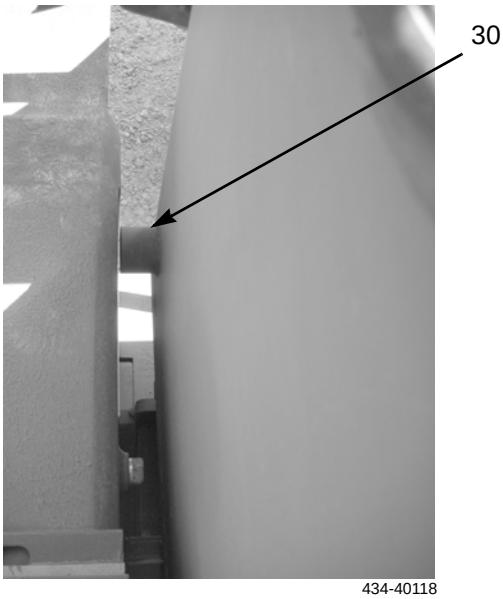
NOTE

The switch should be located approximately 0.039 in. (1 mm) inside proximity switch guard.

1. Move cab to transport position. Activate cab side movement control right until cab stops.

CAB ADJUSTMENT: TRANSPORT POSITION - CONTINUED

2. At right rear of cab and at frame, observe clearance between proximity switch guard (30) and vehicle frame. Proximity switch guard should be as close as possible to, but not applying pressure on frame.



434-40118

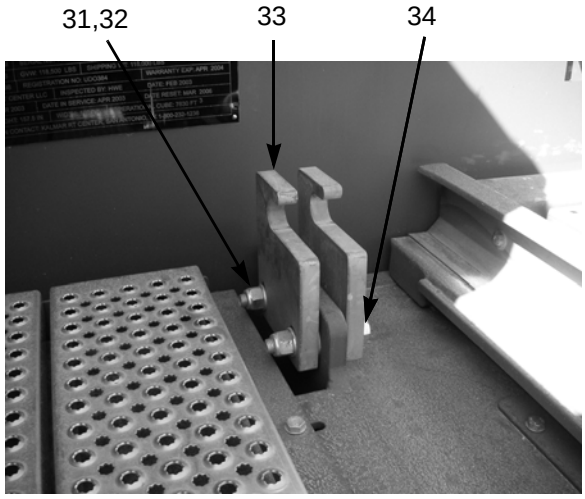
3. Move cab back to operational position.

NOTE

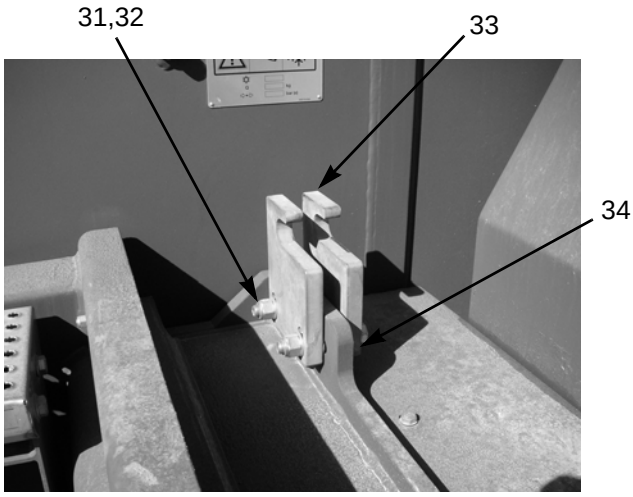
- **Tag or mark shims, nuts, and washers to ensure the same order of replacement during installation.**
- **Mark position of receptacle before loosening nuts.**
- **Use one of the cab pins as a guide when aligning the two receptacle halves when tightening the bolts.**

4. Loosen bolts (34) and nuts (31) on front and rear, right-side transport receptacles (33).
5. Remove and discard two nuts (31) and washers (32) from receptacles (33).
6. Install two new nuts (31) and washers (32) and tighten bolts (34) enough to allow for adjustment.

CAB ADJUSTMENT: TRANSPORT POSITION - CONTINUED



434-40119



434-40120

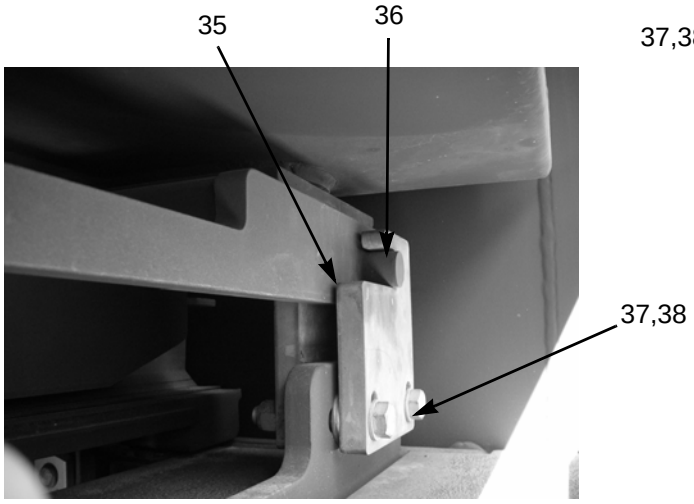
7. Slowly move cab back to transport position and stop just as proximity switch guard (30) touches frame . Ensure proximity switch guard (30) is not binding on frame.

CAB ADJUSTMENT: TRANSPORT POSITION - CONTINUED

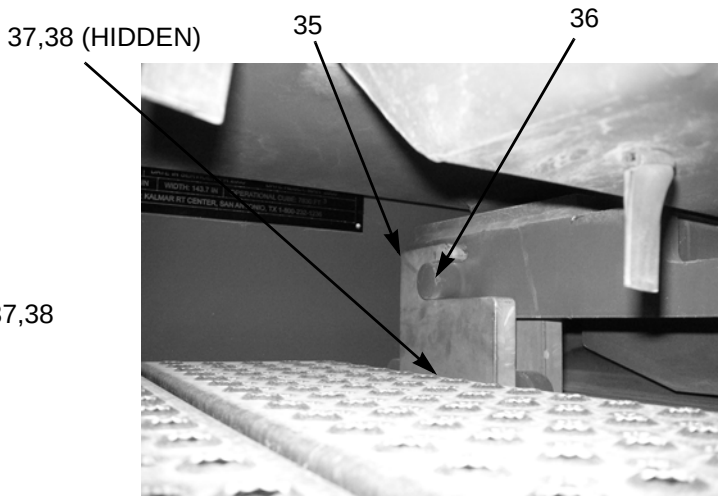
8. Tap right rear transport receptacle (35) in place around frame pin (36). Keep U-shaped receptacle slot level, and center pin in slot.
9. Slowly move cab back to operational position to access adjusted receptacle (35).
10. Tighten receptacle bolts (37) and nuts (39) to 180 lb-ft (244 Nm).
11. Move cab back to transport position. Ensure cab pin (36) is fully seated in frame right front transport receptacle (35) and ensure receptacle does not move.
12. Tap transport receptacle (35) in place around frame pin (36). Keep U-shaped receptacle slot level and center pin in slot.
13. Slowly move cab back to operational position to access adjusted receptacle (35).
14. Tighten receptacle bolts (37) and nuts (39) to 180 lb-ft (244 Nm).

NOTE

A stiff wire (approximately 3 ft (0.91 m) long with a 2-in. (5.08-cm) right angle bend) may aid in ensuring frame pins are fully seated in right transport receptacles.



434-40121

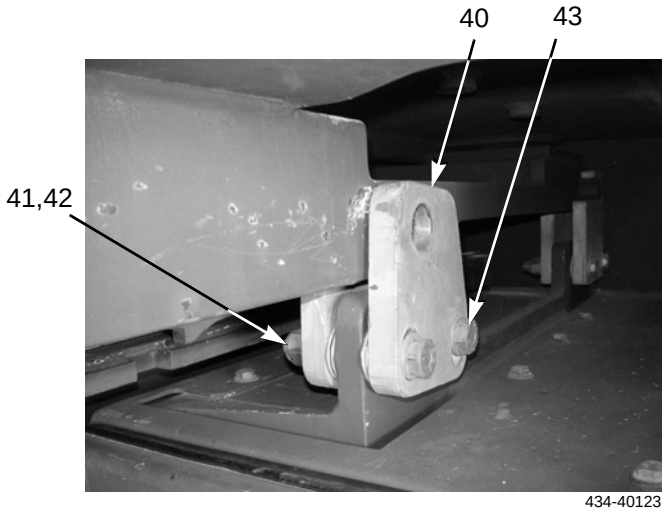


434-40122

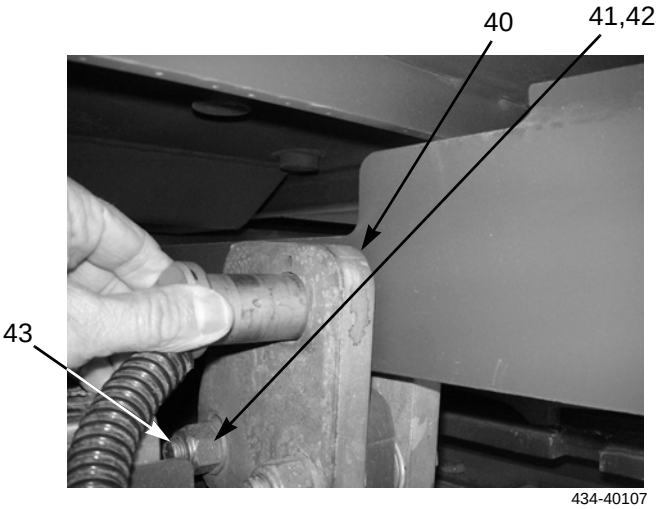
15. Move cab to operational position.
16. Remove and discard two nuts (41) and washers (42) from receptacles (40).
17. Install two new nuts (41) and washers (42) and tighten bolts enough to allow for adjustment.
18. Move cab back to transport position. Ensure cab is fully seated in right-side transport receptacles (35).
19. Tap left-side transport receptacles in place to receive cab pins (11). Ensure the receptacles are parallel and as level as possible.
20. Insert cab pin (11) in hole to center receptacles.
21. Tighten receptacle bolts (43) and nuts (41) to 180 lb-ft (244 Nm).
22. Remove cab pins (11).

CAB ADJUSTMENT: TRANSPORT POSITION - CONTINUED

23. Move cab back and forth several times to check for proper adjustment and operation.



434-40123



434-40107

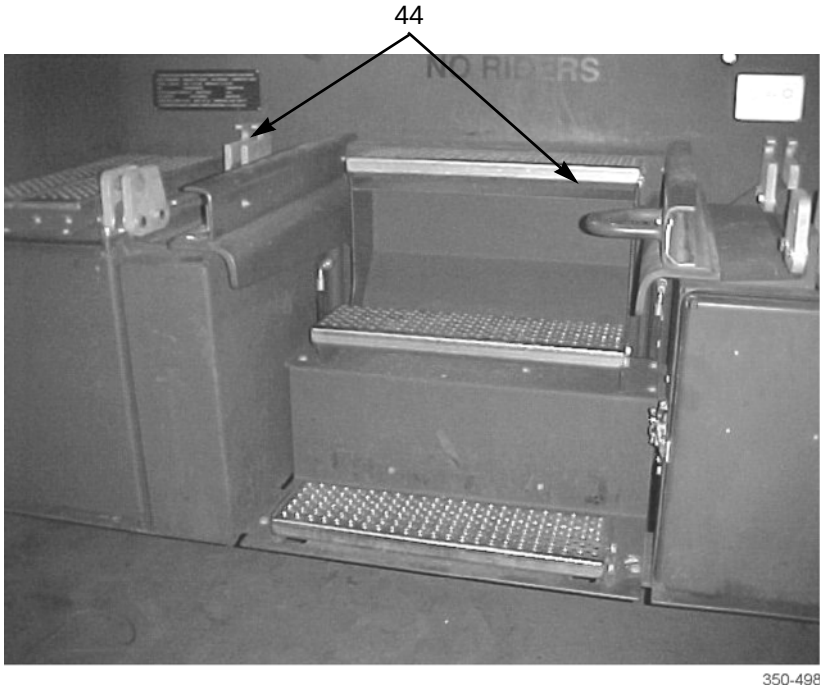
CAB TRANSPORT LIFT REMOVAL



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have a 2,000-lb (908-kg) capacity to lift cab transport lift. Failure to follow this warning may result in death or injury to personnel.**

1. Raise cab transport lift (44) approximately 6 in. (15 cm) to gain clearance to attach nylon sling (TM 10-3930-675-10).
2. Attach nylon sling to cab transport lift (44) and suitable lifting device. Take up slack in nylon sling.

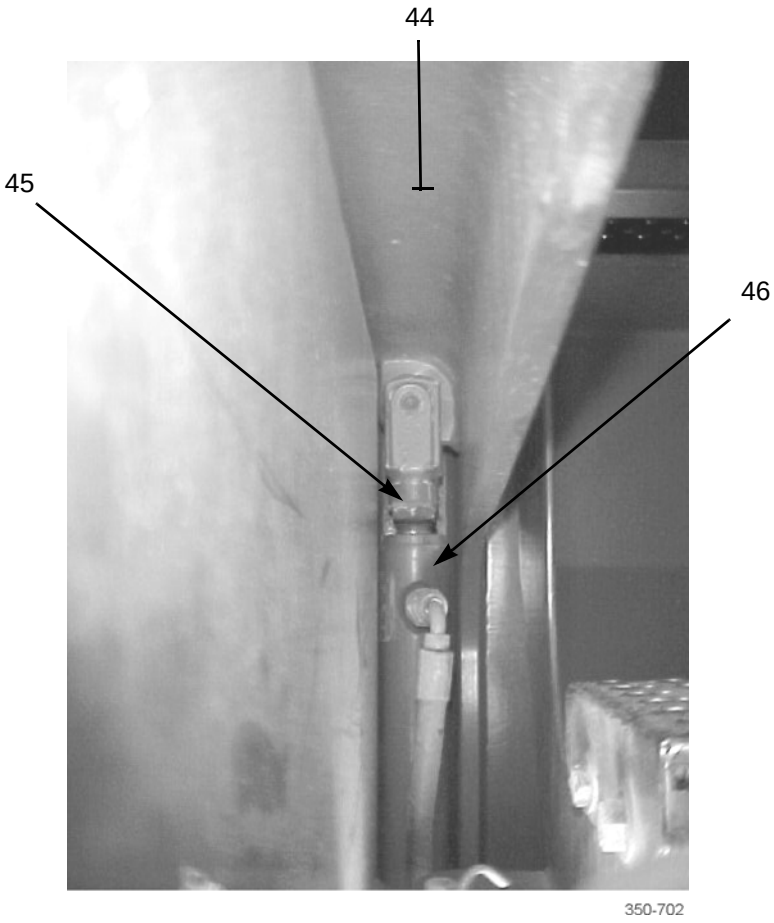


NOTE

Perform step 3 at top of each of two cab lifting cylinders.

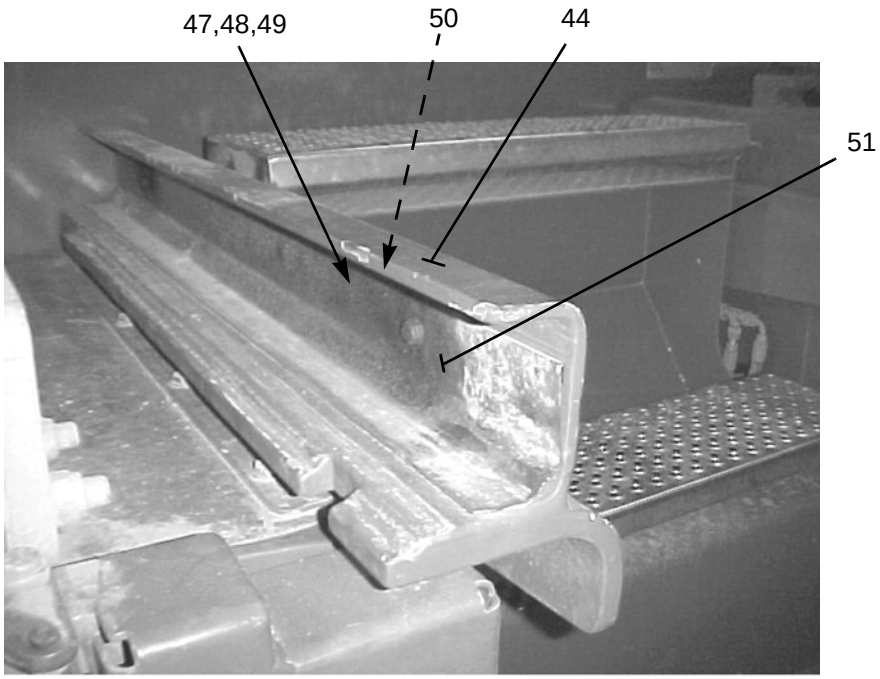
3. Pry spring clip (45) away from cab lifting cylinder (46) and remove spring clip to disconnect cylinder from cab transport lift (44).
4. With assistance, use lifting device to remove cab transport lift (44) from vehicle.

CAB TRANSPORT LIFT REMOVAL - CONTINUED



CAB TRANSPORT LIFT REMOVAL - CONTINUED

5. Remove four locknuts (47), screws (48), eight washers (49), two shims (50), and rails (51) from cab transport lift (44). Discard locknuts.



CAB TRANSPORT LIFT INSTALLATION

1. Install two shims (50) and rails (51) on cab transport lift (44) with eight washers (49), four screws (48), and new locknuts (47).

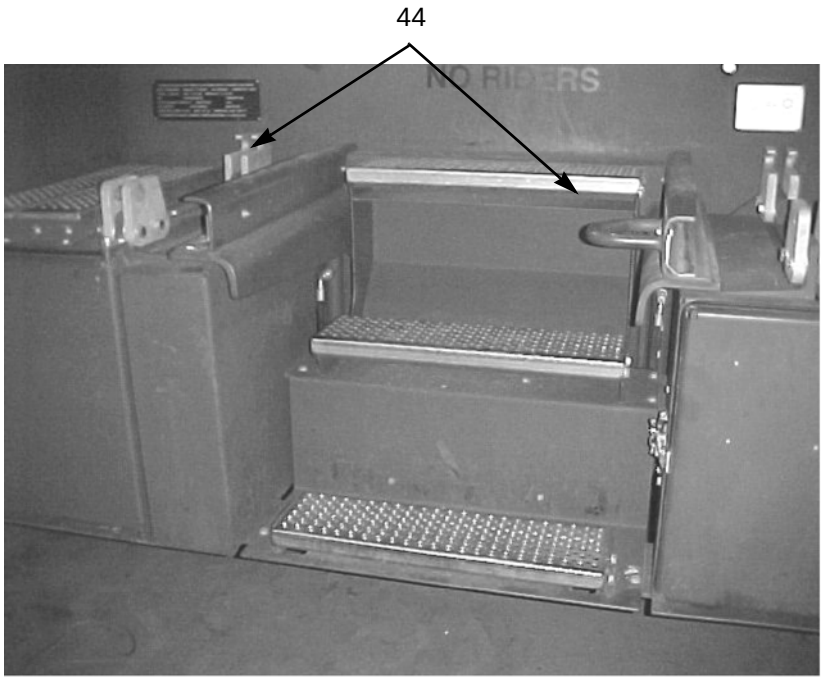


WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have a 2,000-lb (908-kg) capacity to lift cab transport lift. Failure to follow this warning may result in death or injury to personnel.**

CAB TRANSPORT LIFT INSTALLATION - CONTINUED

2. Attach nylon sling to cab lift support (44) and suitable lifting device. Take up slack in nylon sling.



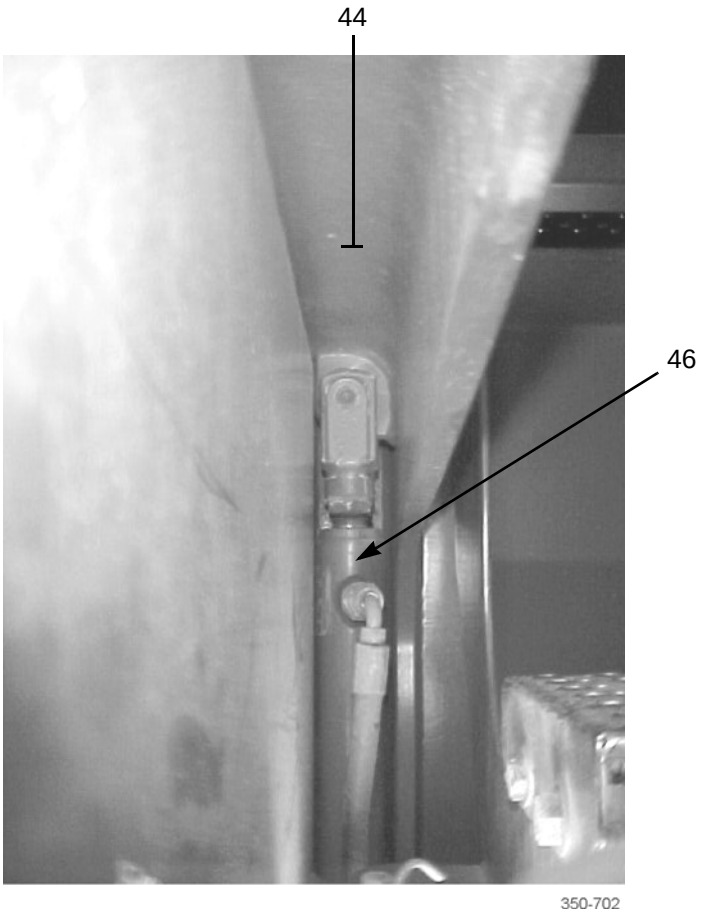
350-498

CAB TRANSPORT LIFT INSTALLATION - CONTINUED

NOTE

If a slight misalignment of components makes installation difficult, refer to *Cab Transport Lift Structure Removal*, step 3 and *Cab Transport Lift Structure Installation*, steps 2 and 7.

3. Position cab transport lift (44) on vehicle and lower cab transport lift onto cab lifting cylinders (46).

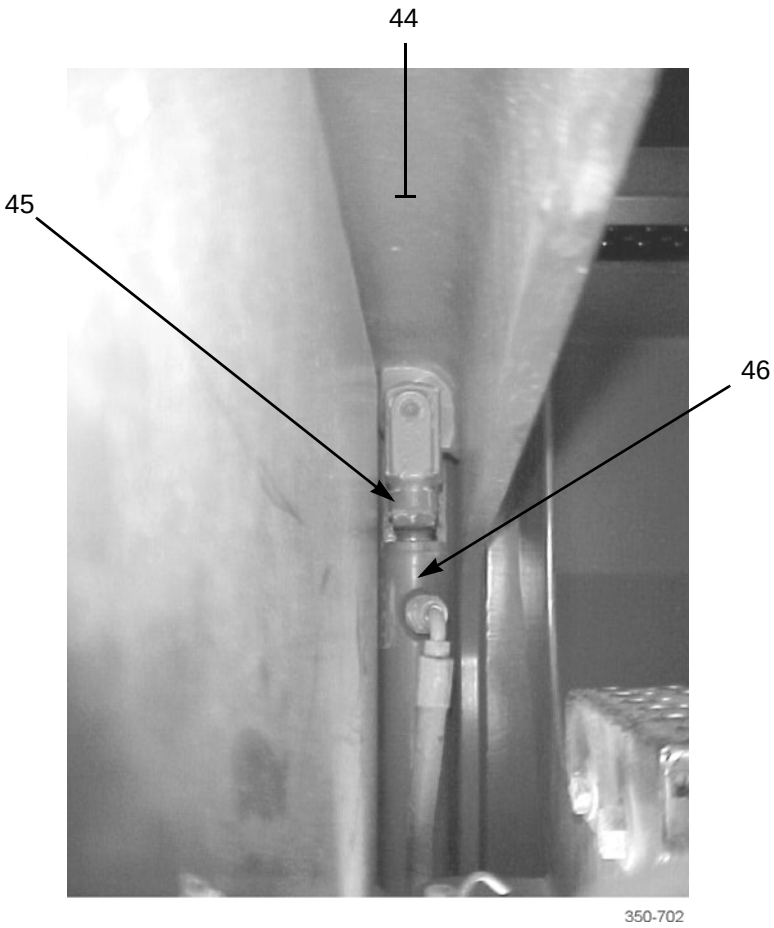


CAB TRANSPORT LIFT INSTALLATION - CONTINUED

NOTE

Perform step 4 at top of each of two cab lifting cylinders.

4. Connect cab lifting cylinder (46) to cab transport lift (44) and install spring clip (45). Ensure spring clip is fully installed.



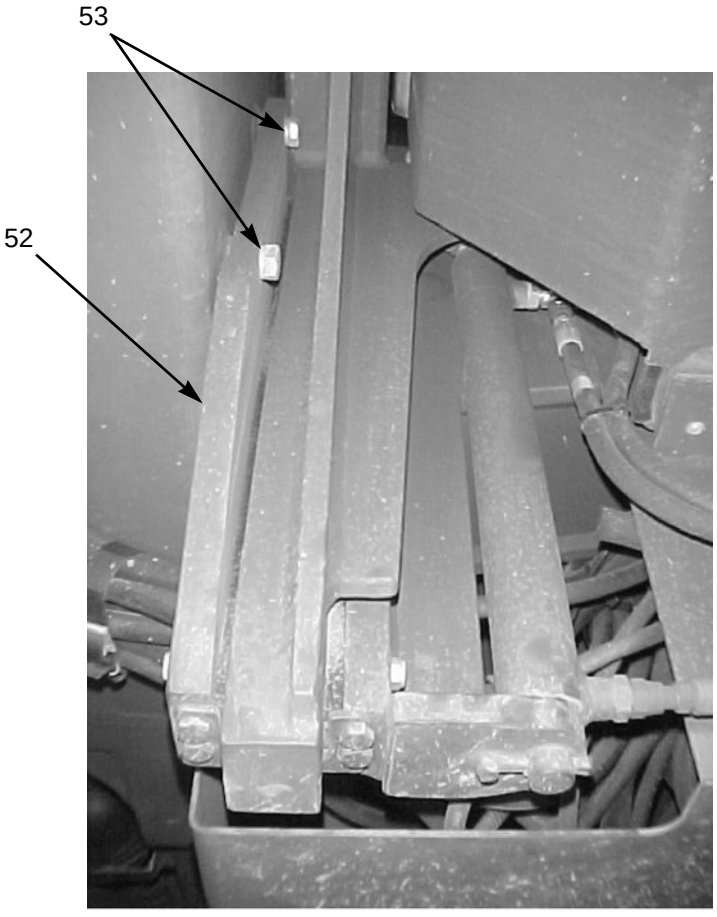
5. Install left-side stair assembly (WP 0140 00).

CAB TRANSPORT LIFT STRUCTURE REMOVAL

NOTE

Perform the following procedure only as required to remove support structure for cab transport lift from frame.

1. Remove remote hydraulic control compartment (WP 0156 00).
2. Remove battery and dolly wheels storage compartment (WP 0155 00).
3. With cab transport lift removed, loosen, but DO NOT remove, four screws (53) at each of two transport lift brackets (52).



350-704

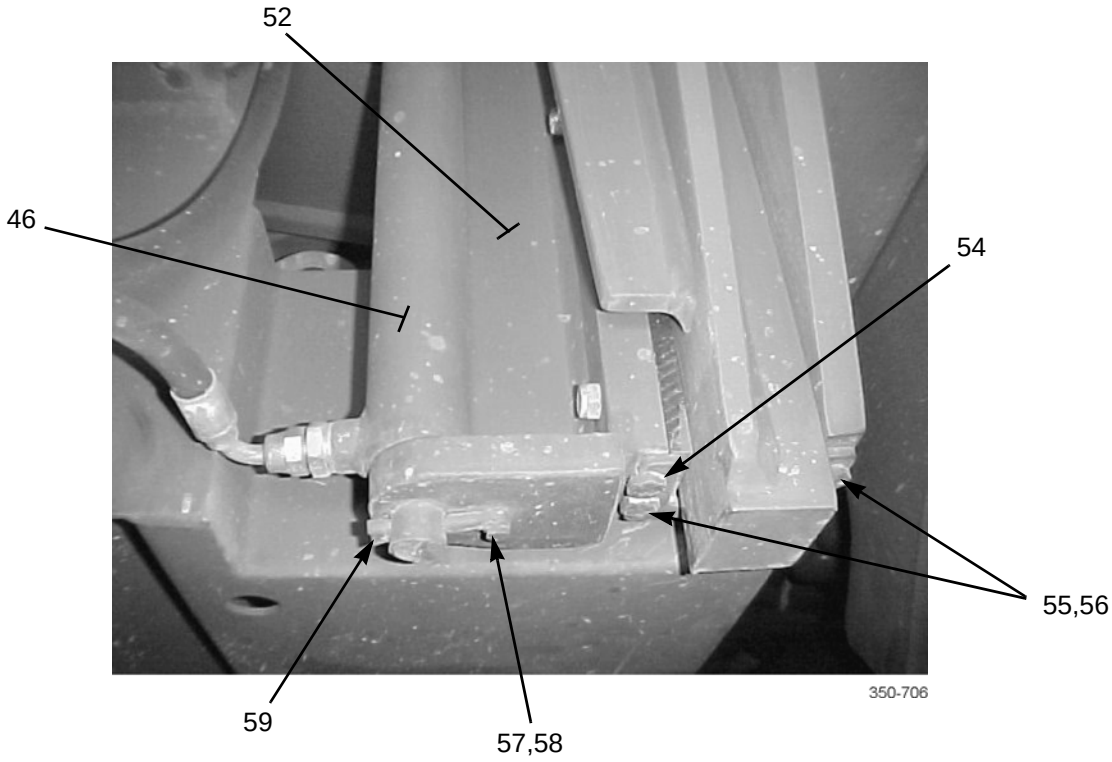
CAB TRANSPORT LIFT STRUCTURE REMOVAL - CONTINUED

4. Remove four screws (55), washers (56), and plate (54) from bottom of transport lift brackets (52).
5. Remove screw (57), three washers (58), and cotter pin (59) holding bottom of cab lifting cylinders (46) to transport lift brackets (52). Discard cotter pins.

NOTE

Hydraulic hoses are to remain connected to cab lifting cylinders. DO NOT attempt to loosen or remove.

6. Raise lifting cylinders (46) from transport lift brackets (52) and set aside.



CAB TRANSPORT LIFT STRUCTURE REMOVAL - CONTINUED



WARNING

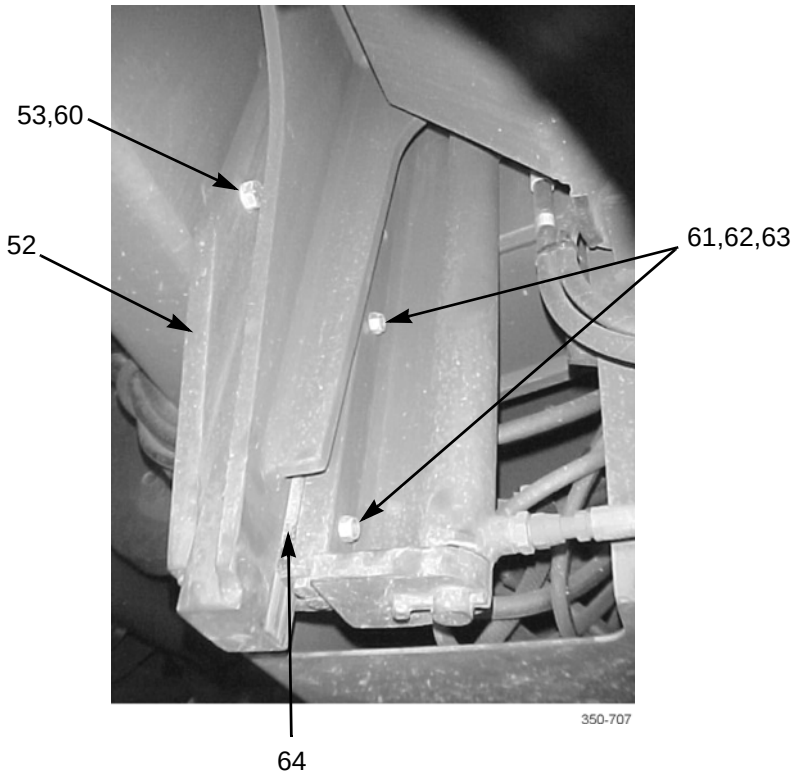
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have a 2,000-lb (908-kg) capacity to lift cab transport lift brackets. Failure to follow this warning may result in death or injury to personnel.**

7. With assistance, use a nylon sling and suitable lifting device to remove eight screws (53), 16 washers (60), and two transport lift brackets (52) from vehicle.

NOTE

Perform step 8 for each transport lift bracket.

8. Remove nine locknuts (61), screws (62), three washers (63), and three wear plates (64). Discard locknuts.



CAB TRANSPORT LIFT STRUCTURE INSTALLATION

NOTE

Perform step 1 for each transport lift bracket.

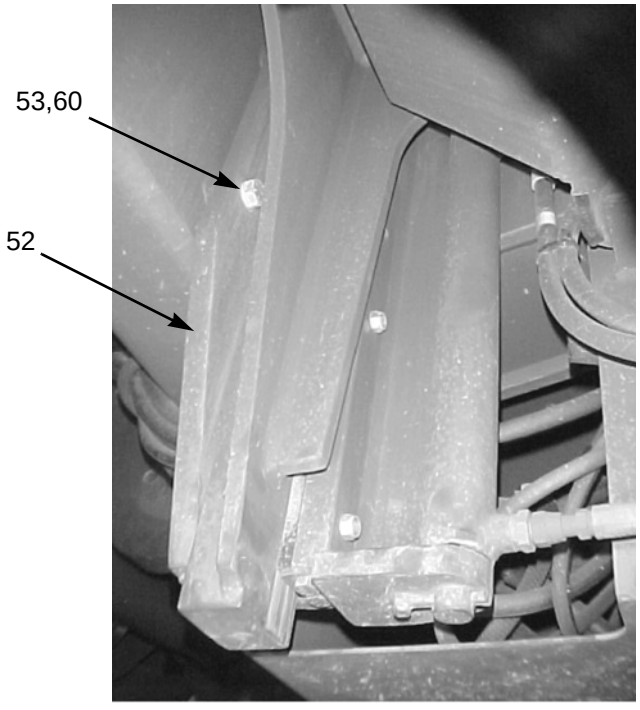
1. Install three wear plates (64) with three washers (63), nine screws (62), and new locknuts (61).



WARNING

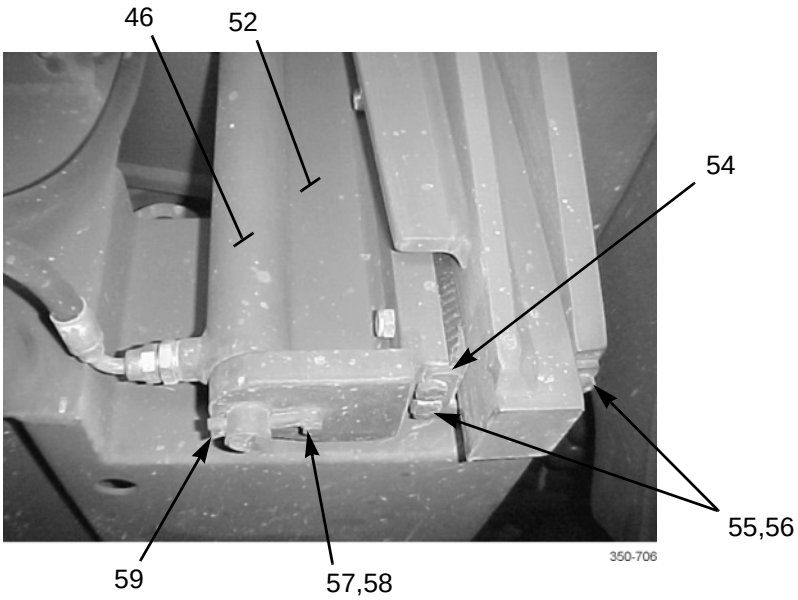
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have a 2,000-lb (980-kg) capacity to lift cab transport lift brackets. Failure to follow this warning may result in death or injury to personnel.**

2. With assistance, use a nylon sling and suitable lifting device to install two transport lift brackets (52) on vehicle with 16 washers (60) and eight screws (53). DO NOT fully tighten screws.



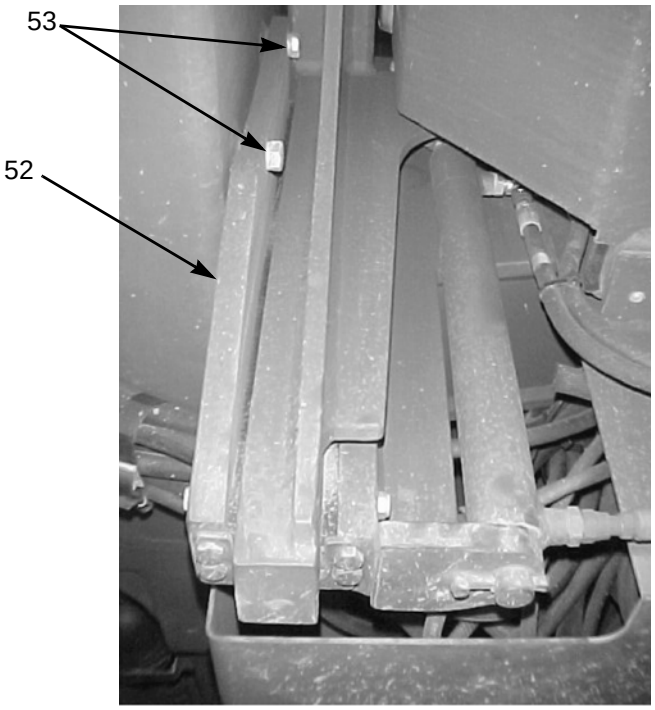
CAB TRANSPORT LIFT STRUCTURE INSTALLATION - CONTINUED

3. Place bottom of cab lifting cylinders (46) into transport lift brackets (52).
4. Install each of two cab lifting cylinders (46) on transport lift brackets (52) with new cotter pin (59), three washers (58), and screw (57).
5. Install plate (54) on bottom of transport lift brackets (52) with four washers (56) and screws (55).



CAB TRANSPORT LIFT STRUCTURE INSTALLATION - CONTINUED

6. Install cab transport lift (refer to *Cab Transport Lift Installation*). Fully tighten four screws (53) on transport lift brackets (52).



7. Install battery and dolly wheels storage compartment (WP 0155 00).
8. Install remote hydraulic control compartment (WP 0156 00).

END OF WORK PACKAGE

RIGHT-SIDE STEP ASSEMBLY REPLACEMENT 0139 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Nut, lock (P/N 920076.002) (4)

Nut, lock (P/N 920076.003) (4)

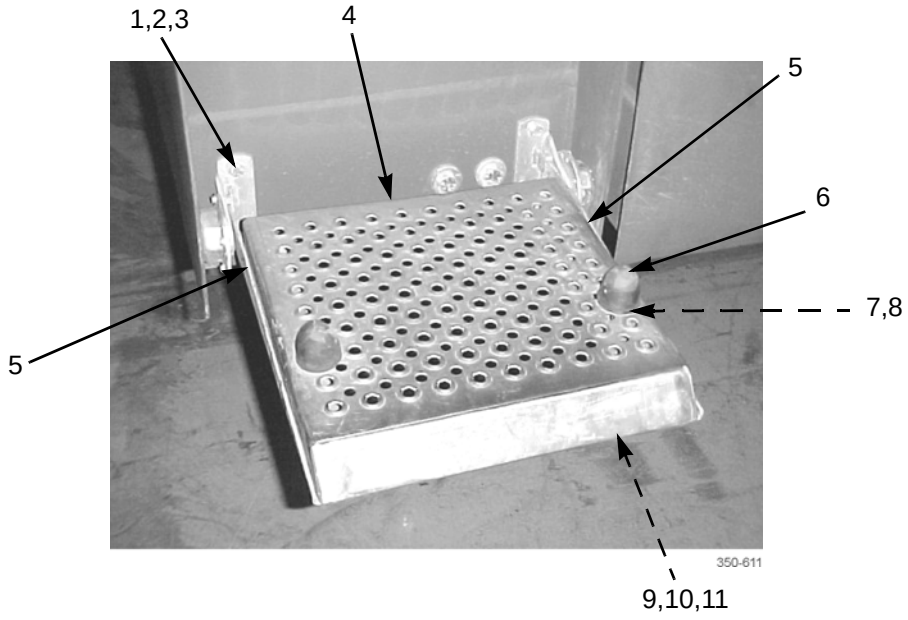


WARNING

Mounting brackets of step are under spring tension. Take care when removing and installing. Wear protective eyewear to prevent injury to personnel.

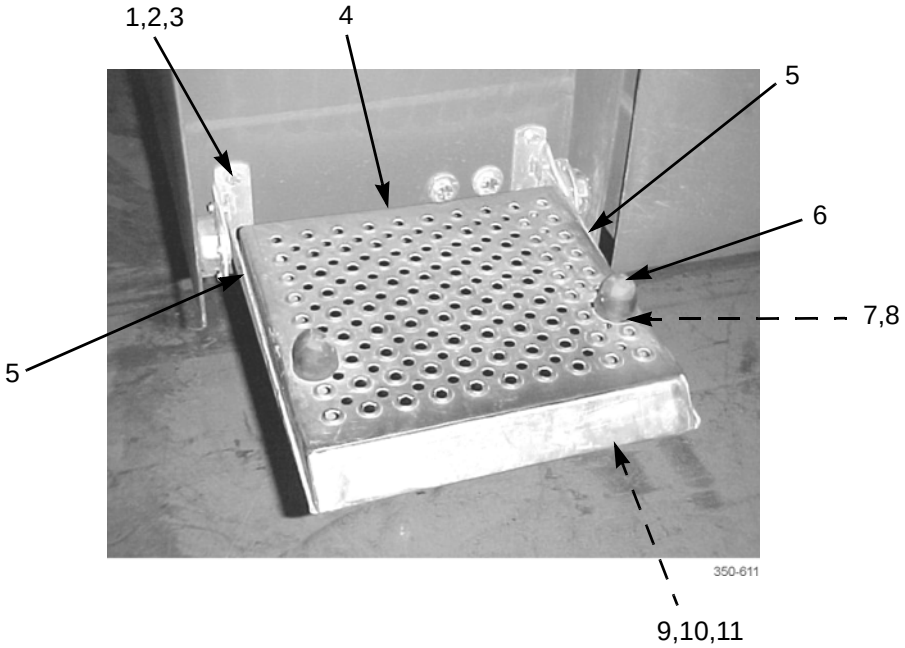
REMOVAL

1. Place step (4) in lowered position.
2. Remove two nuts (7), washers (8), and rubber bumpers (6) from step (4).
3. Remove four locknuts (9), washers (10), screws (11), and step (4) from two step supports (5). Discard locknuts.
4. Remove four locknuts (1), eight washers (2), four screws (3), and two step supports (5) from vehicle. Discard locknuts.



INSTALLATION

1. Install two step supports (5) on vehicle with four screws (3), eight washers (2), and four new locknuts (1).
2. Install step (4) on step supports (5) with four screws (11), washers (10), and new locknuts (9).
3. Install two rubber bumpers (6) on step (4) with two washers (8) and nuts (7).
4. Place step (4) in raised position.



END OF WORK PACKAGE

LEFT-SIDE STAIR ASSEMBLY MAINTENANCE 0140 00

THIS WORK PACKAGE COVERS

Step Replacement

Stair Assembly: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

See “Tool Kit, General Mechanic’s” on page 21.

Materials/Parts

Nut, lock (P/N 5590) (6)

Nut, lock (P/N 5957 (4)

Materials/Parts - Continued

Nut, lock (P/N 920076.003 (4)

Personnel Required

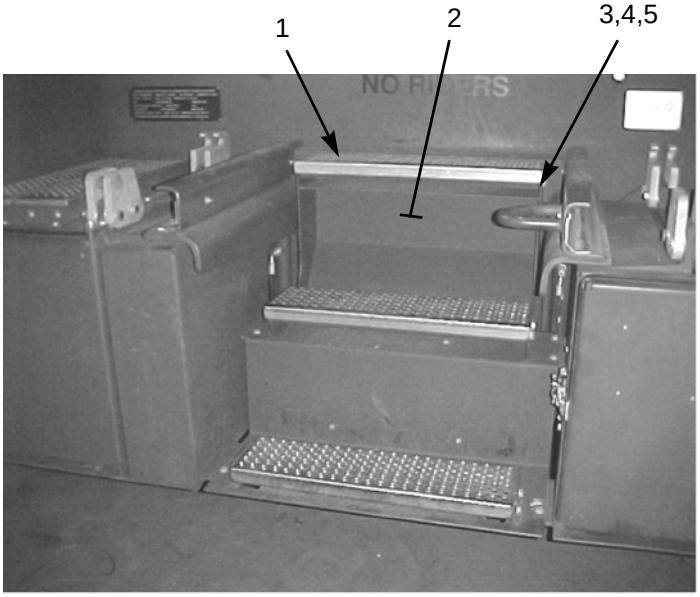
Two (if replacing stair assembly)

Equipment Condition

Wheels chocked

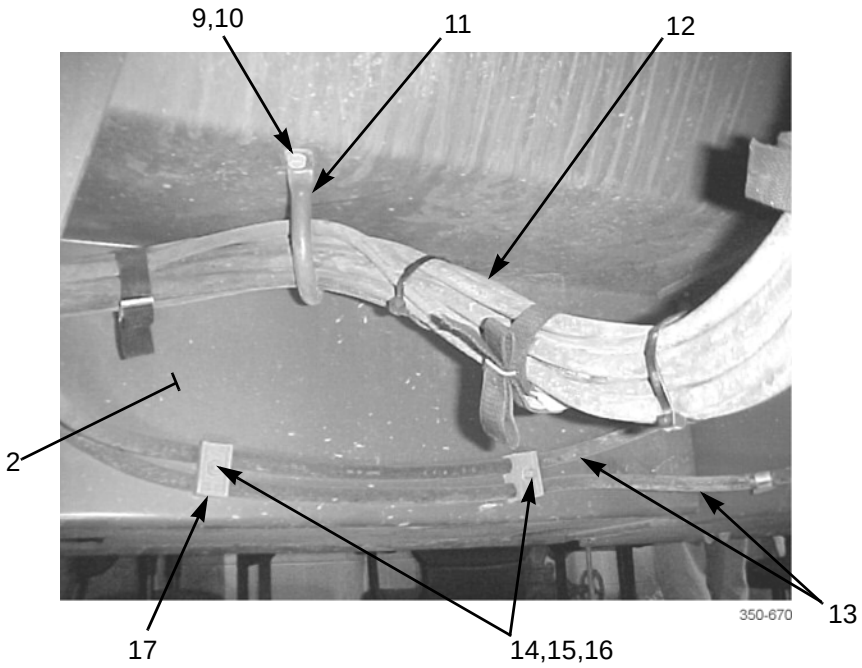
STEP REPLACEMENT

1. Remove four locknuts (3), screws (4), eight washers (5), and step (1) from stair assembly (2). Discard locknuts.
2. Install step (1) on stair assembly (2) with four screws (4), eight washers (5), and four new locknuts (3).

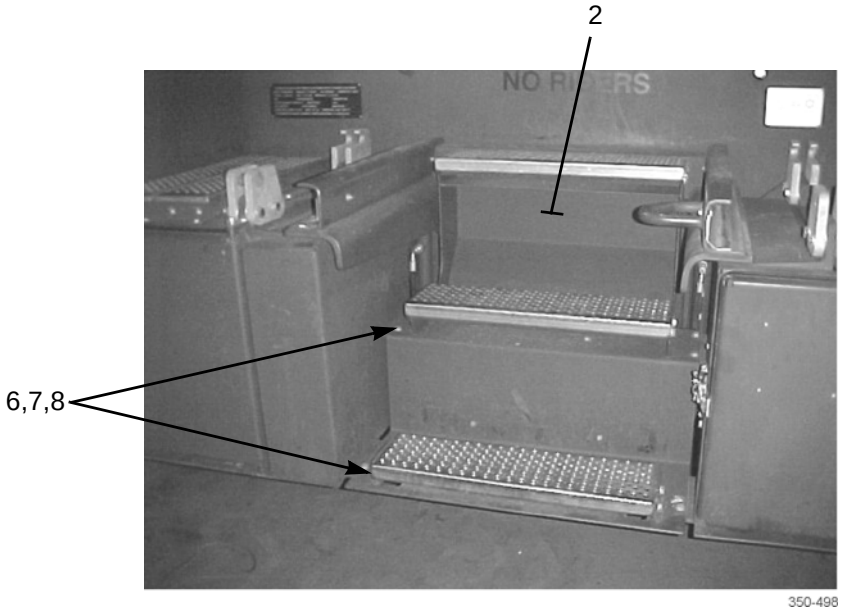


STAIR ASSEMBLY REMOVAL

1. Remove two locknuts (9), screws (10), cable loop (11), and hydraulic hoses (12) from underside of stair assembly (2). Discard locknuts.
2. Remove two locknuts (14), screws (15), washers (16), hose clamps (17), and hydraulic hoses (13) from stair assembly (2). Discard locknuts.



3. Remove six locknuts (6), screws (7), 12 washers (8), and stair assembly (2) from vehicle. Discard locknuts.



STAIR ASSEMBLY INSTALLATION

1. Install stair assembly (2) on vehicle with six screws (7), 12 washers (8), and six new locknuts (6).
2. Secure hydraulic hoses (13) to underside of stair assembly (2) with two hose clamps (17), washers (16), screws (15), and new locknuts (14).
3. Secure hydraulic hoses (12) to stair assembly (2) with cable loop (11), two screws (10), and new locknuts (9).

END OF WORK PACKAGE

AUTOLUBE SYSTEM MAINTENANCE 0141 00

THIS WORK PACKAGE COVERS

Autolube Tube: Removal, Installation

Autolube Pump: Removal, Installation

Autolube Distribution Valve: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (2)

O-ring (9)

Personnel Required

Two

References

TM 10-3930-675-10-2

WP 0050 00

WP 0110 00

AUTOLUBE TUBE REMOVAL

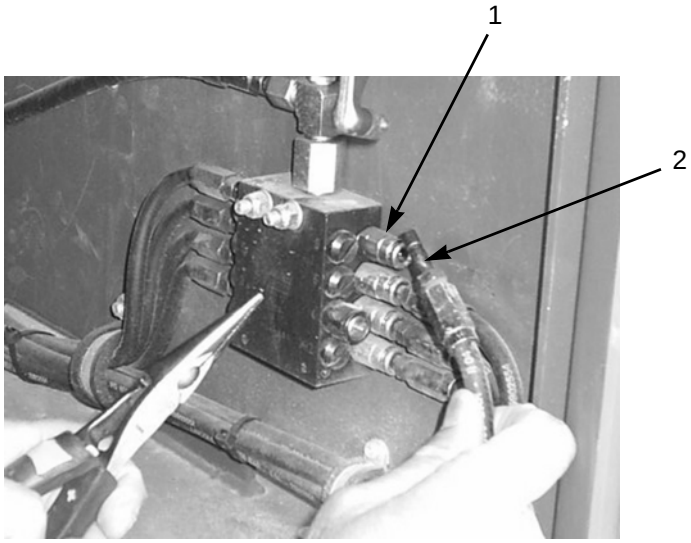
1. Push in quick-disconnect collar (1) to release tube (2).
2. Remove tube (2) from quick-disconnect collar (1).

NOTE

- **If removing the tube to identify a "plugged" line, the tube may appear "stiff" when under pressure.**
- **Remove a "plugged" line by loosening quick-disconnect fitting with an open end wrench to relieve any pressure.**
- **Quick-disconnect fittings will not disconnect when under pressure.**
- **It may be necessary to remove distribution valve from its mounting to gain access to the quick-disconnect fittings.**

AUTOLUBE TUBE INSTALLATION

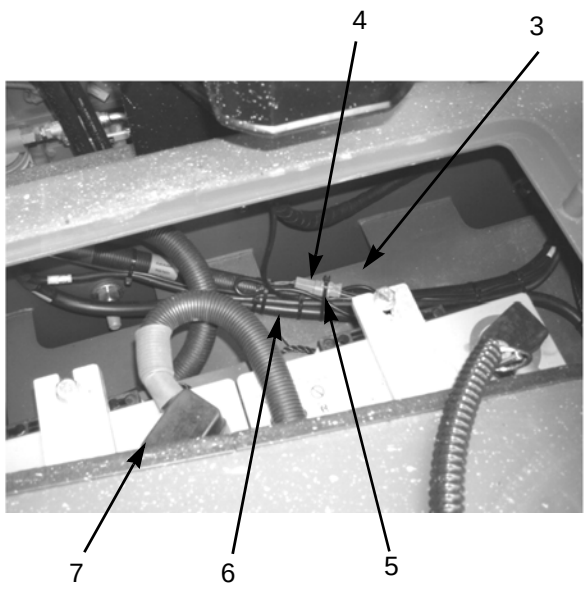
1. Install tube (2) into quick-disconnect fitting (1).
2. Pull tubing (2) to ensure tube has locked in place.

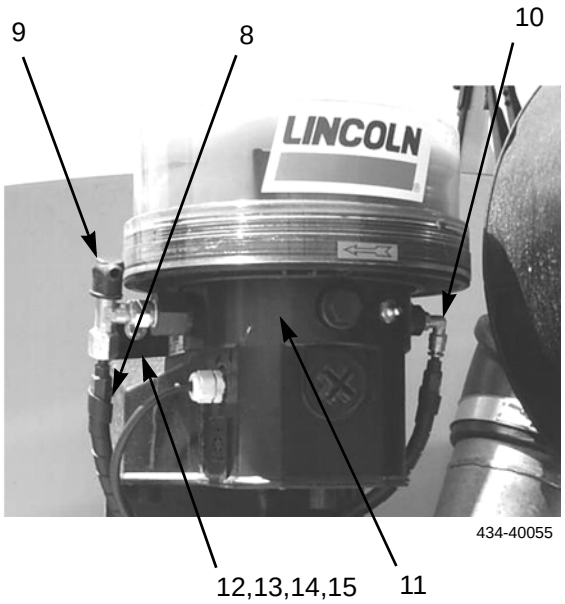


434-40054

AUTOLUBE PUMP REMOVAL

1. Remove battery compartment cover (WP 0110 00).
2. Remove three tiedown straps (5) and pull pump wiring harness (6) through hole and out of battery compartment (7). Discard tiedown straps.
3. Unplug autolube pump wiring harness connector (3) from wiring harness (4).
4. Disconnect lubrication supply tube (8) from pressure limiting valve (9).
5. Disconnect lubrication return tube (10) from pump (11).
6. Remove two mounting bolts (12), washers (13), and locknuts (14) from pump (11). Discard locknuts.
7. Remove pump assembly (11) from mounting bracket (15).





AUTOLUBE PUMP INSTALLATION

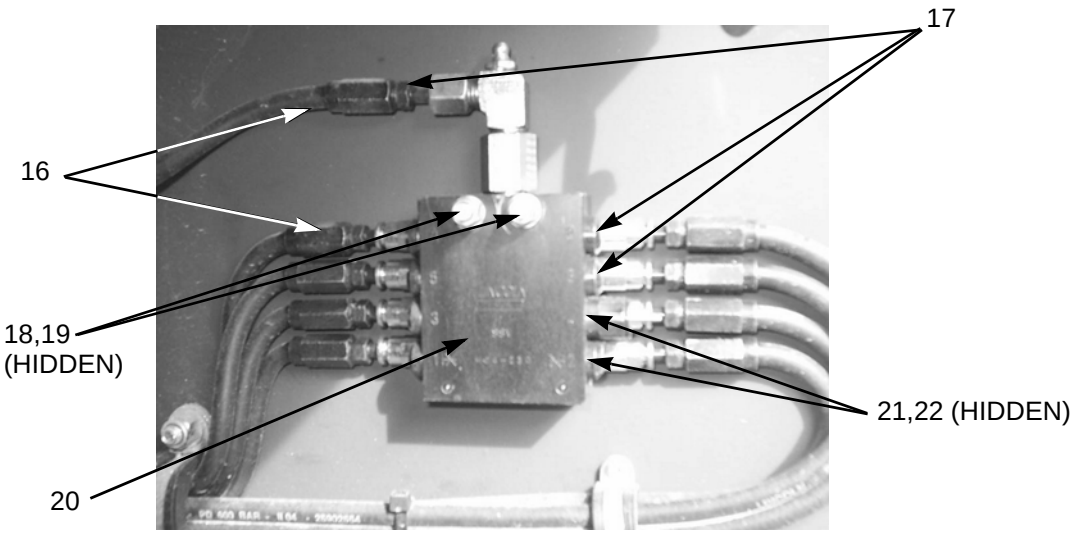
1. Install pump assembly (11) on mounting bracket (15).
2. Install two new locknuts (14), washers (13), and mounting bolts (12) on pump (11).
3. Connect lubrication return tube (10) to pump (11).
4. Connect lubrication supply tube (8) to pressure limiting valve (9).
5. Insert pump wiring harness (6) through hole and out of battery compartment (7).
6. Plug wiring harness (4) into autolube pump wiring harness connector (3).
7. Secure pump wiring harness (6) with three new tiedown straps (5).
8. Fill pump reservoir with grease, GAA (TM 10-3930-675-10-2).
9. Initiate a manual lubrication cycle to ensure system is working properly (WP 0050 00).
10. Install battery compartment cover (WP 0110 00).

AUTOLUBE DISTRIBUTION VALVE REMOVAL

NOTE

Tag each tube on the distribution valve with the number of the port to which it is connected.

1. Disconnect nine tubes (16) from nine quick-disconnect fittings (17) (Refer to *Autolube Tubing Removal*).
2. Remove two mounting bolts (18), locknuts (19), and remove distribution valve (20) from vehicle. Discard locknuts.
3. Remove nine fittings (21) and O-rings (22) from distribution valve (20) and set fittings aside for reuse. Discard O-rings.



AUTOLUBE DISTRIBUTION VALVE INSTALLATION

1. Install nine new O-rings (22) on fittings (21) and install fittings on distribution valve (20).
2. Mount distribution valve (20) on frame and secure with two new locknuts (19) and mounting bolts (18).
3. Connect nine tubes (16) to nine quick-disconnect fittings (17) (refer to *Autolube Tubing Installation*).
4. Initiate a manual lubrication cycle to ensure system is working properly (WP 0050 00).

END OF WORK PACKAGE

TRANSMISSION SKID PLATE AND ACCESS COVERS REPLACEMENT 0142 00

THIS WORK PACKAGE COVERS

Skid Plate: Removal, Installation

Front Access Cover: Removal, Installation

Middle Access Cover and Cab Support: Removal, Installation

Rear Access Cover: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Jack, Hydraulic, Hand (Item 66, WP 0289 00)

Materials/Parts:

Nut, lock (P/N 920076.003) (4)

Nut, lock (P/N 920076.007) (16)

Washer, lock (P/N 923657.0005) (8)

Personnel Required

Two

References

WP 0076 00

WP 0148 00

Equipment Condition

Wheels chocked

Cab in transport position, if replacing access covers (TM 10-3930-675-10)



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

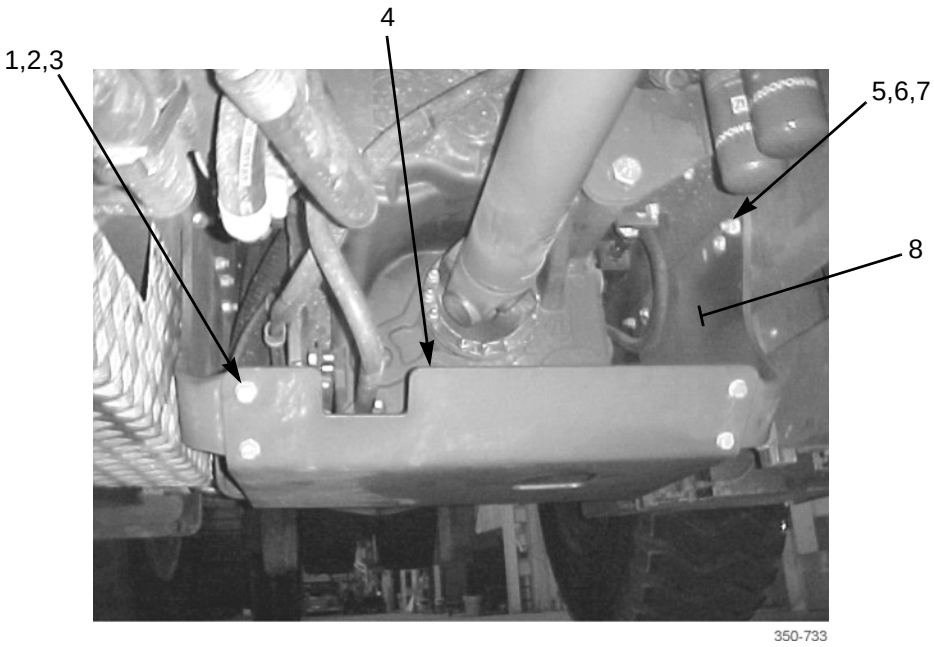
SKID PLATE REMOVAL

1. Position floor jack under center of skid plate (4). Raise jack until it contacts skid plate.
2. Remove eight locknuts (1), screws (2), and 16 washers (3). Discard locknuts.
3. Lower jack and remove skid plate (4) from skid plate brackets (8).

NOTE

Perform step 4 for each of two skid plate brackets.

4. Remove two locknuts (5), screws (6), four lockwashers (7), and skid plate bracket (8) from vehicle. Discard locknuts and lockwashers.



SKID PLATE INSTALLATION

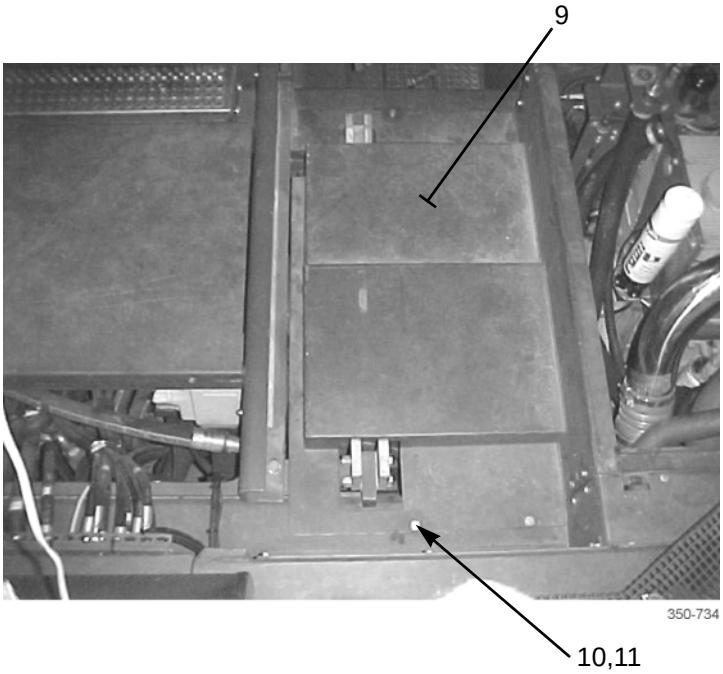
NOTE

Perform step 1 for each of two skid plate brackets.

1. Install skid plate bracket (8) on vehicle with four new lockwashers (7), two screws (6), and new locknuts (5).
2. Using jack, position skid plate (4) on skid plate brackets (8).
3. Install 16 washers (3), eight screws (2), and new locknuts (1).

FRONT ACCESS COVER REMOVAL

1. Remove engine cover (WP 0148 00).
2. Remove eight screws (10), washers (11), and front access cover (9) from vehicle.

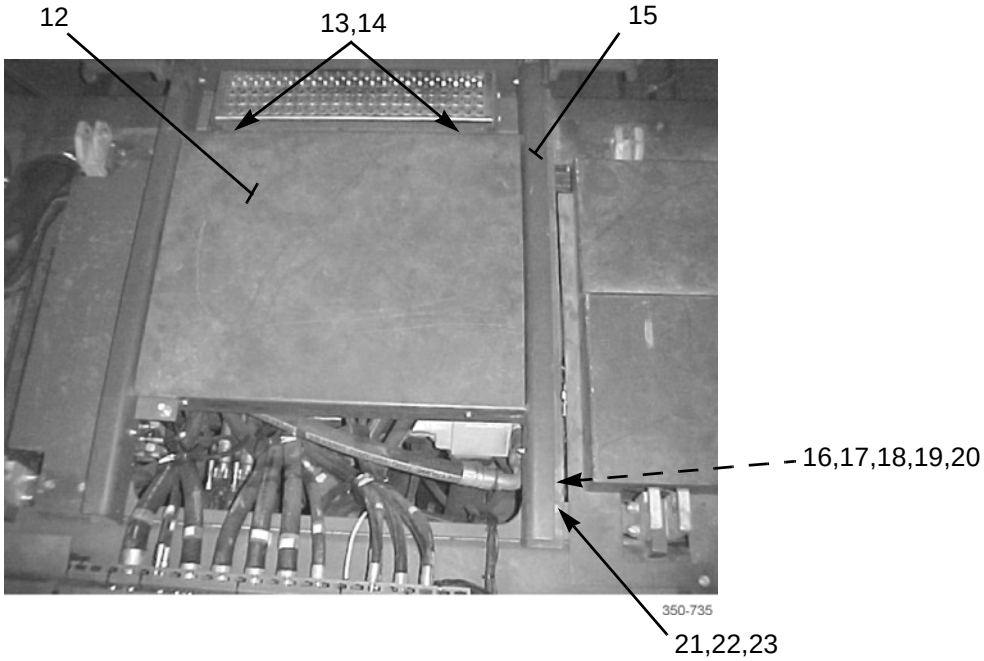


FRONT ACCESS COVER INSTALLATION

1. Install front access cover (9) on vehicle with eight washers (11) and screws (10).
2. Install engine cover (WP 0148 00).
3. Return cab to operational position (TM 10-3930-675-10).

MIDDLE ACCESS COVER AND CAB SUPPORT REMOVAL

1. Remove two screws (13) and washers (14) from middle access cover (12).
2. Remove middle access cover (12) from cab support (15).
3. Remove cab support-mounted cab position proximity switch (WP 0076 00).
4. Remove four locknuts (21), screws (22), eight washers (23), and cab support (15) from vehicle. Discard locknuts.
5. Remove four locknuts (16), screws (17), eight washers (18), two angle plates (19), and two shims (20) from cab support (15). Discard locknuts.

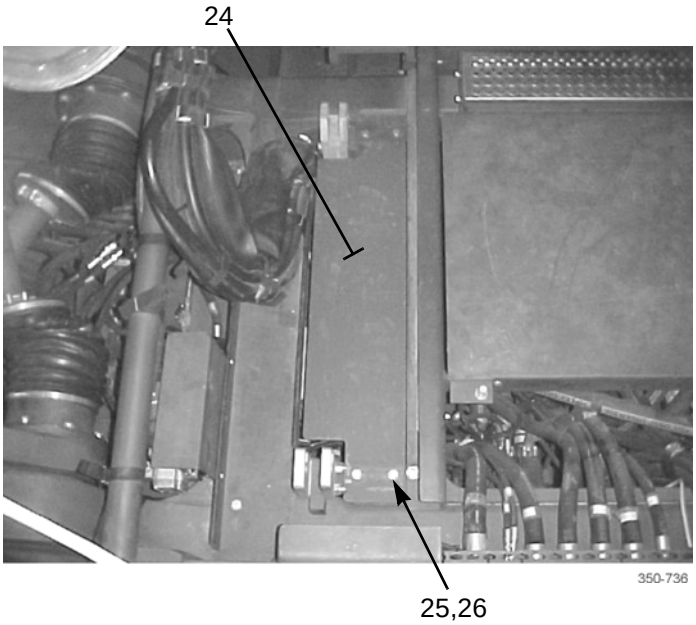


MIDDLE ACCESS COVER AND CAB SUPPORT INSTALLATION

1. Install two shims (20) and two angle plates (19) on cab support (15) with eight washers (18), four screws (17), and new locknuts (16).
2. Install cab support (15) on vehicle with eight washers (23), four screws (22), and new locknuts (21).
3. Install cab support-mounted cab position proximity switch (WP 0076 00).
4. Install middle access cover (12) on cab support (15) with two washers (14) and screws (13).
5. Return cab to operational position (TM 10-3930-675-10).

REAR ACCESS COVER REMOVAL

Remove four screws (25), washers (26), and rear access cover (24) from vehicle.



REAR ACCESS COVER INSTALLATION

1. Install rear access cover (24) on vehicle with four washers (26) and screws (25).
2. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

RADIATOR SPLASH SHIELD REPLACEMENT 0143 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

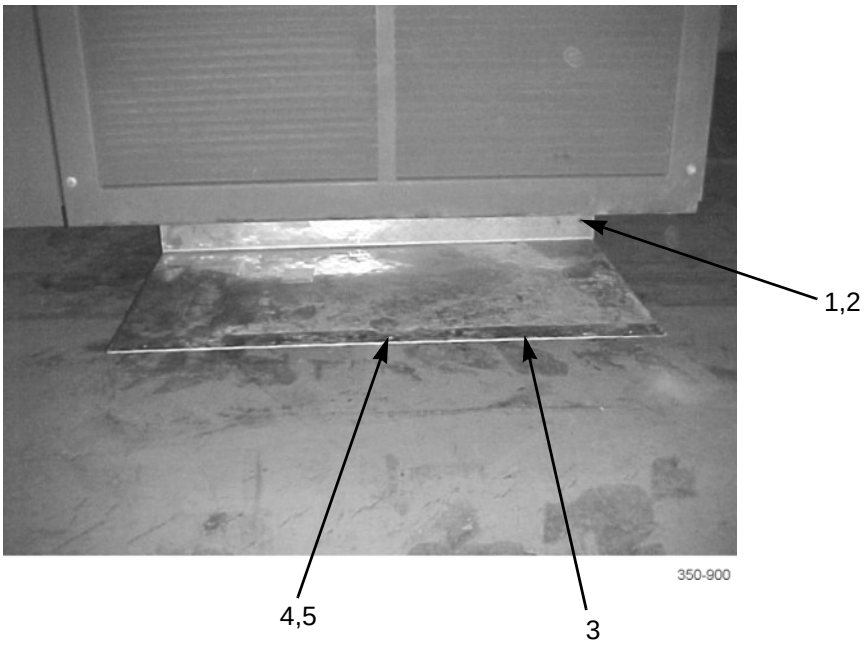
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Nut, lock (P/N 920076.003)

REMOVAL

1. Remove locknut (1) and washer (2) from stud of bracket at left front corner of radiator splash shield (3). Discard locknut.
2. Remove four screws (4), washers (5), and radiator splash shield (3) from vehicle.



INSTALLATION

1. Position radiator splash shield (3) on vehicle and install four washers (5) and screws (4).
2. Install washer (2) and new locknut (1) on stud of bracket.

END OF WORK PACKAGE

RADIATOR TOP GRATING REPLACEMENT 0144 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)



WARNING

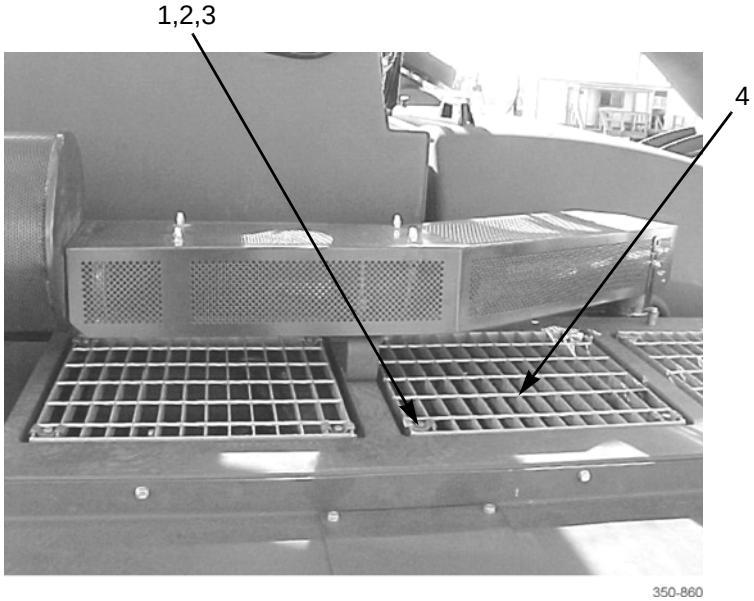
Exhaust and cooling system components may be hot to the touch. Ensure these components have cooled down before replacing radiator top grating. Failure to follow this warning may result in serious burns.

REPLACEMENT

NOTE

Radiator top grating closest to front of vehicle has five mounting screws and hold-down brackets.

1. Remove four screws (1), eight washers (2), four hold-down brackets (3), and grating (4) from vehicle frame.
2. Install grating (4) on vehicle frame with four hold-down brackets (3), eight washers (2), and four screws (1).



END OF WORK PACKAGE

RADIATOR FILL COVER PLATE REPLACEMENT 0145 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

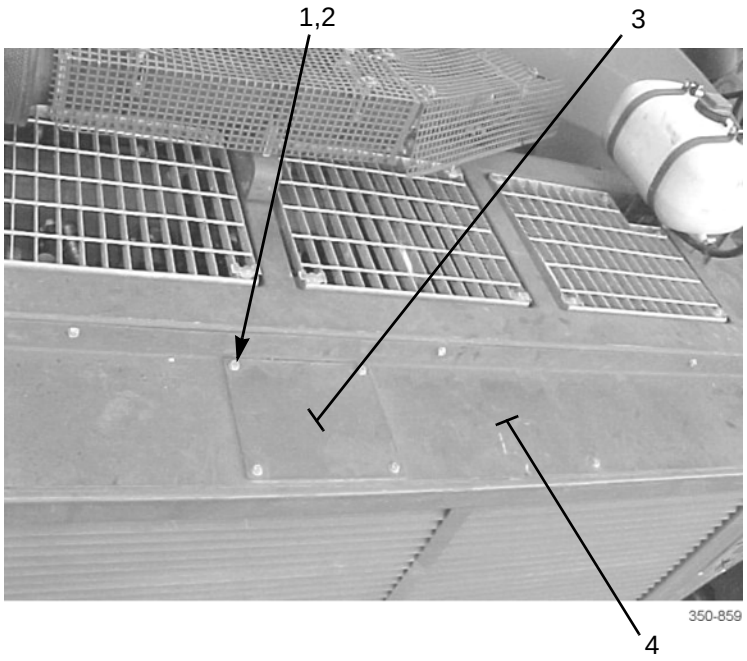
Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

REPLACEMENT

1. Remove four screws (1), washers (2), and fill cover plate (3) from plate (4).
2. Install fill cover plate (3) on plate (4) with four washers (2) and screws (1).



END OF WORK PACKAGE

BOOM ASSEMBLY WEAR PLATES REPLACEMENT 0146 00

THIS WORK PACKAGE COVERS

General

Style A Wear Plate: Removal, Installation

Style B Wear Plate: Removal, Installation

Style C (ARMY and RESET) Wear Plate: Removal, Installation

Style D (USMC Only) Wear Plate: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Washer, lock (P/N 920098.009) (6)

Personnel Required

Two

References

WP 0100 00

WP 0286 00

Equipment Condition

Boom and tophandler lowered to transport position (TM 10-3930-675-10)

NOTE

After initial 100 hours of RTCH operation, torque of boom assembly wear plates must be checked.

BOOM ASSEMBLY WEAR PLATES REPLACEMENT - CONTINUED 0146 00

GENERAL

1. Wear plates are used on the boom assembly between sliding components as opposed to using lubrication grease and grease fittings.

2. Spacer blocks and spacers are used with boom wear plates and need to be replaced to maintain proper spacing between boom sliding assemblies.

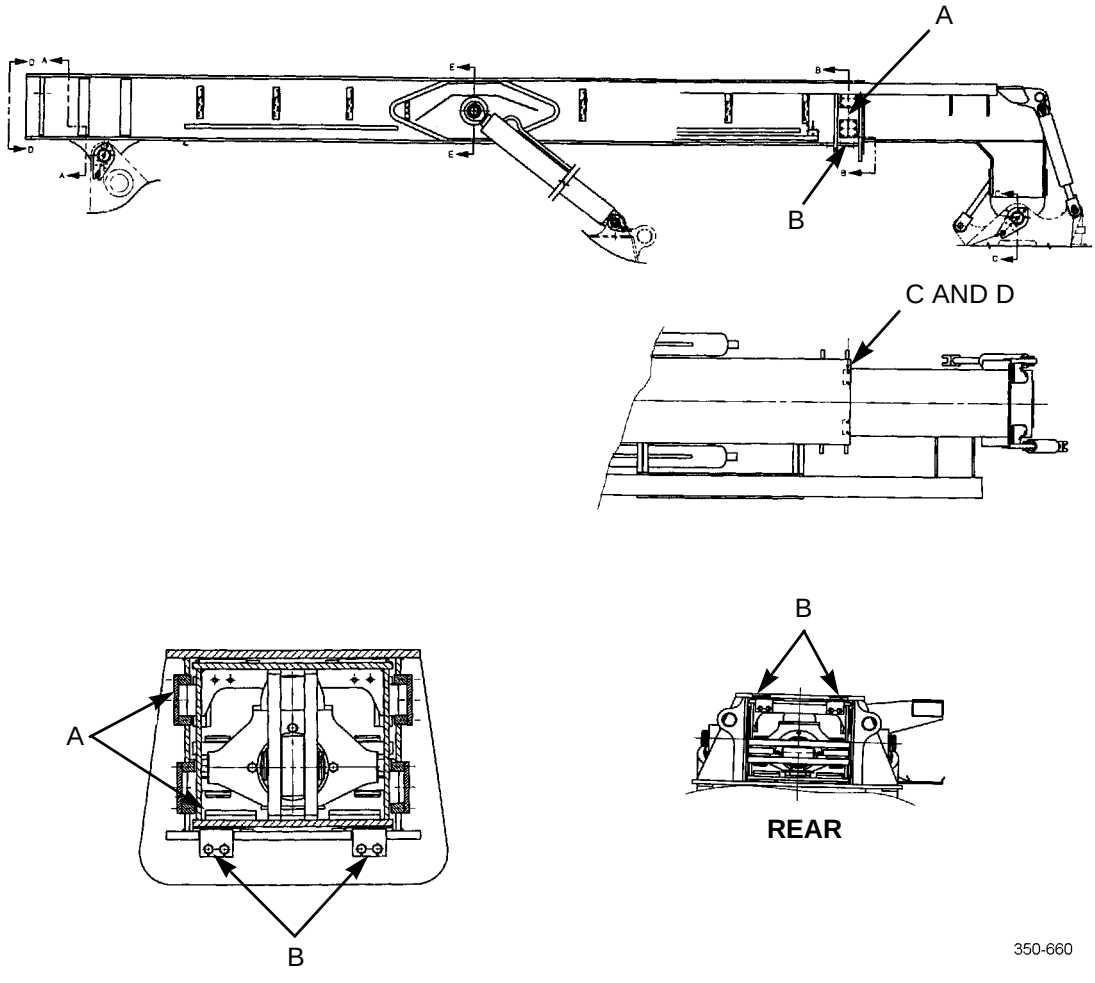
3. Wear plates are inspected at semi-annual intervals and must be maintained in good working order for the boom assembly to function properly.

4. There are three styles of wear plates used on the boom assembly: A, B, and C. One wear plate for each style is replaced in this work package.

5. Appropriate notes and access procedures are included for removal and replacement of each style wear plate as applicable.

6. The fixed boom uses four style A wear plates at the front. The extending boom uses four style A wear plates at the rear.

7. An illustration is provided below to aid in identifying location and style of each wear plate.

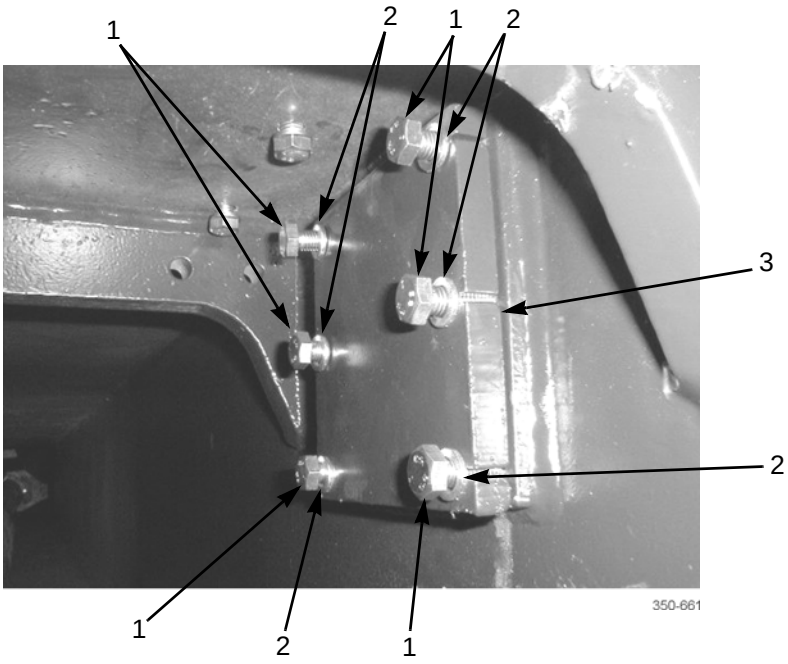


STYLE A WEAR PLATE REMOVAL

NOTE

- **Replace style A wear plates one at a time to maintain distance relationship.**
- **Rear wear plate is illustrated.**

1. Retract boom to access rear wear plates (TM 10-3930-675-10).
2. Remove boom access cover (WP 0100 00).
3. Remove six screws (1), lockwashers (2), and cover plate (3). Discard lockwashers.

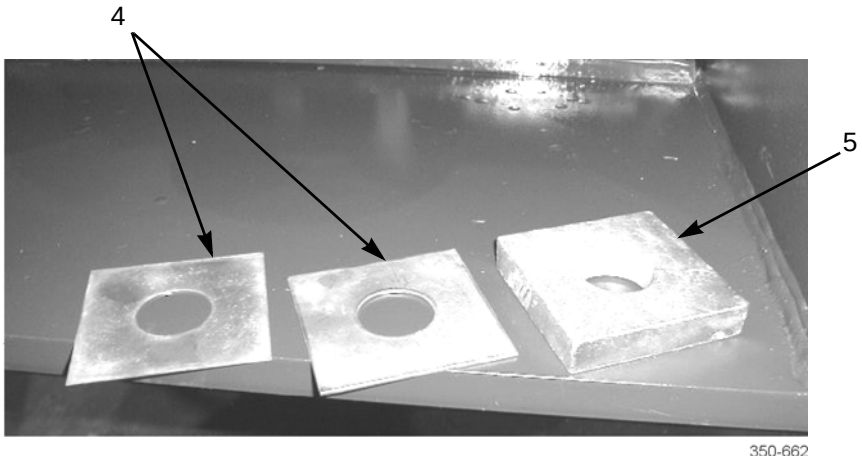


STYLE A WEAR PLATE REMOVAL - CONTINUED

NOTE

Ensure spacers are tagged or marked for location. Spacers must be reinstalled in same location to maintain boom spacing.

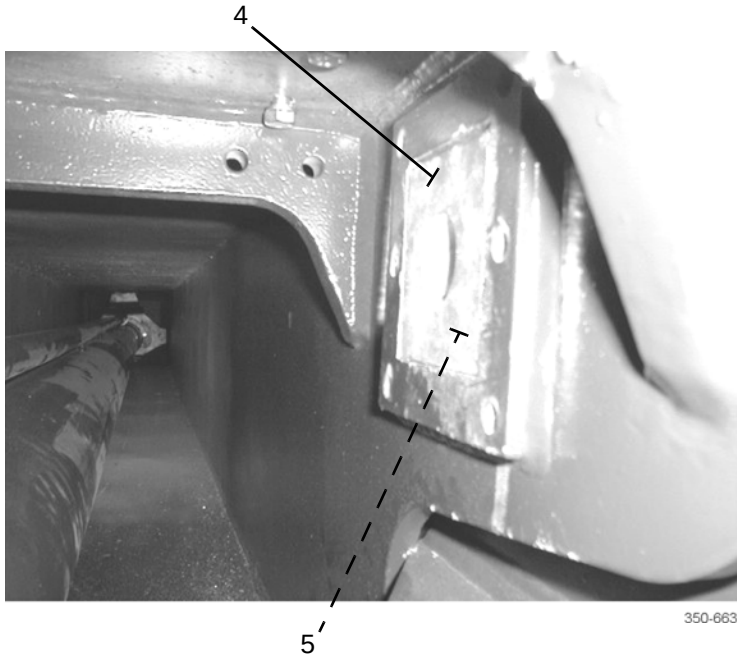
4. Remove spacers (4) and wear plate (5).



5. Measure wear plate thickness. Measurement must be a minimum of 1 in. (25.4 cm). If wear plate is not as specified, replace wear plate.

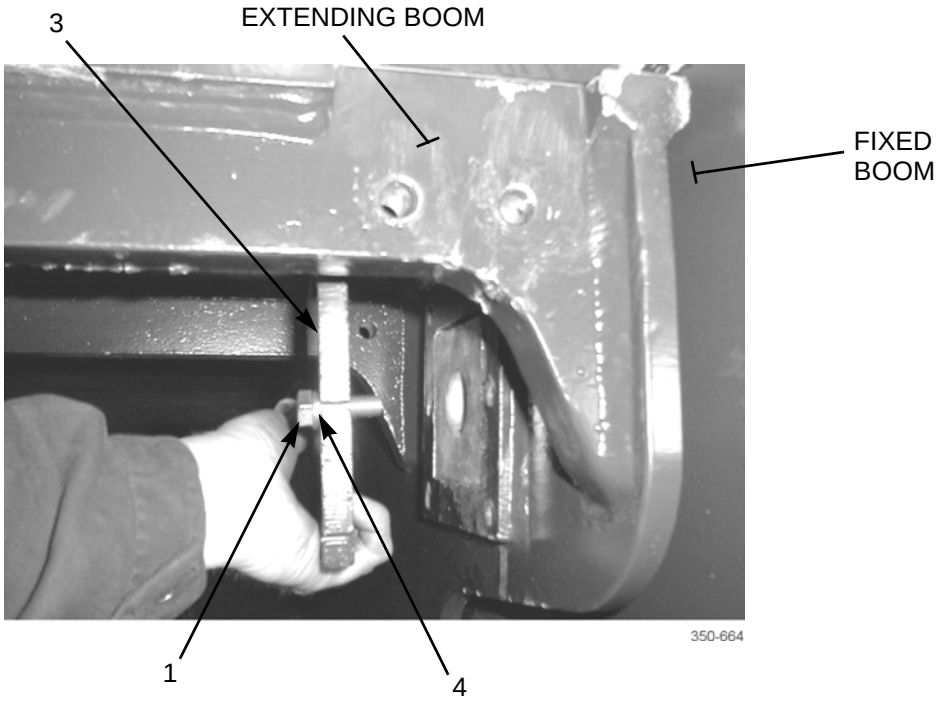
STYLE A WEAR PLATE INSTALLATION

1. Install wear plate (5) and spacers (4) as noted in removal.



STYLE A WEAR PLATE INSTALLATION - CONTINUED

2. Install cover (3) with six screws (1) and new lockwashers (2).



NOTE

Spacing between extending boom and fixed boom should be as even as possible. Add or remove spacers as necessary to maintain even spacing.

3. Check spacing between wear plate and contact surface. Spacing must be 0.078 in. (2 mm). If not within specifications, remove cover and add or subtract spacers to adjust wear plate spacing.
4. Tighten all screws in accordance with *Torque Limits* (WP 0286 00).
5. Perform operational check of boom assembly (TM 10-3930-675-10).
6. Install boom access cover (WP 0100 00).

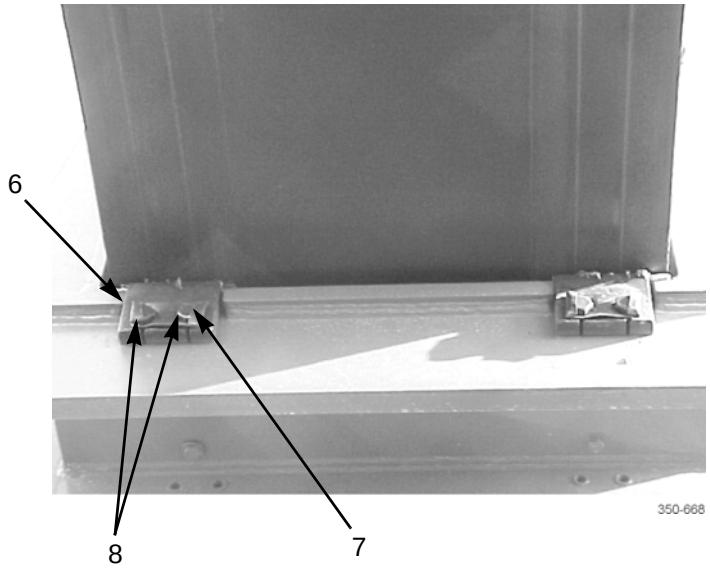
STYLE B WEAR PLATE REMOVAL

1. Measure thickness of wear plate. Measurement should be not less than 9/16 in. (14 mm). If wear plate is not as specified, replace wear plate.
2. To remove style B wear plates from fixed boom lower front location:

NOTE

Extend boom and support tophandler on cribbing to relieve weight on lower front wear plates.

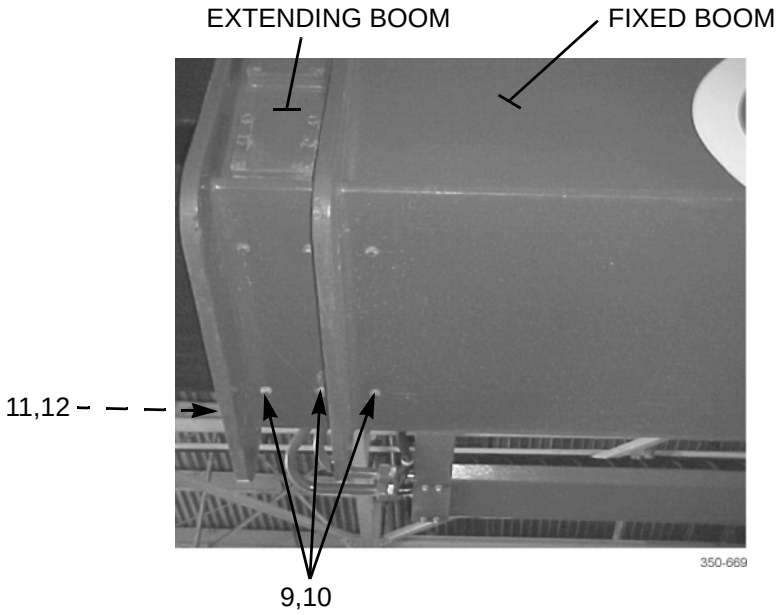
a. Remove two screws (8), lockwashers (7), and lock plate (6). Discard lockwashers.



STYLE B WEAR PLATE REMOVAL - CONTINUED

b. Remove three screws (9) and washers (10) securing wear plate (11).

c. Remove shims (12) and wear plate (11).

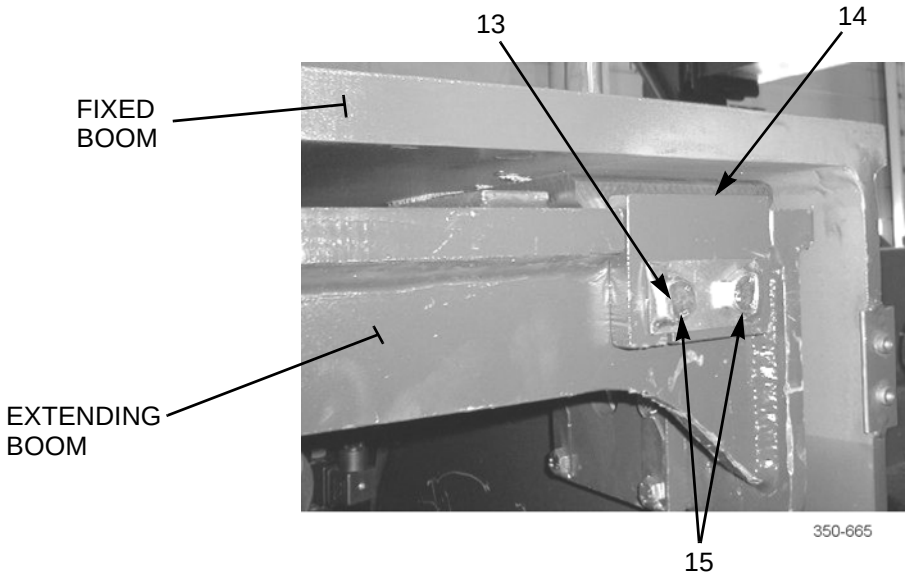


3. To remove style B wear plates from extending boom upper rear location:

NOTE

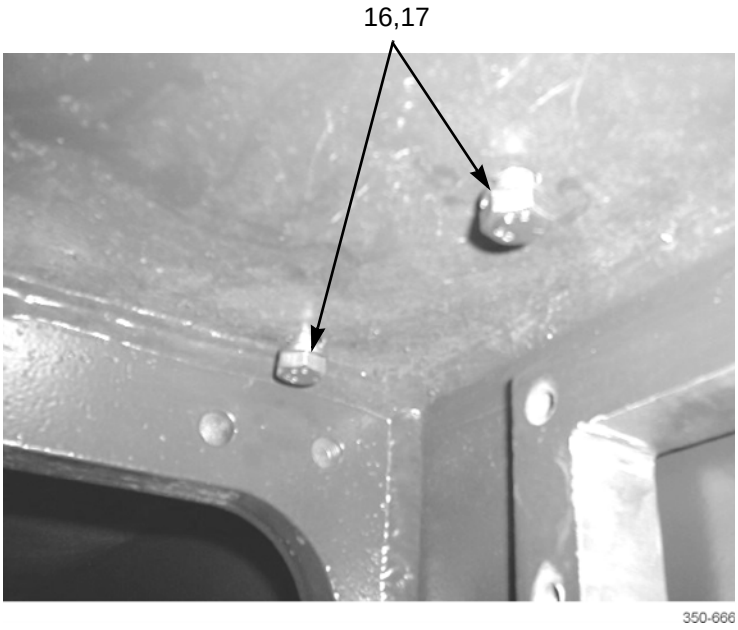
Retract boom and support tophandler on cribbing to relieve weight on upper rear wear plates.

a. Remove two screws (15), lockwashers (13), and lock plate (14). Discard lockwashers.

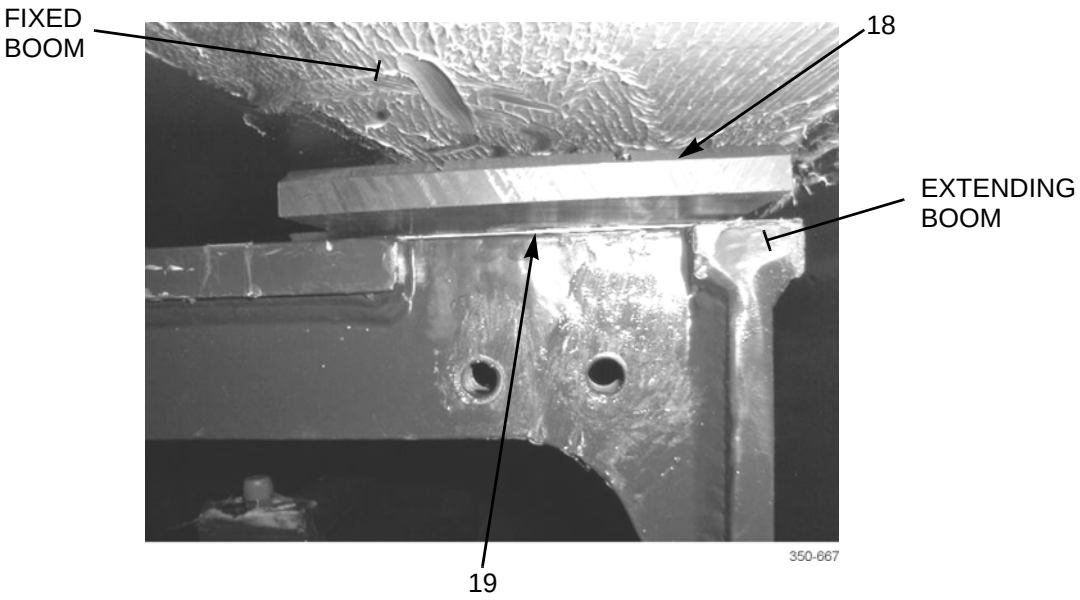


STYLE B WEAR PLATE REMOVAL - CONTINUED

b. Remove three screws (16) and washers (17) securing wear plate.



c. Remove shims (19) and wear plate (18).



STYLE B WEAR PLATE INSTALLATION

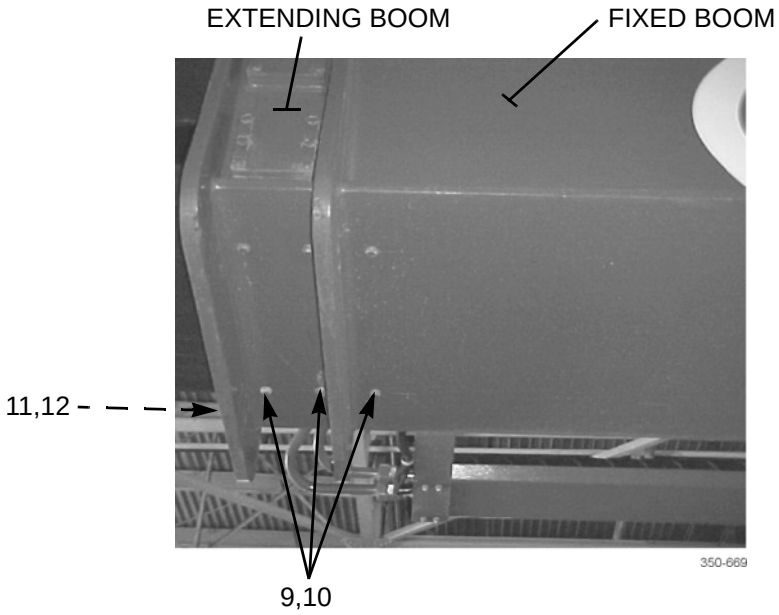
1. To install style B wear plates on fixed boom lower front location:

NOTE

Extend boom and support tophandler on cribbing to relieve weight on lower front wear plates.

a. Install shims (12) and wear plate (11) and align holes in wear plate with holes in bottom of fixed boom.

b. Install and tighten three screws (9) and washers (10) in accordance with *Torque Limits* (WP 0286 00).

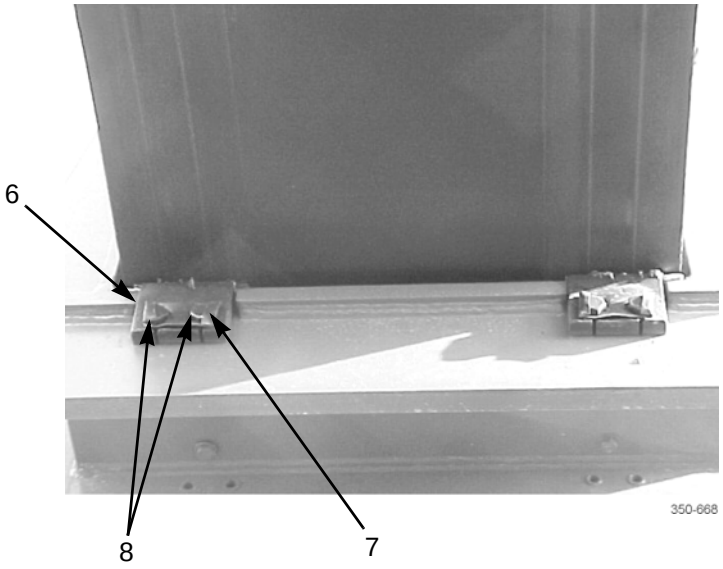


c. Install lock plate (6), two new lockwashers (7), and screws (8).

d. Tighten screws (8) in accordance with *Torque Limits* (WP 0286 00).

e. Perform operational check of boom assembly (TM 10-3930-675-10).

STYLE B WEAR PLATE INSTALLATION - CONTINUED

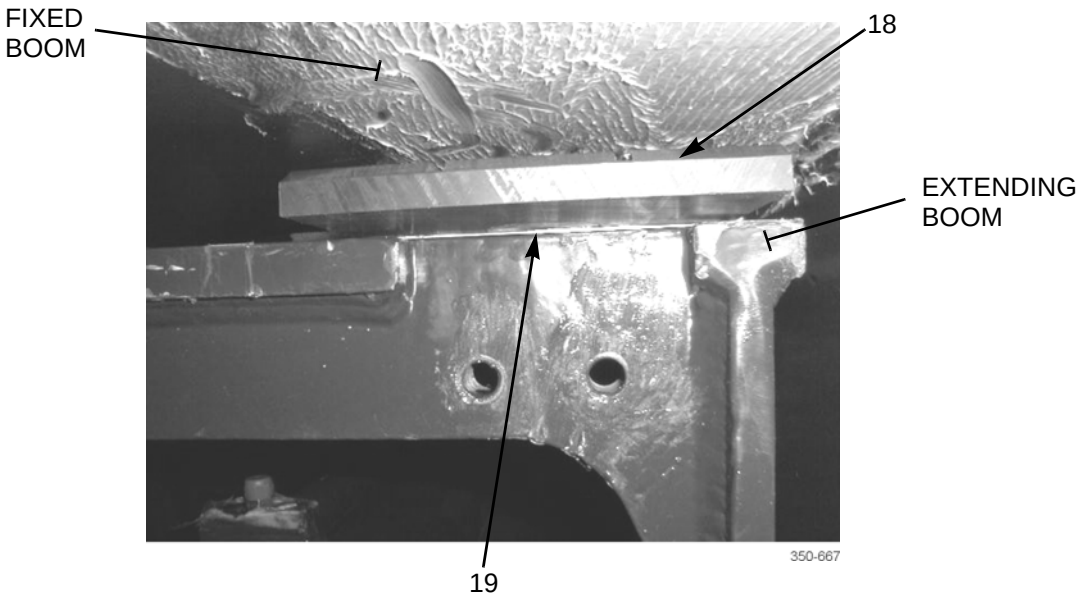


2. To install style B wear plates on extending boom upper rear location:

NOTE

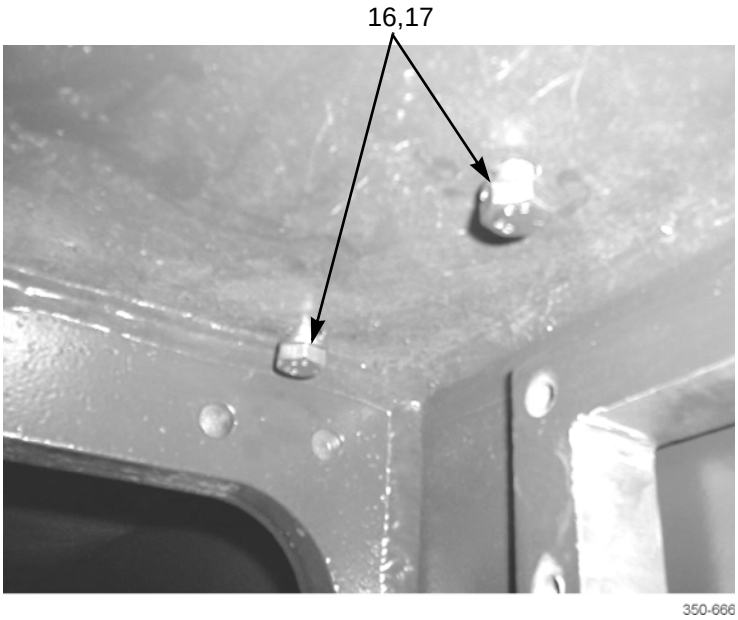
Retract boom and support tophandler on cribbing to relieve weight on upper rear wear plates.

a. Install shims (19) and wear plate (18) and align holes in wear plate with holes in top of extending boom.



STYLE B WEAR PLATE INSTALLATION - CONTINUED

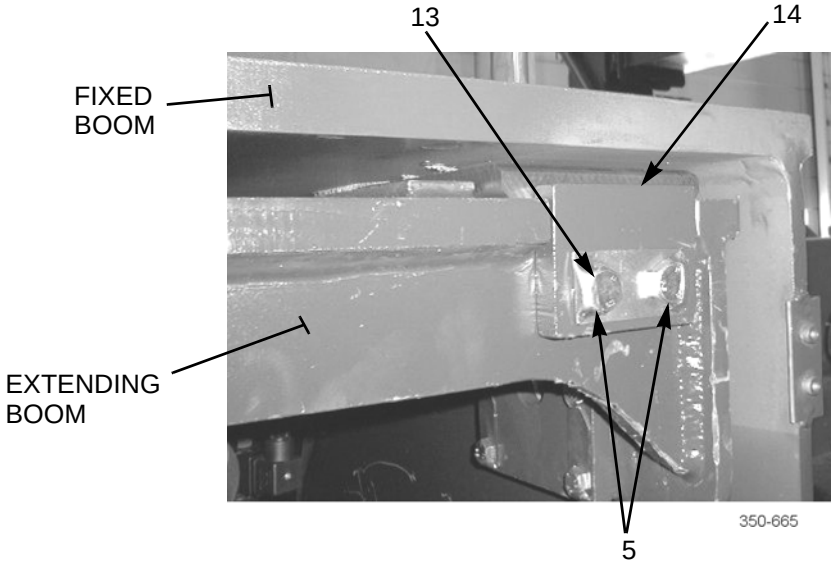
b. Install and tighten three screws (16) and washers (17) in accordance with *Torque Limits* (WP 0286 00).



c. Install lock plate (14), two new lockwashers (13), and screws (15).

d. Tighten screws (15) in accordance with *Torque Limits* (WP 0286 00).

e. Perform operational check of boom assembly (TM 10-3930-675-10).

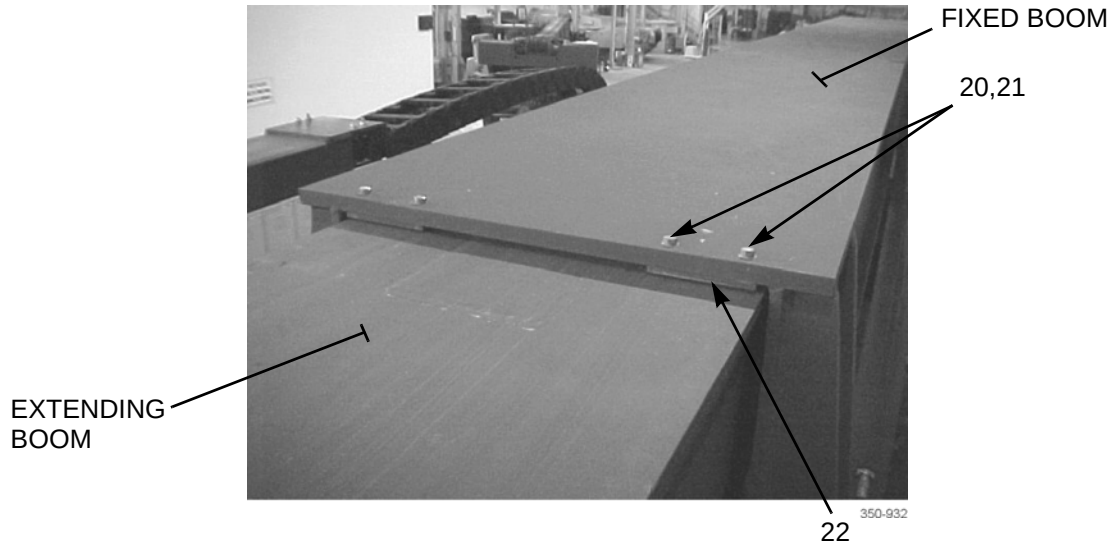


STYLE C (ARMY AND RESET) WEAR PLATE REMOVAL

NOTE

Extend boom, if necessary, and allow tophandler to hang unsupported.

1. Remove two screws (20) and washers (21) securing each of two spacer plates (22).
2. Slide spacer plate (22) from between fixed and extending boom.

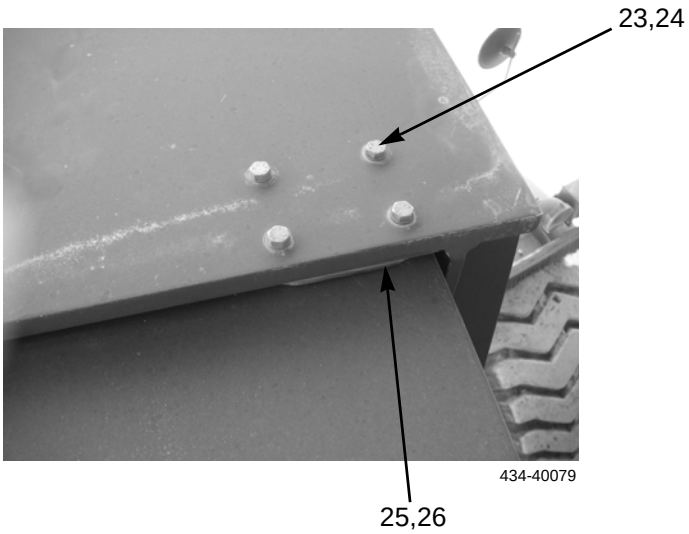


STYLE C (ARMY AND RESET) WEAR PLATE INSTALLATION

1. Install each of two spacer plates (22) between fixed and extending boom. Align holes in wear plate with holes in top of fixed boom.
2. Install and tighten two screws (20) and washers (21) in accordance with *Torque Limits* (WP 0286 00).
3. Perform operational check of boom assembly (TM 10-3930-675-10).

STYLE D (USMC ONLY) WEAR PLATE REMOVAL

1. Remove four capscrews (23) and washers (24) from slide plate (25) and retainer (26).



2. Slide retainer (26) and slide plate (25) out from between inner and outer boom (27).

STYLE D (USMC ONLY) WEAR PLATE INSTALLATION

1. Slide retainer (26) and slide plate (25) in place and align holes in retainer with holes in outer boom (27).
2. Install four capscrews (23) and washers (24) on retainer (26) and slide plate (25).
3. Perform operational check of boom assembly (TM 10-3930-675-10).

END OF WORK PACKAGE

TOPHANDLER WEAR PLATES REPLACEMENT 0147 00

THIS WORK PACKAGE COVERS

General
Style A Wear Plate: Removal, Installation
Style B Wear Plate: Removal, Installation
Style C Wear Plate: Removal, Installation
Style D Wear Plate: Removal, Installation
Style E Wear Plate: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

Two

References

WP 0286 00

Equipment Condition

Boom and tophandler lowered to transport position (TM 10-3930-675-10)

GENERAL

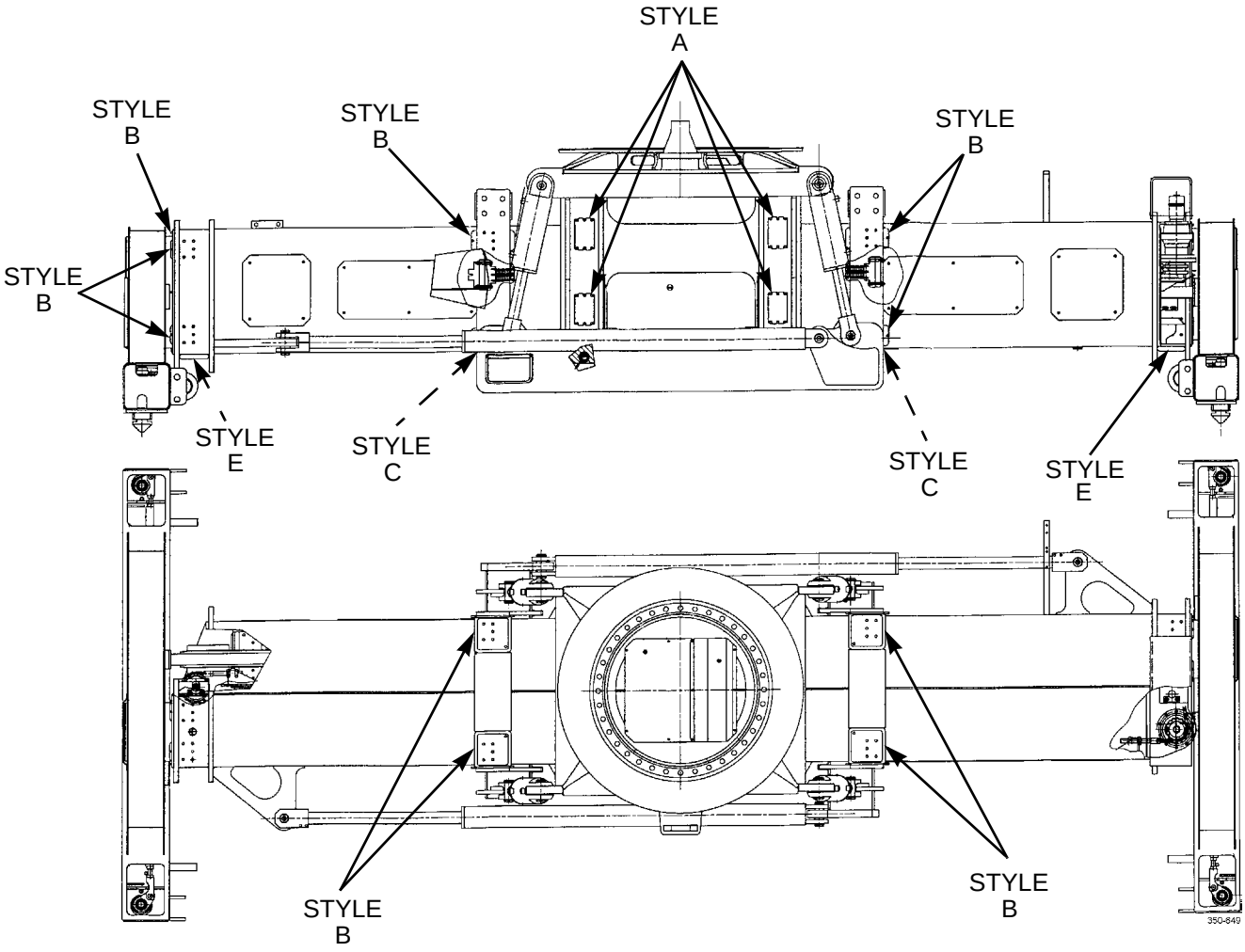
NOTE

DO NOT lubricate wear plates.

1. Wear plates are used on the tophandler between sliding components as opposed to lubrication grease and grease fittings.
2. Wear plates are inspected at semi-annual intervals and must be maintained in good working order for the tophandler to function properly.
3. There are five styles of wear plates: A, B, C, D, and E.

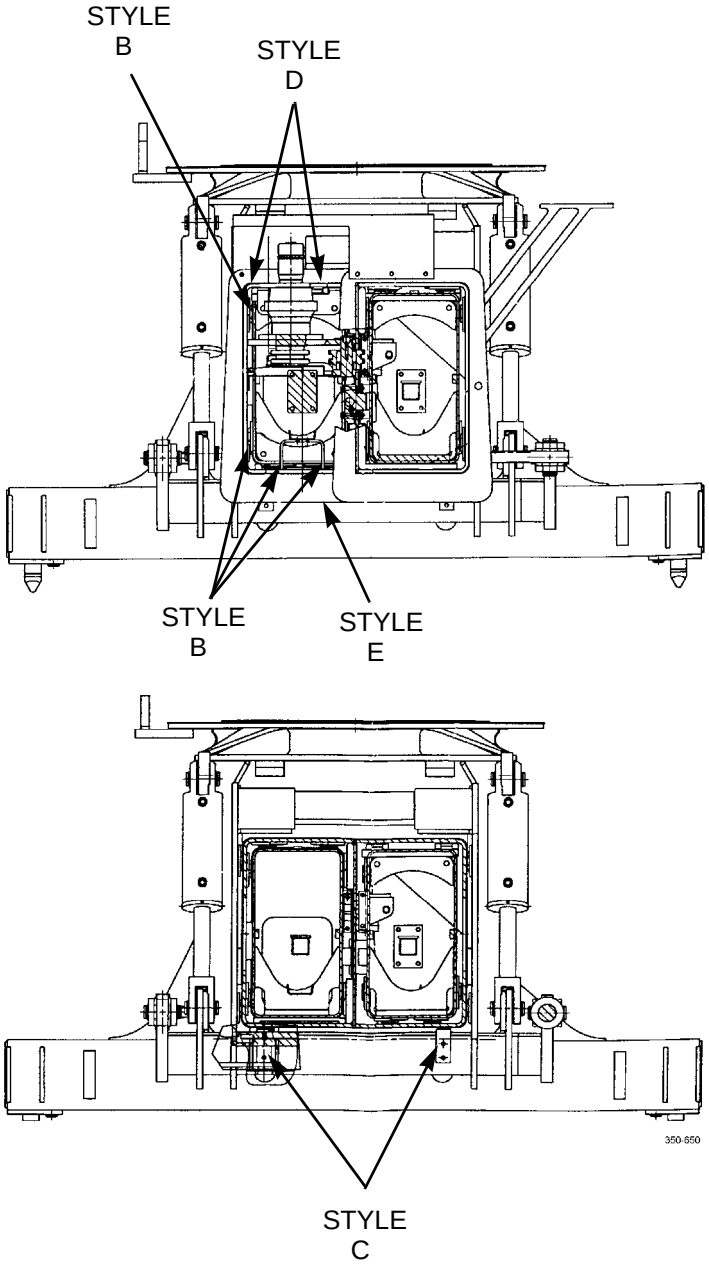
GENERAL - CONTINUED

4. Replacement of one wear plate of each style is described in this work package. Appropriate notes and access procedures are included for removal and replacement of each style wear plate, as applicable.
5. Spacer blocks and shims may be used with wear plates and need to be replaced to maintain proper spacing between tophandler assemblies.
6. Illustrations are provided below to aid in identifying the location of each style wear plate.



WEAR PLATE LOCATOR DIAGRAM

GENERAL - CONTINUED



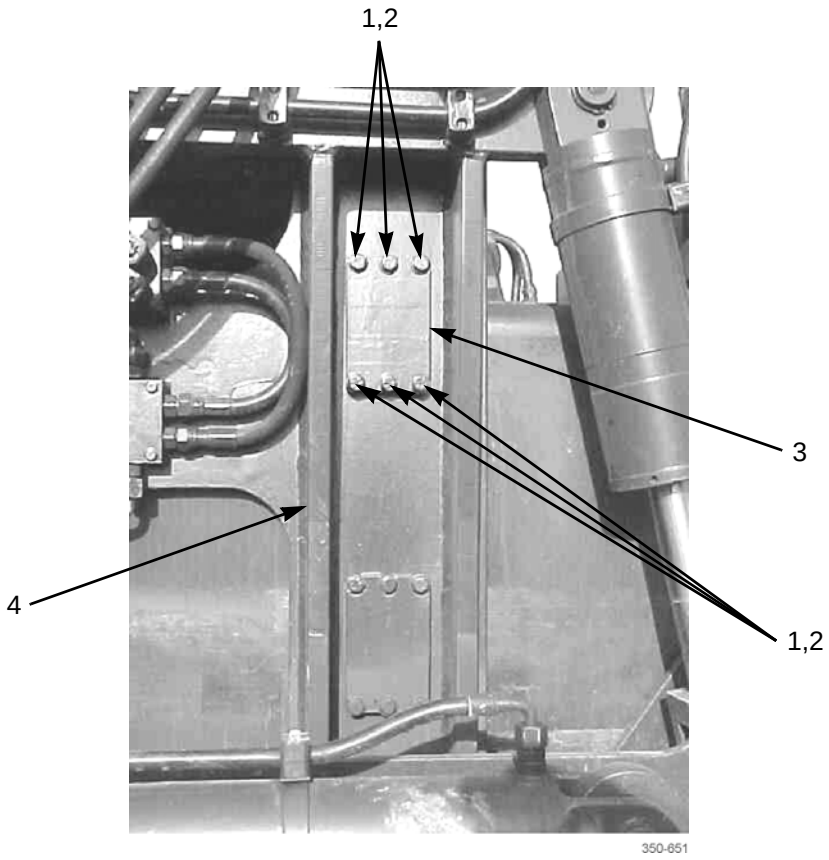
WEAR PLATE LOCATOR DIAGRAM

STYLE A WEAR PLATE REMOVAL

NOTE

- **Replace style A wear plates one at a time to maintain distance relationship.**
- **Replace style A wear plates as a set.**

1. Remove six screws (1), washers (2), and cover plate (3) from sideshift carriage frame (4).

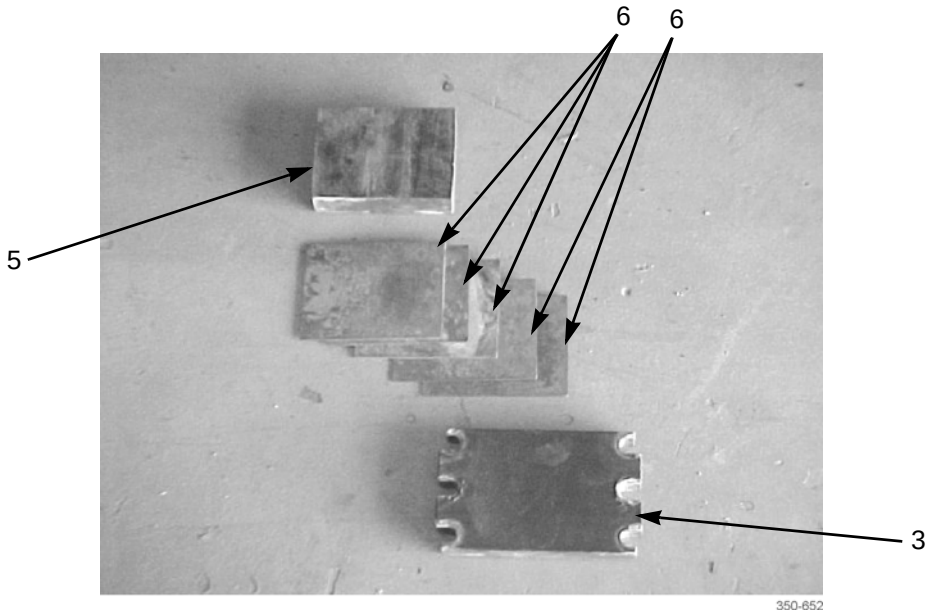


NOTE

If shims are used, note number of shims used.

2. Remove shims (6) and wear plate (5).

STYLE A WEAR PLATE REMOVAL - CONTINUED



3. Measure wear plate thickness. Measurement MUST be a minimum of 1 in. (25.4 mm). If wear plate is not as specified, replace wear plate.

STYLE A WEAR PLATE INSTALLATION

1. Measure thickness of shims (6) removed from wear plate location. Shim measurement MUST NOT exceed 0.25 in. (6.4 mm). Remove shims as necessary so as not to exceed requirement.

NOTE

Total thickness of wear plate and shims for style A location must not exceed 1.25 in. (31.8 mm).

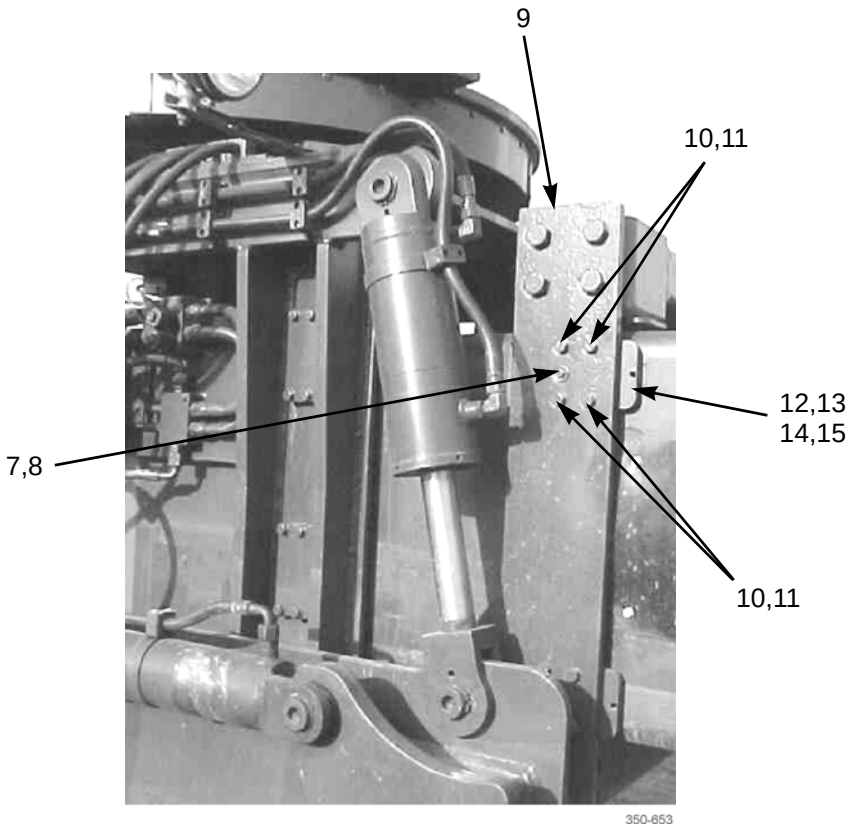
2. Install wear plate (5) and shims (6) as needed in sliding carriage frame (4).
3. Position cover (3) and secure in place with six screws (1) and washers (2). Tighten screws in accordance with *Torque Limits* (WP 0286 00).
4. Perform operational check of tophandler (TM-10-3930-675-10).

STYLE B WEAR PLATE REMOVAL

NOTE

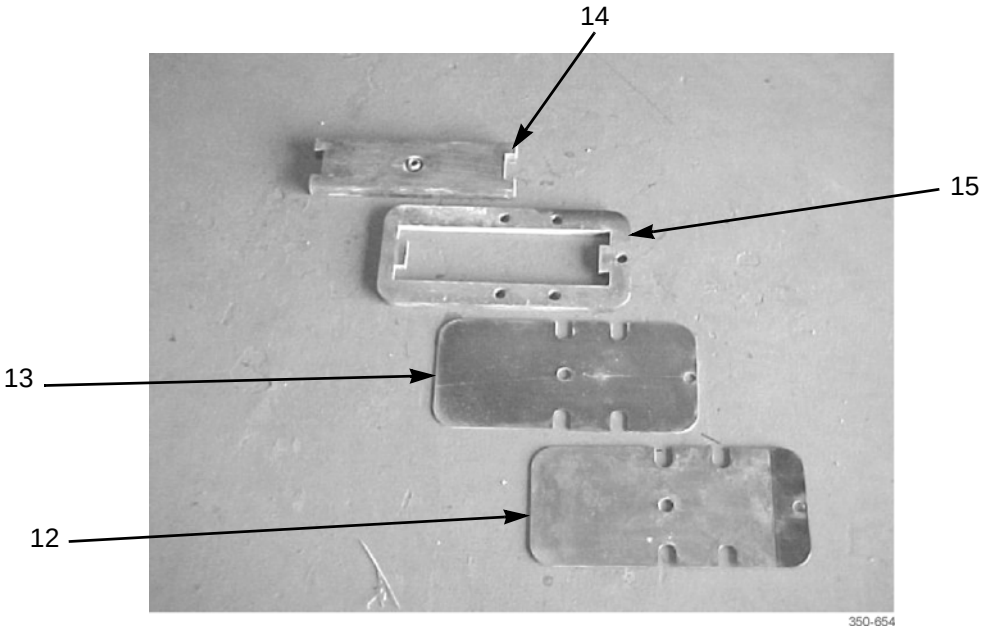
- **Style B wear plates use the same hardware. For removal procedures, refer to step 1 below.**
- **Access procedures and requirements for each location are different. Refer to steps 2 and 3 for specific access procedures.**

1. To remove a style B wear plate mounted on sideshift carriage frame:
   a. Remove four screws (10) and washers (11) securing mounting plate (12), backing plate (13), and frame (15) to sideshift carriage frame (9).
   b. Remove screw (7) and washer (8) securing wear plate (14).



   c. Remove spacer (12), spacer (13), frame (15), and wear plate (14).
   d. Measure thickness of wear plate (14). Measurement must not be less than 0.5 in. (13 mm).
   e. If measurement is more than 0.5 in. (12.7 mm), but less than 1 in. (25.4 mm), add backing plates (13) as needed.

STYLE B WEAR PLATE REMOVAL - CONTINUED



2. To access a style B wear plate mounted on sideshift carriage horizontal frame:

   a. Remove lower right screw (16), nut (17), and washer (18).



   b. Perform procedures in step 1 to remove wear plate.

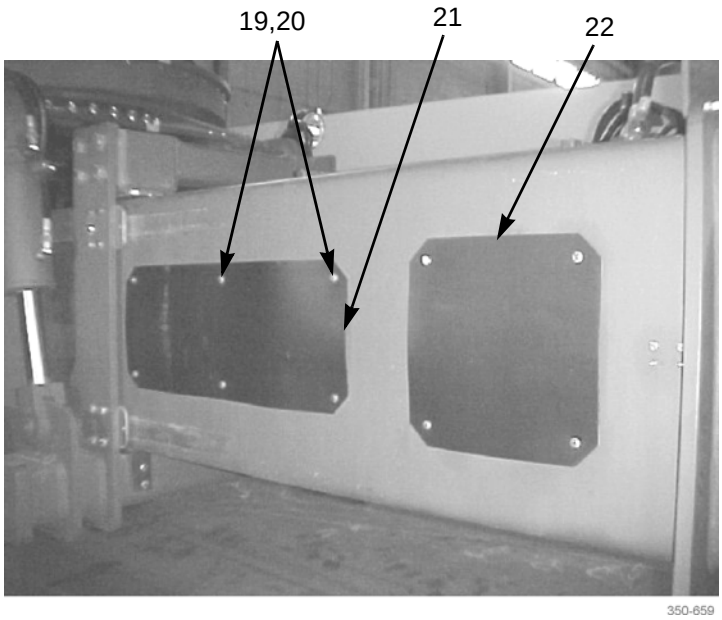
STYLE B WEAR PLATE REMOVAL - CONTINUED

3. To access a style B wear plate on sliding beam interior:

NOTE

Internal beam wear plates may use a spacer block in some mounting locations. Ensure spacer block is retained and replaced.

a. Remove ten screws (19), washers (20), and two access panels (21 and 22) from side of each extending beam.



b. With assistance, extend or retract beams to expose internal-mounted style B wear plates (TM 10-3930-675-10).

c. Position tophandler beams on cribbing to aid in relieving weight from load-bearing wear plates.

d. Perform procedures in step 1 to remove wear plate, frame, backing plate, and mounting plate.

STYLE B WEAR PLATE INSTALLATION

1. To install a style B wear plate mounted on sideshift carriage frame:

a. Position wear plate (14), frame (15), spacer (13), and spacer (12) on sideshift carriage frame (9).

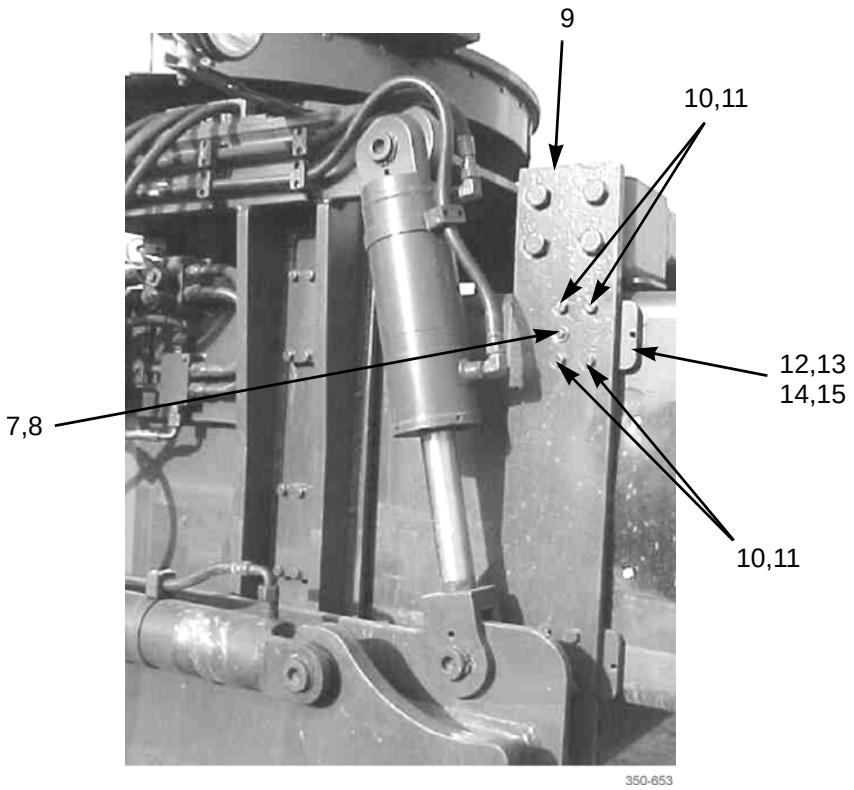
b. Align and install screw (7) and washer (8) to secure wear plate (14) in position on sideshift carriage frame (9). Hand-tighten screw.

c. Align holes in mounting plate (12) with sideshift carriage frame (9) and install four screws (10) and washers (11).

d. Tighten all screws in accordance with *Torque Limits* (WP 0286 00).

e. Perform operational check of tophandler (TM-10-3930-675-10).

STYLE B WEAR PLATE INSTALLATION - CONTINUED



2. To install a style B wear plate mounted on sideshift carriage horizontal frame:

   a. Perform procedures in step 1.

   b. Install lower right screw (16), washer (17), and nut (18), which were removed for access. Tighten screw in accordance with *Torque Limits* (WP 0286 00).



STYLE B WEAR PLATE INSTALLATION - CONTINUED

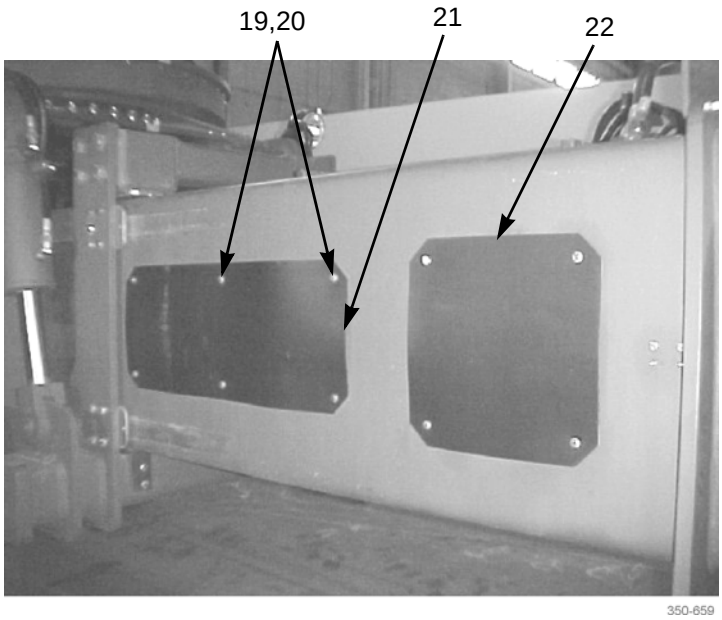
3. To install a style B wear plate on sliding beam interior:

NOTE

Ensure spacer blocks are replaced with sliding beam internal wear plates where used.

a. Perform procedures in step 1.

b. Position two access panels (21 and 22). Install and tighten ten screws (19) and washers (20).



STYLE C WEAR PLATE REMOVAL

NOTE

- **If measurement of wear plate is less 0.5 in. (12.7 mm), perform this procedure to replace wear plate.**
- **To prevent shifting of sideshift carriage, wear plates should be replaced in sets one at a time.**

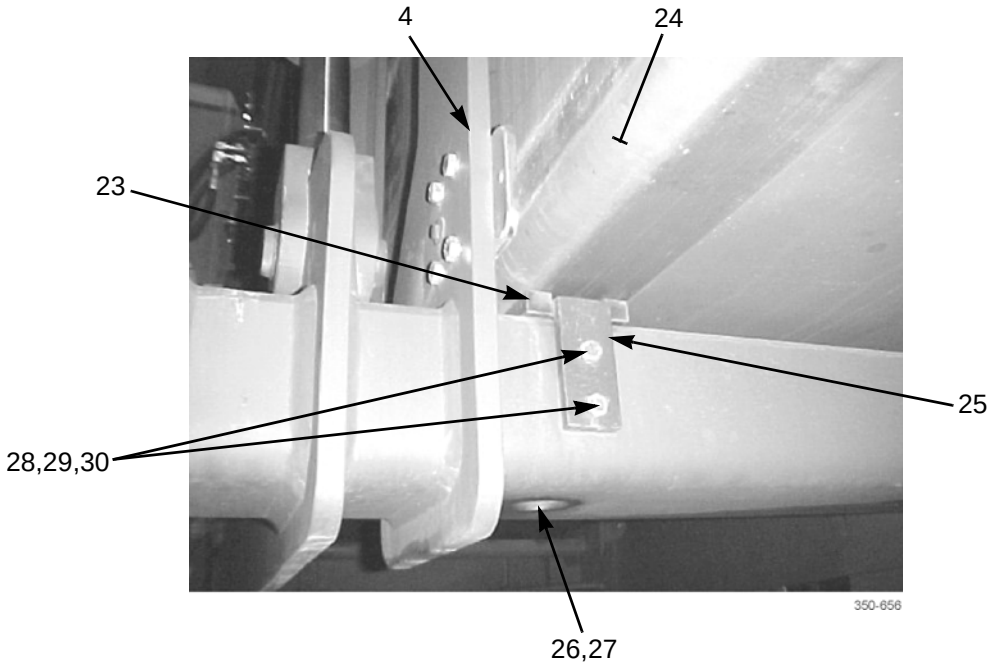
1. With assistance, position sideshift carriage (24) on cribbing to relieve weight on wear plates (23).

2. Remove two screws (28), washers (29), and nuts (30) securing lock plate (25) in position. Remove lock plate and retain for installation.

3. Through access hole in frame bottom, remove screw (26) and washer (27) securing wear plate (23) to sideshift carriage frame (4).

4. Slide wear plate (23) from position on sideshift carriage frame (4).

STYLE C WEAR PLATE REMOVAL - CONTINUED



STYLE C WEAR PLATE INSTALLATION

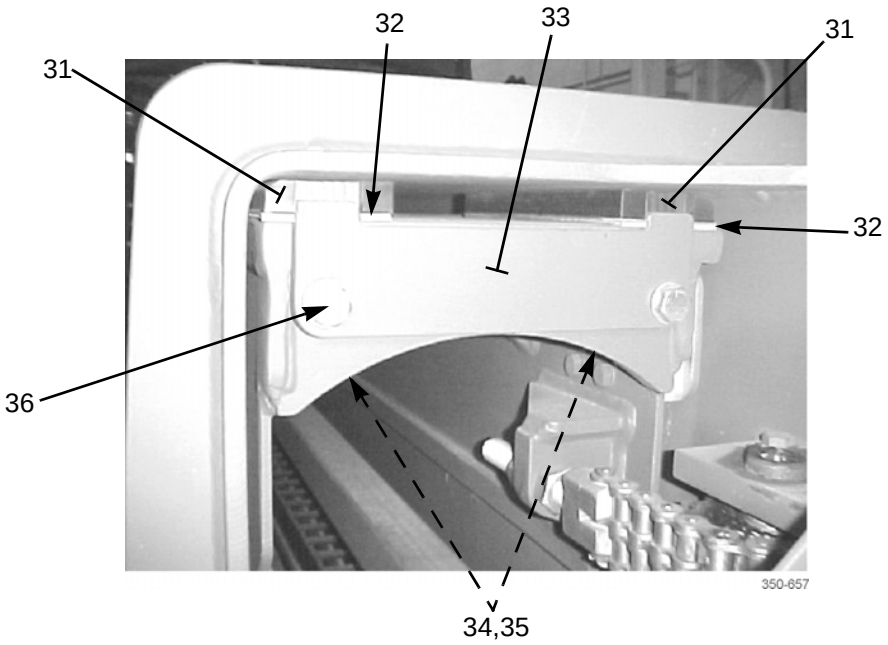
1. Position wear plate (23) on sideshift carriage frame (4) and install screw (26) and washer (27) through access hole in frame bottom.
2. Install lock plate (25) with two screws (28), washers (29), and nuts (30).
3. Tighten all screws in accordance with *Torque Limits* (WP 0286 00).
4. Perform operational check of tophandler (TM-10-3930-675-10).

STYLE D WEAR PLATE REMOVAL

NOTE

- **If measurement of wear plate is less 0.5 in. (12.7 mm), perform this procedure to replace wear plate.**
- **Note location of beveled edge on wear plate. Ensure wear plate is oriented with beveled edge in same position for installation.**

1. Position sliding beam to access wear plate (31) and remove two screws (36) and lock plate (33).
2. Through access hole in extending beam, remove two screws (34) and washers (35) securing wear plate (31) and shims (32).
3. Slide two wear plates (31) and shims (32) from extending beam location.



STYLE D WEAR PLATE INSTALLATION

NOTE

Ensure wear plates are oriented with beveled edge the same as noted in removal.

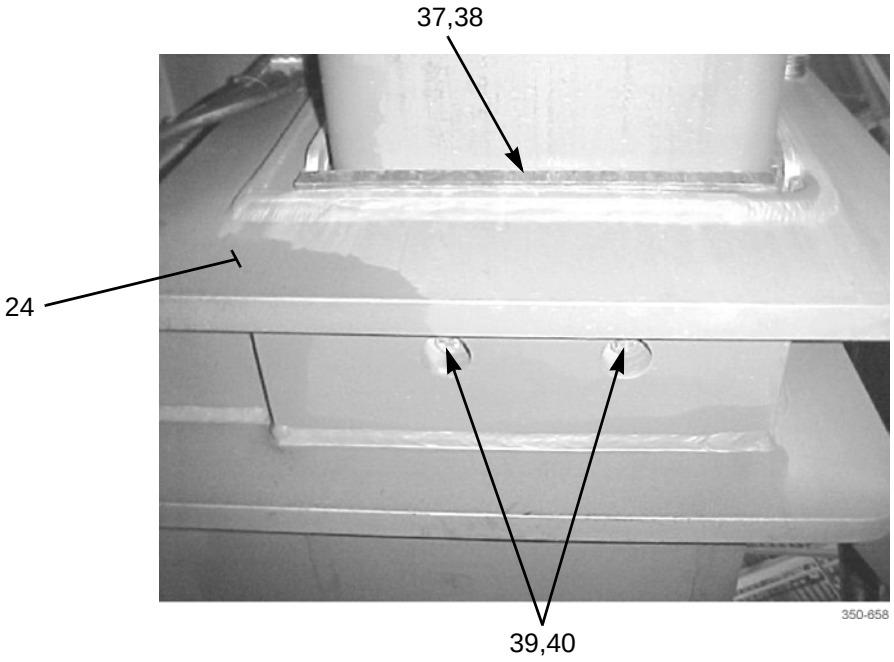
1. Position two wear plates (31) on extending beam.
2. Install two screws (34) and washers (35) through access hole in extending beam to secure wear plates (31).
3. Position lock plate (33) on extending beam.
4. Install two screws (36) to secure lock plate (33).
5. Tighten all screws in accordance with *Torque Limits* (WP 0286 00).
6. Perform operational check of tophandler (TM-10-3930-675-10).

STYLE E WEAR PLATE REMOVAL

NOTE

If measurement of wear plate is less 0.5 in. (12.7 mm), perform this procedure to replace wear plate.

1. Position sliding beam on cribbing to relieve weight on wear plate (37) in sideshift carriage (24).
2. Through access hole in bottom of sideshift carriage (24), remove two screws (39) and washers (40) from lock plate (38).
3. Slide wear plate (37) and lock plate (38) from sideshift carriage (24).



STYLE E WEAR PLATE INSTALLATION

1. Position wear plate (37) with lock plate (38) on sideshift carriage (24).
2. Align lock plate (38) holes with holes in sideshift carriage (24).
3. Install two screws (39) and washers (40) to secure wear plate (37). Tighten screws in accordance with *Torque Limits* (WP 0286 00).
4. Perform operational check of tophandler (TM-10-3930-675-10).

END OF WORK PACKAGE

ENGINE COVER MAINTENANCE 0148 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Adhesive (Item 2, WP 0290 00)

Nut, lock (P/N 920076.002) (6)

Materials/Parts - Continued

Nut, lock (P/N 920076.003) (3)

Weatherseal (P/N 920946.0008)

Personnel Required

Two

References

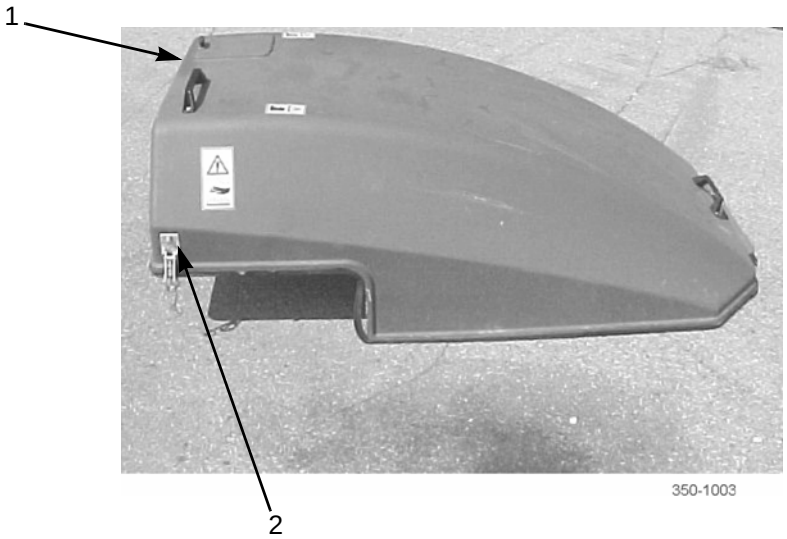
TM 10-3930-675-10

NOTE

For ease in removing engine cover, boom may be raised (TM 10-3930-675-10).

REMOVAL

1. Release latch (2) on each side of engine cover (1).
2. Lift rear of engine cover (1) and slide front of engine cover out from front latch.
3. Lift engine cover (1) off vehicle.

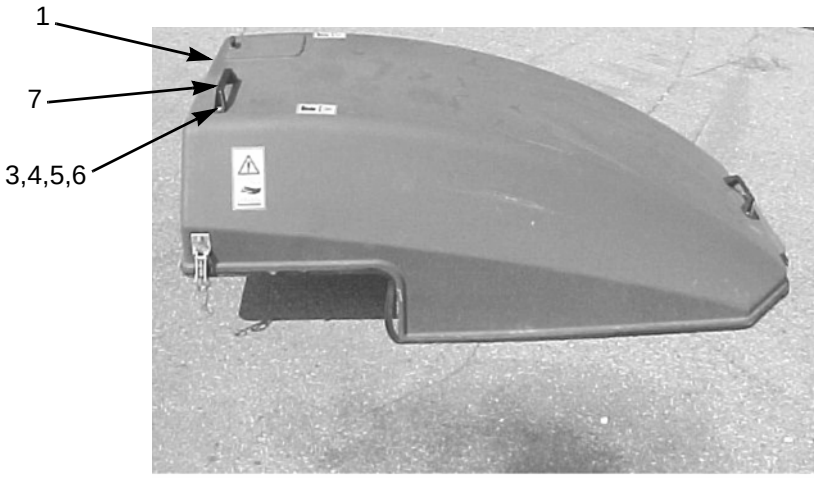


DISASSEMBLY

NOTE

Perform step 1 to remove each of two handles.

1. Remove two locknuts (3), screws (4), washers (5), washers (6), and handle (7) from engine cover (1). Discard locknuts.



NOTE

Perform step 2 to remove each of two latches.

2. Remove four locknuts (8), washers (9), plate (10), four screws (11), and latch (2) from engine cover (1). Discard locknuts.



DISASSEMBLY - CONTINUED

NOTE

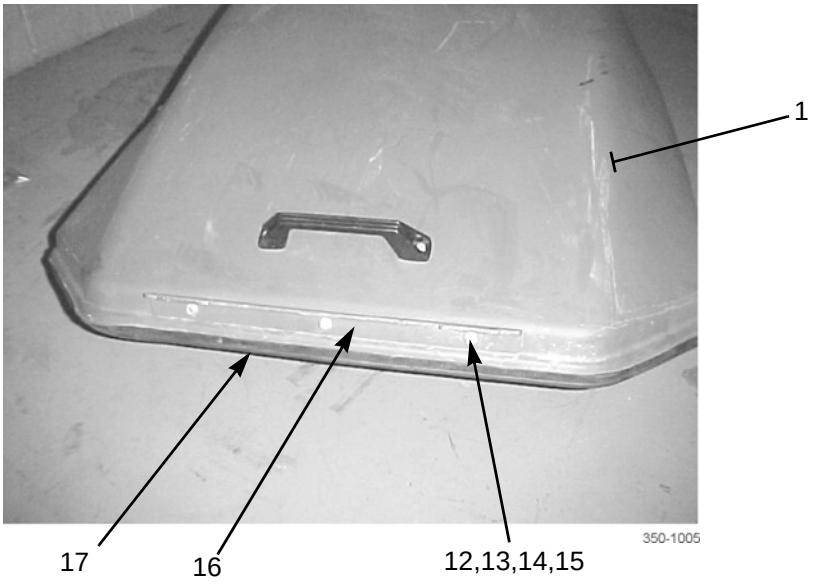
Perform step 3 to remove bracket from front of engine cover.

3. Remove three locknuts (12), washers (13), washers (14), screws (15), and bracket (16) from front of engine cover (1). Discard locknuts.

NOTE

Perform step 4 to remove weatherseal.

4. Remove weatherseal (17) and cut new weatherseal to same length. Discard old weatherseal.



ASSEMBLY

NOTE

Perform step 1 to install weatherseal on engine cover.

1. Apply adhesive to new weatherseal (17) and install weatherseal on edges of engine cover (1).

NOTE

Perform step 2 to install bracket on front of engine cover.

2. Install bracket (16) on front of engine cover (1) with three screws (15), washers (14), washers (13), and new locknuts (12).

NOTE

Perform step 3 to install each of two latches.

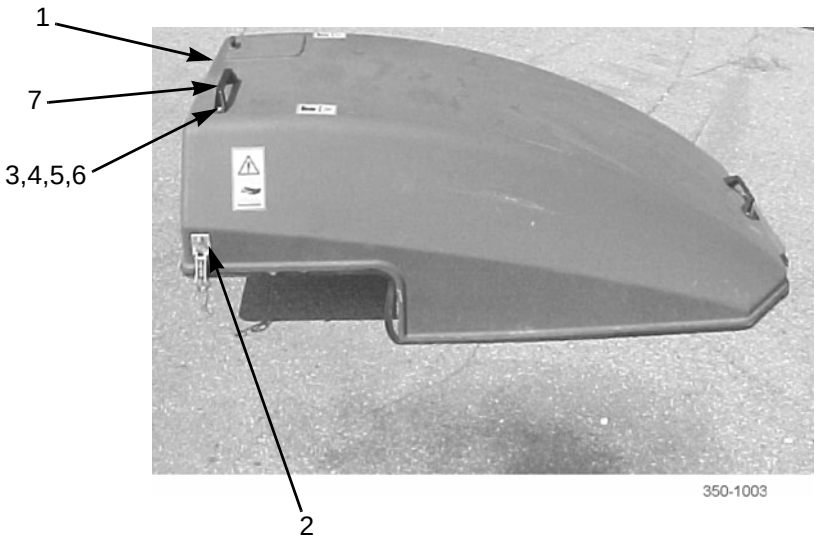
3. Install plate (10) and latch (2) on engine cover (1) with four washers (9), screws (11), and new locknuts (8).

ASSEMBLY - CONTINUED

NOTE

Perform step 4 to install each of two handles.

4. Install handle (7) on engine cover (1) with two washers (6), washers (5), screws (4), and new locknuts (3).



INSTALLATION

1. With assistance, position engine cover (1) over engine compartment and into front latch.
2. Secure engine cover (1) on each side with latch (2).

END OF WORK PACKAGE

FENDER ASSEMBLY REPLACEMENT (ARMY, RESET, AND USMC) 0149 00

THIS WORK PACKAGE COVERS

Fenders and Fender Brackets (Army): Removal, Installation

Front Fenders and Fender Brackets (RESET): Removal, Installation

Rear Fenders and Fender Brackets (USMC): Removal, Installation

Front Fenders and Fender Brackets (USMC): Removal, Installation

Fender Bracket Mounting Plate (All Configurations): Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Nut, lock (P/N 5957) (12)

Nut, lock (P/N 5590) (4)

RTV

Materials/Parts - Continued

Washer, lock (P/N 923657.0006) (rear) (8)

Washer, lock (P/N 923657.0011) (front) (8)

Personnel Required

Two

Reference

WP 0104 00

Equipment Condition

Master battery switch in OFF position

Steering hydraulic system pressure relieved (WP 0164 00)



WARNING

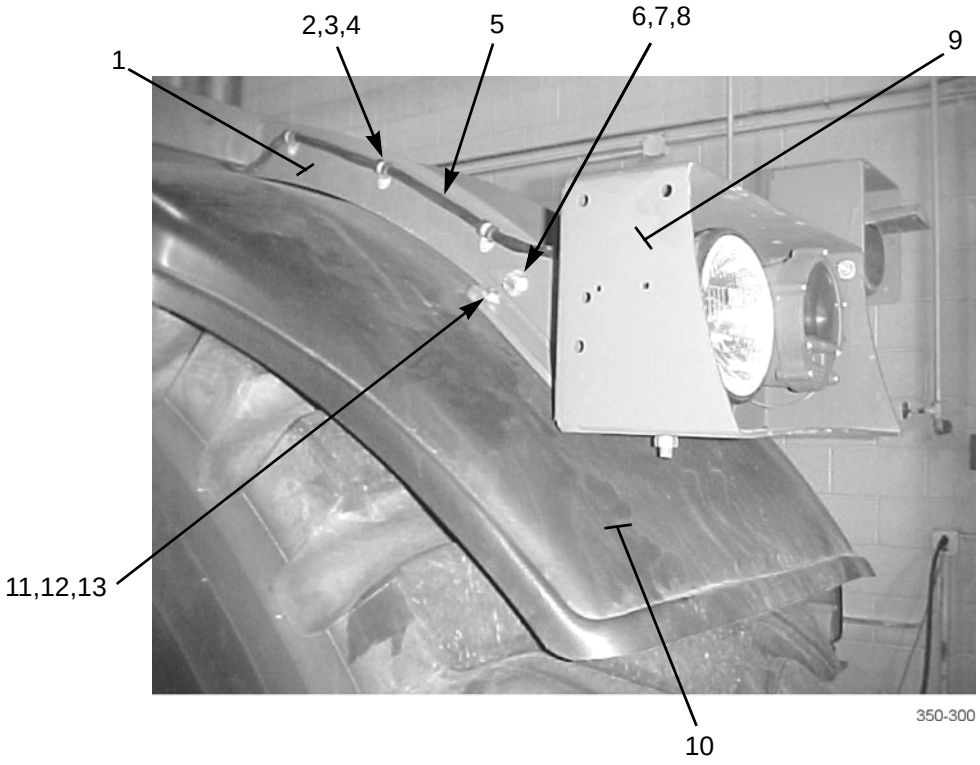
DO NOT perform this task without first relieving steering hydraulic system pressure. When working in close proximity to wheels and tires, safety dictates that there be no danger of inadvertent movement in wheels and tires. Failure to relieve steering hydraulic system pressure could result in injury to personnel.

NOTE

- **All four fenders on the ARMY and the two rear fenders on the RESET vehicle are replaced the same way.**
- **Two front fenders on the RESET and all fenders on the USMC vehicle are replaced using the procedures shown for those configurations.**

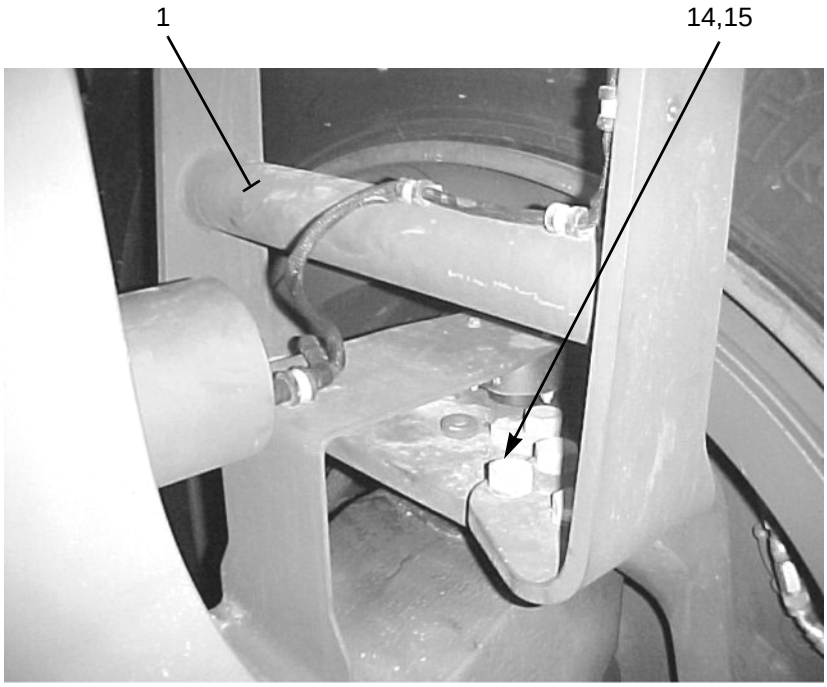
FENDERS AND FENDER BRACKETS REMOVAL (ARMY)

1. At front and rear of fender (10), remove six locknuts (11), six screws (12), and twelve washers (13). Discard locknuts.
2. Remove fender (10) from fender support bracket (1).
3. Remove nine screws (2), washers (3), and clamps (4) to release wiring harness (5) from fender support bracket (1).
4. Remove four locknuts (6), four screws (7), eight washers (8), and light bracket (9) from fender support bracket (1). Set light bracket and wiring harness (5) aside. Discard locknuts.



FENDERS AND FENDER BRACKETS REMOVAL (ARMY) - CONTINUED

5. Remove eight screws (14), eight lockwashers (15), and fender support bracket (1) from vehicle. Discard lockwashers.



350-301

FENDERS AND FENDER BRACKETS INSTALLATION (ARMY)

NOTE

Perform steps 1 thru 3 to install fender support bracket on vehicle.

1. Install fender support bracket (1) on vehicle with eight new lockwashers (15) and screws (14).
2. Install light bracket (9) on fender support bracket (1) with eight washers (8), four screws (7), and new locknuts (6).

NOTE

During installation of the wiring harness, allow a loop in the harness at the base of the fender support bracket to allow the wheel to turn without damaging the harness.

3. Install wiring harness (5) on fender support bracket (1) with nine clamps (4), washers (3), and screws (2).

NOTE

Perform steps 4 and 5 to install fender on fender support bracket.

4. Position fender (10) on fender support bracket (1).
5. Install fender (10) on fender support bracket (1) with twelve washers (13), six screws (12), and new locknuts (11) at front and rear of fender.

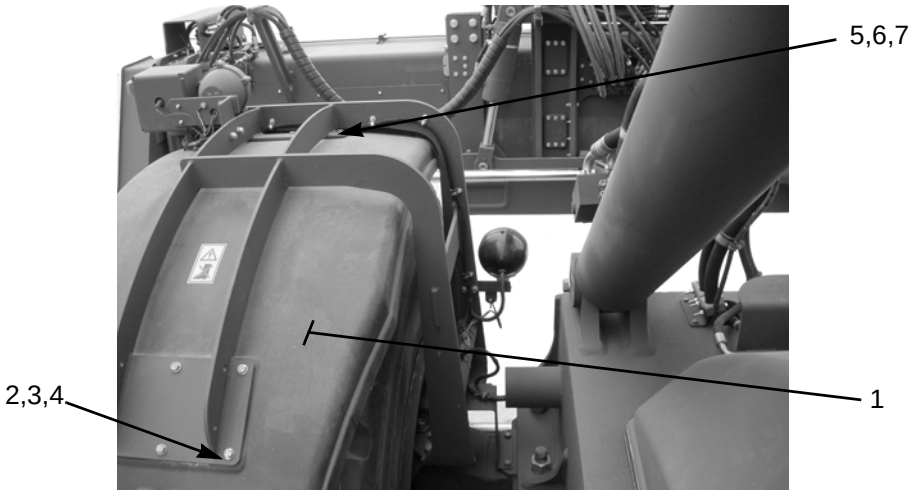
FRONT FENDERS AND FENDER BRACKETS REMOVAL (RESET)



WARNING

DO NOT perform this task without first relieving steering hydraulic system pressure. When working in close proximity to wheels and tires, safety dictates that there be no danger of inadvertent movement in wheels and tires. Failure to relieve steering hydraulic system pressure could result in injury to personnel.

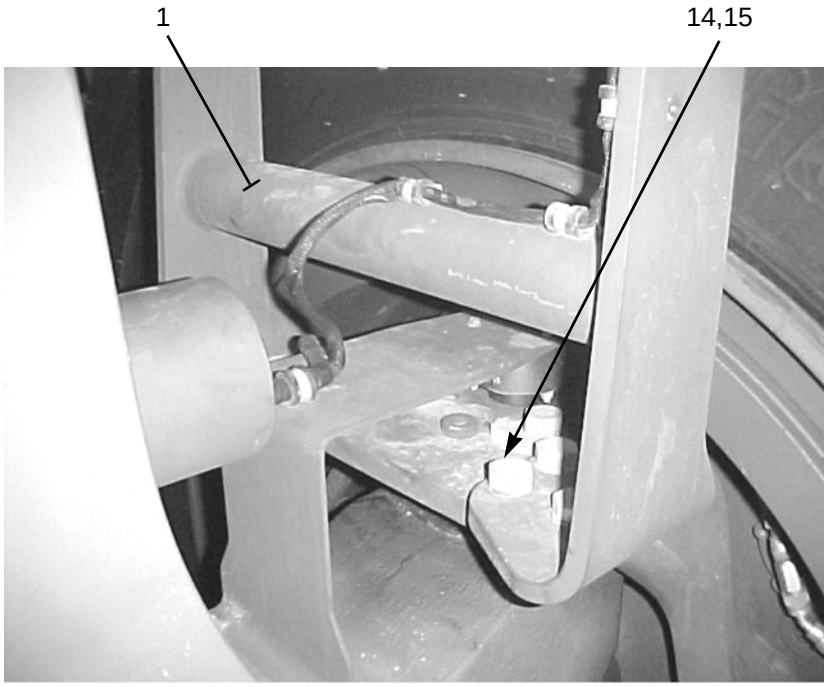
1. At rear of fender, remove six locknuts (2), six screws (3), and twelve washers (4).
2. At front of fender, remove three locknuts (5), three screws (6), and six washers (7).
3. Remove fender (1) from fender bracket (10).



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FRONT FENDERS AND FENDER BRACKETS REMOVAL (RESET) - CONTINUED

4. Remove screws, washers, nuts, and clamps securing wiring harness and light brackets to fender support bracket (1). Set light bracket and wiring harness aside.
5. Remove eight screws (14), lockwashers (15), and fender support bracket (1) from vehicle. Discard lockwashers.



FRONT FENDERS AND FENDER BRACKETS INSTALLATION (RESET)

NOTE

Perform steps 1 and 2 to install fender support bracket on the RESET vehicle.

1. Install fender support bracket (1) on vehicle with eight new lockwashers (15) and screws (14).
2. Install light bracket and wiring harness on fender support bracket (1) with screws, nuts, and washers.

NOTE

Perform steps 3 and 4 to install the fender on the fender support bracket.

3. Position fender (10) on fender support bracket (1).
4. At front of fender, install three screws (5), nuts (6), and six washers (7).
5. At rear of fender, install six screws (2), nuts (3), and twelve washers (4).

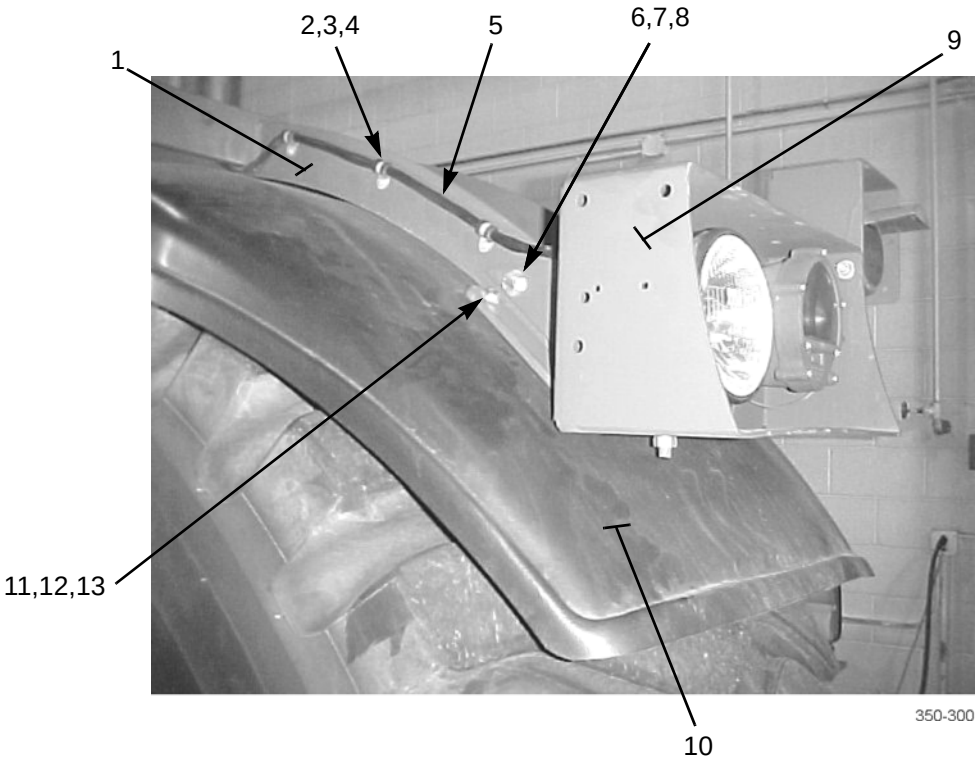
REAR FENDERS AND FENDER BRACKETS REMOVAL (USMC)



WARNING

DO NOT perform this task without first relieving steering hydraulic system pressure. When working in close proximity to wheels and tires, safety dictates that there be no danger of inadvertent movement in wheels and tires. Failure to relieve steering hydraulic system pressure could result in injury to personnel.

1. At front and rear of fender (10), remove six locknuts (11), six screws (12), and twelve washers (13). Discard locknuts.
2. Remove fender (10) from fender support bracket (1).

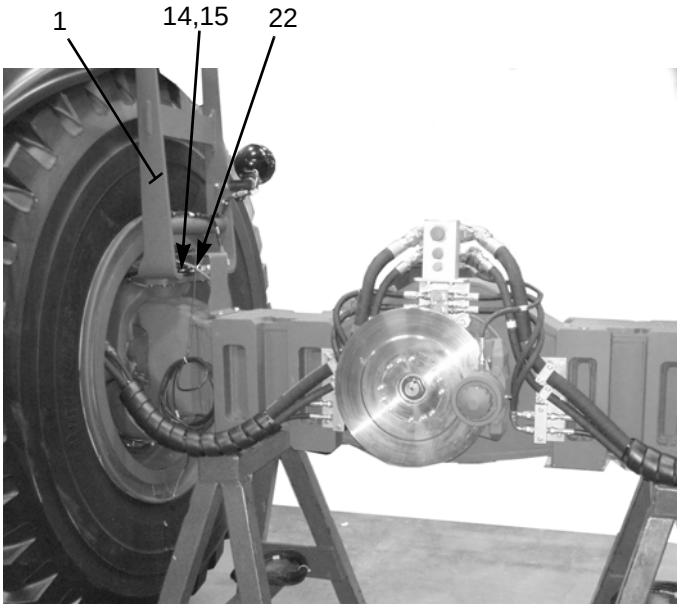


REAR FENDERS AND FENDER BRACKETS REMOVAL (USMC) - CONTINUED

NOTE

Rear fender support brackets can be removed with lights and light brackets attached.

3. Disconnect waterproof connector (22) from inside base of fender support bracket (1).
4. Remove eight screws (14), lockwashers (15), and fender support bracket (1) from vehicle. Discard lockwashers.



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REAR FENDERS AND FENDER BRACKETS INSTALLATION (USMC)

NOTE

Rear fender support brackets can be installed with lights and light brackets attached.

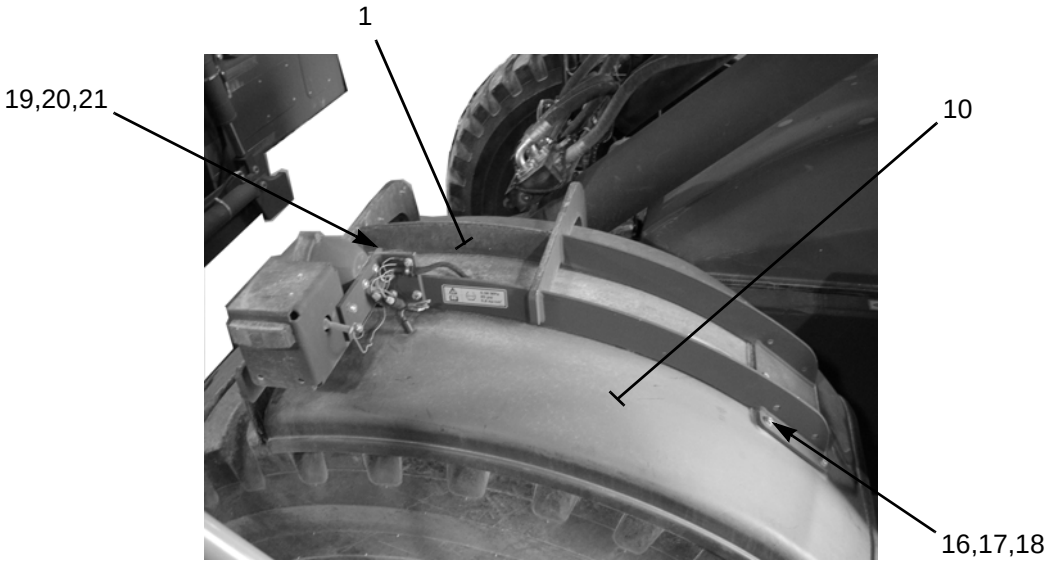
1. Install fender support bracket (1) with eight screws (14) and new lockwashers (15).
2. Connect waterproof connector (22) to inside base of fender support bracket (1).
3. Position fender (10) on fender support bracket (1).
4. At front and rear of fender (10), install six locknuts (11), screws (12), and twelve washers (13).

FRONT FENDERS AND FENDER BRACKETS REMOVAL (USMC)

1. At rear of fender (10), remove six locknuts (16), screws (17), and twelve washers (18). Discard locknuts.
2. At front of fender (10), remove three locknuts (19), screws (20), and six washers (21). Discard locknuts.
3. Remove fender (10) from fender support bracket (1).

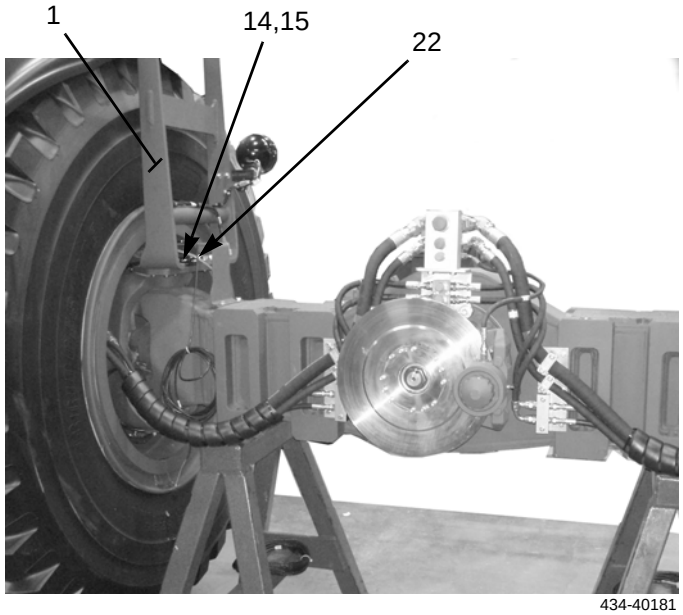
NOTE

Front fender support brackets can be removed with lights and light brackets attached.



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4. Disconnect waterproof connector (22) from inside base of fender support bracket (1).
5. Remove eight screws (14), lockwashers (15), and fender support bracket (1) from vehicle. Discard lockwashers.



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FRONT FENDERS AND FENDER BRACKETS INSTALLATION (USMC)

NOTE

Rear fender support brackets can be installed with lights and light brackets attached.

1. Install fender support bracket (1) with eight screws (14) and new lockwashers (15).
2. Connect waterproof connector (22) to inside base of fender support bracket (1).
3. Position fender (10) on fender support bracket (1).
4. At rear of fender, install six locknuts (16), screws (17), and twelve washers (18). At front fender, install three locknuts (19), screws (20), and six washers (21).

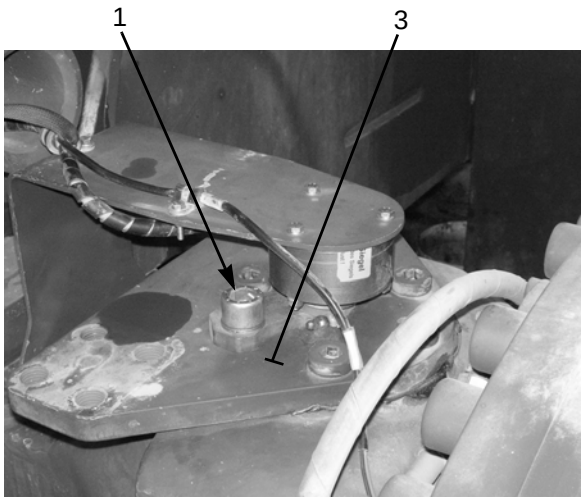
FENDER BRACKET MOUNTING PLATE REMOVAL AND INSTALLATION (ALL VEHICLE CONFIGURATIONS)

Fender Bracket Mounting Plates Removal

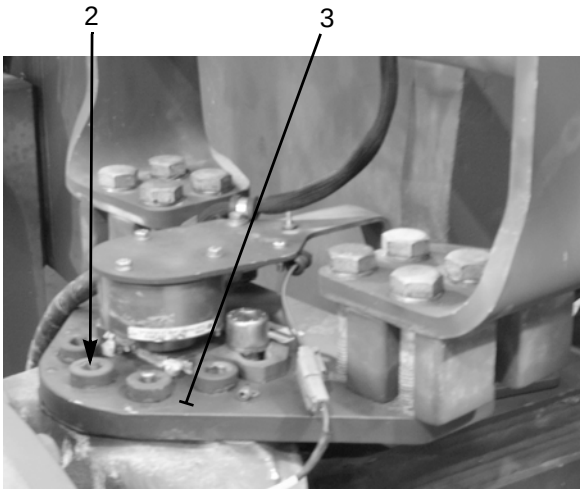
NOTE

Fenders and fender brackets must be removed prior to removing plates.

1. Perform steps 2 and 3 of WP 0104 00-2 and set wheel sensor and bracket aside.
2. Remove six front (1) or eight rear (2) socket head capscrews to free fender bracket mounting plate (3) from axle.



434-40184



434-40185

Fender Bracket Mounting Plate Installation

1. Clean surface of axle and mounting plate (3) and transfer grease fittings from old plate to new plate.
2. Apply RTV to bolt circle on axle, and install fender bracket mounting plate (3) and secure with six front (1) or eight rear (2) socket head capscrews.
3. Perform steps 8 and 9 of WP 0104 00-6 to install wheel sensor.

END OF WORK PACKAGE

MUDGUARD REPLACEMENT 0150 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Nut, lock (P/N 5957) (6)

Personnel Required

Two

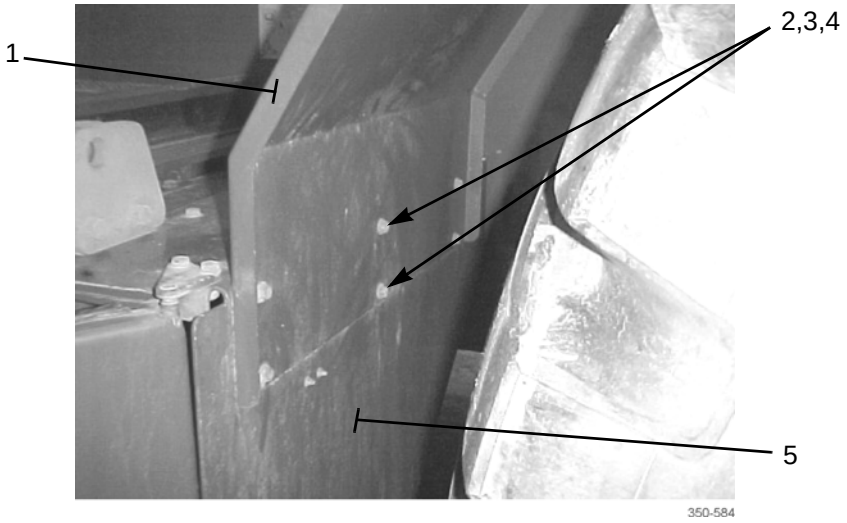


WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

REPLACEMENT

1. Remove six locknuts (2), 12 washers (3), six screws (4), and mudguard (1) from remote hydraulic control compartment (5). Discard locknuts.
2. Install mudguard (1) on remote hydraulic control compartment (5) with six screws (4), twelve washers (3), and six new locknuts (2).



END OF WORK PACKAGE

SEAT BELT REPLACEMENT 0151 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

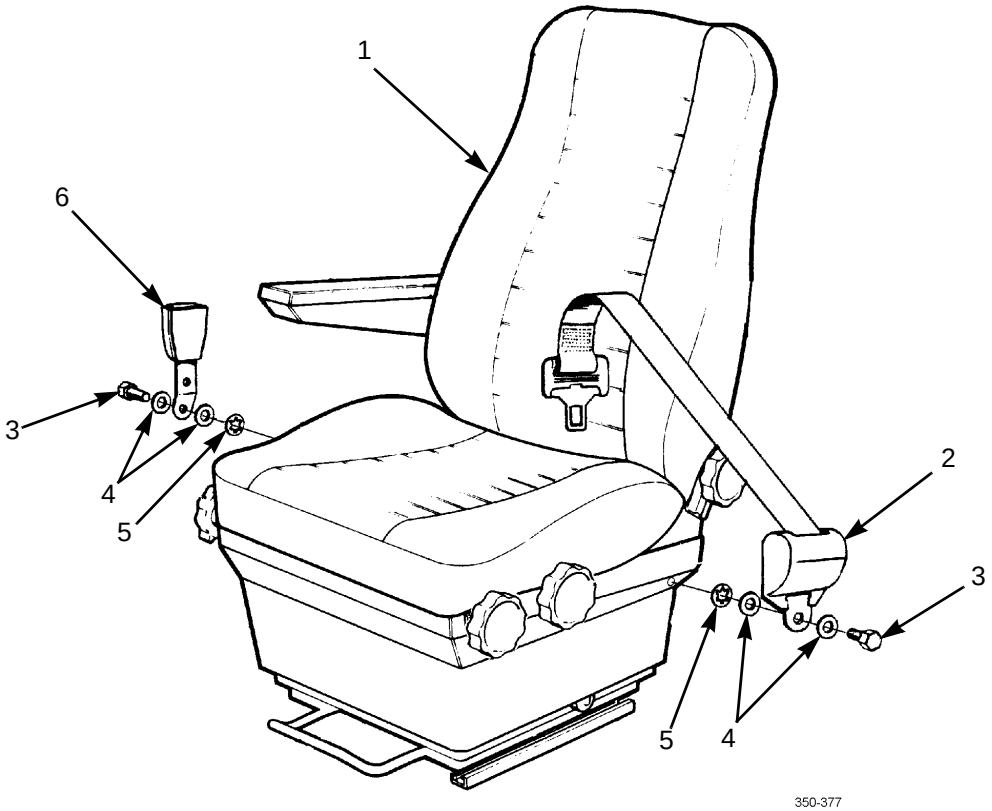
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Kit, Seat Belt (P/N 501216)

REMOVAL

Remove two screws (3), four washers (4), two fiber washers (5), seat belt retractor (2), and seat belt receptacle (6) from seat assembly (1).



INSTALLATION

Install seat belt receptacle (6) and seat belt retractor (2) on seat assembly (1) with two fiber washers (5), four washers (4), and two screws (3).

END OF WORK PACKAGE

SEAT ASSEMBLY MAINTENANCE 0152 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Drill Set, Twist (Item 26, WP 0289 00)

Drill, Electric, Portable (Item 27, WP 0289 00)

Riveter, Blind, Hand (Item 102, WP 0289 00)

Materials/Parts

Nut, lock (P/N 210401) (2)

Rivet (P/N 923899.0573) (2)

Personnel Required

Two

Equipment Condition

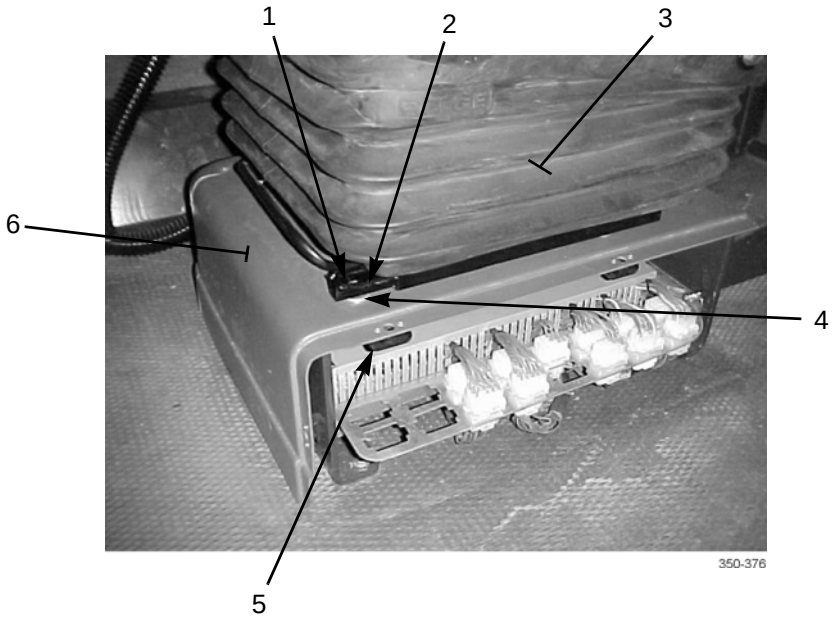
Electronic joystick assembly removed (WP 0082 00)

Seat belt removed (WP 0151 00)

Seat warning buzzer removed (WP 0107 00)

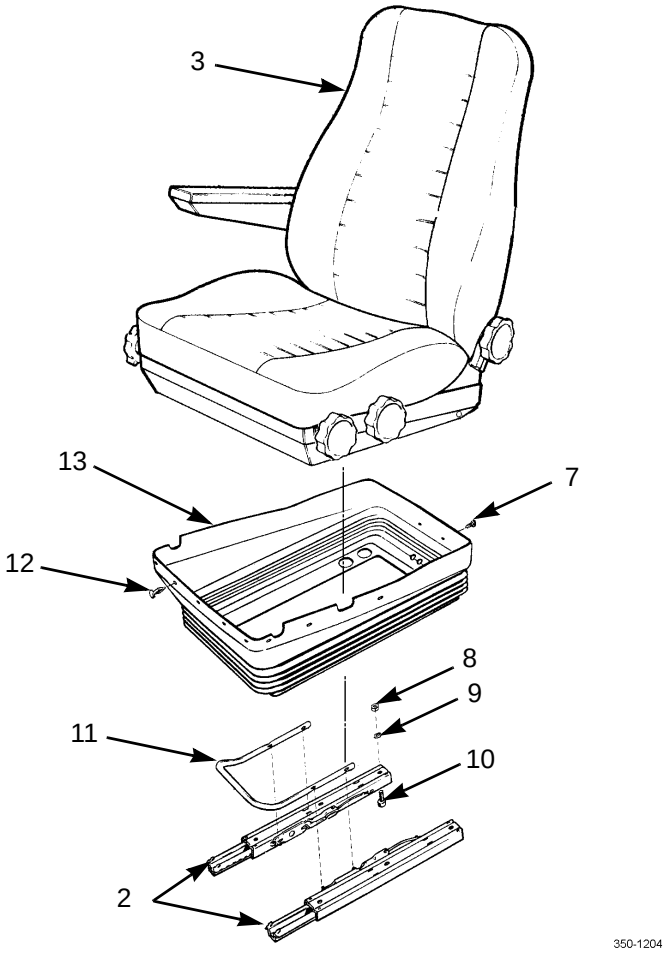
REMOVAL

1. Remove four screws (1) holding slide rails (2) to seat base cover (6) and seat base (5).
2. Remove seat assembly (3) and four spacers (4) from vehicle.



DISASSEMBLY

1. Remove seventeen plastic rivets (12) and five plastic rivets (7) from bellows (13) to separate bellows from seat assembly (3).
2. Remove four nuts (8), washers (9), screws (10), two slide rails (2), and handle (11).
3. Remove bellows (13).



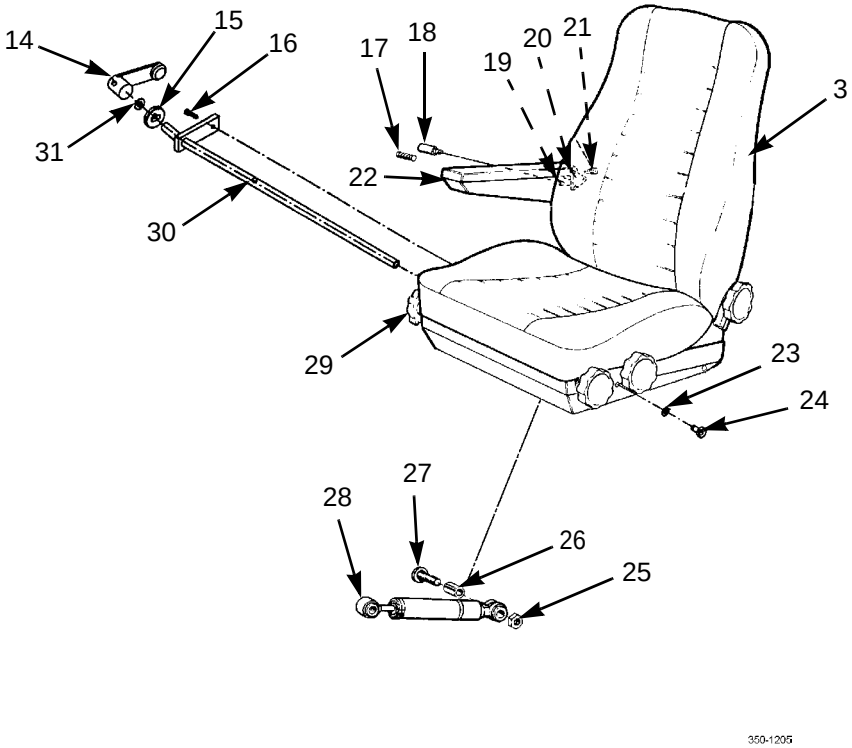
4. Remove lever (14), washer (31), and washer (15) from joystick mounting bracket (30).
5. Remove screw (16), screw (24), washer (23), and joystick mounting bracket (30).
6. Remove screw (17), screw (18), three screws (19), and armrest bracket (20) with armrest (22).
7. Remove adjustment screw (21) from armrest (22).
8. Remove five knobs (29).

NOTE

Step 9 applies to the ARMY vehicle ONLY.

9. Remove two locknuts (25), screws (27), bushings (26), and shock absorber (28). Discard locknuts.

DISASSEMBLY - CONTINUED



ASSEMBLY

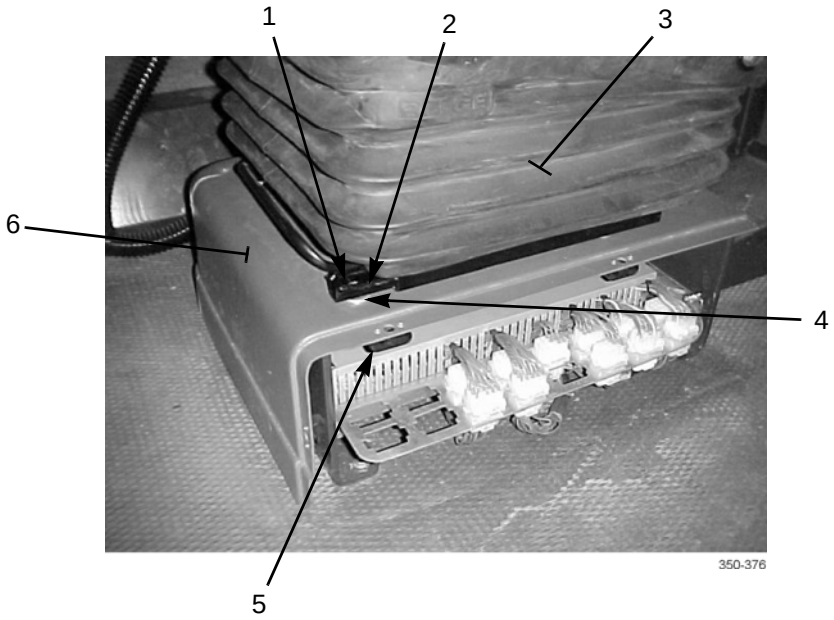
NOTE

Step 1 applies to the ARMY vehicle ONLY.

1. Install shock absorber (28) on bottom of seat assembly (3) with two bushings (26), screws (27), and new locknuts (25).
2. Install five knobs (29).
3. Install adjustment screw (21) in armrest (22).
4. Install armrest bracket (20) with armrest (22), three screws (19), screw (18), and screw (17).
5. Install joystick mounting bracket (30) with washer (23), screw (24), and screw (16).
6. Install washer (15), washer (31), and lever (14) on joystick mounting bracket (30).
7. Position bellows (13) on seat assembly (3).
8. Install handle (11) and two slide rails (2) with four screws (10), washers (9), and nuts (8).
9. Install five plastic rivets (7) and seventeen plastic rivets (12) on bellows (13).

INSTALLATION

1. Position four spacers (4) and seat assembly (3) in vehicle.
2. Install two slide rails (2) on seat base cover (6) and seat base (5) with four screws (1).



3. Install seat warning buzzer (WP 0107 00).
4. Install seat belt (WP 0151 00).
5. Install electronic joystick assembly (WP 0082 00).

END OF WORK PACKAGE

CAB DOOR WEATHERSEAL REPLACEMENT 0153 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

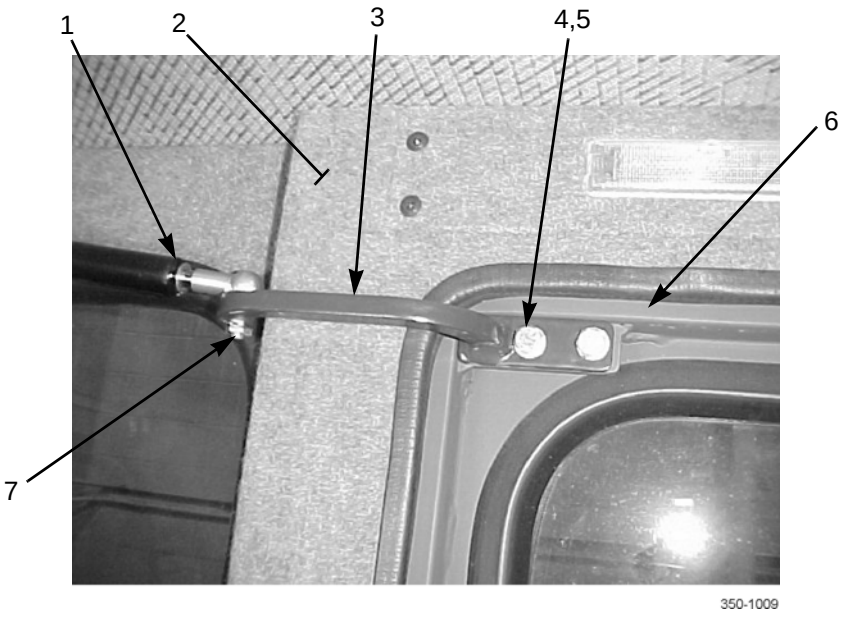
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Compound, Sealing (Item 12, WP 0290 00)
Detergent (Item 15, WP 0290 00)
Rag, Wiping (Item 30, WP 0290 00)
Nut, lock (P/N 923872.0391)
Weatherseal, Rubber (P/N 923899.0564)

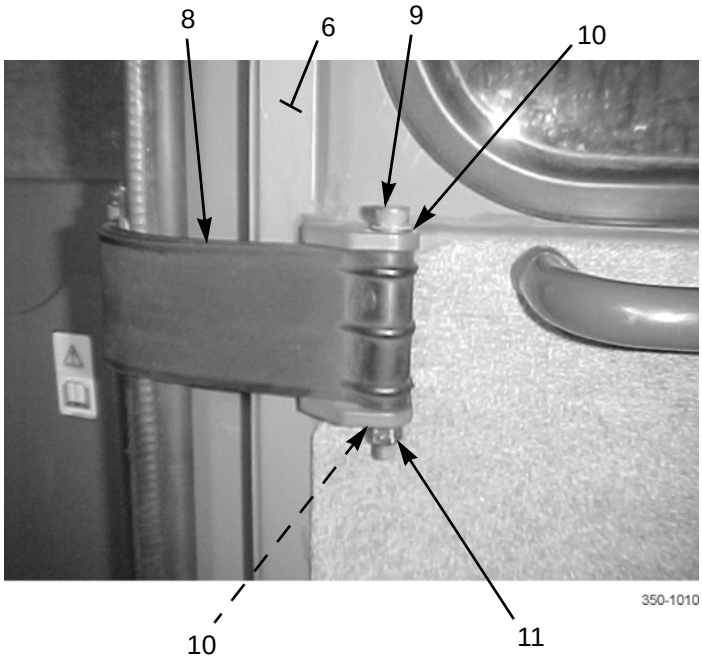
REMOVAL

1. From inside cab (2), with cab door (6) closed, remove nut (7) and disconnect yoke (3) from cylinder (1).
2. Remove two screws (4), washers (5), and yoke (3) from cab door (6).

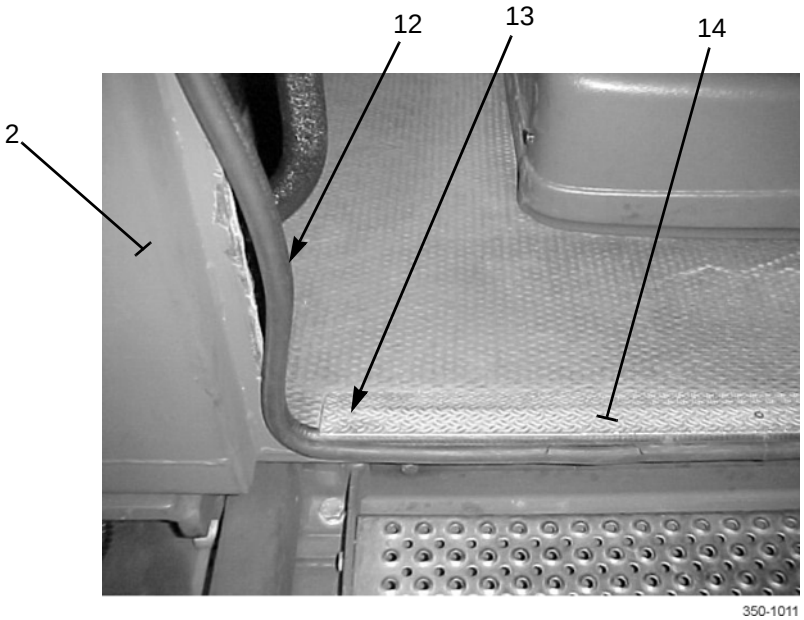


REMOVAL - CONTINUED

3. Open cab door (6) and secure in opened position.
4. Remove locknut (11), two washers (10), screw (9), and door holder (8) from cab door (6). Discard locknut.

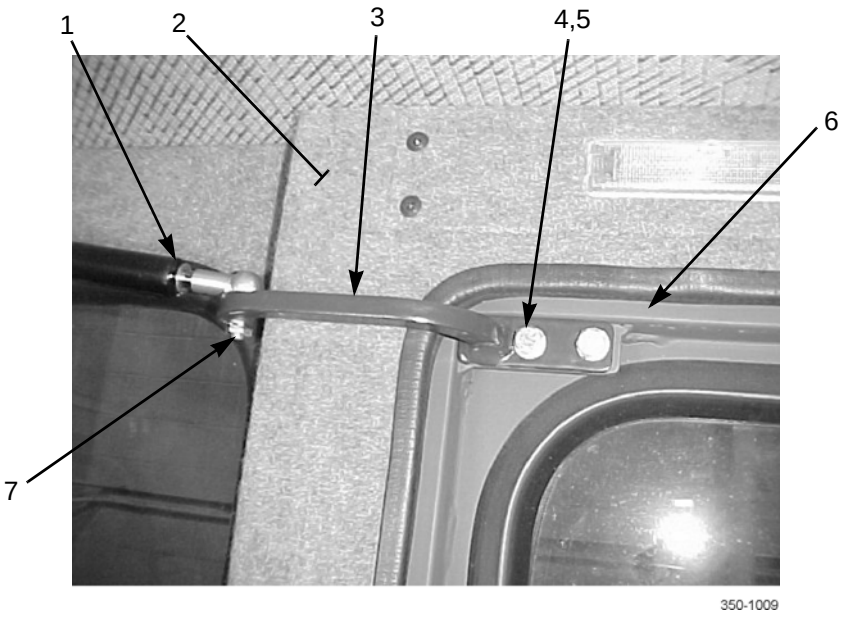


5. Remove three screws (13) and plate (14) from cab floor.
6. Remove cab door weatherseal (12) from cab (2). Discard weatherseal.
7. Clean cab door opening with detergent and water. Dry with clean rags.



INSTALLATION

1. At cab floor, mark center of cab door opening.
2. Start new weatherseal (12) at mark and install weatherseal on cab door opening. Press weatherseal firmly into place.
3. Cut weatherseal (12) to a length that allows ends of weatherseal to come together.
4. Apply sealing compound to ends of weatherseal (12) and press ends together. Allow sealing compound to set.
5. Install plate (14) on cab floor with three screws (13).
6. Install door holder (8) on cab door (6) with screw (9), two washers (10), and new locknut (11).
7. From inside cab (2), with cab door (6) closed, install yoke (3) on cab door with two washers (5) and screws (4).
8. Connect yoke (3) to cylinder (1) and install nut (7).



END OF WORK PACKAGE

STORAGE COMPARTMENT DOORS AND LATCHES REPLACEMENT 0154 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizationals

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Nut, lock (P/N 920076.002) (10)

Personnel Required

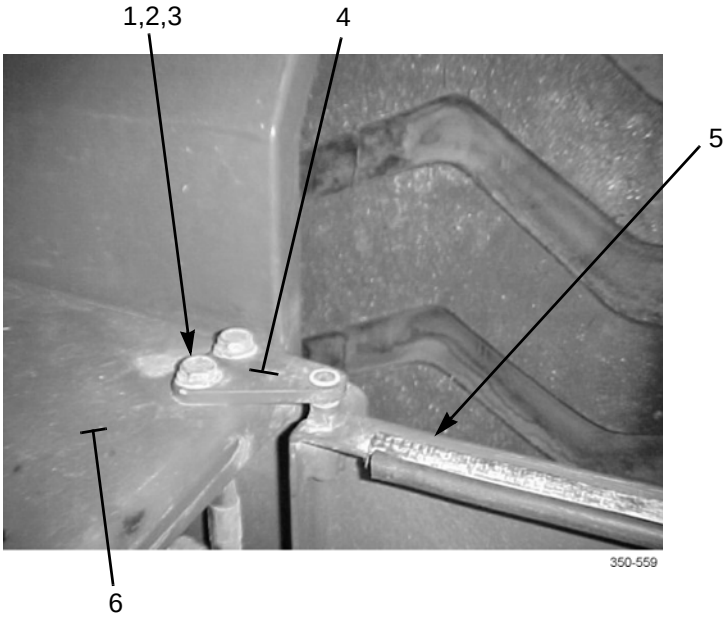
Two

REMOVAL

NOTE

- **Perform step 1 to remove each door.**
- **Replace bracket bushings only if damaged.**

1. With door (5) unlatched and open, remove four locknuts (1), eight washers (2), four screws (3), two brackets (4), and door from storage compartment (6). Discard locknuts.

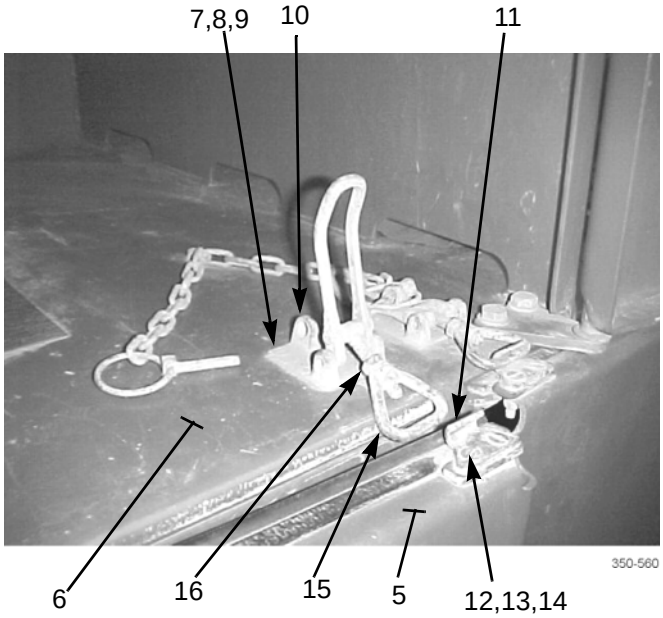


REMOVAL - CONTINUED

NOTE

Perform steps 2 and 3 to remove each door latch.

2. With door (5) unlatched and open, remove four locknuts (7), washers (8), screws (9), and latch (10) from storage compartment (6). Discard locknuts.
3. Remove two locknuts (12), washers (13), screws (14), and hook (11) from door (5). Discard locknuts.



INSTALLATION

NOTE

Perform steps 1 and 2 to install each door latch.

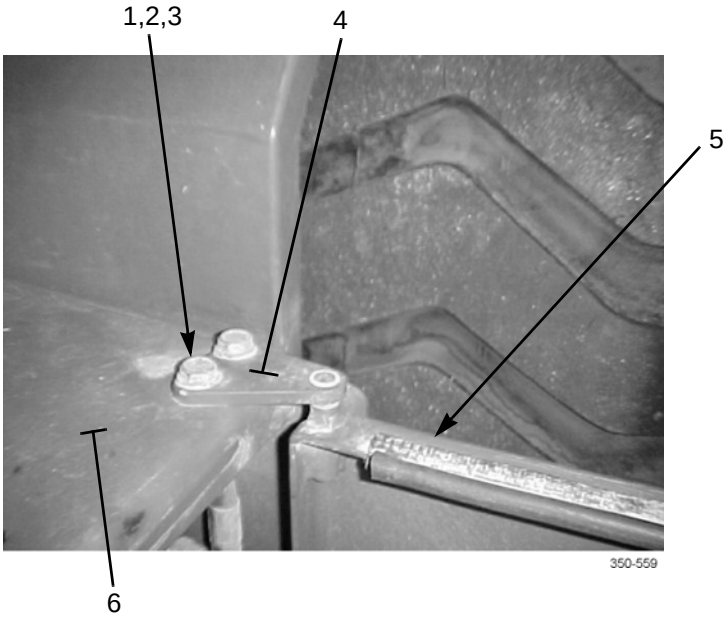
1. Install hook (11) on door (5) with two screws (14), washers (13), and new locknuts (12).
2. Install latch (10) on storage compartment (6) with four screws (9), washers (8), and new locknuts (7).

NOTE

Perform steps 3 and 4 to install each door.

3. Loosely install door (5) on storage compartment (6) with two brackets (4), four screws (3), eight washers (2), and four new locknuts (1). Close door to determine proper position of brackets. Readjust door as required for proper closure.
4. Open door (5) and tighten four locknuts (1).

INSTALLATION - CONTINUED



5. Loosen jamnut (16).
6. Rotate turnbuckle (15) until door (5) fits snugly when latched.
7. Tighten jamnut (16).

END OF WORK PACKAGE

BATTERY AND DOLLY WHEELS STORAGE COMPARTMENT REPLACEMENT 0155 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Truck, Forklift, 4,000-lb capacity

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 5957) (17)

Personnel Required

Three

References

WP 0111 00

WP 0112 00

Equipment Condition

Dolly wheels and ramp removed from storage compartment (TM 10-3930-675-10)

Handrail removed (TM 10-3930-675-10)

Cab transport lift removed (WP 0138 00)

Batteries removed (WP 0108 00)

Air cleaner removed (WP 0057 00)

Exterior rearview mirror removed (WP 0157 00)

Left-side stair assembly removed (WP 0140 00)

Engine cover removed (WP 0148 00)

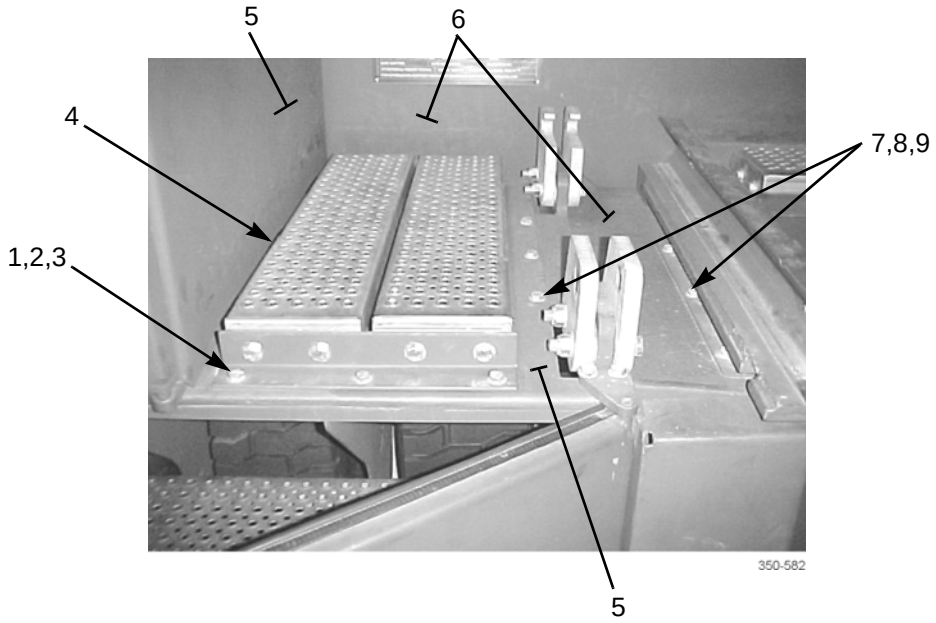


WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

REMOVAL

1. Remove six locknuts (1), screws (2), twelve washers (3), and footstep (4) from top of storage compartment (5). Discard locknuts.
2. Disconnect cables from NATO slave receptacle and master battery switch (WP 0111 00 and WP 0112 00).
3. Remove cables from storage compartment (5) by pulling them out into engine compartment.
4. Position forklift truck against side of vehicle with forklift tines supporting weight of storage compartment (5).
5. Remove five locknuts, ten washers, and five bolts securing storage compartment (5) to side of frame (6). Discard locknuts.
6. Remove six locknuts (7), twelve washers (8), and six bolts (9) securing top of storage compartment (5) to top of frame (6). Discard locknuts.
7. Remove storage compartment (5) from vehicle frame (6).



INSTALLATION

1. Use forklift truck to position storage compartment (5) against vehicle frame (6).
2. Install five bolts, ten washers, and five new locknuts securing storage compartment (5) to side of frame (6).
3. Install six bolts (9), twelve washers (8), and six new locknuts (7) securing top of storage compartment (5) to top of frame (6). Remove forklift truck.
4. Feed cables for NATO slave receptacle and master battery switch into storage compartment (5) through opening in back of compartment.
5. Connect cables to NATO slave receptacle and to master battery switch (WP 0111 00 and WP 0112 00).
6. Install footstep (4) to top of storage compartment (5) with twelve washers (3), six screws (2), and new locknuts (1).

INSTALLATION - CONTINUED

7. Install engine cover (WP 0148 00).
8. Install left-side stair assembly (WP 0140 00).
9. Install exterior rearview mirror (WP 0157 00).
10. Install air cleaner (WP 0057 00).
11. Install batteries (WP 0108 00).
12. Install cab transport lift (WP 0138 00).
13. Install handrail (TM 10-3930-675-10).
14. Stow dolly wheels and ramp in storage compartment (TM 10-3930-675-10).

END OF WORK PACKAGE

REMOTE HYDRAULIC CONTROL COMPARTMENT REPLACEMENT 0156 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Truck, Forklift, 4,000-lb capacity

Materials/Parts

Nut, lock (P/N 5957) (10)

Personnel Required

Two

References

WP 0181 00

Equipment Condition

Cab transport lift raised (TM 10-3930-675-10)

Oil sampling valves removed (WP 0055 00)

Hydraulic system test point fittings removed (WP 0180 00)

Cab transport control valve removed (WP 0170 00)

Boom folding control valve removed (WP 0172 00)

Ball valve (shutoff valve #5) removed (WP 0182 00)

Boom lowering solenoid valve removed (WP 0171 00)

Left-side stair assembly removed (WP 0140 00)

Mudguard removed (WP 0150 00)



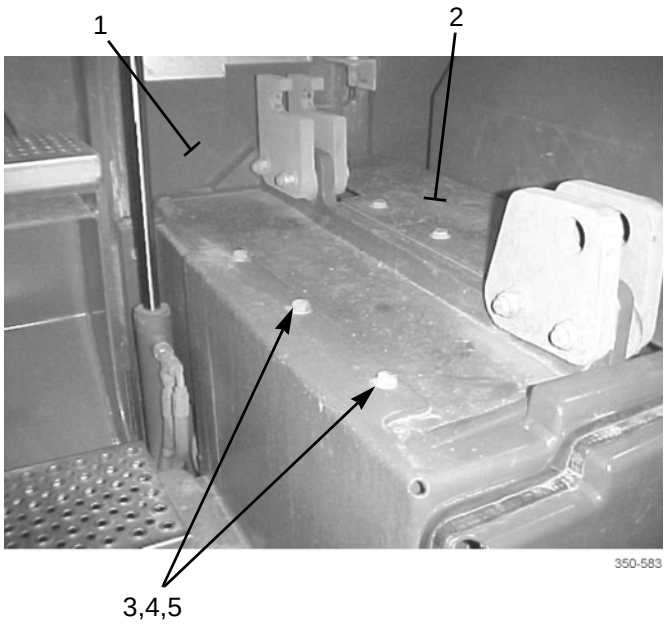
WARNING

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REMOTE HYDRAULIC CONTROL COMPARTMENT REPLACEMENT - CONTINUED 0156 00

REMOVAL

1. Ensure all hydraulic hoses are removed from compartment (2) (WP 0181 00).
2. Position forklift truck against side of vehicle with forklift tines supporting weight of compartment (2).
3. Remove four locknuts, eight washers, and four screws securing compartment (2) to side of frame (1). Discard locknuts.
4. Remove six locknuts (3), twelve washers (4), and six screws (5) securing top of compartment (2) to top of frame (1). Discard locknuts.
5. Remove compartment (2) from vehicle.



INSTALLATION

1. Use forklift truck to position compartment (2) against vehicle frame (1).
2. Install four screws, eight washers, and four new locknuts securing compartment (2) to side of frame (1).
3. Install six screws (5), twelve washers (4), and six new locknuts (3) securing top of compartment (2) to top of frame (1). Remove forklift truck.
4. Install mudguard (WP 0150 00).
5. Install left-side stair assembly (WP 0140 00).
6. Install boom lowering solenoid valve (WP 0171 00).
7. Install ball valve (shutoff valve #5) (WP 0182 00).
8. Install boom folding control valve (WP 0172 00).
9. Install cab transport control valve (WP 0170 00).
10. Install hydraulic system test point fittings (WP 0180 00).
11. Install oil sampling valves (WP 0055 00).
12. Operate cab lift/lower lever in remote hydraulic control compartment to lower cab transport lift (TM 10-3930-675-10).

END OF WORK PACKAGE

REARVIEW MIRRORS REPLACEMENT 0157 00

THIS WORK PACKAGE COVERS

Interior Rearview Mirror Replacement

Exterior Rearview Mirror: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tools and Special Tools - Continued

Wrench Set, Socket Attachment (Item 131, WP 0289 00)

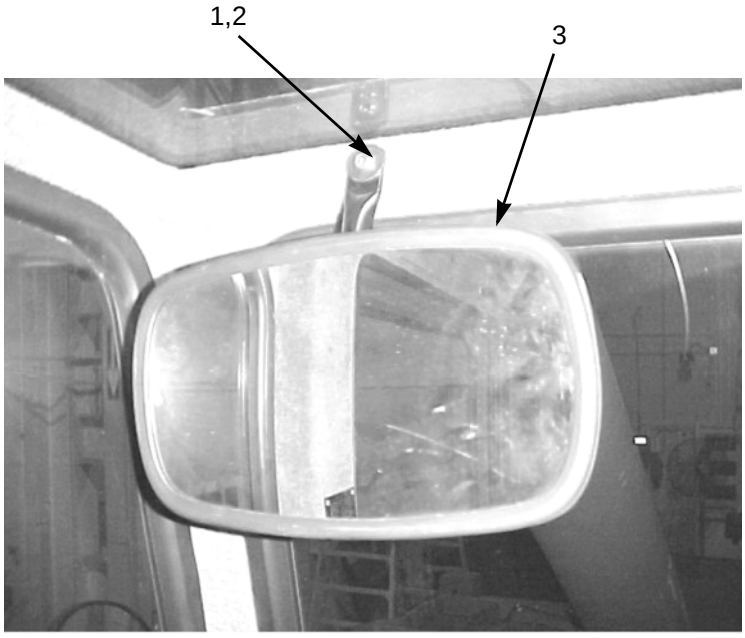
Materials/Parts

Nut, lock (P/N 5957) (2)

Nut, lock (P/N 920076.003) (2)

INTERIOR REARVIEW MIRROR REPLACEMENT

1. Remove screw (1), washer (2), and interior rearview mirror (3) from cab.
2. Install interior rearview mirror (3) in cab with washer (2) and screw (1).



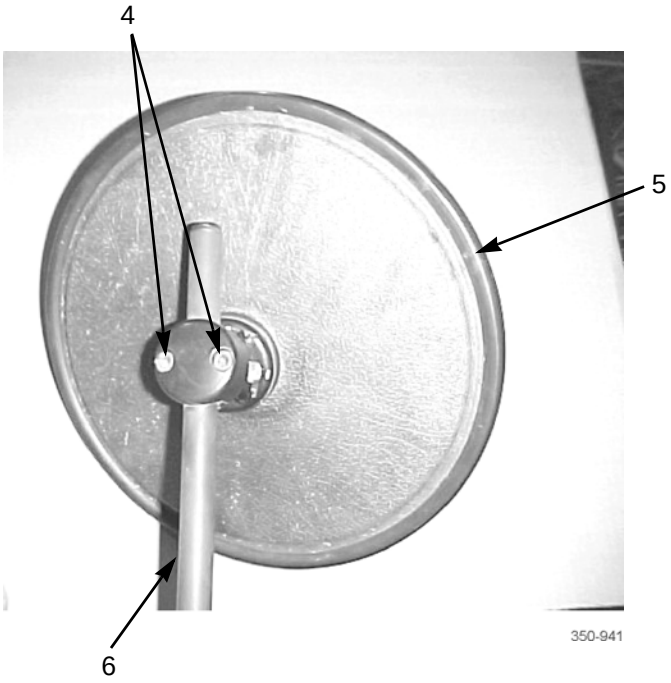
350-419

EXTERIOR REARVIEW MIRROR REMOVAL

NOTE

- **Right and left exterior rearview mirrors are removed the same way.**
- **Perform step 1 to remove exterior rearview mirror from arm.**

1. Loosen two screws (4) and remove exterior rearview mirror (5) from arm (6).

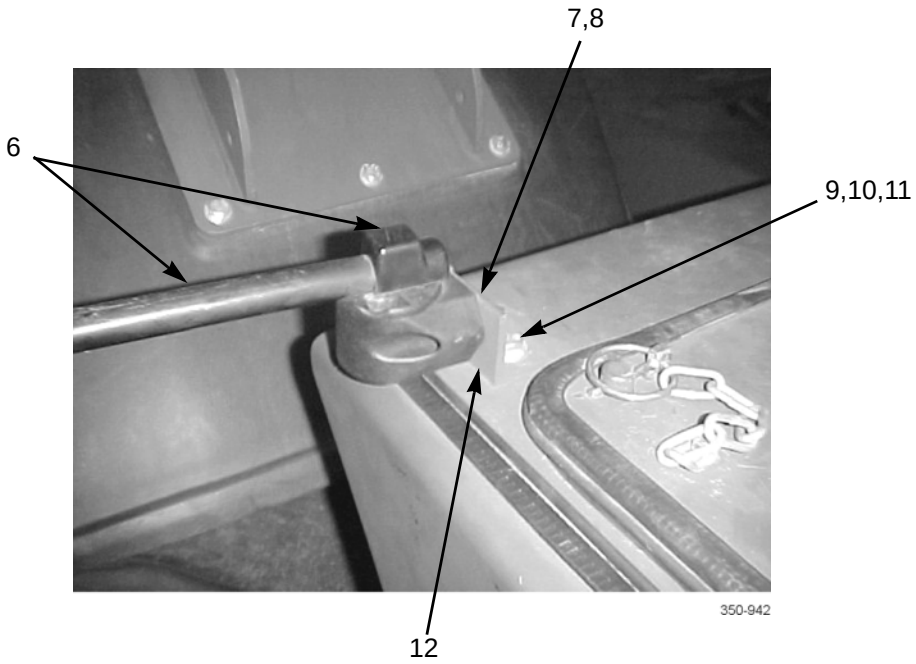


NOTE

Perform steps 2 and 3 to remove arm and mounting bracket from vehicle.

2. Remove two locknuts (7), screws (8), and arm (6) from mounting bracket (12). Discard locknuts.
3. Remove two locknuts (9), four washers (10), two screws (11), and mounting bracket (12) from vehicle. Discard locknuts.

EXTERIOR REARVIEW MIRROR REMOVAL - CONTINUED



EXTERIOR REARVIEW MIRROR INSTALLATION

NOTE

- **Right and left exterior rearview mirrors are installed the same way.**
- **Perform steps 1 and 2 to install mounting bracket and arm on vehicle.**

1. Install mounting bracket (12) on vehicle with two screws (11), four washers (10), and two new locknuts (9).
2. Install arm (6) on mounting bracket (12) with two screws (8) and new locknuts (7).

NOTE

Perform step 3 to install exterior rearview mirror on arm.

3. Install exterior rearview mirror (5) on arm (6) and tighten two screws (4).

END OF WORK PACKAGE

WINDSHIELD WIPER MAINTENANCE 0158 00

THIS WORK PACKAGE COVERS

Front Windshield Wiper and Motor: Removal, Installation

Rear Window Windshield Wiper and Motor: Removal, Installation

Roof Window Windshield Wiper and Motor: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench Set, Socket Attachment (Item 131, WP 0289 00)

Materials/Parts

Compound, Gasket Forming, Silicone (Item 10, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Gasket (P/N 923864.1957)

Kit, Mounting (P/N 920890.0004)

Materials/Parts - Continued

Seal (P/N 920887.0017) (2)

Personnel Required

Two

References

TM 10-3930-675-10

Equipment Condition

Master battery switch in OFF position

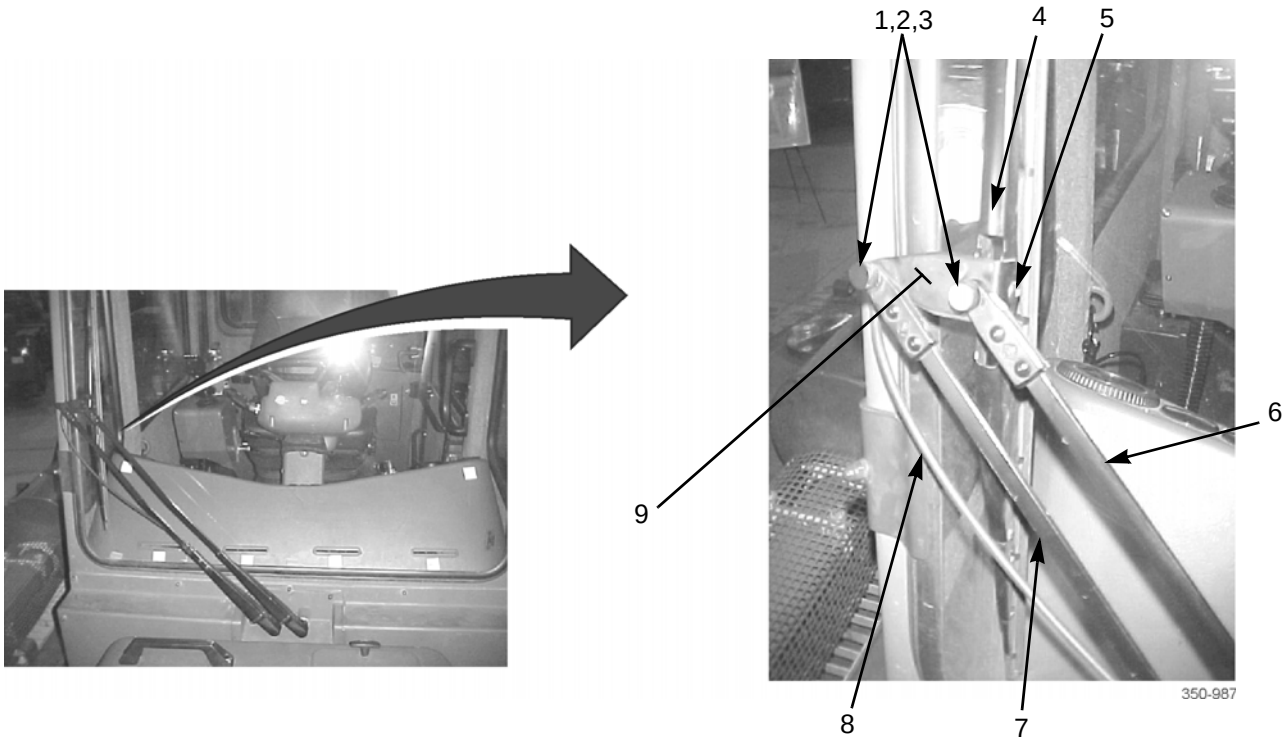
Engine cover removed (to replace front windshield wiper and motor) (WP 0148 00)

FRONT WINDSHIELD WIPER AND MOTOR REMOVAL

NOTE

To remove wiper blade only, perform step 1.

1. Remove screw (5) and wiper blade (4) from yoke (9).
2. Release jet and hose (8) from steering arm (7).
3. As required, remove two caps (1), c-clips (2), and washers (3) to separate steering arm (7) and wiper arm (6) from yoke (9).

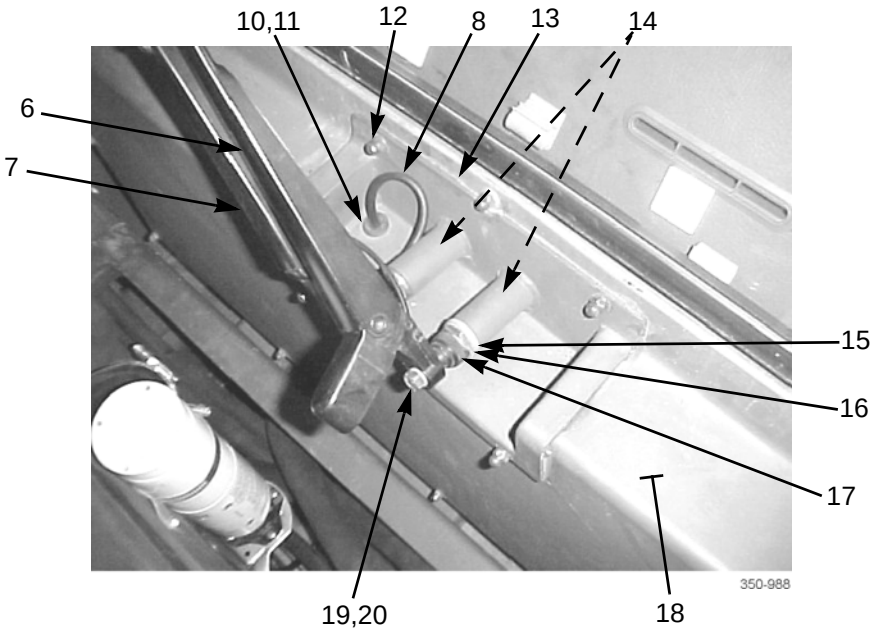


NOTE

- **Perform step 4 to remove steering arm and wiper arm.**
- **Note position of steering arm and wiper arm prior to removal to ensure correct installation.**

4. Lift cover and remove nut (19), lockwasher (20), steering arm (7), and wiper arm (6) from windshield wiper motor shafts (14). Discard lockwasher.
5. Disconnect hose (8) from nipple (11).
6. Remove four capnuts (12), washers, and cover (13) with windshield wiper motor from panel (18).

FRONT WINDSHIELD WIPER AND MOTOR REMOVAL - CONTINUED

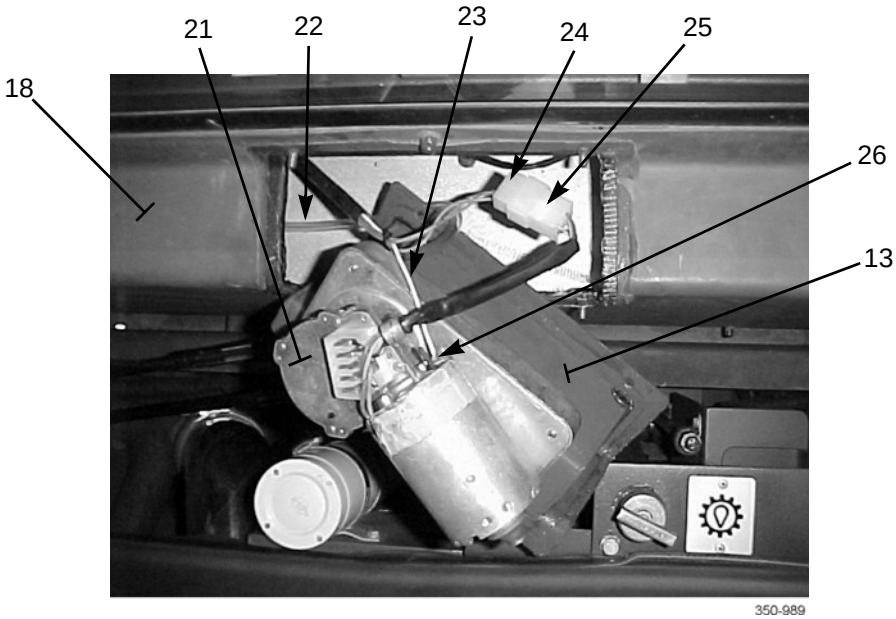


7. Disconnect hose (22) from nipple (11) and remove nipple and grommet (10) from cover (13).

8. Disconnect wiring harness connector (24) from motor connector (25).

9. Remove screw (26) and disconnect ground wire (23) from motor (21).

10. Remove two plastic caps (17), nuts (16), and seals (15), and separate cover (13) and windshield wiper motor (21). Discard seals.

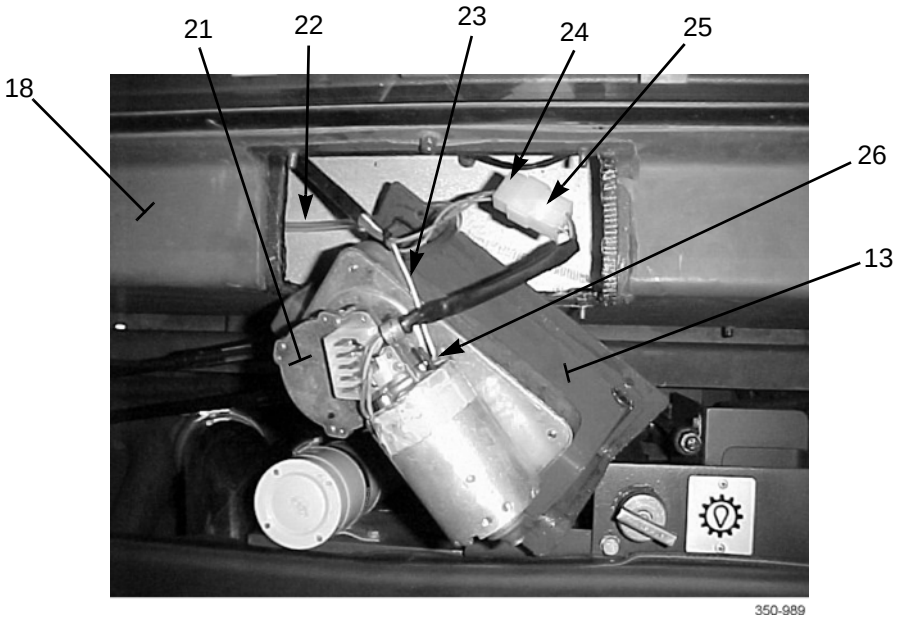


FRONT WINDSHIELD WIPER AND MOTOR INSTALLATION

NOTE

To install wiper blade only, perform step 9.

1. Install windshield wiper motor (21) on cover (13) with windshield wiper motor shafts (14) through cover. Install two new seals (15), nuts (16), and plastic caps (17).
2. Connect ground wire (23) to motor (21) with screw (26).
3. Connect wiring harness connector (24) to motor connector (25).
4. Install grommet (10) and nipple (11) in cover (13). Connect hose (22) to nipple.



NOTE

Ensure all old gasket forming compound has been removed and mounting surfaces are clean.

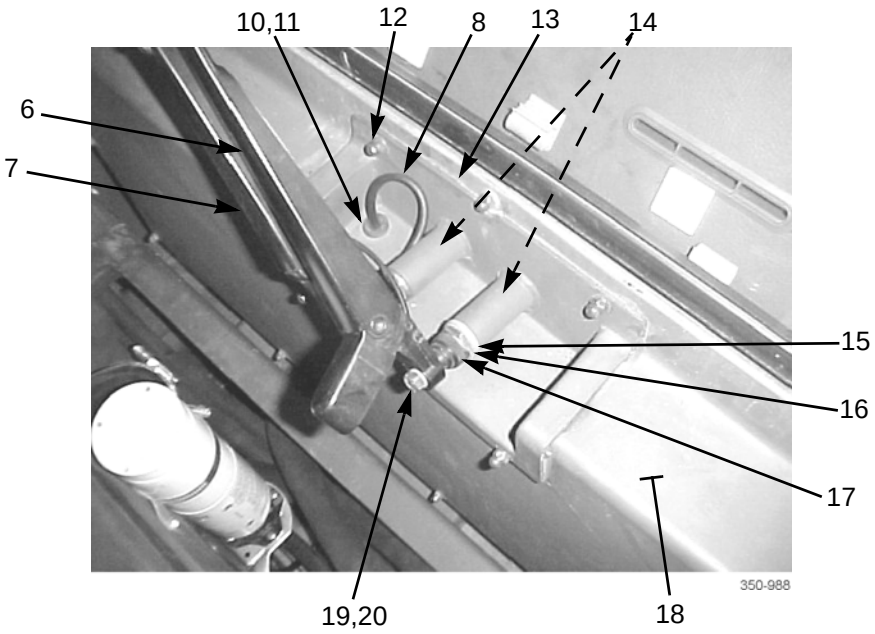
5. Apply gasket forming compound to panel (18). Install cover (13) with windshield wiper motor on panel with four washers and capnuts (12).

NOTE

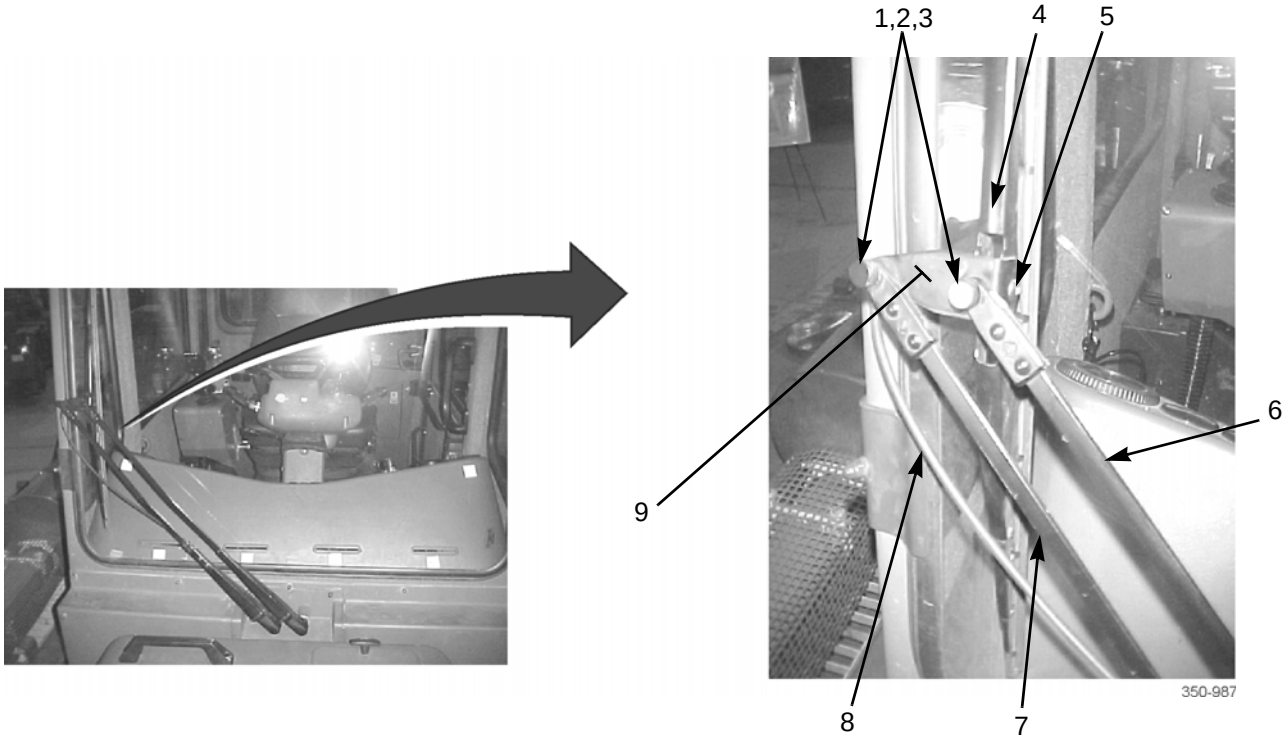
Perform step 6 to install steering arm and wiper arm.

6. Lift cover and install steering arm (7) and wiper arm (6) on windshield wiper motor shafts (14) with new lockwasher (20) and nut (19). Close cover.

FRONT WINDSHIELD WIPER AND MOTOR INSTALLATION - CONTINUED



7. If separated, install wiper arm (6) and steering arm (7) on yoke (9) with two washers (3), C-clips (2), and caps (1).
8. Install hose (8) and jet on steering arm (7).
9. Install wiper blade (4) on yoke (9) with screw (5).



FRONT WINDSHIELD WIPER AND MOTOR INSTALLATION - CONTINUED

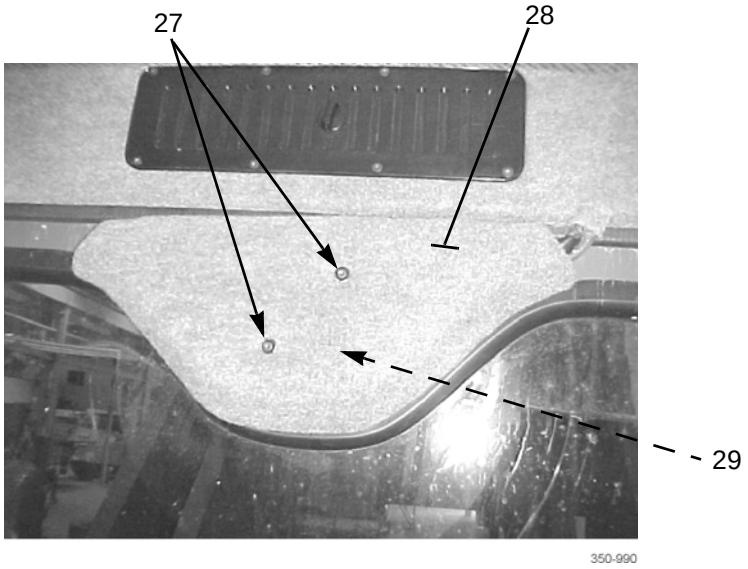
10. Turn master battery switch to ON position and check operation of front windshield wiper and windshield wiper washer (TM 10-3930-675-10).
11. Install engine cover (WP 0148 00).

REAR WINDOW WINDSHIELD WIPER AND MOTOR REMOVAL

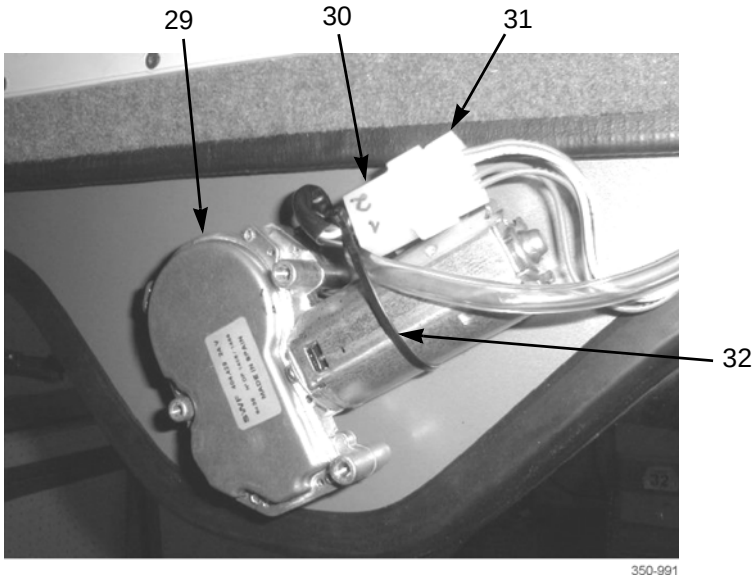
NOTE

To remove wiper blade and arm only, perform steps 3 thru 5.

1. Remove two screws (27) and cover (28) from windshield wiper motor (29) inside cab.



2. Remove and discard tiedown strap (32). Disconnect wiring harness connector (31) from motor connector (30).



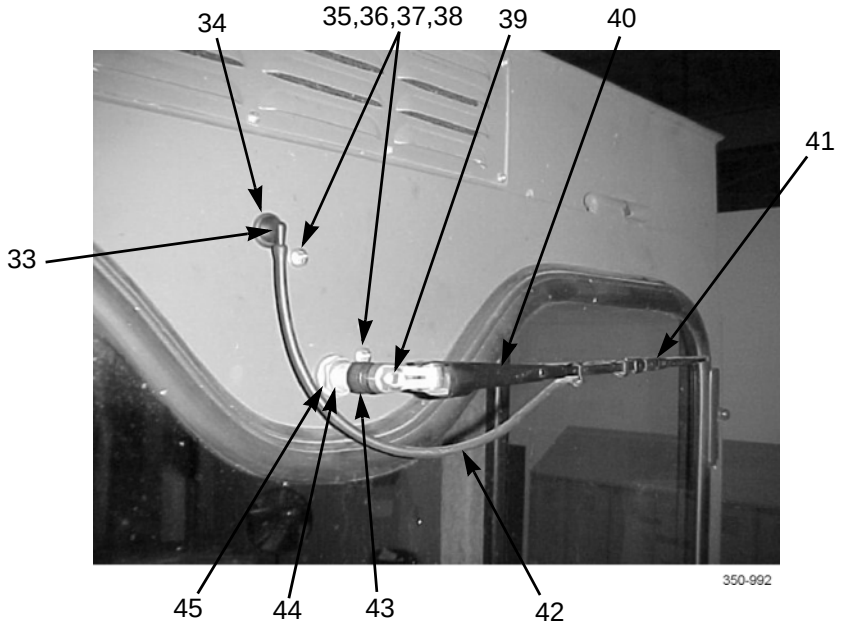
REAR WINDOW WINDSHIELD WIPER AND MOTOR REMOVAL - CONTINUED

3. From outside cab, remove wiper blade (41) from wiper arm (40).
4. Remove hose (42) from wiper arm (40).
5. Lift cover and remove nut (39) and wiper arm (40) from motor shaft (44).
6. Remove plastic cap (43), nut (45), and seal ring from end of motor shaft (44).

CAUTION

Take care when removing windshield wiper motor to avoid damaging windshield.

7. Remove two screws (35), washers (36), seal (37), spacer (38), and windshield wiper motor (29) from cab. Discard seal.
8. If damaged, remove hoses (42) inside and outside cab from fitting (33). Remove fitting and grommet (34) from cab.



REAR WINDOW WINDSHIELD WIPER AND MOTOR INSTALLATION

NOTE

To install wiper blade and arm only, perform steps 4 and 5.

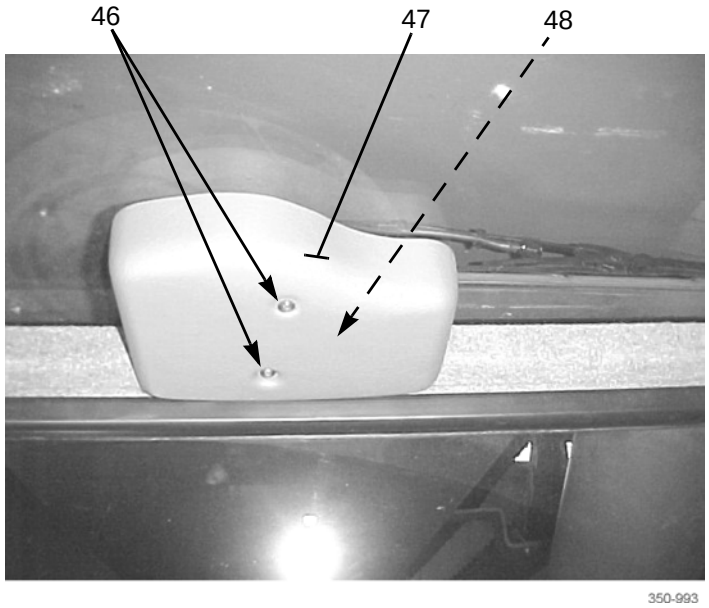
1. If removed, install grommet (34) and fitting (33) in cab. Connect hoses (42) inside and outside cab to fitting.
2. Position new seal (37), spacer (38), and windshield wiper motor (29) against cab with motor shaft (44) through opening in cab. Install two washers (36) and screws (35).
3. From outside cab, install seal ring, nut (45), and plastic cap (43) on end of motor shaft (44).
4. Install wiper arm (40) on motor shaft (44) with nut (39). Close cover over nut. Secure hose (42) to wiper arm.
5. Install wiper blade (41) on wiper arm (42).
6. Inside cab, connect wiring harness connector (31) to motor connector (30). Secure wires and hoses together with new tiedown strap (32) around windshield wiper motor (29).
7. Install two screws (27) and cover (28) on windshield wiper motor (29).
8. Turn master battery switch to ON position and check operation of rear window windshield wiper and windshield wiper washer (TM 10-3930-675-10).

ROOF WINDOW WINDSHIELD WIPER AND MOTOR REMOVAL

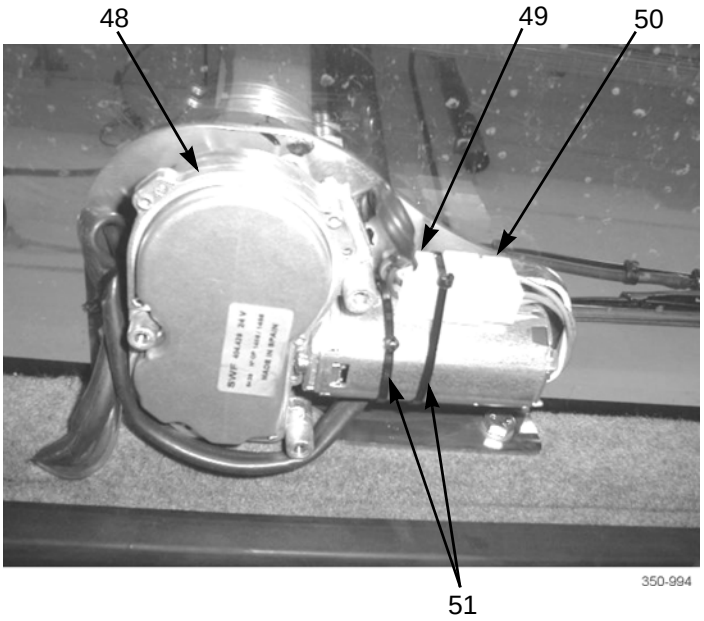
NOTE

- **Boom must be raised to allow access to roof window windshield wiper and motor.**
- **To remove wiper blade and arm only, perform steps 3 thru 5.**

1. Remove two screws (46) and cover (47) from windshield wiper motor (48) inside cab.

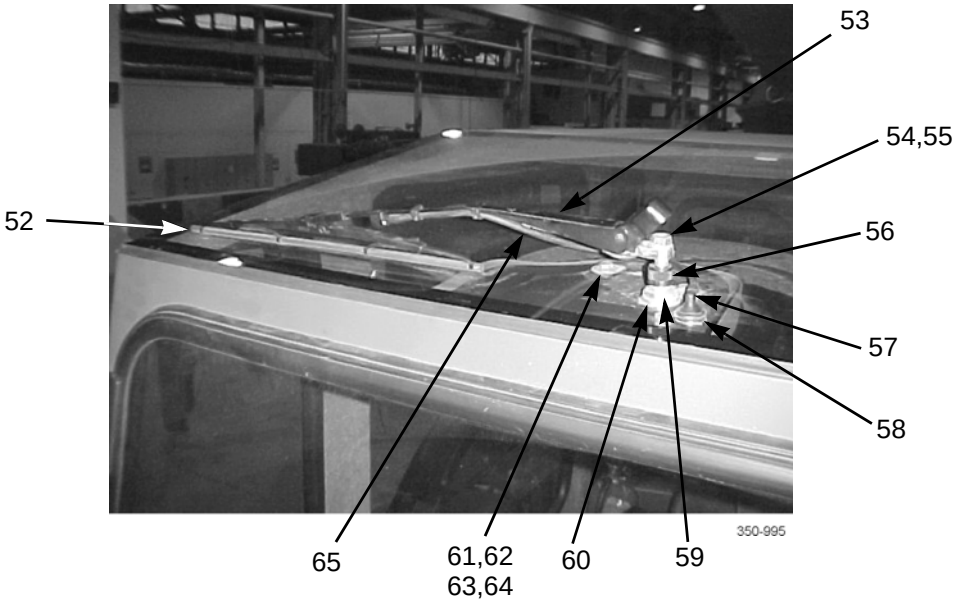


2. Remove and discard tiedown straps (51). Disconnect wiring harness connector (49) from motor connector (50).



ROOF WINDOW WINDSHIELD WIPER AND MOTOR REMOVAL - CONTINUED

3. From outside cab, remove wiper blade (52) from wiper arm (53).
4. Remove hose (65) from wiper arm (53).
5. Lift cover and remove nut (54), lockwasher (55), and wiper arm (53) from motor shaft (59). Discard lockwasher.
6. Remove plastic cap (56), nut (60), and seal ring from end of motor shaft (59).
7. Remove two screws (61), washers (62), seal (63), spacer (64), and windshield wiper motor (48) from roof window. Discard seal.
8. If damaged, remove hoses (65) inside and outside cab from fitting (57). Remove fitting and grommet (58) from roof window.



ROOF WINDOW WINDSHIELD WIPER AND MOTOR INSTALLATION

NOTE

To install wiper blade and arm only, perform steps 4 and 5.

1. If removed, install grommet (58) and fitting (57) in roof window. Connect hoses (65) inside and outside cab to fitting.
2. Position new seal (63), spacer (64), and windshield wiper motor (48) against roof window with motor shaft (59) through opening in roof window. Install two washers (62) and screws (61).
3. From outside cab, install seal ring, nut (60), and plastic cap (56) on end of motor shaft (59).
4. Install wiper arm (53) on motor shaft (59) with new lockwasher (55) and nut (54). Close cover over nut. Secure hose (65) to wiper arm.
5. Install wiper blade (52) on wiper arm (53).
6. Inside cab, connect wiring harness connector (49) to motor connector (50). Secure wires and hoses together with new tiedown straps (51) around windshield wiper motor (48).
7. Install cover (47) on windshield wiper motor (48) with two screws (46).
8. Turn master battery switch to ON position and check operation of roof window windshield wiper and windshield wiper washer (TM 10-3930-675-10).

END OF WORK PACKAGE

WINDSHIELD WASHER RESERVOIR AND PUMP REPLACEMENT 0159 00

THIS WORK PACKAGE COVERS

Windshield Washer Reservoir: Removal, Installation

Windshield Washer Pump: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Compound, Cleaning, Windshield (Item 9, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Equipment Condition

Master battery switch in OFF position

WINDSHIELD WASHER RESERVOIR REMOVAL

1. Disconnect tube (3) from cap fitting (2).

NOTE

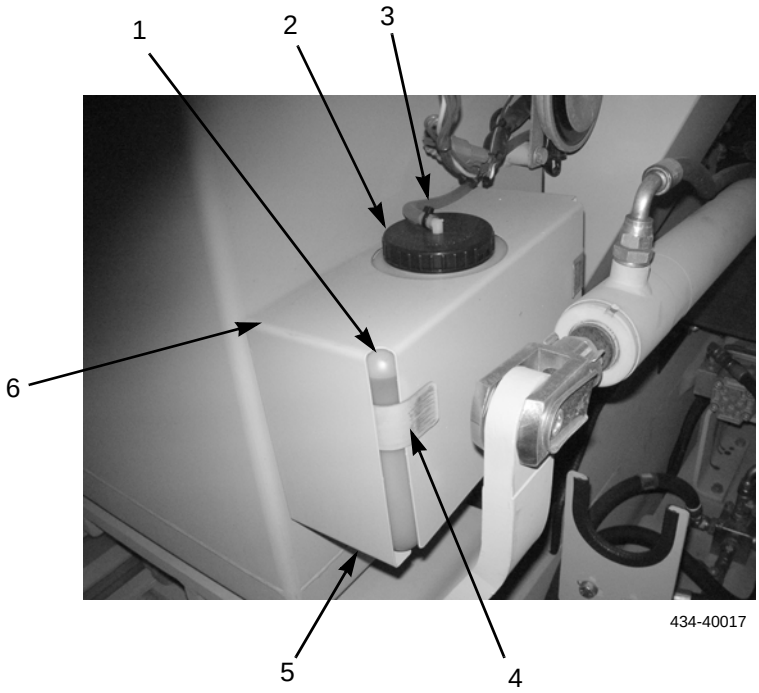
Step 2 applies to USMC vehicles ONLY.

2. For USMC vehicles, remove washer reservoir cover (5) from bracket (4) and washer reservoir (1).
3. Lift windshield washer reservoir (1) from bracket (4).
4. Remove cap (2) and drain windshield cleaning compound into a suitable container.

NOTE

Perform step 5 to remove bracket from rear of cab.

5. Remove four screws (6) and bracket (4) from cab.



WINDSHIELD WASHER RESERVOIR INSTALLATION

NOTE

Perform step 1 to install bracket on rear of cab.

1. Install bracket (4) on cab with four screws (6).
2. Install windshield washer reservoir (1) on bracket (4).
3. Fill windshield washer reservoir (1) with windshield cleaning compound.
4. Install cap (2).

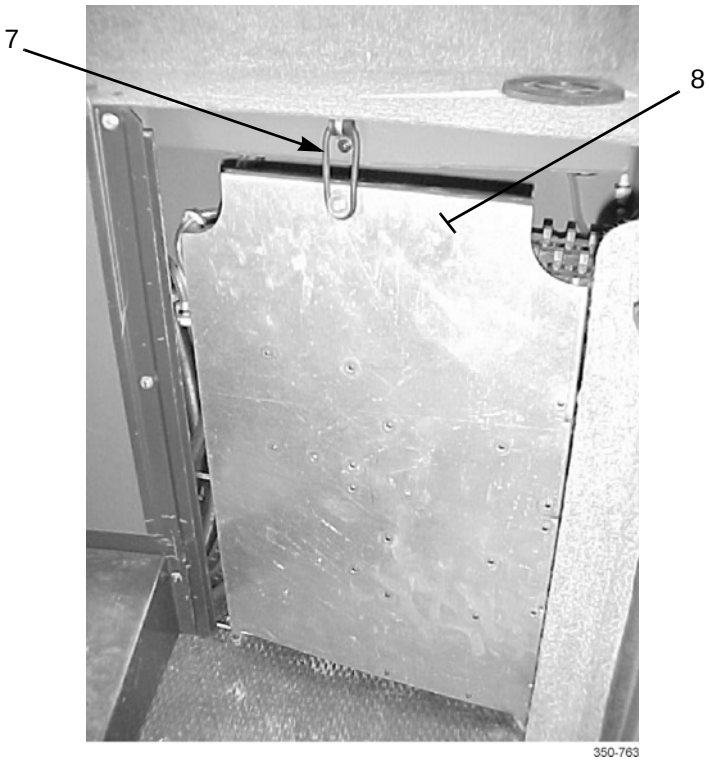
NOTE

Step 5 applies to USMC vehicles ONLY.

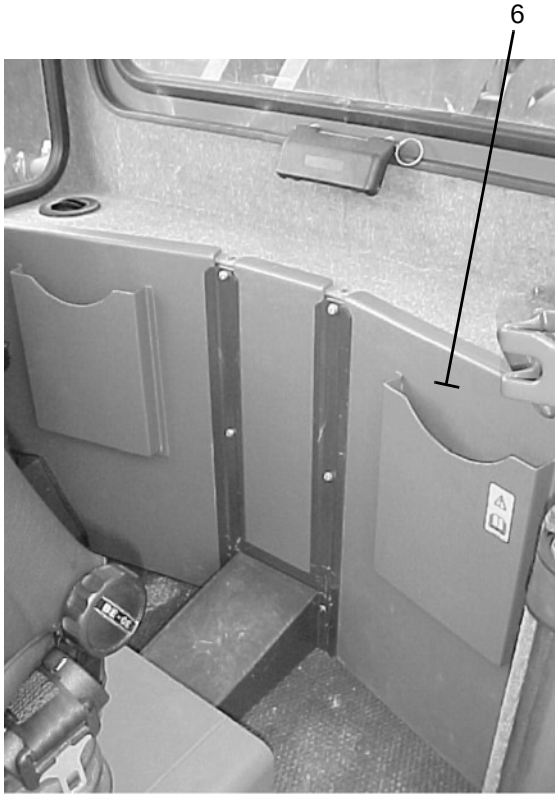
5. For USMC vehicles, install washer reservoir cover (5) on bracket (4) and washer reservoir (1).
6. Connect tube (3) to cap fitting (2).

WINDSHIELD WASHER PUMP REMOVAL

1. Lift and remove left access cover (6) from rear of cab.
2. Disconnect elastic loop (7) from top of circuit breaker/relay box (8). Lift box and tilt box forward to gain access to windshield washer pump behind box.



350-763



350-1007

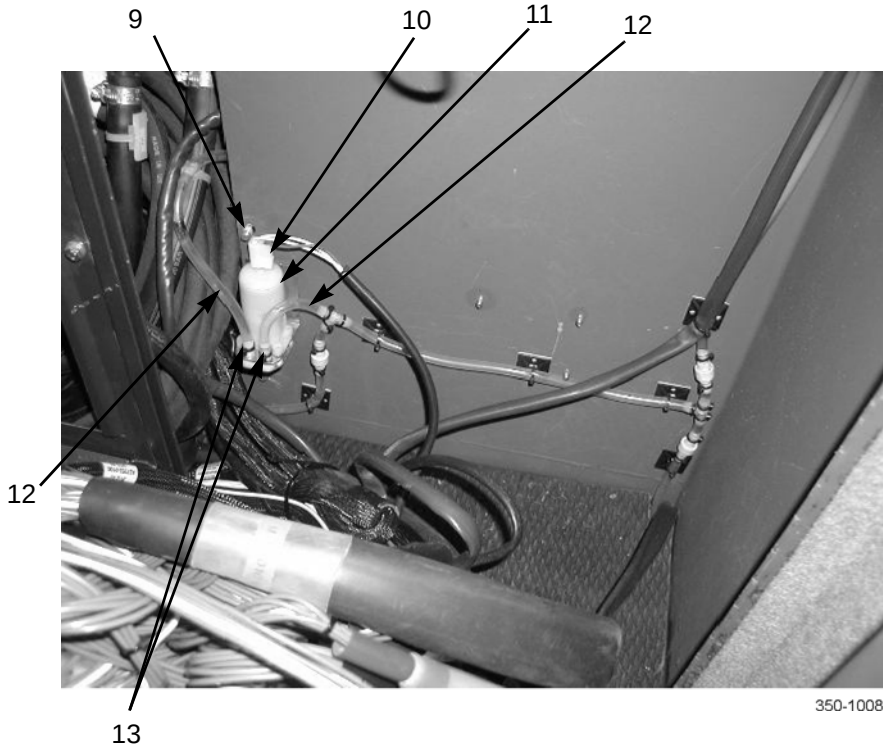
WINDSHIELD WASHER PUMP REMOVAL - CONTINUED

3. Disconnect wiring harness connector (10) from windshield washer pump (11).

NOTE

Note position of tubes for installation.

4. Remove two tiedown straps (13) and disconnect two tubes (12) from windshield washer pump (11). Discard tiedown straps.
5. Remove two screws (9), washers, and windshield washer pump (11) from rear of cab.



WINDSHIELD WASHER PUMP INSTALLATION

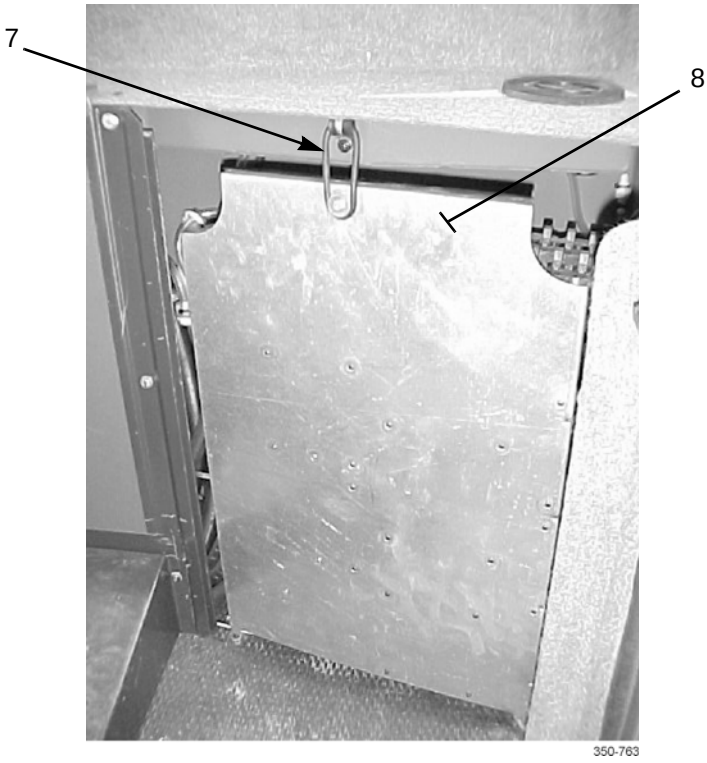
1. Install windshield washer pump (11) on rear of cab with two washers and screws (9).
2. Connect two tubes (12) to windshield washer pump (11) and install two new tiedown straps (13).
3. Connect wiring harness connector (10) to windshield washer pump (11).

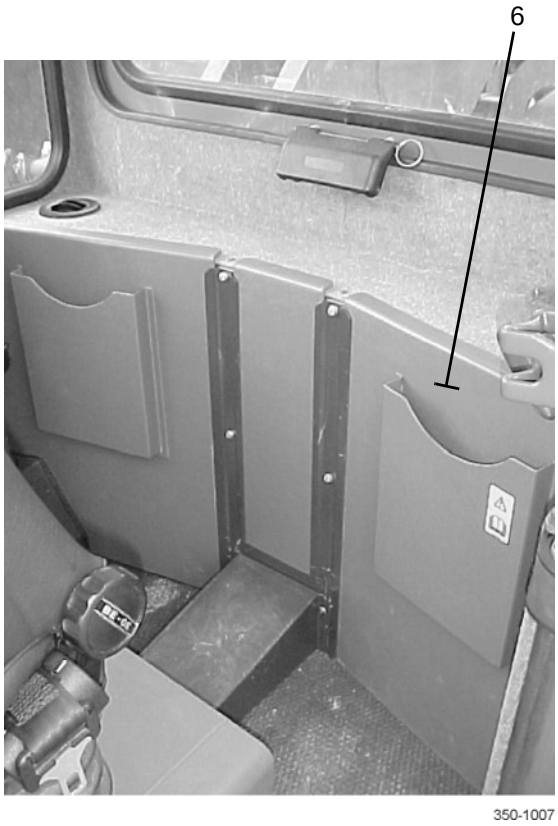
WINDSHIELD WASHER PUMP REMOVAL - CONTINUED

NOTE

Ensure all circuit breakers remain in ON position while circuit breaker/relay box is secured.

4. Tilt circuit breaker/relay box (8) rearward and connect elastic loop (7) to top of box.
5. Install left access cover (6) on rear of cab.





END OF WORK PACKAGE

DATA PLATE REPLACEMENT 0160 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Drill Set, Twist (Item 26, WP 0289 00)

Tools and Special Tools - Continued

Drill, Electric, Portable (Item 27, WP 0289 00)

Riveter, Blind, Hand (Item 102, WP 0289 00)

Materials/Parts

Rivets (as required)

REMOVAL



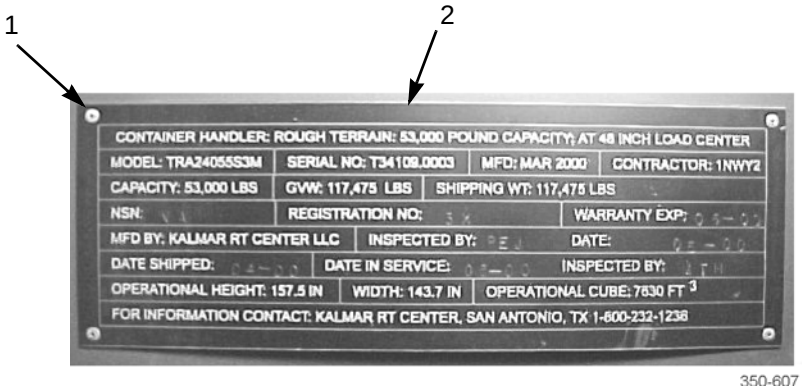
WARNING

Wear eye protection when drilling out rivets. Failure to do so could result in serious eye injury.

CAUTION

Avoid using a twist drill with an excessively large diameter when drilling out rivets. Failure to follow this caution could result in enlarged holes in vehicle, too large for rivet size needed.

1. Drill out four rivets (1) from data plate (2). Discard rivets.
2. Remove data plate (2) from vehicle.



350-607

INSTALLATION

1. Position data plate (2) over existing holes in vehicle.
2. Install data plate (2) on vehicle with four new rivets (1).

END OF WORK PACKAGE

FIRE EXTINGUISHER BRACKET REPLACEMENT 0161 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

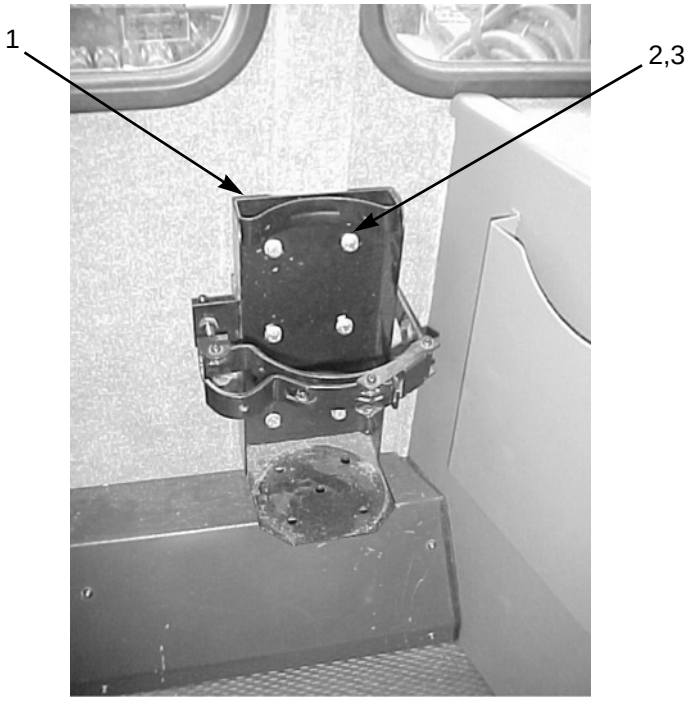
Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

REMOVAL

1. Remove fire extinguisher from fire extinguisher bracket (1).
2. Remove six screws (2), washers (3), and fire extinguisher bracket (1) from cab.



INSTALLATION

1. Install fire extinguisher bracket (1) in cab with six washers (3) and screws (2).
2. Install fire extinguisher on fire extinguisher bracket (1).

END OF WORK PACKAGE

RIFLE MOUNTING BRACKET REPLACEMENT 0162 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

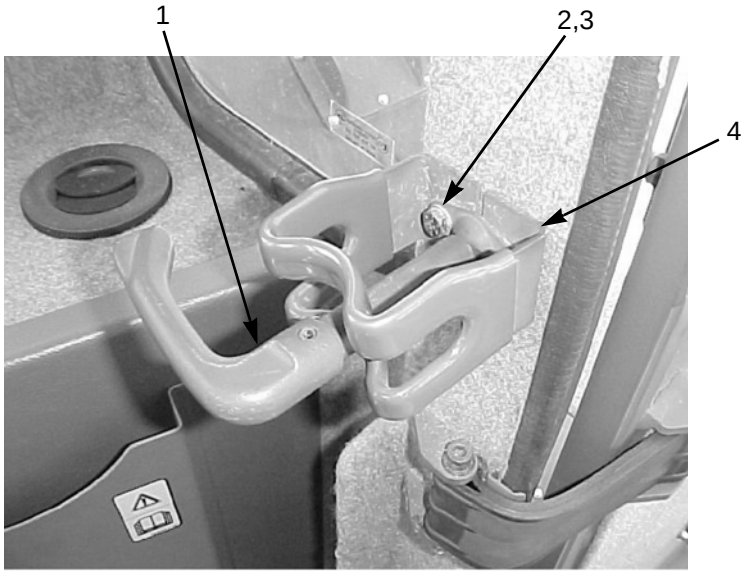
Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

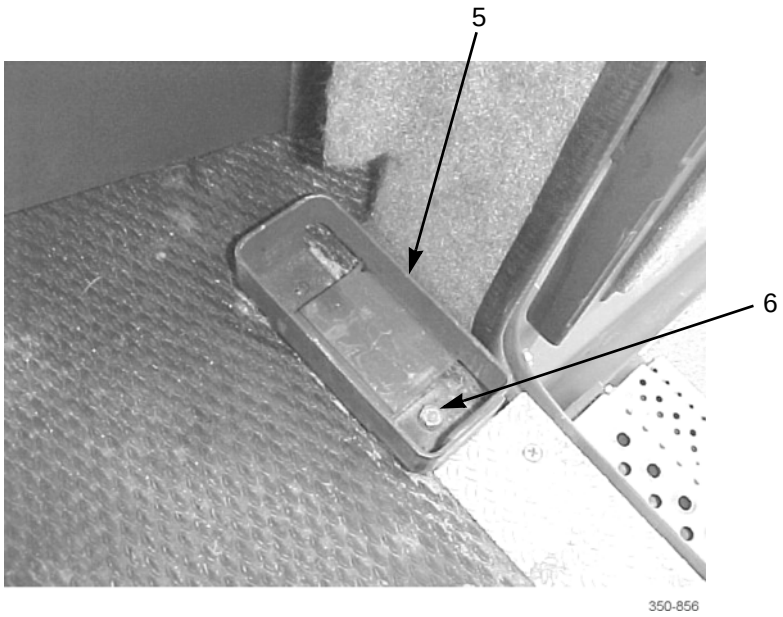
REMOVAL

1. Remove two screws (2), washers (3), latch assembly (1), and bracket (4) from side of cab.



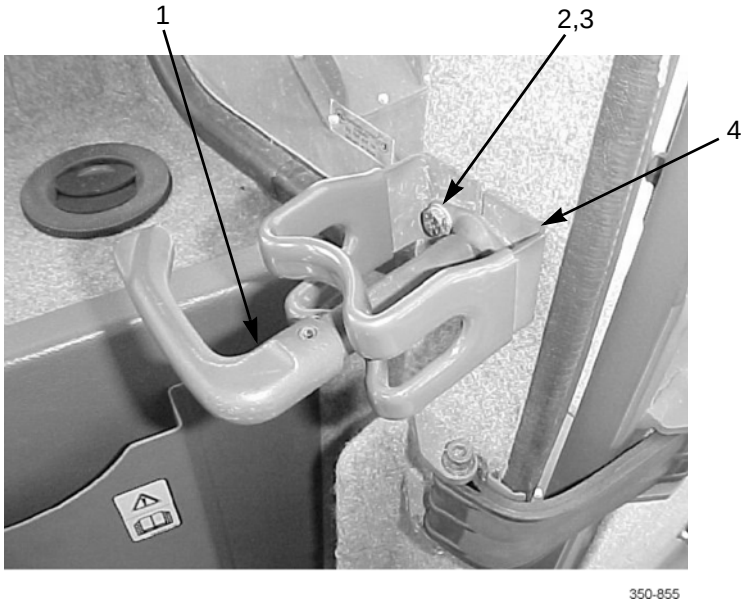
REMOVAL - CONTINUED

2. Remove screw (6) and bracket (5) from floor of cab.



INSTALLATION

1. Install bracket (5) on floor of cab with screw (6).
2. Install bracket (4) and latch assembly (1) on side of cab with two washers (3) and screws (2).



END OF WORK PACKAGE

BOOM-TO-BOOM EXTENSION FLEXIBLE CONVEYER MAINTENANCE 0163 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Adjustable (Item 135, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.003) (6)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Boom fully extended (TM 10-3930-675-10)

Boom hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

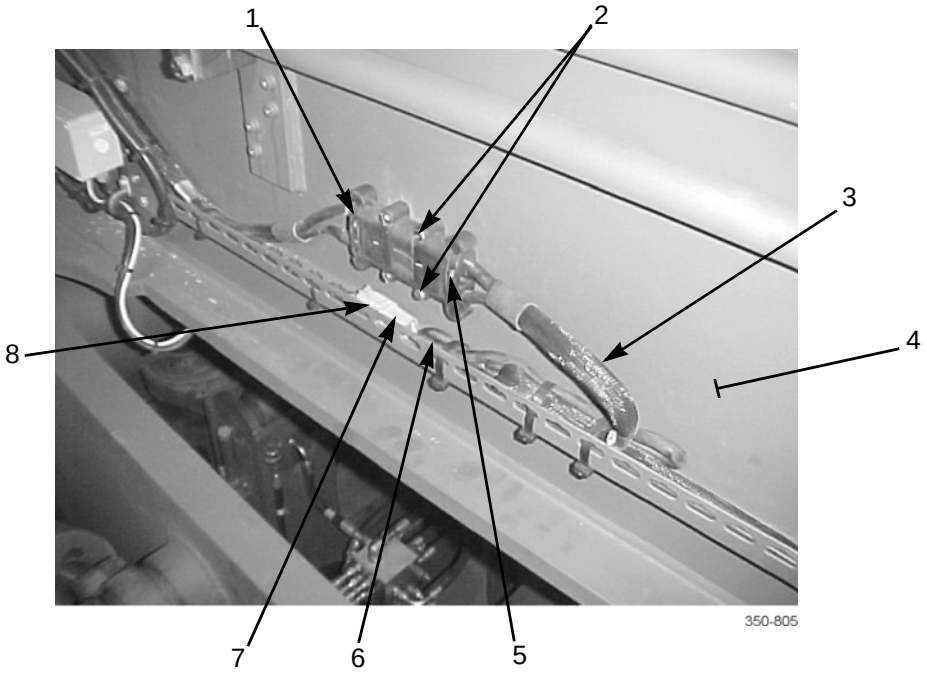
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses and wiring harnesses.**

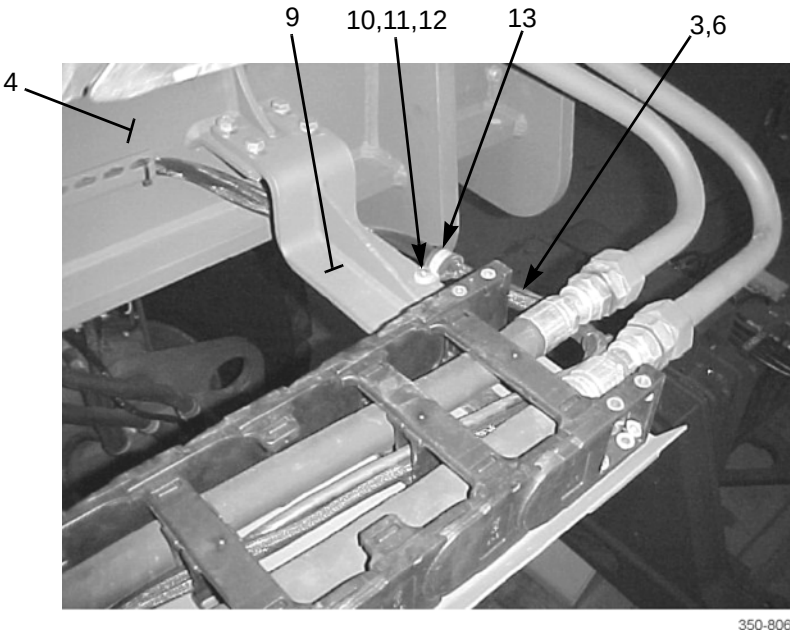
REMOVAL

1. At right rear of boom (4), remove two screws (2) and disconnect boom wiring harness (3) connector (5) from connector (1).
2. Disconnect cable (6) connector (7) from connector (8).
3. Remove boom wiring harness (3) and cable (6) from attachment to right side of boom (4).



4. At right front of boom (4), remove locknut (10), two washers (11), screw (12), and clamp (13) from conveyer support bracket (9). Discard locknut.
5. Remove clamp (13) from boom wiring harness (3) and cable (6).

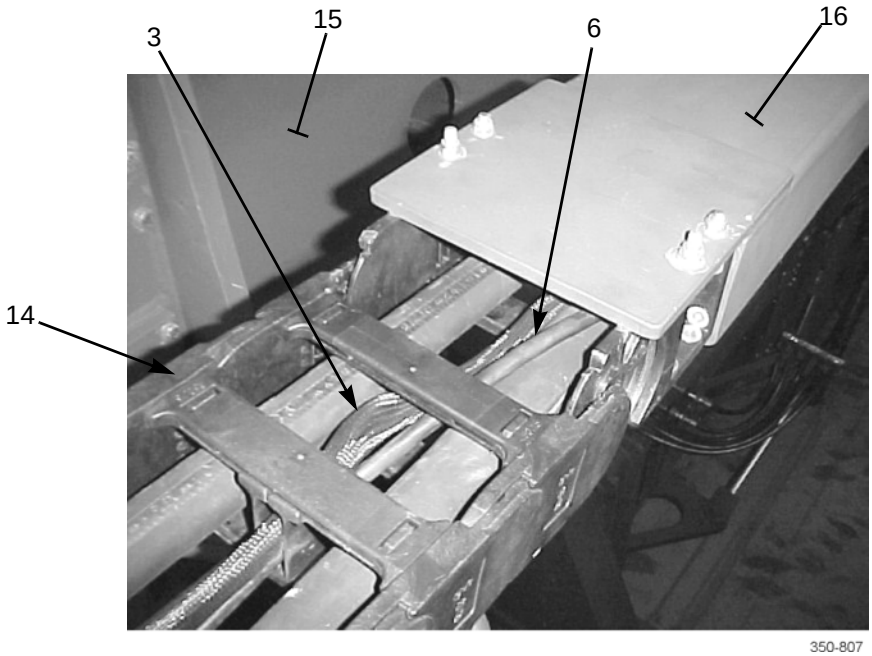
REMOVAL - CONTINUED



NOTE

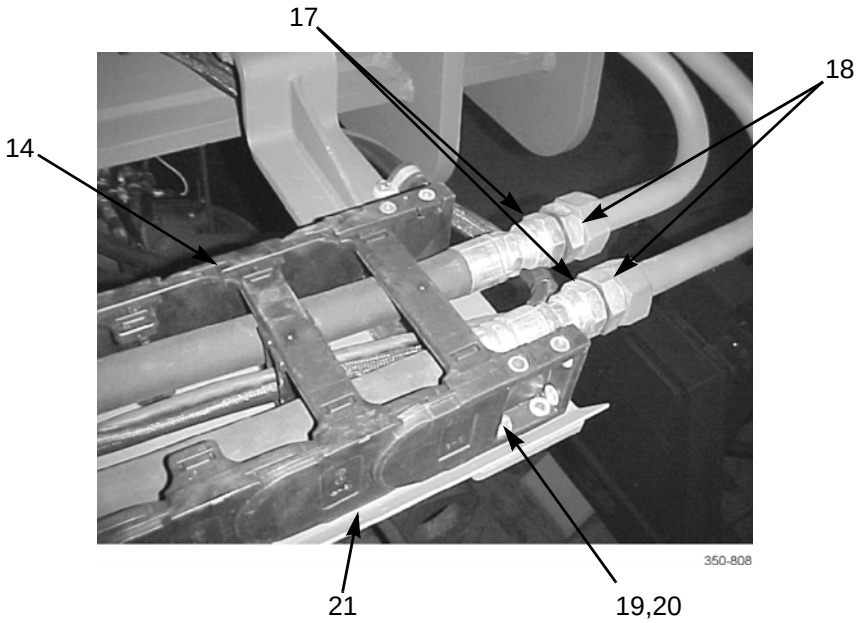
Conveyer spacers may be separated to allow connector of boom wiring harness to pass through.

6. At front of box channel (16) on boom extension (15), pull boom wiring harness (3) and cable (6) through conveyer (14) until wiring harness and cable are just clear of conveyer.

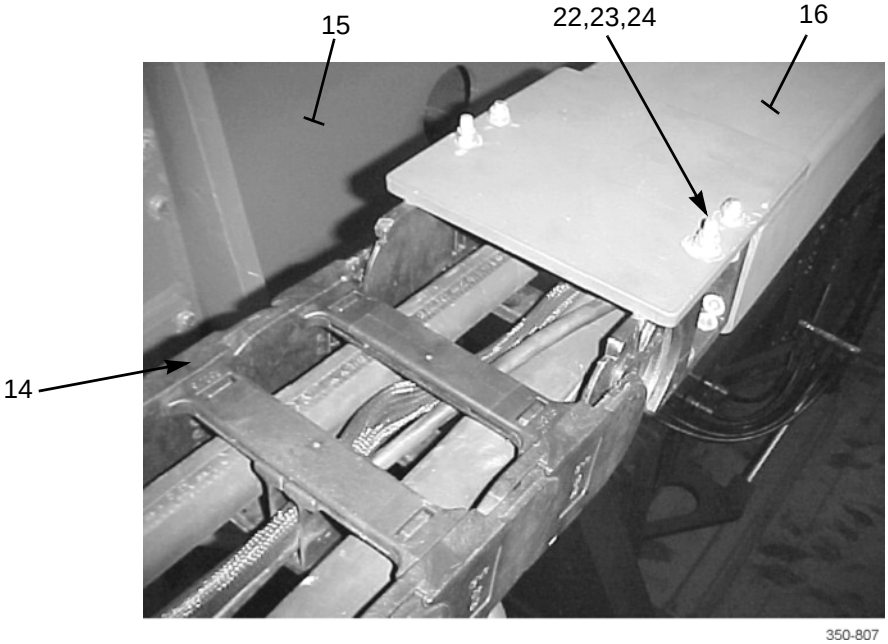


REMOVAL - CONTINUED

7. Disconnect two hydraulic hoses (17) from two adapters (18).
8. Remove two locknuts (19), screws (20), and lower end of conveyer (14) from conveyer support bracket (21). Discard locknuts. Straighten conveyer.
9. At front of box channel (16) of boom extension (15), pull two hydraulic hoses (17) through conveyer (14) until hoses are just clear of conveyer.



10. Remove four locknuts (22), eight washers (23), four screws (24), and top end of conveyer (14) from box channel (16). Discard locknuts.
11. Remove conveyer (14) from vehicle.

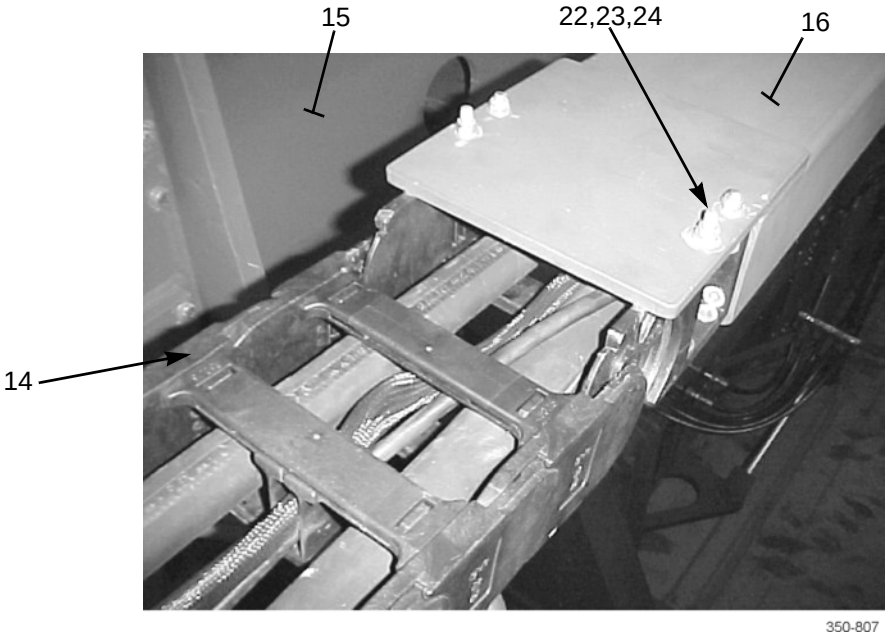


INSTALLATION

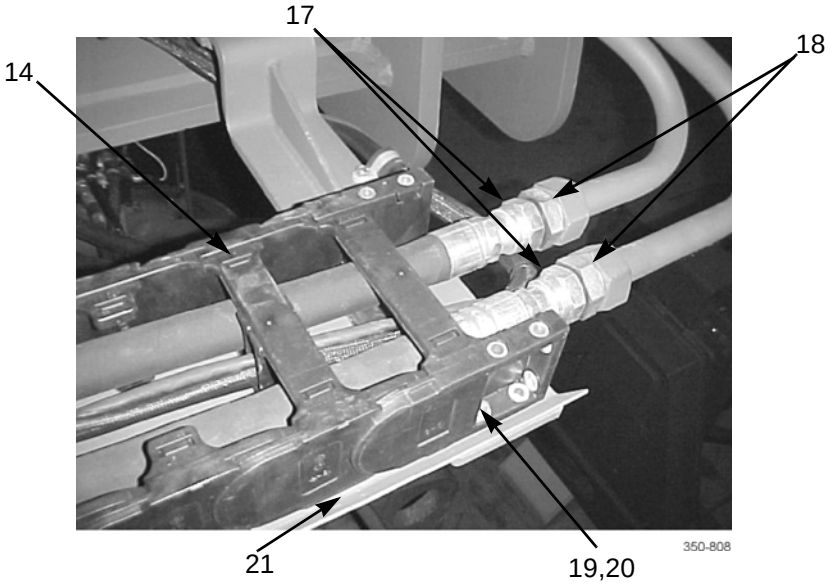
NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Position conveyer (14) on vehicle with conveyer straightened.
2. Install top end of conveyer (14) in box channel (16) with four screws (24), eight washers (23), and four new locknuts (22).

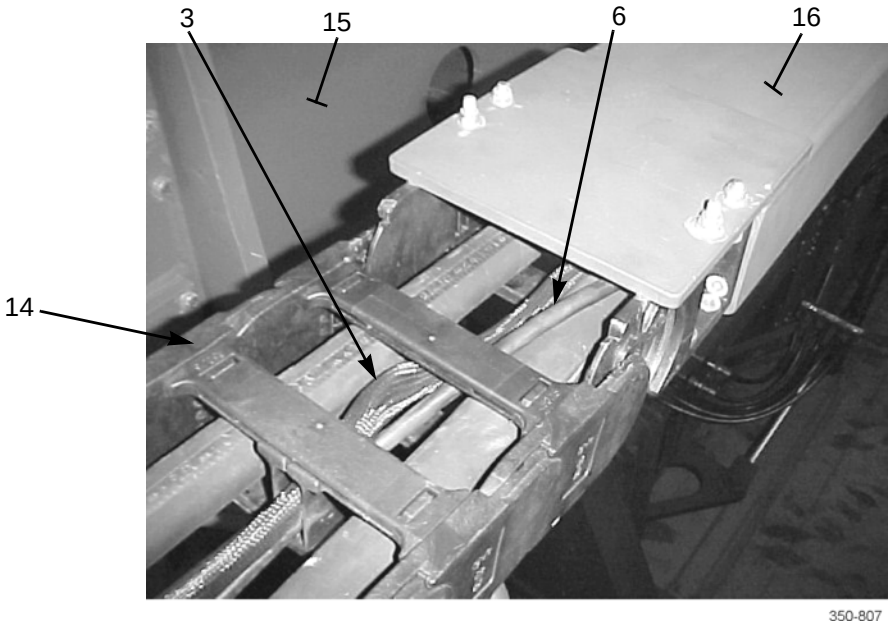


3. Extend two hydraulic hoses (17) out from rear of box channel (16) of boom extension (15) through conveyer (14).
4. Bend conveyer (14) and install lower end of conveyer on conveyer support bracket (21) with two screws (20) and new locknuts (19).
5. Connect two hydraulic hoses (17) to two adapters (18).

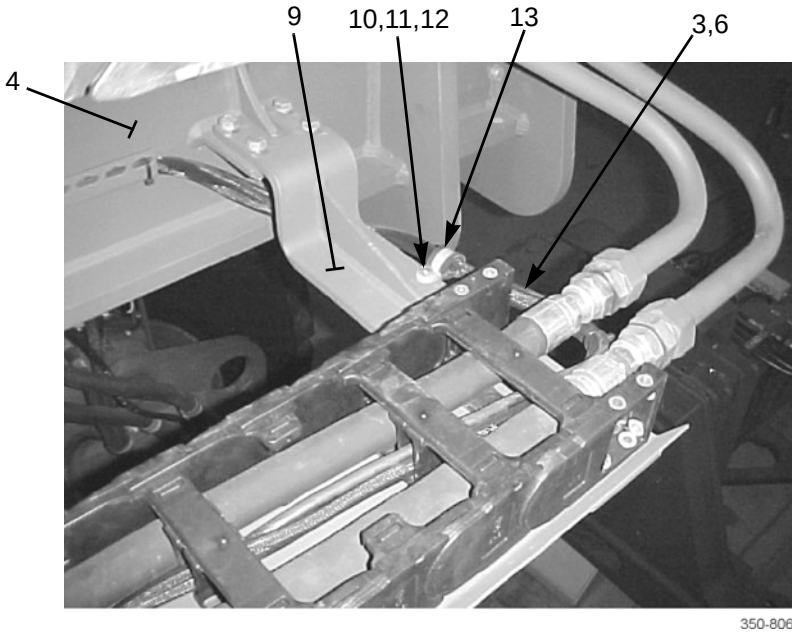


INSTALLATION - CONTINUED

6. Extend boom wiring harness (3) and cable (6) out from rear of box channel (16) on boom extension (15) through conveyer (14) toward rear of vehicle.

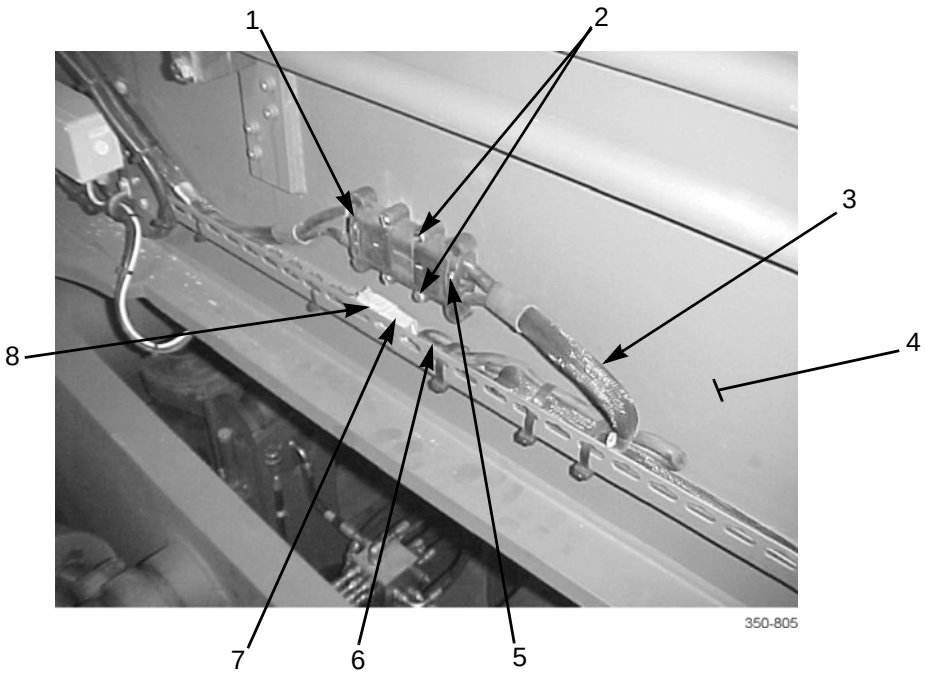


7. At right front of boom (4), position clamp (13) on boom wiring harness (3) and cable (6).
8. Install clamp (13) on conveyer support bracket (9) with screw (12), two washers (11), and new locknut (10).



INSTALLATION - CONTINUED

9. Using new tiedown straps, install boom wiring harness (3) and cable (6) along right side of boom (4).
10. Connect cable (6) connector (7) to connector (8).
11. Connect boom wiring harness (3) connector (5) to connector (1) and install two screws (2).



12. Return boom to operational position (TM 10-3930-675-10) and check for leaks.
13. Add hydraulic oil to reservoir, if necessary (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

RELIEVING HYDRAULIC SYSTEM PRESSURE 0164 00

THIS WORK PACKAGE COVERS

General, Relieving Hydraulic System Pressure

INITIAL SETUP

Maintenance Level	References
Organizational	TM 10-3930-675-10



WARNING

- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**

GENERAL

1. During operation of the RTCH, hydraulic pressure is generated by hydraulic pumps to operate the following:
   a. Lifting boom
   b. Tophandler
   c. Service brakes
   d. Parking brakes
   e. Steering system
   f. Bogie wheel assembly hydraulic cylinders
   g. Cab movement hydraulic cylinders
2. Both brake and steering systems have pressurized accumulators that provide adequate stored energy to operate in the event of engine shutdown.
3. In order to safely perform maintenance on all hydraulic systems, hydraulic pressure must first be relieved.

RELIEVING HYDRAULIC SYSTEM PRESSURE

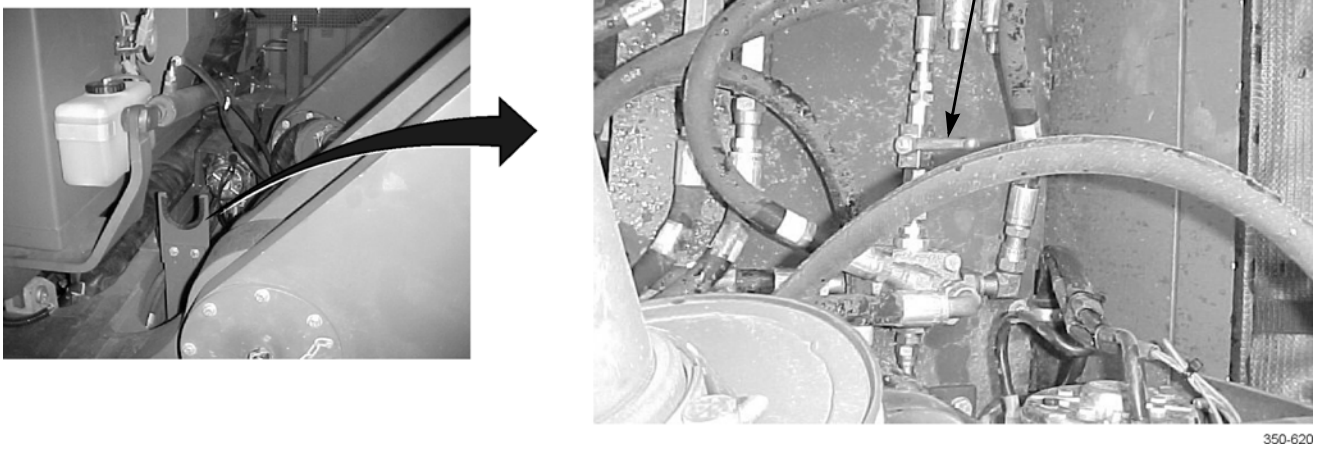
1. To relieve hydraulic pressure in ALL systems:
   a. Lower and fully retract boom (TM 10-3930-675-10).
   b. Shut down engine (TM 10-3930-675-10).

RELIEVING HYDRAULIC SYSTEM PRESSURE - CONTINUED

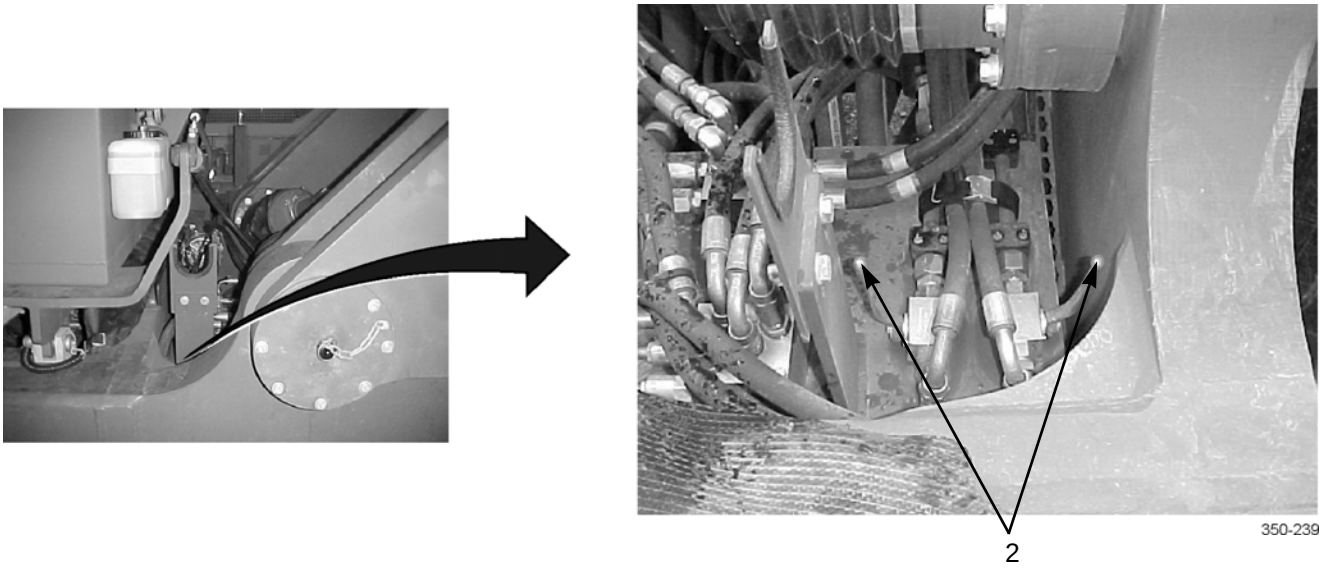
NOTE

When performing steering or brake hydraulic system maintenance, leave evacuation valves open until maintenance action is completed. Then close valves before starting engine to pressurize system.

2. To further release pressure in steering hydraulic system, open steering accumulator evacuation valve (1) behind cab. Allow pressure to release, approximately 15 seconds. It is now safe to perform maintenance on steering system.

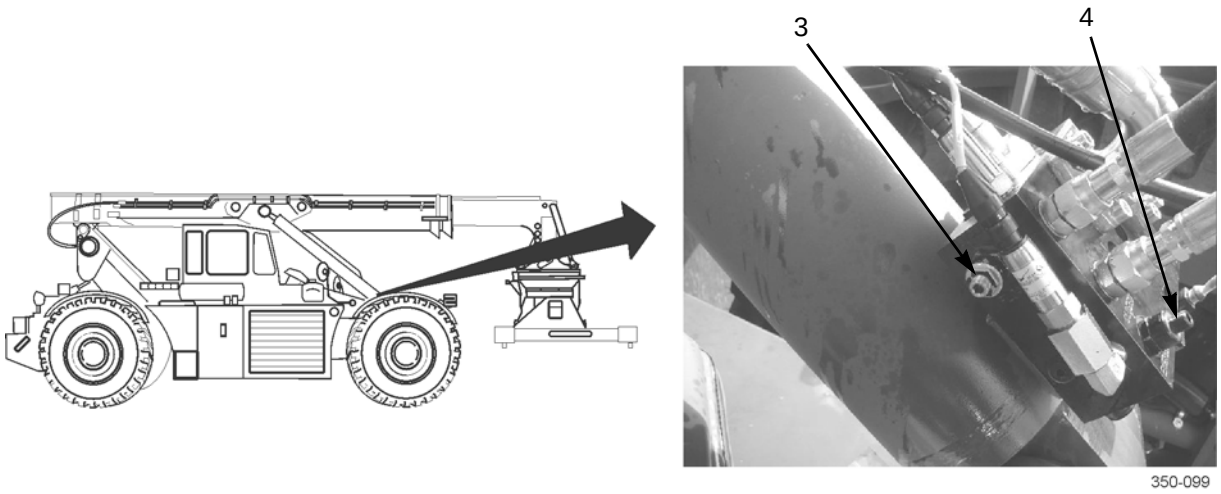


3. To further release pressure in brake hydraulic system, open two brake accumulator evacuation valves (2) behind cab. Allow pressure to release, approximately 15 seconds. It is now safe to perform maintenance on brake system.



RELIEVING HYDRAULIC SYSTEM PRESSURE - CONTINUED

4. To further release pressure in boom hydraulic system (boom extension and lift cylinders, hoses, pipes, and valves), open float control valve (3) and emergency control valve (4) on each locking valve at base of each lift cylinder. Leave valves open until maintenance action is completed, then close valves before starting engine to pressurize system.



5. When disconnecting hydraulic lines from boom folding cylinders, additional precautions are required due to residual pressure in lines:
   a. Wear eye protection.
   b. Have a rag handy and slowly disconnect hydraulic lines.

END OF WORK PACKAGE

AUXILIARY HYDRAULIC PUMP REPLACEMENT 0165 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 5957) (3)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab moved to the left, but not lowered (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

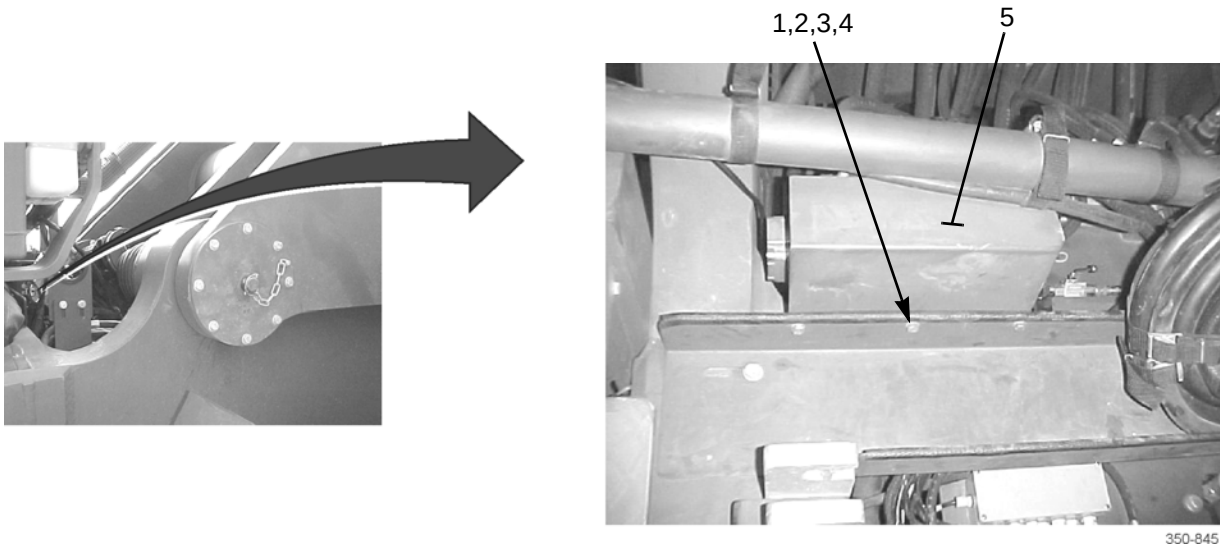
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

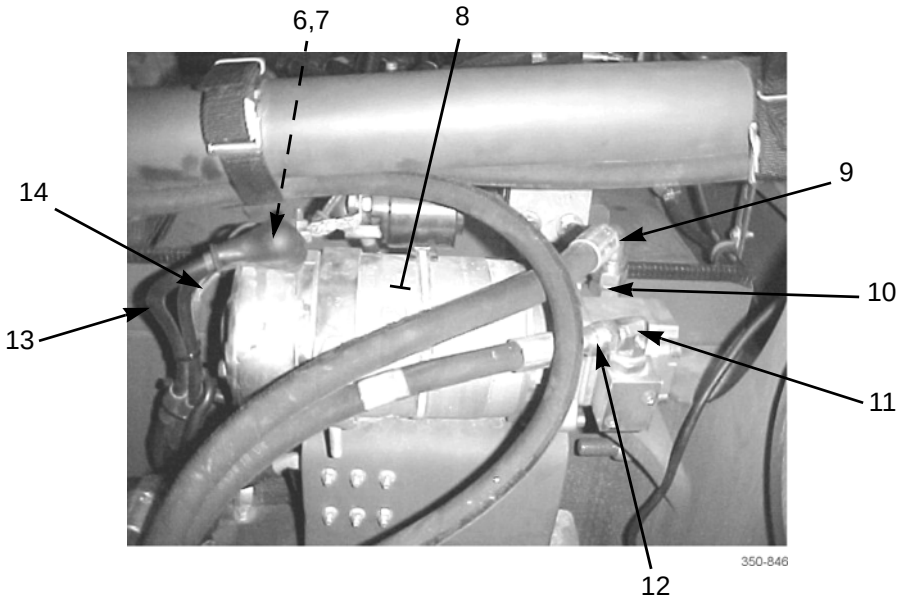
- **USMC pump mounted other way.**
- **Cab may not be moved to transport position.**
- **Tag all electrical wires and hydraulic lines and fittings to ensure correct installation.**

REMOVAL

1. Remove three locknuts (1), bolts (2), washers (3), spacers (4), and cover (5). Discard locknuts.

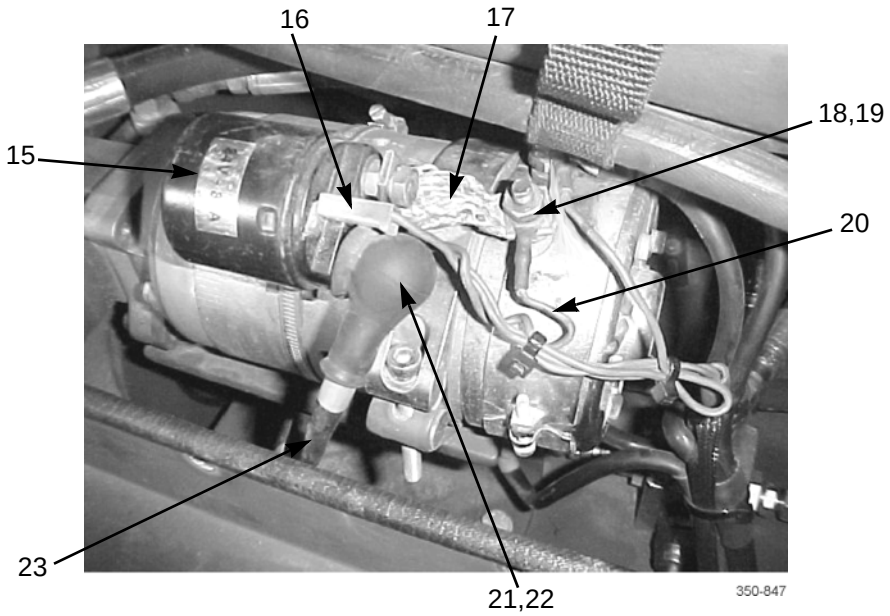


2. Trace supply hose (9) back to hydraulic reservoir. Close ball valve in supply hose at reservoir.
3. Disconnect supply hose (9) from straight connector (10) on pump (8).
4. Disconnect pressure hose (12) from elbow (11).
5. Peel back rubber boot from terminal post (6). Remove nut (7) and disconnect two black wires (13) and gray wire (14) from terminal post.

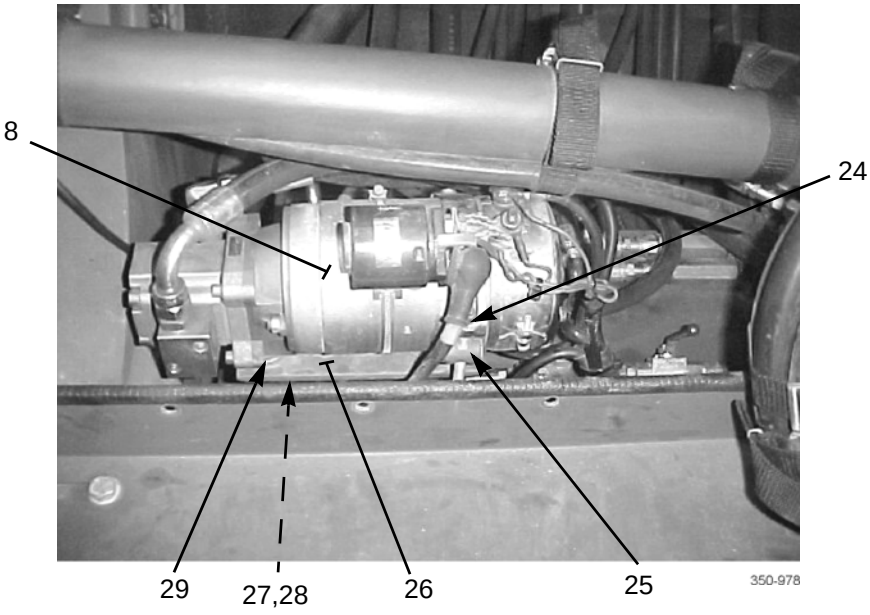


REMOVAL - CONTINUED

6. Remove nut (18), lockwasher (19), and disconnect strap (17) and gray wire (20).
7. Disconnect two connectors (16) from solenoid (15).
8. Peel back rubber boot and remove nut (21), lockwasher (22), and disconnect power cable (23) from solenoid (15).



9. Remove two bolts (27) and washers (28) from underside of pump (8) and mounting bracket (26).
10. Remove two allen screws (24) from clamp (25).
11. Remove pump (8) and two spacers (29) from mounting bracket (26).



REMOVAL - CONTINUED

NOTE

Perform step 12 to remove fittings from pump, if a new pump is being installed.

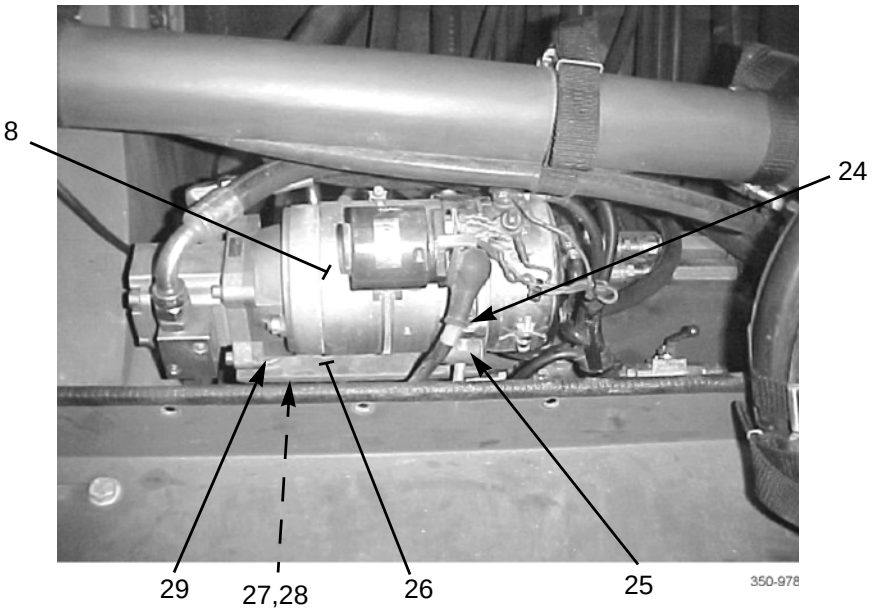
12. Remove straight connector (10) and elbow (11) from pump (8).

INSTALLATION

NOTE

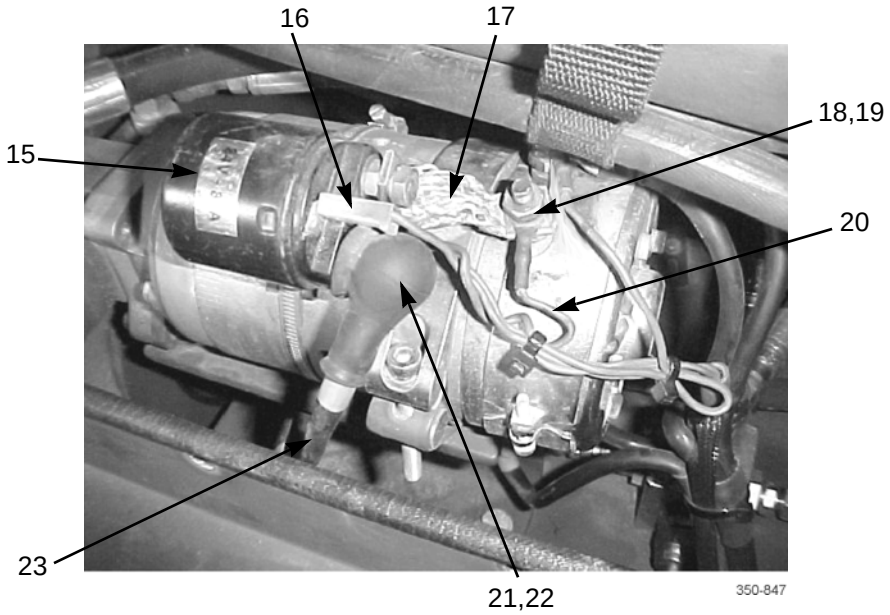
- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old pump, if a new pump is being installed.**

1. Install elbow (11) and straight connector (10) on pump (8).
2. Position two spacers (29) and pump (8) on mounting bracket (26).
3. Loosely install two washers (28) and bolts (27).
4. Secure clamp (25) around pump (8) with two allen screws (24). Fully tighten two bolts (27).

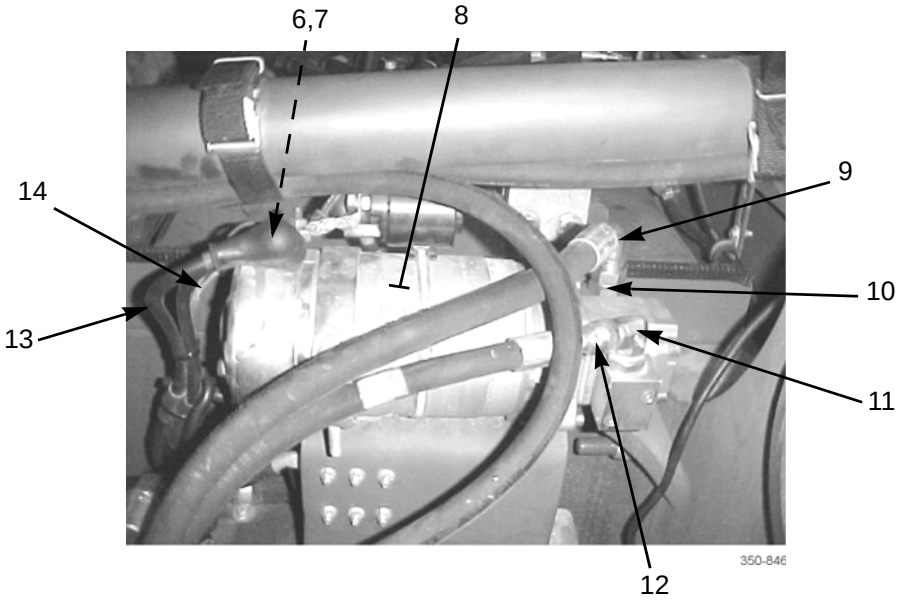


5. Connect power cable (23) to solenoid (15) with lockwasher (22) and nut (21).
6. Connect two connectors (16) to solenoid (15).
7. Connect strap (17) and gray wire (20) with lockwasher (19) and nut (18).

INSTALLATION - CONTINUED

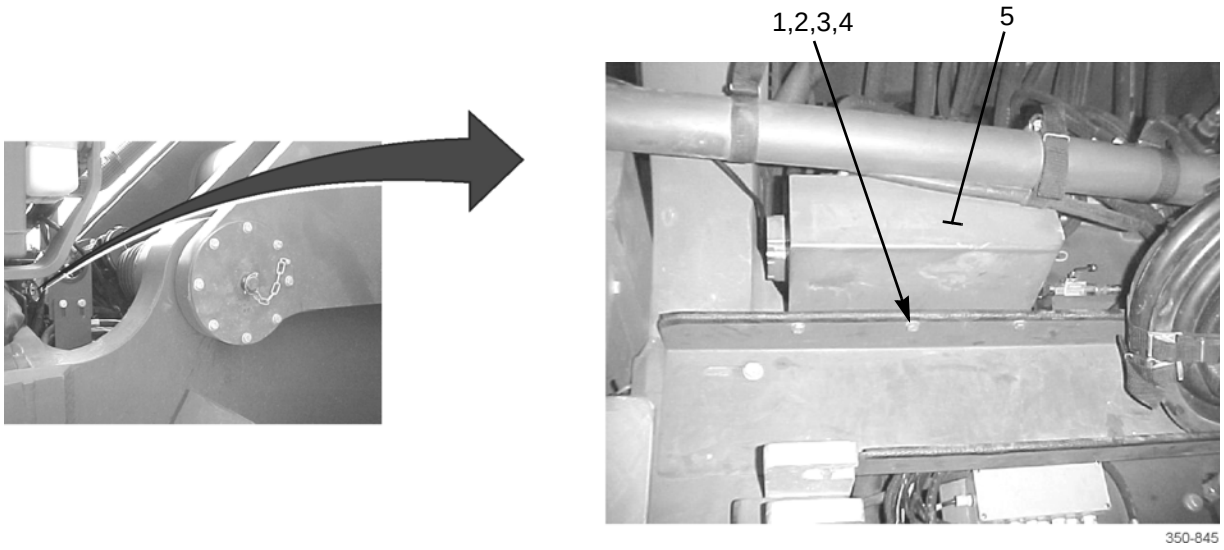


8. Connect two black wires (13) and gray wire (14) to terminal post (6) with nut (7). Cover terminal post with rubber boot.
9. Connect pressure hose (12) to elbow (11).
10. Connect supply hose (9) to straight connector (10).
11. Open ball valve at reservoir for supply hose (9).



INSTALLATION - CONTINUED

12. Check oil level in hydraulic reservoir (WP 0050 00).
13. Start engine and turn on emergency hydraulic pump (TM 10-3930-675-10). Check for leaks.
14. Install cover (5) with three spacers (4), washers (3), bolts (2), and new locknuts (1).



15. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER HYDRAULIC SLEWING MOTORS REPLACEMENT 0166 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, GO 85W/140 (Item 25, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

O-ring (P/N 923828.0797) (2)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

WP 0286 00

Equipment Condition

Boom and tophandler lowered for access (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

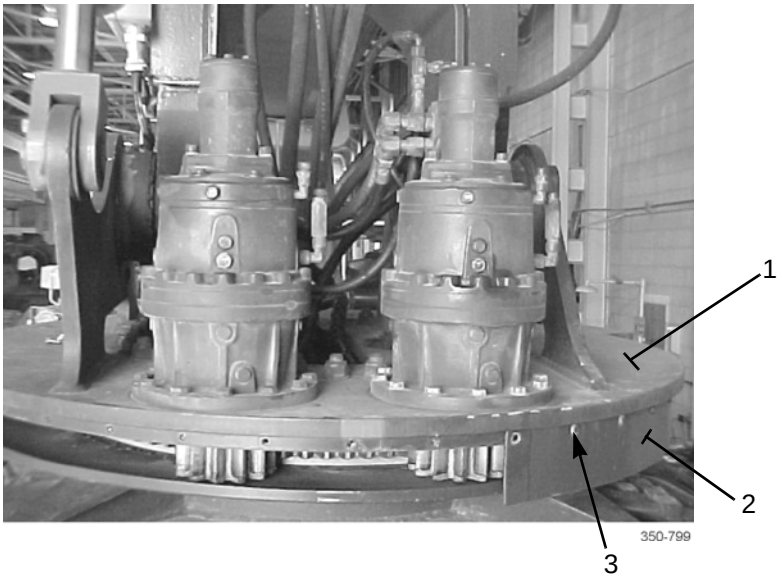
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

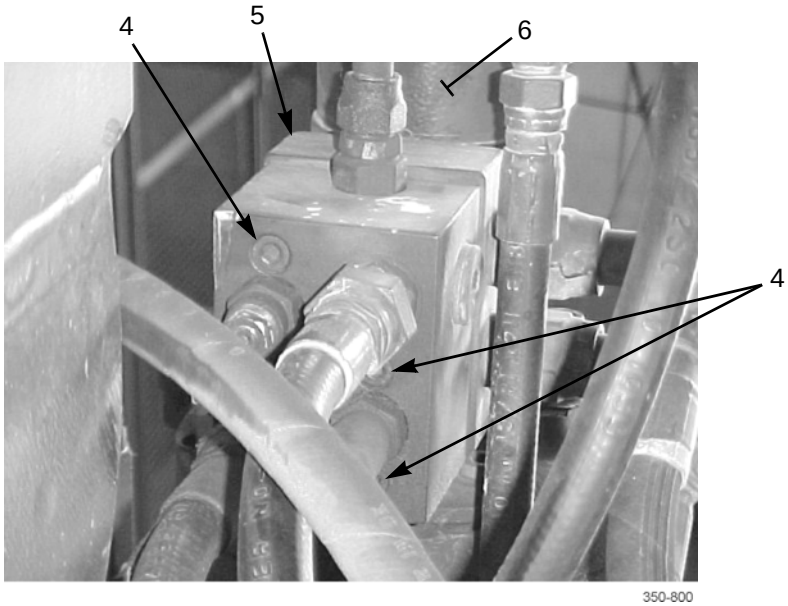
1. Remove ten screws (3) and one of four protection covers (2) from turning plate (1).



NOTE

- **To remove slewing motor with hydraulic manifold, perform steps 2 and 3.**
- **To remove slewing motor without hydraulic manifold, proceed to step 4.**

2. Remove four socket head screws (4) securing hydraulic manifold (5) with hoses to slewing motor (6).
3. Remove hydraulic manifold (5) with hoses attached from slewing motor (6). Discard O-rings.

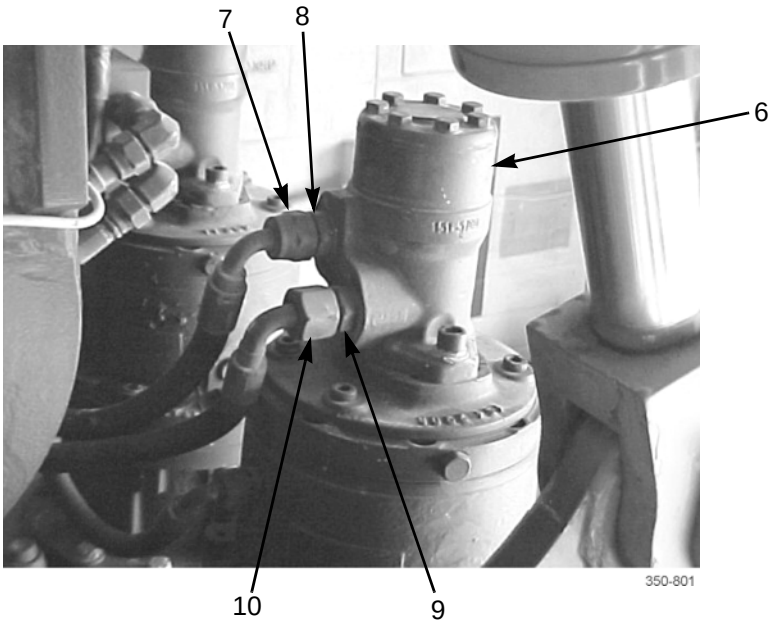


REMOVAL - CONTINUED

NOTE

If removing slewing motor without hydraulic manifold, perform step 4.

4. Remove two hydraulic hoses (7 and 10) and fittings (8 and 9) from slewing motor (6).



REMOVAL - CONTINUED

NOTE

Note orientation of slewing motor for positioning hydraulic connections on installation.

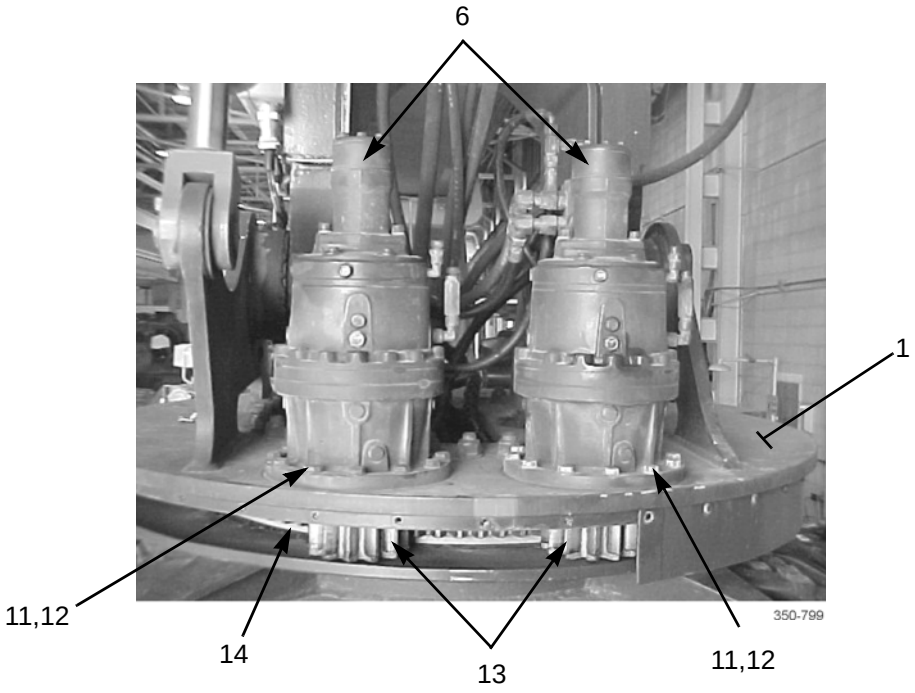
5. Remove ten bolts (11) and washers (12) securing slewing motor (6).



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Slewing motor weighs approximately 150 lb (68 kg). Lifting device must have sufficient capacity to lift motor. Failure to follow this warning may result in injury to personnel.**

6. With assistance, and using nylon sling and suitable lifting device, remove slewing motor (6) with pinion gear (13) from turning plate (1).



INSTALLATION



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Slewing motor weighs approximately 150 lb (68 kg). Lifting device must have sufficient capacity to lift motor. Failure to follow this warning may result in injury to personnel.**

NOTE

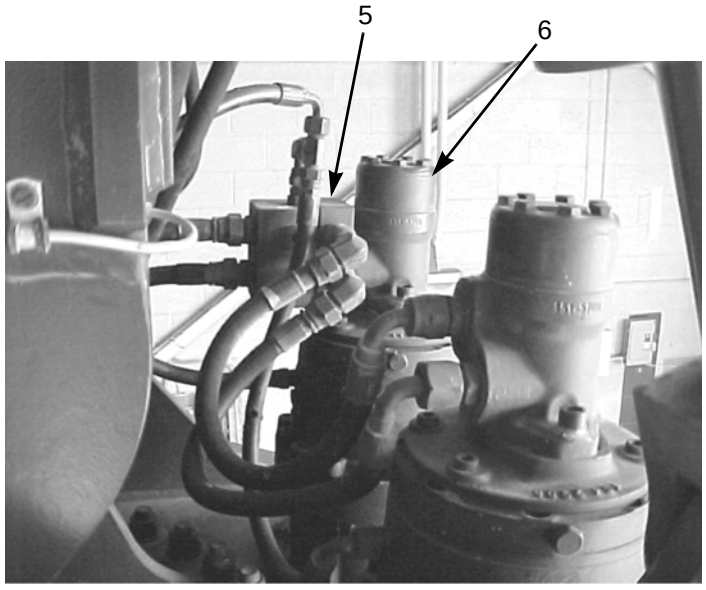
- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Ensure slewing motor is oriented to allow hoses or hydraulic manifold connections.**

1. With assistance, and using nylon sling and suitable lifting device, install slewing motor (6) with pinion gear (13) through turning plate (1) and engage ring gear (14).
2. Install ten bolts (11) and washers (12) to secure slewing motor (6) in place. Tighten bolts in an even pattern in accordance with *Torque Limits* (WP 0286 00).

NOTE

- **To install slewing motor with hydraulic manifold, perform steps 3 and 4.**
- **To install slewing motor without hydraulic manifold, proceed to step 5.**
- **Ensure O-rings are lubricated with lubricating oil prior to installation.**

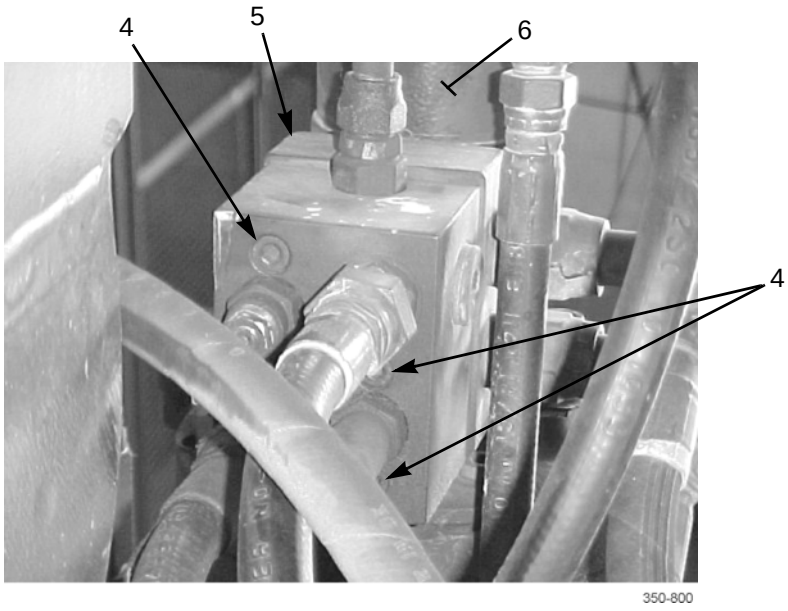
3. Position new O-rings and hydraulic manifold (5) with hoses attached on slewing motor (6) mating surface.



350-802

INSTALLATION - CONTINUED

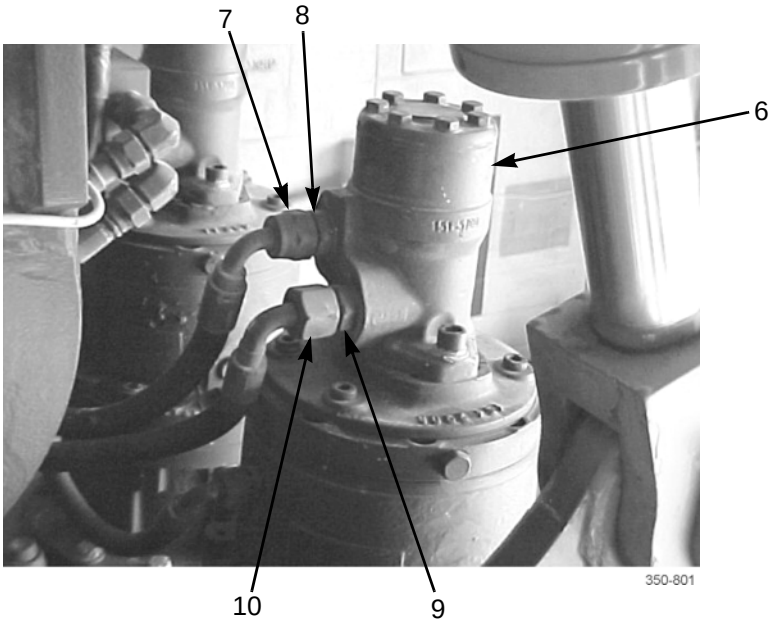
4. Install four socket head screws (4) to secure hydraulic manifold (5) to slewing motor (6).



NOTE

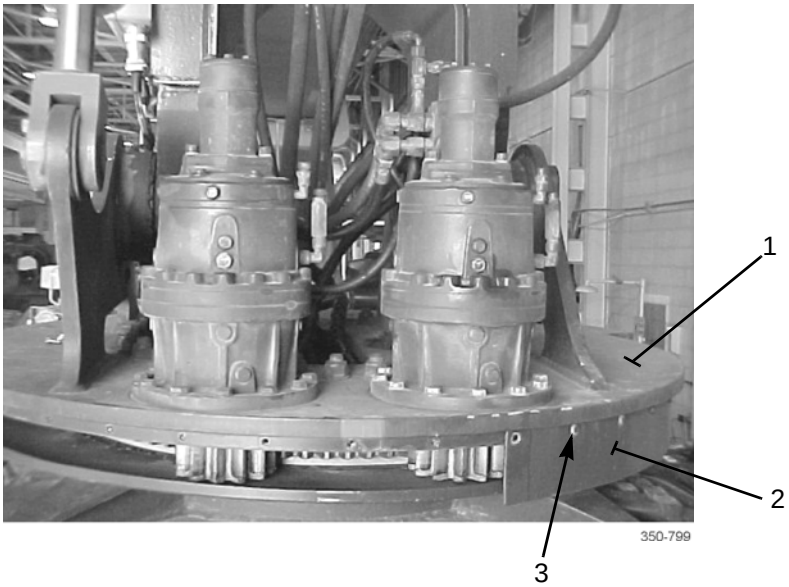
If installing slewing motor without hydraulic manifold, perform step 5.

5. Install fittings (8 and 9) and connect two hydraulic hoses (7 and 10) to slewing motor (6).



INSTALLATION - CONTINUED

6. Position protective cover (2) on turning plate (1) with ten screws (3).



7. If a new slewing motor was installed, lubricate motor in accordance with WP 0051 00.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Operate tophandler (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER HYDRAULIC SPREADER MOTOR REPLACEMENT 0167 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Chain Assembly, Single Leg (Item 20, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Oil, Lubricating, GO 80W/90 (Item 24, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 923863.7200) (7)

O-ring (P/N 923828.0797) (2)

Personnel Required

Two

References

WP 0050 00

WP 0164 00

WP 0185 00

WP 0286 00

Equipment Condition

Boom and tophandler lowered for access (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

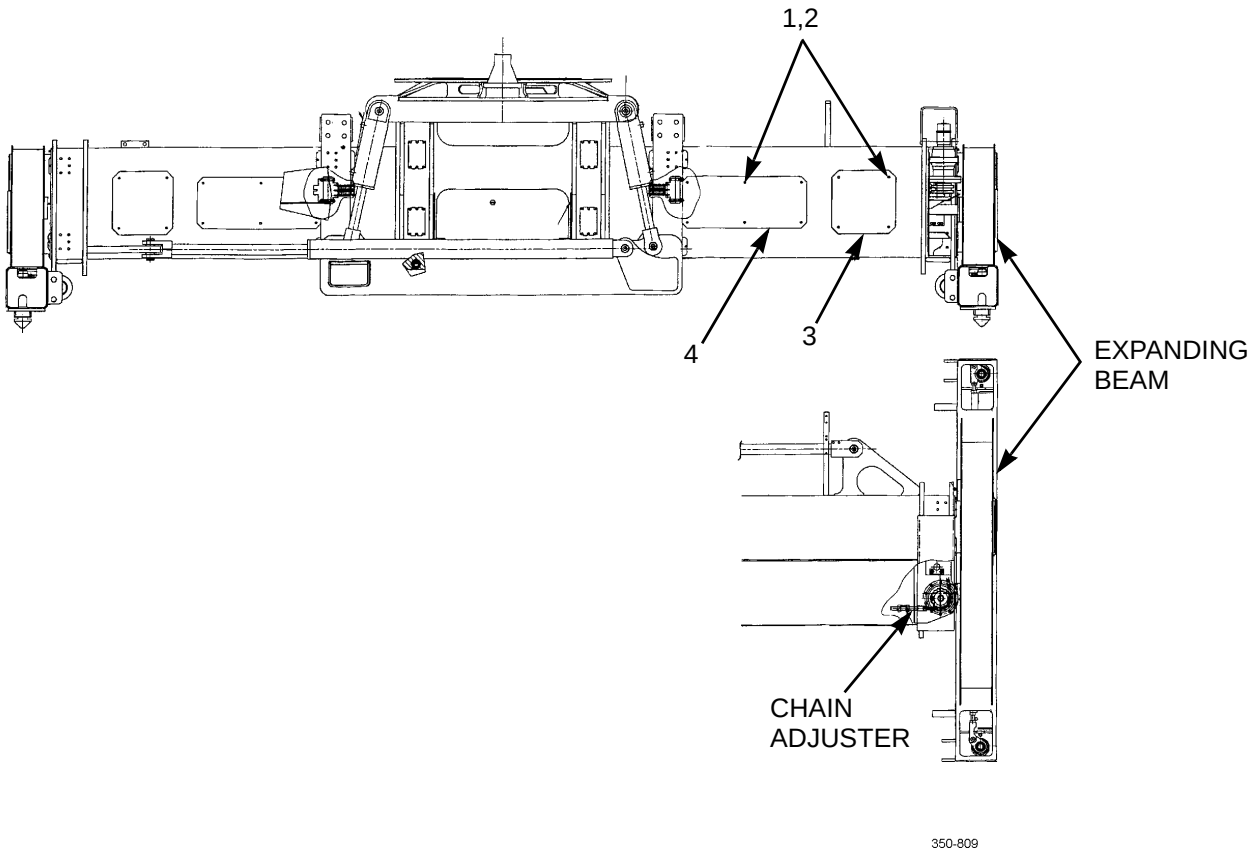
CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

TOPHANDLER HYDRAULIC SPREADER MOTOR REPLACEMENT - CONTINUED 0167 00

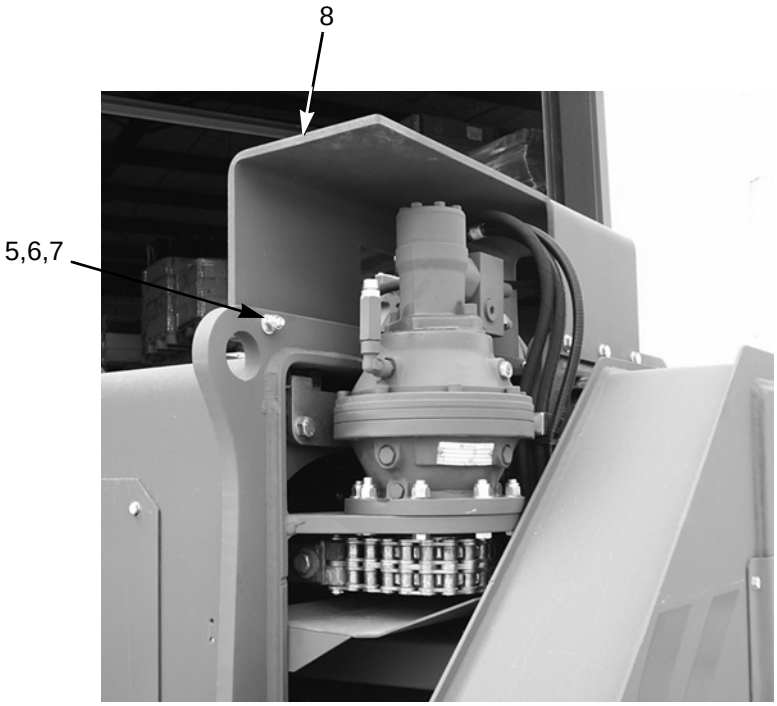
REMOVAL

1. Remove ten screws (1), washers (2), and two access panels (3 and 4) from side of tophandler carriage.
2. Position tophandler expanding beams to access chain adjuster.



REMOVAL - CONTINUED

3. Relieve hydraulic system pressure (WP 0164 00).
4. Remove seven locknuts (5), washers (6), screws (7), and protective cover (8) from tophandler. Set protective cover aside. Discard locknuts.



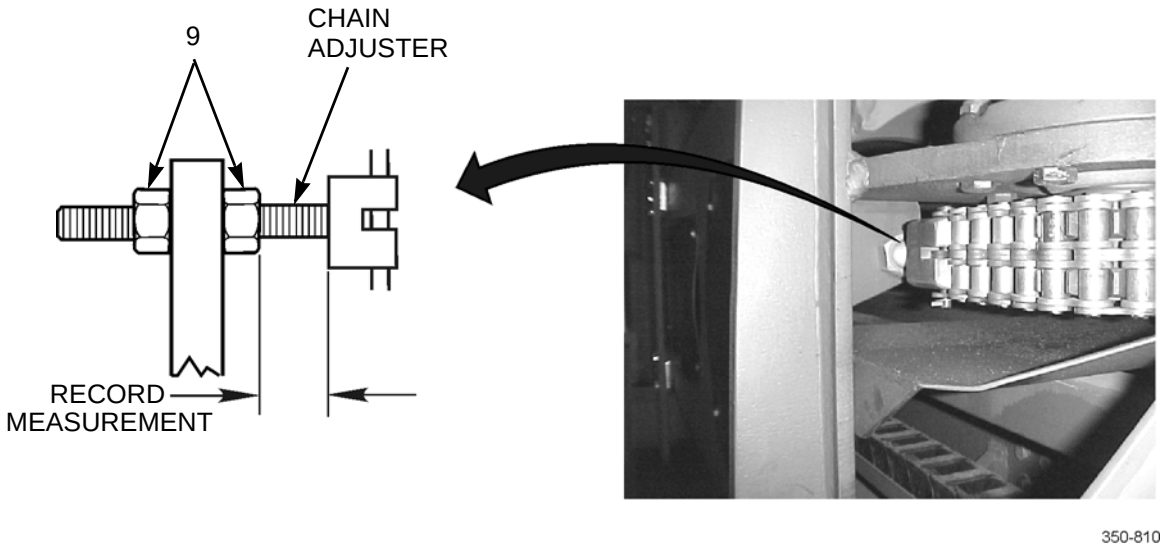
350-901

REMOVAL - CONTINUED

NOTE

Prior to removal or disconnection of drive chain, measure and record adjuster rod length as shown in location diagram to ensure proper chain adjustment on installation.

5. Measure and record chain adjuster as shown below.
6. Loosen chain adjuster jamnuts (9).



7. Remove chain (15) from drive sprocket (14).
8. Remove four socket head screws (13), hydraulic manifold (11) with hoses, and O-rings (12) from spreader motor (10). Discard O-rings.

NOTE

Note direction of screws securing spreader motor to mounting weldment for installation.

9. Remove ten screws (16), washers (18), and nuts (19) securing spreader motor (10) to mounting weldment (17).



WARNING

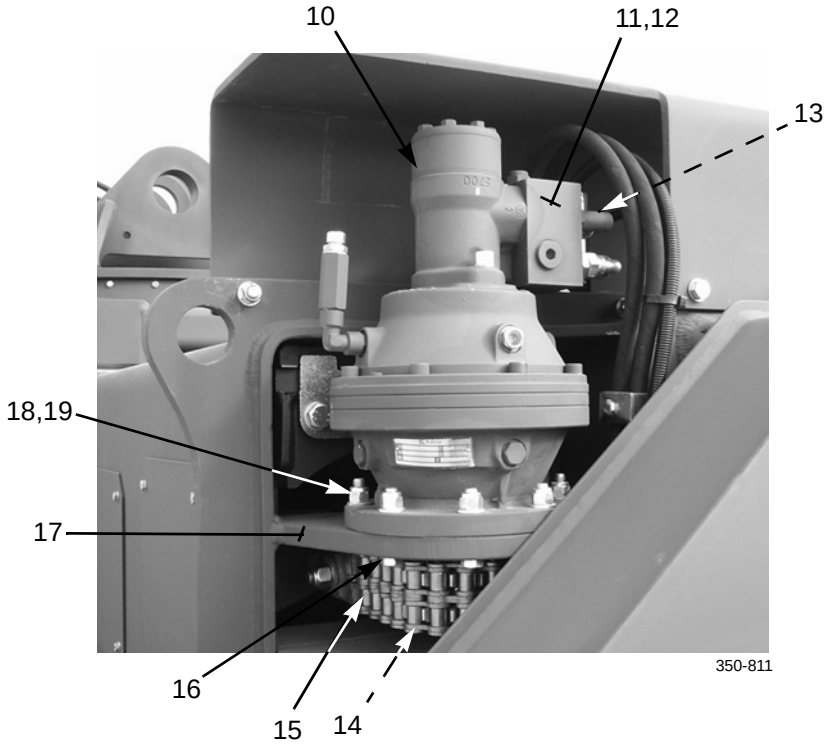
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Spreader motor weighs approximately 150 lb (68 kg). Lifting device must have sufficient capacity to lift motor. Failure to follow this warning may result in injury to personnel.**

REMOVAL - CONTINUED

NOTE

Note orientation of spreader motor to allow connection of hydraulic manifold on installation.

10. Using suitable lifting device, nylon sling, and with assistance, remove spreader motor (10) from mounting weldment (17).



INSTALLATION



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Spreader motor weighs approximately 150 lb (68 kg). Lifting device must have sufficient capacity to lift motor.Failure to follow this warning may result in injury to personnel.**

NOTE

Ensure spreader motor is oriented to allow connection of hydraulic manifold.

1. Using suitable lifting device, nylon sling, and with assistance, install spreader motor (10) on mounting weldment (17).

NOTE

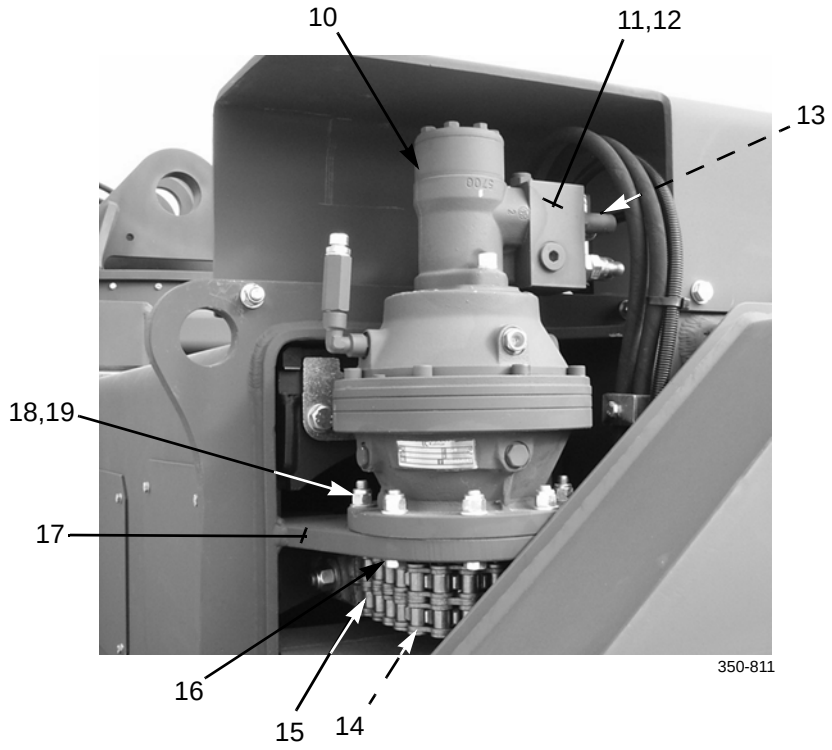
Ensure screws are installed from bottom up as noted in removal.

2. Install ten screws (16), washers (18), and nuts (19) to secure spreader motor (10). Tighten screws in an even pattern in accordance with *Torque Limits* (WP 0286 00).

NOTE

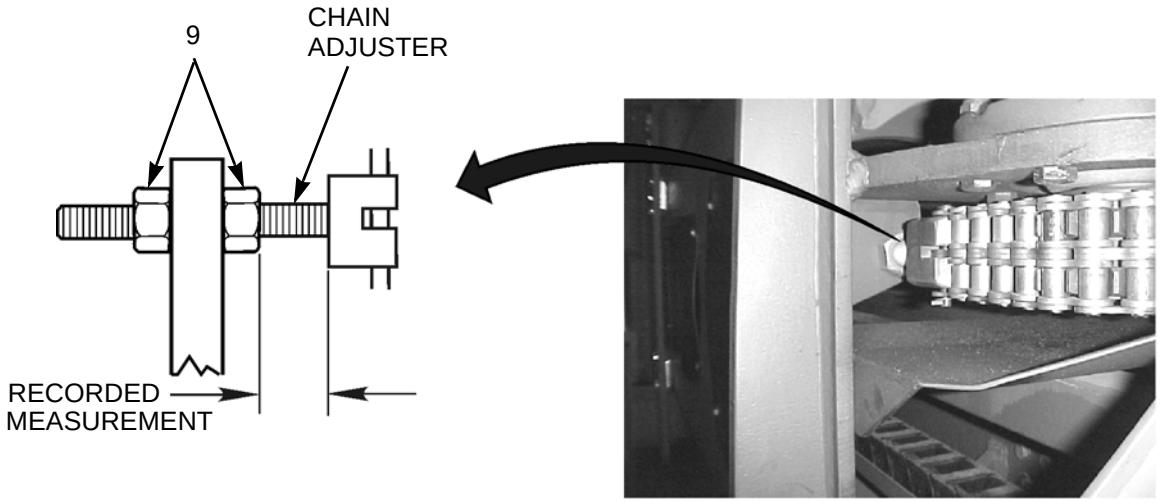
Ensure O-rings are lubricated with lubricating oil prior to installation.

3. Position hydraulic manifold (11) with hoses and new O-rings (12) on spreader motor (10) and secure with four socket head screws (13).
4. Position chain (15) on drive sprocket (14).



INSTALLATION - CONTINUED

5. Measure chain adjuster and compare reading to measurement recorded during removal.
6. Adjust jamnuts (9) on chain adjuster to obtain recorded reading.

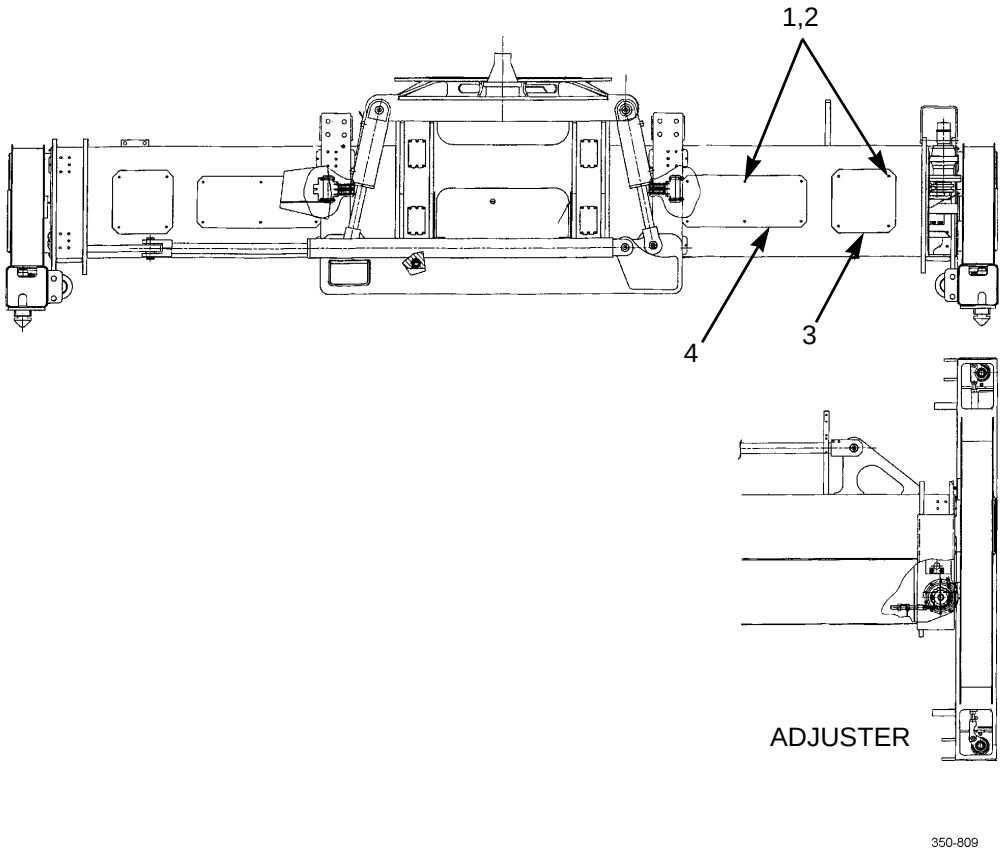


350-810

TOPHANDLER HYDRAULIC SPREADER MOTOR REPLACEMENT - CONTINUED 0167 00

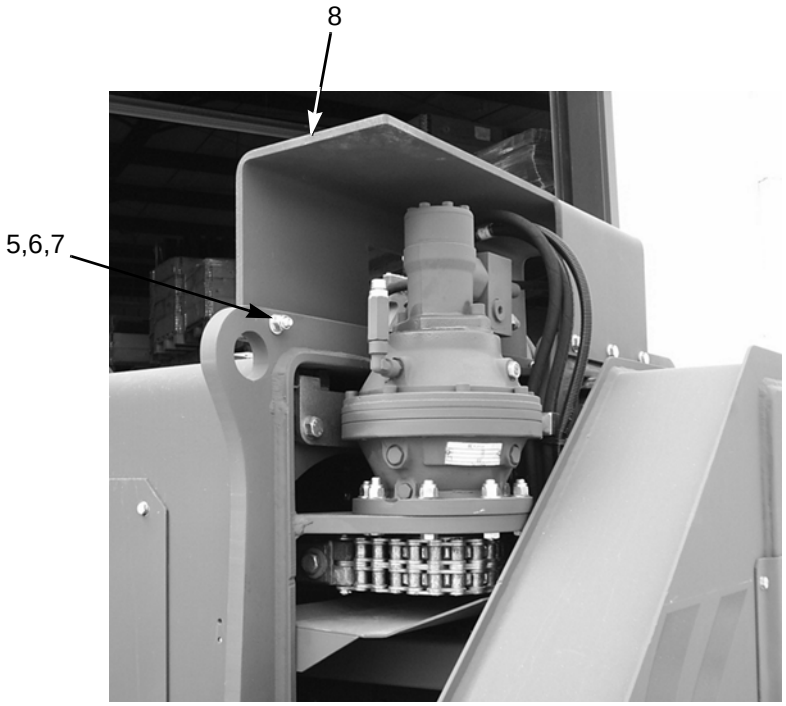
INSTALLATION - CONTINUED

7. If a new spreader motor was installed, lubricate motor in accordance with WP 0050 00.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Operate tophandler spreader motor (TM 10-3930-675-10) and check for leaks.
10. Recheck chain adjuster measurement and adjust jamnuts as required.
11. Install access panels (3 and 4) to side of tophandler carriage with ten washers (2) and screws (1).



INSTALLATION - CONTINUED

12. Install protective cover (8) on tophandler with seven screws (7), washers (6), and new locknuts (5).



350-901

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

SPREADER CHAIN REPLACEMENT 0168 00

THIS WORK PACKAGE COVERS

Removal, Installation, Chain Tension Measurement, Chain Tension Adjustment, Chain Adjuster Vertical Adjustment

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Forklift, 4,000-lb capacity

Ratchet, Strap

Materials and Parts

Cotter Pin (2)

Nut, lock (4)

Personnel Required

Three

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

Tophandler in normal operating position (TM 10-3930-675-10)

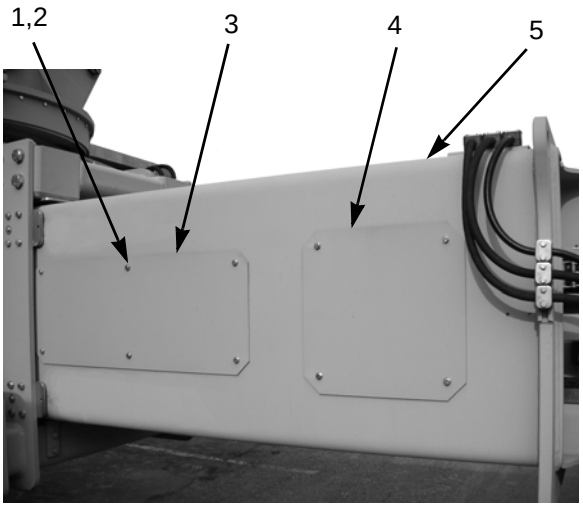
NOTE

Tophandler spreader chain replacement procedure is to be performed due to a broken or worn chain. For broken chain, the tophandler spreader function will be inoperative and the spreader sections could be spread at any position. The procedure described for removal is for a completely closed tophandler. Read through the steps to determine the best starting point as per the tophandler spread position. For worn chain, the tophandler spreader motor can be used to spread tophandler to required positions.

SPREADER CHAIN REPLACEMENT - CONTINUED 0168 00

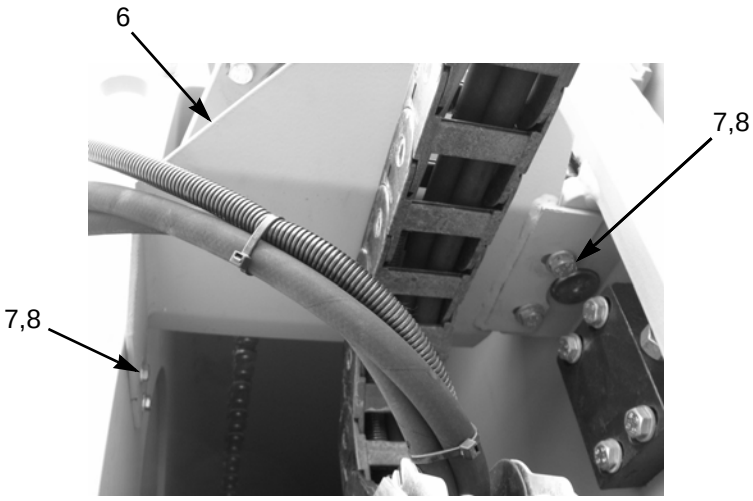
REMOVAL

1. Remove ten capscrews (1), washers (2), and two access panels (3 and 4) from each side of tophandler main beam (5).



434-40186

2. Remove four capscrews (7), washers (8), and protection plate (6) from motor side of tophandler.



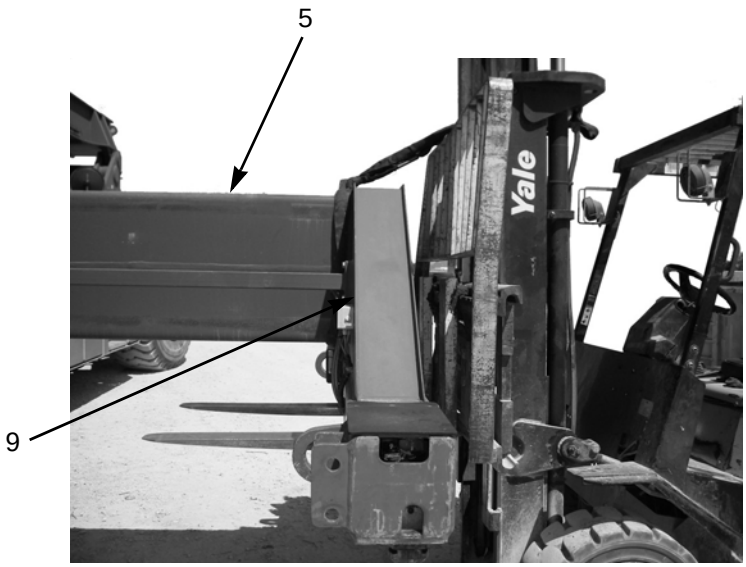
434-40187

REMOVAL - CONTINUED

NOTE

If chain is broken, a forklift or other device must be used to move sliding beams to facilitate this procedure and position the beams as necessary to access and perform each step.

3. Position a forklift under tophandler tee and attach a sling around beam and forklift carriage, to allow sliding beam (9) to be pulled out of main beam (5).



434-40188

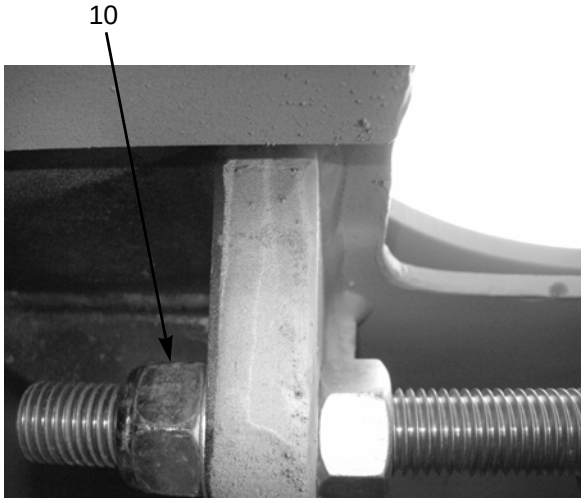
REMOVAL - CONTINUED

4. Pull sliding beam (9) out until chain tensioner (11), which attaches to chain end being replaced, is positioned in access hole of main beam (5).
5. Remove locknut (10), which secures tensioner to beam.
6. Place a mark (A) on sliding beam at end of main beam for reference during installation process.

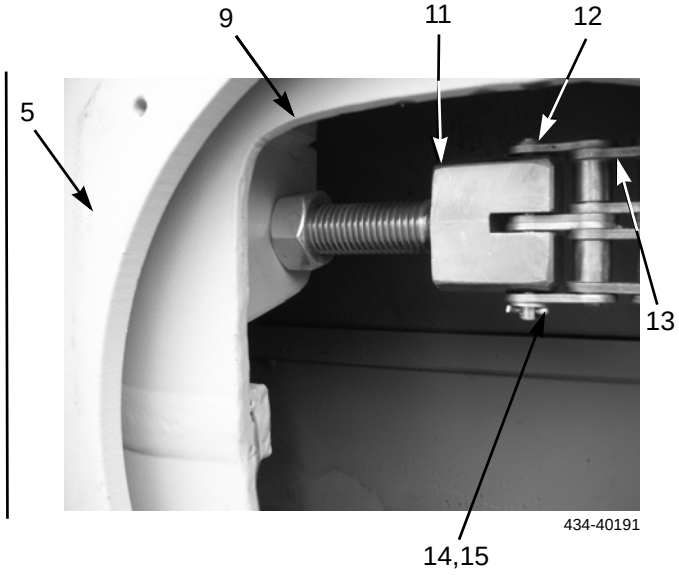


434-40189

7. Remove cotter pin (14), washer (15), pin (12), and tensioner (11) from chain (13). Discard cotter pin.



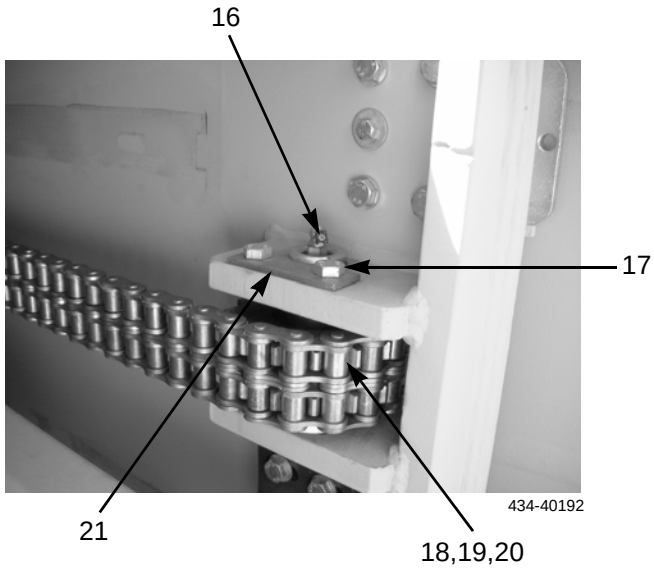
434-40190



434-40191

REMOVAL - CONTINUED

8. At idler gear (18), remove two capscrews (17) and locking plate (21). Use a punch and hammer to move idler shaft (16), from lower end, up through idler gear and remove it to free idler gear, bearing (19), and spacer (20).

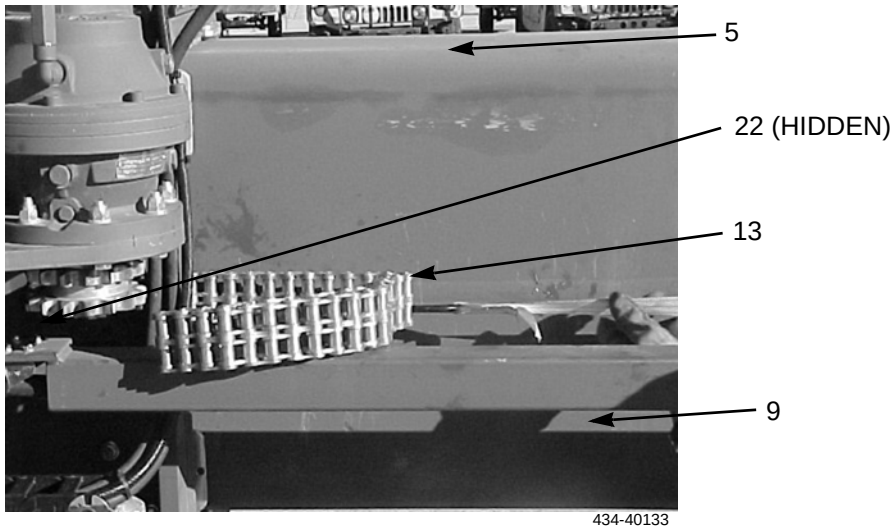


CAUTION

Step 9 will keep the loose chain from bunching up between the main and sliding beams as the sliding beam moves outward. Lack of tension on the chain could cause the beams to bind and prevent the sliding beam from moving.

9. Thread loose end of chain (13) through opening vacated by idler gear, and out of end of main beam (5), along wall of sliding beam (9) until full length of chain is positioned against sliding beam wall.

10. Attach a ratchet strap to spreader chain, and to end beam tee, and apply tension to chain (13), to allow chain to move with sliding beam (9), while it is being slid out to access chain anchor (22) attached to inside of beam.

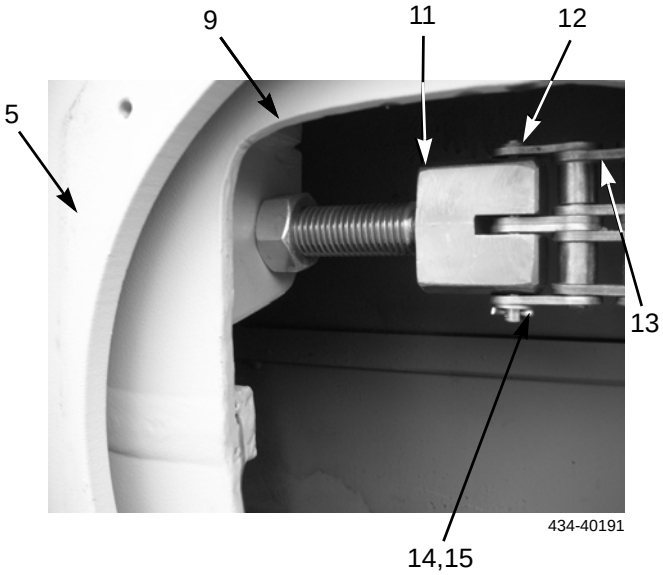


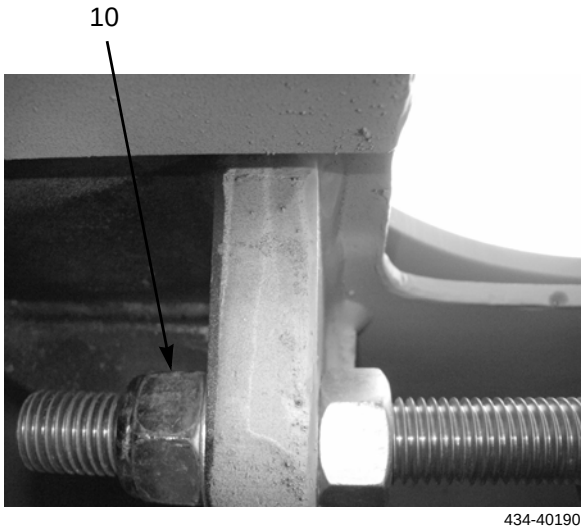
REMOVAL - CONTINUED

NOTE

Step 11 is performed to remove the tensioner. This will allow the sliding beam being pulled out for chain replacement to move without disturbing the other sliding beam. It is not necessary to remove the tensioner from the spreader chains on both ends unless both chain are being replaced.

11. At other end of tophandler, measure and record distance (B) from mounting flange (24) to center of pin (12) for correct positioning during reassembly. Remove locknut (23) from beam and tensioner (11).



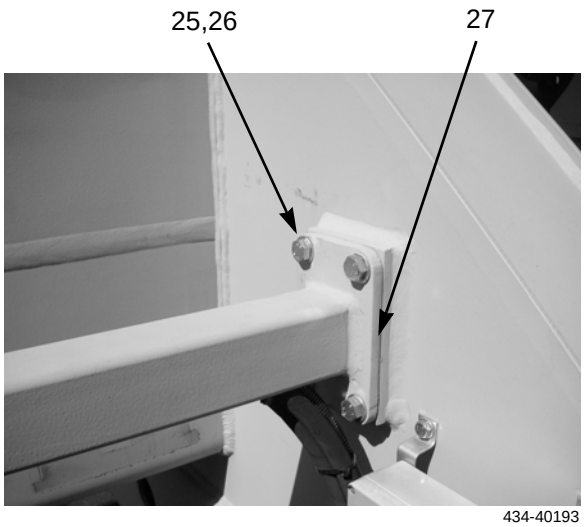


REMOVAL - CONTINUED

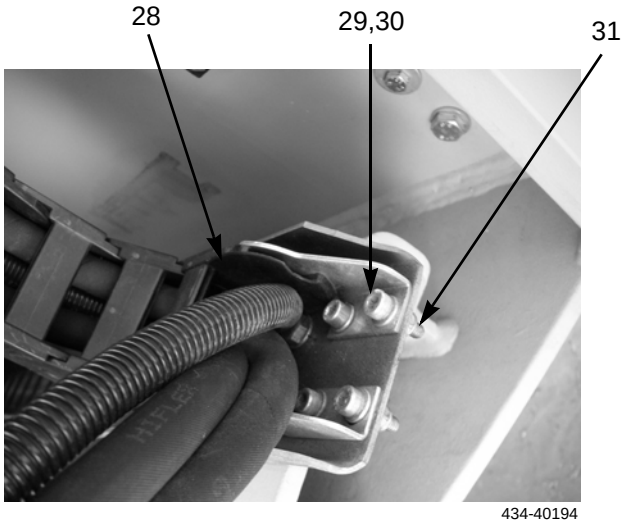
12. Return to end of tophandler where chain is being replaced and slowly pull sliding beam out of main beam until it reaches 40-ft stop block (34).

13. Remove four capscrews (25) and washers (26) from hydraulic/electrical hose power track support (27), allow support to hang loose.

14. Remove four socket head capscrews (29), washers (30), and locknuts (31), from other end of hydraulic hose/electric power track (28) to allow enough slack to continue to slide beam outward. Discard locknuts.



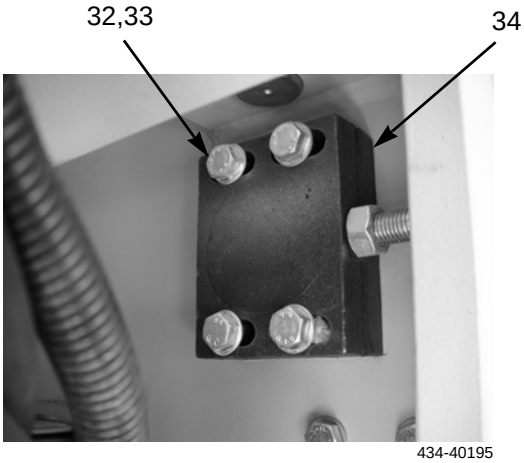
434-40193



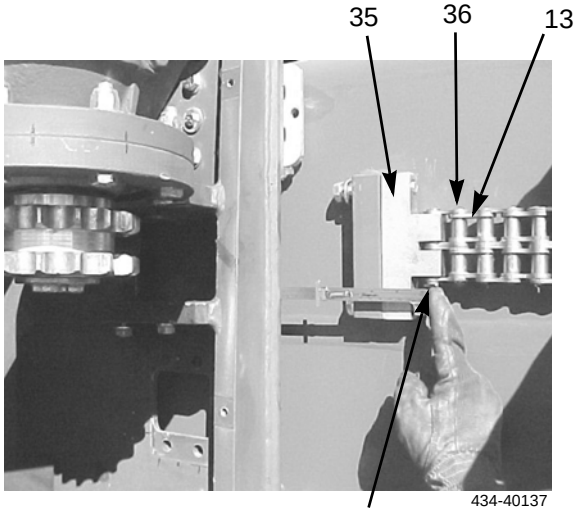
434-40194

15. Mark position (C) of 40-ft stop block (34) for repositioning during reassembly. Remove four capscrews (32), washers (33), and stop block (34) and slowly pull sliding beam out another 2.5 ft (76.2 cm) to access chain anchor (35).

16. Remove cotter pin (37), washer (38), and pin (36) from chain (13). Discard cotter pin.



434-40195



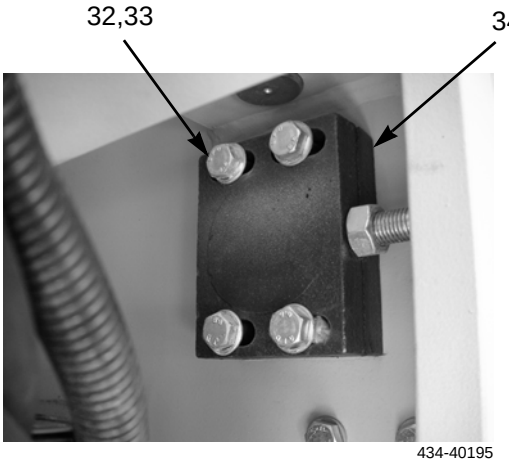
434-40137

INSTALLATION

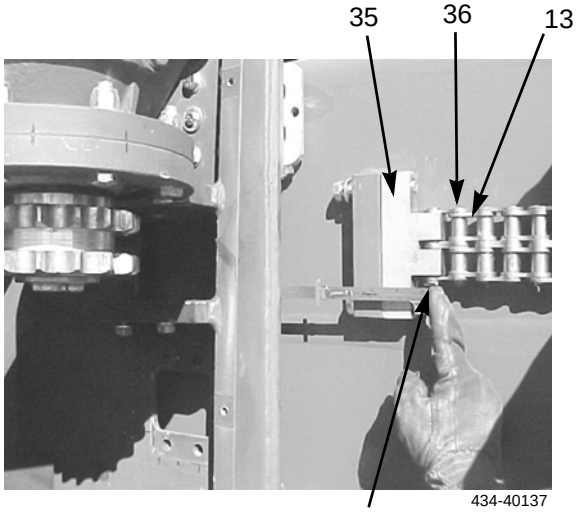
1. Install new chain (13) on chain anchor (35) with pin (36), washer (38), and new cotter pin (37).
2. Attach ratchet strap to spreader chain (13) and end beam tee, and apply tension to keep spreader chain tight, while sliding beam is being pushed back into main beam about 30 in. (76.2 cm).
3. Install 40-ft stop block (34), four screws (32), and four washers (33). Position stop block on mark (C) made during removal and tighten bolts.
4. Install four socket head capscrews (29), washers (30), and new locknuts (31) on other end of hydraulic hose/electric power track (28).
5. Install four capscrews (25) and washers (26) on hydraulic/electrical hose power track support (27) and vehicle.
6. Using forklift, slowly slide beam into main beam until it is positioned at mark (A), on wall of sliding beam at main beam, made during removal.



434-40189



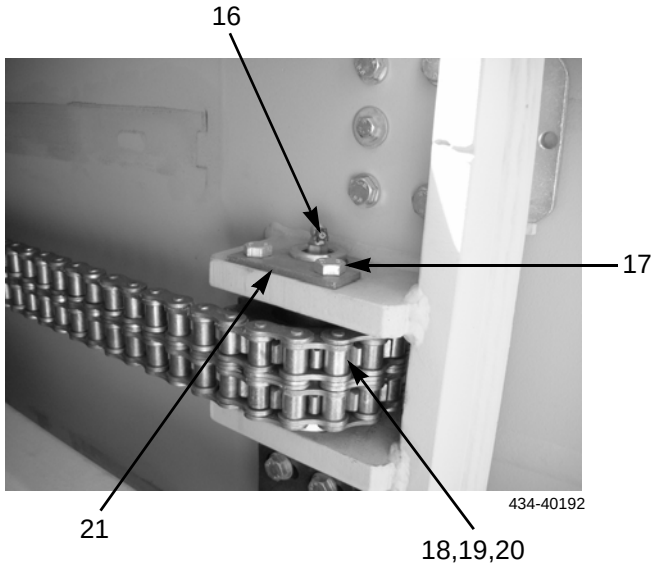
434-40195



434-40137

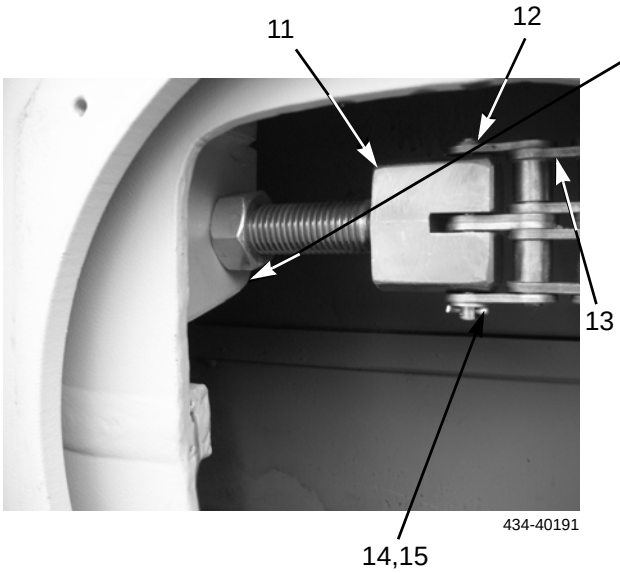
INSTALLATION - CONTINUED

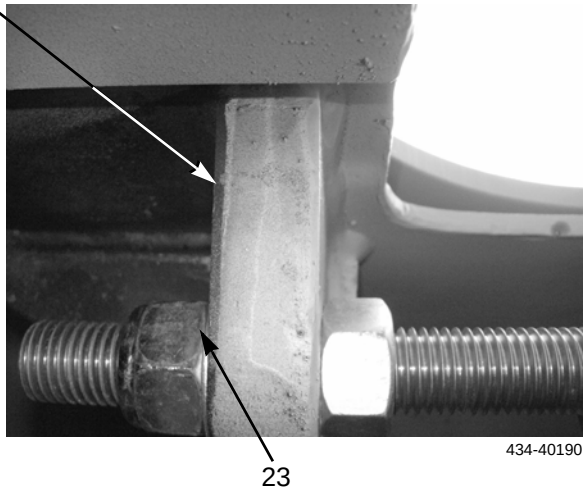
7. Remove ratchet strap from spreader chain and thread spreader chain through idler gear opening.
8. Install idler gear (18), bearing (19), spacer (20), and shaft (16) with two capscrews (17) and idler shaft locking plate (21).



INSTALLATION - CONTINUED

9. Position chain tensioner (11) on spreader chain (13) and install pin (12), washer (15), and new cotter pin (14) to secure tensioner to spreader chain.
10. Position spreader chain (13) around idler gear (and spreader motor gear if that end is being replaced) and slide threaded end of tensioner (11) through flange (24) and install locknut (23).
11. At opposite end of tophandler, install tensioner (11) with locknut (23). Tighten to position (B) marked during removal.
12. At end of tophandler where chain is being replaced, tighten locknut (23) until spreader chain (13) is tight and slack is removed.





CHAIN TENSION MEASUREMENT

1. Open tophandler spreader to 40-ft position and observe spreader has bottomed out on stop blocks. Measurement is to be made at third access hole closest to middle of tophandler.
2. Place tape measure against back wall of tophandler middle section perpendicular to chain.
3. Apply force of approximately 50 to 60 lb (250 N) against chain (19).
4. Measure deflection of chain. Deflection should be a minimum of 3/4 in. (20 mm) to a maximum of 1-1/2 in. (40 mm).
5. Measure tension of both chains.

CHAIN TENSION ADJUSTMENT

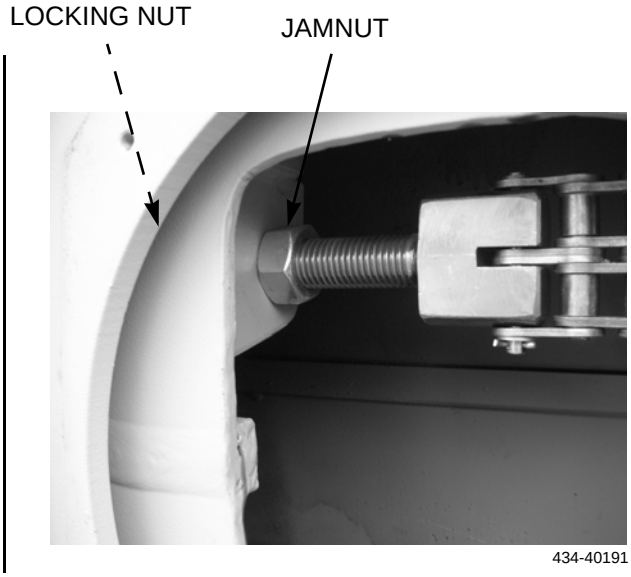
NOTE

- **Both chains must be equally adjusted during adjustment procedure.**
- **DO NOT adjust more than 1 turn (1/8 in. (2 mm)) of the adjustment nut at a time without rechecking chain tension. Operating tophandler spreader with excessive tension on chain may result in damage to equipment.**

1. If chains (19) require adjustment, operate tophandler spreader towards 20-ft position, stopping to allow access to chain adjuster.
2. Loosen jamnut. Loosen or tighten locking nut to decrease or increase tension.
3. Reposition tophandler spreader and recheck tension measurement. Adjust as needed.
4. Tighten jamnut when correct tension is obtained.



434-40144



434-40191

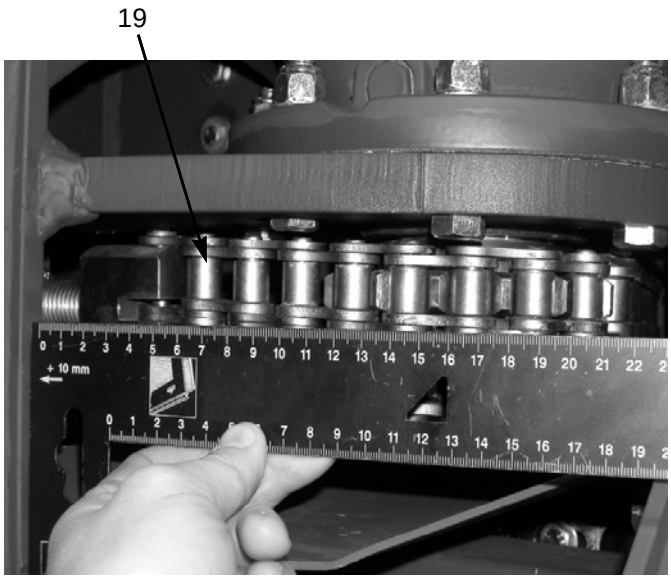
CHAIN ADJUSTER VERTICAL ADJUSTMENT (ARMY AND RESET ONLY)

1. Close tophandler spreader to 20-ft position.
2. Check angle of pull on chain (19) in relation to spreader motor sprocket.
3. If chain is pulling upward, adjust vertical adjustment on chain adjuster down until pull is straight.
4. If chain is pulling downward, adjust vertical adjustment on chain adjuster up until the pull is straight.

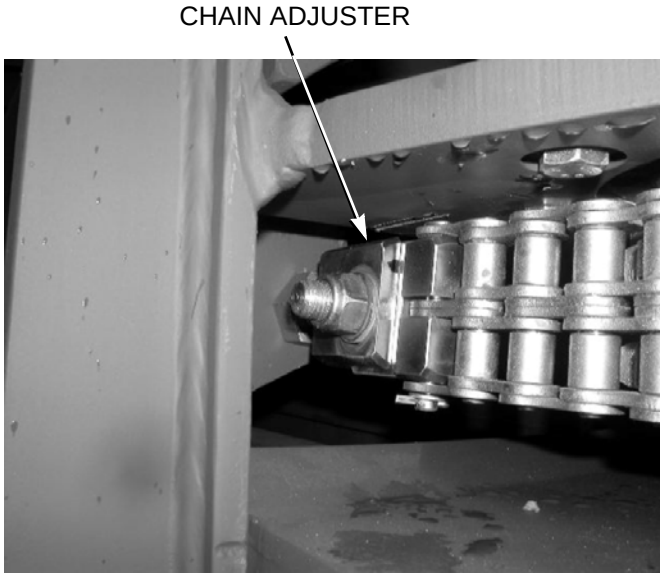
NOTE

Chain has vertical adjustment in only one direction. It may be necessary to reconfigure the chain adjuster as follows to gain adjustment in the other direction.

- **a. Loosen and remove chain adjuster from mounting flange. Mark adjustment position before removing.**
- **b. Remove vertical adjustment bolt.**
- **c. Separate two parts and rotate adjusting screw side.**
- **d. Reassemble two parts and install bolt, nut, and washers.**
- **e. Install the chain adjuster back onto mounting at original position.**

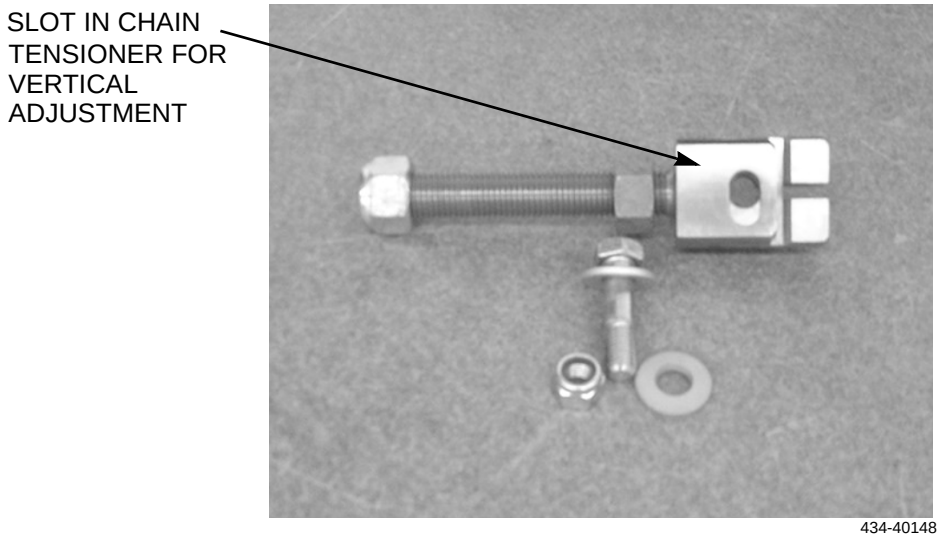


434-40146



434-40147

CHAIN ADJUSTER VERTICAL ADJUSTMENT (ARMY AND RESET ONLY) - CONTINUED



434-40148

5. Operate tophandler spreader function several times (TM 10-3930-675-10) and observe chain tension. Make adjustments as needed.

END OF WORK PACKAGE

SPREADER 20 AND 40 FOOT ADJUSTMENT 0169 00

THIS WORK PACKAGE COVERS

Measurement and Adjustment - 20 ft

Measurement and Adjustment - 40 ft

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tape, Measuring (Item 118, WP 0289 00)

36 mm Open-End Wrenches (2)

Materials/Parts

Antifreeze, Permanent (Item 4, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Washers (as required)

Personnel Required

Two

References

TM 10-3930-675-10

WP 0168 00

Equipment Condition

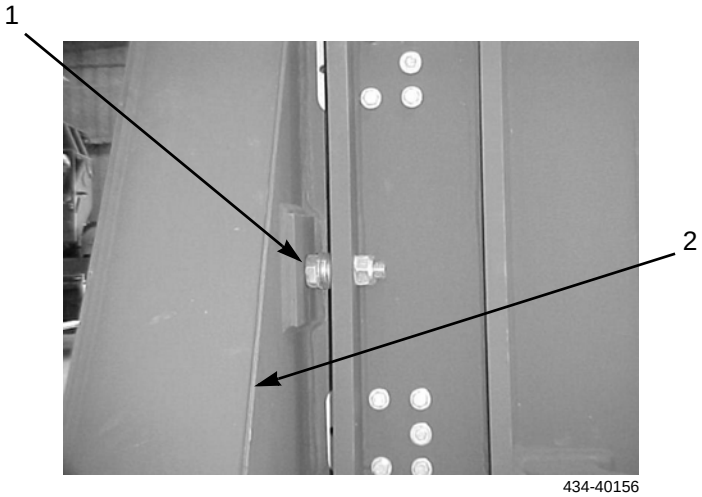
Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Tophandler in normal operating position with spreader motor on left side (TM 10-3930-675-10)

MEASUREMENT AND ADJUSTMENT - 20 FT

1. Check tophandler chain tension and adjust if necessary (WP 0168 00)
2. Operate tophandler spreader to 20-ft position (TM 10-3930-675-10).
3. Ensure stop blocks (1) are bottomed out on both ends of spreader sections (2).



434-40156

MEASUREMENT AND ADJUSTMENT - 20 FT - CONTINUED

NOTE

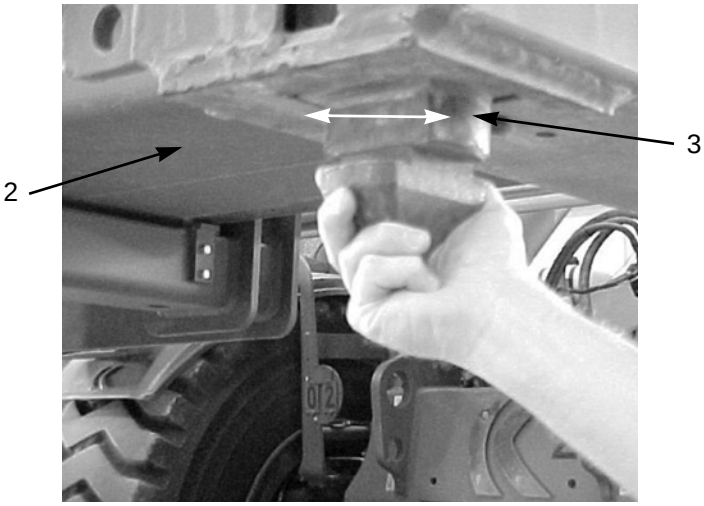
Twistlocks can be moved side to side in any horizontal position, by hand, to position them in middle of cutout.

4. Use override switch to operate twistlocks (3) to locked position. Green light on boom will be lit (TM 10-3930-675-10).

NOTE

When twistlocks are in the locked position, spreader function is deactivated.

5. Ensure twistlocks (3) are in middle of cutout position in bottom of spreader section (2).

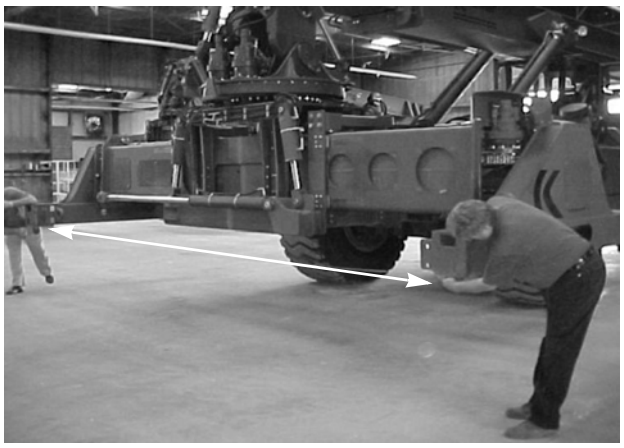


434-40157

6. Measure from inside flat edge of one twistlock (3) to other twistlock outer flat edge.

NOTE

Measurement should be 230 7/16 in. ± 1/8 in. (5,853 mm ± 3 mm).



434-40158

MEASUREMENT AND ADJUSTMENT - 20 FT - CONTINUED

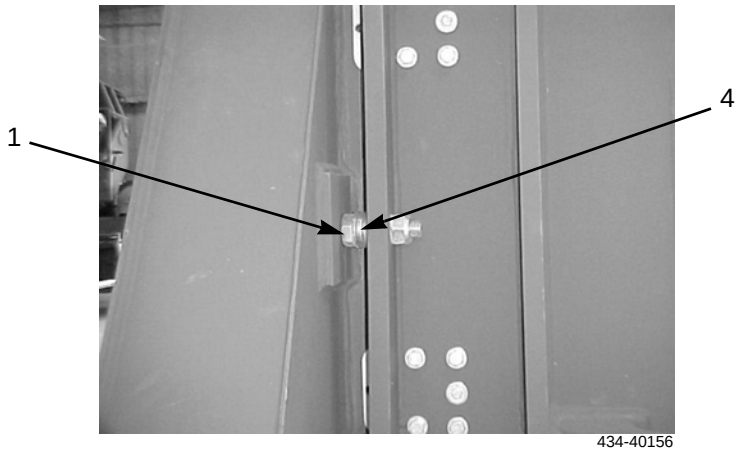
CAUTION

DO NOT remove washers on left side (spreader motor side) bolt stop. Removing washers from left-side stop bolt will cause damage to spreader motor when operated.

NOTE

Remove or add one washer at a time, then recheck measurement.

7. If measurement is not within limits, extend spreader section, add or remove washers (4) at 20-ft position bolt stop (1) on right side only.
8. Recheck chain tension and adjust if necessary (WP 0168 00).



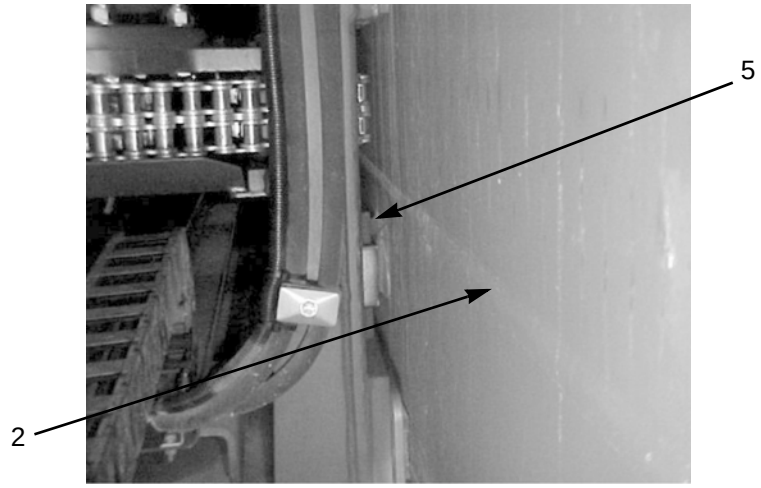
9. Use override switch to operate twistlocks to unlocked position. Red light on boom will be lit (TM 10-3930-675-10).

MEASUREMENT AND ADJUSTMENT - 40 FT

1. Check tophandler chain tension and adjust if necessary (WP 0168 00).
2. Operate tophandler spreader to 40-ft position (TM 10-3930-675-10).

MEASUREMENT AND ADJUSTMENT - 40 FT - CONTINUED

3. Ensure stop blocks (5) are bottomed out on both spreader sections (2).



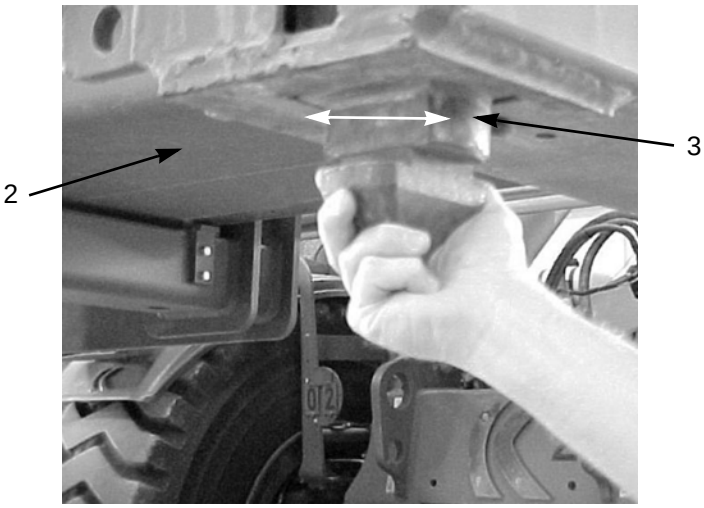
434-40159

4. Use override switch to operate twistlocks (3) to locked position (TM 10-3930-675-10).

NOTE

When twistlocks are in locked position, spreader function is deactivated.

5. Ensure twistlocks (3) are in middle position of cutout in bottom of spreader section (2).



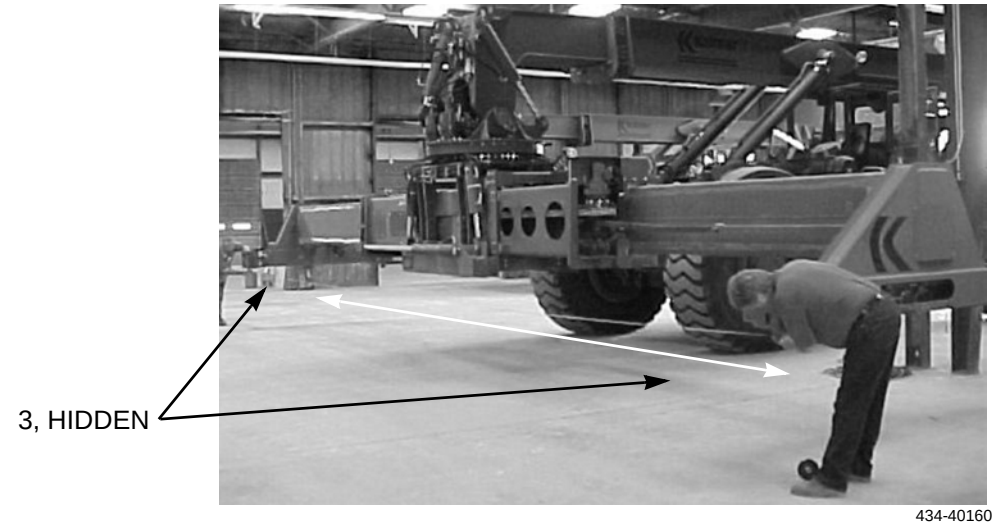
434-40157

6. Measure from inside flat edge of one twistlock (3) to other twistlock outer flat edge.

MEASUREMENT AND ADJUSTMENT - 40 FT - CONTINUED

NOTE

Measurement should be 471 7/8 in. ± 1/8 in. (11,985 mm ± 3 mm).

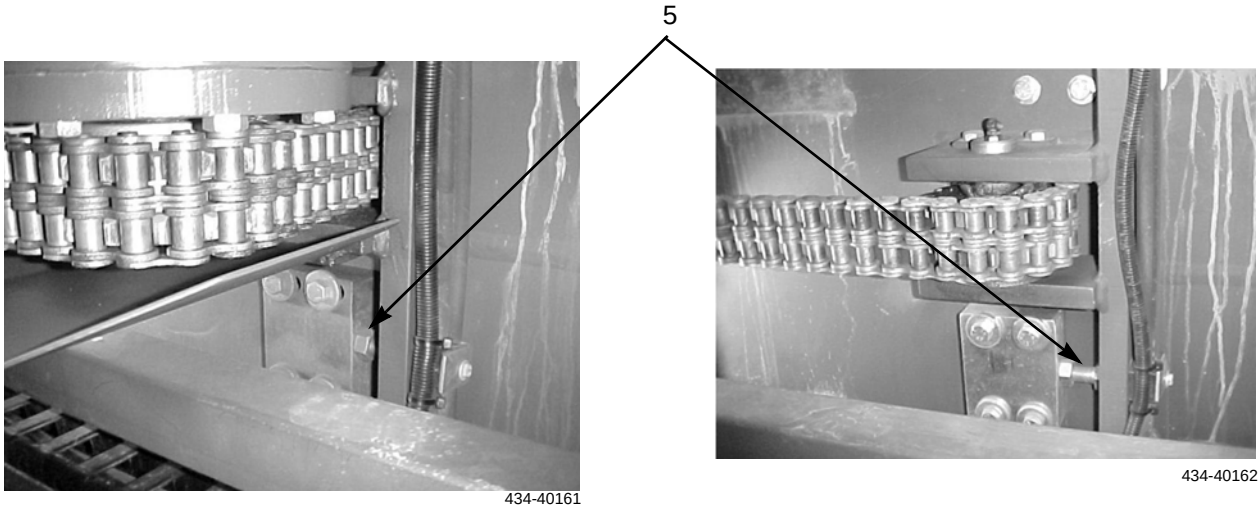


434-40160

7. If measurement is not within limits, adjust stop block (5) at each end of spreader section.
8. Recheck chain tension and adjust if necessary (WP 0168 00.

NOTE

DO NOT adjust more than one turn at a time on adjusting nuts before rechecking measurement and chain tension.



434-40161

434-40162

9. Use override switch to operate twistlocks to unlocked position. Red light on boom will be lit (TM 10-3930-675-10).
10. Operate tophandler spreader to 20-ft and 40-ft position (TM 10-3930-675-10).
11. Recheck 20-ft and 40-ft measurements.
12. Recheck chain tension (WP 0168 00).

END OF WORK PACKAGE

CAB TRANSPORT CONTROL VALVE REPLACEMENT 0170 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

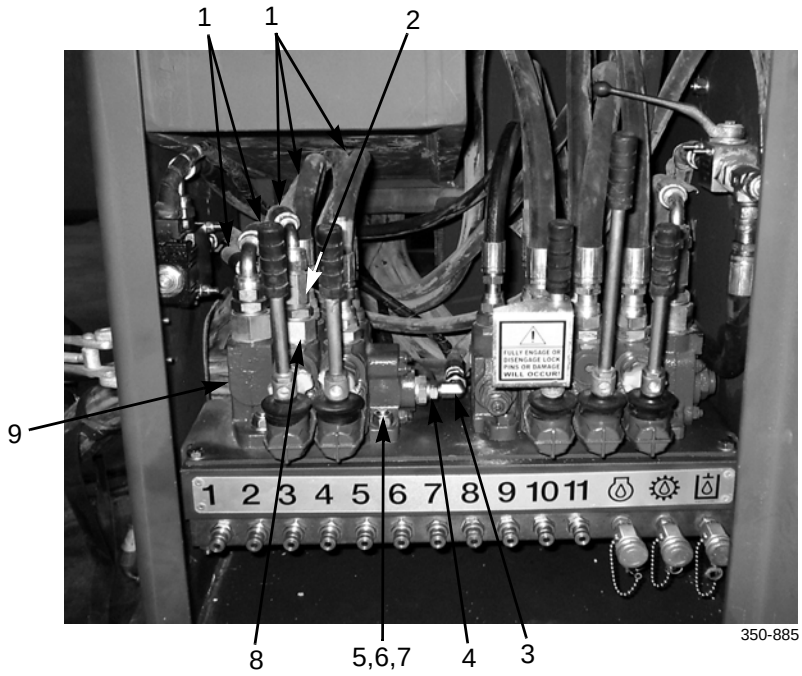
REMOVAL

1. Disconnect nine hoses (1) from fittings at control valve (9).
2. Remove four screws (5), nuts (6), washers (7), and control valve (9) from remote hydraulic control compartment.

NOTE

Perform step 3 to remove fittings from control valve, if a new control valve is being installed.

3. Remove elbow (3), tee (2), adapter fittings (4), and nipples (8) from control valve (9).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install nipples (8), adapter fittings (4), elbow (3), and tee (2) on control valve (9).
2. Install control valve (9) in remote hydraulic control compartment with four screws (5), nuts (6), and washers (7).
3. Connect nine hoses (1) to fittings at control valve (9).
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10), operate control valve levers, and check for leaks.
6. Install new tiedown straps as necessary to support hydraulic hoses.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

CONTROL VALVE SOLENOIDS REPLACEMENT 0171 00

THIS WORK PACKAGE COVERS

Type A Solenoid: Removal, Installation

Type B Solenoid: Removal, Installation

Type C Solenoid: Removal, Installation

Type D Solenoid: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Key Set, Socket Head Screw (Item 67, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Seal Kit (P/N 923828.0012)

Equipment Condition

Master battery switch in OFF position

NOTE

- **There are four basic types of solenoid located on control valves throughout the RTCH. Replacement of each type of solenoid is described in this work package.**
- **Tag connectors to ensure correct installation.**

TYPE A SOLENOID REMOVAL

NOTE

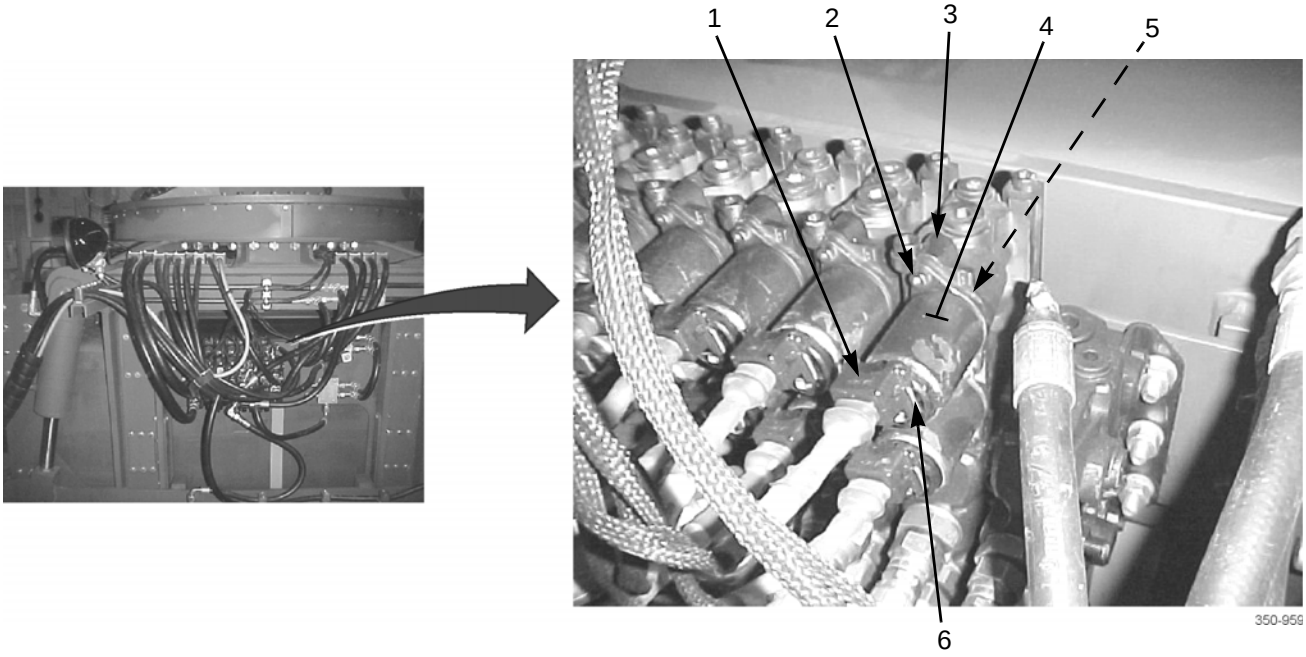
Perform this procedure for each of 12 solenoids to be removed.

1. Press in on retaining clip (6) on side of connector (1) and disconnect tophandler wiring harness connector from solenoid (4).

NOTE

- **There are twelve solenoid valves on the tophandler control valve assembly; each has an orifice underneath it. Ten have large orifices and two have small orifices. To aid in installation, note the position of the smaller orifices during removal.**
- **Carefully remove orifice from end of solenoid and retain for use on new solenoid during installation.**
- **If the orifice remains in the valve port during removal, leave it there and install the solenoid valve.**

2. Remove two screws (2) and solenoid (4) from control valve (3).
3. Remove O-ring (5) from solenoid (4). Discard O-ring.



TYPE A SOLENOID INSTALLATION

NOTE

Perform this procedure for each of 12 solenoids to be installed.

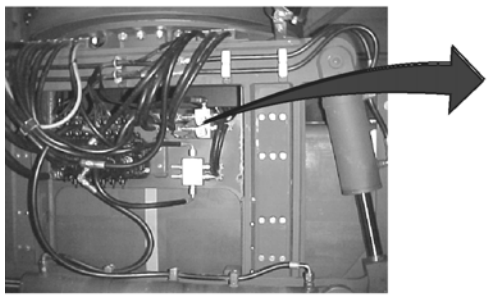
1. Install new O-ring (5) and original orifice from old solenoid onto solenoid (4).
2. Install solenoid (4) on control valve (3) with two screws (2).
3. Connect tophandler wiring harness connector (1) to solenoid (4).

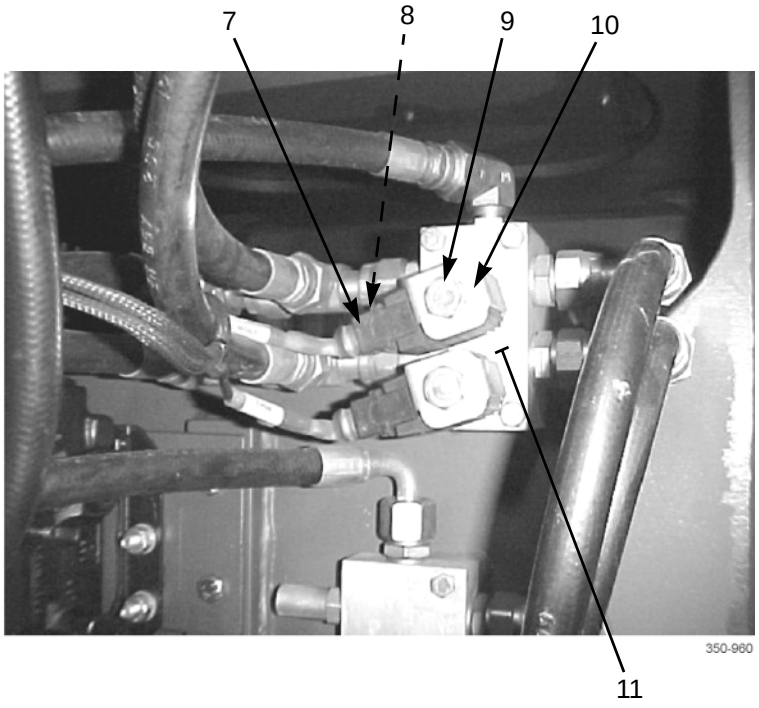
TYPE B SOLENOID REMOVAL

NOTE

Perform this procedure for each of two solenoids to be removed.

1. Press in on retaining clip (8) on side of connector (7) and disconnect tophandler wiring harness connector from side of solenoid (10).
2. Remove nut (9) and slide solenoid (10) out of control valve (11).





TYPE B SOLENOID INSTALLATION

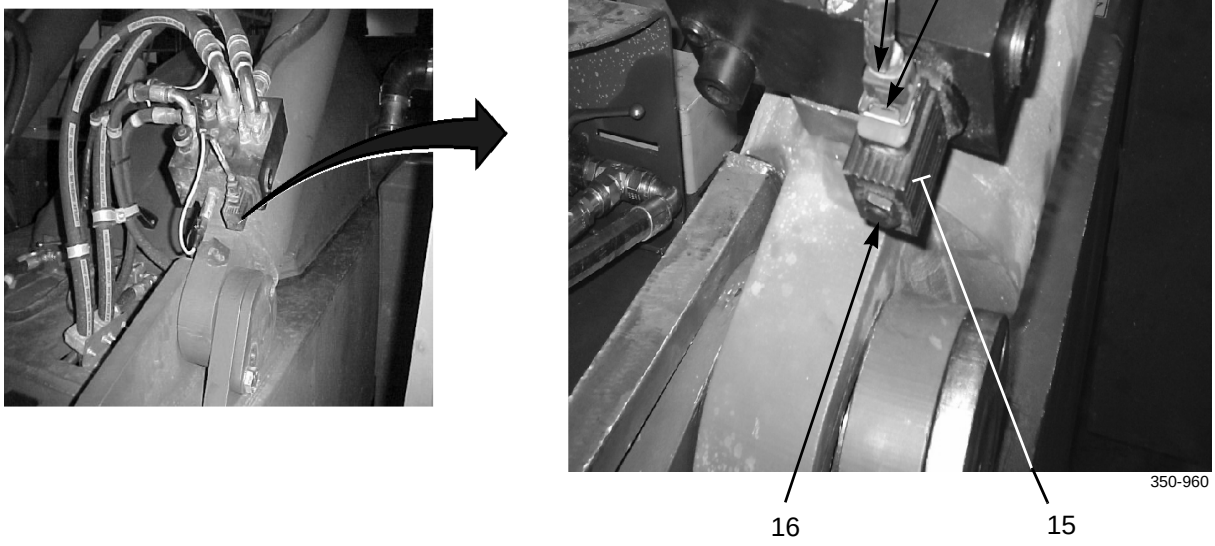
NOTE

Perform this procedure for each of two solenoids to be installed.

1. Slide solenoid (10) onto control valve (11) and install nut (9).
2. Connect tophandler wiring harness connector (7) to side of solenoid (10).

TYPE C SOLENOID REMOVAL

1. Press in on retaining clip (13) on side of connector (12) and disconnect vehicle wiring harness connector from side of solenoid (15).
2. Remove nut (16) and slide solenoid (15) out of control valve (14).



TYPE C SOLENOID INSTALLATION

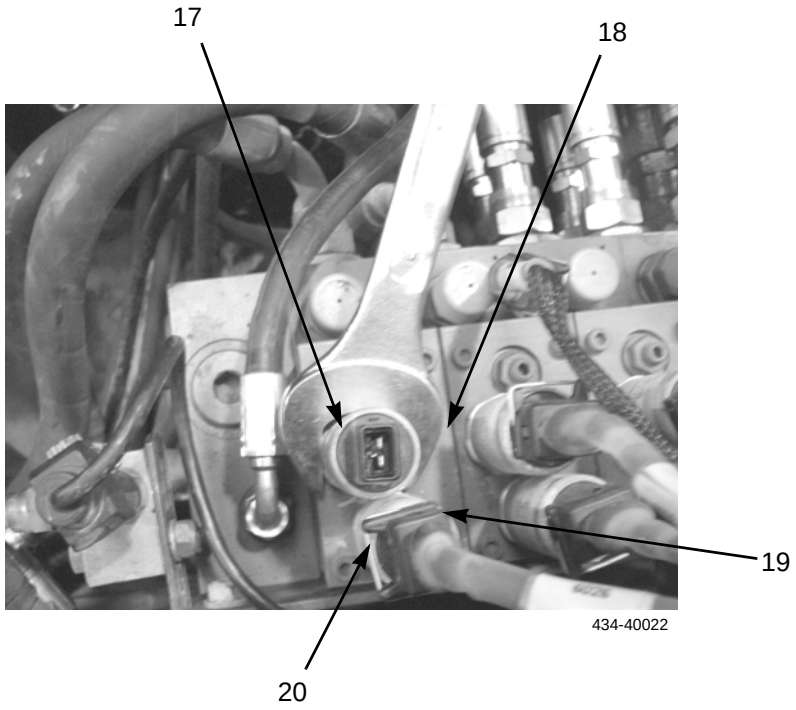
1. Slide solenoid (15) onto control valve (14) and install nut (16).
2. Connect vehicle wiring harness connector (12) to side of solenoid (15).

TYPE D SOLENOID REMOVAL

NOTE

To remove a back row solenoid the adjacent front row solenoid must first be removed.

1. Press in on retaining clip (20) on top of connector (19) and disconnect connector from solenoid (17).
2. Remove solenoid (17) from control valve (18).



TYPE D SOLENOID INSTALLATION

1. Install solenoid (17) on valve (18) and tighten.
2. Position connector (19) on solenoid (17) and press in on clip (20) to install connector.

END OF WORK PACKAGE

BOOM FOLDING CONTROL VALVE REPLACEMENT 0172 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

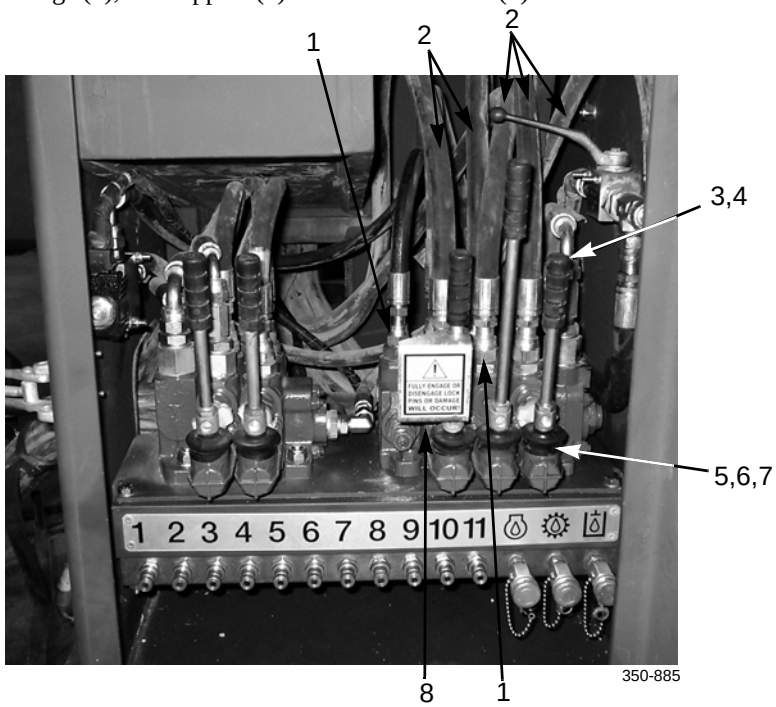
REMOVAL

1. Disconnect nine hoses (2) from fittings at control valve (8).
2. Remove four nuts (5), screws (6), washers (7), and control valve (8) from remote hydraulic control compartment.

NOTE

Perform step 3 to remove fittings from control valve, if a new control valve is being installed.

3. Remove tee (3), adapter fittings (1), and nipples (4) from control valve (8).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install nipples (4), adapter fittings (1), and tee (3) on control valve (8).
2. Install control valve (8) in remote hydraulic control compartment with four washers (7), screws (6), and nuts (5).
3. Connect nine hoses (2) to fittings at control valve (8).
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10), operate control valve levers, and check for leaks.
6. Install new tiedown straps as necessary to support hydraulic hoses.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

CAB LIFTING CYLINDER REPLACEMENT 0173 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

O-ring (2)

Pin, Cotter (P/N 3293) (2)

Personnel Required

Two

References

WP 0050 00

WP 0164 00

WP 0181 00

WP 0185 00

WP 0284 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

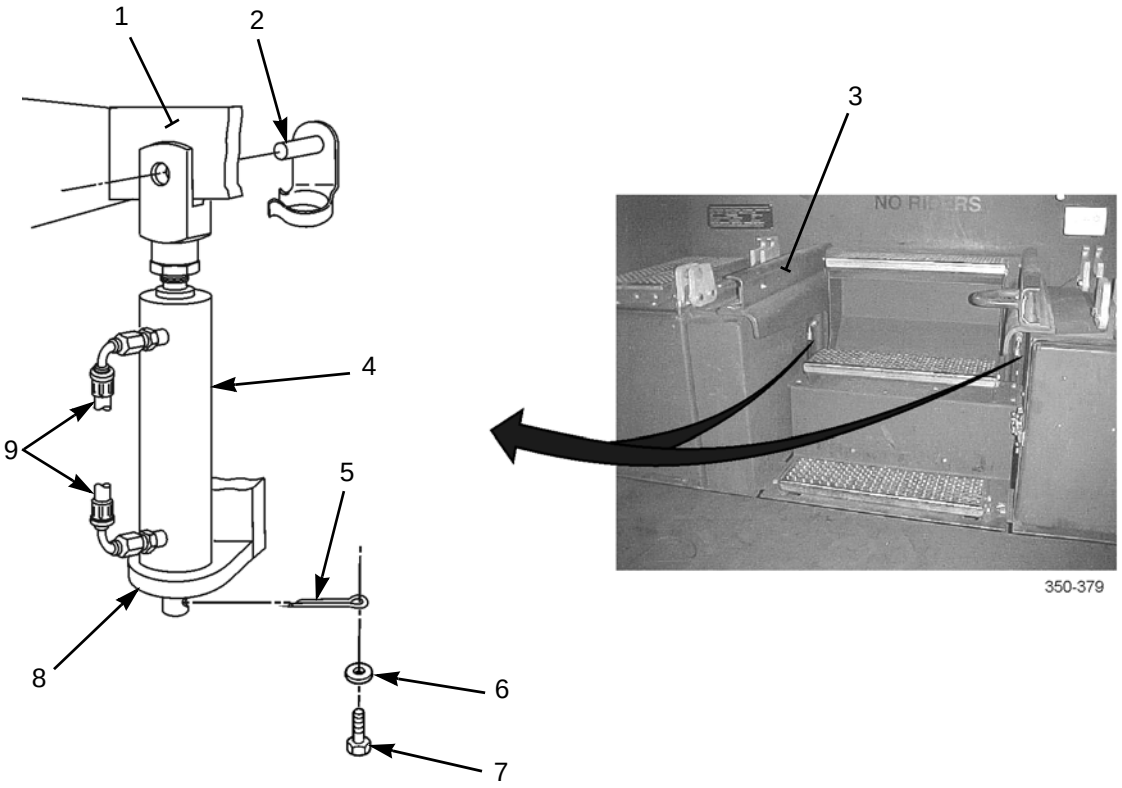
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Each cab lifting cylinder is replaced in the same manner.**
- **Tag all hydraulic lines.**
- **Remove ladder from area of step, as necessary.**

REMOVAL

1. Raise cab lifting cylinders to fully raised position (TM 10-3930-675-10).
2. Place wood cribbing under cab transport lift (3) to hold cab transport lift in raised position.
3. Relieve hydraulic system pressure (WP 0164 00).
4. Close hydraulic reservoir ball valve (WP 0181 00).
5. Disconnect two hydraulic hoses (9) from cylinder (4). Cap/plug both hydraulic hoses. Remove and discard O-rings.
6. Remove pin (2) from top of cylinder (4).
7. Remove screw (7), washer (6), and cotter pin (5) from bottom of cylinder (4). Discard cotter pin.
8. Lift cab transport lift (3) to remove cylinder (4) from mounting brackets (1 and 8).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lift cab transport lift (3) and align cylinder (4) to mounting brackets (1 and 8).
2. Install new cotter pin (5), washer (6), and screw (7) on bottom of cylinder (4).
3. Apply a thin coat of grease to pin (2). Install pin in top of cylinder (4).

INSTALLATION - CONTINUED

NOTE

Ensure new O-rings are lubricated with lubricating oil before installation.

4. Remove cap/plug from two hydraulic hoses (9), install two new O-rings, and connect hoses to cylinder (4).
5. Start engine (TM 10-3930-675-10).
6. Remove wood cribbing from cab transport lift (3).
7. Open hydraulic reservoir ball valve (WP 0181 00).
8. Check for leaks and proper operation of cab lifting cylinder (TM 10-3930-675-10). Shut down engine.
9. Check oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

CAB SLIDING CYLINDER REPLACEMENT 0174 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Hydraulic reservoir ball valve closed (WP 0181 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

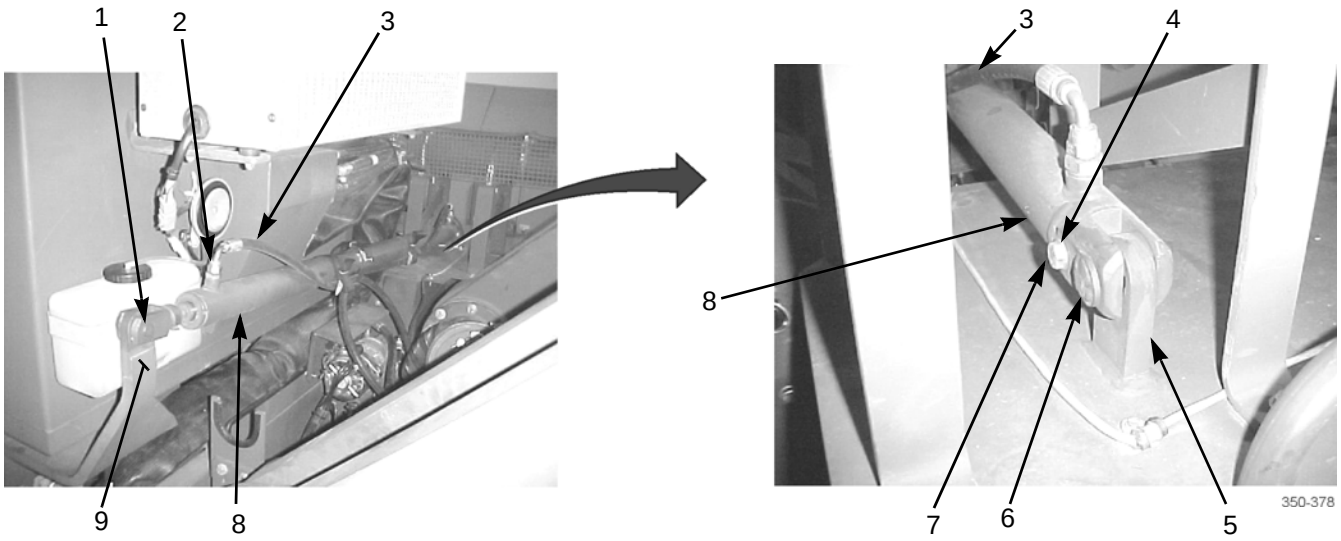
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Disconnect two hydraulic hoses (3) from cylinder (8). Cap or plug all openings.
2. At end of cylinder (8), remove pin (1).
3. At opposite end of cylinder (8), remove screw (7), washer (4), and shaft (6).
4. Remove cylinder (8) from mounting brackets (5 and 9).
5. Remove two fittings (2) from cylinder (8).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Install two fittings (2) on cylinder (8).
2. Align end of cylinder (8) to mounting bracket (5) so shaft (6) can be installed.
3. Apply a thin coat of grease to shaft (6) and install cylinder (8) with shaft.
4. Install washer (4) and screw (7).
5. Apply a thin coat of grease to pin (1).
6. At opposite end of cylinder (8), align cylinder to mounting bracket (9) and install pin (1).
7. Remove caps/plugs and connect two hydraulic hoses (3) to cylinder (8).
8. Open hydraulic reservoir ball valve (WP 0181 00).
9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10).
11. Check for leaks and proper operation of cab sliding cylinder (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER TWISTLOCK CYLINDER REPLACEMENT 0175 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0050 00

WP 0075 00

WP 0185 00

WP 0284 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

Tophandler tilted, to assist in capturing hydraulic fluid through spreader beam drain opening

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

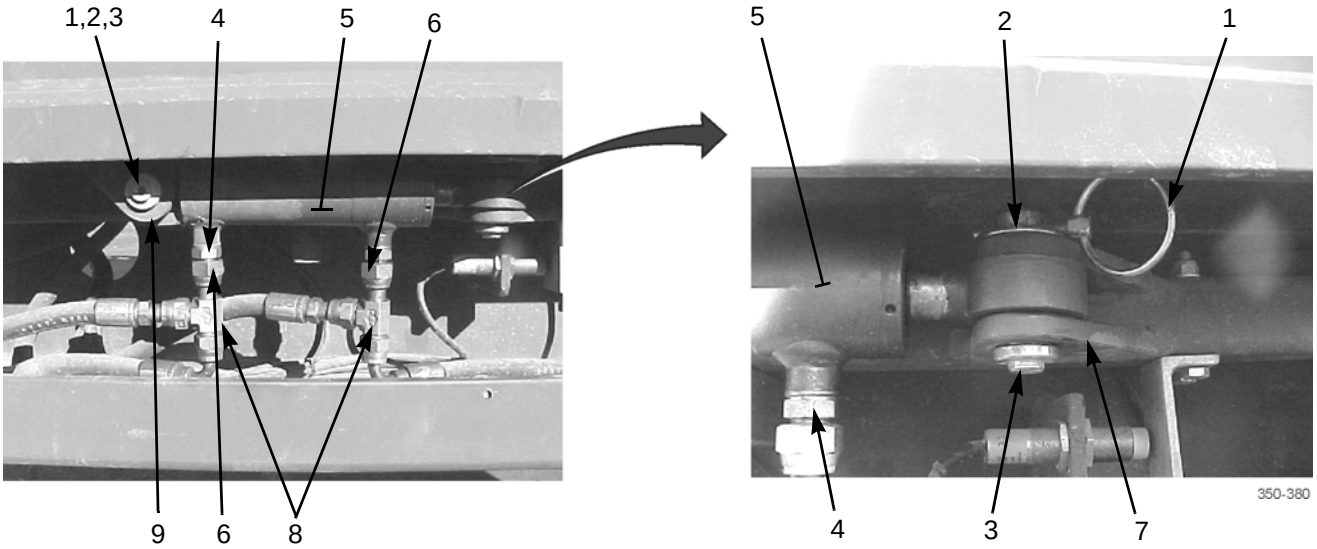
- **Tophandler twistlock cylinders are replaced in the same manner.**
- **Note direction of cylinder during removal to aid in installation.**
- **Tag all hydraulic lines.**

REMOVAL

NOTE

A container may be placed under drain opening on underside of spreader beam, inbound from twistlock, to catch draining hydraulic fluid.

1. Loosen fitting nuts (6) and disconnect two tees (8) from fittings (4). Cap/plug hydraulic openings.
2. At each end of cylinder (5), remove retaining pin (1), spacer (2), and shaft (3).
3. Remove cylinder (5) from mounting bracket (9) and link (7).
4. Remove two fittings (4) from cylinder (5).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Install two fittings (4) on cylinder (5).
2. Align cylinder (5) to mounting bracket (9) and link (7).
3. At each end of cylinder (5), install shaft (3), spacer (2), and retaining pin (1).
4. Remove cap/plug from hydraulic openings and connect two tees (8) to fittings (4). Tighten two fitting nuts (6).
5. Adjust proximity switches (WP 0075 00).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10), operate twistlock cylinders, and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC SYSTEM COOLING HOSES AND FITTINGS REPLACEMENT 0176 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

Washer, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Brake hydraulic system pressure relieved (WP 0164 00)

Radiator assembly top grating and bottom splash shield removed, if replacing hydraulic cooling fan hoses and fittings (WP 0143 00 and WP 0144 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **This work package covers replacement of hydraulic hoses and fittings that support the following hydraulic system components:**
  - **engine-driven hydraulic pump**
  - **cooling fan**
  - **front and rear service brake cooling lines**
- **Tag all hydraulic lines.**

REMOVAL

1. Using appropriate illustration (refer to foldouts, FO-4 and FO-5) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown straps.
3. Discard O-ring(s) removed.

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.
6. If removed, install radiator assembly top grating and bottom splash shield (WP 0143 00 and WP 0144 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

CAB PARKING AND SERVICE BRAKE HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0177 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake OFF (TM 10-3930-675-10)

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-6 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Remove caps/plugs and install and tighten hose(s) or fitting(s).
2. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
3. Check oil level in hydraulic reservoir (WP 0050 00).
4. Start engine (TM 10-3930-675-10), operate brake system, and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

MAIN HYDRAULIC SYSTEM HOSES AND FITTINGS REPLACEMENT 0178 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

- **Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.**
- **If replacing hydraulic line coming from bottom of reservoir, close ball valve at reservoir so reservoir need not be drained. After installation of hydraulic line, be sure to open ball valve to restore hydraulic fluid flow. Failure to do so will damage equipment.**

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-7 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
3. Remove and discard O-ring(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Open any ball valve at hydraulic reservoir that was closed.
5. Check oil level in hydraulic reservoir (WP 0050 00).
6. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC SERVO SYSTEM HOSES AND FITTINGS REPLACEMENT 0179 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-8 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
3. Remove and discard O-ring(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC SYSTEM TEST POINT HOSES AND FITTINGS REPLACEMENT 0180 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-9 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Remove caps/plugs and install and tighten hose(s) or fitting(s).
2. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
3. Check oil level in hydraulic reservoir (WP 0050 00).
4. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

CAB TRANSPORT HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0181 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheel chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

- **Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.**
- **If replacing hydraulic line coming from bottom of reservoir, close ball valve at reservoir so reservoir need not be drained. After installation of hydraulic line, be sure to open ball valve to restore hydraulic fluid flow. Failure to do so will damage equipment.**

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-10 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).
3. Remove and discard O-ring(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Open any ball valve at hydraulic reservoir that was closed.
5. Check oil level in hydraulic reservoir (WP 0050 00).
6. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM HYDRAULIC SYSTEM HOSES AND FITTINGS REPLACEMENT 0182 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Boom hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using applicable boom hydraulic subsystem illustration (refer to foldouts, FO-11 thru FO-14 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown straps.
3. Remove and discard O-ring(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Lubricate and install new O-ring(s).
2. Remove caps/plugs and install and tighten hose(s) or fitting(s).
3. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
4. Check oil level in hydraulic reservoir (WP 0050 00).
5. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER HYDRAULIC SYSTEM HOSES AND FITTINGS REPLACEMENT 0183 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (as required)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using applicable tophandler hydraulic subsystem illustration (refer to foldouts, FO-15 thru FO-18 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Remove caps/plugs and install and tighten hose(s) or fitting(s).
2. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
3. Check oil level in hydraulic reservoir (WP 0050 00).
4. Start engine (TM 10-3930-675-10), operate tophandler, and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

FORKLIFT KIT HYDRAULIC HOSES AND FITTINGS REPLACEMENT 0184 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Forklift removed from vehicle



WARNING



- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

- **Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.**

NOTE

Tag all hydraulic lines.

REMOVAL

1. Using illustration (refer to foldout, FO-19 at the end of this manual) as a guide, remove damaged hose(s) or fitting(s). Cap or plug openings.

NOTE

Note position of tiedown straps and clamps to aid in installation.

2. Remove tiedown strap(s) and clamp(s) (if applicable). Discard tiedown strap(s).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Remove caps/plugs and install and tighten hose(s) or fitting(s).
2. Install clamp(s) and new tiedown strap(s) (if applicable) in same position as noted during removal.
3. Check oil level in hydraulic reservoir (WP 0050 00).
4. Start engine (TM 10-3930-675-10) and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC SYSTEM OIL FILTERS REPLACEMENT 0185 00

THIS WORK PACKAGE COVERS

Hydraulic Reservoir Return Oil Filter: Removal, Installation

Hydraulic Reservoir Breather Filter: Removal, Installation

Hydraulic System In-Line Filters and Filter Head: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Strap, Oil Filter (Item 138, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Compound, Sealing, Pipe (Item 14, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Filter, breather (P/N 920130.009) (2)

Materials/Parts - Continued

Filter Return, Insert (P/N 923110.0668) (2)

Filter, Insert (P/N 921689.0009)

Filter, Insert (P/N 923071.0002) (2)

Filter, Insert (P/N 923071.0001)

References

TM 10-3930-675-10

WP 0050 00

WP 0103 00

Equipment Condition

Wheels chocked

Steering and brake hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before removing hydraulic system oil filters. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe filter and surrounding area clean prior to removal. After filter removal, immediately install replacement filter or cover area with a clean rag. Contaminated hydraulic system could cause equipment failure.

HYDRAULIC RESERVOIR RETURN OIL FILTER REMOVAL

NOTE

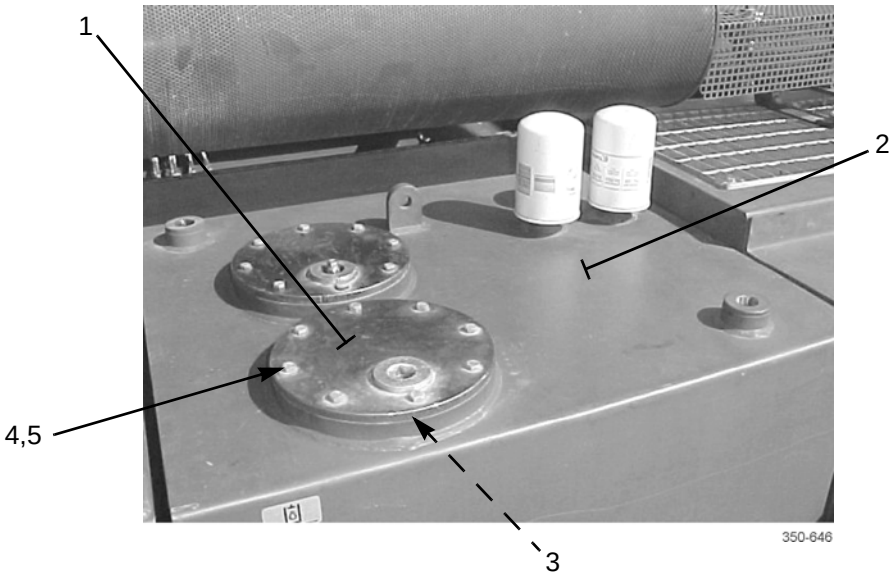
Hydraulic reservoir has two return oil filters. Each is removed the same way.

1. Clean area at top of hydraulic reservoir (2).

WARNING

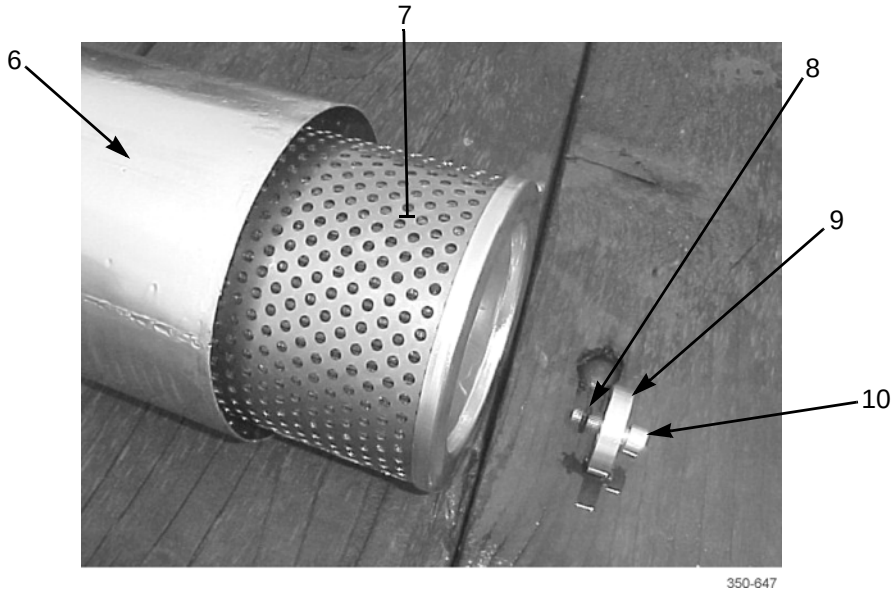
Plate is under spring tension. Take care when removing final screws. Failure to follow this warning may result in injury to personnel.

2. Remove eight screws (4), washers (5), and plate (1) from top of hydraulic reservoir (2).
3. If damaged, remove O-ring (3) from hydraulic reservoir (2). Discard O-ring.



4. Lift oil filter housing (6) out of hydraulic reservoir (2).
5. From bottom of oil filter housing (6), remove screw (10), washer (9), and O-ring (8).
6. Remove oil filter insert (7) from oil filter housing (6). Discard oil filter insert.

HYDRAULIC RESERVOIR RETURN OIL FILTER REMOVAL - CONTINUED



HYDRAULIC RESERVOIR RETURN OIL FILTER INSTALLATION

1. Clean oil filter housing (6).
2. Place new oil filter insert (7) into oil filter housing (6).
3. Install O-ring (8), washer (9), and screw (10).
4. Position oil filter housing (6) in hydraulic reservoir (2).
5. If removed, install new O-ring (3) on hydraulic reservoir (2).

NOTE

Two of eight washers and screws may first be placed on opposite sides of plate, and tightened evenly, to fit plate to hydraulic reservoir.

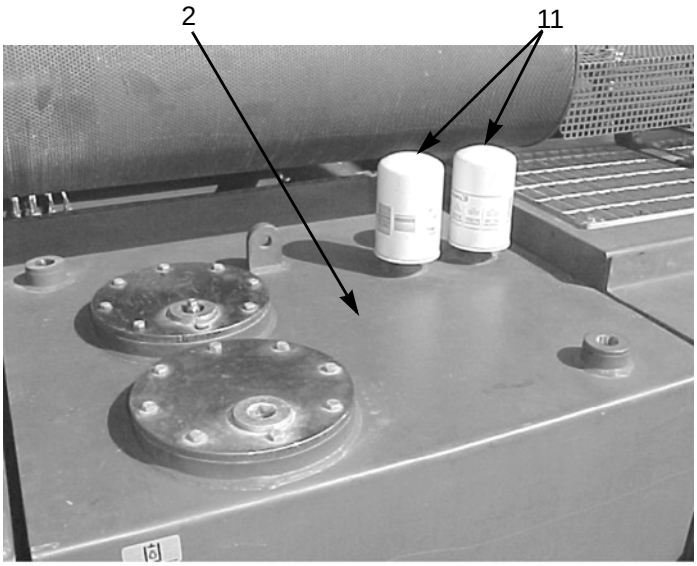
6. Install plate (1) on hydraulic reservoir (2) with eight washers (5) and screws (4). Tighten screws to 27 lb-ft (37 Nm).
7. Operate vehicle (TM 10-3930-675-10) and check for leaks.

HYDRAULIC RESERVOIR BREATHER FILTER REMOVAL

NOTE

Hydraulic reservoir has two breather filters. Each breather filter is removed the same way.

Using strap wrench, remove breather filter (11) from hydraulic reservoir (2). Discard breather filter.



HYDRAULIC RESERVOIR BREATHER FILTER INSTALLATION

NOTE

Breather filter comes with a gasket that is not required for this application. Discard gasket.

1. Apply a thin coat of pipe sealing compound to threads at top of hydraulic reservoir (2).
2. Install new breather filter (11) on hydraulic reservoir (2).

HYDRAULIC SYSTEM IN-LINE FILTERS AND FILTER HEAD REMOVAL

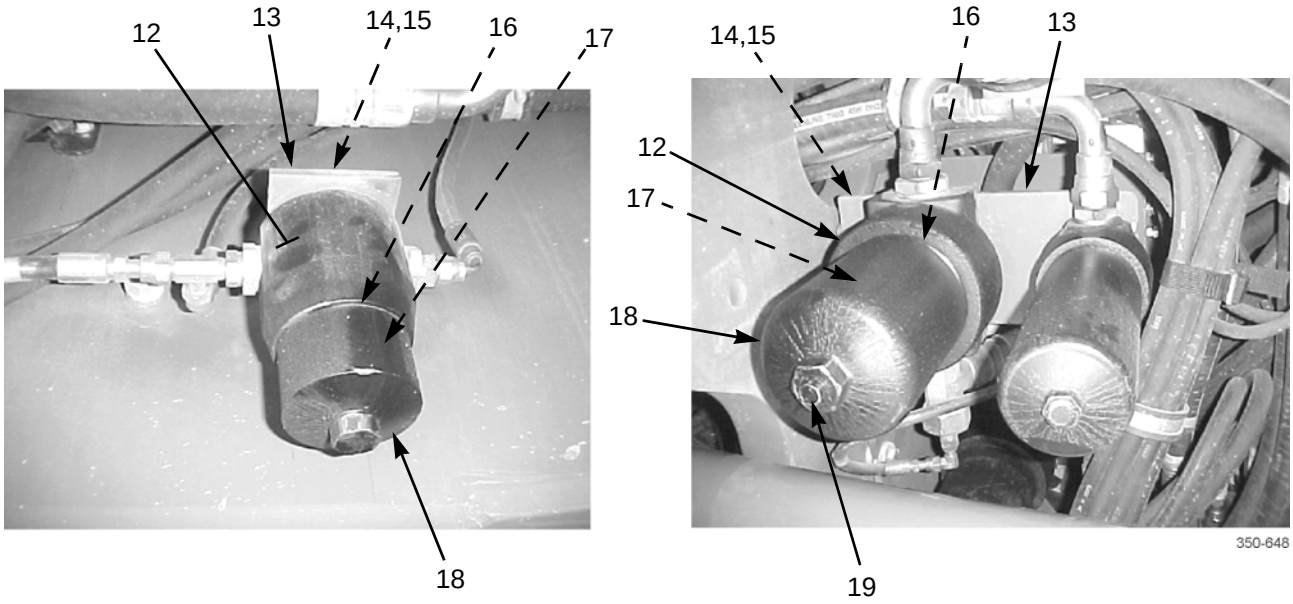
1. Close appropriate ball valve at hydraulic reservoir.
2. If hydraulic filter has a drain plug (19) at bottom of filter bowl (18), remove drain plug and drain hydraulic fluid into a suitable container. Reinstall drain plug.
3. Remove filter bowl (18) from filter head (12) by rotating filter bowl counterclockwise.
4. Remove filter element (17) from filter bowl (18). Discard filter element.
5. Remove O-ring (16) between filter head (12) and filter bowl (18). Discard O-ring.

NOTE

Tag hydraulic lines for installation.

6. Disconnect hydraulic hoses and fittings from filter head (12).
7. Remove sensor from filter head (WP 0103 00).
8. Remove two screws (14), washers (15), and filter head (12) from bracket (13).

HYDRAULIC SYSTEM IN-LINE FILTERS AND FILTER HEAD REMOVAL - CONTINUED



HYDRAULIC SYSTEM IN-LINE FILTERS AND FILTER HEAD INSTALLATION

1. Install sensor on filter head (WP 0103 00).
2. Install filter head (12) on bracket (13) with two washers (15) and screws (14).
3. Connect fittings and hydraulic hoses to filter head (12).

NOTE

New O-ring comes packed with new filter element.

4. Lubricate new O-ring (16) with lubricating oil.
5. Clean filter bowl (18).
6. Insert new filter element (17) in filter bowl (18).
7. Place O-ring (16) between filter head (12) and filter bowl (18) and install filter bowl on filter head by rotating bowl clockwise.
8. Open any ball valve at hydraulic reservoir that was closed.
9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10) and check for leaks.

END OF WORK PACKAGE

DRAINING AND FILLING HYDRAULIC RESERVOIR 0186 00

THIS WORK PACKAGE COVERS

Draining, Filling

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Tool, Hydraulic Reservoir (TM 10-3930-675-10, *Basic Issue Items*)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Oil, Lubricating, OEA, Arctic (Item 28, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

References

WP 0050 00

WP 0128 00

WP 0185 00

Equipment Condition

Boom fully lowered and retracted (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before draining reservoir. Failure to so do could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe drain plug and filters and surrounding areas clean prior to removal. After draining, immediately reinstall drain plug and cover openings into reservoir with a clean rag. Contaminated hydraulic system could cause equipment failure.

DRAINING

NOTE

Hydraulic reservoir capacity is 180 gal. (680 L).

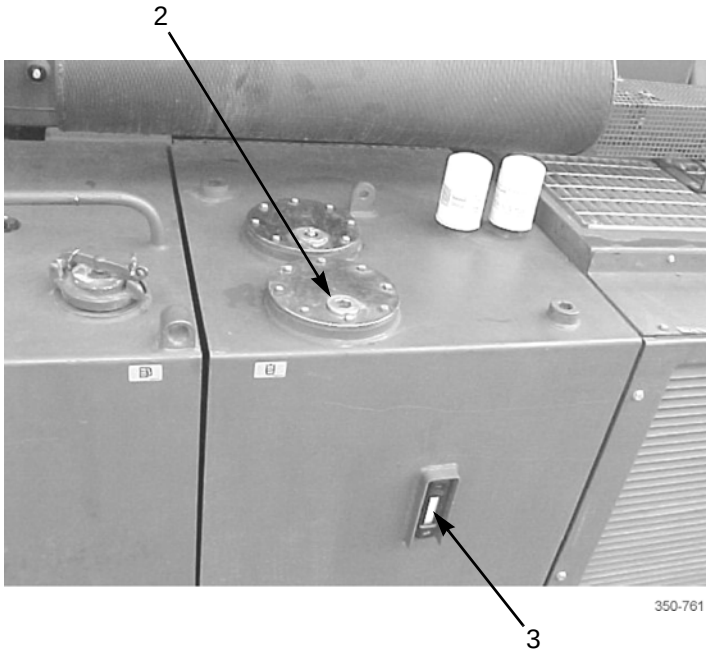
1. Place a suitable container under drain plug (1).
2. Remove drain plug (1) and drain hydraulic fluid into container. Dispose of oil in accordance with standard operating procedures (SOP).
3. Reinstall drain plug (1).



FILLING

1. Fill hydraulic reservoir by removing plug (2) in top of reservoir. Refer to WP 0051 00 for correct lubricating oil to be used per expected temperature ranges.
2. Replace all hydraulic system filters (WP 0128 00 and WP 0185 00).
3. Start engine (TM 10-3930-675-10) and bring up to operating temperature.
4. Operate joystick and cycle steering and brake system to circulate hydraulic fluid throughout system (TM 10-3930-675-10). Check for leaks.
5. Shut down engine. Wait 3 to 4 minutes after engine shutdown, then check oil level in hydraulic reservoir. Level should be visible in sight gage (3).
6. As required, add hydraulic fluid through plug (2) opening on top of hydraulic reservoir.

FILLING - CONTINUED



END OF WORK PACKAGE

HYDRAULIC RESERVOIR SIGHT GAGE REPLACEMENT 0187 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

O-ring (2)

Rubber Seal (2)

Equipment Condition

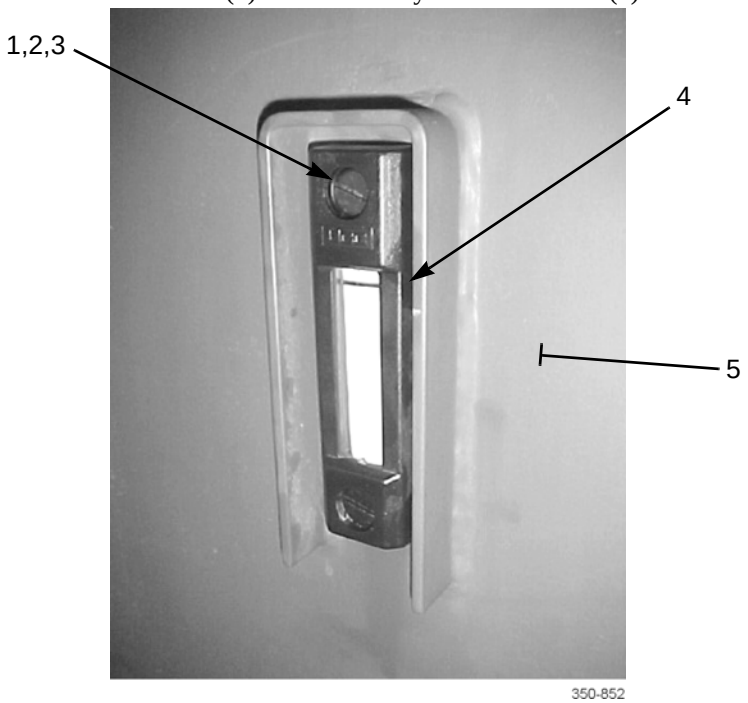
Boom elevated to maximum height (TM 10-3930-675-10)

NOTE

New sight gage comes with new O-rings and new rubber seals.

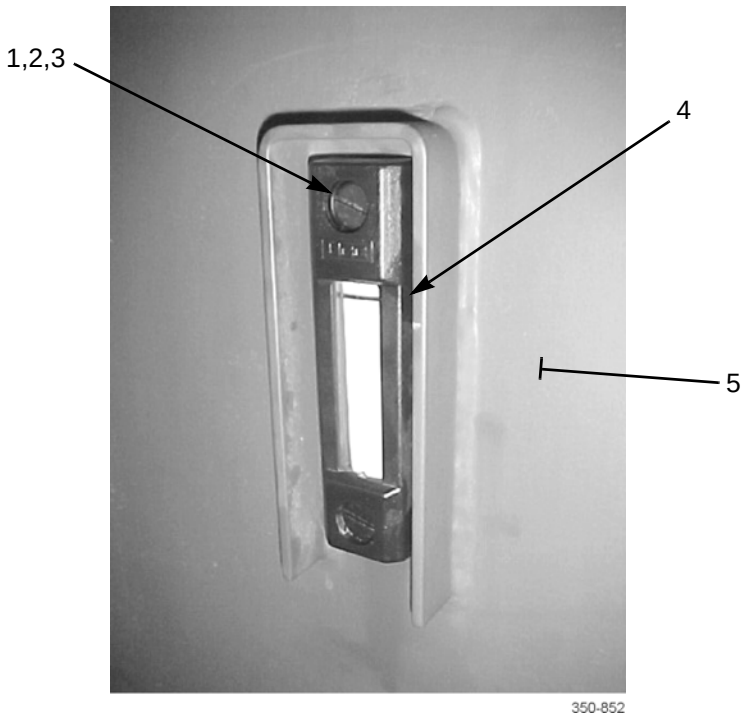
REMOVAL

1. Remove two fluid passage bolts (1) and O-rings (2) from hydraulic reservoir sight gage (4).
2. Remove sight gage (4) and two rubber seals (3) from side of hydraulic reservoir (5).



INSTALLATION

1. Position two new rubber seals (3) and sight gage (4) on side of hydraulic reservoir (5).
2. Install two new O-rings (2) and fluid passage bolts (1) on sight gage (4).



3. Fully lower boom and check for leaks (TM 10-3930-675-10).

END OF WORK PACKAGE

HYDRAULIC SYSTEM TEST POINT PROCEDURES 0188 00

THIS WORK PACKAGE COVERS

General

Test Point No. 1: Brake Accumulator No. 1

Test Point No. 2: Brake Accumulator No. 2

Test Point No. 3: Steering System Main Valve

Test Point No. 4: Brake Circuit No. 2

Test Point No. 5: Brake Circuit No. 1

Test Point No. 6: Steering Pump No. 1

Test Point No. 7: Steering Pump No. 2

Test Point No. 8: Boom Lift and Extend Main Valve

Test Point No. 9: Servo System

Test Point No. 10: Cab Lift Main Valve

Test Point No. 11: Tophandler and Boom Folding Systems

Test Point No. 12: Engine Driven Pump/Fan Hydraulic System

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Adapter, Quick Disconnect (Item 1, WP 0289 00)

Gage, Pressure, Multiple Dial Indicating (Item 44, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

Two

References

WP 0148 00

Equipment Condition

Parking brake applied (TM 10-3930-675-10)

Engine shut down (TM 10-3930-675-10)

Wheels chocked



WARNING





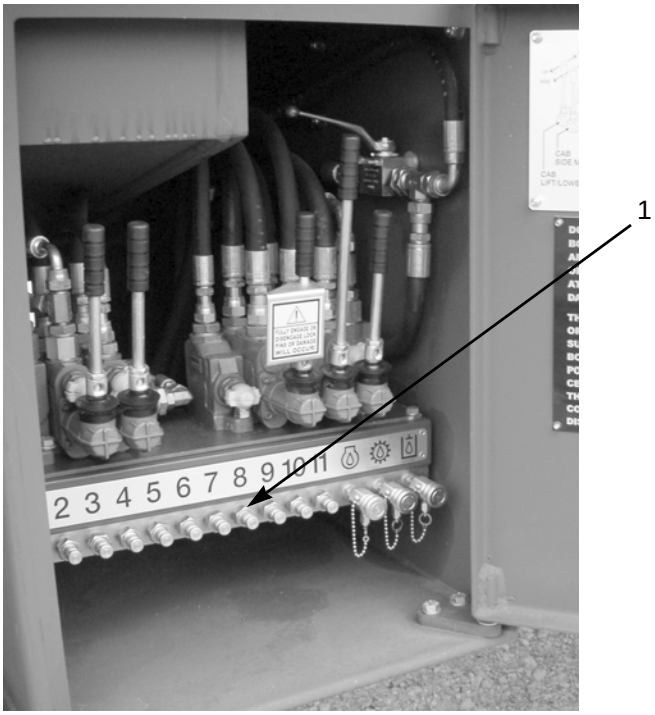
- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

GENERAL

This work package describes how to use each of 11 test points (1) located inside the remote hydraulic control compartment and the one test point on the engine driven pump to check hydraulic pressure in various systems/circuits on the vehicle.



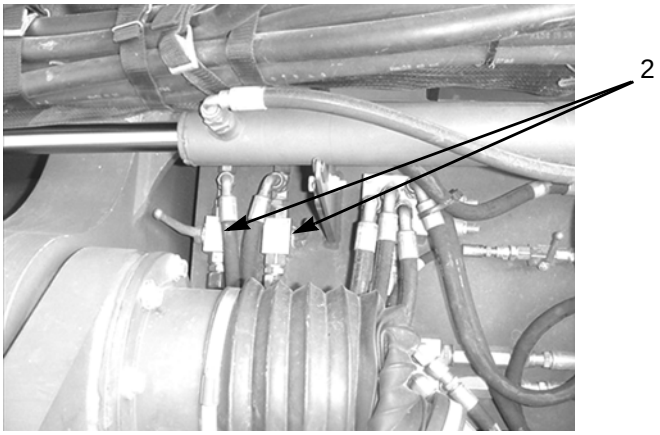
434-40081

TEST POINT NO. 1: BRAKE ACCUMULATOR NO. 1

NOTE

Test point no. 1 provides a means to check brake charging valve opening pressure and accumulator pre-charge nitrogen pressure within brake circuit no. 1.

1. Open both brake system drain valves (2) slowly until pressure is completely drained.
2. Connect hydraulic test gage to test point no. 1.



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3. Close both valves (2).
4. Start engine. Pressure will jump to pre-charged nitrogen pressure in accumulators; 1,230 to 1,300 psi (85 to 90 bar). Pressure will then build to 2,540 to 2,610 psi (175 to 180 bar).
5. Pump brake pedal. Pressure will slowly drop to 2,000 psi (140 bar) and back to 2,540 to 2,610 (175 to 180 bar) when pumping is stopped.
6. Shut engine off. Open both brake system valves slowly and note point at which pressure drops off completely. Drop-off point is pre-charged nitrogen pressure in accumulators; 1,230 to 1,300 psi (85 to 90 bar).
7. Disconnect hydraulic test gage from test point no. 1. Close both valves (2).

TEST POINT NO. 2: BRAKE ACCUMULATOR NO. 2

NOTE

Test point no. 2 provides a means to check brake charging valve opening pressure and accumulator pre-charge nitrogen pressure within brake circuit no. 2.

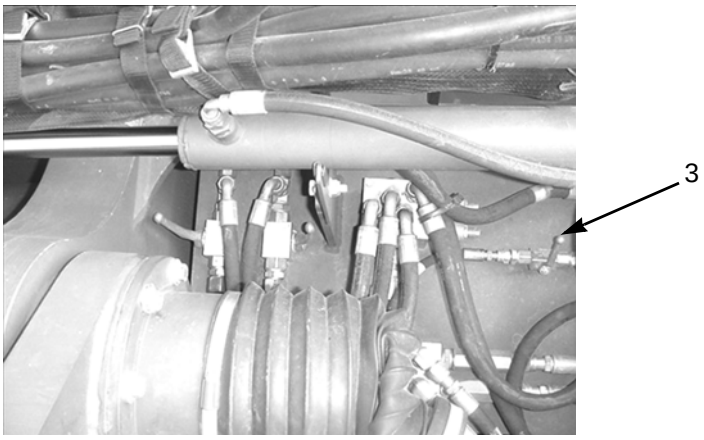
1. Open both brake system drain valves (2) slowly until pressure is completely drained.
2. Connect hydraulic test gage with adapter to test point no. 2.
3. Close both valves (2).
4. Start engine. Pressure will jump to pre-charged nitrogen pressure in accumulators; 1,230 to 1,300 psi (85 to90 bar). Pressure will then build to 2,540 to 2,610 psi (175 to 180 bar).
5. Pump brake pedal. Pressure will slowly drop to 2,000 psi (140 bar) and back to 2,540 to 2,610 (175 to 180 bar) when pumping is stopped.
6. Shut engine off. Open both brake system valves slowly and note point at which pressure drops off completely. Drop-off point is pre-charged nitrogen pressure in accumulators; 1,230 to 1,300 psi (85 to 90 bar).
7. Disconnect hydraulic test gage from test point no. 2. Close both valves (2).

TEST POINT NO. 3: STEERING SYSTEM MAIN VALVE

NOTE

Test point no. 3 provides a means to check the steering system main valve operating pressure.

1. Open steering accumulator drain valve (3) slowly until pressure is drained completely. Close valve.



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2. Connect hydraulic test gage with adapter to test point no. 3.
3. Start engine. Pressure will be 260 psi (18 bar). After 5 seconds, pressure will jump to 3,045 psi (210 bar).
4. Shut engine off. Open steering accumulator drain valve (3) slowly until pressure is drained completely. Close valve.
5. Disconnect hydraulic test gage from test point no. 3.

TEST POINT NO. 4: BRAKE CIRCUIT NO. 2

NOTE

Test point no. 4 provides a means to check brake circuit no. 2 operating pressures.

1. Chock vehicle wheels.
2. Release parking brake.
3. Connect hydraulic test gage to test point no. 4.
4. Start engine. Apply parking brake. Pressure will jump to 1,100 psi (75 bar).
5. Press brake pedal. Pressure will jump to 1,450 psi (100 bar).
6. Release brake pedal. Release parking brake.
7. Disconnect hydraulic test gage from test point no. 4.
8. Apply parking brake.

TEST POINT NO. 5: BRAKE CIRCUIT NO. 1

NOTE

Test point no. 5 provides a means to check brake circuit no. 1 operating pressures.

1. Connect hydraulic test gage to test point no. 5.
2. Start engine. Press brake pedal. Pressure will jump to 1,450 psi (100 bar).
3. Shut engine off. Release brake pedal. Disconnect hydraulic test gage from test point no. 5.

TEST POINT NO. 6: STEERING PUMP NO. 1

NOTE

Test point no. 6 provides a means to check steering pump no. 1 operating pressures.

1. Connect hydraulic test gage to test point no. 6.
2. Start engine. Pressure will be 260 psi (18 bar). After 5 seconds, pressure will jump to 3,045 psi (210 bar).
3. Shut engine off. Disconnect hydraulic test gage from test point no. 6.

TEST POINT NO. 7: STEERING PUMP NO. 2

NOTE

Test point no. 7 provides a means to check steering pump no. 2 operating pressures.

1. Connect hydraulic test gage to test point no. 7.
2. Start engine. Pressure will be 260 psi (18 bar). After 5 seconds pressure will jump to 3,045 psi (210 bar).
3. Shut down engine. Disconnect hydraulic test gage from test point no. 7.

TEST POINT NO. 8: BOOM LIFT/EXTEND MAIN VALVE

NOTE

Test point no. 8 provides a means to check boom lift and extend main valve operating pressure.

1. Connect hydraulic test gage to test point no. 8.
2. Start engine. Press throttle and hold at 1,500 RPM.
3. Fully retract boom and hold. Pressure will build to 3,480 psi (240 bar).
4. Release joystick. Release throttle. Shut engine off.
5. Disconnect hydraulic test gage from test point no. 8.

TEST POINT NO. 9: SERVO SYSTEM

NOTE

Test point no. 9 provides a means to check the servo system operating pressure.

1. Connect hydraulic test gage to test point no. 9.
2. Start engine. Pressure will be 435 psi (30 bar).
3. Shut engine off. Turn ignition on. Exercise joystick. Turn ignition off.
4. Disconnect hydraulic test gage from test point no. 9.

TEST POINT NO. 10: CAB LIFT MAIN VALVE

NOTE

Test point no. 10 provides a means to check the cab lift operating pressure.

1. Remove handrail from mounted position.
2. Connect hydraulic test gage to test point no. 10.
3. Turn ignition on, but DO NOT start engine. Turn on auxiliary pump.
4. Raise cab transport lift and hold.
5. Pressure will build to 1,595 psi (110 bar).
6. Lower cab transport lift.
7. Turn auxiliary pump off. Turn ignition off.
8. Reinstall handrail.
9. Disconnect hydraulic test gage from test point no. 10.

TEST POINT NO. 11: TOPHANDLER/BOOM FOLDING SYSTEMS

NOTE

Test point no. 11 provides a means to check tophandler and boom folding system operating pressure.

1. Connect hydraulic test gage to test point no. 11.
2. Start engine. Pressure will be 260 psi (18 bar). After 5 seconds, pressure will jump to 3,045 psi (210 bar).
3. Shut engine off. Disconnect hydraulic test gage from test point no. 11.

TEST POINT NO. 12: ENGINE DRIVEN PUMP/FAN HYDRAULIC SYSTEM

WARNING

The engine will be operated at full throttle during the test: DO NOT stand or sit around the front of the engine while performing this test. Keep hands and objects away from the engine drive belts. Failure to follow this warning may result in serious injury to personnel.

CAUTION

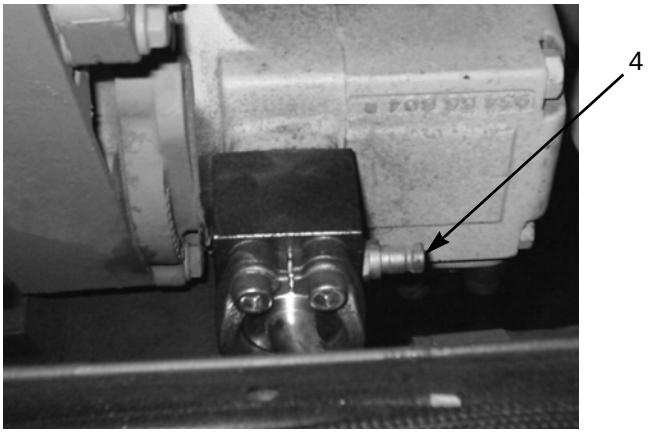
The engine should be at operating temperature before performing this test. Operating a cold engine at full throttle may result in premature wear or damage to the engine.

TEST POINT NO. 12: ENGINE DRIVEN PUMP/FAN HYDRAULIC SYSTEM - CONTINUED

NOTE

Test point no. 12 provides a means to check the engine driven pump pressure and the fan hydraulic system operation and pressure.

1. Remove engine cover to access engine driven pump located at left front of engine (WP 0148 00).
2. Locate test point (4) on engine driven pump discharge port. Clean test point and connect hydraulic test gage.



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3. Start engine.
4. Enter diagnostic menu EXTRA FUNCT Screen 11 (13). Use plus and minus keys to increase fan speed to 100%.
5. Press the accelerator pedal fully and bring engine to full throttle.
6. Pressure will increase to 2,600 to 2,700 psi (180 to 186 bar).
7. Release accelerator pedal.
8. Shut down engine after 30 seconds.
9. Disconnect hydraulic test gage from test point (4).
10. Reinstall engine cover (WP 0148 00).

END OF WORK PACKAGE

TOPHANDLER REPLACEMENT 0189 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Jackscrew (2) (TM 10-3930-675-10, *Basic Issue Items*)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

4 x 4-in. Cribbing Materials

4 x 4-in. Oak 12 in. Long

Washer, lock (P/N 923657.0001) (2)

Washer, lock (P/N 923657.0004) (2)

Personnel Required

Three

References

WP 0101 00

WP 0259 00

CAUTION

- **DO NOT extend the boom support locking pins into the frame with the tophandler removed from the boom.**
- **Damage to boom support and frame slide bearings can occur if the boom support locking pins are extended or retracted into the operational/locked position when the tophandler is removed from the boom.**

NOTE

The tophandler can be removed onto a trailer at least 50-in. (127 cm) high without placing the boom in the transport position.

TOPHANDLER REPLACEMENT - CONTINUED 0189 00

REMOVAL

1. Position RTCH directly behind trailer on which tophandler is to be placed.
2. Side shift tophandler right 6 to 8 in. (15.2 to 20.3 cm) from center position. Extend boom to 110 in. (279.4 cm). Raise boom to 19 degrees (TM 10-3930-675-10).
3. Place cribbing of 4 x 4s on deck of trailer so twistlocks will not touch trailer deck when tophandler spreader beams (1) are placed on cribbing.



434-40080

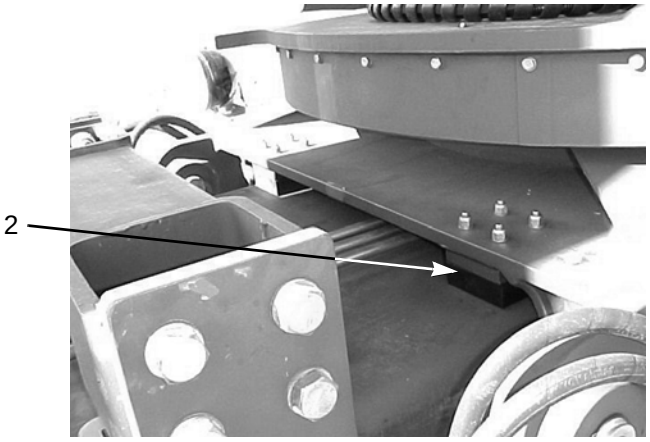
4. Drive RTCH as close as possible to back of trailer. Apply parking brake.
5. Place boom in transport position (TM 10-3930-675-10):
   a. Remove boom support locking pin retaining pins.
   b. Move cab to transport position.
   c. Ensure boom is at 19 degrees and extended to 100 in. (254 cm).
   d. Pull center (tall) lever to raise boom support fully.
   e. Retract boom support locking pins.
   f. Fully lower boom support to lowest position.
   g. Lower boom until bottom of tophandler is 5 to 6 ft (152.4 to 182.9 cm) off ground.
   h. Rotate tophandler clockwise to longitudinal position.
   i. Raise boom high enough to clear trailer height.

REMOVAL - CONTINUED

CAUTION

Damage to boom support and frame slide bearings can occur if the boom support locking pins are extended or retracted into the operational/locked position when the tophandler is removed from the boom.

6. Lower tophandler onto cribbing on deck of trailer until oscillation/leveling cylinders are fully collapsed (TM 10-3930-675-10). **Raise boom just enough to start lifting collapsed center section .04 in. (1 mm) or less off center wear pads (2).**



434-40057

WARNING

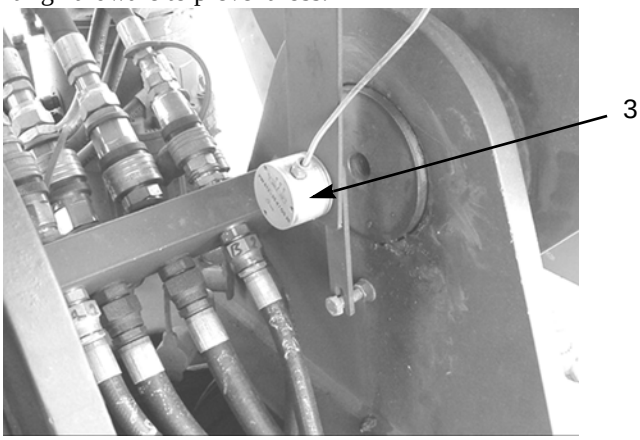
DO NOT fully relax the boom pressure on the tophandler. Serious injury or damage can occur from boom movement during pivot shaft removal.

7. Shut down RTCH engine.

NOTE

DO NOT disconnect tophandler angle sensor from junction box.

8. Remove tophandler angle sensor/bracket (3) and cable clamps from their mounting, move aside and secure to boom, (WP 0101 00). Reinstall mounting hardware to prevent loss.



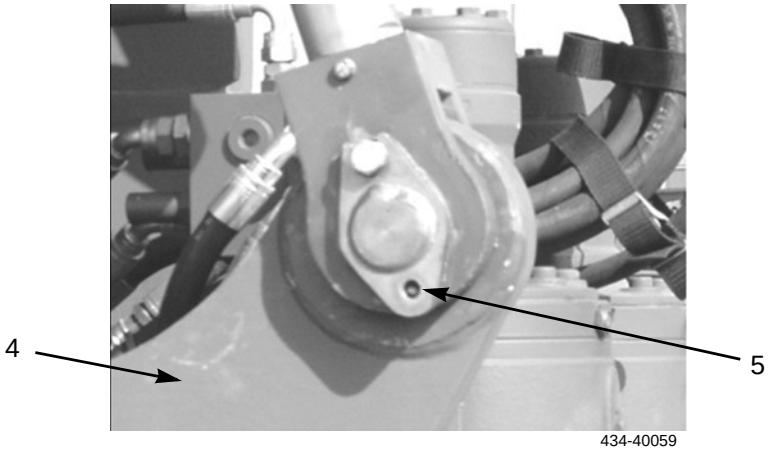
434-40058

REMOVAL - CONTINUED

NOTE

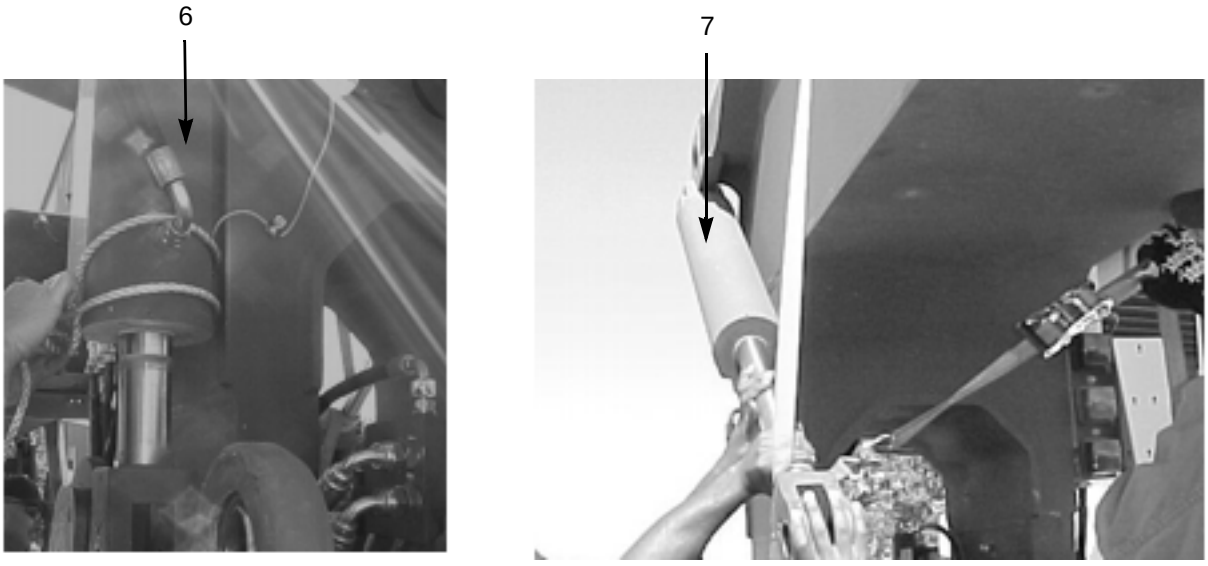
DO NOT disconnect tilt cylinder hydraulic hoses when disconnecting tilt cylinders from tophandler.

9. Disconnect each tilt cylinder from tophandler (4):
   a. Remove bolt and lockwasher. Retain lockwasher.
   b. Install bolt into threaded hole (5) in pin, and screw in to withdraw pin.
   c. After disconnecting tilt cylinders, reinstall pin, bolt, and lockwasher in cylinder end for stowage.



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10. Operate tilt cylinders to fully retract right tilt cylinder (6) and fully extend left tilt cylinder (7) (TM 10-3930-675-10).
11. Rest right tilt cylinder (6) on tilt cylinder support bolt and secure. Secure left tilt cylinder (7) to boom by wrapping cargo strap around boom.



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REMOVAL - CONTINUED

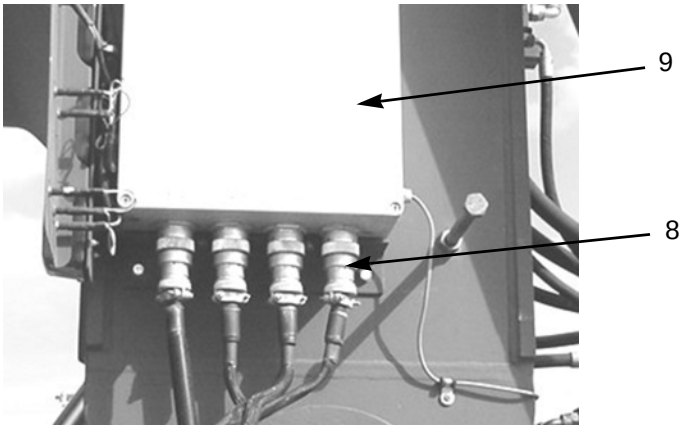
CAUTION

Ensure electrical connectors are clear and secured to avoid damaging connectors.

NOTE

Tag electrical connectors to ensure correct installation.

12. Disconnect four electrical connectors (8) from bottom of tophandler junction box (9) and secure.

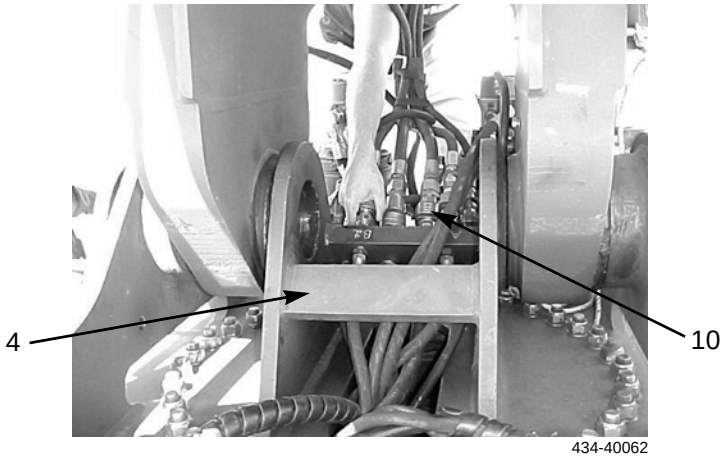


434-40061

CAUTION

- **Wipe clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.**
- **Ensure hydraulic hoses are clear and secure to avoid damaging hoses.**

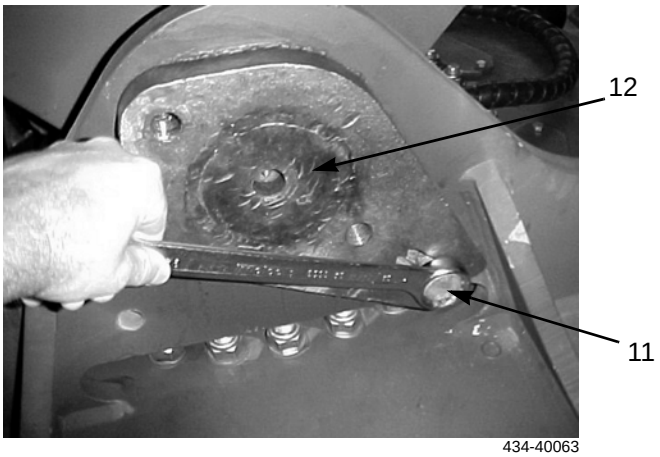
13. Disconnect six hydraulic hose quick disconnect fittings (10) from top of tophandler (4). Cap/plug all hydraulic connections. Lift hoses up and over slewing motors and secure to boom.



434-40062

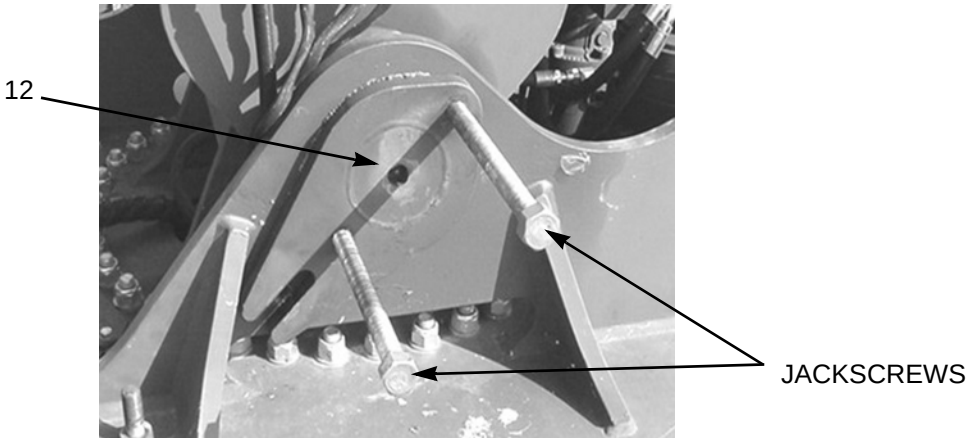
REMOVAL - CONTINUED

14. Remove bolt and lockwasher (11) from each pivot shaft (12). Retain lockwashers.



434-40063

15. Lubricate two jackscrews (from *Basic Issue Items*) with lubricating oil and install into threaded holes of pivot shaft (12).



434-40064

REMOVAL - CONTINUED

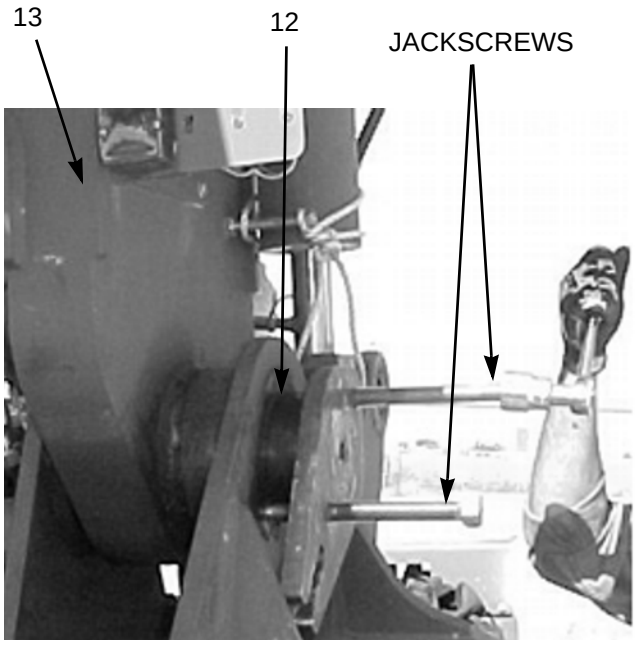
CAUTION

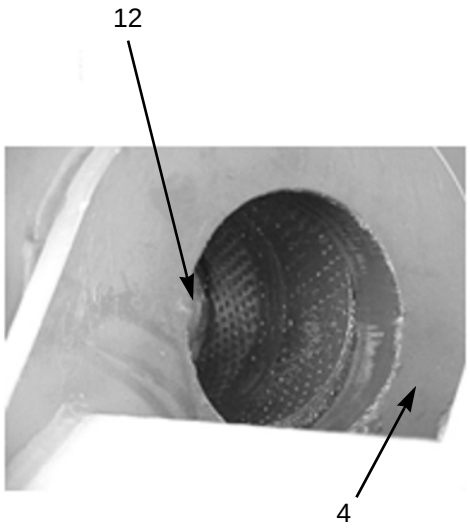
- **Use caution when removing the last part of the pivot shaft from the boom. The boom may drop or lift slightly when the pivot shaft is released.**
- **The pivot shafts are extremely heavy. DO NOT withdraw them all the way out.**

NOTE

To avoid binding pivot shaft, screw in jackscrews equally and alternately.

16. Screw in jackscrews approximately 8 in. (20.3 cm) to completely withdraw each pivot shaft (12) until boom (13) is free of tophandler (4).





REMOVAL - CONTINUED

NOTE

Because tophandler junction box is disconnected from RTCH electrical system, error codes will appear on driver's ECS display screen when boom is operated. These error codes will include numbers 245 to 265 as well as others. To continue operation, reset driver's display and use override button on right side of joystick housing (TM 10-3930-675-10).

17. Operate boom (13) while pressing override switch to lift boom clear of tophandler (4) (TM 10-3930-675-10).



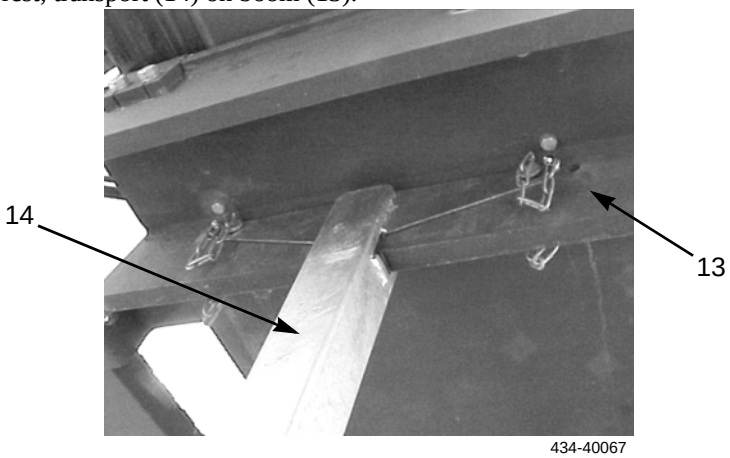
434-40066

18. Back RTCH away from trailer.

CAUTION

- **The boom support must be lowered to its lowest position before installing boom rest, transport.**
- **Damage will occur to the equipment if the boom is fully lowered when the tophandler is removed from the boom and the boom support is lowered to its lowest position.**

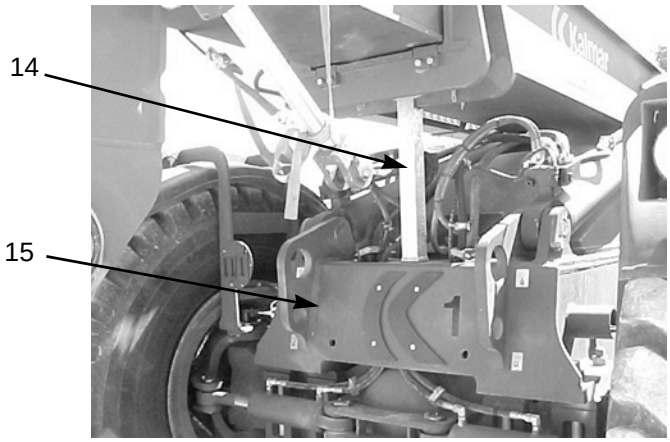
19. Install boom rest, transport (14):
    a. Fully retract boom (TM 10-3030-675-10).
    b. Remove boom rest, transport (14) from stowed position (rear of RTCH).
    c. Install the boom rest, transport (14) on boom (13).



434-40067

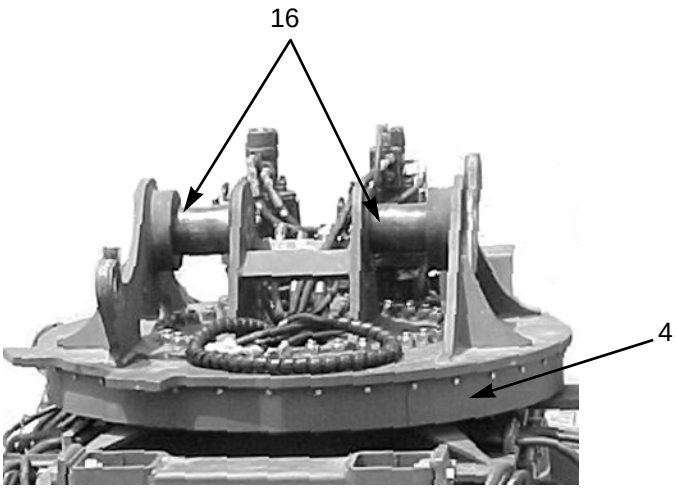
REMOVAL - CONTINUED

d. Lower boom until boom rest, transport (14) is resting on RTCH frame (15).



434-40068

20. Tie down tophandler to trailer IAW shipping data plate on RTCH (TM 10-3930-675-10).
21. Reinstall tophandler mounting hardware (pivot shafts, lockwashers, and bolts) (16) to provide secure stowage of items while tophandler (4) is in transit.



434-40069

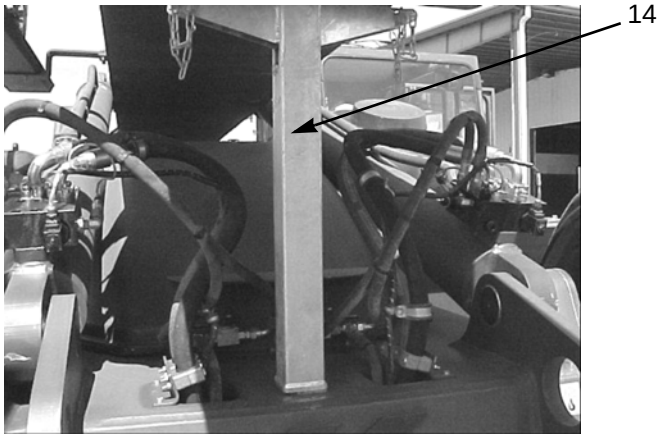
INSTALLATION

1. Remove tiedowns from tophandler and trailer.

NOTE

It is crucial that RTCH and trailer be in alignment. If time is not taken to ensure accurate alignment, installation of tophandler to boom will be very difficult because pivot shafts will bind while being installed.

2. Position RTCH 10 to 15 ft (3.0 to 4.6 m) directly behind trailer, so that tophandler and RTCH boom are aligned.
3. Raise boom off boom rest, transport (14). Remove boom rest, transport and stow (rear of RTCH).

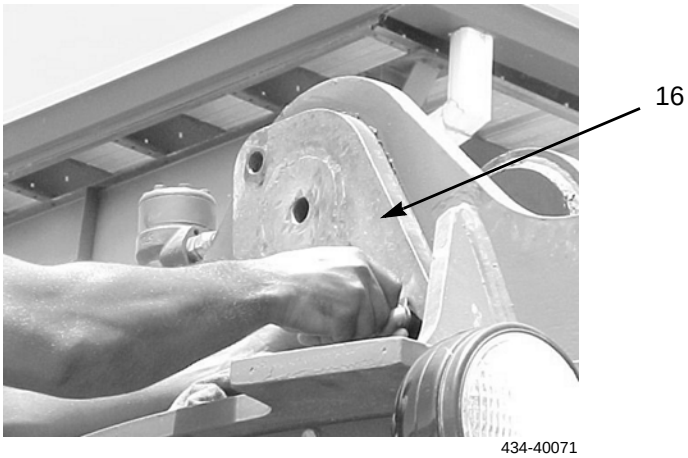


434-40070

CAUTION

Damage will occur to the equipment if the boom is fully lowered when the tophandler is removed from the boom and the boom support is lowered to its lowest position.

4. Remove tophandler mounting hardware (pivot shafts, lockwashers, and bolts) (16). Discard lockwashers if new lockwashers are available.



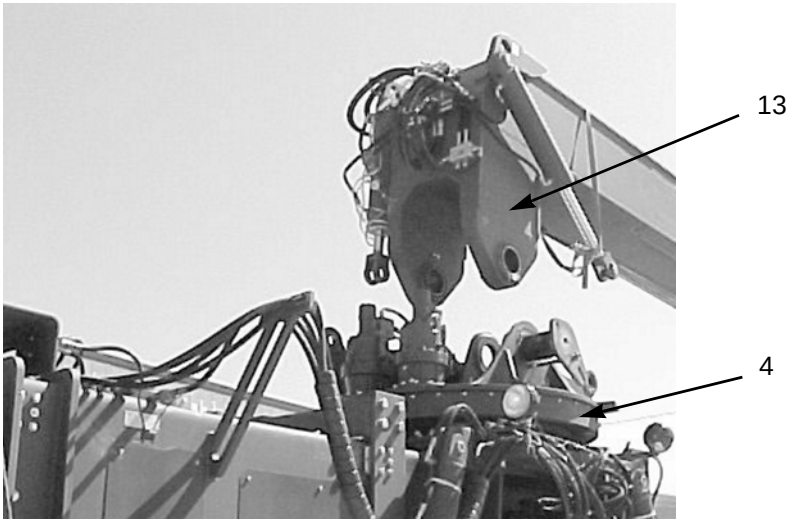
434-40071

INSTALLATION - CONTINUED

NOTE

- **Because tophandler junction box is disconnected from RTCH electrical system, error codes will appear on driver's ECS display screen when boom is operated. These error codes will include numbers 245 to 265 as well as others. To continue operation, reset driver's display and use override button on right side of joystick housing (TM 10-3930-675-10).**
- **If alignment of boom to tophandler does not look OK, reposition RTCH and ensure accurate alignment before proceeding.**

5. Raise boom high enough to clear tophandler. Extend boom to 120 in. (304.8 cm). Using a ground guide, slowly drive RTCH toward trailer until boom is over tophandler.
6. Lower boom (13) and position boom into tophandler (4), while aligning pivot shaft holes in boom with holes in tophandler.



434-40072

INSTALLATION - CONTINUED

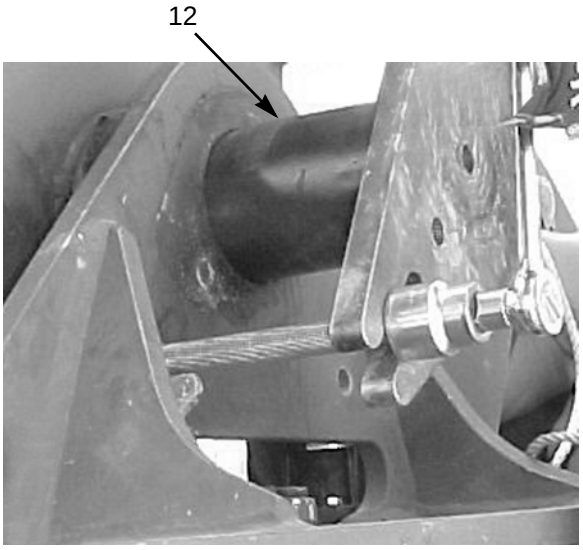
CAUTION

Never hammer directly on the pivot shaft flanges. Always use a wooden block or damage will occur to the pivot shaft.

NOTE

- **Ensure pivot shafts are clean.**
- **When installing pivot shafts, slots in pivot shaft for retaining bolt must be aligned with bolt hole in tophandler.**
- **Remove the lockwashers from the retaining bolt and place on one of the jackscrews. Insert the jackscrew through the slot and into the retaining screw bolt hole. Use the jackscrew to draw the pivot shaft into the boom. It may be necessary to tap on the pivot shaft with a 4x4 block and hammer to aid in installation. Make sure the lockwashers are reinstalled back onto the retaining bolt before installation.**
- **It may be necessary to connect the hydraulic hoses and use tophandler controls to aid in boom-to-tophandler positioning.**
- **Turning the steering wheel while in crab steering will move the boom side to side for minor alignment adjustments. Boom movement is the opposite of steering wheel movement.**

7. Install pivot shaft (12) on each side of tophandler. Secure with new lockwasher and bolt.



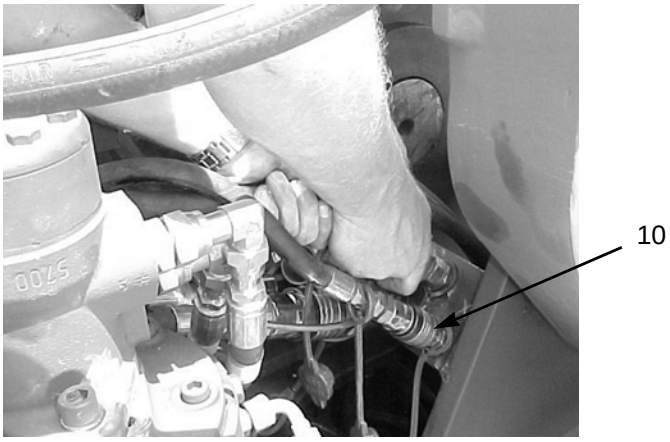
434-40073

INSTALLATION - CONTINUED

NOTE

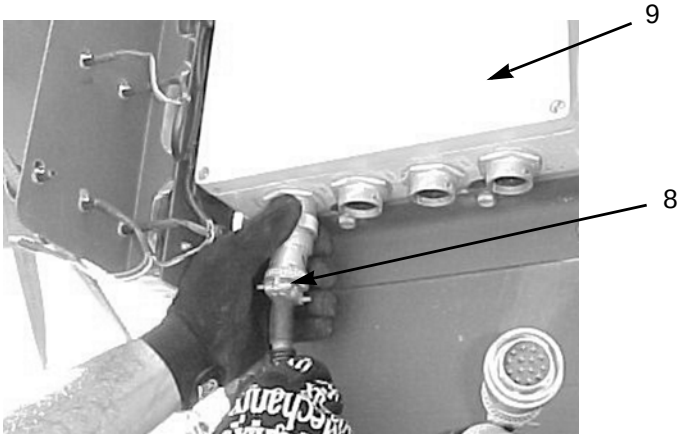
Install the hose with the large female quick disconnect fitting first. It will be necessary to bleed off the residual oil in the hose by rocking it back and forth on the male fitting before the fitting will connect. Use plenty of rags to catch the bled off oil.

8. Remove caps/plugs and connect six hydraulic hose quick disconnect fittings (10) to top of tophandler.



434-40074

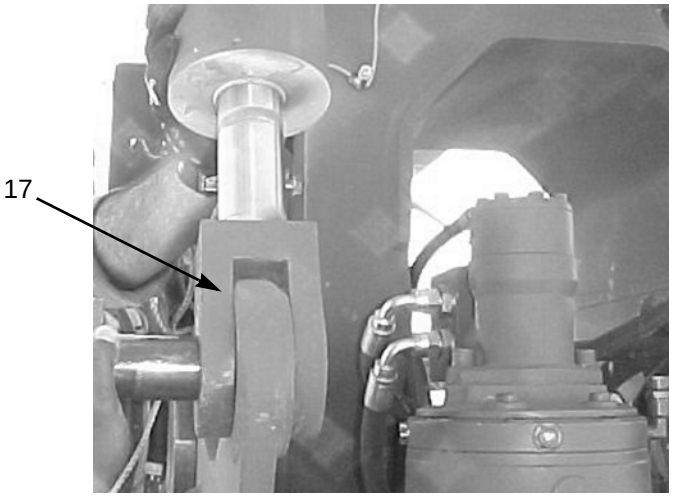
9. Connect four electrical connectors (8) to bottom of tophandler junction box (9).



434-40075

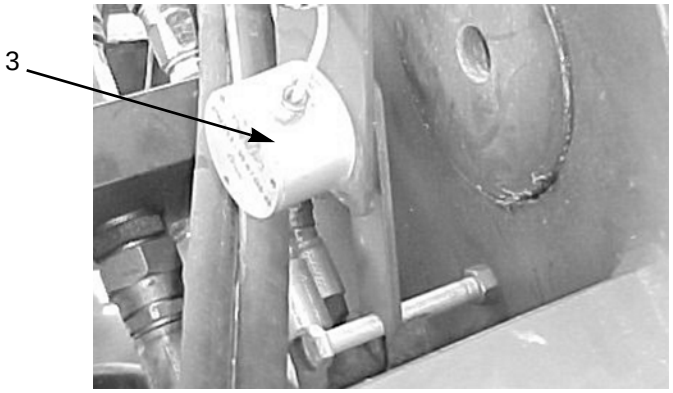
INSTALLATION - CONTINUED

10. Remove cargo straps from tilt cylinders (17) and remove pin, bolt, and lockwasher from cylinder ends.
11. Operate tilt cylinders to align tilt cylinder ends (17) with mounting holes in tophandler (TM 10-3930-675-10).
12. Install pin at end of each tilt cylinder (17). Secure with new lockwasher and bolt.



434-40076

13. Install tophandler angle sensor/bracket (3) (WP 0101 00).



434-40077

INSTALLATION - CONTINUED

14. Raise boom and tophandler off trailer and back RTCH away from trailer.
15. Place boom back into operational position (TM 10-3930-675-10):
    a. Extend the boom to 110 in. (279.4 cm).
    b. Rotate tophandler 90 degrees counterclockwise to operational position.
    c. Raise boom and tophandler 12 to 13 ft (3.7 to 4.0 m) off the ground.
    d. Retract locking pins fully.
    e. Raise boom support fully.
    f. Check boom angle and readjust to 19 degrees.
    g. Extend boom support locking pins.
    h. Return cab to operational position (TM 10-3930-675-10).
    i. Install boom support locking pin retaining pins.
16. Perform boom and tophandler calibration (WP 0259 00).

CERTIFICATION OF INSPECTION

1. If tophandler was replaced, RTCH must be load tested and certified.
2. A tophandler that was removed and reinstalled from one RTCH does not have to be re-certified.

END OF WORK PACKAGE

HEATER HOSES REPLACEMENT 0190 00

THIS WORK PACKAGE COVERS

Engine Heater Hoses: Removal, Installation

Cab Heater Hoses: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Antifreeze, Permanent (Item 4, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two (if replacing engine heater hoses)

References

TM 10-3930-675-10

WP 0142 00

WP 0148 00

Equipment Condition

Coolant drained (WP 0064 00)

NOTE

Tag hoses to ensure proper connection on installation.

ENGINE HEATER HOSES REMOVAL

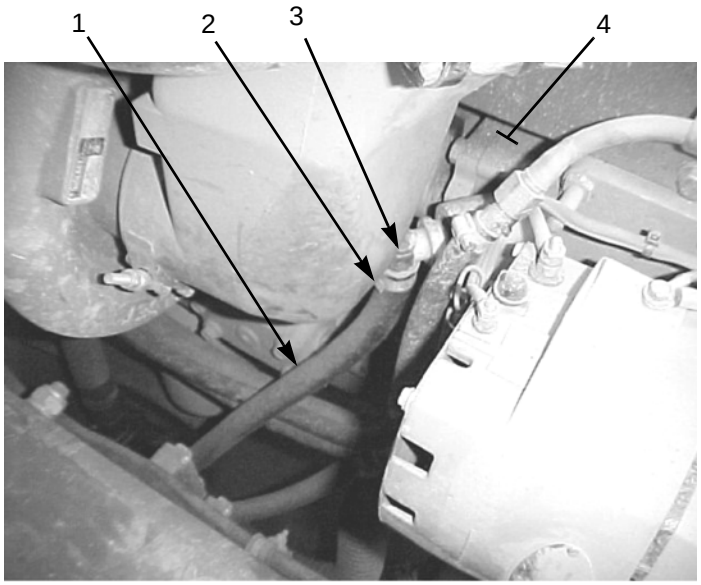
NOTE

- **Perform the following steps to remove heater hoses between engine and rear of cab.**
- **Remove loop clamps and remove and discard tiedown straps as necessary.**

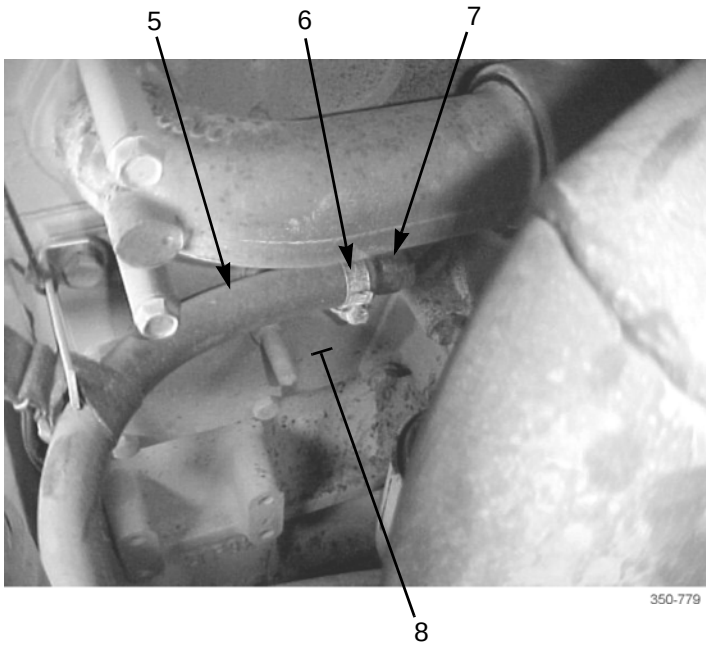
1. Remove engine cover (WP 0148 00).
2. Place cab in transport position (TM 10-3930-675-10).
3. Remove transmission access covers (WP 0142 00).

ENGINE HEATER HOSES REMOVAL - CONTINUED

4. Remove hose clamp (2) and heater hose (1) from fitting (3) at water pump (4).



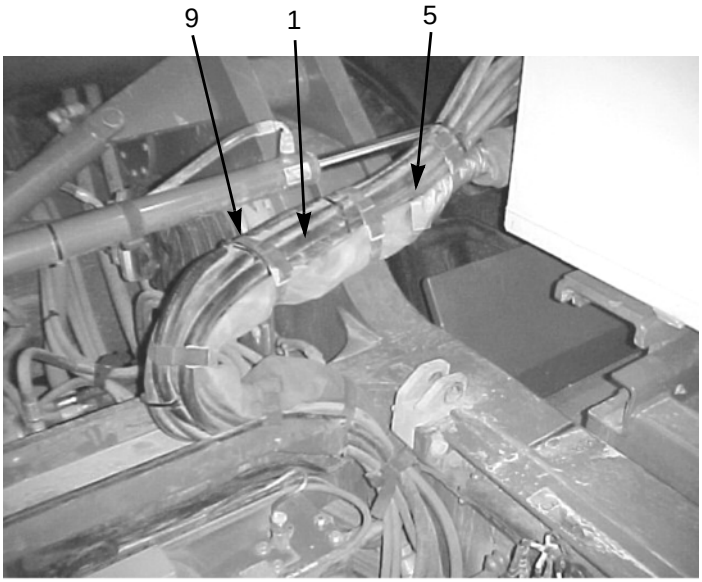
5. Remove hose clamp (6) and heater hose (5) from fitting (7) at right side of engine (8).



HEATER HOSES REPLACEMENT - CONTINUED 0190 00

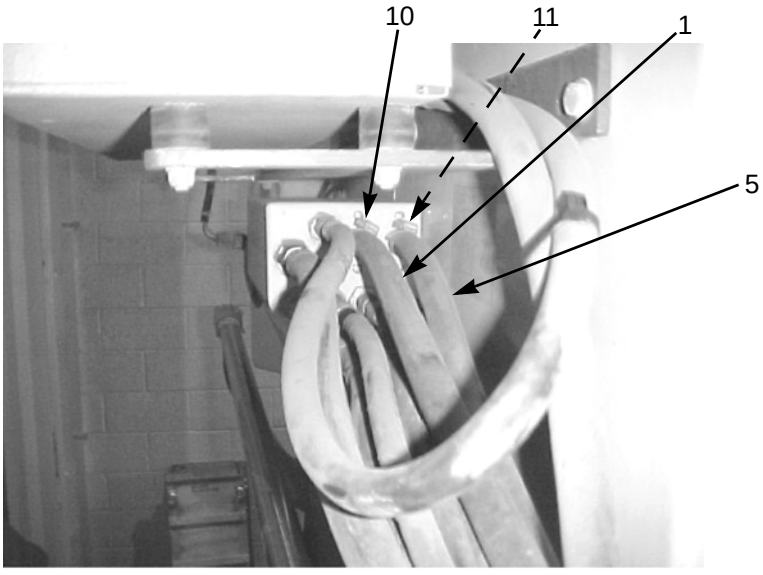
ENGINE HEATER HOSES REMOVAL - CONTINUED

6. Toward rear of vehicle, remove canvas straps (9) from around heater hoses (1 and 5).



350-780

7. At cab interface unit at rear of cab, remove two hose clamps (10) and two heater hoses (1 and 5) from two fittings (11).
8. Remove two heater hoses (1 and 5) from vehicle.



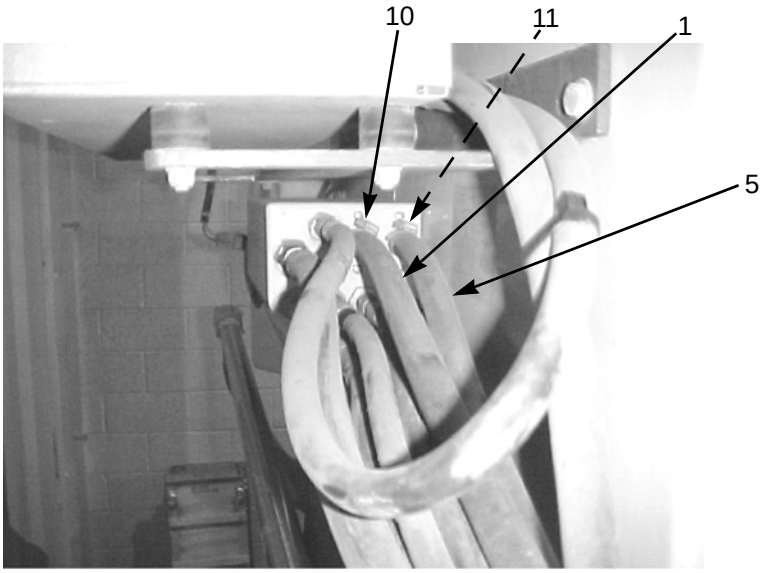
350-781

ENGINE HEATER HOSES INSTALLATION

NOTE

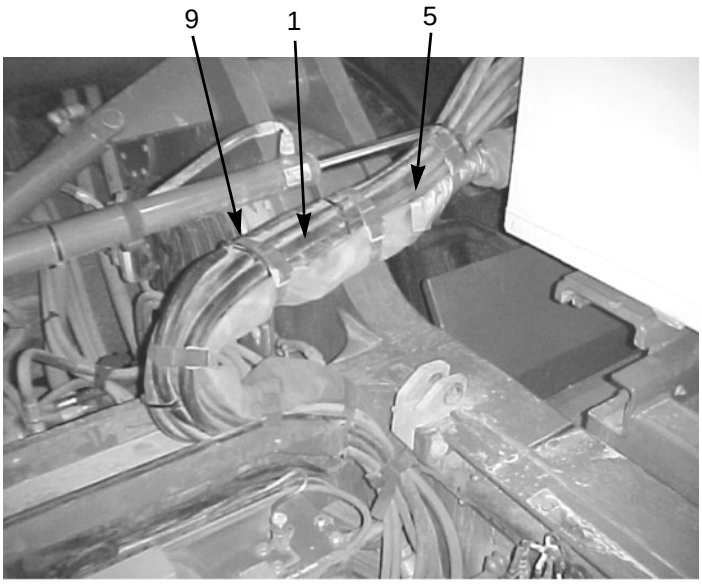
Perform the following steps to install heater hoses between engine and rear of cab.

1. Position two heater hoses (1 and 5) on vehicle.
2. At cab interface unit at rear of cab, install two heater hoses (1 and 5) on two fittings (11) with two hose clamps (10).



350-781

3. Install canvas straps (9) around heater hoses (1 and 5).



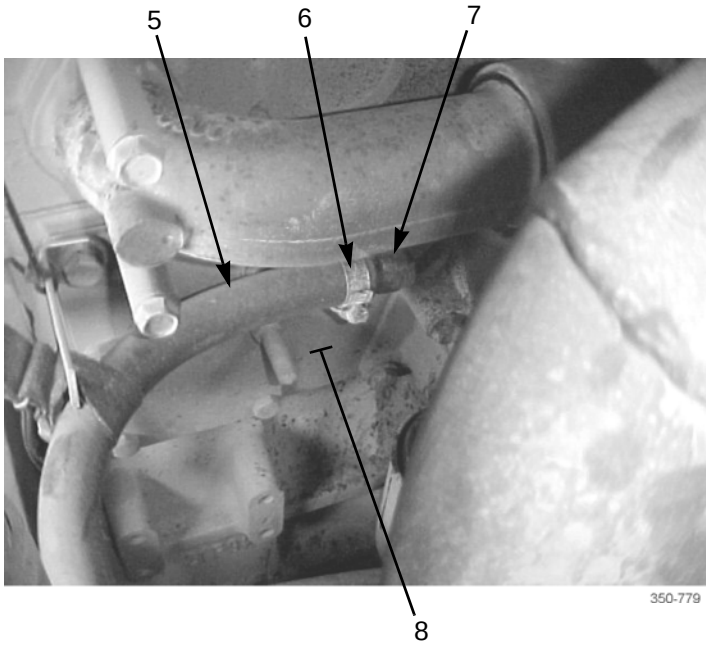
350-780

ENGINE HEATER HOSES INSTALLATION - CONTINUED

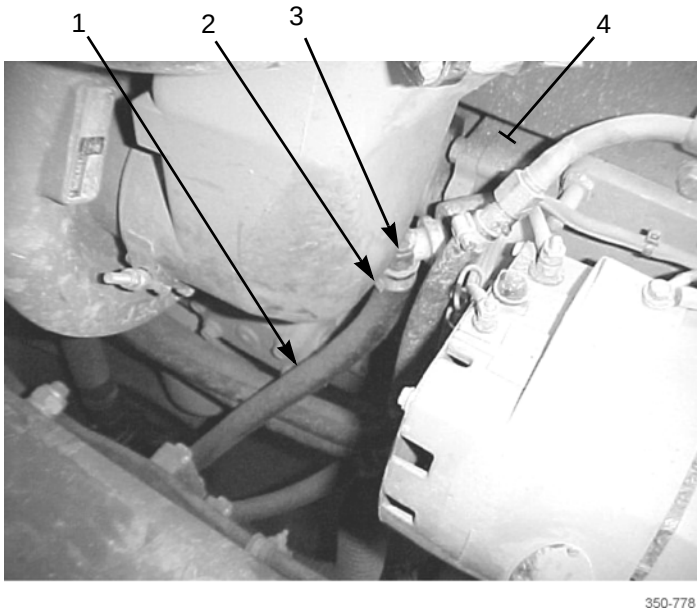
NOTE

Install loop clamps and new tiedown straps as necessary.

4. Install heater hose (5) on fitting (7) at right side of engine (8) with hose clamp (6).



5. Install heater hose (1) on fitting (3) at water pump (4) with hose clamp (2).



ENGINE HEATER HOSES INSTALLATION - CONTINUED

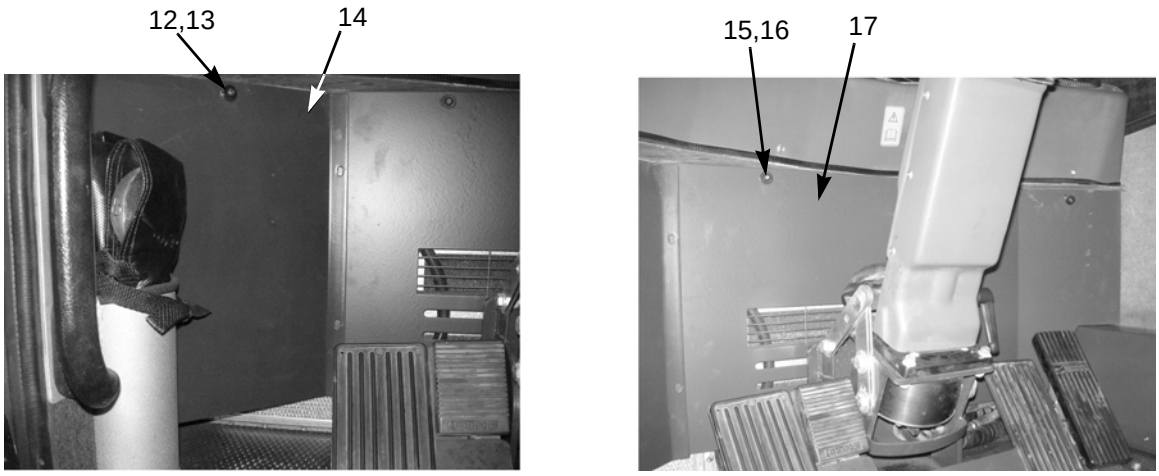
6. Fill cooling system (WP 0064 00).
7. Start engine (TM 10-3930-675-10) and check for leaks.
8. Install transmission access covers (WP 0142 00).
9. Return cab to operational position (TM 10-3930-675-10).
10. Install engine cover (WP 0148 00).

CAB HEATER HOSES REMOVAL

NOTE

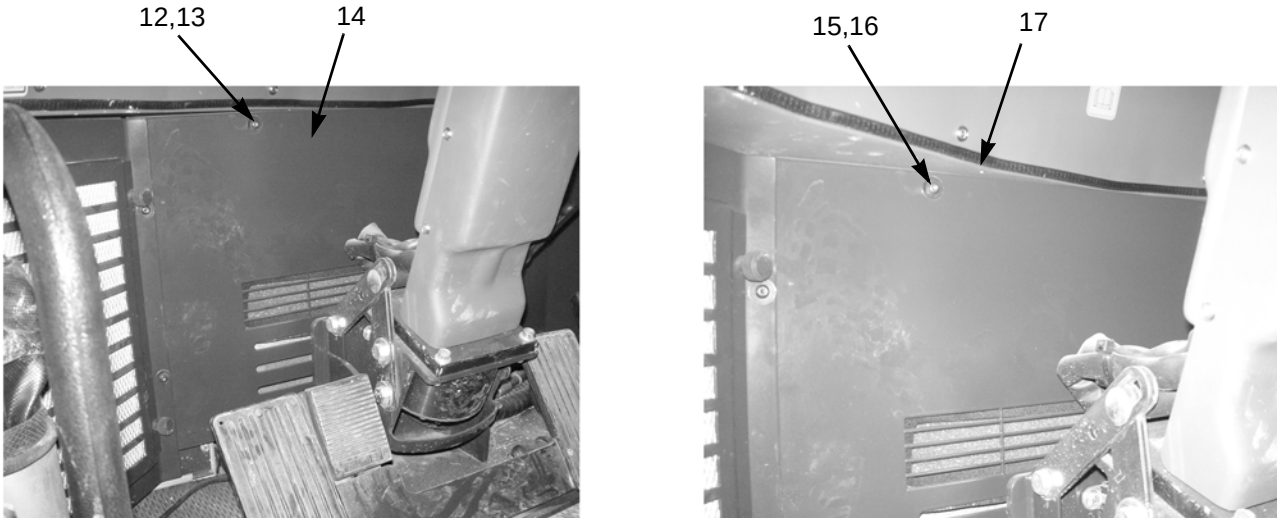
Perform the following steps to remove heater hoses between rear of cab and heater.

1. Remove three screws (12), washers (13), and left lower panel (14).
2. Remove three screws (15), washers (16), and right lower panel (17).



434-40006A

ARMY AND RESET VEHICLES



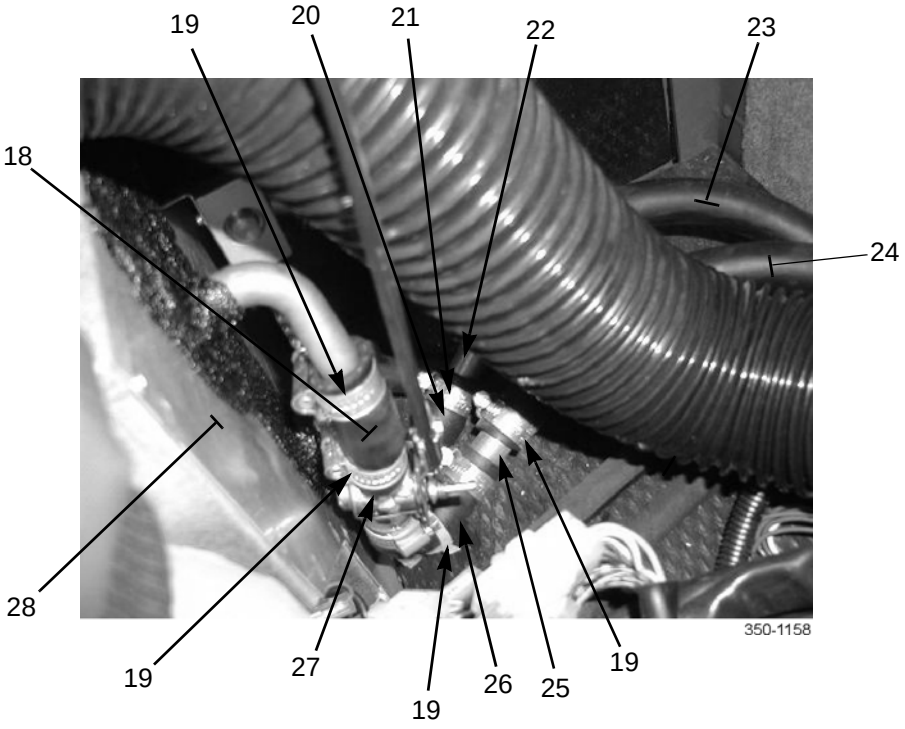
434-40007A

USMC VEHICLES

HEATER HOSES REPLACEMENT - CONTINUED 0190 00

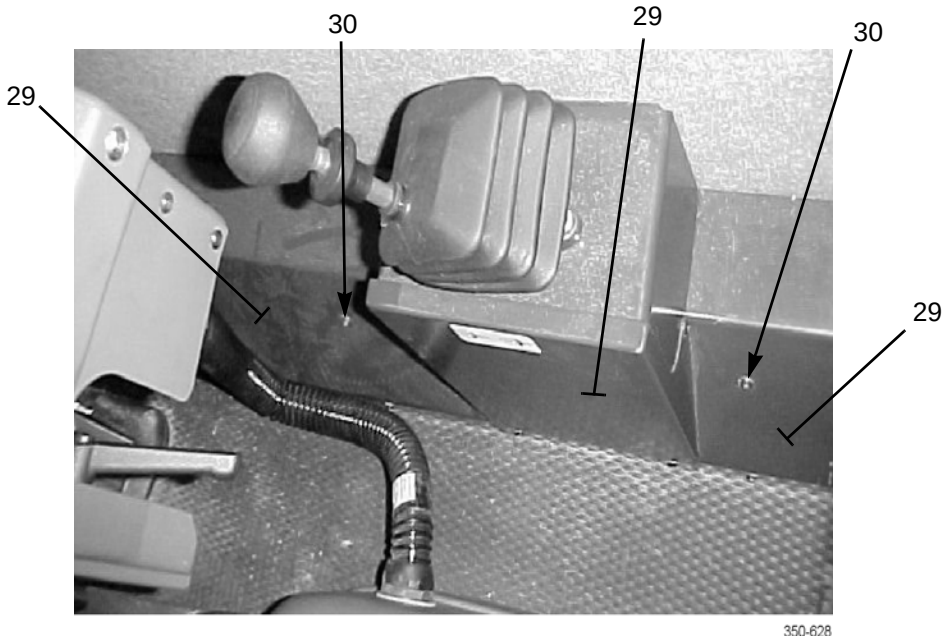
CAB HEATER HOSES REMOVAL - CONTINUED

3. Remove three hose clamps (21), heater hose (23), connector (22), and hose (20) from heater and A/C unit (28).
4. Remove five hose clamps (19), heater hose (24), connector (25), hose (26), heat control valve (27), and hose (18) from heater and A/C unit (28).



CAB HEATER HOSES REMOVAL - CONTINUED

5. Remove 14 screws (30) and three access covers (29) from right side of cab.



6. Lift and remove right access cover (31) and middle access cover (32) from rear of cab.



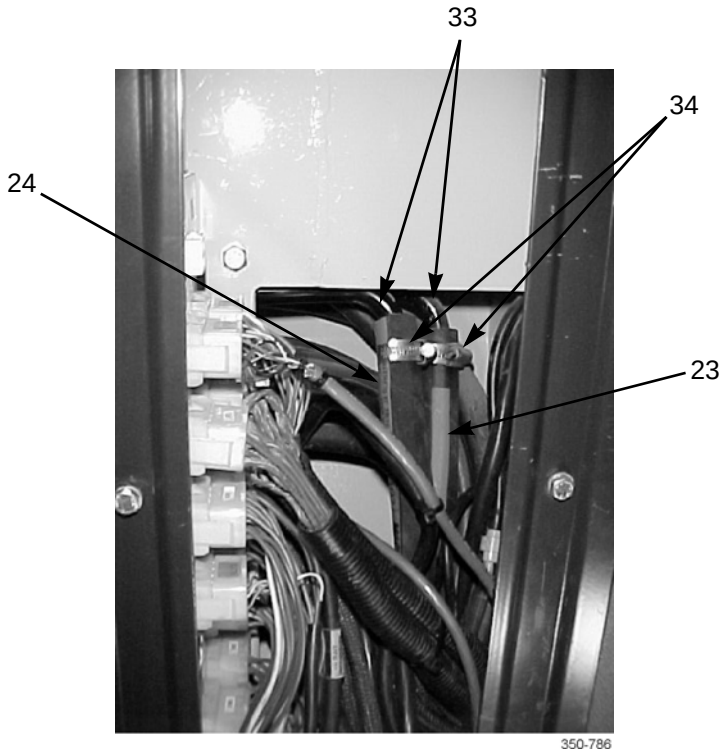
CAB HEATER HOSES REMOVAL - CONTINUED

7. Remove two hose clamps (34) and two heater hoses (24 and 23) from two fittings (33).

NOTE

Remove and discard tiedown straps as necessary.

8. Remove two heater hoses (24 and 23) from cab.



CAB HEATER HOSES INSTALLATION

NOTE

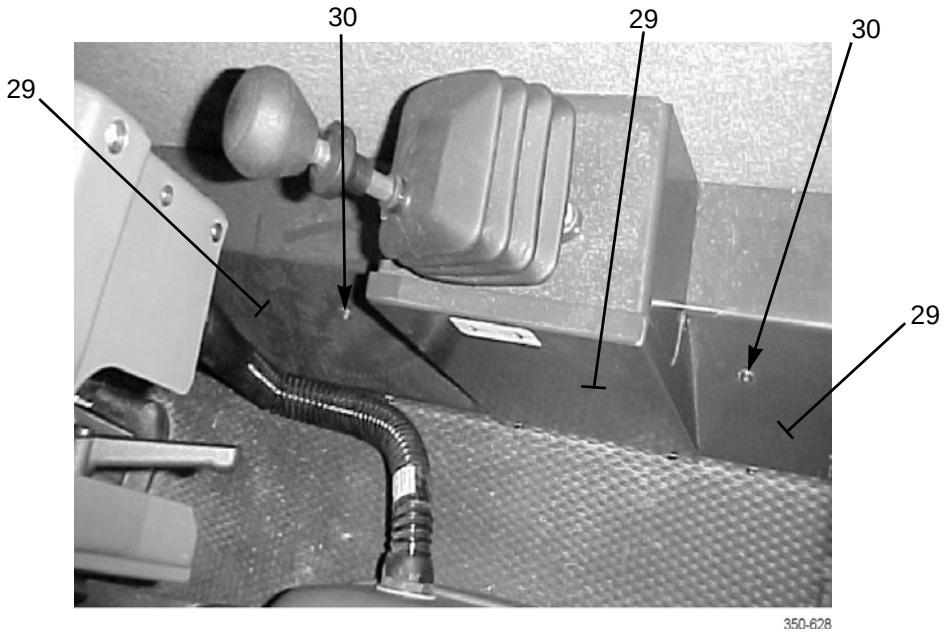
Perform the following steps to install heater hoses between rear of cab and heater.

1. Position two heater hoses (24 and 23) in cab.
2. At rear of cab, install two heater hoses (24 and 23) on two fittings (33) with two hose clamps (34).
3. Install middle access cover (32) and right access cover (31) in rear of cab.

NOTE

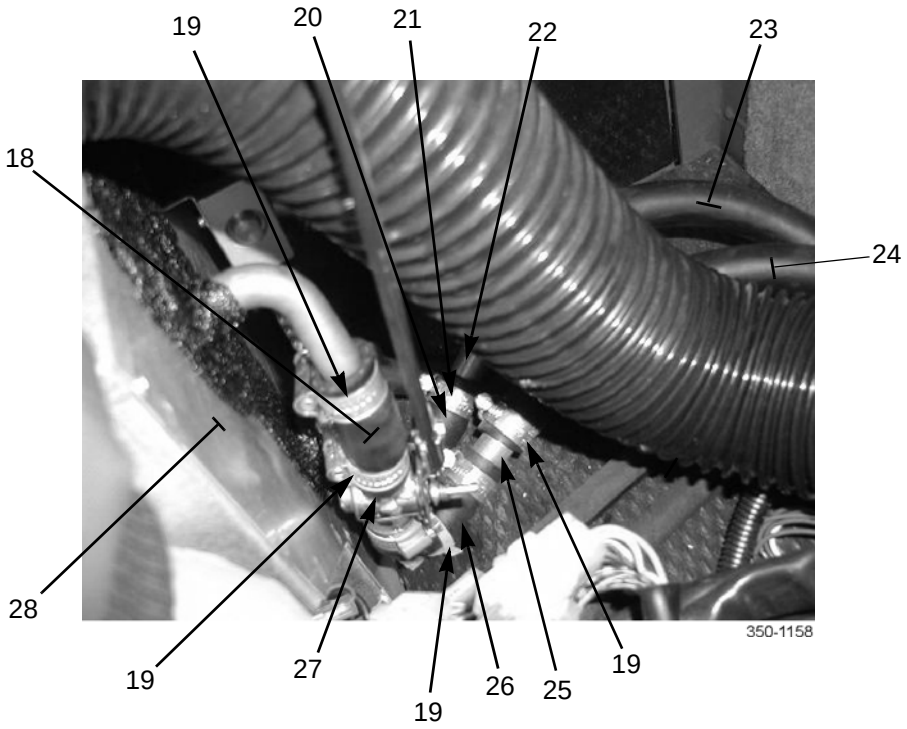
Install new tiedown straps as necessary.

4. Install three access covers (29) on right side of cab with 14 screws (30).



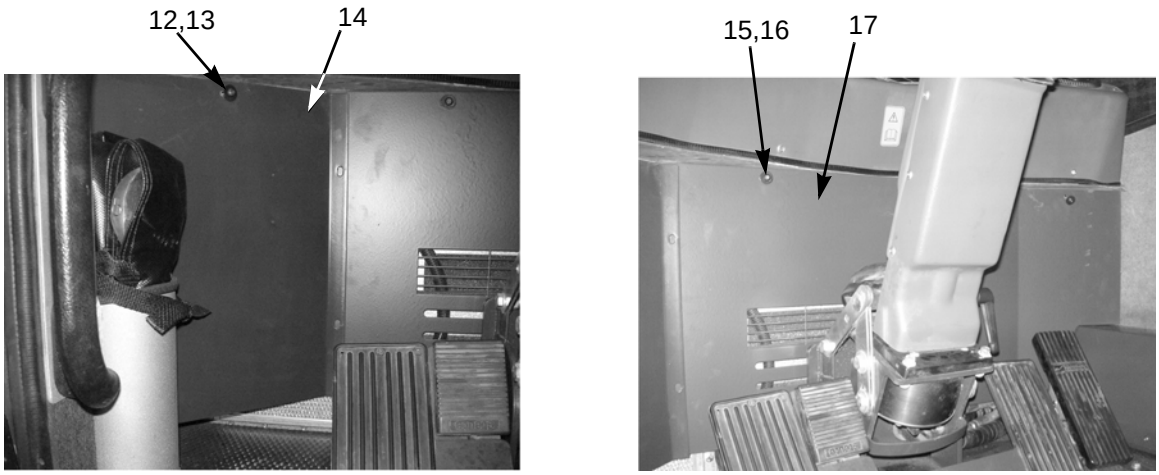
CAB HEATER HOSES INSTALLATION - CONTINUED

5. Install hose (18), heat control valve (27), hose (26), connector (25), and heater hose (24) on heater and A/C unit (28) with five hose clamps (19).
6. Install hose (20), connector (21), and heater hose (23) on heater and A/C unit (28) with three hose clamps (21).

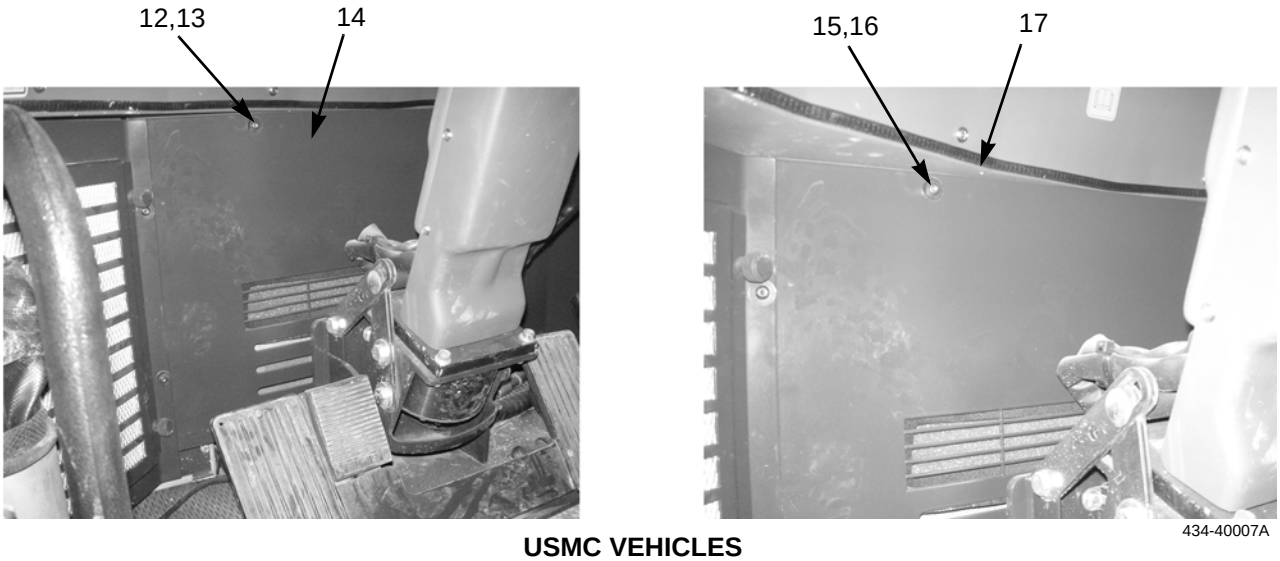


CAB HEATER HOSES INSTALLATION - CONTINUED

7. Fill cooling system (WP 0064 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.
9. Install right lower panel (17) with three screws (15) and three washers (16).
10. Install left lower panel (14) with three screws (12) and three washers (13).



ARMY AND RESET VEHICLES



USMC VEHICLES

END OF WORK PACKAGE

CAB HEATER/AIR CONDITIONING BLOWER MOTOR AND FAN REPLACEMENT 0191 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Air cleaner removed (WP 0057 00)

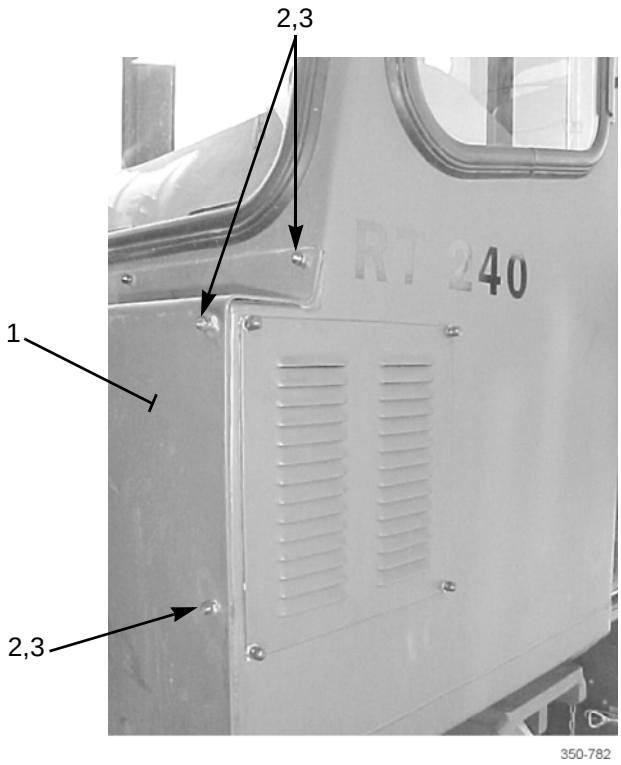
Front windshield wiper assembly removed (WP 0158 00)

Cab moved to the left, but not lowered (TM 10-3930-675-10)

Master battery switch in OFF position

REMOVAL

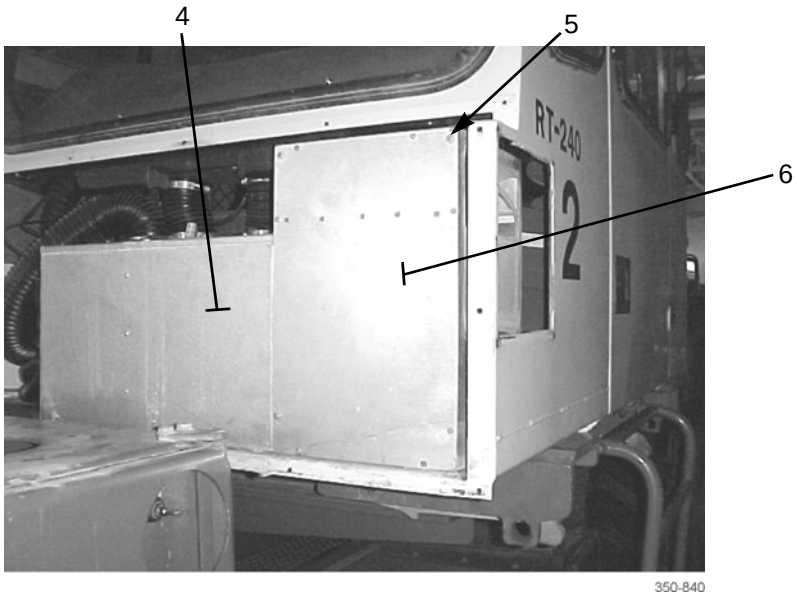
1. Remove 14 capnuts (2), washers (3), and front panel (1) from cab.



CAB HEATER/AIR CONDITIONING BLOWER MOTOR AND FAN REPLACEMENT - CONTINUED 0191 00

REMOVAL - CONTINUED

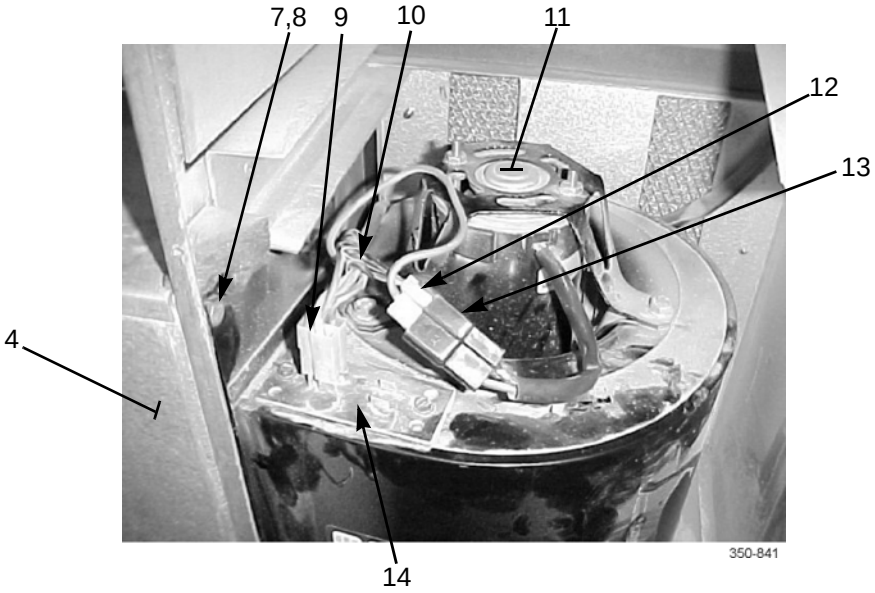
2. Remove eight screws (5) and cover (6) from cab heater and A/C unit (4).



NOTE

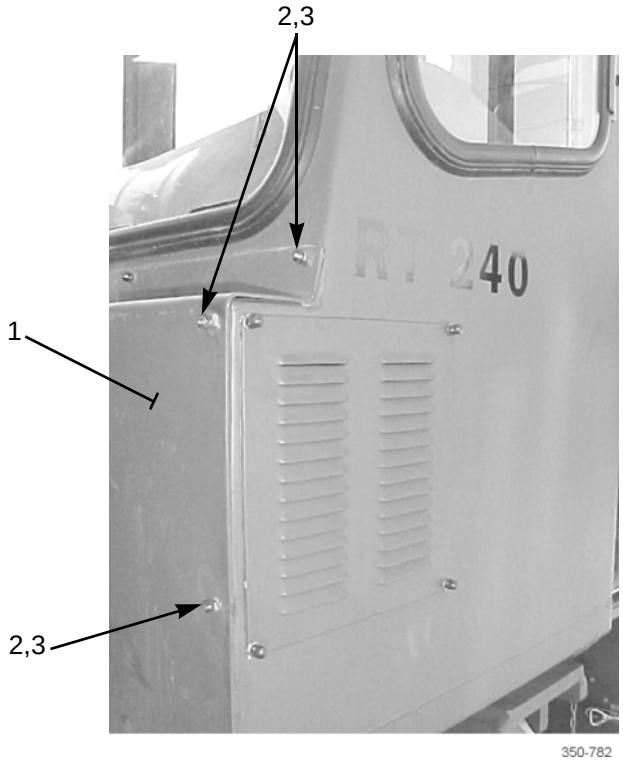
Tag connectors for installation.

3. Disconnect three connectors (9) of wiring harness (10) from temperature sensor (14) of blower motor and fan (11).
4. Disconnect two connectors (12) of wiring harness (10) from connector (13) of blower motor and fan (11).
5. Remove two screws (7), washers (8), and blower motor and fan (11) from cab heater and A/C unit (4).



INSTALLATION

1. Install blower motor and fan (11) on cab heater and A/C unit (4) with two washers (8) and screws (7).
2. Connect two connectors (12) of wiring harness (10) to connector (13) of blower motor and fan (11).
3. Connect three connectors (9) of wiring harness (10) to temperature sensor (14) of blower motor and fan (11).
4. Install cover (6) on cab heater and A/C unit (4) with eight screws (5).
5. Install front panel (1) on cab with 14 washers (3) and capnuts (2).



6. Install front windshield wiper assembly (WP 0158 00).
7. Install air cleaner (WP 0057 00).
8. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

CAB AIR FILTERS REPLACEMENT 0192 00

THIS WORK PACKAGE COVERS

Cab Side Air Filter: Removal, Cleaning and Inspection, Installation

Cab Interior Air Filter: Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Dispenser, Sealant (Item 25, WP 0289 00)

Materials/Parts

Compound, Gasket Forming, Silicone (Item 10, WP 0290 00)

Detergent (Item 15, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)



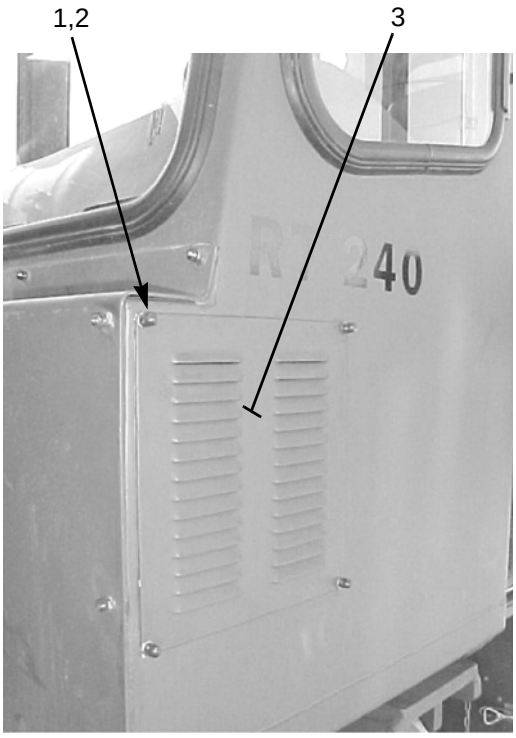
WARNING



If NBC exposure is suspected, all air cleaner media should be handled by personnel wearing protective equipment. Consult your NBC officer or NBC NCO for appropriate handling or disposal procedures.

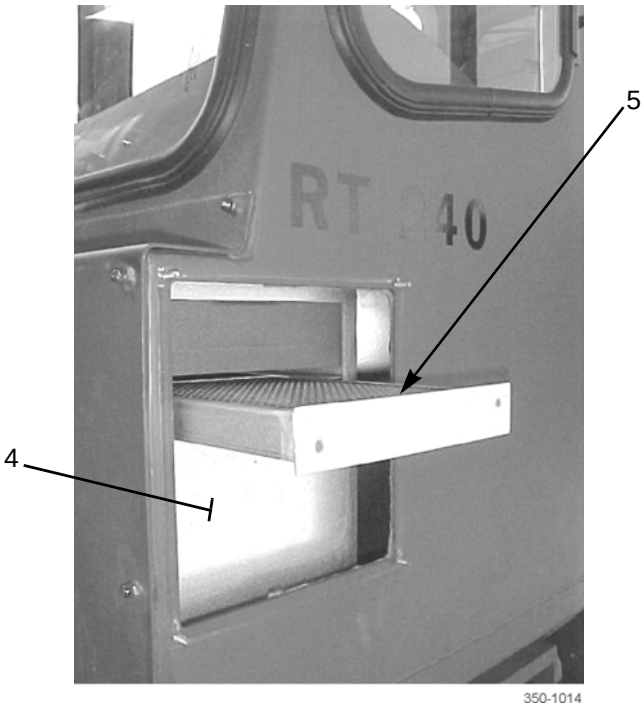
CAB SIDE AIR FILTER REMOVAL

1. Remove four capnuts (1), washers (2), and grille (3) from side of cab.



CAB SIDE AIR FILTER REMOVAL - CONTINUED

2. Remove filter element (5) from cab heater and A/C housing (4).
3. Using rags, wipe interior of cab heater and A/C housing (4) free of dust and dirt.



CAB SIDE AIR FILTER CLEANING AND INSPECTION



WARNING

Compressed air used for cleaning or drying purposes, or for cleaning restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.

1. Use compressed air to clean dirt and debris from air filter.
2. As required, a solution of detergent and water may be used to clean air filter. Dry thoroughly with compressed air.
3. Inspect air filter for damage. Replace if damaged.

CAB SIDE AIR FILTER INSTALLATION

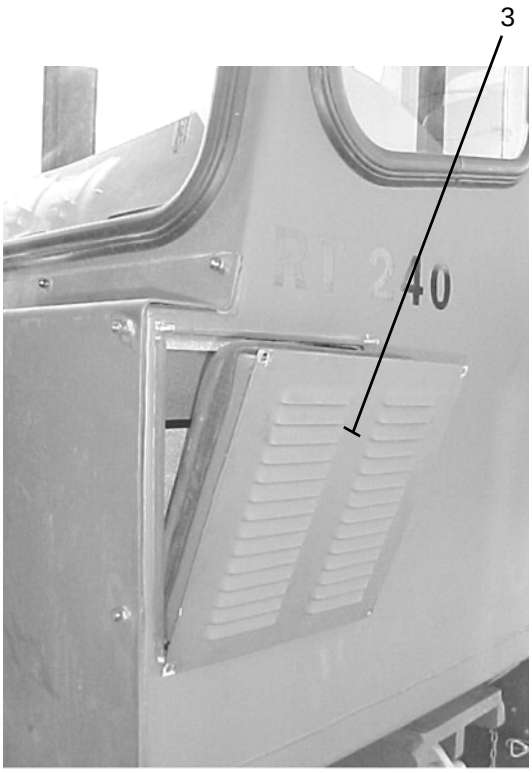
1. Install filter element (5) in cab heater and A/C housing (4).

CAB SIDE AIR FILTER INSTALLATION - CONTINUED

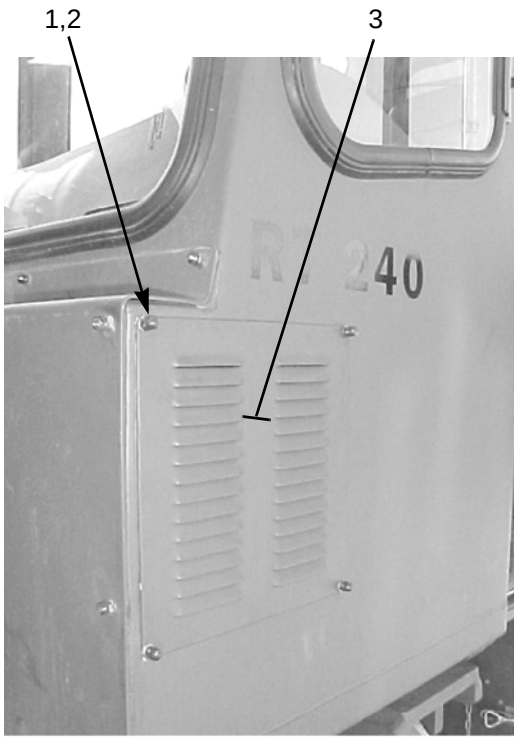
CAUTION

Take care when installing grille to prevent damaging rubber seal.

2. Apply a thin bead of gasket forming compound to flange of grille (3) and install grille on side of cab with four washers (2) and capnuts (1).



350-1015



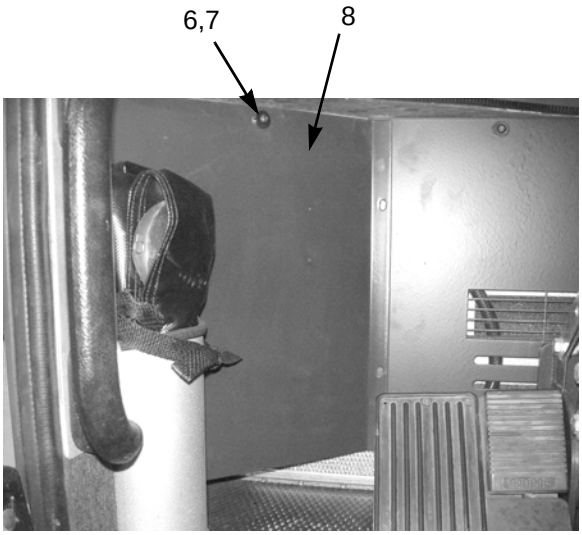
350-782

CAB INTERIOR AIR FILTER REMOVAL

NOTE

Step 1 applies to the ARMY and RESET vehicles ONLY.

1. Remove three screws (6), washers (7), and left lower panel (8).

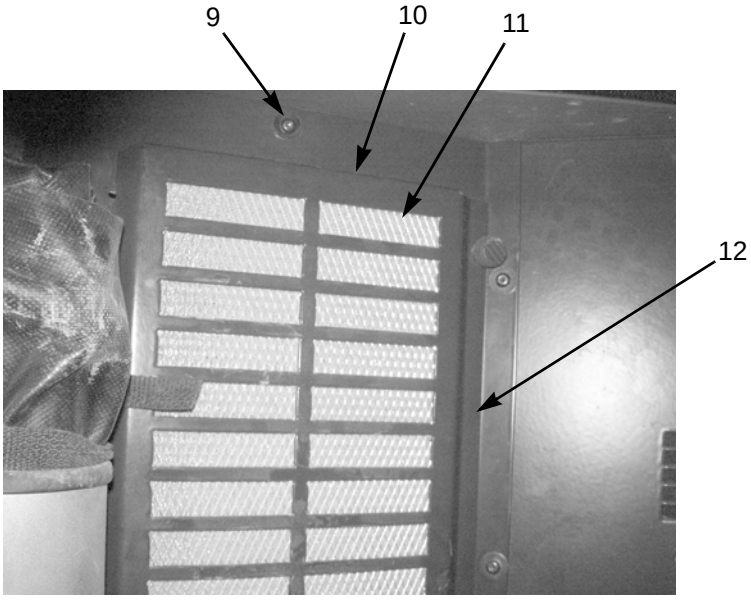


434-40018

NOTE

Step 2 applies to USMC vehicles ONLY.

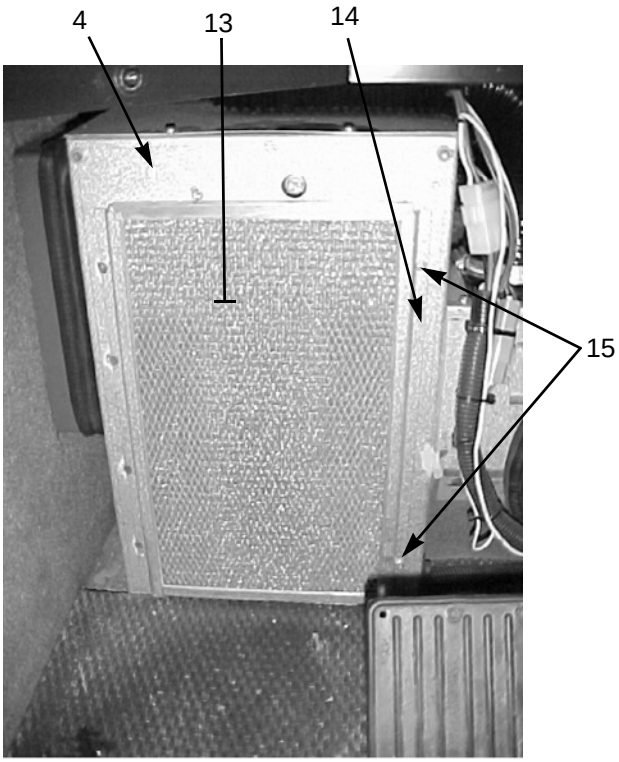
2. Remove two thumbscrews (9), securing retaining panel (10) and remove air filter (11) from panel (12).



434-40019

CAB INTERIOR AIR FILTER REMOVAL - CONTINUED

3. Remove two screws (15), bracket (14), and cab interior air filter (13) from cab heater and A/C housing (4).



CAB INTERIOR AIR FILTER CLEANING AND INSPECTION

Refer to *Cab Side Air Filter Cleaning and Inspection* procedures.

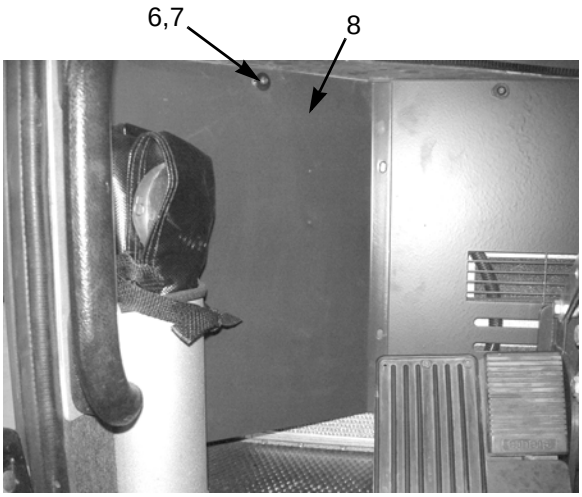
CAB INTERIOR AIR FILTER INSTALLATION

1. Install cab interior air filter (13) and bracket (14) on cab heater and A/C housing (4) with two screws (15).

NOTE

Step 2 applies to the ARMY and RESET vehicles ONLY.

2. Install left lower panel (8) with three screws (6) and three washers (7).



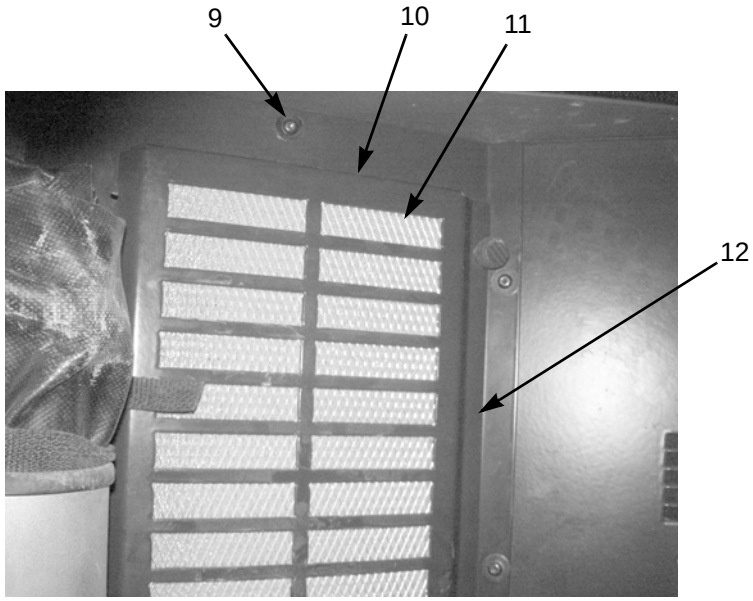
434-40018

CAB INTERIOR AIR FILTER INSTALLATION - CONTINUED

NOTE

Steps 3 and 4 apply to the USMC vehicles ONLY.

3. Position air filter (11) on panel (12).
4. Install retaining panel (10) and secure with two thumbscrews (9).



434-40019

END OF WORK PACKAGE

CAB AUXILIARY FAN REPLACEMENT 0193 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Equipment Condition

Master battery switch in OFF position

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

REMOVAL

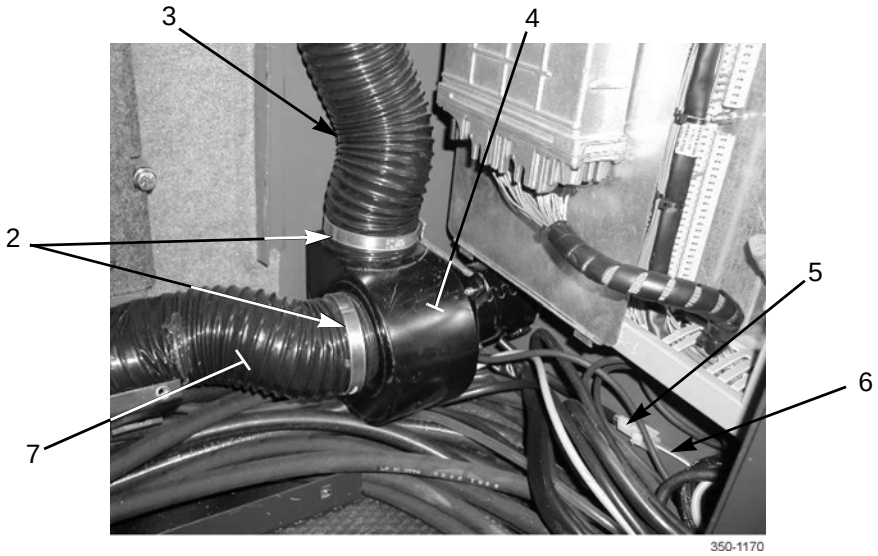
1. Lift and remove access panel (1) at rear of cab.



CAB AUXILIARY FAN REPLACEMENT - CONTINUED 0193 00

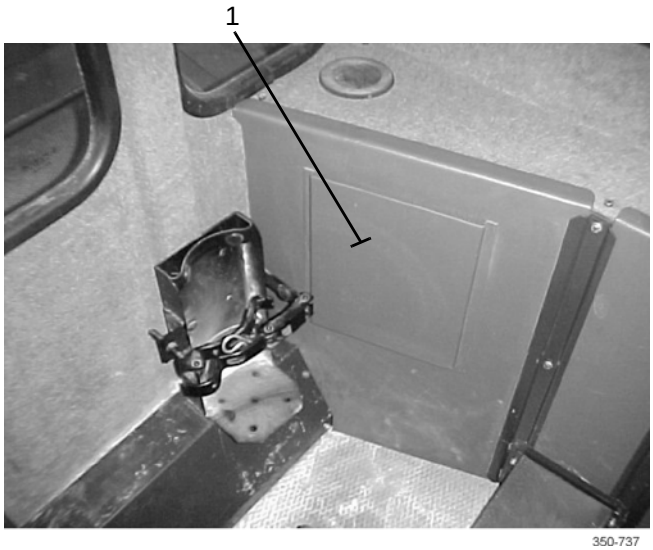
REMOVAL - CONTINUED

2. Disconnect connector (5) of auxiliary fan (4) from cab wiring harness (6).
3. Loosen two hose clamps (2) and disconnect two ducts (3 and 7).
4. Remove three screws and auxiliary fan (4) from cab.



INSTALLATION

1. Install auxiliary fan (4) in cab with three screws.
2. Connect two ducts (3 and 7) and tighten two hose clamps (2).
3. Connect connector (5) of auxiliary fan (4) to cab wiring harness (6).
4. Install access panel (1) on rear of cab.



END OF WORK PACKAGE

AIR CONDITIONER LEAK TEST 0194 00

THIS WORK PACKAGE COVERS

Inspection, Test

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Leak Detector, Refrigerant (Item 70, WP 0289 00)

INSPECTION


WARNING


- **Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness may result if you come in contact with liquid refrigerant.**
- **Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in fire or explosion, which could cause personal injury.**

NOTE

- **Refrigerant is odorless. As a result, all of it may leak away and not be noticed until system stops cooling. All vehicle refrigerant systems lose some refrigerant depending on the condition of the system. Higher loss rates signal a need to locate and repair leaks.**
- **Leaks are most often found at the compressor hose connections and at various fittings and joints in the system. If unapproved replacement hoses are installed, refrigerant can be lost through hose permeation.**

1. Visually inspect refrigerant system for A/C lubricant leakage and corrosion and damage to lines, hoses, and other components.
2. Visually inspect lowest points of fittings, hoses, and lines for indications of lubricant leakage.

TEST

Use a leak detector in accordance with manufacturer's instruction manual and check for refrigerant leakage at hose connections, fittings, and in areas where leakage might occur. If leaks are indicated, notify Direct Support Maintenance of leak in A/C system.

END OF WORK PACKAGE

AIR CONDITIONING COMPRESSOR DRIVE BELTS REPLACEMENT 0195 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

References

TM 10-3930-675-10

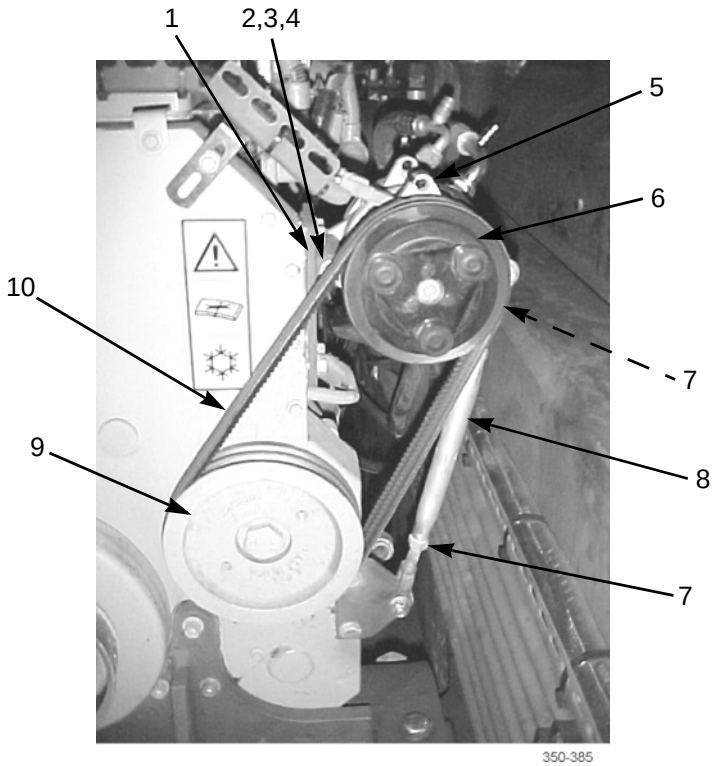
Equipment Condition

Engine cover removed (WP 0148 00)

Master battery switch in OFF position

REMOVAL

1. Loosen screw (2), nut (3), and washer (4) securing A/C compressor (5) to mounting bracket (1).
2. Loosen two adjusting jamnuts (7) on belt tension adjusting rod (8).
3. Remove drive belts (10) from accessory drive pulley (9) and A/C compressor pulley (6).

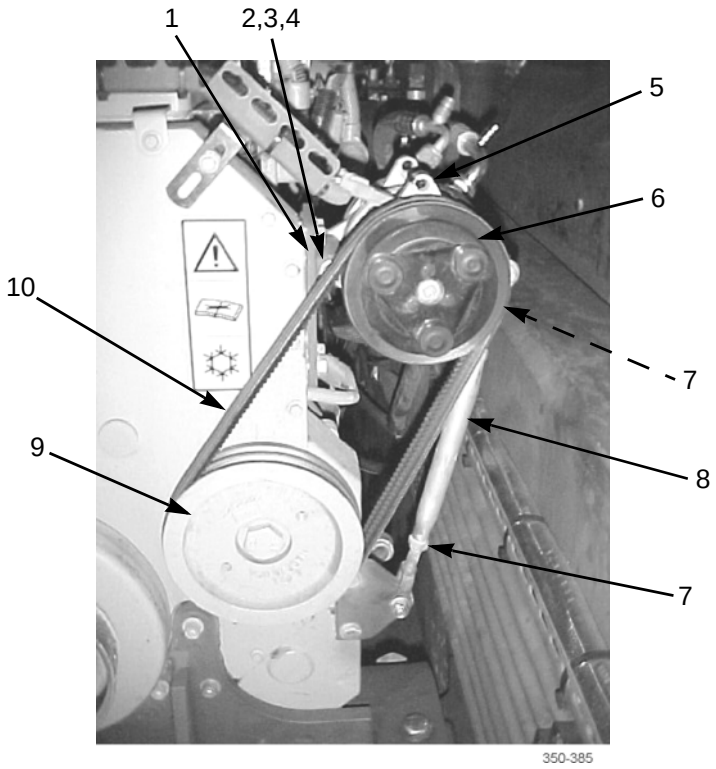


INSTALLATION

NOTE

If drive belts are worn, cracked, frayed, or dry rotted, belts must be replaced.

1. Install drive belts (10) around accessory drive pulley (9) and A/C compressor pulley (6).
2. Tighten belt tension adjusting rod (8) until drive belts (10) can be depressed no more than ½-in. (12.7 mm) at center of belts.
3. Tighten two adjusting jamnuts (7) on belt tension adjusting rod (8).
4. Tighten screw (2), washer (4), and nut (3) securing A/C compressor (5) to mounting bracket (1).
5. Recheck tension of drive belts (10) to ensure not more than ½-in. (12.7 mm) depression at center of belts.



6. Turn master battery switch to ON position.
7. Operate engine (TM 10-3930-675-10) for ten minutes. Shut down, recheck, and adjust tension as needed.
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

AIR CONDITIONER FANS MAINTENANCE 0196 00

THIS WORK PACKAGE COVERS

Air Conditioner Fans: Removal, Installation

Relays and Resistors: Removal, Installation

INITIAL SETUP

Maintenance Level

Organizational

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.001) (6)

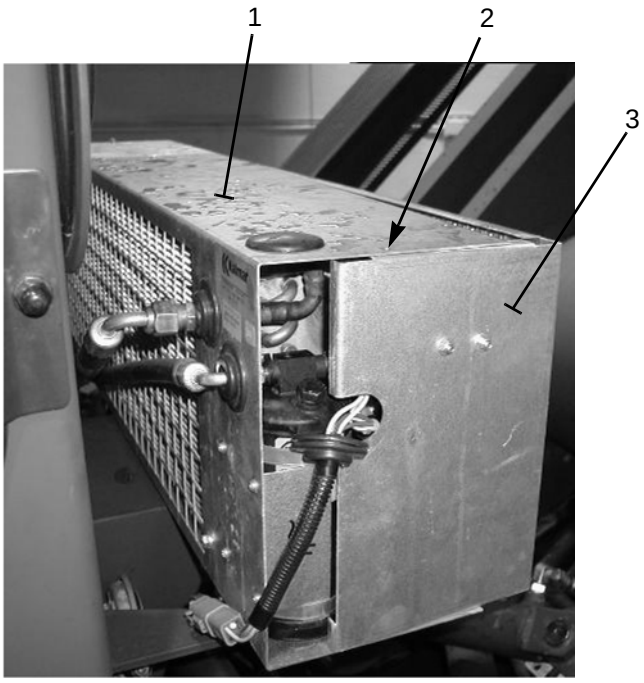
Nut, lock (P/N 920076.002) (8)

Equipment Condition

Master battery switch in OFF position

AIR CONDITIONER FANS REMOVAL

1. Remove ten screws (2) to free cover (3) assembly from condenser fan box (1).

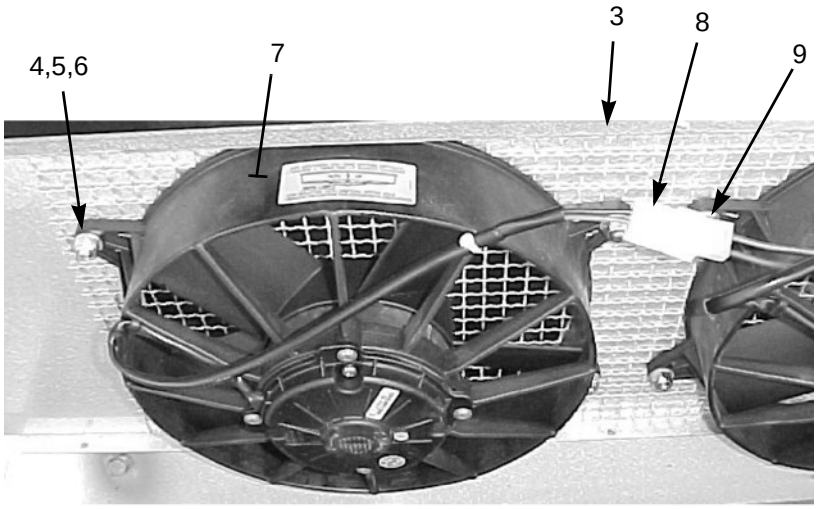


AIR CONDITIONER FANS REMOVAL - CONTINUED

NOTE

- **Perform steps 2 and 3 for each of two air conditioner fans.**
- **Tag connectors for installation.**
- **Remove tiedown straps as necessary.**

2. Disconnect air conditioner fan (7) connector (8) from fan wiring harness (9).
3. Remove four locknuts (4), eight washers (5), four screws (6), and air conditioner fan (7) from cover (3). Discard locknuts.



350-793

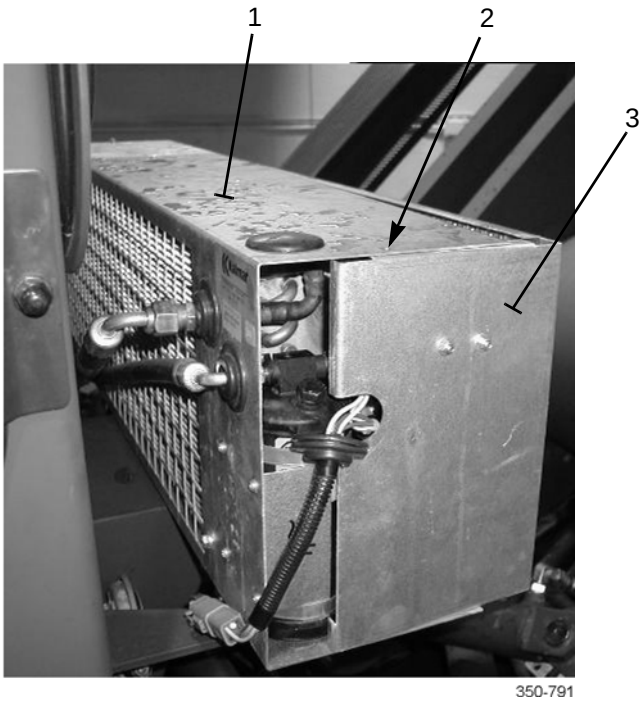
AIR CONDITIONER FANS INSTALLATION

NOTE

Perform steps 1 and 2 for each of two air conditioner fans.

1. Install air conditioner fan (7) on cover (3) with four screws (6), eight washers (5), and four new locknuts (4).
2. Connect connector (8) of air conditioner fan (7) to fan wiring harness (9). Install new tiedown straps.
3. Position cover (3) assembly on condenser fan box (1) and install ten screws (2).

AIR CONDITIONER FANS INSTALLATION - CONTINUED



RELAYS AND RESISTORS REMOVAL

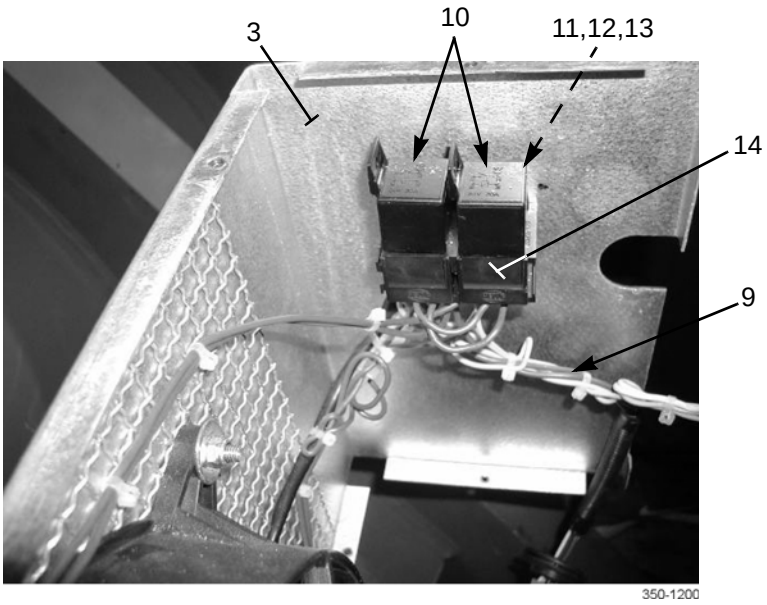
1. Remove two screws (2) to free cover assembly (3) from condenser fan box (1).

RELAYS AND RESISTORS REMOVAL- CONTINUED

NOTE

Perform steps 2 and 3 to remove two fan relays.

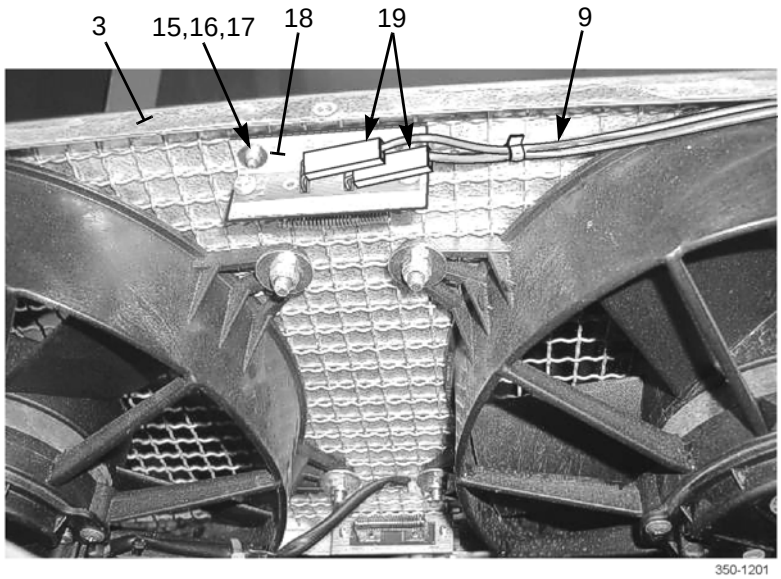
2. Remove two relays (10) from terminal blocks (14) of fan wiring harness (9).
3. Remove two locknuts (11), washers (12), screws (13), and terminal blocks (14) from cover (3). Discard locknuts.



NOTE

Perform steps 4 and 5 to remove each of two resistors.

4. Disconnect two connectors (19) of fan wiring harness (9) from resistor (18).
5. Remove two locknuts (15), washers (16), screws (17), and resistor (18) from cover (3). Discard locknuts.



RELAYS AND RESISTORS INSTALLATION

NOTE

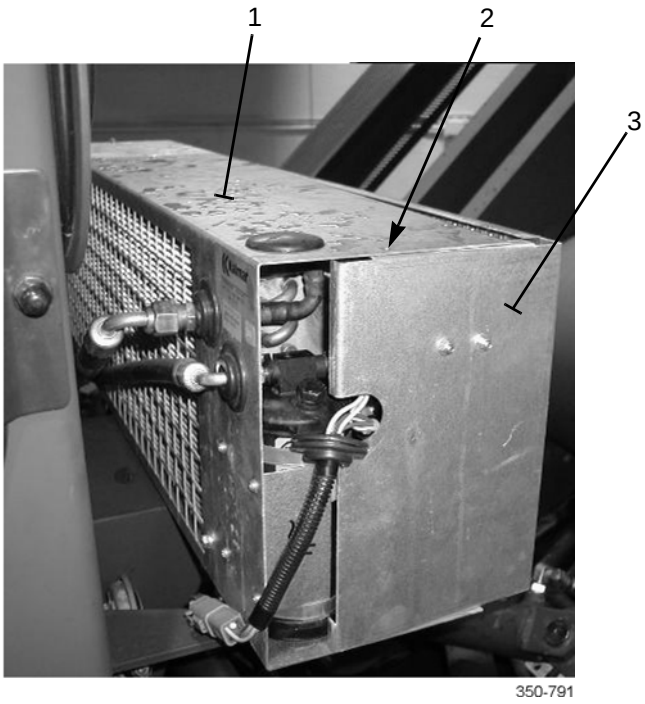
Perform steps 1 and 2 to install each of two resistors.

1. Install resistor (18) on cover (3) with two screws (17), washers (16), and new locknuts (15).
2. Connect two connectors (19) of fan wiring harness (9) to resistor (18).

NOTE

Perform steps 3 and 4 to install two fan relays.

3. Install terminal blocks (14) of fan wiring harness (9) on cover (3) with two screws (13), washers (12), and new locknuts (11).
4. Install two relays (10) on terminal blocks (14).
5. Install cover (3) assembly on condenser fan box (1) and install ten screws (2).



350-791

END OF WORK PACKAGE

CHAPTER 4
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

ENGINE ASSEMBLY REPLACEMENT 0197 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Fixture, Engine Lifting (Item 37, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Engine and Transmission (Item 110, WP 0289 00)

Stand, Engine Support (Item 117, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Stud, Guide

Materials/Parts

Compound, Gasket Forming, Silicone (Item 10, WP 0290 00)

Fuel, Diesel, DF-2 Grade (Item 18, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Gasket (P/N 182459)

Gasket (P/N 3026134)

Nut, lock (P/N 920076.002)

Washer, lock (98174) (12)

Personnel Required

Three

References

WP 0050 00

WP 0198 00

WP 0223 00

WP 0247 00

Equipment Condition

Boom raised to maximum angle (TM 10-3930-675-10)

Cab in transport position (TM 10-3930-675-10)

Engine cover removed (WP 0148 00)

Access covers and skid plates removed (WP 0142 00)

Battery cables disconnected (WP 0110 00)

Alternator removed (WP 0070 00)

Coolant drained and coolant lines disconnected from engine (WP 0064 00 and WP 0065 00)

Oil drained from engine (WP 0053 00)

Oil sampling supply hose disconnected (WP 0055 00)

Transmission dipstick removed (WP 0117 00)

Fuel supply and drain return hoses disconnected (WP 0060 00)

Air intake ducts removed (WP 0058 00)

Exhaust system disconnected from turbocharger (WP 0063 00)

Turbocharger removed (WP 0217 00)

Electrical interface wiring harness disconnected from ECU and removed (WP 0080 00)

Electrical wiring harness and leads disconnected from starter (WP 0072 00)

Ether cold start system removed (WP 0061 00)

Air conditioning compressor drive belt removed (WP 0195 00)

CAUTION

- **If engine and/or transmission is not operational and boom must be elevated, auxiliary pump can be used to provide hydraulic power for boom operation. Operate pump for not more than four minutes and allow pump to cool for not less than two minutes. Perform operate and cool cycle as many times as needed to elevate boom. Failure to allow pump to cool may cause damage to pump.**
- **DO NOT begin engine assembly replacement without first having all required tools and equipment to complete the procedure. This will help in reducing the time boom must remain at maximum elevation.**

NOTE

Remove engine from front of vehicle using suitable lift.

REMOVAL



- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Engine weighs 2,070 lb (940 kg). Lifting device must have sufficient capacity to lift engine. Failure to follow this warning may result in death or injury to personnel.**
- **Improper use of lifting equipment and improper attachment of cable to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.**
- **Fuel lines and hoses may contain residual amounts of fuel that may be spilled. To prevent personnel injury from slipping on spilled fuel, spilled fuel should be cleaned up immediately.**

NOTE

If A/C compressor is being removed for access, it is not necessary to disconnect refrigerant lines.

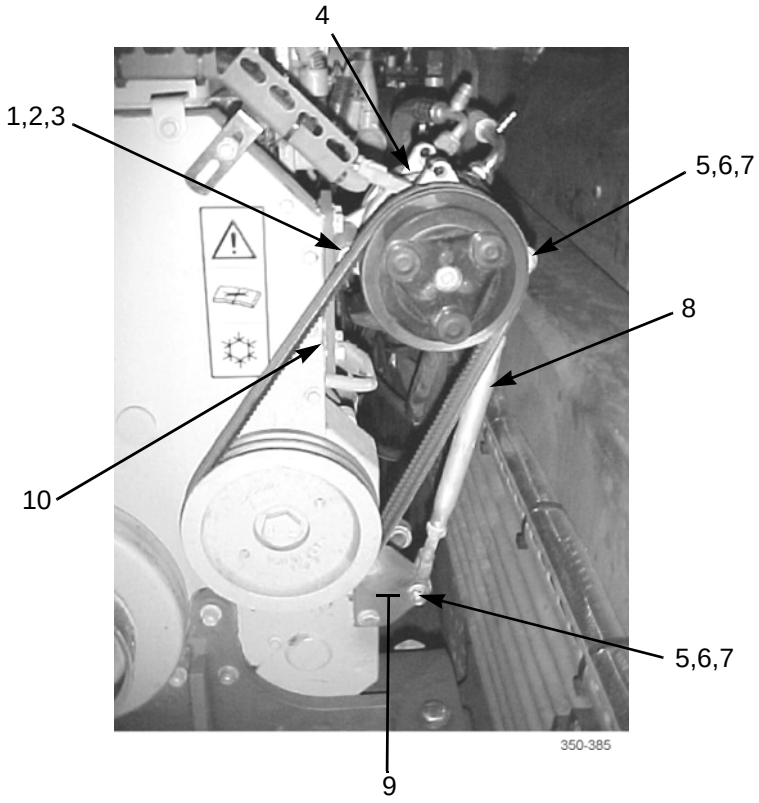
1. Remove all tiedown straps and clamps securing A/C refrigerant lines to engine. Discard tiedown straps.
2. Remove screw (5), washer (6), and nut (7) securing drive belt adjustment arm (8) to A/C compressor (4).
3. Remove screw (5), washer (6), and nut (7) securing drive belt adjustment arm (8) to engine mount bracket (9). Remove drive belt adjustment arm and retain for installation.
4. Remove screw (1), washer (2), and nut (3) securing A/C compressor to engine mount bracket (10).

NOTE

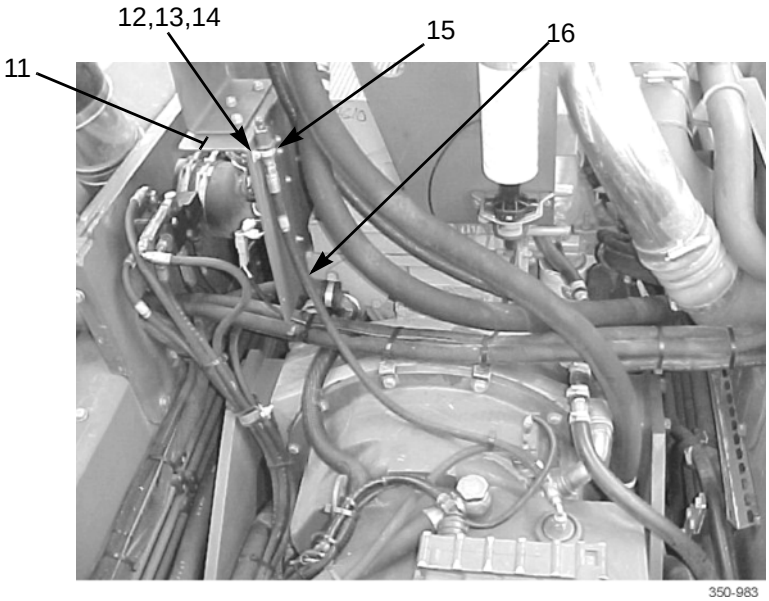
When positioning A/C compressor and refrigerant lines free of engine, ensure refrigerant line connections are not loosened or broken, allowing refrigerant to escape from system.

5. With assistance, remove A/C compressor (4) with refrigerant lines attached and position free of engine compartment.

REMOVAL - CONTINUED



6. Remove screw (14), two washers (13), locknut (12), hose clamp (15), and transmission vent hose (16) from bracket (11). Secure vent hose free of engine and discard locknut.



REMOVAL - CONTINUED

NOTE

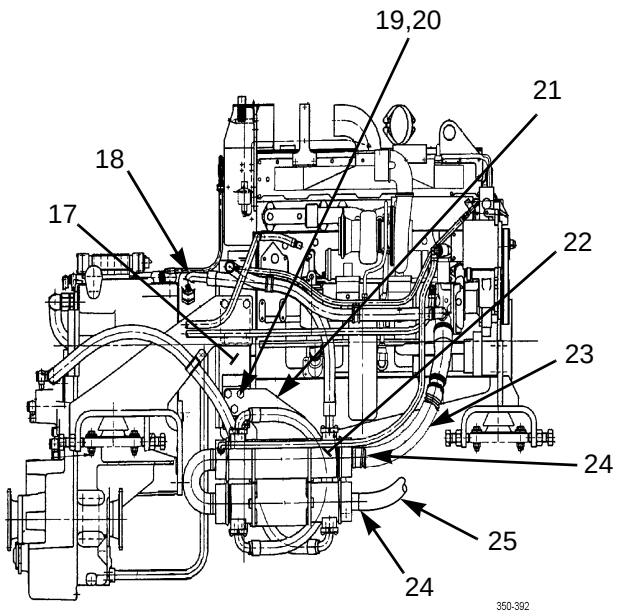
Tag transmission coolant lines to ensure correct installation.

7. Loosen hose clamp (24) and disconnect coolant inlet hose (23) from transmission oil cooler (22).
8. Loosen hose clamp (24) and disconnect coolant outlet hose (25) from transmission oil cooler (22).

NOTE

When removing transmission oil cooler for access, it is not necessary to disconnect oil hoses from transmission oil cooler.

9. Remove hose clamps, screws, washers, and nuts as needed to release transmission oil hoses.
10. Disconnect hydraulic hose (18).
11. Remove three screws (19) and washers (20) securing transmission oil cooler bracket (21) to flywheel housing (17).
12. With assistance, remove transmission oil cooler (22) with hoses attached from flywheel housing (17). Position transmission oil cooler and hoses free of engine lift area.

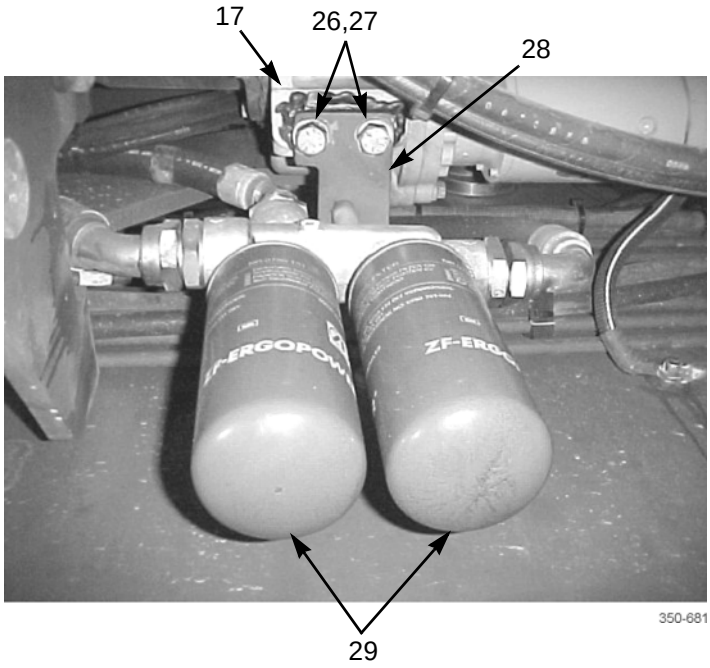


NOTE

When removing transmission oil filters and bracket for access, it is not necessary to disconnect transmission oil hoses from filters.

13. Remove two screws (26) and washers (27) securing transmission oil filter bracket (28) to flywheel housing (17).
14. Remove transmission oil filters (29) and bracket (28) from flywheel housing (17). Position free of engine lift area.

REMOVAL - CONTINUED



NOTE

When removing cooling fan hydraulic pump from engine, it is not necessary to disconnect two hydraulic hoses attached.

15. Remove cooling fan hydraulic pump from drive adapter of engine and set pump aside (WP 0247 00).

REMOVAL - CONTINUED

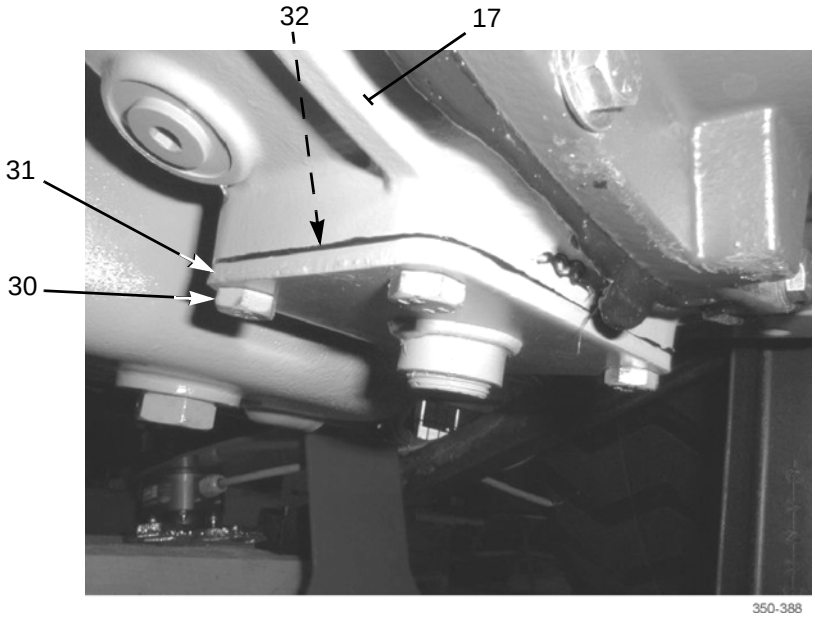


WARNING

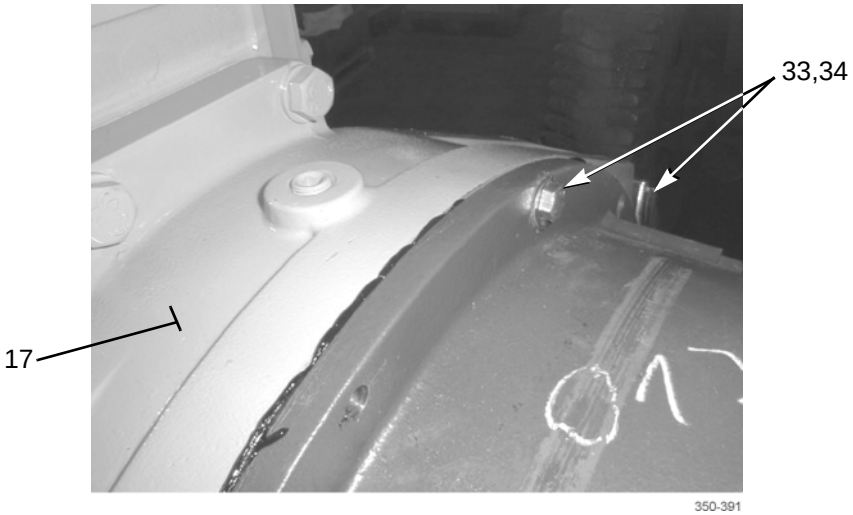
Engine weighs 2,070 lb (940 kg). Lifting device must have sufficient capacity to lift engine. Failure to follow this warning may result in death or injury to personnel.

16. Connect engine lifting fixture and suitable lifting device to engine front and rear lifting brackets. Take slack out of chains.

17. Remove four screws (30), access cover (31), and gasket (32) from bottom of flywheel housing (17). Discard gasket.



18. Remove 12 screws (33) and lockwashers (34) securing transmission to engine flywheel housing (17). Discard lockwashers.

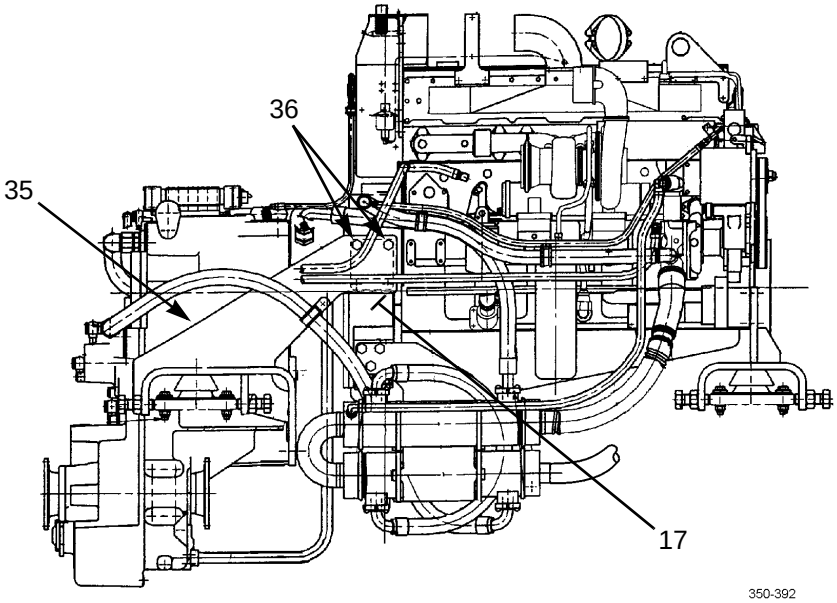


REMOVAL - CONTINUED

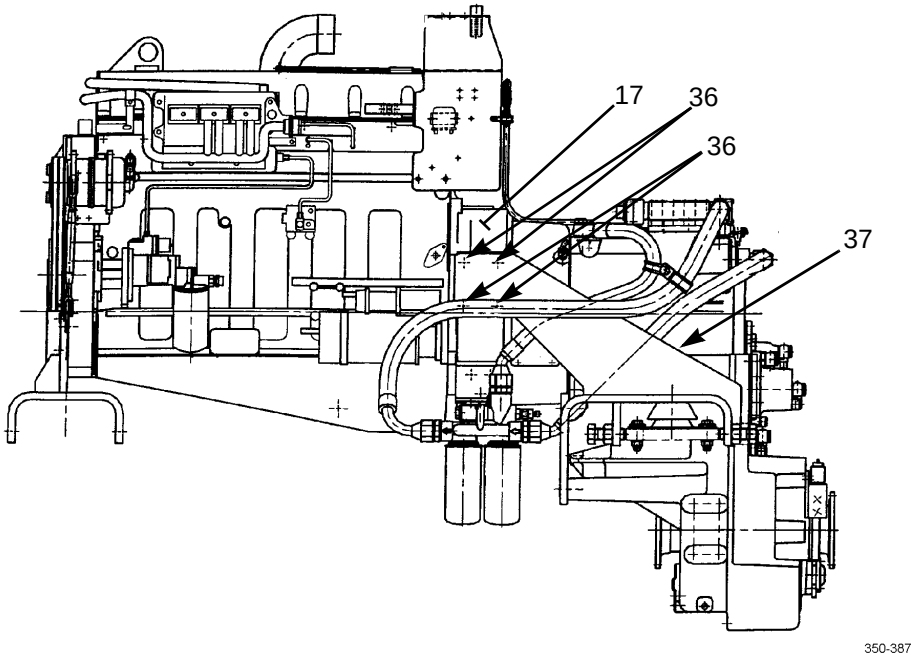
NOTE

Ensure engine weight is supported by lifting device.

19. Remove four screws (36) securing right rear engine and transmission mounting bracket (35) to flywheel housing (17).



20. Remove four screws (36) securing left rear engine and transmission mounting bracket (37) to flywheel housing (17).



REMOVAL - CONTINUED

21. Disconnect front engine mounts from engine and frame. Move front engine mounts forward to gain access to remove engine (WP 0198 00).

NOTE

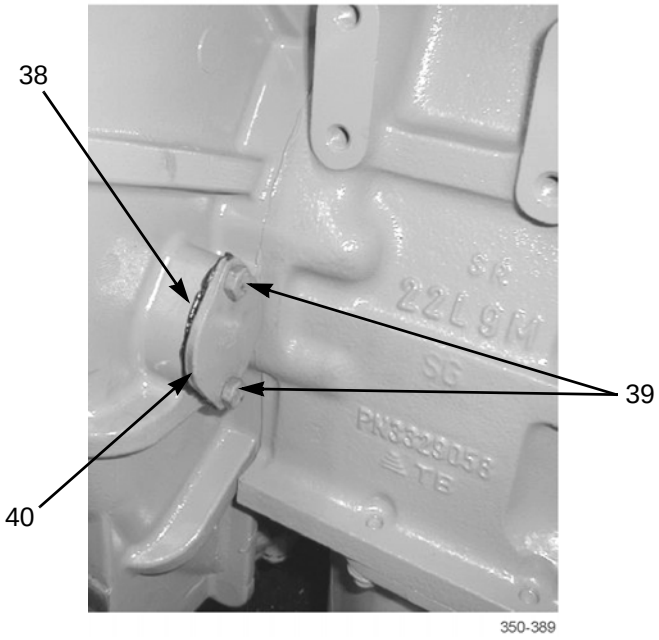
- **Damper plates and torque converter should remain with engine during engine removal.**
- **It may be necessary to tap on transmission-to-engine connection point with plastic-faced hammer to break seal between two units.**

22. Carefully separate engine from transmission and lift engine from vehicle.

NOTE

If replacement engine is being installed, inspect removed engine for components to be removed and transferred to replacement engine.

23. Secure engine on suitable stand or in container.
24. Remove two screws (39), cover (40), and gasket (38) from flywheel-to-damper plate mounting screw access.

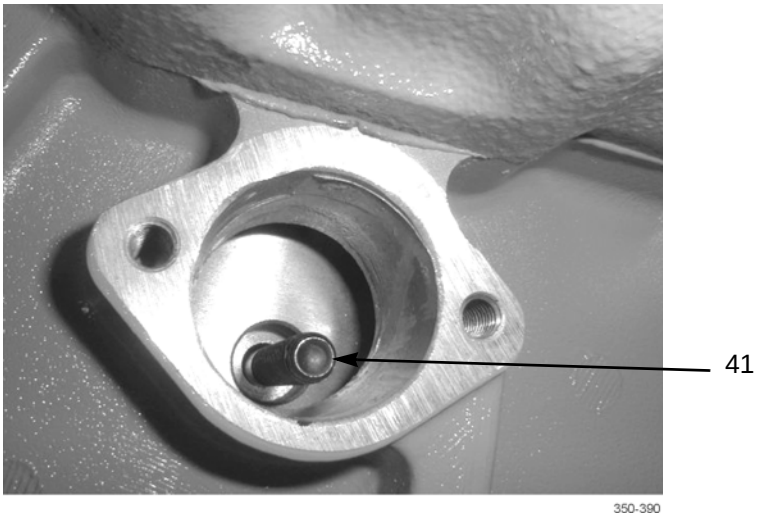


REMOVAL - CONTINUED

NOTE

Flywheel is secured to transmission damper plates with 12 screws.

25. With assistance, bar engine in clockwise direction using accessory drive while observing through access hole. Stop rotation when screw is visible through access hole.
26. Remove screw (41) securing flywheel to damper plate.



27. Repeat steps 25 and 26 to remove remaining eleven screws (41).
28. Upon removal of last screw, insert guide stud and secure to damper plate.



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

29. Remove torque converter and damper plates from engine.

INSTALLATION



WARNING

Engine weighs 2,070 lb (940 kg). Lifting device must have sufficient capacity to lift engine. Failure to follow this warning may result in death or injury to personnel.

NOTE

- **Ensure all bracket mounting, engine mating, and transmission mating surfaces have been cleaned and are free of old gasket forming compound and gasket material.**
- **Prior to lowering engine into vehicle, ensure flywheel-to-damper plate screw hole is visible through access hole in flywheel housing.**

1. Install torque converter and damper plates on transmission (WP 0223 00).
2. Using suitable lifting device and engine lifting fixture, lower engine into vehicle.
3. Apply coat of silicone gasket forming compound to engine and transmission mating surface.

NOTE

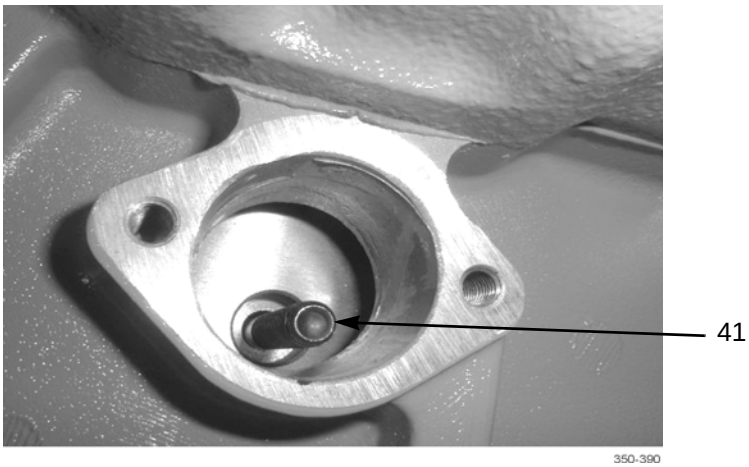
It may be necessary to adjust transmission damper plate by hand to align guide stud with mating flywheel screw hole.

4. Position engine to allow damper plate guide stud to pass through flywheel-to-damper screw hole and flywheel housing access.

NOTE

Flywheel and damper plates are secured with 12 screws; final tightening is done after all screws are installed.

5. Remove guide stud and install screw (41). Tighten screw hand tight.
6. Bar engine over until next screw hole is visible and install screw (41). Tighten screw hand tight.
7. Repeat step 6 for remaining screws until 12 screws are installed securing flywheel to damper plate.
8. Bar engine over clockwise and tighten each screw (41) to 48 lb-ft (65 Nm).

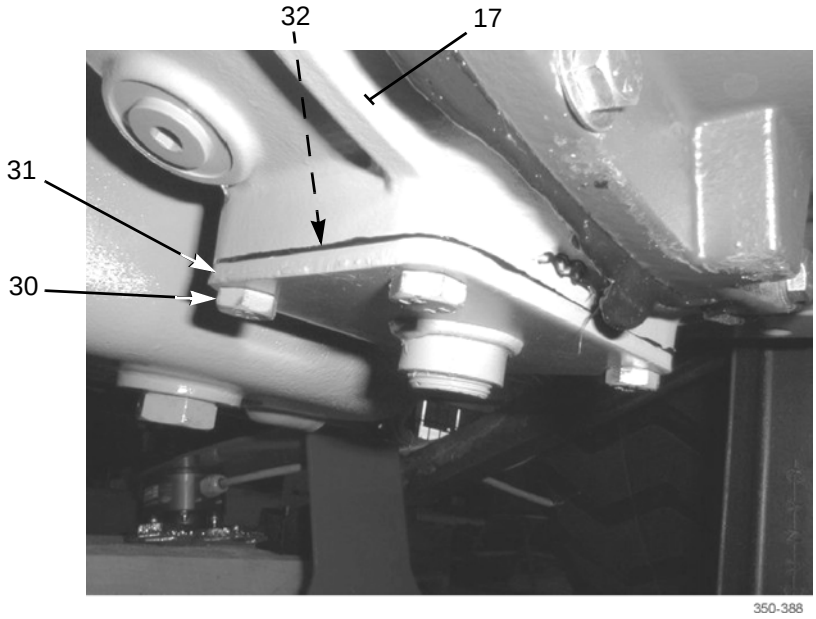


INSTALLATION - CONTINUED

9. Install 12 screws (33) and new lockwashers (34) to secure transmission to flywheel housing (17). Tighten screws to 38 lb-ft (52 Nm).

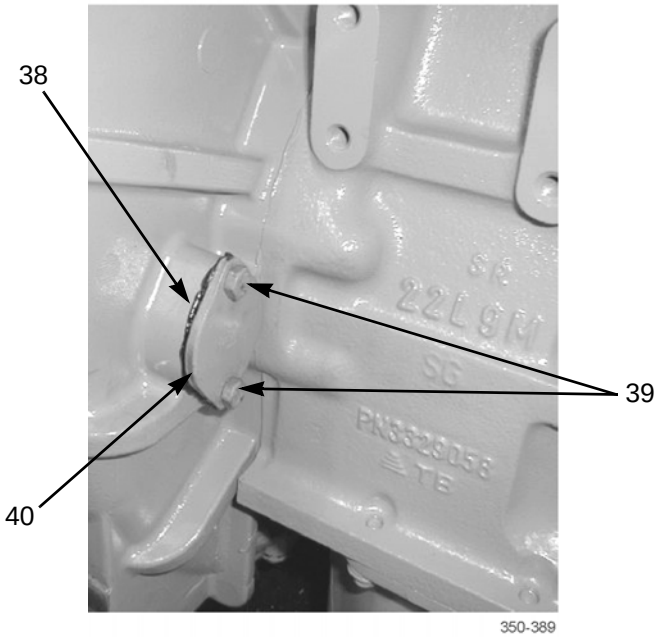


10. Install access cover (31) and new gasket (32) on bottom of flywheel housing (17) with four screws (30).

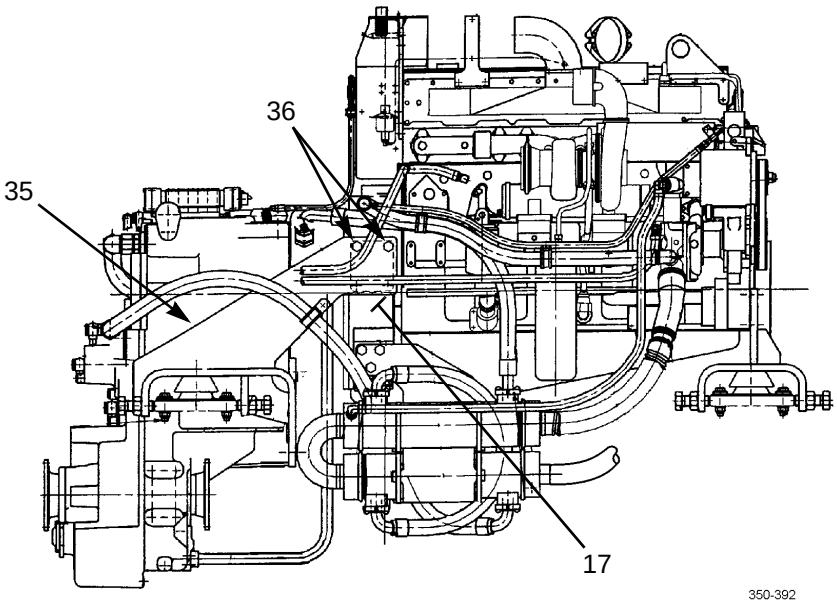


INSTALLATION - CONTINUED

11. Install cover (40) and new gasket (38) with two screws (39) over flywheel-to-damper plate screw access.

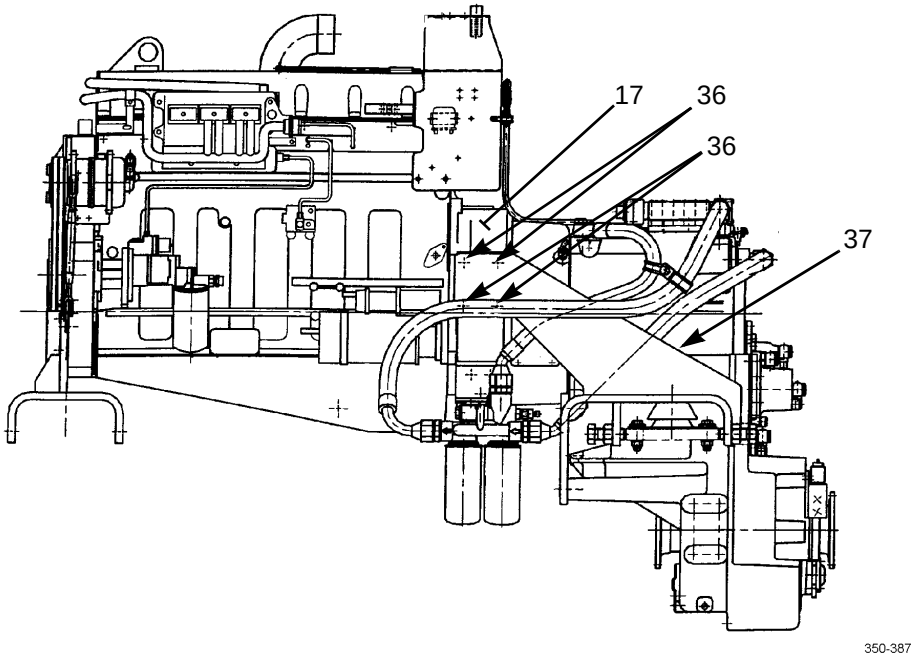


12. Apply gasket forming compound to mounting surface and install four screws (36) to secure right rear engine and transmission mounting bracket (35) to flywheel housing (17). Tighten screws to 116 lb-ft (157 Nm).



INSTALLATION - CONTINUED

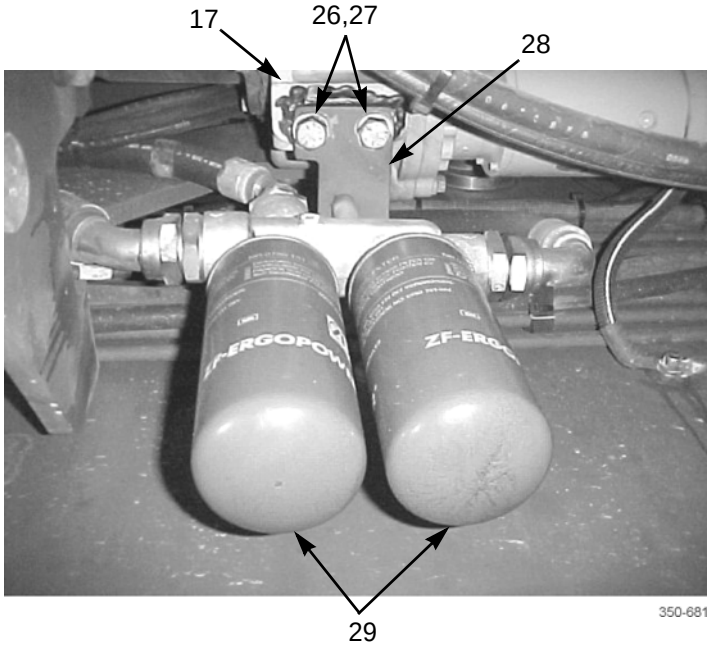
13. Apply gasket forming compound to mounting surface and install four screws (36) to secure left rear engine and transmission mounting bracket (37) to flywheel housing (17). Tighten screws to 116 lb-ft (157 Nm).



14. Install front engine mounts on frame and engine (WP 0198 00).

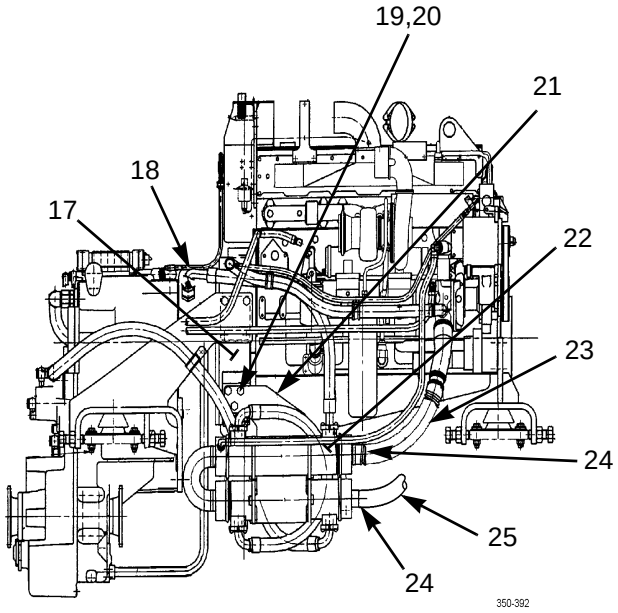
15. Release tension on engine lifting fixture chains and disconnect lifting device and lifting fixture from engine lifting brackets.

16. Apply gasket forming compound to mounting surface on flywheel housing (17) and install two screws (26) and washers (27) to secure transmission oil filter bracket (28) with transmission oil filters (29) and hoses in place. Tighten screws to 116 lb-ft (157 Nm).

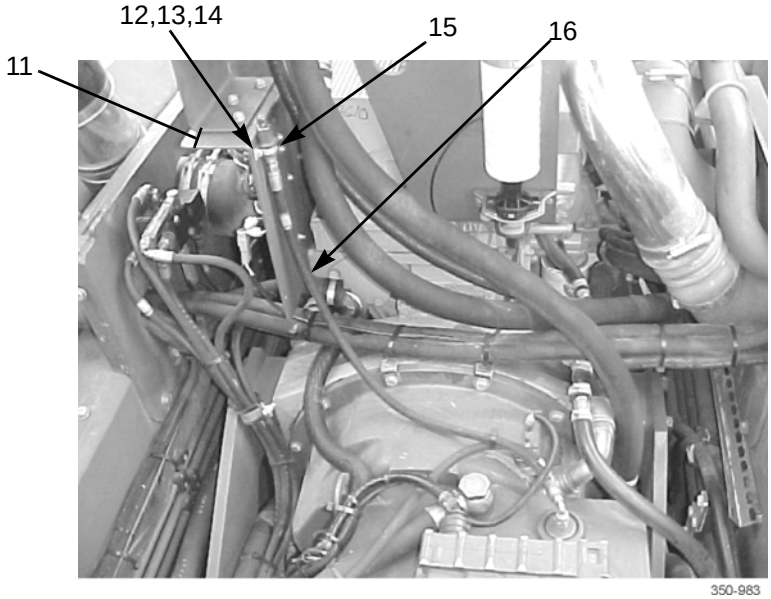


INSTALLATION - CONTINUED

17. Install cooling fan hydraulic pump on drive adapter of engine (WP 0247 00).
18. Apply gasket forming compound to mounting surface on flywheel housing (17) and install three screws (19) and washers (20) to secure transmission oil cooler bracket (21) with oil cooler (22) and transmission oil hoses. Tighten screws to 116 lb-ft (157 Nm).
19. Connect hydraulic hose (18).
20. Install hose clamps, screws, washers, and nuts as necessary to secure transmission oil hoses.
21. Install coolant inlet hose (23) and coolant hose outlet (25) on transmission oil cooler (22) and secure with hose clamps (24).

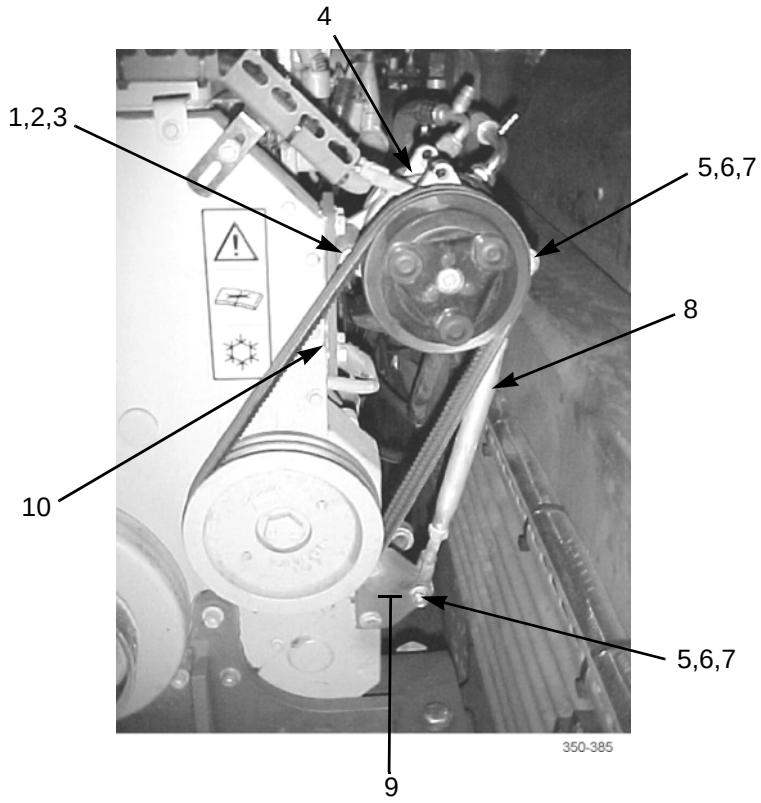


22. Install transmission vent hose (16), hose clamp (15), screw (14), two washers (13), and new locknut (12) on bracket (11).



INSTALLATION - CONTINUED

23. Position A/C compressor (4) with refrigerant lines on engine mount bracket (10) and secure with screw (1), washer (2), and nut (3).
24. Position drive belt adjustment arm (8) and secure one end to engine mount bracket (9) and opposite end to A/C compressor (4) with two screws (5), washers (6), and nuts (7).



25. Install and adjust A/C compressor drive belt (WP 0195 00).
26. Install ether cold start system (WP 0061 00).
27. Connect electrical wiring harness and leads to starter (WP 0072 00).
28. Connect electrical interface wiring harness to ECU (WP 0080 00).
29. Install turbocharger (WP 0217 00).
30. Connect exhaust system to turbocharger (WP 0063 00).
31. Install air intake ducts (WP 0058 00).
32. Connect coolant lines to engine (WP 0064 00 and WP 0065 00).
33. Install transmission dipstick (WP 0117 00).
34. Connect oil sampling supply hose to engine (WP 0055 00).
35. Connect fuel supply and drain return hoses (WP 0060 00).
36. Install alternator (WP 0070 00).
37. Connect battery cables (WP 0110 00).
38. Check and fill all fluids (fuel, coolant, engine oil, transmission oil) to proper level (WP 0050 00).

INSTALLATION - CONTINUED

CAUTION

If normal engine oil pressure is not indicated within 15 seconds, shut down engine immediately. Failure to follow this caution may result in serious engine damage.

39. Operate engine for three minutes, shut down, and check for fluid leaks and proper indications (TM 10-3930-675-10).
40. Operate engine to normal temperature and check operation (TM 10-3930-675-10).
41. Install access covers and skid plates (WP 0142 00).
42. Install engine cover (WP 0148 00).
43. Return cab to operational position and lower boom (TM 10-3930-675-10).

END OF WORK PACKAGE

ENGINE MOUNTS AND LIFTING BRACKETS REPLACEMENT 0198 00

THIS WORK PACKAGE COVERS

Lifting Brackets: Removal, Installation

Front Engine Mount: Removal, Installation

Rear Engine Mount: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Trestle, Hoist, Portable (Item 129, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Compound, Sealing (Item 13, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Personnel Required

Two

Equipment Condition

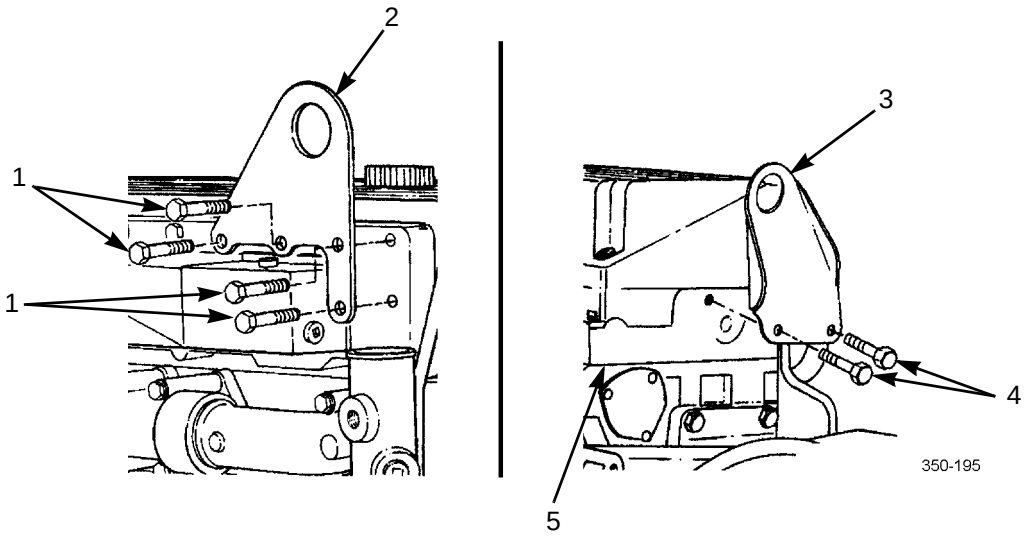
Engine cover removed (WP 0148 00)

Cab in transport position (TM 10-3930-675-10)

Access covers removed (WP 0142 00)

LIFTING BRACKETS REMOVAL

1. Remove four screws (1) securing front lifting bracket (2) and two screws (4) securing rear lifting bracket (3).
2. Remove front and rear lifting brackets (2 and 3) from cylinder head (5).



LIFTING BRACKETS INSTALLATION

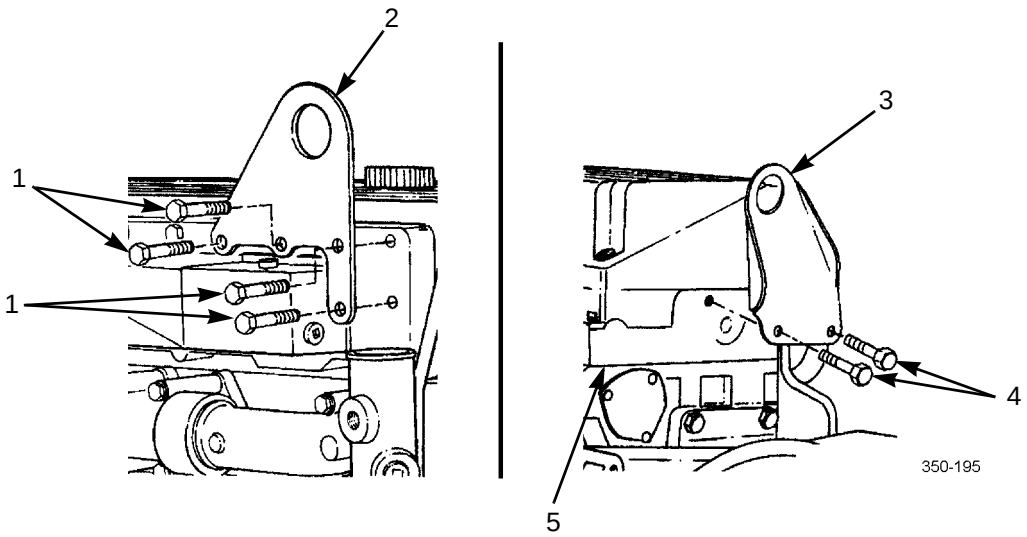
CAUTION

DO NOT use or install a cracked, bent, or otherwise damaged lifting bracket. Do not weld a cracked bracket. Doing so may cause severe equipment damage during lifting operations.

NOTE

Ensure lifting brackets are not cracked or bent and are clean and free of dirt.

1. Position front lifting bracket (2) and secure with four screws (1). Tighten screws to 35 lb-ft (47 Nm).
2. Position rear lifting bracket (3) and secure with two screws (4). Tighten screws to 60 lb-ft (81 Nm).



3. Install access covers (WP 0142 00).
4. Return cab to operational position (TM 10-3930-675-10).
5. Install engine cover (WP 0148 00).

FRONT ENGINE MOUNT REMOVAL

CAUTION

Position trestle under front of engine to assist with supporting weight while front engine mounts are not in place. DO NOT, however, position trestle under oil pan. Damage to oil pan may result.

1. Position suitable lifting device and attach to engine front lifting bracket (2).

NOTE

Right- and left-front engine shock mounts are removed in the same manner. Perform steps 2 thru 5 on both front engine shock mounts.

2. Loosen two jamnuts (14) and adjusting screws (13).

NOTE

Adjust lifting device to support weight of engine without applying tension on mounting hardware.

ENGINE MOUNTS AND LIFTING BRACKETS REPLACEMENT - CONTINUED 0198 00

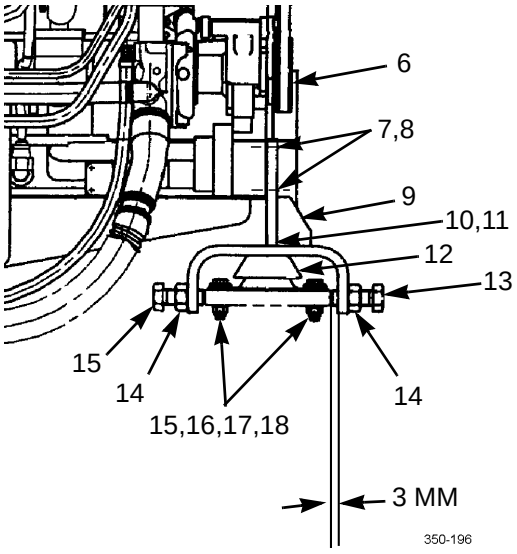
FRONT ENGINE MOUNT REMOVAL - CONTINUED

3. Remove screw (10) and washer (11) securing front engine mount (9) to shock mount (12).
4. Remove two nuts (18), four washers (16 and 17), and two screws (15) securing shock mount (12) in place.
5. Lift engine (6) slightly to relieve pressure on shock mount (12). Remove shock mount.

NOTE

To remove front engine mount, perform steps 6 and 7.

6. Remove six screws (7) and washers (8) securing front engine mount (9) to engine (6).
7. Remove front engine mount (9) from vehicle.



FRONT ENGINE MOUNT INSTALLATION

NOTE

If front engine mount was removed, perform step 1 to reinstall.

1. Apply a light coat of sealing compound to front engine mount (9) and install on engine (6) with six washers (8) and screws (7). Tighten screws to 50 lb-ft (68 Nm).

NOTE

Ensure engine is supported by suitable lifting device and remove trestle from under front of engine.

2. Position shock mount (12) and secure in place with two screws (15), four washers (16 and 17), and two nuts (18). Tighten nuts to 125 lb-ft (169 Nm).
3. Position front engine mount (9) over shock mount (12) and secure with screw (10) and washer (11). Tighten screw to 288 lb-ft (390 Nm).
4. Set front engine mount adjusting screws (13) for a clearance of 0.12 in. (3 mm) and tighten jamnuts (14).
5. Install access covers (WP 0142 00).
6. Return cab to operational position (TM 10-3930-675-10).

FRONT ENGINE MOUNT INSTALLATION - CONTINUED

7. Install engine cover (WP 0148 00).

REAR ENGINE MOUNT REMOVAL

CAUTION

Position trestle under rear of engine to assist with supporting weight while rear engine mount is not in place. DO NOT, however, position trestle under oil pan. Damage to oil pan may result.

1. Position suitable lifting device and attach to engine lifting brackets.

NOTE

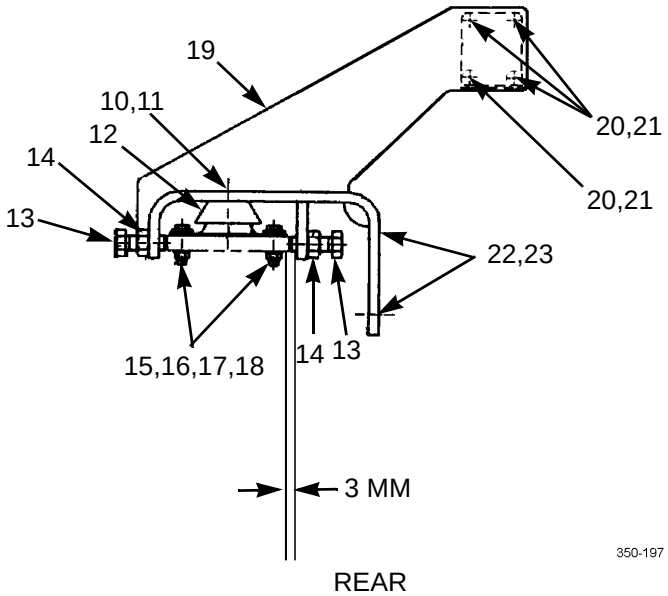
Left- and right-rear engine shock mounts are removed in the same manner.

2. Loosen two jamnuts (14) and adjusting screws (13).

NOTE

Adjust lifting device to support weight of engine without applying tension on mounting hardware.

3. Remove four screws (20) and washers (21) to disconnect rear support bracket (19) from engine.
4. Remove two screws (22) and washers (23) to disconnect rear support bracket (19) from transmission.
5. Remove screw (10) and washer (11) securing rear support bracket (19) to shock mount (12).
6. With assistance, lift rear support bracket (19) from installed location.
7. Remove two nuts (18), four washers (16 and 17), two screws (15), and shock mount (12).



REAR ENGINE MOUNT INSTALLATION

1. Position shock mount (12) and secure in place with two screws (15), four washers (16 and 17), and two nuts (18). Tighten nuts to 125 lb-ft (169 Nm).

NOTE

Ensure engine and transmission are supported by suitable lifting device and remove trestle from under engine.

2. With assistance, lower rear support bracket (19) into position over shock mount (12) and secure with screw (10) and washer (11). Tighten screw to 288 lb-ft (390 Nm).
3. Position rear support bracket (19) on engine and secure four screws (20) and washers (21). Tighten screws to 115 lb-ft (156 Nm).
4. Position rear support bracket (19) on transmission and secure with two screws (22) and washers (23). Tighten screws to 100 lb-ft (135 Nm).
5. Set rear support bracket adjusting screws (13) for a clearance of 0.12 in. (3 mm) and tighten jamnuts (14).
6. Install access covers (WP 0142 00).
7. Return cab to operational position (TM 10-3930-675-10).
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

CYLINDER HEAD REPLACEMENT 0199 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Bracket, Lifting, Cylinder Head (Item 10, WP 0289 00)

Gage, Capscrew, Cylinder Head (Item 38, WP 0289 00)

Wrench Set, Socket Attachment (Item 131, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Abrasive Pad (Item 1, WP 0290 00)

Fuel, Diesel, DF-2 Grade (Item 18, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Gasket Set (P/N 4089478)

References

TM 10-3930-675-10

WP 0207 00

Equipment Condition

Air intake ducts removed (WP 0058 00)

Rocker arm cover removed (WP 0052 00)

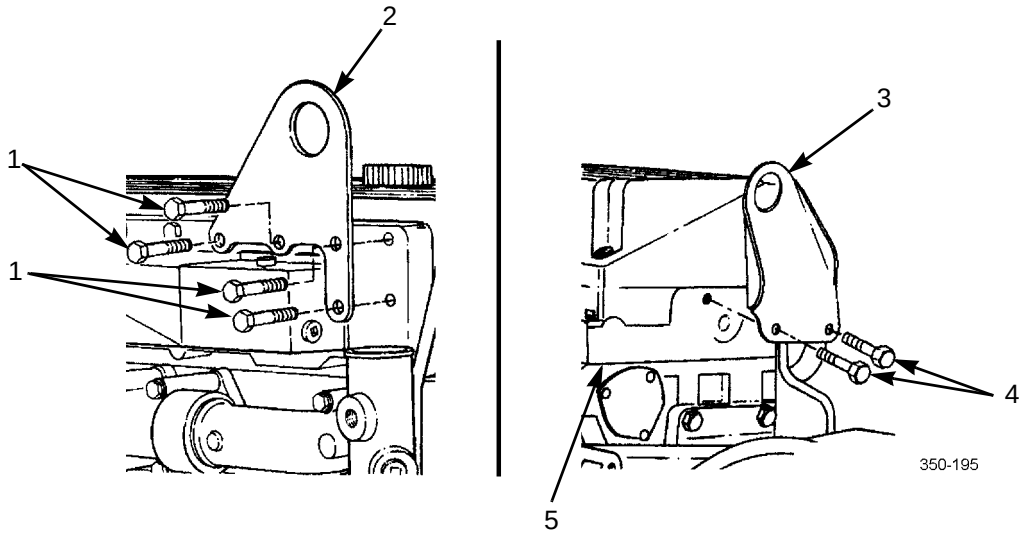
Turbocharger removed (WP 0217 00)

Exhaust manifold removed (WP 0210 00)

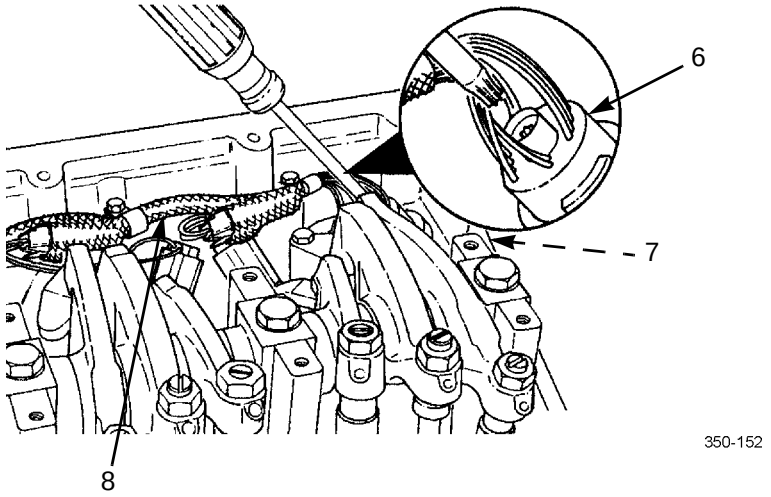
Cooling system drained (WP 0064 00)

REMOVAL

1. Remove four screws (1) securing front lifting bracket (2) and two screws (4) securing rear lifting bracket (3) to cylinder head (5).



2. Disconnect connector (6) of cylinder head wiring harness (8) from engine harness (7).

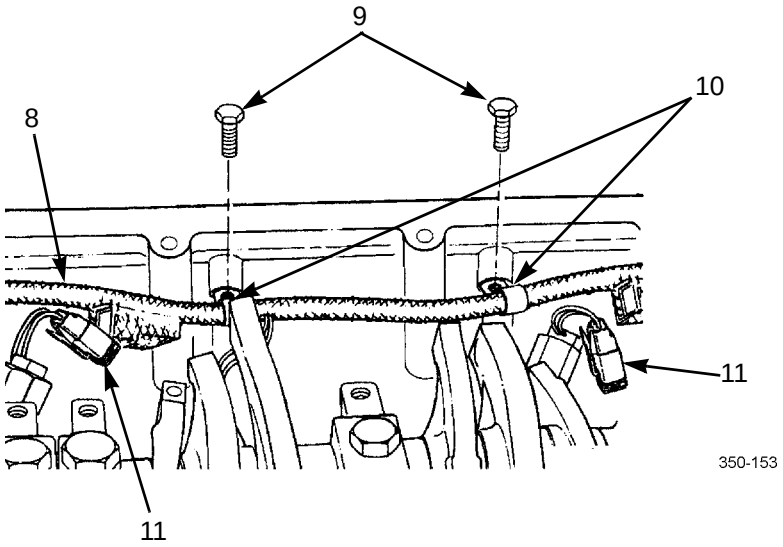


NOTE

Tag wiring harness to identify injector connections and positions prior to removal to ensure correct connection on installation.

REMOVAL - CONTINUED

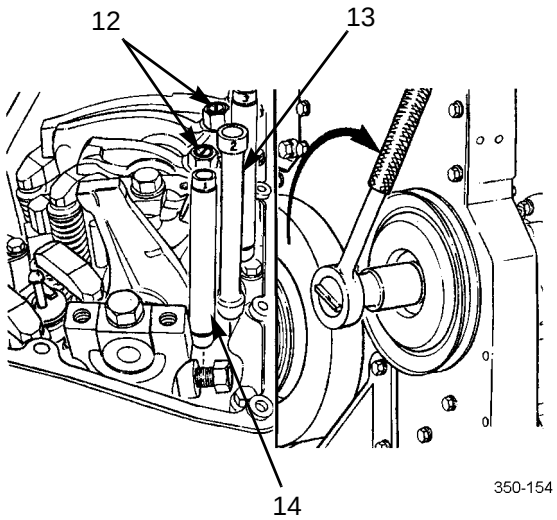
3. Disconnect six fuel injector connectors (11) from cylinder head wiring harness (8).
4. Remove screws (9) securing clamps (10) and cylinder head wiring harness (8) in place and remove cylinder head wiring harness.



NOTE

Mark position of valve push tubes and injector push rods. Push tubes and rods must be installed in the same positions during installation.

5. Loosen rocker lever adjusting screws (12). Remove valve push tubes (14) and injector push rods (13).



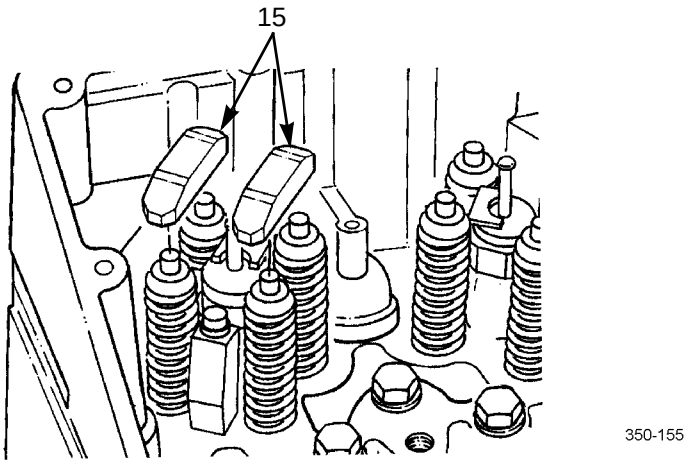
REMOVAL - CONTINUED

6. Remove rocker arm assembly (WP 0206 00).

NOTE

Mark position of crossheads prior to removal. Crossheads must be installed in the same position during assembly.

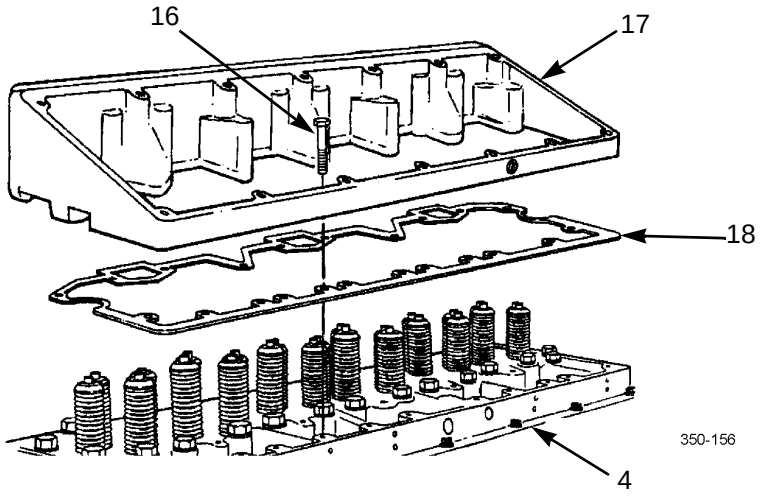
7. Remove crossheads (15).



NOTE

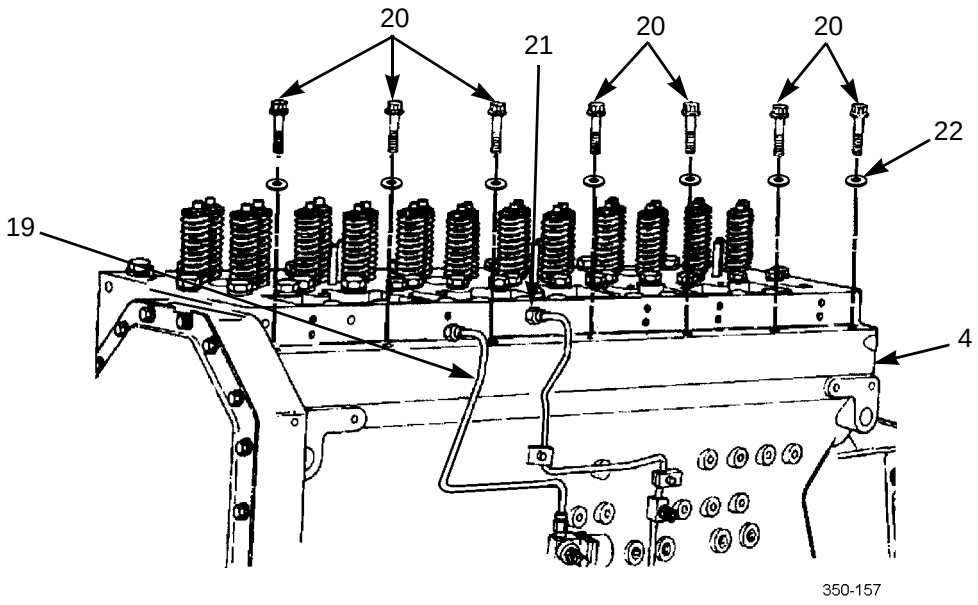
Rocker lever housing and intake manifold are removed as a single unit.

8. Remove 24 screws (16) securing rocker lever housing (17) and gasket (18) to cylinder head (4). Remove rocker lever housing and intake manifold as a single unit.



REMOVAL - CONTINUED

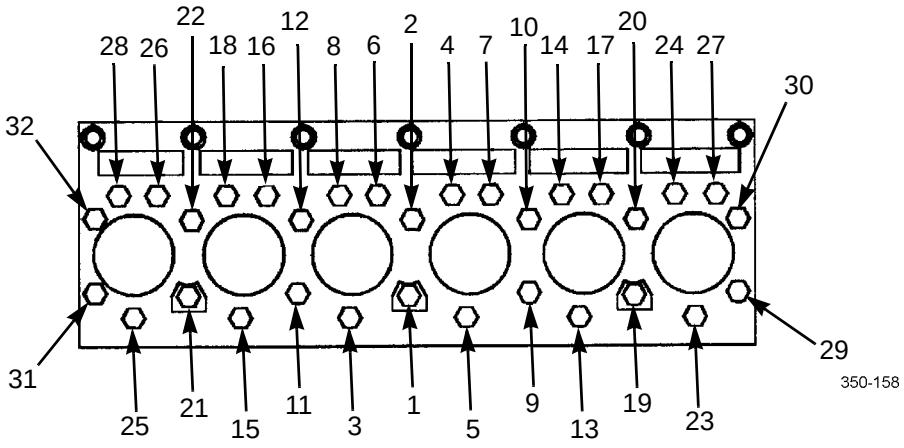
9. Disconnect fuel supply line (19) and fuel drain line (21) from cylinder head (4).
10. Remove seven 12-point cylinder head screws (20) and sealing washers (22) from fuel pump side of engine.



NOTE

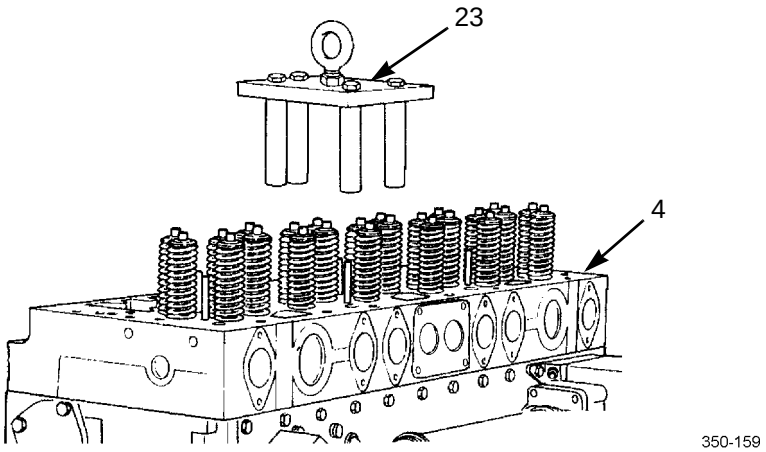
Three cylinder head screws are located inside intake ports.

11. Remove remaining 32 cylinder head screws (20) in sequence shown.



REMOVAL - CONTINUED

12. Install cylinder head lifting bracket (23) on cylinder head (4) and secure with two rocker lever support mounting screws and two long rocker housing screws. Tighten screws to 35 lb-ft (47 Nm).





WARNING



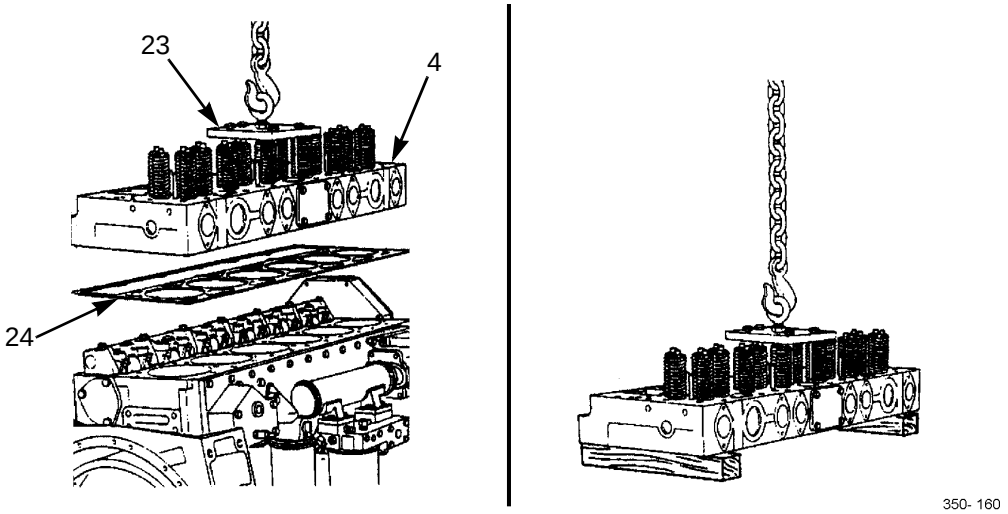
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

CAUTION

Place cylinder head on wooden blocks to prevent damage to combustion face.

REMOVAL - CONTINUED

13. Attach lifting device to cylinder head lifting bracket (23). Lift cylinder head (4) from engine and place on wooden blocks. Remove and discard head gasket (24).



CLEANING



WARNING

Dry cleaning solvent P-D-680 type III is toxic and flammable. Use protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200ºF (94ºC). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.

NOTE

Place clean, lint-free rags over cam followers and above pistons to prevent dirt and other foreign matter from entering engine. Plug or cover coolant and oil passages in cylinder block deck.

1. Remove all gasket material from cylinder block deck surface.

CAUTION

DO NOT use caustic or acid solutions to clean cylinder head screws. Doing so will cause damage to equipment.

2. Clean threads of cylinder head screws with dry cleaning solvent and wire brush.

CLEANING - CONTINUED



- **When using steam cleaner, wear protective clothing and eye protection. Hot steam will cause serious burns.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

3. Steam clean cylinder head and dry with compressed air.
4. Use Abrasive Pad (Item 1, WP 0290 00) to clean exhaust gasket surface, rocker housing gasket surface, and combustion face of cylinder head.

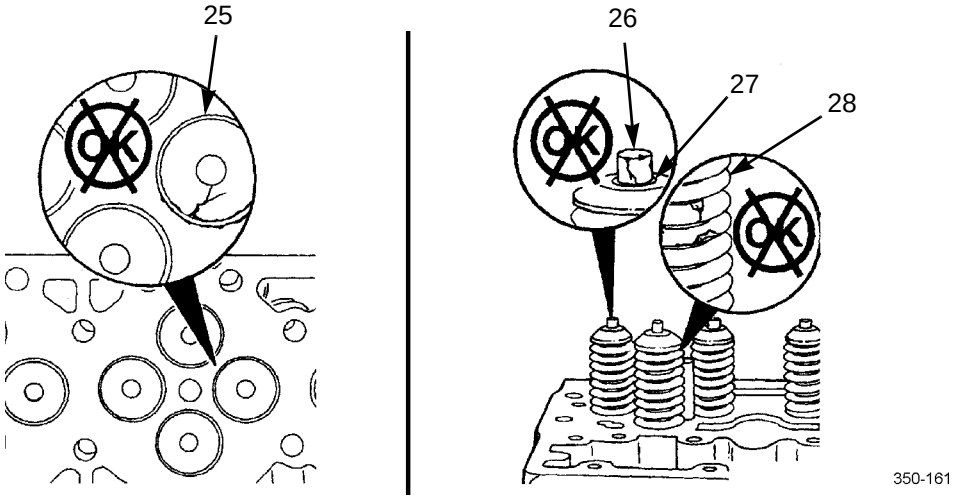
INSPECTION

1. Visually inspect fuel drillings and water passages for restrictions or foreign material. Remove any obstructions.

NOTE

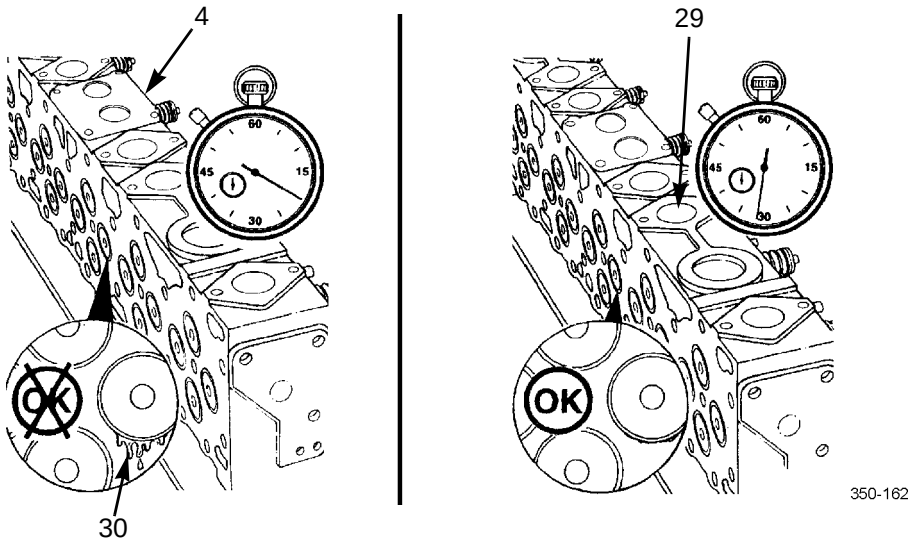
If conditions in steps 2 and 3 below are found, cylinder head must be disassembled and repaired. If conditions are not noted, proceed to step 4.

2. Visually inspect valves (25) and valve springs (28) for cracks, bent or broken valve stems (26), broken valve spring collets (27), or other damage.
3. Visually inspect valves (25) for indications of leakage or burning.



INSPECTION - CONTINUED

4. Perform leak test for exhaust valves as follows:
   a. Place cylinder head (4) on work bench with exhaust ports facing up.
   b. Pour fuel into exhaust port (29) until full.
   c. If fuel drips (30) or runs down face of head within 30 seconds, disassemble and repair cylinder head.
   d. Perform steps b and c for each exhaust port.



5. Perform leak test for intake valves as follows:
   a. Place cylinder head on work bench with exhaust ports facing up.
   b. Pour fuel into one intake port until full.

NOTE

Each intake port supplies two cylinders on M Series cylinder heads.

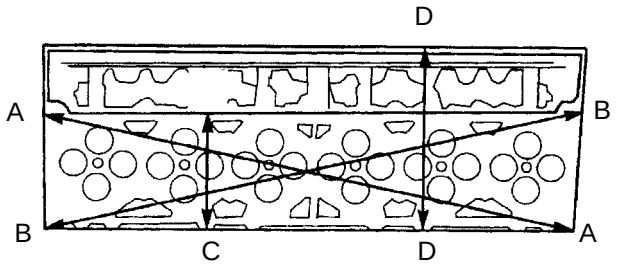
   c. If fuel drips or runs down face of cylinder head within 30 seconds, disassemble and repair cylinder head.
   d. Perform steps b and c for all six cylinders.

INSPECTION - CONTINUED

NOTE

Dimensions CC and DD must be checked from front to rear of cylinder head if head is going to be rebuilt.

6. Measure flatness of cylinder head combustion face surface as follows:
   a. AA and BB (corner to corner).
   b. CC (across combustion face).
   c. DD (across entire head surface).
   d. Measurements must be as noted in Table 1.



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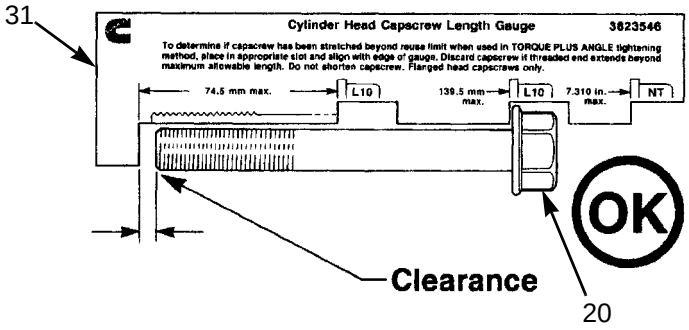
Table 1. Cylinder Head Flatness Measurements.

CYLINDER HEAD FLATNESS	MM	MAXIMUM	ALLOWABLE DEVIATION IN.
AA and BB	0.200	MAX	0.008
CC	0.076	MAX	0.003
DD	0.127	MAX	0.005

NOTE

Use slot marked for L10 cylinder head screws when checking M11 cylinder head screws.

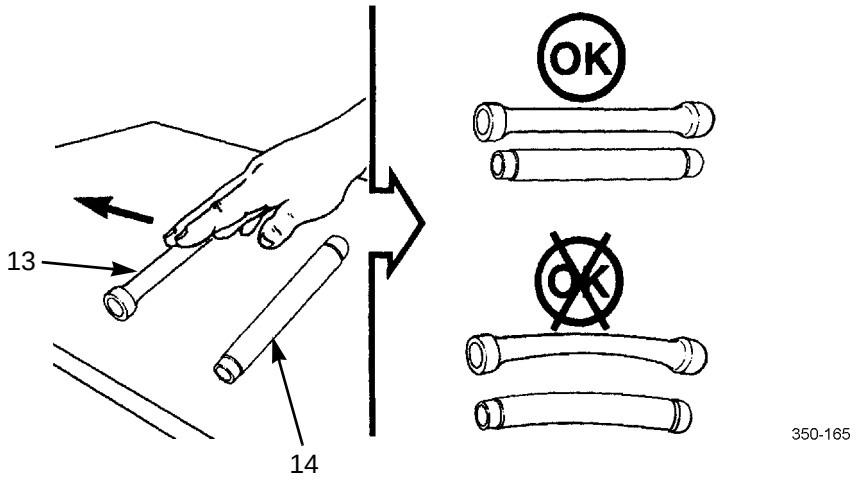
7. Check free length of 32 cylinder head screws (20) using screw length gage (31). If end of screw touches foot of gage, screw is too long and must be replaced. If there is clearance between end of screw and bottom base of gage, screw can be reused.



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INSPECTION - CONTINUED

8. Inspect push rods (13) and push tubes (14) for excessive or uneven wear and bending. If push rod or tube is bent, shows excessive wear, or is filled with oil, it must be replaced.



INSTALLATION




WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

CAUTION

DO NOT drop cylinder head on gasket. Gasket material can be damaged.

NOTE

Ensure shipping plug and plastic insert are removed from fuel inlet and fuel drain passage. If plastic insert is not removed from passage of fuel inlet line connection, engine will not start.

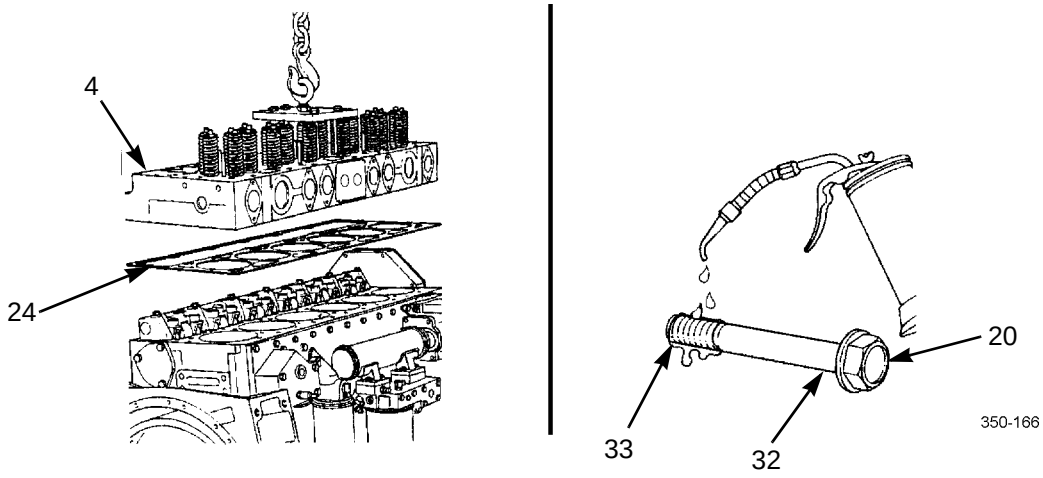
INSTALLATION - CONTINUED

1. Position new cylinder head gasket (24) on engine block and set cylinder head (4) in place.
2. Apply a light coating of clean lubricating oil to thread (33) and flange (32) area of cylinder head screws (20).

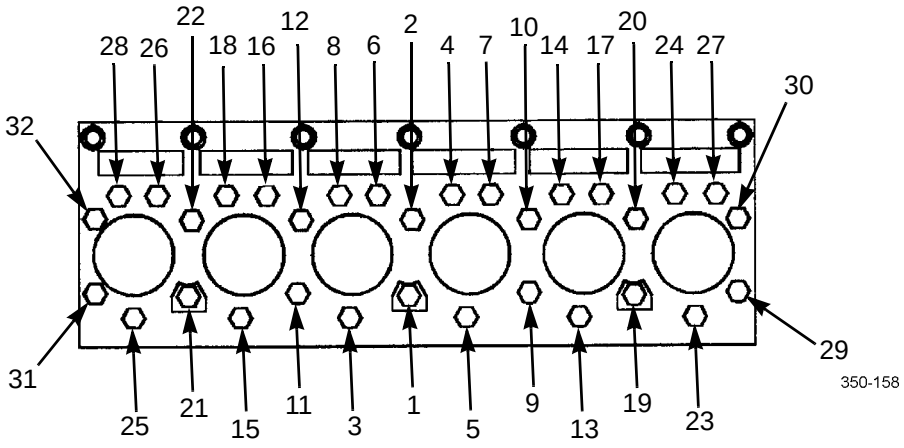
NOTE

Ensure three cylinder head screws are installed inside intake ports.

3. Install and hand-tighten 32 cylinder head screws (20).



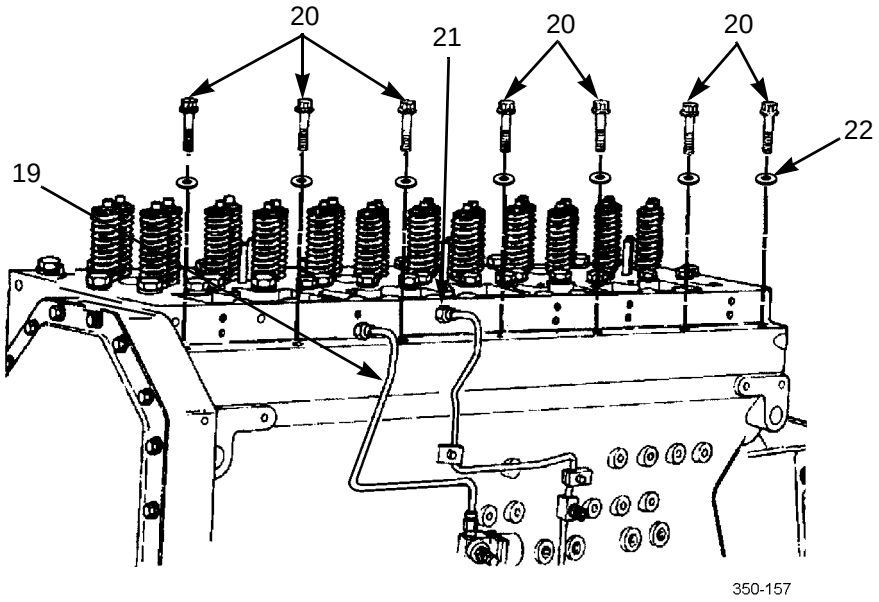
4. Tighten cylinder head screws (20) to 100 lb-ft (136 Nm) in sequence shown. Repeat sequence and tighten to 160 lb-ft (217 Nm).



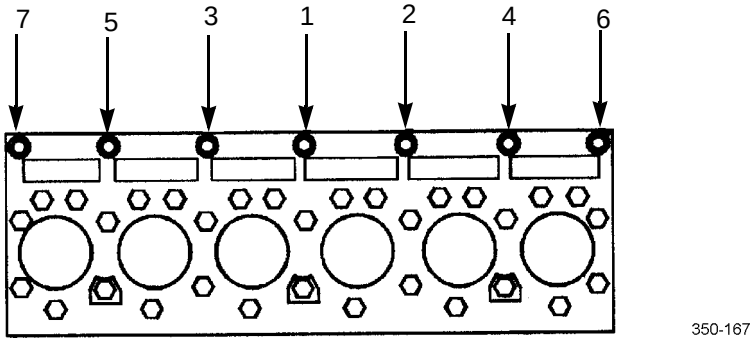
TIGHTENING SEQUENCE

INSTALLATION - CONTINUED

5. Tighten cylinder head screws (20) an additional 90 degrees after completing step 4.
6. Install seven new sealing washers (22) and screws (20) on fuel pump side of cylinder head.



7. Tighten cylinder head screws (20) to 50 lb-ft (68 Nm) in sequence shown.



TIGHTENING SEQUENCE

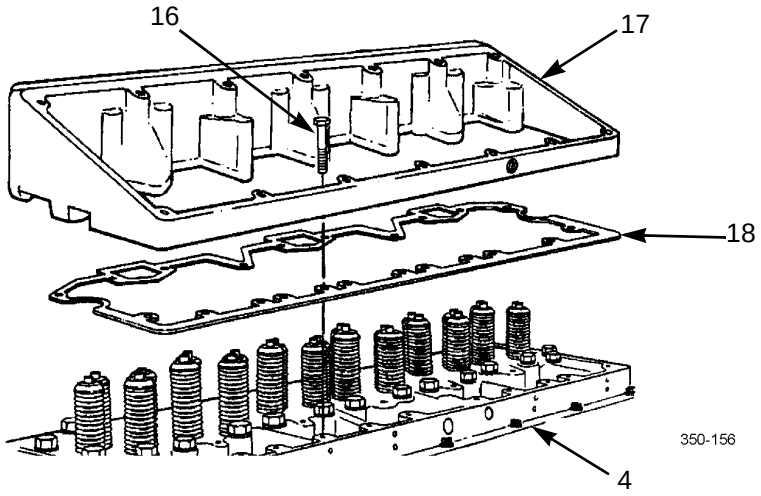
8. Connect fuel supply line (19) and fuel drain line (21).

INSTALLATION - CONTINUED

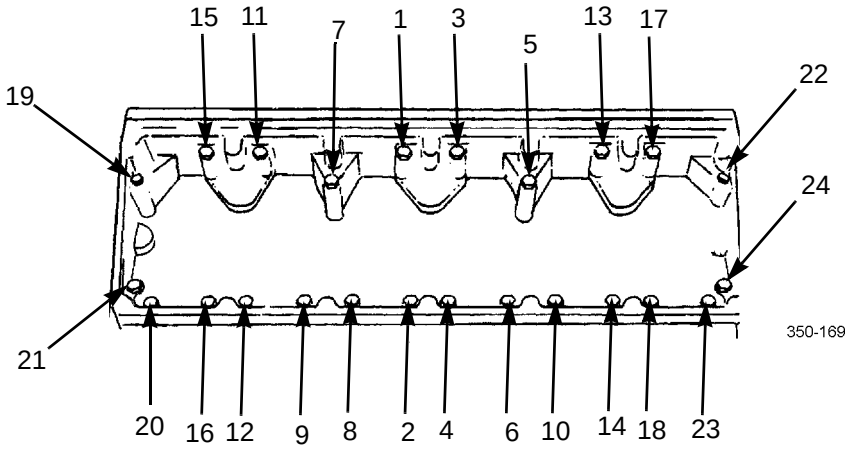
NOTE

Ensure rocker lever housing is clean and free of old gasket material.

9. Install new gasket (18) and rocker lever housing (17) on cylinder head (4).



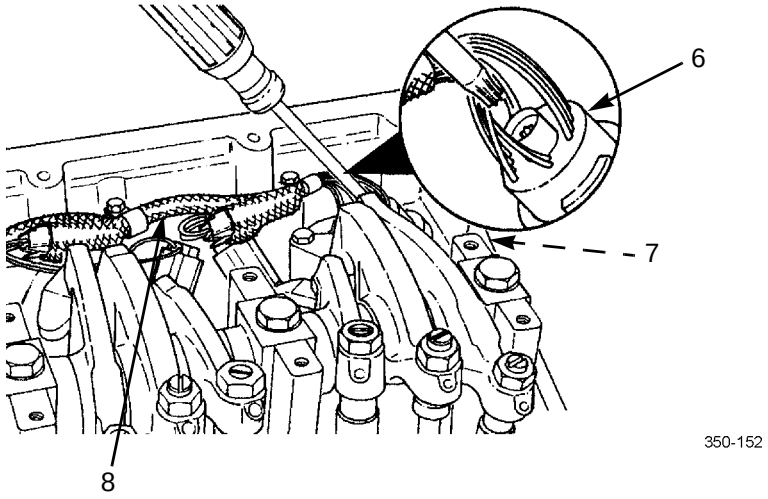
10. Install and tighten 24 screws (16) to 25 lb-ft (34 Nm) in sequence shown. Repeat sequence, tightening to 45 lb-ft (61 Nm).



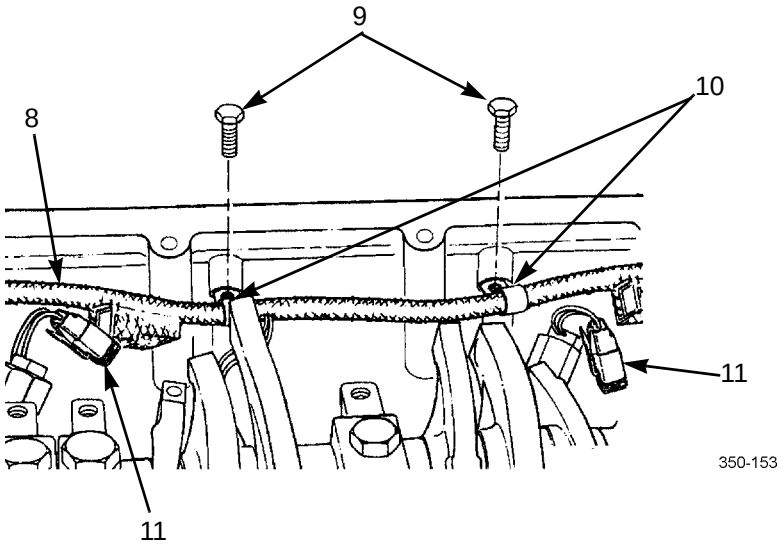
11. Install rocker arm assembly (WP 0206 00).

INSTALLATION - CONTINUED

12. Position cylinder head wiring harness (8). Connect cylinder head wiring harness connector (6) to engine wiring harness (7).



13. Install wire clamps (10) and secure cylinder head wiring harness (8) in place with screws (9). Tighten screws to 15 lb-ft (20 Nm).
14. Connect six fuel injector connectors (11) to cylinder head wiring harness (8).



INSTALLATION - CONTINUED

NOTE

Crossheads must be installed in the same position from which they were removed.

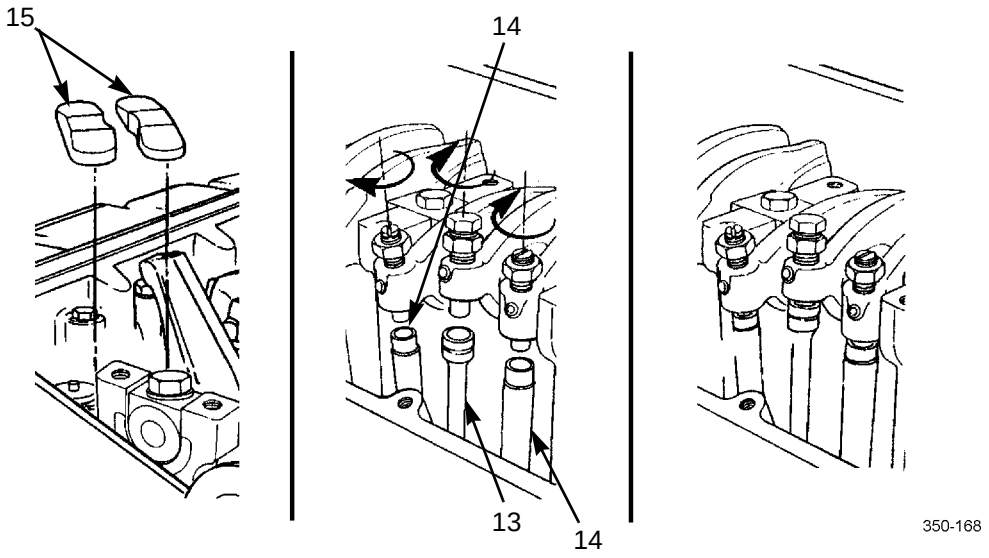
15. Install crossheads (15).

16. Apply a light coat of clean lubricating oil to ball end of valve push tubes (14) and injector push rods (13).

NOTE

Injector push rods are smaller diameter and longer than valve push tubes. Both push rods and push tubes must be installed as noted during removal.

17. Install valve push tubes (14) and injector push rods (13) as noted during removal.



18. Adjust valves and injectors (WP 0207 00).

19. Install exhaust manifold (WP 0210 00).

20. Install turbocharger (WP 0217 00).

21. Install rocker arm cover (WP 0052 00).

22. Install air intake ducts (WP 0058 00).

23. Fill cooling system (WP 0064 00).

24. Operate engine and check for leaks (TM 10-3930-675-10).

END OF WORK PACKAGE

CYLINDER HEAD REPAIR 0200 00

THIS WORK PACKAGE COVERS

Disassembly, Cleaning, Inspection, Assembly

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

English and Metric Measurements, (Item 19, WP 0289 00)

Compressor, Valve Spring (Item 23, WP 0289 00)

Driver, Injector Sleeve (Item 32, WP 0289 00)

Expander, Tube (Item 34, WP 0289 00)

Extractor, Valve Seat (Item 36, WP 0289 00)

Gage, Pressure, Dial Indicating (Item 43, WP 0289 00)

Holding Tool, Injector Sleeve (Item 57, WP 0289 00)

Insert Kit, Valve Seat (Item 59, WP 0289 00)

Installation Tool, Seal, Valve (Item 63, WP 0289 00)

Kit, Dye (Item 68, WP 0289 00)

Puller, Mechanical (Item 97, WP 0289 00)

Tools and Special Tools - Continued

Removal Tool, Valve Guide (Item 101, WP 0289 00)

Tester, Valve Spring (Item 125, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Abrasive Pad (Item 1, WP 0290 00)

Oil, Cutting (Item 23, WP 0290 00)

Oil, Lubricating, GO 80W/90 (Item 24, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Collet, valve (P/N 3275354) (24)

Seal, O-ring (P/N 3007759) (6)

Seal, Valve Guide (P/N 3606766) (24)

Equipment Condition

Cylinder head removed (WP 0199 00)

Fuel injectors removed (WP 0215 00)

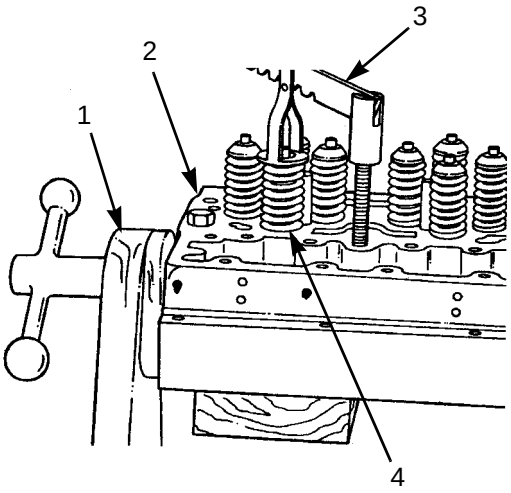
DISASSEMBLY

1. Remove and install cylinder head (2) in holding fixture (1) and position wood blocks to support valves (WP 0199 00).

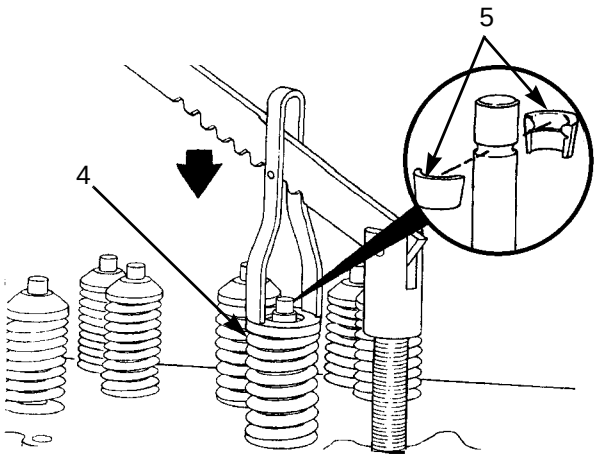
NOTE

This procedure will remove one valve. Perform steps 2 thru 6 for each valve to be removed.

2. Install valve spring compressor (3) with adapters to compress valve spring (4).



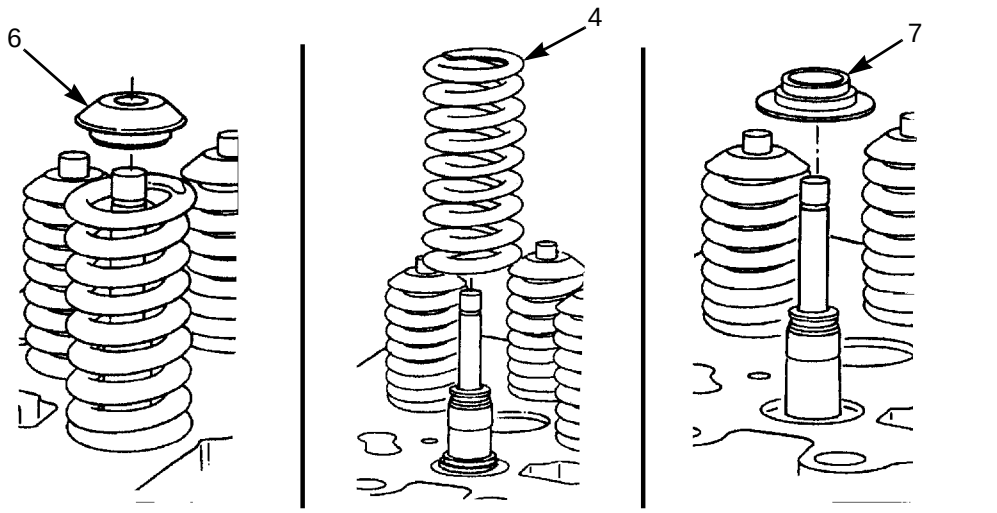
3. Compress valve spring (4) and remove collets (5). Discard collets.



DISASSEMBLY - CONTINUED

4. Release pressure on valve spring (4) slowly.

5. Remove valve spring retainer (6), valve spring (4), and valve spring wear plate (7).

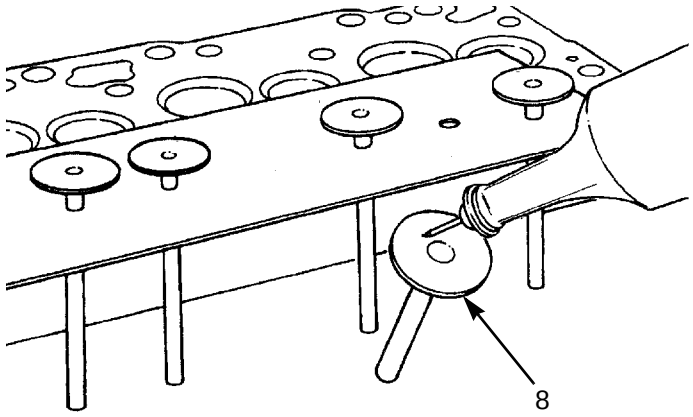


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NOTE

Intake and exhaust valves are manufactured from different material and are NOT interchangeable. Mark each valve for location to ensure correct installation.

6. Remove valve (8).



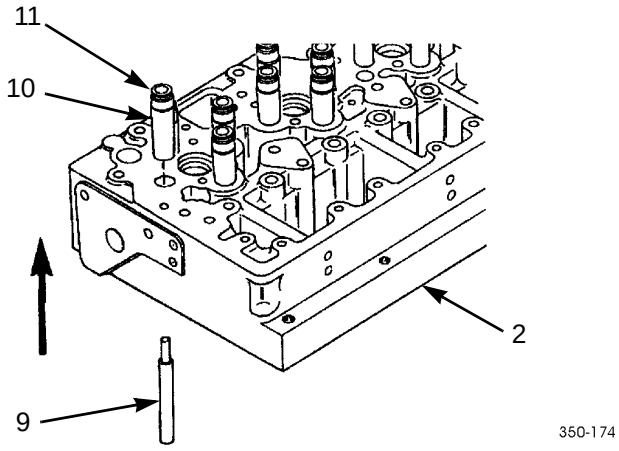
350-173

DISASSEMBLY - CONTINUED

NOTE

- **DO NOT remove components in steps 7 thru 9 unless they do not meet inspection standards. Refer to *Inspection* for details.**
- **If valve guide does not meet inspection standards, remove valve guide. Step 7 will remove one valve guide. Any damaged valve guide is removed in the same manner.**

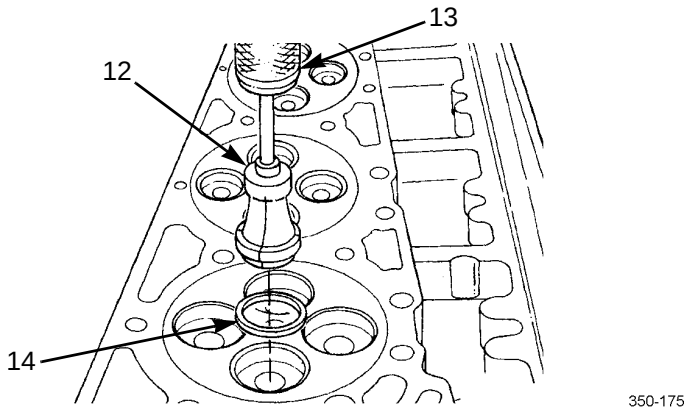
7. Insert valve guide removal tool (9) from combustion surface side and drive valve guide (10) and valve guide seal (11) out of cylinder head (2). Discard seal.



NOTE

If valve seat insert is defective, remove in the following manner. Any damaged or defective valve seat insert is removed in the same manner.

8. Install valve seat extractor (12) and slide hammer (13) on defective valve seat insert (14). Remove and discard valve seat insert.

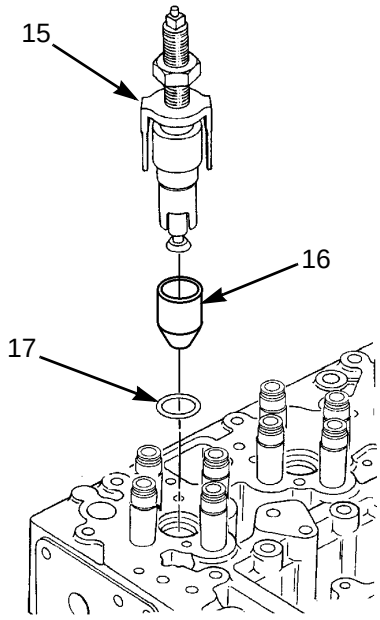


DISASSEMBLY - CONTINUED

NOTE

If injector sleeve is defective, remove in the following manner. Any damaged or defective injector sleeve is removed in the same manner.

9. Install injector sleeve puller tool (15). Remove injector sleeve (16) and O-ring (17). Discard O-ring.



CLEANING


WARNING


- **When using steam cleaner, wear protective clothing and eye protection. Hot steam will cause serious burns.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

1. Steam clean cylinder head and dry with compressed air.
2. Remove all gasket deposits from rocker lever housing surface. Use Abrasive Pad (Item 1, WP 0290 00) to clean combustion face and exhaust gasket surface.
3. Clean fuel and oil passages with cleaning brush to remove deposits and obstructions.

CLEANING - CONTINUED

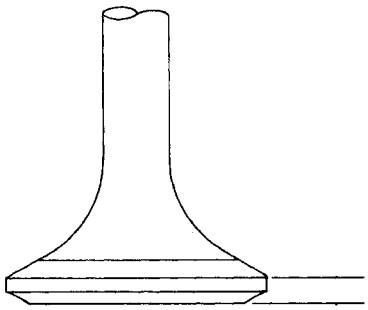


Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.

4. Clean valve guide bore with solvent and brush to remove deposits.
5. Clean valve seat insert bores with solvent and brush to remove deposits.

INSPECTION

1. Visually inspect valve springs, valve spring retainers, and valve spring wear plates for damage or worn areas. Discard damaged or worn parts.
2. Measure valve spring free height. Spring height is 4.0669 in. (103.30 mm).
3. Using valve spring tester, measure valve spring working load at a working height of 2.8142 in (71.48 mm). If spring load is not as listed below, discard spring.
   a. Min. 281 lb-ft (381 Nm)
   b. Max. 356 lb-ft (482 Nm)
4. Visually inspect valves and collet grooves for damage. If damaged, replace valve.
5. Measure outside diameter (OD) of valve stem. If valve stem is not within limits, replace valve.
   a. Min. OD 0.3772 in. (9.580 mm)
   b. Max. OD 0.3793 in. (9.633 mm)
6. Place valve on flat surface and measure head thickness. If valve head thickness is not within limits, replace valve.
   a. Min. 0.124 in. (3.15 mm)
   b. Max. 0.143 in. (3.62 mm)



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HEAD THICKNESS

INSPECTION - CONTINUED

7. Visually inspect valve guides for chips or cracks. If damage is found, or valve guide does not meet specification, replace valve guide.

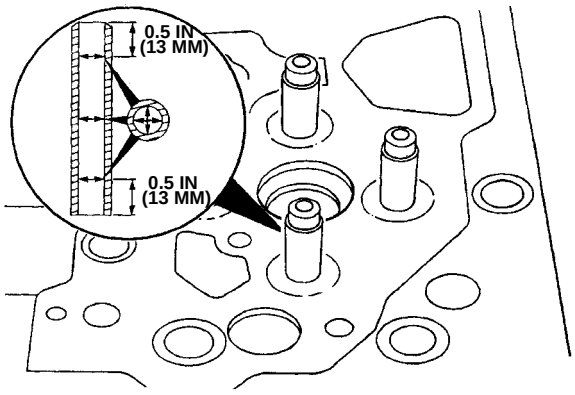
NOTE

Valve guide inside diameter (ID) is measured at three points: ½ in. (13 mm) from top and bottom and at center of guide. Installed height is measured from surface of cylinder head. If valve guide is not within limits, replace valve guide.

8. Measure inside diameter (ID) and installed height of valve guide.

   a. Min. ID 0.3807 in. (9.67 mm)

   b. Max. ID 0.3831 in. (9.73 mm)

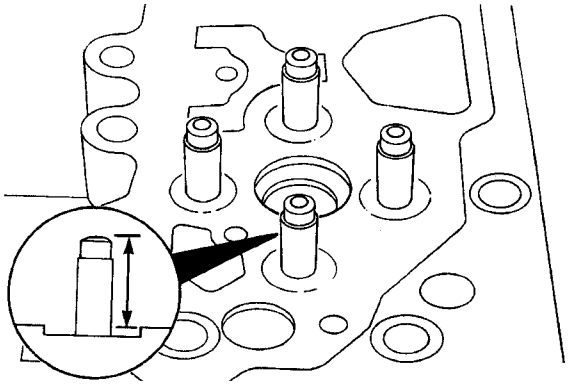


350-178

INSIDE DIAMETER, VALVE GUIDE

   c. Min. installed height 1.069 in. (27.15 mm)

   d. Max. installed height 1.089 in. (27.65 mm)



350-179

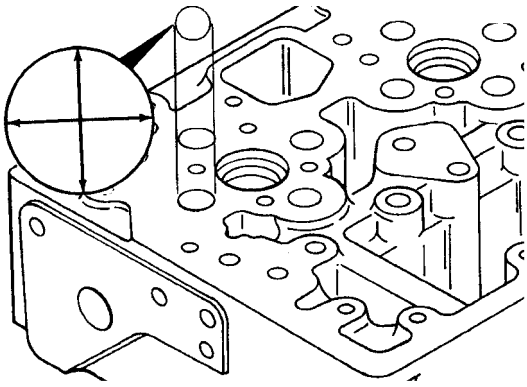
INSTALLED HEIGHT, VALVE GUIDE

INSPECTION - CONTINUED

NOTE

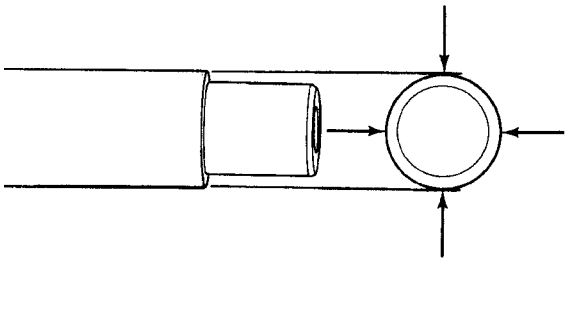
If valve guide bore exceeds maximum limits, replace valve guide with oversized valve guide.

9. Measure ID of valve guide bore in cylinder head.
   a. Min. valve guide bore ID 0.6488 in. (16.48 mm)
   b. Max. valve guide bore ID 0.6496 in. (16.50 mm)



INSIDE DIAMETER, VALVE GUIDE BORE

10. Measure base and seal area OD of valve guide. If valve guide is not within limits, replace valve guide.
   a. Min. base OD 0.6501 in. (16.51 mm)
   b. Max. base OD 0.6506 in. (16.53 mm)

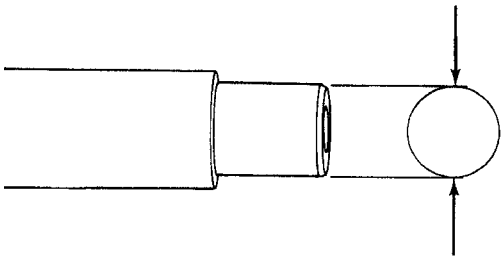


OUTSIDE DIAMETER, VALVE GUIDE BASE

INSPECTION - CONTINUED

c. Min. seal area OD 0.561 in. (14.25 mm)

d. Max. seal area OD 0.566 in. (14.37 mm)



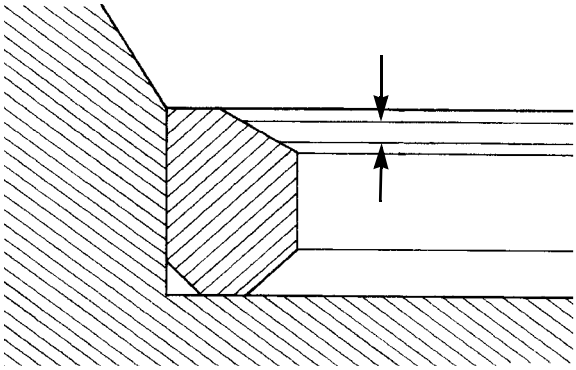
350-185

OUTSIDE DIAMETER, VALVE GUIDE SEAL

11. Measure width of valve seat area of valve seat insert. If valve seat area is worn wider than maximum, replace valve seat insert.

a. Min. width 0.064 in. (1.63 mm)

b. Max. width 0.106 in. (2.69 mm)



350-180

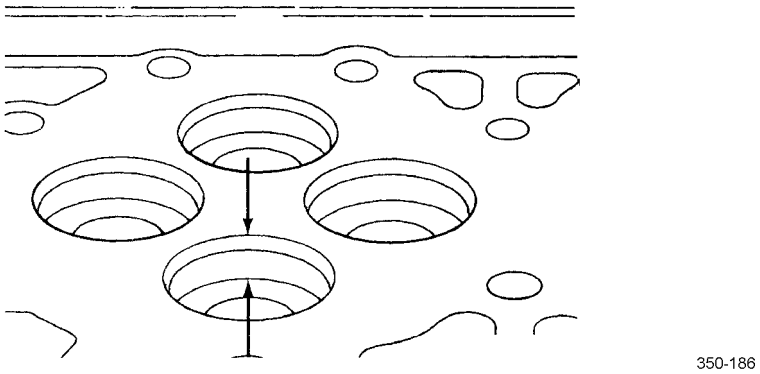
VALVE SEAT AREA

INSPECTION - CONTINUED

NOTE

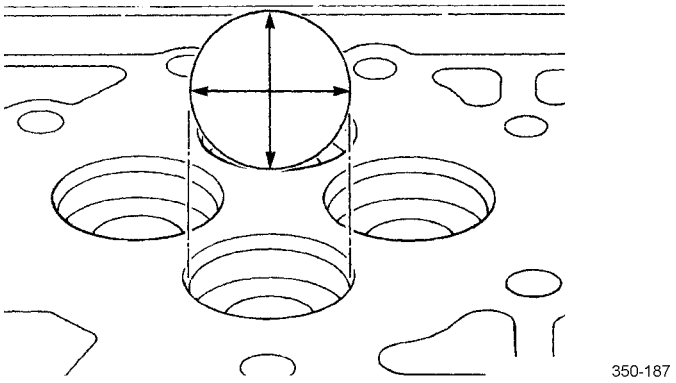
If bore is not within limits, vehicle head and use oversized valve seat inserts for assembly.

12. Measure valve seat insert bore depth.
    a. Insert depth min. 0.370 in. (9.40 mm)
    b. Insert depth max. 0.374 in. (9.50 mm)



INSERT BORE DEPTH, VALVE SEAT

13. Measure valve seat insert bore ID.
    a. Insert bore ID min. 1.803 in. (45.92 mm)
    b. Insert bore ID max. 1.8085 in. (45.94 mm)



INSIDE DIAMETER, VALVE SEAT INSERT BORE

NOTE

If tip protrusion exceeds maximum or bluing pattern is not within limits, replace injector sleeve and O-ring.

14. Measure fuel injector tip protrusion and seating area as follows:
    a. Apply a bluing compound to outside diameter of injector at injector sleeve seat area.

INSPECTION - CONTINUED

CAUTION

Support cylinder head in holding fixture to prevent damage to injector tip protruding from combustion face.

b. Install injector into cylinder head without O-rings. Tighten to 55 lb-ft (75 Nm).

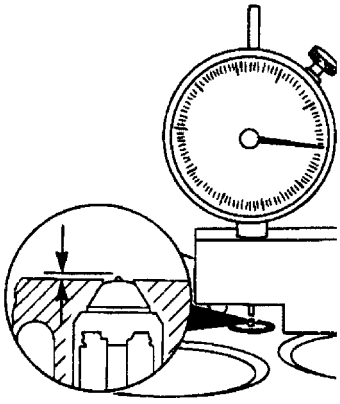
NOTE

If measurements in step c and d are not within limits, replace injector sleeve and O-ring.

c. Turn cylinder head over and measure injector tip protrusion with depth gage.

(1) Min. 0.090 in. (2.28 mm)

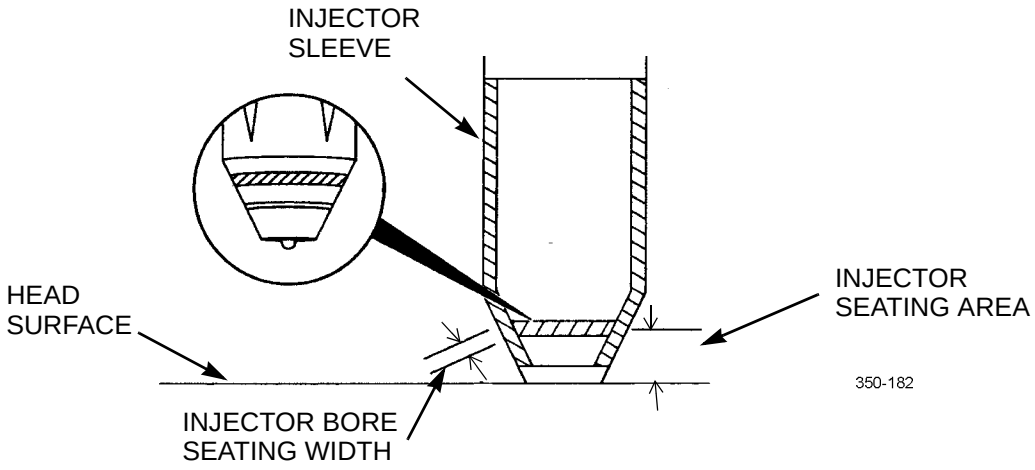
(2) Max. 0.104 in. (2.65 mm)



FUEL INJECTOR TIP PROTRUSION

d. Remove injector and measure bluing pattern. Bluing pattern for injector seating area must be approximately 0.50 in. (13 mm) from cylinder head combustion surface.

15. Measure injector bore seating width. Width must be a minimum of 0.060 in. (1.52 mm)



ASSEMBLY

NOTE

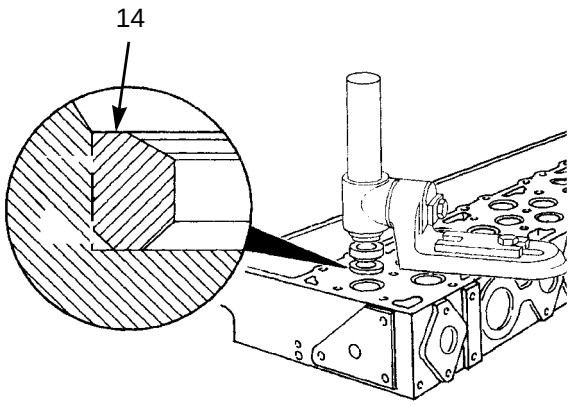
During assembly of cylinder head, each component must be checked and measured for proper installation.

1. Install base and swivel of valve seat insert tool and valve guide arbor on cylinder head.

NOTE

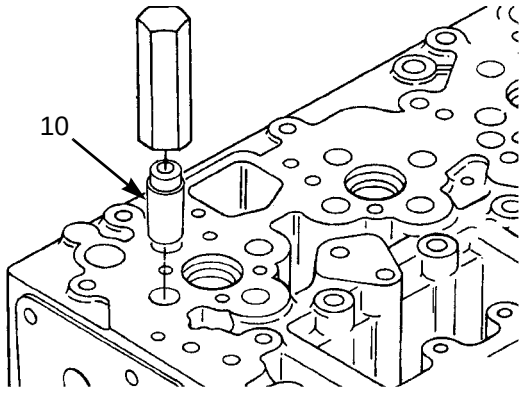
Ensure valve seat insert is positioned with chamfer installed toward bottom of counterbore and installed in bottom of counterbore.

2. Using valve seat driver with seat insert tool and guide arbor, install valve seat insert (14).



350-188

3. Install valve guide (10) using valve guide driver.



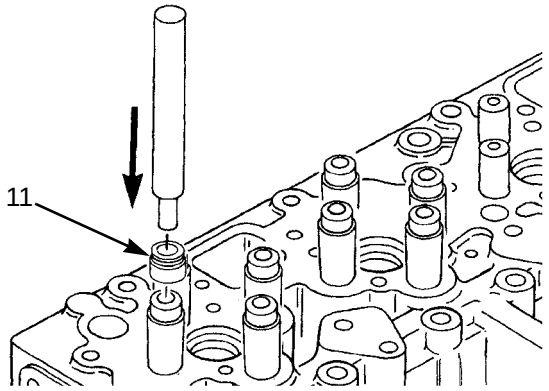
350-189

CAUTION

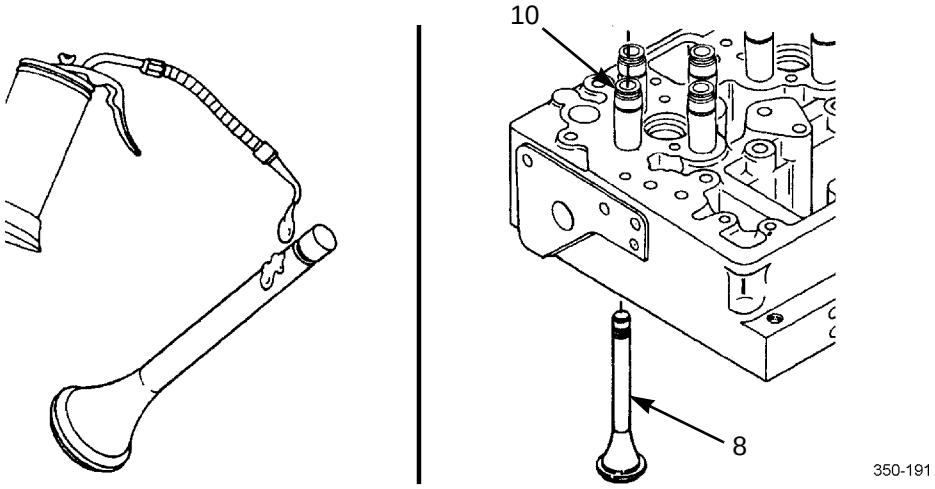
DO NOT use excessive force when installing valve guide seals or damage to seals may result.

ASSEMBLY - CONTINUED

4. Install new valve guide seal (11) using valve seal driver.



5. Apply a coating of 80W, or higher, gear oil to valve stem and install valve (8) in valve guide (10).

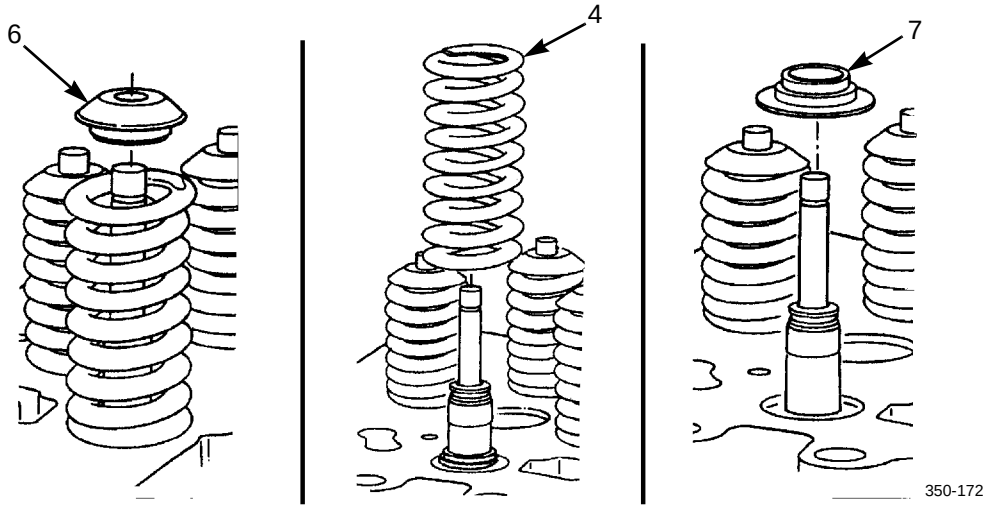


ASSEMBLY - CONTINUED

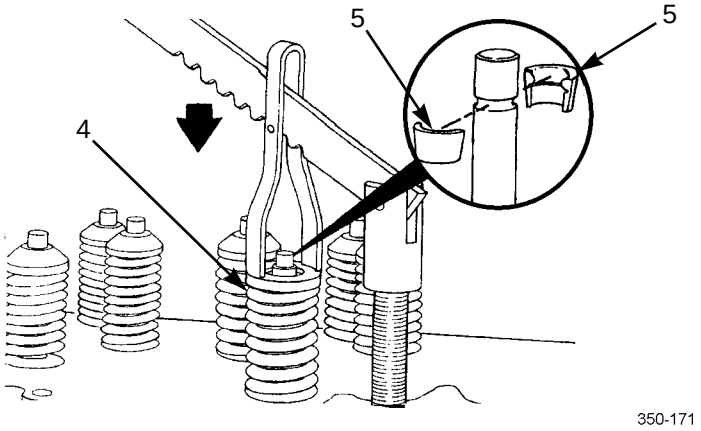
NOTE

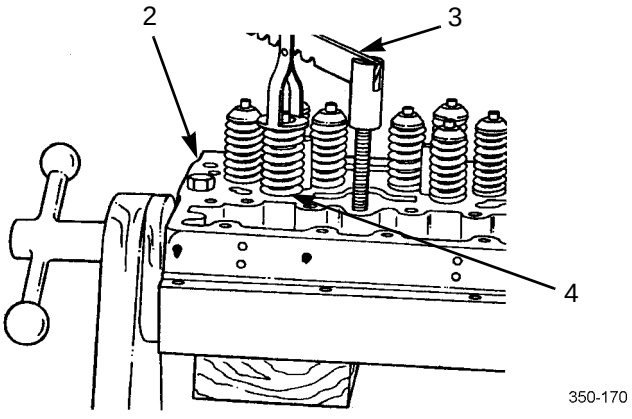
Position cylinder head with installed valves on flat surface that will NOT damage cylinder head surface.

6. Install valve spring wear plate (7), valve spring (4), and valve spring retainer (6).



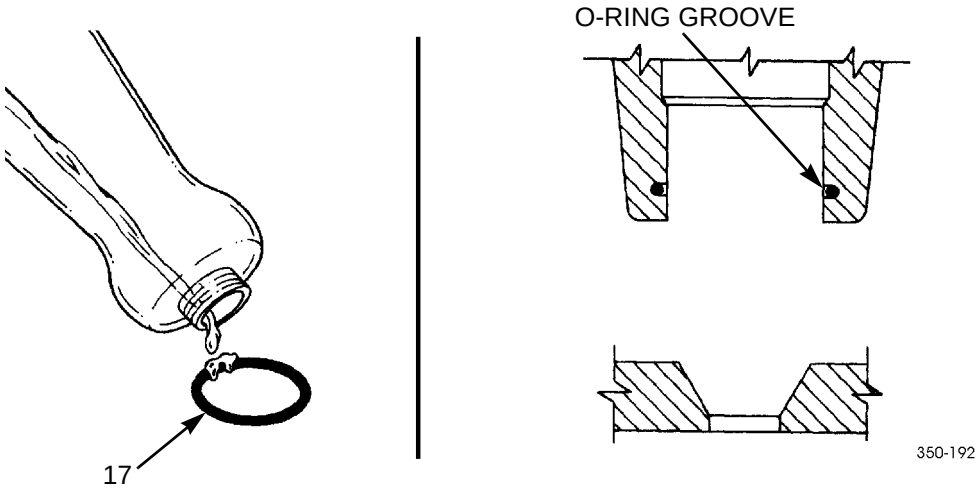
7. Attach valve spring compressor (3) to cylinder head (2), compress valve spring (4), and install new collets (5).



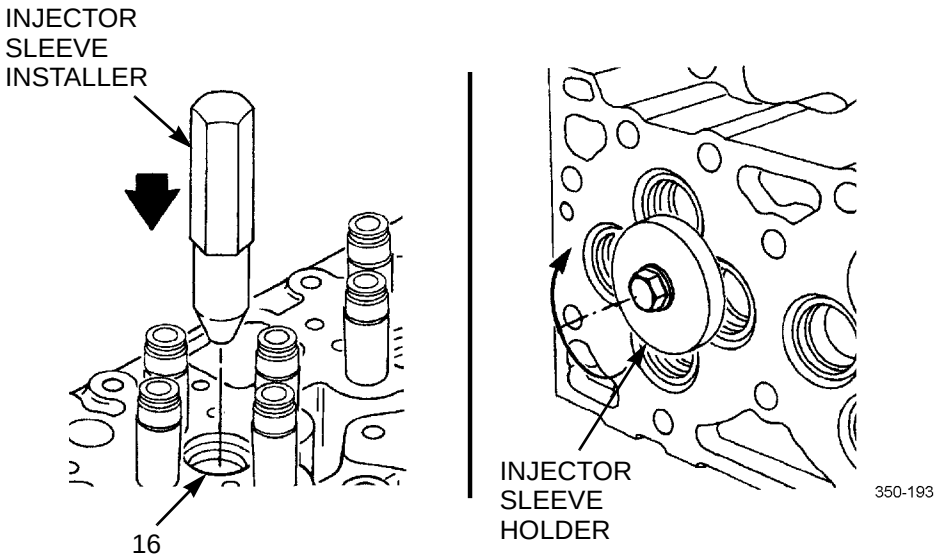


ASSEMBLY - CONTINUED

8. Remove valve spring compressor (3).
9. Lubricate new injector sleeve O-ring (17) with oil and install O-ring in groove of injector sleeve bore.

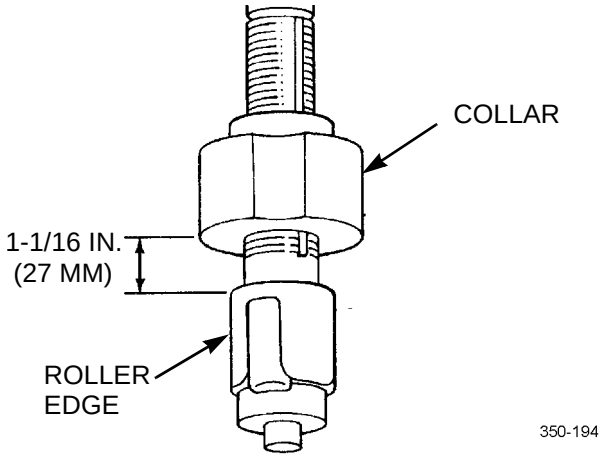


10. Position new injector sleeve (16) and install using injector sleeve driver.
11. Remove injector sleeve driver and install injector sleeve holding tool. Tighten screw to 38 lb-ft (50 Nm).
12. Reinstall injector sleeve driver and strike with mallet to seat injector sleeve (16). Retighten injector sleeve holding tool screw as needed.



ASSEMBLY - CONTINUED

13. Adjust tube expander to 1-1/16 in. (27 mm) between collar and roller edge. Install tube expander, tighten expander to 75 lb-in. (9 Nm), and expand upper portion of injector sleeve.



14. Remove tube expander and injector sleeve holding tool.

NOTE

Ensure cutting oil is used to lubricate injector sleeve cutter.

15. Vehicle injector sleeve until sealing area is smooth, using injector seal cutter, pilot, and holder.
16. Install fuel injectors (WP 0215 00).
17. Install cylinder head (WP 0199 00).

END OF WORK PACKAGE

FRONT MAIN OIL SEAL REPLACEMENT 0201 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

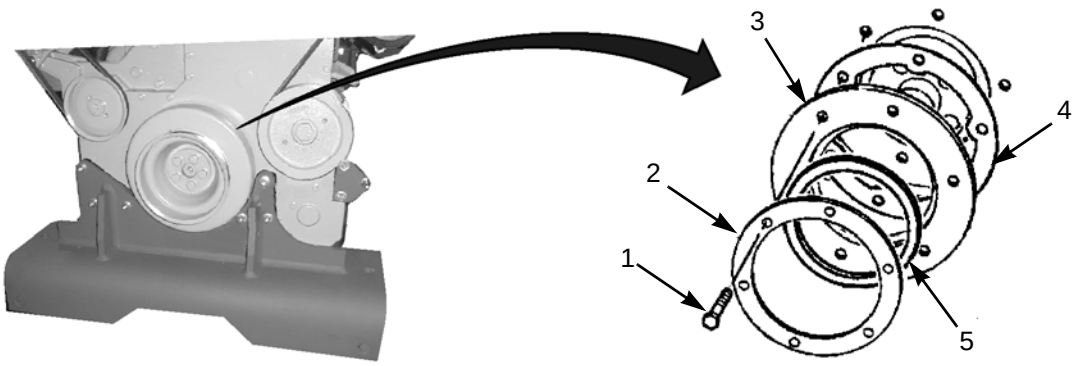
Kit, Oil Seal (P/N 3804744)

Equipment Condition

Vibration damper removed (WP 0203 00)

REMOVAL

1. Remove six screws (1) and clamping ring (2).
2. Remove oil seal (3) and dust seal (5) together. Discard oil seal and dust seal.
3. Remove and discard gasket (4).



350-202

INSTALLATION

NOTE

- **Ensure gasket surfaces on crankshaft and front gear cover have been thoroughly cleaned and all old gasket and seal material has been removed.**
- **Front gear cover, seal, and gasket are marked for correct orientation with an arrow. Clamping ring is marked with four punch marks.**

1. Orient new gasket (4) with arrow mark on front gear cover (6) and install gasket.

NOTE

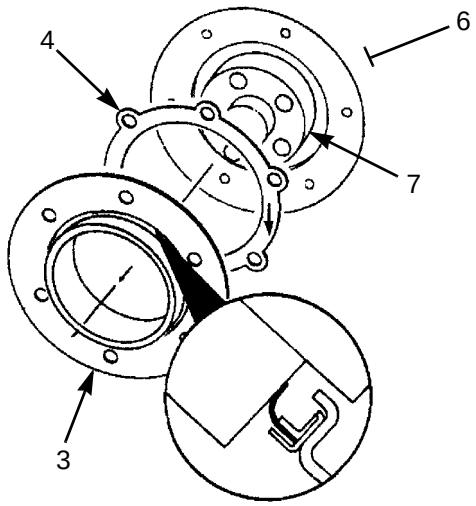
DO NOT use lubricant of any kind to install oil seal. Oil seal must be installed with lip of seal and crankshaft clean and dry. Ensure yellow dust lip of oil seal is facing out.

2. Position new oil seal (3) on crankshaft (7) and match arrow mark on oil seal with mark on front gear cover.

CAUTION

To prevent damage to new seal, seal installer provided with oil seal kit must be used.

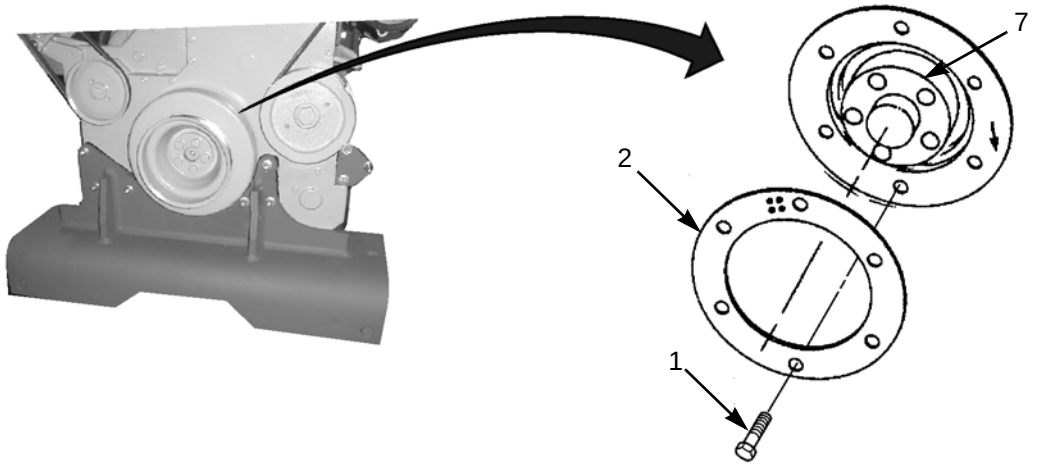
3. Using installation tool, install oil seal (3).



350-203

4. Position clamping ring (2) on crankshaft (7) with four punch marks orientated at 11:30 o'clock position.
5. Apply a coating of thread sealant to six mounting screws (1) and install hand tight.
6. Tighten screws (1) in star pattern to 60 lb-in. (7 Nm). Retighten screws in same pattern to 180 lb-in. (20 Nm).

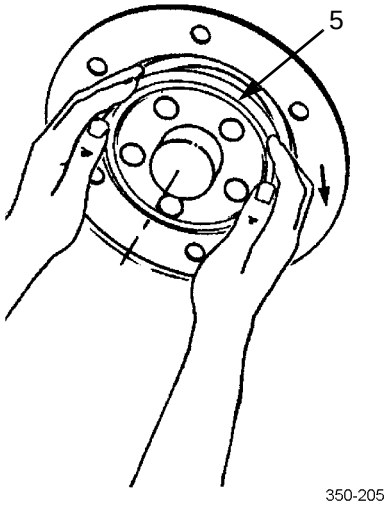
INSTALLATION - CONTINUED



NOTE

Ensure dust seal is installed with larger outside diameter facing engine and seal is pushed back until entire seal contacts oil seal case.

7. Apply a light coat of oil to inside diameter of new dust seal (5) and install dust seal.



8. Install vibration damper (WP 0203 00).

END OF WORK PACKAGE

REAR MAIN OIL SEAL REPLACEMENT 0202 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Kit, Oil Seal (P/N 3804744)

Seal, Dust (P/N 3895023)

Equipment Condition

Flywheel assembly removed (WP 0204 00)

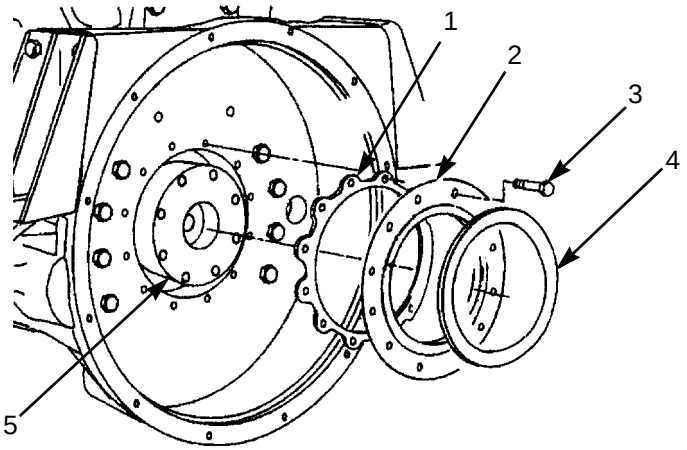
REMOVAL

1. Remove 12 screws (4).

NOTE

Ensure oil seal and dust seal are removed as a unit.

2. Remove oil seal (2) and dust seal (4) from crankshaft (5). Discard oil seal and dust seal.
3. Remove and discard gasket (1).



INSTALLATION

NOTE

Ensure all old gasket and seal material has been removed from crankshaft.

1. Install new gasket (1).

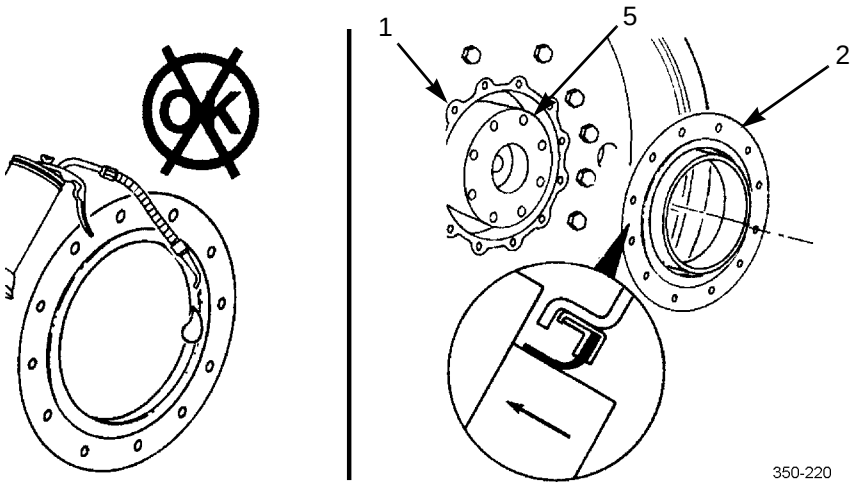
CAUTION

Installation tool provided with seal kit must be used to install oil seal. Failure to use proper tool may result in damage to oil seal.

NOTE

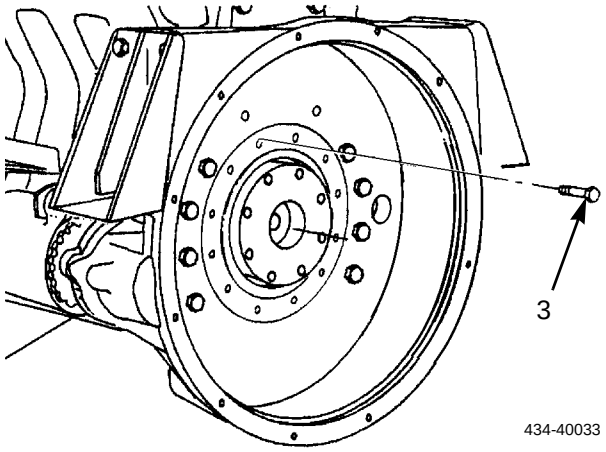
DO NOT use lubricant of any kind to install oil seal. Oil seal must be installed with lip of seal and crankshaft clean and dry.

2. Install new oil seal (2) on crankshaft (5).



INSTALLATION - CONTINUED

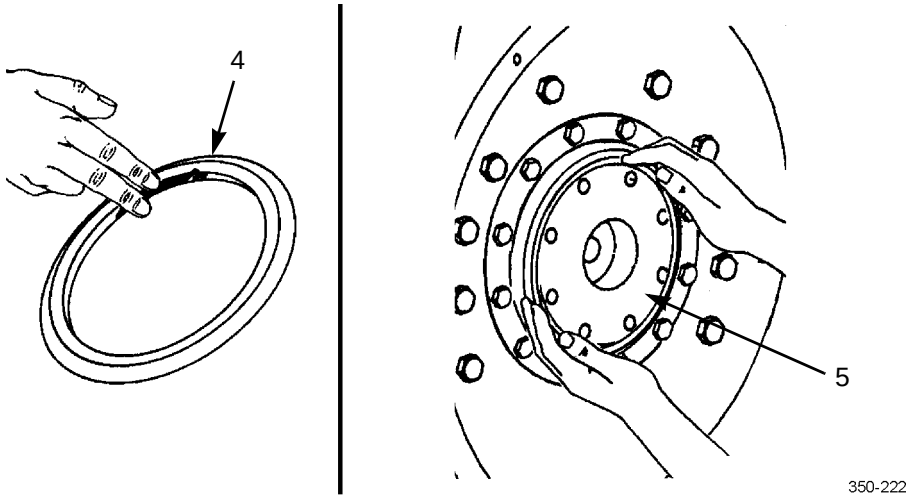
3. Install 12 screws (3) hand tight.
4. Tighten screws (3) in a star pattern to 60 lb-in. (7 Nm). Retighten screws in star pattern to 180 lb-in. (20 Nm).



NOTE

Ensure dust seal is oriented with larger diameter facing toward engine.

5. Apply a light coat of lubricating oil to inside diameter of new dust seal (4) and install dust seal on crankshaft (5).
6. Push dust seal (4) back by hand until entire dust seal contacts oil seal case.



7. Install flywheel assembly (WP 0204 00).

END OF WORK PACKAGE

VIBRATION DAMPER REPLACEMENT 0203 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Barring Tool, Engine (Item 7, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Pin Kit, Guide (Item 77, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

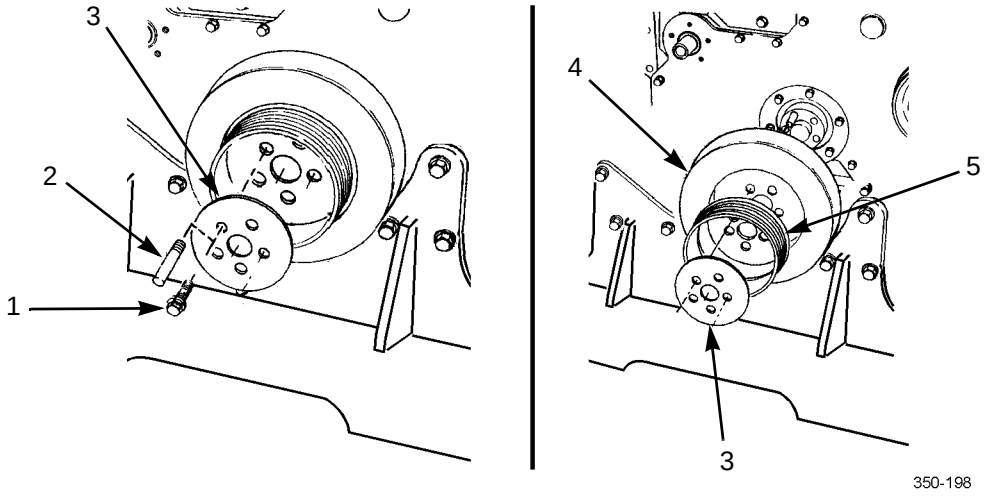
REMOVAL

1. Remove two screws (1) from clamping plate (3). Install guide studs (2) in holes.
2. Remove three remaining screws (1) and replace with guide studs (2).

CAUTION

DO NOT use hammer or screwdriver to remove vibration damper. These tools can damage vibration damper.

3. Remove clamping plate (3), crankshaft pulley (5), and vibration damper (4) from engine.



INSPECTION

NOTE

Ensure vibration damper has been cleaned and is free of dirt, grease, and other foreign matter.

1. Check mounting web for cracks and housing for dents or raised surfaces. If any of these conditions are noted, vibration damper must be replaced.

2. Scrape paint from four locations on either side of vibration damper as shown.

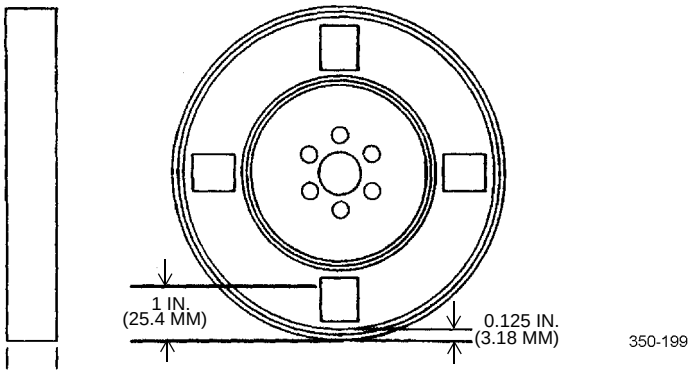
NOTE

- **Thickness check will result in a total of eight measurements.**
- **If thickness recorded varies more than 0.010 in. (0.25 mm) between any of eight measurements, or if thickness at any one point exceeds 1.772 in. (45 mm), replace vibration damper.**

3. Measure and record thickness of vibration damper at two places on each of four selected locations as follows:

   a. Measure thickness at 0.125 in. (3.18 mm) from outer lip.

   b. Measure thickness at 1.0 in. (25.4 mm) from outer lip.



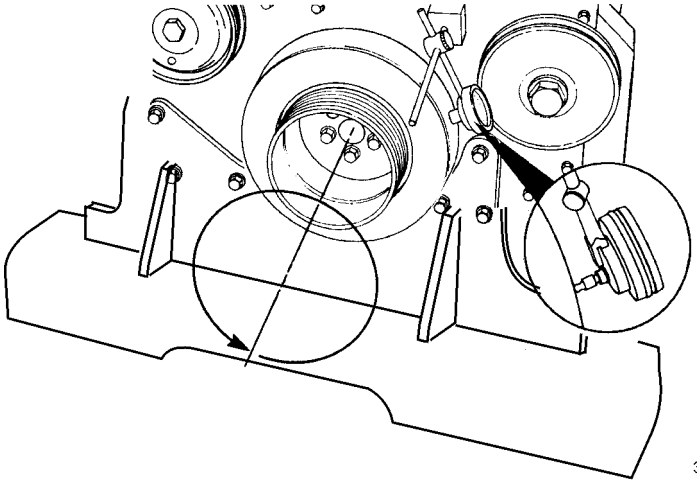
THICKNESS MEASUREMENT

NOTE

Eccentricity (out of round) and wobble (face alignment) checks are performed to verify correct installation and serviceability of vibration damper. If either check exceeds 0.011 in. (0.28 mm), vibration damper is defective and must be replaced.

4. Attach dial indicator to front cover as indicated and “0” dial indicator. Manually bar engine over one complete revolution (360°) and record total movement of dial indicator.

INSPECTION - CONTINUED

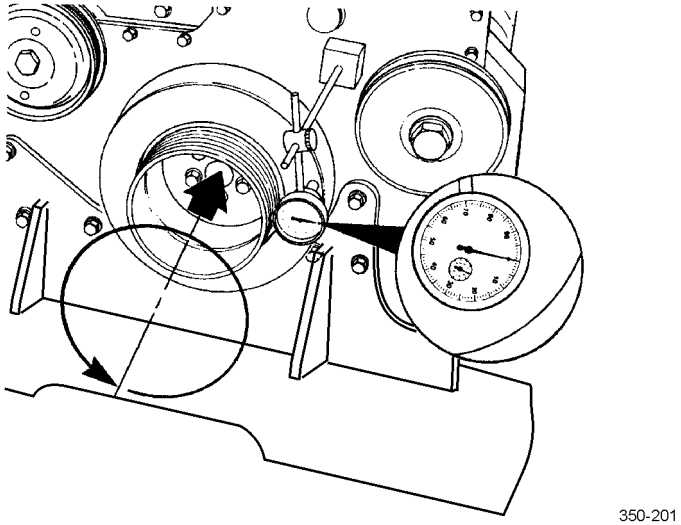


ECCENTRICITY CHECK

NOTE

Ensure crankshaft is to front or rear of engine and "0" dial indicator.

5. Position dial indicator to measure wobble (face alignment) as shown. Manually bar engine over one complete revolution (360°) and record total indicator movement.



WOBBLE CHECK

INSTALLATION

NOTE

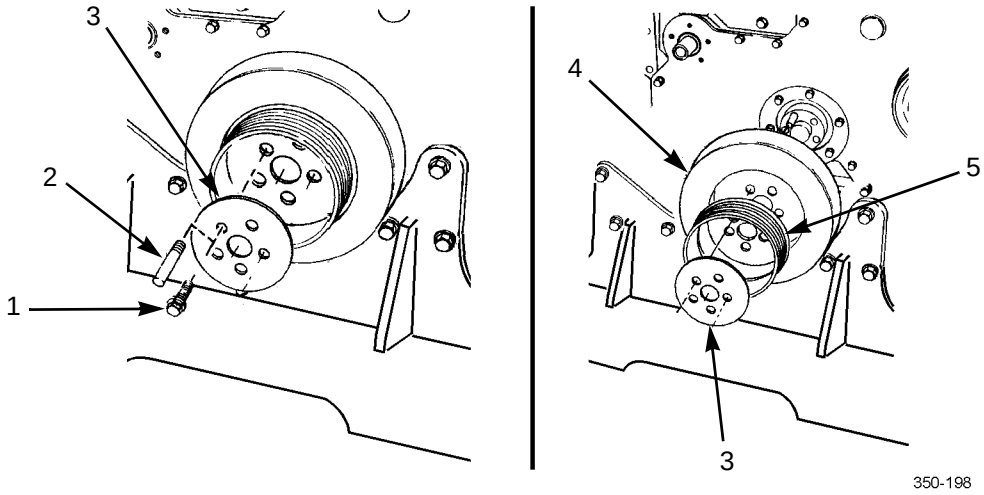
Ensure mounting surface of crankshaft is clean and free of dirt.

1. Position vibration damper (4) over guide studs (2) and slide in place.

NOTE

Ensure mounting screw threads are lubricated with clean oil prior to installation.

2. Install clamping plate (3) and crankshaft pulley (5). Remove three guide studs (2) and install screws (1) hand tight.
3. Remove two guide studs (2) and install remaining screws (1). Tighten all screws in a star pattern to 150 lb-ft (203 Nm).



4. Start engine (TM 10-3930-675-10) and check operation.
5. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FLYWHEEL ASSEMBLY REPLACEMENT 0204 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Attachment, Dial (Item 6, WP 0289 00)

Barring Tool, Engine (Item 7, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Pin Kit, Guide (Item 77, WP 0289 00)

Tools and Special Tools - Continued

Sling, Endless (Item 109, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

Two

Equipment Condition

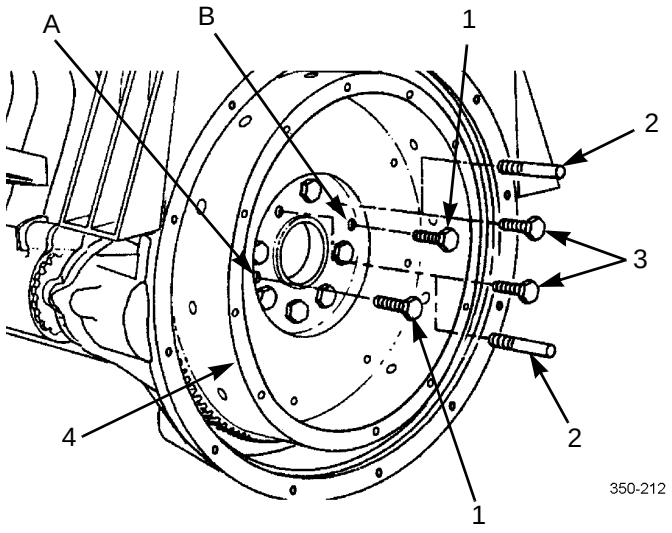
Engine removed (WP 0197 00)

REMOVAL

NOTE

Two screws are installed into tapped holes in flywheel and are used to loosen flywheel from crankshaft.

1. Install two screws (1) at positions "A" and "B" on flywheel (4).
2. Remove two mounting screws (3) and replace with guide pins (2).

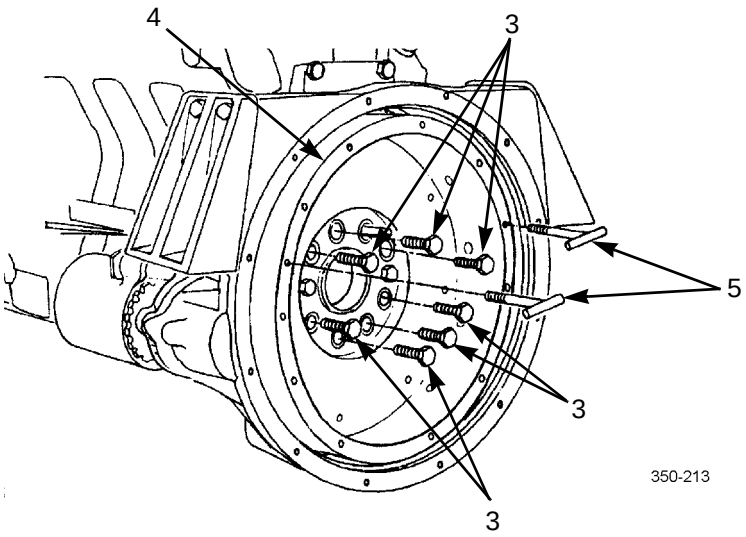


REMOVAL - CONTINUED

NOTE

- **T-handles, or similar devices, are used to provide attachment points for lifting device sling. T-handles are normally fabricated using bar stock. Suitably-sized bolts or eyebolts may also be used.**
- **Check torque converter mounting holes for thread size and use appropriate T-handles. Normal U. S. customary thread sizes are 3/8-16 in., 7/16-20 in., and ½-13 in., Ensure correct size is used.**

3. Install two T-handles (5) into flywheel (4) at opposite points suitable for lifting.
4. Remove remaining mounting screws (3) from flywheel (4).



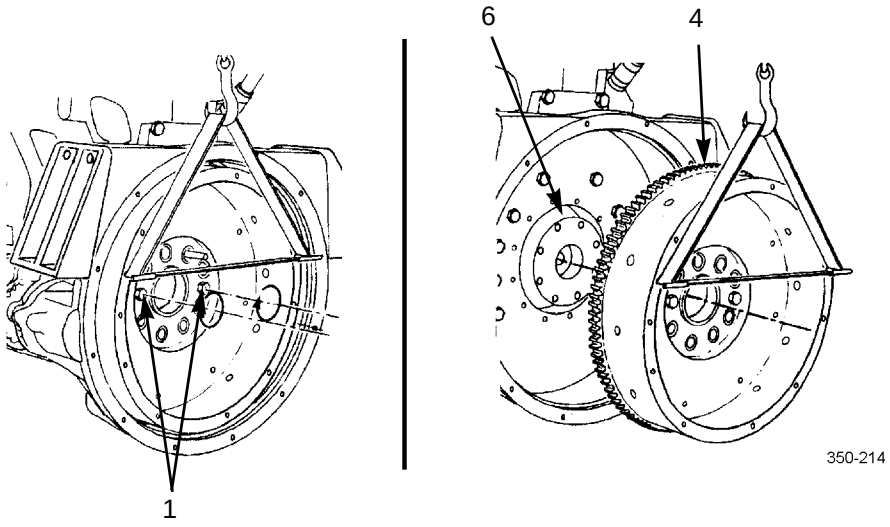



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Flywheel weighs 50 lb (23 kg) or more. Use suitable lifting device or assistance to lift flywheel.**

5. Install nylon sling on T-handles and attach to suitable lifting device.
6. Tighten screws (1) in alternating sequence to loosen and remove flywheel (4) from crankshaft (6).

REMOVAL - CONTINUED

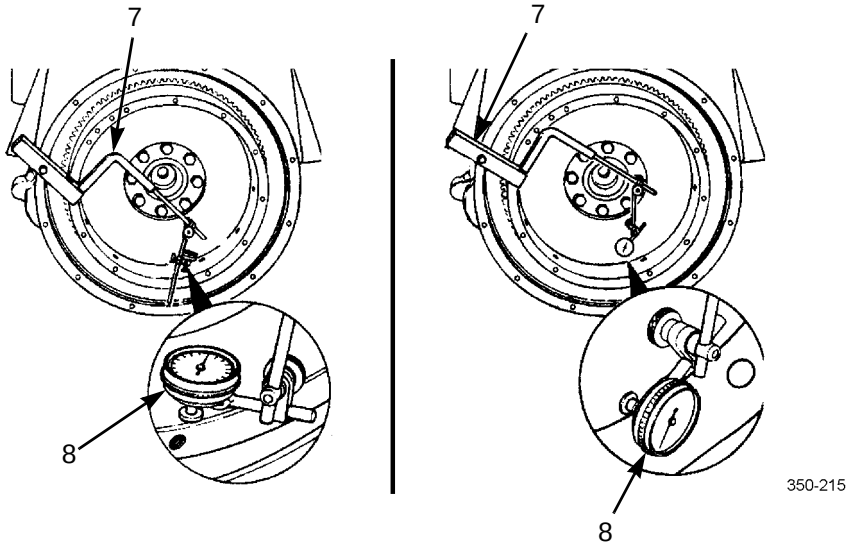


INSPECTION

NOTE

Flywheel bore runout and face runout checks confirm serviceability and proper installation of flywheel. If flywheel does not meet requirements of either check, flywheel must be replaced.

1. Install dial indicator (8) and attachments (7) and check flywheel bore runout.



INSPECTION - CONTINUED

2. Rotate flywheel, using engine barring tool, one revolution and record indication. Total indicator reading MUST NOT exceed 0.0050 in. (0.127 mm).

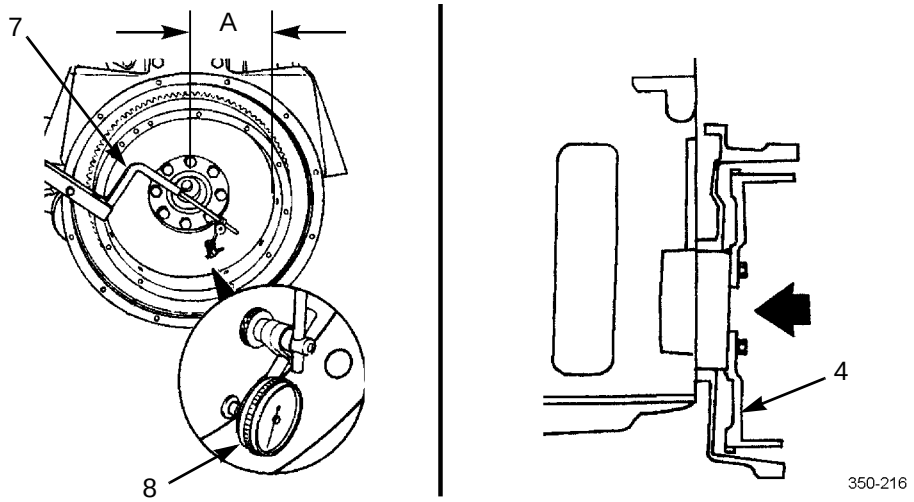
NOTE

Flywheel face runout check results in five readings. If any one of the readings exceeds the maximum, flywheel must be replaced.

3. Measure flywheel face runout as follows:

   a. Install dial indicator (8) and attachments (7).

   b. Push flywheel (4) forward to remove crankshaft end thrust.



   c. Zero and position dial indicator at radius indicated in Table 1, *Flywheel Face Runout*.

   d. Rotate crankshaft, using engine barring tool, one revolution and record total indicator reading.

   e. Repeat steps a thru d for each radius setting listed in Table 1, *Flywheel Face Runout*.

Table 1. Flywheel Face Runout.

RADIUS (A)		MAXIMUM TIR	
MM	IN.	MM	IN.
203	8	0.203	0.008
254	10	0.254	0.010
305	12	0.305	0.012
356	14	0.356	0.014
406	16	0.406	0.016

INSTALLATION

NOTE

Ensure flywheel mounting surface and crankshaft is free of dirt.

1. Install guide pin (2).

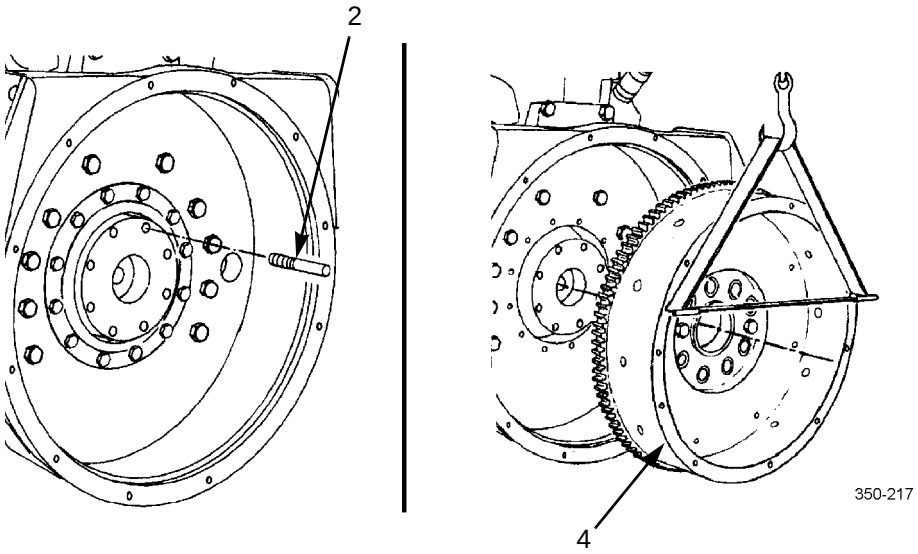


WARNING



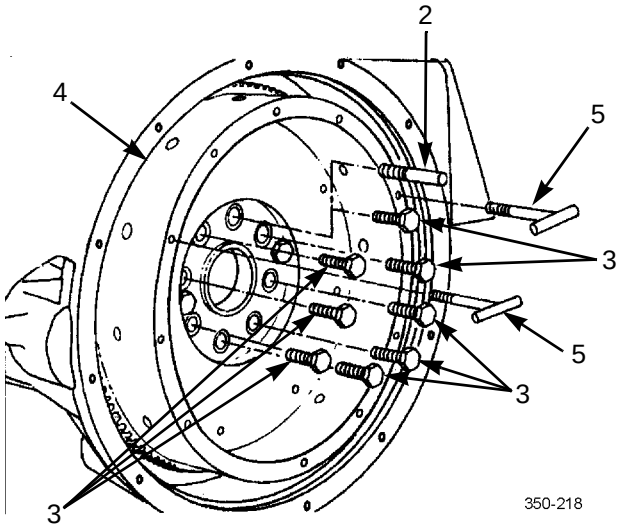
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Flywheel weighs 50 lb (23 kg) or more. Use suitable lifting device or assistance to lift flywheel.**

2. Using nylon sling, T-handles, and suitable lifting device, position flywheel (4) on guide pin (2).



INSTALLATION - CONTINUED

3. Secure flywheel (4) in place with seven screws (3) hand tight.
4. Disconnect lifting device and sling. Remove T-handles (5).
5. Remove guide pin (2) and install last mounting screw (3). Tighten screws in star pattern to 135 lb-ft (183 Nm).



6. Install engine (WP 0197 00).

END OF WORK PACKAGE

FLYWHEEL HOUSING REPLACEMENT 0205 00

THIS WORK PACKAGE COVERS

Removal, Installation, alignment

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Alignment Plate, Flywheel Housing (Item 4, WP 0289 00)

Barring Tool, Engine (Item 7, WP 0289 00))

Gage, Depth, Dial Indicating (Item 40, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Pin Kit, Guide (Item 77, WP 0289 00)

Sling, Endless (Item 109, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Kit, Oil Seal (P/N 3803727)

Personnel Required

Two

References

WP 0202 00

Equipment Condition

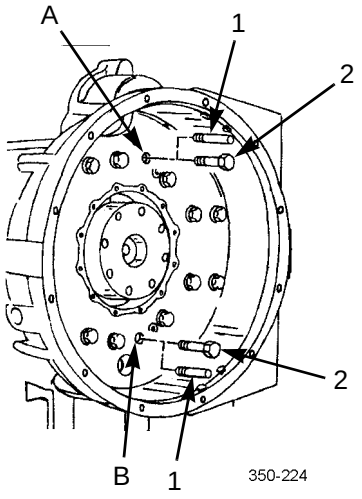
Starter removed (WP 0072 00)

Flywheel assembly removed (WP 0204 00)

Engine oil pan removed (WP 0208 00)

REMOVAL

1. Remove and discard rear main oil seal (WP 0202 00).
2. Remove two screws (2) from positions “A” and “B” and install guide pins (1).





WARNING

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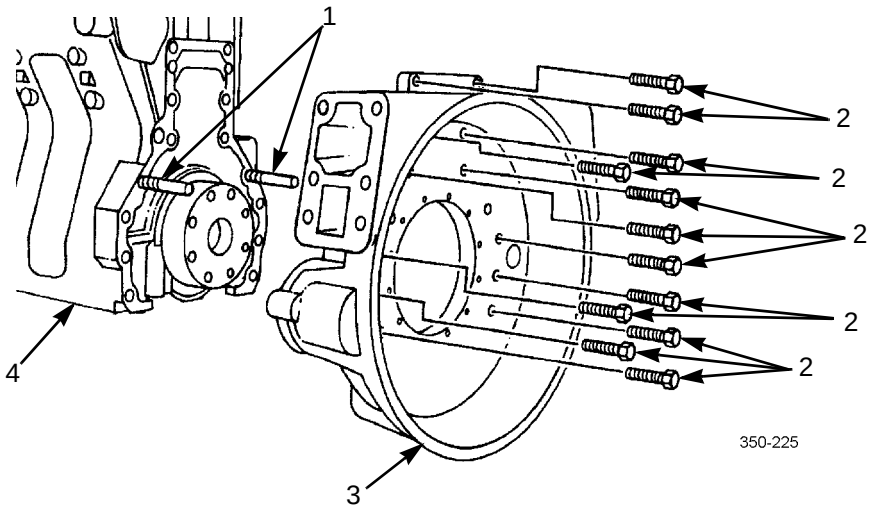
NOTE

Flywheel housing weighs 50 lb (23 kg) or more. Use sling and lifting device to support and remove flywheel housing.

3. Remove 12 screws (2) securing flywheel housing (3) to cylinder block (4).
4. Use a plastic-faced hammer, if needed, to loosen flywheel housing (3). With assistance, remove flywheel housing.

REMOVAL - CONTINUED

5. Remove guide pins (1) from cylinder block (4).



INSTALLATION

1. Measure inside diameter of flywheel housing bore. Compare reading to Table 1 and determine SAE number and size of housing being installed.

Table 1. Flywheel Housing Bore Maximum Inside Diameter (ID).

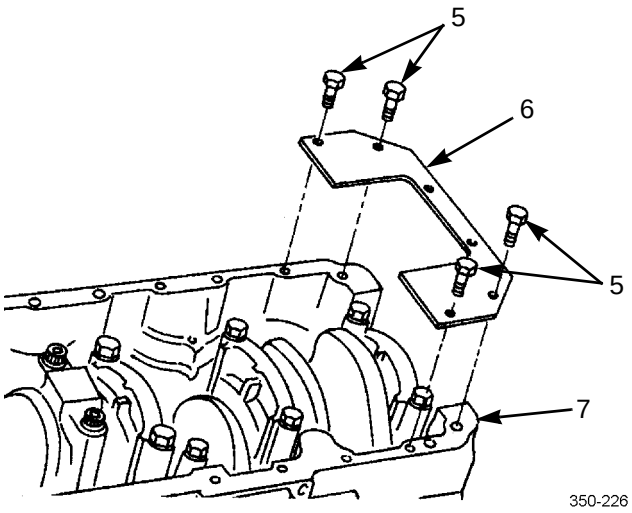
MM	SAE NO.	IN.
787.7	00	31.01
648.0	0	25.51
584.4	½	23.01
511.3	1	20.13
447.8	2	17.63
409.7	3	16.13

INSTALLATION - CONTINUED

NOTE

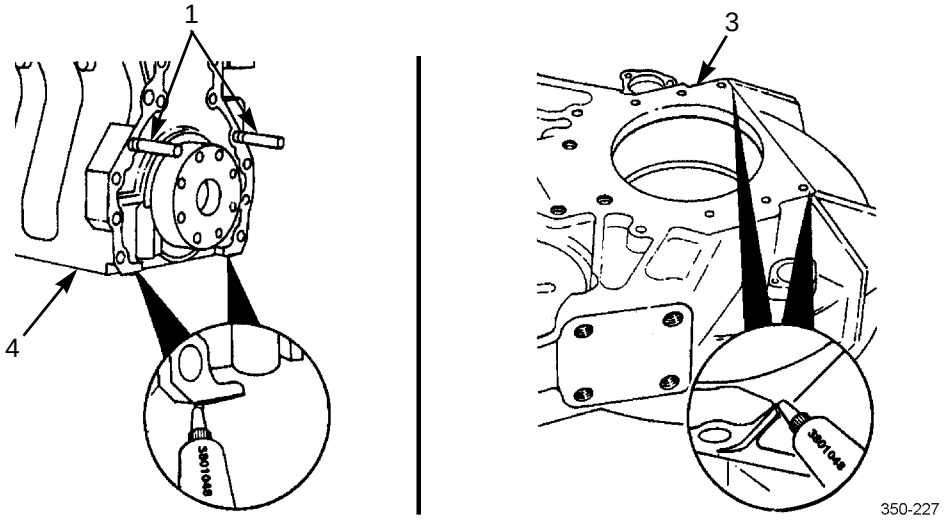
Ensure flywheel housing mounting surface and cylinder block surface has been cleaned and all old sealant removed.

2. Install flywheel alignment plate (6) on oil pan mounting flange (7) and secure with four oil pan screws (5). Tighten screws to 35 lb-ft (47 Nm).



3. Apply bead of silicone sealant to mounting surface on flywheel housing (3) and cylinder block (4).

4. Install two guide pins (1) in cylinder block (4).



INSTALLATION - CONTINUED



WARNING



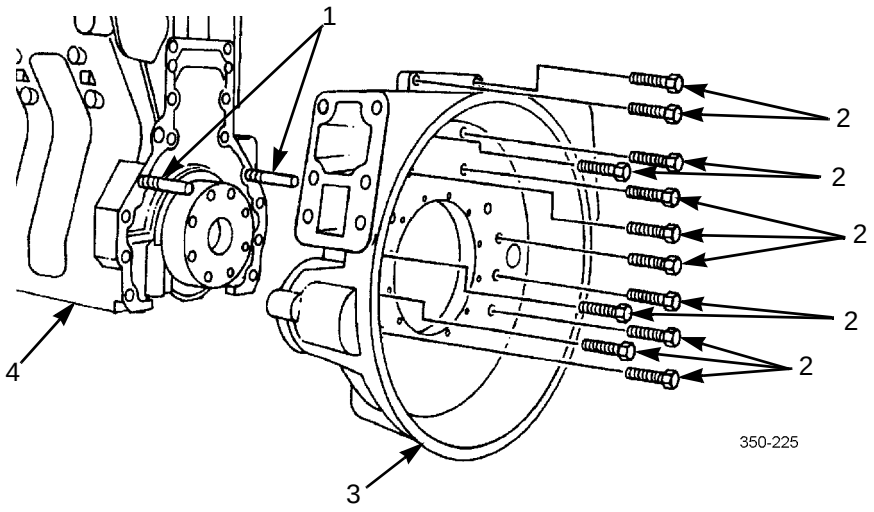
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

5. With assistance, using sling and lifting device, position flywheel housing (3) over guide pins (1).

NOTE

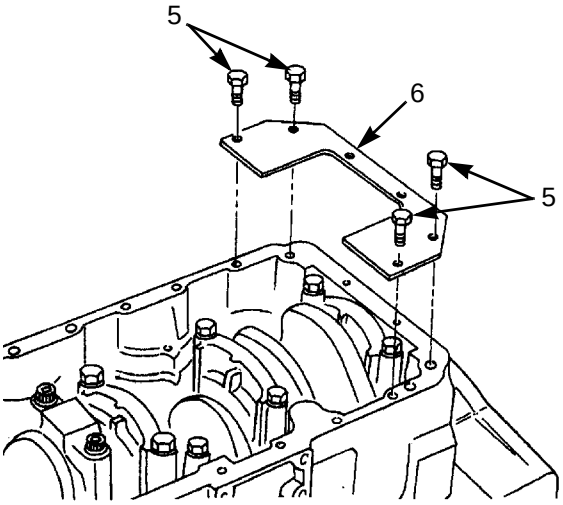
Retaining screws are not fully tightened until flywheel housing has been aligned with crankshaft.

6. Secure flywheel housing (3) with 12 screws (2) and tighten screws initially to 60 lb-in. (7 Nm).
7. Remove guide pins (1) and install remaining screws (2). Tighten screws to 60 lb-in. (7 Nm).



INSTALLATION - CONTINUED

8. Remove four oil pan screws (5) and flywheel alignment plate (6).



ALIGNMENT

CAUTION

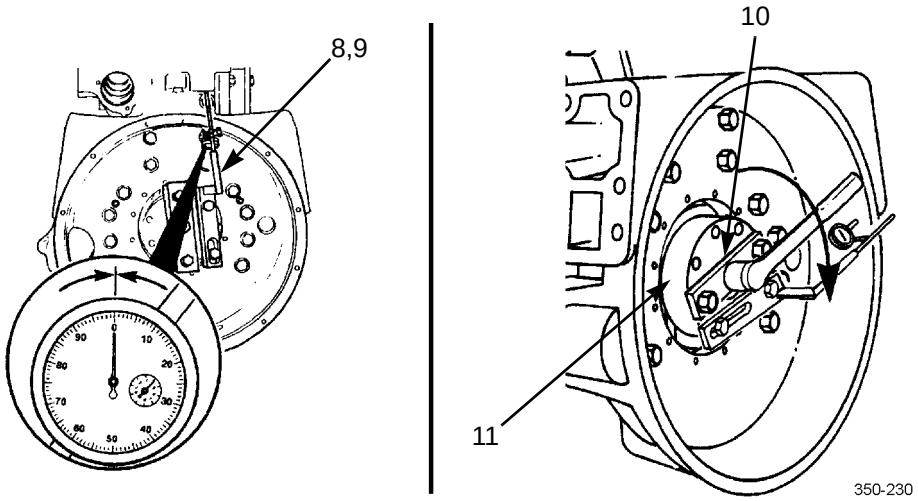
Flywheel housing must be properly positioned in relation to crankshaft for rear main oil seal to fully seat and for flywheel to be centered in housing. Failure to properly align flywheel housing may result in early seal failure and other equipment damage.

NOTE

If bore alignment is not within specification and bore is not round, flywheel housing must be replaced.

1. Perform flywheel housing bore alignment check as follows:
   a. Install dial indicator gage (8), attachments (9), and engine barring tool (10).
   b. Position dial indicator at 12 o'clock position and adjust gage for "0" (zero).
   c. Using engine barring tool (10), rotate crankshaft (11) one complete revolution and record total indicator reading.

ALIGNMENT - CONTINUED



d. Compare recorded reading to Table 2 for SAE number of flywheel housing being installed. If maximum bore alignment does not meet specification, use a plastic-faced hammer to adjust position of flywheel housing.

Table 2. Flywheel Housing Bore Alignment Maximum TIR.

MM	SAE NO.	IN.
0.31	00	0.012
0.25	0	0.010
0.25	½	0.010
0.20	1	0.008
0.20	2	0.008
0.20	3	0.008

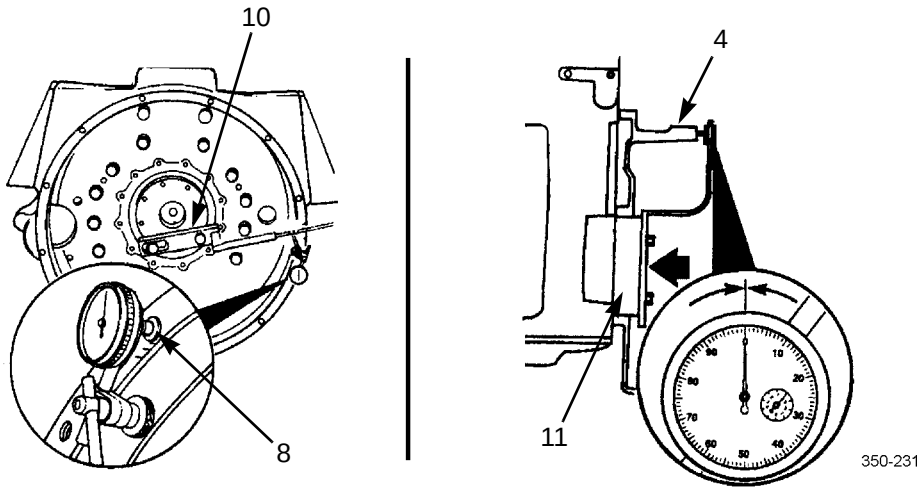
e. Repeat bore alignment check steps a thru d until recorded reading is within specifications. If flywheel housing cannot be aligned, it must be replaced.

ALIGNMENT - CONTINUED

CAUTION

DO NOT allow tip of gage to enter capscrew holes while performing face alignment check. If tip of gage enters holes, gage will be damaged.

2. Perform flywheel housing face alignment as follows:
   a. Position contact tip of dial indicator gage (8) against flywheel housing (4) face.
   b. Push crankshaft (11) toward front of engine.
   c. Adjust gage dial to “0” (zero).



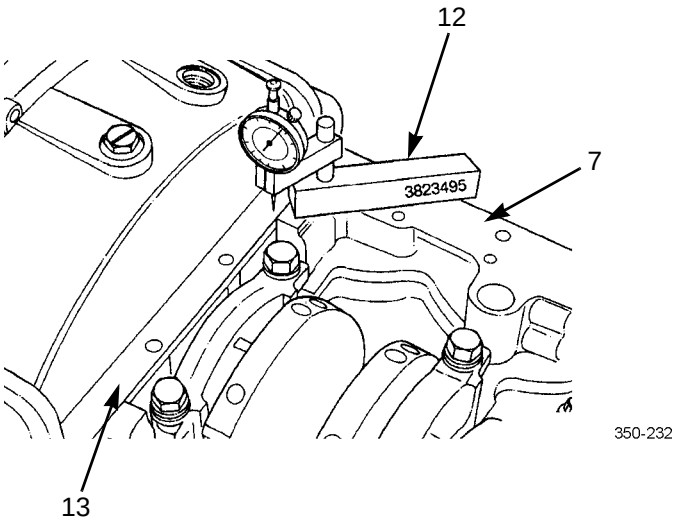
   d. Using engine barring tool (10), rotate crankshaft one complete revolution and record reading.
   e. Compare recorded reading to Table 3 for SAE number of flywheel housing being installed. If maximum face alignment does not meet specification, and no visible damage or defects have been detected, flywheel housing must be replaced.

Table 3. Flywheel Housing Face Alignment Maximum TIR.

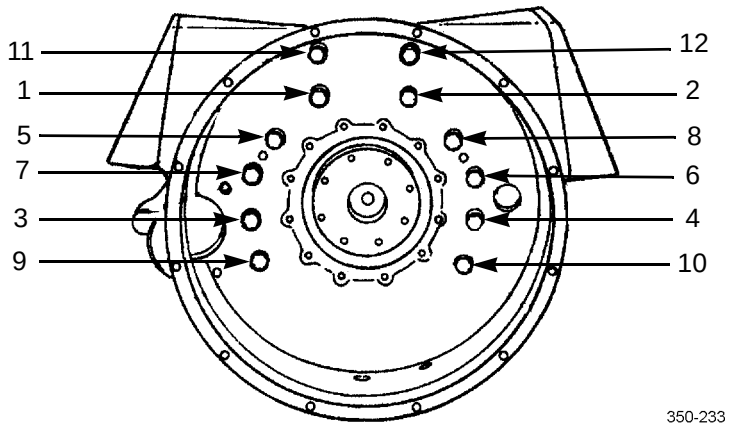
MM	SAE NO.	IN.
0.31	00	0.012
0.25	0	0.010
0.25	½	0.010
0.20	1	0.008
0.20	2	0.008
0.20	3	0.008

3. Using gage block (12), check alignment of oil pan flange of flywheel housing (13) with cylinder block oil pan mounting flange (7). Flywheel housing oil pan flange must be even with cylinder block oil pan mounting flange to within ± 0.006 in. (0.15 mm).

ALIGNMENT - CONTINUED



4. Using tightening sequence pattern shown, fully tighten 12 screws in three steps as follows:
   a. In first sequence, tighten screws to 50 lb-ft (68 Nm).
   b. In second sequence, tighten screws to 95 lb-ft (129 Nm).
   c. In third sequence, tighten screws to 145 lb-ft (197 Nm).



TIGHTENING SEQUENCE

5. Recheck bore and face alignment measurements. If measurements are within specification, remove measurement tools and engine barring tool.
6. Install new rear main oil seal (WP 0202 00).
7. Install flywheel assembly (WP 0204 00).

ALIGNMENT - CONTINUED

8. Install starter (WP 0072 00).
9. Install engine oil pan (WP 0208 00).

END OF WORK PACKAGE

ROCKER ARM ASSEMBLY MAINTENANCE 0206 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Gage, Thickness (Item 45, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0207 00

Equipment Condition

Engine cover removed (WP 0148 00)

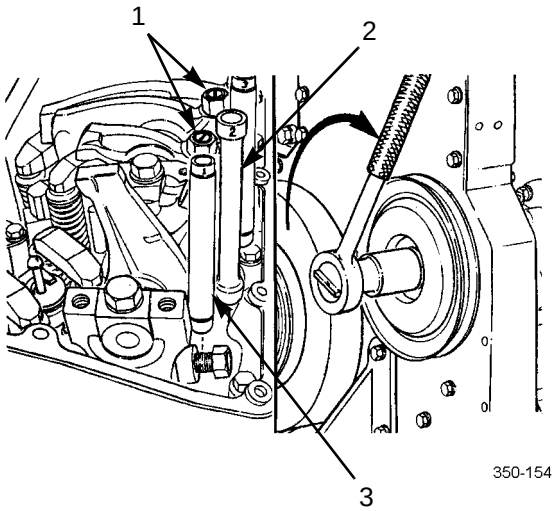
Rocker arm cover removed (WP 0052 00)

NOTE

Tag or mark all items removed or disassembled while performing these procedures. For proper operation and adjustment, items must be assembled and installed in the location from which they were removed.

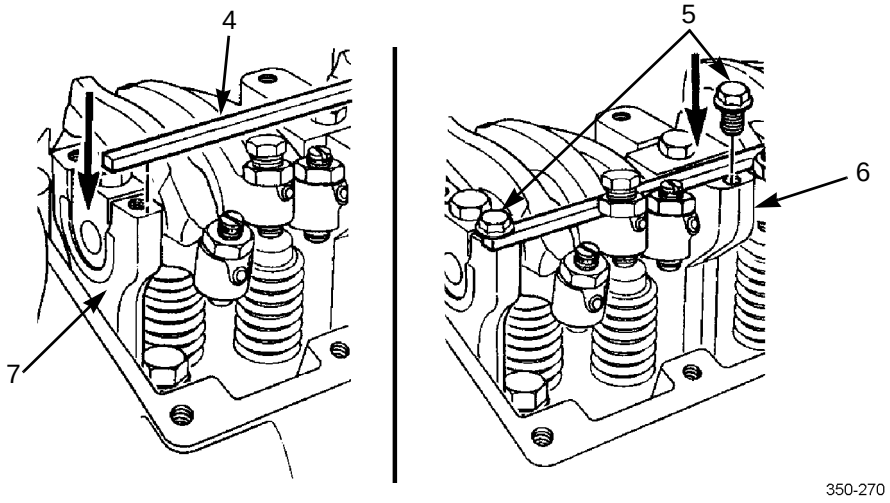
REMOVAL

1. Loosen rocker lever adjusting screws (1) and remove push rods (3) and push tubes (2).

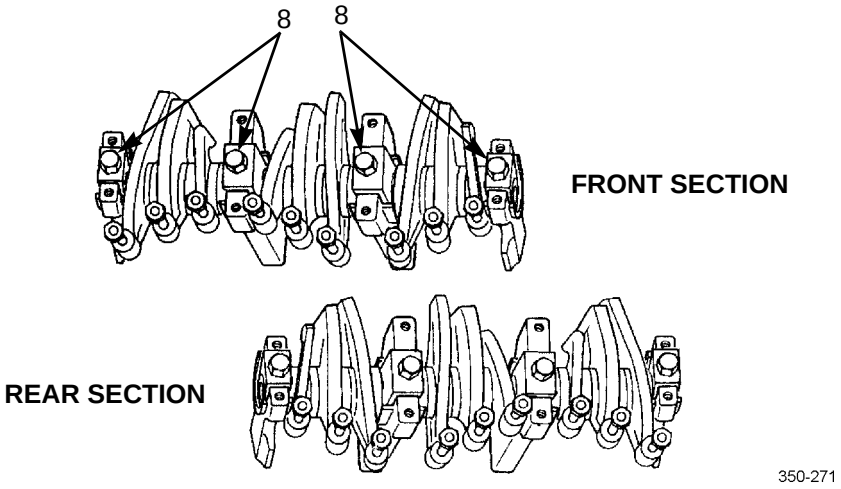


REMOVAL - CONTINUED

2. Position ¼ x 18 in. key stock (4) or similar item on top of rocker lever assembly supports (6 and 7). Secure in place with four screws (5).



3. Loosen four rocker shaft screws (8). Remove front section of rocker arm assembly.



4. Repeat steps 1 thru 3 and remove rear section of rocker arm assembly.

DISASSEMBLY

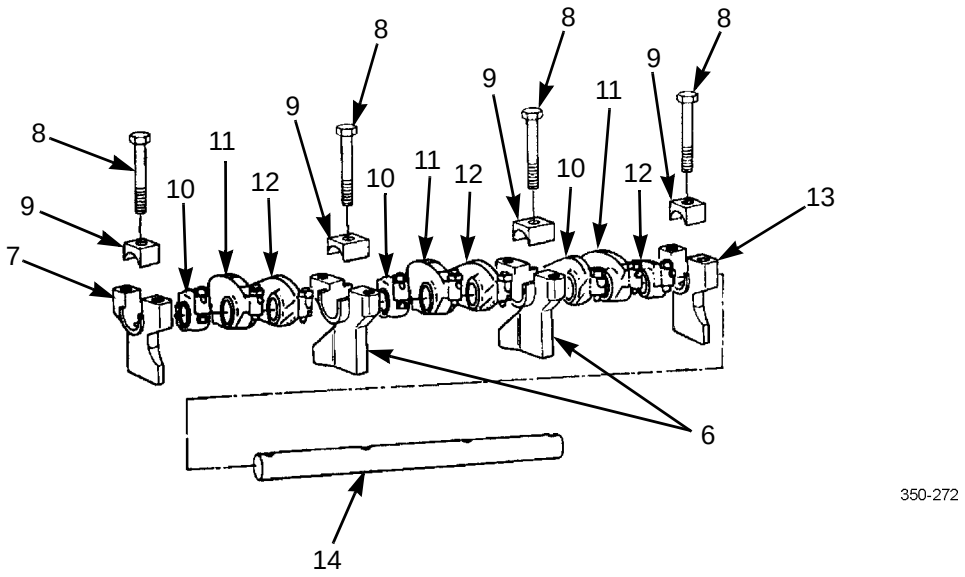
NOTE

Mark or tag each rocker lever, shaft, and support with relative position in rocker assembly.

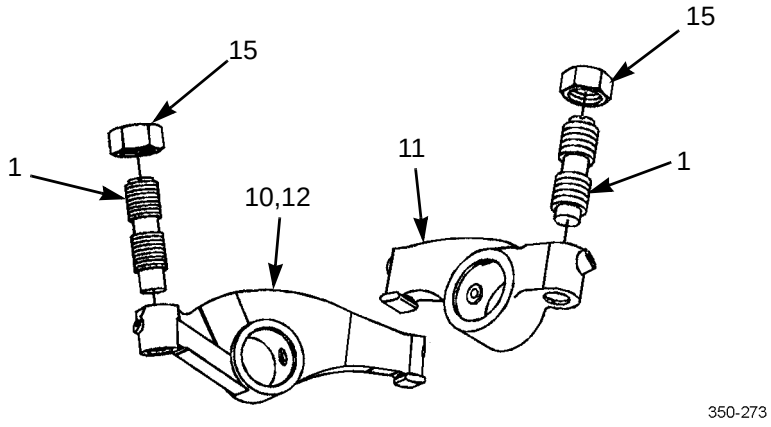
1. Remove four rocker shaft screws (8) and retaining clamps (9).
2. Lift shaft (14) and three rocker levers (10, 11, and 12) out of supports (6, 7, and 13).

DISASSEMBLY - CONTINUED

3. Remove three rocker levers (10, 11, and 12) from shaft (14).



4. Remove adjusting nut (15) and adjusting screw (1) from each rocker lever (10, 11, and 12).

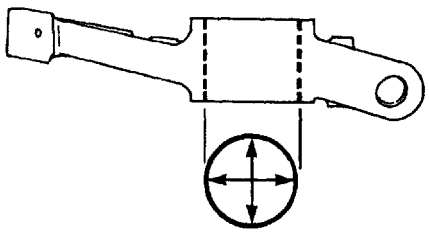


INSPECTION

NOTE

If the following conditions are noted or specifications are not met, item being inspected must be replaced.

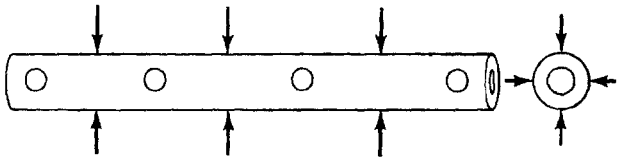
1. Ensure components have been thoroughly cleaned and visually inspect rocker levers for these conditions:
   a. Cracks, excessive pitting, or other visible damage.
   b. Thread damage to adjusting screw threads.
   c. Sockets and pads for cracks, pits, wear, or other damage.
2. Visually inspect adjusting nut and adjusting screw for damaged threads.
3. Visually inspect shaft for pitting, scoring, or other damage.
4. Visually inspect supports for cracks, pitting, or other damage.
5. Measure rocker lever bushing inside diameter. Measurement must be 1.3735 to 1.3776 in. (34.887 to 34.99 mm). If not within range, replace bushing.



350-274

INSIDE DIAMETER, ROCKER LEVER BUSHING

6. Measure outside diameter of rocker lever shaft. Diameter must be 1.3715 to 1.3726 in. (34.837 to 34.864 mm). If diameter is not within range, replace rocker lever shaft.



350-275

OUTSIDE DIAMETER, ROCKER LEVER SHAFT

ASSEMBLY

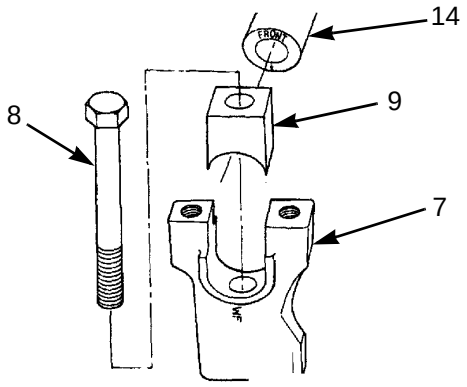
CAUTION

Ensure rocker lever shafts are installed in support with arrow on end of shaft pointed down. Failure to install rocker lever shafts with arrow down will have an adverse effect on rocker lever lubrication and may cause damage to rocker arm assemblies.

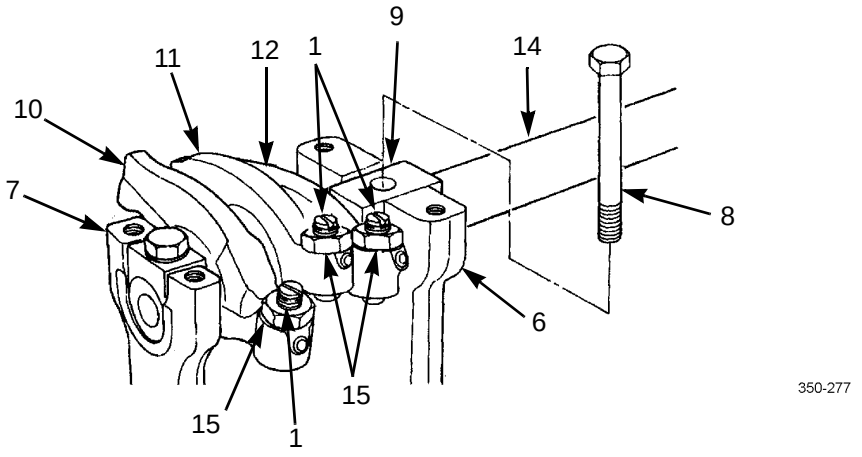
NOTE

Ensure rocker lever shafts are oriented according to marking on shaft ends.

1. Apply a light coat of clean lubricating oil to each rocker lever shaft (14) and install front end support (7) on each rocker lever shaft.
2. Install screw (8) and retaining clamp (9) to secure rocker lever shaft (14) to front end support (7).

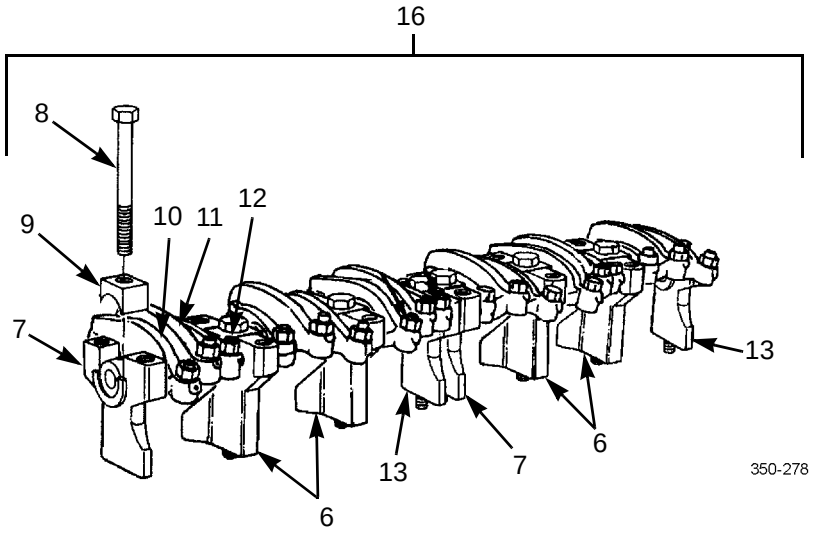


3. Install adjusting screw (1) and adjusting nut (15) in three rocker levers (10, 11, and 12) and position rocker levers on shaft (14) in correct sequence as noted in disassembly.
4. Position one center support (6) and secure in place with retaining clamp (9) and screw (8).
5. Install three rocker levers (10, 11, and 12) and remaining support (6) with rocker levers in correct position as noted in disassembly.

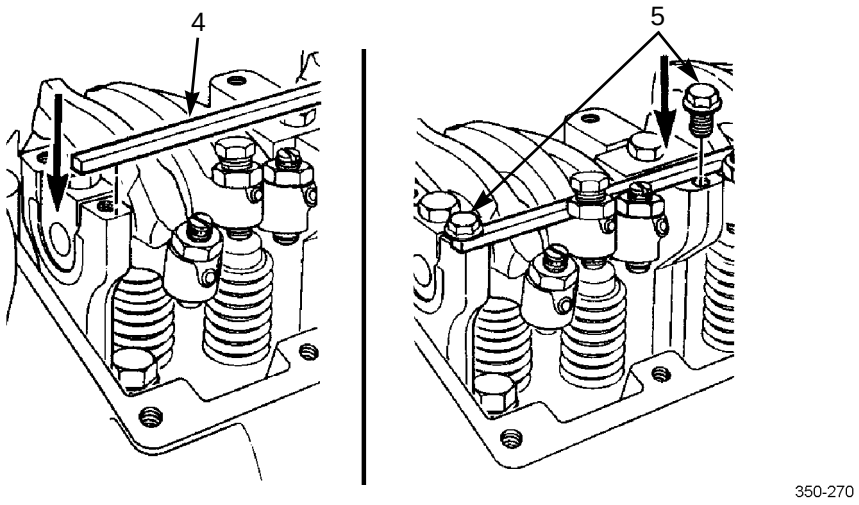


ASSEMBLY - CONTINUED

6. Install support (13) and remaining retaining clamps (9) and screws (8) on front and rear sections of rocker arm assembly (16).



7. Position key stock (4) used to remove assembly on top of supports and secure in place with four screws (5).

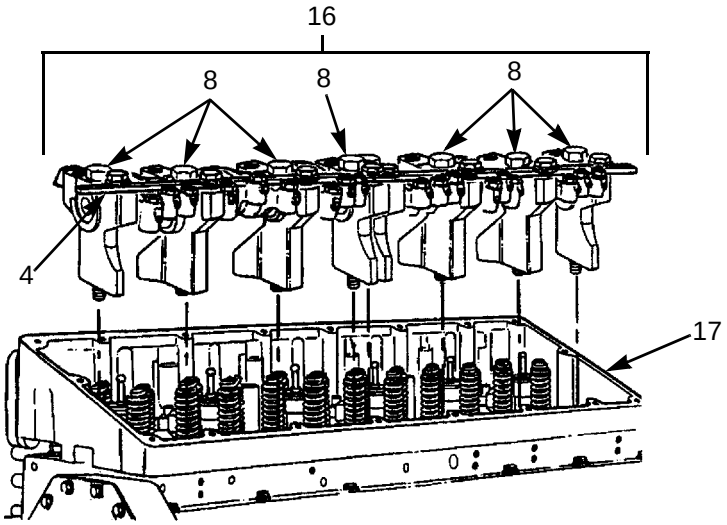


INSTALLATION

NOTE

Rocker arm assembly must be installed in same position from which it was removed.

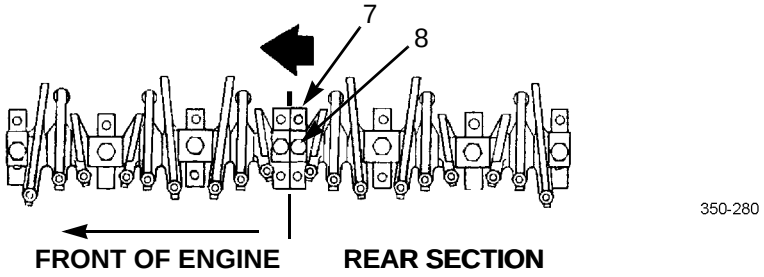
1. Position rocker arm assembly (16) on cylinder head (17). Hand-tighten eight screws (8) and remove key stock (4).



NOTE

Rocker lever side clearance MUST be adjusted before screws are fully tightened.

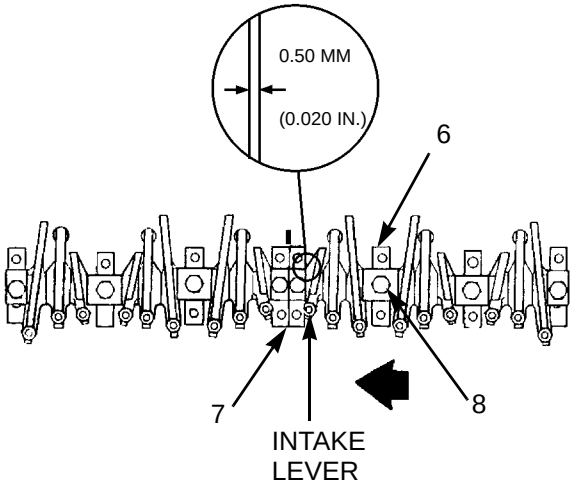
2. Set side clearance for rear section of rocker arm assembly as follows:
   a. Tap number five rocker lever support (7) toward front of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



INSTALLATION - CONTINUED

b. Insert 0.020 in. (0.50 mm) feeler gage between number five support (7) and intake lever for number four cylinder.

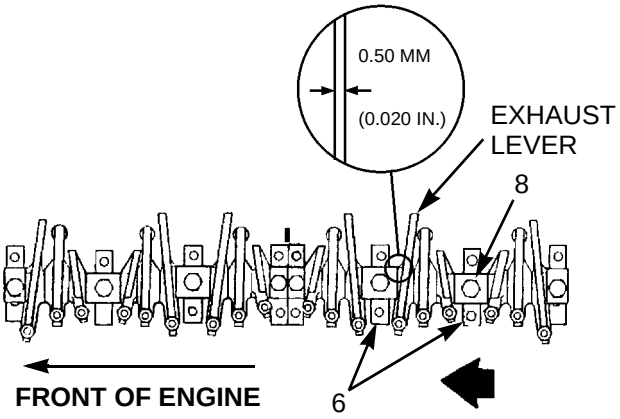
c. Push or tap number six support (6) toward front of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



350-281

d. Insert 0.020 in. (0.50 mm) feeler gage between number six support (6) and exhaust lever for number five cylinder.

e. Push or tap number seven support (6) toward front of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



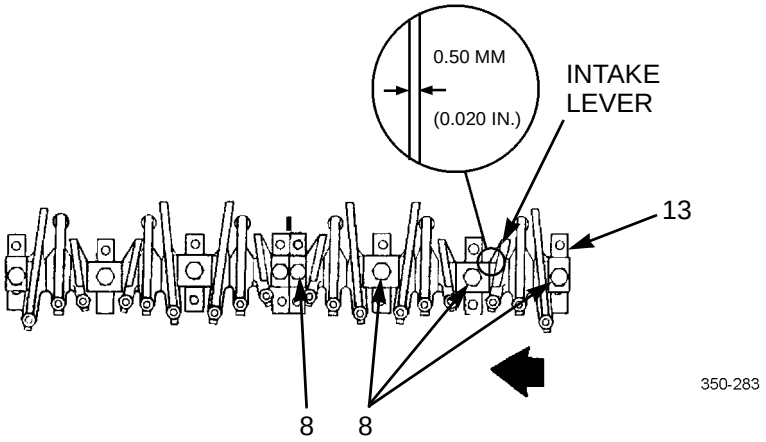
350-282

INSTALLATION - CONTINUED

f. Insert 0.020 in. (0.50 mm) feeler gage between number seven support (6) and intake lever for number six cylinder.

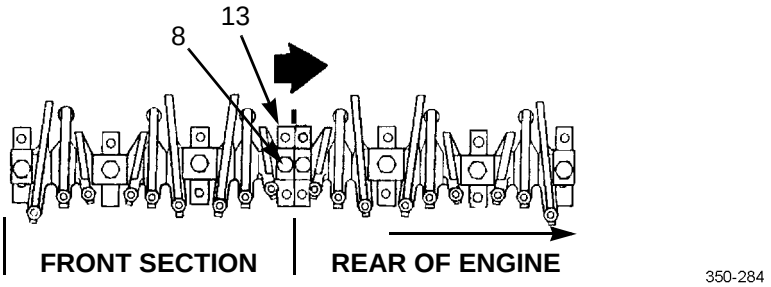
g. Push or tap number eight support (13) toward front of engine.

h. Fully tighten four support mounting screws (8) to 135 lb-ft (183 Nm).



3. Set side clearance for front section of rocker arm assembly as follows:

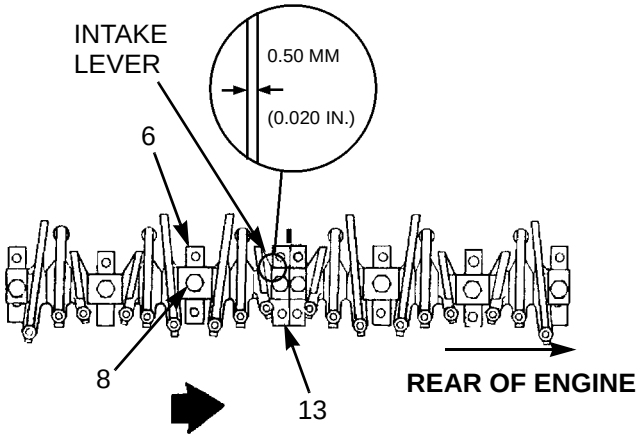
a. Push or use hammer to tap number four support (13) toward rear of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



INSTALLATION - CONTINUED

b. Insert 0.020 in. (0.50 mm) feeler gage between number four support (13) and intake lever of number three cylinder.

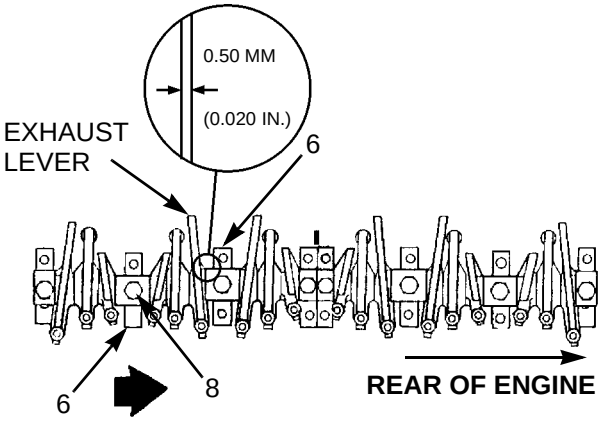
c. Push or tap number three support (6) toward rear of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



350-285

d. Insert 0.020 in. (0.50 mm) feeler gage between number three support (6) and exhaust lever for number two cylinder.

e. Push or tap number two support (6) toward rear of engine. Tighten mounting screw (8) to 45 lb-in. (5 Nm).



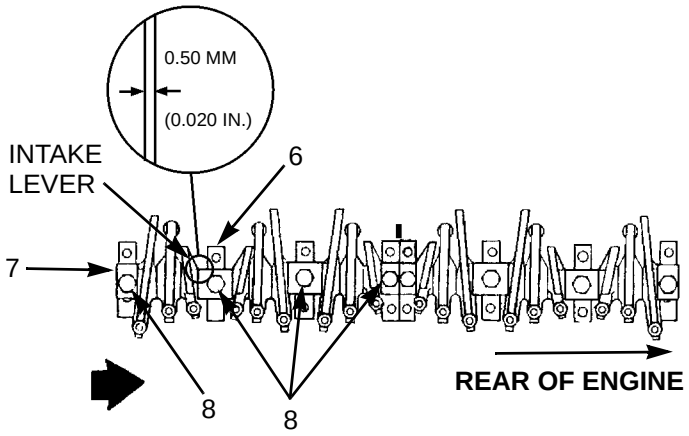
350-286

INSTALLATION - CONTINUED

f. Insert 0.020 in. (0.50 mm) feeler gage between number two support (6) and intake lever for number one cylinder.

g. Push or tap number one support (7) toward rear of engine.

h. Fully tighten four support mounting screws (8) to 135 lb-ft (183 Nm).



350-287

NOTE

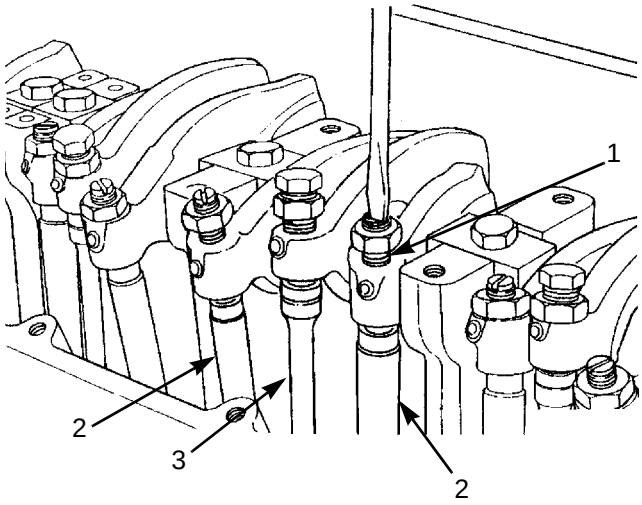
Injector push rods are smaller in diameter and longer than valve push tubes.

4. Apply a light coat of clean lubricating oil to ball end of push rods (3) and push tubes (2).

NOTE

Ensure push rods and tubes are installed in position as noted in removal.

5. Install valve push tubes (2) and injector push rods (3) and tighten adjusting screws (1) enough to hold push rods and tubes in position.



350-288

INSTALLATION - CONTINUED

6. Adjust valves and injectors (WP 0207 00).
7. Install rocker arm cover (WP 0052 00).
8. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

VALVE AND INJECTOR ADJUSTMENTS 0207 00

THIS WORK PACKAGE COVERS

Valve Lash Check
Injector Lash Check
Injector Adjustment
Valve Adjustment

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)
Adapter, Wrench Torque (Item 2, WP 0289 00)
Adjustment Kit, Injector (Item 3, WP 0289 00)
Gage, Thickness (Item 45, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Torque (Item 140, WP 0289 00)
Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Equipment Condition

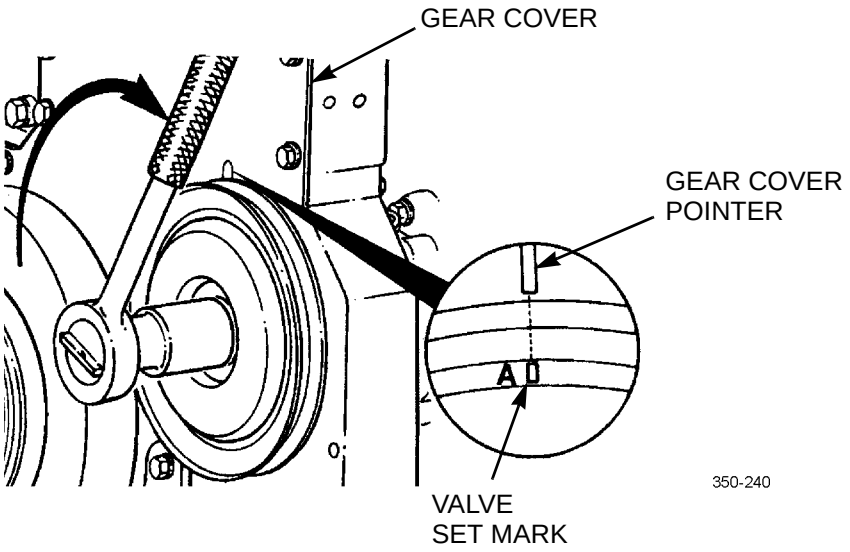
Rocker arm cover removed (WP 0052 00)

NOTE

- **All overhead valve and injector lash measurements and adjustments MUST be made when engine is cold.**
- **Valve set marks "A", "B", and "C" are located on accessory drive pulley. Marks align with pointer on gear housing.**
- **Engine cylinders are numbered from front to rear 1-2-3-4-5-6.**
- **Crankshaft rotation is clockwise when viewed from front of engine. Firing order is 1-5-3-6-2-4.**
- **One pair of valves and one injector are checked or adjusted at each pulley index mark before rotating accessory drive to next mark.**
- **Two crankshaft rotations are required to check or adjust all valves and injectors.**

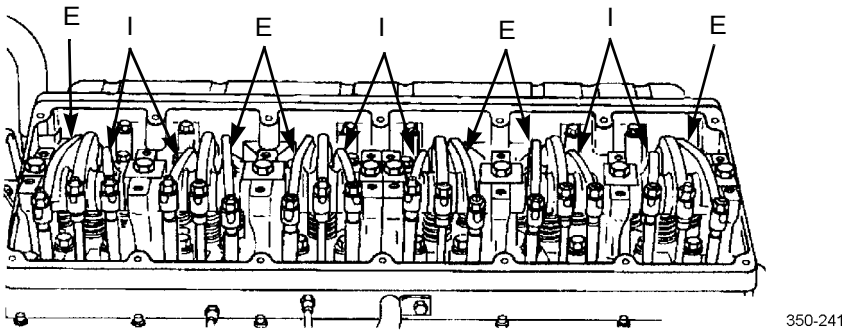
VALVE LASH CHECK

1. Perform valve lash check on each cylinder until all cylinders have been checked.
2. Rotate accessory drive clockwise until valve set mark “A” is aligned with pointer on gear cover.



NOTE

Each cylinder has three rocker levers: long lever (E)—exhaust valve; middle lever–injector; short lever (I)—intake valve.



VALVE LASH CHECK - CONTINUED

3. Observe rocker lever arms of cylinder and compare rocker lever arm positions to Table 1. Intake and exhaust valves must be closed and injector plunger must be at bottom of stroke for cylinder 1. If this is not correct, cylinder 6 must be ready to check.

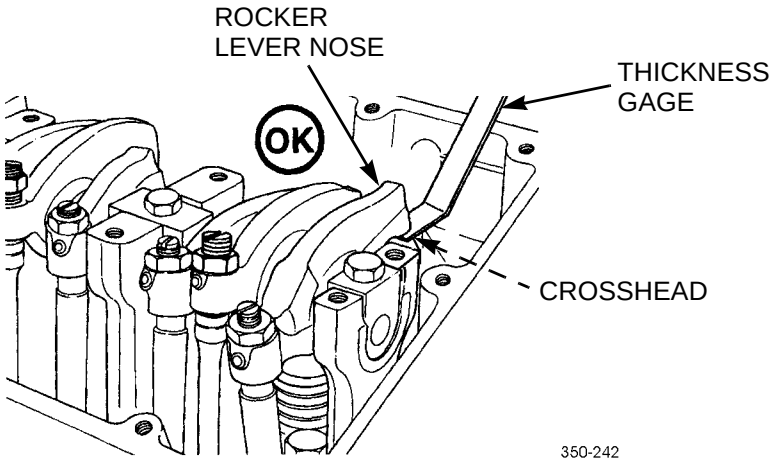
Table 1. Injector and Valve Measurement Sequence.

BAR ENGINE IN DIRECTION OF ROTATION	PULLEY POSITION	SET CYLINDER	
		INJECTOR	VALVE
Start	A	1	1
Advance to	B	5	5
Advance to	C	3	3
Advance to	A	6	6
Advance to	B	2	2
Advance to	C	4	4
Firing Order: 1-5-3-6-2-4			

NOTE

Ensure rocker levers on both intake and exhaust valves of cylinder being checked can be “rattled” or push tubes can be freely rotated.

4. With thickness gage, measure and record amount of clearance between crosshead and rocker lever nose for both intake and exhaust valve.



VALVE LASH CHECK - CONTINUED

5. If valve lash clearance is not within specifications listed in Table 2, valves must be adjusted.

Table 2. M Series Valve Lash Recheck Limits.

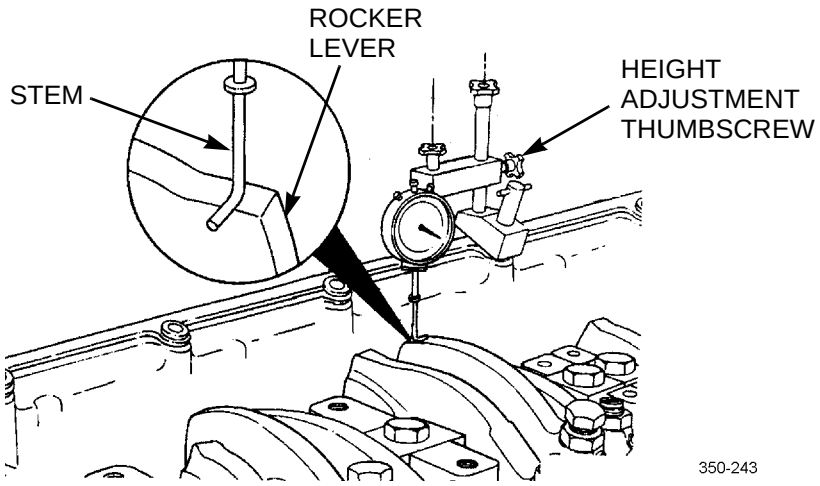
	MM		IN.
INTAKE	0.10	MIN	0.004
	0.41	MAX	0.016
EXHAUST	0.46	MIN	0.018
	0.76	MAX	0.030

INJECTOR LASH CHECK

NOTE

To ensure accurate measurement, securely tighten all hold-down screws and thumbscrews.

1. Install dial indicator on cylinder being checked to measure injector rocker arm lever.
2. Adjust and set dial indicator for reading as follows:
   a. Set tip of dial indicator to rest on rocker lever directly above socket.
   b. Loosen height adjustment thumbscrew and lower indicator against injector rocker lever until stem is fully compressed.
   c. Raise indicator approximately 0.500 in. (12.7 mm) and tighten height adjustment thumbscrew to hold position.

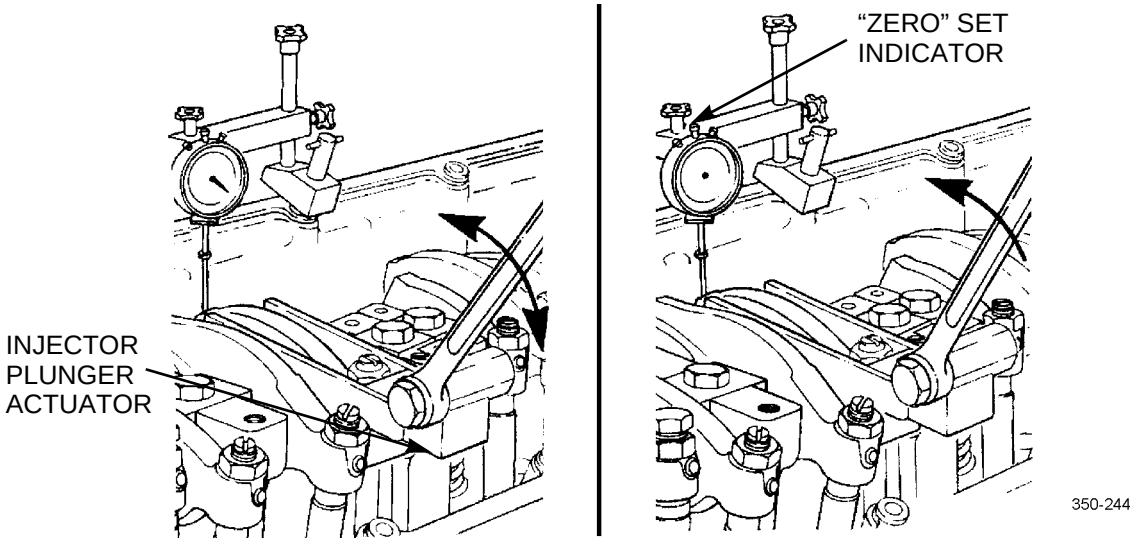


INJECTOR LASH CHECK - CONTINUED

WARNING

Injector plunger is under spring tension. DO NOT allow tool to slip. Serious personal injury can result.

3. With actuator, operate injector plunger three or four times to ensure fuel has been removed from injector assembly.
4. With actuator, operate lever again and, while holding injector plunger to bottom of travel, set dial indicator at “0” (zero).



5. Slowly release actuator and check dial indicator travel. Record measured value. If injector lash setting is not within specifications listed in Table 3, injector must be adjusted.

Table 3. M Series Injector Lash Recheck Limits.

MM		IN.
0.51	MIN	0.020
2.04	MAX	0.080

INJECTOR ADJUSTMENT

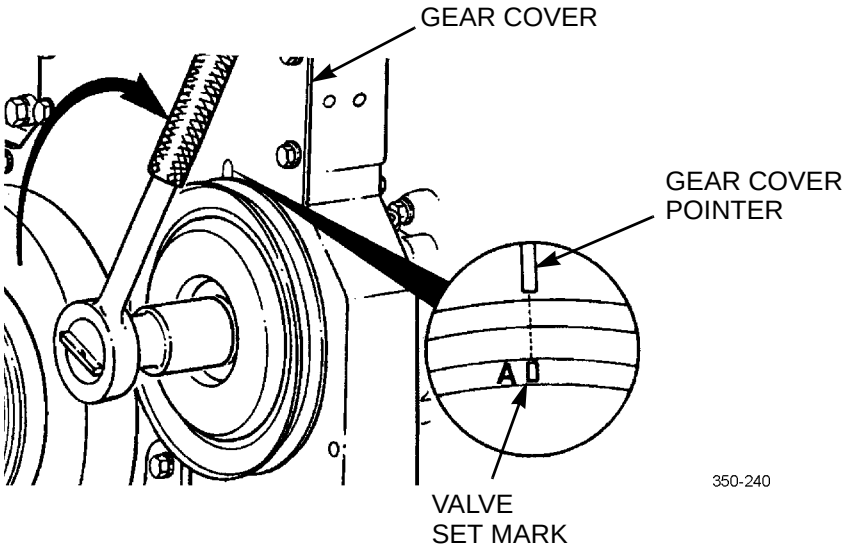
NOTE

- **Set injectors on cylinders before setting valves.**
- **Adjustment may begin with any valve set mark. Position “A” is described in the following steps.**

VALVE AND INJECTOR ADJUSTMENTS - CONTINUED 0207 00

INJECTOR ADJUSTMENT - CONTINUED

1. Rotate accessory drive clockwise until “A” valve set mark on accessory drive pulley is aligned with pointer on gear cover.

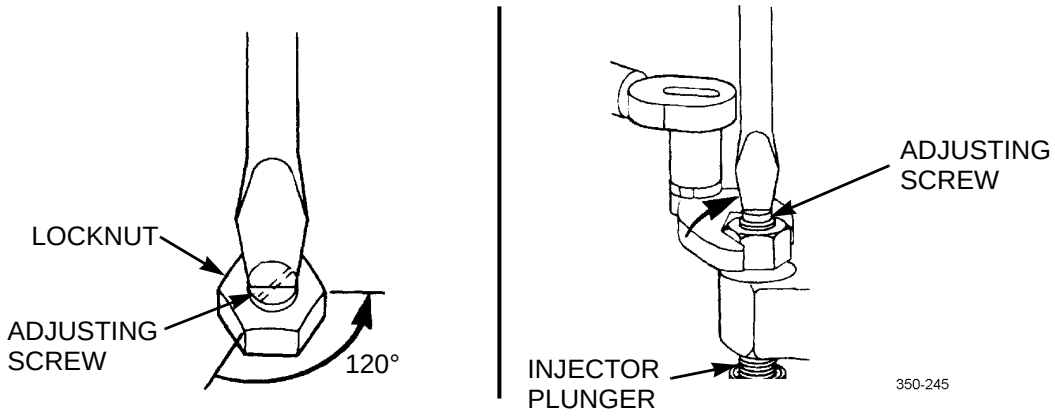


2. With valve set mark “A” aligned with pointer, observe both valve rocker levers for cylinder 1. Intake and exhaust valves for cylinder must be closed. If condition is not met, then cylinder 6 injector and valves must be ready to set.
3. Adjust injector as follows:
   a. Loosen injector adjusting screw locknut.
   b. Bottom injector plunger three or four times to remove fuel.

NOTE

DO NOT use excessive force when bottoming plunger.

   c. Turn adjusting screw in until you can feel it lightly bottom plunger.
   d. Back out adjusting screw two flats or 120 degrees.
   e. Hold adjusting screw and tighten locknut to 45 lb-ft (61 Nm).



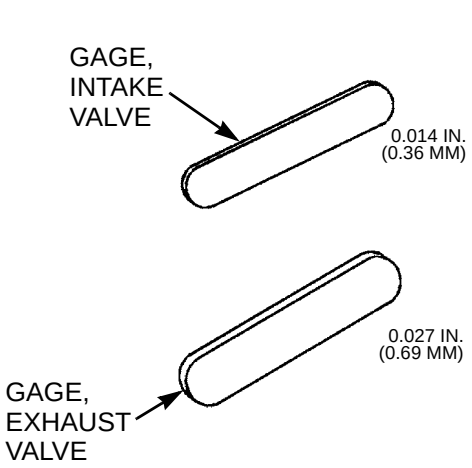
4. Perform valve adjustments on same cylinder.

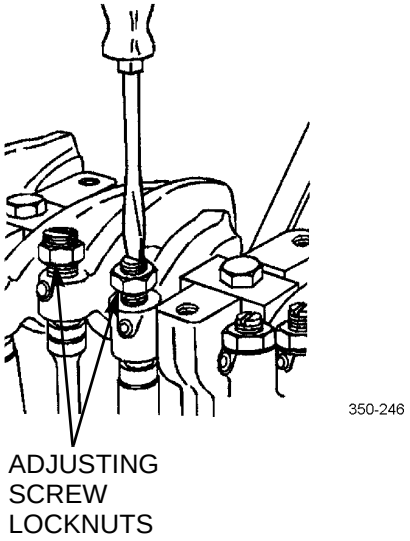
VALVE ADJUSTMENT

NOTE

Ensure valve set mark "A" is aligned with pointer on gear cover and both valves are closed on cylinder to be adjusted.

1. Loosen adjusting screw locknuts on intake and exhaust valves.
2. Select thickness gage for correct valve lash specification listed:
   a. Intake valve—0.014 in. (0.36 mm)
   b. Exhaust valve—0.027 in. (0.69 mm)





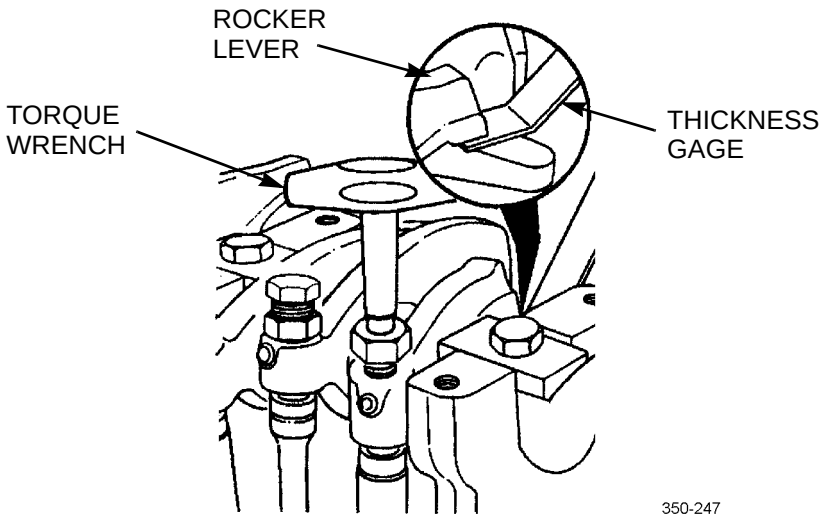
VALVE ADJUSTMENT - CONTINUED

3. Insert thickness gage between top of crosshead and rocker lever pad.

NOTE

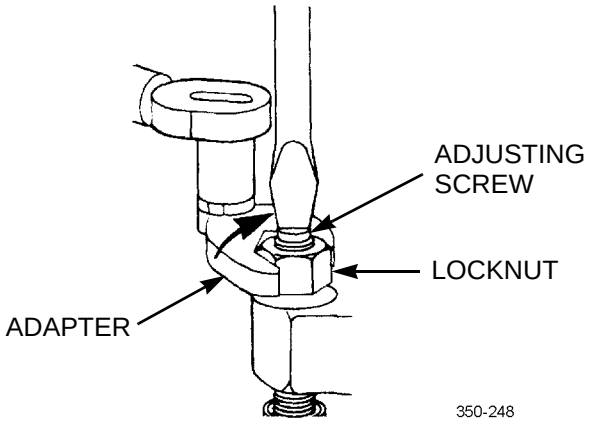
Two methods of adjusting valve lash can be used: The first method, which is preferred, is described in steps 4 thru 7, and uses the inch-pound torque wrench; the second method is described in steps 8 thru 11.

4. With inch-pound torque wrench, tighten adjusting screw to 6 lb-in. (0.7 Nm).



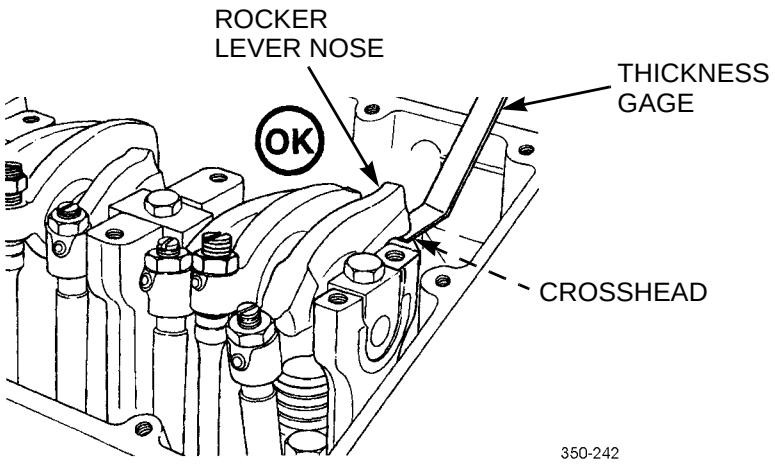
5. Hold adjusting screw in position and tighten locknut.

6. With adapter, tighten locknut to 35 lb-ft (47 Nm).

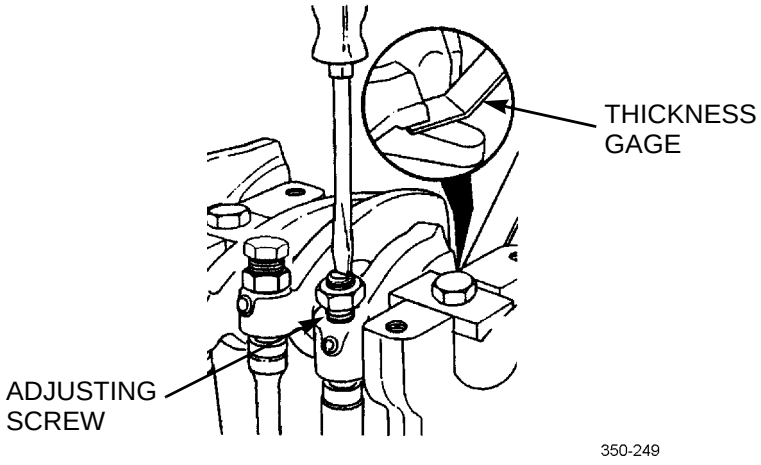


VALVE ADJUSTMENT - CONTINUED

7. Check adjustment by ensuring thickness gage will slide backward and forward with only slight drag.

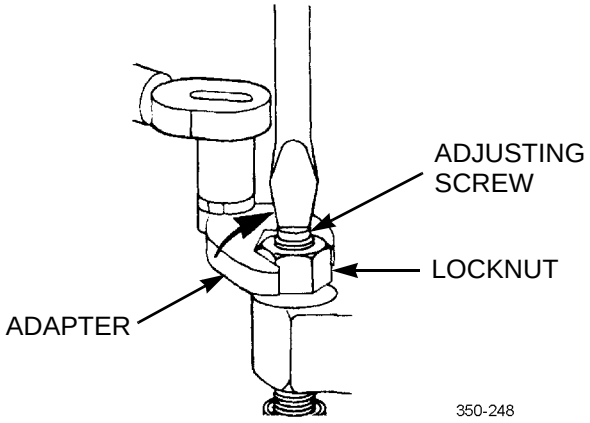


8. Tighten adjusting screw until a slight drag is felt on thickness gage.



VALVE ADJUSTMENT - CONTINUED

9. Hold adjusting screw and tighten locknut.
10. With adapter, tighten locknut to 35 lb-ft (47 Nm).



11. Check adjustment by attempting to insert a 0.001 in. (0.03 mm) feeler gage between crosshead and rocker lever pad. Valve lash is not correct if gage can be inserted.
12. Perform injector and valve adjustments for remaining cylinders.
13. Install rocker arm cover (WP 0052 00).

END OF WORK PACKAGE

OIL PAN REPLACEMENT 0208 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Materials/Parts - Continued

Gasket (P/N 3882733)

Seal, O-ring (P/N 3032787) (2)

References

TM 10-3930-675-10

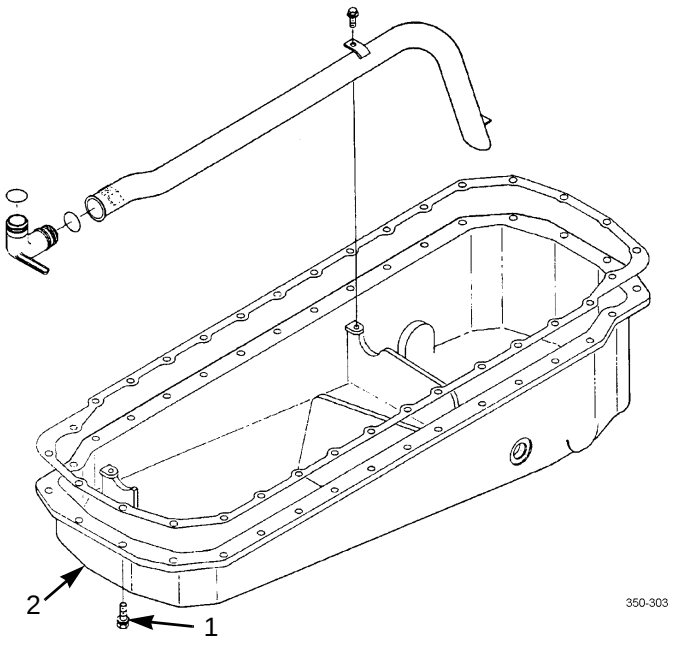
Equipment Condition

Engine oil drained (WP 0053 00)

Front propeller shaft disconnected from front axle flange only (WP 0120 00)

REMOVAL

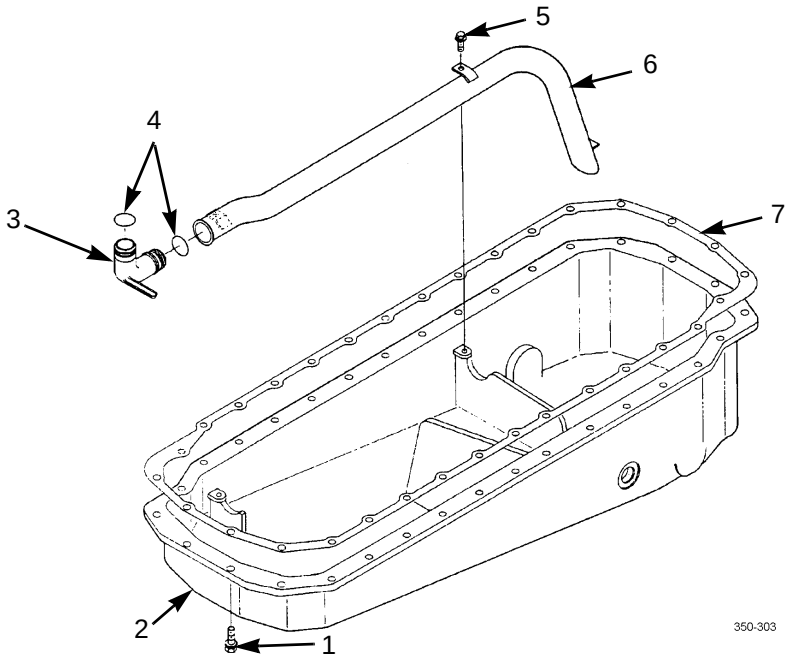
1. Remove 32 screws (1) securing oil pan (2) to engine block.



REMOVAL - CONTINUED

NOTE

It may be necessary to tap lightly on oil pan with a plastic-faced hammer to break seal between oil pan and engine block.

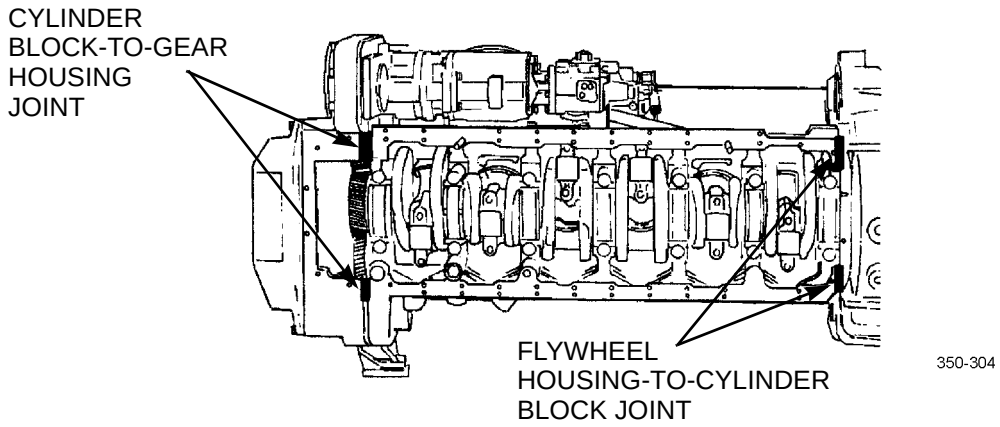


2. Lower oil pan (2) and remove from engine.
3. Remove and discard oil pan gasket (7).
4. Remove two O-ring seals (4) and oil transfer tube (3) from oil pan suction tube (6). Discard O-ring seals.

INSTALLATION

1. Install oil transfer tube (3) with two new O-ring seals (4).

INSTALLATION - CONTINUED

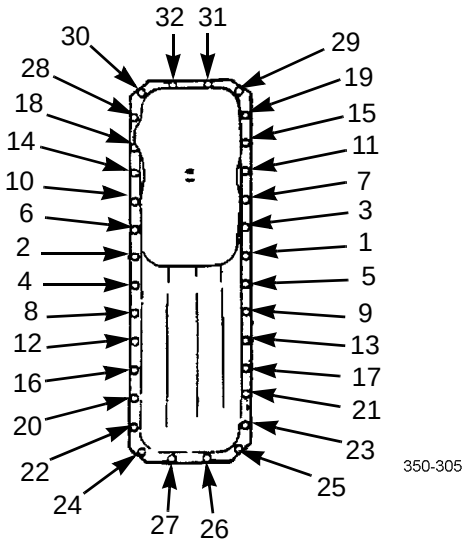


2. Place new gasket (7) on oil pan (2) mounting flange.

CAUTION

During installation, carefully align transfer tube to connection on block. Failure to properly align could cause connector to break and result in low/no oil pressure.

3. Align oil suction tube (6) with engine block and install oil pan (2) on engine block.
4. Secure oil pan (2) with 32 screws (1). Tighten screws to 35 lb-ft (47 Nm) in sequence shown.



TIGHTENING SEQUENCE

5. Fill engine oil (WP 0053 00).
6. Start engine (TM 10-3930-675-10) and build up oil pressure. Shut down engine.
7. Check oil pan for leaks.
8. Connect front propeller shaft (WP 0120 00).

END OF WORK PACKAGE

OIL FILTER HEAD AND OIL COOLER MAINTENANCE 0209 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning, Inspection, Test, Assembly, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pliers, Retaining Ring (Item 81, WP 0289 00)

Pliers, Retaining Ring (Item 82, WP 0289 00)

Test Kit, Pressure, Lubricating Oil Cooler (Item 120, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Gasket (P/N 3820629)

Materials/Parts - Continued

Gasket (P/N 3892625) (2)

Seal, O-ring (P/N 109080) (2)

Seal (P/N 3080769) (2)

Personnel Required

Two

References

TM 10-3930-675-10

WP 0050 00

Equipment Condition

Engine cover removed (WP 0148 00)

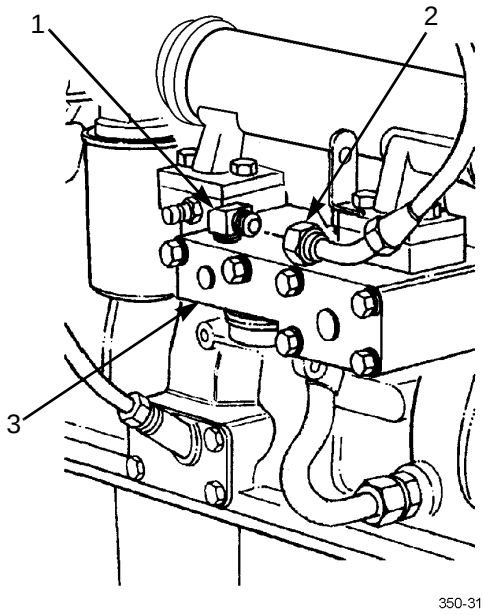
Oil filter removed (WP 0053 00)

Radiator drained (WP 0064 00)

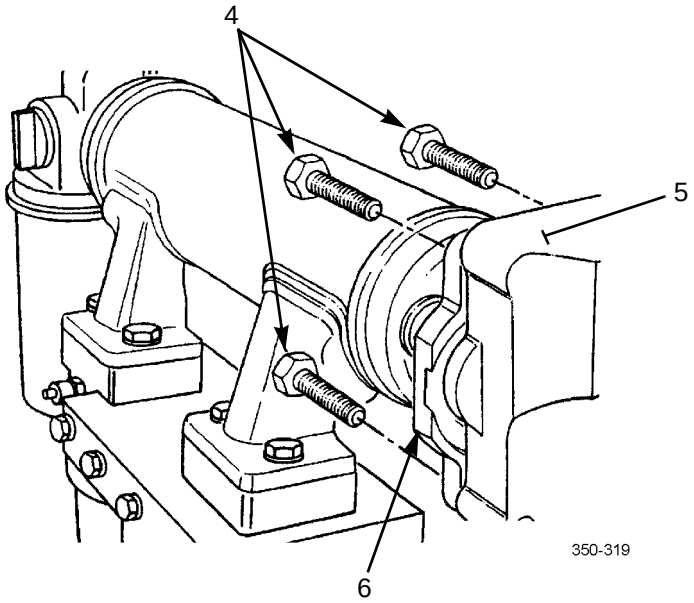
Turbocharger removed (WP 0217 00)

REMOVAL

1. Disconnect turbocharger oil supply line (2) and remove elbow fitting (1) from oil filter head (3).



2. Remove four screws (4) securing oil cooler thermostat housing flange (6) to thermostat housing (5).



REMOVAL - CONTINUED



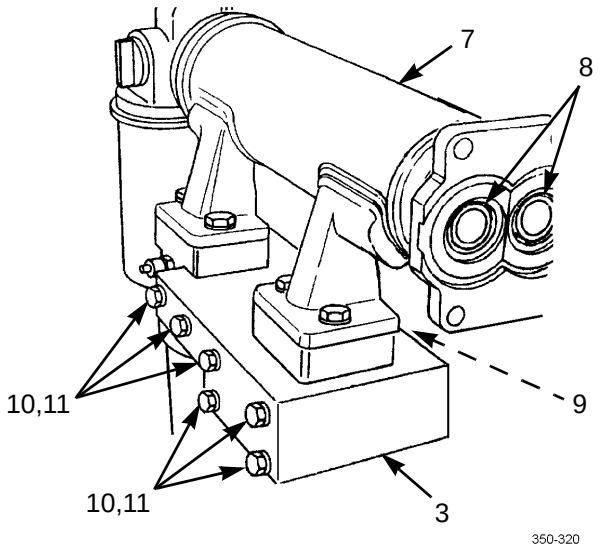
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

When removing oil filter head and oil cooler as a unit, ensure oil cooler thermostat housing flange, O-ring adapters, and thermostat housing flange O-rings are removed with oil cooler.

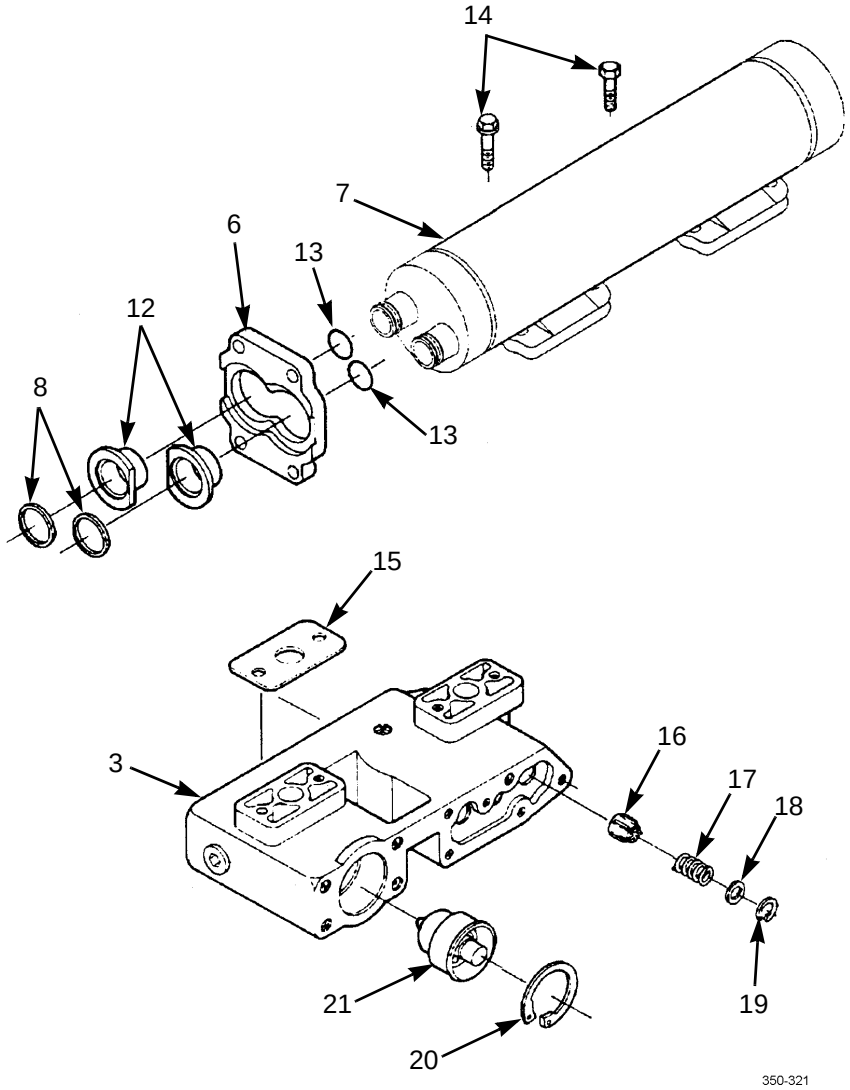
3. Remove six screws (10) and washers (11) securing oil filter head (3) to engine and, with assistance, remove oil cooler (7) and oil filter head as a unit from engine. Discard oil filter head gasket (9) and two oil cooler thermostat housing flange O-rings (8).



OIL FILTER HEAD AND OIL COOLER MAINTENANCE - CONTINUED 0209 00

DISASSEMBLY

1. Slide seal retainer (6) and two seal retainers (12) from oil cooler (7).
2. Remove and discard two oil cooler inlet and outlet O-rings (13).
3. Remove four screws (14) securing oil cooler (7) to oil filter head (3).
4. Remove oil cooler (7) and two gaskets (15) from oil filter head (3). Discard gaskets.
5. Remove retaining ring (20) securing oil filter head thermostat (21) in oil filter head (3). Remove thermostat.
6. Remove retaining ring (19) securing bypass valve plunger (16) in oil filter head (3).
7. Remove washer (18), spring (17), and bypass valve plunger (16) from oil filter head (3).



CLEANING



WARNING

- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

1. Clean thermostat and bypass valve plunger with solvent and dry with compressed air.

NOTE

Ensure oil filter head open passages are cleaned and dried.

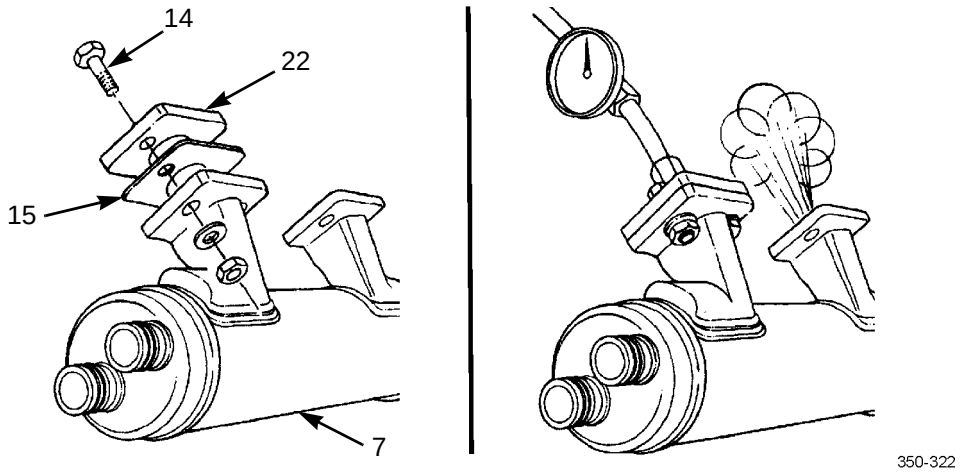
2. Clean oil filter head with solvent and dry with compressed air.
3. Clean all mating surfaces of oil cooler, oil filter head, and engine to remove old gasket material.
4. Clean oil cooler as follows:
   a. Install pressure test plate (22), gasket (15), and two screws (14) on one of two oil passage openings in oil cooler (7).



WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.

   b. Attach air pressure line to pressure test plate (22) and clear oil from inside oil passage.



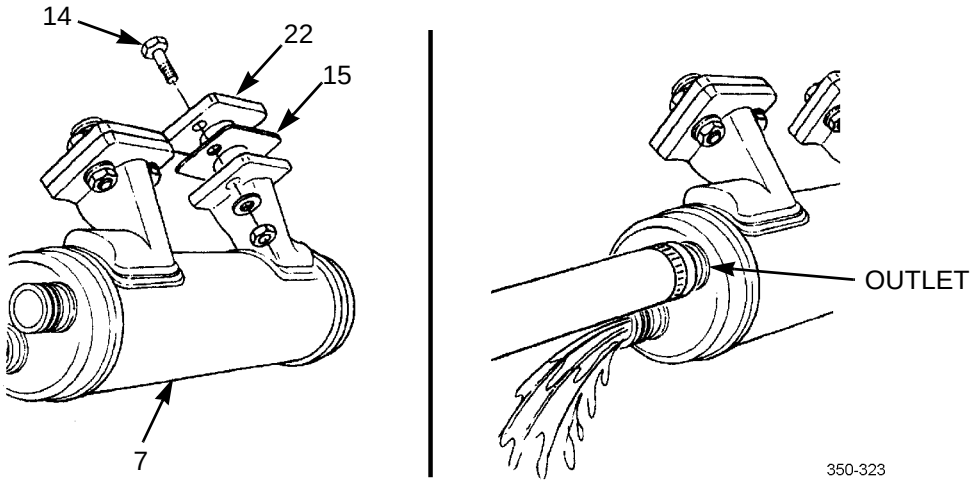
CLEANING - CONTINUED

c. Install pressure test plate (22), gasket (15), and two screws (14) on second oil passage opening in oil cooler (7).

NOTE

Both oil passage openings must be sealed before cleaning oil cooler water core.

d. Use water pressure, attached to outlet side of housing, to clean oil cooler water core.



INSPECTION

1. Inspect oil filter head for cracks or other damage. If damaged, replace oil filter head.
2. Inspect oil thermostat and bypass valve for cracks or other damage. If damaged, replace.
3. Inspect oil cooler for cracks or other damage. If damaged, replace.

TEST

NOTE

Oil cooler is not a repairable component. If oil cooler is defective, it must be replaced.

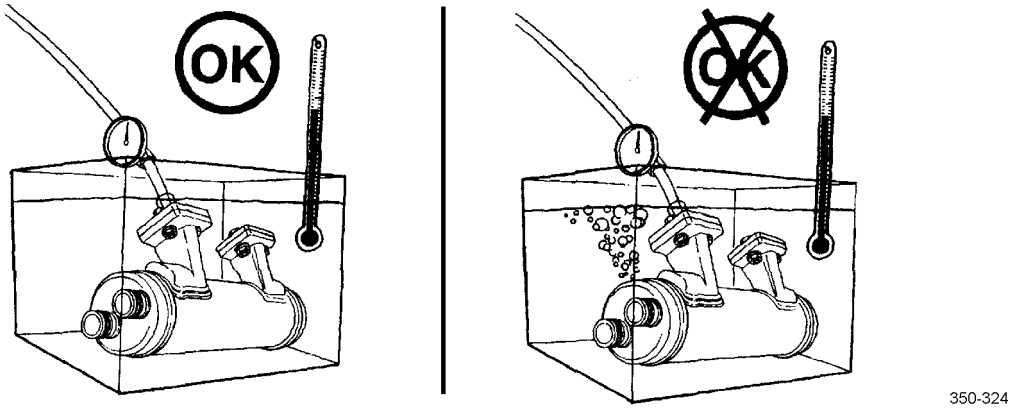
To determine oil cooler serviceability, perform pressure test as follows:

a. Ensure both oil passages are sealed with pressure test plates and install air pressure line to one pressure test plate.

b. Place oil cooler in tank of water heated to 180°F (82°C).

c. Apply air pressure not to exceed 60 psi (414 kPa) and observe oil cooler. If leaks are detected, oil cooler is defective and must be replaced.

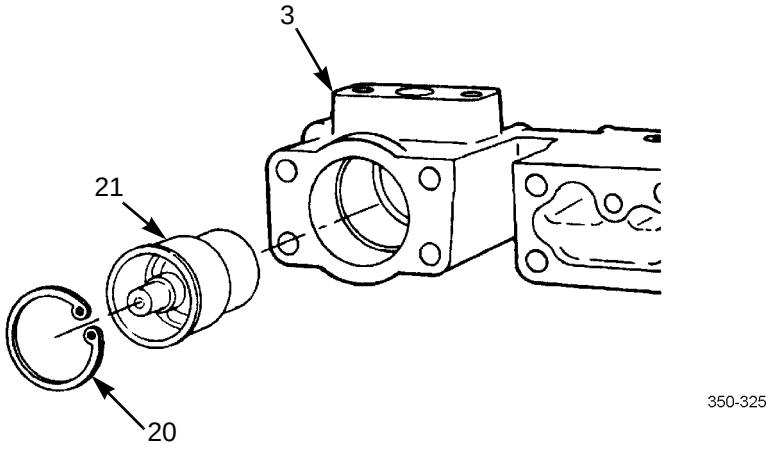
TEST - CONTINUED



OIL COOLER PRESSURE TEST

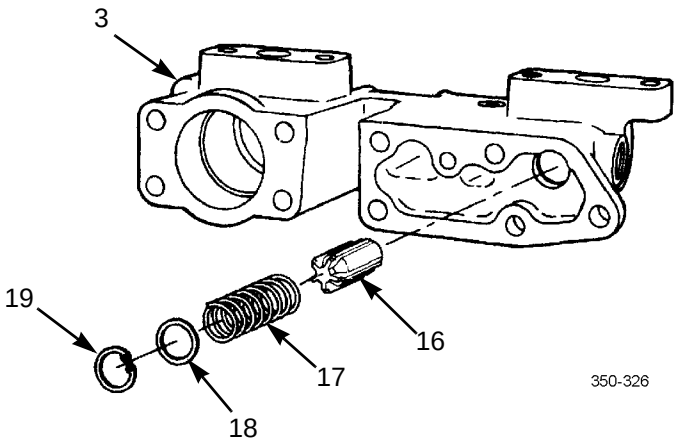
ASSEMBLY

1. Install thermostat (21) in oil filter head (3) and secure with retaining ring (20).



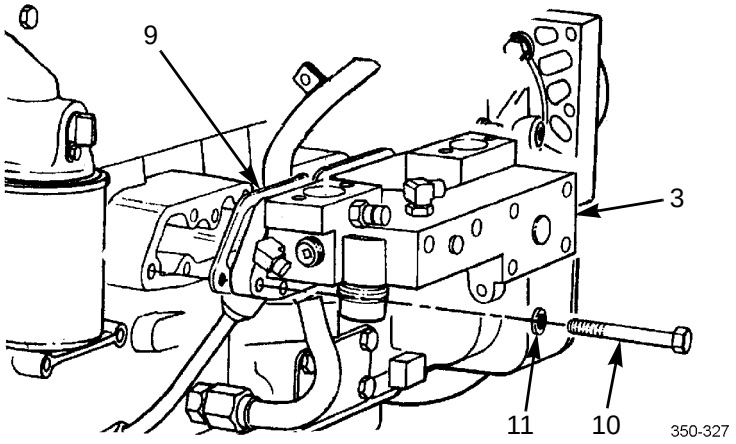
ASSEMBLY - CONTINUED

2. Install bypass valve plunger (16), spring (17), and washer (18) in oil filter head (3) and secure with retaining ring (19).



INSTALLATION

1. With assistance, position oil filter head (3) with new gasket (9) on engine.
2. Secure oil filter head (3) with six washers (11) and screws (10). Tighten screws to 35 lb-ft (47 Nm).



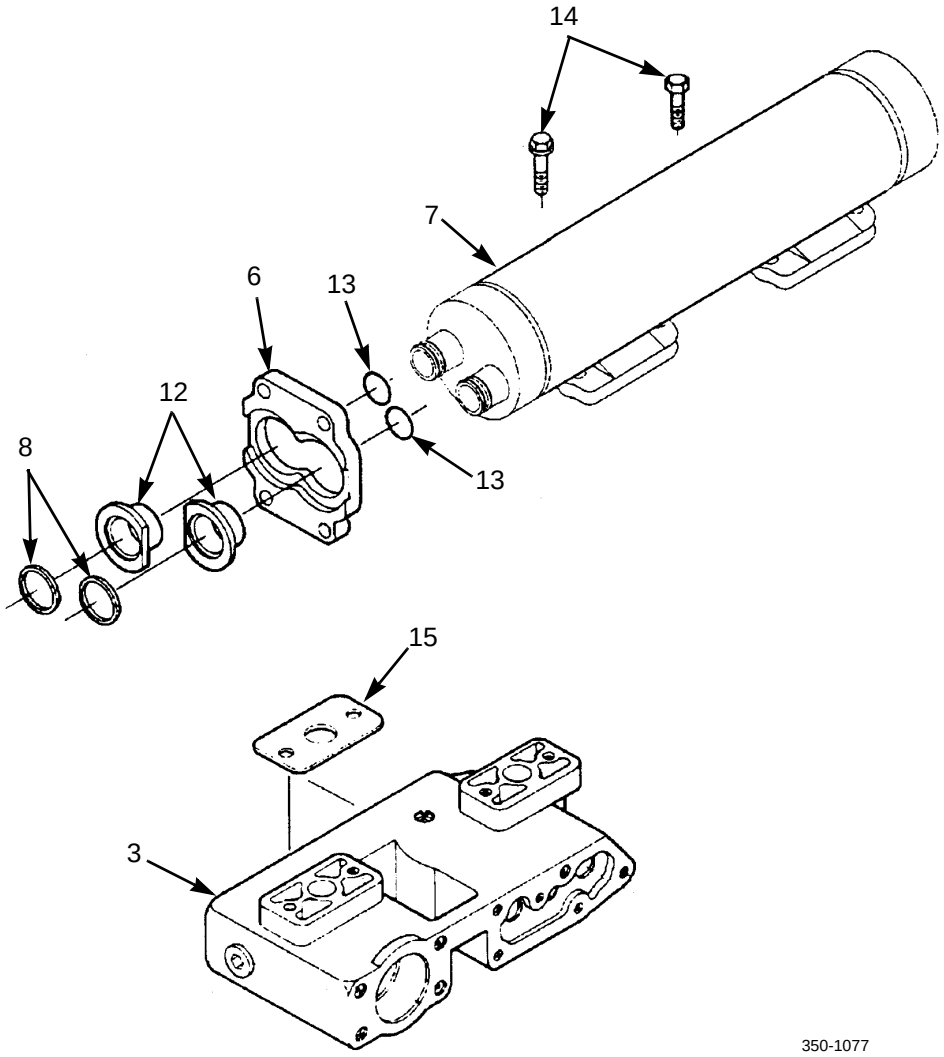
3. Lubricate two new O-rings (13) with clean engine oil and install on oil cooler inlet and outlet tubes.

NOTE

Ensure seal retainer flat sides are facing each other when inserted into seal retainer.

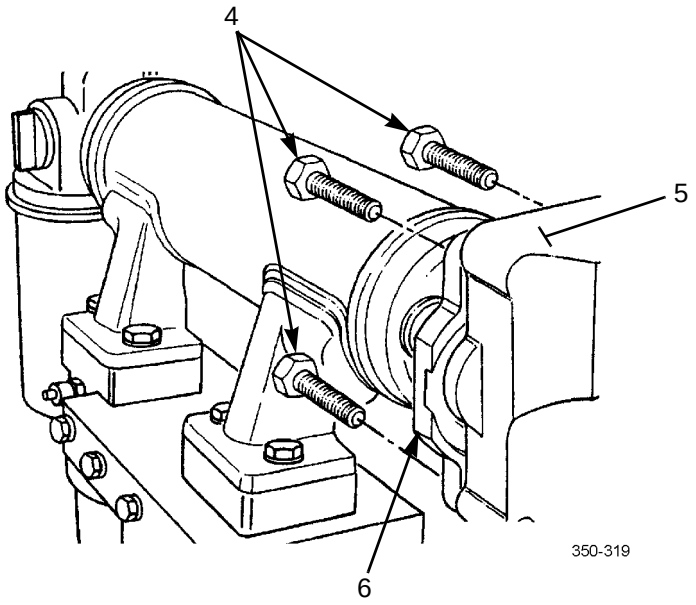
4. Place seal retainer (6) on oil cooler (7) and insert, as far as possible, two seal retainers (12).
5. Lubricate two new O-rings (8) with clean engine oil and insert into seal retainers (12).
6. Position new gaskets (15) on oil filter head (3).
7. Install oil cooler (7) into thermostat housing and on oil filter head (3). Secure oil cooler to oil filter head with four screws (14). Tighten screws to 35 lb-ft (47 Nm).

INSTALLATION - CONTINUED



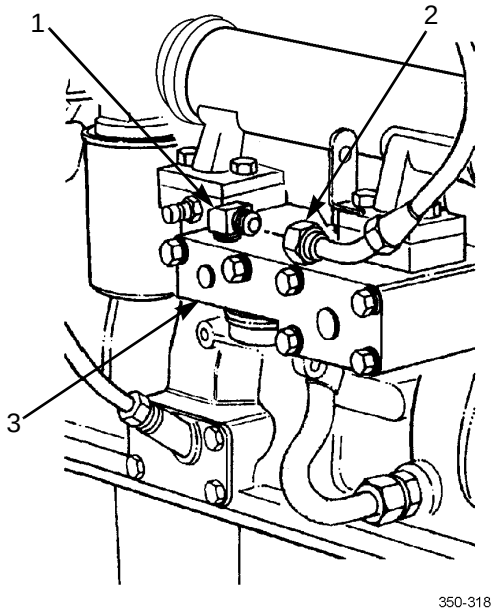
INSTALLATION - CONTINUED

8. Secure oil cooler thermostat housing flange (6) in thermostat housing (5) with four screws (4). Tighten screws to 35 lb-ft (47 Nm).



9. Install turbocharger (WP 0217 00).

10. Install elbow fitting (1) on oil filter head (3) and connect turbocharger oil supply line (2).



INSTALLATION - CONTINUED

11. Install oil filter (WP 0053 00).

NOTE

Ensure cooling system drains are closed.

12. Fill cooling system (WP 0064 00).
13. Top off oil (WP 0050 00).

CAUTION

Engine oil pressure MUST be indicated on gage within 15 seconds after starting. If oil pressure is not registered within 15 seconds, shut off engine immediately to avoid engine damage.

14. Start engine (TM 10-3930-675-10). Operate engine at idle for 3 minutes to check for leaks.
15. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

EXHAUST MANIFOLD REPLACEMENT 0210 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pin, Guide (Item 78, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Compound, Antiseize (Item 7, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Gasket (P/N 3328948) (6)

References

TM 10-3930-675-10

Equipment Condition

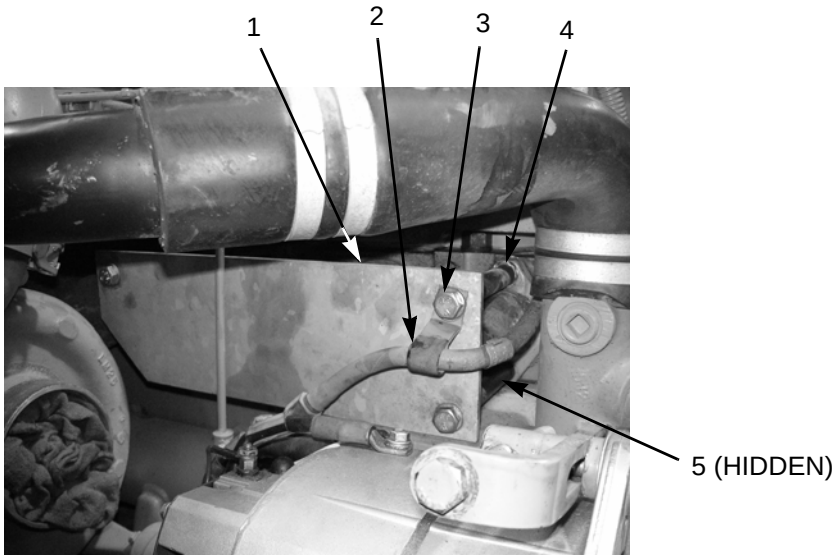
Engine cover removed (WP 0148 00)

Air duct removed (WP 0058 00)

Turbocharger removed (WP 0217 00)

REMOVAL

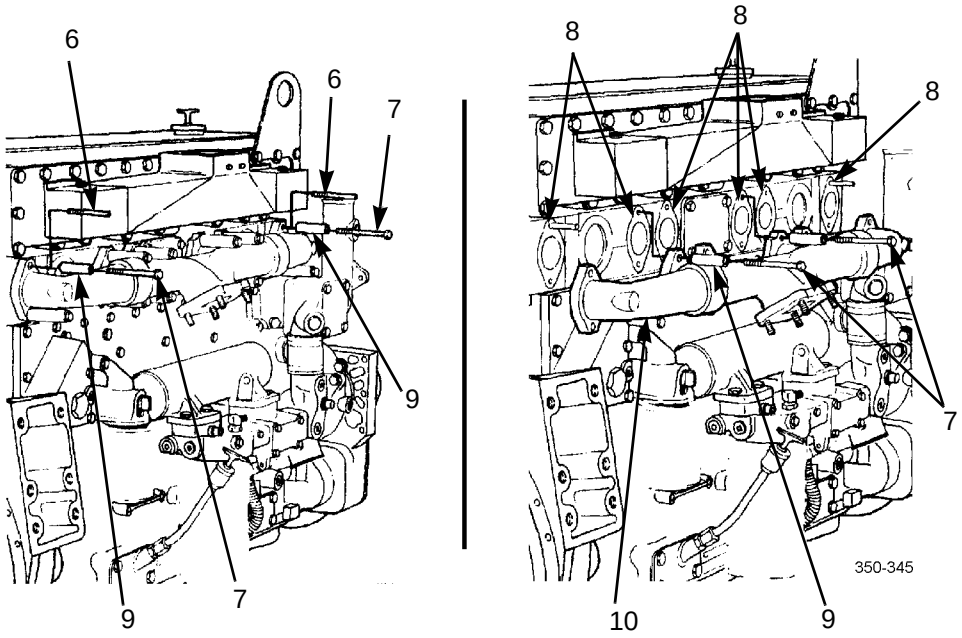
1. Remove three cap screws (3), heat shield (1), clamp (2), and three long spacers (4) from front of exhaust manifold (5).



434-40034

REMOVAL - CONTINUED

2. Remove two screws (7) and spacers (9) from end sections of exhaust manifold (10).
3. Install guide pins (6) in place of removed screws (7).
4. Remove ten remaining screws (7), spacers (9), exhaust manifold (10), and six gaskets (8). Discard gaskets.



INSTALLATION

NOTE

- **Ensure exhaust manifold is free of cracks or other damage. If cracks are present, replace exhaust manifold.**
- **Ensure old gasket material is removed from exhaust ports and exhaust manifold mating surfaces.**

1. If guide pins (6) were removed, install guide pins in outside top holes of exhaust ports.

NOTE

DO NOT use adhesive of any kind to hold gaskets in place.

2. Place new gasket (8) on each guide pin (6).
3. Position exhaust manifold (10) on guide pins (6).

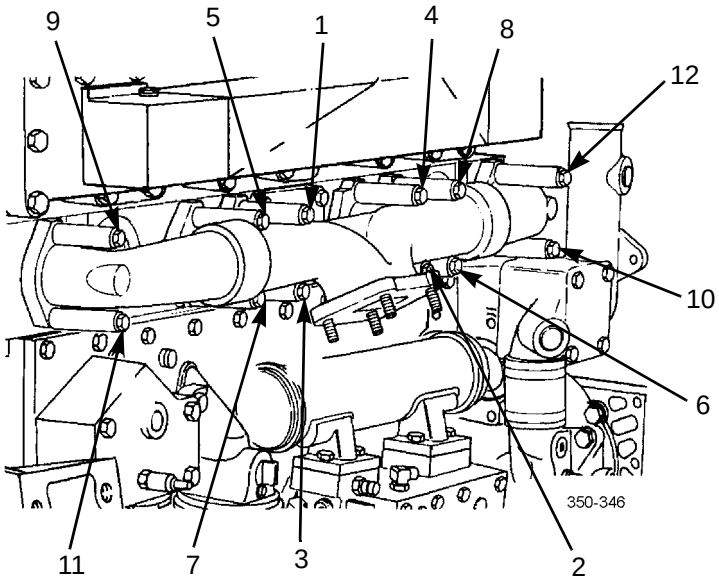
NOTE

Apply a light coat of antiseize compound to screw threads only.

4. Install four new gaskets (8), ten spacers (9), and screws (7) to secure exhaust manifold (10) in place. Tighten screws hand tight.
5. Remove guide pins (6) and replace with two spacers (9) and screws (7). Tighten screws hand tight.

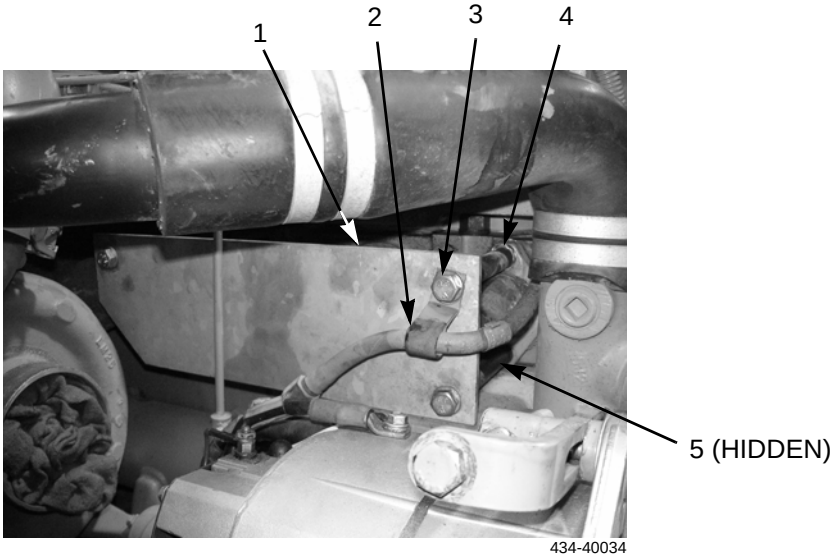
INSTALLATION - CONTINUED

6. Tighten screws (7) in two steps following sequence shown:
   a. First step: 20 lb-ft (27 Nm)
   b. Second step: 35 lb-ft (47 Nm)



TIGHTENING SEQUENCE

7. Install clamp (2), three long spacers (4), heat shield (1), and three cap screws (3) at front of exhaust manifold (5).



8. Install turbocharger (WP 0217 00).
9. Install air ducts (WP 0058 00).
10. Start engine (TM 10-3930-675-10). Operate engine and check for exhaust leaks.
11. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

INTAKE MANIFOLD REPLACEMENT 0211 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Gasket (P/N 3069786)

References

TM 10-3930-675-10

Equipment Condition

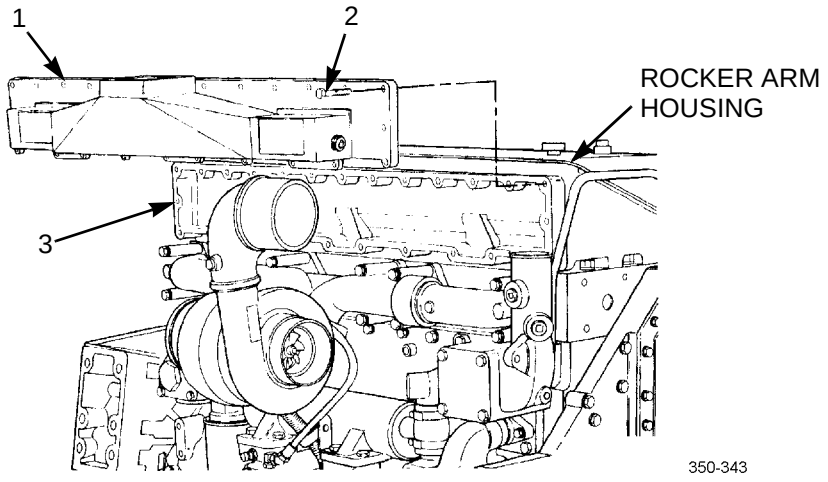
Engine cover removed (WP 0148 00)

Air duct removed (WP 0058 00)

Engine sensors removed from intake manifold (WP 0094 00)

REMOVAL

1. Remove 24 screws (2) securing intake manifold (1) in position.
2. Remove intake manifold (1) and gasket (3). Discard gasket.

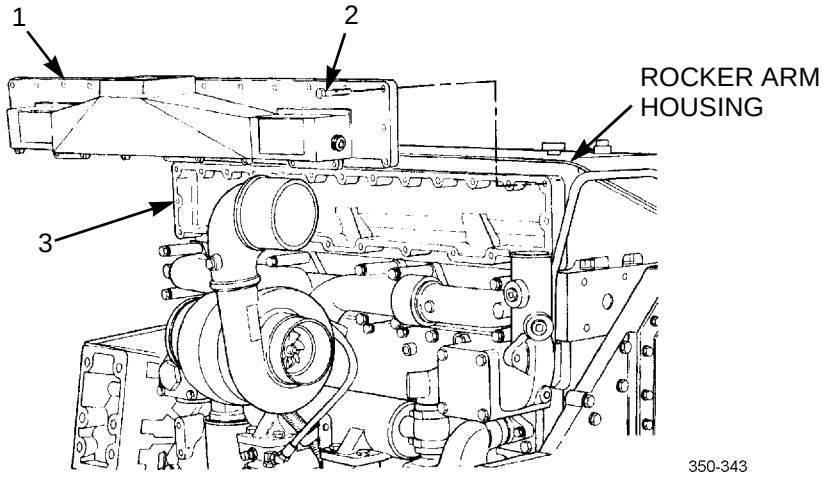


INSTALLATION

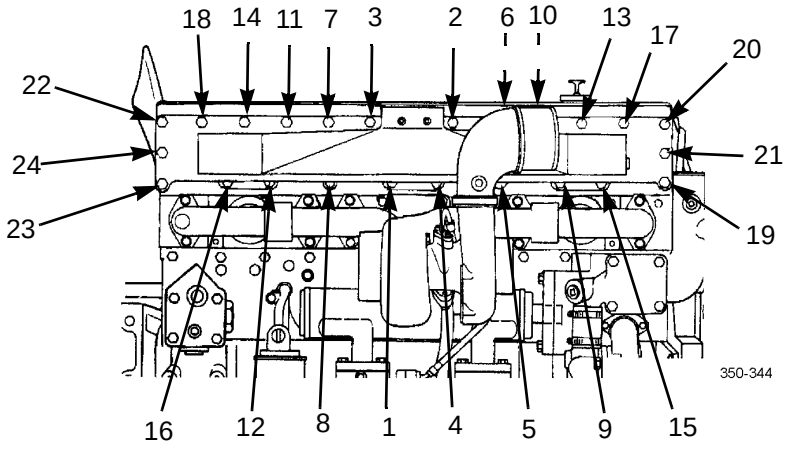
NOTE

Ensure intake manifold and rocker arm housing mating surfaces have been cleaned and all old gasket material removed.

1. Position new gasket (3) and intake manifold (1).
2. Secure intake manifold (1) with 24 screws (2).



3. Tighten screws (2) in sequence shown to 35 lb-ft (47 Nm).



TIGHTENING SEQUENCE

4. Install engine sensors on intake manifold (WP 0094 00).
5. Install air ducts (WP 0058 00).
6. Start engine (TM 10-3930-675-10). Operate engine at high idle and use a solution of soapy water to check for air leaks.
7. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FRONT GEAR COVER REPLACEMENT 0212 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 142, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 3883510)

Seal, Rectangular Ring (P/N 3200945)

Materials/Parts - Continued

Seal, Rectangular Ring (P/N 3200946)

Seal, Rectangular Ring (P/N 3201659) (6)

Seal, Rectangular Strip (P/N 3893964)

Personnel Required

Two

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

Alternator drive belt and pulley removed (WP 0071 00)

A/C compressor drive belt and pulley removed (WP 0195 00)

Vibration damper removed (WP 0203 00)

Front main oil seal removed (WP 0201 00)

Water pump oil seal removed (WP 0068 00)

Accessory drive oil seal removed (WP 0213 00)

Front engine mount removed (WP 0198 00)

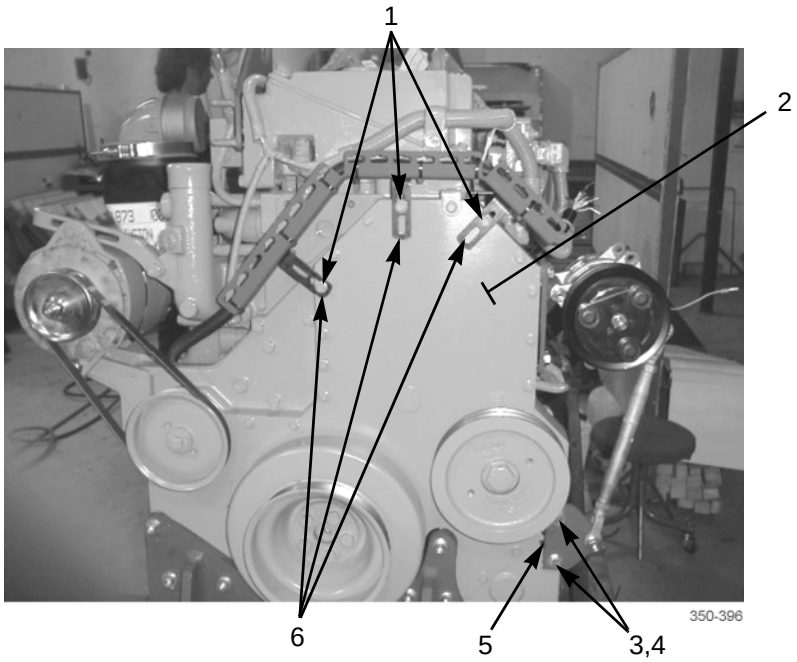
FRONT GEAR COVER REPLACEMENT - CONTINUED 0212 00

REMOVAL

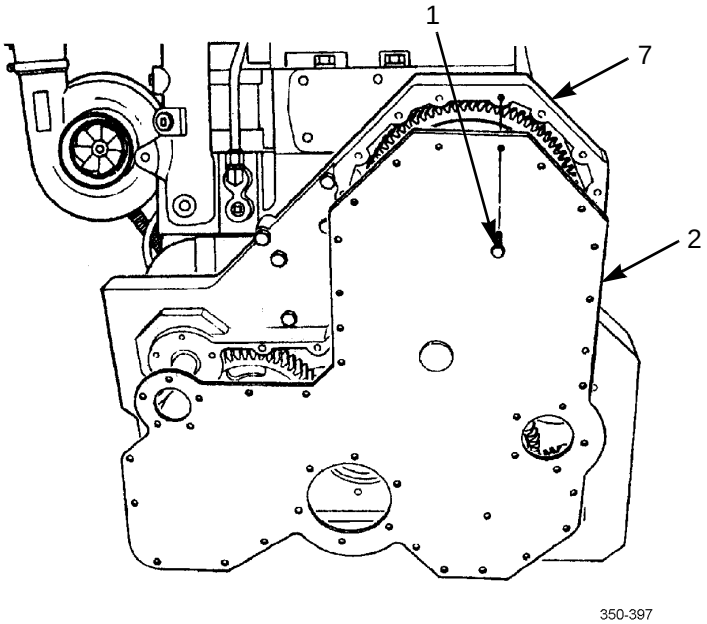
NOTE

Wiring harness attachment brackets and belt tensioning arm bracket are mounted to front cover. Ensure these additional items and accessories are tagged or marked for location prior to removal.

1. Remove three flange head screws (1) securing wiring harness brackets (6). Remove two screws (3) and washers (4) securing belt tensioning arm bracket (5) to front cover (2).

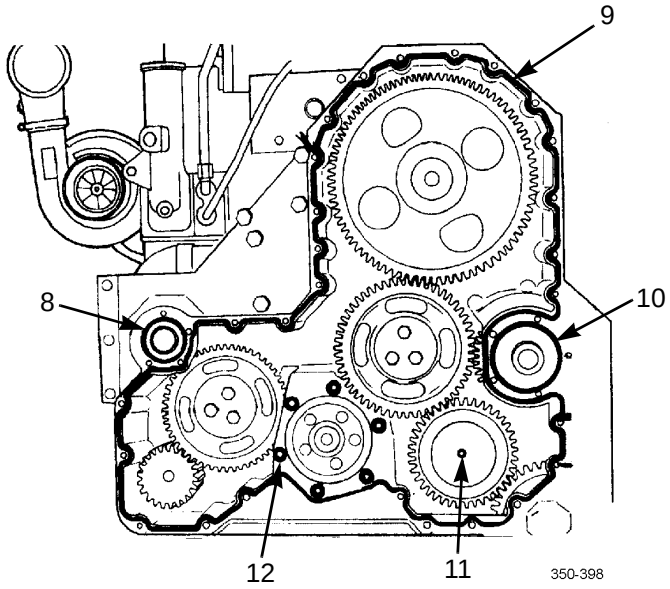


2. Remove 18 remaining flange head screws (1) securing front cover (2) to gear housing (7).
3. With assistance, remove front cover (2) from gear housing (7).



REMOVAL - CONTINUED

4. Remove six rectangular seals (12) at crankshaft seal mounting. Discard seals.
5. Remove two rectangular seals (8 and 10) at accessory drive mounting and water pump mounting. Discard seals
6. Remove O-ring (11) from hydraulic drive idler retainer. Discard O-ring.
7. Remove front gear cover seal (9) from gear housing groove. Discard seal.



CLEANING



WARNING

Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.

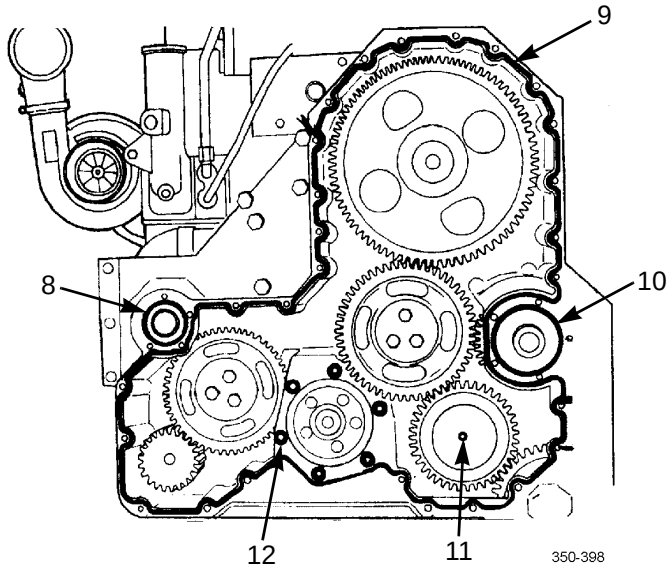
1. Clean mating surface of front cover and gear housing with cleaning solvent and remove old gasket material.
2. Clean seal grooves with cleaning solvent and remove all residue of old seals.

INSTALLATION

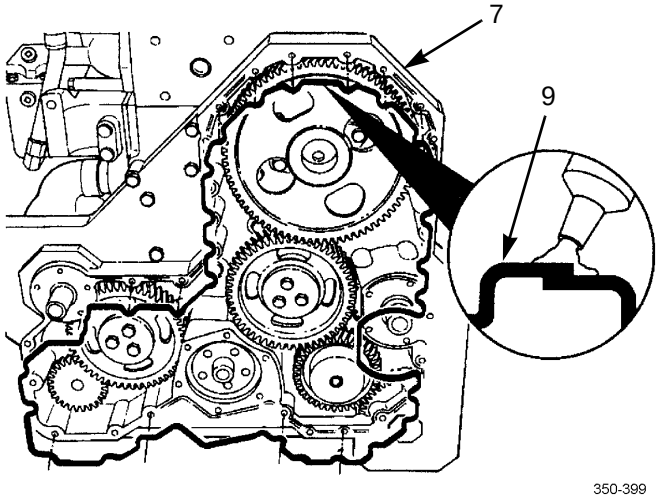
NOTE

Ensure O-ring and seal grooves are clean and free of old material. Apply a light coat of lubricating oil to new O-ring and seals prior to installing.

1. Install two new rectangular seals (8 and 10) in grooves around water pump mounting and accessory drive mounting.
2. Install six new rectangular seals (12) at crankshaft seal mounting.
3. Install new O-ring (11) at hydraulic drive idler retainer.

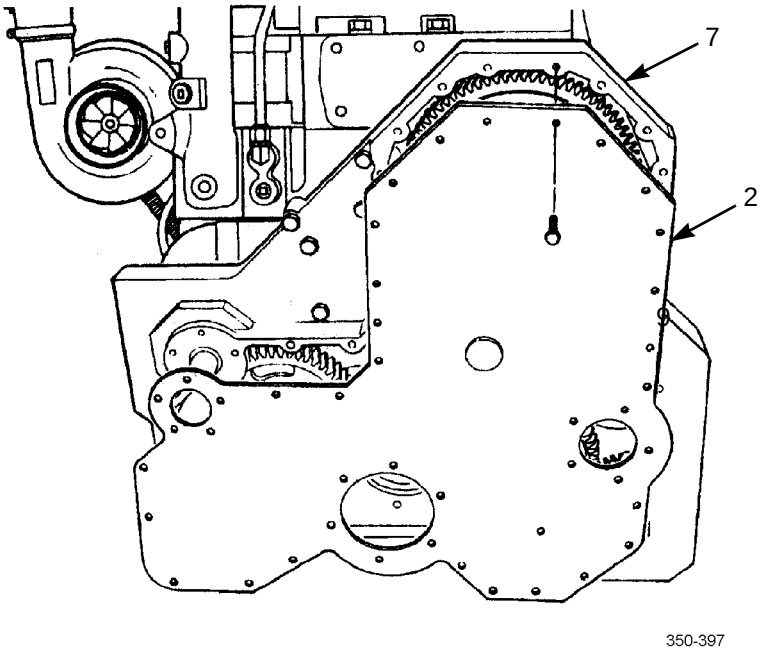


4. Install new front gear cover seal (9) in gear housing groove. Apply silicone sealant to overlap joint at top of gear housing (7).

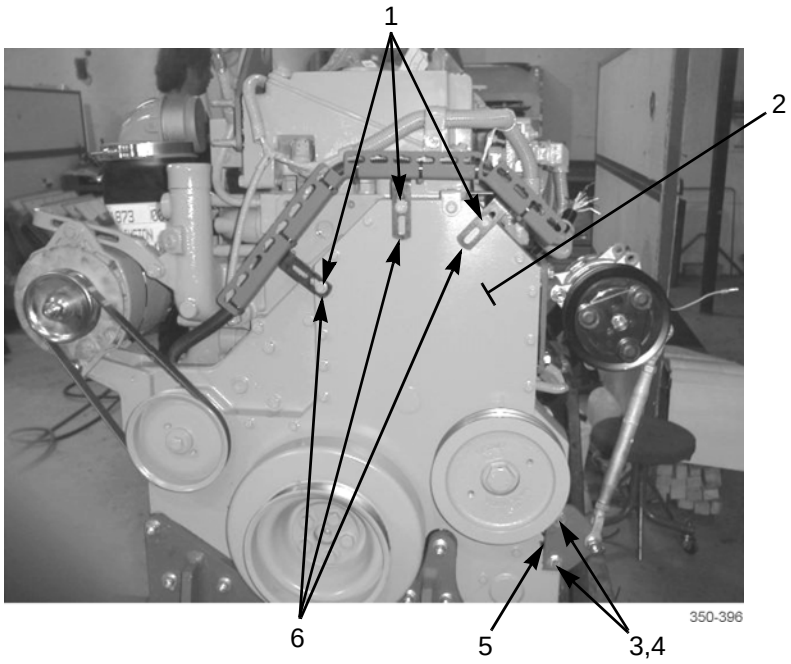


INSTALLATION - CONTINUED

5. With assistance, position gear cover (2) on gear housing (7).

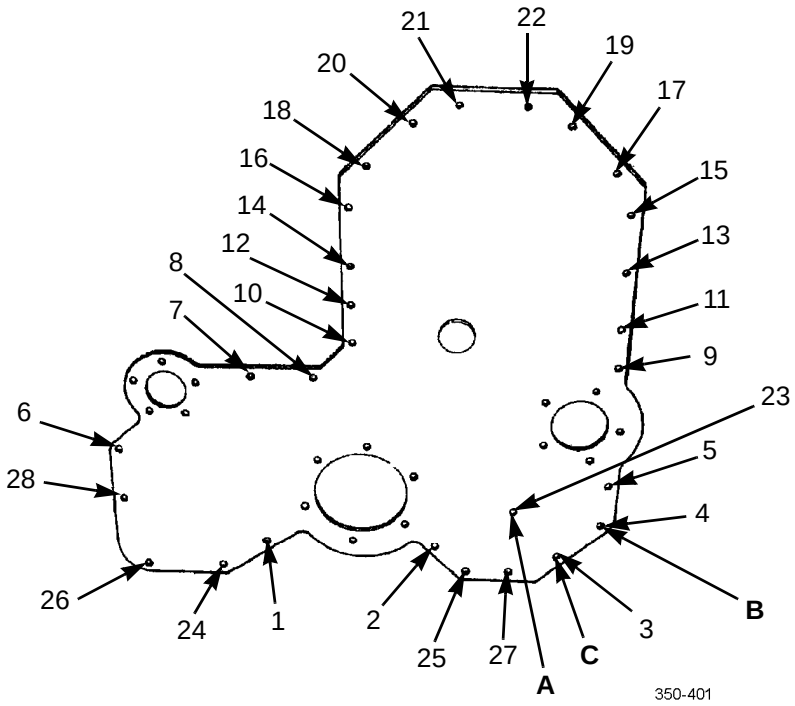


6. Install three wiring harness brackets (6) and belt tensioning arm bracket (5) on front cover (2). Secure in place with three flange head screws (1) and two washers (4) and screws (3). Tighten screws to 55 lb-in. (6 Nm).



INSTALLATION - CONTINUED

7. Apply silicone sealant to threads of screws at locations A, B, and C.
8. Install remaining flange head screws (1). Tighten screws to 55 lb-in. (6 Nm).
9. Tighten all front cover screws in sequence as shown:
   a. Screws 1 to 22: 15 lb-ft (20 Nm)
   b. Screws 23 to 28: 50 lb-ft (68 Nm)



TIGHTENING SEQUENCE

10. Remove six flange head screws used to mount front engine mount. Install front engine mount (WP 0198 00).
11. Tighten six front engine mount flange head screws in sequence and tightness as in step 9.
12. Install accessory drive (WP 0213 00).
13. Install front main oil seal (WP 0201 00).
14. Install vibration damper (WP 0203 00).
15. Install water pump oil seal (WP 0068 00).
16. Install and adjust alternator and A/C compressor pulleys and drive belts (WP 0071 00 and WP 0195 00).
17. Start and run engine to operational temperature (TM 10-3930-675-10). Shut down and check for leaks.
18. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

ACCESSORY DRIVE ASSEMBLY MAINTENANCE 0213 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Inside (Item 16, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Driver, Gear, Fuel Pump (Item 31, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Press, Arbor (Item 84, WP 0289 00)

Puller Kit, Universal (Item 92, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

References

TM 10-3930-675-10

Materials/Parts

Compound, Gasket Forming, Silicone (Item 10, WP 0290 00)

Compound, Sealing (Item 12, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Lubriplate, Lubricant (Item 22, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Gasket (P/N 3883538)

Kit, Oil Seal (P/N 3804304)

O-ring (P/N 3034412) (2)

Washer (P/N 3882885) (6)

Equipment Condition

Engine cover removed (WP 0148 00)

A/C compressor drive belts removed (WP 0195 00)

Fuel pump assembly removed (WP 0216 00)

REMOVAL

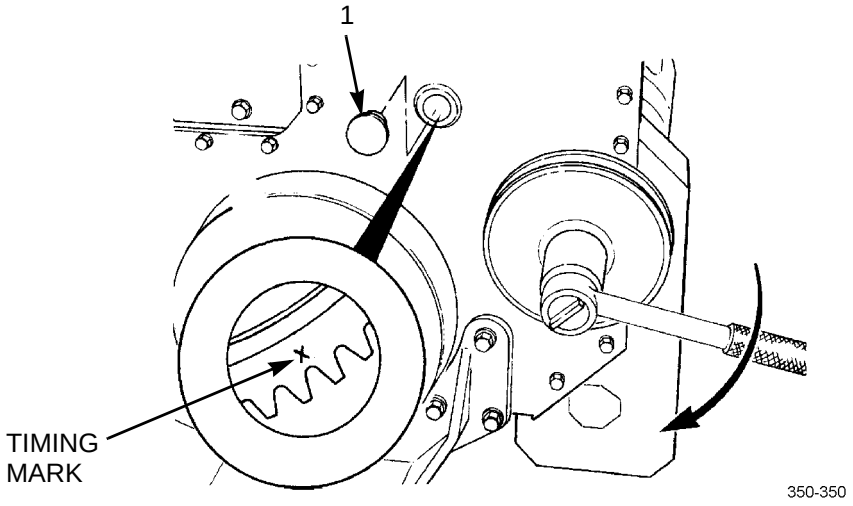
1. Mark accessory drive pulley position as follows:

   a. Remove inspection hole plug (1) in gear cover.

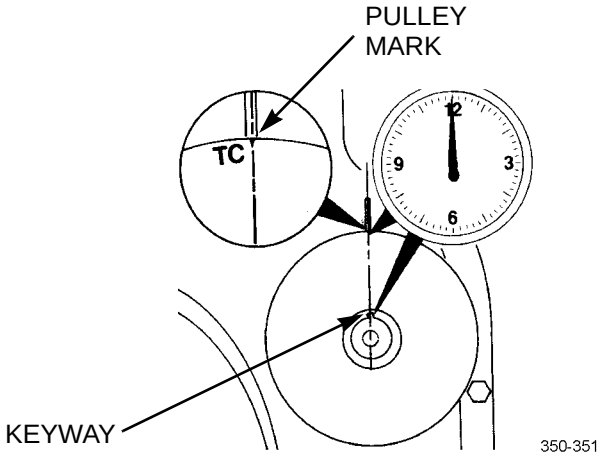
NOTE

When timing mark is visible, cylinders no. 1 and 6 are at top dead center and accessory drive pulley T-C mark and keyway are at 12 o'clock position.

   b. Rotate engine using accessory driveshaft until camshaft gear timing mark is visible.



   c. Ensure accessory drive pulley T-C mark and keyway are at 12 o'clock position.



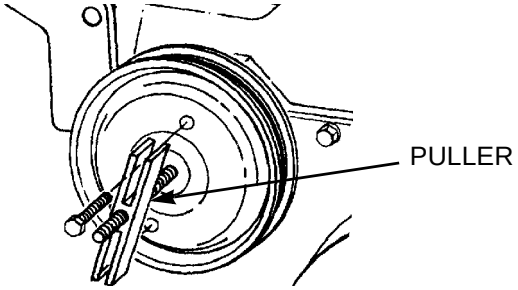
REMOVAL - CONTINUED

NOTE

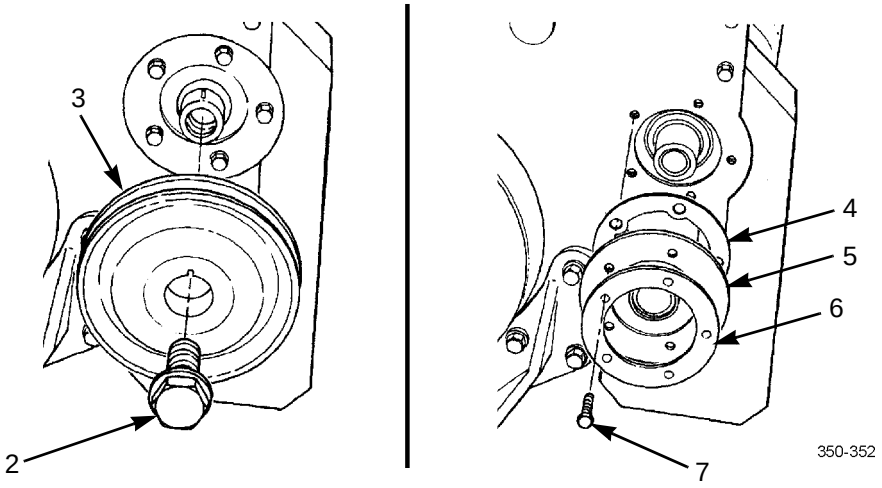
Accessory drive pulley is a slip fit pulley and does not require use of a puller for removal. Tapping with a plastic-faced hammer may be necessary to remove pulley.

d. Remove water pump pulley retaining screw (2) from water pump pulley (3).

e. Use mechanical puller to remove water pump pulley (3).

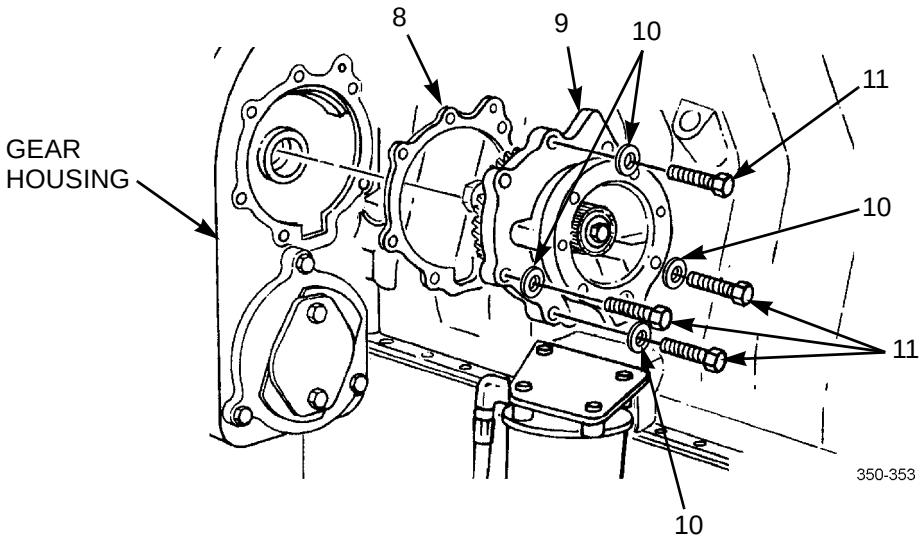


2. Remove five screws (7), clamping ring (6), oil seal (5), and gasket (4) from front of gear housing. Discard oil seal and gasket.



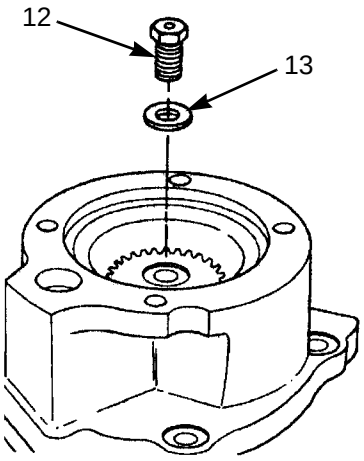
REMOVAL - CONTINUED

3. Remove six screws (11) and washers (10) securing accessory drive assembly (9) to engine. Discard washers.
4. Remove accessory drive assembly (9) and gasket (8). Discard gasket.



DISASSEMBLY

1. Remove retaining screw (12) and washer (13).



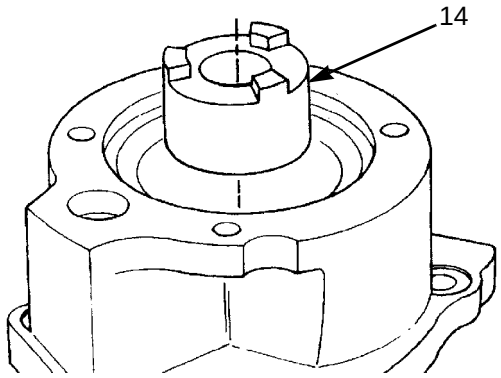
350-354

DISASSEMBLY - CONTINUED

CAUTION

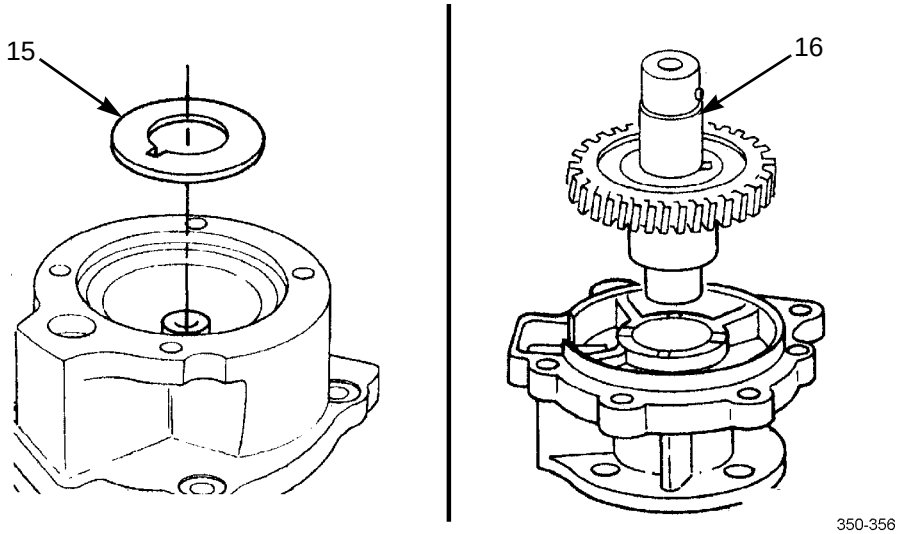
DO NOT use hydraulic press to remove hub coupling. Using hydraulic press may cause damage to thrust bearing.

2. Use three-jaw puller to remove hub coupling (14).



350-825

3. Remove thrust bearing (15) and shaft and gear assembly (16).



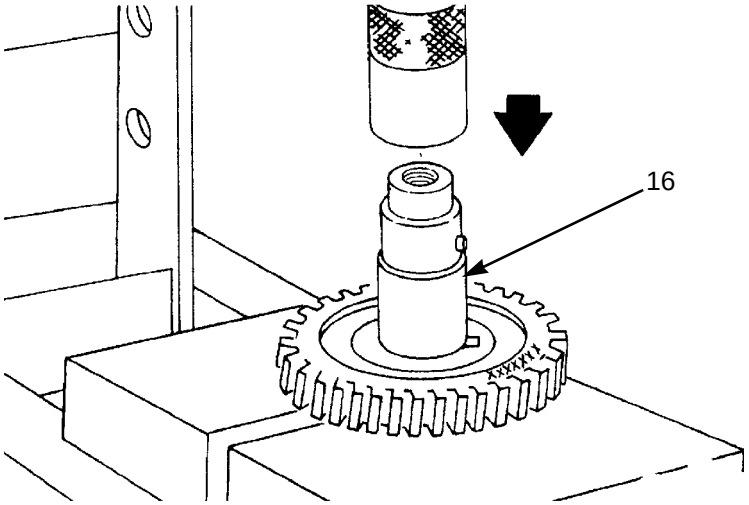
350-356

DISASSEMBLY - CONTINUED

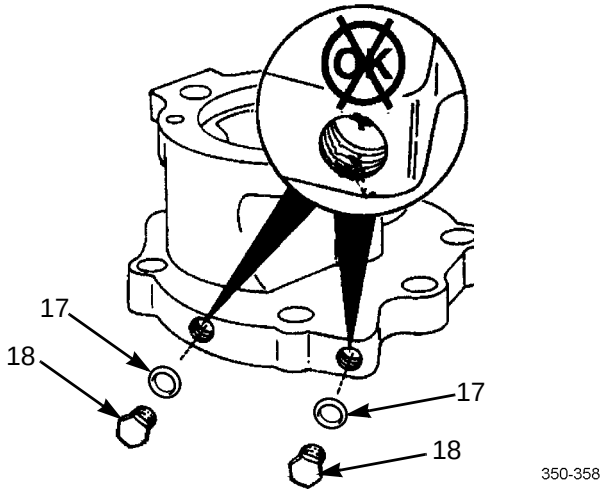
NOTE

Ensure shaft and gear assembly is placed on press with gear part number facing up.

4. Position shaft and gear assembly (16) on press and press shaft from gear.

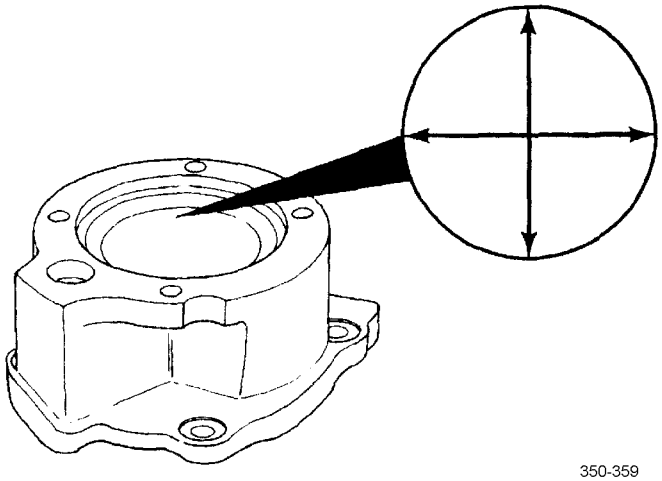


5. Remove two threaded plugs (18) and O-rings (17) from drive housing. Discard O-rings.



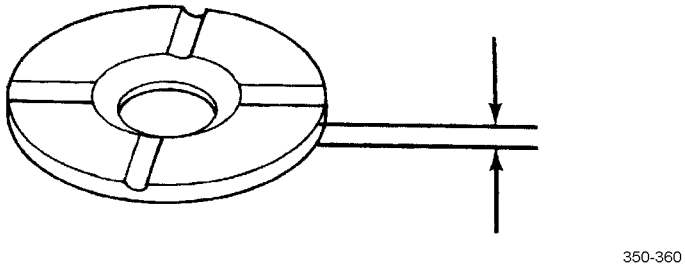
INSPECTION

1. Visually inspect all component parts for the following conditions. If noted conditions are found, replace defective component.
   a. Cracks
   b. Scoring and scratches
   c. Severely worn gear teeth
2. Measure inside diameter of drive housing bearing bore. Inside diameter must be 1.8809 to 1.8770 in. (47.775 to 47.676 mm). If inside diameter is not within standard, replace drive housing.



HOUSING INSIDE DIAMETER

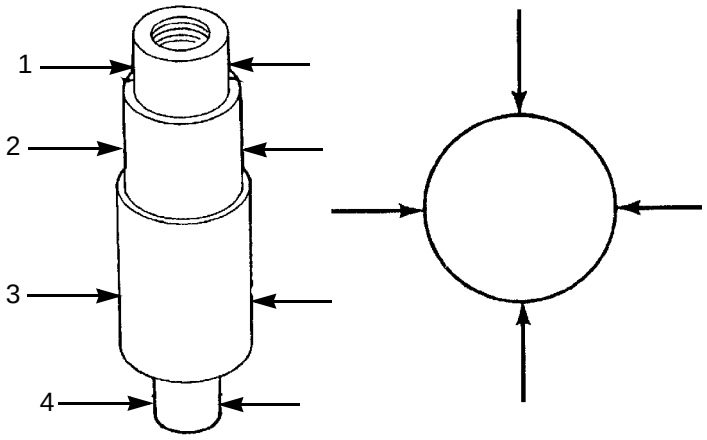
3. Measure thrust bearing thickness. Thickness must be 0.2395 to 0.2485 in. (6.084 to 6.312 mm). If thrust bearing is not within these standards, replace thrust bearing.



THRUST BEARING THICKNESS

INSPECTION - CONTINUED

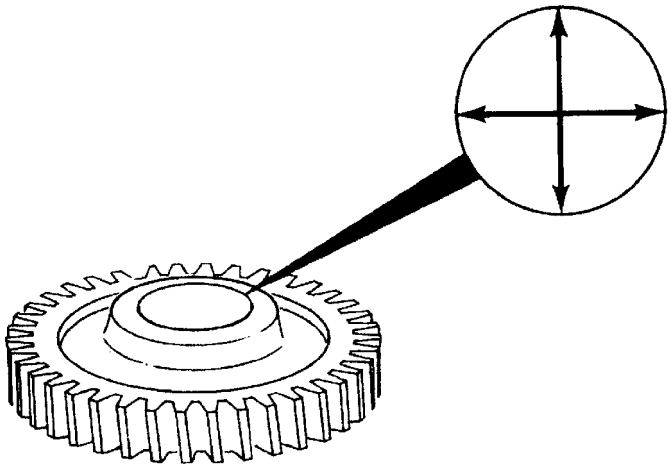
4. Measure driveshaft journals at four points indicated. Measurement must be as indicated. If driveshaft journals are not within standard, replace shaft.
   a. Point 1: 1.3773 to 1.3779 in. (34.984 to 35.000 mm)
   b. Point 2: 1.7706 to 1.7716 in. (44.975 to 45.000 mm)
   c. Point 3: 1.8772 to 1.8728 in. (47.554 to 47.570 mm)
   d. Point 4: 1.0030 to 1.0035 in. (25.476 to 25.489 mm)



350-361

DRIVE SHAFT JOURNALS

5. Measure inside diameter of drive gear. Measurement must be 1.8694 to 1.8704 in. (47.484 to 47.509 mm). If diameter is not within standard, replace drive gear.

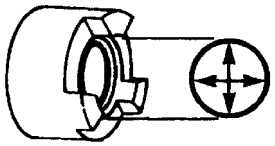


350-362

DRIVE GEAR INSIDE DIAMETER

INSPECTION - CONTINUED

6. Measure inside diameter of hub coupling. Measurement must be 1.0010 to 1.0015 in. (25.425 to 25.438 mm). If diameter is not within standard, replace hub coupling.



350-363

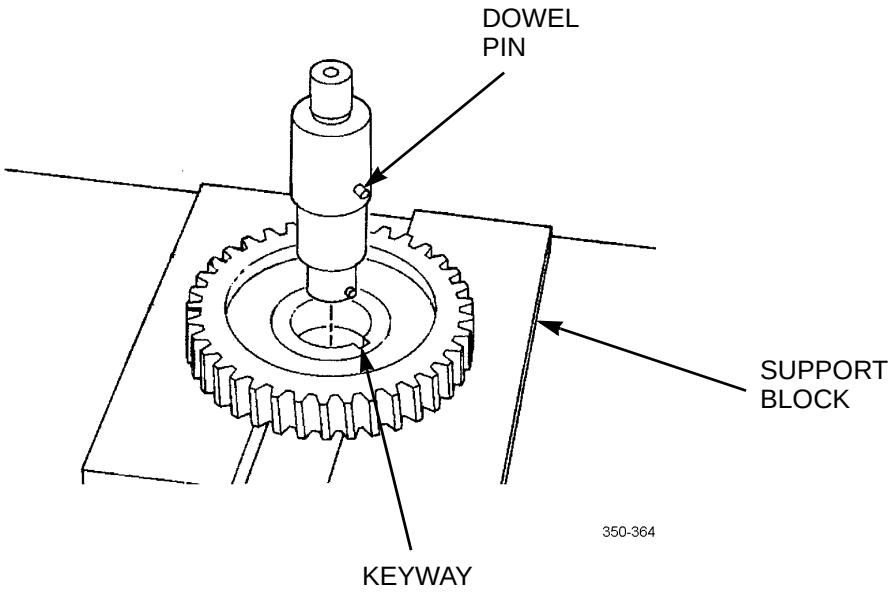
HUB COUPLING INSIDE DIAMETER

ASSEMBLY

NOTE

Ensure all parts have been cleaned and are free of old gasket material.

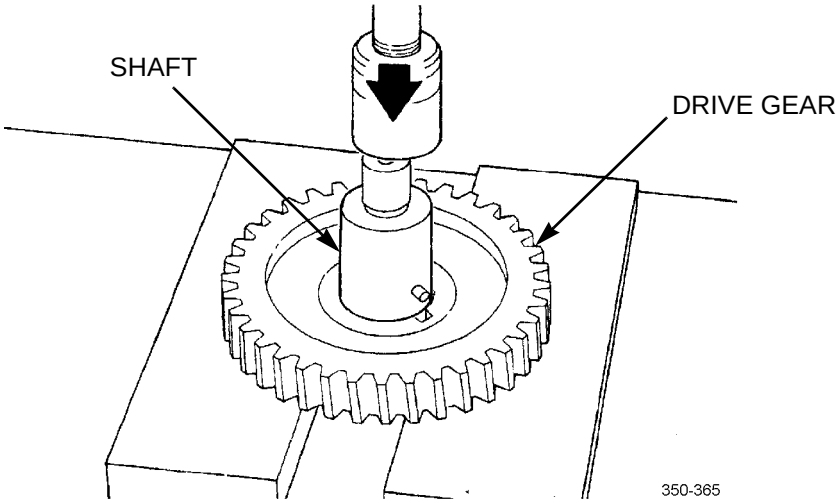
1. Place drive gear in press with gear part number face down. Provide support for drive gear as shown.
2. Install larger diameter end of shaft through gear bore.
3. Align keyway in gear with dowel pin in shaft.



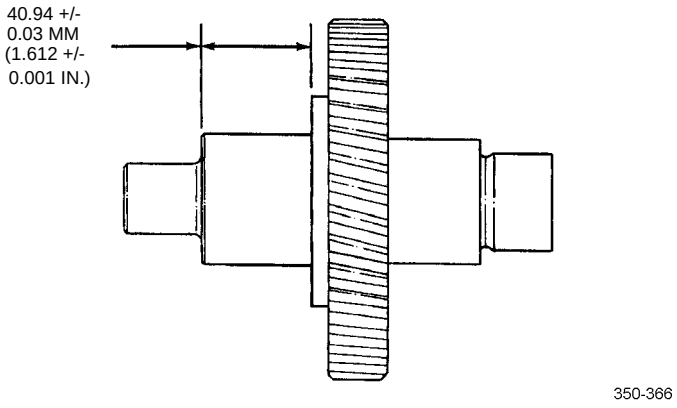
350-364

ASSEMBLY - CONTINUED

4. Using accessory drive assembly tool, press shaft into gear until tool comes in contact with gear surface.



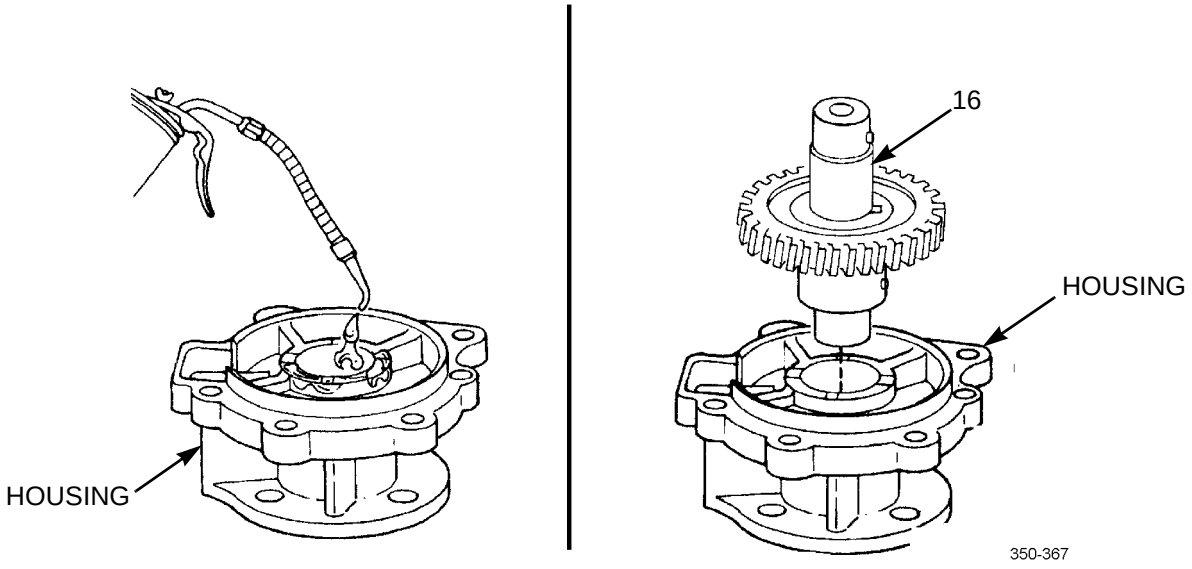
5. Remove tool and measure shaft as shown. If measurement is not within range, remove shaft from gear (refer to *Disassembly,* step 4) and repeat steps 1 thru 4.



SHAFT POSITION MEASUREMENT

ASSEMBLY - CONTINUED

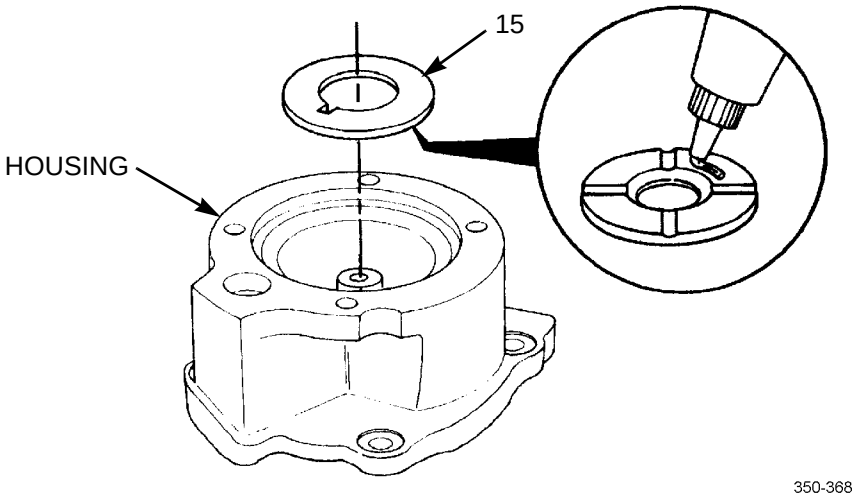
6. Apply a coating of clean lubricating oil to housing shaft bore and thrust bearing (15) surface.
7. Install shaft and gear assembly (16) into housing.



CAUTION

Thrust bearing MUST be installed with grooved surface facing thrust surface of housing. Failure to install thrust bearing correctly may cause improper lubrication and damage to drive assembly.

8. Apply a coating of lubriplate to grooved surface of thrust bearing (15) and install thrust bearing over shaft.

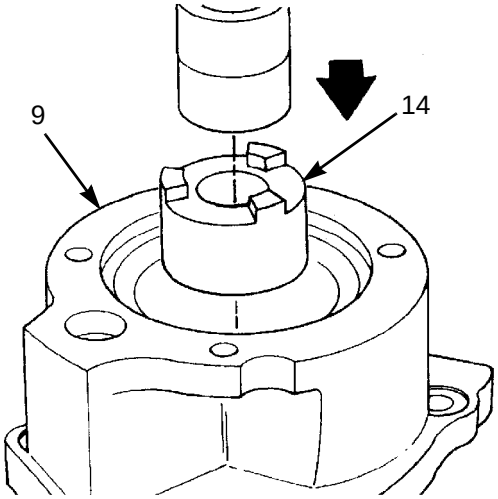


ASSEMBLY - CONTINUED

NOTE

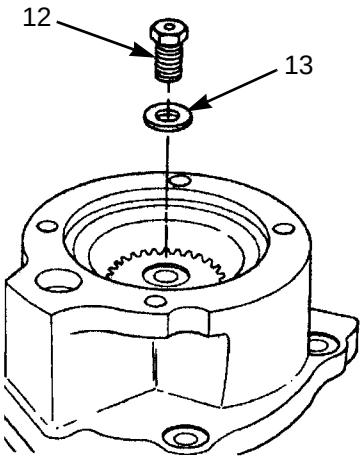
Ensure end of drive shaft is supported.

9. Install accessory drive assembly (9) in press with drive gear facing down.
10. Apply a coating of clean lubricating oil to bore of hub coupling (14) and press hub coupling onto shaft.



350-355

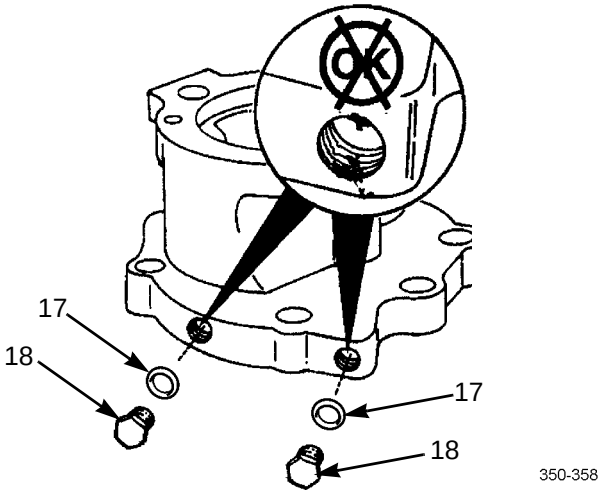
11. Install washer (13) and retaining screw (12) on shaft. Tighten screw to 35 lb-ft (47 Nm).



350-354

ASSEMBLY - CONTINUED

12. Install two plugs (18) and new O-rings (17) in accessory drive housing.



INSTALLATION

CAUTION

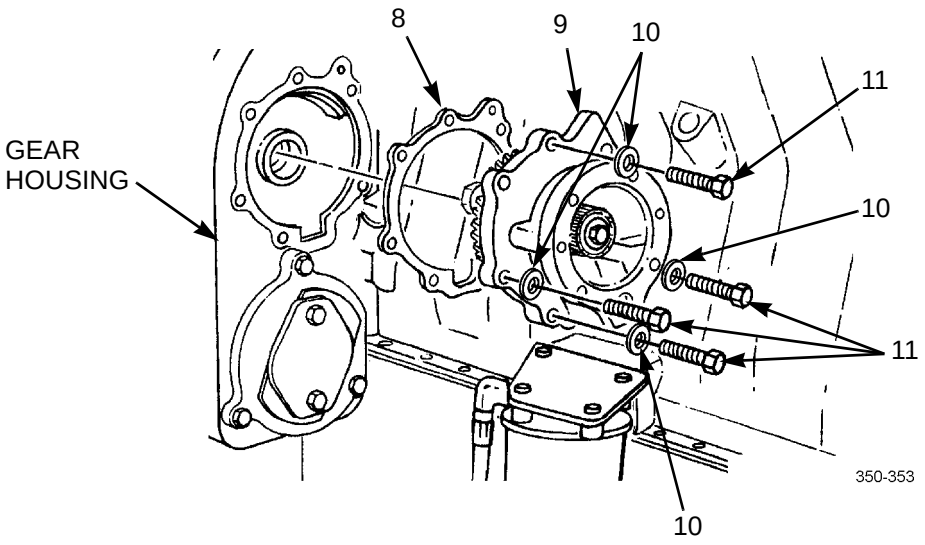
Take care when installing accessory drive gasket. A twisted gasket may cause a leak path or block oil passages, resulting in damage to equipment.

1. Apply a light amount of gasket forming compound to hold new gasket (8) in place and position gasket on gear housing.

NOTE

Driveshaft dowel pin MUST be at 12 o'clock position when installing accessory drive gear assembly.

2. Rotate drive shaft by hand to orient position of drive shaft dowel pin. Install accessory drive gear assembly (9).

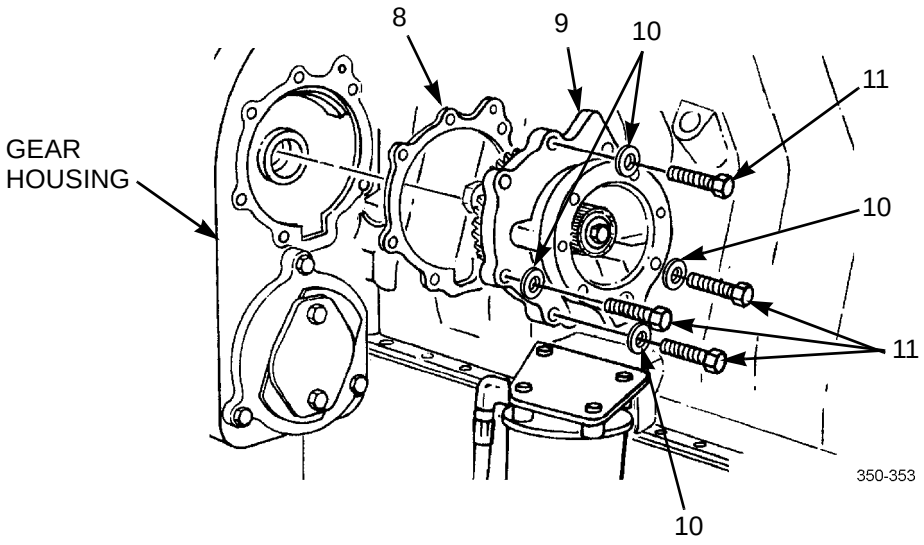


INSTALLATION - CONTINUED

NOTE

Apply thread sealant to threaded portion of screws only.

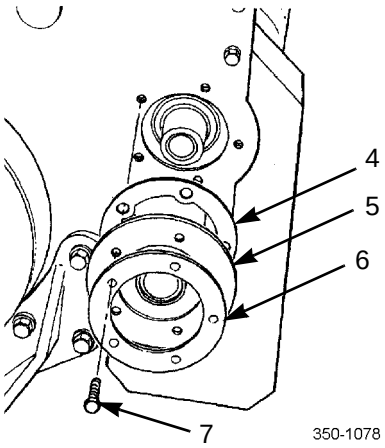
3. Secure accessory drive assembly (9) with six screws (11) and new washers (10). Tighten screws evenly to 35 lb-ft (47 Nm).



NOTE

Yellow dust lip of oil seal MUST be facing out.

4. Install new gasket (4) and new oil seal (5).
5. Apply a coating of sealing compound to five screws (7) and install clamping ring (6) and screws. Tighten screws using a star pattern in two steps as follows:
   a. Step 1: 60 lb-in. (7 Nm)
   b. Step 2: 175 lb-in. (20 Nm)

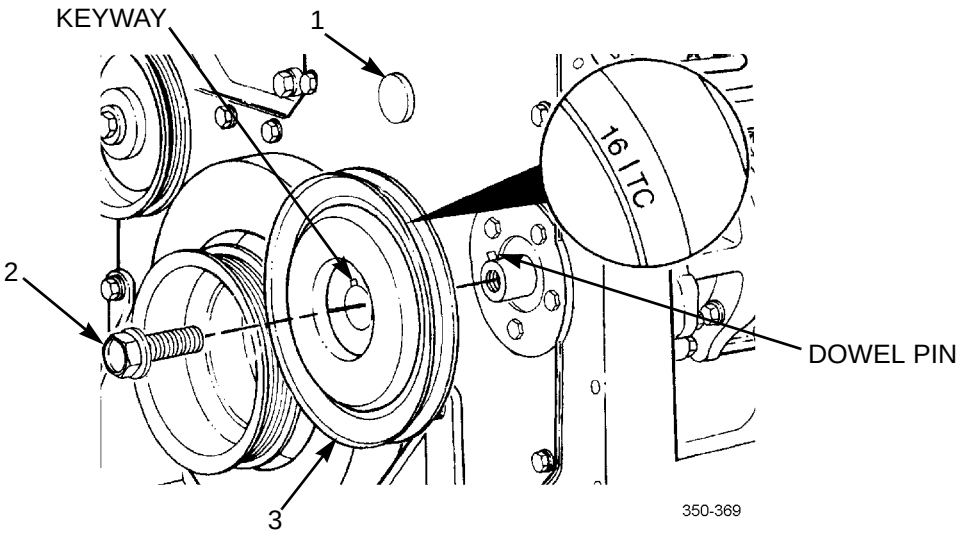


INSTALLATION - CONTINUED

NOTE

Ensure timing marks on pulley face out.

6. Align keyway in water pump pulley (3) with dowel pin in driveshaft and install pulley, tapping with hammer on driveshaft until securing bolts can be started to pull pulley in place.
7. Secure water pump pulley (3) with retaining screw (2). Tighten screw to 400 lb-ft (542 Nm).
8. Install plug (1) in inspection hole on gear cover.



9. Install fuel pump assembly (WP 0216 00).
10. Install A/C compressor drive belts (WP 0195 00).
11. Operate engine (TM 10-3930-675-10) and check for fuel and oil leaks.
12. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

COOLING FAN HYDRAULIC PUMP DRIVE GEAR REPLACEMENT 0214 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Barring Tool, Engine (Item 7, WP 0289 00)

Bearing Kit, Needle (Item 8, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Gage, Depth, Dial Indicating (Item 40, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Hammer, Slide, Mechanical (Item 54, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Bearing, Needle (P/N 3025354)

Bearing, Needle (P/N 3084899)

Seal, O-ring (P/N 388304)

References

TM 10-3930-675-10

WP 0197 00

Equipment Condition

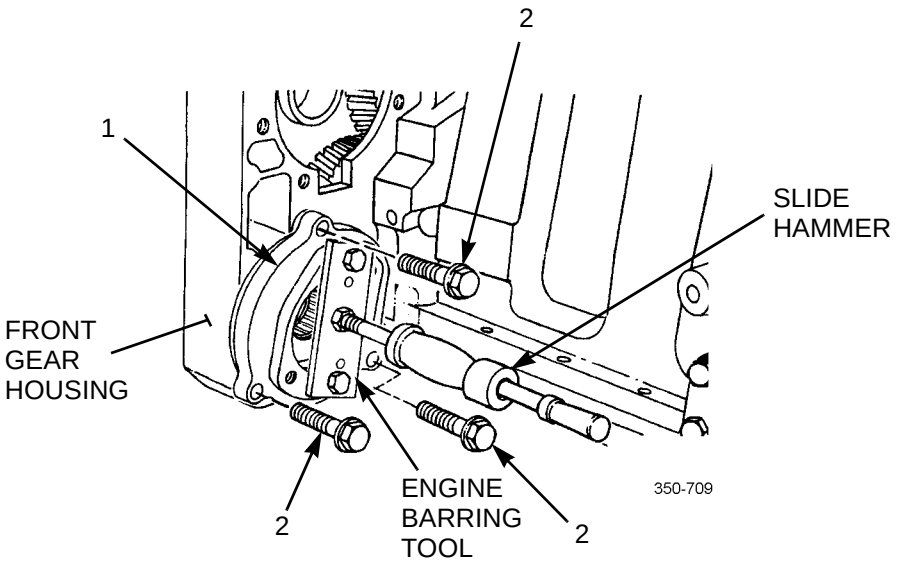
Engine cover removed (WP 0148 00)

Cooling fan hydraulic pump removed (WP 0247 00)

COOLING FAN HYDRAULIC PUMP DRIVE GEAR REPLACEMENT - CONTINUED 0214 00

REMOVAL

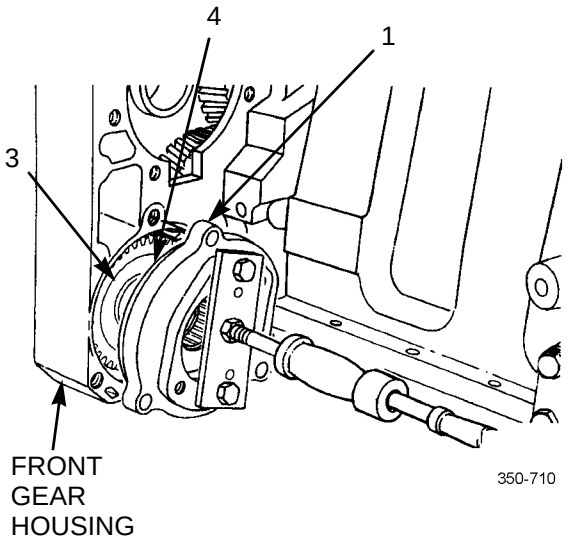
1. Remove three screws (2) securing hydraulic pump drive adapter (1) to engine front gear housing.
2. Install engine barring tool and slide hammer on hydraulic pump drive adapter (1).



CAUTION

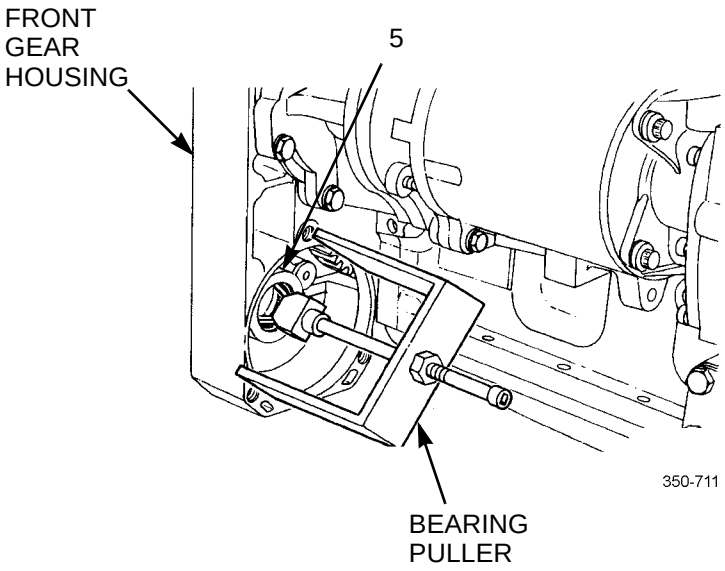
DO NOT allow drive gear to slide out of adapter or gear housing during removal. Damage to gear will result.

3. Remove hydraulic pump drive adapter (1), O-ring seal (4), and drive gear (3) from front gear housing.

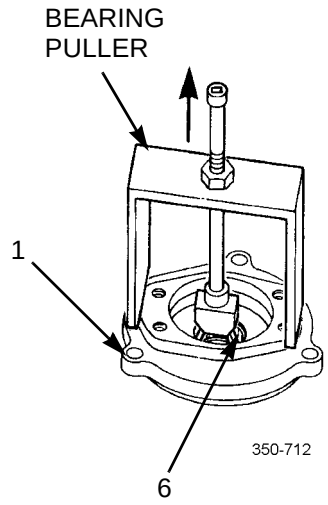


REMOVAL - CONTINUED

4. Using bearing puller, remove needle bearing (5) from front gear housing. Discard needle bearing.

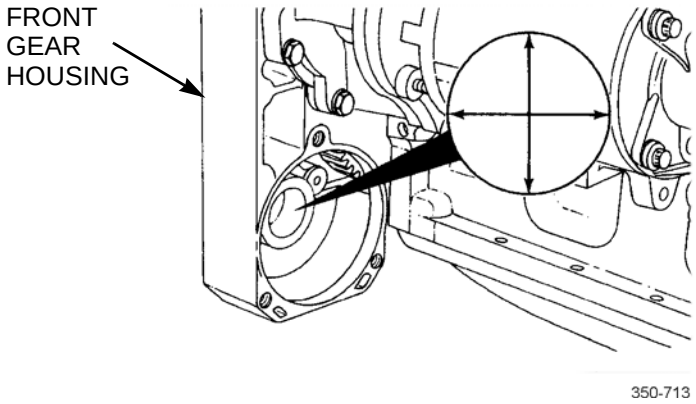


5. Using bearing puller, remove needle bearing (6) from hydraulic pump drive adapter (1). Discard needle bearing.



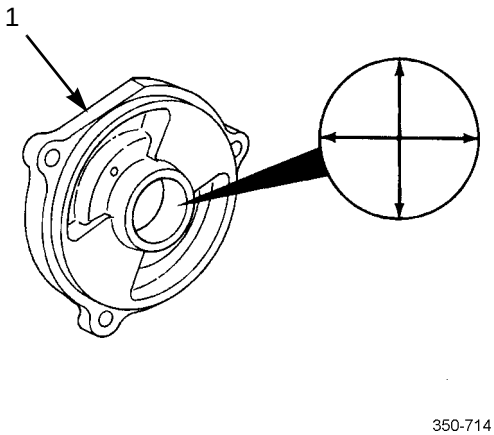
INSPECTION

1. Visually inspect all components for damage. Replace damaged components.
2. Inspect drive gear for chipped or broken teeth. If found, replace drive gear.
3. Measure inside diameter of needle bearing bore in front gear housing as shown. Measurement must be 1.6522 to 1.6532 in. (41.967 to 41.992 mm). If not as specified, front gear housing is defective. Replace engine (WP 0197 00).



INSIDE DIAMETER, BEARING BORE

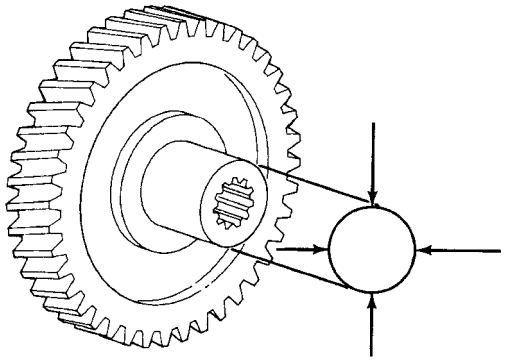
4. Measure inside diameter of needle bearing bore in hydraulic pump drive adapter (1) as shown. Measurement must be 1.6522 to 1.6532 in. (41.967 to 41.992 mm). If not as specified, replace hydraulic pump drive adapter.



INSIDE DIAMETER, BEARING BORE

INSPECTION - CONTINUED

5. Measure drive gear drive shaft outside diameter as shown. Measurement must be 1.3773 to 1.3780 in. (34.984 to 35.000 mm). If not as specified, replace drive gear.



OUTSIDE DIAMETER, DRIVE GEAR SHAFT

INSTALLATION

NOTE

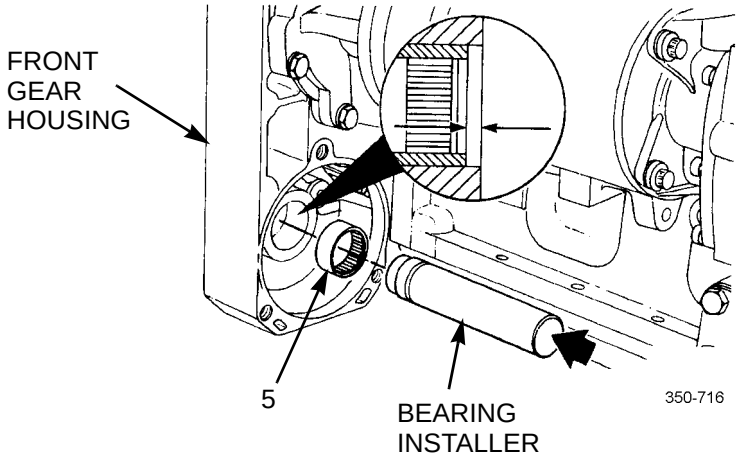
Ensure all components have been cleaned and are free of old sealants and gasket material.

1. Apply a light coat of clean lubricating oil to needle bearing bore in front gear housing and hydraulic pump drive adapter.
2. Apply a light coat of clean lubricating oil to outside diameter of both needle bearings.

NOTE

Front gear housing needle bearing MUST be installed 0.010 to 0.030 in. (0.25 to 0.76 mm) below gear housing surface.

3. Using bearing installer provided, install new needle bearing (5) in front gear housing.

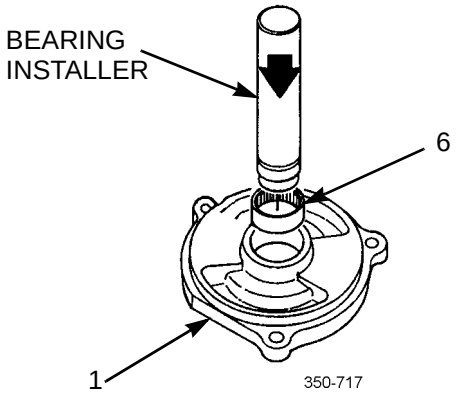


INSTALLATION - CONTINUED

NOTE

Hydraulic pump drive adapter needle bearing MUST be centered between front and rear surface of adapter.

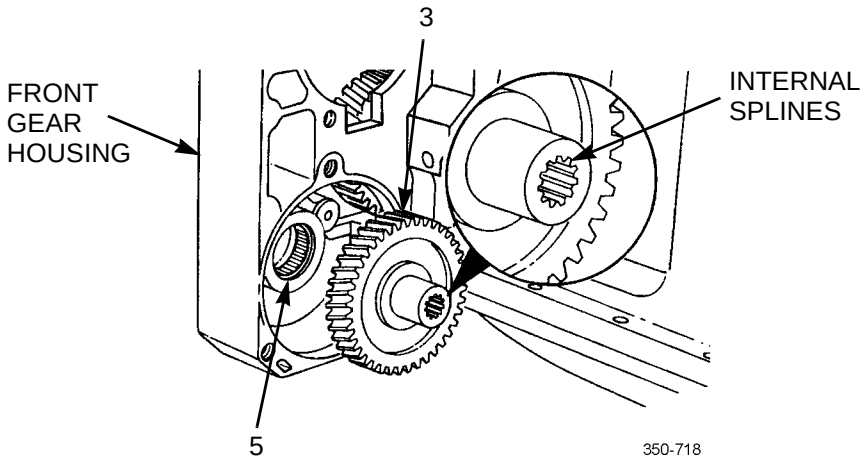
4. Install new needle bearing (6) in hydraulic pump gear drive adapter (1) from side closest to front gear housing.



NOTE

Ensure hydraulic pump drive gear is installed with shaft internal splines facing rear of engine.

5. Apply a coat of clean lubricating oil to drive gear shaft, front gear housing needle bearing (5), and install hydraulic pump drive gear (3) in front gear housing.



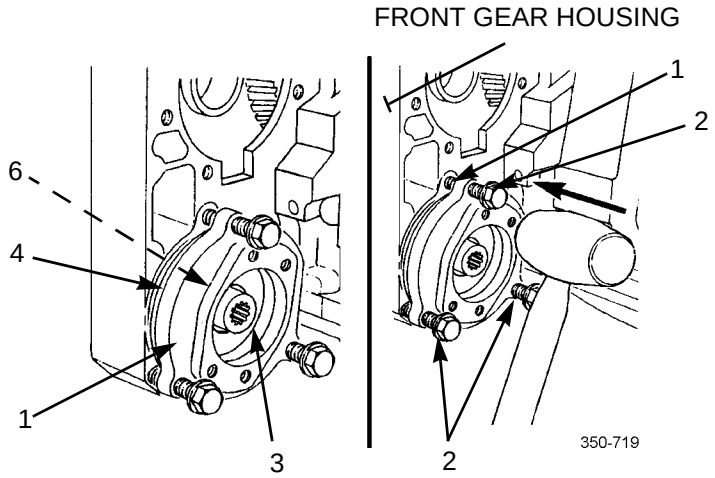
INSTALLATION - CONTINUED

6. Install new O-ring seal (4) on hydraulic pump drive adapter (1).
7. Apply a coat of clean lubricating oil to O-ring seal (4) and hydraulic pump drive adapter needle bearing (6).
8. Install hydraulic pump drive adapter (1) over shaft drive gear (3).
9. Install three screws (2) by hand to align hydraulic pump drive adapter (1) with front gear housing.

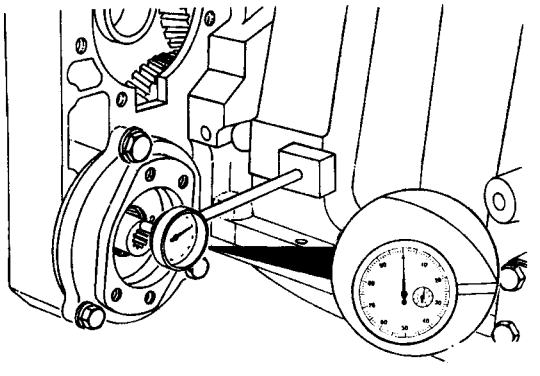
CAUTION

Take care when tapping around outside surface of adapter. Damage to O-ring seal may result.

10. Using plastic-faced hammer, install hydraulic pump drive adapter (1) in front gear housing.
11. Tighten three screws (2) evenly to 35 lb-ft (47 Nm).



12. Measure drive shaft end clearance as shown. Measurement must be 0.003 to 0.025 in. (0.076 to 0.635 mm). If not as specified, remove and reinstall needle bearings.



DRIVE SHAFT END CLEARANCE

13. Install cooling fan hydraulic pump (WP 0247 00).
14. Start engine (TM 10-3930-675-10) and check for leaks.
15. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL INJECTOR REPLACEMENT 0215 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Puller and Driver, Injector (Item 85, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 3070136)

Seal, O-ring (P/N 3070137)

Seal, O-ring (P/N 3070138)

References

WP 0207 00

Equipment Condition

Engine cover removed (WP 0148 00

Rocker arm cover removed (WP 0052 00)



WARNING

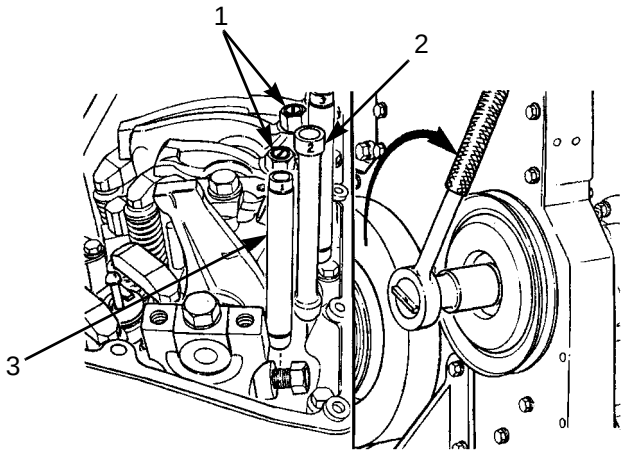
- **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.**
- **Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.**

REMOVAL

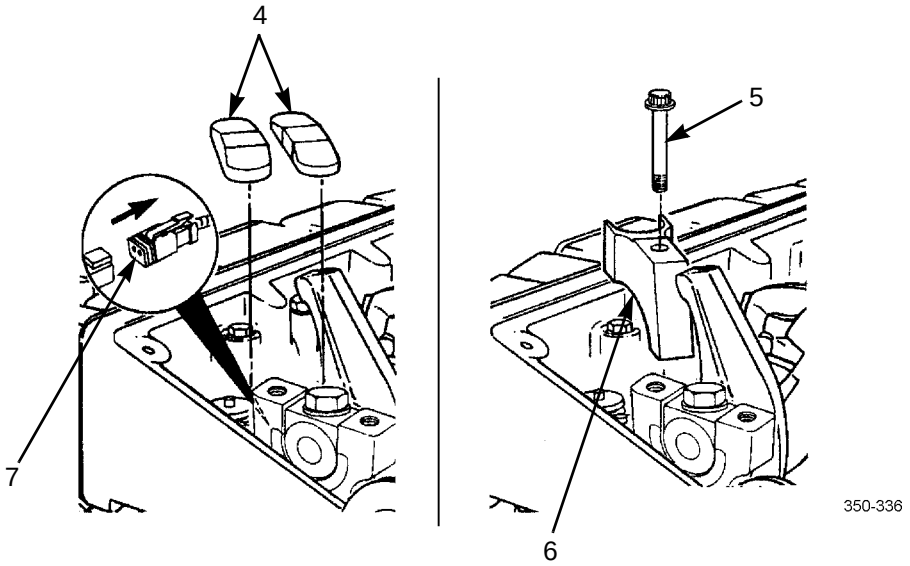
NOTE

- **Due to engine operating characteristics, adjustments, and alignments, mark or tag push rods, push tubes, crossheads, and injector assemblies for identification as they are removed. If removed, these items MUST be replaced in original locations during installation.**
- **Some push rods are under compression due to valve position. To relieve spring tension, hold push rod while rotating crankshaft CLOCKWISE with accessory drive.**

1. Loosen injector and valve adjusting screws (1) and remove push rods (3) and push tubes (2) on cylinder requiring injector replacement.

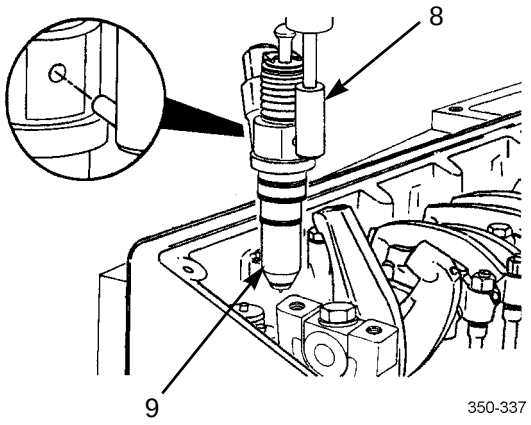


2. Remove crossheads (4) and disconnect injector connector (7).
3. Remove screw (5) and injector hold-down clamp (6).



REMOVAL - CONTINUED

4. Using injector tool (8), remove injector (9) from cylinder head.



INSTALLATION

NOTE

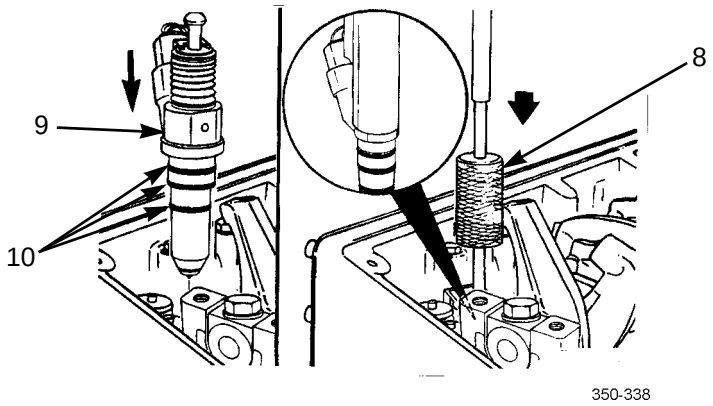
Ensure three new O-rings have been properly installed on injector. O-rings are color coded for location as follows: red – top, white – middle, blue – bottom.

1. Lubricate three new O-rings (10) with clean engine oil.
2. Position injector (9) in cylinder head injector bore with solenoid valve toward intake port.
3. Align injector (9) between valve springs.

CAUTION

DO NOT drive injector in by striking solenoid valve area. This can damage solenoid or cause injector to be out of alignment in bore, which will result in O-ring damage.

4. Using injector tool (8), seat injector (9) in bore.

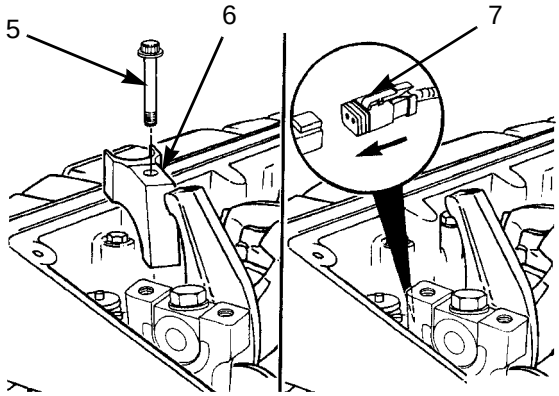


INSTALLATION - CONTINUED

CAUTION

Injector must be fully seated before installing hold-down clamp. Engine damage can occur if injector is not fully seated.

5. Install injector hold-down clamp (6) and screw (5). Tighten screw to 55 lb-ft (75 Nm).
6. Connect injector connector (7). Check lock tab to ensure connector is locked in place.



NOTE

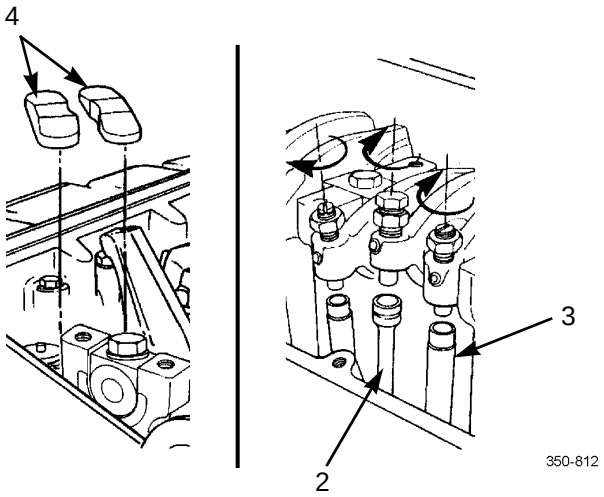
Ensure crossheads are installed in the same positions from which they were removed.

7. Install crossheads (4) on intake and exhaust valves.

NOTE

Ensure push rods and push tubes are installed in the same positions from which they were removed.

8. Rotate rocker arms down and install push rods (3) and push tubes (2).



9. Adjust valves and injectors (WP 0207 00).
10. Install rocker arm cover (WP 0052 00).
11. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL PUMP ASSEMBLY REPLACEMENT 0216 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Fuel, Diesel, DF-2 Grade (Item 18, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Gasket (P/N 3609103)

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)

Battery cables disconnected (WP 0110 00)

Fuel line and hose disconnected from fuel pump (WP 0060 00)

Fuel filter/water separator removed (WP 0059 00)

Wire lead disconnected from fuel solenoid shutoff valve (WP 0056 00)



WARNING



- **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.**
- **Some residual fuel may remain in fuel lines and hoses. Spilled fuel is slippery and must be cleaned up as soon as possible. Failure to clean up spills may result in injury to personnel.**

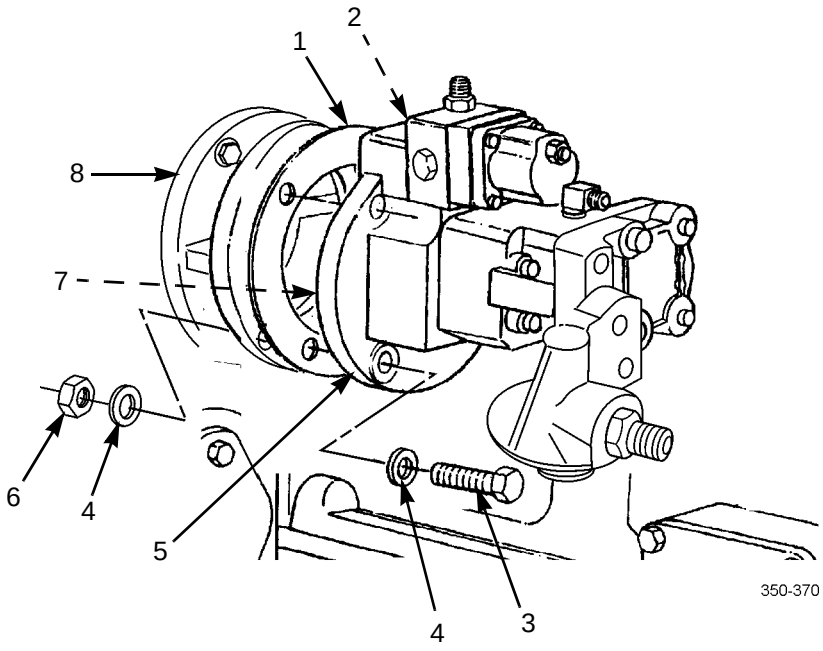
FUEL PUMP ASSEMBLY REPLACEMENT - CONTINUED 0216 00

REMOVAL

1. On USMC and RESET vehicles, close ball valve at rear of fuel filter.



2. Remove four screws (3), nuts (6), and eight washers (4) securing fuel pump (5) to accessory drive (8).
3. Remove fuel pump (5), gasket (1), and jaw coupling spider (7) from accessory drive (8). Discard gasket.



INSPECTION

1. Inspect fuel pump mounting flange for cracks and other damage. If cracks are found, replace fuel pump.
2. Inspect jaw coupling spider and jaw coupling hub for wear and other damage. If either component is worn or damaged, replace component.

INSTALLATION

NOTE

Ensure both fuel pump and accessory drive mating flanges are clean and free of old gasket material.

1. Install jaw coupling spider (7), new gasket (1), and fuel pump (5) on accessory drive (8).
2. Secure in place with four screws (3), nuts (6), and eight washers (4). Tighten screws to 35 lb-ft (47 Nm).
3. Connect fuel hose from fuel tank to pump. Connect fuel line from fuel pump to cylinder head (WP 0060 00).
4. Connect wire lead to fuel solenoid shutoff valve (WP 0056 00).

NOTE

To reduce engine cranking time, fill fuel filter with fuel prior to installation.

5. Install fuel filter/water separator (WP 0059 00).
6. On USMC and RESET vehicles, open ball valve.



434-40003

7. Connect battery cables (WP 0110 00).
8. Operate engine (TM 10-3930-675-10) and check for fuel leaks.
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

TURBOCHARGER REPLACEMENT 0217 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Gage, Depth (Item 39, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Compound, Antiseize (Item 7, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Gasket (P/N 3088984)

Gasket (P/N 3899343)

Seal, O-ring (P/N 3037537)

Seal, O-ring (P/N 3883284)

Seal, O-ring (P/N 3922794)

Personnel Required

Two

References

TM 10-3930-675-10

Equipment Condition

Engine cover removed (WP 0148 00)



WARNING

DO NOT perform maintenance on turbocharger unless engine has been allowed to cool down. Turbocharger maintenance involves working around exhaust system. Exhaust manifold and pipes may be hot and will cause serious burns.

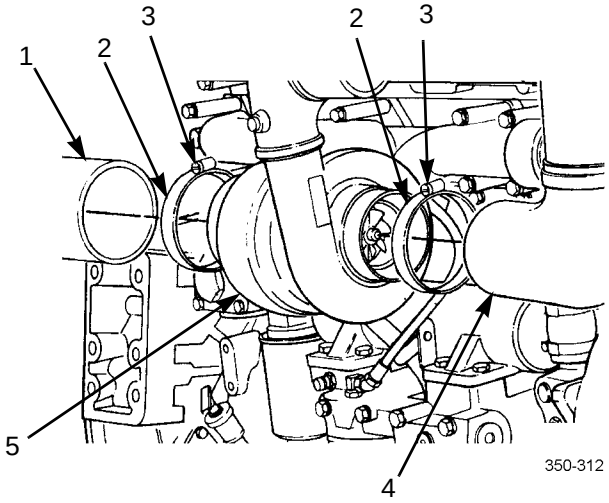
NOTE

If removal of turbocharger is required for access, perform the steps identified in *Removal*. Prior to removal of turbocharger for other reasons, perform *Inspection* to verify need to remove and replace turbocharger.

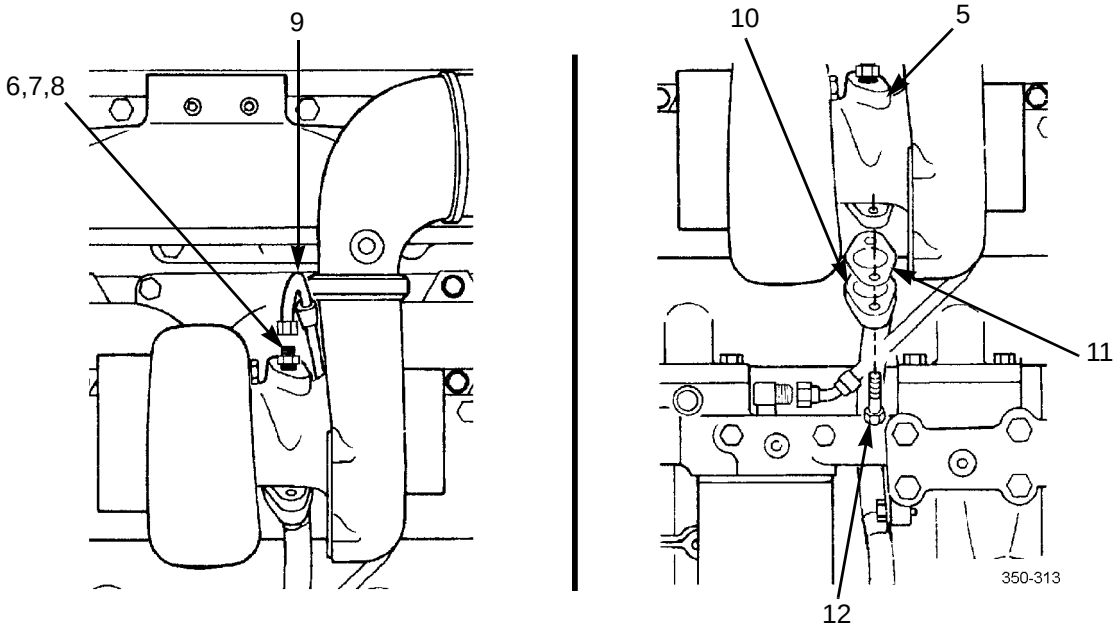
TURBOCHARGER REPLACEMENT - CONTINUED **0217 00**

REMOVAL

1. Loosen hose clamp screws (3) and remove clamps (2) from exhaust and intake pipes (1 and 4) and from turbocharger (5).

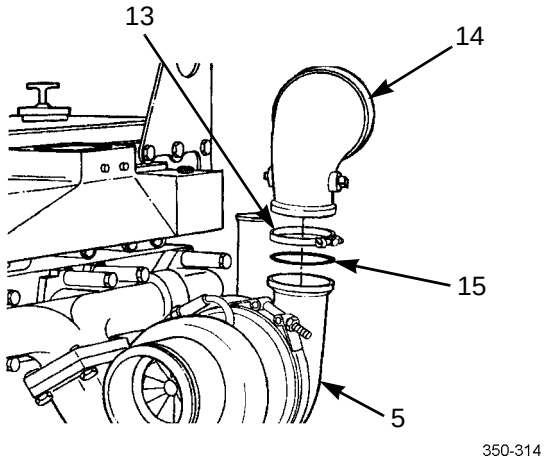


2. Disconnect oil supply line (9) from fitting (6) on top of turbocharger (5). Remove fitting and two O-ring seals (7 and 8) from turbocharger. Discard O-ring seals.
3. Remove two screws (12) securing oil drain line (10) and gasket (11) to bottom of turbocharger (5). Disconnect oil drain line. Discard gasket.

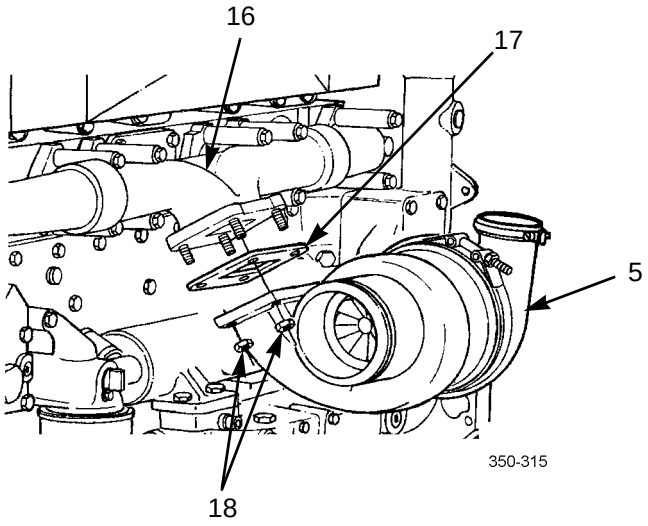


REMOVAL - CONTINUED

4. Remove v-band clamp (13), discharge elbow (14), and O-ring seal (15) from turbocharger (5). Discard O-ring seal.

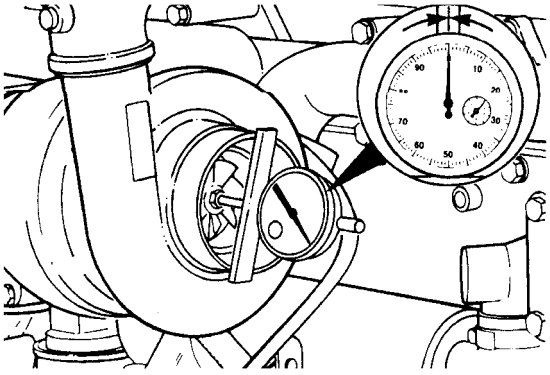


5. Remove four nuts (18) securing turbocharger (5) to exhaust manifold (16). With assistance, remove turbocharger and gasket (17) from exhaust manifold. Discard gasket.



INSPECTION

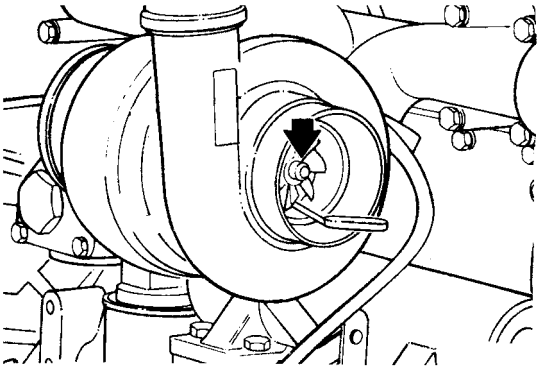
1. Perform turbocharger axial clearance check as follows:
   a. Loosen hose clamp screws and remove intake and exhaust pipes from turbocharger. Install dial depth gage as shown and push rotor assembly away from gage.
   b. Set gage to zero.
   c. Push rotor assembly toward gage and record reading.
   d. Recorded reading must be 0.0015 to 0.0035 in. (0.038 to 0.089 mm). If axial clearance reading is not within specified range, replace turbocharger.



350-316

AXIAL CLEARANCE CHECK

2. Perform turbocharger radial bearing clearance check as follows:
   a. Loosen hose clamp screws and remove intake and exhaust pipes from turbocharger.
   b. Push compressor wheel toward compressor housing. Measure clearance with gage and record reading.
   c. Push compressor wheel away from housing. Measure clearance, in same location, with gage and record reading.
   d. Subtract smaller clearance from larger clearance to obtain radial bearing clearance reading. Radial bearing clearance must be 0.006 to 0.025 in. (0.152 to 0.635 mm). If reading is not within specified range, replace turbocharger.



350-317

RADIAL BEARING CLEARANCE CHECK

INSPECTION - CONTINUED

3. Inspect compressor impeller blades and turbine wheel for damage. If damage is found, replace turbocharger.
4. Visually check turbine and compressor housings for cracks. If cracks exist on outer walls, replace turbocharger.
5. Visually check turbocharger intake and discharge for oil. If noted on turbine side, and oil discharge line is not restricted, replace turbocharger. If oil is on intake side and no restriction is found, replace turbocharger.

NOTE

Mounting flanges must be inspected after removal of turbocharger from engine.

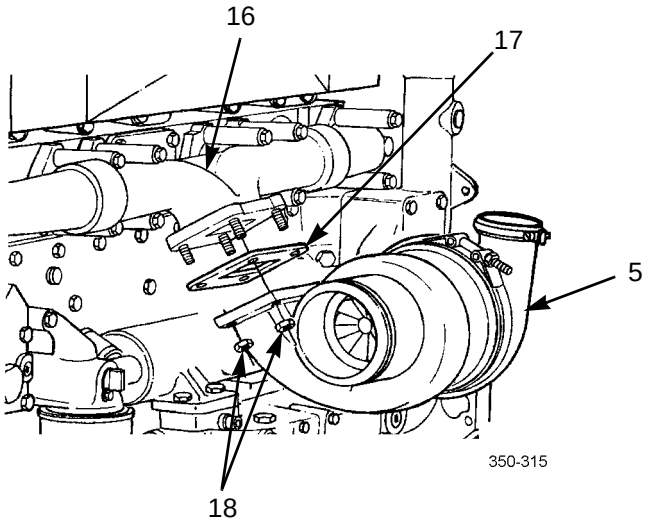
6. Visually check mounting flange surfaces for cracks. Cracks longer than 0.6 in. (15.2 mm) or cracks which extend to mounting holes are not acceptable. Cracks of any length, which extend through divider, are acceptable only if separated by at least 0.5 in. (12.7 mm).

INSTALLATION

NOTE

Ensure mounting flanges on exhaust manifold and turbocharger are clean and free of old gasket material.

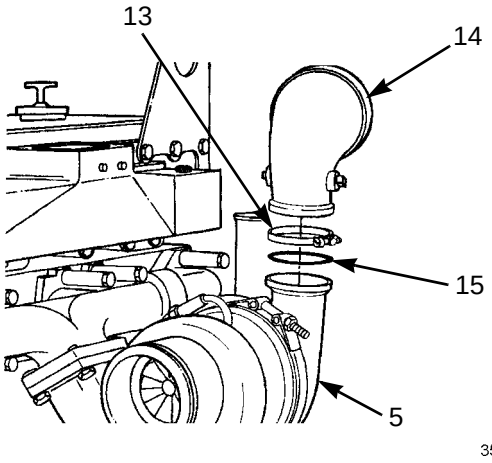
1. Apply a thin coat of antiseize compound to exhaust manifold (16) mounting studs.
2. With assistance, install new gasket (17) and turbocharger (5) on exhaust manifold (16). Secure with four nuts (18). Tighten nuts to 45 lb-ft (61 Nm).



TURBOCHARGER REPLACEMENT - CONTINUED **0217 00**

INSTALLATION - CONTINUED

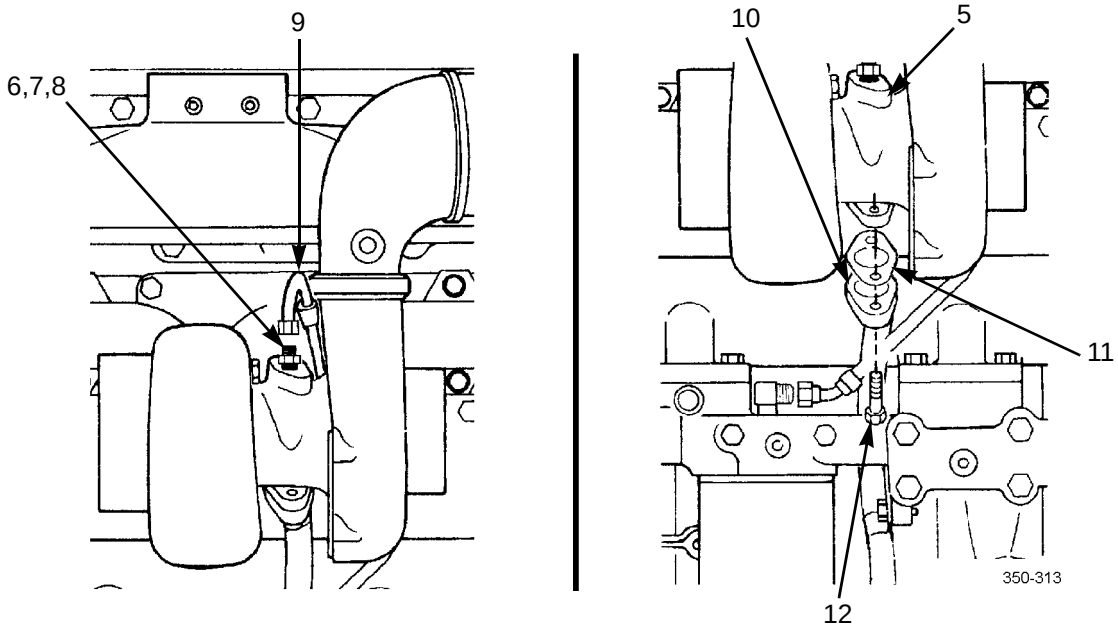
3. Install discharge elbow (14), v-band clamp (13), and new O-ring seal (15) on turbocharger (5). Tighten v-band clamp.



4. Install oil drain line (10) and new gasket (11) on turbocharger (5) with two screws (12). Tighten screws to 20 lb-ft (27 Nm).

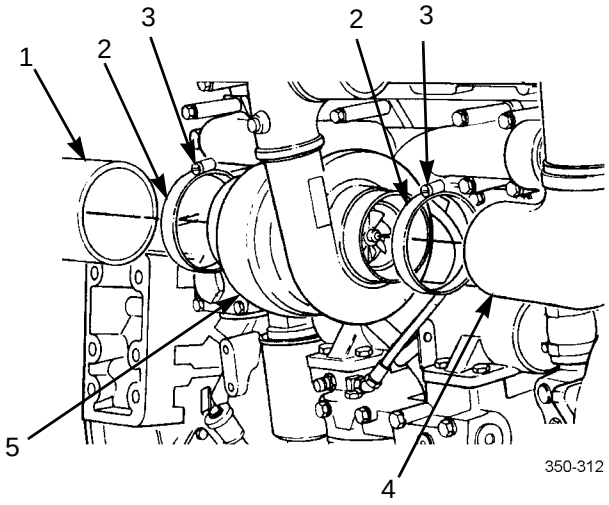
5. Pour 2 to 3 oz (50 to 60 cc) of clean engine oil into turbocharger inlet port.

6. Install fitting (6) and new O-ring seals (7 and 8) on turbocharger inlet port and connect oil supply line (9) to fitting.



INSTALLATION - CONTINUED

7. Install exhaust and intake pipes (1 and 4) and clamps (2) on turbocharger (5). Tighten hose clamp screws (3).



8. Start engine (TM 10-3930-675-10). Check for air, exhaust, coolant, and oil leaks.
9. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FUEL TANK REPLACEMENT 0218 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Nut, lock (P/N 920076.003) (5)

Personnel Required

Three

References

TM 10-3930-675-10

Equipment Condition

Fuel level sending unit removed (WP 0095 00)

Muffler removed (WP 0063 00)

Fuel drained from fuel tank (WP 0060 00)

Arctic heater fuel lines disconnected from fuel tank, if equipped with arctic heater (WP 0060 00)

Fuel supply and return hoses disconnected from fuel tank (WP 0060 00)

Right-side step removed (WP 0139 00)

Cab sliding cylinder disconnected from fuel tank (WP 0174 00)



WARNING



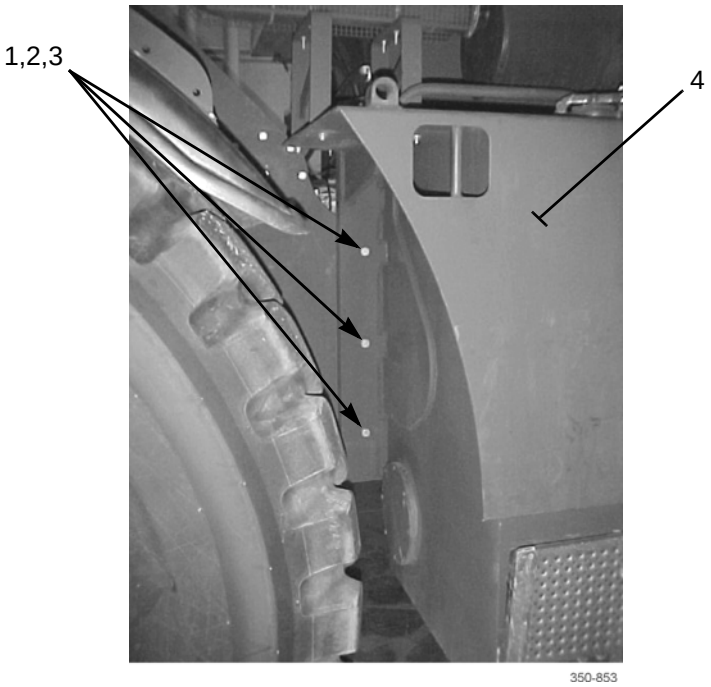
- **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy objects supported only by a lifting device. Failure to follow this warning may result in death or injury to personnel.**

NOTE

Fuel tank may contain residual amounts of fuel, which may be spilled when replacing tank. Spilled fuel should be cleaned up immediately.

REMOVAL

1. Attach a nylon sling to lifting eyes at top of fuel tank (4) and to suitable lifting device. Take up slack in sling.
2. Remove three locknuts (1), screws (2), and six washers (3) from fuel tank (4) and frame. Discard locknuts.

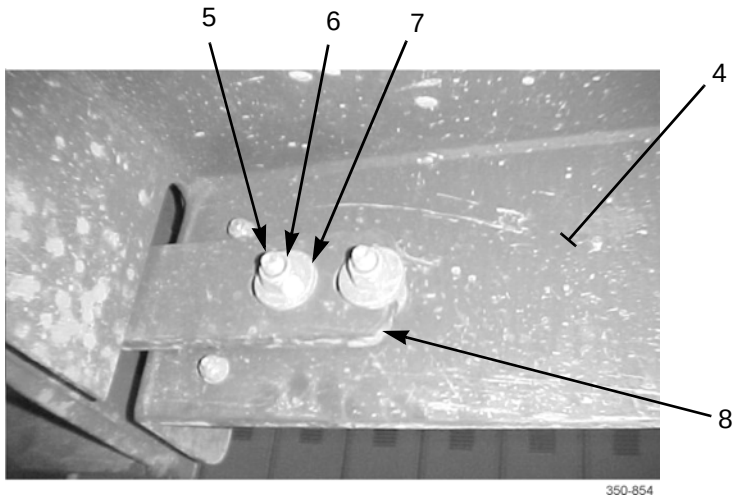


3. Remove two locknuts (6), screws (5), and four spacer washers (7) from fuel tank (4) and bracket (8). Discard locknuts.

CAUTION

Use caution not to allow fuel tank to contact hydraulic reservoir or other components of RTCH as it is being removed.

4. Raise fuel tank (4) to clear bracket (8) and remove from frame.



INSTALLATION

1. Attach a nylon sling to lifting eyes at top of fuel tank (4) and to suitable lifting device. Take up slack in sling.

CAUTION

Use caution not to allow fuel tank to contact hydraulic reservoir or other components of RTCH as it is being installed.

2. Raise fuel tank (4) and position fuel tank at frame.
3. Secure fuel tank (4) to frame with three screws (2), six washers (3), and three new locknuts (1).
4. Install four spacer washers (7), two screws (5), and new locknuts (6) on fuel tank (4) and bracket (8).
5. Connect cab sliding cylinder to fuel tank (WP 0174 00).
6. Install right-side step (WP 0139 00).
7. Connect fuel supply and return hoses to fuel tank (WP 0060 00).
8. Connect arctic heater fuel lines to fuel tank, if equipped with arctic heater (WP 0060 00).
9. Install fuel level sending unit (WP 0095 00).
10. Install muffler (WP 0063 00).
11. Fill fuel tank (TM 10-3930-675-10).
12. Start engine (TM 10-3930-675-10) and check for leaks.

END OF WORK PACKAGE

RADIATOR ASSEMBLY REPLACEMENT 0219 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.003) (2)

Washer, lock (P/N 923657.0005) (6)

Personnel Required

Two

References

WP 0058 00

WP 0065 00

WP 0178 00

WP 0185 00

WP 0284 00

Equipment Condition

Radiator assembly drained (WP 0064 00)

Fording water level sensor removed (WP 0091 00)

Hydraulic system pressure relieved (WP 0164 00)



WARNING

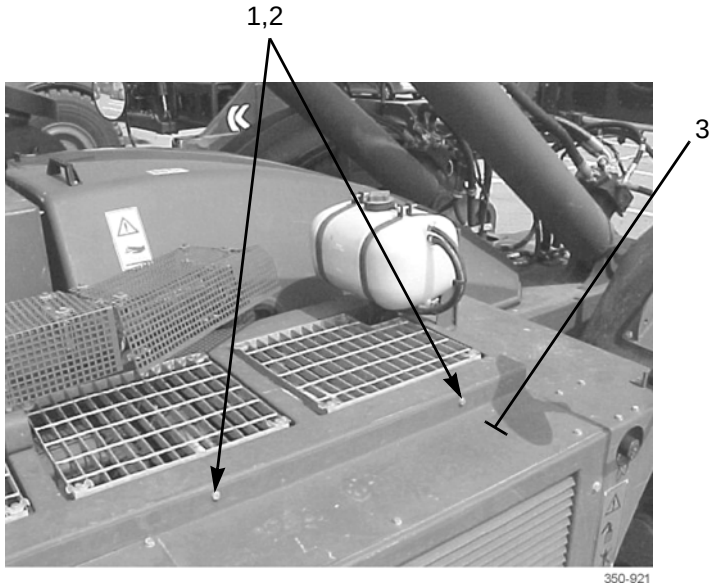




- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

REMOVAL

1. Remove eight screws (1), washers (2), and angle plate (3) from top of vehicle.



2. Disconnect air intake hoses and tubes from radiator assembly (WP 0058 00).
3. Disconnect cooling system hoses from radiator assembly (WP 0065 00).
4. Disconnect hydraulic cooling fan hoses and fittings from radiator assembly (WP 0178 00).
5. Disconnect hydraulic hoses from cooling fan motor and bypass valve (WP 0178 00).
6. Disconnect electrical connection from bypass valve and remove wiring harness from radiator fan support.



WARNING

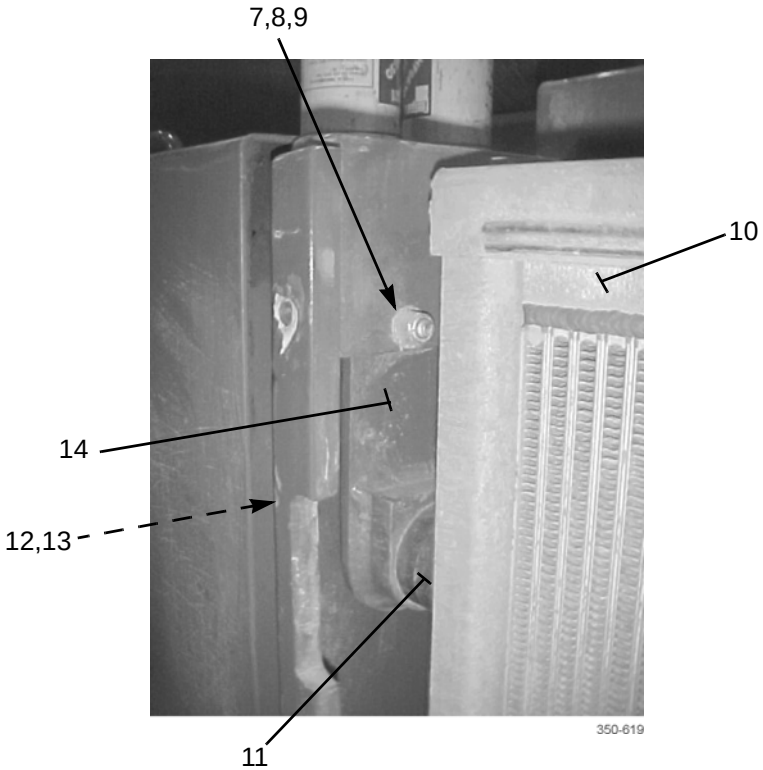
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy objects supported only by a lifting device. Failure to follow this warning may result in injury or death to personnel.**
- **Lifting device must have a capacity of approximately 1,000 lb (454 kg) to lift radiator grille and radiator. Failure to follow this warning may result in injury or death to personnel.**

7. Attach a suitable lifting device to radiator grille (6).
8. Remove six screws (4), washers (5), and radiator grille (6) from side of vehicle.

REMOVAL - CONTINUED



9. Attach a suitable lifting device to top of radiator assembly (10) with two bolts.
10. Remove two locknuts (7), washers (8), and screws (9) to separate radiator bracket (14) from vehicle. Discard locknuts.
11. Remove six screws, lockwashers, rubber bushings, and radiator assembly (10) from frame. Remove two bolts and lifting device. Discard lockwashers.
12. Remove two screws (12), washers (13), radiator bracket (14), and two rubber bushings (11) from radiator assembly (10).



INSTALLATION

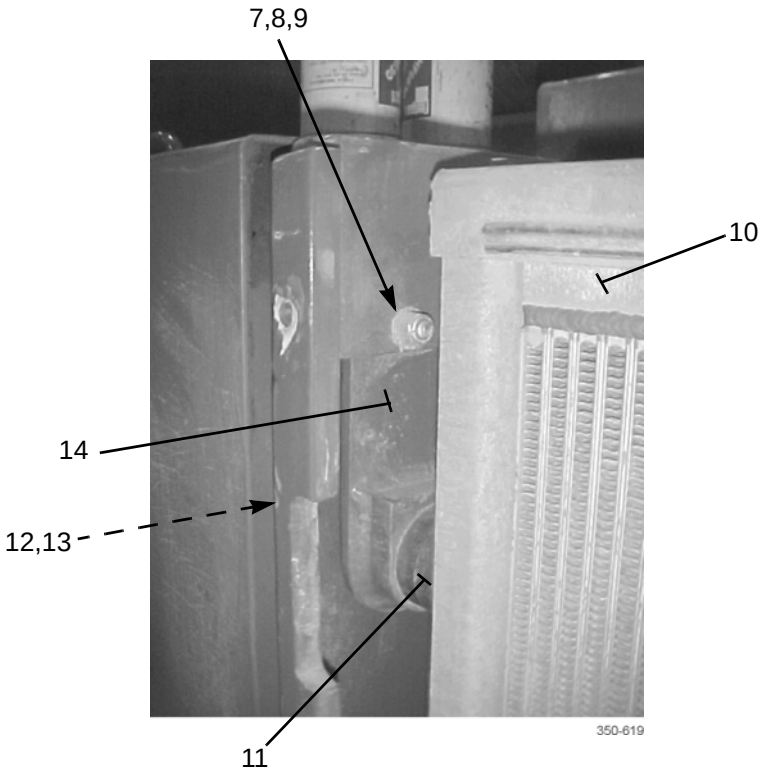
1. Install two rubber bushings (11) and radiator bracket (14) on radiator assembly (10) with two washers (13) and screws (12).



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy objects supported only by a lifting device. Failure to follow this warning may result in injury or death to personnel.**
- **Lifting device must have a capacity of approximately 1,000 lb (454 kg) to lift radiator grille and radiator. Failure to follow this warning may result in injury or death to personnel.**

2. Attach a suitable lifting device to top of radiator assembly (10) with two bolts.
3. Install radiator assembly (10) on frame with six rubber bushings, new lockwashers, and screws. Remove two bolts and lifting device.
4. Secure radiator bracket (14) to vehicle with two screws (9), washers (8), and new locknuts (7).
5. Attach lifting device to radiator grille (6).
6. Install radiator grille (6) on side of vehicle with six washers (5) and screws (4).



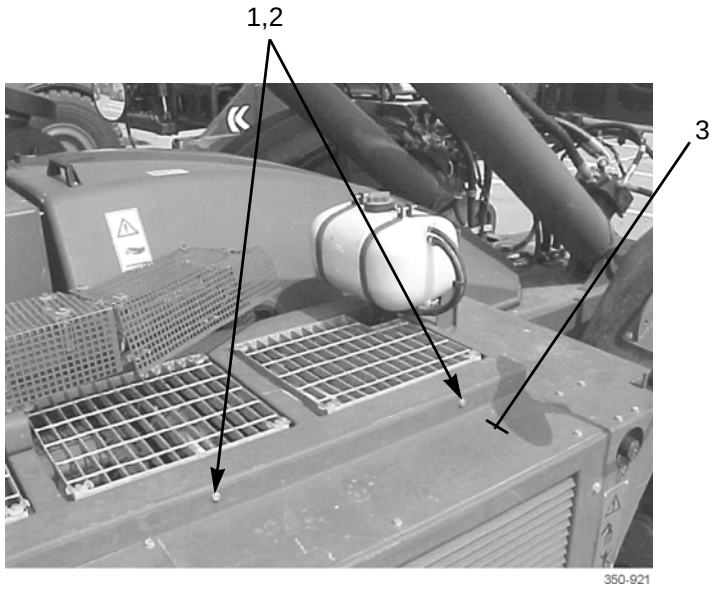
INSTALLATION - CONTINUED

7. Connect electrical connection to bypass valve. Screw wiring to radiator fan support.

NOTE

Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

8. Connect hydraulic hoses to cooling fan motor and bypass valve (WP 0178 00).
9. Connect hydraulic cooling fan hoses and fittings to radiator assembly (WP 0178 00).
10. Connect cooling system hoses to radiator assembly (WP 0065 00).
11. Connect air intake hoses and tubes to radiator assembly (WP 0058 00).
12. Install angle plate (3) on top of vehicle with eight washers (2) and screws (1).



13. Install fording water level sensor (WP 0091 00).
14. Fill radiator (WP 0064 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM WIRING HARNESSES REPLACEMENT 0220 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

References

TM 10-3930-675-10

WP 0222 00

Equipment Condition

Master battery switch in OFF position

NOTE

Two wiring harnesses are routed along right side of boom and boom extension and terminate at tophandler junction box. This work package describes replacement of these two wiring harnesses.

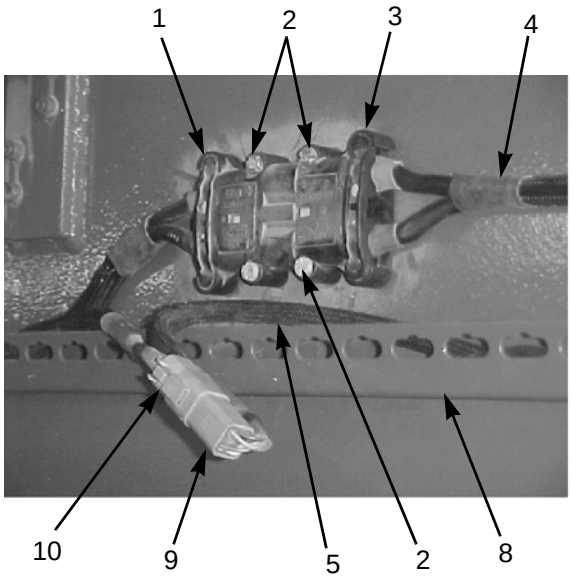
REMOVAL

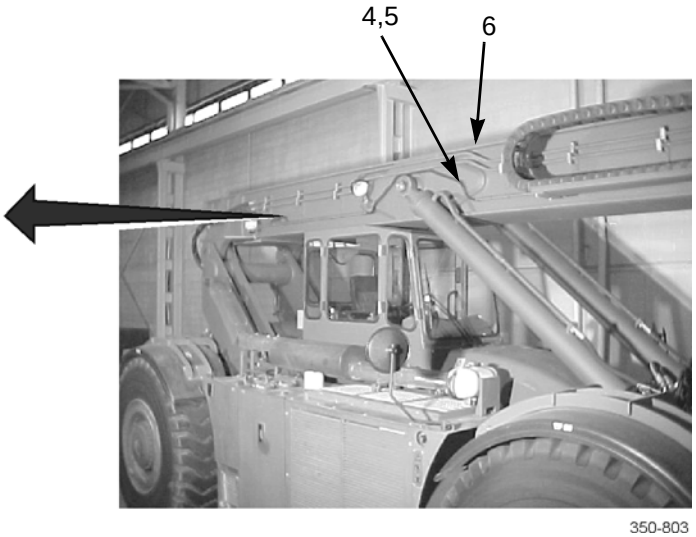
1. Disconnect wiring harness (5) connector (9) from chassis wiring harness connector (10).
2. Remove four screws (2). Disconnect wiring harness (4) connector (3) from chassis wiring harness connector (1).

NOTE

Note routing of wiring harnesses and positioning of tiedown straps to assist in installation.

3. Trace wiring harnesses (4 and 5) along boom (6), removing and discarding all tiedown straps that secure wiring harnesses to channels (8).





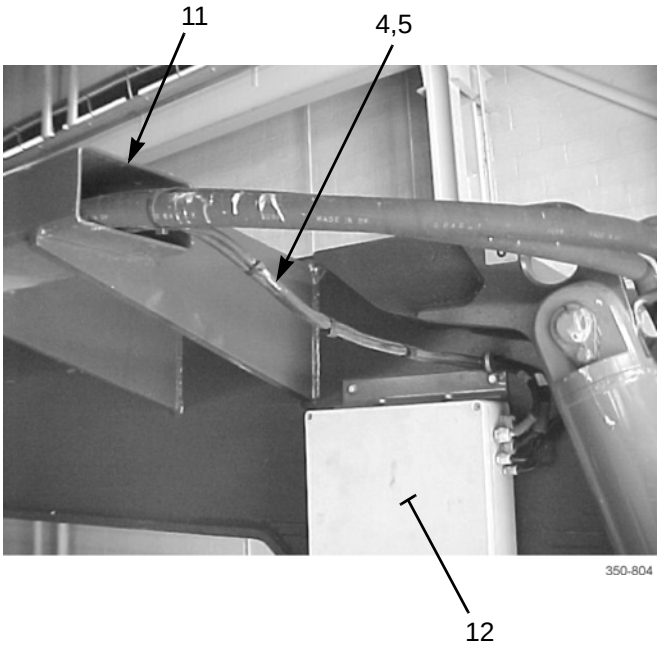
REMOVAL - CONTINUED

4. Trace wiring harnesses (4 and 5) to tophandler junction box (12) and disconnect from junction box (WP 0222 00).
5. Remove and discard tiedown straps that secure wiring harnesses (4 and 5) together at tophandler junction box (12) end.

NOTE

Note routing of wiring harnesses through middle portion of flexible conveyer.

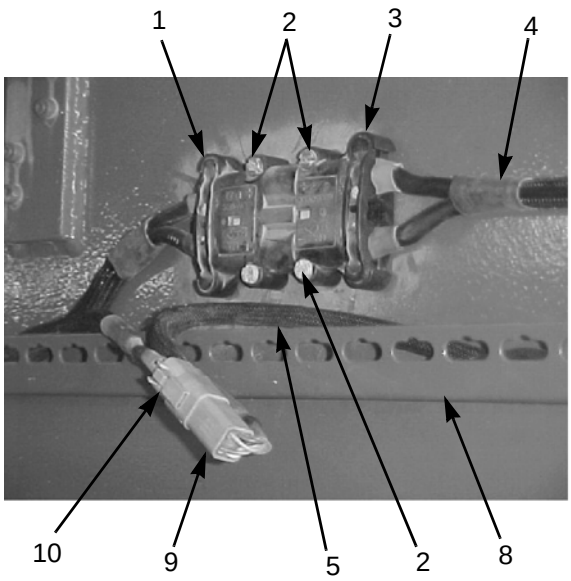
6. Pull wiring harnesses (4 and 5) toward front of vehicle, pulling them through box channel (11) and flexible conveyer (7).
7. Remove wiring harnesses (4 and 5) from vehicle.

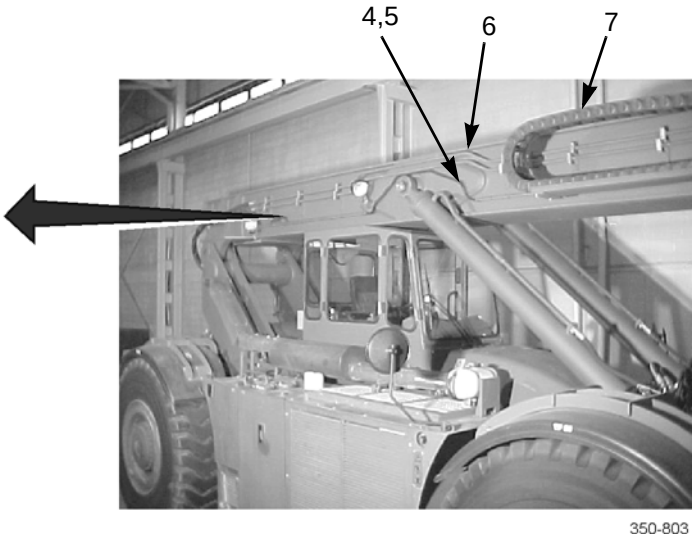


INSTALLATION

1. Starting from rear of flexible conveyer (7) and working toward tophandler, feed wiring harnesses (4 and 5) through middle portion of flexible conveyer and into box channel (11), until wiring harness ends reach tophandler junction box (12).
2. Connect wiring harnesses (4 and 5) to tophandler junction box (12) (WP 0222 00).
3. Install new tiedown straps to secure wiring harnesses (4 and 5) together at tophandler junction box (12) end.
4. Position wiring harnesses (4 and 5) inside channels (8) along boom (6), until ends of wiring harnesses reach connection points to chassis wiring harnesses.
5. Connect wiring harness (4) connector (3) to chassis wiring harness connector (1). Install four screws (2).
6. Connect wiring harness (5) connector (9) to chassis wiring harness connector (10).
7. Secure wiring harnesses (4 and 5) to channels (8) with new tiedown straps.

INSTALLATION - CONTINUED





END OF WORK PACKAGE

TOPHANDLER WIRING HARNESSES REPLACEMENT 0221 00

THIS WORK PACKAGE COVERS

Wiring Harness A, Tophandler Junction Box-to-Junction Box 182: Removal, Installation

Wiring Harness B, Tophandler Junction Box-to-Control Valve: Removal, Installation

Wiring Harness C, Tophandler Junction Box-to-Control Valve: Removal, Installation

Wiring Harness D, Junction Box 182-to-Junction Box 183: Removal, Installation

Wiring Harness E, Junction Box 182-to-Junction Box 184: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Wire, Nonelectrical (Item 43, WP 0290 00)

Personnel Required

Two

References

WP 0048 00

WP 0259 00

Equipment Condition

Boom and tophandler fully lowered (TM 10-3930-675-10)

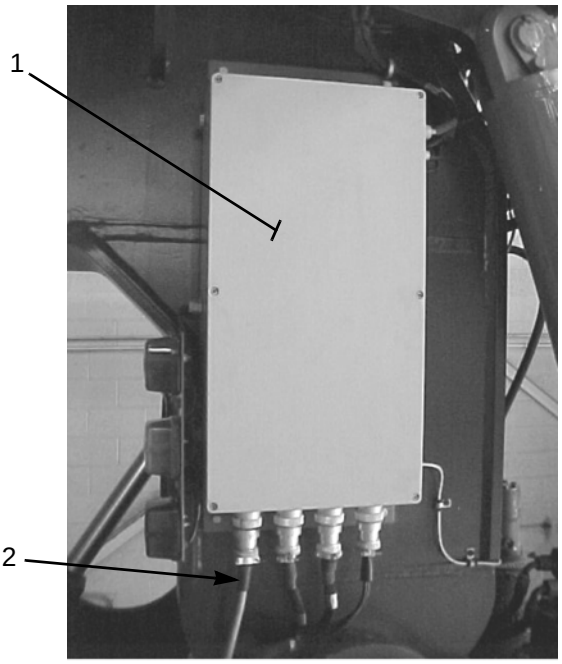
Master battery switch in OFF position

NOTE

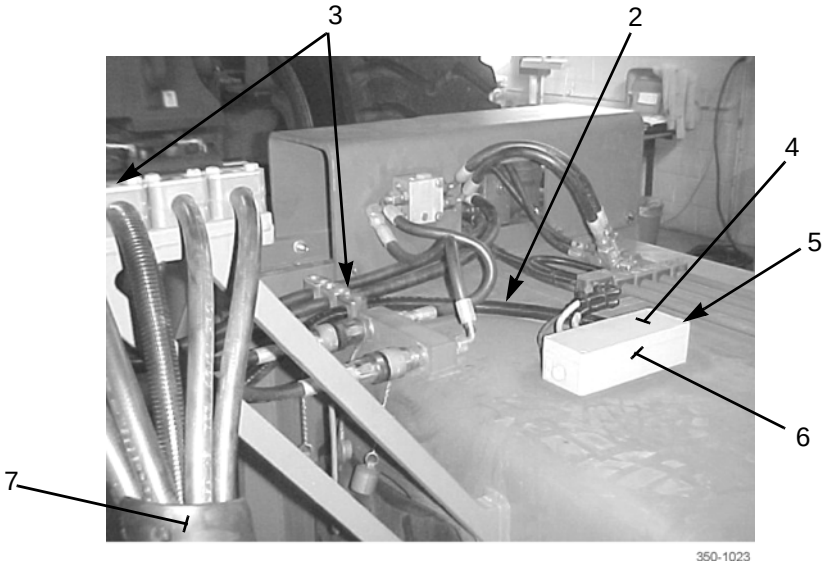
Replacement of wiring harnesses D and E is easier to perform with tophandler extended to 40-ft (12.2-m) width.

WIRING HARNESS A, TOPHANDLER JUNCTION BOX-TO-JUNCTION BOX 182: REMOVAL

1. Disconnect wiring harness A (2) connector from tophandler junction box (1) connector.



2. Trace routing of wiring harness A (2). Loosen cable clamps (3) and cut tiedown straps as needed to gain free movement of harness A.
3. Unwrap upper and lower cable guard (7) from harness A (2) routing. Retain for installation.
4. Loosen four screws (5) and remove cover (4) from junction box 182 (6). Inspect rubber seal in groove of cover. Replace only if damaged.

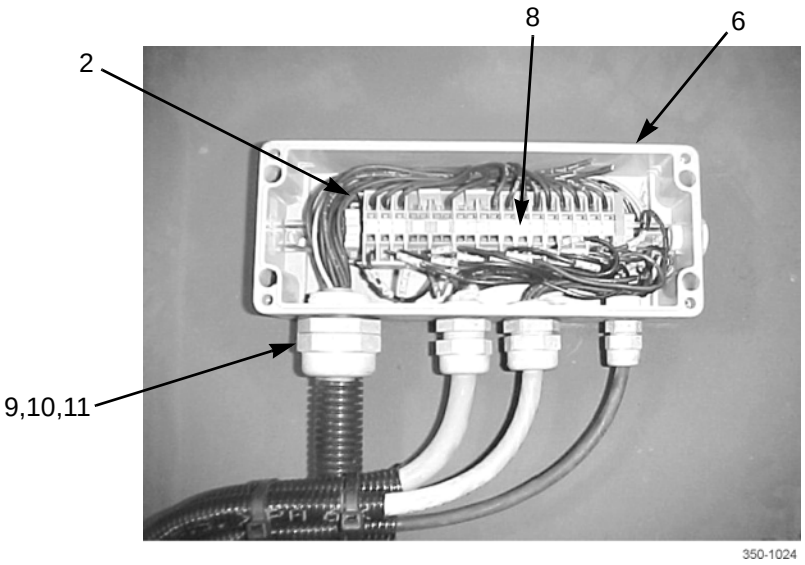


WIRING HARNESS A, TOPHANDLER JUNCTION BOX-TO-JUNCTION BOX 182: REMOVAL - CONTINUED

NOTE

Use wiring diagrams in WP 0048 00, as needed, and note terminal block numbers to wire lead numbers for installation.

5. Using jeweler's screwdriver, disconnect wiring harness A (2) leads from junction box 182 (6) terminal block (8).
6. Remove retainer nut (9), grommet (10), sleeve (11), and wiring harness A (2) from junction box 182 (6). Retain retainer nut, grommet, and sleeve for installation.



7. From tophandler junction box end, with assistance, pull wiring harness A (2) from routing until wiring harness A is approximately 18 in. (46 cm) from tophandler carriage frame above control valve.

NOTE

Nonelectrical wire is secured to wiring harness to be used as a guide wire during installation of new harness.

8. Secure approximately 6 ft (183 cm) of nonelectrical wire to wiring harness A (2).
9. With assistance, continue to pull wiring harness A (2) and nonelectrical wire through cable routing until wiring harness is free of tophandler carriage frame.
10. Remove wiring harness A (2) from nonelectrical wire leaving nonelectrical wire in place through wiring harness routing.

WIRING HARNESS A, TOPHANDLER JUNCTION BOX-TO-JUNCTION BOX 182: INSTALLATION

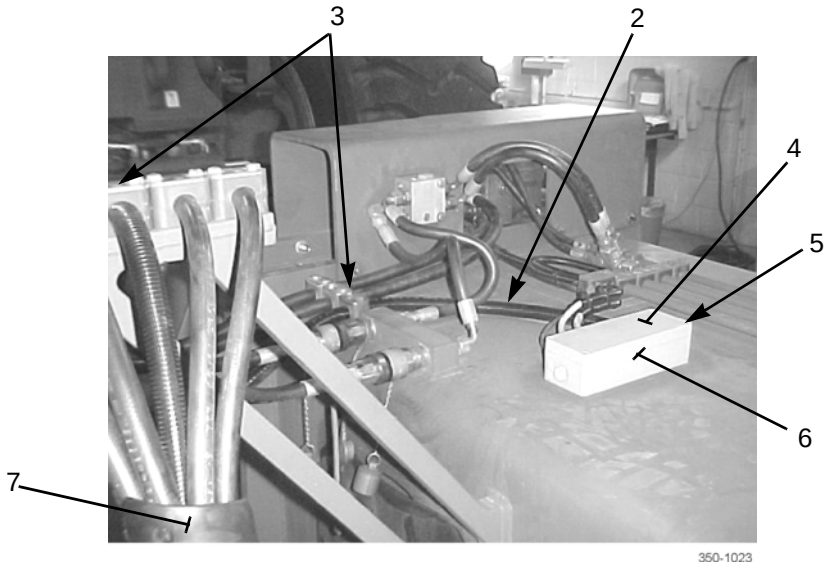
CAUTION

Ensure sufficient length of wiring harness is coiled within tophandler opening, so that tophandler can rotate freely in both directions without damaging harness.

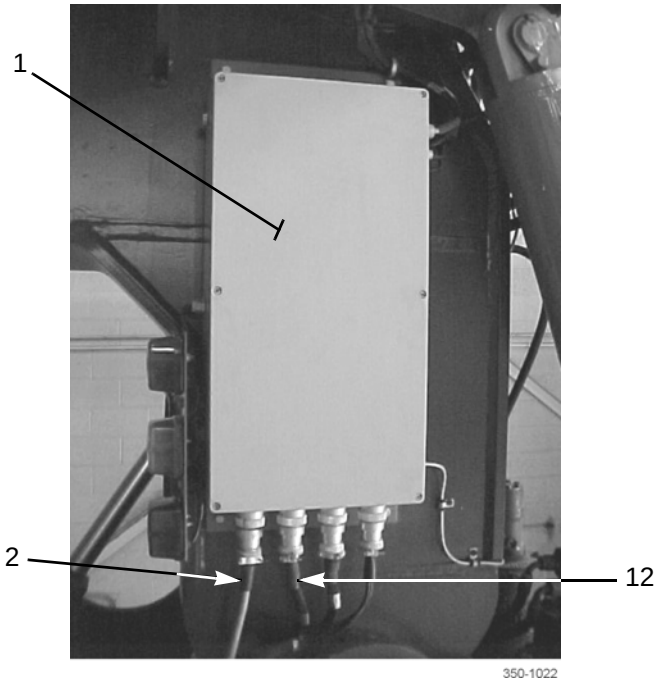
1. Attach junction box 182 (6) end of wiring harness A (2) to nonelectrical wire at tophandler junction box (1) end.
2. With assistance, pull other end of nonelectrical wire and wiring harness A (2) through tophandler carriage frame until approximately 18 in. (46 cm) of wiring harness A is exposed.
3. Remove nonelectrical wire from wiring harness A (2) and continue to route wiring harness A to junction box 182 (6).
4. Install wiring harness A (2) through retainer nut (9), grommet (10), sleeve (11), and use a jeweler's screwdriver to connect leads to terminal block (8) as noted during removal. Tighten retainer nut.

WIRING HARNESS A, TOPHANDLER JUNCTION BOX-TO-JUNCTION BOX 182: INSTALLATION - CONTINUED

5. Install cover (4) on junction box 182 (6) and tighten four screws (5).
6. Tighten cable clamps (3) and install new tiedown straps as needed to secure wiring harness A (2).
7. Install upper and lower cable guard (7).



8. Connect connector of wiring harness A (2) to connector of tophandler junction box (1)



9. Perform boom and tophandler calibration (WP 0259 00).

WIRING HARNESS B, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: REMOVAL

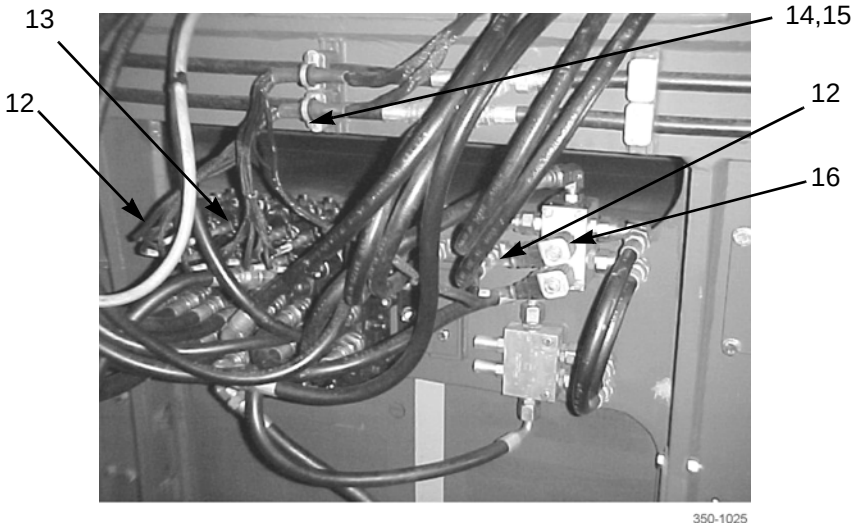
1. Disconnect wiring harness B (12) connector from tophandler junction box (1) connector.
2. Remove upper cable guard from wiring harness B (12). Retain cable guard for installation.
3. Remove screw (14) and cable clamp (15) from wiring harness B (12) grommet.

NOTE

Use wiring diagrams in WP 0048 00, as needed, and ensure diagram or record of wire lead connections is made prior to disconnection to ensure correct connection of leads.

4. At control valve, locate these wire leads, press in on retaining clips, and disconnect leads from solenoids (13) as follows:

WIRE NUMBER	SOLENOID FUNCTION
6008	Rotation Clockwise
6009	Rotation Counterclockwise
6010	Tilt Out
6011	Tilt In
6018	Spreader Out
6019	Spreader In



5. Disconnect wire lead 6034-1 from leveling lock solenoid (16).

NOTE

Nonelectrical wire is secured to wiring harness to be used as a guide wire during installation of new harness.

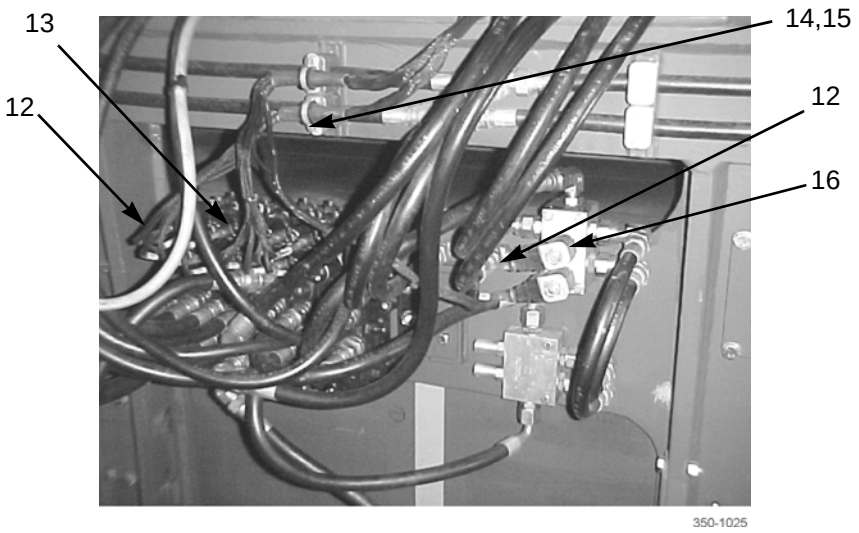
6. Secure all loose leads of wiring harness B (12) to nonelectrical wire.
7. With assistance, pull wiring harness B (12) up through tophandler carriage until nonelectrical wire is exposed approximately 18 in. (46 cm).
8. Remove wiring harness B (12) from nonelectrical wire, leaving nonelectrical wire in place as a guide wire.

WIRING HARNESS B, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: INSTALLATION

CAUTION

Ensure sufficient length of wiring harness is coiled within tophandler opening, so that tophandler can rotate freely in both directions without damaging harness.

1. Attach wiring harness B (12) control valve wire leads to upper end of nonelectrical wire.
2. With assistance, pull nonelectrical wire and wiring harness B (12) down through tophandler carriage frame.
3. Remove wiring harness B (12) leads from nonelectrical wire.
4. Connect wire leads to solenoids (13) as follows:

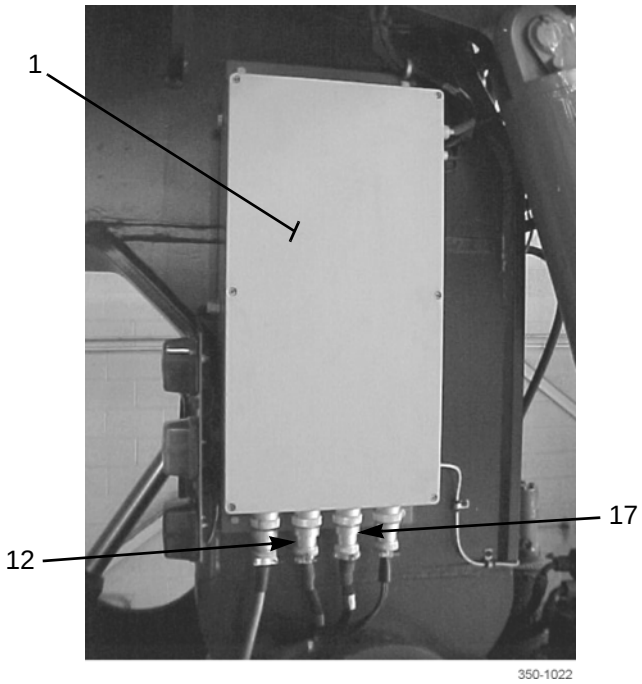


WIRE NUMBER	SOLENOID FUNCTION
6008	Rotation Clockwise
6009	Rotation Counterclockwise
6010	Tilt Out
6011	Tilt In
6018	Spreader Out
6019	Spreader In

5. Connect lead 6034-1 to leveling lock solenoid (16).
6. Install cable clamp (15) on wiring harness B (12) grommet with screw (14).

WIRING HARNESS B, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: INSTALLATION - CONTINUED

7. Connect wiring harness B (12) connector to tophandler junction box (1) connector and install cable guard.



8. Perform boom and tophandler calibration (WP 0259 00).

WIRING HARNESS C, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: REMOVAL

1. Disconnect wiring harness C (17) connector from tophandler junction box (1) connector.
2. Remove upper cable guard from wiring harness C (17). Retain cable guard for installation.

WIRING HARNESS C, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: REMOVAL - CONTINUED

3. Remove screw (18) and cable clamp (19) from wiring harness C (17) grommet.

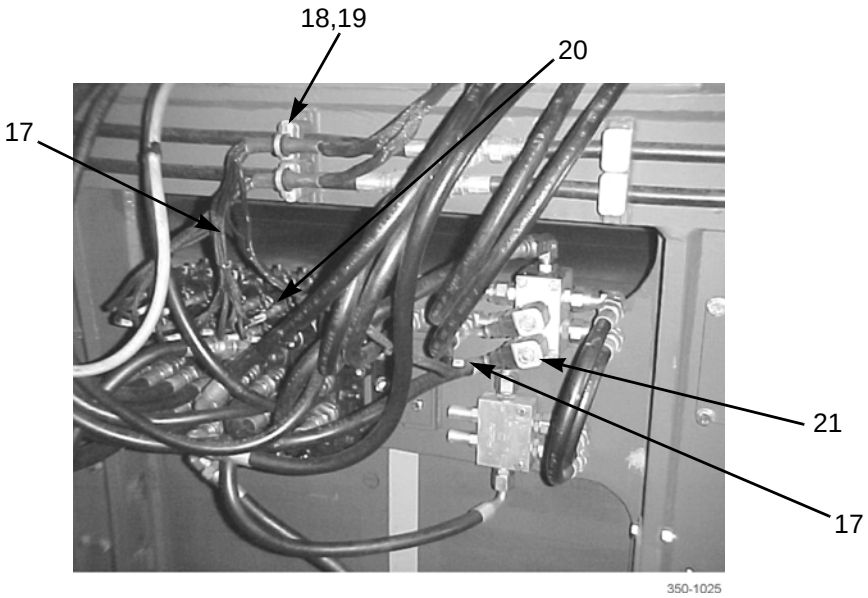
NOTE

Use wiring diagrams in WP 0048 00, as needed, and ensure a diagram or record of wire lead connections is made prior to disconnection to ensure correct connection of leads.

4. At control valve, locate these wire leads, press in on retaining clips, and disconnect leads from solenoids (20) as follows:

WIRE NUMBER	SOLENOID FUNCTION
6020	Sideshift Left
6021	Sideshift Right
6035	Leveling Right
6036	Leveling Left
6039	Unlock Twistlocks
6040	Lock Twistlocks

5. Disconnect wire lead 6034-2 from leveling lock solenoid (21).



NOTE

Nonelectrical wire is secured to wiring harness to be used as a guide wire during installation of new harness.

6. Secure all loose leads of wiring harness C (17) to nonelectrical wire.
7. With assistance, pull wiring harness C (17) up through tophandler carriage until nonelectrical wire is exposed approximately 18 in. (46 cm).
8. Remove wiring harness C (17) from nonelectrical wire and leave nonelectrical wire in place as a guide wire.

WIRING HARNESS C, TOPHANDLER JUNCTION BOX-TO-CONTROL VALVE: INSTALLATION

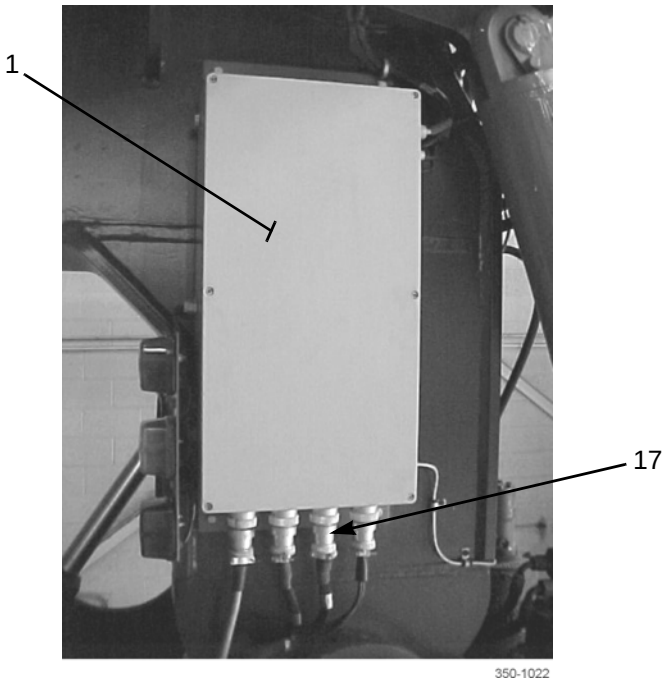
CAUTION

Ensure sufficient length of wiring harness is coiled within tophandler opening, so that tophandler can rotate freely in both directions without damaging harness.

1. Attach wiring harness C (17) control valve wire leads to upper end of nonelectrical wire.
2. With assistance, pull nonelectrical wire and wiring harness C (17) down through tophandler carriage frame.
3. Remove wiring harness C (17) leads from nonelectrical wire.
4. Connect wire leads to solenoids (20) as follows:

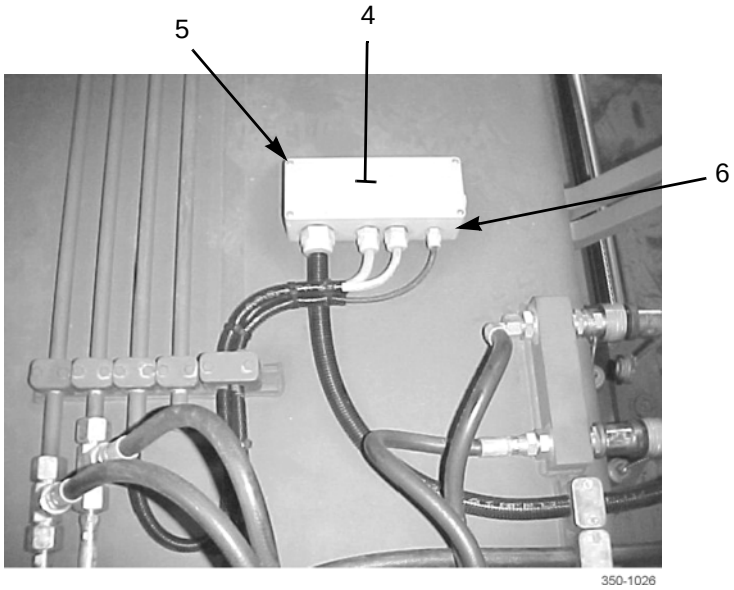
WIRE NUMBER	SOLENOID FUNCTION
6020	Sideshift Left
6021	Sideshift Right
6035	Leveling Right
6036	Leveling Left
6039	Unlock Twistlocks
6040	Lock Twistlocks

5. Connect lead 6034-2 to leveling lock solenoid (21).
6. Install cable clamp (19) on wiring harness C (17) grommet with screw (18).
7. Connect wiring harness C (17) connector to tophandler junction box (1) connector and install cable guard.



WIRING HARNESS D, JUNCTION BOX 182-TO-JUNCTION BOX 183: REMOVAL

1. Loosen four screws (5) and remove cover (4) from junction box 182 (6). Inspect rubber seal in groove of cover. Replace only if damaged.

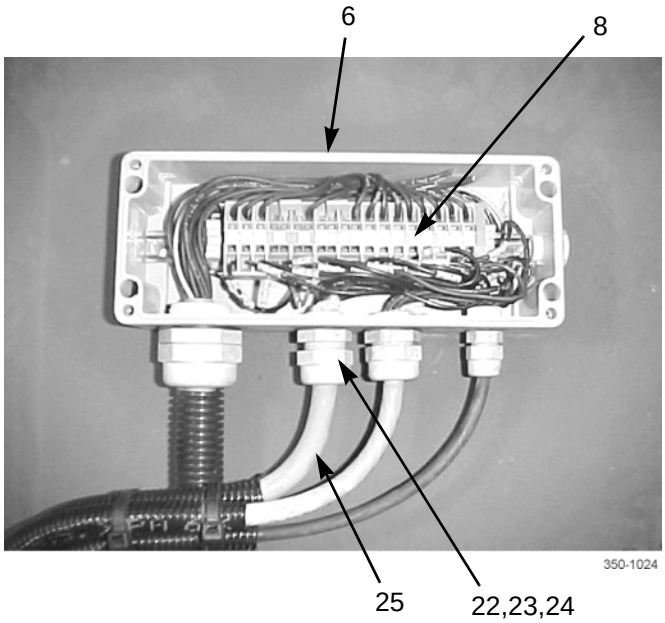


2. Remove retainer nut (22), grommet (23), and sleeve (24).

NOTE

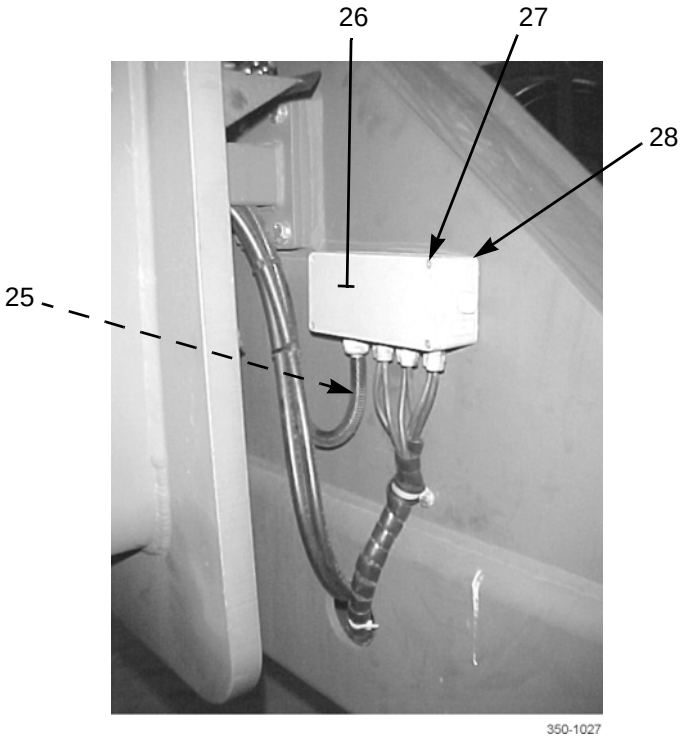
Use wiring diagrams in WP 0048 00, as needed, and note terminal block numbers to wire lead numbers for installation.

3. Using jeweler's screwdriver, disconnect wiring harness D (25) leads from junction box 182 (6) terminal block (8). Remove harness from junction box.



WIRING HARNESS D, JUNCTION BOX 182-TO-JUNCTION BOX 183: REMOVAL - CONTINUED

4. Trace wiring harness D (25) from junction box 182 (6) to junction box 183 (28). Cut tiedown straps and loosen clamps, as needed, to gain free movement of wiring harness. Discard tiedown straps.
5. Loosen four screws (27) and remove cover (26) from junction box 183 (28). Inspect rubber seal in groove of cover. Replace only if damaged.



WIRING HARNESS D, JUNCTION BOX 182-TO-JUNCTION BOX 183: REMOVAL - CONTINUED

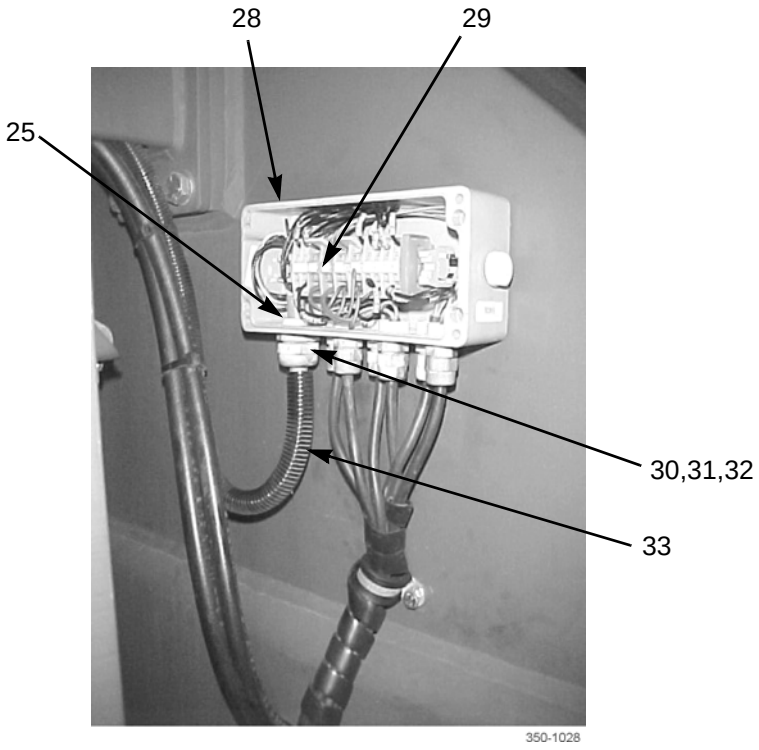
6. Remove retainer nut (30), grommet (31), and sleeve (32).

NOTE

Use wiring diagrams in WP 0048 00, as needed, and note terminal block numbers to wire lead numbers for installation.

7. Using jeweler's screwdriver, disconnect wiring harness D (25) leads from junction box 183 (28) terminal block (29). Remove harness from junction box.

8. Remove wiring harness D (25) from cable guard (33) along cable routing. Retain cable guard.



WIRING HARNESS D, JUNCTION BOX 182-TO-JUNCTION BOX 183: INSTALLATION

1. Install wiring harness D (25) through cable guard (33) and position wiring harness along cable routing.

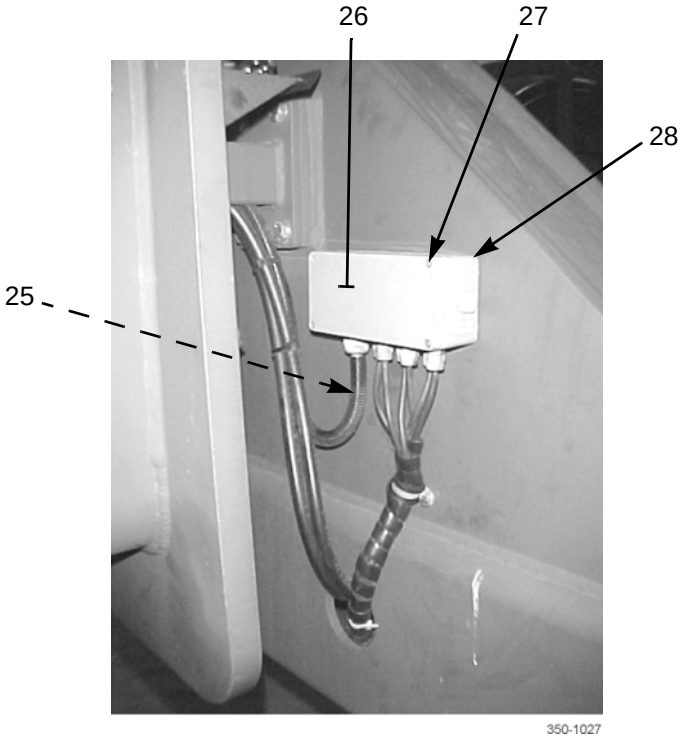
2. Position retainer nut (30), grommet (31), and sleeve (32) on wiring harness D (25) at junction box 183 (28). Install harness into junction box.

3. Using jeweler's screwdriver, connect wiring harness D (25) leads to terminal block (29).

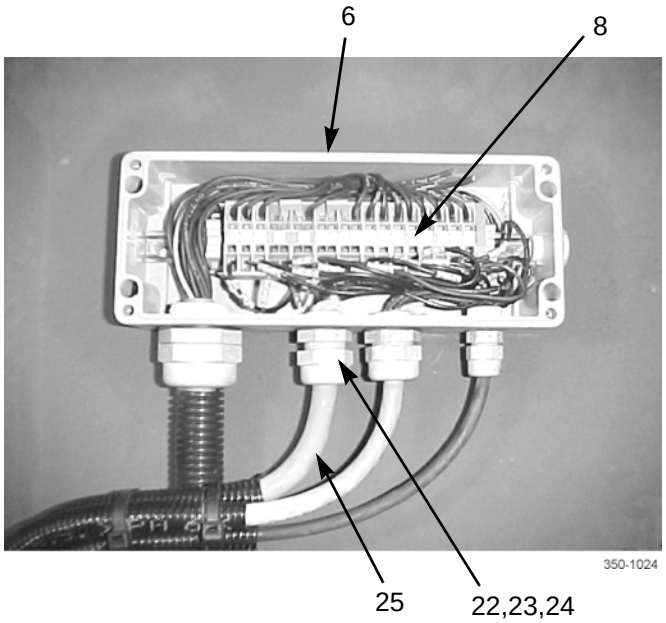
4. Install sleeve (32), grommet (31), and retainer nut (30).

5. Install cover (26) on junction box 183 (28) and tighten four screws (27).

WIRING HARNESS D, JUNCTION BOX 182 -TO-JUNCTION BOX 183: INSTALLATION - CONTINUED

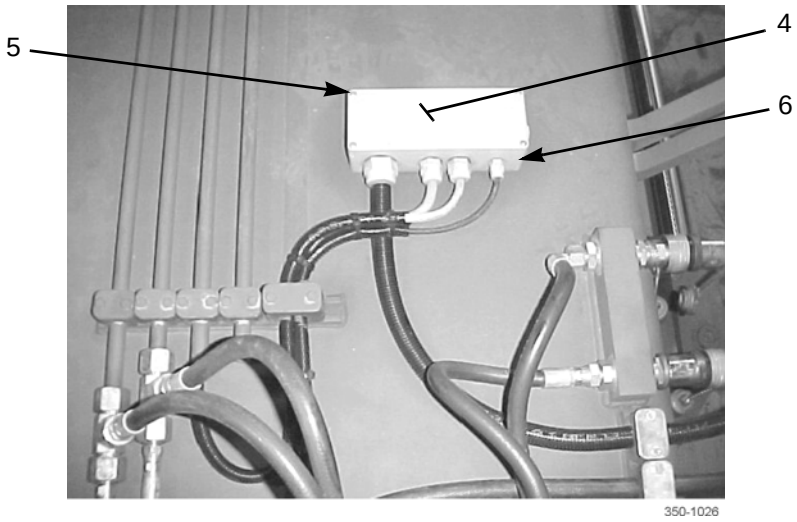


6. Position retainer nut (22), grommet (23), and sleeve (24) on other end of wiring harness D (25) at junction box 182 (6). Install harness into junction box.
7. Using jeweler's screwdriver, connect wiring harness D (25) leads to terminal block (8).
8. Install sleeve (24), grommet (23), and retainer nut (22).



WIRING HARNESS D, JUNCTION BOX 182-TO-JUNCTION BOX 183: INSTALLATION - CONTINUED

9. Install cover (4) on junction box 182 (6) and tighten four screws (5).



10. Secure wiring harness D along cable routing by tightening clamps and installing new tiedown straps as needed.
11. Perform operational check of tophandler (TM 10-3930-675-10).

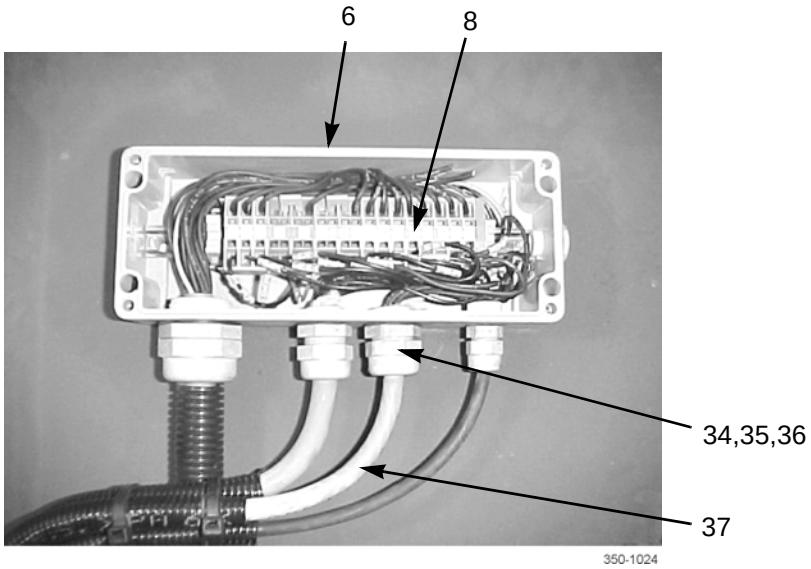
WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: REMOVAL

1. Loosen four screws (5) and remove cover (4) from junction box 182 (6). Inspect rubber seal in groove of cover. Replace only if damaged.
2. Remove retainer nut (34), grommet (35), and sleeve (36).

NOTE

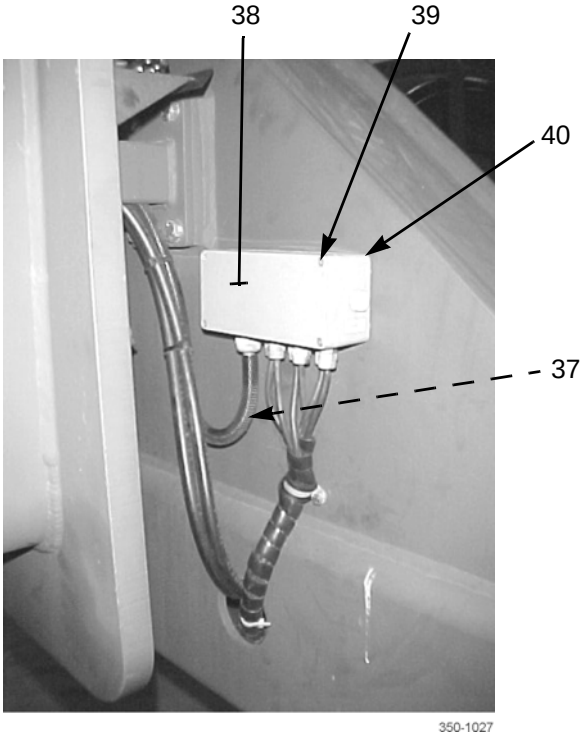
Use wiring diagrams in WP 0048 00, as needed, and note terminal block numbers to wire lead numbers for installation.

3. Using jeweler's screwdriver, disconnect wiring harness E (37) leads from junction box 182 (6) terminal block (8). Remove harness from junction box.



WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: REMOVAL - CONTINUED

4. Trace wiring harness E (37) from junction box 182 (6) through conduit along top of tophandler to junction box 184 (40).
5. Loosen four screws (39) and remove cover (38) from junction box 184 (40). Inspect rubber seal in groove of cover. Replace only if damaged.



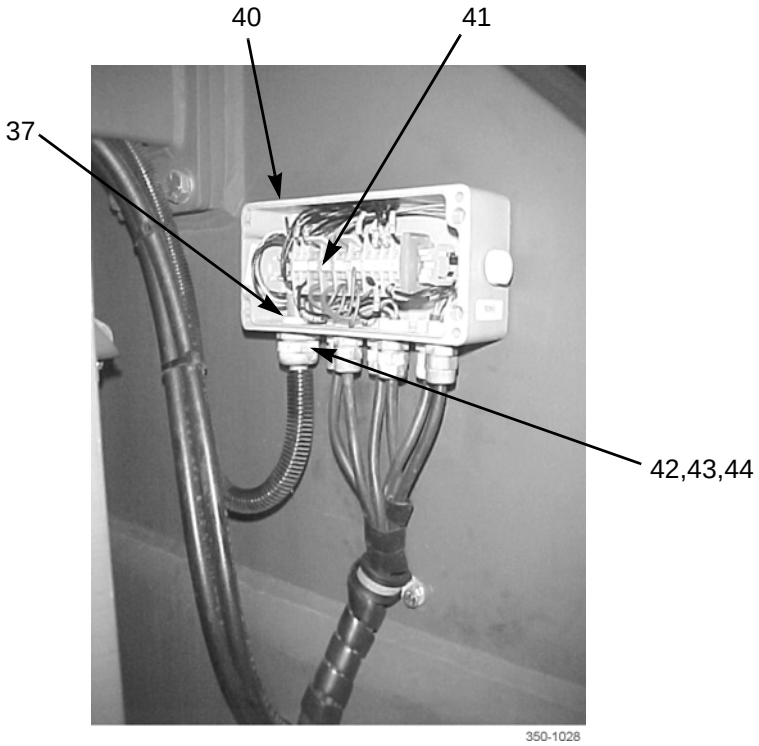
WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: REMOVAL - CONTINUED

6. Remove retainer nut (42), grommet (43), and sleeve (44).

NOTE

Use wiring diagrams in WP 0048 00, as needed, and note terminal block numbers to wire lead numbers for installation.

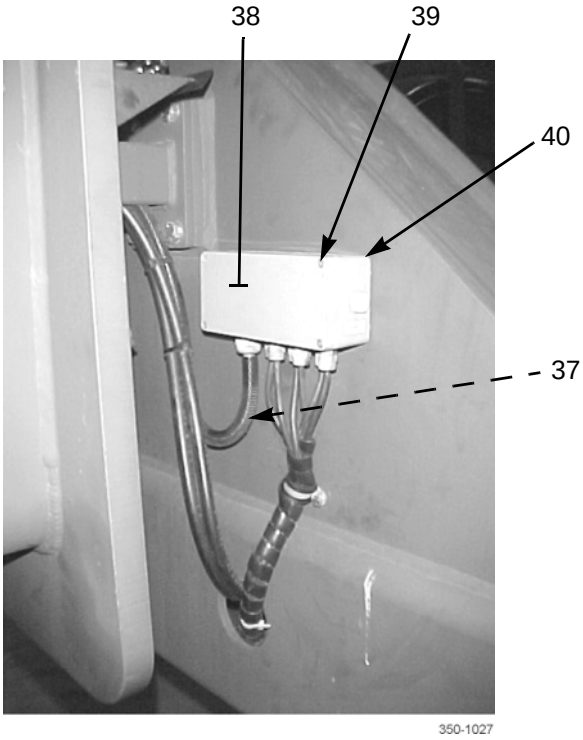
7. Using jeweler's screwdriver, disconnect wiring harness E (37) leads from junction box 184 (40) terminal block (41). Remove harness from junction box.
8. Secure all loose leads of wiring harness E (37) to nonelectrical wire.
9. With assistance, pull wiring harness E (37) out from conduit until approximately 18 in. (46 cm) of nonelectrical wire is exposed.
10. Remove wiring harness E (37) leads from nonelectrical wire and leave nonelectrical wire in place as a guide wire.



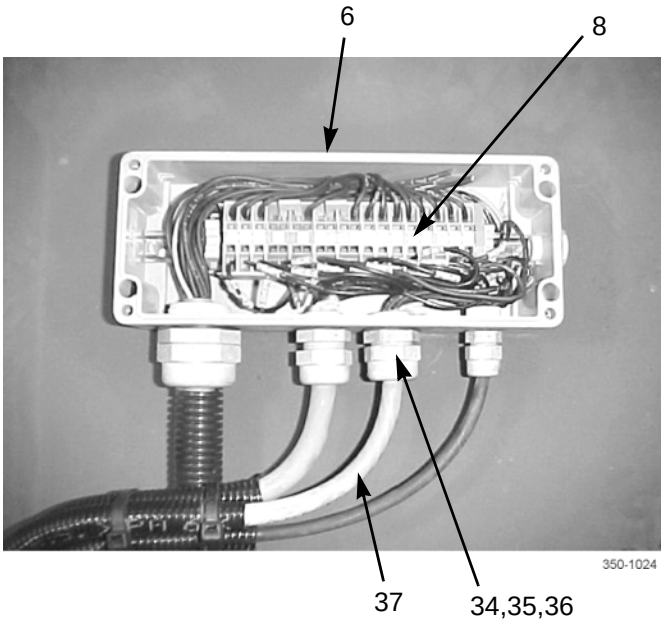
WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: INSTALLATION

1. At junction box 182 (6), secure all loose leads of wiring harness E (37) to nonelectrical wire.
2. With assistance, pull wire harness E (37) through conduit until sufficient length is exposed to reach junction box 184 (40).
3. Remove wiring harness E (37) from nonelectrical wire.
4. Position retainer nut (42), grommet (43), and sleeve (44) on wiring harness E (37) at junction box 184 (40). Install harness into junction box.
5. Using jeweler's screwdriver, connect wiring harness E (37) leads to terminal block (41).
6. Install sleeve (44), grommet (43), and retainer nut (42).
7. Install cover (38) on junction box 184 (40) and tighten four screws (39).

WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: INSTALLATION - CONTINUED

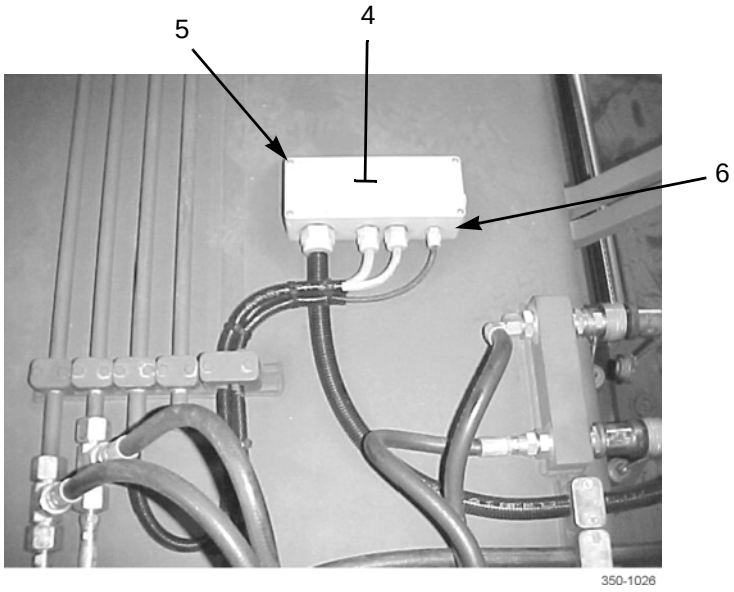


8. Position retainer nut (34), grommet (35), and sleeve (36) on other end of wiring harness E (37) at junction box 182 (6). Install harness into junction box.
9. Using jeweler's screwdriver, connect wiring harness E (37) leads to terminal block (8).
10. Install sleeve (36), grommet (35), and retainer nut (34).



WIRING HARNESS E, JUNCTION BOX 182-TO-JUNCTION BOX 184: INSTALLATION - CONTINUED

11. Install cover (4) on junction box 182 (6) and tighten four screws (5).



12. Perform operational check of tophandler (TM 10-3930-675-10).

END OF WORK PACKAGE

TOPHANDLER JUNCTION BOX REPLACEMENT 0222 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Materials/Parts

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 920076.003) (4)

References

TM 10-3930-675-10

WP 0088 00

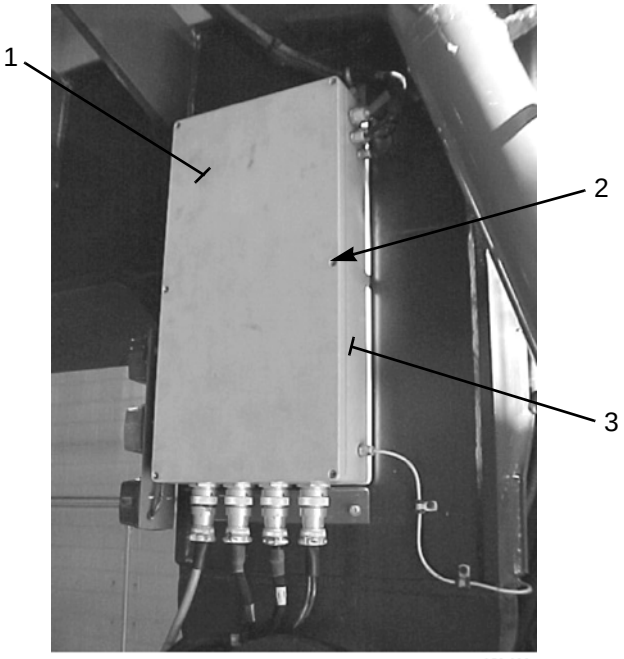
WP 0259 00

Equipment Condition

Master battery switch in OFF position

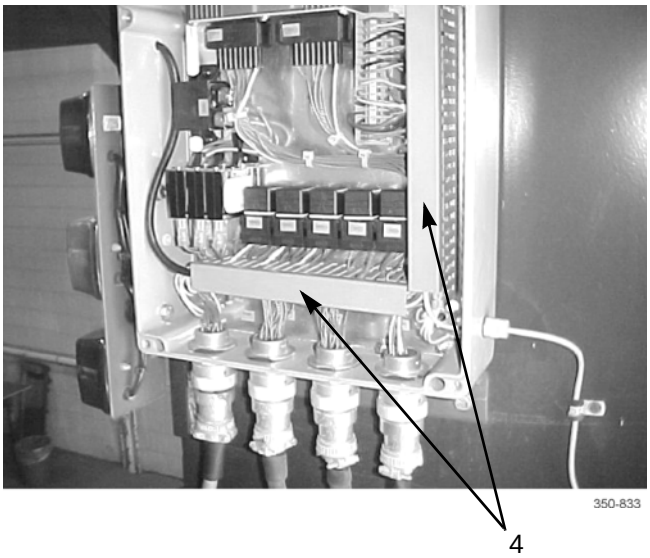
REMOVAL

1. Loosen six screws (2) and remove cover (1) from tophandler junction box (3). Inspect rubber seal in groove of cover. Replace only if damaged.



REMOVAL - CONTINUED

2. Remove two plastic covers (4).



NOTE

- **Tag wires to ensure proper connection on installation.**
- **Remove and discard tiedown straps as necessary.**

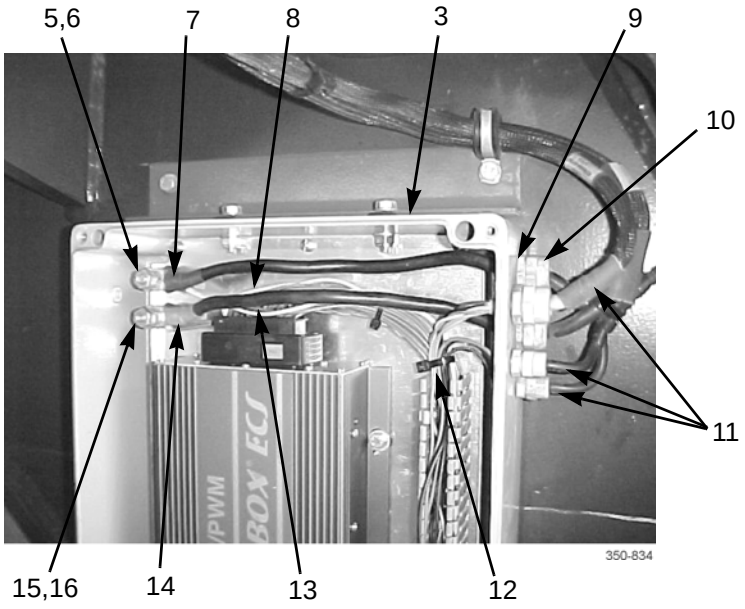
3. At top of junction box (3), remove locknut (5) and washer (6) and disconnect terminal of large black wire (7), marked “black”, and terminal of small white wires (8) from terminal stud.
4. Remove locknut (15) and washer (16) and disconnect terminal of large black wire (14), marked “red”, and terminal of small black wires (13) from terminal stud.

NOTE

Note location of fittings for installation.

5. Loosen cap (10) on each of five fittings (9) and remove fittings from junction box (3).
6. Pull large black wires (7 and 14) out from junction box (3).
7. Trace route of each wire (12) in three cables (11) to connecting point and disconnect wire. Note connecting point.
8. Pull each wire (12) out from junction box (3).

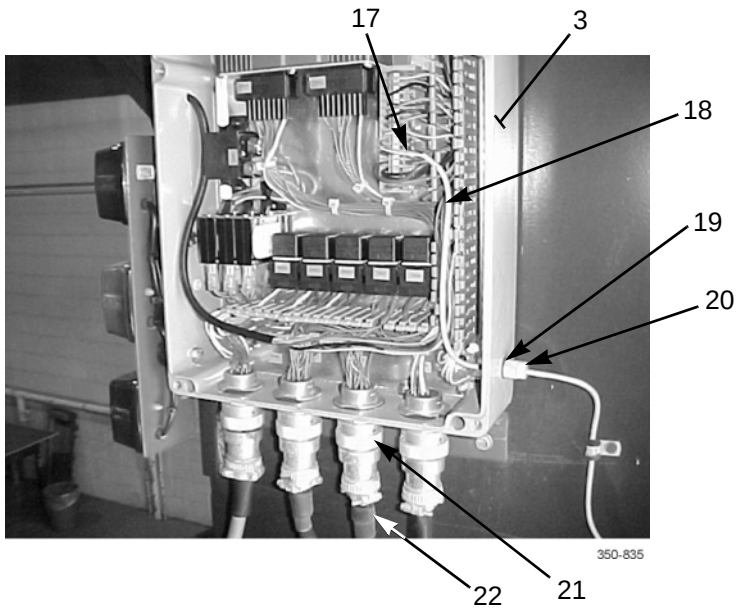
REMOVAL - CONTINUED



NOTE

Tag wires to ensure proper connection on installation.

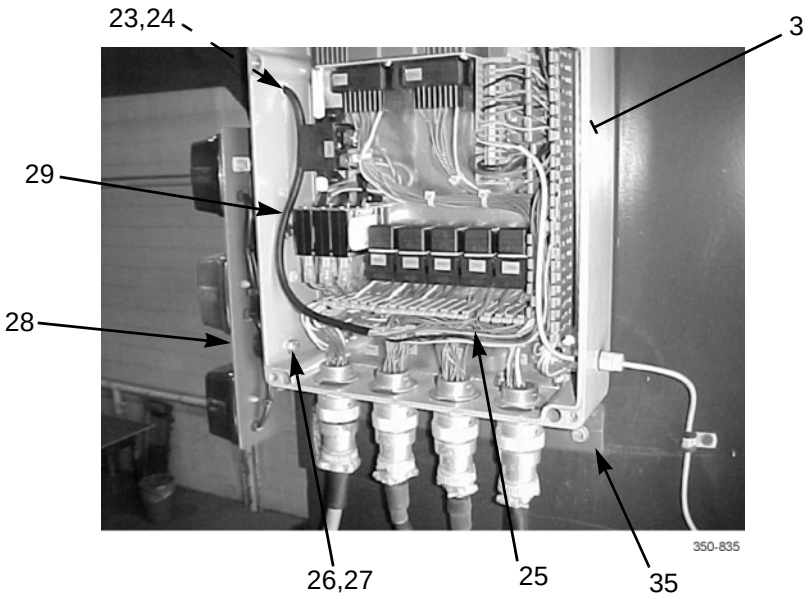
9. At bottom of junction box (3), disconnect connectors (21) of four cables (22).
10. Loosen cap (20) on fitting (19) and remove fitting from junction box (3).
11. Trace route of three wires (17) of cable (18) to connecting point and disconnect wires. Note connecting point.
12. Pull cable (18) out from junction box (3).



TOPHANDLER JUNCTION BOX REPLACEMENT - CONTINUED 0222 00

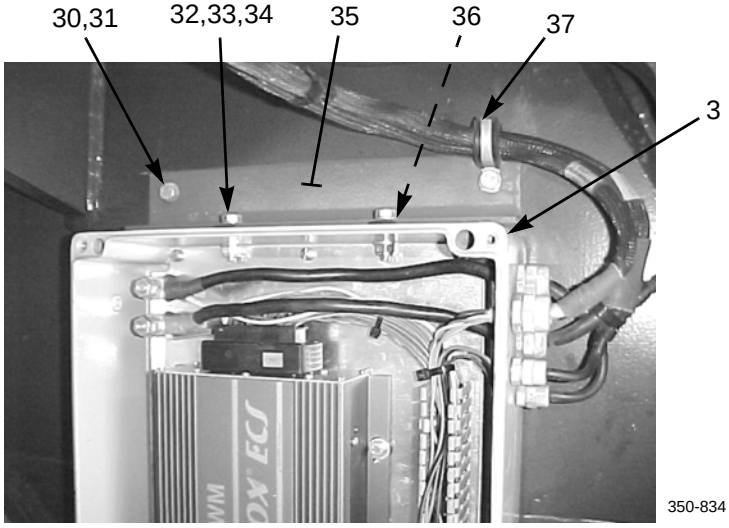
REMOVAL - CONTINUED

13. Loosen cap (23) on fitting (24) and remove fitting from junction box (3).
14. Trace route of eight wires (25) of cable (29) to connecting point and disconnect wires. Note connecting point.
15. Pull cable (29) out from junction box (3).
16. Remove two screws (26), washers (27), and twistlock indicator light assembly (28) from side of junction box (3). Also remove twistlock indicator IR lights (WP 0088 00).



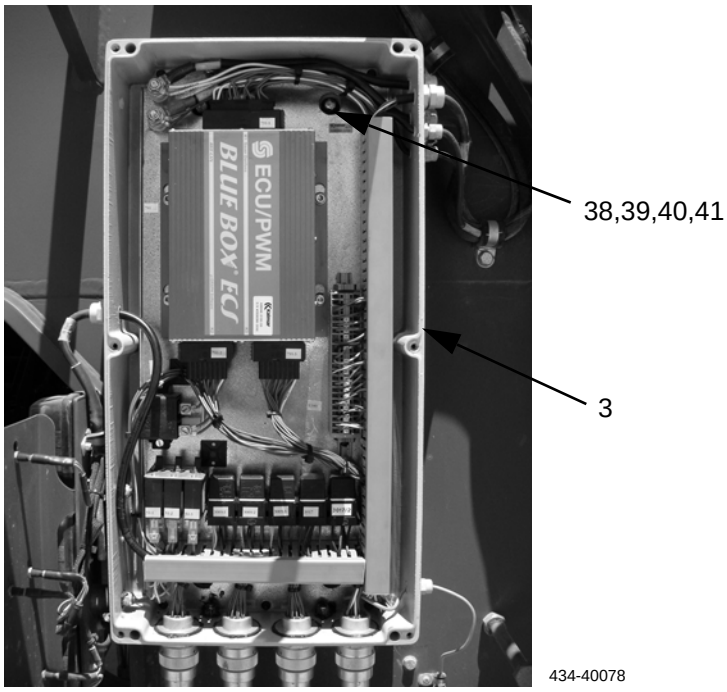
17. For ARMY and RESET vehicles, remove four screws (30), washers (31), loop clamp (37), and 791 junction box (3), with two brackets (35) from tophandler.
18. For ARMY and RESET vehicles, remove four locknuts (32), screws (33), eight washers (34), two brackets (35), and four rubber grommets (36) from 791 junction box (3). Discard locknuts.

.



REMOVAL - CONTINUED

19. For USMC vehicles, remove four capscrews (38), washers (39), spacers (40), eight O-rings (41), and junction box (3) from boom. Discard O-rings.

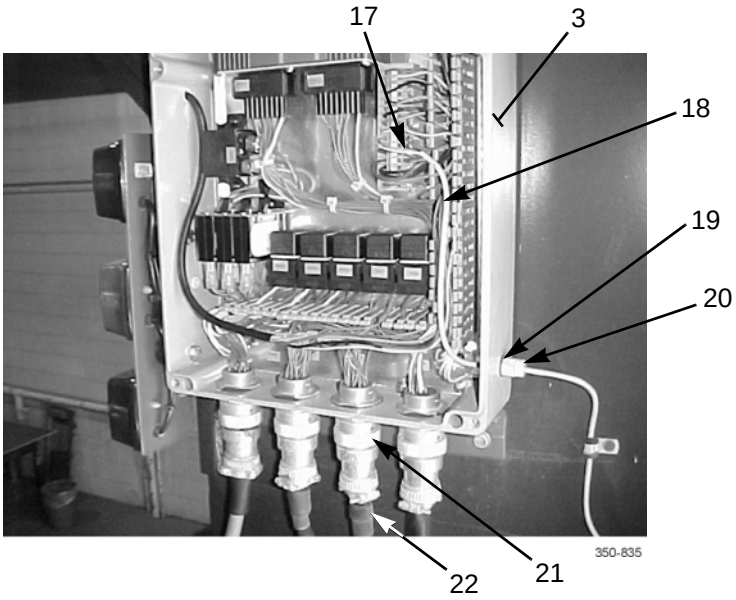


INSTALLATION

1. For USMC vehicles, install junction box (3) with four capscrews (38), washers (39), spacers (40), and eight O-rings (41).
2. For ARMY and RESET vehicles, install four rubber grommets (36) and two brackets (35) in junction box (3) with eight washers (34), four screws (33), and four new locknuts (32).
3. For ARMY and RESET vehicles, install two brackets (35), junction box (3), and loop clamp (37) on tophandler with four washers (31) and screws (30).
4. Install twistlock indicator light assembly (28) on side of junction box (3) with two washers (27) and screws (26). Also install twistlock indicator IR lights (WP 0088 00).
5. Push twistlock indicator light assembly cable (29) into junction box (3).
6. Connect eight wires (25) of cable (29) to connecting points, as noted during removal.
7. Install fitting (24) in junction box (3) and tighten cap (23).

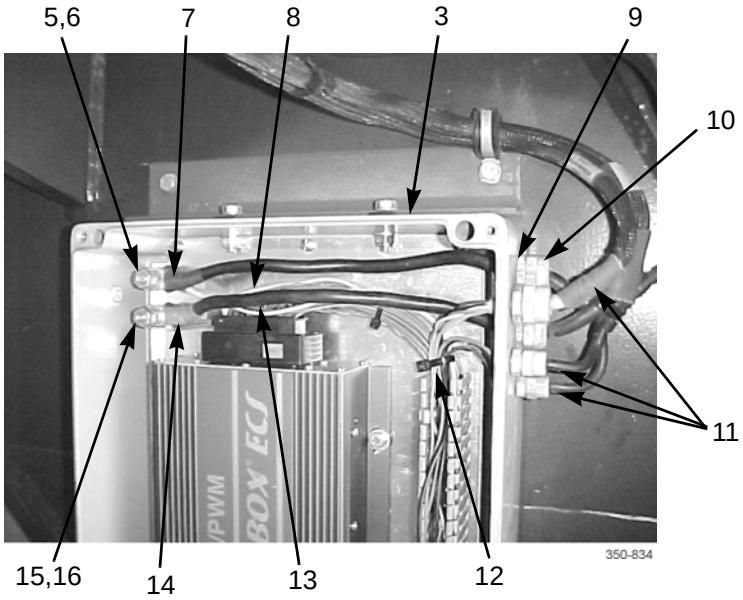
INSTALLATION - CONTINUED

8. Push cable (18) into junction box (3).
9. Connect three wires (17) of cable (18) to connecting points, as noted during removal.
10. Install fitting (19) in junction box (3) and tighten cap (20).
11. At bottom of junction box (3), connect connectors (21) of four cables (22).



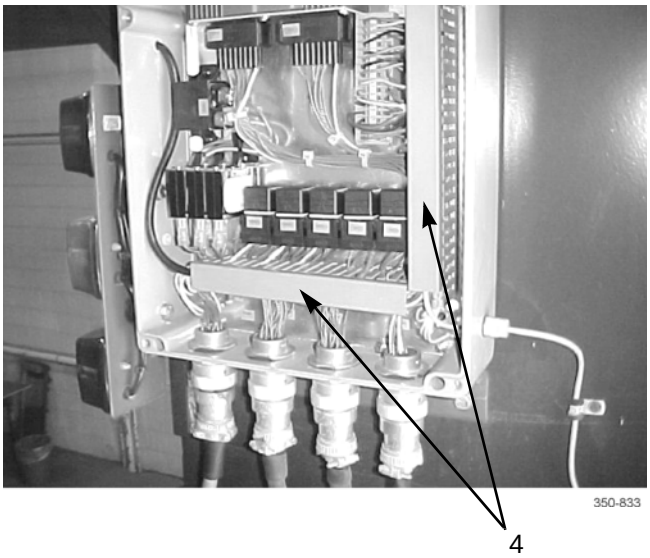
INSTALLATION - CONTINUED

12. Push wires (12) of three cables (11) into junction box (3).
13. Connect wires (12) of three cables (11) to connecting points, as noted during removal.
14. Push wires (7 and 14) into junction box (3).
15. Install five fittings (9) in junction box (3) and tighten five caps (10).
16. Connect terminal of small black wires (13) and terminal of large black wire (14), marked “red”, to terminal stud and install washer (16) and new locknut (15).
17. Connect terminal of small white wires (8) and terminal of large black wire (7), marked “black”, to terminal stud and install washer (6) and new locknut (5).

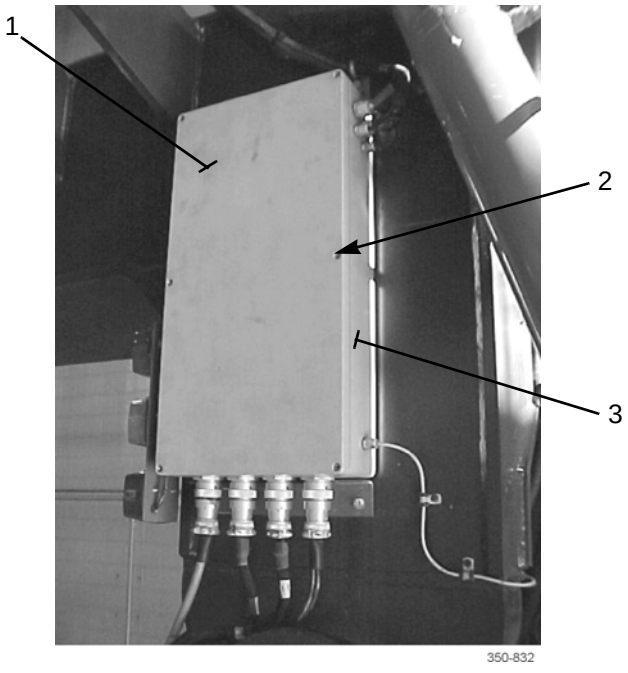


INSTALLATION - CONTINUED

18. Install two plastic covers (4).



19. Install cover (1) on tophandler junction box (3) and tighten six screws (2).



NOTE

Calibration must be performed only if ECU inside tophandler junction box is new.

20. Perform boom and tophandler calibration (WP 0259 00).
21. Operate tophandler to check operation (TM 10-3930-675-10).

END OF WORK PACKAGE

TRANSMISSION TORQUE CONVERTER REPLACEMENT 0223 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

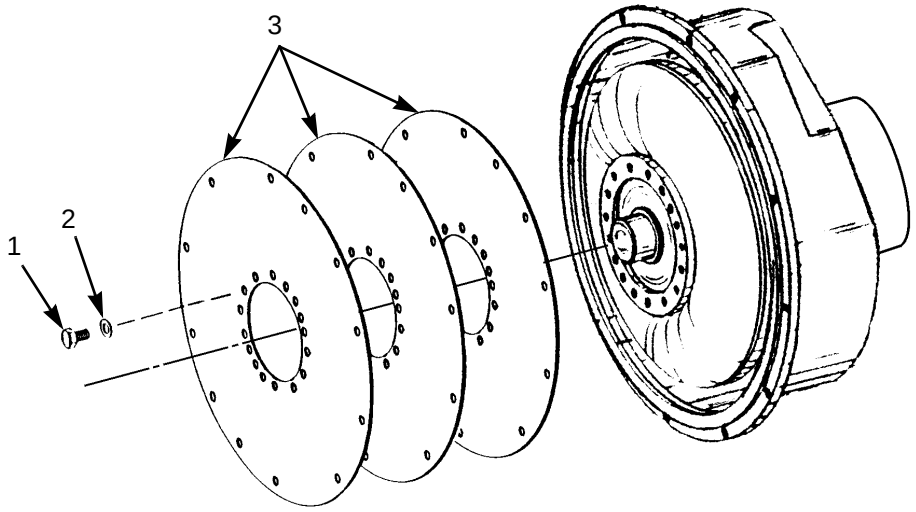
Two

Equipment Condition

Transmission assembly removed (WP 0224 00)

REMOVAL

1. Remove 16 screws (1), washers (2), and three damper plates (3).



350-771

REMOVAL - CONTINUED



WARNING

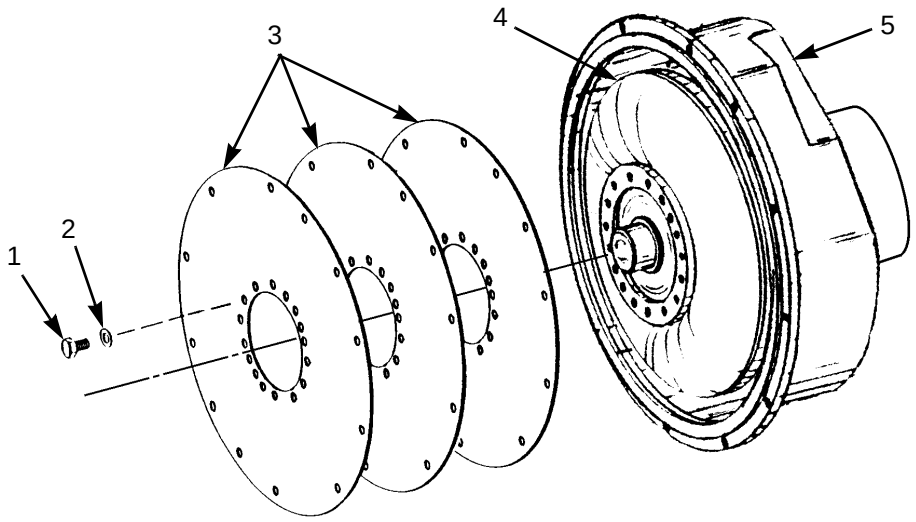


Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

Torque converter contains oil and is subject to spillage if positioned shaft side down when removed. Ensure spills are cleaned up immediately.

2. Slide torque converter (4) from transmission bell housing (5).
3. Place torque converter (5) with transmission side up on suitable cribbing.



350-771

INSTALLATION



WARNING



Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

1. Position torque converter (4) on input shaft and slide into transmission bell housing (5).

NOTE

Ensure damper plates are not bent or damaged.

2. Install three damper plates (3), 16 washers (2), and screws (1).
3. Rotate damper plates (3) and torque converter (4) by hand to ensure no binding occurs.
4. Install transmission assembly (WP 0224 00).

END OF WORK PACKAGE

TRANSMISSION ASSEMBLY REPLACEMENT 0224 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Handle, Socket Wrench (Item 55, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Engine and Transmission (Item 110, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Socket, Socket Wrench (Item 114, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Stud, Guide

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Pipe (Item 33, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Materials/Parts - Continued

Gasket (P/N 182459)

Gasket (P/N 3026134)

Gasket (P/N 4642 331 216)

Washer, lock (P/N 98174) (12)

Personnel Required

Three

References

WP 0050 00

WP 0096 00

WP 0223 00

WP 0225 00

WP 0235 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Boom raised to maximum angle (TM 10-3930-675-10)

Engine cover removed (WP 0148 00)

Transmission skid plate and access covers removed (WP 0142 00)

Transmission oil drained (WP 0117 00)

Front and rear propeller shafts disconnected (WP 0120 00)

Boom and brake system hydraulic pump removed (WP 0246 00)

Tophandler and steering hydraulic pump assembly removed (WP 0242 00)

REMOVAL



WARNING

- **Use extreme caution when handling heavy parts. Transmission weighs approximately 1,654 lb (750 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Improper use of lifting equipment and improper attachment of cable or chains to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

- **If engine and/or transmission is not operational and boom must be elevated, auxiliary pump can be used to provide hydraulic power for boom operation. Operate pump for not more than four minutes and allow pump to cool for not less than two minutes. Perform operate and cool cycle as many times as needed to elevate boom. Failure to allow pump to cool may cause damage to pump.**
- **DO NOT begin transmission assembly replacement without first having all required tools and equipment to complete the procedure. This will help in reducing the time boom must remain at maximum elevation.**
- **Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.**

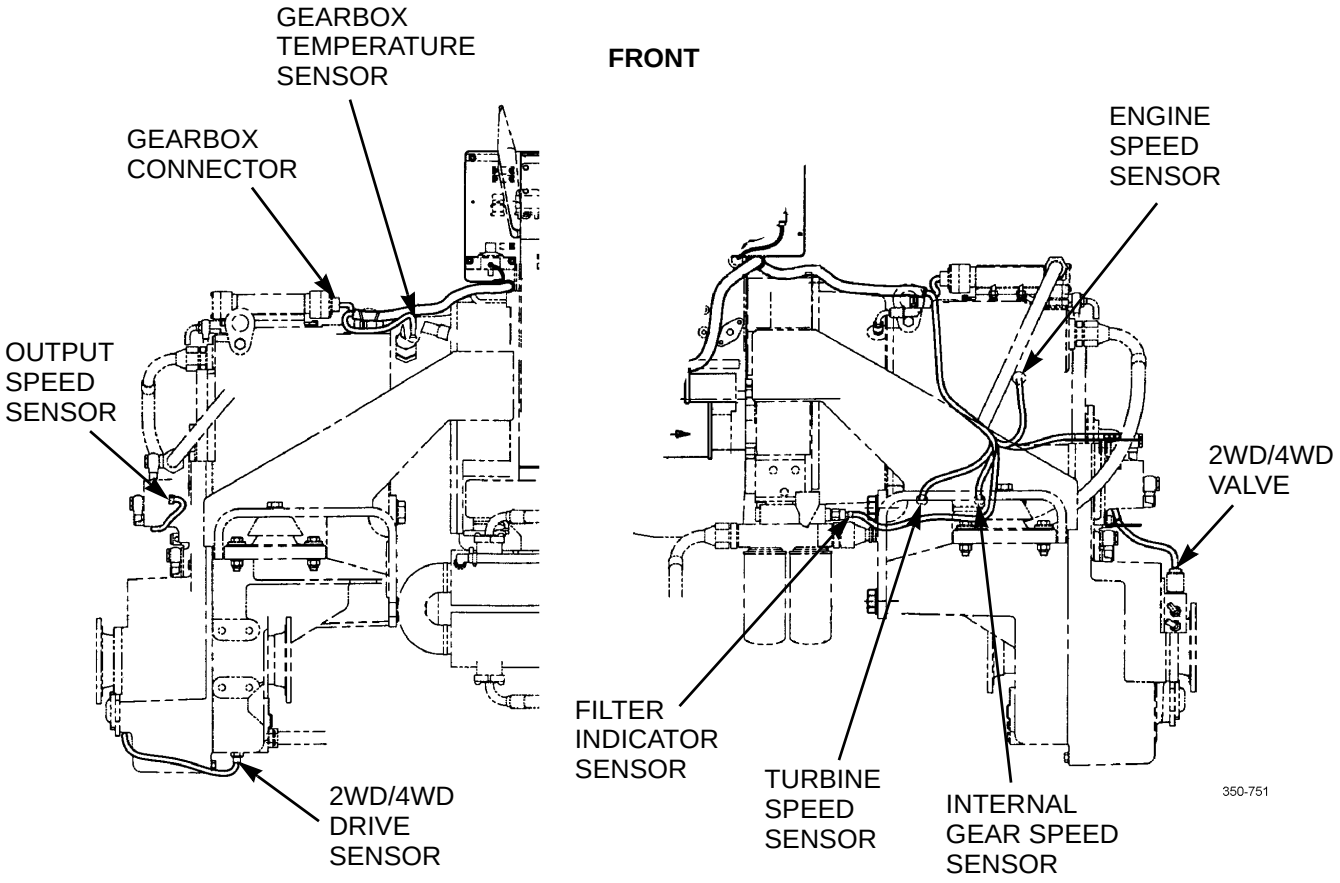
NOTE

- **Ensure all hydraulic hoses, lines, fittings, and electrical wiring harnesses and leads are tagged for identification and location prior to disconnection.**
- **When disconnecting hydraulic lines or hoses, position suitable container to catch hydraulic oil retained in lines and hoses.**

1. Disconnect electrical wiring connectors from these connections shown on locator diagrams:
   a. Gearbox temperature sensor and gearbox connectors
   b. 2WD/4WD valve and output speed sensor connectors
   c. 2WD/4WD sensor connector
   d. Filter indicator, turbine speed sensor, and internal gear speed sensor connectors
   e. Engine speed sensor connector

TRANSMISSION ASSEMBLY REPLACEMENT - CONTINUED **0224 00**

REMOVAL - CONTINUED

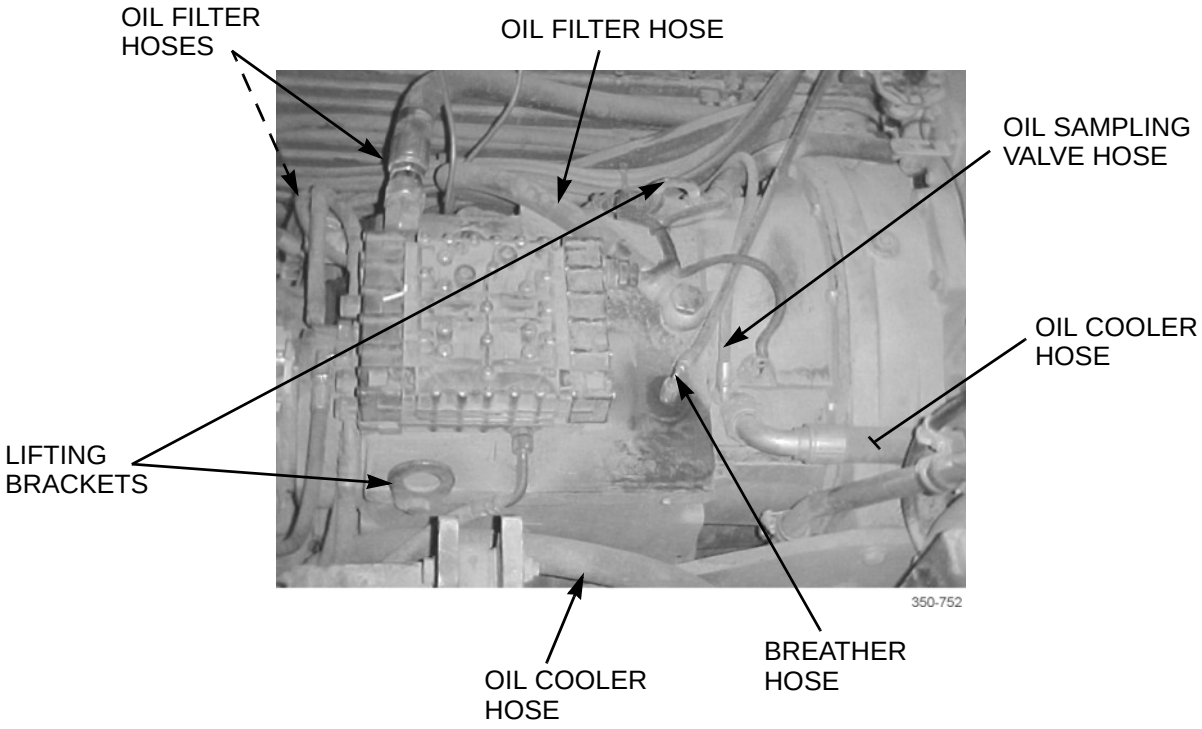


REMOVAL - CONTINUED

NOTE

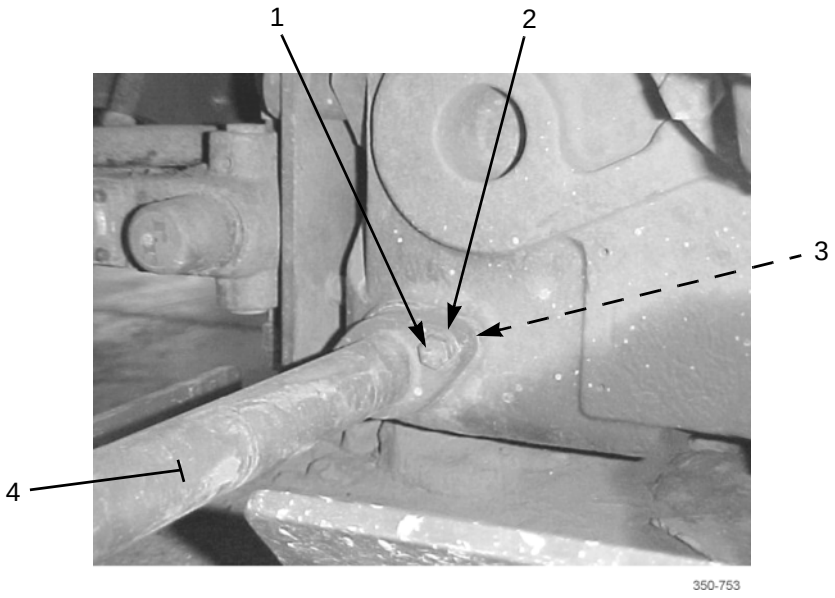
Ensure all wiring harnesses and connectors are secured away from transmission with temporary tiedowns.

2. Remove and discard all tiedown straps as necessary to remove wiring harnesses from transmission.
3. Disconnect these components:
   a. Two transmission oil cooler hoses
   b. Oil sampling valve hose
   c. Breather hose
   d. Three oil filter hoses
4. Install lifting sling between two lifting brackets on transmission assembly. Connect sling to suitable lifting device. Raise lifting device and take up slack in sling.



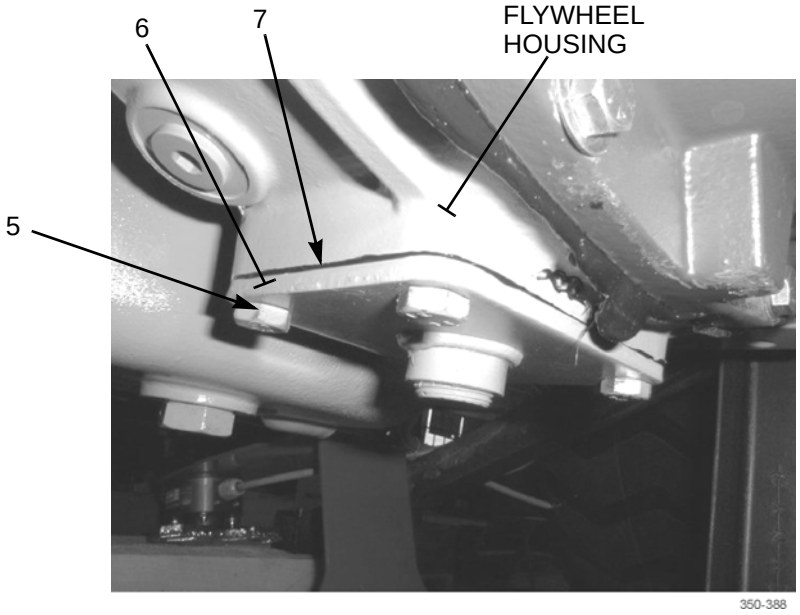
REMOVAL - CONTINUED

5. Remove two screws (1), flange (2), gasket (3), and oil fill tube (4) from transmission assembly. Discard gasket.
6. Remove all screws, washers, nuts, and clamps securing oil fill tube (4) to vehicle. Remove oil fill tube and retain for later installation.

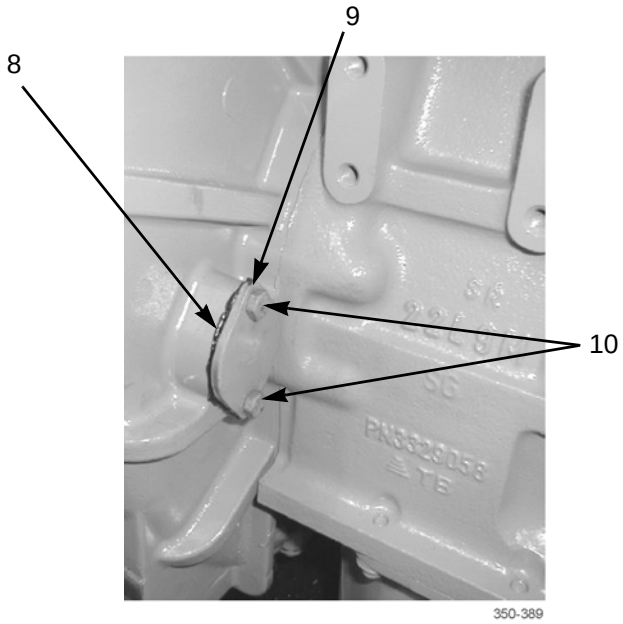


REMOVAL - CONTINUED

7. Disconnect two hydraulic hoses from emergency steering pump (WP 0235 00). DO NOT remove pump at this time.
8. Remove four screws (5), access cover (6), and gasket (7) from bottom of flywheel housing. Discard gasket.



9. Remove two screws (10), cover (9), and gasket (8) from flywheel-to-damper plate mounting screw access.

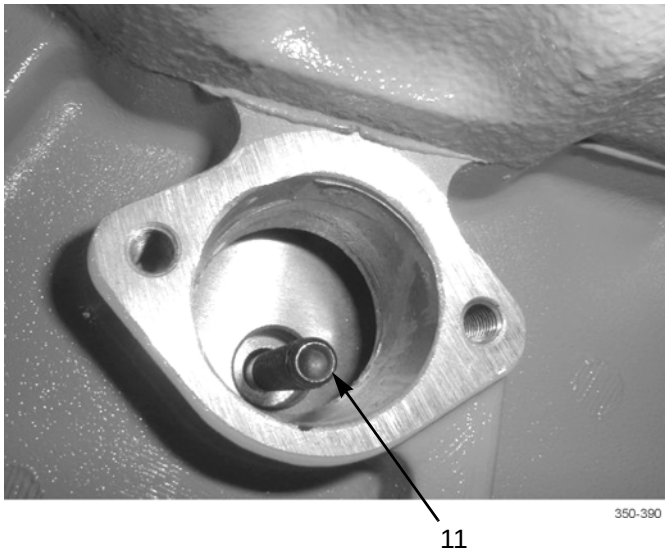


NOTE

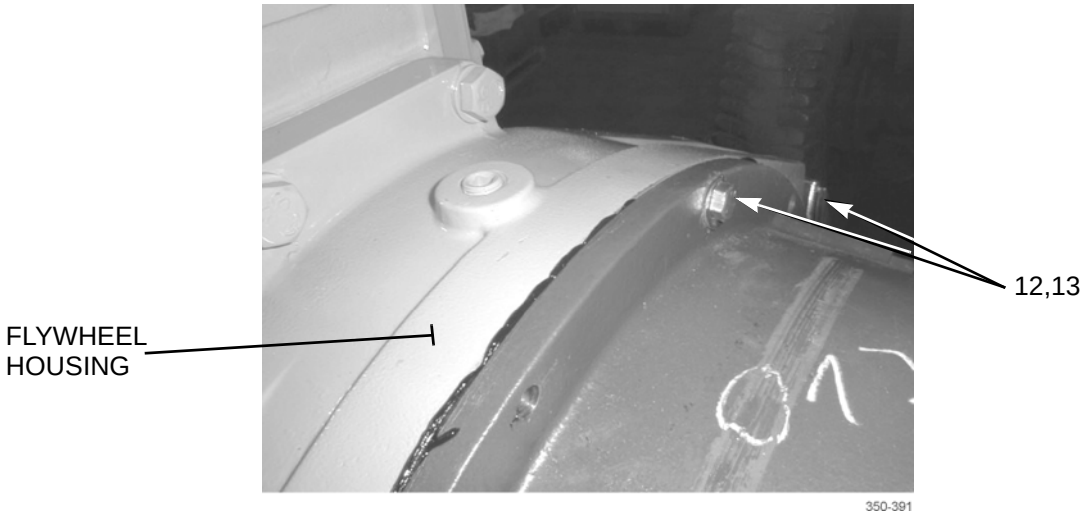
Transmission damper plates and torque converter are secured to flywheel with 12 screws.

REMOVAL - CONTINUED

10. With assistance, bar engine in clockwise direction using accessory drive while observing through access hole. Stop rotation when screw is visible through access hole.
11. Remove screw (11) securing damper plates to flywheel.
12. Repeat steps 10 and 11 to remove remaining eleven screws (11).

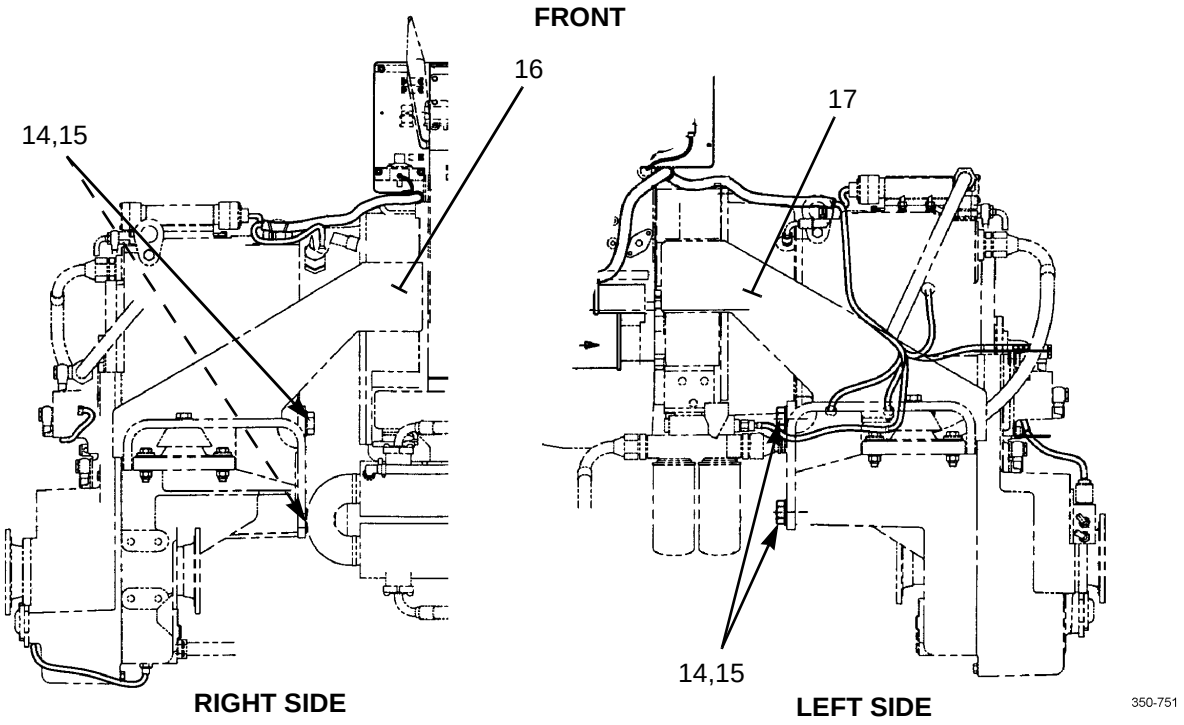


13. Upon removal of last screw, insert guide stud and secure to damper plate.
14. Remove 12 screws (12) and lockwashers (13) securing transmission to engine flywheel housing. Discard lockwashers.



REMOVAL - CONTINUED

15. Remove four screws (14) and washers (15) securing transmission to mounting brackets (16 and 17).



NOTE

Transmission must be moved toward rear, away from engine a minimum of 3 inches, while keeping perfect alignment to avoid major damage to the flywheel and to allow damper plate guide stud to clear the flywheel housing.

16. Separate transmission from engine and use nylon sling to ensure damper plates and torque converter remain with transmission.

17. Lift transmission from vehicle and place on temporary cribbing.

NOTE

Perform steps 18 thru 21 only if a replacement transmission is to be installed.

18. Remove and retain damper plates and torque converter (WP 0223 00).

19. Remove and retain these sensors (WP 0096 00):

    a. Gearbox temperature sensor

    b. Output speed sensor

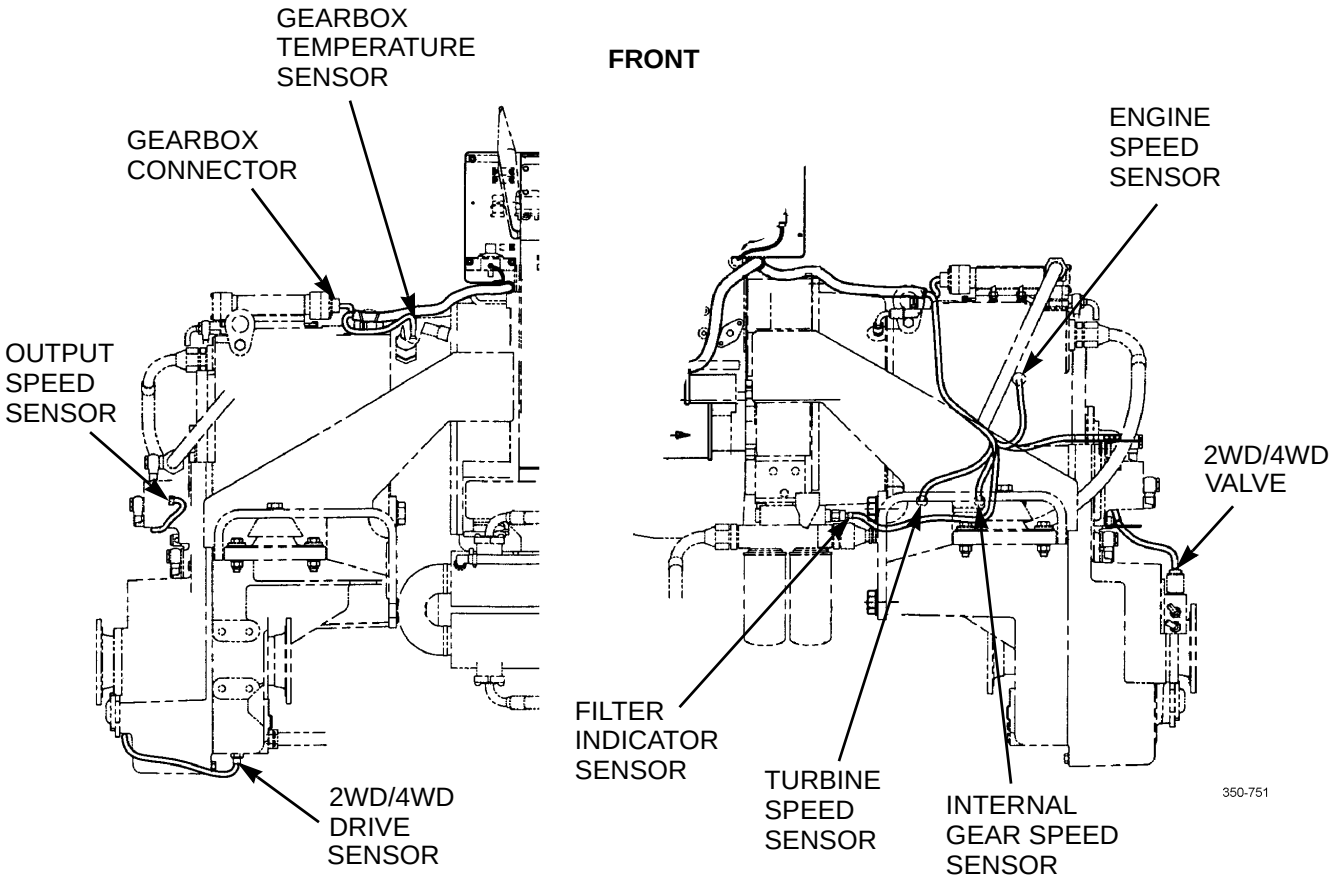
    c. Engine speed sensor

    d. 2WD/4WD sensor

    e. Turbine speed sensor

    f. Internal gear speed sensor

REMOVAL - CONTINUED



RIGHT SIDE **LEFT SIDE**

REMOVAL - CONTINUED

20. Remove fittings for oil filter, oil sampling valve, oil cooler, and breather hoses.
21. Remove emergency steering pump (WP 0235 00).

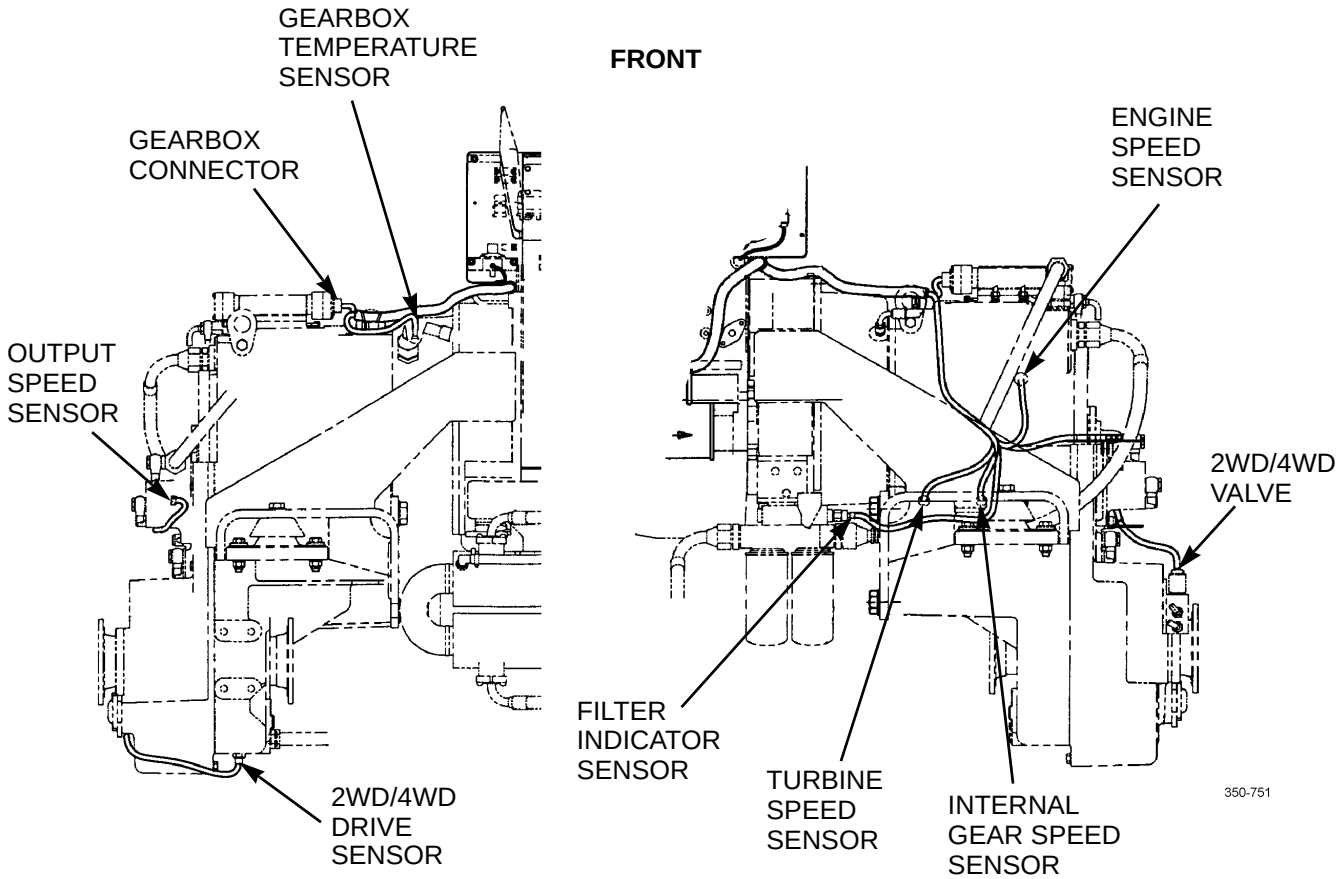
INSTALLATION

NOTE

If a replacement transmission is not being installed, proceed to step 5.

1. Install emergency steering pump (WP 0235 00).
2. Apply sealant to threads and install fittings for oil filter, oil sampling valve, oil cooler, and breather hoses.
3. Apply sealant to threads and install these sensors (WP 0096 00):
    a. Gearbox temperature sensor
    b. Output speed sensor
    c. Engine speed sensor
    d. 2WD/4WD sensor
    e. Turbine speed sensor
    f. Internal gear speed sensor

INSTALLATION - CONTINUED



4. Install torque converter and damper plates (WP 0223 00).

INSTALLATION - CONTINUED



WARNING



- **Use extreme caution when handling heavy parts. Transmission weighs approximately 1,654 lb (750 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Improper use of lifting equipment and improper attachment of cable or chains to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.**

NOTE

Ensure transmission and engine mating surfaces are clean and free of old sealant.

5. Install lifting sling between two transmission assembly lifting brackets and connect sling to suitable lifting device.
6. Install nylon sling to hold damper plates and torque converter in place.

NOTE

- **Position damper plate guide stud to mate with flywheel housing screw hole.**
- **Ensure guide stud will clear flywheel housing while transmission is lowered.**

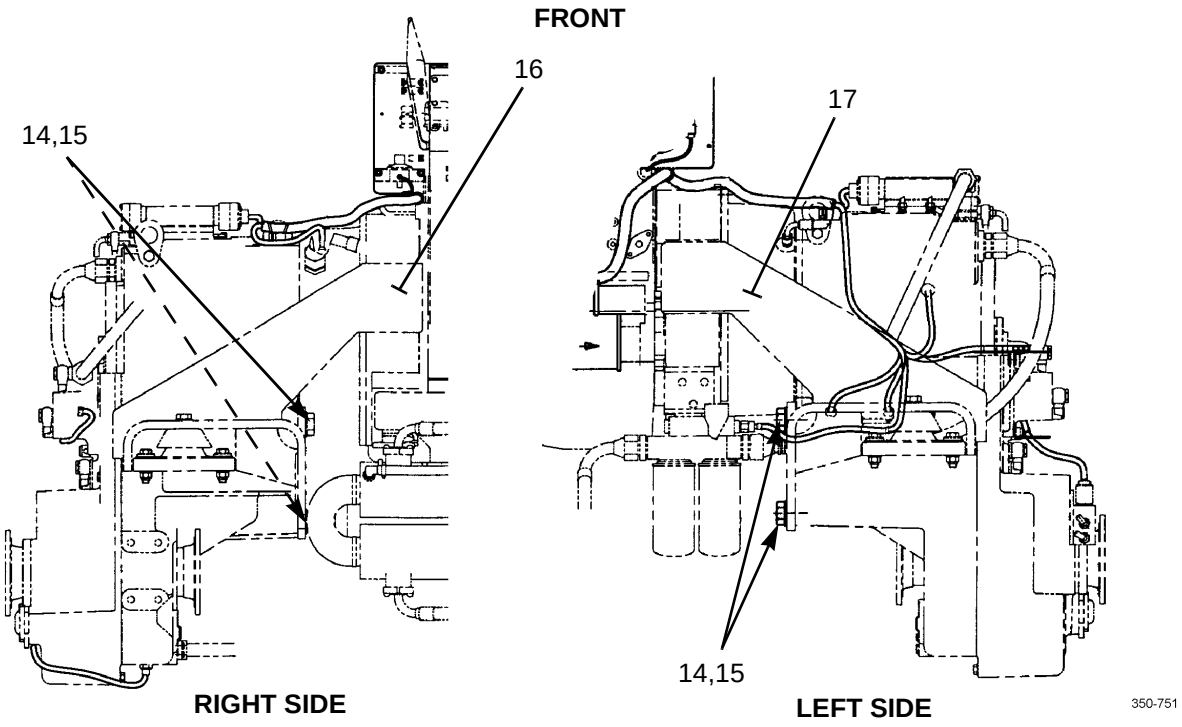
7. Using suitable lifting device, lift transmission assembly and lower into vehicle.
8. Remove nylon sling holding damper plates and torque converter in place.
9. Apply a coat of silicone sealant to engine and transmission mating surface.

NOTE

Transmission must be moved toward engine, while keeping perfect alignment to avoid damage to the flywheel. It may be necessary to adjust transmission damper plate by hand to align guide stud with mating flywheel screw hole.

10. Position transmission to allow damper plate guide stud to pass through flywheel-to-damper screw hole and flywheel housing access.
11. Install four washers (15) and screws (14) securing transmission to mounting brackets (16 and 17). DO NOT fully tighten screws at this time.

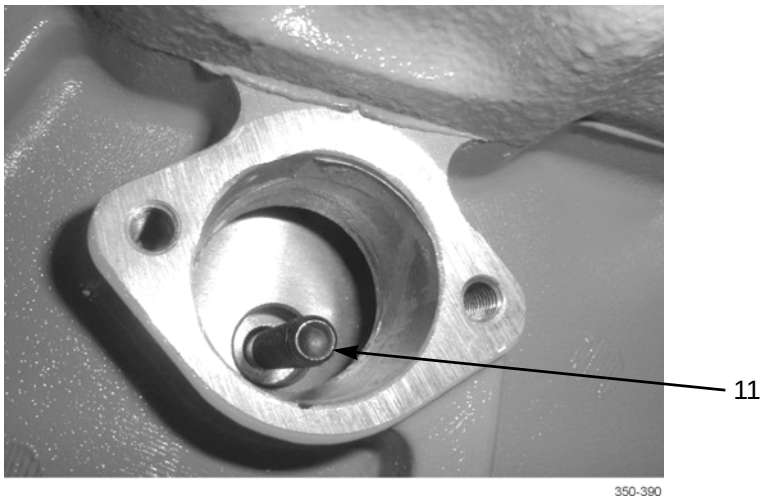
INSTALLATION - CONTINUED



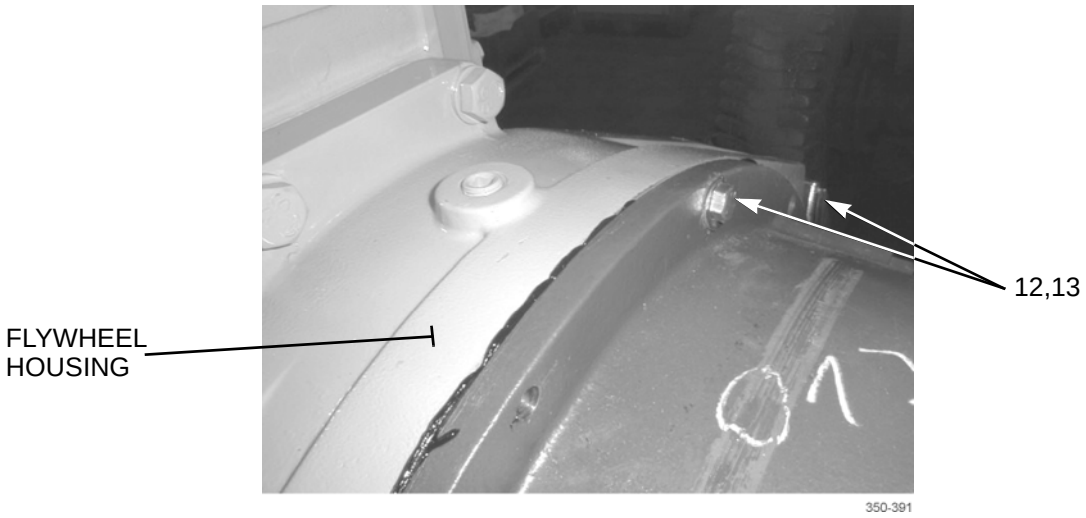
NOTE

Flywheel and damper plates are secured with 12 screws. Final tightening is done after all screws are installed.

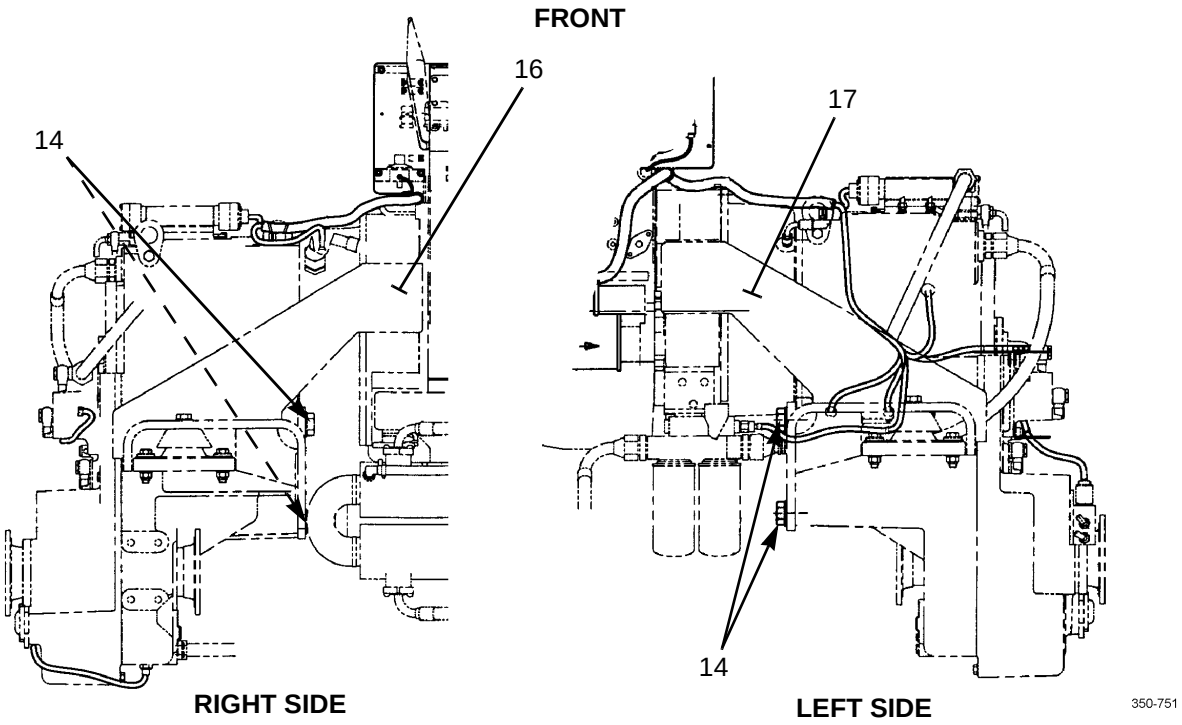
12. Remove guide stud and install screw (11). Tighten screw hand tight.
13. Bar engine over until next screw hole is visible and install screw (11). Tighten screw hand tight.
14. Repeat step 13 for remaining screws until 12 screws are installed securing flywheel to damper plate.
15. Bar engine over clockwise and tighten each screw (11) to 48 lb-ft (65 Nm).



16. Install 12 new lockwashers (13) and screws (12) to secure transmission to flywheel housing. Tighten screws to 38 lb-ft (52 Nm).

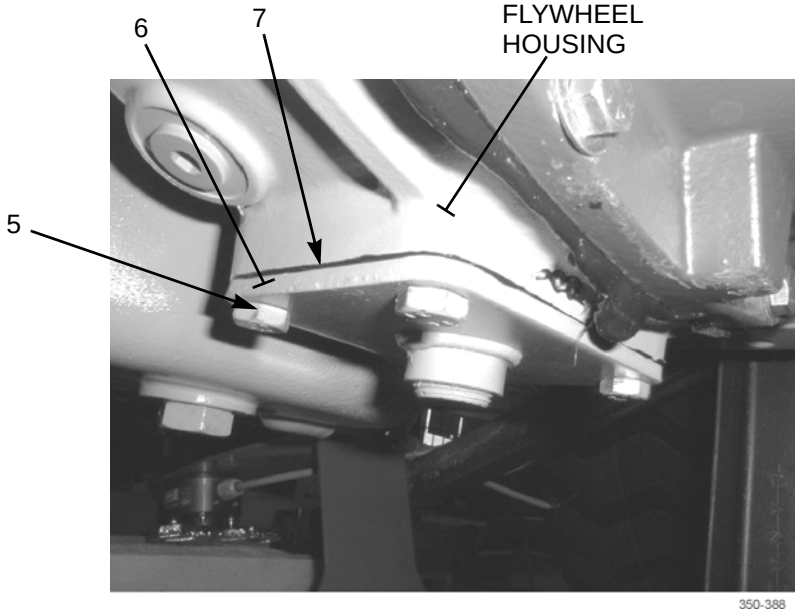


17. Tighten four screws (14) securing transmission to mounting brackets (16 and 17) to 146 lb-ft (198 Nm).

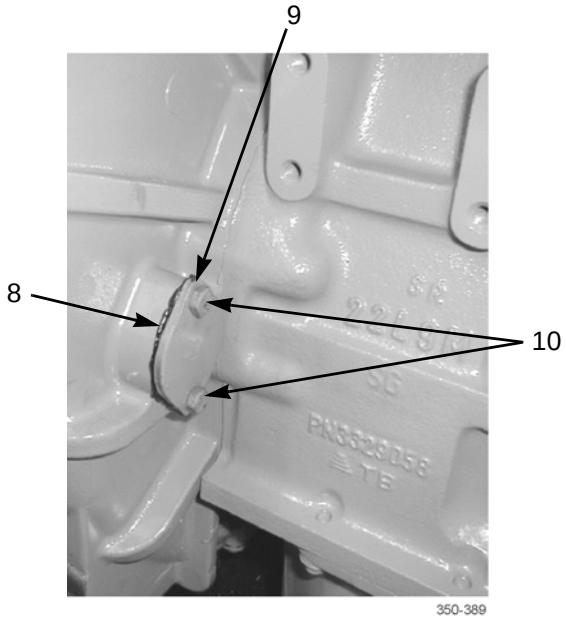


INSTALLATION - CONTINUED

18. Remove lifting sling and lifting device.
19. Install new gasket (7) and access cover (6) on bottom of flywheel housing with four screws (5).

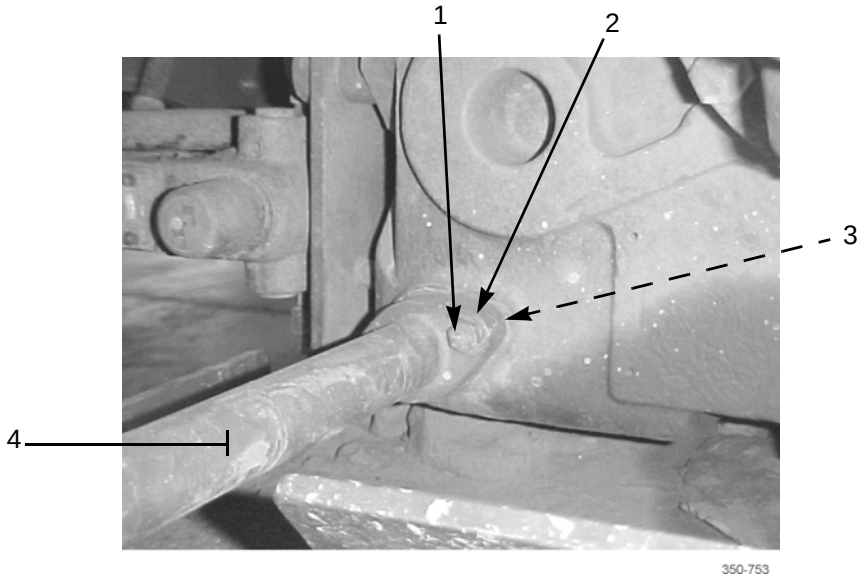


20. Install new gasket (8) and cover (9) over flywheel-to-damper plate screw access with two screws (10).

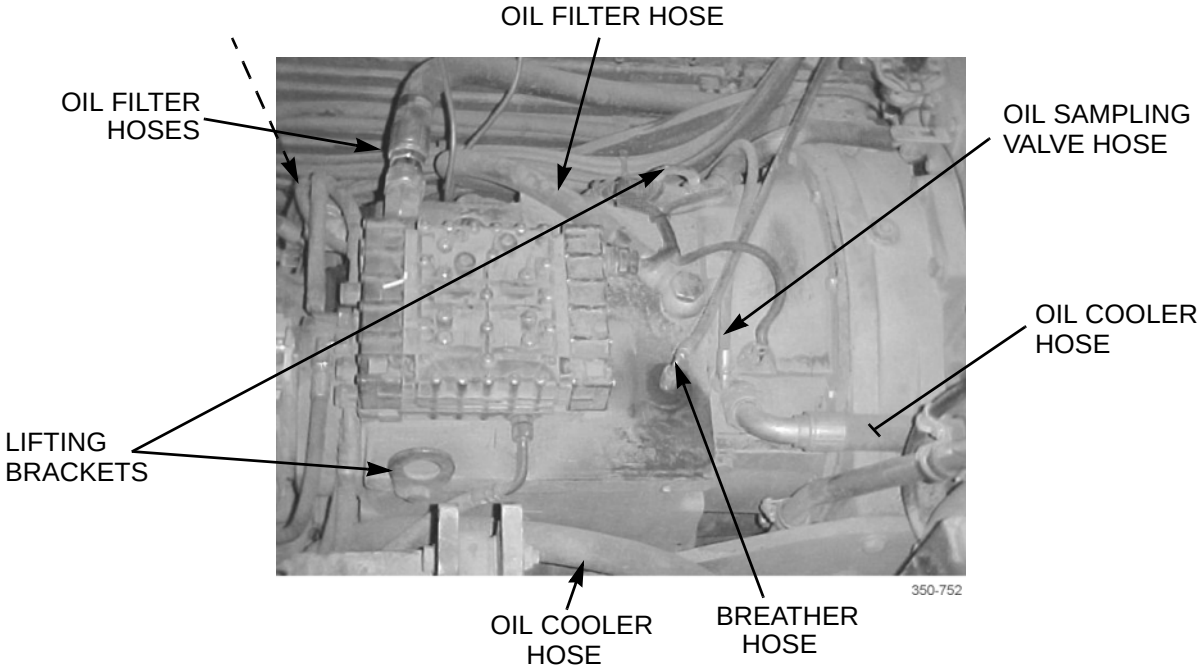


INSTALLATION - CONTINUED

21. Install new gasket (3), flange (2), and oil fill tube (4) with two screws (1).



22. Secure oil fill tube to vehicle with screws, nuts, washers, and clamps as needed.
23. Connect two hydraulic hoses to emergency steering pump (WP 0235 00).
24. Connect these hoses:
    a. Two transmission oil cooler hoses
    b. Oil sampling valve hose
    c. Breather hose
    d. Three oil filter hoses

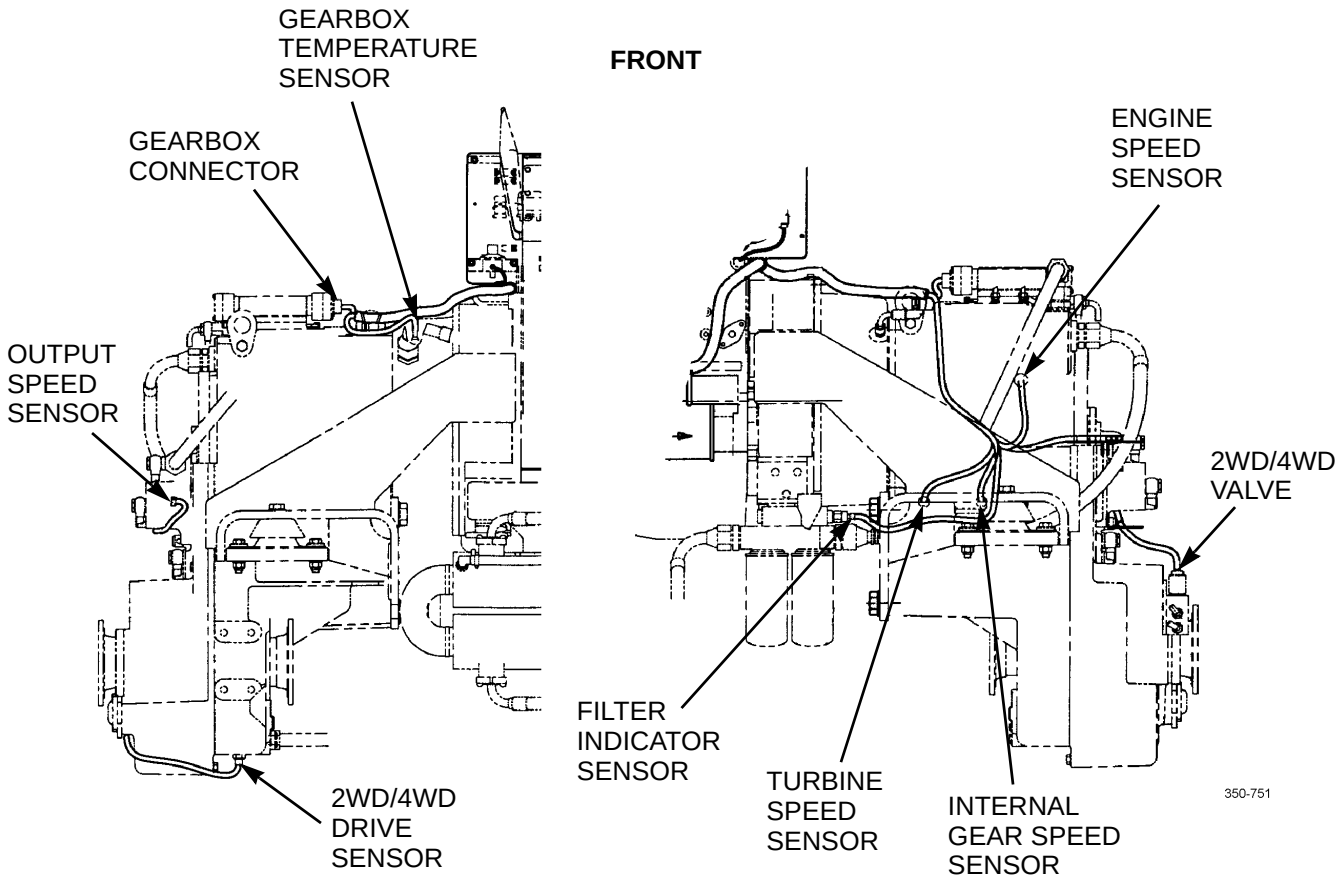


INSTALLATION - CONTINUED

NOTE

- **Remove temporary tiedowns from electrical harnesses and install wiring harnesses using locator diagrams as a routing guide.**
- **Ensure wiring harnesses are secured after connection to terminal points using new tiedown straps as required.**

25. Connect wiring harnesses to these connectors:
    a. Gearbox temperature sensor and gearbox connectors
    b. 2WD/4WD sensor connector
    c. 2WD/4WD valve and output speed sensor connectors
    d. Engine speed sensor connector
    e. Filter indicator, turbine speed sensor, and internal gear speed sensor connectors



INSTALLATION - CONTINUED

26. Fill transmission and check fluid level (WP 0050 00).
27. Install tophandler and steering hydraulic pump assembly (WP 0242 00).
28. Install boom and brake system hydraulic pump (WP 0246 00).
29. Connect front and rear propeller shafts (WP 0120 00).

NOTE

DO NOT install transmission skid plate at this time.

30. Install transmission access covers (WP 0142 00).
31. Perform operational check of all systems (TM 10-3930-675-10).
32. Perform transmission calibration (WP 0225 00).
33. Shut down vehicle (TM 10-3930-675-10) and check for leaks.
34. Install skid plate under transmission (WP 0142 00).

END OF WORK PACKAGE

TRANSMISSION CALIBRATION 0225 00

THIS WORK PACKAGE COVERS

Calibration

INITIAL SETUP

Maintenance Level	References
Direct Support	TM 10-3930-675-10

CALIBRATION

NOTE

Calibration procedures and checks must be performed if any of the following maintenance actions have occurred:

- **Transmission ECM replaced or disconnected**
- **Transmission oil replaced**
- **Repairs or adjustment made to transmission**
- **Transmission assembly replaced**

1. **Access to Calibration Menus.**
   a. Turn master battery switch to ON position.
   b. Turn ignition ON.
   c. Place transmission shift control lever in Neutral (N) position.
   d. Apply parking brake.
   e. Start engine and operate at idle speed.
   f. Wait for transmission oil temperature to reach operating range of 131 to 194°F (55 to 90°C).
   g. Select KALMAR service menu on driver's Electronic Control System (ECS) display screen and press "Enter".
   h. Enter calibration program access number "13221" and press "Enter".
   i. Press right arrow button to locate "CALIBR GEAR BOX" menu, then press "Enter".

CALIBRATION - CONTINUED

2. **Transmission Calibration, ECM to Clutch Modulation Cycles.**

   a. To initiate calibration process, press “Enter”.

   b. When calibration process is completed without error, ECS display will show an AEB MAIN CODE of no. 7 (refer to Table 1). Calibration data will be saved within transmission ECM when ignition is turned off.

   c. When an error is identified during calibration process, AEB MAIN CODE will show a range of error codes of 0 thru 14 identifying the transmission component under calibration and an AEB SUB CODE range of error codes of 1 thru 8 (refer to Main Codes and Sub Codes in Table 1 and Table 2).

CALIBR GEAR BOX	1 (2)
AEB CYCLE NR AEB MAIN CODE AEB SUB CODE	0 0 0

   d. When calibration process is completed without error, press “Enter” to return to main menu. ECS display screen should resemble window shown below:

CALIBR GEAR BOX	2 (2)
CALIBRATION OF GEAR BOX DONE	ENTER

CALIBRATION - CONTINUED

Table 1. Main Code Identification.

MAIN CODE	COMPONENT BEING CALIBRATED
0	AEB mode not selected
1	AEB mode selected, calibrating K1
2	AEB mode selected, calibrating K2
3	AEB mode selected, calibrating K3
4	AEB mode selected, calibrating K4
5	AEB mode selected, calibrating KV
6	AEB mode selected, calibrating KR
7	AEB mode selected, calibration finished
8	AEB mode selected, calibration aborted
9	AEB mode selected, calibration aborted while adjusting K1
10	AEB mode selected, calibration aborted while adjusting K2
11	AEB mode selected, calibration aborted while adjusting K3
12	AEB mode selected, calibration aborted while adjusting K4
13	AEB mode selected, calibration aborted while adjusting KV
14	AEB mode selected, calibration aborted while adjusting KR

CALIBRATION - CONTINUED

Table 2. Sub Code Identification.

SUB CODE	COMPONENT BEING CALIBRATED
1	Stop and restart truck if fault code is “0”. Repeat calibration procedure. If failure continues, transmission maintenance may be required.
2	Stop and restart truck. Ensure transmission shift control lever is in Neutral (N) position. Repeat calibration procedure.
3	Stop and restart truck. Ensure parking brake is applied. Repeat calibration procedure.
4	Stop and restart truck. Test parking brake operation. If parking brake operates properly, repeat calibration procedure. If parking brake is not operating properly, service parking brake. Repeat calibration procedure.
5	Stop and restart truck. Allow transmission to warm to operating temperature. Repeat calibration procedure.
6	Allow transmission oil to cool by idling engine but not operating transmission. When oil temperature has cooled, transmission ECM will resume calibration program.
7	Increase engine RPM. Transmission ECM will resume calibration program when RPM are within a specified range.
8	Decrease engine RPM. Transmission ECM will resume calibration program when RPM are within a specified range.

END OF WORK PACKAGE

TRANSMISSION OIL COOLER REPLACEMENT 0226 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Pipe (Item 33, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 920798.0002) (4)

Personnel Required

Two

References

TM 10-3930-675-10

WP 0050 00

Equipment Condition

Engine cover removed (WP 0148 00)

Radiator splash shield removed (WP 0143 00)

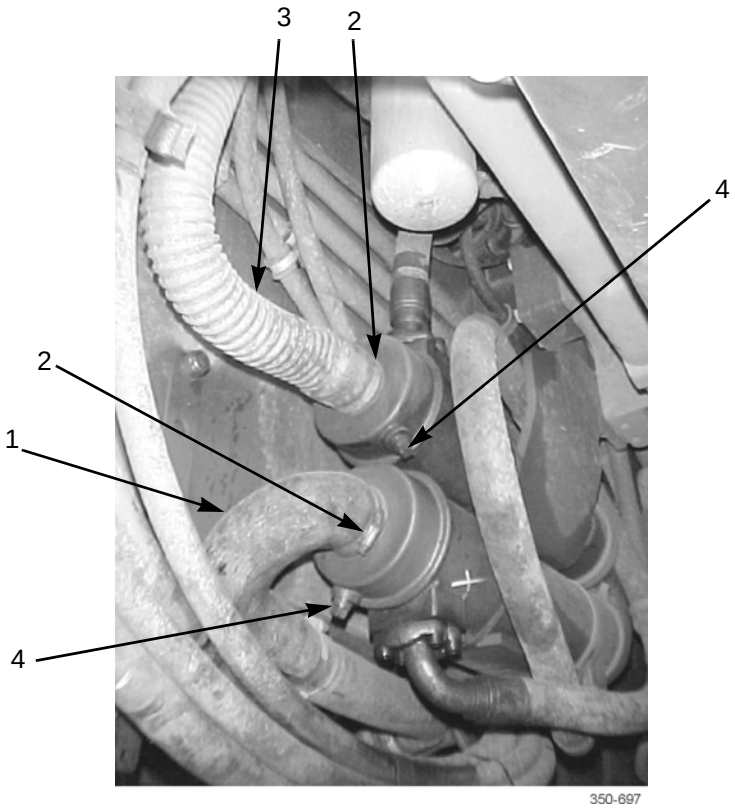
Engine coolant drained (WP 0064 00)

REMOVAL

NOTE

- **Transmission oil cooler consists of two units interconnected with coolant and hydraulic hoses. The two units are mounted on a common bracket attached to engine flywheel housing.**
- **Coolant may remain in transmission oil coolers even when cooling system has been drained. To aid in removal, drain residual coolant from transmission oil coolers. Ensure suitable container is positioned to catch draining transmission oil from disconnected hoses or components.**
- **Tag hoses for installation.**

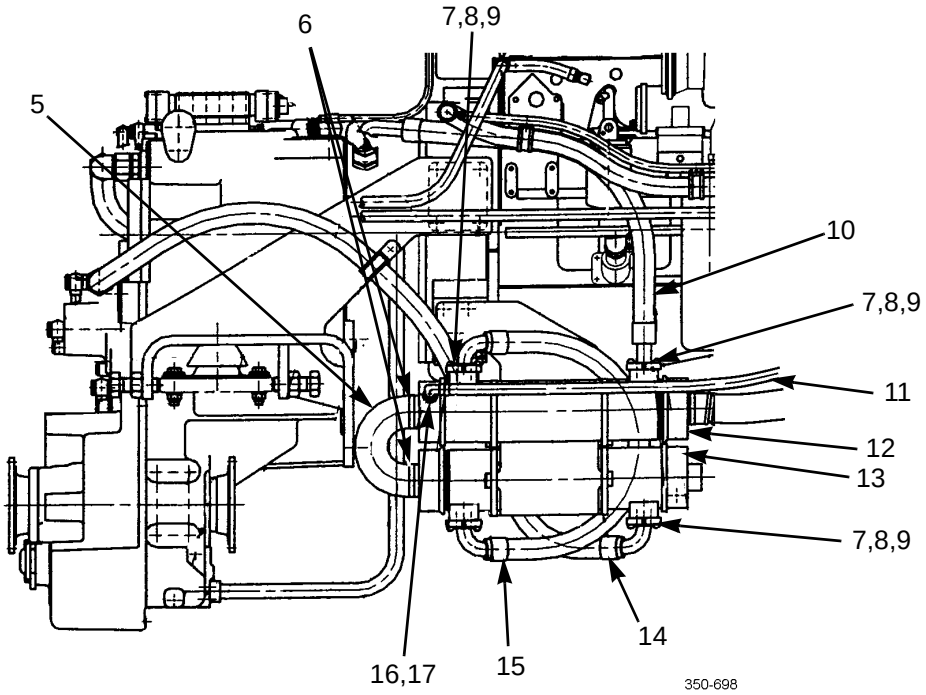
1. Position suitable container under transmission oil coolers and remove two plugs (4).
2. Loosen hose clamps (2) and disconnect coolant hoses (1 and 3).



3. Loosen two hose clamps (6) and remove coolant hose (5).
4. Remove eight screws (7), two flanges (8), O-ring seals (9), and disconnect two hoses (14 and 15) from bottom of transmission oil cooler lower unit (13). Discard O-ring seals.
5. Remove eight screws (7), two flanges (8), O-ring seals (9), and disconnect two hoses (10 and 15) from top of transmission oil cooler upper unit (12). Discard O-ring seals.
6. Loosen hose clamp (16) and disconnect water hose (11) from fitting (17).
7. Remove fitting (17) from transmission oil cooler upper unit (12).

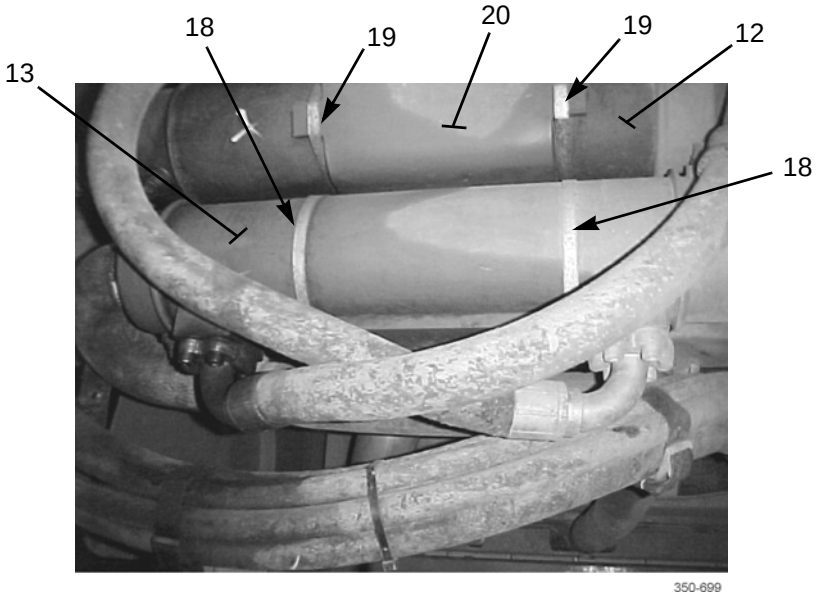
TRANSMISSION OIL COOLER REPLACEMENT - CONTINUED **0226 00**

REMOVAL - CONTINUED



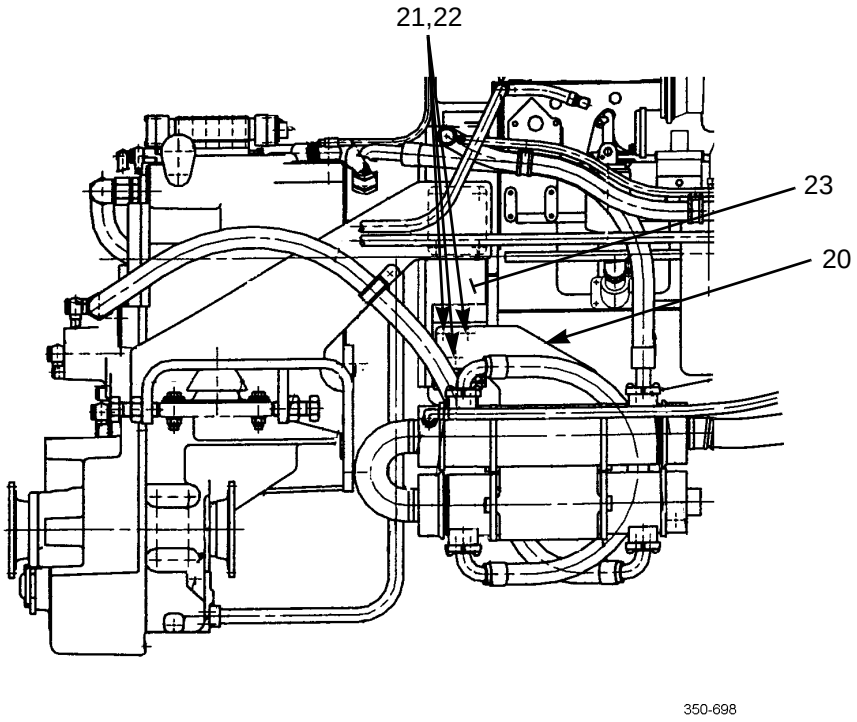
8. With assistance, loosen two hose clamp bands (18) securing transmission oil cooler lower unit (13) to mounting bracket (20). Remove lower unit from bracket.

9. With assistance, loosen two hose clamp bands (19) securing transmission oil cooler upper unit (12) to mounting bracket (20). Remove upper unit from bracket.



REMOVAL - CONTINUED

10. If damaged, remove three screws (21), washers (22), and bracket (20) from flywheel housing (23).



INSTALLATION

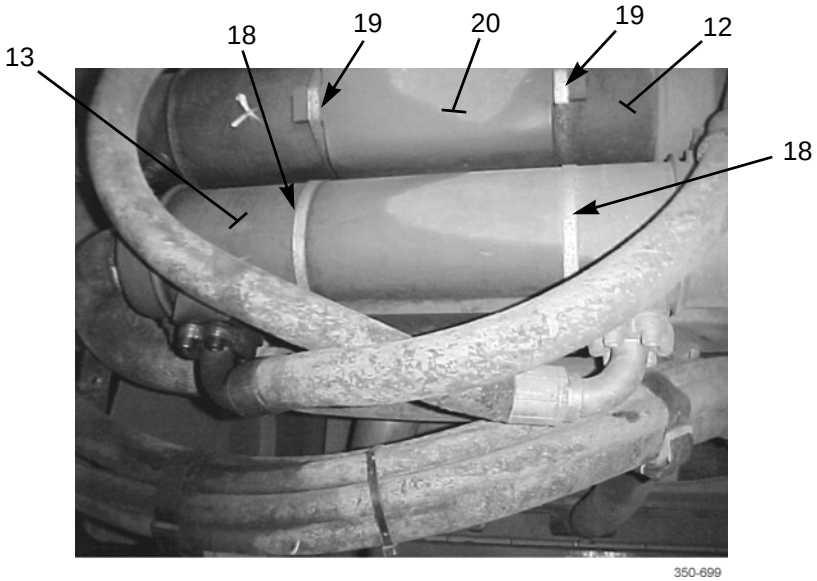
1. If removed, install bracket (20) on flywheel housing (23) with three washers (22) and screws (21).

NOTE

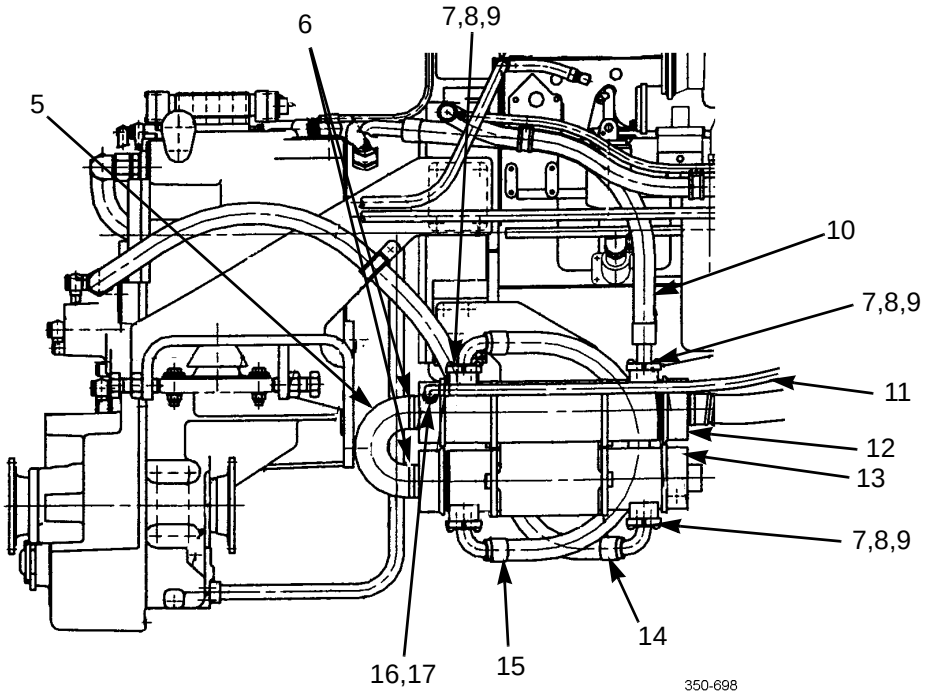
Ensure hydraulic hose mounting flange surfaces on transmission oil cooler units are clean and free of residue.

2. With assistance, position transmission oil cooler upper unit (12) on bracket (20) and secure with two hose clamp bands (19).
3. With assistance, position transmission oil cooler lower unit (13) on bracket (20) and secure with two hose clamp bands (18).

INSTALLATION - CONTINUED

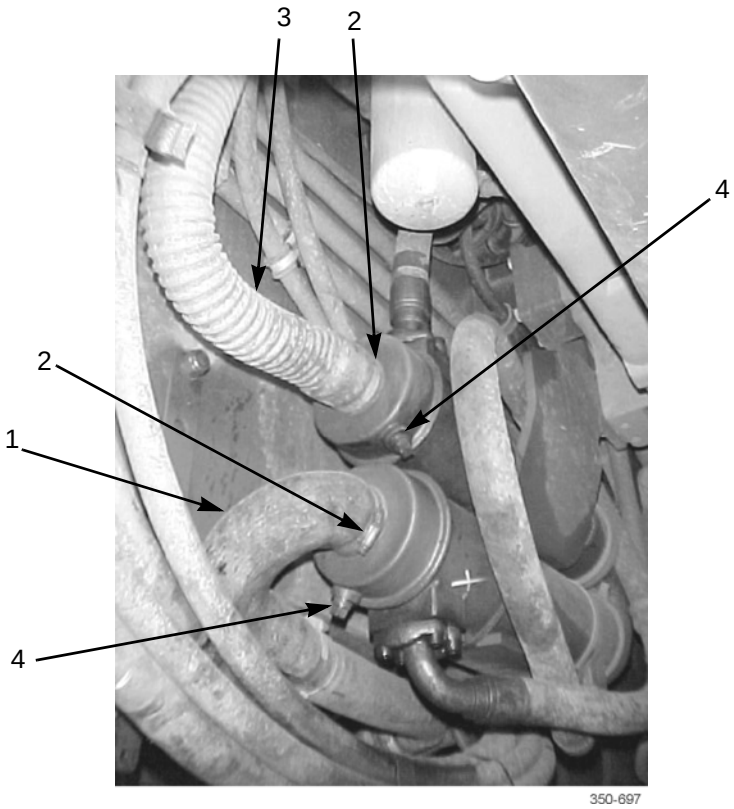


4. Install two hoses (10 and 15) on top of transmission oil cooler upper unit (12) with two new O-ring seals (9) and flanges (7). Secure flanges with eight screws (8).
5. Install two hoses (14 and 15) on bottom of transmission oil cooler lower unit (13) with two new O-ring seals (9) and flanges (7). Secure flanges with eight screws (8).
6. Apply pipe sealant to fitting (17) and install fitting in transmission oil cooler upper unit (12). Connect water hose (11) to fitting with hose clamp (16).
7. Install coolant hose (5) and secure with two hose clamps (6).



INSTALLATION - CONTINUED

8. Connect coolant hose (3) from water pump and secure with hose clamp (2).
9. Connect coolant hose (1) from radiator and secure with hose clamp (2).
10. Apply pipe sealant and install two plugs (4).



11. Check transmission oil level and add oil as needed (WP 0050 00).
12. Add coolant (WP 0064 00).
13. Start engine (TM 10-3930-675-10) and check for leaks. Shut down engine.
14. Install radiator splash shield (WP 0143 00).
15. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

FRONT AXLE ASSEMBLY REPLACEMENT 0227 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Jack Kit, Hydraulic, Hand (Item 65, WP 0289 00)

Multiplier, Torque Wrench (Item 75, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench Set, Socket (Item 133, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Truck, Forklift, 10,000-lb Capacity (Atlas)

Materials/Parts

Washer, lock (P/N 923657.0011) (16)

Personnel Required

Two

References

WP 0050 00

WP 0093 00

WP 0104 00

WP 0127 00

WP 0135 00

WP 0185 00

WP 0229 00

WP 0232 00

WP 0238 00

Equipment Condition

Vehicle parked on level, hard surface

Rear wheels chocked

Boom raised as required (TM 10-3930-675-10)

Brake and steering hydraulic system pressure relieved (WP 0164 00)

Front fender assemblies removed (WP 0149 00)

Front propeller shaft removed (WP 0120 00)



WARNING

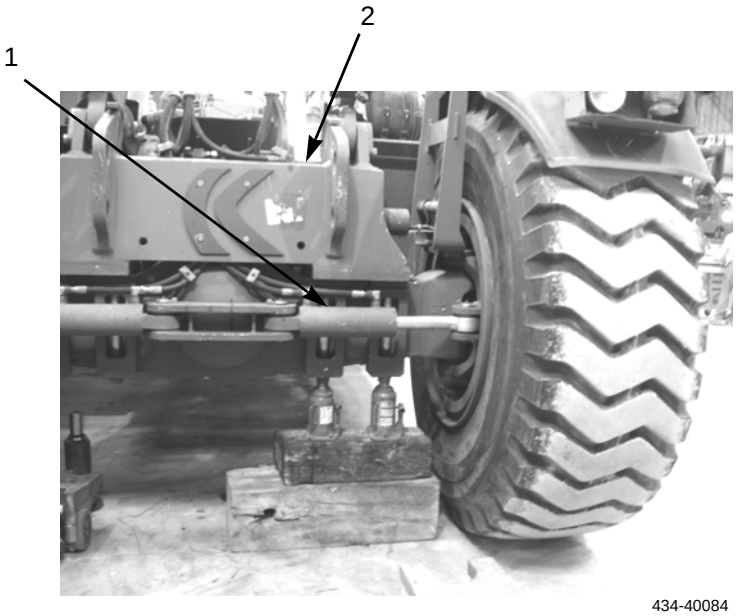
- **Hydraulic jacks are intended only for lifting RTCH, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Forklift truck used to replace front axle assembly must have a 10,000-lb capacity to ensure task is performed in a safe manner. Failure to follow this warning may result in death or injury to personnel.**

REMOVAL

NOTE

Blocking both sides of rear axle will prevent vehicle from tilting when front of vehicle is raised.

1. Block left and right sides of rear axle between axle and axle stops.
2. Place two hydraulic jacks under front axle (1) as shown. Raise jacks to contact bottom of axle and lift.
3. Place wood blocks under front of vehicle frame (2) close to hydraulic jacks. Lower jacks and support frame on wood blocks.



434-40084

4. Repeat steps 2 and 3 on opposite side of front axle.
5. Drain front axle differential (WP 0050 00).
6. Remove front wheel and tire assemblies (WP 0232 00).

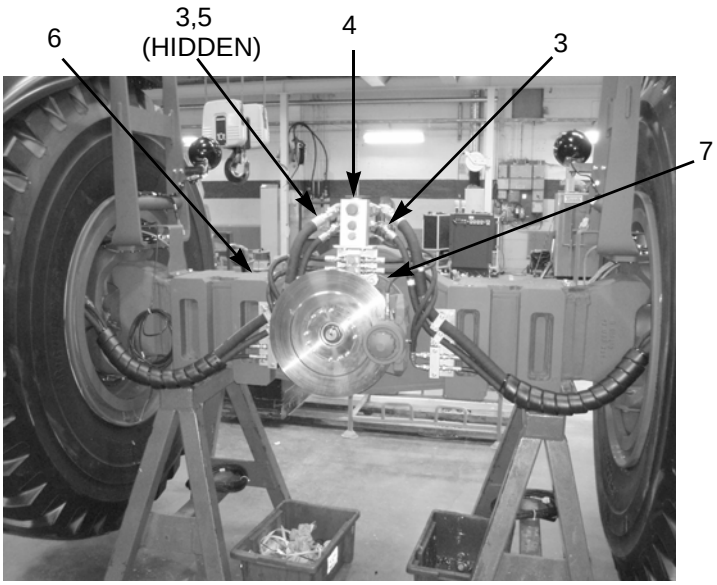
NOTE

Axle must be removed with all local connecting lines, fittings, and assorted parts intact.

7. Trace main hydraulic supply and return lines (3) to junction box (4), located above axle center section. Disconnect and cap lines and fittings from junction box.
8. Disconnect breather line (5) from top of axle (6) center section.
9. Remove and cap parking brake hydraulic pressure line (7).
10. Disconnect wheel temperature sensor at connector on left end of axle (WP 0093 00).
11. Remove steering system wheel sensors (WP 0104 00, steps 1 thru 3 and NOTE). Hang sensors on main frame.

REMOVAL - CONTINUED

12. For USMC vehicles, disconnect front wheel autolube main supply lines.



434-40102

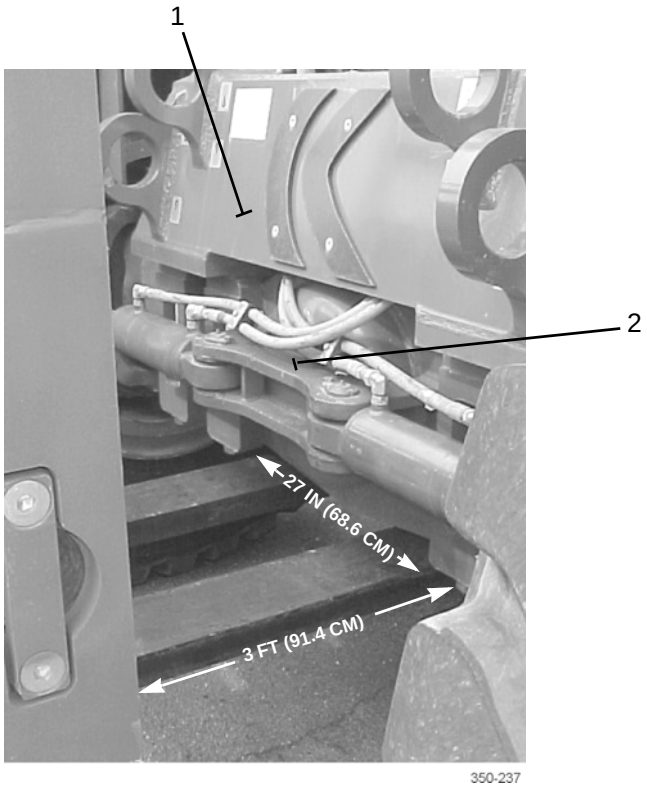
13. Using forklift truck, firmly support front axle (2).
14. Remove eight nuts (3), bolts (4), and sixteen lockwashers (5) to free front axle (2) from vehicle. Discard lockwashers.

REMOVAL - CONTINUED

NOTE

- **Width of fork tines outside-to-outside should be 27 in. (68.6 cm).**
- **Front face of axle should be 3 ft (91.4 cm) away from forklift back plate.**

15. With forklift truck, lower front axle (2) to clear lineup pins and move front axle to work area. Place axle on wood blocks or trestles, next to replacement axle.



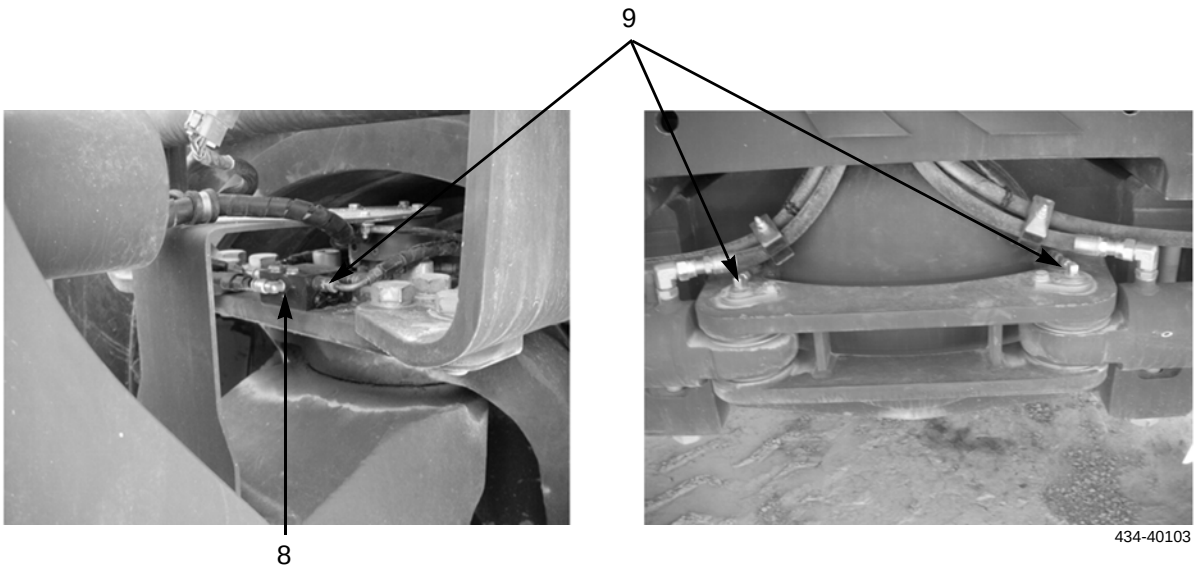
NOTE

Using the removed axle as a pattern and the work packages as references, transfer all local connecting lines, fittings, and assorted parts to the new axle.

16. Remove and install front parking brake cylinder (WP 0229 00).
17. Remove and install front steering cylinders (WP 0135 00).
18. Remove and install front brake lines and brackets (WP 0127 00).
19. Remove and install wheel temperature sensors (WP 0093 00).

REMOVAL - CONTINUED

20. For USMC vehicles, remove and install autolube junction boxes (8) and local connecting lines (9) that supply front wheel spindle area components and steering cylinder pivot points.



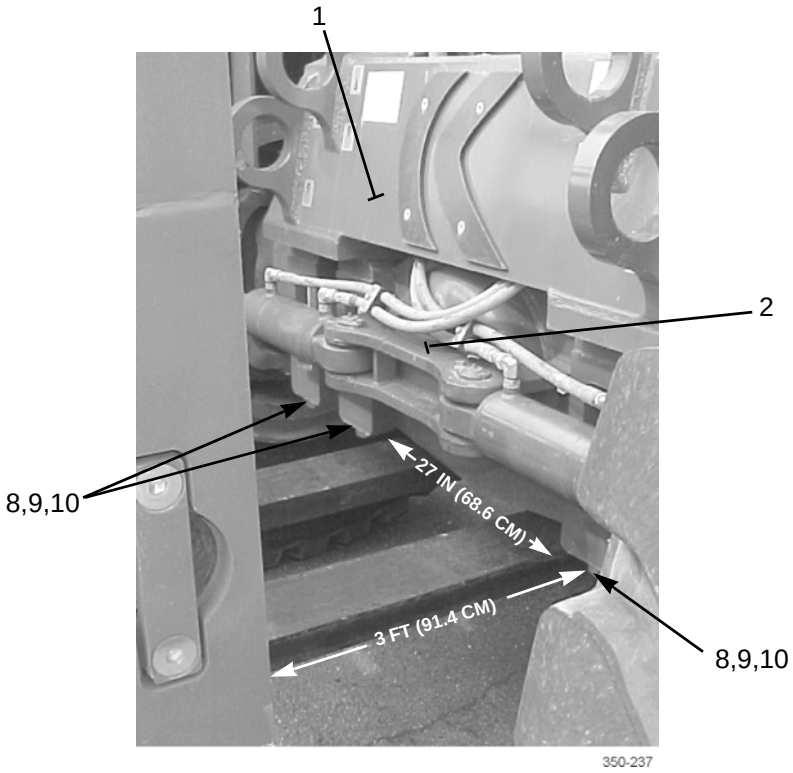
INSTALLATION

1. Using forklift truck, lift and move front axle (2) to vehicle.

NOTE

Two or more bolts inserted through frame from above may be used to help align axle with frame.

2. Align front axle (2) with front of vehicle frame (1). Install axle on frame with eight bolts (9), sixteen new lockwashers (10), and eight nuts (8). Tighten nuts securely to hold axle in place. Final torque will be applied when tires and wheels have been installed and vehicle is sitting on ground.



3. Move forklift truck away from vehicle.
4. Reconnect main hydraulic supply lines to junction box located above axle.
5. Connect breather line to top of axle center section.
6. Replace steering system wheel sensors (WP 0104 00).

NOTE

For the USMC model ONLY, connect the main supply lines of the autolube that feed the front wheel areas.

7. Install front wheel and tire assemblies (WP 0232 00).
8. Using two hydraulic jacks under one end of axle, remove wood blocks from under the frame and lower vehicle to the ground. Repeat procedure on the opposite end of axle.
9. Remove blocks from left and right sides of rear axle.
10. Using torque wrench and torque multiplier, tighten eight nuts (8) to 1,733 lb-ft (2,350 Nm).

INSTALLATION - CONTINUED

11. Install front parking brake cylinder (WP 0229 00).
12. Install front steering sensors (WP 0104 00).
13. Install front steering cylinders (WP 0135 00).
14. Install front propeller shaft (WP 0120 00).
15. Install a jumper between pins of the wheel temperature sensor connector, at the connector end attached to the vehicle wiring harness (WP 0093 00). This will allow filling of the wheel cooling areas and will be removed and the sensor connected normally later.
16. Install front fender assemblies (WP 0149 00).
17. Fill front axle differential (WP 0050 00) and check for leaks.
18. Fill front axle hub ends (WP 0050 00) and check for leaks.
19. Start engine and bring hydraulic oil temperature to 150°F.
20. Perform steering calibration (WP 0238 00).
21. Operate machine 100 feet forward and then 100 feet in reverse, 10 times at a speed of no greater than 5 mph.
22. When step 21 is completed, stop the machine and remove the jumper between pins of the wheel temperature sensor connector and connect the sensor to the wiring harness. Check for leaks and recheck oil levels in axle.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

REAR AXLE ASSEMBLY REPLACEMENT 0228 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Jack Kit, Hydraulic, Hand (Item 65, WP 0289 00)

Shackle, Lifting (Item 105, WP 0289 00)

Sling, Eye (Item 111, WP 0289 00)

Materials/Parts

Compound, Antiseize (Item 7, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

O-ring (P/N 923873.0006) (2)

Personnel Required

Three

References

WP 0050 00

References - Continued

WP 0185 00

WP 0232 00

WP 0238 00

Equipment Condition

Vehicle parked on level, hard surface

Front wheels chocked

Bogie wheel assembly removed (WP 0233 00)

Cab and boom support in transport position (TM 10-3930-675-10)

Rear propeller shaft removed (WP 0120 00)

Rear parking brake cylinder removed (WP 0229 00)

Rear brake hydraulic hoses and fittings removed (WP 0127 00)

Rear steering sensors removed (WP 0104 00)

Rear wheel temperature sensors removed (WP 0093 00)

Rear steering cylinders removed (WP 0135 00)

Rear fender assemblies removed (WP 0149 00)



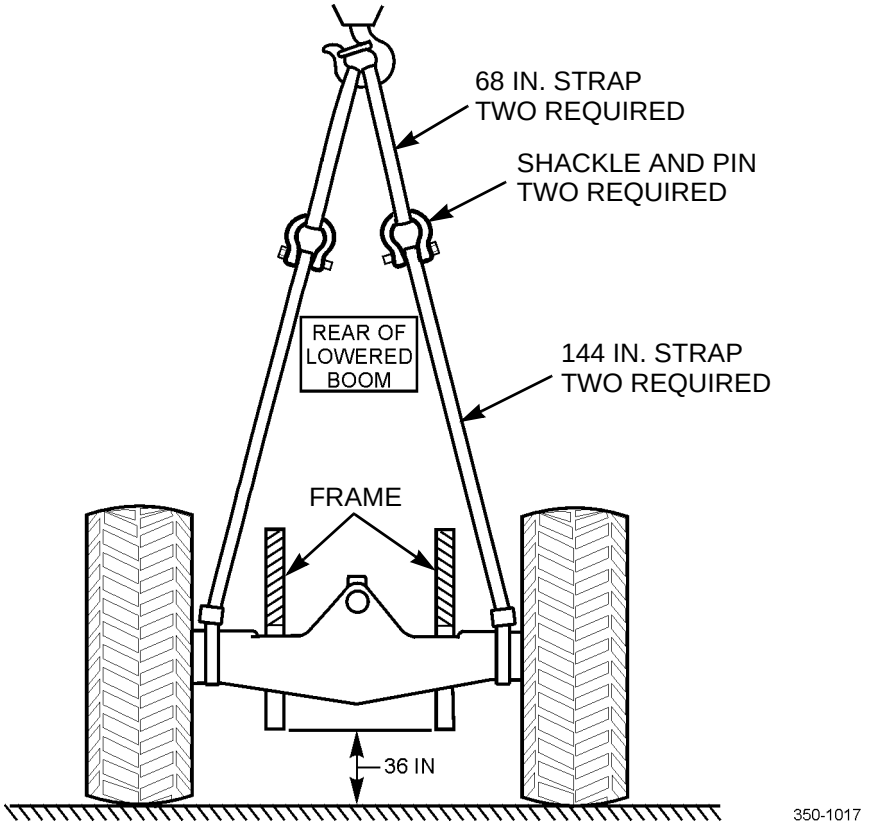
WARNING

- **Hydraulic jacks are intended only for lifting RTCH, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**

REAR AXLE ASSEMBLY REPLACEMENT - CONTINUED 0228 00

REMOVAL

1. Place two hydraulic jacks under flat section of vehicle frame (7) in front of rear axle (8). Raise jacks to contact bottom of frame. Ensure jacks are positioned securely under frame.
2. Raise vehicle frame (7) to provide enough clearance to remove two rear wheel and tire assemblies from rear axle (8).
3. Remove two rear wheel and tire assemblies (WP 0232 00).
4. Assemble rigging on rear axle (8) as shown. Attach rigging to suitable lifting device and support rear axle.



REAR AXLE RIGGING

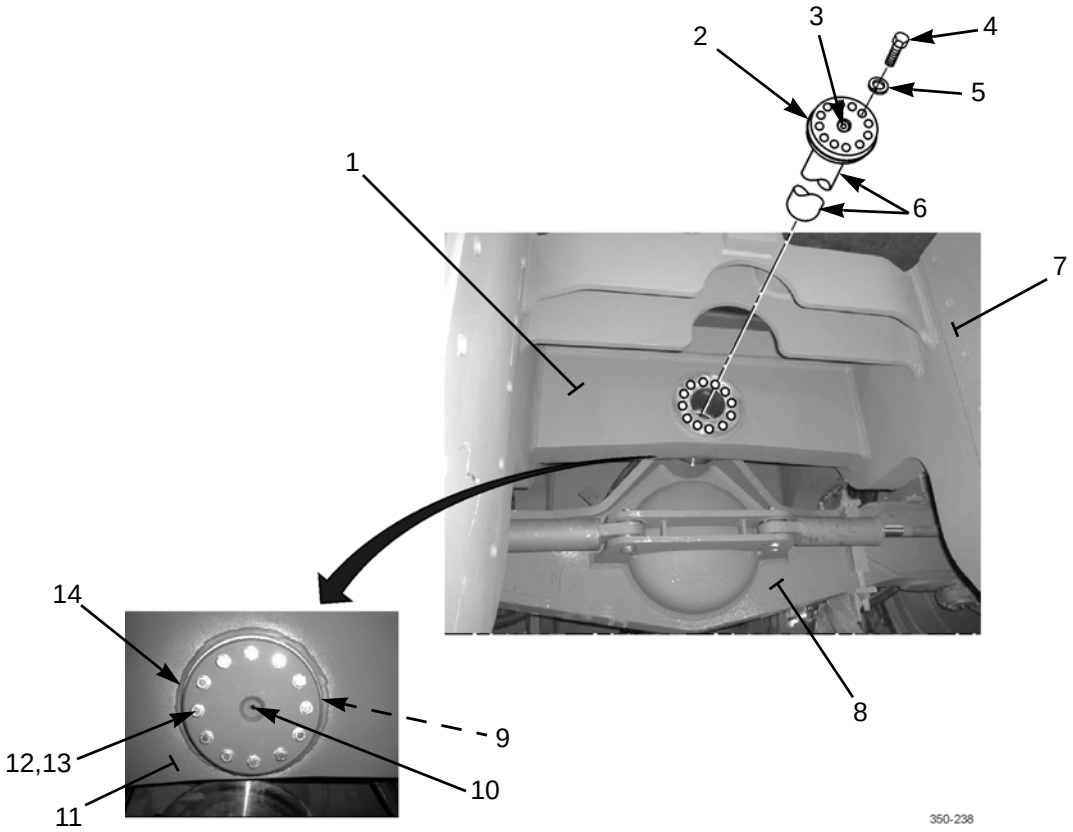
5. Using hydraulic jacks under frame (7), raise frame to 36 in. (91 cm) height as indicated in *Rear Axle Rigging* diagram and remove two hydraulic jacks (WP 0232 00) from under rear axle (8).
6. Place wood blocks or trestles under vehicle frame (7) in front of, and close to, hydraulic jacks. Lower jacks and support frame on wood blocks.
7. For USMC vehicle, remove the autolube junction boxes and local connecting lines that supply the rear wheel spindle area components and steering cylinder pivot points.
8. At rear of rear axle (8), remove 12 screws (4) and washers (5) holding shaft (6) flange to crossmember (1).
9. At front of rear axle (8), remove 12 screws (12), washers (13), and cover (14). Remove O-ring (9) and grease fitting (10) from cover. Discard O-ring.

REMOVAL - CONTINUED

NOTE

Raise or lower rear axle slightly, as necessary, for ease in shaft removal.

10. Remove shaft (6) holding rear axle (8) to crossmembers (1 and 11). Remove O-ring (2) and grease fitting (3) from shaft flange. Discard O-ring.
11. Lower rear axle (8) to clear frame (7) and move rear axle away from vehicle. Place axle on wood blocks or trestles. Remove rigging.



INSTALLATION

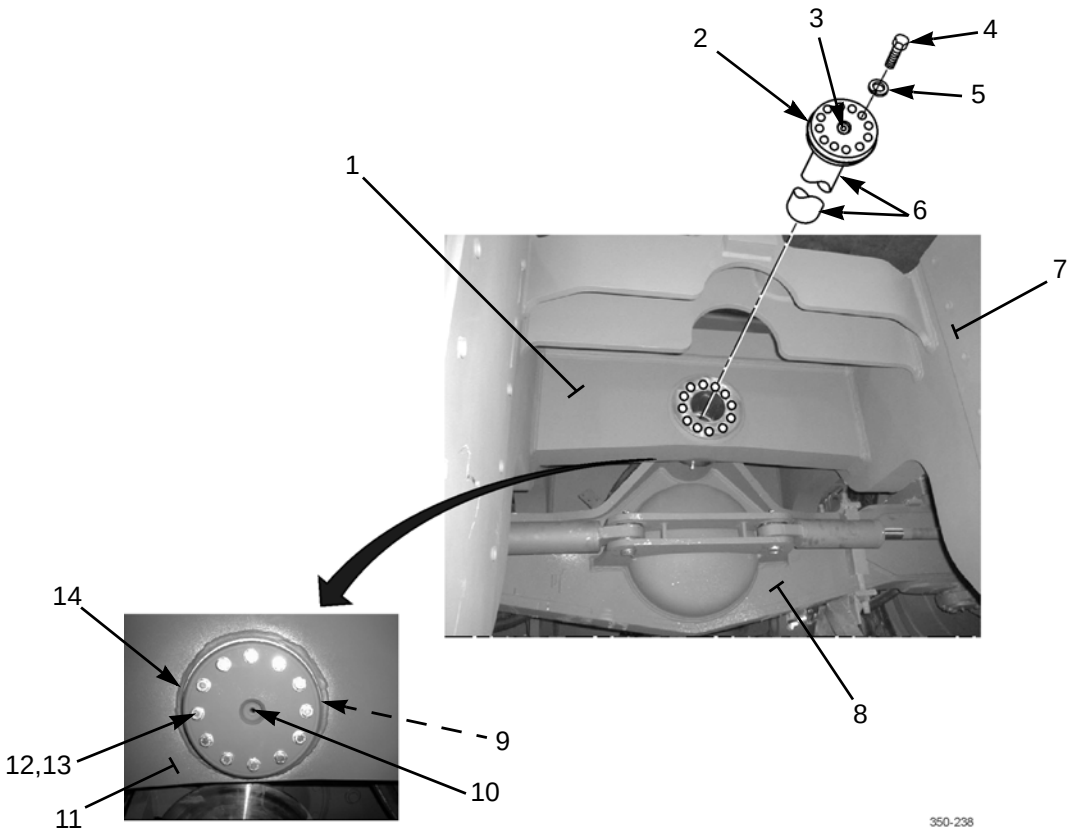
1. Assemble rigging on rear axle (8). Refer to *Rear Axle Rigging* diagram. Attach rigging to suitable lifting device.
2. Position rear axle (8) on vehicle.
3. Apply antiseize compound to shaft (6) bearing surface.
4. Install grease fitting (3) and new O-ring (2) on shaft (6) flange.

INSTALLATION - CONTINUED

NOTE

Adjust position of rear axle slightly to ensure accurate alignment of rear axle with crossmembers.

5. Install shaft (6) through crossmembers (1 and 11) and rear axle (8).
6. At front of rear axle (8), install grease fitting (10) and new O-ring (9) on cover (14). Install cover on crossmember (11) with 12 washers (13) and screws (12).
7. At rear of rear axle (8), install shaft (6) flange on crossmember (1) with 12 washers (5) and screws (4).
8. Install two rear wheel and tire assemblies (WP 0232 00).
9. Remove rigging from rear axle.
10. Position and raise two hydraulic jacks to support vehicle frame (7) and remove trestles or wood blocks.
11. Lower and remove hydraulic jacks from under frame (7).



INSTALLATION - CONTINUED

12. For USMC vehicle, install the autolube junction boxes and local connecting lines that supply the rear wheel spindle area components and steering cylinder pivot point.
13. Install rear fender assemblies (WP 0149 00).
14. Install rear steering cylinders (WP 0135 00).
15. Install rear wheel temperature sensors (WP 0093 00).
16. Install rear brake lines and brackets (WP 0127 00).
17. Install rear parking brake cylinder (WP 0229 00).
18. Install rear propeller shaft (WP 0120 00).
19. Return cab and boom support to operational position (TM 10-3930-675-10).
20. Install bogie wheel assembly (WP 0233 00).
21. Apply grease to two grease fittings (3 and 10) (WP 0050 00).
22. Fill rear axle differential. Check and/or fill hub end of new axle (WP 0050 00).
23. Remove blocks from front wheels.
24. Install rear steering sensors (WP 0104 00).
25. Install a jumper between pins of the wheel temperature sensor connector, at the connector end attached to the vehicle wiring harness (WP 0093 00). This will allow filling of the wheel cooling areas and will be removed and the sensor connected normally later.
26. Start engine and bring hydraulic oil temperature to 150°F.
27. Perform steering calibration (WP 0238 00).
28. Operate machine 100 feet forward and then 100 feet in reverse, 10 times at a speed of no greater than 5 mph.
29. When step 28 is completed, stop the machine and remove the jumper between pins of the wheel temperature sensor connector and connect the sensor to the wiring harness. Check for leaks and recheck oil levels in axle.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

PARKING BRAKE CYLINDER MAINTENANCE 0229 00

THIS WORK PACKAGE COVERS

Parking Brake Cylinder: Removal, Disassembly, Assembly, Installation

Parking Brake Rotor: Removal, Installation

Parking Brake Bracket: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Goggles, Industrial (Item 50, WP 0289 00)

Multiplier, Torque Wrench (Item 75, WP 0289 00)

Wrench, Strap, Pipe (Item 139, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Wire, Nonelectrical (Item 43, WP 0290 00)

O-ring (P/N 923727.0504) (2)

Pin, Cotter (P/N 923726.0433)

Seal Kit (P/N 923828.0504)

References

TM 10-3930-675-10

WP 0120 00

Equipment Condition

Wheels chocked

Brake hydraulic system pressure relieved (WP 0164 00)

Parking brake pads removed (WP 0122 00)

NOTE

- **Maintenance tasks for parking brake cylinder at front axle and rear axle are performed the same way.**
- **After performance of this task, notify Organizational Maintenance to replace hydraulic reservoir return filters after 100 hours of operation.**

PARKING BRAKE CYLINDER REMOVAL

NOTE

A strap wrench may be required to remove cover.

1. Remove cover (6) and O-ring (8) from pressure ring (4). Remove and discard O-ring only if damaged.

WARNING

Parking brake is under spring tension. Parts could become loose and fly out suddenly if parking brake is not correctly disassembled. Be sure to follow instructions in step 2 before proceeding to avoid injury to personnel.

2. Loosen nut (5) and remove adjusting screw (7) from adjusting cylinder (9). Position adjusting screw back into adjusting cylinder a few turns.
3. Position cover (6) back onto pressure ring (4) a few turns.
4. Remove cotter pin (14) from one remaining castle nut (13). Discard cotter pin.
5. Remove castle nut (13), bolt (15), and parking brake cylinder (2) from rotor (12) and parking brake bracket (1). Support parking brake cylinder with nonelectrical wire.



WARNING





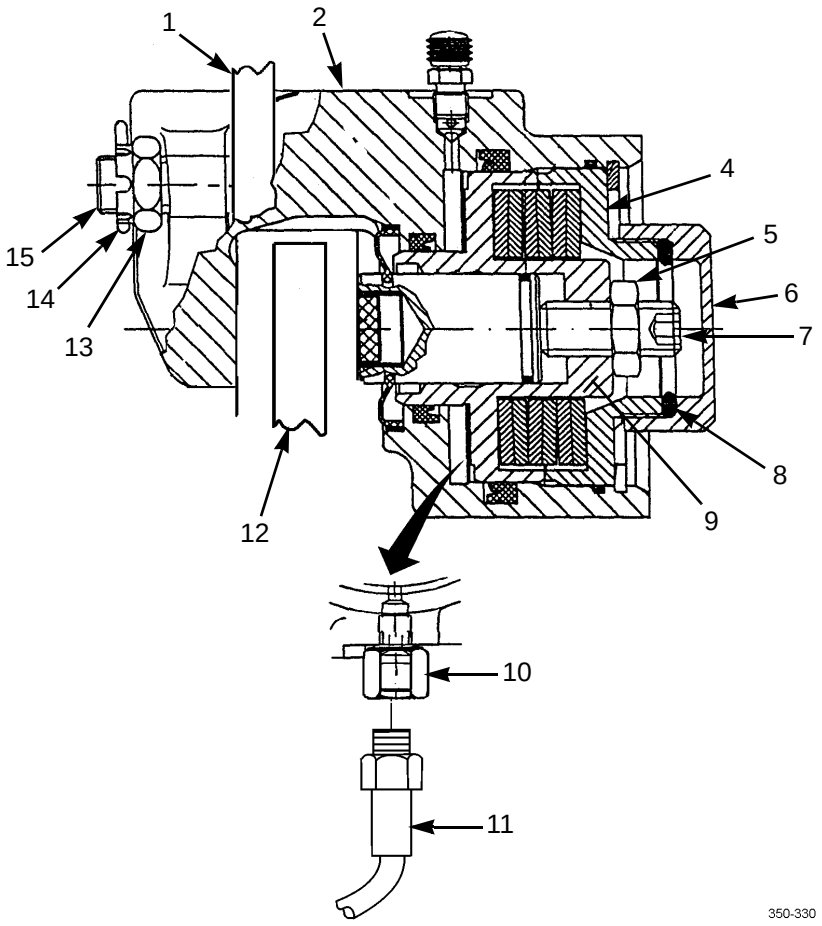
- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

6. Disconnect hydraulic hose (11) from fitting (10) and remove parking brake cylinder (2) from vehicle.

PARKING BRAKE CYLINDER REMOVAL - CONTINUED



PARKING BRAKE CYLINDER DISASSEMBLY

1. Remove cover (6), adjusting screw (7), and nut (5) from parking brake cylinder.
2. Remove fitting (10) and seal ring (23) from housing (16). Discard seal ring.
3. Remove bleeder valve (3) from housing (16).

NOTE

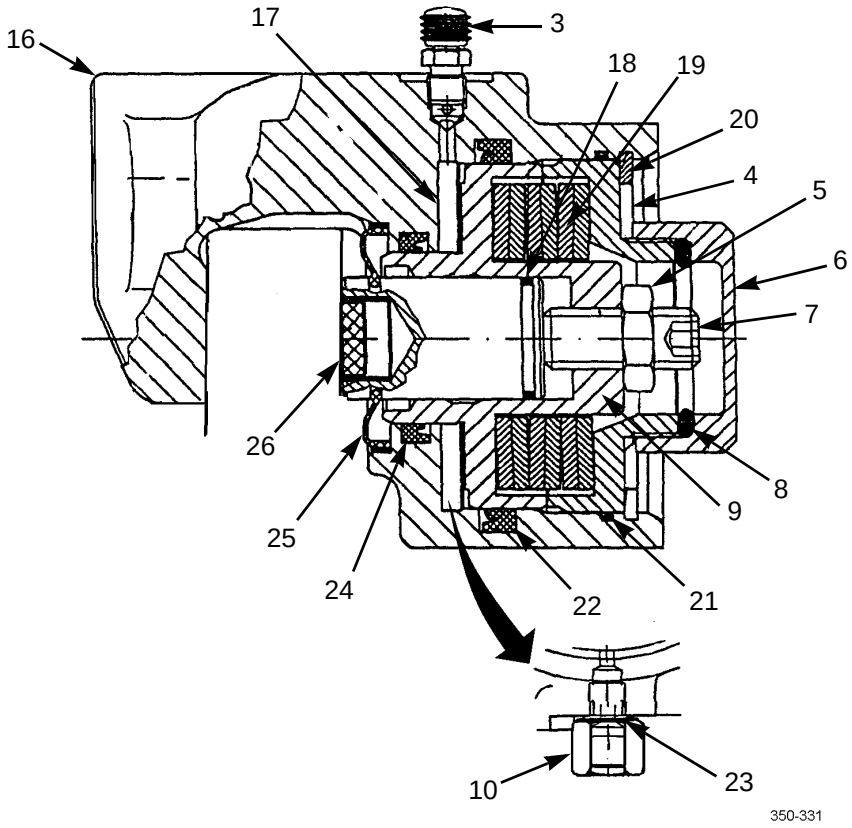
Note position of spring washers for assembly.

4. Remove lock ring (20), pressure ring (4), and six spring washers (19).
5. Remove dust seal (25) from groove of adjusting cylinder (9) and remove piston (17) with adjusting cylinder from housing (16).
6. Remove adjusting cylinder (9) from piston (17) and remove O-ring (18) and magnet (26) from adjusting cylinder. Discard O-ring.

NOTE

Note position of seal rings for assembly.

7. Remove O-ring (21), dust seal (25), and two seal rings (22 and 24) from housing (16). Discard O-ring, dust seal, and two seal rings.



PARKING BRAKE CYLINDER ASSEMBLY

1. Install two new seal rings (22 and 24), new dust seal (25), and new O-ring (21) in housing (16).
2. Apply a thin coat of grease to inner and outer sealing surfaces of piston (17).
3. Install magnet (26) and new O-ring (18) on adjusting cylinder (9) and install adjusting cylinder in piston (17).
4. Install piston (17) with adjusting cylinder (9) in housing (16). Install dust seal (25) in groove of adjusting cylinder.
5. Install six spring washers (19), pressure ring (4), and lock ring (20).
6. Install bleeder valve (3) in housing (16).
7. Install new seal ring (23) and fitting (10) in housing (16).
8. Loosely install adjusting screw (7) and nut (5) on piston (17).
9. If removed, install new O-ring (8) on cover (6). Loosely install cover.

PARKING BRAKE CYLINDER INSTALLATION

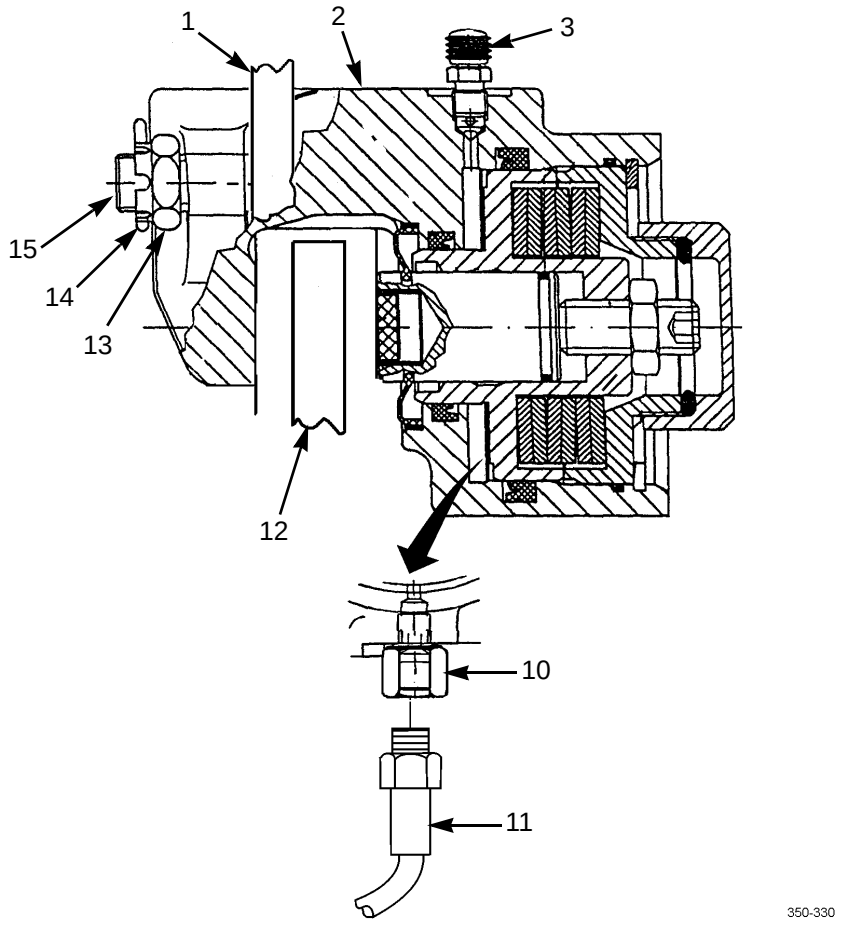
1. Support parking brake cylinder (2) on vehicle with nonelectrical wire and connect hydraulic hose (11) to fitting (10).
2. Install parking brake cylinder (2) on rotor (12) and parking brake bracket (1) with one of two bolts (15) and one of two castle nuts (13). Remove nonelectrical wire.
3. Install new cotter pin (14) in one of two castle nuts (13).
4. Install parking brake pads (WP 0122 00).
5. Start engine (TM 10-3930-675-10) to provide hydraulic pressure.



WARNING

Wear eye protection when opening bleeder valve to avoid eye injury.

6. Open bleeder valve (3) slowly until air and a small quantity of hydraulic oil is expelled. Close bleeder valve.

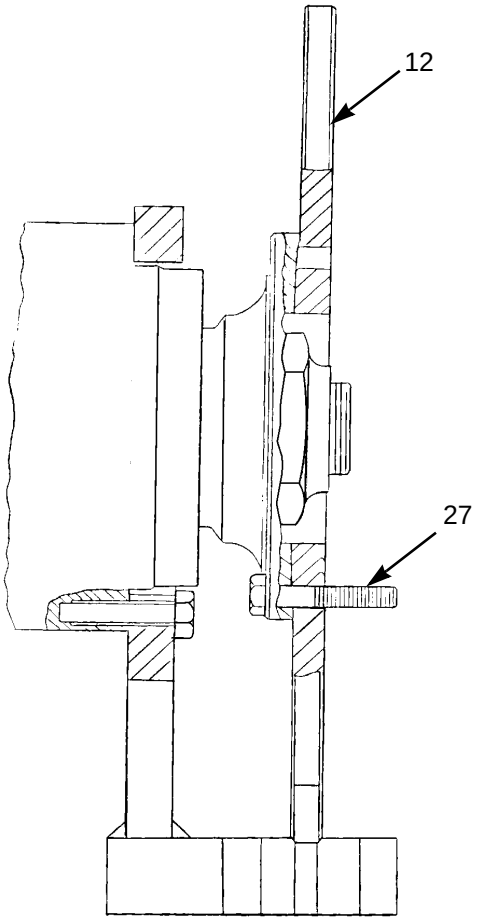


PARKING BRAKE ROTOR REMOVAL

NOTE

Front and rear parking brake rotors are removed the same way.

1. Remove front or rear propeller shaft (WP 0120 00).
2. Remove parking brake cylinder (refer to *Parking Brake Cylinder Removal*).
3. Remove parking brake rotor (12) from 12 bolts (27).



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PARKING BRAKE ROTOR INSTALLATION

NOTE

Front and rear parking brake rotors are installed the same way.

1. Install parking brake rotor (12) on 12 bolts (27).
2. Install parking brake cylinder (refer to *Parking Brake Cylinder Installation*).
3. Install front or rear propeller shaft (WP 0120 00).

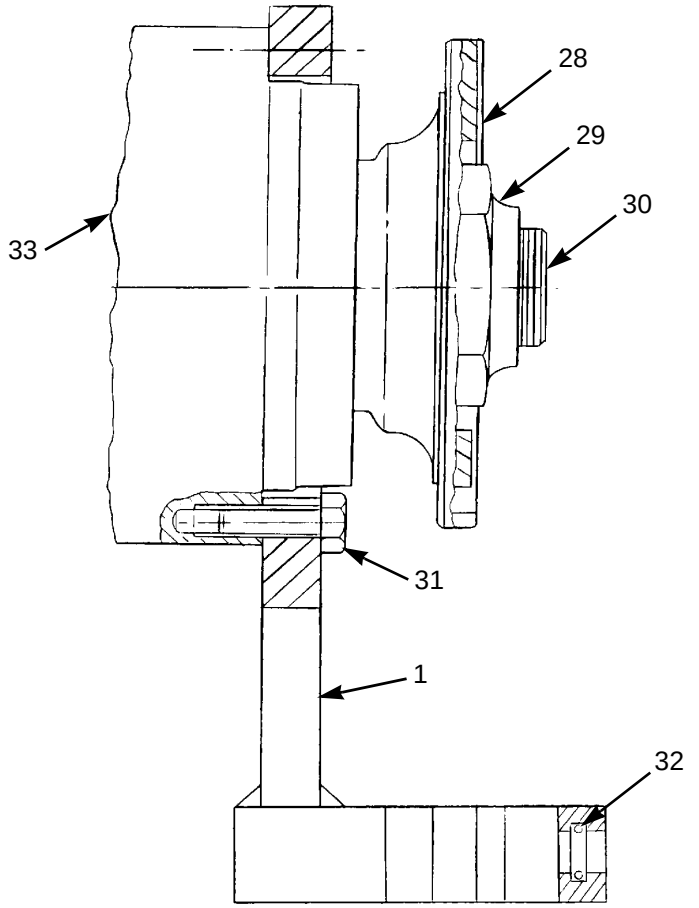
PARKING BRAKE BRACKET REMOVAL

1. Remove parking brake rotor (refer to *Parking Brake Rotor Removal*).
2. Remove nut (29) and flange (28) from differential shaft (30).

NOTE

Note position of parking brake bracket on axle for installation.

3. Remove 12 screws (31) and parking brake bracket (1) from front or rear axle (33).
4. Remove two O-rings (32) from parking brake bracket (1). Discard O-rings.



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PARKING BRAKE BRACKET INSTALLATION

1. Install two new O-rings (32) on parking brake bracket (1).
2. Install parking brake bracket (1) on front or rear axle (33) with 12 screws (31).
3. Install flange (28) on differential shaft (30) with nut (29). Tighten nut to 774 to 811 lb-ft (1,050 to 1,100 Nm).
4. Install parking brake rotor (refer to *Parking Brake Rotor Installation*).

END OF WORK PACKAGE

BRAKE ACCUMULATOR REPLACEMENT 0230 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Goggles, Industrial (Item 50, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Adjustable (Item 135, WP 0289 00)

Wrench, Strap, Oil Filter (Item 138, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Nut, lock (P/N 920076.003) (2)

O-ring (P/N 5936)

O-ring (P/N 920002.011)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0231 00

Equipment Condition

Brake hydraulic system pressure relieved (WP 0164 00)



WARNING





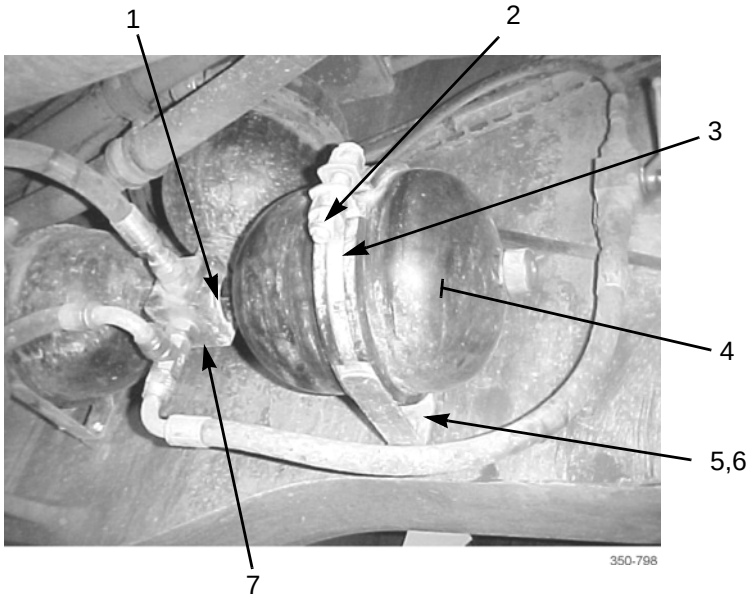
- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

REMOVAL

1. Place a suitable container under terminal block (7) to catch any spillage.
2. Loosen nut (2) so accumulator (4) can be rotated in clamp (3).
3. Use a strap wrench to turn accumulator (4) counterclockwise, while holding terminal block (7) with an adjustable wrench. Remove accumulator and O-ring from nipple (1). Discard O-ring.
4. Remove nipple (1) and O-ring from terminal block (7). Discard O-ring.
5. If damaged, remove two locknuts (5), screws (6), and clamp (3) from welded bracket at frame. Discard locknuts.
6. If accumulator is unserviceable, ensure it is drained of nitrogen before disposal (WP 0231 00).



INSTALLATION

1. If removed, install clamp (3) on welded bracket at frame with two screws (6) and new locknuts (5).

NOTE

O-rings should be lubricated before installation.

2. Install new O-ring and nipple (1) on terminal block (7).
3. Position accumulator (4) inside clamp (3).
4. Install new O-ring and accumulator (4) on nipple (1) while holding terminal block (7) with an adjustable wrench.
5. Tighten nut (2) to secure accumulator (4) inside clamp (3).
6. Verify accumulator pre-charge pressure and charge as required (WP 0231 00).
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10). Make several brake applications and check for leaks.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BRAKE AND STEERING ACCUMULATOR SERVICE 0231 00

THIS WORK PACKAGE COVERS

Brake Accumulator: Checking Pre-Charge Pressure, Charging

Steering Accumulator: Checking Pre-Charge Pressure, Charging

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Goggles, Industrial (Item 50, WP 0289 00)

Kit, Nitrogen Charging (Item 69, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Equipment Condition

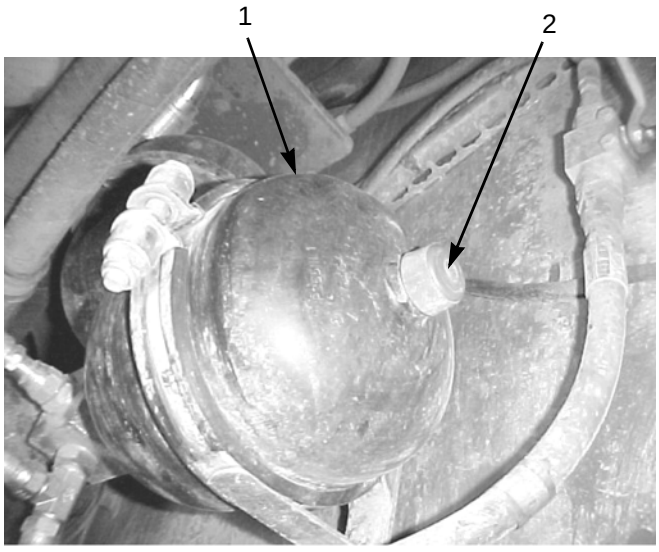
Brake or steering hydraulic system pressure relieved, if checking pre-charge pressure on vehicle (WP 0164 00)

NOTE

- **Annually, brake and steering accumulators must have pre-charge pressure checked to ensure accumulator serviceability. This check may be performed on vehicle or off.**
- **New brake and steering accumulators are not shipped charged. They must be charged prior to installation on vehicle.**

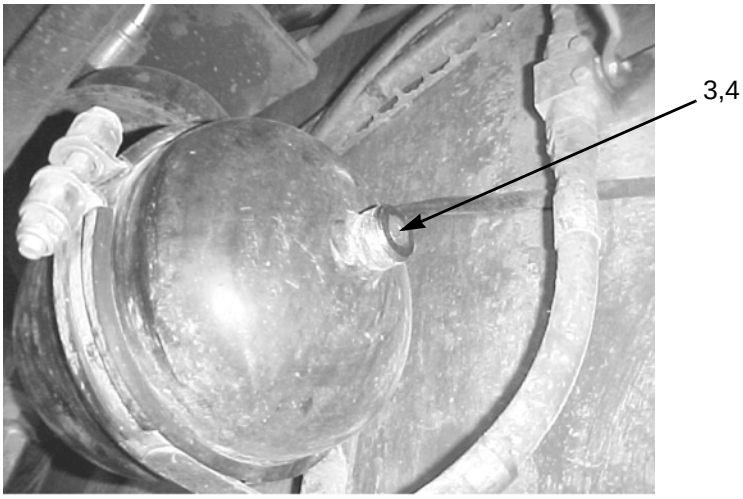
CHECKING BRAKE ACCUMULATOR PRE-CHARGE PRESSURE

1. Remove cap (2) from valve end of brake accumulator (1).



CHECKING BRAKE ACCUMULATOR PRE-CHARGE PRESSURE - CONTINUED

2. Remove plug (3) and connect hose assembly of nitrogen charging kit to valve (4).



3. Slowly open pressure regulator valve.
4. Take pressure reading from low pressure gage. Pre-charge pressure for brake accumulator must be 1,305 psi (90 bar). If pressure is OK, close pressure regulator valve.

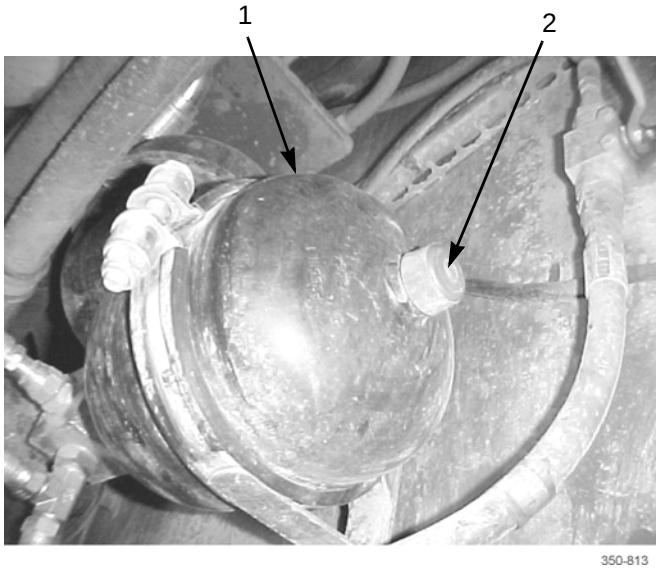
NOTE

If pressure reading on low pressure gage is less than 1,305 psi (90 bar), perform *Brake Accumulator Charging*.

5. If pressure reading on low pressure gage is more than 1,305 psi (90 bar), bleed off excess pressure using bleeder valve, then close pressure regulator valve.
6. Disconnect hose assembly of nitrogen charging kit from valve (4). Install plug (3).
7. Install cap (2) on valve end of brake accumulator (1).
8. Perform a soapsuds leak check at valve end of brake accumulator (1).

BRAKE ACCUMULATOR CHARGING

1. Remove cap (2) from valve end of brake accumulator (1). Remove plug (3).



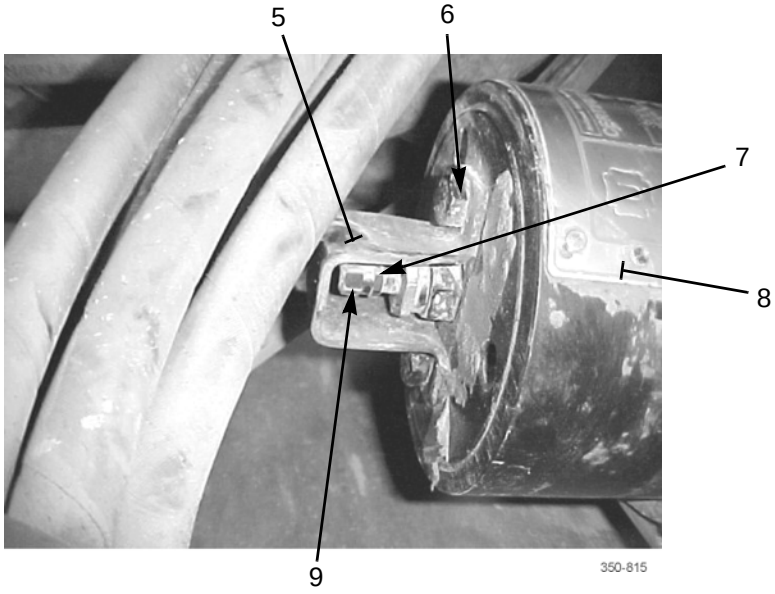
2. Remove plug (3) and connect hose assembly of nitrogen charging kit to valve (4).
3. Open nitrogen tank valve.
4. Slowly open pressure regulator valve.
5. Charge accumulator with nitrogen until pressure reading on low pressure gage is 1,305 psi (90 bar). Bleed off excess pressure using bleeder valve, then close pressure regulator valve.
6. Close nitrogen tank valve.
7. Disconnect hose assembly of nitrogen charging kit from valve (4). Install plug (3).
8. Install cap (2) on valve end of brake accumulator (1).
9. Perform a soapsuds leak check at valve end of brake accumulator (1).

CHECKING STEERING ACCUMULATOR PRE-CHARGE PRESSURE

NOTE

It may be necessary to remove screws, washers, and brackets securing hoses to release hoses to gain access to valve protector.

1. Remove two screws (6) and valve protector (5) from valve end of steering accumulator (8).
2. Remove cap (9) from valve (7).
3. Connect hose assembly of nitrogen charging kit to valve (7).



4. Slowly open pressure regulator valve.
5. Take pressure reading from low pressure gage. Pre-charge pressure for steering accumulator must be 1,450 psi (100 bar). If pressure is OK, close pressure regulator valve.

NOTE

If pressure reading on low pressure gage is less than 1,450 psi (100 bar), perform *Steering Accumulator Charging*.

6. If pressure reading on low pressure gage is more than 1,450 psi (100 bar), bleed off excess pressure using bleeder valve, then close pressure regulator valve.
7. Disconnect hose assembly of nitrogen charging kit from valve (7).
8. Install cap (9) on valve (7).
9. Perform a soapsuds leak check at valve end of steering accumulator (8).
10. Install valve protector (5) on valve end of steering accumulator (8) with two screws (6).

STEERING ACCUMULATOR CHARGING

1. Remove two screws (6) and valve protector (5) from valve end of steering accumulator (8).
2. Remove cap (9) from valve (7) of steering accumulator (8).
3. Connect hose assembly of nitrogen charging kit to valve (7).
4. Open nitrogen tank valve.
5. Slowly open pressure regulator valve.
6. Charge accumulator with nitrogen until pressure reading on low pressure gage is 1,450 psi (100 bar). Bleed off excess pressure using bleeder valve, then close pressure regulator valve.
7. Close nitrogen tank valve.
8. Disconnect hose assembly of nitrogen charging kit from valve (7).
9. Install cap (9) on valve (7) of steering accumulator (8).
10. Perform a soapsuds leak check at valve end of steering accumulator (8).
11. Install valve protector (5) on valve end of steering accumulator (8) with two screws (6).

END OF WORK PACKAGE

WHEEL AND TIRE REPLACEMENT 0232 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Chain Assembly, Single Leg (Item 20, WP 0289 00)

Jack Kit, Hydraulic, Hand (Item 65, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Wrench Set, Socket, Impact (Item 132, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Impact, Pneumatic (Item 136, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Truck, Forklift

Personnel Required

Two

Equipment Condition

Vehicle parked on level, hard surface



WARNING

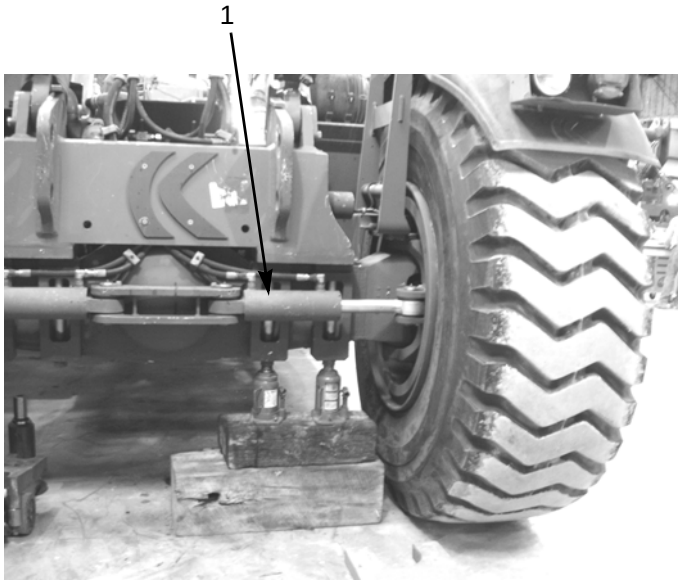
- **Hydraulic jacks are intended only for lifting RTCH, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**

REMOVAL

NOTE

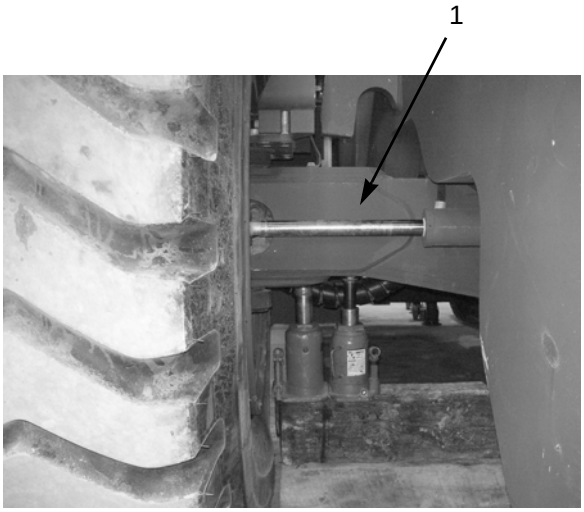
- **Use two 20-ton jacks placed side-by-side on wood blocks to raise end of front or rear axle.**
- **Step 1 applies to front wheel and tire. Steps 2 and 3 apply to rear wheel and tire.**

1. Position two hydraulic jacks on wood blocks under front axle (1). Raise jacks to contact axle.



434-40084

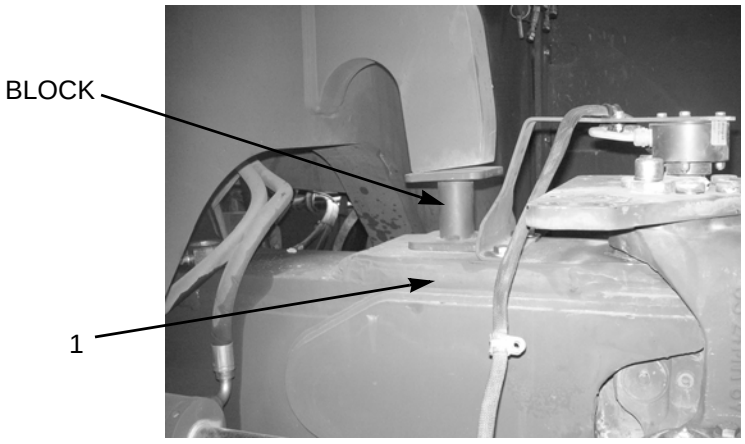
2. Position two hydraulic jacks on wood blocks under rear axle (1). Raise jacks to contact bottom of axle.



434-40085

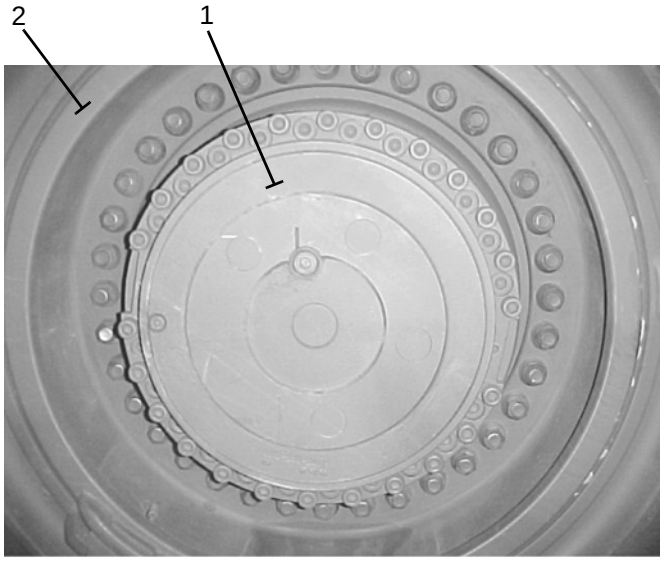
REMOVAL - CONTINUED

3. Insert a block between top of rear axle (1) and axle stop prior to raising jacks.



434-40086

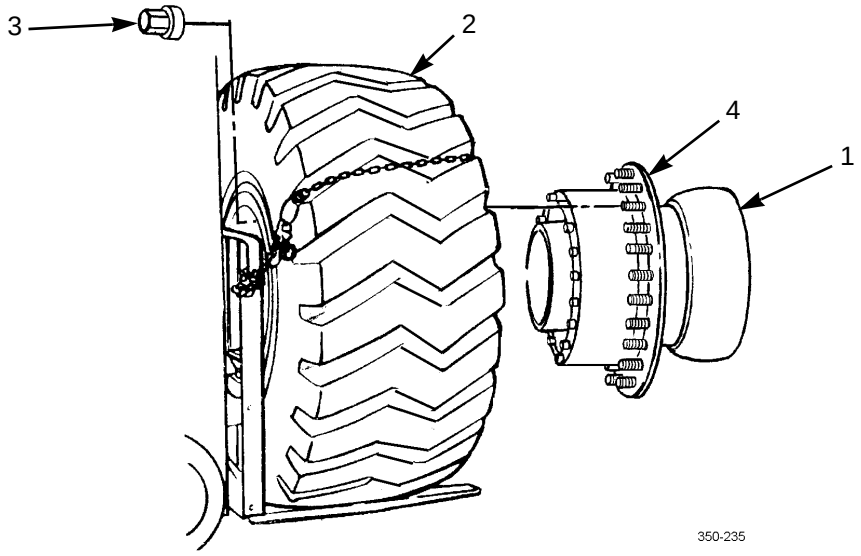
4. Using wood blocks, chock tires of wheels NOT being removed.
5. Raise jacks to lift wheel and tire assembly (2) clear of ground. Place wood blocks under rear axle (1).



350-234

REMOVAL - CONTINUED

6. Using forklift truck, support wheel and tire assembly (2).
7. Secure wheel and tire assembly (2) to forklift truck with chain assembly.
8. Remove 36 nuts (3) to separate wheel and tire assembly (2) from axle flange (4).
9. Attach nylon sling to wheel and tire assembly (2). Attach nylon sling to overhead lifting device.
10. Remove chain assembly and lift wheel and tire assembly (2) from forklift truck.



INSTALLATION

1. Attach nylon sling to wheel and tire assembly (2) and attach nylon sling to overhead lifting device.
2. Lift wheel and tire assembly (2) and place on forklift truck. Secure wheel and tire assembly to forklift truck with chain assembly.
3. Move wheel and tire assembly (2) to vehicle and install wheel and tire assembly on axle flange (4) with 36 nuts (3).
4. Remove chain assembly and move forklift truck away from vehicle.
5. Remove wood blocks from under axle (1) and lower wheel and tire assembly (2) to ground. Remove hydraulic jacks.
6. Tighten 36 nuts (3) to 479 lb-ft (650 Nm).
7. Remove wood blocks from tires not replaced.

END OF WORK PACKAGE

BOGIE WHEEL ASSEMBLY MAINTENANCE 0233 00

THIS WORK PACKAGE COVERS

Bogie Wheel: Removal, Installation
Hydraulic Cylinders: Removal, Installation
Screw Assembly: Removal, Installation
Bogie Wheel Frame: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Maintenance/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

TM 9-2610-200-14

Equipment Condition

Wheels chocked

Cab in transport position (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

BOGIE WHEEL REMOVAL

1. Lower bogie wheels (2) (TM 10-3930-675-10) until wheels touch ground.

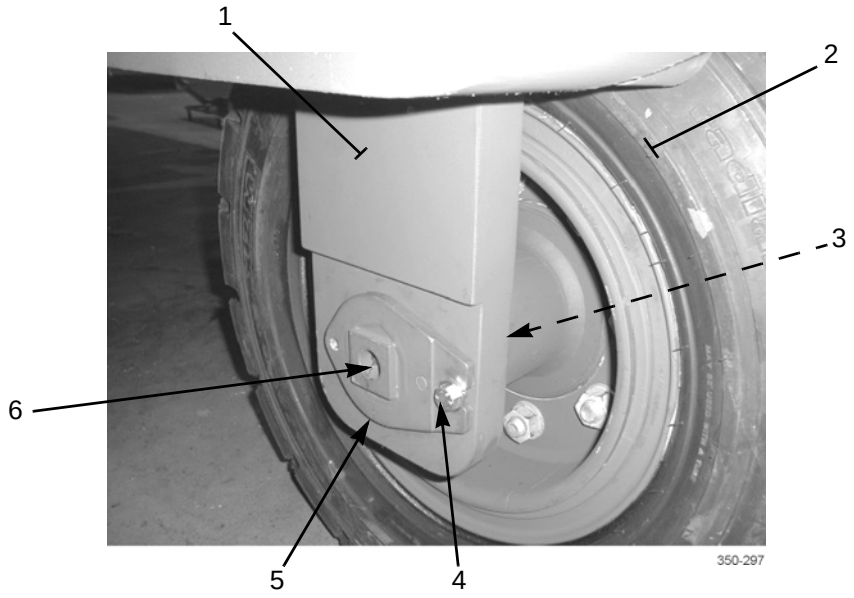


BOGIE WHEEL REMOVAL - CONTINUED

NOTE

Perform steps 2 thru 5 for each of two bogie wheels.

2. Remove allen head screw (4) from end of axle shaft (5).
3. Rotate axle shaft (5) 180 degrees and remove axle shaft, bogie wheel (2), and two O-rings (3) from frame (1). Retain O-rings if not damaged.
4. Remove grease fitting (6) from axle shaft (5).
5. Roll bogie wheel (2) away from vehicle.



6. For tire maintenance, refer to TM 9-2610-200-14.

BOGIE WHEEL INSTALLATION

1. Roll bogie wheel (2) to vehicle.

NOTE

Perform steps 2 thru 6 for each of two bogie wheels.

2. Temporarily place one O-ring (3) on each side of bogie wheel (2) hub and position bogie wheel on frame (1).
3. Install grease fitting (6) on end of axle shaft (5).
4. Apply coat of grease to bearing surface of axle shaft (5) and install axle shaft through frame (1) and bogie wheel (2). Rotate axle shaft, as necessary, until fully seated.
5. Rotate axle shaft (5) an additional 180 degrees and install allen head screw (4).
6. Move each of two O-rings (3) over to snap into notch between wheel (2) hub and frame (1).

BOGIE WHEEL INSTALLATION - CONTINUED

7. Start engine (TM 10-3930-675-10).
8. Lubricate bogie wheels (WP 0050 00).
9. Raise bogie wheels (2) (TM 10-3930-675-10).

HYDRAULIC CYLINDERS REMOVAL



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connectors prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag hydraulic lines for installation.

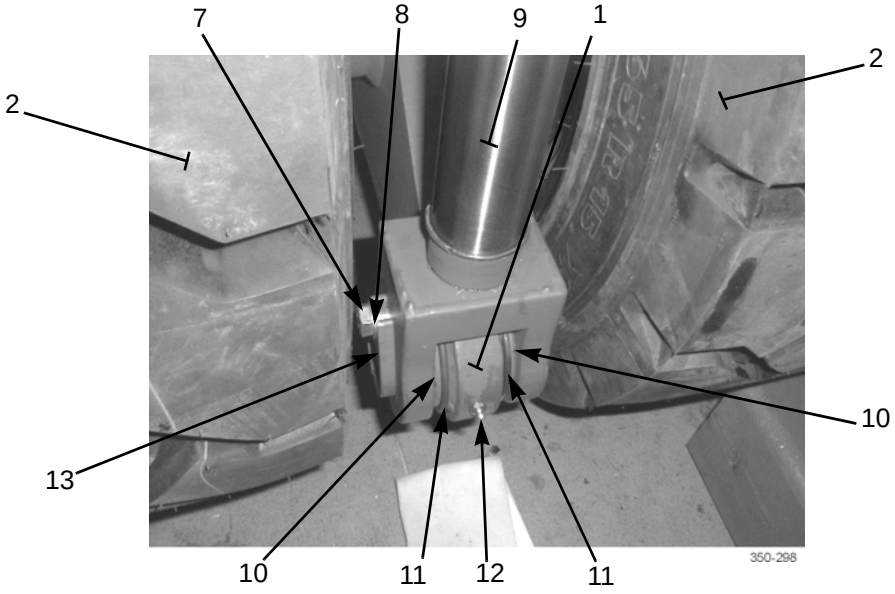
1. Remove bogie wheels (refer to *Bogie Wheel Removal*).

HYDRAULIC CYLINDERS REMOVAL - CONTINUED

NOTE

If bogie wheel frame is to be removed from vehicle after hydraulic cylinders are removed, support bogie wheel frame with nylon sling and overhead lifting device instead of wood blocks.

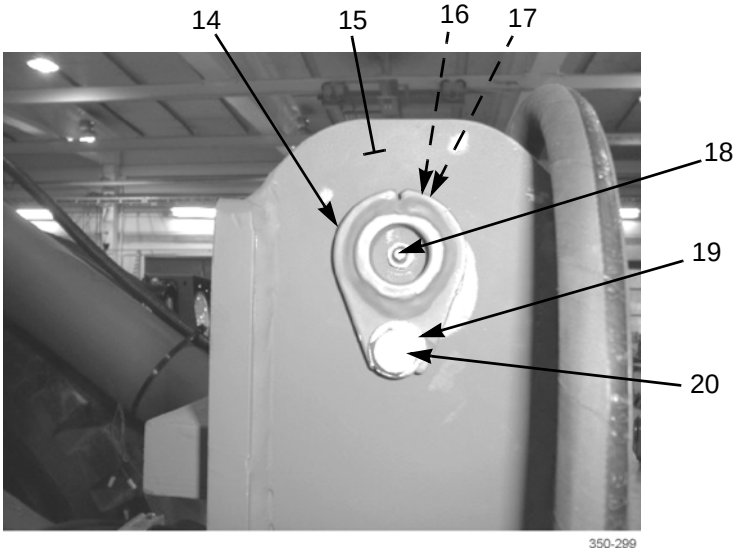
2. Support frame (1) with wood blocks.
3. Disconnect hydraulic hoses from each of two hydraulic cylinders (9).



NOTE

Perform steps 4 thru 6 at top end of each hydraulic cylinder.

4. Remove screw (20) and washer (19) from end of upper pin (14).
5. Remove upper pin (14), two washers (16), and O-rings (17) from vehicle frame (15). Retain O-rings if not damaged.
6. Remove grease fitting (18) from upper pin (14).



HYDRAULIC CYLINDERS REMOVAL - CONTINUED

NOTE

Perform steps 7 and 8 at bottom end of each hydraulic cylinder.

7. Remove screw (7) and washer (8) from end of lower pin (13).
8. Remove lower pin (13), two washers (10), and O-rings (11) from frame (1) and hydraulic cylinders (9). Remove hydraulic cylinder. Retain O-rings if not damaged.
9. Remove grease fitting (12) from frame (1) as necessary.

HYDRAULIC CYLINDERS INSTALLATION

1. If removed, install grease fitting (12) on frame (1).
2. Position two hydraulic cylinders (9) on vehicle.

NOTE

Perform steps 3 and 4 at lower end of each hydraulic cylinder.

3. Install two O-rings (11), washers (10) and hydraulic cylinder (9) on frame (1) and install lower pin (13).
4. Install washer (8) and screw (7) on end of lower pin (13).

NOTE

Perform steps 5 thru 7 at upper end of each hydraulic cylinder.

5. Install grease fitting (18) on upper pin (14).
6. Install two O-rings (17), washers (16), and hydraulic cylinder (9) on vehicle frame (15) and install upper pin (14).
7. Install washer (19) and screw (20) on end of upper pin (14).
8. Connect hydraulic hoses to each of two hydraulic cylinders (9).

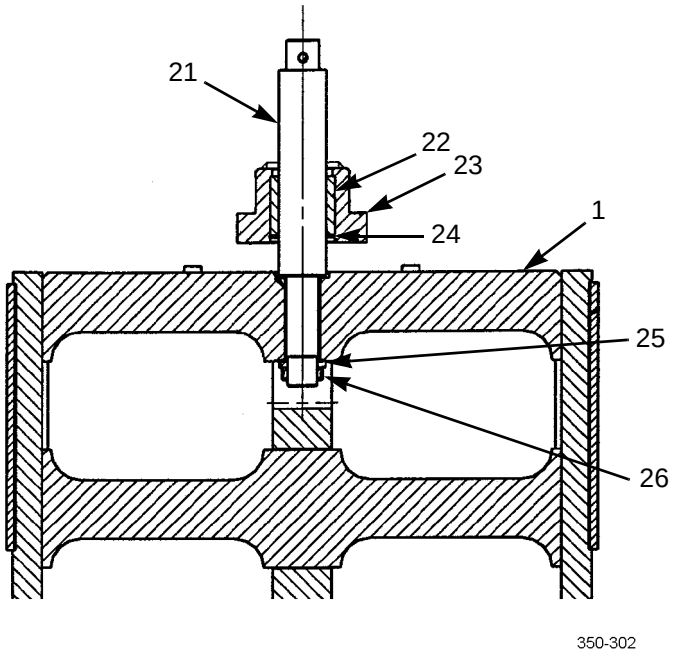
NOTE

Remove wood blocks, or nylon sling and overhead lifting device, as bogie wheels are installed.

9. Install bogie wheels (2) (refer to *Bogie Wheel Installation*).
10. Apply grease to grease fittings (WP 0050 00).
11. Check level of oil in hydraulic reservoir (WP 0050 00).
12. Raise bogie wheels (TM 10-3930-675-10).

SCREW ASSEMBLY REMOVAL

1. Lower bogie wheels (TM 10-3930-675-10).
2. Remove two locknuts (26) and ring (25) from lower end of screw (21).
3. Lift screw (21) assembly out of frame (1).
4. Remove swivel lock (23) assembly from screw (21).
5. Remove retaining ring (24) from swivel lock (23) and press out nut (22).



SCREW ASSEMBLY INSTALLATION

1. Press nut (22) into swivel lock (23) and install retaining ring (24).
2. Install swivel lock (23) assembly on screw (21).
3. Position screw (21) assembly on frame (1).

NOTE

After installation of ring and two locknuts, screw must be able to rotate freely in frame. Adjust position of two locknuts as necessary.

4. Install ring (25) and two locknuts (26) on lower end of screw (21). Tighten one locknut against the other.
5. Apply grease to frame grease fitting (WP 0050 00).
6. Raise bogie wheels (TM 10-3930-675-10).

BOGIE WHEEL FRAME REMOVAL

NOTE

To remove bogie wheel frame, clearance between ground and vehicle frame at rear of vehicle must be at least 40 in. (100 cm). Position rear of vehicle on ramps or over maintenance location that provides proper clearance.

1. Remove hydraulic cylinders (refer to *Hydraulic Cylinders Removal*).
2. Remove screw assembly (refer to *Screw Assembly Removal*).
3. Lower frame (1) to ground and remove nylon sling.
4. Remove frame (1) from under vehicle.

BOGIE WHEEL FRAME INSTALLATION

1. Position frame (1) under vehicle.
2. Install nylon sling on top of frame (1) and attach nylon sling to overhead lifting device.
3. Raise frame (1) and guide frame into vehicle.
4. Continue to raise frame (1) until frame is positioned in vehicle.
5. Install screw assembly (refer to *Screw Assembly Installation*).
6. Install hydraulic cylinders (refer to *Hydraulic Cylinders Installation*).
7. Remove nylon sling with overhead lifting device from top of frame (1) and position vehicle on level ground.

END OF WORK PACKAGE

STEERING COLUMN REPAIR 0234 00

THIS WORK PACKAGE COVERS

Disassembly, Assembly

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

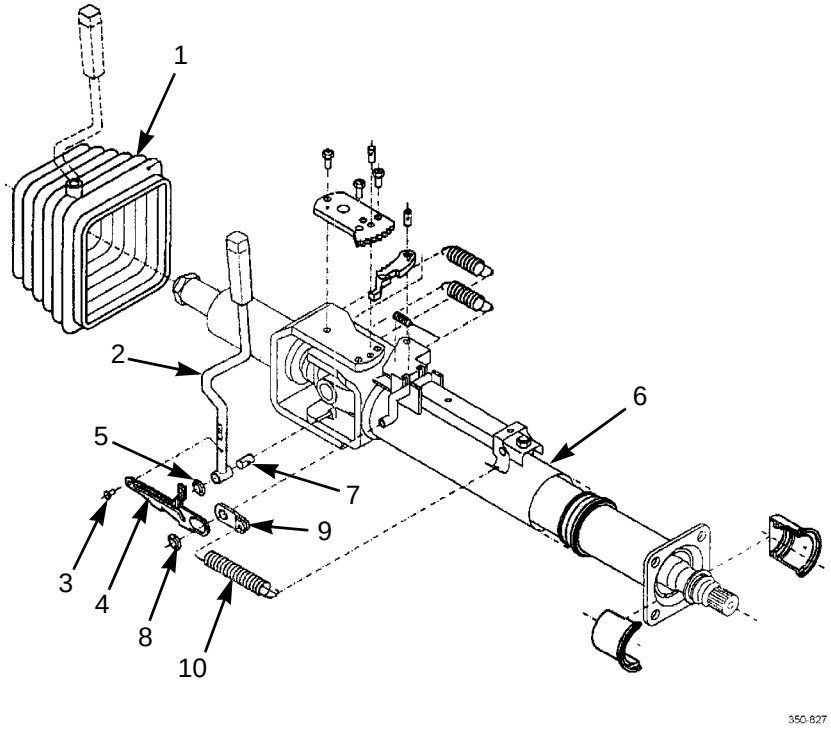
Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Equipment Condition

Steering column removed (WP 0133 00)

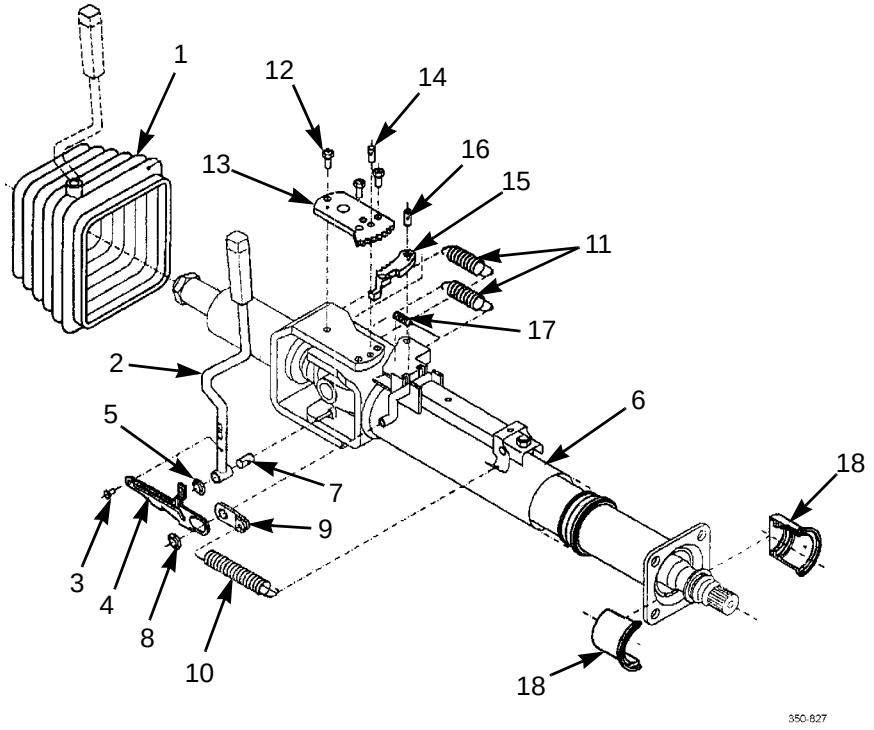
DISASSEMBLY

1. Lift edge of rubber bellows (1) to expose inner end of tilt lever (2).
2. Remove screw (3) to disconnect end of link (4) from tilt lever (2).
3. Remove nut (5), tilt lever (2), and rubber bellows (1) from steering column (6). Remove rubber bellows and bushing (7) from tilt lever.
4. Remove pushnut (8), link (4), connector (9), and spring (10) from steering column (6).



DISASSEMBLY - CONTINUED

5. Remove two springs (11).
6. Remove three screws (12), plate (13), and pin (14).
7. Remove locking plate (15), pin (16), and spring (17).
8. Remove two halves of bearing (18) from end of steering column (6).



ASSEMBLY

1. Install two halves of bearing (18) to end of steering column (6).
2. Install spring (17), pin (16), and locking plate (15) on steering column (6).
3. Install pin (14) and plate (13) with three screws (12).
4. Install two springs (11).
5. Install spring (10), connector (9), link (4), and pushnut (8).
6. Install bushing (7) on tilt lever (2) and position tilt lever through rubber bellows (1).
7. Install tilt lever (2), with rubber bellows (1), on steering column (6) with nut (5).
8. Connect end of link (4) to tilt lever (2) with screw (3).
9. Install steering column (WP 0133 00).

END OF WORK PACKAGE

EMERGENCY STEERING PUMP REPLACEMENT 0235 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Adjustable (Item 135, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Sealant, Pipe (Item 33, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

O-ring (P/N 923899.0521)

References

TM 10-3930-675-10

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Steering hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Emergency steering pump is located on lower right rear surface of transmission.**
- **Tag all hydraulic lines.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

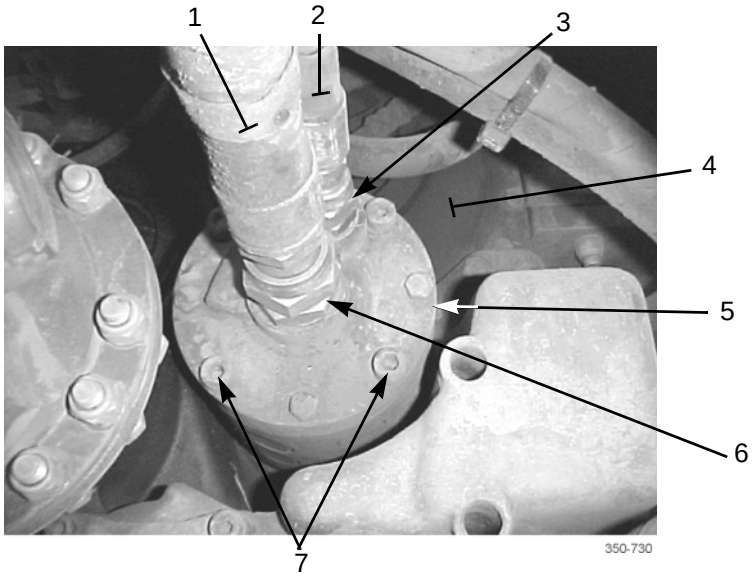
REMOVAL

1. Trace supply hose (1) back to hydraulic reservoir. Close ball valve in supply hose at reservoir.
2. Disconnect hose (2) from fitting (3).
3. Disconnect supply hose (1) from fitting (6).
4. Remove four screws (7) and pump (5) from transmission (4).

NOTE

Perform step 5 to remove fittings from pump, if a new pump is being installed.

5. Remove fittings (3 and 6) from pump (5).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Ensure a light coat of sealant is applied to fitting threads.**
- **Perform step 1 to install fittings removed from old pump, if a new pump is being installed.**

1. Install fittings (3 and 6) in pump (5).
2. Install pump (5) on transmission (4) with four screws (7).
3. Connect supply hose (1) to fitting (6).
4. Connect hose (2) to fitting (3).
5. Open ball valve at reservoir for supply hose (1).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Install new tiedown straps as necessary to support hydraulic hoses.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

STEERING CONTROL VALVE REPLACEMENT 0236 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Steering hydraulic system pressure relieved (WP 0164 00)

Transmission access covers removed (WP 0142 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

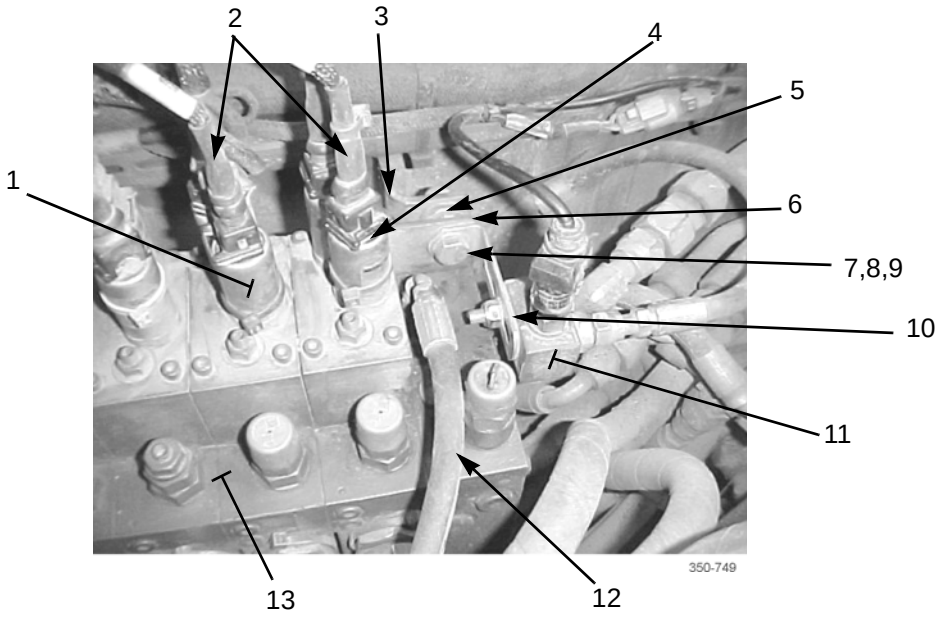
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines, fittings, and electrical leads.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

REMOVAL

1. Press in on eight retaining clips (4) and disconnect eight electrical leads (2) from solenoids (1).



2. Disconnect 12 hoses (12) from fittings (14) at control valve (13).

WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Steering control valve weighs approximately 100 lb (45 kg). Lifting device must have sufficient capacity to lift control valve. Failure to follow this warning may result in injury to personnel.**

3. Wrap a nylon sling around control valve (13) and attach sling to a suitable lifting device.

4. Remove four nuts (7), screws (8), eight washers (9), spacers (5), and control valve (13) with plate (6) from two welded angle brackets (3). Set solenoid valve (11) with bracket (10) aside.

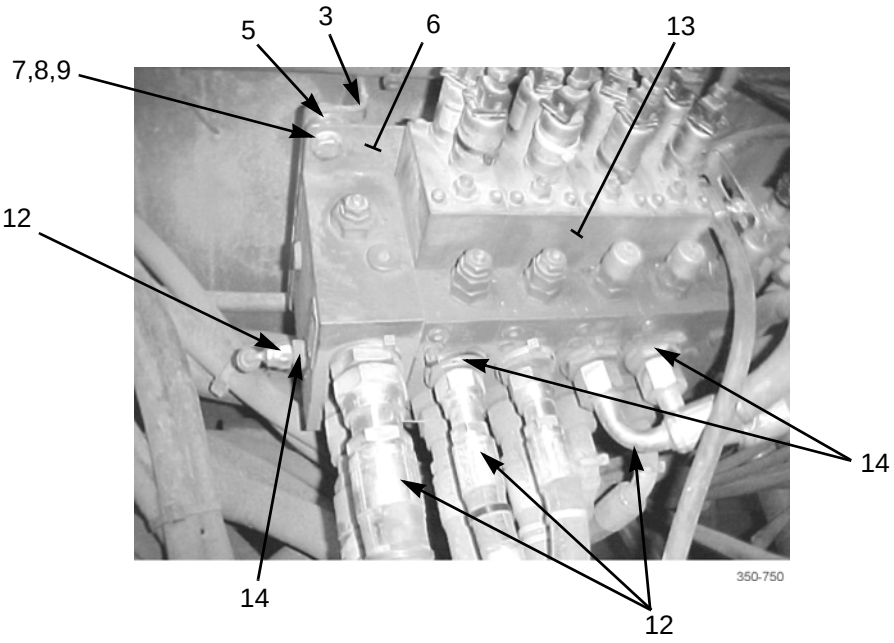
5. Remove four screws and washers and separate control valve (13) from plate (6).

NOTE

Perform step 6 to remove fittings from control valve, if a new control valve is being installed.

6. Remove 12 fittings (14) from control valve (13).

REMOVAL - CONTINUED



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install 12 fittings (14) in control valve (13).
2. Install control valve (13) on plate (6) with four washers and screws.



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Steering control valve weighs approximately 100 lb (45 kg). Lifting device must have sufficient capacity to lift control valve. Failure to follow this warning may result in injury to personnel.**

3. With a nylon sling wrapped around control valve (13) and sling supported by a suitable lifting device, position control valve with plate (6) and spacers (5) at two welded angle brackets (3). Position solenoid valve (11) with bracket (10). Install four screws (8), eight washers (9), and four nuts (7).
4. Connect 12 hoses (12) to fittings (14) at control valve (13).
5. Connect eight electrical leads (2) to solenoids (1).

INSTALLATION - CONTINUED

6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10), operate steering system, and check for leaks.
8. Recheck oil level in hydraulic reservoir (WP 0050 00).
9. Install new tiedown straps as necessary to support hydraulic hoses.
10. Install transmission access covers (WP 0142 00).
11. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

STEERING ACCUMULATOR REPLACEMENT 0237 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Nut, lock (P/N 920076.003) (4)

References

WP 0050 00

WP 0185 00

WP 0231 00

WP 0284 00

Equipment Condition

Steering hydraulic system pressure relieved (TM 10-3930-675-20)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

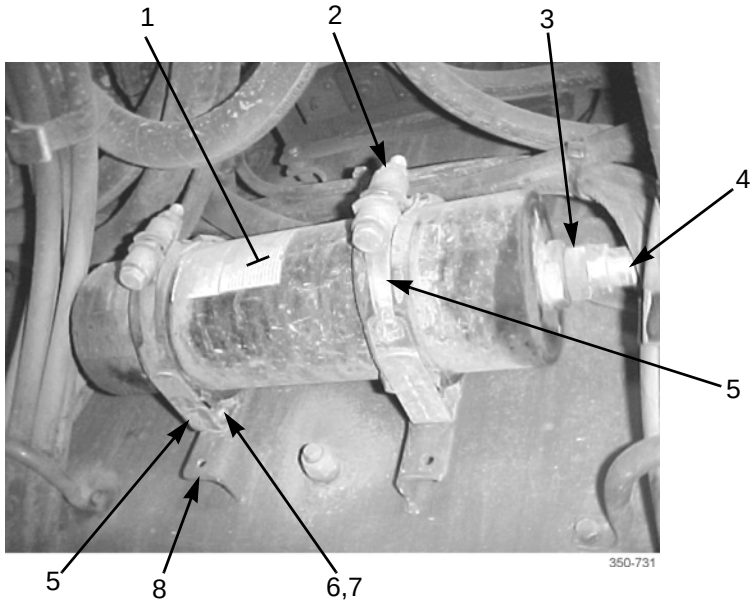
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Steering accumulator is located on inside of left-side frame.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hose.**

REMOVAL

1. Disconnect hose (4) from fitting (3).
2. Remove two nuts (2) and loosen clamps (5).
3. Remove accumulator (1) from clamps (5).
4. If damaged, remove four locknuts (6), screws (7), and two clamps (5) from welded angle brackets (8). Discard locknuts.
5. If replacing accumulator (1), remove fitting (3) from accumulator.
6. If accumulator is unserviceable, ensure it is drained of nitrogen before disposal (WP 0231 00).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. If installing a new accumulator (1), install fitting (3) on accumulator.
2. If removed, install two clamps (5) on welded angle brackets (8) with four screws (7) and new locknuts (6).
3. Position accumulator (1) inside clamps (5) and install and tighten two nuts (2).
4. Connect hose (4) to fitting (3).
5. Verify accumulator pre-charge pressure and charge as required (WP 0231 00).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10), operate steering, and check for leaks.
8. Recheck oil level in hydraulic reservoir (WP 0050 00).
9. Install new tiedown straps as necessary to support hydraulic hoses.

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

STEERING CALIBRATION 0238 00

THIS WORK PACKAGE COVERS

Calibration

INITIAL SETUP

Maintenance Level

Direct Support

References

TM 10-3930-675-10

Tools and Special Tools

Tape, Measuring (Item 119, WP 0289 00)

NOTE

- **When calibrating the steering system, perform all ten calibration steps in order. DO NOT skip or omit any steps.**
- **RTCH must be parked on level ground with all wheels pointing straight ahead.**
- **RTCH wheels are numbered as follows during calibration procedures:**
  - **a. Right front wheel is no. 1**
  - **b. Right rear wheel is no. 2**
  - **c. Left rear wheel is no. 3**
  - **d. Left front wheel is no. 4**

CALIBRATION

1. **Access to Calibration Menus.**
   a. Turn master battery switch to ON position.
   b. Turn ignition ON and start truck.
   c. Select KALMAR service menu on driver's Electronic Control System (ECS) display screen and press "Enter".
   d. Enter calibration program access number "13221" and press "Enter".
   e. Press right arrow button to locate "CALIBR STEERING" menu, then press "Enter".
2. **Emergency Steering System Turning Speed Calibration (Menu 1 of 10).**
   a. Press value increase "+" or value decrease "-" buttons until a value of "60" is displayed on ECS display screen.
   b. When value of "60 "is displayed, press "Enter". ECS display screen should look as shown:

CALIBR STEERING	1 (10)
TURNING SPEED FOR BUTTON STEERING	60

   c. Press right arrow button to advance through remaining steering system calibration menus.

CALIBRATION - CONTINUED

3. **Steering System Hydraulic and Electrical Connections Check (Menu 2 of 10).**

   a. Pressing value increase "+" button will result in wheel no.1 (RF) moving to the right and an increase of values on ECS display screen.

   b. Pressing value decrease "-" button will result in wheel no.1 moving to the left and a decrease of values on ECS display screen. ECS display screen should look as shown:

CALIBR STEERING	2 (10)
AXLE 1	
ADJUST WHEEL	X
ANGLE	X

Range 0 +/-5

   c. Press right arrow button to advance thru remaining steering system calibration menus.

4. **Steering Cylinder No. 1 Calibration (Menu 3 of 10).**

   a. Steering cylinders position must be manually checked by measuring cylinder length. Measurement should be taken from center-to-center of cylinder mounting pins. Correct length is 31 5/16 in. (796 mm). If length is incorrect, adjust steering cylinder for wheel no.1 (RF) by pressing increase "+" or decrease "-" buttons.

   b. Press "Enter".

   c. Recheck steering cylinder position. Correct length should be 31 5/16 in. (796 mm).

   d. ECS display screen should look as shown:

CALIBR STEERING	3 (10)
AXLE 1	
SET WHEEL	0
ANGLE	0

   e. Press right arrow button to advance thru remaining steering system calibration menus.

5. **Steering System Hydraulic and Electrical Connections Check (Menu 4 of 10).**

   a. Pressing value increase "+" button will result in wheel no. 2 (RR) moving to the right and an increase of values on ECS display screen.

   b. Pressing value decrease "-" button will result in wheel no. 2 moving to the left and a decrease of values on ECS display screen. ECS display screen should look as shown:

CALIBR STEERING	4 (10)
AXLE 2	
ADJUST WHEEL	0
ANGLE	0

Range 0 +/-5

   c. Press right arrow button to advance through remaining steering system calibration menus.

CALIBRATION - CONTINUED

6. **Steering Cylinder No. 2 Calibration (Menu 5 of 10).**

   a. Steering cylinder position must be manually checked by measuring cylinder length. Measurement should be taken from center-to-center of cylinder mounting pins. Correct length is 34 in. (868 mm). If length is incorrect, adjust steering cylinder for wheel no. 2 (RR) by pressing increase "+" or decrease "-" buttons.

   b. Press "Enter".

   c. Recheck steering cylinder position. Correct length should be 34 in. (868 mm).

   d. ECS display screen should look as shown:

CALIBR STEERING	5 (10)
AXLE 2	
SET WHEEL	0
ANGLE	0

   e. Press right arrow button to advance through remaining steering system calibration menus.

7. **Steering System Hydraulic and Electrical Connections Check (Menu 6 of 10).**

   a. Pressing value increase "+" button will result in wheel no. 3 (LR) moving right and an increase of values on ECS display screen.

   b. Pressing value decrease "-" button will result in wheel no. 3 moving left and a decrease of values on ECS display screen. ECS display screen should look as shown:

CALIBR STEERING	6 (10)
AXLE 3	
ADJUST WHEEL	0
ANGLE	0

Range 0 +/-5

   c. Press right arrow button to advance through remaining steering system calibration menus.

8. **Steering Cylinder No. 3 Calibration (Menu 7 of 10).**

   a. Steering cylinder position must be manually checked by measuring cylinder length. Measurement should be taken from center-to-center of cylinder mounting pins. Correct length is 34 in. (868 mm). If length is incorrect, adjust steering cylinder for wheel no. 3 (LR) by pressing increase "+" or decrease "-" buttons.

   b. Press "Enter".

   c. Recheck steering cylinder position. Correct length should be 34 in. (868 mm).

   d. ECS display screen should look as shown:

CALIBR STEERING	7 (10)
AXLE 3	
SET WHEEL	0
ANGLE	0

   e. Press right arrow button to advance through remaining steering system calibration menus.

CALIBRATION - CONTINUED

9. **Steering System Hydraulic and Electrical Connections Check (Menu 8 of 10).**

   a. Pressing value increase "+" button will result in wheel no. 4 (LF) moving right and an increase of values on ECS display screen.

   b. Pressing value decrease "-" button will result in wheel no. 4 moving left and a decrease of values on ECS display screen. ECS display screen should look as shown:

CALIBR STEERING	8 (10)
AXLE 4 ADJUST WHEEL ANGLE	 0 0

Range 0 +/-5

   c. Press right arrow button to advance through remaining steering system calibration menus.

10. **Steering Cylinder No. 4 Calibration (Menu 9 of 10).**

   a. Steering cylinder position must be manually checked by measuring cylinder length. Measurement should be taken from center-to-center of cylinder mounting pins. Correct length is 31 5/16 in. (796 mm). If length is incorrect, adjust steering cylinder for wheel no. 4 (LF) by pressing increase "+" or decrease "-" buttons.

   b. Press "Enter".

   c. Recheck steering cylinder position. Correct length should be 31 5/16 in. (796 mm).

   d. ECS display screen should look as shown:

CALIBR STEERING	9 (10)
AXLE 4 SET WHEEL ANGLE	 0 0

   e. Press right arrow button to advance to remaining steering system calibration menu.

11. **Calibration of Steering System Completed (Menu 10 of 10).**

   a. With all calibration steps complete and corrections or adjustments made, press "Enter" to return to main menu.

   b. ECS display screen should look as shown:

CALIBR STEERING	10 (10)
CALIBRATION OF STEERING DONE	 ENTER

12. Turn off engine and restart to save data.

END OF WORK PACKAGE

LOCKING PIN BUSHING REPLACEMENT 0239 00

THIS WORK PACKAGE COVERS

Frame Bushings: Removal, Installation

Cleaning and Inspection

Boom Support Bushings: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Locktite 242

Locktite 603

Materials/Parts - Continued

Bushing Kit (P/N 12J1447 and 12J1448)

Bushings (P/N 920070.043)

Personnel Required

Two

References

WP 0050 00

WP 0254 00

WP 0281 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Boom support in transport position (TM 10-3930-675-10)

FRAME BUSHINGS REMOVAL



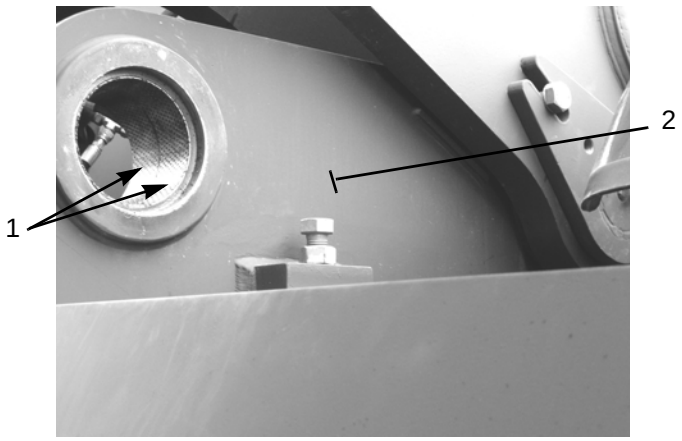
WARNING

Work will be performed around the exhaust pipe and muffler. To prevent injury, allow the exhaust system to cool before starting this procedure.

CAUTION

- **Take care not to scar or damage the bushing bore in the frame.**
- **If bushing is damaged, collapse it with common tools.**

Remove two bushings (1) from frame (2). Discard damaged bushings.



350-0048

CLEANING AND INSPECTION

1. Clean bushing bore of old locktite and smooth any scratches.
2. Clean bore with oil free solvent.
3. Dry with compressed air.



WARNING

- **Solvent cleaning compound MIL-PRF-680 Type III is an environmentally compliant and low-toxic material. However, it may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well-ventilated areas. Keep away from open flames and other sources of ignition. Failure to do so may result in injury or death to personnel.**
- **Particles blown by compressed air are hazardous. DO NOT exceed 15 psi (103 kPa) nozzle pressure when drying parts with compressed air. DO NOT direct compressed air against human skin. Failure to follow this warning may result in injury to personnel. Make sure air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield.**

FRAME BUSHINGS INSTALLATION

NOTE

Bushings are installed from the inside and outside of the frame.

1. Lightly coat outside of new bushings (1) and bushing bore in frame (2) with 603 locktite.
2. Place one new bushing (1) on installation tool and center in frame bushing bore and lightly tap tool to get bushing started and centered.
3. With bushing aligned, hold pressure on tool and press against bushing while it is being driven/hammered into bore until tool bottoms out against frame.

CAUTION

When installing the second bushing, drive it in only until it contacts the first bushing in the center of the frame. Do not drive it in until the bushing driver seats against the frame. Failure to follow this caution may cause distortion of bushings and binding of locking pin. This could cause the locking pin not to move or the bushing to be pushed out of the bore.

NOTE

Ensure that seams of the bushings are <u>not</u> aligned with each other.

4. Install second bushing (1) from opposite side of frame (2). Drive in until it makes contact with first bushing.
5. Clean inside of bushings (1) of excess locktite that may have seeped through holes in bushings.

NOTE

Allow locktite to cure for 24 hours before the locking pins are extended into bushings.

6. Apply a thin coat of GAA to locking pins and bushings.
7. Return boom and cab to operational position (TM 10-3930-675-10).

BOOM SUPPORT BUSHINGS REMOVAL

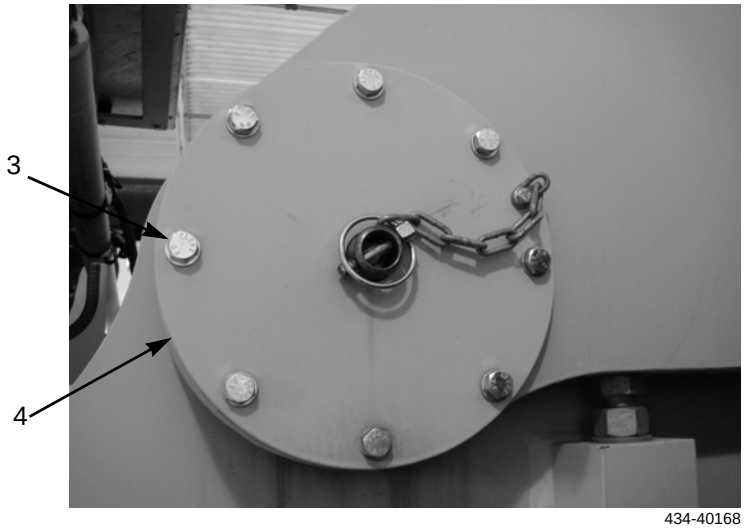
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

- **Locking pin weighs 65 lb (29 kg).**
- **Locking pin support weighs 35 lb (16 kg).**

1. If removing inside bushings only, locking pin and locking pin support must first be removed (WP 0254 00).
2. If removing outside bushings only, the outside cover must be removed and locking pins must be retracted (WP 0281 00).
3. Remove eight capscrews (3) and outside cover (4).



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4. Remove large clamp (8) from protection bellows (7) on cylinder end of locking pin (5) of inside boom support (11).
5. Slide bellows (7) toward boom support (12) to expose locking pin (5).
6. Remove upper snap ring (6) from locking pin (5).
7. Tap pin on end using hammer and drift pin to push it through and out of locking pin (5).

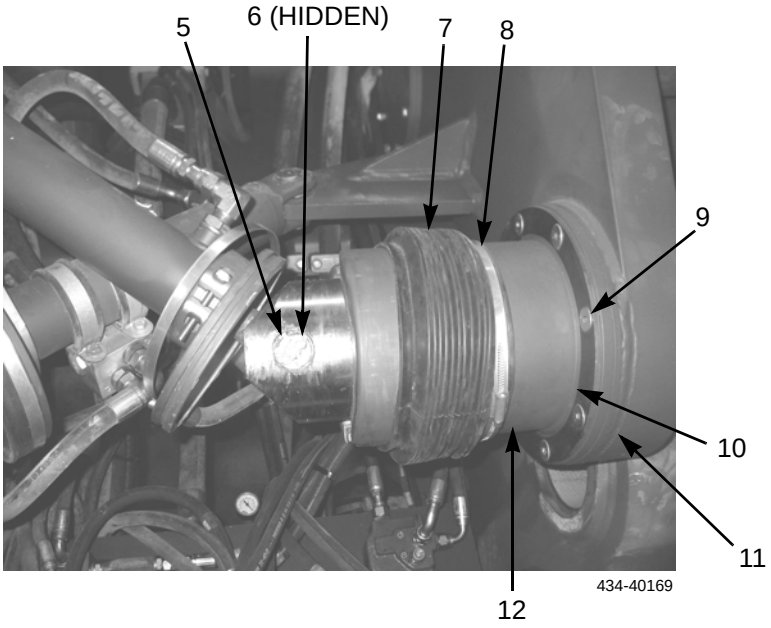
NOTE

Do not disconnect hoses or other end of cylinder.

8. Rotate disconnected cylinder end away from locking pin (5).
9. Remove locking pin (5) from locking pin support (12) and place in a protected area.
10. Remove eight flat socket head capscrews (9) from locking pin support (12).

BOOM SUPPORT BUSHINGS REMOVAL - CONTINUED

11. Remove retaining ring (10) and locking pin support (12) and set aside.



NOTE

- **Support weighs 35 lb (16 kg).**
- **Take care not to scar or damage bushing bore in the boom support.**
- **If bushing is damaged, it may be collapsed and removed with common tools.**

12. Clean bushing bore in the boom support as in *Cleaning and Inspection*.

BOOM SUPPORT BUSHINGS INSTALLATION

NOTE

Bushings must be installed from the inside and outside of the boom support towards the center of the support legs.

1. Lightly coat outside of new bushings (1) and bushing bore (3) in boom support (2) with 603 locktite.
2. Place one new bushing (1) on installation tool and center in boom support bushing bore. Lightly tap tool to get started and centered.
3. With bushing (1) aligned, hold pressure on tool and press against bushing while it is being driven/hammered into bore until tool bottoms out against boom support.

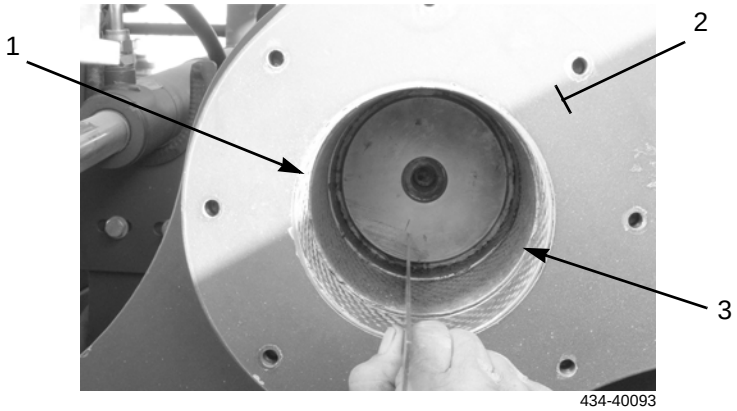
CAUTION

When installing the second bushing, drive it in only until it contacts the first bushing in the center of the boom support. Do not drive it in until the bushing driver seats against the boom support. Failure to follow this caution may cause distortion of bushings and binding of the locking pin. This could cause the locking pin not to move or the bushing to be pushed out of the bore.

NOTE

- **Ensure that seems of the bushings are <u>not</u> aligned with each other.**
- **Allow locktite to cure for 24 hours before the locking pins are extended into bushings.**

4. Install second bushing (1) from opposite side of boom support (2). Drive in until it makes contact with first bushing.
5. Clean inside of bushings (1) of excess locktite that may have seeped through holes in bushings.



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BOOM SUPPORT BUSHINGS INSTALLATION - CONTINUED

6. Install locking pin support (12) and retaining ring (10) on vehicle.
7. Install eight flat socket head capscrews (9) in retaining ring (10).
8. Install locking pin (5) into locking pin support (12).

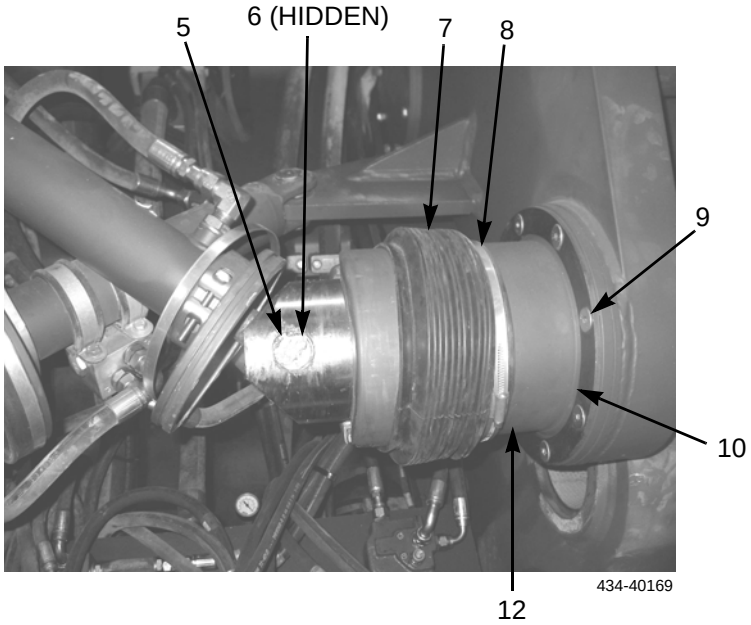
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

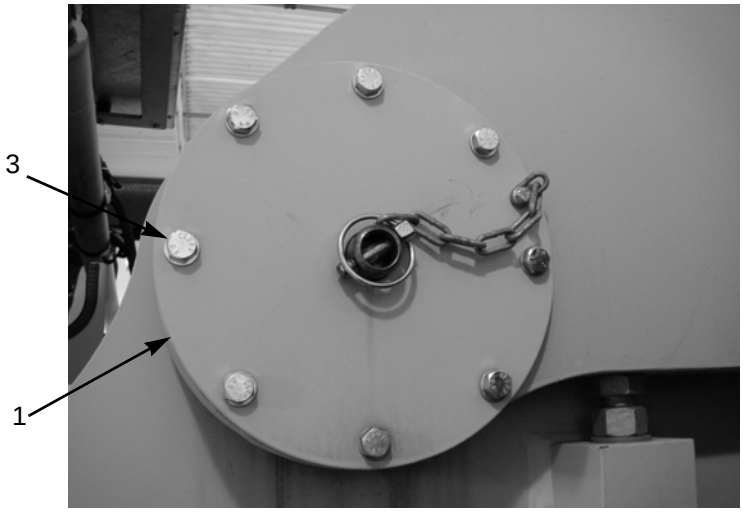
- **Locking pin weighs 65 lb (29 kg).**
- **Locking pin support weighs 35 lb (16 kg).**

9. Position locking pin (5) on cylinder end.
10. Tap locking pin (5) into place using hammer and drift pin.
11. Install upper snap ring (6) on locking pin (5).
12. Slide protection bellows (7) over locking pin (5).
13. Install large clamp (8) on protection bellows (7) on cylinder end of locking pin (5).



BOOM SUPPORT BUSHINGS INSTALLATION - CONTINUED

14. Install eight capscrews (3) and outside cover (4).



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15. Apply a thin coat of GAA to locking pins and bushings (WP 0050 00).
16. Adjust boom support-to-frame alignment (WP 0254 00).
17. Return boom and cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

CAB DOOR ASSEMBLY MAINTENANCE 0240 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Nut, lock (923863.7197) (4)

Materials/Parts - Continued

Nut, lock (923872.0391)

References

WP 0050 00

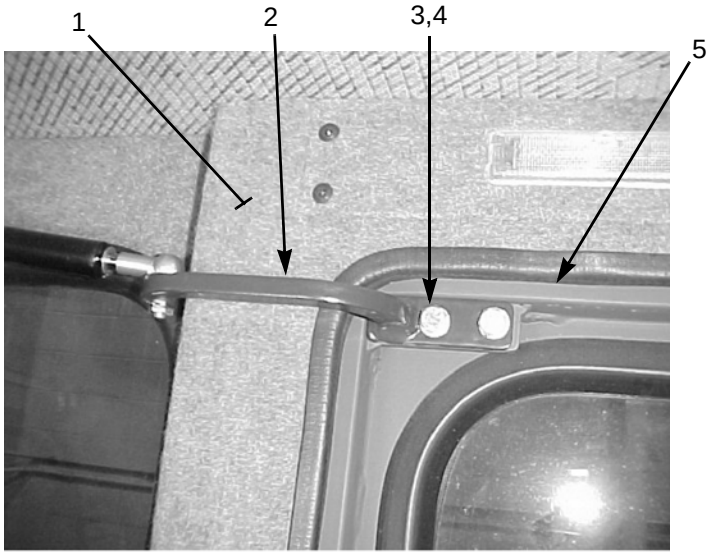
WP 0241 00

Personnel Required

Two

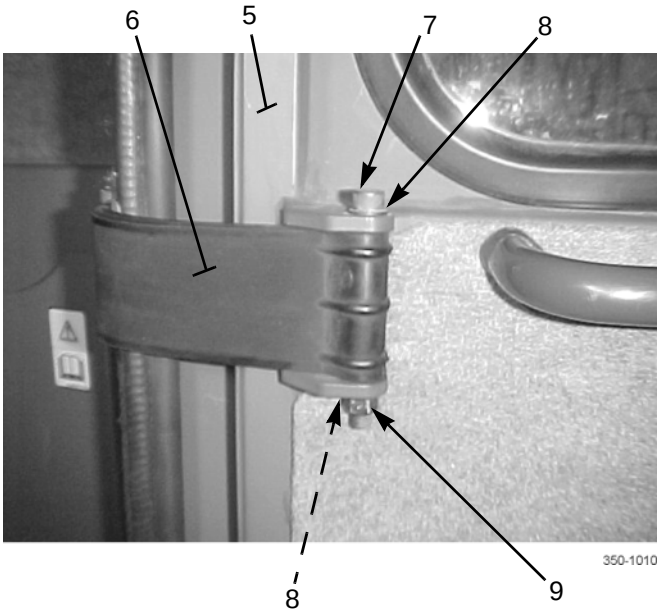
REMOVAL

1. From inside cab (1), with cab door (5) closed, remove two screws (3), washers (4), and yoke (2) from cab door.



REMOVAL - CONTINUED

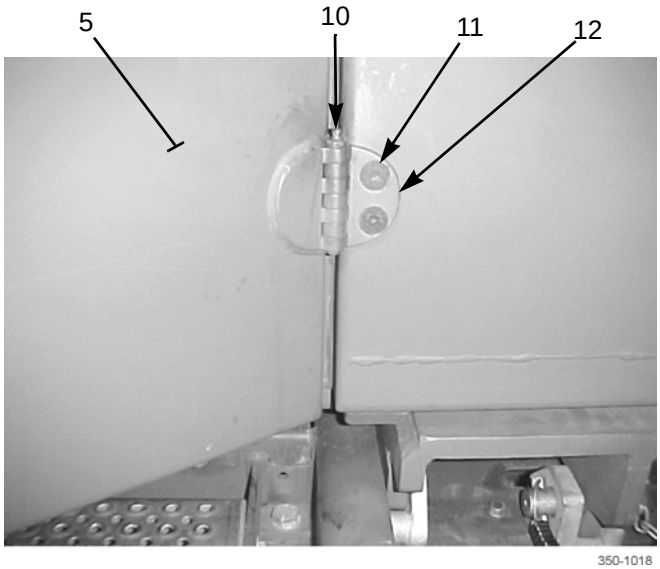
2. Remove locknut (9), two washers (8), screw (7), and door holder (6) from cab door (5). Discard locknut.



3. Partially open cab door (5) and, with assistance, remove four screws (11) and cab door from vehicle.

DISASSEMBLY

1. Remove grease fitting (10) from each of two cab door hinges (12).
2. Remove cab door window glass (WP 0241 00).

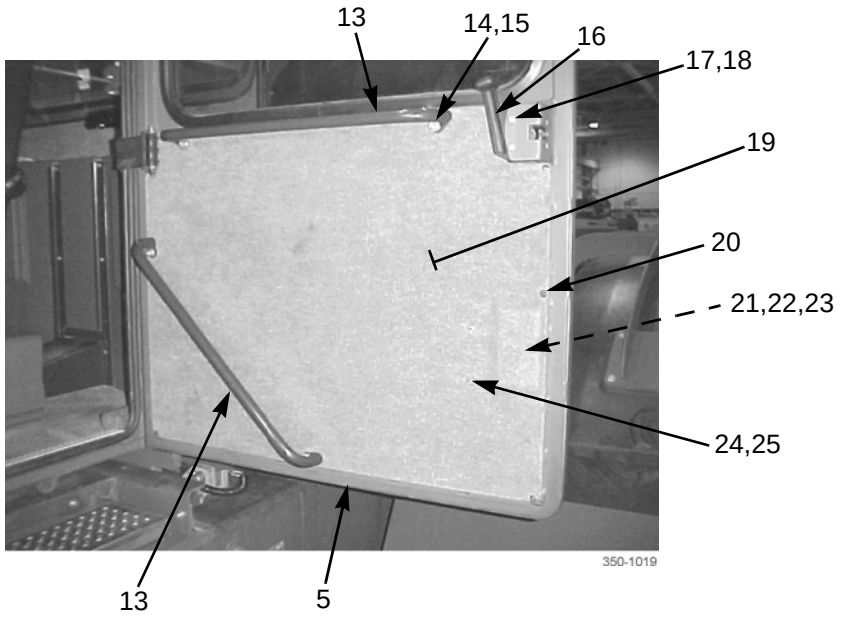


DISASSEMBLY - CONTINUED

NOTE

Perform step 3 for each of two handles.

3. Remove two screws (14), washers (15), and handle (13).
4. Remove four locknuts (17), screws (18), and door lock (16). Discard locknuts.
5. Remove two screws (24) and washers (25) from door panel (19).
6. Remove five screws (20) and door panel (19) from cab door (5).
7. Remove two screws (21), washers (22), and door latch (23).



ASSEMBLY

1. Install door latch (23) on cab door (5) with two washers (22) and screws (21).
2. Install door panel (19) with five screws (20).
3. Install two washers (25) and screws (24) on door panel (19).
4. Install door lock (16) with four screws (18) and new locknuts (17).

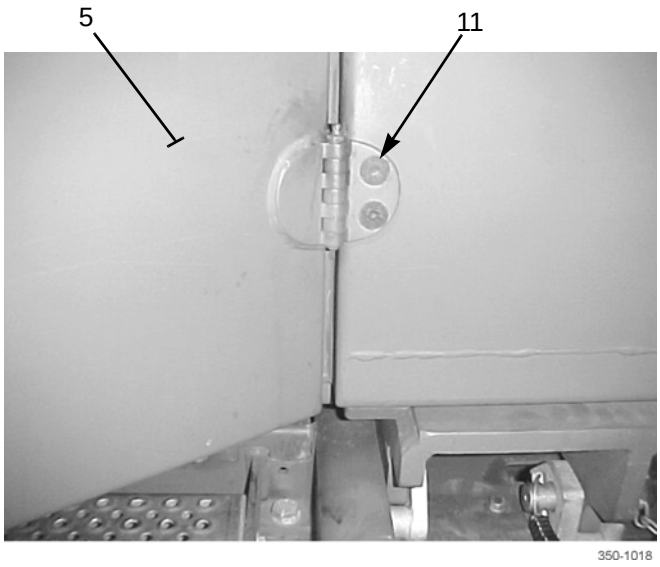
NOTE

Perform step 5 for each of two handles.

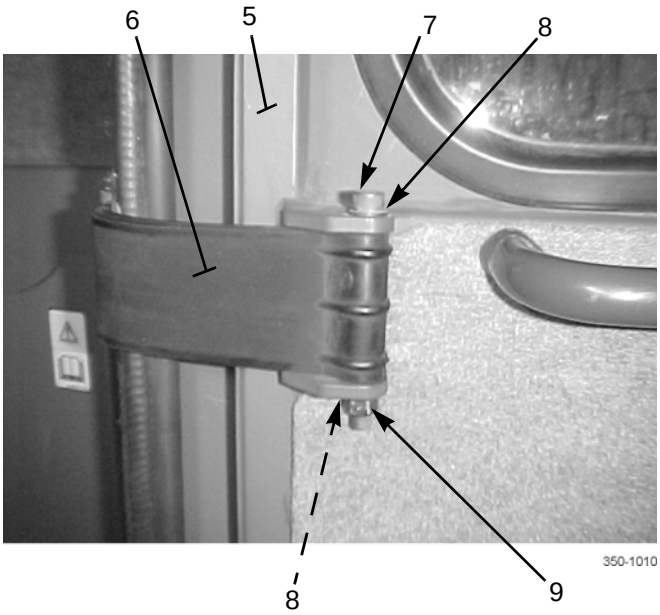
5. Install handle (13) with two washers (15) and screws (14).
6. Install cab door window glass (WP 0241 00).
7. Install grease fitting (10) in each of two cab door hinges (12).

INSTALLATION

1. With assistance, install cab door (5) on vehicle with four screws (11).

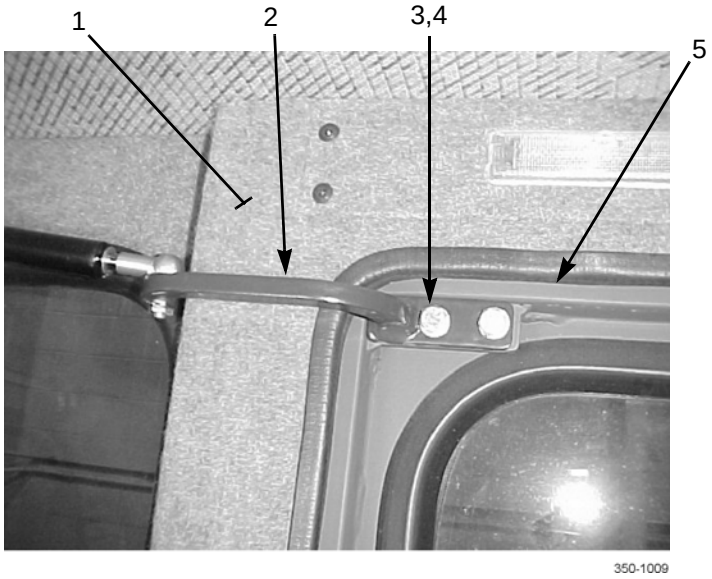


2. From inside cab (1), and with cab door (5) closed, install door holder (6) on cab door with screw (7), two washers (8), and new locknut (9).



INSTALLATION - CONTINUED

3. Install yoke (2) with two washers (4) and screws (3).



4. Lubricate cab door hinges (WP 0050 00).

END OF WORK PACKAGE

WINDSHIELD AND WINDOW GLASS REPLACEMENT 0241 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Dispenser, Sealant (Item 25, WP 0289 00)

Gloves, Welders, Leather (Item 48, WP 0289 00)

Materials/Parts

Detergent (Item 15, WP 0290 00)

Materials/Parts - Continued

Weatherseal (P/N 923828.0654)

Personnel Required

Two

Equipment Condition

Windshield wiper removed, as applicable (WP 0158 00)

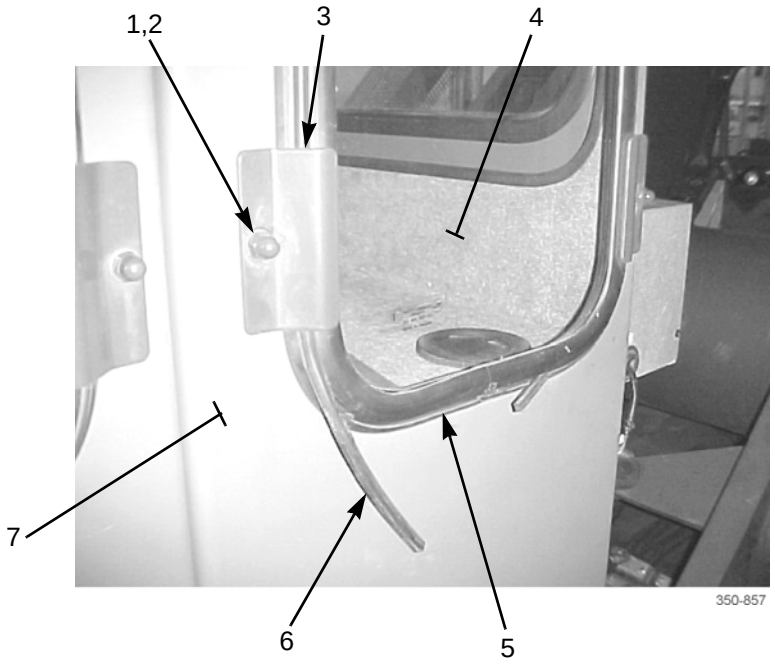


WARNING

- **Handle windshield and window glass with care. Dropping or handling windows roughly may cause window to shatter. Failure to follow this warning may result in injury to personnel.**
- **Wear gloves and face shield when handling windshield and window glass to protect against possible injury.**

REMOVAL

1. Remove four capnuts (1), washers (2), and brackets (3) from cab (7).
2. Trace locking strip (6) of weatherseal (5) to find where ends of locking strip join together.
3. Pry out one end of locking strip (6) and remove locking strip from weatherseal (5).
4. Starting at one INSIDE corner of window (4), pry up flange of weatherseal (5) while pressing outward on window.
5. Work around entire length of weatherseal (5), as necessary, until window (4) and weatherseal are removed from cab (7).
6. Remove weatherseal (5) from window (4).

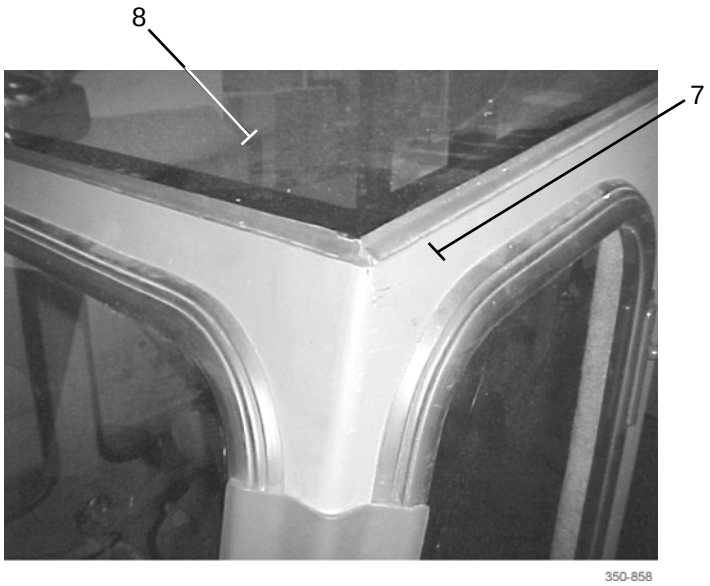


NOTE

Perform step 7 to remove cab roof window.

REMOVAL - CONTINUED

7. Cut through gasket forming compound of cab roof window (8) and remove cab roof window from cab (7).



INSTALLATION

NOTE

Perform steps 1 and 2 to install cab roof window.

1. Apply gasket forming compound to all four edges of cab roof window (8) and top of cab (7).
2. Position cab roof window (8) on cab (7). Reapply gasket forming compound as needed and smooth to a beveled finish.
3. Position length of weatherseal (5) on edge of window (4) and cut weatherseal so ends of weatherseal will meet in a straight line. Remove weatherseal.
4. Install weatherseal (5) on window (4) with recess for locking strip (6) facing toward outside of window.
5. Install locking strip (6) on weatherseal (5).
6. Lubricate weatherseal (5) with a solution of detergent and water.
7. Place window (4) with weatherseal (5) to outside of cab (7), with one lower corner of weatherseal installed on flange of cab.
8. Work around entire length of weatherseal (5) while gently pressing inward on window until weatherseal is fully installed on cab (7).
9. Install four brackets (3) with four washers (2) and capnuts (1).
10. Install windshield wiper, as applicable (WP 0158 00).

END OF WORK PACKAGE

TOPHANDLER AND STEERING HYDRAULIC PUMP ASSEMBLY REPLACEMENT 0242 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 920076.003) (3)

O-ring (P/N 920052.011) (2)

Materials/Parts - Continued

O-ring (P/N 3503) (7)

O-ring (P/N 3505)

O-ring (P/N 3507)

O-ring (P/N 5933) (4)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0243 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Steering hydraulic system pressure relieved (WP 0164 00)

Transmission access covers removed (WP 0142 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

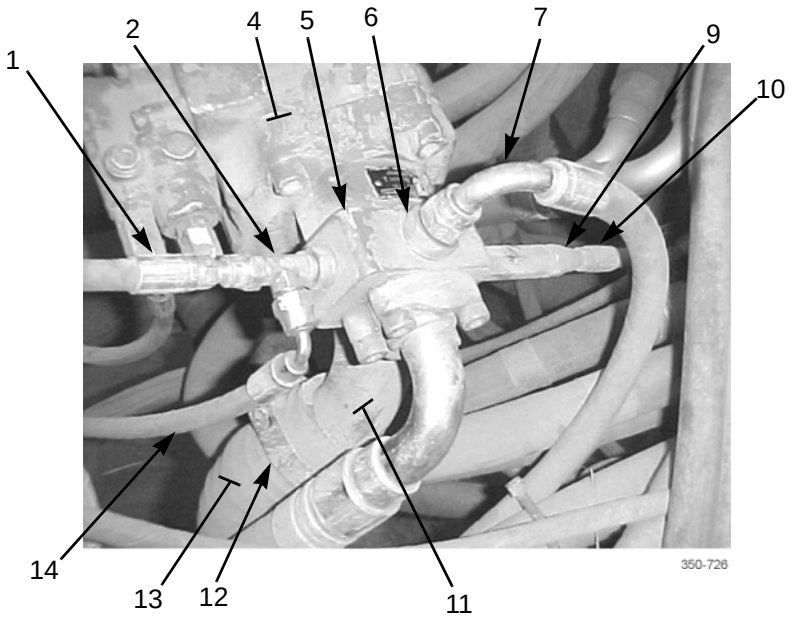
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Remove nylon straps and remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**
- **Tag all hydraulic lines.**

REMOVAL

1. Trace two supply hoses (13) under pump (4) back to hydraulic reservoir. Close ball valves in supply hoses at reservoir.
2. Loosen clamp (12) and disconnect supply hose (13) from hose (11). Also loosen two hose clamps and disconnect other supply hose from hose connection.
3. Disconnect hoses (1 and 14) from tee (2).
4. Disconnect hose (7) from fitting (6).
5. Disconnect hose (10) from fitting (9).

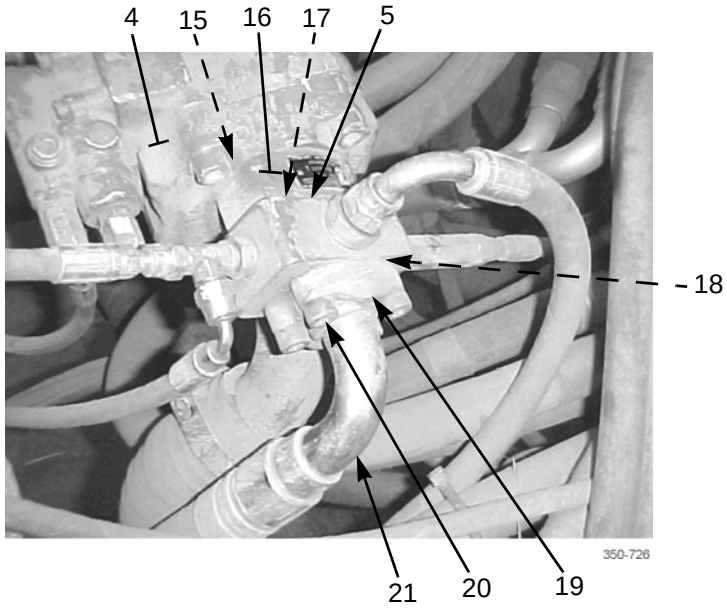


NOTE

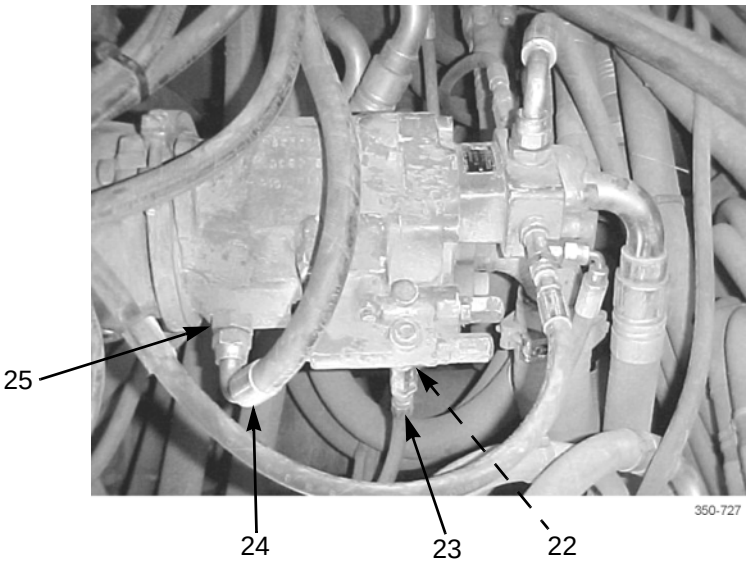
Witness mark terminal block, check valve, and pump to ensure correct installation.

6. Remove four screws (20), flange (19), hose (21), and O-ring (18) from terminal block (5). Discard O-ring.
7. Remove terminal block (5), O-ring (17), check valve (16), and O-ring (15) from pump (4). Discard O-rings.

REMOVAL - CONTINUED

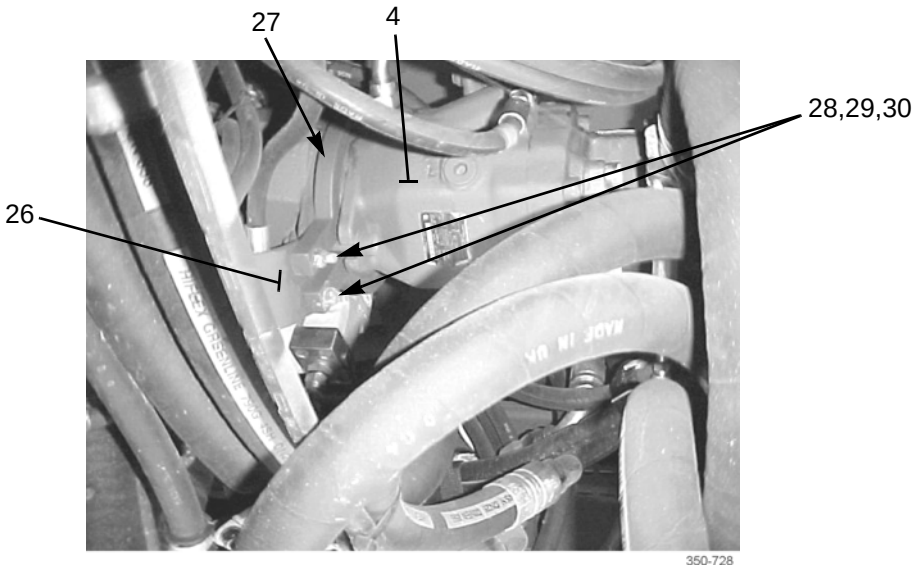


8. Disconnect two hoses (23 and 24) from fittings (22 and 25).

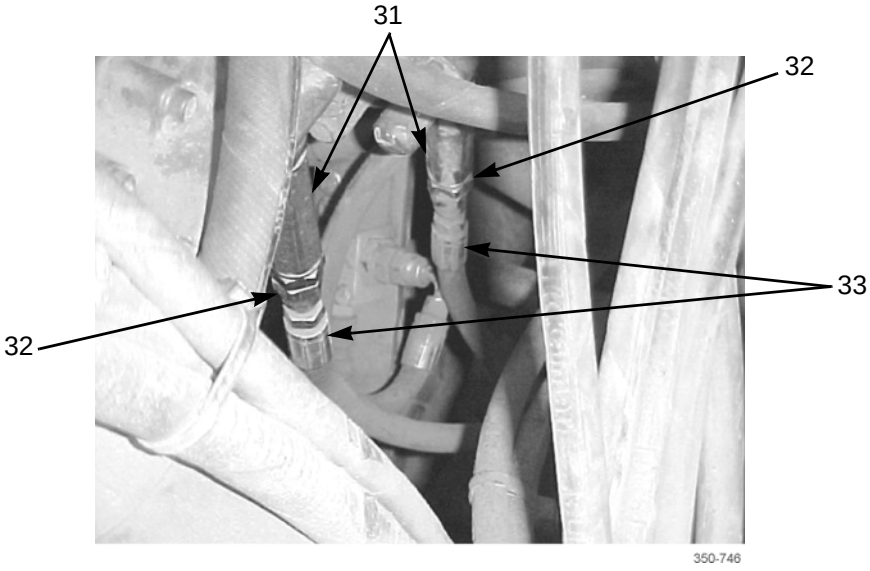


REMOVAL - CONTINUED

9. On underside of pump (4), remove two locknuts (28), washers (29), and screws (30) and release yoke (27) from brace (26). Discard locknuts.



10. Disconnect two hoses (33) from fittings (32) at check valves (31).



11. Disconnect two hoses (39) from fittings (40).

12. Disconnect two hoses (42) from tee (41).

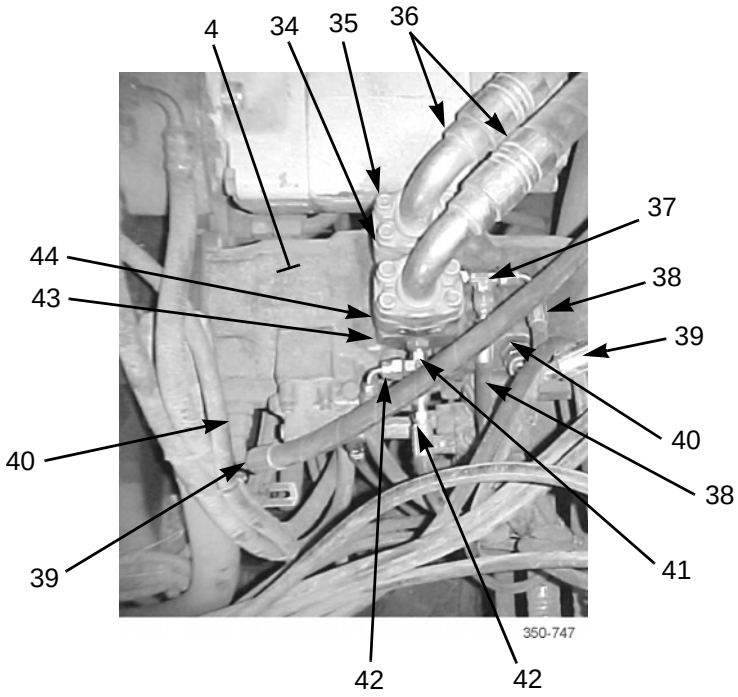
13. Disconnect two hoses (38) from tee (37).

REMOVAL - CONTINUED

NOTE

Witness mark check valves, terminal block, and pump to ensure correct installation.

14. Remove eight screws (35), two flanges (34), and disconnect two hoses (36) from check valves (44). Remove and discard two O-rings.
15. Remove two check valves (44), terminal block (43), and two O-rings from pump (4). Discard O-rings.



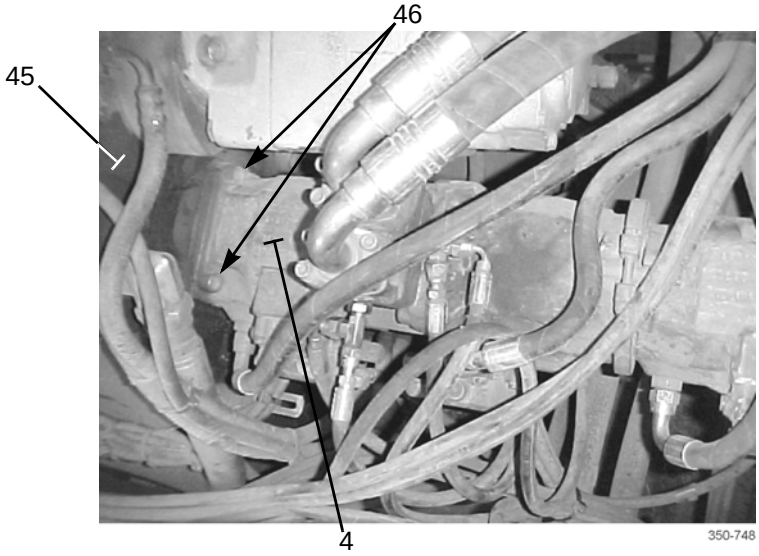
REMOVAL - CONTINUED



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

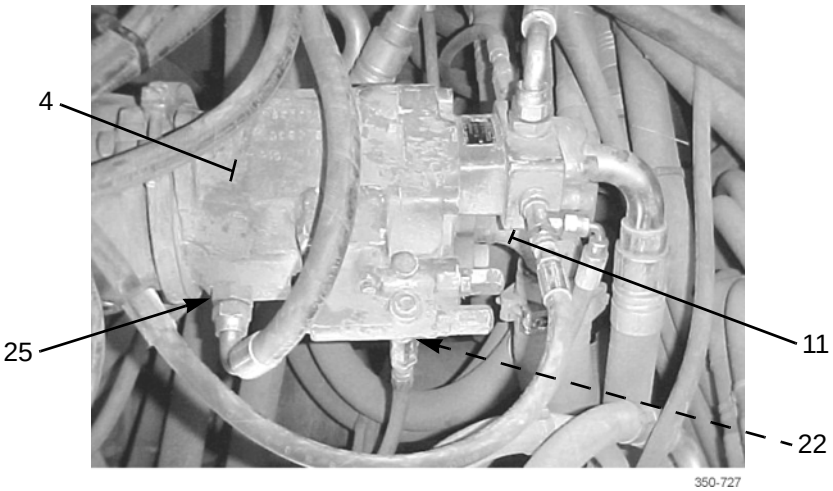
16. Wrap a nylon sling around pump (4) and attach sling to a suitable lifting device.
17. With assistance, remove four screws (46) and pump (4) from transmission (45).



NOTE

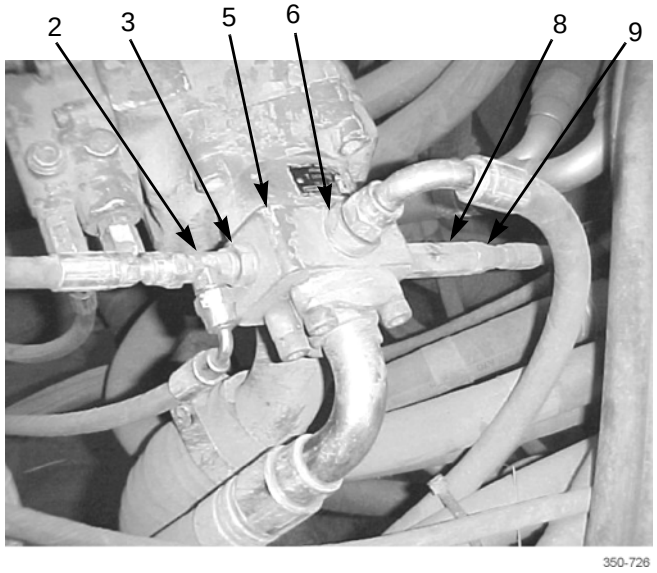
Perform steps 18 thru 25 to remove fittings from pump, if a new pump is being installed.

18. Remove fittings (22 and 25) from pump (4).
19. On underside of pump (4), remove four screws, flange, hose (11), and O-ring. Discard O-ring.

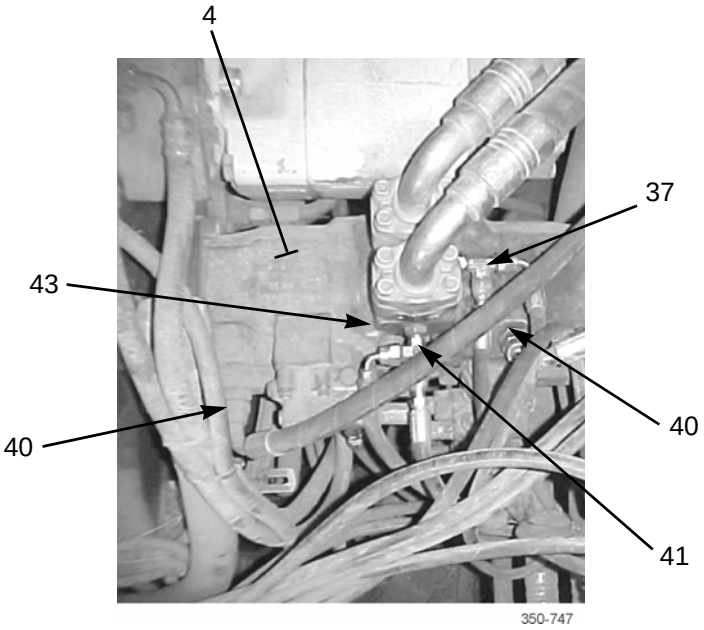


REMOVAL - CONTINUED

20. Remove tee (2), fitting (3), and fitting (6) from terminal block (5).
21. Remove fitting (9), check valve (8), O-ring, adapter, and seal ring from terminal block (5). Discard O-ring.

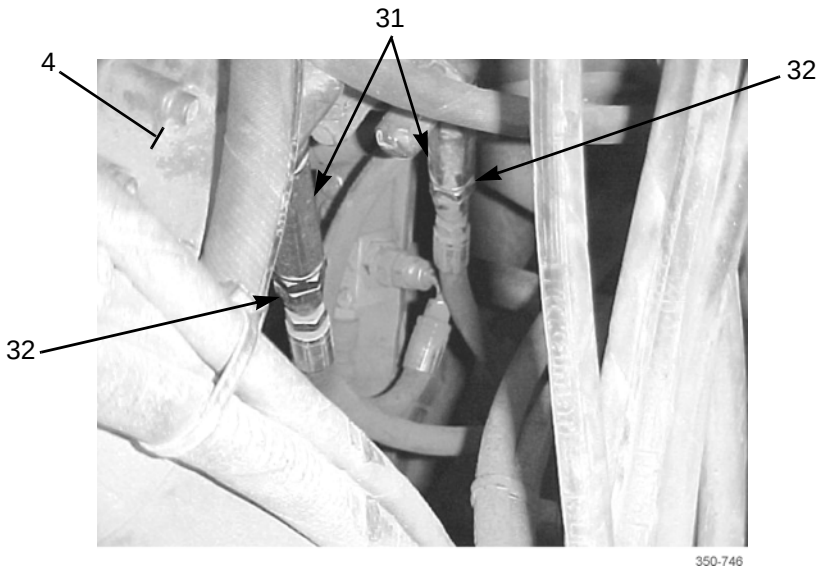


22. Remove two fittings (40) from pump (4).
23. Remove two tees (37 and 41) from terminal block (43).



REMOVAL - CONTINUED

24. On underside of pump (4), remove two fittings (32), check valves (31), O-rings, nipples, and O-rings. Discard O-rings.
25. On underside of pump (4), remove four screws, flange, hose connection, and O-ring. Discard O-ring.



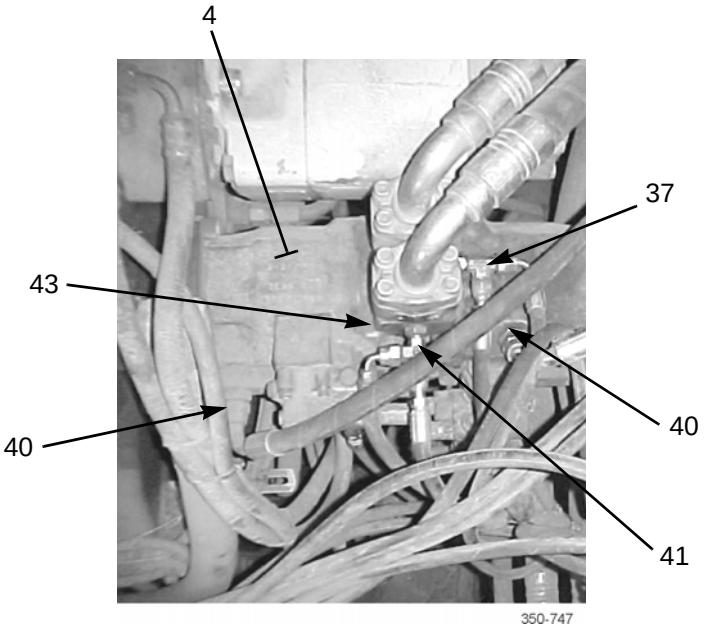
INSTALLATION

NOTE

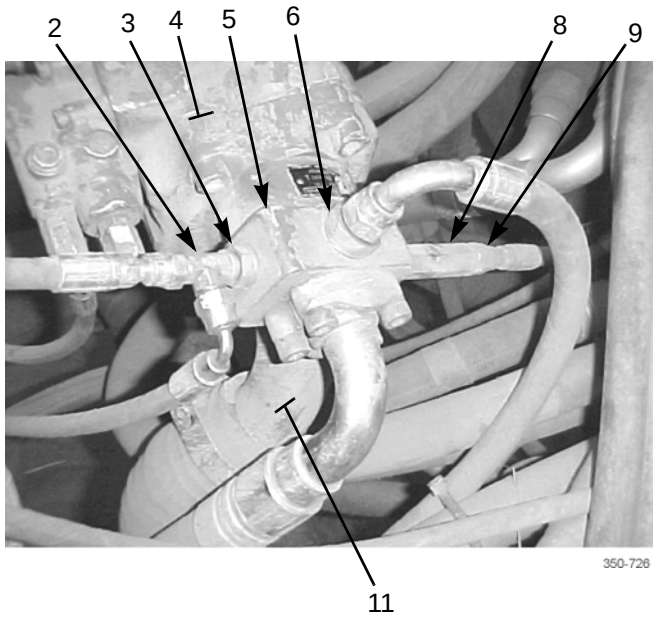
- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform steps 1 thru 8 to install fittings removed from old pump, if a new pump is being installed.**
- **Lubricate new O-rings with lubricating oil as they are installed.**

1. On underside of pump (4), install new O-ring and hose connection with flange and four screws.
2. On underside of pump (4), install two new O-rings, nipples, new O-rings, check valves (31), and fittings (32).
3. Install two tees (37 and 41) on terminal block (43).

INSTALLATION - CONTINUED

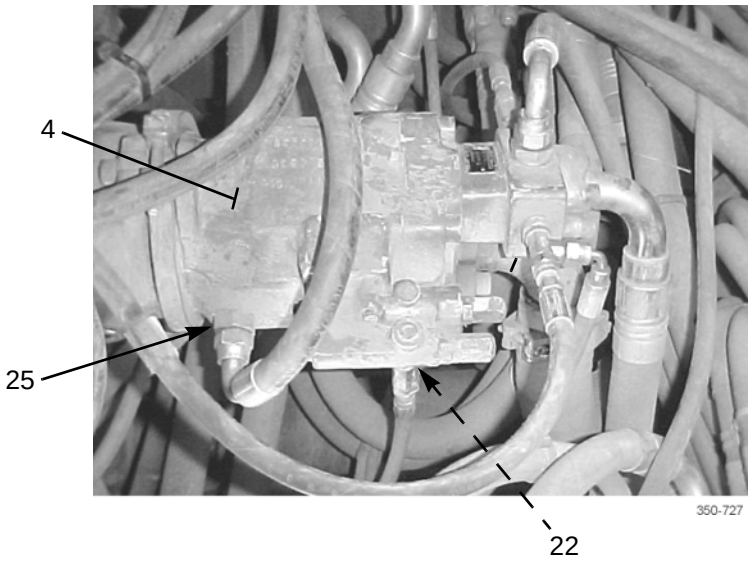


4. Install two fittings (40) on pump (4).
5. Install seal ring, adapter, new O-ring, check valve (8), and fitting (9) on terminal block (5).
6. Install fitting (6), fitting (3), and tee (2) on terminal block (5).
7. On underside of pump (4), install new O-ring and hose (11) with flange and four screws.



INSTALLATION - CONTINUED

8. Install fittings (22 and 25) on pump (4).

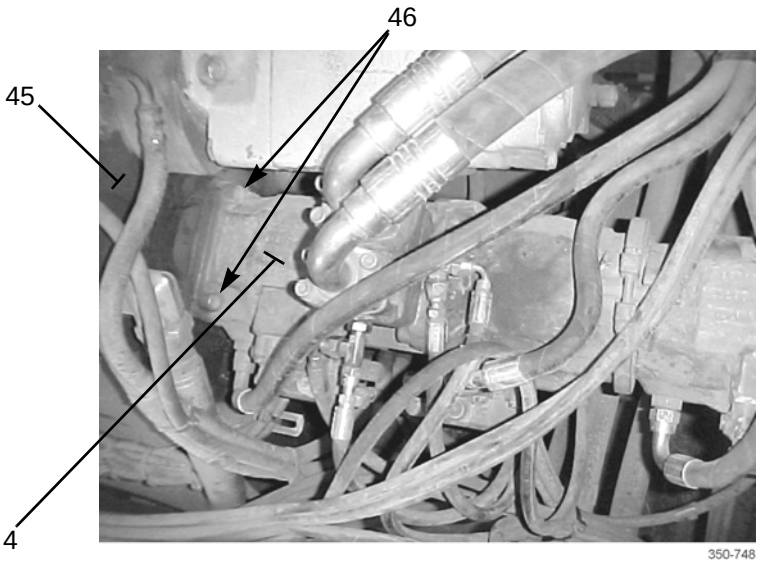


WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

9. Apply sealant to mounting surface of pump (4).
10. With assistance and using a nylon sling, position pump (4) at transmission (45) and install four screws (46).

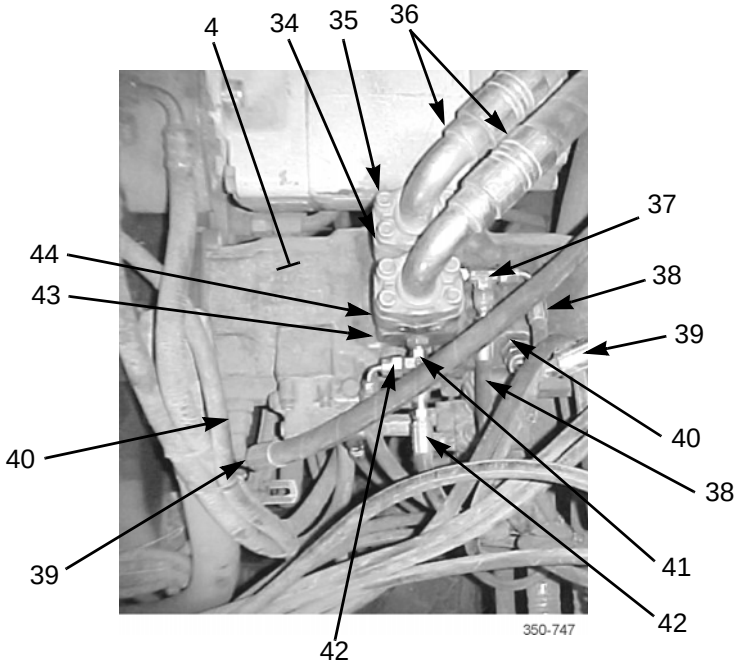
INSTALLATION - CONTINUED



NOTE

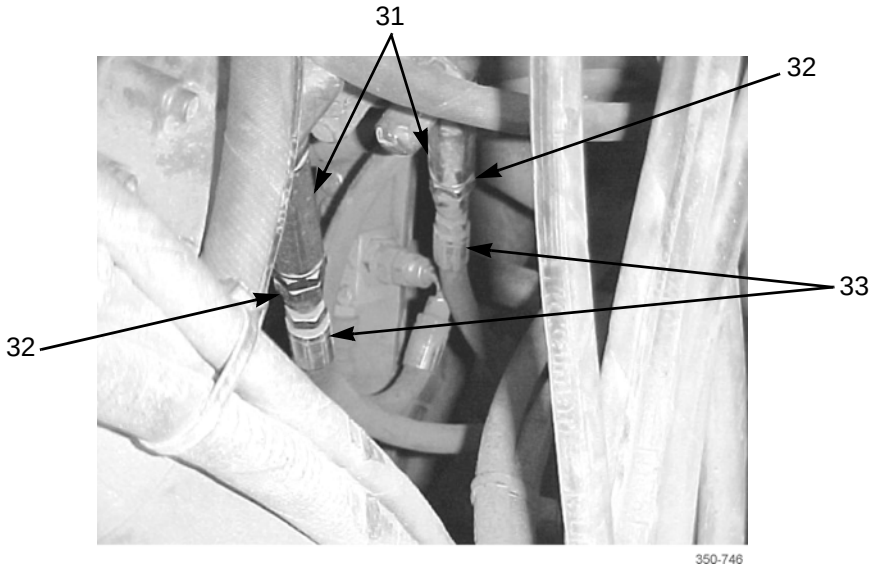
Ensure terminal block and check valves are installed on pump in accordance with witness marks.

11. Assemble two new O-rings, terminal block (43), and two check valves (44) on pump (4). Install two new O-rings and hoses (36) on check valves with two flanges (34) and eight screws (35).
12. Connect two hoses (38) to tee (37).
13. Connect two hoses (42) to tee (41).
14. Connect two hoses (39) to fittings (40).

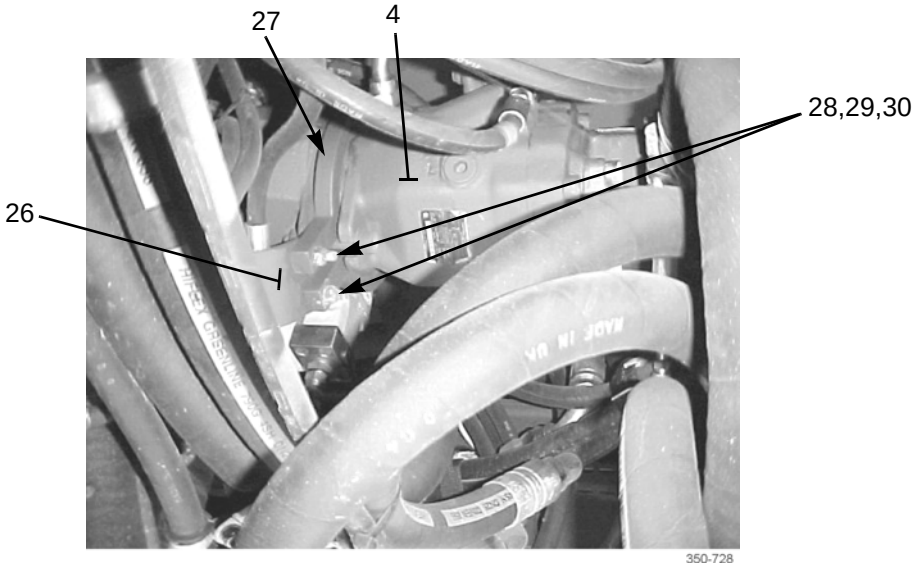


INSTALLATION - CONTINUED

15. Connect two hoses (33) to fittings (32) at check valves (31).

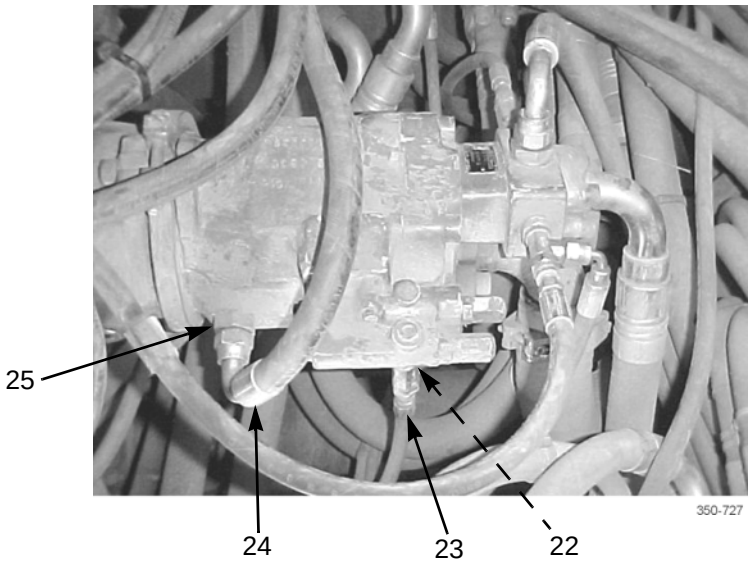


16. Secure yoke (27) to brace (26) on underside of pump (4) with two screws (30), washers (29), and new locknuts (28).



INSTALLATION - CONTINUED

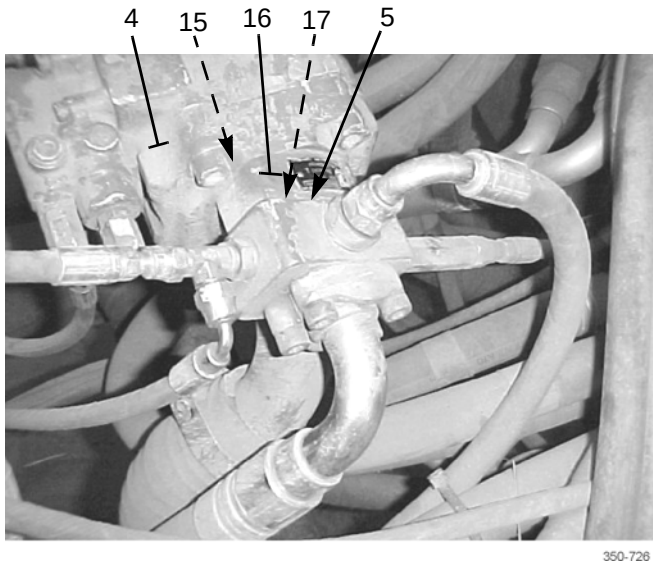
17. Connect two hoses (23 and 24) to fittings (22 and 25).



NOTE

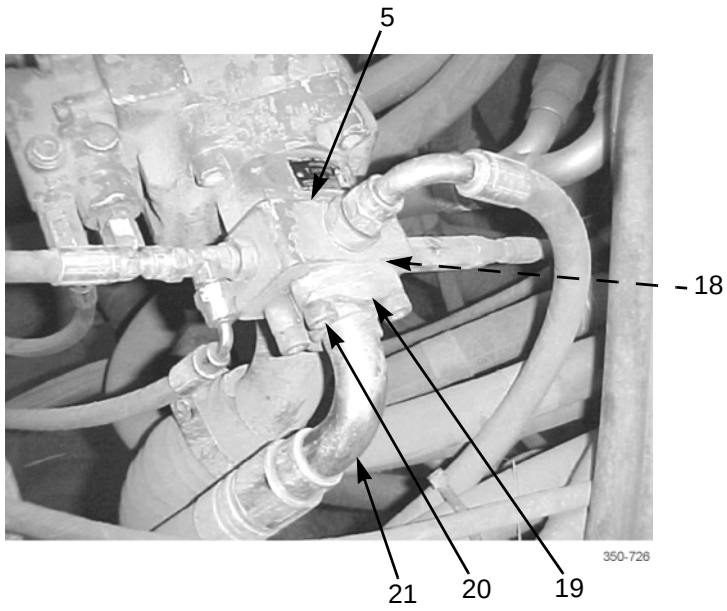
Ensure check valve and terminal block are installed on pump in accordance with witness marks.

18. Assemble new O-ring (15), check valve (16), new O-ring (17), and terminal block (5) on pump (4).

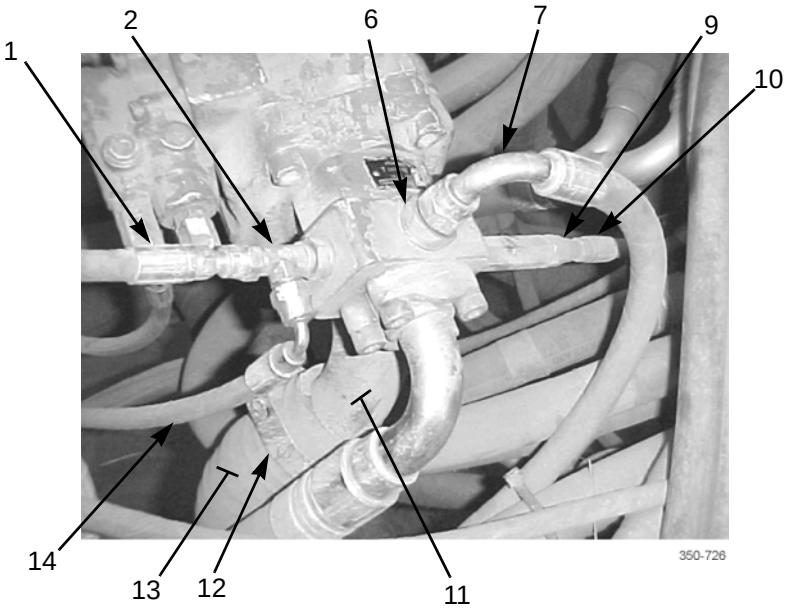


INSTALLATION - CONTINUED

19. Install new O-ring (18) and hose (21) on terminal block (5) with flange (19) and four screws (20).



20. Connect hose (10) to fitting (9).
21. Connect hose (7) to fitting (6).
22. Connect hoses (1 and 14) to tee (2).
23. Connect supply hose (13) to hose (11) and tighten clamp (12). Also connect other supply hose to hose connection and tighten two hose clamps.
24. Open two ball valves at reservoir for supply hoses (13).



INSTALLATION - CONTINUED

25. Check oil level in hydraulic reservoir (WP 0050 00).

CAUTION

Failure to prime pump assembly may damage pump.

26. Trace and locate return hoses for pump assembly at top of hydraulic reservoir. Disconnect return hoses and fill hoses with hydraulic fluid. Reconnect hoses.
27. Start engine (TM 10-3930-675-10), operate tophandler and steering systems, and check for leaks.
28. Recheck oil level in hydraulic reservoir (WP 0050 00).
29. If a new tophandler and steering pump assembly was installed, adjust each pump (WP 0243 00).
30. Install nylon straps and new tiedown straps as necessary to support hydraulic hoses.
31. Install transmission access covers (WP 0142 00).
32. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER AND STEERING HYDRAULIC PUMPS ADJUSTMENT 0243 00

THIS WORK PACKAGE COVERS

Standby and Operating Hydraulic Pressure Adjustment:
Tophandler Pump, Steering Pumps Nos. 1 and 2

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Personnel Required

Two

References

WP 0188 00

Equipment Condition

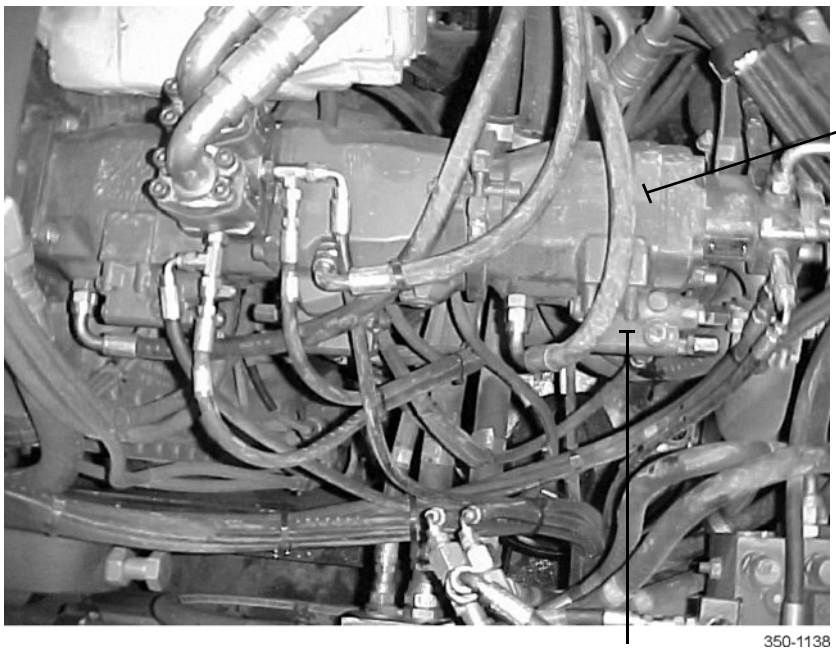
Cab moved to the left, but not lowered (TM 10-3930-675-10)

Steering hydraulic system pressure relieved (WP 0164 00)

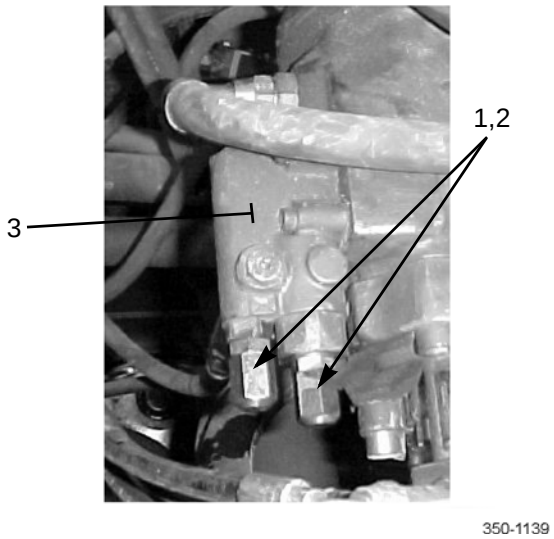
Transmission access covers removed (WP 0142 00)

TOPHANDLER PUMP STANDBY AND OPERATING HYDRAULIC PRESSURE ADJUSTMENT

1. Access maintenance diagnostic menus by entering diagnostic code “12443” into driver’s ECS display panel (TM 10-3930-675-10).
2. Using left/right arrows, locate DIAG EXTRA FUNCT menu, then press “Enter”.
3. Using left/right arrow, locate EXTRA FUNCT screen 2 (13) and press “+” button to turn OFF hydraulic pumps.



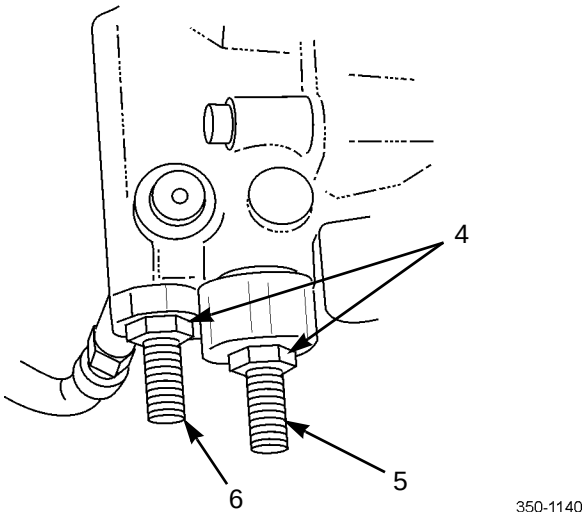
4. Connect hydraulic pressure test gage to hydraulic test point no. 11 (WP 0188 00).
5. Remove protective caps (1) and washers (2) from tophandler pump adjusting valves (3).



6. Start engine (TM 10-3930-675-10).

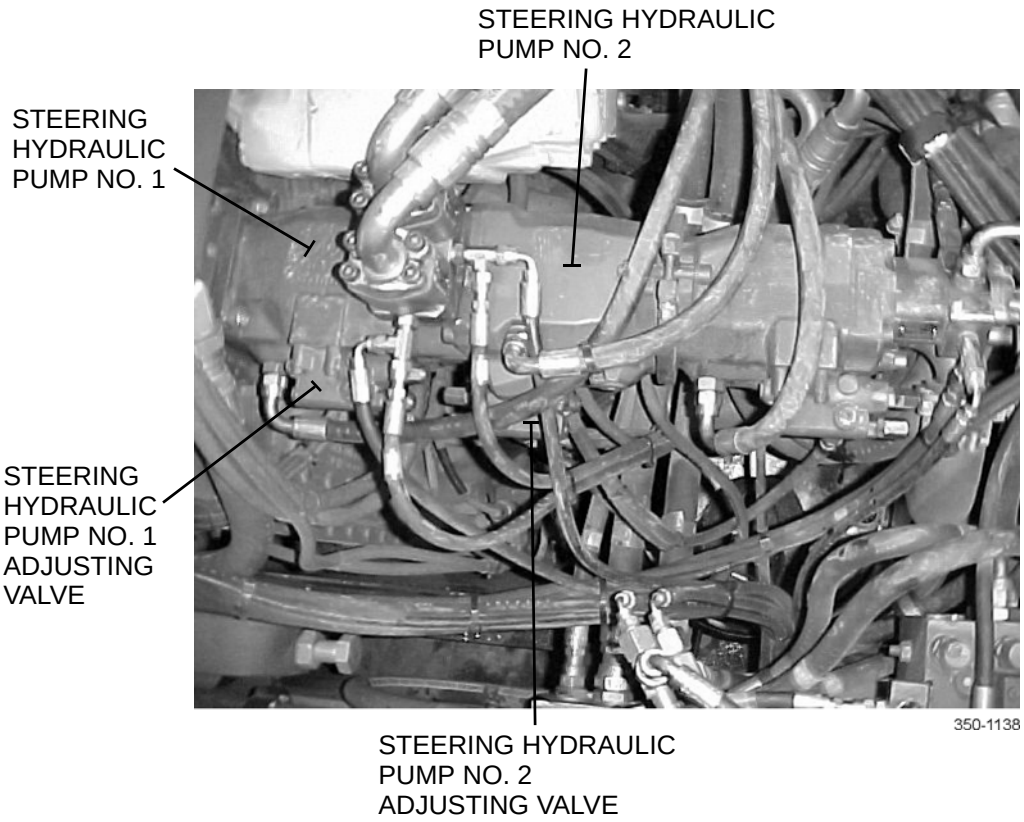
TOPHANDLER PUMP STANDBY AND OPERATING HYDRAULIC PRESSURE ADJUSTMENT - CONTINUED

7. Note tophandler standby hydraulic pressure on test gage. Pressure should be 261 psi (18 bar):
   a. If pressure is correct, no adjustment is required.
   b. If pressure is not correct, loosen adjusting screw jamnut (4) and turn adjusting screw (6) inward to increase pressure and outward to decrease pressure. Secure adjusting screw with jamnut.



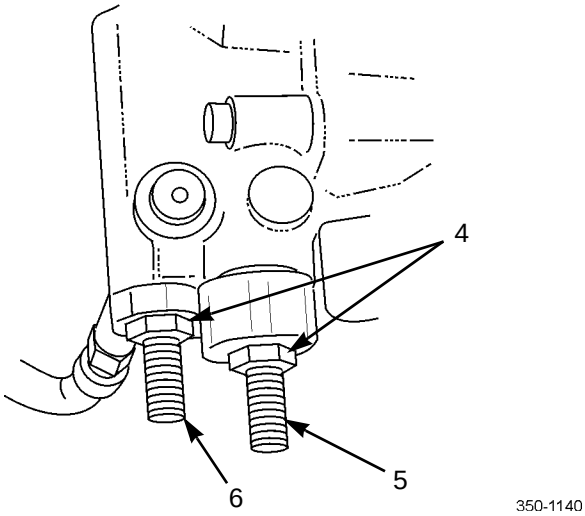
8. At EXTRA FUNCT screen 2 (13), press "-" button to turn ON hydraulic pumps.
9. Note tophandler operating hydraulic pressure on test gage. Pressure should be 3,045 psi (210 bar).
   a. If pressure is correct, no adjustment is required.
   b. If pressure is not correct, loosen adjusting screw jamnut (4) and turn adjusting screw (5) inward to increase pressure and outward to decrease pressure. Secure adjusting screw with jamnut.
10. Shut down engine.
11. Reinstall washers (2) and protective caps (1) on adjusting screws (5 and 6).
12. Relieve hydraulic system pressure (WP 0164 00).
13. Disconnect hydraulic test gage.

STEERING PUMPS NOS. 1 AND 2 STANDBY AND OPERATING HYDRAULIC PRESSURE ADJUSTMENT

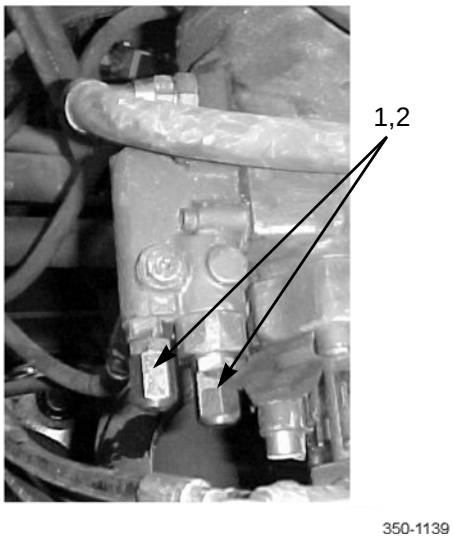


1. Access maintenance diagnostic menus by entering diagnostic code “12443” into driver’s ECS display panel (TM 10-3930-675-10).
2. Using left/right arrows, locate DIAG EXTRA FUNCT menu, then press “Enter”.
3. Using left/right arrow, locate EXTRA FUNCT screen 2 (13) and press “+” button to turn OFF hydraulic pumps.
4. Connect hydraulic pressure test gage to hydraulic test point no. 6 for steering pump no. 1 or test point no. 7 for steering pump no. 2 (WP 0188 00).
5. Remove protective caps (1) and washers (2) from steering pump adjusting valves (3).
6. Start engine (TM 110-3930-675-10).
7. Note steering pump standby hydraulic pressure on test gage. Pressure should be 261 psi (18 bar).
   a. If pressure is correct, no adjustment is required.
   b. If pressure is not correct, loosen adjusting screw jamnut (4) and turn adjusting screw (6) inward to increase pressure and outward to decrease pressure. Secure adjusting screw with jamnut.

STEERING PUMPS NOS. 1 AND 2 STANDBY AND OPERATING HYDRAULIC PRESSURE ADJUSTMENT - CONTINUED



8. At EXTRA FUNCT screen 2 (13), press “-” button to turn ON hydraulic pumps.
9. Note steering pump operating hydraulic pressure on test gage. Pressure should be 3,045 psi (210 bar).
   a. If pressure is correct, no adjustment is required.
   b. If pressure is not correct, loosen adjusting screw jamnut (4) and turn adjusting screw (5) inward to increase pressure and outward to decrease pressure. Secure adjusting screw with jamnut.
10. Shut down engine.
11. Reinstall washers (2) and protective caps (1) on adjusting screws (5 and 6).



12. Relieve hydraulic system pressure (WP 0164 00).
13. Disconnect hydraulic test gage.

END OF WORK PACKAGE

SLEWING MOTOR BRAKE REPLACEMENT 0244 00

THIS WORK PACKAGE COVERS

Hydraulic Motor: Removal, Installation

Slewing Motor: Brake Removal, Installation

Planetary Assembly: Removal, Installation

Slewing Motor Gear: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Shop Equipment, Common No. 1 (Item 107, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Torque (Item 140, WP 0289 00)

Personnel Required

Two

References

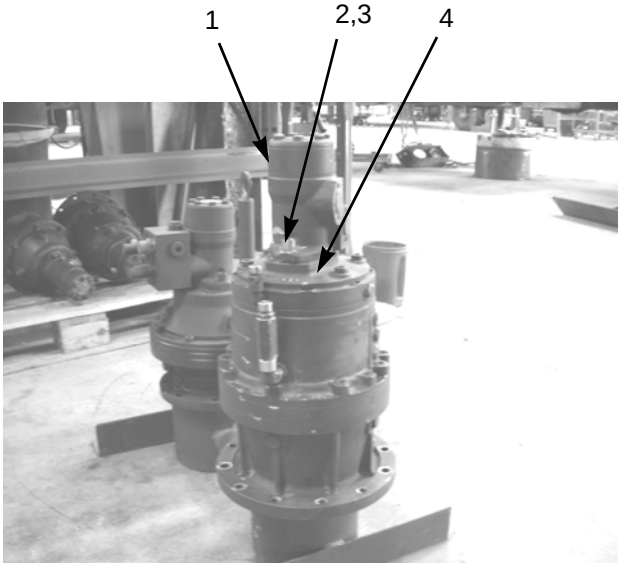
WP 0166 00

NOTE

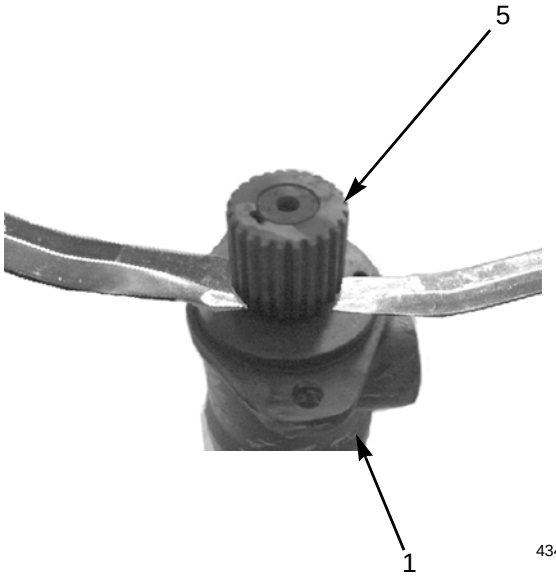
- **Motor can be replaced without removing slewing motor assembly from the tophandler.**
- **Place an index mark on hydraulic motor and slew motor brake to mark location for assembly.**

HYDRAULIC MOTOR REMOVAL

1. Remove two socket-head capscrews (2), washers (3), and hydraulic motor (1) from slewing motor brake (4).
2. Using two pry-bars, remove spur gear (5) from hydraulic motor (1).



434-40096



434-40172

HYDRAULIC MOTOR INSTALLATION

1. Align keyway of spur gear (5) to key on hydraulic motor (1) shaft and, using dead blow hammer, drive it into place on shaft.
2. Set hydraulic motor (1) in place and secure it with two socket-head capscrews (2) and two washers (3).

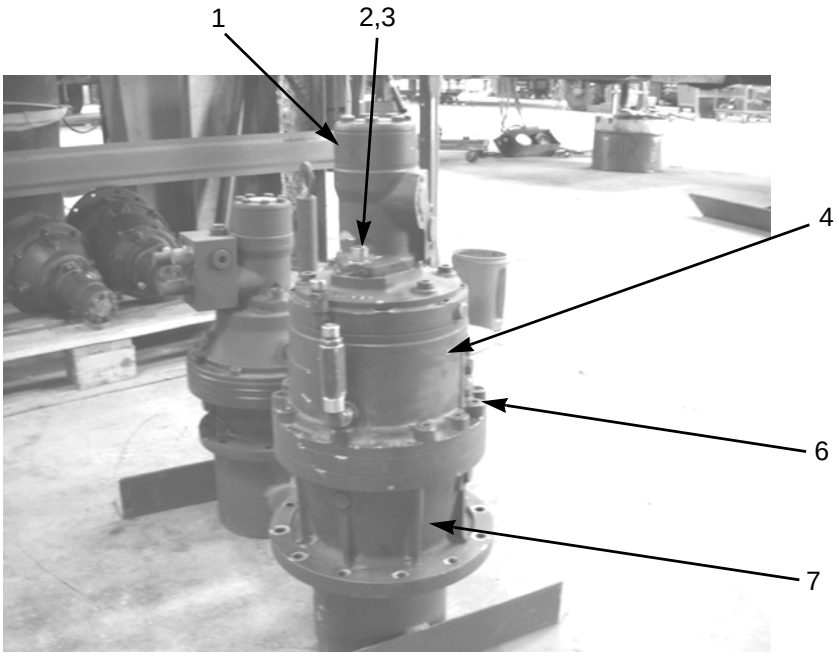
SLEWING MOTOR BRAKE REMOVAL

1. Place an index mark on slewing motor brake (4) and planetary housing (7) to mark location for reassembly.
2. Perform step 1 of *Hydraulic Motor Removal* to remove hydraulic motor.

NOTE

- **Only remove hardware that is in the way.**
- **Note which side sight glasses are removed from to aid in installation.**

3. Remove fittings, plugs, and sight glasses and loosen allen head screws (6).
4. Remove slewing motor from vehicle (WP 0166 00).
5. Remove eight allen head screws (6) securing slewing motor brake (4) to planetary gear assembly (7).
6. Separate slewing motor brake (4) from planetary gear assembly (7).



434-40096

SLEWING MOTOR BRAKE INSTALLATION

1. Transfer index mark from old slewing motor brake (4) to new brake for proper positioning of brake during installation.
2. Align index marks and assemble slewing motor brake (4) on planetary assembly (7).
3. Install eight allen head screws (6) to secure slewing motor brake (4) to planetary assembly (7).

SLEWING MOTOR BRAKE INSTALLATION - CONTINUED

NOTE

Apply teflon tape to threads of fittings.

4. Install fittings, plugs, and sight glasses that were removed.
5. Install slewing motor on vehicle (WP 0166 00).
6. Perform step 2 of *Hydraulic Motor Installatio*n.

PLANETARY ASSEMBLY REMOVAL

Remove hydraulic motor, slewing motor brake, and slewing motor gear from planetary assembly.

PLANETARY ASSEMBLY INSTALLATION

Assemble slewing motor gear, slewing motor brake, and hydraulic motor on new planetary assembly.

SLEWING MOTOR GEAR REMOVAL

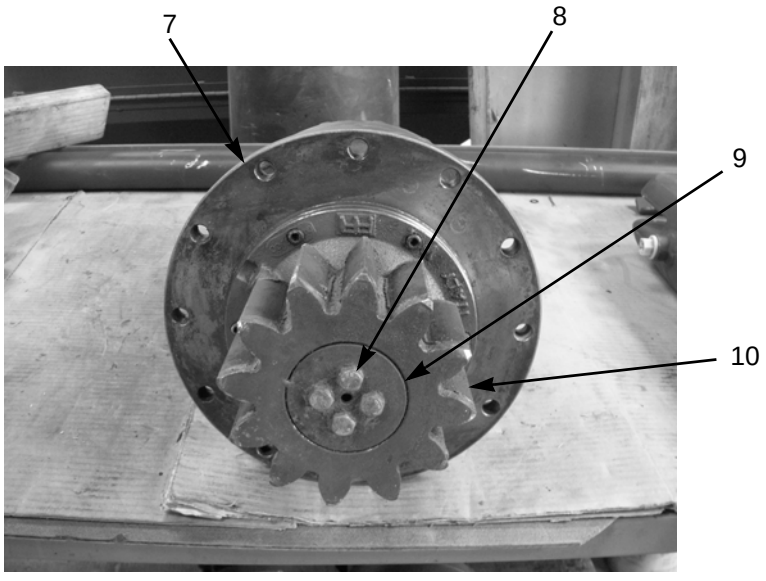
NOTE

A removed capscrew can be installed into center hole of retaining plate to aid in plate removed.

1. Remove four capscrews (8) and retaining plate (9) securing slewing motor gear (10) to shaft of planetary assembly (7).
2. Slide gear (10) off splined shaft of planetary assembly (7).

SLEWING MOTOR GEAR INSTALLATION

1. Align splines of gear (10) to shaft splines of planetary assembly (7) and slide gear into place.
2. Position retaining plate (9) and secure with four capscrews (8).



434-40099

END OF WORK PACKAGE

SPREADER MAINTENANCE 0245 00

THIS WORK PACKAGE COVERS

Hydraulic Motor: Removal, Installation
Gear: Removal, Installation
Planetary Assembly: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Personnel Required

Two

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Equipment Condition

Tophandler hydraulic spreader motor removed (WP 0167 00)

Material/Parts

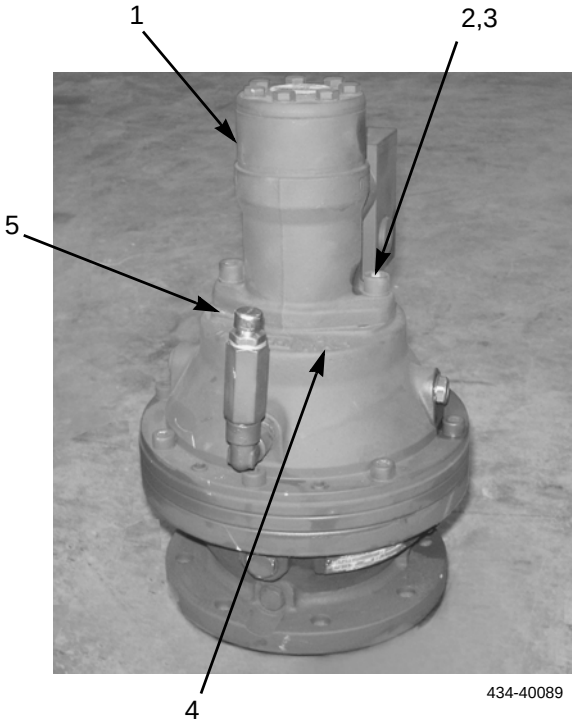
O-ring

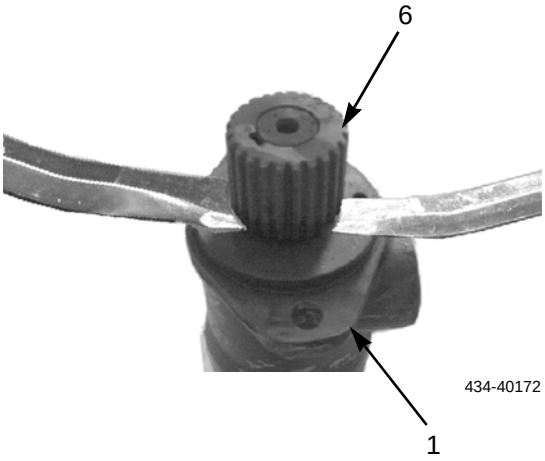
NOTE

Place an index mark on hydraulic motor and spreader assembly to mark location for assembly.

HYDRAULIC MOTOR REMOVAL

1. Remove two socket-head capscrews (2) and washers (3). Lift hydraulic motor (1) from spreader assembly (4).
2. Remove and discard O-ring (5).
3. Use two pry-bars to remove drive gear (6) from shaft of hydraulic motor (1).





HYDRAULIC MOTOR INSTALLATION

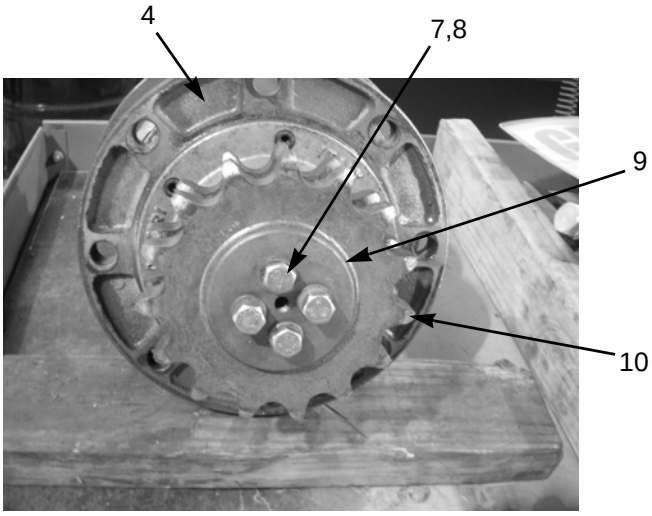
1. Align keyway in drive gear (6) with key in shaft of hydraulic motor (1) and drive key into place with a dead blow hammer.
2. Install new O-ring (5).
3. Position hydraulic motor (1) on spreader assembly (4) and secure in place with two socket-head capscrews (2) and washers (3).

GEAR REMOVAL

1. Remove four capscrews (7), washers (8), and retaining plate (9).
2. Slide gear (10) off of splined shaft of spreader assembly (4).

GEAR INSTALLATION

1. Align gear (10) with splined shaft of spreader assembly (4) and slide gear onto shaft.
2. Install retaining plate (9) with four capscrews (7) and washers (8).



434-40091

PLANETARY ASSEMBLY REMOVAL

1. Perform step 1 of *Hydraulic Motor Removal*.
2. Perform *Gear Removal* procedure.

PLANETARY ASSEMBLY INSTALLATION

1. Perform *Gear Installation* procedure.
2. Perform *Hydraulic Motor Installation* procedure.

END OF WORK PACKAGE

BOOM AND BRAKE SYSTEM HYDRAULIC PUMP REPLACEMENT 0246 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

O-ring (P/N 3503)

Materials/Parts - Continued

O-ring (P/N 3505)

O-ring (P/N 921039.0015)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Brake hydraulic system pressure relieved (WP 0164 00)

Transmission access covers and cab support removed (WP 0142 00)

Master battery switch in OFF position

Wheels chocked



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines and fittings.**
- **Remove nylon straps and remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

REMOVAL

1. Trace supply hose (13) under pump (4) back to hydraulic reservoir. Close ball valve in supply hose at reservoir.

NOTE

Witness mark check valve and pump to ensure correct installation.

2. Remove four screws (10), flange (9), pump-to-primary filter hose (11), O-ring (8), and check valve (7) from pump (4). Discard O-ring.
3. Under pump (4), loosen two hose clamps (12) and disconnect supply hose (13) from hose connection (16).
4. Disconnect hose (18) from fitting (19) on underside of pump (4).
5. If required, loosen eight screws (3) and rotate two hydraulic pump assembly hoses (2) aside.



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Boom and brake system hydraulic pump weighs approximately 200 lb (91 kg). Lifting device must have sufficient capacity to lift pump. Failure to follow this warning may result in injury to personnel.**

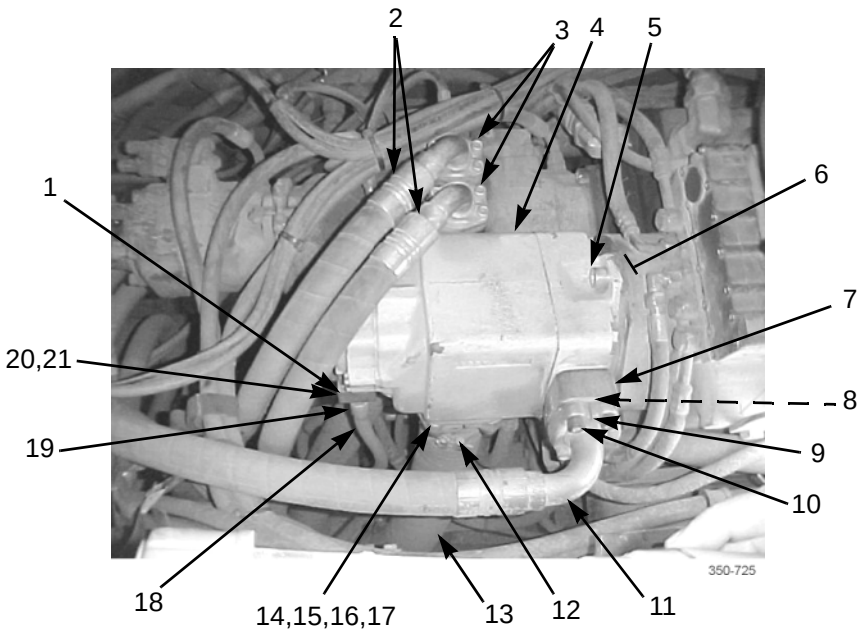
6. Wrap a nylon sling around pump (4) and attach sling to a suitable lifting device.
7. Remove two screws (5) and pump (4) from transmission (6).

NOTE

Perform steps 8 and 9 to remove fittings from pump, if a new pump is being installed.

8. On underside of pump (4), remove fitting (19) from flange (1). Remove four screws (20), flange, and O-ring (21) from pump. Discard O-ring.
9. On underside of pump (4), remove four screws (14), flange (15), hose connection (16), and O-ring (17) from pump. Discard O-ring.

REMOVAL - CONTINUED



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform steps 1 and 2 to install fittings removed from old pump, if a new pump is being installed.**
- **Lubricate new O-rings with lubricating oil as they are installed.**

1. On underside of pump (4), install new O-ring (17) and hose connection (16) with flange (15) and four screws (14).
2. On underside of pump (4), install new O-ring (21) and flange (1) on pump with four screws (20). Install fitting (19) on flange.



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Boom and brake system hydraulic pump weighs approximately 200 lb (91 kg). Lifting device must have sufficient capacity to lift pump. Failure to follow this warning may result in injury to personnel.**

INSTALLATION - CONTINUED

NOTE

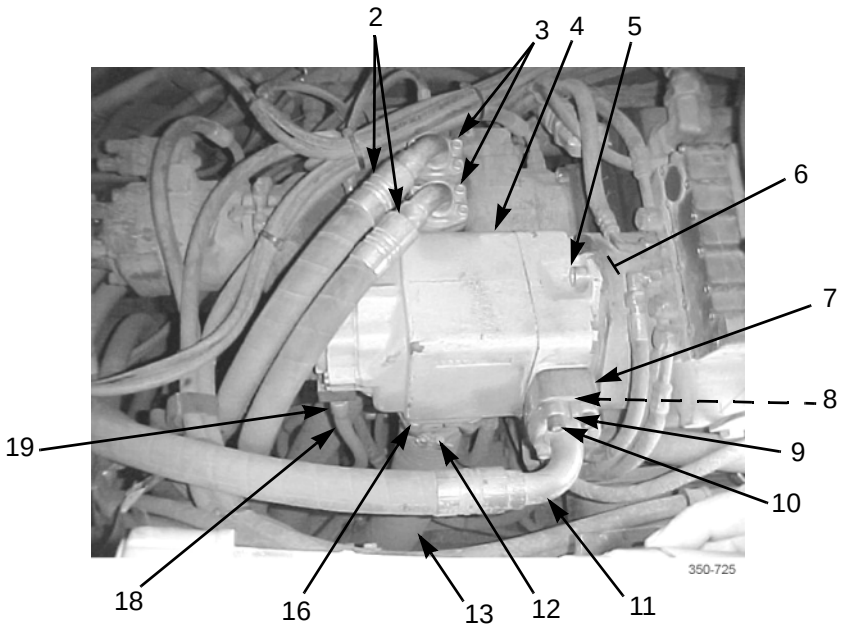
Ensure mating surfaces of pump and transmission are clean and free of old sealant material.

3. With a nylon sling wrapped around pump (4) and sling supported by a suitable lifting device, apply sealant to mating surfaces and install pump on transmission (6) with two screws (5).
4. Connect hose (18) to fitting (19) on underside of pump (4).
5. Connect supply hose (13) to hose connection (16) and tighten two hose clamps (12).
6. If loosened, reposition two hydraulic pump assembly hoses (2) and tighten eight screws (3).

NOTE

Ensure check valve is installed on pump in accordance with witness marks.

7. Install check valve (7), new O-ring (8), pump-to-primary filter hose (11), and flange (9) with four screws (10).
8. Open ball valve at reservoir for supply hose (13).



9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10), operate boom and brakes, and check for leaks.
11. Recheck oil level in hydraulic reservoir (WP 0050 00).
12. Install nylon straps and new tiedown straps as necessary to support hydraulic hoses.
13. Install transmission access covers and cab support (WP 0142 00).
14. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

COOLING FAN HYDRAULIC PUMP REPLACEMENT 0247 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

O-ring (P/N 3503)

O-ring (P/N 3505)

Personnel Required

Two

References

TM 10-3930-675-10

WP 0050 00

WP 0059 00

WP 0185 00

WP 0284 00

Equipment Condition

Engine cover removed (WP 0148 00)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Tag hydraulic lines and fittings.

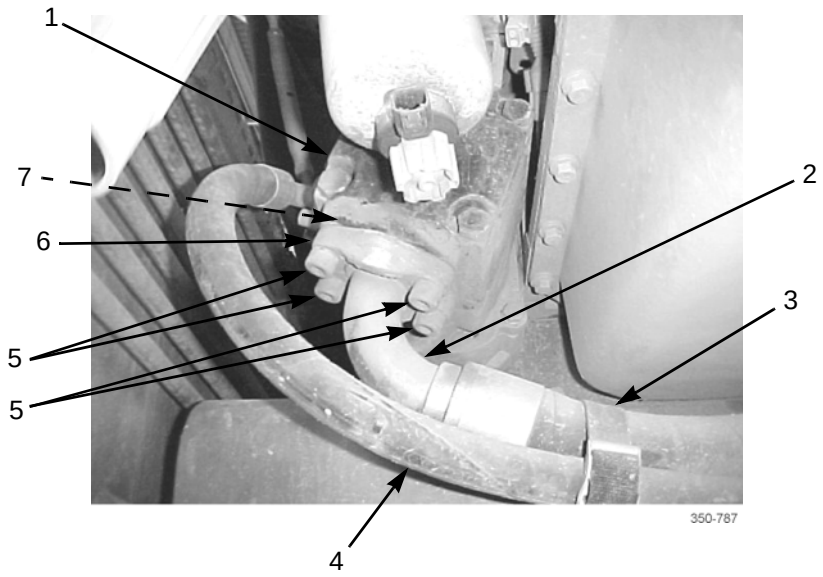
REMOVAL

1. Drain and remove fuel filter/water separator (WP 0059 00).
2. Trace hydraulic hose (2) from hydraulic pump (1) back to reservoir and locate ball valve. Close ball valve.
3. Remove canvas straps (3) and remove and discard tiedown straps, as needed, to allow free movement in hydraulic hoses (2 and 4).

NOTE

Position suitable container to catch hydraulic oil retained in hoses.

4. Remove four screws (5), flange (6), O-ring (7), and hydraulic hose (2) from hydraulic pump (1) input port. Discard O-ring.



5. Remove four screws (13), flange (12), O-ring (11), and hydraulic hose (4) from hydraulic pump (1) output port. Discard O-ring.

WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

6. Remove two screws (8) and washers (9) securing hydraulic pump (1) to drive adapter (10).
7. Remove hydraulic pump (1) from drive adapter (10).

INSTALLATION



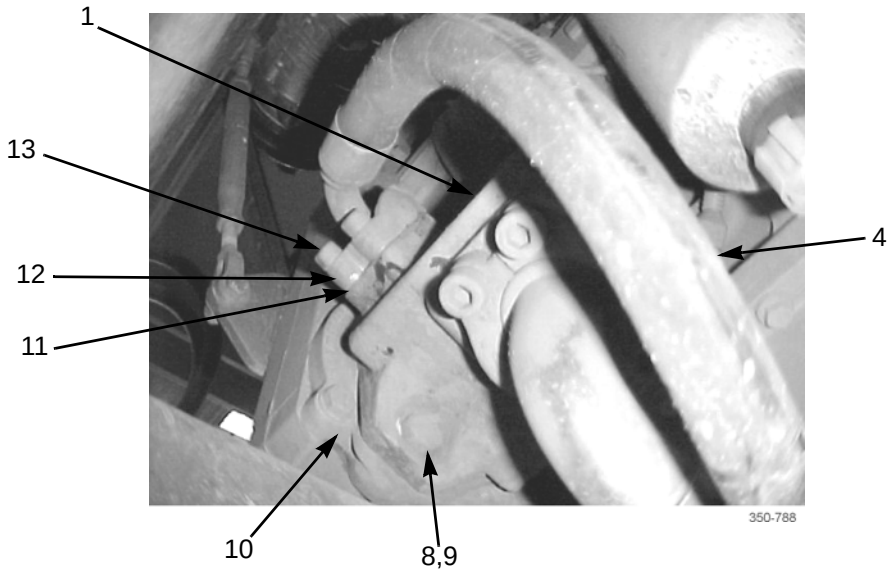
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Ensure mating surfaces on hydraulic pump and drive adapter are clean and free of old sealant material.**
- **Lubricate new O-rings with lubricating oil as they are installed.**

1. Apply sealant to mating surfaces and install hydraulic pump (1) in position on drive adapter (10).
2. Install two screws (8) and washers (9). Tighten screws to 35 lb-ft (47 Nm).
3. Install new O-ring (11) and hydraulic hose (4) on hydraulic pump (1) outlet port with flange (12) and four screws (13).



4. Install new O-ring (7) and hydraulic hose (2) on hydraulic pump (1) inlet port with flange (6) and four screws (5).
5. Secure hydraulic hoses with canvas straps (3) and new tiedown straps as needed.
6. Install fuel filter/water separator filter (WP 0059 00).
7. Open ball valve at reservoir for supply hose.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

INSTALLATION - CONTINUED

10. Recheck oil level in hydraulic reservoir.
11. Install engine cover (WP 0148 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC COOLING FAN MAINTENANCE 0248 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Nut, lock (P/N 5590) (2)

Pin, Cotter (P/N 95004)

Materials/Parts - Continued

Washer, lock (P/N 923657.0004) (2)

Personnel Required

Two

Equipment Condition

Radiator assembly removed from vehicle (WP 0219 00)

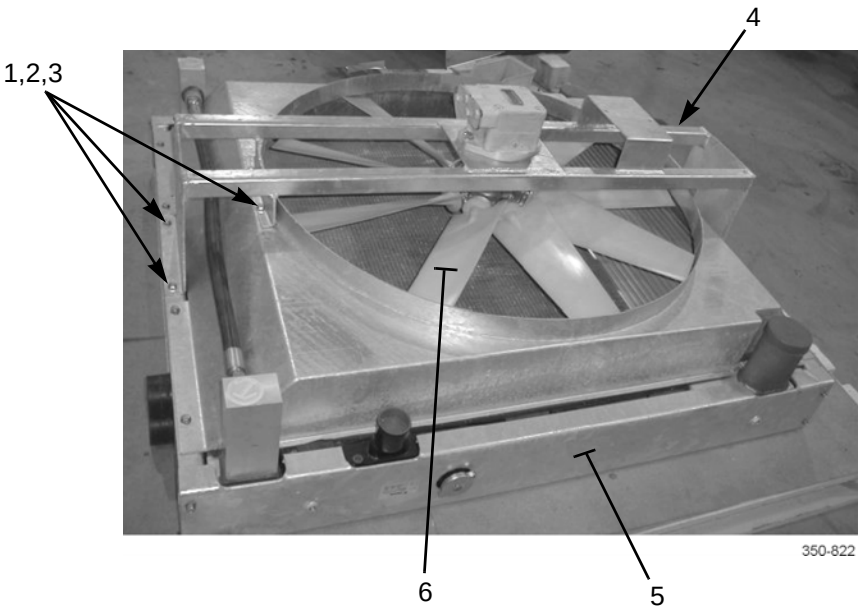
REMOVAL

1. Remove eight screws (1), washers (2), and nuts (3) securing fan support frame (4) to radiator assembly (5).

NOTE

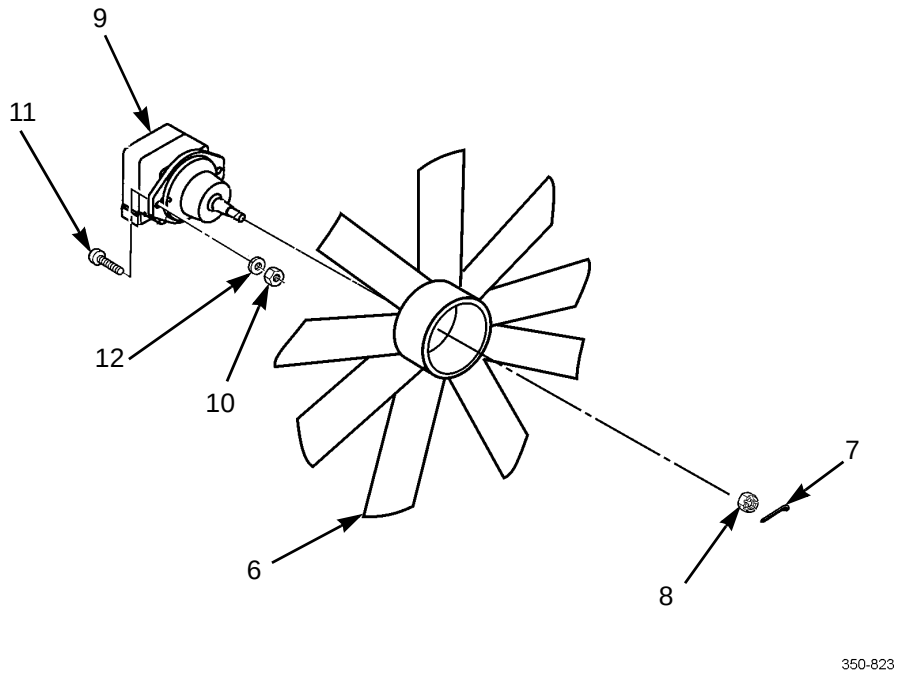
Fan motor, blade, bracket with bypass valve, and fan support frame are removed as a unit from radiator assembly.

2. With assistance, lift cooling fan from radiator assembly (5) and place on work surface with fan blade (6) facing up.



DISASSEMBLY

1. Remove cotter pin (7) and castle nut (8), and lift fan blade (6) from hydraulic motor (9). Discard cotter pin.
2. Remove two locknuts (10), screws (11), lockwashers (12), and hydraulic motor (9), and bracket (13) with bypass valve from fan support frame (4). Discard locknuts and lockwashers.



ASSEMBLY

1. Install bracket (13) with bypass valve and hydraulic motor (9) on fan support frame (4) with two screws (11), new lockwashers (12), and new locknuts (10).
2. Install fan blade (6) on hydraulic motor (9) and secure with castle nut (8) and new cotter pin (7).

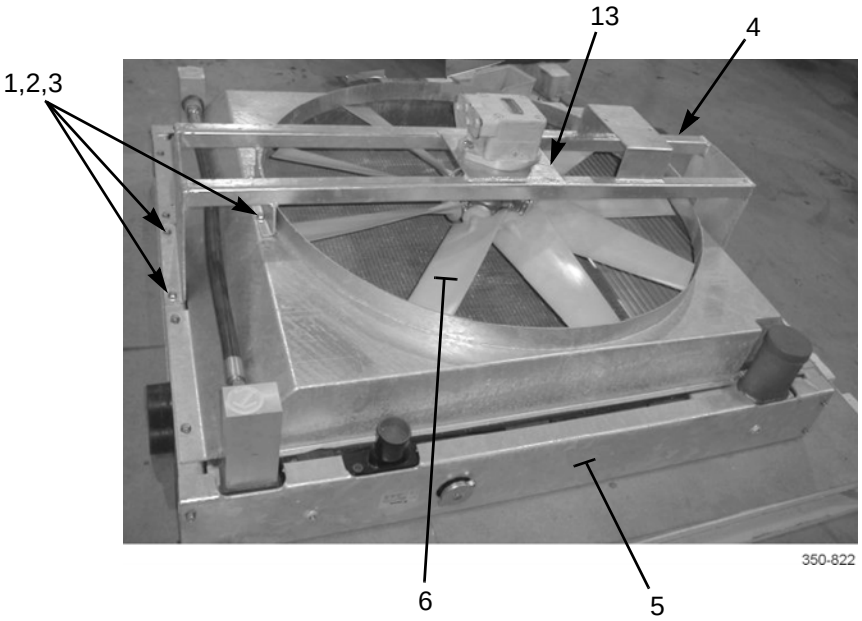
INSTALLATION

NOTE

Fan motor, blade, bracket with bypass valve, and fan support frame are installed as a unit on radiator assembly.

1. With assistance, install cooling fan on radiator assembly (5) and secure with eight screws (1), washers (2), and nuts (3).

INSTALLATION - CONTINUED



2. Rotate fan blade (6) by hand to ensure blade turns freely in fan shroud.
3. Install radiator assembly (WP 0219 00).

END OF WORK PACKAGE

MAIN CONTROL VALVE REPLACEMENT 0249 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

O-ring (P/N 3503) (7)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Transmission access covers and cab support frame removed (WP 0142 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

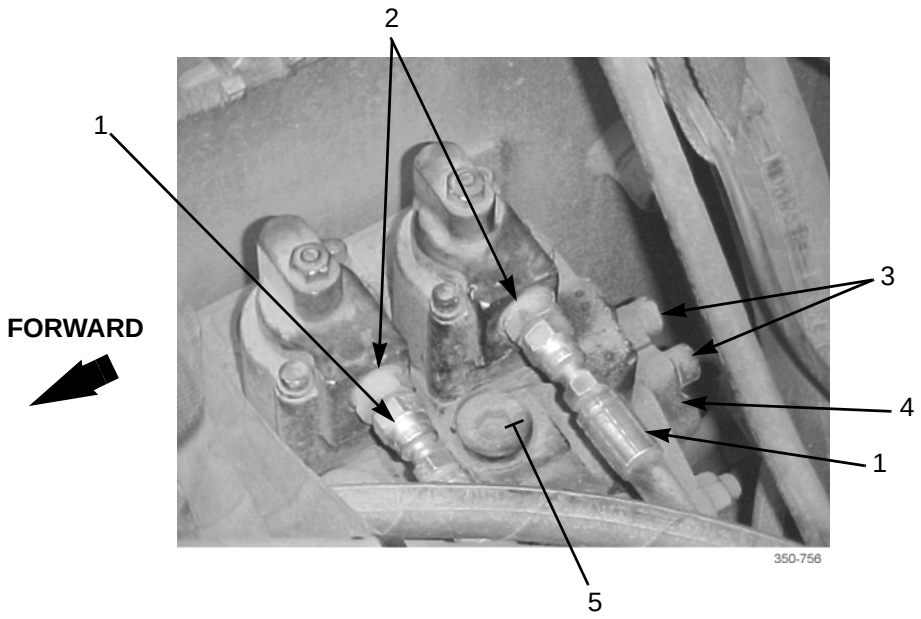
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Main control valve is located on right side of vehicle, on inner surface of frame.**
- **Tag all hydraulic lines.**
- **Remove nylon straps and clamp. Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

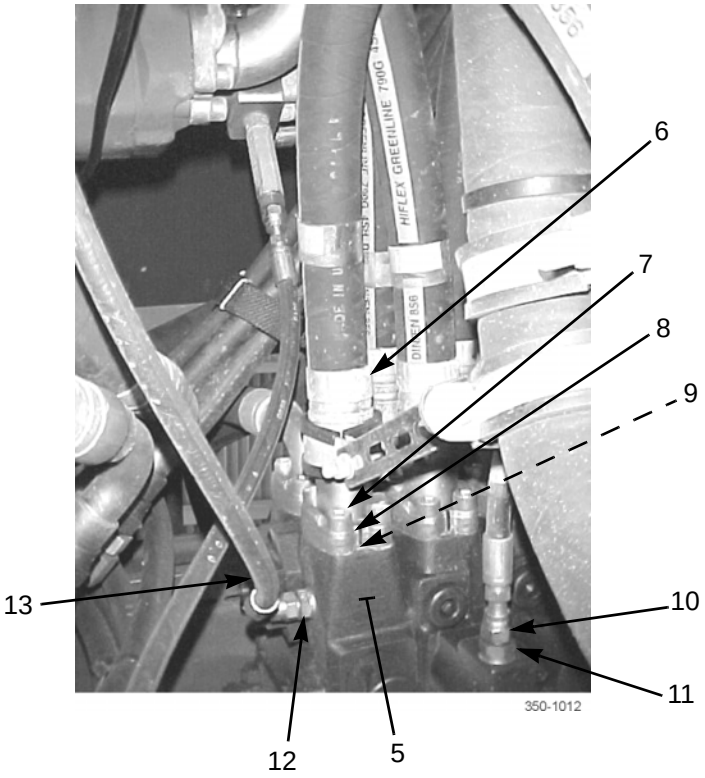
REMOVAL

1. Disconnect two hoses (1) from fittings (2) at top of control valve (5).
2. On rearward-facing surface of control valve (5), remove four screws (3) and flange (4) and disconnect hose from control valve. Remove and discard O-ring.



3. Disconnect two hoses (10) from fittings (11) on underside of control valve (5).
4. On forward-facing surface of control valve (5), disconnect hose (13) from fitting (12).
5. On left inner surface of control valve (5), disconnect each of six remaining hoses (6) as follows: Remove four screws (7), flange (8), and O-ring (9). Discard O-ring.

REMOVAL - CONTINUED



VIEW FROM UNDERSIDE

REMOVAL - CONTINUED



WARNING

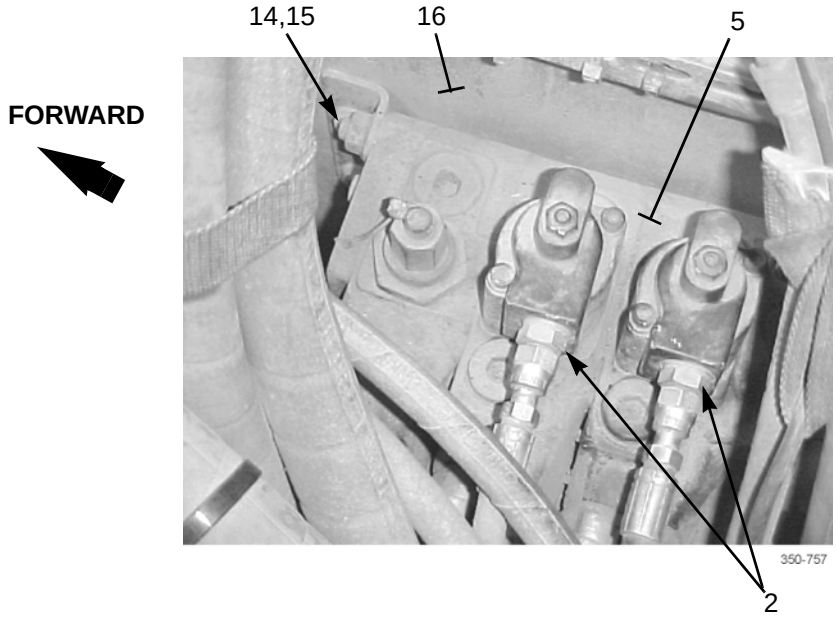
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Main control valve weighs approximately 100 lb (45 kg). Lifting device must have sufficient capacity to lift control valve. Failure to follow this warning may result in injury to personnel.**

6. Wrap a nylon sling around control valve (5) and attach sling to a suitable lifting device.
7. Remove four screws (14), washers (15), and control valve (5) from frame (16) and lower from vehicle.

NOTE

Perform step 8 to remove fittings from control valve, if a new control valve is being installed.

8. Remove two fittings (2), fittings (11), and fitting (12) from control valve (5).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install fitting (12), two fittings (11), and fittings (2) on control valve (5).

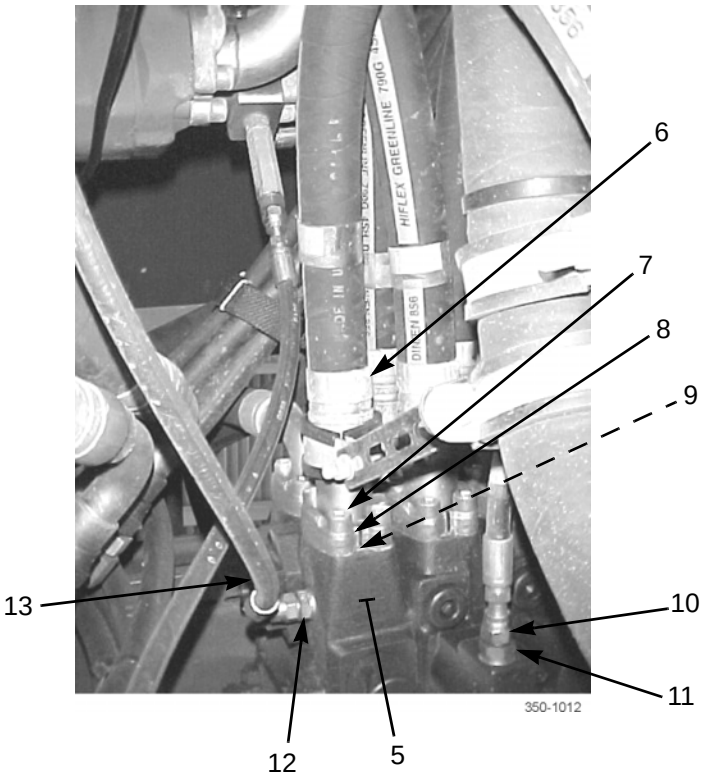
INSTALLATION - CONTINUED



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Main control valve weighs approximately 100 lb (45 kg). Lifting device must have sufficient capacity to lift control valve. Failure to follow this warning may result in injury to personnel.**

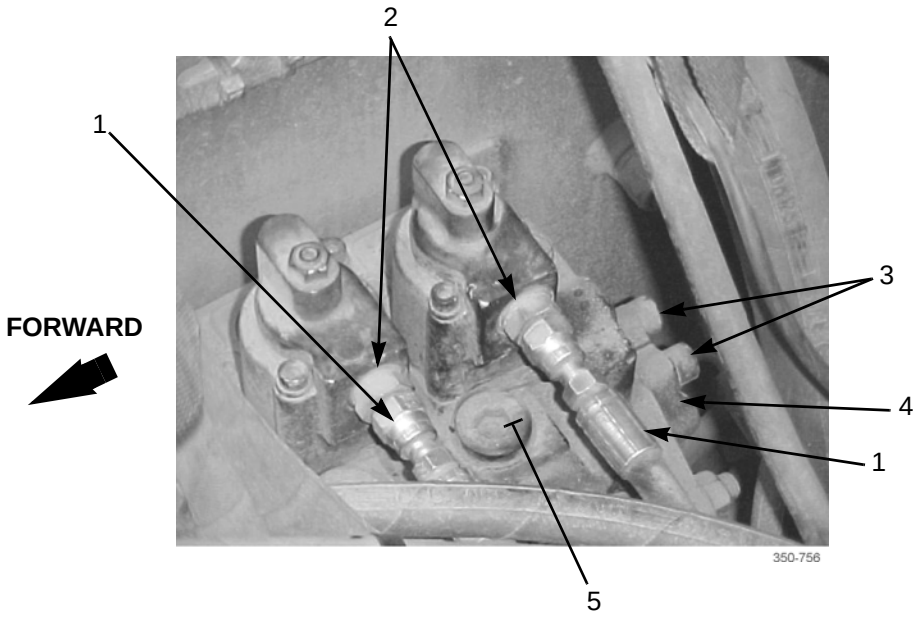
2. With a nylon sling wrapped around control valve (5) and sling supported by a suitable lifting device, position control valve against frame (16) and install four washers (15) and screws (14).
3. On left inner surface of control valve (5), connect each of six hoses (6) as follows: Install new O-ring (9) and hose with flange (8) and four screws (7).
4. On forward-facing surface of control valve (5), connect hose (13) to fitting (12).
5. Connect two hoses (10) to fittings (11) on underside of control valve (5).



VIEW FROM UNDERSIDE

INSTALLATION - CONTINUED

6. On rearward-facing surface of control valve (5), install new O-ring and hose with flange (4) and four screws (3).
7. Connect two hoses (1) to fittings (2) at top of control valve (5).



8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10). Raise and lower boom and check for leaks.
10. Recheck oil level in hydraulic reservoir (WP 0050 00).
11. Install nylon straps, clamp, and new tiedown straps as necessary to support hydraulic hoses.
12. Install transmission access covers and cab support frame (WP 0142 00).
13. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

SERVO CONTROL VALVE REPLACEMENT 0250 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Transmission access covers removed (WP 0142 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all hydraulic lines and electrical leads.**
- **Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses.**

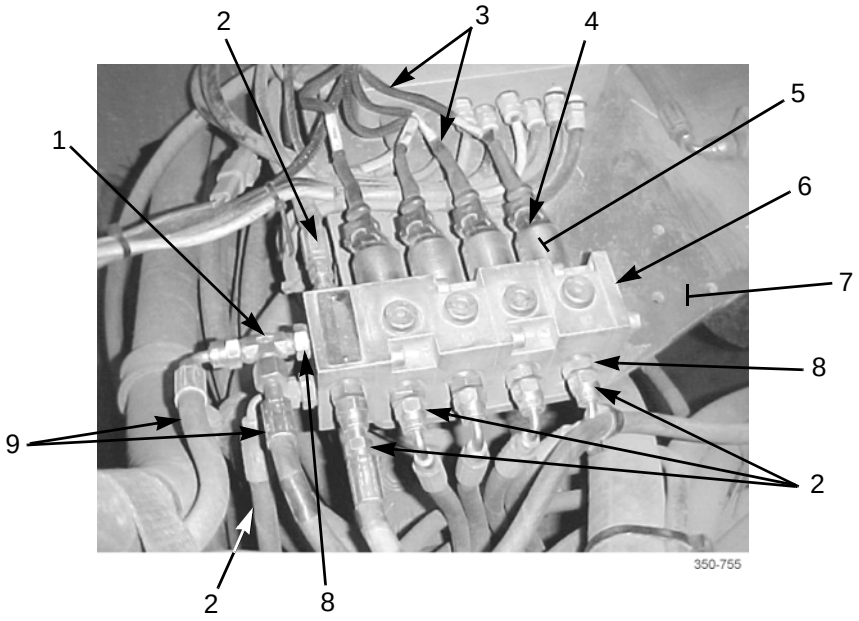
REMOVAL

1. Press in on four retaining clips (4) and disconnect four electrical leads (3) from solenoids (5).
2. Disconnect two hoses (9) from tee (1).
3. Disconnect seven hoses (2) from fittings (8) at control valve (6).
4. Remove two screws, washers, and control valve (6) from plate (7).

NOTE

Perform step 5 to remove fittings from control valve, if a new control valve is being installed.

5. Remove tee (1) and seven fittings (8) from control valve (6).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install seven fittings (8) and tee (1) on control valve (6).
2. Install control valve (6) on plate (7) with two washers and screws.
3. Connect seven hoses (2) to fittings (8) at control valve (6).
4. Connect two hoses (9) to tee (1).
5. Connect four electrical leads (3) to solenoids (5).
6. Check oil level in hydraulic reservoir (WP 0050 00).

INSTALLATION - CONTINUED

7. Start engine (TM 10-3930-675-10), operate systems, and check for leaks.
8. Install new tiedown straps, as necessary, to support hydraulic hoses.
9. Install transmission access covers (WP 0142 00).
10. Return cab to operational position (TM 10-3930-675-10).
11. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER CONTROL VALVE REPLACEMENT 0251 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 923828.0759) (4)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab and boom support in transport position (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Master battery switch in OFF position



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tag all electrical leads and hydraulic lines.**
- **Remove and discard tiedown straps as necessary to gain free movement in electrical leads and hydraulic hoses.**

REMOVAL

1. Press in on retaining clips (8) and disconnect electrical leads (7) from solenoids (6). Secure electrical leads away from control valve (5).
2. Disconnect hydraulic hoses (9) from fittings (10) at control valve (5). Secure all hydraulic hoses away from control valve.



WARNING

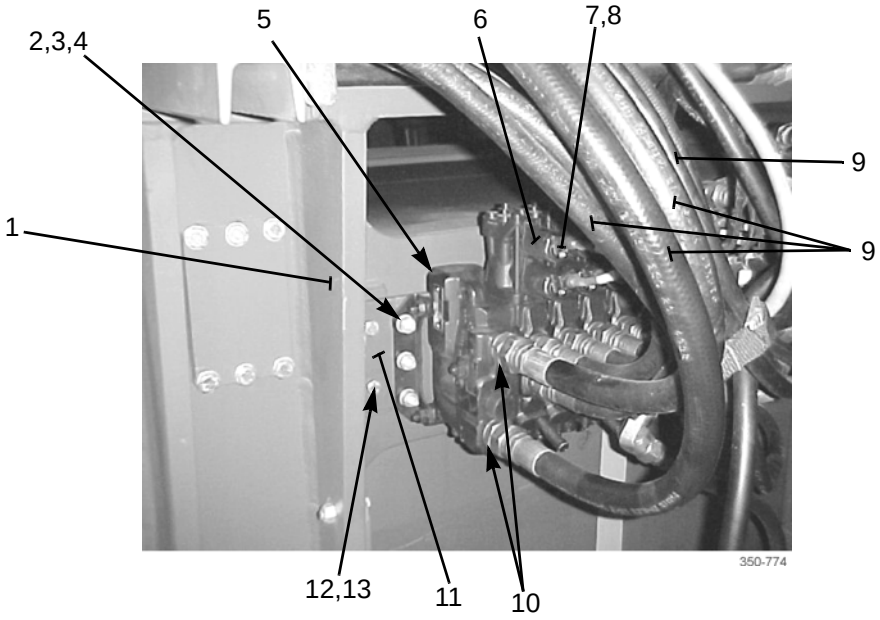
Use extreme caution when handling heavy parts. Tophandler control valve weighs approximately 150 lb (68 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

3. With assistance, remove four screws (12) and washers (13) securing mounting plate (11) with control valve (5) to tophandler (1). Remove control valve to work bench.
4. Remove four screws (2), washers (3), locknuts (4), and mounting plate (11) from control valve (5). Discard locknuts.

NOTE

Perform step 5 to remove fittings from control valve, if a new control valve is being installed.

5. Remove fittings (10) from control valve (5).



INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old control valve, if a new control valve is being installed.**

1. Install fittings (10) on control valve (5).



WARNING

Use extreme caution when handling heavy parts. Tophandler control valve weighs approximately 150 lb (68 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

2. Position mounting plate (11) on control valve (5) and secure with four screws (2), washers (3), and new locknuts (4).
3. With assistance, position control valve (5) against tophandler (1) and secure with four washers (13) and screws (12).
4. Connect electrical leads (7) to solenoids (6).
5. Connect hydraulic hoses (9) to fittings (10) at control valve (5).
6. Install new tiedown straps, as necessary, to support electrical leads (7) and hydraulic hoses (9).
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10), operate tophandler, and check for leaks.
9. Return cab and boom support to operational position (TM 10-3930-675-10).
10. Check operation of tophandler (TM 10-3930-675-10).
11. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM LIFT CYLINDER REPLACEMENT 0252 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Jackscrew (2) (TM 10-3930-675-10, *Basic Issue Items*)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

O-ring (P/N 3503)

Materials/Parts - Continued

O-ring (P/N 3505)

Washer, lock (P/N 5398)

Washer, lock (P/N 923657.0001)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Tophandler fully lowered (TM 10-3930-675-10) and resting on cribbing

Boom hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



WARNING

- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Boom lift cylinder weighs 885 lb (402 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

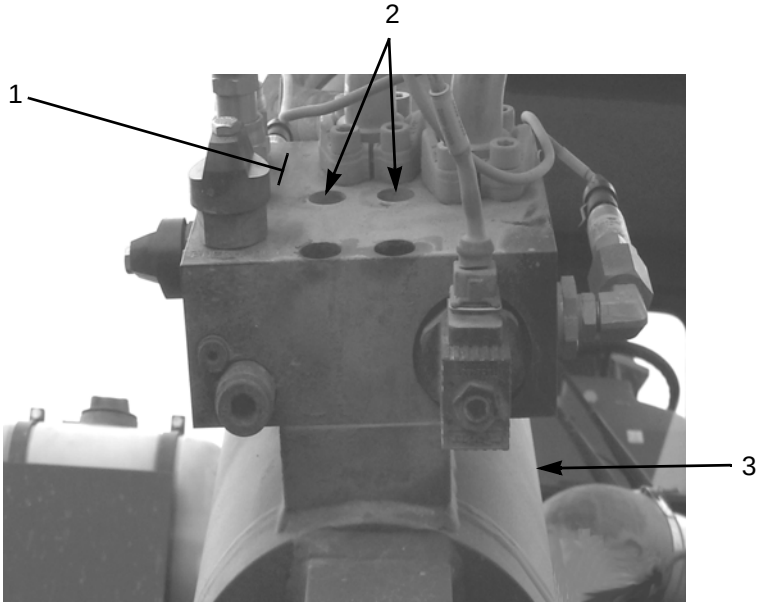
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

Boom lift cylinders are replaced in same manner.

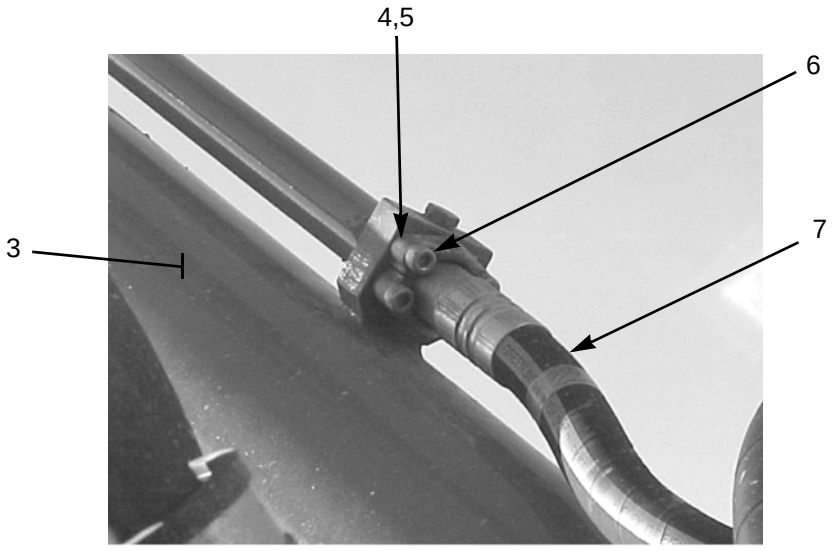
REMOVAL

1. Open emergency lowering and float valves.
2. Remove four screws (2) securing valve (1) to cylinder (3). Set valve aside. Discard O-ring.



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3. Remove four screws (6), flange (4), O-ring (5), and hose (7) from cylinder (3). Discard O-ring.



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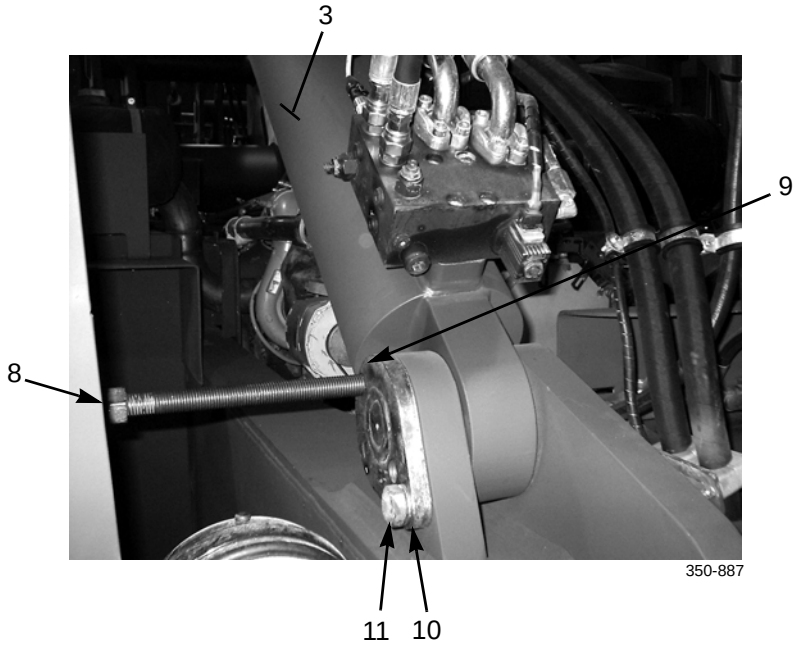
REMOVAL - CONTINUED



WARNING

Boom lift cylinder weighs 885 lb (402 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

4. Attach a nylon sling and suitable lifting device to cylinder (3).
5. At frame end of cylinder (3), remove screw (11) and lockwasher (10). Discard lockwasher.
6. Using two jackscrews (8), remove pin (9).

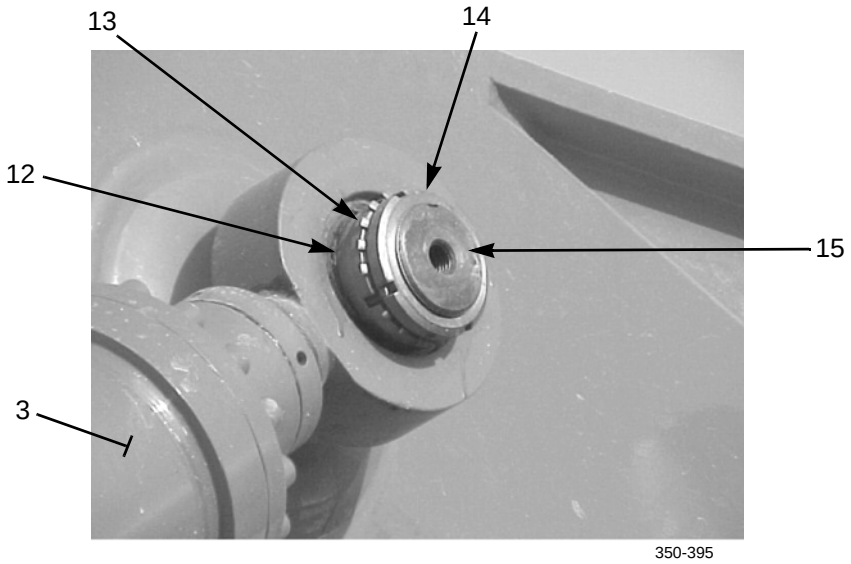


REMOVAL - CONTINUED

NOTE

Ensure sling is positioned so cylinder is balanced and will not tilt when removed from vehicle.

7. Raise cylinder (3) until parallel with ground.
8. At boom end of cylinder (3), remove nut (14), lockwasher (13), and washer (12). Discard lockwasher.
9. Remove end of cylinder (3) from welded shaft (15) on boom.
10. Lower cylinder (3) to ground.



INSTALLATION



WARNING

Boom lift cylinder weighs 885 lb (402 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

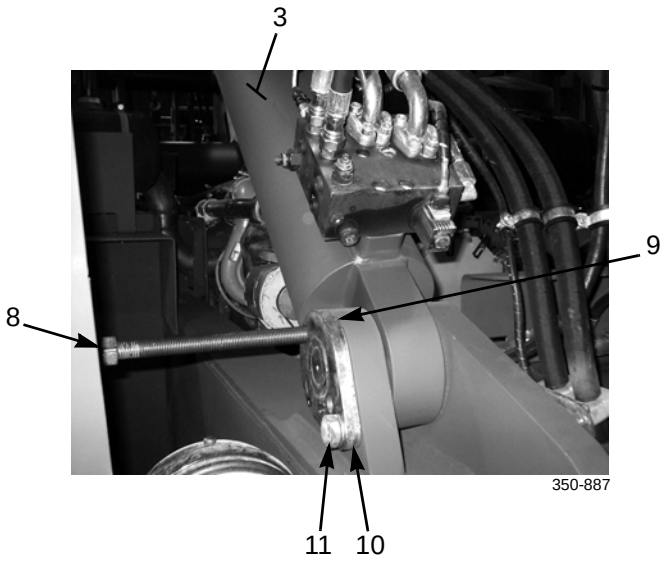
1. Using nylon sling and lifting device, raise cylinder (3) parallel to ground and position on slide boom end of cylinder on welded shaft (15).
2. Slide end of cylinder (3) onto welded shaft (15).
3. Install washer (12), new lockwasher (13), and nut (14). Bend tabs on lockwasher.
4. Lower frame end of cylinder (3) to mounting bracket on vehicle body.

INSTALLATION - CONTINUED

NOTE

- **Ensure pin is clean and free of burrs.**
- **When installing pin, slot in pin for retaining screw must be aligned with screw hole in mounting bracket.**

5. Install pin (9).
6. Install new lockwasher (10) and screw (11).

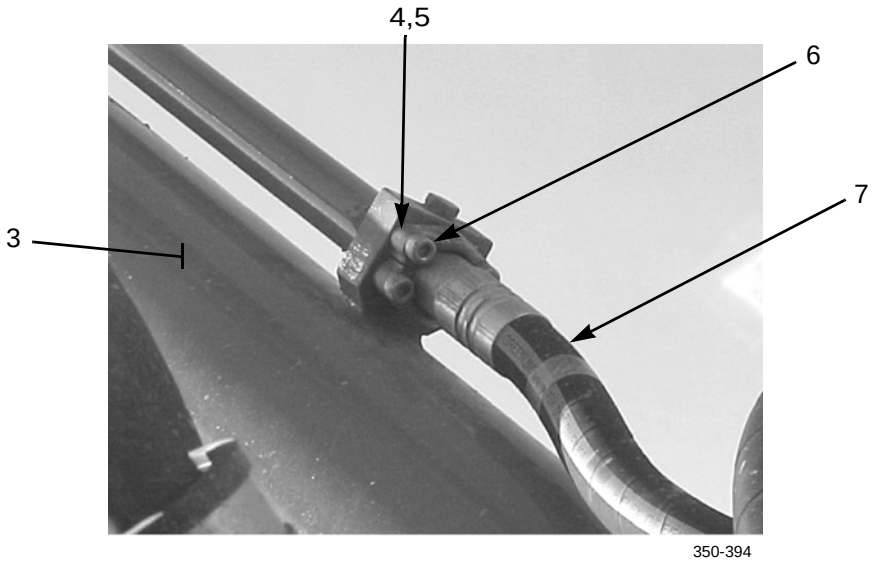


7. Remove sling and lifting device from cylinder (3).

NOTE

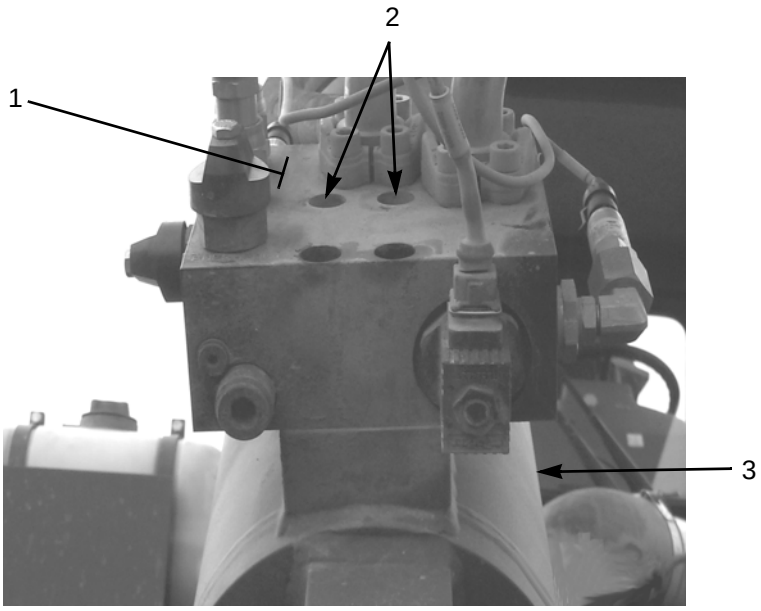
Lubricate new O-rings with lubricating oil.

8. Install new O-ring (5) and hose (7) on cylinder (3) with flange (4) and four screws (6).



INSTALLATION - CONTINUED

9. Position new O-ring and valve (1) and secure to cylinder (3) with four screws (2).
10. Close emergency lowering and float valves.



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11. Check oil level in hydraulic reservoir (WP 0050 00).
12. Start engine (TM 10-3930-675-10), operate lift cylinders, and check for leaks.
13. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM FOLDING CYLINDER REPLACEMENT 0253 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Goggles, Industrial (Item 50, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Boom hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Boom folding cylinder weighs 132 lb (60 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Boom folding cylinders are replaced in same manner.**
- **Tag all hydraulic lines.**
- **Measure and record overall length of cylinder prior to removal. The recorded measurement will aid in cylinder adjustment procedures after installation.**

REMOVAL

1. Remove hose clamp (7) from cylinder (8).



WARNING

Wear eye protection and have a rag handy when disconnecting hydraulic lines to boom folding cylinder. Failure to do so may result in eye injury due to residual hydraulic pressure in lines.

2. Disconnect two hydraulic hoses (6) from cylinder (8).

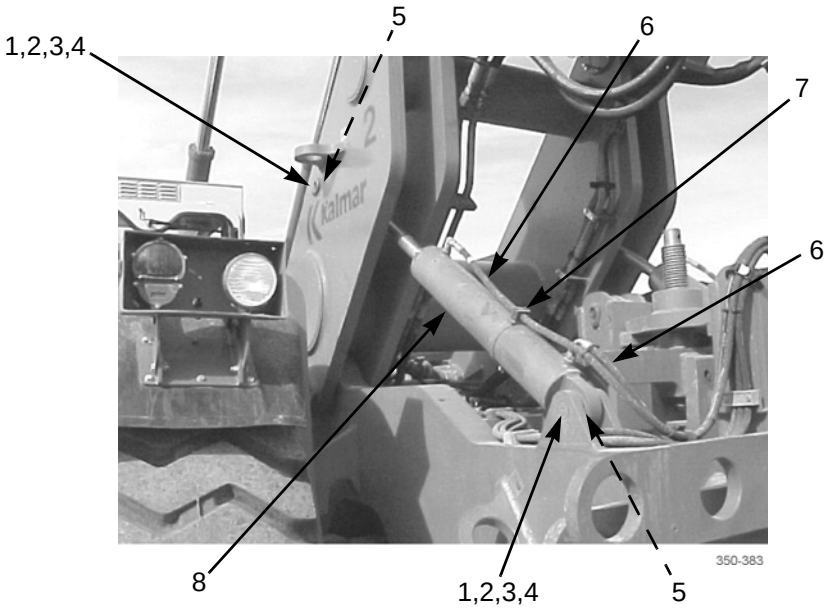


WARNING

Boom folding cylinder weighs 132 lb (60 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

3. Attach a nylon sling and suitable lifting device to cylinder (8).
4. At one end of cylinder (8), remove screw (1) and washer (2).
5. Remove pin (3). Remove grease fitting (4) from pin.
6. Remove and discard two O-rings (5) only if damaged.
7. Repeat steps 4 thru 6 for opposite end of cylinder (8).
8. Remove cylinder (8) from vehicle.

REMOVAL - CONTINUED



INSTALLATION



WARNING

Boom folding cylinder weighs 132 lb (60 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Using nylon sling and suitable lifting device, align cylinder (8) to vehicle.
2. Lubricate two O-rings (5) with lubricating oil.
3. Position two O-rings (5) on cylinder (8) end.
4. Install grease fitting (4) on pin (3) and install pin.
5. Install washer (2) and screw (1).
6. Repeat steps 1 thru 5 for opposite end of cylinder (8).
7. Connect two hydraulic hoses (6) to cylinder (8).
8. Install hose clamp (7) on hydraulic hose (6) and cylinder (8).

INSTALLATION - CONTINUED

Procedure for ARMY and RESET vehicles

Operate boom folding cylinders to full extended position (TM 10-3930-675-10). Measure overall length of cylinder (8). If measurement is the identical to that recorded prior to removal, adjustment may not be required. If measurement is not identical, cylinder adjustment is required.

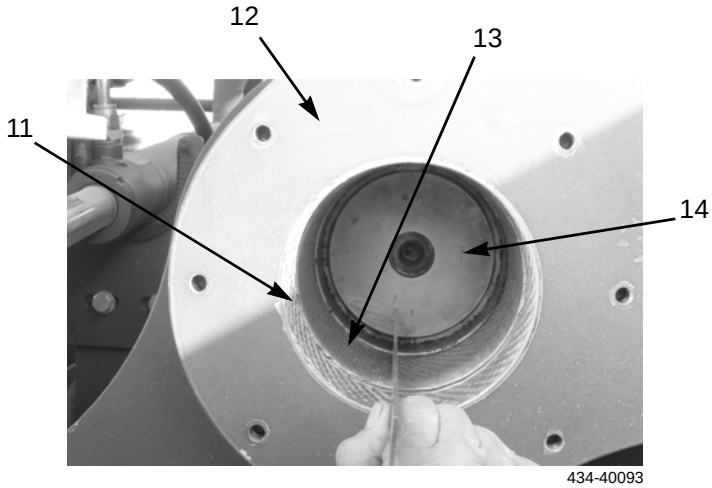
CAUTION

Prior to making adjustments to boom folding cylinders, boom and tophandler must be installed and boom should be raised to a 19 degree angle and extended to 110 in. (279 cm). Failure to perform this step will result in equipment damage.

NOTE

Ensure boom folding cylinders are operated to the full extended position. This will allow boom support locking pin cylinders to operate freely.

9. Measure overall length of cylinder (8). If measurement is identical to that recorded prior to removal, no adjustment is required. If measurement is not identical, cylinder adjustment is required. Proceed to next step.
10. Adjust cylinder length by loosening two clevis clamping screws (10) at upper end of cylinder (8). Access cylinder piston rod adjusting nut (9) through opening in boom support.
11. Turn adjusting nut to adjust overall length of cylinder. Tighten two clevis clamping screws. Proper adjustment is achieved when two bushings (11) of folding boom support (12) are in perfect alignment with stationary bushing (13) mounted in frame.

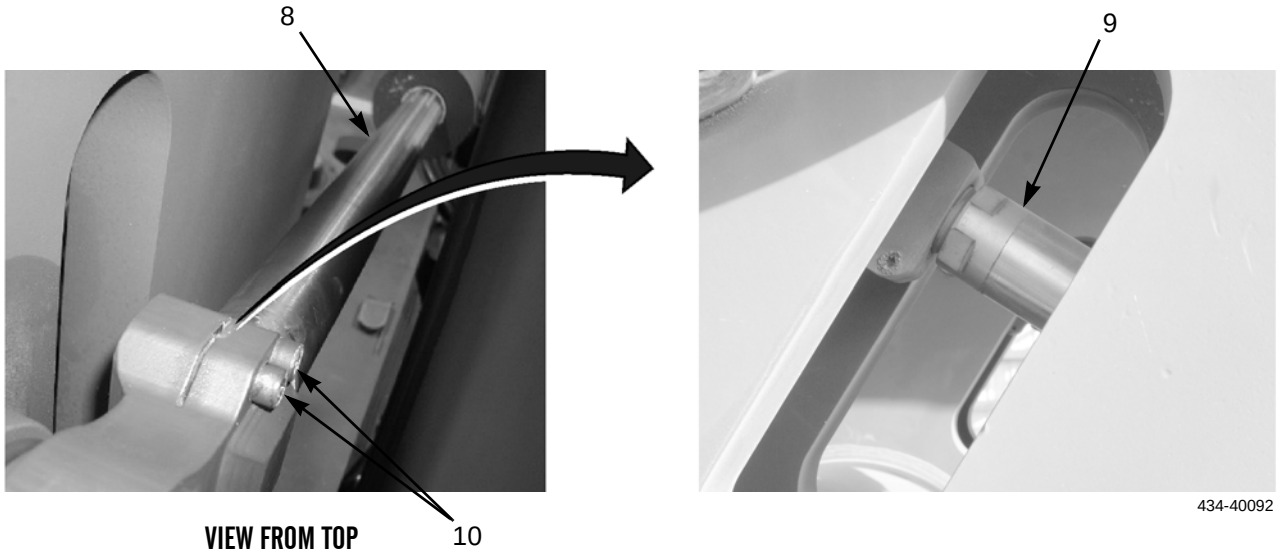


434-40093

INSTALLATION - CONTINUED

Procedure for ARMY and RESET Vehicles - Continued

12. After installing and adjusting boom folding cylinders (8), operate boom support locking pin cylinders (14) to ensure locking pins will retract and extend properly (TM 10-3930-675-10). If pins do not, repeat step 12.



13. Check oil level in hydraulic reservoir (WP 0050 00).
14. Lubricate grease fittings (WP 0050 00).
15. Start engine (TM 10-3930-675-10).
16. Check for leaks and proper operation of boom folding cylinders (TM 10-3930-675-10).
17. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

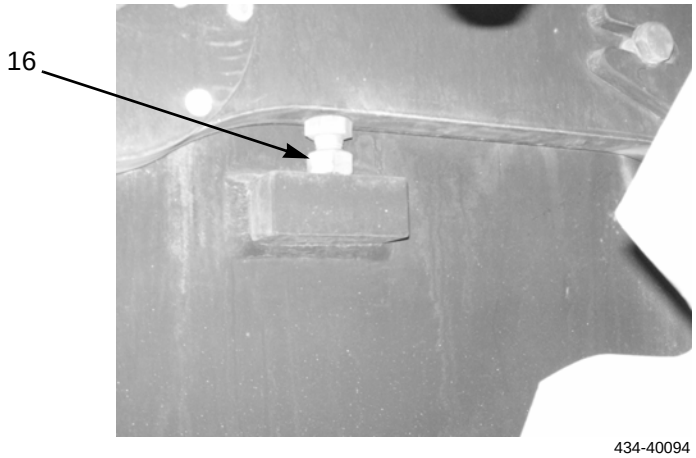
INSTALLATION - CONTINUED

Procedure for USMC Vehicle

CAUTION

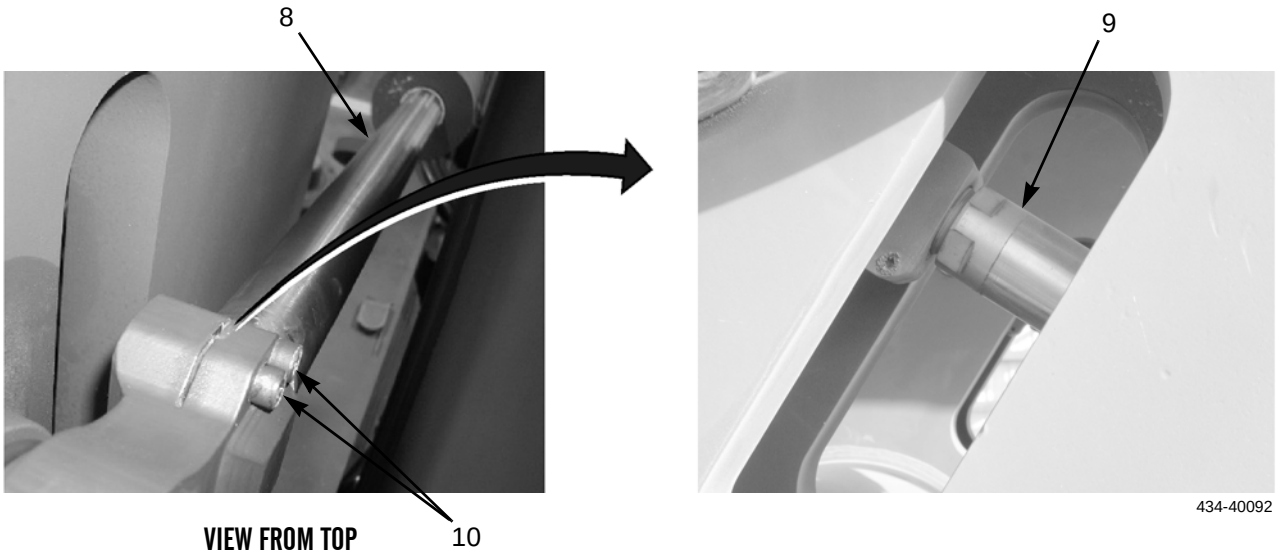
Prior to making adjustments to boom support, boom and tophandler must be installed and boom should be raised to 19 degrees and extended to 110 in. (279 cm). Failure to comply will result in equipment damage.

1. Operate boom folding cylinders to full extended position (TM 10-3930-675-10). Folding boom support should contact stop bolts (16) that are positioned on frame, slightly before cylinder (8) is fully extended. If boom does not, adjustment is required. Proceed to next step.



434-40094

Adjust cylinder length by loosening two clevis clamping screws (10) at upper end of cylinder (8). Access cylinder piston rod adjusting nut (9) through opening in boom supports. Turn adjusting nut to adjust overall length of cylinder. Tighten two clevis clamping screws.

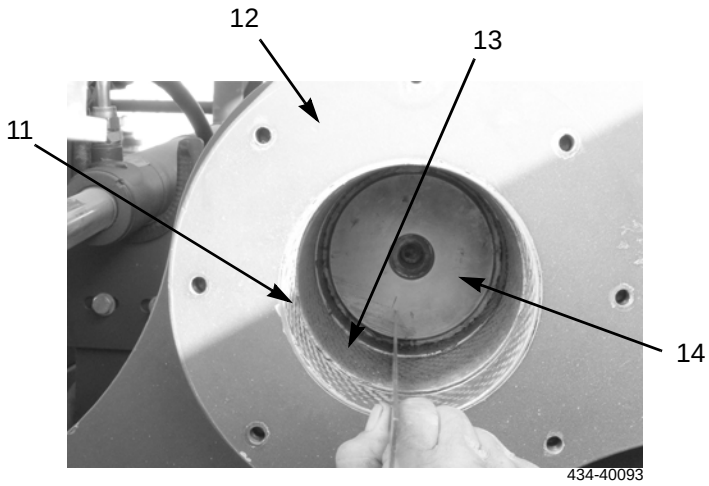


434-40092

INSTALLATION - CONTINUED

Procedure for USMC Vehicle - Continued

2. Final adjustment of folding boom support position is achieved with stop bolts (16) positioned on frame adjacent to folding boom support (12). Stop bolts should be adjusted so two bushings (11) of folding boom support (12) are in perfect alignment with stationary bushing (13) mounted in frame.
3. Determine proper alignment by placing a straightedge across bushings (11). When boom is in proper position for operating boom, support locking pin cylinders (TM 10-3930-675-10) and locking pins (14) are retracted.



4. After installing and adjusting boom folding cylinders (8) and adjusting folding boom support stop bolts (16), operate boom support locking pin cylinders (14) to ensure locks will retract and extend properly (TM 10-3930-675-10). If locks do not, repeat step 5.
5. Check oil level in hydraulic reservoir (WP 0050 00).
6. Lubricate grease fittings (WP 0050 00).
7. Start engine (TM 10-3930-675-10).
8. Check for leaks and proper operation of boom folding cylinders (TM 10-3930-675-10).
9. Recheck oil level in hydraulic reservoir (WP 0050 00).

END OF WORK PACKAGE

BOOM SUPPORT LOCKING PIN CYLINDER AND LOCKING PIN REPLACEMENT 0254 00

THIS WORK PACKAGE COVERS

Locking Pin Cylinder: Removal, Installation

Locking Pin: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Pliers, Retaining Ring (Item 81, WP 0289 00)

Pliers, Retaining Ring (Item 82, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Ring, Retaining (P/N 5313) (2)

Ring, Retaining (P/N 95088) (2)

O-ring (2)

References

WP 0050 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Boom locking pins in retracted position (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**

CAUTION

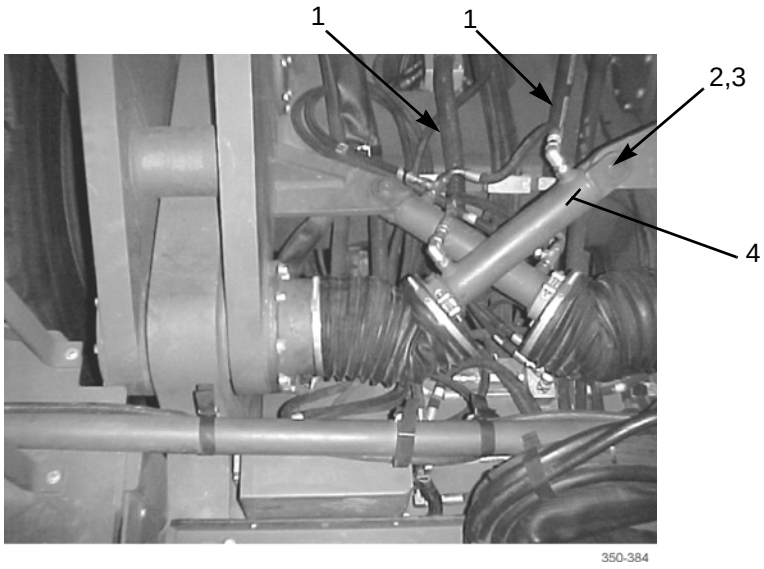
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

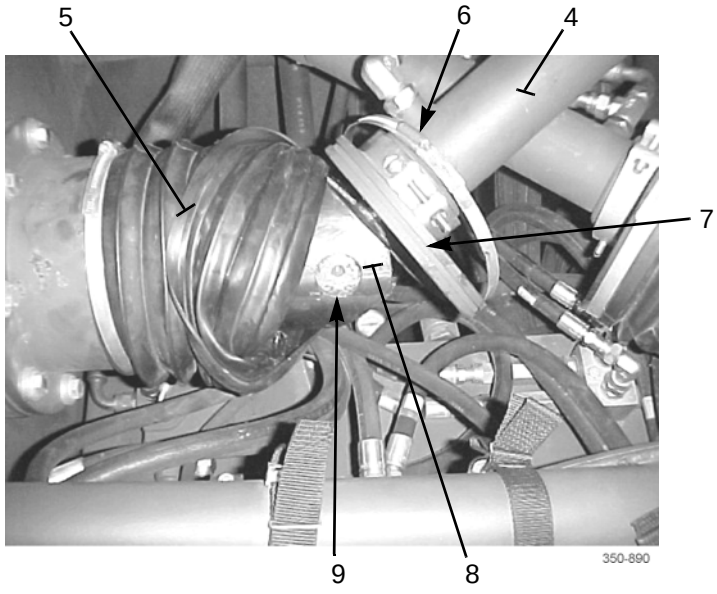
- **Both boom locking pin cylinders are replaced in the same manner.**
- **Tag all hydraulic lines.**

LOCKING PIN CYLINDER REMOVAL

1. Disconnect two hydraulic hoses (1) from check valve mounted on one cylinder (4).
2. Remove two retaining rings (2) and pin (3) that secure cylinder (4) to vehicle. Discard retaining rings.

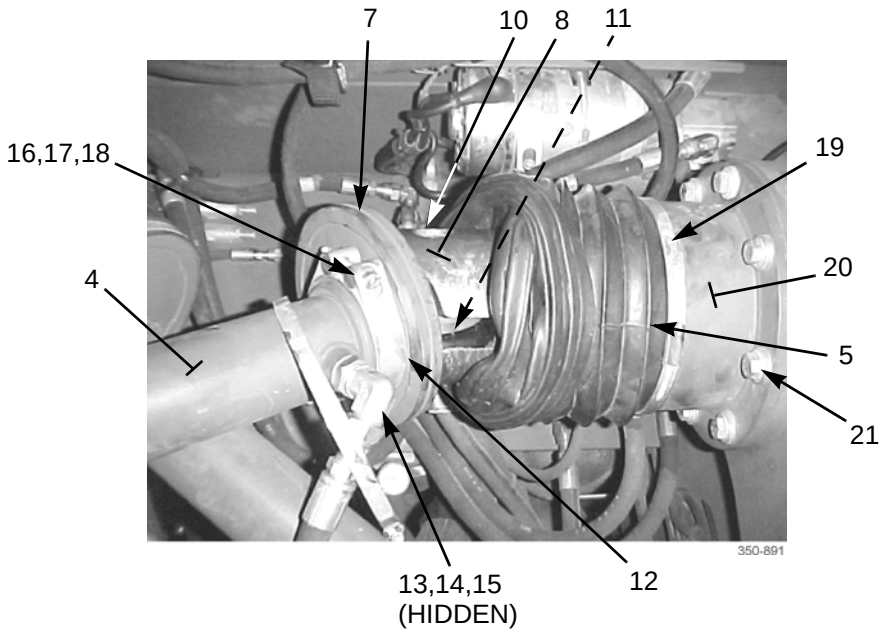


3. Loosen hose clamp (6) and slide rubber bellows (5) from bellows retaining plate (7) to expose end of cylinder (4) connected to locking pin (8).
4. Remove and discard two retaining rings (9).



LOCKING PIN CYLINDER REMOVAL - CONTINUED

5. Pivot and rotate cylinder (4) to access retaining ring (10).
6. Remove retaining ring (10) and pin (11). Discard retaining ring.
7. Loosen clamp (12) and remove rubber bellows (5), retaining plate (7), two adapter fittings (13), check valve (14), two O-rings (15), clamp (12), two bolts (16), nuts (17), and four washers (18) from cylinder (4). Retain for installation.



LOCKING PIN REMOVAL

WARNING

Locking pin weighs 85 lb (39 kg). Care should be taken in handling to prevent injury to personnel.

1. Loosen clamp (19) securing rubber bellows (5) to locking pin carrier assembly (20) and remove bellows.
2. Slide locking pin (8) out of locking pin carrier assembly (20).
3. Remove eight socket head screws (21) and locking pin carrier assembly (20).

LOCKING PIN INSTALLATION

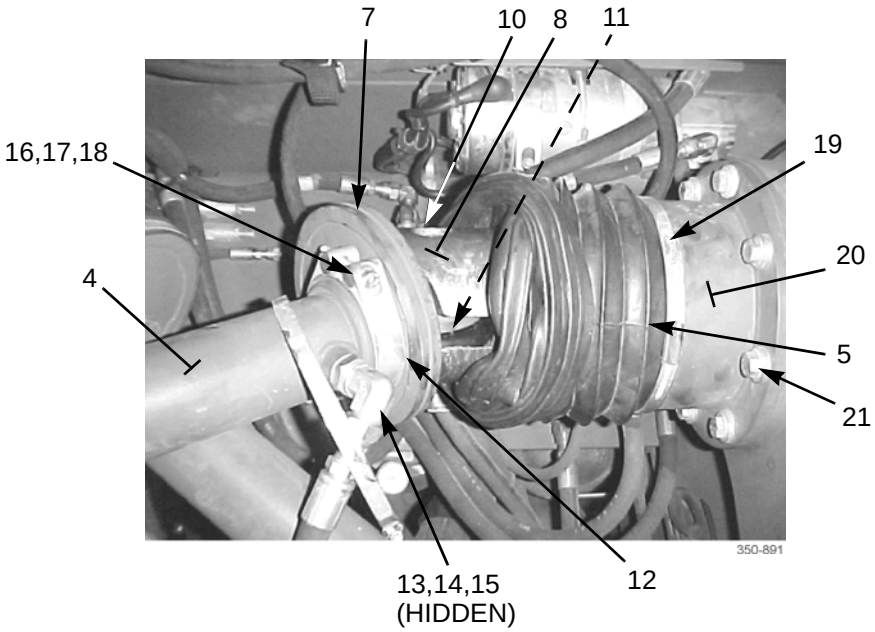
WARNING

Locking pin weighs 85 lb (39 kg). Care should be taken in handling to prevent injury to personnel.

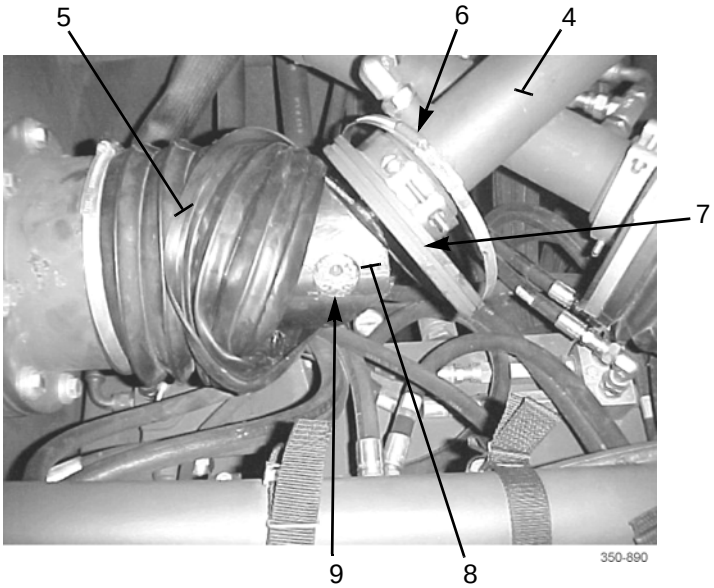
1. Install locking pin carrier assembly (20) and eight socket head screws (21).
2. Install locking pin (8) and slide into locking pin carrier assembly (20), leaving hole for cylinder pin exposed.
3. Slide rubber bellows (5) into place and secure with clamp (19).

LOCKING PIN CYLINDER INSTALLATION

1. Install two adapter fittings (13) on cylinder (4).
2. Install bellows retaining plate (7) and clamp (12) on cylinder (4).
3. Install four washers (18), two nuts (17), bolts (16), clamp (12), check valve (14), and rubber bellows (5) on cylinder (4). Tighten clamp.



4. Insert cylinder (4) into locking pin (8) and secure with pin (11) and new retaining ring (10).
5. Rotate and pivot cylinder (4) and insert new retaining rings (9).
6. Slide rubber bellows (5) over retaining plate (7) and secure with clamp (6).



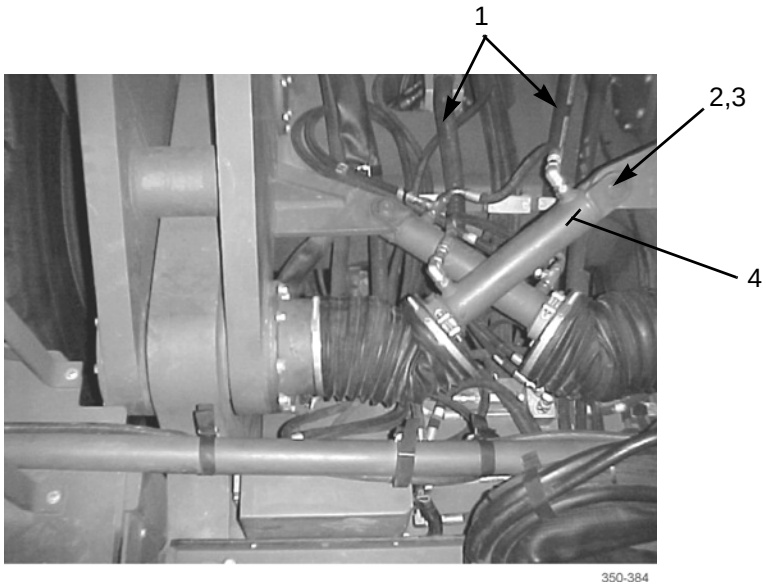
LOCKING PIN CYLINDER INSTALLATION - CONTINUED

7. Position cylinder (4) on vehicle mounting and secure with pin (3) and two new retaining rings (2).

NOTE

Refer to *General Maintenance Instructions* in (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.

8. Connect two hydraulic hoses (1) to cylinder (4).



9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10), extend and retract boom support locking pins, and check for leaks.
11. Perform operational check of boom locking pins (TM 10-3930-675-10).

END OF WORK PACKAGE

TOPHANDLER TILT CYLINDER REPLACEMENT 0255 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Tag, Marker (Item 38, WP 0290 00)

Washer, lock (P/N 923657.0004) (2)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Tophandler fully lowered (TM 10-3930-675-10) and resting on cribbing

Hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Tophandler tilt cylinder weighs 115 lb (52 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tophandler tilt cylinders are replaced in the same manner.**
- **Tag all hydraulic lines.**

REMOVAL

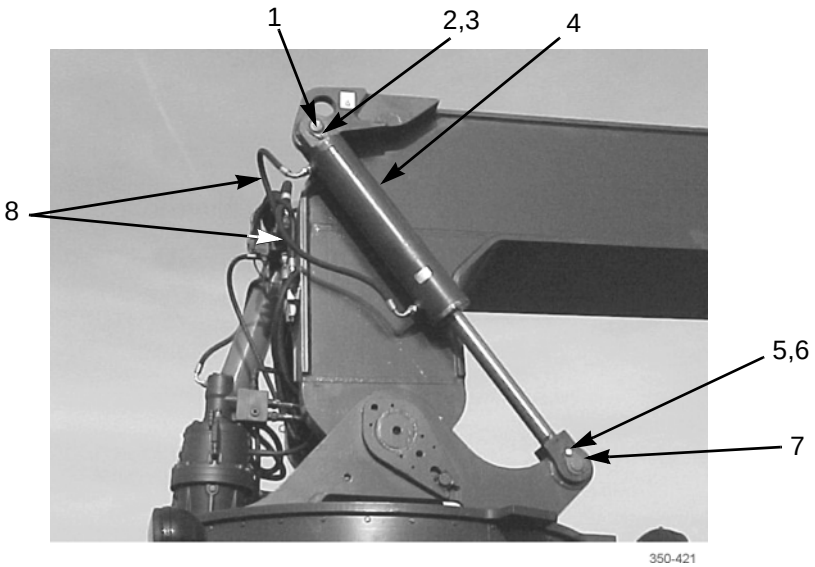
1. Disconnect two hydraulic hoses (8) from cylinder (4).



WARNING

Tophandler tilt cylinder weighs 115 lb (52 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

2. Attach a nylon sling and suitable lifting device to cylinder (4).
3. At lower end of cylinder (4), remove screw (5) and lockwasher (6). Discard lockwasher.
4. Remove pin (7).
5. Raise cylinder (4) to free lower end of cylinder from tophandler. Ensure sling is positioned so cylinder will not tilt when removed.
6. At upper end of cylinder (4), remove screw (2) and lockwasher (3). Discard lockwasher.
7. Remove pin (1).
8. Remove upper end of cylinder (4) from boom.
9. Lower cylinder (4) to ground.



INSTALLATION



WARNING

Tophandler tilt cylinder weighs 115 lb (52 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Coat pins with grease before installation.**

1. Using nylon sling and lifting device, position cylinder (4) so upper end of cylinder can be attached to boom.
2. Install upper end of cylinder (4) on boom with pin (1).
3. Install new lockwasher (3) and screw (2).
4. Lower end of cylinder (4) to tophandler.
5. Install pin (7).
6. Install new lockwasher (6) and screw (5).
7. Remove sling and lifting device from cylinder (4).
8. Connect two hydraulic hoses (8) to cylinder (4).
9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10), operate tilt cylinders, and check for leaks.
11. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER SIDESHIFTING CYLINDER REPLACEMENT 0256 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Pliers, Retaining Ring (Item 81, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Tophandler sideshifting cylinder weighs 211 lb (96 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Tophandler sideshifting cylinders should be fully retracted to aid in replacement.**
- **Tophandler sideshifting cylinders are replaced in same manner.**
- **Tag all hydraulic lines.**

REMOVAL

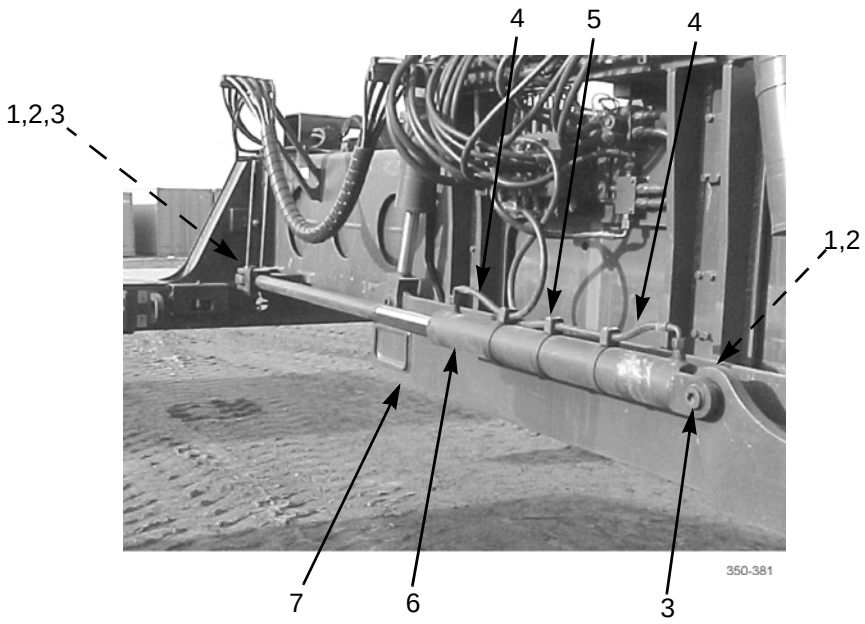
1. Remove three hose clamps (5) from hydraulic hoses (4) and cylinder (6).
2. Place a container under cylinder (6) to catch any spillage. Disconnect two hydraulic hoses (4) from cylinder.



WARNING

Tophandler sideshifting cylinder weighs 211 lb (96 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

3. Attach nylon sling to cylinder (6) and attach sling to suitable lifting device.
4. Remove lockring (1), spacer ring (2), and pin (3).
5. Repeat step 4 at opposite end of cylinder (6).
6. Remove cylinder (6) from tophandler (7).



INSTALLATION



WARNING

Tophandler sideshifting cylinder weighs 211 lb (96 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Using suitable lifting device and nylon sling attached to cylinder (6), align cylinder to tophandler (7).
2. Install pin (3), spacer ring (2), and lockring (1).
3. Repeat step 2 at opposite end of cylinder (6).
4. Connect two hydraulic hoses (4) to cylinder (6).
5. Install three hose clamps (5) on hydraulic hoses (4) and cylinder (6).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10), operate sideshifting cylinders, and check for leaks.
8. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

TOPHANDLER LEVELING CYLINDER REPLACEMENT 0257 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Pliers, Retaining Ring (Item 81, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Tophandler supported with leveling cylinders fully collapsed (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Tophandler leveling cylinder weighs 97 lb (44 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **All tophandler leveling cylinders are replaced in the same manner.**
- **Tag all hydraulic lines.**

REMOVAL

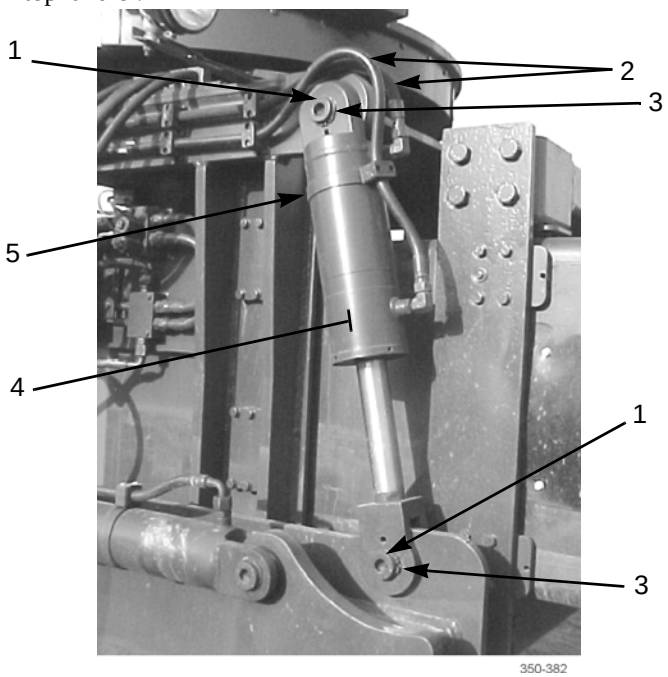
1. Remove hose clamp (5) from hydraulic hose (2) and cylinder (4).
2. Disconnect two hydraulic hoses (2) from cylinder (4).



WARNING

Tophandler leveling cylinder weighs 97 lb (44 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

3. Attach a nylon sling to cylinder (4) and attach sling to suitable lifting device.
4. Remove lockring (3) and pin (1).
5. Repeat step 4 at opposite end of cylinder (4).
6. Remove cylinder (4) from tophandler.



INSTALLATION



WARNING

Tophandler leveling cylinder weighs 97 lb (44 kg). Lifting device must have sufficient capacity to lift cylinder. Failure to follow this warning may result in death or injury to personnel.

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. Using a suitable lifting device and nylon sling, align cylinder (4) to tophandler.
2. Install pin (1) and lockring (3).
3. Repeat step 2 at opposite end of cylinder (4).
4. Connect two hydraulic hoses (2) to cylinder (4).
5. Install hose clamp (5) on hydraulic hose (2) and cylinder (4).
6. Check oil level in hydraulic reservoir (WP 0050 00).
7. Start engine (TM 10-3930-675-10), operate leveling cylinders, and check for leaks.
8. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM ASSEMBLY REPLACEMENT 0258 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Screwdriver Set, Jeweler's (Item 103, WP 0289 00)

Wrench, Adjustable (Item 135, WP 0289 00)

Jackscrew (2) (TM 10-3930-675-10, *Basic Issue Items*)

20-Ton Capacity Crane or Other Suitable Lifting Device (2)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00))

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Washer, lock (P/N 923657.0001) (2)

Personnel Required

Three

References

WP 0050 00
WP 0078 00
WP 0085 00
WP 0090 00
WP 0099 00
WP 0100 00
WP 0101 00
WP 0163 00
WP 0176 00
WP 0178 00
WP 0182 00
WP 0185 00
WP 0220 00
WP 0222 00
WP 0252 00
WP 0255 00
WP 0259 00
WP 0284 00

Equipment Condition

RTCH parked on level ground
Parking brake applied (TM 10-3930-675-10)
Wheels chocked
Tophandler removed (WP 0189 00)



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

Boom assembly weighs 20,486 lb (9,300 kg).

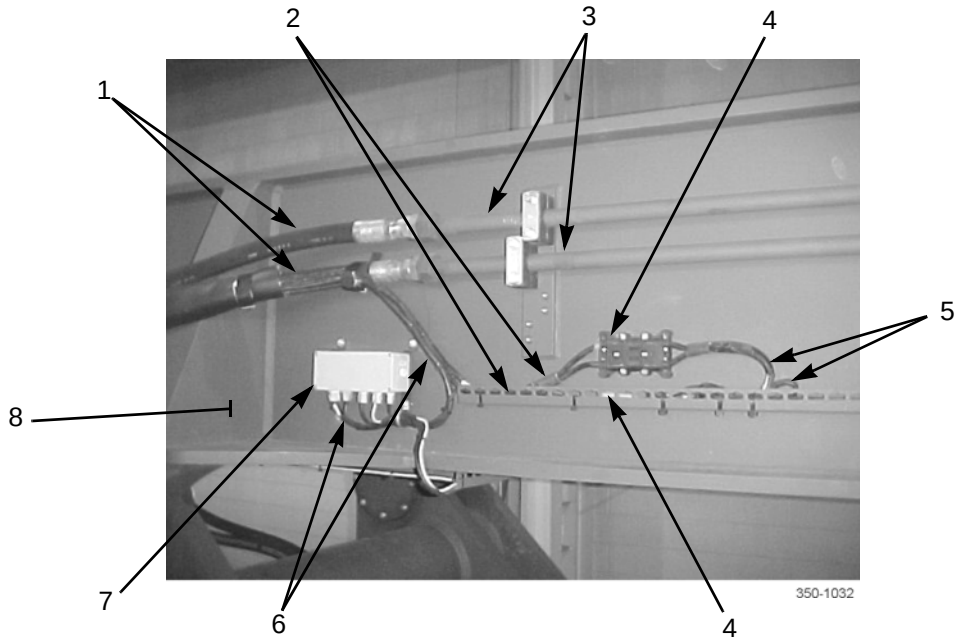
REMOVAL

1. Fully retract boom (TM 10-3930-675-10).

NOTE

Use a jeweler's screwdriver to disconnect electrical leads from boom junction box.

2. Remove boom angle sensor (WP 0099 00).
3. Remove boom extension sensor (WP 0100 00). Remove sensor cable from attachment to boom assembly (8) and from boom junction box (7). Discard tiedown straps removed.
4. Disconnect electrical leads of wiring harness (6) from boom junction box (7).
5. Disconnect boom wiring harnesses (5) from two connectors (4).
6. Remove wiring harnesses (2 and 6) from attachment to boom assembly (8). Discard tiedown straps removed.
7. Disconnect hydraulic hoses (1) from hydraulic pipes (3) (WP 0182 00). Remove hydraulic hoses from attachment to boom assembly (8).



8. Disconnect hydraulic hoses from extension cylinder (WP 0178 00).

NOTE

With boom fully retracted, boom assembly's center of gravity is 142 in. (360.6 cm), as measured forward from center of pivot shaft that attaches boom assembly to boom support.

9. Sling boom assembly, using a 20-ton crane or other suitable lifting device. Attach slings to lifting eyes at each end of boom assembly (8). Take up slack in slings.
10. Remove lift cylinders from boom assembly (8) and rest cylinders on blocks of wood on frame (WP 0252 00).
11. Remove screw (11) and lockwasher (12) from each side of boom support (9). Discard lockwashers.

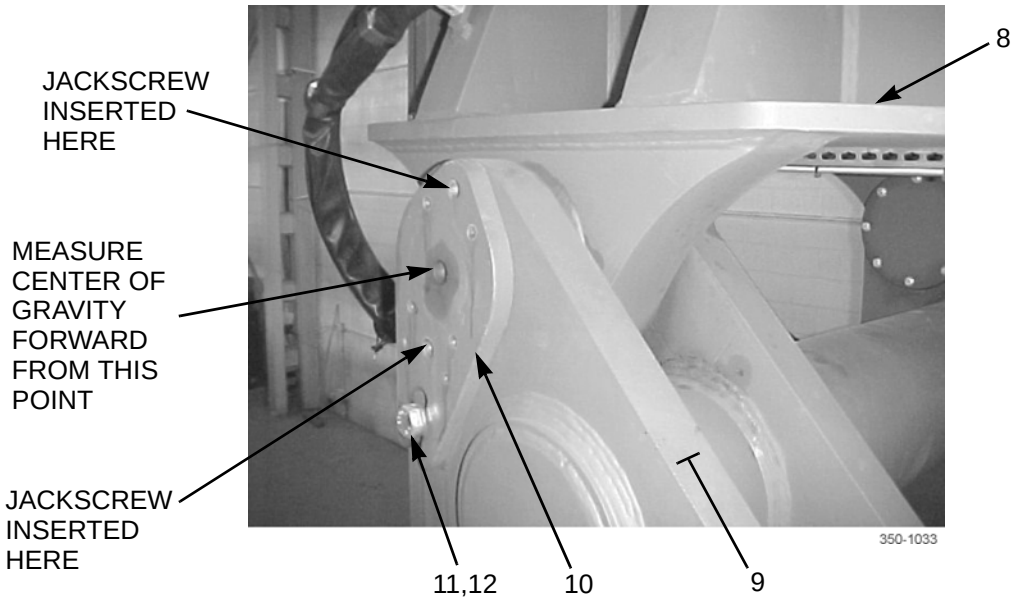
REMOVAL - CONTINUED

12. Lubricate two jackscrews with lubricating oil and install into ear of each pivot shaft (10).

NOTE

To avoid binding pivot shaft, screw in jackscrews equally and alternately.

13. Screw in jackscrews approximately 8 in. (20.3 cm) to withdraw each pivot shaft (10) until boom assembly (8) is free of boom support (9).





WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

CAUTION

Use caution when lifting boom assembly. Ensure boom assembly clears vehicle and does not contact electrical or hydraulic components. Failure to follow this caution may cause damage to components on boom assembly or damage to vehicle.

14. Ensure all disconnected electrical and hydraulic lines are secured away. Lift boom assembly (8) from vehicle and remove. Place boom assembly on suitable cribbing as required.

REMOVAL - CONTINUED

15. As required, remove these components from boom assembly (8) to be installed on replacement boom assembly:
    a. Work lights and IR lights (WP 0085 00 and WP 0090 00).
    b. Boom wiring harnesses (WP 0220 00).
    c. Boom junction box (WP 0078 00).
    d. Hydraulic hoses, pipes, and fittings (WP 0178 00).
    e. Boom-to-boom extension flexible conveyer (WP 0162 00).
    f. Tophandler tilt cylinders (WP 0257 00).
    g. Tophandler junction box with twistlock indicator lights (WP 0222 00).
    h. Tophandler angle sensor (WP 0101 00).

INSTALLATION

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. If removed, install these components on replacement boom assembly (8):
    a. Work lights and IR lights (WP 0085 00 and WP 0090 00).
    b. Boom wiring harnesses (WP 0220 00).
    c. Boom junction box (WP 0078 00).
    d. Hydraulic hoses, pipes, and fittings (WP 0178 00).
    e. Boom-to-boom extension flexible conveyer (WP 0163 00).
    f. Tophandler tilt cylinders (WP 0255 00).
    g. Tophandler junction box with twistlock indicator lights (WP 0222 00).
    h. Tophandler angle sensor (WP 0101 00).

NOTE

With boom fully retracted, boom assembly's center of gravity is 142 in. (360.6 cm), as measured forward from center of pivot shaft that attaches boom assembly to boom support.

2. Sling boom assembly, using a 20-ton crane or other suitable lifting device. Attach slings to lifting eyes at each end of boom assembly (8). Take up slack in slings.



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

INSTALLATION - CONTINUED

CAUTION

Use caution when lifting boom assembly. Ensure boom assembly clears vehicle and does not contact electrical or hydraulic components. Failure to follow this caution may cause damage to components on boom assembly or damage to vehicle.

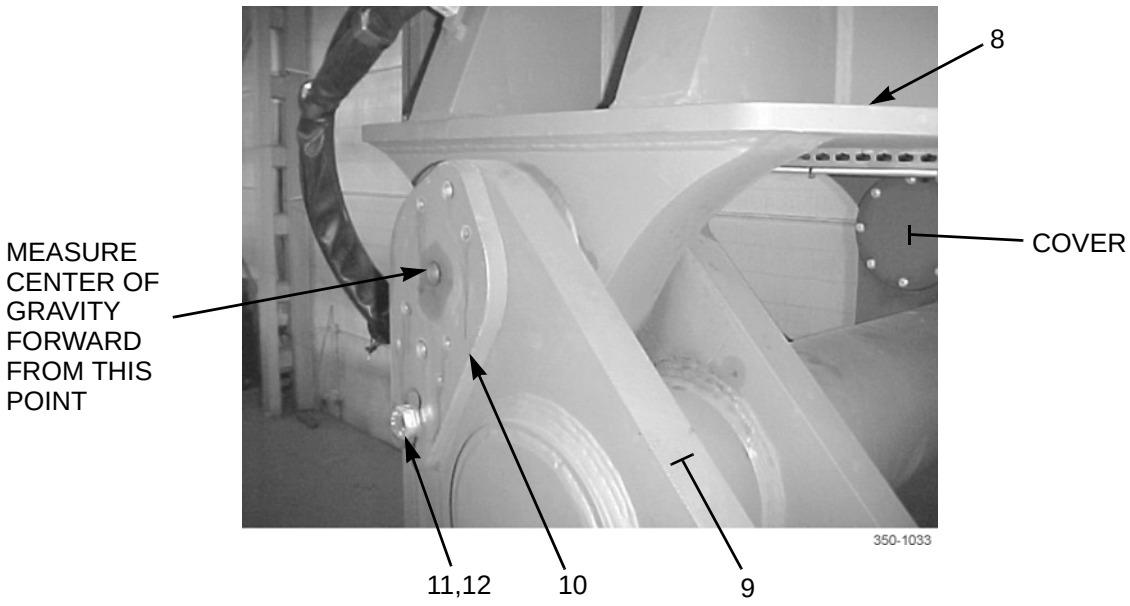
3. Lift boom assembly and position at vehicle.

4. Lower boom assembly (8) and position into boom support (9), while aligning pivot shaft holes in boom assembly with holes in boom support.

NOTE

- **Ensure pivot shafts are clean and free of burrs.**
- **When installing pivot shafts, slot in pivot shaft for retaining screw must be aligned with screw hole in boom assembly.**
- **Covers may be removed to aid in alignment of pivot shafts.**

5. Install pivot shaft (10) on each side of boom support (9). Secure with new lockwasher (12) and screw (11).



6. Connect lift cylinders to boom assembly (WP 0252 00).

7. Remove lifting device from boom assembly (8).

8. Connect hydraulic hoses to extension cylinder (WP 0176 00).

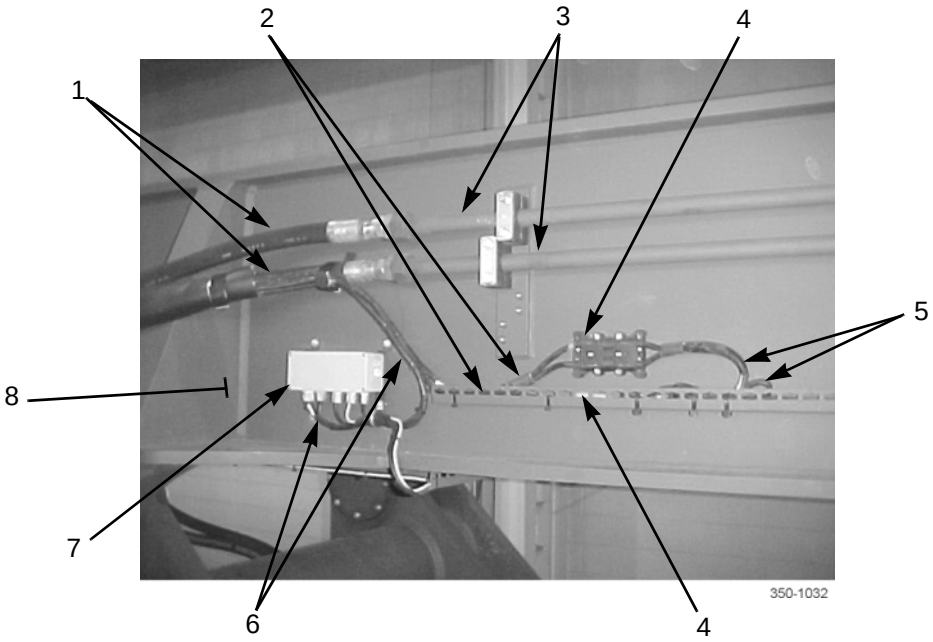
INSTALLATION - CONTINUED

9. Connect hydraulic hoses (1) to hydraulic pipes (3) (refer to *General Maintenance Instructions*, WP 0284 00). Secure hydraulic hoses to boom assembly (8).
10. Secure wiring harnesses (2 and 6) to boom assembly (8) with new tiedown straps.
11. Connect boom wiring harnesses (5) to two connectors (4).

NOTE

Use a jeweler's screwdriver to connect electrical leads to boom junction box.

12. Connect electrical leads of wiring harness (6) to boom junction box (7).



13. Install boom extension sensor (WP 0100 00). Connect sensor cable to boom junction box (7) and secure cable to boom assembly (8) with new tiedown straps.
14. Install boom angle sensor (WP 0099 00).
15. Lubricate pivot shafts (WP 0050 00).
16. Install tophandler (WP 0189 00).
17. Check oil level in hydraulic reservoir (WP 0050 00).
18. Perform *Boom and Tophandler Calibration* (WP 0259 00).
19. Check operation of boom assembly and tophandler (TM 10-3930-675-10).
20. Recheck oil level in hydraulic reservoir (WP 0050 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

BOOM AND TOPHANDLER CALIBRATION 0259 00

THIS WORK PACKAGE COVERS

Calibration

INITIAL SETUP

Maintenance Level

Direct Support

References

TM 10-3930-675-10

NOTE

- **RTCH must be parked on level ground with all wheels pointing straight ahead.**
- **When calibrating the boom and tophandler, perform all ten calibration steps in order. DO NOT skip or omit any steps.**

CALIBRATION

1. **Access to Calibration Menus.**
   a. Turn master battery switch to ON position.
   b. Turn ignition switch ON and start vehicle.
   c. Select Kalmar service menu on driver's Electronic Control System (ECS) display screen and press "Enter".

NOTE

If boom or tophandler angle sensors have been removed or are being replaced, steps d thru f must be performed prior to calibration.

   d. Ensure boom and tophandler are level with ground.
   e. Enter diagnostic menus, select DIAG SERVO menu, and scroll down to display 7 (13). Note angle sensor voltage reading.
   f. Loosen setscrew securing angle sensor lever to shaft. Rotate sensor shaft until voltage reading is between 7 and 8V (boom angle sensor) or 4V (tophandler angle sensor). Retighten setscrew and recheck voltage reading.
   g. Enter calibration program access number "13221" and press "Enter".
   h. Press right arrow button to locate "CALIBR SERVO" menu, then press "Enter".

CALIBRATION - CONTINUED

2. **Boom Calibration, Boom Angle, Lowered Position (Menu 1 of 10).**

   a. Lower boom to lowest position.

   b. Allow ECS display to stabilize, then press “Enter”.

   c. ECS display screen should look as shown:

CALIBR SERVO	1 (10)
LOWER MINIMUM BOOM ANGLE	 XXX XXX

Range 600-800

   d. Press right arrow button to advance through remaining calibration menus.

3. **Boom Calibration, Tophandler Tilt Position (Menu 2 of 10).**

   a. Lower boom to lowest position.

   b. Level tophandler with ground.

   c. Allow ECS display to stabilize, then press “Enter”.

   d. ECS display screen should look as shown:

CALIBR SERVO	2 (10)
LOWER MINIMUM TILT ANGLE	 XXX XXX

Range 200-400

   e. Press right arrow button to advance through remaining calibration menus.

4. **Boom Calibration, Boom Angle, Raised Position (Menu 3 of 10).**

   a. Raise boom to maximum height and fully retract with tophandler level with ground.

   b. Allow ECS display to stabilize, then press “Enter”.

   c. ECS display screen should look as shown:

CALIBR SERVO	3 (10)
LIFT MAXIMUM BOOM ANGLE	 XXX XXX

Range 200-400

   d. Press right arrow button to advance through remaining calibration menus.

CALIBRATION - CONTINUED

5. **Boom Calibration, Tophandler Tilt Angle (Boom in Raised Position) (Menu 4 of 10).**

   a. Raise boom to maximum height, fully retract, and level tophandler with ground.

   b. Allow ECS display to stabilize, then press “Enter”.

   c. ECS display screen should look as shown:

CALIBR SERVO	4 (10)
LIFT MAXIMUM TILT ANGLE	 XXX XXX

Range 600-800

   d. Press right arrow button to advance through remaining calibration menus.

6. **Boom Calibration, Retracted Position (Menu 5 of 10).**

   a. Raise boom to maximum height and fully retract.

   b. Allow ECS display to stabilize, then press “Enter”.

   c. ECS display screen should look as shown:

CALIBR SERVO	5 (10)
BOOM MIN EXTENSION	XXX XXX

Range 35-150

   d. Press right arrow button to advance through remaining calibration menus.

7. Boom Calibration, Extended Position (Menu 6 of 10).

   a. Fully extend boom.

   b. Allow ECS display to stabilize, then press “Enter”.

   c. ECS display screen should look as shown:

CALIBR SERVO	6 (10)
BOOM MAX EXTENSION	XXX XXX

Range 400-550

   d. Press right arrow button to advance through remaining calibration menus.

CALIBRATION - CONTINUED

8. **Boom Calibration, Boom Cylinders (Retracted) (Menu 7 of 10).**

   a. Fully retract and lower boom.

   b. Raise boom 1/4-in. (.64 cm) to pressurize boom cylinders, then release joystick. DO NOT reposition or move joystick again until procedure is completed.

   c. Allow system and ECS display to stabilize (10 to 20 seconds), then press “Enter”.

   d. ECS display screen should look as shown:

CALIBR SERVO	7 (10)
INIT BY MIN LOAD LE XXX XXX	RI XXX XXX

Range 500-650

   e. Press right arrow button to advance through remaining calibration menus.

9. **Boom Calibration, Boom Cylinders (Extended) (Menu 8 of 10).**

   a. Fully extend and lower boom.

   b. Raise boom 1/4-in. (.64 cm) to pressurize lift cylinders, then release joystick. DO NOT reposition or move joystick again until procedure is completed.

   c. Allow system and ECS display to stabilize (10 to 20 seconds), then press “Enter”.

   d. ECS display screen should look as shown:

CALIBR SERVO	8 (10)
INIT BY MAX LOAD LE XXX XXX	RI XXX XXX

Range 800-950

   e. Press right arrow button to advance through remaining calibration menus.

10. **Boom Calibration, Load Check (Menu 9 of 10).**

   a. Fully retract boom and raise 1 in. (2.5 cm).

   b. Check ECS display. Actual Load should read “0-100” lb.

   c. Reposition boom. Actual Load reading should return to “0-100” lb after stabilizing.

   d. Reposition tophandler. Actual Load reading should return to “0-100” lb after stabilizing.

   e. ECS display screen should look as shown:

CALIBR SERVO	9 (10)
ALLOWED LOAD ACTUAL LOAD L-LC	Kg Kg M

   f. Press right arrow button to advance to remaining calibration menu.

CALIBRATION - CONTINUED

11. **Boom Calibration Completed (Menu 10 of 10).**
    a. With all calibration steps completed and corrections or adjustments made, press “Enter” to return to main menu.
    b. ECS display screen should look as shown:

CALIBR SERVO	10 (10)
CALIBRATION OF EL SERVO	DONE

END OF WORK PACKAGE

TOPHANDLER TWISTLOCK REPLACEMENT 0260 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pliers, Retaining Ring (Item 81, WP 0289 00)

Wrench Set, Socket (Item 134, WP 0289 00)

Wrench, Adjustable (Item 135, WP 0289 00)

Wrench, Torque (Item 141, WP 0289 00)

Materials/Parts

Nut, lock (P/N 923828.0843)

Pin, Cotter (P/N 923828.0837) (2)

Set, washer, lock (P/N 923828.0842)

Personnel Required

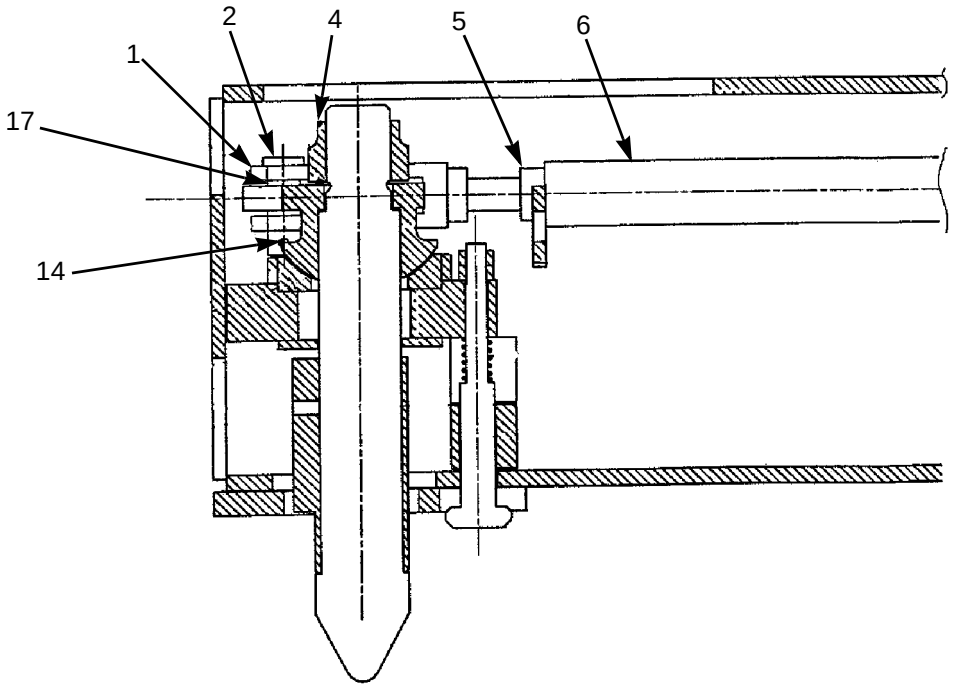
Two

References

WP 0075 00

REMOVAL

1. Remove cotter pin (14), retaining ring (17), and shaft (2) from end bracket (1) of twistlock link (6). Discard cotter pin.
2. Loosen locknut (4) and nut (5).



350-543

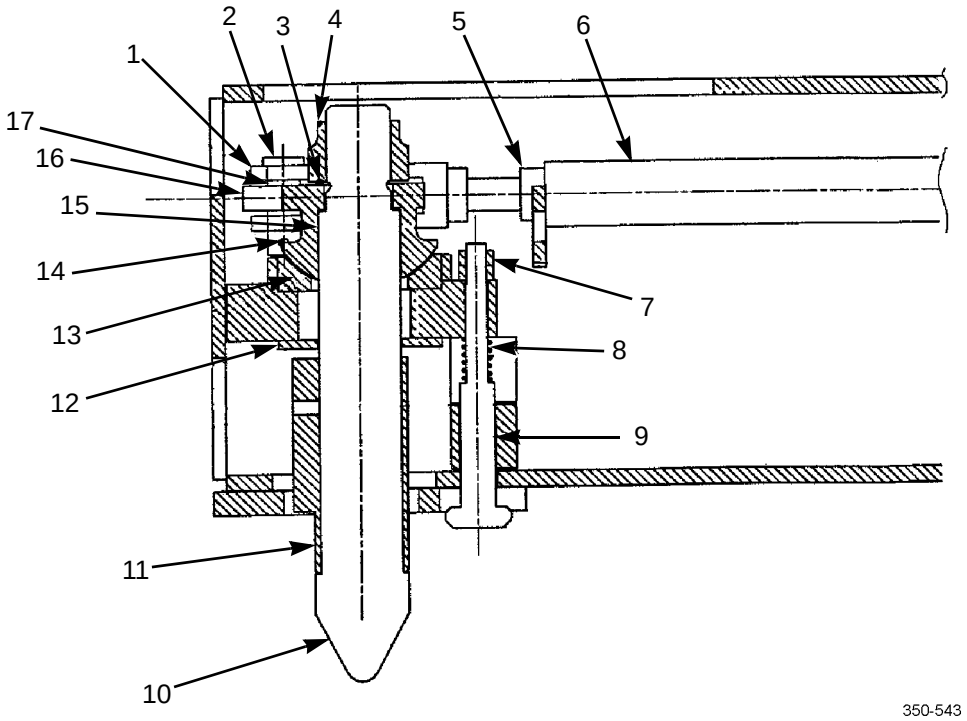
REMOVAL - CONTINUED

3. Remove twistlock link (6) assembly from tophandler.

NOTE

Note position and location of each of two end brackets for installation.

4. Remove end bracket (1) and nut (5) from twistlock link (6).
5. Remove locknut (4) and lockwasher set (3) from lifting pin (10). Discard locknut and lockwasher set.
6. Remove key (15), lever (16), bearing (13), lifting pin (10), and washer (12) from tophandler.
7. Remove guide pin (11) from lifting pin (10).
8. Remove two nuts (7), bar (9), and spring (8) from tophandler.



INSTALLATION

1. Install spring (8) and bar (9) on tophandler with two nuts (7).
2. Install guide pin (11) on lifting pin (10).
3. Install washer (12), lifting pin (10), bearing (13), lever (16), and key (15) on tophandler.
4. Loosely install new lockwasher set (3) and new locknut (4) on lifting pin (10).
5. Install nut (5) and end bracket (1) on twistlock link (6).
6. Position twistlock link (6) assembly on tophandler.
7. Tighten nut (5).

INSTALLATION - CONTINUED

8. Tighten locknut (4) to 221 lb-ft (300 Nm).
9. Install shaft (2) and retaining ring (17) on end bracket (1) of twistlock link (6) with new cotter pin (14).
10. Ensure bar (9) is adjusted so its vertical movement aligns with proximity switch.
11. Adjust proximity switch (WP 0075 00).

END OF WORK PACKAGE

FORKLIFT CYLINDER REPLACEMENT 0261 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Two

References

WP 0185 00

WP 0284 00

Equipment Condition

Forklift removed from tophandler (TM 10-3930-675-10)



WARNING





- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**

CAUTION

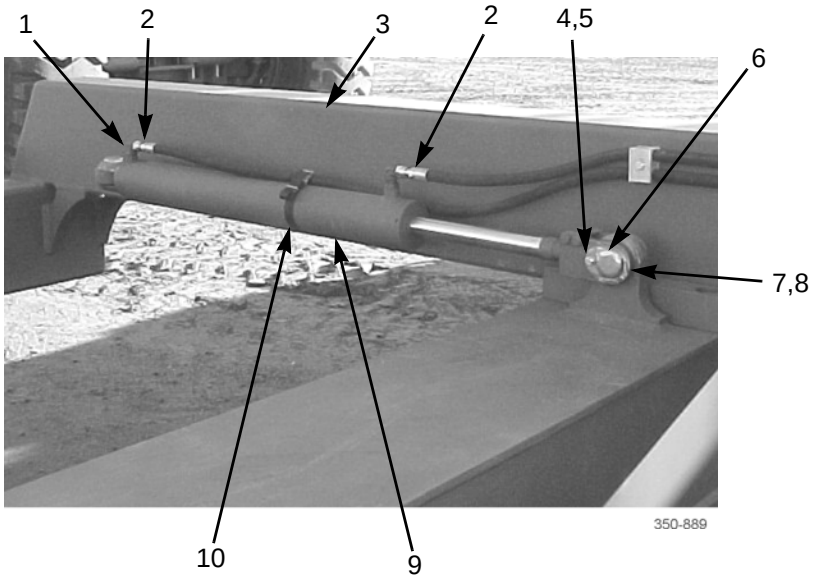
Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

NOTE

- **Forklift cylinders are replaced in the same manner.**
- **Tag all hydraulic lines.**

REMOVAL

1. Loosen nylon strap (10) and disconnect two hydraulic hoses (2) from adapter fittings (1).
2. Remove two adapter fittings (1) from cylinder (9).
3. At one end of cylinder (9), remove screw (4) and spring washer (5).
4. Remove pin (6).
5. If damaged, remove two retaining rings (7) and guide bearing (8).
6. Repeat steps 3 thru 5 for opposite end of cylinder (9).
7. Remove cylinder (9) from forklift frame (3).



INSTALLATION

NOTE

Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.

1. If removed, install guide bearing (8) and two retaining rings (7).
2. Position cylinder (9) on forklift frame (3) and install pin (6).
3. Install spring washer (5) and screw (4).
4. Repeat steps 1 thru 3 for opposite end of cylinder (9).
5. Install two adapter fittings (1) on cylinder (9).
6. Connect two hydraulic hoses (2) to cylinder (9). Tighten nylon strap (10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC RESERVOIR REPLACEMENT 0262 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Truck, Forklift, 2,000-lb Capacity

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Seal, O-ring (P/N 1358)

Seal, O-ring (P/N 3503) (11)

Seal, O-ring (P/N 3505) (2)

Seal, O-ring (P/N 3507) (2)

Seal, O-ring (P/N 5252) (2)

Personnel Required

Two

References

WP 0050 00

WP 0185 00

WP 0284 00

Equipment Condition

Cab in transport position (TM 10-3930-675-10)

Transmission access covers removed (WP 0142 00)

Exhaust muffler removed (WP 0063 00)

Fuel tank removed (WP 0218 00)

Radiator splash shield removed (WP 0143 00)

Hydraulic reservoir drained (WP 0186 00)

Master battery switch in OFF position

Hydraulic reservoir pressure sensor removed (WP 0102 00)



WARNING

- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have sufficient capacity to lift reservoir. Use a forklift truck with a 2,000-lb capacity to remove reservoir. Failure to follow this warning may result in injury to personnel.**

CAUTION

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

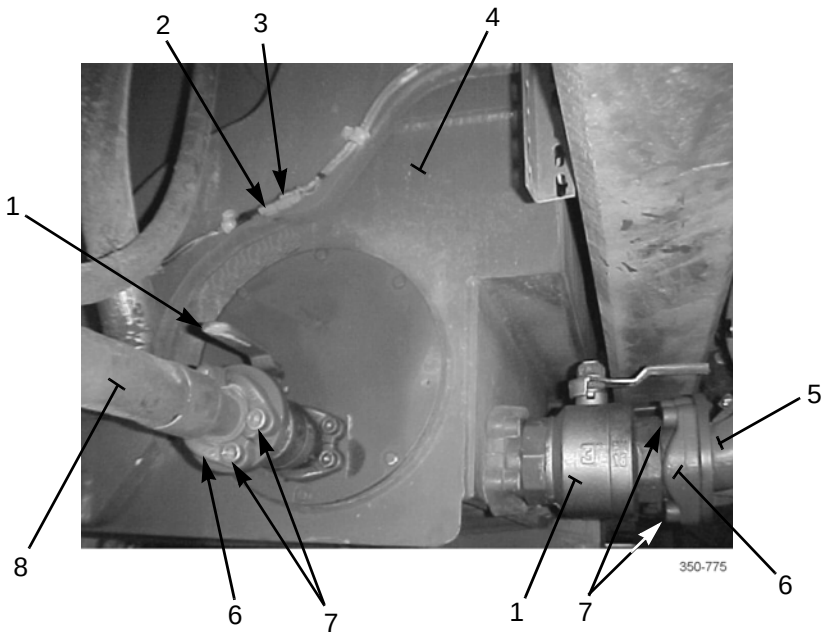
NOTE

- **Tag all hydraulic lines and electrical leads.**
- **Remove nylon straps and cut and discard tiedown straps, as necessary, to gain free movement in hydraulic hoses and electrical leads.**

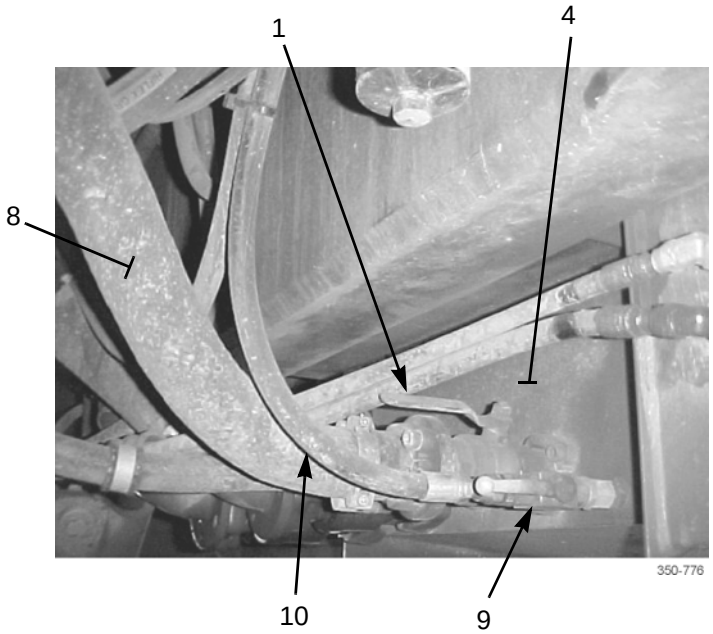
REMOVAL

1. Disconnect connector (2) from wiring harness connector (3).
2. Close five ball valves (1) at bottom of reservoir (4).
3. At five ball valves (1), remove four screws (7), flange (6), and disconnect hose (8) or pipe (5) from ball valve. Remove and discard O-ring.

REMOVAL - CONTINUED



4. Close ball valve (9) and disconnect hose (10) from ball valve.

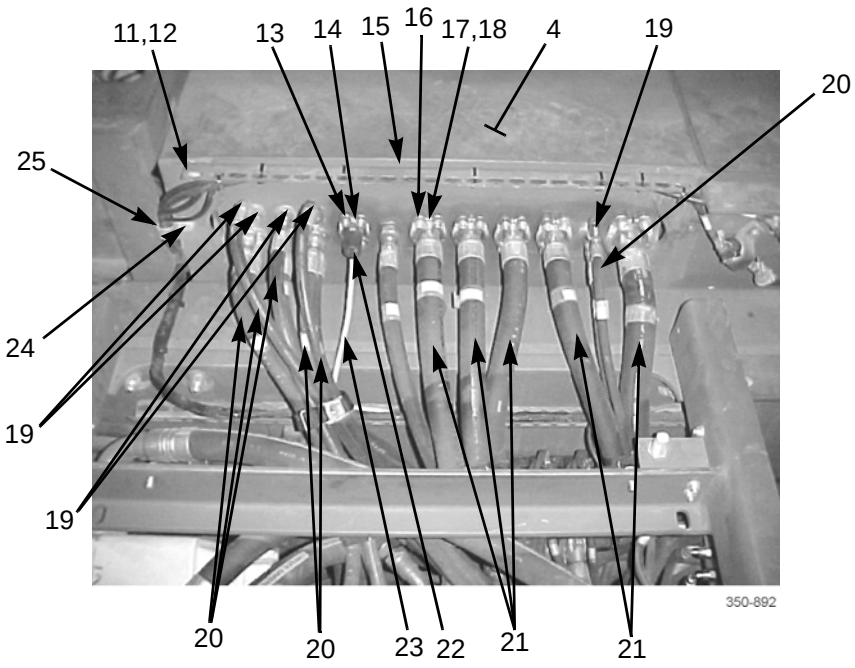


REMOVAL - CONTINUED

NOTE

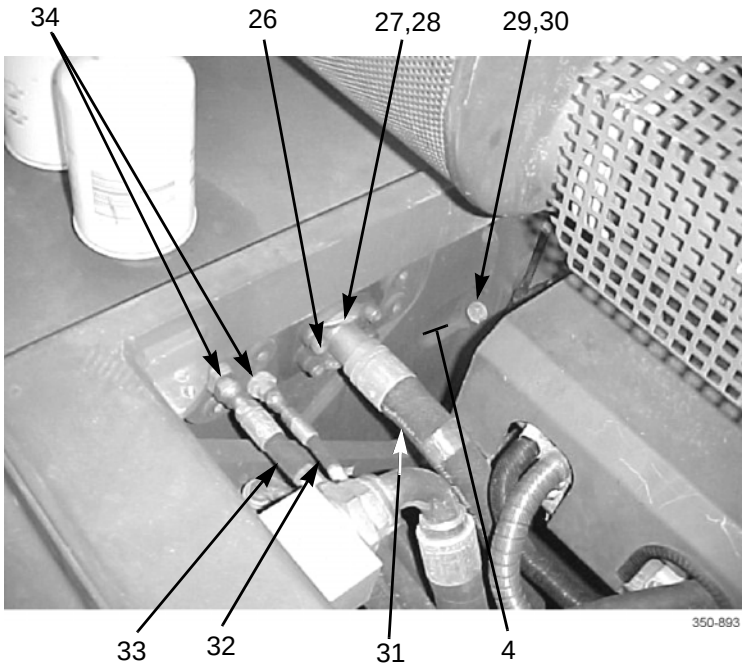
If vehicle is equipped with arctic heater, perform steps 5 thru 7. If vehicle is not equipped with arctic heater, proceed to step 8.

5. Remove two screws (11), washers (12), and arctic heater electrical and fuel lines (15) with support from hydraulic reservoir (4).
6. Remove screw (24) and hose clamp (25). Cut and discard tiedown straps as necessary.
7. Position arctic heater electrical and fuel lines (15) away from hydraulic reservoir (4).
8. At top left side of reservoir (4), disconnect hydraulic oil return hoses as follows:
   a. Remove four screws (16), flange (17), and O-ring (18) to disconnect each of five hoses (21). Discard O-rings.
   b. Disconnect ten remaining hoses (20) from fittings (19) at reservoir.
9. Remove four screws (13), flange (14), and sensor (22) with electrical lead (23) from hydraulic reservoir (4).



REMOVAL - CONTINUED

10. At top front of reservoir (4), remove three hydraulic hoses as follows:
    a. Remove four screws (26), flange (27), O-ring (28), and hose (31). Discard O-ring.
    b. Disconnect two hoses (32 and 33) from adapter fittings (34).





WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have sufficient capacity to lift reservoir. Use a forklift truck with a 2,000-lb capacity to remove reservoir. Failure to follow this warning may result in injury to personnel.**

NOTE

Ensure forklift truck is positioned with forks raised to support reservoir prior to removing attaching hardware.

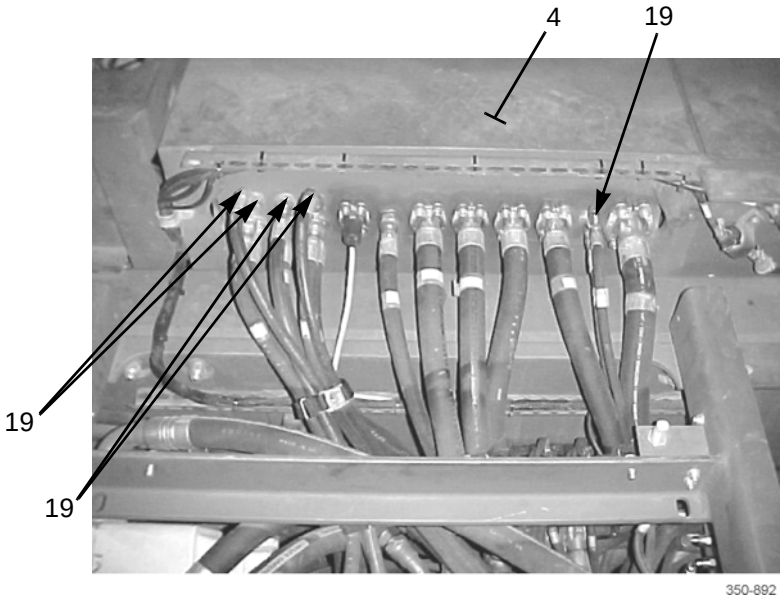
11. Remove six screws (29) and washers (30) securing hydraulic reservoir (4) to frame.

REMOVAL - CONTINUED

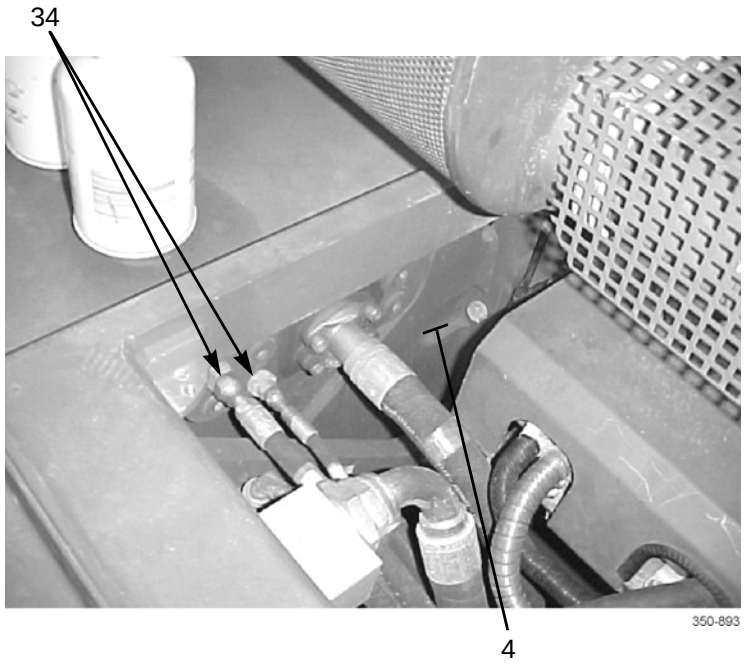
NOTE

Perform steps 12 thru 15 to remove fittings and ball valves from reservoir, if a new reservoir is being installed.

12. Remove 10 fittings (19) from top left side of reservoir (4).

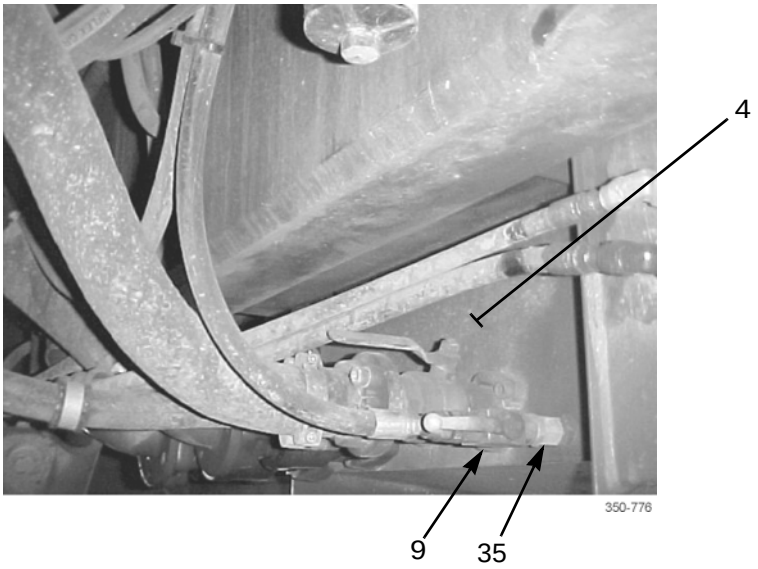


13. Remove two adapter fittings (34) from top front of reservoir (4).

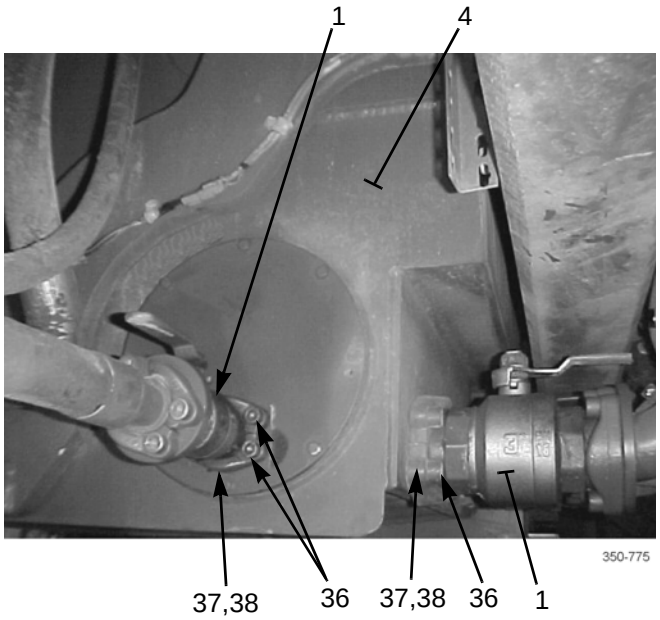


REMOVAL - CONTINUED

14. Remove ball valve (9) and fitting (35) from reservoir (4).



15. Remove each remaining ball valve (1) from reservoir (4) as follows:
    a. Remove four screws (36), flange (37), and ball valve (1).
    b. Remove and discard O-ring (38).

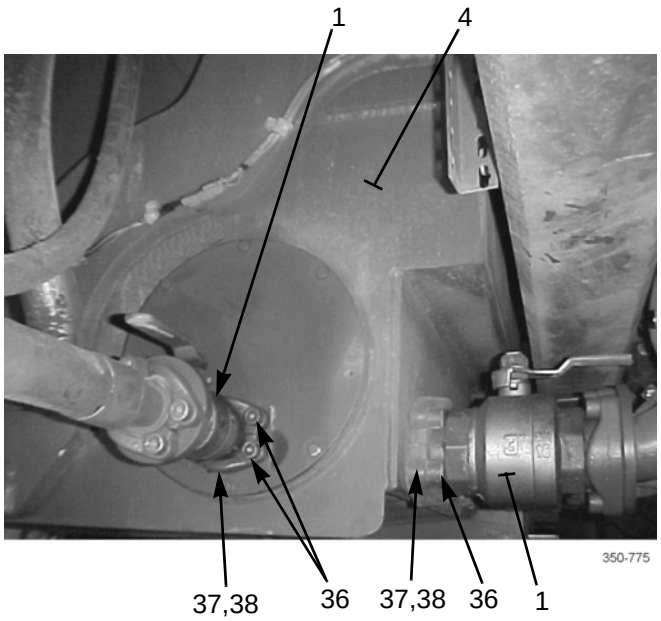


INSTALLATION

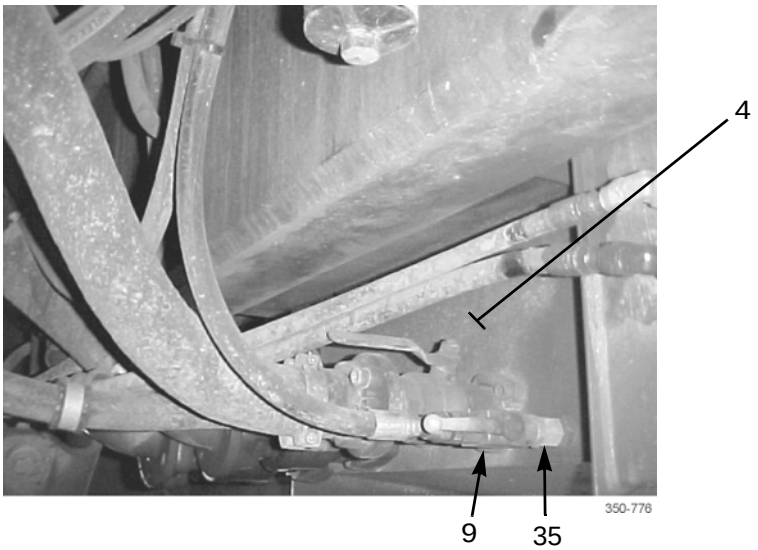
NOTE

- **Refer to *General Maintenance Instructions* in WP 0284 00 for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform steps 1 thru 4 to install fittings removed from old reservoir, if a new reservoir is being installed.**

1. Install each of five ball valves (1) at bottom of reservoir (4) as follows:
   a. Lubricate new O-ring (38).
   b. Install new O-ring (38) and ball valve (1) with flange (37) and four screws (36).

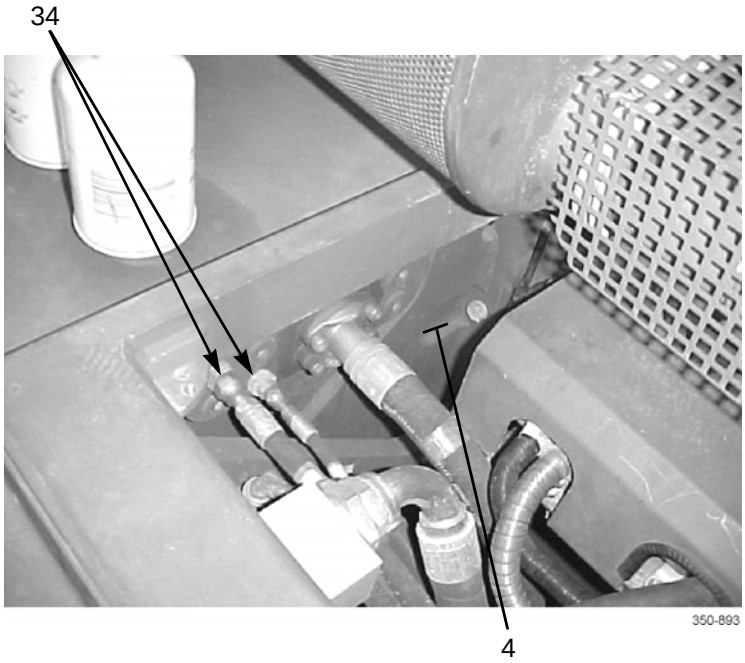


2. Install fitting (35) and ball valve (9) at bottom of reservoir (4).

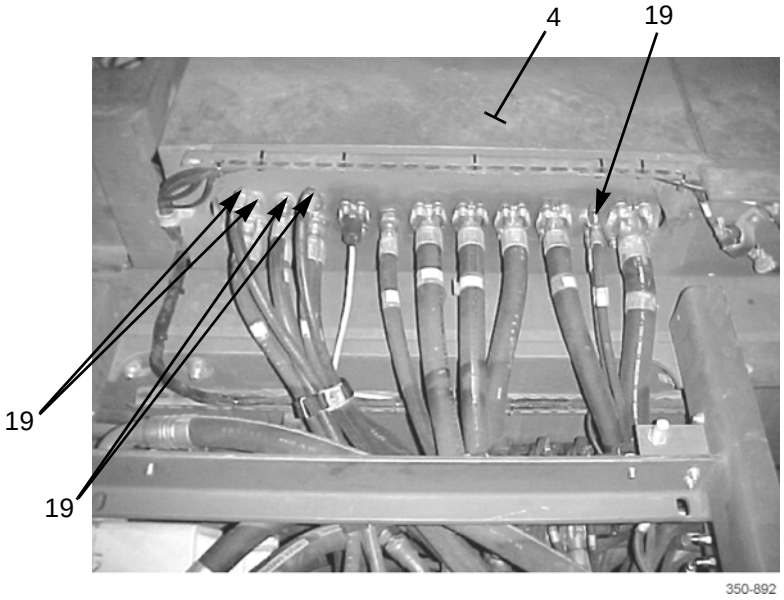


INSTALLATION - CONTINUED

3. Install two adapter fittings (34) on top front of reservoir (4).



4. Install 10 fittings (19) on top left side of reservoir (4).



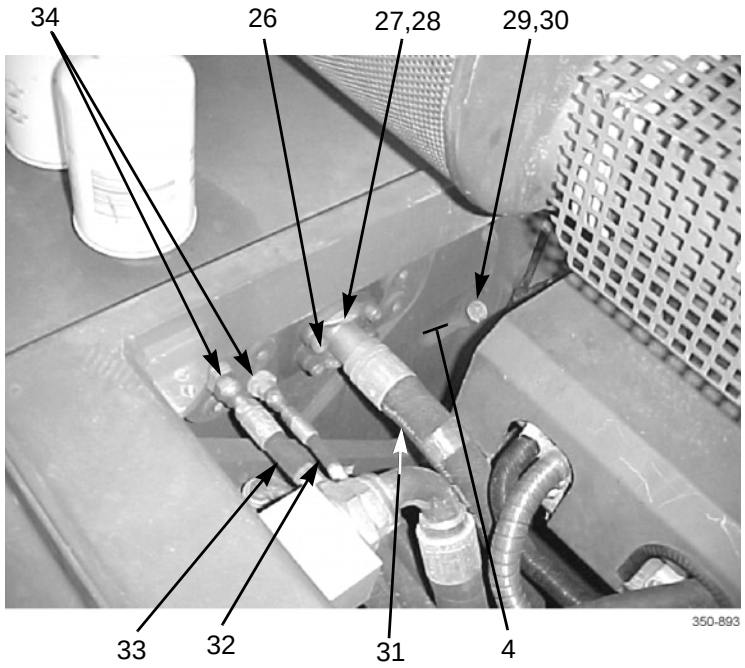
INSTALLATION - CONTINUED



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.**
- **Lifting device must have sufficient capacity to lift reservoir. Use a forklift truck with a 2,000-lb capacity to install reservoir. Failure to follow this warning may result in injury to personnel.**

5. Using forklift truck, position reservoir (4) and secure to frame with six washers (30) and screws (29).
6. At top front of hydraulic reservoir (4), install three hydraulic hoses as follows:
   a. Lubricate new O-ring (28). Install new O-ring and hose (31) with flange (27) and four screws (26).
   b. Connect two hoses (32 and 33) to two adapter fittings (34).



NOTE

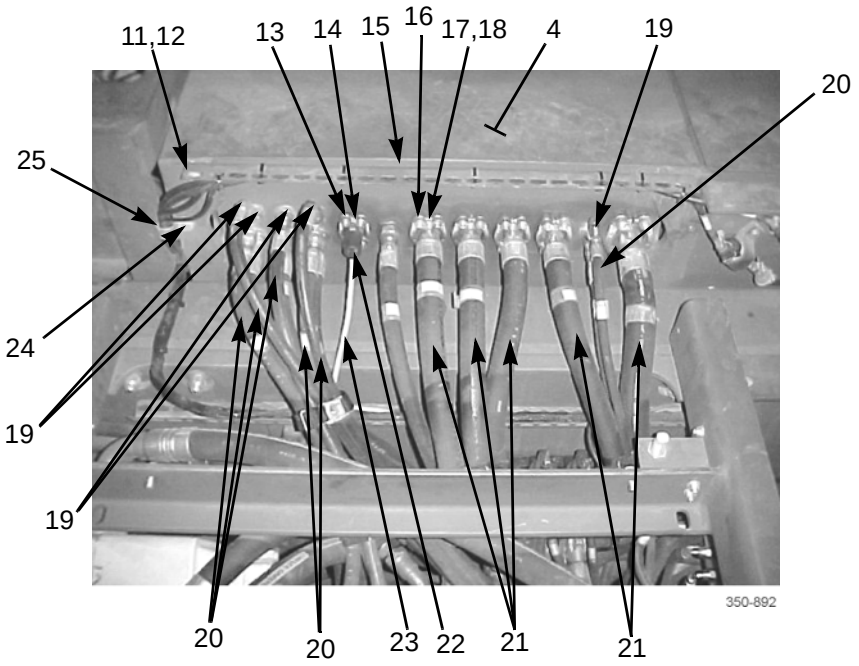
If vehicle is equipped with arctic heater, perform steps 7 and 8. If vehicle is not equipped with arctic heater, proceed to step 9.

7. Position arctic heater electrical and fuel lines (15) with support on hydraulic reservoir (4) and secure with two screws (11) and washers (12).
8. Install screw (24) and hose clamp (25). Install new tiedown straps as necessary.
9. Install sensor (22) with electrical lead (23) and flange (14) with four screws (13).

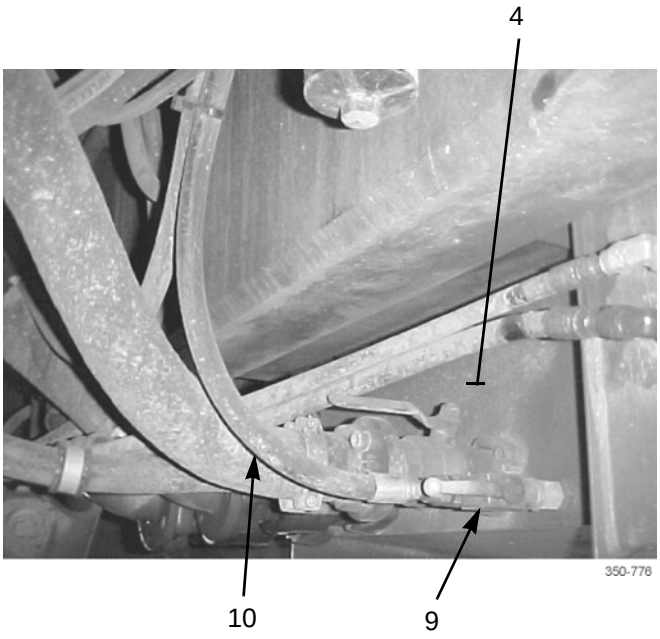
HYDRAULIC RESERVOIR REPLACEMENT - CONTINUED 0262 00

INSTALLATION - CONTINUED

10. At top of reservoir (4), connect hydraulic oil return hoses as follows:
    a. Connect ten hoses (20) to fittings (19).
    b. Lubricate new O-ring (18). Install each of five hoses (21) with new O-ring, flange (17), and four screws (16).

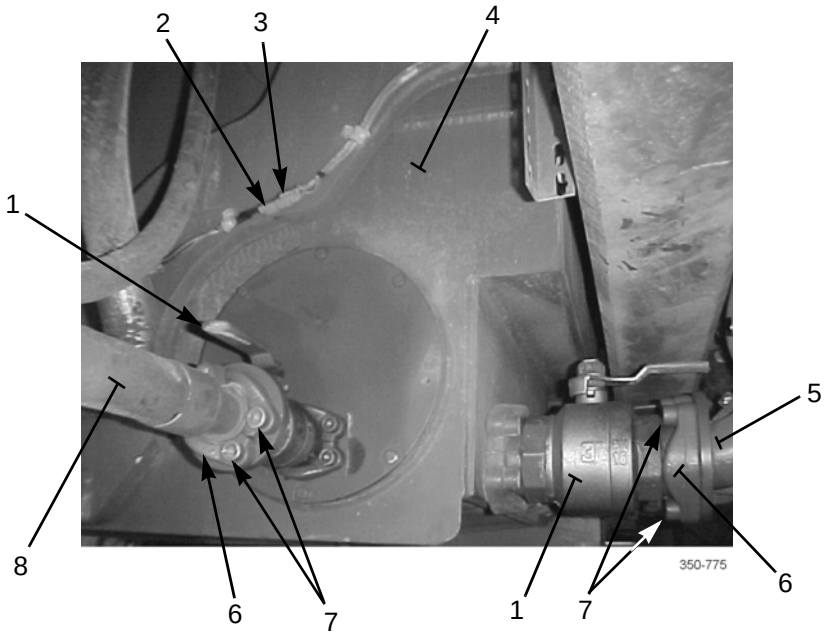


11. At bottom of reservoir (4), connect hose (10) to ball valve (9).

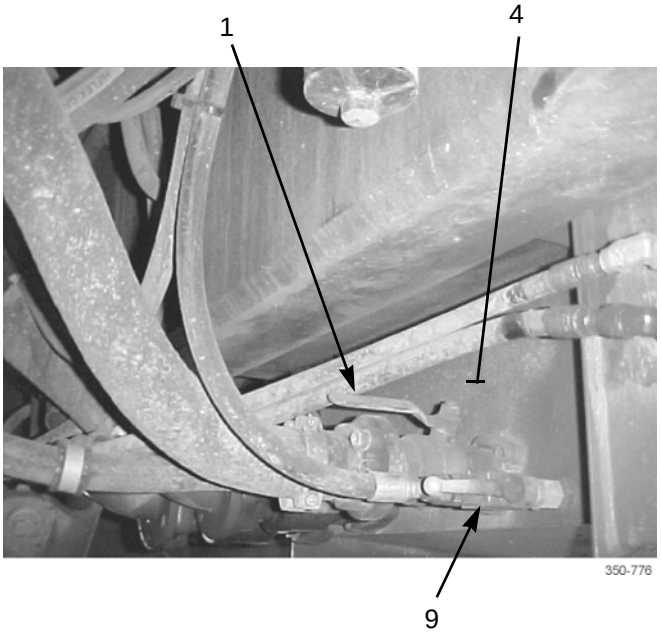


INSTALLATION - CONTINUED

12. At each of five ball valves (1), lubricate new O-ring. Install hose (8) or pipe (5) on ball valve with new O-ring, flange (6), and four screws (7).
13. Connect connector (2) to wiring harness connector (3).



14. Install hydraulic reservoir pressure sensor (WP 0102 00).
15. Fill hydraulic reservoir (WP 0186 00).
16. Open five ball valves (1) and ball valve (9) at bottom of reservoir (4).



INSTALLATION - CONTINUED

17. Install fuel tank (WP 0218 00).
18. Install nylon straps and new tiedown straps as necessary to support electrical leads and hydraulic hoses.
19. Install exhaust muffler (WP 0063 00).
20. Start engine (TM 10-3930-675-10) and check for leaks.
21. Perform operational check of all hydraulic systems (TM 10-3930-675-10).
22. Recheck oil level in hydraulic reservoir (WP 0050 00).
23. Install transmission access covers (WP 0142 00).
24. Install radiator splash shield (WP 0143 00).
25. Return cab to operational position (TM 10-3930-675-10).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

HYDRAULIC SYSTEM VALVE MAINTENANCE 0263 00

THIS WORK PACKAGE COVERS

Pump shut-off valve (611): Removal, Installation

Shift valve (6041): Removal, Installation

Boom support/bogie supply valve (6043): Removal, Installation

Servo pressure regulator valve (6043): Removal, Installation

Bogie/boom support flow control valve: Removal, Adjustment, and Installation

Boom support locking pin double pilot operated check valve: Removal, Installation

Bogie pressure ball valve: Removal, Installation

Extension cylinder over-center valve: Removal, Installation

Parking brake hold flow control valve: Removal, Installation

Brake charging valve: Removal, Installation

Brake drain shut-off valve: Removal, Installation

Brake circuit safety regulating valve: Removal, Installation

Front brake cooling bypass valve (6049-1): Removal, Installation

Rear brake cooling bypass valve (6049-2): Removal, Installation

Cooling fan control valve (6037): Removal, Installation

Emergency steering pressure balancing valve: Removal, Installation

Moderation and tilt manifold valve: Removal, Installation

Tilt over-center valve: Removal, Installation

Oscillation over-center valve: Removal, Installation

Oscillation float lock flow control valve: Removal, Installation

Twistlock double pilot operated check valve: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Gage, Pressure, Dial Indicating (Item 43, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (as required)

O-ring (as required)

References

WP 0050 00

WP 0100 00

WP 0142 00

WP 0143 00

WP 0144 00

WP 0185 00

WP 0188 00

WP 0284 00

WP 0286 00

Equipment Condition

Wheels chocked

Parking brake applied (TM 10-3930-675-10)

Hydraulic system pressure relieved (WP 0164 00)



WARNING





- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connection before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**
- **At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.**
- **Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.**
- **DO NOT stand under the tophandler while performing this procedure; tophandler could lower suddenly, causing injury or death to personnel.**

CAUTION

- **Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting if possible. Contamination of hydraulic system could result in equipment failure.**
- **Replace hydraulic reservoir return filters after 100 hours of operation after opening any part of the hydraulic system (WP 0185 00).**

NOTE

Tag and cap or plug all hydraulic lines and openings.

PUMP SHUT-OFF VALVE (611) REMOVAL

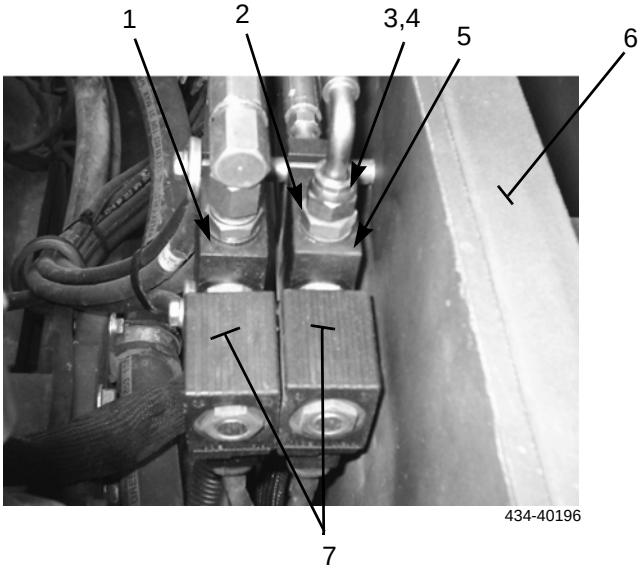
NOTE

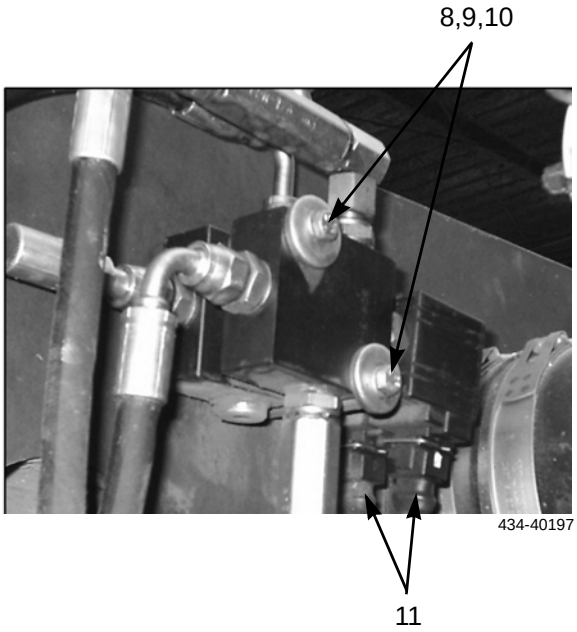
- **Refer to Foldout, FO-8 as a guide to remove hose(s) and/or fitting(s) from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

1. Press in on retaining clip and disconnect electrical leads (11) from two solenoids (7).
2. Remove tiedown straps and clamps (if applicable). Discard tiedown straps.
3. Remove two bolts (8), nuts (9), washers (10), and valves (1 and 5) from mounting plate (6). Move shift valve 6041 (1) aside.
4. Remove two hoses (3) and O-rings (4) from valve (5). Discard O-rings.

PUMP SHUT-OFF VALVE (611) REMOVAL - CONTINUED

5. Remove two fittings (2) from valve (5).





PUMP SHUT-OFF VALVE (611) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if a new valve is being installed.**

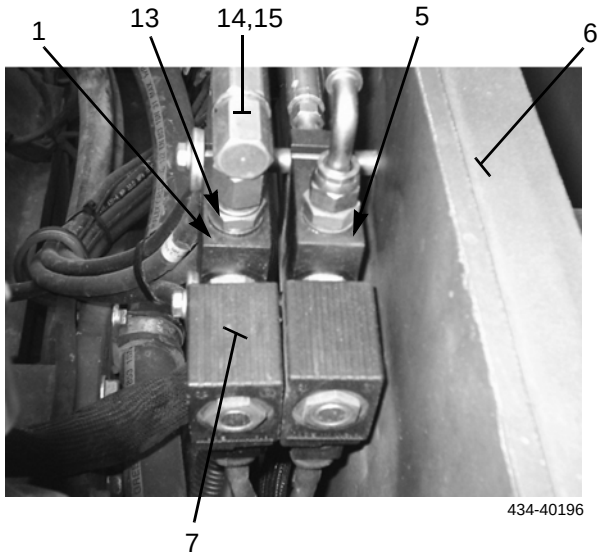
1. Install two fittings (2) on valve (5).
2. Lubricate and install two new O-rings (4).
3. Install two hoses (3) on valve (5).
4. Install two valves (5 and 1) on mounting plate (6) with two bolts (8), washers (10), and nuts (9). Tighten bolts to specification (WP 0286 00).
5. Connect electrical leads (11) to valve solenoid (7).
6. Install clamps and new tiedown straps as needed, in same position as noted during removal.
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

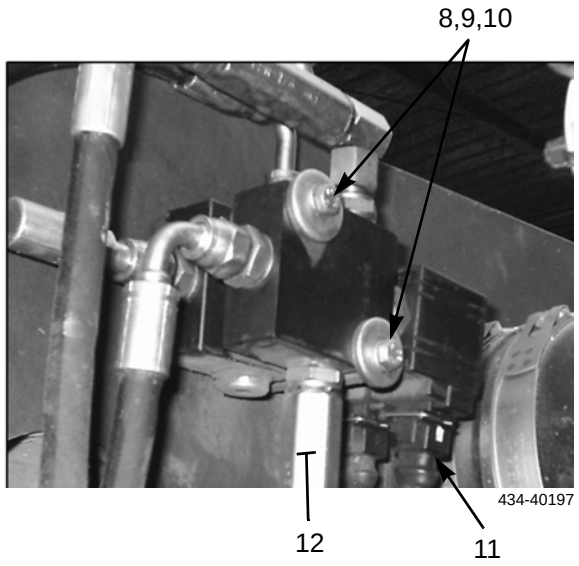
SHIFT VALVE (6041) REMOVAL

NOTE

- **Refer to Foldout, FO-9 as a guide to remove hoses and fittings from the valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

1. Press in on retaining clip and disconnect electrical lead (11) from solenoid (7).
2. Remove tideown straps and clamps (if applicable). Discard tiedown straps.
3. Remove two bolts (8), nuts (9), washers (10), and valves (1 and 5) from mounting plate (6).
4. Remove three hoses (14) and O-rings (15) from valve (1). Discard O-rings.
5. Remove three fittings (13) and two check valves (12) from valve (1).





SHIFT VALVE (6041) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if a new valve is being installed.**

1. Install three fittings (13) and two check valves (12) on valve (1).
2. Lubricate and install three new O-rings (15).
3. Install and tighten three hoses (14) on valve (1).
4. Install valves (5 and 1) on mounting plate (6) with two bolts (8), washers (10), and nuts (9). Tighten in accordance with WP 0286 00.

SHIFT VALVE (6041) INSTALLATION - CONTINUED

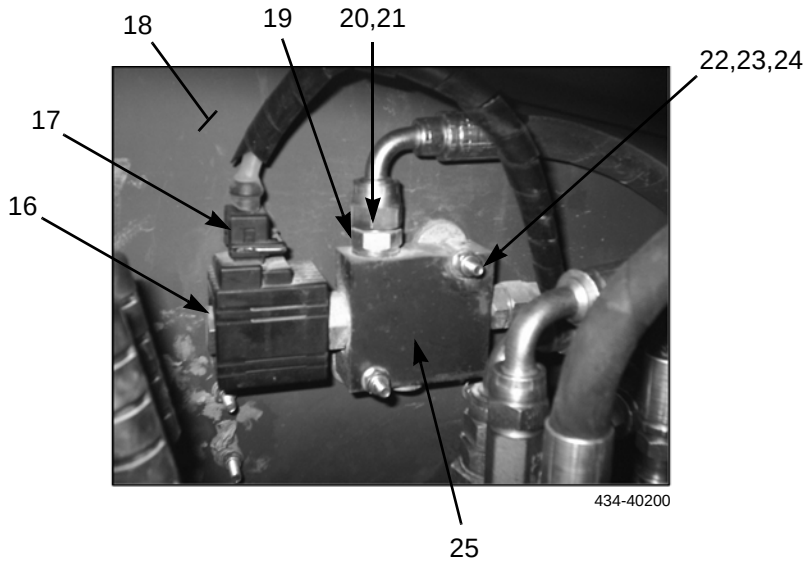
5. Connect electrical lead (11) to valve solenoid (7).
6. Install clamps (and new tiedown straps, as needed) in position as noted during removal.
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0051 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

BOOM SUPPORT/BOGIE SUPPLY VALVE (6043) REMOVAL

NOTE

- **Refer to Foldout, FO-13 as a guide to remove hose(s) and fitting(s) from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

1. Press in on retaining clip and disconnect electrical lead (17) from solenoid (16).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove two bolts (22), nuts (23), washers (24), and valves (25) from mounting plate (18).
4. Remove two hoses (20) and O-rings (21) from valve (25). Discard O-rings.
5. Remove two fittings (19) from valve (25).

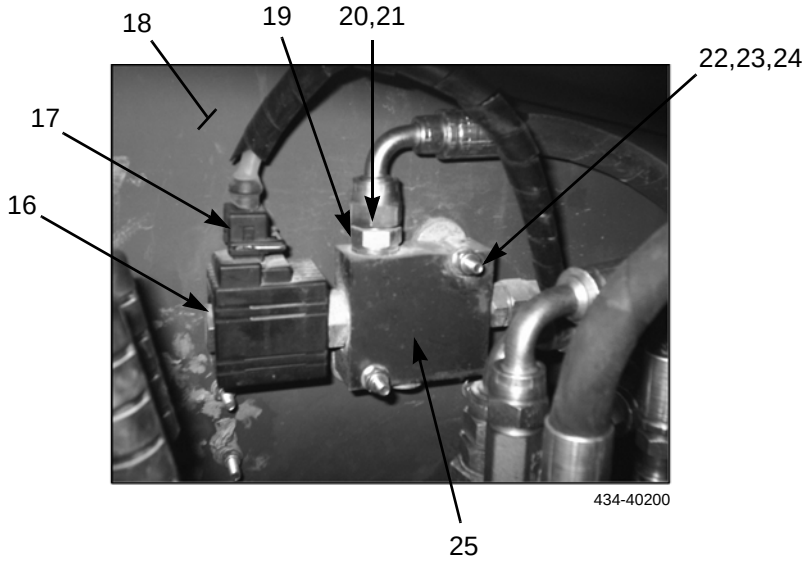


BOOM SUPPORT/BOGIE SUPPLY VALVE (6043) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if a new valve is being installed.**

1. Install two fittings (19) on valve (25).
2. Lubricate and install two new O-rings (21).
3. Install and tighten two hoses (20) on valve (25).
4. Install valve (25) on mounting plate (18) with two bolts (22), washers (24), and nuts (23). Tighten in accordance with WP 0286 00.
5. Connect electrical lead (17) to valve solenoid (16).



6. Install clamps and new tiedown straps as needed, in same position as noted during removal.
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

SERVO PRESSURE REGULATOR VALVE (6043) REMOVAL

1. Move cab to transport position (TM 10-3930-675-10).
2. Remove rear access cover plate (WP 0142 00).

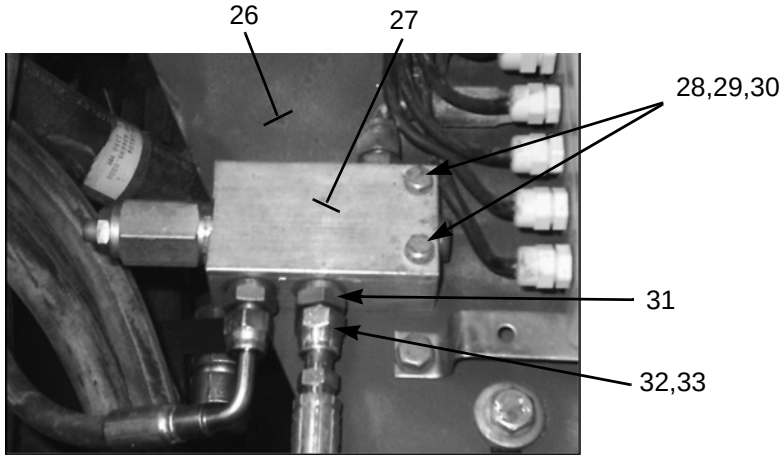
NOTE

- **Refer to Foldout, FO-8 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
4. Remove two bolts (28), nuts (29), washers (30), and valve (27) from mounting plate (26).

SERVO PRESSURE REGULATOR VALVE (6043) REMOVAL - CONTINUED

5. Remove three hoses (32) and O-rings (33) from valve (27). Discard O-rings.
6. Remove three fittings (31) from valve (27).



SERVO PRESSURE REGULATOR VALVE (6043) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if a new valve is being installed.**

1. Install three fittings (31) on valve (27).
2. Lubricate and install three new O-rings (33).
3. Install and tighten three hoses (32) on valve (27).
4. Install valve (27) to mounting plate (26) with two bolts (28), washers (30), and nuts (29). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.
9. Install rear access cover plate (WP 0142 00).
10. Move cab back to operational position (TM 10-3930-675-10).

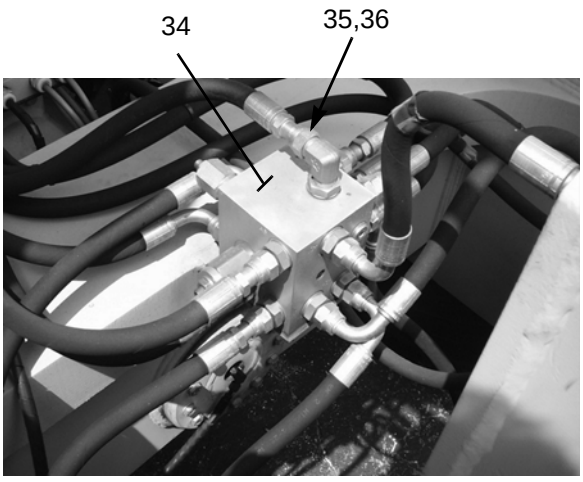
BOGIE/BOOM SUPPORT FLOW CONTROL VALVE REMOVAL

1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove 14 hoses (35) and O-rings (36) from valve (34). Discard O-rings.

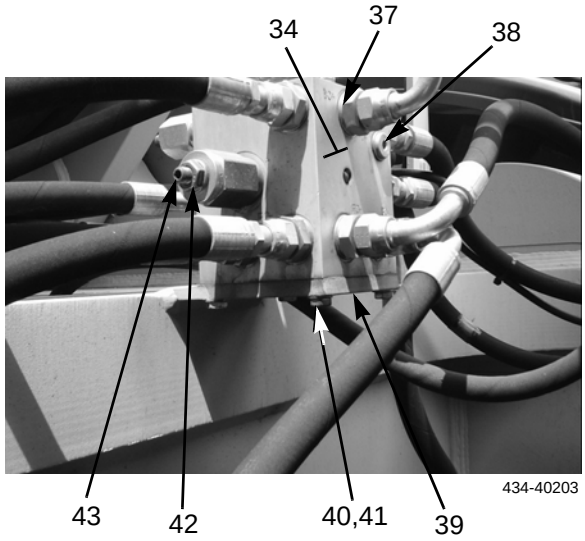
NOTE

- **Refer to Foldout, FO-13 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove four bolts (40), washers (41), and valve (34) from mounting plate (39).
4. Remove 14 fittings (37) from valve (27).



434-40202



434-40203

BOGIE/BOOM SUPPORT FLOW CONTROL VALVE ADJUSTMENT

1. Remove plug (38) and connect hydraulic pressure gauge to port “M” on valve (34).
2. Place cab in transport position (TM 10-3930-675-10).
3. Raise bogie wheel off of locking collar and turn 90 degrees, to UNLOCKED position (TM 10-3930-675-10).
4. Lower bogie wheels to ground (TM 10-3930-675-10).
5. Check bogie wheel tire pressure and adjust to 85 psi (586 kPa), if necessary (TM 10-3930-675-10).
6. Loosen jamnut (42) on valve adjusting screw (43). Turn adjusting screw counterclockwise two turns.
7. Start engine and open bogie pressure valve to apply pressure to valve (34) and bogie wheels (TM 10-3930-675-10).
8. Turn adjusting screw (43) clockwise to increase pressure or counterclockwise to decrease pressure on hydraulic gage. Adjust pressure to 1,088 psi (7,501.5 kPa) and tighten jamnut (42).
9. Close bogie pressure valve and raise bogie wheels to stowed position. Turn bogie locking collar 90 degrees to LOCKED position. Lower bogie wheels to seat locking collar on stowage flanges (TM 10-3930-675-10).
10. Shut engine down and remove hydraulic gauge from valve (34). Reinstall plug (38) in port “M”.
11. Place cab in operational position (TM 10-3930-675-10).

BOGIE/BOOM SUPPORT FLOW CONTROL VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if a new valve is being installed.**

1. Install 14 fittings (37) on valve (34).
2. Lubricate and install 14 new O-rings (36).
3. Install and tighten 14 hoses (35) on valve (34).
4. Install valve (34) on mounting plate (39) with four bolts (40) and washers (41). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

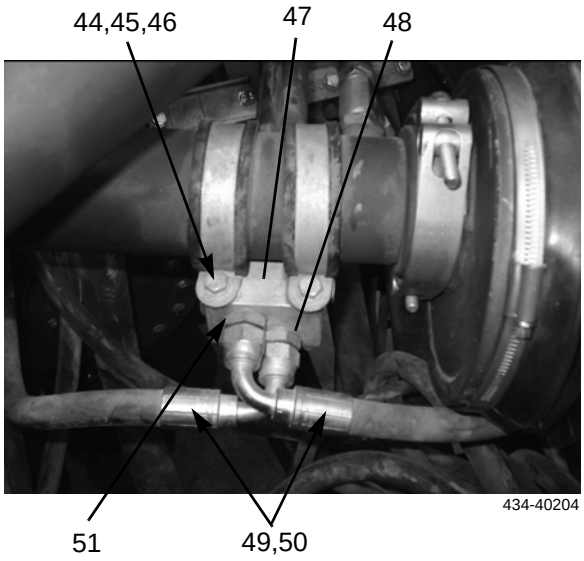
BOOM SUPPORT LOCKING PIN DOUBLE PILOT OPERATED CHECK VALVE REMOVAL

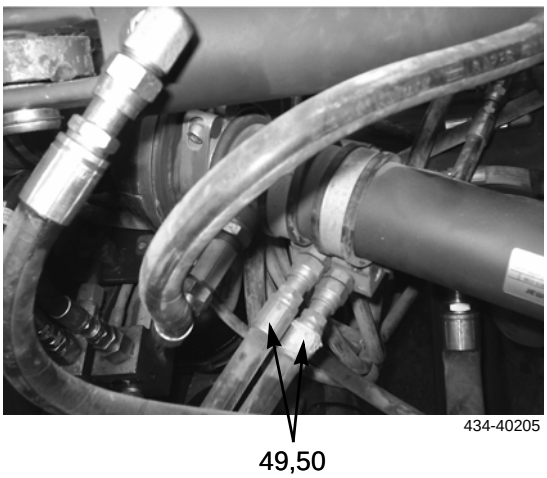
1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove four hoses (49) and O-rings (50) from valve (48). Discard O-rings.

NOTE

- **Refer to Foldout, FO-14 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove two bolts (44), washers (45), nuts (46), and valve (48) from mounting plate (47).
4. Remove four fittings (51) from valve (48).



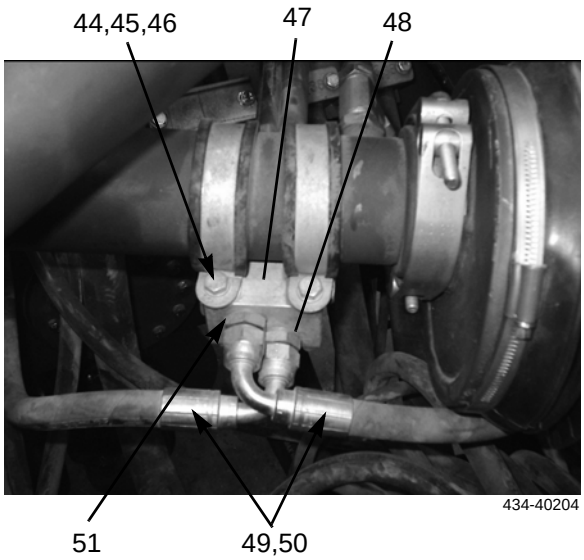


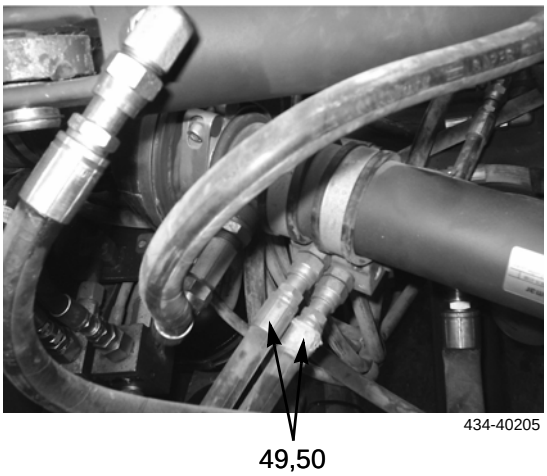
BOOM SUPPORT LOCKING PIN DOUBLE PILOT OPERATED CHECK VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (51) on valve (48).
2. Lubricate and install four new O-rings (50).
3. Install and tighten four hoses (49) on valve (48).
4. Install valve (48) on mounting plate (47) with two bolts (44), washers (45), and nuts (46). Tighten in accordance with WP 0286 00.





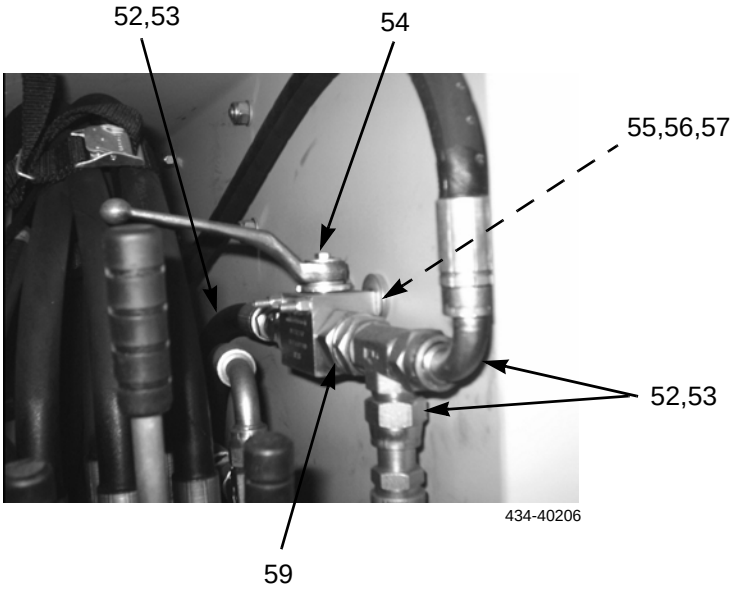
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

BOGIE PRESSURE BALL VALVE REMOVAL

NOTE

- **Refer to Foldout, FO-13 as a guide to remove hoses and fittings from valve.**
- **Note position of tiedown straps and clamps to aid in installation.**

1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove two bolts (55), nuts (56), washers (57), and valve (54) from mounting plate (58).
3. Remove three hoses (52) and O-rings (53) from valve (54). Discard O-rings.
4. Remove three fittings (59) from valve (54).



BOGIE PRESSURE BALL VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install three fittings (59) on valve (54).
2. Lubricate and install three new O-rings (53).
3. Install and tighten three hoses (52) on valve (54).
4. Install valve (54) on mounting plate (58) with two bolts (55), washers (57), and nuts (56). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

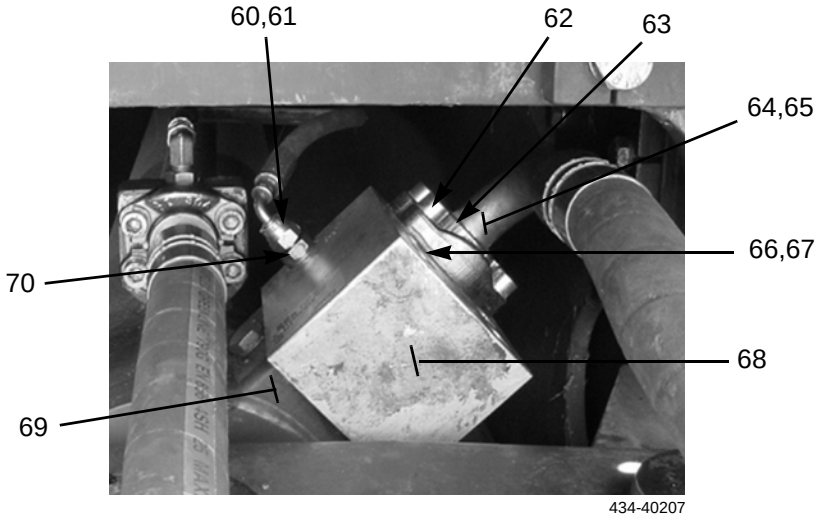
EXTENSION CYLINDER OVER-CENTER VALVE REMOVAL

1. Lower and retract boom fully (TM 10-3930-675-10).
2. Remove cover from rear of boom (WP 0100 00).
3. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
4. Remove hose (60) and O-ring (61) from over-center valve (68). Discard O-ring.
5. Remove four screws (62), flange (63), hose (64), and O-ring (65) from over-center valve (68). Discard O-ring.

NOTE

- **Refer to Foldout, FO-12 as a guide to remove hoses and fittings from valve.**
- **Note position of tiedown straps and clamps to aid in installation.**

6. Remove four bolts (66), washers (67), and valve (68) from extension cylinder (69).
7. Remove fitting (70) from valve (68).



EXTENSION CYLINDER OVER-CENTER VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install fitting (70) on valve (68).
2. Install valve (68) on extension cylinder (69) with four bolts (66) and washers (67). Tighten in accordance with WP 0286 00.
3. Lubricate new O-rings (65).
4. Install new O-ring (65), hose (64), and flange (63) on over-center valve (68) with four screws (62).
5. Lubricate new O-ring (61).
6. Install new O-ring (61) and tighten hose (60) on valve (68).

EXTENSION CYLINDER OVER-CENTER VALVE INSTALLATION - CONTINUED

7. Install clamps and new tiedown straps as needed, in same position as noted during removal.
8. At hydraulic reservoir, open any ball valve that may have been closed.
9. Check oil level in hydraulic reservoir (WP 0050 00).
10. Start engine (TM 10-3930-675-10) and check for leaks.
11. Install cover on rear of boom (WP 0100 00).

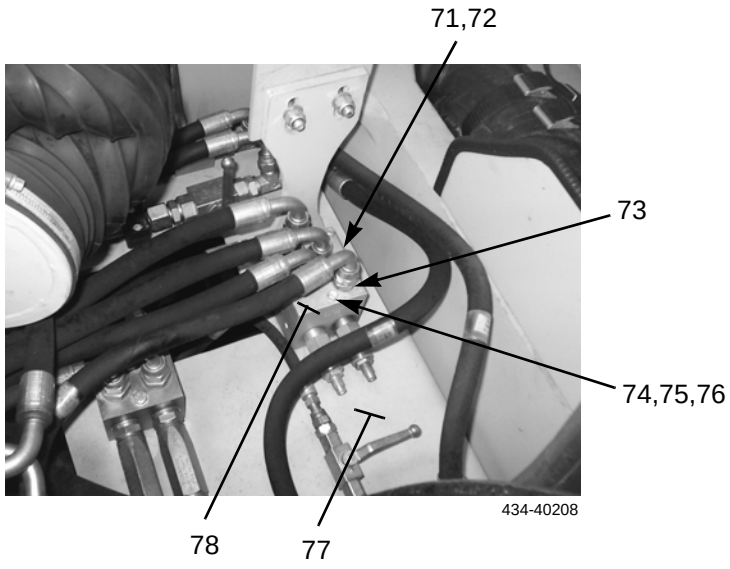
PARKING BRAKE HOLD FLOW CONTROL VALVE REMOVAL

1. Relieve pressure in both brake circuits by opening both brake drain shut-off valves (WP 0188 00).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove six hoses (71) and O-rings (72) from valve (78). Discard O-rings.

NOTE

- **Refer to Foldout, FO-1 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove two bolts (74), washers (75), nuts (76), and valve (78) from mounting plate (77).
5. Remove six fittings (73) from valve (78).

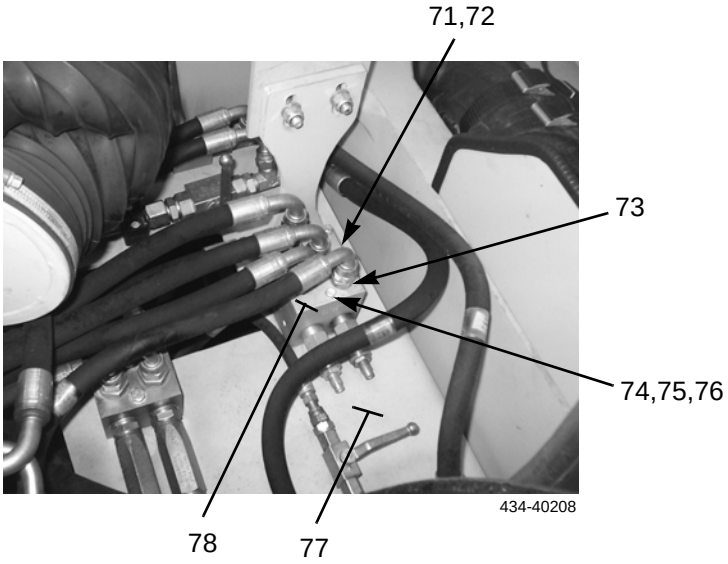


PARKING BRAKE HOLD FLOW CONTROL VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install six fittings (73) on valve (78).
2. Install valve (78) on mounting plate (77) with two bolts (74), washers (75), and nuts (76). Tighten in accordance with WP 0286 00.
3. Lubricate and install six new O-rings (72).
4. Install and tighten six hoses (71) on valve (78).



5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Close both brake drain shut-off valves (WP 0188 00).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

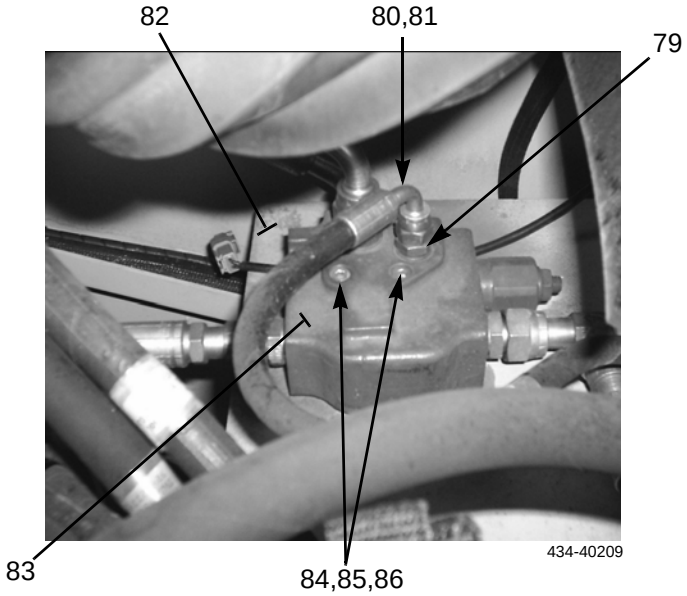
BRAKE CHARGING VALVE REMOVAL

1. Relieve pressure in both brake circuits by opening both brake drain shut-off valves (WP 0188 00).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove five hoses (80) and O-rings (81) from valve (83). Discard O-rings.

NOTE

- **Refer to Foldout, FO-2 and FO-5 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove two bolts (84), washers (85), nuts (86), and valve (83) from mounting plate (82).
5. Remove five fittings (79) from valve (83).



BRAKE CHARGING VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install five fittings (79) on valve (83).
2. Lubricate and install five new O-rings (81).
3. Install valve (83) on mounting plate (82) with two bolts (84), washers (85), and nuts (86). Tighten in accordance with WP 0286 00.
4. Install and tighten five hoses (80) on valve (83).
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Close both brake drain shut-off valves (WP 0188 00).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

BRAKE DRAIN SHUT-OFF VALVE REMOVAL

1. Relieve pressure in both brake circuits by opening two brake drain shut-off valves (WP 0188 00).

NOTE

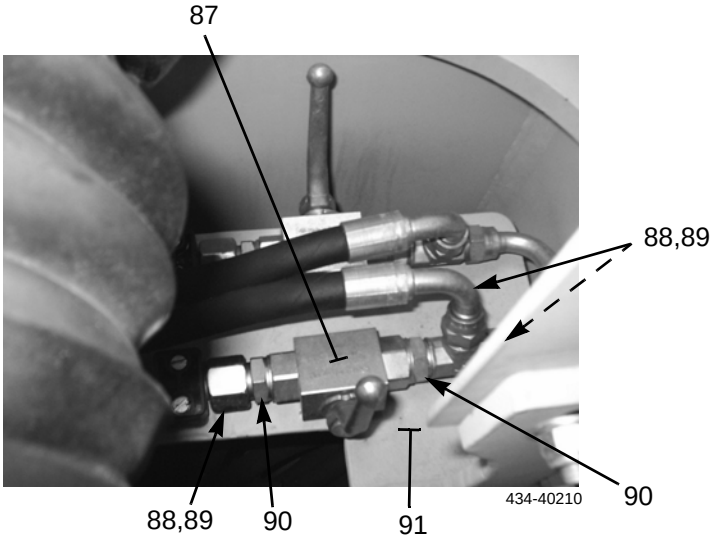
Perform the following steps to remove each of two brake drain shut-off valves.

2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove three hoses (88) and O-rings (89) from valve (87). Discard O-rings.

NOTE

- **Refer to Foldout, FO-2 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove valve (87) from mounting plate (91).
5. Remove two fittings (90) from valve (87).



BRAKE DRAIN SHUT-OFF VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform steps 1 thru 5 to install each of two brake drain shut-off valves.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install two fittings (90) on valve (87).
2. Lubricate and install three new O-rings (89).
3. Install and tighten three hoses (88) on valve (87).
4. Install valve (87) on mounting plate (91).
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Close both brake drain shut-off valves (WP 0188 00).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

BRAKE CIRCUIT SAFETY REGULATING VALVE REMOVAL

1. Relieve pressure in both brake circuits by opening both brake drain shut-off valves (WP 0188 00).

NOTE

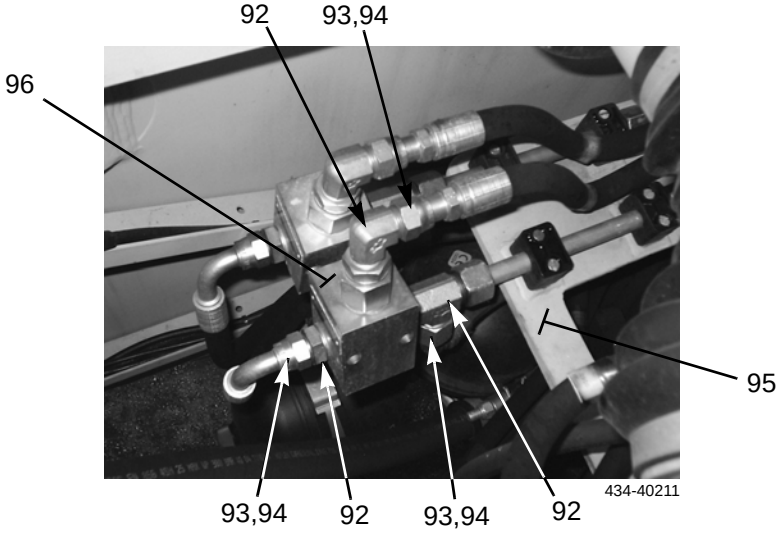
Perform the following steps to remove each of two brake circuit safety regulating valves.

2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove three hoses (93) and O-rings (94) from valve (96). Discard O-rings.

NOTE

- **Refer to Foldout, FO-2 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove valve (96) from mounting plate (95).
5. Remove three fittings (92) from valve (96).



BRAKE CIRCUIT SAFETY REGULATING VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform steps 1 thru 5 to install each of two brake drain shut-off valves.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

6. Install two fittings (92) on valve (96).
7. Lubricate and install three new O-rings (94).
8. Install and tighten three hoses (93) on valve (96).
9. Install valve (96) on mounting plate (95).
10. Install clamps and new tiedown straps as needed, in same position as noted during removal.
11. Close both brake drain shut-off valves (WP 0188 00).
12. At hydraulic reservoir, open any ball valve that may have been closed.
13. Check oil level in hydraulic reservoir (WP 0050 00).
14. Start engine (TM 10-3930-675-10) and check for leaks.

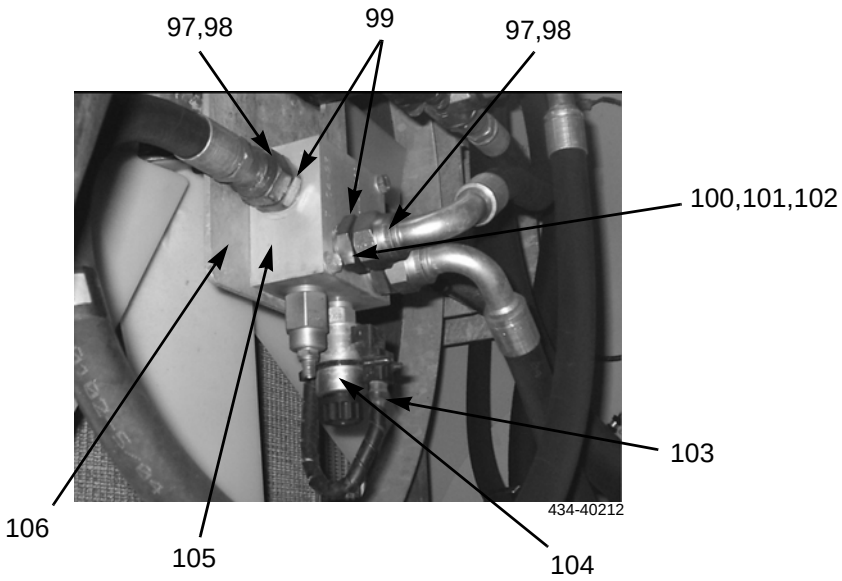
FRONT BRAKE COOLING BYPASS VALVE (6049-1) REMOVAL

1. Remove radiator splash shield (WP 0143 00).
2. Press in on retaining clip and disconnect electrical lead (103) from solenoid (104).
3. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
4. Remove three hoses (97) and O-rings (98) from valve (105). Discard O-rings.

NOTE

- **Refer to Foldout, FO-4 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

5. Remove two bolts (100), washers (101), nuts (102), and valve (105) from mounting plate (106).
6. Remove three fittings (99) from valve (105).



FRONT BRAKE COOLING BYPASS VALVE (6049-1) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install three fittings (99) on valve (105).
2. Lubricate and install three new O-rings (98).
3. Install and tighten three hoses (97) on valve (105).
4. Install valve (105) on mounting plate (106) with two bolts (100), washers (101), and nuts (102). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Connect electrical lead (103) to solenoid (104).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.
10. Install radiator splash shield (WP 0143 00).

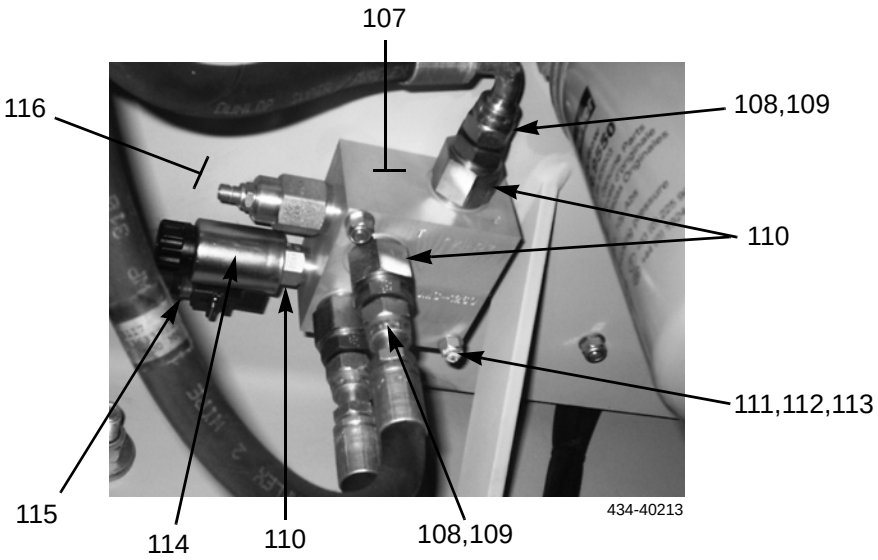
REAR BRAKE COOLING BYPASS VALVE (6049-2) REMOVAL

1. Press in on retaining clip and disconnect electrical lead (115) from solenoid (114).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove three hoses (108) and O-rings (109) from valve (107). Discard O-rings.

NOTE

- **Refer to Foldout, FO-5 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove two bolts (111), washers (112), nuts (113), and valve (107) from mounting plate (116).
5. Remove three fittings (110) from valve (107).



REAR BRAKE COOLING BYPASS VALVE (6049-2) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install three fittings (110) on valve (107).
2. Lubricate and install three new O-rings (109).
3. Install and tighten three hoses (108) on valve (107).
4. Install valve (107) on mounting plate (116) with two bolts (111), washers (112), and nuts (113). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Connect electrical lead (115) to valve solenoid (114).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

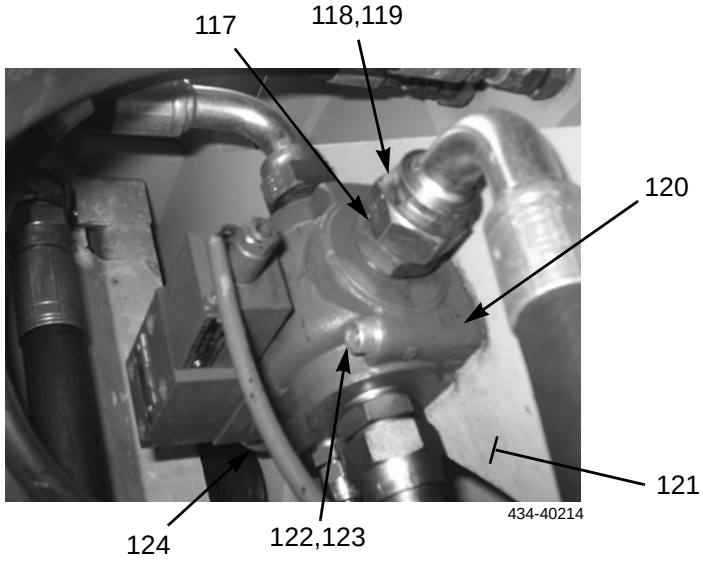
COOLING FAN FLOW CONTROL VALVE (6037) REMOVAL

1. Remove middle and rear radiator top grating sections (WP 0144 00).
2. Remove radiator splash shield (WP 0143 00).
3. Disconnect electrical lead from solenoid harness (124).
4. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
5. Remove four hoses (118) and O-rings (119) from valve (120). Discard O-rings.

NOTE

- **Refer to Foldout, FO-4 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

6. Remove two screws (122), washers (123), and valve (120) from mounting plate (121).
7. Remove three fittings (117) from valve (120).



COOLING FAN FLOW CONTROL VALVE (6037) INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (117) on valve (120).
2. Lubricate and install four new O-rings (119).
3. Install and tighten four hoses (118) on valve (120).
4. Install valve (120) on mounting plate (121) with two screws (122) and washers (123). Tighten in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Connect electrical lead to solenoid harness (124).
7. At hydraulic reservoir, open any ball valve that may have been closed.

COOLING FAN FLOW CONTROL VALVE (6037) INSTALLATION - CONTINUED

8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.
10. With engine running, enter diagnostic menu EXTRA FUNCTION 11(13). Use +/- keys to change fan speed to test valve operation (TM 10-3930-675-10).
11. Install middle and rear radiator top grating sections (WP 0144 00).
12. Install radiator splash shield (WP 0143 00).

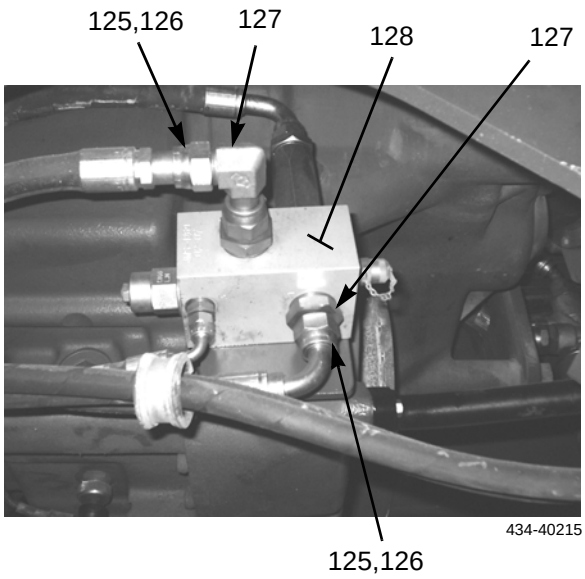
EMERGENCY STEERING PRESSURE BALANCING VALVE REMOVAL

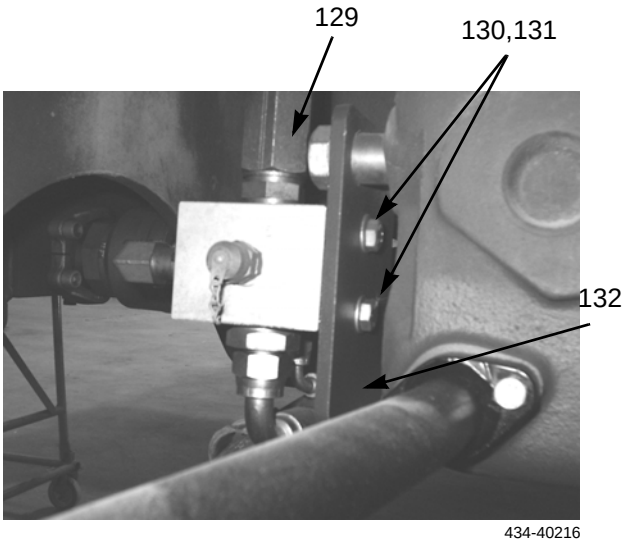
1. Remove transmission skid plate (WP 0142 00).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove four hoses (125) and O-rings (126) from valve (128). Discard O-rings.

NOTE

- **Refer to Foldout, FO-3 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove two bolts (130), washers (131), and valve (128) from mounting plate (132).
5. Remove check valve (129) and four fittings (127) from valve (128).





EMERGENCY STEERING PRESSURE BALANCING VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (127) and check valve (129) on valve (128).
2. Lubricate and install four new O-rings (126).
3. Install and tighten four hoses (125) on valve (128).
4. Install valve (128) on mounting plate (132) with two bolts (130) and washers (131). Tighten bolts in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.
9. Install transmission skid plate (WP 0142 00).

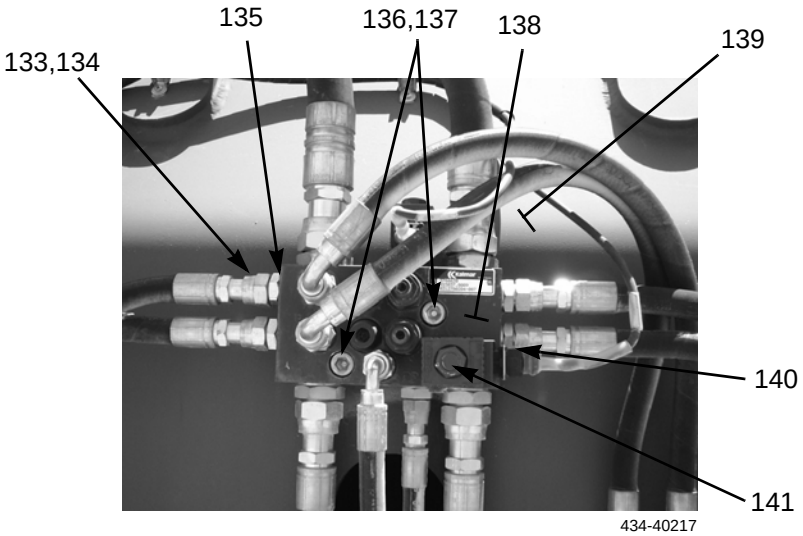
MODERATION AND TILT MANIFOLD VALVE REMOVAL

1. Press in on retaining clip and disconnect two electrical leads (140) from solenoids (141).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove 12 hoses (133) and O-rings (134) from valve (138). Discard O-rings.

NOTE

- **Refer to Foldout, FO-13 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove two bolts (136), washers (137), and valve (138) from mounting plate (139).
5. Remove 12 fittings (135) from valve (138).



MODERATION AND TILT MANIFOLD VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install 12 fittings (135) on valve (138).
2. Lubricate and install 12 new O-rings (134).
3. Install and tighten 12 hoses (133) on valve (138).
4. Install valve (138) on mounting plate (139) with two bolts (136) and washers (137). Tighten bolts in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Connect electrical leads (140) to valve solenoids (141).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

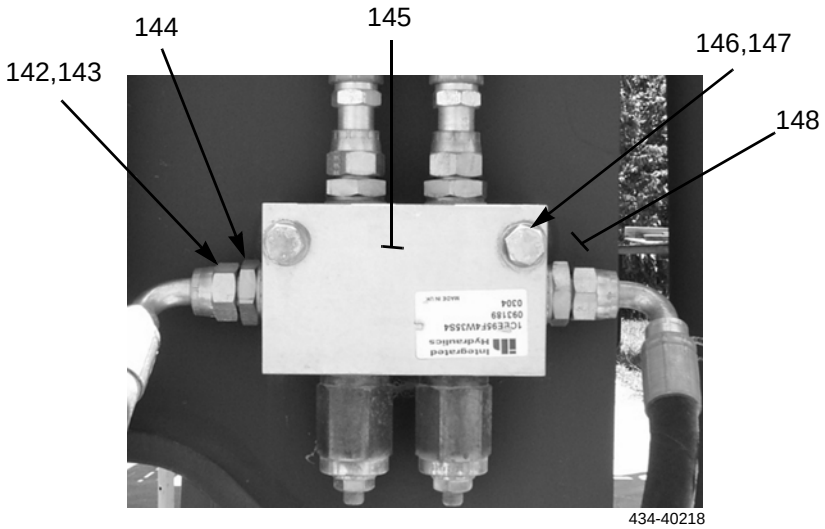
TILT OVER-CENTER VALVE REMOVAL

1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove four hoses (142) and O-rings (143) from valve (145). Discard O-rings.

NOTE

- **Refer to Foldout, FO-13 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove two bolts (146), washers (147), and valve (145) from mounting plate (148).
4. Remove four fittings (144) from valve (145).



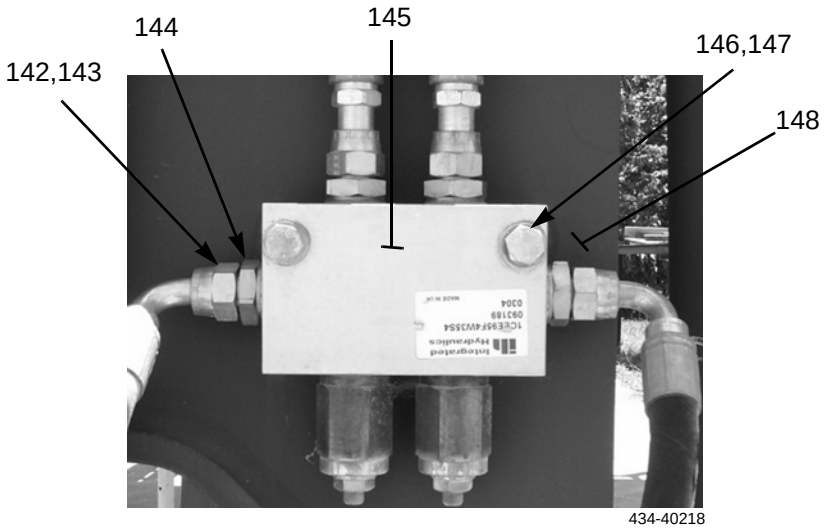
434-40218

TILT OVER-CENTER VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (144) on valve (145).
2. Lubricate and install four new O-rings (143).
3. Install and tighten four hoses (142) on valve (145).
4. Install valve (145) on mounting plate (148) with two bolts (146) and washers (147). Tighten bolts in accordance with WP 0286 00.



5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

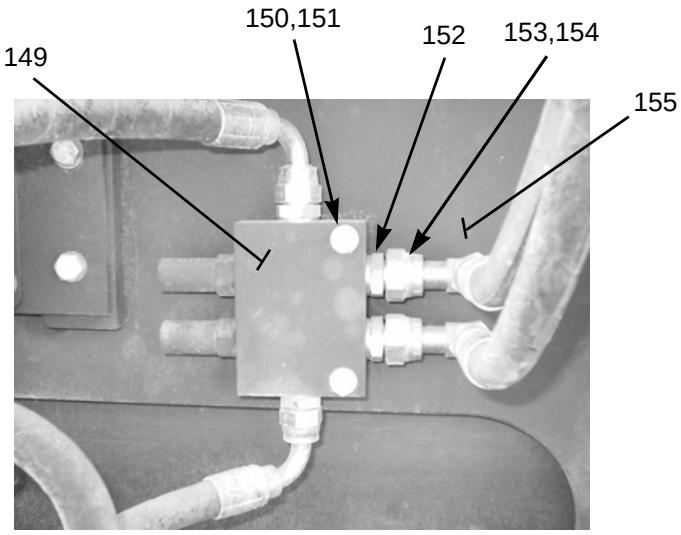
OSCILLATION OVER-CENTER VALVE REMOVAL

1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove four hoses (153) and O-rings (154) from valve (149). Discard O-rings.

NOTE

- **Refer to Foldout, FO-14 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove two bolts (150), washers (151), and valve (149) from mounting plate (155).
4. Remove four fittings (152) from valve (149).



434-40219

OSCILLATION OVER-CENTER VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (152) on valve (149).
2. Lubricate and install four new O-rings (154).
3. Install and tighten four hoses (153) on valve (149).
4. Install valve (149) on mounting plate (155) with two bolts (150) and washers (151). Tighten bolts in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

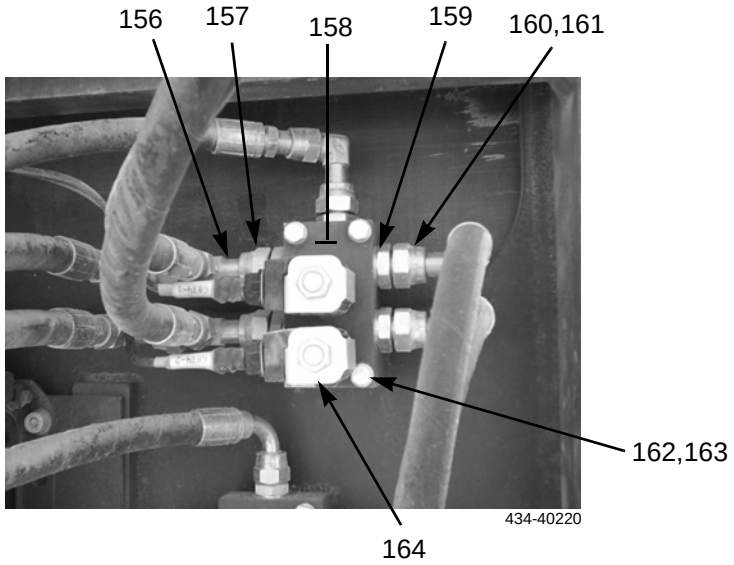
OSCILLATION FLOAT LOCK FLOW CONTROL VALVE REMOVAL

1. Press in on retaining clip and disconnect electrical lead (156) from each of two solenoids (157).
2. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
3. Remove five hoses (160) and O-rings (161) from valve (158). Discard O-rings.

NOTE

- **Refer to Foldout, FO-14 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

4. Remove four bolts (162), washers (163), and valve (158) from mounting plate (164).
5. Remove four fittings (159) from valve (158).



OSCILLATION FLOAT LOCK FLOW CONTROL VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (159) on valve (158).
2. Lubricate and install five new O-rings (161).
3. Install and tighten five hoses (160) on valve (158).
4. Install valve (158) on mounting plate (164) with four bolts (162) and washers (163). Tighten bolts in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. Connect electrical lead (156) to each of two valve solenoids (157).
7. At hydraulic reservoir, open any ball valve that may have been closed.
8. Check oil level in hydraulic reservoir (WP 0050 00).
9. Start engine (TM 10-3930-675-10) and check for leaks.

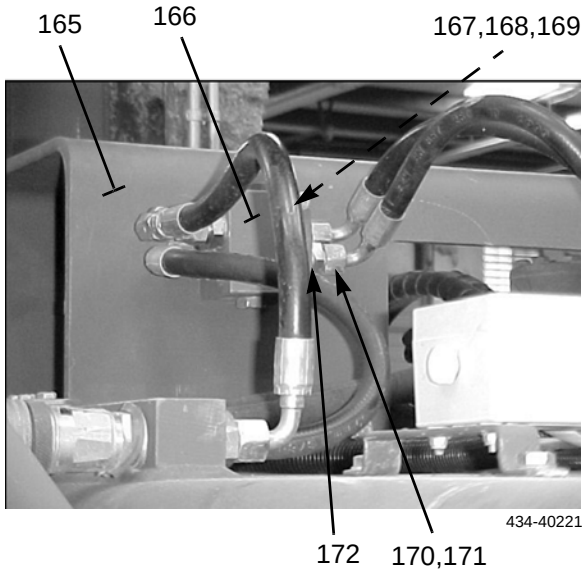
TWISTLOCK DOUBLE PILOT OPERATED CHECK VALVE REMOVAL

1. Remove tiedown straps and clamps, as needed. Discard tiedown straps.
2. Remove four hoses (170) and O-rings (171) from valve (166). Discard O-rings.

NOTE

- **Refer to Foldout, FO-16 as a guide to remove hoses and fittings from valve or component.**
- **Note position of tiedown straps and clamps to aid in installation.**

3. Remove two bolts (167), washers (168), nuts (169), and valve (166) from mounting plate (165).
4. Remove four fittings (172) from valve (166).



TWISTLOCK DOUBLE PILOT OPERATED CHECK VALVE INSTALLATION

NOTE

- **Refer to *General Maintenance Instructions* (WP 0284 00) for complete instructions on connecting hydraulic hoses and applying proper torque.**
- **Perform step 1 to install fittings removed from old valve, if new valve is being installed.**

1. Install four fittings (172) on valve (166).
2. Lubricate and install four new O-rings (171).
3. Install and tighten four hoses (170) on valve (166).
4. Install valve (166) on mounting plate (165) with two bolts (167), washers (168), and nuts (169). Tighten bolts in accordance with WP 0286 00.
5. Install clamps and new tiedown straps as needed, in same position as noted during removal.
6. At hydraulic reservoir, open any ball valve that may have been closed.
7. Check oil level in hydraulic reservoir (WP 0050 00).
8. Start engine (TM 10-3930-675-10) and check for leaks.

END OF WORK PACKAGE

CAB HEATER/AIR CONDITIONING UNIT REPLACEMENT 0264 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Materials/Parts

Antifreeze, Permanent (Item 4, WP 0290 00)

Cap Set, Protective (Item 5, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00) (2)

Tag, Marker (Item 38, WP 0290 00)

Nut, lock (P/N 923899.0553) (3)

Personnel Required

Two

References

WP 0064 00

WP 0073 00

WP 0190 00

WP 0269 00

Equipment Condition

Cab moved to the left, but not lowered (TM 10-3930-675-10)

Air cleaner removed (WP 0057 00)

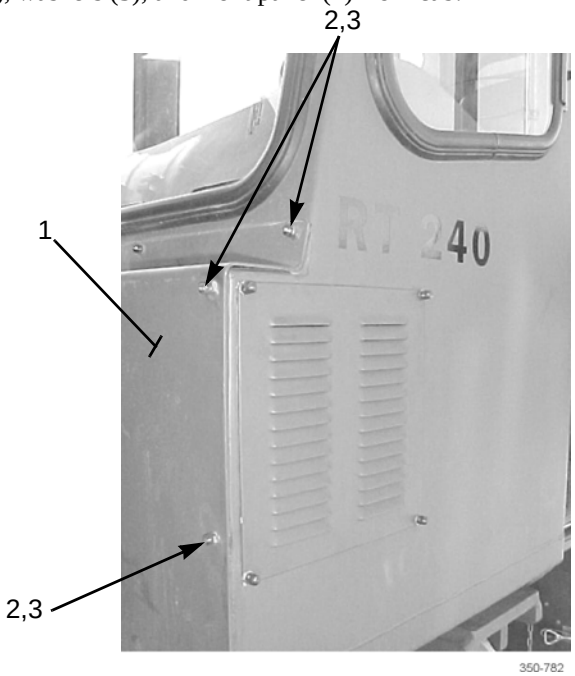
Windshield wiper assembly removed (WP 0158 00)

Refrigerant recovered from A/C system (WP 0265 00)

Coolant drained (WP 0064 00)

REMOVAL

1. Remove 14 capnuts (2), washers (3), and front panel (1) from cab.



CAB HEATER/AIR CONDITIONING UNIT REPLACEMENT - CONTINUED 0264 00

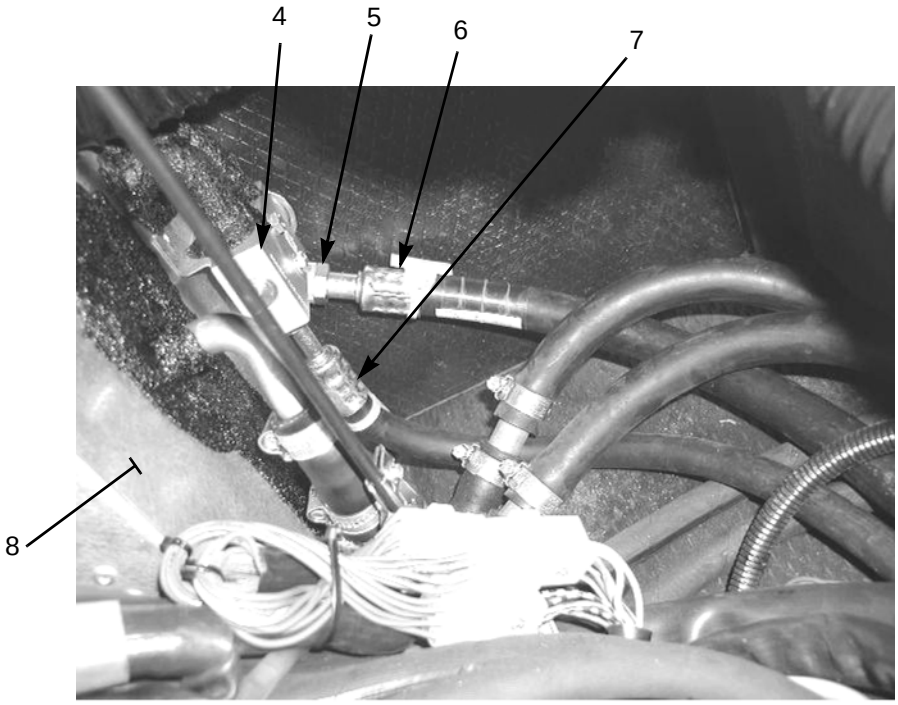
REMOVAL - CONTINUED

2. Underneath instrument panel, disconnect connectors from A/C control switch, disconnect cable from heater temperature control, and remove A/C temperature control (WP 0073 00).
3. Disconnect two heater hoses from side of cab heater and A/C unit (WP 0190 00).

CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

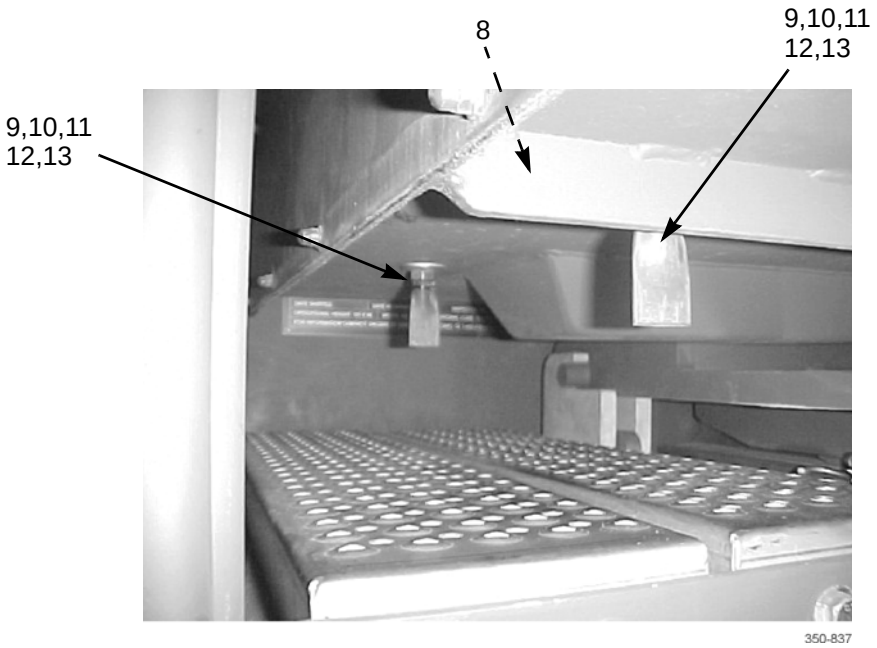
4. Loosen two fitting nuts (5) and disconnect two A/C hoses (6 and 7) from expansion valve (4).
5. Loosen four hose clamps and disconnect four flexible ducts from top of cab heater and A/C unit (8).
6. Remove screw and disconnect white ground wire from top corner of cab heater and A/C unit (8).



350-783

REMOVAL - CONTINUED

7. Underneath cab, remove two tiedown straps (9) and drain valves (10).
8. Remove three locknuts (11), washers (12), and grommets (13). Discard locknuts.
9. Remove cab heater and A/C unit (8) from cab.



INSTALLATION

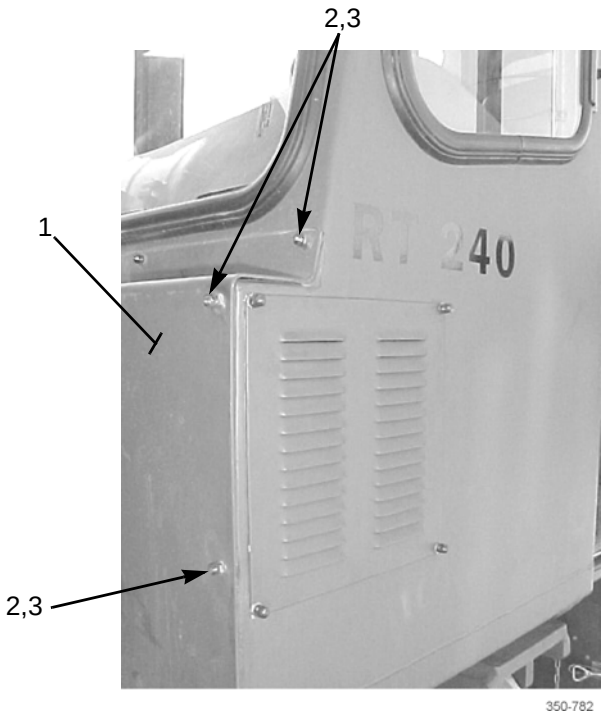
NOTE

Ensure white ground wire, windshield wiper wiring harness, and clear plastic tube are accessible.

1. Position cab heater and A/C unit (8) in cab.
2. Underneath cab, install three grommets (13), washers (12), and new locknuts (11).
3. Install two drain valves (10) with two new tiedown straps (9).
4. Connect white ground wire to top corner of cab heater and A/C unit (8) with screw.
5. Connect four flexible ducts to top of cab heater and A/C unit (8) and tighten four hose clamps.
6. Connect two A/C hoses (6 and 7) to expansion valve (4) and tighten two fitting nuts (5).
7. Replace receiver/dryer (WP 0269 00).
8. Connect two heater hoses to side of cab heater and A/C unit. Add coolant (WP 0064 00).
9. Underneath instrument panel, install A/C temperature control, connect cable to heater temperature control, and connect connectors to A/C control switch (WP 0073 00).
10. Install air cleaner (WP 0057 00).
11. Start engine (TM 10-3930-675-10) and check for coolant leaks.
12. Charge A/C system with refrigerant (WP 0265 00).

INSTALLATION - CONTINUED

13. Install front panel (1) on cab with 14 washers (3) and capnuts (2).



14. Install windshield wiper assembly (WP 0158 00).
15. Return cab to operational position (TM 10-3930-675-10).

END OF WORK PACKAGE

AIR CONDITIONING SYSTEM MAINTENANCE 0265 00

THIS WORK PACKAGE COVERS

Recovery, Evacuating/Recycling, Purging, Flushing, Charging

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Gloves, Chemical and Oil, Protective, Rubber (Item 47, WP 0289 00)

Goggles, Industrial (Item 50, WP 0289 00)

Reclaimer, Refrigerant, R-134A (Item 100, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Materials/Parts - Continued

Oil, Lubricating, Refrigerant (Item 29, WP 0290 00)

Tetrafluoroethane (Item 40, WP 0290 00)

References

TM 10-3930-675-10

WP 0194 00

WP 0266 00

WP 0269 00

Equipment Condition

Engine cover removed (WP 0148 00)



- **Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Take care to prevent refrigerant from touching your skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Serious injury or blindness may result if you come in contact with liquid refrigerant.**
- **Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury or death.**

RECOVERY

1. Remove caps from suction valve (5) and discharge valve (6) on A/C compressor (7).
2. Wearing protective goggles and non-leather gloves, attach recovery/recycling station's hoses to valves (5 and 6).

NOTE

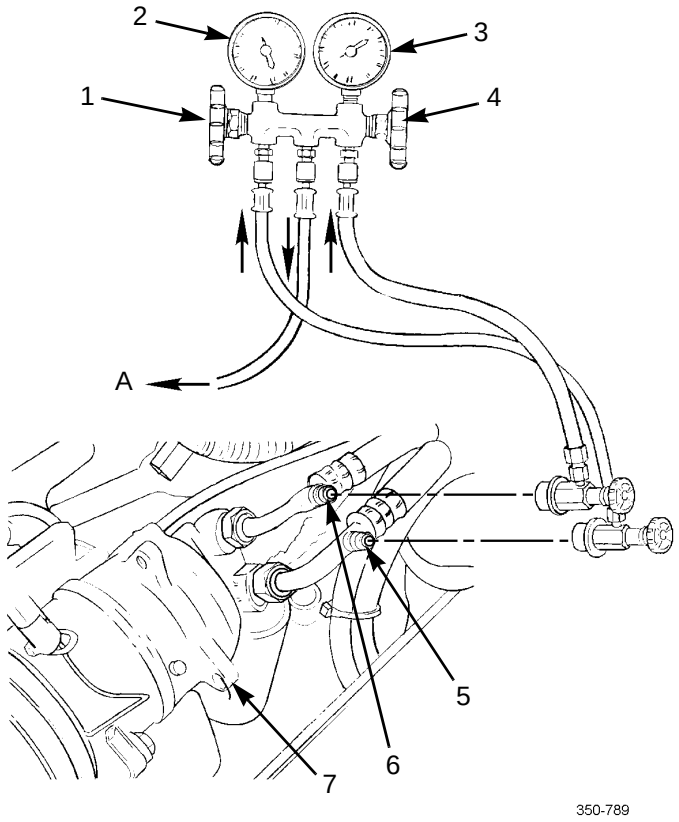
Push down firmly on hose connectors until a clicking sound is heard. This will ensure coupler is locked.

a. Ensure recovery/recycling station's valves are closed.

b. Connect red hose to discharge valve (6).

c. Connect blue hose to suction valve (5).

d. Turn knob clockwise on each coupler to open valves (5 and 6).



A To Recovery Station

1 Manifold Suction Hand Valve (Open)
2 Low-Side Gage
3 High-Side Gage
4 Manifold Discharge Hand Valve (Open)
5 Suction Valve
6 Discharge Valve
7 A/C Compressor

3. Follow recovery/recycling manufacturer's instructions and recover all refrigerant from system.

NOTE

- **Always comply with all local regulations regarding refrigerant disposal. You may be subject to substantial penalties for improper disposal.**
- **Anytime A/C system refrigerant is evacuated, replace receiver/dryer.**

4. Replace receiver/dryer (WP 0269 00).

RECOVERY - CONTINUED

NOTE

If system is contaminated with moisture, compressor oil must be replaced with clean oil. If system is heavily contaminated with desiccant or grit, replace compressor and expansion valve.

5. Replace A/C compressor (WP 0266 00).

EVACUATING/RECYCLING

NOTE

System must have been recovered and compressor filled with correct amount of refrigerant oil. Replace receiver/dryer if system is opened.

1. Wearing protective goggles and rubber gloves, attach recovery/recycling station's hoses to valves.

NOTE

Push down firmly on hose connectors until a clicking sound is heard. This will ensure coupler is locked.

   a. Ensure recovery/recycling station's valves are closed.
   b. Connect red hose to discharge valve (6).
   c. Connect blue hose to suction valve (5).
   d. Turn knob clockwise on each coupler to open valves (5 and 6).

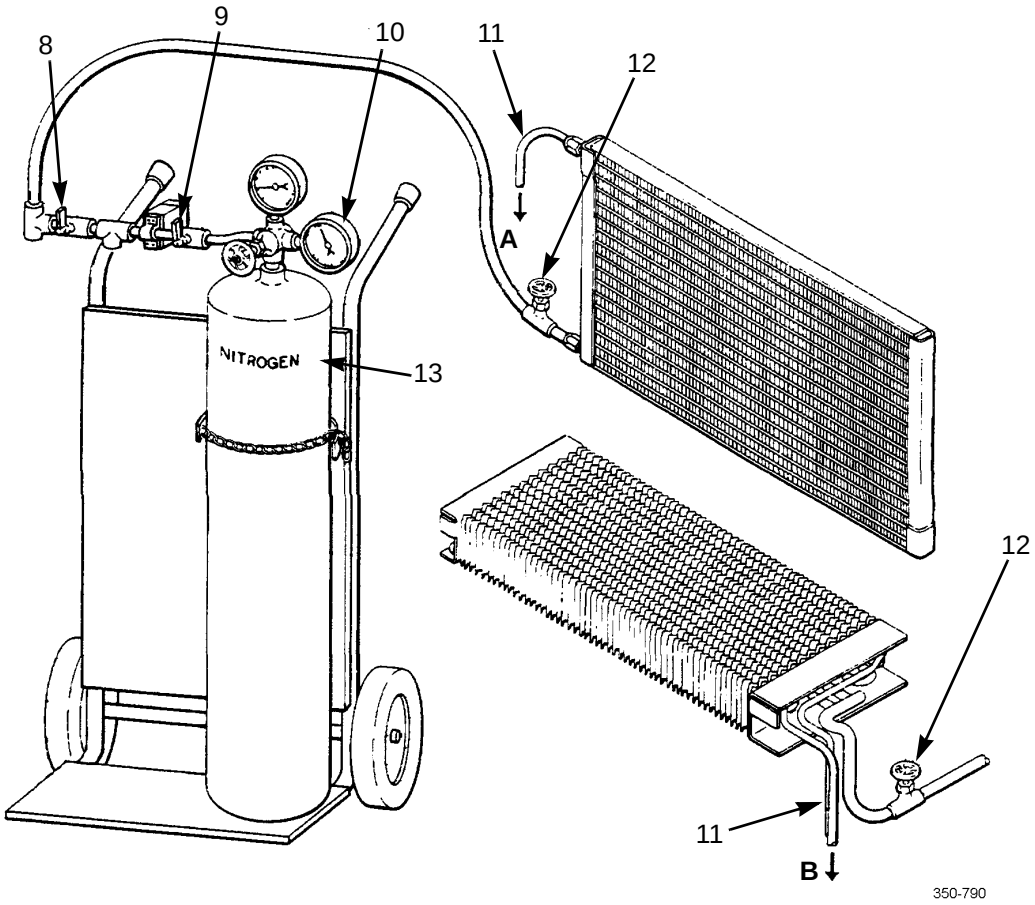
2. Follow recovery/recycling manufacturer's instructions and evacuate/recycle refrigerant system.

PURGING

NOTE

Dry nitrogen gas is recommended for purging. A pressure regulator is required to regulate between 0 to 200 psi (0 to 1,379 kPa). Commercial cylinders of nitrogen contain pressures in excess of 2,000 psi (13,780 kPa); this pressure must be reduced to 200 psi (1,379 kPa) for purging.

1. Recover system refrigerant (refer to *Recovery*).
2. Disconnect both ends of line or part being purged. Tightly cap rest of system.
3. Ensure valves (8, 9, and 12) are closed.



A To Waste Container

8 Purging Control Valve
9 Nitrogen Bottle Control Valve
10 Nitrogen Bottle Regulator/Gage

B To Recycling System Container

11 Drain Line
12 Supply Line Valve
13 Nitrogen Bottle

4. Connect supply line valve (12) to outlet end of part or line.
5. Connect drain line (11) to inlet end of part or line.
6. Place outlet of drain line into a recycling system container.

PURGING - CONTINUED

7. Adjust nitrogen bottle regulator (10) to 200 psi (1,379 kPa). Open nitrogen bottle control valve (9) and purging control valve (8). Then, slowly open supply line valve (12). Check drain line (11) for gas flow.
8. Let nitrogen flow at 200 psi (1,379 kPa) for 1 to 2 minutes. If part or line was very wet, allow it to flow until there is no trace of refrigerant oil or solid bits of dirt or grit flowing from drain tube.
9. Close nitrogen bottle control valve (9) and purging control valve (8) first, then close supply line valve (12).
10. Disconnect supply line valve (12) and drain line (11). Tightly cap both ends of part or line.

FLUSHING

1. Recover refrigerant system (refer to *Recovery*).
2. Disconnect both ends of part or line being flushed. Tightly cap lines to rest of system.
3. Heat R-134a refrigerant in a dial-a-charge or pressurize refrigerant in accordance with manufacturer's instructions provided with refrigerant reclaimer.
4. Connect dial-a-charge outlet hose to outlet side of system (this will ensure R-134a will flow in reverse direction of normal flow).
5. Connect a line from inlet side of system to recovery/recycling station.

NOTE

If system is extremely contaminated, install a receiver/dryer inline as a pre-filter for recovery/recycling station.

6. Turn on recovery/recycling station and open outlet valve for dial-a-charge. Allow about 2 lb (1 kg) of R-134a to flow through system.
7. Close supply line valve and wait for recovery station to shut off.
8. Disconnect supply line and drain line from dial-a-charge and recovery station. Connect lines to nitrogen bottle.
9. Purge system and check collection bottle for contaminants. Repeat process if needed.
10. Disconnect lines from part and tightly cap both ends of part.

CHARGING

NOTE

Before charging, system must be recovered and evacuated with recovery and recycling station connected to service and discharge port connections.

1. Obtain enough refrigerant to fully charge system. Set tank on a scale and weigh for correct amount of refrigerant to enter system. This prevents overcharging, which could cause damage to compressor.
2. Charge refrigerant system.

NOTE

If equipped with a recovery, recycling, and recharging system, charge system on high side following manufacturer's instructions. If charging from a bulk container, perform the following steps:

a. Turn tank (bulk container) upside down. With engine off, open high-side hand valve. DO NOT open low-side hand valve.

b. Allow refrigerant to enter system until correct charge (by weight) has entered. Close high-side hand valve.

CHARGING - CONTINUED

c. Start engine and run at 1,500 RPM. Set cab A/C controls at maximum cooling and fan speed; refrigerant compressor must engage.

d. If a charge did not enter system, place tank (bulk container) in upright position, then open LOW-SIDE valve to draw vapor into system. Leave valve open until correct weight of refrigerant has entered system, then close low-side valve.

NOTE

If refrigerant is slow to enter system because of low outside temperatures, vaporization can be quickened by placing refrigerant tank in a tub of warm water, no warmer than 125°F (52°C).

3. Disconnect high-side hose. With engine running, open low-side and high-side hose valves to recover refrigerant from lines.
4. Shut down engine.
5. Leak test A/C system (WP 0194 00).
6. Check operation of A/C system (TM 10-3630-675-10).
7. Install engine cover (WP 0148 00).

END OF WORK PACKAGE

AIR CONDITIONER COMPRESSOR REPLACEMENT 0266 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Strap, Tiedown (Item 37, WP 0290 00)

Materials/Parts - Continued

Nut, lock (P/N 5957) (2)

References

WP 0269 00

Equipment Condition

Master battery switch in OFF position

A/C system refrigerant recovered (WP 0265 00)

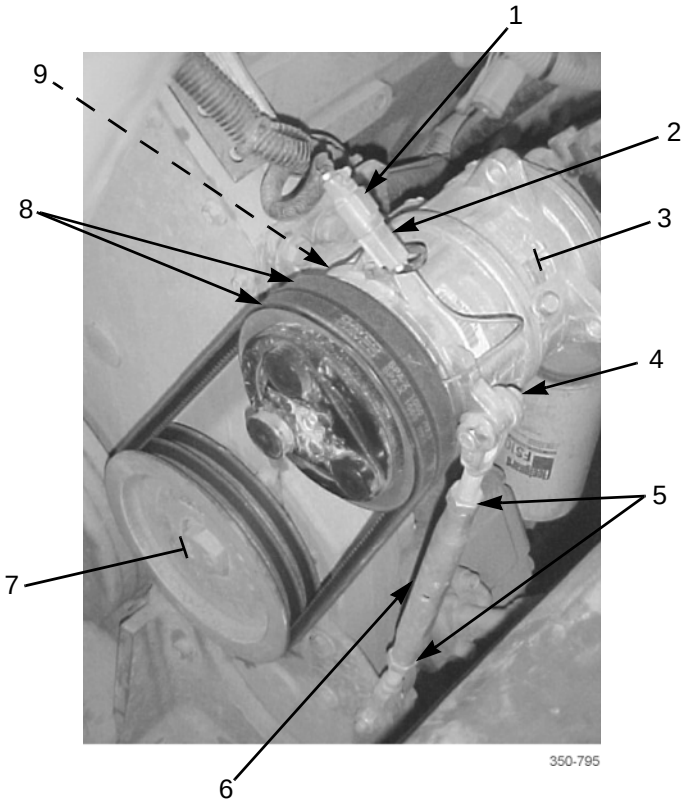
REMOVAL

NOTE

Remove and discard tiedown strap as necessary.

REMOVAL - CONTINUED

1. Disconnect A/C compressor (3) connector (2) from engine wiring harness (1).
2. Loosen locknuts (4 and 9).
3. Loosen two jamnuts (5) and rotate support rod (6) to allow slack in two belts (8).
4. Remove two belts (8) from A/C compressor (3) and pulley (7).



5. Remove locknut (4) and screw (18) from support rod (6) yoke (17) . Discard locknut.

CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

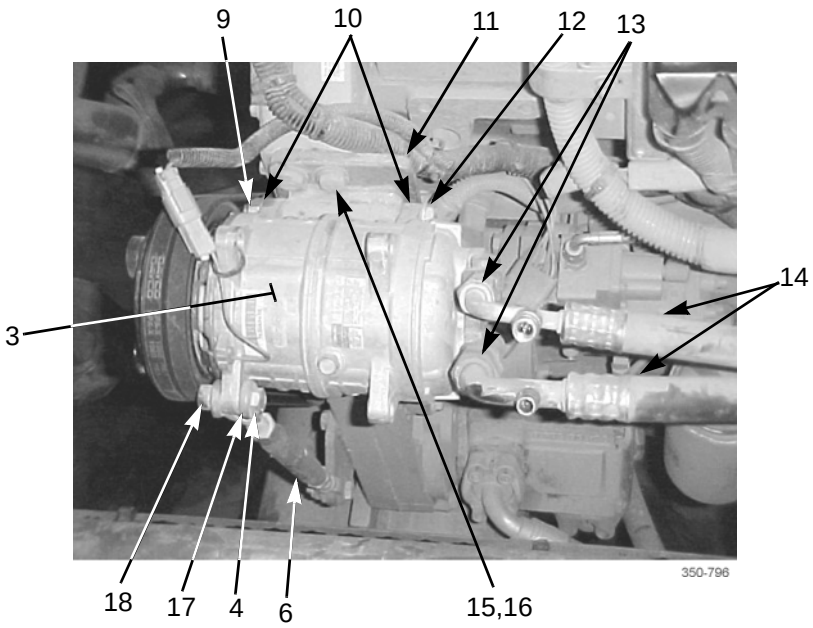
6. Loosen two fitting nuts (13) and disconnect two A/C hoses (14) from A/C compressor (3).
7. Remove locknut (9), bolt (12), two washers (10), and A/C compressor (3) from bracket (11). Discard locknut.

NOTE

Perform step 8 to remove bracket from engine.

REMOVAL - CONTINUED

8. Remove four screws (15), washers (16), and bracket (11) from left front of engine.



INSTALLATION

NOTE

Perform step 1 to install bracket on engine.

1. Install bracket (11) on left front of engine with four washers (16) and screws (15).
2. Install A/C compressor (3) on bracket (11) with two washers (10), bolt (12), and new locknut (9). DO NOT fully tighten locknut.
3. Connect two A/C hoses (14) to A/C compressor (3) and tighten two fitting nuts (13).
4. Position two belts (8) on A/C compressor (3) and pulley (7).
5. Install support rod (6) yoke (17) on A/C compressor (3) with screw (18) and new locknut (4). DO NOT fully tighten locknut.
6. Rotate support rod (6) until belts (8) can be depressed no more than 1/2 in. (12.7 mm) at center of belts. Tighten two jamnuts (5).
7. Tighten locknuts (4 and 9).

NOTE

Install new tiedown strap as necessary.

8. Connect A/C compressor (3) connector (2) to engine wiring harness (1).

NOTE

Any time A/C system refrigerant is evacuated, replace receiver/dryer.

9. Replace receiver/dryer (WP 0269 00).
10. Charge A/C system (WP 0265 00).

END OF WORK PACKAGE

AIR CONDITIONER HOSES REPLACEMENT 0267 00

THIS WORK PACKAGE COVERS

Chassis A/C Hoses: Removal, Installation

Cab Rear A/C Hose: Removal, Installation

Cab Interior A/C Hoses: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Materials/Parts - Continued

Strap, Tiedown (Item 37, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

References

WP 0142 00

WP 0269 00

Equipment Condition

A/C system refrigerant recovered (WP 0265 00)

CHASSIS A/C HOSES REMOVAL

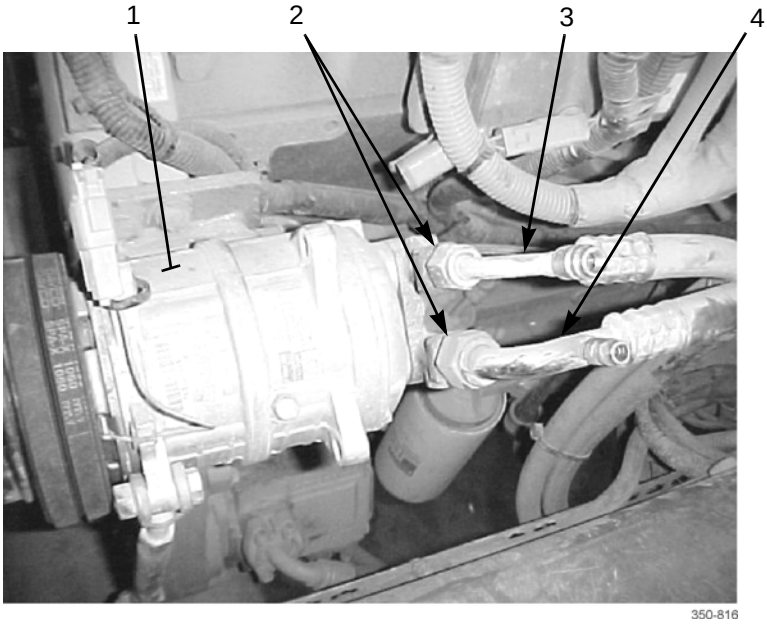
1. Remove transmission access covers (WP 0142 00).

CHASSIS A/C HOSES REMOVAL - CONTINUED

CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines and compressor should be capped after disconnection to avoid contamination.

2. Loosen two fitting nuts (2) and disconnect two A/C hoses (3 and 4) from A/C compressor (1).



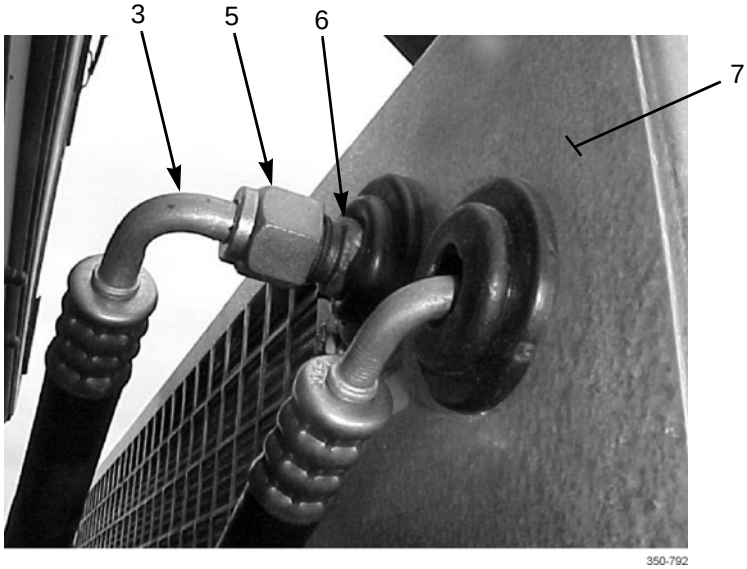
CAUTION

Use two wrenches when loosening fitting nut to avoid twisting condenser tube.

NOTE

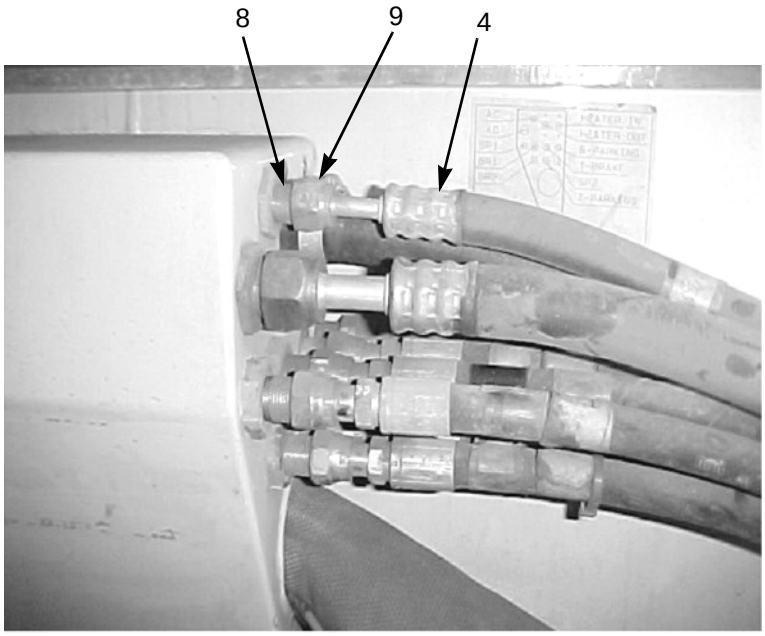
Remove nylon straps and remove and discard tiedown straps as necessary.

3. Behind cab, loosen fitting nut (5) and disconnect A/C hose (3) from condenser (6) at condenser fan box (7).



CHASSIS A/C HOSES REMOVAL - CONTINUED

4. Loosen fitting nut (9) and disconnect A/C hose (4) from fitting (8) at cab interface at rear of cab.



5. Remove two A/C hoses (3 and 4) from vehicle.

CHASSIS A/C HOSES INSTALLATION

1. Position two A/C hoses (3 and 4) on vehicle.
2. Connect A/C hose (4) to fitting (8) at cab interface at rear of cab and tighten fitting nut (9).

CAUTION

Use two wrenches when tightening fitting nut to avoid twisting condenser tube.

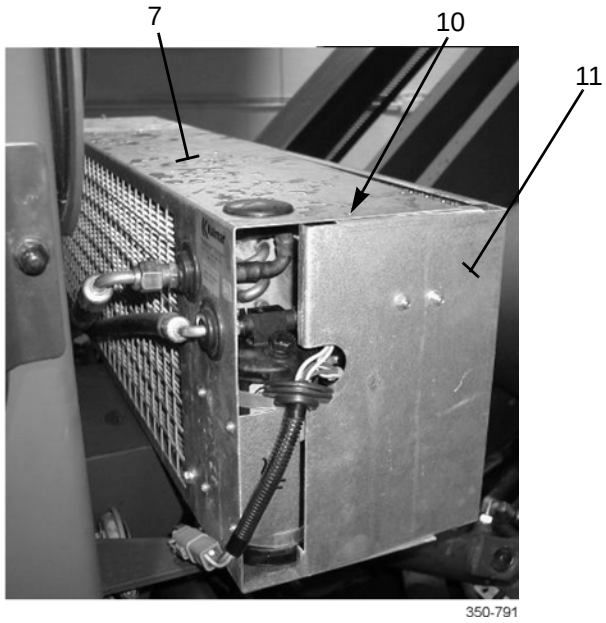
3. Connect A/C hose (3) to condenser (6) at condenser fan box (7) and tighten fitting nut (5).
4. Toward front of vehicle, connect two A/C hoses (3 and 4) to A/C compressor (1) and tighten two fitting nuts (2).
5. Replace receiver/dryer (WP 0269 00).
6. Charge A/C system (WP 0265 00).
7. Install transmission access covers (WP 0142 00).

CAB REAR A/C HOSE REMOVAL

NOTE

Perform the following steps for short A/C hose at outside rear of cab.

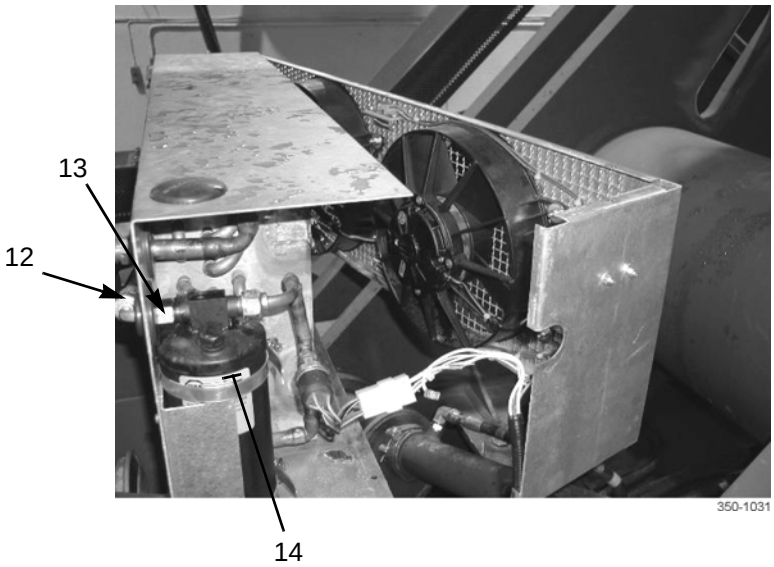
1. Remove ten screws (10) and separate cover (11) assembly from condenser fan box (7).



CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

2. Loosen fitting nut (13) and disconnect A/C hose (12) from receiver/dryer (14).

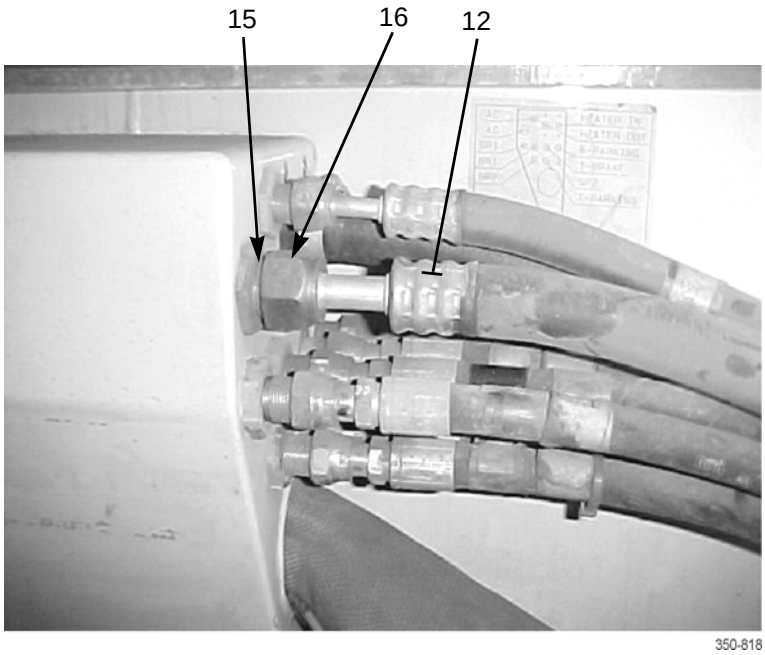


CAB REAR A/C HOSE REMOVAL - CONTINUED

NOTE

Remove and discard tiedown straps as necessary.

3. Loosen fitting nut (16) and disconnect other end of A/C hose (12) from fitting (15) at cab interface at rear of cab.
4. Remove A/C hose (12) from rear of cab.

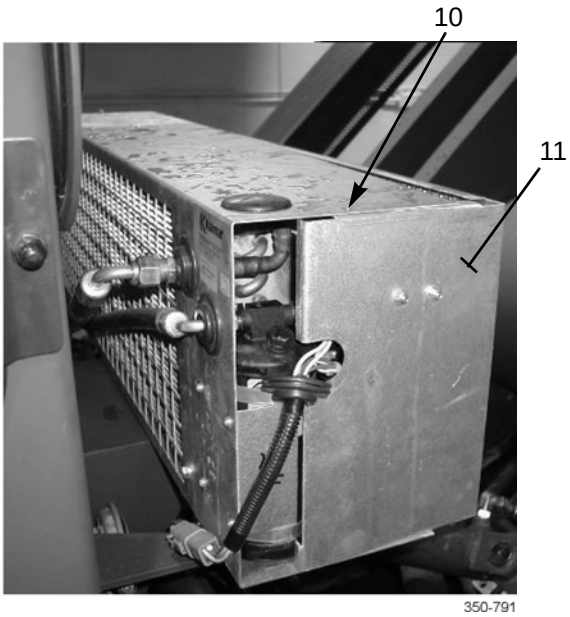


CAB REAR A/C HOSE INSTALLATION

1. Position A/C hose (12) at rear of cab.
2. Connect A/C hose (12) to fitting (15) at cab interface at rear of cab and tighten fitting nut (16).
3. Replace receiver/dryer (WP 0269 00).
4. Connect other end of A/C hose (12) to receiver/dryer (14) and tighten fitting nut (13).

CAB REAR A/C HOSE INSTALLATION - CONTINUED

5. Charge A/C system (WP 0265 00).
6. Close cover (11) assembly and install ten screws (10).

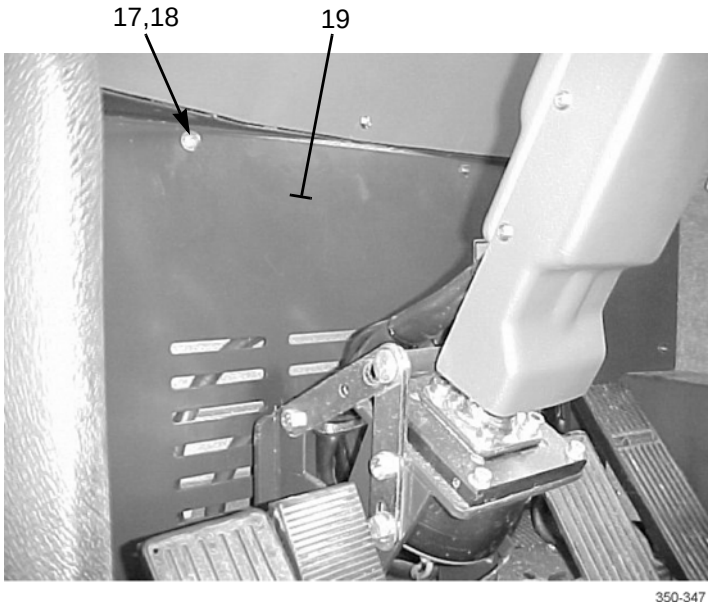


CAB INTERIOR A/C HOSES REMOVAL

NOTE

Perform the following steps to remove A/C hoses between cab heater and A/C unit and rear of cab.

1. Remove four screws (17), washers (18), and lower panel (19) from cab.

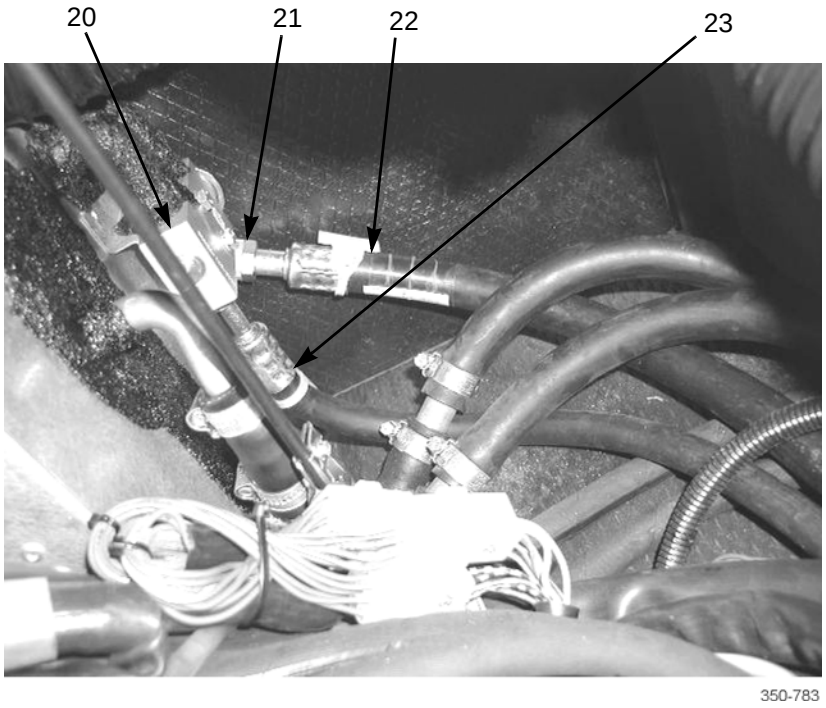


CAB INTERIOR A/C HOSES REMOVAL - CONTINUED

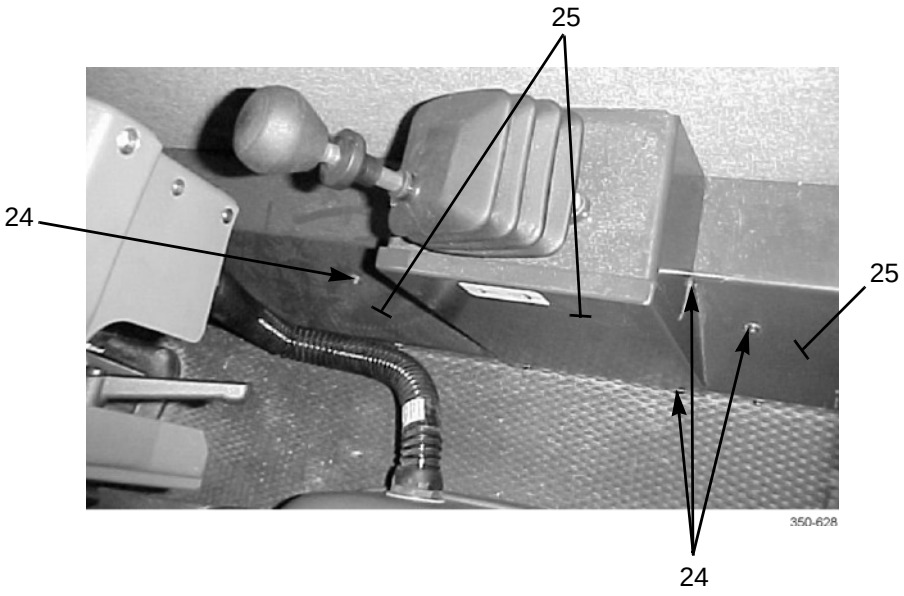
CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

2. Loosen two fitting nuts (21) and disconnect two A/C hoses (22 and 23) from expansion valve (20).



3. Remove fourteen screws (24) and three access covers (25) from right side of cab.

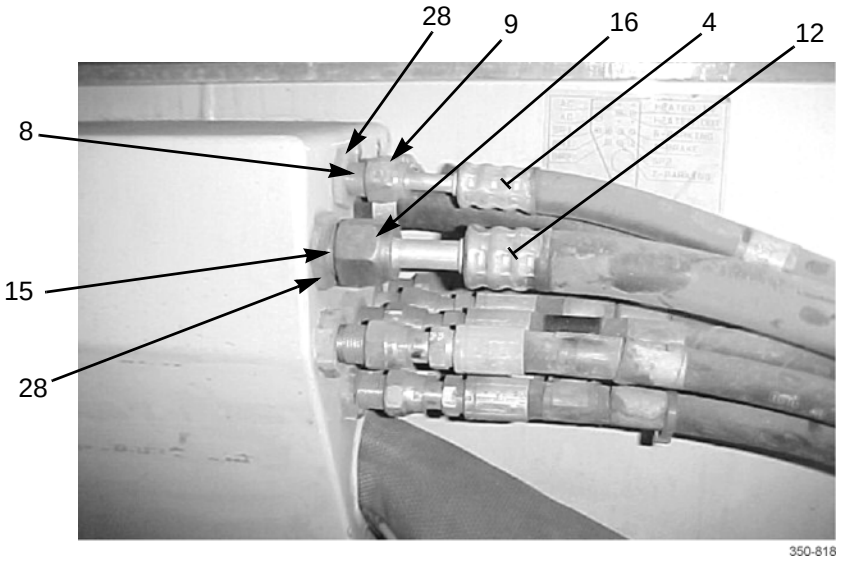


CAB INTERIOR A/C HOSES REMOVAL - CONTINUED

4. Lift and remove right access cover (26) and middle access cover (27) from rear of cab.



5. At cab interface behind cab, loosen two fitting nuts (9 and 16) and disconnect two A/C hoses (4 and 12) from two fittings (8 and 15).
6. Remove two jamnuts (28) and push two fittings (8 and 15), with two A/C hoses (23 and 22) attached, into cab.



CAB INTERIOR A/C HOSES REMOVAL - CONTINUED

7. At inside rear of cab, loosen two fitting nuts (29) and disconnect two A/C hoses (23 and 22) from two fittings (8 and 15). Set fittings aside.
8. Remove two A/C hoses (23 and 22) from cab.

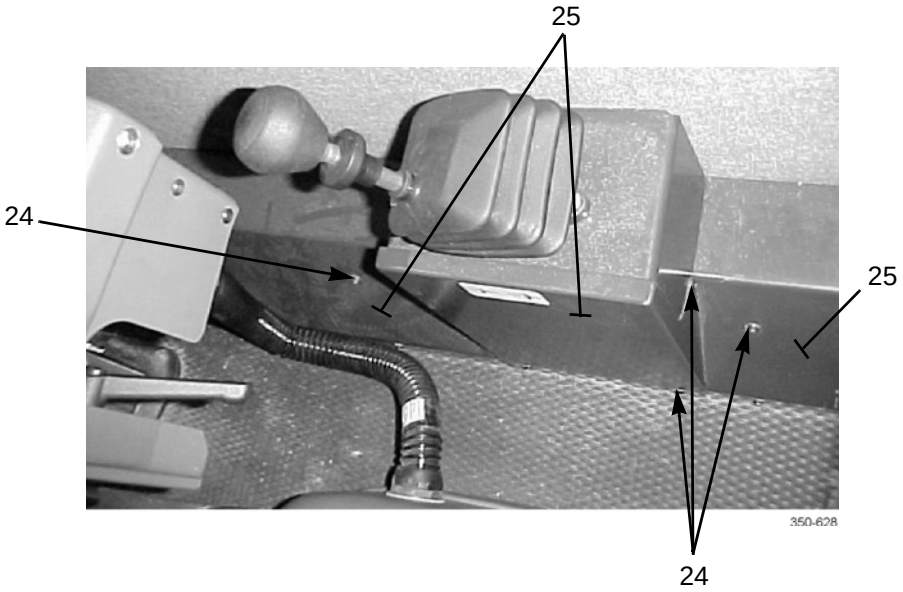


CAB INTERIOR A/C HOSES INSTALLATION

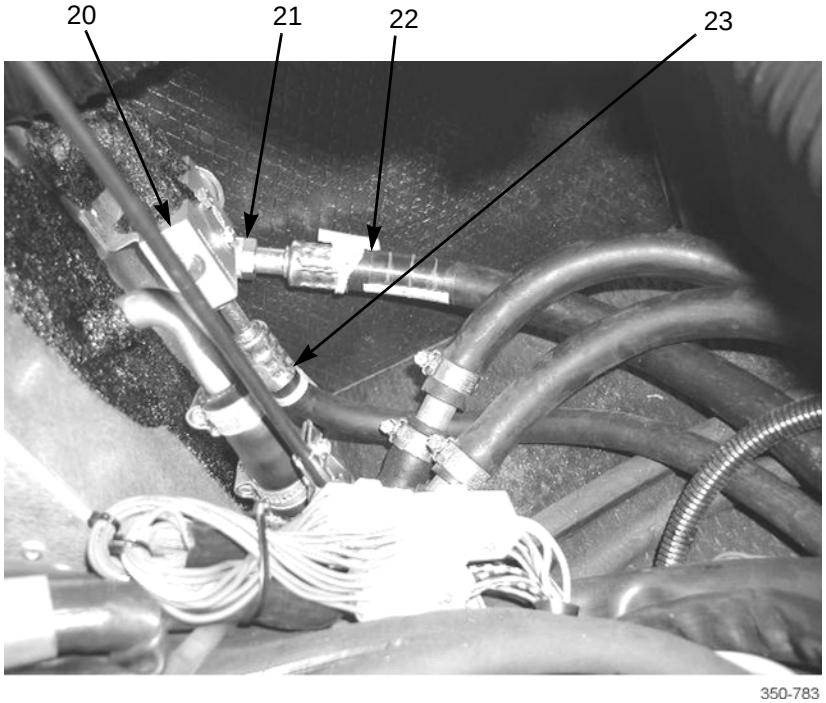
1. Position two A/C hoses (23 and 22) in cab.
2. At inside rear of cab, connect two A/C hoses (23 and 22) to two fittings (8 and 15) and tighten two fitting nuts (29).
3. Push two fittings (8 and 15), with two A/C hoses (23 and 22) attached, out of cab. Install two jamnuts (28).
4. Connect two A/C hoses (4 and 12) to two fittings (8 and 15) and tighten two fitting nuts (9 and 16).
5. Install middle access cover (27) and right access cover (26) in rear of cab.

CAB INTERIOR A/C HOSES INSTALLATION - CONTINUED

6. Install three access covers (25) on right side of cab with fourteen screws (24).

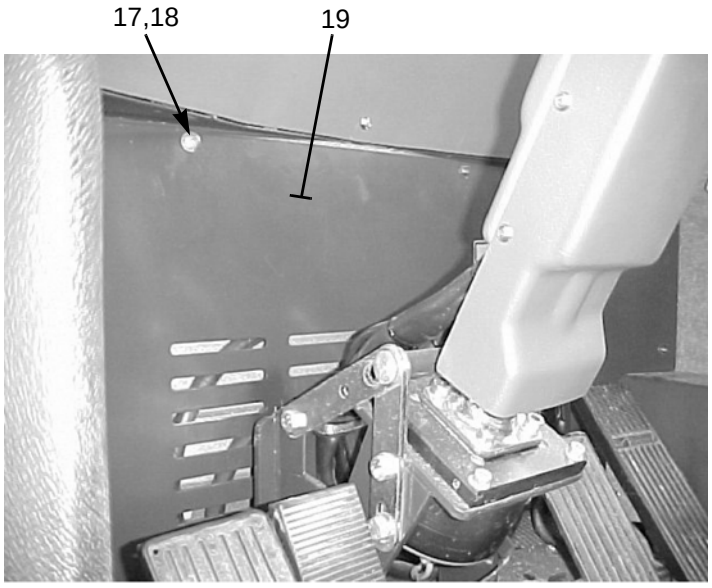


7. Connect two A/C hoses (23 and 22) to expansion valve (20) and tighten two fitting nuts (21).



CAB INTERIOR A/C HOSES INSTALLATION - CONTINUED

8. Install lower panel (19) to cab with four washers (18) and screws (17).



9. Replace receiver/dryer (WP 0269 00).
10. Charge A/C system (WP 0265 00).

END OF WORK PACKAGE

AIR CONDITIONER CONDENSER REPLACEMENT 0268 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Cap Set, Protective (Item 5, WP 0290 00)

Materials/Parts - Continued

Washer, lock (P/N 5954) (4)

References

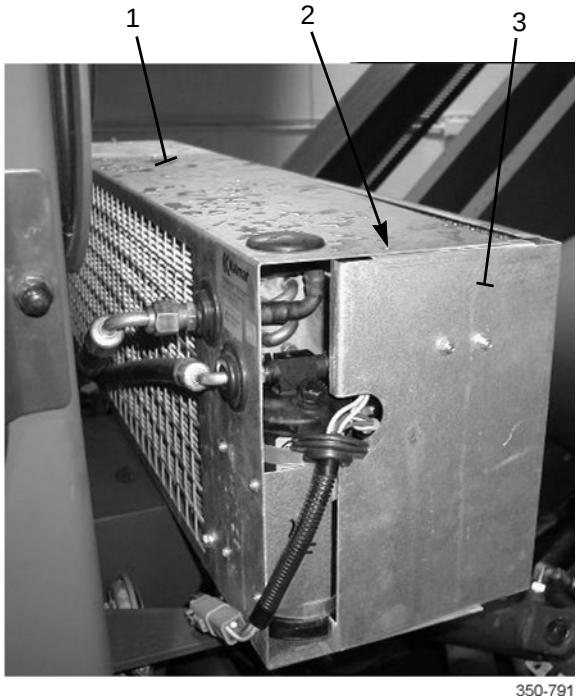
WP 0269 00

Equipment Condition

A/C system refrigerant recovered (WP 0265 00)

REMOVAL

1. Remove ten screws (2) and separate cover (3) assembly from condenser fan box (1).



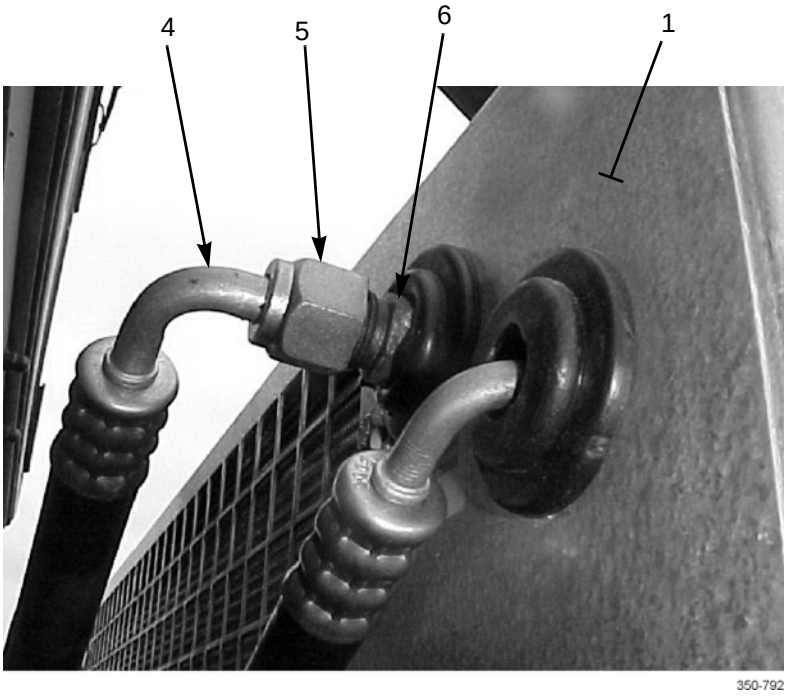
350-791

REMOVAL - CONTINUED

CAUTION

- **Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.**
- **Use two wrenches when loosening fitting nut to avoid twisting condenser tube.**

2. From outside condenser fan box (1), loosen fitting nut (5) and disconnect A/C hose (4) from condenser (6).



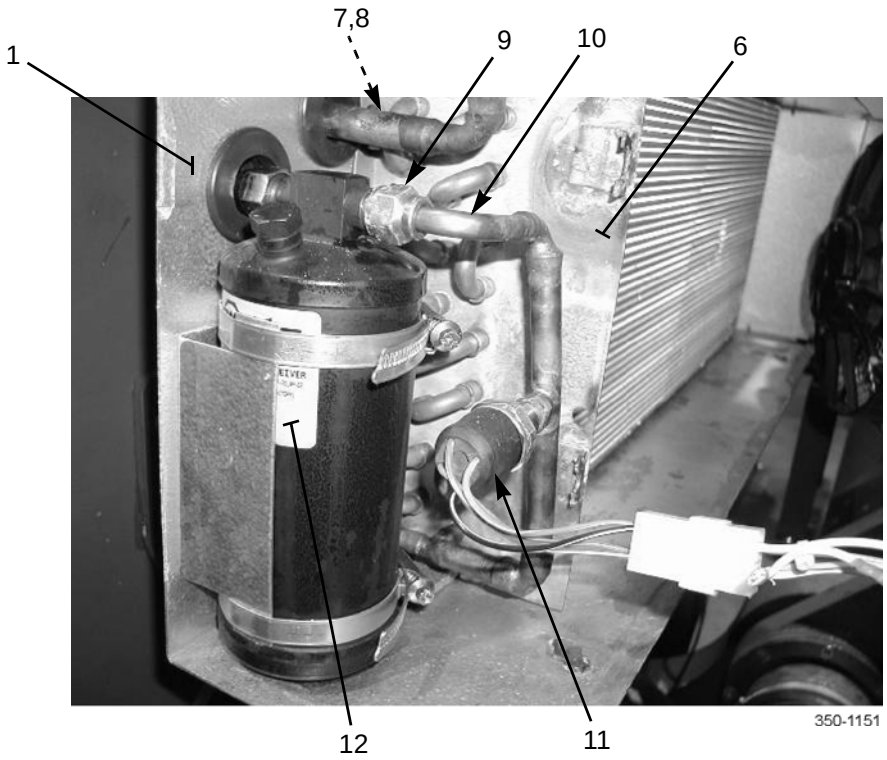
3. From inside condenser fan box (1), loosen fitting nut (9) and disconnect tube (10) from receiver/dryer (12).
4. Remove pressure switch (11) from condenser (6).
5. Remove four screws (7), lockwashers (8), and condenser (6) from condenser fan box (1). Discard lockwashers.

NOTE

Any time A/C system refrigerant is evacuated, replace receiver/dryer.

6. Remove receiver/dryer (12) (WP 0269 00).

REMOVAL - CONTINUED

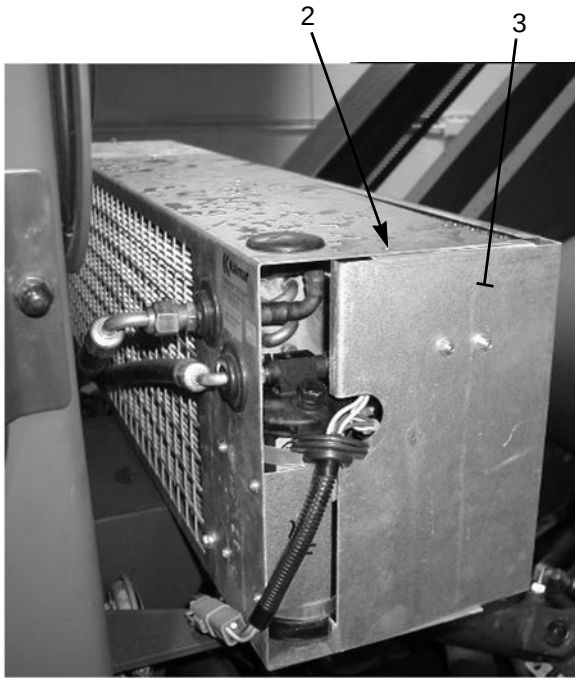


INSTALLATION

1. Install receiver/dryer (12) (WP 0269 00).
2. Install condenser (6) in condenser fan box (1) with four screws (7) and new lockwashers (8).
3. Install pressure switch (11).
4. Connect tube (10) to receiver/dryer (12) and tighten fitting nut (9).
5. Outside condenser fan box (1), connect A/C hose (4) to condenser (6) and tighten fitting nut (5).
6. Charge A/C system (WP 0265 00).

INSTALLATION - CONTINUED

7. Close cover (3) assembly and install ten screws (2).



350-791

END OF WORK PACKAGE

AIR CONDITIONER RECEIVER/DRYER REPLACEMENT 0269 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

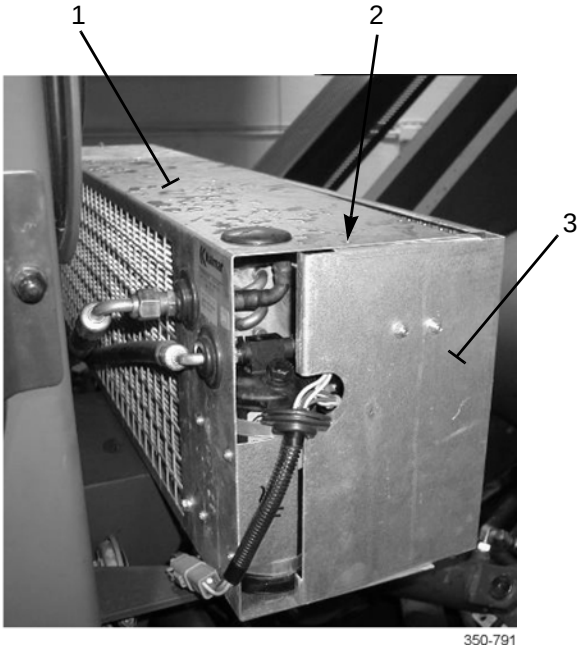
Cap Set, Protective (Item 5, WP 0290 00)

Equipment Condition

A/C system refrigerant recovered (WP 0265 00)

REMOVAL

1. Remove ten screws (2) and separate cover (3) assembly from condenser fan box (1).

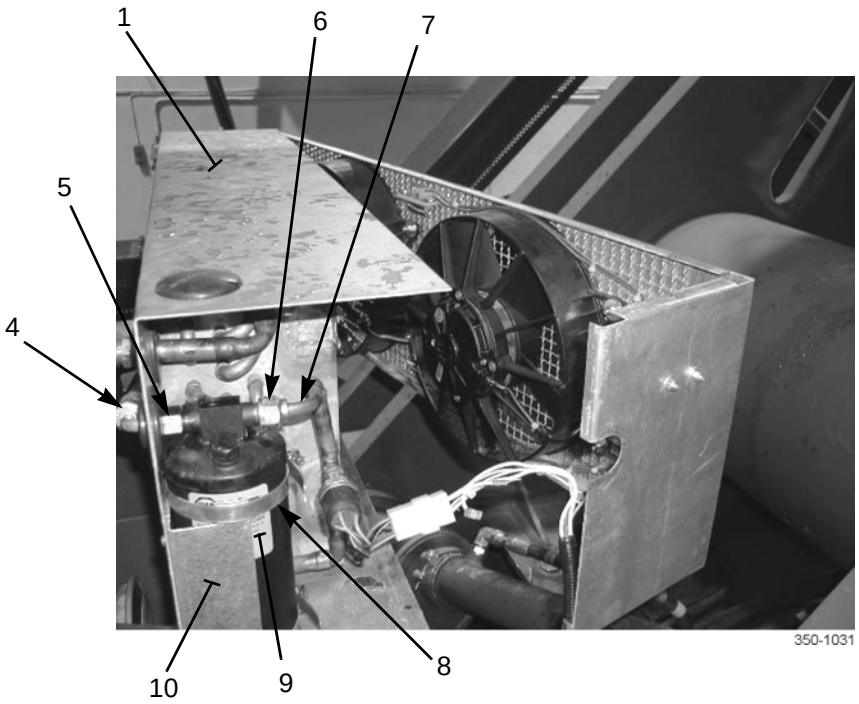


REMOVAL - CONTINUED

CAUTION

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

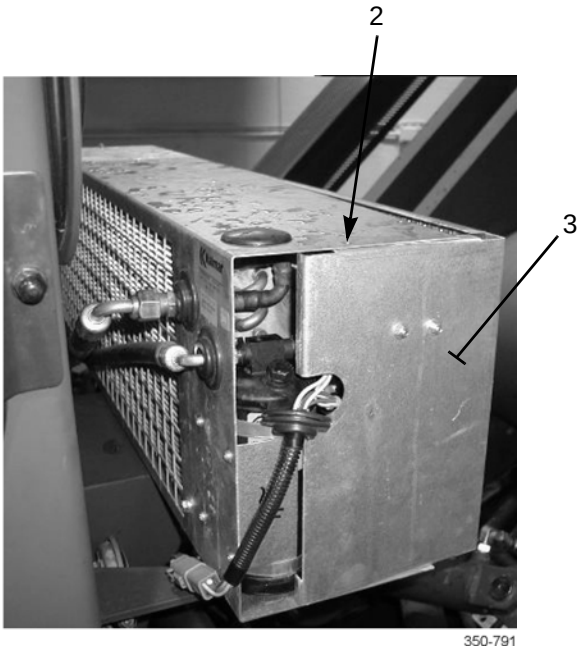
2. From inside condenser fan box (1), loosen fitting nut (5) and disconnect A/C hose (4) from receiver/dryer (9).
3. Loosen fitting nut (6) to disconnect tube (7) from receiver/dryer (9).
4. Remove two clamps (8) and receiver/dryer (9) from bracket (10).



INSTALLATION

1. Install receiver/dryer (9) on bracket (10) with two clamps (8). Do not fully tighten clamps.
2. Connect tube (7) to receiver/dryer (9) and tighten fitting nut (6).
3. Connect A/C hose (4) to receiver/dryer (9) and tighten fitting nut (5). Tighten two clamps (8).
4. Charge A/C system (WP 0265 00).
5. Close cover (3) assembly and install ten screws (2).

INSTALLATION - CONTINUED



END OF WORK PACKAGE

CHAPTER 5
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

MOUNTING ENGINE ON REBUILD STAND 0270 00

THIS WORK PACKAGE COVERS

Installation, Removal

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Fixture, Engine Lifting (Item 37, WP 0289 00)

Pin, Guide (Item 78, WP 0289 00)

Plate, Adapter, Engine Stand (Item 80, WP 0289 00)

Stand, Engine Rebuild (Item 116, WP 0289 00)

Stand, Engine Support (Item 117, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Gasket, Heater Housing (P/N 3893690)

Gasket, Thermostat Housing Support (P/N 3893692)

Materials/Parts - Continued

Gasket, Water Header Plate (P/N 3899229)

Seal, O-ring (P/N 3819751) (2)

Personnel Required

Two

Equipment Condition

Engine removed and mounted on support stand (WP 0197 00)

Coolant filter removed (WP 0069 00)

Alternator drive belt removed (WP 0071 00)

Alternator removed (WP 0070 00)

Air ducts removed (WP 0058 00)

Water pump removed (WP 0068 00)

Thermostat and thermostat housing removed (WP 0067 00)

Intake manifold removed (WP 0211 00)

Exhaust manifold removed (WP 0210 00)

Engine oil cooler and oil filter head removed (WP 0209 00)

INSTALLATION

CAUTION

Care must be taken to ensure no surface scratches occur on water header plate or cylinder block mounting surfaces. Scratches on these surfaces will cause future leak paths.

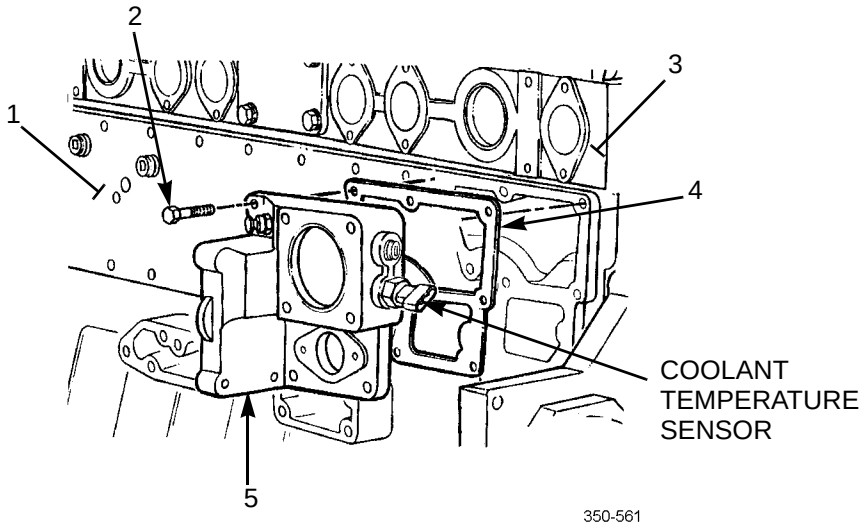
NOTE

- **Tag wiring harness leads, connectors, and receptacles to ensure correct installation.**
- **Note size and location of attaching hardware during removal to ensure correct hardware is used during engine assembly.**

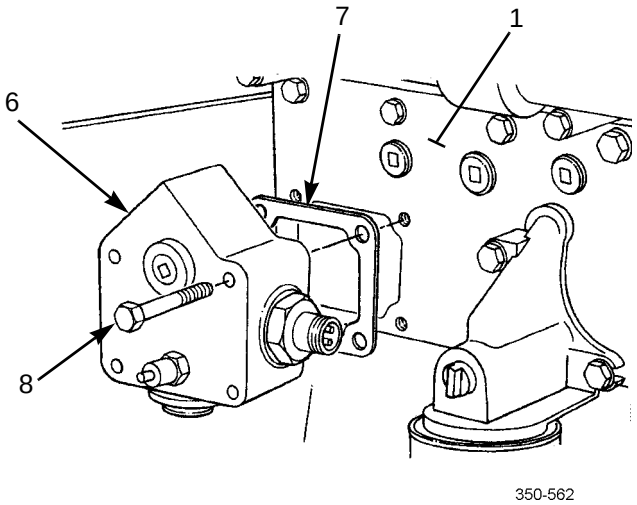
MOUNTING ENGINE ON REBUILD STAND - CONTINUED 0270 00

INSTALLATION - CONTINUED

1. Remove water header plate (1) from exhaust side of cylinder block (3) as follows:
   a. Disconnect wiring harness from coolant temperature sensor.
   b. Remove four screws (2), thermostat housing support (5), and gasket (4). Discard gasket.



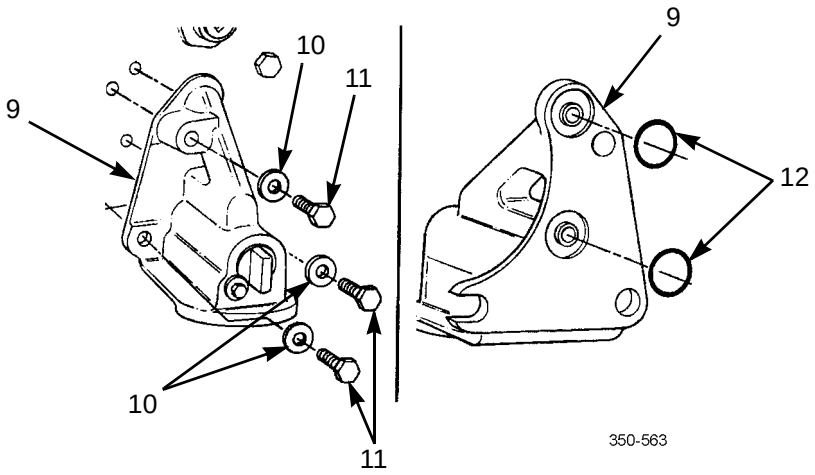
   c. Remove four screws (8), water heater housing (6), and gasket (7) from water header plate (1). Discard gasket.



MOUNTING ENGINE ON REBUILD STAND - CONTINUED **0270 00**

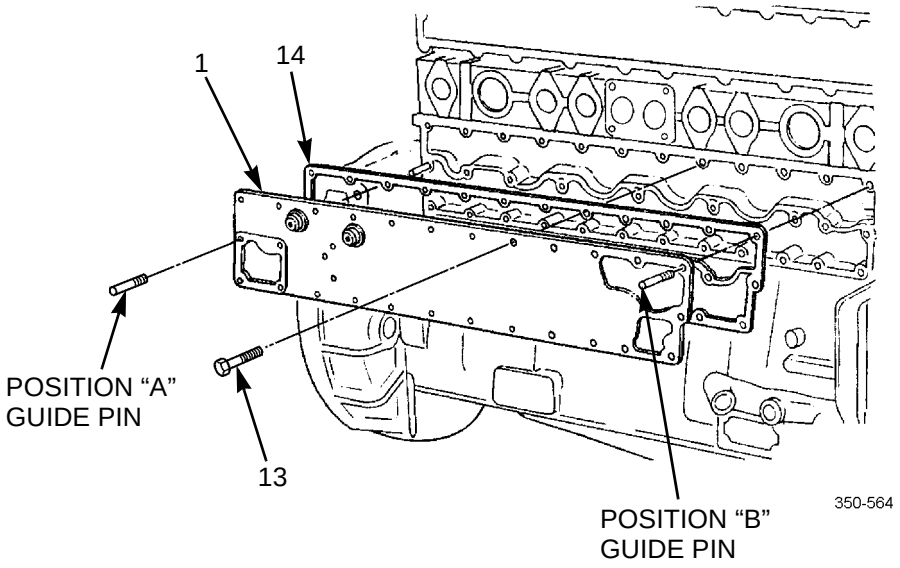
INSTALLATION - CONTINUED

d. Remove three screws (11), washers (10), two O-rings (12), and coolant filter head (9). Discard O-rings.



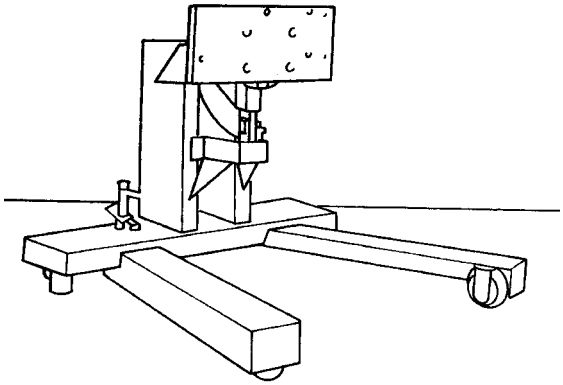
e. Remove two screws from positions “A” and “B”. Replace screws with guide pins.

f. Remove 16 remaining screws (13), water header plate (1), gasket (14), and guide pins. Discard gasket.



INSTALLATION - CONTINUED

2. Install adapter plate on rebuild stand with five screws. Tighten screws to 135 lb-ft (183 Nm).



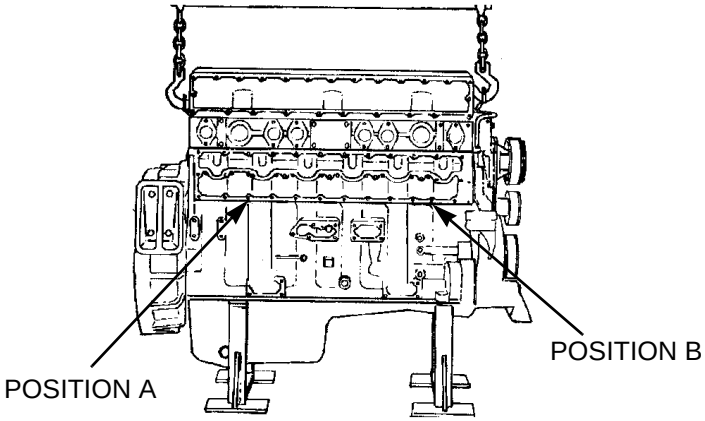
350-565

ENGINE REBUILD STAND WITH ADAPTER PLATE

NOTE

Ensure lifting brackets are installed on front and rear of engine.

3. Install guide pins in water header plate mounting screw holes at positions “A” and “B”.



350-566



WARNING

Engine weighs 2,070 lb (940 kg). Lifting device must have sufficient capacity to lift engine. Failure to follow this warning may result in death or injury to personnel.

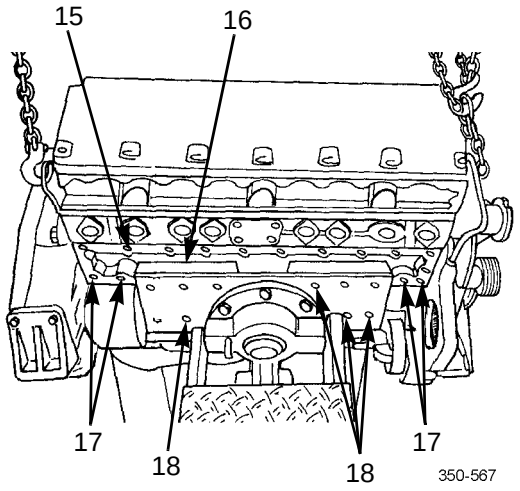
INSTALLATION - CONTINUED

4. Using engine lifting fixture, lift and install exhaust side of engine on rebuild stand as follows:
   a. Align top of adapter plate (16) to top row of water header plate mounting screw holes (15).

NOTE

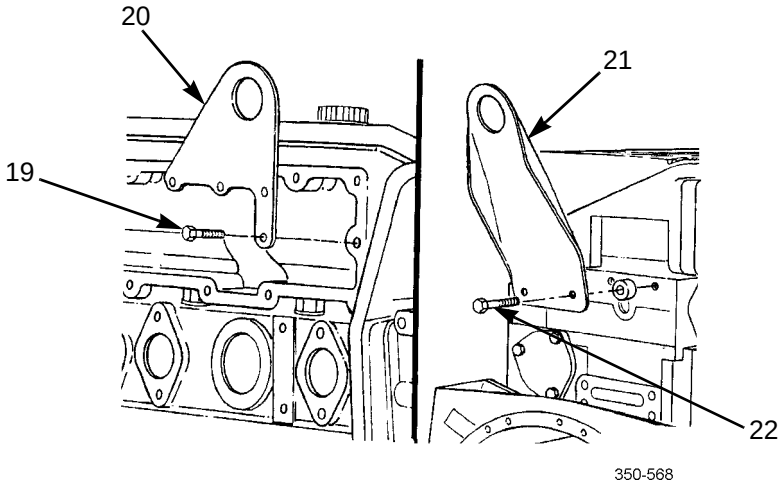
Cylinder block must be positioned so two screw holes (17) in bottom row will show on each side of adapter plate.

   b. Align guide pins with bottom row of adapter plate holes.
   c. Secure engine to rebuild stand with eight screws (18). Tighten screws to 35 lb-ft (47 Nm).
   d. Remove two guide pins and install remaining two screws (18). Tighten screws to 35 lb-ft (47 Nm).



REMOVAL

1. Install front lifting bracket (20) with four screws (19). Install rear lifting bracket (21) with two screws (22). Tighten screws to 55 lb-ft (75 Nm).



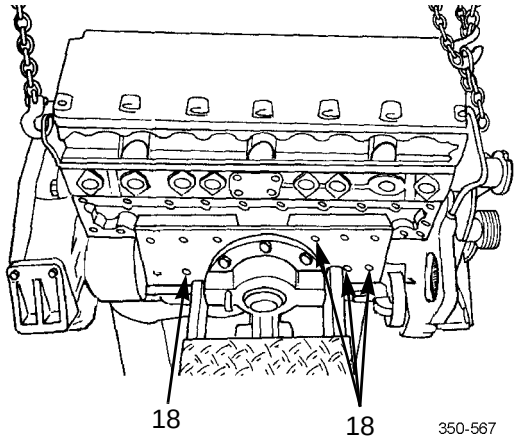
REMOVAL - CONTINUED



WARNING

Engine weighs 2,070 lb (940 kg). Lifting device must have sufficient capacity to lift engine. Failure to follow this warning may result in death or injury to personnel.

2. Attach lifting fixture to engine and remove ten screws (18) securing engine to rebuild stand.



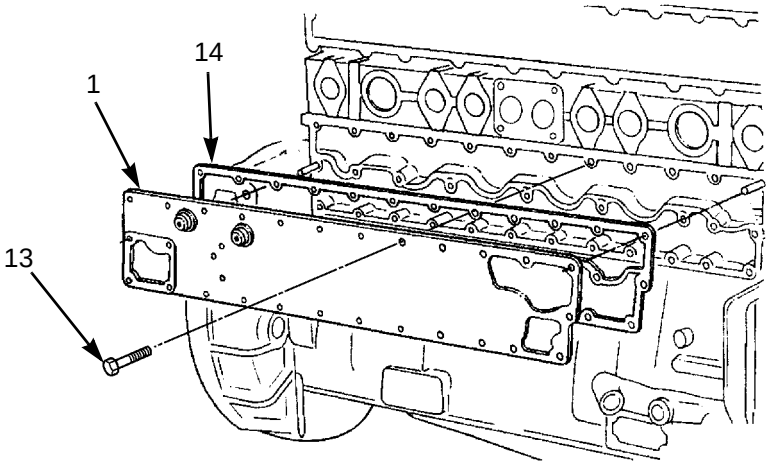
3. Place engine on support stand and disconnect lifting fixture.
4. Remove front lifting bracket and retain for future use.

NOTE

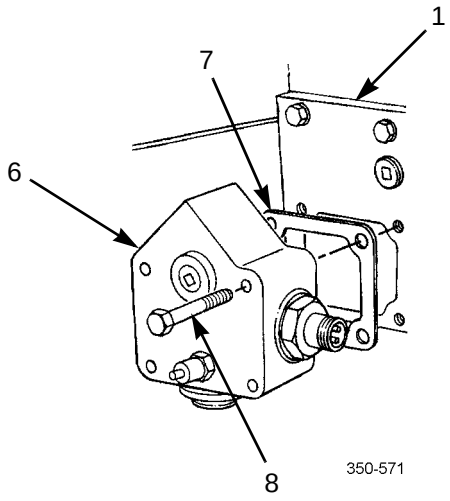
Ensure attaching hardware is used as was noted during installation on rebuild stand.

REMOVAL - CONTINUED

5. Install water header plate (1) with new gasket (14) and secure with 18 screws (13). Tighten screws to 15 lb-ft (20 Nm).



6. Position water heater housing (6) with new gasket (7) on water header plate (1). Install four screws (8) and tighten to 15 lb-ft (20 Nm).



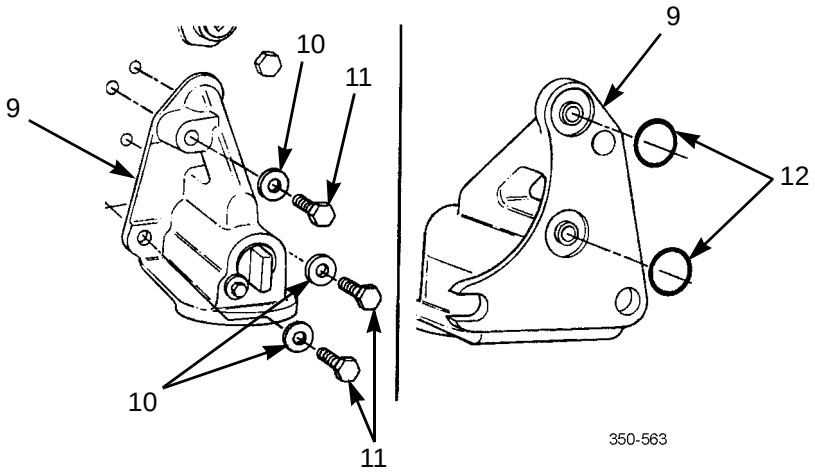
REMOVAL - CONTINUED

7. Apply lubricant to two new O-rings (12) and install on coolant filter head (9).

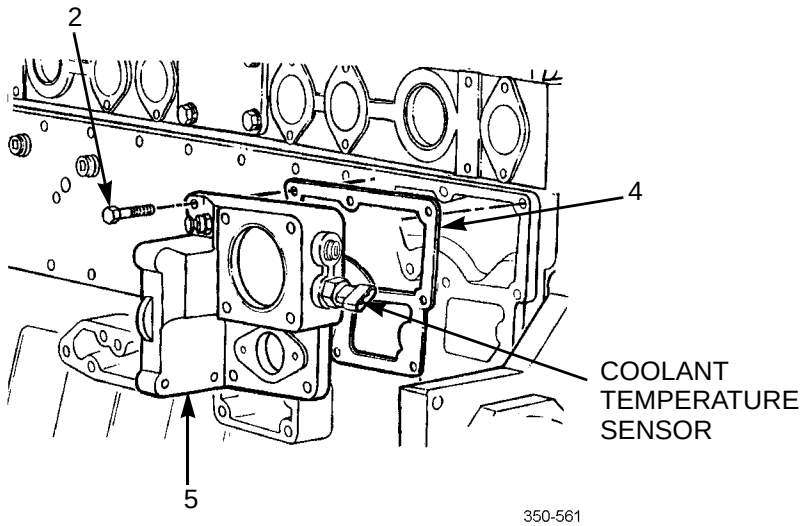
CAUTION

Ensure control valve on coolant filter head is in ON position. Possible engine damage may occur if valve is not in ON position.

8. Position coolant filter head (9) with new O-rings (12) on water header plate and install three washers (10) and screws (11). Tighten screws to 15 lb-ft (20 Nm).

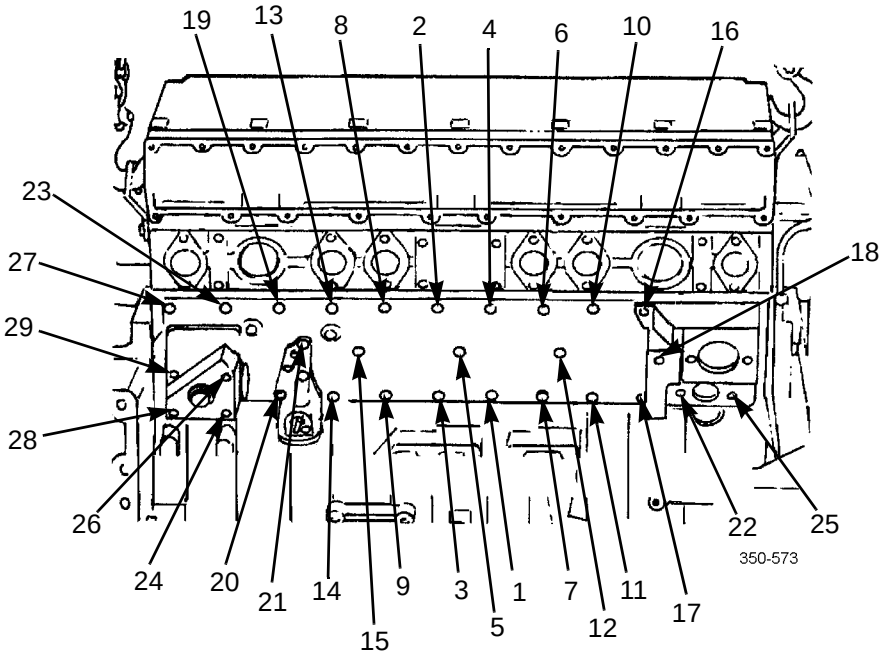


9. Position thermostat housing support (5) with new gasket (4) and install with four screws (2). Tighten screws to 15 lb-ft (20 Nm). Connect wiring harness to temperature sensor.



REMOVAL - CONTINUED

10. Tighten screws securing water header plate to 40 lb-ft (55 Nm) in sequence shown.



TIGHTENING SEQUENCE

11. Install engine oil cooler and oil filter head (WP 0209 00).
12. Install exhaust manifold (WP 0210 00).
13. Install intake manifold (WP 0211 00).
14. Install thermostat and thermostat housing (WP 0067 00).
15. Install water pump (WP 0068 00).
16. Install alternator (WP 0070 00).
17. Install alternator drive belt (WP 0071 00).
18. Install air ducts (WP 0058 00).
19. Install coolant filter (WP 0069 00).

END OF WORK PACKAGE

CYLINDER BLOCK REPAIR 0271 00

THIS WORK PACKAGE COVERS

Disassembly, Cleaning, Inspection, Assembly

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Driver (Item 28, WP 0289 00)

Driver, Expansion Plug (Item 29, WP 0289 00)

Driver, Expansion Plug (Item 30, WP 0289 00)

Extractor, Dowel Pin (Item 35, WP 0289 00)

Fixture, Engine Lifting (Item 37, WP 0289 00)

Gage, Depth, Dial Indicating (Item 40, WP 0289 00)

Gage, Master Ring (Item 42, WP 0289 00)

Guide (Item 51, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Inserter, Bearing and Bushing (Item 60, WP 0289 00)

Liner/Installation Tool (Item 71, WP 0289 00)

Plate, Adapter, Engine Stand (Item 80, WP 0289 00)

Puller, Cylinder Liner (Item 94, WP 0289 00)

Tools and Special Tools - Continued

Stand, Engine Rebuild (Item 116, WP 0289 00)

Stand, Engine Support (Item 117, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Abrasive Pad (Item 1, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Cup Plug (Item 32, WP 0290 00)

Wipes, Lint-Free (Item 42, WP 0290 00)

Kit, Cylinder Liner (P/N 3803703) (6)

Pin, Dowel (P/N 70550)

Pin, Dowel (P/N 142207) (2)

Pin, Dowel (P/N 3008446) (3)

Plug, Expansion (P/N 3007632) (9)

Plug, Expansion (P/N 3007635) (4)

Ring, Dowel (P/N 3026231) (3)

Equipment Condition

Engine mounted on rebuild stand (WP 0270 00)

Cylinder head removed (WP 0199 00)

Crankshaft removed (WP 0272 00)

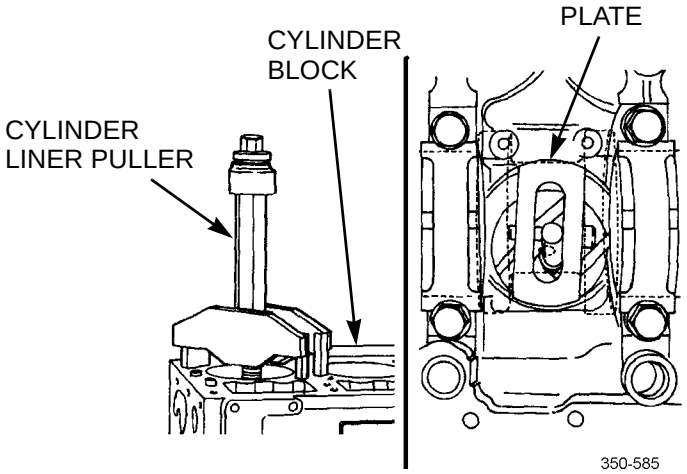
DISASSEMBLY

CAUTION

Cylinder liner puller must be installed and used as described to avoid damage to cylinder block. Puller plate must be parallel to main bearing saddles and must not overlap liner outside diameter.

DISASSEMBLY - CONTINUED

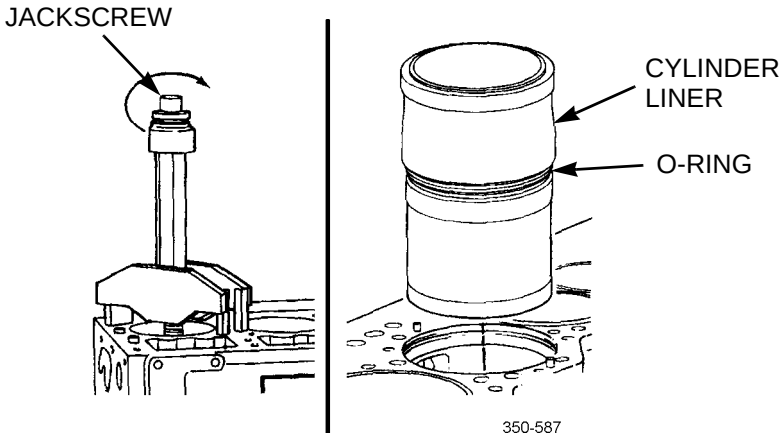
1. Install cylinder liner puller in top of cylinder block.



NOTE

Ensure liner puller is centered on top of cylinder liner being removed.

2. Turn puller jackscrew clockwise to loosen cylinder liner from cylinder block.
3. Use both hands to remove liner. Remove and discard O-ring.



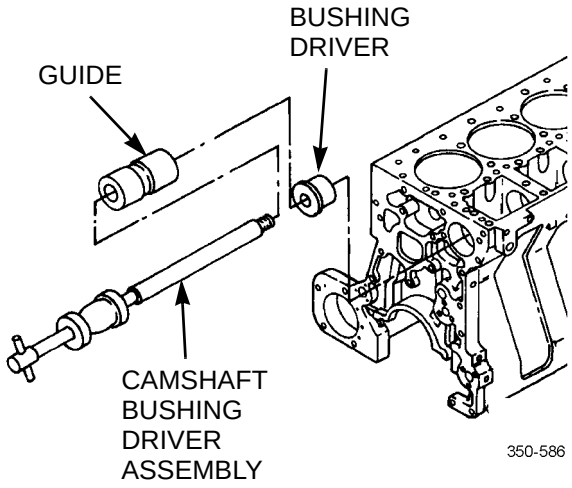
NOTE

Cylinder liners must be reinstalled in cylinder from which they were removed.

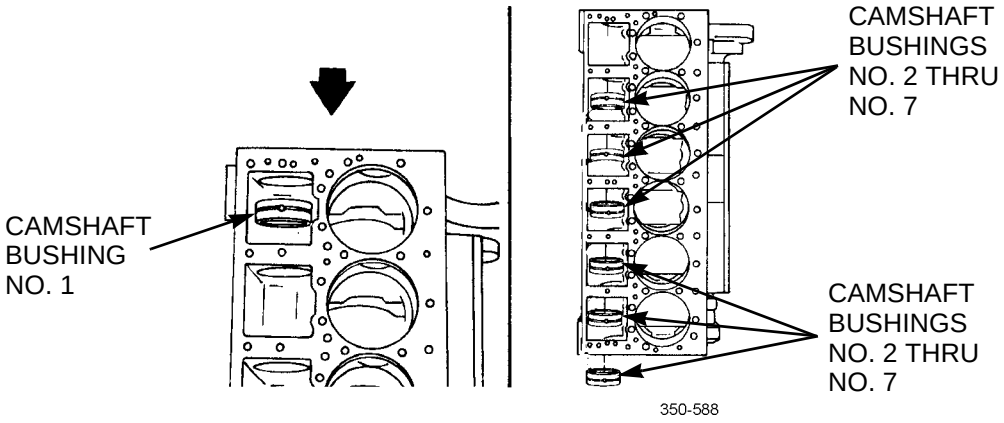
4. Mark cylinder liner with cylinder number and place orientation mark on camshaft side.
5. Perform steps 1 thru 4 for each liner to be removed.

DISASSEMBLY - CONTINUED

6. Camshaft bushings are removed from cylinder block as follows:
   a. Using camshaft bushing driver, driver assembly, and guide, remove camshaft bushing no. 1.

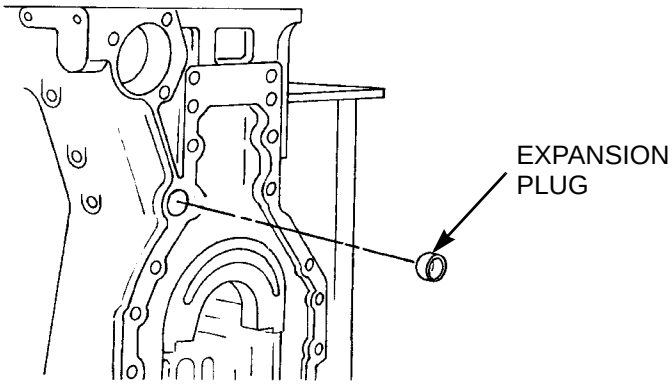


   b. Remove remaining camshaft bushings nos. 2 thru 7 in order.



DISASSEMBLY - CONTINUED

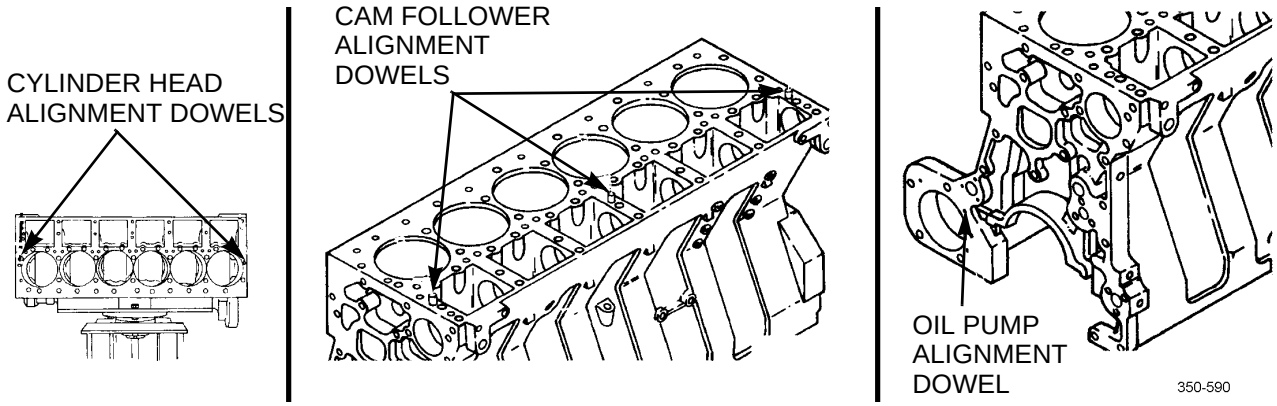
7. Remove and discard all expansion plugs.



NOTE

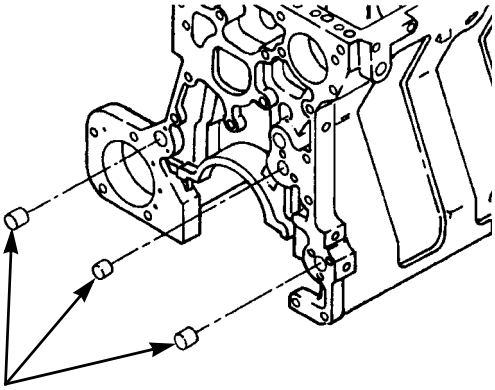
If guide dowels require replacement, perform the steps below to remove appropriate dowel pins or dowel rings.

8. If necessary, use dowel pin extractor and remove two cylinder head alignment dowels, three cam follower alignment dowel pins, and oil pump alignment dowel pin. Discard all removed dowel pins.



DISASSEMBLY - CONTINUED

9. If necessary, use universal puller and remove three idler gear ring dowels. Discard dowels.



CLEANING

CAUTION

DO NOT damage vehicle surfaces when using wire brush or gasket scraper to clean cylinder block surfaces.

NOTE

If rust or corrosion cannot be removed with abrasive pad or bristle brush, cylinder block MUST be cleaned with chemical bath.

1. Use abrasive pad or bristle brush and clean these cylinder block areas:
   a. Gasket surfaces
   b. Cylinder liner bores
   c. Cylinder liner counterbores
   d. Cylinder head deck
   e. Cup plug bores
   f. Main bearing saddles and caps
   g. Water passages

CLEANING - CONTINUED

NOTE

If cleaning with abrasive pad has not removed old gasket or sealant material, it may be necessary to steam clean cylinder block.

2. Remove cylinder block from rebuild stand and place in cleaning tank as follows:
   a. Install main bearing caps nos. 3 and 5.



WARNING

Cylinder block is heavy. Lifting device must have sufficient capacity to lift cylinder block. Failure to follow this warning may result in death or injury to personnel.

   b. Using lifting sling, remove cylinder block from rebuild stand and place in cleaning tank.





WARNING

- **When using steam cleaner, wear protective clothing and eye protection. Hot steam will cause serious burns.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

   c. Ensure all oil passages and oil drillings are clean and free of foreign material. If cylinder block is NOT to be used immediately, coat with oil and cover to prevent rust.
   d. Remove cylinder block from cleaning tank, steam clean, and dry with compressed air.
3. Clean cylinder liners as follows:





WARNING

- **When using steam cleaner, wear protective clothing and eye protection. Hot steam will cause serious burns.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

CAUTION

DO NOT use any abrasives in ring travel area of liner. Liner can be damaged.

   a. Remove scale and rust from liner using brush or abrasive pad.
   b. Lubricate inside of liner with clean engine oil and allow oil to soak in for 5 to 10 minutes.
   c. Wipe excess oil from inside liner with clean lint-free wipes.
   d. Continue to lubricate inside of liner and wipe clean until no gray or black residue shows on wipes.

INSPECTION

1. Visually inspect cylinder liners as follows:

NOTE

If the conditions in steps a thru d are found, replace liner.

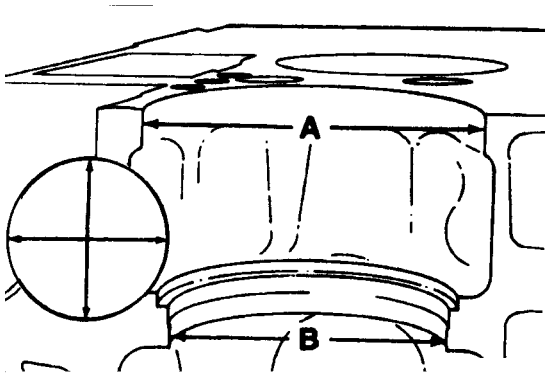
   a. Cracks on inside and outside diameters.
   b. Cracks under liner flange.
   c. Corrosion or pitting on outside diameter.
   d. Scuffing or scoring on inside diameter.
   e. Inspect inside diameter for vertical scratches. If fingernail catches in scratch, liner must be replaced.
   f. Inspect inside diameter for bore polishing. If a heavy polish is present over 20 percent of piston ring travel area, replace liner.

2. Visually inspect for cracks or damage in these areas of cylinder block:
   a. Cylinder head mounting surface.
   b. Upper liner bore.
   c. Liner counterbore.
   d. Lower liner bore.

NOTE

All measurements of cylinder block MUST be made when block is positioned on a flat surface. If block is mounted on engine stand, measurements can be wrong due to distortion. If any measurements are not as specified, cylinder block must be replaced.

3. Measure cylinder block upper liner bore inside diameter (ID). Measurement “A” must be 5.7441 to 5.7491 in. (145.900 to 146.027 mm).
4. Measure liner seal bore inside diameter 0.32 to 0.53 in. (8.0 to 13.5 mm) below counterbore. Measurement “B” must be 5.4355 to 5.4375 in. (138.063 to 138.113 mm).

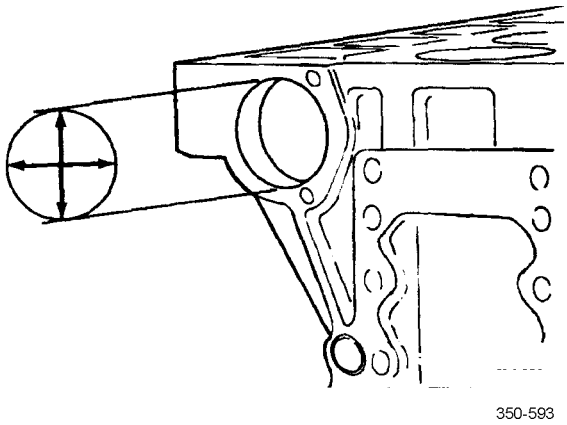


350-592

INSIDE DIAMETER, CYLINDER BLOCK UPPER LINER AND LINER SEAL BORE

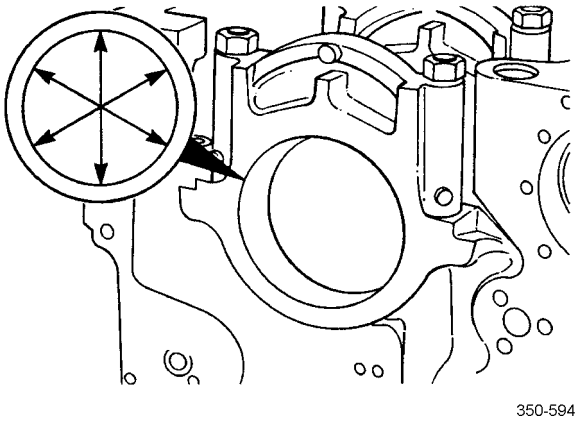
INSPECTION - CONTINUED

5. Measure camshaft bushing bore inside diameter. Measurement must be 3.0310 to 3.0331 in. (76.987 to 77.040 mm).



INSIDE DIAMETER, CAMSHAFT BUSHING BORE

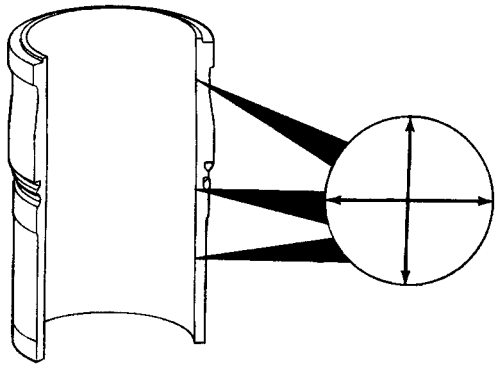
6. Measure main bearing bore inside diameter as follows:
   a. Position main bearing caps on cylinder block.
   b. Insert master ring gage in main bearing bore no. 1 and tighten screws in same steps as installation of crankshaft (WP 0272 00).
   c. Remove master ring and perform step b once for each remaining main bearing bore.
   d. Measure inside diameter in three places. Measurement must be 4.8028 to 4.8037 in. (121.990 to 122.015 mm).



INSIDE DIAMETER, MAIN BEARING BORE

INSPECTION - CONTINUED

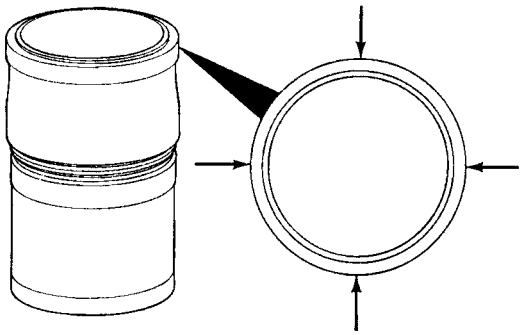
7. Measure cylinder liner inside diameter 90 degrees apart at top, middle, and bottom of piston travel. Measurement must be 4.9213 to 4.9250 in. (125.000 to 125.095 mm). If not as specified, replace liner.



350-595

INSIDE DIAMETER, CYLINDER LINER

8. Measure cylinder liner top press fit outside diameter. Measurement must be 5.7456 to 5.7471 in. (145.938 to 145.976 mm). If not as specified, replace liner.



350-596

OUTSIDE DIAMETER, CYLINDER LINER TOP PRESS FIT

ASSEMBLY

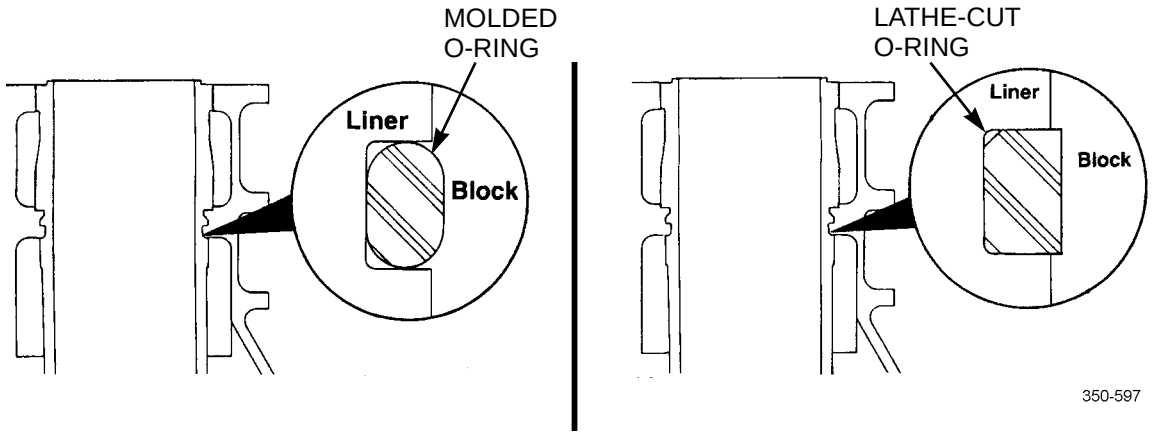
CAUTION

Cylinder liner O-rings are made by two different processes: molded or lathe-cut. Lathe-cut O-rings must be installed with straight side facing cylinder block.

NOTE

Ensure cylinder block is installed on rebuild stand for assembly.

1. Lubricate new O-ring with clean engine oil and install O-ring on cylinder liner as shown.



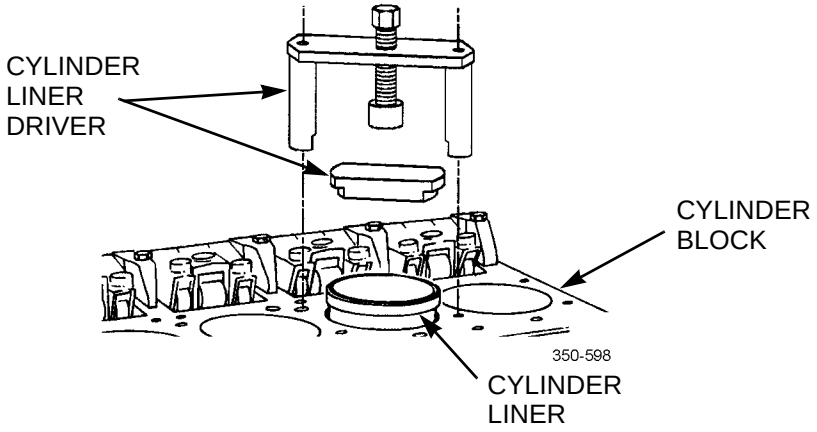
CAUTION

Liners must be installed within 30 seconds after being lubricated with oil. If liners are not installed within this time limit, O-ring will swell and be damaged when liner is installed.

NOTE

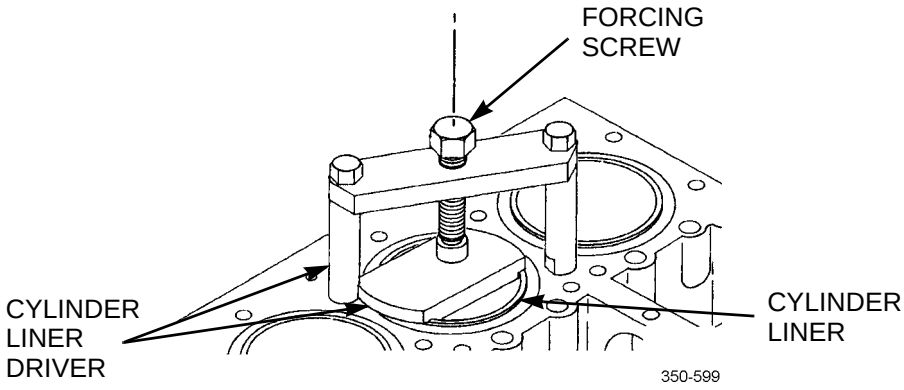
When acceptable reused liners are installed, rotate liner 90 degrees from original position in engine. Thrust and anti-thrust surfaces MUST face front and back of cylinder block.

2. Using cylinder liner driver and plastic-faced hammer, install cylinder liner into cylinder block bore.

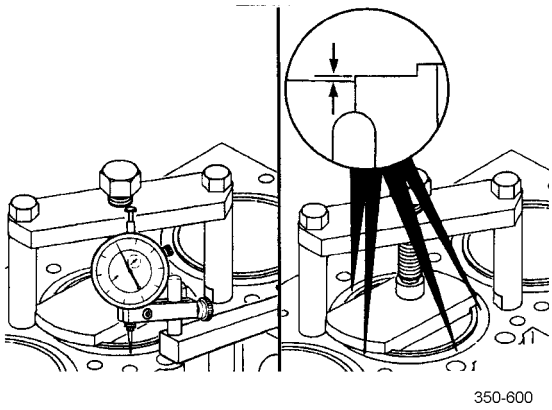


ASSEMBLY - CONTINUED

3. Cylinder liner protrusion MUST be checked for each replaced cylinder liner as follows:
   a. Install cylinder liner driver across liner and secure to cylinder. Tighten forcing screw to 100 lb-ft (136 Nm)



   b. Using dial indicating depth gage, measure liner protrusion at four points 90 degrees apart. Measurement must be 0.000 to 0.005 in. (0.00 to 0.13 mm). If measurement varies more than 0.0010 in. (0.025 mm) for each 180 degrees, replace liner.



CYLINDER LINER PROTRUSION

ASSEMBLY - CONTINUED

NOTE

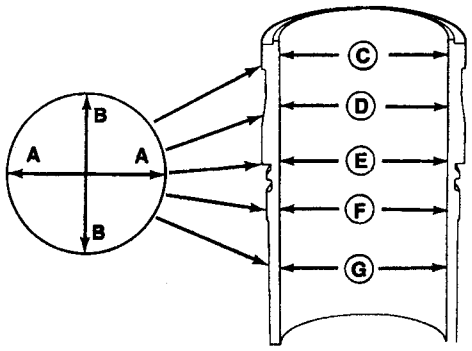
Each cylinder liner must be checked for out-of-roundness and cylinder liner-to-block clearance after being installed in cylinder block.

4. Measure cylinder liner out-of-roundness as follows:

   a. Measure cylinder liner at points “C”, “D”, “E”, “F”, and “G”.

   b. Measure each point in direction “AA” and “BB”.

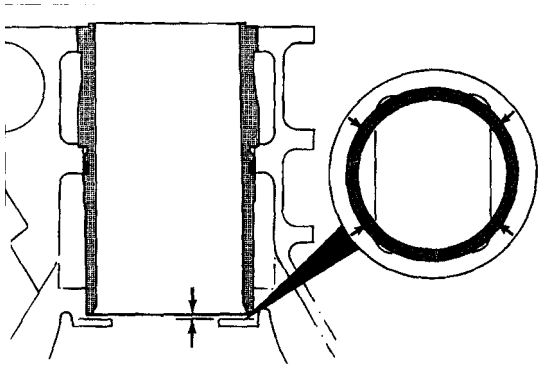
   c. Bore MUST NOT be more than 0.004 in. (0.10 mm) out-of-round.



350-601

CYLINDER LINER OUT-OF-ROUND

5. Using thickness gage, measure cylinder liner-to-block clearance. Measurement must be 0.10 in. (0.25 mm). If measurement is less than specified, remove and reinstall liner.



350-602

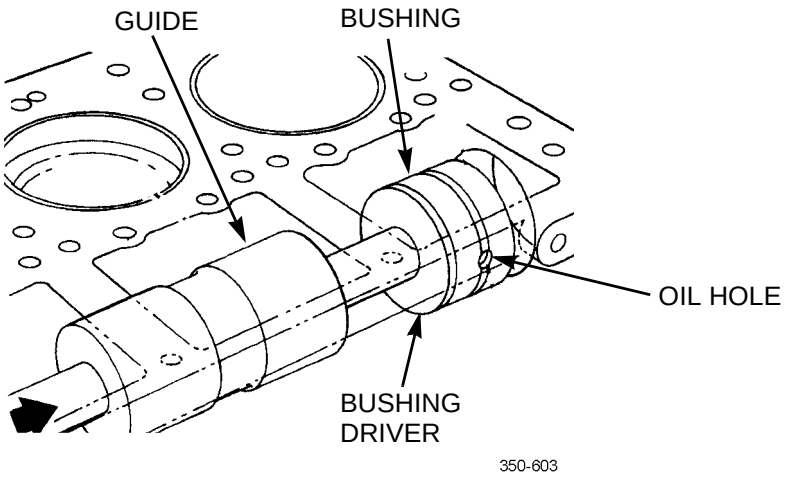
CYLINDER LINER-TO-BLOCK CLEARANCE

ASSEMBLY - CONTINUED

NOTE

- **Camshaft bushings are installed in the following order: 7, 6, 5, 4, 3, 2, and 1.**
- **Ensure oil hole in bushing is at 3 o'clock position as viewed from front of engine on installation.**

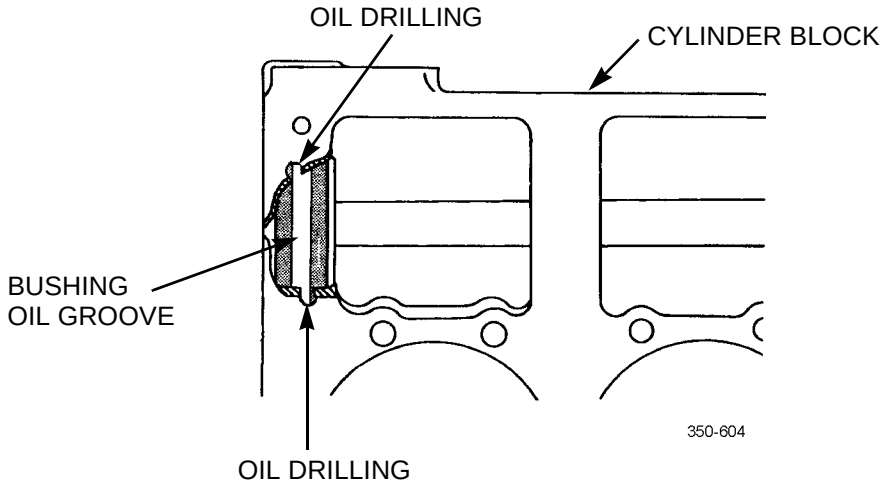
6. Install no. 7 camshaft bushing as follows:
   a. Install guide between no. 6 and no. 5 bores.
   b. Install bushing on driver with oil hole at 3 o'clock position as viewed from front of engine.
   c. Drive bushing in bore.



CAUTION

Bushing oil groove must be visible in both cylinder block oil drillings to prevent engine damage. Oil drillings are not aligned with each other.

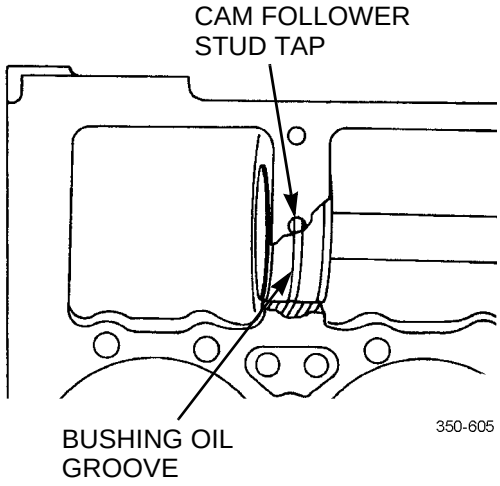
7. Visually inspect bushing oil groove alignment to ensure bushing is installed correctly.



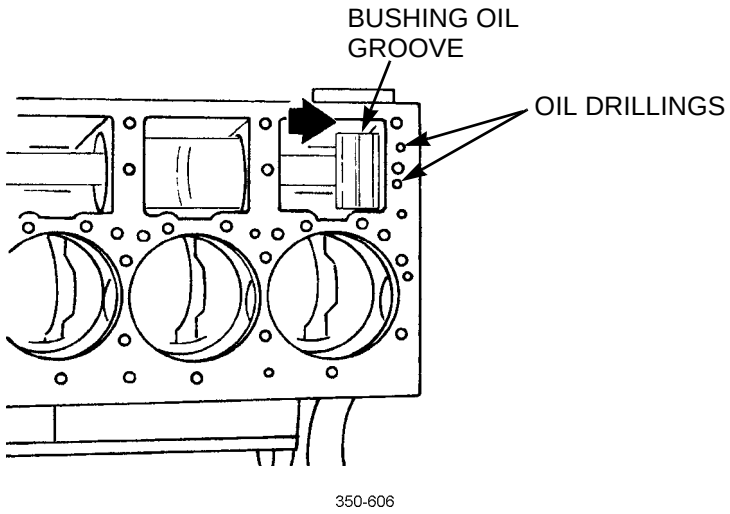
ASSEMBLY - CONTINUED

8. Install bushings in positions 6, 5, 4, 3, and 2 in same manner.

9. Look through cam follower stud taps for oil groove in camshaft bushing.



10. Follow procedures in step 6 to install no. 1 camshaft bushing.



11. Visually check for oil groove alignment. Oil groove must be visible through cylinder block oil drillings.

12. As necessary, apply sealant to new expansion plugs and, using expansion plug driver, install expansion plug.

13. Install crankshaft (WP 0272 00).

14. Install cylinder head (WP 0199 00).

END OF WORK PACKAGE

CRANKSHAFT REPLACEMENT 0272 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Inspection, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Plate, Adapter, Engine Stand (Item 80, WP 0289 00)

Puller Kit, Universal (Item 91, WP 0289 00)

Puller, Main Bearing Cap (Item 95, WP 0289 00)

Sling, Endless (Item 109, WP 0289 00)

Stand, Engine Rebuild (Item 116, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Lubriplate, Lubricant (Item 22, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Personnel Required

Two

Equipment Condition

Engine mounted on rebuild stand (WP 0270 00)

Flywheel housing removed (WP 0205 00)

Front gear housing removed (WP 0278 00)

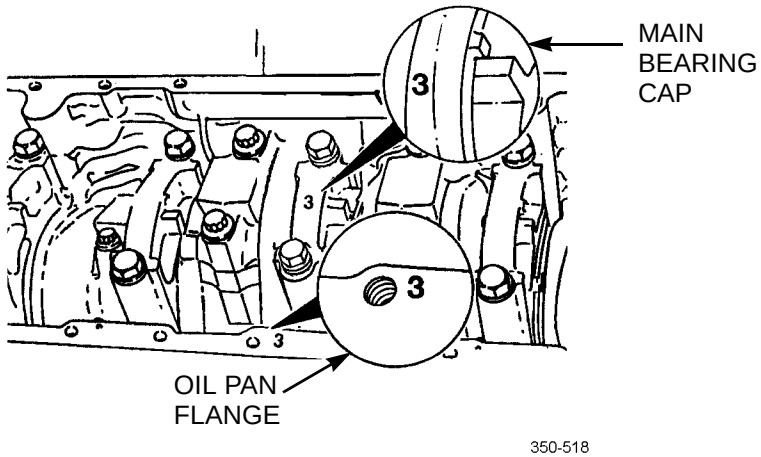
Pistons and connecting rods removed (WP 0273 00)

REMOVAL

NOTE

Position engine on stand with oil pan mounting flange facing up.

1. Verify stamped number on main bearing cap matches number stamped on oil pan flange. If not, stamp main bearing cap with number to match.



REMOVAL - CONTINUED

CAUTION

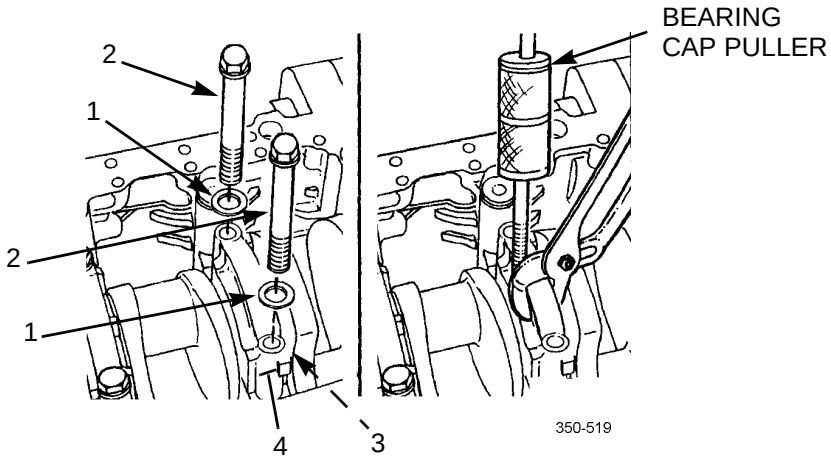
No. 4 main bearing cap is doweled to block. To avoid damage to cylinder block, DO NOT rock cap to remove.

2. Remove 14 main bearing capscrews (2) and washers (1).

NOTE

Main bearing cap puller must be centered on cap.

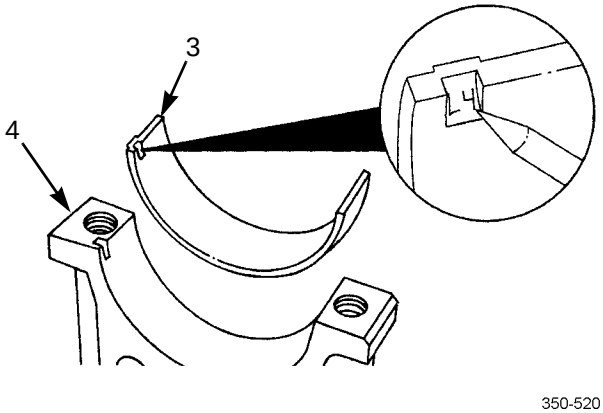
3. Remove seven main bearing caps (4) with lower bearing shells (3).



CAUTION

DO NOT mark main bearings on crankshaft mating surface. Possible damage to engine may occur if bearings are reused.

4. Remove seven lower bearing shells (3) from main bearing caps (4) and mark bearing for location as shown.

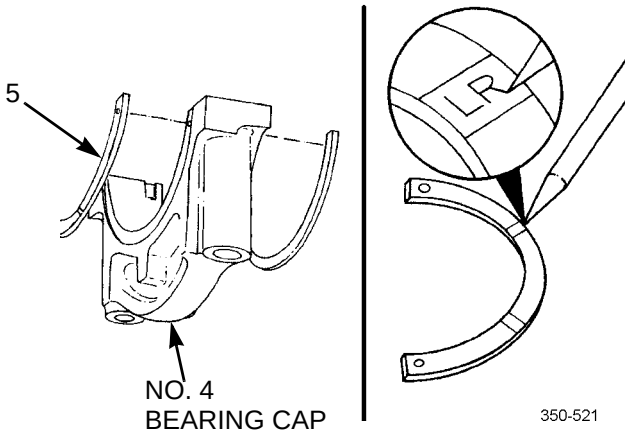


REMOVAL - CONTINUED

NOTE

No. 4 main bearing cap has four thrust bearings.

5. Remove and mark two lower thrust bearings (5) for location. Mark “L” for lower and “F” or “R” for front or rear.



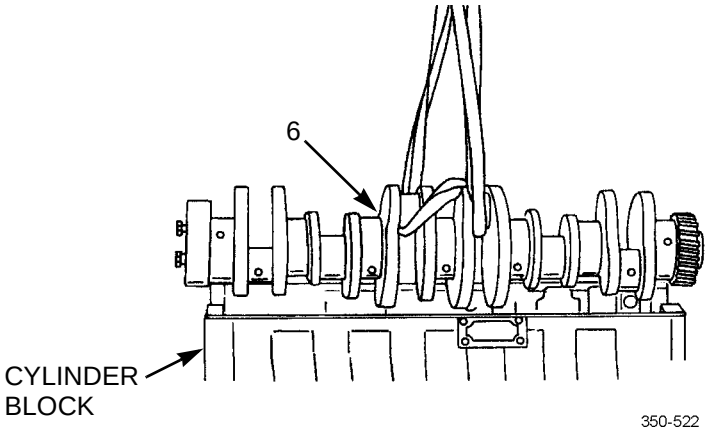
6. Remove and mark two upper thrust bearings (5) in same manner.



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during these procedures. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

7. Using lifting sling and assistance, remove crankshaft (6) from cylinder block and place on work surface.

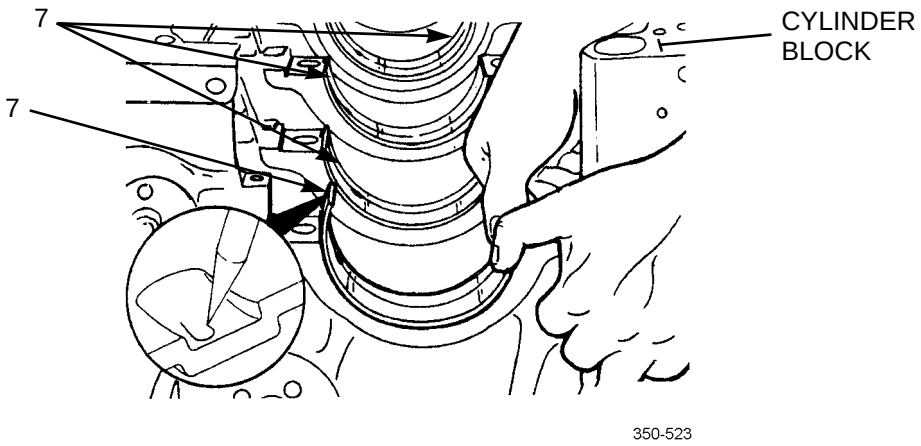


REMOVAL - CONTINUED

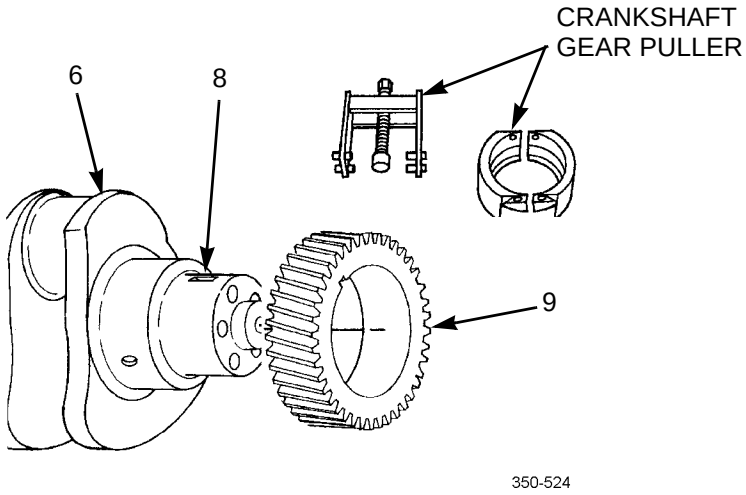
CAUTION

DO NOT mark main bearings on crankshaft mating surface. Possible damage to engine may occur if bearings are reused.

8. Remove seven upper main bearing shells (7) and mark for location.



9. Install gear puller and remove crankshaft gear (9).
10. Remove and retain crankshaft key (8).



CLEANING



- **When using steam cleaner, wear protective clothing and eye protection. Hot steam will cause serious burns.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

1. Steam clean crankshaft and dry with compressed air.
2. Clear out threaded holes for flywheel and vibration damper mounting in ends of crankshaft.
3. Clean crankshaft oil drilling passages of deposits.

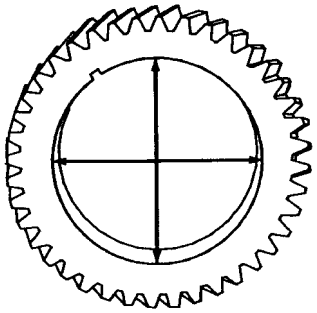


Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.

4. Clean crankshaft gear with solvent and dry with compressed air.
5. Clean main bearing caps, capscrews, and main bearings with solvent and dry with compressed air.
6. Apply clean engine oil to crankshaft and crankshaft gear to prevent rust.

INSPECTION

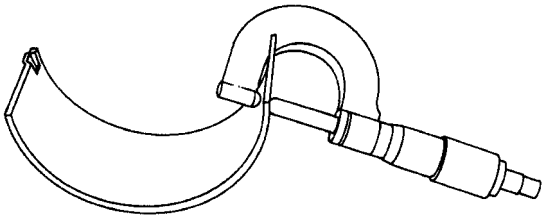
1. Visually inspect main bearing caps, capscrews, and washers for damage. If damaged, replace.
2. Visually inspect upper and lower main bearing shells for nicks, scratches, or damage. If damaged, replace.
3. Visually inspect crankshaft vehicle surfaces for scratches or nicks. If scratches or nicks can be felt with fingernail after polishing, replace crankshaft.
4. Visually inspect threaded holes in both ends of crankshaft for damage. If more than three holes are damaged in one end, replace crankshaft.
5. Visually inspect crankshaft gear for cracks, broken, or missing teeth. If damaged, replace gear.
6. Measure inside diameter of crankshaft gear bore. Measurement must be 3.3823 to 3.3833 in. (85.910 to 85.935 mm). If not as specified, replace crankshaft gear.



350-525

INSIDE DIAMETER, CRANKSHAFT GEAR BORE

7. Measure main bearing shell thickness. Measurement must be 0.1533 to 0.1553 in. (3.894 to 3.945 mm). If not as specified, replace bearing.

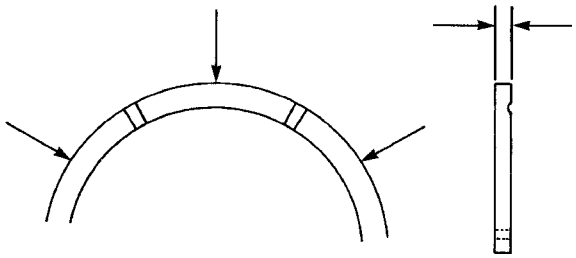


350-527

THICKNESS, MAIN BEARING SHELL

INSPECTION - CONTINUED

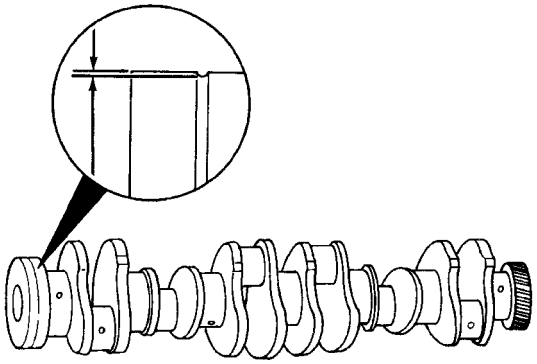
8. Measure thrust bearing thickness in three places. Measurement must be 0.1870 to 0.1925 in. (4.75 to 4.89 mm). If not as specified, replace thrust bearing.



350-526

THICKNESS, THRUST BEARING

9. Measure crankshaft as follows. If crankshaft is not within specifications, replace crankshaft.
   a. Measure front and rear oil seal wear groove. Measurement must be 0.0098 in. (0.25 mm).

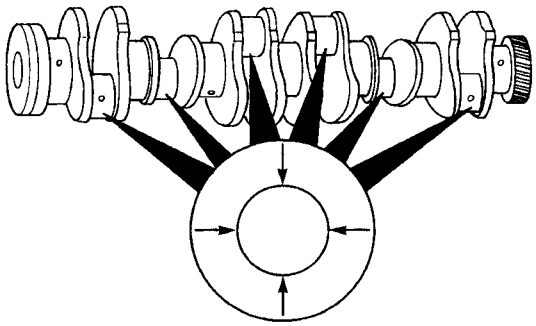


350-528

OIL SEAL WEAR GROOVE

INSPECTION - CONTINUED

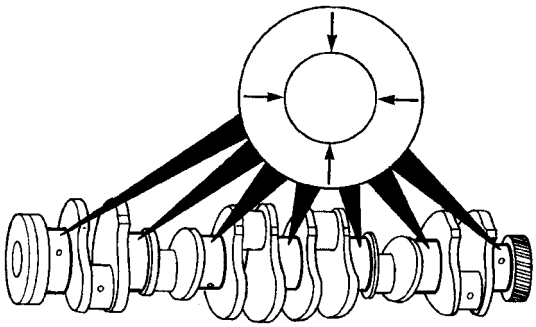
b. Measure connecting rod journals outside diameter. Measurement must be 3.1083 to 3.1107 in. (78.950 to 79.013 mm).



350-529

OUTSIDE DIAMETER, CONNECTING ROD JOURNALS

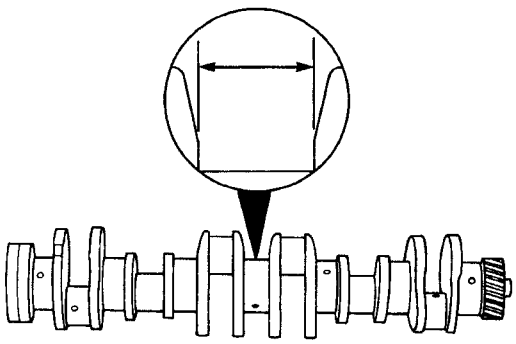
c. Measure main bearing journals outside diameter. Measurement must be 4.4888 to 4.4903 in. (114.015 to 114.055 mm).



350-530

OUTSIDE DIAMETER, MAIN BEARING JOURNALS

d. Measure thrust face width. Measurement must be 1.9675 to 1.9724 in. (49.975 to 50.100 mm).

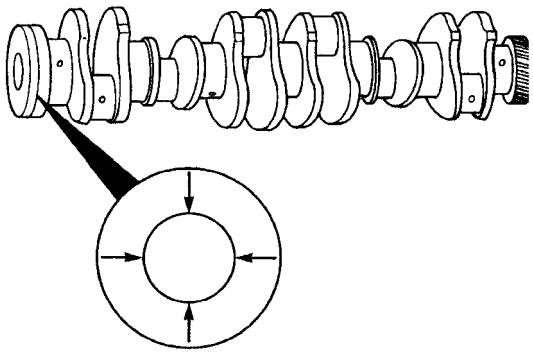


350-531

WIDTH, THRUST FACE

INSPECTION - CONTINUED

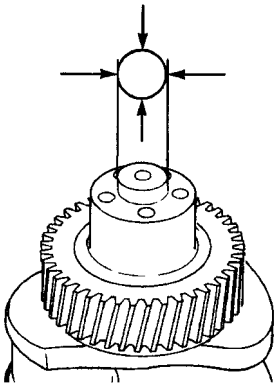
e. Measure crankshaft rear oil seal flange outside diameter. Measurement must be 6.4947 to 6.4974 in. (164.965 to 165.035 mm).



350-532

OUTSIDE DIAMETER, REAR OIL SEAL FLANGE

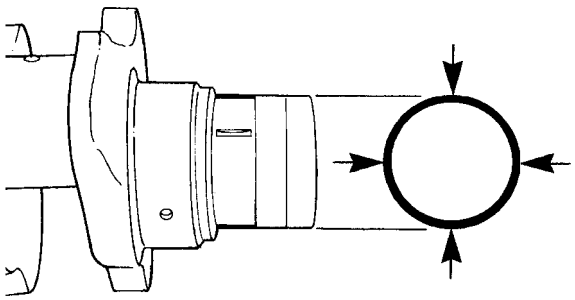
f. Measure damper pilot outside diameter. Measurement must be 1.2602 to 1.2614 in. (32.01 to 32.04 mm).



350-533

OUTSIDE DIAMETER, DAMPER PILOT

g. Measure crankshaft gear journal outside diameter. Measurement must be 3.3848 to 3.3858 in. (85.975 to 86.000 mm).



350-542

OUTSIDE DIAMETER, CRANKSHAFT GEAR JOURNAL

INSTALLATION

1. Using a plastic-faced hammer, install crankshaft key (8) in crankshaft keyway.



WARNING

Use protective clothing when handling heated or hot components. Failure to do so will cause serious burns.

CAUTION

DO NOT exceed specified heating time or temperature when heating crankshaft gear. Damage may be done to gear and teeth.

2. Heat crankshaft gear (9) to 350°F (177°C) for a minimum of 1.5 hours, but NOT more than 6 hours.
3. Apply a coating of lubriplate to crankshaft gear journal.

CAUTION

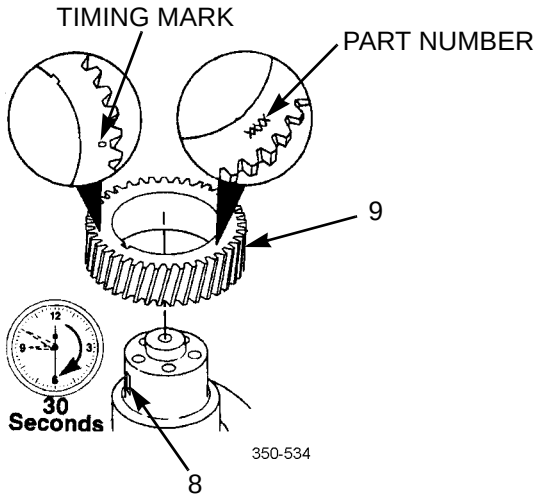
Ensure timing mark and part number on crankshaft gear face away from crankshaft when installed. Failure to orient gear prior to installation can result in damage to engine.

4. Orient crankshaft gear (9) with timing mark and part number facing away from crankshaft.

CAUTION

DO NOT use water or oil to reduce cooling time. Gear may crack. Allow gear to air cool.

5. Align crankshaft gear keyway with crankshaft key (8) and install gear within 30 seconds. Allow gear to cool.

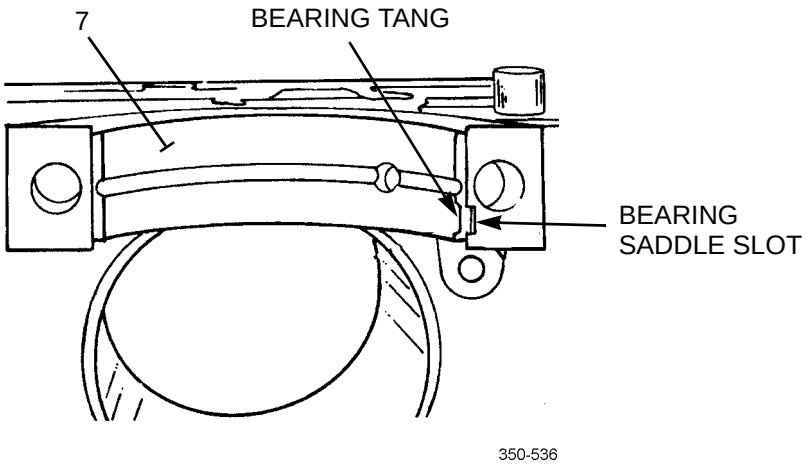


INSTALLATION - CONTINUED

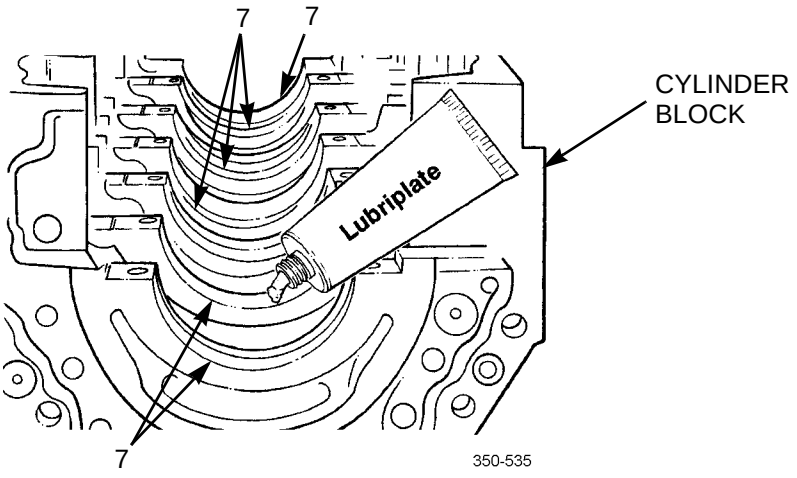
CAUTION

- **Bearing shells are marked with words upper and lower. Each must be installed in correct location as marked during removal to prevent possible engine damage.**
- **Tang of bearing shell must be in slot of bearing saddle to correctly position bearing and prevent engine damage.**

6. Install seven upper main bearing shells (7) in saddles on cylinder block.



7. Apply lubriplate to crankshaft mating surface of upper main bearing shells (7).



INSTALLATION - CONTINUED

8. Install lifting sling on crankshaft (6) nos. 3 and 4 rod bearing journals.



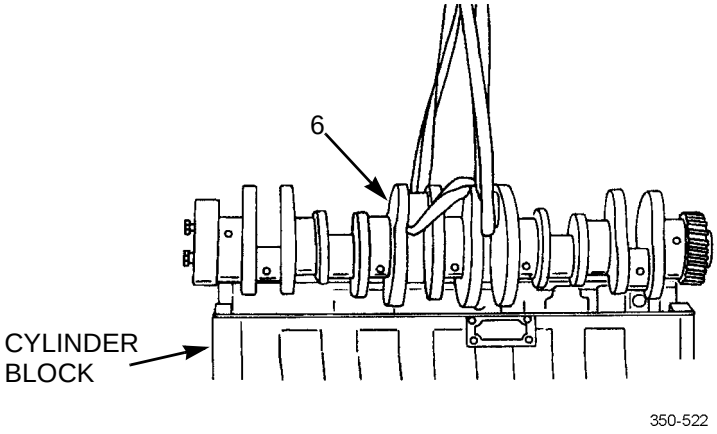
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during these procedures. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

NOTE

Ensure upper main bearing shells do not move when installing crankshaft.

9. With assistance, lift crankshaft (6) and install in cylinder block.

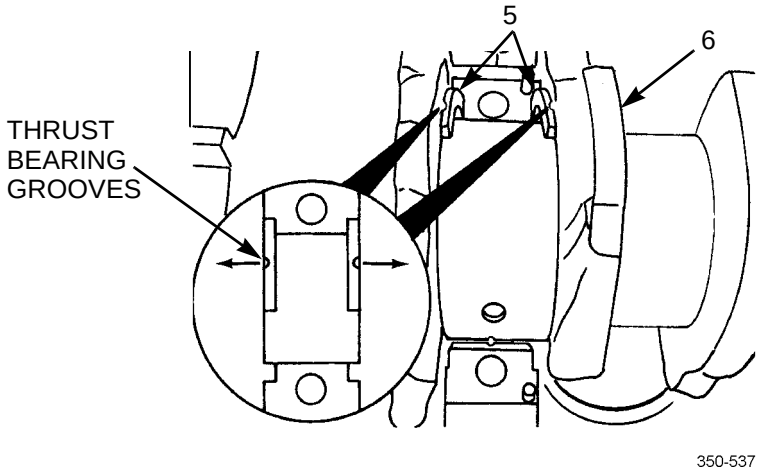


INSTALLATION - CONTINUED

NOTE

Thrust bearings must be installed with grooves facing crankshaft.

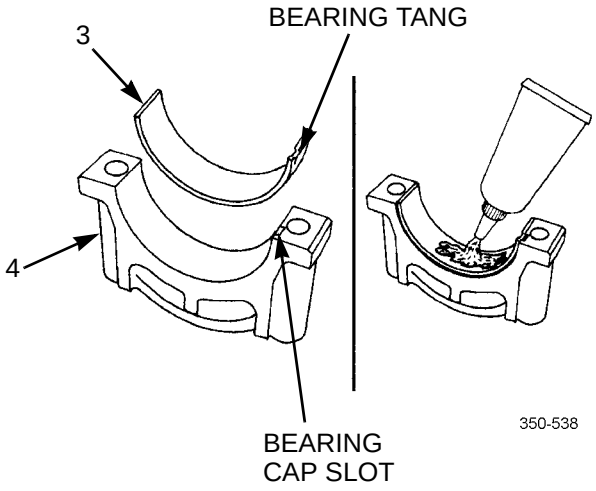
10. Apply lubriplate to two upper thrust bearings (5) and install in no. 4 main bearing saddle as follows:
    a. Push crankshaft (6) toward rear of engine and install rear thrust bearing.
    b. Push crankshaft (6) toward front of engine and install front thrust bearing.



NOTE

Ensure lower main bearing shells, if reused, are installed in same main bearing caps from which they were removed.

11. Install seven lower main bearing shells (3) with bearing tang in slot of main bearing cap (4). Apply lubriplate to bearing crankshaft mating surface.



INSTALLATION - CONTINUED

NOTE

Thrust bearings must be installed with grooves facing crankshaft.

12. Apply lubriplate to two lower thrust bearings (5) and install in no. 4 main bearing cap (4).

NOTE

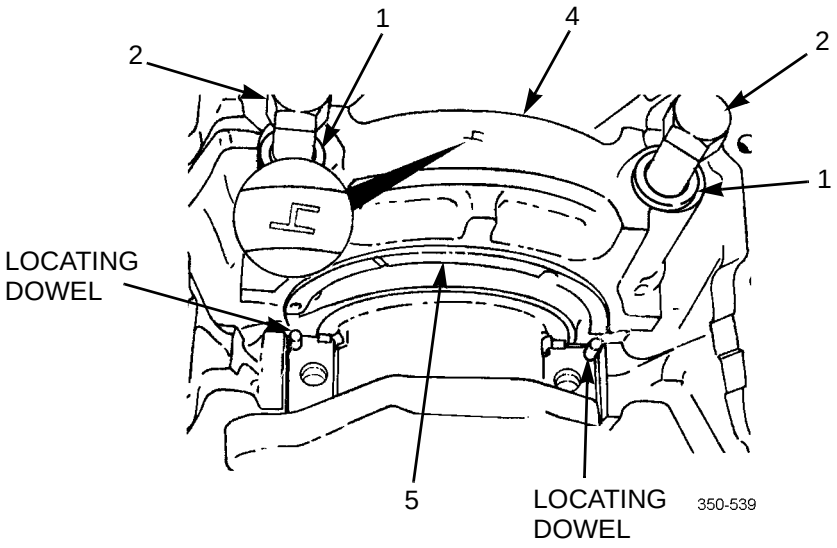
Ensure main bearing caps are installed on journal with stamped number of cap matching number on oil pan flange.

13. Apply clean engine oil to main bearing capscrews and washers and allow excess oil to drain off. Install main bearing caps nos. 1, 2, 3, 5, 6, and 7 with washers and capscrews. Hand tighten capscrews.

CAUTION

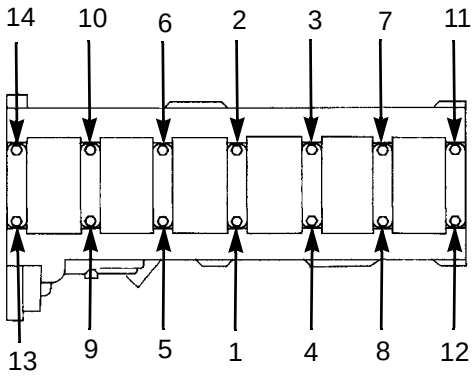
No. 4 main bearing cap is doweled and must be positioned to match locating dowels in cylinder block saddle. If main bearing cap and dowels are not aligned, cylinder block and main bearing cap will be damaged when screws are tightened.

14. Install no. 4 main bearing cap (4) with capscrews (2) and washers (1). Hand tighten capscrews.



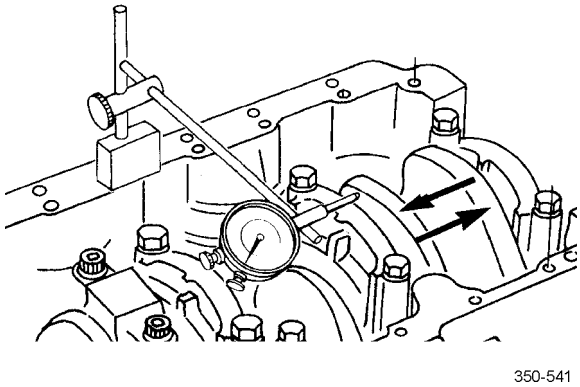
15. Tighten main bearing capscrews in this manner and in sequence shown:
    a. Tighten capscrews to 50 lb-ft (68 Nm).
    b. Tighten capscrews to 105 lb-ft (142 Nm).
    c. Tighten to 155 lb-ft (210 Nm).
    d. Loosen capscrews completely.
    e. Tighten to 50 lb-ft (68 Nm).
    f. Tighten to 105 lb-ft (142 Nm).
    g. Tighten to 155 lb-ft (210 Nm).

INSTALLATION - CONTINUED



TIGHTENING SEQUENCE

16. Turn crankshaft by hand. If crankshaft does not turn freely, loosen main bearing capscrews one at a time to locate tight bearing and replace if necessary.
17. Use dial indicator to measure crankshaft end clearance. Measurement must be 0.004 to 0.022 in. (0.10 to 0.56 mm). If not as specified, replace thrust washers.



CRANKSHAFT END CLEARANCE

18. Install pistons and connecting rods (WP 0273 00).
19. Install flywheel housing (WP 0205 00).
20. Install front gear housing (WP 0278 00).

END OF WORK PACKAGE

PISTON AND CONNECTING ROD MAINTENANCE 0273 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning, Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Micrometer, Inside (Item 17, WP 0289 00)

Caliper, Micrometer, Outside (Item 18, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Compressor, Piston Ring (Item 22, WP 0289 00)

Expander, Piston Ring (Item 33, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Pins, Guide, Connecting Rod (Item 79, WP 0289 00)

Plate, Adapter, Engine Stand (Item 80, WP 0289 00)

Pliers, Retaining Ring (Item 83, WP 0289 00)

Stand, Engine Rebuild (Item 116, WP 0289 00)

Tools and Special Tools - Continued

Wrench, Torque (Item 144, WP 0289 00)

Wrench, Torque (Item 145, WP 0289 00)

Materials/Parts

Abrasive Pad (Item 1, WP 0290 00)

Detergent (Item 15, WP 0290 00)

Lubriplate, Lubricant (Item 22, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Piston Kit, Engine (P/N 3800470) (6)

Equipment Condition

Engine mounted on rebuild stand (WP 0270 00)

Oil pan removed (WP 0208 00)

Cylinder head removed (WP 0199 00)

Cam follower assembly removed (WP 0275 00)

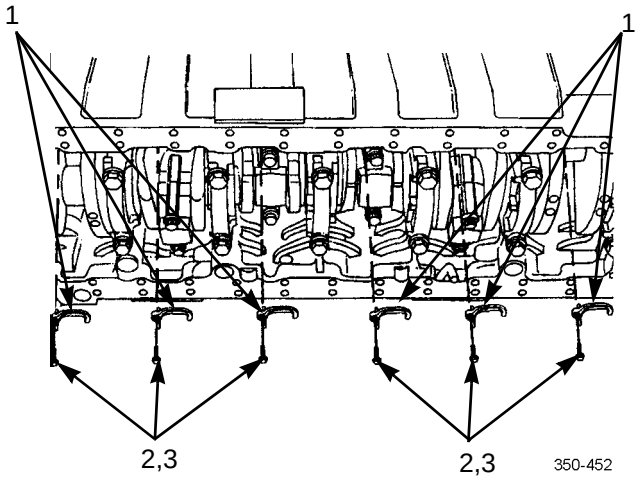
REMOVAL

NOTE

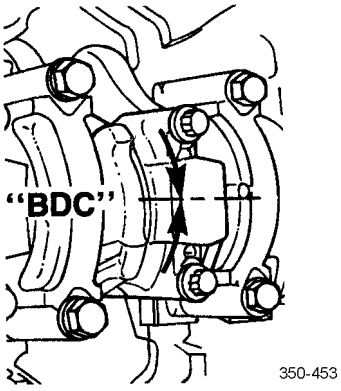
- **Piston cooling nozzle MUST be removed prior to removing piston and connecting rod assembly. All cooling nozzles are removed and installed in the same manner.**
- **Crankshaft MUST be rotated to allow access to each piston cooling nozzle. Bar engine over using accessory drive for cooling nozzle access.**

REMOVAL - CONTINUED

1. Remove piston cooling nozzle (1) as follows:
   a. Remove screw (2) and washer (3) securing cooling nozzle (1).
   b. Remove cooling nozzle (1). Retain for installation.
   c. Rotate crankshaft to access next cooling nozzle for removal.
   d. Repeat steps a thru c to remove remaining cooling nozzles.



2. Using accessory drive, bar engine over to position piston at bottom dead center (BDC).



BOTTOM DEAD CENTER POSITION

CAUTION

DO NOT use emery cloth or sandpaper to remove carbon from cylinder liners or cylinder block top deck surface. Aluminum oxide or silicon particles from emery cloth or sandpaper can cause serious engine damage.

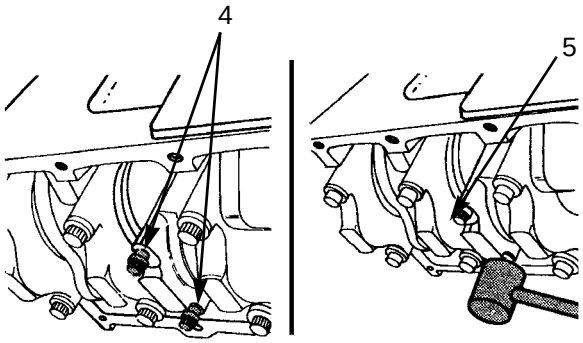
3. Using 1, clean carbon ridge from cylinder liner, above ring travel area, in cylinder liner of piston being removed.

REMOVAL - CONTINUED

NOTE

DO NOT remove connecting rod capscrews until caps have been loosened.

4. Loosen connecting rod capscrews (4) and tap heads of screws with plastic-faced hammer to loosen connecting rod cap (5) from dowel rings.



350-454

NOTE

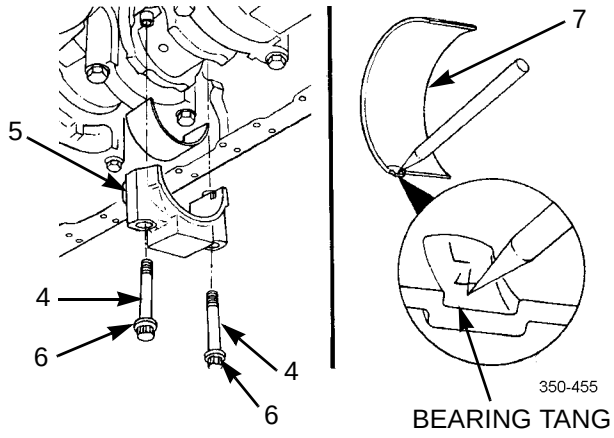
DO NOT drop bottom bearing when cap is removed.

5. Remove two capscrews (4) with captive washers (6) and connecting rod cap (5) with lower bearing (7).

CAUTION

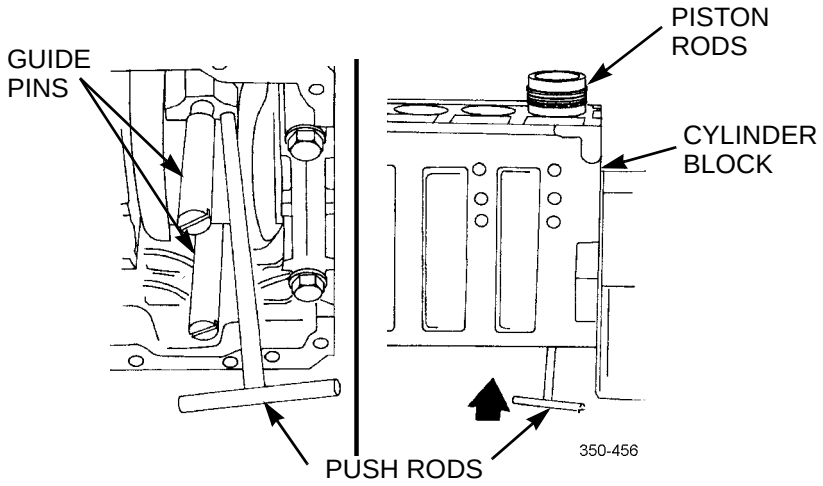
DO NOT mark bearing on crankshaft mating surface. Damage to engine can occur if bearings are reinstalled.

6. Mark cylinder number and letter “L” in flat surface of lower bearing (7) tang and connecting rod cap (5).



REMOVAL - CONTINUED

7. Install two connecting rod guide pins in connecting rod screw holes.
8. Using a nonmetallic push rod or hammer handle, push connecting rod away from crankshaft.
9. Push connecting rod until piston rings are outside cylinder block.
10. Using both hands, remove piston and connecting rod assembly from engine.

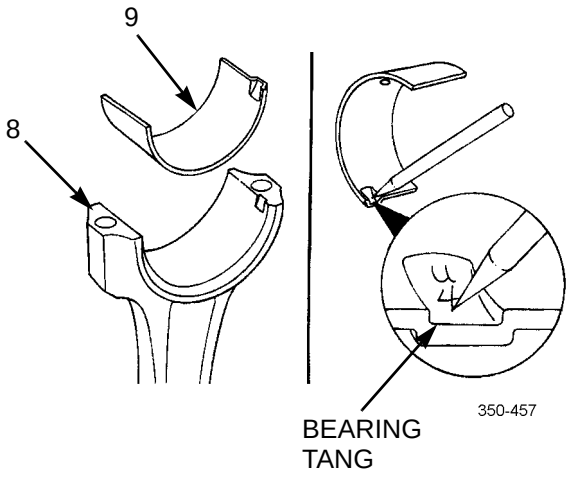


11. Remove upper bearing (9) from connecting rod (8).

CAUTION

DO NOT mark bearing on crankshaft mating surface. Damage to engine can occur if bearings are reinstalled.

12. Mark cylinder number and letter “U” in flat surface of upper bearing (9) tang.

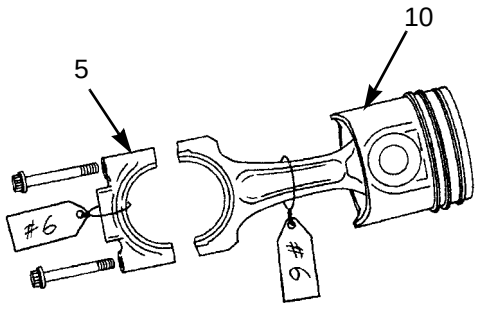


REMOVAL - CONTINUED

CAUTION

Piston, connecting rod, and connecting rod cap are matched sets to cylinder from which they were removed. Ensure they are tagged for identification with cylinder number and placed in a storage container or in a location to protect them from damage.

13. Tag piston and connecting rod assembly (10) and matching connecting rod cap (5) for cylinder location. Place in temporary storage container.



350-458

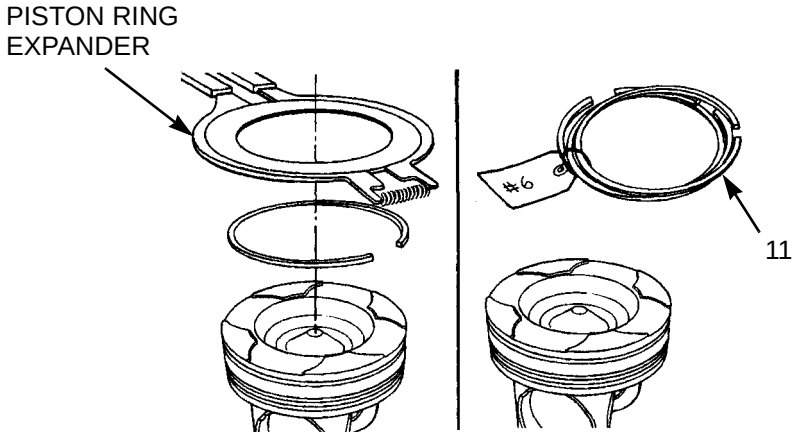
14. Repeat steps 2 thru 13 to remove each remaining piston and connecting rod assembly.

DISASSEMBLY

NOTE

- **Ensure all component parts are tagged with cylinder number from which they were removed.**
- **Perform steps 1 thru 4 to disassemble each piston and connecting rod assembly.**

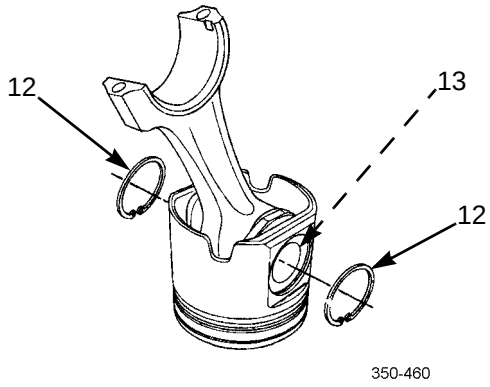
1. Using piston ring expander, remove and tag three piston rings (11).



350-459

DISASSEMBLY - CONTINUED

2. Remove two retaining rings (12) securing piston pin (13) in place. Discard retaining rings.



CAUTION

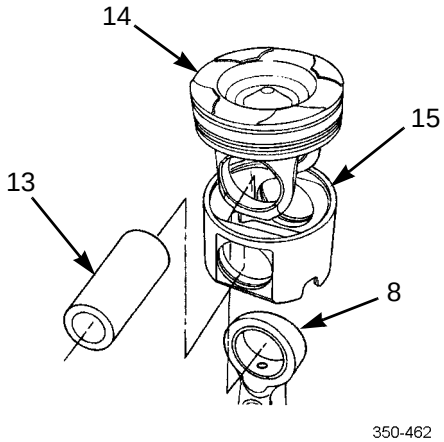
DO NOT use hammer to remove piston pin. Piston can distort, causing it to seize in cylinder.

3. If piston pin is not easily removed:
   a. Heat container of water to 212°F (100°C).
   b. Insert piston and connecting rod assembly in container for 15 minutes.
   c. Use wood dowel stock to push piston pin from piston assembly.

NOTE

When piston pin is removed from articulated piston, skirt and crown will separate.

4. Tag piston pin (13), connecting rod (8), skirt (15), and crown (14) with cylinder number from which they were removed.



CLEANING




WARNING




Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200ºF (94ºC). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.

1. Soak pistons in solvent for a minimum of 30 minutes.
2. Remove carbon deposits with hot, soapy solution and nonmetallic brush.
3. Use solvent to clean connecting rods.



WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.

4. Dry all components with compressed air.

INSPECTION

1. Visually inspect connecting rod, connecting rod cap, and screws as follows:
   a. Inspect connecting rod for damage. If "I-beam" is nicked or damaged, replace connecting rod.
   b. Inspect connecting rod pin bore bushing for damage. If damaged, replace bushing.
   c. Inspect connecting rod cap for damage. If damaged, replace cap.
   d. Inspect capscrews for damaged threads. If damaged, replace capscrews.

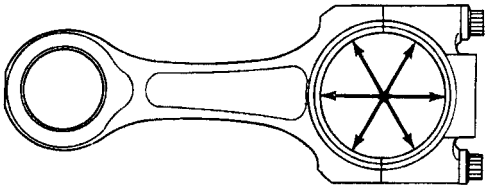
NOTE

Connecting rod cap and connecting rod are matched with a stamped number. When assembling connecting rod caps to connecting rods, stamped numbers MUST match and be on the same side.

2. Install connecting rod cap on connecting rod and secure with two capscrews with captive washers. Tighten as follows:
   a. Tighten capscrews to 50 lb-ft (68 Nm).
   b. Tighten to 105 lb-ft (142 Nm).
   c. Tighten to 155 lb-ft (210 Nm).
   d. Loosen capscrews completely.
   e. Repeat steps a thru c.

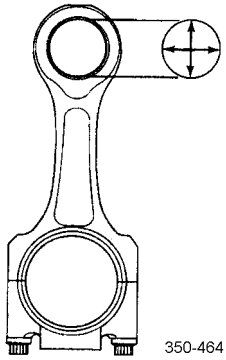
INSPECTION - CONTINUED

3. Measure connecting rod crankshaft bore inside diameter in three places as shown. Measurement should be 3.3061 to 3.3080 in. (83.975 to 84.025 mm). If measurement is not within specification, replace connecting rod, connecting rod cap, and capscrews.



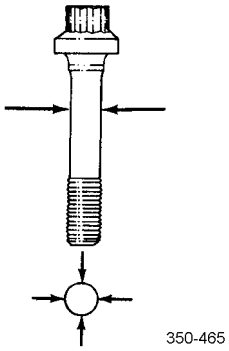
INSIDE DIAMETER, CONNECTING ROD CRANKSHAFT BORE

4. Measure piston pin bushing inside diameter in two places as shown. Measurement should be 2.1281 to 2.1299 in. (54.054 to 54.099 mm). If measurement is not within specification, replace connecting rod, connecting rod cap, and capscrews.



INSIDE DIAMETER, PISTON PIN BUSHING BORE

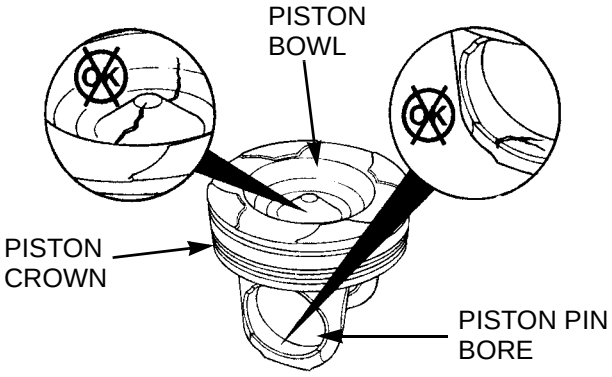
5. Remove two capscrews and measure outside diameter in two places as shown. Measurement should be 0.496 to 0.504 in. (12.60 to 12.80 mm). If measurement is not within specification, replace capscrews.



OUTSIDE DIAMETER, CONNECTING ROD CAPSCREWS

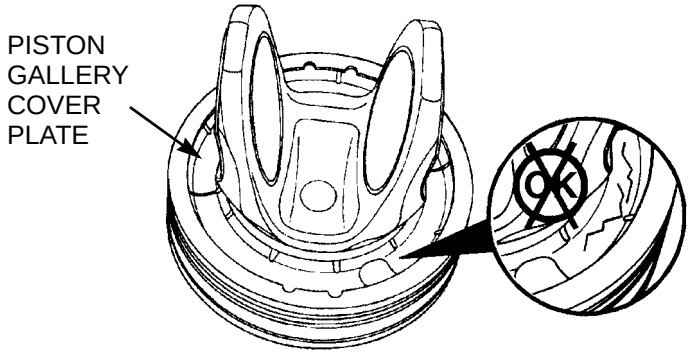
INSPECTION - CONTINUED

6. Visually inspect piston bowl and piston crown pin bore for cracks or damage. If noted, replace piston crown.



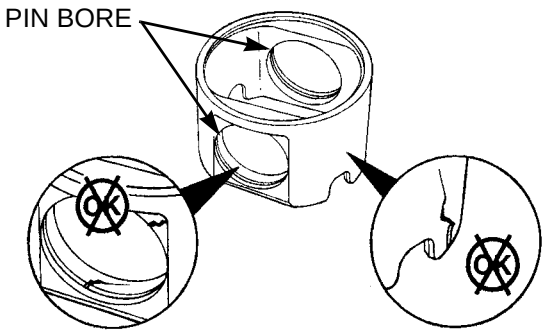
350-466

7. Inspect piston gallery cover plate for cracks or looseness. If noted, replace piston crown.



350-467

8. Visually inspect piston skirt pin bore and sides for cracks or damage. If noted, replace piston skirt.

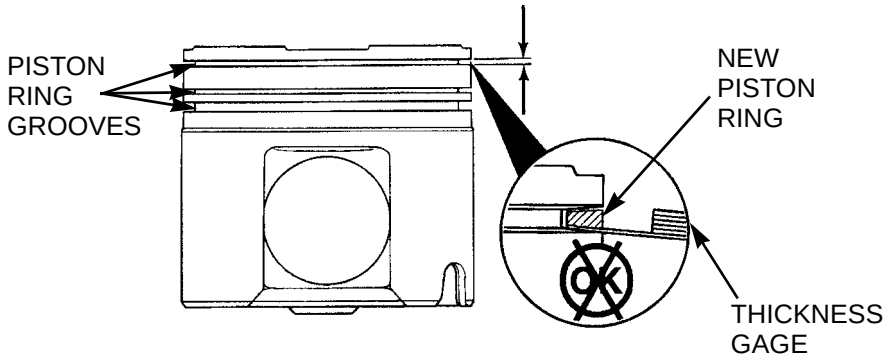


PISTON SKIRT

350-468

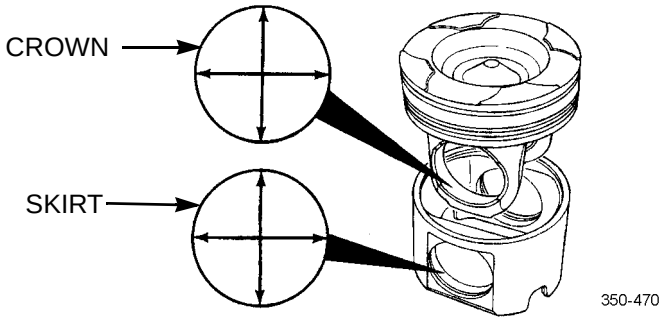
INSPECTION - CONTINUED

9. Using new piston ring and thickness gage, inspect piston ring grooves for wear as follows:
   a. Hold new piston ring in ring groove.
   b. Insert 0.006 in. (0.15 mm) thickness gage into ring groove. If thickness gage enters without resistance, there is too much wear. Replace piston.



PISTON CROWN 350-469

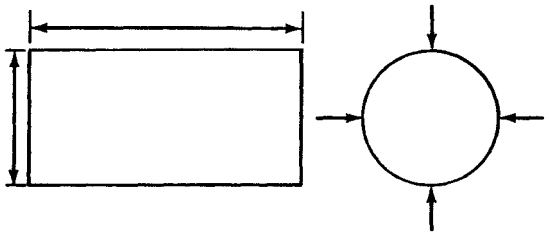
10. Measure piston pin bore inside diameter in both crown and skirt as shown. Measurement for crown should be 2.1276 to 2.1281 in. (54.040 to 54.055 mm) and for skirt 2.1263 to 2.1266 in. (54.007 to 54.015 mm). If measurement is not within specification, replace defective component.



INSIDE DIAMETER, PISTON PIN BORES

INSPECTION - CONTINUED

11. Measure piston pin outside diameter and length as shown. Length should be 4.0039 to 4.0157 in. (101.70 to 102.00 mm). Outside diameter should be 2.1259 to 2.1261 in. (53.997 to 54.003 mm). If piston pin is not within specification, replace piston pin.



350-471

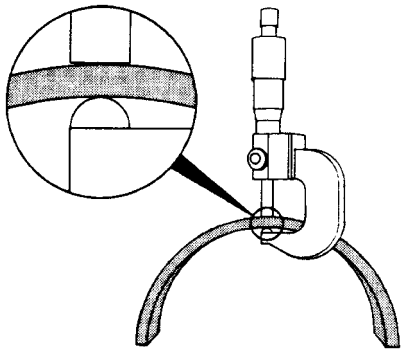
OUTSIDE DIAMETER AND LENGTH, PISTON PIN

12. Visually inspect piston cooling nozzle for damage and a nominal length of 1.752 in. (44.5 mm). Replace if defective.

NOTE

Normal bearing wear produces a smooth finish which will wear into copper lining. Exposed copper does NOT always indicate worn bearings.

13. Visually inspect connecting rod bearings. Replace bearings with any of these conditions:
    a. Pitting
    b. Flaking
    c. Corrosion
    d. Lock tang damage
    e. Scratches (deep enough to be felt with a fingernail)
14. Measure connecting rod bearing thickness at three locations on each edge of bearing. Measurement should be 0.0957 to 0.974 in. (2.430 to 2.473 mm). If not as specified, replace bearing.



350-461

THICKNESS, CONNECTING ROD BEARING

ASSEMBLY

CAUTION

Retaining ring must be seated completely in piston pin groove to prevent damage during engine operation.

NOTE

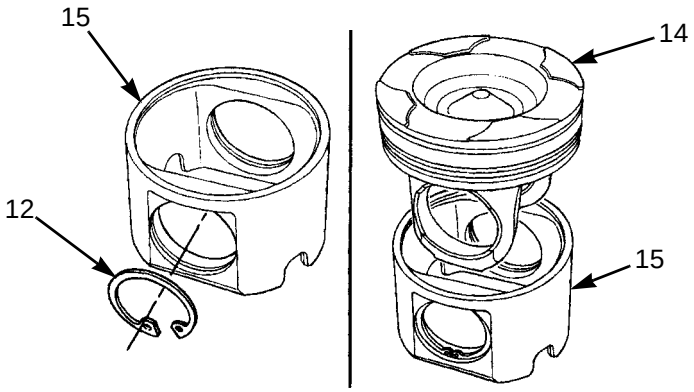
Perform steps 1 thru 5 to assemble each piston and connecting rod assembly.

1. Install new retaining ring (12) in one piston pin bore of piston skirt (15).

NOTE

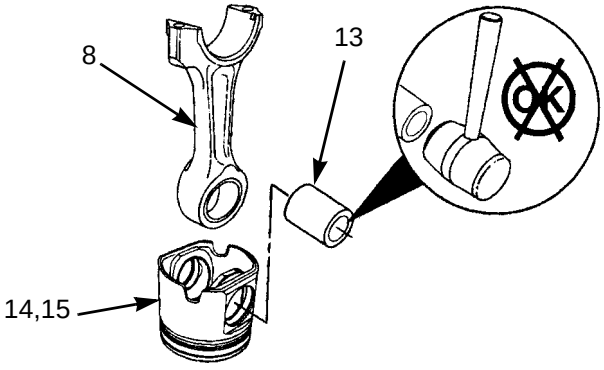
If piston is being reused, ensure crown, skirt, and pin are matched as noted in disassembly.

2. Position piston skirt (15) over piston crown (14).



350-472

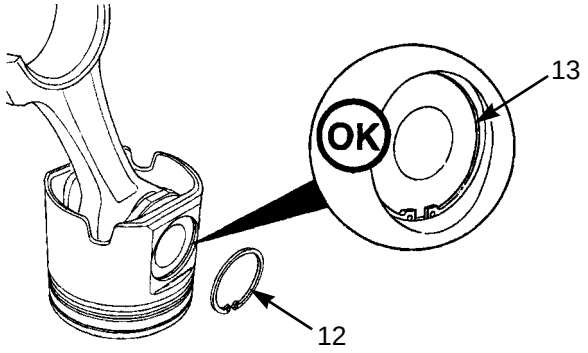
3. Align pin bore of connecting rod (8) with pin bore of piston skirt (15) and crown (14). Install piston pin (13).



350-473

ASSEMBLY- CONTINUED

4. Install new retaining ring (12) in piston bore to secure piston pin (13).

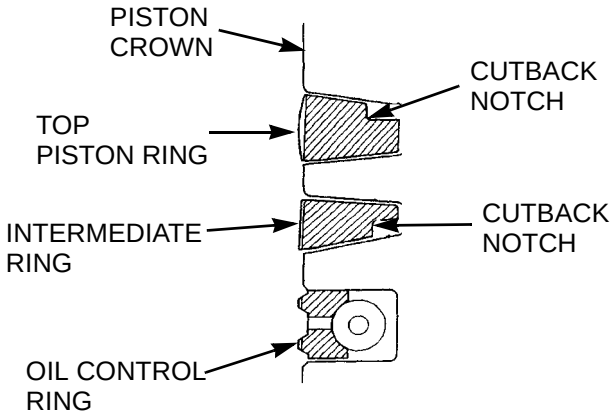


350-474

NOTE

Two-piece oil control ring MUST be installed with expander ring gap 180 degrees from gap of oil ring. DO NOT overlap ends of expander ring.

5. Using piston ring expander, install piston rings in piston ring grooves as shown.



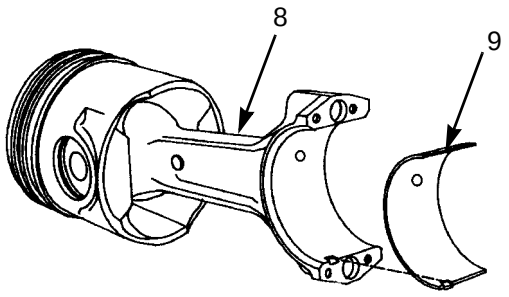
350-475

INSTALLATION

NOTE

- **If new bearings are not being used, ensure bearings and connecting rod are matched as marked during removal and disassembly.**
- **Tang of bearing MUST be in slot of connecting rod and end of bearing MUST be even with cap mounting surface.**

1. Install upper bearing (9) in matching connecting rod (8).



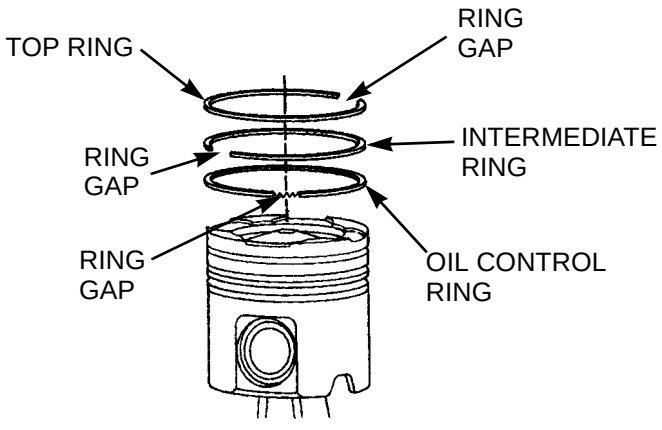
350-476

2. Apply a heavy film of clean engine oil to cylinder liner for piston and connecting rod assembly being installed.
3. To lubricate piston and connecting rod assembly, insert assembly in container of clean engine oil. Remove assembly, allowing excess oil to drain into container.

NOTE

Ring gaps MUST NOT be aligned with piston pin or any other ring gap.

4. Rotate piston rings to position ring gaps as shown.

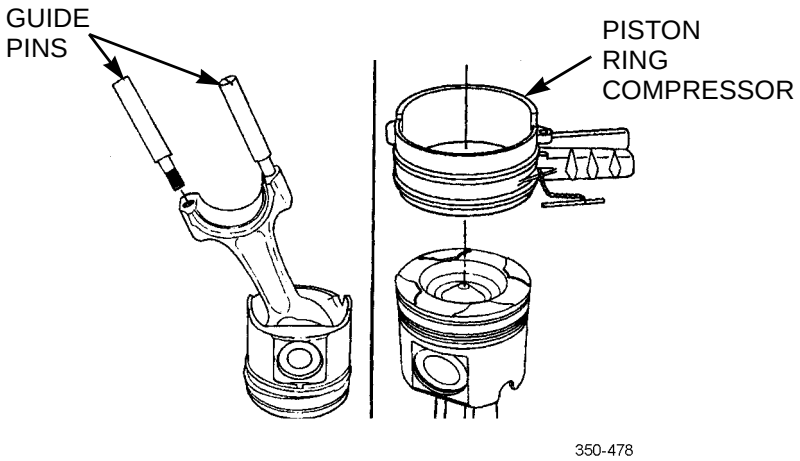


350-477

PISTON RING GAP ALIGNMENT

INSTALLATION - CONTINUED

5. Install connecting rod guide pins.
6. Compress piston rings with piston ring compressor.



7. Using accessory drive, rotate crankshaft so connecting rod journal of piston rod assembly being installed is at BDC.
8. Insert piston and connecting rod assembly through cylinder liner, with bearing tang toward camshaft side of engine, until ring compressor contacts top of liner.

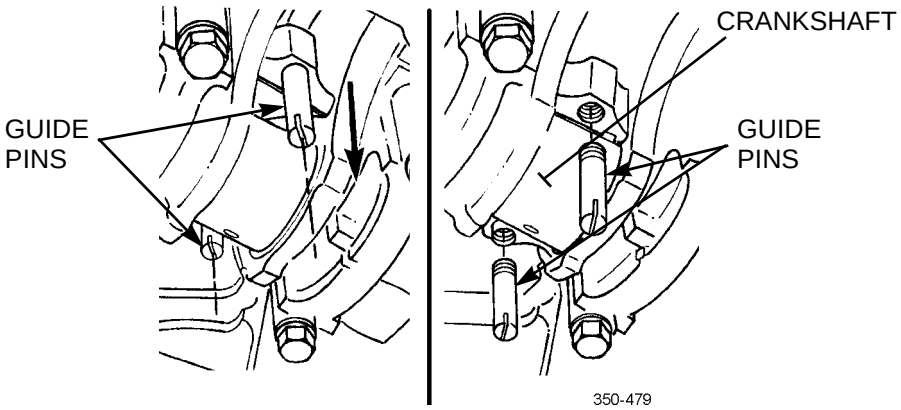
CAUTION

DO NOT use metal drift to push piston and connecting rod assembly into cylinder liner. Piston rings or cylinder liner may be damaged.

NOTE

If piston does not move freely, remove and inspect for broken or damaged rings.

9. Hold ring compressor against cylinder liner. Push piston through ring compressor into cylinder liner until top ring is completely in cylinder liner.
10. Use guide pins to align connecting rod with crankshaft while pushing piston and connecting rod assembly in place.
11. Remove guide pins.

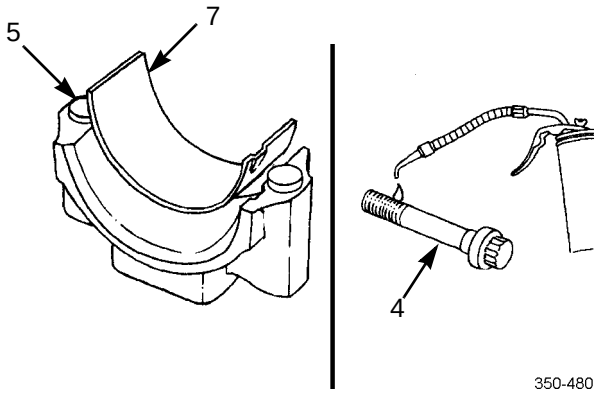


INSTALLATION - CONTINUED

NOTE

- **If new bearings are not being used, ensure bearings and connecting rod cap are matched as marked during removal and disassembly.**
- **Tang of bearing MUST be in slot of connecting rod cap and end of bearing MUST be even with cap mounting surface.**

12. Install lower bearing (7) in matching connecting rod cap (5).
13. Apply lubriplate to inside diameter of lower bearing (7).
14. Apply clean engine oil to threads of connecting rod capscrews (4).



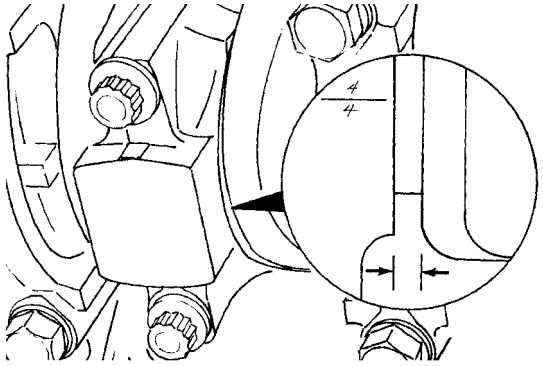
NOTE

- **Connecting rod and rod cap MUST have same stamped number and be installed in same cylinder from which they were removed.**
- **Connecting rod and rod cap stamped number MUST be on same side.**

15. Install connecting rod cap and two capscrews. Tighten as follows:
    a. Tighten capscrews to 50 lb-ft (68 Nm).
    b. Tighten to 105 lb-ft (142 Nm).
    c. Tighten to 155 lb-ft (210 Nm).
    d. Loosen capscrews completely.
    e. Repeat steps a thru c.

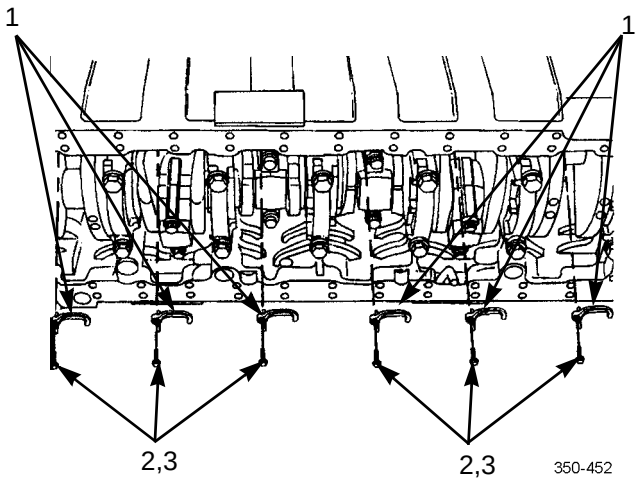
INSTALLATION - CONTINUED

16. Verify connecting rod side clearance as shown. Measurement should be 0.004 to 0.012 in. (0.10 to 0.30 mm).



CONNECTING ROD SIDE CLEARANCE

17. Install piston cooling nozzle (1) and secure with screw (2) and washer (3). Tighten screw to 21 lb-ft (28 Nm).



18. Repeat steps 1 thru 17 to install each remaining piston and connecting rod assembly.
19. Install cam follower assembly (WP 0275 00).
20. Install cylinder head (WP 0199 00).
21. Install oil pan (WP 0208 00).

END OF WORK PACKAGE

CAMSHAFT AND DRIVE GEAR REPLACEMENT 0274 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Inspection, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Guide, Camshaft Pilot (Item 52, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Puller Kit, Camshaft Gear (Item 87, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Lubriplate, Lubricant (Item 22, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Gasket (P/N 3025296)

Equipment Condition

Engine removed and installed on stand (WP 0197 00)

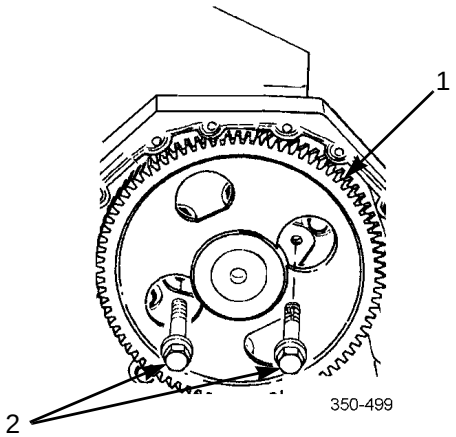
Cylinder head removed (WP 0199 00)

Cam follower assembly removed (WP 0275 00)

Camshaft idler gear removed (WP 0276 00)

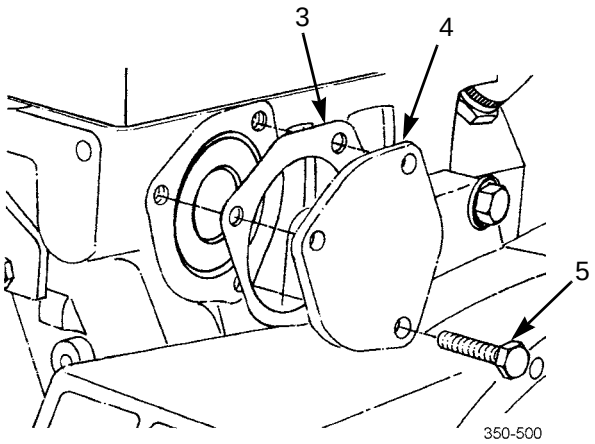
REMOVAL

1. Rotate camshaft to align holes in camshaft drive gear (1) with thrust washer plate screws (2).
2. Remove two thrust plate mounting screws (2).

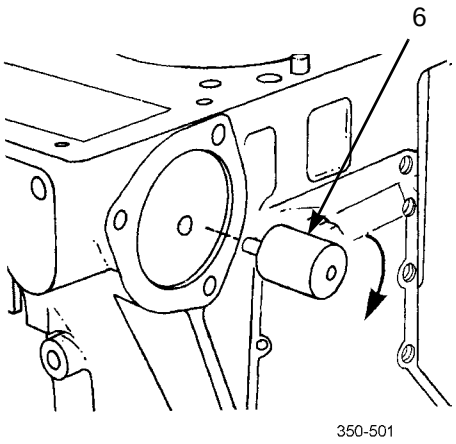


REMOVAL - CONTINUED

3. Remove three screws (5), gasket (3), and camshaft rear cover plate (4). Discard gasket.

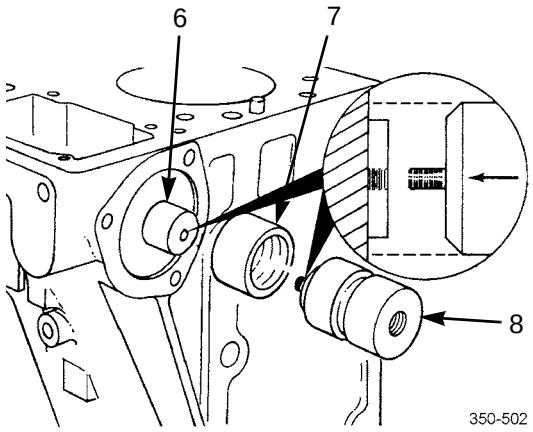


4. Install camshaft installation pilot guide as follows:
   a. Install expander (6) in camshaft through rear cover plate opening.

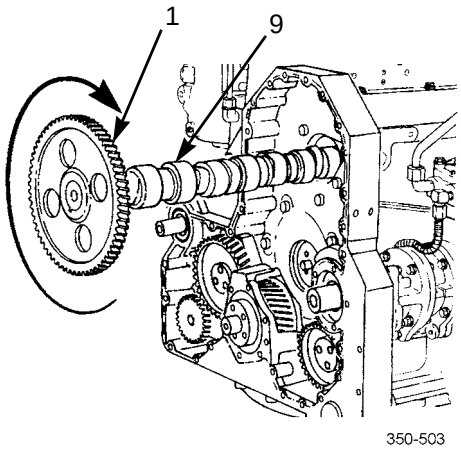


   b. Turn screw inside expander (6) clockwise to expand swell plug.
   c. Install arbor sleeve (7) over expander (6).
   d. Install locating pilot extensions (8) on expander (6).

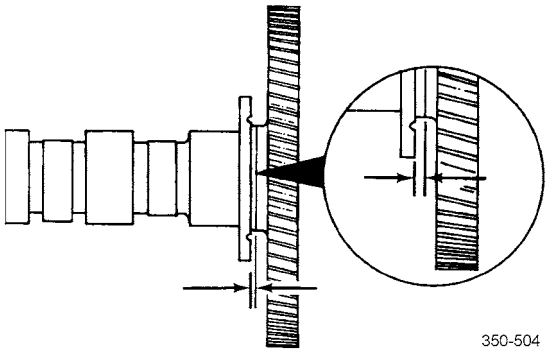
REMOVAL - CONTINUED



5. Rotate and pull camshaft (9) and drive gear (1) from cylinder block.
6. Remove camshaft installation pilot guide from rear of camshaft (9).



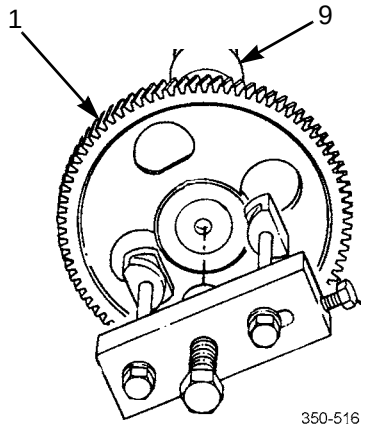
7. Measure and record clearance between camshaft gear hub and thrust washer plate. Measurement should be 0.005 to 0.013 in. (0.13 to 0.33 mm).



GEAR HUB-TO-THRUST WASHER PLATE CLEARANCE

REMOVAL - CONTINUED

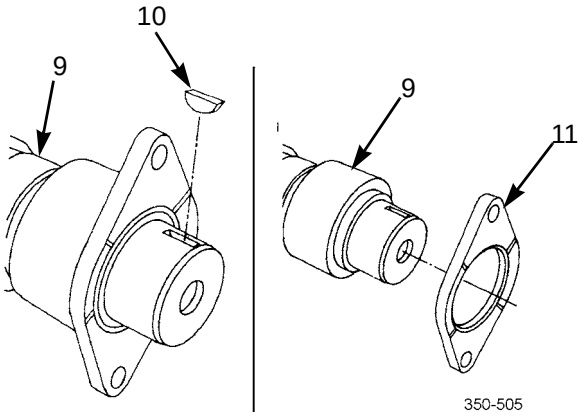
8. Using camshaft gear puller, remove camshaft drive gear (1) from camshaft (9).



NOTE

Record arrow direction on camshaft key and direction of offset for installation reference.

9. Remove and retain camshaft key (10).
10. Remove thrust washer plate (11) from camshaft (9).



CLEANING

1. Remove gasket material from camshaft rear cover plate and mating surface of cylinder block.



- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. Do not use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

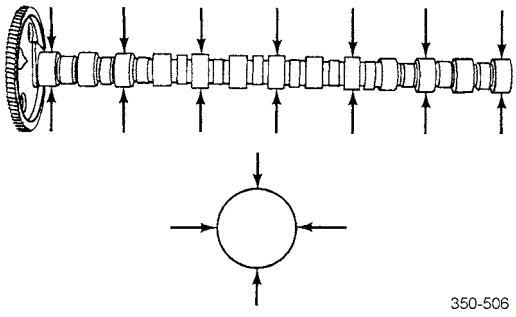
CAUTION

DO NOT touch vehicle surfaces of camshaft with bare hands after cleaning. This can cause rust to form, which will damage camshaft. Lubricate camshaft with clean engine oil before handling.

2. Clean camshaft in solvent and dry with compressed air.

INSPECTION

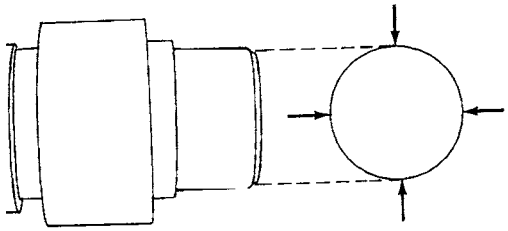
1. Visually inspect camshaft as follows. If these conditions are found, replace camshaft.
   a. Lobes: cracks, scratches, or other damage.
   b. Nose: burrs.
2. Visually inspect camshaft drive gear as follows. If these conditions are found, replace gear.
   a. Gear teeth: chipped, broken, or cracked.
   b. Gear bore and keyway: burrs.
3. Measure camshaft as follows. If camshaft is not within specification, replace camshaft.
   a. Bushing journal outside diameter: 2.8331 to 2.8352 in. (71.960 to 72.013 mm).



OUTSIDE DIAMETER, BUSHING JOURNALS

INSPECTION - CONTINUED

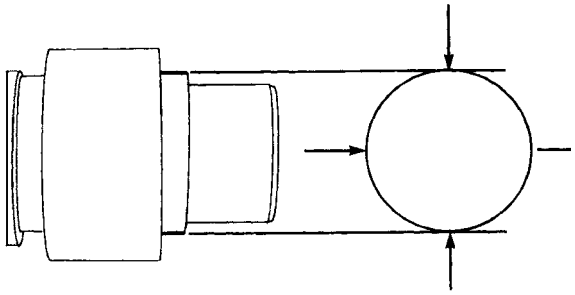
b. Gear mounting surface outside diameter: 1.8499 to 1.8509 in. (46.987 to 47.013 mm).



350-507

OUTSIDE DIAMETER, GEAR MOUNTING SURFACE

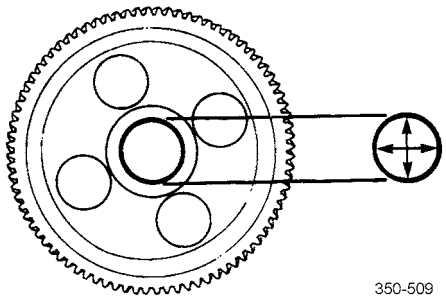
c. Thrust washer plate journal outside diameter: 2.1575 to 2.1732 in. (54.800 to 55.200 mm).



350-508

OUTSIDE DIAMETER, THRUST WASHER PLATE JOURNAL

4. Measure camshaft drive gear bore inside diameter: Measurement should be 1.8469 to 1.8479 in. (46.912 to 46.938 mm). If not as specified, replace camshaft drive gear.



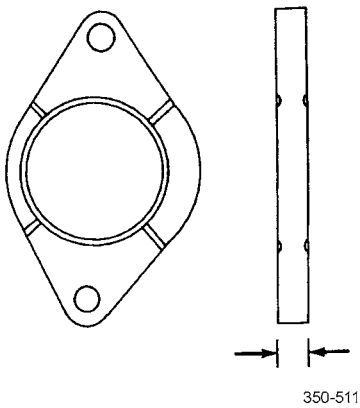
350-509

INSIDE DIAMETER, CAMSHAFT DRIVE GEAR BORE

5. Measure thrust washer plate as follows. If not as specified, replace thrust washer plate.

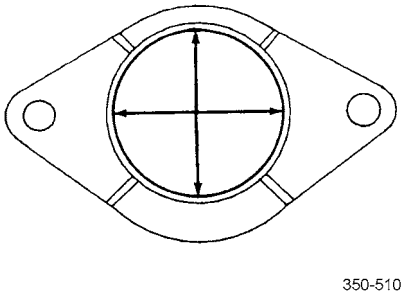
a. Thickness: 0.353 to 0.356 in. (8.96 to 9.04 mm).

INSPECTION - CONTINUED



THICKNESS, THRUST WASHER PLATE

b. Bore inside diameter: 2.1890 to 2.2287 in. (55.60 to 56.61 mm).



INSIDE DIAMETER, THRUST WASHER PLATE BORE

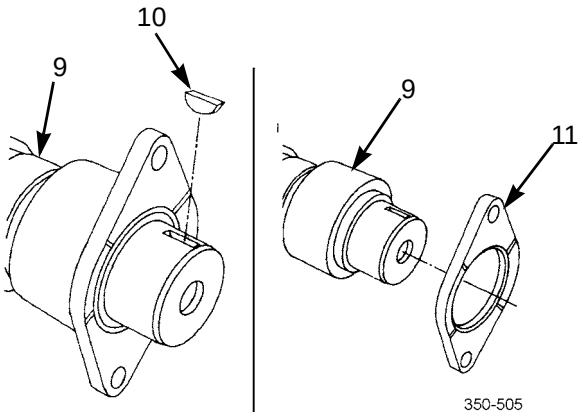
INSTALLATION

1. Install thrust washer plate (11) on camshaft (9).

NOTE

Ensure arrow on camshaft key is oriented as recorded in removal.

2. Install camshaft key (10) in camshaft (9). Tap with plastic-faced hammer as needed.



INSTALLATION - CONTINUED



WARNING

Use protective clothing when handling heated or hot components. Failure to do so will cause serious burns.

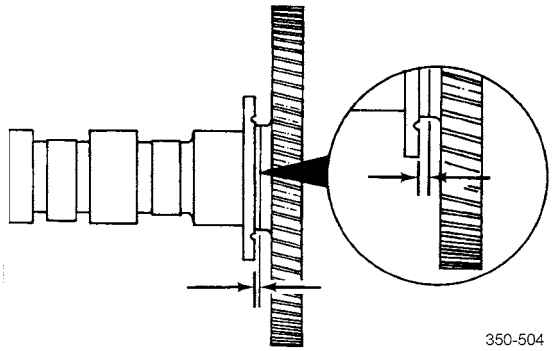
CAUTION

- **Camshaft drive gear timing marks and part number MUST be facing away from camshaft when gear is installed.**
- **Maintain camshaft in a vertical position until gear has cooled and DO NOT use water to reduce cooling time; gear will crack.**

NOTE

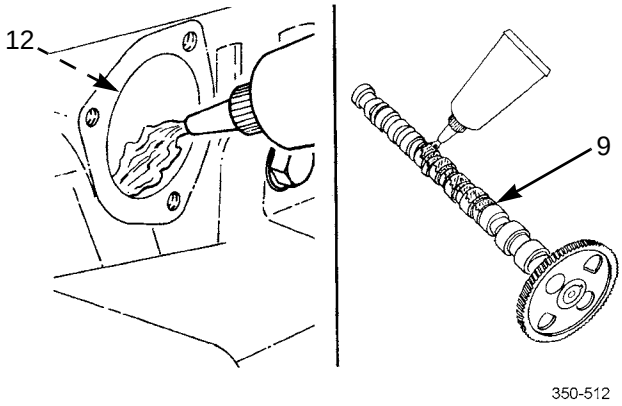
Camshaft drive gear MUST be heated to 450°F (235°C) for a minimum of one and not more than six hours. Installation must be accomplished within 30 seconds or gear may need to be reheated.

3. Apply lubriplate to camshaft drive gear journal.
4. Align heated camshaft drive gear keyway with key in camshaft. Install camshaft drive gear on camshaft.
5. Measure camshaft thrust washer plate clearance. Measurement must be 0.005 to 0.013 in. (0.13 to 0.33 mm).



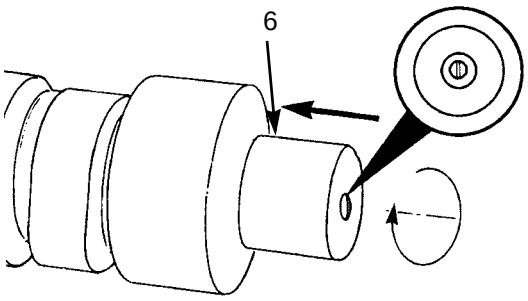
CLEARANCE, THRUST WASHER PLATE JOURNAL

6. Apply lubriplate to camshaft bushings (12) and camshaft (9).



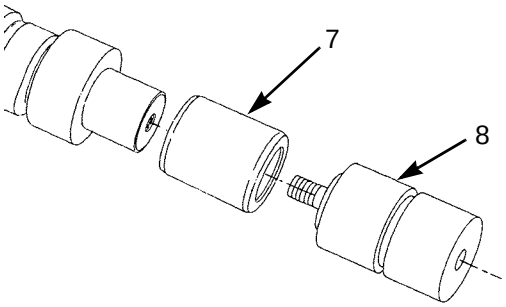
INSTALLATION - CONTINUED

7. Install camshaft installation pilot as follows:
   a. Install expander (6) in camshaft.



350-513

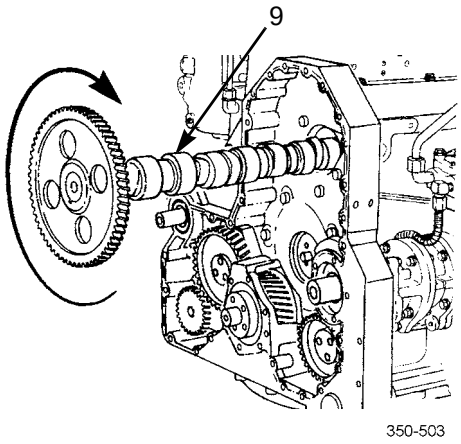
   b. Turn screw inside expander (6) clockwise to expand swell plug.
   c. Install arbor sleeve (7) over expander (6).
   d. Install locating pilot extensions (8) on expander (6).



350-514

INSTALLATION - CONTINUED

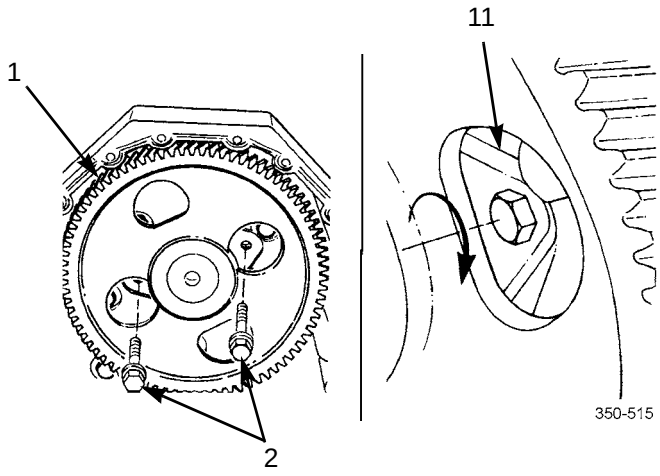
8. Rotate camshaft (9) slowly as it is being installed in cylinder block.



NOTE

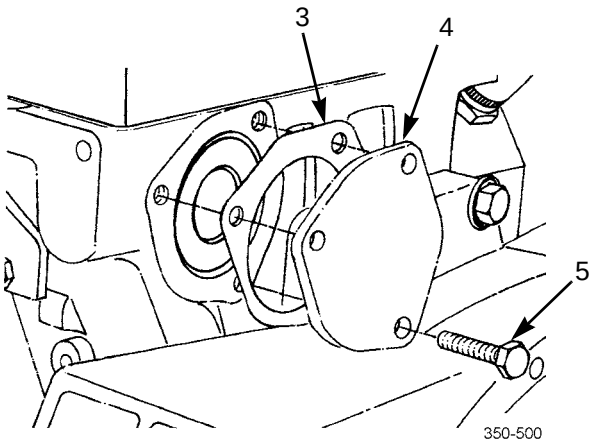
Camshaft installation pilot tool MUST be disassembled as it clears the no. 7 camshaft bushing to prevent interference with flywheel housing.

9. Remove camshaft installation pilot tool.
10. Rotate camshaft to align holes in camshaft drive gear (1) with thrust washer plate screw holes.
11. Rotate thrust plate washer (11) to align screw holes with cylinder block holes and install two screws (2). Tighten screws to 35 lb-ft (47 Nm).



INSTALLATION - CONTINUED

12. Position new gasket (3) and camshaft rear cover plate (4). Install three screws (5) and tighten to 35 lb-ft (47 Nm).



13. Measure camshaft drive gear end clearance. Measurement must be 0.005 to 0.013 in. (0.13 to 0.33 mm). If not as specified, remove and check measurements.
14. Install camshaft idler gear (WP 0276 00).
15. Install cam follower assembly (WP 0275 00).
16. Install cylinder head (WP 0199 00).

END OF WORK PACKAGE

CAM FOLLOWER ASSEMBLY MAINTENANCE 0275 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning, Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Installation/Removal Tool, Cam Follower (Item 64, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Equipment Condition

Engine removed and installed on stand (WP 0197 00)

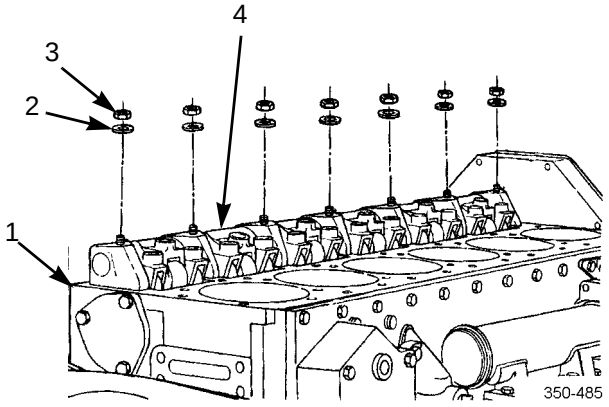
Cylinder head removed (WP 0199 00)

REMOVAL

CAUTION

Take care when removing attaching hardware securing cam follower assembly. Hardware can fall into engine, causing internal damage.

1. Remove seven nuts (3) and washers (2) securing cam follower assembly (4) to cylinder block (1).



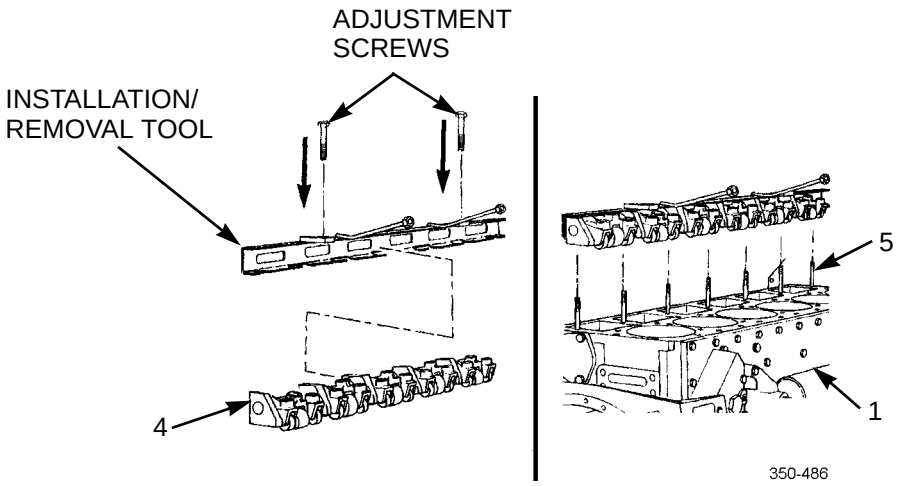
REMOVAL - CONTINUED

2. Attach cam follower installation/removal tool as follows:
   a. Slide tool under cam follower assembly (4) and around cam follower studs (5).
   b. If necessary, bump dowel supports to loosen.
   c. Slide tool forward until adjustment screws on top of tool can be finger tightened into socket of injector cam followers.

NOTE

Cam follower assembly consists of two shaft assemblies with a common center support.

3. Lift cam follower installation/removal tool and cam follower assembly (4) from cylinder block (1).



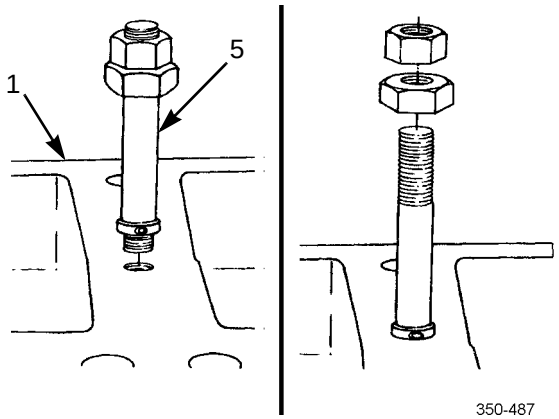
4. Place unit on work surface and remove cam follower installation/removal tool.

NOTE

Cam follower studs have an internal oil passage and must be removed for cleaning and inspection.

5. Remove seven cam follower studs (5) from cylinder block (1) as follows:
   a. Install two nuts together on cam follower stud (5).
   b. Turn bottom nut counterclockwise to remove cam follower stud (5).

REMOVAL - CONTINUED



DISASSEMBLY

NOTE

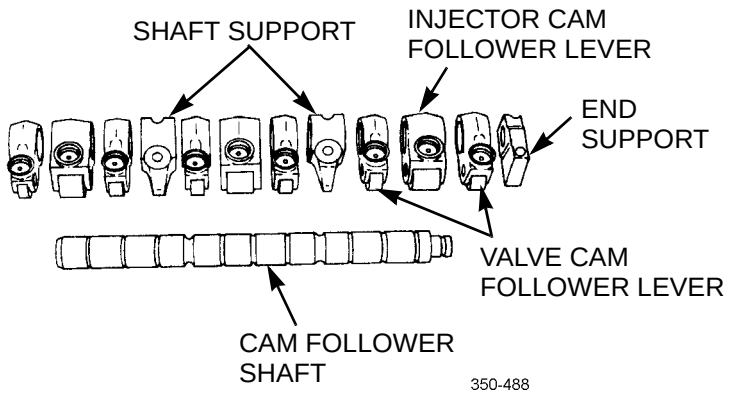
Cam follower levers have established wear patterns and MUST be installed in the same position from which they were removed.

1. Mark end supports, internal supports, and all cam follower levers on front and rear sections to show location.

NOTE

Front and rear sections are disassembled and assembled in the same manner.

2. Remove end support from shaft.
3. Remove intake valve cam follower lever, injector cam follower lever, exhaust valve cam follower lever, and shaft supports from cam follower shaft.
4. Repeat steps 2 and 3 to disassemble remaining section.



CLEANING



- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

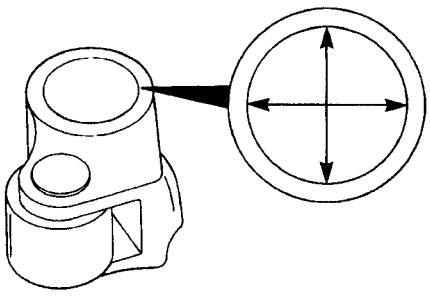
NOTE

Ensure all components are cleaned and oil passages free of debris.

1. Clean cam follower levers and shafts with solvent and dry with compressed air.
2. Clean cam follower studs and oil passages with solvent and dry with compressed air.

INSPECTION

1. Visually inspect components as follows:
   a. Visually inspect cam follower shafts for scoring or damage. If scoring or damage are found, replace.
   b. Visually inspect cam follower levers for cracks or damage. If cracks or damage are found, replace.
   c. Visually inspect cam follower shaft supports for cracks or damage. If found, replace supports.
2. Measure outside diameter of cam follower shaft journals. Measurement must be 1.3382 to 1.3389 in. (33.991 to 34.009 mm). If not as specified, replace shaft.
3. Measure inside diameter of cam follower lever shaft bore. Measurement must be 1.3420 to 1.3431 in. (34.086 to 34.116 mm). If not as specified, replace cam follower lever.

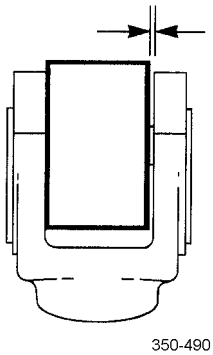


350-489

INSIDE DIAMETER, CAM FOLLOWER LEVER SHAFT BORE

INSPECTION - CONTINUED

4. Measure roller side clearance of cam follower lever. Measurement must be 0.007 to 0.026 in. (0.19 to 0.65 mm). If not as specified, replace cam follower lever.



ROLLER SIDE CLEARANCE

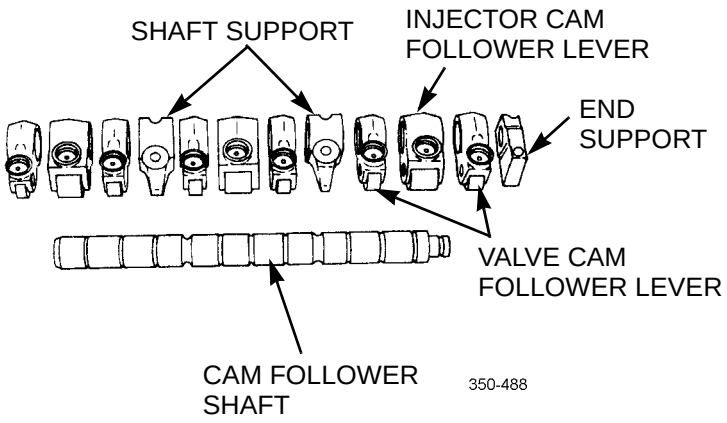
ASSEMBLY

1. Using clean engine oil, lubricate cam follower shaft and cam follower levers.

NOTE

Cam follower levers have established wear patterns and MUST be installed in the same position from which they were removed.

2. Install end support on shaft.
3. Install intake valve cam follower lever, injector cam follower lever, exhaust valve cam follower lever, and shaft support on shaft in same position as noted during disassembly.
4. Install remaining valve cam follower levers, injector cam follower levers, and supports as noted during disassembly.

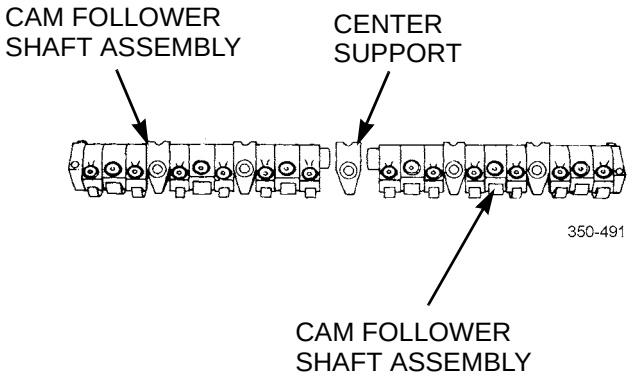


ASSEMBLY - CONTINUED

NOTE

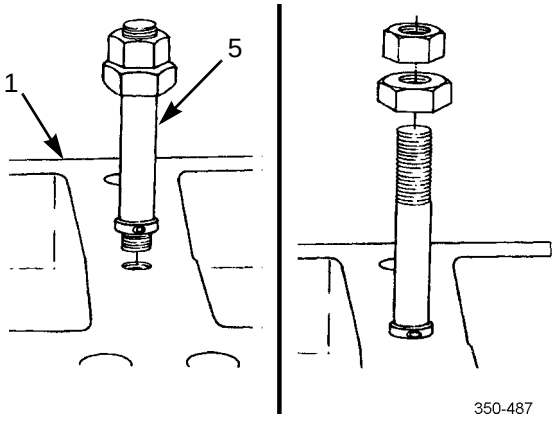
Common center support has a locating dowel hole. Other inner supports do not have this hole.

5. Install two cam follower shaft assemblies into common center support.



INSTALLATION

1. Install seven cam follower studs (5) in cylinder block (1) using two nuts tightened together. Tighten studs to 25 lb-ft (34 Nm).
2. Remove two nuts.



3. Install cam follower installation/removal tool on cam follower assembly.

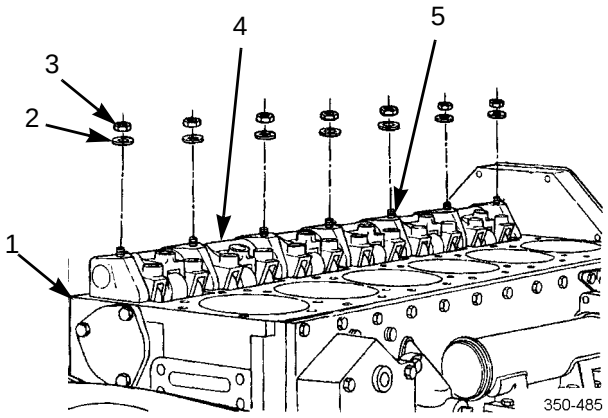
NOTE

Cam follower support nos. 1, 4, and 7 are doweled and must align with dowel pins in cylinder block.

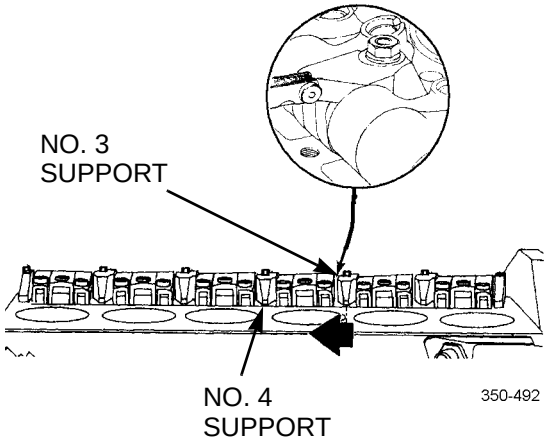
4. Position cam follower assembly (4) over cam follower studs (5) and on cylinder block (1). Remove installation/removal tool.

INSTALLATION - CONTINUED

5. Install seven washers (2) and nuts (3). Tighten, at this time only, nuts for cam follower studs nos. 1, 4, and 7 to 35 lb-ft (47 Nm).

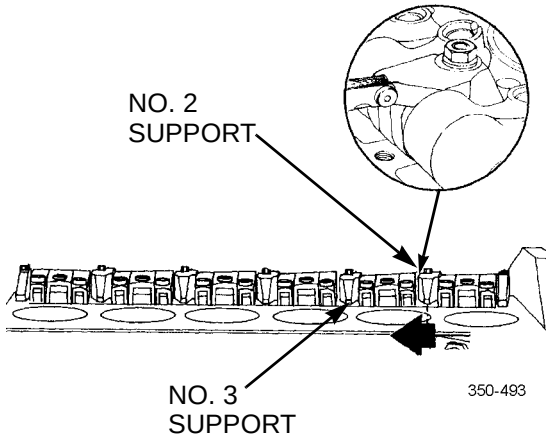


6. Install 0.030 in. (0.76 mm) thickness gage between no. 3 cam follower shaft support and exhaust lever for cylinder no. 3.
7. Push no. 3 cam follower levers toward no. 4 cam follower shaft support.
8. Tighten no. 3 cam follower stud nut to 35 lb-ft (47 Nm).

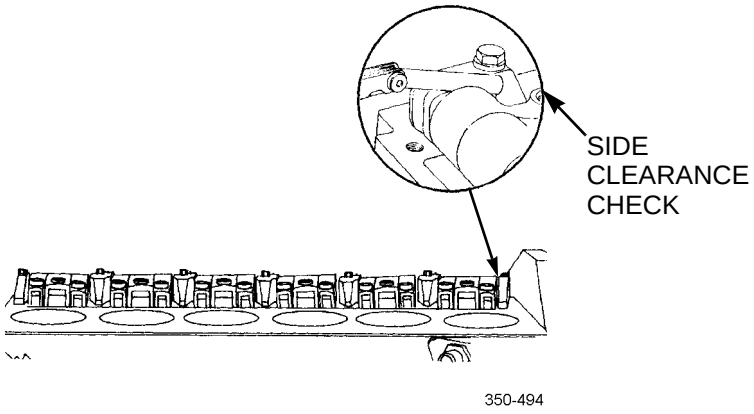


INSTALLATION - CONTINUED

9. Install 0.030 in. (0.76 mm) thickness gage between no. 2 cam follower shaft support and intake lever for cylinder no. 2.
10. Push no. 2 cam follower levers toward no. 3 cam follower shaft support.
11. Tighten no. 2 cam follower stud nut to 35 lb-ft (47 Nm).

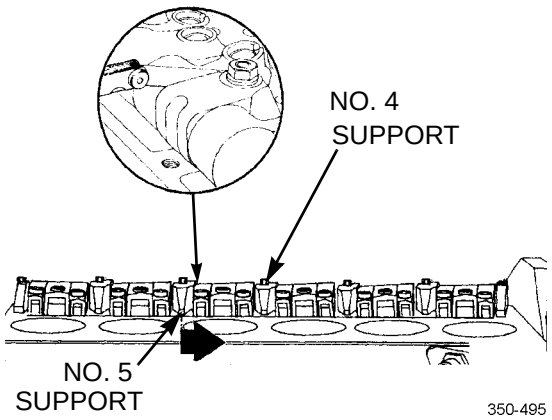


12. Measure side clearance between no. 1 cam follower levers and end support. Measurement should be 0.030 in. (0.76 mm).

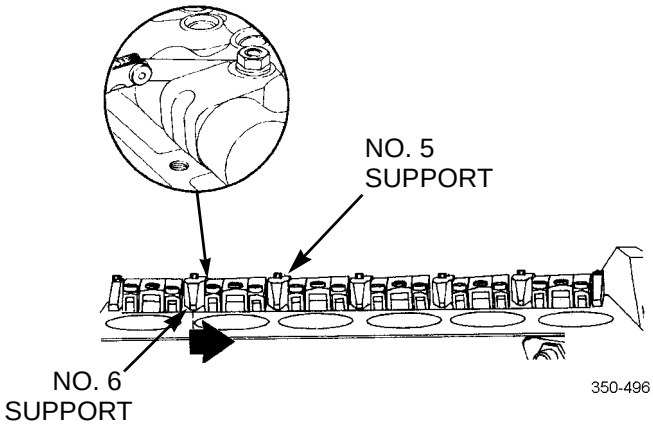


INSTALLATION - CONTINUED

13. Install 0.030 in. (0.76 mm) thickness gage between no. 5 cam follower shaft support and exhaust lever for cylinder no. 4.
14. Push no. 5 cam follower levers toward no. 4 cam follower shaft support. Tighten no. 5 cam follower stud nut to 35 lb-ft (47 Nm).

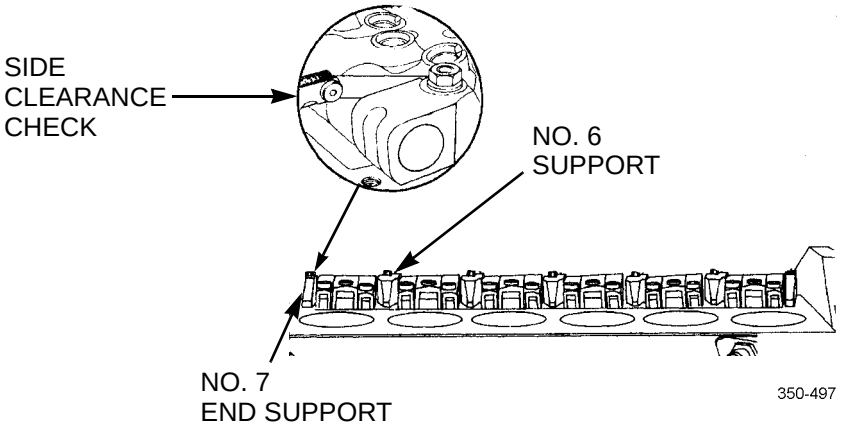


15. Install 0.030 in. (0.76 mm) thickness gage between no. 6 cam follower shaft support and intake lever for cylinder no. 5.
16. Push no. 6 cam follower levers toward no. 5 cam follower shaft support. Tighten no. 6 cam follower stud nut to 35 lb-ft (47 Nm).



INSTALLATION - CONTINUED

17. Measure side clearance between no. 6 cam follower levers and cam follower end support. Measurement should be 0.030 in. (0.76 mm).



18. Install cylinder head (WP 0199 00).

END OF WORK PACKAGE

IDLER GEARS AND CAMSHAFT DRIVE GEAR REPLACEMENT 0276 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Inspection, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Hammer, Hand, Plastic (Item 53, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Installation Tool, Needle Bearing (Item 62, WP 0289 00)

Puller Kit, Cam Gear (Item 86, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Lubriplate, Lubricant (Item 22, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Seal, Rectangular (P/N 3883150)

Equipment Condition

Engine removed and installed on stand (WP 0197 00)

Alternator removed (WP 0070 00)

Cooling fan hydraulic pump removed (WP 0247 00)

Cooling fan hydraulic pump drive gear removed (WP 0214 00)

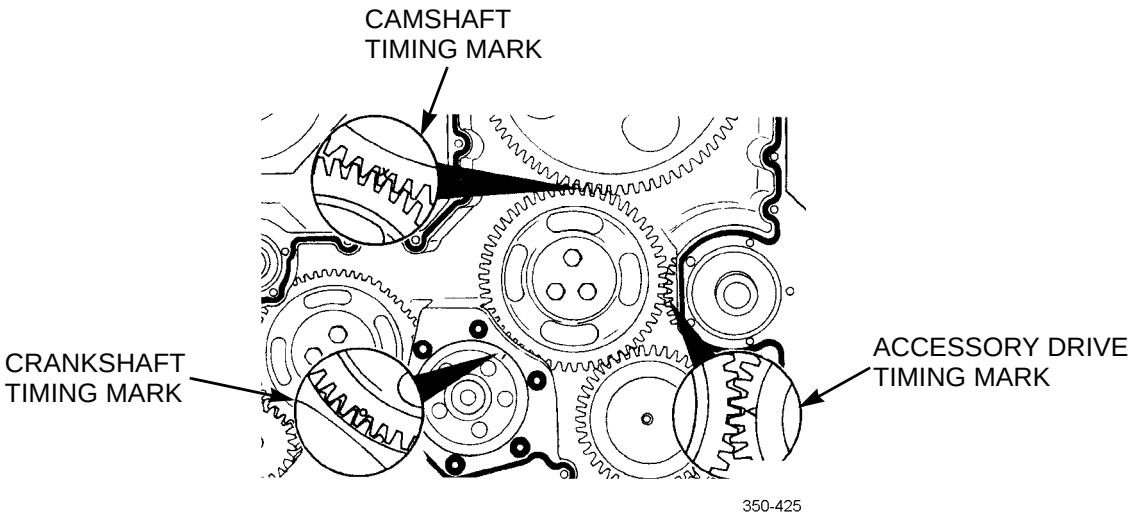
Front gear cover removed (WP 0212 00)

NOTE

Camshaft idler gear has more gear teeth than crankshaft gear; therefore, camshaft idler gear timing marks will NOT align with crankshaft, camshaft, and accessory drive gear timing marks on every crankshaft revolution.

REMOVAL

1. Use accessory driveshaft to rotate crankshaft until timing marks on crankshaft gear, camshaft gear, and accessory drive gear are completely engaged in camshaft idler gear as shown.



TIMING MARK POSITIONS

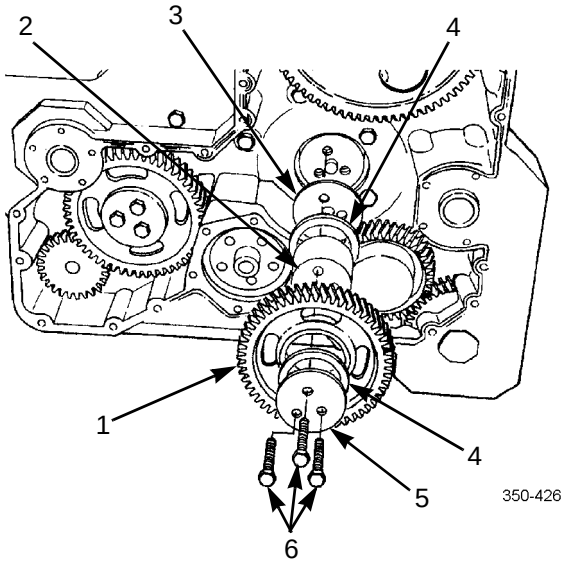
2. Remove camshaft idler gear as follows:

NOTE

- **It may be necessary to tap camshaft idler gear with a plastic-faced hammer to loosen gear.**
- **Ensure all components are tagged for identification and location.**

a. Remove three screws (6) securing cover plate (5) and front thrust bearing (4).

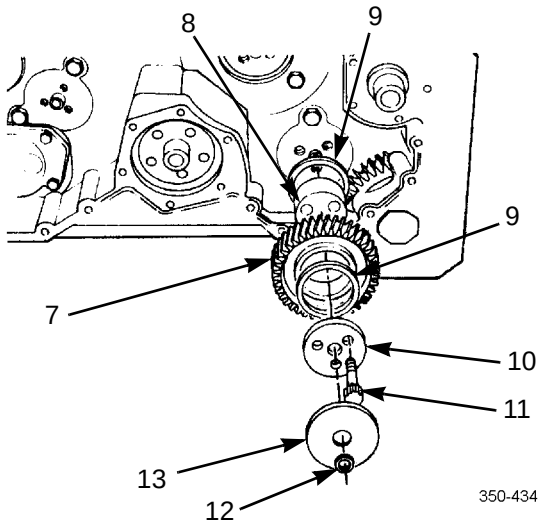
b. Remove camshaft idler gear (1), rear thrust bearing (4), idler gear shaft (2), and wear plate (3).



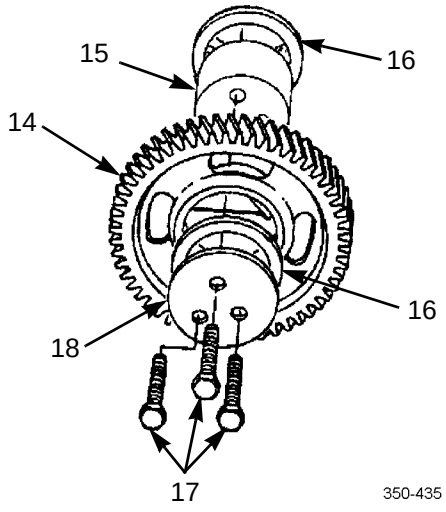
IDLER GEARS AND CAMSHAFT DRIVE GEAR REPLACEMENT - CONTINUED 0276 00

REMOVAL - CONTINUED

3. Remove hydraulic pump idler gear as follows:
   a. Remove and discard rectangular seal (12).
   b. Remove spacer (13), three screws (11), gear retainer (10), and front thrust bearing (9).
   c. Remove hydraulic pump idler gear (7), idler gear shaft (8), and rear thrust bearing (9).



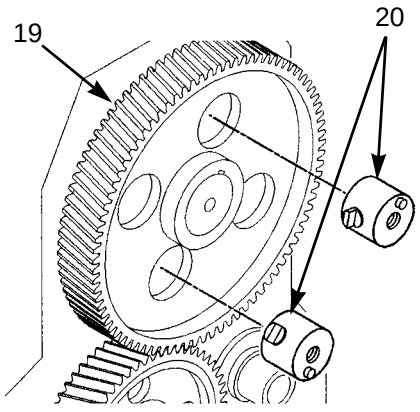
4. Remove water pump idler gear as follows:
   a. Remove three screws (17), cover plate (18), and front thrust bearing (16).
   b. Remove idler gear (14) with idler gear shaft (15) and rear thrust bearing (16).



REMOVAL - CONTINUED

5. Remove camshaft drive gear as follows:

   a. Install two puller adapters (20) in opposite holes in camshaft drive gear (19).



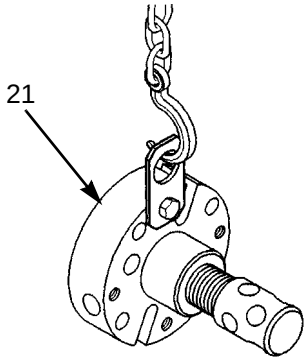
350-436



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

   b. Attach camshaft gear puller assembly (21) to suitable lifting device.



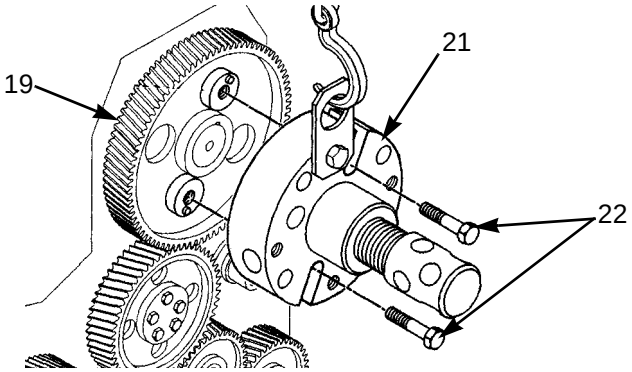
350-437

REMOVAL - CONTINUED

NOTE

Ensure forcing screw pilot is engaged with center of camshaft and puller adapter studs are properly seated in camshaft gear lifting device.

c. Install camshaft gear puller assembly (21) and lifting device to camshaft drive gear (19) with two screws (22). Tighten screws securely.



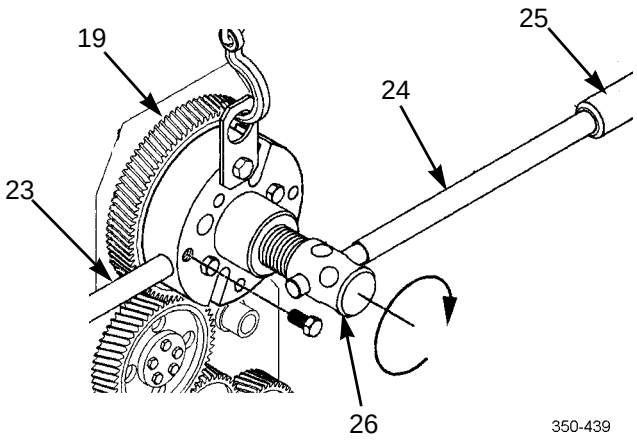
350-438



WARNING

Ensure lifting device remains attached to camshaft gear puller assembly. Camshaft gear and puller assembly may fall when released. Failure to follow this warning may cause serious injury to personnel.

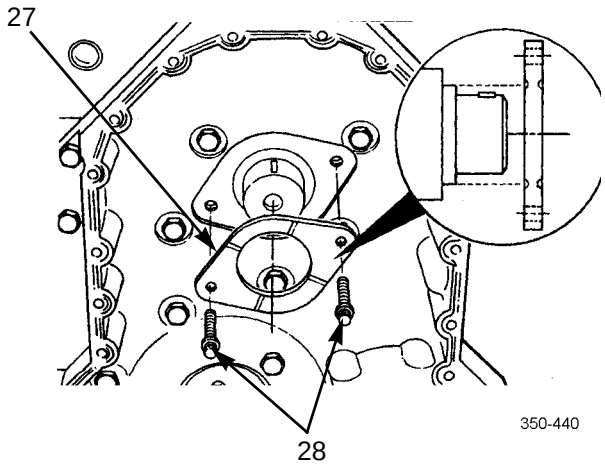
d. Using lever bar (24), extension bar (25), and torque reaction bar (23), turn forcing screw (26) clockwise to pull camshaft drive gear (19) from camshaft.



350-439

REMOVAL - CONTINUED

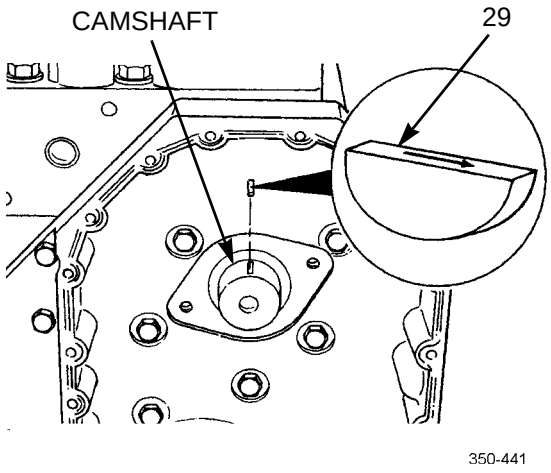
e. Remove two screws (28) and camshaft thrust plate (27).



NOTE

Make note of arrow direction on camshaft key to aid in installation.

f. Remove camshaft key (29). Retain for installation.



CLEANING



- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200ºF (94ºC). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

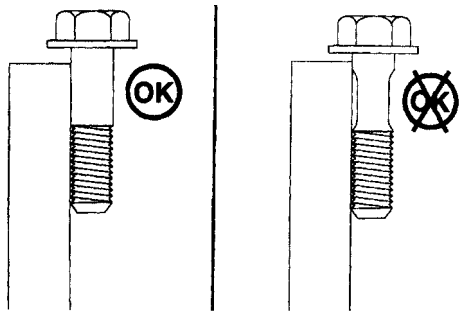
NOTE

- **Cleaning procedures for camshaft idler gear are applicable to all idler gears and camshaft drive gear.**
- **Ensure all components have been tagged or marked for location and identification.**

1. Clean all components of camshaft idler gear with solvent and dry with compressed air.
2. Use solvent and compressed air to clean oil drillings of gear shaft.

INSPECTION

1. Inspect all retaining screws with a straightedge for evidence of "necking". If necking is observed, retaining screws MUST be replaced.

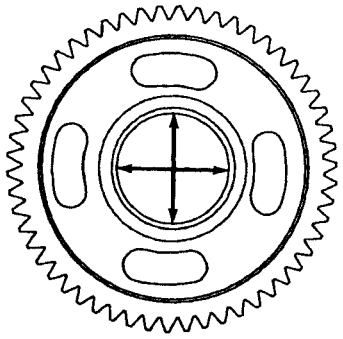


350-427

RETAINING SCREW "NECKING"

INSPECTION - CONTINUED

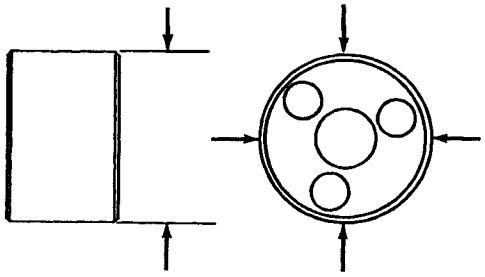
2. Visually inspect all idler gears and camshaft drive gear for chipped, broken, or cracked teeth. If found, replace gear.
3. While flexing thrust bearings approximately 1/8 to ¼ in. (3 to 6 mm), check for cracks. If found, replace thrust bearings.
4. Inspect camshaft, hydraulic pump, and water pump idler gears, shafts, thrust bearings, and ring dowels as follows. If indicated specifications are not met, replace defective gear or component.
   a. Measure inside diameter (ID) of idler gear bushing bore. Measurement must be 2.3640 to 2.3661 in. (60.045 to 60.100 mm).



350-428

INSIDE DIAMETER, IDLER GEAR BUSHING BORE

   b. Measure outside diameter (OD) of idler gear shaft. Measurement must be 2.3612 to 2.3625 in. (59.975 to 60.008 mm).

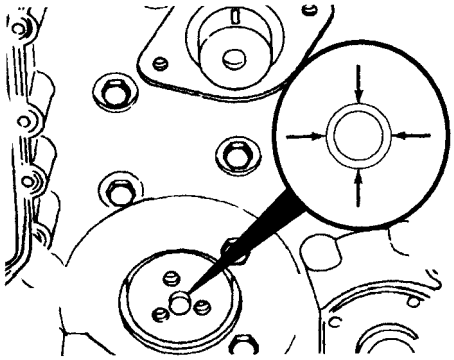


350-429

OUTSIDE DIAMETER, IDLER GEAR SHAFT

INSPECTION - CONTINUED

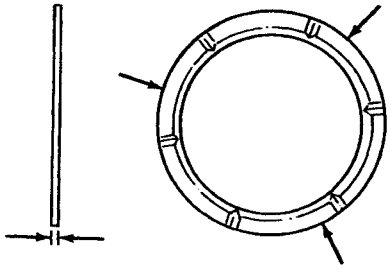
c. Measure OD of idler gear ring dowel. Measurement must be 0.7566 to 0.7576 in. (19.217 to 19.243 mm).



350-430

OUTSIDE DIAMETER, IDLER GEAR RING DOWEL

5. Measure thickness of all thrust bearings in three places 120 degrees apart. Measurement must be 0.0945 to 0.0972 in. (2.400 to 2.470 mm).



350-431

THICKNESS, THRUST WASHER

6. Inspect camshaft drive gear and thrust plate as follows:

   a. Visually inspect camshaft drive gear for cracks, chips, or broken teeth. Inspect bore of gear and keyway for burrs or frets. If burrs or frets cannot be removed, or other damage is present, replace camshaft drive gear.

   b. Measure inside diameter of gear bore. Measurement must be 1.8469 to 1.8479 in. (46.912 to 46.938 mm). If measurement is not within specification, replace camshaft drive gear.

   c. Measure camshaft thrust plate inside diameter. Measurement must be 2.1890 to 2.2287 in. (55.60 to 56.61 mm). If measurement is not as specified, replace thrust plate.

   d. Measure camshaft thrust plate thickness. Measurement must be 0.3528 to 0.3559 in. (8.960 to 9.040 mm). If measurement is not as specified, replace thrust plate.

INSTALLATION

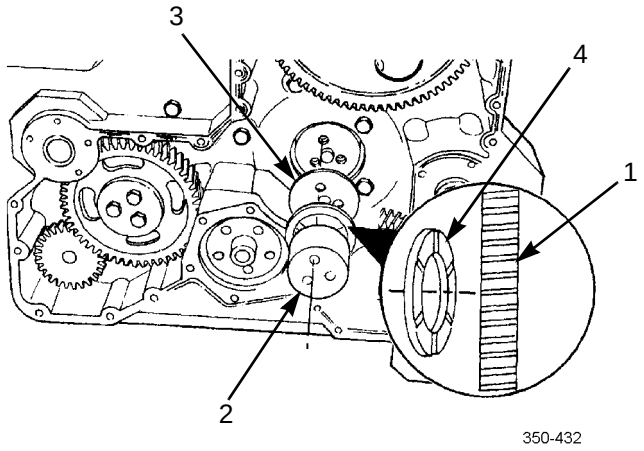
1. Install camshaft idler gear as follows:

CAUTION

To prevent damage to gear and engine during operation, position rear thrust bearing with grooved side toward idler gear.

a. Apply a light coating of lubriplate to wear plate (3), rear thrust bearing (4), and camshaft idler gear (1).

b. Install wear plate (3), rear thrust bearing (4), and idler gear shaft (2).

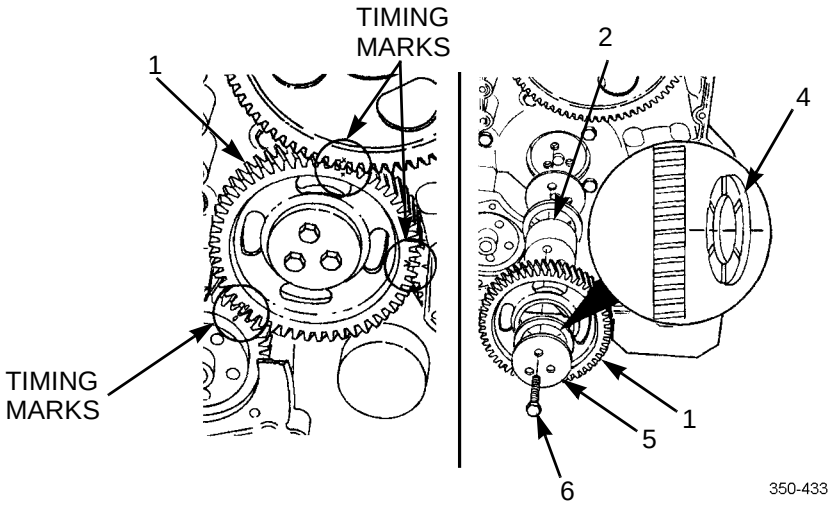


c. Align camshaft idler gear (1) and position on idler gear shaft (2) so timing marks on idler gear match marks on other gears as shown.

CAUTION

To prevent damage to gear and engine during operation, position front thrust bearing with grooved side toward idler gear.

d. Install front thrust bearing (4) and cover plate (5). Secure with three screws (6). Tighten screws to 45 lb-ft (61 Nm).



INSTALLATION - CONTINUED

2. Install hydraulic pump idler gear as follows:

CAUTION

To prevent damage to gear and engine during operation, position rear thrust bearing with grooved side toward idler gear.

a. Apply a light coating of lubriplate to rear thrust bearing (9) and hydraulic pump idler gear (7).

b. Install rear thrust bearing (9) and idler gear shaft (8).

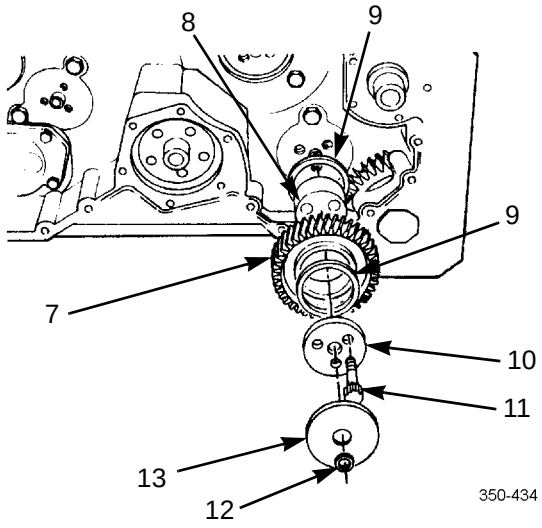
CAUTION

To prevent damage to gear and engine during operation, position front thrust bearing with grooved side toward idler gear.

c. Install hydraulic pump idler gear (7) and front thrust bearing (9) on idler gear shaft (8).

d. Install gear retainer (10) and three screws (11). Tighten screws to 45 lb-ft (61 Nm).

e. Insert spacer (13) and new rectangular seal (12).



INSTALLATION - CONTINUED

3. Install water pump idler gear as follows:

CAUTION

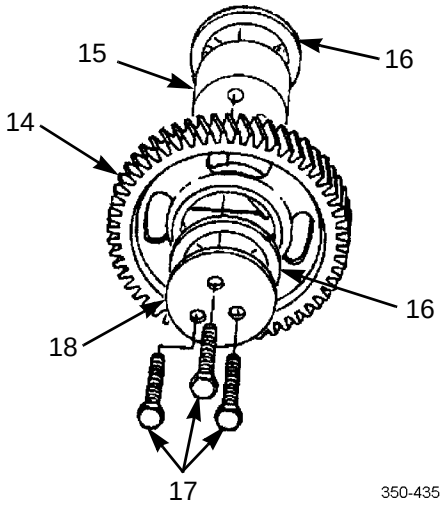
To prevent damage to gear and engine during operation, position rear thrust bearing with grooved side toward idler gear.

a. Apply a light coating of lubriplate to rear thrust bearing (16) and idler gear shaft (15).
b. Install rear thrust bearing (16) and water pump idler gear (14) without idler gear shaft (15).
c. Align bore of idler gear (14) with bore of rear thrust bearing (16).
d. Install idler gear shaft (15) through idler gear (14) and rear thrust bearing (16) bores.

CAUTION

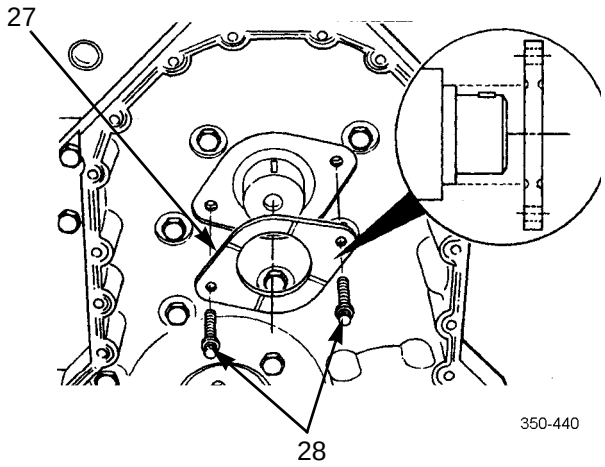
To prevent damage to gear and engine during operation, position front thrust bearing with grooved side toward idler gear.

e. Install front thrust bearing (16), cover plate (18), and three screws (17). Tighten screws to 45 lb-ft (61 Nm).



INSTALLATION - CONTINUED

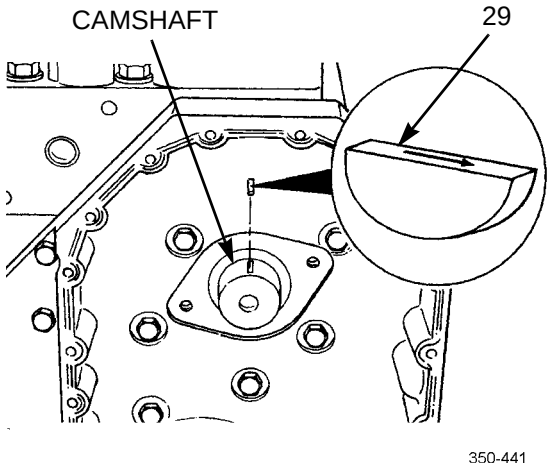
4. Install camshaft drive gear as follows:
   a. Install camshaft thrust plate (27) and secure with two screws (28). Tighten screws to 35 lb-ft (47 Nm).



NOTE

Ensure direction of arrow on camshaft key is the same as noted during removal.

   b. Install camshaft key (29) in slot on camshaft. Seat key by tapping with a plastic-faced hammer.



   c. Apply a coating of lubriplate to nose of camshaft.

INSTALLATION - CONTINUED



WARNING

Use protective clothing when handling heated or hot components. Failure to use protective clothing to handle heated or hot components will cause serious burns.

CAUTION

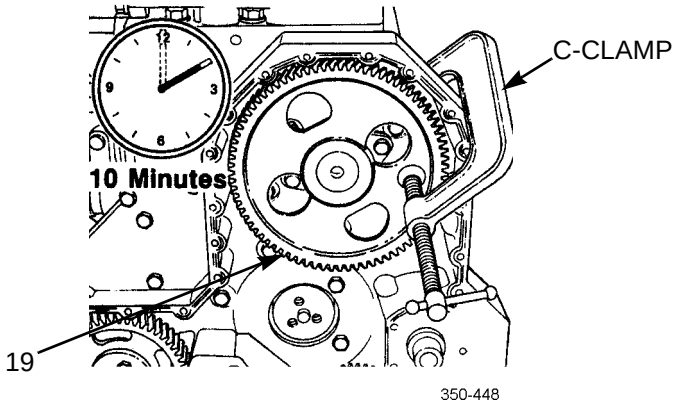
Camshaft drive gear timing marks and part number MUST be facing away from camshaft when gear is installed.

NOTE

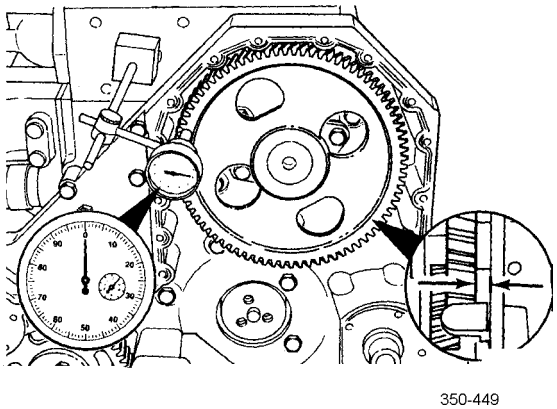
Camshaft drive gear MUST be heated to 450°F (235°C) for a minimum of one and not more than six hours. Installation must be accomplished within 30 seconds or gear may need to be reheated.

d. Align heated camshaft gear keyway with key in camshaft. Install camshaft drive gear (19) on camshaft.

e. Install C-clamp to hold camshaft drive gear (19) in place and allow it to cool. Remove C-clamp only after camshaft drive gear has cooled to room temperature.



f. Using dial indicator, verify camshaft drive gear end clearance is within specification of 0.005 to 0.013 in. (0.13 to 0.33 mm).



CAMSHAFT GEAR END CLEARANCE

INSTALLATION - CONTINUED

NOTE

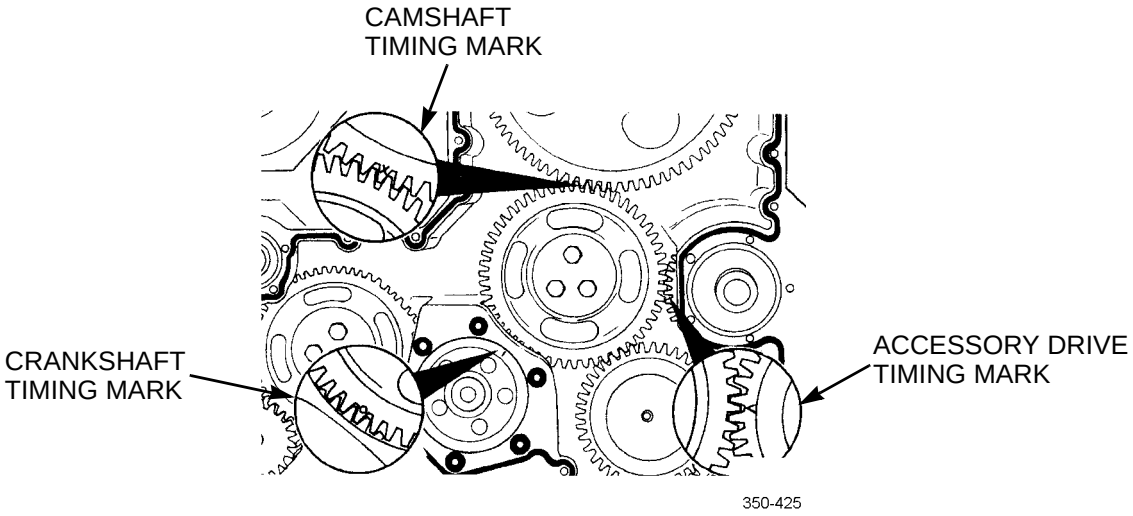
Specifications listed below apply to all idler gears.

5. Measure camshaft, hydraulic pump, and water pump idler gear end clearance and backlash. End clearance measurement must be 0.012 to 0.021 in. (0.30 to 0.53 mm). Backlash measurement must be 0.003 to 0.015 in. (0.08 to 0.38 mm).

CAUTION

Failure to check engine timing can cause severe engine damage.

6. Check engine timing marks on gear train. Marks should be as shown.



TIMING MARK POSITIONS

7. Install cooling fan hydraulic pump drive gear (WP 0214 00).
8. Install cooling fan hydraulic pump (WP 0247 00).
9. Install front gear cover (WP 0212 00).
10. Install alternator (WP 0070 00).

END OF WORK PACKAGE

OIL PUMP ASSEMBLY MAINTENANCE 0277 00

THIS WORK PACKAGE COVERS

Removal, Inspection, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Indicator, Dial (Item 58, WP 0289 00)

Puller, Mechanical (Item 96, WP 0289 00)

Wrench, Torque (Item 143, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Materials/Parts - Continued

Lubriplate, Lubricant (Item 22, WP 0290 00)

Oil, Lubricating, OE/HDO 15/40 (Item 27, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Sealant (Item 31, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

O-ring (P/N 3033247)

O-ring (P/N 3033248)

Equipment Condition

Engine removed and installed on stand (WP 0197 00)

Water pump removed (WP 0068 00)

Front gear cover removed (WP 0212 00)

REMOVAL

NOTE

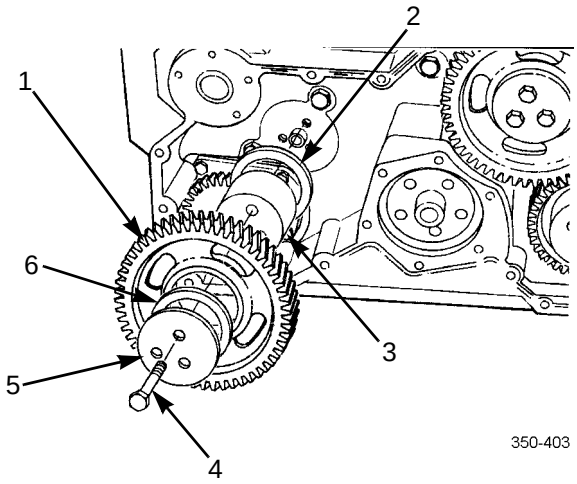
Water pump idler gear MUST be removed for access prior to removing oil pump.

1. Remove three screws (4) securing water pump idler gear assembly in place.

NOTE

Ensure all items are tagged for identification and location prior to removal.

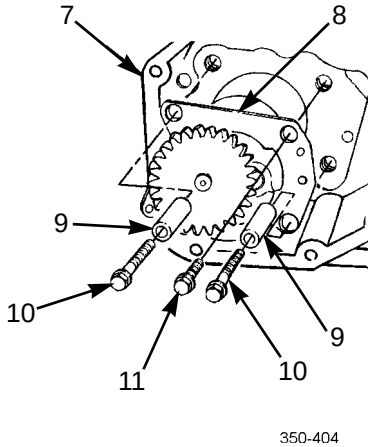
2. Remove cover plate (5), front thrust bearing (6), idler gear (1), rear thrust bearing (2), and idler gear shaft (3).



CAUTION

DO NOT pry on oil pump gear or mounting flange. Failure to follow this caution may result in damage to oil pump.

3. Remove two long screws (10), two spacers (9), and one short screw (11) securing oil pump assembly (8) to engine (7).
4. Remove oil pump assembly (8) from engine by hand.



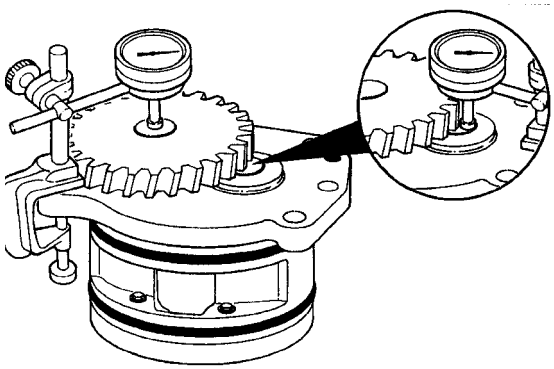
5. Remove and discard two O-rings from oil pump.

INSPECTION

NOTE

Ensure oil pump and component parts have been cleaned prior to inspection.

1. Perform this procedure to determine if disassembly is required. If any of these conditions are noted, disassembly and further inspection is required.
   a. Turn main drive gear by hand to check gears for freedom of movement.
   b. Visually inspect drive gear for cracked, worn, or broken teeth.
   c. Visually inspect rear cover plate shaft bores for excessive wear or discoloration.
   d. Measure driveshaft end clearance in two locations 90 degrees apart. Clearance must be 0.0025 to 0.0106 in. (0.064 to 0.269 mm).



350-405

DRIVESHAFT END CLEARANCE

NOTE

Perform the following inspections on component parts of oil pump.

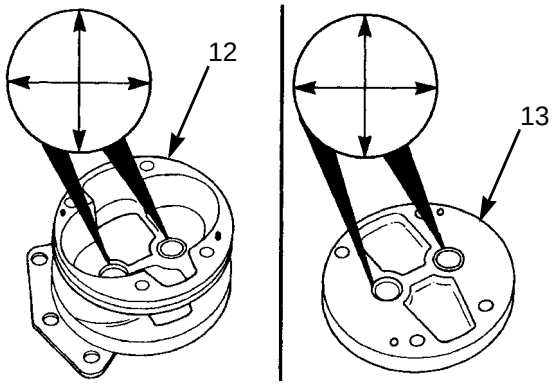
2. Visually inspect gear pockets in pump body for excessive wear or scoring. If excessive wear or scoring is found, oil pump MUST be replaced.
3. Visually inspect internal oil pump gears for cracked or broken teeth or excessive wear. If found, replace gears.

INSPECTION - CONTINUED

CAUTION

DO NOT drill or ream oil pump body and cover plate shaft bores. Failure to follow this caution will cause damage to oil pump vehicle components.

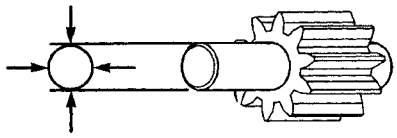
4. Measure inside diameter of shaft bores in oil pump body (12) and rear cover plate (13). Shaft bore IDs must be 0.7370 to 0.7380 in. (18.720 to 18.746 mm).



350-406

INSIDE DIAMETER, OIL PUMP AND COVER PLATE

5. Measure outside diameter of oil pump gear shafts. Shaft ODs must be 0.7350 to 0.7355 in. (18.669 to 18.625 mm). If shafts are worn past limits, replace gear shafts.

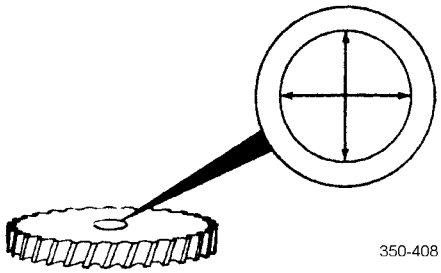


350-407

OUTSIDE DIAMETER, GEAR SHAFT

INSPECTION - CONTINUED

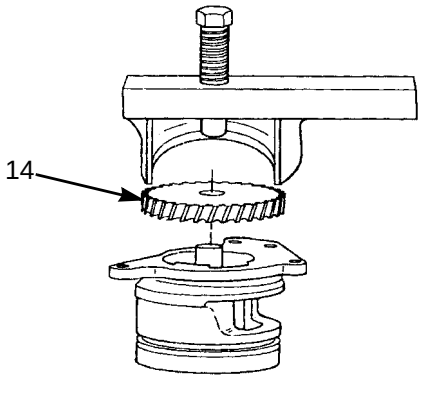
6. Measure inside diameter of drive gear bore. Gear bore ID must be 0.7323 to 07.333 in. (18.600 to 18.625 mm). If worn past limits, replace gear.



INSIDE DIAMETER, DRIVE GEAR BORE

DISASSEMBLY

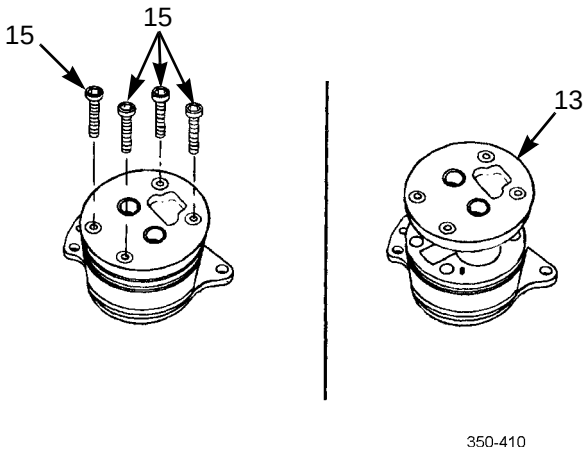
1. Use oil pump gear puller to remove main drive gear (14).



NOTE

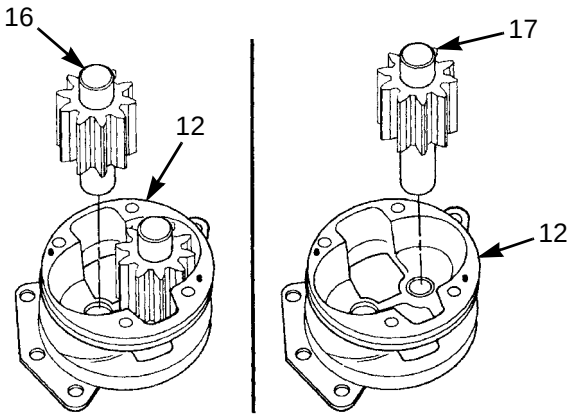
Rear cover plate is located with dowel pins. Take care not to damage or break dowels.

2. Remove four screws (15) and remove rear cover plate (13).



DISASSEMBLY - CONTINUED

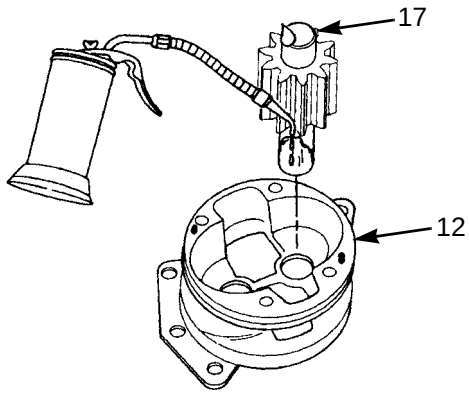
3. Remove driven gear and shaft (16) from oil pump body (12).
4. Remove drive gear and shaft (17) from oil pump body (12).



350-411

ASSEMBLY

1. Apply clean lubricating oil to drive gear and shaft (17) and install in oil pump body (12).



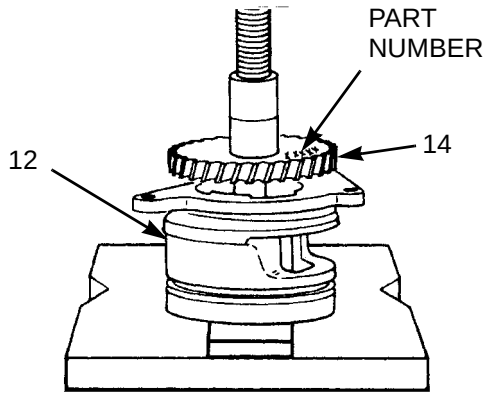
350-412

CAUTION

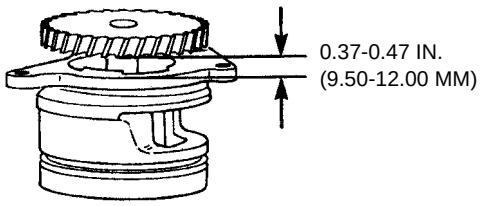
Ensure flat face of oil pump body, and not dowel pins, is resting against press table. Damage to dowel pins may occur when installing drive gear.

2. Place oil pump body (12) in press with front facing up and support driveshaft.
3. Position drive gear (14) on shaft with part number facing up.
4. Press drive gear (14) on shaft far enough to leave specified clearance. Gear-to-body clearance must be 0.37 to 0.47 in. (9.50 to 12.00 mm).

ASSEMBLY - CONTINUED



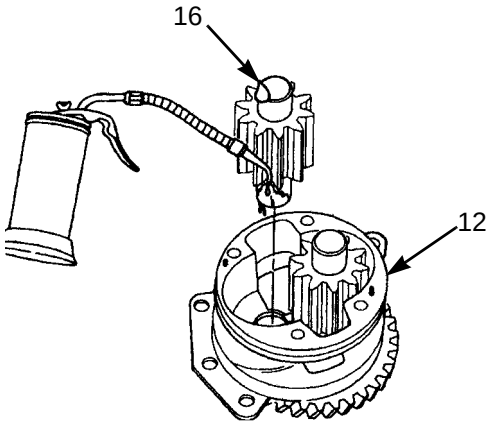
350-413



350-414

GEAR-TO-BODY CLEARANCE

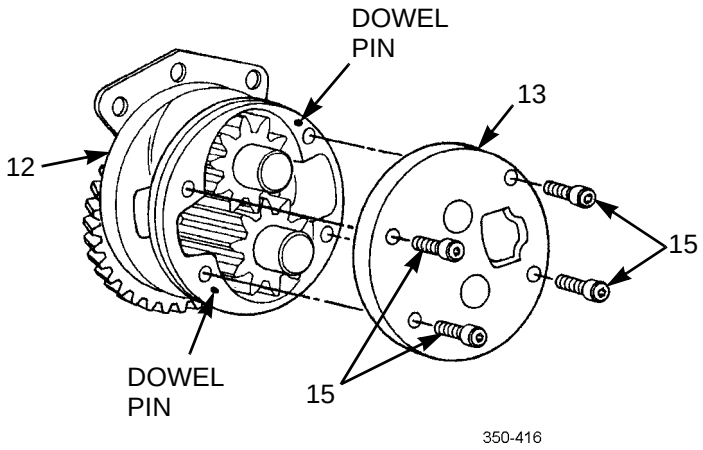
5. Apply clean lubricating oil to driven gear and shaft (16) and install into oil pump body (12).



350-415

ASSEMBLY - CONTINUED

6. Align dowel pins in oil pump body (12) with locating holes in rear cover plate (13) and secure rear cover plate with four screws (15). Alternately tighten screws to 216 lb-in. (20 Nm).



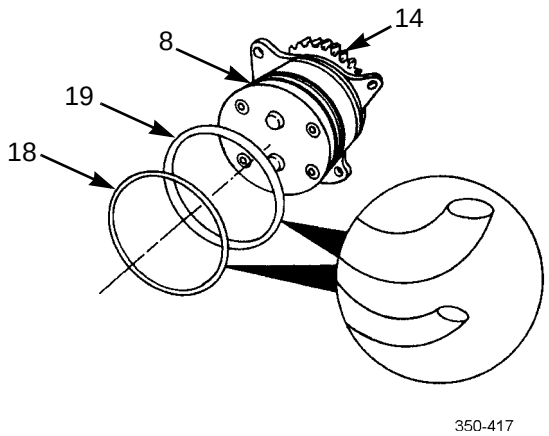
7. Verify drive gear turns freely and shaft end clearance is within specifications (refer to *Inspection*).

INSTALLATION

NOTE

- **Ensure cylinder block mounting holes and screws have been cleaned and all residue removed.**
- **DO NOT lubricate new O-rings. O-rings will swell and pump cannot be installed.**

1. Install two new O-rings (18 and 19) on oil pump assembly (8) with thickest O-ring in groove nearest drive gear (14).



2. Apply clean lubricating oil to oil pump gears.

3. Apply a thin film of grease to oil pump bore in cylinder block.

INSTALLATION - CONTINUED

CAUTION

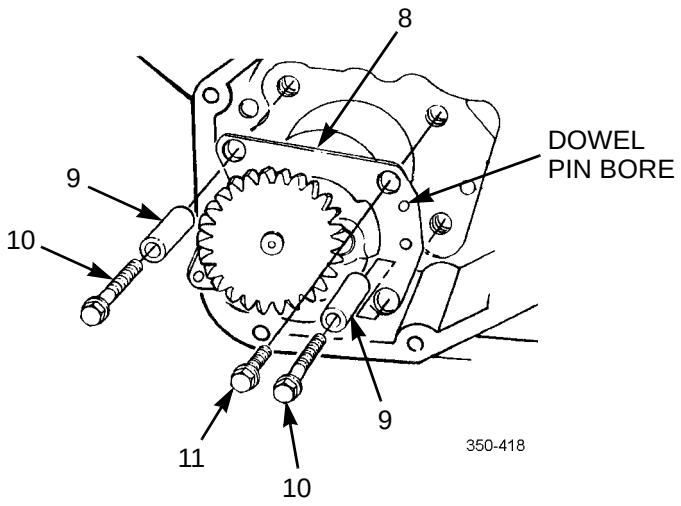
Dowel pin bore in oil pump flange must be aligned with dowel pin in cylinder block to prevent damage to oil pump flange during installation. DO NOT use mounting screws to pull oil pump into bore. This will cause damage to oil pump mounting flange.

4. Install oil pump assembly (8) by hand.

NOTE

Sealant MUST be used to coat threads of mounting screws to prevent air from being drawn past screws during operation.

5. Apply sealant to mounting screw threads. Install short screw (11) in upper right mounting location, and two longer screws (10) with spacers (9) in remaining two locations. Tighten screws to 30 lb-ft (41 Nm).



INSTALLATION - CONTINUED

CAUTION

Grooved side of rear thrust bearing must face toward gear to prevent damage to gear and engine.

6. Apply lubriplate to rear thrust bearing (2) and idler gear shaft (3).
7. Install rear thrust bearing (2) without idler gear shaft (3).
8. Align inside diameter of rear thrust bearing (2) and inside diameter of idler gear (1).

NOTE

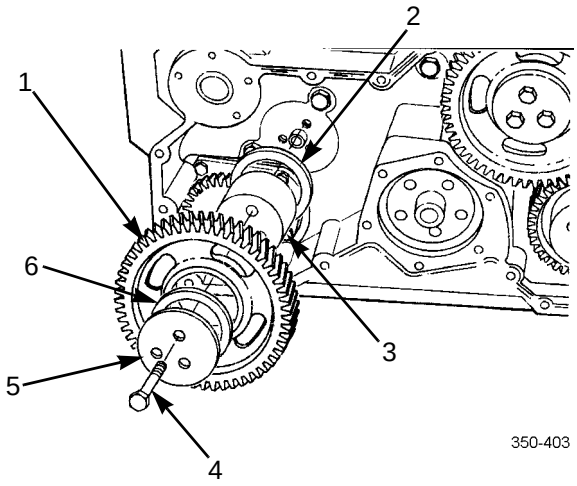
Shaft MUST pass through gear and pilot into rear thrust bearing. After installation, shaft MUST protrude from idler gear only slightly more than thickness of front thrust bearing.

9. Install idler gear shaft (3) into idler gear (1) bore.

CAUTION

Grooved side of front thrust bearing must face gear to prevent damage to gear and engine.

10. Apply lubriplate to front thrust bearing (6) and install bearing.
11. Install cover plate (5) and secure with three screws (4). Tighten screws to 45 lb-ft (61 Nm). Rotate 60 degrees and check torque.



12. Install water pump (WP 0068 00).
13. Using dial indicator, verify idler gear end clearance is 0.012 to 0.021 in. (0.30 to 0.53 mm) and backlash is 0.003 to 0.015 in. (0.08 to 0.38 mm).
14. Install front gear cover (WP 0212 00).

END OF WORK PACKAGE

FRONT GEAR HOUSING REPLACEMENT 0278 00

THIS WORK PACKAGE COVERS

Removal, Cleaning, Inspection, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Bearing Kit, Needle (Item 8, WP 0289 00)

Caliper, Vernier (Item 19, WP 0289 00)

Pin, Guide (Item 78, WP 0289 00)

Puller Kit, Universal (Item 88, WP 0289 00)

Wrench, Torque (Item 144, WP 0289 00)

Materials/Parts

Rag, Wiping (Item 30, WP 0290 00)

Sealant, Silicone (Item 34, WP 0290 00)

Solvent, Dry Cleaning, Type III (Item 36, WP 0290 00)

Bearing, Needle (P/N 3025354)

Materials/Parts - Continued

Bearing, Needle (P/N 3893919)

Seal, O-ring (P/N 3883150)

Seal, Rectangular Ring (P/N 3201659) (6)

Seal, Rectangular Ring (P/N 3820945)

Seal, Rectangular Ring (P/N 3820946)

Personnel Required

Two

Equipment Condition

Engine removed (WP 0197 00)

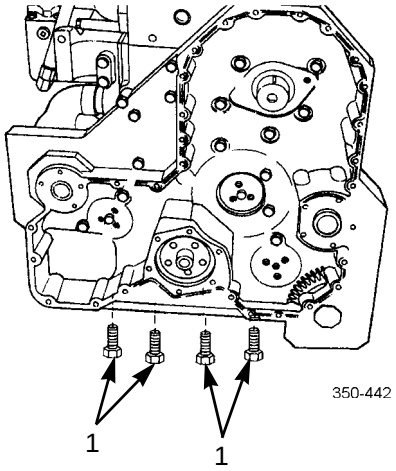
Engine position sensor removed (WP 0094 00)

Water pump removed (WP 0068 00)

Idler and camshaft drive gears removed (WP 0276 00)

REMOVAL

1. Remove four oil pan-to-gear housing screws (1).



FRONT GEAR HOUSING REPLACEMENT - CONTINUED 0278 00

REMOVAL - CONTINUED

NOTE

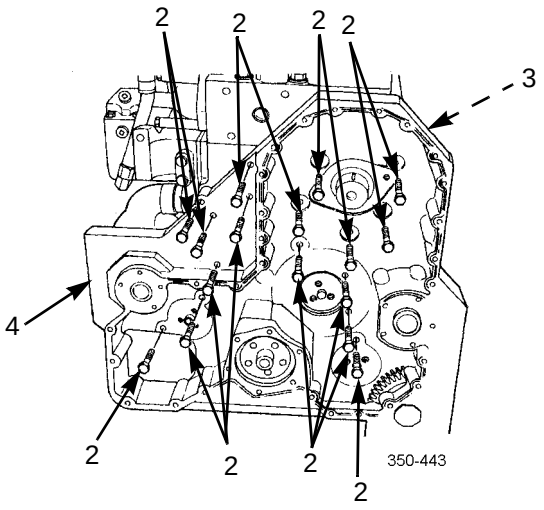
Note location and length of screws during removal to aid in installation.

2. Remove 16 flange head screws (2) securing front gear housing (4) to cylinder block (3).

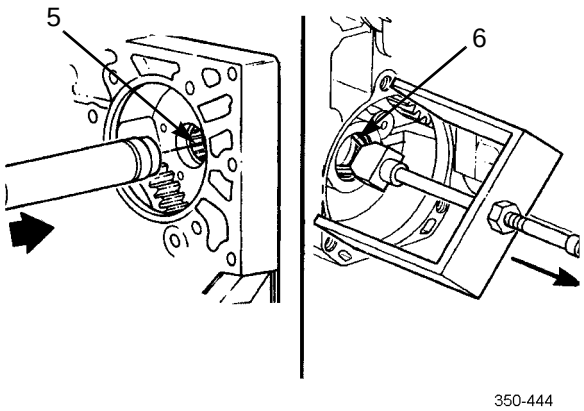
CAUTION

Take care when removing front gear housing not to damage oil pan gasket. If oil pan gasket is damaged, oil pan must be removed and gasket replaced.

3. Remove front gear housing (4) from cylinder block (3).

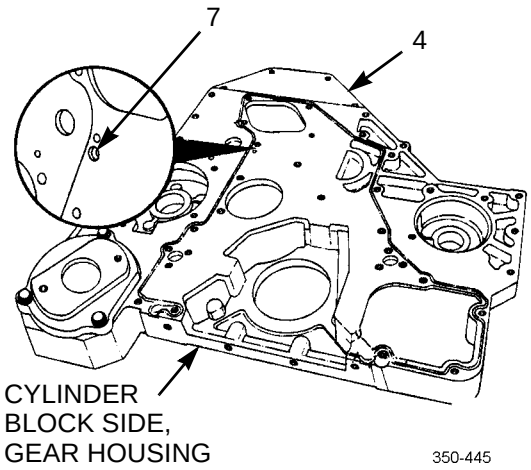


4. Use needle bearing tool to remove water pump drive needle bearing (5). Discard bearing.
5. Use needle bearing tool to remove hydraulic pump drive needle bearing (6). Discard bearing.



REMOVAL - CONTINUED

6. Remove one O-ring seal (7) and eight rectangular seals from front and back surfaces of front gear housing (4). Discard O-ring seal and rectangular seals.



CLEANING

1. Remove gasket-forming material from all mating surfaces.
2. Remove seal residue from grooves on front surface of front gear housing.

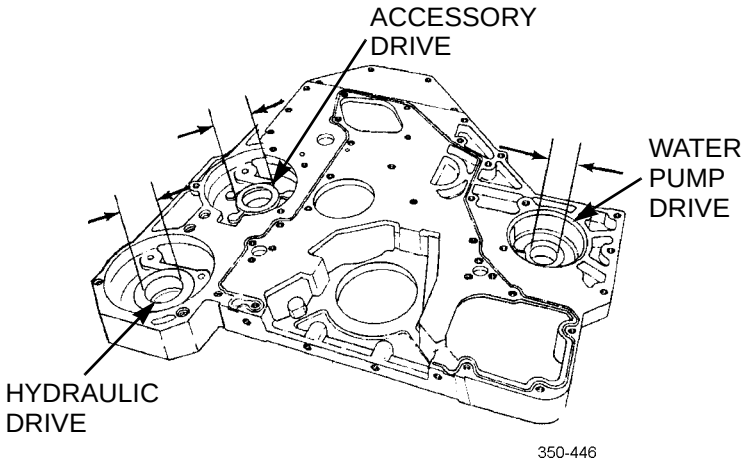


- **Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. DO NOT use near open flames or excessive heat. The solvent's flash point is 200ºF (94ºC). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.**
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.**

3. Clean front gear housing with solvent and dry with compressed air.
4. Use compressed air to clear oil jumper gallery of any obstructions.

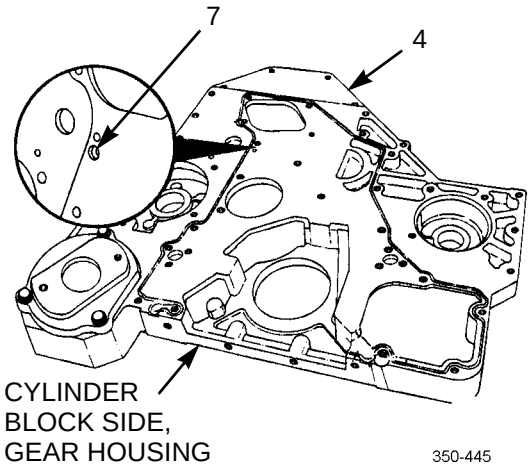
INSPECTION

1. Visually inspect front gear housing for cracks or other damage.
2. Inspect seal grooves on both sides for debris or damage.
3. Inspect O-ring groove at accessory drive oil jumper gallery for cracks or damage.
4. Measure inside diameter of bearing bores. Measurements should be as listed below. If not, replace front gear housing.
   a. Hydraulic drive: 1.6522 to 1.6532 in. (41.967 to 41.992 mm)
   b. Water pump drive: 1.4553 to 1.4564 in. (36.967 to 36.992 mm)
   c. Accessory drive: 1.7756 to 1.7766 in. (45.100 to 45.125 mm)



INSTALLATION

1. Install new O-ring seal (7) in rear of front gear housing (4) at oil jumper gallery for accessory drive support. Install eight new rectangular seals in front surface of front gear housing.



INSTALLATION - CONTINUED

2. Install two guide pins in front gear housing end of cylinder block.

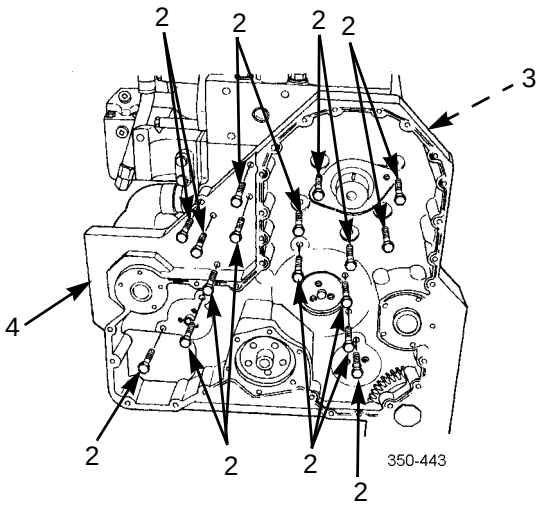
CAUTION

Avoid use of excessive amounts of sealant, which could result in blocked oil passages in engine.

NOTE

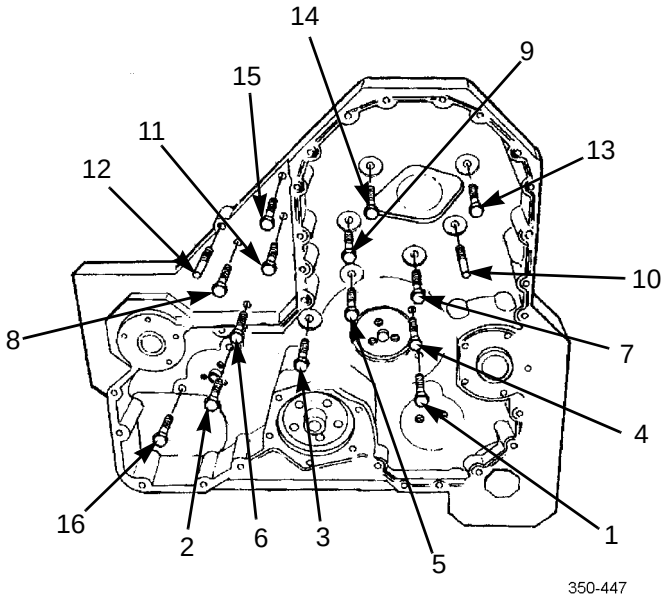
Sealant requires installation in ten minutes or less. It is best to apply sealant and immediately install front gear housing.

3. Apply sealant to areas of front gear housing (4) as follows:
   a. Apply sealant to rear of gear housing, filling groove so 1/16 to 1/8 in. (1.6 to 3.2 mm) is above block mounting surface.
   b. Apply a 1/16-in. (1.6 mm) bead of sealant to oil pan and cylinder block gear housing joint.
   c. Apply additional sealant to area by camshaft opening.
4. Install front gear housing (4) over guide pins on cylinder block (3) and install 14 flange head screws (2) as noted during removal.
5. Remove two guide pins and install two remaining flange head screws (2).



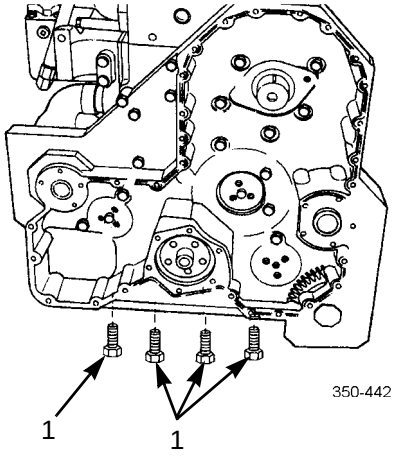
INSTALLATION - CONTINUED

6. Tighten all flange head screws (2) in sequence shown:
   a. 15 lb-ft (20 Nm).
   b. 50 lb-ft (68 Nm).



TIGHTENING SEQUENCE

7. Install four oil pan-to-gear housing screws (1). Tighten screws to 35 lb-ft (47 Nm).

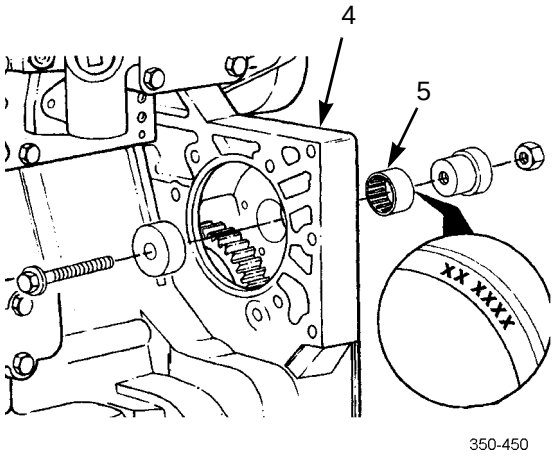


NOTE

Needle bearing MUST be installed with part number side of bearing against installation tool.

INSTALLATION - CONTINUED

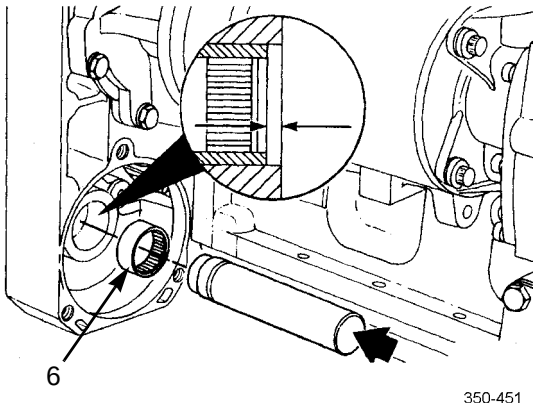
8. Install new water pump drive needle bearing (5) from front side of front gear housing (4) until needle bearing is flush with front edge of housing bore.



NOTE

Hydraulic pump drive needle bearing MUST be 0.010 to 0.030 in. (0.25 to 0.76 mm) past outside edge of front gear housing bore surface.

9. Using installation tool, gently tap new hydraulic pump drive needle bearing (6) until it comes in contact with shoulder in front gear housing.



10. Install idler gears and camshaft drive gear (WP 0276 00).
11. Install water pump (WP 0068 00).
12. Install engine position sensor (WP 0094 00).

END OF WORK PACKAGE

HYDRAULIC CYLINDER REPAIR (CAB LIFT AND SIDESHIFT) 0279 00

THIS WORK PACKAGE COVERS

Disassembly, Inspection, Assembly

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Wrench, Strap, Pipe (Item 139, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Materials/Parts - Continued

Rag, Wiping (Item 30, WP 0290 00)

Seal Kit

Personnel Required

Two

Equipment Condition

Hydraulic cylinder removed (WP 0173 00 or WP 0174 00)

NOTE

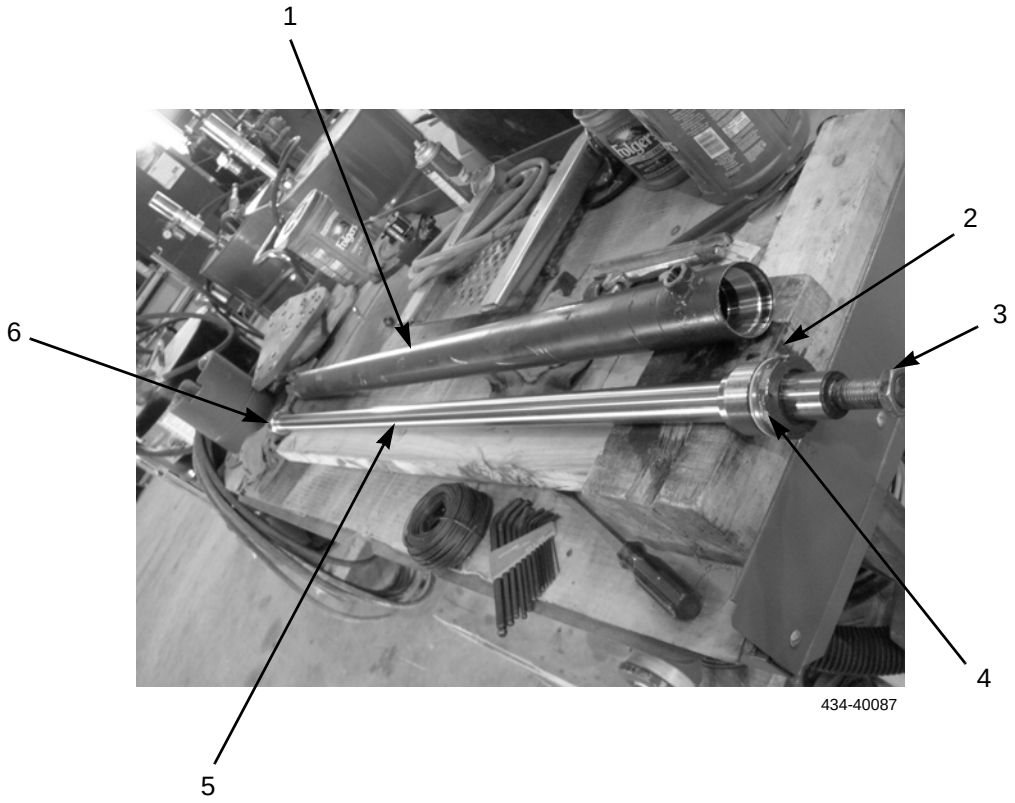
All oil cannot be drained from cylinder until it is disassembled.

DISASSEMBLY

1. Clean cylinder exterior.
2. Secure cylinder in an appropriate holding device using caution to protect painted surfaces. (A bar, through hole in clevis end of housing, will prevent cylinder from rotating while removing gland nut.)

DISASSEMBLY - CONTINUED

3. Using pipe wrench or spanner wrench, loosen and unscrew gland nut (4).
4. Slide rod (5) out of housing (1) to separate rod assembly from housing (1).
5. Remove clevis (not shown) attached to rod (5) end, by loosening locknut (3), and unscrew both to remove from rod.
6. Remove gland nut (4) from rod (5).
7. Remove all seals (2) from gland nut (4) and rod piston (6), and discard.



INSPECTION

NOTE

If any of these parts are pitted, scored, gouged, or rusted, cylinder is beyond repair and should be replaced.

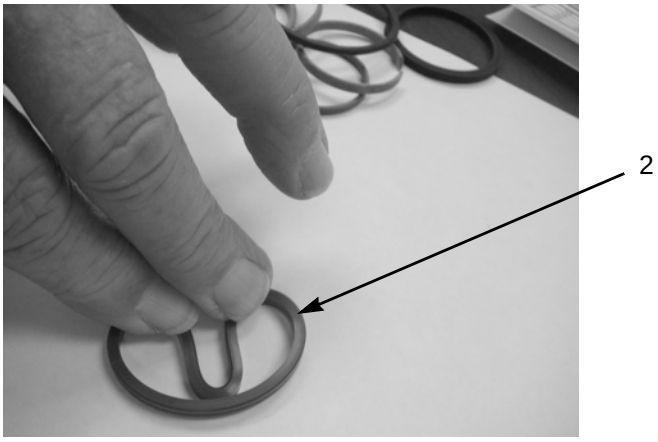
Inspect rod (5), piston (6), gland nut (4), and housing (1) for pitting, scoring, gouges, or signs of rust.

ASSEMBLY

1. Install new seals (2) on piston (6) and gland nut (4).

NOTE

- **There may be seals left over.**
- **Inner seal can be shaped as shown below to install.**



434-40088

NOTE

After installation, apply light coat of lubricating oil and run finger around interior of seal to position it.

2. Coat piston and gland nut seals (2) with lubricating oil.
3. Slide gland nut (4) onto rod (5).

CAUTION

Be careful not to damage seals when installing piston past the threads into housing.

4. Start piston (6) into housing (1) far enough to allow gland nut (4) to be started onto threads, which will align rod (5) to housing during assembly.
5. Continue to push rod (5) into housing (1), leaving about 3 in. (7.6 cm) of rod exposed.
6. Assemble locknut (3) and clevis (not shown) on rod (5) end, and tighten locknut.
7. Install hydraulic cylinder (WP 0173 00 or WP 0174 00).

END OF WORK PACKAGE

HYDRAULIC CYLINDER REPAIR (TOPHANDLER, SIDESHIFT, LEVELING, LOCKING PIN, AND FORKLIFT KIT) 0280 00

THIS WORK PACKAGE COVERS

Disassembly, Inspection, Assembly

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Materials/Parts - Continued

Kit, Seal

Personnel Required

Two

Equipment Condition

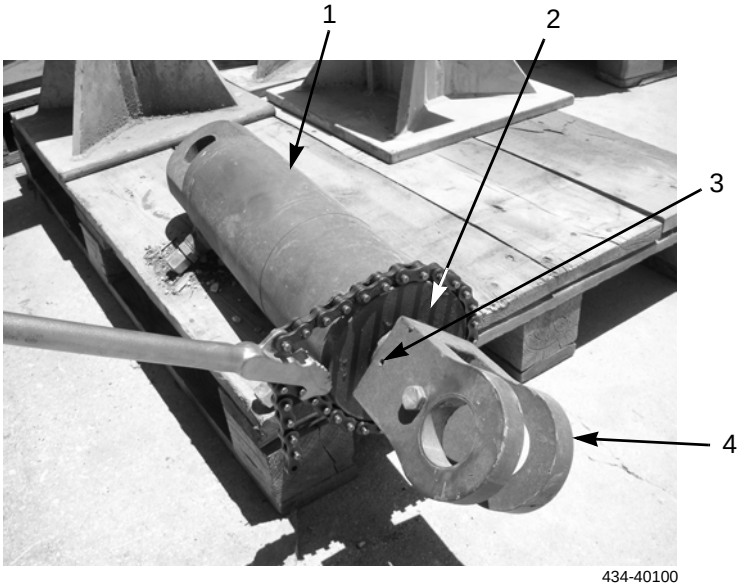
Hydraulic cylinder removed (WP 0254 00, WP 0255 00, WP 0256 00, WP 0257 00, or WP 0261 00)

NOTE

All oil cannot be drained from cylinder until it is disassembled.

DISASSEMBLY

1. Clean cylinder exterior.
2. Secure cylinder in an appropriate holding device using caution to protect painted surfaces (place a bar through hole in clevis end of housing [1]).
3. Using a chain wrench or a pin spanner wrench, loosen and unscrew gland nut (2).



434-40100

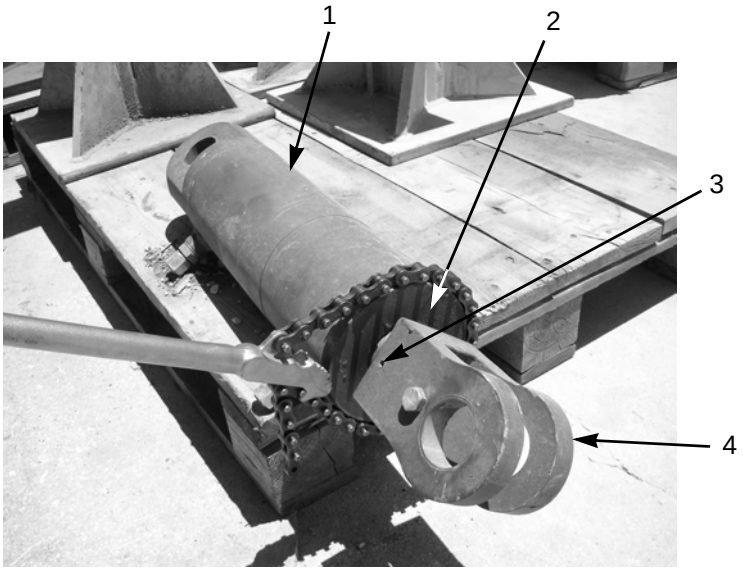
DISASSEMBLY - CONTINUED

4. Slide rod out of housing (1).

NOTE

Slide gland nut to expose flat ends of rod.

5. Remove clevis (4) attached to rod end by loosening allen set-screw (3). Unscrew clevis from rod.
6. Slide gland nut (2) off of rod.
7. Remove all seals (5) from gland nut and piston (2), and discard.



434-40100

INSPECTION

NOTE

If any of these parts are pitted, scored, gouged, or rusted, cylinder is beyond field repair and should be replaced.

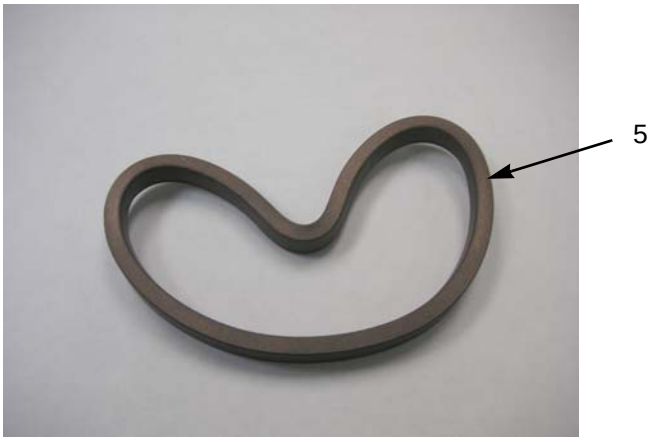
Clean and inspect rod, piston, gland nut, and housing (1) for pitting, scoring, gouges, or signs of rust.

ASSEMBLY

1. Install new seals (5) on piston and gland nut (2) and prepare for reassembly.

NOTE

Inner seal should be shaped as shown below to install.



434-40101

NOTE

After installation, apply light coat of lubricating oil and run finger around interior of seal to position it.

2. Coat piston and gland nut (2) seals with lubricating oil.
3. Slide gland nut (2) onto rod.
4. Start piston into housing (1), far enough to allow gland nut (2) to be started into threads at end of housing (1), which will align rod in cylinder during assembly.
5. Continue to push rod into housing (1), leaving about 3 in. (7.6 cm) of rod exposed.
6. Tighten gland nut (2) in housing (1), using chain wrench or pin spanner wrench.
7. Assemble clevis (4) onto end of rod and secure with allen set-screw (3).
8. Install cylinder in vehicle (WP 0254 00, WP 0255 00, WP 0256 00, WP 0257 00, or WP 0261 00).

END OF WORK PACKAGE

BOOM SUPPORT REPLACEMENT 0281 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Pan, Drain (Item 76, WP 0289 00)

Sling, Nylon (Item 112, WP 0289 00)

Wood Block, 2 x 4

Jackscrews (2)

Lifting Device, 10-ton Capacity

Materials/Parts

Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00)

Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00)

Rag, Wiping (Item 30, WP 0290 00)

Cap Set, Protective (Item 5, WP 0290 00)

Tag, Marker (Item 38, WP 0290 00)

Personnel Required

Three

References

WP 0141 00

WP 0149 00

WP 0185 00

WP 0239 00

WP 0254 00

WP 0256 00

WP 0259 00

Equipment Condition

Boom assembly removed (WP 0258 00)

Hydraulic system pressure relieved (WP 0164 00)

Parking brake applied (TM 10-3930-675-10)

Tophandler removed (WP 0189 00)

Boom locking pin in retracted position (TM 10-3930-675-10)

Cab in transport position (TM 10-3930-675-10)



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during these procedures. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

NOTE

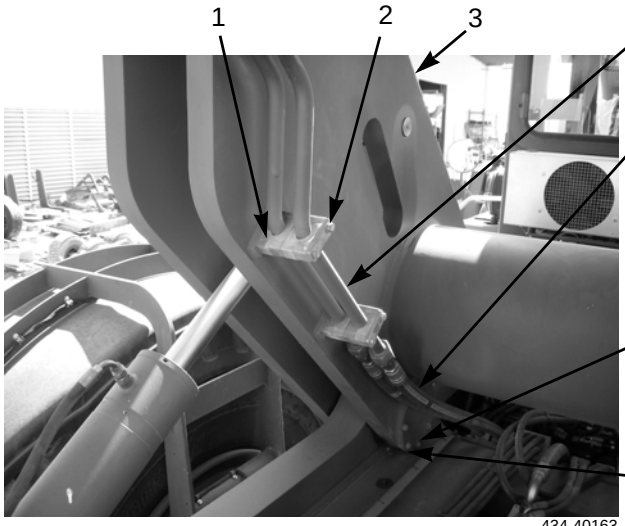
- **Boom support weighs approximately 8,000 lb (3,632 kg).**
- **Tag and mark hydraulic pipes to ensure proper installation.**

REMOVAL

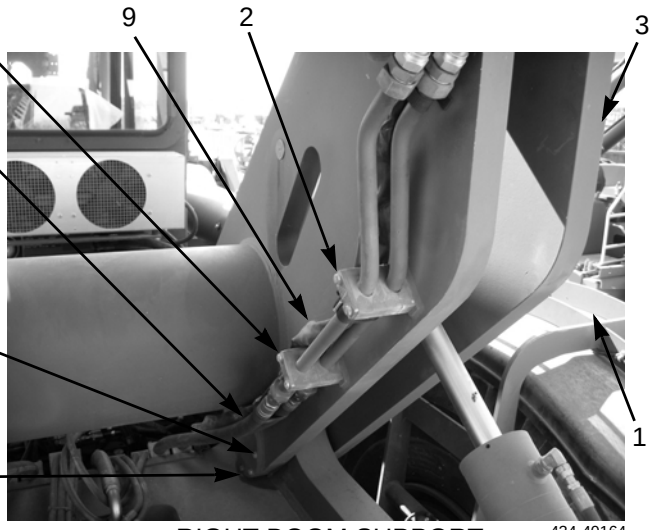
CAUTION

DO NOT sit or step on hoses or pipes. Failure to comply could cause bending damage.

1. Remove eight bolts (2) and four clamps (1) from rear of boom support (3).
2. Disconnect and cap hoses (5) and pipes (4). Lay along frame, on left and right sides. Bundle wire harness (9) and set aside.
3. Remove sixteen bolts (6), washers (7), and two cover plates (8) from inside of boom support (3).



LEFT BOOM SUPPORT

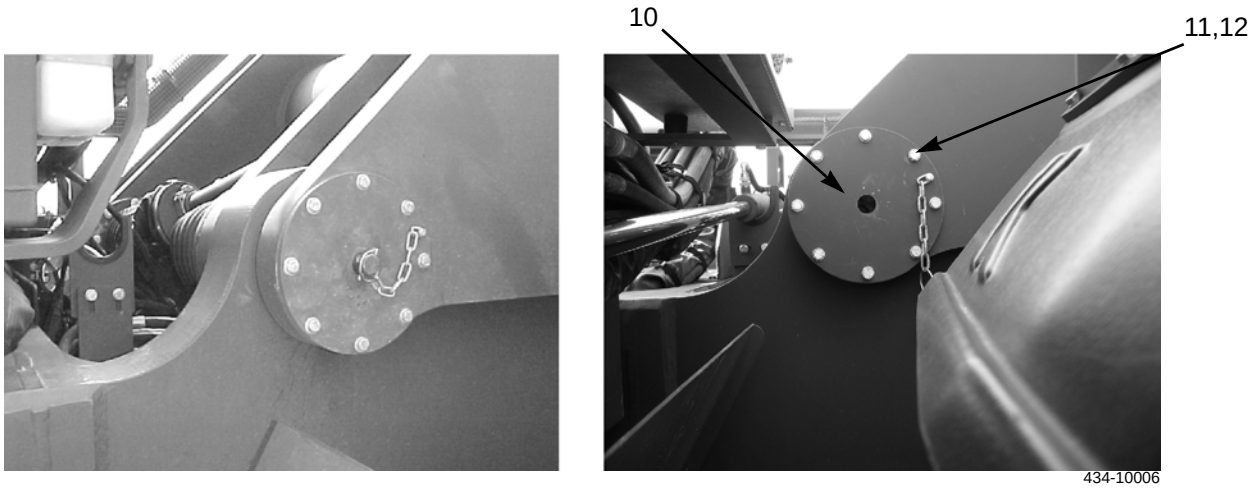


RIGHT BOOM SUPPORT

CAUTION

Wipe clean area around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

4. Remove eight bolts (11) and washers (12) from boom support and remove cover (10) from vehicle. Repeat for other side.

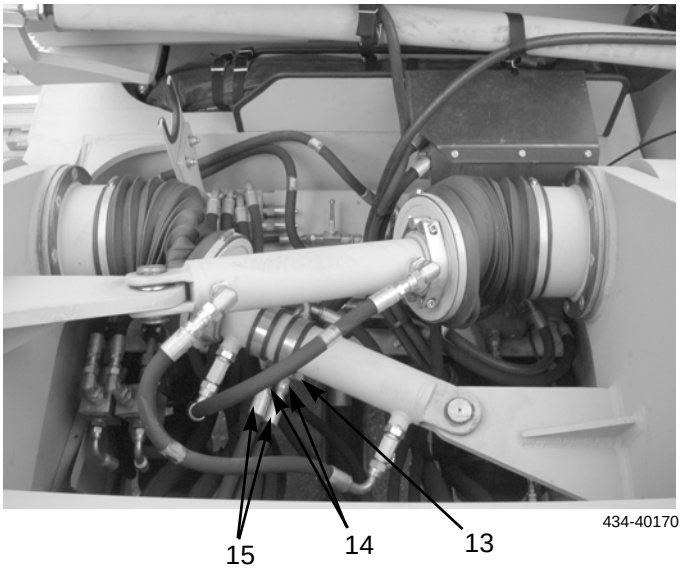


REMOVAL - CONTINUED

NOTE

Tag all hydraulic lines for installation.

5. Remove two hydraulic hoses (15) from check valve (13). Cap hoses and fittings (14).

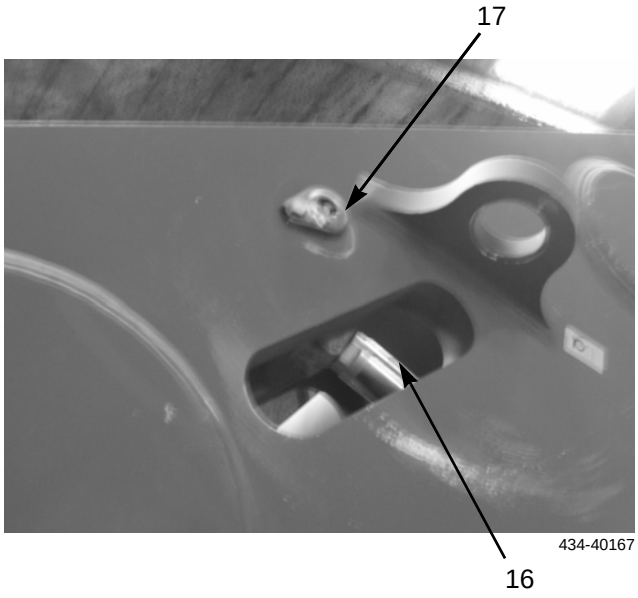


REMOVAL - CONTINUED

NOTE

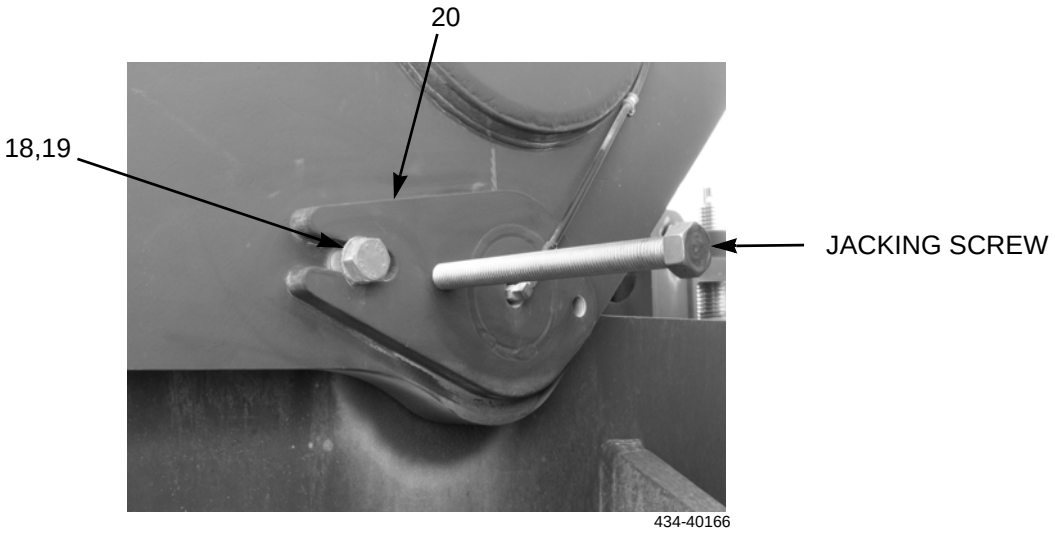
Fold boom support completely (TM 10-3930-675-10).

6. With lifting device, sling boom support assembly, before and after, right and left. Take up slack and lift boom support evenly, imposing a slight strain to allow pivot pins to be removed easily.
7. Remove autolube system from boom support (USMC ONLY) (WP 0141 00).
8. Remove upper clevis pins (17) from boom folding cylinders (16). Support cylinders with wood blocks.





9. Retract folding cylinders by operating boom folding lift/lower lever (TM 10-3930-675-10).
10. Remove screw (18) and lockwasher (19) from each boom support pivot pin (20).



REMOVAL - CONTINUED

NOTE

Clean the threads in pivot pin prior to installing jacking screws from BII.

11. Lubricate two jacking screws with lubricating oil and install one into ear of each pivot pin (20).

NOTE

- **To avoid bending pivot pin flanges, turn jacking screws in equally and alternately on both sides of vehicle. It may require two jacking screws to get pivot pins to move initially.**
- **Before removal of pivot pins, remove rear fenders and fender support brackets (WP 0149 00). This will gain clearance to remove boom pivot pins.**

12. Turn jacking screws in, to withdraw each pivot pin until clear of frame. Remove pins and set aside.



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during these procedures. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

CAUTION

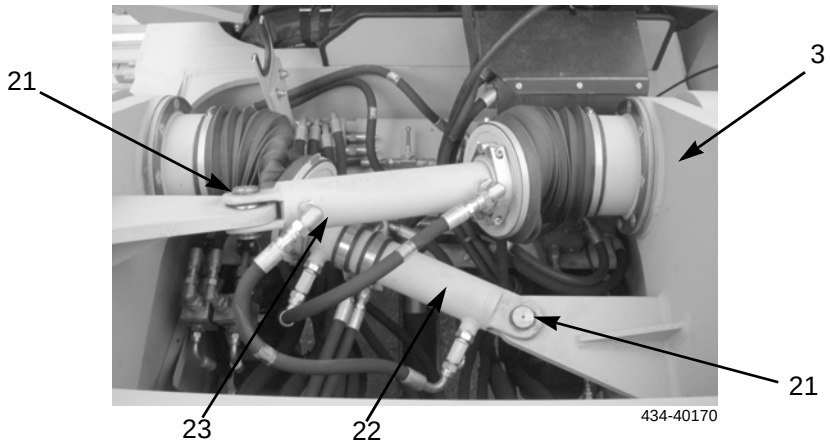
Use caution when lifting boom support assembly. Ensure assembly clears vehicle and does not contact electrical or hydraulic components. Failure to follow this caution may cause damage to support or damage to vehicle.

NOTE

Boom support weighs approximately 8,000 lb (3,632 kg).

13. Ensure all disconnected electrical and hydraulic lines are moved aside and secured. Lift boom support assembly from vehicle and remove.

14. Remove attaching pins (21) and cylinders (22 and 23) with locking pins attached, from removed boom support (3) and set aside for installation on new boom support (WP 0254 00).



INSTALLATION



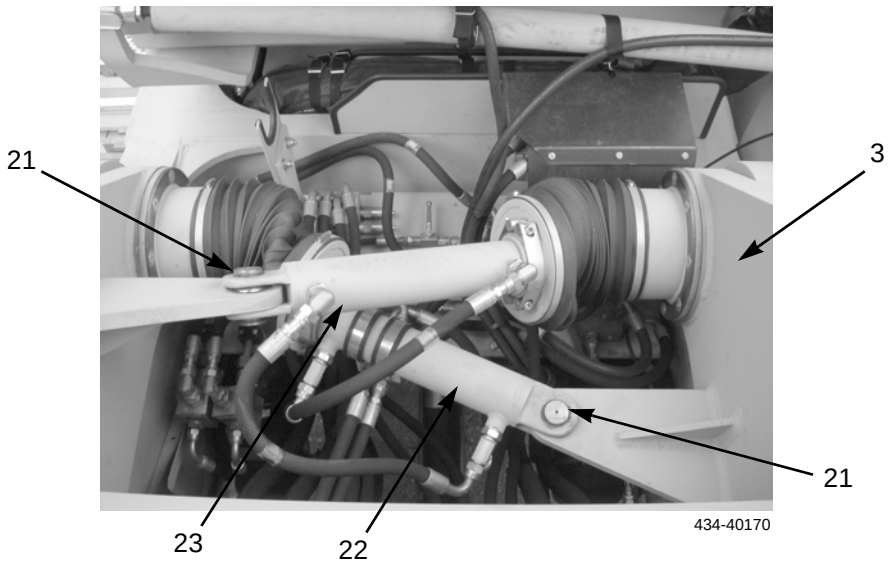
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during these procedures. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

NOTE

Boom support weighs approximately 8,000 lb (3,632 kg).

1. Install boom support locking pins, carriers, and hardware onto new boom support assembly (WP 0254 00).
2. Install cylinders (22 and 23) with locking pins attached using attaching pins (21) onto new boom support assembly (WP 0256 00).



3. Visually check condition of locking pin bushings in frame. Replace bushings if necessary (WP 0239 00).
4. Sling boom assembly, before and after, right and left, and lift boom support evenly to allow alignment of boom support assembly pivot holes to frame, while lowering boom support into place.

INSTALLATION - CONTINUED



WARNING

- **Use extreme caution when handling heavy parts. Provide adequate support and use assistance during lifting procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Stay clear of heavy parts supported only by the lifting device. Failure to follow this warning may result in injury or death to personnel.**
- **DO NOT insert hands when checking for bore alignment. The use of a straight edge will assist in aligning parts.**

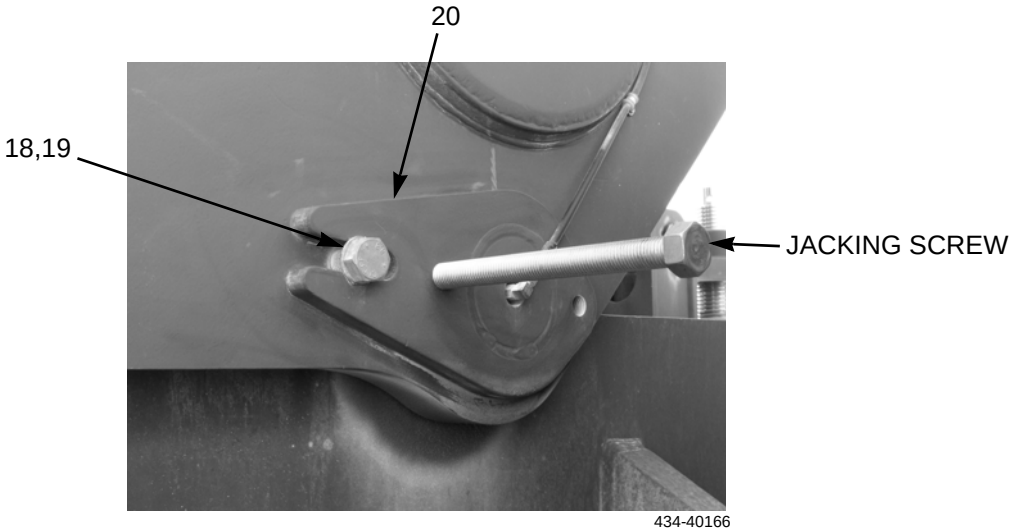
CAUTION

Use caution when lifting boom support to ensure boom support clears vehicle and does not contact electrical or hydraulic components. Failure to follow this caution may cause damage to components or to vehicle.

NOTE

- **Alignment of pin bores is critical for pin installation. Observe from inside to ensure proper alignment.**
- **Coat pins and bushings with grease before installation.**
- **Ensure pivot shafts are clean and free of burrs.**
- **When installing pivot pins, slot in pivot pin flange should be aligned with screw hole in frame.**

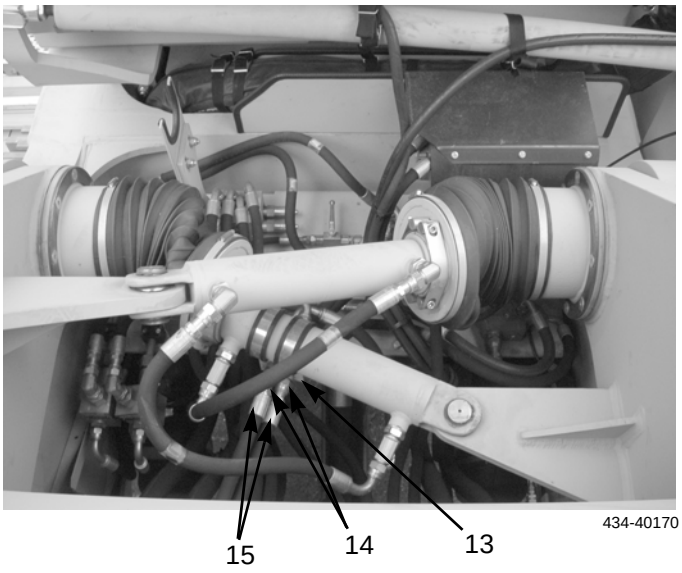
5. When aligned, install pivot pins (20) on each side of boom support through boom support and frame. Secure pivot pins with lockwashers (19) and capscrews (18).



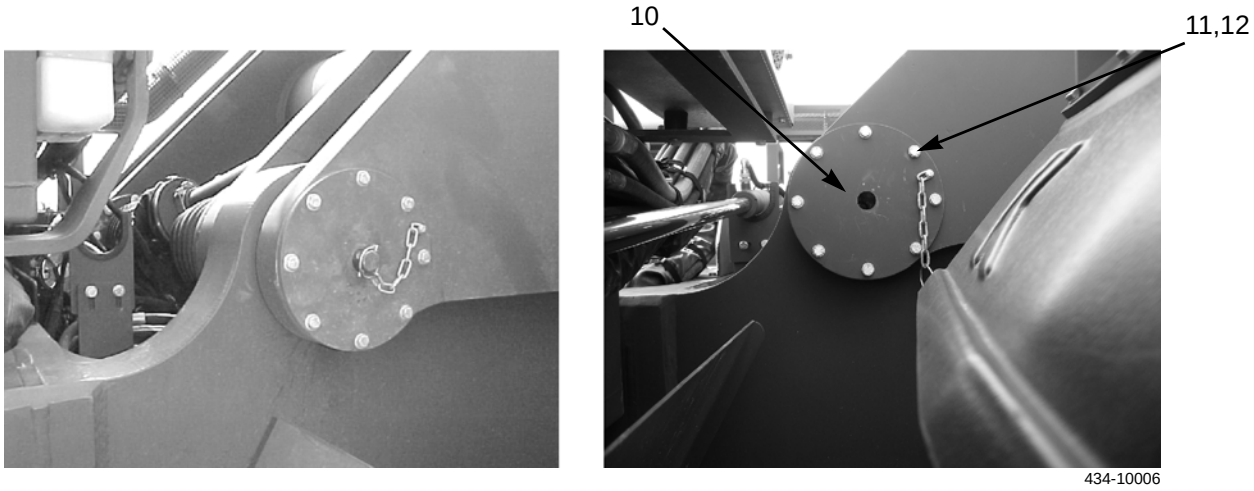
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INSTALLATION - CONTINUED

6. Connect two hydraulic hoses (15) to fittings (14) of check valve (13).

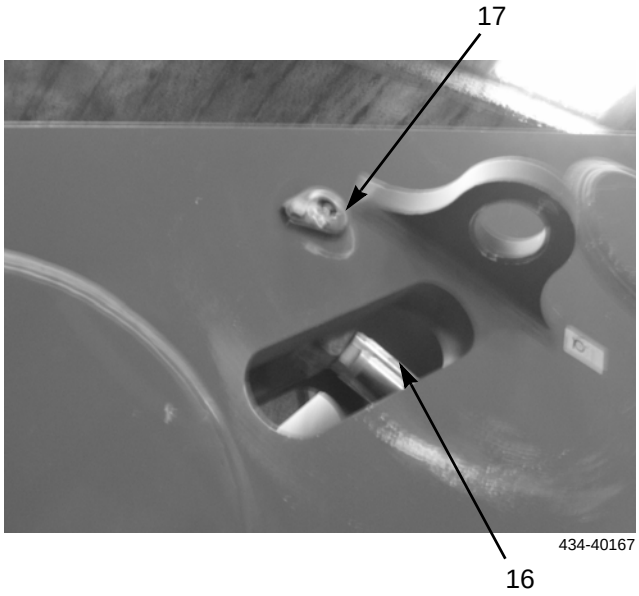


7. Start vehicle and position boom support folding cylinder rods to align bores in rod end with holes in boom support (TM 10-3930-675-10).

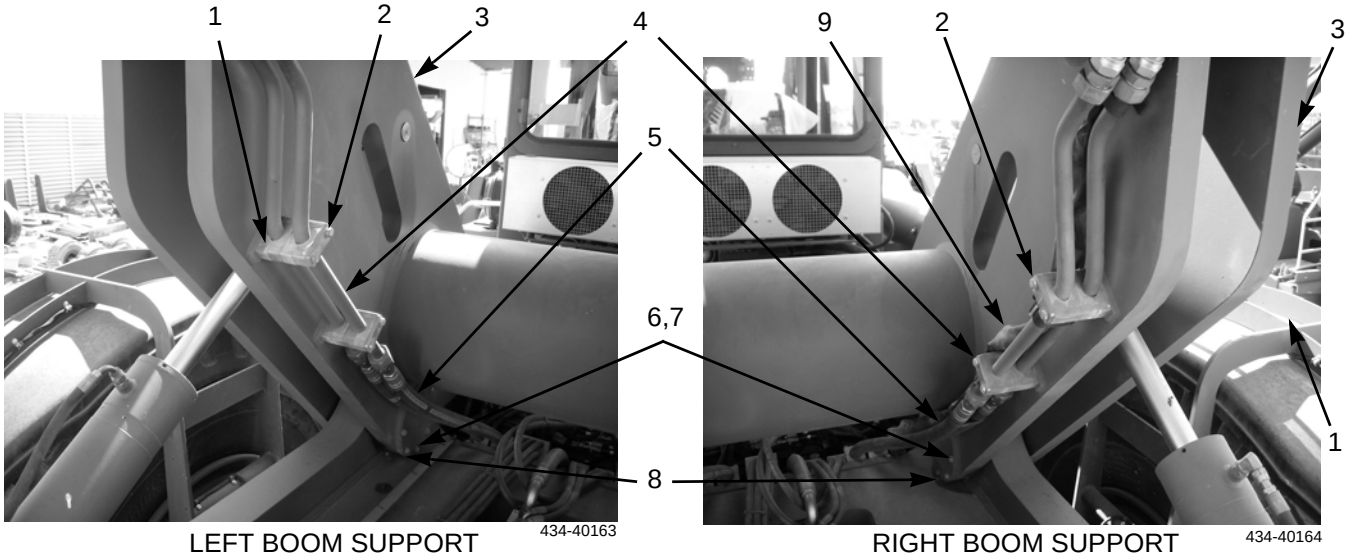


INSTALLATION - CONTINUED

8. Install pins (17) in boom support folding cylinders (16).



9. Install two cover plates (8) using sixteen washers (7) and bolts (6) on inside of boom support (3).
10. Install hydraulic hoses (5) and pipes (4) on each side of boom support (3). Attach clamps (1) and secure with eight bolts (2).
11. Raise boom support by extending folding cylinders (TM 10-3930-675-10).
12. Install and secure electrical cable (9) on right side of frame.



INSTALLATION - CONTINUED

13. Install autolube system to boom support (USMC only) (WP 0141 00).
14. Using eight bolts (11) and washers (12) install cover (10) to boom support. Repeat for other side.
15. Install rear fender and fender support brackets (WP 0149 00).
16. Install boom (WP 0258 00).
17. Install tophandler (WP 0189 00).
18. Raise boom support completely (TM 10-3930-675-10).

NOTE

Raise boom to 19 degrees and extend to 110 in. (279.4 cm). During this process, always adjust to above settings and pull center lever on boom folding valve to ensure folding cylinders are fully extended.

19. Align boom support locking pin bushing bores (WP 0254 00).

CAUTION

After bushing alignment is achieved, lubricate locking pins with GAA grease. Extend locking pins to ensure correct and smooth operation. Note sign inside of remote hydraulic control compartment. If sliding pins bind, damage to vehicle may result.

20. Calibrate boom and tophandler, servo/load system (WP 0259 00).

NOTE

Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

END OF WORK PACKAGE

PREPARATION FOR ARCTIC OPERATION 0282 00

THIS WORK PACKAGE COVERS

Preparation for Arctic Operation

INITIAL SETUP

Maintenance Level

General Support

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

Fuel, Diesel, DF-1 Grade, Winter (Item 17, WP 0290 00)

Oil, Lubricating, OEA, Arctic (Item 28, WP 0290 00)

References

TB 750-651

TM 10-3930-675-10

References - Continued

WP 0050 00

WP 0053 00

WP 0071 00

WP 0117 00

WP 0128 00

WP 0159 00

WP 0185 00

WP 0186 00

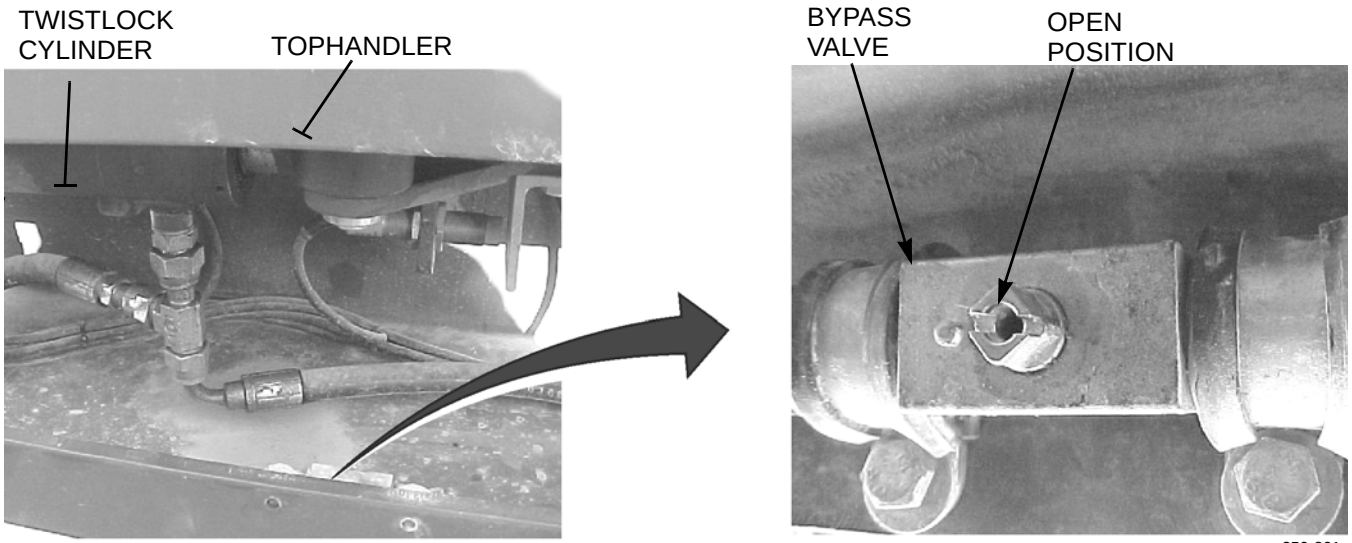
WP 0195 00

PREPARATION FOR ARCTIC OPERATION

1. Drain engine oil and replace with OEA oil. Replace engine oil filter (WP 0053 00).
2. Drain transmission oil and replace with OEA oil. Replace transmission oil filters (WP 0117 00).
3. Drain hydraulic reservoir oil and replace with OEA oil (WP 0186 00).
4. Replace all hydraulic (steering, brake, and boom) system filters (WP 0185 00 and WP 0128 00).

PREPARATION FOR ARCTIC OPERATION - CONTINUED

5. Check engine coolant to ensure safe operation at temperature range down to -50°F (-46°C) (TB 750-651).
6. Drain fuel tank. Refill with arctic grade diesel fuel (TM 10-3930-675-10).
7. Inspect engine drive belts for signs of cracking. Replace belts as required (WP 0071 00 and WP 0195 00).
8. Drain windshield washer fluid (WP 0159 00).
9. Start vehicle and allow engine to reach operating temperature (TM 10-3930-675-10).
10. Open both left- and right-side twistlock cylinder bypass valves on tophandler, by using a flat tip screwdriver to turn slotted area on valve so it is in line with fluid flow through valve.



11. Operate twistlocks at least five times, while activating override switch, to circulate hydraulic oil within twistlock cylinders (TM 10-3930-675-10).
12. Close both left- and right-side twistlock cylinder bypass valves, by turning slotted area so it is perpendicular to fluid flow through valve.
13. Perform operational check of all vehicle systems (TM 10-3930-675-10).

END OF WORK PACKAGE

PREPARATION FOR STORAGE OR SHIPMENT 0283 00

THIS WORK PACKAGE COVERS

Preparation for Short-Term Storage

Preparation for Return to Service from Short-Term Storage

Preparation for Long-Term Storage

Preparation for Return to Service from Long-Term Storage

Preparation for Shipment

NOTE

Short-term storage is storage for two weeks or less. Long-term storage is for more than two weeks.

PREPARATION FOR SHORT-TERM STORAGE

1. Thoroughly clean vehicle.
2. Perform Operator Preventive Maintenance Checks and Services (PMCS) (TM 10-3930-675-10).
3. Fill fuel tank completely to prevent condensation from forming (TM 10-3930-675-10).
4. Perform Organizational PMCS (WP 0051 00).
5. Schedule next PMCS on ULLS-G (Unit Level Logistics System – Ground).
6. Store vehicle indoors in a dry, protected area with boom fully lowered and retracted (TM 10-3930-675-10).
7. When moderate temperatures are expected, leave batteries in place. If extreme cold is expected, remove batteries (WP 0108 00) and store in a protected area.
8. Check engine coolant to ensure coolant has correct mixture for expected temperatures (TB 750-651).
9. Seal all openings in engine, including air intake, exhaust outlet, and crankcase breather tube.
10. Close cab rear window and door.
11. Ensure engine cover is installed and latched (WP 0148 00).
12. Ensure master battery switch is in OFF position (TM 10-3930-675-10).
13. Relieve hydraulic system pressure. Be sure to close evacuation valves after pressure is relieved (WP 0164 00).
14. Fill in Form DD 1397 completely and attach to a conspicuous part of vehicle.

PREPARATION FOR RETURN TO SERVICE FROM SHORT-TERM STORAGE

1. Remove seals from all engine openings, including air intake, exhaust outlet, and crankcase breather tube.
2. If removed, install batteries (WP 0108 00).
3. Check oil and hydraulic fluid levels in engine crankcase, transmission, axle differentials, wheel hub ends, hydraulic reservoir, and tophandler slewing and spreader motors (WP 0050 00).
4. Check coolant level in radiator expansion tank (TM 10-3930-675-10).
5. Start engine (TM 10-3930-675-10) and idle engine 3 to 5 minutes to allow it to warm up. Verify all indicator and warning lights operate properly on driver’s ECS display screen.
6. Ensure fuel tank is full (TM 10-3930-675-10).
7. Drive vehicle without a load and check engine, transmission, brakes, steering, and electrical accessories for proper operation (TM 10-3930-675-10).
8. Check operation of boom and tophandler (TM 10-3930-675-10).

PREPARATION FOR LONG-TERM STORAGE

1. Perform Operator PMCS (TM 10-3930-675-10).
2. Perform Organizational PMCS (WP 0051 00).
3. Schedule next PMCS on ULLS-G.
4. Thoroughly clean vehicle.
5. Inspect vehicle for corrosion. Use touch-up paint where necessary to prevent rust.
6. Store vehicle indoors in a dry, protected area with boom fully lowered and retracted and with tophandler resting on cribbing or other suitable supporting device. Exercise joystick through all positions after engine shutdown to relieve any pressure in hydraulic circuits (TM 10-3930-675-10).
7. Coat all exposed hydraulic cylinder rods with Grease, Automotive and Artillery, GAA (Item 20, WP 0290 00) to protect polished surfaces.

NOTE

If vehicle has accumulated very low mileage since its last scheduled lubrication service, DO NOT drain and refill transmission and axles; skip step 8.

8. Drain and refill transmission and axles with new oil (WP 0050 00).
9. Drain engine crankcase and refill with recommended oil (WP 0050 00).
10. Completely drain fuel tank. Mix a solution of Fuel, Diesel, DF-2 Grade (Item 18, WP 0290 00) and flushing oil per instructions supplied with flushing oil. Pour mixture into fuel tank. Run engine for at least 10 minutes on this solution.
11. Before shutting down engine, treat upper cylinders by spraying recommended engine oil into air intake for about two minutes. Open throttle momentarily, shut engine down, and continue spraying oil into air intake until engine comes to a stop.
12. Check engine coolant to ensure coolant has correct mixture for expected temperatures (TB 750-651).
13. Seal all openings in engine, including air intake, exhaust outlet, and crankcase breather tube.
14. Loosen or remove alternator drive belt and A/C compressor drive belts (WP 0071 00 and WP 0195 00).
15. Ensure master battery switch is in OFF position (TM 10-3930-675-10).
16. Remove batteries (WP 0108 00). Clean batteries and ensure they are fully charged (TM 9-6140-200-14).
17. Completely drain fuel tank.
18. Close cab rear window and door.
19. Ensure engine cover is installed and latched (WP 0148 00).
20. Place blocking under axles to remove weight from tires.
21. Relieve hydraulic system pressure. Be sure to close evacuation valves after pressure is relieved (WP 0164 00).
22. Fill in Form DD 1397 completely and attach to a conspicuous part of vehicle.

PREPARATION FOR RETURN TO SERVICE FROM LONG-TERM STORAGE

1. Ensure tires are inflated to 85 psi (586 kPa).
2. Remove blocking from under axles.
3. Remove GAA grease from exposed hydraulic cylinder rods. Wipe rods clean with a Rag, Wiping (Item 30, WP 0290 00) dipped in Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00).
4. Fill fuel tank with fuel (TM 10-3930-675-10).

PREPARATION FOR RETURN TO SERVICE FROM LONG-TERM STORAGE - CONTINUED

5. Check oil and hydraulic fluid levels in engine crankcase, transmission, axle differentials, wheel hub ends, hydraulic reservoir, and tophandler slewing and spreader motors (WP 0050 00).
6. Check coolant level in radiator expansion tank (TM 10-3930-675-10).
7. Install fully charged batteries (WP 0108 00).
8. Tighten or install alternator drive belt and A/C compressor drive belts (WP 0071 00 and WP 0195 00).
9. Remove seals from all engine openings, including air intake, exhaust outlet, and crankcase breather tube.
10. Start engine (TM 10-3930-675-10). Idle engine 3 to 5 minutes to allow it to warm up. Verify all indicator and warning lights operate properly on driver's ECS display screen.
11. Drive vehicle without a load and check engine, transmission, brakes, steering, and electrical accessories for proper operation (TM 10-3930-675-10).
12. Check operation of boom and tophandler (TM 10-3930-675-10).

PREPARATION FOR SHIPMENT

1. Follow instructions in TM 10-3930-675-10 to prepare vehicle for these transport modes:
    - Highway Transport on M1000 Trailer
    - Rail Transport
    - Marine Transport
    - Air Transport
2. Ensure RTCH transmission control lever is in Neutral (N) and parking brake is applied.
3. Ensure RTCH wheels are securely blocked and adequate tiedowns are used.
4. For rail and marine transport, seal all openings in engine, including air intake, exhaust outlet, and crankcase breather tube.
5. Check engine coolant to ensure coolant has correct mixture for expected temperatures (TB 750-651).

WARNING

Check travel route for overpass and bridge clearances. If clearances are not adequate, an accident causing injury or death to personnel or damage to equipment could result.

6. For highway transport, check state and local laws governing weight, width, and length of load.

END OF WORK PACKAGE

GENERAL MAINTENANCE INSTRUCTIONS 0284 00

GENERAL

1. These general maintenance instructions contain general shop practices and specific methods which you must be familiar with to properly maintain the RT 240 RTCH. You should read and understand these practices and methods before performing any Organizational Maintenance procedures.
2. Before beginning a task, find out how much repair, modification or replacement is needed to fix the equipment. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace damaged parts.
3. In some cases, a part may be damaged during removal. If the part appears to be good, and other parts behind it are not defective, leave it in place and continue with the procedure. Here are a few simple rules:
   a. DO NOT remove dowel pins or studs unless loose, bent, broken, or otherwise damaged.
   b. DO NOT remove bearings or bushings unless damaged. If you need to remove them to access parts behind, carefully pull out bearings and bushings.
   c. Replace all gaskets, lockwashers, locknuts, seals, cotter pins, and O-rings.
4. All tags and forms attached to the equipment must be checked to learn the reason for removal of equipment from service. Modification Work Orders (MWOs) and Technical Bulletins (TBs) must also be checked for equipment changes and updates.

WORK SAFETY

1. Before beginning a procedure, think about the safety risks and hazards to yourself and to others. Wear protective gear such as safety goggles or lenses, safety shoes, on rubber apron, or gloves.
2. Before beginning a procedure, ensure the following conditions have been observed, unless otherwise specified:
   a. Vehicle must be parked on level ground with parking brake applied or wheels chocked.
   b. Transmission must be in N (Neutral).
   c. Engine must be off.
   d. Master battery switch must be in OFF position.
   e. Components must be at operating temperature to be tested.
   f. Components which are hot at operating temperatures (i.e., cooling, exhaust, and hydraulic systems) must cool down before they are removed.



WARNING

- **DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.**
- **Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.**

3. DO NOT disconnect any hydraulic line or fitting without first relieving pressure in hydraulic lines. Follow instructions in WP 0164 00 to safely relieve pressure.
4. Immediately clean up spilled fluids to avoid slipping.
5. When lifting heavy parts, have someone help you. Ensure lifting equipment or jack is working properly, meets weight requirement of part being lifted, and is securely fastened to part.

WORK SAFETY - CONTINUED

6. Always use power tools carefully.
7. Observe all WARNINGs and CAUTIONS.

CLEANING INSTRUCTIONS

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further instructions.

1. **General.** Cleaning instructions will be the same for the majority of parts and components which make up the RTCH. The following applies to all cleaning operations:
   a. Clean all parts before inspection, after repair, and before assembly.
   b. Keep hands free of grease which can collect dust, dirt, and grit.
   c. After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled after cleaning.
2. **Castings, Forgings, and Vehicle Metal Parts.**
   a. Clean inner and outer surfaces with Detergent (Item 15, WP 0290 00) and dry with clean Rag, Wiping (Item 30, WP 0290 00).
   b. Remove grease and accumulated deposits with a scrub brush.



WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.

   c. Clear all threaded holes with compressed air to remove dirt and cleaning fluids.

CAUTION

DO NOT wash oil seals, electrical cables, and flexible hoses with dry cleaning solvent or mineral spirits. Serious damage or destruction of material will result.

3. **Oil Seals, Electrical Cables, and Flexible Hoses.** Wash oil seals, electrical cables, and flexible hoses with a solution of Detergent (Item 15, WP 0290 00) and water, and wipe dry with a clean Rag, Wiping (Item 30, WP 0290 00).
4. **Bearings.** Clean bearings in accordance with TM 9-214.

PRESERVATION OF PARTS

Unpainted metal parts that will not be installed immediately after cleaning may be covered with a thin coat of Oil, Lubricating, OE/HDO 10 (Item 26, WP 0290 00).

PAINTING

1. On painted areas where paint has been removed, paint in accordance with procedures outlined in TM 43-0139 and TB 43-0209.
2. For camouflage painting instructions, refer to FM 5-20.

INSPECTION INSTRUCTIONS

NOTE

All damaged areas should be marked for repair or replacement.

1. All components and parts must be carefully checked to determine if they are serviceable for use, can be repaired or must be scrapped.
2. Inspect drilled and tapped (threaded) holes for the following:
   a. Wear, distortion, cracks, and any other damage in or around holes.
   b. Threaded areas for wear, distortion (stretching), and evidence of cross-threading.
3. Inspect metal lines, flexible lines or hoses, and metal fittings and connectors for the following:
   a. Metal lines for sharp kinks, cracks, bad bends, and dents.
   b. Flexible lines or hoses for fraying, evidence of leakage, and loose metal fittings or connectors.
   c. Metal fittings and connectors for thread damage and worn or rounded hex heads.
4. Inspect castings, forgings, and vehicle metal parts for the following:
   a. Vehicle surfaces for nicks, burrs, raised metal wear, and other damage.
   b. Inner and outer surfaces for breaks and cracks.
5. Inspect bearings in accordance with TM 9-214.

DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

1. Keep major components together whenever possible and practical.
2. Tag hoses, electrical wires, cables, and harnesses to identify them and aid during installation.
3. Keep related parts together for identification purposes.
4. Temporarily install attaching hardware such as screws, bolts, washers, and nuts to prevent loss.
5. Only disassemble to the point of the problem.
6. Ensure parts are clean and lubricated before assembly.

REPAIR INSTRUCTIONS

CAUTION

Before welding, the following components must be disconnected to avoid damage to electronic components:

- Hydraulic servo system ECU - computer no. 790 (WP 0080 00).
- Tophandler ECU - computer no. 791 (WP 0077 00).
- Steering system ECU - computer no. 792 (WP 0080 00).
- Transmission ECU - computer no. 793 (WP 0080 00).
- Engine ECU - computer no. 794 (WP 0080 00).
- Electronic Control System (ECS) display screen - computer no. 795 (WP 0081 00).

1. Repair castings, forgings, and vehicle parts using the following instructions:
   a. Repair minor cracked castings or forgings in accordance with TM 9-237.
   b. Repair minor damage to vehicle surfaces with an abrasive cloth dipped in Detergent (Item 15, WP 0290 00).
   c. Replace any deeply nicked vehicle surface that could affect the assembly operation.
   d. Repair minor damage to threaded capscrew holes with thread tap of same size to prevent cutting oversize.
2. After repair, thoroughly clean all parts to prevent dirt, metal chips or other foreign material from entering any working parts.

LUBRICATION INSTRUCTIONS

NOTE

Refer to *PMCS Introduction* (WP 0050 00) and to *PMCS* (WP 0051 00) for detailed, illustrated instructions on proper lubrication.

Some general practices to remember:

a. Use the correct lubricant.

b. Keep lubricants clean.

c. Clean all fittings prior to lubrication.

d. Lubricate clean disassembled and new parts to prevent rust.

APPLICATION OF ADHESIVES AND SEALING COMPOUNDS

1. **General.** Adhesives are recommended in some tasks to ensure and strengthen seals. Sealing compounds are used to seal parts against moisture. The following information describes their correct use and application.

2. **Adhesive.** Adhesive provides a seal against leakage and a resistance to loosening when used in the assembly of threaded, slip-fitted, or press-fitting parts. Always use the grade of adhesive specified and never use adhesive when other retaining means are provided, such as lockwires, lockwashers, lockplates, and fasteners.

3. **Sealing Compound.**

   a. Anytime a seal is broken, the part must be thoroughly cleaned to remove any remaining sealing compound and dirt.

   b. Thoroughly clean surface before applying sealing compound.

   c. When applying sealing compound, ensure the area is completely covered. Press sealing compound into and around parts as necessary.

   d. Refer to manufacturer's instructions for time needed to set sealing compound.

STANDARD TOOL REQUIREMENTS

1. The following are general practices regarding the use of tools:

   a. Always use the proper tool kit and tools for the procedure being performed.

   b. Ensure tools are clean and lubricated to reduce wear and prevent rust.

   c. Keep track of tools. DO NOT be careless with them.

   d. Return tools to toolbox when finished with repair or maintenance.

   e. Return toolboxes and tools to tool storage when not in use.

   f. Inventory tools before and after each use.

2. Some maintenance tasks may require special or fabricated tools. The "Initial Setup" of the procedure will specify any special or fabricated tools needed to perform that procedure. Use these special tools only for the maintenance procedures for which they are designed or called out. If you are unfamiliar with a required tool, see your supervisor.

TAGGING WIRES AND HOSES

1. Use Tag, Marker (Item 38, WP 0290 00) to identify all electrical wires, fuel, oil, coolant, and hydraulic lines, and any other parts which may be hard to identify or replace later. Fasten tags to parts during removal by wrapping wire fasteners around or through parts and twisting ends together. Position tags to be out of the way during cleaning, inspection, and repair. Mark tags with a pencil, pen, or marker.

TAGGING WIRES AND HOSES - CONTINUED

2. Whenever possible, identify electrical wires with the number of the terminal or wire to which it connects. If no markings can be found, tag both wires or wire and terminal, and use the same identifying mark for both. If you cannot tag a wire because it must fit through a small hole or you cannot reach it, write down the description of the wire and the point to which it connects or draw a simple diagram on paper. Be sure to write down enough information so you will be able to properly connect the wires during assembly. If you need to identify a loose wire, look for an identifying number near end of the wire, stamped on a permanent metal tag. Compare the number to wire numbers on the appropriate electrical schematic.
3. Identify fuel, oil, coolant, and hydraulic lines when you are taking off more than one line at the same time. Mark tags with points to which lines and hoses must be connected. If it is not obvious which end of a line goes where, tag each end of the line.
4. Identify and tag other parts as required by name and installed location.

LINES AND PORTS

To keep dirt from contaminating fluid systems when removing and installing fuel, oil, coolant, and hydraulic lines, perform the following steps:

a. Clean fittings and surrounding area before disconnecting lines.
b. Cover, Cap Set, Protective (Item 5, WP 0290 00) or tape lines and ports after disconnecting lines. When these are not available, use plastic bags and rubber bands, clean Rag, Wiping (Item 30, WP 0290 00), Tape, Duct (Item 39, WP 0290 00)or other similar materials to prevent dirt from entering system.
c. Ensure new and used parts are clean before installing.
d. Wait to remove cover, cap, plug, or tape from lines and ports until just before installing lines.

HYDRAULIC HOSE CONNECTION PROCEDURES

1. Always use new O-rings where applicable. O-rings should always be installed wet. Coat O-ring with Oil, Lubricating, GO 80W/90 (Item 24, WP 0290 00).
2. Tables 1 through 4 identify and cross reference various O-rings found on the RTCH by dimensions and part numbers. These O-rings are available in a kit. The complete O-ring kit, part number 12J1037, NSN 5330-01-529-0690, is available from: Kalmar RT Center LLC, 103 Guadalupe Drive, Cibolo, TX 78108, Tel. 1-800-558-7232, 1-210-599-3478, fax 1-210-599-4009.

Table 1. Boss Type O-Rings.

DIMENSIONS (I.D. x W)	SAE No.	KRTC P/N	QTY PER KIT
0.351 x .072	AS568-904 (4)	12J1038	10
0.468 x .078	AS568-906 (4)	12J1039	10
0.644 x .087	AS568-908 (8)	12J1040	10
0.755 x .097	AS568-910 (10)	12J1041	10
0.924 x .116	AS568-912 (12)	12J1042	10
1.171 x 0.116	AS568-916 (16)	12J1043	5
1.475 x 0.118	AS568-920 (20)	12J1044	5
1.720 x 0.118	AS568-924 (24)	12J1045	5
2.337 x 0.118	AS568-932 (32)	12J1046	5

HYDRAULIC HOSE CONNECTION PROCEDURES - CONTINUED

Table 2. Flat-Face Type O-rings.

DIMENSIONS (I.D. x W)	SAE No.	KRTC P/N	QTY PER KIT
0.301 x 0.070	AS568-011 (4)	12J1047	10
0.364 x 0.070	AS568-012 (6)	12J1048	10
0.489 x 0.070	AS568-014 (8)	12J1049	10
0.614 x 0.070	AS568-016 (10)	12J1050	10
0.739 x 0.070	AS568-018 (12)	12J1051	10
0.926 x 0.070	AS568-021 (16)	12J1052	5
1.176 x 0.070	AS568-025 (20)	12J1053	5
1.489 x 0.070	AS568-029 (24)	12J1054	5

Table 3. O-ring/Retainer Type Fitting Seals.

DIMENSIONS (I.D. x W)	SAE No.	KRTC P/N	QTY PER KIT
.250	BSPP (4)	12J1119	5
.625	BSPP (6)	12J1120	6
.500	BSPP (8)	12J1121	6
.625	BSPP (10)	12J1122	2
.750	BSPP (12)	12J1123	6
1.000	BSPP (16)	12J1124	4
1.250	BSPP (20)	12J1125	3
1.500	BSPP (24)	12J1126	3

Table 4. Split Flange Type O-rings.

DIMENSIONS (I.D. x W)	SAE No.	KRTC P/N	QTY PER KIT
1.506 x .136	AS568-219 (16)	12J1127	4
2.036 x .138	AS568-225 (24)	12J1128	1

HYDRAULIC HOSE CONNECTION PROCEDURES - CONTINUED

3. Connect hydraulic hose and use a Crowfoot Attachment Set (Item 24, WP 0289 00) and appropriate torque wrench to tighten the connection.
4. Table 5 provides torque range in relation to size of hydraulic hose fitting.

Table 5. Hydraulic Hose Torque Chart.

WIDTH ACROSS FLATS IN MM	TORQUE RANGE
18	17-18 lb-ft (23-25 Nm)
21	24-28 lb-ft (33-38 Nm)
24	38-42 lb-ft (51-57 Nm)
29	59-66 lb-ft (80-90 Nm)
35	88-96 lb-ft (120-130 Nm)
41	111-125 lb-ft (150-170 Nm)
48	133-147 lb-ft (180-200 Nm)
51	147-177 lb-ft (200-240 Nm)

CAUTION

Following any hydraulic system maintenance that results in hydraulic system being opened, replacement of hydraulic reservoir return filters is required after 100 hours of operation.

5. Replace hydraulic reservoir return filters after 100 hours of operation (WP 0185 00).

FLUID DISPOSAL

Dispose of contaminated drained fluids in accordance with the Standard Operating Procedures (SOP) of your unit.

END OF WORK PACKAGE

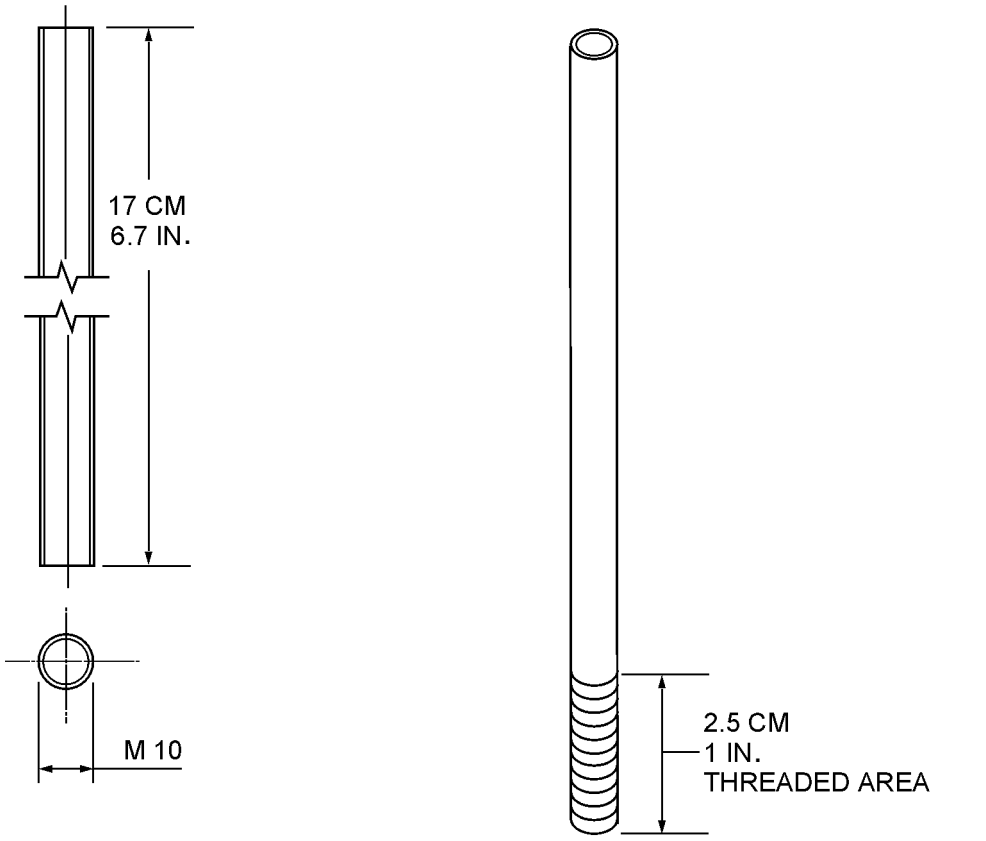
ILLUSTRATED LIST OF MANUFACTURED ITEMS 0285 00

SCOPE

1. This work package includes complete instructions for making items authorized to be manufactured or fabricated at Direct or General Support Maintenance.
2. All bulk materials needed for manufacture of an item are listed by part number or specification number.

MANUFACTURED ITEMS

Table 1. Manufactured Items.



NOTES:
1. Material: Steel Bar
2. Remove all sharp edges.

STUD, GUIDE, P/N A27255.0500 01

END OF WORK PACKAGE

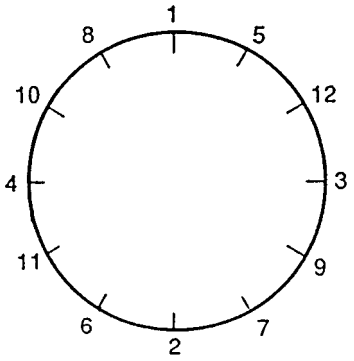
TORQUE LIMITS 0286 00

SCOPE

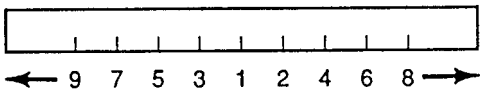
This work package lists standard torque values and provides general information for applying torque. Special torque values and tightening sequences are indicated in the maintenance procedures for applicable components.

GENERAL

1. Always use torque values listed in Table 1 when a maintenance procedure does not give a specific torque value.
2. Unless otherwise indicated, standard torque tolerance shall be ±10 percent.
3. Torque values listed are based on clean, dry threads. Reduce torque by 10 percent when engine oil is used as a lubricant. Reduce torque by 20 percent if new plated capscrews are used.
4. If the maintenance procedures do not specify a tightening order, use the following guides:
   a. Unless otherwise specified, lubricate threads of fasteners with oil (OE/HDO-10 or OEA).
   b. When tightening fasteners above 30 lb-ft (41 Nm), use the torque pattern but only tighten to 70 percent of final value (multiply final value by 0.7). Repeat pattern until final value is reached.
   c. Tighten circular patterns using circular torque pattern and tighten straight patterns using straight torque pattern.



CIRCULAR TORQUE PATTERN



STRAIGHT TORQUE PATTERN

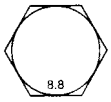
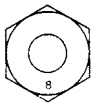
CAUTION

If replacement capscrews are of higher grade than originally supplied, use torque specifications for the original. This will prevent equipment damage due to overtorquing.

TORQUE LIMITS - CONTINUED 0286 00

GENERAL - CONTINUED

Table 1. Torque Limits.

Torque values for metric thread fasteners with lubricated* or plated threads†				
Thread Diameter-Pitch	 **Class 8.8 Bolt**	 **Class 8 Nut**	 **Class 10.9 Bolt**	 **Class 10 Nut**
	Torque: lb-ft (Nm)		**Torque: lb-ft (Nm)**	
M6 M8 M8 x 1	5 (7) 12 (16) 13 (18)		7 (9) 17 (23) 18 (24)	
M10 M10 x 1.25	24 (33) 27 (37)		34 (46) 38 (52)	
M12 M12 x 1.5	42 (57) 43 (58)		60 (81) 62 (84)	
M14 M14 x 1.5	66 (89) 72 (98)		95 (129) 103 (140)	
M16 M16 x 1.5	103 (140) 110 (149)		148 (201) 157 (213)	
M18 M18 x 1.5	147 (199) 165 (224)		203 (275) 229 (310)	
M20 M20 x 1.5	208 (282) 213 (313)		288 (390) 320 (434)	
M22 M22 x 1.5	283 (384) 315 (427)		392 (531) 431 (584)	
M24 M24 x 2	360 (488) 392 (531)		498 (675) 542 (735)	
M27 M27 x 2	527 (715) 569 (771)		729 (988) 788 (1,068)	
M30 M30 x 2	715 (969) 792 (1,074)		990 (1,342) 1,096 (1,486)	

* Kalmar recommends that all plated and unplated fasteners be coated with oil before installation.

† Use these torque values if either the bolt or nut is lubricated or plated (zinc-phosphate conversion-coated, cadmium-plated, or waxed).

END OF WORK PACKAGE

CHAPTER 6
SUPPORTING INFORMATION

REFERENCES 0287 00

SCOPE

This work package lists all forms, field manuals, technical bulletins, technical manuals, and other publications referenced in this manual and which apply to Direct and General Support Maintenance of the RTCH-RT 240.

PUBLICATIONS INDEXES

The following indexes should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this technical manual.

Consolidated Index of Army Publications and Blank Forms . . . . . .DA Pam 25-30
The Army Maintenance Management System (TAMMS) Users Manual . . . . . DA Pam 750-8
U.S. Army Equipment Index of Modification Work Orders. . . . . .DA Pam 750-10

FORMS

Refer to DA Pam 750-8, *The Army Maintenance Management System (TAMMS)* for instructions on the use of maintenance forms.

Equipment Inspection and Maintenance Worksheet . . . . . .DA Form 5988-E
Equipment Log Assembly (Records) . . . . . DA Form 2408
Maintenance Request Form. . . . . .DA Form 5990-E
Preventive Maintenance Schedule and Record . . . . . .DA Form 5986-E
Processing and Deprocessing Record for Shipment, Storage and Issue of Vehicles and Spare Engines . . . . . DD Form 1397
Product Quality Deficiency Report . . . . . SF Form 368
Recommended Changes to Equipment Technical Publications . . . . . DA Form 2028-2
Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028
Report of Discrepancy (ROD). . . . . SF Form 364
Request for AOAP . . . . . DD Form 2026, DA Form 5991-E

FIELD MANUALS

Basic Cold Weather Manual . . . . . .FM 31-70
Camouflage . . . . . .FM 5-20
Chemical, Biological, Radiological, and Nuclear Defense. . . . . .FM 21-40
First Aid. . . . . .FM 4-25. 11
Northern Operations . . . . . .FM 31-71
Operation and Maintenance of Ordnance Material in Extreme Cold Weather (0°F to -65°F) . . . . . .FM 9-207

TECHNICAL BULLETINS AND SUPPLY BULLETINS

Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment . . . . . TB 43-0209
Solder and Soldering . . . . . TB SIG 222
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems . . . . . TB 750-651
Warranty Bulletin for RT 240 RTCH . . . . . .TB 10-3930-675-14

TECHNICAL MANUALS

Chemical, Biological, Radiological, and Nuclear Defense. . . . . TM 3-220
Cooling Systems: Tactical Vehicles . . . . . TM 750-254
Inspection, Care, and Maintenance of Antifriction Bearings . . . . . TM 9-214

REFERENCES - CONTINUED **0287 00**

TECHNICAL MANUALS - CONTINUED

Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel and Related Materials, Including Chemicals . . . . . TM 9-247

Operator's, Unit, Direct Support and General Maintenance Manual for Care, Maintenance, Repair and Inspection of Pneumatic Tires and Inner Tubes . . . . . TM 9-2610-200-14

Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries . . . . . TM 9-6140-200-14

Operator's Manual for RT 240 RTCH. . . . . TM 10-3930-675-10

Operator's Manual for Welding Theory and Application . . . . . TM 9-237

Organizational Maintenance Manual for RT 240 RTCH . . . . . TM 10-3930-675-20

Painting Instruction for Field Use . . . . . TM 43-0139

Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use. . . . . TM 750-244-6

Repair Parts and Special Tools Lists for RT 240 RTCH . . . . . TM 9-2320-302-24P

OTHER PUBLICATIONS

Abbreviations and Acronyms . . . . . ASME Y14.38-1999

Army Medical Department Expendable/Durable Items . . . . . CTA 8-100

Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items) . . . . . CTA 50-970

END OF WORK PACKAGE

MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION 0288 00

THE ARMY MAINTENANCE SYSTEM MAC

1. This introduction provides a general explanation of all maintenance and repair functions authorized at the various maintenance levels under the standard Army Maintenance System concept.

2. The MAC immediately following the introduction designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown in the MAC (WP 0289 00) in column (4) as:

   Unit - includes two subcolumns, C (Operator/Crew) and O (Organizational) Maintenance

   Direct Support - includes an F subcolumn

   General Support - includes an H subcolumn

   Depot - includes a D subcolumn

3. The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

4. The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

Maintenance functions are limited to and defined as follows:

1. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.

3. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.

6. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

8. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. “Replace” is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

9. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

MAINTENANCE FUNCTIONS - CONTINUED

NOTE

The following definitions are applicable to the "repair" maintenance function:

- **Services - Inspect, test, service, adjust, align, calibrate, and/or replace.**
- **Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).**
- **Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item and to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).**
- **Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.**

10. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

11. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

EXPLANATION OF COLUMNS IN THE MAC, TABLE 1

1. **Column (1) - Group Number.** Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

2. **Column (2) - Component/Assembly.** Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

3. **Column (3) - Maintenance Function.** Column (3) lists the functions to be performed on the item listed in Column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

4. **Column (4) - Maintenance Level.** Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

C . . . . . Operator or Crew Maintenance
O . . . . . Organizational Maintenance
F. . . . . Direct Support Maintenance
L . . . . . Specialized Repair Activity (SRA)
H . . . . . General Support Maintenance
D . . . . . Depot Maintenance

EXPLANATION OF COLUMNS IN THE MAC, TABLE 1 - CONTINUED

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS CODE column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

5. **Column (5) - Tools and Equipment Reference Code.** Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.
6. **Column (6) - Remarks Code.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries (Table 3).

EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS, TABLE 2

1. **Column (1) - Tool or Test Equipment Reference Code.** The tool and test equipment reference code correlates with a code used in column (5) of the MAC.
2. **Column (2) - Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.
3. **Column (3) - Nomenclature.** Name or identification of the tool or test equipment.
4. **Column (4) - National Stock Number (NSN).** The NSN of the tool or test equipment.
5. **Column (5) - Tool Number.** The manufacturer's part number, model number, or type number.

EXPLANATION OF COLUMNS IN THE REMARKS, TABLE 3

1. **Column (1) - Remarks Code.** The code recorded in column (6) of the MAC.
2. **Column (2) - Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

Table 1. MAC for the RT 240 RTCH.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
01	**ENGINE**								
0100	Engine Assembly	Inspect	0.5						
		Test		1.5	2.0				
		Service		2.0				107,128	
		Replace			36.0			37,106,107, 117,128	A
		Repair		4.0	4.0	95.5		78,80,106,107, 108,116,117, 128	
	Engine Mounts	Inspect		1.1					
		Replace			12.0			106,128	
	Lifting Bracket	Replace			1.0			106,128	
0101	Crankcase, Cylinder Block, and Head								
	Cylinder Block	Replace				4.0		106,107,128	
		Repair				30.0		28,29,30, 35,37,41, 42,51,60, 71,80,94, 106,107,116, 117,128	
	Cylinder Head Assembly	Inspect			0.5				
		Replace			2.0			10,38,107, 128,131	
		Repair				8.0		18,23,32, 34,36,43, 57,59,63, 68,97,101, 108,125,128	
0102	Crankshaft Assembly								
	Crankshaft	Replace				8.0		58,80,91,95, 106,107,109, 116,128	
		Repair			2.0	16.0		106,107,128	
	Vibration Damper	Replace			2.0			7,58,77 107,128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
01	**ENGINE - Continued**								
0103	Flywheel Assembly								
	Flywheel	Replace			2.0			6,7,58,77, 107,109,128	
	Flywheel Housing	Replace			4.0			4,7,40,77,106, 108,109,128	
	Main Seals	Replace			4.0			107,108,128	
0104	Piston and Connecting Rod Assemblies								
	Pistons, Pins, and Rings	Replace				35.0		18,22,33,79, 80,106,107, 116,128	D
	Connecting Rods and Bearings	Replace				35.0		18,22,33,79, 80,106,107, 116,128	D
0105	Valves, Camshaft, and Timing System								
	Rocker Arm Assemblies	Inspect			1.0			128	
		Replace			4.0			106,107,108, 128	
		Repair			1.5			106,128	
	Rocker Arm Cover	Replace		1.0				108,128	
	Gear Housing	Inspect				1.0		8,78,88,106, 107,128	D
		Replace				3.0		8,78,88,106, 107,128	D
	Camshaft Assembly	Inspect				1.0		128	D
		Replace				4.0		52,58,87, 106,107,128	D
	Camshaft Drive Gear	Inspect				0.5		128	D
		Replace				2.0		52,58,87, 106,107,128 64,106,128	D
	Cam Follower	Inspect				1.0		64,106,128	D
		Replace				3.0		64,106,128	D

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
01	**ENGINE - Continued**								
0106	Engine Lubrication System								
	Oil Pan	Inspect		0.7					
		Replace			4.0			106,107,128	
	Oil Filter	Replace		0.5				107,128,137	
	Oil Filter Head	Replace			2.0			106,107,120, 128	
	Oil Pump Assembly	Replace				4.0		58,106,107, 128	D
	Oil Hoses, Tubes, and Fittings	Replace		2.0				128	
	Oil Sampling Valve	Replace		0.5				128	
0108	Manifolds								
	Exhaust Manifold	Replace			3.0			78,107,128	
	Intake Manifold	Replace			3.0			107,128	
0109	Accessory Drive								
	Gear Housing Cover	Replace			3.0			107,108,128	
	Idler/Drive Gears/ Pulleys/Housing	Replace			4.0	4.0		16,31,58, 62,86,106,107, 128	D
03	**FUEL SYSTEM**								
0301	Fuel Injector								
	Injector	Adjust			2.0			2,3,106,107, 128,139	
		Replace			1.5			85,107,128	
0302	Fuel Pumps								
	Fuel Pump	Replace			4.0			107,128	
		Repair		1.0		4.0			D
	Hoses, Lines, and Fittings	Inspect		0.5					
		Replace		2.0				128	
	Fuel Solenoid Shutoff Valve	Replace		2.5				108,128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
03	**FUEL SYSTEM - Continued**								
0304	Air Cleaner								
	Air Cleaner Assembly and Element	Inspect	0.3						
		Service	0.5						
		Replace		1.0				128	
		Repair		0.5				128	
	Air Intake Hose and Tube Assembly	Replace		1.0				128	
0305	Turbocharger	Inspect			1.0			128	
		Replace			2.0			39,107,128	
0306	Fuel Tank	Inspect		1.0				108	
		Replace			8.0			112,128	
0309	Fuel Filter/Water Separator	Service	0.5						
		Replace		0.7				128,137	
0311	Engine Starting Aid	Service		0.4				128	
		Replace		1.5				128	
		Repair		0.5				128	
0312	Throttle Position Sensor (Accelerator Pedal)	Replace		1.5				128	
04	**EXHAUST SYSTEM**								
0401	Muffler	Inspect		0.5					
		Replace		3.0				128	
	Exhaust Pipe	Inspect		0.5					
		Replace		3.0				128	
05	**COOLING SYSTEM**								
0501	Radiator								B
	Radiator Assembly	Inspect	0.5	1.0					
		Service		1.0				128	
		Replace			8.0			128	
		Repair			2.0	8.0		107,128	
	Expansion Tank	Service	0.5						
		Replace		1.5				128	
0503	Thermostat	Replace		1.5				107,128	
	Hoses	Replace		1.5				128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
05	**COOLING SYSTEM - Continued**								
0504	Water Pump	Replace			3.0			98,99,104, 107,128	
0505	Fan Motor	Replace			3.0			128	
0508	Coolant Filter	Replace		0.7				128	
06	**ELECTRICAL SYSTEM**								
0601	Generator/Alternator								
	Generator/Alternator Assembly	Test Replace		0.7 1.5				107 107,128	
	Drive Belt	Inspect Adjust Replace	0.7	 1.0 1.5				 9,107,128 107,128	
0603	Starter								
	Starter Assembly	Test Replace Repair		1.0 1.7		 6.0		107 107,128	 D
0607	Instrument Panel								
	Instrument Panel Switches, Gages, and Indicators Lights	Inspect Replace	0.5	 1.0				 103,107,128	
	Fuse, Relay, and Circuit Breaker	Replace		1.5				128	
	Proximity Switches	Adjust Replace		0.8 1.5				128 103,107,128	
	Transmission Shift Control Lever	Inspect Replace	0.5	 2.0					
0608	Miscellaneous Electrical Components								
	Cables	Replace		1.0				56,128	
	Distribution Box	Replace Repair		1.0 1.5	3.0			103,128 128	
	Temperature and Pressure Sensors/ Switches	Test Replace		0.7 1.5				108 128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
06	**ELECTRICAL SYSTEM - Continued**								
	Electronic Control Units and Modules	Calibrate		1.0					
		Replace		2.0				108,128	A
		Repair				1.0			D
	Electronic Joystick Assembly and Wiring Harness	Replace		1.5				128	
0609	Lights								
	Headlights and Backup Light	Replace		0.7				108,128	
		Repair		0.5				108,128	
	Taillights	Replace		0.7				108,128	
		Repair		0.5				108,128	
	Blackout Lights	Replace		0.7				108,128	
	Side Marker Lights	Replace		0.7				108,128	
	Turn Signal Lights	Replace		0.7				108,128	
	Worklights	Replace		0.7				108,128	
		Repair		0.5				108,128	
	Interior Light	Replace		0.5				128	
		Repair		0.3				128	
	IR Lights	Replace		0.5				108,128	
0610	Sending Units, Sensors, Warning Switches								
	Oil Pressure Sensor	Replace		1.0				128	
	Oil Temperature Sensor	Replace		1.0				128	
	Water Temperature Sensor	Replace		1.0				128	
	Engine Sensors	Replace		1.5				61,107,113, 128	
	Hydraulic Filter Indicator Sensors	Replace		1.5				24,103,128	
	Transmission Sensors	Replace		1.5				107,128	
	Fuel Level Sending Unit	Replace		0.8				128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
06	**ELECTRICAL SYSTEM - Continued**								
	Boom Angle Sensor	Inspect		0.5				128	
		Calibrate		0.5					
		Replace		1.0				128	
	Boom Extension Sensor	Inspect		0.5				128	
		Calibrate		0.5					
		Replace		1.0				128	
	Tophandler Angle Sensor	Inspect		0.5					
		Calibrate		0.5					
		Replace		1.0				128	
0611	Horn and Alarms								
	Electric Horn	Replace		1.0				128	
	Backup Alarm	Replace		0.7				128	
0612	Batteries								
	Batteries	Inspect	0.2						
		Test		1.0				107	
		Service		1.0				107,108,128	
		Replace		1.7				107,108,128	C
	Cables	Inspect	0.4						
		Replace		1.0				108,128	
	Master Battery Switch	Replace		0.9				128	
	Slave Receptacle	Replace		1.0				128	
0613	Electrical Wiring Harnesses								
	Engine and Transmission Harness	Test		3.0				108,128	
		Replace				14.0			
		Repair		2.0		4.0		107,128	D
	Instrument Panel Harness	Test		2.0				107,128	
		Replace		4.0				128	
	Cab Harness	Test		1.5				107,128	
		Replace		8.0				128	
	Cab to Chassis Harness	Test		2.5				107,128	
		Replace			14.0				D
	Boom and Tophandler Harness	Test		2.0				107,128	
		Replace			6.0			103,128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
07	**TRANSMISSION**								
0700	Transmission Assembly	Inspect	0.5						
		Service		1.0				107,128	
		Replace			55.0			106,107,128	A
		Repair		2.0	4.0	65.0			D
	Hoses	Replace		4.5				128	
0705	Transmission Shifting Components								
0708	Torque Converter	Replace			2.0			107,128	A
0721	Filters, Breathers, and Coolers								
	Oil Filters	Replace		1.5				107.128	
	Oil Cooler Assembly	Replace		4.0				107,128	
	Hoses	Replace		3.5				107,128	
	Oil Sampling Valve	Replace		0.5				128	
09	**PROPELLER AND PROPELLER SHAFTS**								
0900	Propeller Shafts	Inspect		0.7					
		Replace		2.0				107,128	
	Universal Joints	Inspect		0.5					
		Service		0.7				107	
		Replace		2.0				107,108,128	
10	**FRONT AXLE**								
1000	Front Axle Assembly	Inspect		0.7					
		Service		2.0				107,128	
		Replace			24.0			106,107,128	A
		Repair				48.0			D
	Front Kingpin	Replace				27.5			D
		Repair				8.0			D
1002	Front Differential	Service		2.0		32.0		107,128	
		Replace				12.0			D
		Repair							D

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
09	**PROPELLER AND PROPELLER SHAFTS - Continued**								
1003	Front Planetary Wheel Ends	Service		1.5		26.0		107,128	
		Replace				25.0			D
		Repair							D
11	**REAR AXLE**								
1100	Rear Axle Assembly	Inspect		0.7					
		Service		2.0				107,128	
		Replace			21.0			105,111,126, 128	A
		Repair				65.0			D
	Rear Kingpin	Replace				22.0			D
		Repair				8.0			D
1102	Rear Differential	Service		2.0				107,128	
		Replace				32.0			D
		Repair				12.0			D
1103	Rear Planetary Wheel Ends	Service		1.5				107,128	
		Replace				26.0			D
		Repair				25.0			D
12	**BRAKES**								
1201	Parking Brake								
	Brake Cylinder	Replace			2.5			106,128,139	
		Repair				2.5		106,128,139	D
	Brake Pads Front/Rear	Inspect		0.5				107,128,139	
		Adjust		1.0				107,128,139	
		Replace		2.0					
1202	Services Brakes								
	Front Brake Pads	Inspect			1.5			41,128	
		Replace				1.5			D
	Rear Brake Pads	Inspect			1.5			41,128	
		Replace				1.5			D
1204	Hydraulic Brake System								
	Brake Control Valves	Inspect		1.5					
		Replace		2.0				128	
	Accumulators	Service			1.5			69,107,128	
		Replace			2.5			107,108,128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
12	**BRAKES - Continued**								
	Brake Hoses, Lines, and Fittings	Inspect		1.5					
		Replace		2.5				107,128	
	Brake System Cooling Filters	Replace		1.5				107,128	
1206	Mechanical Brakes	Replace		4.0				128	
13	**WHEELS**								
1311	Wheel Assembly	Inspect	0.5	0.5					
		Replace			5.0			20,107,128, 132,136	
		Repair				3.0			G
	Bogie Wheels and Tires	Replace			14.0				
		Repair			4.0				
	Dolly Wheels and Tires	Inspect	0.5	0.5					
		Replace			2.5			107,112,128	
		Repair			3.0			107,112,128	E
1313	Tires, Tubes, Tire Chains	Replace			4.0			107,128	
14	**STEERING**								
1401	Mechanical Steering								
	Steering Wheel	Replace		0.5				128	
	Adjustable Steering Column	Inspect	1.0						
		Replace		4.0				128	
		Repair			2.0			128	
1410	Hydraulic Steering System								
	Tophandler and Steering Hydraulic Pump Assembly	Adjust			1.0			128	
		Replace			8.0			107,112,128	A,F
		Repair				28.0			D
	Emergency Steering Pump	Replace			4.0			107,108,128	F
1411	Hoses, Lines, and Fittings	Replace		4.5				107,128	F
1412	Front Steering Cylinders	Replace		1.5				107,128	F
		Repair				16.0			D

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
14	**STEERING - Continued**								
	Rear Steering Cylinders	Replace		2.0					
		Repair				4.0			
1414	Steering System Valves and Accumulator								
	Steering Control Valves	Replace			6.0			107,112,128	F
	Accumulator	Service			1.5			106,128	
		Replace			2.5			107,128	
	Steering Sensor	Replace		2.5				128	
15	**FRAME ASSEMBLY**								
1501	Frame Components	Inspect			1.5				
	Skid Plates and Access Covers	Replace		2.5				107,128	
	Wear Plates	Inspect		1.0				128	
		Replace		2.5				107,128	
1503	Pintle Hook	Inspect	0.2						
		Service	0.2						
		Replace		0.5				108,128	
1507	Bogie Wheel Frame	Replace		8.0				128	
18	**BODY, CAB, AND HOOD**								
1801	Cab Assembly	Inspect	1.0						
		Replace				22.0			D
		Repair				30.0			D
	Cab Support Frame	Replace		4.0					D
		Repair				32.0			D
	Cab Lift Frame	Replace		4.0				112,128	
		Repair		1.0				128	
	Cab Door	Replace			2.5			128	
		Repair			1.5			128	
	Right Side Step	Replace		5.0				128	
		Repair		2.5				128	
	Left Side Step	Replace		12.0				128	
		Repair		1.0				128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
18	**BODY, CAB, AND HOOD - Continued**								
	Storage Compartment	Replace		16.0				107,128	
		Repair		1.0				128	
	Engine Cover	Replace		1.0				107,128	
1802	Fenders, Windshields, Glass, Attaching Parts	Replace		1.5				106,107,128	
	Fender Assembly	Replace		4.5				128	
1806	Seat Assembly	Inspect	0.5						
		Replace		2.0				102,107,128	
		Repair		1.0				128	
	Seat Belt Assembly	Inspect	0.1						
		Replace		1.5				128	
22	**ACCESSORY ITEMS**								
2202	Accessory Items								
	Mirrors	Inspect	0.2						
		Adjust	0.2						
		Replace		0.8				128,131	
	Front, Rear, and Roof Windshield Wipers	Inspect	0.2						
		Replace		0.4				128,131	
	Windshield Washer and Motor	Service	0.4						
		Replace		1.5				128,131	
	Heater Hoses	Replace		2.0				107,128	
	Heater/Air Conditioning Unit	Test		1.3				70	
		Replace			4.0			107,128	
		Repair			4.5			100,107,128	
	Blower Motor and Fan	Replace		6.0				128	
	Autolube System	Replace		4.0				128	
2210	Data Plates	Replace		1.5				107,128	
24	**HYDRAULIC AND FLUID SYSTEMS**								
2400	Hydraulic System	Test		3.0				1,44,107,128	
2401	Boom and Brake Hydraulic Pump	Replace			8.0			107,112,128	A,F
		Repair				24.0			D

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
24	**HYDRAULIC AND FLUID SYSTEMS - Continued**								
	Cooling Fan Hydraulic Pump	Replace			4.0			107,128	F
		Repair				12.0			D
	Cooling Fan Hydraulic Motor	Replace			4.0			128	F
		Repair				7.0			D
	Hydraulic System Auxiliary Pump	Replace		1.5				128	F
	Tophandler Slewing Motor Assembly	Replace		6.0				107,112,128	A,F
		Repair		2.0	22.0			128	
	Tophandler Slewing Motor	Replace		2.0				128	
		Repair			12.0			128	
	Gear Cluster and Brake	Replace							
	Tophandler Spreader Motor Assembly	Replace		8.0				128	
		Repair			12.0			128	
	Tophandler Spreader Motor	Replace		2.0				128	
2402	Main Flow Control Valve Assembly	Replace			8.0			107,112,128	A,F
		Repair				30.0			D
	Steering System Flow Control Valve	Replace			6.0			128	
		Repair			2.0	6.0		128	D
	Lift Cylinder Flow Control Valve	Replace			2.0			128	
		Repair				12.0			D
	Boom Folding Flow Control Valve	Replace			5.0			128	
		Repair			1.0	1.0		128	D
	Cab Lowering Flow Control Valve	Replace			5.0			128	
		Repair			1.0	1.0		128	D
2405	Strainers, Filters, Hoses, Tubes, and Fittings								
	Hoses, Lines, and Fittings	Inspect	0.5						
		Replace		2.5				24,107,128	F
	Oil Sampling Valve	Replace		0.5				107,128	F
	Oil Filters	Replace		3.0				107,128,139	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
24	**HYDRAULIC AND FLUID SYSTEMS - Continued**								
2406	Boom Servo Flow Control Valve	Replace			6.0			107,128	A,F
		Repair			2.5	6.0			D
	Tophandler Control Valves	Replace			8.0			107,128	F
		Repair			1.0	30.0			D
	Fan Flow Control Valve	Replace			2.0			128	
2407	Boom Lift Cylinder	Replace			8.0			106,112,128	A,F
		Repair				15.0			D
	Boom Extension Cylinder	Replace			30.0				D,F
		Repair				15.0			D
	Boom Folding Cylinders	Replace			6.0			106,112,128	A,F
		Repair				10.0			D
	Cab Lifting and Sliding Cylinders	Replace		3.0				107,128	F
		Repair			6.0			128	
	Bogie Wheel Lift Cylinders	Replace			3.0			106,112,128	F
		Repair				7.0			D
	Folding Boom Locking Pin Cylinders	Replace			3.0			106,112,128	F
		Repair				7.0		128	
	Tophandler Tilt Cylinders	Replace			3.0			106,112,128	F
		Repair				8.0			D
	Tophandler Side Shift Cylinders	Replace			2.0			106,112,128	F
		Repair				8.0		106,128	
	Tophandler Leveling Cylinders	Replace			2.0			106,112,128	F
		Repair				6.0		106,128	
	Twistlock Cylinders	Replace		1.0				107,128	F
2408	Tanks and Reservoirs								
	Hydraulic Reservoir	Inspect	0.5						
		Service		1.5				128	
		Replace			26.0			107,128	F
	Gage, Level	Replace		1.5				107,128	

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
32	**BASIC ISSUE ITEMS, TROOP INSTALLED**								
3200	Dolly Wheels	Inspect	0.3						
		Replace		2.0				128	
		Repair		1.0				128	E
33	**SPECIAL PURPOSE KITS**								
3307	Forklift Assembly	Inspect	0.5						
		Install	0.5						
		Repair				10.0		107,128	D
	Forklift Control Valve	Replace		2.0				107,128	F
		Repair				20.0			D
	Forklift Cylinders	Replace		2.0				106,128	F
		Repair				6.0		106,128	
	Forklift Manifold Valve	Replace			10.0			128	
52	**REFRIGERATION, AIR CONDITIONER/ HEATER, AND AIR CONDITIONING COMPONENTS**								
5200	Air Conditioning System	Inspect	0.5	0.5				70,128	
		Service			2.0			100,107,128	
	Compressor	Replace			3.0			128	
	Belt	Adjust		0.7				128	
		Replace		1.0				128	
5217	Valves and Lines	Replace			3.5			128	
5230	Condenser	Replace			2.5			128	
	Receiver/Dryer	Replace			3.0			128	
74	**CRANES, SHOVELS, AND EARTHMOVING EQUIPMENT COMPONENTS**								
7417	Lifting Boom	Inspect	1.0	1.0					
		Replace			24.0			103,108,128	A
		Repair				60.0			D

Table 1. MAC for the RT 240 RTCH - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	REF CODE	REMARKS CODE
74	**CRANES, SHOVELS, AND EARTHMOVING EQUIPMENT COMPONENTS - Continued**								
	Boom Support	Replace			40.0			106,128	
	Assembly	Repair			4.0			106,128	
	Slide Plate	Replace			7.0			128	
	Flexible Conveyor	Replace		8.0				128	
		Repair		3.5				128	
7421	Tophandler Assembly	Inspect	1.0	1.0					
		Replace		4.0				128	
		Repair				225.0			D
	Chain Assembly	Inspect		1.5					
		Adjust		2.5				128	
		Replace		7.0				106,128	
	Hydraulic Hoses	Replace		8.0				128	
	Slide Plate (Wear Pads)	Replace		14.0				128	
	Twistlocks	Inspect	0.5						
		Adjust		1.5				128	
		Replace			2.5			106,128	

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
1	O	Adapter, Quick Disconnect		PD260
2	F	Adapter, Wrench Torque		3163196
3	F	Adjustment Kit, Injector	4910-00-548-7984	3823610
4	F	Alignment Plate, Flywheel Housing		3376606
5	O	Apron, Utility, Impermeable	8415-00-082-6108	8415-00-082-6108
6	F	Attachment, Dial	4910-01-097-6972	ST-1325
7	F	Barring Tool, Engine		3824270
8	F	Bearing Kit, Needle		3823774
9	O	Belt, Tension Gage	5220-01-141-5776	ST1138
10	F	Bracket, Lifting, Cylinder Head		3822479
11	O	Cable, Breakout: Ambient Air Pressure Sensor		3824774
12	O	Cable, Breakout Pressure Sensor		3824775
13	O	Cable, Breakout Pressure Sensor		3824776
14	O	Cable, Breakout Pressure/Temperature Sensor		3162898
15	O	Cable, Test/Repair		3823256
16	F	Caliper, Inside Firm joint, 12 in. size	5210-00-189-9640	27-12
17	H	Caliper, Micrometer, Inside 2 to 12 in. range	5210-00-221-1921	124BZ
18	F	Caliper, Micrometer, Outside 0 to 1 in. range	5210-00-540-2973	T230RL
19	F	Caliper, Vernier English and Metric Measurements, 0 to 6 in. and 1 to 150 mm	5210-01-113-1548	GGG-C-111
20	F	Chain Assembly, Single Leg 14 ft long	4010-00-171-4426	R-R-C-271
21	O	Clamp, C-	5120-00-203-6431	A-A-431
22	H	Compressor, Piston Ring		3823309
23	F	Compressor, Valve Spring	5120-01-145-7293	ST-448
24	O	Crowfoot Attachment Set Socket wrench, 1/2 in. drive	5120-01-429-1109	216FCOM

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH - Continued.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
25	O	Dispenser, Sealant	5120-00-061-1283	45RCT
26	O	Drill Set, Twist	5133-00-293-0983	800434
27	O	Drill, Electric, Portable 3/8 in. size	5130-00-935-7354	6635
28	H	Driver		3376070
29	H	Driver, Expansion Plug	4910-01-143-3337	3376816
30	H	Driver, Expansion Plug		3822372
31	F	Driver, Gear, Fuel Pump		3823581
32	F	Driver, Injector Sleeve	5120-00-981-3108	ST-1227
33	H	Expander, Piston Ring		ST-821
34	F	Expander, Tube	3441-00-922-6699	ST880
35	H	Extractor, Dowel Pin		3163720
36	F	Extractor, Valve Seat		3376146
37	F	Fixture, Engine Lifting		3162871
38	F	Gage, Capscrew, Cylinder Head		3823546
39	F	Gage, Depth	4910-00-238-9957	ST-537
40	F	Gage, Depth, Dial Indicating	5210-01-157-3091	3164438
41	F	Gage, Depth, Micrometer: 0 to 6 in. range	5210-00-619-4045	52-225-015
42	H	Gage, Master Ring		3376576
43	F	Gage, Pressure, Dial Indicating	6620-01-382-1206	3375275
44	O	Gage, Pressure, Multiple Dial Indicating	4940-01-086-8756	123221E6828
45	F	Gage, Thickness 0.051 to 1.00 mm	5210-01-045-3526	66MA
46	O	Gage, Tire Pressure	4910-00-204-3170	7188BH
47	O	Gloves, Chemical and Oil, Protective, Rubber	5415-00-641-4601	ZZ-G-381
48	O	Gloves, Welders, Leather	8415-00-268-7859	A-A-50022
49	O	Goggles, Industrial	4240-00-052-3776	A-A-1110
50	O	Goggles, Industrial	4240-00-816-3819	WA60-5H0746-0315
51	H	Guide		3376069
52	H	Guide, Camshaft Pilot		3376388
53	F	Hammer, Hand, Plastic	5120-01-065-2211	57-534

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH - Continued.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
54	F	Hammer, Slide, Mechanical	5120-00-313-9498	4056H
55	O	Handle, Socket Wrench	5120-00-709-4072	L52BH
56	O	Heater, Gun	4940-00-561-1002	6966C
57	F	Holding Tool, Injector Sleeve	5120-00-104-1795	ST1179
58	F	Indicator, Dial	5210-01-157-2291	3376050
59	F	Insert Kit, Valve Seat	4910-00-345-3708	ST-257
60	H	Inserter, Bearing and Bushing	5120-01-156-6186	3376637
61	O	Installation Tool, EPS		3822759
62	H	Installation Tool, Needle Bearing		3824117
63	F	Installation Tool, Seal, Valve		3823946
64	H	Installation/Removal Tool, Cam Follower		3824519
65	F	Jack Kit, Hydraulic, Hand 20 ton capacity	5120-00-595-8387	A-A-312
66	O	Jack, Hydraulic, Hand 12 ton capacity	5120-00-224-7330	67224
67	O	Key Set, Socket Head Screw	5120-00-935-4641	56011
68	F	Kit, Dye	4820-01-446-7489	3376891
69	F	Kit, Nitrogen Charging	1025-01-070-3200	8449334
70	O	Leak Detector, Refrigerant	4940-01-387-0948	16500
71	H	Liner/Installation Tool		3824272
72	O	Lubricating Gun, Hand	4930-00-253-2478	1142
73	O	Multimeter, Digital	6625-01-139-2512	T00377
74	F	Multimeter, Digital	6625-01-265-6000	27FM W/ACCE
75	O	Multiplier, Torque Wrench	5120-00-169-2986	PD1201
76	O	Pan, Drain 4 gal. capacity	4910-00-387-9592	450
77	F	Pin Kit, Guide		3376695
78	F	Pin, Guide		3376488
79	H	Pins, Guide, Connecting Rod		3376038
80	H	Plate, Adapter, Engine Stand		3376432
81	O	Pliers, Retaining Ring External, 0.038 to 1.000 in. diameter	5120-00-288-9717	0200
82	O	Pliers, Retaining Ring Internal, 1.02 to 1.37 ring size	5120-00-293-0048	0100

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH - Continued.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
83	O	Pliers, Retaining Ring Internal, 1.75 to 2 in. ring size	5120-00-293-0045	0300
84	F	Press, Arbor Hand operated	3444-00-449-7295	A-A-51194
85	F	Puller and Driver, Injector		3823579
86	H	Puller Kit, Cam Gear		3162895
87	H	Puller Kit, Camshaft Gear		3824106
88	H	Puller Kit, Universal	5180-01-104-2762	3375784
89	H	Puller Kit, Universal	5180-01-178-5332	3375840
90	H	Puller Kit, Universal	5180-01-104-2762	3375784
91	H	Puller Kit, Universal	5180-01-178-5332	3375840
92	F	Puller Kit, Universal	5180-00-313-9496	1178
93	O	Puller, Battery Terminal	5120-00-944-4268	21
94	H	Puller, Cylinder Liner		3163745
95	H	Puller, Main Bearing Cap	5120-01-141-5779	ST-1178
96	H	Puller, Mechanical	5120-01-331-6468	3375082
97	F	Puller, Mechanical	5120-00-113-5271	3377079
98	O	Puller, Mechanical	5120-01-156-4183	3376326
99	O	Puller, Mechanical	5120-00-499-1489	ST-647
100	F	Reclaimer, Refrigerant, R-134A	4250-01-396-8928	EEEAC304A
101	F	Removal Tool, Valve Guide		3823271
102	O	Riveter, Blind, Hand 3/32 in., 1/8 in., 5/32 in., and 3/16 in. diameters	5120-00-017-2849	98
103	O	Screwdriver Set, Jeweler's	5120-00-288-8739	250
104	F	Separator Tool, Bearing	5120-01-128-2674	3375326
105	F	Shackle, Lifting	4030-00-169-9298	358T1 1-2
106	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC 4910-95-A31
107	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-754-0654	SC 4910-95-A74

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH - Continued.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
108	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2	4910-00-754-0650	SC 4910-95-A72
109	F	Sling, Endless	3940-01-183-9412	3375957
110	F	Sling, Engine and Transmission	4910-01-243-5556	DFP-188
111	F	Sling, Eye	3940-01-334-0749	EE1-202
112	O	Sling, Nylon	2835-01-078-2081	4-8FTX2IN
113	O	Socket, Deep Well 1-1/4 in.		3823843
114	F	Socket, Socket Wrench 46 mm	5130-01-113-1565	IMM462
115	F	Soldering Gun	3439-00-618-6623	D550-3
116	H	Stand, Engine Rebuild	4910-01-128-2686	3375194
117	F	Stand, Engine Support		3376057
118	O	Tape, Measuring 50 ft long	5210-00-554-7085	403
119	O	Tape, Measuring 50 ft long	5210-00-234-6745	C213
120	F	Test Kit, Pressure, Lubricating Oil Cooler		3376861
121	O	Test Lead, Female		3822917
122	O	Test Lead, Female		3823994
123	O	Test Lead, Female		3823996
124	O	Test Lead, Male		3822758
125	F	Tester, Valve Spring	4910-01-142-4929	3375182
126	F	Tool Kit, Automotive Fuel and Electrical System Repair	5180-00-754-0655	SC 5180-95-B08
127	O	Tool Kit, Electrical Connector Repair	5180-00-876-9336	7550526
128	O	Tool Kit, General Mechanic’s Automotive	5180-00-177-7033	SC 5180-95-N26
129	F	Trestle, Hoist, Portable 7 ton capacity	3950-00-251-8013	306
130	O	Vise, Machinist's	5120-00-293-1439	504M2
131	O	Wrench Set, Socket Attachment Screwdriver, torx, 1/4 and 1/8 in. drive	5120-01-178-6342	J29843

Table 2. Tools and Test Equipment Requirements for the RT 240 RTCH - Continued.

(1) ITEM NO.	(2) MAINTENANCE LEVEL	(3) ITEM NAME	(4) NATIONAL STOCK NUMBER	(5) PART NUMBER
132	F	Wrench Set, Socket, Impact	5130-00-357-5136	B107.2
133	F	Wrench Set, Socket 3/4 in. drive	5120-00-204-1999	FEDSTD353
134	F	Wrench Set, Socket 1 in. drive	5120-00-081-2309	A-A-1392
135	O	Wrench, Adjustable 3-5/8 in. jaw, 15 in. long	5120-00-264-3793	2117080
136	F	Wrench, Impact, Pneumatic	5130-00-542-3230	5130-00-542-3230
137	O	Wrench, Strap	5120-01-262-7306	3898145
138	O	Wrench, Strap, Oil Filter	5120-00-020-2947	2432097
139	O	Wrench, Strap, Pipe	5120-00-242-3249	D170X
140	F	Wrench, Torque	5120-01-348-0959	3376592
141	F	Wrench, Torque 3/4 in. drive, 100 to 600 lb-ft capacity	5120-01-113-9564	7379
142	O	Wrench, Torque 3/8 in. drive, 0 to 200 lb-in. capacity	5120-00-853-4538	F200
143	O	Wrench, Torque 3/8 in. drive, 0 to 300 lb-in. capacity	5120-00-776-1841	2163993
144	O	Wrench, Torque 3/8 in. drive, 15 to 75 lb-ft capacity	5120-01-355-1739	QC2FR75
145	O	Wrench, Torque 50 to 250 lb-ft capacity	5120-01-042-0982	VB-2503MFR

Table 3. Remarks for the RT 240 RTCH.

(1) Reference Code	(2) Remarks
A	Prior to removing a major assembly or component, contact Specialized Repair Activity (SRA) for possible further troubleshooting information and/or shipping instructions. For SRA assistance, call Kalmar RT Center (KRTC) at: • 1-800-558-7232, ext 24 • 1-210-599-3478, ext 24 • 1-210-599-4009 (Fax) • E-mail to: rtch@kalmarRT.com For RT 240 RTCH information and FAQ, visit the KRTC web site: www.kalmarRT.com
B	Refer to TM 750-254 (cooling systems) for additional information.
C	Refer to TM 9-6140-200-14 (batteries) for additional information.
D	Replacement or repair responsibility is assigned to Specialized Repair Activity (SRA). For SRA assistance, call Kalmar RT Center (KRTC) at: • 1-800-558-7232, ext 24 • 1-210-599-3478, ext 24 • 1-210-599-4009 (Fax) • E-mail to: rtch@kalmarRT.com For RT 240 RTCH information and FAQ, visit the KRTC web site: www.kalmarRT.com
E	Refer to TM 9-2610-200-14 (tires) for additional information.
F	The replacement of hydraulic reservoir return filters is required after 100 hours of operation, following any hydraulic system maintenance action that resulted in the hydraulic system being opened.
G	Local repair of tire and wheel assembly is authorized.

END OF WORK PACKAGE

EXPENDABLE AND DURABLE ITEMS LIST 0290 00

SCOPE

This work package lists expendable and durable items you will need to maintain the RTCH. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, *Expendable/ Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items)*, or CTA 8-100, *Army Medical Department Expendable/Durable Items*.

EXPLANATION OF COLUMNS

1. **Column (1) - Item Number.** This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item [e.g., Use Abrasive Pad (Item 1, WP 0290 00)].
2. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

   F- Direct Support Maintenance

   H- General Support Maintenance
3. **Column (3) - National Stock Number (NSN).** This is the NSN assigned to the item which you can use to requisition it.
4. **Column (4) - Description, Item Name, Commercial and Government Entity Code (CAGEC), and Part Number (P/N).** This provides the other information you need to identify the item.
5. **Column (5) - Unit of Measure (U/M).** This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable List for the RT 240 RTCH.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1	F		Abrasive Pad (15434) 3823258	EA
2	O		Adhesive (71984) RTV732	
		8040-00-877-9872	3 Ounce Tube	OZ
3	C		Antifreeze, Permanent: Arctic Grade (81349) MILA11755	
		6850-00-174-1806	55 Gallon Drum	GAL
4	C		Antifreeze, Permanent Ethylene Glycol, Inhibited (81349) MIL A46153	
		6850-00-181-7929	1 Gallon Bottle	GAL
		6850-00-181-7933	5 Gallon Can	GAL
		6850-00-181-7940	55 Gallon Drum	GAL
5	O	5340-00-450-5718	Cap Set, Protective Dust and Moisture Seal (19207) 10935405	EA
6	O		Cloth, Abrasive, Emery, Fine (80204) ANSI B74.18	
		5350-00-584-4654	50 Sheet Package	EA
7	O		Compound, Antiseize (05972) 76764	
		8030-00-251-3980	1 Pound Can	LB
8	F		Compound, Antiseize High Temperature (73165) 51008	
		8030-00-597-5367	2.5 Pound Can	LB
9	C		Compound, Cleaning, Windshield (81348) O-C-1901	
		6850-00-926-2275	16 Ounce Can	OZ
10	O		Compound, Gasket Forming, Silicone (05972) 77C	OZ
			13 Ounce Cartridge	OZ
11	F		Compound, Gasket Forming High Tack (77247) 98D	
		5330-00-151-6659	1 Pint Can	

Table 1. Expendable and Durable List for the RT 240 RTCH - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
12	O		Compound, Sealing (81349) MIL-S-46163	
		8030-00-111-2763	10 cc Bottle, Box of 10 Bottles	CC
		8030-00-111-2762	50 cc Bottle	CC
13	F		Compound, Sealing Dissimilar Metal Protection (71961) 6099	
		8030-01-392-3276	1 Gallon Can	GAL
14	O		Compound, Sealing, Pipe (05972) 079-21	
		8030-00-081-2327	10 cc Bottle, Box of 10 Bottles	CC
		8030-00-081-2286	50 cc Bottle	CC
15	C		Detergent General Purpose Liquid (81348) P-D-220	
		7930-00-282-9699	1 Gallon Can	GAL
16	O		Flux, Soldering (58536) A-A-51145TY1 FORM A	
		3439-00-255-9935	1 Pound Can	LB
17	C		Fuel, Diesel, DF-1 Grade, Winter (81346) ASTM D 975	
		9140-00-286-5286	Bulk	GAL
		9140-00-286-5287	5 Gallon Can	GAL
		9140-00-286-5288	55 Gallon Drum	GAL
18	C		Fuel, Diesel, DF-2 Grade (81346) ASTM D 975	
		9140-00-286-5294	Bulk	GAL
		9140-00-286-5295	5 Gallon Can	GAL
		9140-00-286-5296	55 Gallon Drum	GAL
19	C	9130-01-031-5816	Fuel, Turbine, Aviation (81349) milt83133 GR JP8	GAL

Table 1. Expendable and Durable List for the RT 240 RTCH - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
20	C		Grease, Automotive and Artillery, GAA	
		9150-01-197-7688	(81349) M-10924-A 1-1/4 Ounce Tube	OZ
		9150-01-197-7693	(81349) M-10924-B 14 Ounce Cartridge	OZ
		9150-01-197-7690	(81349) M-10924-C 2-1/4 Pound Can	LB
		9150-01-197-7692	(81349) M-10924-E 35 Pound Can	LB
21	O	9150-01-361-8919	Grease, Electrically Conductive (47224) 5190179	OZ
22	F	7050-00-961-7663	Lubriplate, Lubricant (90536) ST40334	OZ
23	F		Oil, Cutting (77247) 22F	
		9150-00-825-6131	1 Gallon Can	GAL
24	F		Oil, Lubricating, GO 80W/90 (81349) MIL-PRF-2105	
		9150-01-035-5392	1 Quart Can	QT
		9150-01-313-2191	1 Gallon Can	GAL
		9150-00-001-9395	5 Gallon Can	GAL
		9150-01-035-5394	55 Gallon Drum	GAL
25	O		Oil, Lubricating, GO 85W/140 (81349) MIL-PRF-2105	
		9150-01-048-4591	1 Quart Can	QT
		9150-01-035-5395	5 Gallon Can	GAL
		9150-01-035-5396	55 Gallon Drum	GAL
26	C		Oil, Lubricating, OE/HDO 10 (81349) MIL-L-2104	
		9150-00-189-6727	1 Quart Can	QT
		9150-00-186-6668	5 Gallon Can	GAL
		9150-00-191-2772	55 Gallon Drum	GAL

Table 1. Expendable and Durable List for the RT 240 RTCH - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
27	C		Oil, Lubricating, OE/HDO 15/40 (81349) MIL-L-2104	
		9150-01-152-4117	1 Quart Can	QT
		9150-01-152-4118	5 Gallon Can	GAL
		9150-01-152-4119	55 Gallon Drum	GAL
28	C		Oil, Lubricating, OEA, Arctic (81349) MIL-L-46167	
		9150-00-402-4478	1 Quart Can	QT
		9150-00-402-2372	5 Gallon Can	GAL
		9150-00-491-7197	55 Gallon Drum	GAL
29	F	9150-01-410-8972	Oil, Lubricating, Refrigerant Compressor, Synthetic Ester (59595) CAPELLA HFG-68NA	
		9150-01-410-8972	1 Quart Can	QT
30	C		Rag, Wiping (64067) 7920-00-205-1711	
		7290-00-205-1711	50 Pound Bale	LB
31	F		Sealant (15434) 3824038	OZ
32	F		Sealant, Cup Plug (15434) 3375068	OZ
33	O		Sealant, Pipe (15434) 3375066	OZ
34	O		Sealant, Silicone (15434) 3823494	OZ
35	O		Solder Lead-Tin Alloy, Rosin Core (15434) 3823494	
		3439-00-555-4629	1 Pound Spool	LB
36	C		Solvent, Dry Cleaning, Type III (81348) P-D-680	
		6850-01-377-1808	1 Quart Container	QT
		6850-01-331-3349	5 Gallon Can	GAL
		6850-01-331-3350	55 Gallon Drum	GAL

Table 1. Expendable and Durable List for the RT 240 RTCH - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
37	O		Strap, Tiedown Electrical Components	
		5975-00-903-2284	(96906) MS3367-4-0 4 Inch Length, Black Package of 100	EA
		5975-00-984-6582	(96906) MS3367-1-0 6 Inch Length, Black Package of 100	EA
		5975-00-935-5946	(96906) MS3367-2-1 13 Inch Length, Brown Package of 100	EA
38	O		Tag, Marker (64067) 9905-00-537-8954	
		9905-00-537-8954	Pack of 50	EA
39	O		Tape, Duct 2 Inches Wide (39482) 1791K70	
		5640-00-103-2254	60 Yard Roll	YD
40	F		Tetrafluoroethane Technical Refrigerant, R-134A (4V886) R134A	
		6830-01-439-0614	43 Pound Cylinder	LB
41	O		Tubing: Heat Shrinkable (81349) M23053/5-106-0	
		5970-00-815-1295	250 Foot Spool	FT
42	F	8305-01-301-1031	Wipes, Lint-Free (28480) 92193W	EA
43	O		Wire, Nonelectrical (81346) ASTM A641	
		9905-00-596-0191	5 Pound Coil	LB

END OF WORK PACKAGE

LOAD TESTING PROCEDURE 0291 00

THIS WORK PACKAGE COVERS

Boom Cylinder Drift Test, Extension Cylinder Drift Test

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's (Item 128, WP 0289 00)

Materials/Parts

2 x 4 x 3 ft

Personnel Required

Construction Equipment Repairer (2)

References

WP 0004 00

WP 0259 00

Equipment Condition

RTCH parked on level smooth pavement

Parking brake applied (TM 10-3930-675-10)

Hydraulic temperature at 150°F (66°C)

WARNING

- **DO NOT stand directly under tophandler or container while performing this procedure.**
- **Inspect the lift cylinders, blocking valves and hoses before starting this procedure.**
- **Failure to do so may result in injury or death.**

NOTE

Certifier is the Safety Officer of the Installation.

BOOM CYLINDER DRIFT TEST

1. Operate RTCH hydraulics to warm hydraulic oil temperature to 150°F (66°C).
2. Use right arrow key and advance to fourth operator screen to monitor temperature.

NOTE

- **To lessen the time needed to warm the hydraulic temperature to 150°F (66°C), hold the engine RPM approximately 1,000 to 1,500 and fully retract the boom and hold. This will force the hydraulic oil through the over relief valve and raise the temperature quicker.**
- **Make sure the blocking valve float and emergency lowering valves are fully closed before starting the test.**
- **Use the heaviest container available within the weight range 35,000 to 53,000 lb (15,876 to 24,040 kg) for the test procedure.**
- **Boom and tophandler must be properly calibrated before performing the test procedure. Calibrate boom and tophandler if necessary (WP 0259 00).**

3. After raising hydraulic oil temperature to 150°F (66°C) cycle boom up and down to increase oil temperature in lift cylinders (at least 12 cycles).
4. Cycle boom extension in and out 10 cycles to raise temperature in boom extension cylinder.
5. Engage and lift 20-ft ISO weighted container approximately 1 to 2 ft (30 to 60 cm) off ground.

LOAD TESTING PROCEDURE - CONTINUED 0291 00

BOOM CYLINDER DRIFT TEST - CONTINUED

NOTE

Make sure the float locks are in the unlocked position.

6. Extend boom until overload protection system reaches maximum allowed position and boom functions are locked out.
7. Retract boom approximately 1 ft (30 cm) and adjust height of container approximately 1 ft (30 cm) above ground.



434-40150

8. Stand a 2x4 on end and place next to container in middle of container end. See photos on next page.
9. Lean the 2x4 against container so it will not fall over.
10. Shut off engine then turn ignition on to access information from the operator’s display screen.
11. Mark **reference** points on 2x4 and on container that line up.
12. Record time as soon as **reference** is marked and record these readings:
    a. Time.
    b. Ambient temperature (third operator screen).
    c. Voltages from right and left cylinder pressure sensors (Diag Servo 8(13), WP 0004 00-5).
    d. Hydraulic oil temperature (third operator screen).

Reference Readings 1				
Item	5	10	15	20

LOAD TESTING PROCEDURE - CONTINUED 0291 00

BOOM CYLINDER DRIFT TEST - CONTINUED

13. Record readings every 5 minutes for 20 minutes.
14. Maximum drift allowed in 20 minutes is 2 in. (5.1 cm).



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NOTE

a. If drift exceeds 2 in. (5.1 cm) in 20 minutes, check float and emergency lower valves for tightness. With boom fully lowered, open float valves and ball valves and try to lift boom; this will flush valves. Close valves and repeat same flushing procedure with emergency lowering valves. Again, make sure valves are tightly closed. An uneven voltage reading for pressure sensors (one side increases and other side decreases) will indicate which lift cylinder or blocking valve to investigate.

b. Repeat drift test.

EXTENSION CYLINDER DRIFT TEST

1. Again, make sure hydraulic temperature is 150°F (66°C).
2. Cycle extension cylinder in and out 10 times to raise temperature in cylinder.
3. Engage and lift 20-ft ISO weighted container.
4. Lift to maximum boom angle (fully raised).



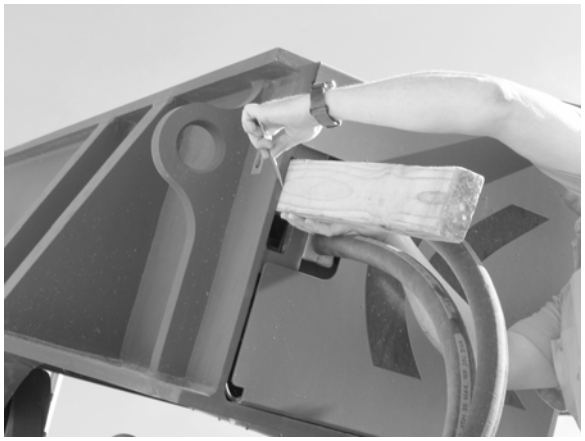
434-40155

5. Fully retract boom.
6. Extend boom extension approximately 6 in. (152 mm).
7. Shut off engine then turn ignition on to access information from the operator's display screen.
8. Using access ladder, climb up on rear frame area of RTCH and insert 2x4 in rectangular slot at rear boom cover (left side). Push the 2x4 through the slot and bottom it out against inner boom side plate. This gives you a reference for extension distance.
9. Mark **reference** point on 2x4 at end of boom.

EXTENSION CYLINDER DRIFT TEST - CONTINUED



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10. Note time when making **reference** point and record these readings:
    a. Time.
    b. Ambient temperature (third operator screen).
    c. Boom extension (fifth operator screen).
    d. Hydraulic temperature (third operator screen).
11. Record readings every 5 minutes for 20 minutes.
12. Maximum drift allowed in 20 minutes is 1 in. (30 cm).

Reference Readings 2				
Item	5	10	15	20

13. If test is failed, notify Sustainment Maintenance.

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By Order of the Secretary of the Army:

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PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 10-3930-675-24-2	.1 December 2006	Field and Sustainment Maintenance Manual (Includes Unit, Direct and General Support) for the Rough Terrain Container Handler (RTCH-RT-240)

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	0017 00-2					Part number supplied for item 2 is incorrect.

SAMPLE

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

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PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

SAMPLE

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TM 10-3930-675-24-2	.1 December 2006	Field and Sustainment Maintenance Manual (Includes Unit, Direct and General Support) for the Rough Terrain Container Handler (RTCH-RT-240)

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE
AMSTA-LC-LPIT/TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630		

PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*
AMSTA-LC-LPIT/TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 10-3930-675-24-2	.1 December 2006	Field and Sustainment Maintenance Manual (Includes Unit, Direct and General Support) for the Rough Terrain Container Handler (RTCH-RT-240)

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AMSTA-LC-LPIT/TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630		

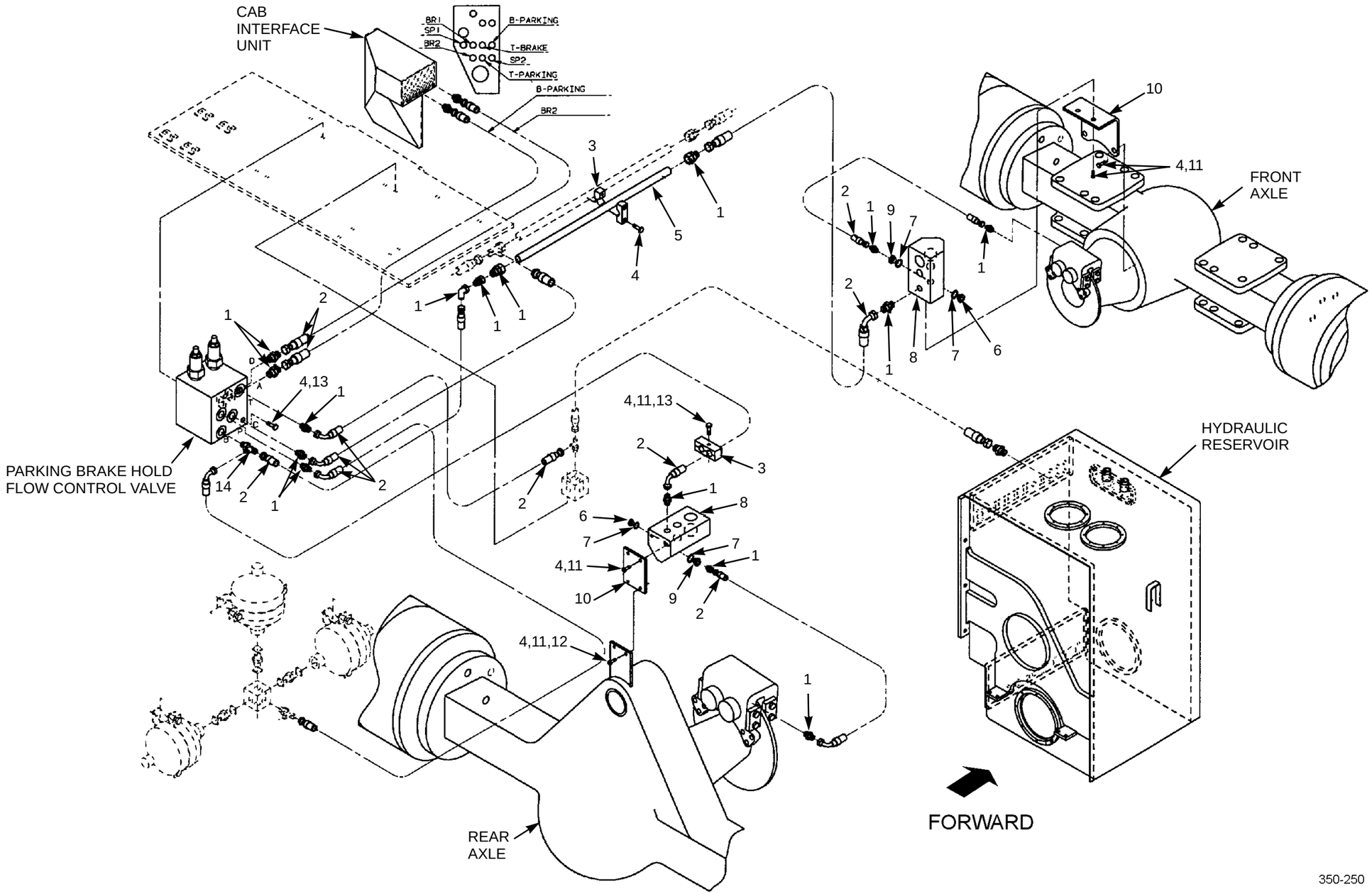
PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

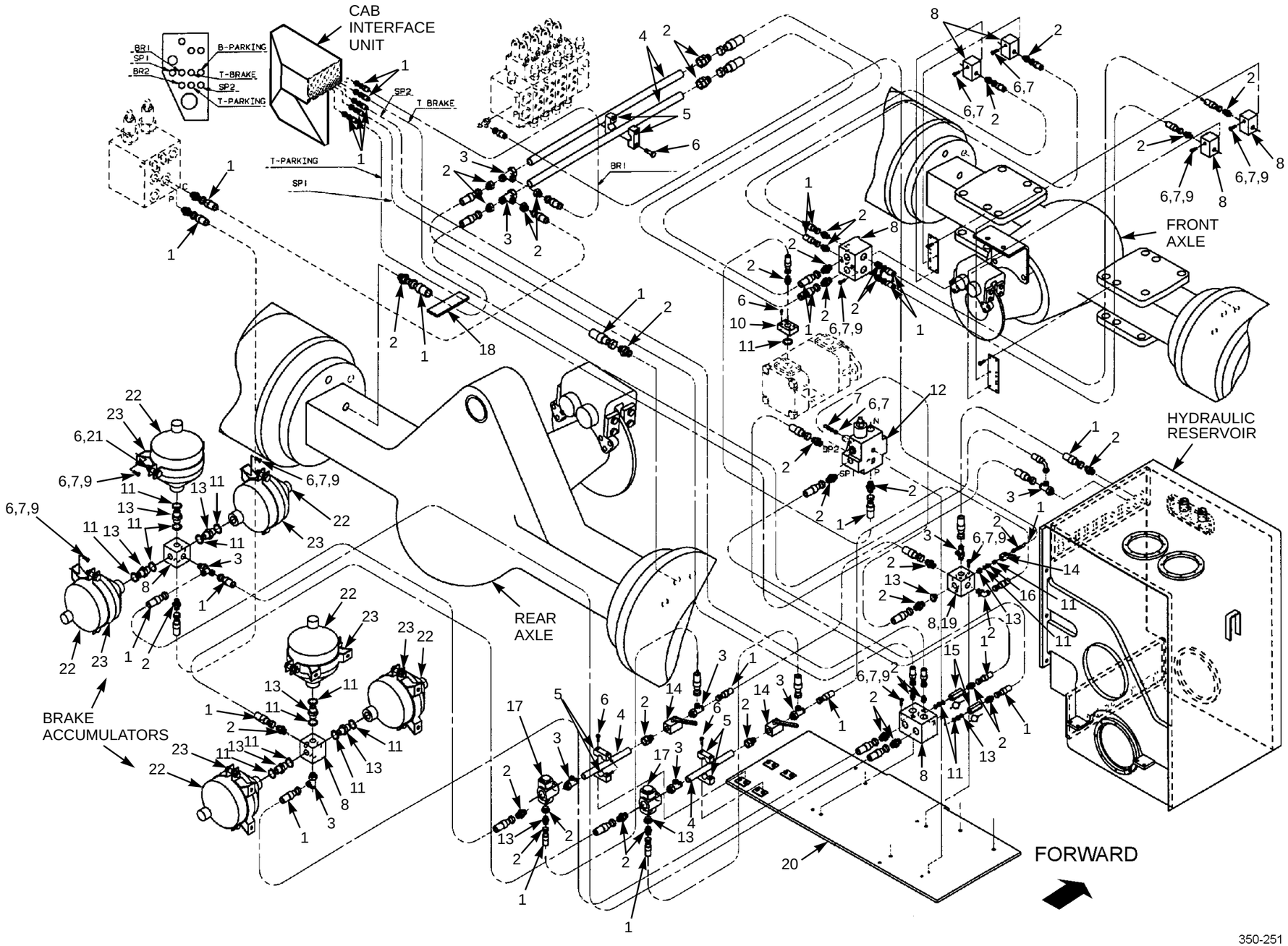
TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE



ITEM NO.	DESCRIPTION
1	Fitting
2	Hydraulic Hose
3	Clamp
4	Screw
5	Pipe
6	Plug
7	O-ring
8	Manifold Block
9	Nipple
10	Bracket
11	Washer
12	Nut
13	Locknut
14	T-Fitting

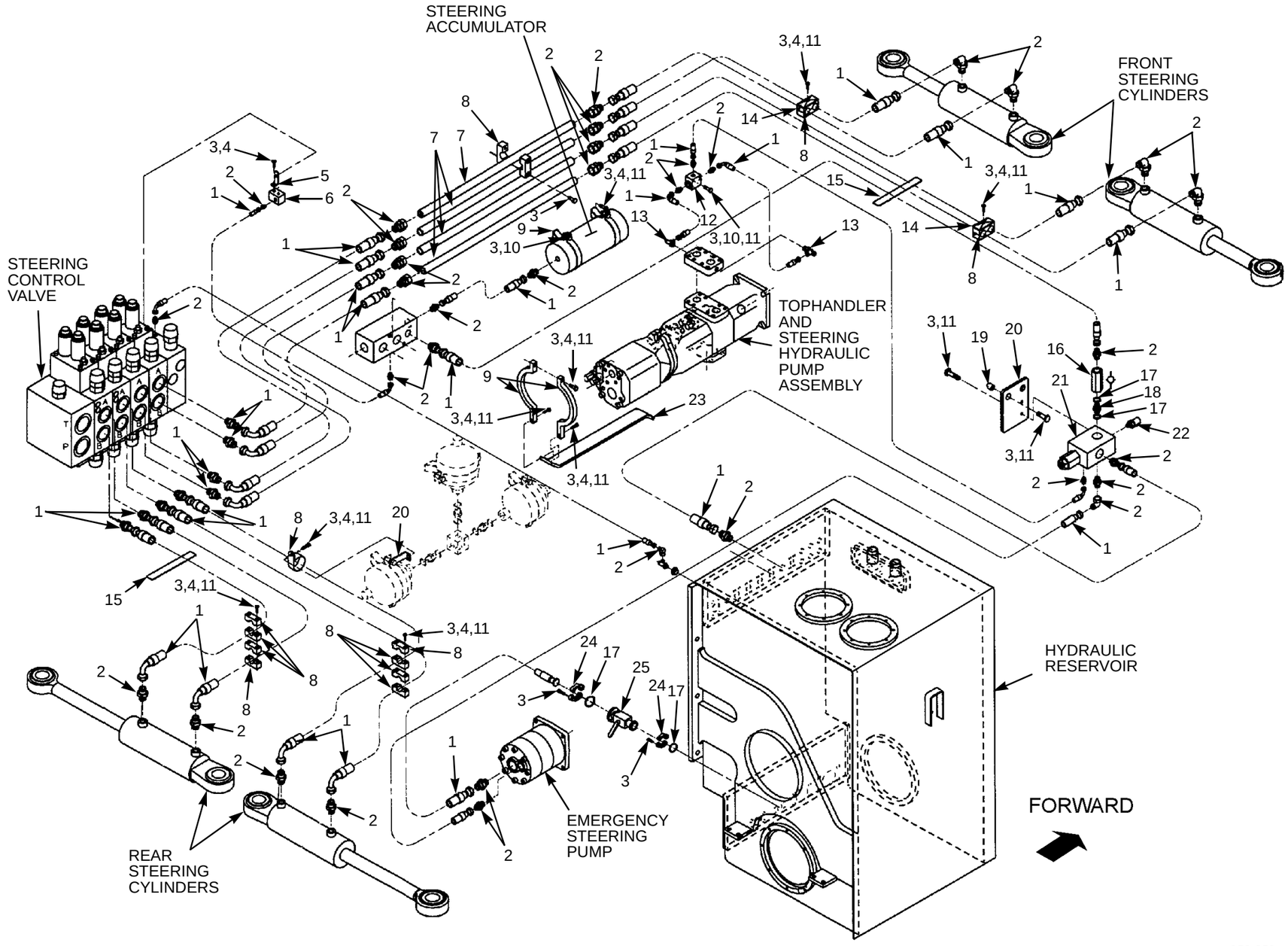
Parking Brake Hold Flow Control Valve

Figure 1. Parking Brake System Hydraulic Hoses and Fittings.



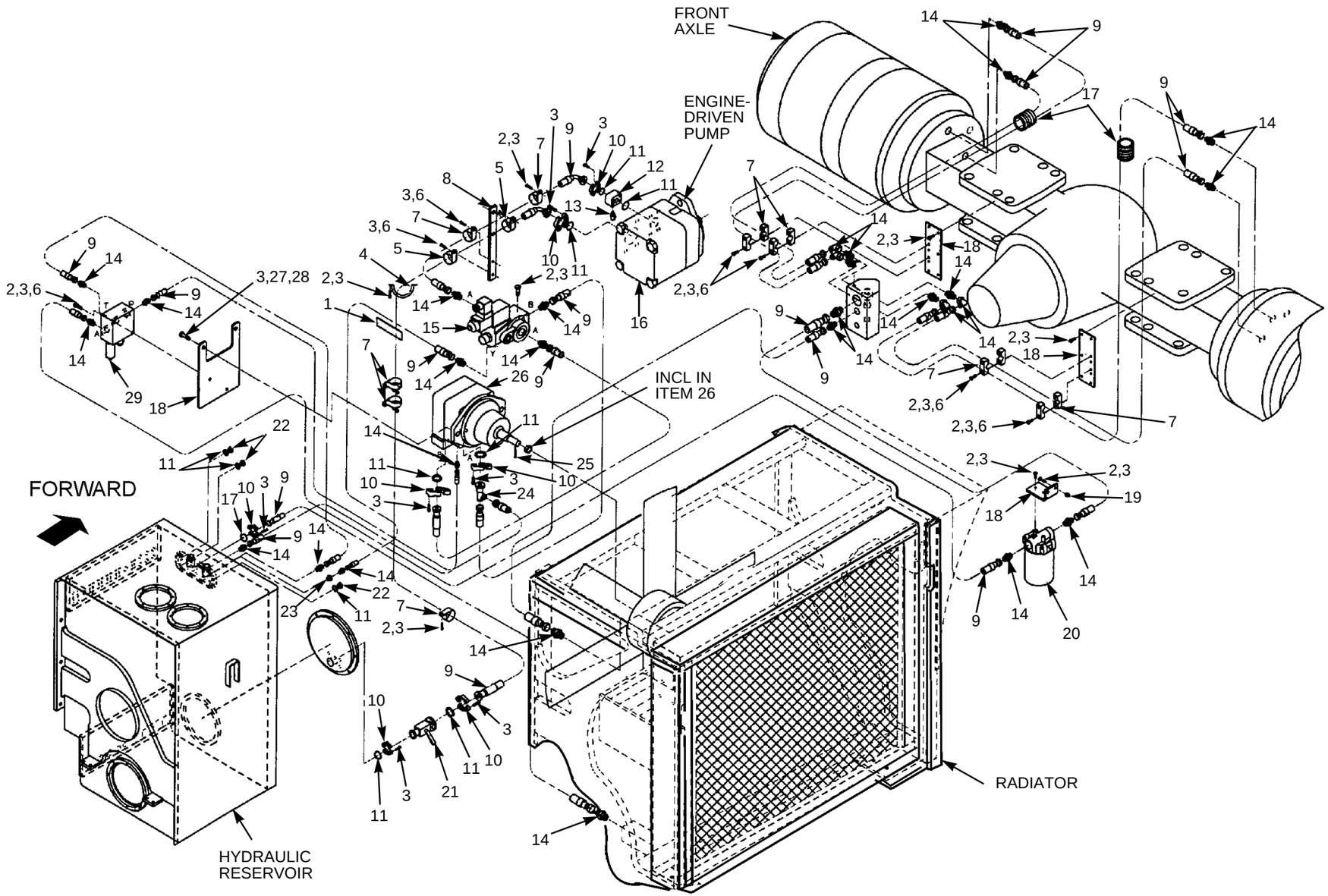
ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	T-Fitting
4	Pipe
5	Clamp
6	Screw
7	Locknut
8	Manifold Block
9	Washer
10	Flange
11	O-ring
12	Brake Charging Valve
13	Nipple
14	Ball Valve - Brake/Steering Drain
15	Check Valve
16	Adapter
17	Brake Safety Regulating Valve
18	Band
19	Plug
20	Plate (located behind cab)
21	Nut
22	Accumulator
23	Bracket

Figure 2. Service Brake System Hydraulic Hoses and Fittings.



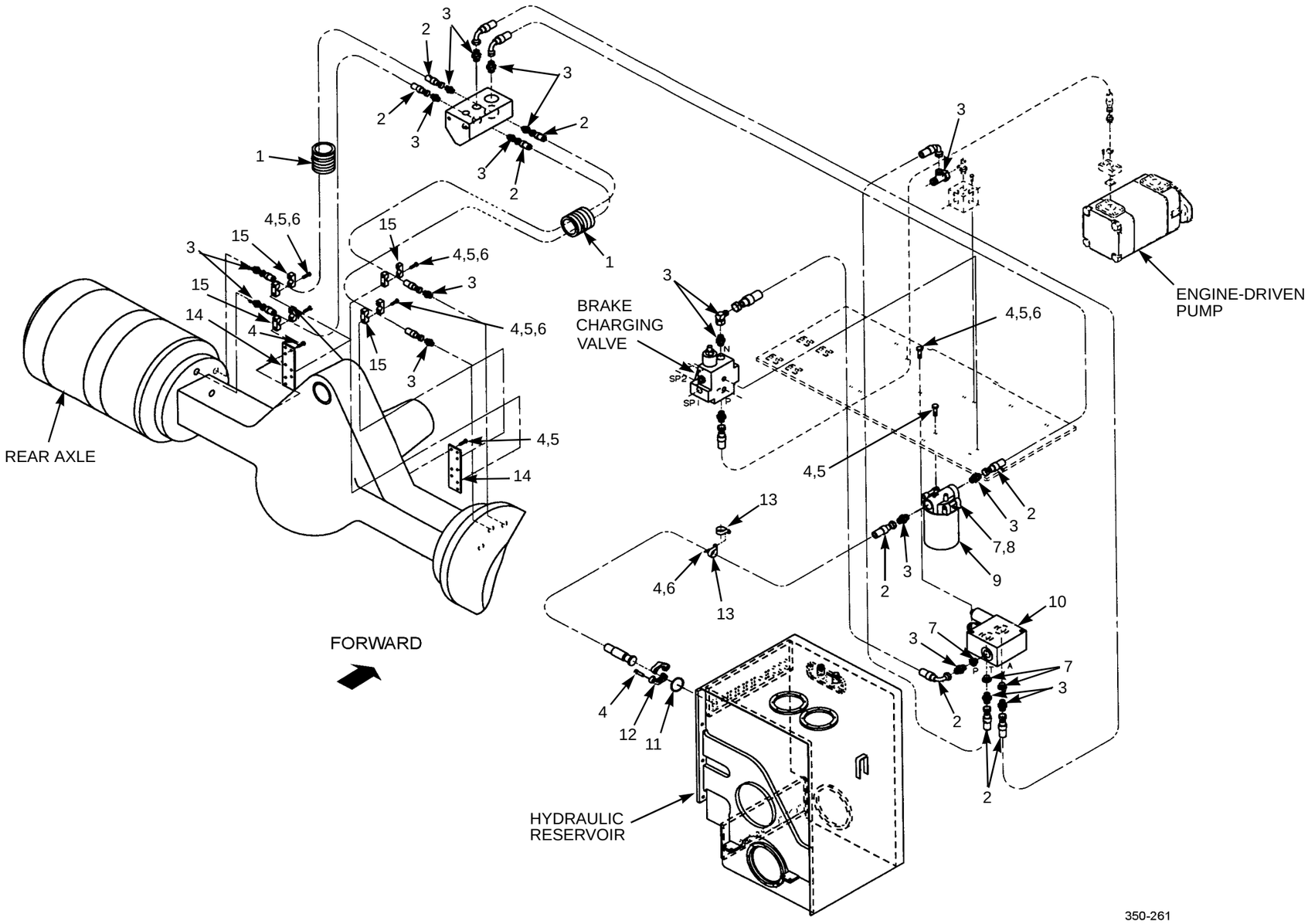
ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	Screw
4	Locknut
5	Bracket
6	Manifold Block
7	Pipe
8	Clamp
9	Yoke
10	Nut
11	Washer
12	Shuttle Valve
13	T-Fitting
14	Plate
15	Band
16	Check Valve
17	O-ring
18	Adapter
19	Spacer
20	Bracket
21	Emergency Steering Pressure Balancing Valve
22	Test Nipple
23	Stay
24	Flange
25	Ball Valve

Figure 3. Steering System Hydraulic Hoses and Fittings.



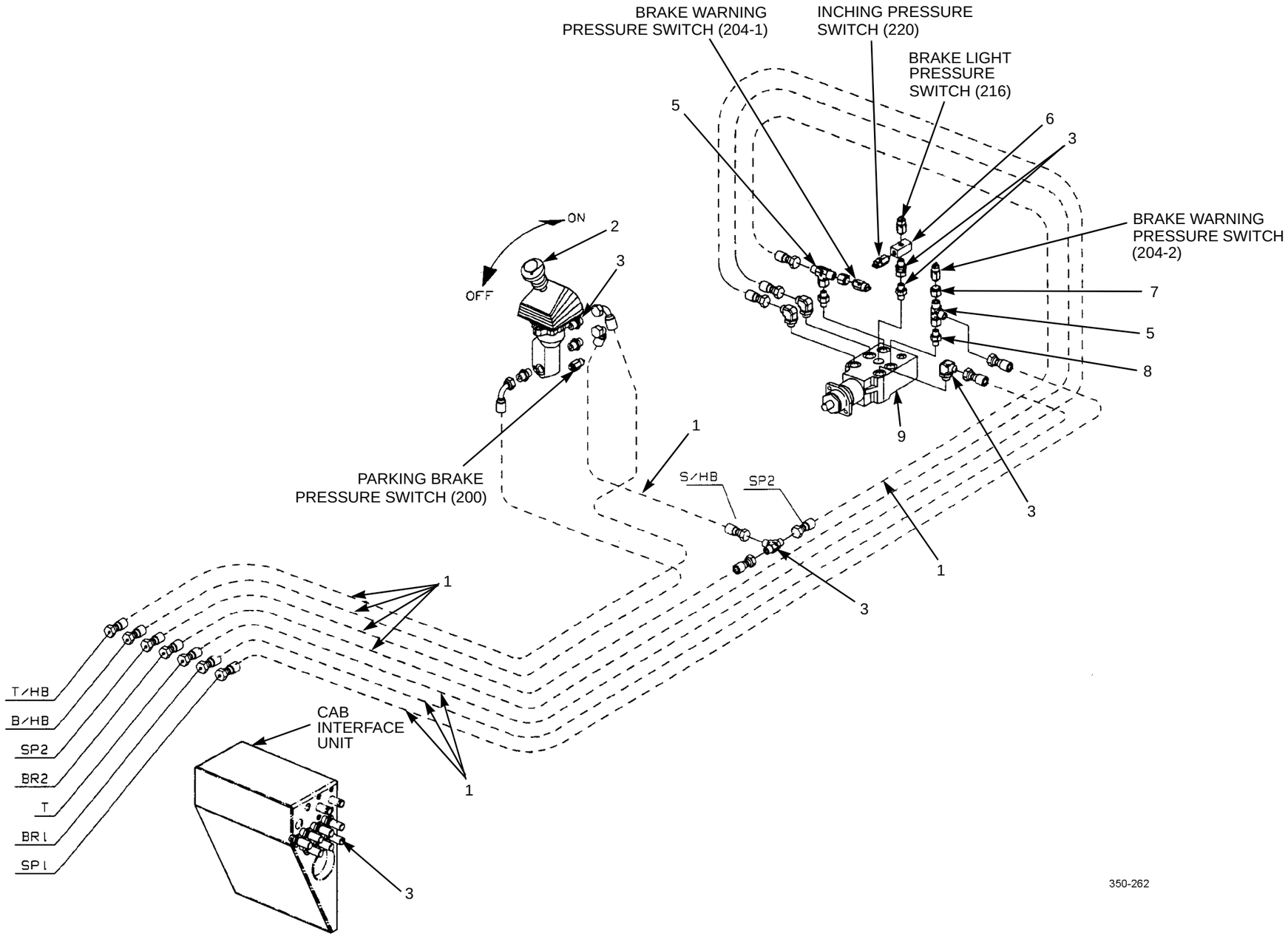
ITEM NO.	DESCRIPTION
1	Band
2	Washer
3	Screw
4	Yoke
5	Rubber Clamp
6	Locknut
7	Clamp
8	Suspension
9	Hydraulic Hose
10	Flange
11	O-ring
12	Manifold Block
13	Test Nipple (Test Point #12)
14	Fitting
15	Fan Control Valve (6037)
16	Hydraulic Pump
17	Hose Protection
18	Bracket
19	Spacer
20	Front Brake Cooling Filter
21	Shutoff Valve
22	Plug
23	Nipple
24	T-fitting
25	Split Pin
26	Fan Hydraulic Motor
27	Nut
28	Lockwasher
29	Front Brake Cooling Bypass Valve (6049-1)

Figure 4. Hydraulic System Cooling Hoses and Fittings.



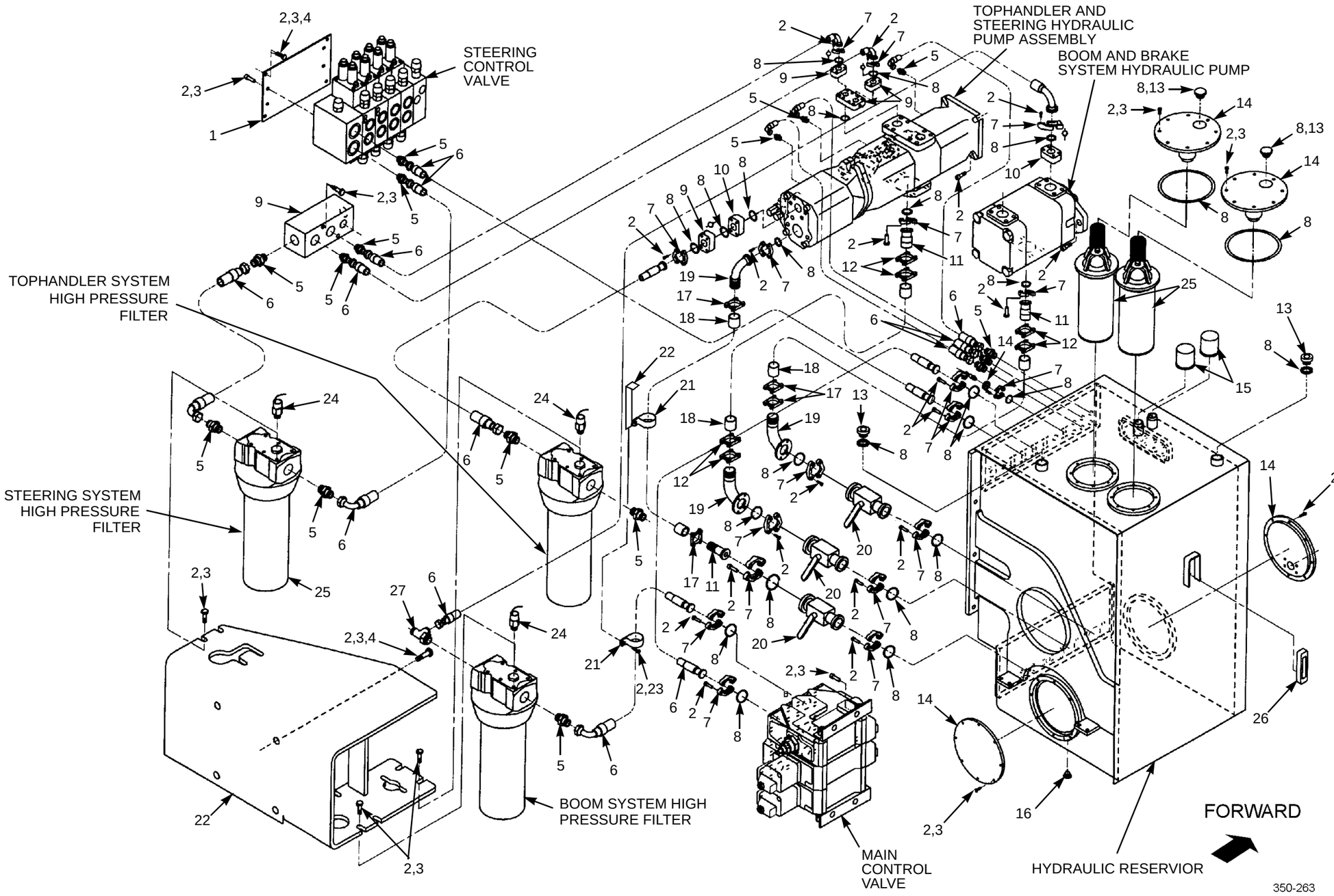
ITEM NO.	DESCRIPTION
1	Hose Protection
2	Hydraulic Hose
3	Fitting
4	Screw
5	Washer
6	Locknut
7	Nipple
8	Lubricator Extension
9	Rear Brake Cooling Filter
10	Rear Brake Cooling Bypass Valve (6049-2)
11	O-ring
12	Flange
13	Rubber Clamp
14	Bracket
15	Clamp

Figure 4. Hydraulic System Cooling Hoses and Fittings - Continued.



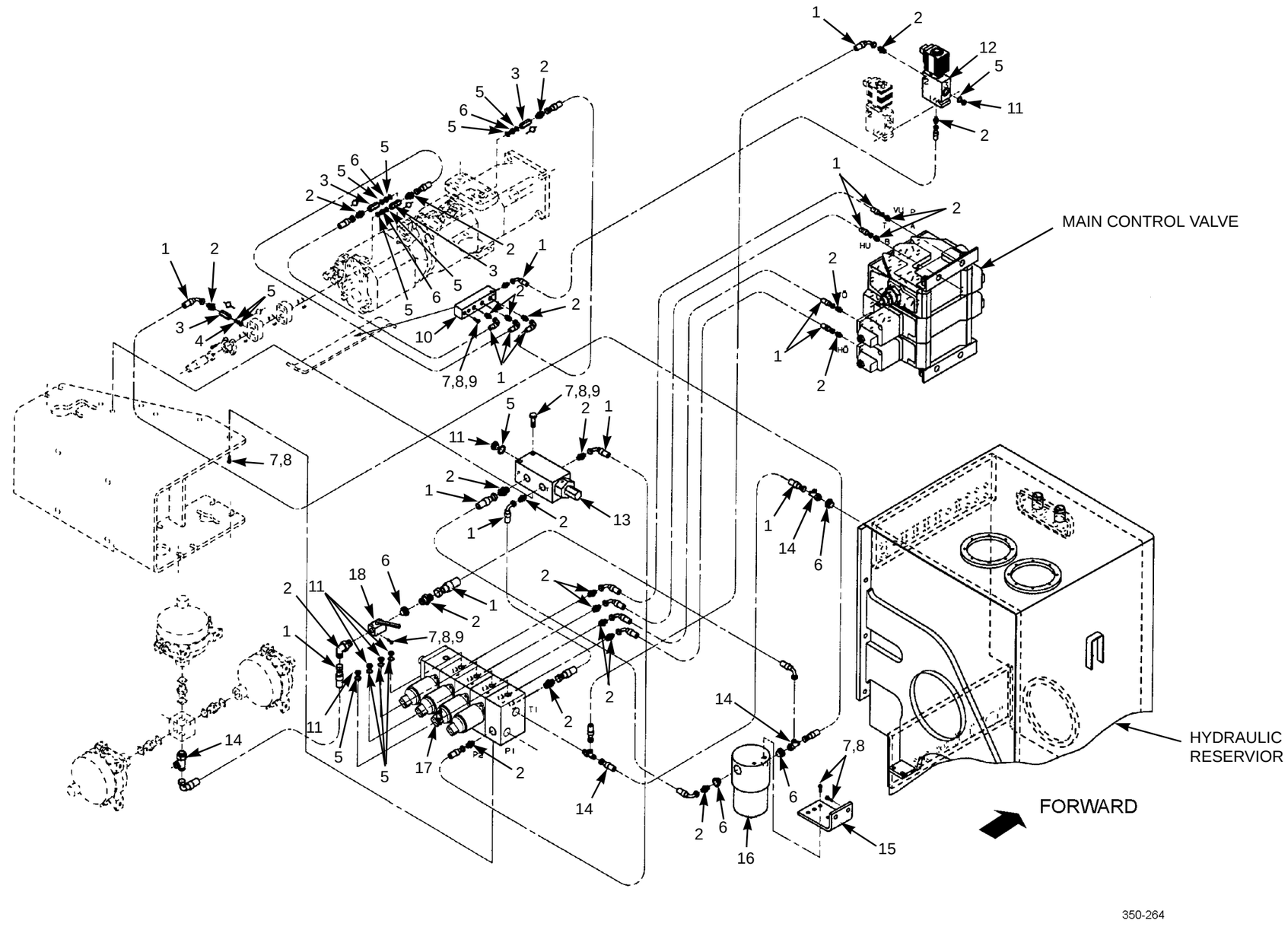
ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Parking Brake
3	Fitting
4	Pressure Switch
5	T-Fitting
6	Manifold Block
7	Connection
8	Nipple
9	Service Brake Valve

Figure 5. Cab Parking and Service Brake Hydraulic Hoses and Fittings.



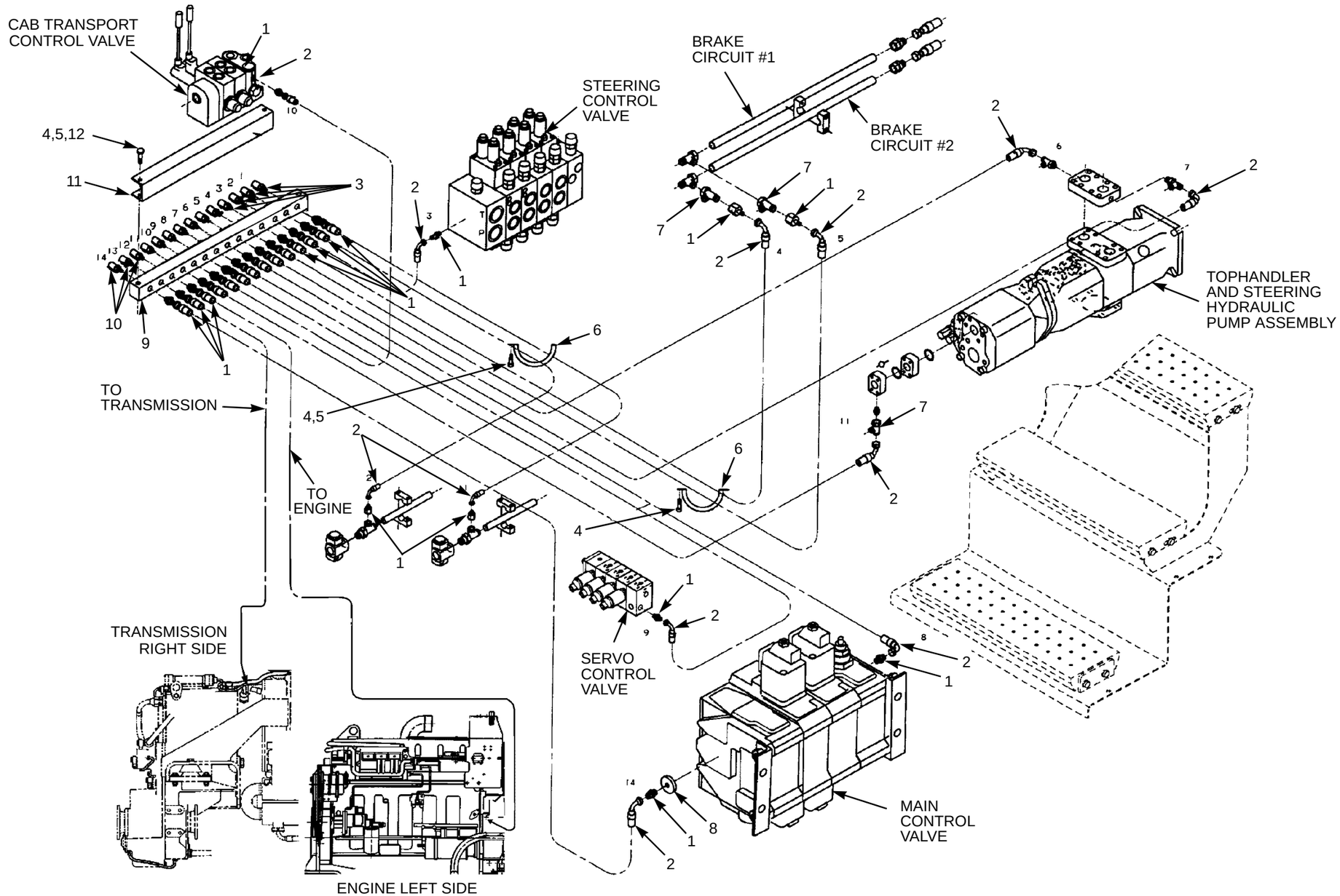
ITEM NO.	DESCRIPTION
1	Plate
2	Screw
3	Washer
4	Nut
5	Fitting
6	Hydraulic Hose
7	Flange
8	O-ring
9	Manifold Block
10	Check Valve
11	Hose Connection
12	Clamp
13	Plug
14	Cover
15	Hydraulic Reservoir Breather Filters
16	Magnetic Plug
17	Hose Clamp
18	Hose
19	Suction Pipe
20	Ball Valve
21	Rubber Clamp
22	Bracket
23	Locknut
24	Filter Restriction Sensor
25	Hydraulic Reservior Return Filters
26	Level Indicator
27	T-Fitting

Figure 6. Main Hydraulic System Hoses and Fittings.



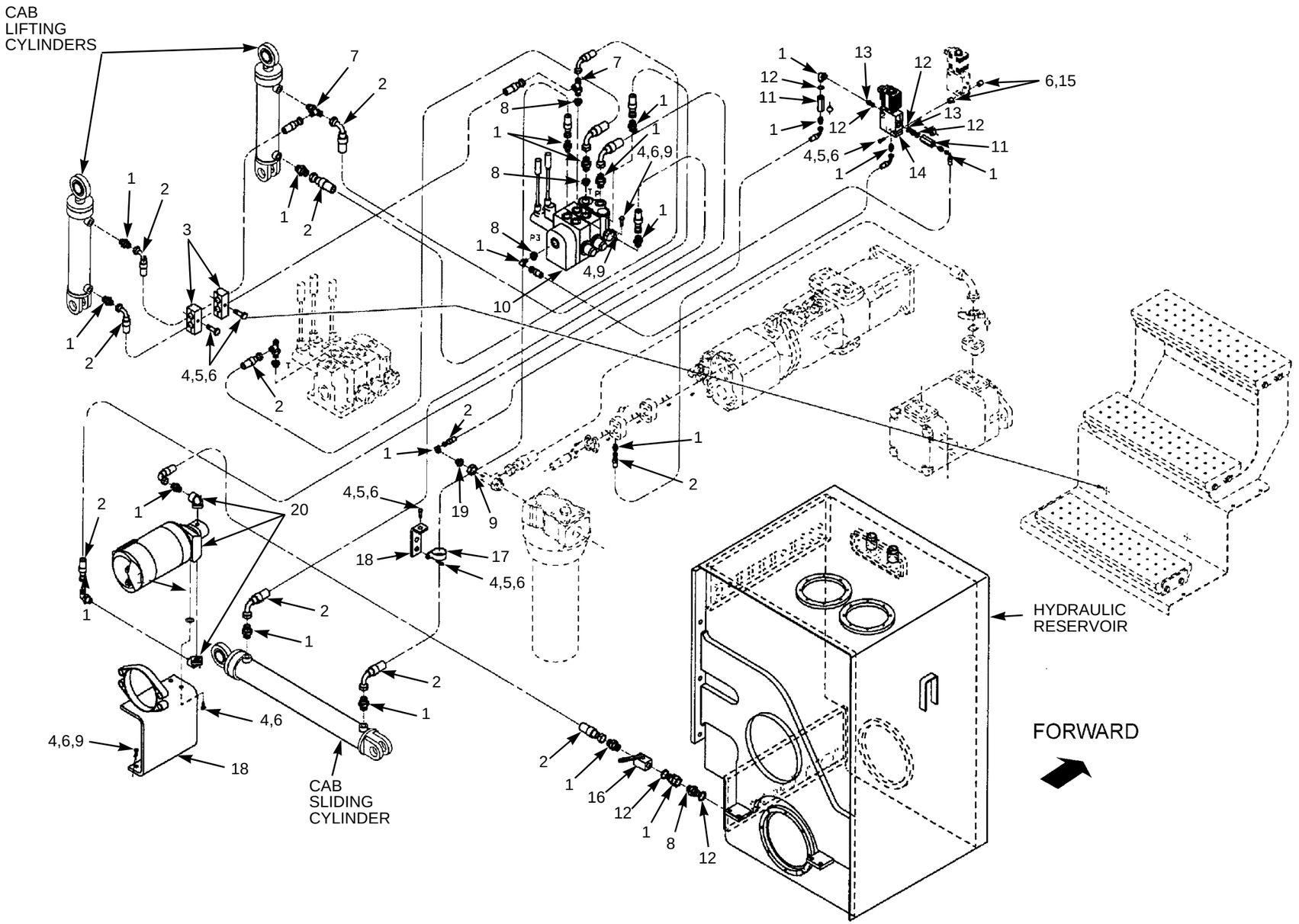
ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	Check Valve
4	Adapter
5	O-ring
6	Nipple
7	Screw
8	Washer
9	Locknut
10	Manifold Block
11	Plug
12	Pump Shut-off Valve (611)
13	Servo Regulator Valve
14	T-Fitting
15	Bracket
16	Servo Filter
17	Servo Control Valve
18	Ball Valve

Figure 7. Hydraulic Servo System Hoses and Fittings.



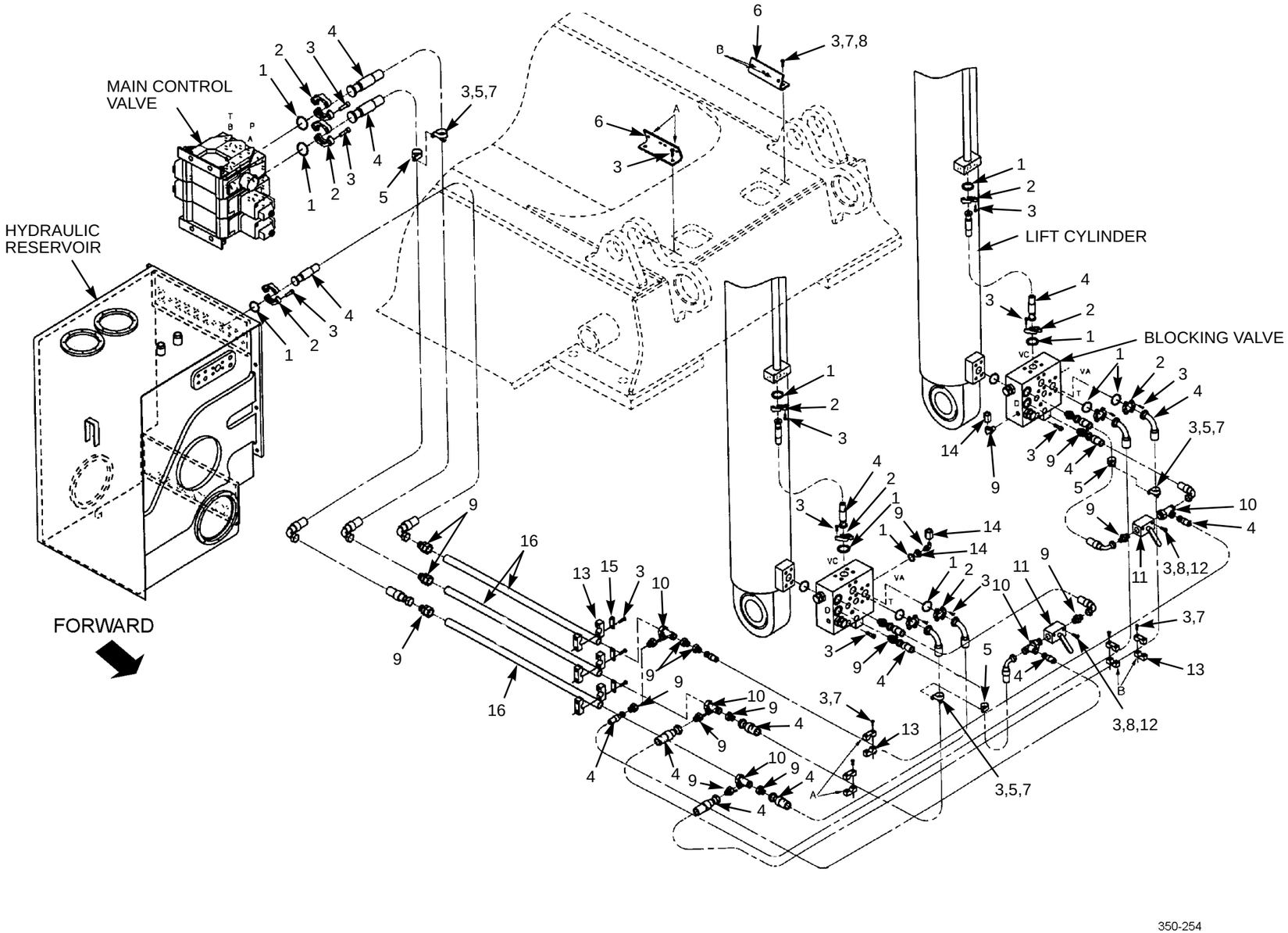
ITEM NO.	DESCRIPTION
1	Fitting
2	Hydraulic Hose
3	Test Nipple
4	Screw
5	Locknut
6	Yoke
7	T-Fitting
8	Cover
9	Manifold Block
10	AOAP Sampling Valve
11	Spacer
12	Washer

Figure 8. Hydraulic System Test Point Hoses and Fittings.



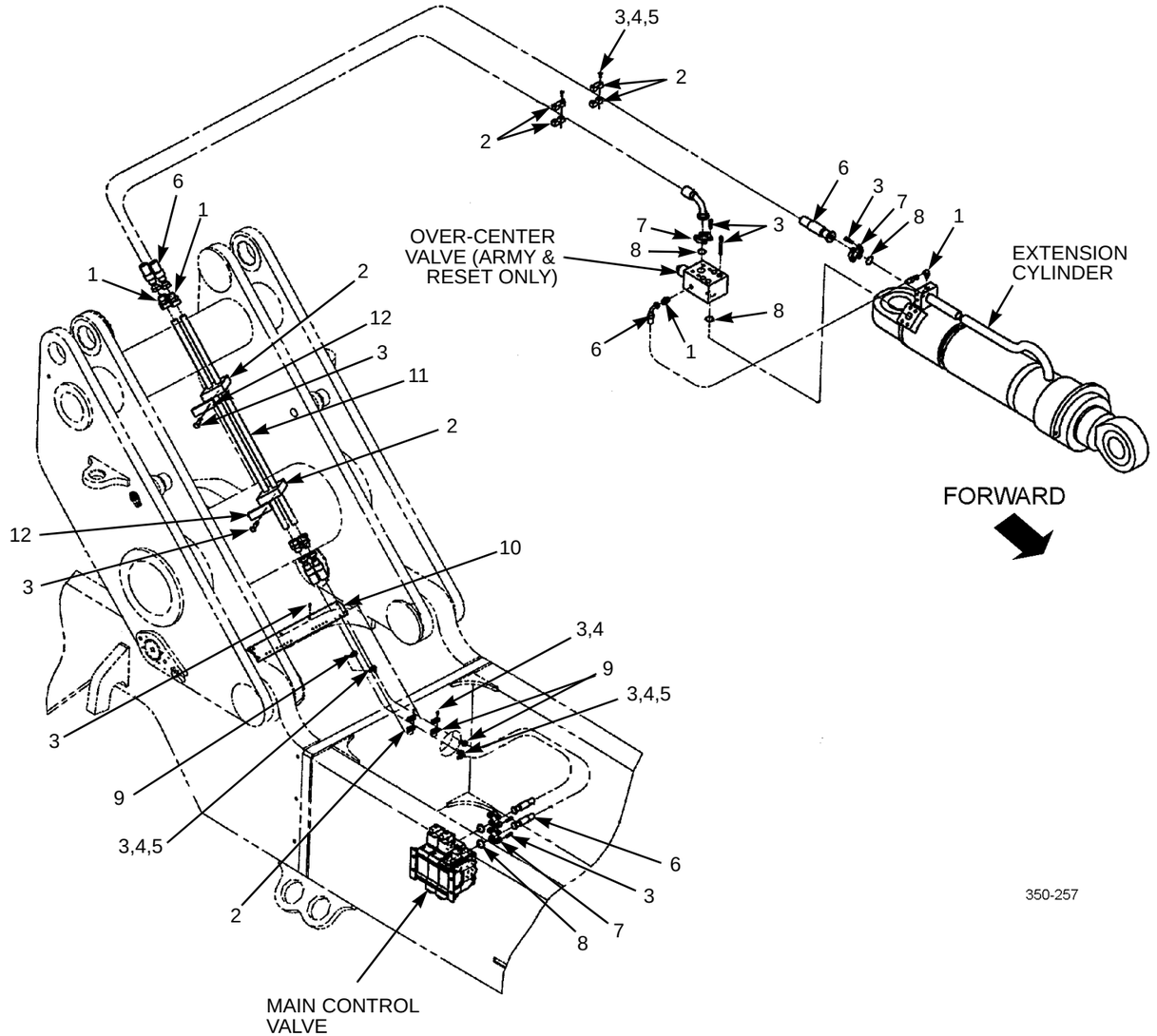
ITEM NO.	DESCRIPTION
1	Fitting
2	Hydraulic Hose
3	Cap
4	Screw
5	Locknut
6	Washer
7	T-Fitting
8	Nipple
9	Nut
10	Control Valve (Cab Transport)
11	Check Valve
12	O-ring
13	Adapter
14	Shift Valve (6041)
15	Spacer
16	Ball Valve
17	Rubber Clamp
18	Bracket
19	Reducer
20	Auxiliary Pump

Figure 9. Cab Transport Hydraulic Hoses and Fittings.



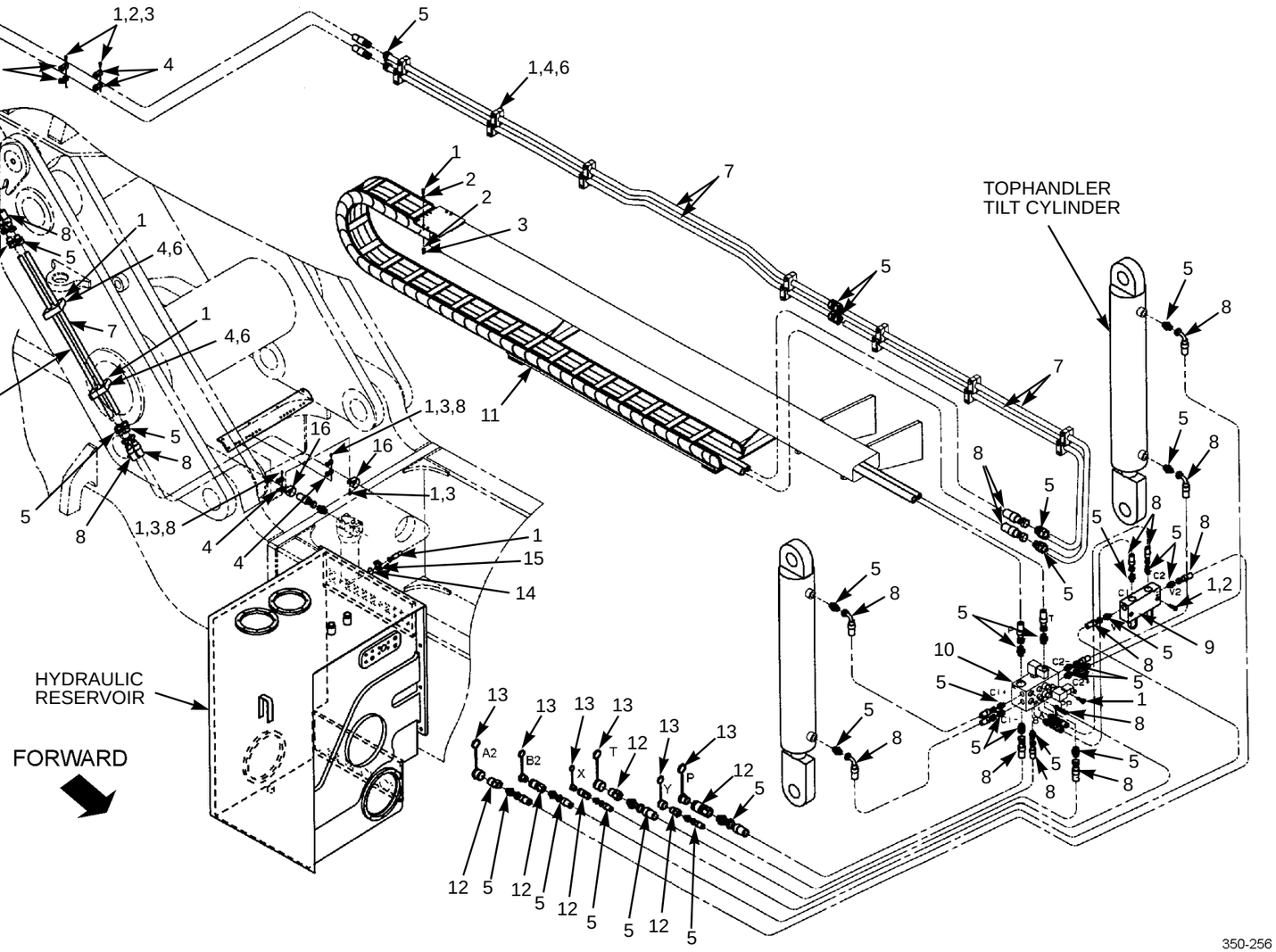
ITEM NO.	DESCRIPTION
1	O-ring
2	Flange
3	Screw
4	Hydraulic Hose
5	Rubber Clamp
6	Bracket
7	Locknut
8	Washer
9	Fitting
10	T-Fitting
11	Ball Valve
12	Nut
13	Clamp
14	Nipple
15	Plate
16	Pipe

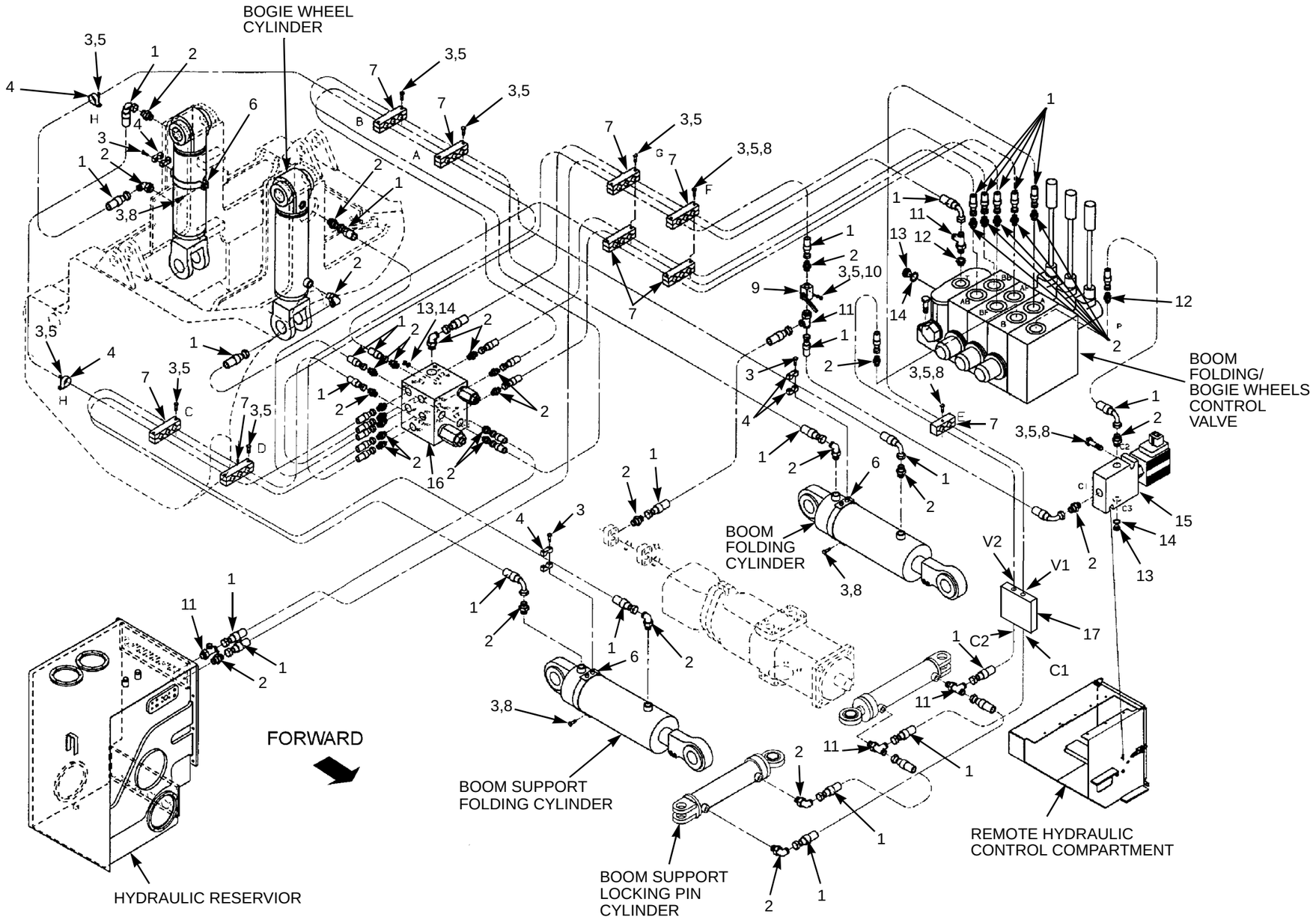
Figure 10. Boom Lifting Hydraulic System.



ITEM NO.	DESCRIPTION
1	Fitting
2	Clamp
3	Screw
4	Locknut
5	Washer
6	Hydraulic Hose
7	Flange
8	O-ring
9	Rubber Clamp
10	Bracket
11	Pipe
12	Plate

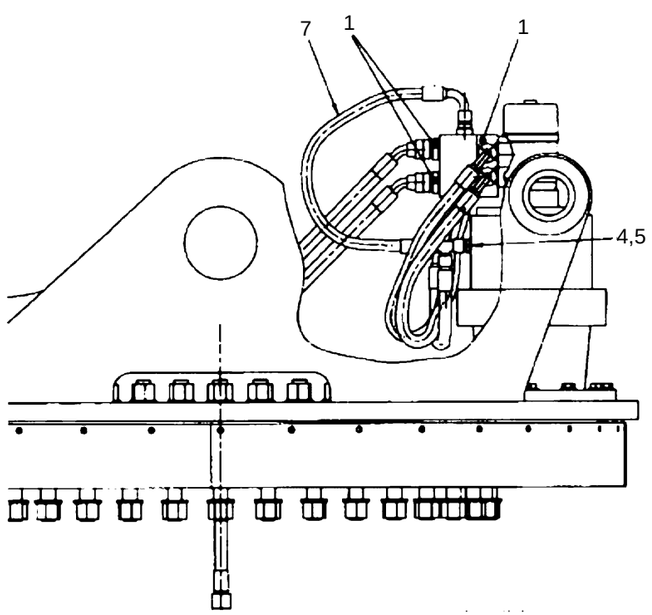
Figure 11. Boom Extension Hydraulic System.

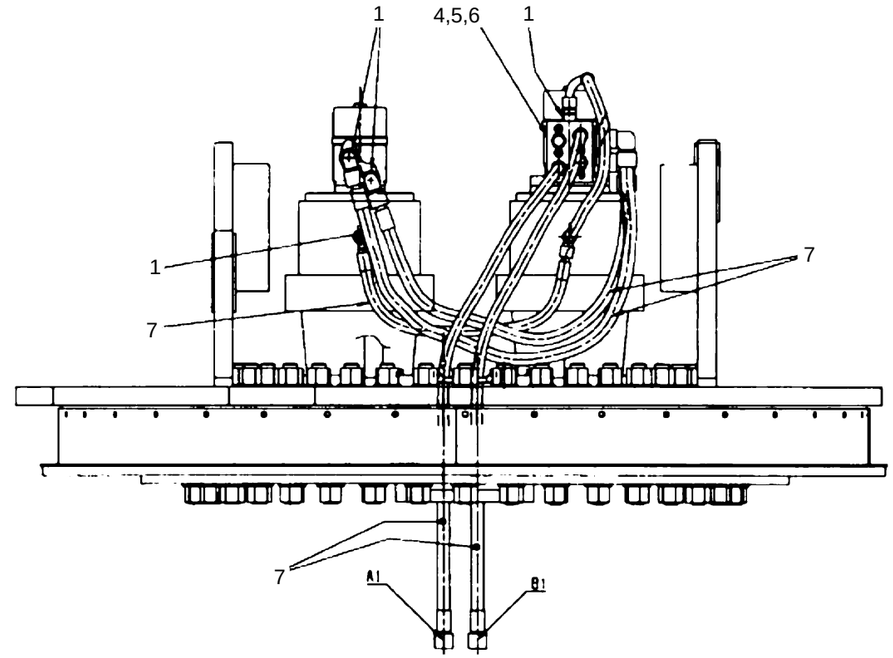

1,2,3
4
4
5
1,4,6
7
1
2
2
3
11
TOPHANDLER
TILT CYLINDER
5
8
8
5
5
4,6
1
7
7
1
4,6
7
5
8
1,3,8
16
16
1,3
5
8
1,3,8
4
4
1
15
14
HYDRAULIC
RESERVOIR
FORWARD
13
13
13
13
13
13
A2
B2
X
T
Y
P
12
12
12
5
5
5



ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	Screw
4	Clamp
5	Washer
6	Hose Holder
7	Cap
8	Locknut
9	Bogie Pressure Ball Valve
10	Nut
11	T-Fitting
12	Nipple
13	Plug
14	O-ring
15	Boom Support/ Bogie Supply Valve (6043)
16	Boom Support Over-Center & Bogie Pressure Reducing Relieving Valve
17	Boom Support Locking Pin Double Pilot Operated Check Valve

Figure 13. Boom Support Folding and Bogie Hydraulic System.





ITEM NO.	DESCRIPTION
1	Fitting
2	Spacer
3	Seal
4	Valve
5	Screw
6	Cover
7	Hydraulic Hose
8	Quick Coupling
9	Plug
10	Cover
11	Nipple
12	Adapter

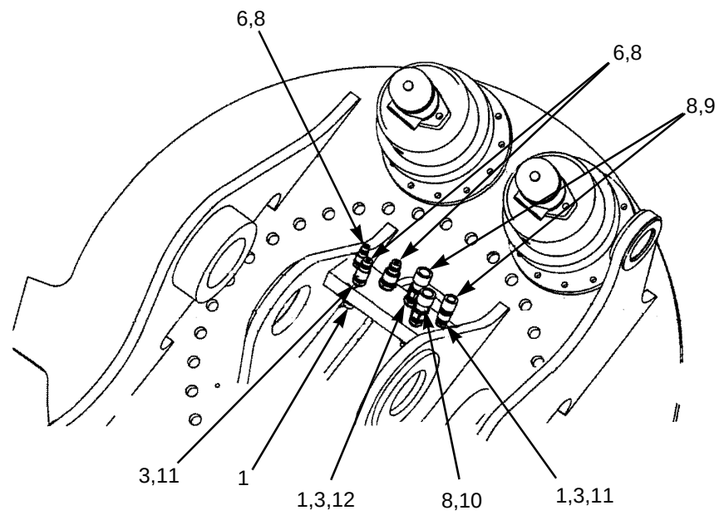
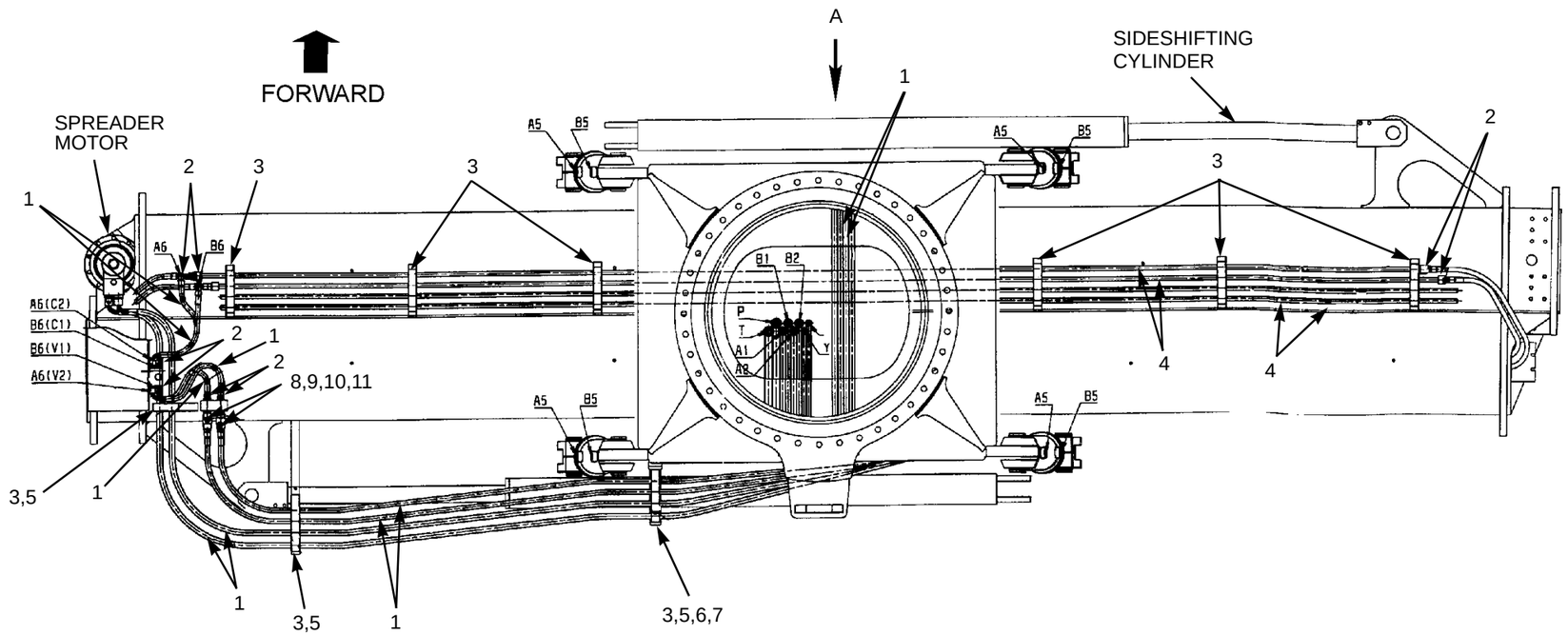


Figure 14. Tophandler Hydraulic System Hoses and Fittings.



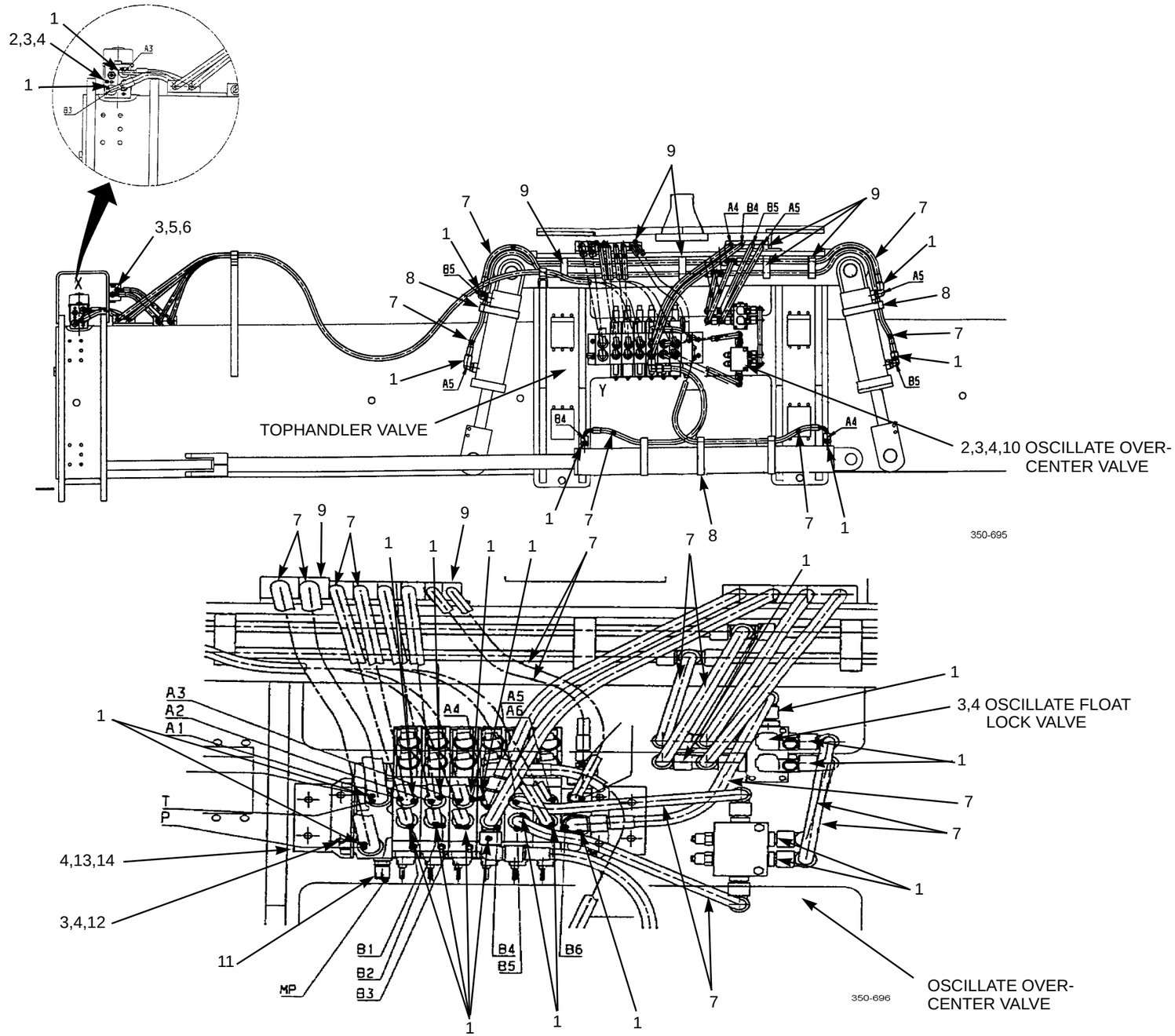
ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	Clamp
4	Pipe
5	Retainer
6	Screw
7	Hose Support
8	Nipple
9	Seal
10	Quick Coupling
11	Cover

TOP VIEW

350-267

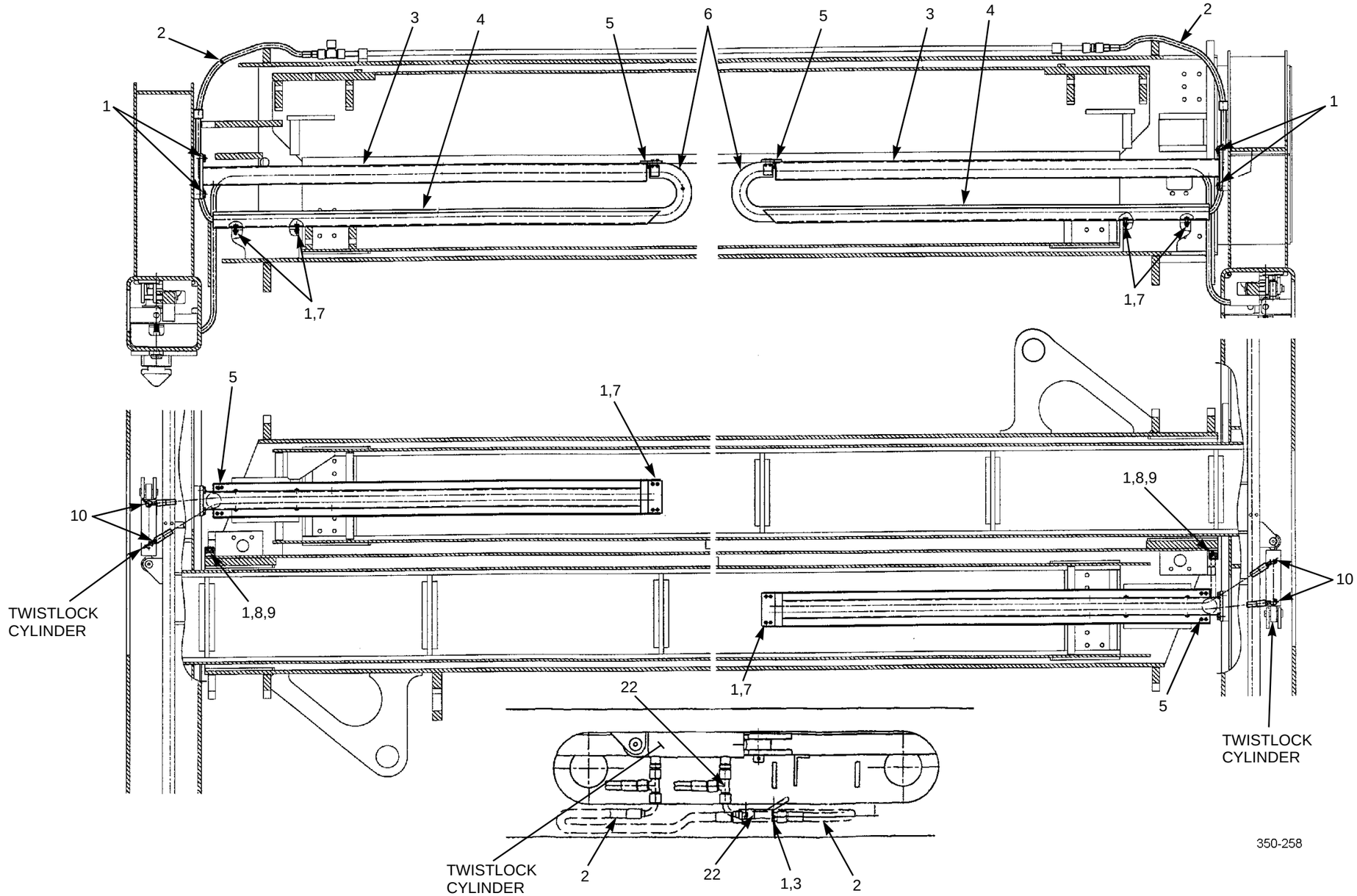
VIEW A

Figure 14. Tophandler Hydraulic System Hoses and Fittings - Continued.



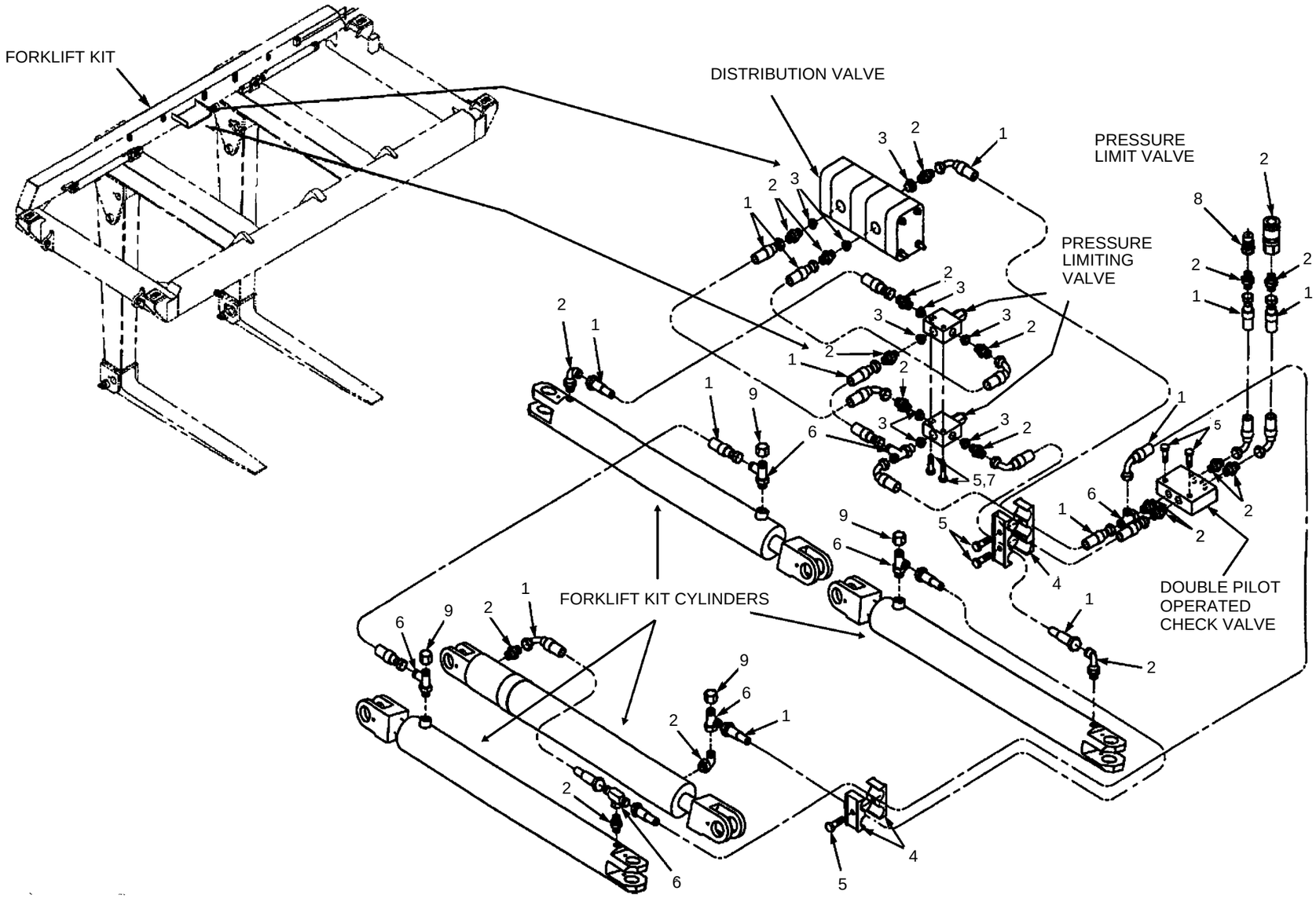
ITEM NO.	DESCRIPTION
1	Fitting
2	Cover
3	Valve
4	Screw
5	Nut
6	Grease Fitting
7	Hydraulic Hose
8	Clamp
9	Retainer
10	Valve Housing
11	Nipple
12	Locknut
13	Washer
14	Support

Figure 14. Tophandler Hydraulic System Hoses and Fittings - Continued.



ITEM NO.	DESCRIPTION
1	Screw
2	Hydraulic Hose
3	Bracket
4	Channel
5	Kit
6	Flexible Conveyer
7	Locknut
8	Hose Clamp
9	Plate
10	Fitting

Figure 14. Tophandler Hydraulic System Hoses and Fittings - Continued.



ITEM NO.	DESCRIPTION
1	Hydraulic Hose
2	Fitting
3	Nipple
4	Clamp
5	Screw
6	T-Fitting
7	Nut
8	Quick Coupling
9	Cap

Figure 15. Forklift Kit Hydraulic Hoses and Fittings.

THE METRIC SYSTEM AND EQUIVALENTS

Linear Measure

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 in.
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 in.
1 Kilometer = 1000 Meters = 0.621 Miles

Weights

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Pounds
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

Liquid Measure

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

Square Measure

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq in.
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.0386 Sq Miles

Cubic Measure

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu in.
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

Temperature

5/9 (°F - 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° +32 = F°

APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

PIN: 083707-000