TM 5-3800-205-23-1

FIELD MAINTENANCE MANUAL
(INCLUDES UNIT AND DIRECT SUPPORT MAINTENANCE)

FOR

SCRAPER, TRACTOR
ELEVATING, SELF-PROPELLED, 11 CUBIC YARDS, SECTIONALIZED
MODEL 613CS
(NSN 3805-01-497-0697) (EIC: EE4)

AND

DISTRIBUTOR, WATER, TANK TYPE,
2525 GALLON CAPACITY, SECTIONALIZED
MODEL 613CWD
(NSN 3825-01-497-0690) (EIC: EEF)

TRACTOR AND COMMON COMPONENTS





Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 2005

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



EAR PROTECTION - Headphones over ears show that noise level will harm ears.



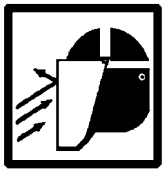
ELECTRICAL - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



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 shows that particles flying through the air will harm face.



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



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



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.



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



POISON - skull and crossbones shows material is poinsonous or is a danger to life.



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.

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 tractor is operated.

1. DO NOT operate tractor engine in enclosed areas.
2. DO NOT idle tractor engine without adequate ventilation.
3. DO NOT drive tractor 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



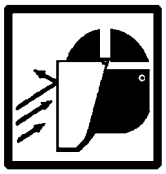
- To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such 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

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

ETHER COLD START SYSTEM




Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.



WARNING

FUEL HANDLING

- DO NOT smoke or permit any open flame in area of machine while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.
- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death to personnel.
- Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to follow this warning may result in injury to personnel.



WARNING

HAZARDOUS WASTE DISPOSAL

When servicing this machine, 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

HEARING PROTECTION

Hearing protection is required when operating machine or when within 23 feet of machine when it is operating. Failure to wear hearing protection may result in hearing loss.



WARNING

HYDRAULIC SYSTEM



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- 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.

WARNING

ISU-60 CONTAINER

Never transport container with doors open. Transporting container with doors open may cause serious injury or death to personnel.



WARNING

NBC EXPOSURE



- If NBC exposure is suspected, personnel wearing protective equipment should handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures. Failure to follow this warning may result in illness or death to personnel.
- NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel. Failure to follow this warning may result in illness or death to personnel.



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

NON-POTABLE WATER

(WATER DISTRIBUTOR)

NEVER drink water contained in water distributor tank. Water contained or dispensed from tank is NON-POTABLE. Drinking non-potable water could result in illness or death.

WARNING

OPERATION SAFETY

- Use caution and maintain three-point contact at all times when mounting and dismounting machine, to avoid injury to personnel.
- DO NOT allow riders on the tractor. Failure to follow this warning may result in serious injury or death to personnel.
- DO NOT operate machine unless seat belt has been fastened. Failure to follow this warning may result in serious injury or death, in the event of an accident.
- BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel and obstructions before starting engine, moving machine or lowering or raising scraper bowl. Failure to follow this warning may result in serious injury or death to personnel or damage to equipment.
- Never leave the operator's position without applying the parking brake. Failure to follow this warning may result in death to injury to personnel or damage to equipment.
- Never use starting fluid or spray to aid in starting the engine other than the on-board ether cold start system. Failure to follow this warning may result in death or injury to personnel or damage to equipment.
- Always use a ground guide when driving machine up or down ramps in preparation for highway, marine or air transport, or when driving tractor into position for assembly to scraper. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- When loaded and traveling across a hillside, reduce speed significantly BEFORE turning uphill. Failure to do so may cause machine to roll over, resulting in injury or death to personnel.
- Do NOT operate machine if parking brake was applied due to a malfunction of airbrake system or parking brake. Correct any problem before attempting to operate machine. Personal injury or death can result from a brake malfunction.
- For water distributor only, DO NOT operate machine at speeds greater than 18 mph (29 kph), in all weather and road conditions and fully loaded. Maximum operating at 18 mph (29 kph) is 7 hours within a 24-hour period. Failure to follow this warning may cause external or internal injury due to excessive whole-body vibration.



WARNING

PREPARATION FOR TRANSPORT

- 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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1st gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.
- Always use a ground guide when moving machine during preparation for transport procedures (driving up and down ramps, onto airdrop platform or onto rail flatcars). Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- Use extreme caution when driving sectionalized tractor with stability skids and no ROPS/FOPS. Use first gear forward or reverse and low idle ONLY. Ground guide or ground safety officer assistance is required to monitor path in front of front stability skid, to avoid obstacles and direct tractor operation. Failure to follow this warning may result in injury or death to personnel or damage to equipment.
- Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.
- Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.
- Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine. Use caution when climbing on right side if upper handrail has been removed. Failure to do so may result in injury to personnel.



- Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.



WARNING

PRESSURIZED AIR

- Do NOT disconnect any air system lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.



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

SLAVE STARTING

When slave starting tractor:

- 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.
- DO NOT allow disabled and booster machines to come in contact with each other at any time during slave starting

Failure to follow this warning may result in injury or death to personnel.





WARNING

SOLVENT CLEANING COMPOUND





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.

WARNING

TIRES

- Operating machine with underinflated or defective tire may lead to tire failure and loss of traction or control. Damage to equipment or injury to personnel may result.
- Use a self-inflating chuck and stand at a distance behind tire when inflating tire. Failure to do so could result in injury or death to personnel.

WARNING

WORK SAFETY



- Lifting cables, chains, hooks, and slings used for lifting machine must be in good condition and of suitable capacity. Failure to follow this warning may result in injury or death to personnel and damage to equipment.



- Improper use of lifting equipment and improper attachment of cables to machine can result in serious personnel injury and equipment damage. Observe all standard rules of safety.

- Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.
- Configuration changes to cutting edge and cutting edge-to-elevator clearance adjustments should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause 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.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

Date of issue for original manual is:

Original 15 JULY 2005

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 64 AND TOTAL NUMBER OF WORK PACKAGES IS 172 CONSISTING OF THE FOLLOWING:

Page/WP No.	*Change No.
Cover/(Back Blank)	0
a to h	0
A/(B Blank)	0
i to xii	0
WP 0001 00 to 0172 00	0
Index-1 to Index 8	0

* Zero in this column indicates an original page or work package.

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TECHNICAL MANUAL
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HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 15 July 2005

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TRACTOR and COMMON COMPONENTS

REPORTING ERRORS and RECOMMENDING IMPROVEMENTS

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Table of Contents

Page Number

VOLUME 1 - TM 5-3800-205-23-1

Warning Summary . . . . . a
How To Use This Manual xi

CHAPTER 1 INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

WP 0001 00 General Information 0001 00-1
WP 0002 00 Equipment Description and Data 0002 00-1
WP 0003 00 Theory of Operation 0003 00-1

Table of Contents - Continued

Page Number

CHAPTER 2 TROUBLESHOOTING PROCEDURES

WP 0004 00 Troubleshooting Introduction 0004 00-1
WP 0005 00 Tests, Inspections, and Adjustments 0005 00-1
WP 0006 00 Troubleshooting Symptom Index 0006 00-1
WP 0007 00 Troubleshooting Procedures 0007 00-1

CHAPTER 3 UNIT MAINTENANCE PROCEDURES

WP 0008 00 Service Upon Receipt 0008 00-1
WP 0009 00 Unit Preventive Maintenance Checks and Services (PMCS) Introduction 0009 00-1
WP 0010 00 Unit Preventive Maintenance Checks and Services (PMCS) 0010 00-1

CHAPTER 4 UNIT LEVEL TRACTOR MAINTENANCE

Engine

WP 0011 00 Rocker Arm Cover Replacement. 0011 00-1
WP 0012 00 Crankcase Breather Replacement 0012 00-1
WP 0013 00 Engine Oil Filter Replacement 0013 00-1
WP 0014 00 Engine Oil Pan Replacement. 0014 00-1
WP 0015 00 Engine Oil Sampling Valve Replacement. 0015 00-1

Fuel System

WP 0016 00 Fuel Lines and Fittings Replacement 0016 00-1
WP 0017 00 Fuel Shutoff Solenoid Replacement 0017 00-1
WP 0018 00 Air Cleaner Assembly Maintenance 0018 00-1
WP 0019 00 Air Intake Hose Replacement 0019 00-1
WP 0020 00 Fuel Governor Hoses and Lines Replacement 0020 00-1
WP 0021 00 Secondary Fuel Filters and Base Replacement 0021 00-1
WP 0022 00 Ether Cold Start Aid System Maintenance 0022 00-1
WP 0023 00 Accelerator Pedal Replacement. 0023 00-1
WP 0024 00 Throttle Control Cable Replacement. 0024 00-1

Exhaust System

WP 0025 00 Exhaust Guard, Exhaust Pipe and Muffler Replacement 0025 00-1

Cooling System

WP 0026 00 Hydraulic Oil Cooler Replacement. 0026 00-1
WP 0027 00 Radiator Hoses, Tubes, and Clamps Replacement 0027 00-1
WP 0028 00 Thermostat Replacement. 0028 00-1
WP 0029 00 Water Pump Replacement. 0029 00-1
WP 0030 00 Belt Tightener Replacement 0030 00-1
WP 0031 00 Fan and Fan Drive Replacement. 0031 00-1
WP 0032 00 Fan, Alternator, and Water Pump Drive Belts Replacement. 0032 00-1

Electrical System

WP 0033 00 Electrical General Maintenance Instructions. 0033 00-1
WP 0034 00 Alternator Replacement. 0034 00-1
WP 0035 00 Starter Replacement. 0035 00-1
WP 0036 00 Backup Alarm Switch Replacement 0036 00-1
WP 0037 00 Battery Disconnect Switch Replacement 0037 00-1

Table of Contents - Continued

Page Number

Electrical System - Continued

WP 0038 00 Circuit Breakers Replacement 0038 00-1
WP 0039 00 EMS Panel Replacement 0039 00-1
WP 0040 00 Fuse Replacement 0040 00-1
WP 0041 00 Hazard Flasher Unit Replacement 0041 00-1
WP 0042 00 Instrument Panel Gages and Bulbs Replacement 0042 00-1
WP 0043 00 Key Start Switch Replacement 0043 00-1
WP 0044 00 Light Switch and Ground Cable Replacement 0044 00-1
WP 0045 00 Main, Fuel Pump, Start, and Air Intake Heater Relays Replacement 0045 00-1
WP 0046 00 Neutral Start Switches Replacement 0046 00-1
WP 0047 00 Parking Brake and Emergency Brake Pressure Switches Replacement 0047 00-1
WP 0048 00 Relay Replacement 0048 00-1
WP 0049 00 Rocker Switches Replacement 0049 00-1
WP 0050 00 Parking Light/Blackout Marker Light Maintenance 0050 00-1
WP 0051 00 Turn Signal/hazard Flasher Switch Replacement 0051 00-1
WP 0052 00 Blackout Drive Light Maintenance 0052 00-1
WP 0053 00 Dimmer Switch Replacement 0053 00-1
WP 0054 00 Headlights Replacement 0054 00-1
WP 0055 00 EMS Alarm Replacement 0055 00-1
WP 0056 00 Air Intake Heater Timer Replacement 0056 00-1
WP 0057 00 Work Light Maintenance. 0057 00-1
WP 0058 00 Stop Lamp Pressure Switch Replacement 0058 00-1
WP 0059 00 Torque Converter Temperature Switch Replacement 0059 00-1
WP 0060 00 Torque Convertor Temperature Sender Replacement. 0060 00-1
WP 0061 00 Coolant Temperature Sender Replacement 0061 00-1
WP 0062 00 Engine and Transmission Speed Sensors Replacement 0062 00-1
WP 0063 00 EngineTemperature and Ether Start Aid Temperature Switch Replacement . . 0063 00-1
WP 0064 00 Engine Oil, Fuel Level Relay, and Ejector Detent Pressure Switches Replacement 0064 00-1
WP 0065 00 Engine Fuel System Pressure Switch Replacement 0065 00-1
WP 0066 00 Service Brake Air Supply Block Solenoid Valve Replacement 0066 00-1
WP 0067 00 Battery and Battery Cables Maintenance 0067 00-1
WP 0068 00 Slave Start Receptacle and Cables Replacement. 0068 00-1

Transmission

WP 0069 00 Transmission Shift Control Cable Replacement 0069 00-1
WP 0070 00 Transmission Shift Control Cam and Linkage Replacement 0070 00-1
WP 0071 00 Transmission Shift Lever and Lock Replacement. 0071 00-1
WP 0072 00 Transmission Oil Filter and Oil Filter Base Replacement. 0072 00-1
WP 0073 00 Transmission Oil Sampling Valve Replacement. 0073 00-1
WP 0074 00 Transmission Oil Cooler Replacement 0074 00-1

Transfer Assembly

WP 0075 00 Transmission Oil Suction Screen and Tube Assembly (Magnetic Screen) Replacement 0075 00-1

Propeller and Propeller Shafts

WP 0076 00 Lower Prop Shaft Maintenance 0076 00-1

Table of Contents - Continued

		Page Number
Front Axle		
WP 0077 00	Final Drive Maintenance	0077 00-1
WP 0078 00	Front Axle Shafts Replacement	0078 00-1
WP 0079 00	Front Spindle Assembly Maintenance	0079 00-1
WP 0080 00	Front Wheel, Hub, Brake Disc, and Wheel Bearings and Seals Maintenance	0080 00-1
WP 0081 00	Differential Lock Control Valve Maintenance	0081 00-1
Brake System		
WP 0082 00	Parking Brake Assembly Maintenance	0082 00-1
WP 0083 00	Air Compressor Governor and Air Compressor Maintenance	0083 00-1
WP 0084 00	Front Service Brakeshoes Replacement	0084 00-1
WP 0085 00	Skid Steer Control and Air Lines Replacement	0085 00-1
WP 0086 00	Air/Hydraulic Brake Cylinder Replacement	0086 00-1
WP 0087 00	Brake Caliper Replacement	0087 00-1
WP 0088 00	Parking Brake Actuator Replacement	0088 00-1
WP 0089 00	Parking Brake or Emergency Brake Control Valve Replacement	0089 00-1
WP 0090 00	Service Brake Control Valve Replacement	0090 00-1
WP 0091 00	Pressure Protection Valve Replacement	0091 00-1
WP 0092 00	Double Check Valves Replacement	0092 00-1
WP 0093 00	Air Hoses and Tubes Replacement	0093 00-1
WP 0094 00	Air Tanks Replacement	0094 00-1
WP 0095 00	Service Brake Bleeding	0095 00-1
Wheels and Tires		
WP 0096 00	Front Tire and Rim Replacement	0096 00-1
Steering		
WP 0097 00	Steering Wheel and Column Replacement	0097 00-1
Body and Cab		
WP 0098 00	ROPS/FOPS Replacement	0098 00-1
WP 0099 00	Engine Grille, Engine Access Door, and Hood Assembly Replacement	0099 00-1
WP 0100 00	Guard Plates Replacement	0100 00-1
WP 0101 00	Fenders Replacement	0101 00-1
WP 0102 00	Windshield Maintenance	0102 00-1
WP 0103 00	Seat Replacement	0103 00-1
WP 0104 00	Seat Repair	0104 00-1
WP 0105 00	Rifle Rack Replacement	0105 00-1
WP 0106 00	Fire Extinguisher and Bracket Replacement	0106 00-1
Body Accessory Items		
WP 0107 00	Rearview and Side Mirrors Replacement	0107 00-1
WP 0108 00	Data Plate and Decal Replacement	0108 00-1
WP 0109 00	Windshield Washer Reservoir and Pump Replacement	0109 00-1
WP 0110 00	Windshield Wiper Arm and Motor Replacement	0110 00-1
WP 0111 00	Air Horn Replacement	0111 00-1
WP 0112 00	Air Horn Solenoid Replacement	0112 00-1
WP 0113 00	Air Horn Switch Replacement	0113 00-1

Table of Contents - Continued

Page Number

Hydraulic System

WP 0114 00 Direction Control and Hydraulic Control Levers Replacement 0114 00-1
WP 0115 00 Hydraulic Oil Filters and Bypass Valve Maintenance 0115 00-1
WP 0116 00 Hydraulic Lines and Fittings Replacement 0116 00-1
WP 0117 00 Hydraulic Oil Sampling Valve Replacement 0117 00-1
WP 0118 00 Hydraulic Tank Safety Relief Valve Assembly Maintenance. 0118 00-1
WP 0119 00 Hydraulic Tank Sight Gage Replacement 0119 00-1
WP 0120 00 Hydraulic Tank Filler Cap Repair 0120 00-1
WP 0121 00 Hydraulic Oil Switch Replacement 0121 00-1

CHAPTER 5 DIRECT SUPPORT LEVEL TRACTOR MAINTENANCE

Engine

WP 0122 00 Engine Replacement 0122 00-1
WP 0123 00 Front and Rear Engine Supports Replacement 0123 00-1
WP 0124 00 Engine Front and Rear Lifting Brackets Replacement 0124 00-1
WP 0125 00 Cylinder Head Replacement 0125 00-1
WP 0126 00 Vibration Damper and Pulley Replacement 0126 00-1
WP 0127 00 Crankshaft Front Seal Replacement 0127 00-1
WP 0128 00 Crankshaft Rear Seal Carrier Replacement. 0128 00-1
WP 0129 00 Crankshaft Rear Seal Replacement 0129 00-1
WP 0130 00 Flywheel Housing Replacement 0130 00-1
WP 0131 00 Flywheel Maintenance. 0131 00-1
WP 0132 00 Engine Front Cover Replacement 0132 00-1
WP 0133 00 Rocker Shaft Group Replacement 0133 00-1
WP 0134 00 Engine Oil Filter Base and Oil Cooler Maintenance. 0134 00-1
WP 0135 00 Engine Oil Pump Assembly Maintenance. 0135 00-1
WP 0136 00 Exhaust Manifold Replacement 0136 00-1
WP 0137 00 Intake Manifold Replacement 0137 00-1

Fuel System

WP 0138 00 Fuel Injector Control Linkage Replacement 0138 00-1
WP 0139 00 Fuel Unit Injector Replacement. 0139 00-1
WP 0140 00 Injector Synchronization, Fuel Setting, and Fuel Timing 0140 00-1
WP 0141 00 Fuel Transfer Pump and Governor Replacement 0141 00-1
WP 0142 00 Aftercooler and Air Inlet Heater Replacement 0142 00-1
WP 0143 00 Turbocharger Replacement 0143 00-1

Cooling System

WP 0144 00 Radiator Replacement 0144 00-1
WP 0145 00 Fan Drive Repair 0145 00-1

Transmission/Transfer Assembly

WP 0146 00 Torque Converter Replacement. 0146 00-1
WP 0147 00 Transmission/Transfer Assembly Replacement 0147 00-1
WP 0148 00 Transmission Hydraulic Control Valve Replacement. 0148 00-1
WP 0149 00 Transmission Oil and Scavenger Pump Replacement. 0149 00-1

Table of Contents - Continued

Page Number

Propeller and Propeller Shafts

WP 0150 00 Upper Prop Shaft Replacement 0150 00-1

Front Axle

WP 0151 00 Front Axle Assembly Replacement 0151 00-1
WP 0152 00 Differential and Bevel Gear Replacement 0152 00-1

Steering

WP 0153 00 Steering Hydraulic Cylinders Replacement 0153 00-1
WP 0154 00 Steering Hydraulic Control Valve Replacement 0154 00-1

Frame, Towing, and Articulation Systems

WP 0155 00 Draft Frame, Hitch, and Tractor Frame Pins and Bearings Replacement 0155 00-1
WP 0156 00 Steering Link Replacement 0156 00-1

Body and Cab

WP 0157 00 Windshield Glass Replacement 0157 00-1

Hydraulic System

WP 0158 00 Hydraulic and Steering Pump Replacement 0158 00-1
WP 0159 00 Elevator/Water Hydraulic Pump Replacement 0159 00-1
WP 0160 00 Main Control Valve Replacement 0160 00-1
WP 0161 00 Elevator/Water Pump Control Valve Replacement 0161 00-1
WP 0162 00 Hydraulic Tank Replacement 0162 00-1

CHAPTER 6 COMPONENTS OF END ITEM (COEI) MAINTENANCE

WP 0163 00 Container Maintenance 0163 00-1
WP 0164 00 Container Repair 0164 00-1
WP 0165 00 Cutting Edge Wheels and Load Transfer Axles Repair 0165 00-1
WP 0166 00 Load Transfer Relief Valve and Hose Assembly Repair 0166 00-1
WP 0167 00 Auxiliary Fuel Tank Repair 0167 00-1

CHAPTER 7 SUPPORTING INFORMATION

WP 0168 00 References 0168 00-1
WP 0169 00 Maintenance Allocation Chart (MAC) Introduction 0169 00-1
WP 0170 00 Maintenance Allocation Chart (MAC) 0170 00-1
WP 0171 00 Expendable and Durable Items List 0171 00-1
WP 0172 00 Tool Identification List 0172 00-1
WP 0173 00 Torque Limits 0173 00-1
WP 0174 00 Preparation for Storage or Shipment 0174 00-1
WP 0175 00 List of Principle Caterpillar Dealers 0175 00-1
WP 0176 00 Nuclear, Biological, and Chemical (NBC) and ElectroMagnetic Pulse (EMP) Susceptible Components 0176 00-1
WP 0177 00 Warranty Information (Caterpillar, Inc.) 0177 00-1
WP 0178 00 Warranty Information (All Except Caterpillar, Inc.) 0178 00-1
Index Index-1

Table of Contents - Continued

Page Number

VOLUME 2 - TM 5-3800-205-23-2

CHAPTER 1 UNIT LEVEL SCRAPER MAINTENANCE

Fuel System

WP 0001 00 Fuel Pump, Hoses, and Tubes Replacement 0001 00-1
WP 0002 00 Fuel/Water Separator Replacement 0002 00-1

Electrical System

WP 0003 00 Electrical General Maintenance Instructions 0003 00-1
WP 0004 00 Ground Straps Replacement 0004 00-1
WP 0005 00 Composite Light Maintenance 0005 00-1
WP 0006 00 Blackout Light Maintenance 0006 00-1
WP 0007 00 Fuel Level Sending Unit and Dial Sensor Replacement 0007 00-1
WP 0008 00 Backup Alarm Replacement 0008 00-1

Axles

WP 0009 00 Rear Hub and Disc Replacement 0009 00-1

Brake System

WP 0010 00 Air/Hydraulic Brake Cylinder Replacement 0010 00-1
WP 0011 00 Rear Service Brakeshoes and Caliper Replacement 0011 00-1
WP 0012 00 Air Hoses and Tubes Replacement 0012 00-1
WP 0013 00 Quick-Release Valve Replacement 0013 00-1
WP 0014 00 Brake Lines Replacement 0014 00-1
WP 0015 00 Service Brakes Bleeding 0015 00-1

Wheel and Tire

WP 0016 00 Rear Tire and Rim Replacement 0016 00-1

Body and Cab

WP 0017 00 Toolbox and Rear Deck Cover Replacement 0017 00-1

Body and Accessory Items

WP 0018 00 Data Plate Replacement 0018 00-1

Hydraulic System

WP 0019 00 Elevator Motor Replacement 0019 00-1
WP 0020 00 Hydraulic Lines and Fittings Replacement 0020 00-1
WP 0021 00 Check Valve and Lift Cylinder Replacement 0021 00-1

Scraper System

WP 0022 00 Elevator Assembly Adjustment 0022 00-1
WP 0023 00 Elevator Flights and Chains Replacement 0023 00-1
WP 0024 00 Elevator Guard Replacement 0024 00-1
WP 0025 00 Elevator Chain Adjustment 0025 00-1
WP 0026 00 Elevator Chain Idler Replacement 0026 00-1
WP 0027 00 Ejector Clearance Adjustment 0027 00-1
WP 0028 00 Cutting Edges and Router Bits Replacement 0028 00-1

Table of Contents - Continued

Page Number

CHAPTER 2 DIRECT SUPPORT LEVEL SCRAPER MAINTENANCE

Axles

WP 0029 00 Rear Wheel Bearings and Seal Replacement 0029 00-1

Hydraulic System

WP 0030 00 Floor Check Valve Replacement. 0030 00-1
WP 0031 00 Ejector Cylinder Replacement. 0031 00-1
WP 0032 00 Floor Cylinder Replacement 0032 00-1

Scraper System

WP 0033 00 Elevator Assembly Replacement. 0033 00-1
WP 0034 00 Elevator Chain Idler Repair. 0034 00-1
WP 0035 00 Elevator Chain Roller Replacement 0035 00-1
WP 0036 00 Elevator Drive Replacement 0036 00-1
WP 0037 00 Ejector Carrier Roller Maintenance. 0037 00-1
WP 0038 00 Ejector Guide Roller Maintenance 0038 00-1
WP 0039 00 Ejector Support Roller Maintenance 0039 00-1
WP 0040 00 Sliding Floor Replacement 0040 00-1
WP 0041 00 Sliding Floor Roller Maintenance 0041 00-1
WP 0042 00 Sliding Floor Link Replacement 0042 00-1
WP 0043 00 Sliding Floor Dump Arm Replacement. 0043 00-1

CHAPTER 3 SUPPORTING INFORMATION

WP 0044 00 References 0044 00-1
WP 0045 00 Maintenance Allocation Chart (MAC) Introduction 0045 00-1
WP 0046 00 Maintenance Allocation Chart (MAC) 0046 00-1
WP 0047 00 Expendable and Durable Items List 0047 00-1
WP 0048 00 Tool Identification List 0048 00-1
WP 0049 00 Torque Limits 0049 00-1
WP 0050 00 Preparation for Storage or Shipment 0050 00-1
WP 0051 00 List of Principle Caterpillar Dealers 0051 00-1
WP 0052 00 Warranty Information (Caterpillar, Inc.). 0052 00-1
WP 0053 00 Warranty Information (All Except Caterpillar, Inc.). 0053 00-1
Index . . . . . Index -1

Table of Contents - Continued

Page Number

VOLUME 3 - TM 5-3800-205-23-3

CHAPTER 1 UNIT LEVEL WATER DISTRIBUTOR MAINTENANCE

Fuel System

WP 0001 00 Fuel Pump, Hoses, and Tubes Replacement 0001 00-1
WP 0002 00 Fuel/Water Separator Replacement 0002 00-1

Electrical System

WP 0003 00 Electrical General Maintenance Instructions. 0003 00-1
WP 0004 00 Composite Light Maintenance 0004 00-1
WP 0005 00 Blackout Light Maintenance 0005 00-1
WP 0006 00 Work Light Maintenance 0006 00-1

Electrical System - Continued

WP 0007 00 Fuel Level Sending Unit and Dial Sensor Replacement 0007 00-1
WP 0008 00 Backup Alarm Replacement 0008 00-1
WP 0009 00 Water Tank Wiring Harness Replacement 0009 00-1

Axles

WP 0010 00 Rear Hub and Disc Replacement. 0010 00-1

Brake System

WP 0011 00 Air/hydraulic Brake Cylinder Replacement 0011 00-1
WP 0012 00 Rear Service Brakeshoes and Brake Caliper Replacement 0012 00-1
WP 0013 00 Air Hose and Tube Replacement. 0013 00-1
WP 0014 00 Quick-Release Valve Replacement 0014 00-1
WP 0015 00 Brake Lines Replacement 0015 00-1
WP 0016 00 Service Brakes Bleeding 0016 00-1

Wheel and Tire

WP 0017 00 Rear Tire and Rim Replacement 0017 00-1

Body and Cab

WP 0018 00 Rear Handrails and Step Assembly Maintenance 0018 00-1
WP 0019 00 Toolbox Replacement 0019 00-1
WP 0020 00 Water Tank Inspection Cover Replacement 0020 00-1
WP 0021 00 Water Tank Access Cover Maintenance 0021 00-1
WP 0022 00 Mudflap and Rear Grabhandle Replacement 0022 00-1

Body Accessory Items

WP 0023 00 Data Plate Replacement. 0023 00-1

Hydraulic System

WP 0024 00 Hydraulic Hoses Maintenance (Draft Arm-to-Water Tank) 0024 00-1
WP 0025 00 Hydraulic Hoses Replacement (Water Tank-to-Hydraulic Motor). 0025 00-1
WP 0026 00 Check Valve and Lift Cylinder Replacement 0026 00-1

Table of Contents - Continued

Page Number

Water Distributor System

WP 0027 00 Butterfly Valve Assembly Maintenance 0027 00-1
WP 0028 00 Upper and Lower Spray Bar Replacement 0028 00-1
WP 0029 00 Control Panel and Air Hoses Maintenance 0029 00-1
WP 0030 00 Hose Reel Assembly Maintenance 0030 00-1
WP 0031 00 Water Level Sender Replacement 0031 00-1
WP 0032 00 Water Tank Foot Valve Assembly Replacement 0032 00-1
WP 0033 00 Suction Inlet Manual Valve and Vacuum Valve Replacement 0033 00-1
WP 0034 00 Suction Hose Foot Valve Assembly Repair 0034 00-1
WP 0035 00 Water Hose Assemblies, Inlet/Outlet Pipes, and Manifolds Replacement 0035 00-1

CHAPTER 2 DIRECT SUPPORT LEVEL WATER DISTRIBUTOR MAINTENANCE

Axles

WP 0036 00 Rear Wheel Bearings and Seal Replacement 0036 00-1

Hydraulic System

WP 0037 00 Water Pump Hydraulic Motor Replacement 0037 00-1

Water Distributor System

WP 0038 00 Water Pump Maintenance 0038 00-1
WP 0039 00 Water Pump Housing Replacement. 0039 00-1
WP 0040 00 Water Pump Check Valve Assembly Maintenance. 0040 00-1

CHAPTER 3 SUPPORTING INFORMATION

WP 0041 00 References 0041 00-1
WP 0042 00 Maintenance Allocation Chart (MAC) Introduction 0042 00-1
WP 0043 00 Maintenance Allocation Chart (MAC) 0043 00-1
WP 0044 00 Expendable and Durable Items List 0044 00-1
WP 0045 00 Tool Identification List 0045 00-1
WP 0046 00 Torque Limits 0046 00-1
WP 0047 00 Preparation for Storage or Shipment 0047 00-1
WP 0048 00 List of Principle Caterpillar Dealers 0048 00-1
WP 0049 00 Warranty Information (Caterpillar, Inc.) 0049 00-1
WP 0050 00 Warranty Information (All Except Caterpillar, Inc.) 0050 00-1
Index Index-1

HOW TO USE THIS MANUAL

INTRODUCTION

1. This manual is designed to help you perform troubleshooting and maintenance on the 613CS Scraper and the 613CWD Water Distributor.
2. This manual is divided into volumes and written in work package format:
    a. Volume 1 addresses tractor/common components and procedures. Volume 2 addresses scraper unique components. Volume 3 addresses water distributor unique components.
    b. Chapters divide the manual into major categories of information (e.g., *Introductory Information with Theory of Operation, Troubleshooting Procedures, Unit Maintenance Procedures, Unit Level Tractor Maintenance, Direct Support Level Tractor Maintenance, Components of End Item (COEI) Maintenance, Unit Level Scraper Maintenance, Direct Support Level Scraper Maintenance, Unit Level Water Distributor Maintenance, Direct Support Level Water Distributor Maintenance,* and *Supporting Information*).
    c. Each chapter is divided into work packages, which are identified by a 6-digit number (e.g., 0001 00, 0002 00, etc.) located on the upper right-hand corner of each page. The work package page number (e.g., 0001 00-1, 0001 00-2, etc.) is located centered at the bottom of each page.
    d. If a Change Package is issued to this manual, added work packages use the 5th and 6th 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.
3. Scan through this manual to become familiar with its organization and contents before attempting to operate or maintain the equipment.

CONTENTS OF VOLUME 1 OF THIS MANUAL

1. A *Warning Summary* is located at the beginning of this manual. Become familiar with these warnings before operating or performing maintenance on the scraper or water distributor.
2. A *Table of Contents*, located in the front of this manual, lists all chapters and work packages in the publication.
    a. The Table of Contents also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to this 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 this manual.
3. Chapter 1, *Introductory Information with Theory of Operation*, provides general information on the equipment.
4. Chapter 2, *Troubleshooting Procedures*, contains a *Troubleshooting Symptom Index*. If the machine malfunctions, this index should always be consulted to locate the appropriate troubleshooting procedure.
5. Chapter 3, *Unit Maintenance Procedures*, contains *Service Upon Receipt* and *PMCS.*
6. Chapter 4, *Unit Level Tractor Maintenance*, provides instructions on Unit level maintenance tractor components.
7. Chapter 5, *Direct Support Level Tractor Maintenance*, provides instructions on DS level maintenance of the tractor.
8. Chapter 6, *Components of End Item (COEI) Maintenance*, contains maintenance of the components of end item.
9. Chapter 7 includes *Supporting Information: References; Maintenance Allocation Chart (MAC) Introduction, Maintenance Allocation Chart (MAC)*; *Expendable and Durable Items List; Tool Identification List; Torque Limits Preparation for Storage or Shipment; List of Principal Caterpillar Dealer; and NBC and EMP Susceptible Components*.

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. 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.

   If you are told: “Remove Rocker Arm Cover (WP 0011 00)”, go to Work Package 0011 00 in this manual for instructions on replacing the rocker arm covers.
4. Illustrations are placed after, and as close 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.
5. Numbers located at lower right corner of art (e.g. 390-001; 390-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
6. Dashed leader lines used in the Lubrication Chart in WP 0010 00 (*PMCS Introduction*) indicate that called out lubrication points are located on both sides of the machine.
7. 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 this 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 1
INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

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GENERAL INFORMATION 0001 00

SCOPE

1. **Type of Manual.** This manual is for use in performing Field Maintenance (includes Unit and Direct Support Maintenance) on the 613CS Scraper and 613CWD Water Distributor, components of the Airborne Scraper Water Distributor System (ASWDS).

2. **Equipment Name and Model Number.**

   a. Scraper, Tractor, Elevating, Self-Propelled, 11 Cubic Yards, Sectionalized, Model 613CS.

   b. Distributor, Water, Tank Type, 2525 Gallon Capacity, Sectionalized, Model 613CWD.

3. **Purpose of Equipment.**

   a. The 613CS Scraper is used to self-load, haul, dump, and spread soil in worldwide earthmoving and construction projects by U.S. Army forces in engineer troop support.

   b. The 613CWD Water Distributor provides dust control, soil stabilization, and power washing capabilities in worldwide earthmoving and construction projects by U.S. Army forces in engineer troop support.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for the equipment will be those prescribed by DA Pam 738-750, *Functional User's Manual for the Army Maintenance Management System (TAMMS*), as contained in the Maintenance Management Update.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS)

If your machine needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF Form 368 *(Product Quality Deficiency Report)*. Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, Illinois 61299-7630. We'll send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

1. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

2. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using SF Form 368 *(Product Quality Deficiency Report)*. Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

THREAT OF NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) CONTAMINATION

1. The 613C machine incorporates a CARC painted exterior. Materials used in the machine are metal, rubber, plastic, fabric, and glass.

2. In the event of NBC contamination, decontaminants for these surfaces and materials are listed in FM 3-5. For decontamination procedures, refer to FM 3-7 and to TM 5-3800-205-10-1 or TM 5-3800-205-10-2, *Operation Under Unusual Conditions*.

3. For a list of 613C susceptible components, refer to WP 0176 00 in this manual.

ELECTROMAGNETIC PULSE (EMP) EXPOSURE

1. Components listed and designated as EMP susceptible may be damaged by EMP exposure. If the machine is exposed to an EMP incident, verify proper operation and repair as necessary.
2. For a list of 613C susceptible components, refer to WP 0176 00 in this manual.

OZONE DEPLETING SUBSTANCES

Listing to be provided by requiring activity.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-3.

PREPARATION FOR STORAGE OR SHIPMENT

For preparation for storage or shipment procedures, refer to WP 0174 00.

WARRANTY INFORMATION

The machines are warranted by Caterpillar Inc. in accordance with TM 5-3800-205-10-1 or TM 5-3800-205-10-2. Warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your Unit Maintenance shop.

LIST OF ABBREVIATIONS/ACRONYMS

NOTE

Refer to ASME Y14.38-1999 for standard abbreviations.

ABBREVIATION/ACRONYMS	DEFINITION
AAL	Additional Authorization List
AAR	Association of American Railroads
AOAP	Army Oil Analysis Program
ASWDS	Airborne Scraper Water Distributor System
BDC	Bottom Dead Center
BFOR	Bridgestone/Firestone Off Road
BII	Basic Issue Items
C	Centigrade or Celsius
CAGEC	Commercial and Government Entity Code
CARB	California Air Resources Board
CARC	Chemical Agent Resistant Coating
CCA	Cold Cranking Amps
CFR	Code of Federal Regulations
CID	Cubic Inch Displacement
cm	Centimeter
COEI	Components of End Item
CONUS	Continental United States
CPC	Corrosion Prevention and Control

LIST OF ABBREVIATIONS/ACRONYMS - CONTINUED

ABBREVIATION/ACRONYMS	DEFINITION
DAP	Decontamination Apparatus
ECM	Electronic Control Module
EIR	Equipment Improvement Recommendations
EMP	ElectroMagnetic Pulse
EMS	Electronic Monitoring System
EPA	Environmental Protection Agency
F	Fahrenheit
FRC	Fuel-air Ration Control
ft	Feet
gal	Gallons
GCWR	Gross Combination Weight Rating
GET	Ground Engaging Tools
GIC	Gabarit International de Chargement
gpm	Gallons per minute
GVWR	Gross Vehicle Weight Rating
HAZMAT	Hazardous Material
IAW	In Accordance With
ISO	International Organization for Standardization
ISU	Internal Airlift/Helicopter Slingable Container Unit
kg	Kilogram
km	Kilometer
kPa	Kilopascal
kph	Kilometers per Hour
kW	Kilowatt
in.	Inches
l	Liter
lb	Pounds
lb-ft	Pound Foot
LC	Load Center
lph	Liters per Hour
m	Meters
mm	Millimeter
mph	Miles per hour
MSDS	Material Safety Data Sheets
MTMC	Military Traffic Management Command
MTMCTEA	Military Traffic Management Command Transportation Engineering Agency
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical

LIST OF ABBREVIATIONS/ACRONYMS - CONTINUED

ABBREVIATION/ACRONYMS	DEFINITION
Nm	Newton Meter
NSN	National Stock Number
OCONUS	Outside Continental United States
OSHA	Occupational Safety and Health Administration
PMCS	Preventive Maintenance Checks and Services
Qty	Quantity
ROD	Report of Discrepancy
RPM	Revolutions per minute
ROPS/FOPS	Rollover Protective Structure/Falling Object Protective Structure
RO/RO	Roll-On/Roll-Off
Rqd	Required
TAMMS	The Army Maintenance Management System
TMPH	Ton-mile per-hour
U/M	Unit of Measure
V	Volts
yd	Yards

END OF WORK PACKAGE

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (SCRAPER)

1. **Characteristics.**

   a. The 613CS Scraper, used in conjunction with the 613CWD Water Distributor, provides the Army with the capability to efficiently build roads, airstrips, and other engineering assets in a wide variety of geographic, environmental, and tactical situations.

   b. The scraper self-loads, hauls, dumps, and spreads earth, thereby providing grading capability from start to finish of a job.

   c. The machine is capable of all critical earthmoving operations in a degraded mode of operation (i.e., without ROPS/FOPS).

2. **Capabilities and Features.**

NOTE

Refer to *Equipment Data (Scraper)* at the end of this work package for machine dimensions, weights, fluid capacities, and other miscellaneous equipment data.

   a. The scraper consists of two sections: front tractor section and rear elevating scraper section. These may be separated (sectionalization) to allow external air transport by CH-47 helicopter.

   b. All parts and tools needed for sectionalization are contained within an ISU-60 container. This container also has stowage space for parts that are removed from the machine for sectionalization.

   c. After sectionalization, the tractor half of this machine is reassembled with the scraper. The tractor may also be assembled and operated with the water distributor half of the 613CWD Water Distributor (interchangeability).

   d. The scraper can be transported by driving onto the following aircraft: C-17 and C-5. After reconfiguration, the scraper can be driven onto a C-130 for transport.

   e. The machine can be rigged on an air delivery platform for airdrop from C-130 aircraft.

   f. Commercial trailers, trains or marine vessels can also transport the scraper.

   g. The scraper can fresh-water ford to a depth of 3.28 ft (1 m) without damage or contamination of lubricants.

   h. The tractor front section has the following capabilities and features:

      (1) Caterpillar® 3116TA turbocharged diesel engine with six in-line cylinders, generating 175 horsepower @ 2300 RPM;

      (2) integral ether cold start for engine startup down to -25°F (-32°C);

      (3) Caterpillar® powershift, manual transmission with six forward speeds and one reverse;

      (4) operator’s cab with adjustable seat and steering column/wheel;

      (5) removable bolt-on ROPS/FOPS canopy;

      (6) front full-floating drive axle with outboard planetary final drives;

      (7) differential lock control to reduce wheel slippage when high traction is required;

      (8) articulated frame steering with two double-acting steering cylinders;

      (9) oil sampling valves for engine, transmission, and hydraulic systems;

      (10) NATO slave receptacle; and

      (11) mounting provisions for M16 rifle and portable fire extinguisher inside cab, and decontamination apparatus at left front of tractor.

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (SCRAPER) - CONTINUED

i. The scraper rear section has the following capabilities and features:

(1) non-drive axle;

(2) elevating bowl with a load rate of less than one minute, to an 11 yd^3 (8.4 m^3) capacity;

(3) interchangeable and reversible cutting edges, with center section predrilled to allow installation of four cutting teeth;

(4) two-speed forward, one reverse speed elevator to lift material into bowl; and

(5) retracting floor and dozer-type ejector for rapid unloading.

j. When sectionalized, tractor can be driven using front and rear skids for stability, and steered using a skid steer system.

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (WATER DISTRIBUTOR)

1. **Characteristics.**

a. The 613CWD Water Distributor, used in conjunction with the 613CS Scraper, provides the Army with the capability to efficiently build roads, helipads, airfields, landing zones/airstrips, and other engineering assets in a wide variety of geographic, environmental, and tactical situations.

b. The water distributor self-loads, transports, and distributes a maximum of 2525 gallons (9,558 liters) of water, soil stabilization or dust palliative solutions, providing soil stabilization, dust control, and compaction capabilities.

c. The machine also provides power washing and de-icing operations when required.

d. With optional attachments mounted, the machine provides soil cultivation and road grading capabilities.

e. The water distributor is capable of all critical water distribution operations in a degraded mode of operation (i.e., without ROPS/FOPS).

2. **Capabilities and Features.**

NOTE

Refer to *Equipment Data (Water Distributor)* at the end of this work package for machine dimensions, weights, fluid capacities, and other miscellaneous equipment data.

a. The water distributor consists of two sections: front tractor section and rear water distributor section. These may be separated (sectionalization) to allow external air transport by CH-47 helicopter.

b. All parts and tools needed for sectionalization are contained within an ISU-60 container. This container also has stowage space for parts that are removed from the machine for sectionalization.

c. After sectionalization, the tractor half of this machine is reassembled with the water distributor half. It may also be assembled and operated with the scraper half of the 613CS Scraper (interchangeability).

d. The water distributor can be transported by driving onto the following aircraft: C-17 and C-5. After reconfiguration, it can be driven onto a C-130 for transport.

e. The machine can be rigged on an air delivery platform for airdrop from C-130 aircraft.

f. Commercial trailers, trains or marine vessels can also transport the water distributor.

g. The water distributor can fresh-water ford to a depth of 3.28 ft (1 m) without damage or contamination of lubricants.

h. The tractor front section has the following capabilities and features:

(1) Caterpillar® 3116TA turbocharged diesel engine with six in-line cylinders, generating 175 horsepower @ 2300 RPM;

(2) integral ether cold start for engine startup down to -25°F (-32°C);

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (WATER DISTRIBUTOR) - CONTINUED

(3) Caterpillar® powershift, manual transmission with six forward speeds and one reverse;

(4) operator's cab with adjustable seat and steering column/wheel;

(5) removable bolt-on ROPS/FOPS canopy;

(6) front full-floating drive axle with outboard planetary final drives;

(7) differential lock control to reduce wheel slippage when high traction is required;

(8) articulated frame steering with two double-acting steering cylinders;

(9) oil sampling valves for engine, transmission, and hydraulic systems;

(10) NATO slave receptacle; and

(11) mounting provisions for M16 rifle and portable fire extinguisher inside cab, and decontamination apparatus at left front of tractor.

i. The water distributor rear section has the following capabilities and features:

(1) non-drive axle;

(2) ASTM 588 (core ten) corrosion-resistant steel tank with a maximum capacity of 2525 gallons (9558 liters);

(3) internal, positive prime foot valve at bottom of tank;

(4) interior surge baffling to ensure stability on side slopes;

(5) 20-inch access cover (with bag cutter/can breaker) at rear of tank provides access for top loading and for adding soil stabilization, dust control or deicing compounds to tank;

(6) 20-inch inspection cover at front of tank;

(7) stainless steel internal piping and overflow, with cleanouts front and rear;

(8) drafting line for suction bottom loading;

(9) components inside tank provide for thorough mixing (sparging) of tank amendment solutions, as well as cleaning and rinsing of tank interior;

(10) upper spray bar provides pressure discharge with flexible/adjustable spray patterns, for dust control;

(11) lower spray bar provides pressure or gravity discharge, for soil stabilizers or de-icing agents;

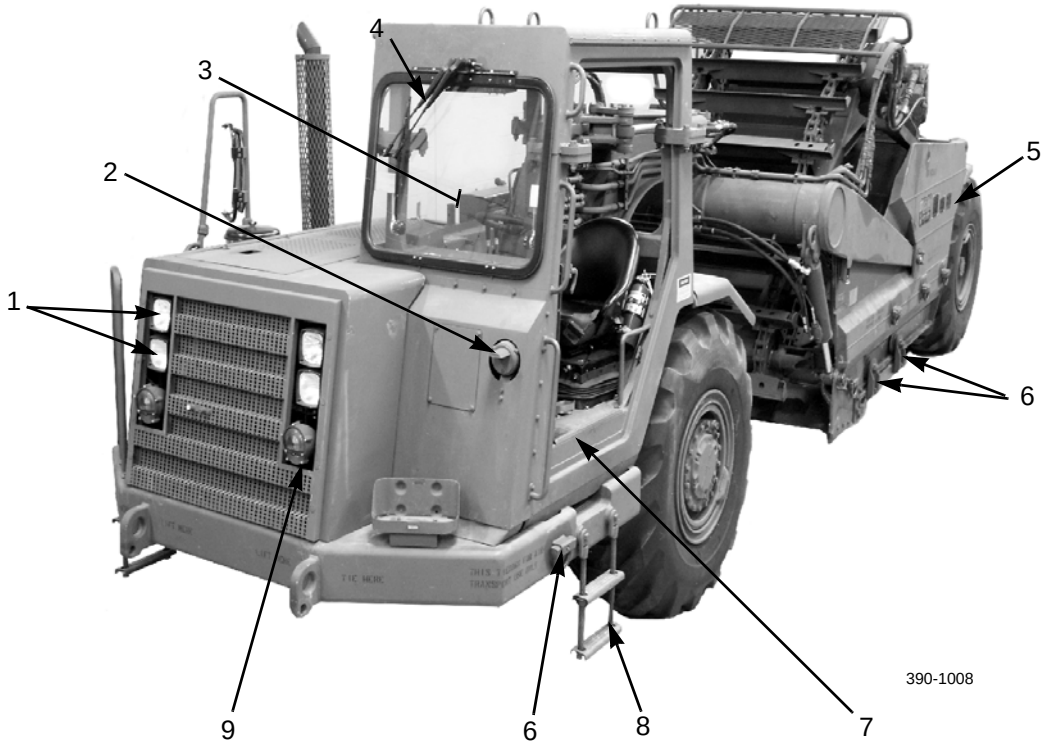
(12) hose reel with 70 ft (21.4 m) hose for power washing operations;

(13) cab-mounted control panel for water distributor operations; and

(14) provisions to mount optional attachments: front-mounted disc to cultivate soil, blade for road grading operations, and de-icing extensions.

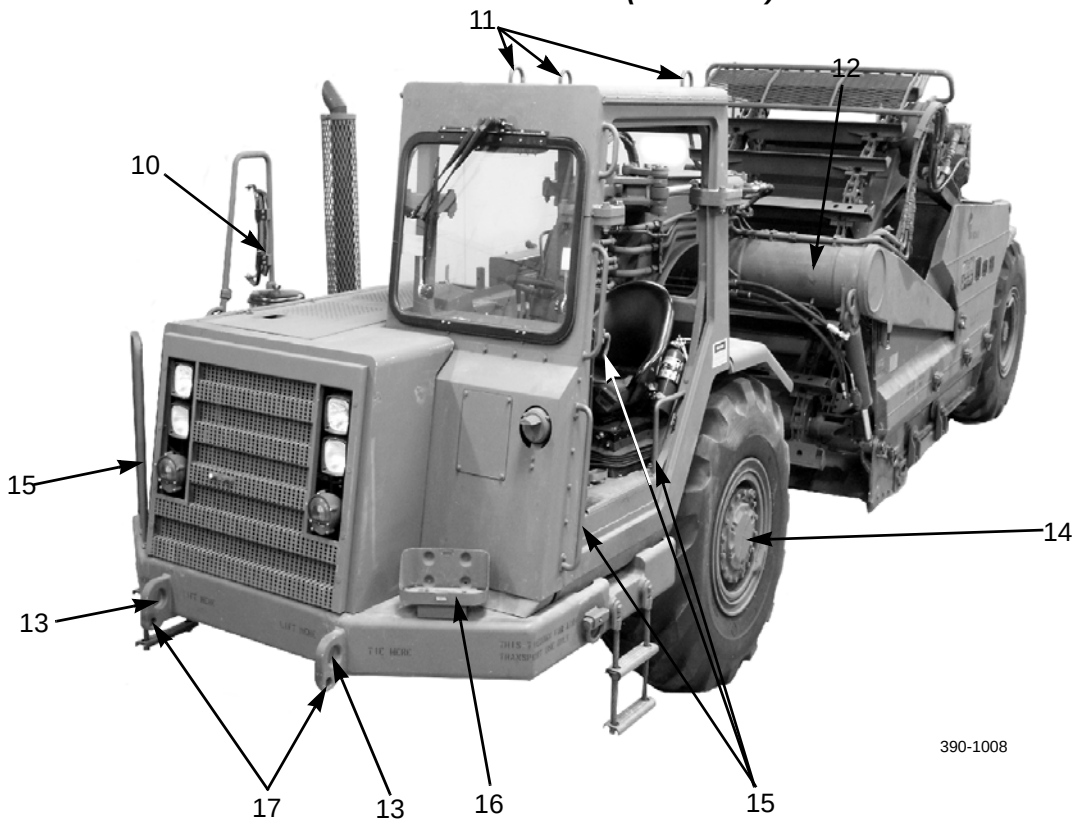
j. When sectionalized, the tractor can be driven using front and rear skids for stability, and steered using a skid steer system.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER)



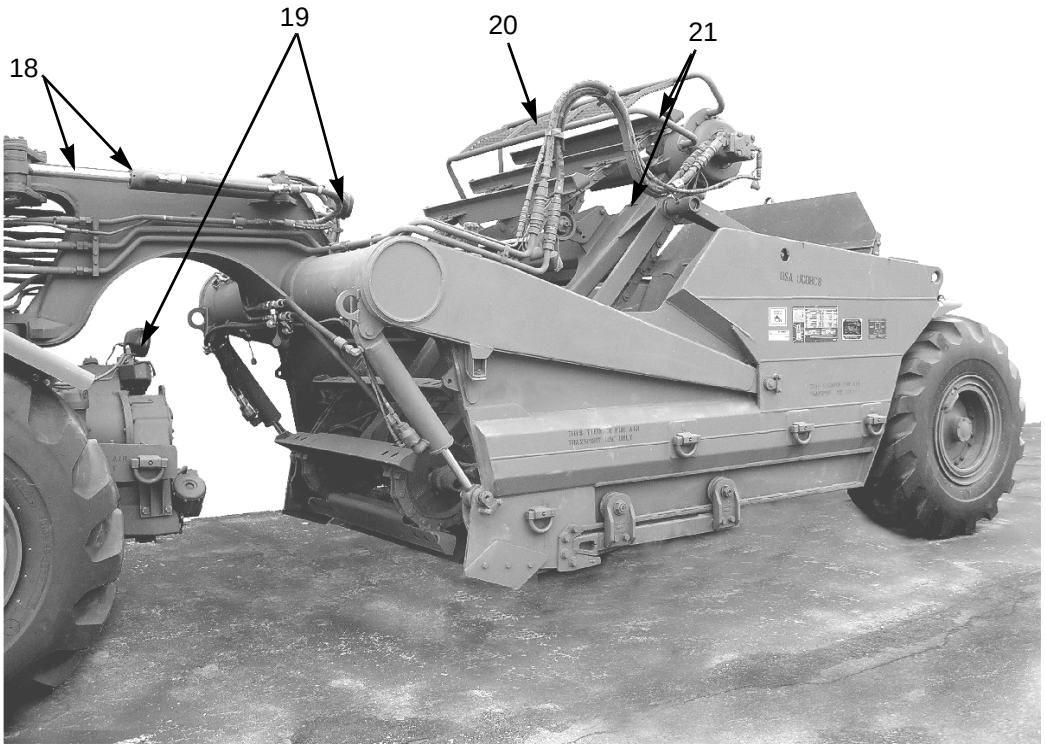
KEY	COMPONENT	DESCRIPTION
1	Service Headlights	Top pair of lights are high beam. Bottom are low beam.
2	Blackout Drive Light	Used when operating in blackout mode.
3	Windshield	Protects operator from inclement weather and flying objects. Includes windshield wipers. Can be removed in preparation for transport.
4	ROPS/FOPS	Provides rollover and falling object protection for operator. Can be removed in preparation for transport.
5	Bowl	High-strength steel construction with 11 yd^3 (8.4 m^3) capacity. Low profile design with wide cutting edge maximizes speed and efficiency of self-loading.
6	Tiedown D-Rings	Used to tie machine down when being air transported.
7	Cab	Enclosure contains operator's seat and all driving and scraper controls.
8	Steps	Provide access to cab.
9	Parking/Turn Signal and Blackout Marker Lights	Serve as parking lights and flash to indicate direction machine is turning. In blackout mode, bottom of light serves as blackout markers.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED



KEY	COMPONENT	DESCRIPTION
10	Side Mirror	Provides operator with a view to rear and side of machine.
11	Lift Points	Attachment points for overhead lifting of ROPS/FOPS.
12	Draft Frame	Joins tractor hitch to scraper bowl.
13	Lift/Tiedown Points	Provide for slinging or tiedown of machine.
14	Planetary Wheel Ends	Power front driving axle.
15	Grabhandles	Provide a handhold for personnel climbing on machine.
16	Decontamination Apparatus Mounting Bracket	Provides mounting for Portable Decontamination Apparatus (DAP).
17	Towing Lugs	Provide attachment point for medium-duty towbar.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED

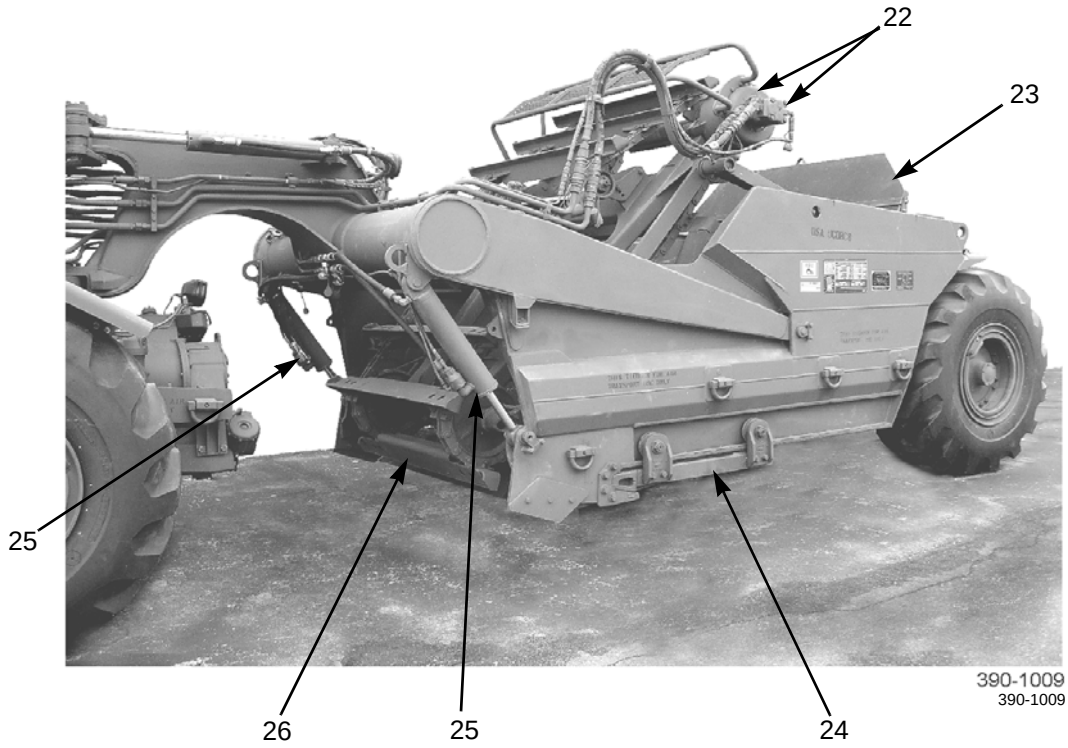


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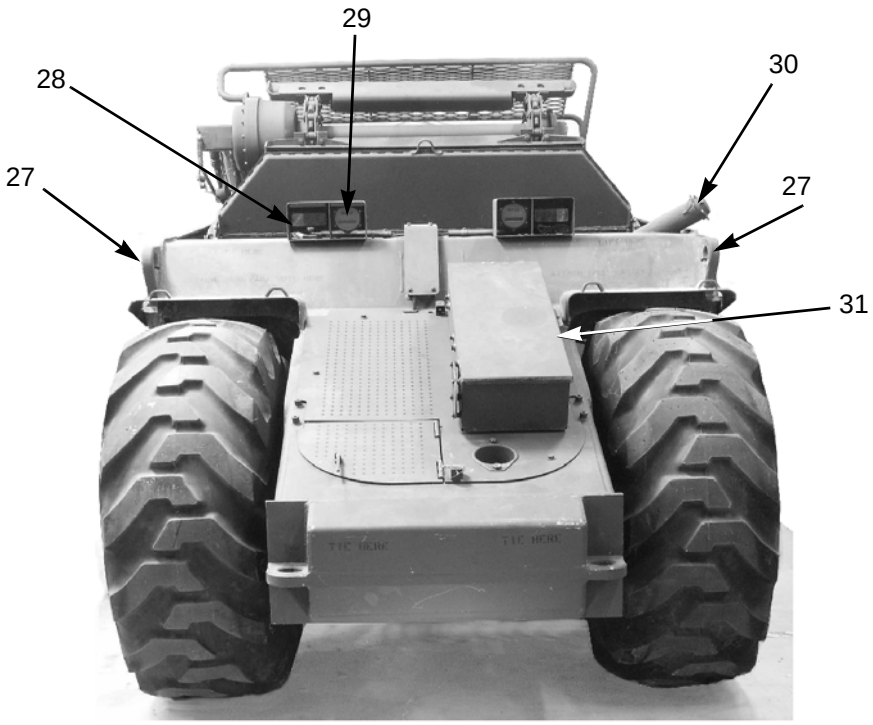
KEY	COMPONENT	DESCRIPTION
18	Steering Cylinder	Two hydraulic cylinders provide for 90-degree right or left turns with articulated frame steering system.
19	Work Lights	Illuminate cutting edge and loading area of scraper bowl.
20	Elevator Guard	Reduces spillage when elevator is lifting earth into bowl during self-load.
21	Elevator	Two-speed, chain-operated elevating mechanism is engaged for all loading/discharging operations. Flights on elevator carry soil from cutting edge up and into bowl. Breaking action of elevator flights during loading results in less chunky material and easier spreading at fill and compaction. Elevator reverses direction to aid ejection. Can be reduced in height for transport

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED



KEY	COMPONENT	DESCRIPTION
22	Elevator Speed Reducer and Motor	Powers elevator at two forward speeds and one reverse speed. Motor can be removed in preparation for transport.
23	Ejector	Hydraulically-operated back wall of bowl moves forward to push load from bowl during unloading/spreading operations. Can be reduced in height for transport.
24	Bowl Retracting Floor	Retracts, as ejector moves forward, to facilitate dumping operations.
25	Bowl Lift Cylinders	One on each side lower bowl to desired height for self-loading. Cylinders raise bowl for haul to dump (fill) area.
26	Bowl Cutting Edge	Leading edge at bottom of bowl floor. Three types of cutting edges can be configured, depending on soil type and depth of cut desired: straight edge (low penetration/finishing operations), stinger edge (center cutting edge extended - medium penetration), and teeth edge (high penetration). Distance between cutting edge and elevator flights may be adjusted to accommodate differing soil conditions.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED

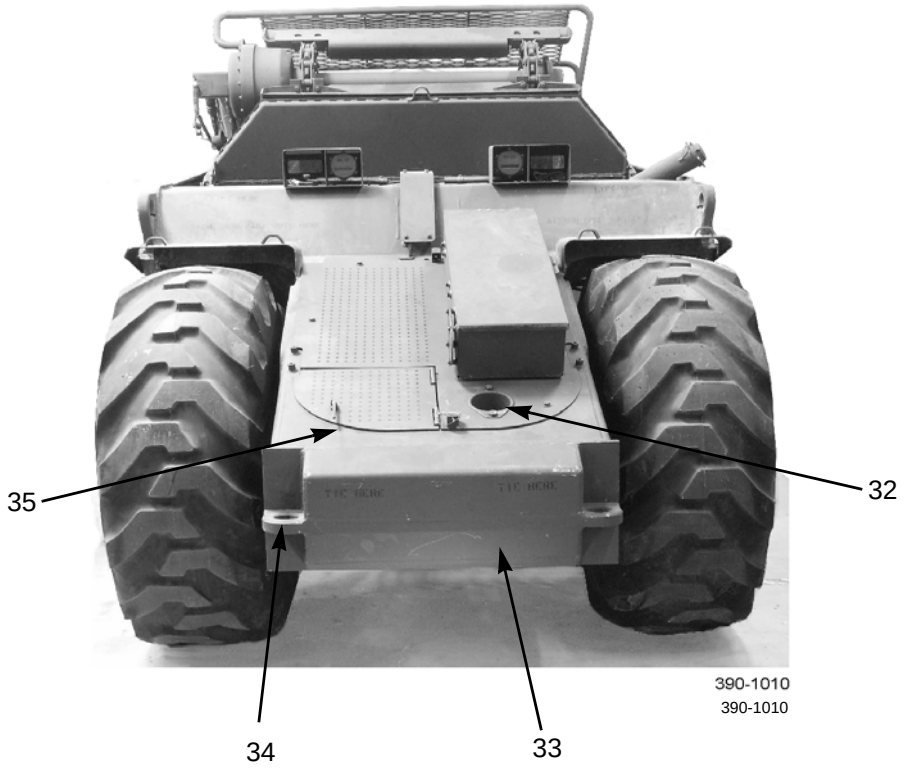


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KEY	COMPONENT	DESCRIPTION
27	Sling Points	Attachment points for overhead slinging during external air transport by CH-47 helicopter. There are two on front and two on rear of machine.
28	Composite Lights	Outside light serves as parking light and turn signal. Middle light is service light. Inside light is brake light. Used when operating in standard mode.
29	Blackout Marker Lights	Used when operating in blackout mode.
30	Fuel Tank Fill Tube	Provides means to fill fuel tank. Tube is removed for airdrop by C130 aircraft.
31	BII Toolbox	Provides stowage for all BII items or tools required for transport preparations.

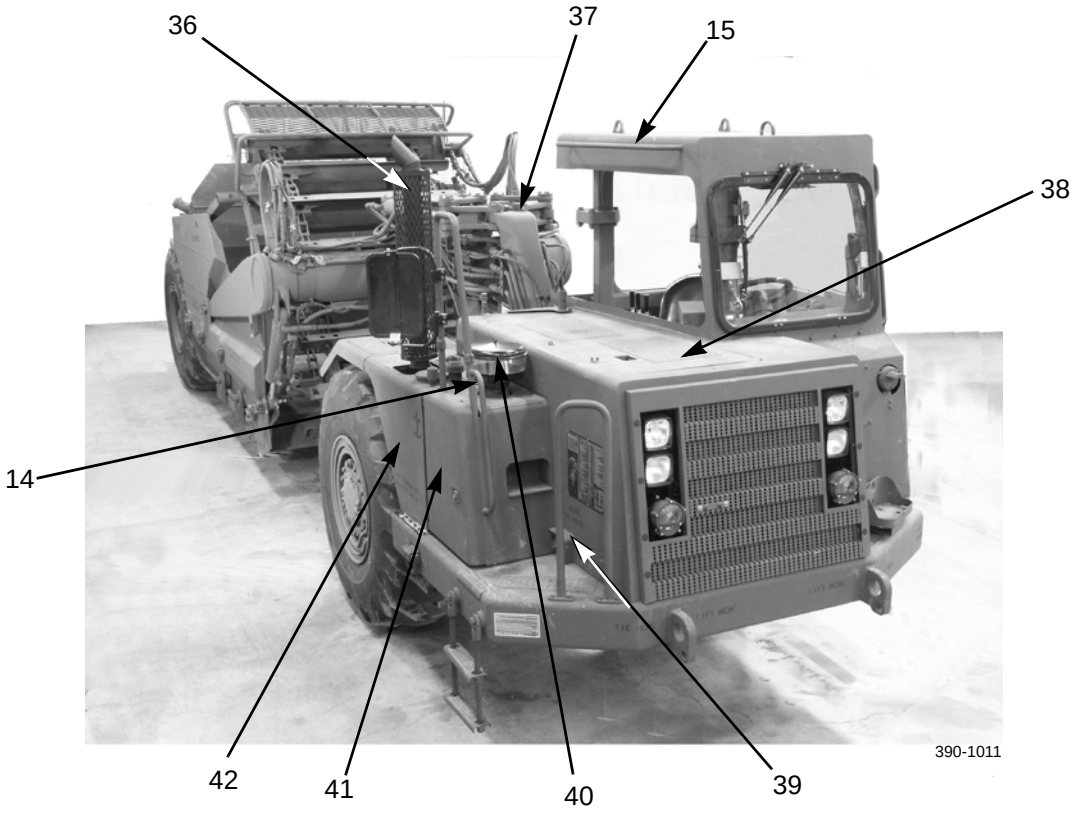
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED



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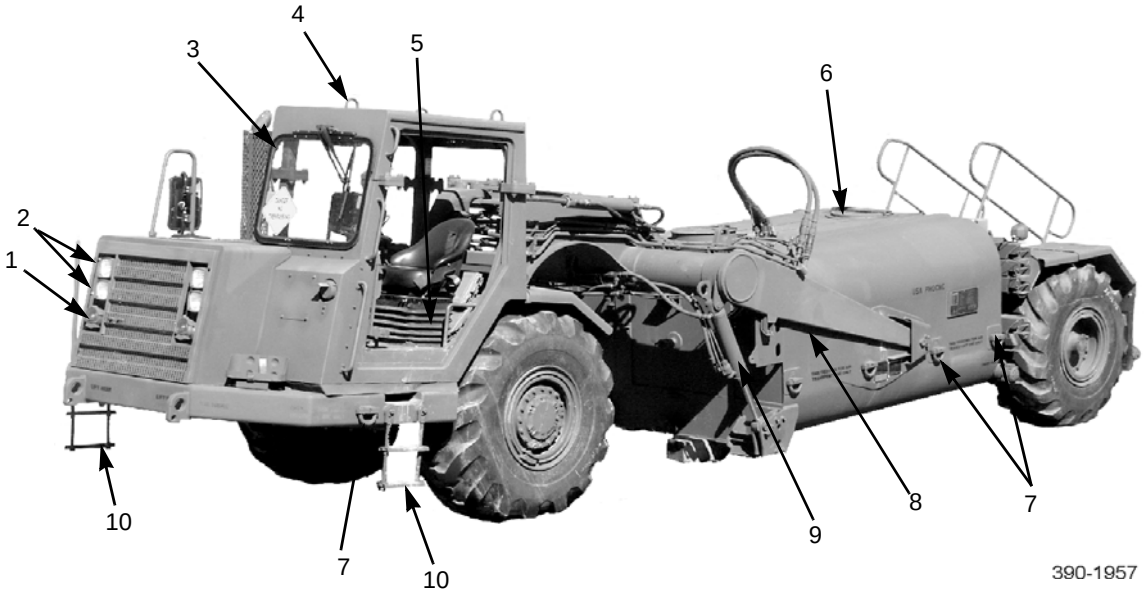
KEY	COMPONENT	DESCRIPTION
32	Hydraulic Motor Stowage Location	Provides stowage for elevator speed reducer hydraulic motor during certain modes of transport.
33	Push Block	Used ONLY during machine recovery operations, by push tractor, if machine is stuck in sand or mud. NEVER use push block to push-load scraper.
34	Tiedown Points	Provide for tiedown of machine.
35	Rear Compartment Access Door	Provides access to fuel and brake system components for service or maintenance.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (SCRAPER) - CONTINUED



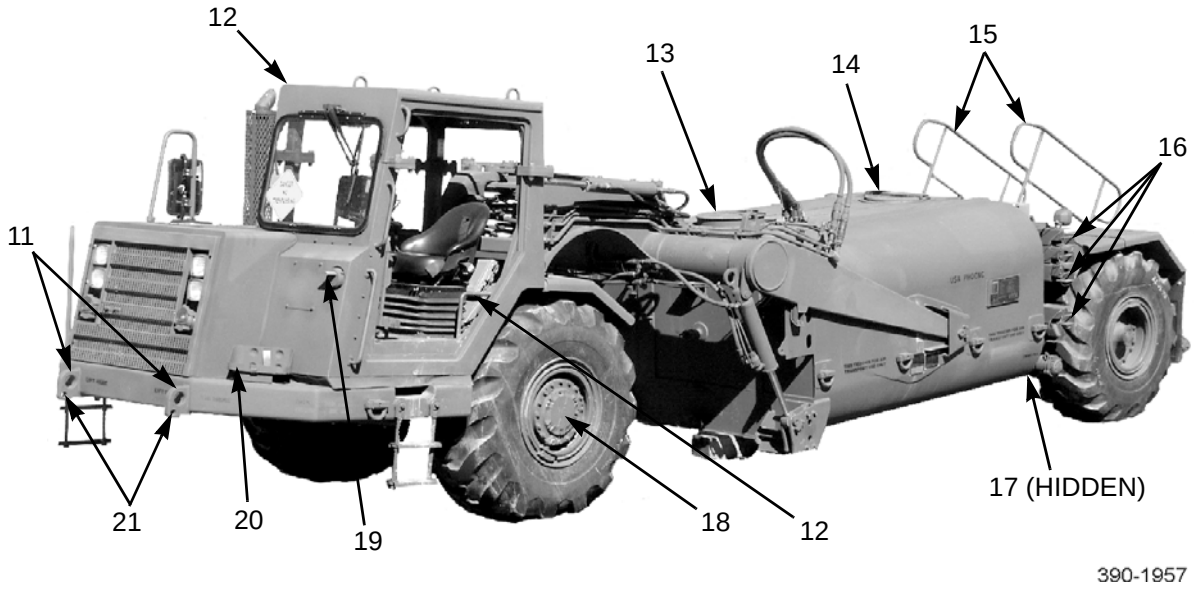
KEY	COMPONENT	DESCRIPTION
15	Grabhandles	Provide a handhold for personnel climbing on machine.
36	Exhaust Stack	Direct exhaust away from machine. Can be removed in preparation for transport.
37	Hitch	Joins tractor to draft frame.
38	Engine Access Door	Provides access to engine compartment.
39	NATO Slave Receptacle	Provides connection point for NATO slave cable to slave start machine.
40	Engine Air Precleaner	Provides convenient means to remove debris filtered from incoming air to engine.
41	Engine Air Filter and Battery Compartment	Enclosure provides access to engine air filter primary and secondary elements and to batteries for servicing.
42	Hydraulic Tank	Stores hydraulic fluid used in machine hydraulic systems. Contains sight gage for fluid level check.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (WATER DISTRIBUTOR)



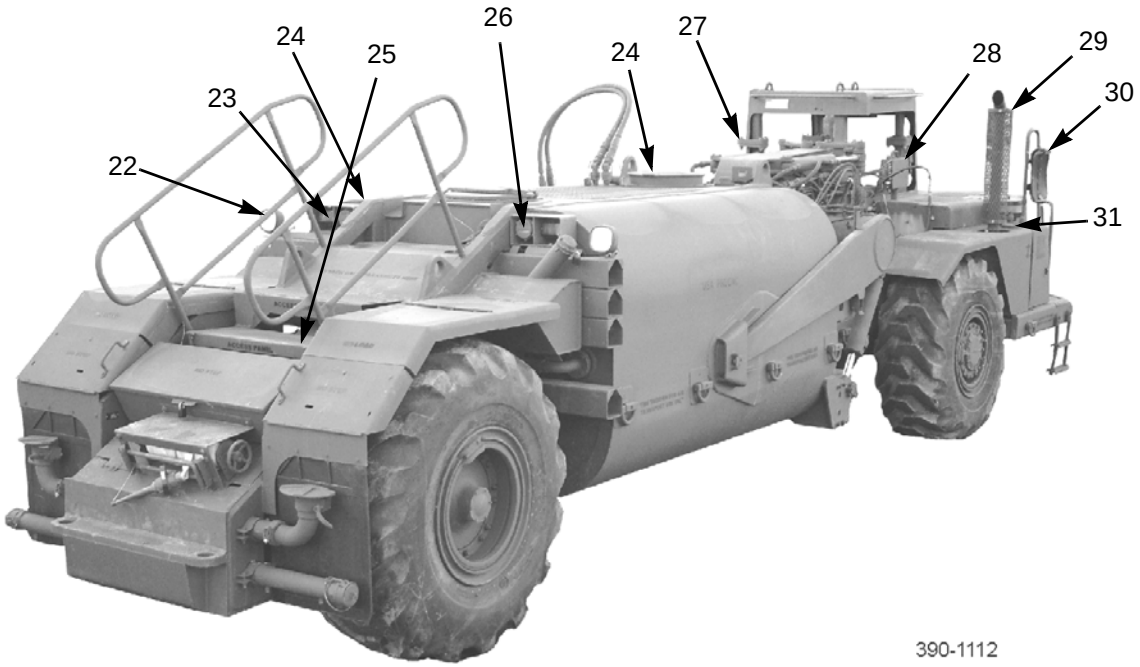
KEY	COMPONENT	DESCRIPTION
1	Parking/Turn Signal and Blackout Marker Lights	Serve as parking lights and flash to indicate direction machine is turning. In blackout mode, bottom of light serves as blackout markers.
2	Service Headlights	Top pair of lights are high beam. Bottom are low beam.
3	Windshield	Protects operator from inclement weather and flying objects. Includes windshield wipers. Can be removed in preparation for transport.
4	ROPS/FOPS	Provides rollover and falling object protection for operator. Can be removed in preparation for transport.
5	Cab	Enclosure contains operator's seat and all driving and scraper controls.
6	Tank	Has a maximum capacity of 2525 gallons (9,558 liters).
7	Tiedown D-Rings	Used to tie machine down when being air transported.
8	Draft Frame	Joins tractor hitch to water distributor.
9	Tank Lift Cylinders	Raise and lower front of tank.
10	Steps	Provide access to machine.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (WATER DISTRIBUTOR) - CONTINUED



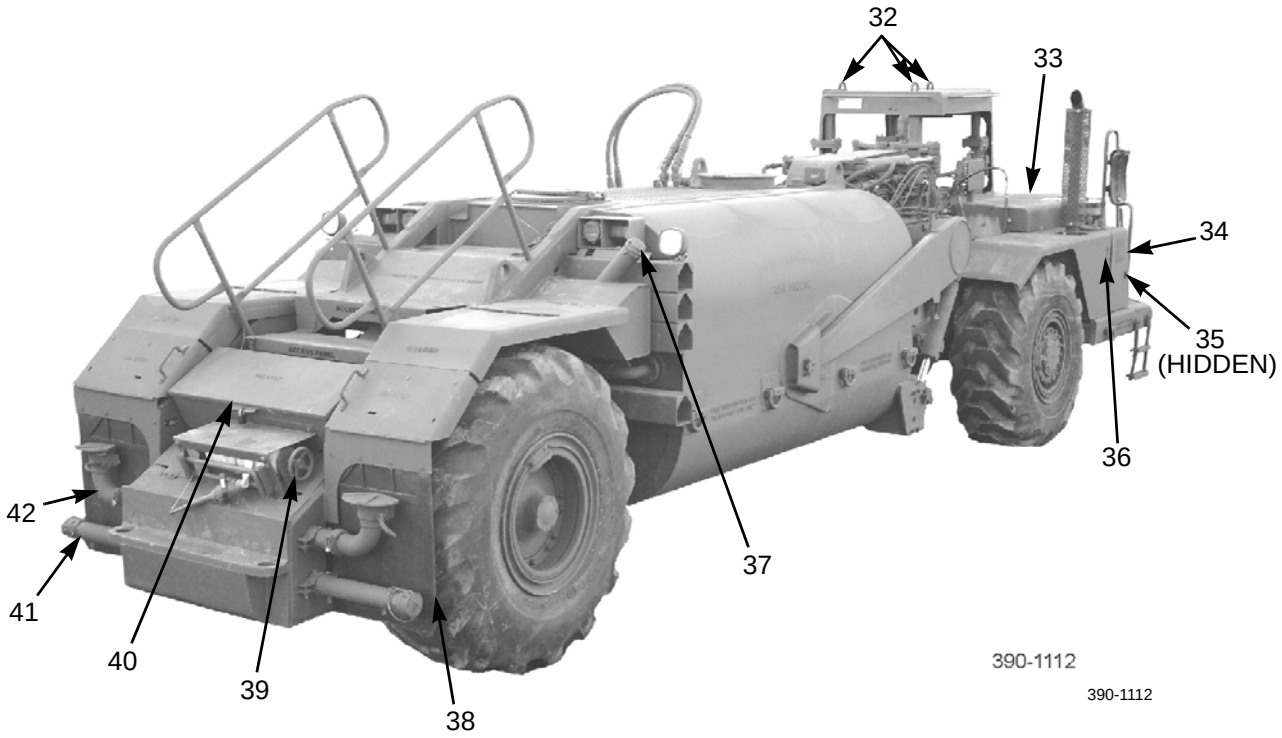
KEY	COMPONENT	DESCRIPTION
11	Lift Points	Attachment points for overhead lifting.
12	Grabhandles	Provide a handhold for personnel climbing on machine.
13	Inspection Cover	20-inch opening allows inspection of tank interior.
14	Access Cover	20-inch opening for top loading and adding amendments to tank.
15	Handrails	Provide a handhold for personnel climbing onto tank. Can be removed in preparation for transport.
16	Stowage Tubes	Stowage location for four suction hose lengths.
17	Suction Inlet	Camlock fitting allows attachment of pressurized water line or suction hose during bottom loading of tank. Suction hose foot valve is stowed at suction inlet when not in use.
18	Planetary Wheel Ends	Power front driving axle.
19	Blackout Drive Light	Used when operating in blackout mode.
20	Decontamination Apparatus Mounting Bracket	Provides mounting for portable decontamination apparatus (DAP).
21	Towing Lugs	Provide attachment point for medium-duty towbar.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (WATER DISTRIBUTOR) - CONTINUED



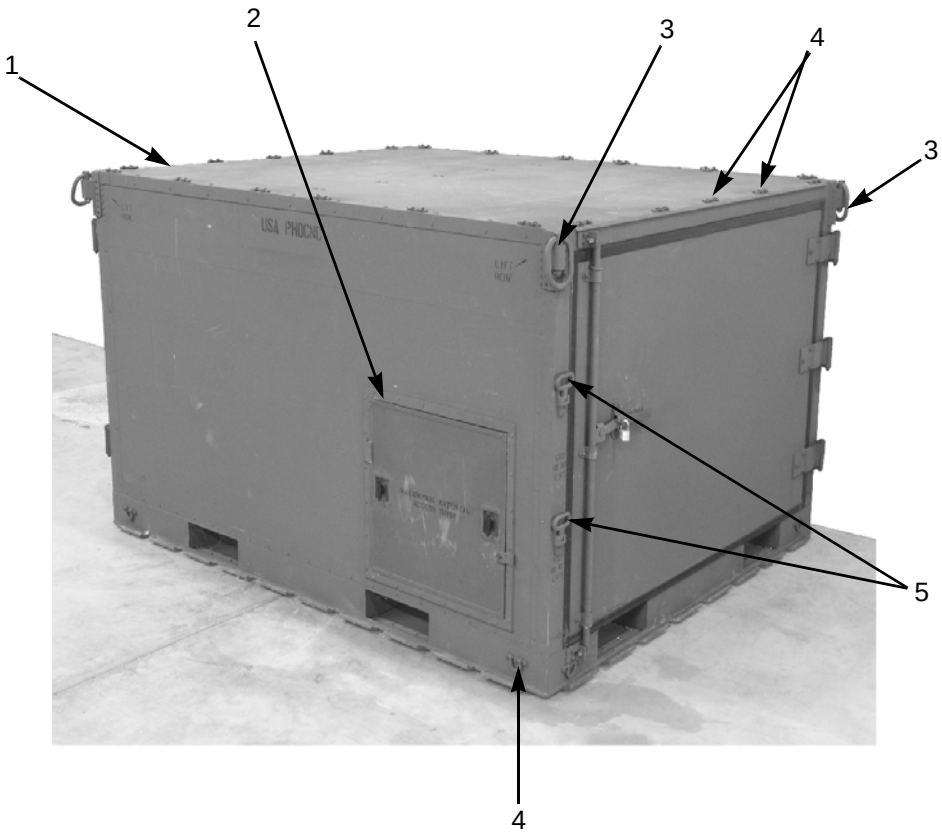
KEY	COMPONENT	DESCRIPTION
22	Work Lights	Illuminate rear of water distributor.
23	Composite Lights	Outside light serves as parking light and turn signal. Middle light is service light. Inside light is brake light. Used when operating in standard mode.
24	Sling Points	Attachment points for overhead slinging during external air transport by CH-47 helicopter. There are two on front and two on rear of machine.
25	Rear Steps and Platform	Provides access to top of tank.
26	Blackout Marker Lights	Used when operating in blackout mode.
27	Steering Cylinders	Two hydraulic cylinders provide for 90-degree right or left turns with articulated frame steering system.
28	Water Distributor Control Panel	Provides operator control of water distributor valves from inside the cab. Includes water tank level gage.
29	Exhaust Stack	Directs exhaust away from machine. Can be removed in preparation for transport.
30	Side Mirror	Provides operator with a view to rear and side of machine.
31	Engine Air Precleaner	Provides convenient means to remove debris filtered from incoming air to engine.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (WATER DISTRIBUTOR) - CONTINUED



KEY	COMPONENT	DESCRIPTION
32	Lift Points	Attachment points for overhead lifting of ROPS/FOPS.
33	Engine Access Door	Provides access to engine compartment.
34	Engine Air Filter and Battery Compartment	Enclosure provides access to engine air filter primary and secondary elements and to batteries for servicing.
35	NATO Slave Receptacle	Provides connection point for NATO slave cable to slave start machine.
36	Hydraulic Tank	Stores hydraulic fluid used in machine hydraulic systems. Contains sight gage for fluid level check.
37	Fuel Tank Fill Tube	Provides means to fill fuel tank.
38	Mudflaps	Reduce spray from water and debris.
39	Hose Reel	Provides stowage for 70 ft (21.4 m) hose, used in power washing operations.
40	BII Toolbox	Provides stowage for all BII items or tools required for transport preparations.
41	Lower Spray Bar	Provides soil stabilization by pressure discharge of soil stabilization solutions. May also be used for de-icing operations, with or without optional extensions.
42	Upper Spray Bar	Provides dust control by spraying water and dust palliatives from four-way adjustment fan-type spray heads.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (ISU-60 CONTAINER) - CONTINUED



KEY	COMPONENT	DESCRIPTION
1	ISU-60 Container	Cabinet type enclosure used for storage and shipment of transport supplies and equipment.
2	HAZMAT Access Door	Allows access to auxiliary fuel tank.
3	Lifting Rings	One ring at each top corner of container provides hookup point for sling assembly when lifting container using crane or helicopter.
4	Winching Rings	Bottom rings allow fully loaded container to be pulled into position on roller conveyors. Rings along top edge of container roof are used as tiedowns.
5	Folding Steps	Provide access to roof for sling leg rigging and hookup when lifting container.

EQUIPMENT DATA

Overall:

Length (Tractor and Water Distributor)	34.9 ft (10.64 m)
Width (Tractor and Water Distributor)	8.5 ft (2.59 m)
Wheelbase (Tractor and Water Distributor)	22.7 ft (6.92 m)
Height:	
Tractor	9.7 ft (2.96 m)
Water Distributor	9.0 ft (2.74 m)
Weight (Empty):	
Tractor and Water Distributor	33505 lb (15198 kg)
Weight (Loaded):	
Tractor and Water Distributor	55760 lb (25292 kg)
Fording Depth	3.28 ft (1.00 m)
Maximum Travel Speeds:	
Empty	23.5 mph (38 kph)
Loaded	21.1 mph (34 kph)
Turning Width, Curb-to-Curb	50.7 ft (15.45 m)
Air Mobile:	
Length	34.9 ft. (10.64 m)
Width	8.5 ft (22.59 m)
Wheelbase	22.8 ft (6.95 m)
Height:	
Tractor	8.0 ft (2.44 m)
Water Distributor	7.4 ft (2.26 m) w/o handrails
Weight (Empty):	
Tractor and Water Distributor	33985 lb (15415 kg)
Airdrop:	
Length	34.96 ft (10.64 m)
Width	8.5 ft (2.59 m)
Wheelbase	22.8 ft (6.95 m)
Height:	
Tractor	7.6 ft (2.32 m)
Water Distributor	7.4 ft (2.26 m) w/o handrails
Weight (Empty):	
Tractor and Water Distributor	33085 lb (15007 kg)

EQUIPMENT DATA - CONTINUED

Overall - Continued

Air Assault:	
Length:	
Tractor	23.8 ft (7.25 m)
Water Distributor	19.7 ft (6.00 m)
Width:	
Tractor	8.5 ft (2.59 m)
Water Distributor	8.2 ft (2.50 m)
Height:	
Tractor	8.0 ft (2.44 m)
Water Distributor	7.4 ft (2.26 m) w/o handrails
Weight (Empty):	
Tractor	16637 lb (7546 kg)
Water Distributor	16495 lb (7482 kg)

Tractor:

Engine:	
Manufacturer	Caterpillar Inc.
Model	3116TA
Horsepower	175 hp (131 kw) @ 2300 RPM
Rated Engine RPM	2450 (high idle); 825 (low idle)
Cylinders	6
Displacement	403 CID (6.6 l)
Weight	1874 lb (851 kg)
Fuel System	Unit injection
Cooling System, Thermostat Range	165°-210° F (74°-99°C)
Transmission:	
Manufacturer	Caterpillar Inc.
Type	6 speeds forward, 1 reverse
Range Selection	powershift, manual
Final Drive:	
Manufacturer	Caterpillar Inc.
Type	planetary/outboard
Axle	full-floating
Brakes:	
Service	air-over-oil actuated, caliper disc
Parking	spring actuated, drum
Tires (Tractor and Water Distributor):	
Manufacturer	Firestone
Size	23.5R25
Inflation	45 psi (310 kPa)
Steering:	
Type	two double-acting hydraulic cylinders

EQUIPMENT DATA - CONTINUED

Tractor - Continued:

Capacities:	
Fuel Tank	66 gal. (250 l)
Cooling System	9.9 gal. (38 l)
Final Drive (Each)	1.5 gal. (6 l)
Front Axle Differential	5 gal. (19 l)
Hydraulic System	24.5 gal. (93 l)
Engine Crankcase	7.8 gal. (30 l)
Transmission	9.2 gal. (35 l)
Electrical System:	
System Voltage	24 volt
Batteries:	
Quantity	2
Voltage	12 volt
Cold Cranking Amps Rating	950 CCA

Water Distributor:

Capacity	2525 gal. (9,558 l)
Self-Load Time	11 minutes
Gravity Drain Time	5 minutes
Pump	850 gpm
Attachments	cultivator; cutting edge assembly; and de-icing extensions

ISU-60 Container:

Overall Dimensions:	
Height	60.00 in. (152.40 cm)
Width	108.00 in. (274.32 cm)
Depth	88.00 in. (223.52 cm)
Weight (Empty)	1,260 lb (572 kg)
Maximum Capacity (w/Storage Items)	10,000 lb (4,535 kg)
Gross Weight	11,260 lb (5,108 kg)
Shelf Capacity	750 lb (340 kg)
Transport Requirements:	
Military Air Transportability	463L Military Aircraft Restraint System
Commercial Air Transportability	747 commercial freighter
Forkliftable	12,000 lb (4,535 kg) capacity fork truck with 72 in. (182.88 cm) tines
Stackable	Maximum two high with optional stacking rack (PN 60210-001)

END OF WORK PACKAGE

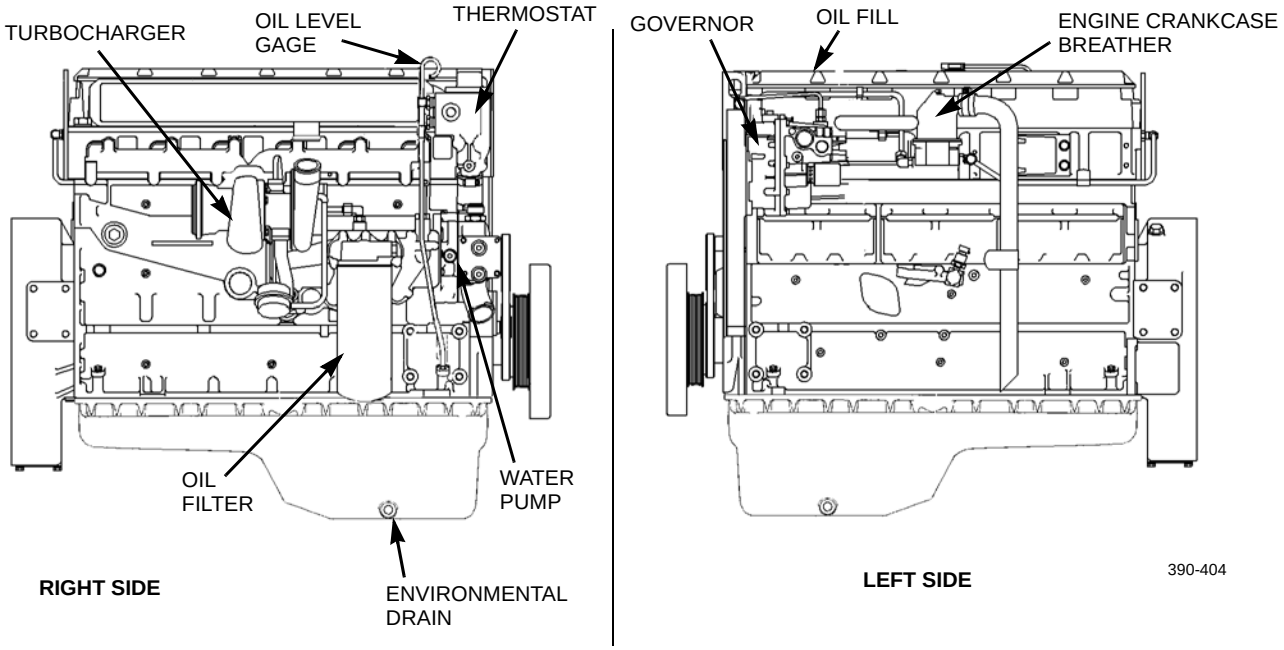
THEORY OF OPERATION 0003 00

INTRODUCTION

1. The scraper consists of the following functional systems: engine; power train; air and brake systems; electrical system; and steering and scraper hydraulic systems.
2. This work package explains how the systems and components of the machine work together. A functional description is provided for each major component and system.

ENGINE

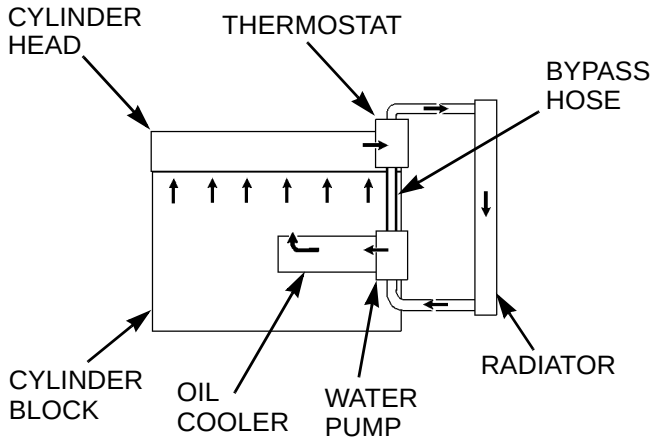
1. **General.** The tractor is equipped with a Caterpillar® 3116TA turbocharged diesel engine with six in-line cylinders, generating 175horsepower @ 2300 RPM.



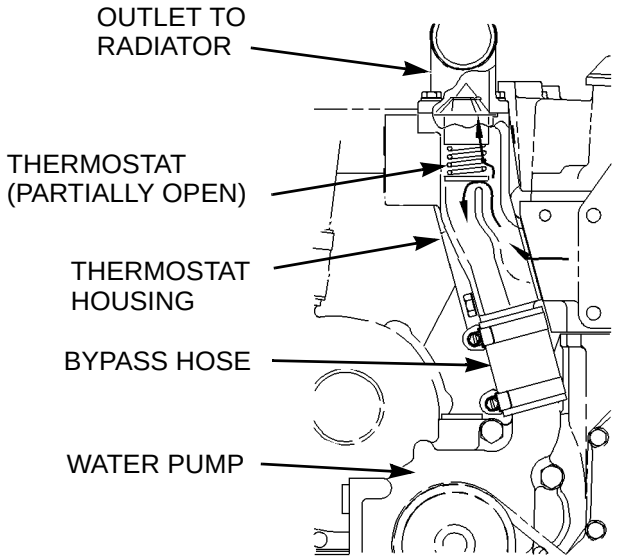
2. **Fuel System.** The engine is powered with a direct fuel injection system. Fuel from the fuel tank is pulled through a fuel/water separator and two secondary fuel filters by an electric fuel pump and the fuel transfer pump that is an integral part of the engine governor. Drilled passages in the cylinder head provide continuous flow of fuel to the injectors. Unused fuel is returned to the fuel tank.

ENGINE - CONTINUED

3. **Cooling System.** The cooling system consists of a belt-driven circulating water pump, 165°F-210°F (74°C-99°C) thermostat for controlling coolant flow, engine-driven fan, oil cooler, and radiator. The cooling system cools the engine by circulating pressurized ethylene glycol based coolant through the engine and radiator.



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4. **Lubrication System.** The engine lubrication system consists of a gear-driven oil pump, oil filter, oil cooler, and oil pan. The engine is lubricated by cooled and pressurized oil which is circulated through the engine block and head.

5. **Exhaust System.** The exhaust system removes exhaust gases from the engine through the exhaust manifold and turbocharger. The gases flow into exhaust pipes and a muffler to the atmosphere above the cab.

POWER TRAIN

1. **General.** Power from the engine is sent to the torque converter. The converter output is connected to the upper drive shaft that moves the power to the six-speed powershift transmission. The transmission is connected to transfer gears that direct the power via the lower drive shaft to the differential in the drive axle. The differential and drive axles provide the power to the planetary carriers in the left and right final drives.

2. **Transmission.** The transmission has six hydraulically activated clutches that provide six speeds forward and one speed reverse. The speed and direction are manually selected.

3. **Transfer Gears.** The transfer drive gear receives power from the transmission output and transfers the power via a transfer gear and shaft to the drive shaft yoke that is connected to the lower drive shaft. The transfer also mounts the parking brake actuator, drum, and shoes.

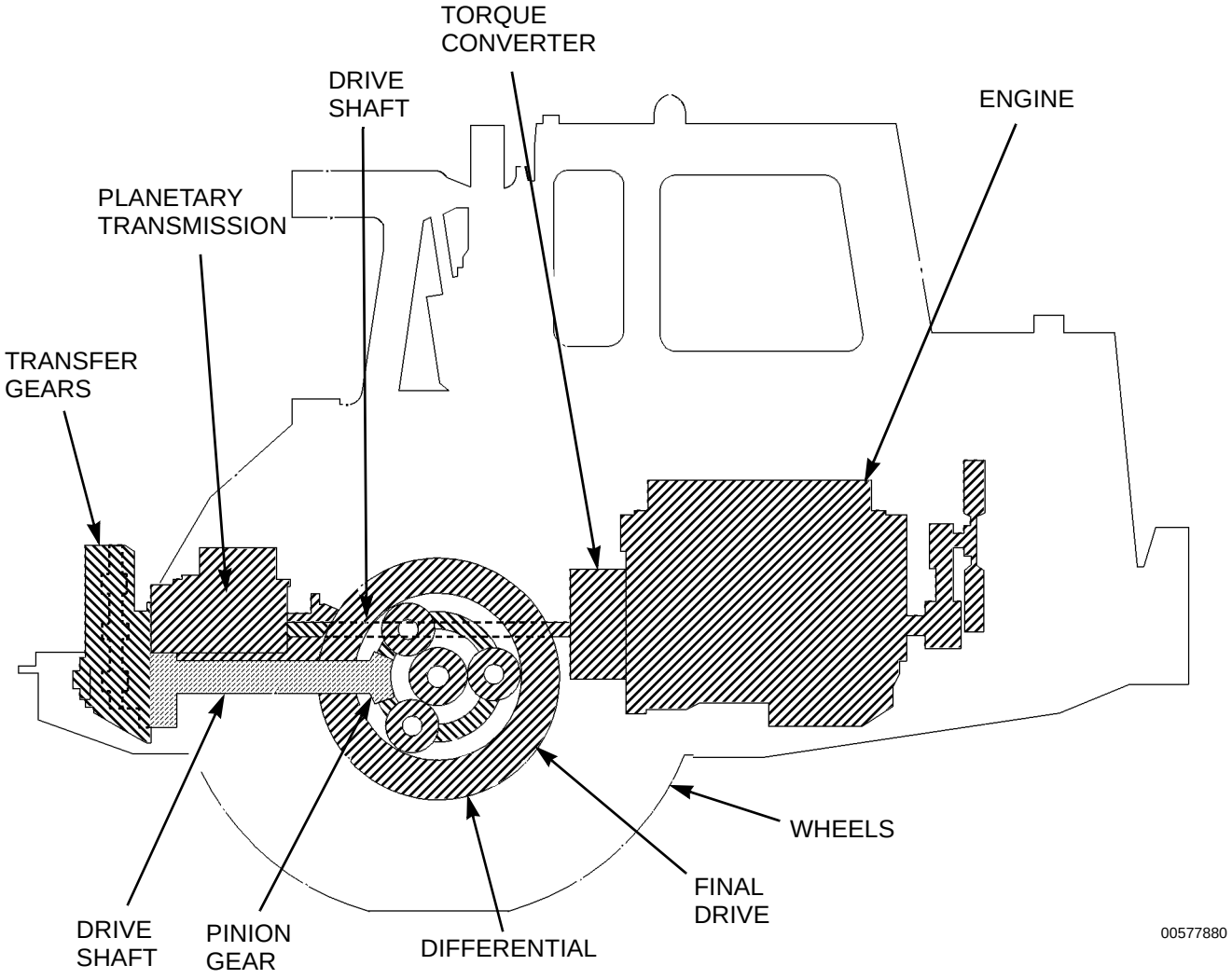
4. **Differential.** The differential divides the balance of power that is sent to the final drives and wheels. When the machine is turning, the differential allows the inside wheel to turn at a slower rate than the outside wheel. However, the differential still sends the same torque to each wheel.

5. **Differential Lock.** The differential lock is utilized when maximum traction is needed. The operator engages the differential lock by pressing down and holding the differential lock pedal. This in turn allows air pressure to engage the lock; when the pedal is released, internal springs will disengage the lock. The differential lock should never be engaged when one tractor wheel is spinning or when operator is turning (steering) machine; this action would result in damage to the differential assembly.

THEORY OF OPERATION - CONTINUED **0003 00**

POWER TRAIN - CONTINUED

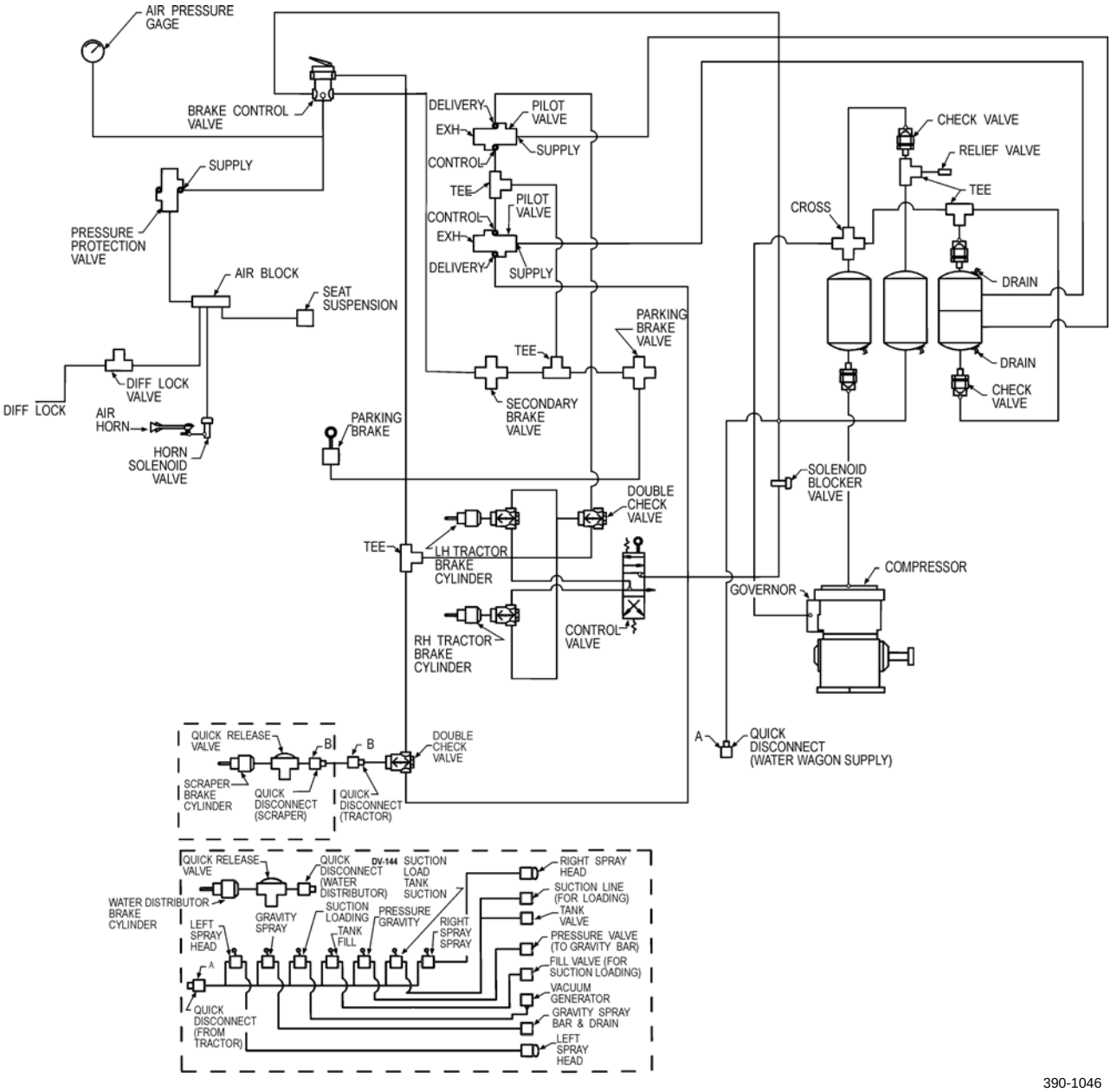
6. **Final Drive.** The planetary final drive causes speed reduction and an increase in torque at the tractor wheels. Power from the differential turns the axle shafts; the shafts turn the sun gear in the center of the planetary gears. The movement of the planetary gears causes the planetary carrier to turn; in turn the wheels are turned.



THEORY OF OPERATION - CONTINUED 0003 00

AIR AND BRAKE SYSTEMS

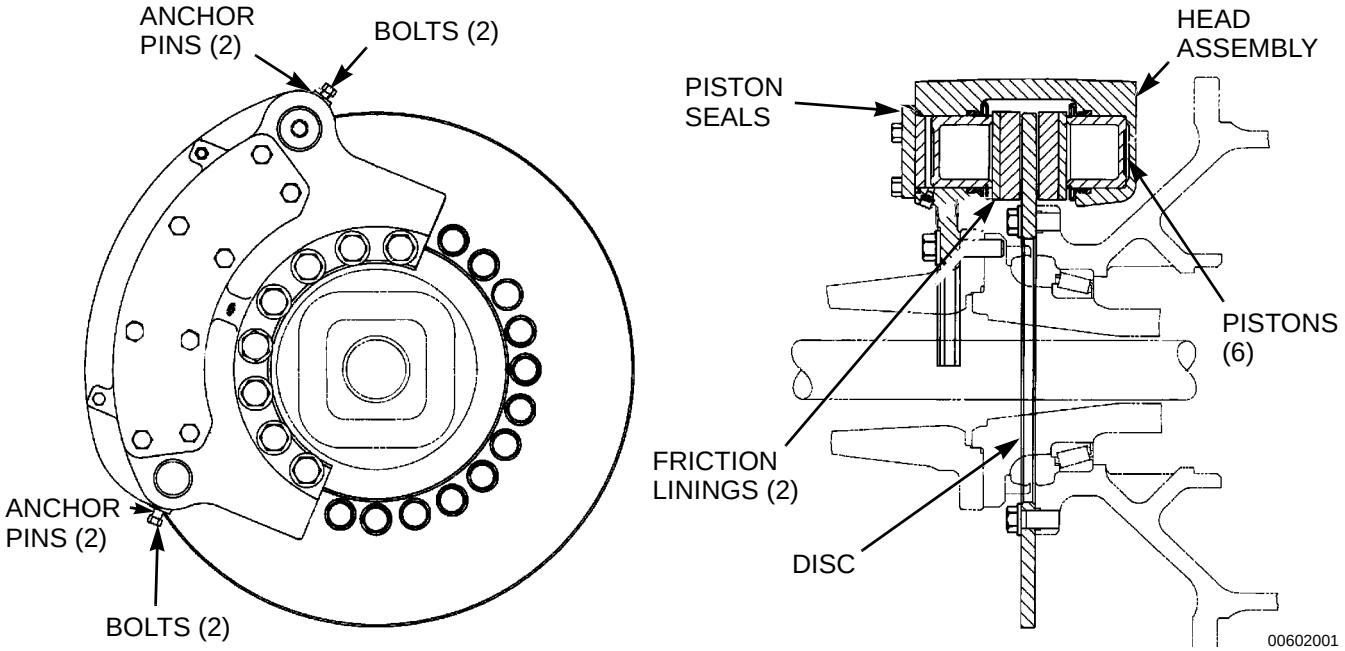
1. **General.** The air system consists of an engine-driven air compressor, three air tanks (wet, dry, and reserve), and related lines, hoses, and valves. The system provides the required air to operate the machine's service and parking brakes, differential lock, operator's seat, and air horn.



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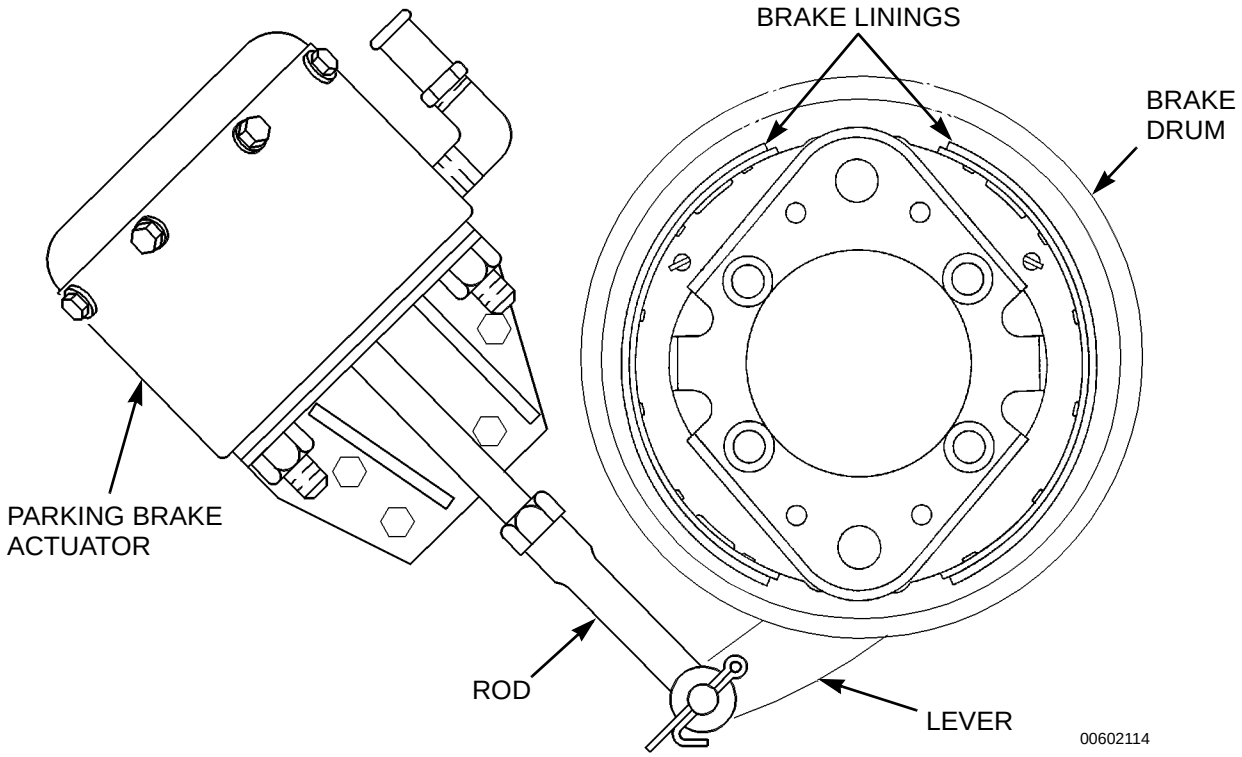
AIR AND BRAKE SYSTEMS - CONTINUED

2. **Service Brakes.** The service brakes are an air-over-fluid activated caliper disc brake system. Each caliper has six pistons and two friction linings. There are three pistons and one friction lining on each side of the rotating brake disc.



AIR AND BRAKE SYSTEMS - CONTINUED

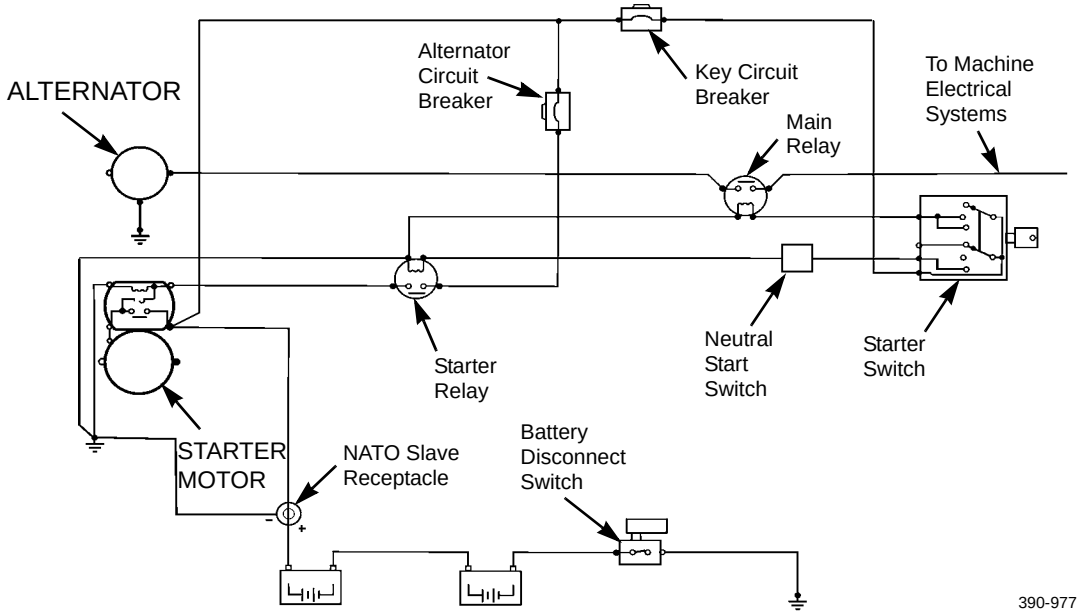
3. **Parking Brake.** The parking brake is an air released/spring applied type of parking brake system. When the parking brake control knob is pulled out, air pressure is exhausted from the brake cylinder and spring pressure is applied. When the control knob is pressed in, air pressure is applied to the cylinder and the parking brake is released.



ELECTRICAL SYSTEM

1. The electrical system consists of two 12-volt batteries connected in series, with negative grounding, providing 24 volts to operate the electrical systems and components.
2. The system contains all the necessary switches, circuit breakers, fuses, relays, harnesses, and connectors to operate the machine, including a NATO slave receptacle.
3. The three major systems comprising the electrical system are:
   a. starting and charging systems;
   b. service, work, and blackout lights; and
   c. EMS monitoring and alarm system.

ELECTRICAL SYSTEM - CONTINUED



HYDRAULIC SYSTEM

1. General.

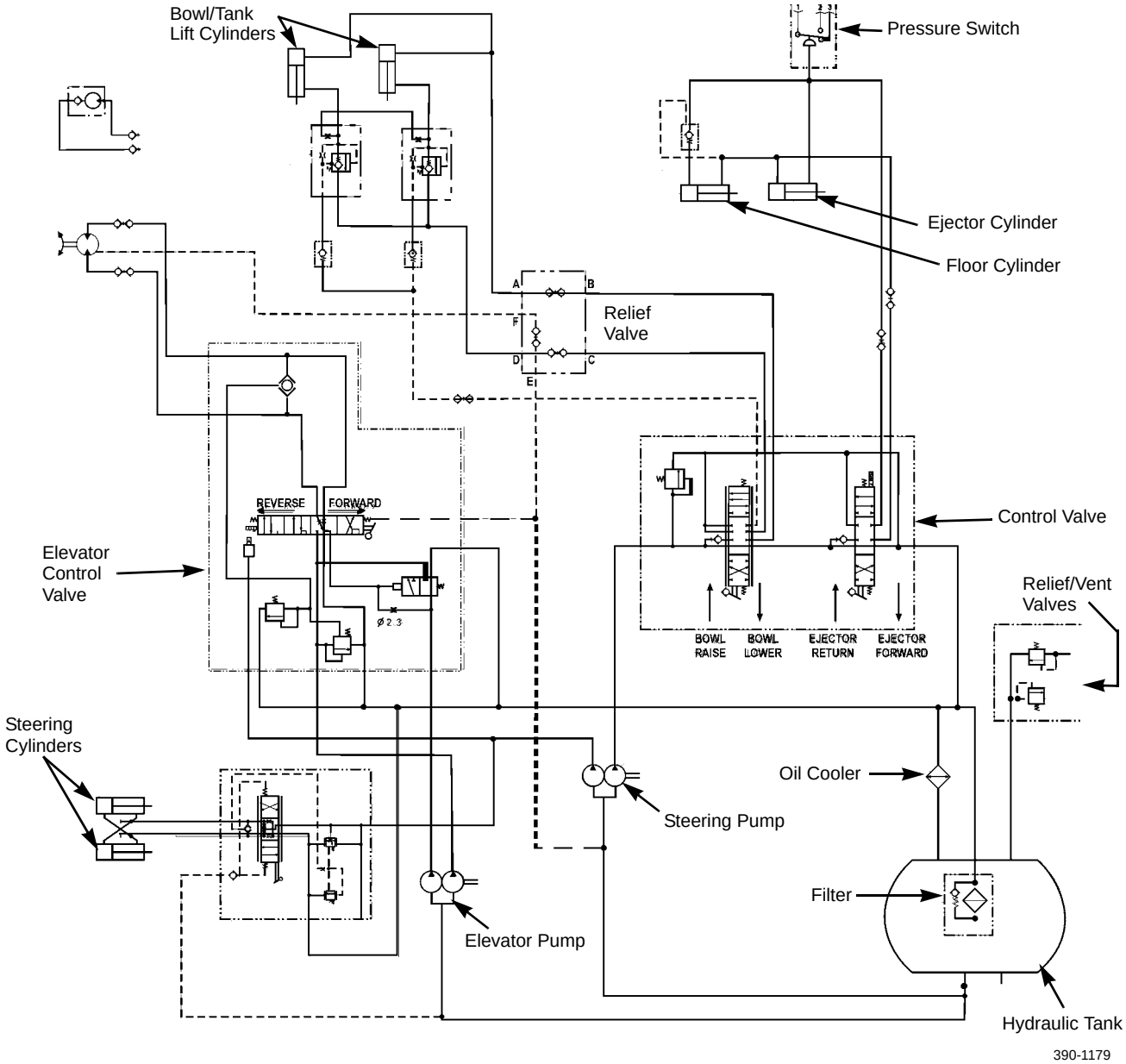
a. The machine hydraulic system supports both steering and scraper hydraulic systems.

b. The hydraulic system consists of vane pumps; control, check, and spool type valves; filters; hydraulic motor; lines, hoses, and fittings; oil cooler; and hydraulic tank. Two vane type pumps mounted on the torque converter provide hydraulic system pressure.

HYDRAULIC SYSTEM - CONTINUED

2. **Steering System.** The steering system is a variable flow modulated system. This type of system allows the operator good control for minor steering corrections at fast ground speeds as well as good control while operating at slower speeds during tight turns.

3. **Scraper Hydraulic System.** The scraper hydraulic system consists of three primary hydraulic circuits to support scraper operations: bowl circuit for raising and lowering the bowl; ejector/floor circuit for ejecting material from the bowl; and elevator circuit for loading and unloading material.



END OF WORK PACKAGE

CHAPTER 2
TROUBLESHOOTING PROCEDURES

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TROUBLESHOOTING INTRODUCTION 0004 00

INTRODUCTION

1. Troubleshooting procedures are grouped into tables, containing information you need to fault locate malfunctions on the 613CS Scraper or 613CWD Water Distributor. A *Troubleshooting Symptom Index* in WP 0006 00 is provided to aid in locating a malfunction or symptom and direct you to the appropriate troubleshooting table in WP 0007 00.
2. WP 0005 00 contains tests, inspections, and adjustments that may be performed as a function of troubleshooting or maintenance.

PRELIMINARY TROUBLESHOOTING PROCEDURES

NOTE

Fluid leaks are classified as either Class I, Class II or Class III

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.

1. Before starting any specific troubleshooting procedures, perform the following:
   a. Visually check for ruptured oil hoses or tubes and for Class II or Class III leaks.
   b. Check for mechanical jamming or binding caused by rocks or other foreign matter.
   c. Check fluid levels in subject area and service as required (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Ensure all applicable operator troubleshooting has been performed before proceeding.

EXPLANATION OF TROUBLESHOOTING TABLE COLUMNS

The columns in troubleshooting tables are defined as follows:

1. **MALFUNCTION.** Indicates fault that has occurred in system/equipment.
2. **TEST OR INSPECTION.** Indicates test or inspection to be performed to isolate probable cause for fault symptom.
3. **CORRECTIVE ACTION.** Indicates procedure to correct the problem.

ELECTRICAL TROUBLESHOOTING

1. Analyze the symptoms and conditions and use common sense and logic to determine the most likely cause for the problem, then troubleshoot that circuit first. The more information you have concerning the problem, the easier it will be to troubleshoot.
2. Isolate to the subsystem level (in cases where more than one subsystem is involved); next isolate the problem to a single circuit within the subsystem; then, isolate the problem to the faulty component using the troubleshooting symptom index (WP 0006 00).
3. Frayed, broken, loose or corroded wiring is a common source of problems in any electrical circuit. Always make visual inspection before starting detail troubleshooting. Observe in particular contacts to ground. Components with case grounds are especially troublesome.

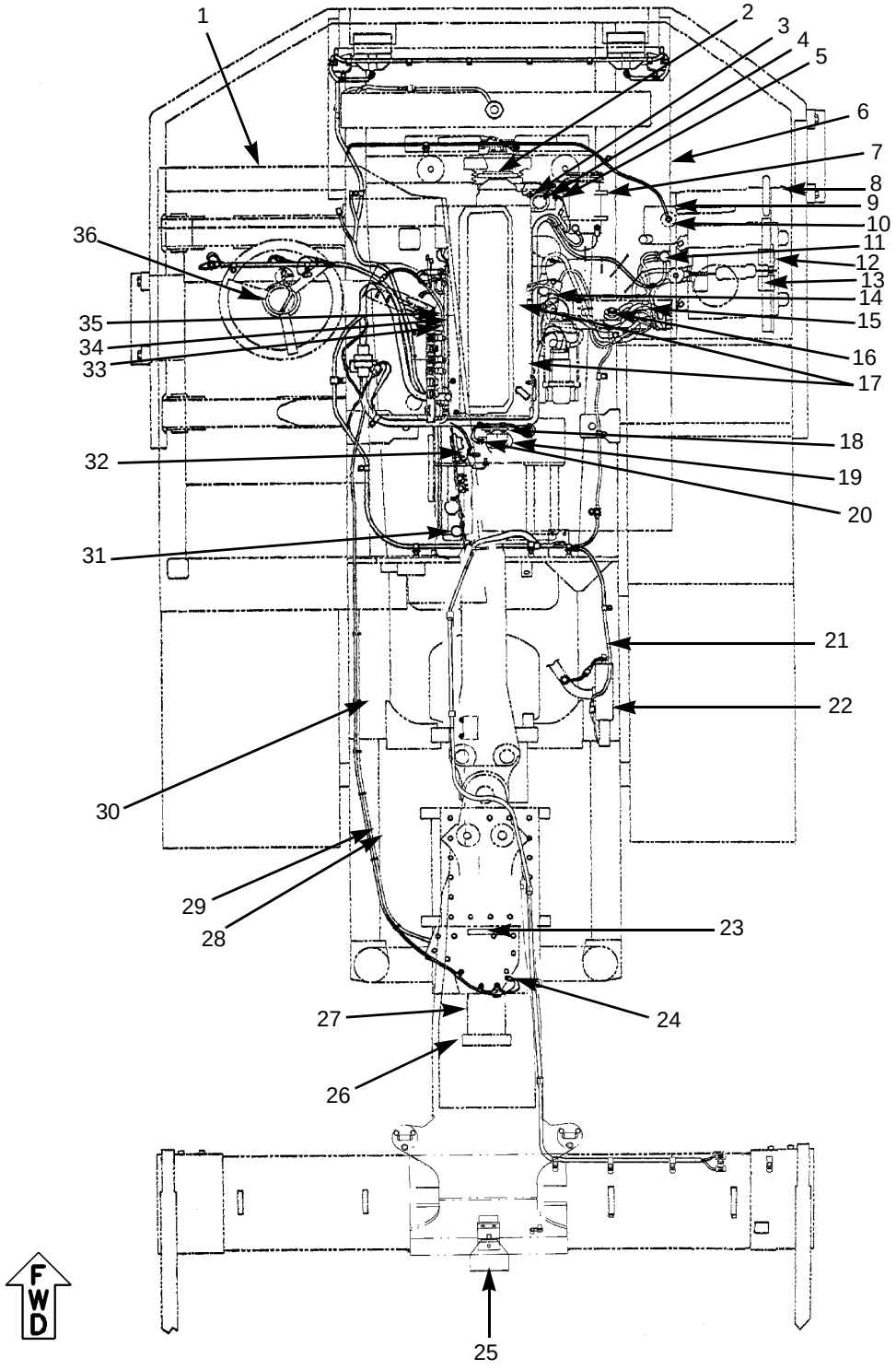
CAUTION

When making continuity checks, make sure the test equipment is isolated from power source. Failure to do so may result in damage to equipment.

4. Most of checks made are voltage checks. Pay particular attention to voltages being checked in procedures. This equipment is a 24-volt system. Instructions prior to the step instruct to disconnect at test point from the potential malfunctioning component. Once the check has been made, either repair the component or go to the referenced step. If going to another step, reconnect connection or do as otherwise instructed, such as install jumper wires using jumper wire kit. When ready to make the prescribed check, apply power to the circuit (if required). A helper may be required if the switch or power source is out of reach. Release the power function prior to going on, to avoid damage to equipment.

COMPONENT LOCATIONS

Figure 1. General Location of Troubleshooting Components.

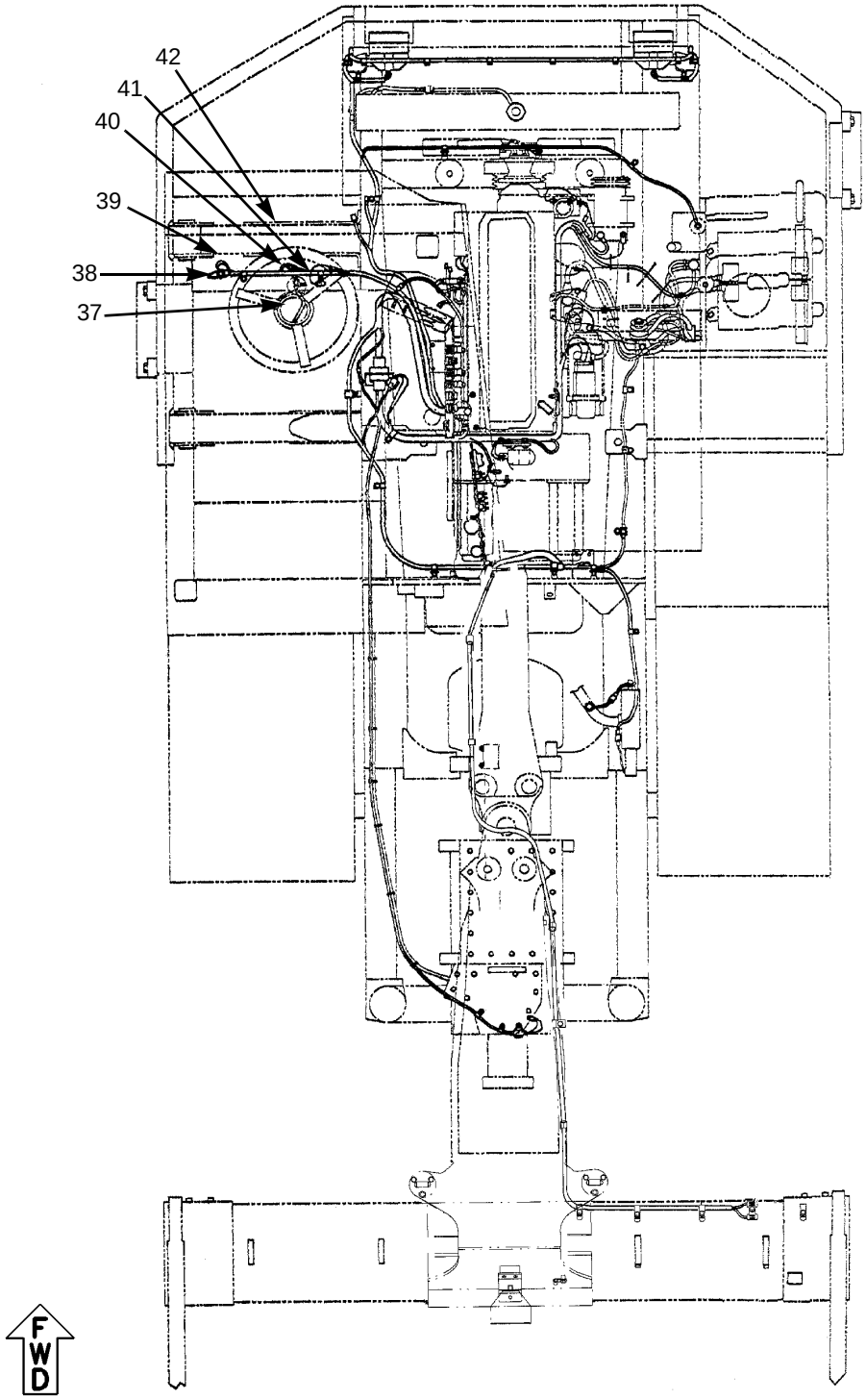


COMPONENT LOCATIONS - CONTINUED

KEY	COMPONENT	LOCATION
1	Blackout Drive Light	Left-front side of cab, below windshield.
2	Drive Belts	Front of engine.
3	Engine Temperature Switch	Right-front side of engine.
4	Start Aid Temperature Switch	Right-front side of engine.
5	Coolant Temperature Sender	Right-front side of engine.
6	Slave Receptacle	Right-front side above wire ladder.
7	Alternator	Right-front side of engine.
8	Air Tanks	Right-front side below engine compartment.
9	Windshield Washer Pump	Inside engine compartment, right side.
10	Windshield Washer Reservoir	Inside engine compartment, right side.
11	Air Intake Heater Relay	Inside engine compartment, right side below battery disconnect switch.
12	Batteries	In compartment on right side of vehicle.
13	Air Cleaner	In compartment on right side of vehicle.
14	Fuel Shutoff Solenoid	Attached to governor.
15	Air Filter Service Indicator	Inside engine compartment, right side.
16	Battery Disconnect Switch	Inside engine compartment, right side.
17	Ground Strap	Inside engine compartment connected to air intake heater and engine block.
18	Engine Fuel Pressure Switch	Left-rear of engine.
19	Torque Converter Temperature Sender	Center-rear of engine.
20	Torque Converter Temperature Switch	Center-rear of engine.
21	Fuel System Pressure Switch	Right side of machine below fuel filter.
22	Main (Bowl/Ejector) Control Valve	Right side of machine aft of fuel filter.
23	Cutting Edge Work Light	Mounted on top of transfer case.
24	Transmission Speed Sensor	Upper right side of transfer case.
25	Bowl Work Light	Mounted at rear of hitch.
26	Parking Brake Actuator Rod	Connected to parking brake.
27	Parking Brake	Mounted on lower rear of transfer case.
28	Ether Canister	Inside left fender.
29	Ether Start Valve	Inside left fender below ether canister.
30	Elevator/Water Pump Control Valve	Inside left fender.
31	Brake Air Supply Block Solenoid	Lower-left side mounted to rear cross-member.
32	Engine Speed Sensor	Left-rear of engine.
33	Ejector Detent Pressure Switch	Left-center of engine, aft of air compressor.
34	Fuel Level Relay Pressure Switch	Left-center of engine, aft of air compressor.
35	Engine Oil Pressure Switch	Left-center of engine, aft of air compressor.
36	Steering Control Valve	Under cab floor, beneath steering column.

COMPONENT LOCATIONS - CONTINUED

Figure 1. General Location of Troubleshooting Components - Continued.

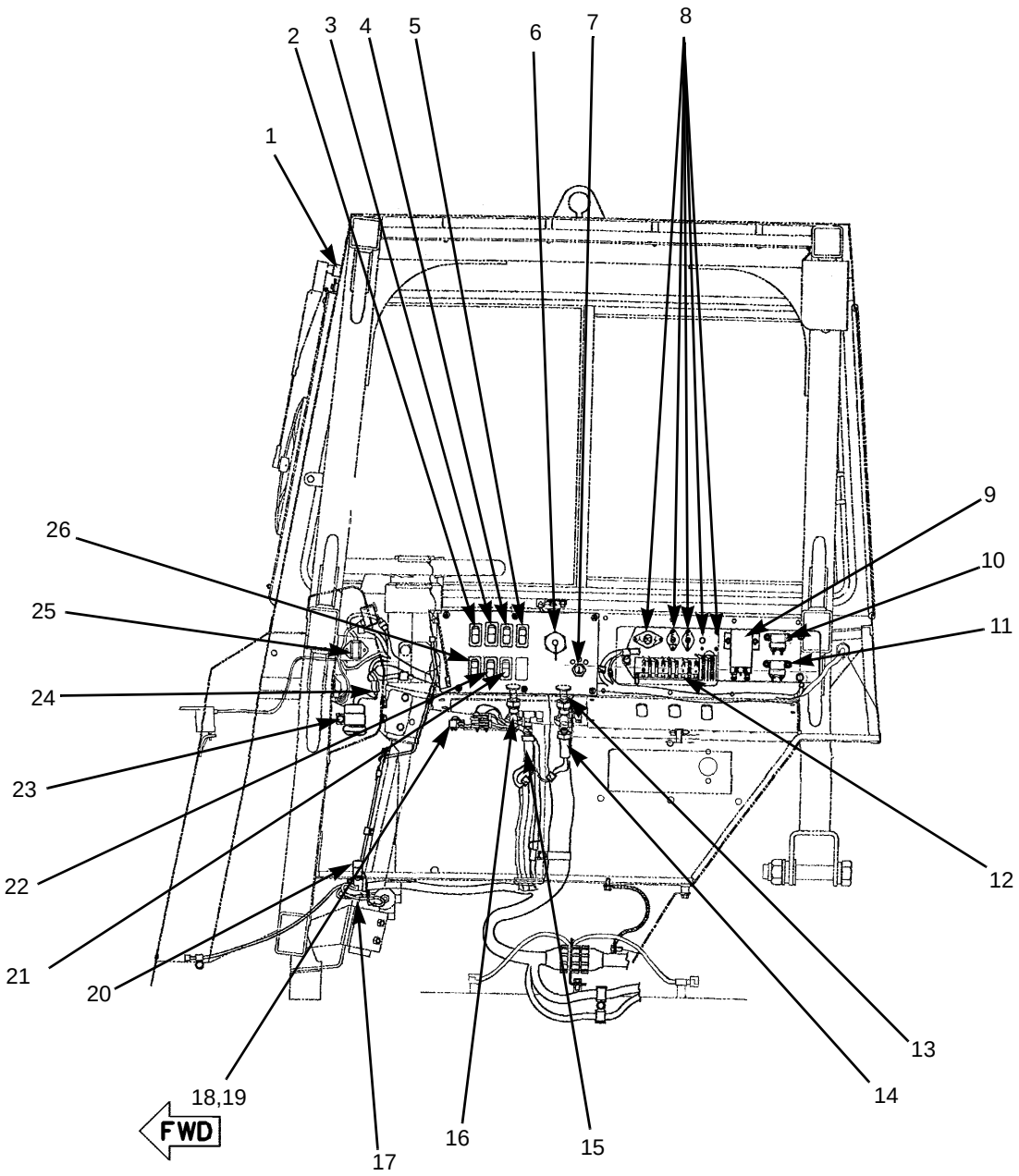


COMPONENT LOCATIONS - CONTINUED

KEY	COMPONENT	LOCATION
37	Horn Button	Center of steering wheel.
38	Directional Control and Hazard Flasher	Mounted on left side of steering column.
39	Relays: Turn/Flash, Flood Enable, LO/HI Beam, Horn/Backup Alarm and Water Wagon Flood	Left of steering column in dash panel.
40	Stop Lamp Pressure Switch	Bottom of brake pedal below cab floor.
41	Light Switch	Lower-right side of steering wheel.
42	Horn	Front left under cab, mounted to bumper.

COMPONENT LOCATIONS - CONTINUED

Figure 2. Location of Electrical Components.

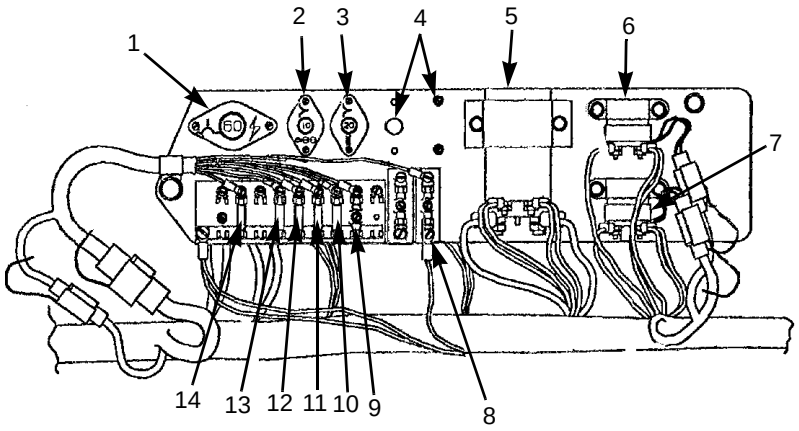


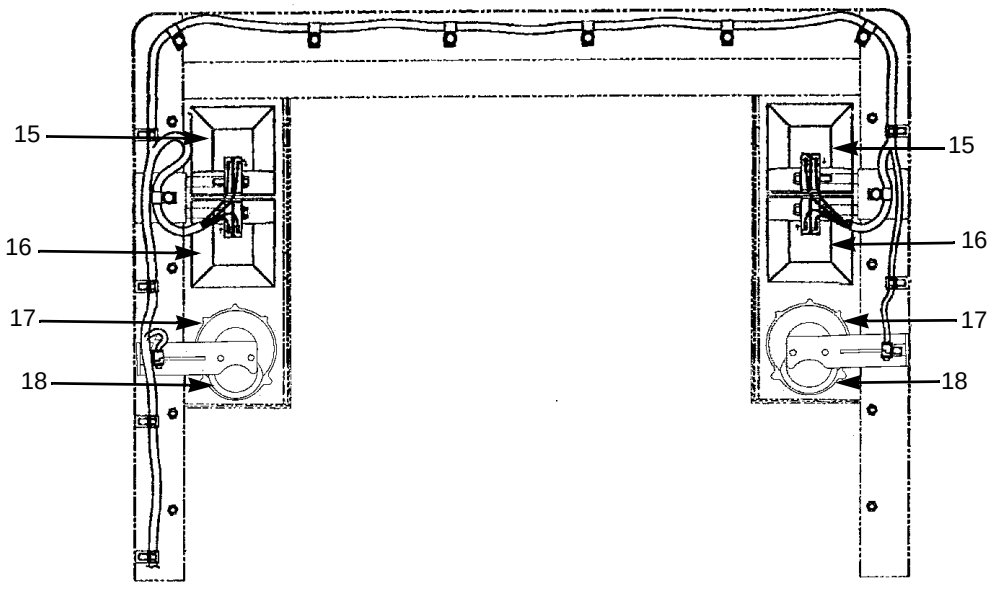
COMPONENT LOCATIONS - CONTINUED

KEY	COMPONENT	LOCATION
1	Windshield Wiper Motor	Upper-right side of cab interior.
2	Panel Test Switch	Switch panel.
3	Flood Lamp Switch	Switch panel.
4	Ether Start Aid Switch	Switch panel.
5	Air Intake Preheat Switch	Switch panel.
6	Test Connector	Switch panel.
7	Key Start Switch	Right side of cab on switch panel.
8	Circuit Breakers	Circuit breakers/fuse panel.
9	Main Relay	Circuit breakers/fuse panel compartment.
10	Fuel Pump Relay	Circuit breakers/fuse panel compartment.
11	Start Relay	Circuit breakers/fuse panel compartment.
12	Fuses	Circuit breakers/fuse panel.
13	Emergency Brake	Right side of cab on shift control panel.
14	Pressure Switch	Attached to emergency brake air valve.
15	Pressure Switch	Attached to parking brake air valve.
16	Parking Brake	Right side of cab on shift control panel.
17	Horn Solenoid	Lower-front left of machine below floor.
18	Electronic Monitor System (EMS) Neutral Switch	Mounted at bottom of shift lever.
19	Transmission Neutral Start Switch	Mounted at bottom of shift lever.
20	Dimmer Switch	Lower-left cab floor under foot guard.
21	Windshield Washer Switch	Switch panel.
22	Windshield Wiper Switch	Switch panel.
23	EMS Action Alarm	Mounted behind instrument panel.
24	Backup Alarm Limit Switch	In shift console forward of shift lever.
25	Air Inlet Heater Timer	Mounted behind instrument panel above EMS action alarm.
26	Fuel Pump Switch	Switch panel.

COMPONENT LOCATIONS - CONTINUED

Figure 3. Location of Electrical Components.

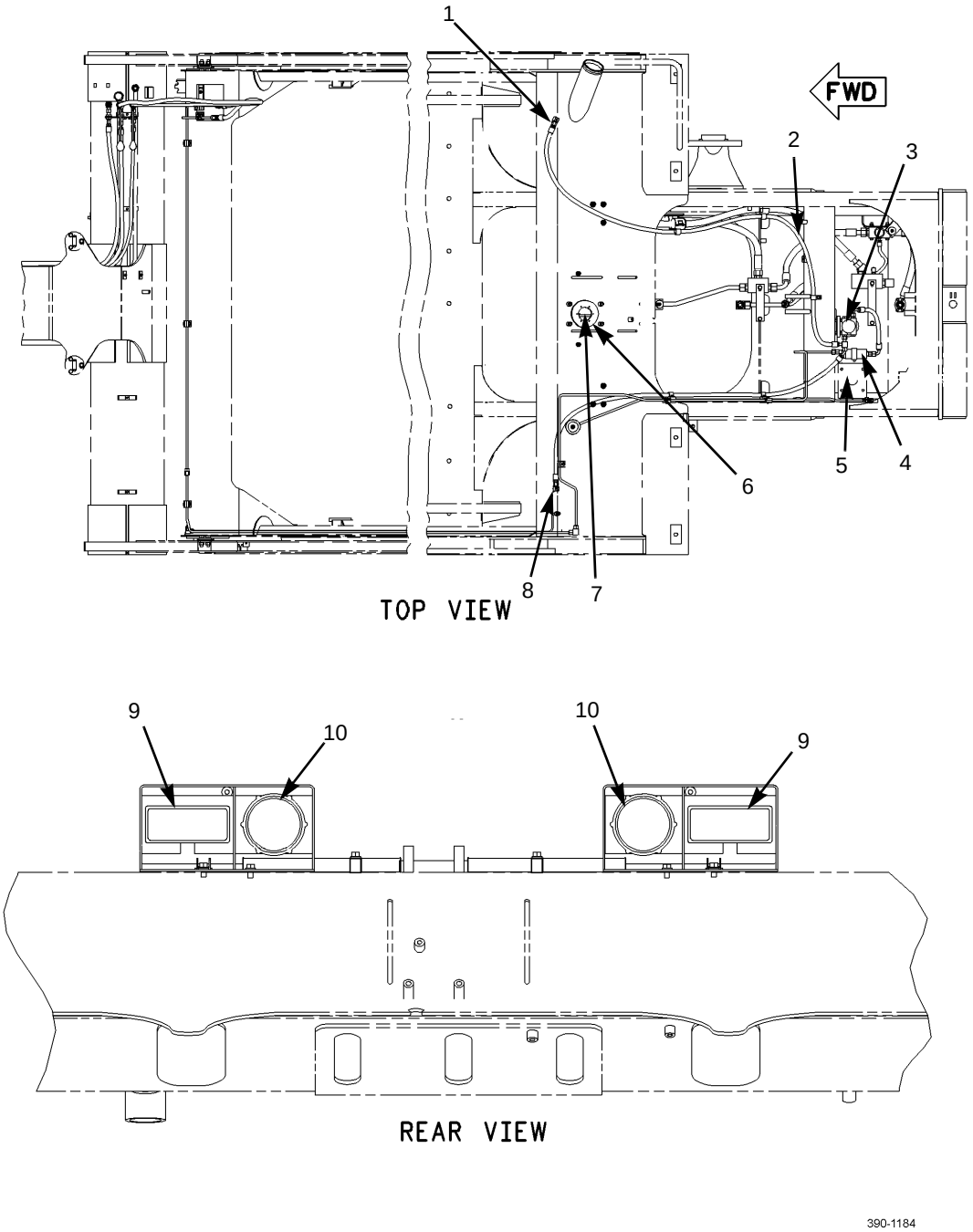




KEY	COMPONENT	LOCATION
1	Alternator Circuit Breaker (60 amp)	Circuit breaker/fuse panel.
2	Key Start Switch Circuit Breaker (10 amp)	Circuit breaker/fuse panel.
3	Turn Lamp Circuit Breaker (20 amp)	Circuit breaker/fuse panel.
4	Blackout and Headlamp Circuit Breakers (15 amp)	Circuit breaker/fuse panel.
5	Main Relay	Circuit breaker/fuse panel.
6	Fuel Pump Relay	Circuit breaker/fuse panel.
7	Start Relay	Circuit breaker/fuse panel.
8	Horn/Backup Alarm Fuse	Circuit breaker/fuse panel.
9	Fuel Pump Fuse	Circuit breaker/fuse panel.
10	Flood Lamps Fuse	Circuit breaker/fuse panel.
11	Windshield Wiper Motor Fuse	Circuit breaker/fuse panel.
12	Gages and EMS Fuse	Circuit breaker/fuse panel.
13	Water Wagon Fuse	Circuit breaker/fuse panel.
14	Ejector Lever Fuse	Circuit breaker/fuse panel.
15	High Beam Lamp	Front-left and front-right of machine.
16	Headlamp	Front-left and front-right of machine.
17	Parking Light	Front-left and front-right of machine.
18	Blackout Drive Marker Light	Front-left and front-right of machine.

COMPONENT LOCATIONS - CONTINUED

Figure 4. Location of Electrical/Mechanical Components.



KEY	COMPONENT	LOCATION
1	Fuel Shutoff Valve	Right-rear of machine.
2	Backup Alarm	Right-rear of machine below Basic Issue Items (BII) box.
3	Fuel/Water Separator	Left-rear of machine under access door.
4	Fuel Pump	Left-rear of machine under access door.
5	Brake Fluid Reservoir	Left of fuel pump.
6	Fuel Level Sender	Top of fuel tank below access plate.
7	Fuel Level Sensor	Top of fuel tank connected to fuel level sender
8	Fuel Shutoff Valve	Right-rear of machine.
9	Stop/Taillights (Composite)	Left-rear and right-rear of machine.
10	Blackout Drive/Blackout Markers	Left-rear and right-rear of machine.

END OF WORK PACKAGE

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TESTS, INSPECTIONS, AND ADJUSTMENTS 0005 00

INTRODUCTION

1. This work package includes miscellaneous tasks, inspections, and adjustment procedures that are performed in conjunction with troubleshooting or as a function of maintenance.

2. The following is a list of procedures covered in this work package:

   a. Troubleshooting Using Multimeter

   b. Differential Lock Check

   c. Electronic Monitoring System (EMS) Air System Check

   d. Air System Pressure Check

   e. Air Compressor Governor Adjustment

   f. Air Leakage Checks

   g. Parking and Emergency Brake Control Valves Test

   h. Steering System Pressure Test

   i. Steering Time Check

   j. Steering Wheel Force Check

   k. Steering Wheel Free Play Check

   l. Steering Wheel Slip Check

   m. Main Control Valve Test and Adjustment

   n. Elevator Operating Speed Check



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

3. If machine is parked indoors during performance of troubleshooting, vent exhaust fumes to the outside if engine is running.

TROUBLESHOOTING USING MULTIMETER

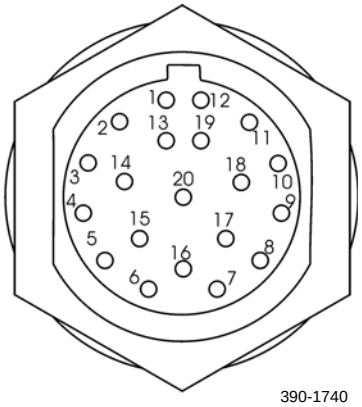
1. **Introduction.**

   a. This section applies to troubleshooting machine's starting and charging circuits using a multimeter. It can be applied to a machine that can self-start, and to a machine that cannot self-start. When using these procedures for a machine that cannot self-start, refer to TM 5-3800-205-10-1 or TM 5-3800-205-10-2 for slave starting procedures.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

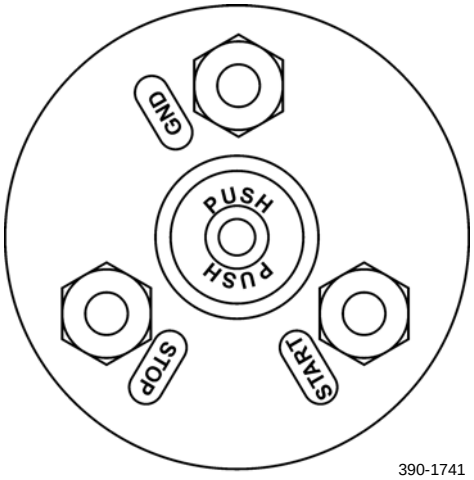
b. Results of the following tests could indicate replacement of components. Before replacing any components, check for loose or corroded connectors in circuit that indicates a defect. If any loose or corroded connectors are found, clean/reconnect connectors and retest. Check all ground points to ensure that they are clean and free of CARC paint.

TEST CONNECTOR PIN LOCATION



390-1740

FRONT FACE OF FUEL SHUTOFF SOLENOID



390-1741

2. **Starter Ground Circuit Voltage Test.**

NOTE

This test measures voltage drop in ground lead of starter.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove wire from upper terminal (GND Negative) on engine fuel shutoff solenoid.

e. Remove protective cap from test connector receptacle.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 7.

h. Connect negative (black) lead from multimeter to test connector pin 3.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

NOTE

Tachometer will indicate no more than 400 RPM for this test.

i. Using key start switch, crank engine and observe multimeter for an indication more than 1.30 volts. If indication is more than 1.30 volts, problem could be:

TROUBLESHOOTING USING MULTIMETER - CONTINUED

(1) Corroded ground cable-to-frame connection. Clean ground cable-to-frame connection (WP 0033 00) and retest.

(2) Frayed or cut ground cable. Replace ground cable (WP 0033 00) and retest.

(3) Battery disconnect switch has excessive voltage drop. Replace battery disconnect switch (WP 0037 00).

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) of engine fuel shutoff solenoid.

3. **Batteries Voltage Test.**

NOTE

This test measures TERMINAL voltage of batteries.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove wire from upper terminal (GND Negative) on engine fuel shutoff solenoid.

e. Remove protective cap from test connector receptacle.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 1.

h. Connect negative (black) lead from multimeter to test connector pin 7.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

NOTE

During engine cranking, it is normal for battery voltage to go below 23.1 volts. However, if battery voltage then goes below 12.5 volts, batteries will probably have cranked engine only momentarily.

i. Using key start switch, crank engine and observe multimeter for an indication of less than 23.1 volts. If indication is less than 23.1 volts, problem could be:

(1) A light or accessory was left ON, while machine was shut down, causing batteries to discharge. Recharge batteries (WP 0067 00) and retest.

(2) Worn out batteries that will not hold a charge. Replace batteries (WP 0067 00) and retest.

(3) No alternator output. Replace alternator (WP 0034 00).

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) of engine fuel shutoff solenoid.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

4. **Alternator Circuit Breaker Voltage Test.**

NOTE

- Tachometer will indicate zero for this test.
- This test measures a voltage drop of either polarity across alternator circuit breaker.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove protective cap from test connector receptacle.

e. Select VDC on multimeter.

f. Connect positive (red) lead from multimeter to test connector pin 1.

g. Connect negative (black) lead from multimeter to test connector pin 9.

NOTE

A thirty (30) minute cool down time may be required before circuit breaker can be reset.

h. Observe multimeter for an indication of more than 0.45 volts. If indication is more than 0.45 volts, problem could be:

(1) A tripped circuit breaker. If circuit breaker is tripped, reset circuit breaker and retest.

(2) A closed circuit breaker with excessive voltage drop. Replace circuit breaker (WP 0038 00).

i. Remove test leads from test connector.

j. Install test connector protective cap.

5. **Key Start Switch Circuit Breaker Voltage Test.**

NOTE

- Tachometer will indicate zero for this test.
- This test measures voltage drop across key start switch circuit breaker.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove wire from upper terminal (GND Negative) on engine fuel shutoff solenoid.

e. Remove protective cap from test connector receptacle.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 1.

h. Connect negative (black) lead from multimeter to test connector pin 5.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

NOTE

A thirty (30) minute cool down time may be required before circuit breaker can be reset.

i. Observe multimeter for an indication of more than 0.75 volts. If indication is more than 0.75 volts, problem could be:

(1) A tripped circuit breaker. If circuit breaker is tripped, reset circuit breaker and retest. If problem still exists, replace circuit breaker (WP 0038 00).

(2) A closed circuit breaker with excessive voltage drop. Replace circuit breaker (WP 0038 00).

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) on engine fuel shutoff solenoid.

6. **Key Start Switch Voltage Test.**

NOTE

- Tachometer will indicate zero for this test.
- This test measures voltage drop across both poles of key start switch.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove protective cap from test connector receptacle.

e. Select VDC on multimeter.

f. Connect positive (red) lead from multimeter to test connector pin 1.

g. Connect negative (black) lead from multimeter to test connector pin 6.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

h. Using key start switch, crank engine and observe multimeter for an indication of more than 2.5 volts. Record indication.

i. Place key start switch to OFF.

j. Connect positive (red) lead from multimeter to test connector pin 1.

k. Connect negative (black) lead from multimeter to test connector pin 8.

l. Place key start switch to ON.

m. Observe multimeter for an indication of more than 2.5 volts. Record indication.

n. Remove test leads from test connector.

o. Install test connector protective cap.

p. A defect is present if voltage drop between either or both of these two sets of test points is more than 2.5 volts. Replace key start switch (WP 0043 00).

TROUBLESHOOTING USING MULTIMETER - CONTINUED

q. Connect wire to upper terminal (GND Negative) on engine fuel shutoff solenoid.

7. **Main Relay Voltage Test.**

NOTE

- Tachometer will indicate zero for this test.
- This test measures voltage drop across main relay.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove protective cap from test connector receptacle.

e. Select VDC on multimeter.

f. Connect positive (red) lead from multimeter to test connector pin 9.

g. Connect negative (black) lead from multimeter to test connector pin 12.

h. Place key start switch to ON.

NOTE

A thirty (30) minute cool down time may be required before circuit breaker can be reset.

i. Observe multimeter for an indication of more than 1.3 volts. If indication is more than 1.3 volts, problem could be:

(1) A tripped circuit breaker. If circuit breaker is tripped, reset circuit breaker and retest.

(2) A closed circuit breaker with excessive voltage drop. Replace circuit breaker (WP 0038 00) and retest.

(3) An open relay contact, a closed relay with excessive voltage drop or a relay with welded contacts. Replace main relay (WP 0045 00) and retest.

j. Remove test leads from test connector.

k. Install test connector protective cap.

8. **Engine Temperature Coolant Switch Voltage Test.**

NOTE

- Perform this test only when engine coolant temperature is below 100°F (38°C).
- Tachometer will indicate zero for this test.
- This test measures voltage drop across engine temperature switch.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove protective cap from test connector receptacle.

e. Select VDC on multimeter.

f. Connect positive (red) lead from multimeter to test connector pin 11.

g. Connect negative (black) lead from multimeter to test connector pin 7.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

h. Observe multimeter for an indication of more than 1.3 volts. If indication is more than 1.3 volts, replace engine temperature switch (WP 0063 00).

i. Remove test leads from test connector.

j. Install test connector protective cap.

9. **Start Aid Temperature Switch/Solenoid Voltage Test.**

NOTE

- Perform this test only when engine coolant temperature is below 80°F (27°C).
- Tachometer will indicate zero for this test.
- This test measures voltage drop across start aid temperature switch, and resistance of solenoid coil.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove protective cap from test connector receptacle.

e. Select VDC on multimeter.

f. Connect positive (red) lead from multimeter to test connector pin 8.

g. Connect negative (black) lead from multimeter to test connector pin 10.

h. Observe multimeter for an indication of more than 2.5 volts. If indication is more than 2.5 volts, replace start aid temperature switch (WP 0063 00).

i. Select OHMS on multimeter.

j. Connect positive (red) lead from multimeter to test connector pin 10.

k. Connect negative (black) lead from multimeter to test connector pin 7.

l. Observe multimeter for an indication of more than 300 ohms. If indication is more than 300 ohms, replace start aid solenoid (WP 0022 00).

m. Remove test leads from test connector.

n. Install test connector protective cap.

10. **Starter Relay Voltage Test.**

NOTE

This test measures voltage drop across starter relay contacts.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove wire from upper terminal (GND Negative) on engine fuel shutoff solenoid.

e. Remove protective cap from test connector.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 9.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

h. Connect negative (black) lead from multimeter to test connector pin 4.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

NOTE

Tachometer will indicate no more than 400 RPM for this test.

i. Using key start switch, crank engine and observe multimeter for an indication of more than 0.45 volts. If indication is more than 0.45 volts, replace starter relay (WP 0045 00).

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) on engine fuel shutoff solenoid.

11. **Starter Solenoid Voltage Test.**

NOTE

This test measures voltage drop across starter solenoid contacts.

a. Ensure engine is OFF.

b. Place battery disconnect switch in ON position.

c. Turn all accessories OFF.

d. Remove fuel pump fuse (WP 0040 00) to shut OFF fuel supply (engine should crank, but not start).

e. Remove protective cap from test connector.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 1.

h. Connect negative (black) lead from multimeter to test connector pin 2.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

NOTE

Tachometer will indicate no more than 400 RPM for this test.

i. Using key start switch, crank engine and observe multimeter for an indication of more than 0.75 volts. If indication is more than 0.75 volts, replace starter (WP 0035 00).

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) on engine fuel shutoff solenoid.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

12. **Alternator Voltage Test.**

NOTE

This test measures alternator output voltage.

a. Ensure engine is OFF.
b. Place battery disconnect switch in ON position.
c. Turn all accessories OFF.
d. Engage parking brake.
e. Ensure transmission select lever is in N (Neutral), and transmission neutral lock control is in locked position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
f. Remove protective cap from test connector receptacle.
g. Select VDC on multimeter.
h. Connect positive (red) lead from multimeter to test connector pin 9.
i. Connect negative (black) lead from multimeter to test connector pin 7.

NOTE

Batteries need over two (2) minutes to charge to voltage range required for the following test, especially if machine being tested was boost started.

j. Start engine.
k. Slowly speed up engine until 2440 RPM is indicated on tachometer.
l. With multimeter connected to pins 9 and 7, observe multimeter for an indication between 26.2 and 28.9 volts. If indication is less than 26.2 volts (undercharge condition), the problem could be:
    (1) Loose or broken alternator drive belts. Tighten or replace alternator belts (WP 0032 00) and retest.
    (2) Starter-to-engine block ground cable damaged, loose or missing, Tighten or replace ground cable (WP 0033 00) and retest.
    (3) Defective batteries. Charge batteries (WP 0067 00) and retest. If problem still exists, replace batteries (WP 0067 00).
    (4) Defective alternator. Replace alternator (WP 0034 00).
m. If indication is more than 28.9 volts (overcharge condition), replace alternator (WP 0034 00).
n. Allow engine to idle for five (5) minutes before turning engine OFF.
o. Remove multimeter leads from test connector receptacle.
p. Install test connector receptacle protective cap.

13. **Starter Solenoid Power Circuit Voltage Test.**

NOTE

This test measures voltage drop across starter solenoid pull-in coil.

a. Ensure engine is OFF.
b. Place battery disconnect switch in ON position.

TROUBLESHOOTING USING MULTIMETER - CONTINUED

c. Turn all accessories OFF.

d. Remove wire from upper terminal (GND Negative) on engine fuel shutoff solenoid.

e. Remove protective cap from test connector.

f. Select VDC on multimeter.

g. Connect positive (red) lead from multimeter to test connector pin 2.

h. Connect negative (black) lead from multimeter to test connector pin 4.

CAUTION

DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.

NOTE

Tachometer will indicate no more than 400 RPM for this test.

i. Using key start switch, crank engine and observe multimeter for an indication of less than 1.0 volt. If indication is more than 1.0 volt, the problem could be:

(1) Alternator circuit breaker with excessive voltage drop. Replace alternator circuit breaker (WP 0038 00) and retest.

(2) Start relay with excessive voltage drop. Replace start relay (WP 0045 00) and retest.

j. Remove test leads from test connector.

k. Install test connector protective cap.

l. Connect wire to upper terminal (GND Negative) on engine fuel shutoff solenoid.

DIFFERENTIAL LOCK CHECK

1. **Equipment Condition.** Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

2. **Differential Lock Check.**

a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and allow air pressure to reach cut-out pressure of 125 psi (860 kPa).

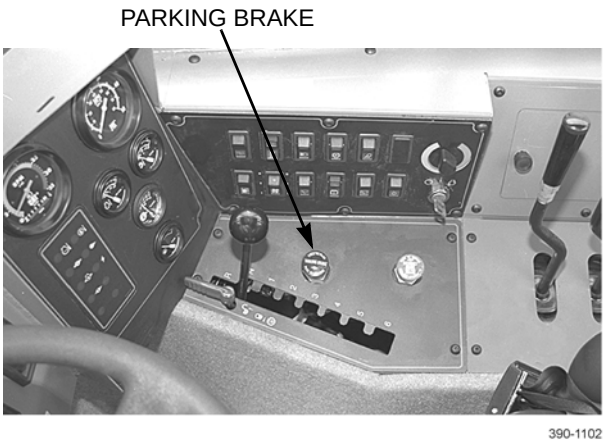
b. Raise bowl/water tank (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

c. Place parking brake to OFF.

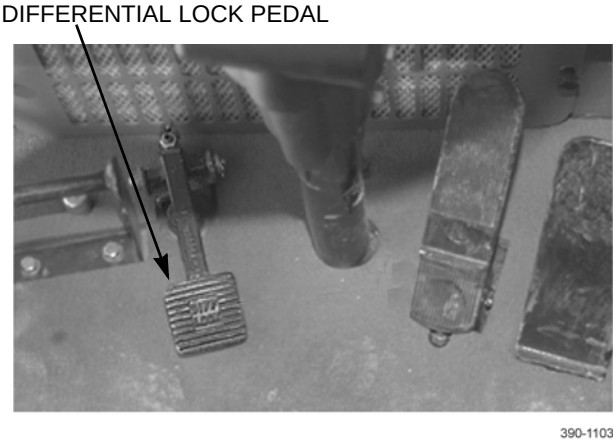
d. With engine at low idle speed, use steering wheel and articulate machine completely to left and right.

e. With tractor and scraper or water distributor in a straight position, push and hold differential lock pedal down.

EMS AIR SYSTEM CHECK - CONTINUED



390-1102



390-1103

f. Repeat step d. Machine should resist turning when differential lock is engaged.

g. If machine makes a complete left and/or right articulation, refer to Troubleshooting (WP 0006 00).

h. Release pedal.

i. If machine does not make a complete left and/or right articulation, refer to Troubleshooting (WP 0006 00).

EMS AIR SYSTEM CHECK

1. **Tools and Special Tools.** Tool kit, general mechanic's (Item 33, WP 0172 00)
2. **EMS Air System Check.**
   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and allow air pressure to reach 75 psi (520 kPa).

NOTE

Action alarm and action light for low air pressure will operate until air pressure is 65 psi (450 kPa).

b. If action alarm and/or action light do not operate, stop engine.

c. Check electrical connections at action alarm, action light, and parking and emergency brake pressure switches. Check action light bulb. If connections are good and bulb is okay, connect a continuity light across terminals of one pressure switch.

NOTE

Air pressure must be less than specifications of pressure switches.

d. If continuity light does not come on, replace pressure switch (WP 0047 00).

e. Perform steps c and d for other pressure switch.

f. If action alarm does not operate, connect a continuity light across terminals of pressure switch.

g. If continuity light does not come on, replace pressure switch (WP 0047 00).

h. If action alarm and/or light operate above 60 psi (415 kPa), stop engine.

i. Install a new pressure switch or pressure switches (WP 0047 00).

j. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

k. Allow air pressure to reach approximately 75 psi (520 kPa).

l. Slowly open air tank valve and bleed air pressure.

EMS AIR SYSTEM CHECK - CONTINUED

m. Action alarm and light must operate at 60 psi (415 kPa).

n. Stop engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

o. If action alarm and/or light do not operate at correct pressure, check electrical connections for the following components: action alarm, light, and pressure switches. Check bulb for light switch.

p. If connections are good, replace pressure switch or switches (WP 0047 00).

AIR SYSTEM PRESSURE TEST

1. **Tools and Special Tools.**

   a. Tool kit, general mechanic's (Item 33, WP 0172 00).

   b. Tool outfit, hydraulic systems (HSTRU) (Item 35, WP 0172 00).

2. **Equipment Condition.**

   a. Engine OFF (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

   b. Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

3. **Air System Pressure Test.**



WARNING

Always wear eye protection when draining air tanks. Failure to do so could result in injury.

   a. Open three drain valves on air tanks to release air pressure from air tanks.

   b. Remove drain valve from one air tank.

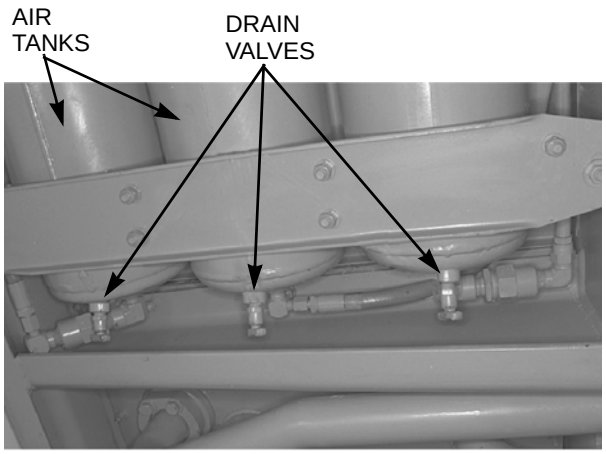
   c. Install bushing and hose assembly to air tank where drain valve was removed.

   d. Connect other end of hose to needle valve.

   e. Connect 290 psi (2000 kPa) gage to valve.

   f. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-2) and allow air pressure to reach cut-out pressure of 125 psi (860 kPa).

   g. Compare indications of air pressure gage on machine and test gage. The difference between two gages should not be more than 15 psi (105 kPa). If this condition exists, replace air pressure gage on machine (WP 0042 00).

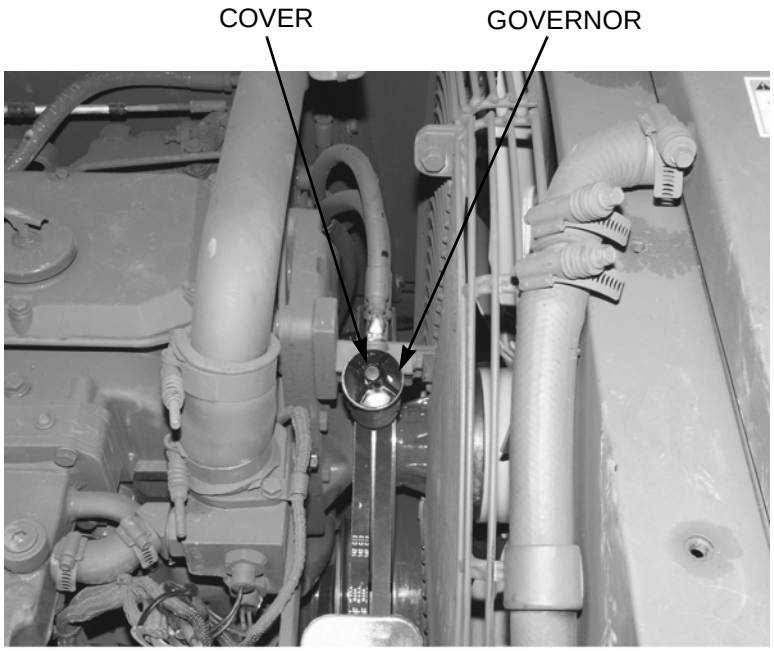


390-1101

AIR COMPRESSOR GOVERNOR ADJUSTMENT

1. **Tools and Special Tools.** Tool kit, general mechanic's (Item 33, WP 0172 00).
2. **Equipment Condition.**
   a. Engine OFF (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   b. Engine access cover open (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   c. Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. **Air Compressor Governor Adjustment.**
   a. Install air pressure gage in accordance with *Air System Pressure Test* in this work package.
   b. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and allow air pressure to reach cut-out pressure of 125 psi (860 kPa).
   c. Observe cut-out pressure on machine air pressure gage.
   d. Push brake pedal rapidly several times.
   e. Observe cut-in pressure on gage. Cut-in pressure should be 100-105 psi (690-725 kPa).
   f. If necessary, adjust air compressor governor:
      (1) Remove cover from governor.

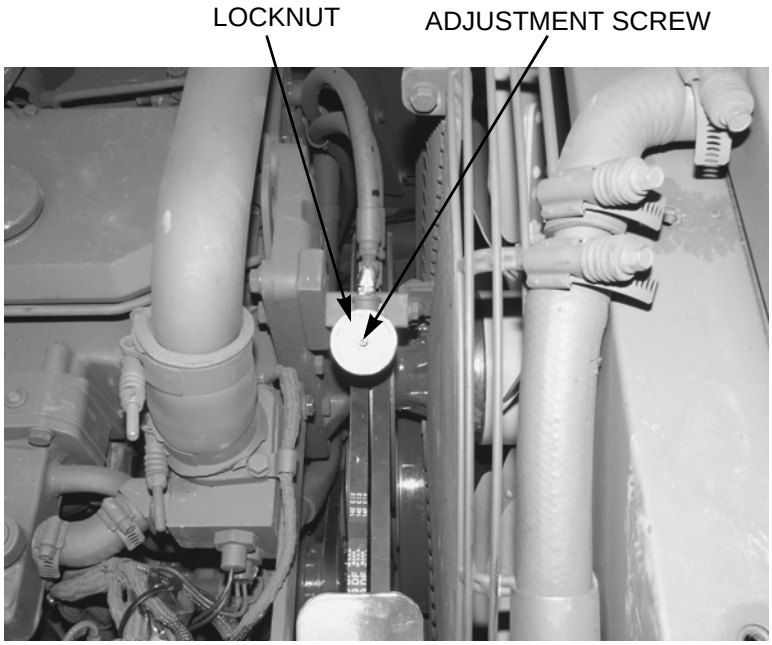
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390-1610

AIR COMPRESSOR GOVERNOR ADJUSTMENT - CONTINUED

(2) Loosen locknut on adjustment screw.



390-1611

(3) Turn adjustment screw counterclockwise to raise cut-out pressure. One turn of adjustment screw changes pressure approximately 20 psi (140 kPa). Cut-in pressure will change by the same amount.

(4) Turn adjustment screw clockwise to lower cut-out pressure. One turn of adjustment screw changes pressure approximately 20 psi (140 kPa).

g. If adjustment screw does not change cut-out pressure, air compressor unloading valves are not working correctly.

h. If no difference between cut-in and cut-out pressure is observed, replace air compressor governor (WP 0083 00).

AIR LEAKAGE CHECKS

1. **Materials.** Detergent (Item 11, WP 0171 00).

2. **Air Leakage Checks.**

WARNING

Sudden movement of machine or release of air under pressure can cause injury to personnel on or near machine. To prevent possible injury, perform procedure before testing and adjusting air system and brakes.

NOTE

You can hear air leakage. Air leakage can be seen when soapy water is applied to connections, valves and hoses.

a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and allow air pressure to reach cut-out pressure of 125 psi (860 kPa). Once pressure is reached, stop engine.

b. Check for leakage at hoses, lines, and connections between air compressor and tractor air tanks.

c. Check for leakage at hoses, lines, and connections between tractor air tanks and service brake control valve.

AIR LEAKAGE CHECKS - CONTINUED

d. Check for leakage at service brake control valve.

NOTE

If air pressure drops below cut-out pressure of 125 psi (860 kPa), start and run engine until air pressure reaches cut-out pressure. Once pressure is reached, stop engine.

e. Check for leakage at hoses, lines, and connections between service brake control valve and between air tanks and relay valves.

f. Check for leakage at valves and pressure switches.

g. Check for leakage at hoses, lines, and connections between service brake control valve and parking/emergency brake control valves.

h. Release parking brake (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

When checking air valves for leakage, check exhaust passages for restrictions such as mud or dirt. A restriction in an exhaust passage will prevent release of pressurized air during normal operations.

i. Check for leakage at hoses, lines, and connections between parking brake control valve and double check valves.

j. Check for leakage at double check valves.

k. Push and hold service brake pedal. Check for leakage at hoses, lines, and connections between service brake control valve and scraper/water tank brake actuators.

l. Continue holding service brake pedal and check for leakage at hoses, lines, and connections between service brake control valve and tractor brake actuators.

m. Release service brake pedal.

PARKING AND EMERGENCY BRAKE CONTROL VALVES TEST

1. **Tools and Special Tools.**

   a. Tool kit, general mechanic's (Item 33, WP 0172 00).

   b. Tool outfit, hydraulic systems (HSTRU) (Item 35, WP 0172 00).

2. **Parking and Emergency Brake Control Valves Test.**

   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and allow air pressure to reach cut-out pressure of 125 psi (860 kPa).

   b. Release parking and emergency brakes (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

   c. Push brake pedal rapidly several times until control knobs automatically move to ON position.

   d. Install air pressure gage in accordance with *Air System Pressure Test* in this work package.

   e. Observe pressure indication on test gage.

   f. Correct pressure that will automatically engage brakes is 40 psi (280 kPa). If pressure on gage is not correct, operation of control valve is not correct. Replace control valve (WP 0089 00).

STEERING SYSTEM PRESSURE TEST

1. **Tools and Special Tools.**
   a. Tool kit, general mechanic's (Item 33, WP 0172 00).
   b. Shop equipment, common no. 2 (Item 25, WP 0172 00)
2. **Equipment Condition.** Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. **Steering System Pressure Test.**
   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   b. Move machine to a flat, hard surface.
   c. Shut down engine.



WARNING



- DO NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure Escaping hydraulic fluid under pressure can penetrate the skin causing serious injury.
- At operating temperature, hydraulic oil tank is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.

   d. Turn steering wheel left and right to relieve any pressure from steering system.

WARNING

Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

NOTE

- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

STEERING SYSTEM PRESSURE TEST - CONTINUED

e. Remove protective cap from test port for steering control valve, under left front of tractor.

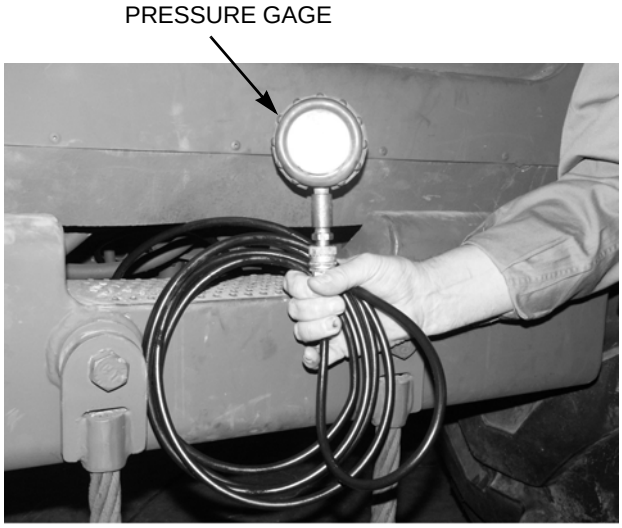


UNDER LEFT FRONT OF TRACTOR 390-1867

f. Connect hose assembly and pressure gage to test post.



390-1868



390-1869

STEERING SYSTEM PRESSURE TEST - CONTINUED

CAUTION

Do not turn steering wheel when engine is running and a low pressure gage is installed in steering circuit. If steering wheel is turned, pressure of oil to steering cylinders will be too high for a low pressure gage and it may be damaged.

g. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and operate engine at high idle.

h. Raise bowl/water tank (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and release brakes.

i. Pressure gage at test port should indicate 135 psi (930 kPa).

j. If pressure indication is out of tolerance, stop machine and shut off engine. Engage parking brake (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

k. Remove hose assembly and pressure gage from test port. Install protective cap.

l. Check oil level in hydraulic tank. If oil level is low, add hydraulic oil (WP 0009 00 and WP 0010 00).

STEERING TIME CHECK

1. **Tools and Special Tools.** Stopwatch.

2. **Equipment Condition.** Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

3. **Steering Time Check.**

   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

   b. Move machine to a flat, hard surface.

   c. Operate engine at high idle. Raise bowl/water tank and release brakes (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

Notify DS Maintenance if steering time is not within limits.

   d. Time for a full turn must be 6.2 to 7.5 seconds. A full turn is from stop to stop. Turning left or turning right must take the same amount of time. The maximum allowable difference between the steering times is 0.6 seconds.

   e. If time is out of tolerance, perform *Steering System Pressure Test* in this work package.

STEERING WHEEL FORCE CHECK

1. **Tools and Special Tools.**

   a. Tool kit, general mechanic's (Item 33, WP 0172 00).

   b. Shop equipment, common no. 1 (Item 24, WP 0172 00).

2. **Equipment Condition.**

   a. Engine OFF (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

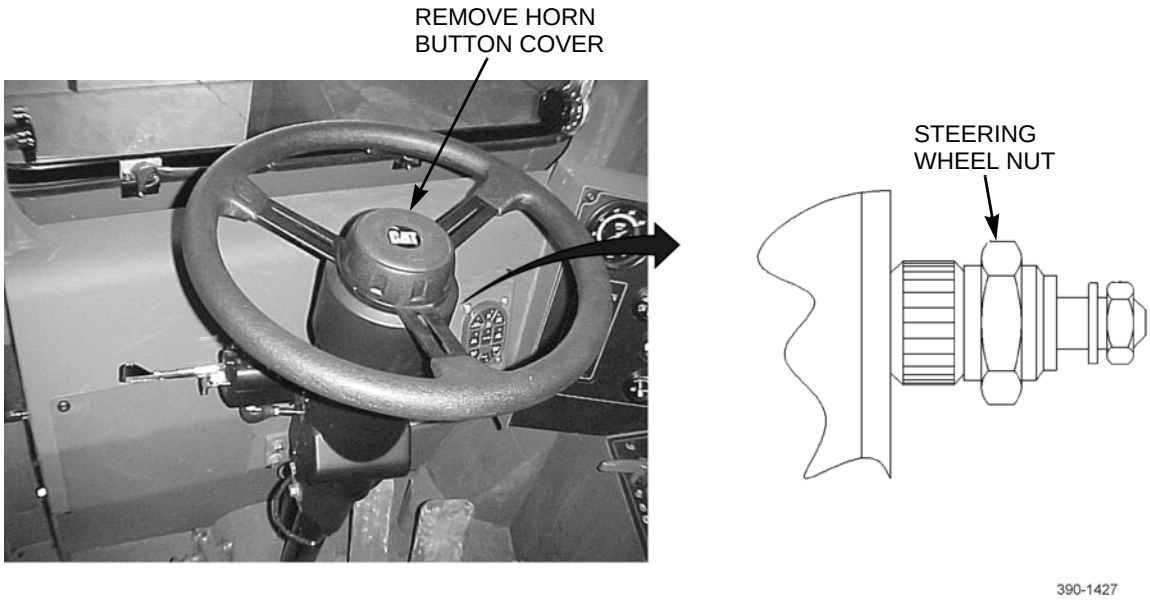
   b. Horn button cover removed (WP 0097 00).

STEERING WHEEL FORCE CHECK - CONTINUED

3. **Steering Wheel Force Check.**

   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and operate at low idle speed.

   b. Using torque wrench, turn steering wheel nut.



NOTE

Torque should be between 25-35 lb-in. (2.8-4.0 Nm).

   c. If torque is greater than 102 lb-in. (11.5 Nm), refer to *Steering System* Troubleshooting (WP 0006 00).

STEERING WHEEL FREE PLAY CHECK

1. **Equipment Condition.** Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

2. **Steering Wheel Free Play Check.**

   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

   b. Move machine to a flat, hard surface.

   c. Raise bowl/water tank and release brakes (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

   d. Run engine at high idle speed.

NOTE

Free play must not exceed 25°.

   e. Turn steering wheel from left to right without machine articulation. If free play is more than 25°, refer to *Steering System* Troubleshooting (WP 0006 00).

STEERING WHEEL SLIP CHECK

1. **Equipment Condition.** Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. **Steering Wheel Slip Check.**
   a. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   b. Move machine to a flat, hard surface.
   c. Raise bowl/water tank and release brakes (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   d. Turn steering wheel right until stops hit. Turn steering wheel left until stops hit.
   e. Count rotations of steering wheel. Repeat procedure for right turn. Steering wheel rotations for a turn must not exceed three full rotations. If number of rotations exceeds three full rotations, steering slip is excessive and steering system requires troubleshooting (WP 0006 00).

MAIN CONTROL VALVE TEST AND ADJUSTMENT

1. **Tools and Special Tools.**
   a. Tool kit, general mechanic's (Item 33, WP 0172 00)
   b. Tool outfit, hydraulic systems (HSTRU) (Item 35, WP 0172 00).
2. **Materials/Parts.**
   a. Oil, lubricating (Item 24 or 29, WP 0171 00).
   b. O-ring.
3. **Equipment Condition.**
   a. Bowl/water tank empty (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   b. Bowl/water tank lowered (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
   c. Engine OFF (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

MAIN CONTROL VALVE TEST AND ADJUSTMENT - CONTINUED

4. **Main Control Valve Test and Adjustment.**



WARNING



- DO NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin causing serious injury.
- At operating temperature, hydraulic oil tank is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.

a. Operate control levers in cab to relieve any pressure in hydraulic system.

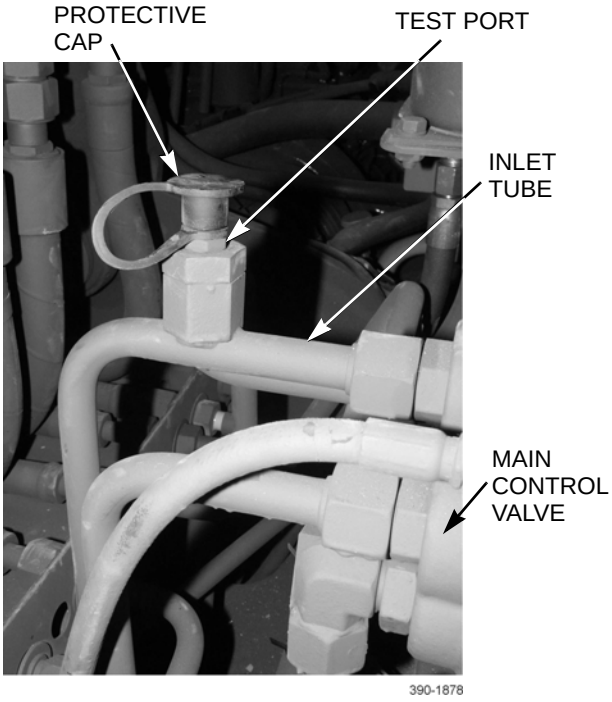
WARNING

Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

NOTE

- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

b. Remove protective cap from test port on inlet tube of control valve.



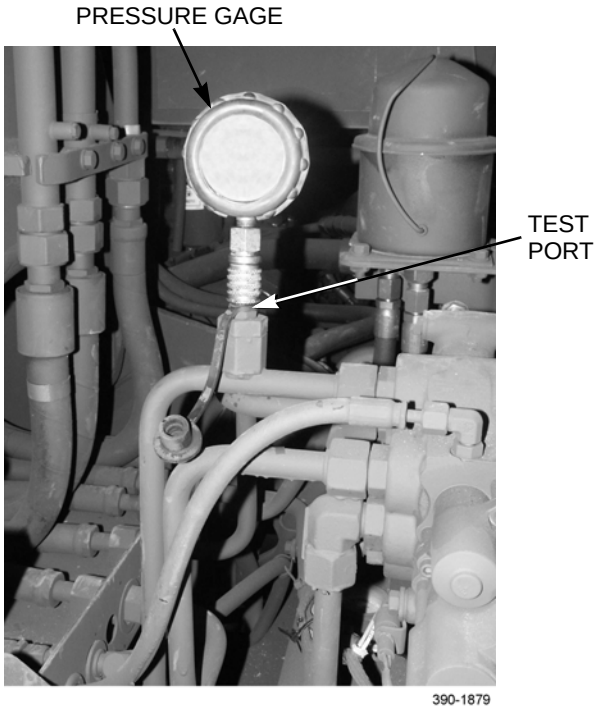
MAIN CONTROL VALVE TEST AND ADJUSTMENT - CONTINUED

c. Install pressure gage on test port.

d. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and run at 825 RPM.

e. Completely raise bowl/water tank (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

f. Increase engine RPM to 2450.



g. Slowly move control lever for bowl/water tank to UP and hold for no more than 5 seconds. Correct pressure indication should be 2500 psi (17237 kPa).

h. If pressure indication is not correct, relief valve must be adjusted as follows:

(1) Remove locking plug and O-ring from relief valve. Discard O-ring.

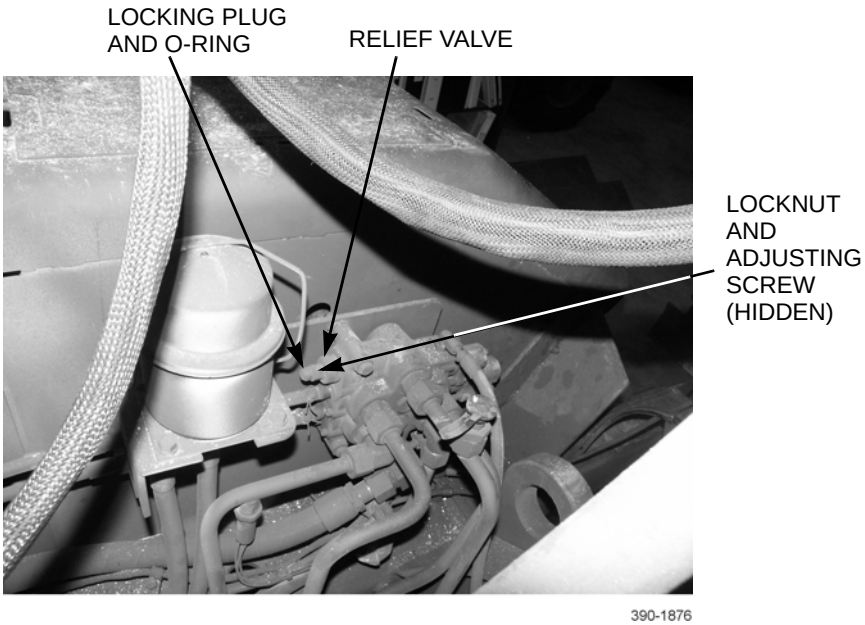
(2) Loosen locknut. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.

(3) Tighten locknut after adjustment is completed.

(4) Coat new O-ring with clean oil and install O-ring in locking plug.

(5) Install locking plug on relief valve.

MAIN CONTROL VALVE TEST AND ADJUSTMENT - CONTINUED



i. If pressure of 2500 psi (17237 kPa) cannot be obtained, notify DS Maintenance to replace main control valve.

ELEVATOR OPERATING SPEED CHECK

1. **Tools and Special Tools.** Tool kit, general mechanic's (Item 33, WP 0172 00).
2. **Personnel Required.** Two.
3. **Equipment Condition.**
   a. Machine parked on hard, level surface (TM 5-3800-205-10-1).
   b. Scraper bowl lowered to ground (TM 5-3800-205-10-1).
   c. Parking brake applied (TM 5-3800-205-10-1).
   d. Wheels chocked (TM 5-3800-205-10-1).

ELEVATOR OPERATING SPEED CHECK - CONTINUED

4. **Elevator Operating Speed Check.**
   a. Place a mark on one link of chain.
   b. Start engine (TM 5-3800-205-10-1).
   c. Operate engine at high idle RPM (2450 +/- 50 RPM).
   d. Operate elevator (TM 5-3800-205-10-1). Observe and record number of chain revolutions for one minute. Refer to Table 1 for proper elevator operating speeds.

Table 1. Elevator Operating Speeds.

Speed Range	Chain RPM
Fast Forward	14 to 15
Slow Forward	7 to 8
Reverse	7 to 8

END OF WORK PACKAGE

TROUBLESHOOTING SYMPTOM INDEX 0006 00

Malfunction/Symptom — **Troubleshooting Procedure Page**

AIR SYSTEM AND BRAKES

Brake Air Pressure Low Alert Indicator, Action Light and Action Alarm Come On During Operation 0007 00-1
Parking Brake Alert Indicator Does Not Come On When Parking Brake is Engaged 0007 00-1
Parking/Emergency Brake Will Not Apply. 0007 00-2
Parking/Emergency Brake Will Not Release 0007 00-2
Service Brakes Do Not Apply Correctly. 0007 00-3
Service Brakes Do Not Release Correctly 0007 00-5

CHARGING SYSTEM

Alternator Alert Indicator Comes On 0007 00-6

COOLING SYSTEM

Coolant Temperature Alert Indicator is On and Action Light Flashes, Indicating Engine is Overheating. . . 0007 00-7

DIFFERENTIAL LOCK CONTROL

Differential Lock Control Will Not Engage When Pedal is Pressed. 0007 00-8
Differential Lock Control Will Not Disengage When Pedal is Released 0007 00-8

ELECTRICAL SYSTEM

Backup Alarm Will Not Sound When Machine is Placed in Reverse 0007 00-9
Blackout Drive Light(s) Do Not Operate When B.O. DRIVE Function is Selected 0007 00-9
Blackout Drive Marker Light(s) Do Not Operate When B.O. MARKER Function is Selected 0007 00-10
Cutting Edge/Bowl Work Light Inoperative 0007 00-11
Directional Turn Signal or Hazard Flasher Control are Not Working 0007 00-12
EMS Action Alarm Does Not Sound After Engine Startup 0007 00-13
EMS Alert Indicators and Action Light Do Not Come On When Panel Test Switch is Placed to On 0007 00-13
Horn Will Not Sound When Button is Pressed 0007 00-14
Headlight(s)/Parking Light(s) Do Not Operate When SER. DRIVE or PARK Functions are Selected . . . 0007 00-14
High Beams Do Not Come On 0007 00-14
Stoplights Do Not Operate When Brake Pedal is Pressed 0007 00-15
Taillights Do Not Come On. 0007 00-16
Water Distributor Control Panel Light Does Not Come On When Key Start Switch is ON 0007 00-16
Water Distributor Control Panel Water Level Green/Red Panel Indicator Lights Do Not Come On. 0007 00-17
Water Distributor Work Lights Inoperative. 0007 00-17
Water Distributor Control Panel Has No Power, With Key Start Switch ON. 0007 00-18
Windshield Washer Not Working 0007 00-18
Windshield Wiper Not Working 0007 00-18

Malfunction/Symptom **Troubleshooting Procedure Page**

ENGINE

Engine Cranks But Fails to Start (Operating Temperature Above 32°F (0°C) 0007 00-20
Engine Cranks But Fails to Start (Operating Temperature Below 32°F (0°C) 0007 00-20
Engine Does Not Develop Full Power 0007 00-21
Engine Does Not Idle Properly 0007 00-21
Engine Fails to Crank When Key Start Switch is Turned to START 0007 00-21
Engine Starts But Dies 0007 00-22
Engine Starts But Misfires or Runs Rough After Proper Warmup Period 0007 00-23
Excessive Engine Oil Consumption 0007 00-23
Excessive Exhaust Smoke (At Normal Engine Operating Speed) 0007 00-23
Excessive Exhaust Smoke (White) During Startup 0007 00-24
Low or No Engine Oil Pressure - Alert Indicator, Action Light and Action Alarm are On 0007 00-24

SCRAPER SYSTEM

Bowl Control Lever Binds 0007 00-25
Bowl Drifts After Control Lever is Released or Centered 0007 00-25
Ejector Control Lever Binds 0007 00-26
Elevator Control Lever Binds 0007 00-26
Elevator Operating Speeds are Too Slow 0007 00-27
Floor Opens During Operation 0007 00-27
Oil Temperature is Too Hot 0007 00-27
Travel Time of Bowl Cylinders is Slow 0007 00-28
Travel Time of Ejector (Floor) is Slow 0007 00-29

STEERING SYSTEM

Machine Slowly Drifts (Either Direction) and/or Wanders or Pulls to One Side On Level Pavement, Even When Steering Wheel is in Straight Position 0007 00-30
Machine Turns Correctly Under Normal Driving Conditions, But Turns Slowly With a Load 0007 00-30
Machine Turns Slowly in Both Directions 0007 00-30
Machine Turns Slowly in One Direction 0007 00-32
Steering is Erratic 0007 00-32
Turning Steering Wheel is Difficult 0007 00-33

SUSPENSION SEAT

Seat Air Compressor Will Not Come On 0007 00-34
Seat Moves to Left or Right 0007 00-34
Seat Will Not Raise or Lower When Making a Height Adjustment 0007 00-34
Suspension Ride is Too Hard or Too Soft 0007 00-34

TRANSMISSION

Machine Moves When Shift Lever is in NEUTRAL 0007 00-35
Slow or Erratic Transmission Engagement 0007 00-35
Torque Converter Oil Temperature Alert Indicator and Action Light Come On (Indicates Overheating During Normal Operation) 0007 00-36

TRANSMISSION - CONTINUED

Transmission Shifting is Rough. 0007 00-36
Transmission Does Not Operate in any Speed 0007 00-37
Transmission Does Not Shift From One Direction to Another. 0007 00-38
Transmission Does Not Shift From One Speed to Another 0007 00-38
Transmission Engages, But Machine Does Not Move. Engine Stops Running 0007 00-39

WATER DISTRIBUTOR

Lower Spray Bar Will Not Discharge 0007 00-40
Lower Spray Bar Will Not Gravity Discharge 0007 00-40
No Pressure Discharge From Lower Spray Bar 0007 00-40
No Pressure Discharge From Left Upper Spray Bar. 0007 00-31
No Pressure Discharge From Right Upper Spray Bar. 0007 00-31
Pump Control Lever (Elevator Control Lever) Binds. 0007 00-42
Pump Control Lever (Elevator Control Lever) Will Not Engage 0007 00-42
Pump Control Lever (Elevator Control Lever) Will Not Return to Hold Position 0007 00-42
Tank Cannot Be Filled Using Pressurized Water Source Through Suction Inlet 0007 00-42
Tank Cannot Be Suction Loaded Using Onboard Pump. 0007 00-42
Water Pump Will Not Operate in High Speed. 0007 00-43
Water Pump Will Not Operate in Low Speed 0007 00-43
Water Tank Drifts Up and Down When Tank Control Lever is in Hold Position. 0007 00-44

END OF WORK PACKAGE

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NOTE

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

Table 1. Air System and Brakes Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Brake Air Pressure Low Alert Indicator, Action Light and Action Alarm Come On During Operation.		
WARNING When the action alarm sounds, immediate shutdown of the machine is required to prevent injury to personnel and/or severe damage to the machine. **NOTE** Alarm and lights operate until air pressure is above 65 psi (448 kPa).		
	1. Check air pressure gage for an indication less than 65 psi (448 kPa).	If indication is less than 65 psi (448 kPa), go to test step 2.
	2. Perform *Air Leakage Checks* (WP 0005 00).	Repair any leaks found during *Air Leakage Checks*. If problem still exists, go to test step 3.
	3. Perform *EMS Air System Check* (WP 0005 00).	Repair/replace any faulty components as specified in check (WP 0005 00).
2. Parking Brake Alert Indicator Does Not Come On When Parking Brake is Engaged.	1. Press EMS panel test switch UP and check if indicator light comes on. Release switch.	a. If indicator light comes on, go to MALFUNCTION 3 below to check parking brake. b. If indicator light does not come on, go to test step 2.
	2. Check for loose connection at indicator light.	a. Tighten loose connection. b. If problem still exists, go to test step 3.
	3. Check if alert indicator light is burned out.	Replace indicator light (WP 0042 00).

Table 1. Air System and Brakes Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. Parking/Emergency Brake Will Not Apply.		
NOTE If any malfunctions are noted during operation check, return here for corrective action.		
	Perform *Parking and Emergency Brake Control Valves Test* (WP 0005 00).	a. Adjust brake actuator rod travel (WP 0088 00). If problem still exists, go to step b. b. Replace parking/emergency brake control valve (WP 0089 00). If problem still exists, go to step c. c. Replace double check valves (WP 0092 00). If problem still exists, go to step d. d. Adjust brake (WP 0082 00). If problem still exists, go to step e. e. Inspect brake linings for wear. If linings are worn to top of rivets, replace brake linings (WP 0082 00). If problem still exists, go to step f. f. Replace brake actuator (WP 0088 00).
4. Parking/Emergency Brake Will Not Release.		
NOTE Manual release of brakes requires air pressure above 55 psi (379 kPa).		
	1. Check air pressure gage for an indication of 55 psi (379 kPa). If indication is less than 55 psi (379 kPa) ensure that air tank drain valve(s) are closed.	If air tank valve(s) are closed, go to test step 2.
	2. Check adjustment of air compressor governor (WP 0005 00).	If problem still exists after adjustment of governor, go to test step 3.

Table 1. Air System and Brakes Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. Parking/Emergency Brake Will Not Release - Continued.	3. Perform *Air Leakage Checks* (WP 0005 00).	Repair any leaks found during *Air Leakage Checks*. If problem still exists, go to step 4.
NOTE If any malfunctions are noted during operation check, return here for corrective action.		
	4. Perform *Parking and Emergency Brake Control Valves Test* (WP 0005 00).	a. Adjust brake actuator rod travel (WP 0088 00). If problem still exists, go to test step b. b. Replace parking/emergency brake control valve (WP 0089 00). If problem still exists, go to step c. c. Replace double check valves (WP 0092 00). If problem still exists, go to step d. d. Inspect brake linings for wear. If linings are worn to top of rivets, replace brake linings (WP 0082 00). If problem still exists, go to step e. e. Replace brake actuator (WP 0088 00).
5. Service Brakes Do Not Apply Correctly.	1. Check for mud or dirt under brake pedal.	a. Clean mud or dirt from under brake pedal. b. If problem still exists, go to test step 2.
	2. Check air pressure gage for an indication of 125 psi (860 kPa). If indication is less than 125 psi (860 kPa), ensure that air tank drain valve(s) are closed.	If air tank valve(s) are closed, go to test step 3.
	3. Check brake fluid level in brake fluid reservoirs (WP 0010 00)	a. If fluid levels are low, fill to proper level (WP 0009 00 and WP 0010 00). b. If problem still exists, go to test step 4.

Table 1. Air System and Brakes Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
5. Service Brakes Do Not Apply Correctly - Continued.	4. Check adjustment of air compressor governor (WP 0005 00).	If problem still exists after adjustment of governor, go to test step 5.
	5. Perform *Air Leakage Checks* (WP 0005 00).	a. Repair any leaks found during *Air Leakage Checks*.
		b. If problem still exists, go to test step 6.
	NOTE Be sure to check service brake linings at rear of machine (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).	
	6. Check service brake linings for wear or damage in accordance with PMCS annual check (WP 0010 00).	a. Replace service brake linings (WP 0084 00).
		b. If problem still exists, go to test step 7.
	7. Check brake control valve for damage.	a. Replace brake control valve (WP 0090 00).
		b. If problem still exists, go to test step 8.
	NOTE Be sure to check brake calipers at rear of machine (TM 5-3800-205-23-2 or TM 3800-205-23-3).	
	8. Check brake caliper(s) for damage.	a. Replace brake caliper(s) (WP 0087 00).
		b. If problem still exists, go to test step 9.
	9. Check double check valves for damage.	Replace double check valves (WP 0092 00).

Table 1. Air System and Brakes Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. Service Brakes Do Not Release Correctly.	1. Check for mud or dirt under brake pedal.	a. Clean mud or dirt from under brake pedal. b. If problem still exists, go to test step 2.
	2. Perform *Air Leakage Checks* (WP 0005 00)	a. Repair any leaks found during *Air Leakage Checks*. b. If problem still exists, go to test step 3.
NOTE Be sure to check service brake linings at rear of machine (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).		
	3. Check service brake linings for wear or damage in accordance with PMCS annual check (WP 0010 00).	a. Replace service brake linings (WP 0084 00). b. If problem still exists, go to test step 4.
	4. Check brake control valve for damage.	Replace brake control valve (WP 0090 00).
NOTE Be sure to check brake calipers at rear of machine (TM 5-3800-205-23-2 or TM 3800-205-23-3).		
	5. Check brake caliper(s) for damage.	a. Replace brake caliper(s) (WP 0087 00). b. If problem still exists, go to test step 6.
	6. Check double check valves for damage.	Replace double check valves (WP 0092 00).

Table 2. Charging System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Alternator Alert Indicator Comes on.		
NOTE A thirty (30) minute cool down time may be required before circuit breaker can be reset.		
	1. Check that circuit breaker is not tripped.	Reset circuit breaker. If problem still exists, go to test step 2.
	2. Check for loose or broken drive belt(s).	a. Tighten loose drive belt(s) (WP 0032 00). b. Replace broken drive belt(s) (WP 0032 00). c. If problem still exists, go to test step 3.
	3. Check for loose connections at alternator terminals.	a. Tighten any loose connections (WP 0034 00). b. If problem still exists, go to test step 4.
	4. Check alternator "R" terminal for continuity.	If no continuity is indicated, go to test step 5.
	5. Using a multimeter, perform *Alternator Circuit Breaker Voltage Test* (WP 0005 00).	Replace circuit breaker if voltage indication is more than 0.45 Vdc (WP 0038 00).

Table 3. Cooling System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Coolant Temperature Alert Indicator is On and Action Light Flashes, Indicating Engine is Overheating.	1. Check coolant temperature gage for an indication above 240° F (120° C).	If indication is above 240° F (120° C), let engine cool, then go to test step 2.
	2. Check coolant level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).	a. If low, add coolant (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 3.
	3. Check for loose or broken drive belt(s).	a. Tighten loose drive belt(s) (WP 0032 00).
		b. Replace broken drive belt(s) (WP 0032 00).
		c. If problem still exists, go to test step 4.
	4. Check cooling system for leaks.	a. Repair any coolant system leaks.
		b. If problem still exists, go to test step 5.
	5. Check engine oil level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).	a. If engine oil is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 6.
	6. Check transmission oil level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).	a. If transmission oil level is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 7.
	7. Check engine temperature switch for continuity.	If no continuity is observed, replace engine temperature switch (WP 0063 00).

Table 4. Differential Lock Control Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Differential Lock Control Will Not Engage When Pedal is Pressed.	1. Check air pressure gage for an indication of 125 psi (862 kPa).	If air pressure gage indication is okay, go to test step 2.
	2. Perform *Air Leakage Checks* (WP 0005 00).	Repair any leaks found during *Air Leakage Checks*. If problem still exists, go to test step 3.
	3. Check adjustment of air compressor governor (WP 0005 00).	If problem still exists after adjustment of governor, go to test step 4.
	4. Perform *Differential Lock Check* (WP 0005 00).	If check indicates a discrepancy, go to test step 5.
	5. Check differential lock control valve adjustment.	a. Adjust differential lock control valve (WP 0080 00).
		b. If problem still exists, go to test step 6.
	6. Check differential lock control valve for damage.	a. Replace differential lock control valve if worn or damaged (WP 0081 00).
		b. If problem still exists, notify DS Maintenance.
2. Differential Lock Control Will Not Disengage When Pedal is Released.	1. Turn machine slightly, while decreasing engine RPM as an aid in unlocking differential lock control.	If problem still exists, go to test step 2.
	2. Perform *Differential Lock Check* (WP 0005 00).	If check indicates a discrepancy, go to test step 3.
	3. Check differential lock control valve adjustment.	a. Adjust differential lock control valve (WP 0081 00).
		b. If problem still exists, go to test step 4.
	4. Check differential lock control valve for wear or damage.	a. Replace differential lock control valve if worn or damaged (WP 0081 00).
		b. If problem still exists, notify DS Maintenance.

Table 5. Electrical System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
NOTE Backup alarm will not operate if machine is in blackout drive mode.		
1. Backup Alarm Will Not Sound When Machine is Placed in Reverse.	1. Check if STOP LIGHT or SER. DRIVE function has been selected on lighting key pad.	Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.
	2. Check for blown fuse.	a. If fuse is blown, replace fuse (WP 0040 00).
		b. If problem still exists, go to test step 3.
	3. Check continuity and adjustment of backup alarm limit switch.	a. If no continuity is found, replace backup alarm limit switch (WP 0036 00).
		b. Adjust backup alarm limit switch if required (WP 0036 00).
		c. If problem still exists, replace backup alarm limit switch (WP 0036 00).
		d. If problem still exists, go to test step 4.
	4. Check transmission shift control adjustment (WP 0070 00).	a. Adjust transmission shift control (WP 0069 00).
		b. If problem still exists, go to test step 5.
	5. Check alarm, wiring harness, and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair or replace damaged wires or connectors (WP 0033 00).
		b. Replace damaged backup alarm (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
2. Blackout Drive Light(s) Do Not Operate When B.O. DRIVE Function is Selected.		
NOTE A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. Blackout Drive Light(s) Do Not Operate When B.O. DRIVE Function is Selected - Continued.	1. Check that circuit breaker is not tripped.	a. If circuit breaker does not reset after thirty (30) minutes, replace circuit breaker (WP 0038 00). b. If problem still exists, go to test step 2.
	2. Check blackout lights for damage or burned out bulbs.	a. Replace burned out bulbs (WP 0052 00, TM 5-3800-205-23-2 or TM 5-3800-205-23-3). b. Replace damaged blackout light (WP 0052 00, TM 5-3800-205-23-2 or TM 5-3800-205-23-3). If problem still exists, go to test step 3.
	3. Check blackout light(s) wiring harnesses and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair or replace damaged wires or connectors (WP 0033 00). b. If problem still exists, go to test step 4.
	4. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
3. Blackout Drive Marker Light(s) Do Not Operate When B.O. MARKER Function is Selected.		
NOTE A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
	1. Check that circuit breaker is not tripped.	a. If circuit breaker does not reset after thirty (30) minutes, replace circuit breaker (WP 0038 00). b. If problem still exists, go to test step 2.
	2. Check blackout drive marker lights for damage.	a. Replace damaged lights (WP 0050 00). b. If problem still exists, go to test step 3.

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. Blackout Drive Light(s) Do Not Operate When B.O. MARKER Function is Selected - Continued.	3. Check wiring harness and connectors for damage, continuity and proper voltage of 24 +/- 6 Vdc.	a. Repair or replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 4.
	4. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
NOTE Lamps will not operate if machine is in blackout mode.		
4. Cutting Edge/Bowl Work Light Inoperative.	1. Check if STOP LIGHT or SER. DRIVE function has been selected on lighting key pad.	a. Select STOP LIGHT or SER. DRIVE.
		b. If problem still exists, go to test step 2.
	2. Check for blown fuse and/or tripped B.O. drive light circuit breaker.	a. Replace fuse (WP 0040 00) if required.
		b. If circuit breaker does not reset after thirty (30) minutes, replace circuit breaker (WP 0038 00).
		c. If problem still exists, go to test step 3.
	3. Check work lights for damage or burned out lamps.	a. Replace burned out/damaged lamps (WP 0057 00 or TM 5-3800-205-23-2).
		b. If problem still exists, go to test step 4.
	4. Check wiring harness and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair or replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 5.
	5. Check flood enable relay for damage or shorts.	Replace flood enable relay (WP 0048 00).

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	NOTE Turn signals or hazard lights will not operate if machine is in blackout mode.	
5. Directional Turn Signal or Hazard Flasher Control are Not Working.	1. Check if STOP LIGHT or SER. DRIVE function has been selected on lighting key pad.	a. Select STOP LIGHT or SER. DRIVE.
		b. If problem still exists, go to test step 2.
	NOTE A thirty (30) minute cool down time may be required before circuit breaker can be reset.	
	2. Check that circuit breaker is not tripped.	a. If circuit breaker will not reset after thirty (30) minutes, replace circuit breaker (WP 0038 00).
		b. If problem still exists, go to test step 3.
	3. Check that B.O. drive light circuit breaker is not tripped.	a. If circuit breaker does not reset after thirty (30) minutes, replace circuit breaker (WP 0038 00).
		b. If problem still exists, go to test step 4.
	4. Check turn signal/hazard flasher lights for damaged or burned out bulbs.	a. Replace damaged/burned out bulbs (WP 0051 00).
		b. If problem still exists, go to test step 5.
	5. Check wiring harness and connectors for damage, continuity and proper voltage of 24 Vdc.	Repair/replace damaged wires or connectors (WP 0033 00).
	6. Check flasher unit for damage or shorts.	Replace damaged/shorted flasher unit (WP 0041 00).
	7. Check turn/flash relay for shorts or damage.	Replace shorted/damaged relay (WP 0048 00).
	8. Check turn signal/hazard flasher switch and wiring for damage or continuity.	Replace switch (WP 0051 00).

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. EMS Action Alarm Does Not Sound After Engine Startup.		
NOTE It is normal for action alarm and action light to come on and stay on until an air pressure of approximately 65 psi (448 kPa) is reached. If alarm does not come on, shut engine down.		
	1. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required. b. If problem still exists, go to test step 2.
	2. Check action alarm electrical connector.	a. Reconnect if required. b. If problem still exists, go to test step 3.
	3. Check wiring harness and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00). b. Replace EMS action alarm (WP 0055 00).
7. EMS Alert Indicators and Action Light Do Not Come On When Panel Test Switch is Placed to ON.	1. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required. b. If problem still exists, go to test step 2.
	2. Check rocker switch for continuity.	If no continuity is indicated, replace rocker switch (WP 0049 00).

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
8. Horn Will Not Sound When Button is Pressed.	1. Check horn wiring harness for continuity and proper voltage of 24 Vdc.	If horn wiring harness checks okay, go to test step 2.
	2. Check horn solenoid and horn switch for continuity.	a. If no continuity is indicated, for solenoid, replace horn solenoid (WP 0113 00).
		b. If no continuity is indicated, for switch, replace horn switch (WP 0114 00).
9. Headlight(s)/Parking Light(s) Do Not Operate When SER. DRIVE or PARK Functions are Selected.	1. Check lights for damage or burned out lamps/bulbs.	a. Replace burned out lamps/ bulbs. (WP 0050 00, WP 0054 00).
		b. Replace any damaged light assemblies (WP 0050 00, WP 0054 00).
		c. If problem still exists, go to test step 2.
	2. Check wiring harness(es) and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 3.
	3. Check if light switch ground cable is loose.	Tighten ground cable if required. If problem still exists, go to test step 4.
	4. Check LO/HI beam relay for damage or shorts.	a. Replace LO/HI beam relay (WP 0048 00).
		b. If problem still exists, go to test step 5.
	5. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
10. High Beams Do Not Come On.	1. Check that no mud or dirt is packed around dimmer switch on floor of cab.	a. Clean any mud or dirt from around switch.
		b. If problem still exists, go to test step 2.

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
10. High Beams Do Not Come On - Continued.	2. Check lights for damage or burned out lamps/bulbs.	a. Replace any damaged lights.
		b. Replace any burned out lamps/bulbs.
		c. If problem still exists, go to test step 3.
	3. Check dimmer switch for continuity.	a. If no continuity exists, replace dimmer switch (WP 0053 00).
		b. If problem still exists, go to test step 4.
	4. Check LO/HI beam relay for damage or shorts.	a. Replace LO/HI beam relay (WP 0048 00).
		b. If problem still exists, go to test step 5.
	5. Check wiring harness, connectors and light switch for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 6.
	6. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
11. Stoplights Do Not Operate When Brake Pedal is Pressed.	1. Check stoplights for damage or burned out bulbs.	a. Replace burned out bulbs. (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
		b. Replace stoplight assembly (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
		c. If problem still exists, go to test step 2.
	2. Check stop lamp pressure switch for damage or shorts.	a. Replace stop lamp pressure switch (WP 0058 00).
		b. If problem still exists, go to test step 3.

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
11. Stoplights Do Not Operate When Brake Pedal is Pressed - Continued.	3. Check wiring harness, connectors and light switch for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 4.
	4. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
12. Taillights Do Not Come On.	1. Check taillights for damage or burned out bulbs.	a. Replace burned out bulbs (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
		b. Replace taillight assembly (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
		c. If problem still exists, go to test step 2.
	2. Check wiring harness, connectors and light switch for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 3.
	3. Check light switch for damage and continuity.	Replace light switch (WP 0044 00).
13. Water Distributor Control Panel Light Does Not Come On When Key Start Switch is ON.	1. Check for burned out bulb.	a. If bulb is burned out, replace burned out bulb (TM 5-3800-205-23-3).
		b. If bulb is okay, go to test step 2.
	2. Check for blown fuse.	a. Replace fuse if required (WP 0040 00).
		b. If fuse is okay, replace control panel (TM 5-3800-205-23-3).

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
14. Water Distributor Control Panel Water Level Green/Red Panel Indicator Lights Do Not Come On.	1. Check for burned out bulb(s).	a. If bulb(s) is burned out, replace bulb(s) (TM 5-3800-205-23-3).
		b. If bulb(s) is okay, go to test step 2.
	2. Check connector of control panel electrical harness at receptacle connector on side of cab (TM 5-3800-205-10-2).	a. Reconnect connector if required.
		b. If problem still exists, go to test step 3.
	3. Check electrical connection at tank water level sender for tightness and continuity (TM 5-3800-205-23-3).	a. Reconnect connector if required. If continuity is okay and problem still exists, go to step b.
		b. Replace water level sender (TM 5-3800-205-23-3).
15. Water Distributor Work Lights Inoperative.	1. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required.
		b. If problem still exists, go to test step 2.
	2. Check work lights for damage or burned out lamps.	a. Replace burned out/damaged lamps (TM 5-3800-205-23-3).
		b. If problem still exists, go to test step 3.
	3. Check wiring harness and connectors for damage, continuity and proper voltage of 24 Vdc.	a. Repair or replace damaged wires or connectors (WP 0033 00).
		b. If problem still exists, go to test step 4.
	4. Check flood enable relay for damage or shorts.	Replace flood enable relay (WP 0048 00).

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
16. Water Distributor Control Panel Has No Power, With Key Start Switch ON.	1. Check control panel connection of electrical harness at receptacle connector on side of cab (TM 5-3800-205-10-2).	a. Reconnect connector if required.
		b. If problem still exists, replace control panel (TM 5-3800-205-23-3).
	2. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required.
		b. If problem still exists, go to test step 3.
	3. Check harness for damage and continuity.	a. Repair damaged harness (WP 0033 00).
		b. If no continuity is observed, replace control panel (TM 5-3800-205-23-3).
17. Windshield Washer Not Working.	1. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required.
		b. If problem still exists, go to test step 2.
	2. Check windshield washer switch for continuity.	a. If no continuity is indicated, replace switch (WP 0049 00).
		b. If problem still exists, go to test step 3.
	3. Check wiring harness, connectors and windshield washer pump for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00). If problem still exists, go to step b.
		b. Replace windshield washer pump (WP 0109 00).
18. Windshield Wiper Not Working.	1. Check for blown fuse.	a. Replace fuse (WP 0040 00) if required.
		b. If problem still exists, go to test step 2.

Table 5. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
18. Windshield Wiper Not Working - Continued.	2. Check windshield wiper switch for damage and continuity.	a. Replace (WP 0049 00).
		b. If problem still exists, go to test step 3.
	3. Check wiring harness, connectors and windshield wiper motor for damage, continuity and proper voltage of 24 Vdc.	a. Repair/replace damaged wires or connectors (WP 0033 00).
		b. Replace windshield wiper motor (WP 0110 00).

Table 6. Engine Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Engine Cranks But Fails to Start (Operating Temperature Above 32°F (0°C).	1. Check that engine is primed by placing fuel pump switch to ON.	If problem still exists after engine priming, go to test step 2.
	2. Check that fuel shutoff valves are fully OPEN.	a. Open fuel shutoff valves (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 3.
	3. Using a multimeter, perform *Starter Ground Circuit Voltage Test*, *Starter Relay Voltage Test*, and *Starter Solenoid Voltage Test* (WP 0005 00).	a. Follow corrective actions as described in test procedures.
		b. If problem still exists, go to test step 4.
	4. Using a multimeter, check fuel shutoff solenoid GND and STOP terminals for an indication of 10.30 ohms, and GND and START for 1.55 ohms.	If indications are not as specified, replace fuel shutoff solenoid (WP 0017 00).
2. Engine Cranks But Fails to Start (Operating Temperature Below 32°F (0°C).	1. Check that fuel shutoff valves are fully OPEN.	a. Open fuel shutoff valves (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 2.
CAUTION DO NOT crank starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or premature starter failure.		
	2. While cranking engine, press top of ether start aid switch. Wait approximately two (2) seconds between injections.	a. If problem still exists, replace ether canister (WP 0022 00), then try to start engine.
		b. If problem still exists, go to test step 3.

Table 6. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. Engine Cranks But Fails to Start (Operating Temperature Below 32°F (0°C) - Continued.	3. Using a multimeter, perform *Starter Ground Circuit Voltage Test, Starter Relay Voltage Test, Starter Solenoid Voltage Test,* and *Start Aid Temperature Switch Solenoid Voltage Test* (WP 0005 00).	a. Follow corrective actions as described in test procedures.
		b. If problem still exists, go to test step 4.
	4. Using a multimeter, check fuel shutoff solenoid GND and STOP terminals for an indication of 10.30 ohms, and GND and START for 1.55 ohms.	If indications are not as specified, replace fuel shutoff solenoid (WP 0017 00).
3. Engine Does Not Develop Full Power.	1. Check for restricted or sticking accelerator pedal.	a. Remove restrictions from accelerator pedal on cab floor.
		b. If problem still exists, go to test step 3.
	2. Check for clogged fuel/water separator.	Replace fuel/water separator (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
4. Engine Does Not Idle Properly.	1. Check indication of air filter service indicator.	a. If indicator is red, clean air filter and retest.
		b. If problem still exists replace air filter.
		c. If problem still exists, go to test step 2.
	2. Check for clogged fuel/water separator.	Replace fuel/water separator (TM 5-3800-205-23-2 or TM 5-3800-205-23-3).
5. Engine Fails to Crank When Key Start Switch is Turned to START.	1. Check position of battery disconnect switch.	a. Place battery disconnect switch to ON.
		b. If problem still exists. go to test step 2.
	2. Check position of transmission shift lever.	a. Place transmission shift lever in N (Neutral).

Table 6. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
5. Engine Fails to Crank When Key Start Switch is Turned to START - Continued.		b. If problem still exists, go to test step 3.
NOTE A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
	3. Check that key start switch circuit breaker is not tripped.	a. If circuit breaker doesn't reset within thirty (30) minutes, replace circuit breaker (WP 0038 00). b. If problem still exists, go to test step 4.
	4. Check for dirty, loose, or damaged battery cables.	a. Clean dirty cables (WP 0010 00). b. Tighten loose connections. c. Replace cables if damaged (WP 0067 00). d. If problem still exists, go to test step 5.
	5. Using a multimeter, perform *Batteries Voltage Test, Alternator Circuit Breaker Voltage Test, Key Start Switch Circuit Breaker Voltage Test, Key Start Switch Voltage Test,* and *Main Relay Voltage Test* (WP 0005 00).	Follow corrective actions as described in test procedures.
6. Engine Starts But Dies.	1. Check for loose electrical connections at fuel shutoff solenoid.	If connections are okay, go to test step 2.
NOTE Push in button on solenoid to manually shut off engine. Solenoid cannot be manually latched in run position for starting.		
	2. Check position of button on fuel shutoff solenoid.	If button is out and problem still exists, replace fuel shutoff solenoid (WP 0017 00).

Table 6. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
7. Engine Starts But Misfires or Runs Rough After Proper Warmup Period.	1. Check fuel/water separator for moisture.	a. Open fuel/water separator drain valve and drain water from separator (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 2.
	2. Check for water in fuel.	a. Drain secondary fuel filters.
		b. If problem still exists, go to test step 3.
	3. Check for air in fuel system and restricted fuel lines or hoses.	Tighten, repair or replace fuel system lines and hoses (WP 0016 00).
8. Excessive Engine Oil Consumption.	1. Check for loose oil lines/ hoses and oil leaks.	a. Tighten any loose oil lines/ hoses.
		b. Repair any oil leaks.
		c. If problem still exists, notify DS Maintenance.
	2. Check exhaust for blue smoke.	If smoke is blue, go to test step 3.
	3. Remove air inlet hose from turbocharger and check for evidence of oil.	If oil if found, notify DS Maintenance.
9. Excessive Exhaust Smoke (At Normal Engine Operating Speed).	1. Check for water in fuel.	a. Drain secondary fuel filters.
		b. If problem still exists, notify DS Maintenance.
	2. Check fuel tank for evidence of water.	If water is found in fuel tank, notify DS Maintenance.

Table 6. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
10. Excessive Exhaust Smoke (White) During Startup.	1. Check and monitor engine operating temperature.	a. Allow engine to warm up to operating temperature. b. If problem still exists, go to test step 2.
	2. Check operation of thermostat.	a. If thermostat is inoperative, replace thermostat (WP 0028 00). b. If problem still exists, go to test step 3.
	3. Check operation of air inlet heater.	If air inlet heater is malfunctioning, notify DS Maintenance.
11. Low or No Engine Oil Pressure - Alert Indicator, Action Light and Action Alarm are On.		
WARNING When action alarm sounds, immediate shutdown of the machine is required to prevent injury to the operator and/or severe damage to the machine.		
	1. Check engine oil level.	a. If engine oil is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). b. If problem still exists, go to test step 2.
	2. Check for external engine oil leaks.	a. Tighten any leaking oil lines or fittings. b. If problem still exists, go to test step 3.
	3. Check oil pressure switch harness for damage and continuity.	a. If harness is damaged, replace harness. b. If no continuity is observed, replace oil pressure switch (WP 0064 00). c. If problem still exists, go to test step 4.
	4. Using a multimeter, check oil pressure switch resistance.	If no resistance is observed, replace oil pressure switch (WP 0064 00).

Table 7. Scraper System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Bowl Control Lever Binds.	1. Check for bent or damaged lever.	a. If lever is bent or damaged, replace lever (WP 0114 00). b. If lever is okay, go to test step 2.
WARNING Park machine on level ground, stop engine, and lower bowl/water tank to prevent injury to operator and/or severe damage to machine.		
	2. Check bowl/ejector main control valve, inboard of right fender for buildup of debris.	a. Clean debris from control valve linkage. b. If problem still exists, go to test step 3.
	3. Perform *Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00). b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
2. Bowl Drifts After Control Lever is Released or Centered.	1. Check drift of bowl hydraulic cylinders: a. Lift bowl 6-10 in. (15-25 cm). b. Move control lever to hold position. c. After three (3) minutes, make a mark on side of bowl at bottom of draft arm. Mark should also be 6 in. (15 cm) from front of bowl side. d. After five (5) minutes, make a measurement for drift. e. Drift on a new machine should not be more than 0.31 in. (7.9 mm).	If drift exceeds 0.31 in. (7.9 mm), go to test step 2.

Table 7. Scraper System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. Bowl Drifts After Control Lever is Released or Centered- Continued.	2. Check bowl hydraulic cylinder(s) for external leakage.	a. Repair any leaks if required.
		b. If cylinder(s) are damaged, replace cylinder(s) (TM 5-3800-05-23-2).
3. Ejector Control Lever Binds.	1. Check for bent or damaged lever.	a. If lever is bent or damaged, replace lever (WP 0114 00).
		b. If lever is okay, go to test step 2.
WARNING Park machine on level ground, stop engine, and lower bowl/water tank to prevent injury to operator and/or severe damage to machine.		
	2. Check bowl/ejector main control valve, inboard of right fender for buildup of debris.	a. Clean debris from control valve linkage.
		b. If problem still exists, go to test step b.
	3. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
4. Elevator Control Lever Binds.	1. Check for bent or damaged lever.	a. If lever is bent or damaged, replace lever (WP 0114 00).
		b. If lever is okay, go to test step 2.
WARNING Park machine on level ground, stop engine, and lower bowl/water tank to prevent injury to operator and/or severe damage to machine.		
	2. Check elevator main control valve, inboard of left fender, for buildup of debris.	a. Clean debris from control valve linkage.
		b. If problem still exists, go to test step 3.

Table 7. Scraper System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. Elevator Control Lever Binds - Continued.	3. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
5. Elevator Operating Speeds are Too Slow.	1. Check elevator chain for looseness.	a. Adjust elevator chain (TM 5-3800-205-23-2).
		b. If problem still exists, go to test step 2.
	2. Perform *Elevator Operating Speeds Check* (WP 0005 00).	Go to test step 3.
	3. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, go to test step 4.
	4. Check hydraulic motor mounting surface or drain plug "WEEP" hole for hydraulic oil leakage.	If any leakage is found, notify DS Maintenance to replace hydraulic motor.
NOTE If floor is not closing properly, it may cause premature floor opening		
6. Floor Opens During Operation.	Check floor area for any buildup of debris that would stop floor from closing.	a. Clean any debris from floor area.
		b. If problem still exists, notify DS Maintenance to replace floor check valve.
7. Oil Temperature is Too Hot.		
NOTE Before checking oil level, ensure machine is parked on level ground with parking brake applied, transmission in N (Neutral), oil warm, engine at low idle, ejector moved fully forward, and scraper bowl lowered with slight downward pressure applied.		
	1. Check that all control lavers are returning to hold position.	Return control levers to hold position.

Table 7. Scraper System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
7. Oil Temperature is Too Hot - Continued	2. Check hydraulic oil level.	a. If oil level is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
		b. If problem still exists, go to test step 3.
	3. Check hydraulic oil viscosity in accordance with PMCS (WP 0009 00).	a. If viscosity of hydraulic oil is not to specification, replace oil with specified type oil (WP 0009 00 and WP 0010 00).
		b. If problem still exists, go to test step 4.
	4. Check that load on system is not too high.	a. Reduce load.
		b. If problem still exists, go to test step 5.
	5. Check for hydraulic oil leakage at piston seals on steering cylinder(s).	a. If any leakage is found, notify DS Maintenance to replace steering cylinder(s).
		b. If problem still exists, go to test step 6.
	6. Perform *Steering System Test* (WP 0005 00).	a. If low pressure output is indicated, notify DS Maintenance to replace steering control valve.
		b. If problem still exists, go to test step 7.
	7. Check for air in system.	If air is found, notify DS Maintenance to replace steering vane pump.
8. Travel Time of Bowl Cylinders is Slow.		
NOTE To verify travel time of bowl cylinders, lower bowl to ground. Run engine at high idle RPM. Use a stopwatch to verify time required to fully lift bowl. Time required to lift bowl from ground is approximately 4 seconds.		
	1. Check bowl hydraulic cylinders for any buildup of debris.	a. Clean any debris from cylinder(s).

Table 7. Scraper System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
8. Travel Time of Bowl Cylinders is Slow - Continued.		b. If problem still exists, go to test step 2
	2. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, go to test step 3.
	3. Check bowl hydraulic cylinder piston seals for leakage.	If cylinder piston seals are leaking, replace cylinder (TM 5-3800-205-23-2).
9. Travel Time of Ejector (Floor) is Slow.		
NOTE To verify travel time of ejector (floor), lift bowl approximately 6 in. (152 mm). Make sure that floor is closed. Run engine at high idle RPM. Move ejector control handle to EJECT position. Use a stop-watch to verify time required to fully open floor. When bowl is empty, time required to fully open floor is approximately 6.3 seconds.		
	1. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, notify DS Maintenance to replace floor check valve (TM 5-3800-205-23-2).
		c. If problem still exists, go to test step 2.
	2. Check floor and ejector hydraulic cylinder piston seals for leakage.	If cylinder piston seals are leaking, notify DS Maintenance to replace cylinder (TM 5-3800-205-23-2).

Table 8. Steering System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
WARNING Hitch and steering movement can reduce clearances suddenly and cause personal injury. Stop engine before servicing.		
1. Machine Slowly Drifts (Either Direction) and/or Wanders or Pulls to One Side On Level Pavement, Even When Steering Wheel is in Straight Position.	1. Check that tires are proper size and type.	a. Replace tires with proper size or type (WP 0096 00, TM 5-3800-205-23-2, or TM 5-3800-205-23-3). b. If problem still exists, go to test step 2.
	2. Check steering linkage for damage or binding.	a. Notify DS Maintenance to repair any damaged linkage. b. If problem still exists, go to test step 3.
	3. Check centering position and freedom of movement of main control spool in steering control valve.	If main spool will not center or shows signs of restricted movement, notify DS Maintenance.
2. Machine Turns Correctly During Normal Driving Conditions, But Turns Slowly With a Load.	1. Possibility of oil leakage past seat of relief valve in steering control valve.	a. Notify DS Maintenance. b. If problem still exists, go to test step 2.
	2. Possibility of oil leakage past seals and ball check valve in steering control valve.	Notify DS Maintenance.
3. Machine Turns Slowly in Both Directions.		
NOTE Before checking oil level, ensure machine is parked on level ground with parking brake applied, transmission in N (Neutral), oil warm, engine at low idle, ejector moved fully forward, and scraper bowl/water distributor tank lowered with slight downward pressure applied.		
	1. Check hydraulic oil level.	If oil level is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
	2. Check for hydraulic oil leakage at piston seals on steering cylinder(s).	a. Notify DS Maintenance to replace steering cylinder(s).

Table 8. Steering System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. Machine Turns Slowly in Both Directions - Continued.		b. If problem still exists, go to test step 3.
	3. Check that main control spool in steering control valve is centered and that there is no damage to spool.	a. If spool does not center correctly or if any damage is found, notify DS Maintenance to replace steering control valve.
		b. If problem still exists, go to test step 4.
	4. Perform *Steering System Pressure Test* (WP 0005 00).	a. If low output pressure is indicated, notify DS Maintenance to replace steering control valve.
		b. If problem still exists, go to test step 5.
	5. Check for leakage at steering control valve.	a. If any leakage is found, notify DS Maintenance to replace steering control valve.
		b. If problem still exists, go to test step 6.
	6. Check valve seat in ball check valve for damage.	a. If any damage to valve seat is found, notify DS Maintenance to replace steering control valve.
		b. If problem still exists, notify DS Maintenance to replace steering vane pump.

Table 8. Steering System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. Machine Turns Slowly in One Direction.	1. Check for hydraulic oil leakage at piston seals on steering cylinder(s).	a. If any leakage is found, notify DS Maintenance to replace steering cylinder(s). b. If problem still exists, go to test step 2.
	2. Check that main control spool in steering control valve is centered and spool achieves full travel.	a. If spool does not center correctly or if less than full travel of spool was found, notify DS Maintenance to replace steering control valve. b. If problem still exists, go to test step 3.
	3. Check for leakage at steering control valve.	a. If any leakage is found, notify DS Maintenance to replace steering control valve. b. If problem still exists, go to test step 4.
	4. Check for oil leakage past ball of steering control valve ball check valve.	If any leakage is found, notify DS Maintenance to replace steering control valve.
5. Steering is Erratic.	1. Check tires for proper pressure.	a. Inflate tires to proper pressure (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). b. If problem still exists, go to test step 2.
	2. Check for freedom of movement of main control spool in steering control valve.	a. If main spool shows signs of restricted movement, notify DS Maintenance to replace steering control valve. b. If problem still exists, go to test step 3.
	3. Check for air in steering system.	a. If air is found, notify DS Maintenance to replace steering vane pump. b. If problem still exists, go to test step 4.
	4. Perform *Steering System Pressure Test* (WP 0005 00).	a. If low output pressure is indicated, notify DS Maintenance to replace steering control valve.

Table 8. Steering System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. Turning Steering Wheel is Difficult.	1. Check for steering column linkage misalinement that would cause binding.	Align steering column linkage (WP 0097 00). If problem still exists, go to test step 2.
	2. Check steering control linkage for restricted movement.	a. Remove any restrictions from steering control linkage (WP 0097 00). b. If problem still exists, go to test step 3.
	3. Check for freedom of movement of main control spool in steering control valve.	If main spool shows signs of restricted movement, notify DS Maintenance to replace steering control valve.

Table 9. Suspension Seat Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Seat Air Compressor Will Not Come On.	1. Check for blown fuse.	a. If fuse is blown, replace fuse (WP 0040 00).
		b. If problem still exists, go to test step 2.
	2. Check wiring harness for damage and continuity.	a. Repair any damage to harness if required.
		b. If no continuity is observed, replace harness.
		c. If harness was okay, replace air compressor (WP 0104 00).
2. Seat Moves to Left or Right.	Check for excessive play between upper side plate and rail section.	a. Loosen mounting bolts for front and rear stop.
		b. Pry against front stop to remove excessive play, then tighten front stop bolt.
		c. Repeat step b for rear stop.
3. Seat Will Not Raise or Lower When Making a Height Adjustment.	Check height control valve ports for debris.	a. Clean height control valve ports of any debris. If problem still exists, go to step b.
		b. Replace height control valve (WP 0104 00).
4. Suspension Ride is Too Hard or Too Soft.	Check that correct damping is selected.	a. Move suspension damping lever to rear for more damping, or forward for less damping.
		b. If selecting a different suspension damping does not change damping, replace shock absorber (WP 0104 00).

Table 10. Transmission Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
NOTE Prior to removing major assembly, contact Specialized Repair Activity (SRA) for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).		
1. Machine Moves When Shift Lever is in NEUTRAL.	1. Check control linkage proper adjustment (WP 0070 00).	a. Adjust control linkage (WP 0070 00). b. If problem still exists, notify DS Maintenance.
2. Slow or Erratic Transmission Engagement.		
	1. Check control linkage for proper adjustment or damage.	a. Repair any damage to control linkage (WP 0069 00). If problem still exists, go to step b. b. Adjust control linkage (WP 0070 00). If problem still exists, go to test step 2.
	2. Check for loose lines/hoses on inlet side of transmission oil pump.	a. Tighten any loose lines/hoses. b. If problem still exists, notify DS Maintenance.
NOTE Prior to removing major assembly, contact Specialized Repair Activity (SRA) for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).		
3. Torque Converter Oil Temperature Alert Indicator and Action Light Come On (Indicates Overheating During Normal Operation).	1. Observe torque converter oil temperature gage for indication above 270° F (132° C).	If temperature exceeds 270° F (132° C), go to test step 2.
	2. Ensure proper transmission range is selected for machine operation.	Select proper transmission range. If proper range was used, go to test step 3.

Table 10. Transmission Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. Torque Converter Oil Temperature Alert Indicator and Action Light Come On (Indicates Overheating During Normal Operation) - Continued.		
NOTE Before checking oil level, ensure machine is parked on level ground with parking brake applied, transmission in N (Neutral), oil warm, engine at low idle, ejector moved fully forward, and scraper bowl/water distributor tank lowered with slight downward pressure applied.		
	3. Check transmission oil level.	a. If transmission oil is low, fill to correct level (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). b. If problem still exists, notify DS Maintenance.
4. Transmission Shifting is Rough.	1. Check control linkage for proper adjustment.	a. Adjust control linkage (WP 0070 00). b. If problem still exists, go to test step 2.
NOTE Prior to removing major assembly, contact SRA for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).		
	2. Check primary pressure setting of modulation relief valve.	a. Reset modulation relief valve primary setting. If problem still exists, go to step b. b. Replace modulation relief valve. c. If problem still exists, go to test step 3.
	3. Check for movement of pressure control valve load piston.	a. If no movement of load piston is observed, replace pressure control valve. b. If problem still exists, go to test step 4.

Table 10. Transmission Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. Transmission Shifting is Rough - Continued.	4. Check operation of pressure differential valve.	a. If pressure differential valve is inoperative, replace valve. b. If problem still exists, go to test step 5.
	5. Check pressure control valve springs for damage or weakness.	If springs are damaged or weak, replace pressure control valve.
5. Transmission Does Not Operate in any Speed.	1. Check oil pump and oil pump drive for damage or wear that would cause low oil pressure.	a. If any damage or wear was found, notify DS Maintenance to replace oil pump and oil pump drive (WP 0149 00) b. If problem still exists, go to test step 2.
	2. Check inlet side of oil pump for air leaks.	a. Notify DS Maintenance to repair any air leaks to inlet side of oil pump. b. If problem still exists, go to test step 3.
NOTE Prior to removing major assembly, contact SRA for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).		
	3. Check primary pressure setting of modulation relief valve.	a. Reset modulation relief valve primary setting. If problem still exists, go to test step b. b. Replace modulation relief valve. c. If problem still exists, go to test step 4.
	4. Check operation of pressure control valve.	a. If pressure control valve is inoperative, replace pressure control valve. b. If problem still exists, go to test step 5.

Table 10. Transmission Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
5. Transmission Does Not Operate in any Speed - Continued.	5. Check for mechanical failure in transmission.	a. Repair any mechanical failures found in transmission.
		b. If problem still exists, go to test step 6.
	6. Check for mechanical failure in transfer gears.	a. If mechanical failures were found, replace transfer gears.
		b. If problem still exists, go to test step 7.
	NOTE Prior to removing major assembly, contact SRA for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).	
	7. Check for mechanical failures in differential.	a. If mechanical failures were found, notify DS Maintenance to replace differential.
		b. If problem still exists, go to test step 8.
	8. Check for mechanical failures in torque converter.	a. If mechanical failures were found, notify DS Maintenance to replace torque converter.
		b. If problem still exists, go to test step 9.
	9. Check for excessive leakage inside transmission.	a. Repair any leaks in transmission. If problem still exists, go to test step b.
		b. Notify DS Maintenance to replace transmission.
6. Transmission Does Not Shift From One Direction to Another.	Check control linkage for proper adjustment (WP 0070 00).	Adjust control linkage (WP 0070 00).
7. Transmission Does Not Shift From One Speed to Another.	Check control linkage for proper adjustment (WP 0070 00).	Adjust control linkage (WP 0070 00).

Table 10. Transmission Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
NOTE Prior to removing major assembly, contact SRA for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).		
8. Transmission Engages, But Machine Does Not Move. Engine Stops Running.	1. Check for mechanical failure in output transfer gears.	a. If mechanical failures were found, notify DS Maintenance to replace output transfer gears. b. If problem still exists, go to test step 2.
	2. Check for mechanical failure in differential.	a. If mechanical failures were found, notify DS Maintenance to replace differential. b. If problem still exists, go to test step 3.
	3. Check for mechanical failure in a final drive.	a. If mechanical failures were found, replace final drive (WP 0077 00). b. If problem still exists, go to test step 4.
	4. Check for mechanical failure to clutches and gears in transmission.	If any mechanical failures were found, notify DS Maintenance to replace transmission.

Table 11. Water Distributor Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Lower Spray Bar Will Not Discharge.		
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	Check that indicator on gravity spray valve is horizontal to manifold assembly.	If red indicator is in horizontal position and problem still exists, replace gravity spray valve (TM 5-3800-205-23-3).
2. Lower Spray Bar Will Not Gravity Discharge.		
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	1. Check that indicator on pressure gravity valve is horizontal to manifold assembly.	If red indicator is in horizontal position and problem still exists, go to test step 2.
	2. Check for loose air connections at pressure gravity valve.	If connections are okay and problem still exists, replace pressure gravity valve (TM 5-3800-205-23-3).
3. No Pressure Discharge From Lower Spray Bar.	1. Check that PUMP switch is ON and PRESSURE GRAVITY switch is OFF.	If switches are in proper position and problem still exists, go to test step 2.
	2. Check that pump control lever (elevator control lever) is in pump on, slow/fast position.	If control lever is in proper position and problem still exists, notify DS Maintenance to replace pump.
	3. Check for loose air connections at air valve.	a. If connections are okay and problem still exists, replace pressure gravity valve (TM 5-3800-205-23-3). b. If problem still exists, go to test step 4.
	4. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00). b. If problem still exists, after adjustment, notify DS Maintenance to replace main control valve.

Table 11. Water Distributor Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. No Pressure Discharge From Left Upper Spray Bar.	1. Check that PUMP switch is ON, and PRESSURE GRAVITY switch is OFF.	If switches are in proper position and problem still exists, go to test step 2.
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	2. Check that red indicator on right-side spray valve is vertical to spray bar.	If right-side spray valve is closed and problem still exists, go to test step 3.
	3. Check that indicator on left-side spray valve is horizontal to spray bar.	If red indicator is in horizontal position and problem still exists, go to test step 4.
	4. Check for loose air connections at left-side spray valve.	If connections are okay and problem still exists, replace left-side spray valve (TM 5-3800-205-23-3).
	5. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
5. No Pressure Discharge From Right Upper Spray Bar.	1. Check that PUMP switch is ON, and PRESSURE GRAVITY switch is OFF.	If switches are in proper position and problem still exists, go to test step 2.
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	2. Check that indicator on left-side spray valve is vertical to spray bar.	If indicator is vertical and problem still exists, go to test step 3.
	3. Check that indicator on right-side air valve is horizontal to spray bar.	If red indicator is in horizontal position and problem still exists, go to test step 4.
	4. Check for loose air connections at right-side spray valve.	a. If connections are okay, and problem still exists, replace right-side spray valve, (TM 5-3800-205-23-3)
	5. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).

Table 11. Water Distributor Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
5. No Pressure Discharge From Right Upper Spray Bar - Continued.		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
6. Pump Control Lever (Elevator Control Lever) Binds.	1. Check for bent or damaged lever.	a. If lever is bent or damaged, replace lever (WP 0114 00).
		b. If lever is okay, go to test step 2.
	2. Check elevator valve, inboard of left fender, for buildup of debris.	a. Clean debris from control valve linkage.
		b. If problem still exists, go to test step 3.
	3. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting.
		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
7. Pump Control Lever (Elevator Control Lever) Will Not Engage.	Check for bent or damaged linkage.	Replace bent or damaged linkage (WP 0114 00).
8. Pump Control Lever (Elevator Control Lever) Will Not Return to Hold Position.	Check for bent or damaged linkage.	Replace bent or damaged linkage (WP 0114 00).
9. Tank Cannot Be Filled Using Pressurized Water Source Through Suction Inlet.	1. Check that TANK FILL SPARGER switch is ON.	If switch is ON and problem still exists, notify DS Maintenance to replace pump.
	2. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00).
		b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
10.Tank Cannot Be Suction Loaded Using Onboard Pump.	1. Check that locking lever (elevator direction control lever) is in FORWARD position.	If control lever is in FORWARD position and problem still exists, replace vacuum generator (TM 5-3800-205-23-3).

Table 11. Water Distributor Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
10. Tank Cannot Be Suction Loaded Using Onboard Pump - Continued.	2. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00). b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
11.Water Pump Will Not Operate in High Speed.	1. Check that pump control lever (elevator control lever) is in high speed position.	If control lever is in high speed position and problem still exists, go to test step 2.
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	2. Check that red indicator on pump valve is horizontal to suction pipe.	If red indicator is in horizontal position and problem still exists, go to test step 3.
	3. Check for loose air connections at pump valve.	If connections are okay, and problem still exists, replace pump valve (TM 5-3800-205-23-3).
	4. Perform *Main Control Valve Test and Adjustment* (WP 0005 00).	a. Adjust relief valve setting (WP 0005 00). b. If problem still exists after adjustment, notify DS Maintenance to replace main control valve.
12.Water Pump Will Not Operate in Low Speed.	1. Check that pump control lever (elevator control lever) is in low speed position.	If control lever is in low speed position and problem still exists, go to test step 2.
NOTE Refer to component locator for butterfly valve assemblies (TM 5-3800-205-23-3) and get assistance to check valve indicator position.		
	2. Check that red indicator on pump valve is horizontal to suction pipe.	If red indicator is in horizontal position and problem still exists, go to test step 3.
	3. Check for loose air connections at pump valve.	If connections are okay and problem still exists, replace pump valve (TM 5-3800-205-23-3).

Table 11. Water Distributor Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
13. Water Tank Drifts Up and Down When Tank Control Lever is in Hold Position.	1. Check drift of tank hydraulic cylinders: a. Lift water tank 6-10 in. (15-25 cm). b. Move control lever to hold position. c. After three (3) minutes, make a mark on side of tank at bottom of draft arm. Mark should also be 6 in. (15 cm) from front of water tank side. d. After five (5) minutes, make a measurement for drift. e. Drift on a new machine should not be more than 0.31 in. (7.9 mm).	If drift exceeds 0.31 in. (7.9 mm), go to test step 2.
	2. Check hydraulic cylinder(s) for external leakage.	a. Repair any leaks if required. b. If cylinder(s) are damaged, replace cylinder(s) (TM 5-3800-205-23-3).

END OF WORK PACKAGE

CHAPTER 3
UNIT MAINTENANCE PROCEDURES

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SERVICE UPON RECEIPT 0008 00

GENERAL

1. When a new, used or reconditioned 613CS Scraper or 613CWD Water Distributor 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 that follow.

INSPECTION INSTRUCTIONS

1. Read and follow all precautions and instructions on DD Form 1397.
2. Remove all packing and shipping material, such as tape, tie downs, 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 that 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 5-3800-205-10-1 or TM 5-3800-205-10-2.

SERVICING INSTRUCTIONS

1. Service the machine in accordance with TM 5-3800-205-10-1 or TM 5-3800-205-10-2 and Unit Preventive Maintenance Checks and Service (PMCS) (WP 0009 00 and WP 0010 00). Schedule the next PMCS on DA Form 5986-E.
2. Refer to TM 5-3800-205-10-1 or TM 5-3800-205-10-2 and perform functional checks of all major machine systems.

END OF WORK PACKAGE

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UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION 0009 00

GENERAL

1. To ensure that the 613CS Scraper and 613CWD Water Distributor are ready for operation at all times, they must be lubricated and inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure or injury to personnel.
2. The *KEY* in this work package lists the types, amounts, and temperature ranges of the lubricants required for specified intervals.
3. Lubrication Charts at the end of this work package show all lubrication points for the scraper and water distributor.
4. Table 1 in WP 0010 00 contains systematic instructions on lubrications, inspections, adjustments, and corrections to be performed by Unit Maintenance to keep the 613CS Scraper in good operating condition and ready for its primary mission.
5. Tables 2 through 7, located following scraper PMCS, list mandatory replacement parts, by interval, for the scraper.

NOTE

PMCS for the 613CWD Water Distributor begins on page 0009 00-43.

6. Table 8 in WP 0010 00 contains systematic instructions on lubrications, inspections, adjustments, and corrections to be performed by Unit Maintenance to keep the 613CWD Water Distributor in good operating condition and ready for its primary mission.
7. Tables 7 through 13, located following water distributor PMCS, list mandatory replacement parts, by interval, for the water distributor.
8. For information on Corrosion Prevention and Control (CPC), refer to WP 0001 00.

EXPLANATION OF TABLE ENTRIES

1. **Item Number (Item No.) Column.** Numbers in this column are for reference. When completing DA Form 2404 or 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.

NOTE

If both an hours and calendar interval are provided, perform check or service at whichever interval comes first.

2. **Interval Column.** This column tells you when you must perform the procedure in the procedure column. Intervals are based on calender dates or hours.
   a. *Hours* procedures must be done at the hour interval listed.
   b. *Semiannual* procedures must be done twice each year
   c. *Annual* procedures must be done once each year.
   d. *Biennial* procedures must be done once every two years.
3. **Man-Hours Column.** This column indicates man-hours required to complete prescribed lubrication service.
4. **Item to Check/Service Column.** This column identifies the item to be checked or serviced.

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.

UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED 0009 00

EXPLANATION OF TABLE ENTRIES - CONTINUED

6. **Not Fully Mission Capable 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 check/service 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

NOTE

- Lubrication instructions contained in this PMCS are mandatory.
- Refer to TM 5-3800-205-10-1 or TM 5-3800-205-10-2 for Operator Maintenance level lubrication.
- Dashed leader lines used in illustrations of lubrication points indicate that lubrication is required on both sides of the equipment.

1. Recommended intervals are based on normal conditions of operation, temperature, and humidity. When operating under extreme conditions, such as high or low temperatures or exposure to sand or dust, lubricants should always be changed more frequently. Lubricants that have become contaminated must be changed regardless of interval. When in doubt, notify your supervisor.



WARNING

When servicing this machine, 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.

2. Ensure that all fluids drained as a result of lubrication or maintenance are collected in a suitable container and disposed of in accordance with local policy and ordinances. Clean up any spills immediately.
3. 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 all lubrication equipment clean and ready for use.
4. Maintain a good record of all lubrication performed and report any problem noted during lubrication. Refer to DA Pam 738-750 for maintenance forms and procedures to record and report any findings.



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.

5. Keep all external parts of equipment not requiring lubrication free of lubricants. Before lubrication, wipe lubrication fittings with a clean rag (Item 31, WP 0171 00) and solvent cleaning compound (Item 6, WP 0171 00). After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.
6. Refer to FM 9-207 for lubrication instructions in cold weather.

UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED 0009 00

GENERAL LUBRICATION PROCEDURES - CONTINUED

7. Refer to AR 70-12 for use of standardized fuels and lubricants.
8. Engine, transmission, and hydraulic system oil filters shall be changed when:
   a. they are known to be contaminated or clogged;
   b. at prescribed hardtime intervals.
9. This equipment is not covered by AOAP. Follow manufacturer's intervals as specified in this manual.
10. For equipment under manufacturer's warranty, hardtime oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (i.e., longer-than-usual operating hours, extended idling periods or extreme dust).

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 rags (Item 31, WP 0171 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 11, WP 0171 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 lubricating oil (Item 24, WP 0171 00). Report it to your supervisor.
   c. **Bolts, Nuts, and Screws.** Check bolts, nuts, and screws for obvious looseness, 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 one 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 that the wires are in good condition.
   f. **Hydraulic Hoses and Lines.** Look for wear, damage, and signs of leaks. Ensure that 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 (WP 0170 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 machine. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your machine. 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.

GENERAL PMCS PROCEDURES - CONTINUED

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.** This paragraph lists tools, materials, and personnel required for PMCS and lubrication.
2. **Tools (WP 0172 00).**
   a. Common no. 1 shop set
   b. Common no. 2 shop set
   c. Drain tool
   d. General mechanic's tool kit
3. **Materials (WP 0171 00).**
   a. Antifreeze
   b. Brake fluid, automotive, silicone, MIL-B-46176
   c. Cleaning compound, solvent
   d. Cloth, abrasive, emery, fine
   e. Detergent
   f. Grease, GAA
   g. Insulating varnish, electrical
   h. Lubricating oil, OE/HDO 10
   i. Lubricating oil, OE/HDO 10W/30
   j. Lubricating oil, OE/HDO 15W/40
   k. Lubricating oil, OE, HDO 30
   l. Lubricating oil, OE HDO 40
   m. Lubricating oil, OEA
   n. Lubricating oil, GO 85W/140
   o. Lubricating oil, GO 80W/90
   p. Lubricating oil, GO 75
   q. Petrolatum
   r. Rags
4. **Personnel.**
   a. Driver/Operator
   b. Unit Maintenance Mechanic

NOTE

- Components requiring lubrication on scraper only are identified by (S).
- Components requiring lubrication on water distributor only are identified by (WD).

- 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)	-25°F to +32°F (-4°C to 0°C)	
OE/HDO Lubricating Oil, ICE, Tactical					**HR - Hours S - Semiannual A - Annual B - Biennial**
OEA Lubricating Oil, ICE, Arctic					
Engine Crankcase	7.8 Gal. (30 L)	See Chart A			
Oil Can Points	As Reqd	See Chart A			
Transmission	9.2 Gal. (35 L)	See Chart B			
Hydraulic Tank	24.5 Gal. (93 L) System Capacity	See Chart C			
Water Pump Bearing Housing (WD)	As Reqd	See Chart C			
GO Lubricating Oil, Gear, Multipurpose					
Front Axle Differential	5 Gal. (19 L)	See Chart D			
Front Axle Final Drives	1.5 Gal. (6 L)	See Chart D			
Elevator Speed Reducer (S)	1.4 Gal. (5 L)	See Chart D			
BFS Brake Fluid, Automotive, Silicone					
Brake Fluid Reservoirs	1.4 Pts. (0.7 L)	All Temperatures			
GAA Grease, Automotive and Artillery					
Wheel Bearings, Rear Drive Shafts Hitch Steering Linkage Tiedown D-Rings Elevator Assembly (S) Floor Rollers (S) Ejector Rollers (S)		All Temperatures			
*** For arctic operation, refer to FM 9-207.**					

- 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)	-25°F to +32°F (-4°C to 0°C)	
ANTIFREEZE Ethylene Glycol, Inhibited, Heavy Duty					**HR - Hours S - Semiannual A - Annual B - Biennial**
ANTIFREEZE Ethylene Glycol, Arctic Grade					
Engine Radiator	9.9 Gal. (38 L) System Capacity	See Chart E			
*** For arctic operation, refer to FM 9-207.**					

CHART A—ENGINE AND OIL CAN POINTS

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	Lubricating Oil, ICE, Tactical																		
OEA	Lubricating Oil, ICE, Arctic																		
OE/HDO 15W/40								———	———	———	———	———	———	———	———	———	———	———	———
OE/HDO 10W/30							———	———	———	———	———	———							
OEA						———	———	———	———	———	———								

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	Lubricating Oil, ICE, Tactical																		
OEA	Lubricating Oil, ICE, Arctic																		
OE/HDO 40												———	———	———	———	———	———	———	
OE/HDO 30											———	———	———	———	———	———			
OE/HDO 10*								———	———	———	———	———							
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 C—HYDRAULIC TANK AND WATER PUMP BEARING HOUSING (WD)

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	Lubricating Oil, ICE, Tactical																		
OEA	Lubricating Oil, ICE, Arctic																		
OE/HDO 10*							———	———	———	———	———	———	———	———	———	———	———	———	———
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.

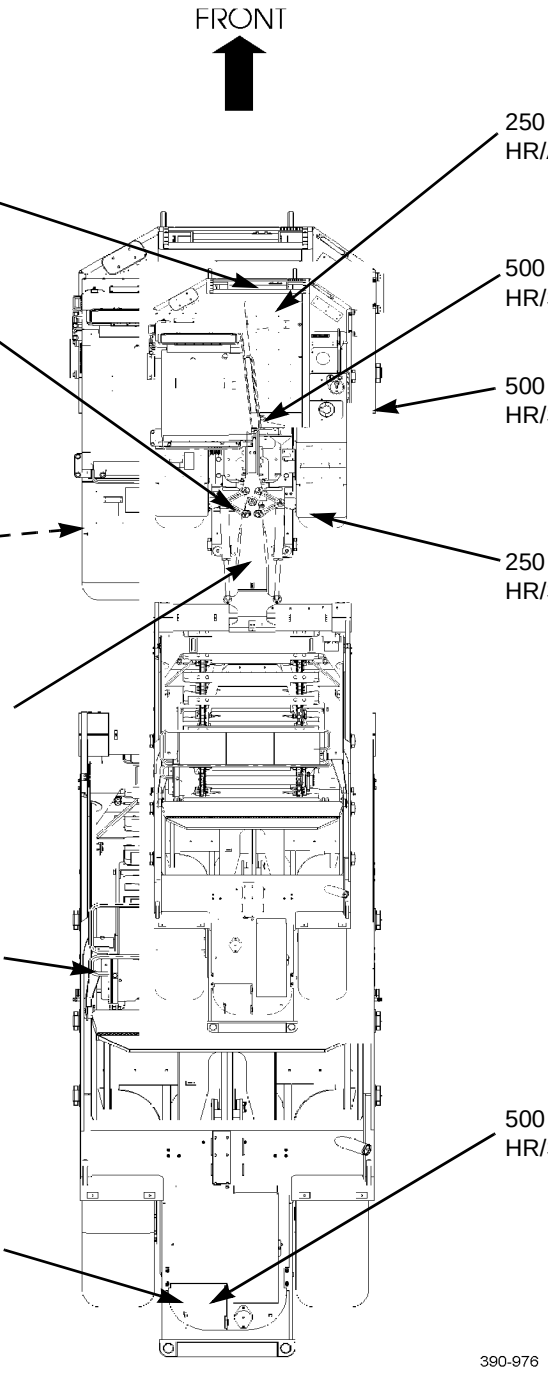
CHART D—FRONT AXLE DIFFERENTIAL AND FINAL DRIVES, AND ELEVATOR SPEED REDUCER (S)

Lubricant	EXPECTED TEMPERATURES																					
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
GO	Lubricating Oil, Gear, Multipurpose																					
GO-75																						
GO-80W/90																						
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	+100	+120
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
ANTIFREEZE	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty																					
ANTIFREEZE	Antifreeze, Arctic Grade																					
Antifreeze																						
Antifreeze,Arctic Grade																						

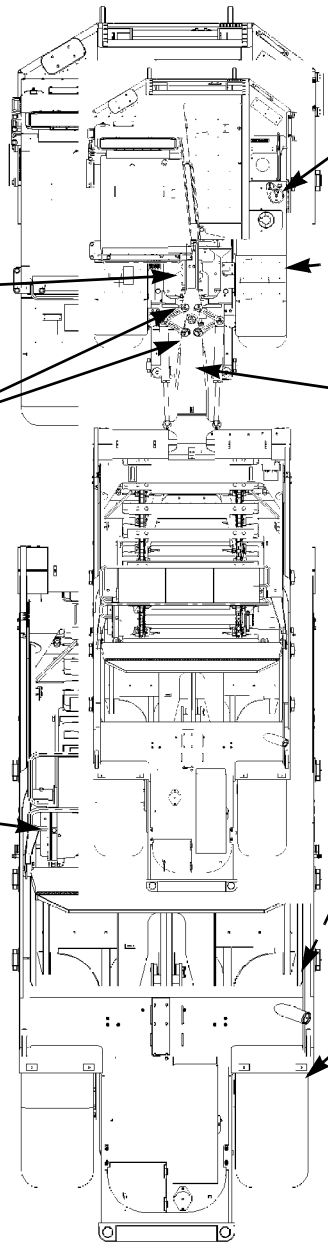
LUBRICANT •		INTERVAL	INTERVAL •		LUBRICANT
Radiator Drain/Refill	Anti-freeze	B	250 HR/A	OEA or OE/ HDO	Engine Oil and Filter Replace
Front Axle Differential Check Level and Add	GO	250 HR/S	500 HR/S		Secondary Fuel Filters Replace
			500 HR/S		Hydraulic System Oil Filters Replace
Front Axle Final Drives Check Level and Add	GO	250 HR/S	250 HR/S	BFS	Brake Fluid Reservoir Check Level and Add
Transmission Oil Filter Replace		1000 HR/A			
Elevator Speed Reducer Check Level and Add	GO	250 HR/S			
			500 HR/S		Primary Fuel Filter Replace
Brake Fluid Reservoir Check Level and Add	BFS	250 HR/S			



613CS SCRAPER

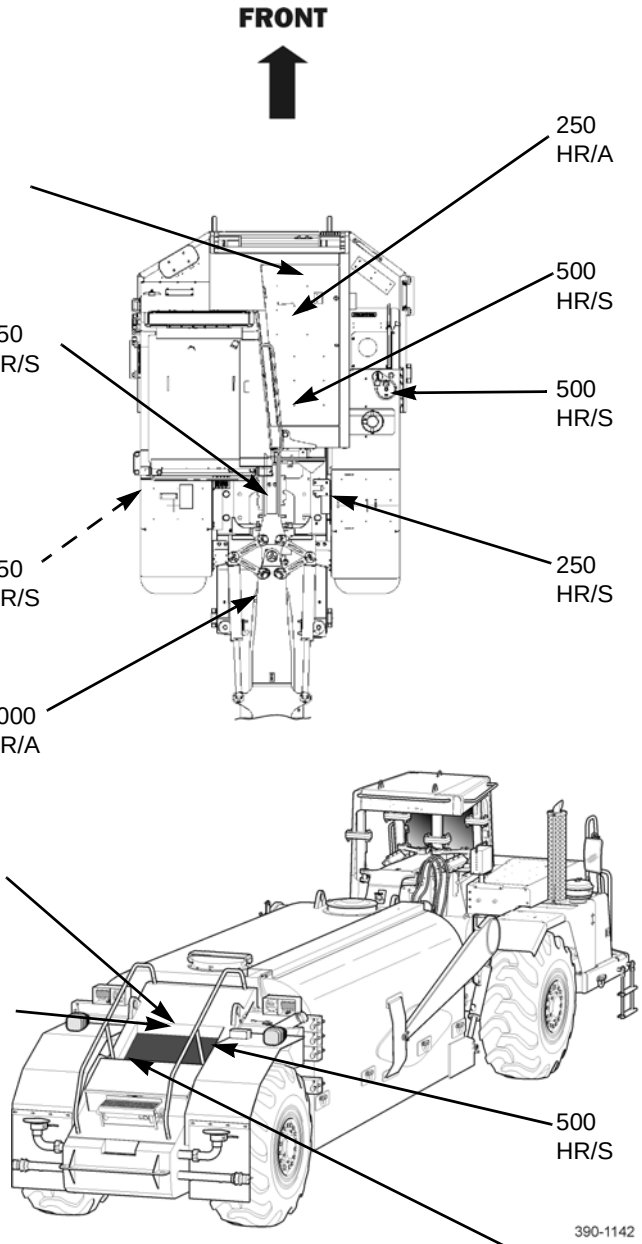
LUBRICANT	•	INTERVAL
Front Axle Differential Drain and Refill	GO	2000 HR/A
Upper and Lower Drive Shafts 3 Fittings	GAA	250 HR/S
Elevator Speed Reducer Drain and Refill	GO	2000 HR/A

INTERVAL	•	LUBRICANT	
2000 HR/A	OEA or OE/ HDO	Hydraulic Tank Drain and Refill
2000 HR/A	GO	Front Axle Final Drives Drain and Refill
1000 HR/A	OEA or OE/ HDO	Transmission Drain and Refill
2000 HR/A	GAA	Ejector Carrier and Guide Rollers Pack
2000 HR/A	GAA	Wheel Bearings Pack



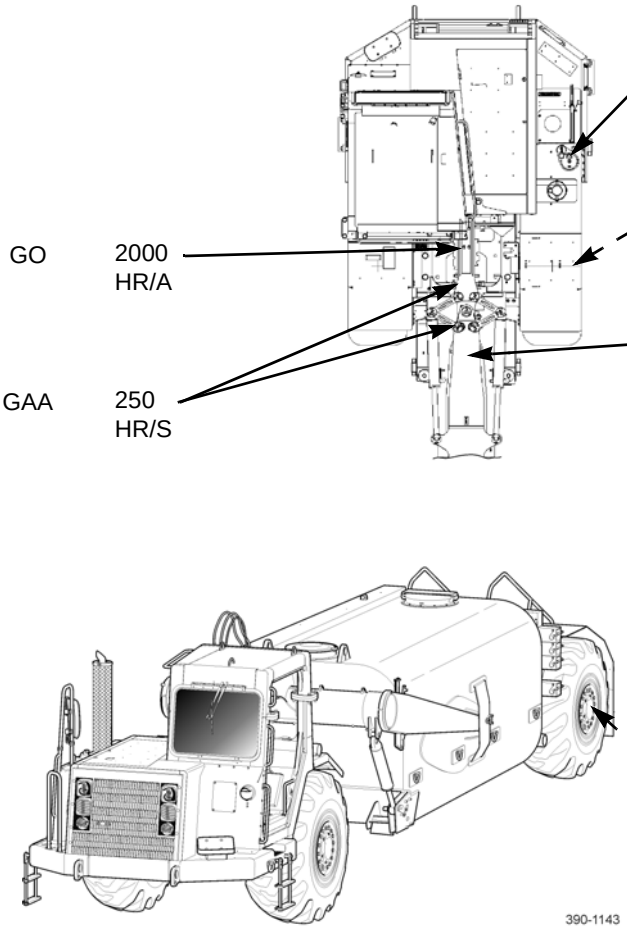
613CS SCRAPER

LUBRICANT	• INTERVAL		INTERVAL	• LUBRICANT	
Radiator Drain/Refill	Anti-freeze	B	250 HR/A	OEA or OE/ HDO	Engine Oil and Filter Replace
			500 HR/S		Secondary Fuel Filters Replace
Front Axle Differential Check Level and Add	GO	250 HR/S	500 HR/S		Hydraulic System Oil Filters Replace
Front Axle Final Drives Check Level and Add	GO	250 HR/S	250 HR/S	BFS	Brake Fluid Reservoir Check Level and Add
Transmission Oil Filter Replace		1000 HR/A			
Water Pump Bearing Housing Check Level and Add	OEA or OE/ HDO	A			
Water Pump Bearing Housing Change Oil	OEA or OE/ HDO	A	500 HR/S		Primary Fuel Filter Replace
			250 HR/S	BFS	Brake Fluid Reservoir Check Level and Add



613CWD WATER DISTRIBUTOR

LUBRICANT •		INTERVAL	INTERVAL •	LUBRICANT	
Front Axle Differential Drain and Refill	GO	2000 HR/A	2000 HR/A	OEA or OE/ HDO	Hydraulic Tank Drain and Refill
Upper and Lower Drive Shafts 3 Fittings	GAA	250 HR/S	2000 HR/A	GO	Front Axle Final Drives Drain and Refill
			1000 HR/A	OEA or OE/ HDO	Transmission Drain and Refill
			2000 HR/A	GAA	Wheel Bearings Pack



613CWD WATER DISTRIBUTOR

END OF WORK PACKAGE

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
				 WARNING If machine is parked indoors during performance of PMCS, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning. NOTE • Review all WARNINGs, CAUTIONs, and NOTEs before performing PMCS on the 613CS Scraper. • Unless otherwise indicated, perform all lubrication and preventive maintenance with machine parked on level ground, parking brake applied, transmission in N (Neutral) and locked, scraper bowl lowered to the ground, and engine shut down. • Perform Operator PMCS prior to or in conjunction with Unit PMCS if: a. There is a delay between daily operation of the machine and Unit PMCS. b. The regular operator is not assisting.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	**Initial 250 Hours**		**Transmis-sion**	NOTE Transmission oil filter should be replaced after initial 250 hours of operation of a new or reconditioned machine. Replace transmission oil filter (WP 0072 00) if machine is new or reconditioned.	
2	**250 Hours or Semi-annual**	**0.5 Hours**	**Front Axle Final Drives**	Check level of oil in each wheel end final drive: a. Position front wheels with plug on center line with front axle. b. Clean area around plug. c. Remove plug. d. Maintain oil level to plug opening. If level is low, add gear lubricating oil (Item 21, 22, or 23, WP 0171 00). e. Clean plug and install.	

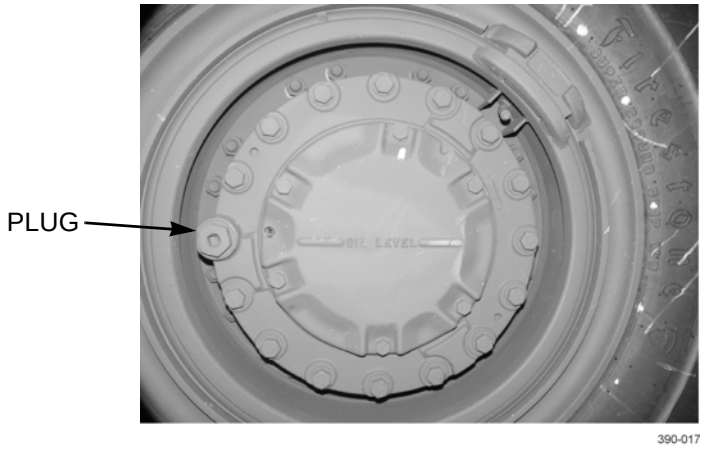


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
3	**250 Hours or Semi-annual**	**0.2 Hours**	**Front Axle Differential**	Level check of oil in front axle differential: a. Clean area around level/fill plug, located on front face of differential. b. Remove level/fill plug. c. Maintain oil level to level/fill plug opening. If level is low, add gear lubricating oil (Item 21, 22, or 23, WP 0171 00). d. Clean level/fill plug and install.	
4	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	CAUTION Use caution to ensure dirt and debris are not introduced into reservoirs. Contamination of brake fluid could result. NOTE • There is a brake fluid reservoir on both tractor and scraper. On tractor, reservoir is located inboard of right fender. On scraper, reservoir is located inside rear compartment. • Scraper reservoir is illustrated. a. Wipe cover of reservoir clean with a clean rag (Item 31, WP 0171 00).	

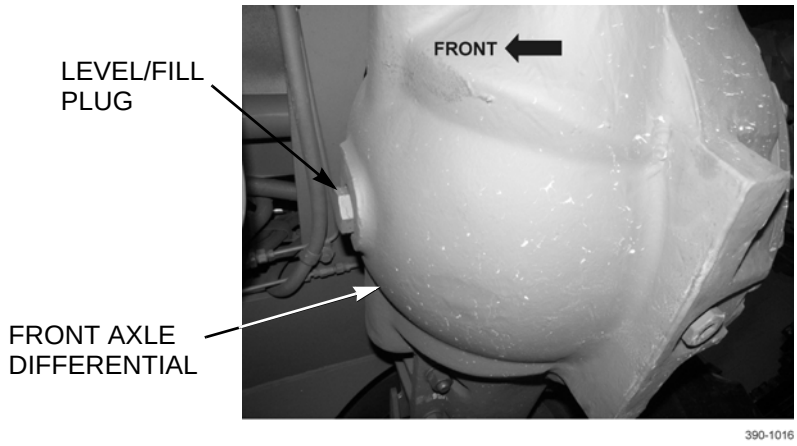


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	b. Release retainer and remove cover. Clean diaphragm with a clean rag. Remove diaphragm. c. Brake fluid level should be 1/2 in. (13 mm) down from top of reservoir. Add brake fluid (Item 4, WP 0171 00) as required. d. Ensure diaphragm and cover are clean. Install diaphragm and cover. Secure cover with retainer.	



390-012



390-1015

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	NOTE • There is one brake master cylinder on scraper and two on tractor. • Brake master cylinder on scraper is located inside rear compartment. • Brake master cylinders on tractor are located under tractor, above right-rear corner of rear belly guard plate. One cylinder is mounted laterally; the second one is above the first, mounted longitudinally. e. Inspect brake master cylinder(s), brake lines, and fittings for leaks or damage. Replace any damaged or leaking component.	



SCRAPER



TRACTOR

5	**250 Hours or Semi-annual**		**Drive Belts**	a. Inspect drive belts for general condition: check for cracks, missing pieces, frayed areas, and wear. A worn belt will ride in the bottom of the pulley or will be stretched beyond limits of adjuster. Replace worn or damaged belt (WP 0032 00).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
5 (Con't)	**250 Hours or Semi-annual**		**Drive Belts**	b. Check adjustment of drive belts: A correctly adjusted belt will deflect 1/2-3/4 in. (13-19 mm) when a deflection force of 25 lb (110 N) is applied midway between pulleys. Adjust belt tension as required (WP 0032 00).	
6	**250 Hours or Semi-annual**	**0.2 Hours**	**Elevator Speed Reducer**	Check level of oil in elevator speed reducer: a. Clean area around level plug. b. Remove level plug. Oil should drip out of level plug opening. c. If oil level is low, remove filler plug and add gear lubricating oil (Item 21, 22 or 23, WP 0171 00) until oil drips out level plug opening. d. Clean filler and level plugs and install.	

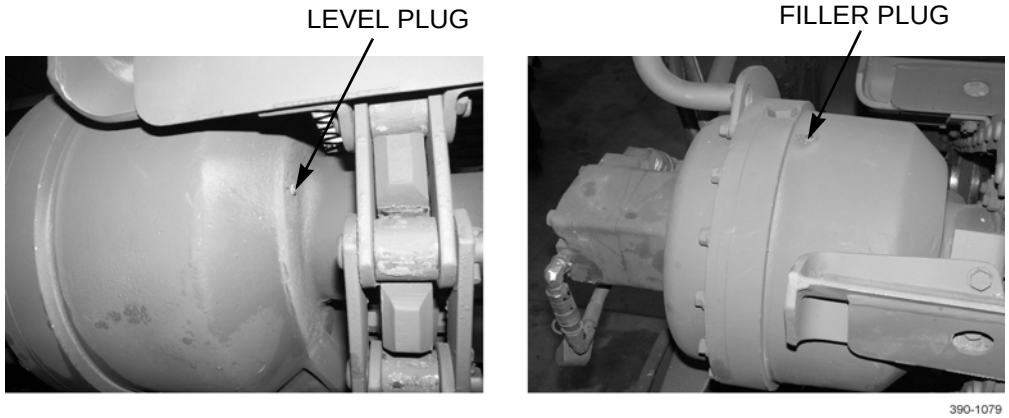


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	**250 Hours or Semi-annual**	**0.3 Hours**	**Drive Shafts**	a. Wipe grease fitting on upper drive shaft slip joint clean. b. Apply GAA grease (Item 16, WP 0171 00) to grease fitting.	



Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

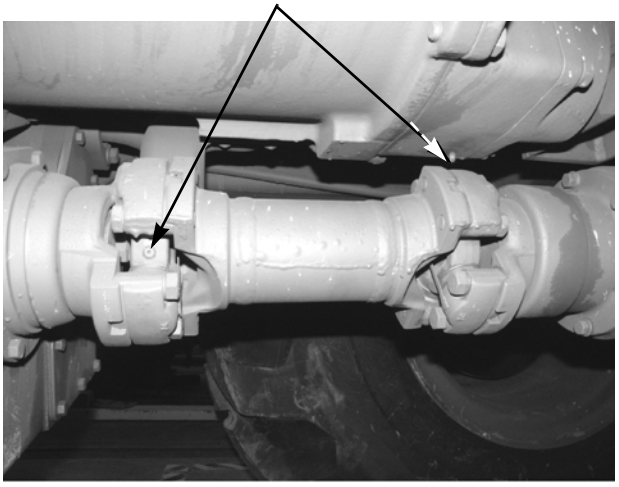
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7 (Con't)	**250 Hours or Semi-annual**	**0.3 Hours**	**Drive Shafts**	c. Wipe grease fittings on lower drive shaft clean. d. Apply GAA grease (Item 16, WP 0171 00) to grease fittings.	
				 390-1081	
8	**250 Hours or Semi-annual**	**0.6 Hours**	**Engine Oil and Filter**	NOTE • Machine should be parked on level ground, with transmission in Neutral (N) and locked with parking brake applied. Shut down engine. • Drain crankcase while oil is warm. • Engine crankcase capacity is 7.8 gal. (30 L). • Clean area around fill cap and drain plug prior to removing. a. Remove engine oil fill cap inside engine compartment. b. Access oil pan by removing access panel from middle guard plate under tractor.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Engine Oil and Filter**	c. Open draincock and drain oil into a suitable container. Dispose of drained oil in accordance with local policy and ordinances. Close draincock and reinstall access panel to middle guard plate.	



Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

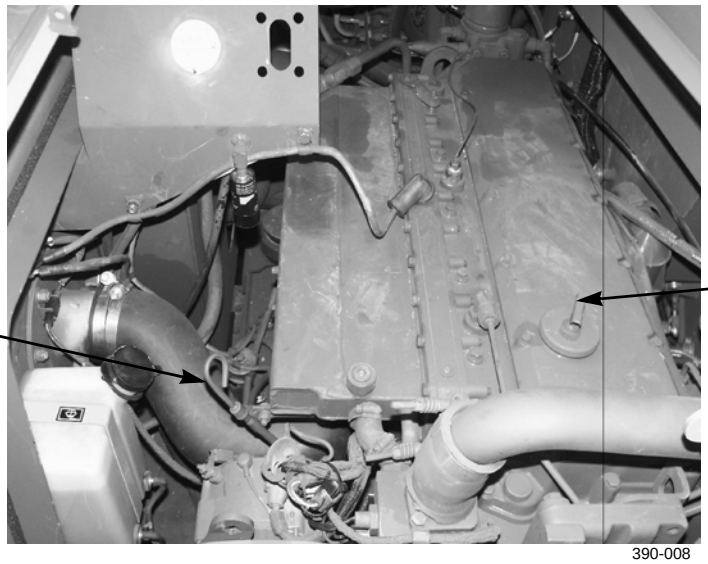
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Engine Oil and Filter**	d. Replace engine oil filter (WP 0013 00). e. Add oil (Item 25, 26, or 29, WP 0171 00) through oil fill opening until level on dipstick is between ADD and FULL lines on dipstick.	
				 390-008	
9	**500 Hours or Semi-annual**		**Ejector Carrier (Lower) and Ejector Guide (Upper) Rollers**	a. Check adjustment of ejector carrier (lower) rollers. Adjust rollers as required (TM 5-3800-205-23-2). b. Check adjustment of ejector guide (upper) rollers. Adjust rollers as required (TM 5-3800-205-23-2).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper- Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
10	**500 Hours or Semi-annual**	**0.6 Hours**	**Fuel System**	 WARNING • DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death to personnel. • Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to do so may result in injury to personnel a. Replace fuel system primary and secondary filters (TM 5-3800-205-23-2 and WP 0021 00 of this manual). b. Disassemble and clean fuel tank cap: (1) Remove fuel tank cap. (2) Remove gasket from cap and inspect for damage. Replace gasket if damaged.  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. (3) Disassemble fuel tank cap: Remove valve assembly, washer, baffle, gasket, and filter elements.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

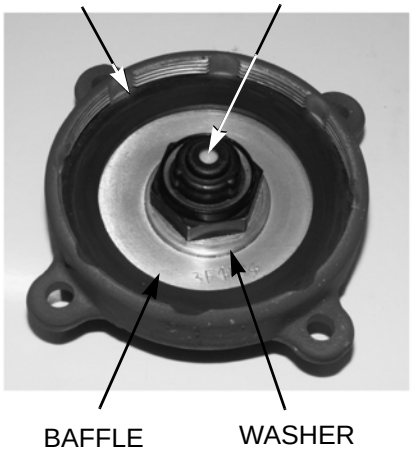
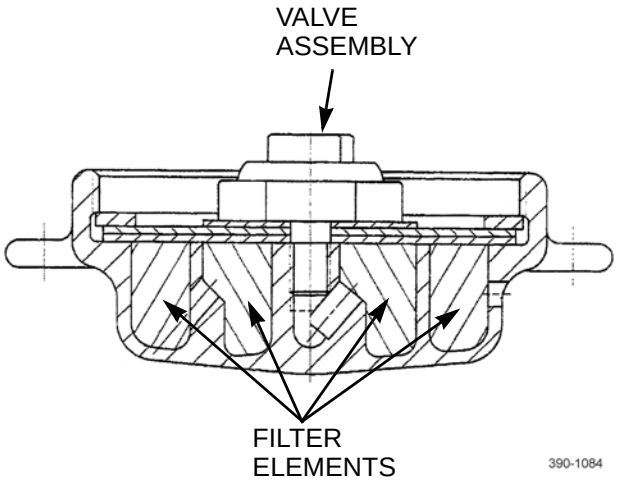
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
10 (Con't)	**500 Hours or Semi-annual**	**0.6 Hours**	**Fuel System**	(4) Clean elements in solvent cleaning compound (Item 6, WP 0171 00). Inspect all parts for damage and replace as needed. (5) Apply a thin coat of oil (Item 24, WP 0171 00) to filter elements and assemble cap. Tighten valve assembly to 177 lb-in. (20 Nm). Install fuel cap gasket.	
				 		
				f. Remove strainer from filler neck of fuel tank. Clean strainer in solvent cleaning compound (Item 6, WP 0171 00). g. Install strainer into filler neck. Install fuel tank cap and tighten securely.	
11	**500 Hours or Semi-annual**	**1.0 Hours**	**Hydraulic System**	a. Replace hydraulic system oil filter elements (WP 0115 00). Do NOT change hydraulic system oil at this time (Refer to *Annual* interval). b. Clean hydraulic tank relief valve (WP 0118 00).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

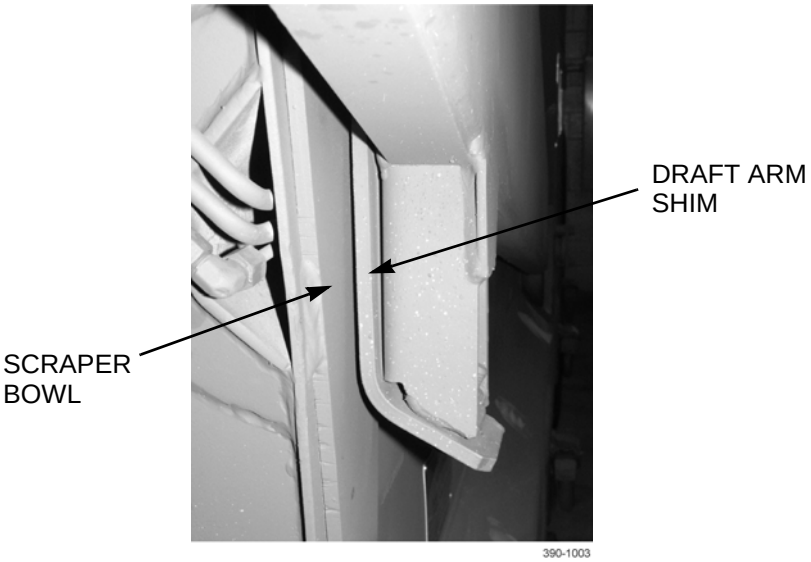
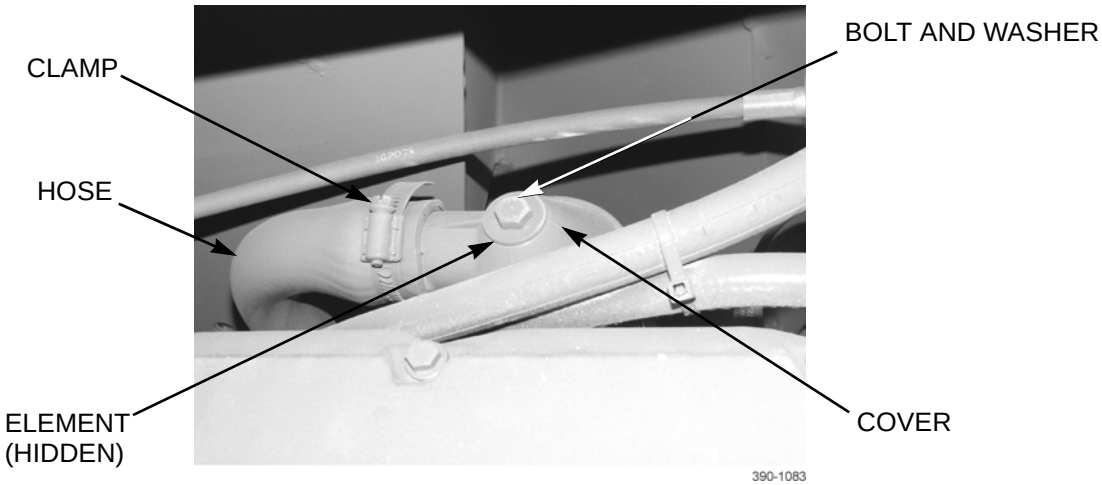
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
12	**Semiannual**		**Draft Arm Wear Plates**	a. Check clearance between draft arm shim and scraper bowl on each side of bowl. Clearance should be 0.118 +/- 0.080 in. (3 +/- 2 mm). b. If clearance is greater than 0.198 in. (5 mm), add shim(s).	
					
13	**Semiannual**		**Engine Crankcase Breather Assembly**	Open engine access door and access engine crankcase breather assembly on left side of engine compartment. Clean breather: a. Loosen clamp and remove hose from cover of breather. b. Remove bolt, washer, cover, and breather element. c. Inspect cover seal for damage. Replace seal if damaged.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
13 (Con't)	Semiannual		Engine Crankcase Breather Assembly	 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. • 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. d. Wash breather element in solvent cleaning compound (Item 6, WP 0171 00). Shake dry or dry using compressed air.	



				e. Inspect hose and replace if damaged.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
13 (Con't)	**Semiannual**		**Engine Crankcase Breather Assembly**	f. Install breather element and cover with washer and bolt. Tighten bolt to 62 lb-in. (7 Nm). g. Install hose to cover and tighten clamp.	
14	**Semiannual**		**Batteries**	 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. CAUTION • If battery compartment is corroded, it will be necessary to remove batteries and clean compartment to remove acid residues and corrosion. • Buildup of dirt or corrosion on batteries may lead to electrical malfunctions. Service batteries as follows: a. Access batteries inside engine air filter and battery compartment. b. Check battery hold-down for looseness, corrosion or damage.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
14 (Con't)	**Semiannual**		**Batteries**	c. Clean top of batteries with a clean rag (Item 31, WP 0171 00). d. Inspect batteries for evidence of a cracked case and electrolyte leakage. e. Disconnect battery cables (WP 0067 00). **NOTE** • If machine is equipped with original equipment maintenance-free batteries, batteries will have no filler caps; electrolyte level cannot be checked. • Skip steps f through i if batteries are maintenance free. f. Ensure all battery filler caps are present. g. Remove batteries (WP 0067 00). h. Remove filler caps and check electrolyte level in battery cells. Electrolyte level should be to bottom of filler openings. Add distilled water as required and reinstall filler caps snugly. i. As required, use a baking soda solution of 4 oz (100 grams) of baking soda with 1 qt (1 L) of clean water to remove any acid film from batteries. Rinse with clean water. Reinstall batteries (WP 0067 00). j. Clean battery terminals with a fine grade of sandpaper or emery cloth (Item 7, WP 0171 00). k. Connect battery cables (WP 0067 00). Coat terminal connections with petrolatum (Item 30, WP 0171 00).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
15	Semiannual		ROPS/FOPS	a. Inspect for cracked welds, bends, breaks, chipped/missing paint or corrosion. Do NOT attempt to straighten ROPS/FOPS or repair welds. Replace ROPS/FOPS if damaged (WP 0098 00). b. Check for loose or missing mounting bolts, washers, and nuts. Install new mounting hardware or tighten as required. Apply torque of 317 lb-ft (430 Nm).	
16	Semiannual		Seat Belt	a. Inspect seat belt for security of mounting, worn or frayed strap webbing or worn or damaged buckle and anticreep slides. Replace seat belt if damaged (WP 0103 00). NOTE Date label attached to seat belt indicates age of belt. b. Replace seat belt, regardless of condition, if it has been in service for three years (WP 0103 00).	
17	Semiannual		Electrical Ground Connections	Inspect electrical ground connections on machine for secure connection and evidence of cracked insulating varnish. If connection is loose or there is cracking in protective coating, disconnect connection, clean, thoroughly dry, and reconnect. Apply insulating varnish (Item 19, WP 0171 00) to connection in accordance with manufacturer's instructions on packaging.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

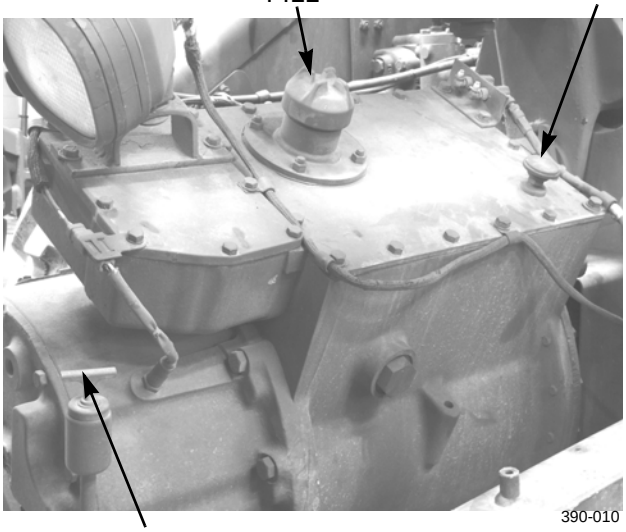
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	**Semiannual**		**Wheels and Tires**	a. Inspect tires for general condition and proper inflation of 45 psi (310 kPA). Replace any missing valve stem caps. b. Inspect tires for wear. If tread depth is 0.39 in (10 mm) or less, or if operator has reported a critical loss of traction, replace tires (WP 0096 00 or TM 5-3800-205-23-2). c. Check for loose or missing lug nuts. Correct lug nut torque is 370 lb-ft (500 Nm). d. Inspect brake discs for excessive scoring and pitting. Replace if excessively scored or pitted (WP 0080 00 or TM 5-3800-205-23-2).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19	**1000 Hours or Annual**	**1.2 Hours**	**Transmis-sion**	NOTE • Machine should be parked on level ground, with transmission in Neutral (N) and locked with parking brake applied. Shut down engine. • Transmission fluid will drain easier if warm. • Use a suitable container to catch transmission fluid. Transmission fluid capacity is 9.2 gal. (35 L). • Clean area around fill cap and drain plug prior to removing. a. Remove cap from transmission fill. CAUTION Install drain tool finger tight only until oil starts to drain. If drain tool is forced into valve, damage to valve and leaking will result. b. Remove drain plug and O-ring from transfer case. Insert drain tool into drain valve and turn tool finger tight to drain transmission fluid. Dispose of fluid in accordance with local policy and ordinances. Discard O-ring. Clean drain plug and reinstall, using a new O-ring.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19 (Con't)	**1000 Hours or Annual**	**1.2 Hours**	**Transmis-sion**		
				c. Replace transmission oil filter (WP 0072 00). d. Remove, clean, and reinstall transmission oil suction screen and tube assembly (magnetic screen) (WP 0074 00). e. Remove, clean, dry, and reinstall transmission breather. f. Refill transmission with oil (Item 24, 27, 28, or 29, WP 0171 00) through fill opening until reading on dipstick is at COLD MIN SAFE TO START with engine cold. g. Start engine and bring transmission to operating temperature. Fluid level should be within cross-hatched area, between ADD and FULL marks on dipstick.	



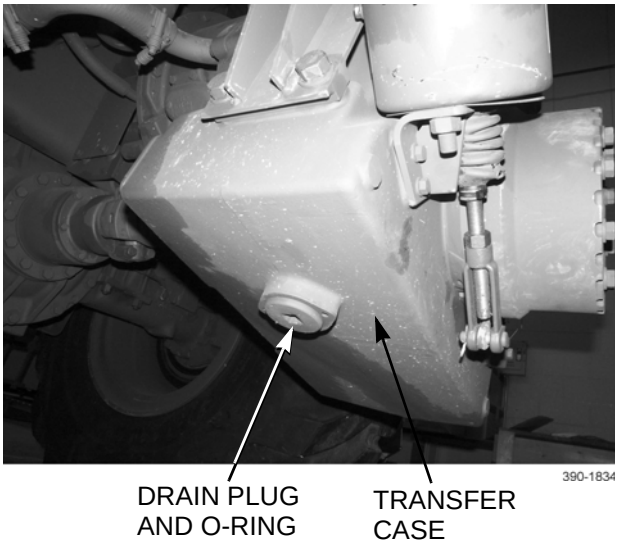


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
20	**1000 Hours or Annual**		**Engine Valve Lash Check**	Notify DS Maintenance to check and adjust engine valve lash as required.	

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Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21	2000 Hours or Annual	1.0 Hours	Front Axle Differential and Final Drives	NOTE • Front axle final drive capacity is 1.5 gal. (6 L). • Front axle differential capacity is 5 gal. (19 L). • Clean area around fill and drain plugs prior to removing. a. Park machine on level ground with plugs at wheel end final drives oriented at 6 o'clock. Remove plug, O-ring, and seal at each wheel end and drain oil into a suitable container. Dispose of oil in accordance with local policy and ordinances. Discard plug O-ring and seal. b. Remove level/fill plug and seal from differential. Remove drain plug and seal and drain oil. Discard seals. Clean drain plug and reinstall with a new seal.	

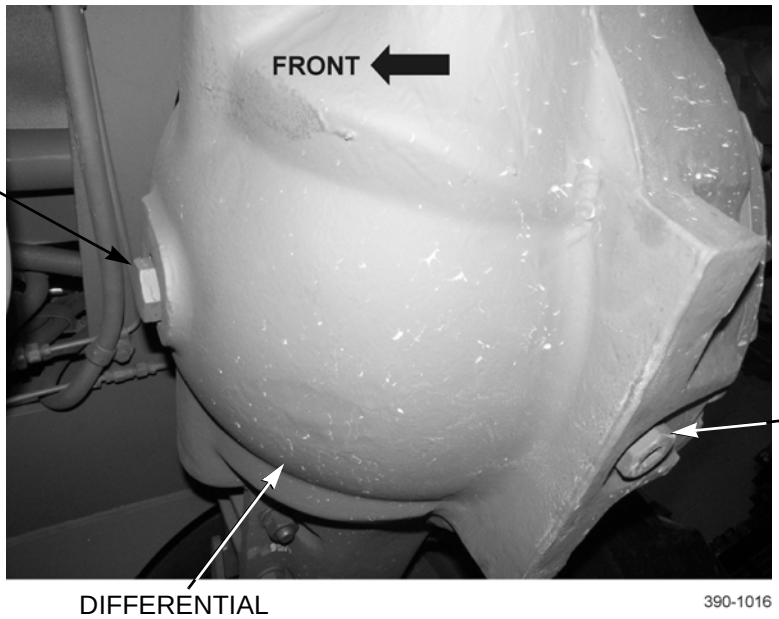


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

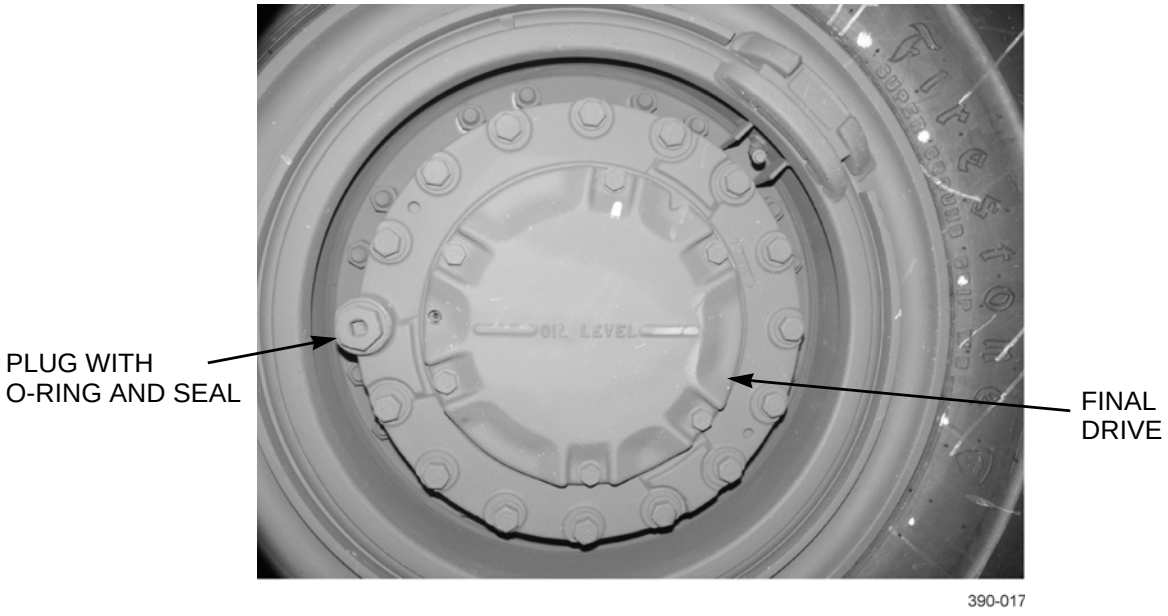
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21 (Con't)	**2000 Hours or Annual**	**1.0 Hours**	**Front Axle Differential and Final Drives**	c. Position machine so that plugs at wheel end final drives are at 3 or 9 o'clock.	
					
				d. Add oil (Item 21, 22 or 23, WP 0171 00) to differential through level/fill opening until oil is level with opening. Clean level/fill plug and reinstall with a new seal. e. Add oil (Item 21, 22 or 23, WP 0171 00) at each wheel end until level with opening. Clean plug and reinstall with a new O-ring and seal.	
22	**2000 Hours or Annual**	**4.0 Hours**	**Rear Axle Wheel Bearings**	Notify DS Maintenance to remove, clean, inspect, pack with GAA grease (Item 16, WP 0171 00), and install rear axle wheel bearings.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
23	**2000 Hours or Annual**	**1.0 Hours**	**Hydraulic System**	NOTE • Hydraulic tank capacity is 24.5 gal (93 L). • Perform service with machine on level ground, bowl lowered and ejector moved all the way forward, transmission in Neutral (N) and locked, parking brake applied, and engine shut down. Oil should be warm. • Clean area around fill cap and drain plug before removing. a. Remove fill cap. CAUTION Install drain tool finger tight only until oil starts to drain. If drain tool is forced into valve, damage to valve and leakage will result. b. Remove drain plug and O-ring from bottom of hydraulic tank. Insert drain tool into drain valve and turn tool finger tight to drain oil into a suitable container. Dispose of oil in accordance with local policy and ordinances. Discard O-ring. c. Clean drain plug and reinstall with a new O-ring.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
23 (Con't)	**2000 Hours or Annual**	**1.0 Hours**	**Hydraulic System**		
				d. Remove, clean, inspect, and reinstall relief valve (WP 0118 00). e. Replace hydraulic system oil filters (WP 0115 00). f. Remove retaining ring and clean strainer at fill opening. Reinstall strainer. g. Inspect fill cap gasket and replace if damaged. h. Fill tank with oil (Item 24 or 29, WP 0171 00) until oil is visible in sight gage. Install fill cap. i. Start engine and bring hydraulic system to operating temperature. Oil level must be above bottom line on sight gage. Add oil as required.	

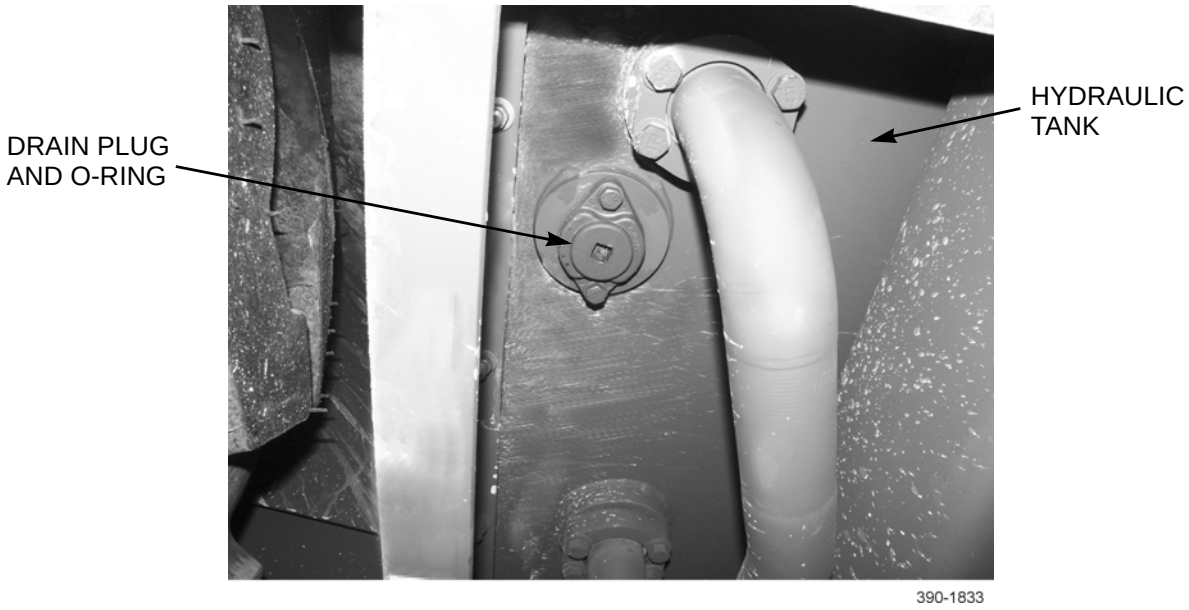


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
23 (Con't)	**2000 Hours or Annual**	**1.0 Hours**	**Hydraulic System**		
				  390-009	
24	**2000 Hours or Annual**	**1.5 Hours**	**Ejector Carrier (Lower) Rollers**	a. Remove, clean, inspect, and pack ejector carrier (lower) rollers with grease (TM 5-3800-205-23-2). b. Adjust ejector carrier rollers (TM 5-3800-205-23-2).	
25	**2000 Hours or Annual**	**1.5 Hours**	**Ejector Guide (Upper) Rollers**	a. Remove, clean, inspect, and pack ejector guide (upper) rollers with grease (TM 5-3800-205-23-2). b. Adjust ejector guide (upper) rollers (TM 5-3800-205-23-2).	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
26	**2000 Hours or Annual**		**Ejector Support (Rear) Rollers**	a. Check clearance of two ejector support (rear) rollers at rear of ejector: (1) Move ejector all the way forward. With ejector forward, support rollers will be accessible inboard from rear tires. (2) Measure clearance between support roller and track on each side of ejector frame. Clearance should be 0.032-0.190 in. (0.80-4.80 mm). c. Check for wear or damage to support (rear) rollers. d. If clearance is not as specified, or if ejector support (rear) rollers are worn or damaged, remove, clean, inspect, and pack with grease or replace rollers (TM 5-3800-205-23-2).	

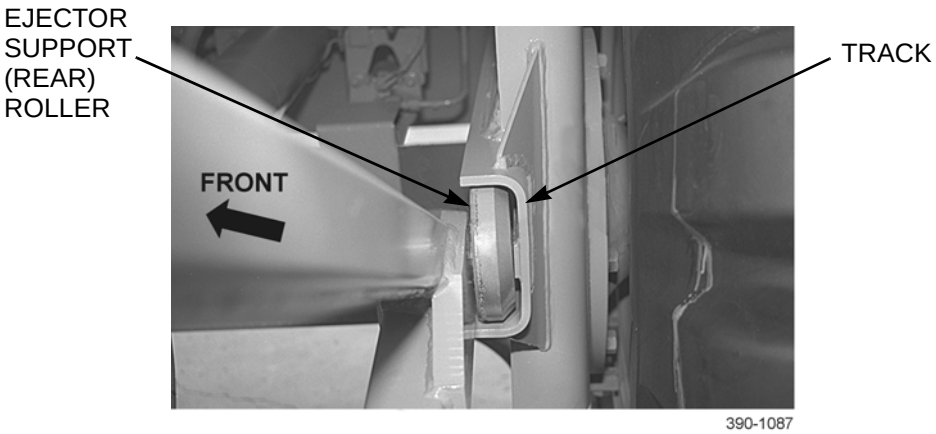
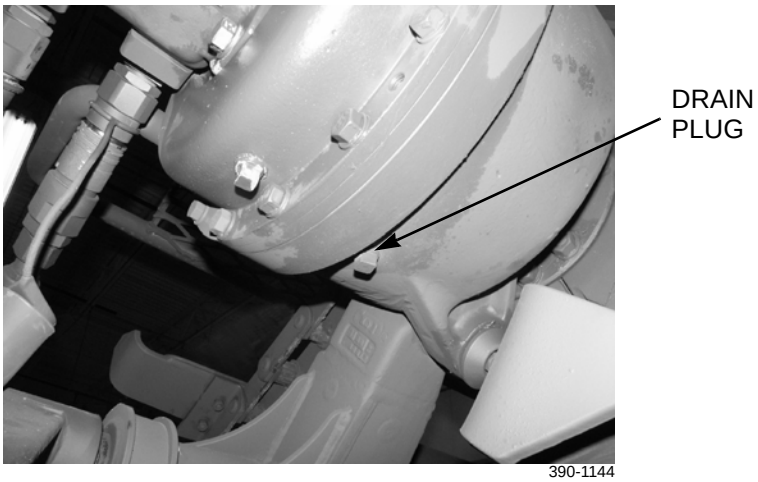


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
27	2000 Hours or Annual	0.5 Hours	Elevator Speed Reducer	NOTE Refill capacity of elevator speed reducer is 10.6 qt (10 l). Change oil in elevator speed reducer: a. Clean area around filler, level, and drain plugs with a clean rag (Item 31, WP 0171 00). b. Remove drain plug and allow oil to drain into a suitable container. Dispose of oil in accordance with local policy and ordinances.	



390-1144

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
27 (Con't)	**2000 Hours or Annual**	**0.5 Hours**	**Elevator Speed Reducer**	c. Clean drain plug and install. d. Remove level and filler plugs. Add oil (Item 21, 22 or 23, WP 0171 00) through filler plug opening until oil drips out level plug opening. e. Clean filler and level plugs and install.	

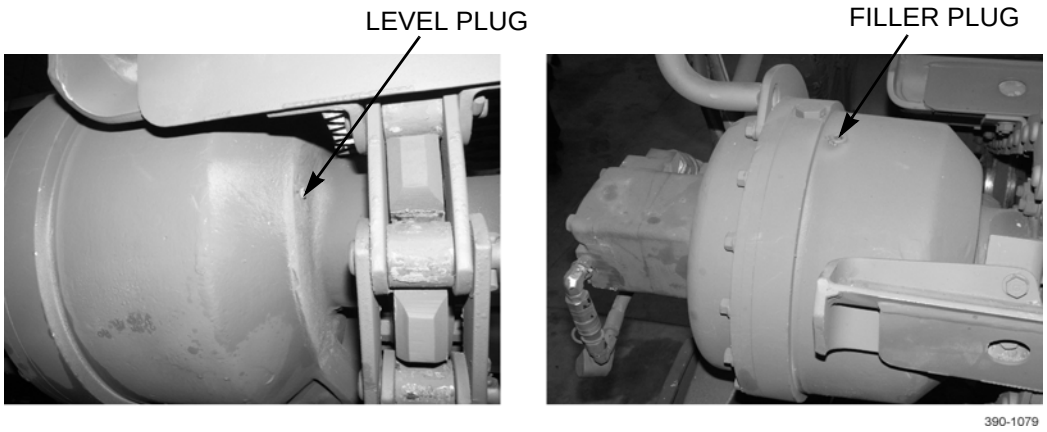
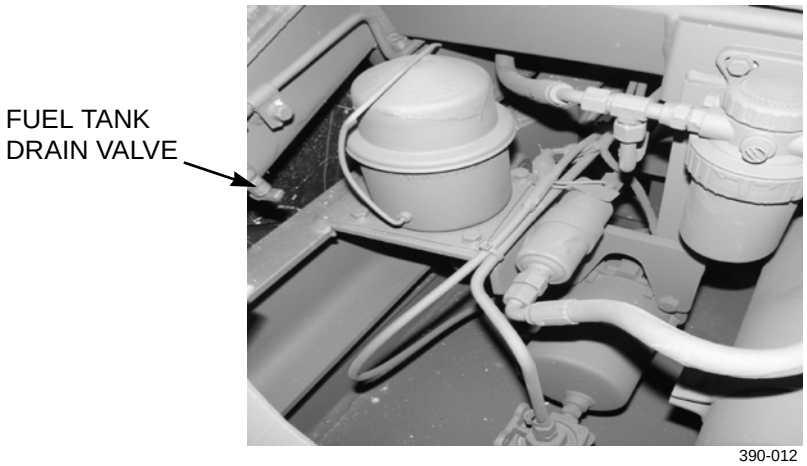


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

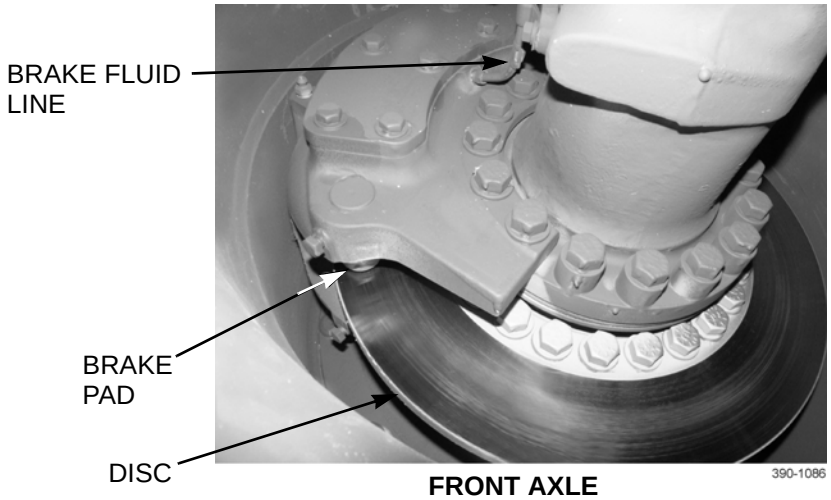
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
28	**Annual**		**Fuel Tank Drain**	**WARNING** • DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death to personnel. • Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to do so may result in injury to personnel. Failure to do so may result in injury to personnel. Access fuel tank drain valve by opening rear compartment access door at rear of scraper. Attach a suitable drain hose, open drain valve, and drain any water/sediment from fuel tank into a suitable container. Close drain valve and remove drain hose.	



390-012

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
29	**Annual**		**Brakes (All Wheels)**	a. Inspect service brake pads for damage, wear, and loose mounting. Measure thickness of lining. If less than 0.50 in. (12.7 mm), replace lining (WP 0084 00 or TM 5-3800-205-23-2). b. Inspect brake discs for distortion, cracks, excessive scoring or wear. Replace if damaged (WP 0080 00 or TM 5-3800-205-23-2). c. Inspect brake fluid lines and fittings for looseness, damage or leaks.	



FRONT AXLE

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
30	**Annual**		**Road Test**	a. Road test machine. Operate all machine controls, check for proper operation, and listen for abnormal noise or vibrations. b. Observe hitch area during road test for play in hitch and steering linkage. There should be no noticeable play at hitch and steering linkage.	

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Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
31	**Biennial**		**Crankshaft Vibration Damper**	a. Remove front guard plate under tractor to access front of engine (WP 0100 00).	
				NOTE Vibration damper has a weight located inside a silicone fluid-filled case.	
				b. Inspect damper for dents, cracks or evidence of leaks. If a fluid leak is found, determine type of fluid. Silicone fluid is transparent, viscous, smooth, and difficult to remove from surfaces. If leak is oil, crankshaft seals are suspect. Notify DS Maintenance if damper is dented, cracked or fluid leaks are evident.	

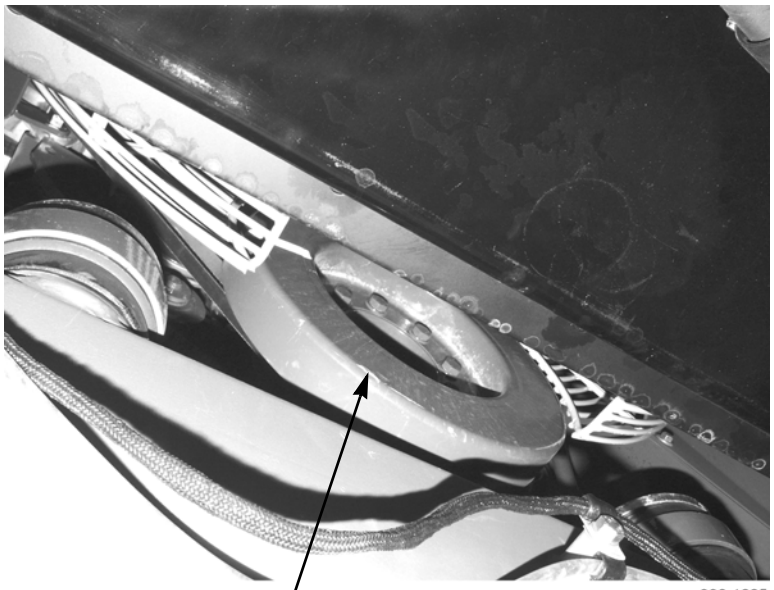


Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
32	**Biennial**	**1.5 Hours**	**Cooling System**	 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 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. NOTE Cooling system capacity is 9.9 gal. (38 L). a. Access engine compartment and remove cooling system pressure cap. b. Attach a suitable drain hose to draincock under right front of tractor. Open draincock and drain coolant into a suitable container. Dispose of coolant in accordance with local policy and ordinances. c. Flush cooling system with clean water until draining water is clear. d. Close draincock and remove drain hose.	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
32 (Con't)	Biennial	1.5 Hours	Cooling System		
				e. Replace thermostat (WP 0028 00). f. Add a 50/50 mixture of antifreeze (Item 2 or 3, WP 0171 00) to radiator. Leave radiator cap off. g. Start engine and run until thermostat opens and coolant level stabilizes. Maintain level 1/2 in. (13 mm) from bottom of filler neck. h. Inspect gasket of pressure cap and replace if damaged. Install cap.	

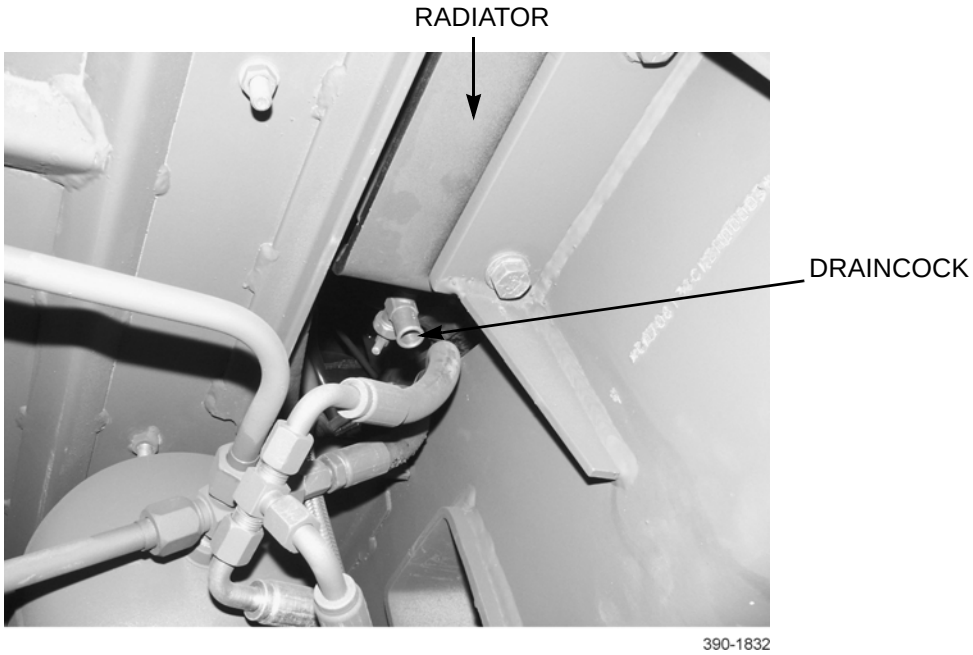


Table 2. Scraper PMCS Mandatory Replacement Parts List - Initial 250 Hours.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0719	2910-00-740-3593	Filter Element, Fluid Transmission	1
2	3J1907	5331-01-333-6444	O-ring	1
3	2S8439	5330-01-021-9880	Seal	1

Table 3. Scraper PMCS Mandatory Replacement Parts List - 250 Hours or Annual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0739	2940-00-029-0388	Filter Element, Fluid, Engine	1

Table 4. Scraper PMCS Mandatory Replacement Parts List - 500 Hours or Semiannual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0751	2910-01-424-7315	Filter Element, Fluid, Secondary Fuel Filter	2
2	117-4089	2910-01-443-6227	Filter Element, Fluid, Fuel/Water Separator	1
3	1328879	4330-01-509-0939	Filter Element, Fluid Hydraulic System	2

Table 5. Scraper PMCS Mandatory Replacement Parts List - 1000 Hours or Semiannual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0719	2910-00-740-3593	Filter Element, Fluid, Transmission (Annual)	1
2	3J1907	5331-01-333-6444	O-ring	1
3	5H7521	5331-00-555-3810	O-ring, Transmission Oil Section Screen Cover	1
4	2S8439	5330-01-021-9880	Seal	1

Table 6. Scraper PMCS Mandatory Replacement Parts List - 2000 Hours or Annual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1328876	4330-01-509-0939	Filter Element, Fluid, Hydraulic System	2
2	2S4663	5330-00-470-5727	Gasket, Valve Safety Relief	2
3	5H2767	5331-00-850-7586	O-ring, Front Axle Final Drive	2
4	5M2057	5331-00-855-8047	O-ring, Hydraulic Tank	1
5	3J1907	5331-01-333-6444	O-ring, Valve, Safety Relief	1
6	5P8132	5325-01-185-7726	Ring, Retaining	1

Table 7. Scraper PMCS Mandatory Replacement Parts List - Biennial.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	195-7339	5330-01-508-2775	Gasket, Thermostat	1
2	126-5869	6685-01-474-2254	Thermostat	1

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Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
				 WARNING If machine is parked indoors during performance of PMCS, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning. NOTE • Review all WARNINGs, CAUTIONs, and NOTEs before performing PMCS on the 613CWD Water Distributor. • Unless otherwise indicated, perform all lubrication and preventive maintenance with machine parked on level ground, parking brake applied, transmission in N (Neutral) and locked, scraper bowl lowered to the ground, and engine shut down. • Perform Operator PMCS prior to or in conjunction with Unit PMCS if: a. There is a delay between daily operation of the machine and Unit PMCS. b. The regular operator is not assisting.	

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Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	**Initial 250 Hours**		**Transmission**	NOTE Transmission oil filter should be replaced after initial 250 hours of operation of a new or reconditioned machine. Replace transmission oil filter (WP 0072 00) if machine is new or reconditioned.	
2	**250 Hours or Semi-annual**	**0.5 Hours**	**Front Axle Final Drives**	Check level of oil in each wheel end final drive: a. Position front wheels with plug on center line with front axle. b. Clean area around plug. c. Remove plug. d. Maintain oil level to plug opening. If level is low, add gear lubricating oil (Item 21, 22 or 23, WP 0171 00). e. Clean plug and install.	
					
3	**250 Hours or Semi-annual**	**0.2 Hours**	**Front Axle Differential**	Level check of oil in front axle differential: a. Clean area around level/fill plug, located on front face of differential. b. Remove level/fill plug.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

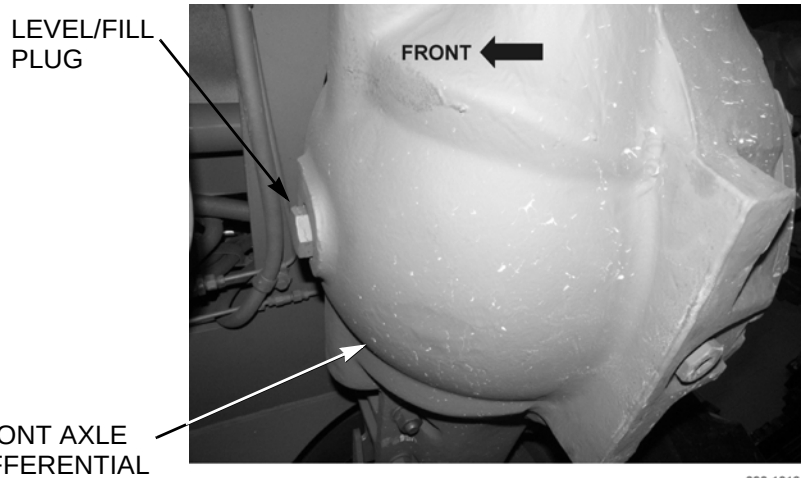
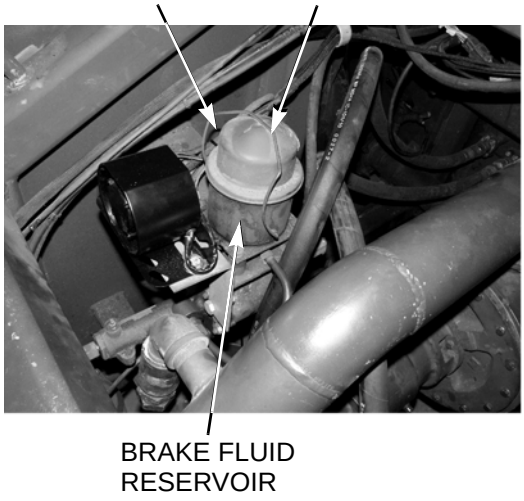
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
3 (Con't)	**250 Hours or Semi-annual**	**0.2 Hours**	**Front Axle Differential**	c. Maintain oil level to level/fill plug opening. If level is low, add gear lubricating oil (Item 21, 22 or 23, WP 0171 00). d. Clean level/fill plug and install.	
					
4	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	**CAUTION** Use caution to ensure dirt and debris are not introduced into reservoirs. Contamination of brake fluid could result. **NOTE** • There is a brake fluid reservoir on both tractor and water distributor. On tractor, reservoir is located inboard of right fender. On water distributor, reservoir is located under water distributor rear steps. • Water distributor reservoir is illustrated. a. Wipe cover of reservoir clean with a clean rag (Item 31, WP 0171 00). b. Release retainer and remove cover. Clean diaphragm with a clean rag. Remove diaphragm.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	c. Brake fluid level should be 1/2 in. (13 mm) down from top of reservoir. Add brake fluid (Item 4, WP 0171 00) as required. d. Ensure diaphragm and cover are clean. Install diaphragm and cover. Secure cover with retainer.	



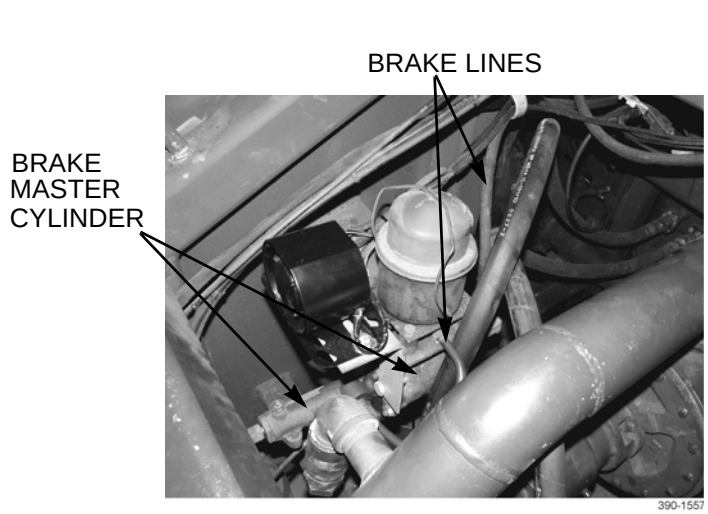


NOTE

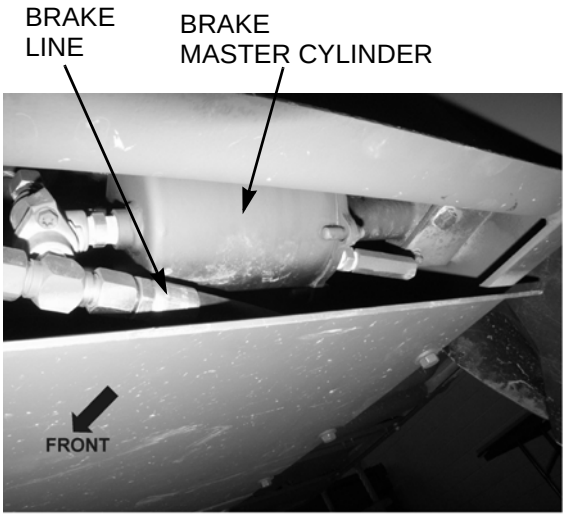
- There is one brake master cylinder on water distributor and two on tractor.
- Brake master cylinder on water distributor is located under rear steps.
- Brake master cylinders on tractor are located under tractor, above right-rear corner of rear belly guard plate. One cylinder is mounted laterally; the second one is above the first, mounted longitudinally.

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4 (Con't)	**250 Hours or Semi-annual**	**0.6 Hours**	**Brake Fluid Reservoirs, Master Cylinders, Brake Lines, and Fittings**	Inspect brake master cylinder(s), brake lines, and fittings for leaks or damage. Replace any damaged or leaking component.	



WATER DISTRIBUTOR

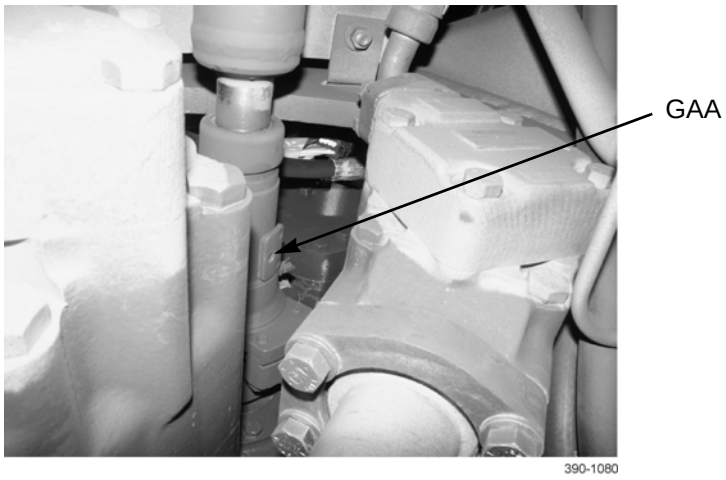


TRACTOR

5	**250 Hours or Semi-annual**		**Drive Belts**	a. Inspect drive belts for general condition: check for cracks, missing pieces, frayed areas, and wear. A worn belt will ride in the bottom of the pulley or will be stretched beyond limits of adjuster. Replace worn or damaged belt (WP 0032 00). b. Check adjustment of drive belts: A correctly adjusted belt will deflect 1/2-3/4 in. (13-19 mm) when a deflection force of 25 lb (110 N) is applied midway between pulleys. Adjust belt tension as required (WP 0032 00).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
6	**250 Hours or Semi-annual**	**0.3 Hours**	**Drive Shafts**	a. Wipe grease fitting on upper drive shaft slip joint clean. b. Apply GAA grease (Item 16, WP 0171 00) to grease fitting.	



				c. Wipe grease fittings on lower drive shaft clean. d. Apply GAA grease (Item 16, WP 0171 00) to grease fitting.	



Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	250 Hours or Semi-annual	0.6 Hours	Engine Oil and Filter	NOTE • Machine should be parked on level ground, with transmission in Neutral (N) and locked and parking brake applied. Shut down engine. • Drain crankcase while oil is warm. • Engine crankcase capacity is 7.8 gal. (30 L). • Clean area around fill cap and drain plug prior to removing. a. Remove engine oil fill cap inside engine compartment. b. Access oil pan by removing access panel from middle guard plate under tractor. c. Open draincock and drain oil into a suitable container. Dispose of drained oil in accordance with local policy and ordinances. Close draincock and reinstall access panel to middle guard plate.	



				d. Replace engine oil filter (WP 0013 00).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

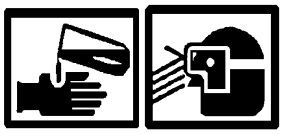
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8	**500 Hours or Semi-annual**	**0.6 Hours**	**Fuel System**	 WARNING • DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death to personnel. • Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. a. Replace fuel system primary and secondary filters (TM 5-3800-205-23-3 and WP 0021 00 of this manual). b. Disassemble and clean fuel tank cap: (1) Remove fuel tank cap. (2) Remove gasket from cap and inspect for damage. Replace gasket if damaged.  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. (3) Disassemble fuel tank cap: Remove valve assembly, washer, baffle, gasket, and filter elements.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

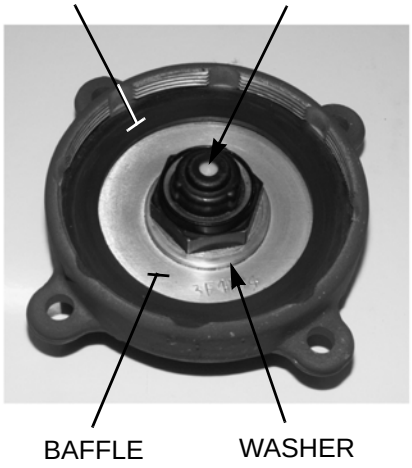
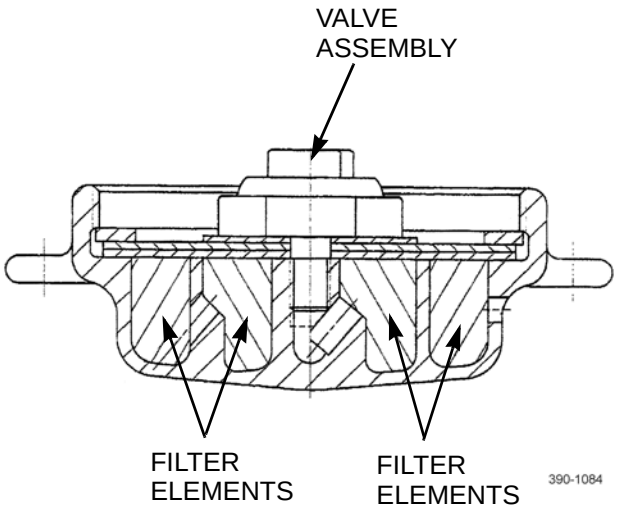
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8 (Con't)	**500 Hours or Semi-annual**	**0.6 Hours**	**Fuel System**	(4) Clean elements in solvent cleaning compound (Item 6, WP 0171 00). Inspect all parts for damage and replace as needed. (5) Apply a thin coat of oil (Item 24, WP 0171 00) to filter elements and assemble cap. Tighten valve assembly to 177 lb-in. (20 Nm). Install fuel cap gasket.	
				 		
				f. Remove strainer from filler neck of fuel tank. Clean strainer in dry cleaning solvent (Item 6, WP 0171 00). g. Install strainer into filler neck. Install fuel tank cap and tighten securely.	
9	**500 Hours or Semi-annual**	**1.0 Hours**	**Hydraulic System**	a. Replace hydraulic system oil filter elements (WP 0115 00). Do NOT change hydraulic system oil at this time (Refer to *Annual* interval). b. Clean hydraulic tank relief valve (WP 0118 00).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
10	**Semiannual**		**Engine Crankcase Breather Assembly**	Open engine access door and access engine crankcase breather assembly on left side of engine compartment. Clean breather: a. Loosen clamp and remove hose from cover of breather. b. Remove bolt, washer, cover, and breather element. c. Inspect cover seal for damage. Replace seal if damaged.  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. • 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.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
10 (Con't)	**Semiannual**		**Engine Crankcase Breather Assembly**	d. Wash breather element in solvent cleaning compound (Item 6, WP 0171 00). Shake dry or dry using compressed air. e. Inspect hose and replace if damaged. f. Install breather element and cover with washer and bolt. Tighten bolt to 62 lb-in (7 Nm). g. Install hose to cover and tighten clamp.	

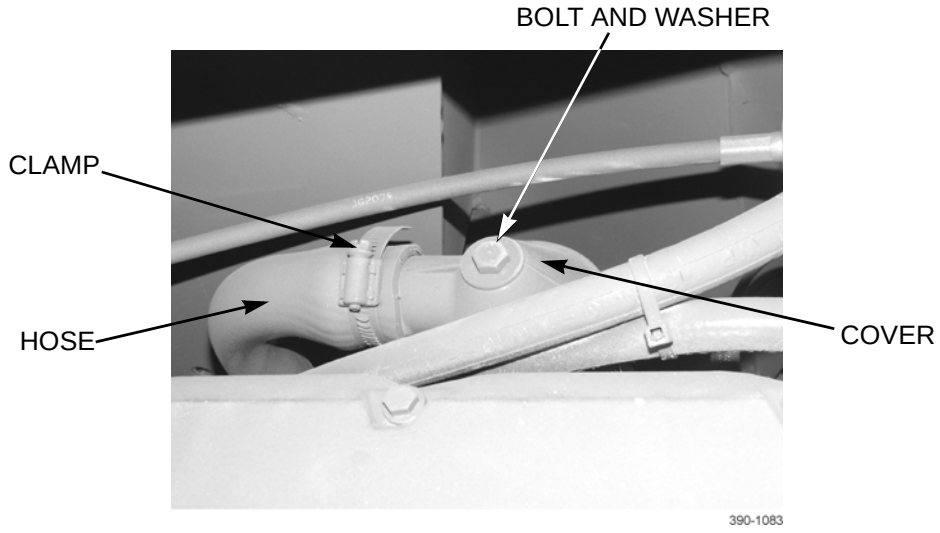


Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
11	Semiannual		Batteries	 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. CAUTION • If battery compartment is corroded, it will be necessary to remove batteries and clean compartment to remove acid residues and corrosion. • Buildup of dirt or corrosion on batteries may lead to electrical malfunctions. Service batteries as follows: a. Access batteries inside engine air filter and battery compartment. b. Check battery hold-down for looseness, corrosion or damage. c. Clean top of batteries with a clean rag (Item 31, WP 0171 00). d. Inspect batteries for evidence of a cracked case and electrolyte leakage. e. Disconnect battery cables (WP 0067 00).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
11 (Con't)	**Semiannual**		**Batteries**	NOTE • If machine is equipped with original equipment maintenance-free batteries, batteries will have no filler caps; electrolyte level cannot be checked. • Skip steps f through i if batteries are maintenance free. f. Ensure all battery filler caps are present. g. Remove batteries (WP 0067 00). h. Remove filler caps and check electrolyte level in battery cells. Electrolyte level should be to bottom of filler openings. Add distilled water as required and reinstall filler caps snugly. i. As required, use a baking soda solution of 4 oz (100 grams) of baking soda with 1 qt (1 L) of clean water to remove any acid film from batteries. Rinse with clean water. Reinstall batteries (WP 0067 00). j. Clean battery terminals with a fine grade of sandpaper or emery cloth (Item 7, WP 0171 00). k. Connect battery cables (WP 0067 00). Coat terminal connections with petrolatum (Item 30, WP 0171 00).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

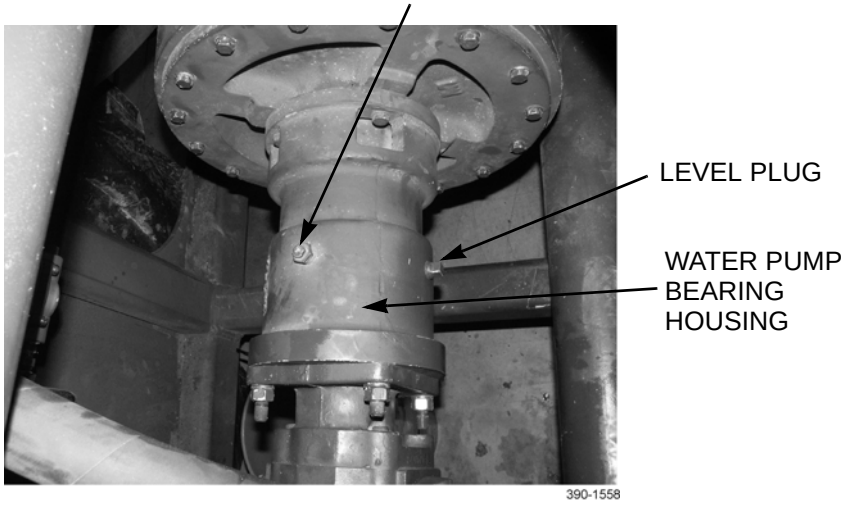
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
12	Semiannual		ROPS/FOPS	a. Inspect for cracked welds, bends, breaks, chipped/missing paint or corrosion. Do NOT attempt to straighten ROPS/FOPS or repair welds. Replace ROPS/FOPS if damaged (WP 0098 00). b. Check for loose or missing mounting bolts, washers, and nuts. Install new mounting hardware or tighten as required. Apply torque of 317 lb-ft (430 Nm).	
13	Semiannual		Seat Belt	a. Inspect seat belt for security of mounting, worn or frayed strap webbing or worn or damaged buckle and anticreep slides. Replace seat belt if damaged (WP 0104 00). NOTE Date label attached to seat belt indicates age of belt. b. Replace seat belt, regardless of condition, if it has been in service for three years (WP 0104 00).	
14	Semiannual		Electrical Ground Connections	Inspect electrical ground connections on machine for secure connection and evidence of cracked insulating varnish. If connection is loose or there is cracking in protective coating, disconnect connection, clean, thoroughly dry, and reconnect. Apply insulating varnish (Item 19, WP 0171 00) to connection in accordance with manufacturer's instructions on packaging.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
15	**Semiannual**		**Wheels and Tires**	a. Inspect tires for general condition and proper inflation of 45 psi (310 kPa). Replace any missing valve stem caps. b. Inspect tires for wear. If tread depth is 10 mm (0.39 in.) or less, or if operator has reported a critical loss of traction, replace tires (WP 0096 00 or TM 5-3800-205-23-2). c. Check for loose or missing lug nuts. Correct lug nut torque is 370 lb-ft (500 Nm). d. Inspect brake discs for excessive scoring and pitting. Replace if excessively scored or pitted (WP 0080 00 or TM 5-3800-205-23-2).	
16	**Semiannual**	**0.3 Hours**	**Water Pump Bearing Housing**	Check level of oil in bearing housing of water pump: a. Access water pump under steps at rear of water distributor. b. Clean area around level and filler plugs with a clean rag (Item 31, WP 0171 00). c. Remove level plug. Oil should be level with plug. d. If level is low, remove filler plug and add oil (Item 24 or 29, WP 0171 00) until drainage is noted from level plug. Clean level and filler plugs and install.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
16 (Con't)	Semiannual	0.3 Hours	Water Pump Bearing Housing		



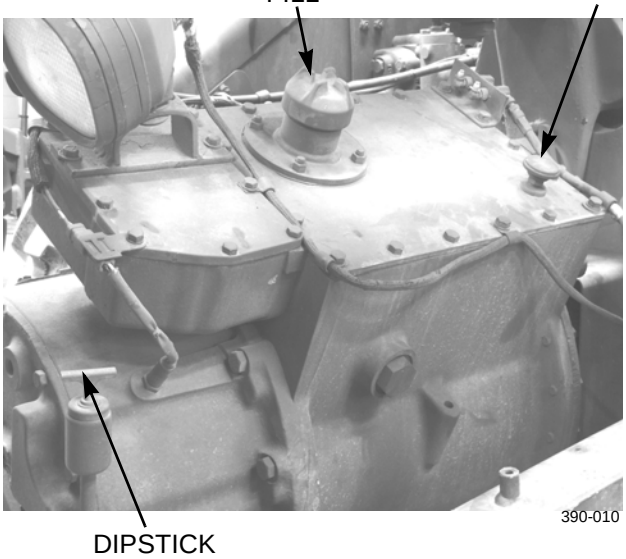
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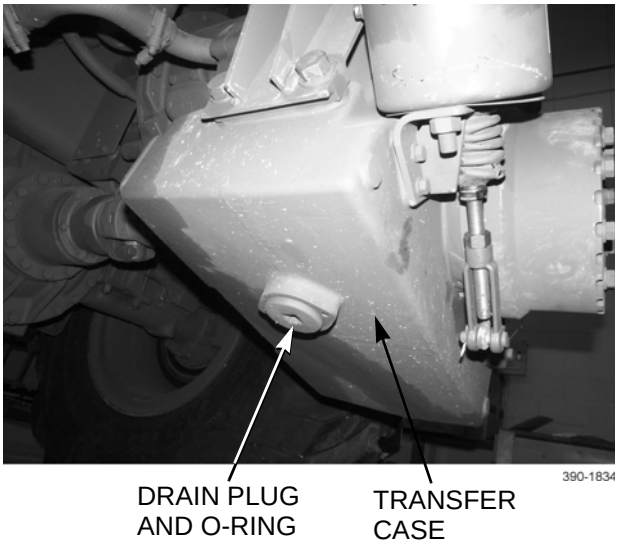
Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
17	1000 Hours or Annual	1.0 Hours	Transmis-sion	NOTE • Machine should be parked on level ground, with transmission in Neutral (N) and locked with parking brake applied. Shut down engine. • Transmission fluid will drain easier if warm. • Transmission fluid capacity is 9.2 gal. (35 L). • Clean area around fill cap and drain plug prior to removing. a. Remove cap from transmission fill. CAUTION Install drain tool finger tight only until oil starts to drain. If drain tool is forced into valve, damage to valve and leakage will result.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
17 (Con't)	**1000 Hours or Annual**	**1.0 Hours**	**Transmission**	b. Remove drain plug and O-ring from transfer case. Insert drain tool into drain valve and turn tool finger tight to drain transmission fluid into a suitable container. Dispose of fluid in accordance with local policy and ordinances. Discard O-ring. Clean drain plug and reinstall, using a new O-ring.	





				c. Replace transmission oil filter (WP 0072 00). d. Remove, clean, and reinstall transmission oil suction screen and tube assembly (magnetic screen) (WP 0074 00). e. Remove, clean, dry, and reinstall transmission breather.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
17 (Con't)	**1000 Hours or Annual**	**1.0 Hours**	**Transmis-sion**	f. Refill transmission with oil (Item 24, 27, 28 or 29, WP 0171 00) through fill opening until reading on dipstick is at COLD MIN SAFE TO START with engine cold. g. Start engine and bring transmission to operating temperature. Fluid level should be within cross-hatched area, between ADD and FULL marks on dipstick.	
18	**1000 Hours or Annual**		**Engine Valve Lash Check**	Notify DS Maintenance to check and adjust engine valve lash as required.	

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Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19	**2000 Hours or Annual**	**1.0 Hours**	**Front Axle Differential and Final Drives**	NOTE • Front axle final drive capacity is 1.5 gal. (6 L). • Front axle differential capacity is 5 gal. (19 L). • Clean area around fill and drain plugs prior to removing. a. Park machine on level ground with plugs at wheel end final drives oriented at 6 o'clock. Remove plug, O-ring, and seal at each wheel end and drain oil into a suitable container. Dispose of oil in accordance with local policy and ordinances. Discard plug O-ring and seal. b. Remove level/fill plug from differential. Remove drain plug and seal and drain oil. Discard seals. Clean drain plug and reinstall with a new seal.	

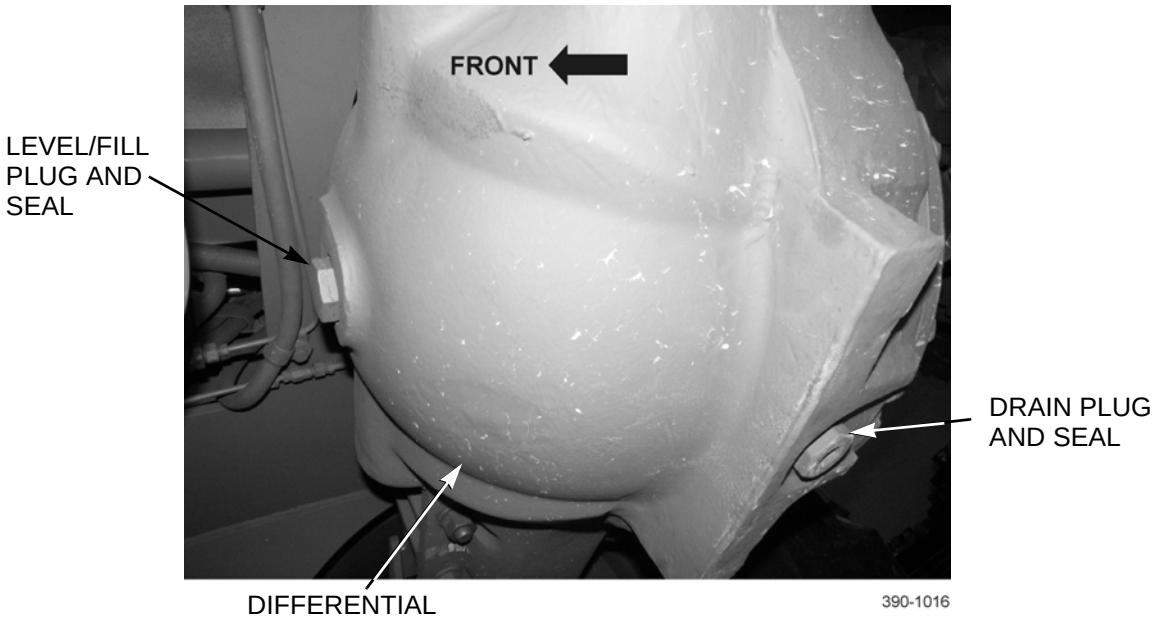


Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

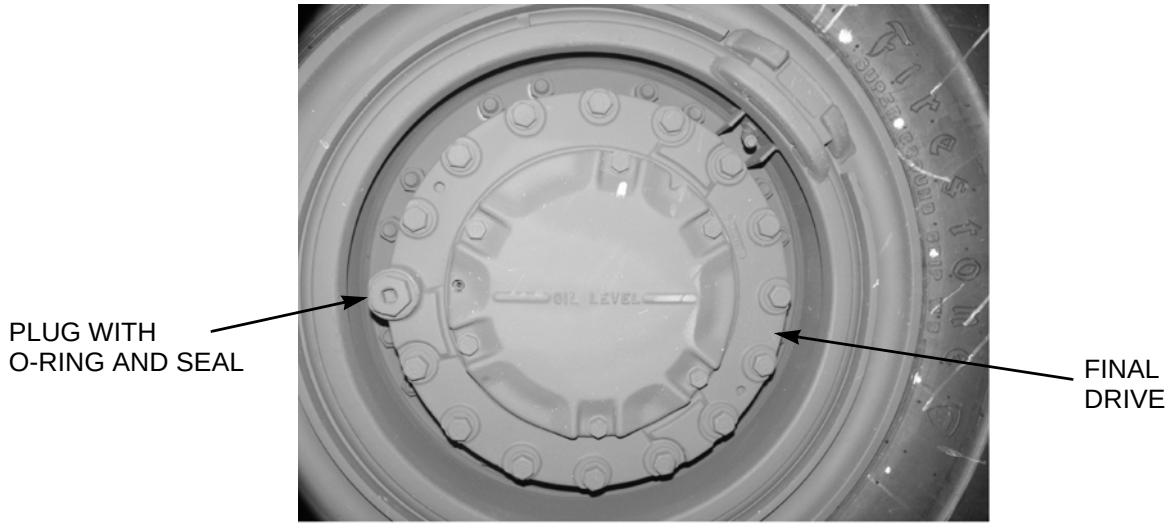
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19 (Con't)	**2000 Hours or Annual**	**1.0 Hours**	**Front Axle Differential and Final Drives**	c. Position machine so that plugs at wheel end final drives are at 3 or 9 o'clock.	
					
				d. Add oil (Item 21, 22 or 23, WP 0171 00) to differential through level/fill opening until oil is level with opening. Clean level/fill plug and reinstall with a new seal. e. Add oil (Item 21, 22 or 23, WP 0171 00) at each wheel end until level with opening. Clean plug and reinstall with a new O-ring and seal.	
20	**2000 Hours or Annual**	**4.0 Hours**	**Rear Axle Wheel Bearings**	Notify DS Maintenance to remove, clean, inspect, pack with GAA grease (Item 16, WP 0171 00), and install rear axle wheel bearings (TM 5-3800-205-23-3).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21	2000 Hours or Annual	1.0 Hours	Hydraulic System	NOTE • Hydraulic tank capacity is 24.5 gal (93 L). • Perform service with machine on level ground, tank lowered, transmission in Neutral (N) and locked, parking brake applied, and engine shut down. Oil should be warm. • Clean area around fill cap and drain plug before removing. a. Remove fill cap. CAUTION Install drain tool finger tight only until oil starts to drain. If drain tool is forced into valve, damage to valve and leakage will result. b. Remove drain plug and O-ring from bottom of hydraulic tank. Insert drain tool into drain valve and turn tool finger tight to drain oil into a suitable container. Dispose of oil in accordance with local policy and ordinances. Discard O-ring. c. Clean drain plug and reinstall with a new O-ring.	

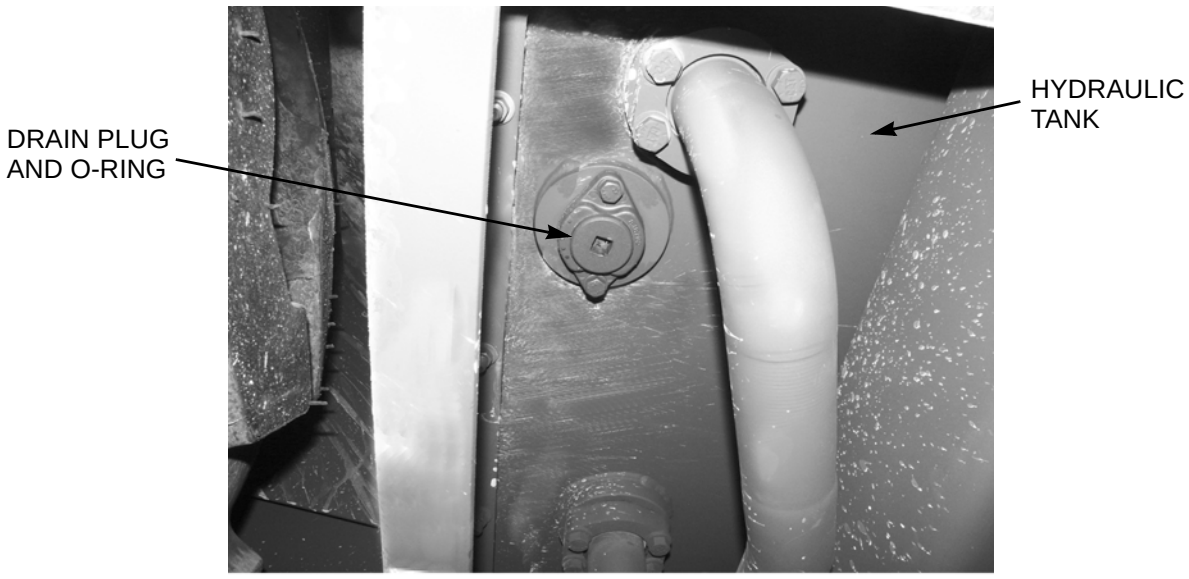


Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21 (Con't)	**2000 Hours or Annual**	**1.0 Hours**	**Hydraulic System**	d. Remove, clean, inspect, and reinstall relief valve (WP 0118 00). e. Replace hydraulic system oil filters (WP 0115 00). f. Remove retaining ring and clean strainer at fill opening. Reinstall strainer. g. Inspect fill cap gasket and replace if damaged. h. Fill tank with oil (Item 24 or 29, WP 0171 00) until oil is visible in sight gage. Install fill cap. i. Start engine and bring hydraulic system to operating temperature. Oil level must be above bottom line on sight gage. Add oil as required.	



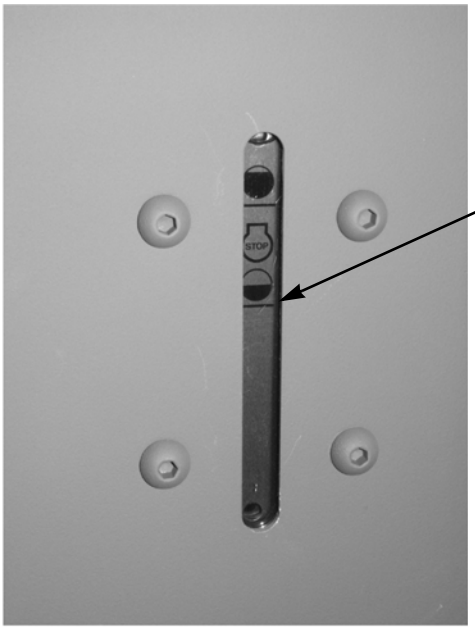
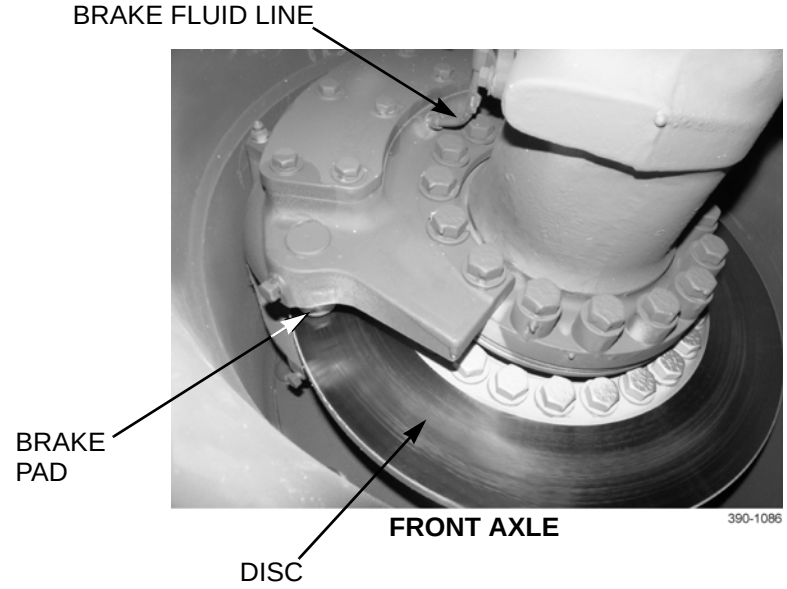


Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
22	Annual		Road Test	a. Road test machine. Operate all machine controls, check for proper operation, and listen for abnormal noise or vibrations. b. Observe hitch area during road test for play in hitch and steering linkage. There should be no noticeable play at hitch and steering linkage.	
23	Annual		Fuel Tank Drain	 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. • Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to do so may result in injury to personnel. Access fuel tank drain valve inboard of right-rear tire. Attach a suitable drain hose, open drain valve, and drain any water/sediment from fuel tank into a suitable container. Close drain valve and remove drain hose.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

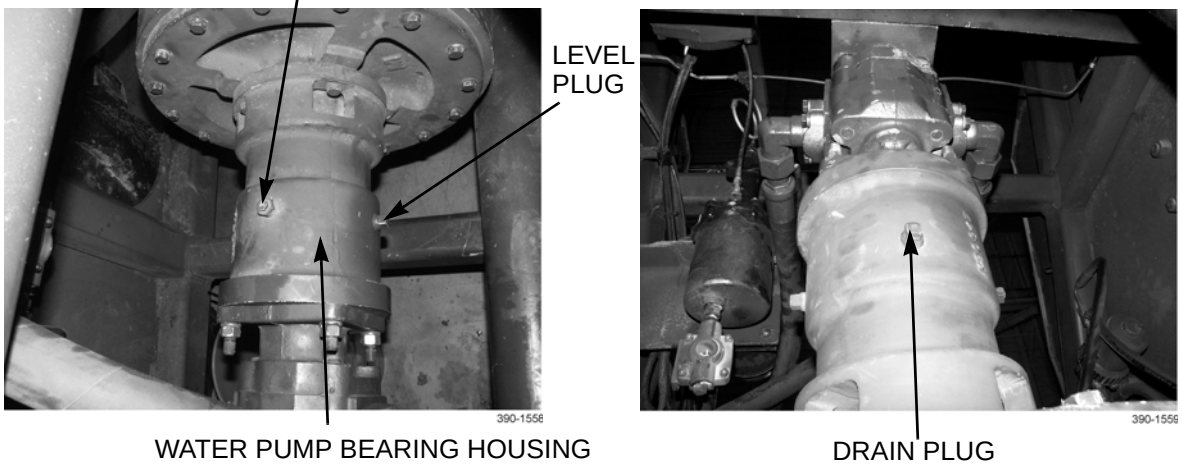
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
24	**Annual**		**Brakes (All Wheels)**	a. Inspect service brake pads for damage, wear, and loose mounting. Measure thickness of lining. If less than 0.50 in. (12.7 mm), replace lining (WP 0084 00 or TM 5-3800-205-23-3). b. Inspect brake discs for distortion, cracks, excessive scoring or wear. Replace if damaged (WP 0080 00 or TM 5-3800-205-23-3). c. Inspect brake fluid lines and fittings for looseness, damage or leaks.	



FRONT AXLE

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
25	**Annual**	**0.5 Hours**	**Water Pump Bearing Housing**	Change oil in water pump bearing housing: a. Access water pump under steps at rear of water distributor. b. Clean area around drain, level, and filler plugs with a clean rag (Item 31, WP 0171 00). c. Remove drain plug and allow oil to drain into a suitable container. Dispose of oil in accordance with local policy and ordinances.	



				d. Clean drain plug and install. e. Remove level and filler plugs. f. Add oil (Item 24 or 29, WP 0171 00) until drainage is noted from level plug. Clean level and filler plugs and install.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION: ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
26	**Annual**		**Foot Valve Assembly**	Remove foot valve access plate and clean debris from foot valve screen. Reinstall plate (TM 5-3800-205-23-3).	
27	**Annual**		**Water Distributor Tank**	a. Remove, clean, and reinstall the following drain plugs: front tank drain, upper spray bar drain, and water pump housing drain. b. Inspect can breaker/bag cutter components at tank rear access opening for corrosion, looseness or other damage. Replace any damaged component (TM 5-3800-205-23-3). c. Inspect front inspection cover and rear access opening for corrosion or damage. Replace any damaged component (TM 5-3800-205-23-3).	
28	**Annual**		**Upper Spray Bar Spray Heads**	Inspect spray heads for corrosion, looseness or damage. Replace any damaged component (TM 5-3800-205-23-3).	
29	**Annual**		**Lower Spray Bar and De-icing Extension Nozzles**	Inspect nozzles on lower spray bar and de-icing extensions for corrosion, looseness or damage. Replace any damaged nozzle (TM 5-3800-205-23-3).	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
30	**Biennial**		**Crankshaft Vibration Damper**	a. Remove front guard parts under tractor to access front of engine (WP 0100 00).	
				NOTE Vibration damper has a weight located inside a silicone fluid-filled case.	
				b. Inspect damper for dents, cracks or evidence of leaks. If a fluid leak is found, determine type of fluid. Silicone fluid is transparent, viscous, smooth, and difficult to remove from surfaces. If leak is oil, crankshaft seals are suspect. Notify DS Maintenance if damper is dented, cracked or fluid leaks are evident.	

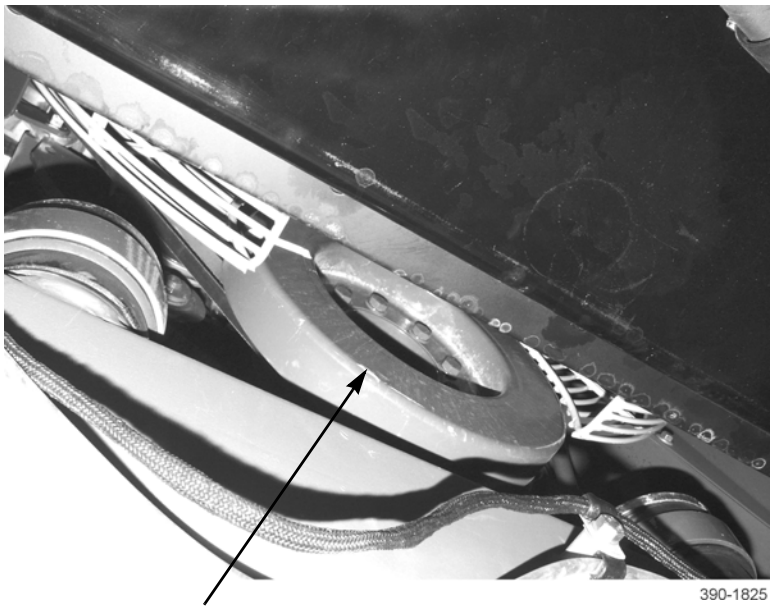


Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
31	**Biennial**	**1.5 Hours**	**Cooling System**	 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 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. NOTE Cooling system capacity is 9.9 gal. (38 L). a. Access engine compartment and remove cooling system pressure cap. b. Attach a suitable drain hose to draincock under right front of tractor. Open draincock and drain coolant into a suitable container. Dispose of coolant in accordance with local policy and ordinances. c. Flush cooling system with clean water until draining water is clear. d. Close draincock and remove drain hose.	

Table 8. Unit Preventive Maintenance Checks and Services (PMCS) for 613CWD Water Distributor- Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
31 (Con't)	**Biennial**	**1.5 Hours**	**Cooling System**		
				e. Replace thermostat (WP 0028 00). f. Add a 50/50 mixture of antifreeze (Item 2 or 3, WP 0171 00) to radiator. Leave radiator cap off. g. Start engine and run until thermostat opens and coolant level stabilizes. Maintain level 1/2 in. (13 mm) from bottom of filter neck. h. Inspect gasket of pressure cap and replace if damaged. Install cap.	



Table 9. Water Distributor PMCS Mandatory Replacement Parts List - Initial 250 Hours.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0719	2910-00-740-3593	Filter Element, Fluid Transmission	1
2	3J1907	5331-01-333-6444	O-ring	1
3	2S8439	5330-01-021-9880	Seal	1

Table 10. Water Distributor PMCS Mandatory Replacement Parts List - 250 Hours or Annual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0739	2940-00-029-0388	Filter Element, Fluid, Engine	1

Table 11. Water Distributor PMCS Mandatory Replacement Parts List - 500 Hours or Semiannual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0751	2910-01-424-7315	Filter Element, Fluid, Secondary Fuel Filter	2
2	117-4089	2910-01-443-6227	Filter Element, Fluid, Fuel/Water Separator	1
3	1328879	4330-01-509-0939	Filter Element, Fluid Hydraulic System	2

Table 12. Water Distributor PMCS Mandatory Replacement Parts List - 1000 Hours or Semiannual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1R0719	2910-00-740-3593	Filter Element, Fluid, Transmission (Annual)	1
2	3J1907	5331-01-333-6444	O-ring	1
3	5H7521	5331-00-555-3810	O-ring, Transmission Oil Section Screen Cover	1
4	2S8439	5330-01-021-9880	Seal	1

Table 13. Water Distributor PMCS Mandatory Replacement Parts List - 2000 Hours or Annual.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	1328876	4330-01-509-0939	Filter Element, Fluid, Hydraulic System	2
2	2S4663	5330-00-470-5727	Gasket, Valve Safety Relief	2
3	2767	5331-00-890-7586	O-ring, Front Axle Final Drive	2
4	5M2057	5331-00-855-8047	O-ring, Hydraulic Tank	1
5	3J1907	5331-01-333-6444	O-ring, Valve, Safety Relief	1
6	5P8132	5325-01-185-7726	Ring, Retaining	1

Table 14. Water Distributor PMCS Mandatory Replacement Parts List - Biennial.

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	195-7339	5330-01-508-2775	Gasket, Thermostat	1
2	126-5869	6685-01-474-2254	Thermostat	1

END OF WORK PACKAGE

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CHAPTER 4
UNIT LEVEL TRACTOR MAINTENANCE

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ROCKER ARM COVER REPLACEMENT 0011 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equpment, common no. 1 (Item 24, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

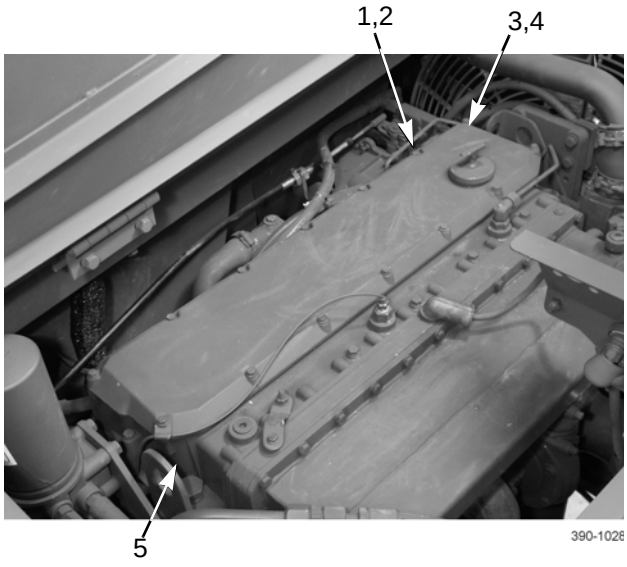
Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

REMOVAL

1. Remove 14 bolts (1), washers (2), rocker arm cover (3) and gasket (4) from intake manifold (5).
2. Inspect gasket (4) for damage. Discard gasket if damaged.



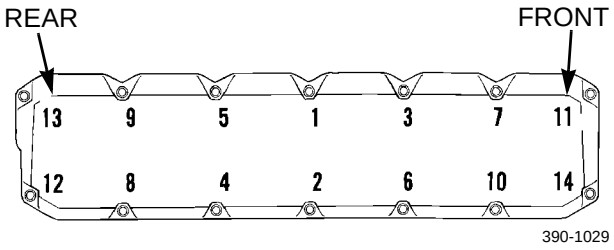
INSTALLATION

1. If gasket (4) was removed, clean any remaining gasket material from rocker arm cover (3).

NOTE

Adhesive is NOT required. Gasket is designed to be installed dry.

2. If removed, position new gasket (4) on intake manifold (5).
3. Install rocker arm cover (3) on cylinder head (5) with 14 washers (2) and bolts (1). Tighten bolts finger tight.
4. Tighten bolts (1) to 106 lb-in. (12 Nm) in sequence illustrated.



390-1029

5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

CRANKCASE BREATHER REPLACEMENT 0012 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

O-ring

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

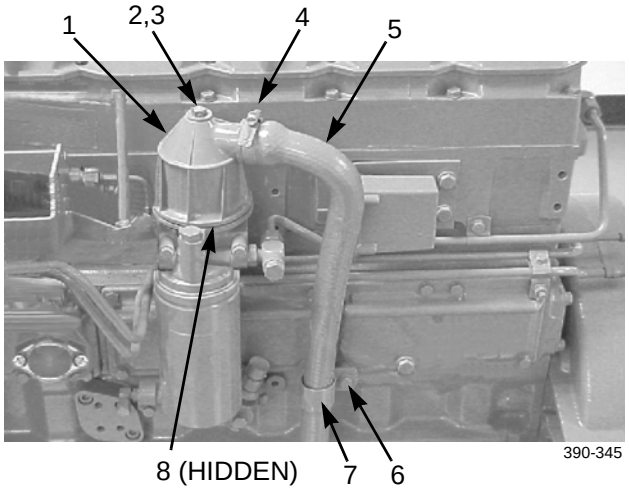
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Loosen clamp (4) and remove breather hose (5) from crankcase breather (1).
2. Remove bolt (2), washer (3), crankcase breather (1), and O-ring (8) from fuel filter base. Discard O-ring.
3. If breather hose (5) is damaged, loosen bolt (6) and remove breather hose from clip (7).



INSTALLATION

1. Install new O-ring (8) and crankcase breather (1) on fuel filter base with washer (3) and bolt (2). Tighten bolt to 62 lb-in. (7 Nm).
2. Position breather hose (5) on crankcase breather (1) and tighten clamp (4).
3. If removed, install breather hose (5) in clip (7) with bolt (6). Tighten bolt to 62 lb-in. (7 Nm).
4. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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ENGINE OIL FILTER REPLACEMENT 0013 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Filter element, fluid

Equipment Condition

Center guard plate removed (WP 0100 00)

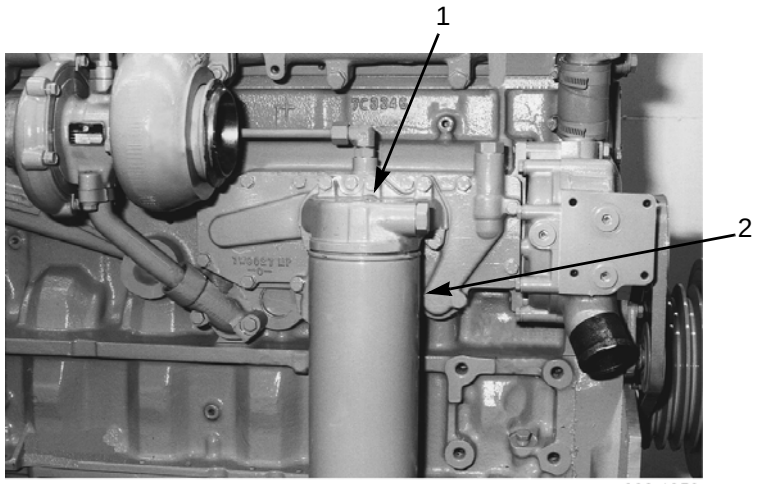
Engine oil drained (WP 0010 00)

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

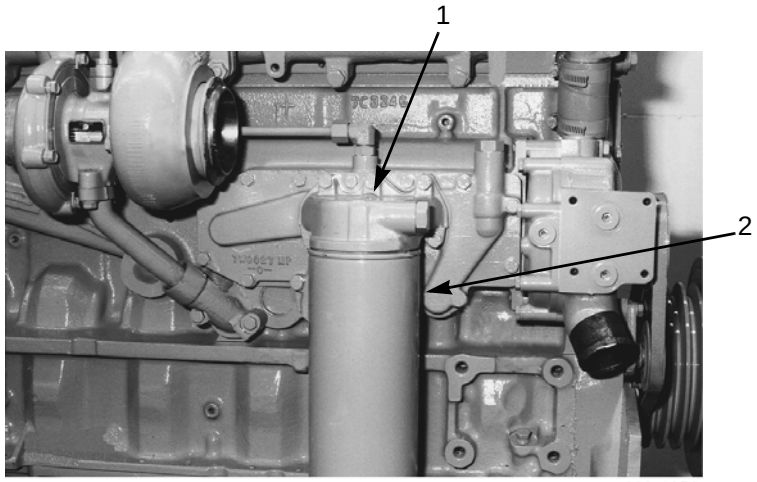
Slowly remove engine oil filter (2) from oil filter base (1).



390-1358

INSTALLATION

1. Apply a coat of clean engine oil to oil filter seal.
2. Install engine oil filter (2) on oil filter base (1) until seal contacts base, then tighten an additional 3/4 turn.



3. Fill engine oil (WP 0009 00 or WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

4. Start engine and check for leaks (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
5. Install center guard plate (WP 0100 00).

END OF WORK PACKAGE

ENGINE OIL PAN REPLACEMENT 0014 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Materials/Parts - Continued

Gasket

Personnel Required

Two

References

WP 0009 00

Equipment Condition

Engine oil drained (WP 0010 00)

Front and center guard plates removed (WP 0100 00)

REMOVAL

1. Remove 36 bolts (1) and washers (2) from engine oil pan (3).

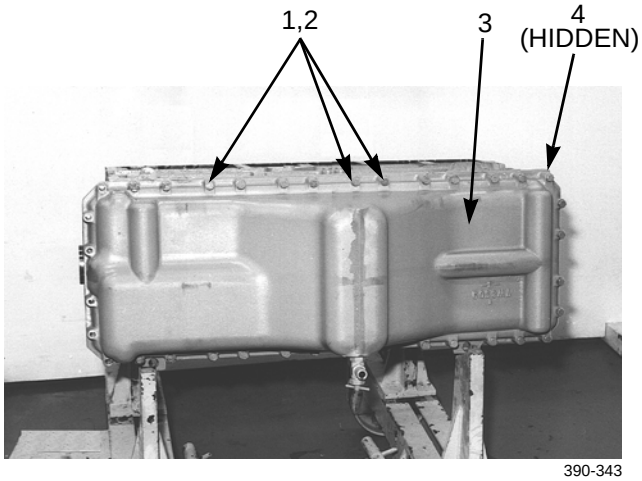
CAUTION

- Do NOT pry on engine oil pan. Damage to oil pan and/or engine mounting surfaces could result.
- Assistance is required when lowering oil pan due to size of oil pan. Failure to follow this caution may result in damage to oil pan.

NOTE

It may be necessary to tap lightly on oil pan with a rubber mallet to break seal between oil pan and engine block.

2. Lower engine oil pan (3) from engine.
3. Remove and discard oil pan gasket (4).



390-343

ENGINE NOT SHOWN

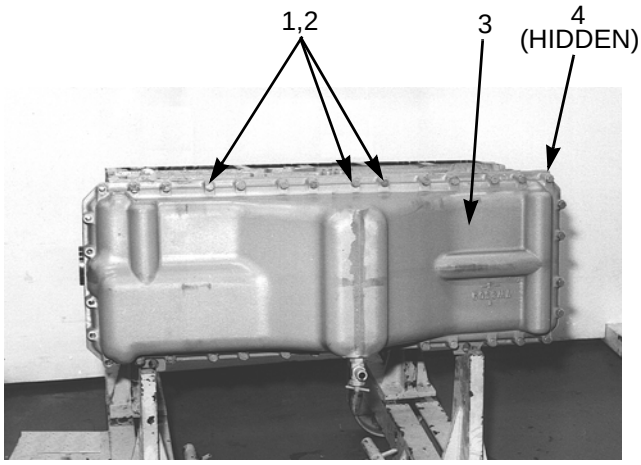
INSTALLATION

1. Clean mating surfaces of engine oil pan (3) and cylinder block.

NOTE

Do NOT apply liquid gasket material on oil pan or gasket surface of engine oil pan.

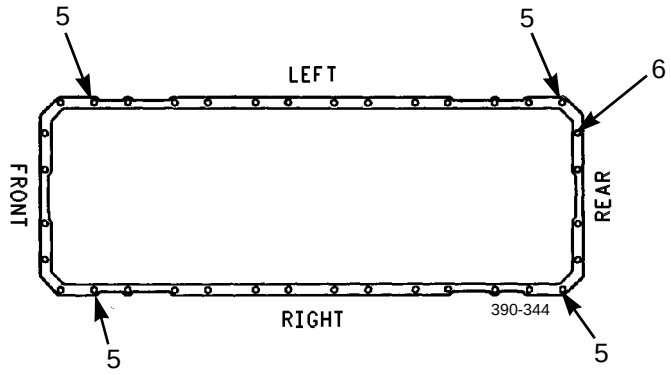
2. Position new gasket (4) on oil pan (3) and install engine oil pan on cylinder block with 36 washers (2) and bolts (1).



390-343

ENGINE NOT SHOWN

3. Tighten bolts (1) to 23 lb-ft (31 Nm) in the following sequence:
   a. Tighten four bolts (5).
   b. Starting with bolt (6), tighten remaining bolts in counterclockwise sequence.



4. Fill engine oil (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2), build up oil pressure, and stop engine. Check oil pan for leaks.
6. Install front and center guard plates (WP 0100 00).

END OF WORK PACKAGE

ENGINE OIL SAMPLING VALVE REPLACEMENT 0015 00

THIS WORK PACKAGE COVERS

Removal

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

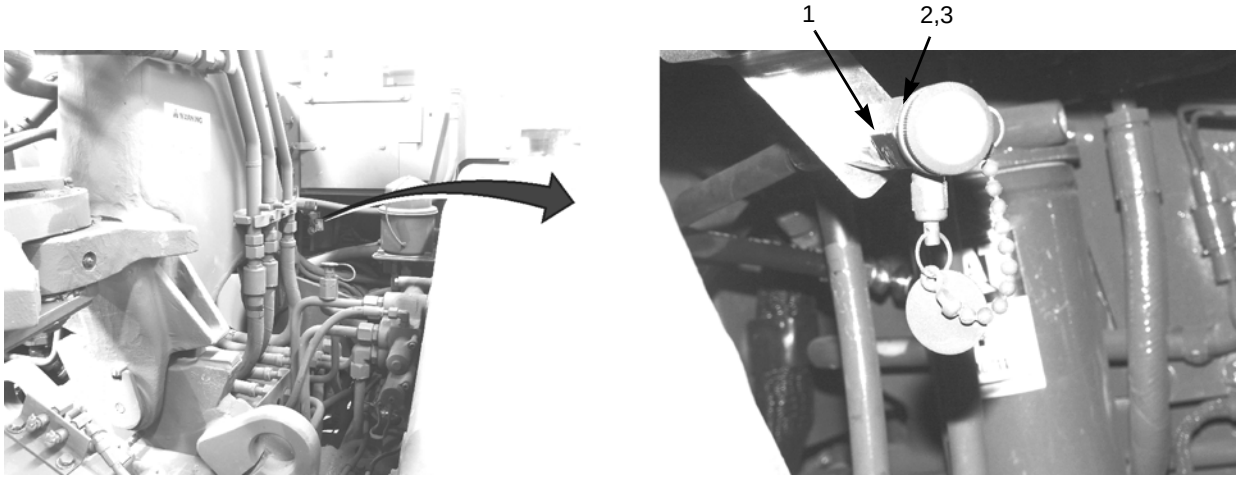
Wheel chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REPLACEMENT

1. Remove oil sampling valve (2) and O-ring (3) from fitting (1). Discard O-ring.
2. Lightly coat new O-ring (3) with clean oil.
3. Install new O-ring (3) and oil sampling valve (2) to fitting (1).

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390-991

REPLACEMENT - CONTINUED



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

4. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and build up oil pressure. Check for leaks.

END OF WORK PACKAGE

FUEL LINES AND FITTINGS REPLACEMENT 0016 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Fuel (Item 13, 14 or 15, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (as required)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite causing damage to machine and injury or death to personnel.
- Clean up all leaked or spilled fuel.

CAUTION

Cap all hoses to prevent fluid loss and contamination of fuel system.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with a suitable container before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and fittings to aid in installation.

REMOVAL

CAUTION

Use line wrenches to disconnect/connect fuel lines, to avoid damage to fittings.

NOTE

- Perform following steps to replace each of four tractor fuel hoses.
- Cut tiedown straps and remove screws and hose clamps as required to separate each hose from machine.

1. Disconnect hose (1) from fitting (2) at auxiliary fuel tank connector (3).

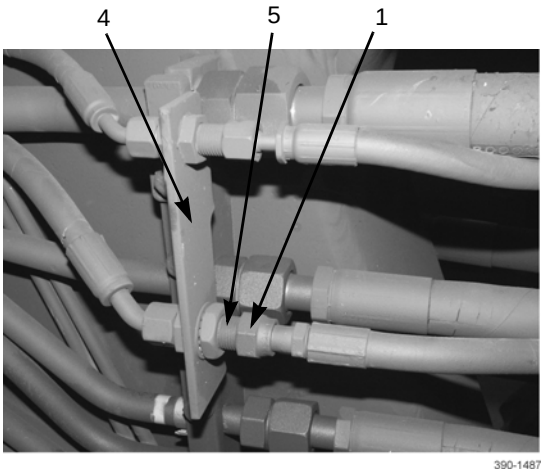


2. Disconnect other end of hose (1) from fitting (5) on bracket (4).
3. Remove hose (1) from machine.

NOTE

Fittings include elbows, jamnuts, lockwashers, adapters, O-rings, and tee. Discard O-rings when removed.

4. Remove fittings (2 and 5) from machine.



INSTALLATION

CAUTION

Use line wrenches to disconnect/connect fuel lines, to avoid damage to fittings.

NOTE

Coat new O-rings with fuel prior to installation.

1. Install new O-rings and fittings (2 and 5) on machine.
2. Position hose (1) on machine.
3. Connect hose (1) to fitting (5) on bracket (4).

NOTE

Install hose clamps, screws, and new tiedown straps to secure each hose to machine.

4. Connect other end of hose (1) to fitting (2) at auxiliary fuel tank connector (3).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for fuel leaks.
6. Close engine access dor (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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FUEL SHUTOFF SOLENOID REPLACEMENT 0017 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Wrench, spanner (Item 37, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24, 25, or 26, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Seal

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fuel. Fuel may ignite causing damage to machine and injury or death to personnel.

CAUTION

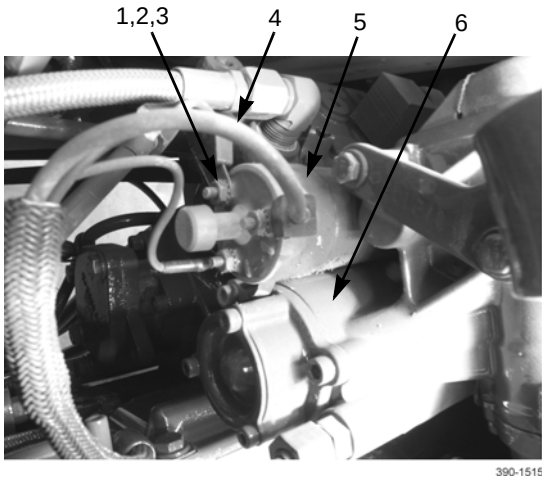
Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all wires to aid in installation.

REMOVAL

1. Remove three nuts (1), washer (2), two lockwashers (3), and three wires (4) from fuel shutoff solenoid (5).
2. Using spanner wrench and ratchet wrench, remove fuel shutoff solenoid (5) from fuel transfer pump/governor (6).
3. Remove and discard seal from fuel shutoff solenoid (5).



INSTALLATION

1. Apply a thin coat of engine oil to new seal and install seal on fuel shutoff solenoid (5).
2. Install fuel shutoff solenoid (5) on fuel transfer pump/governor (6). Tighten fuel shutoff solenoid to 22 lb-ft (30 Nm).
3. Install three wires (4) on fuel shutoff solenoid (5) with two lockwashers (3), washer (2), and three nuts (1).
4. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

AIR CLEANER ASSEMBLY MAINTENANCE 0018 00

THIS WORK PACKAGE COVERS

Precleaner Replacement

Air Cleaner: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Filter element, intake, primary

Filter element, intake, secondary

Equipment Condition

Batteries removed, if replacing air cleaner assembly (WP 0067 00)

Equipment Condition - Continued

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



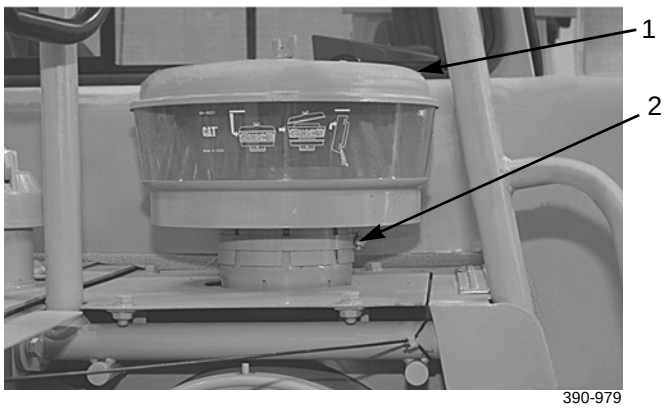
WARNING



- If NBC exposure is suspected, personnel wearing protective equipment should handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures. Failure to follow this warning may result in illness or death to personnel.
- NBC contaminated filters must be handled using adquate precautions (FM 21-10) and must be disposed by trained personnel. Failure to follow this warning may result in illness or death to personnel.

PRECLEANER REPLACEMENT

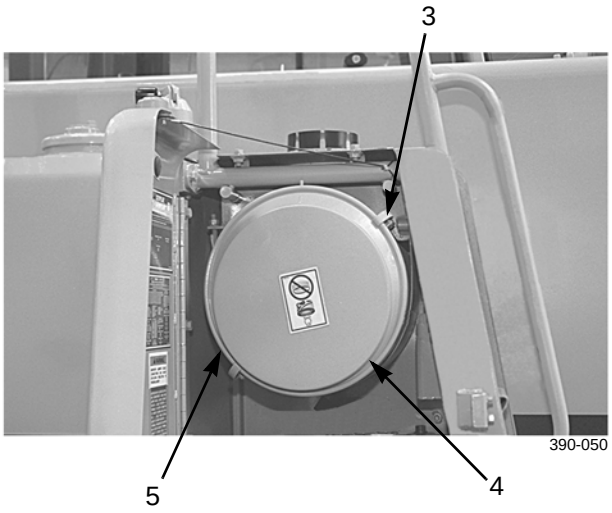
1. Loosen clamp (2) and remove precleaner (1) from air cleaner assembly.
2. Install precleaner (1) on air cleaner assembly and tighten clamp (2).



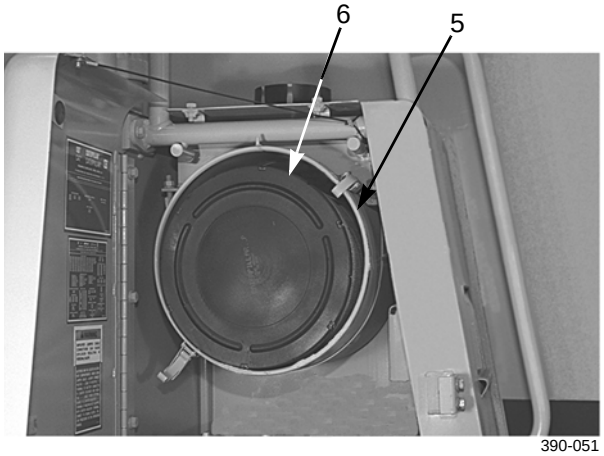
390-979

AIR CLEANER REMOVAL

1. Remove precleaner (refer to *Precleaner Replacement*).
2. Open two clamps (3) and remove cover (4) from air cleaner assembly (5).
3. Remove air filter primary element (6) from air cleaner assembly (5).

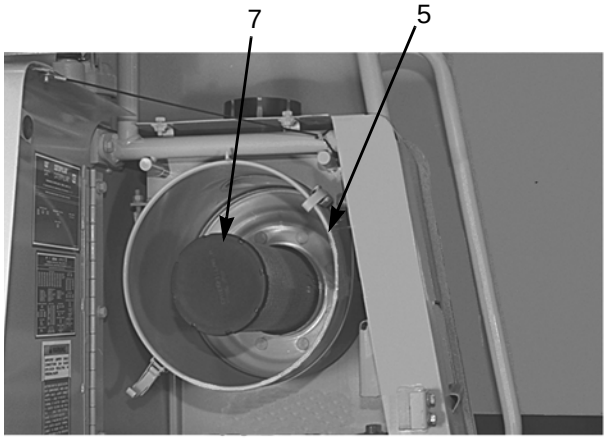


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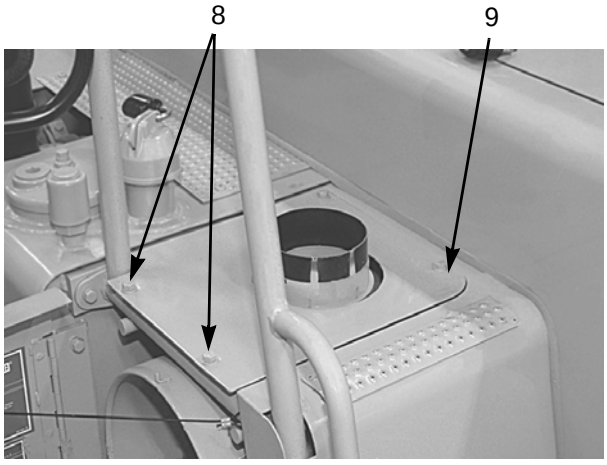


390-051

4. Remove air filter secondary element (7) from air cleaner assembly (5).
5. Remove four screws (8) from plate (9). Remove plate from cover assembly.



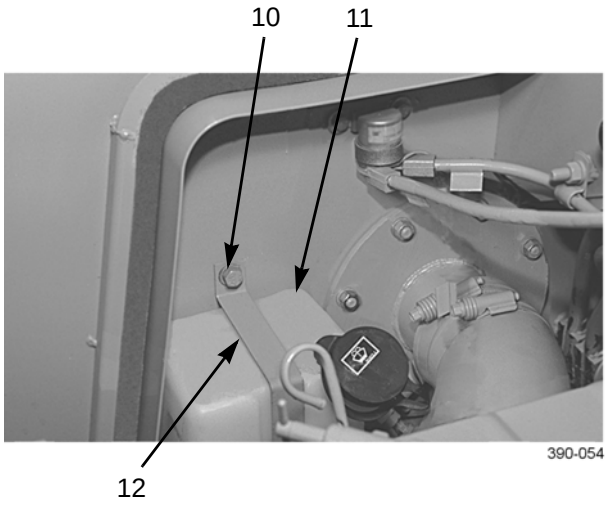
390-052

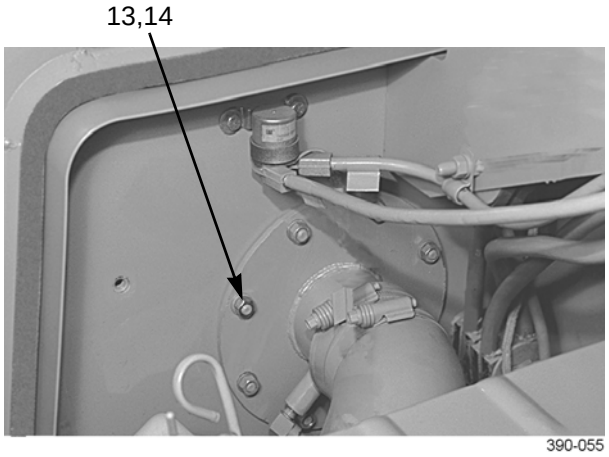


390-053

AIR CLEANER REMOVAL - CONTINUED

6. Remove bolt (10) and washer from bracket (12). Move bracket and windshield washer fluid reservoir (11) aside.
7. Remove eight nuts (13) and washers from studs (14).

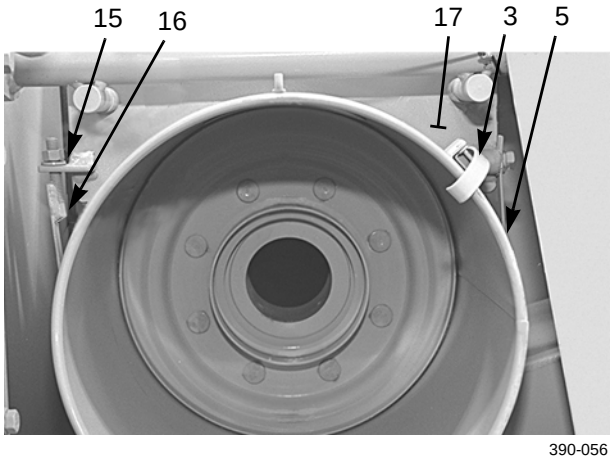


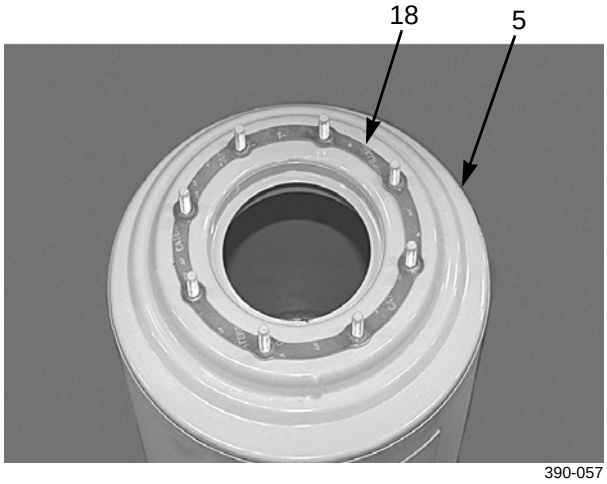


8. Remove nut (15) and washer from strap assembly (16). Disconnect strap assembly from mounting plate assembly (17). Lower strap assembly.
9. Lower air cleaner assembly (5) through mounting plate assembly (17). Move air cleaner assembly away from machine.
10. If gasket (18) was damaged during removal of air cleaner assembly (5), replace damaged gasket with a new gasket.

AIR CLEANER INSTALLATION

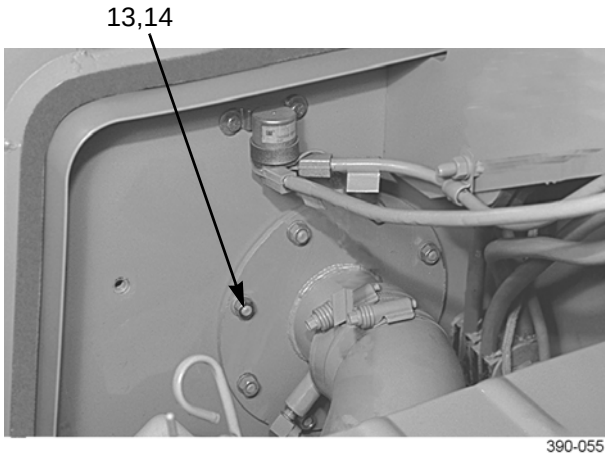
1. Install air cleaner assembly (5). Install strap assembly (16) in mounting plate assembly (17). Install washer and nut (15) on strap assembly.



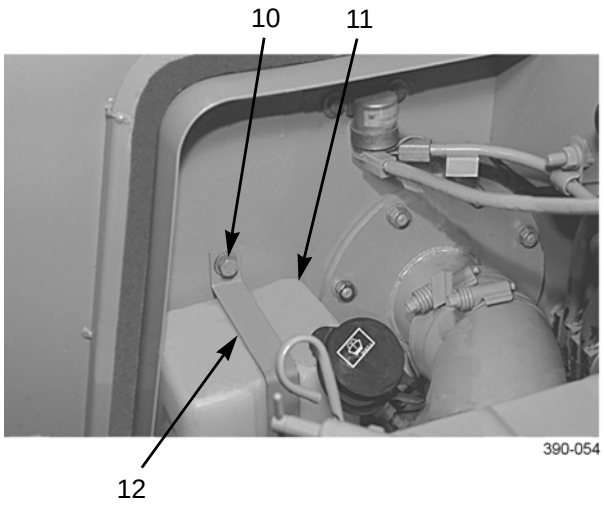


AIR CLEANER INSTALLATION - CONTINUED

2. Install eight washers and nuts (13) on studs (14).
3. Position bracket (12) and windshield washer fluid reservoir (11) to original position. Install washer and bolt (10) to secure bracket to machine frame.

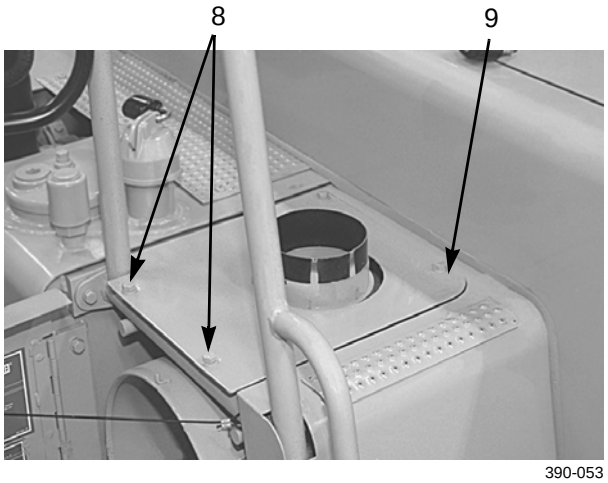


390-055

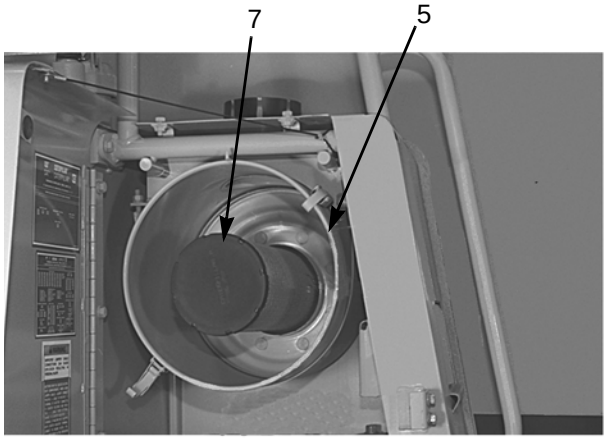


390-054

4. Install mounting plate (9). Install four screws (8) to secure mounting plate to machine frame.
5. Install a new air filter secondary element (7) in air cleaner assembly (5).



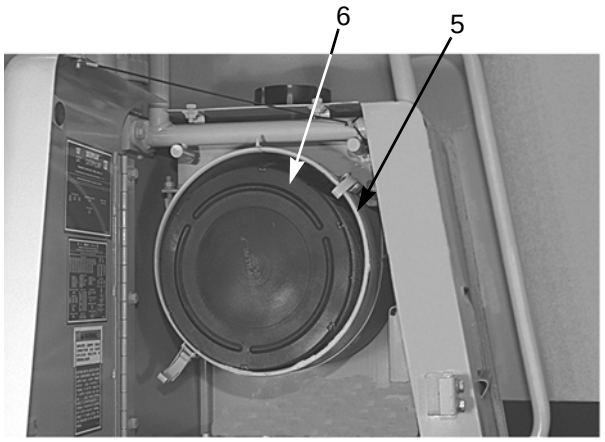
390-053



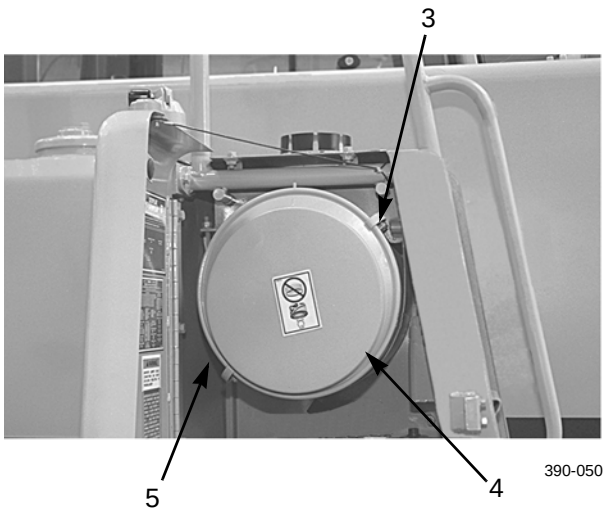
390-052

AIR CLEANER INSTALLATION - CONTINUED

6. Install a new air filter primary element (6) in air cleaner assembly (5).
7. Install cover (4) to air cleaner assembly (5). Close two clamps (3).
8. Install precleaner (Refer to *Precleaner Replacement*).
9. Install batteries (WP 0067 00).
10. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



390-051



390-050

END OF WORK PACKAGE

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AIR INTAKE HOSE REPLACEMENT 0019 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

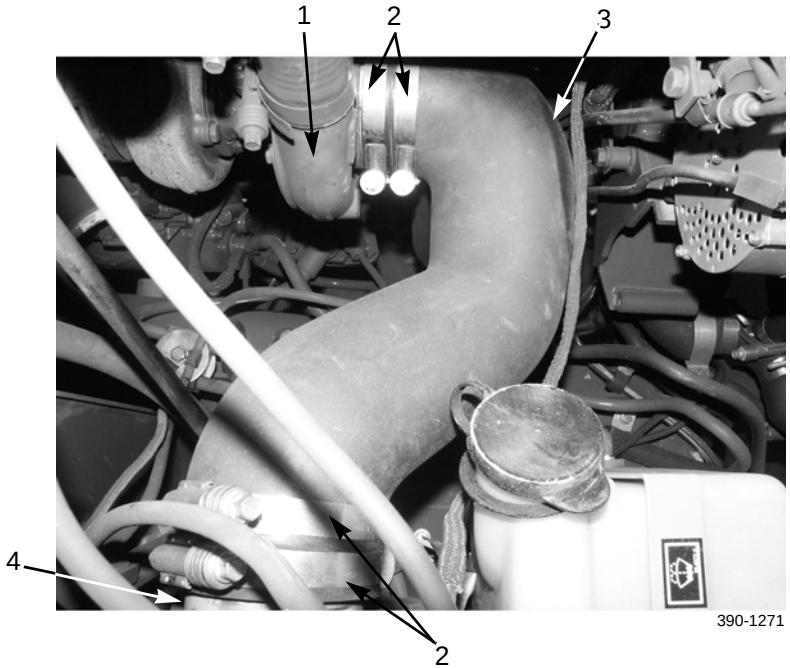
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REPLACEMENT

1. Loosen four hose clamps (2) and remove air intake hose (3) from turbocharger (1) and air cleaner flange (4).
2. Position air intake hose (3) on air cleaner flange (4) and turbocharger (1) and tighten four hose clamps (2).



3. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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FUEL GOVERNOR HOSES AND LINES REPLACEMENT 0020 00

THIS WORK PACKAGE COVERS

Fuel Hose: Removal, Installation

Fuel Tube: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Fuel (Item 13, 14 or 15, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (as required)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death to personnel.
- Clean up all leaked or spilled fuel.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

FUEL HOSE REMOVAL

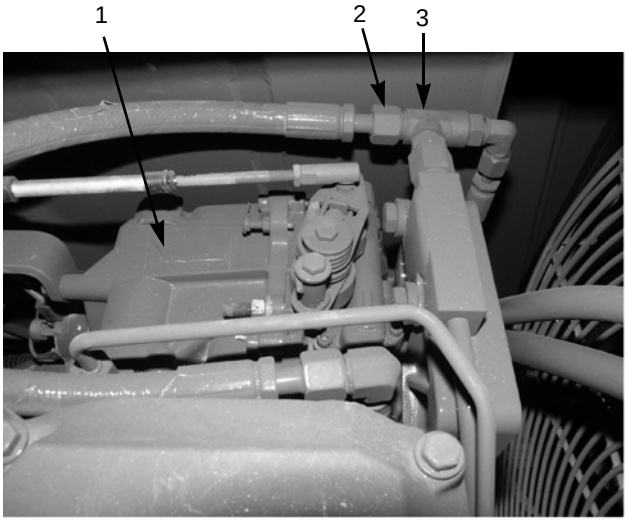
CAUTION

Use line wrenches to disconnect/connect fuel lines, to avoid damage to fittings.

NOTE

- Perform following steps to remove each of four fuel hoses.
- Fittings include elbows, tees, adapters, and O-rings. Discard O-rings when removed.

1. Remove hose (2) and fitting (3) from governor (1).

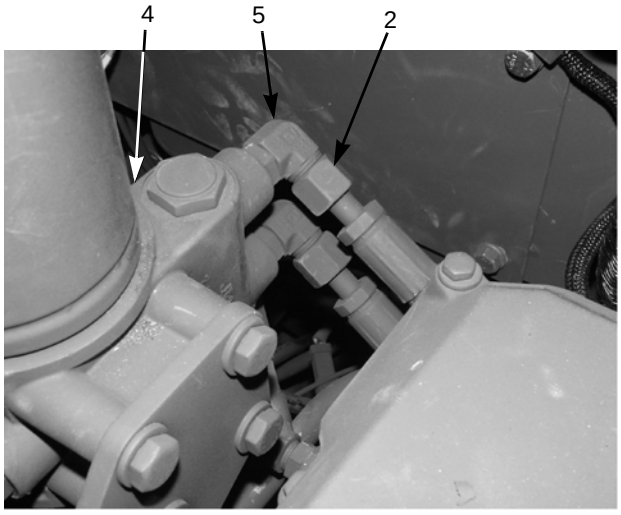


390-1282

NOTE

Cut tiedown straps and remove screws and hose clamps, as necessary, to separate each hose.

2. Remove other end of hose (2) and fitting (5) from secondary fuel filter (4).



390-1283

FUEL HOSE INSTALLATION

CAUTION

Use line wrenches to disconnect/connect fuel lines, to avoid damage to fittings.

NOTE

- Perform following steps to install each of four fuel hoses.
- Coat new O-rings with fuel prior to installation.

1. Install new O-rings.
2. Install fitting (5) and hose (2) on secondary fuel filter (4).
3. Install fitting (3) and other end of hose (2) on governor (1).
4. Install hose clamp, screws, and new tiedown straps, as needed, to secure hose (2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

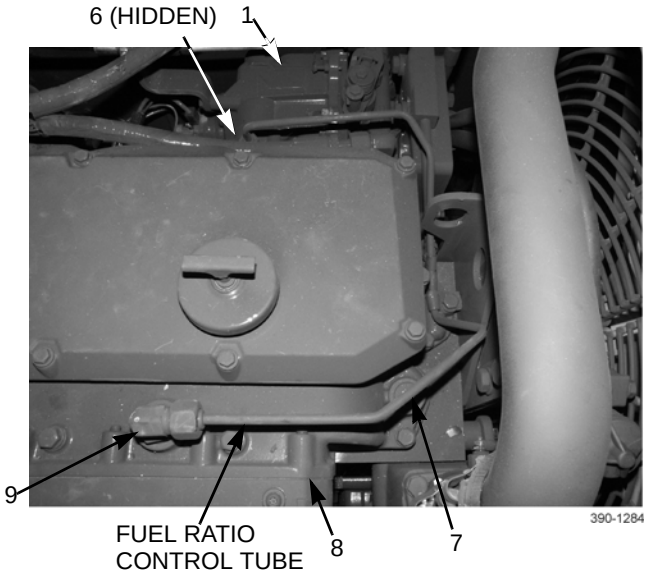
5. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for fuel leaks.
6. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

FUEL TUBE REMOVAL

NOTE

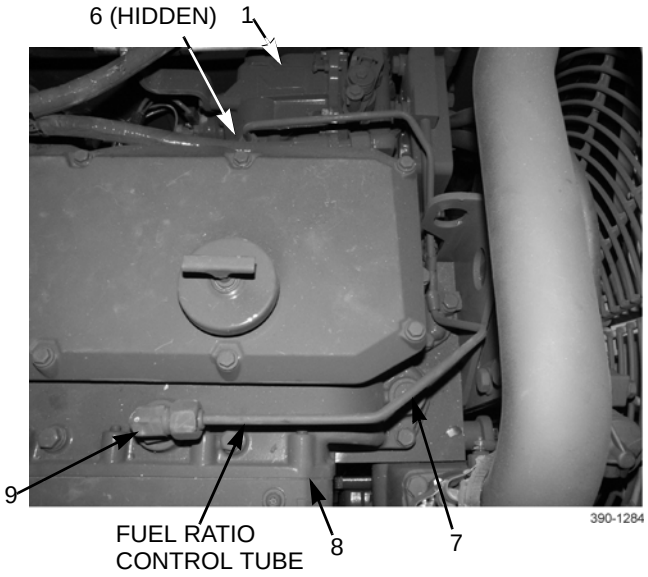
- Perform following steps to remove fuel ratio control tube or two fuel tubes.
- Fittings include elbows, adapters and O-rings. Discard O-rings when removed.

1. Remove fuel tube (7) and fitting (6) from governor (1).



FUEL TUBE REMOVAL - CONTINUED

2. Remove screw and hose clamp, as necessary, to separate each fuel tube.
3. Remove other end of fuel tube (7) and fitting (9) from engine inlet manifold (8).
4. Remove fuel tube (7).



FUEL TUBE INSTALLATION

CAUTION

Use line wrenches to disconnect/connect fuel lines, to avoid damage to fittings.

NOTE

- Perform following steps to install fuel ratio control tube or two fuel tubes.
- Coat new O-rings with fuel prior to installation.

1. Install new O-rings.
2. Position fuel tube (7) on engine.
3. Install fitting (9) and fuel tube (7) on inlet manifold (8).
4. Install hose clamp and screw, as necessary, to secure each fuel tube.
5. Install fitting (6) and other end of fuel tube (7) on governor (1).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

NOTE

It may be necessary to prime fuel system.

FUEL TUBE INSTALLATION - CONTINUED

6. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for fuel leaks.
7. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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SECONDARY FUEL FILTERS AND BASE REPLACEMENT 0021 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Fuel (Item 13, 14 or 15, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Filter element, fluid (2)

O-ring (as required)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Fuel line quick disconnect disconnected at draft arm (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

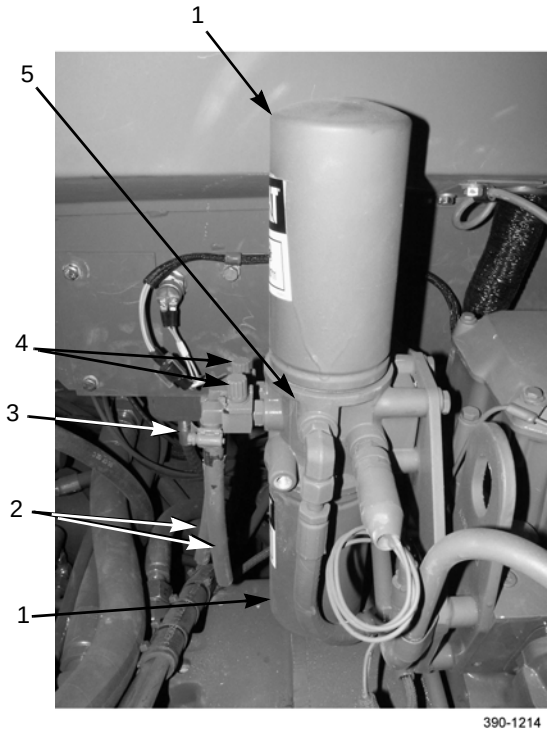
DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fuel. Fuel may ignite, causing damage to machine and injury or death to personnel.

NOTE

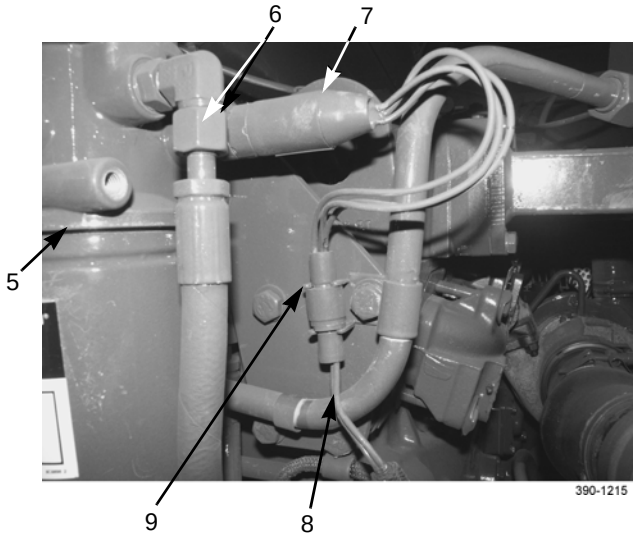
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and wires to aid in installation. Cap all hoses and fittings to prevent fluid loss and contamination of fuel system.

REMOVAL

1. Place a suitable container under ends of two drain hoses (2).
2. Open two drain valves (4) and allow excess fuel to drain from fuel filter base (5). Close drain valves.
3. Remove two fuel filter elements (1) from fuel filter base (5). Discard filter elements.
4. Loosen two hose clamps (3) and remove two drain hoses (2) from elbows at fuel filter base (5).

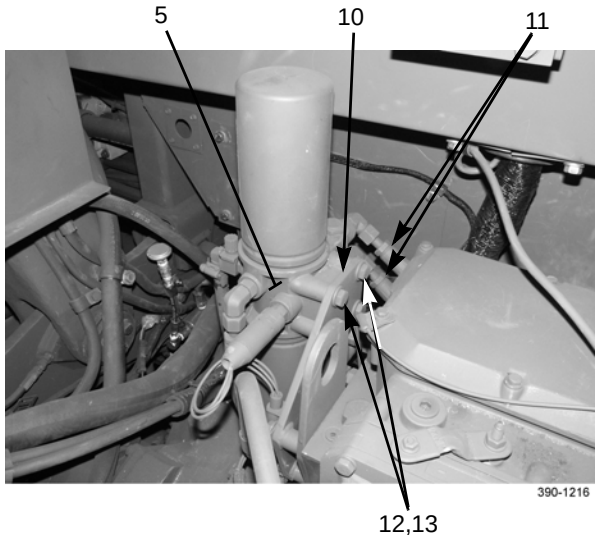


5. Remove fuel pressure sensor (7) connector and wiring harness (8) connector from clip (9) and disconnect.
6. Remove fuel pressure sensor (7) from adapter at side of fuel filter base (5).
7. Disconnect fuel hose (6) from elbow.

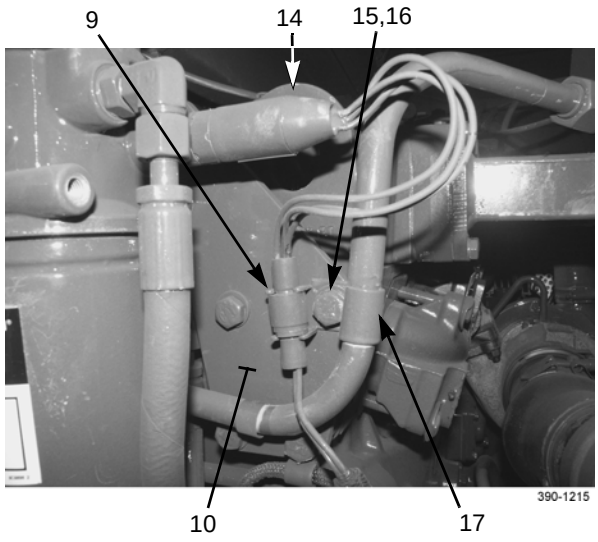


REMOVAL - CONTINUED

8. At opposite side of fuel filter base (5), disconnect two fuel hoses (11) from two elbows.
9. Remove four screws (12), washers (13), and fuel filter base (5) from bracket (10).
10. Remove fittings from fuel filter base (5). Remove O-rings from fittings and discard.

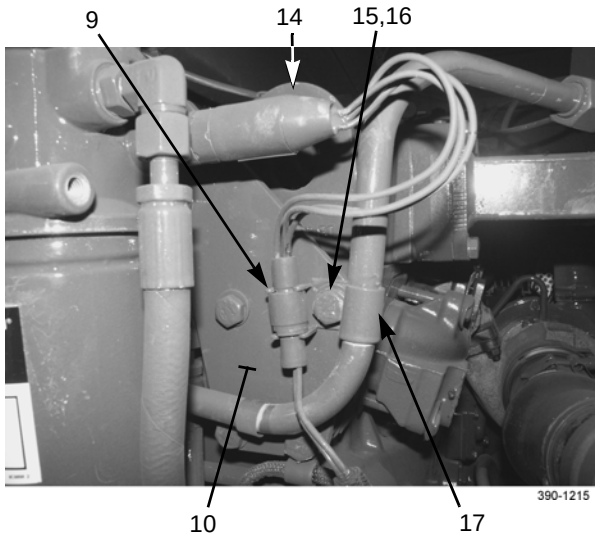


11. Remove four screws (15), washers (16), clip (9), clamp (17), bracket (10), and lifting eye (14) from rear of engine.

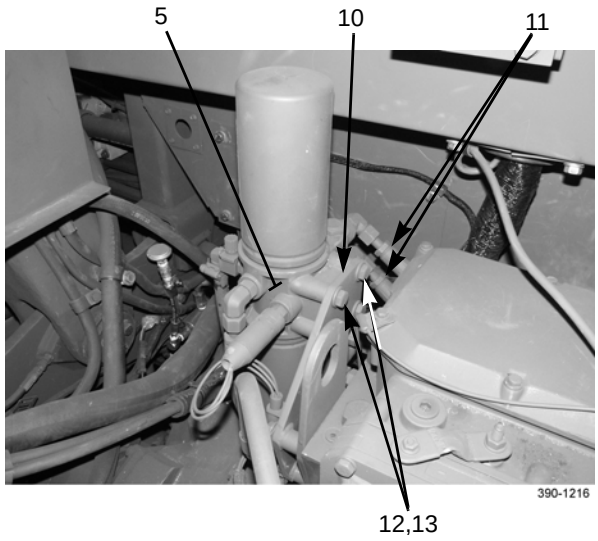


INSTALLATION

1. Install lifting eye (14), bracket (10), clamp (17), and clip (9) on rear of engine with four washers (16) and screws (15).

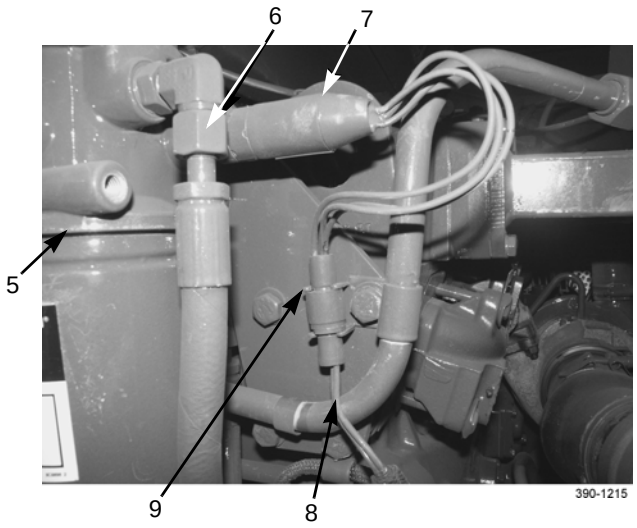


2. Coat new fitting O-rings with fuel and install O-rings and fittings on fuel filter base (5).
3. Install fuel filter base (5) on bracket (10) with four washers (13) and screws (12).
4. At side of fuel filter base (5), connect two fuel hoses (11) to two elbows.

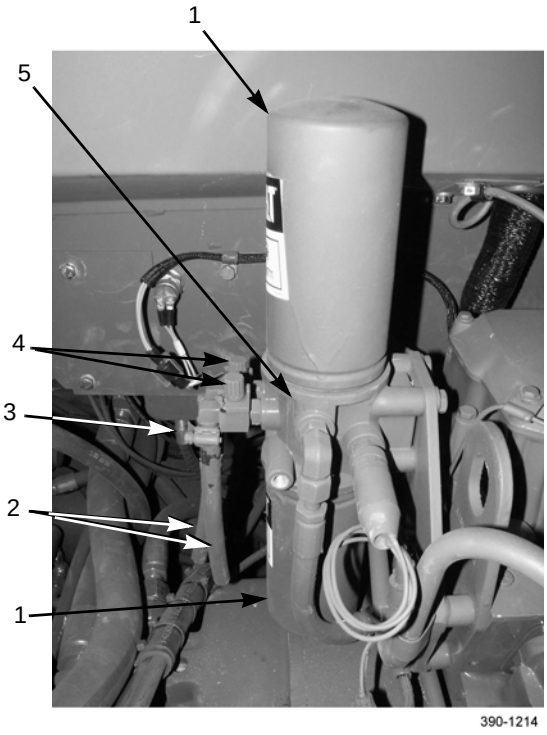


INSTALLATION - CONTINUED

5. At opposite side of fuel filter base (5), connect fuel hose (6) to elbow.
6. Install fuel pressure sensor (7) to adapter at side of fuel filter base (5).
7. Connect pressure sensor (7) connector to wiring harness (8) connector and install in clip (9).



8. Position two drain hoses (2) on two elbows at drain valves (4) of fuel filter base (5) and tighten two hose clamps (3).
9. Apply a thin coat of fuel to rubber seal of two new fuel filter elements (1).
10. Install two fuel filter elements (1) to fuel filter base (5) until rubber seal contacts surface of fuel filter base. Tighten each filter element an additional 3/4 turn.



INSTALLATION - CONTINUED

11. Connect fuel line quick disconnect at draft arm (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
12. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
13. Prime fuel system to fill fuel filters (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

14. Start engine (TM 5-3800-205-10-1 and TM 5-3800-205-10-2) and check for fuel leaks.
15. Close engine access door (TM 5-3800-205-10 and TM 5-3800-205-10-2).

END OF WORK PACKAGE

ETHER COLD START AID SYSTEM MAINTENANCE 0022 00

THIS WORK PACKAGE COVERS

Ether Cylinder Replacement

Clamp and Solenoid Valve: Removal, Installation

Ether Atomizer Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Gasket

O-ring

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

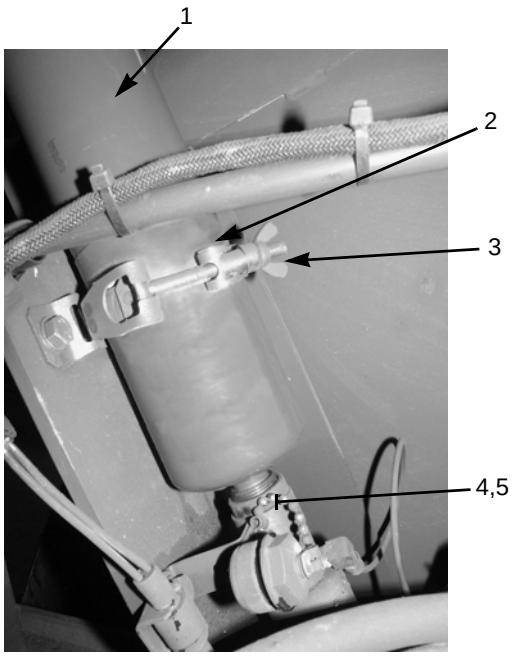


WARNING

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.

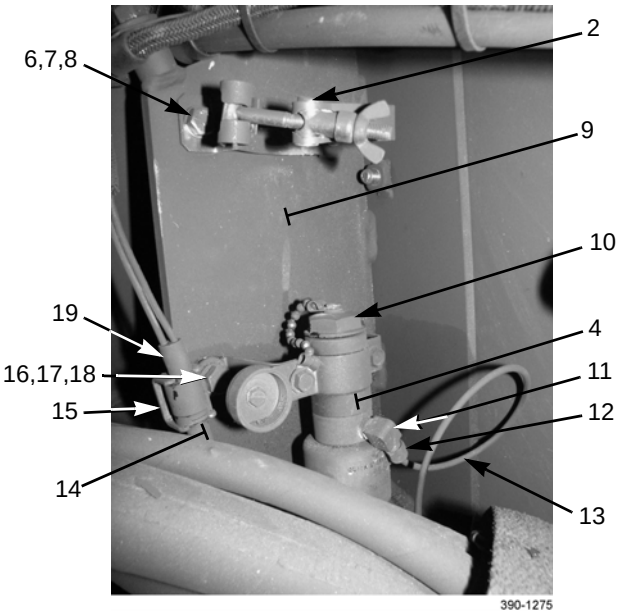
ETHER CYLINDER REPLACEMENT

1. Loosen thumbscrew (3) of retaining clamp (2) and rotate ether cylinder (1) counterclockwise to remove from solenoid valve (4).
2. Remove gasket (5) from solenoid valve (4). Discard gasket.
3. Position new gasket (5) in solenoid valve (4).
4. Install ether cylinder (1) on solenoid valve (4) by rotating clockwise until hand tight.
5. Tighten thumbscrew (3) of retaining clamp (2).



CLAMP AND SOLENOID VALVE REMOVAL

1. Remove ether cylinder (refer to *Ether Cylinder Replacement*).
2. Install protective cap (10) on solenoid valve (4).
3. Remove two nuts (6), screws (7), four washers (8), and retaining clamp (2) from left fender bracket (9).
4. Remove solenoid valve connector (14) and wiring harness (19) from clip (15). Disconnect connectors.
5. Remove fitting (12) and tube (13) from elbow (11).
6. Remove elbow (11) from solenoid valve (4).
7. Remove two nuts (16), screws (17), four washers (18), clip (15), and solenoid valve (4) from left fender bracket (9).



CLAMP AND SOLENOID VALVE INSTALLATION

1. Install solenoid valve (4) and clip (15) on left fender bracket (9) with four washers (18), two screws (17), and nuts (16).
2. Install elbow (11) on solenoid valve (4).
3. Install tube (13) and fitting (12) on elbow (11).
4. Connect solenoid valve connector (14) to wiring harness connector (19) and install in clip (15).
5. Install retaining clamp (2) on left fender bracket (9) with four washers (18), two screws (17), and nuts (16).
6. Remove protective cap (10) from solenoid valve (4).
7. Install ether cylinder (refer to *Ether Cylinder Replacement*).

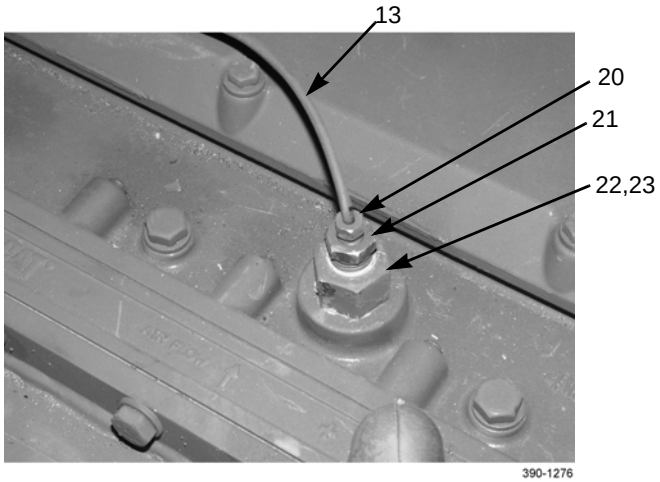
ETHER ATOMIZER REPLACEMENT

1. At top of engine, remove fitting (20) and tube (13) from atomizer (21).
2. Remove atomizer (21) from adapter (22).
3. Remove adapter (22) and O-ring (23) from engine. Discard O-ring.
4. Install new O-ring (23) and adapter (22) on engine.

NOTE

Position atomizer so that direction of spray is parallel to air inlet heater.

5. Install atomizer (21) on adapter (22).
6. Install tube (13) and fitting (20) on atomizer (21).



END OF WORK PACKAGE

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ACCELERATOR PEDAL REPLACEMENT 0023 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

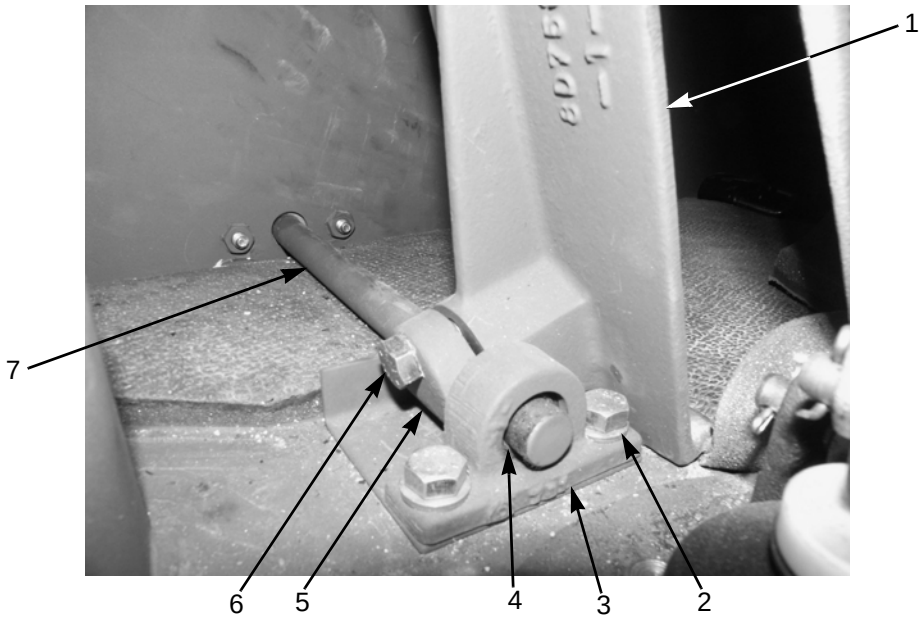
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

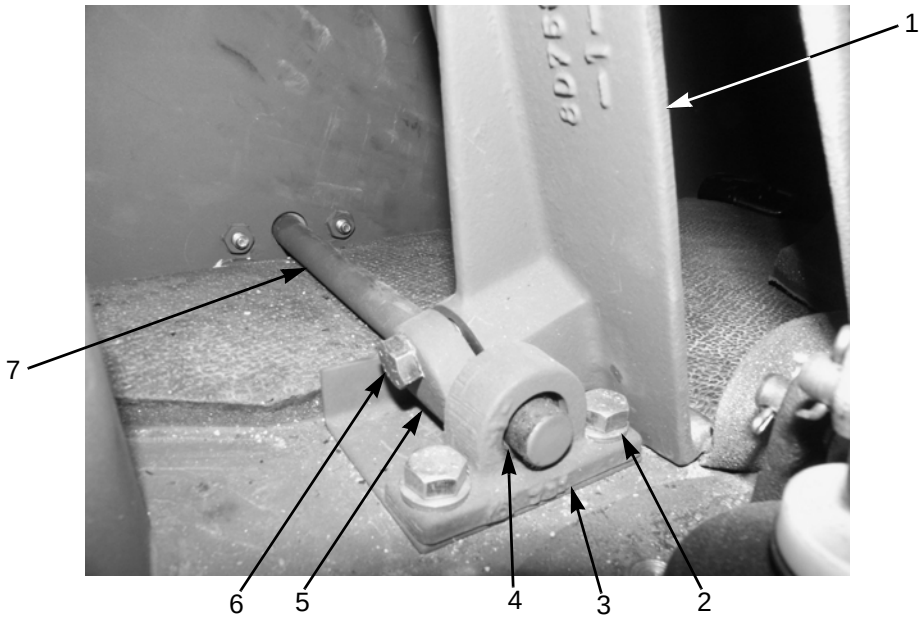
REMOVAL

1. Remove bolt (6) from clamp (5).
2. Remove two bolts (2) from bracket (3).
3. Slide pedal assembly (1) and bracket (3) off of accelerator shaft (7).
4. Remove woodruff key (4) from accelerator shaft (7). Discard woodruff key if damaged.



INSTALLATION

1. Slide pedal assembly (1) on accelerator shaft (7).
2. Install bracket (3) with two bolts (2). Tighten bolts.
3. Install bolt (6) on clamp (5) and tighten.
4. Install woodruff key (4) on accelerator shaft (7).



END OF WORK PACKAGE

THROTTLE CONTROL CABLE REPLACEMENT 0024 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

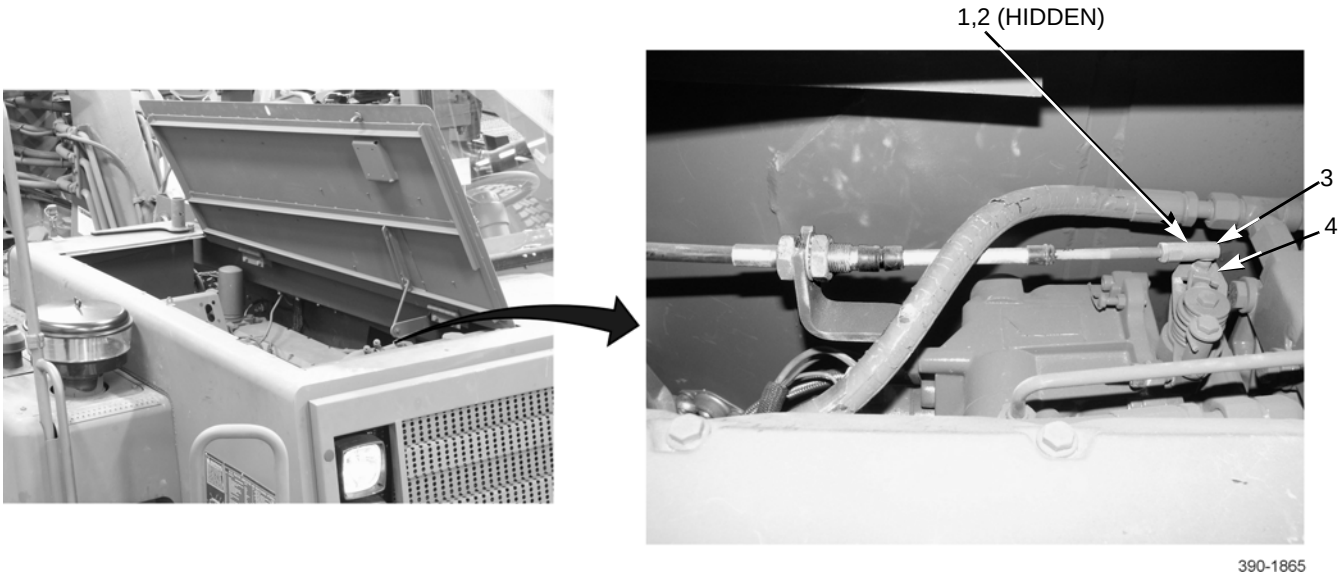
Equipment Condition

Center guard plate removed (WP 0100 00)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Remove nut (1), washer (2), and ball joint (3) from lever (4).

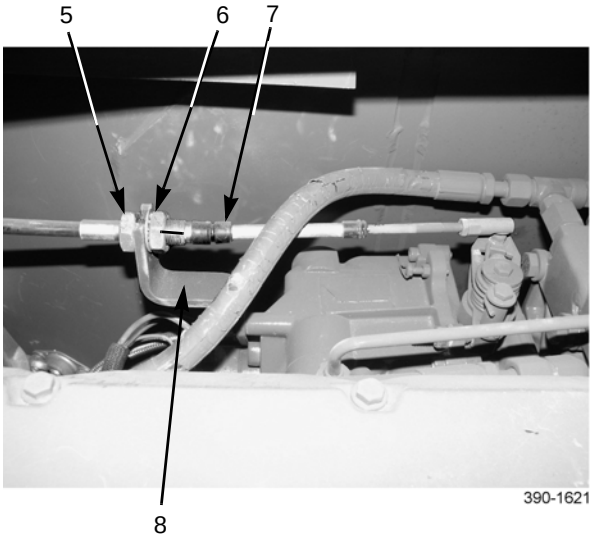


REMOVAL - CONTINUED

NOTE

- Count threads on control cable adjuster from jamnut and mark location to aid in installation.
- Use two wrenches to loosen jamnuts.

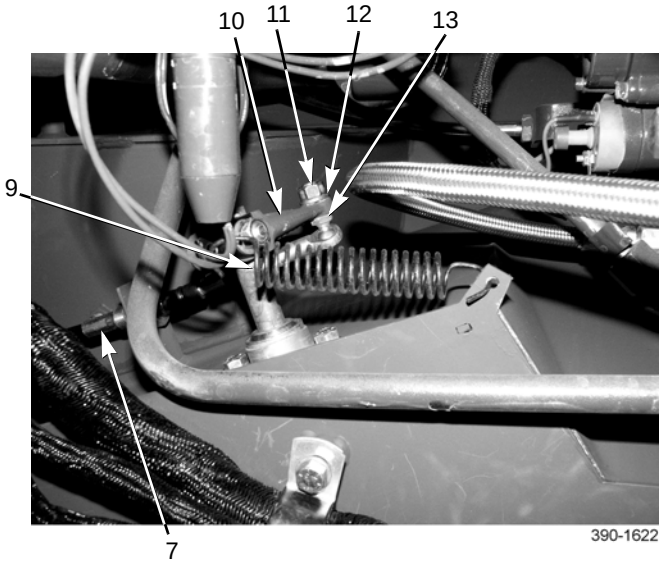
2. Hold jamnut (5) while loosening jamnut (6).
3. Remove control cable (7) from bracket (8).



NOTE

Disconnect control cable and linkage from linkage underneath tractor.

4. Disconnect accelerator spring (9).
5. Hold nut (13) and remove nut (11) and washer (12).
6. Remove control cable (7) from accelerator pedal lever (10).

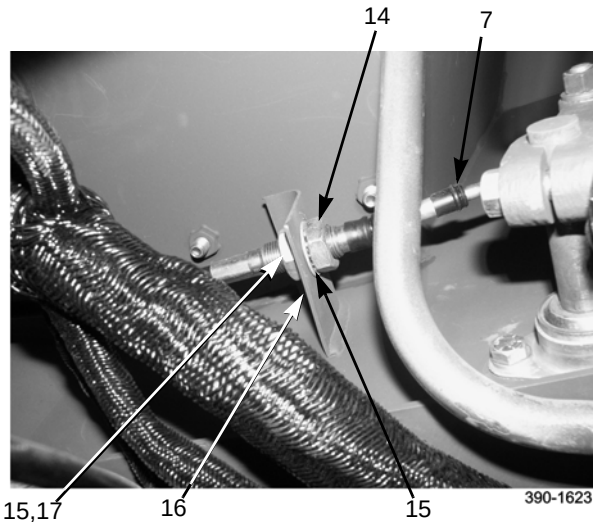


REMOVAL - CONTINUED

NOTE

- Count threads on control cable adjuster from jamnut and mark location for installation.
- Use two wrenches to loosen jamnuts.

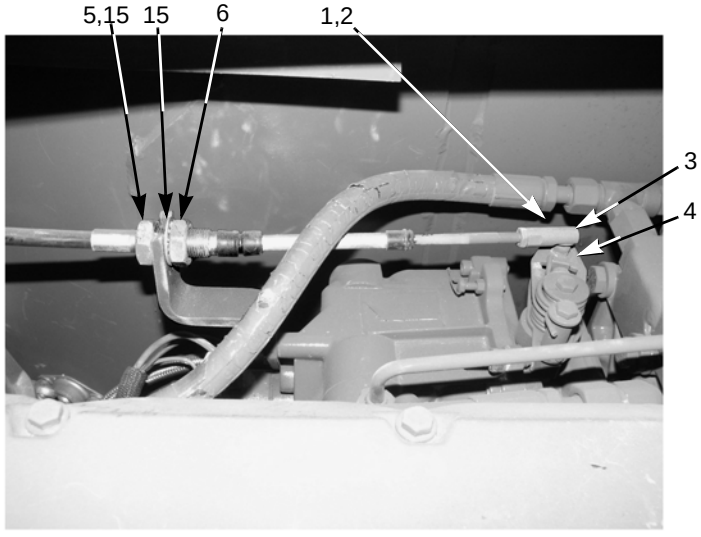
7. Hold jamnut (17) and remove jamnut (14) and starwasher (15) from control cable (7).
8. Slide control cable (7) through bracket (16) and remove from machine.



INSTALLATION

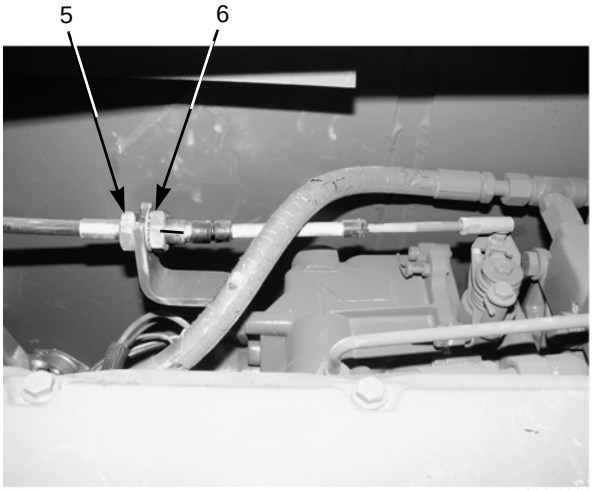
1. Slide control cable (7) through bracket (16), with jamnut (17) and starwasher (15) on one side of bracket.
2. Install starwasher (15) and jamnut (14).
3. Install control cable (7) on accelerator pedal lever (10).
4. Install washer (12) and nut (11).
5. Connect accelerator spring (9).
6. Install control cable (7) on bracket (8) with jamnut (5) and starwasher on one side of bracket.
7. Install starwasher (15) and jamnut (6).
8. Position ball joint (3) in lever (4).
9. Install nut (1) and washer (2).





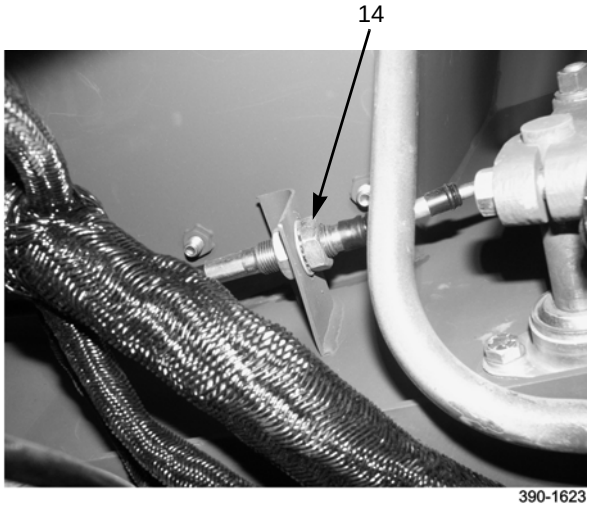
INSTALLATION - CONTINUED

10. Tighten jamnut (5) while holding jamnut (6).



390-1621

11. Adjust jamnuts (5, 6, and 14) for full throttle operations with accelerator pedal.



390-1623

12. Install center guard plate (WP 0100 00).
13. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

EXHAUST GUARD, EXHAUST PIPE, AND MUFFLER REPLACEMENT 0025 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door removed, if replacing muffler (WP 0097 00)

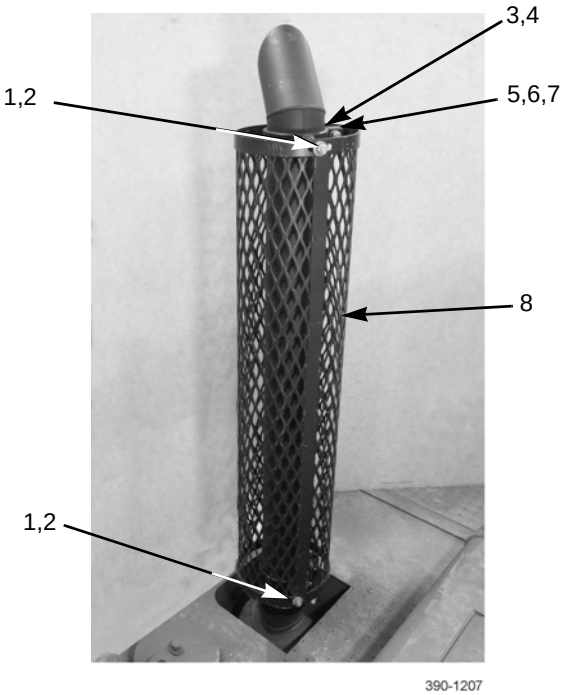


WARNING

Do NOT remove guard, exhaust or muffler until they have cooled to the touch. Wear gloves and protective clothing as required to protect against burns. Failure to follow this warning may cause personnel injury.

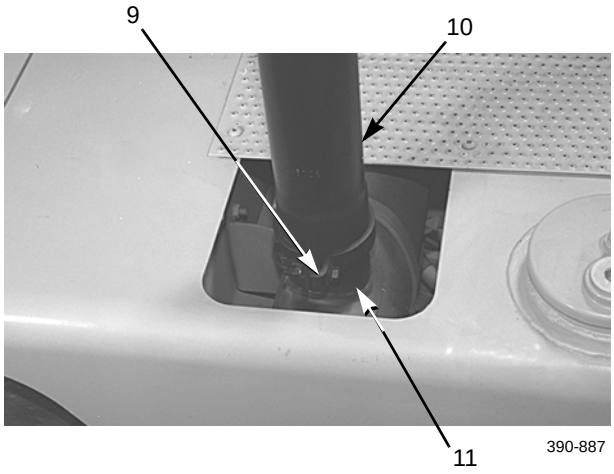
REMOVAL

1. Remove two screws (1) and washers (2) from top and bottom of exhaust guard (8).
2. Inspect two clamps (5) for cracks or damage. If clamps are cracked or damaged, remove two nuts (6), washers (7), screws (3), washers (4), and clamps.

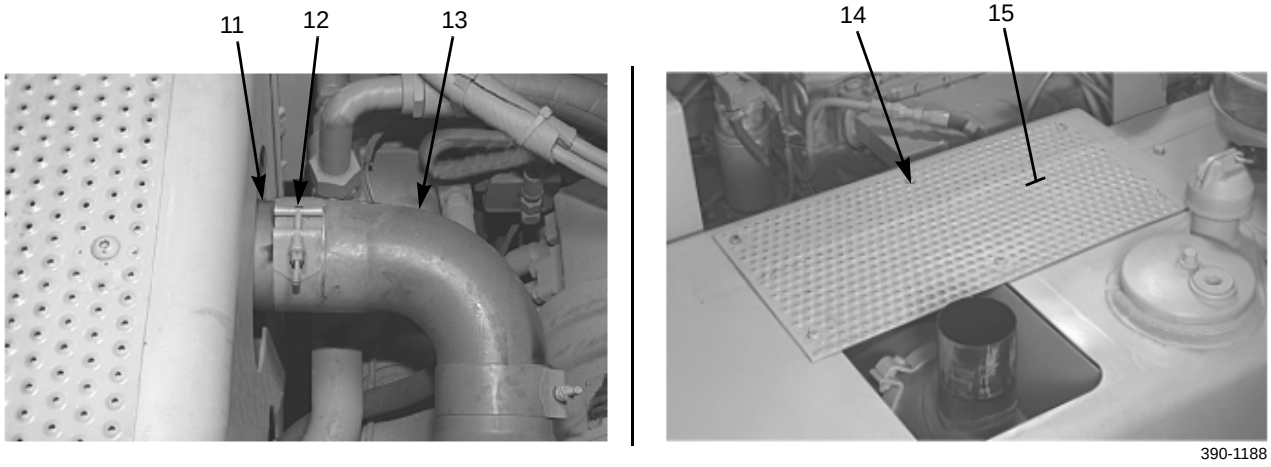


REMOVAL - CONTINUED

3. Loosen clamp (9) and remove exhaust pipe (10) from muffler (11).



4. Loosen exhaust clamp (12) and disconnect elbow (13) from muffler (11).
5. Remove six bolts (14) and plate (15) from machine.



6. Remove four nuts (16) and two clamps (17) from bracket assembly (18).

WARNING

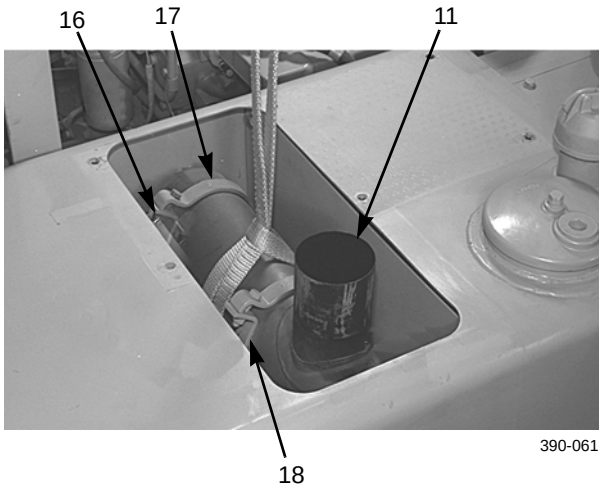
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

Muffler weighs 42 lb (19 kg).

REMOVAL - CONTINUED

7. Wrap a nylon sling around muffler (11) and attach to a suitable lifting device.
8. Remove muffler (11) from bracket assembly (18).



INSTALLATION



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

Muffler weighs 42 lb (19 kg).

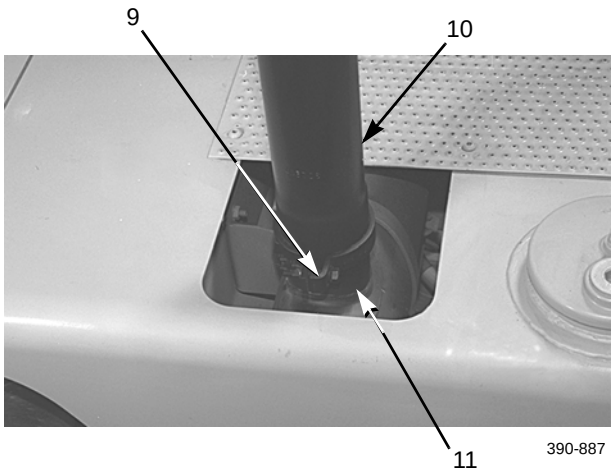
1. Wrap a nylon sling around muffler (11). Use a suitable lifting device to position muffler on bracket assembly (18).
2. Install two clamps (17) on bracket assembly (18) with four nuts (16).
3. Install plate (15) on machine with six bolts (14).
4. Position elbow (13) on muffler (11) and tighten exhaust clamp (12).

INSTALLATION - CONTINUED

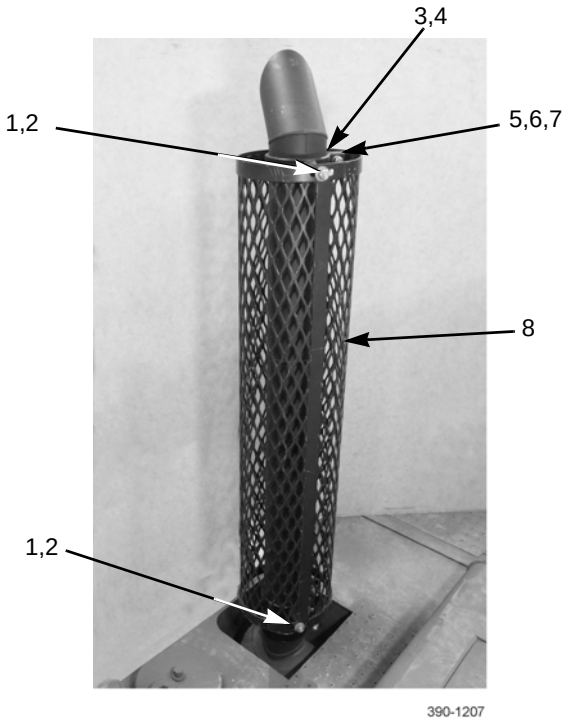
NOTE

Position exhaust pipe on muffler with tip of exhaust pipe pointing away from cab.

5. Position exhaust pipe (10) on muffler (11) and tighten clamp (9).



6. If removed, install two clamps (5) with two washers (4), screws (3), washers (7), and nuts (6).
7. Install guard (8) on clamps (5) with two screws (1) and washers (2).



8. Install engine access door, if removed (WP 0100 00).

END OF WORK PACKAGE

HYDRAULIC OIL COOLER REPLACEMENT 0026 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (2)

References

WP 0009 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic system drained (WP 0010 00)



WARNING



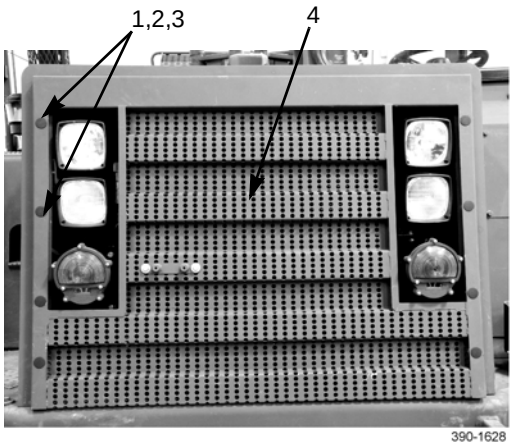
- DO NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature, 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.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses to aid in installation.
- Cap hoses to prevent fluid loss and contamination of the hydraulic system.

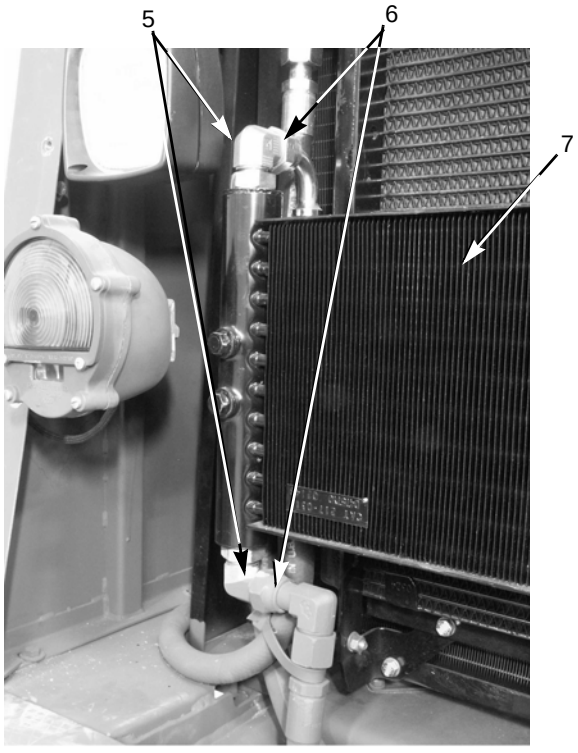
REMOVAL

1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove eight plugs (1) from front of engine grille (4).
3. With assistance, remove eight bolts (2), washers (3), and engine grille (4) from front of machine.



390-1628

4. Disconnect two hydraulic hoses (6) from two elbows (5) of hydraulic oil cooler (7).



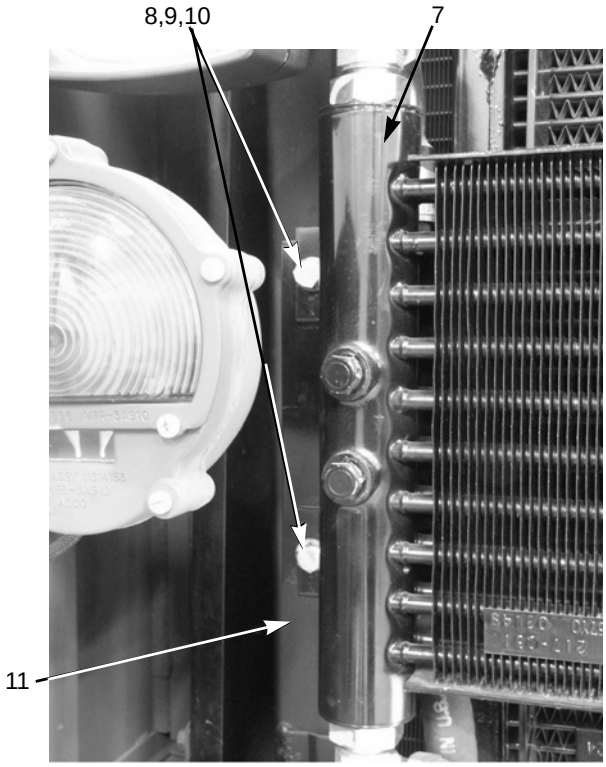
390-1629

REMOVAL - CONTINUED

NOTE

Hose clamp with hose is also removed as hydraulic oil cooler is removed.

5. Remove four nuts (8), bolts (9), eight washers (10) and hydraulic oil cooler (7) from two oil cooler brackets (11).

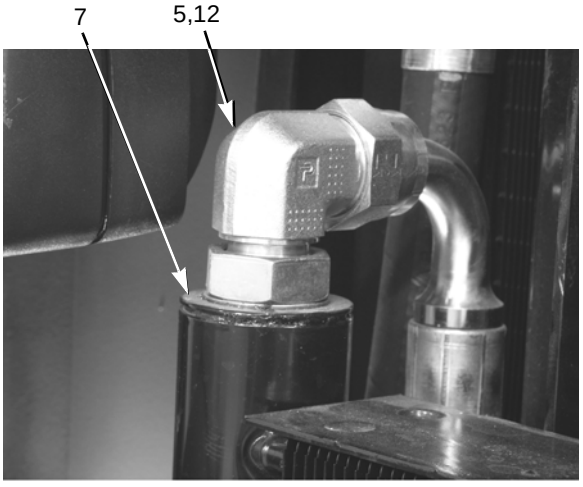


390-1630

NOTE

Note position of two elbows for installation.

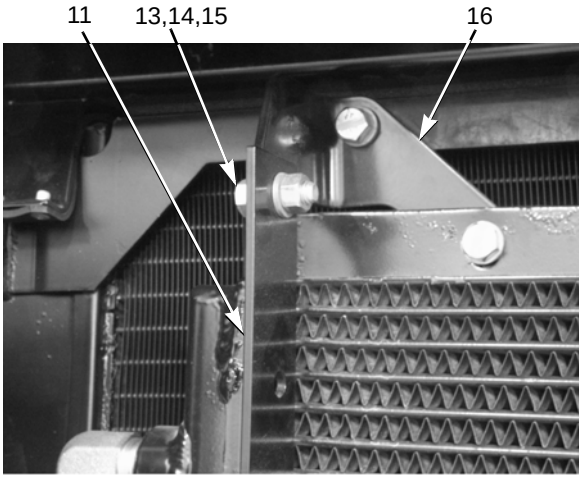
6. Remove two elbows (5) from hydraulic oil cooler (7). Remove O-ring (12) from each elbow. Discard O-rings.



390-1631

REMOVAL - CONTINUED

7. Remove four nuts (13), bolts (14), eight washers (15), and two oil cooler brackets (11) from four transmission oil cooler brackets (16).



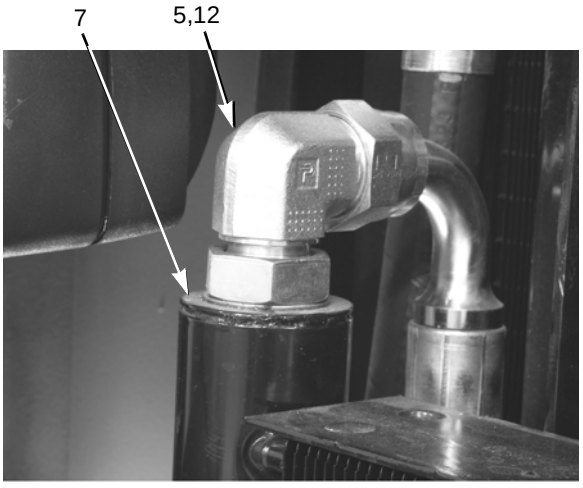
INSTALLATION

1. Install two oil cooler brackets (11) to four transmission oil cooler brackets (16) with eight washers (15), four bolts (14), and nuts (13).

NOTE

Coat new O-rings with oil prior to installation.

2. Install new O-ring (12) to each of two elbows (5) and install elbows to hydraulic oil cooler (7).

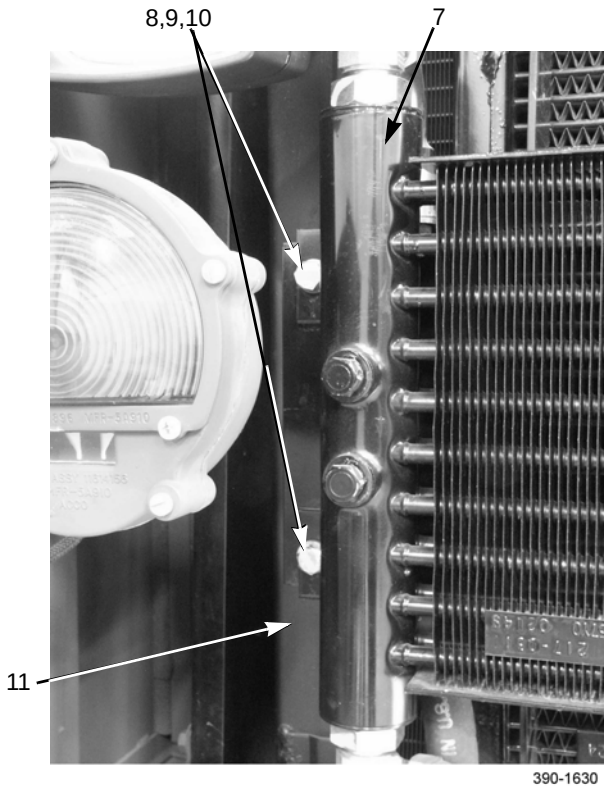


INSTALLATION - CONTINUED

NOTE

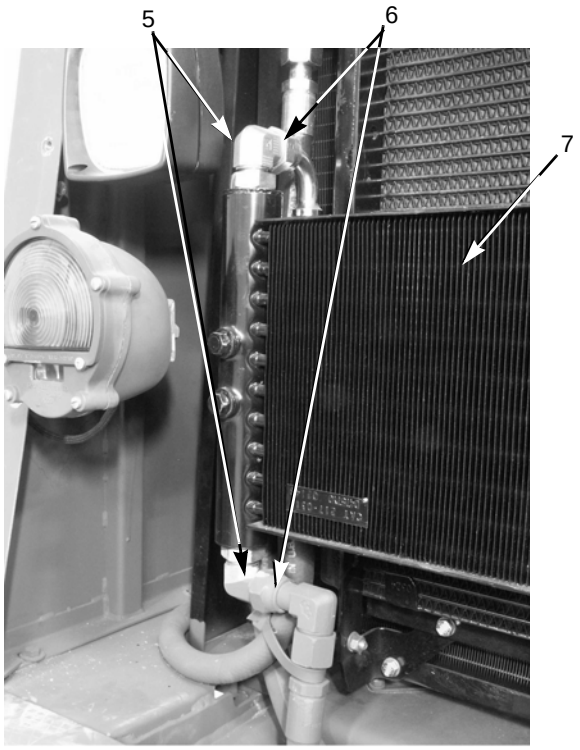
Hose clamp with hose is also installed as hydraulic oil cooler is installed.

3. Install hydraulic oil cooler (7) to two oil cooler brackets (11) with eight washers (10), four bolts (9), and nuts (8).



INSTALLATION - CONTINUED

4. Connect two hydraulic hoses (6) to two elbows (5) of hydraulic oil cooler (7).



5. Fill hydraulic system (WP 0009 00 and WP 0010 00).

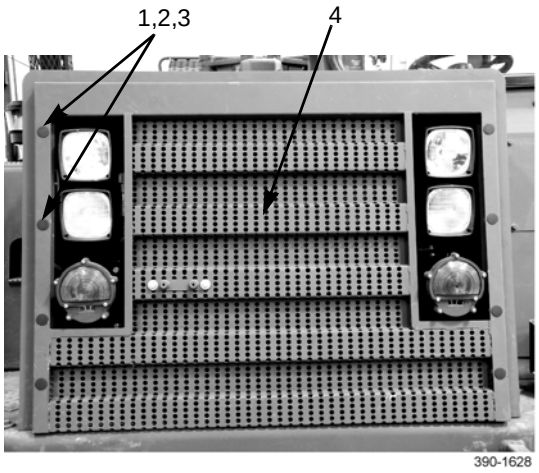
INSTALLATION - CONTINUED



WARNING

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.

6. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
7. Operate hydraulic system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for leaks.
8. Install engine grille (4) to front of machine with eight washers (3) and bolts (2).
9. Install eight plugs (1) to front of engine grille (4).



390-1628

END OF WORK PACKAGE

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RADIATOR HOSES, TUBES, AND CLAMPS REPLACEMENT 0027 00

THIS WORK PACKAGE COVERS

Upper Radiator Hose: Removal, Installation

Lower Radiator Hose: Removal, Installation

Overflow Hose: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

References

WP 0009 00

Equipment Condition

Front guard plate removed, if removing lower radiator hose and overflow hose (WP 0100 00)

Coolant drained (WP 0010 00)



WARNING

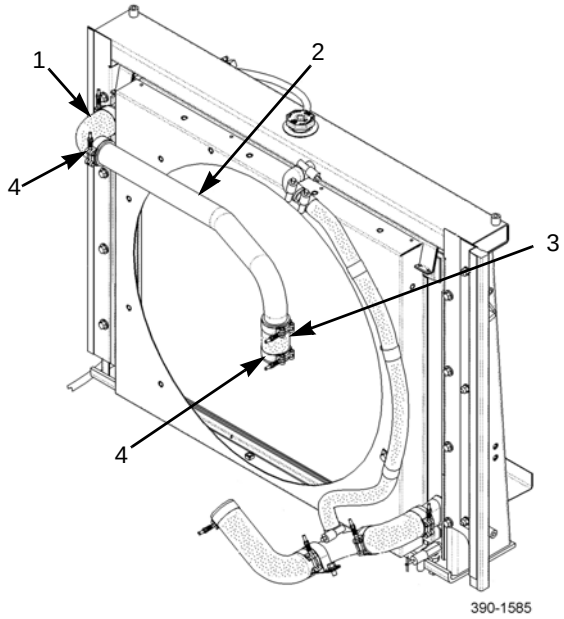
- DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause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

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspections, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable container before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids in accordance with local mandates and regulations.

UPPER RADIATOR HOSE REMOVAL

1. Remove four hose clamps (4) from upper radiator hoses (1 and 3).
2. Separate upper radiator hoses (1 and 3) from tube (2).

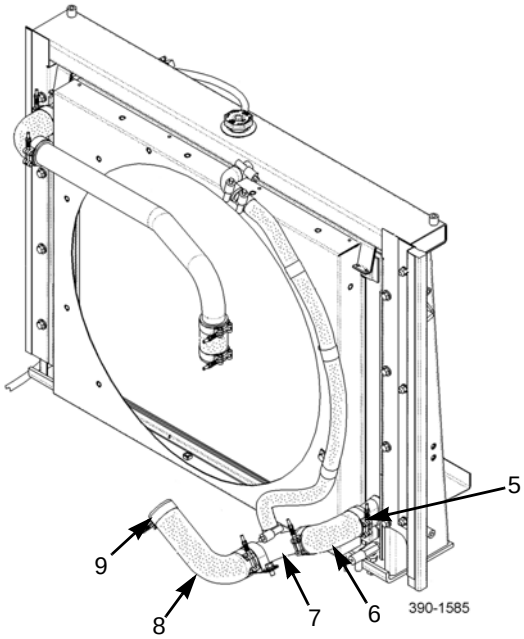


UPPER RADIATOR HOSE INSTALLATION

Position upper radiator hoses (1 and 3) on tube (2) and install four hose clamps (4).

LOWER RADIATOR HOSE REMOVAL

1. Loosen two hose clamps (9) and remove hose (8) from water pump inlet and from connector tube (7).
2. Loosen two hose clamps (5) and remove hose (6) from outlet of radiator and connector tube (7).

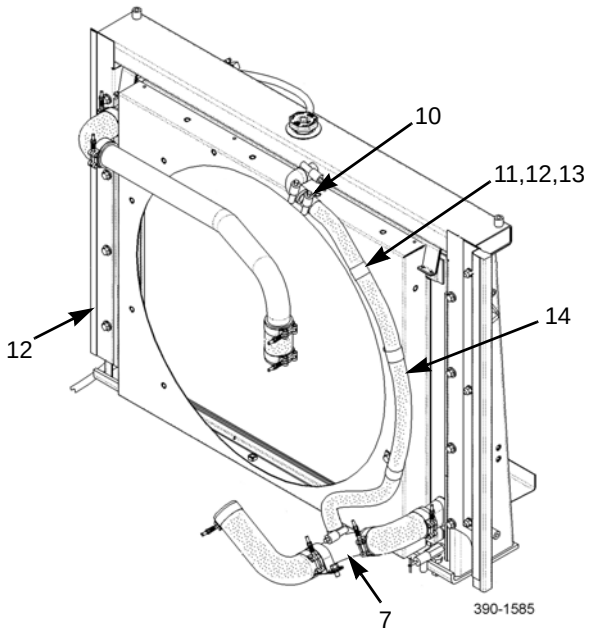


LOWER RADIATOR HOSE INSTALLATION

1. Position hose (8) on water pump inlet and connector tube (7) and install two clamps (9).
2. Position hose (6) on radiator outlet and connector tube (7) and install two clamps (5).

OVERFLOW HOSE REMOVAL

1. Loosen two hose clamps (10).
2. Remove three screws (11), washers (12), and clamps (13).
3. Remove hose (14) from radiator (12) and connector tube (7).



OVERFLOW HOSE INSTALLATION

1. Position hose (14) on connector tube (7) and radiator (12) and install two hose clamps (10).
2. Secure hose (14) with three clamps (13), washers (12), and screws (11).
3. Refill coolant and check for leaks (WP 0009 00 and WP 0010 00).
4. If removed, install front guard plate (WP 0100 00)

END OF WORK PACKAGE

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THERMOSTAT REPLACEMENT 0028 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Gasket

References

WP 0009 00

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Coolant drained (WP 0010 00)



WARNING

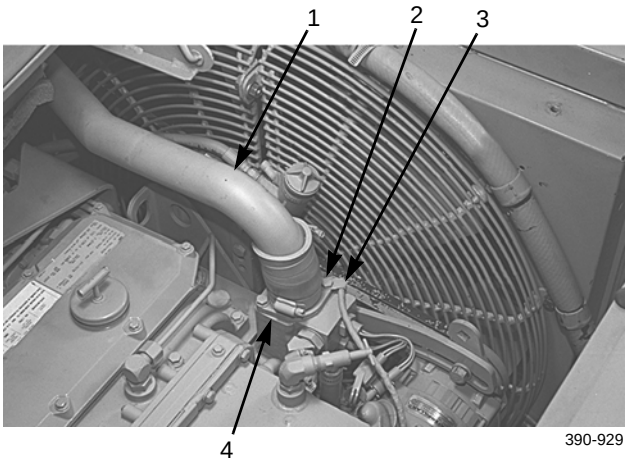
- DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause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

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

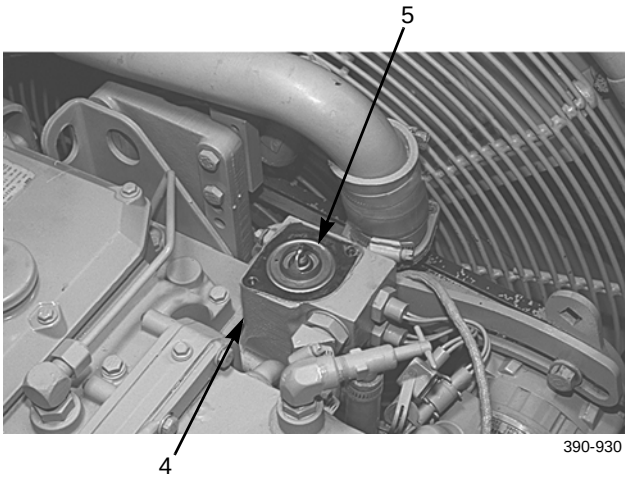
REMOVAL

1. Remove two bolts (2), washers, and clip (3) from thermostat housing (4). Move tube (1) to the side.



390-929

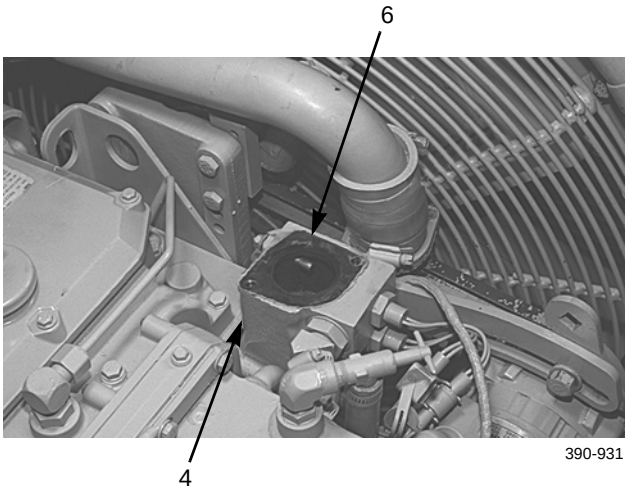
2. Remove thermostat (5) from thermostat housing (4)



390-930

REMOVAL - CONTINUED

3. Remove and discard gasket (6) from thermostat housing (4).

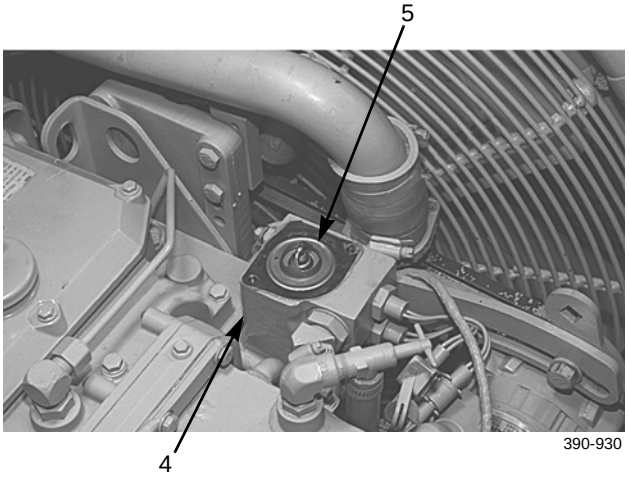


INSTALLATION

NOTE

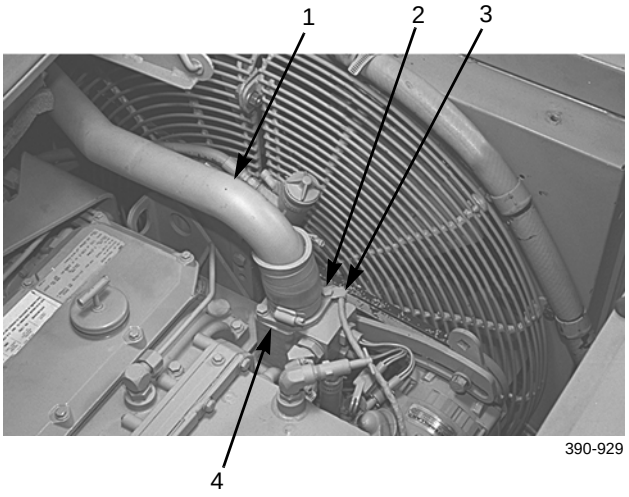
Ensure that thermostat gasket mounting surface is clean.

1. Install new gasket (6) on thermostat housing (4).
2. Install thermostat (5) on thermostat housing (4).



INSTALLATION - CONTINUED

3. Install tube (1) on thermostat housing (4) with clip (3), two washers, and bolts (2).



4. Fill cooling system (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for leaks.
6. Close engine access cover (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

WATER PUMP REPLACEMENT 0029 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

O-ring (2)

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

WP 0009 00

Equipment Condition

Alternator removed (WP 0034 00)

Fan removed (WP 0031 00)

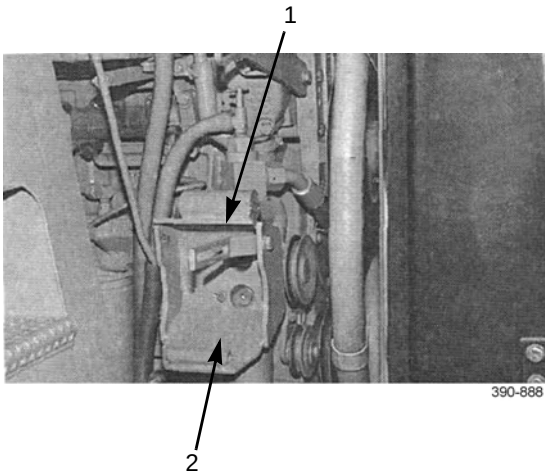
Coolant drained (WP 0010 00)

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

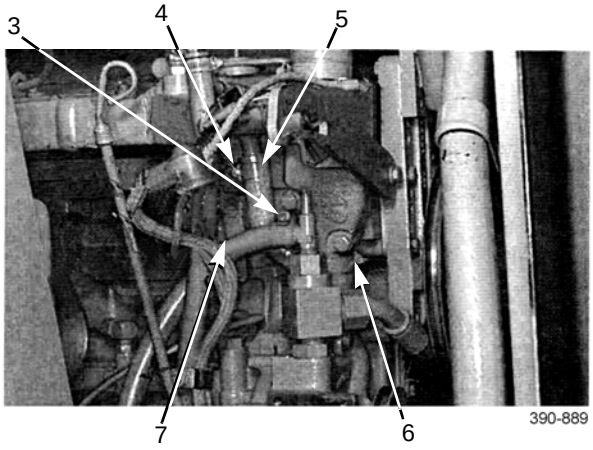
REMOVAL

1. Remove four bolts (1) and bracket (2) from water pump.

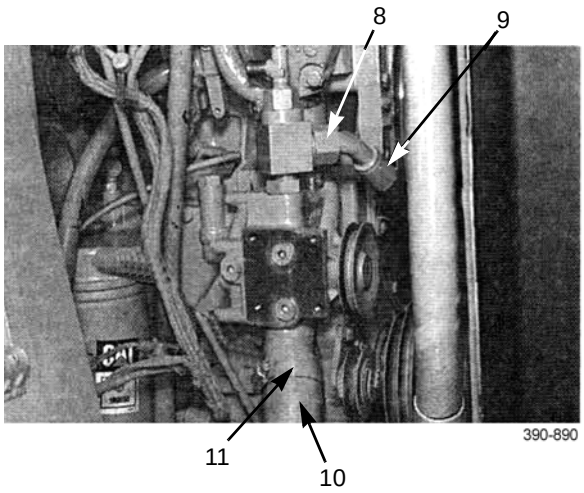


REMOVAL - CONTINUED

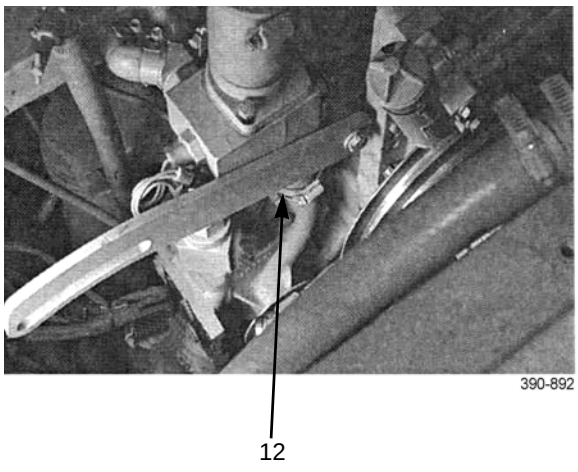
2. Loosen hose clamps (3 and 4) and disconnect hoses (5 and 7) from aftercooler and water pump. Loosen hose clamp (6).



3. Loosen retaining nut (8) and disconnect hose (9) from O-ring port tee.
4. Loosen hose clamp (11) and disconnect hose (10) from water pump.

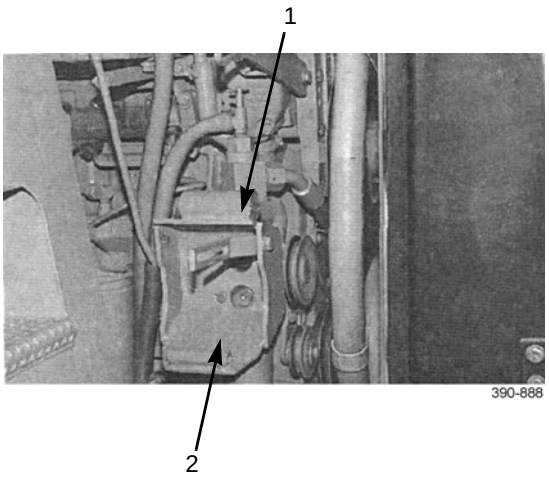


5. Remove four screws (12), water pump, and two O-rings from engine. Discard O-rings.



INSTALLATION

1. Install two new O-rings and water pump on engine with four screws (12).
2. Connect hose (10) to water pump and tighten hose clamp (11).
3. Connect hose (9) to O-ring port tee and tighten retaining nut (8).
4. Connect hoses (5 and 7) to aftercooler and water pump and tighten hose clamps (3 and 4). Tighten hose clamp (6).
5. Install bracket (2) on water pump with four bolts (1).



6. Install alternator (WP 0034 00).
7. Install fan drive (WP 0031 00).
8. Refill cooling system (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

9. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for coolant leaks.

END OF WORK PACKAGE

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BELT TIGHTENER REPLACEMENT 0030 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

References

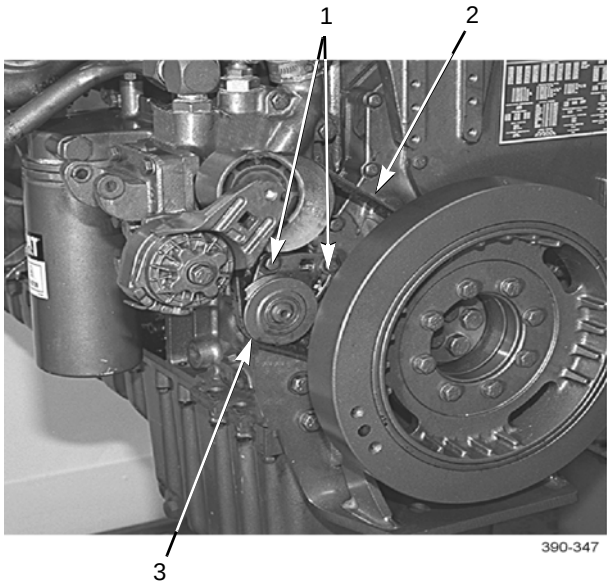
WP 0032 00

Equipment Condition

Alternator removed (WP 0034 00)

REMOVAL

1. Remove two bolts (1) and water pump belt tightener (3) from timing gear housing.
2. Remove V-belt (2) from water pump belt tightener (3) pulley.



INSTALLATION

1. Install water pump belt tightener (3) on timing gear housing with two bolts (1).
2. Install V-belt (2) on water pump belt tightener pulley.
3. Adjust V-belt (2) tension (WP 0032 00).
4. Install alternator (WP 0034 00).

END OF WORK PACKAGE

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FAN AND FAN DRIVE REPLACEMENT 0031 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Bracket, link (Item 6, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Block, wood

References

WP 0032 00

Personnel Required

Two

Equipment Condition

Engine access door removed (WP 0099 00)

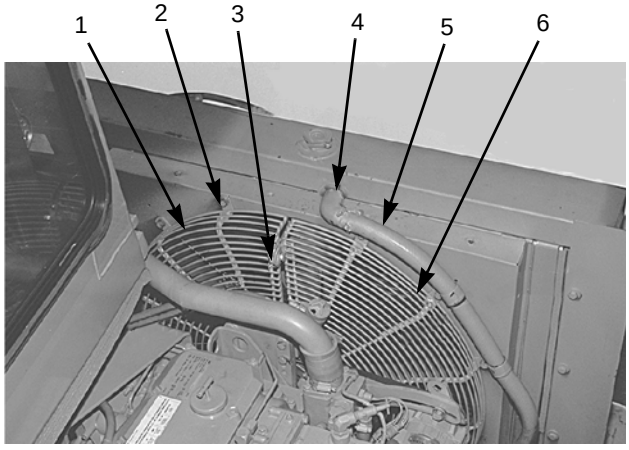
Front guard plate removed (WP 0100 00)

Hydraulic oil cooler removed (WP 0026 00)

Transmission oil cooler removed (WP 0074 00)

REMOVAL

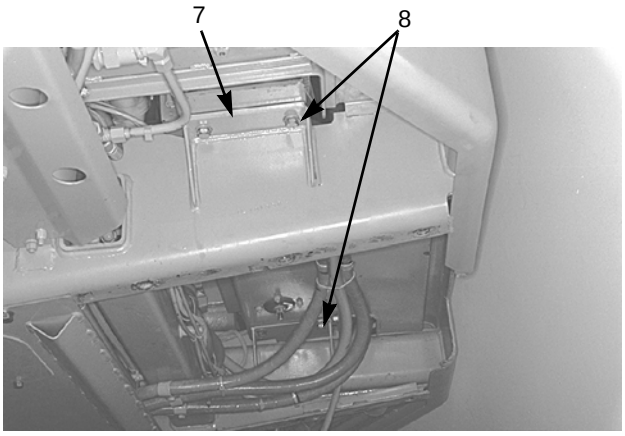
1. Loosen hose clamp (4) and remove hose (5) from radiator assembly.
2. Remove two bolts (3) from fan guards (1 and 6).
3. Remove ten bolts (2) from fan guards (1 and 6) and hose (5) clips.
4. Remove fan guards (1 and 6) from radiator assembly. Reposition hose (5) out of the way.



390-070

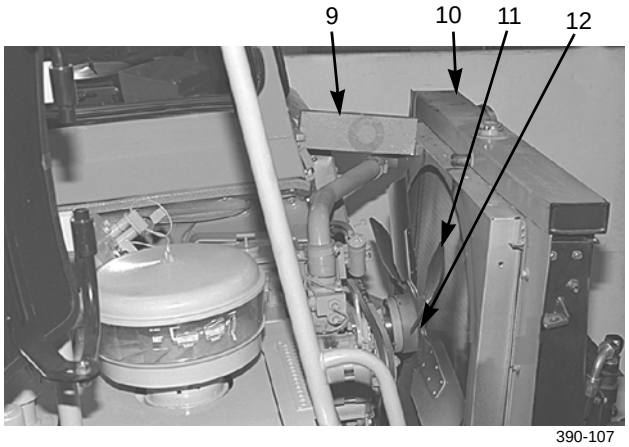
REMOVAL - CONTINUED

5. Remove four bolts (8) from radiator mounting brackets (7).



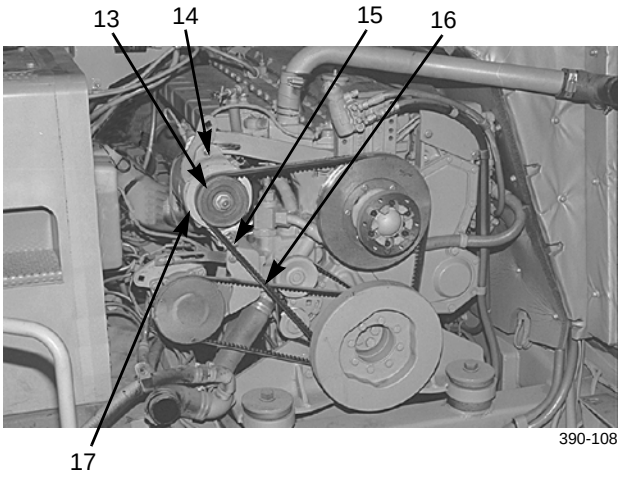
390-085

6. Lean radiator assembly (10) forward for clearance and use a wood block (9) to brace radiator assembly.
7. Remove six bolts (12) from fan assembly (11). Place fan assembly in radiator assembly (10) shroud.



390-107

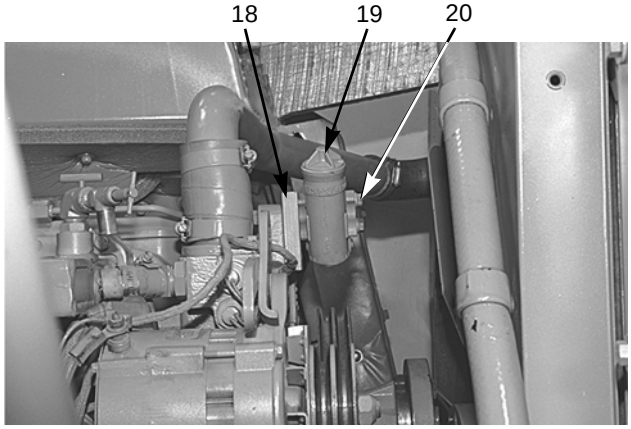
8. Loosen bolts (14 and 15) and tilt alternator (17) toward engine. Remove two V-belts (16) from drive pulley (13).



390-108

REMOVAL - CONTINUED

9. Remove two bolts (20) and governor assembly (19) from fan drive (18).



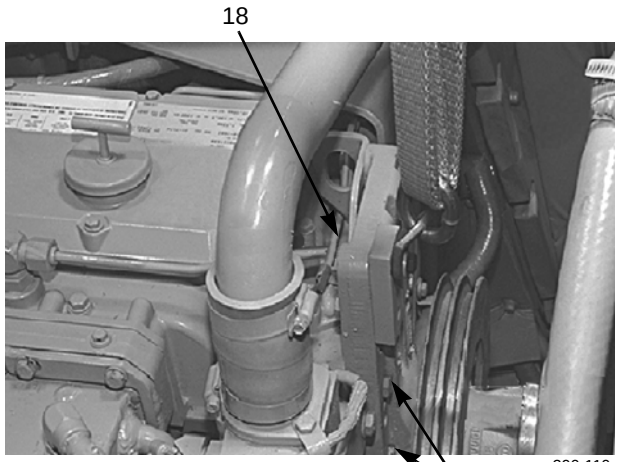
390-109



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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

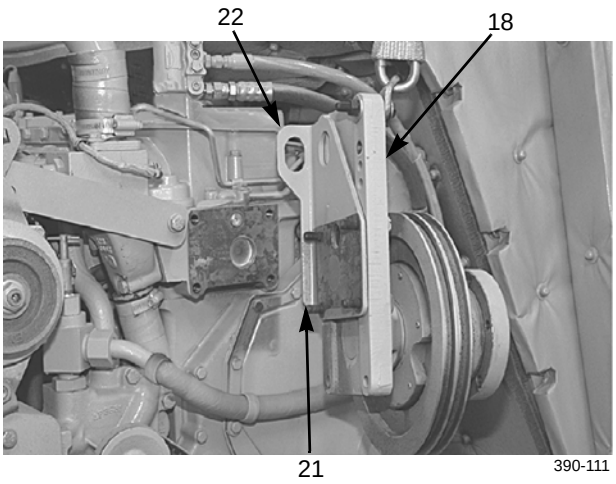
10. Attach link bracket, nylon sling, and suitable lifting device to fan drive (18). Remove four bolts (21) and fan drive from engine as a unit. Bolts are removed from fan drive during repair procedure.



390-110

REMOVAL - CONTINUED

11. Remove engine lifting bracket (22) from four bolts (21) and fan drive (18).
12. Remove fan assembly from radiator assembly shroud.



INSTALLATION

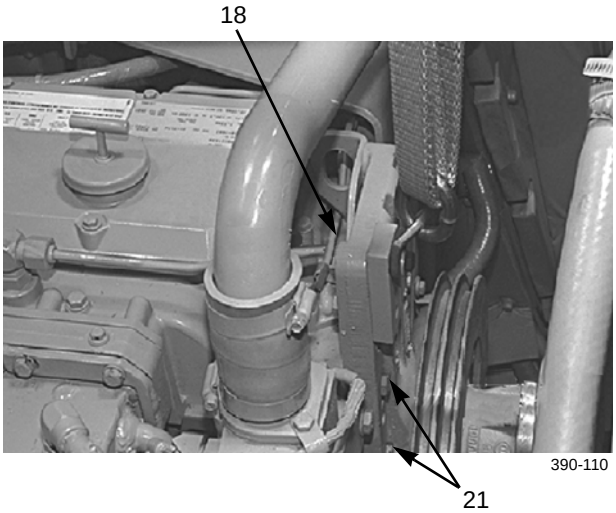
1. Position fan assembly in radiator assembly shroud.



WARNING

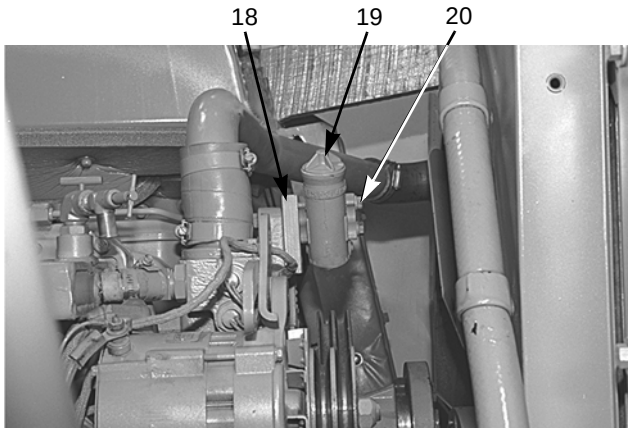
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

2. Attach link bracket, nylon sling, and suitable lifting device to fan drive (18). Install engine lifting bracket (22) on four bolts (21) and fan drive.
3. Install four bolts (21), engine lifting bracket (22), and fan drive (18) on engine as a unit.



INSTALLATION - CONTINUED

4. Install governor assembly (19) on fan drive (18) with two bolts (20).

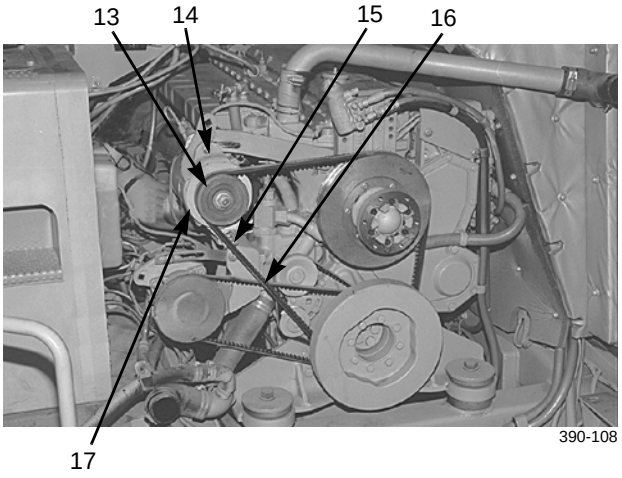


390-109

NOTE

Do NOT adjust V-belts if equipped with a spring-loaded tensioner.

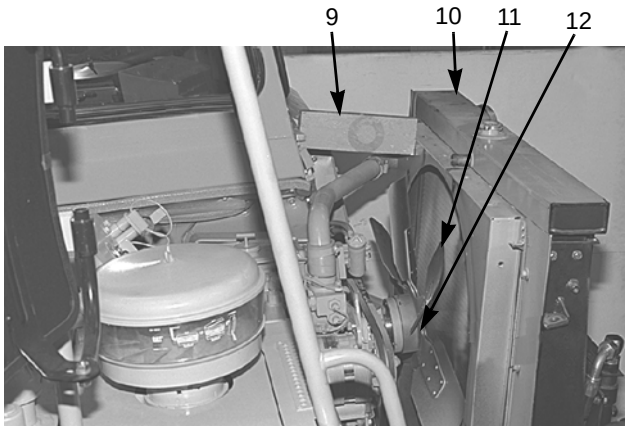
5. Tilt alternator (17) toward engine and install two V-belts (16) on drive pulley (13).
6. Adjust V-belts (WP 0032 00).
7. Tighten bolts (14 and 15).



390-108

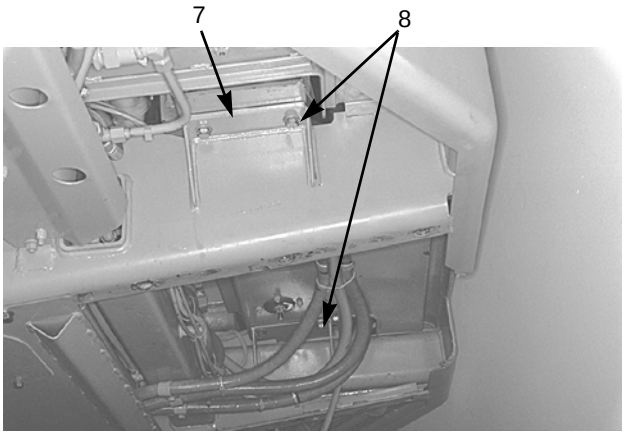
INSTALLATION - CONTINUED

8. Install fan assembly (11) on fan drive (18) with six bolts (12).
9. Remove wood block (9) and place radiator assembly (10) in upright position.



390-107

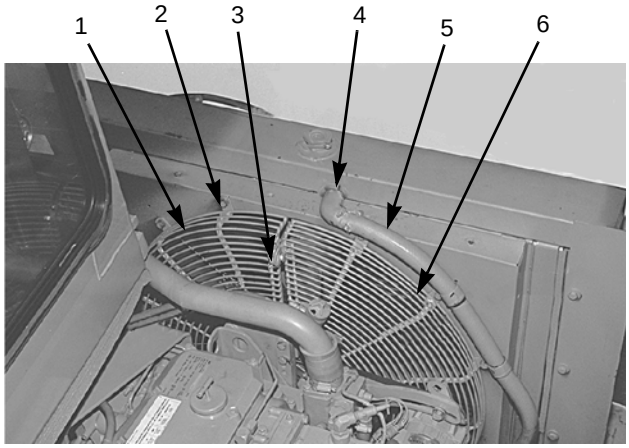
10. Install four bolts (8) on radiator mounting brackets (7).



390-085

INSTALLATION - CONTINUED

11. Position fan guards (1 and 6) to radiator assembly and install ten bolts (2) on fan guards and hose (5) clips.
12. Install two bolts (3) on fan guards (1 and 6).
13. Position hose (5) on radiator assembly and tighten hose clamp (4).



390-070

14. Install transmission oil cooler (WP 0074 00).
15. Install hydraulic oil cooler (WP 0026 00).
16. Install engine access door (WP 0099 00).
17. Install front guard plate (WP 0100 00).

END OF WORK PACKAGE

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FAN, ALTERNATOR, AND WATER PUMP DRIVE BELTS REPLACEMENT 0032 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Equipment Condition

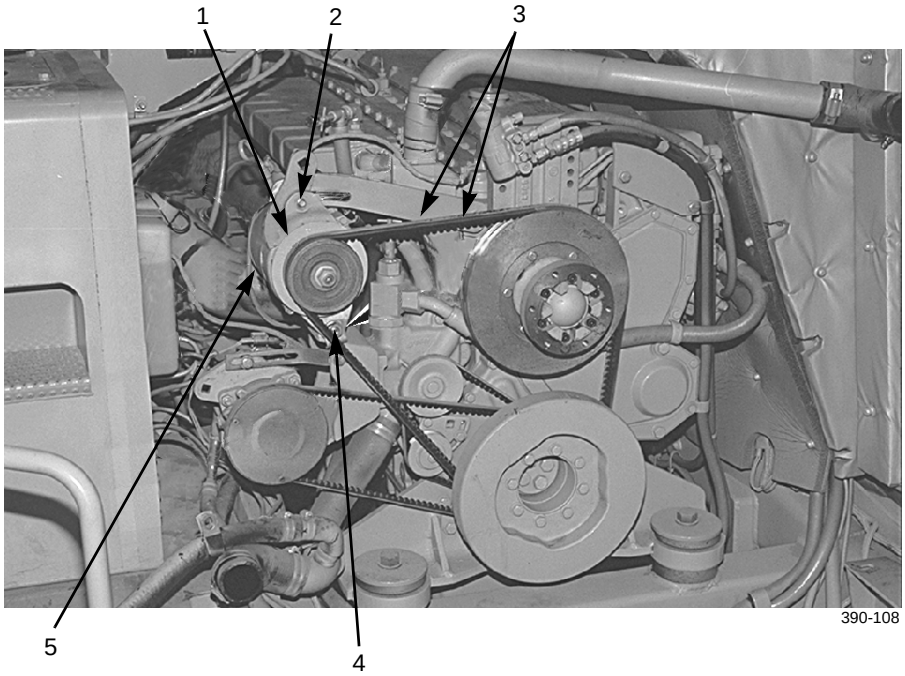
Fan removed (WP 0031 00)

REMOVAL

NOTE

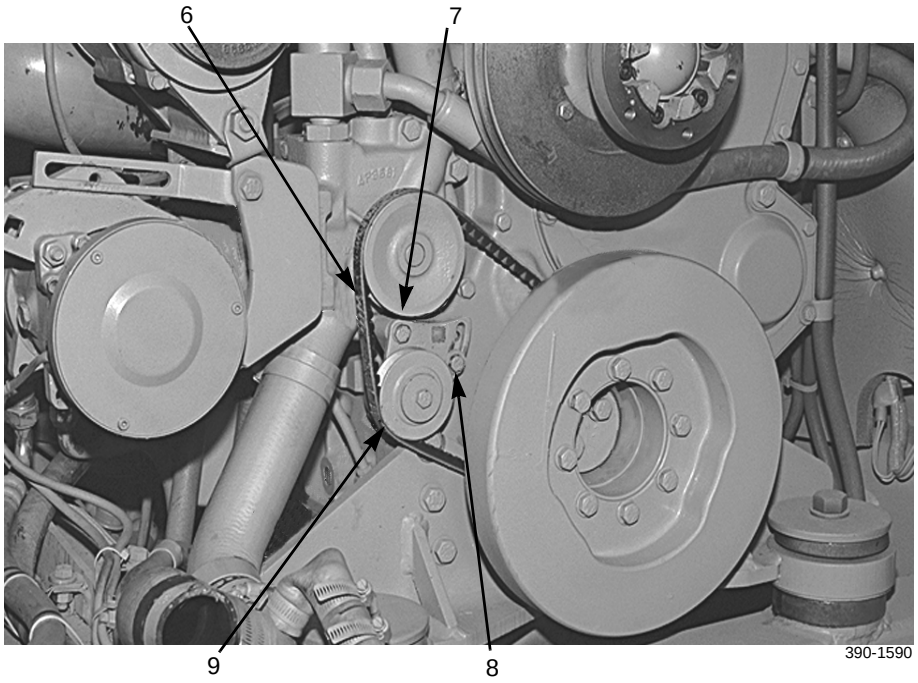
Radiator has been removed for clarity.

1. Loosen bolts (2 and 4) and tilt alternator (5) toward engine. Remove two V-belts (3) from drive pulley (1).



REMOVAL - CONTINUED

2. Loosen bolts (7 and 8). Tilt idler pulley (9) upward and remove V-belt (6) from idler pulley.

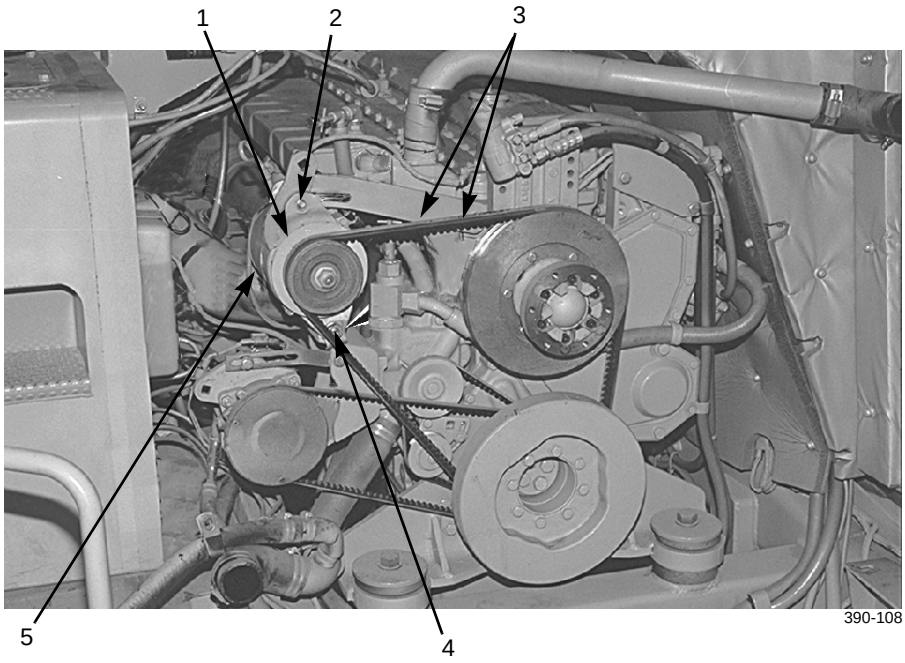


INSTALLATION

1. Install V-belt (6) on idler pulley (9). Adjust V-belt tension to 130 lb-ft (176 Nm).
2. Tighten bolts (7 and 8).

INSTALLATION - CONTINUED

3. Install two V-belts (3) on drive pulley (1). Adjust tension of V-belts to 130 lb-ft (176 Nm). Tighten bolts (2 and 4).



4. Install fan (WP 0031 00).

END OF WORK PACKAGE

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ELECTRICAL GENERAL MAINTENANCE INSTRUCTIONS 0033 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
Air Intake Heater-to-Engine Ground Strap Replacement
Starter Ground Cable Replacement
Cab-to-Frame Ground Strap Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Heater, gun type, electric (Item 14, WP 0172 00)

Materials/Parts

Cloth, abrasive (Item 7, WP 0171 00)

Detergent (Item 11, WP 0171 00)

Materials/Parts - Continued

Grease, electrically conductive (Item 17, WP 0171 00)

Insulating varnish, electrical (Item 19, WP 0171 00)

Insulating sleeving (Item 20, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

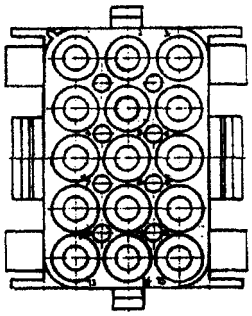
NOTE

- Use electrically conductive grease on unprotected (exposed to weather) electrical connectors before connections are made.
- Use electrical insulating varnish on all electrical connections that are mounted outside of machine and are exposed to harsh weather and/or road spray.

MULTIPLE-PIN CONNECTOR IDENTIFICATION DIAGRAMS

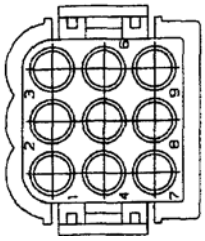
NOTE

The following diagrams illustrate typical multiple-pin connectors and identify pin numbers as viewed from wire side of connector.



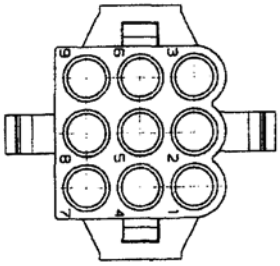
1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

390-1189



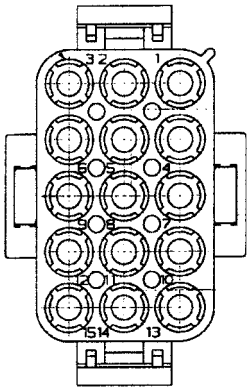
3	6	9
2	5	8
1	4	7

390-1048



9	6	3
8	5	2
7	4	1

390-1049



3	2	1
6	5	4
9	8	7
12	11	10
15	14	13

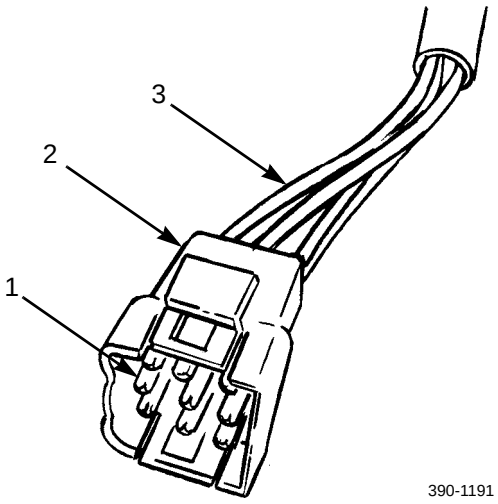
390-1190

CONNECTOR REPAIR

NOTE

- Perform the following steps for each wire of connector.
- Tag wires to aid in 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.



390-1191

NOTE

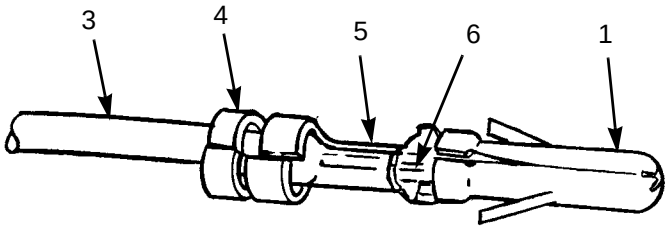
Perform steps 4 through 6 only if pin was removed.

4. Using wire stripping tool, strip insulation of 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).



390-1192

7. Push pin (1) into rear of connector (2) until fully seated.

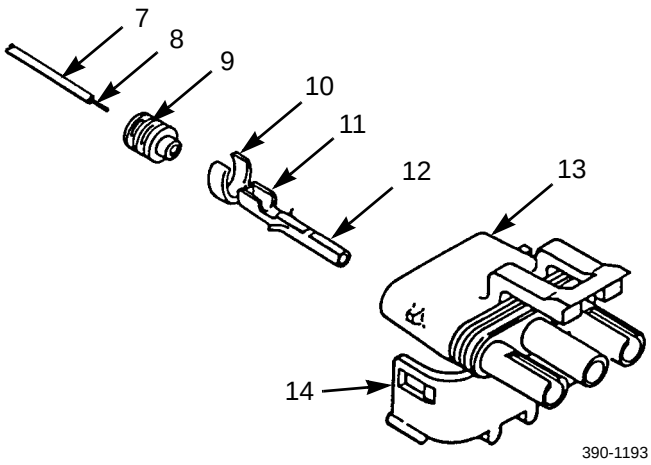
SEALED CONNECTOR REPAIR

1. Open hinged cover (14) of connector (13) for access to rear of connector.

NOTE

- Perform the following steps for each wire of connector.
- Tag wires to aid in 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.



NOTE

Perform steps 5 through 8 only if pin and seal were removed.

5. Position new seal (9) on wire (7).
6. Using wiring stripping tool, strip insulation of 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

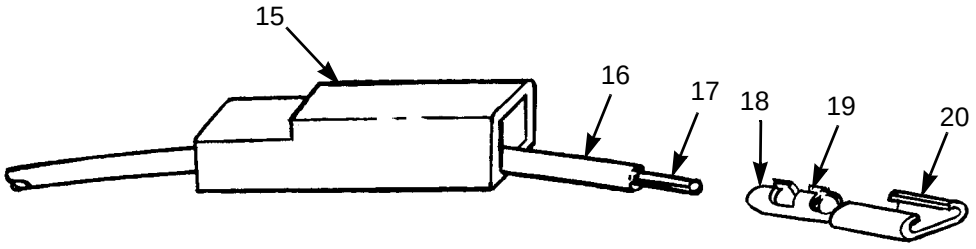
1. Using removal tool, insert tool into front of connector (15) and depress locking tab of receptacle (20).
2. Push wire (16), with receptacle (20) attached, through front of connector (15).
3. If defective, remove receptacle (20) from wire (16) by cutting through wire just behind receptacle.

RECEPTACLE CONNECTOR REPAIR - CONTINUED

NOTE

Perform steps 4 through 7 only if receptacle was removed.

4. Slide connector (15) back on wire (16).

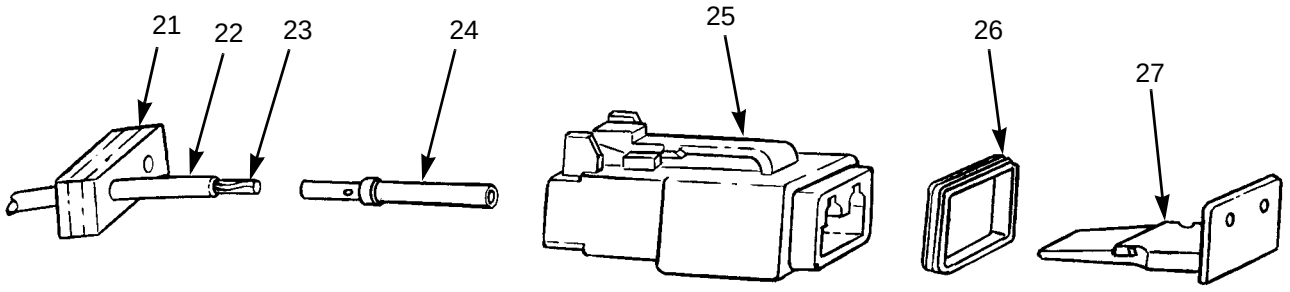


390-1194

5. Using wire stripping tool, strip insulation of 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).



390-1195

NOTE

- Perform the following steps for each wire of connector.
- Tag wires to aid in installation.

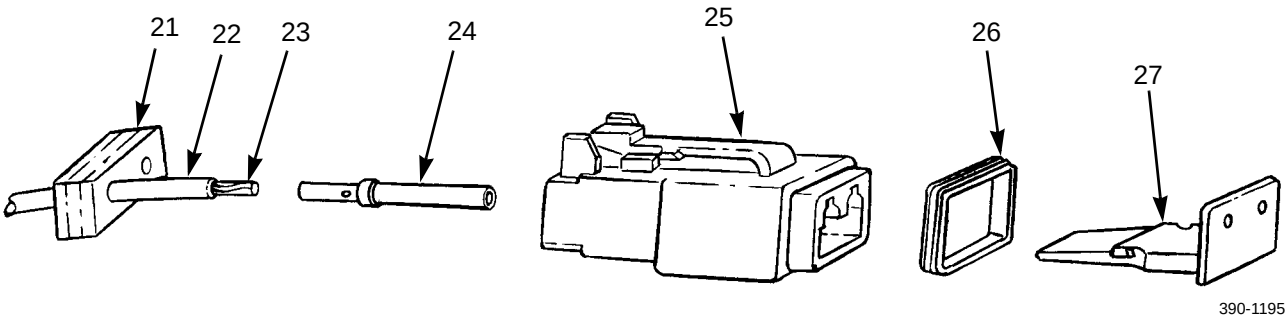
3. Using pin removal tool, insert tool into front of connector (25) and depress locking tab of connector.
4. Remove wire (22) with pin (24) from rear of connector (25).
5. If defective, remove pin (24) from wire (22) by cutting through wire just behind pin.

WATERPROOF CONNECTOR REPAIR - CONTINUED

NOTE

Perform steps 6 through 9 only if pin was removed.

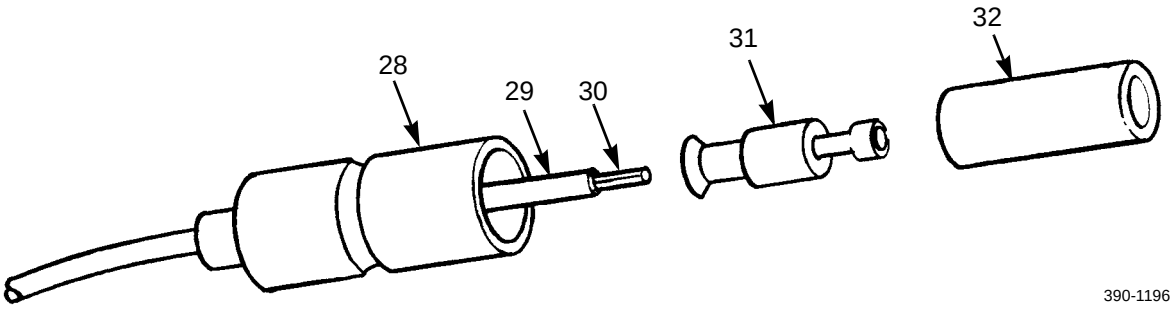
6. Using wire stripping tool, strip insulation of wire (22) to expose ¼ in. (6 mm) length of metal strands (23).
7. Insert metal strands (23) of wire (22) fully into rear of pin (24).
8. Using crimping tool, securely crimp pin (24) to metal strands (23) of wire (22).
9. Push pin (24) into rear of connector (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).



390-1195

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.



390-1196

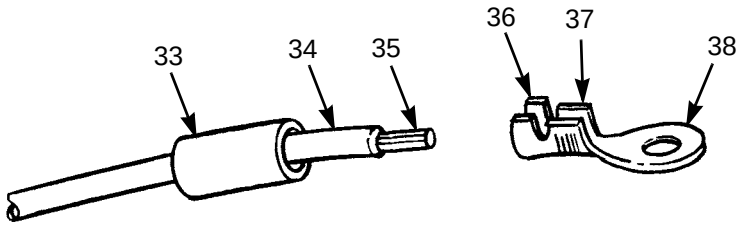
NOTE

Perform steps 4 through 6 only if terminal was removed.

4. Using wire stripping tool, strip insulation of 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) to 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).
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 of 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. Use a heat gun to apply heat to heat shrink tubing (33) until tubing snugly conforms to ring terminal (38) and insulation of wire (34).



390-1197

SPLICING WIRES

NOTE

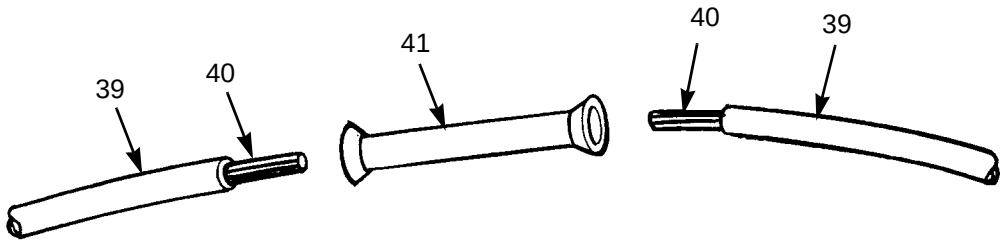
The selection of crimping tool and type of splice connectors is optional. High quality splice connectors can be expected to last the life of the machine.

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).



390-1198

ELECTRICAL GROUND POINTS

Many electrical problems are the result of poor ground connections. Ensure that ground connections are good by performing the following steps:



WARNING

Although battery disconnect switch must be ON to test electrical circuit voltage, turn battery disconnect switch to OFF 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 machine 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.** A multimeter is used to troubleshoot the electrical system of the machine. The multimeter ohms scale is used to test for continuity, shorts, and resistance. The multimeter 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 connector or electrical wiring).

NOTE

If readout will not zero properly, replace batteries and repeat zeroing procedure. If readout will not zero after batteries have been replaced, notify your supervisor.

a. **Zero Multimeter.**

(1) Set multimeter to ON.

(2) Select OHMS.

(3) Select LOWEST VOLTAGE/OHMS scale.

(4) Touch black and red probes together and check for a zero indication on digital readout.

CAUTION

Before performing a continuity test, always place battery disconnect switch in 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 to both terminals of circuit being tested.

(3) Observe readout and interpret results as follows:

(a) If readout indicates 0 (zero), circuit has continuity.

(b) If readout indicates resistance, circuit is open.

MULTIMETER USAGE - CONTINUED

CAUTION

Before performing a continuity test, always place battery disconnect switch in 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.

(1) Zero multimeter.

(2) Connect black probe to one pin and red probe to either ground or another pin.

(3) Observe readout and interpret results as follows:

(a) If readout indicates 0 (zero), circuits are shorted or circuit is grounded, if testing to ground.

(b) If readout does not indicate 0 (zero), circuits are not shorted.

(c) If readout jumps or flickers, circuits are shorted or grounded intermittently.

CAUTION

Before performing a continuity test, always place battery disconnect switch in 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) Select OHMS.

(3) Select LOWEST VOLTAGE/OHMS range. If test specifies ohms range, select required range.

(4) Connect black and red probes across circuit to be tested.

(5) Observe readout and interpret results as circuit resistance.

3. **Measuring DC Voltage.**

a. Set multimeter to ON.

b. Select VOLTS.

c. Select volts DC.

d. Select LOWEST VOLTAGE/OHMS range for voltage range that is higher than volts to be measured.

e. Connect red probe to positive (+) pin and black probe to negative (-) pin.

f. Observe readout 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.

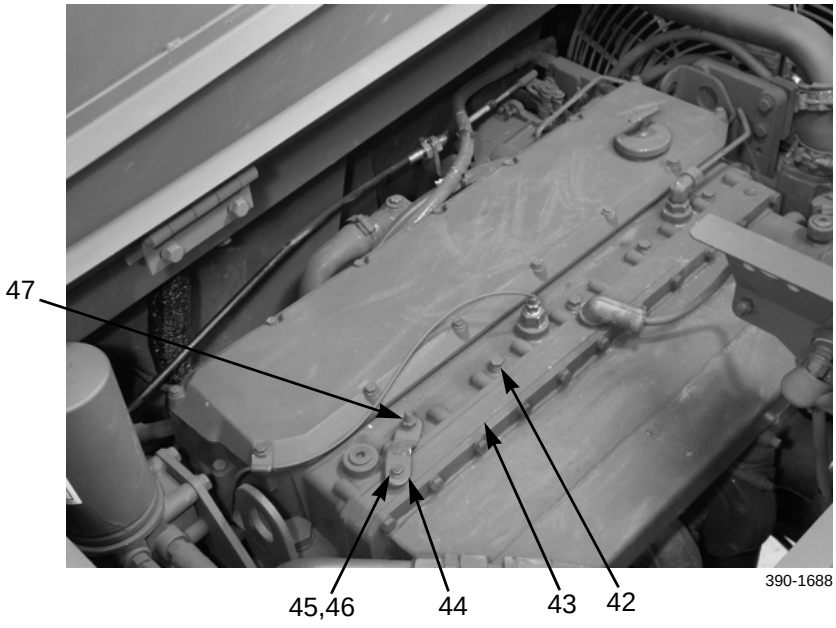
AIR INTAKE HEATER-TO-ENGINE BLOCK GROUND STRAP REPLACEMENT

1. Place battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Open engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. Remove two nuts (45), washers (46), and ground strap (44) from studs (47) on intake heater (43) and engine block (42).

NOTE

Ensure ground points are clean.

4. Install ground strap (44) on studs (47) on intake heater (43) and engine block (42) with two washers (46) and nuts (45).
5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



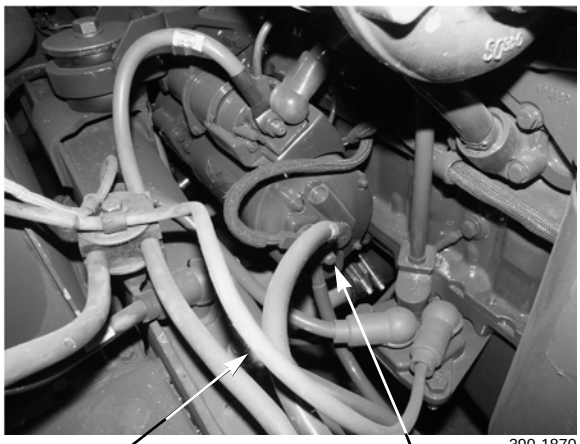
STARTER GROUND CABLE REPLACEMENT

1. Place battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Open engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. Remove screw (48), washer (49), and ground cable (50) from ground lug (51).
4. Remove nut (52), lockwasher (53), and other end of ground cable (50) from starter terminal (54). Discard lockwasher.

NOTE

Ensure ground points are clean and free of paint.

5. Install ground cable (50) on starter terminal (54) with new lockwasher (53) and nut (52).
6. Install other end of ground cable (50) on ground lug (51) with washer (49) and screw (48).
7. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



390-1870

CAB-TO-FRAME GROUND STRAP REPLACEMENT

1. Place battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

Cab-to-frame ground strap is located below cab and to the rear of seat on left side.

2. Remove screw (55), washer (56), and ground strap (58) from cab ground lug (57).



390-1304

CAB-TO-FRAME GROUND STRAP REPLACEMENT - CONTINUED

3. Remove screw (59), washer (60), and other end of ground strap (58) from frame ground lug (61).

NOTE

Ensure ground points are cl3ean and free of paint.

4. Install ground strap (58) on frame ground lug (61) with washer (60) and screw (59).
5. Install other end of ground strap (58) to cab ground lug (57) with washer (56) and screw (55).



END OF WORK PACKAGE

ALTERNATOR REPLACEMENT 0034 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Personnel Required

Two

References

WP 0005 00

References - Continued

WP 0032 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

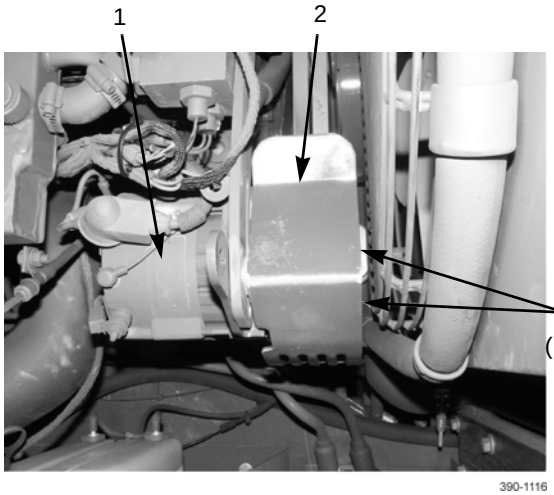
Battery cables disconnected (WP 0067 00)

REMOVAL

NOTE

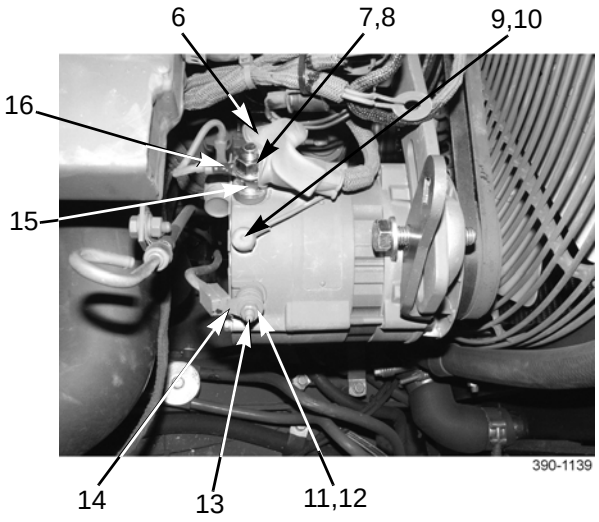
- Tag wires to aid in installation.
- Remove tiedown straps as needed and discard. Use new tiedown straps on installation.

1. Remove two nuts (3) from bolts (4) on alternator (1).
2. Pull out, but do not remove, bolts (4) and washers (5) approximately 1/2 in. (13 mm) and remove alternator belt guard (2).

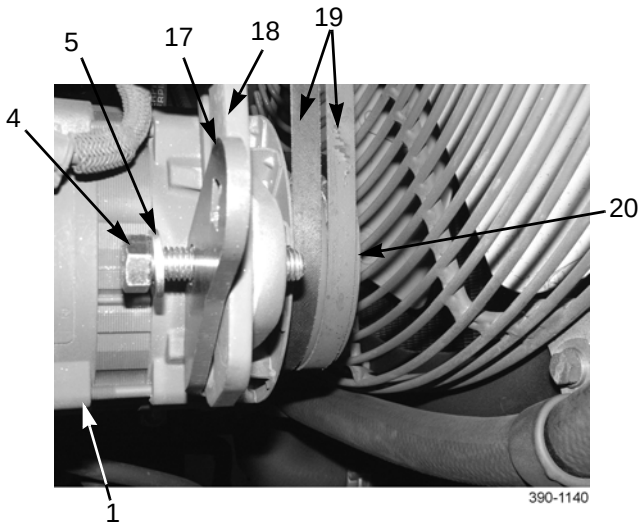


REMOVAL - CONTINUED

3. Pull back rubber cap (6) and remove nut (7), washer (8), and wire terminal (15) from terminal (16).
4. Disconnect wire (9) from terminal (10).
5. Remove nut (11), washer (12), and wire terminal (14) from terminal (13).



6. Remove bolt (4), washer (5), and alternator adjusting bracket (17) from alternator (1) and support arm (18).
7. Tilt alternator (1) toward engine and remove two drive belts (19) from alternator pulley (20).



REMOVAL - CONTINUED



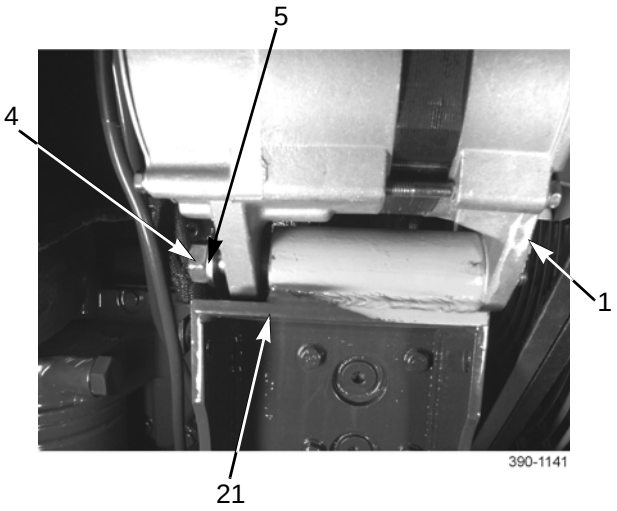
WARNING

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

Alternator weighs 32 lb (15 kg).

8. With assistant holding alternator (1), remove washer (5), bolt (4) and remove alternator (1) from mounting bracket (21).



INSTALLATION



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.

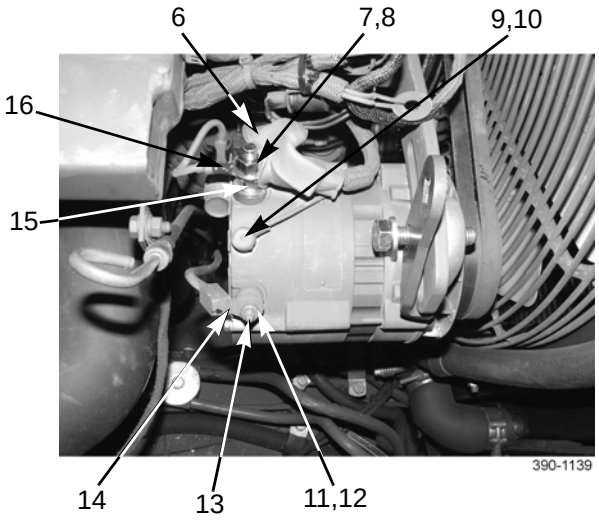
NOTE

Alternator weighs 32 lb (15 kg).

1. With assistance, position alternator (1) on mounting bracket (21) and install bolt (4) and washer (5) approximately 1/2 in. (13 mm).
2. Tilt alternator (1) towards engine and install two drive belts (19) on pulley (20).
3. Position alternator (1) and adjusting bracket (17) on support arm (18) and install bolt (4) and washer (5) approximately 1/2 in. (13 mm).

INSTALLATION - CONTINUED

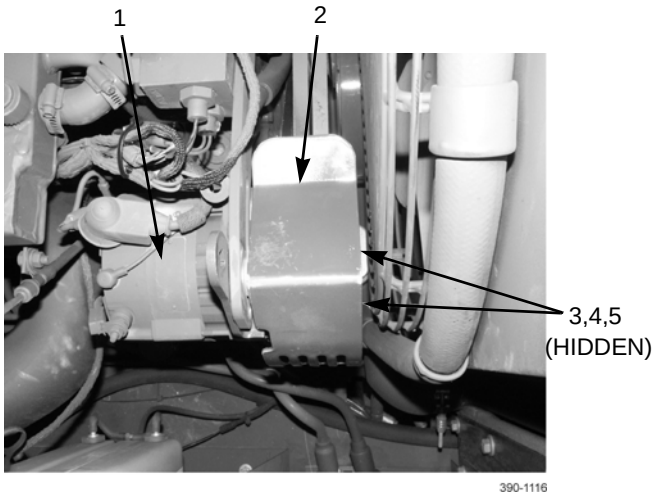
4. Install wire terminal (14) on terminal (13) with washer (12) and with nut (11).
5. Connect wire terminal (9) to terminal (10).
6. Install wire terminal (15) on terminal (16) with washer (8) and nut (7).
7. Install rubber cap (6) on terminal (16).



NOTE

Install nuts loosely.

8. Install alternator belt guard (2) on alternator (1) with two bolts (4) and nuts (3).



9. Adjust drive belts (WP 0032 00).
10. Connect battery cables (WP 0067 00).
11. Test alternator (WP 0005 00).
12. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

INSTALLATION - CONTINUED



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

13. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and verify operation of alternator.

END OF WORK PACKAGE

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STARTER REPLACEMENT 0035 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanics's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Gasket

Personnel Required

Two

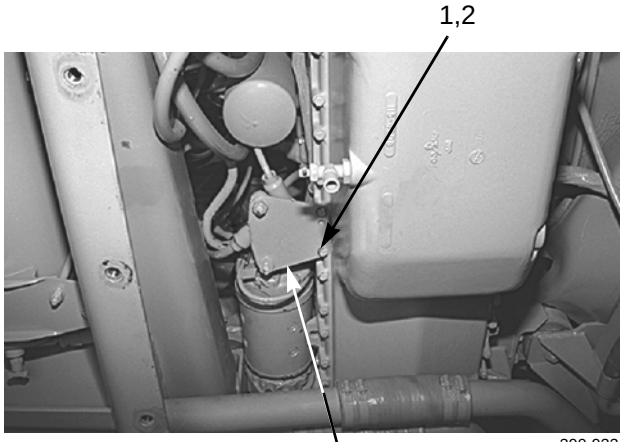
Equipment Condition

Battery cables disconnected (WP 0067 00)

Center guard plates removed (WP 0100 00)

REMOVAL

1. Remove two bolts (1) and washers (2) from plate (3). Move plate aside.

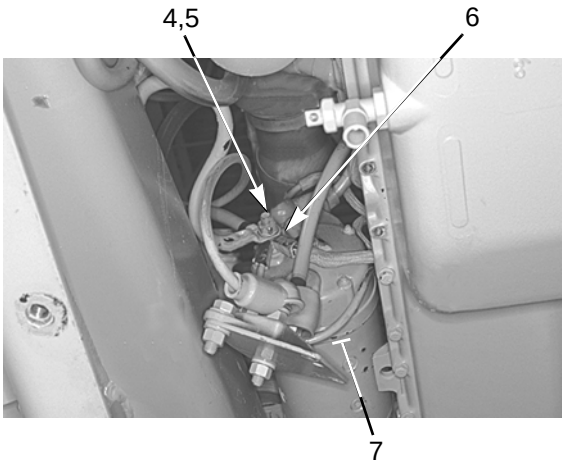


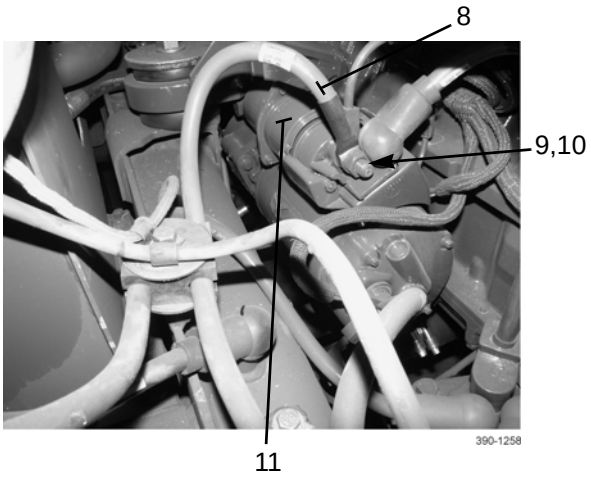
REMOVAL - CONTINUED

NOTE

Tag all wires and cable assemblies to aid in installation.

2. Remove nut (4), washer (5), and four cables (6) from starter (7).
3. Remove nut (9), washer (10) and three cables (8) from solenoid (11).







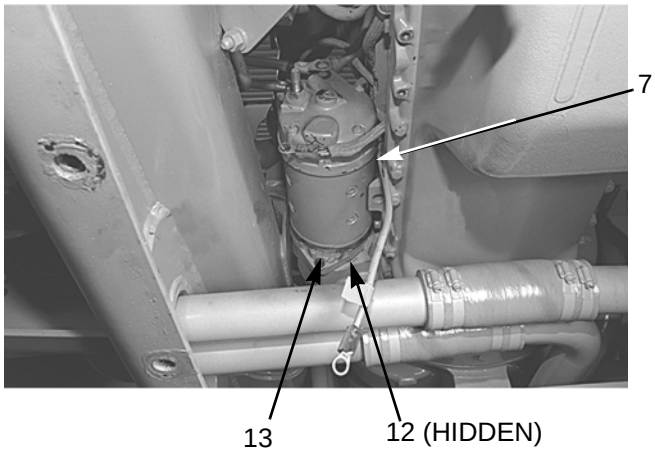
WARNING

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

Starter weighs 57 lb (26 kg).

4. With assistance, remove three bolts (13), starter (7), and gasket (12) from machine. Discard gasket.



INSTALLATION



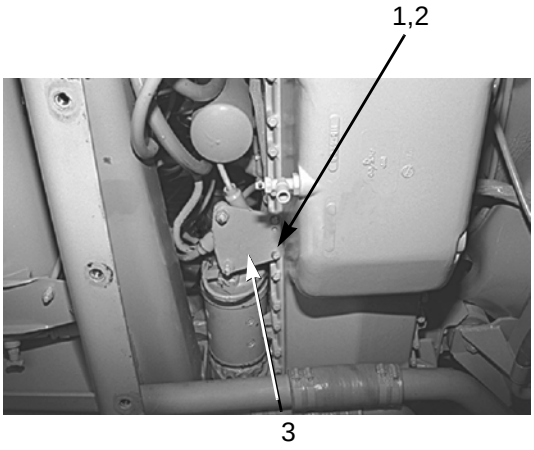
WARNING

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

Starter weighs 57 lb (26 kg).

1. With assistance, install new gasket (12) and starter (7) on machine with three bolts (13).
2. Install three cables (8) on solenoid (11) with washer (10) and nut (9).
3. Install four cables (6) on starter (7) with washer (5) and nut (4).
4. Install plate (3) with two bolts (1) and washers (2).



5. Install center guard plate (WP 0100 00).
6. Connect battery cables (WP 0067 00).

END OF WORK PACKAGE

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BACKUP ALARM SWITCH REPLACEMENT 0036 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Pin, spring (3)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

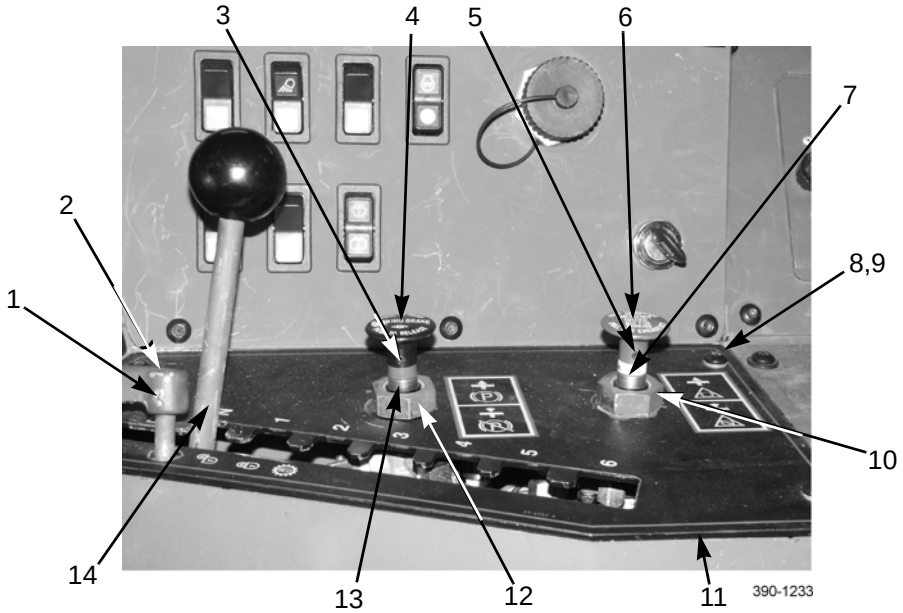
REMOVAL

1. Remove spring pin (1) and neutral lock lever (2) from panel (11). Discard spring pin.
2. Remove spring pin (3), parking brake handle (4), and nut (12) from valve (13). Discard spring pin. Discard nut if seal is cracked or damaged.
3. Remove spring pin (5), emergency brake handle (6), and nut (10) from valve (7). Discard spring pin. Discard nut if seal is cracked or damaged.
4. Remove four screws (8) and washers (9) from panel (11).

NOTE

Panel does not have to be completely removed to access backup alarm switch.

5. Slide panel (11) up transmission shift lever (14) and turn panel to left.



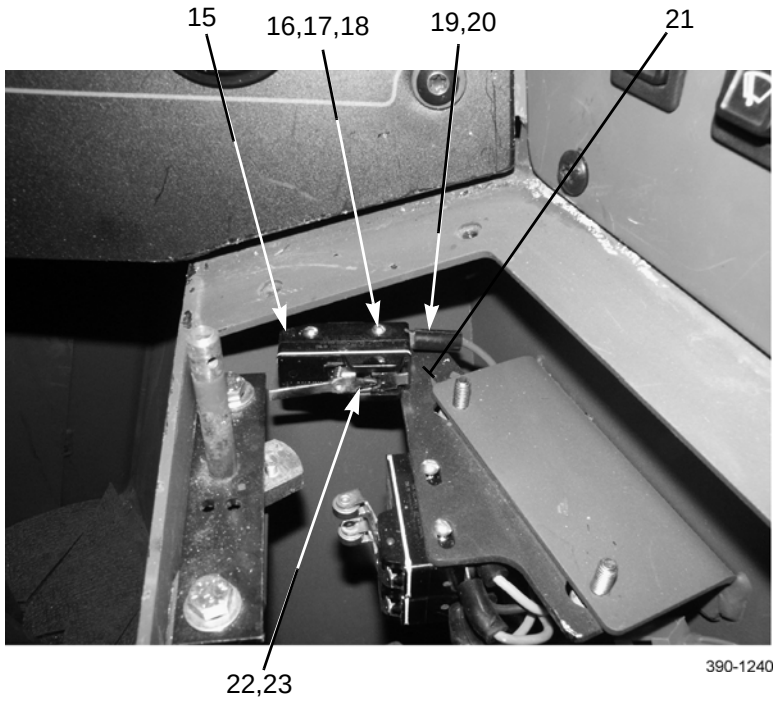
REMOVAL - CONTINUED

6. Mark outline of backup alarm switch (15) on bracket (21).

NOTE

Remove tiedown straps as needed and discard. Use new tiedown straps on installation.

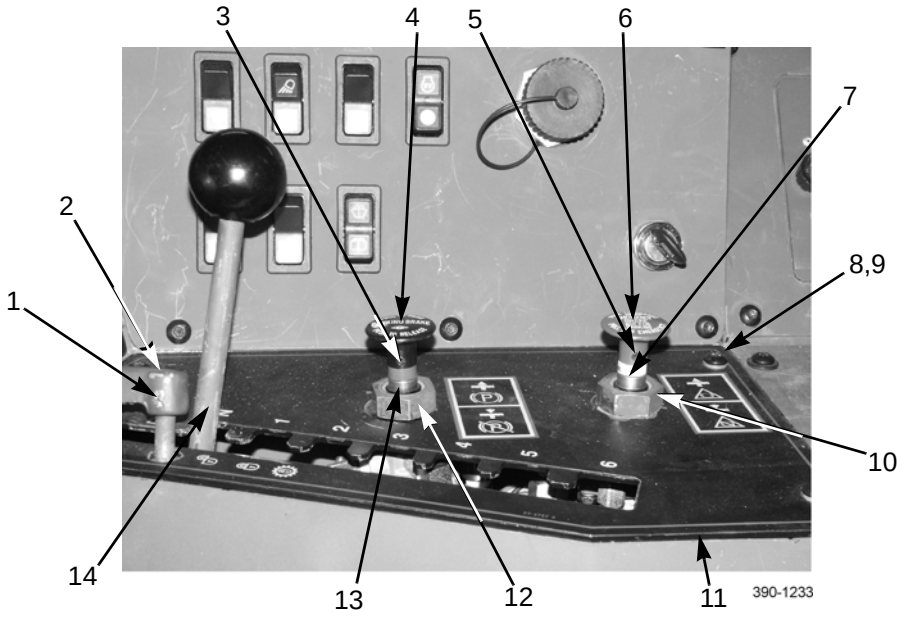
7. Remove two screws (16), washers (17), nuts (18), and backup alarm switch (15) from bracket (21).
8. Remove 114 red lead (19) from COMMON terminal (20).
9. Remove 321 brown lead (22) from OPEN terminal (23).



INSTALLATION

1. Install 321 brown lead (22) on OPEN terminal (23).
2. Install 114 red lead (19) on COMMON terminal (20).
3. Install backup alarm switch (15) on bracket (21) with two screws (16), washers (17), and nuts (18).
4. Install panel (11) with four washers (8) and screws (7).
5. Install nut (10) on valve (7).
6. Install emergency brake handle (6) on valve (7) with new spring pin (5).
7. Install nut (12) on valve (13).
8. Install parking brake handle (4) on valve (13) with new spring pin (3).
9. Install neutral lock lever (2) on panel (11) with new spring pin (1).

INSTALLATION - CONTINUED



END OF WORK PACKAGE

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BATTERY DISCONNECT SWITCH REPLACEMENT 0037 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Lockwasher (4)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

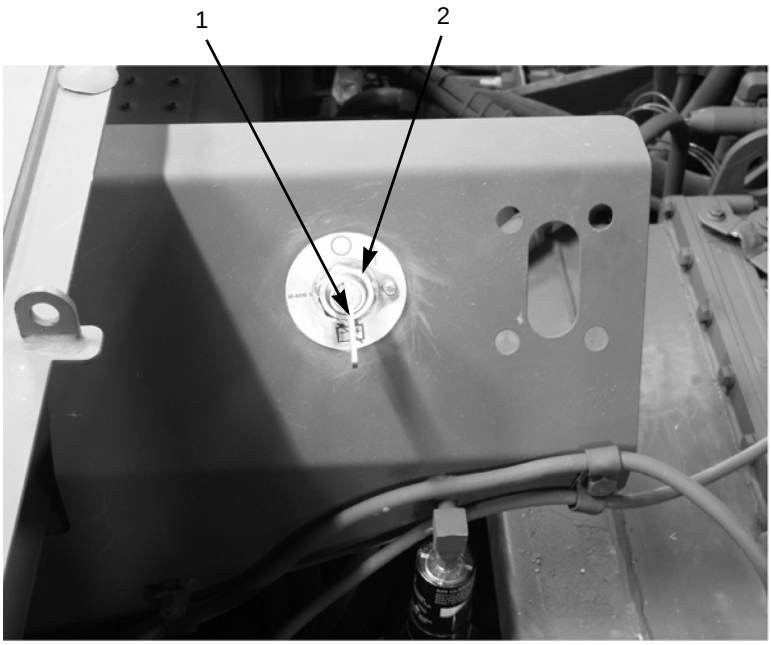
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery cables disconnected (WP 0067 00)

REMOVAL

1. Remove key (1) from switch (2).



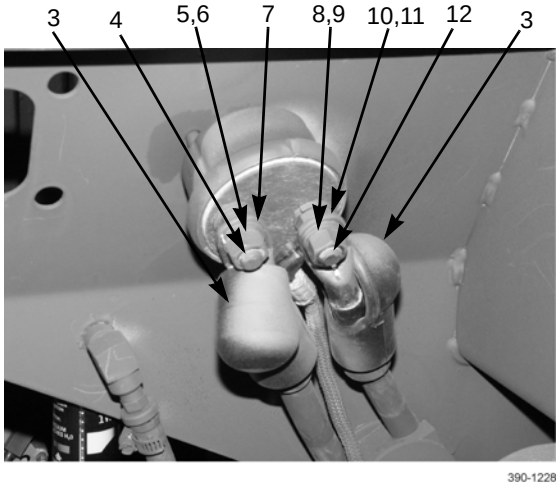
390-1229

REMOVAL - CONTINUED

NOTE

Tag cables to aid in installation.

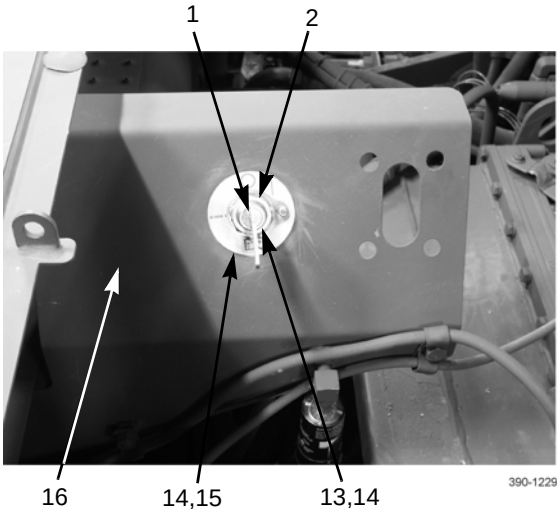
2. Pull rubber boots (3) from terminals (4 and 12).
3. Remove nut (5), lockwasher (6), and cable lead (7) from left terminal (4). Discard lockwasher.
4. Remove nut (8), lockwasher (9), cable lead (10), and electrical lead (11) from right terminal (12). Discard lockwasher.



NOTE

There is another lockwasher (14) located between plate and switch.

5. Remove nut (13) and lockwasher (14) from switch (2). Discard lockwasher.
6. Remove plate (15), lockwasher (14), and switch (2) from mounting bracket (16). Discard lockwasher.
7. Inspect plate (15) for damage. Replace plate if damaged.



INSTALLATION

1. Install new lockwasher (14) on switch (2).

NOTE

Align switch guide pin with hole in mounting bracket when installing switch.

2. Position switch (2) on mounting bracket (16).
3. Install plate (15) on mounting bracket (16) with new lockwasher (14) and nut (13).
4. Install electrical lead (11) and cable lead (10) on right terminal (12) with new lockwasher (9) and nut (8).
5. Install cable lead (7) on left terminal (4) with new lockwasher (6) and nut (5).
6. Install rubber boots (3) over terminals (4 and 12).
7. Install key (1) in switch (2).
8. Connect battery cables (WP 0067 00).

END OF WORK PACKAGE

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CIRCUIT BREAKERS REPLACEMENT 0038 00

THIS WORK PACKAGE COVERS

60-Amp Circuit Breaker: Removal, Installation

10-Amp Circuit Breaker: Removal, Installation

20-Amp Circuit Breaker: Removal, Installation

15-Amp Circuit Breaker: Removal, Installation

INITIAL SETUP

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Lockwasher (as required)

Starwasher (as required)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

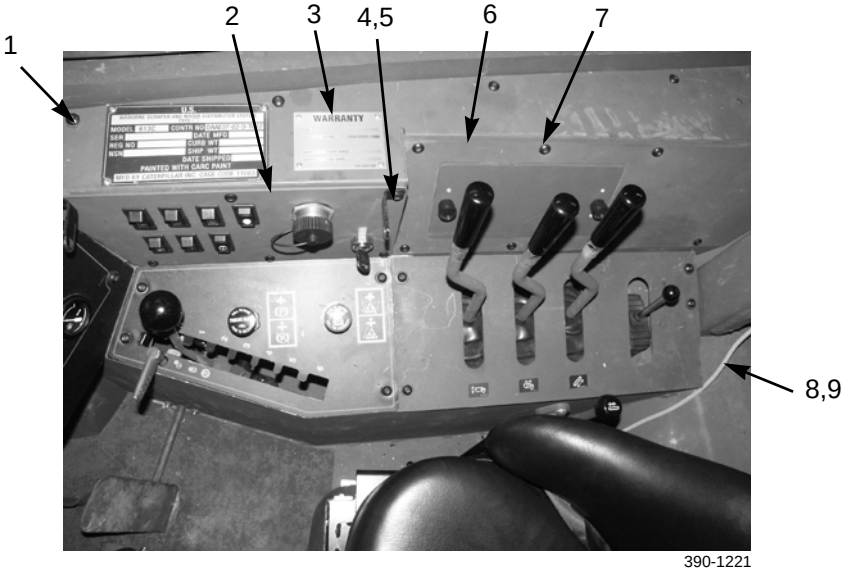
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

60-AMP CIRCUIT BREAKER REMOVAL

1. Remove nine screws (7) from right panel (6).
2. Slide cable (8) from grommet (9) and remove panel (6).
3. Remove three top screws (4) and two brackets (5) from switch panel (2).
4. Remove five screws (1) and top access panel (3).



390-1221

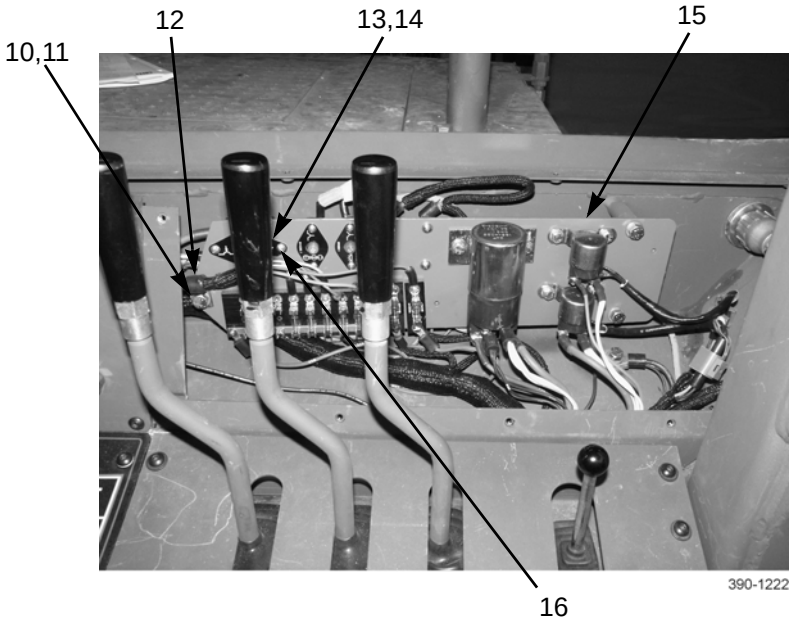
60-AMP CIRCUIT BREAKER REMOVAL - CONTINUED

5. Remove three bolts (10) and washers (11) from fuse/circuit breaker panel (15).
6. Remove cable and clamp (12) from left side of fuse/circuit breaker panel (15).

NOTE

Note orientation of plate prior to removing circuit breaker.

7. Remove two screws (16), plate (13), and circuit breaker (14) from fuse/circuit breaker panel (15).



NOTE

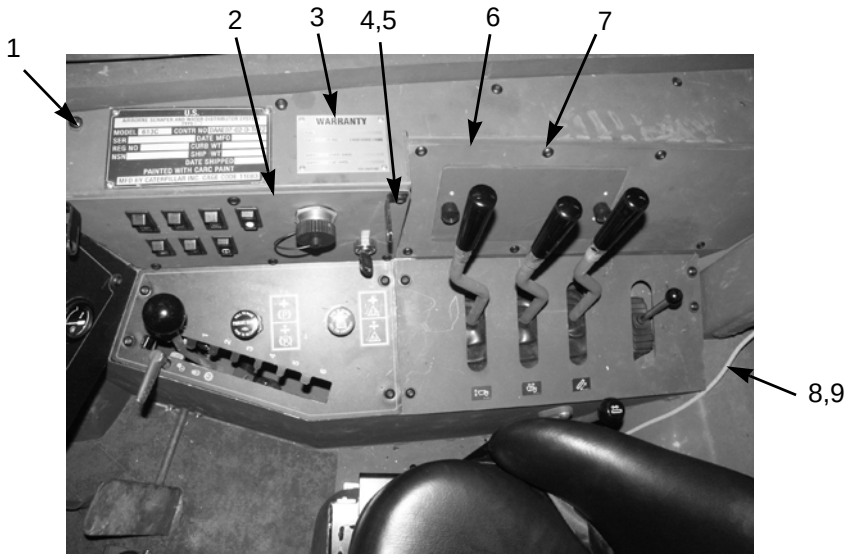
Tag leads to aid in installation.

8. Remove nut (17), washer (18), two leads (19), and lockwasher (20) from left terminal (21). Discard lockwasher.
9. Remove nut (22), washer (23), lockwasher (24), and lead (25) from right terminal (26). Discard lockwasher.



60-AMP CIRCUIT BREAKER INSTALLATION

1. Install lead (25), new lockwasher (24), washer (23), and nut (22) on right terminal (26). Tighten nut to 9 lb-in. (1 Nm).
2. Install new lockwasher (20), two leads (19), washer (18), and nut (17) on left terminal (21). Tighten nut to 9 lb-in. (1 Nm).
3. Install plate (13) and circuit breaker (14) on fuse/circuit breaker panel (15) with two screws (16).
4. Position cable and clamp (12) on left side of fuse/circuit breaker panel (15).
5. Install panel (15) with three bolts (10) and washers (11).
6. Install top access panel (3) and with five screws (1).
7. Install top three bolts (4) and two brackets (5) on switch panel (2).
8. Slide cable (8) into grommet (9) on right panel (6).
9. Install right panel (6) with nine screws (7).



390-1221

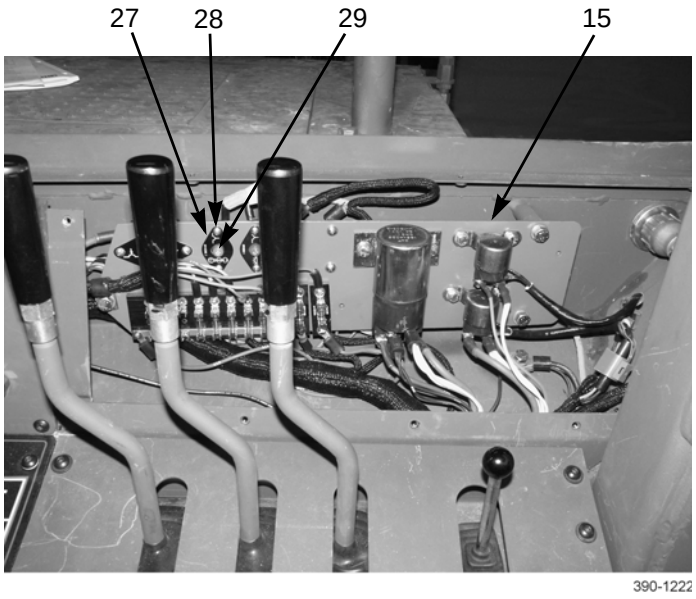
10-AMP CIRCUIT BREAKER REMOVAL

1. Perform steps 1 through 5 of *60-Amp Circuit Breaker Removal*.

NOTE

Note orientation of plate prior to removing circuit breaker.

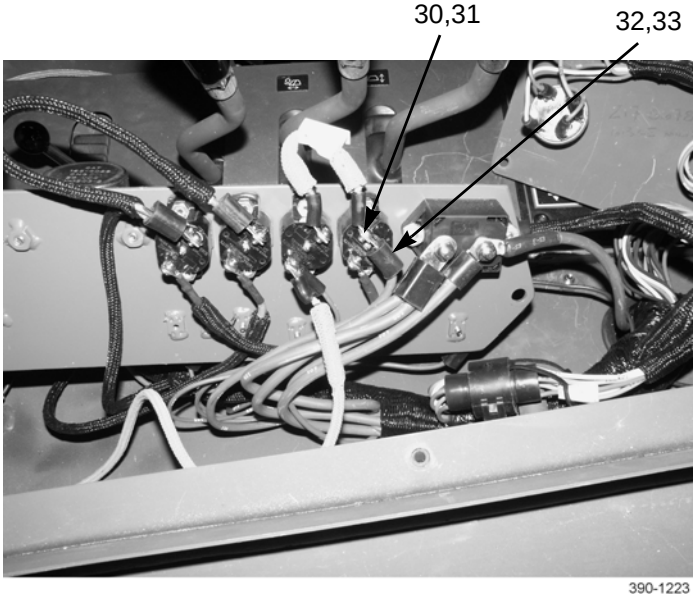
2. Remove two screws (28), plate (27), and circuit breaker (29) from fuse/circuit breaker panel (15).



NOTE

Tag leads to aid in installation.

3. Remove two screws (30), starwashers (31), and leads (32) from terminals (33). Discard starwashers.



10-AMP CIRCUIT BREAKER INSTALLATION

1. Install two screws (30), new starwashers (31), and leads (32) on terminals (33).
2. Install plate (27) and circuit breaker (29) on fuse/circuit breaker panel (15) with two screws (28).
3. Perform steps 4 through 9 of *60-Amp Circuit Breaker Installation.*

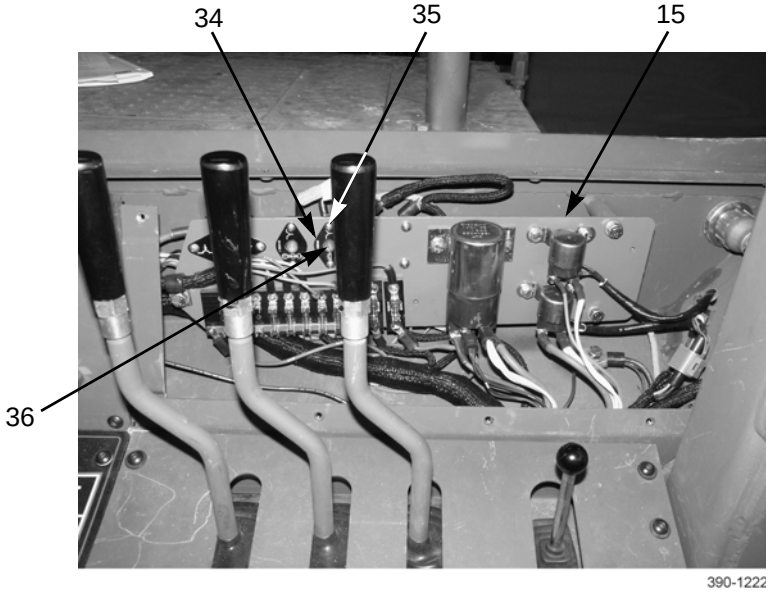
20-AMP CIRCUIT BREAKER REMOVAL

1. Perform steps 1 through 6 of *60-Amp Circuit Breaker Removal*.

NOTE

Note orientation of plate prior to removing circuit breaker.

2. Remove two screws (35), plate (34), and circuit breaker (36) from fuse/circuit breaker panel (15).

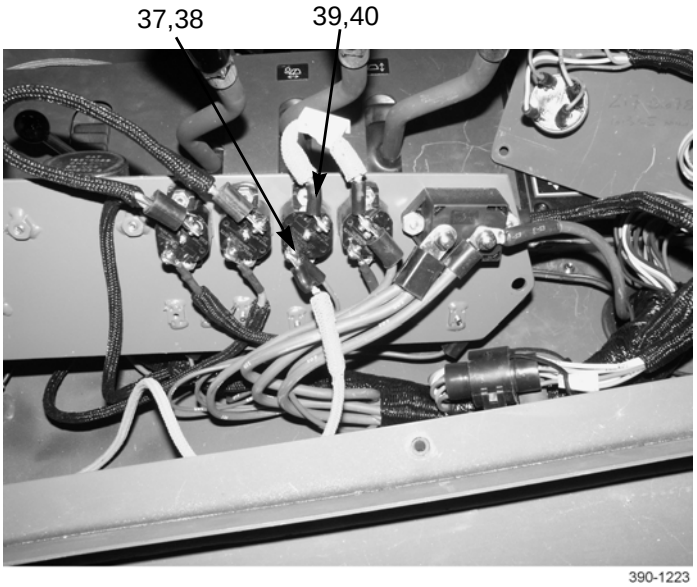


390-1222

NOTE

Tag leads to aid in installation.

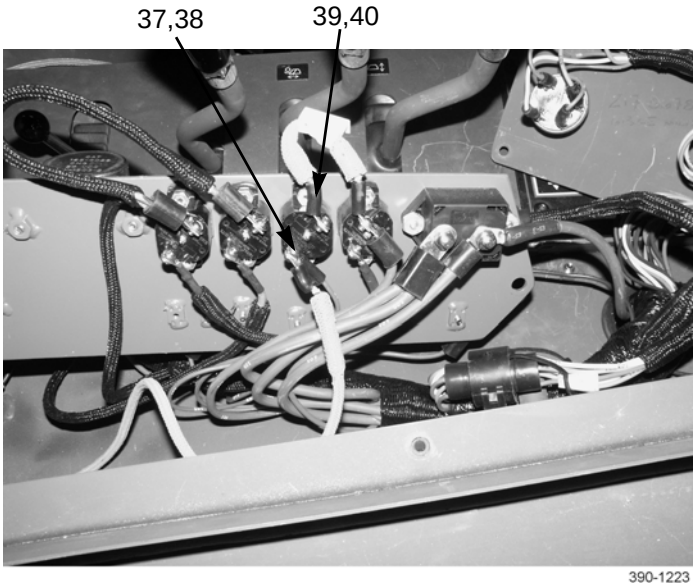
3. Remove two screws (37), starwashers (38), and leads (39) from terminals (40). Discard starwashers.



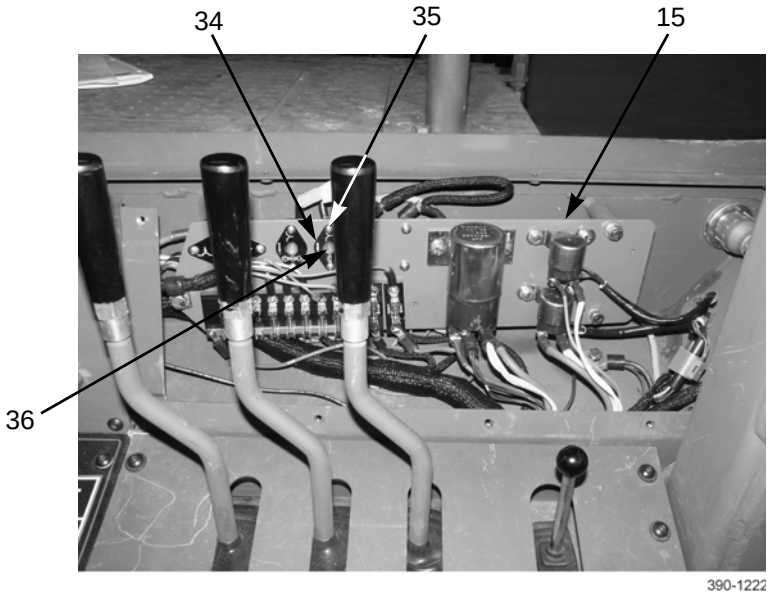
390-1223

20-AMP CIRCUIT BREAKER INSTALLATION

4. Install two screws (37), new starwashers (38), and leads (39) on terminals (40).



5. Install plate (34) and circuit breaker (36) on fuse/circuit breaker panel (15) with two screws (35).



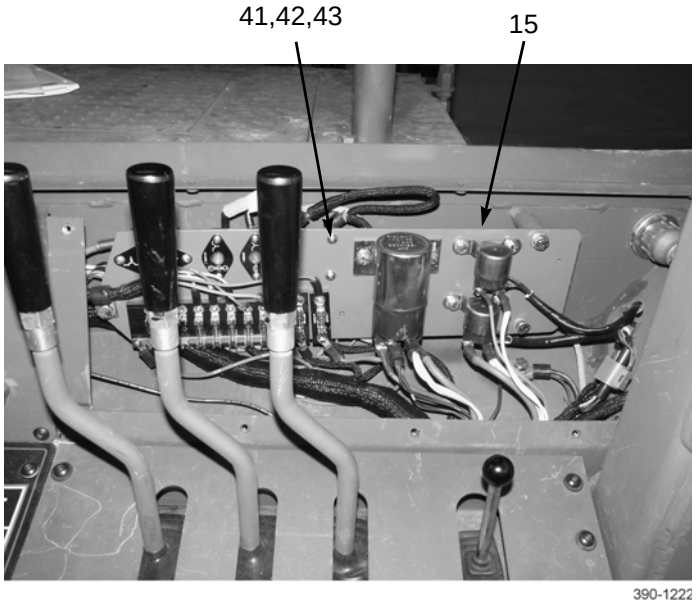
6. Perform steps 4 through 9 of *60-Amp Circuit Breaker Installation.*

15-AMP CIRCUIT BREAKER REMOVAL

NOTE

There are two 15-amp circuit breakers used.

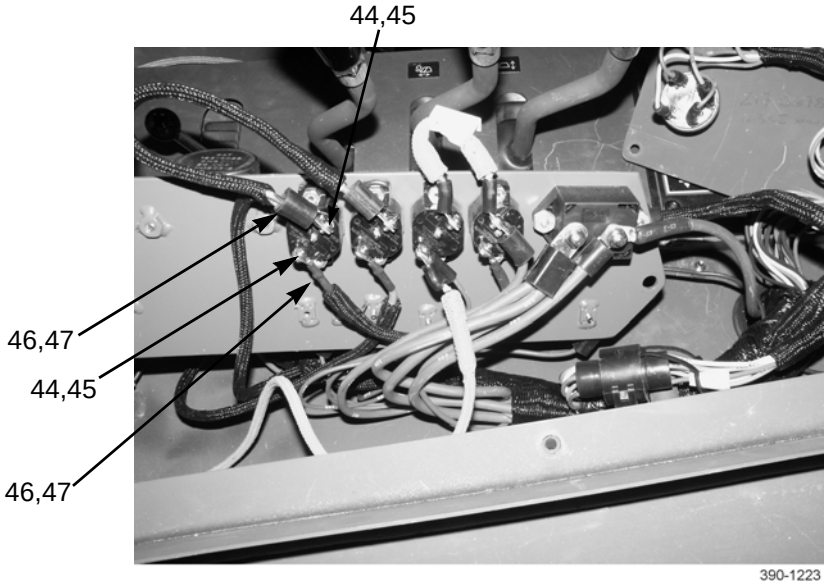
1. Perform steps 1 through 6 of *60-Amp Circuit Breaker Removal*.
2. Remove two screws (41), washers (42), and circuit breaker (43) from fuse/circuit breaker panel (15).



NOTE

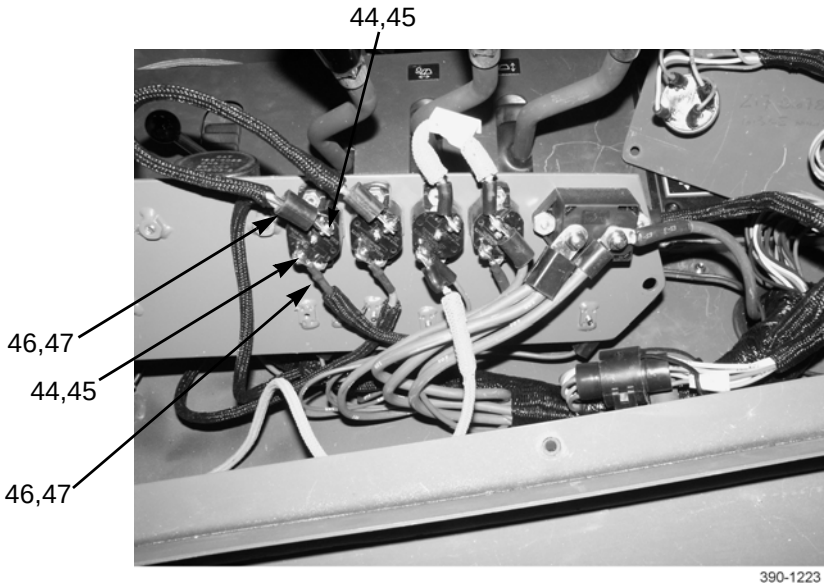
Tag leads to aid in installation.

3. Remove two screws (44), starwashers (45), and leads (46) from terminals (47). Discard starwashers.

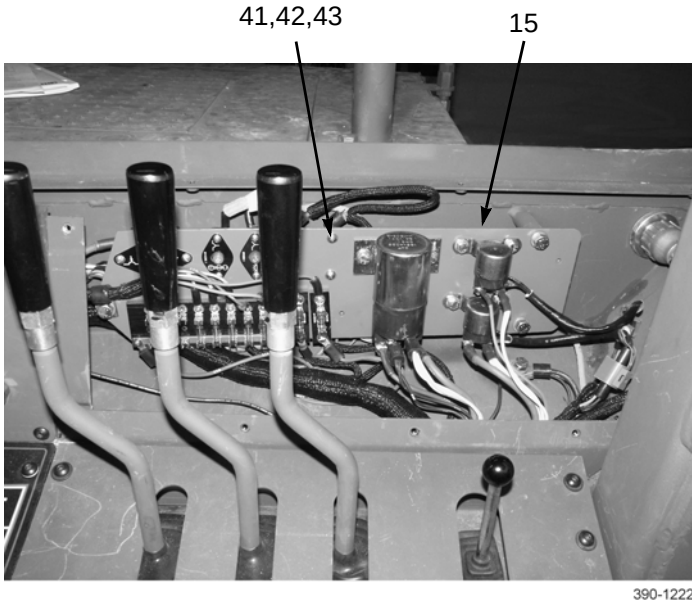


15-AMP CIRCUIT BREAKERS INSTALLATION

4. Install two screws (44), new starwashers (45), and leads (46) on terminals (47).



5. Install two screws (41), washers (42), and circuit breaker (43) on fuse/circuit breaker panel (15).



6. Perform steps 4 through 9 of *60-Amp Circuit Breaker Installation.*

END OF WORK PACKAGE

EMS PANEL REPLACEMENT 0039 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

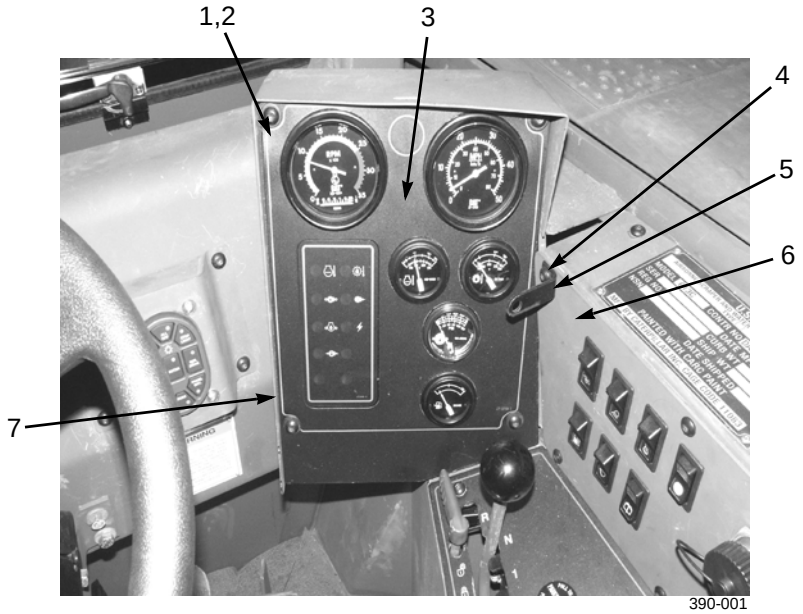
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Remove four screws (1) and washers (2) from panel (3).
2. Remove screw (4) and bracket (5) from switch panel (6).
3. Remove panel (3) from enclosure (7).



390-001

REMOVAL - CONTINUED

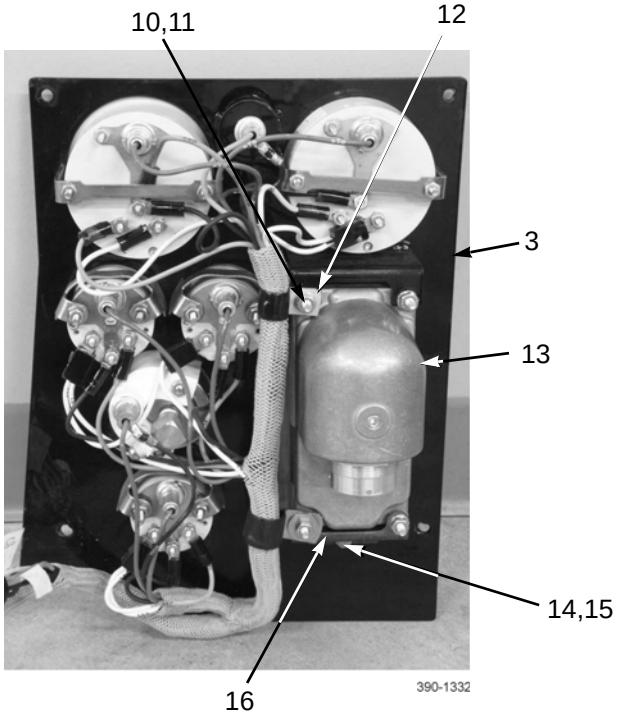
4. Disconnect harness connector (9) from EMS connector (8).



NOTE

Instrument panel shown removed for clarity.

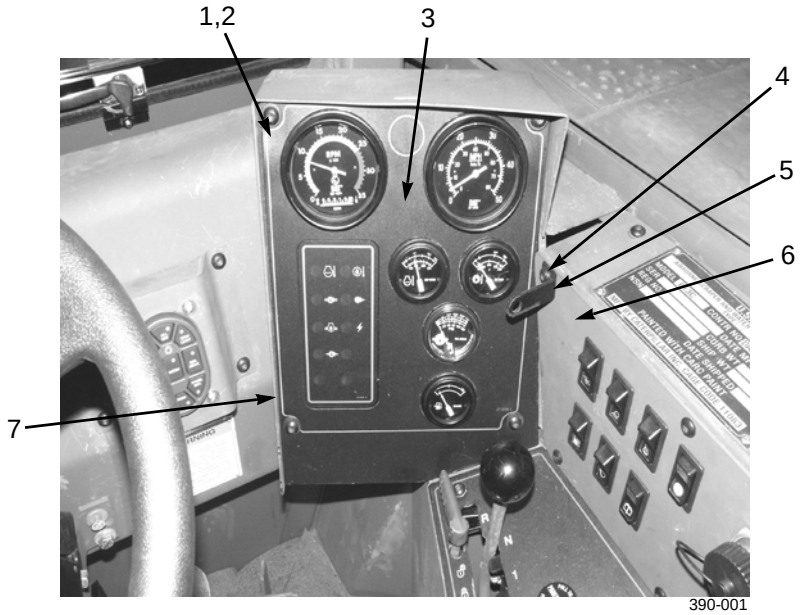
5. Remove four nuts (10), washers (11), and two cable clamps (12) from EMS (13).
6. Remove bolt (14), washer (15), and lower bracket (16) from EMS (13).
7. Remove EMS (13) from panel (3).



EMS PANEL REPLACEMENT - CONTINUED **0039 00**

INSTALLATION

1. Position EMS (13) on panel (3) and install lower bracket (16) with washer (15) and bolt (14).
2. Install two cable clamps (12), from washers (11), and nuts (10) on EMS (13).
3. Connect harness connector (9) to EMS connector (8).
4. Position panel (3) in enclosure (7) and install bracket (5) with screw (4).
5. Install four screws (1) and washers (2) on panel (3).



END OF WORK PACKAGE

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FUSE REPLACEMENT 0040 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

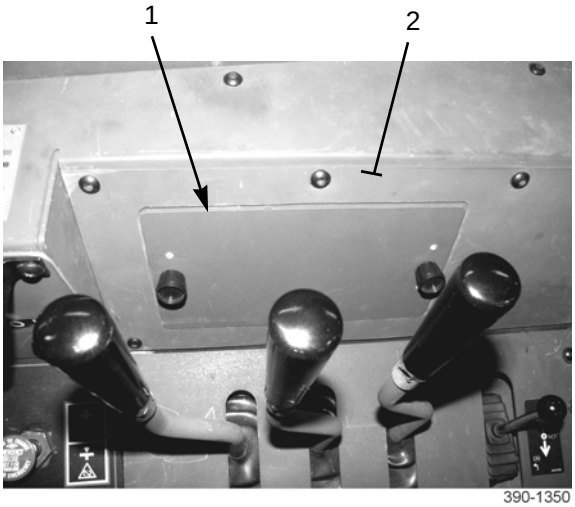
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

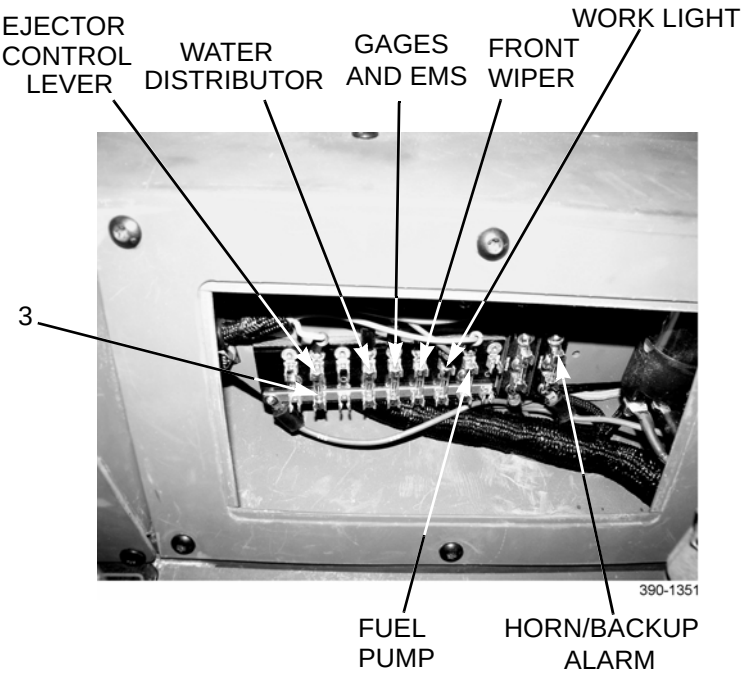
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

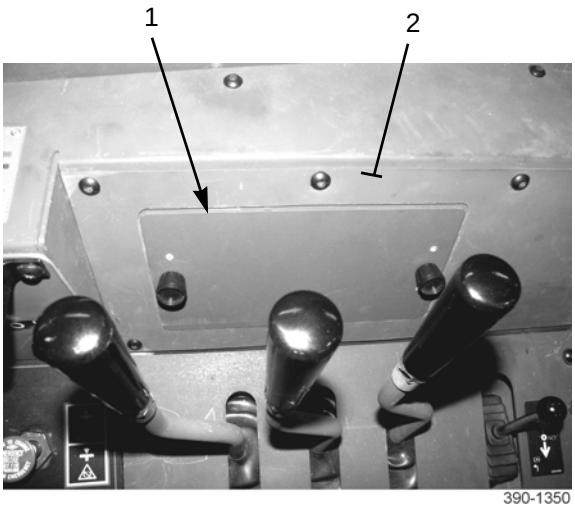
1. Remove cover (1) from fuse/circuit breaker panel (2).
2. Remove failed fuse (3).

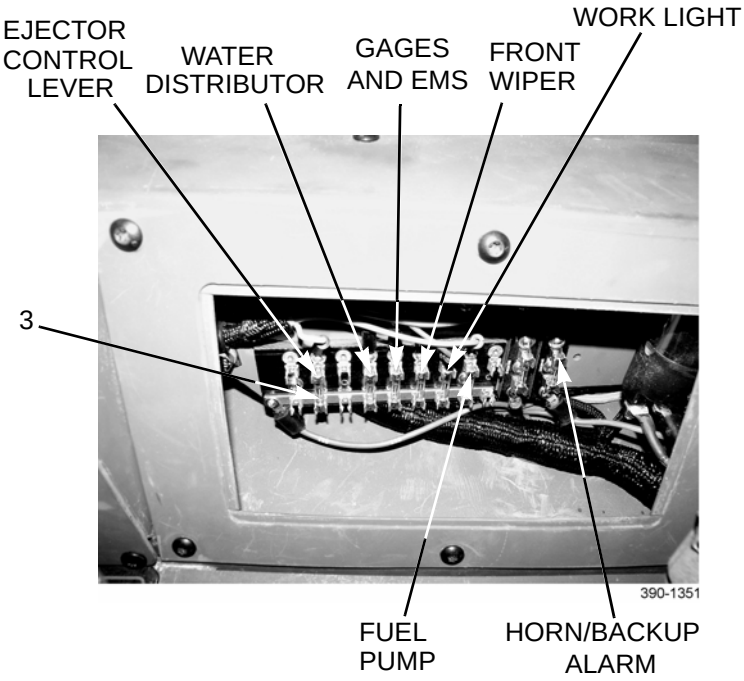




INSTALLATION

1. Install new fuse (3).
2. Install cover (1) on fuse/circuit breaker panel (2).





END OF WORK PACKAGE

HAZARD FLASHER UNIT REPLACEMENT 0041 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

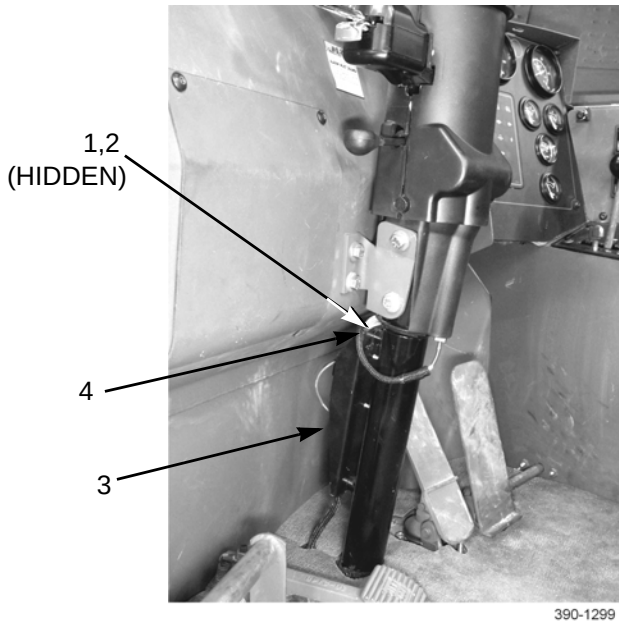
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

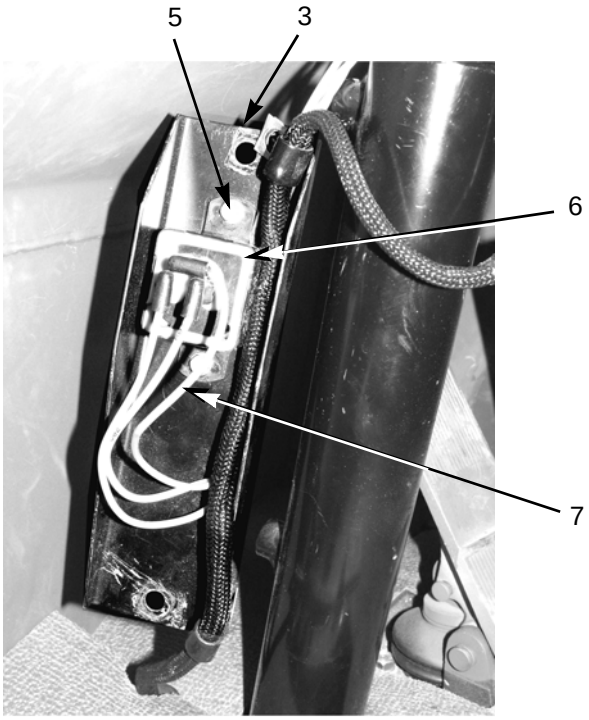
REMOVAL

1. Remove two screws (1), washers (2), bracket (3), and cable clamps from steering column (4).



REMOVAL - CONTINUED

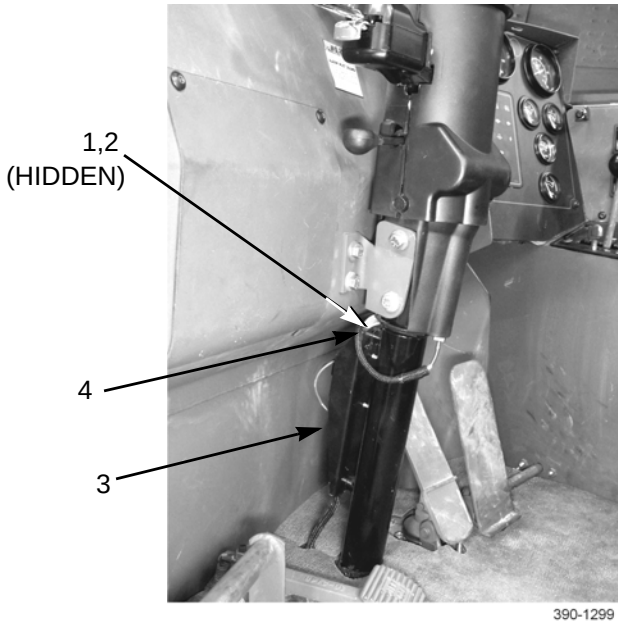
2. Remove two screws (5) and flasher unit (6) from bracket (3).
3. Tag electrical leads (7) and disconnect from flasher unit (6).



INSTALLATION

1. Connect leads (7) to flasher unit (6).
2. Install flasher unit (6) on bracket (3) with two screws (5).
3. Install bracket (3) and cable clamps on steering column (4) with two washers (2) and screws (1).

END OF WORK PACKAGE



INSTRUMENT PANEL GAGES AND BULBS REPLACEMENT 0042 00

THIS WORK PACKAGE COVERS

Instrument Panel: Removal, Installation

Instrument Panel Gages and Bulbs: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

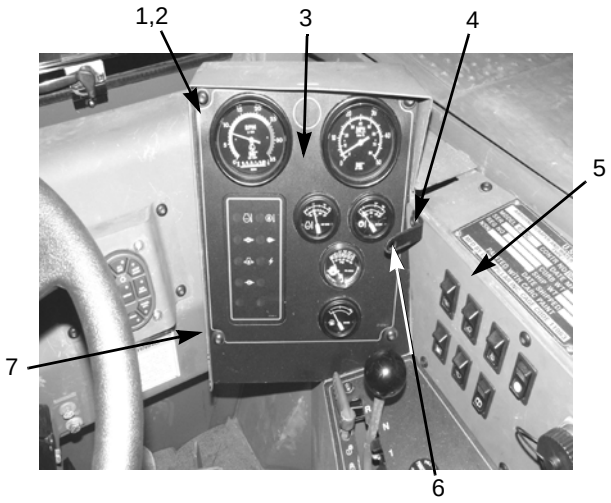
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

INSTRUMENT PANEL REMOVAL

1. Remove four screws (1) and washers (2) from panel (3).
2. Remove screw (4) and bracket (6) from switch panel (5).
3. Pull panel (3) from enclosure (7).



INSTRUMENT PANEL REMOVAL - CONTINUED

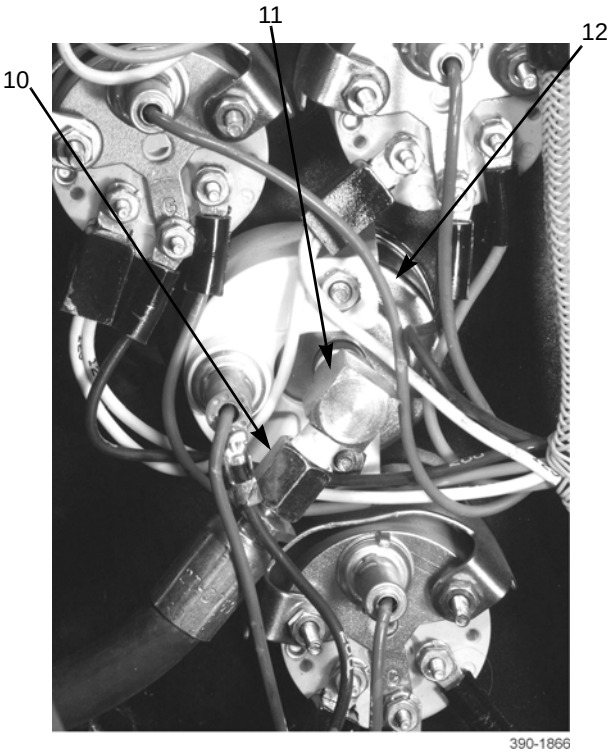
4. Disconnect harness connector (8) from EMS connector (9).



WARNING

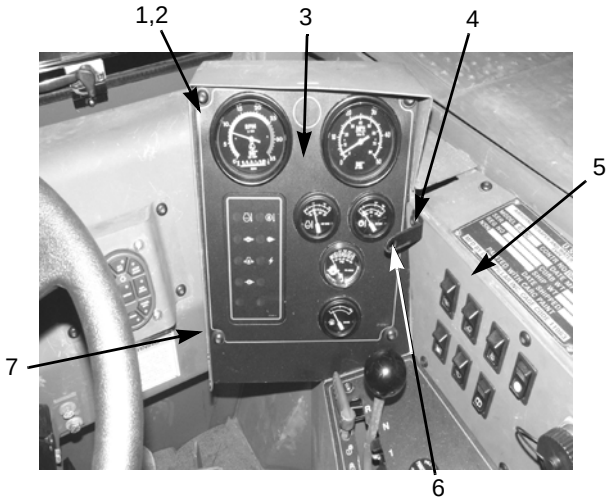
- Do NOT disconnect any air system lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

5. Disconnect air hose (10) from elbow (11) on air pressure gage (12).
6. Remove antiseizing tape from threads of elbow (11).



INSTRUMENT PANEL INSTALLATION

1. Apply antiseizing tape to male threads of elbow (11).
2. Connect air hose (10) to elbow (11) on air pressure gage (12).
3. Connect harness connector (8) to EMS connector (9).
4. Position panel (3) in enclosure (7).
5. Install four screws (1) and washers (2) in panel (3).
6. Install screw (4) and bracket (6) on switch panel (5).

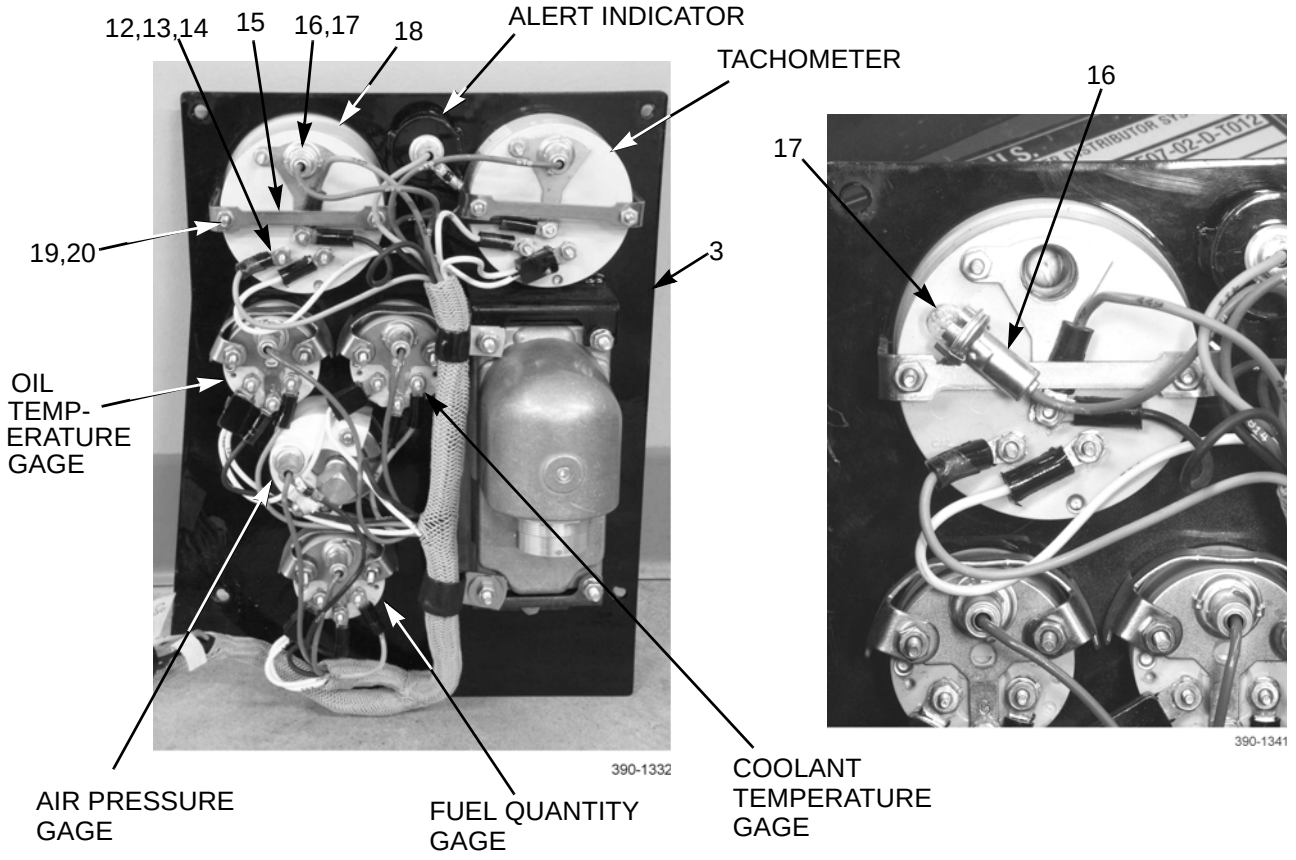


INSTRUMENT PANEL GAGES AND BULBS REMOVAL

NOTE

- Tachometer, alert indicator, speedometer, coolant temperature gage, oil temperature gage, air pressure gage, and fuel quantity gage are removed the same way. Speedometer (18) is shown.
- If removing air pressure gage, ensure that air tanks are drained before disconnecting air hose.
- Panel is shown removed for clarity.
- Tag leads to aid in installation.

1. Loosen, but do not remove, three nuts (12) and lockwashers (13).
2. Remove three leads (14).
3. Remove socket (16) with bulb (17) from speedometer (18).
4. Remove bulb (17) from socket (16).
5. Remove two nuts (19) and washers (20) from bracket (15).
6. Remove bracket (15) from speedometer (18).
7. Remove speedometer (18) from panel (3).



INSTRUMENT PANEL GAGES AND BULBS INSTALLATION

NOTE

- Tachometer, alert indicator, speedometer, coolant temperature gage, oil temperature gage, air pressure gage, and fuel quantity gage are installed the same way. Speedometer (18) is shown.
- If installing air pressure gage, ensure antiseizing tape is used on elbow threads prior to connection of air hose.
- Panel is shown removed for clarity.

1. Position speedometer (18) in panel (3) and install bracket (15) with two washers (20) and nuts (19).
2. Position three leads (14) under lockwashers (13) and tighten nuts (12).
3. Install bulb (17) in socket (16).
4. Install socket (16) with bulb (17) in speedometer (18).

END OF WORK PACKAGE

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KEY START SWITCH REPLACEMENT 0043 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Lockwasher

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

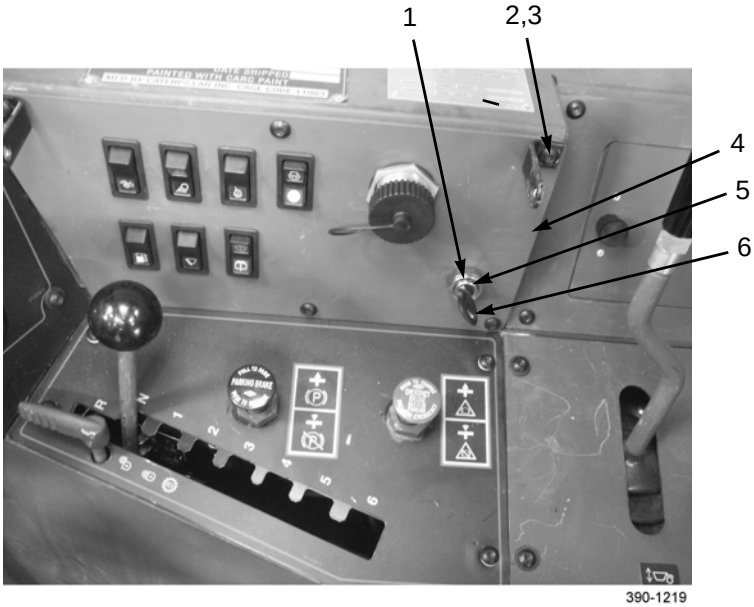
Parking brake applied (TM 5-3800-20510-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Remove six screws (2) and two brackets (3) from switch panel (4).
2. Remove key (6) from key start switch (5).
3. Remove bezel nut (1) from key start switch (5) and pull switch through back of switch panel (4).

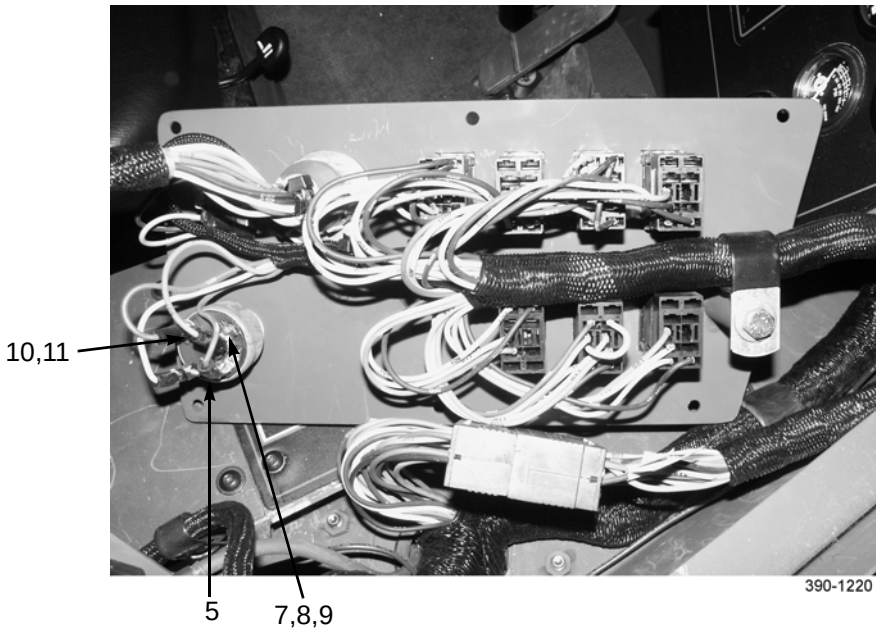


REMOVAL - CONTINUED

NOTE

Tag all wires to aid in installation.

4. Disconnect cable connector (10) from switch connector (11).
5. Remove screw (7), lockwasher (8), wires, and ground cable (9) from key start switch (5). Discard lockwasher.



INSTALLATION

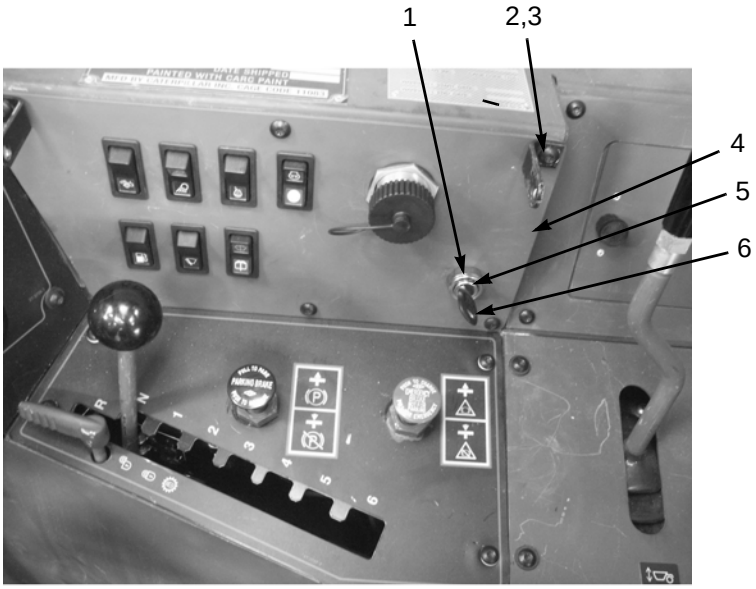
NOTE

When installing wire leads, insert leads between screw and lockwasher.

1. Install wires and ground cable (9) on key start switch (5) with new lockwasher (8) and screw (7).
2. Connect cable connector (10) to switch connector (11).
3. Position key start switch (5) through back of switch panel (4) and install bezel nut (1).
4. Install six screws (2) and two brackets (3) on switch panel (4).
5. Insert key (6) in key start switch (5).

KEY START SWITCH REPLACEMENT - CONTINUED **0043 00**

INSTALLATION - CONTINUED



END OF WORK PACKAGE

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LIGHT SWITCH AND GROUND CABLE REPLACEMENT 0044 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Lockwasher

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

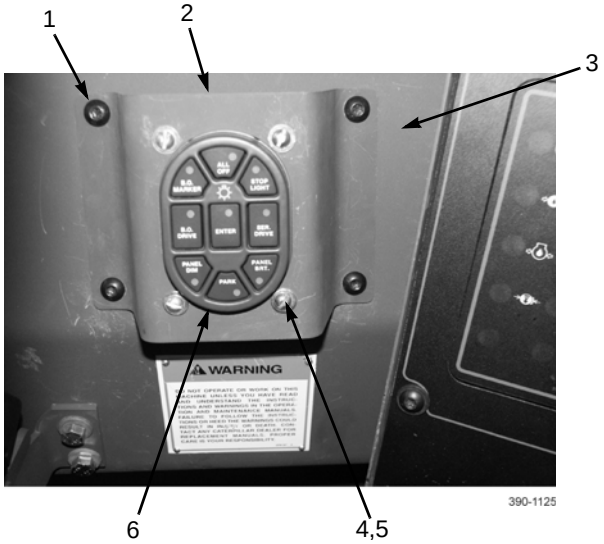
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

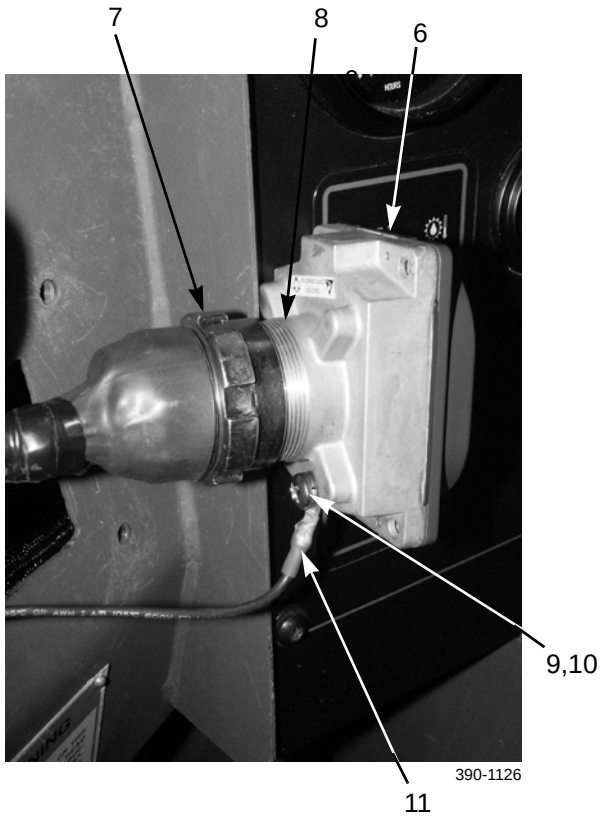
REMOVAL

1. Remove four screws (1) and bracket (2) from dash (3).
2. Remove four screws (4), washers (5), and switch (6) from bracket (2).

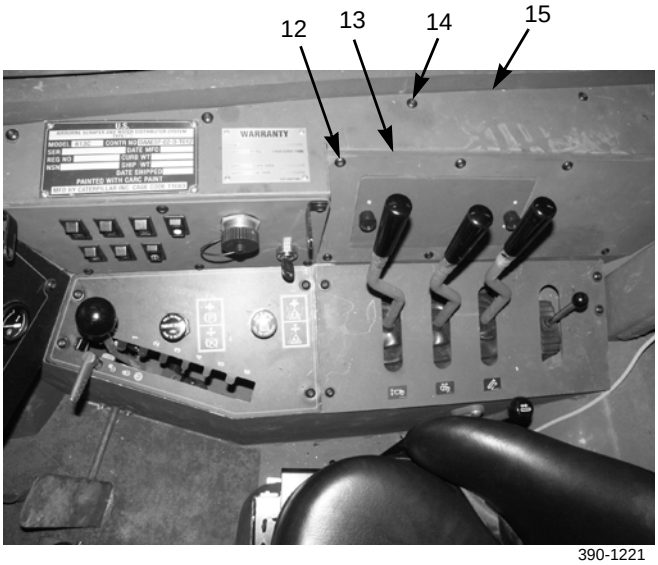


REMOVAL - CONTINUED

3. Remove cable connector (7) from switch connector (8).
4. Remove screw (9), lockwasher (10), and ground cable (11) from switch (6). Discard lockwasher.

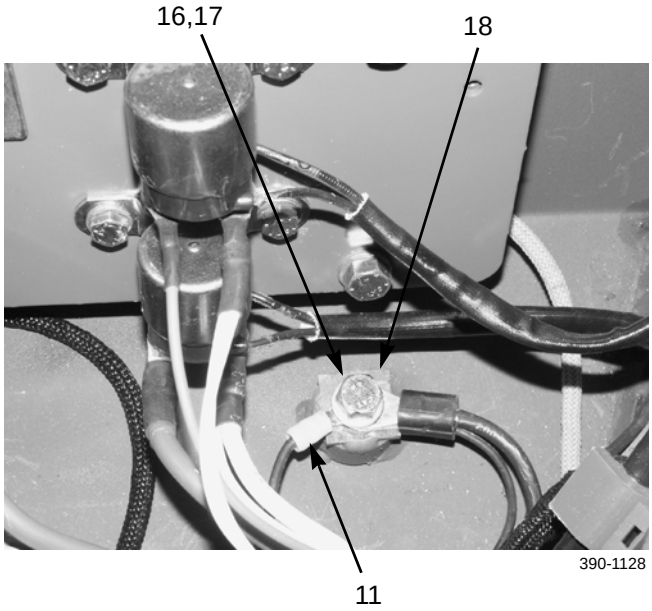


5. Remove nine screws (12) and panel (13).
6. Remove five screws (14) and panel (15).



REMOVAL - CONTINUED

7. Remove screw (16), washer (17), and ground cable (11) from ground lug (18).



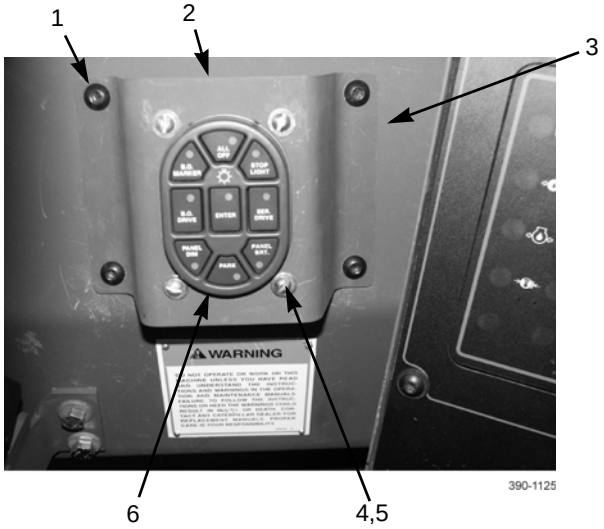
INSTALLATION

1. Ensure that ground lug (18) is clean and install ground cable (11) on ground lug with washer (17) and screw (16).
2. Install panel (15) with five screws (14).
3. Install panel (13) with nine screws (12).

NOTE

Switch connector is master keyed at 6 o'clock position.

4. Align keyways and connect cable connector (7) to switch connector (8).
5. Install ground cable (11) on switch (6) with screw (9) and new lockwasher (10).
6. Install switch (6) on bracket (2) with four screws (4) and washers (5).
7. Install bracket (2) on dash (3) with four screws (1).



END OF WORK PACKAGE

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MAIN, FUEL PUMP, START, AND AIR INTAKE HEATER RELAYS REPLACEMENT 0045 00

THIS WORK PACKAGE COVERS

Main Relay: Removal, Installation

Fuel Pump Relay: Removal, Installation

Start Relay: Removal, Installation

Air Inlet Heater Relay: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Equipment Condition

Machine parked on hard, level ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

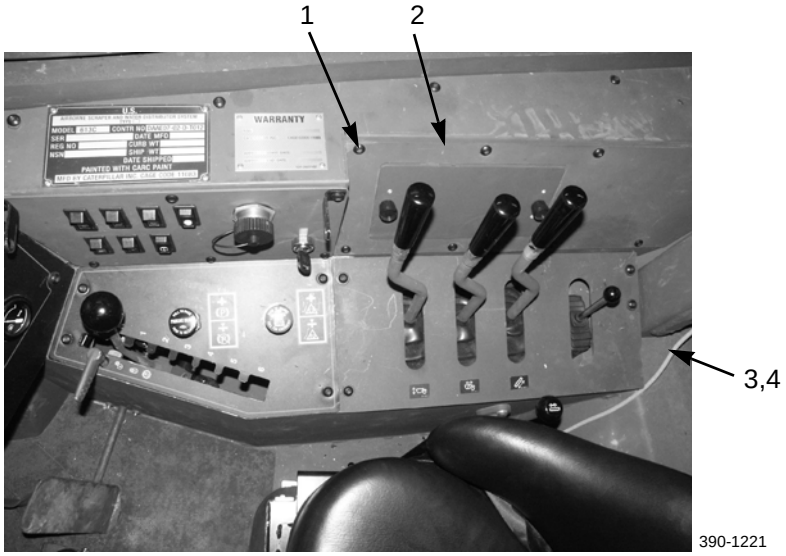
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

NOTE

This procedure is used to replace main, fuel pump, start, and air intake heater relays.

MAIN RELAY REMOVAL

1. Remove nine screws (1) from panel (2).
2. Remove panel (2).
3. Slide grommet (3) and cable (4) from panel (2).



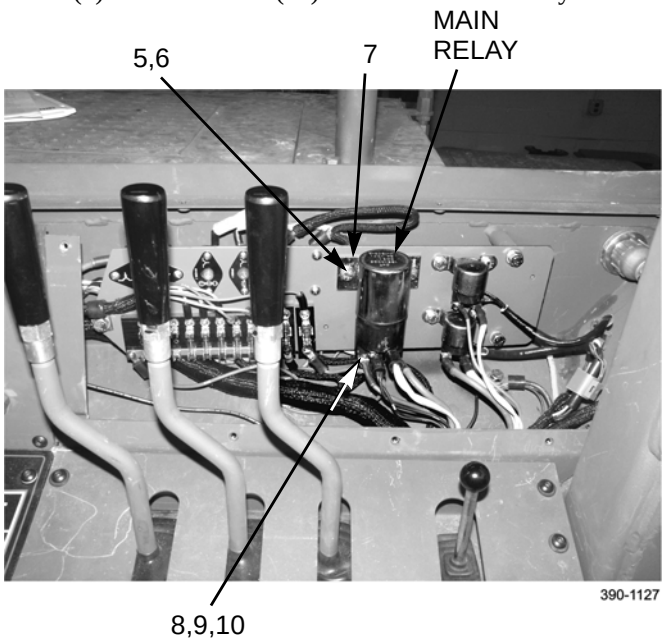
MAIN RELAY REMOVAL - CONTINUED

4. Remove two screws (5) and washers (6) from relay bracket (7).

NOTE

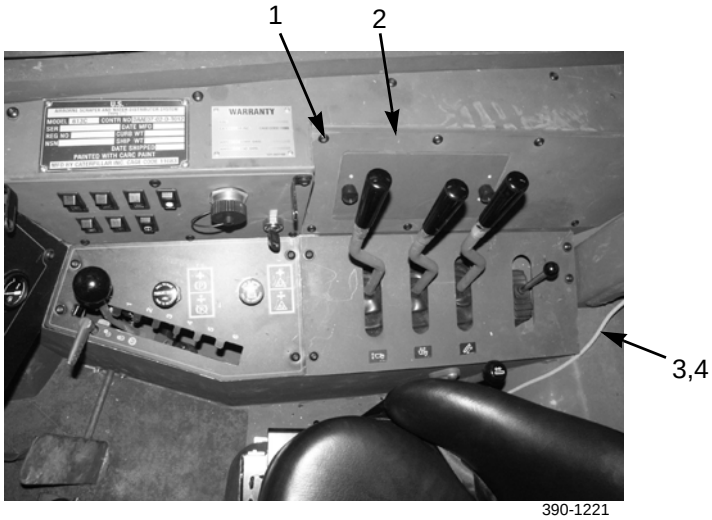
Tag wires to aid in installation.

5. Remove four nuts (8) and wires (9) from terminals (10) and remove main relay.



MAIN RELAY INSTALLATION

1. Install wires (9) on terminals (10) with four nuts (8).
2. Secure relay bracket (7) with two screws (5) and washers (6).
3. Slide grommet (3) and cable (4) on panel (2).
4. Secure panel (2) with nine screws (1).



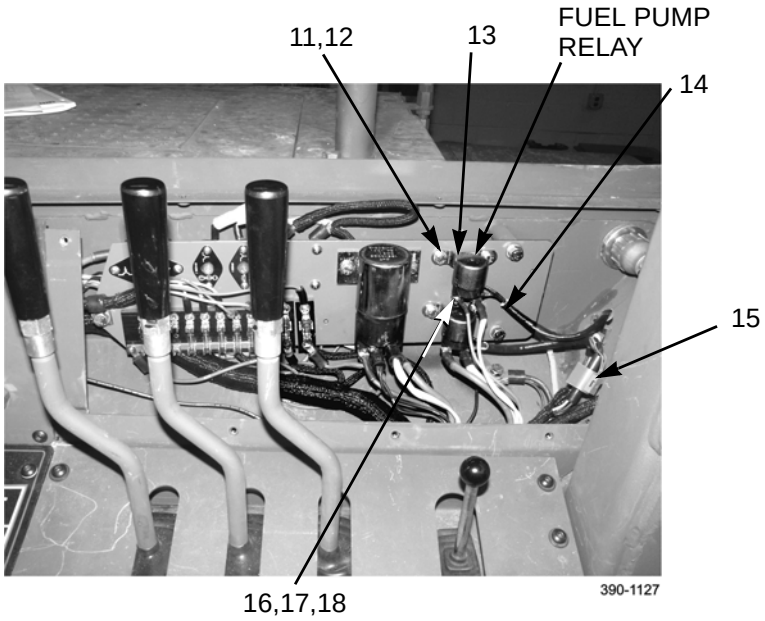
FUEL PUMP RELAY REMOVAL

1. Remove nine screws (1) from panel (2).
2. Remove panel (2).
3. Slide grommet (3) and cable (4) from panel (2).
4. Remove two screws (11) and washers (12) from relay bracket (13).

NOTE

Tag wires to aid in installation.

5. Disconnect black lead (14) from orange and black lead (15).
6. Remove two nuts (16) and wires (17) from terminals (18) and remove fuel pump relay.

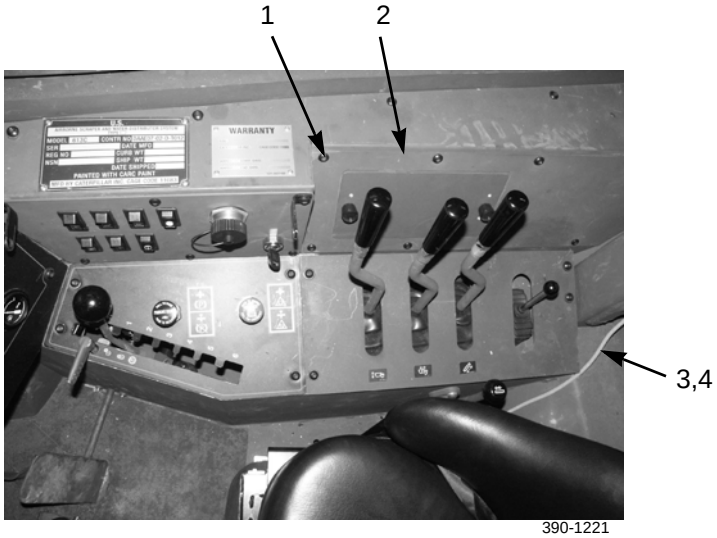


FUEL PUMP RELAY INSTALLATION

1. Install wires (17) on terminals (18) with two nuts (16).
2. Secure relay bracket (13) with two screws (11) and washers (12).
3. Connect black lead (14) to orange and black lead (15).
4. Slide grommet (3) and cable (4) on panel (2).
5. Secure panel (2) with nine screws (1).

START RELAY REMOVAL

1. Remove nine screws (1) from panel (2).
2. Remove panel (2).
3. Slide grommet (3) and cable (4) from panel (2).

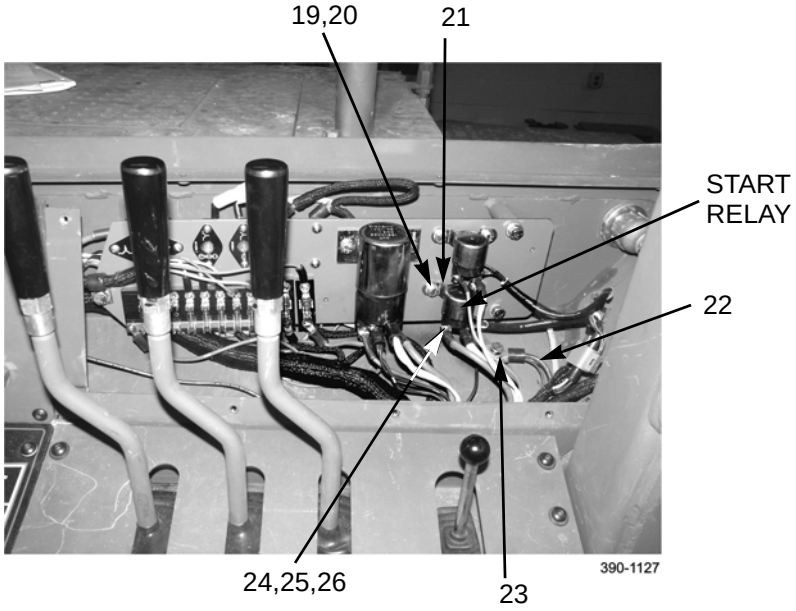


4. Remove two screws (19) and washers (20) from relay bracket (21).

NOTE

Tag wires to aid in installation

5. Disconnect black leads (22) from green and black leads (23).
6. Remove four nuts (24) and wires (25) from terminals (26) and remove start relay.



START RELAY INSTALLATION

1. Install wires (25) on terminals (26) with four nuts (24).
2. Secure relay bracket (21) with two screws (19) and washers (20).
3. Connect black leads (22) to green and black leads (23).
4. Slide grommet (3) and cable (4) on panel (2).
5. Secure panel (2) with nine screws (1).

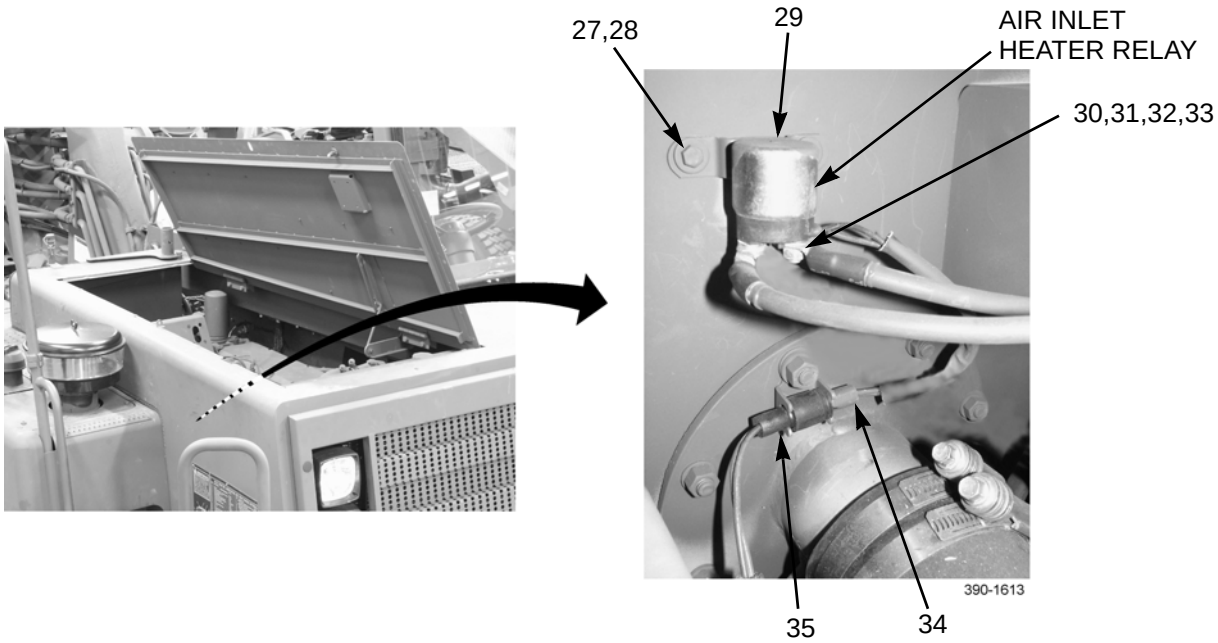
AIR INLET HEATER RELAY REMOVAL

1. Open engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove two screws (27), washers (28), and relay (29) from firewall.

NOTE

Tag wires to aid in installation.

3. Remove two nuts (30) washers (31) and leads (32) from terminals (33).
4. Remove from clip and disconnect relay leads (34) from harness connector leads (35).



AIR INLET HEATER RELAY INSTALLATION

1. Connect relay leads (34) to harness connector leads (35). Secure leads in clip.
2. Install leads (32) on terminals (33) with two washers (31) and nuts (30).
3. Position relay (29) on firewall and secure with two screws (27) and washers (28).
4. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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NEUTRAL START SWITCHES REPLACEMENT 0046 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Pin, spring (3)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

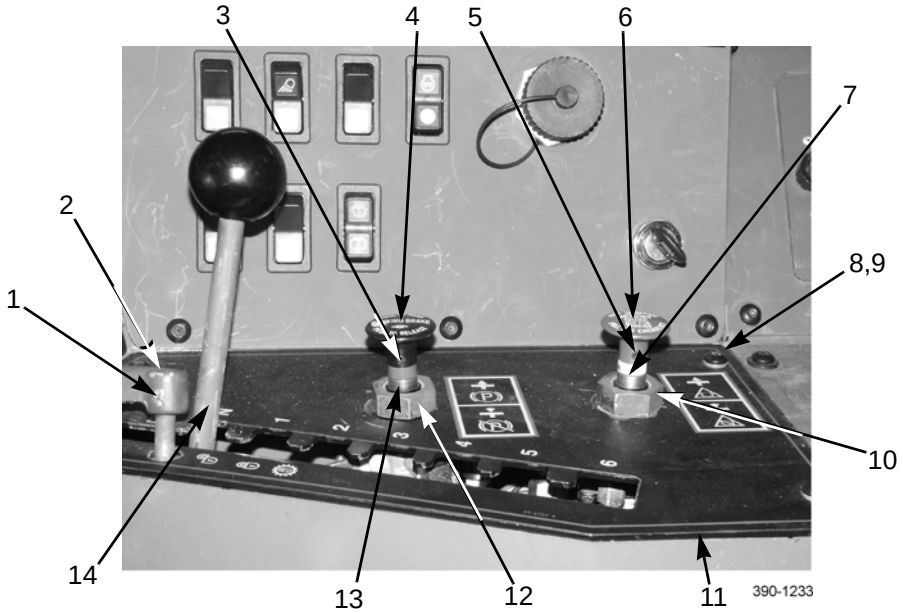
REMOVAL

1. Remove spring pin (1) and neutral lock lever (2) from panel (11). Discard spring pin.
2. Remove spring pin (3), parking brake handle (4), and nut (12) from valve (13). Discard spring pin.
3. Remove spring pin (5), emergency brake handle (6), and nut (10) from valve (7). Discard spring pin.
4. Remove four screws (8) and washers (9) from panel (11).

NOTE

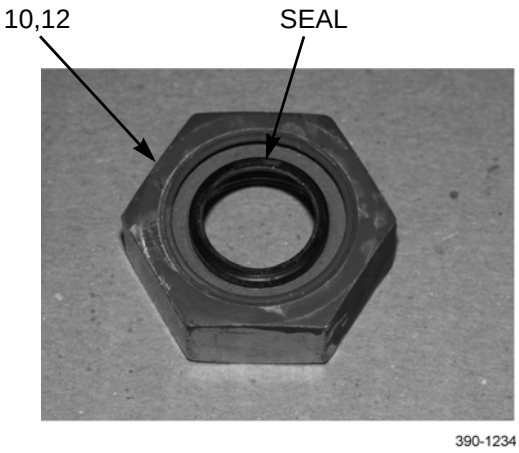
Panel does not have to be completely removed to access neutral start switches.

5. Slide panel (11) up transmission shift lever (14) and turn panel to left.

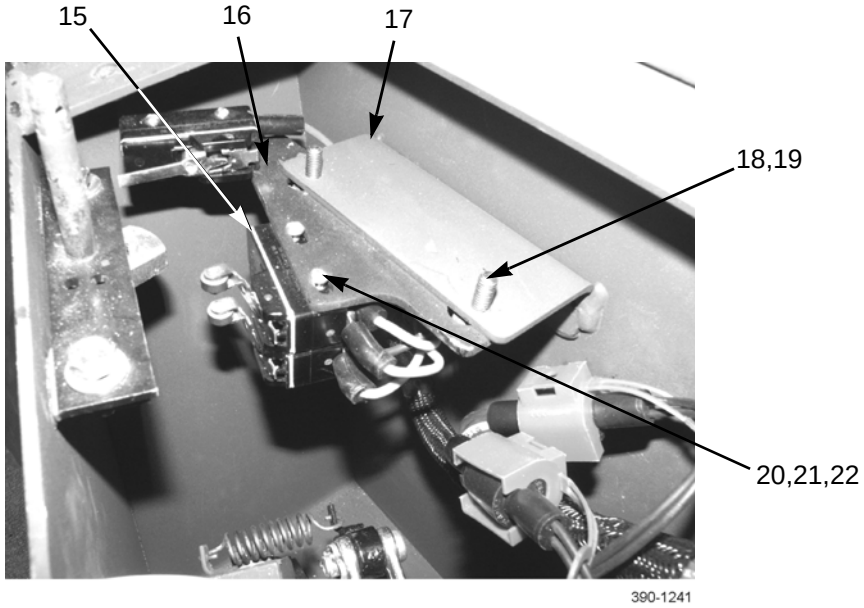


REMOVAL - CONTINUED

6. Inspect seal inside nuts (10 and 12) for cracks or damage. Discard nuts if seal is damaged.



7. Mark outline of switch bracket (16) on support (17).
8. Remove two screws (18) and washers (19) from switch bracket (16). Pull bracket from support (17).
9. Remove two screws (20), washers (21), nuts (22), and switches (15) from switch bracket (16).

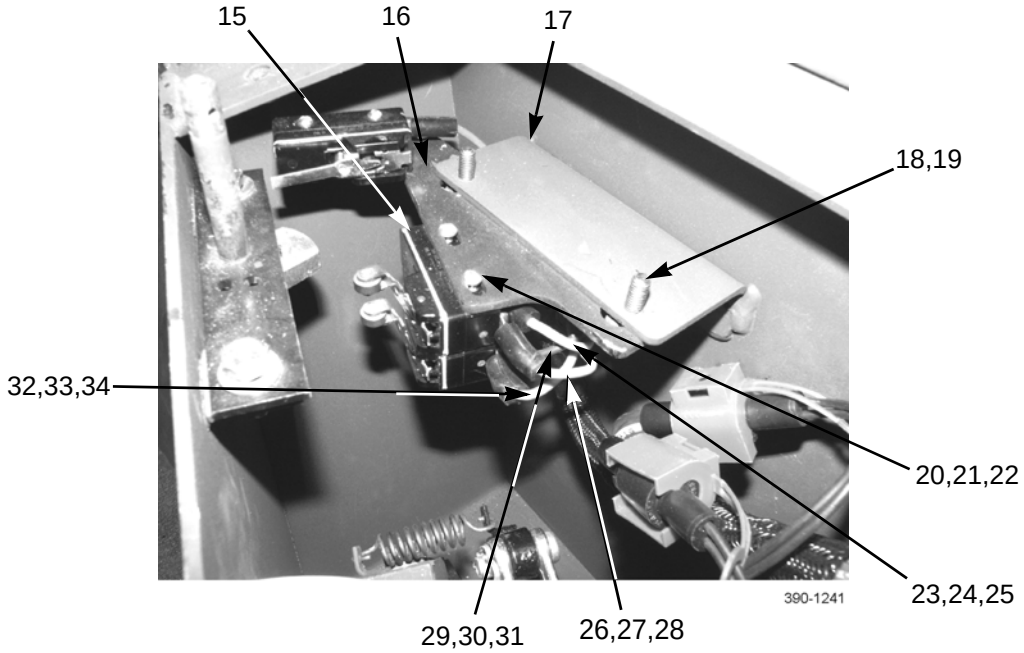


NOTE

- Transmission neutral start switch is top switch and EMS neutral switch is bottom switch.
- Perform step 10 for top switch
- Perform step 11 for bottom switch.
- Tag leads to aid in installation.

REMOVAL - CONTINUED

10. Loosen, but do not remove, screw (23) and remove 316 pink lead (24) from OPEN terminal (25).
11. Loosen, but do not remove, screw (26) and remove 307 orange lead (27) from COMMON terminal (28).
12. Loosen, but do not remove, screw (29) and remove 201 black lead (30) from OPEN terminal (31).
13. Loosen, but do not remove, screw (32) and remove 409 orange lead (33) from COMMON terminal (34).



INSTALLATION

NOTE

- Transmission neutral start switch is top switch and EMS neutral switch is bottom switch.
- Perform step 1 for top switch.
- Perform step 2 for bottom switch.
- Leads must be installed between screw head and starwasher.

1. Install 316 pink lead (24) on OPEN terminal (25) with screw (23).
2. Install 307 orange lead (27) on COMMON terminal (28) with screw (26).
3. Install 201 black lead (30) on OPEN terminal (31) with screw (29).
4. Install 409 orange lead (33) on COMMON terminal (34) with screw (32).
5. Install switches (15) on switch bracket (16) with two screws (20), washers (21), and nuts (22).

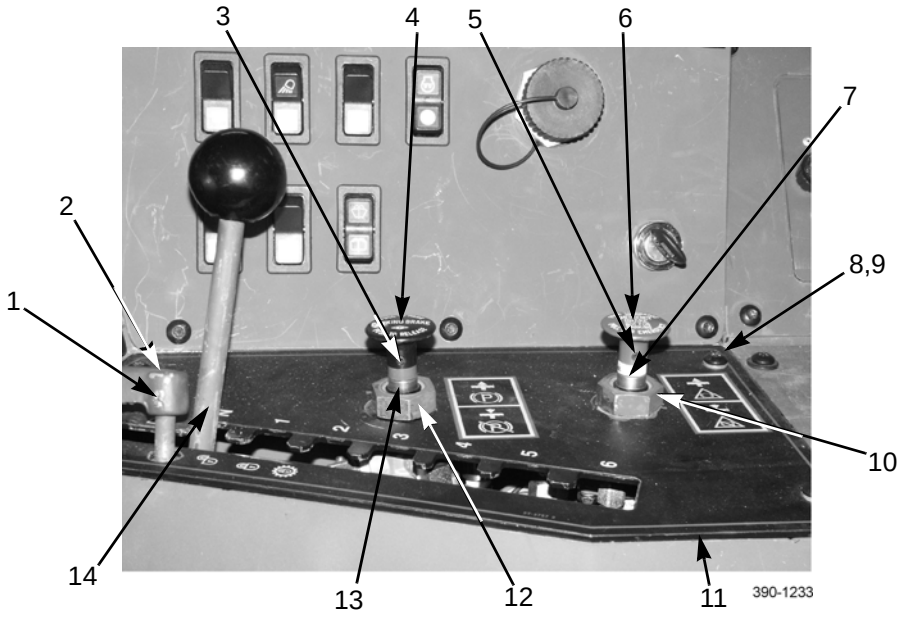
NOTE

Switch bracket must be installed on support as marked prior to removal.

6. Install switch bracket (16) on support (17) with two screws (18) and washers (19).

INSTALLATION - CONTINUED

7. Install panel (11) with four washers (9) and screws (8).
8. Install nut (10) on valve (7).
9. Install emergency brake handle (6) on valve (7) with new spring pin (5).
10. Install nut (12) on valve (13).
11. Install parking brake handle (4) on valve (13) with new spring pin (3).
12. Install neutral lock lever (2) with new spring pin (1).



13. Perform a functional test of neutral start switches (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

PARKING BRAKE AND EMERGENCY BRAKE PRESSURE SWITCHES REPLACEMENT 0047 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tape, antiseizing (Item 40, WP 0171 00)

Pin, spring (3)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205 -10-1 or TM 5-3800-205-10-2)

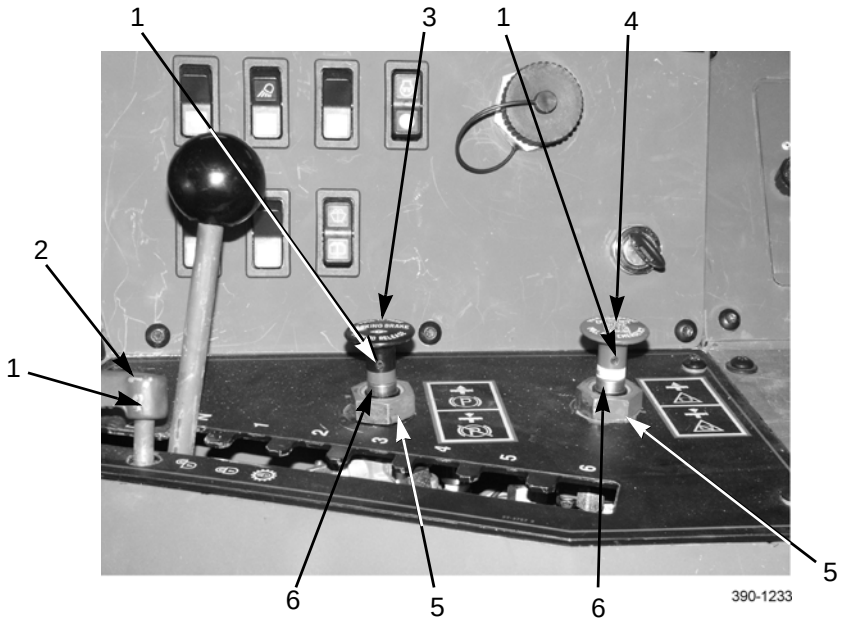
Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

NOTE

This work package describes replacement of both parking and emergency brake pressure switches.

REMOVAL

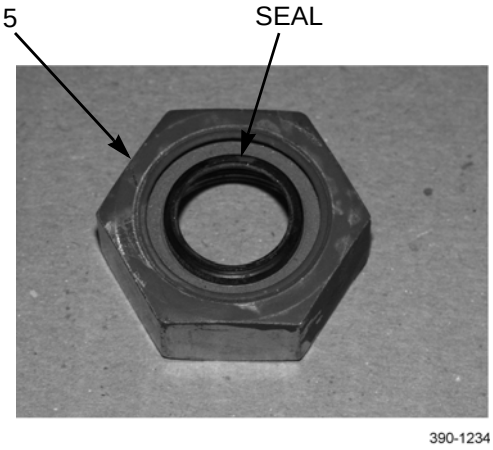
1. Remove spring pins (1) from neutral lock lever (2), parking brake handle (3), and emergency brake handle (4). Discard spring pins.
2. Remove handles (2, 3, and 4).
3. Remove nuts (5) from valves (6).



PARKING BRAKE AND EMERGENCY BRAKE PRESSURE SWITCHES REPLACEMENT- CONTINUED **0047 00**

REMOVAL - CONTINUED

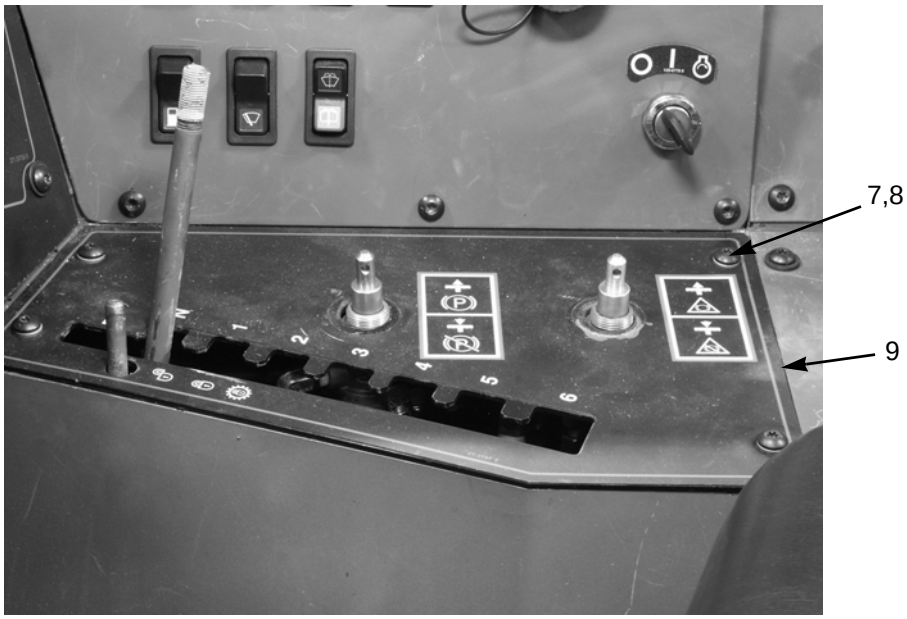
4. Inspect seal inside nuts (5) for cracks or damage. If seals are cracked or damaged, replace nuts (5).



NOTE

Panel does not have to be completely removed to access pressure switches. Slide panel up transmission shift lever and turn panel to left.

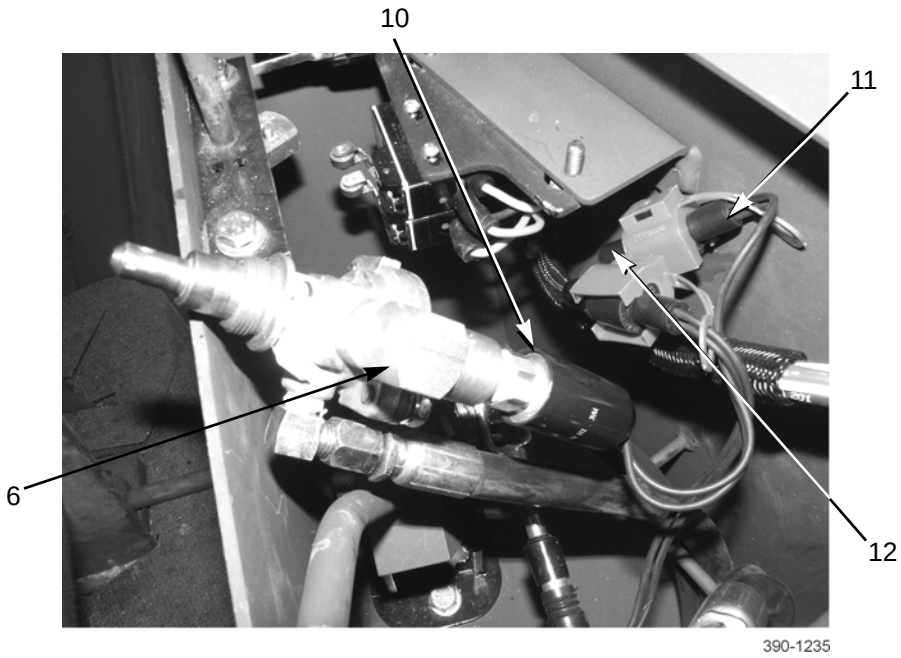
5. Remove four screws (7) and washers (8) from panel (9) and move panel out of the way.



PARKING BRAKE AND EMERGENCY BRAKE PRESSURE SWITCHES REPLACEMENT- CONTINUED **0047 00**

REMOVAL - CONTINUED

6. Disconnect pressure switch connector (11) from harness connector (12).
7. Remove switch (10) from valve (6).



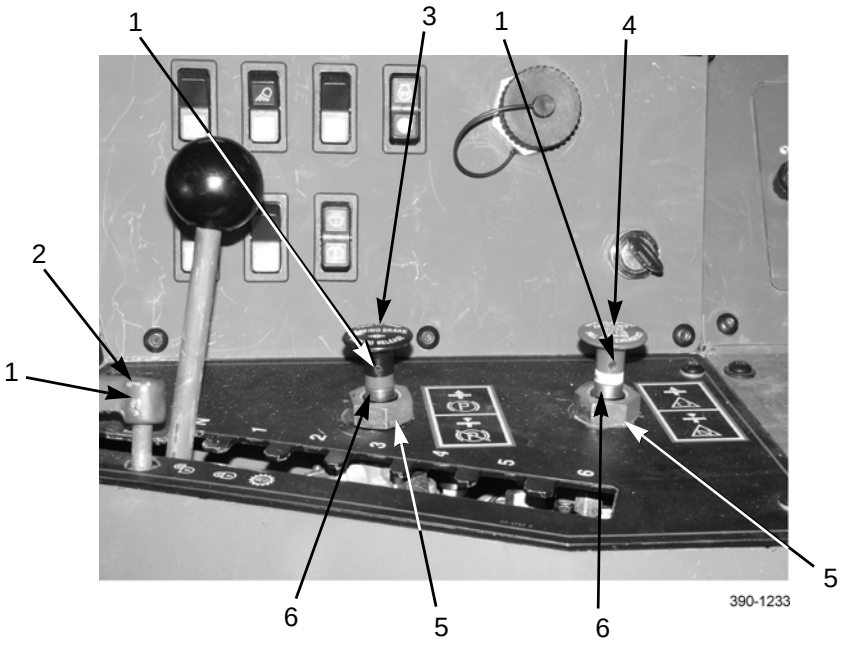
INSTALLATION

1. Apply antiseizing tape to threads of switch (10).
2. Install switch (10) in valve (6).
3. Connect pressure switch connector (11) to harness connector (12).
4. Position valves (6) through panel (9). Secure panel with four screws (7) and washers (8).

PARKING BRAKE AND EMERGENCY BRAKE PRESSURE SWITCHES REPLACEMENT- CONTINUED **0047 00**

INSTALLATION - CONTINUED

5. Secure valves (6) to panel (9) with nuts (5).
6. Position handles (2, 3, and 4) and install new spring pins (1) in handles.



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

7. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
8. Perform a functional check of parking and emergency brake controls (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

RELAY REPLACEMENT 0048 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

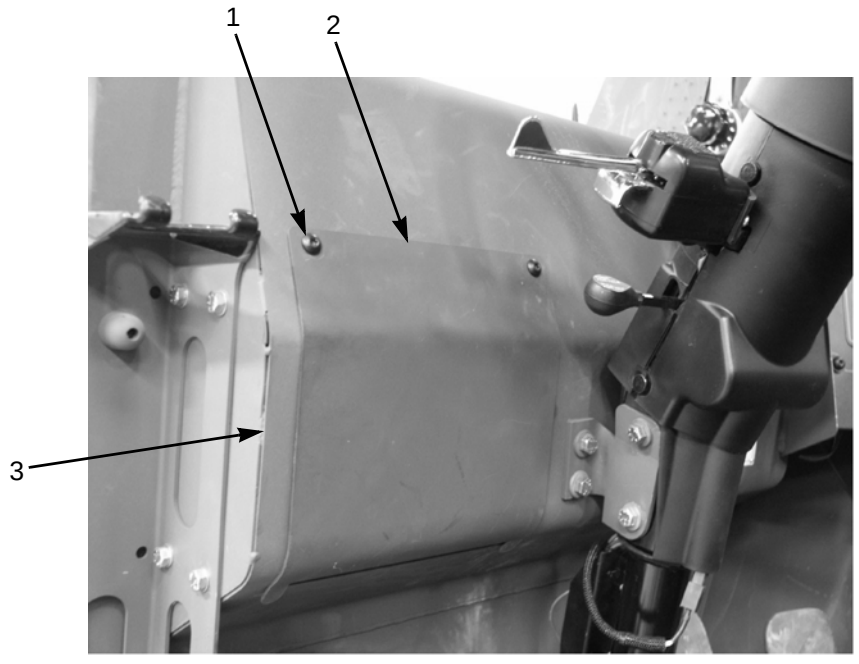
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

NOTE

Turn/flash, flood enable, LO/HI beam, horn/backup alarm, and water wagon flood relays are replaced the same way. Turn/flash relay is shown.

REMOVAL

1. Remove two screws (1) and panel (2) from dash (3).

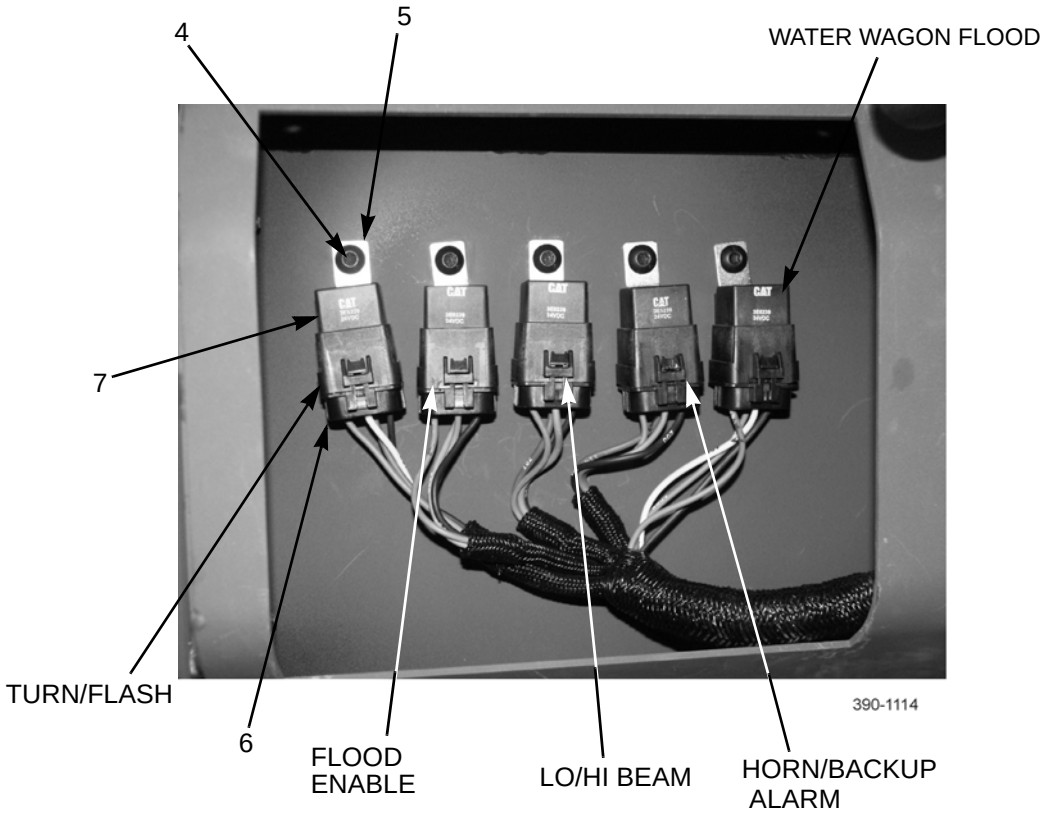


390-1113

RELAY REPLACEMENT - CONTINUED 0048 00

REMOVAL - CONTINUED

2. Remove screw (4) from relay bracket (5).
3. Disconnect electrical connector (6) from relay (7).

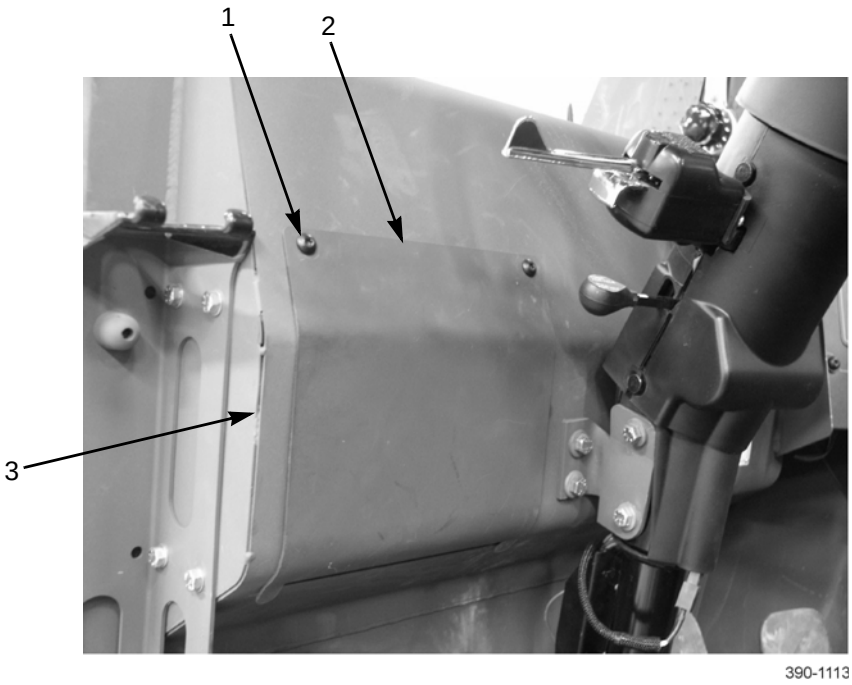


INSTALLATION

1. Connect electrical connector (6) to relay (7).
2. Position relay (7) and relay bracket (5) in dash (3) and install screw (4).

INSTALLATION - CONTINUED

3. Install panel (2) on dash (3) with two screws (1).



END OF WORK PACKAGE

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ROCKER SWITCHES REPLACEMENT 0049 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205 -10 or TM 5-3800-205-10-2)

NOTE

EMS test, flood lamp, air intake heater, ether start, fuel pump, windshield wiper and windshield washer rocker switches are replaced the same way. EMS test switch is shown.

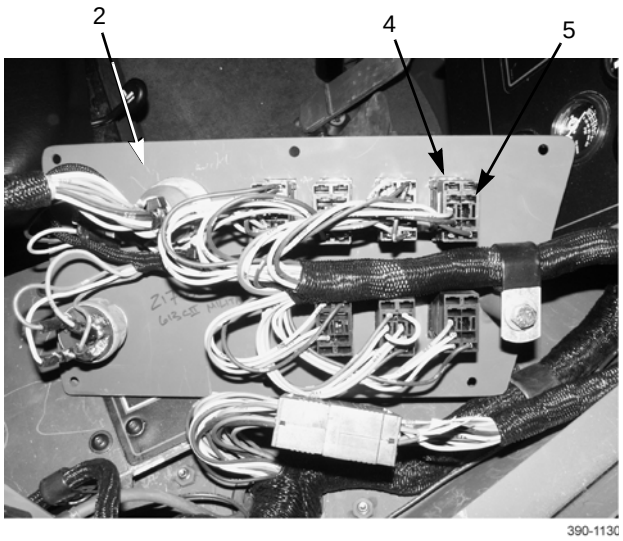
REMOVAL

1. Remove six screws (1) and two brackets (2) from switch panel (3).



REMOVAL - CONTINUED

2. Disconnect harness connector (5) from switch (4).
3. Push switch (4) forward through switch panel (3).



INSTALLATION

1. Position switch (4) on switch panel (3) and connect harness connector (5) to switch.
2. Install switch panel (3) and two brackets (2) with six screws (1).



END OF WORK PACKAGE

PARKING LIGHT/BLACKOUT MARKER LIGHT MAINTENANCE 0050 00

THIS WORK PACKAGE COVERS

Light Assembly: Removal, Installation

Blackout Marker Lens: Removal, Installation

Parking and Turn Signal Bulbs: Removal, Installation

Blackout Marker LED: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Gasket

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

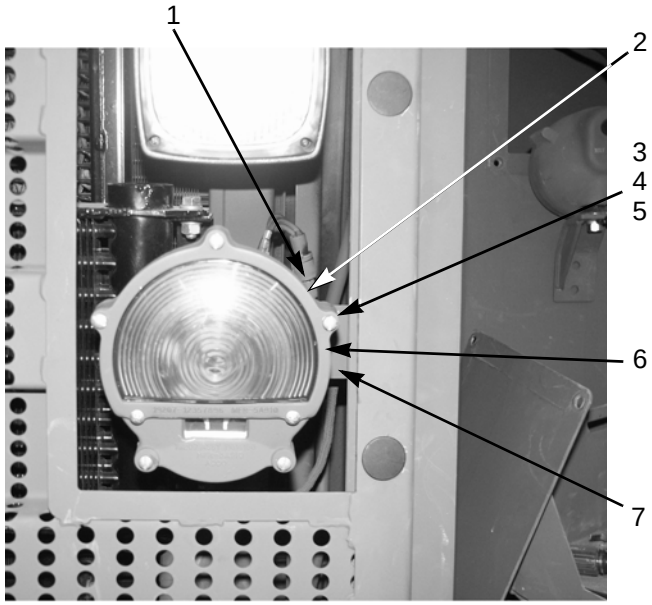
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

NOTE

Left and right side parking/blackout marker lights are replaced the same way. Left side is shown.

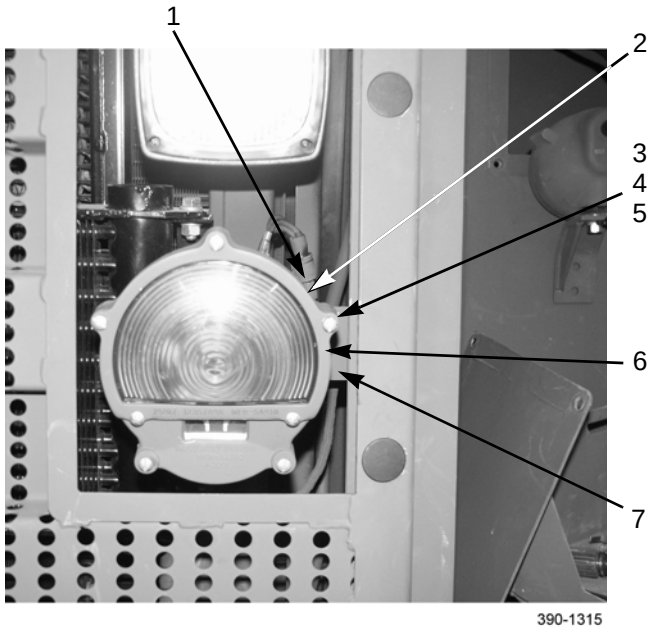
LIGHT ASSEMBLY REMOVAL

1. Disconnect electrical leads (1) from harness connector (2).
2. Remove two screws (3), washers (4), and ground lead (5) from rear of light assembly (6).
3. Remove light assembly (6) from bracket (7).



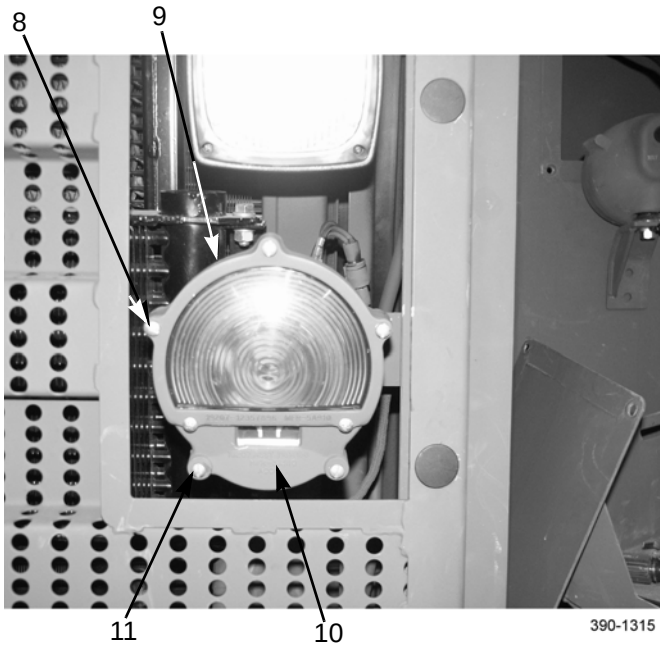
LIGHT ASSEMBLY INSTALLATION

1. Position light assembly (6) on bracket (7).
2. Install two screws (3), washers (4), and ground lead (5) at rear of light assembly (6).
3. Connect electrical leads (1) to harness connector (2).



BLACKOUT MARKER LENS REMOVAL

1. Loosen, but do not remove, three screws (8).
2. Remove two bottom screws (11) and cover (10) from housing (9).

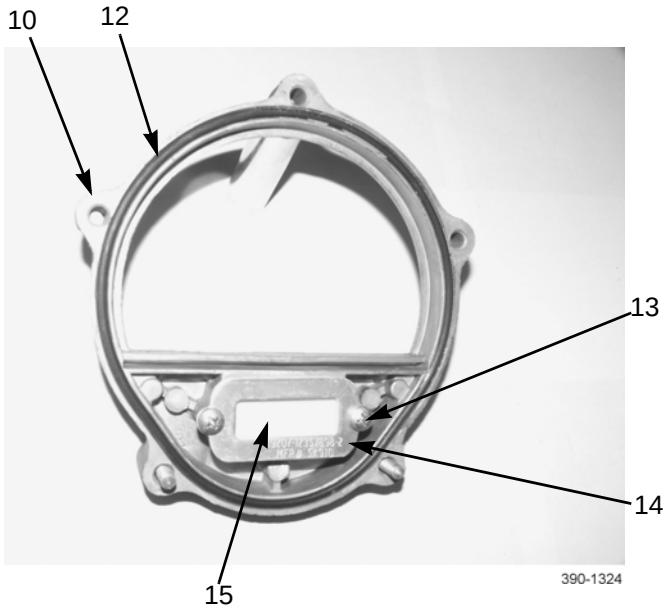


BLACKOUT MARKER LENS REMOVAL - CONTINUED

NOTE

Packing should be replaced if there is evidence of moisture inside housing.

3. Remove packing (12) from cover (10). Inspect packing for tears or damage. If torn or damaged, replace packing.
4. Turn cover (10) over and remove two screws (13) and retainer (14) from cover.
5. Remove marker lens (15) from cover (10).

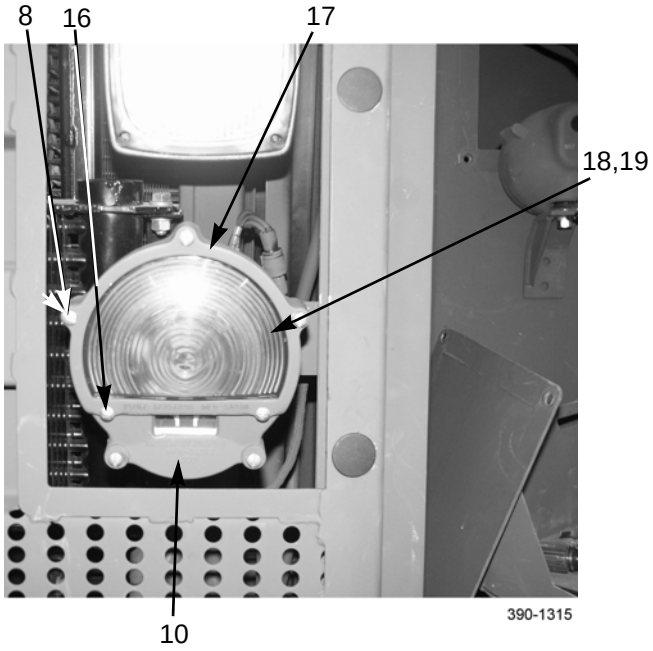


BLACKOUT MARKER LENS INSTALLATION

1. Position marker lens (15) in cover (10) and install retainer (14) with two screws (13).
2. Install packing (12) in cover (10).
3. Position cover (10) on housing (9).
4. Install two bottom screws (11).
5. Tighten three screws (8).

PARKING AND TURN SIGNAL BULBS REMOVAL

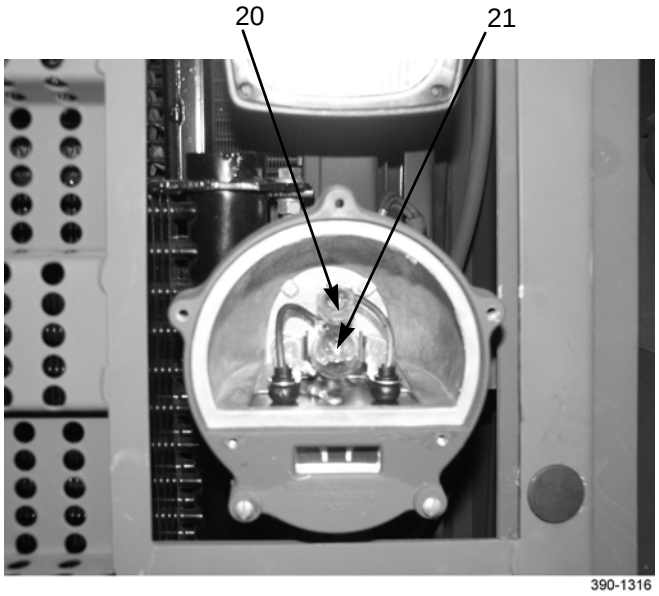
1. Loosen, but do not remove, three screws (8).
2. Remove two middle screws (16).
3. Remove retainer (17) from cover (10).
4. Remove amber lens (18) and gasket (19) from cover (10). Discard gasket.



NOTE

Top bulb is for parking light. Bottom bulb is for turn signal.

5. Remove bulb (20 or 21).



PARKING AND TURN SIGNAL BULBS INSTALLATION

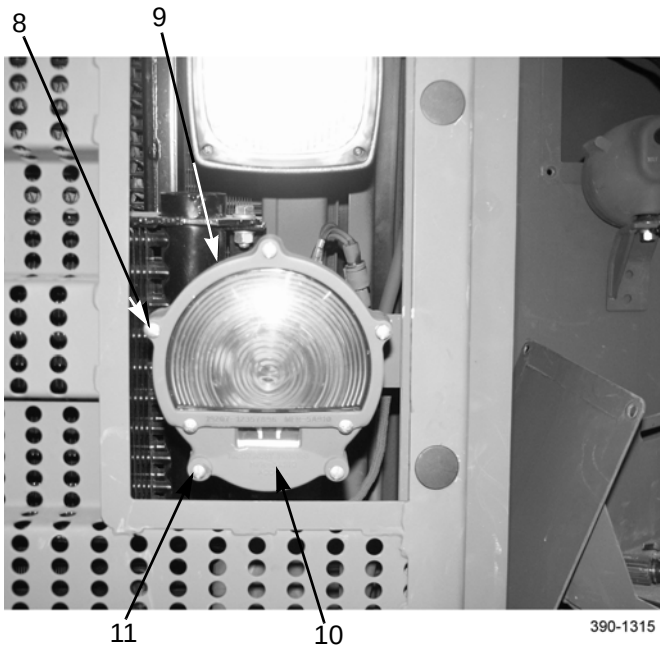
NOTE

Top bulb is for parking light. Bottom bulb is for turn signal.

1. Install bulb (20 or 21).
2. Position amber lens (18) and new gasket (19) in cover (10).
3. Install retainer (17) on cover (10).
4. Install two middle screws (16).
5. Tighten three screws (8).

BLACKOUT MARKER LED REMOVAL

1. Loosen, but do not remove, three screws (8).
2. Remove two bottom screws (11).
3. Remove cover (10) from housing (9).

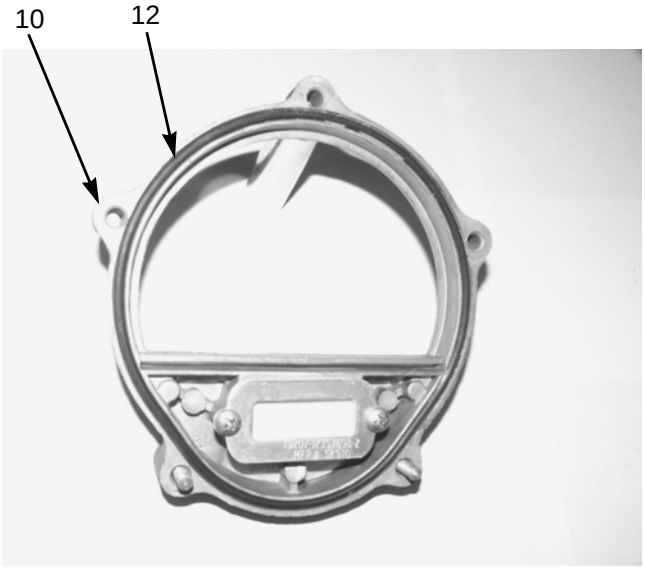


BLACKOUT MARKER LED REMOVAL - CONTINUED

NOTE

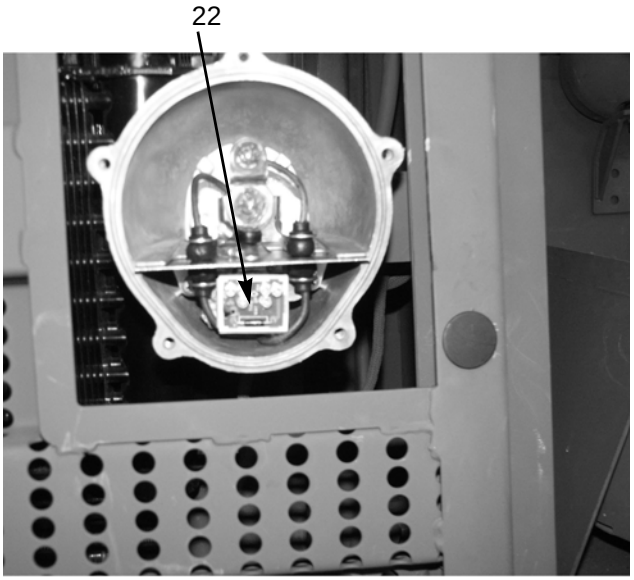
Packing should be replaced if there is evidence of moisture inside housing.

4. Remove packing (12) from cover (10). Inspect packing for tears or damage. If torn or damaged, replace packing.



390-1324

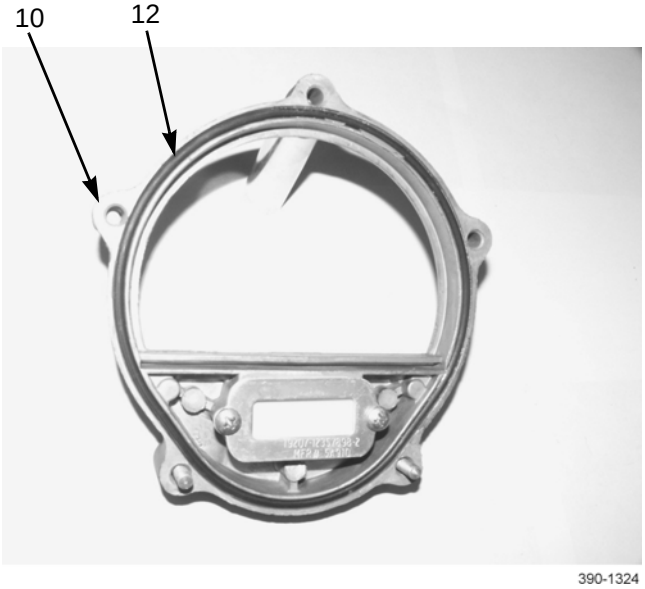
5. Remove blackout marker LED (22).



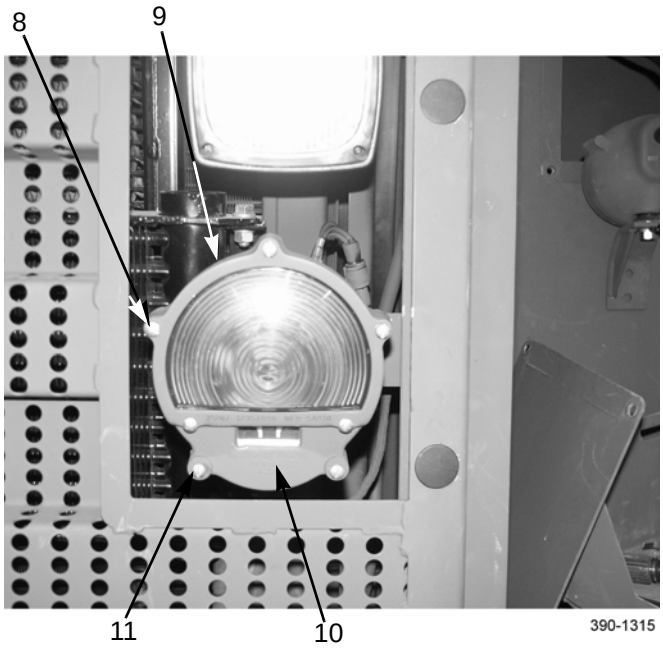
390-1317

BLACKOUT MARKER LED INSTALLATION

1. Install blackout marker LED (22).
2. Install packing (12) in cover (10).



3. Position cover (10) on housing (9).
4. Install two bottom screws (11).
5. Tighten three screws (8).



END OF WORK PACKAGE

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TURN SIGNAL/HAZARD FLASHER SWITCH REPLACEMENT 0051 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

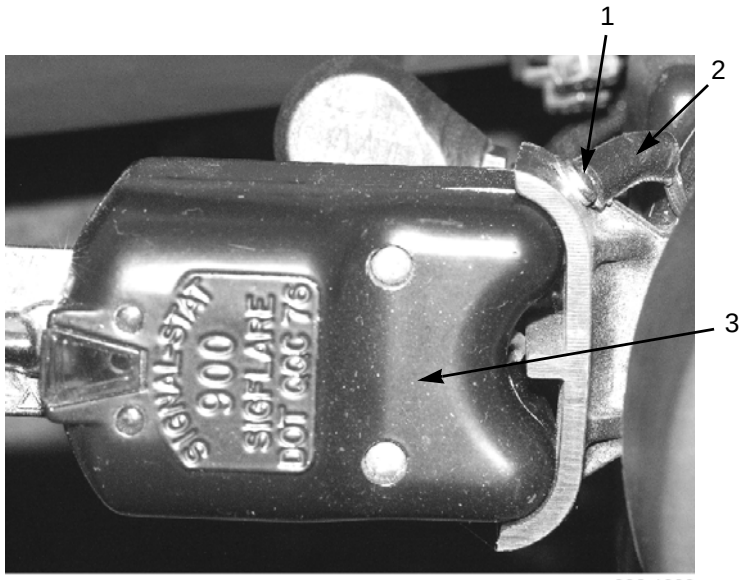
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

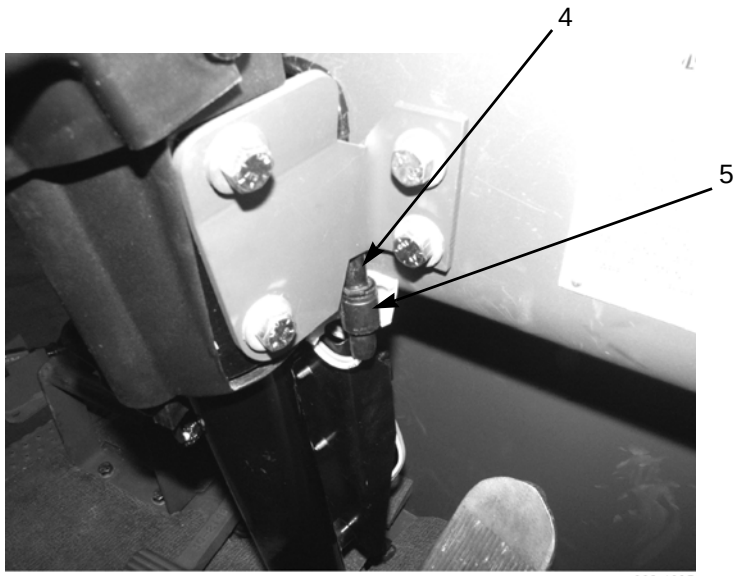
1. Remove two screws (1) and ground wire (2) from switch (3) on left side of steering column.



390-1333

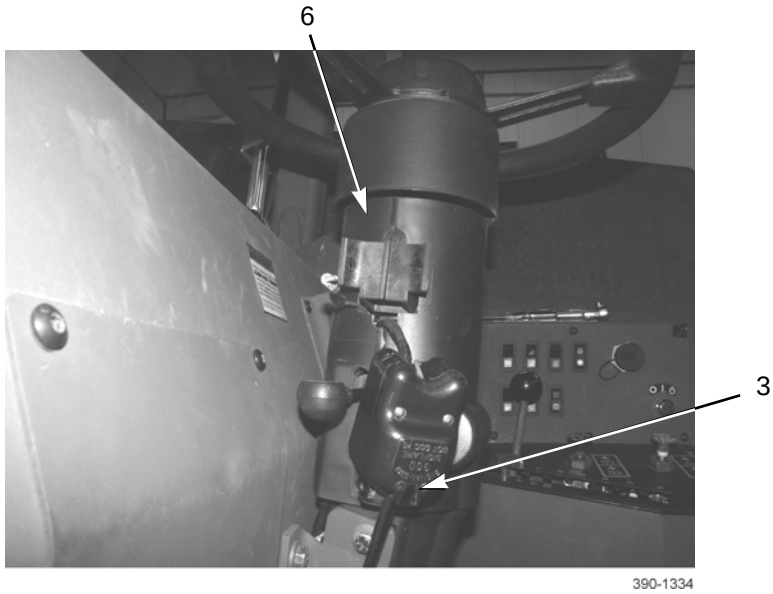
REMOVAL - CONTINUED

2. Disconnect switch leads (4) from harness connector (5).



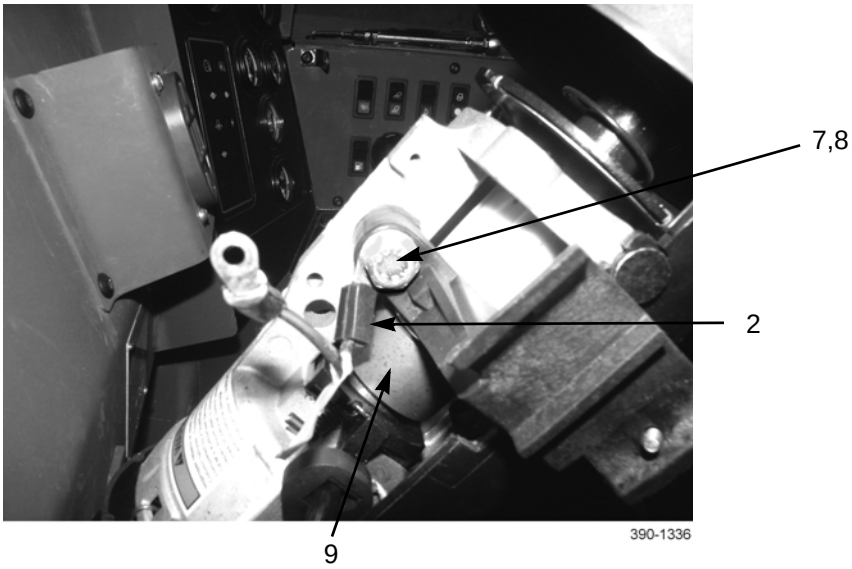
3. Remove steering column rear upper cover (6).

4. Remove switch (3).



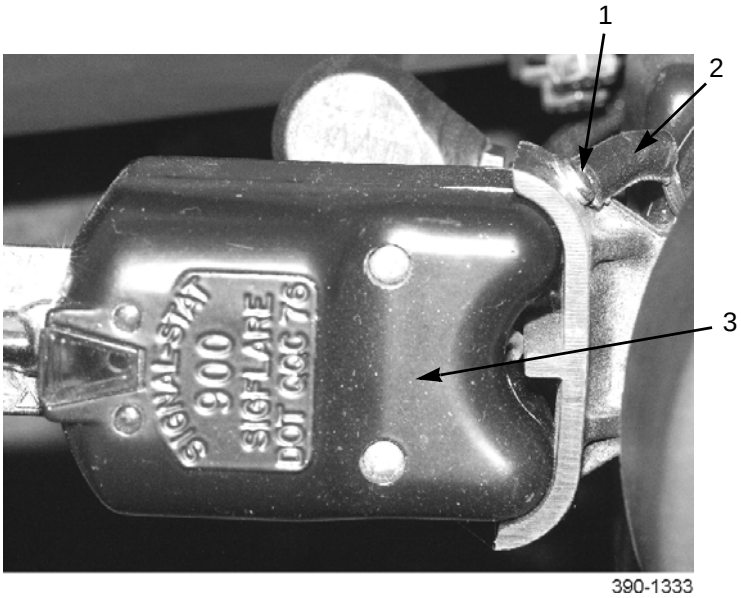
5. Inspect ground wire (2) for damage. If wire is damaged, remove screw (7), washer (8), and ground wire from column (9).

REMOVAL - CONTINUED



INSTALLATION

1. If ground wire (2) was removed, install screw (7), washer (8), and ground wire on column (9).
2. Route and connect switch leads (4) to harness connector (5).
3. Install steering column rear upper cover (6).
4. Position switch (3) on column (9).
5. Install switch (3) and ground wire (2) with two screws (1).



END OF WORK PACKAGE

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BLACKOUT DRIVE LIGHT MAINTENANCE 0052 00

THIS WORK PACKAGE COVERS

Bulb Replacement

Light Assembly: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

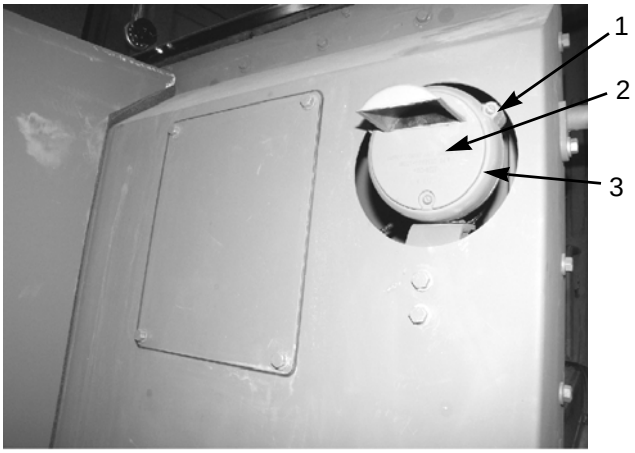
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

BULB REPLACEMENT

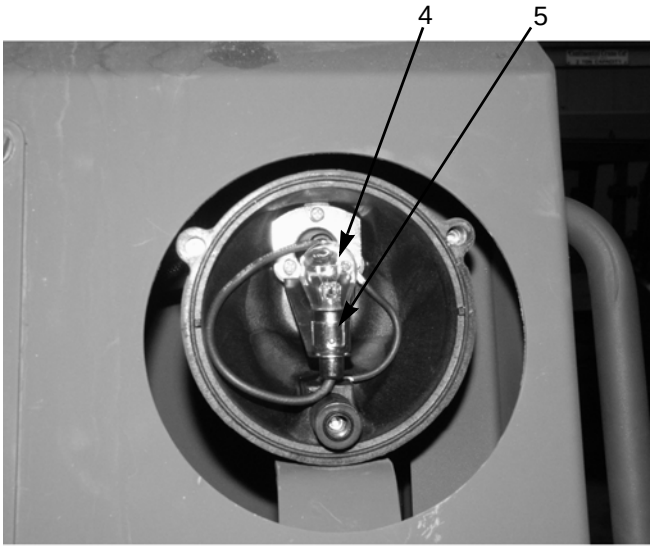
1. Loosen three captive screws (1) and remove cover (2) from housing (3).



390-1310

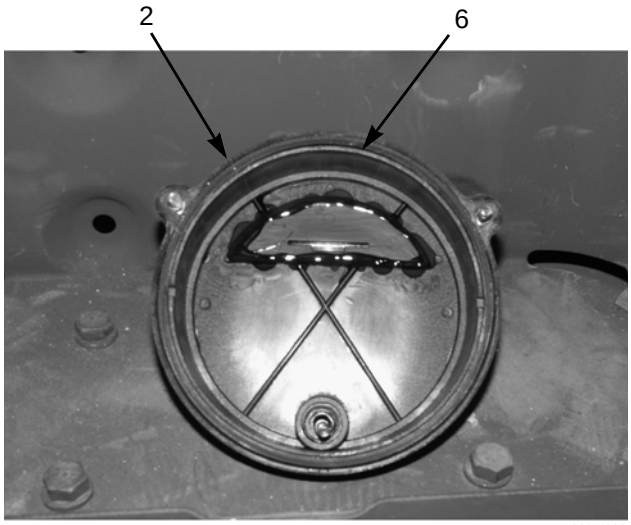
BULB REPLACEMENT - CONTINUED

2. Remove bulb (4) from socket (5).



390-1307

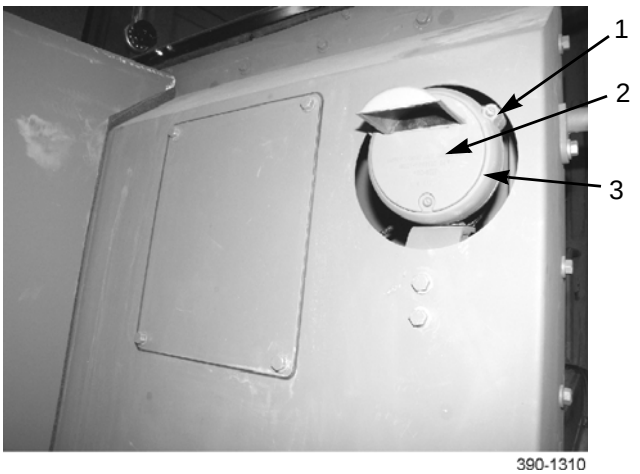
3. Inspect seal (6) for cracks or tears. Remove and discard seal from cover (2) if cracked or damaged.
4. If removed, install new seal (6) on cover (2).



390-1308

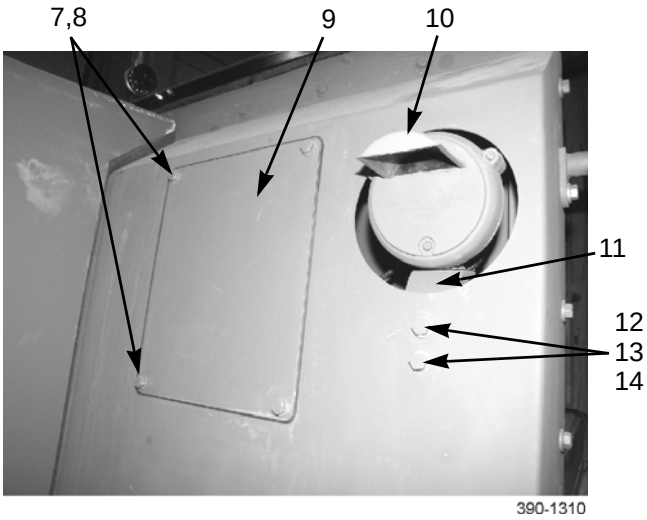
BULB REPLACEMENT - CONTINUED

5. Install bulb (4) in socket (5).
6. Position cover (2) on housing (3) and tighten three captive screws (1).



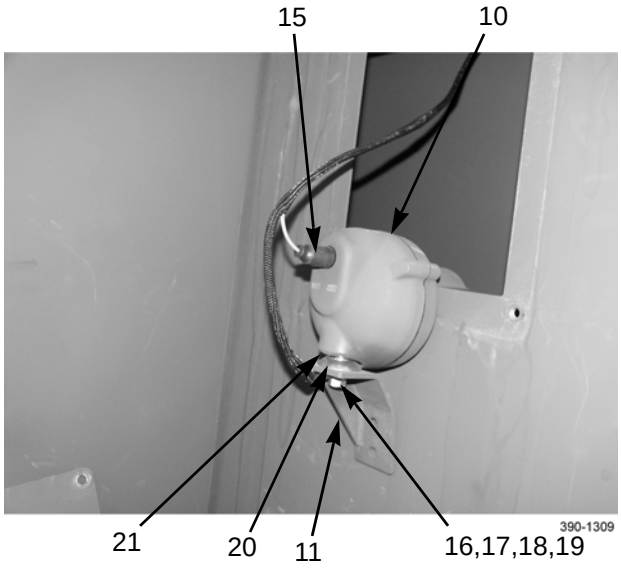
LIGHT ASSEMBLY REMOVAL

1. Remove four screws (7), washers (8), and access plate (9).
2. Remove two screws (12), four washers (13), and two nuts (14) from mounting bracket (11).
3. Pull blackout light assembly (10) out through access plate opening.



LIGHT ASSEMBLY REMOVAL - CONTINUED

4. Disconnect electrical lead (15) from light assembly (10).
5. Remove nut (16), lockwasher (17), and ground lead (18) from stud (19).
6. Remove light assembly (10), swivel (20), and spacer (21) from mounting bracket (11).



LIGHT ASSEMBLY INSTALLATION

1. Install light assembly (10), swivel (20), and spacer (21) on mounting bracket (11).
2. Install ground lead (18) on stud (19) with lockwasher (17) and nut (16).
3. Connect electrical lead (15) to light assembly (10).
4. Position light assembly (10), through access plate opening.
5. Install two screws (12), four washers (13), and two nuts (14) on mounting bracket (11).
6. Install access plate (9) with four washers (8) and screws (7).

END OF WORK PACKAGE

DIMMER SWITCH REPLACEMENT 0053 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Lockwasher (5)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

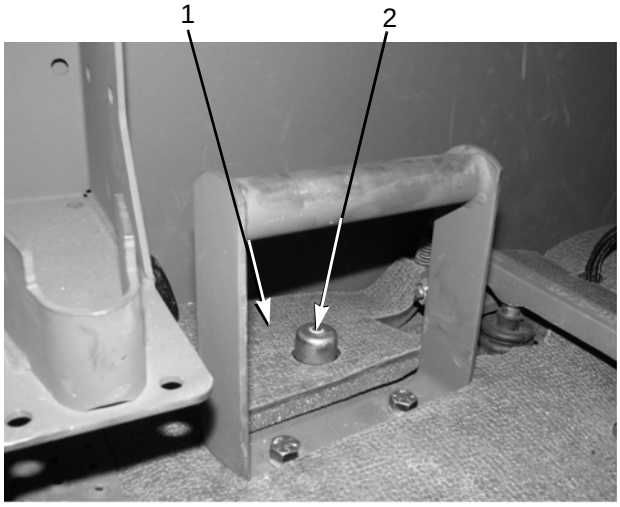
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

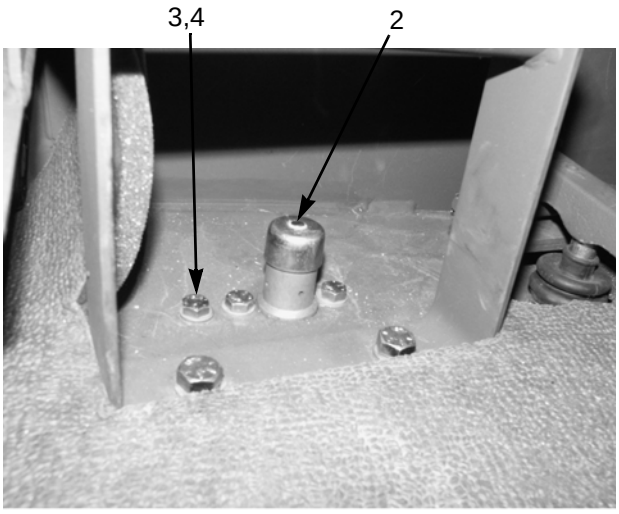
1. Pull floor pad (1) back from dimmer switch (2).



390-1594

REMOVAL - CONTINUED

2. Remove three screws (3) and lockwashers (4) from dimmer switch (2). Discard lockwashers.
3. Remove dimmer switch (2) from cab floor by pushing dimmer switch down through cab floor.

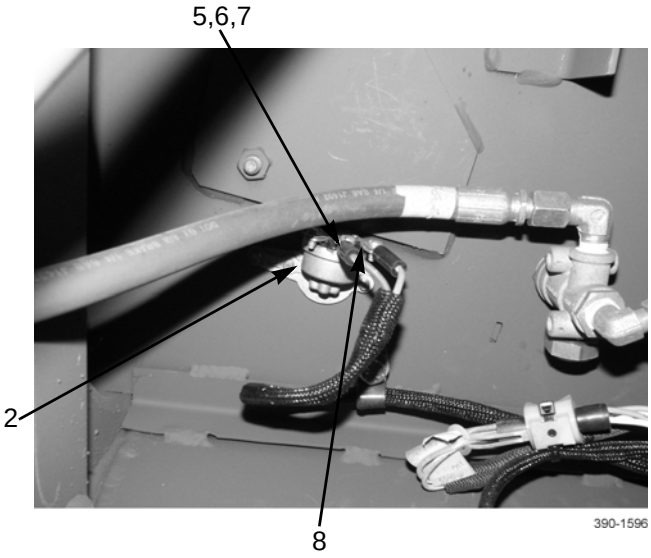


390-1595

NOTE

Tag wires to aid in installation.

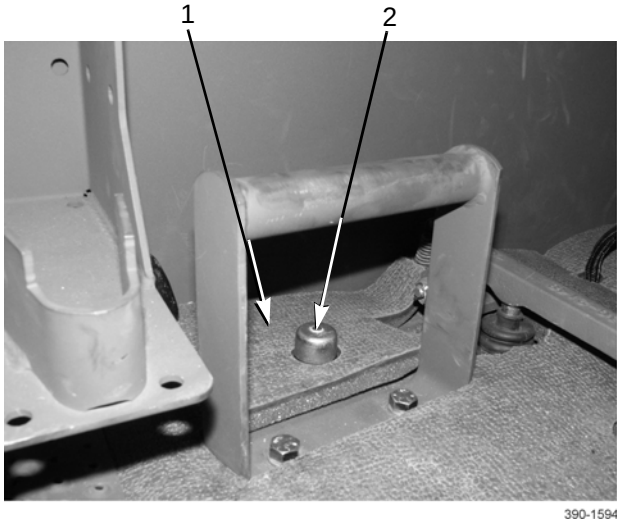
4. Remove two screws (5), lockwashers (6), and wires (7) from dimmer switch terminals (8). Discard lockwashers.
5. Remove dimmer switch (2) from machine.



390-1596

INSTALLATION

1. Install two wires (7) on dimmer switch terminals (8) with two new lockwashers (6) and screws (5).
2. Position dimmer switch (2) by pushing dimmer switch up through cab floor.
3. With assistance, install three new lockwashers (4) and screws (3) on dimmer switch (2).
4. Position floor pad (1) around dimmer switch (2).



END OF WORK PACKAGE

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HEADLIGHTS REPLACEMENT 0054 00

THIS WORK PACKAGE COVERS

Light Assembly: Removal, Installation

Headlight: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Gasket

References

WP 0099 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

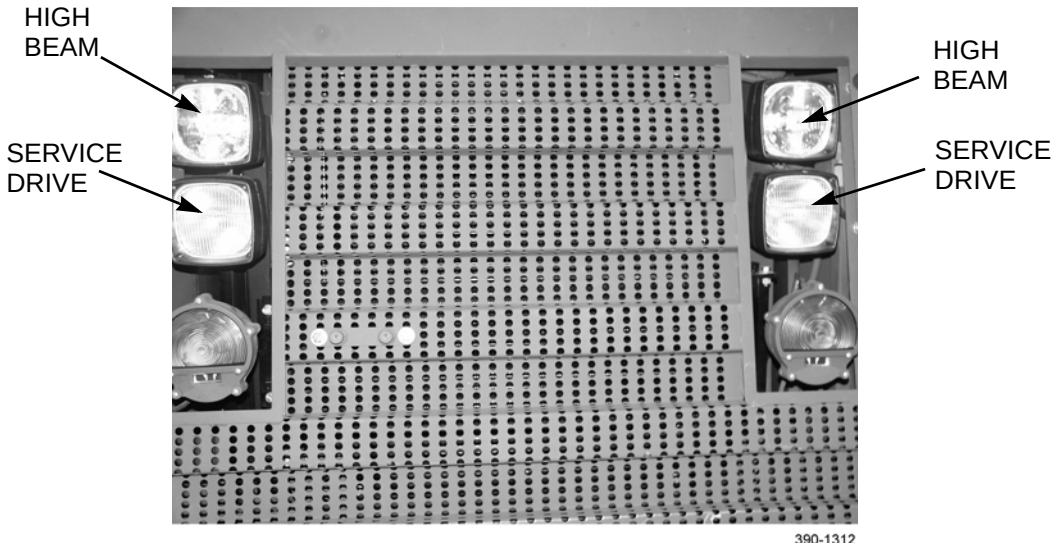
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

LIGHT ASSEMBLY REMOVAL

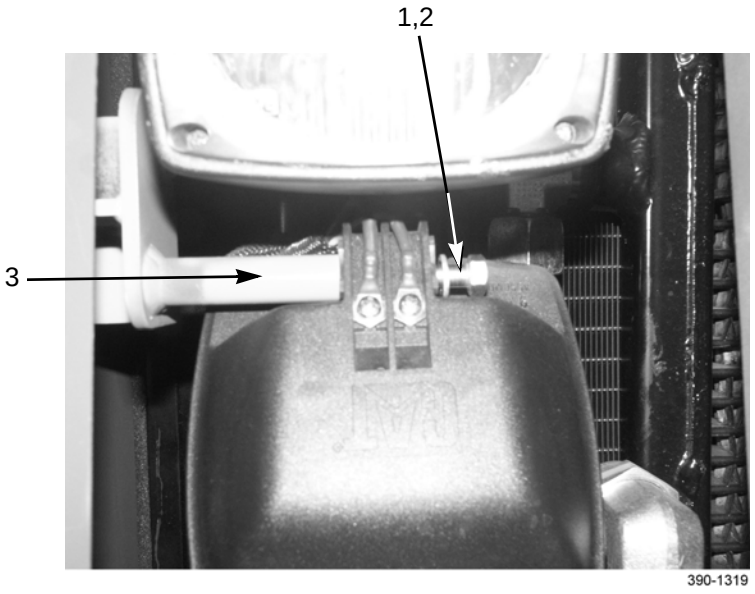
NOTE

- This procedure is used for service drive and high beam lights. Right side service drive light is shown.
- Headlight is shown out of position for clarity.



LIGHT ASSEMBLY REMOVAL - CONTINUED

1. Remove bolt (1) and washer (2) from mount (3).



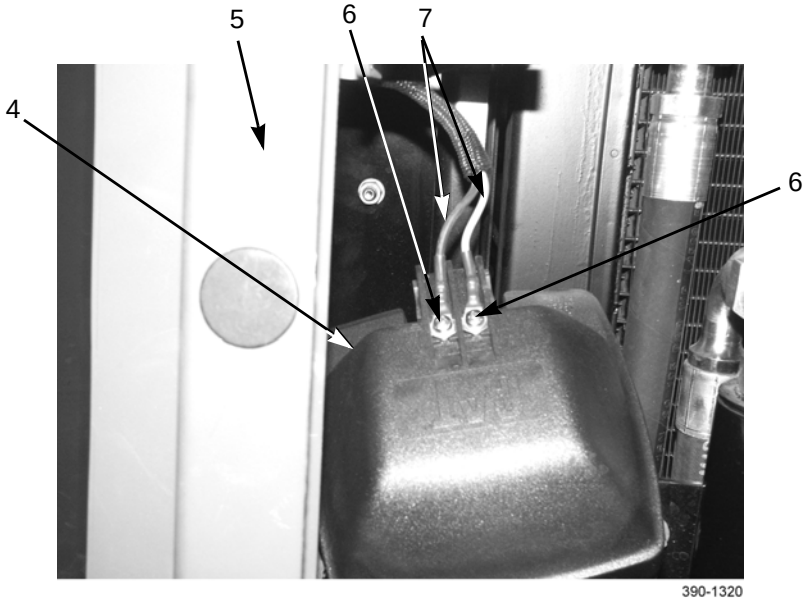
390-1319

2. Pull light assembly (4) from engine grille (5).

NOTE

Tag leads to aid in installation.

3. Remove two screws (6) and electrical leads (7) from light assembly (4).



390-1320

LIGHT ASSEMBLY INSTALLATION

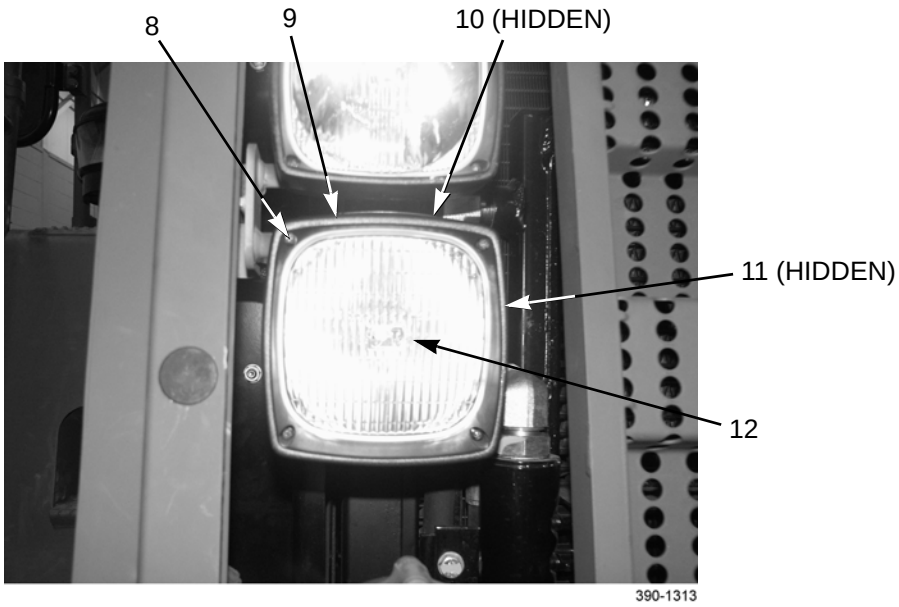
1. Install two electrical leads (7) on light assembly (4) with two screws (6).
2. Position light assembly (4) in engine grille (5).
3. Install bolt (1) and washer (2) on mount (3).

HEADLIGHT REMOVAL

NOTE

This procedure is used for service drive and high beam lights. Right side service drive light is shown.

1. Remove four screws (8) from body assembly (9).
2. Remove body assembly (9) and gasket (10) from housing (11). Discard gasket.
3. Pull headlight (12) from housing (11).

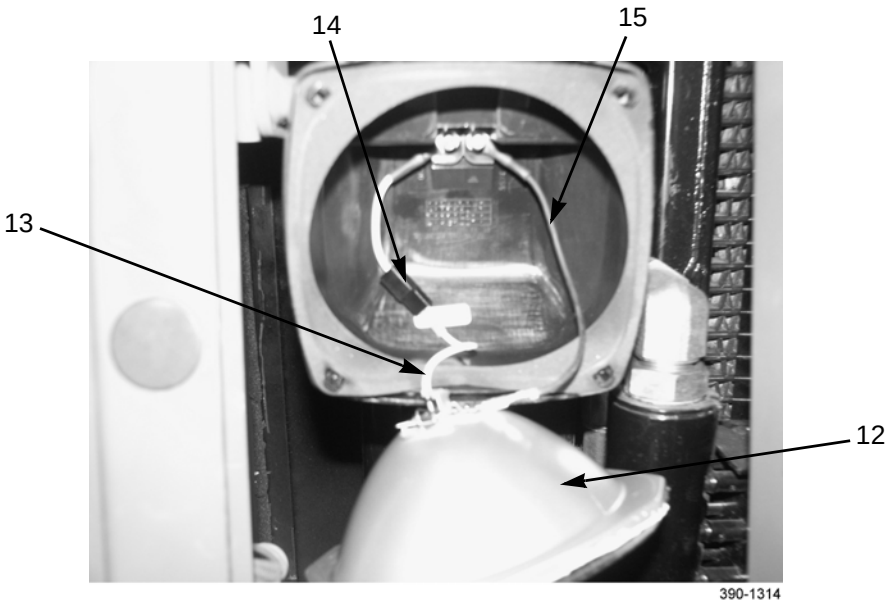


HEADLIGHT REMOVAL - CONTINUED

NOTE

Tag leads to aid in installation.

4. Disconnect lead (13) from harness connector (14).
5. Disconnect lead (15) from headlight (12).



HEADLIGHT INSTALLATION

1. Connect lead (15) to headlight (12).
2. Connect lead (13) to harness connector (14).

NOTE

When installing headlight, ensure word TOP is facing up.

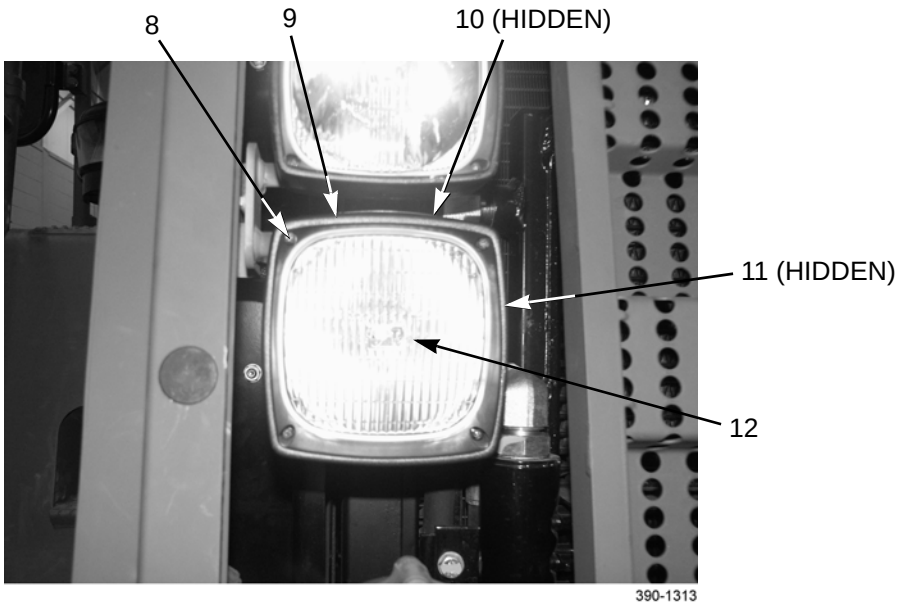
3. Position headlight (12) in housing (11).

NOTE

When installing body assembly, ensure that wide lip of body assembly is at bottom.

4. Install new gasket (10) on body assembly (9) and position body assembly in housing (11).
5. Install four screws (8) in body assembly (9).

HEADLIGHT INSTALLATION - CONTINUED



END OF WORK PACKAGE

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EMS ALARM REPLACEMENT 0055 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

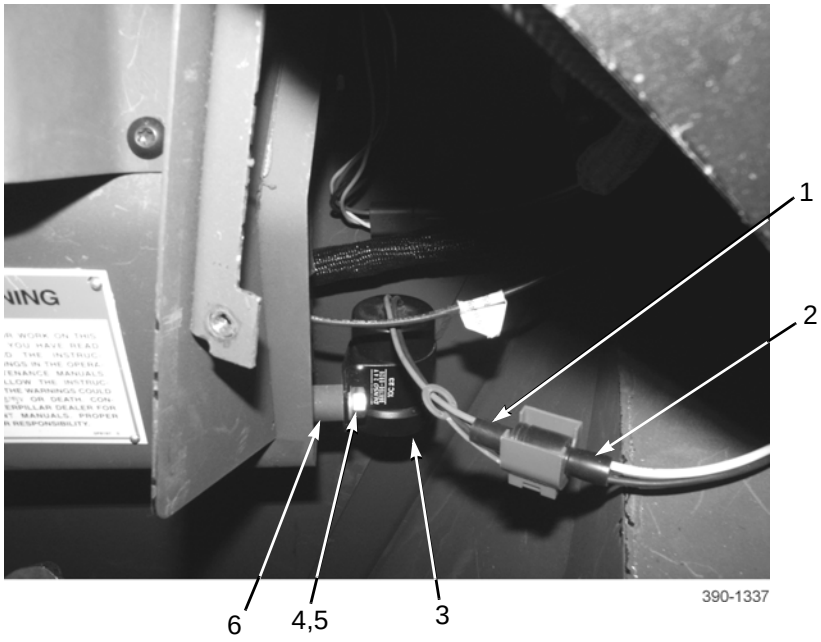
Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

EMS panel removed (WP 0039 00)

REMOVAL

1. Disconnect electrical leads (1) from harness connector (2).
2. Remove screw (4), washer (5), and alarm (3) from mount boss (6).



INSTALLATION

1. Install alarm (3) on mount boss (6) with washer (5) and screw (4).
2. Connect electrical leads (1) to harness connector (2).
3. Install EMS panel (WP 0039 00).

END OF WORK PACKAGE

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AIR INTAKE HEATER TIMER REPLACEMENT 0056 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

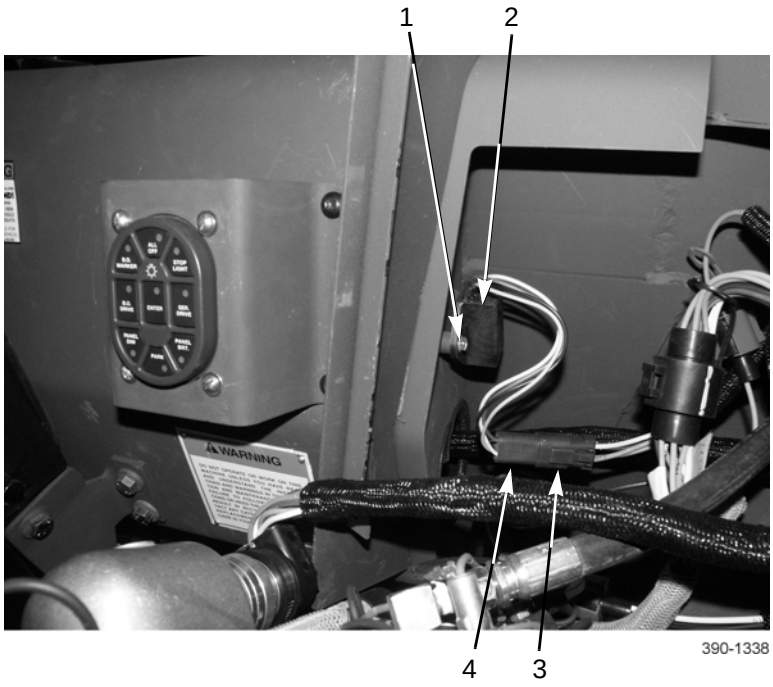
Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

EMS panel removed (WP 0039 00)

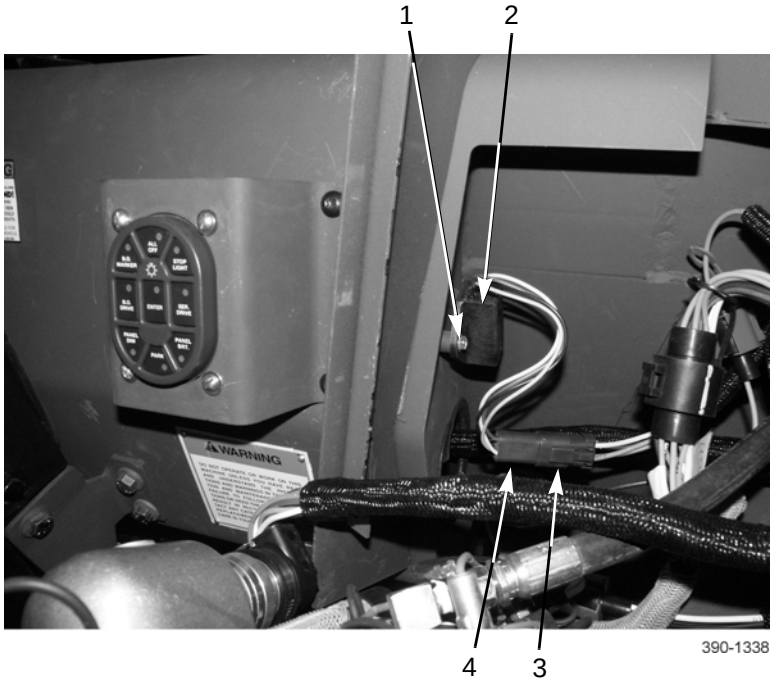
REMOVAL

1. Remove two screws (1) and timer (2).
2. Disconnect leads (4) from harness connector (3).



INSTALLATION

1. Install timer (2) with two screws (1).
2. Connect leads (4) to harness connector (3).
3. Install EMS panel (WP 0039 00).



END OF WORK PACKAGE

WORK LIGHT MAINTENANCE 0057 00

THIS WORK PACKAGE COVERS

Lamp: Removal, Installation

Work Light: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

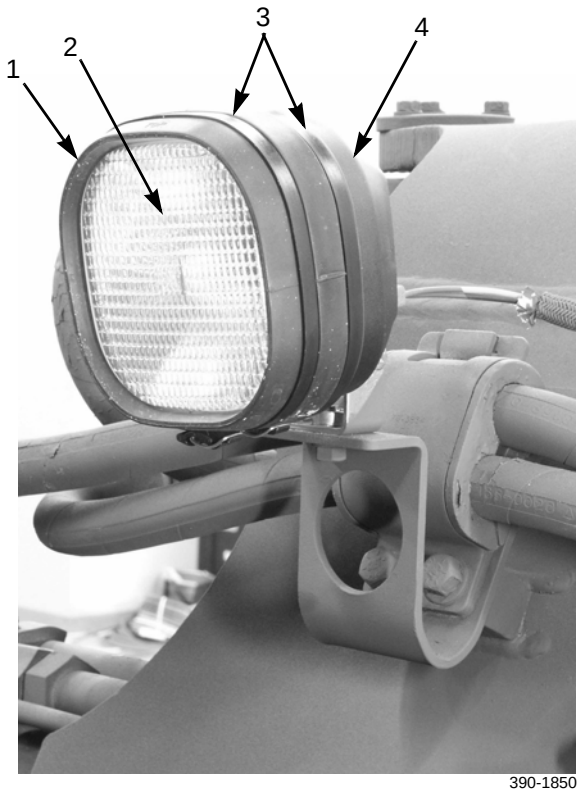
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

LAMP REMOVAL

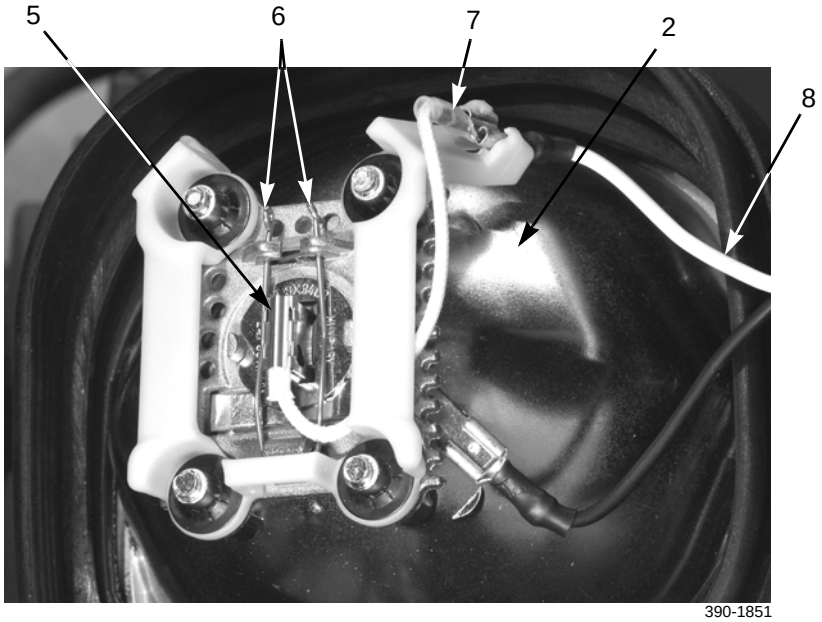
1. Remove two clamps (3) from rubber bezel (1).
2. Remove rubber bezel (1) with lens assembly (2) from work light housing (4) and gently pull outward on bezel to expose rear of lens assembly.



390-1850

LAMP REMOVAL - CONTINUED

3. Disconnect white lamp wire (7) from white work light wiring harness wire (8).
4. Pinch together and release two retaining wires (6) and remove lamp (5) from lens assembly (2).



390-1851

LAMP INSTALLATION

CAUTION

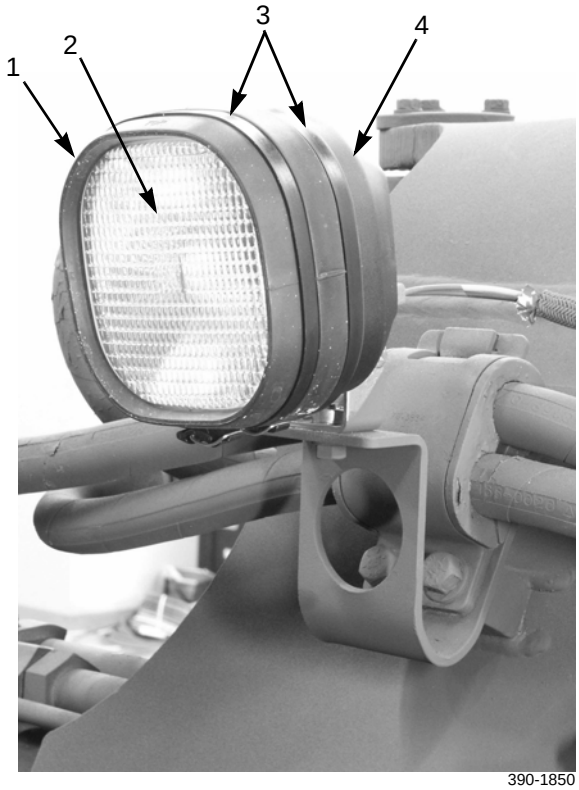
Avoid touching glass surface of lamp with fingers. Oil from fingers on lamp will shorten life of lamp.

1. Position lamp (5) on lens assembly (2) and secure with two retaining wires (6).
2. Connect white lamp wire (7) to white work light wiring harness wire (8).

NOTE

Inspect rubber bezel prior to installation to ensure it is not damaged. Replace if damaged.

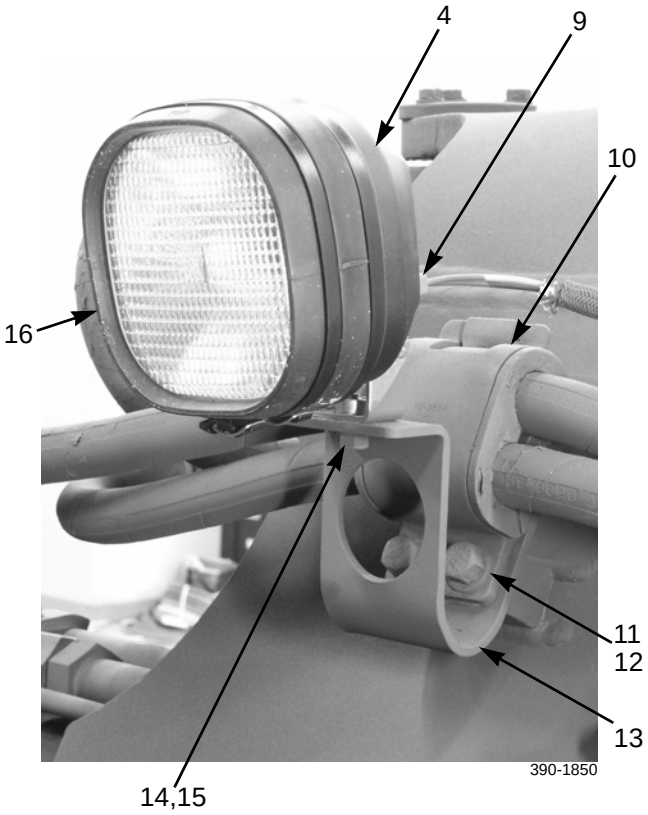
3. Position rubber bezel (1) with lens assembly (2) on work light (4). Ensure that rubber bezel is fully seated.
4. Install two clamps (3) on rubber bezel (1).



390-1850

WORK LIGHT REMOVAL

1. Disconnect tractor wiring harness connector (9) from rear of work light housing (4).
2. Remove bolt (14), washer (15), and work light (16) from work light bracket (13).



NOTE

Two hydraulic hoses and rubber bushing will also be removed as clamp halves are removed.

3. Remove two bolts (11), washers (12), two clamp halves (10), and work light bracket (13) from tractor.

WORK LIGHT INSTALLATION

NOTE

Two hydraulic hoses and rubber bushing will also be installed as clamp halves are installed.

1. Install work light bracket (13) and two clamp halves (10) on tractor with two washers (12) and bolts (11).
2. Install work light (16) on work light bracket (13) with washer (15) and bolt (14).
3. Connect tractor wiring harness connector (9) to rear of work light housing (4).

END OF WORK PACKAGE

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STOP LAMP PRESSURE SWITCH REPLACEMENT 0058 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tape, antiseizing (Item 40, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

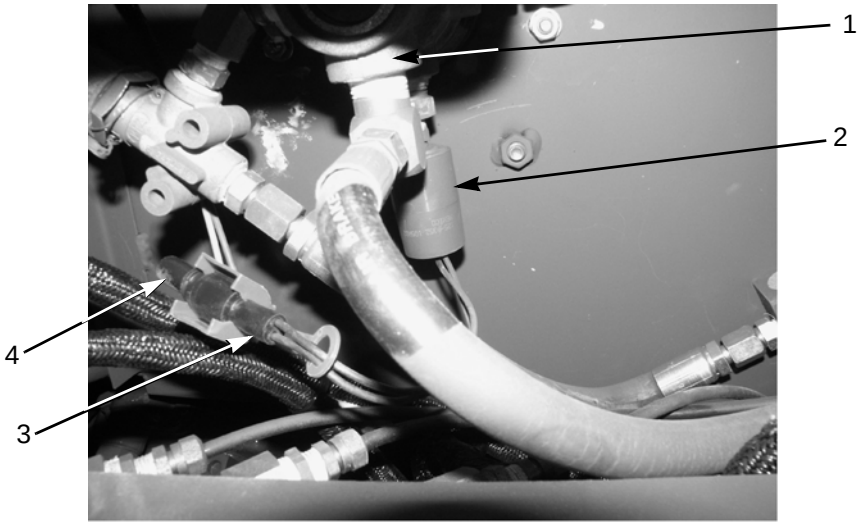
Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

NOTE

Stop lamp pressure switch is connected to service brake control valve below cab floor.

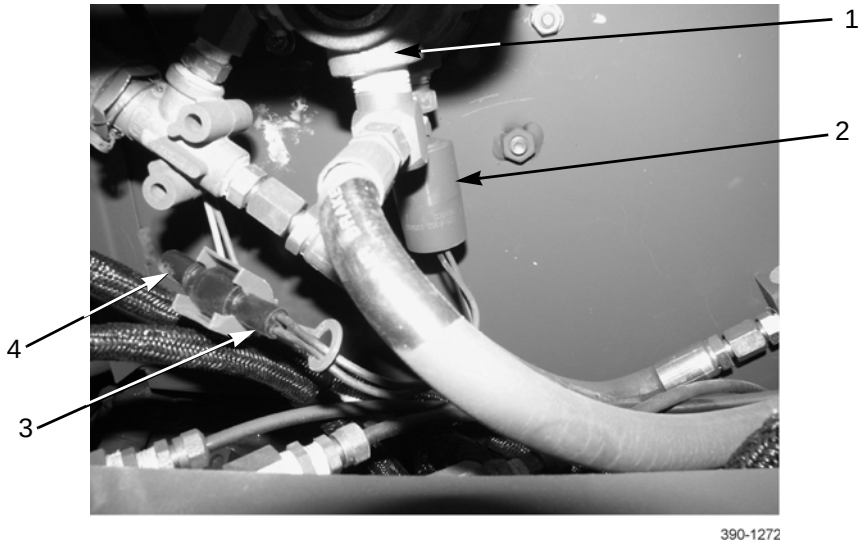
1. Disconnect harness connector (4) from electrical leads (3).
2. Remove pressure switch (2) from control valve (1).



390-1272

INSTALLATION

1. Apply antiseizing tape to threads of pressure switch (2) and install pressure switch on control valve (1).
2. Connect electrical leads (3) to harness connector (4).



END OF WORK PACKAGE

TORQUE CONVERTER TEMPERATURE SWITCH REPLACEMENT 0059 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Lockwasher (2)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

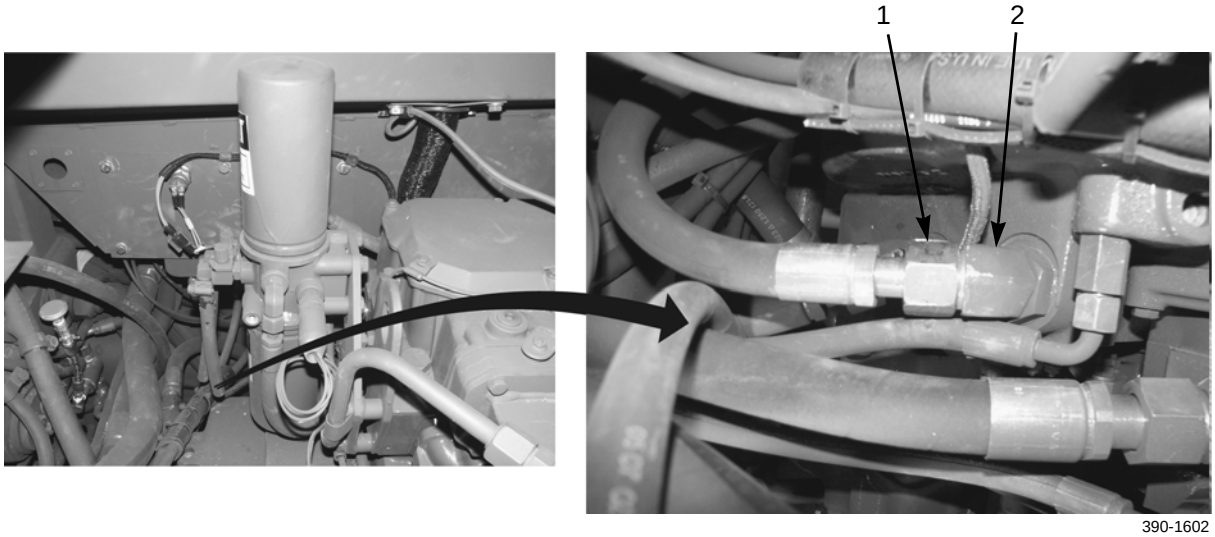


WARNING

Do NOT perform this task when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.

REMOVAL

1. Disconnect hose (1) from elbow (2).



390-1602

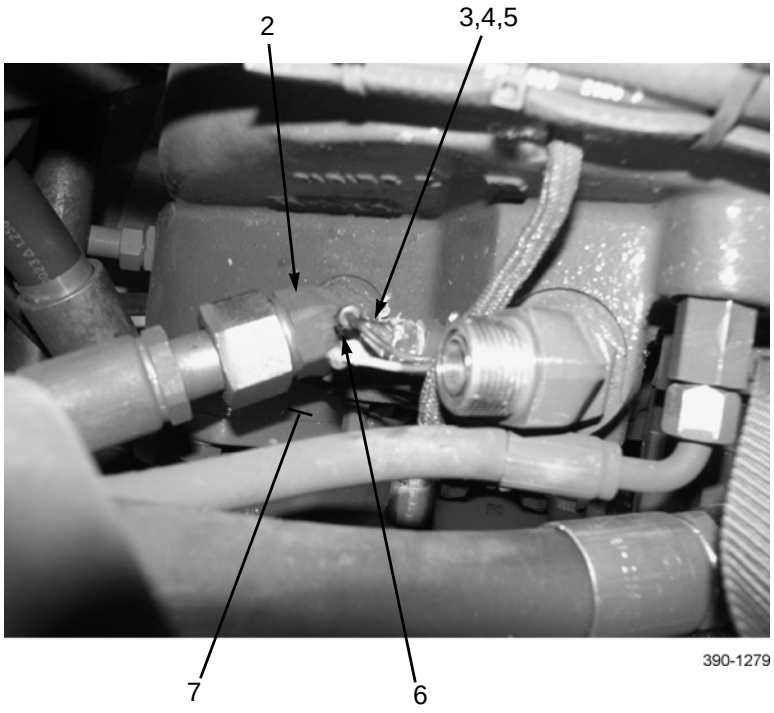
REMOVAL - CONTINUED

2. Install protective cap on elbow (2).

NOTE

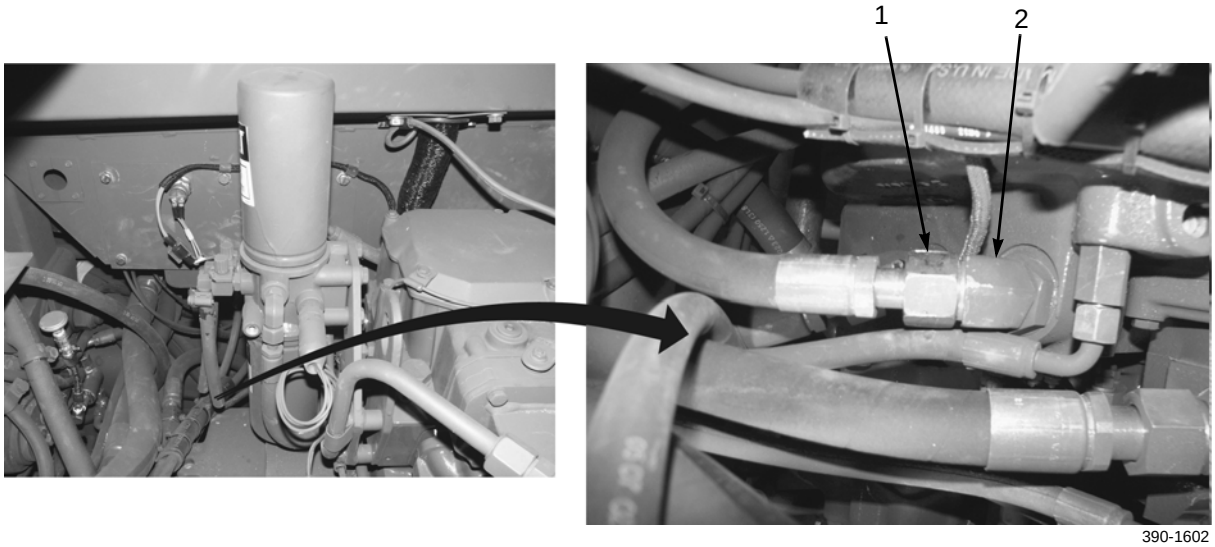
Tag wires to aid in installation.

3. Remove two screws (4), lockwashers (5), and wires (3) from temperature switch (6). Discard lockwashers.
4. Remove temperature switch (6) from torque converter (7).



INSTALLATION

1. Position temperature switch (6) on torque converter (7).
2. Install two screws (4), new lockwashers (5), and wires (3) on temperature switch (6).
3. Remove protective cap from elbow (2)
4. Connect hose (1) to elbow (2).
5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



390-1602

END OF WORK PACKAGE

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TORQUE CONVERTOR TEMPERATURE SENDER REPLACEMENT 0060 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective cap (Item 5, WP 0171 00)

Starwasher

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205 -10-1 or TM 5-3800-205-10-2)

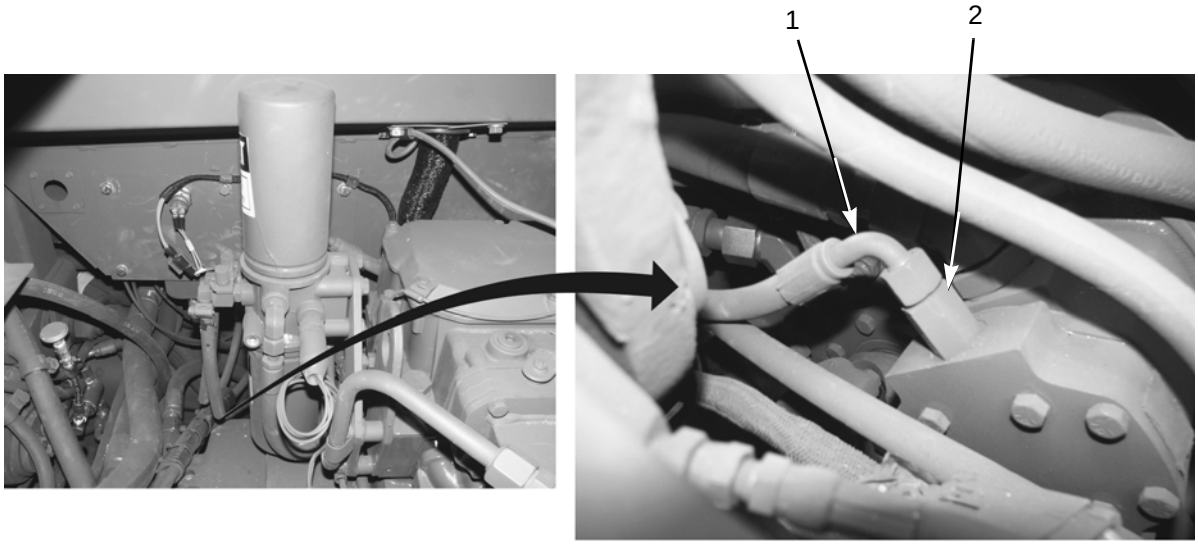


WARNING

Do NOT perform this task when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.

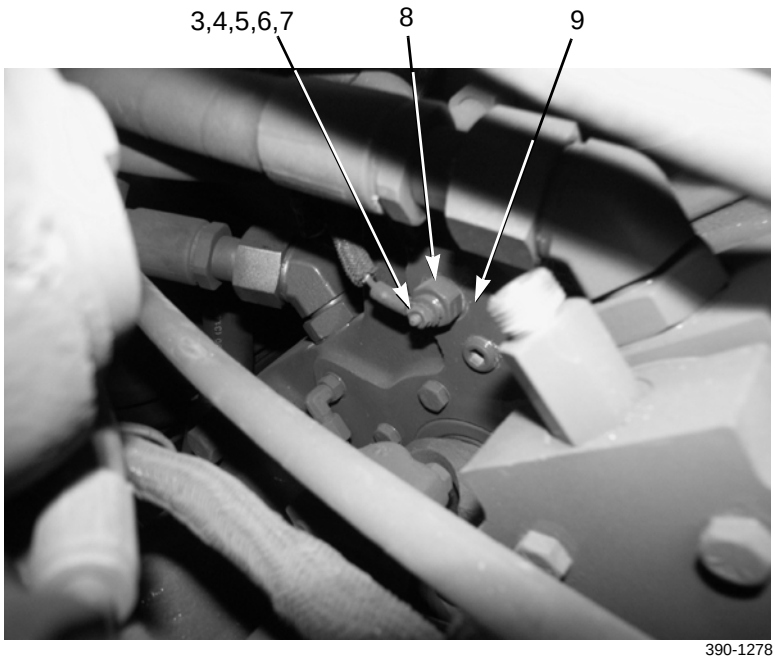
REMOVAL

1. Disconnect hose (1) from adapter (2).
2. Install protective cap on adapter (2).



390-1603

3. Remove nut (3), flatwasher (4), wire terminal (5), starwasher (6), and insulating washer (7) from sender (8). Discard starwasher.
4. Remove sender (8) from torque converter (9).



390-1278

INSTALLATION

1. Install sender (8) on torque converter (9).
2. Install insulating washer (7), new starwasher (6), wire terminal (5), flatwasher (4), and nut (3) on sender (8).
3. Remove protective cap from adapter (2).
4. Connect hose (1) to adapter (2).
5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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COOLANT TEMPERATURE SENDER REPLACEMENT 0061 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Antifreeze (Item 2 or 3, WP 0171 00)

O-ring

Starwasher

References

WP 0009 00

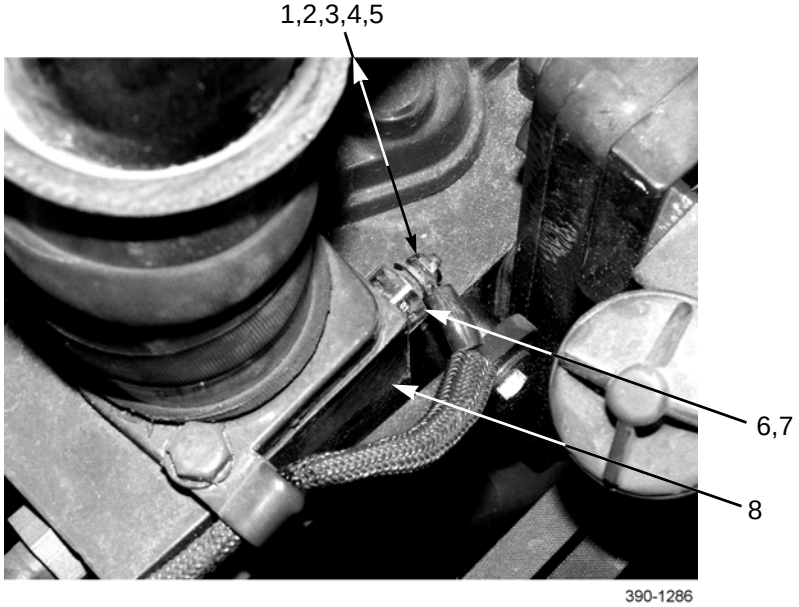
Equipment Condition

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Coolant drained approximately halfway (WP 0010 00)

REMOVAL

1. Remove nut (1), flatwasher (2), starwasher (3), electrical lead (4), and terminal washer (5) from sender (6). Discard starwasher.
2. Remove sender (6) from thermostat housing (8).
3. Remove and discard O-ring (7) from sender (6).



INSTALLATION

1. Coat new O-ring (7) with coolant and install on sender (6).
2. Install sender (6) in thermostat housing (8).
3. Install terminal washer (5), electrical lead (4), new starwasher (3), flatwasher (2), and nut (1) on sender (6).
4. Tighten nut (1).
5. Refill coolant (WP 0009 00 and WP 0010 00).



END OF WORK PACKAGE

ENGINE AND TRANSMISSION SPEED SENSORS REPLACEMENT 0062 00

THIS WORK PACKAGE COVERS

Engine Speed Sensor Replacement

Transmission Speed Sensor Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened, if replacing engine speed sensor (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

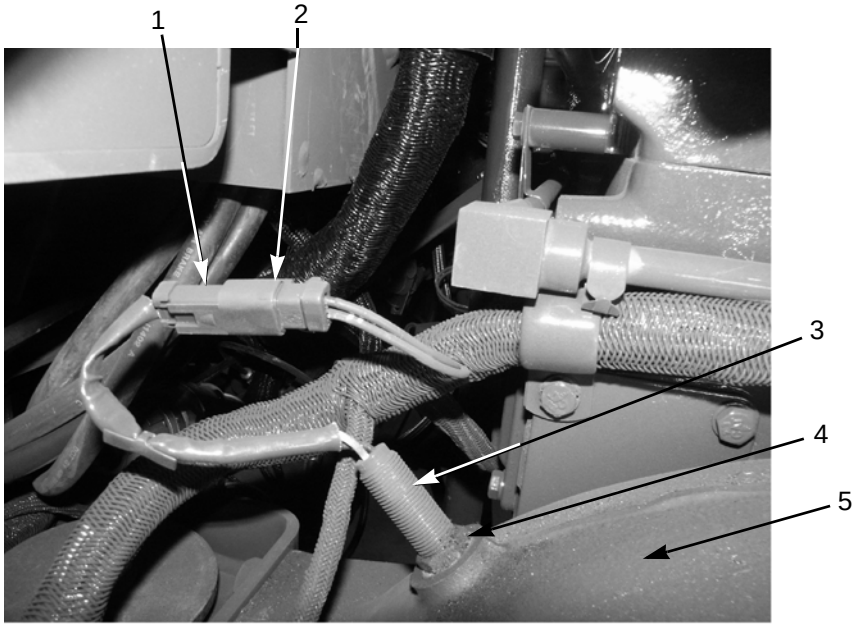
ENGINE SPEED SENSOR REPLACEMENT

1. Remove from clip and disconnect sensor connector (1) from harness connector (2).
2. Hold sensor (3) and loosen locknut (4) on sensor.

NOTE

Mark bottom of sensor to aid in installation.

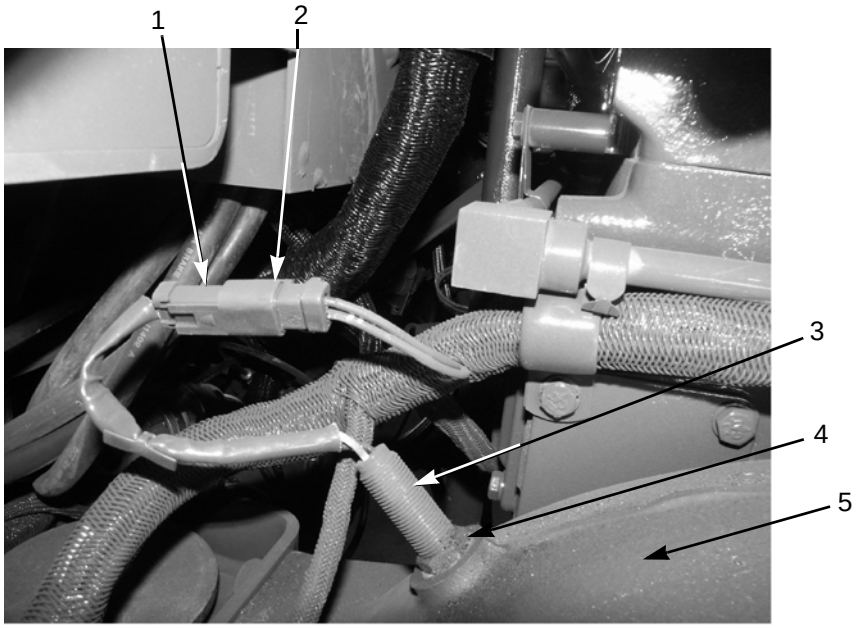
3. Remove sensor (3) from top-left of flywheel housing (5).



390-1273

ENGINE SPEED SENSOR REPLACEMENT - CONTINUED

4. Transfer position mark from old sensor (3) to new sensor.
5. Install sensor (3) until position mark on sensor is even with top of flywheel housing (5).
6. Tighten locknut (4) on sensor (3) while holding sensor flat.
7. Connect sensor connector (1) to harness connector (2) and secure connectors in clip.
8. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



TRANSMISSION SPEED SENSOR REPLACEMENT

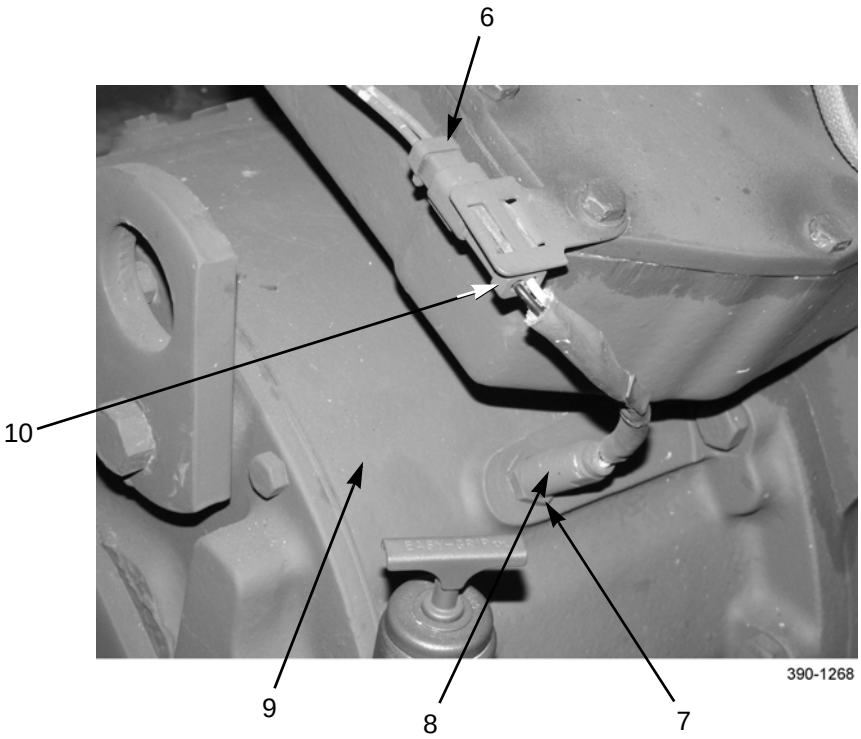
1. Disconnect sensor connector (10) from harness connector (6).
2. Hold sensor (8) and loosen locknut (7).

NOTE

Mark bottom of sensor to aid in installation.

3. Remove sensor (8) from housing (9).
4. Transfer position mark from old sensor (8) to new sensor.
5. Install sensor (8) until position mark on sensor is even with top of housing (9).
6. Tighten locknut (7) on sensor (8) while holding sensor flat.
7. Connect sensor connector (10) to harness connector (6).

TRANSMISSION SPEED SENSOR REPLACEMENT - CONTINUED



END OF WORK PACKAGE

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ENGINE TEMPERATURE AND ETHER START AID TEMPERATURE SWITCH REPLACEMENT 0063 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Antifreeze (Item 2 or 3, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

References

WP 0009 00

Equipment Condition

Cooling system drained (WP 0010 00)

NOTE

Engine temperature switch and start aid temperature switch are replaced the same way. Engine temperature switch is shown.

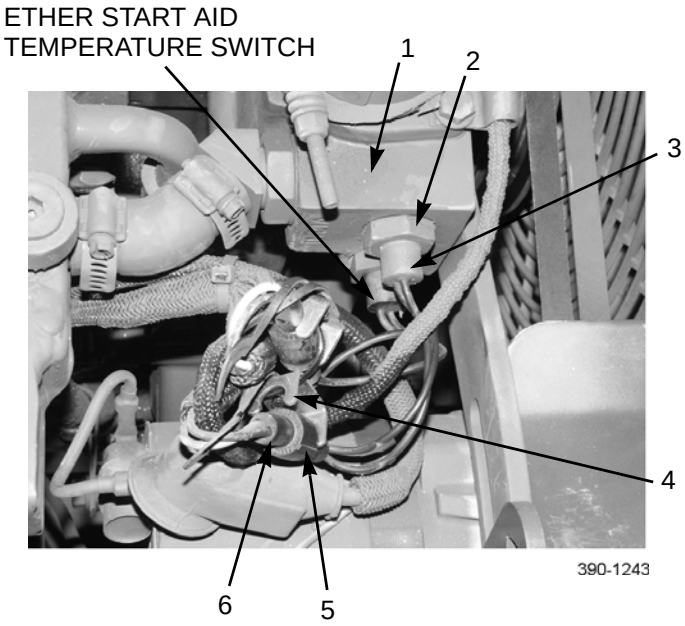
ENGINE TEMPERATURE AND ETHER START AID TEMPERATURE SWITCH REPLACEMENT - CONTINUED **0063 00**

REMOVAL

NOTE

Top switch is for engine temperature. Bottom switch is for ether start aid.

1. Cut tiedown strap from wire bundle. Discard tiedown strap.
2. Remove from clip (4) and disconnect switch connector (5) from harness connector (6).
3. Hold switch (3) and loosen nut (2). Remove switch from thermostat housing (1).



INSTALLATION

1. Position switch (3) in thermostat housing (1) and tighten nut (2).
2. Install new tiestrap around wire bundle.
3. Connect swtich connectors (5) to harness connector (6). Place connectors in clip (4).
4. Fill cooling system (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

ENGINE OIL, FUEL LEVEL RELAY, AND EJECTOR DETENT PRESSURE SWITCHES REPLACEMENT

0064 00

THIS WORK PACKAGE COVERS

Engine Oil Pressure Switch: Removal, Installation

Ejector Detent Pressure Switch: Removal, Installation

Fuel Level Relay Pressure Switch: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

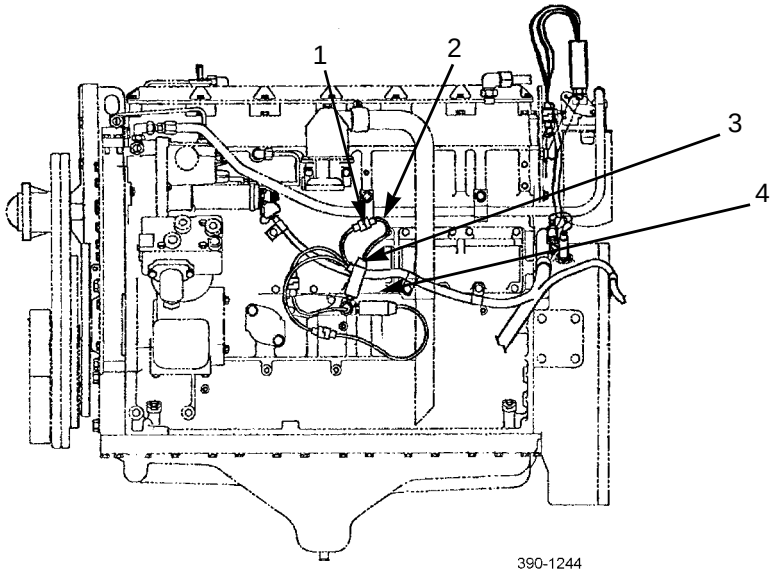
Tape, antiseizing (Item 40, WP 0171 00)

Equipment Condition

Center guard plate removed (WP 0100 00)

ENGINE OIL PRESSURE SWITCH REMOVAL

1. Disconnect harness connector (1) from electrical leads (2).
2. Remove engine oil pressure switch (3) from bracket (4).



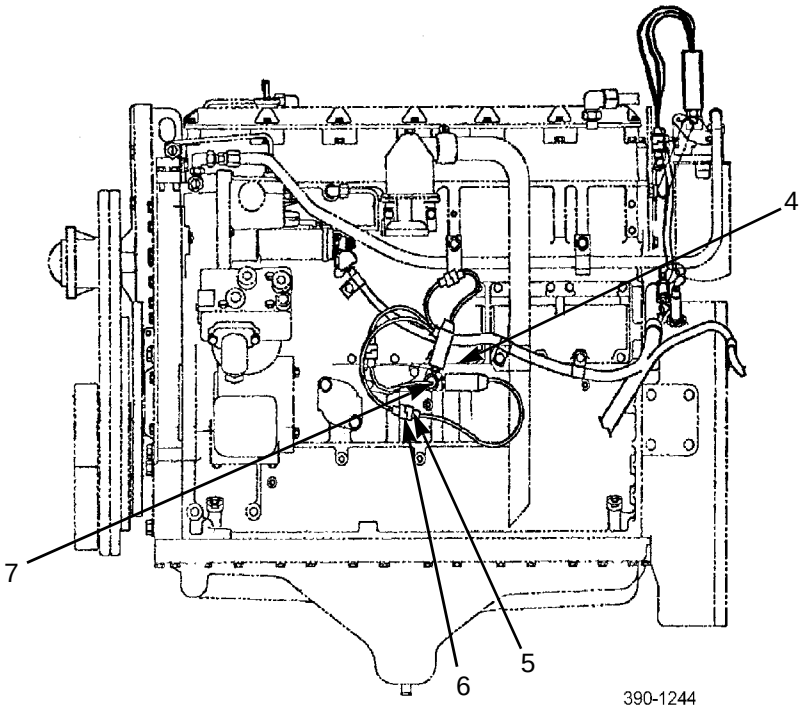
ENGINE OIL PRESSURE SWITCH INSTALLATION

1. Apply antiseizing tape to threads of switch (3) and install switch on bracket (4).
2. Connect electrical leads (2) to harness connector (1).
3. Install center guard plate (WP 0100 00).

ENGINE OIL, FUEL LEVEL RELAY, AND EJECTOR DETENT PRESSURE SWITCHES REPLACEMENT - CONTINUED **0064 00**

EJECTOR DETENT PRESSURE SWITCH REMOVAL

1. Disconnect electrical leads (5) from harness connector (6).
2. Remove ejector detent pressure switch (7) from bracket (4).

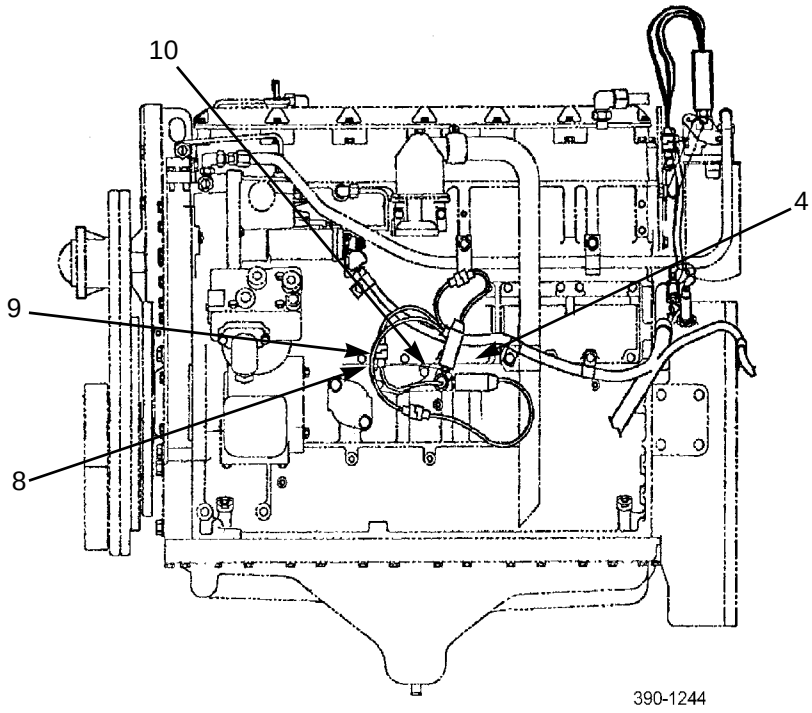


EJECTOR DETENT PRESSURE SWITCH INSTALLATION

1. Apply antiseizing tape to threads of switch (7) and install switch on bracket (4).
2. Connect electrical leads (5) to harness connector (6).
3. Install center guard plate (WP 0100 00).

FUEL LEVEL RELAY PRESSURE SWITCH REMOVAL

1. Disconnect electrical leads (8) from harness connector (9).
2. Remove fuel level relay pressure switch (10) from bracket (4).



FUEL LEVEL RELAY PRESSURE SWITCH INSTALLATION

1. Apply antiseizing tape to threads of switch (10) and install switch on bracket (4).
2. Connect electrical leads (8) to harness connector (9).
3. Install center guard plate (WP 0100 00).

END OF WORK PACKAGE

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ENGINE FUEL SYSTEM PRESSURE SWITCH REPLACEMENT 0065 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Rag, wiping (Item 31, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Fuel hose quick disconnects disconnected at draft arm (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

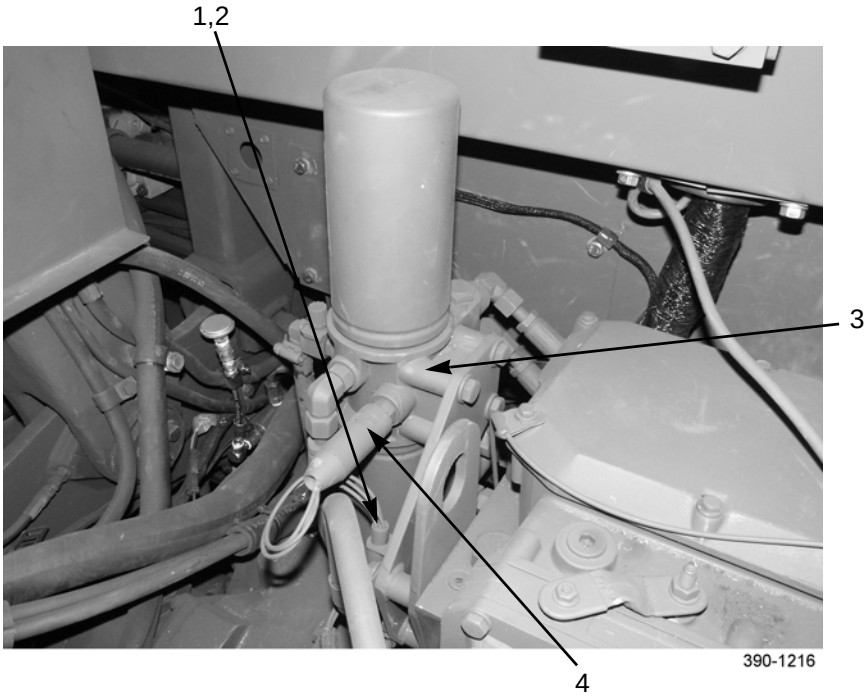


WARNING

DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fuel. Fuel may ignite, causing damage to machine and injury or death to personnel.

REMOVAL

1. Disconnect electrical leads (1) from harness connector (2).
2. Remove pressure switch (4) from housing (3).



INSTALLATION

1. Install pressure switch (4) on housing (3).
2. Connect leads (1) to harness connector (2).
3. Connect fuel quick disconnects at draft arm (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
4. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

SERVICE BRAKE AIR SUPPLY BLOCK SOLENOID VALVE REPLACEMENT 0066 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Equipment Condition

Rear guard plate removed (WP 0100 00)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

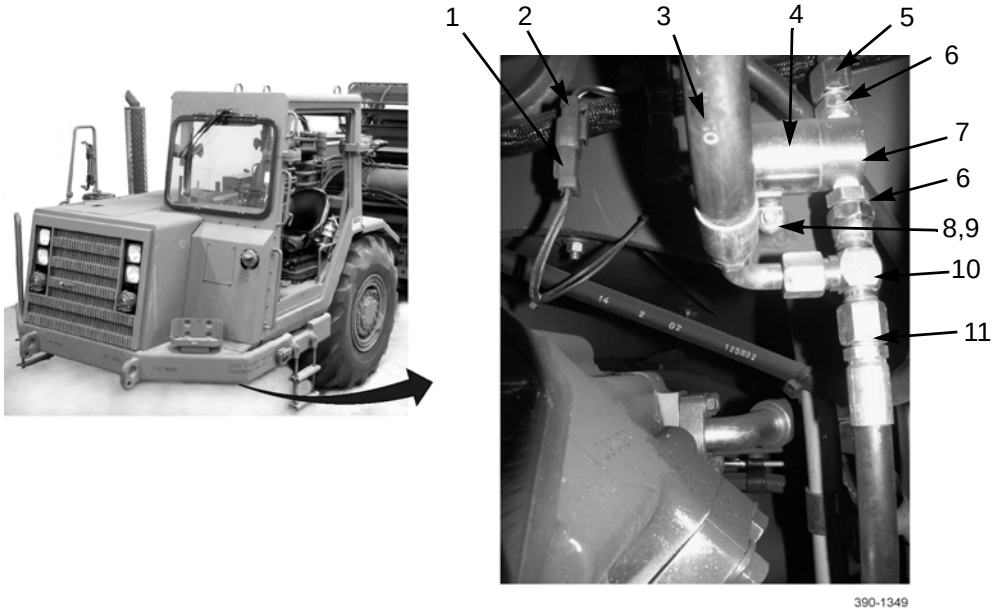
- Do NOT disconnect any air system lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

REMOVAL

NOTE

Service brake air supply block solenoid is located below cab and above rear crossmember.

1. Disconnect solenoid valve leads (1) from harness connector (2).
2. Disconnect hose (3) from tee (10).
3. Disconnect hose (5) from adapter (6) on valve (7).
4. Disconnect hose (11) from tee (10).
5. Remove two screws (8) and washers (9) from valve clamp (4).
6. Remove valve (7) from crossmember (12).
7. Remove tee (10) and two adapters (6) from valve (7).
8. Inspect two adapters (6) and tee (10) for damage. Replace adapters and tee if damaged. Remove antiseizing tape from threads of adapters and tee, if adapters and tee are not damaged.



INSTALLATION

1. Apply antiseizing tape to threads of two adapters (6) and tee (10) and install adapters in valve (7).
2. Install tee (10) on lower adapter (6).
3. Install valve (7) on crossmember (12) with valve clamp (4), two screws (8) and washers (9).
4. Connect hose (11) to tee (10).
5. Connect hose (5) to other adapter (6).
6. Connect hose (3) to tee (10).
7. Connect solenoid valve leads (1) to harness connector (2).
8. Install rear guard plate (WP 0100 00).

END OF WORK PACKAGE

BATTERY AND BATTERY CABLES MAINTENANCE 0067 00

THIS WORK PACKAGE COVERS

Batteries: Removal, Service, Installation

Battery Cables: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 2 (Item 25, WP 0172 00)

Material/Parts

Rag, wiping (Item 31, WP 0171 00)

Locknut (4)

Personnel Required

Two

References

TM 9-6140-200-14

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)




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.

BATTERIES REMOVAL

1. Open compartment access door (1).



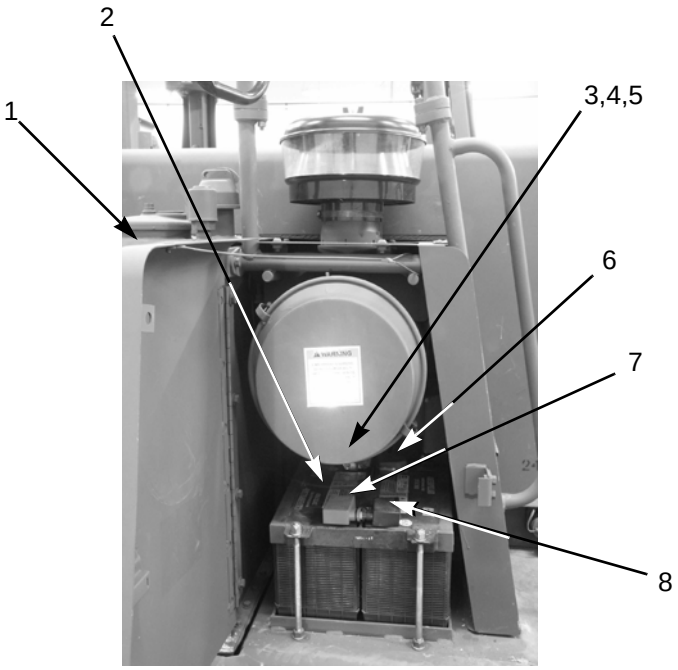
WARNING

- Remove all jewelry such as rings, ID tags, watches, and bracelets when working around batteries. If jewelry or a tool contacts a battery terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.
- Cover battery posts with a clean, dry rag to protect against electric shock.

CAUTION

Disconnect battery cables in sequence as described in steps 2 and 3.

2. Pull back protective cover (2). Loosen nut (3) and remove cable clamp (4) from terminal (5).
3. Repeat step 2 for terminals (7, 8, and 6).



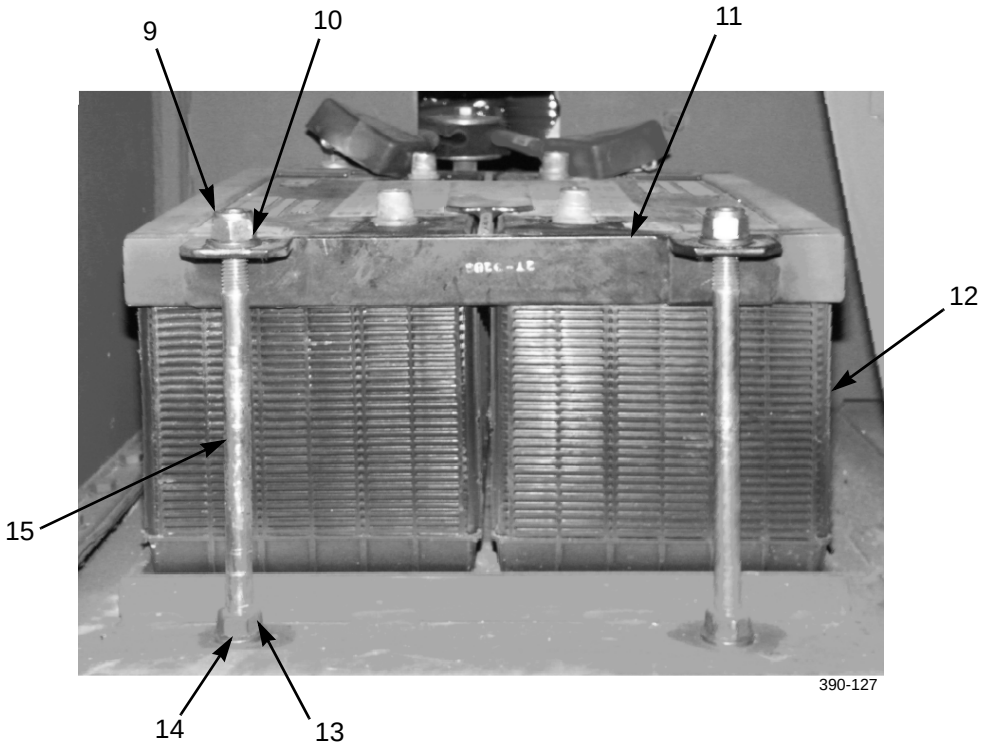
4. Remove four locknuts (9), washers (10), and battery hold-down (11) from two batteries (12). Discard locknuts.

NOTE

Mark bottom of rods to aid in installation.

5. Loosen nuts (13), washers (14), and remove both front rods (15) from battery compartment. Inspect front and rear rods for damage. Replace any rods that are damaged.

BATTERIES REMOVAL - CONTINUED



BATTERIES REMOVAL - CONTINUED



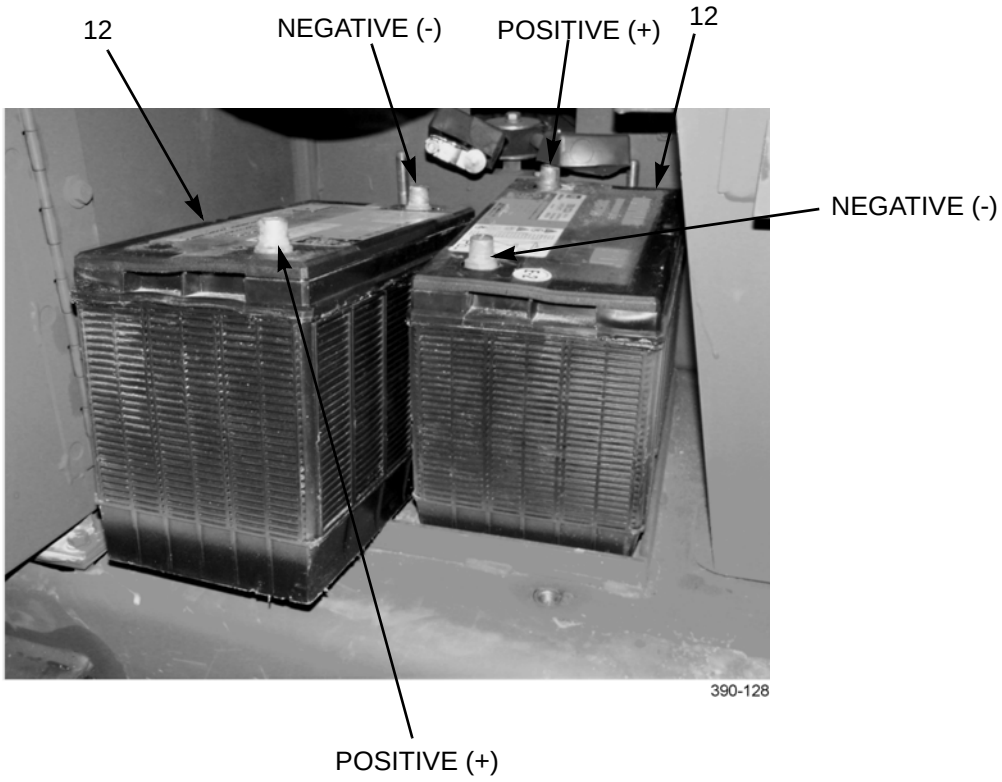
WARNING

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

- Each battery weighs 65 lb (30 kg).
- Note position of batteries for installation.

6. With assistance, remove two batteries (12) from battery compartment.



SERVICE

Service batteries in accordance with TM 9-6140-200-14.

BATTERIES INSTALLATION

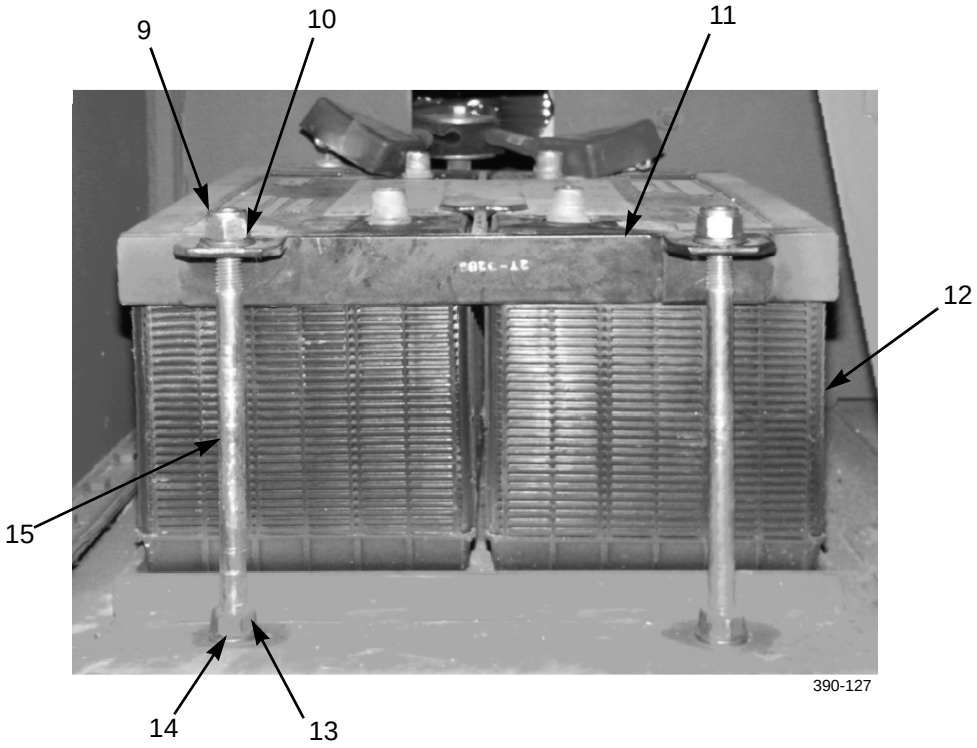
WARNING

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

Each battery weighs 65 lb (30 kg).

1. With assistance, position two batteries (12) in battery compartment.
2. Install rods (15) in battery compartment and secure with nuts (13) and washers (14).
3. Position battery hold-down (11) on top of batteries (12) and secure with four new locknuts (9) and washers (10).



BATTERIES INSTALLATION - CONTINUED



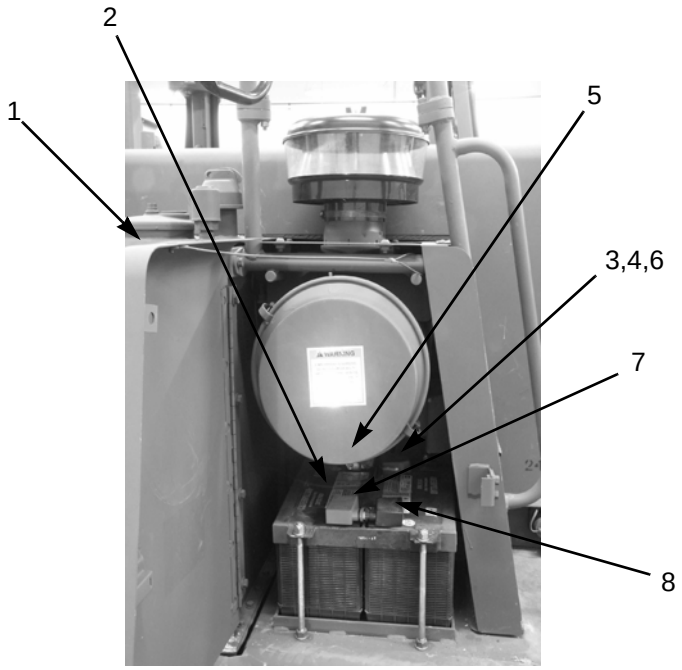
WARNING

- Remove all jewelry such as rings, ID tags, watches, and bracelets when working around batteries. If jewelry or a tool contacts a battery terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.
- Cover battery posts with a clean, dry rag to protect against electric shock.

CAUTION

Connect battery cables in sequence as described in steps 4 through 6.

4. Install cable clamp (4) on terminal (6) and tighten nut (3).
5. Install protective cover (2) over cable clamp (4).
6. Repeat steps 4 and 5 for terminals (8, 7, and 5).
7. Close compartment access door (1).



390-996

BATTERY CABLES REMOVAL



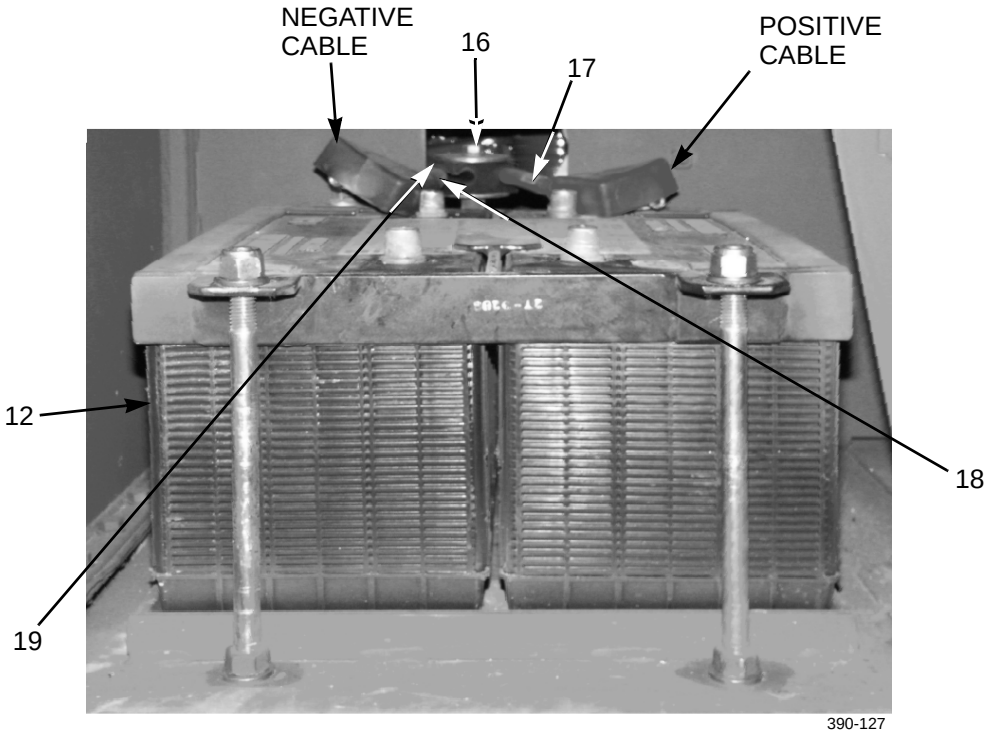
WARNING

Remove all jewelry such as rings, ID tags, watches, and bracelets when working around batteries. If jewelry or a tool contacts a battery terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.

NOTE

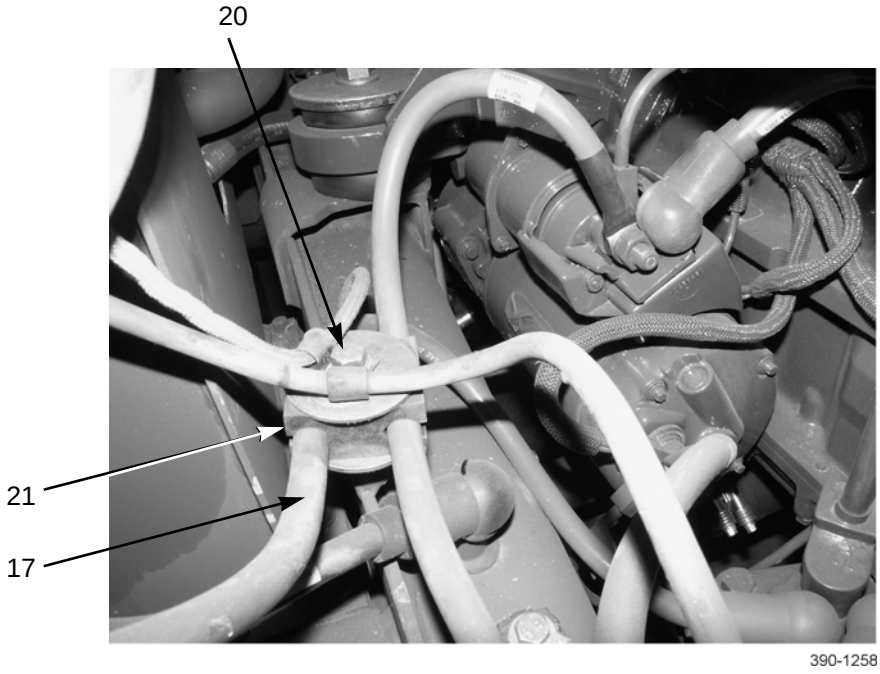
Cover battery posts with a clean, dry rag.

1. Disconnect batteries (12) in accordance with steps 2 and 3 of *Batteries Removal*.
2. Loosen, but do not remove, screw (16) enough to pull cables (17 and 18) from cable clamp (19).

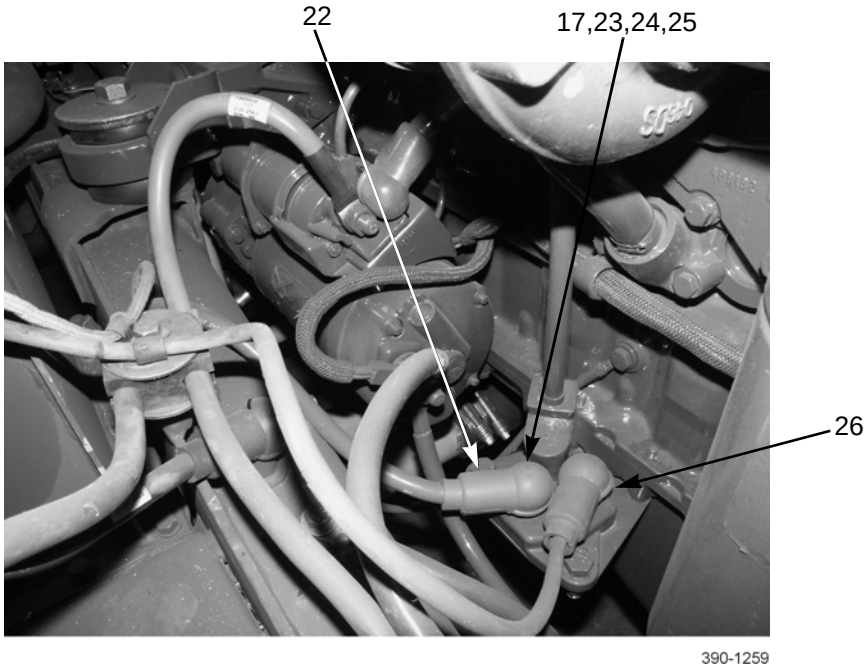


BATTERY CABLES REMOVAL - CONTINUED

3. Loosen, but do not remove, screw (20) enough to pull positive cable (17) from cable clamp (21).

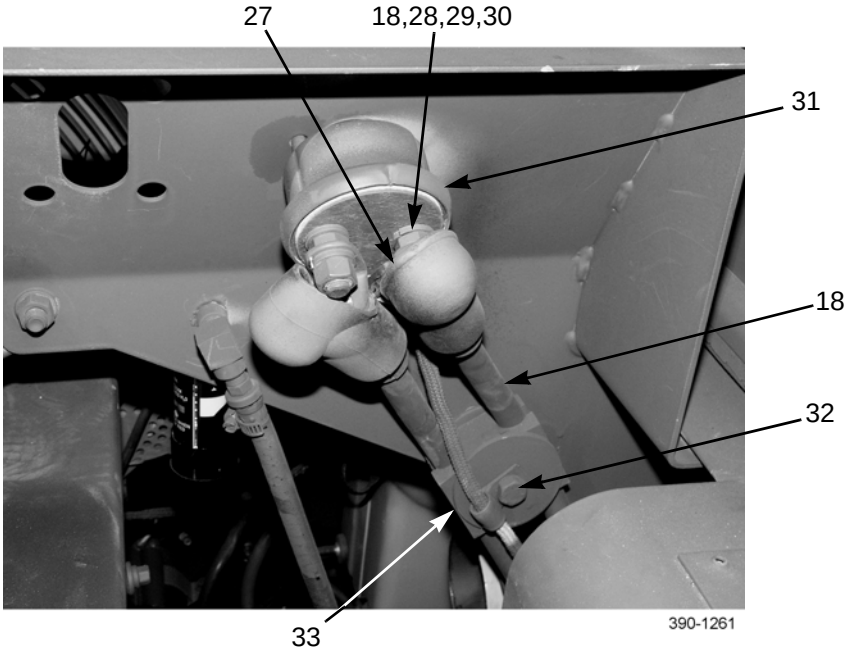


4. Pull back rubber boot (22) and remove nut (23), washer (24), and cable (17) from terminal (25) on junction block (26).
5. Do not remove other washer (24) from terminal (25).

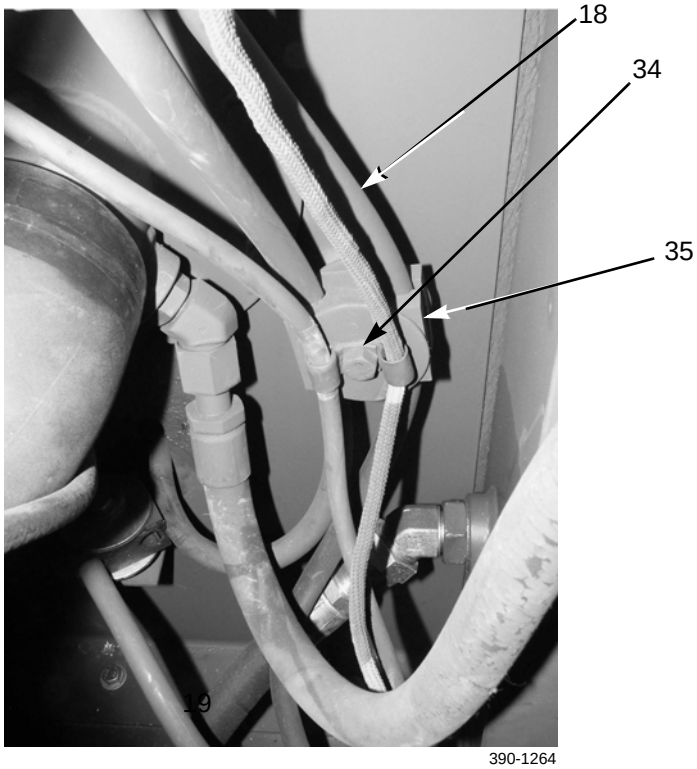


BATTERY CABLES REMOVAL - CONTINUED

6. Pull back rubber boot (27) and remove nut (28), washer (29), and negative cable (18) from terminal (30) on battery disconnect switch (31).
7. Loosen, but do not remove, screw (32) enough to pull cable (18) from clamp (33).

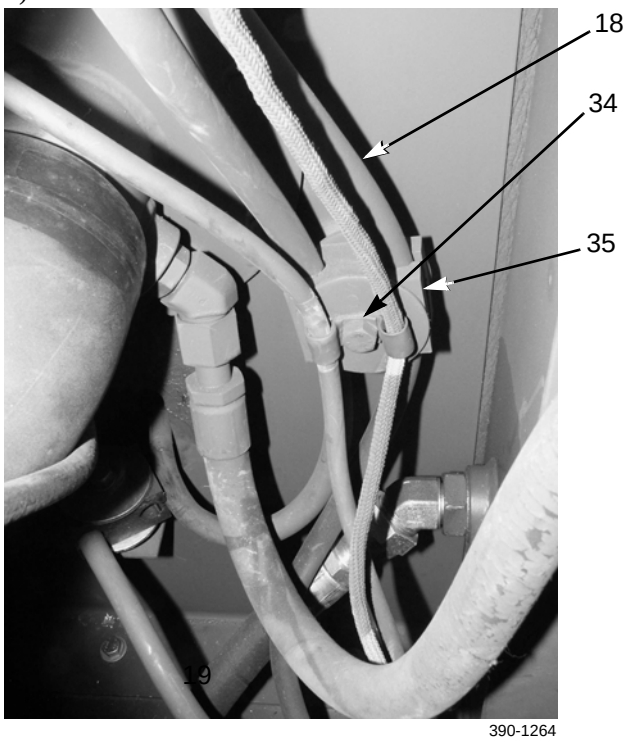


8. Loosen, but do not remove, screw (34) enough to pull cable (18) from clamp (35).

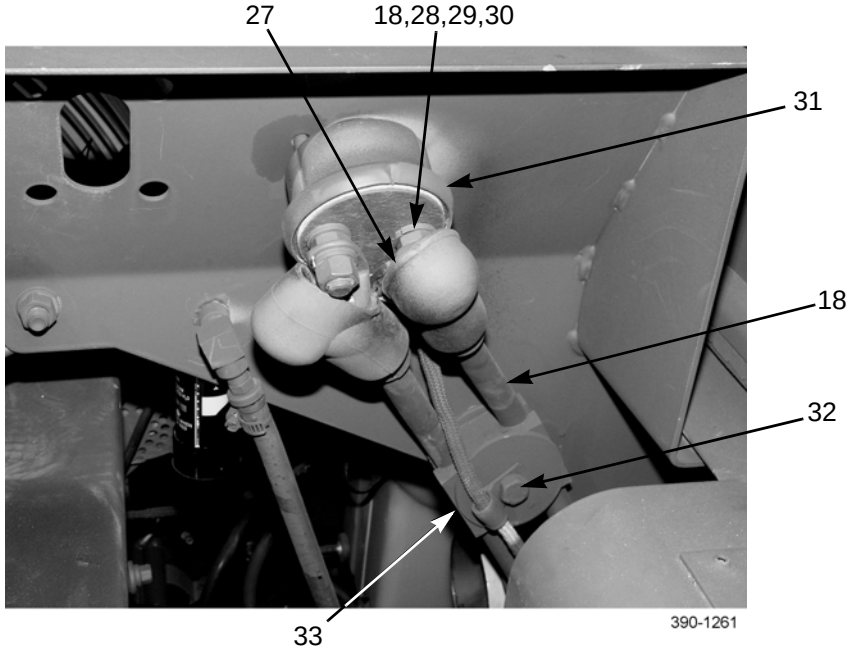


BATTERY CABLES INSTALLATION

1. Position cable (18) in clamp (35).

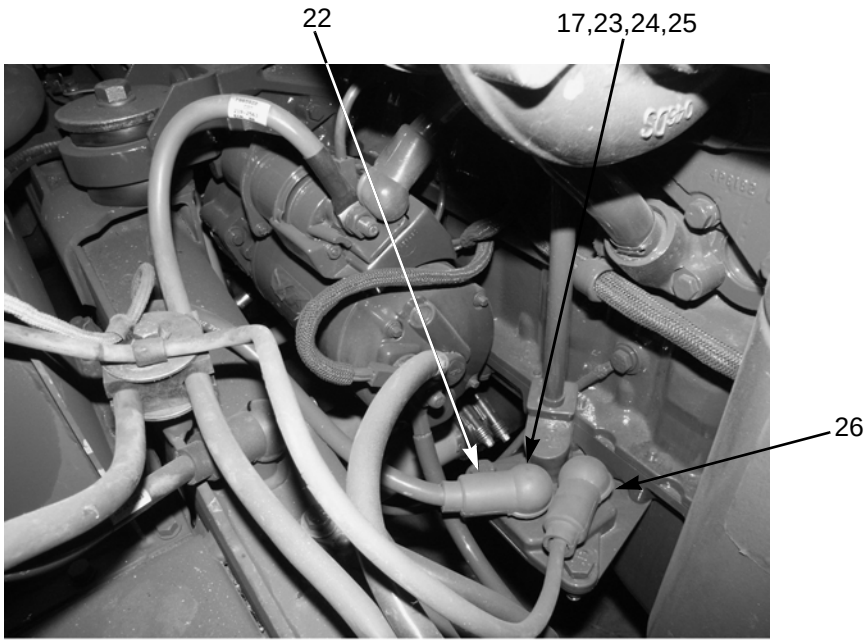


2. Position cable (18) in clamp (33).
3. Install cable (18), washer (29), and nut (28) on terminal (30) of battery disconnect switch (31). Tighten nut.
4. Install boot (27) on terminal (30).
5. Tighten screws (32 and 34).



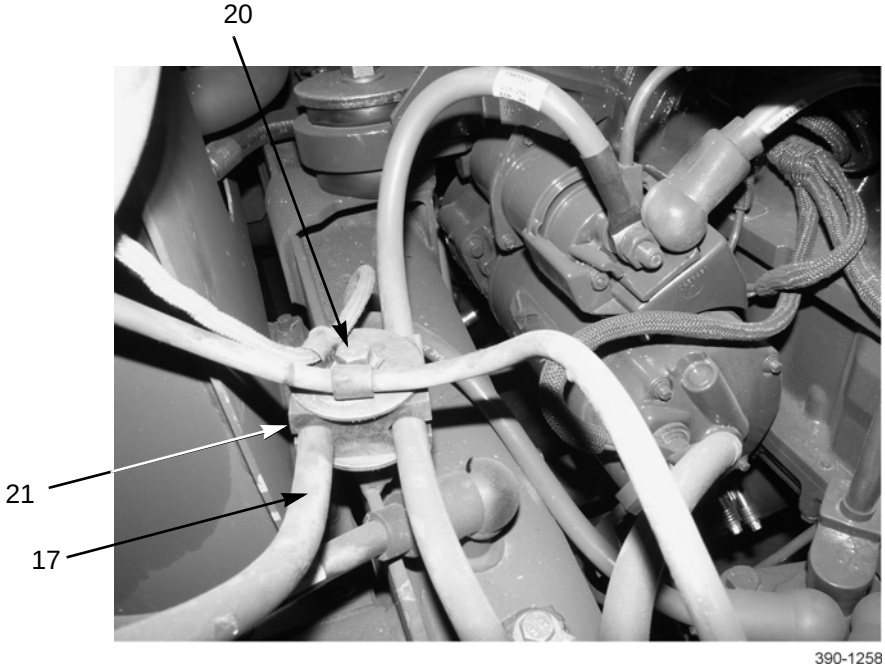
BATTERY CABLES INSTALLATION - CONTINUED

6. Install cable (17), washer (24), and nut (23) on terminal (25) on junction block (26). Tighten nut.
7. Install boot (22) on terminal (25).



390-1259

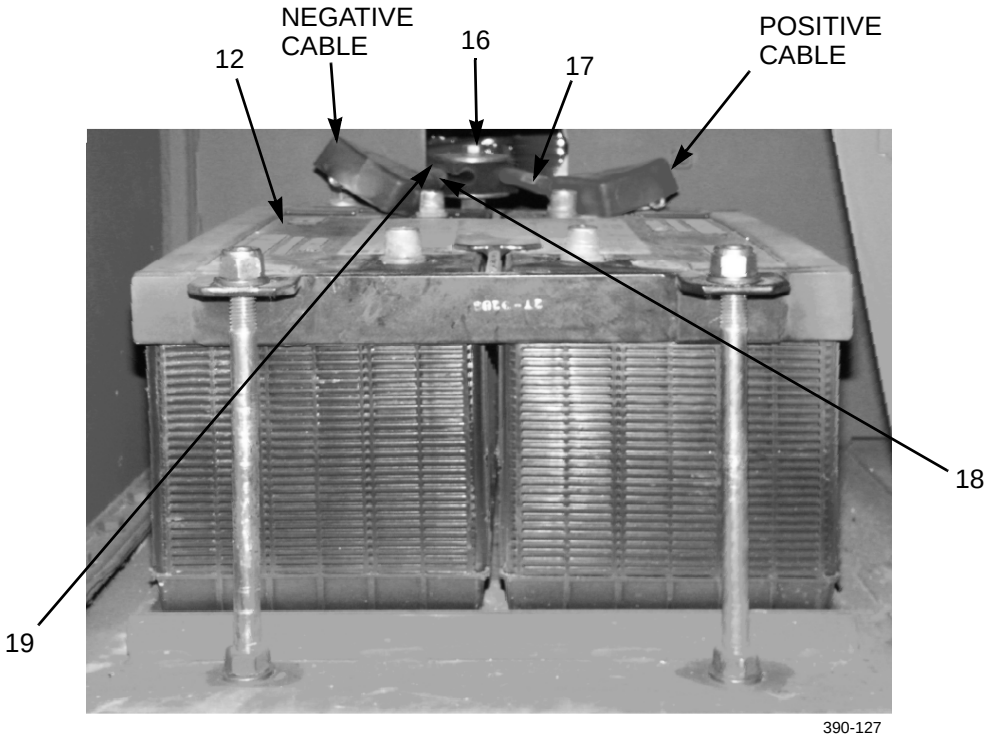
8. Position cable (17) in clamp (21) and tighten screw (20).



390-1258

BATTERY CABLES INSTALLATION - CONTINUED

9. Position cables (17 and 18) in clamp (19). Tighten screw (16).
10. Connect batteries (12) in accordance with steps 4 through 6 of *Batteries Installation*.



END OF WORK PACKAGE

SLAVE START RECEPTACLE AND CABLES REPLACEMENT 0068 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Locknut (4)

Lockwasher (2)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

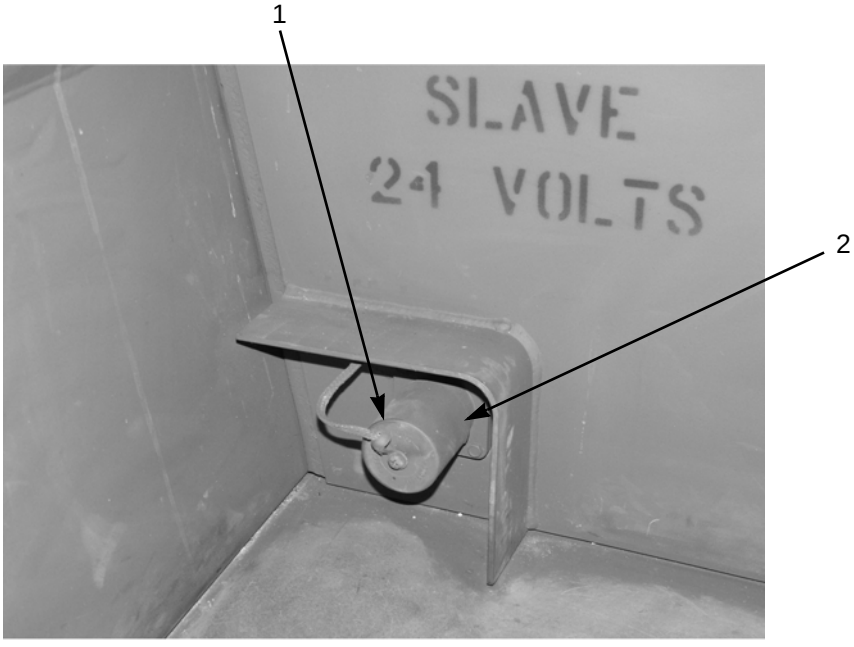
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery cables disconnected (WP 0067 00)

REMOVAL

1. Remove protective cover (1) from slave start receptacle (2).
2. Open engine access door to access back of slave start receptacle (2).



390-1265

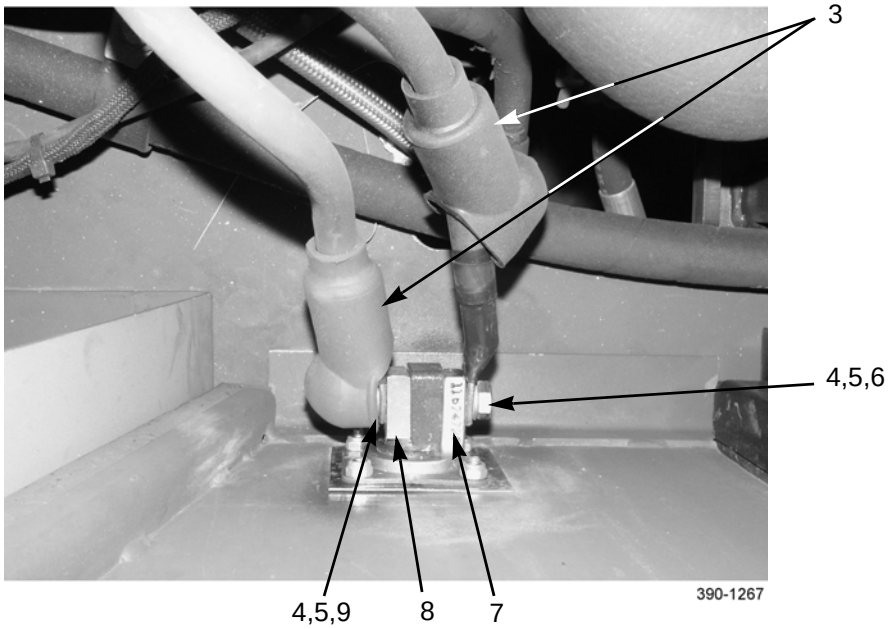
REMOVAL - CONTINUED

3. Remove protective boots (3) from terminals (7 and 8).

NOTE

Tag all cables to aid in installation.

4. Remove screw (4), lockwasher (5), and negative cable (6) from terminal (7). Discard lockwasher.
5. Remove other screw (4), lockwasher (5) and positive cable (9) from terminal (8). Discard lockwasher.



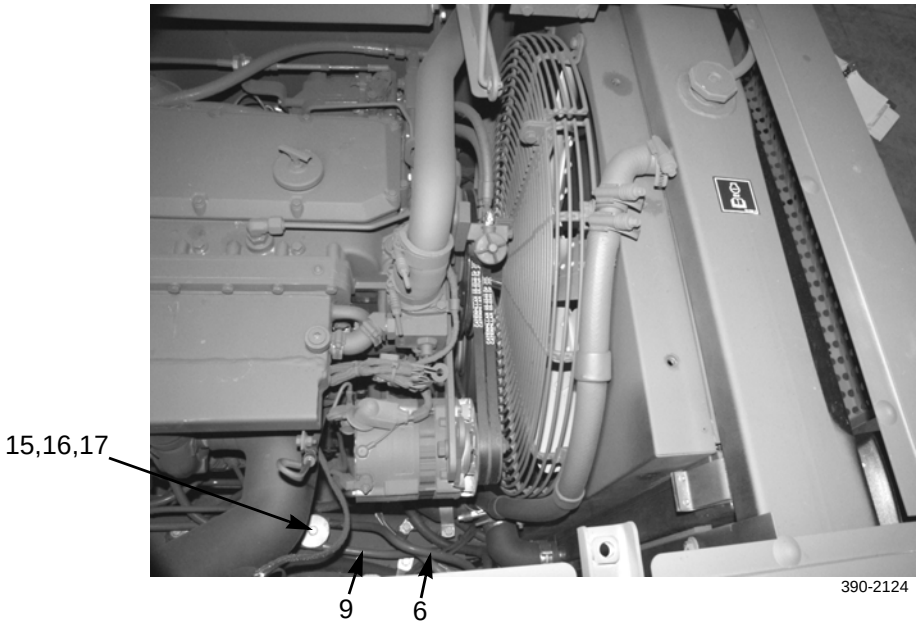
6. Remove four screws (10), washers (11), locknuts (12), and cover strap (13) from slave start receptacle (2). Discard locknuts.
7. With assistance, pull slave start receptacle (2) from bulkhead (14).



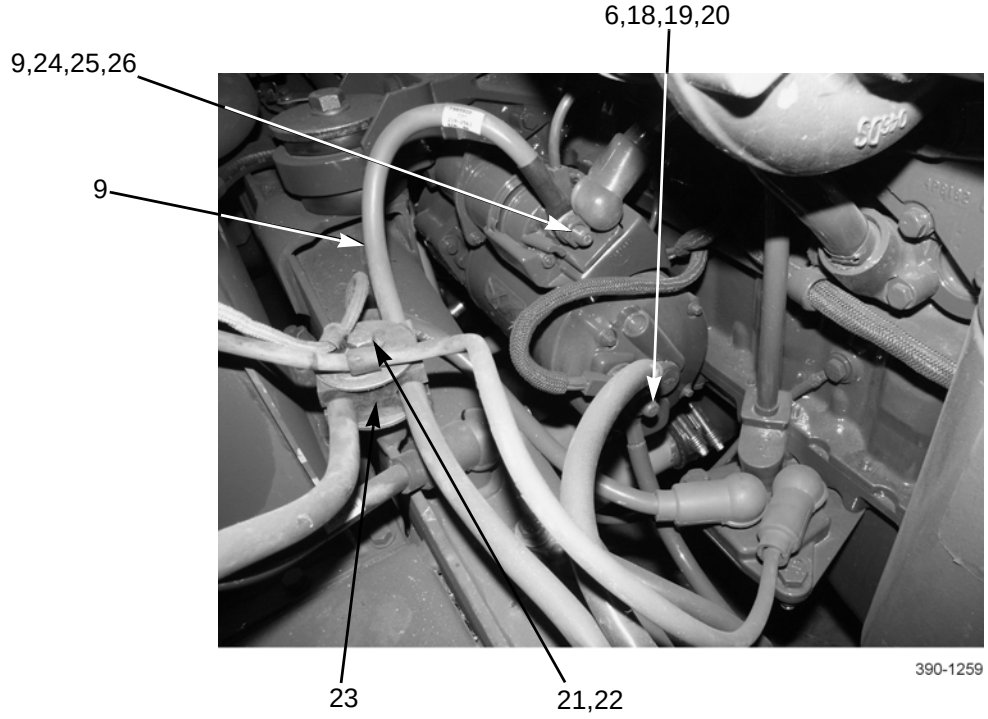
SLAVE START RECEPTACLE AND CABLES REPLACEMENT - CONTINUED 0068 00

REMOVAL - CONTINUED

8. Loosen but do not remove screw (15) and washer (16) on clamp (17).
9. Pull cables (6 and 9) from clamp (17).

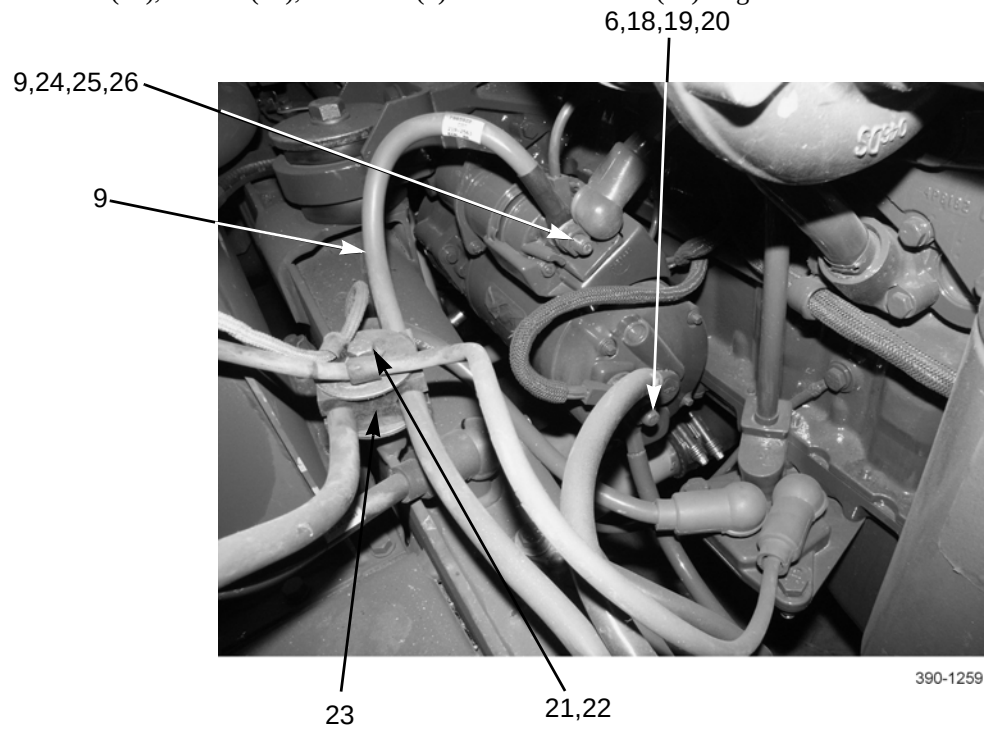


10. Remove nut (18), washer (19), and cable (6) from starter terminal (20).
11. Loosen, but do not remove, screw (21) and washer (22) on clamp (23) and pull cable (9) from clamp.
12. Remove nut (24), washer (25), and cable (9) from starter terminal (26).

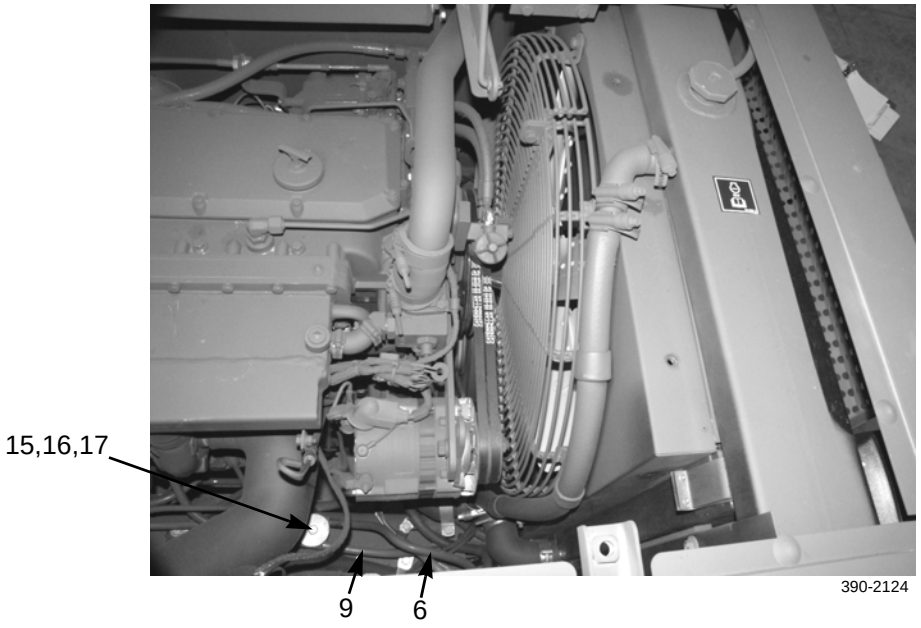


INSTALLATION

1. Install nut (24), washer (25), and cable (9) on starter terminal (26). Tighten nut.
2. Position cable (9) in clamp (23) and tighten screw (21) and washer (22).
3. Install nut (18), washer (19), and cable (6) on starter terminal (20). Tighten nut.



4. Position cables (6 and 9) in clamp (17).
5. Tighten screw (15) and washer (16) on clamp (17).



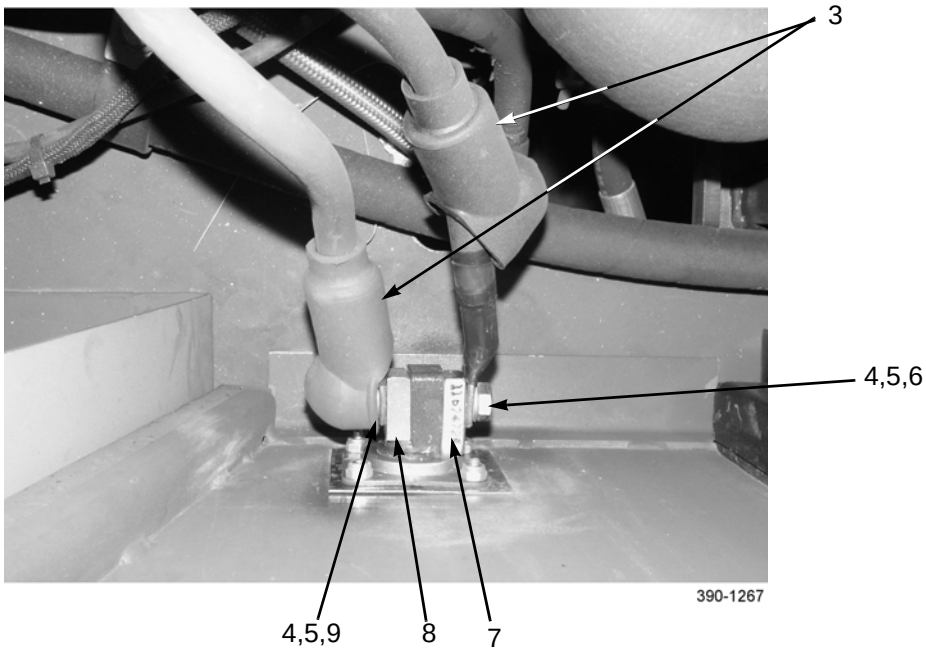
SLAVE START RECEPTACLE AND CABLES REPLACEMENT - CONTINUED 0068 00

INSTALLATION - CONTINUED

6. Position slave start receptacle (2) on bulkhead (14).
7. Install four screws (10), washers (11), new locknuts (12), and cover strap (13) to secure slave start receptacle (2).

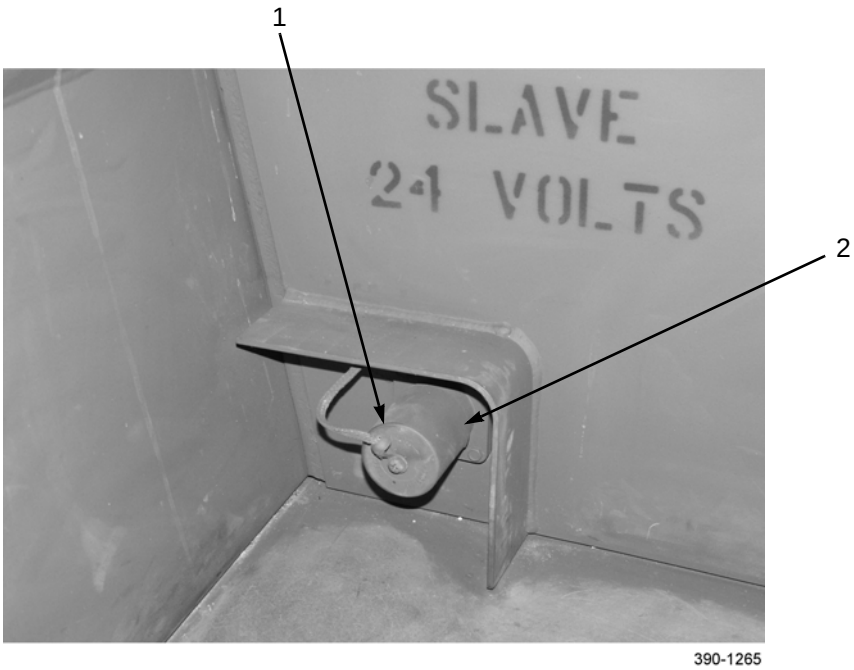


8. Install screw (4), new lockwasher (5), and positive cable (9) on terminal (8).
9. Install other screw (4), new lockwasher (5), and negative cable (6) on terminal (7).
10. Install protective boots (3) on terminals (7 and 8).



INSTALLATION - CONTINUED

11. Install protective cover (1) on slave start receptacle (2).



12. Connect battery cables (WP 0067 00).
13. Close engine access door.

END OF WORK PACKAGE

TRANSMISSION SHIFT CONTROL CABLE REPLACEMENT 0069 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Sealant, silicone (Item 35, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Gasket

Pin, cotter

Pin, spring (3)

Materials/Parts - Continued

Washer, seal

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

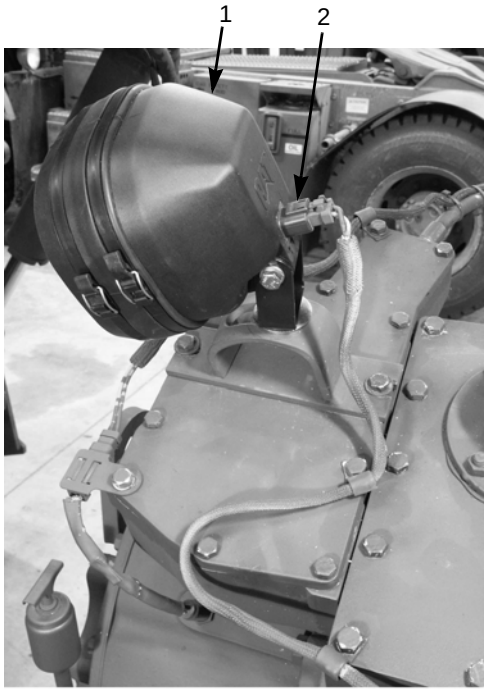
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Disconnect wiring harness connector (2) from work light (1).



390-1720

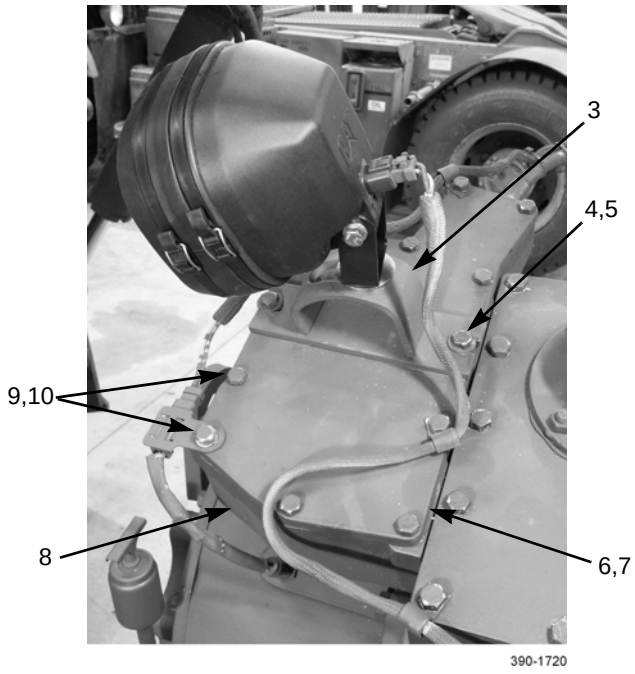
REMOVAL - CONTINUED

2. Remove two screws (4), washers (5), and work light bracket (3), with work light (1), from cover (6).

NOTE

Three cable clamps, washers, and one cable connector holder are also removed as transmission cover is removed. Note position of clamps, washers, and cable connector holder to aid in installation.

3. Remove 10 screws (9), four washers (10), cover (6), and gasket (7) from linkage housing (8). Discard gasket.



4. Remove screw (21), washer (22), and bearing (18) from cam (20).

NOTE

Note position of bearing and nut on shift control cable to aid in installation.

5. Remove grease fitting (19), bearing (18), and nut (17) from shift control cable (16).

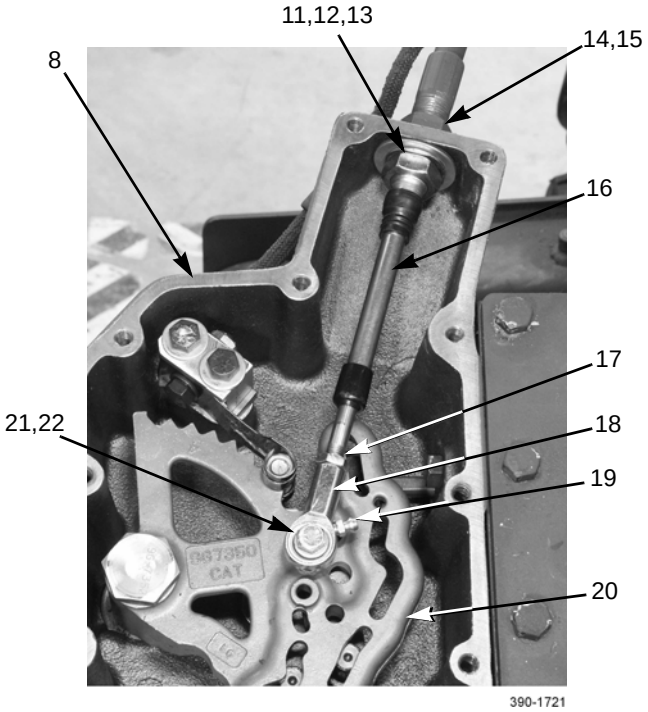
NOTE

Note position of two nuts, washers, and seal washer on shift control cable to aid in installation.

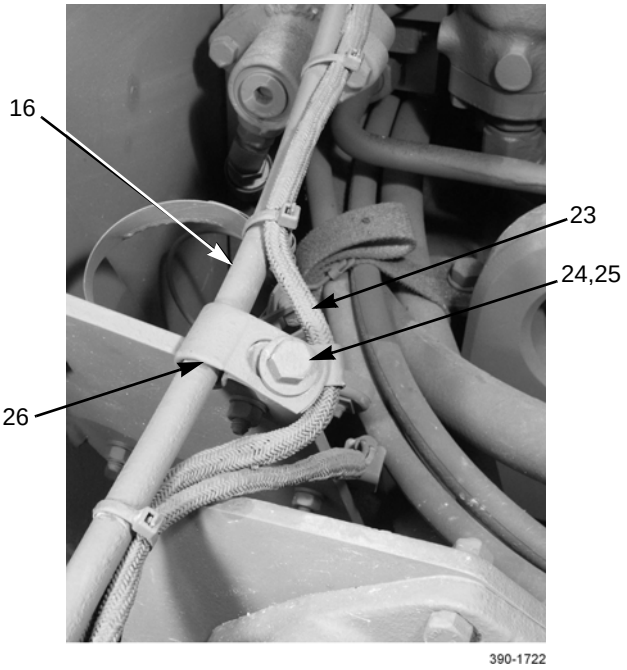
6. Remove nut (11), washer (12), and seal washer (13) from shift control cable (16). Discard seal washer.
7. Pull shift control cable (16) out through hole in linkage housing (8).

REMOVAL - CONTINUED

8. Remove washer (14) and nut (15) from shift control cable (16).

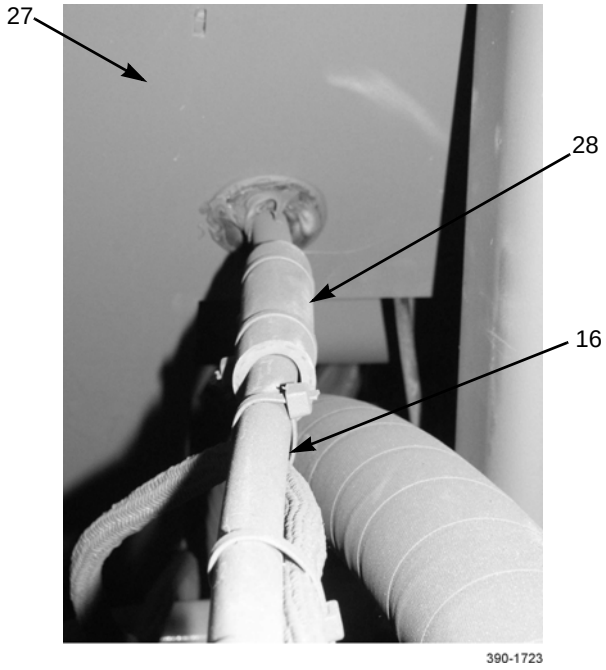


9. Remove two screws (24), washers (25), and clamps (26) holding shift control cable (16) to machine.
10. Remove and discard tiedown straps to separate wiring harness (23) from shift control cable (16).

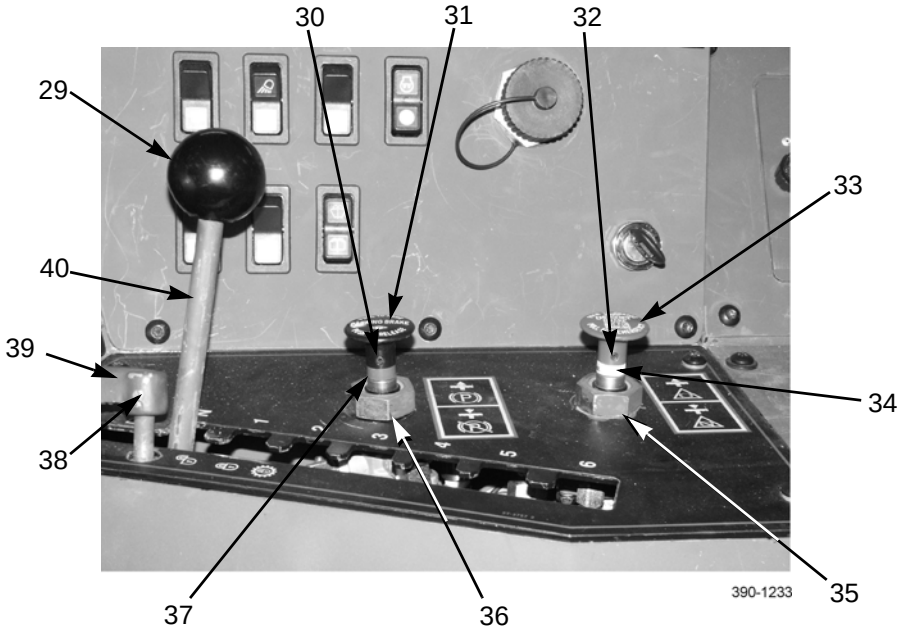


REMOVAL - CONTINUED

11. Remove and discard two tiedown straps and remove insulating sleeve (28) from shift control cable (16).
12. Remove sealant from around shift control cable (16) at rear of cab (27).



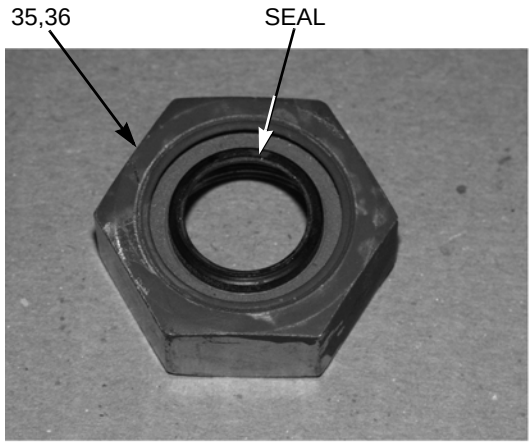
13. Remove spring pin (38) from neutral lock lever (39). Discard spring pin.
14. Remove spring pin (30), parking brake handle (31), and nut (36) from valve (37). Discard spring pin.
15. Remove spring pin (32), emergency brake handle (33), and nut (35) from valve (34). Discard spring pin.
16. Remove knob (29) from transmission shift lever (40).



TRANSMISSION SHIFT CONTROL CABLE REPLACEMENT - CONTINUED 0069 00

REMOVAL - CONTINUED

17. Inspect seal inside nuts (35 and 36) for cracks or damage. Discard nuts if seal is damaged.



390-1234

18. Remove four screws (41) and washers (42) from panel (43).



390-1776

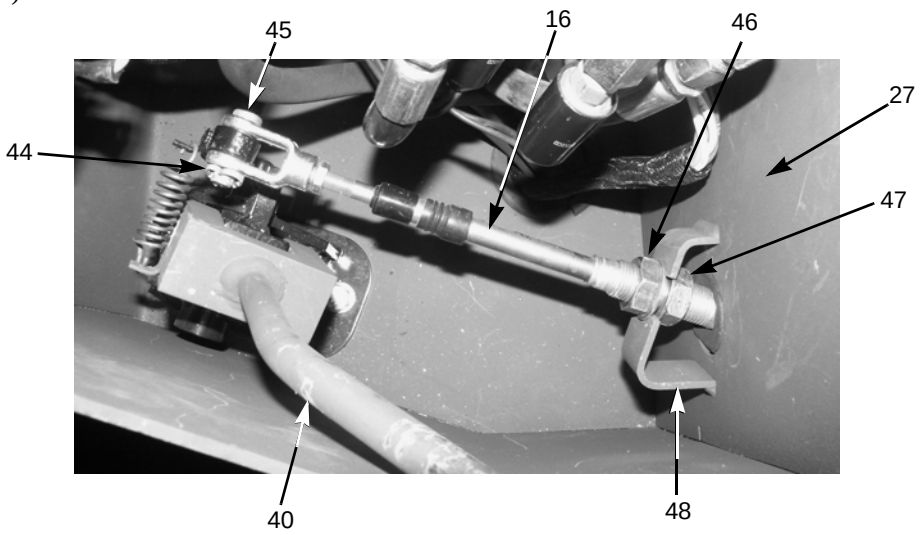
REMOVAL - CONTINUED

19. Remove cotter pin (44), pin (45), and shift control cable (16) from transmission shift lever (40). Discard cotter pin.

NOTE

Note position of two nuts on shift control cable to aid in installation.

20. Loosen two nuts (46 and 47). Lift shift control cable (16) free from bracket (48) and pull shift control cable out from hole in cab (27).



INSTALLATION

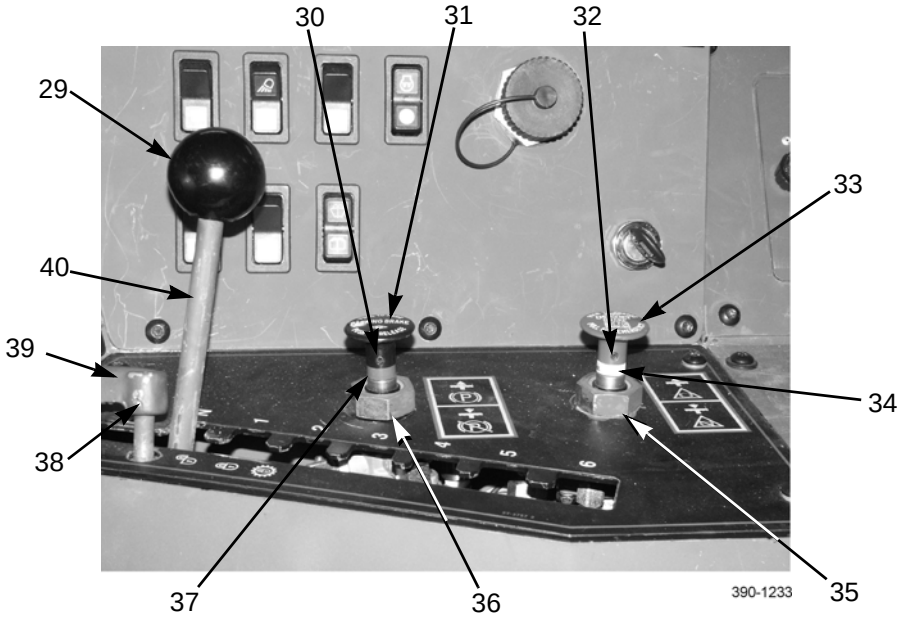
1. Position shift control cable (16) in through hole of cab (27) and position shift control cable to bracket (48). Tighten nuts (46 and 47).
2. Install end of shift control cable (16) on transmission shift lever (40) with pin (45) and new cotter pin (44).
3. Install panel (43) on cab with four washers (42) and screws (41).



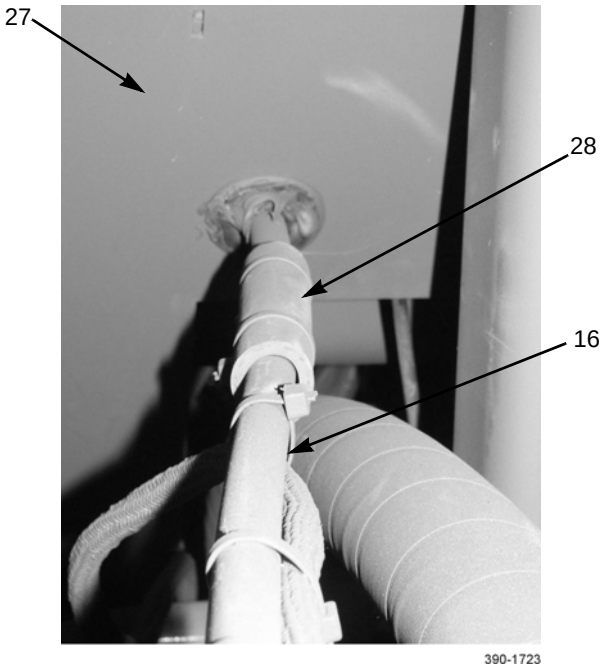
390-1776

INSTALLATION - CONTINUED

4. Install knob (29) on transmission shift lever (40)
5. Install nut (35) on valve (34). Install emergency brake handle (33) on valve with new spring pin (32).
6. Install nut (36) on valve (37). Install parking brake handle (31) on valve with new spring pin (30).
7. Install neutral lock lever (39) with new spring pin (38).

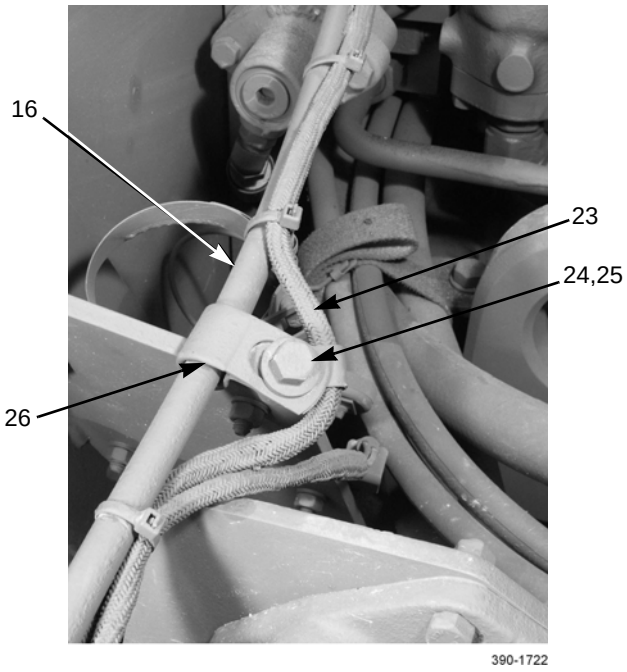


8. Apply sealant around shift control cable (16) at rear of cab (27).
9. Install insulating sleeve (28) to shift control cable (16) with two new tiedown straps.

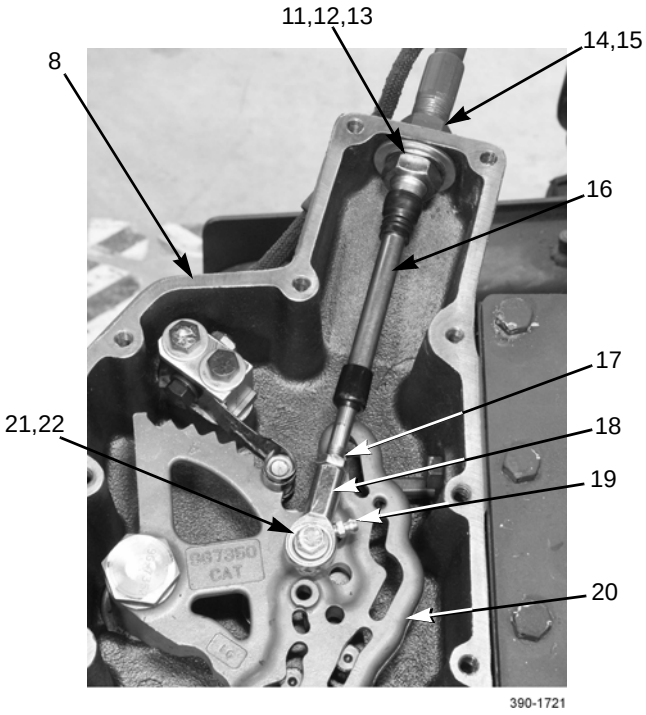


INSTALLATION - CONTINUED

10. Install new tiedown straps to secure wiring harness (23) to shift control cable (16).
11. Install shift control cable (16) to machine with two clamps (26), washers (25), and screws (24).



12. Position washer (14) and nut (15) to shift control cable (16).
13. Push end of shift control cable (16) in through hole in linkage housing (8).
14. Inside linkage housing (8), install new seal washer (13), washer (12), and nut (11).
15. Tighten nuts (11 and 15) against linkage housing (8).
16. Install nut (17) and bearing (18) to end of shift control cable (16). Install grease fitting (19) to bearing.
17. Connect bearing (18) to cam (20) with washer (22) and screw (21). Lubricate bearing with grease.
18. In cab, move transmission shift lever (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) to ensure full range of movement. Adjust shift control cable (16), as required, by positioning nuts (11 and 15). Tighten nuts.

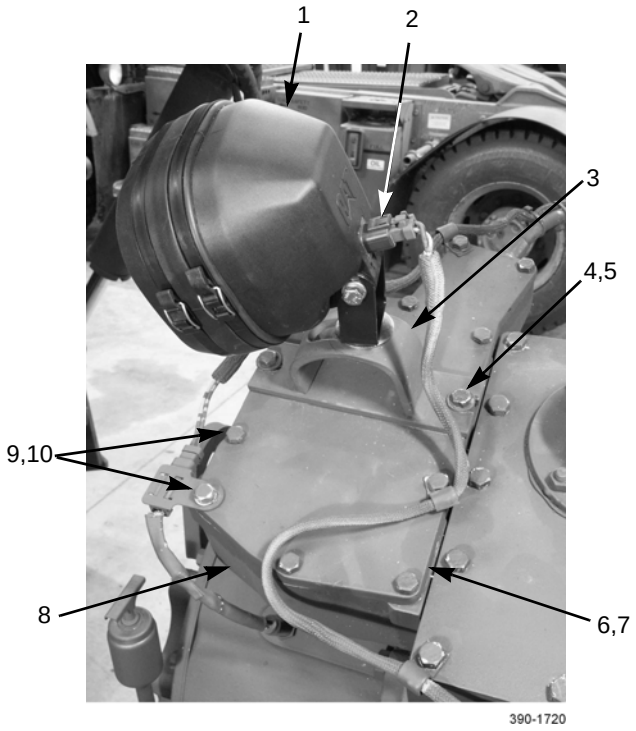


INSTALLATION - CONTINUED

NOTE

Three cable clamps, washers, and one cable connector holder are also installed as cover is installed.

19. Install new gasket (7) and cover (6) on linkage housing (8) with four washers (10) and 10 screws (9).
20. Install work light bracket (3), with work light (1), on cover (6) with two washers (5) and screws (4).
21. Connect wiring harness connector (2) to work light (1).



END OF WORK PACKAGE

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TRANSMISSION SHIFT CONTROL CAM AND LINKAGE REPLACEMENT 0070 00

THIS WORK PACKAGE COVERS

Removal, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Gasket

Materials/Parts - Continued

Locknut (3)

O-ring (4)

Ring, retaining (2)

Equipment Condition

Transmission shift control cable disconnected from transmission (WP 0069 00)

REMOVAL

NOTE

Note position of flat spring assembly and detent notches in cam to aid in installation.

1. Remove locknut (4), bolt (12), washer (13), and flat spring assembly (7) from block (5). Discard locknut.
2. Remove two bolts (2), washers (3), block (5), and spacer block (6) from linkage housing (1).

NOTE

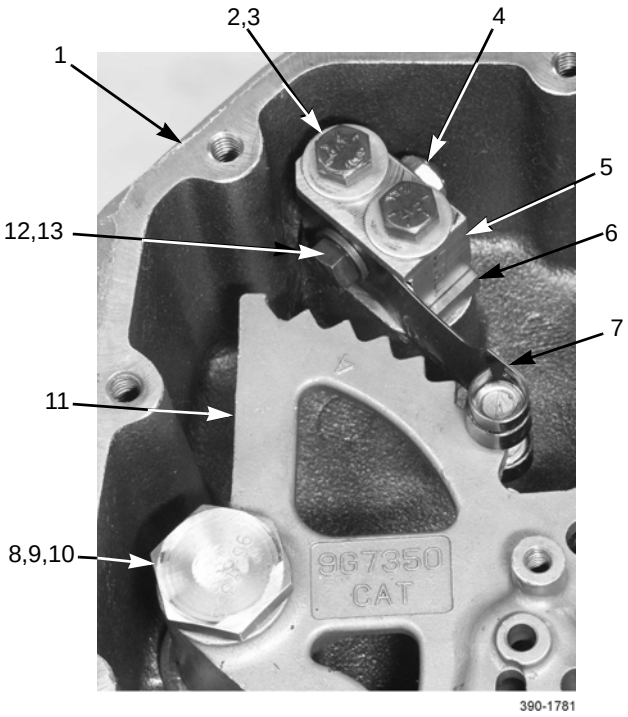
Bolt and washer are located underneath linkage housing.

3. Remove bolt (8), washer (9), and cam pivot pin (10).

NOTE

Note position of two levers and channels of cam as cam is removed.

4. Remove cam (11) from linkage housing (1).

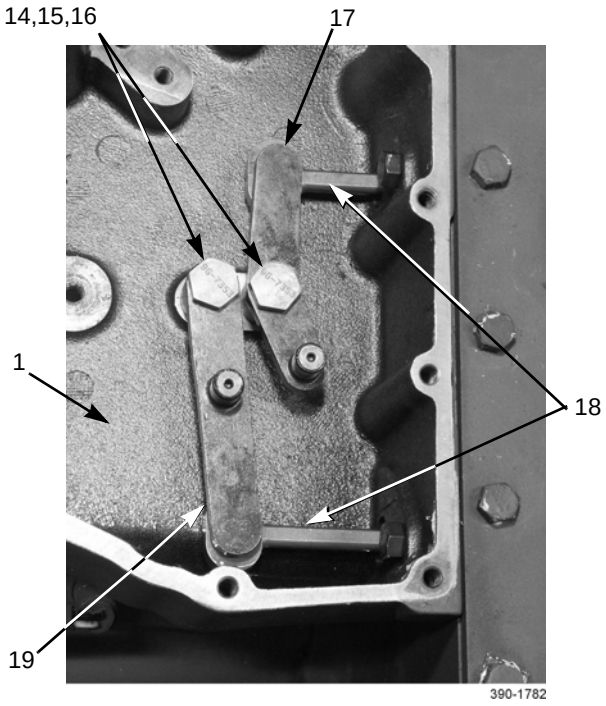


REMOVAL - CONTINUED

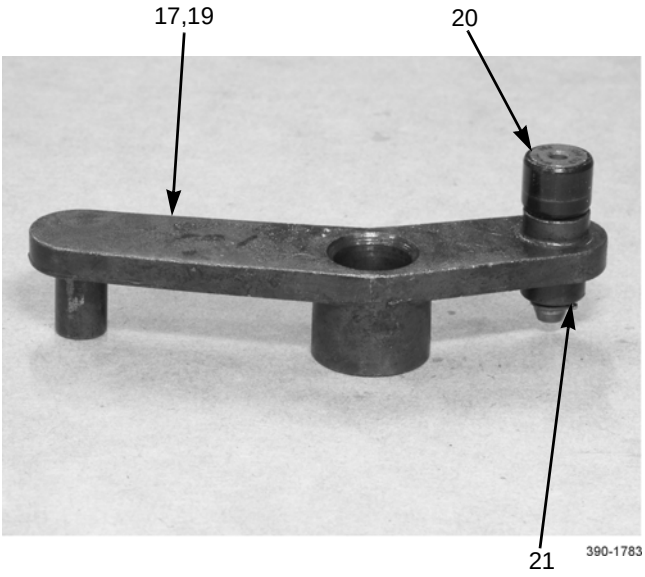
NOTE

Bolts and washers are located underneath linkage housing.

5. Remove two bolts (14), washers (15), lever pivot pins (16), and two levers (17 and 19) from linkage housing (1) and two rods (18).

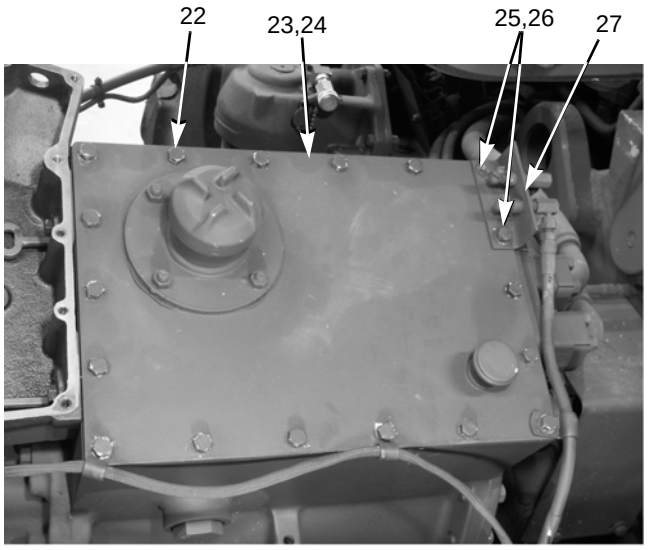


6. Remove retaining ring (21) and cam follower (20) from each of two levers (17 and 19). Discard retaining rings.



REMOVAL - CONTINUED

7. Remove two bolts (25), washers (26), and lube fitting bracket (27) from cover (23). Set bracket aside.



390-1784

NOTE

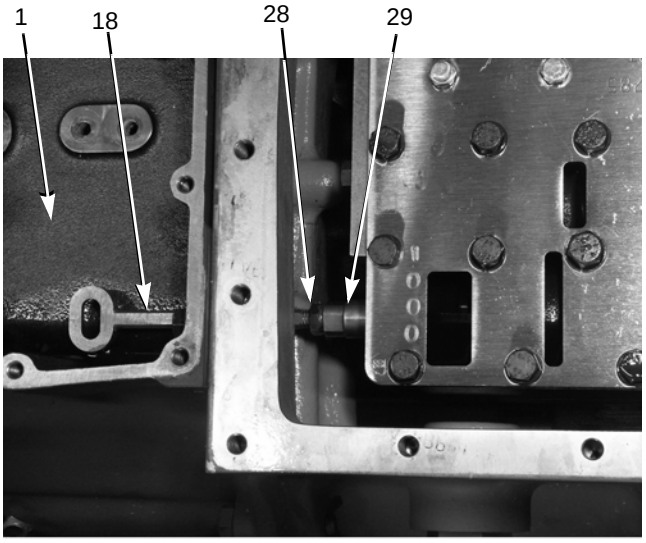
Three cable clamps and wiring harness are also removed as cover is removed.

8. Remove 16 additional bolts (22), cover (23), and gasket (24) from top of control valve housing. Discard gasket.

NOTE

- Perform steps 9 through 12 to remove each of two rods.
- Note position of rod and locknut at each spool to aid in installation.

9. While holding spool (29) from rotating, loosen locknut (28).
10. Rotate spool (29) to separate spool from rod (18).
11. Remove rod (18) from linkage housing (1).
12. Remove locknut (28) from rod (18). Discard locknut.



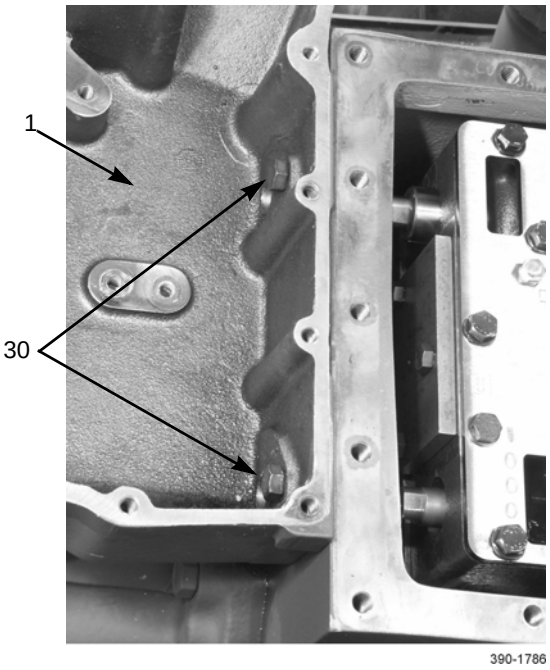
390-1785

REMOVAL - CONTINUED

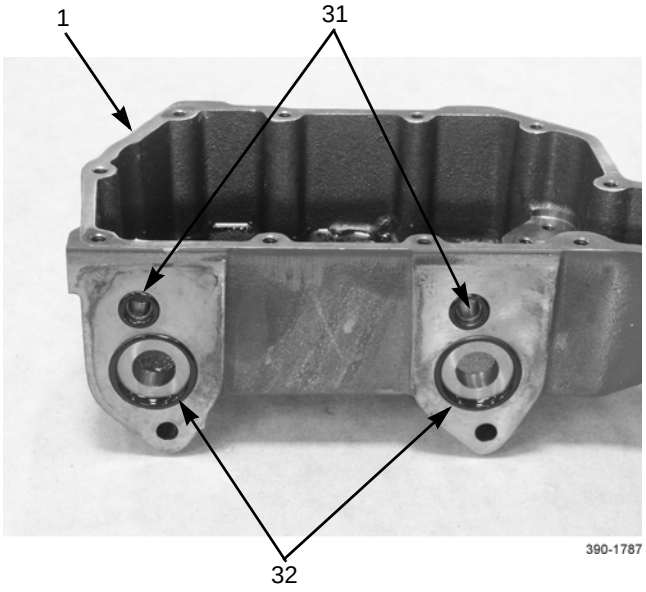
NOTE

Two bolts are located underneath linkage housing.

13. Remove four bolts (30) and linkage housing (1) from control valve housing.



14. Remove two O-rings (31) and two O-rings (32) from linkage housing (1). Discard O-rings.



INSTALLATION

1. Coat with oil and install two new O-rings (32) and two new O-rings (31) to linkage housing (1).

NOTE

Two bolts are installed from under linkage housing.

2. Install linkage housing (1) to control valve housing with four bolts (30).

NOTE

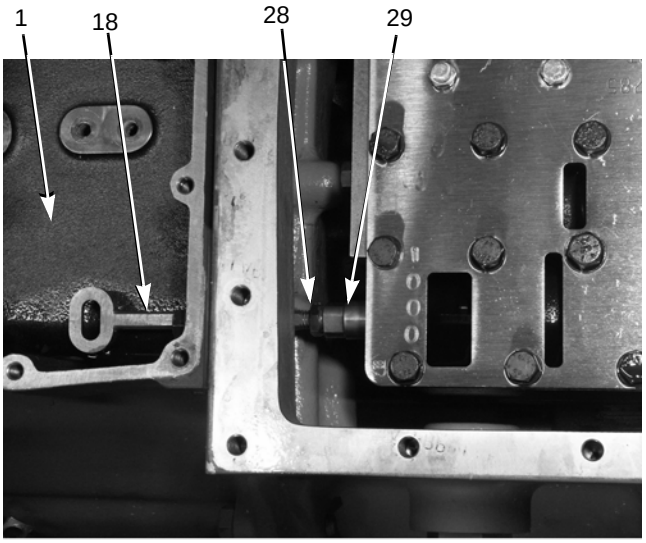
Perform steps 3 through 6 to install each of two rods.

3. Install new locknut (28) to rod (18).
4. Position rod (18) through linkage housing (1).

NOTE

Install rod and locknut in same position as noted during removal.

5. Rotate spool (29) to install spool to rod (18).
6. While holding spool (29) from rotating, tighten locknut (28).

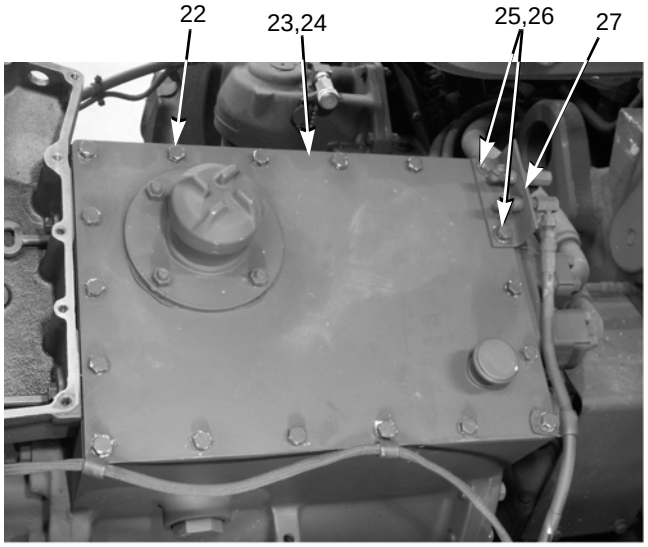


390-1785

NOTE

Wiring harness and three cable clamps are also installed as cover is installed.

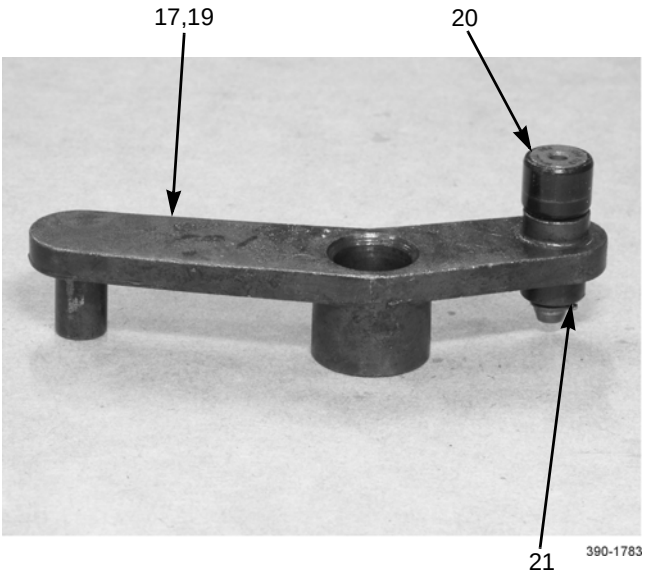
7. Install new gasket (24) and cover (23) to top of control valve housing with 16 bolts (22).
8. Install lube fitting bracket (27) to cover (23) with two additional washers (26) and bolts (25).



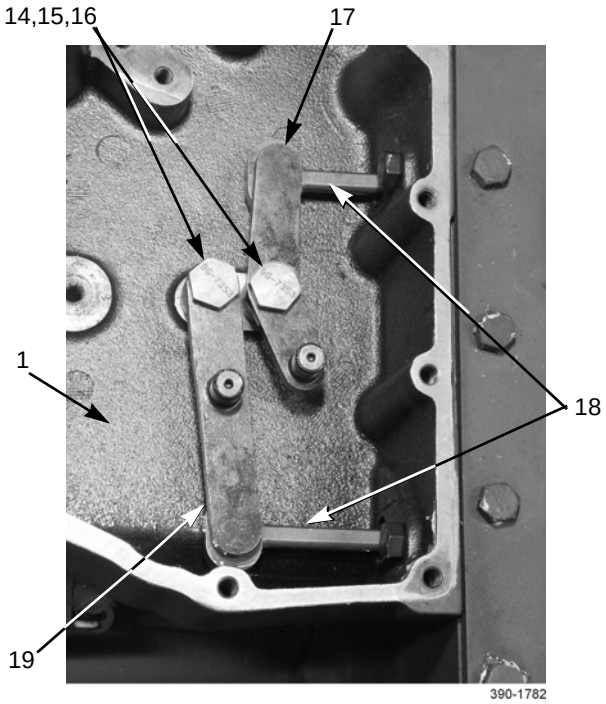
390-1784

INSTALLATION - CONTINUED

9. Install cam follower (20) to each of two levers (17 and 19) with new retaining ring (21).



10. Install two levers (17 and 19) to two rods (18) and linkage housing (1) with two lever pivot pins (16), washers (15), and bolts (14).



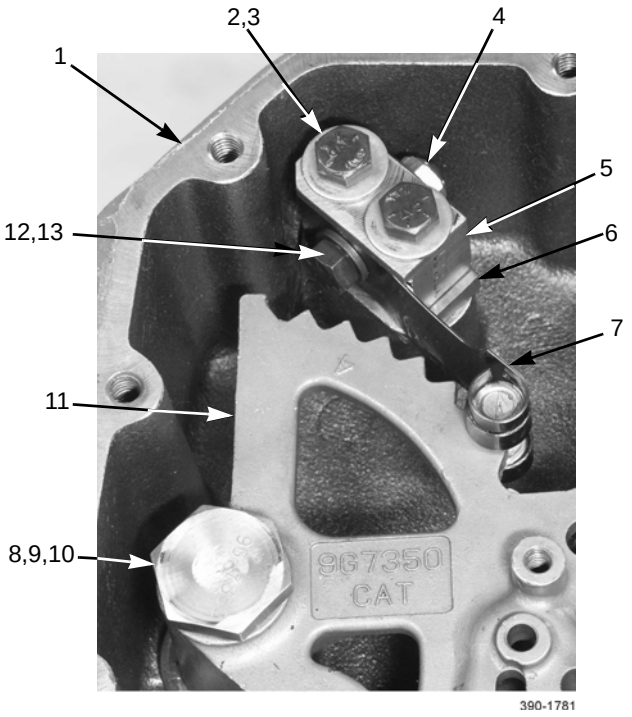
INSTALLATION - CONTINUED

11. Position cam (11) to linkage housing (1).
12. Install cam (11) to linkage housing (1) with cam pivot pin (10), washer (9), and bolt (8).
13. Install spacer block (6) and block (5) to linkage housing (1) with two washers (3) and bolts (2).

NOTE

Install flat spring assembly and detent notches in cam in same position as noted during removal.

14. Install flat spring assembly (7) to block (5) with washer (13), bolt (12), and new locknut (4).
15. Connect transmission shift control cable to transmission (WP 0069 00).



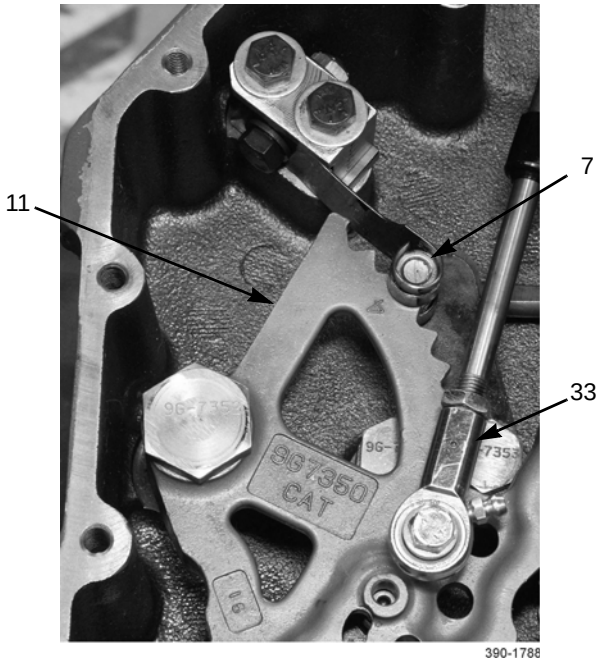
ADJUSTMENT

1. Remove cover from linkage housing (WP 0069 00).
2. Remove cover from control valve housing (Refer to *Removal* steps 7 and 8).
3. In cab, place transmission shift lever in position 4 (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

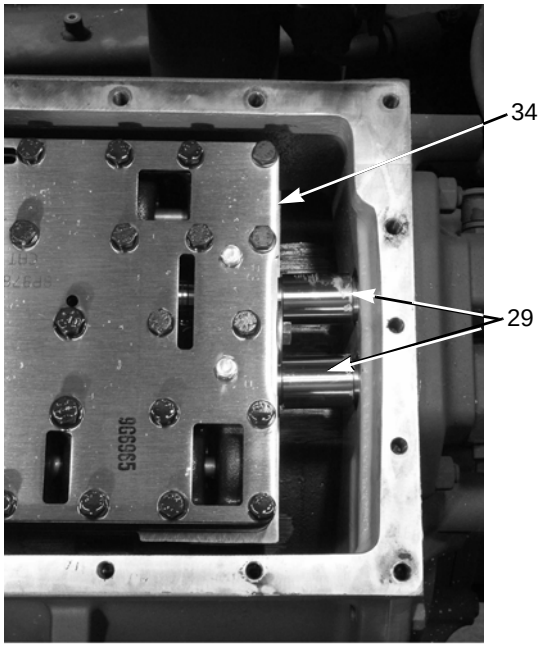
Cam is marked with a number “4”.

4. Confirm that flat spring assembly (7) fully engages detent “4” of cam (11). If not, adjust length of transmission shift control cable (33) (WP 0069 00).



ADJUSTMENT - CONTINUED

5. Ends of two spools (29) should now be flush with front surface (34) of transmission control valve. If not, adjust position of rod in spool (Refer to *Installation* steps 5 and 6).



6. Install cover to control valve housing. (Refer to *Installation* steps 7 and 8).
7. Install cover to linkage housing (WP 0069 00).

END OF WORK PACKAGE

TRANSMISSION SHIFT LEVER AND LOCK REPLACEMENT 0071 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Bushing (3)

Pin, cotter

Pin, spring (3)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

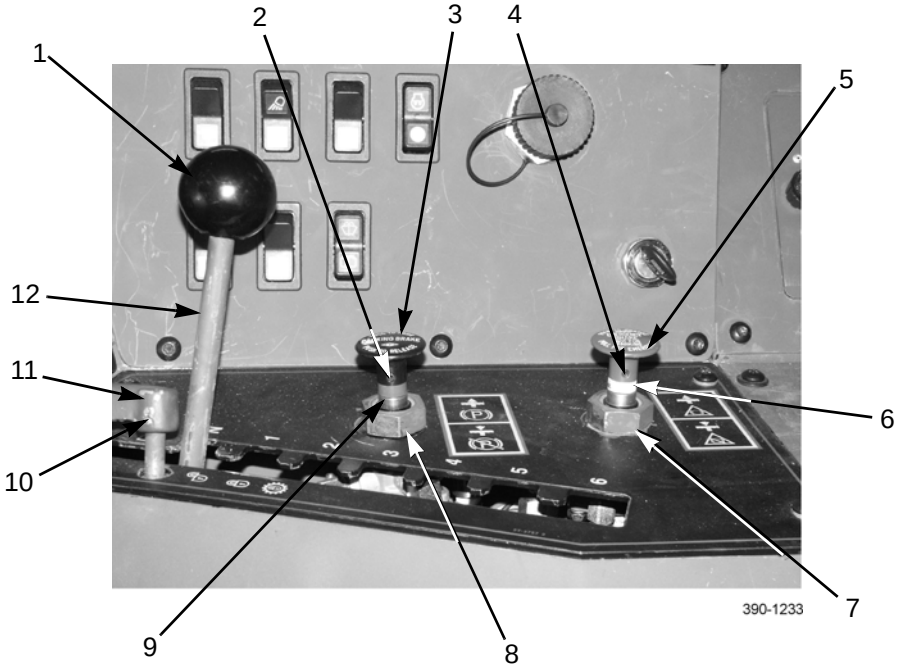
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

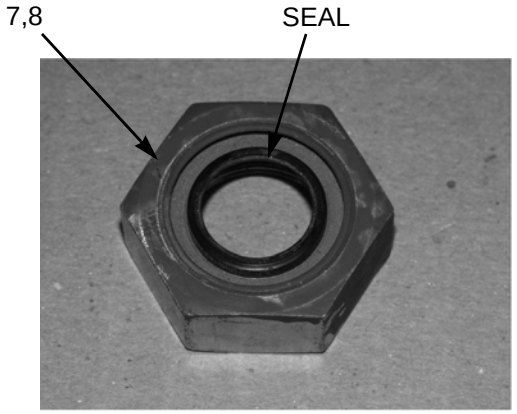
REMOVAL

1. Remove spring pin (10) from neutral lock lever (11). Discard spring pin.
2. Remove spring pin (2), parking brake handle (3), and nut (8) from valve (9). Discard spring pin.
3. Remove spring pin (4), emergency brake handle (5), and nut (7) from valve (6). Discard spring pin.
4. Remove knob (1) from transmission shift lever (12).



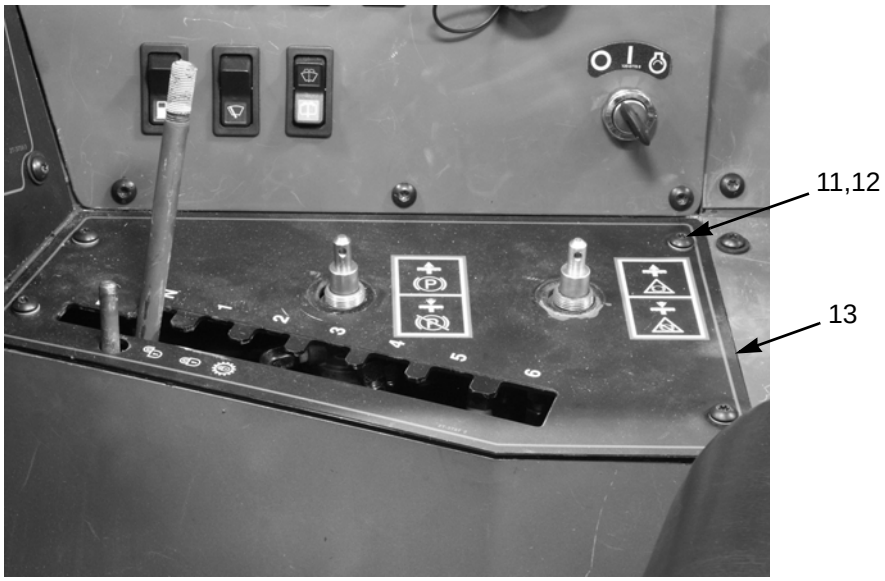
REMOVAL - CONTINUED

5. Inspect seal inside nuts (7 and 8) for cracks or damage. Discard nuts if seal is damaged.



390-1234

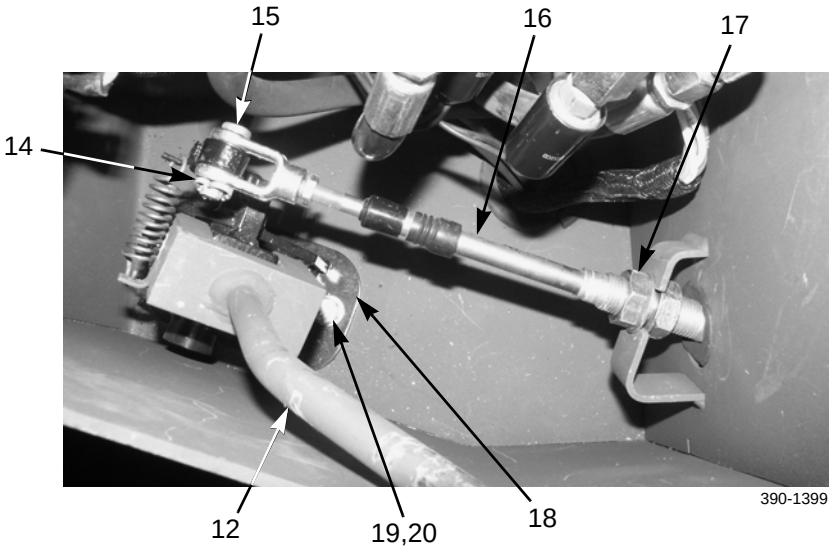
6. Remove four screws (11) and washers (12) from panel (13).



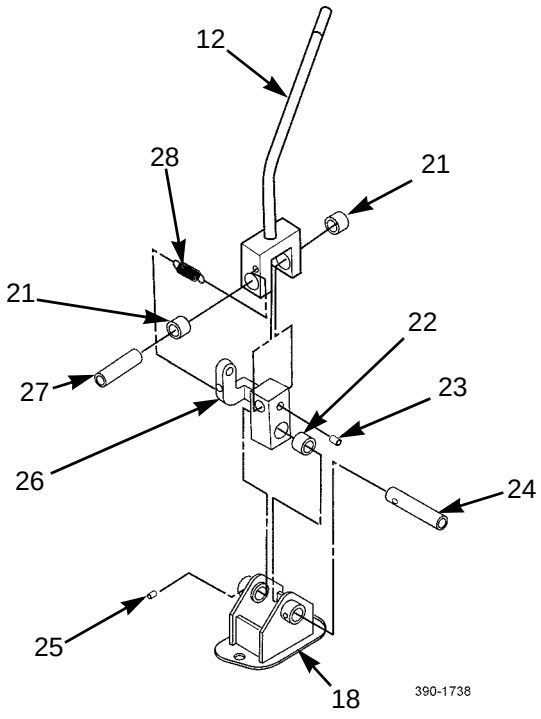
390-1776

REMOVAL - CONTINUED

7. Remove cotter pin (14), pin (15), and shift control cable (16) from shift lever (12). Discard cotter pin.
8. Remove two screws (19) and washers (20) from carrier (18).
9. Loosen nut (17) as required and remove shift lever (12) assembly from cab.



10. Remove spring (28) from shift lever (12) and block (26).
11. Remove setscrew (23), shaft (27), and shift lever (12) from block (26).
12. Remove two bushings (21) from shift lever (12). Discard bushings.
13. Remove setscrew (25), shaft (24), and block (26) from carrier (18).
14. Remove bushing (22) from block (26). Discard bushing.

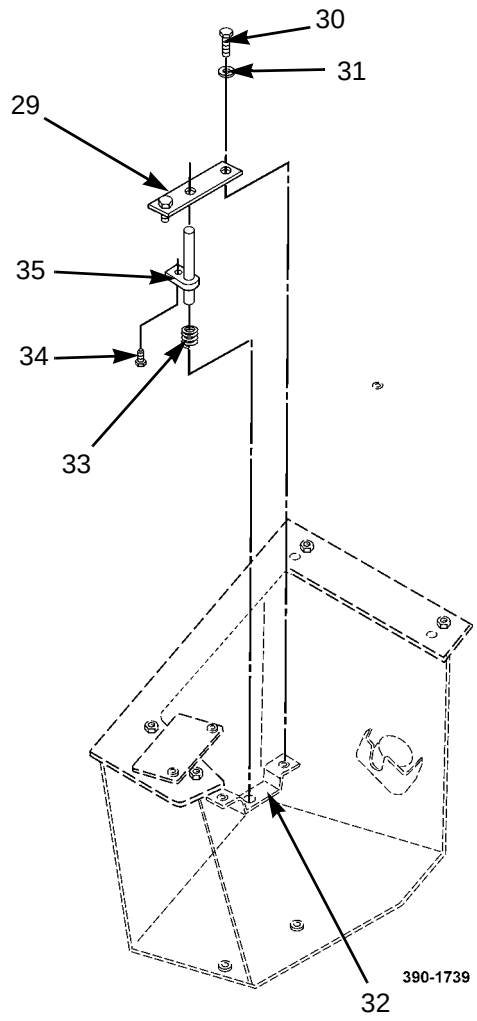


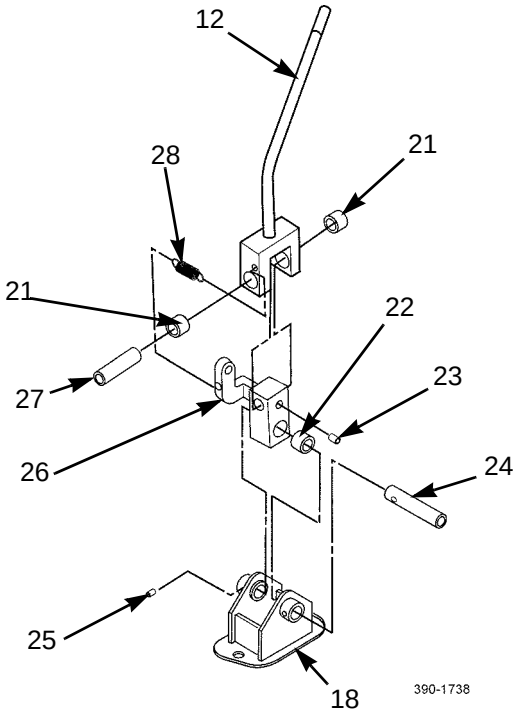
REMOVAL - CONTINUED

15. Remove two screws (30), washers (31), plate (29), lock (35), and spring (33) from bracket (32).
16. Remove two screws (34) from lock (35).

INSTALLATION

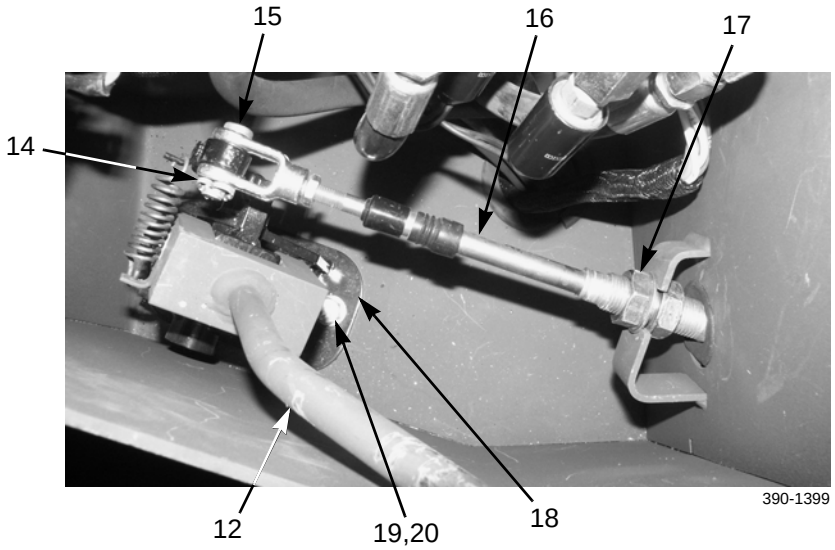
1. Install two screws (34) on lock (35).
2. Install spring (33), lock (35), and plate (29) on bracket (32) with two washers (31) and screws (30).
3. Install new bushing (22) on block (26).
4. Install block (26) on carrier (18) with shaft (24).
5. Install setscrew (25) on carrier (18).
6. Install two new bushings (21) on shift lever (12).
7. Install shaft (27) and shift lever (12) on block (26) with setscrew (23).
8. Install spring (28) on block (26) and shift lever (12).



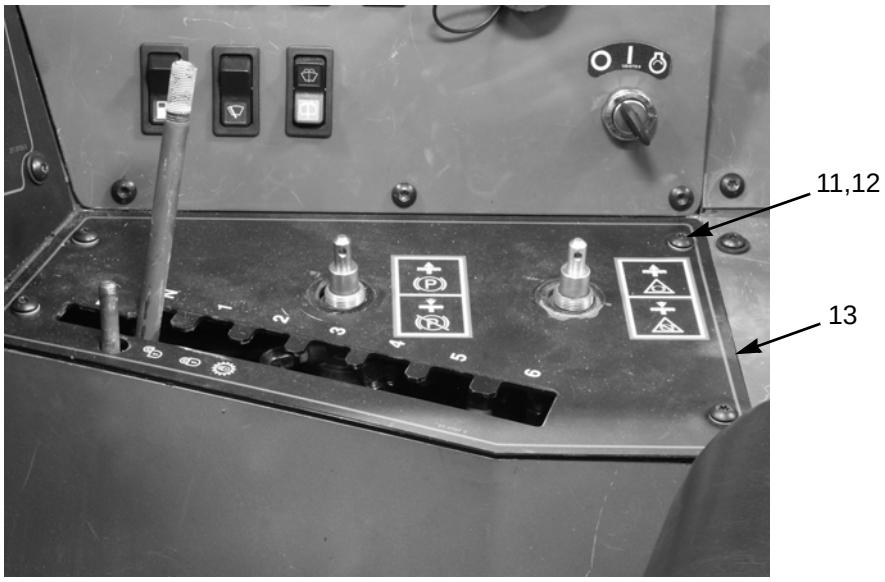


INSTALLATION - CONTINUED

9. Install shift lever (12) assembly on cab with two washers (20) and screws (19).
10. Install shift control cable (16) on shift lever (12) with pin (15) and new cotter pin (14).
11. Tighten nut (17) as required.

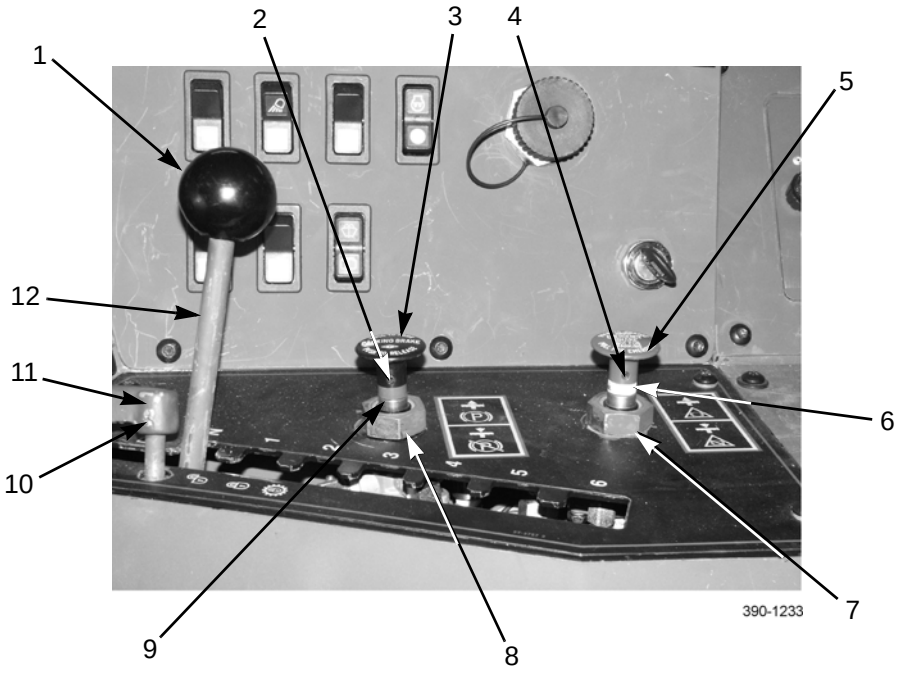


12. Install panel (13) with four washers (12) and screws (11).



INSTALLATION - CONTINUED

13. Install knob (1) on transmission shift lever (12)
14. Install nut (7) on valve (6). Install emergency brake handle (5) on valve with new spring pin (4).
15. Install nut (8) on valve (9). Install parking brake handle (3) on valve with new spring pin (2).
16. Install neutral lock lever (11) with new spring pin (10).



END OF WORK PACKAGE

TRANSMISSION OIL FILTER AND OIL FILTER BASE REPLACEMENT 0072 00

THIS WORK PACKAGE COVERS

Oil Filter: Removal, Installation

Oil Filter Base: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Filter element, fluid

O-ring (3)

Seal

References

WP 0009 00

WP 0010 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

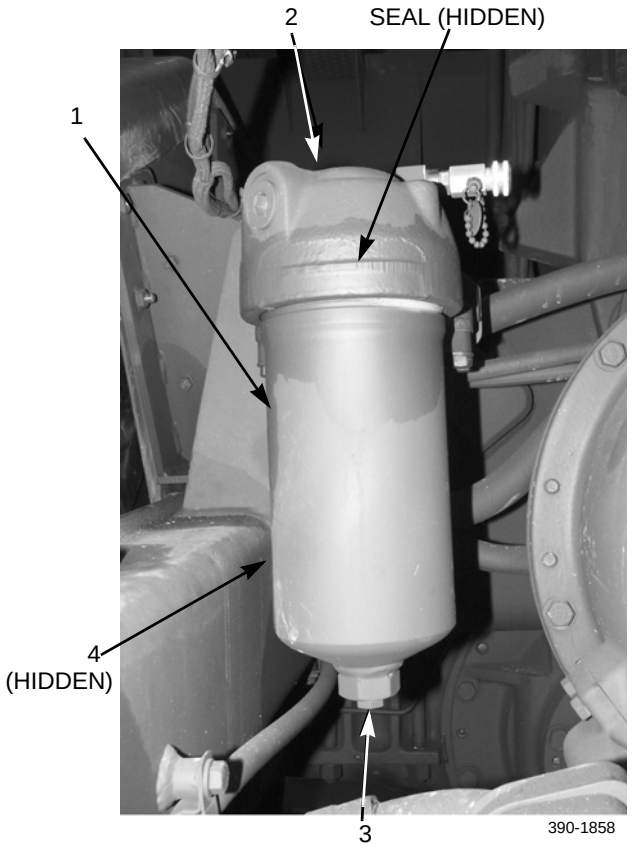
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Transmission fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Cap all lines and openings to prevent fluid loss and contamination of transmission oil.
- Dispose of all fluids according to local regulations and mandates.

OIL FILTER REMOVAL

1. Clean filter base (2) and oil filter body (1).
2. Remove drain plug (3) and O-ring and drain oil from oil filter body (1) into a suitable container. Discard O-ring.
3. Remove oil filter body (1) from filter base (2).
4. Remove and discard filter element (4) from oil filter body (1).
5. Remove seal from filter base (2) and discard.

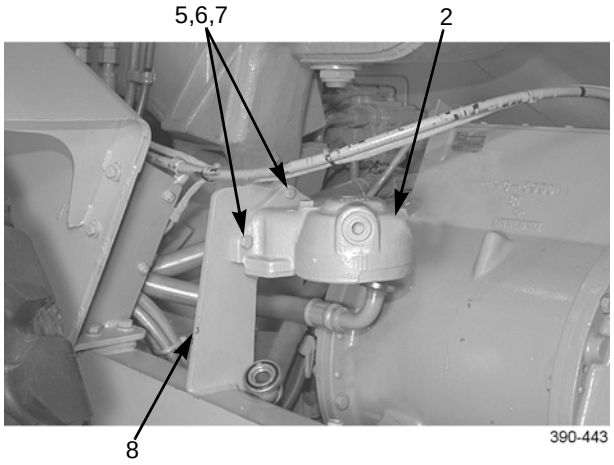


OIL FILTER INSTALLATION

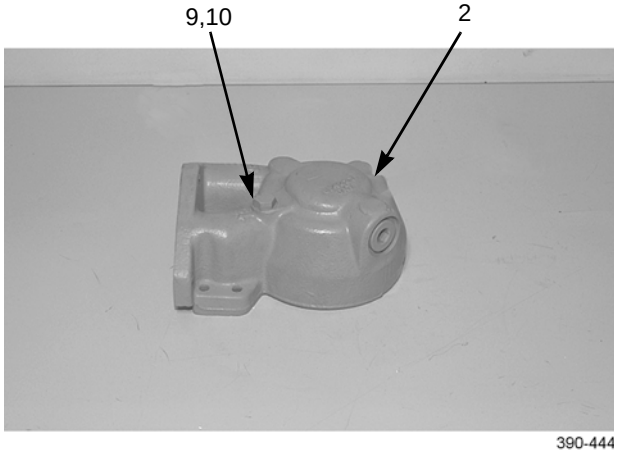
1. Clean inside of oil filter body (1) with a clean rag.
2. Insert new filter element (4) inside oil filter body (1).
3. Coat with oil and install new seal in filter base (2).
4. Install oil filter body (1) to filter base (2).
5. Clean drain plug (3). Coat with oil and install new O-ring and drain plug to oil filter body (1).

OIL FILTER BASE REMOVAL

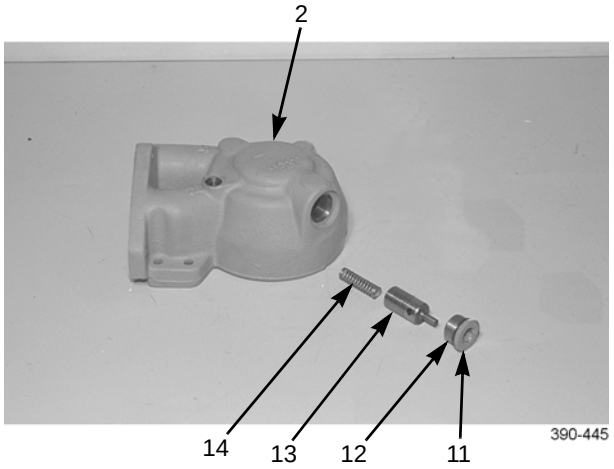
1. Remove transmission oil filter and body from filter base (2) (Refer to *Oil Filter Removal*).
2. Remove two hoses with flange fittings from filter base (2).
3. Remove three nuts (5), washers (6), bolts (7), and filter base (2) from bracket (8).



4. Remove plug (9) and O-ring (10) from filter base (2). Discard O-ring.

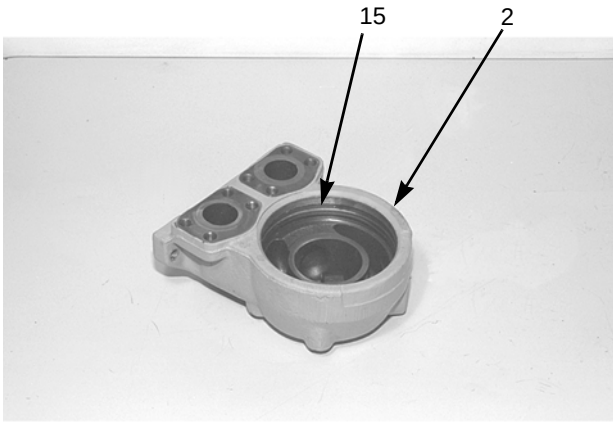


5. Remove plug (11), O-ring (12), spool valve (13), and spring (14) from filter base (2). Discard O-ring.



OIL FILTER BASE REMOVAL - CONTINUED

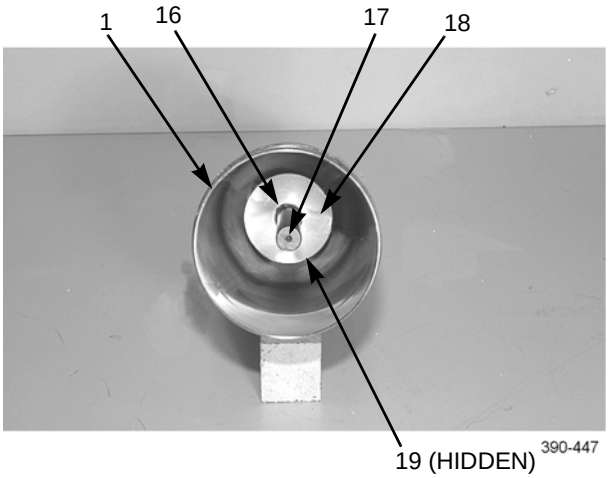
6. If not already removed, remove seal (15) from filter base (2). Discard seal.



WARNING

Sudden release of spring force can cause injury. Wear eye protection and use caution when removing spring, to prevent injury.

7. Remove retaining ring (16) from shaft (17).
8. Remove retainer (18) and spring (19) from oil filter body (1).

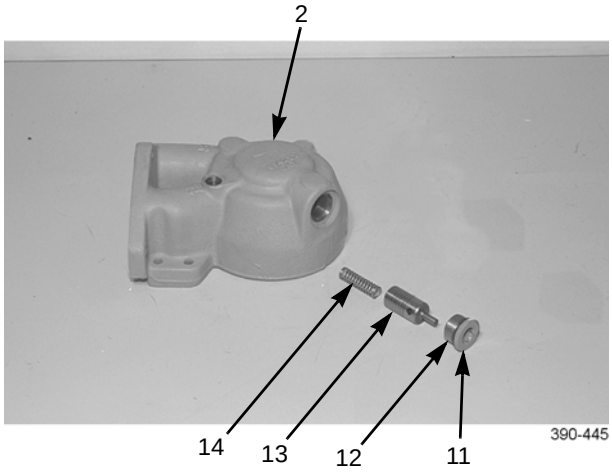


OIL FILTER BASE INSTALLATION

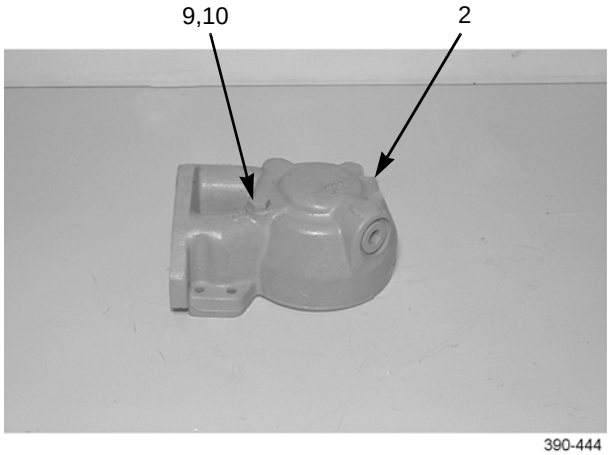
WARNING

Sudden release of spring force can cause injury. Wear eye protection and use caution when installing spring, to prevent injury.

1. Position spring (19) and retainer (18) on oil filter body (1) and install retaining ring (16) on shaft (17).
2. Coat with oil and install new seal (15) on filter base (2).
3. Coat with oil and install spring (14), spool valve (13), new O-ring (12), and plug (11) to filter base (2).

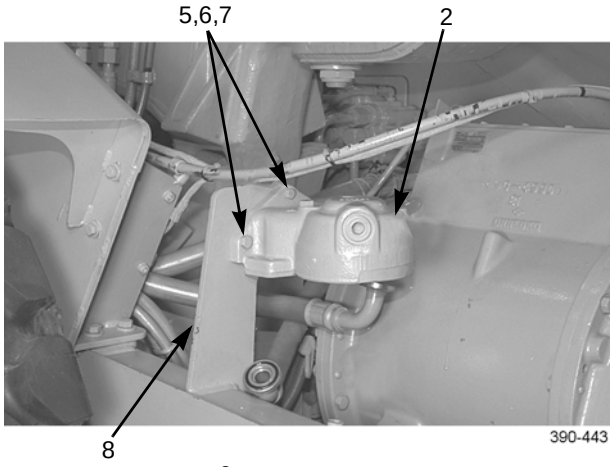


4. Coat with oil and install new O-ring (10) and plug (9) to filter base (2).



OIL FILTER BASE INSTALLATION - CONTINUED

5. Install filter base (2) on bracket (8) with three bolts (7), washers (6), and nuts (5).



6. Install two hoses with flange fittings to filter base (2).
7. Install transmission oil filter and body to filter base (Refer to *Oil Filter Installation*).
8. Check transmission oil level and add as needed (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

TRANSMISSION OIL SAMPLING VALVE REPLACEMENT 0073 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scaper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

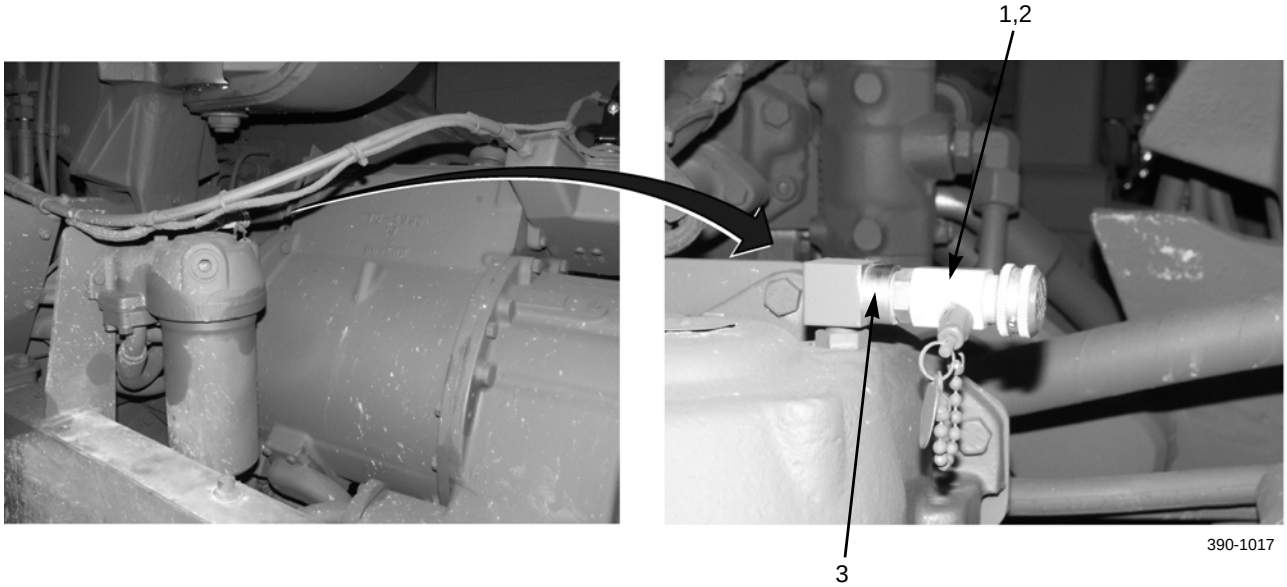
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REPLACEMENT

1. Remove oil sampling valve (1) and O-ring (2) from elbow (3). Discard O-ring.
2. Lightly coat new O-ring (2) with clean oil.
3. Install new O-ring (2) and oil sampling valve (1) to elbow (3).



REPLACEMENT - CONTINUED



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

4. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Move transmission shift lever through all positions. Check for leaks.

END OF WORK PACKAGE

TRANSMISSION OIL COOLER REPLACEMENT 0074 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Seal, O-ring (2)

Personnel Required

Two

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

WP 0009 00

WP 0010 00

Equipment Condition

Engine grille removed (WP 0099 00)

Hydraulic oil cooler removed (WP 0026 00)



WARNING

- At operating temperature, transmission oil is hot. Allow oil to cool before disconnecting any transmission lines. Failure to do so could result in injury.
- Transmission oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

CAUTION

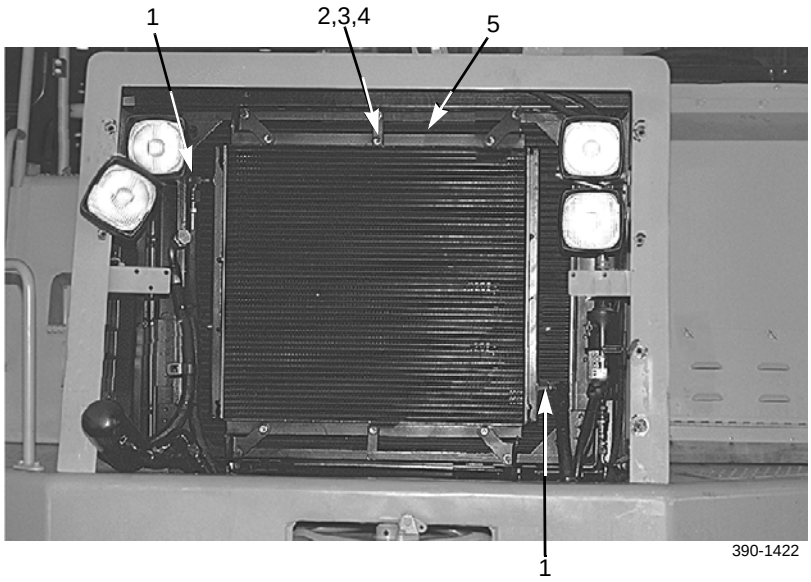
Cap hoses to prevent fluid loss and contamination of system.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses to aid in installation.

REMOVAL

1. Disconnect two hydraulic hose assemblies (1) from transmission oil cooler (5). Remove and discard O-rings from hydraulic hose assemblies.
2. Remove six nuts (2), 12 washers (3), six bolts (4) and transmission oil cooler (5) from radiator.
3. Remove elbows from transmission oil cooler (5).



INSTALLATION

1. Install elbows on transmission oil cooler (5).
2. Install transmission oil cooler (5) on radiator with six bolts (4), 12 washers (3), and six nuts (2).
3. Coat with oil and install new O-rings in two hydraulic hose assemblies (1).
4. Connect two hydraulic hose assemblies (1) to elbows on transmission oil cooler (5).
5. Install hydraulic oil cooler (WP 0026 00).
6. Check transmission oil level and add as needed (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

7. Operate transmission (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for leaks.
8. Install engine grille (WP 0099 00).

END OF WORK PACKAGE

TRANSMISSION OIL SUCTION SCREEN AND TUBE ASSEMBLY (MAGNETIC SCREEN) REPLACEMENT

0075 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

Materials/Parts - Continued

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring seal

References

WP 0009 00

Equipment Condition

Transmission oil drained (WP 0010 00)

WARNING

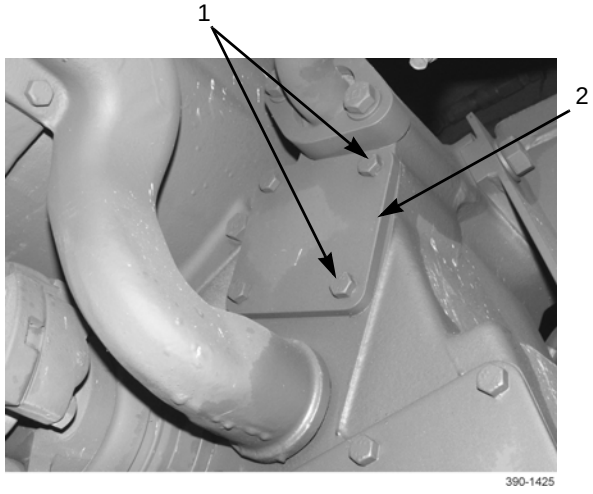
Transmission oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

NOTE

- Care must be taken to ensure that fluids are contained during performance and repair of machine. Collect all fluids with a suitable container before removing transmission cover plate.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

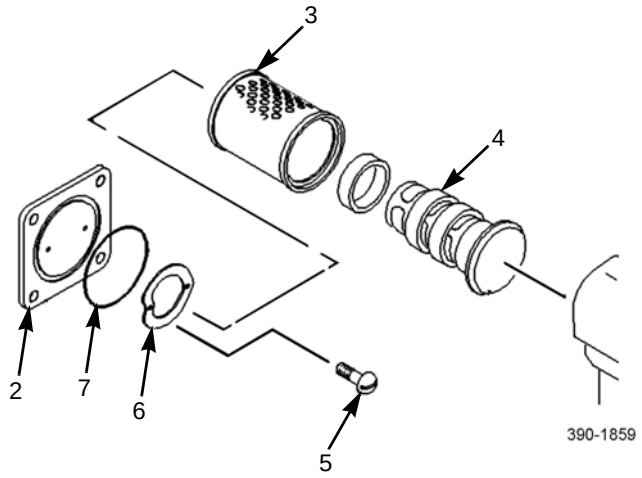
1. Remove four bolts (1) and cover assembly (2).



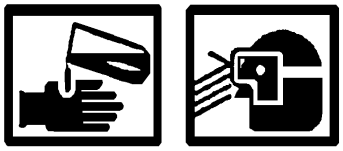
TRANSMISSION OIL SUCTION SCREEN AND TUBE ASSEMBLY (MAGNETIC SCREEN) REPLACEMENT - CONTINUED 0075 00

REMOVAL - CONTINUED

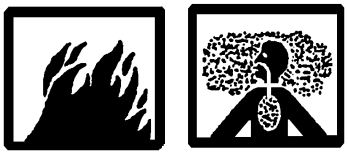
2. Remove and discard O-ring (7) from cover assembly (2).
3. Remove transmission oil suction screen (3) and tube assembly (magnetic screen) (4) from transmission case.
4. Remove two screws (5) and spring washer (6) from cover assembly (2).



CLEANING AND INSPECTION



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. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

CAUTION

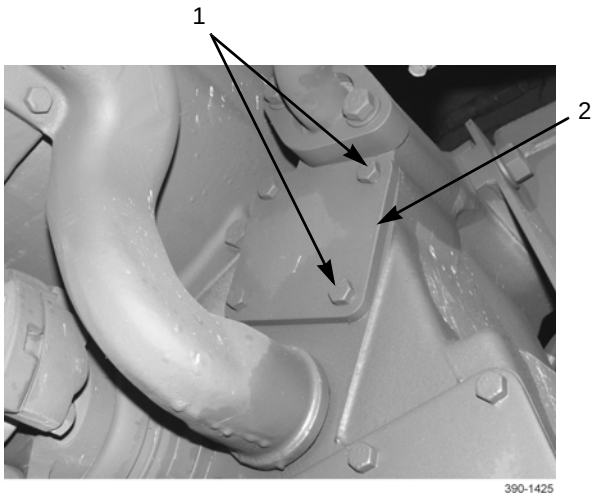
Do NOT rap magnets on hard objects or damage to magnets may result.

1. Clean all removed components in cleaning compound and dry thoroughly.
2. Separate magnets from screen and clean. Use a clean rag or a stiff bristle brush.
3. If magnets are damaged, replace tube assembly (magnetic screen).
4. Replace any other damaged or worn component.

TRANSMISSION OIL SUCTION SCREEN AND TUBE ASSEMBLY (MAGNETIC SCREEN) REPLACEMENT - CONTINUED 0075 00

INSTALLATION

1. Install spring washer (6) to cover assembly (2) with two screws (5).
2. Install transmission tube assembly (magnetic screen) (4) and oil filter screen (3) in transmission case.
3. Coat with oil and install new O-ring (7) on cover assembly (2).
4. Install cover assembly (2) to transmission case with four bolts (1).
5. Fill transmission to proper level (WP 0009 00 and WP 0010 00).



END OF WORK PACKAGE

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LOWER PROP SHAFT MAINTENANCE 0076 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

References

WP 0009 00
WP 0010 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

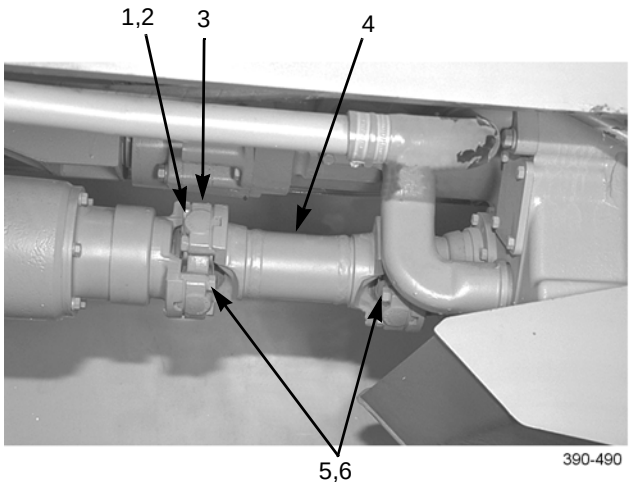
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

Remove eight screws (5), washers (6), and prop shaft (4) with spiders (3) from machine.



DISASSEMBLY

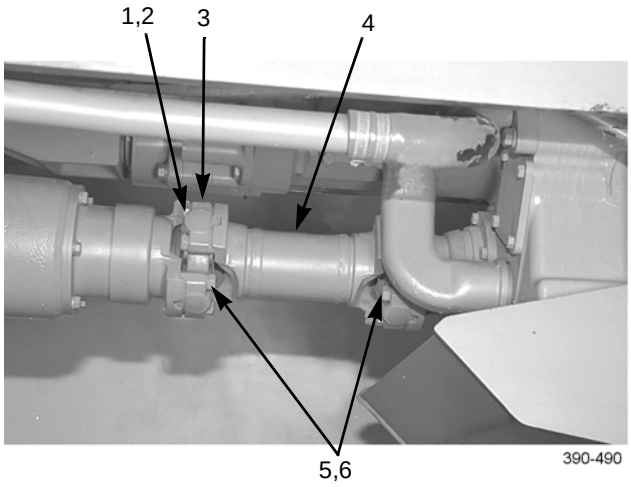
If damaged, remove eight screws (1), washers (2), and two spiders (3) from prop shaft (4).

ASSEMBLY

If removed, install two spiders (3) on prop shaft (4) with eight washers (2) and screws (1).

INSTALLATION

1. Install prop shaft (4) with spiders (3) on machine with eight washers (6) and screws (5). Tighten screws to 100 lb-ft (135 Nm).
2. Lubricate two grease fittings with GAA grease (WP 0009 00 and WP 0010 00).



END OF WORK PACKAGE

FINAL DRIVE MAINTENANCE 0077 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning and Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Bolt, guide (Item 3, WP 0172 00)

Bushing, driver set (Item 7, WP 0172 00)

Link, chain, end (Item 19, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

Personnel Required

Two

Equipment Condition

Front axle shaft removed (WP 0078 00)

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

1. Remove two screws (1) and washers (2) from final drive (3) and wheel assembly. Install two guide bolts (4) into final drive and wheel assembly.
2. Install two chain link ends (5) and attach a nylon sling and suitable lifting device to final drive (3).



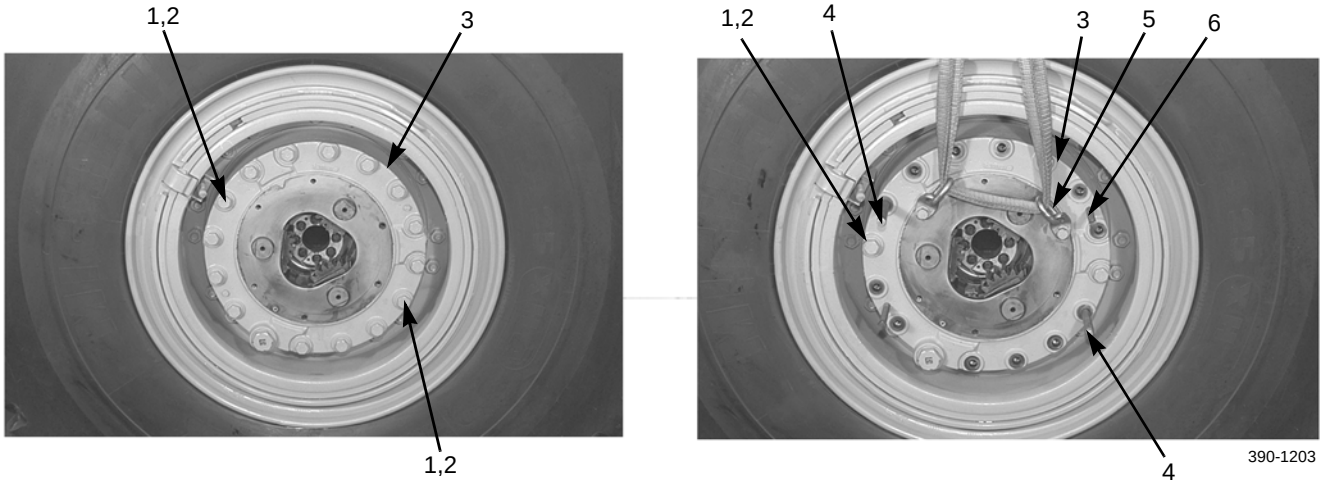
WARNING

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 lift 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

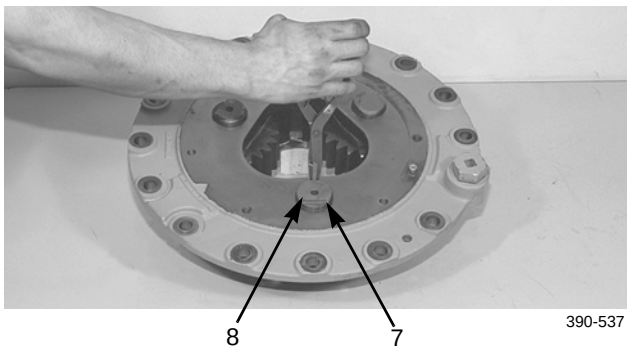
Final drive weighs 93 lb (42 kg).

3. Remove 13 remaining screws (1) and washers (2) and use two forcing screws (6) to remove final drive (3) from wheel assembly.
4. Remove two forcing screws (6).



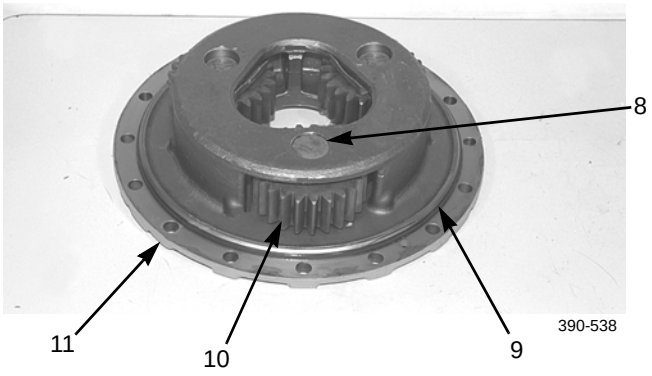
DISASSEMBLY

1. Remove retaining ring (7) from shaft (8).

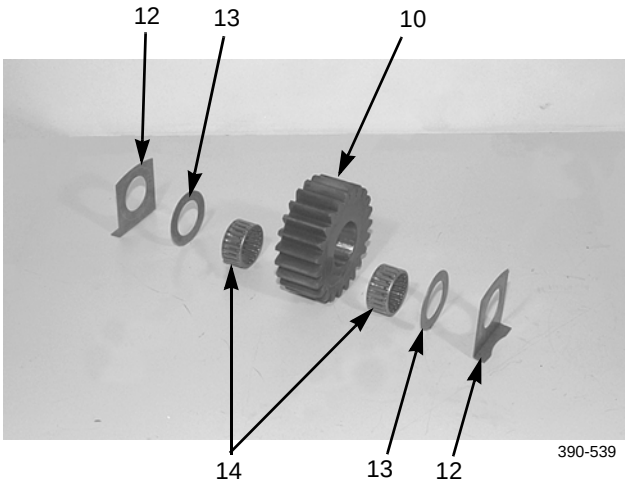


DISASSEMBLY - CONTINUED

2. Remove and discard O-ring (9) from planetary carrier (11).
3. Remove shaft (8) and gear (10) from planetary carrier (11).



4. Remove four thrust washers (12 and 13) and two roller bearings (14) from gear (10).
5. Repeat steps 1 through 4 for other two gears (10).



CLEANING AND INSPECTION



WARNING

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1. Clean all removed components with cleaning compound and dry thoroughly.
2. Inspect all parts. Replace worn or damaged parts.

ASSEMBLY

1. Install two roller bearings (14) and four thrust washers (13 and 12) on gear (10).
2. Install gear (10) in planetary carrier (11) with shaft (8).
3. Install new O-ring (9) on planetary carrier (11).
4. Install retaining ring (7) on shaft (8).
5. Repeat steps 1 through 4 for other gears (10).

INSTALLATION

1. Install two chain link ends (5) and attach a nylon sling and suitable lifting device to final drive (3).

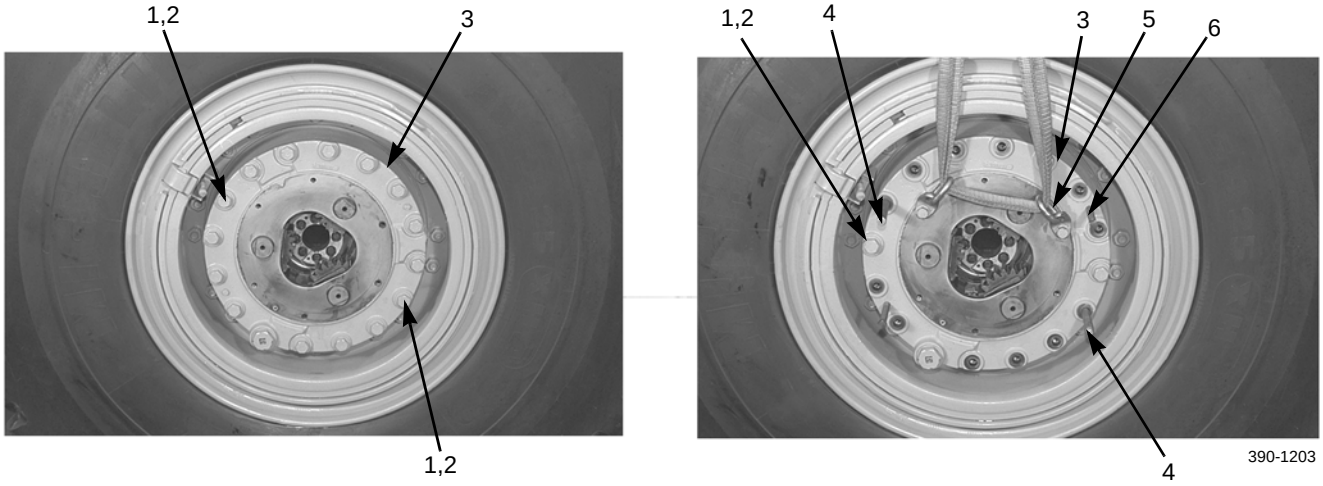
WARNING

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NOTE

Final drive weighs 93 lb (42 kg).

2. Using guide bolts (4), install final drive (3) on wheel assembly with two washers (2) and screws (1).
3. Install 13 remaining washers (2) and screws (1) on final drive (3). Tighten screws to 96 lb-ft (130 Nm), then tighten screws an additional 120°.



4. Install front axle shaft (WP 0078 00).

END OF WORK PACKAGE

FRONT AXLE SHAFTS REPLACEMENT 0078 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

Oil, lubricating (Item 21, 22, or 23, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

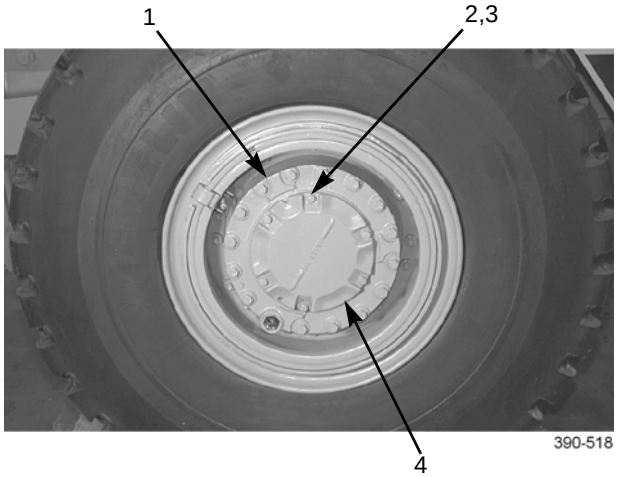
Final drive drained (WP 0010 00)

REMOVAL

NOTE

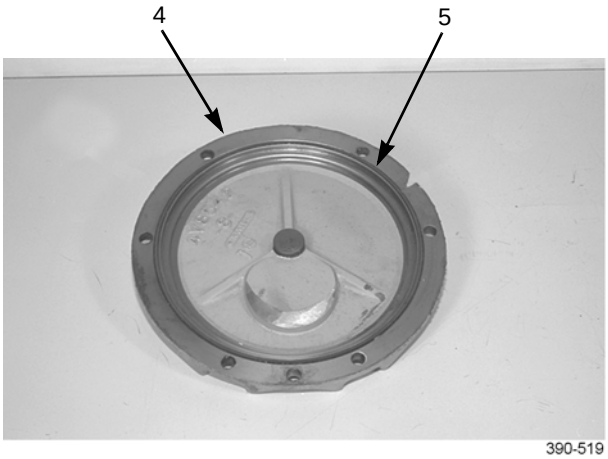
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

1. Remove six bolts (2), washers (3), and cover (4) from final drive (1).



REMOVAL - CONTINUED

2. Remove O-ring (5) from cover (4). Discard O-ring.



390-519



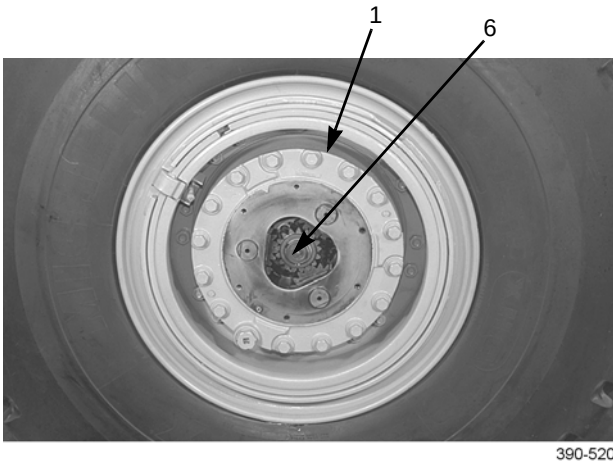
WARNING

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

Axle shaft weighs 53 lb (24 kg).

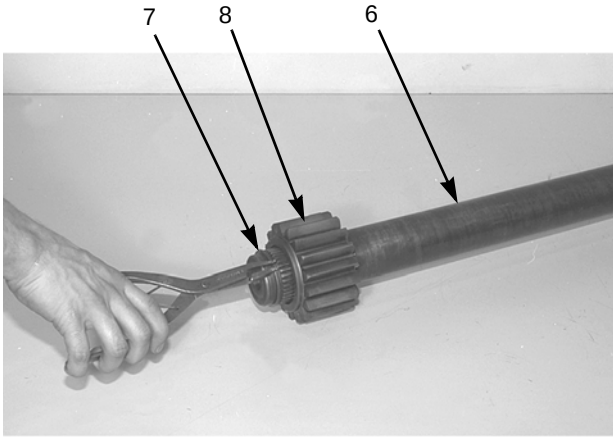
3. With assistance, remove axle shaft (6) from final drive (1).



390-520

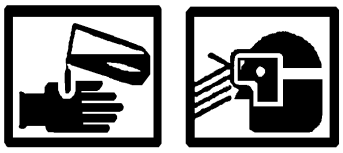
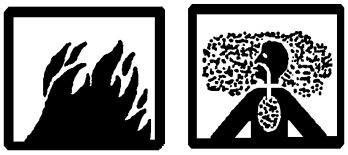
REMOVAL - CONTINUED

4. Remove retaining ring (7) and gear (8) from axle shaft (6).



390-521

CLEANING AND INSPECTION

WARNING

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1. Clean all removed components with cleaning compound and dry thoroughly.
2. Inspect axle shaft for cracks, bends or breaks.
3. Inspect gear for cracks or chipped or missing teeth.
4. Inspect retaining ring for distortion or other signs of damage.
5. Replace any damaged component.

INSTALLATION

1. Install gear (8) on axle shaft (6) with retaining ring (7).



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.

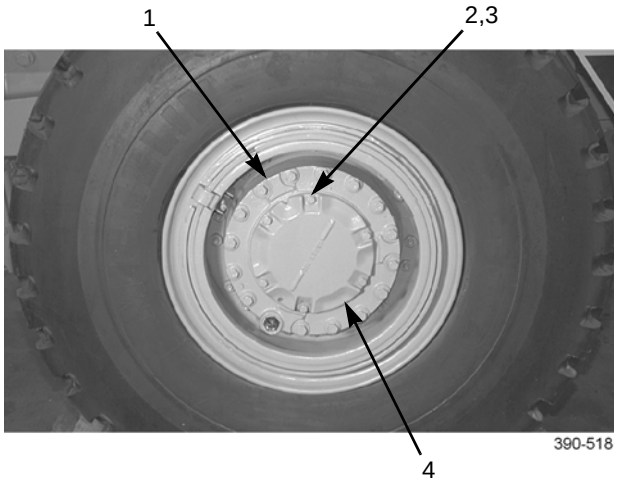
NOTE

Axle shaft weighs 53 lb (24 kg).

2. With assistance, install axle shaft (6) on final drive (1).
3. Coat new O-ring (5) with oil and install to cover (4).

INSTALLATION - CONTINUED

4. Install cover (4) on final drive (1) with six washers (3) and bolts (2).



5. Fill final drive (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

FRONT SPINDLE ASSEMBLY MAINTENANCE 0079 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning and Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

O-ring (2)

Personnel Required

Two

Equipment Condition

Final drive removed (WP 0077 00)

Hub/brake disc, wheel bearings, and seals removed (WP 0080 00)

REMOVAL



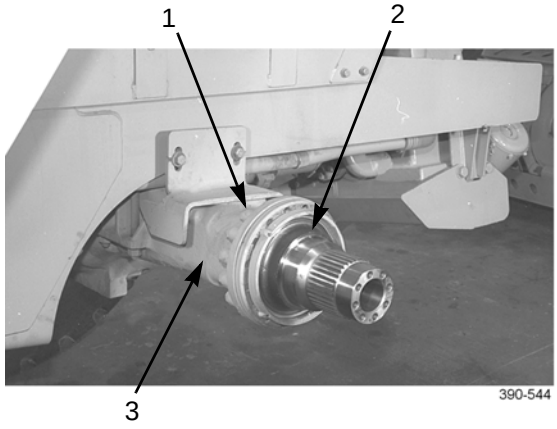
WARNING

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

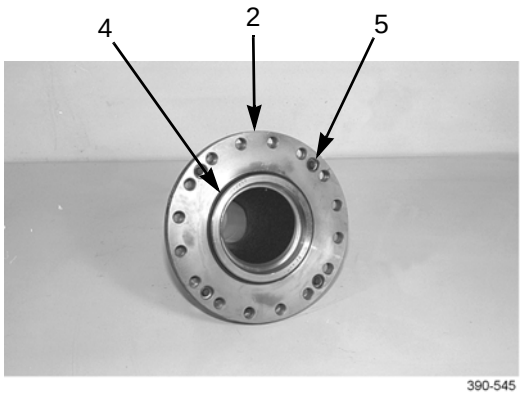
Spindle weighs 60 lb (27 kg).

Remove eight bolts (1) and spindle (2) from axle housing (3).

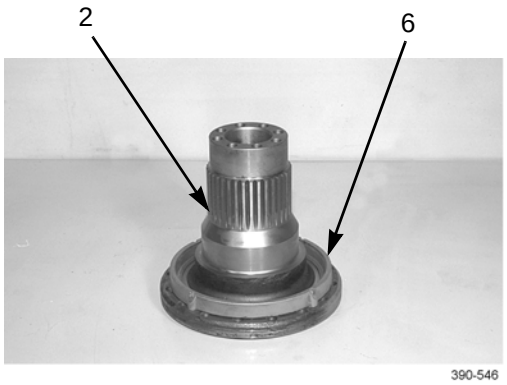


DISASSEMBLY

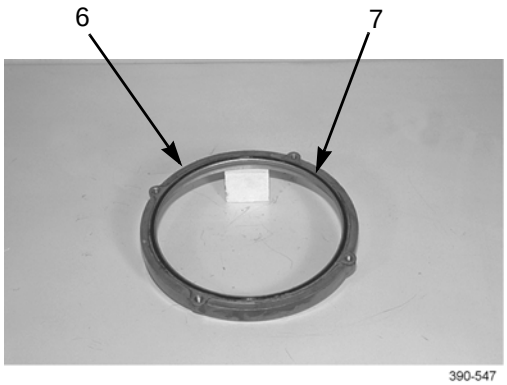
1. Remove O-ring (4) and four bolts (5) from spindle (2). Discard O-ring.



2. Remove retainer (6) from spindle (2).



3. Remove and discard O-ring (7) from retainer (6).



CLEANING AND INSPECTION



WARNING

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1. Clean all removed components with cleaning compound and dry thoroughly.
2. Inspect for cracks, breaks, gouges or other damage. Replace if damaged.

ASSEMBLY

1. Install new O-ring (7) on retainer (6).
2. Install retainer (6) on spindle (2).
3. Install four bolts (5) and new O-ring (4) to spindle (2).

INSTALLATION



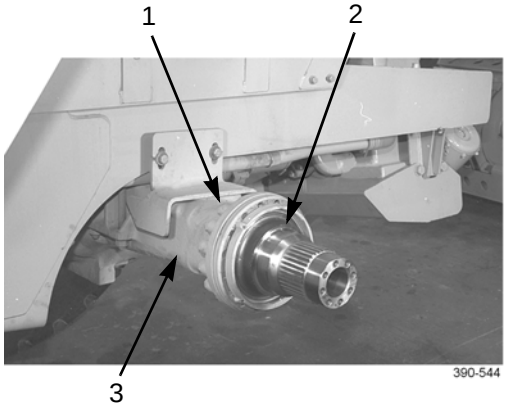
WARNING

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

Spindle weighs 60 lb (27 kg).

1. Install spindle (2) on axle housing (3) with eight bolts (1). Tighten bolts to 95 lb-ft (130 Nm), then turn bolts another 120°.



2. Install hub/brake disc, wheel bearings, and seals (WP 0080 00).
3. Install final drive (WP 0077 00).

END OF WORK PACKAGE

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FRONT WHEEL, HUB, BRAKE DISC, AND WHEEL BEARINGS AND SEALS MAINTENANCE 0080 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning and Inspection, Assembly, Installation and Wheel Bearing Adjustment

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Bushing, driver set (Item 6, WP 0172 00)

Braket, link (Item 4, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

Oil, lubricating (Item 21, 22 or 23, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Seal, duo-cone (2)

Personnel Required

Two

Equipment Condition

Brake caliper removed (WP 0087 00)

Final drive removed (WP 0077 00)

REMOVAL



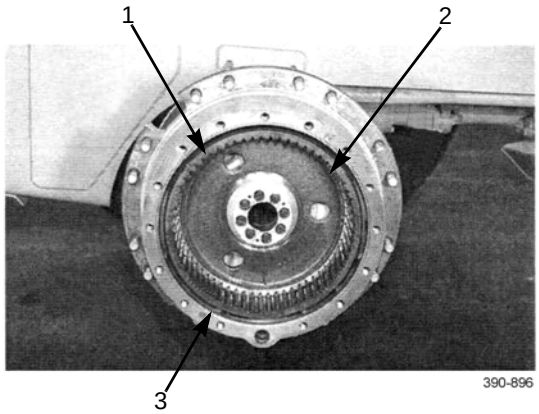
WARNING

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

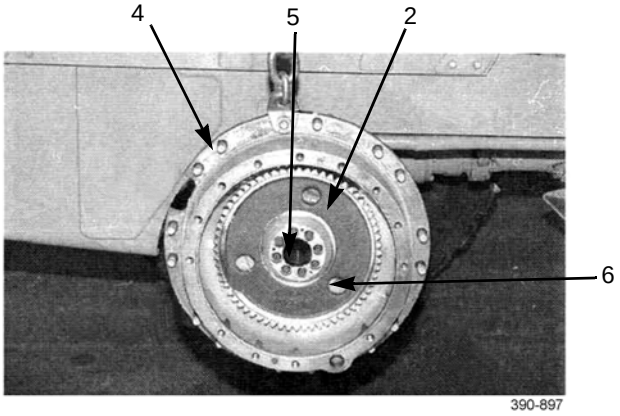
Ring gear weighs 45 lb (20 kg).

1. Remove retaining ring (3) from ring gear (1). With assistance, remove ring gear from hub (2).



REMOVAL - CONTINUED

2. Attach bearing link, nylon strap, and a suitable overhead lifting device to wheel (4). Take up slack in sling.
3. Remove eight bolts (5), retainer plate (6), and wheel bearing adjustment shims from spindle.





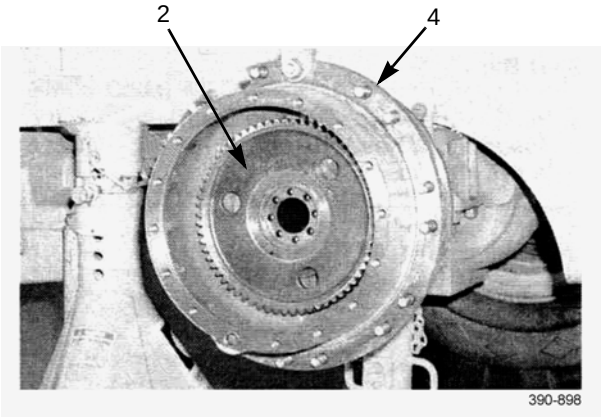
WARNING

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NOTE

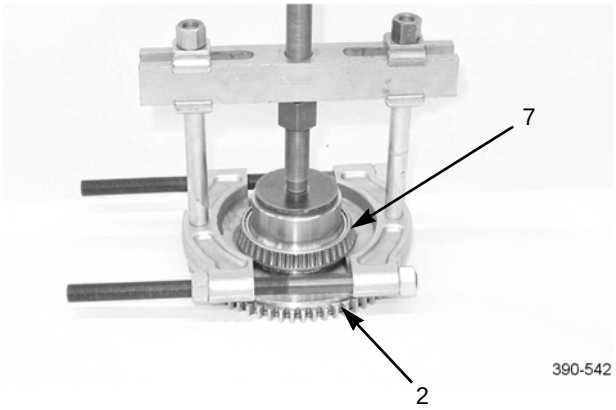
Wheel weighs 183 lb (83 kg).

4. Remove hub (2) from wheel (4). Remove wheel from machine. Remove sling and bearing link from wheel.

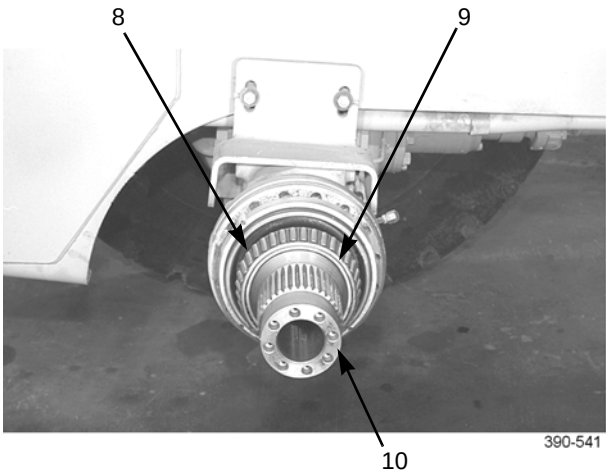


DISASSEMBLY

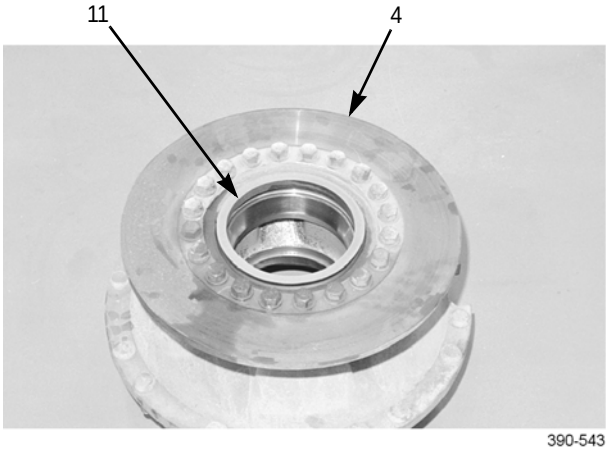
1. Using puller, remove roller bearing (7) from hub (2).



2. Remove duo-cone seal (8) and roller bearing (9) from spindle (10). Discard seal.



3. Remove duo-cone seal (11) from wheel (4). Discard seal.
4. Remove 24 bolts, washers, and brake disc from wheel (4).



CLEANING AND INSPECTION



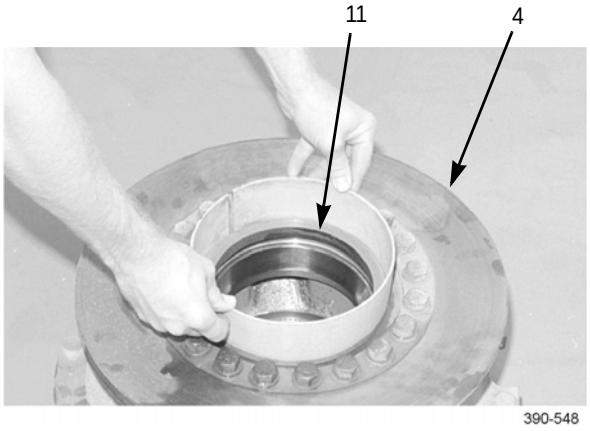
WARNING

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1. Clean all removed components with cleaning compound and dry thoroughly.
2. Inspect for cracks, breaks, chips, excessive scoring or other damage. Replace any damaged component.
3. Inspect bushing inside hub for damage. If damaged, remove and replace bushing.
4. Inspect bearing cups in wheel for damage. Remove and replace bearing cups if damaged.

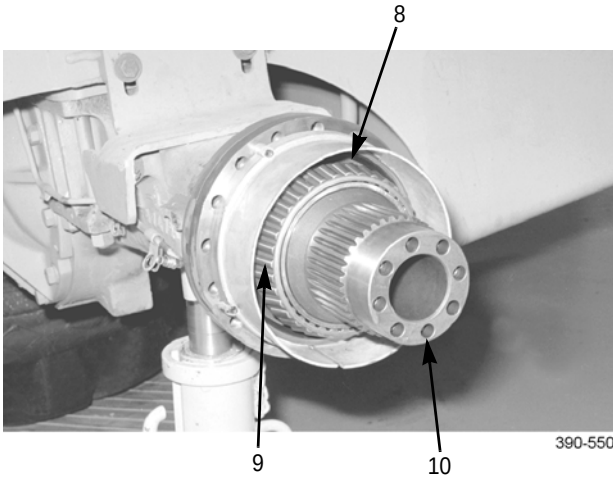
ASSEMBLY

1. Install brake disc to wheel (4) with 24 washers and bolts.
2. Using cone installer, install new duo-cone seal (11) to wheel (4).



ASSEMBLY - CONTINUED

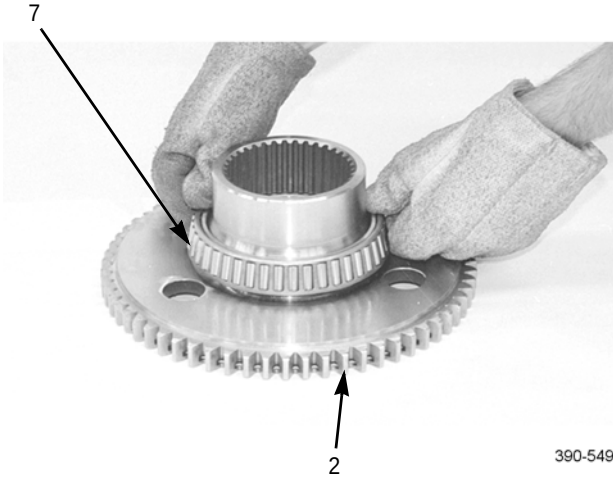
3. Coat with oil and install roller bearing (9) on spindle (10).
4. Using cone installer, install new duo-cone seal (8) on spindle (10).



WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

5. Heat roller bearing (7) to 275°F (135°C), coat with oil, and install roller bearing on hub (2).



INSTALLATION AND WHEEL BEARING ADJUSTMENT



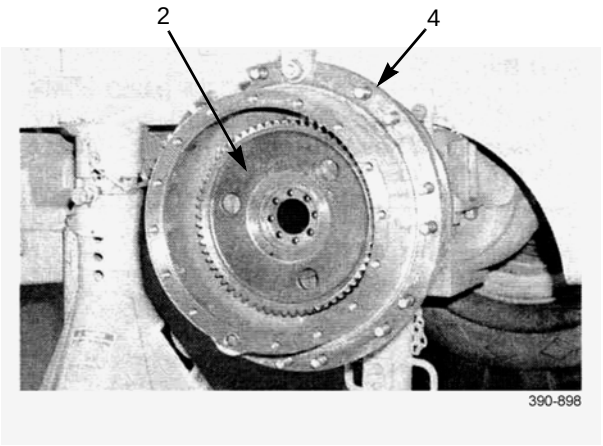
WARNING

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 cause injury or death.

NOTE

Wheel weighs 183 lb (83 kg).

1. Attach bearing link and nylon sling to wheel (4). Use a suitable overhead lift to install wheel.
2. Install hub (2) inside wheel (4).



390-898

NOTE

Assistance from DS Maintenance is required to perform measurements for wheel bearing adjustment.

3. Adjust wheel bearings:
   a. Use an outside micrometer to measure thickness of retainer plate (6) at three small holes in plate. Calculate average thickness and record.

NOTE

Install three bolts in bolt holes next to three small holes in retainer plate.

   b. Install retainer plate (6) to spindle with three bolts (5). Do NOT install shims. Do NOT tighten bolts.
   c. Rotate wheel (4) and tighten three bolts (5) to 74 lb-ft (100 Nm) in order to seat parts.
   d. Loosen three bolts (5).
   e. Tighten three bolts (5) to 18 lb-ft (25 Nm). Rotate wheel several revolutions and retighten bolts to 18 lb-ft (25 Nm). Repeat wheel rotation and bolt tightening until bolts hold torque.
   f. Use a depth micrometer to measure depth of three small hoses in retainer plate. Calculate average depth and record.

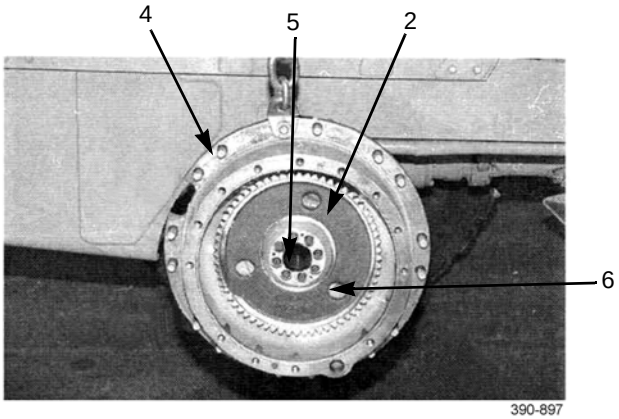
INSTALLATION AND WHEEL BEARING ADJUSTMENT - CONTINUED

g. Calculate difference between measurements in step a and step f. Difference is gap between end of spindle and retainer plate (6).

h. Remove three bolts (5) and retainer plate (6) from spindle.

i. Assemble quantity of shims, so that shim pack thickness is equal to measurement in step g plus 0.203 mm (0.008 in.).

j. Install shims, retainer plate (6) and eight bolts (5). Tighten bolts to 44 lb-ft (60 Nm), then tighten an additional 120°.



390-897



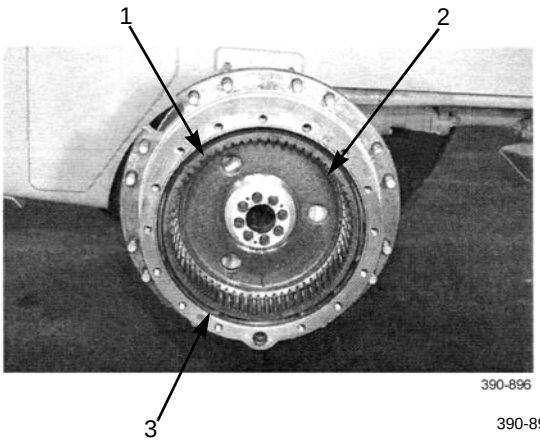
WARNING

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

Ring gear weighs 45 lb (20 kg).

4. With assistance, install ring gear (1) to hub (2) with retaining ring (3).



390-896

390-896

5. Install brake caliper (WP 0087 00).
6. Install final drive (WP 0077 00).

END OF WORK PACKAGE

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DIFFERENTIAL LOCK CONTROL VALVE MAINTENANCE 0081 00

THIS WORK PACKAGE COVERS

Removal, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

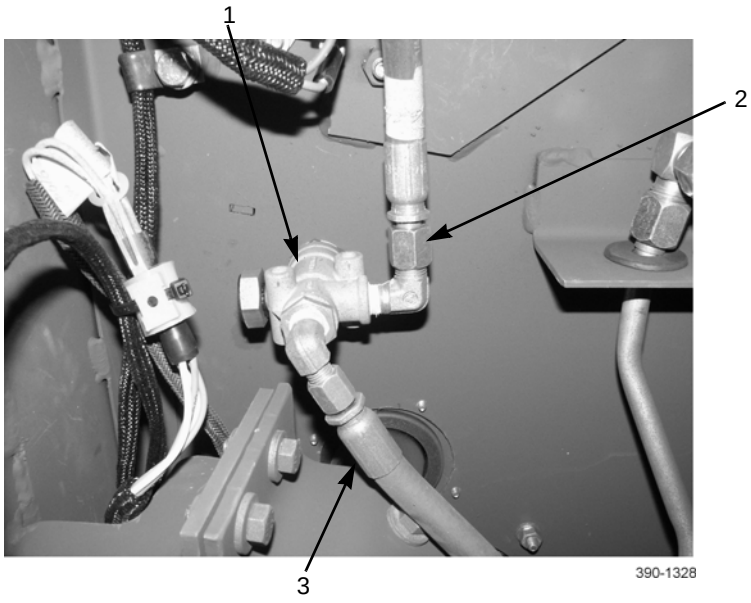


WARNING

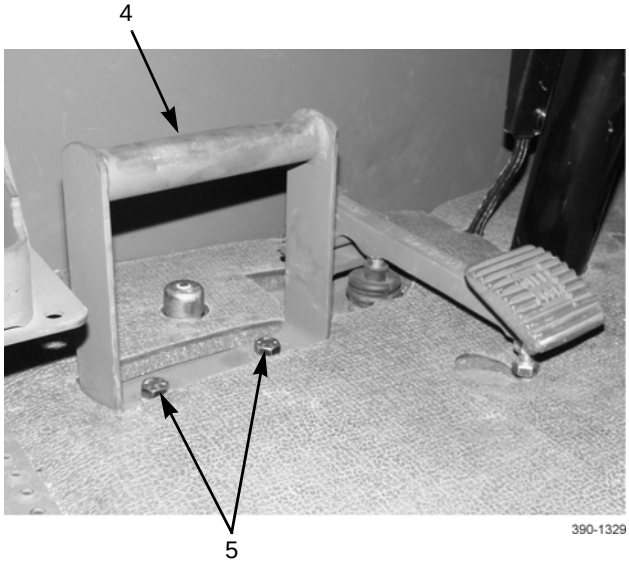
- Do NOT disconnect any air system lines or fittings unless vehicle engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

REMOVAL

1. Tag and disconnect inlet air hose (2) and outlet air hose (3) from differential lock control valve (1), located under cab floor.



2. Remove two bolts (5) and foot rest (4).



REMOVAL - CONTINUED

NOTE

It may be necessary to move or remove floor padding for access to differential locknut.

3. Loosen locknut (6).
4. With assistance under tractor, remove locknut (6) and differential lock control valve (1) from cab floor.



390-1330

INSTALLATION

1. With assistance under tractor, install differential lock control valve (1) on cab floor with locknut (6).
2. Install foot rest (4) on cab floor with two bolts (5).

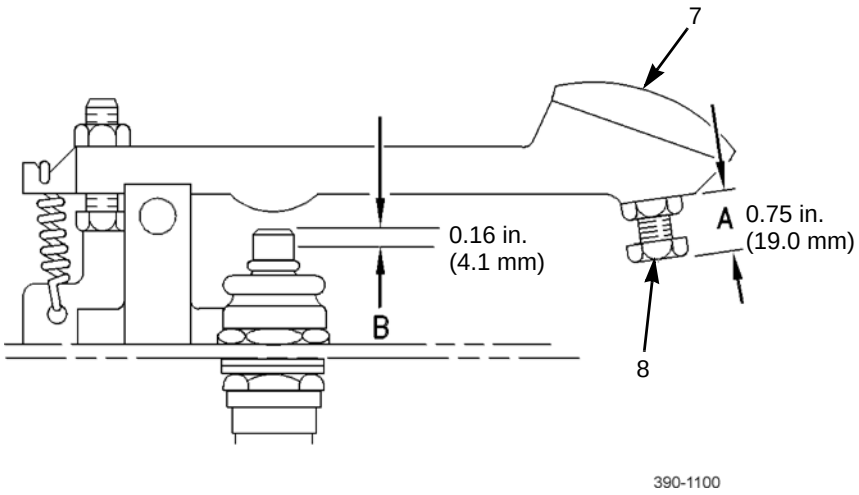
NOTE

Apply antiseize tape to clean threads of fittings before connections are made.

3. Connect outlet air hose (3) and inlet air hose (2) to differential lock control valve (1).

ADJUSTMENT

1. Measure distance between top of bolt (8) (located on bottom of pedal (7)) and bottom of pedal (Measurement A). Distance should be approximately 0.75 in. (19.0 mm). Adjust bolt as required.



NOTE

Ensure that bolt located on bottom of pedal contacts floor before stroke of stem in differential lock control valve bottoms out.

2. With pedal (7) depressed, measure distance of valve stem movement (Measurement B). Measurement should be 0.16 in. (4.1 mm). Adjust bolt (8) as required.

END OF WORK PACKAGE

PARKING BRAKE ASSEMBLY MAINTENANCE 0082 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Pin, cotter

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

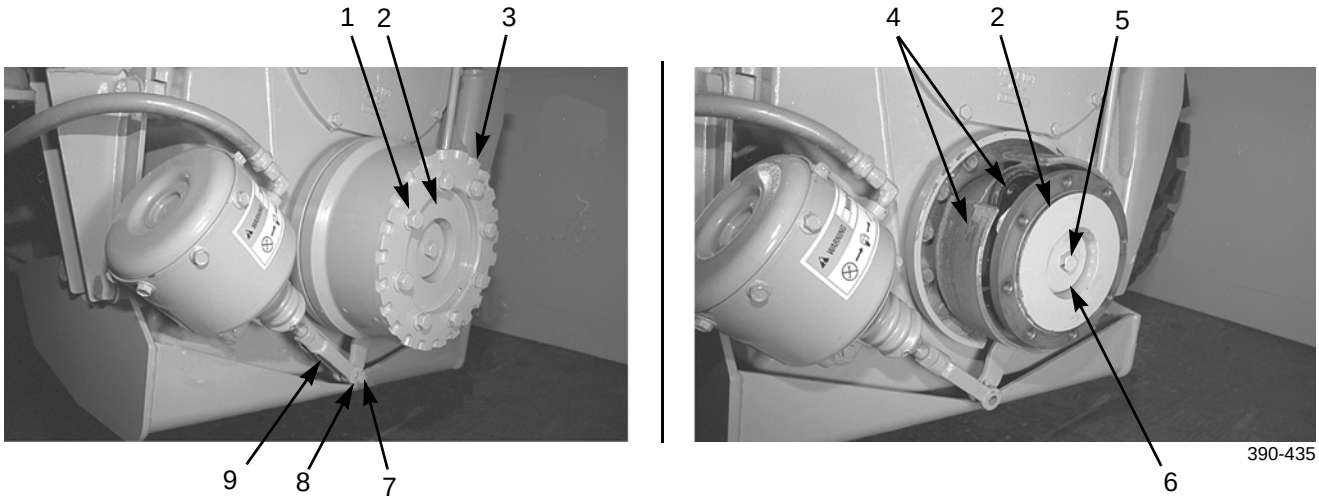
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

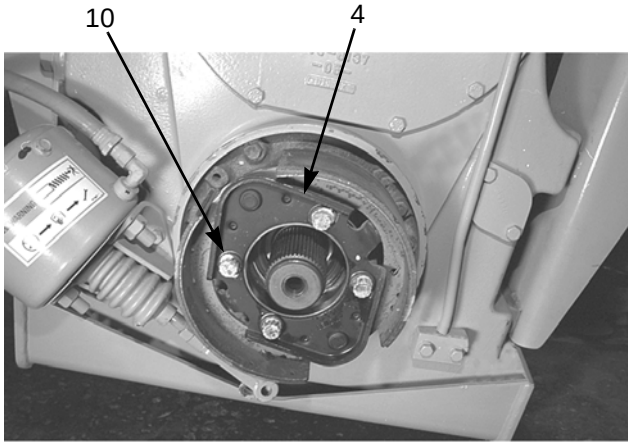
REMOVAL

1. Remove cotter pin (7) and clevis pin (8) from yoke rod end (9). Discard cotter pin.
2. Remove eight bolts (1), washers, and brake drum (3) from flange (2).
3. Remove bolt (5), washer (6), and flange (2) from parking brake assembly (4).



REMOVAL - CONTINUED

4. Remove four bolts (10) and parking brake assembly (4) from transfer case.



390-436

CLEANING AND INSPECTION

1. Clean all components of parking brake group.

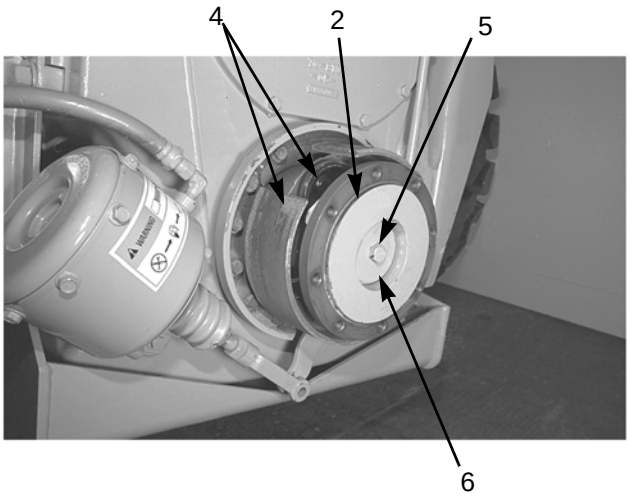
NOTE

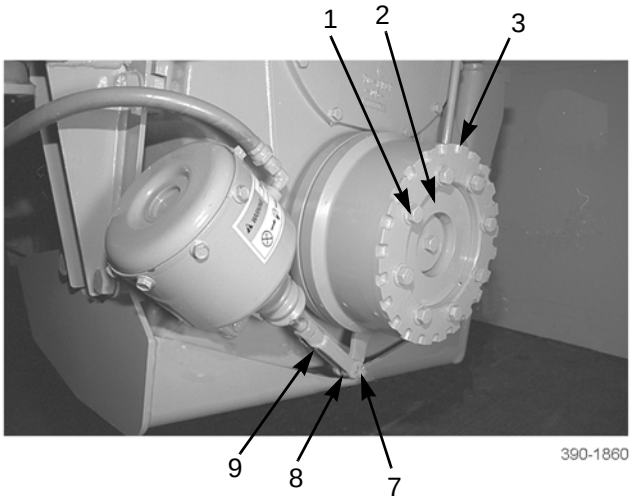
If linings are worn down to rivet heads, brakeshoes are not serviceable.

2. Inspect and replace any item found to be worn or damaged.

INSTALLATION

1. Install parking brake assembly (4) on transfer case with four bolts (10).
2. Install flange (2) on parking brake assembly (4) with washer (6) and bolt (5).
3. Install brakedrum (3) on flange (2) with eight washers and bolts (1).
4. Install yoke rod end (9) with clevis pin (8) and new cotter pin (7).





390-1860

ADJUSTMENT

NOTE

- Parking brake is correctly adjusted if machine cannot be moved in second speed forward with engine at high idle.
- Brakedrum must be free to rotate when parking brake is released.

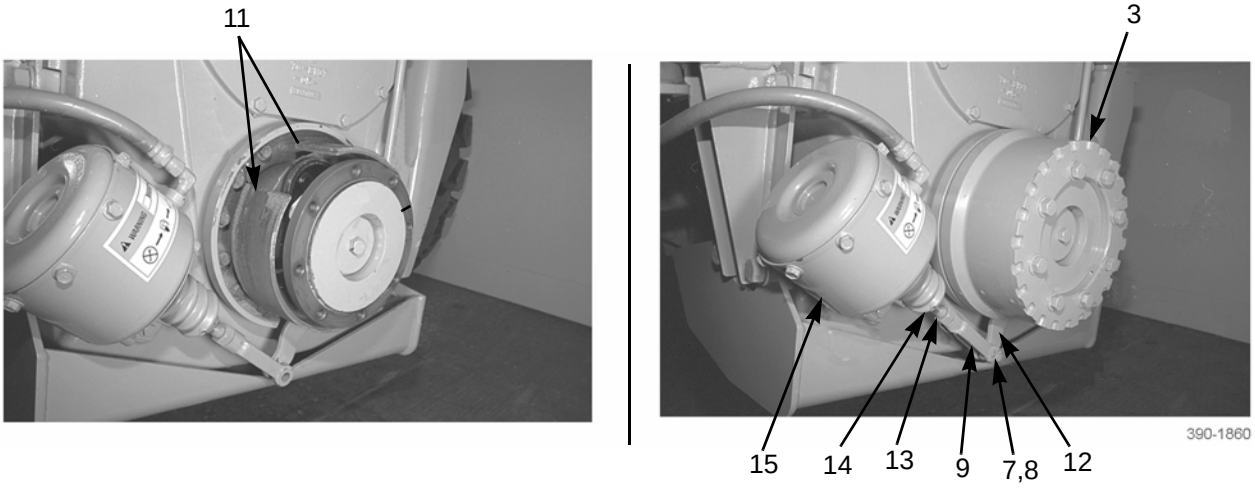
1. Place battery disconnect swtich in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

2. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Allow air pressure to reach operating pressure.
3. Move parking brake control knob to OFF position. Stop engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
4. Remove cotter pin (7) and clevis pin (8).
5. Push end of lever (12) away from parking brake actuator (15) until brake linings (11) come into contact with brakedrum (3).
6. Loosen locknut (13). Rotate yoke rod end (9) on threaded rod (14) until holes in yoke rod end and in lever (12) are aligned. Rotate rod end by one turn toward parking brake actuator (15). Insert clevis pin (8) and cotter pin (7). Tighten locknut (13).



END OF WORK PACKAGE

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AIR COMPRESSOR GOVERNOR AND AIR COMPRESSOR MAINTENANCE 0083 00

THIS WORK PACKAGE COVERS

Air Compressor Governor: Removal, Installation

Air Compressor: Removal, Installation

Air Strainer: Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Antifreeze (Item 2 or 3, WP 0171 00)

Cap set, protective (Item 5, WP 0171 00)

Cleaning compound, solvent (Item 6, WP 0171 00)

Sealant, pipe (Item 34, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Gasket (3)

References

WP 0009 00

Personnel Required

Two

Equipment Condition

Front and center guard plates removed (WP 0100 00)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door open (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Coolant drained (WP 0010 00)



WARNING

- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

CAUTION

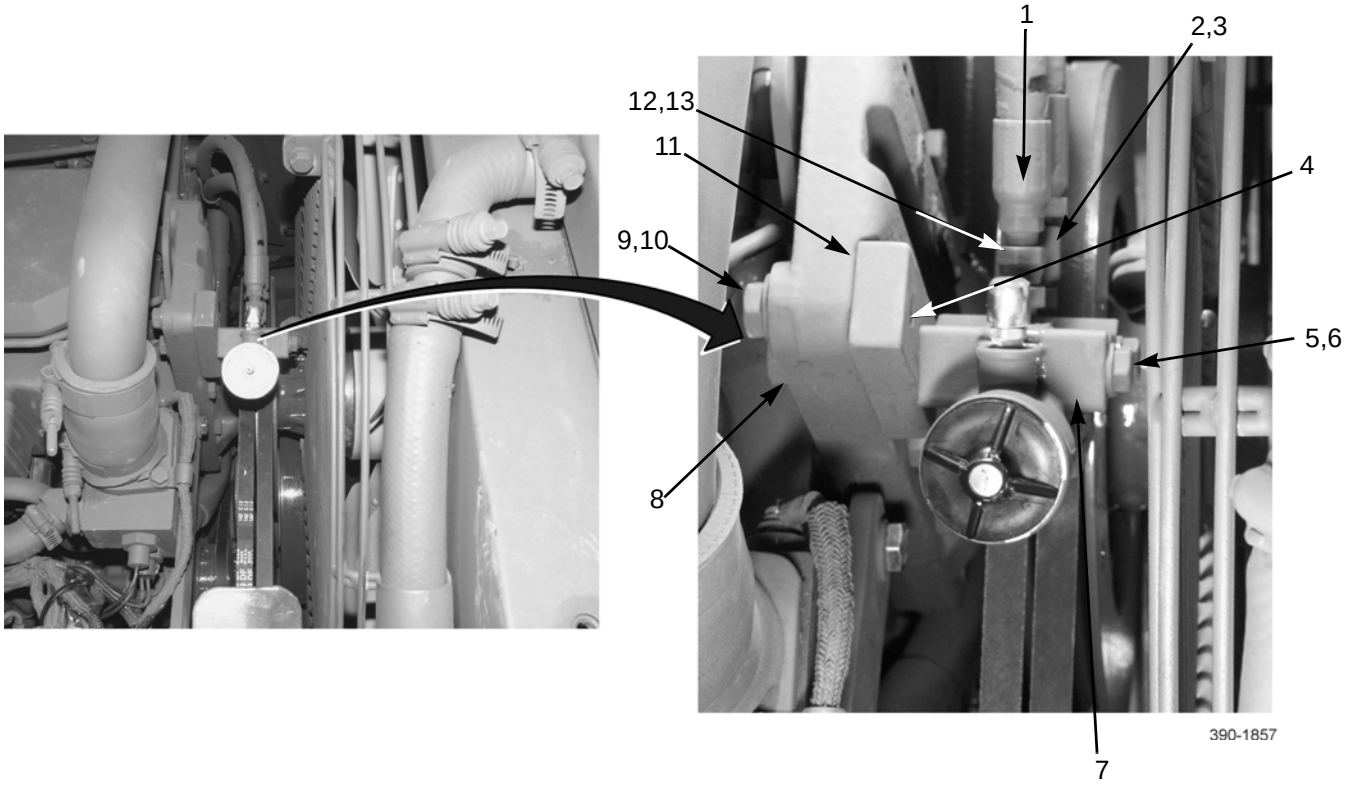
Cap all hoses and tubes to prevent contamination of air system.

NOTE

Tag all hoses and tubes to aid in installation.

AIR COMPRESSOR GOVERNOR REMOVAL

1. Remove vent valve (4) from air compressor governor (7).
2. Loosen collar (12) of adapter (13) and disconnect hose (1) from adapter.
3. Disconnect hose (2) from adapter (3).
4. Remove two long bolts (5), washers (6), and governor (7) from plate (11).
5. Remove two adapters (3 and 13) from governor (7).
6. If damaged, remove two bolts (9), washers (10), and plate (11) from fan drive (8).

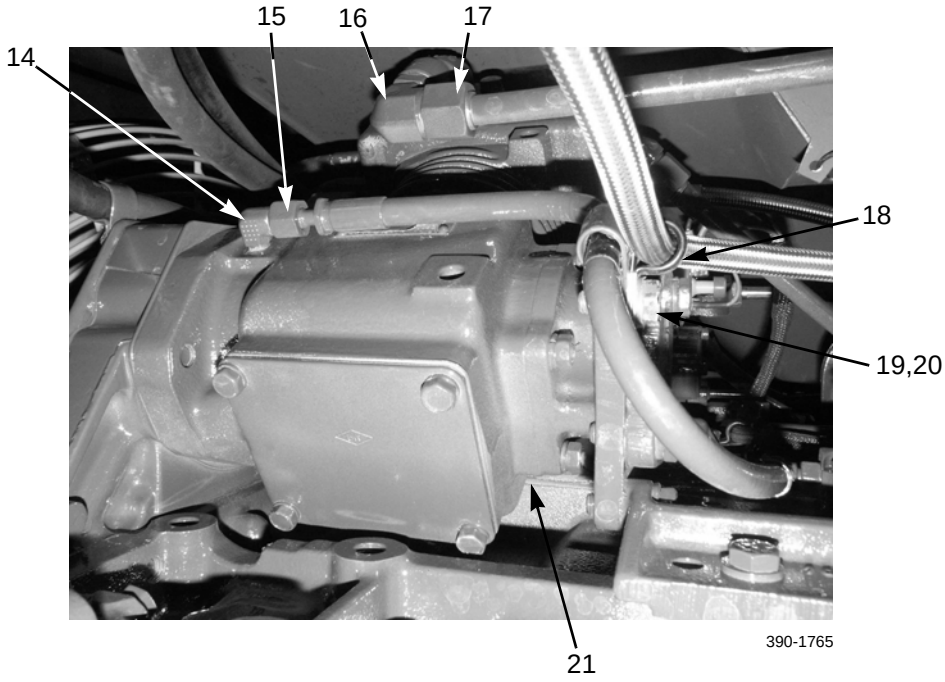


AIR COMPRESSOR GOVERNOR INSTALLATION

1. If removed, install plate (11) to fan drive (8) with two washers (10) and bolts (9).
2. Apply a thin coat of pipe sealing compound to pipe threads of two adapters (3 and 13) and install adapters to governor (7).
3. Install governor (7) to plate (11) with two washers (6) and long bolts (5).
4. Connect hose (2) to adapter (3).
5. Connect hose (1) to adapter (13) and tighten collar (12).
6. Apply a thin coat of pipe sealing compound to pipe threads of vent valve (4) and install vent valve to governor (7).

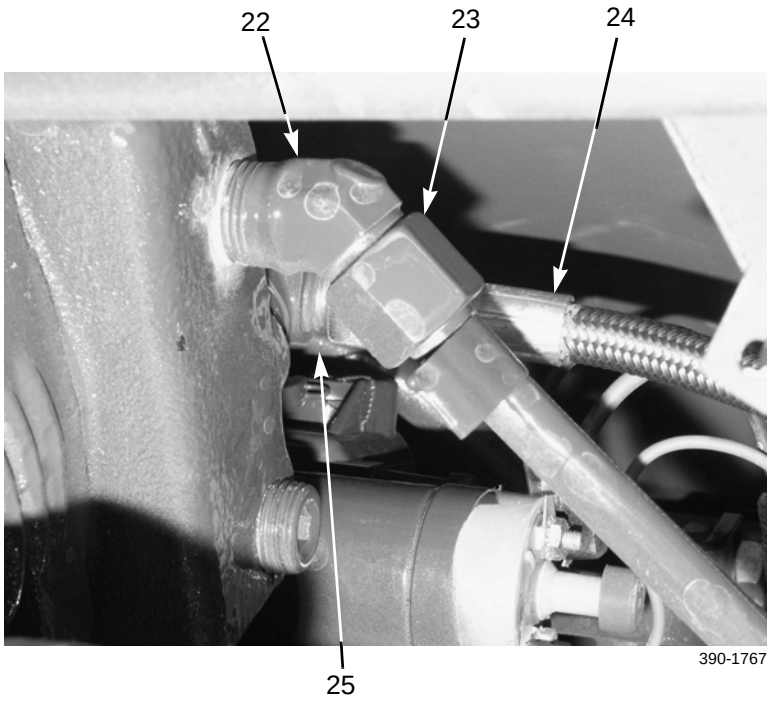
AIR COMPRESSOR REMOVAL

1. Disconnect two hoses from air compressor governor (Refer to steps 1 through 3 of *Air Compressor Governor Removal*).
2. Remove bolt (19), washer (20) and two hose clips (18) from air compressor (21).
3. Disconnect hose (15) from elbow (14) on air compressor (21).
4. Disconnect tube (17) from elbow (16).

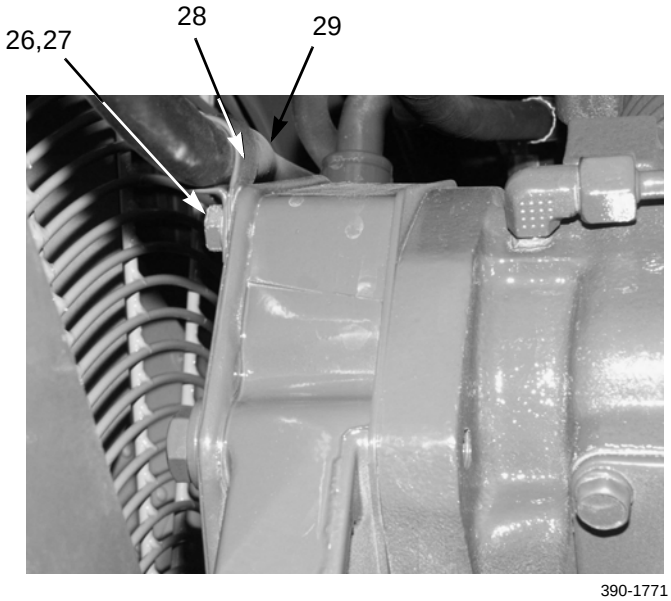


AIR COMPRESSOR REMOVAL - CONTINUED

5. Disconnect tube (23) from elbow (22).
6. Disconnect hose (24) from adapter (25).



7. Remove bolt (26), washer (27), and clamp (28) from hose (29).



AIR COMPRESSOR REMOVAL - CONTINUED



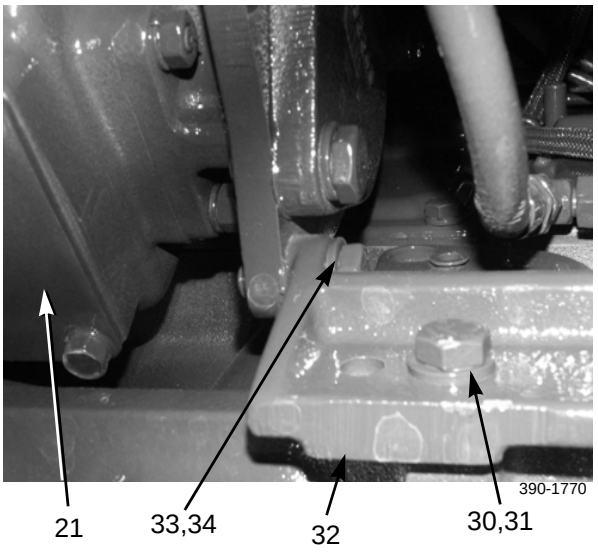
WARNING

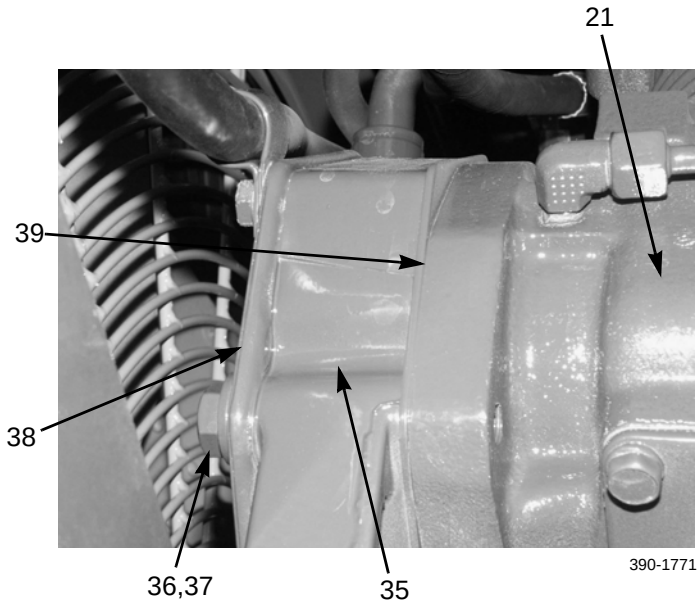
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

- Two hoses are still connected to air compressor. These hoses will be installed on new air compressor.
- Air compressor weighs 65 lb (29.5 kg).

8. Attach nylon sling to a suitable lifting device and to air compressor (21).
9. Remove two bolts (30) and washers (31) from mounting bracket (32).
10. Remove three bolts (36) and washers (37) from air compressor (21) timing gear housing (35), and end plate (38).
11. Remove end plate (38) from timing bear housing (35).
12. Carefully move air compressor (21) toward rear of engine until drive gear of air compressor is clear of engine. Remove and discard gasket (39).
13. Remove all elbows and adapters from air compressor (21). Clean all threads and coat threads with pipe sealing compound and install in new compressor.
14. Remove screw (33), washer (34) and mounting bracket (32) from air compressor (21).





AIR COMPRESSOR INSTALLATION



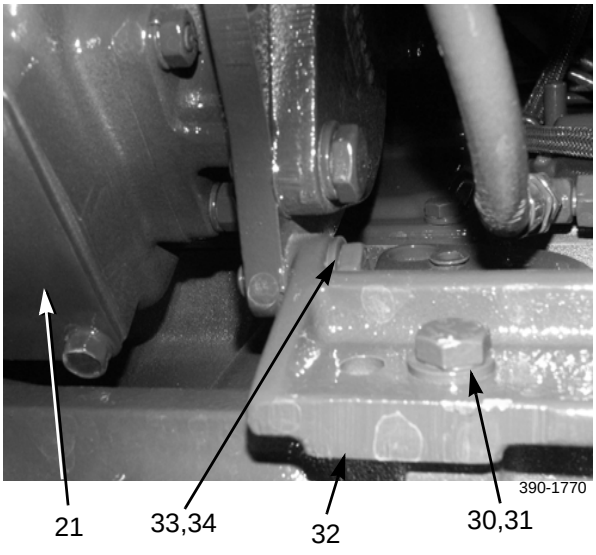
WARNING

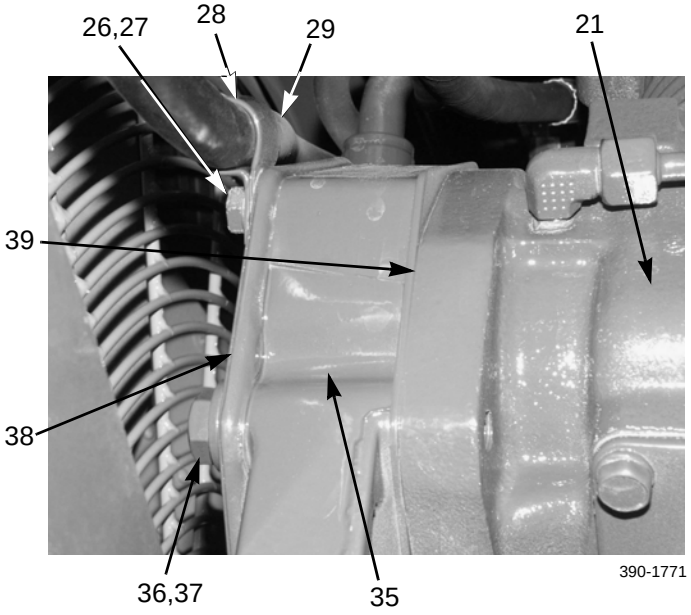
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

- Install hoses from old air compressor on new air compressor.
- Air compressor weighs 65 lb (29.5 kg).

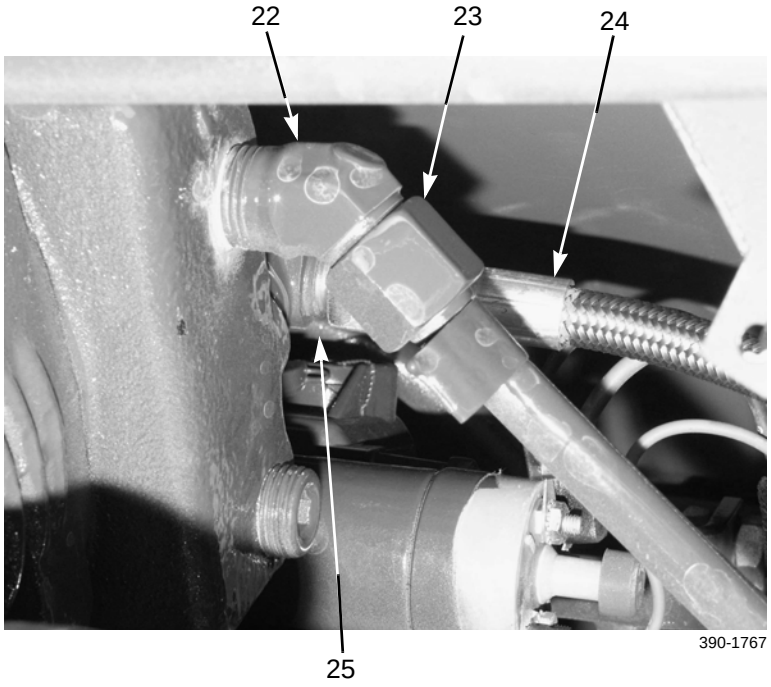
1. Position mounting bracket (32) on air compressor (21) and secure with screw (33) and washer (34).
2. With assistance, attach nylon sling and suitable lifting device to air compressor (21) and position air compressor in engine compartment.
3. Position new gasket (30). Carefully move air compressor (21) toward front of engine until drive gear of air compressor is engaged.
4. Install two bolts (30) and washers (21) on mounting bracket (32).
5. Install three bolts (35) and washers (36) to hold end plate (38) and air compressor (21) to timing gear housing (35).
6. Remove nylon sling.
7. Install bolt (26), washer (27), clamp (28), and hose (29).



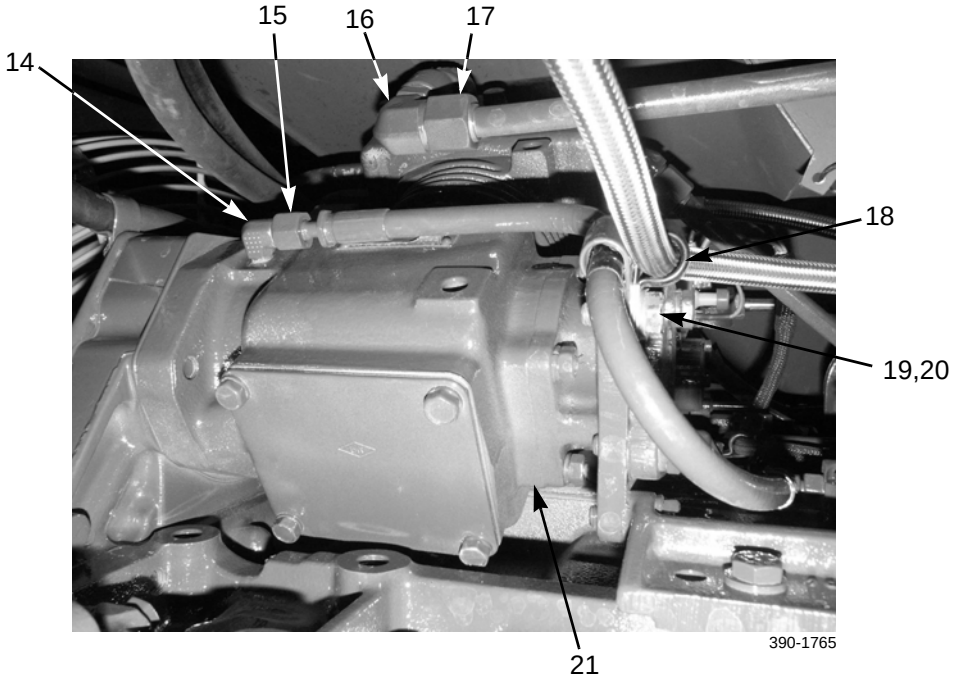


AIR COMPRESSOR INSTALLATION - CONTINUED

8. Connect tube (23) to elbow (22).
9. Connect hose (24) to adapter (25).



10. Connect tube (17) to elbow (16).
11. Connect hose (15) to elbow (14).
12. Install bolt (19), washer (20), and two hose clips (18) to air compressor (21).



AIR COMPRESSOR INSTALLATION - CONTINUED

13. Connect two hoses to air compressor governor (Refer to steps 4 through 6 of *Air Compressor Governor Installation*).
14. Fill cooling system (WP 0009 00 and WP 0010 00).
15. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



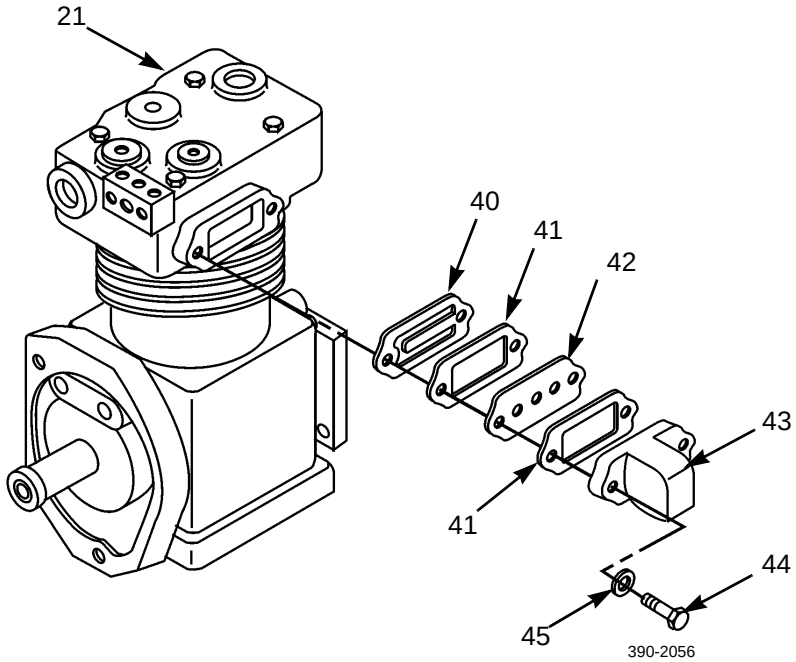
WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

16. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). With assistance, check for leaks.
17. Install front and center guard plates (WP 0100 00).

AIR STRAINER REMOVAL

1. Remove two bolts (44) and washers (45) from elbow (43).
2. Remove elbow (43), gasket (41), strainer element (42), gasket (41), and check valve (40) from air compressor (21). Discard gaskets.



CLEANING AND INSPECTION



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. The use of protective gloves and goggles is suggested. 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.

1. Clean all removed components with cleaning compound and dry thoroughly.
2. Inspect all components for damage. Ensure strainer element is not torn.
3. Replace any damaged components.

AIR STRAINER INSTALLATION

1. Position check valve (40), new gasket (41), strainer element (42), new gasket (41), and elbow (43) on air compressor (21).
2. Install two bolts (44) and washers (45).

END OF WORK PACKAGE

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FRONT SERVICE BRAKESHOES REPLACEMENT 0084 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Bolt, 1/2 in. - 13NC

Materials/Parts

Rag, wiping (Item 31, WP 0171 00)

References

WP 0095 00

Equipment Condition

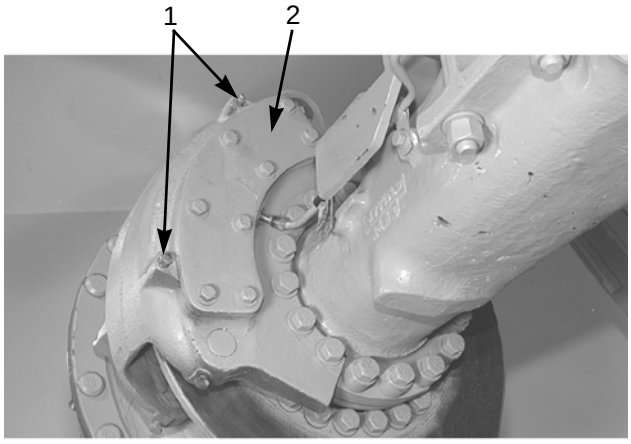
Tire and rim removed (WP 0096 00)

REMOVAL

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

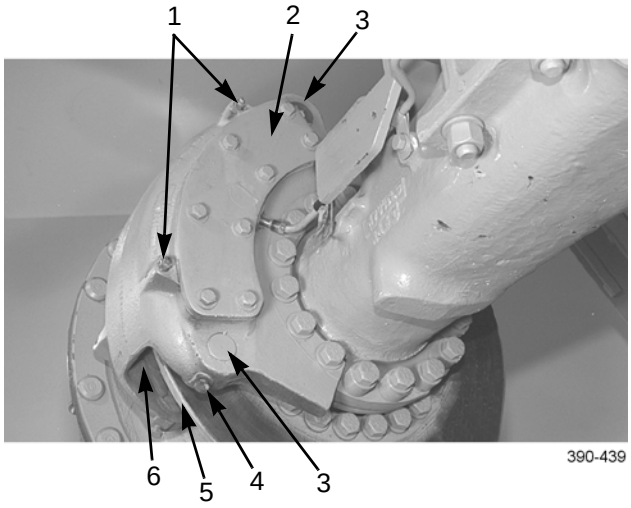
1. Loosen two bleeder screws (1) to relieve pressure from brake caliper (2).



390-439

REMOVAL - CONTINUED

2. Loosen bolts (4) and install 1/2 in. - 13NC bolts (n pins (3).
3. Tighten bolts to remove pins (3) and brakeshoes (6) from brake caliper (2).



CLEANING AND INSPECTION

1. Clean and inspect all parts.
2. Measure thickness of brakeshoes at each end. Minimum allowable thickness in area of most wear of a used brakeshoe is 0.591 in. (15.01 mm).
3. Replace worn and damaged parts.

INSTALLATION

1. Remove 1/2 in. - 13NC bolts from pins (3).
2. Install brakeshoes (6) in brake caliper (2) with pins (3). Tighten four bolts (4).
3. Check clearance between pin (3) and brake disc (5):
   a. Clearance between pin (3) and brake disc (5) must not be less than 0.010 in. (0.25 mm) and not more than 0.118 in. (3.00 mm).
   b. If clearance between pin (3) and brake disc (5) is less than 0.010 in. (0.25 mm), loosen bolt (4) and slide pin (3) to obtain required clearance.
4. Tighten two bleeder screws (1).
5. Bleed air from brake system (WP 0095 00).
6. Install tire and rim (WP 0096 00).

END OF WORK PACKAGE

SKID STEER CONTROL AND AIR LINES REPLACEMENT 0085 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Heater, gun type, electric (Item 14, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

CAUTION

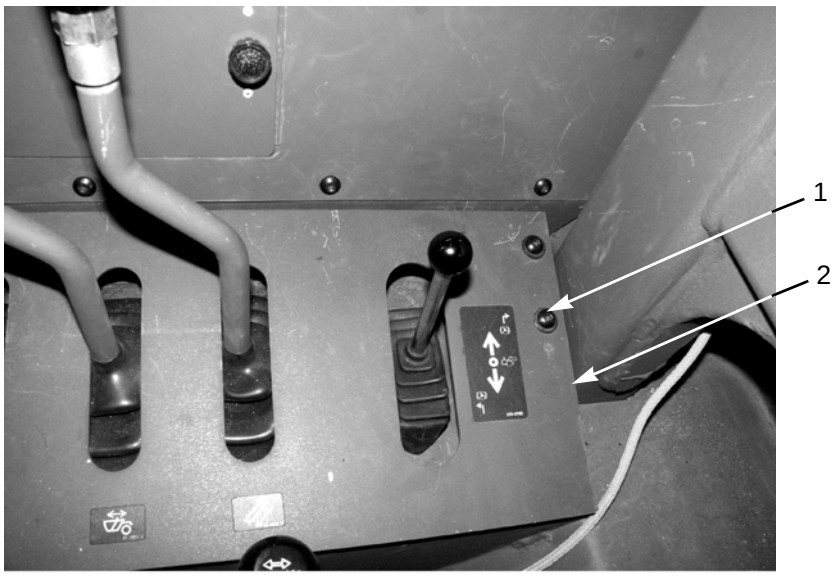
Cap air lines and ports to prevent contamination of air system and parts.

NOTE

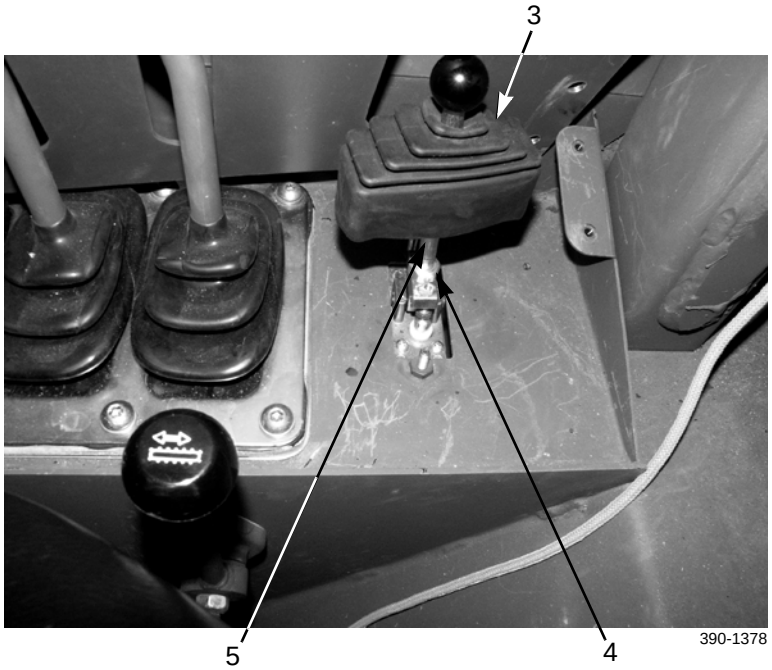
- Tag all air lines prior to removal.
- Remove retaining clamps as required and note location to ensure correct installation.

REMOVAL

1. Remove four screws (1) and washers from panel (2) inside cab.

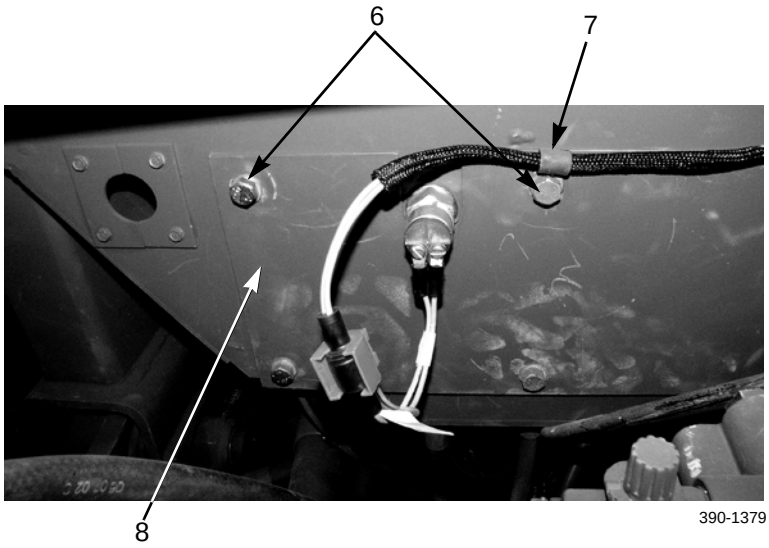


2. Lift control lever boot (3) upward. Remove locknut (4) and control lever (5).



REMOVAL - CONTINUED

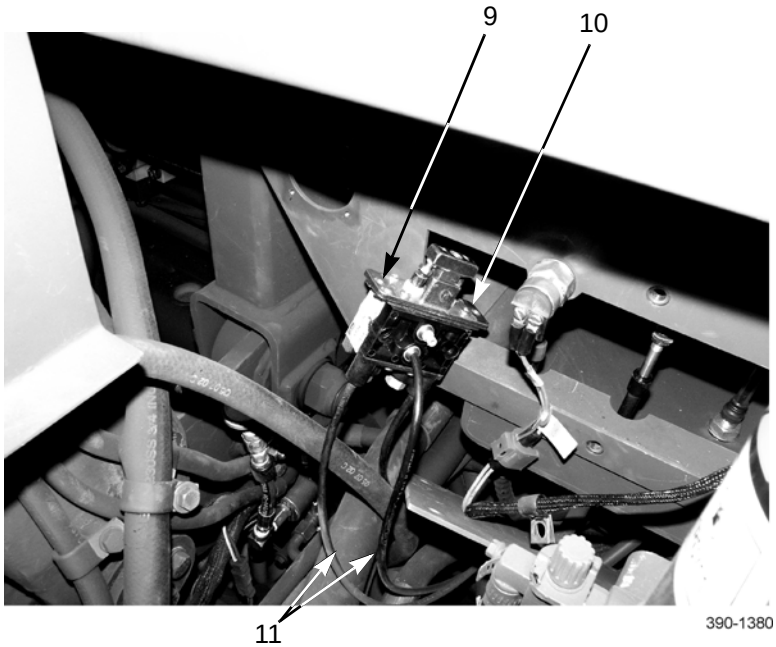
3. Open engine access door. Remove six screws (6) and washers from access panel cover (8) at left rear of engine compartment. Remove electrical harness clip (7). Remove access panel.



NOTE

Two screws holding skid steer control unit are only accessible through access panel at left rear of engine compartment.

4. Remove two screws (10) and washers, and remove skid steer control unit (9).
5. Use a heater gun to remove air lines (11) from skid steer control unit (9).

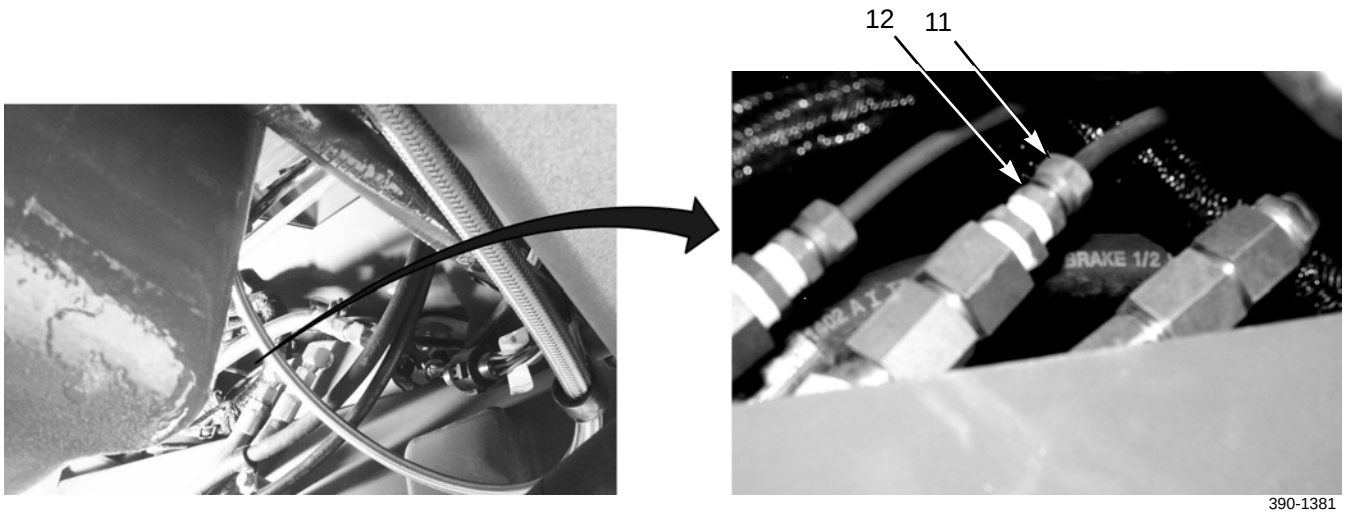


REMOVAL - CONTINUED

NOTE

Access air lines on left inside surface of tractor frame.

6. Unscrew fittings (12) and remove air lines (11).



INSTALLATION

NOTE

- Access air lines on left inside surface of tractor frame.
- Apply antiseizing tape to male threads of fittings and air lines before connections are made.

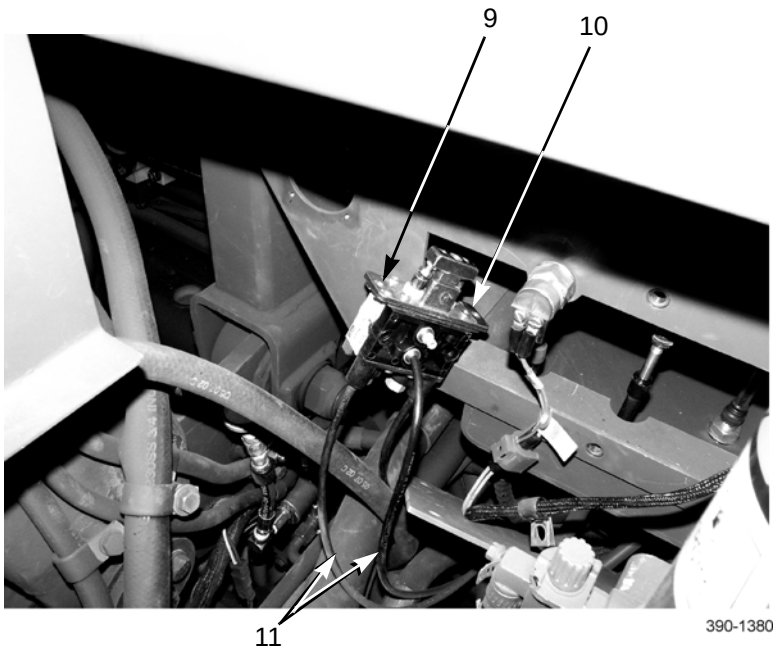
1. Install air lines (11) and fittings (12).

INSTALLATION - CONTINUED

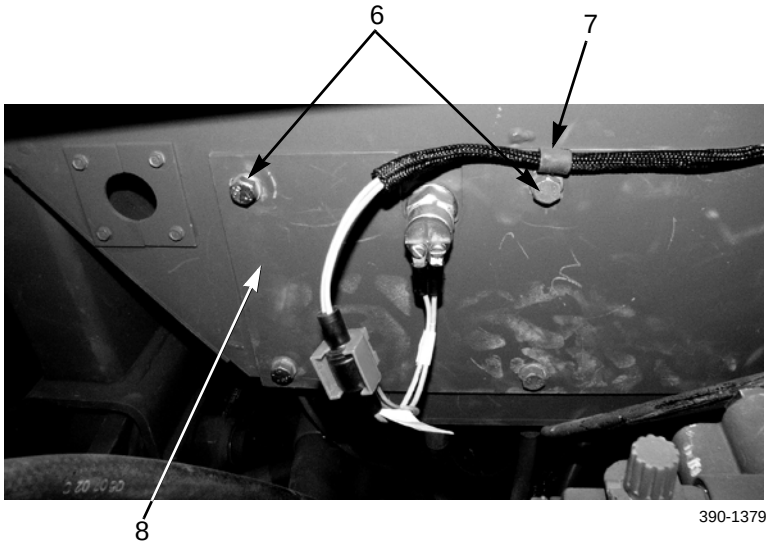
NOTE

Two screws holding skid steer control unit are only accessible through access panel at left rear of engine compartment.

2. Use a heater gun to install air lines (11) into skid steer control unit (9).
3. Install two screws (10) and washers and tighten.

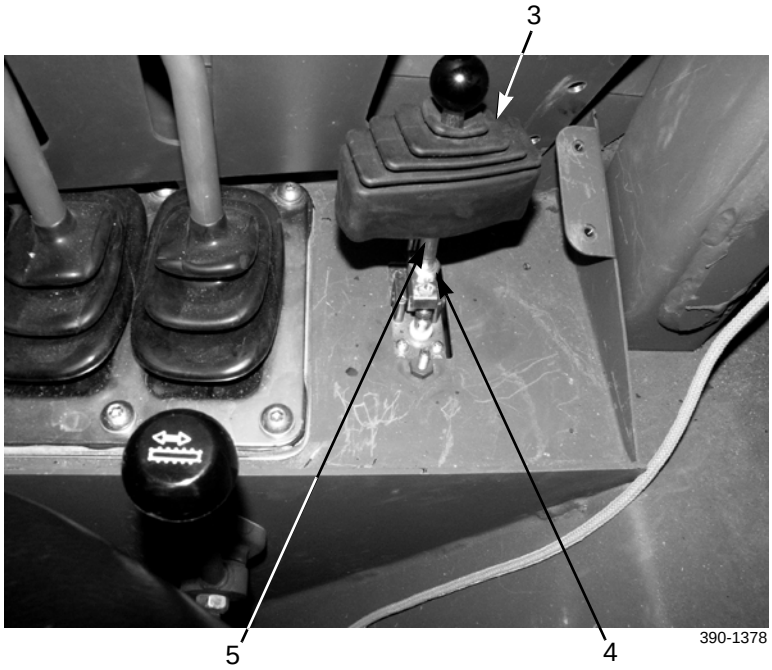


4. Install access panel cover (8) and electrical harness clip (7) with six screws (6) and washers. Tighten screws.



INSTALLATION - CONTINUED

5. Install control lever (5) and locknut (4). Lower control lever boot (3).



6. Install panel (2) with four screws (1) and washers.



INSTALLATION - CONTINUED

7. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-20510-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

8. Start engine and check for air leaks (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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AIR/HYDRAULIC BRAKE CYLINDER REPLACEMENT 0086 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Materials/Parts - Continued

Tape, antiseizing (Item 40, WP 0171 00)

Personnel Required

Two

Equipment Condition

Center and rear guard plates removed (WP 0100 00)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

- Do NOT disconnect any air system lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

CAUTION

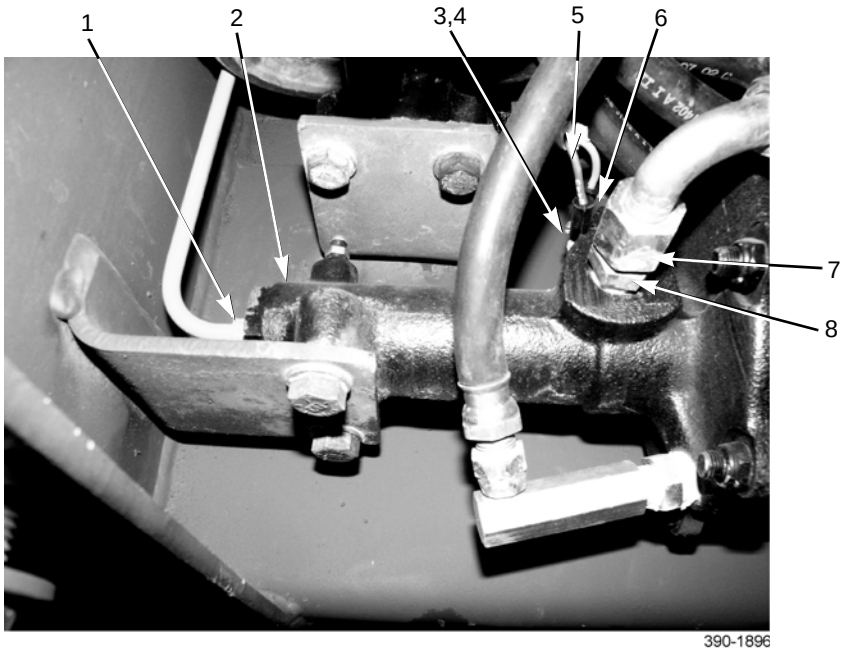
Cap all lines, hoses, and tubes to prevent fluid loss and contamination of oil system.

NOTE

- Tag all hoses, tubes, and wires to aid in installation.
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Air/hydraulic brake cylinders are replaced in a similar manner. There are minor differences in the configuration of hoses and fittings. One air/hydraulic brake cylinder is shown.

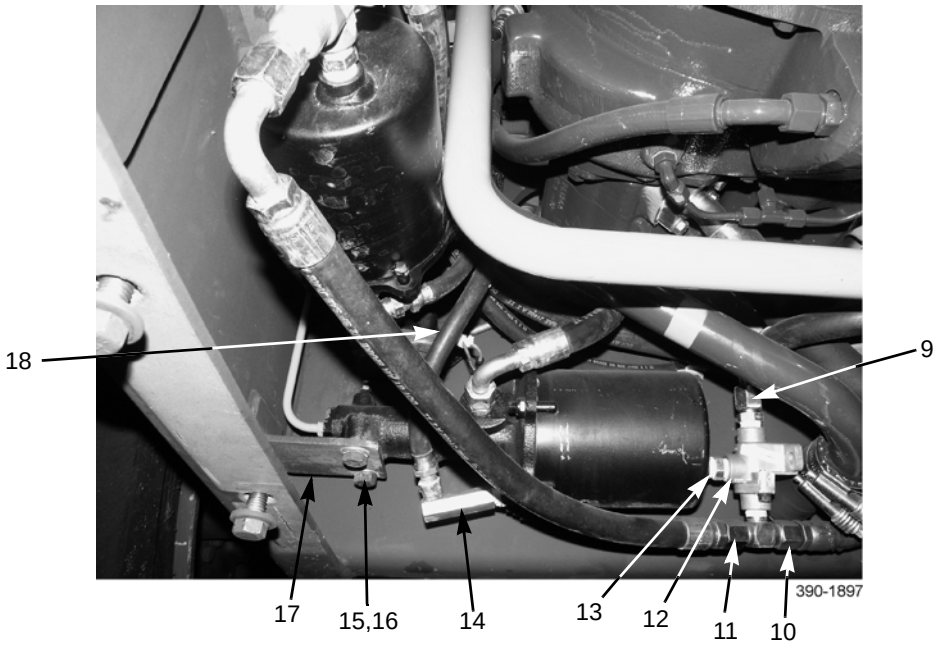
REMOVAL

1. Disconnect brake tube assembly (1) from air/hydraulic cylinder (2).
2. Remove two screws (3), lockwashers (4), and wires (5) from overstroke indicator (6).
3. Remove hose assembly (7) from adapter (8).



REMOVAL - CONTINUED

4. Disconnect hose (18) from elbow (14).
5. Disconnect hoses (9, 10, and 11) from check valve (12).
6. With assistance, remove two bolts (15) and washers (16) from bracket (17) and remove air/hydraulic cylinder (2) from machine.
7. Remove adapter (8), elbow (14), check valve (12), and adapter (13) from old cylinder (2).



INSTALLATION

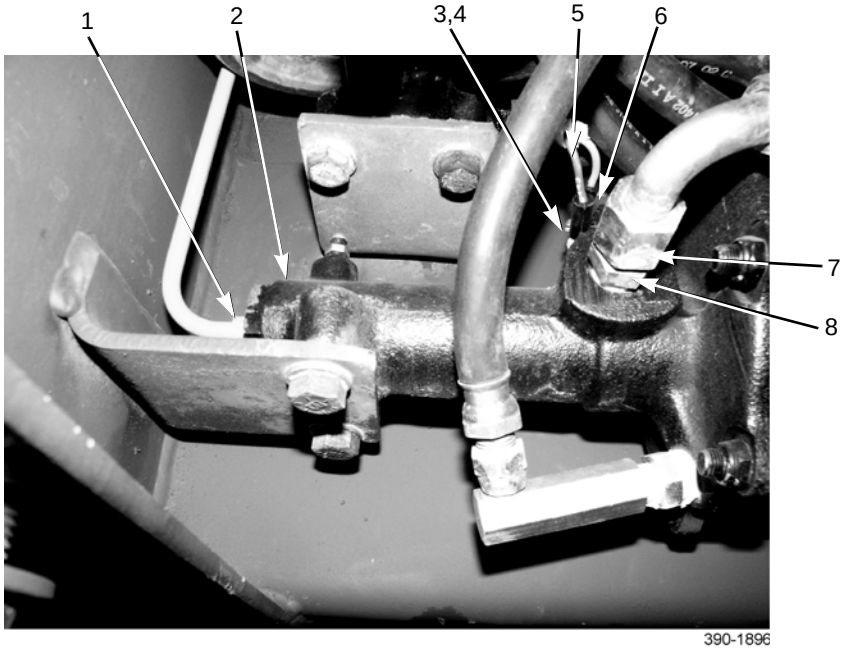
1. With assistance, position air/hydraulic cylinder (2) on bracket (17) and secure with two bolts (15) and washers (16).
2. Connect hoses (9, 10, and 11) to check valve (12).

NOTE

Remove old antiseizing tape and apply new antiseizing tape to male threads of air system fitting before connection is made.

3. Connect hose (18) to elbow (14).
4. Connect hose assembly (7) to adapter (8).
5. Install wires (5) to overstroke indicator (6) with two lockwashers (4) and screws (3).
6. Remove tags from wires (5).
7. Connect brake tube assembly (1) to air/hydraulic cylinder (2).

INSTALLATION - CONTINUED



8. Bleed air from brake system (WP 0093 00).

WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

9. Start engine and apply and release brakes (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). With assistance, check for air and brake fluid leaks.
10. Install center and rear guard plates (WP 0100 00).

END OF WORK PACKAGE

BRAKE CALIPER REPLACEMENT 0087 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Bracket, link (Item 6, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Materials/Parts - Continued

Rag, wiping (Item 31, WP 0171 00)

Personnel Required

Two

References

WP 0095 00

Equipment Condition

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

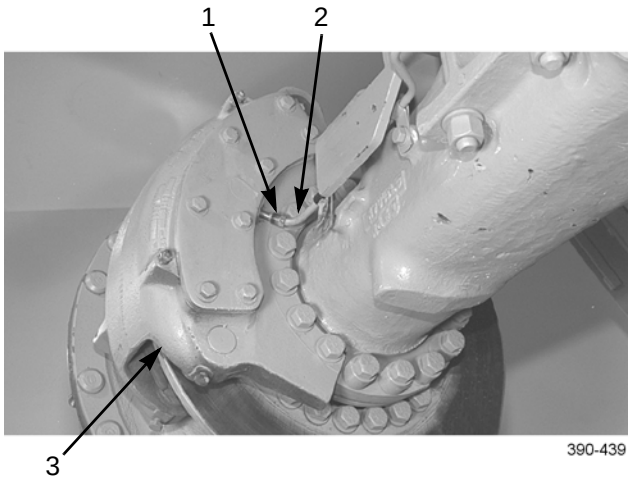
Front tire and rim removed (WP 0096 00)

NOTE

- Use a suitable container to catch any draining fluid. Ensure that all spills are properly cleaned up.
- Dispose of all fluids according to local policy and mandates.

REMOVAL

1. Loosen nut (1) and disconnect brake line (2) from brake caliper (3). Install protective cap on brake line.



REMOVAL - CONTINUED

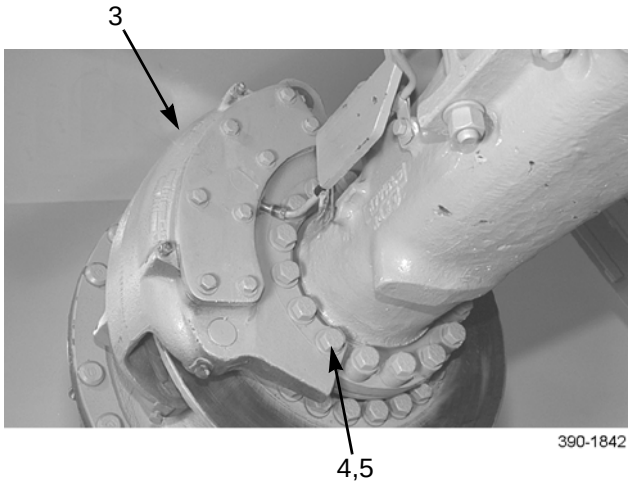
WARNING

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

Brake caliper weighs 106 lb (48 kg).

2. Remove two bolts from brake caliper (3) and install two links.
3. Attach nylon sling to links and to suitable lifting device.
4. With assistance, remove eight bolts (4), washers (5), and brake caliper (3) from machine.
5. If replacing brake caliper (3), remove links from caliper.



INSTALLATION

WARNING

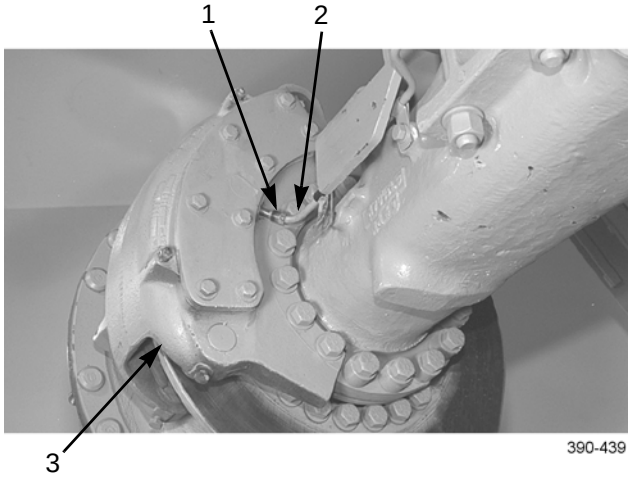
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

Brake caliper weighs 106 lb (48 kg).

INSTALLATION - CONTINUED

1. If installing a new brake caliper (3), remove two bolts from brake caliper and install two links.
2. Attach nylon sling to links and to suitable lifting device.
3. Position brake caliper (3) on machine and install eight bolts (4) and washers.
4. Remove links and resinstall two bolts to brake caliper (3).
5. Connect brake line (2) to brake caliper (3) and tighten nut (1).



6. Bleed brake system (WP 0095 00).
7. Install tire and rim (WP 0096 00).

END OF WORK PACKAGE

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PARKING BRAKE ACTUATOR REPLACEMENT 0088 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Tape, antiseizing (Item 40, WP 0171 00)

Pin, cotter

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Release parking brake (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). If air to release parking brake is not available, apply air to charge system using quick disconnect fitting at rear of machine's middle air tank, then release parking brake.

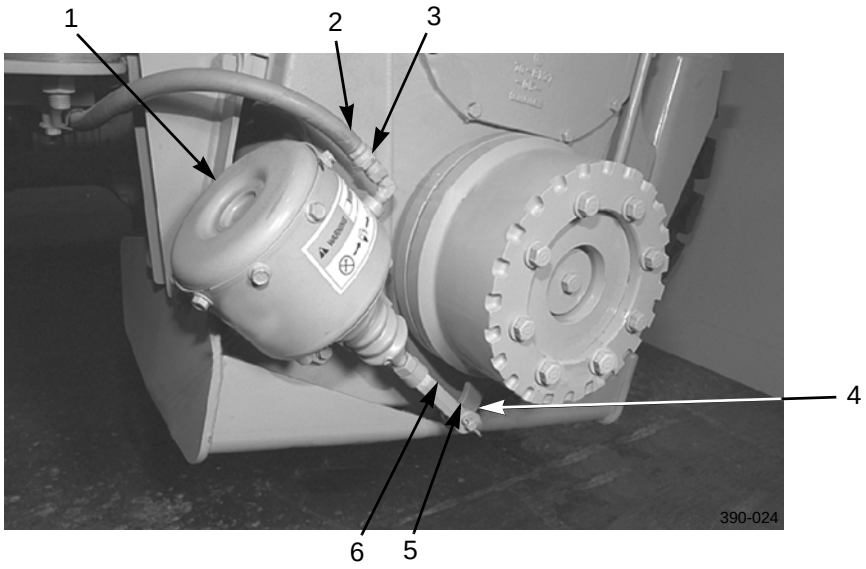
REMOVAL - CONTINUED

2. Remove cotter pin (4) and clevis pin (5) from yoke rod end (6). Discard cotter pin.
3. Drain air tanks (TM 5-3800-205-10 or TM 5-3800-205-10-2).

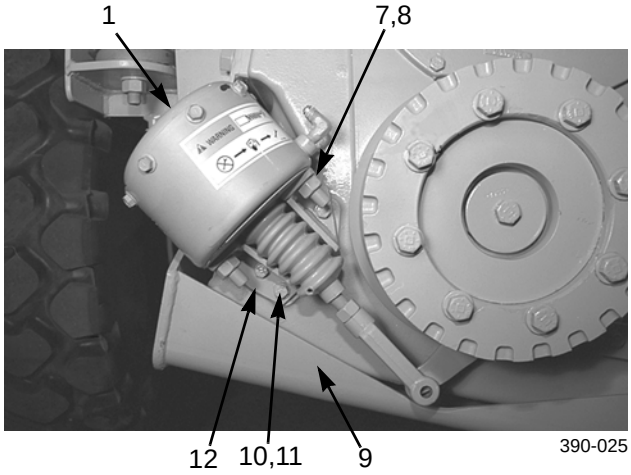
WARNING

- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

4. Loosen nut (3) and disconnect hose (2) from parking brake actuator (1).



5. Remove two nuts (7), washers (8), and parking brake actuator (1) bracket (12).
6. If damaged, remove two bolts (10), washers (11), and bracket (12) from transfer case (9).



INSTALLATION

1. If removed, install bracket (12) to transfer case (9) with two washers (11) and bolts (10).
2. Position parking brake actuator (1) on bracket (12).
3. Align yoke rod end (6) with parking brake lever and install two washers (8) and nuts (7). Tighten nuts to 89 lb-ft (120 Nm).

NOTE

Apply antiseizing tape to male threads of fittings before connection is made.

4. Position hose (2) on parking brake actuator (1) and tighten nut (3).
5. Install clevis pin (5) and new cotter pin (4) on yoke rod end (6).
6. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

7. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
8. Operate parking brake and check for air leaks.

END OF WORK PACKAGE

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PARKING BRAKE OR EMERGENCY BRAKE CONTROL VALVE REPLACEMENT 0089 00

THIS WORK PACKAGE COVERS

Removal and Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Pin, spring (3)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

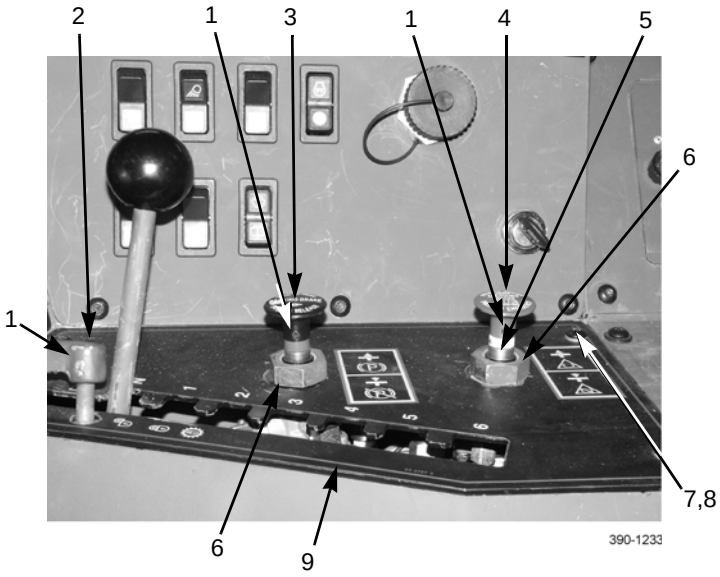
REMOVAL

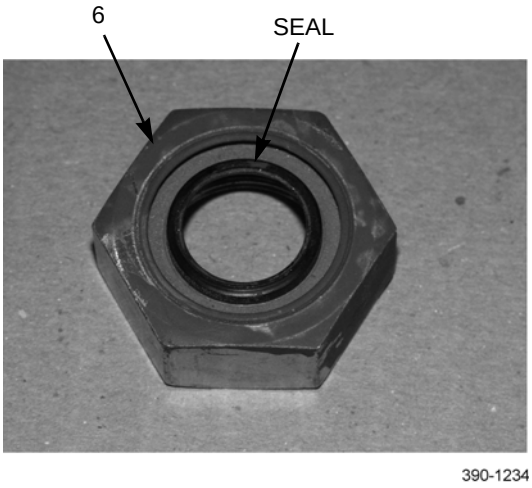
1. Remove spring pins (1) from neutral lock, parking brake, and emergency brake handles (2,3, and 4). Discard spring pins.
2. Remove lock handle (2).
3. Remove handles (3 and 4) from two valves (5).
4. Remove nuts (6) from valves (5).
5. Inspect seal inside nuts (6) for cracks or damage. If seals are cracked or damaged, replace nut(s).

NOTE

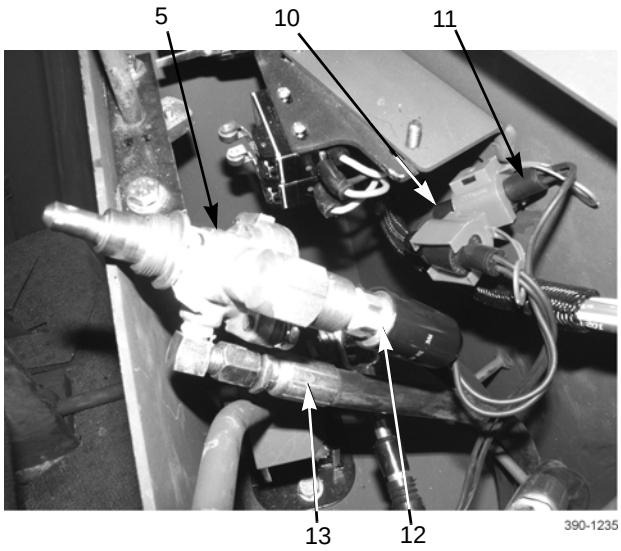
Panel does not have to be completely removed to access control valves. Slide panel up transmission shift lever and turn panel to left.

6. Remove four screws (7) and washers (8) from panel (9).





7. Disconnect pressure switch connector (10) from harness connector (11).
8. Remove switch (12) from valve (5).
9. Tag and disconnect two hoses (13) from valve (5) and remove valve.
10. Remove adapters, tees and elbows from old valve (5). Remove antiseizing tape from threads of adapters, tees and elbows.



INSTALLATION

1. Apply antiseizing tape to male threads of adapters, tees, and elbows.
2. Install adapters, tees and elbows in new valve (5).
3. Connect two hoses (13) to valve (5).
4. Apply antiseizing tape to male threads of switch (12).
5. Install switch (12) in valve (5).
6. Connect pressure switch connector (10) to harness connector (11).
7. Position panel (9) on console, with valves (5) through panel openings. Secure panel with four screws (7) and washers (8).
8. Secure valves (5) in panel (9) with nuts (6).
9. Position handles (3 and 4) on valves (5). Position lock handle (2).
10. Install new spring pins (1) in handles (2, 3, and 4).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

11. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
12. Operate parking or emergency brake control (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). With assistance, check for air leaks.

END OF WORK PACKAGE

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SERVICE BRAKE CONTROL VALVE REPLACEMENT 0090 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Gasket (2)

Lockwasher (3)

Pin, cotter

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

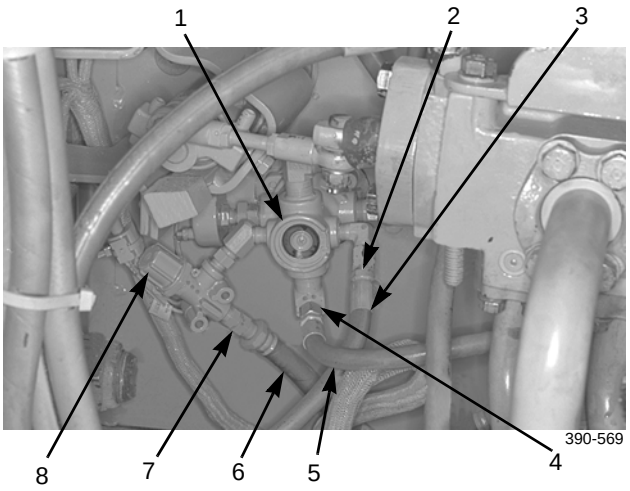
- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

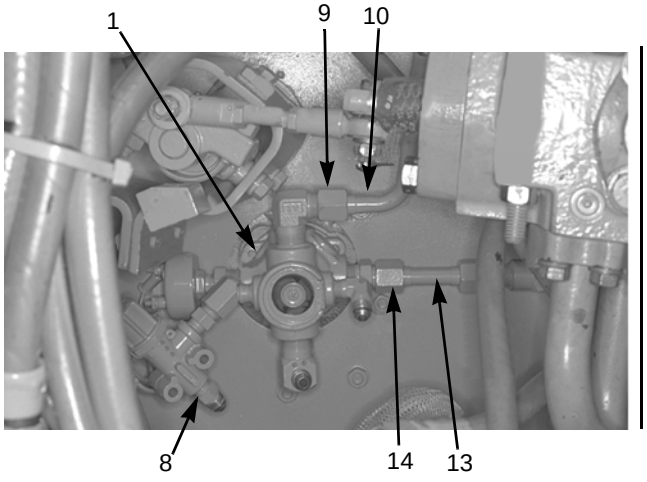
- Service brake control valve is located under cab, beneath service brake pedal.
- Tag all hoses and tubes to aid in installation.

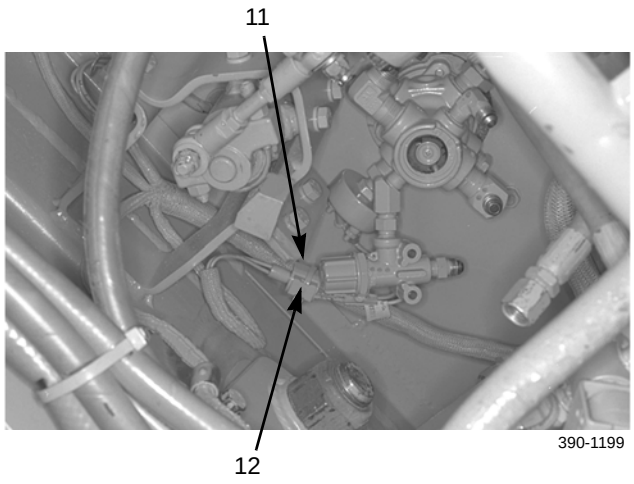
REMOVAL

1. Loosen nut (7) and disconnect hose (6) from pressure protection valve (8).
2. Loosen nut (4) and disconnect hose (5) from service brake control valve (1).
3. Loosen nut (2) and disconnect hose (3) from service brake control valve (1).



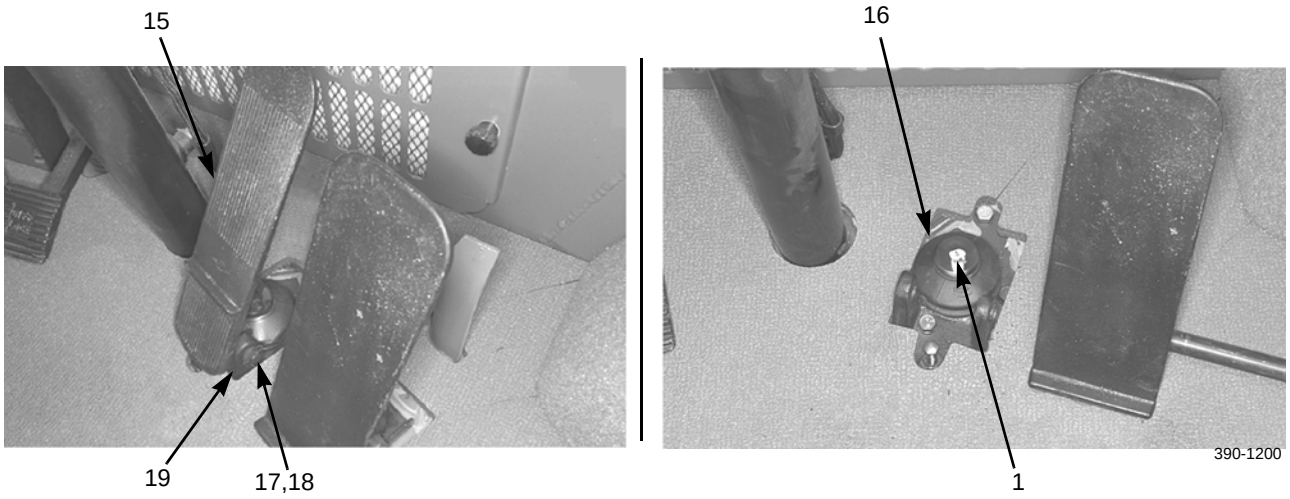
4. Loosen nut (9) and disconnect tube (10) from service brake control valve (1).
5. Loosen nut (14) and disconnect tube (13) from service brake control valve (1).
6. As required, cut wire tiedown strap (12). Disconnect electrical connection (11).



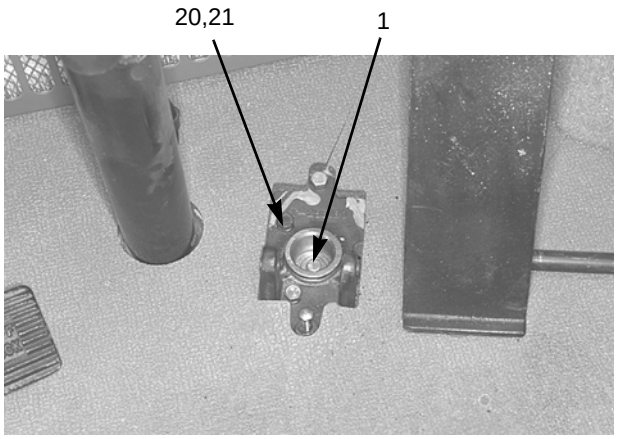


REMOVAL - CONTINUED

7. Remove cotter pin (17), clevis pin (18), and brake pedal (15) from brake pedal mounting plate (19). Discard cotter pin.
8. Remove rubber boot (16) from service brake control valve (1).



9. Remove three bolts (20), lockwashers (21), service brake control valve (1) and two gaskets from brake pedal mounting plate (19) and from floor of cab. Discard lockwashers and gaskets.
10. Separate pressure protection valve (8) from service brake control valve (1).
11. Remove all fittings from service brake control valve (1).

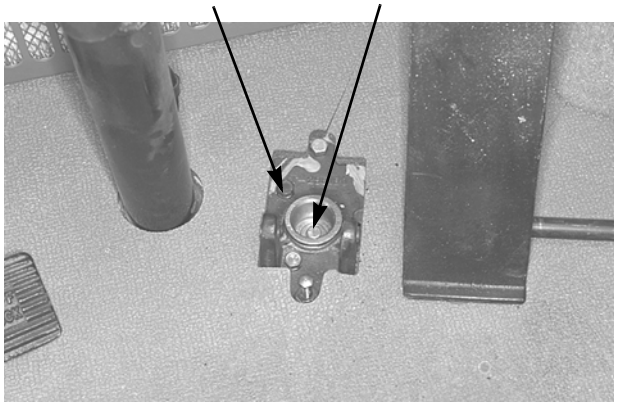


INSTALLATION

NOTE

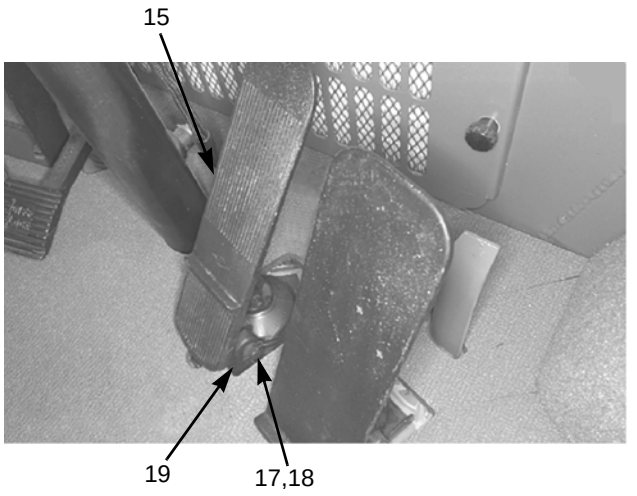
Remove old antiseizing tape and apply new antiseizing tape to male threads of all fittings before connections are made.

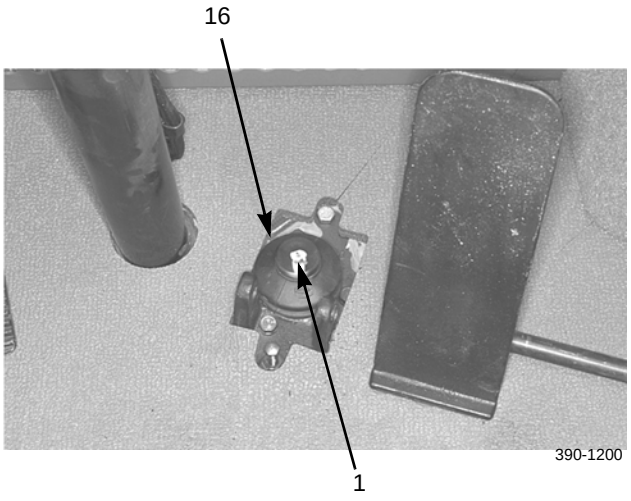
1. Install a new service brake control valve (1), with fittings removed from old valve.
2. Install pressure protection valve (8) to service brake control valve (1).
3. Install two new gaskets and service brake control valve (1) on floor of cab and brake pedal mounting plate (19) with three new lockwashers (21) and bolts (20).



390-574

4. Install rubber boot (16) on service brake control valve (1).
5. Install brake pedal (15) on brake pedal mounting plate (19) with clevis pin (18) and new cotter pin (17).

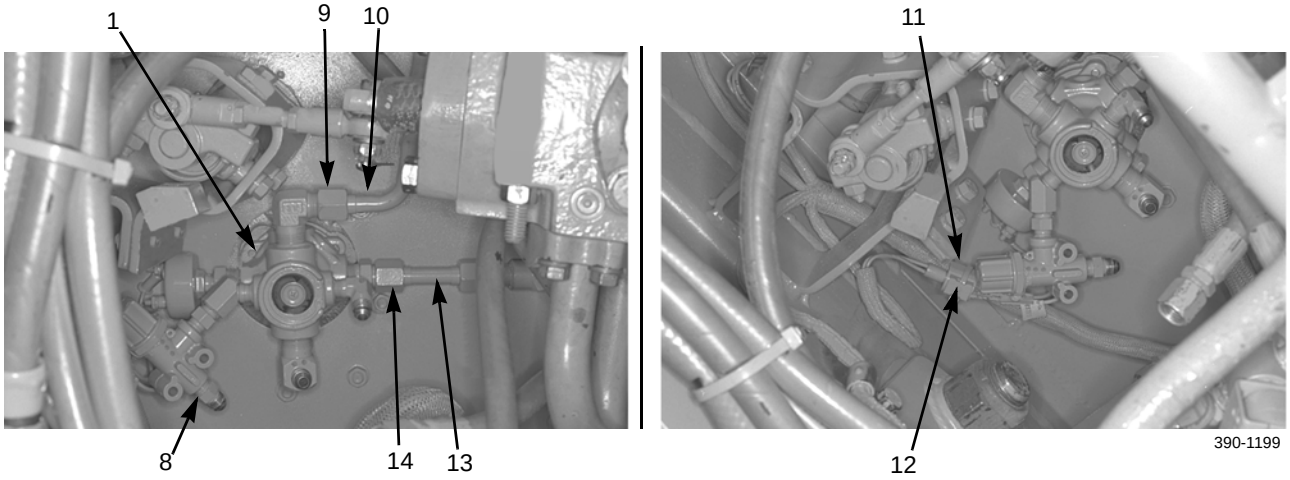




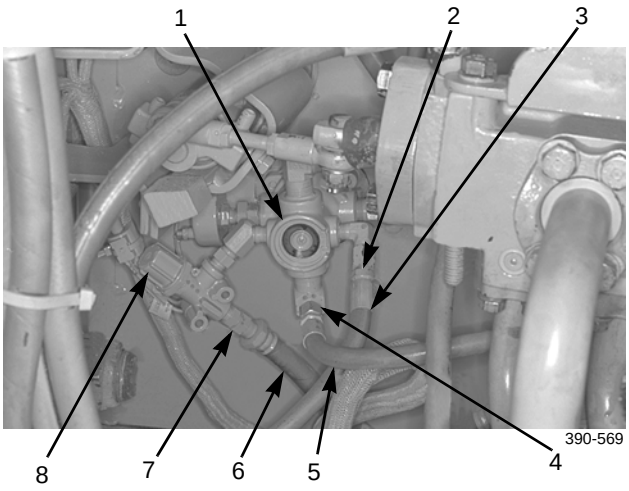
390-1200

INSTALLATION - CONTINUED

6. Connect electrical connection (11). Attach a new tiedown strap (12) to electrical connection.
7. Position tube (13) on service brake control valve (1) and tighten nut (14).
8. Position tube (10) on service brake control valve (1) and tighten nut (9).



9. Position hose (6) on pressure protection valve (8) and tighten nut (7).
10. Position hose (5) on service brake control valve (1) and tighten nut (4).
11. Position hose (3) on service brake control valve (1) and tighten nut (2).





WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

12. Start engine and fully charge air system (TM 5-3800-20510-1 or TM 5-3800-205-10-2).
13. Depress and release service brake pedal and, with assistance, check for leaks and proper operation of service brakes.

END OF WORK PACKAGE

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PRESSURE PROTECTION VALVE REPLACEMENT 0091 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tape, antiseizing (Item 40, WP 0171 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

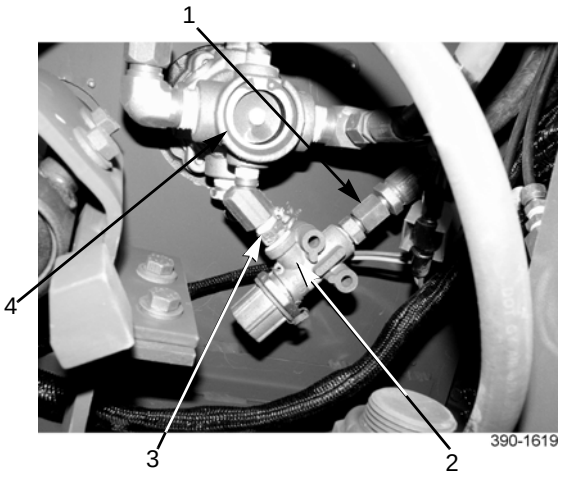
- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

Pressure protection valve is located beneath service brake pedal and is installed on service brake control valve under cab.

REMOVAL

1. Disconnect hose (1) from pressure protection valve (2).
2. Remove valve (2) from service brake control valve (4).
3. Remove adapters (3) from valve (2).
4. Remove antiseizing tape from threads of adapters (3).



INSTALLATION

NOTE

Remove old antiseizing tape and apply new antiseizing tape to male threads of all fittings before connections are made.

1. Install adapters (3) in new valve (2).
2. Install valve (2) on service brake control valve (4).
3. Connect hose (1) to valve (2).
4. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
6. Depress and release service brake pedal. With assistance, check for leaks at pressure protection valve.

END OF WORK PACKAGE

DOUBLE CHECK VALVES REPLACEMENT 0092 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

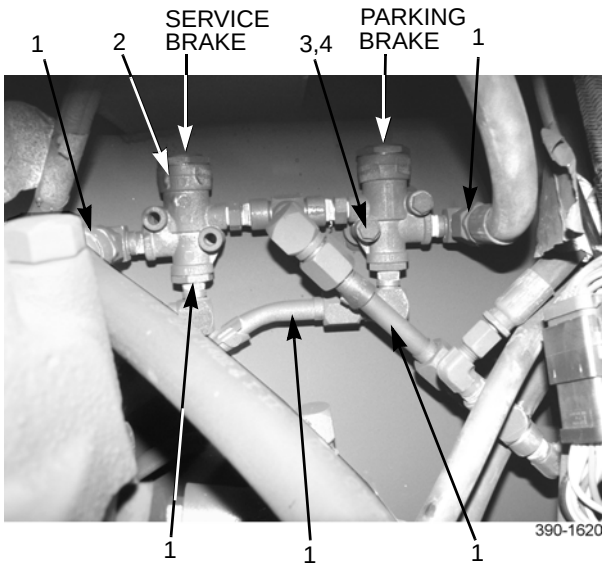
- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

- Double check valves are located beneath seat assembly and under cab floor.
- Tag hoses and tubes to aid in installation.

REMOVAL

1. Disconnect hoses and tubes (1) from double check valves (2).
2. Remove two screws (3), washers (4), and valves (2) from machine.
3. Remove elbows, tees, and adapters from valves (2).
4. Remove antiseizing tape from threads of elbows, tees, and adapters.



INSTALLATION

NOTE

Remove old antiseizing tape and apply new antiseizing tape to male threads of all fittings before connections are made.

1. Install elbows, tees, and adapters in new valves (2).
2. Install two screws (3), washers (4), and valves (2) on machine.
3. Connect hose and tubes (1) to double check valves (2).
4. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
6. Depress and release service brake pedal and, with assistance, check for leaks and proper operation of service brakes.

END OF WORK PACKAGE

AIR HOSES AND TUBES REPLACEMENT 0093 00

THIS WORK PACKAGE COVERS

Air Hoses Replacement

Air Tubes Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Materials/Parts - Continued

O-ring (as required)

Equipment Condition

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Guard plates removed (WP 0100 00)



WARNING

- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

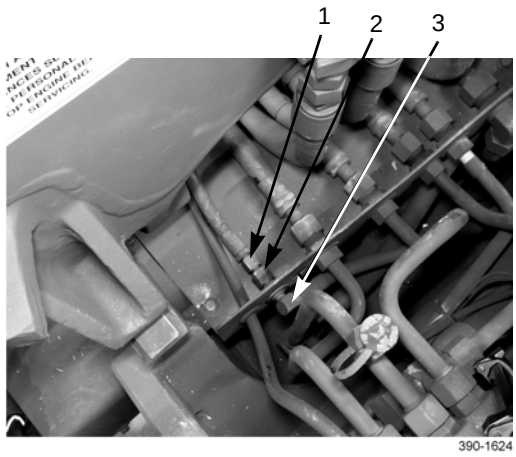
Tag hoses and tubes to aid in installation.

AIR HOSES REPLACEMENT

NOTE

Perform following steps to replace each of 30 tractor air hoses. Hoses are connected to adapters, elbows, fittings, and air tubes.

1. At right-rear of tractor, disconnect hose (1) from adapter (2) at elbow (3).

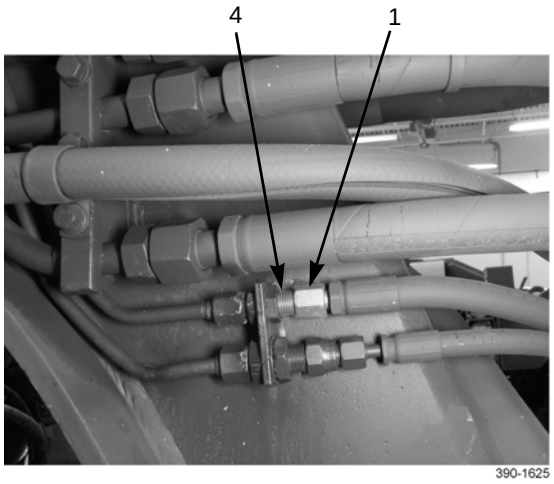


2. Disconnect other end of hose (1) from fitting (4).
3. Cut tiedown straps and remove screws and hose clamps to separate each hose from machine.
4. Remove hose (1) from machine.

NOTE

Fittings include elbows, adapters, connectors, and O-rings. Discard O-rings when removed.

5. Remove fittings from machine.



NOTE

Remove old antiseizing tape and apply new antiseizing tape to male threads of all fittings before connections are made.

6. Install fittings and new O-rings to machine.
7. Position hose (1) to machine.
8. Connect hose (1) to fitting (4).

AIR HOSES REPLACEMENT - CONTINUED

NOTE

Install hose clamps, screws, and new tiedown straps to secure each hose to machine.

9. Connect other end of hose (1) to adapter (2) at elbow (3).
10. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

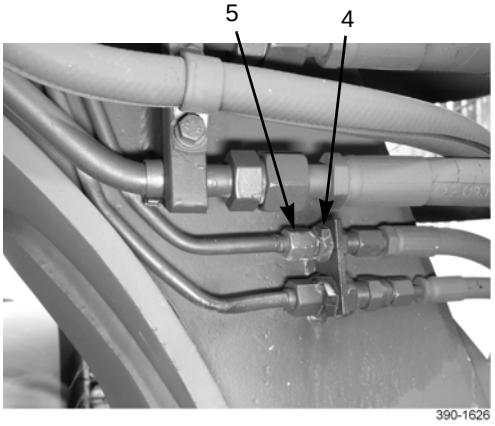
11. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
12. Check for air leaks.
13. Install guard plates (WP 0100 00).
14. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

AIR TUBES REPLACEMENT

NOTE

Perform following steps to replace each of nine tractor air tubes. Tubes are connected to hoses, adapters, elbows, and air system components.

1. At right-rear of tractor, disconnect tube (5) from fitting (4).



AIR TUBES REPLACEMENT - CONTINUED

2. Disconnect hose (6) from other end of tube (5).

NOTE

Remove screws and clamps to separate tube from machine.

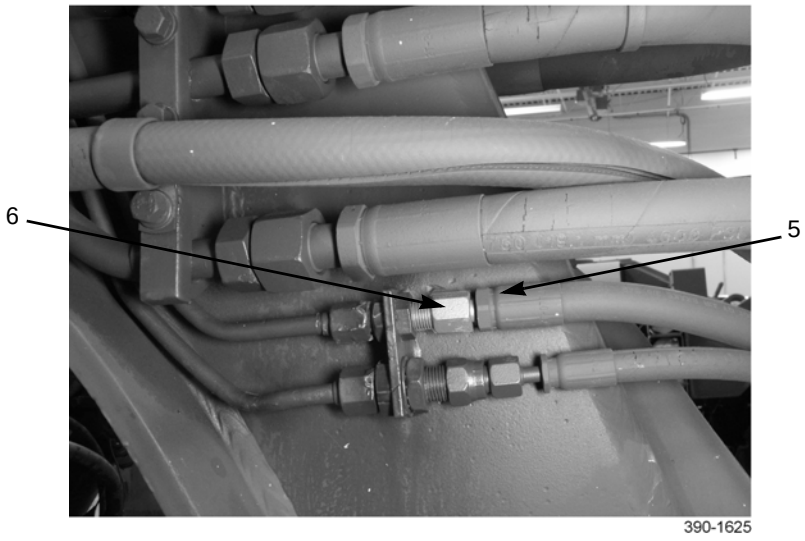
1. Remove tube (5) from machine.

1. Position tube (5) to machine.

NOTE

Remove old antiseizing tape and apply new antiseizing tape to male threads of all fittings before connections are made.

2. Connect hose (6) to tube (5).



NOTE

Install clamps and screws to secure tube to machine.

3. Connect other end of tube (5) to fitting (4).
4. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

5. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
6. Check for air leaks.
7. Install guard plates (WP 0100 00).
8. Close engine access door (TM 5-3800-205-10-1 or TM 5-380-205-10-2).

END OF WORK PACKAGE

AIR TANKS REPLACEMENT 0094 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Tape, antiseizing (Item 40, WP 0171 00)

Locknut (12)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

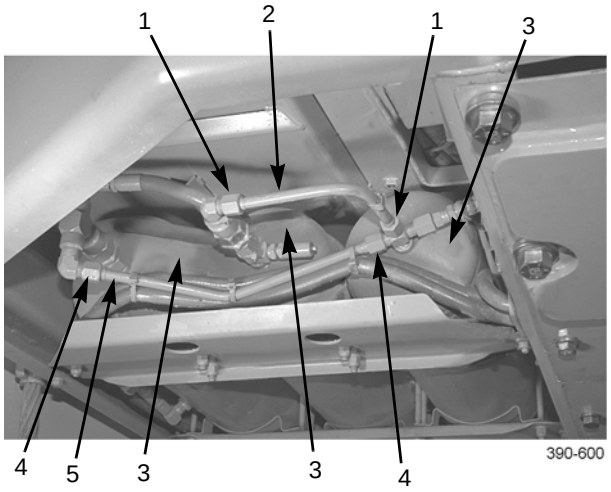
- Do NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

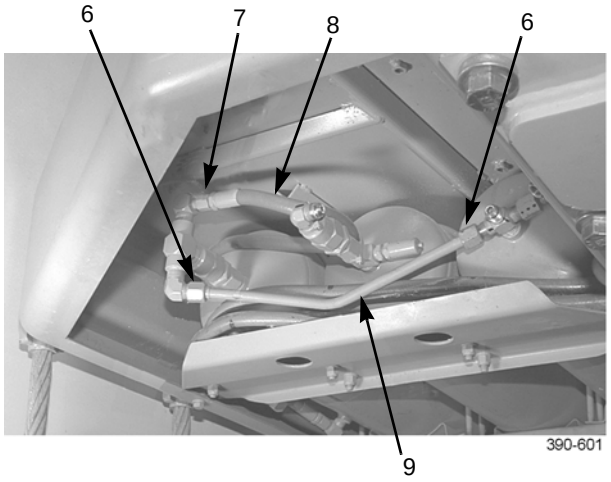
Tag hoses and tubes to aid in installation.

REMOVAL

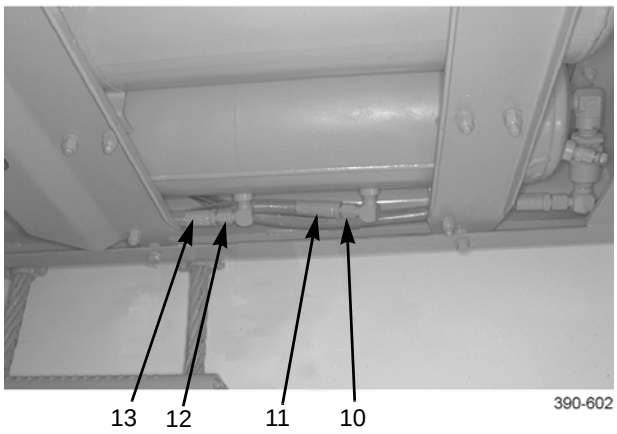
1. Loosen two nuts (1) and remove tube (2) from air tanks (3).
2. Loosen two nuts (4).
3. Cut tiedown straps as required and remove hose (5). Discard tiedown straps.



4. Loosen two nuts (6) and remove tube (9).
5. Loosen nut (7) and disconnect hose (8).

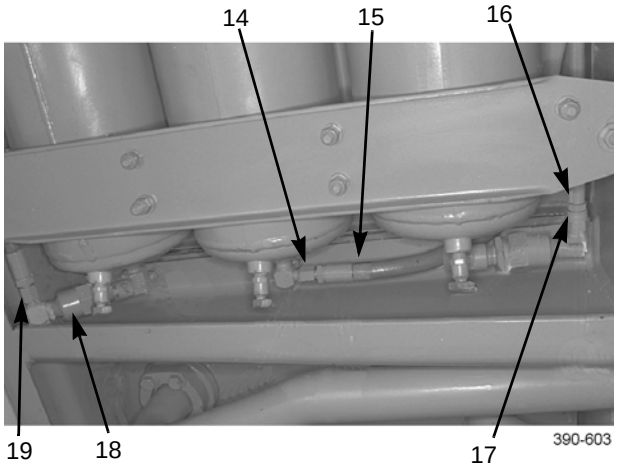


6. Loosen nut (10) and disconnect hose (11).
7. Loosen nut (12) and disconnect hose (13).



REMOVAL - CONTINUED

8. Loosen nut (18) and disconnect hose (19).
9. Loosen nut (14) and disconnect hose (15).
10. Loosen nut (17) and disconnect hose (16).





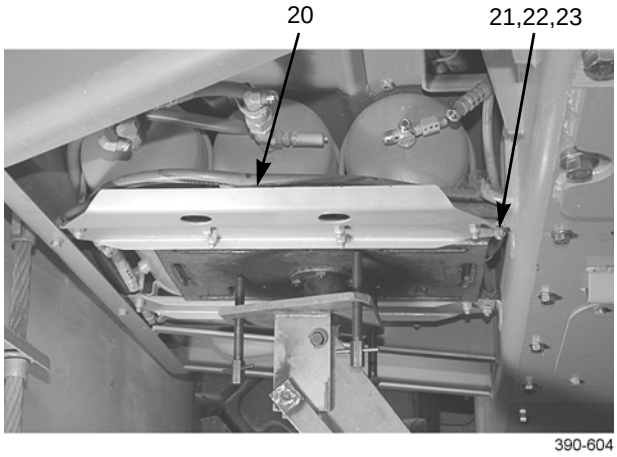
WARNING

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 lift 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

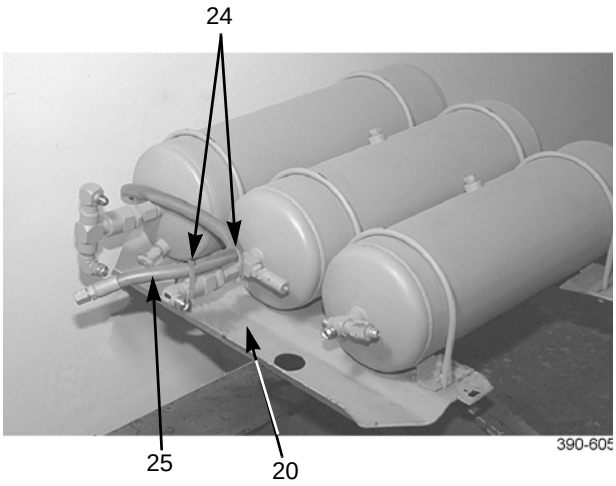
Three air tanks together weigh 132 lb (60 kg).

11. Place lifting device under air tanks (20) and remove four bolts (21), eight washers (22), and four nuts (23).
12. Carefully lower air tanks (20).

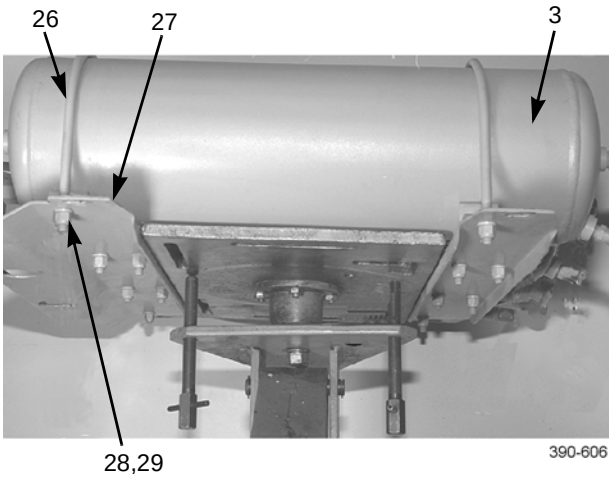


REMOVAL - CONTINUED

13. Cut two tiedown straps (24) and remove hose (25) from air tanks (20). Discard tiedown straps.



14. Remove 12 locknuts (28), washers (29), six U-bolts (26) and two plates (27). Discard locknuts.
15. Remove each air tank (3) from lifting device.



INSTALLATION

1. Position each air tank (3) on suitable lifting device and install two plates (27) with six U-bolts (26), 12 washers (29) and new locknuts (28).
2. Install hose (25) on air tanks (20). Secure hose with two new tiedown straps (24).

INSTALLATION - CONTINUED



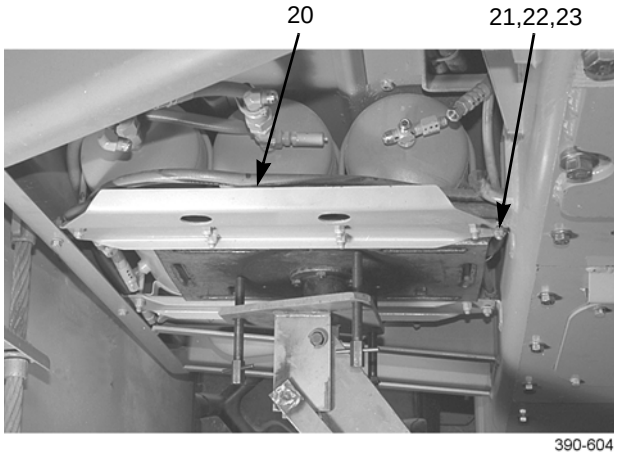
WARNING

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 lift 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

Three air tanks together weigh 132 lb (60 kg).

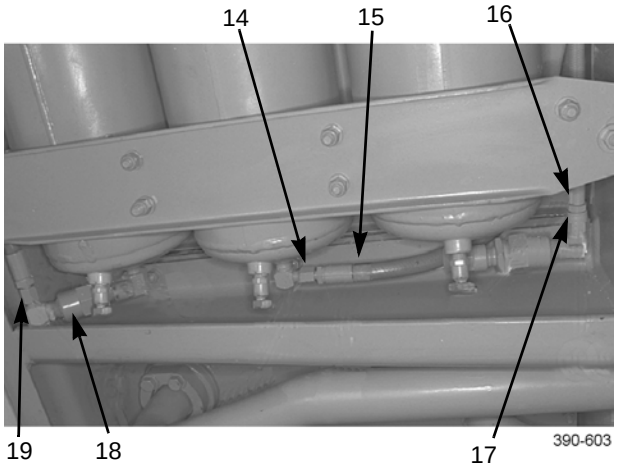
3. Position air tanks (20) on machine and install four bolts (21), eight washers (22), and four nuts (23).



NOTE

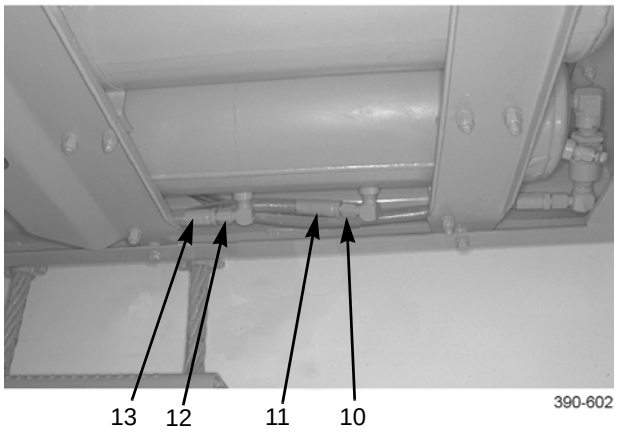
Remove old antiseizing tape from male fittings and apply new tape before connections are made.

4. Connect hose (16) and tighten nut (17).
5. Connect hose (15) and tighten nut (14).
6. Connect hose (19) and tighten nut (18).

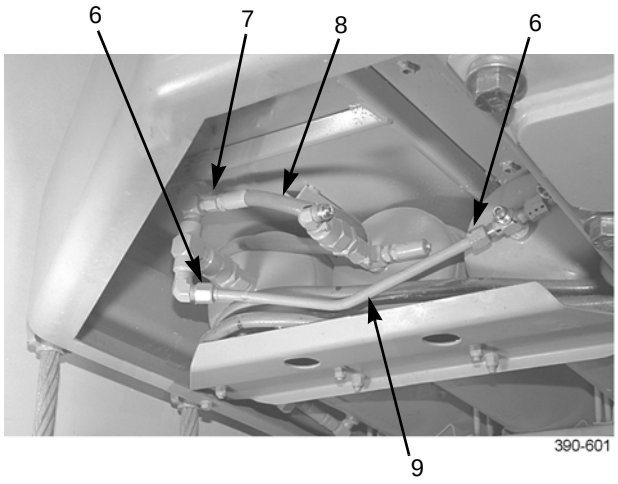


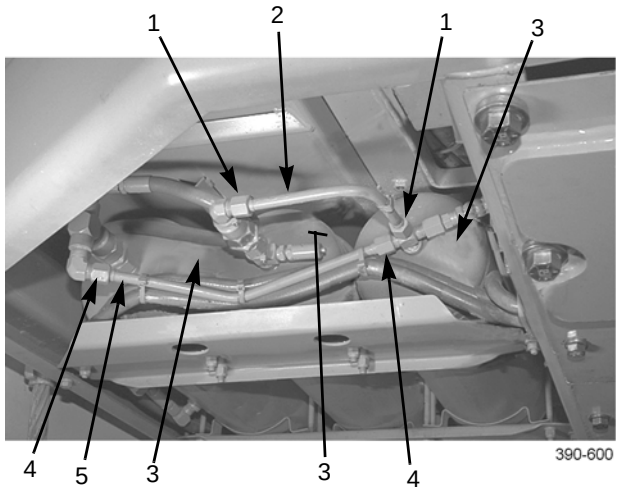
INSTALLATION - CONTINUED

7. Connect hose (13) and tighten nut (12).
8. Connect hose (11) and tighten nut (10).



9. Connect hose (8) and tighten nut (7).
10. Connect tube (9) and tighten two nuts (6).
11. Install hose (5) and tighten two nuts (4). Secure hose with two new tiedown straps.
12. Install tube (2) and tighten two nuts (1) on air tanks (3).





13. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

14. Start engine and fully charge air system (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
15. With assistance, check for air leaks.

END OF WORK PACKAGE

SERVICE BRAKE BLEEDING 0095 00

THIS WORK PACKAGE COVERS

Bleeding

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Brake fluid (Item 4, WP 0171 00)

Materials/Parts - Continued

Hose, clear, neoprene (Item 18, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

References

WP 0010 00

Personnel Required

Two

Equipment Condition

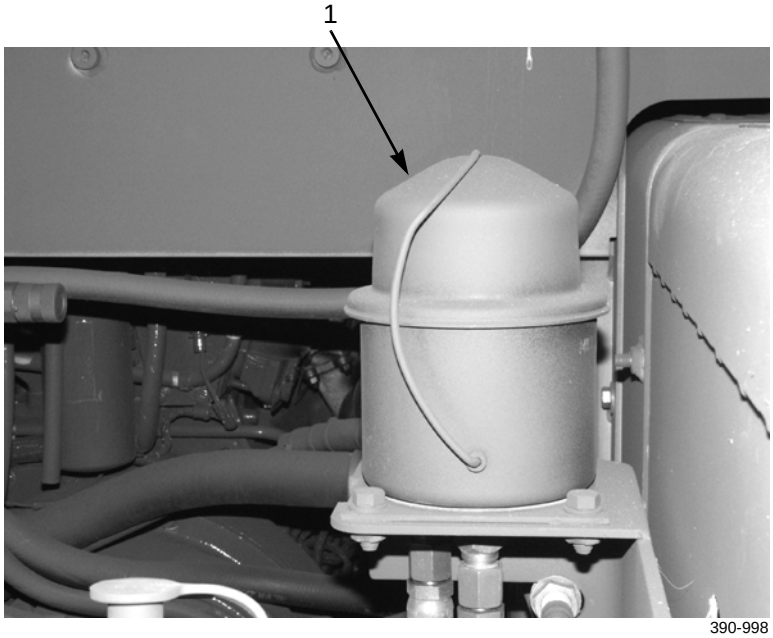
Rear guard plate removed (WP 0100 00)

BLEEDING

CAUTION

- Ensure that brake fluid reservoir, air/hydraulic brake cylinder, and caliper bleed screws are free of external contamination such as dirt, grease, and oil. Failure to follow this caution may result in contamination of brake system.
- Ensure that brake fluid reservoir is full prior to connecting power bleed unit. Failure to follow this caution may result in damage to brake system.

1. Connect power bleed unit to brake fluid reservoir (1).
2. Using power bleed unit, allow system air pressure to reach 125 psi (862 kPa).



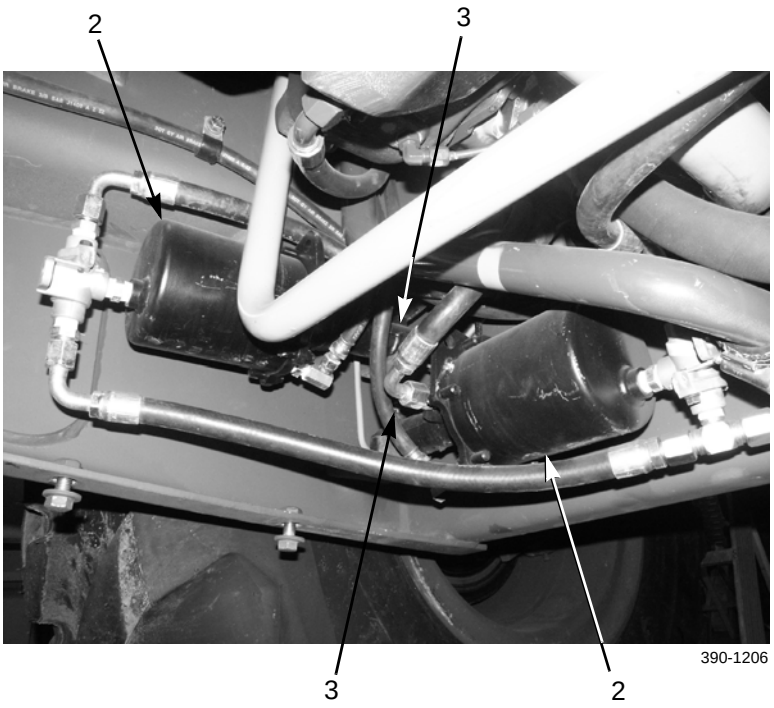
390-998

BLEEDING - CONTINUED

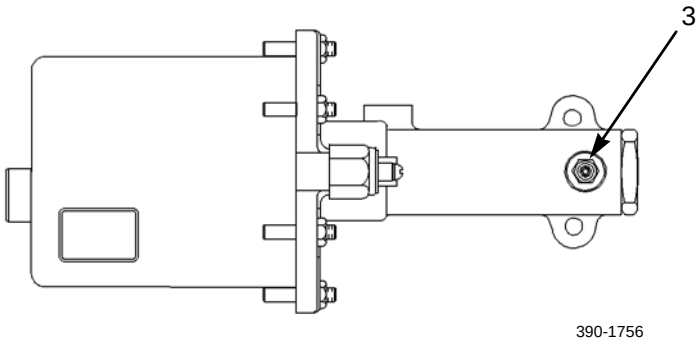
NOTE

- Care must be taken to ensure that fluids are contained during maintenance of machine. Be prepared to collect fluid with suitable containers before opening any component or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Bleed air/hydraulic brake cylinders before bleeding wheel brake calipers.
- Perform steps 3 and 4 for both air/hydraulic brake cylinders.

3. Attach clear hose to bleed screw (3) on air/hydraulic brake cylinder (2).



4. Open bleed screw (3) and allow fluid to flow. Close bleed screw when bubble-free fluid is observed. Remove hose from bleed screw.

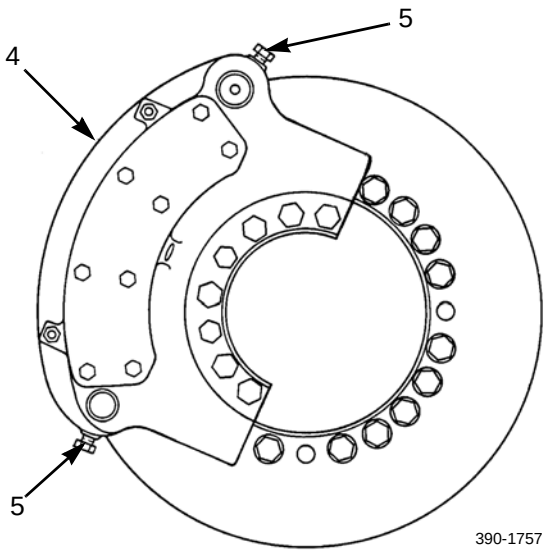


BLEEDING - CONTINUED

NOTE

Wheel brake calipers have two bleed screws per caliper. When bleeding caliper do one bleed screw at a time.

5. Install clear hose on bleed screw (5). Open one bleed screw on caliper (4) to allow fluid flow. Close bleed screw when bubble-free fluid flow is observed. Remove hose from bleed screw.
6. Repeat step 5 for other bleed screw (5) on caliper (4).



7. Disconnect power bleed unit.
8. Ensure brake fluid reservoir is full before installing cover (WP 0010 00).
9. Install rear guard plate (WP 0100 00).

END OF WORK PACKAGE

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FRONT TIRE AND RIM REPLACEMENT 0096 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 2 (Item 24, WP 0172 00)

Guard, safety, tire inflation (Item 12, WP 0172 00)

Jack, dolly type, hydraulic (Item 17, WP 0172 00)

Stand, maintenance (Item 29 or 30, WP 0172 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake engaged (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Loosen 16 nuts (1).

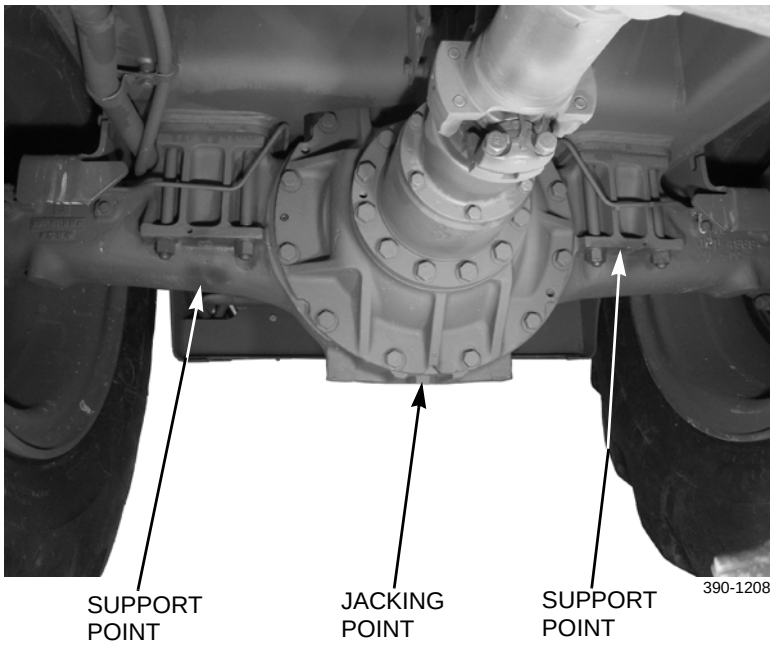


390-017

REMOVAL - CONTINUED

2. Position lift stand under tractor frame at jacking point.

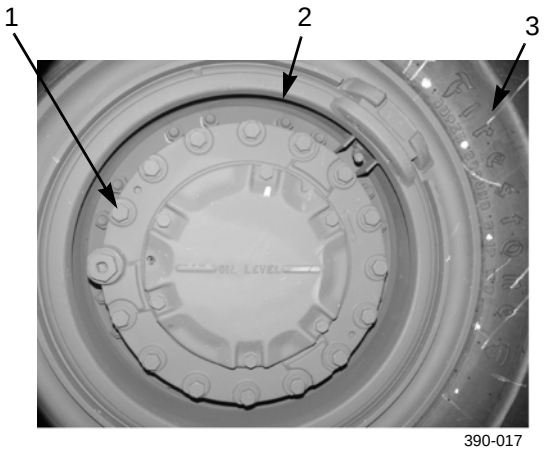
3. Raise tractor and position two suitable supports at support points.

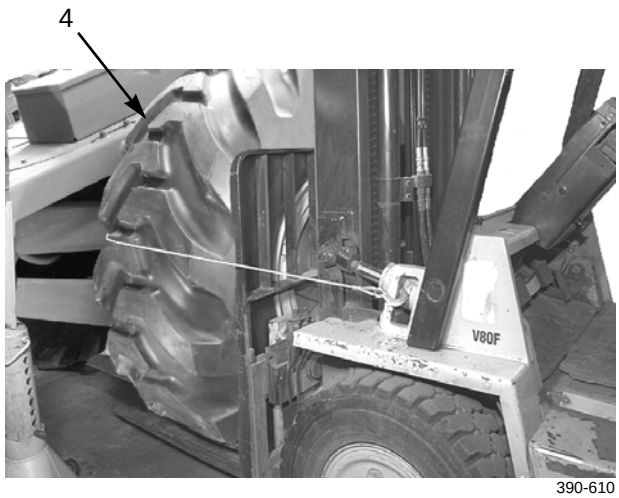


NOTE

Sixteen nuts are used to secure tire to tractor. Remove only 14 at this time.

4. Remove 14 nuts (1) and washers (2) from rim (3). Leave two nuts on rim to hold tire (4) in place.





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

Tire and rim assembly weighs 928 lb (421 kg).

5. Secure tire (4) to lift truck and remove two remaining nuts (1), washers (2), and tire from tractor.
6. If required, tire and rim assembly may be disassembly at a local repair facility.

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.

NOTE

Tire and rim assembly weighs 928 lb (421 kg).

1. Position tire (4) on tractor.
2. Install two washers (2) and nuts (1) on rim (3) and remove lift truck from tire (4).
3. Install 14 remaining washers (2) and nuts (1) on rim (3). Tighten nuts to 105 lb-ft (140 Nm).
4. Tighten nuts (1) to 370 lb-ft (500 Nm).
5. Remove two stands and use floor jack to lower tractor to ground.

WARNING

Use of a tire inflation safety cage is required if tire has inflation pressure of 36 psi (248 kPa) or less. Failure to do so may result in injury or death to personnel.

6. Check tire pressure and add air as required (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

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STEERING WHEEL AND COLUMN REPLACEMENT 0097 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Pin, cotter

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Tractor and scraper/water distributor aligned

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

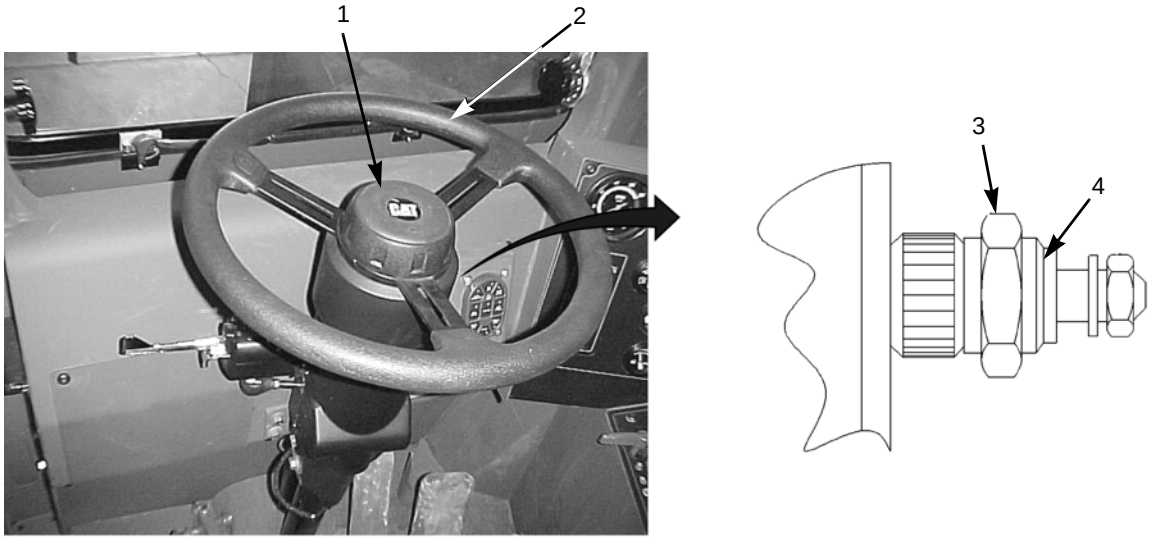
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-1-10 or TM 5-3800-205-10-2)

STEERING WHEEL REMOVAL

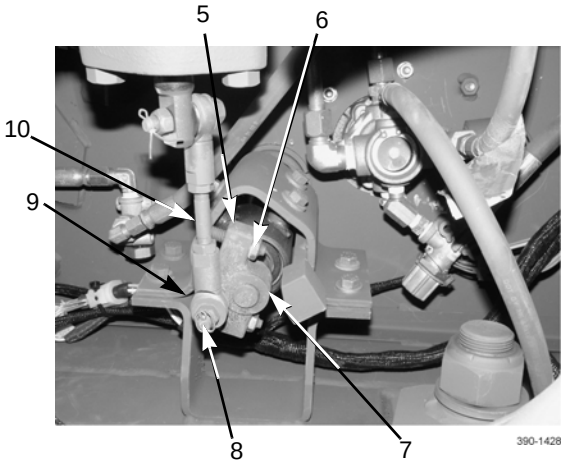
1. Remove air horn button (1) from steering wheel (2). Disconnect electrical connector from air horn button and remove air horn button.
2. Remove steering nut (3) from steering column (4).
3. Using steering wheel puller, remove steering wheel (2) from steering column (4).



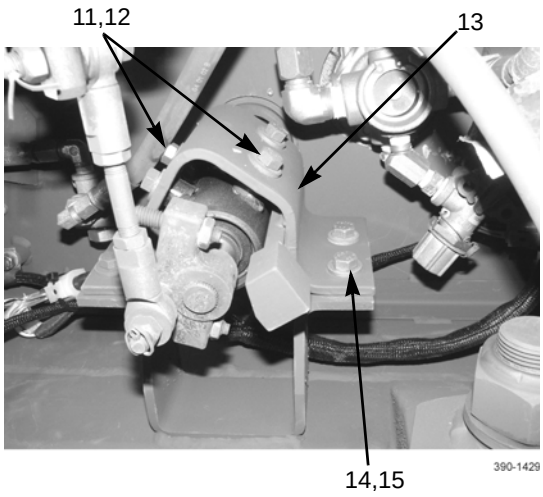
390-1427

REMOVAL - CONTINUED

4. Remove cotter pin (8), linkage nut (9), and remove steering linkage (10). Discard cotter pin.
5. Remove stop screw (7), two nuts (6), and steering stop (5).

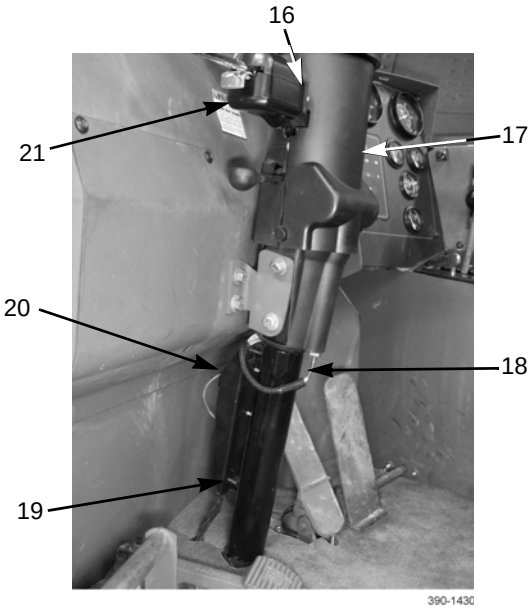


6. Remove four bolts (11) and washers (12) from steering mount bracket (13).
7. Remove four bolts (14), washers (15), and steering mount bracket (13).

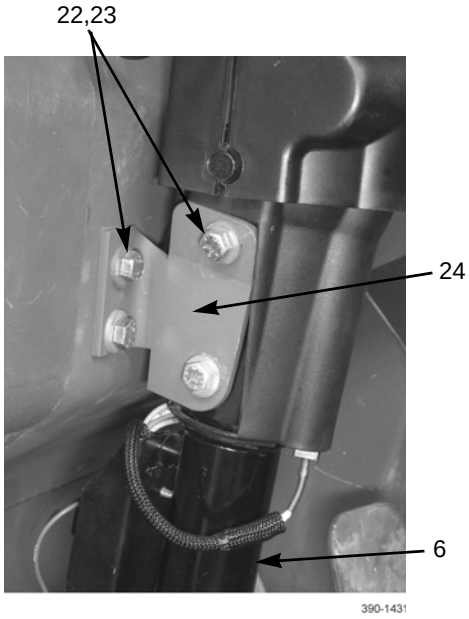


REMOVAL - CONTINUED

8. Disconnect electrical wire (18).
9. Remove cover from turn signal connector box (20) and remove two bolts (19).
10. Remove steering column cover (17) and disconnect turn signal connector.
11. Remove two screws (16), ground wire and turn signal (21).

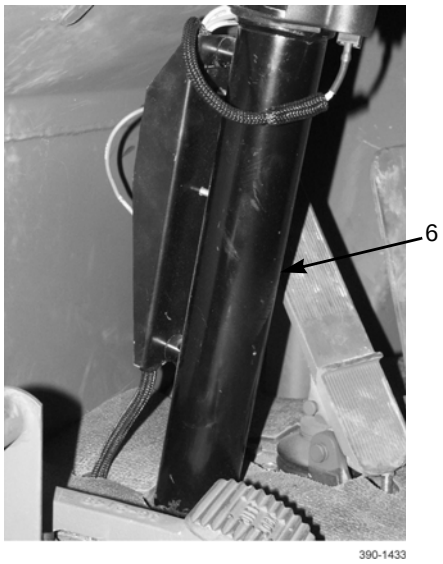


12. Remove four bolts (22), washers (23), and steering column mount bracket (24) from each side of steering column (6).



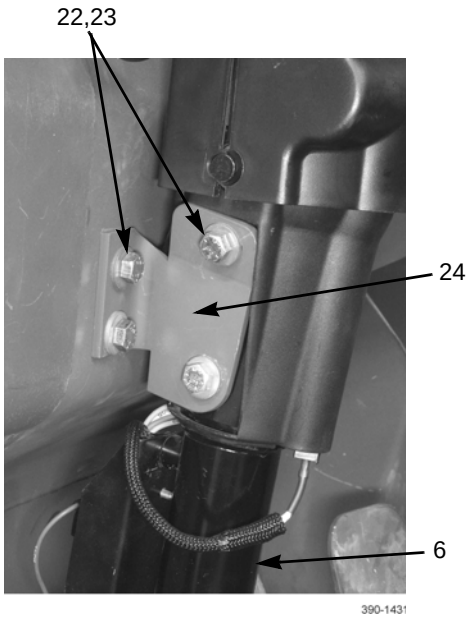
REMOVAL - CONTINUED

13. Remove steering column (6).



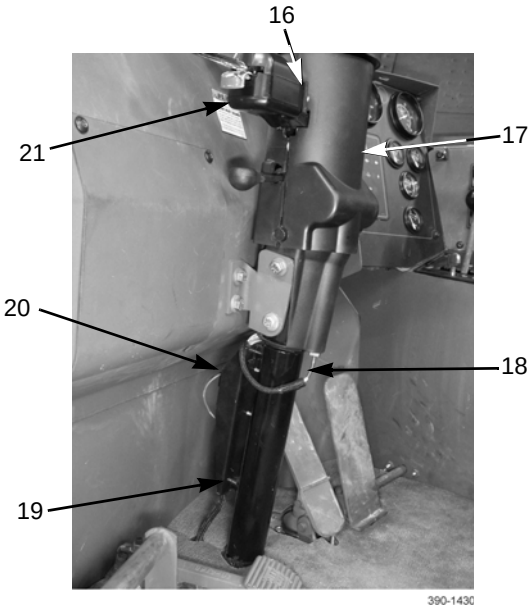
INSTALLATION

1. Carefully position steering column (6) in steering column housing and install mount bracket (24) on each side with four bolts (22) and washers (23).

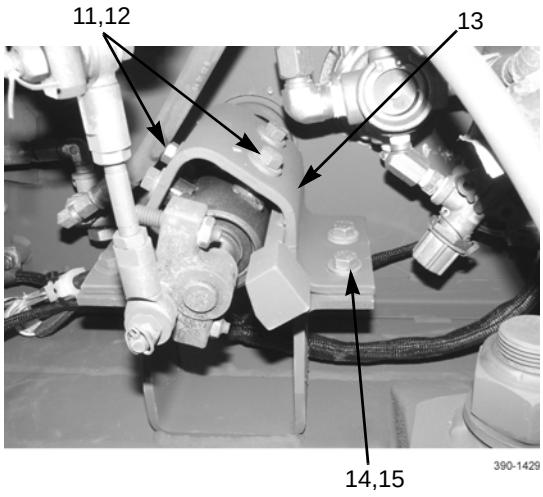


INSTALLATION - CONTINUED

2. Install ground wire and turn signal (21) with two screws (16).
3. Connect turn signal connector and position steering column cover (17) on steering column (6).
4. Install two bolts (19). Install cover on turn signal connector box (20).
5. Connect electrical wire (18).



6. Install steering mounting bracket (13) with four washers (15) and bolts (14).
7. Align holes on steering column (6) with mount bracket (13) and install four bolts (11) and washers (12).

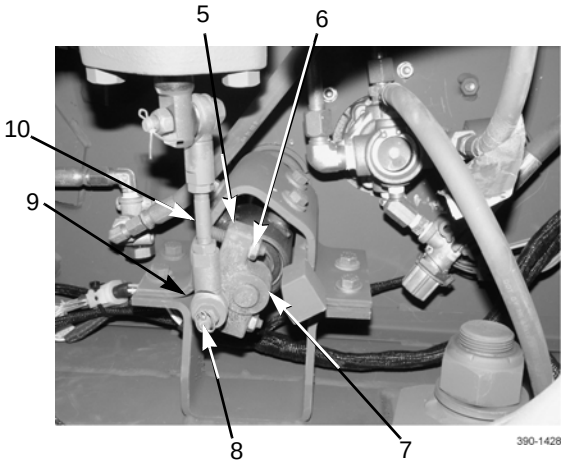


INSTALLATION - CONTINUED

CAUTION

Use care when installing steering stop. Failure to follow this caution may result in damage to steering column spline teeth.

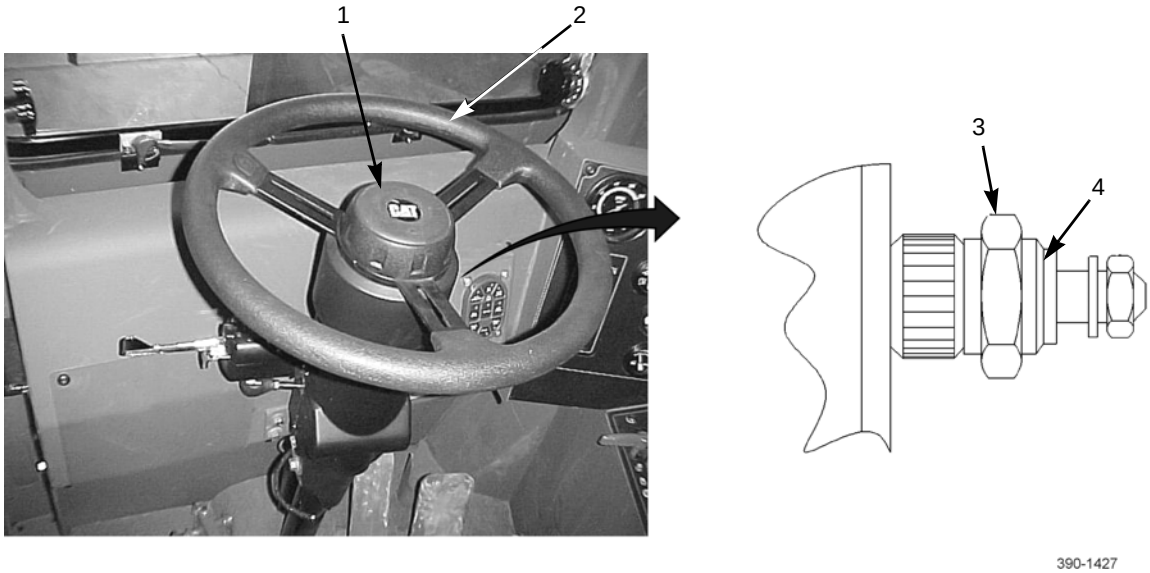
8. Lubricate steering column spline teeth with grease and install steering stop (5) with stop screw (7) and two nuts (6).
9. Install new cotter pin (8), linkage nut (9), and steering linkage (10).



NOTE

Apply grease to steering wheel teeth for smoother installation.

10. Lubricate steering wheel teeth and install steering wheel (2) on steering column (4).
11. Install steering nut (3) on steering column (4).
12. Connect electrical connector to air horn button (1). Install air horn button on steering wheel (2).



END OF WORK PACKAGE

ROPS/FOPS REPLACEMENT 0098 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Personnel Required

Three

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

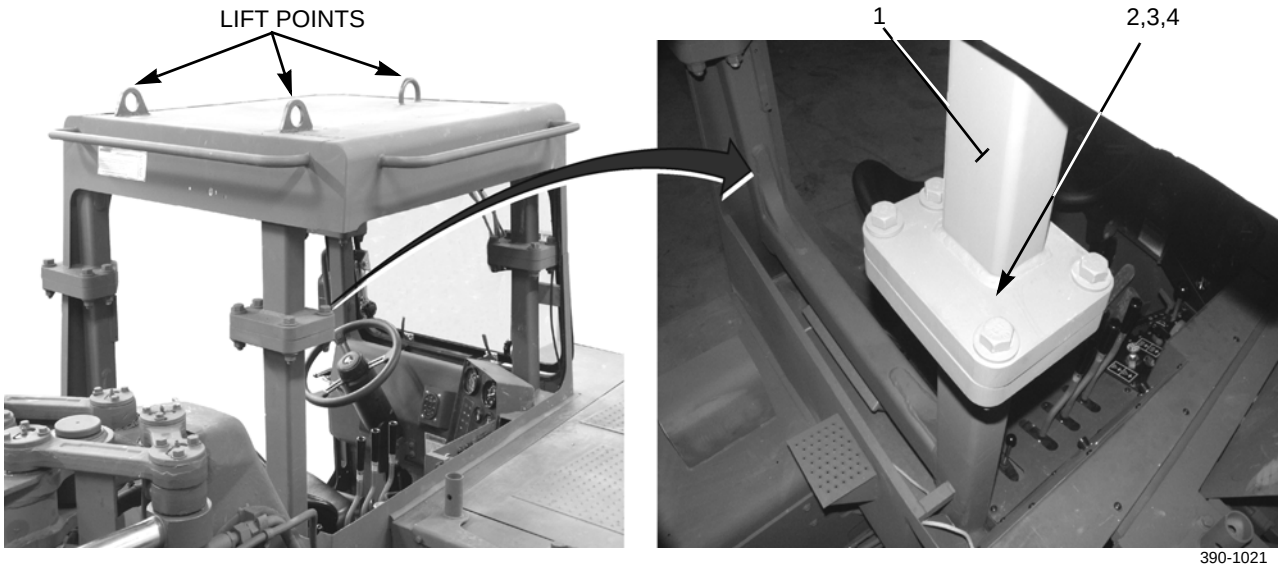
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

NOTE

ROPS/FOPS weighs 447 lb (203 kg).

REMOVAL

1. Attach slings to three lift points of ROPS/FOPS (1) and attach slings to overhead lifting device. Take up slack in slings.
2. Remove 16 nuts (2), 32 washers (3), and 16 bolts (4) from four corner posts of ROPS/FOPS (1).
3. Remove ROPS/FOPS (1) and place on ground. Remove slings.



390-1021

INSTALLATION

1. Attach slings to three lift points of ROPS/FOPS (1) and attach slings to overhead lifting device. Take up slack in slings.

NOTE

Tighten all mounting nuts using a crisscross tightening pattern. This will ensure even tightening and correct installation alignment on all four cab corner posts.

2. Lift ROPS/FOPS (1) into position at four corner posts of cab. While positioning ROPS/FOPS, loosely install 16 bolts (4), 32 washers (3), and 16 nuts (2).
3. Final tighten nuts (2) in a crisscross tightening pattern to 317 lb-ft (430 Nm).
4. Remove slings.

END OF WORK PACKAGE

ENGINE GRILLE, ACCESS DOOR, AND HOOD ASSEMBLY REPLACEMENT 0099 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Bracket, link (Item 4, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

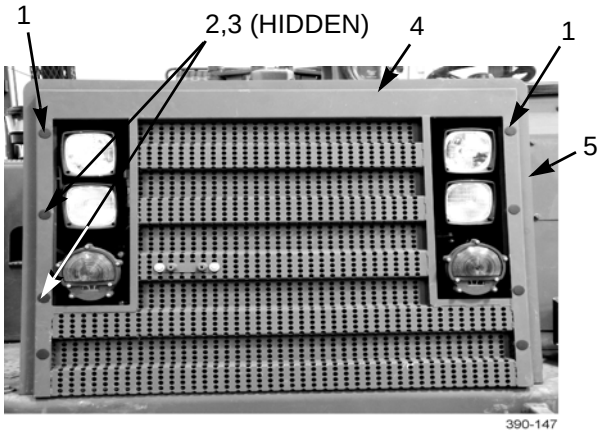


WARNING

Keep personnel away from machine when lifting engine grille, engine access door, and hood assembly. Failure to follow this warning may result in death or injury to personnel.

REMOVAL

1. Remove eight button plugs (1).
2. With assistance, remove eight bolts (2), washers (3), and engine grille (4) from hood assembly (5).



REMOVAL - CONTINUED



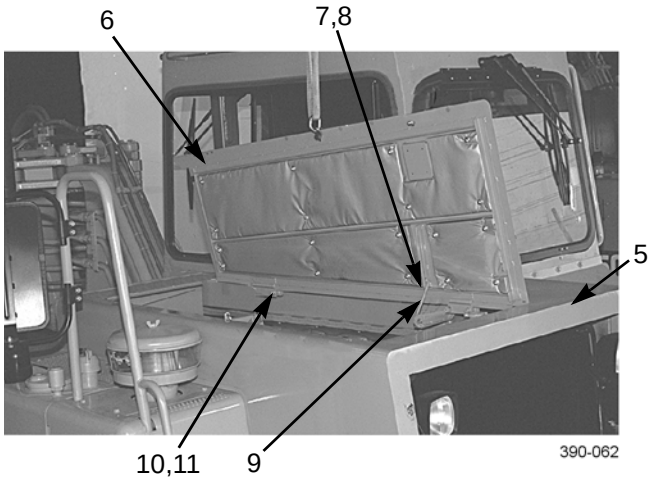
WARNING

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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

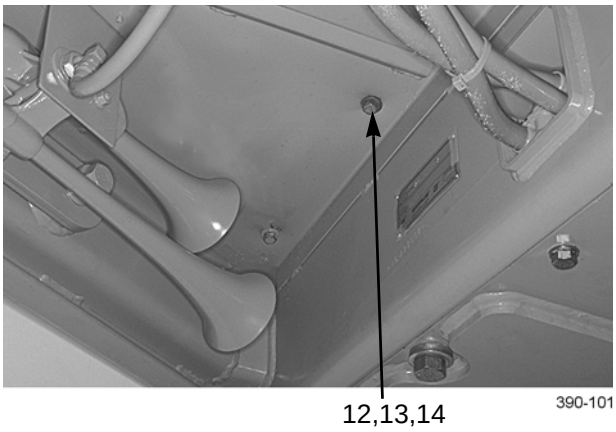
NOTE

Engine access door weighs 75 lb (34 kg).

3. Open engine access door (6). Fasten suitable lifting device and link bracket to engine access door.
4. Remove cotter pin (7) and washer (8) from control rod (9).
5. Remove four bolts (10) and washers (11) from hinges. Remove engine access door (6) from hood assembly (5).

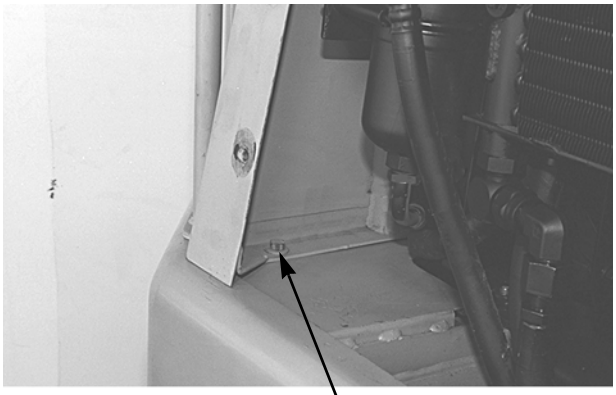


6. Remove two nuts (12), bolts (13), and washers (14) from hood assembly mounting under left front of cab.

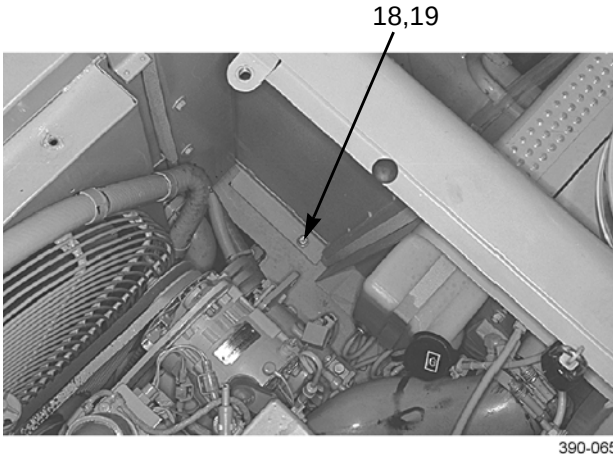


REMOVAL - CONTINUED

7. Remove two nuts (15), bolts (16), and washers (17) from right-front mounting.

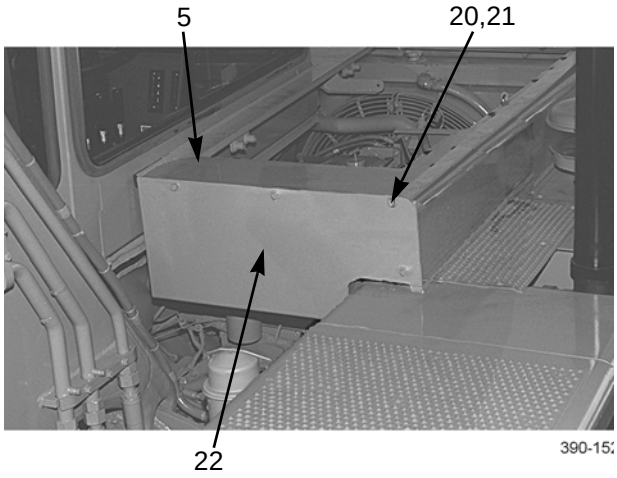


8. Remove bolt (18) and washer (19) from mounting bracket under slave receptacle.

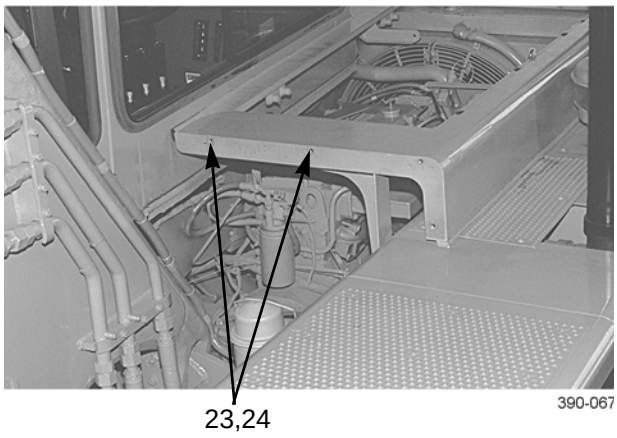


REMOVAL - CONTINUED

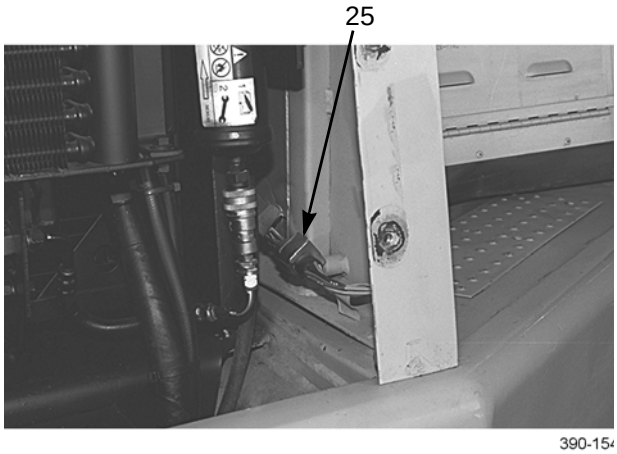
9. Remove four bolts (20) and washers (21) from hood assembly (5). Remove cover plate (22) from hood assembly.



10. Remove two bolts (23) and washers (24) from mounting bracket.



11. Remove wiring harness from clip (25) and disconnect wiring harness connectors.



REMOVAL - CONTINUED

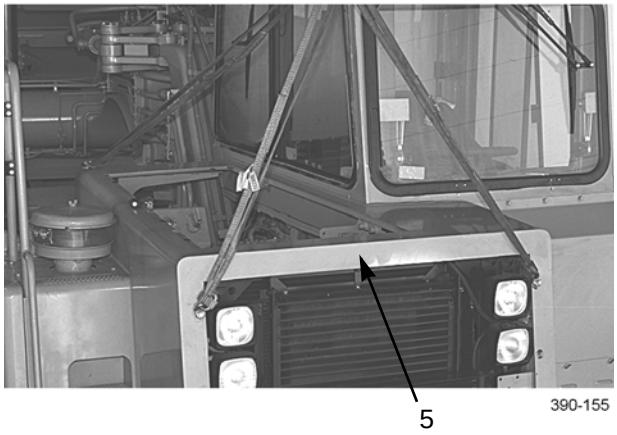
WARNING

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 lift 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

Hood assembly weighs 140 lb (64 kg).

12. Fasten a suitable three-point lifting device and link brackets to hood assembly (5). Carefully remove hood assembly from machine.



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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

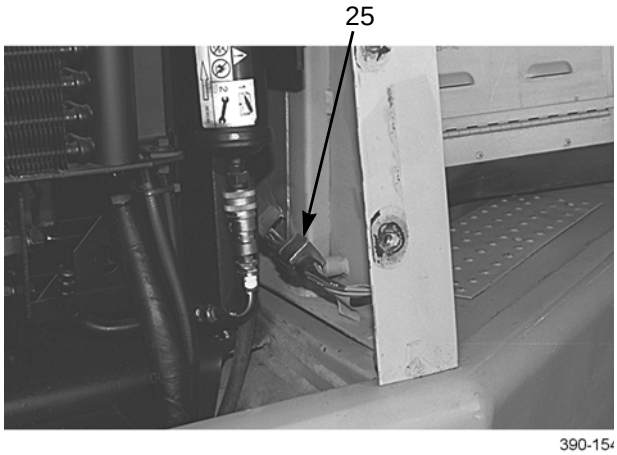
NOTE

Hood assembly weighs 140 lb (64 kg).

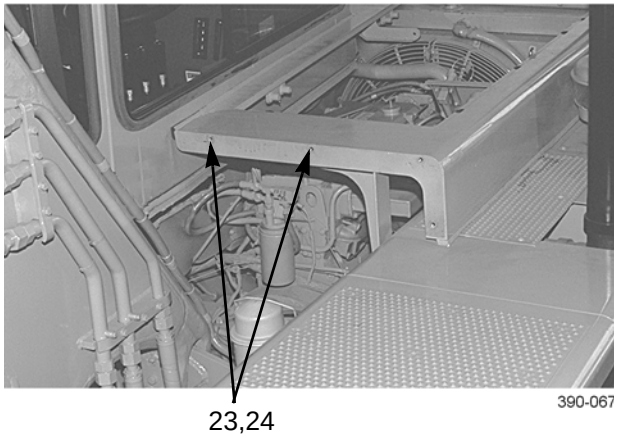
1. Fasten a suitable three-point lifting device and link brackets to hood assembly (5).
2. Lift hood assembly (5) into position, aligning mounting bolt holes.

INSTALLATION - CONTINUED

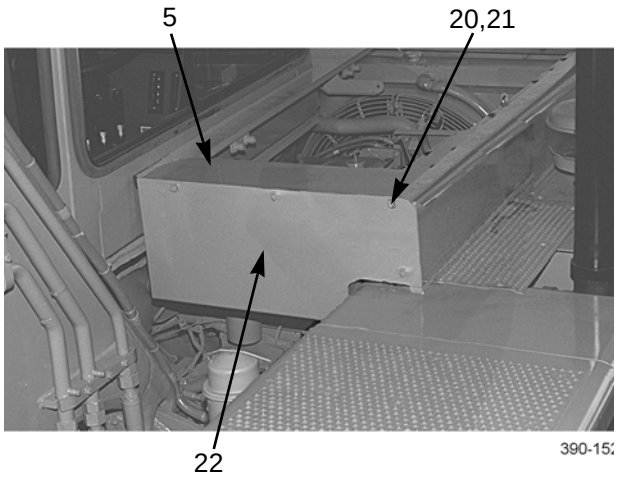
3. Connect wiring harness connectors and install wiring harness in clip (25).



4. Install two bolts (23) and washers (24) to mounting bracket.

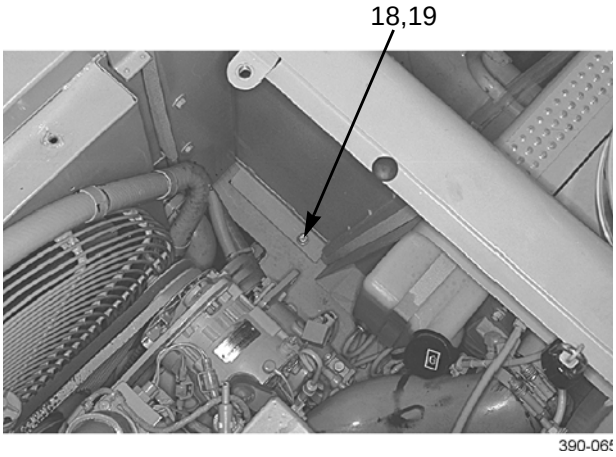


5. Install cover plate (22) to hood assembly (5). Install four bolts (20) and washers (21) to hood assembly.

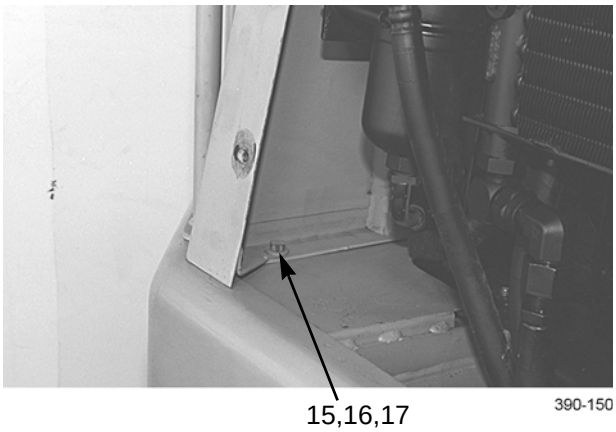


INSTALLATION - CONTINUED

6. Install bolt (18) and washer (19) to mounting bracket under slave receptacle.

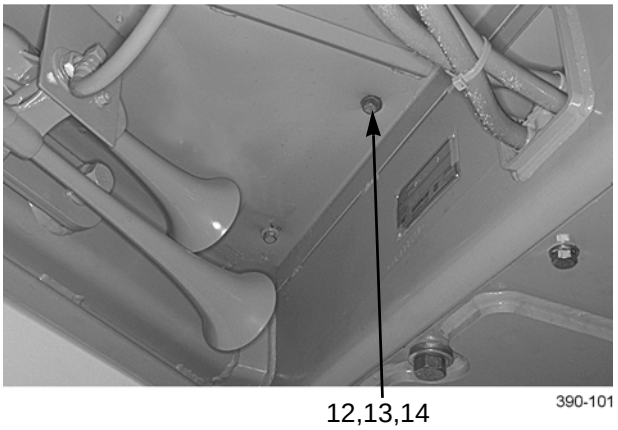


7. Install two bolts (16), washers (17), and nuts (15) to right-front mounting.



INSTALLATION - CONTINUED

8. Install two bolts (13), washers (14), and nuts (12) to hood assembly mounting under left front of cab.





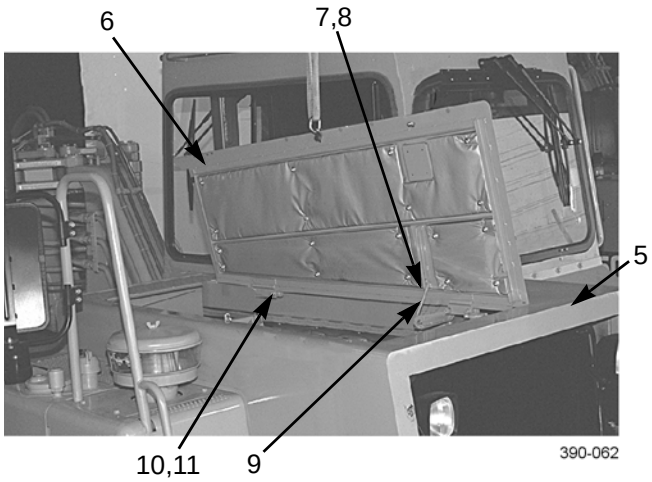
WARNING

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 lift 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

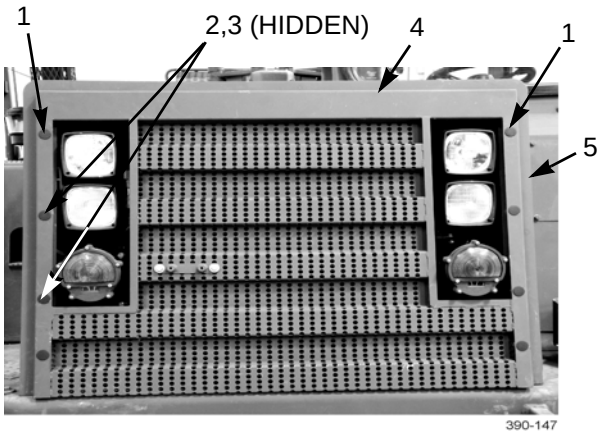
Engine access door weighs 75 lb (34 kg).

9. Fasten a suitable lifting device and link bracket to engine access door (6) and lift access door into position at hood assembly (5).
10. Install four bolts (10) and washers (11) to hinges. Install cotter pin (7) and washer (8) to control rod (9).
11. Close and secure engine access door (6).



INSTALLATION - CONTINUED

12. With assistance, position engine grille (4) to hood assembly (5).
13. Install eight washers (3) and bolts (2).
14. Install button plugs (1).



END OF WORK PACKAGE

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GUARD PLATES REPLACEMENT 0100 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Compound, antiseize (Item 8, WP 0171 00)

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2))

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

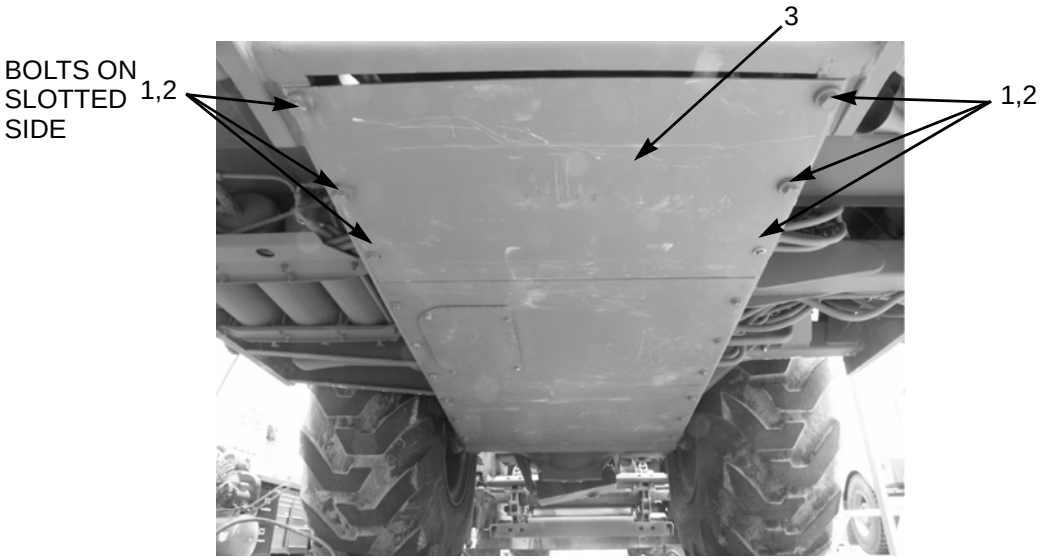
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

REMOVAL

NOTE

- Perform following steps to replace each of three guard plates.
- If removing all three guard plates, mark plates as “front”, “middle”, and “rear” to assist in installation.

1. Loosen, but DO NOT remove, six bolts (1) securing guard plate (3) to underside of tractor frame.



NOTE

Wood cribbing may be used as a spacer between jack and guard plate as necessary.

2. Position floor jack under center of guard plate (3) and raise jack until jack contacts plate.
3. Remove three bolts (1) and washers (2) along LEFT side of tractor frame.
4. Lower jack slightly and pull guard plate (3) free of three bolts (1) and washers (2) at opposite (slotted) side of plate.
5. While holding guard plate (3) level on jack, lower jack and remove jack and plate from underneath tractor.

INSTALLATION

NOTE

Apply antiseize compound to bolt threads before installation.

1. Position guard plate (3) so that plate is centered and level on floor jack. Position jack and plate underneath tractor.
2. Raise jack and push guard plate (3) so that slots of plate align with three bolts (1) and washers (2).
3. Install three washers (2) and bolts (1) along LEFT side of tractor frame.
4. Lower and remove jack.
5. Tighten six bolts (1).

END OF WORK PACKAGE

FENDERS REPLACEMENT 0101 00

THIS WORK PACKAGE COVERS

Left Fender: Removal, Installation

Right Fender: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Personnel Required

Two

References

WP 0022 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2))

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

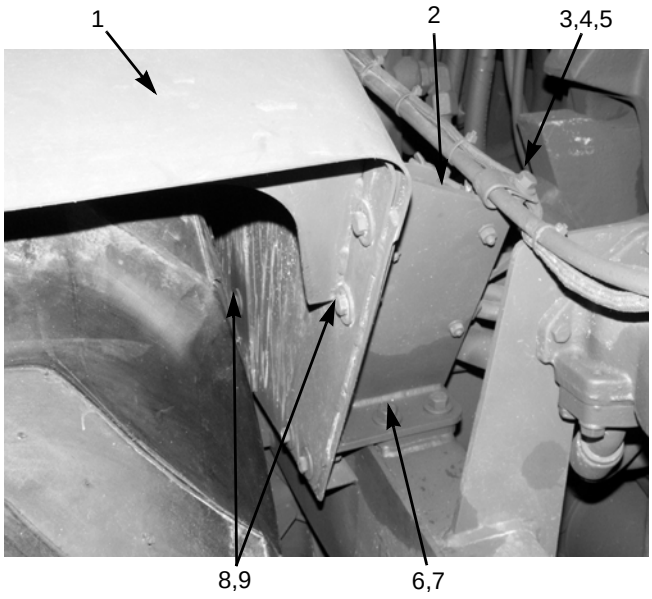


WARNING

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 injury or death to personnel.

LEFT FENDER REMOVAL

1. Remove six bolts (8) and washers (9) securing left fender (1) to left frame bracket (2) and tractor.
2. Attach sling through slot in welded bracket of left fender (1) and attach sling to overhead lifting device. Take up slack in sling.
3. Remove an additional 12 bolts (8) and washers (9) and remove left fender (1) from tractor. Remove sling.
4. Remove seal from left fender (1).
5. Remove screw (3), washer (4), and cable clamp (5) from left frame bracket (2).
6. Remove ether cold start aid system from left frame bracket (2) (WP 0021 00).
7. Remove four bolts (6), washers (7), and left frame bracket (2) from tractor.

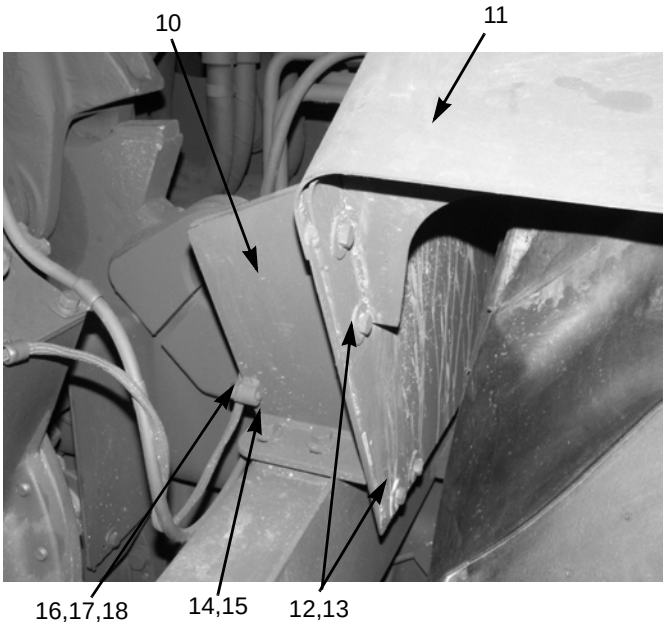


LEFT FENDER INSTALLATION

1. Install left frame bracket (2) on tractor with four washers (7) and bolts (6).
2. Install ether cold start aid system on left frame bracket (2) (WP 0022 00).
3. Install cable clamp (5) to left frame bracket (2) with washer (4) and screw (3).
4. Install seal to left fender (1).
5. Attach sling through slot in welded bracket of left fender (1) and attach sling to overhead lifting device.
6. Raise left fender (1) and position fender on tractor.
7. Install left fender (1) on tractor with 12 washers (9) and bolts (8). Remove sling.
8. Install left fender (1) on left frame bracket (2) and tractor with an additional six washers (9) and bolts (8).

RIGHT FENDER REMOVAL

1. Remove six bolts (12) and washers (13) securing right fender (11) to right frame bracket (10).
2. Remove an additional 11 bolts (12) and washers (13) and remove right fender (11) from tractor.
3. Remove screw (16), washer (17), and cable clamp (18) from right frame bracket (10).
4. Remove four bolts (14), washers (15) and right frame bracket (10) from tractor.



RIGHT FENDER INSTALLATION

1. Install right frame bracket (10) to tractor with four washers (15) and bolts (14).
2. Install cable clamp (18) to right frame bracket (10) with washer (17) and screw (16).
3. Install right fender (11) to tractor with 11 washers (13) and bolts (12).
4. Install right fender (11) on right frame bracket (10) with an additional six washers (13) and bolts (12).

END OF WORK PACKAGE

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WINDSHIELD MAINTENANCE 0102 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Assembly, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Locknut (4)

Personnel Required

Two

Equipment Condition

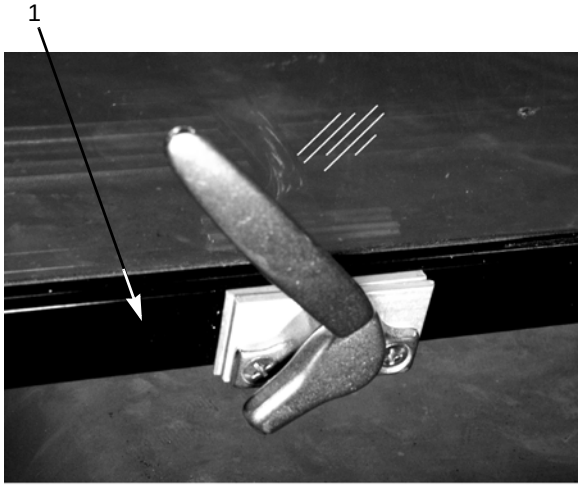
Wiper arm removed (WP 0110 00)

WARNING

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause injury to personnel from cut glass if windshield breaks.

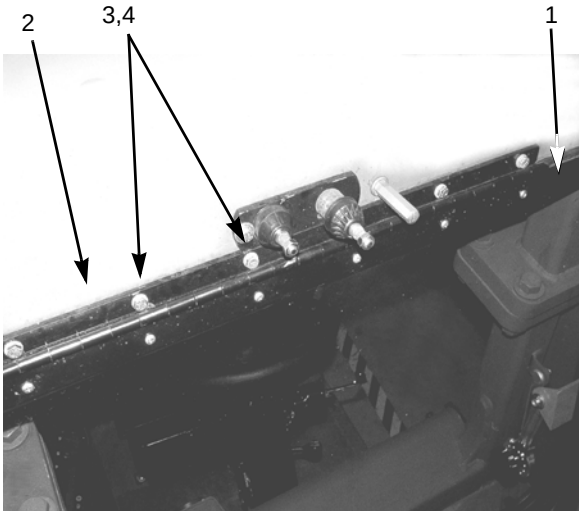
REMOVAL

1. Unlatch and open windshield frame (1).

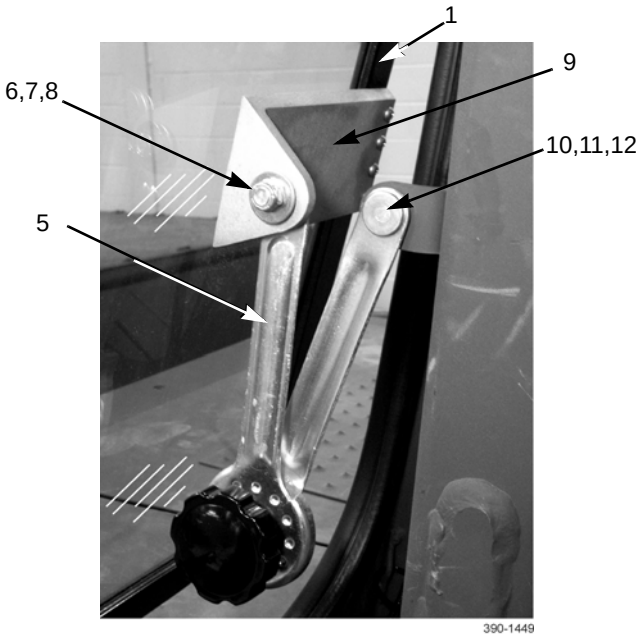


REMOVAL - CONTINUED

2. Remove six screws (3), 12 washers, and six nuts (4) from hinge (2) and separate windshield frame (1) from ROPS/FOPS.



3. At each of two arm assemblies (5), remove locknut (6), washer (7), and two plastic bushings (8). Separate arm assembly from arm mount (9). Discard locknuts.

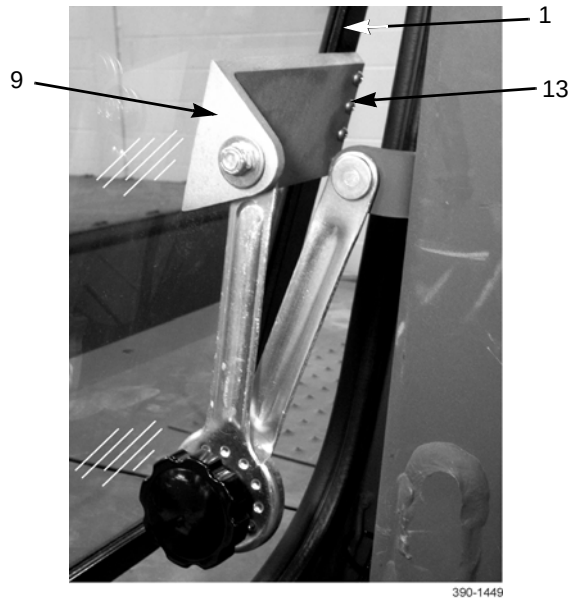


DISASSEMBLY

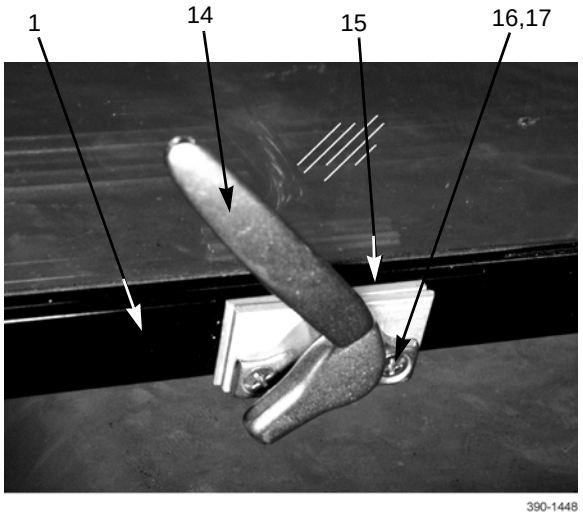
1. Remove locknut (10), washer (11), and two plastic bushings (12) from each of two arm assemblies (5) and remove arm assemblies from cab. Discard locknuts.

DISASSEMBLY - CONTINUED

2. At each side of windshield frame (1), remove four screws (13) to separate arm mount (9) from windshield frame.

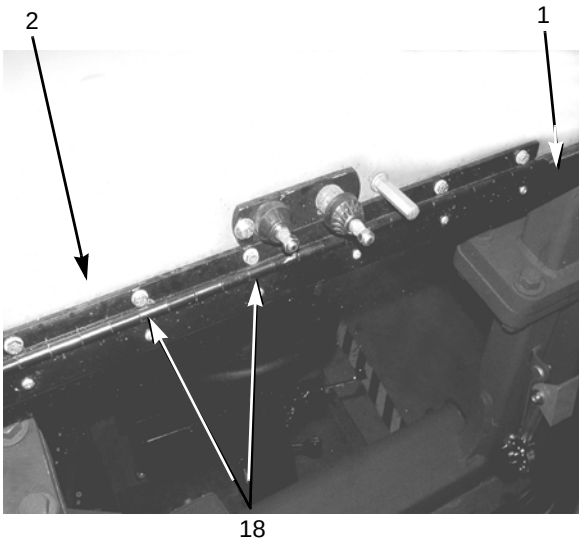


3. Remove two acorn nuts (16), screws (17), handle (14), and two shims (15) from windshield frame (1). Repeat step for other handle.



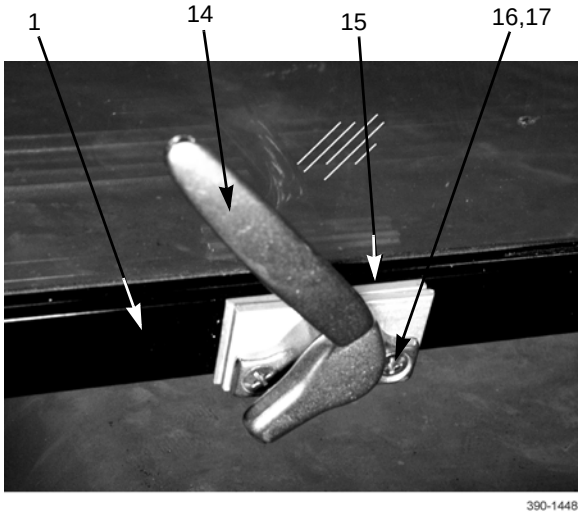
DISASSEMBLY - CONTINUED

4. Remove six screws (18) and hinge (2) from windshield frame (1).



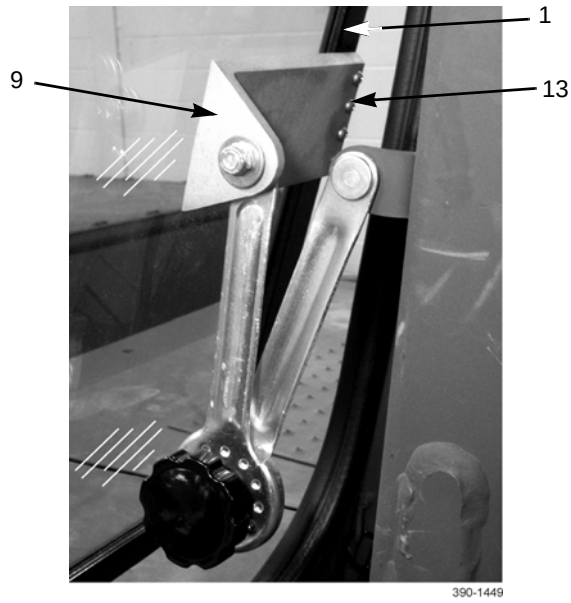
ASSEMBLY

1. Install hinge (2) to windshield frame (1) with six screws (18).
2. Install two shims (15) and handle (14) to windshield frame (1) with two screws (17) and acorn nuts (16). Repeat step for other handle.

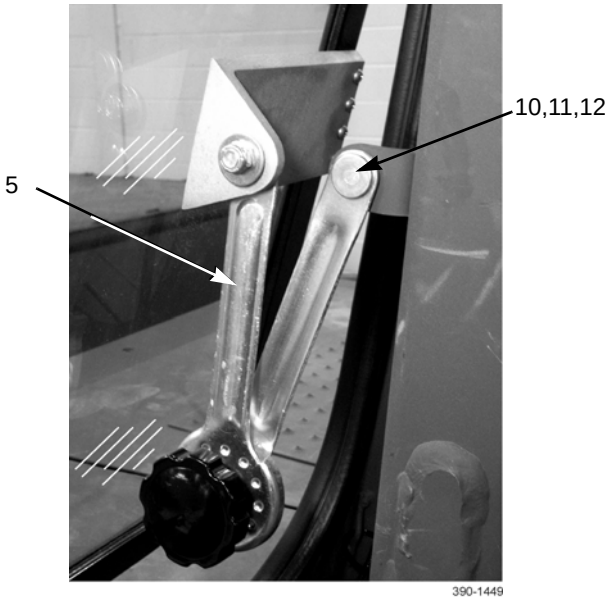


ASSEMBLY - CONTINUED

3. At each side of windshield frame (1), install arm mount (9) to windshield frame with four screws (13).

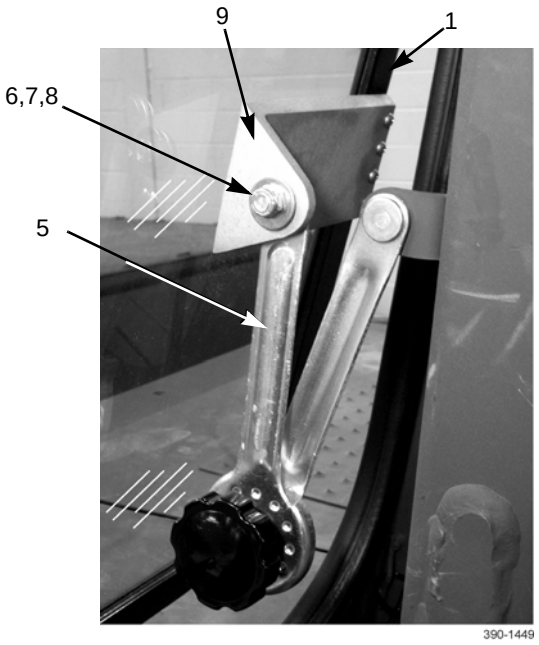


4. Install each of two arm assemblies (5) to cab with two plastic bushings (12), washer (11), and new locknut (10).

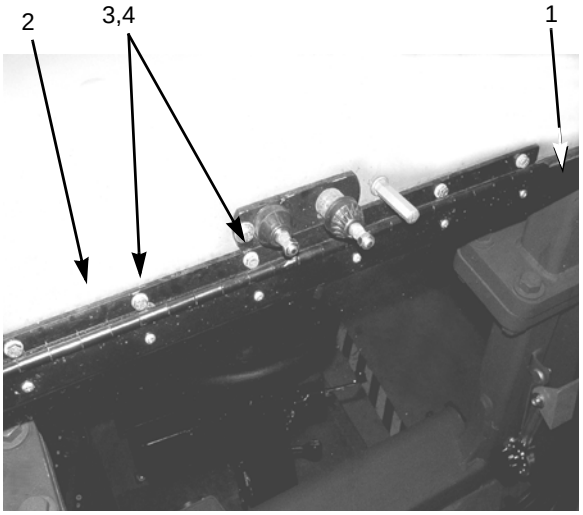


INSTALLATION

1. Position windshield frame (1) and install each of two arm assemblies (5) to arm mount (9) with two plastic bushings (8), washer (7), and new locknut (6).

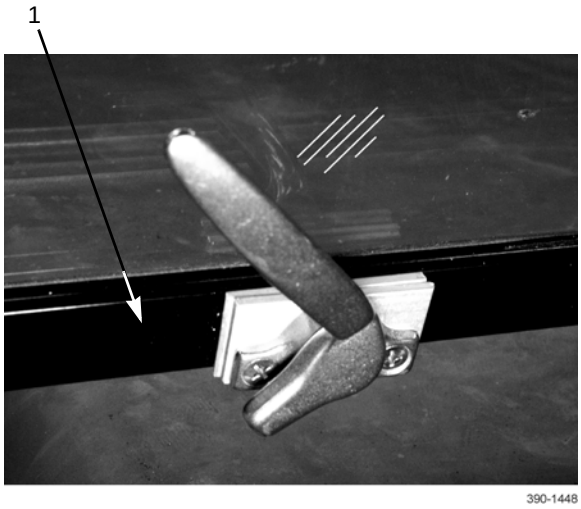


2. Loosely install hinge (2) to ROPS/FOPS with 12 washers, six screws (3), and nuts (4).



INSTALLATION - CONTINUED

3. Close windshield frame (1) and latch securely.
4. Fully tighten six nuts (4).



5. Install wiper arm (WP 0110 00).

END OF WORK PACKAGE

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SEAT REPLACEMENT 0103 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Personnel Required

Three

Equipment Condition

Machine parked on hard, level ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

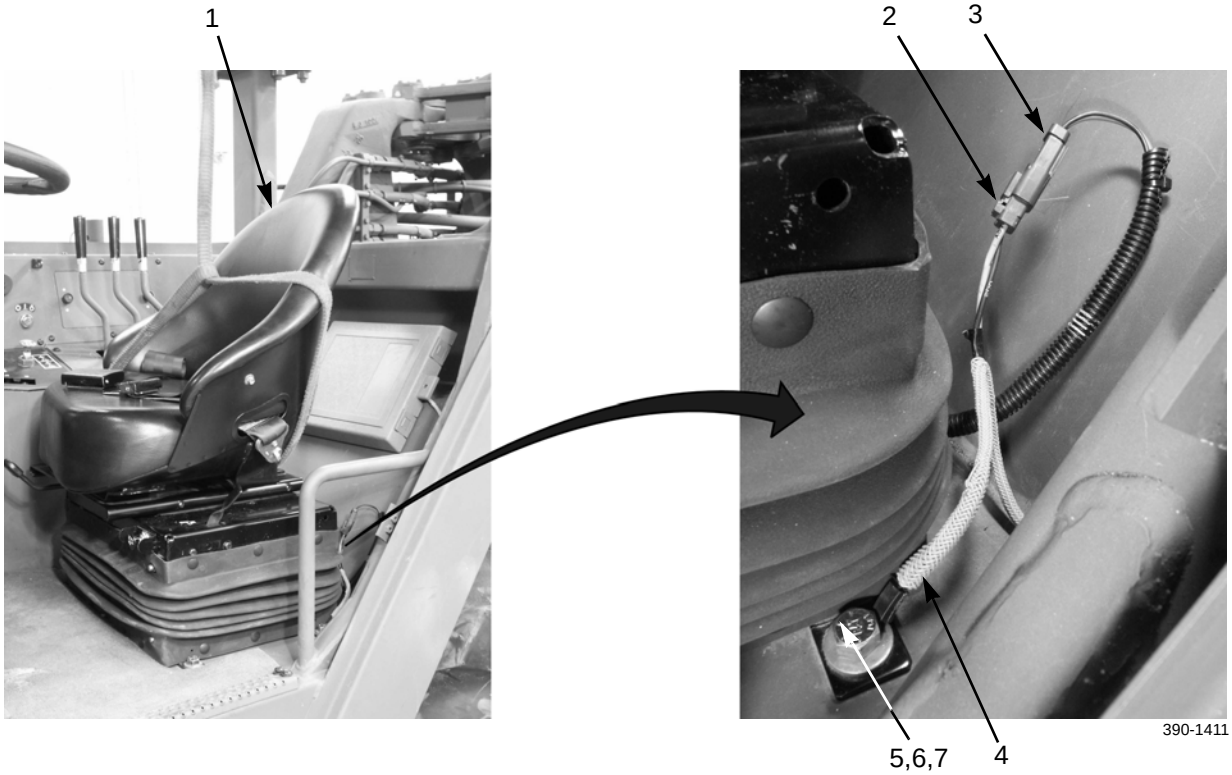
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury to personnel.

NOTE

Seat weighs approximately 134 lb (61 kg).

REMOVAL

1. Disconnect seat wiring harness connector (3) from cab wiring harness connector (2).
2. Remove four nuts (5), eight washers (6), four bolts (7), and ground wire (4) from seat (1) and cab floor.
3. Attach nylon sling to seat (1).



NOTE

While one person in cab lifts upward on sling, two persons on ground lift and guide seat out of cab.

4. Lift seat (1) and remove from machine.
5. Remove nylon sling from seat (1).

INSTALLATION

1. Attach nylon sling to seat (1).

NOTE

While one person in cab lifts upward on sling, two persons on ground lift and guide seat into cab.

2. Lift seat (1) and position in machine.
3. Install ground wire (4) and seat (1) on cab floor with four bolts (7), eight washers (6) and four nuts (5). Remove nylon sling from seat.
4. Connect seat wiring harness connector (3) to cab wiring harness connector (2).

END OF WORK PACKAGE

SEAT REPAIR 0104 00

THIS TASK COVERS

Disassembly, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Sealant, pipe (Item 34, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Kit, fastener

Materials/Parts - Continued

Kit, roller

Kit, shock absorber

Kit, slider block

Kit, tether

Locknut (4)

Ring, retaining

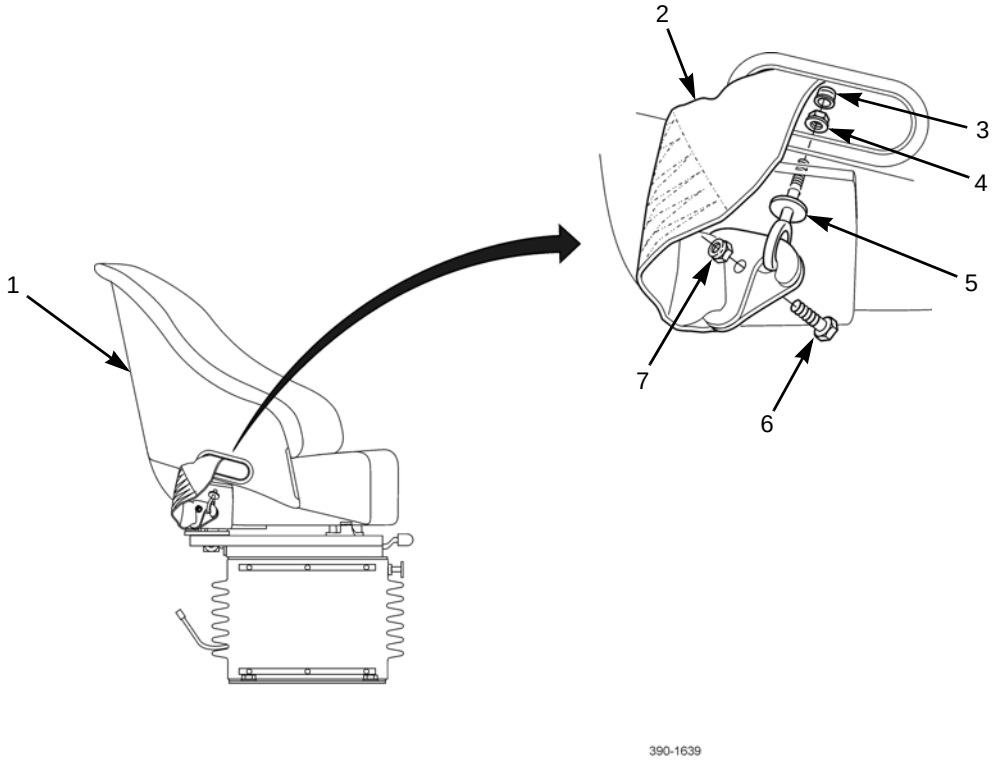
Personnel Required

Two

Equipment Condition

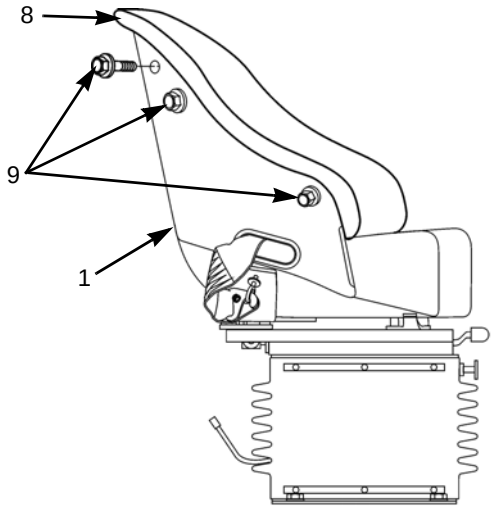
Seat removed (WP 0103 00)

1. At each side of seat (1), loosen locknut (7) and screw (6) and remove seat belt (2) from eye bolt (5).
2. Remove protective caps (3), locknuts (4) and eyebolts (5). Discard locknuts.



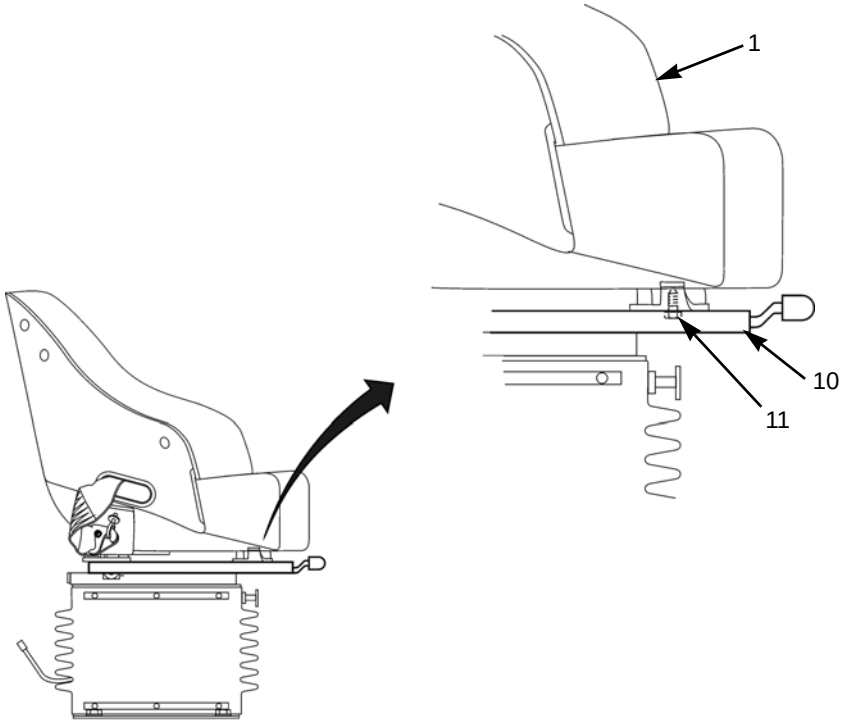
DISASSEMBLY - CONTINUED

3. Remove five bolts (9) and vinyl back cushion (8) from seat (1).



390-1640

4. With seat adjuster (10) moved fully forward, remove two bolts (11) securing seat (1) to front of seat adjuster.

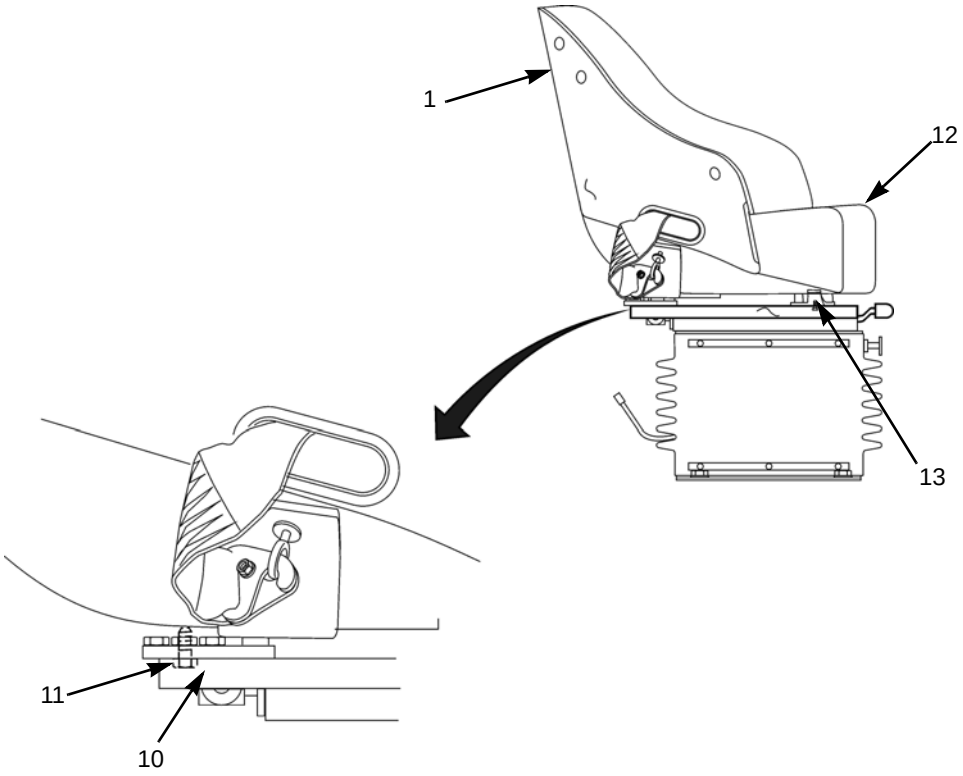


390-1641

SEAT REPAIR - CONTINUED 0104 00

DISASSEMBLY - CONTINUED

5. With seat adjuster (10) moved to rear, remove two additional bolts (11) securing seat (1) to rear of seat adjuster. Remove seat from seat adjuster.
6. Remove two bolts (13) from underside of seat (1) and remove vinyl seat cushion (12) from seat.



DISASSEMBLY - CONTINUED

7. Position seat adjuster (10) until two setscrews (14) can be seen through two holes at left side of seat adjuster. Loosen each setscrew equally approximately two turns.

8. Remove two bolts (16) and stop block (17) from right-front corner of seat adjuster (10).

NOTE

Note position of two guides with loosened setscrews for assembly.

9. Slide seat adjuster (10) forward and remove seat adjuster and four guides (15) from seat suspension assembly.

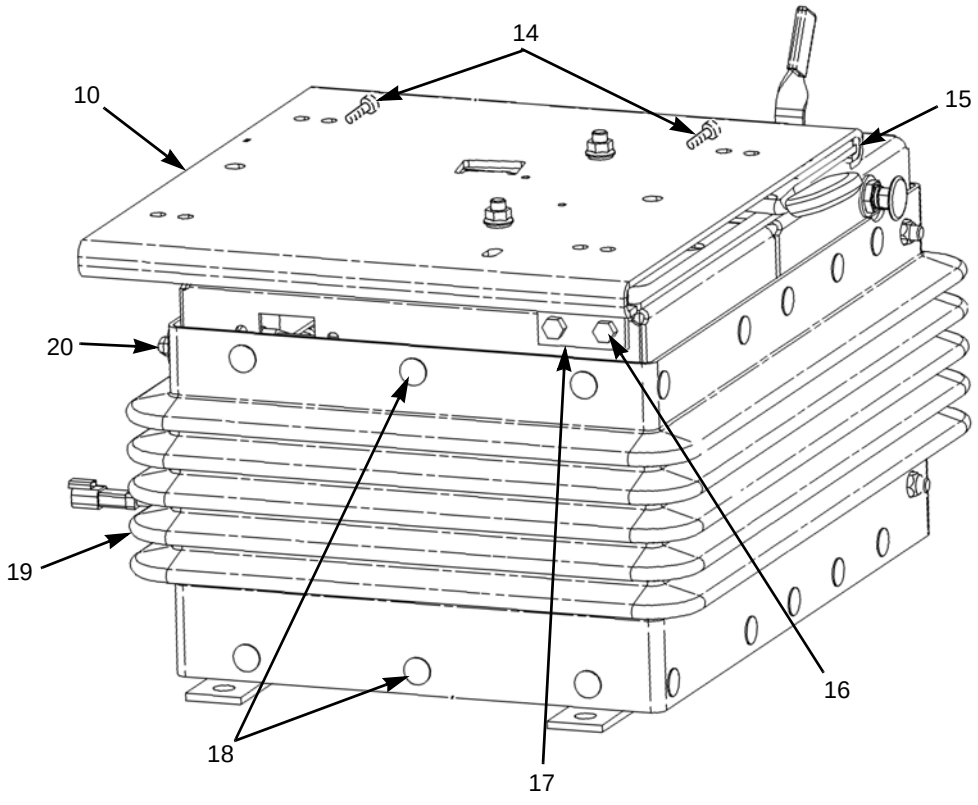
CAUTION

Remove plastic retainers carefully to avoid damaging boot.

NOTE

One plastic retainer at rear of seat suspension is positioned with head at INSIDE of upper plate.

10. Remove one nut (20) and pry 32 plastic retainers (18) out from seat suspension assembly and remove boot (19). Discard plastic retainers.

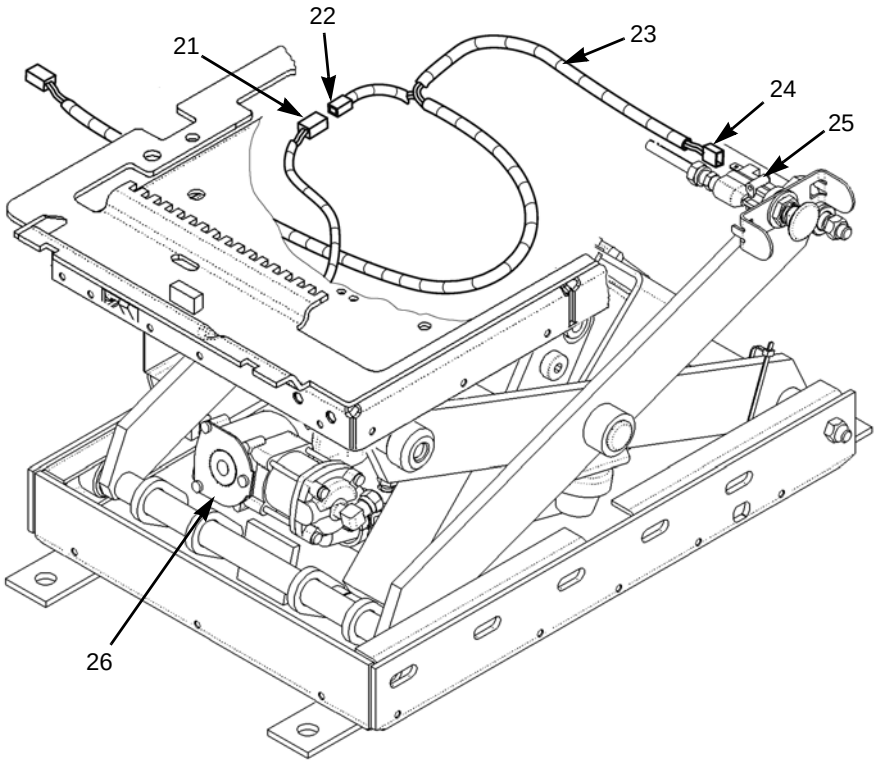


DISASSEMBLY - CONTINUED

NOTE

Cut and discard tiedown straps as necessary.

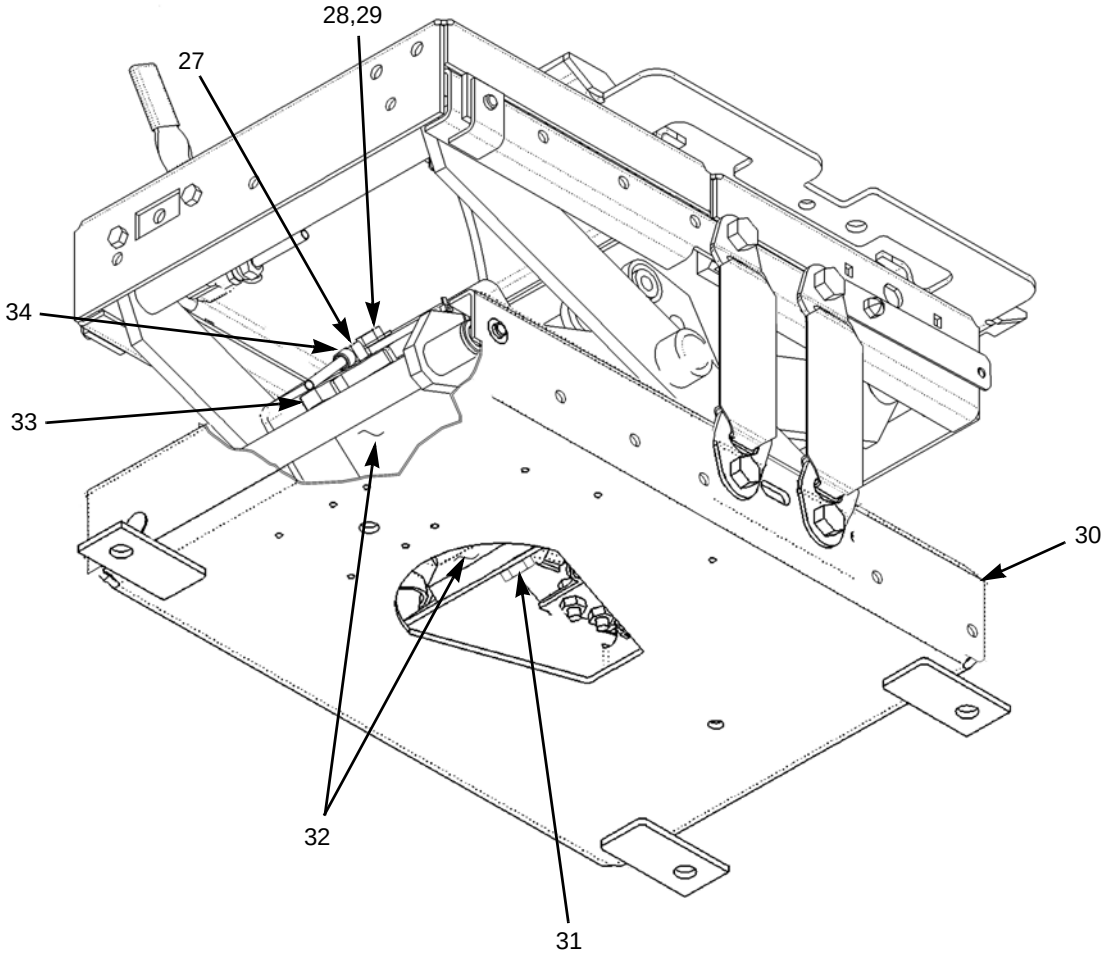
11. Disconnect harness connector (22) of seat wiring harness (23) from connector (21) of compressor (26).
12. Disconnect harness connector (24) of seat wiring harness (23) from air valve (25).
13. Remove seat wiring harness (23) and loom from seat suspension.



390-1644

DISASSEMBLY - CONTINUED

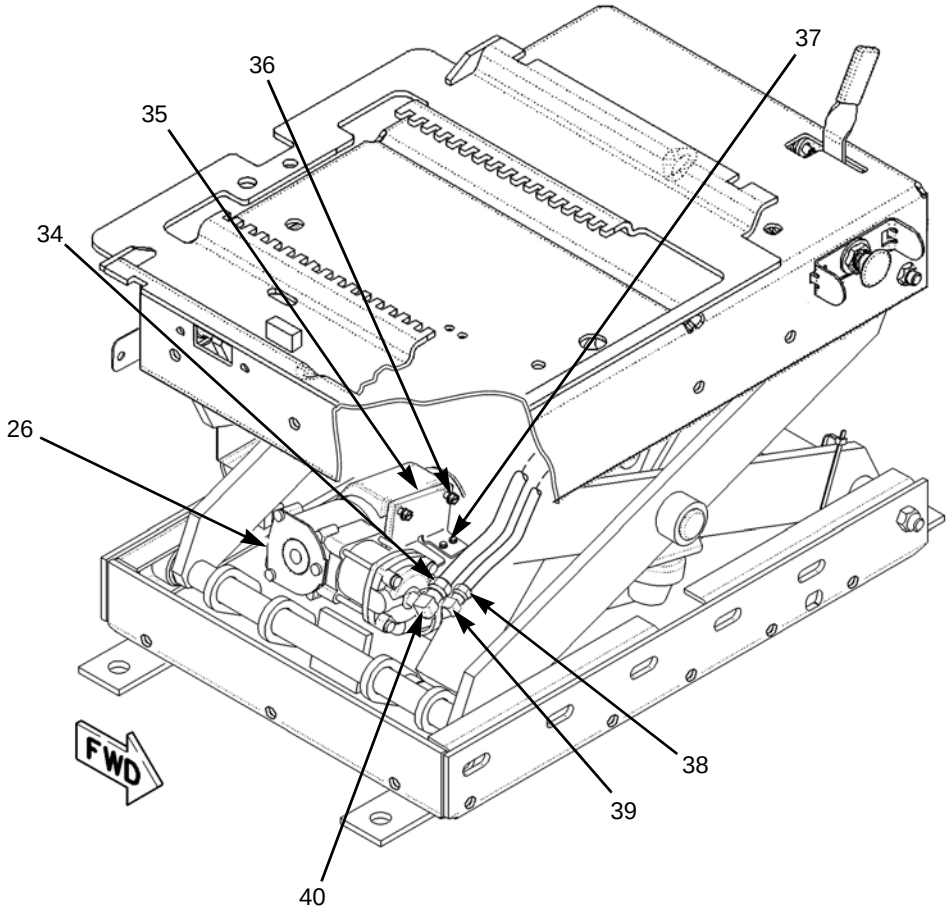
14. From underside of lower plate (30), remove bolt (31) securing lower end of air spring (32) to lower plate.
15. At top of air spring (32), disconnect air tube (34) from elbow (27).
16. Remove bolt (28), washer (29), air spring (32), and retainer (33) from seat suspension.
17. Remove elbow (27) from air spring (32).



390-1645

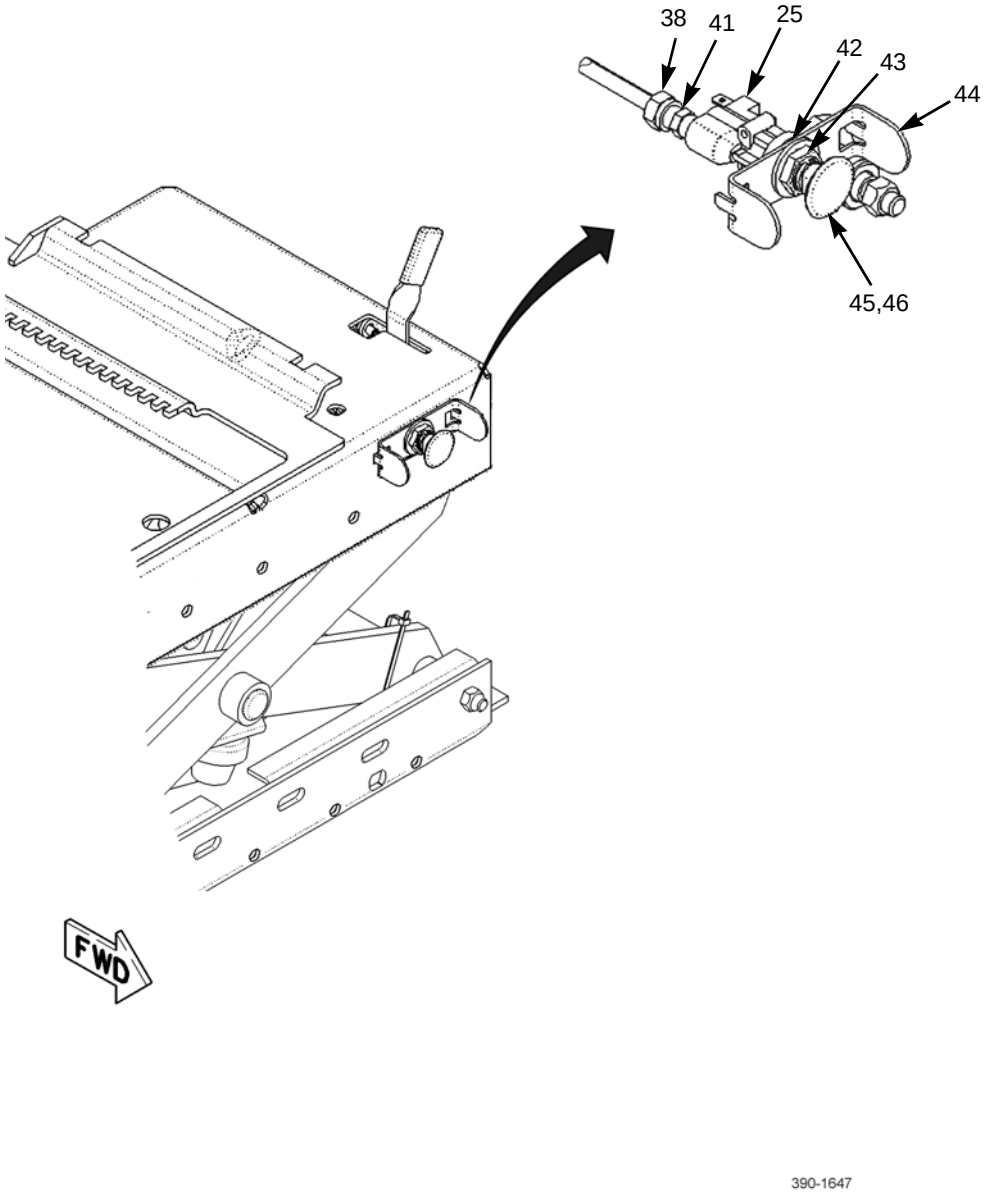
DISASSEMBLY - CONTINUED

18. Remove other end of air tube (34) from elbow (40) on compressor (26) and remove air tube and loom from seat suspension.
19. Disconnect air tube (38) from elbow (39) on compressor (26).
20. Remove two bolts (36) and compressor (26) from compressor bracket (35).
21. Remove two elbows (39 and 40) from compressor (26).
22. Remove two bolts (37) and compressor bracket (35) from seat suspension.



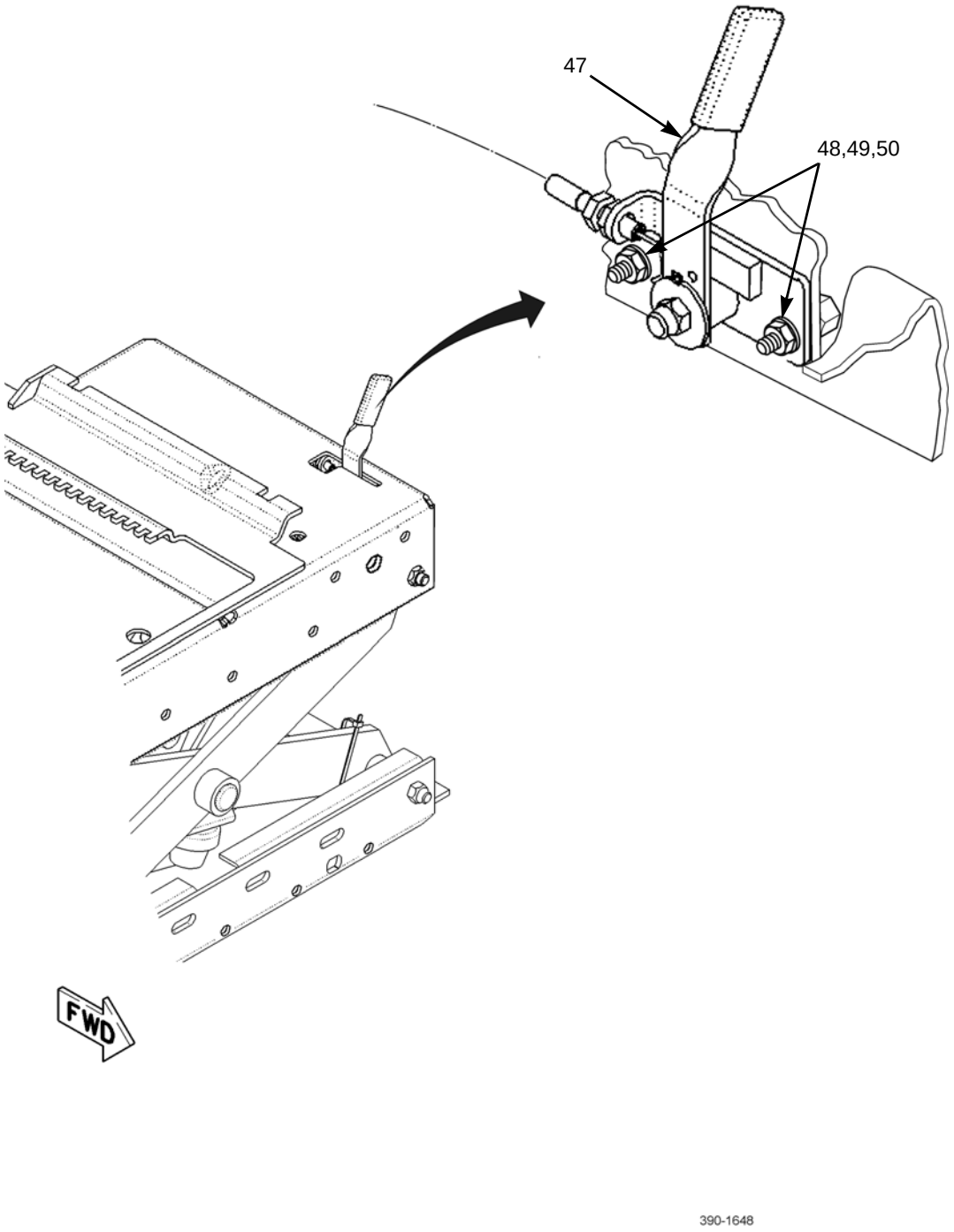
DISASSEMBLY - CONTINUED

23. Remove other end of air tube (38) from adapter (41) on air valve (25) and remove air tube and loom from seat suspension.
24. Loosen setscrew (45) in knob (46) on air valve (25) and remove knob.
25. Remove jamnut (43), lockwasher (42), plate (44), and air valve (25) from seat suspension. Discard lockwasher.
26. Remove adapter (41) from air valve (25).



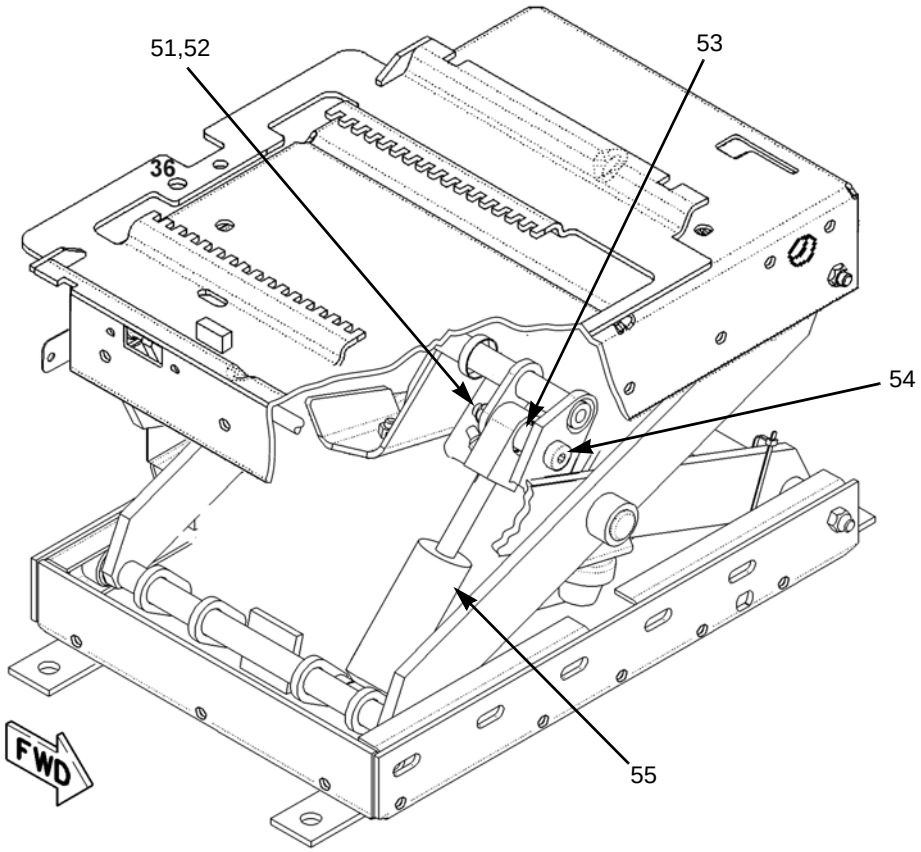
DISASSEMBLY - CONTINUED

27. At left side of seat suspension, remove two locknuts (48), washers (49), and screws (50) to free shock absorber control lever (47) assembly from seat suspension. Set lever and cable aside. Discard locknuts.



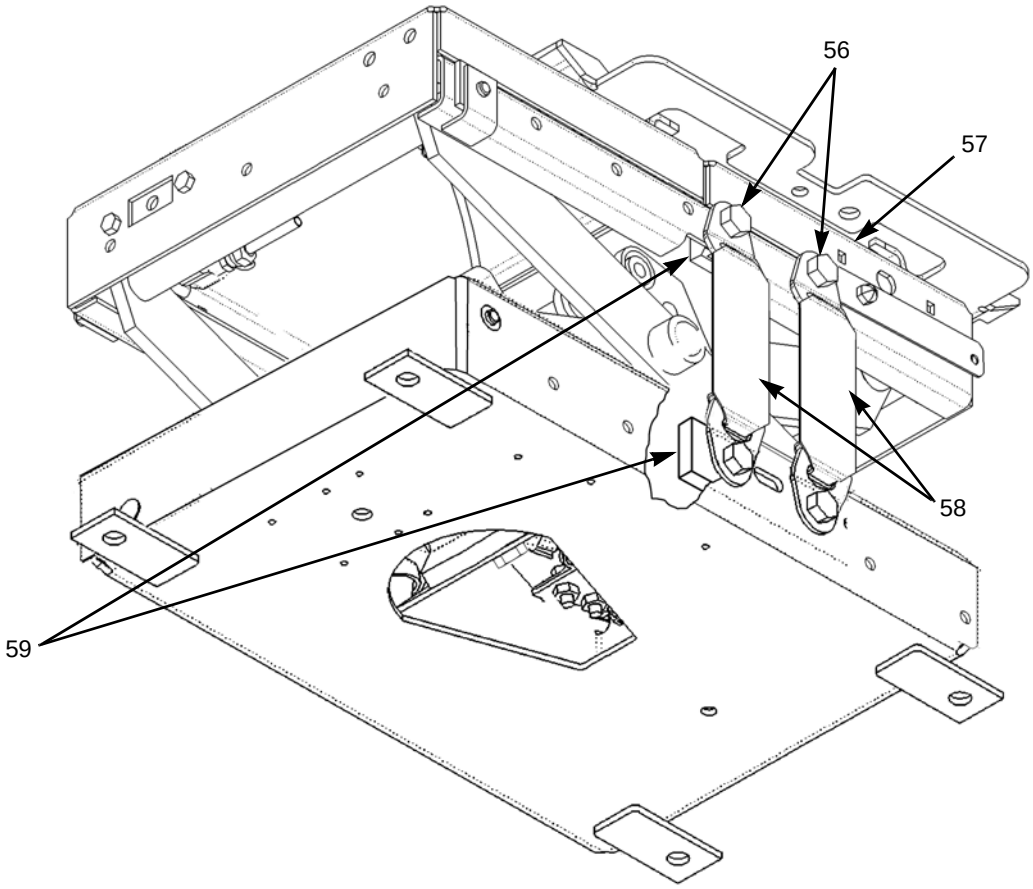
DISASSEMBLY - CONTINUED

28. Remove nut (51), lockwasher (52), bolt (54), and nylon bushing (53) to separate upper end of shock absorber (55) from seat suspension. Discard lockwasher.



DISASSEMBLY - CONTINUED

29. At rear of seat suspension, remove four bolts (56), two blocks (59), two tethers (58), and retainer (57).



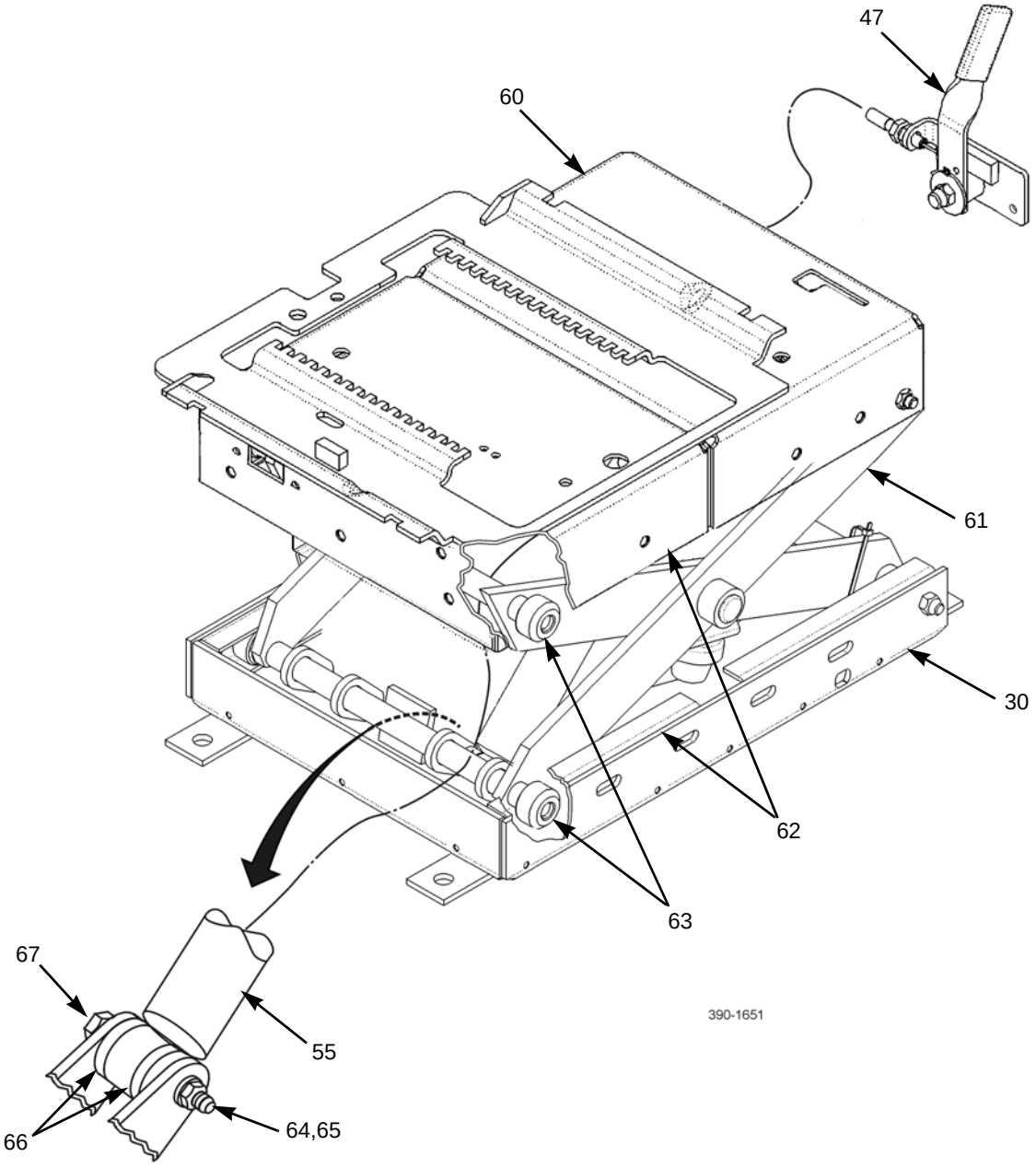
390-1650

DISASSEMBLY - CONTINUED

NOTE

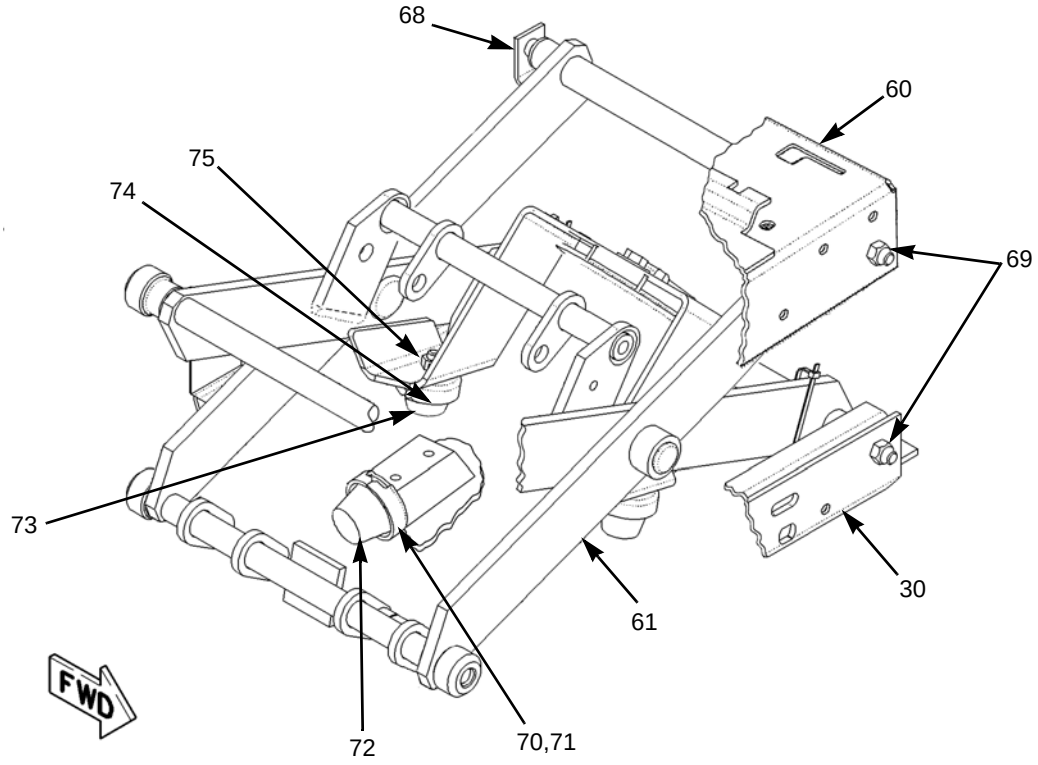
Tilt upper plate and lower plate away from each other as rollers come free of upper and lower plate.

30. Position scissors (61) so that scissors are lengthened and four nylon rollers (63) pass through small slots (62) in upper plate (60) and lower plate (30).
31. Remove nut (64), lockwasher (65), bolt (67), and two nylon bushings (66) to separate lower end of shock absorber (55) from seat suspension. Discard lockwasher.
32. Remove shock absorber (55), control lever (47) and cable assembly from seat suspension as an assembly. Set assembly aside.



DISASSEMBLY - CONTINUED

33. Remove locknut (69) from each of two rods (68). Discard locknuts.
34. Remove two rods (68), upper plate (60), and lower plate (30) from scissors (61).
35. Remove nut (70), bumper (72), and bumper retainer (71) from lower plate (30).
36. Remove two nuts (75), bumpers (73), and bumper retainers (74) from scissors (61).



DISASSEMBLY - CONTINUED

NOTE

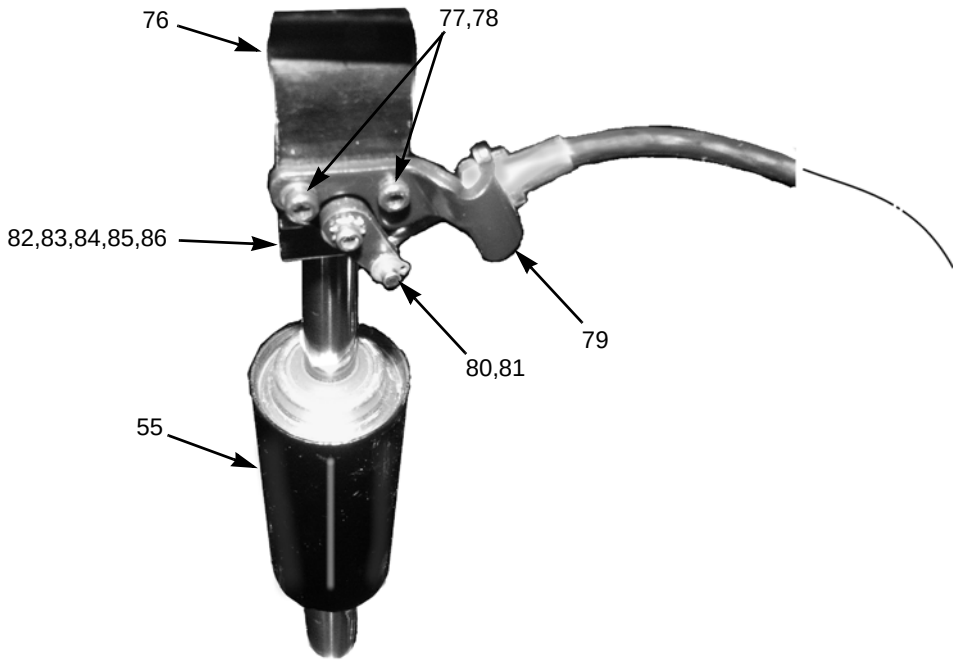
Perform following steps to disassemble shock absorber, control lever and cable assembly.

37. Remove two screws (77), lockwashers (78) and bracket (79) from bushing block (76) of shock absorber (55). Discard lockwashers.

NOTE

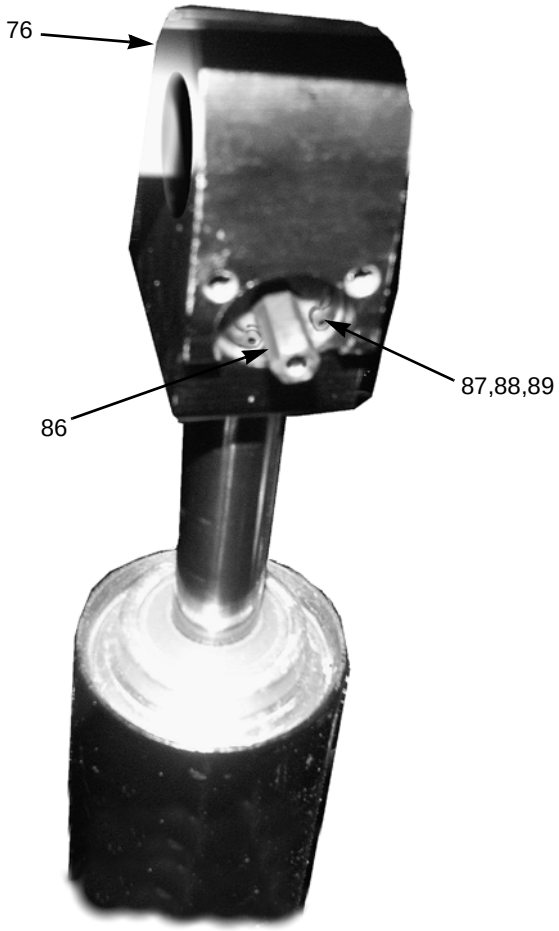
Note position of lever on valve pin for assembly.

38. Remove screw (82), lockwasher (83), lever (84) and spacer (85) from valve pin (86). Discard lockwasher.
39. Remove retaining ring (80) and disconnect end of cable (81) from lever (84). Discard retaining ring.



DISASSEMBLY - CONTINUED

40. Remove retaining ring (87), washer (88), seal (89), and valve pin (86) from bushing block (76). Discard retaining ring and seal.



390-1654

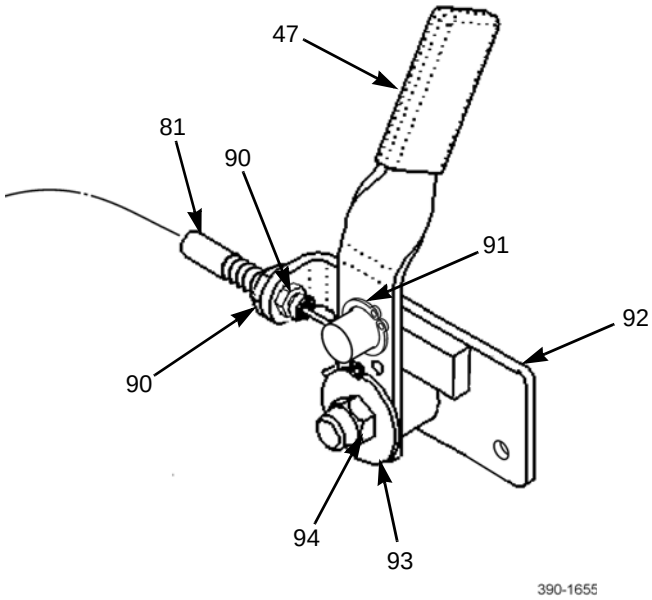
DISASSEMBLY - CONTINUED

41. At other end of cable (81), remove locknut (94), washer (93), and lever (47) from lever bracket (92). Discard locknut.
42. Remove retaining ring (91) to disconnect end of cable (81) from lever (47). Discard retaining ring.

NOTE

Note position of cable and jamnuts for assembly.

43. Remove two jamnuts (90) and cable (81) from lever bracket (92).



ASSEMBLY

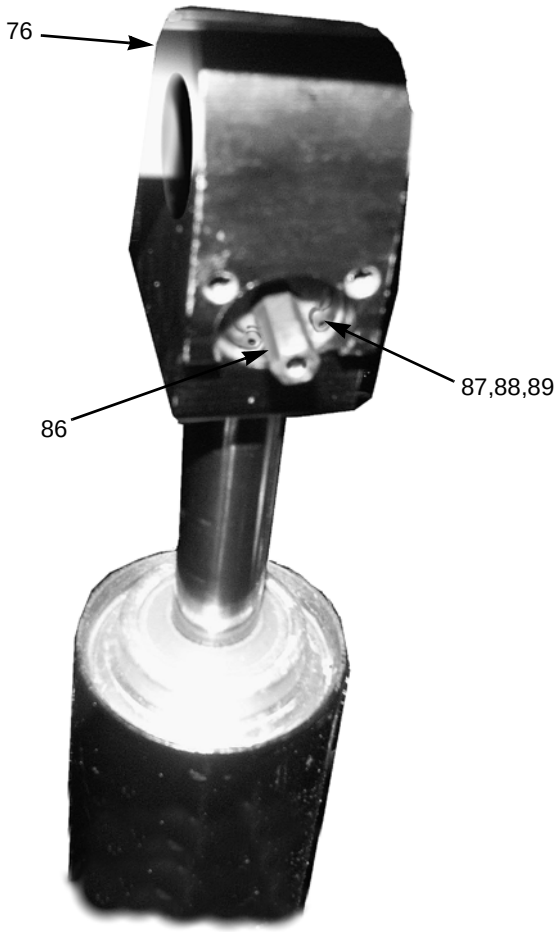
NOTE

Perform steps 1 through 7 to assemble shock absorber, control lever and cable assembly.

1. Install cable (81) and two jamnuts (90) to lever bracket (92).
2. Connect cable (81) to lever (47) with new retaining ring (91).
3. Install lever (47) to lever bracket (92) with washer (93) and new locknut (94).

ASSEMBLY - CONTINUED

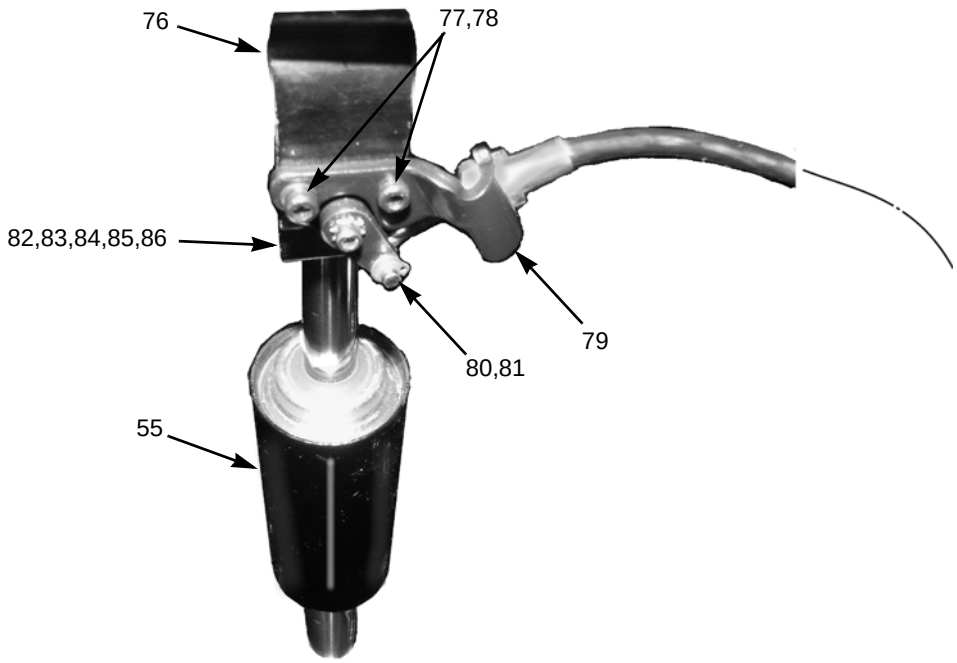
4. Install valve pin (86), new seal (89), washer (88) and new retaining ring (87) to bushing block (76).



390-1654

ASSEMBLY - CONTINUED

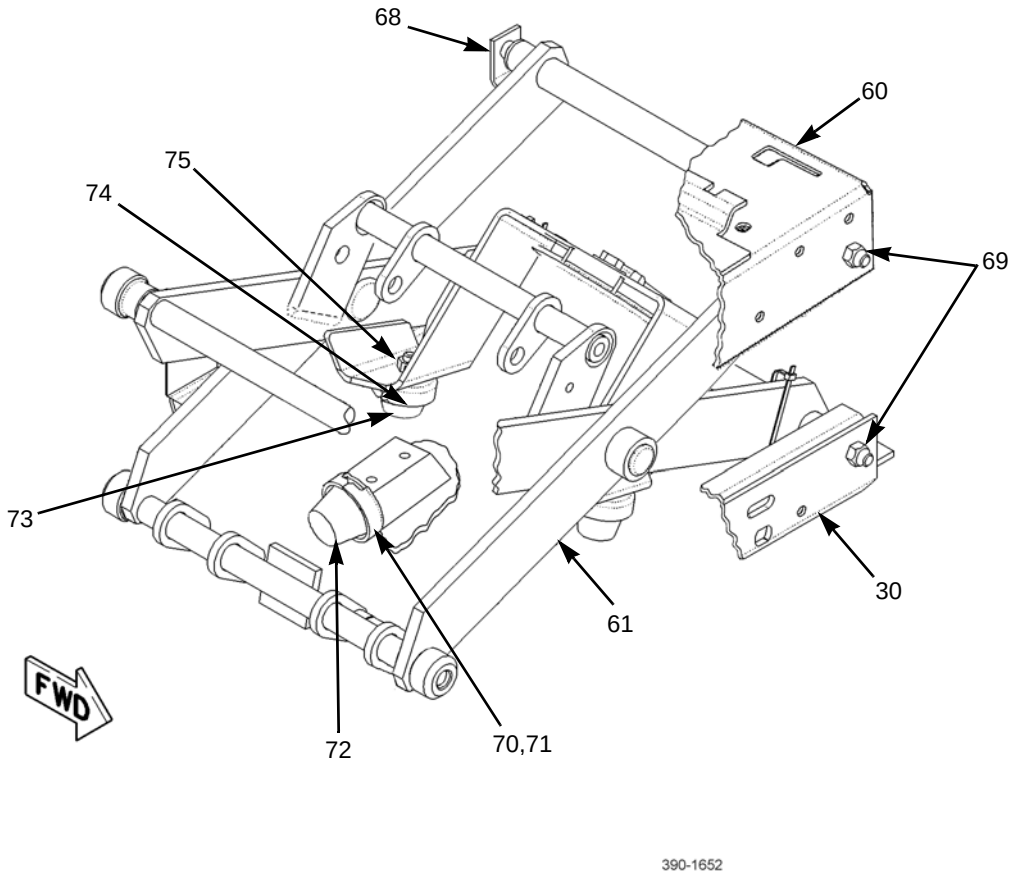
5. Connect end of cable (81) to lever (84) with new retaining ring (80). Set assembly aside.
6. Install bracket (79) to bushing block (76) with two new lockwashers (78) and screws (77).
7. Install spacer (85) and lever (84) to valve pin (86) with new lockwasher (83) and screw (82).



390-1653

ASSEMBLY - CONTINUED

8. Install two bumper retainers (74) and bumpers (73) to scissors (61) with two nuts (75).
9. Install bumper retainer (71) and bumper (72) to lower plate (30) with nut (70).
10. Install lower plate (30) and upper plate (60) to scissors (61) with two rods (68).
11. Install new locknut (69) to each of two rods (68).



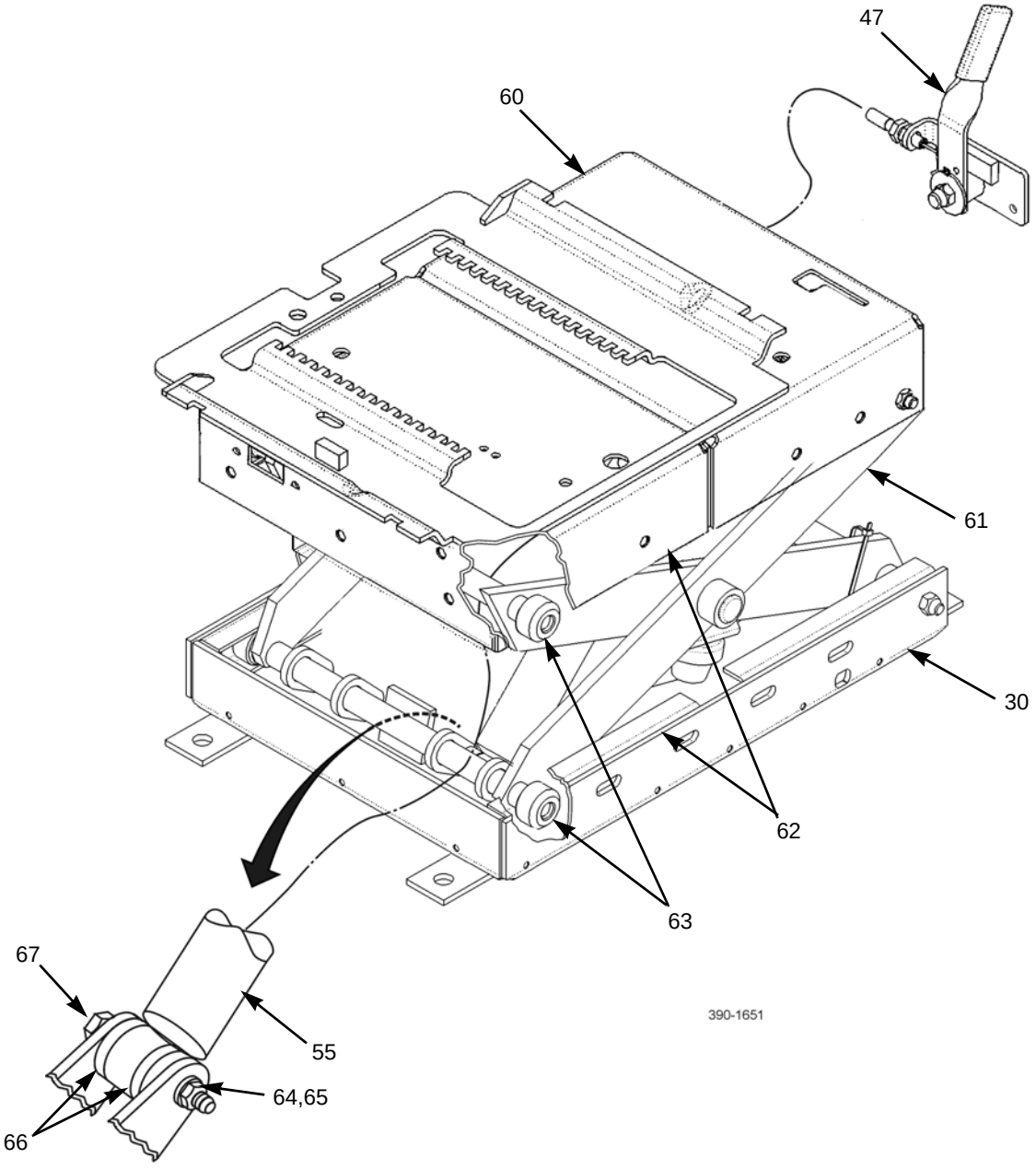
ASSEMBLY - CONTINUED

12. Position shock absorber (55), control lever (47) and cable assembly to seat suspension.
13. Install lower end of shock absorber (55) and two nylon bushings (66) to seat suspension with bolt (67), new lockwasher (65) and nut (64).

NOTE

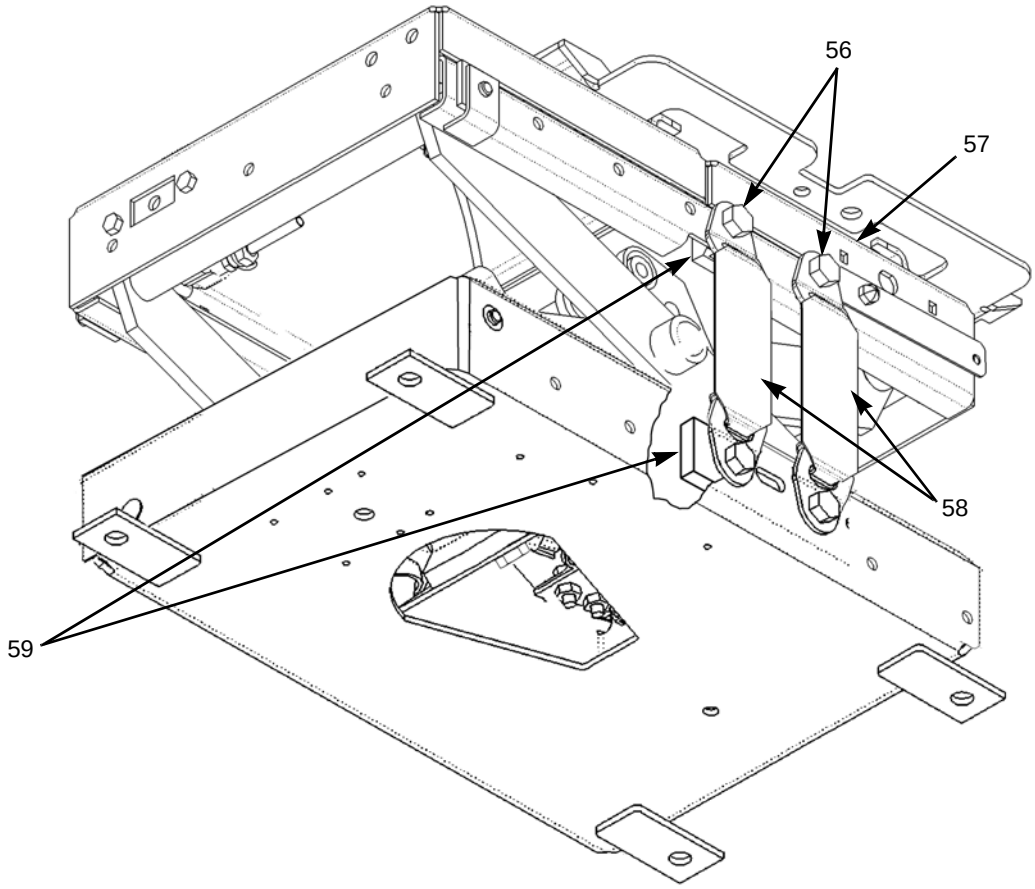
Tilt upper plate and lower plate toward each other as rollers are positioned into upper and lower plate.

14. Position scissors (61) so that scissors are shortened and four nylon rollers (63) pass through small slots (62) in upper plate (60) and lower plate (30).



ASSEMBLY - CONTINUED

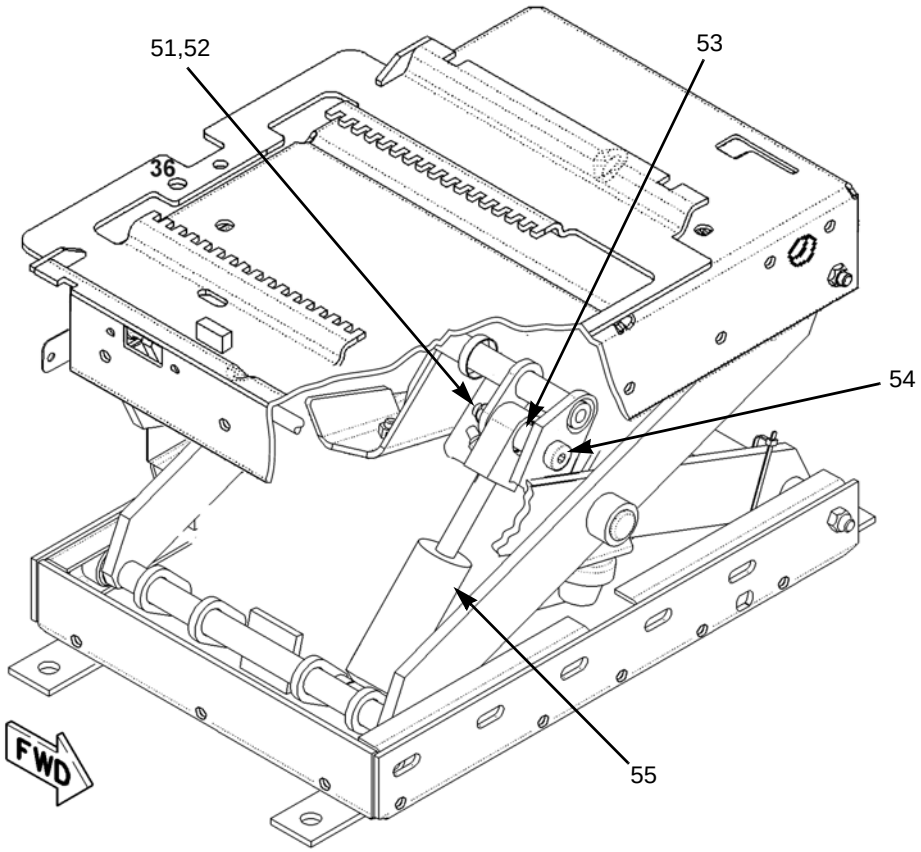
15. At rear of seat suspension, install retainer (57), two tethers (58), and two blocks (59) with four bolts (56).



390-1650

ASSEMBLY - CONTINUED

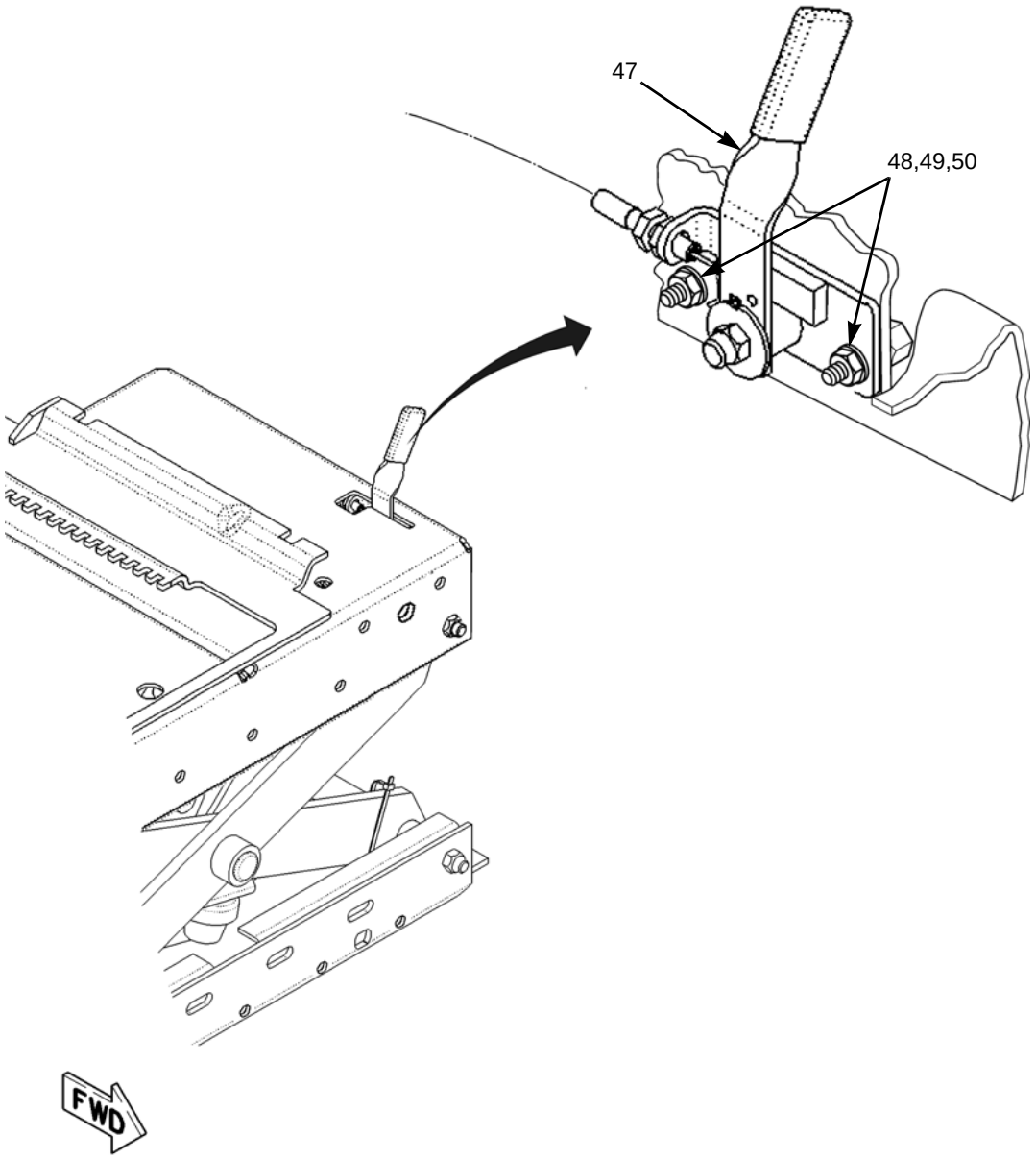
16. Install upper end of shock absorber (55) and nylon bushing (53) on seat suspension with bolt (54), new lockwasher (52), and nut (51).



390-1649

ASSEMBLY - CONTINUED

17. At left side of seat suspension, install shock absorber control lever (47) assembly with two screws (50), washers (49), and new locknuts (48).

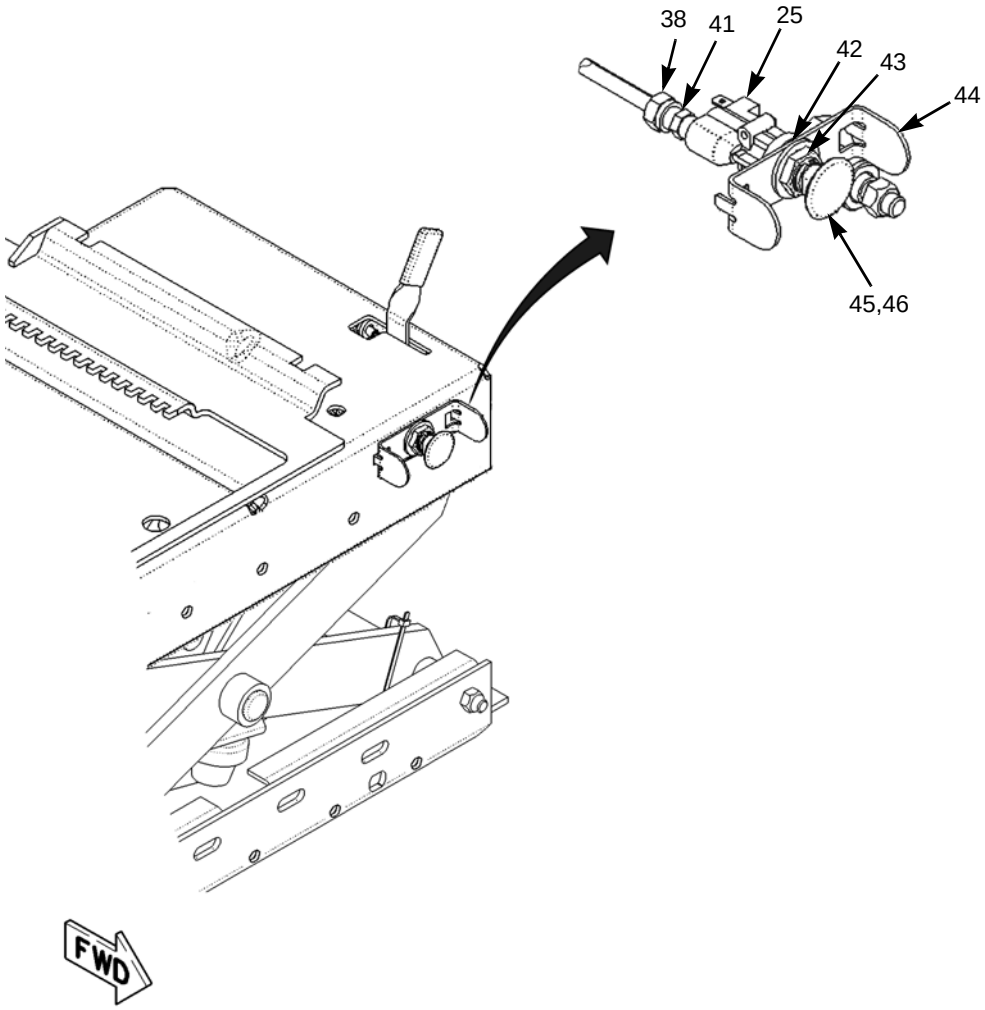


ASSEMBLY - CONTINUED

NOTE

Apply thin coat of pipe sealant to pipe threads of adapter at assembly.

18. Install adapter (41) on air valve (25).
19. Install air valve (25) and plate (44) on seat suspension with new lockwasher (42) and jamnut (43).
20. Position knob (46) on air valve (25) and tighten setscrew (45).
21. Position air tube (38) and loom on seat suspension and connect air tube to adapter (41) on air valve (25).



390-1647

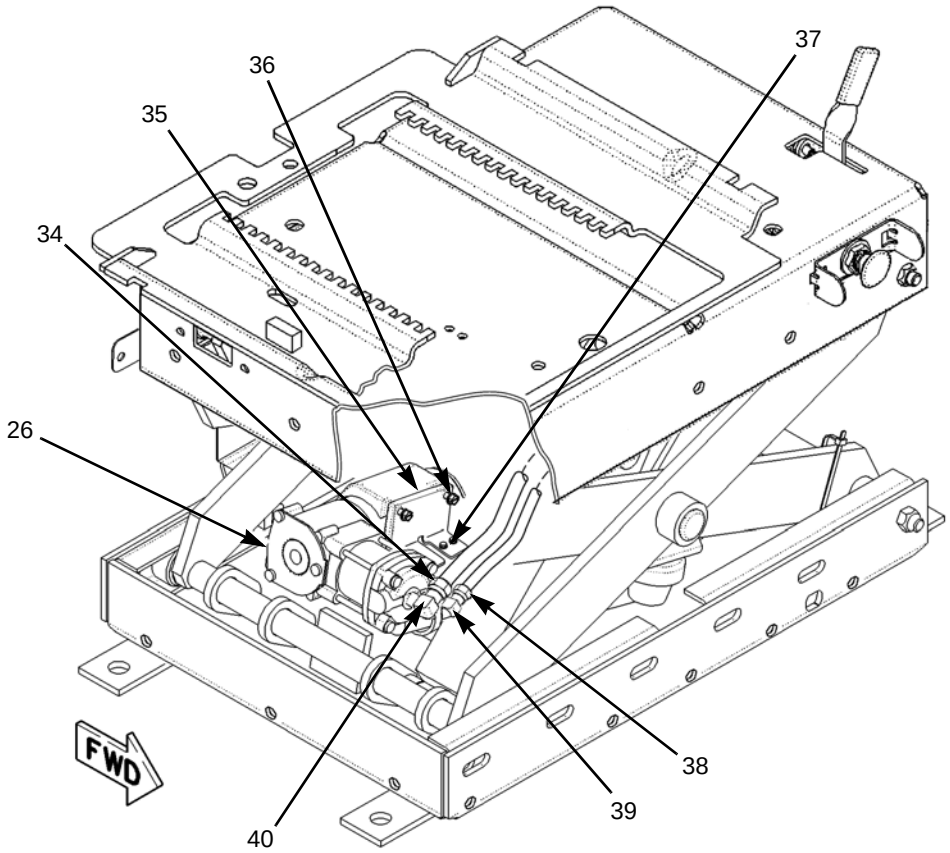
ASSEMBLY - CONTINUED

22. Install compressor bracket (35) on seat suspension with two bolts (37).

NOTE

Apply thin coat of pipe sealant to pipe threads of two elbows at assembly.

23. Install two elbows (39 and 40) on compressor (26).
24. Install compressor (26) on compressor bracket (35) with two bolts (36).
25. Connect other end of air tube (38) to elbow (39) on compressor (26).
26. Position air tube (34) and loom on seat suspension and connect air tube to elbow (40) on compressor (26).



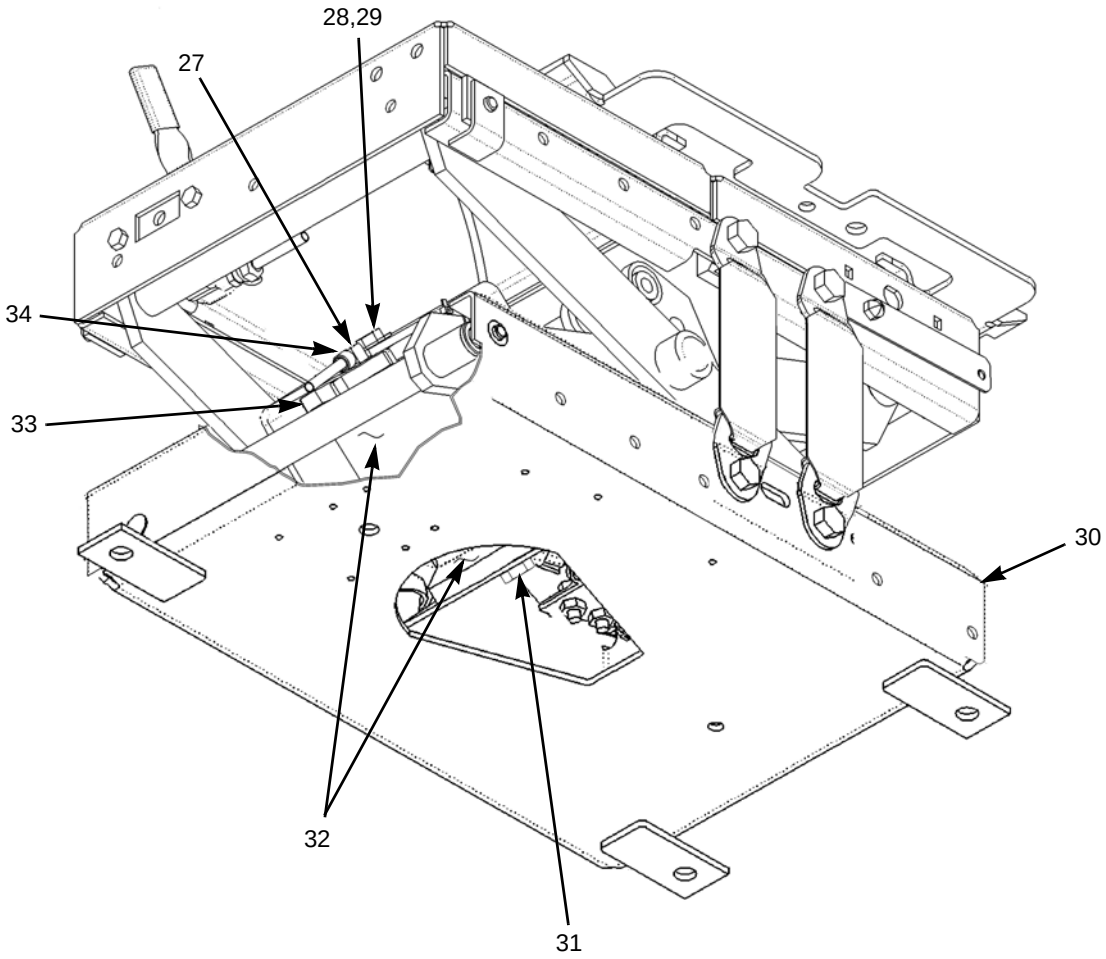
390-1646

ASSEMBLY - CONTINUED

NOTE

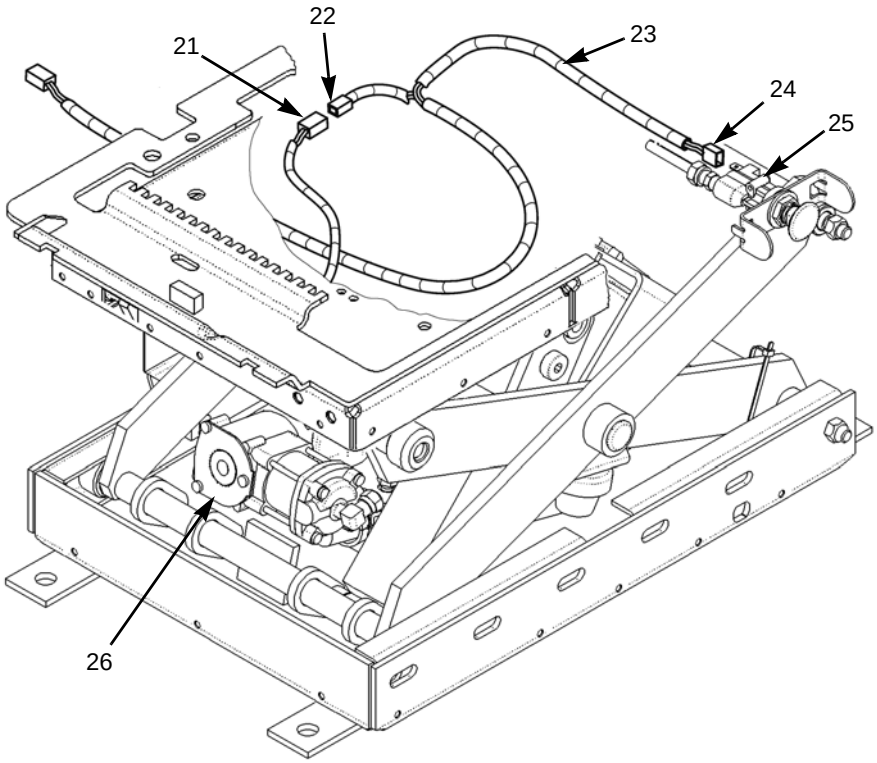
Apply thin coat of pipe sealant to pipe threads of elbow at assembly.

27. Install elbow (27) on air spring (32).
28. Install retainer (33) and air spring (32) on seat suspension with washer (29) and bolt (28).
29. Connect other end of air tube (34) to elbow (27).
30. At underside of seat suspension, install bolt (31) to secure lower end of air spring (32) to lower plate (30).



ASSEMBLY - CONTINUED

31. Position seat wiring harness (23) and loom into seat suspension.
32. Connect harness connector (24) on seat wiring harness (23) to air valve (25).
33. Connect harness connector (22) on seat wiring harness (23) to connector (21) on compressor (26).



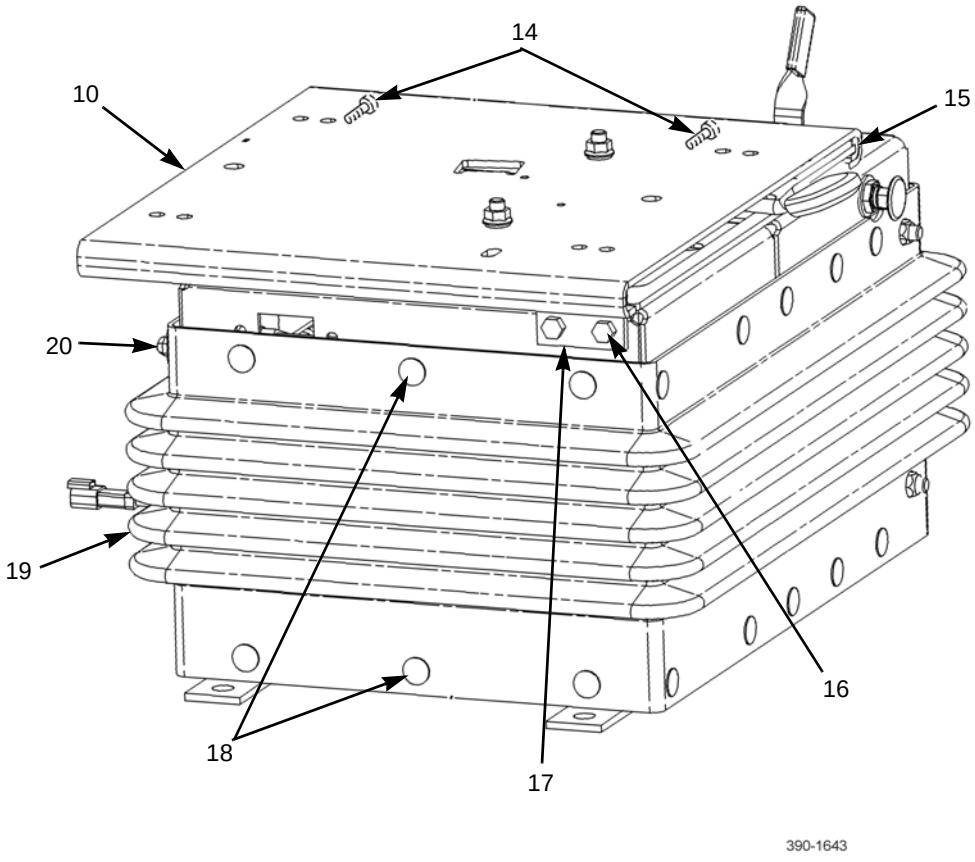
390-1644

ASSEMBLY - CONTINUED

NOTE

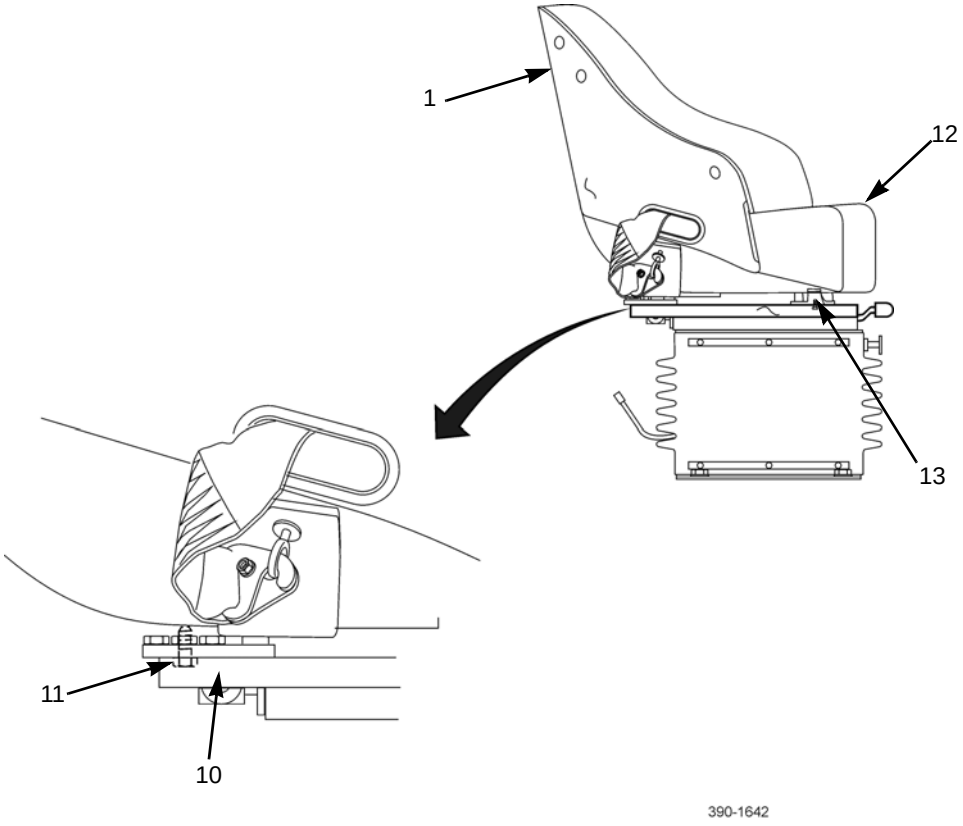
- Install new tiedown straps to secure wiring harness and air tubes to seat suspension.
- One plastic retainer at rear of seat suspension is installed with head at INSIDE of upper plate.

34. Position boot (19) around seat suspension and secure with 32 plastic retainers (18) and one nut (20). Extend seat wiring harness out through rear of seat suspension and boot.
35. While positioning front two guides (15) and rear two guides (15) into notches of seat suspension, slide seat adjuster (10) over all four guides until centered on seat suspension.
36. Position stop block (17) to right-front corner of seat adjuster (10) and secure with two bolts (16).
37. Position seat adjuster (10) so that two setscrews (14) can be seen through two holes at left side of seat adjuster. Tighten each setscrew approximately two turns. Check that seat adjuster can freely move forward and back when lever is operated, but without excess slack. Adjust setscrews as necessary.



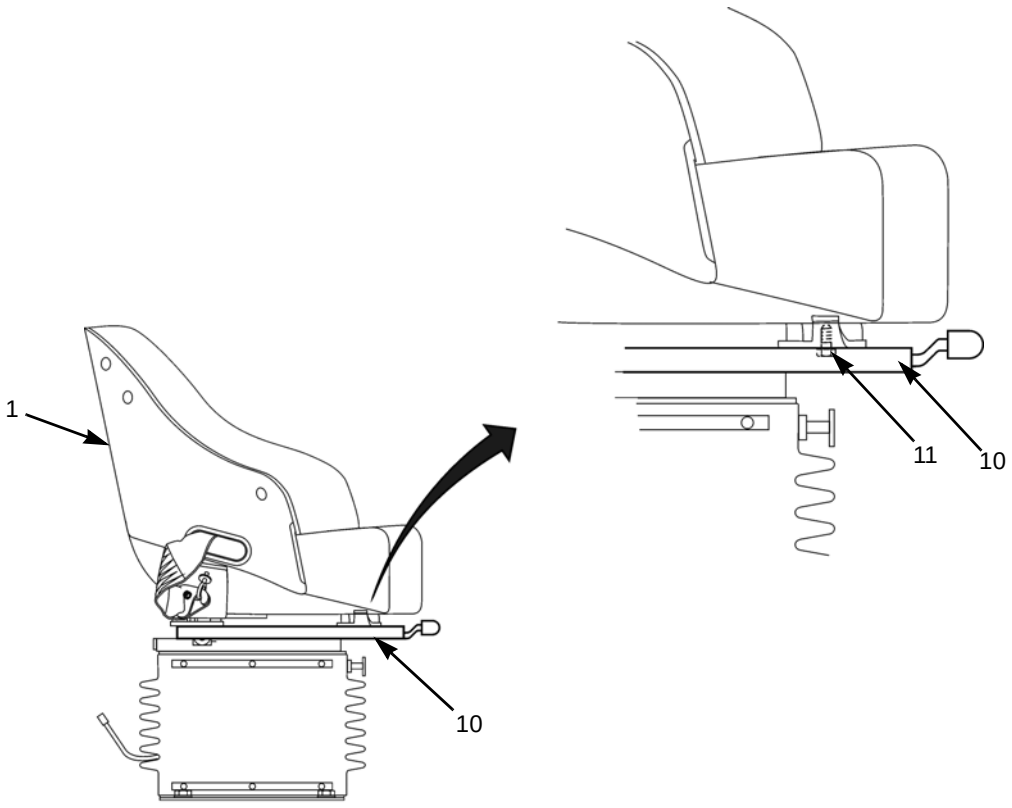
ASSEMBLY - CONTINUED

38. Position vinyl seat cushion (12) to seat (1) and secure with two bolts (13).
39. With seat adjuster (10) moved to rear, position seat (1) to seat adjuster and install two bolts (11).



ASSEMBLY - CONTINUED

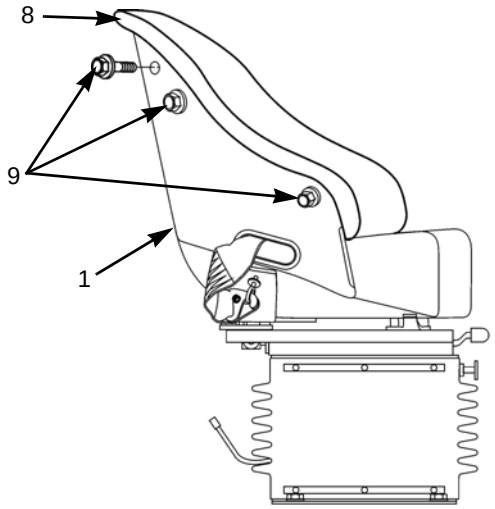
40. With seat adjuster (10) moved fully forward, install an additional two bolts (11).



390-1641

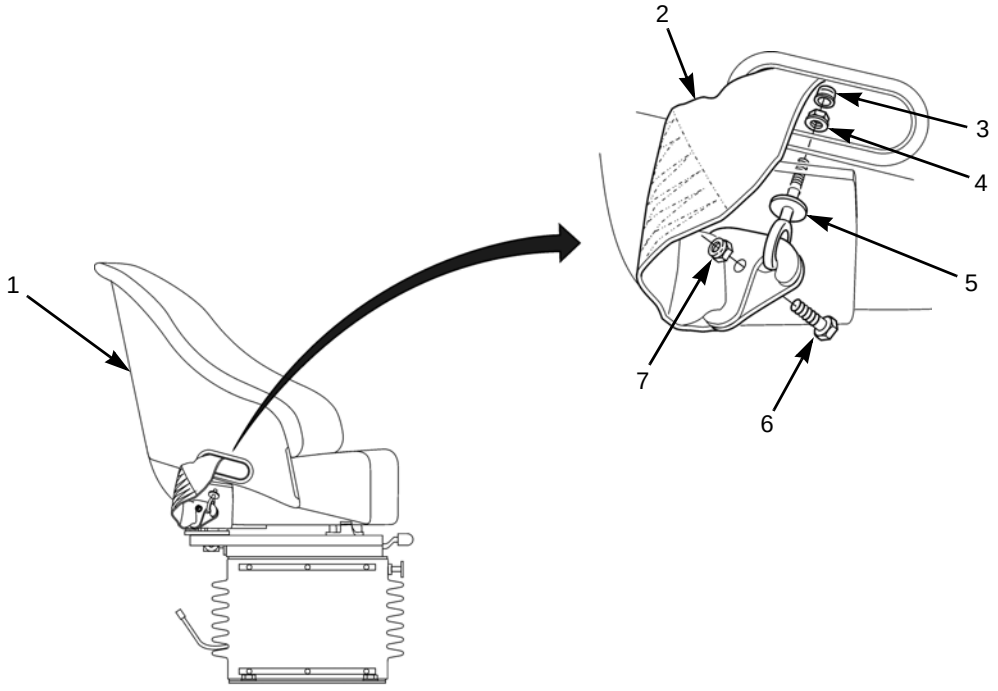
ASSEMBLY - CONTINUED

41. Position vinyl back cushion (8) to seat (1) and secure with five bolts (9).



390-164

42. At each side of seat (1), install eyebolt (5) with new locknut (4). Install protective cap (3) over threads of eyebolt.
43. Install seat belt (2) to each eyebolt (5) and tighten screw (6) and locknut (7).



44. Install seat (WP 0103 00).

END OF WORK PACKAGE

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RIFLE RACK REPLACEMENT 0105 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

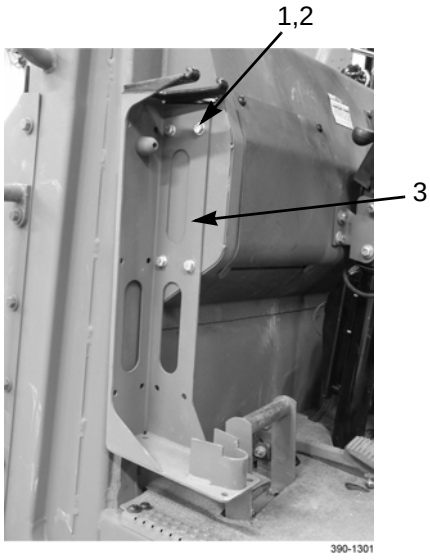
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

Remove four screws (1), washers (2), and rifle rack (3) from left side of cab.



INSTALLATION

Install rifle rack (3) on left side of cab with four washers (2) and screws (1).

END OF WORK PACKAGE

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FIRE EXTINGUISHER AND BRACKET REPLACEMENT 0106 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

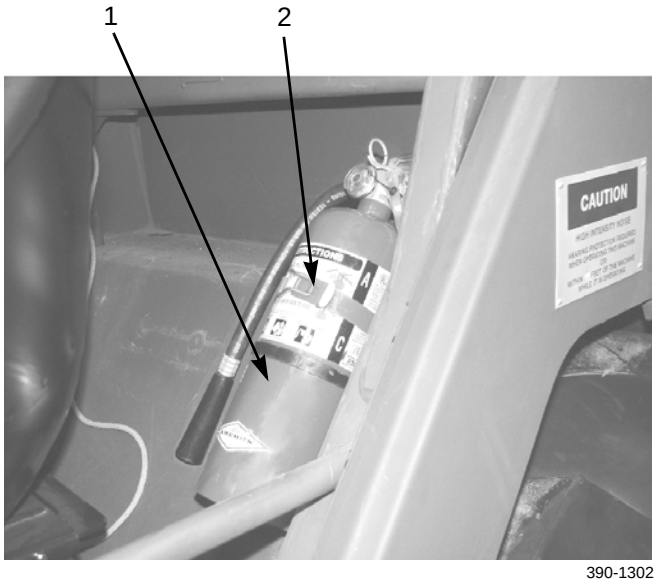
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

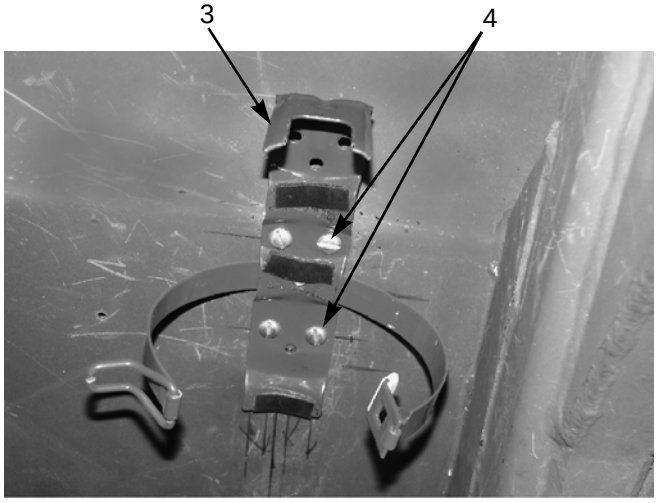
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

1. Move seat all the way forward, for better access to fire extinguisher (1) located behind seat (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Open latch (2) and remove fire extinguisher (1) from bracket (3).
3. Remove four screws (4) and bracket (3) from rear wall of cab.



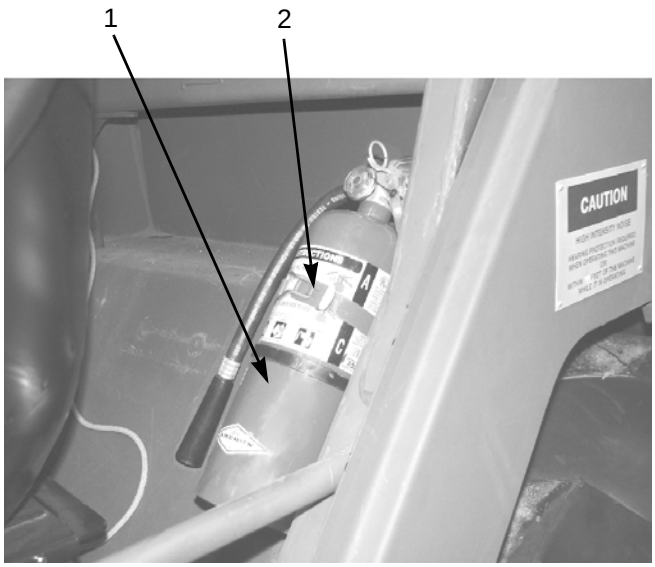
390-1302



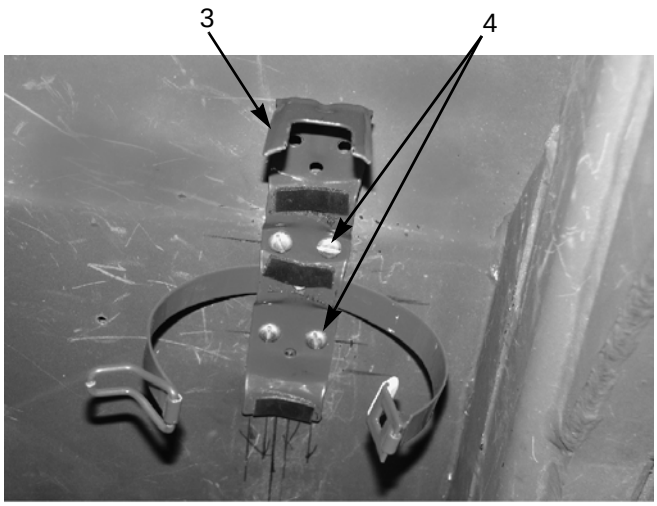
390-1303

INSTALLATION

1. Install bracket (3) on rear wall of cab with four screws (4).
2. Position fire extinguisher (1) on bracket (3) and secure latch (2).
3. Move seat to the rear (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



390-1302



390-1303

END OF WORK PACKAGE

REARVIEW AND SIDE MIRRORS REPLACEMENT 0107 00

THIS WORK PACKAGE COVERS

Rearview Mirror: Removal, Installation

Side Mirror: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

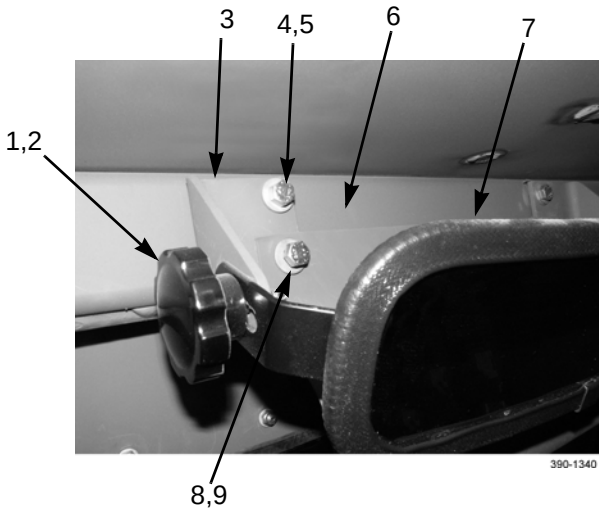
Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REARVIEW MIRROR REMOVAL

1. Remove two knobs (1), washers (2), and rearview mirror (7) from two mirror brackets (3).
2. Remove two screws (8), washers (9), and wiper motor cover (6) from two mirror brackets (3).
3. Remove two screws (4), washers (5), and mirror brackets (3) from machine.

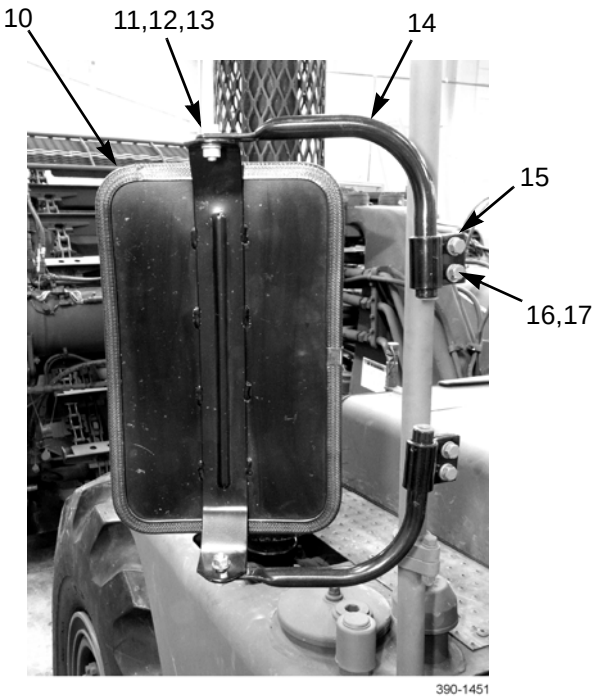


REARVIEW MIRROR INSTALLATION

1. Install two mirror brackets (3) on machine with two washers (5) and screws (4).
2. Install wiper motor cover (6) on two mirror brackets (3) with two washers (9) and screws (8).
3. Install mirror (7) on two mirror brackets (3) with two washers (2) and knobs (1).
4. Adjust position of rearview mirror (7) for maximum visibility to rear of machine and tighten two knobs (1).

SIDE MIRROR REMOVAL

1. Remove two nuts (11), four washers (12), two screws (13), and side mirror (10) from two mirror arms (14).
2. Remove four screws (16), washers (17), two clamps (15), and two mirror arms (14) from upper handrail.
3. Separate two clamps (15) from two mirror arms (14).



SIDE MIRROR INSTALLATION

1. Position two clamps (15) on two mirror arms (14).
2. Install two clamps (15) on upper handrail with four washers (17) and screws (16).
3. Install side mirror (10) on two mirror arms (14) with two screws (13), four washers (12), and two nuts (11).
4. Adjust position of side mirror (10) for maximum visibility to rear of machine and tighten two nuts (11).

END OF WORK PACKAGE

DATA PLATE AND DECAL REPLACEMENT 0108 00

THIS WORK PACKAGE COVERS

Data Plate (Solid Rivet) Replacement

Data Plate (Blind Rivet) Replacement

Decal Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Heater, gun type, electric (Item 14, WP 0172 00)

Materials/Parts

Detergent, general purpose (Item 11, WP 0171 00)

Rivet, solid (as required)

Rivet, blind (as required)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

DATA PLATE (SOLID RIVET) REPLACEMENT

1. Using center punch and hammer, mark center of each rivet (1).
2. Using electric drill and twist drill slightly larger than body diameter of rivet (1), drill into each rivet head until rivet head can be separated from rivet body.
3. Remove data plate (2) from tractor.

CAUTION

DO NOT drill any deeper than necessary to remove rivet body. Failure to follow this caution will result in damage to tractor.

4. Using twist drill the same diameter as rivet (1) body, remove rivet body from tractor. Discard rivets.
5. Install data plate (2) on tractor with new rivets (1).

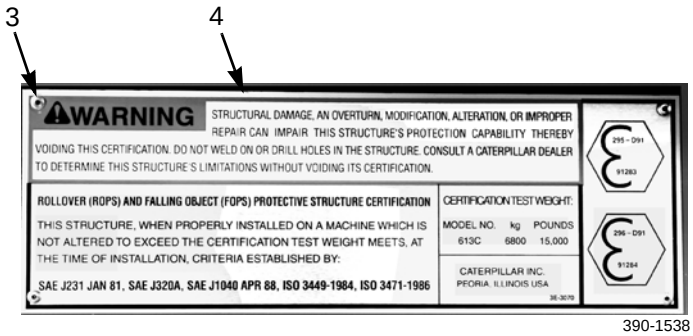


DATA PLATE (BLIND RIVET) REPLACEMENT

CAUTION

DO NOT drill any deeper than necessary to remove rivet. Failure to follow this caution will result in damage to tractor.

1. Using electric drill and twist drill the same diameter as body of rivet (3), drill through head and body of rivet and remove each rivet from data plate (4). Discard rivets.
2. Remove data plate (4) from tractor.
3. Using blind hand riveter, install new data plate (4) on tractor with new rivets (3).



390-1538

DECAL REPLACEMENT

NOTE

Use heat gun, as necessary, for ease in removing decal.

1. Lift and peel back decal (5) to remove decal from surface of tractor.
2. Clean any remaining adhesive from decal (5) using detergent. Rinse and dry area.
3. Peel paper backing from decal (5) and apply to surface of tractor.



390-1554

END OF WORK PACKAGE

WINDSHIELD WASHER RESERVOIR AND PUMP REPLACEMENT 0109 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

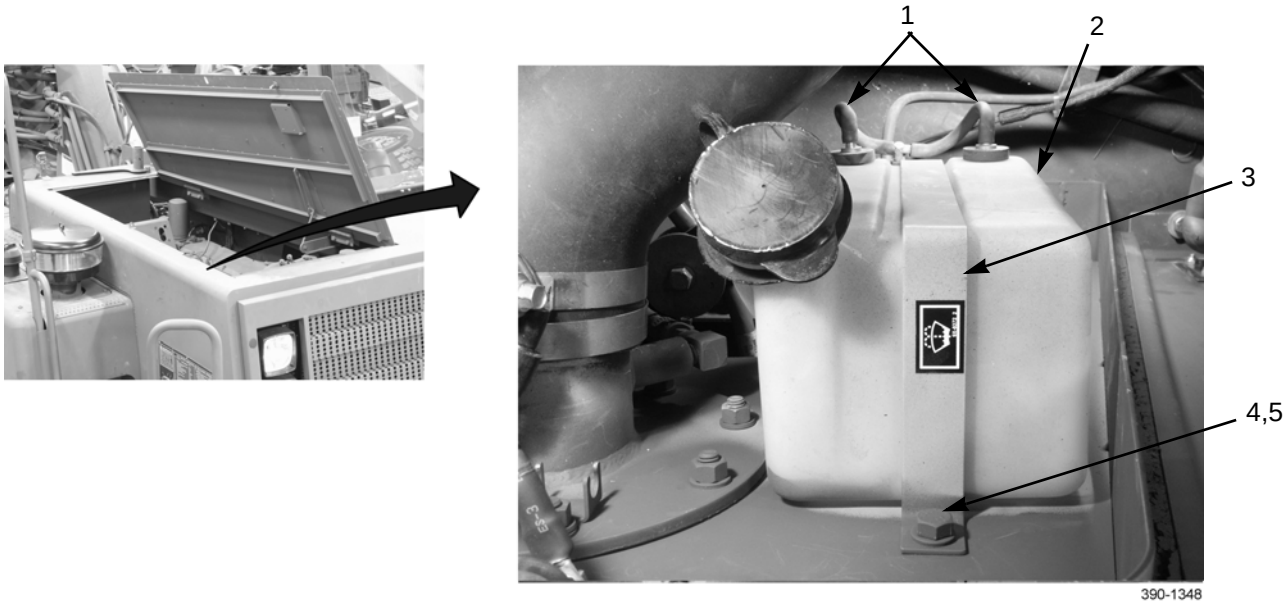
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

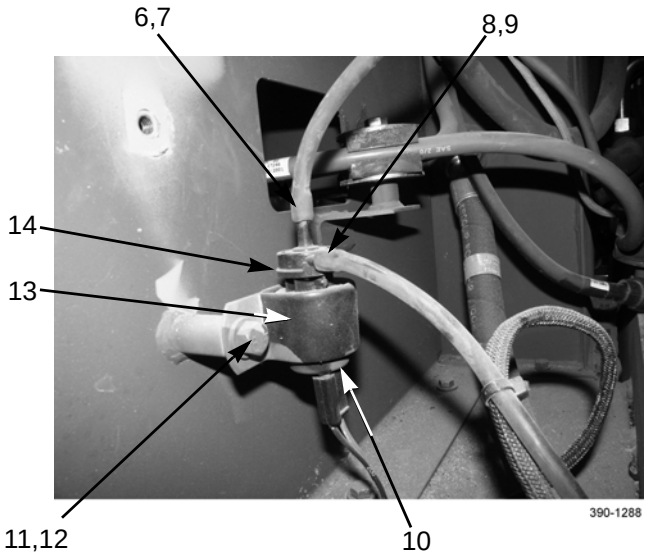
REMOVAL

1. Disconnect two hoses (1) at bottom of reservoir (2) and allow washer fluid to drain.
2. Remove two bolts (4), washers (5), bracket (3), and reservoir (2) from engine hood.



REMOVAL - CONTINUED

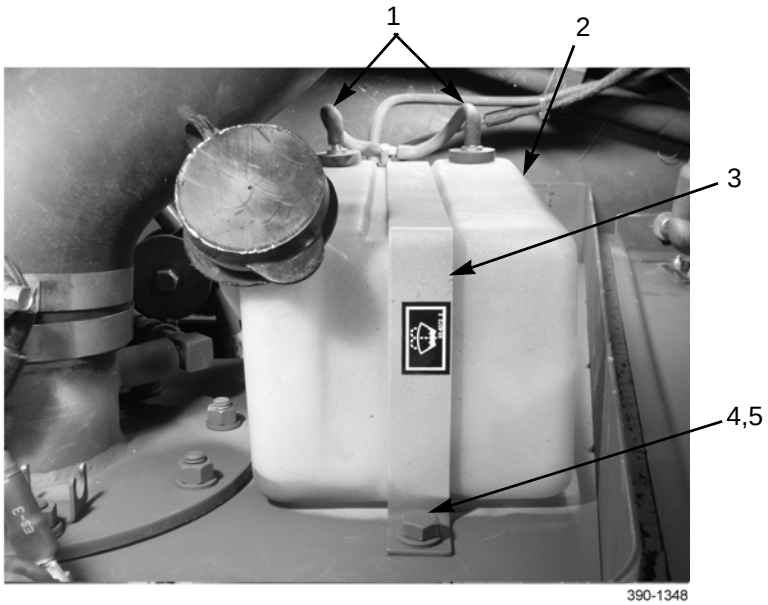
3. Disconnect electrical connector (10) from pump (14).
4. Remove hose (6) from inlet port (7).
5. Remove hose (8) from outlet port (9).
6. Remove screw (11) and washer (12) from clamp (13).
7. Remove pump (14) from clamp (13).
8. Inspect clamp (13) for damage. Replace clamp if damaged.



INSTALLATION

1. Install pump (14) in clamp (13) with washer (12) and screw (11).
2. Install hose (8) on outlet port (9).
3. Install hose (6) on inlet port (7).
4. Connect electrical connector (10) to pump (14).
5. Install reservoir (2) on engine hood with bracket (3), two washers (5), and bolts (4).
6. Connect two hoses (1) to bottom of reservoir (2).





7. Fill reservoir (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
8. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

WINDSHIELD WIPER ARM AND MOTOR REPLACEMENT 0110 00

THIS WORK PACKAGE COVERS

Windshield Wiper Arm: Removal, Installation

Windshield Wiper Motor: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

WINDSHIELD WIPER ARM REMOVAL

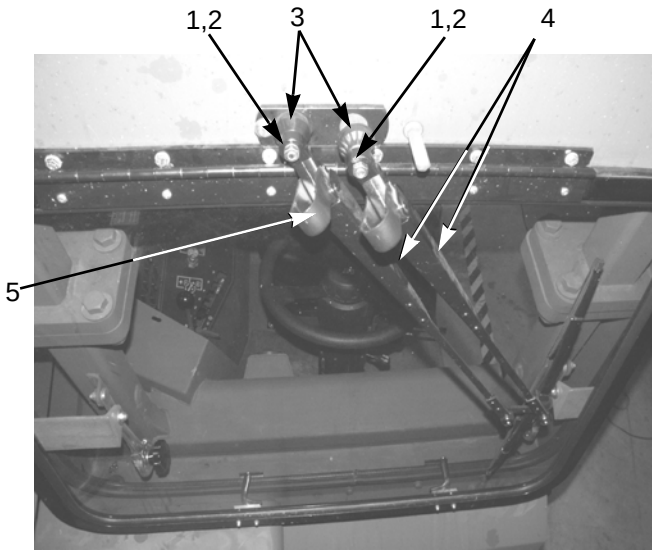
NOTE

Note position of wiper arm on windshield to aid in installation.

1. Pull open two covers (5) and remove two nuts (1), washers (2), and wiper arm (4) from drive and pivot shaft.
2. Remove two plastic caps (3).

WINDSHIELD WIPER ARM INSTALLATION

1. Install two plastic caps (3).
2. Install wiper arm (4) on drive and pivot shaft with two washers (2) and nuts (1).
3. Close two covers (5).



390-1060

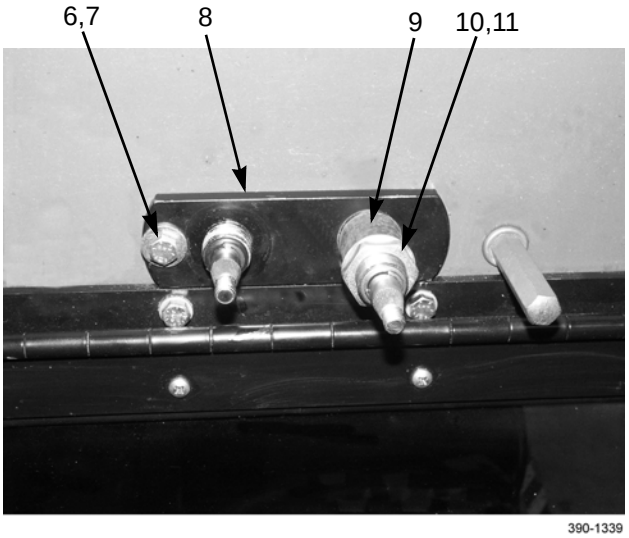
WINDSHIELD WIPER MOTOR REMOVAL

1. Remove wiper arm (Refer to *Windshield Wiper Arm Removal*).

NOTE

Wiper motor will become loose from inside cab as nut, washer and spacer are removed.

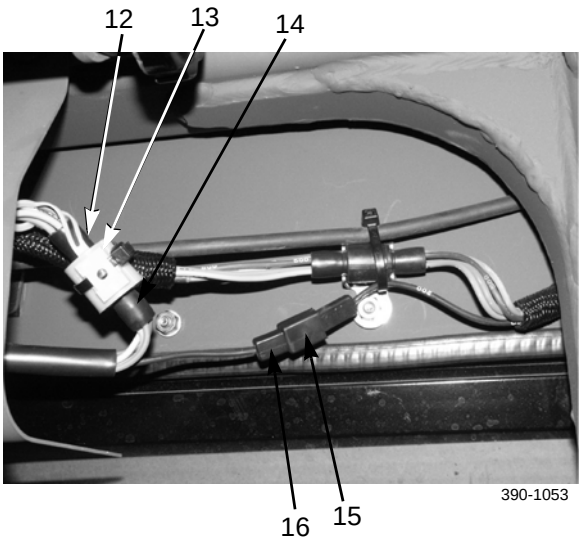
2. Remove screw (6) and washer (7) from pivot plate (8).
3. Remove nut (10), washer (11), spacer (9), and pivot plate (8).



NOTE

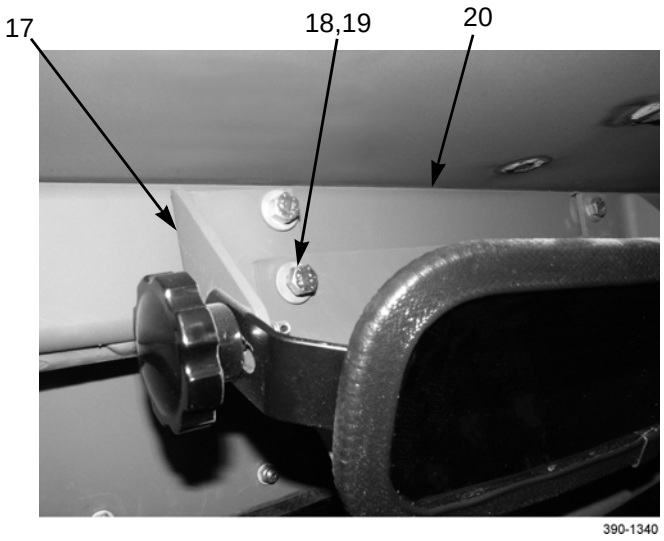
Cut and discard tiedown straps as necessary.

4. From inside of cab, remove clip (13) and disconnect wiper motor connector (14) from wiring harness connector (12).
5. Disconnect ground wire connector (16) from wiring harness connector (15).



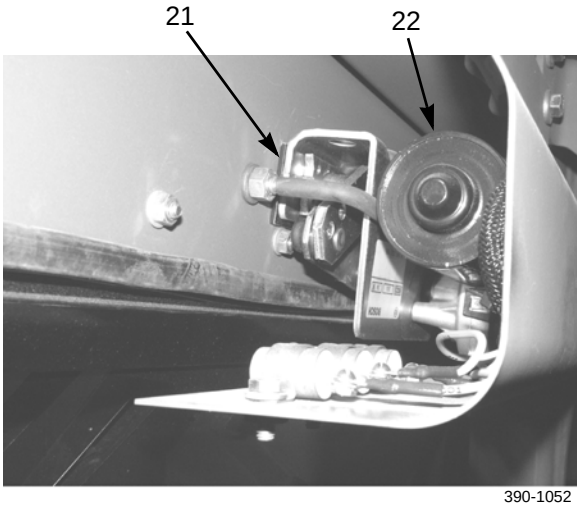
WINDSHIELD WIPER MOTOR REMOVAL - CONTINUED

6. Remove two lower screws (18) and washers (19) at each end of cover (20). Separate cover from mirror brackets (17).



390-1340

7. Remove wiper motor (22) and shim (21) from inside cab.



390-1052

WINDSHIELD WIPER MOTOR INSTALLATION

1. Position shim (21) and wiper motor (22) inside cab and install cover (20) to mirror brackets (17) with two lower washers (19) and screws (18).
2. Connect ground wire connector (16) to wiring harness connector (15).
3. Connect wiper motor connector (14) to wiring harness connector (12). Install clip (13).

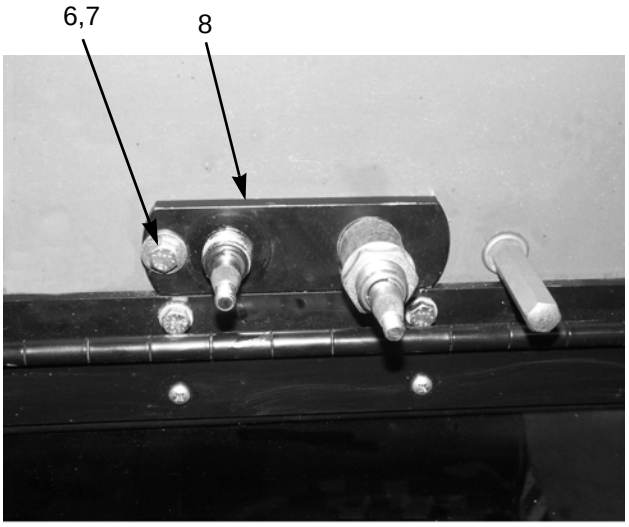
NOTE

Windshield wiper motor will be secured to inside of cab as spacer, washer, and nut are installed.

4. From outside of cab, install pivot plate (8), and spacer (9) with washer (11) and nut (10).

WINDSHIELD WIPER MOTOR INSTALLATION - CONTINUED

5. Install washer (7) and screw (6) on pivot plate (8).
6. Install wiper arm (Refer to *Windshield Wiper Arm Installation*).



390-1339

END OF WORK PACKAGE

AIR HORN REPLACEMENT 0111 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Sealant, pipe (Item 34, WP 0171 00)

Lockwasher

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

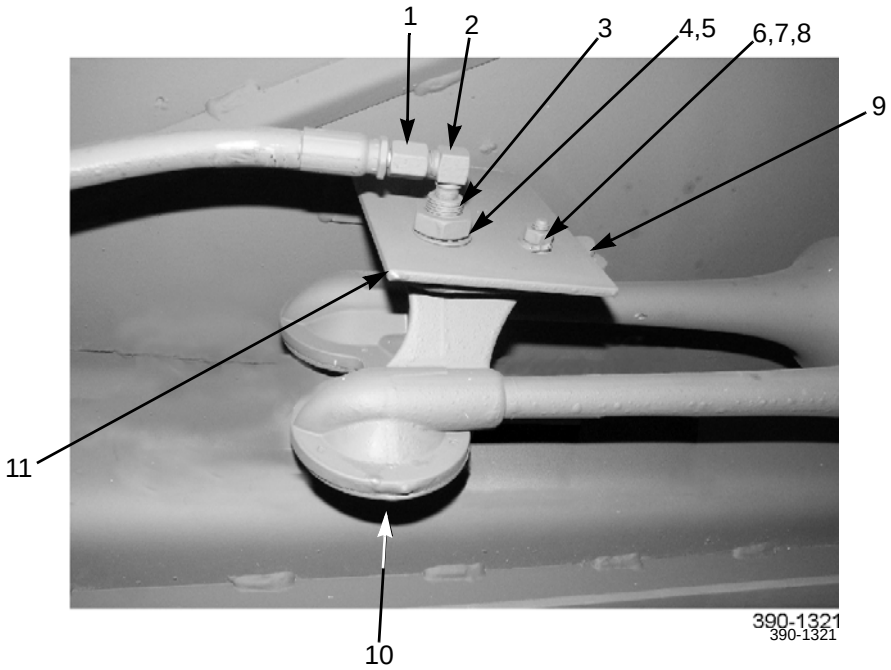


WARNING

- Do NOT disconnect any air system lines or fittings unless vehicle engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

REMOVAL

1. Remove hose (1) and elbow (2) from adapter (3).
2. Remove nut (4) and lockwasher (5) from adapter (3). Discard lockwasher.
3. Remove nut (6), washer (7), screw (8), horn (10), and pad (9) from cab bracket (11).
4. Remove adapter (3) from horn (10).



INSTALLATION

1. Apply a thin coat of pipe sealant to threads of adapter (3) and install adapter on horn (10).
2. Install pad (9) and horn (10) on cab bracket (11) with screw (8), washer (7), and nut (6).
3. Install new lockwasher (5) and nut (4) on adapter (3).
4. Apply a thin coat of pipe sealant to threads of elbow (2) and install elbow and hose (1) on adapter (3).

END OF WORK PACKAGE

AIR HORN SOLENOID REPLACEMENT 0112 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Tape, antiseizing (Item 40, WP 0171 00)

Equipment Condition

Center guard plate removed (WP 0100 00)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

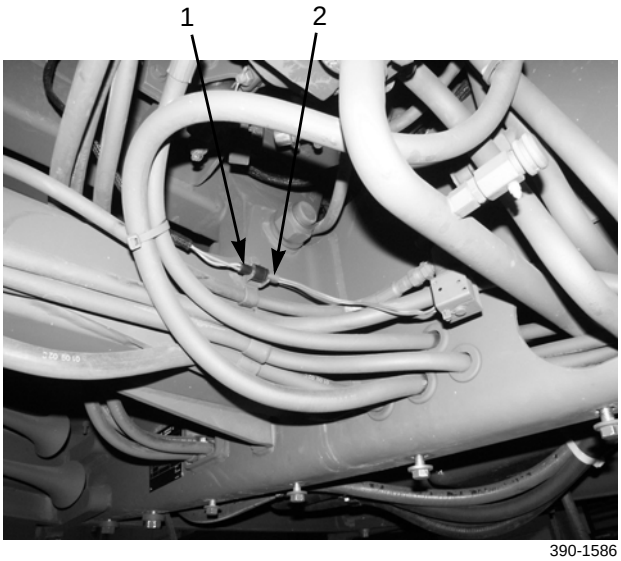


WARNING

- Do NOT disconnect any air system lines or fittings unless vehicle engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

REMOVAL

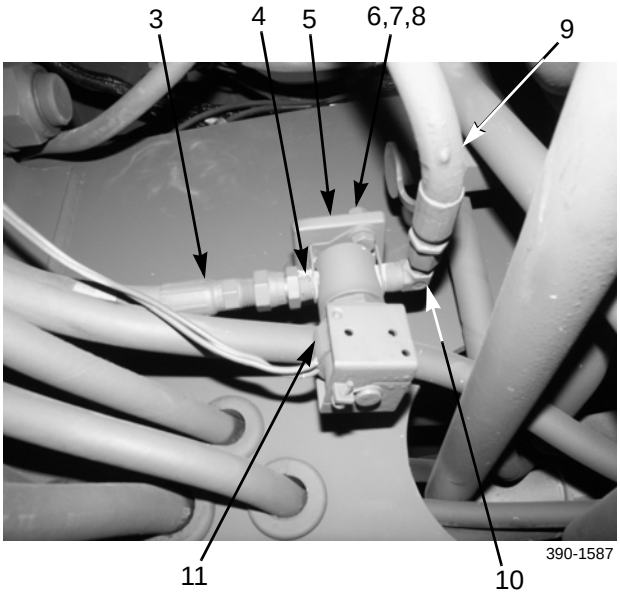
1. Disconnect harness connector (1) from air horn solenoid connector (2).



390-1586

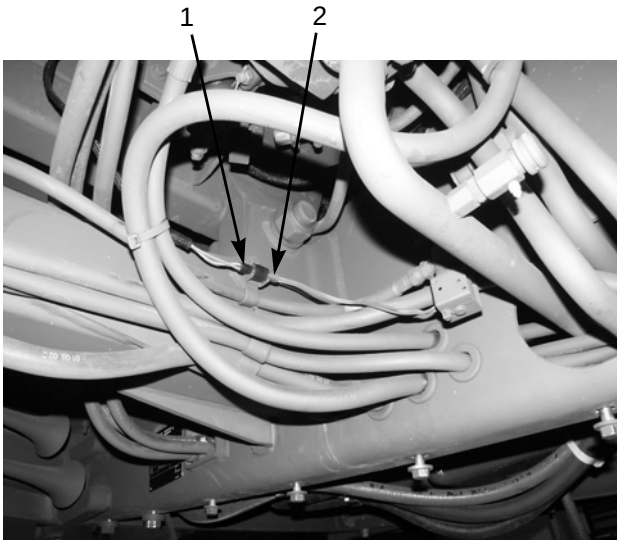
REMOVAL - CONTINUED

2. Disconnect hose (3) from adapter (4).
3. Disconnect hose (9) from elbow (10).
4. Remove two screws (6), washers (7), nuts (8), and air horn solenoid (11) from bracket (5).
5. Remove elbow (10) and adapter (4) from air horn solenoid (11). Remove antiseizing tape from threads of elbow and adapter.



INSTALLATION

1. Install antiseizing tape on threads of elbow (10) and adapter (4) and install elbow and adapter on air horn solenoid (11).
2. Install air horn solenoid (11) on bracket (5) with two screws (6), washers (7), and nuts (8).
3. Connect hose (9) to elbow (10).
4. Connect hose (3) on adapter (4).
5. Connect harness connector (1) to air horn solenoid connector (2).



6. Install center guard plate (WP 0100 00).

END OF WORK PACKAGE

AIR HORN SWITCH REPLACEMENT 0113 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

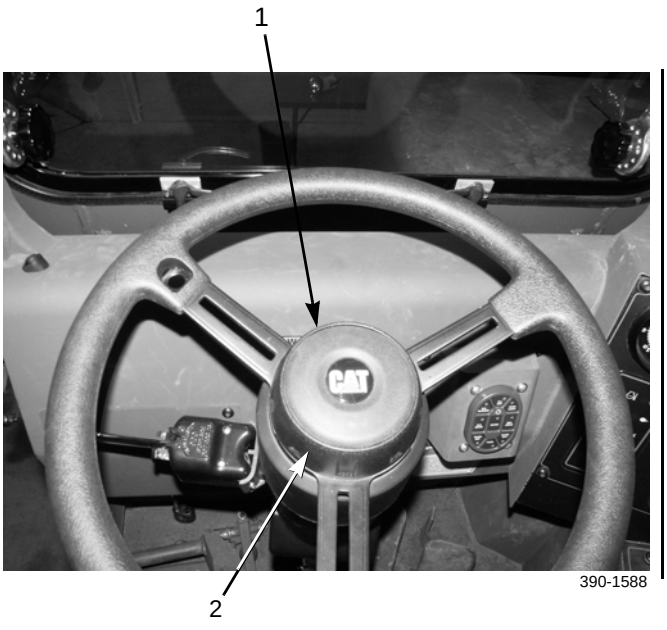
Parking brake engaged (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

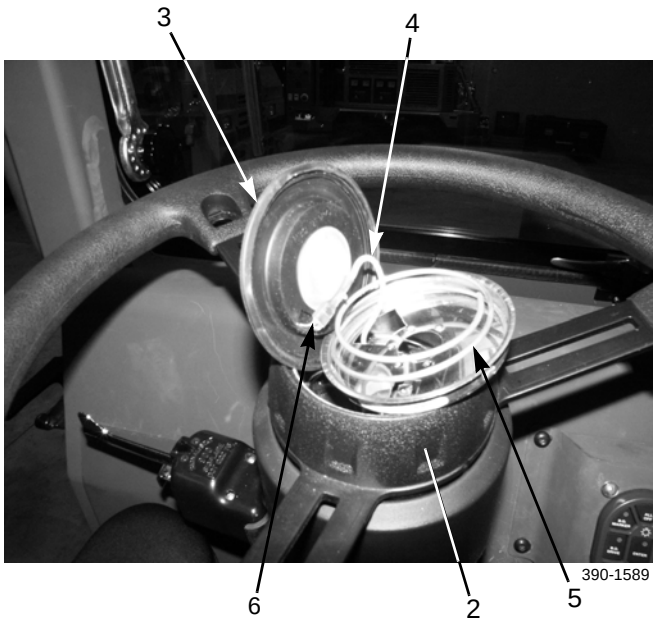
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

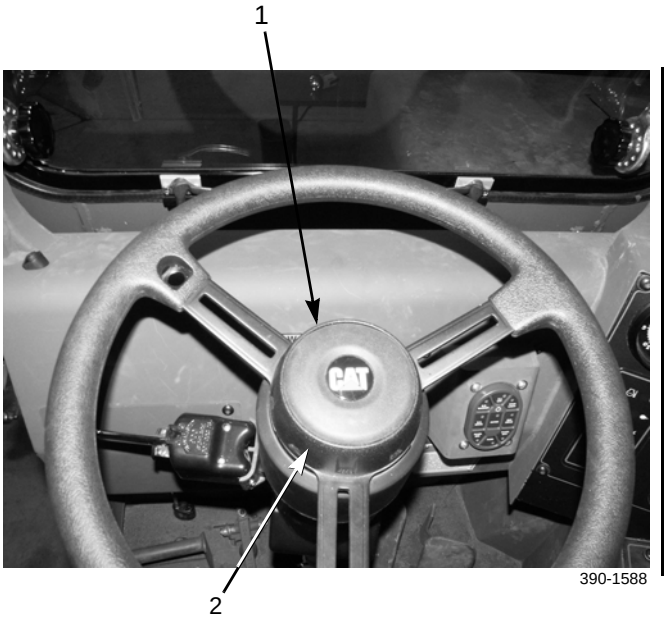
1. Remove air horn switch assembly (1) from steering wheel hub (2).
2. Remove air horn button (3) from air horn switch (5).
3. Disconnect wire (4) from terminal (6).
4. Remove air horn button (3) and air horn switch (5) from steering wheel hub (2).

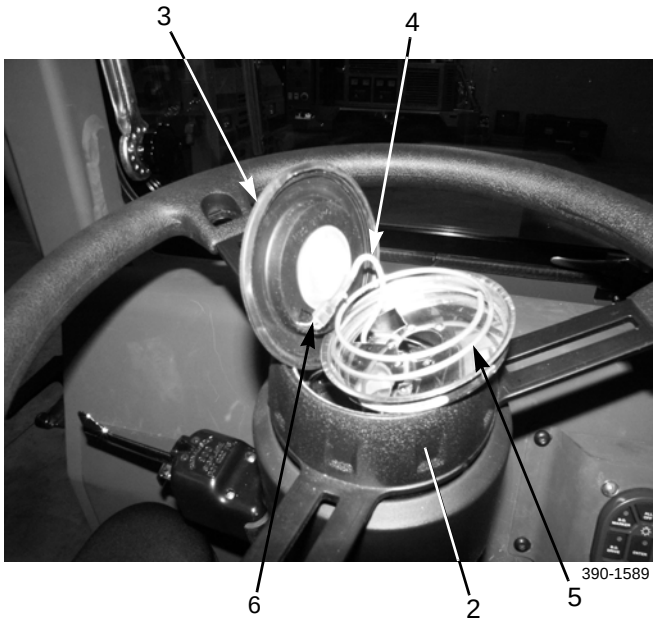




INSTALLATION

1. Position air horn button (3) and air horn switch (5) on steering wheel hub (2).
2. Route wire (4) through air horn switch (5) and connect wire to terminal (6).
3. Install air horn button (3) on air horn switch (5).
4. Install air horn switch assembly (1) on steering wheel hub (2).





END OF WORK PACKAGE

DIRECTION CONTROL AND HYDRAULIC CONTROL LEVERS REPLACEMENT 0114 00

THIS WORK PACKAGE COVERS

Direction Control Lever: Removal, Installation

Hydraulic Control Levers: Removal, Installation

INITIAL SETUP

Maintenance Unit

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Gasket

Locknut

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

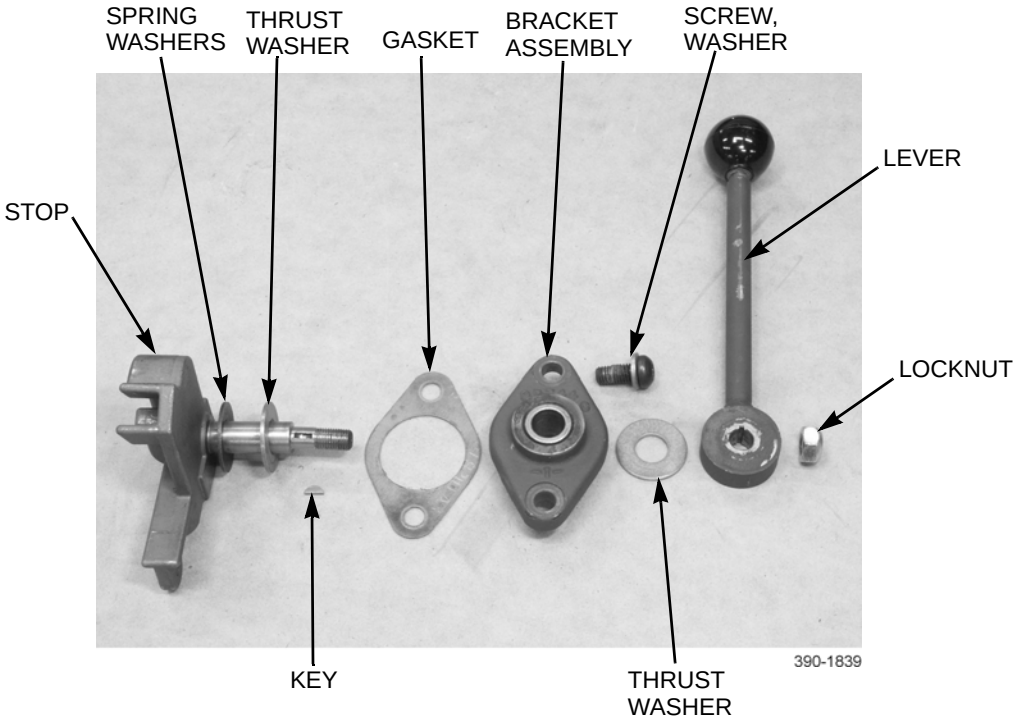
Scraper bowl or water tank lowered to ground (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

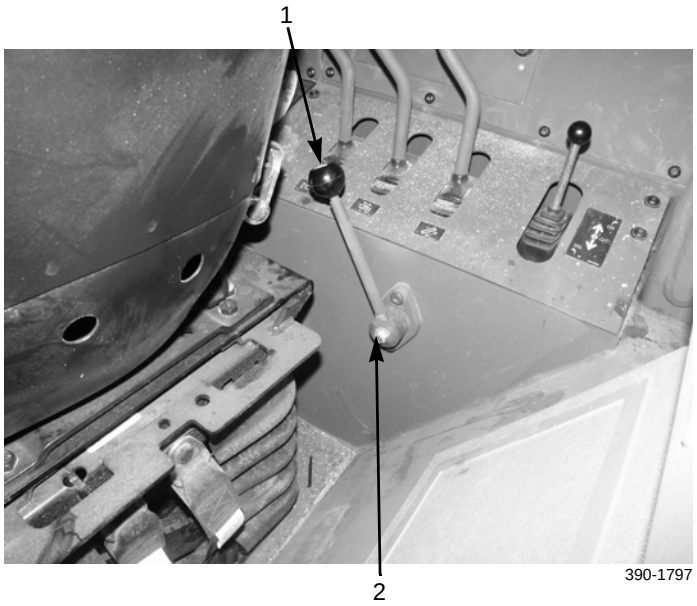
DIRECTION CONTROL LEVER REMOVAL



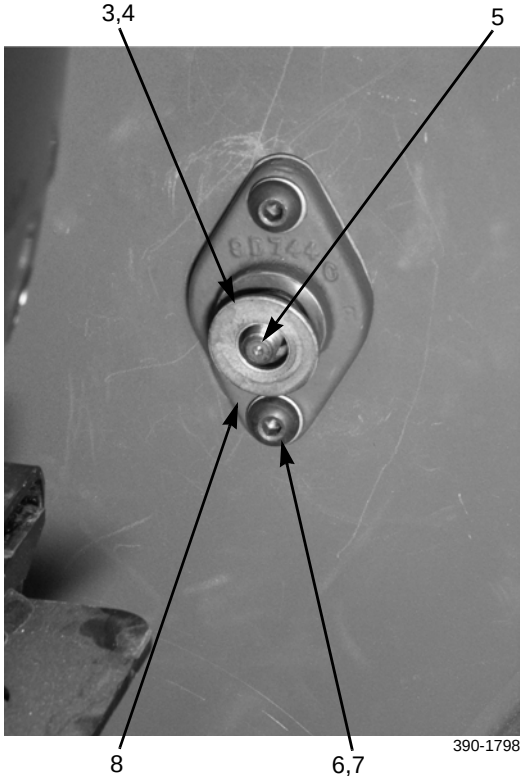
DISASSEMBLED DIRECTION CONTROL LEVER

DIRECTION CONTROL LEVER REMOVAL - CONTINUED

1. Remove and discard locknut (2) from lever (1).

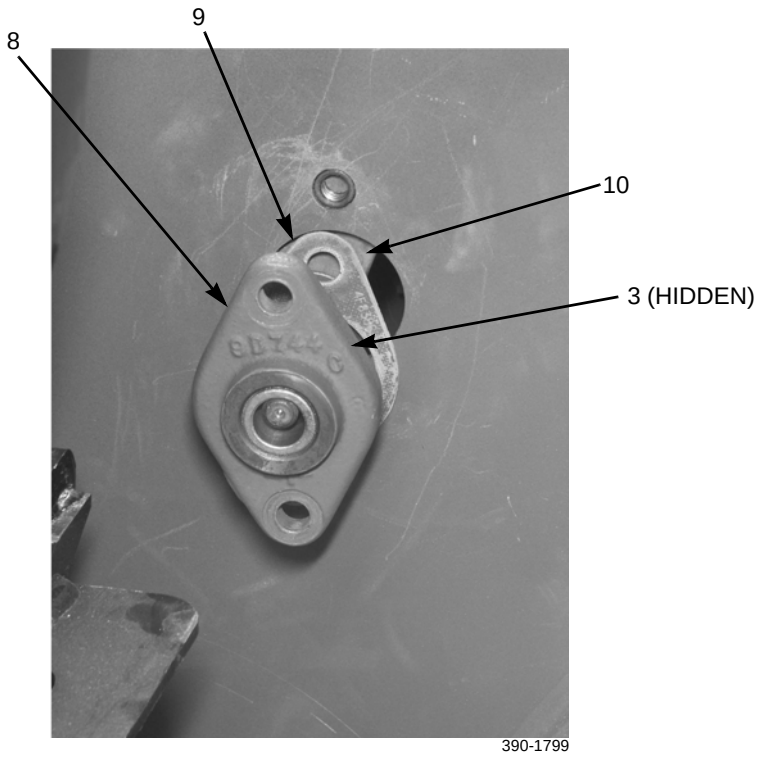


2. Remove lever (1), thrust washer (3), and key (4) from shaft (5).
3. Remove two screws (6) and washers (7) from bracket assembly (8).



DIRECTION CONTROL LEVER REMOVAL - CONTINUED

4. Remove bracket assembly (8), gasket (9), and another thrust washer (3) from stop (10). Discard gasket.

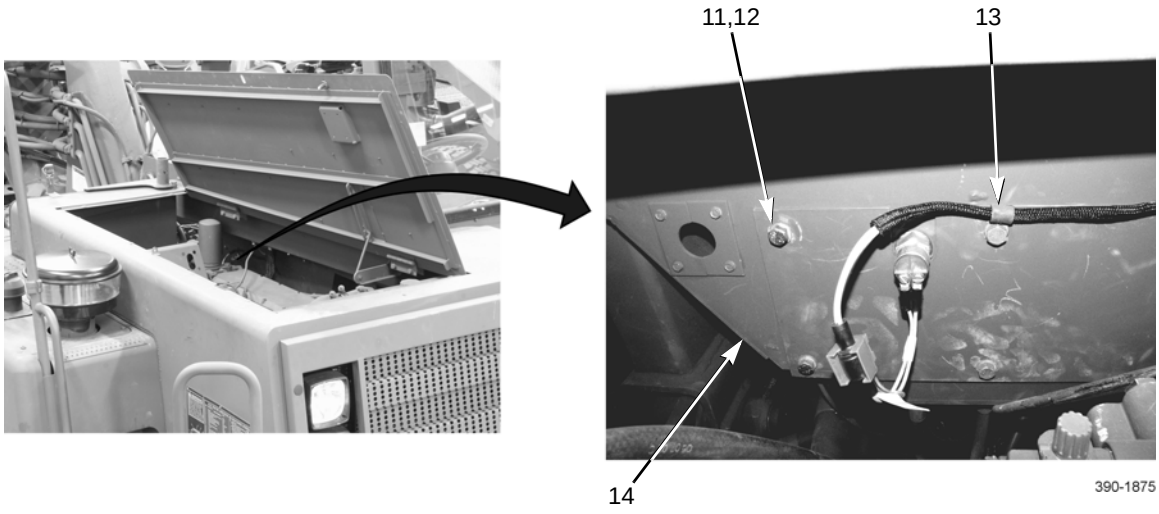


5. Open engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

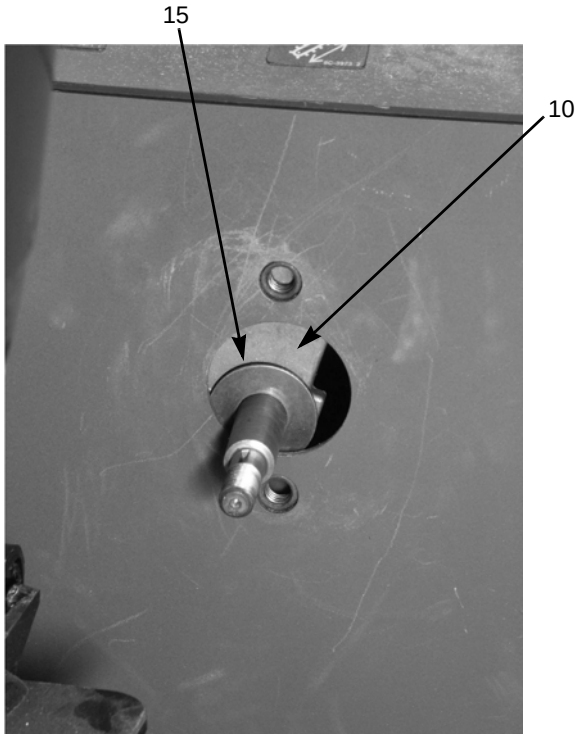
Note position of harness clamps to aid in installation.

6. Remove six screws (11), washers (12), two harness clamps (13), and access panel (14).



DIRECTION CONTROL LEVER REMOVAL - CONTINUED

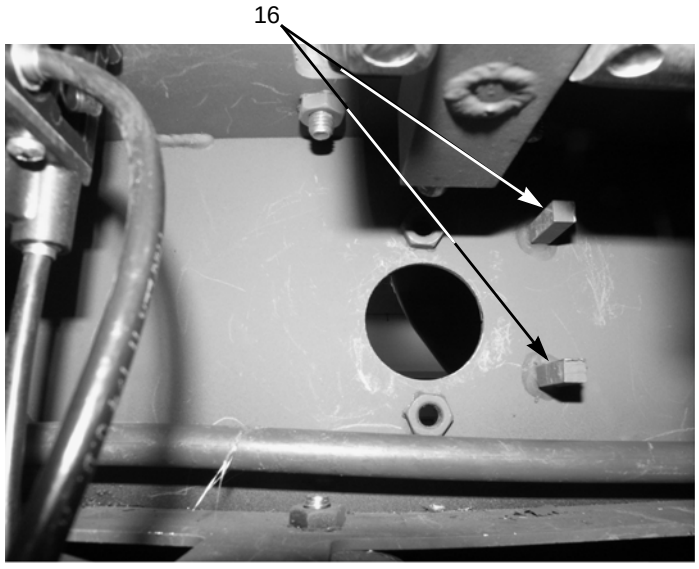
7. Remove spring washers (15) and stop (10).



390-1800

DIRECTION CONTROL LEVER INSTALLATION

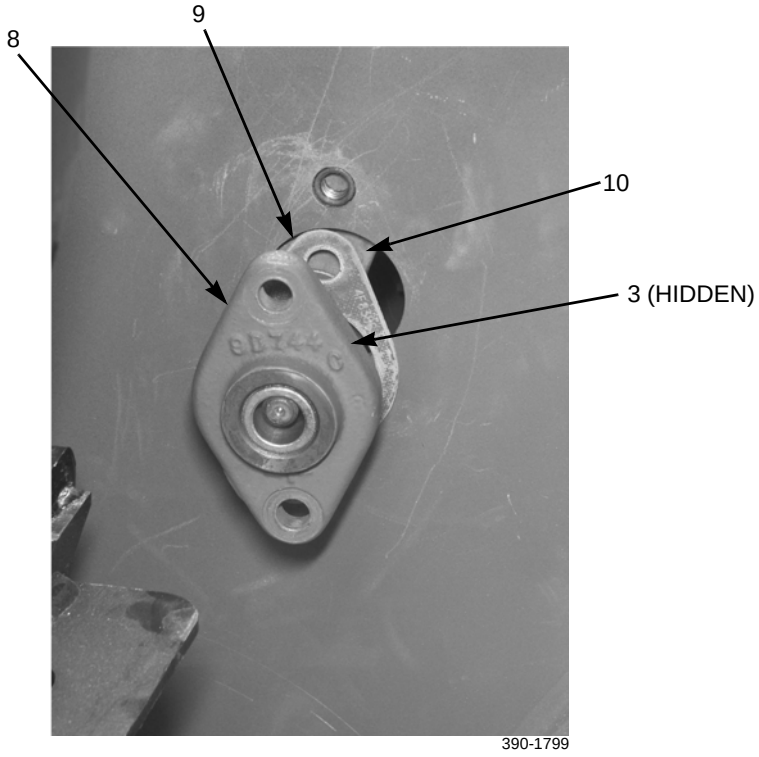
1. With assistance, position spring washers (15) and stop (10) in bulkhead with leg of stop (10) between mechanical stops (16).



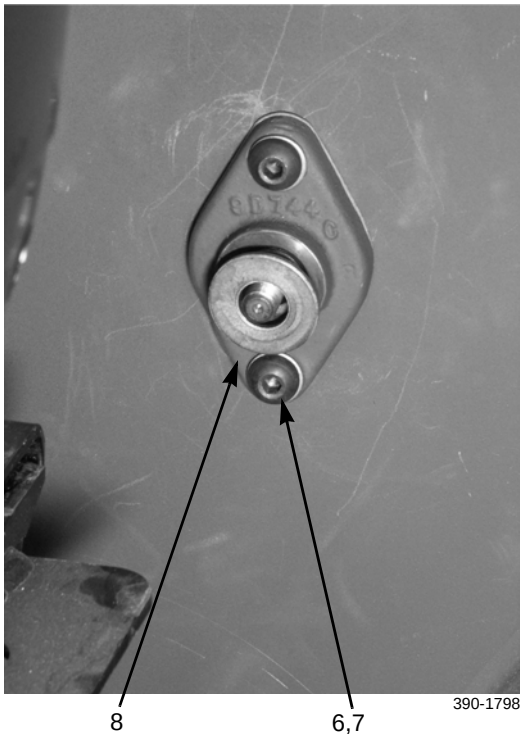
390-1840

DIRECTION CONTROL LEVER INSTALLATION - CONTINUED

2. Install new gasket (9), thrust washer (3), and bracket assembly (8) on stop (10).

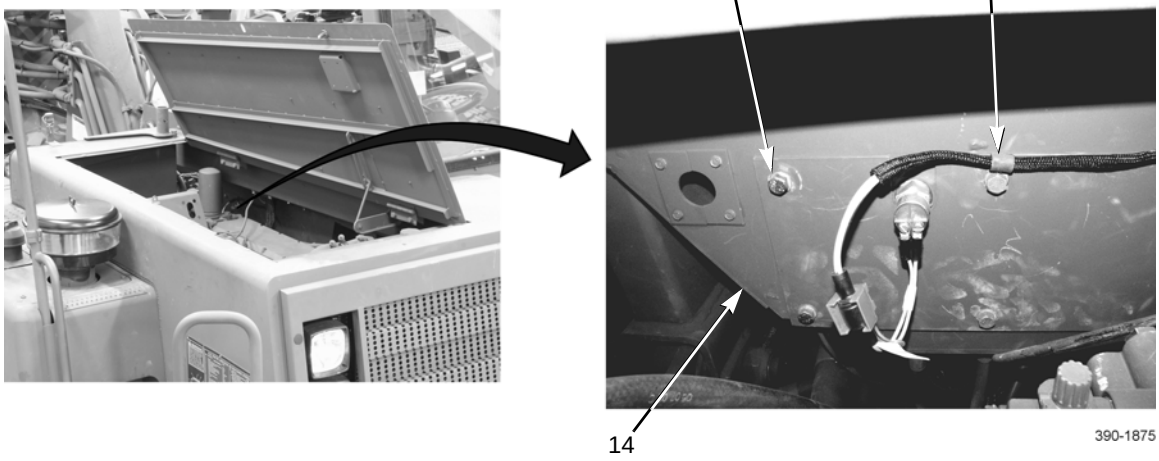


3. Install two screws (6) and washers (7) on bracket assembly (8).

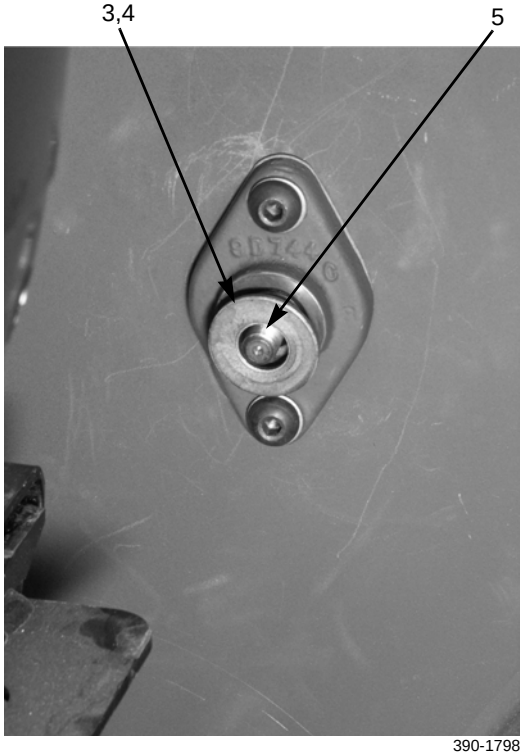


DIRECTION CONTROL LEVER INSTALLATION - CONTINUED

4. Install six screws (11), washers (12), two harness clamps (13), and access panel (14).
5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

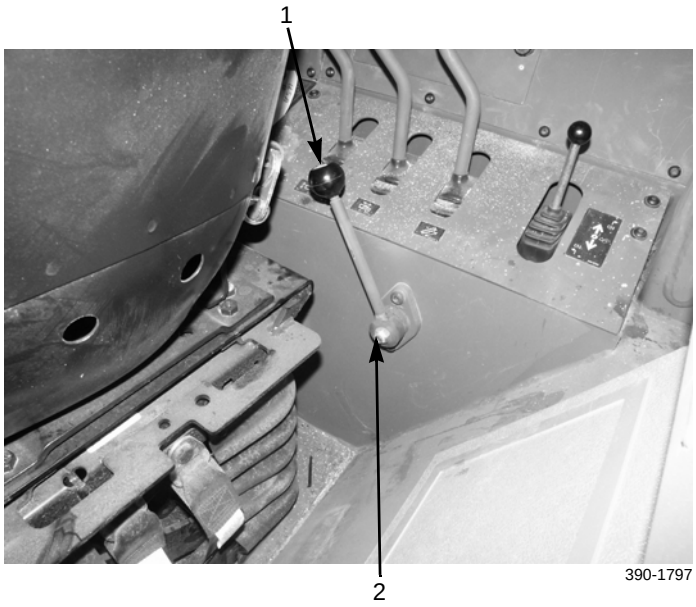


6. Install another thrust washer (3) and key (4) on shaft (5).



DIRECTION CONTROL LEVER INSTALLATION - CONTINUED

7. Install lever (1) with new locknut (2).



HYDRAULIC CONTROL LEVERS REMOVAL

1. Remove four screws (17) and washers (18) from access panel (19).



HYDRAULIC CONTROL LEVERS REMOVAL - CONTINUED

2. Remove eight screws (20) and washers (21) from mounting plate (22) and protective boot (23). Inspect boot for damage or tears. Replace boot if required.

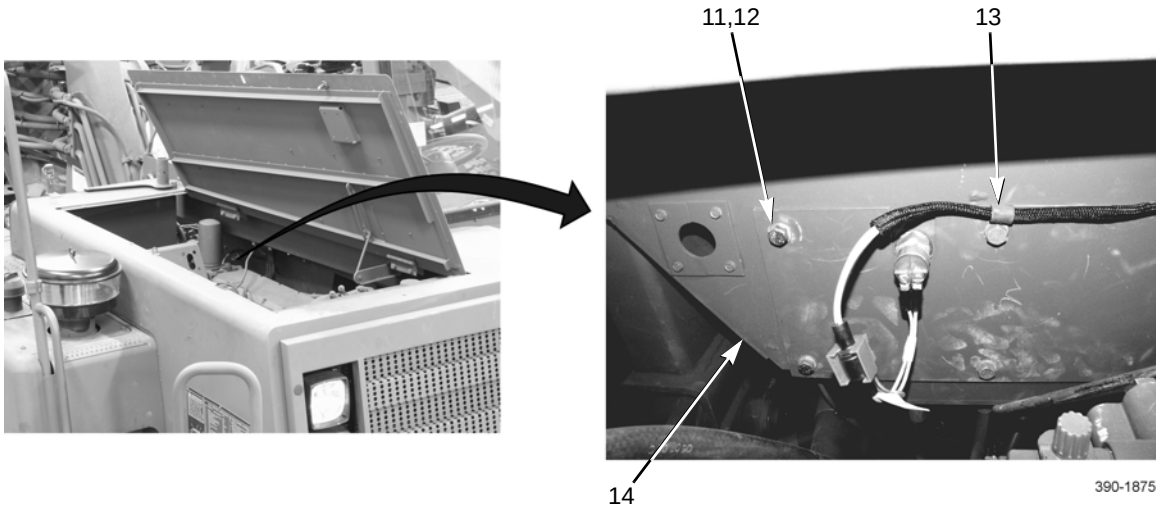


3. Open engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

NOTE

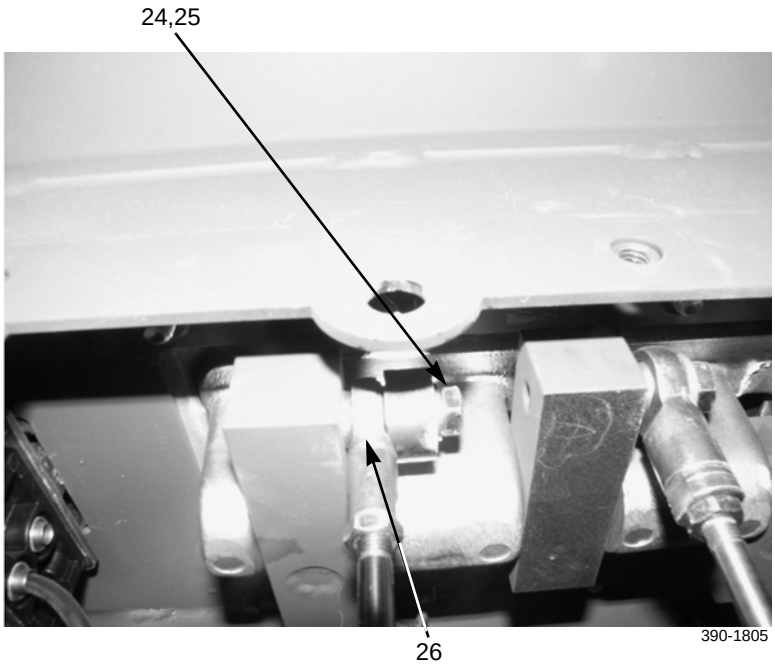
Note position of harness clamps to aid in installation.

4. Remove six screws (11), washers (12), two harness clamps (13), and access panel (14).

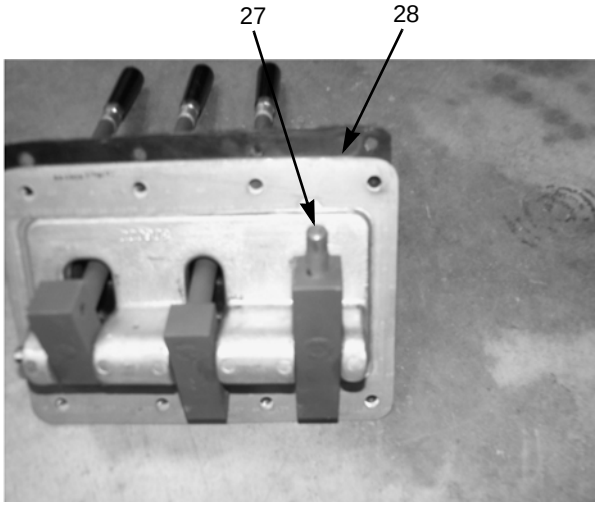


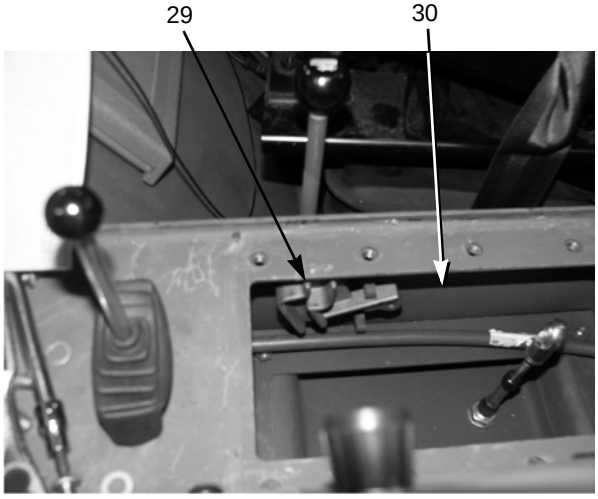
HYDRAULIC CONTROL LEVERS REMOVAL - CONTINUED

5. Remove three screws (24) and washers (25) from control cable rod end yokes (26).



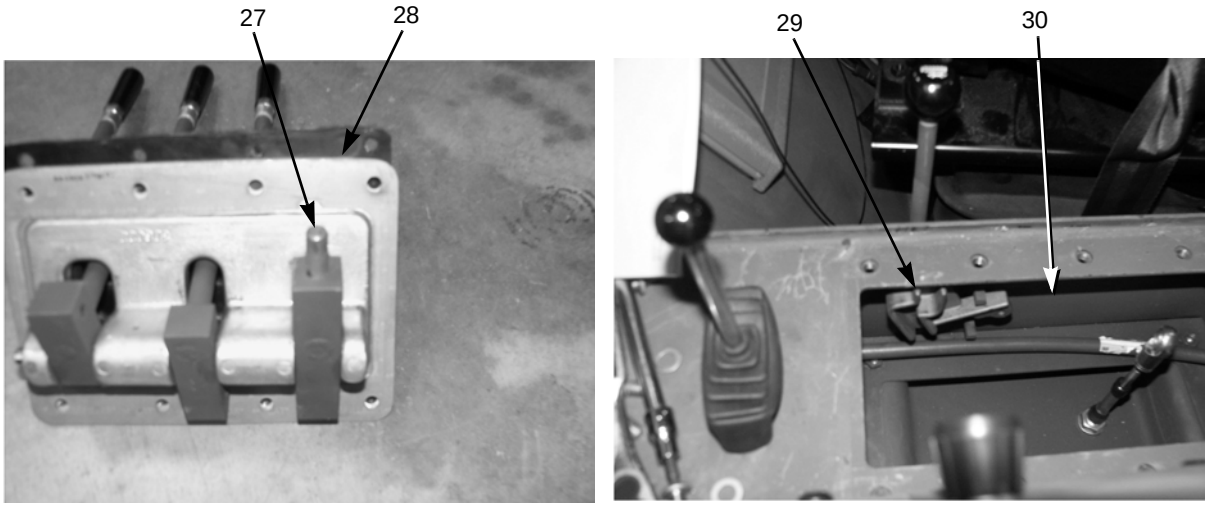
6. Disengage guide pin (27) from stop (29) while removing lever assembly (28) from bulkhead (30).



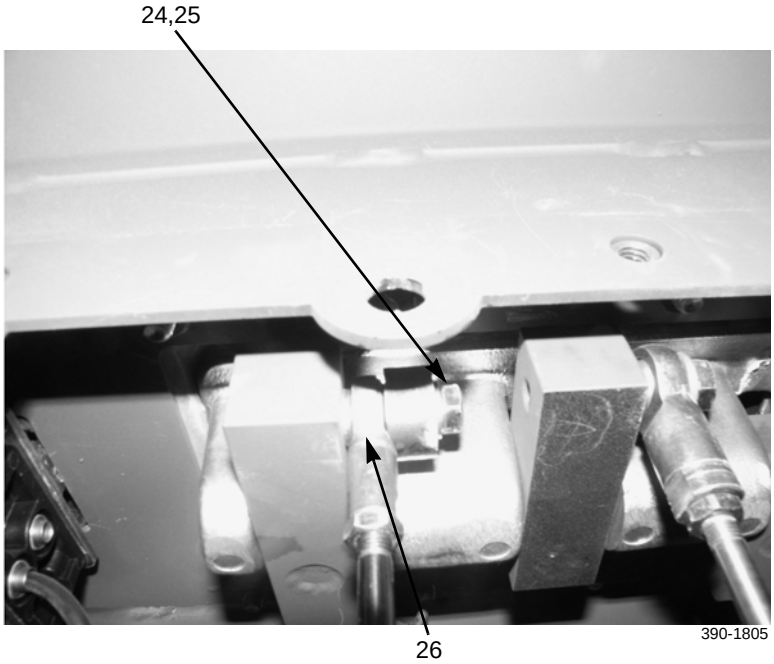


HYDRAULIC CONTROL LEVERS INSTALLATION

1. Engage guide pin (27) in stop (29) while installing lever assembly (28) in bulkhead (30).

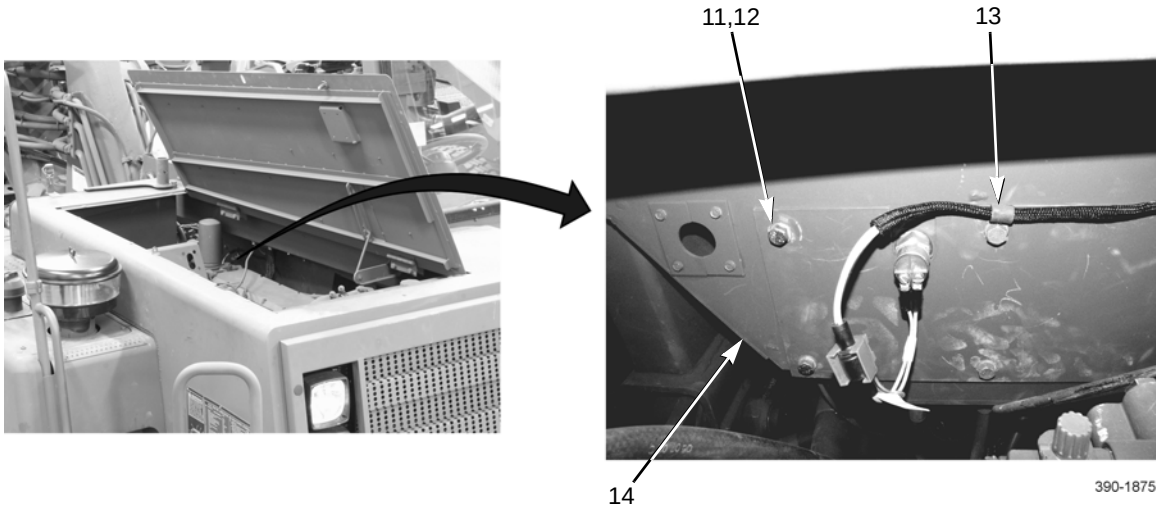


2. Install three screws (24) and washers (25) in control cable rod end yokes (26).



HYDRAULIC CONTROL LEVERS INSTALLATION - CONTINUED

3. Install six screws (11), washers (12), two harness clamps (13), and access panel (14).

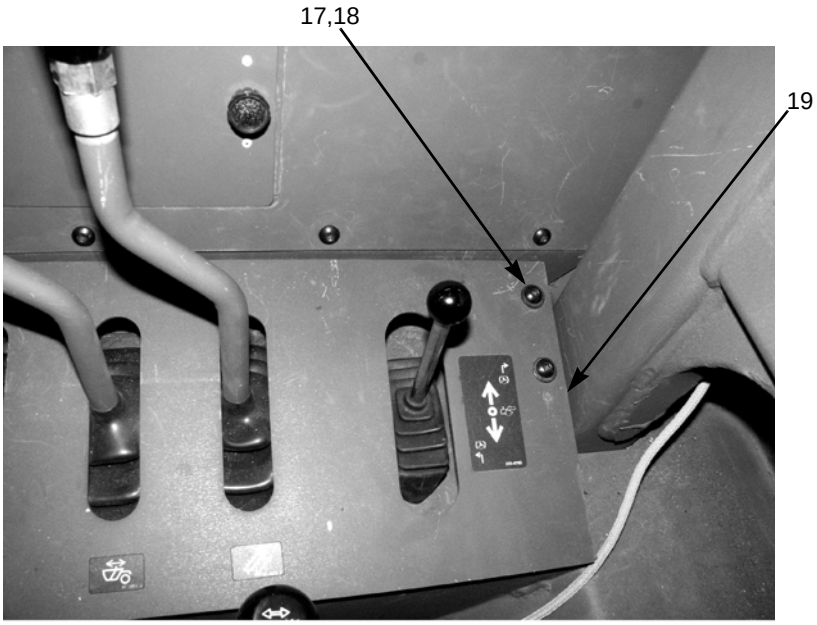


4. Install eight screws (20), washers (21), mounting plate (22), and protection boot (23).



HYDRAULIC CONTROL LEVERS INSTALLATION - CONTINUED

5. Install four screws (17) and washers (18) on access panel (19).



6. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

HYDRAULIC OIL FILTERS AND BYPASS VALVE MAINTENANCE 0115 00

THIS WORK PACKAGE COVERS

Oil Filter Replacement

Bypass Valve: Disassembly, Cleaning and Inspection, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Filter element, fluid (2)

Gasket

O-ring (2)

Materials/Parts - Continued

Pin, spring

References

WP 0009 00

WP 0010 00

Equipment Condition

Machine parked on hard, level ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING



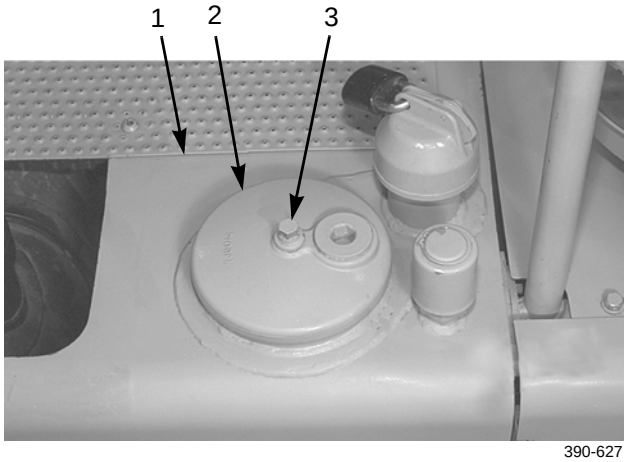
- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydrualic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before replacing hydraulic oil filters. Failure to follow this warning may cause injury to personnel.
- Hydraulic oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

OIL FILTER REPLACEMENT

1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Loosen bolt (3) and remove filter housing cover (2) assembly from hydraulic tank (1).

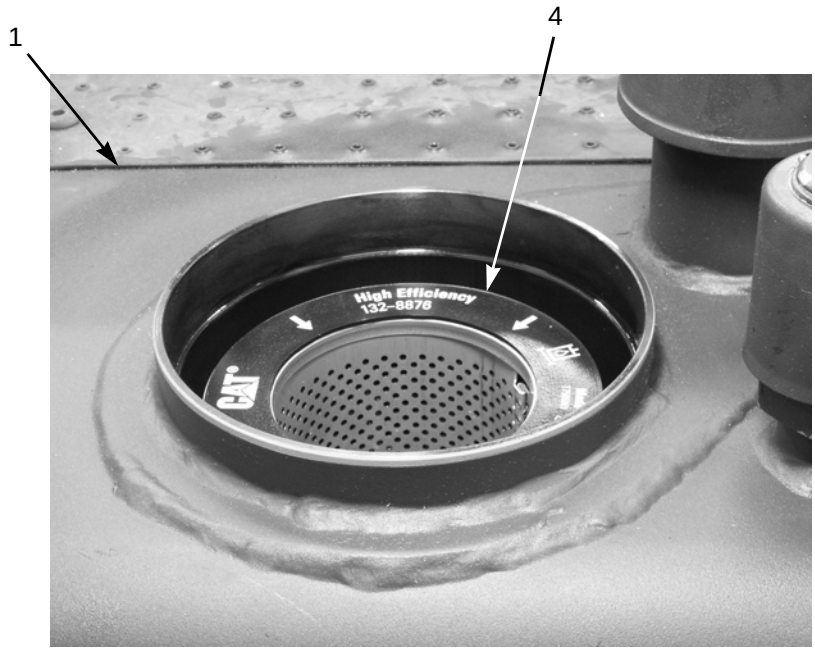


390-627

NOTE

Filter elements are stacked one on top of the other.

3. Remove two hydraulic oil filter elements (4) from hydraulic tank (1). Discard filter elements.
4. Install two new hydraulic oil filter elements (4) in hydraulic tank (1).

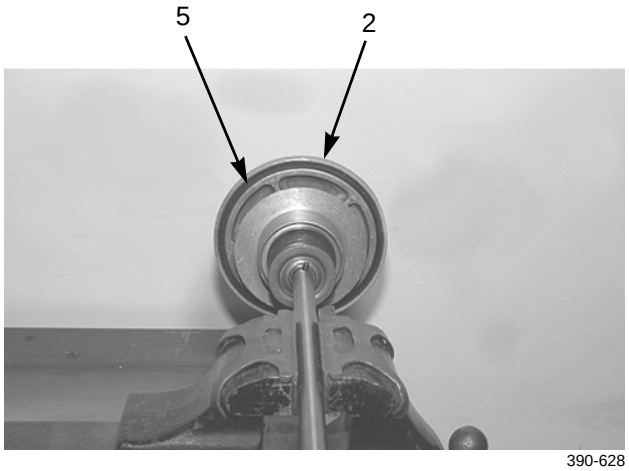


390-1856

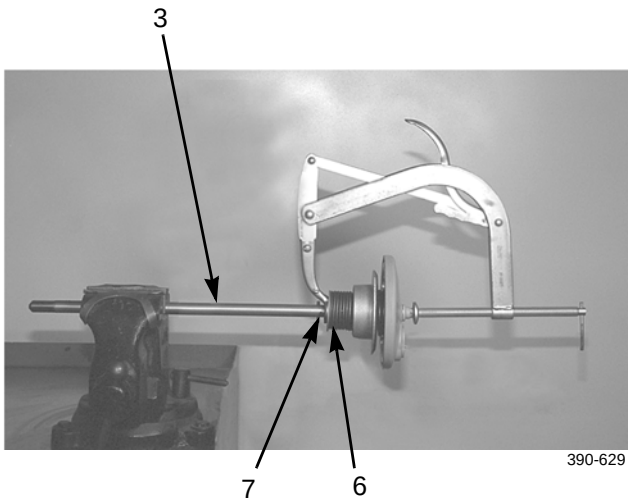
5. Position filter housing cover (2) assembly on hydraulic tank (1) and tighten bolt (3) to 59 lb-ft (80 Nm).

BYPASS VALVE DISASSEMBLY

1. Remove filter housing cover assembly (Refer to *Oil Filter Replacement*).
2. Remove gasket (5) from filter housing cover (2). Discard gasket.
3. Compress spring (6) and remove spring pin (7) from bolt (3). Discard spring pin.

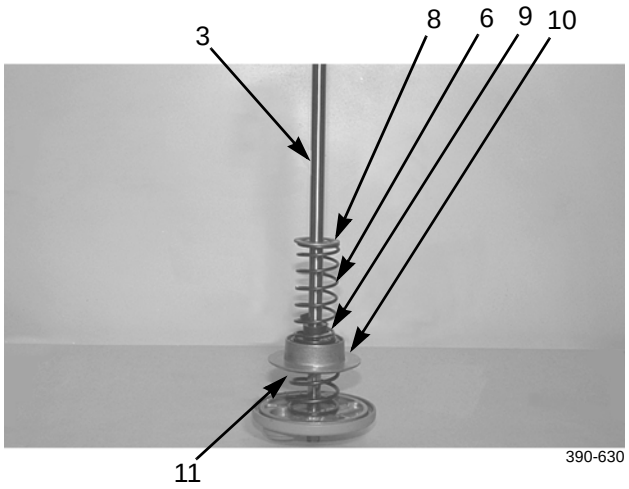


390-628

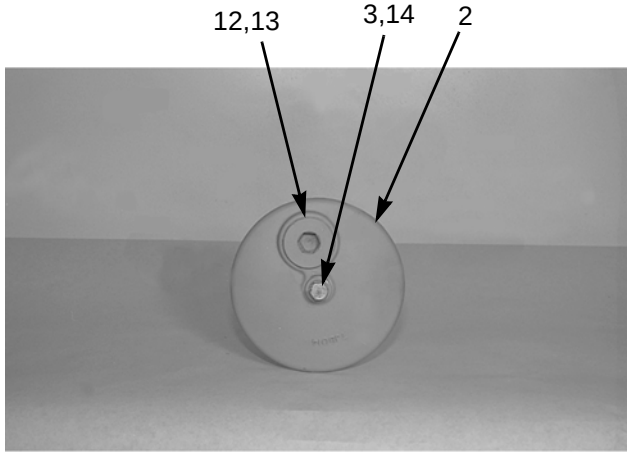


390-629

4. Remove retainer (8), spring (6), valve (9), valve seat (10), and spring (11) from bolt (3).
5. Remove bolt (3) from filter housing cover (2).
6. Remove O-ring (14) from bolt (3). Discard O-ring.
7. Remove plug (12) and O-ring (13) from filter housing cover (2). Discard O-ring.



390-630



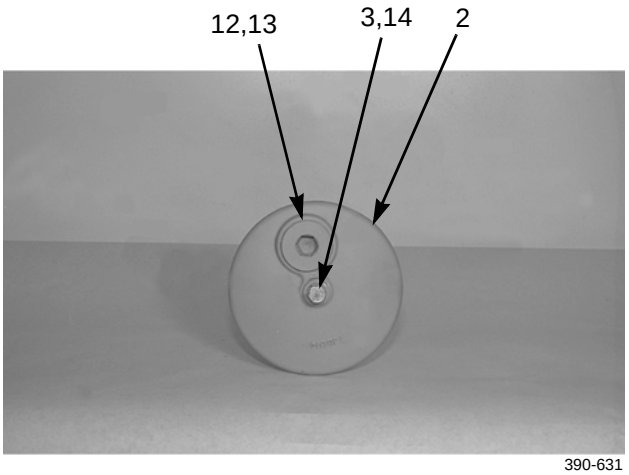
390-631

BYPASS VALVE CLEANING AND INSPECTION

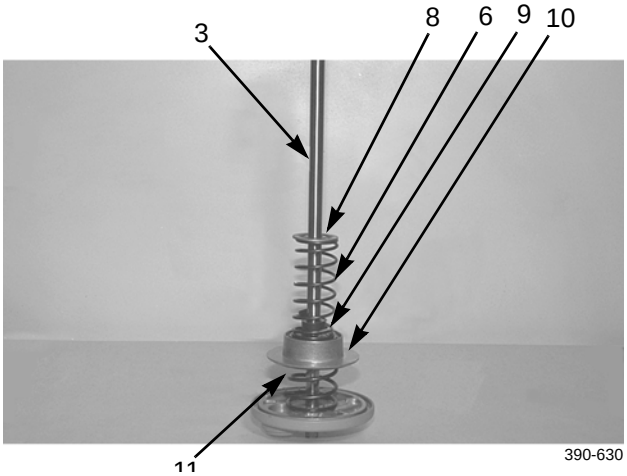
1. Use rags to clean surfaces of components.
2. Inspect springs for damage and distorted coils. Replace springs if damaged or distorted.
3. Inspect other components for cracks, wear or damage. Replace if cracked, worn or damaged.

BYPASS VALVE ASSEMBLY

1. Install new O-ring (13) and plug (12) in filter housing cover (2).
2. Install new O-ring (14) on bolt (3).
3. Install bolt (3) on filter housing cover (2).
4. Install spring (11), valve seat (10), valve (9), spring (6), and retainer (8) on bolt (3).

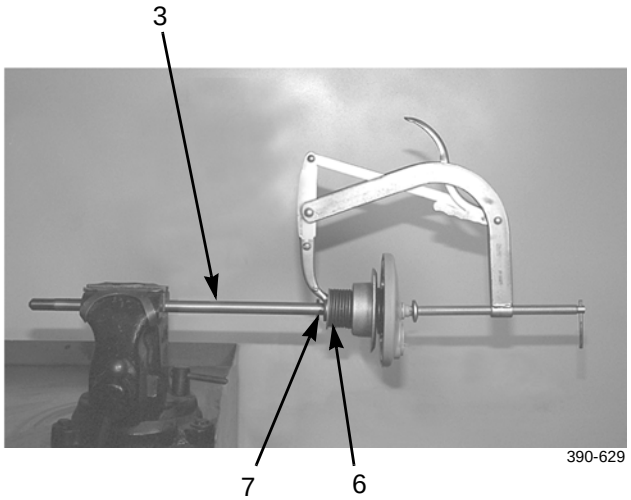


390-631

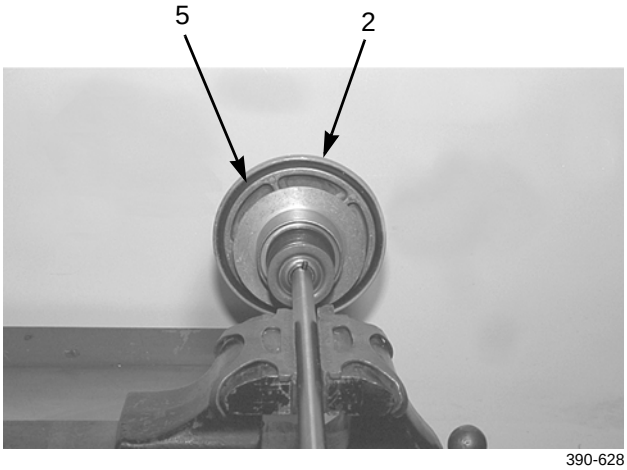


390-630

5. Compress spring (6) and install new spring pin (7) in bolt (3).
6. Apply a thin coat of clean hydraulic oil to surface of new gasket (5) and install new gasket in filter housing cover (2).
7. Install filter housing cover assembly (Refer to *Oil Filter Replacement*).



390-629



390-628

8. Check and fill hydraulic oil (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

HYDRAULIC LINES AND FITTINGS REPLACEMENT 0116 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring

References

WP 0009 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic tank drained (WP 0010 00)



WARNING

Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydrualic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.

NOTE

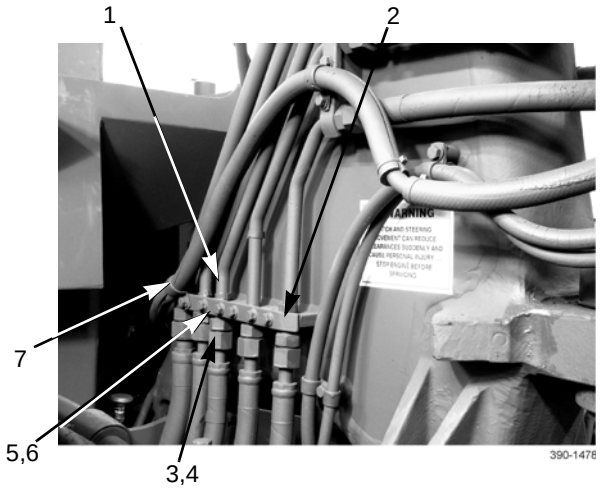
- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all lines to aid in installation. Cap all lines to prevent fluid loss and contamination of oil system.
- All hydraulic lines and fittings are replaced the same way. One hydraulic tube assembly is illustrated.

REMOVAL

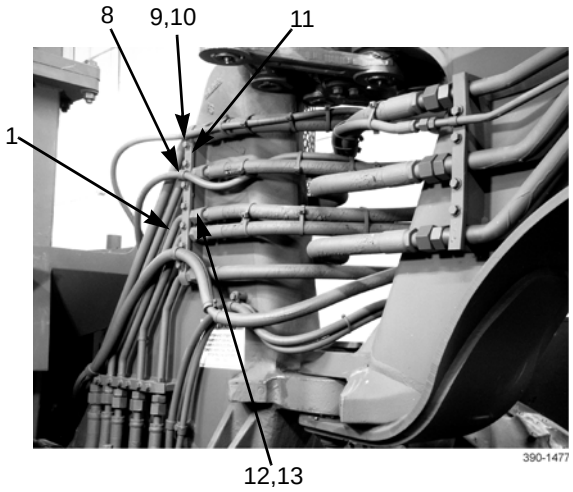
1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

REMOVAL - CONTINUED

2. Remove six bolts (5), washers (6), clamp (7), and retaining strap (2) from hitch.
3. Disconnect tube assembly (1) from hose assembly (3).
4. Remove O-ring (4) from hose assembly (3). Discard O-ring.



5. Remove seven bolts (9), washers (11), clamps (8) and retaining strap (11) from hitch.
6. Disconnect hose assembly (12) from tube assembly (1) and remove tube assembly from hitch.
7. Remove O-ring (13) from hose assembly (12). Discard O-ring.



INSTALLATION

NOTE

Apply a thin coat of oil to new O-rings prior to installation.

1. Install new O-ring (13) to end of hose assembly (12).
2. Position tube assembly (1) on hitch and connect hose assembly (12) to tube assembly.
3. Install retaining strap (11) and clamps (8) on hitch with seven washers (10) and bolts (9).
4. Install new O-ring (4) to end of hose assembly (3).
5. Connect hose assembly (3) to tube assembly (1).
6. Install retaining strap (2) and clamp (7) on hitch with six washers (6) and bolts (5).
7. Fill hydraulic tank (WP 0009 00 and WP 0010 00).
8. Bleed air from circuit by moving cylinders through complete travel at least three times.

END OF WORK PACKAGE

HYDRAULIC SYSTEM OIL SAMPLING VALVE REPLACEMENT 0117 00

THIS WORK PACKAGE COVERS

Replacement

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

References

WP 0009 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic tank drained (WP 0010 00)



WARNING

Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.

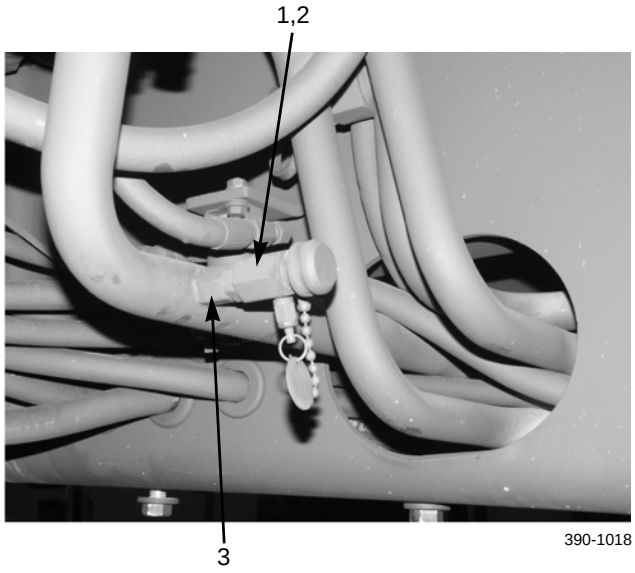
REPLACEMENT

1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

REPLACEMENT - CONTINUED

2. Remove oil sampling valve (1) and O-ring (2) from tube fitting (3). Discard O-ring.
3. Lightly coat new O-ring (2) with clean oil.
4. Install new O-ring (2) and oil sampling valve (1) to tube fitting (3).





5. Refill hydralic tank (WP 0009 00 and WP 0010 00).

WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

6. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Move hydraulic control levers through all positions. Check for leaks.

END OF WORK PACKAGE

HYDRAULIC TANK SAFETY RELIEF VALVE ASSEMBLY MAINTENANCE 0118 00

THIS WORK PACKAGE COVERS

Removal, Disassembly, Cleaning and Inspection, Assembly, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Detergent (Item 11, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring (3)

Ring, retaining

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

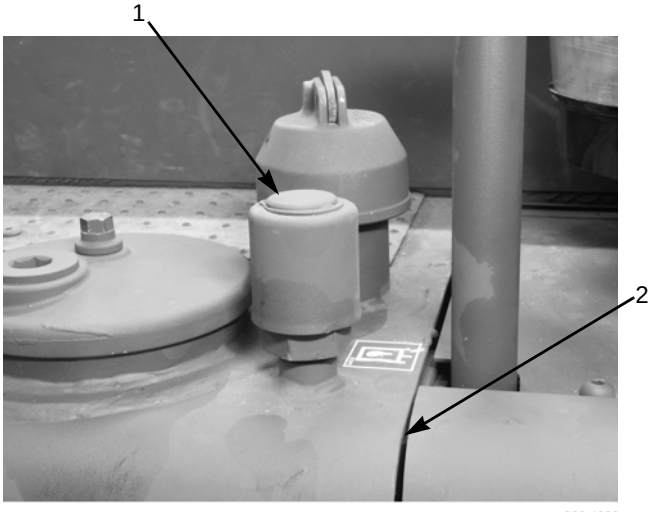


WARNING

Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.

REMOVAL

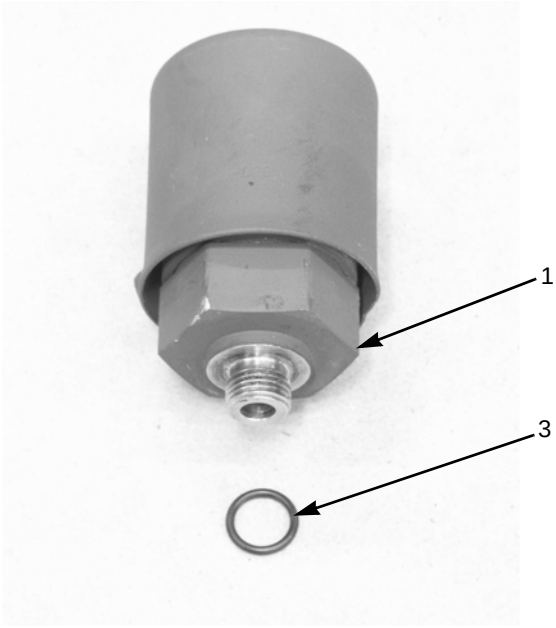
1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove relief valve (1) assembly from top of hydraulic tank (2).



390-1836

REMOVAL - CONTINUED

3. Remove and discard O-ring (3) from relief valve (1).



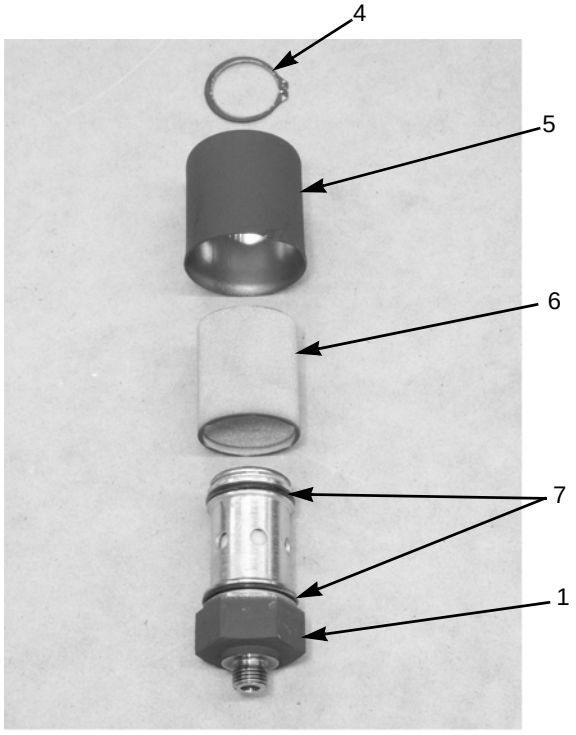
390-1837

DISASSEMBLY

NOTE

Filter may be serviced with relief valve installed or removed from hydraulic tank. Filter is illustrated removed from hydraulic tank.

1. Remove retaining ring (4) and cover (5) from relief valve (1). Discard retaining ring.
2. Remove filter (6) and two O-rings (7) from relief valve (1). Discard O-rings.



390-1838

CLEANING AND INSPECTION

1. Clean dust and dirt from relief valve filter with detergent, water, and rags. Dry with clean rags.
2. Inspect relief valve filter for damage and dirt that cannot be removed. Replace filter if damaged or if dirt cannot be cleaned.

CAUTION

Clean outside surfaces of relief valve only. DO NOT permit detergent, water or dirt to enter inside relief valve.

3. Clean outside of relief valve with detergent, water, and rags. Dry with clean rags.
4. Inspect relief valve for damage. Replace relief valve if damaged.

ASSEMBLY

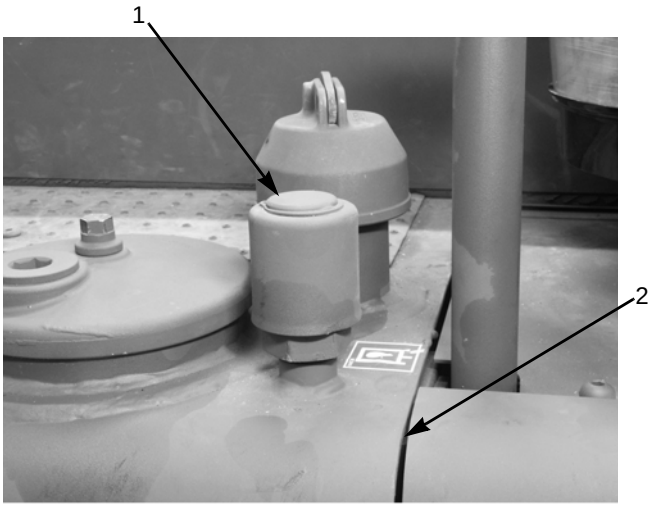
NOTE

Inside of filter is tapered and can only be installed in one direction.

1. Coat with oil and install two new O-rings (7) on relief valve (1). Install filter (6).
2. Install cover (5) on relief valve (1) with new retaining ring (4).

INSTALLATION

1. Coat with oil and position new O-ring (3) on relief valve (1).
2. Install relief valve (1) assembly on top of hydraulic tank (2).



390-1836

END OF WORK PACKAGE

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HYDRAULIC TANK SIGHT GAGE REPLACEMENT 0119 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Grommet

O-ring (4)

References

WP 0009 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

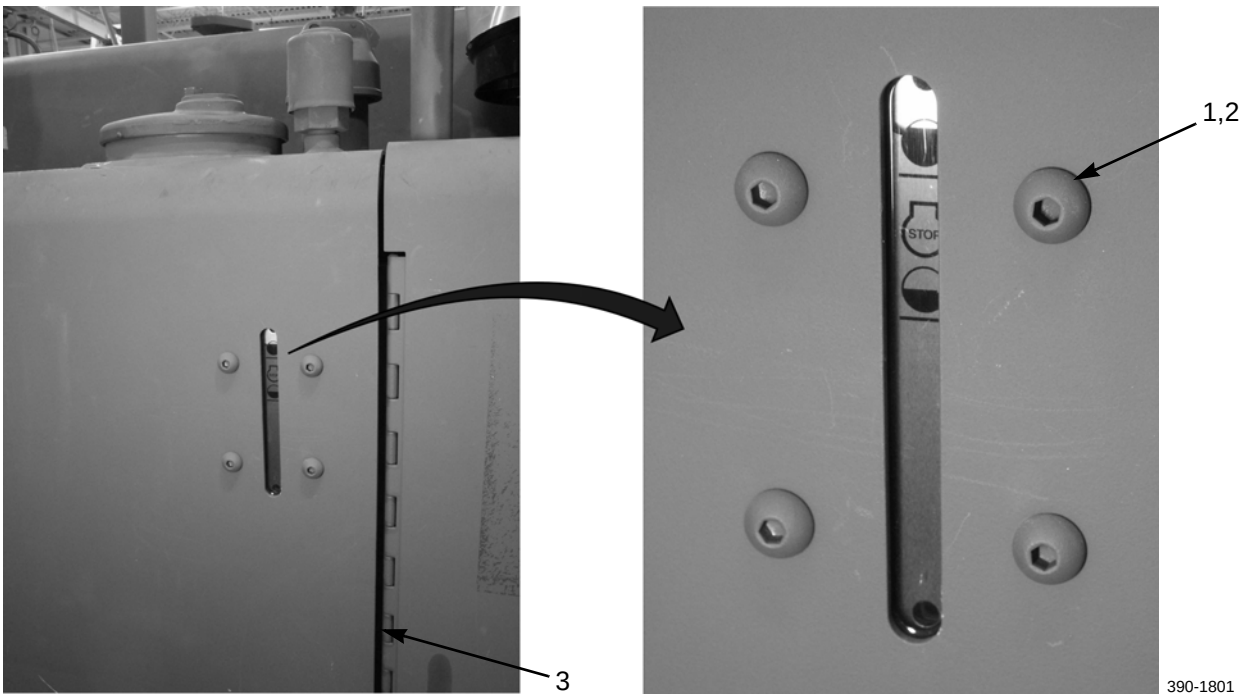
Hydraulic tank drained below level of sight gage (WP 0010 00)

REMOVAL

CAUTION

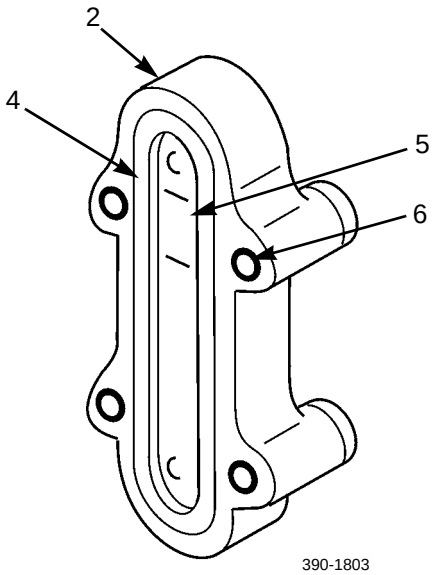
While reaching inside hydraulic tank, hold sight glass assembly to prevent sight glass from falling to bottom of tank as screws are removed. Failure to follow this caution may result in damage to sight glass.

1. Remove four screws (1) and plate (2) from hydraulic oil tank (3).



REMOVAL - CONTINUED

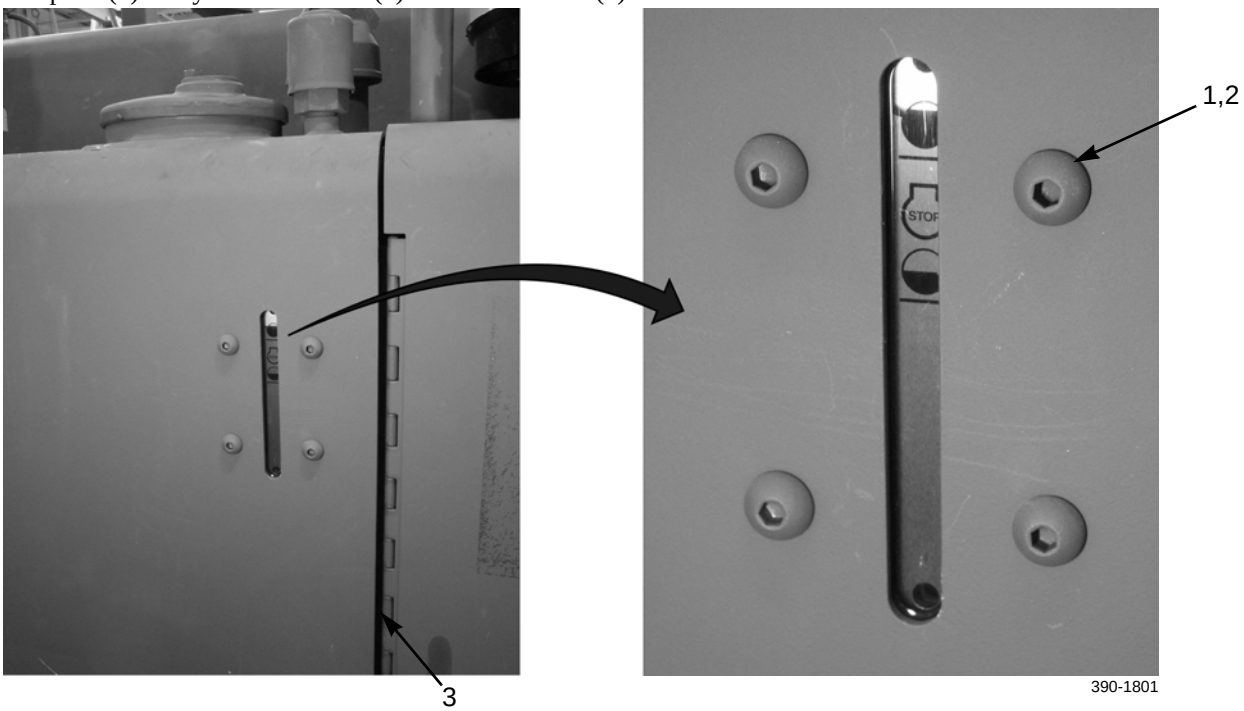
2. Remove grommet (4), sight glass (5) and four O-rings (6) from plate (2). Discard grommet and O-rings.



390-1803

INSTALLATION

1. Install four new O-rings (6), sight glass (5), and new grommet (4) on plate (2).
2. Install plate (2) on hydraulic oil tank (3) with four screws (1).



390-1801

3. Refill hydraulic tank (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

HYDRAULIC TANK FILLER CAP REPAIR 0120 00

THIS WORK PACKAGE COVERS

Disassembly, Cleaning and Inspection, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Rag, wiping (Item 31, WP 0171 00)

Gasket

Ring, retaining

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

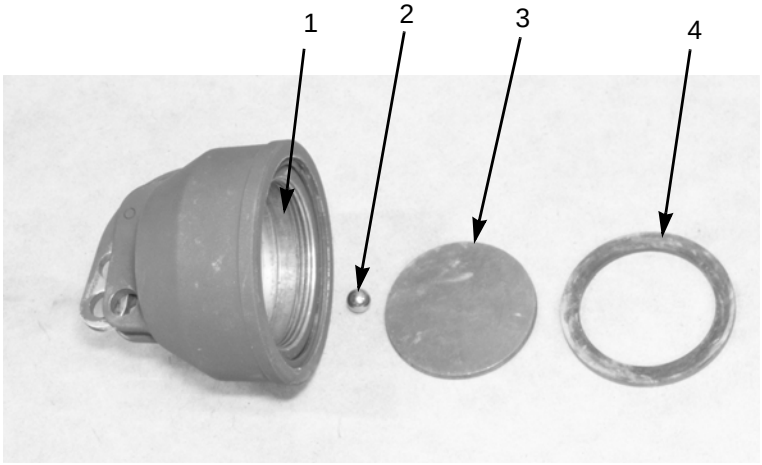
Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic tank filler cap removed (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

DISASSEMBLY

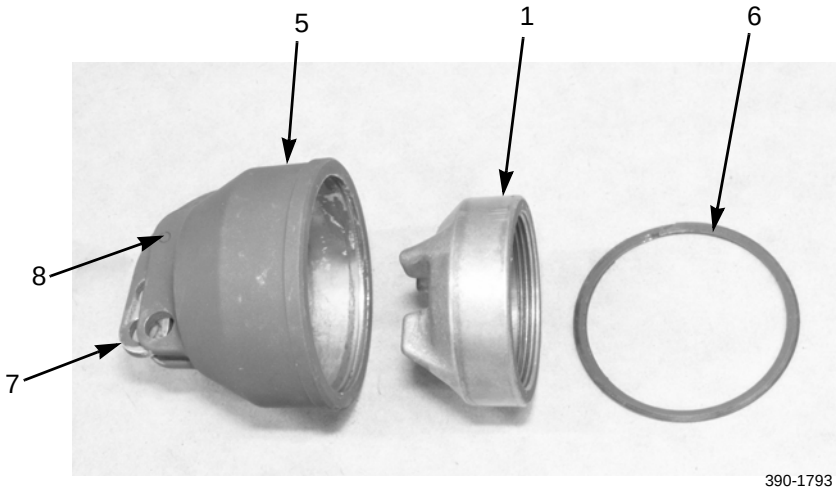
1. Remove gasket (4), pressure plate (3), and ball (2) from filler cap (1). Discard gasket.



390-1792

DISASSEMBLY - CONTINUED

1. Remove retaining ring (6) and filler cap (1) from cover (5). Discard retaining ring.



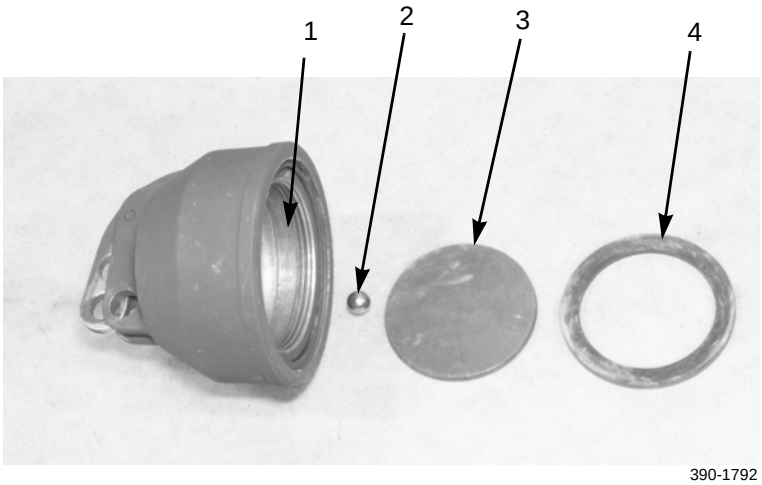
390-1793

CLEANING AND INSPECTION

1. Clean all components with clean, dry rags.
2. Inspect components for cracks, wear and damage. Replace any cracked, worn or damaged components.
3. Check that pressure relief hole in filler cap is clear of any debris. Clean hole as required. If hole is plugged and cannot be cleaned, replace filler cap.
4. Inspect cover lever (7). Ensure that lever operates freely and is not bent or damaged. If lever is bent or damaged, remove pin (8) and lever. Install replacement lever with pin.

ASSEMBLY

1. Install filler cap (1) on cover (5) with new retaining ring (6).
2. Install ball (2), pressure plate (3), and new gasket (4) on filler cap (1).
3. Install hydraulic tank filler cap (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).h



390-1792

END OF WORK PACKAGE

HYDRAULIC OIL SWITCH REPLACEMENT 0121 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Strap, tiedown (Item 38, WP 0171 00)

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition - Continued

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

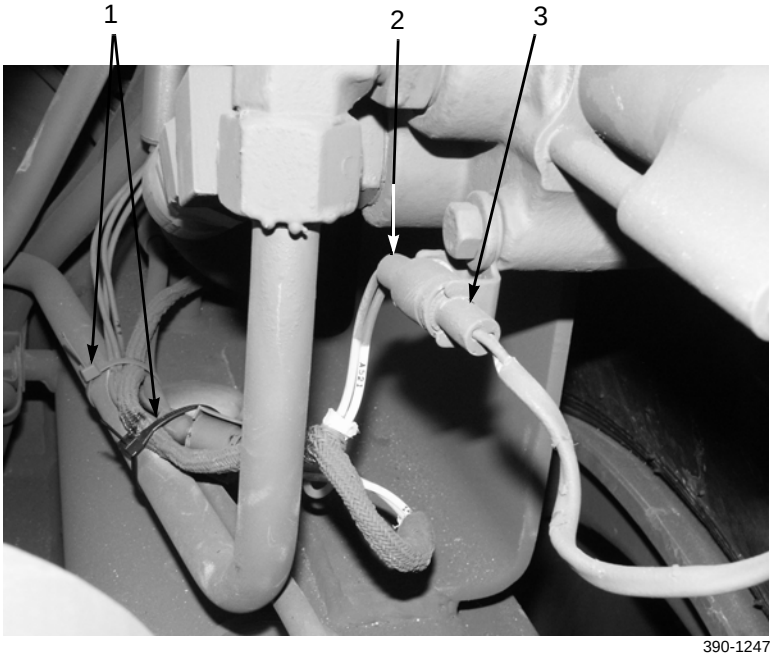
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic hose quick disconnects disconnected at draft arm (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

REMOVAL

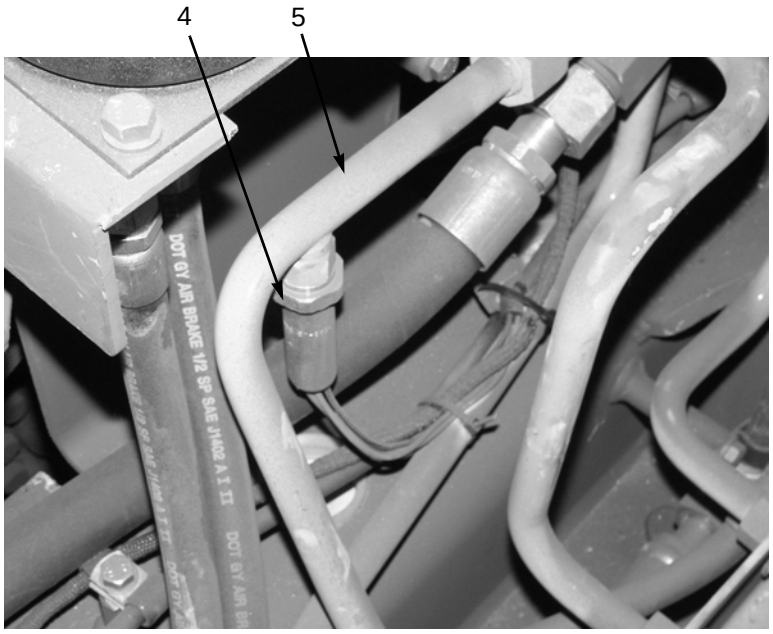
1. Cut tiedown straps (1) from bundle and discard.
2. Remove from clip and disconnect switch connector (2) from harness connector (3).



390-1247

REMOVAL - CONTINUED

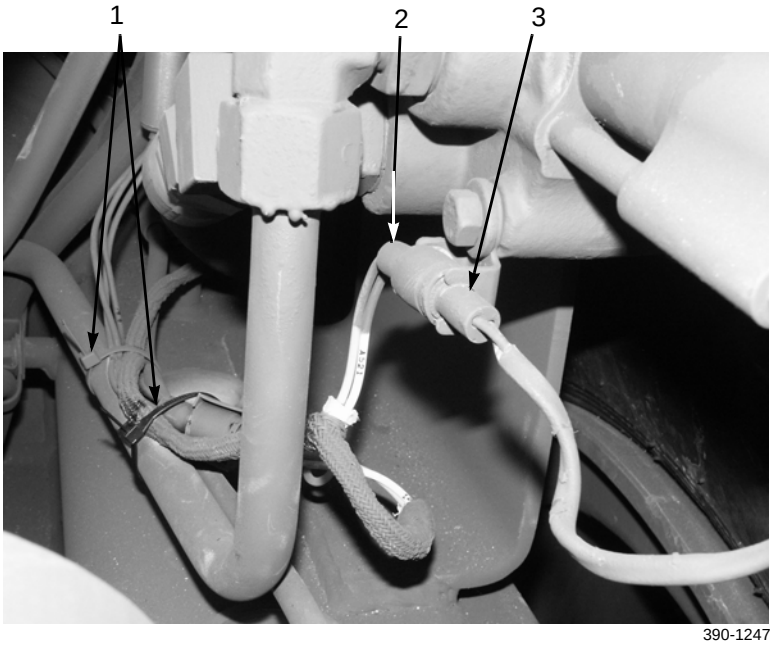
3. Remove pressure switch (4) from tube (5).



390-1246

INSTALLATION

1. Install pressure switch (4) in tube (5).
2. Connect switch connector (2) to harness connector (3).
3. Install new tiedown straps (1) on bundle.



390-1247

4. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
5. Connect hydraulic hose quick disconnects (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

CHAPTER 5
DIRECT SUPPORT LEVEL TRACTOR MAINTENANCE

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ENGINE REPLACEMENT 0122 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Leveler, load (Item 18, WP 0172 00)

Lifting device

Personnel Required

Three

References

WP 0009 00

WP 0010 00

Equipment Condition

Battery cables disconnected (WP 0067 00)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Equipment Condition (Continued)

Radiator removed (WP 0144 00)

Engine grille, access door, and hood assembly removed (WP 0099 00)

Shift control cables disconnected (WP 0069 00)

Wiring harness disconnected (WP 0035 00)

Guard plates removed (WP 0100 00)

Air cleaner disconnected (WP 0018 00)

Turbocharger disconnected (WP 0143 00)

Fuel lines and hoses disconnected (WP 0020 00)

Hydraulic lines and fittings disconnected (WP 0116 00)

Engine oil sampling valve disconnected (WP 0015 00)

Steering hoses, lines, and fittings disconnected (WP 0153 00 and WP 0154 00)

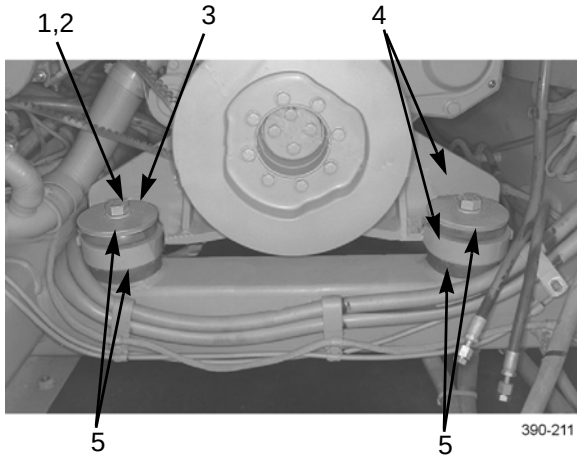
Air compressor disconnected (WP 0083 00)

Universal joints disconnected (WP 0076 00)

Starter cables disconnected (WP 0035 00)

REMOVAL

1. Remove two bolts (1), washers (2), and large washers (3) from front mount assemblies (5) on front engine support (4).

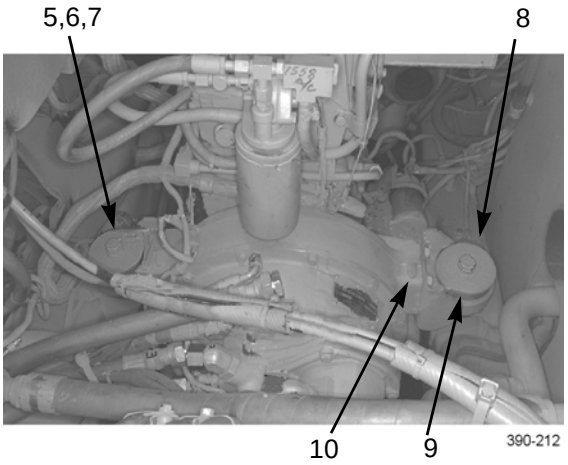


REMOVAL - CONTINUED

NOTE

Nut (7) is used only on left-rear mount.

2. Remove two bolts (5), four washers (6), nut (7), and two large washers (8) from from rear mount assemblies (9) on rear engine supports (10).



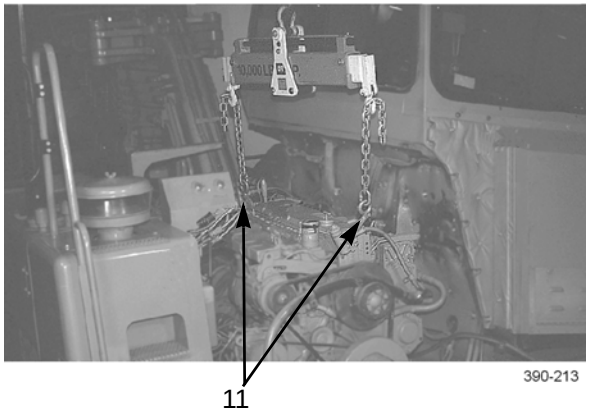
WARNING

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 lift 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

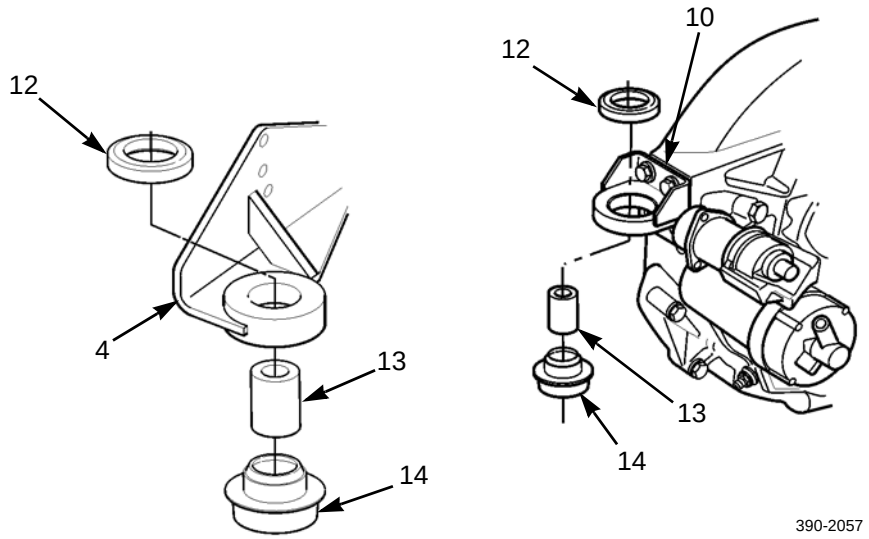
Engine weighs 1,874 lb (850 kg).

3. Attach load leveler (hoisting beam) and a suitable lifting device to engine lifting plates (11). Carefully remove engine from machine.



REMOVAL - CONTINUED

4. Retrieve upper resilient mounts (12) from each side of front engine support (4) and from rear engine supports (10).
5. Retrieve lower resilient mounts (14) and spacers (13) from frame.
6. Inspect front and rear mount assemblies for damage or wear. If worn or damaged, obtain replacements.



INSTALLATION

1. Place four lower resilient mounts (14) and spacers (13) on frame.



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 lift 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

Engine weighs 1,874 lb (850 kg).

2. Attach load leveler (hoisting beam) and suitable lifting device to lifting plates (11). Carefully install engine in machine.

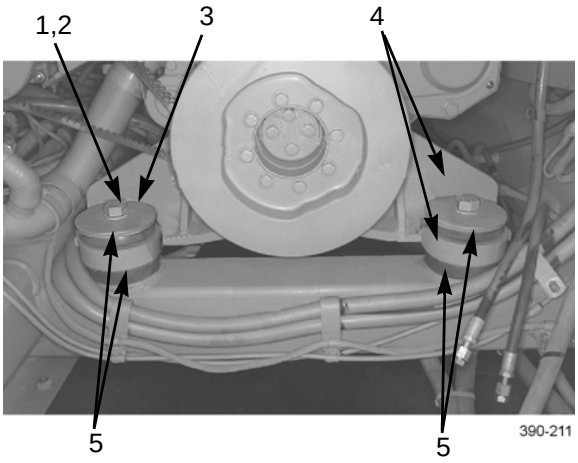
NOTE

Nut (7) is used only on left-rear mount.

3. Install upper resilient mounts (12) to each side of front engine support (4) and two rear engine supports (10).
4. Position two upper resilient mounts (12) and install two bolts (5), four washers (6), and nuts (7) to secure rear mount assemblies (9) on rear engine supports (10).

INSTALLATION - CONTINUED

5. Position two upper resilient mounts (12) and install two bolts (1), washers (2) and large washers (3) to secure front mount assemblies (5) on front engine support (4).



6. Tighten bolts (1 and 5) and nut (7) to 332 lb-ft (450 Nm).
7. Connect universal joints (WP 0076 00).
8. Connect air compressor (WP 0083 00).
9. Connect steering hoses, lines, and fittings (WP 0153 00 and WP 0154 00).
10. Connect engine oil sampling valve (WP 0015 00).
11. Connect hydraulic lines and fittings (WP 0116 00).
12. Connect fuel lines and hoses (WP 0020 00).
13. Connect turbocharger (WP 0143 00).
14. Connect air cleaner (WP 0018 00).
15. Connect wiring harness (WP 0035 00).
16. Connect shift control cables (WP 0069 00).
17. Install hood assembly, engine access door, and grille (WP 0099 00).
18. Install radiator (WP 0143 00).
19. Connect battery cables (WP 0067 00).
20. Connect starter cables (WP 0035 00)
21. Check level of oil in crankcase and add as needed (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

22. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2) and check for leaks and proper operation.

END OF WORK PACKAGE

FRONT AND REAR ENGINE SUPPORTS REPLACEMENT 0123 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Tools and Special Tools - Continued

Suitable lifting device

Personnel Required

Two

Equipment Condition

Engine removed (WP 0122 00)

REMOVAL



WARNING

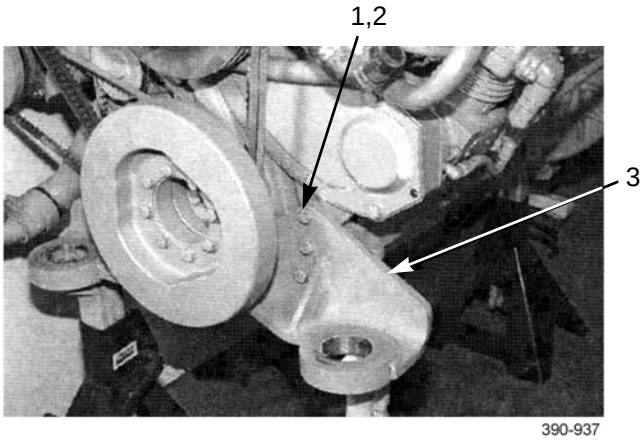
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

1. Attach a suitable lifting device to engine front lifting plate and raise front of engine off engine stand.

NOTE

Front engine support weighs 33 lb (15 kg).

2. With assistance, remove six bolts (1), washers (2), and front engine support (3) from engine.



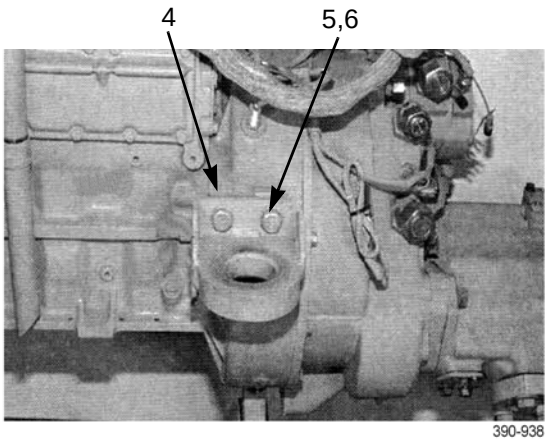
390-937

REMOVAL - CONTINUED

NOTE

Right-rear and left-rear engine supports are removed the same way. Left-rear engine support is illustrated.

3. Remove four bolts (5), washers (6), and rear engine support (4) from engine.



INSTALLATION

NOTE

Right- and left-rear engine supports are installed the same way. Left-rear engine support is illustrated.

1. With assistance, install rear engine support (4) on engine with four washers (6) and bolts (5).

NOTE

Front engine support weighs 33 lb (15 kg).

2. Install front engine support (3) on engine with six bolts (1) and washers (2).

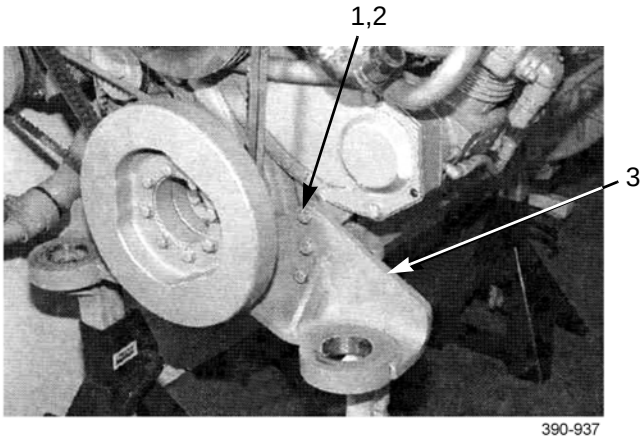


WARNING

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 lift 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 - CONTINUED

3. Lower front of engine and remove lifting device.
4. Install engine (WP 0122 00).



END OF WORK PACKAGE

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ENGINE FRONT AND REAR LIFTING BRACKETS REPLACEMENT 0124 00

THIS WORK PACKAGE COVERS

Engine Front Lifting Bracket Replacement

Engine Rear Lifting Bracket Replacement

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

References

WP 0031 00

Equipment Condition

Machine parked on hard, level surface (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

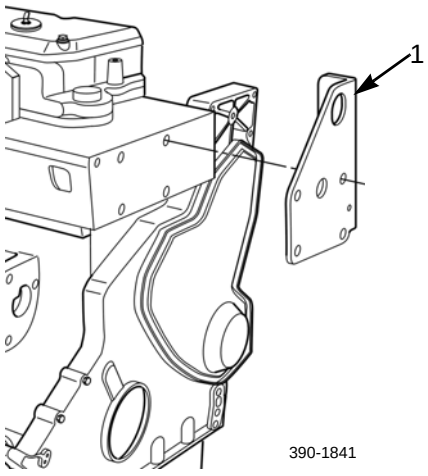
Battery disconnect switch in OFF position (TM 5-380-205-10-1 or TM 5-3800-205-10-2)

ENGINE FRONT LIFTING BRACKET REPLACEMENT

NOTE

Engine front lifting bracket will be removed as fan drive is removed.

1. Remove fan and fan drive from front of engine (WP 0031 00).
2. Remove engine front lifting bracket (1) from front of engine.
3. Position engine front lifting bracket (1) to front of engine.
4. Install fan and fan drive to front of engine (WP 0031 00).

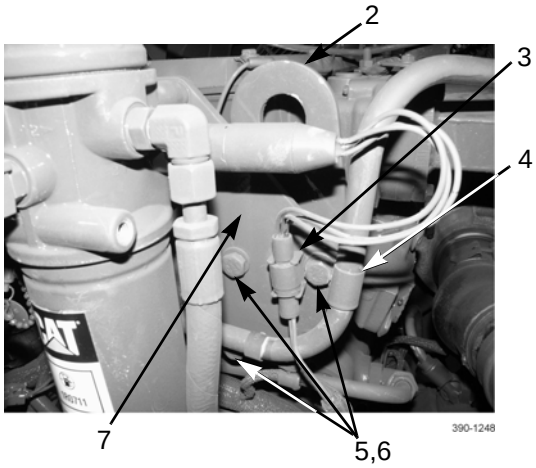


ENGINE REAR LIFTING BRACKET REPLACEMENT

NOTE

Secondary fuel filters and filter base are attached to bracket (7). Ensure assembly is supported during procedure.

1. Remove four bolts (5), washers (6), clamp (4), and bracket (3) from bracket (7).
2. Remove engine rear lifting bracket (2) from bracket (7).
3. Install lifting bracket (2), clamp (4), and bracket (3) on bracket (7) with four bolts (5) and washers (6).



END OF WORK PACKAGE

CYLINDER HEAD REPLACEMENT 0125 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Gasket

References

WP 0009 00

Personnel Required

Two

Equipment Condition

Batteries disconnected (WP 0067 00)

Coolant drained (WP 0010 00)

Rocker arm cover removed (WP 0011 00)

Crankcase breather removed (WP 0012 00)

Fuel transfer pump and governor assembly removed (WP 0141 00)

Fuel injector control linkage removed (WP 0138 00)

Fuel unit injectors removed (WP 0139 00)

Rocker shaft and pushrods removed (WP 0133 00)

Air cleaner disconnected (WP 0018 00)

Turbocharger removed (WP 0143 00)

Aftercooler and air inlet heater removed (WP 0142 00)

Exhaust manifold and muffler removed (WP 0025 00)

Inlet manifold removed (WP 0137 00)

CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL



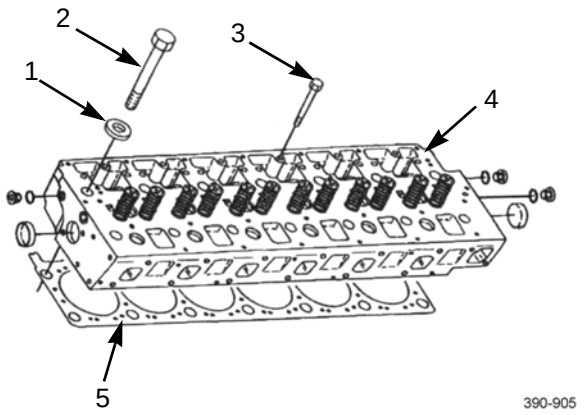
WARNING

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 lift 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

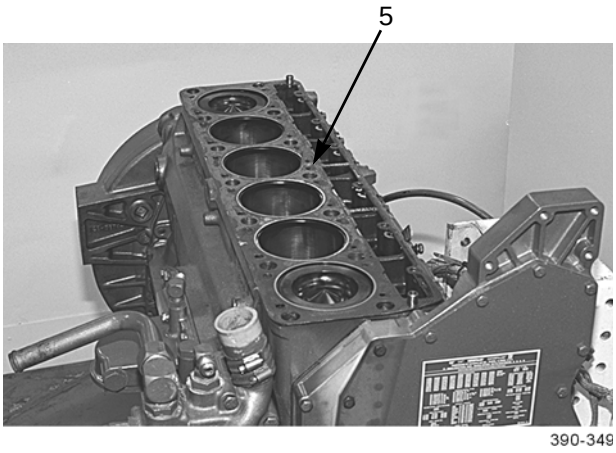
Cylinder head weighs 187 lb (85 kg).

1. Attach suitable lifting device to cylinder head (4).
2. Remove 14 bolts (2), washers (1), 6 bolts (3), and cylinder head (4) from cylinder block.



REMOVAL - CONTINUED

3. Remove cylinder head gasket (5) from cylinder block. Discard gasket.



INSTALLATION

1. Check for warpage on engine block surface.

NOTE

To avoid damage to cylinder head gasket, use guide bolts of an appropriate size to install cylinder head.

2. Install a new cylinder head gasket (5) on cylinder block.



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 lift 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

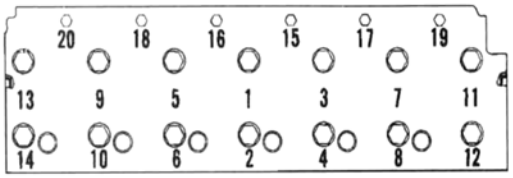
Cylinder head weighs 187 lb (85 kg).

3. Attach suitable lifting device to cylinder head (4).
4. Position cylinder head (4) onto dowels in cylinder block. Lower cylinder head onto cylinder block.
5. Inspect condition of cylinder head bolts (2 and 3). Replace bolts if damaged.
6. Lubricate cylinder head bolts (2 and 3) and both sides of washers (1) and install washers and bolts.

INSTALLATION - CONTINUED

7. Tighten cylinder head bolts according to following procedure:

   a. Tighten bolt (1) through bolt (14) in numerical sequence to 110 lb-ft (150 Nm).
   b. Tighten bolt (1) through bolt (14) again in numerical sequence to 320 lb-ft (435 Nm).
   c. Tighten bolt (1) through bolt (14) again in a numerical sequence to 320 lb-ft (435 Nm).
   d. Tighten bolt (15) through bolt (20) in numerical sequence to 41 lb-ft (55 Nm).



390-907

8. Install rocker shaft and pushrods (WP 0133 00).
9. Install fuel unit injectors (WP 0139 00).
10. Install inlet manifold (WP 0137 00).
11. Install exhaust manifold and muffler (WP 0025 00).
12. Install turbocharger (WP 0143 00).
13. Install air inlet heater and aftercooler (WP 0142 00).
14. Install fuel transfer pump and governor assembly (WP 0141 00).
15. Install rocker arm cover (WP 0011 00).
16. Install crankcase breather (WP 0012 00).
17. Connect fuel injector control linkage (WP 0138 00).
18. Connect air cleaner (WP 0018 00).
19. Connect batteries (WP 0067 00).
20. Fill coolant (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

21. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for leaks and proper operation.

END OF WORK PACKAGE

VIBRATION DAMPER AND PULLEY REPLACEMENT 0126 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Bushing, driver set (Item 7, WP 0172 00)

Materials/Parts

Lockwasher (8)

Personnel Required

Two

Equipment Condition

Drive belts removed (WP 0032 00)

Radiator removed (WP 0144 00)

REMOVAL



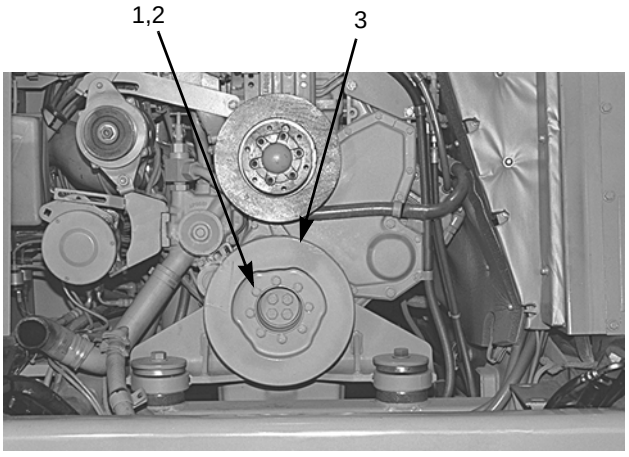
WARNING

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

Vibration damper weighs 40 lb (18 kg).

1. Remove eight screws (1), lockwashers (2), and vibration damper (3) from pulley.



390-033

REMOVAL - CONTINUED

2. Remove four screws (4) and retaining plate (5) from pulley (6).

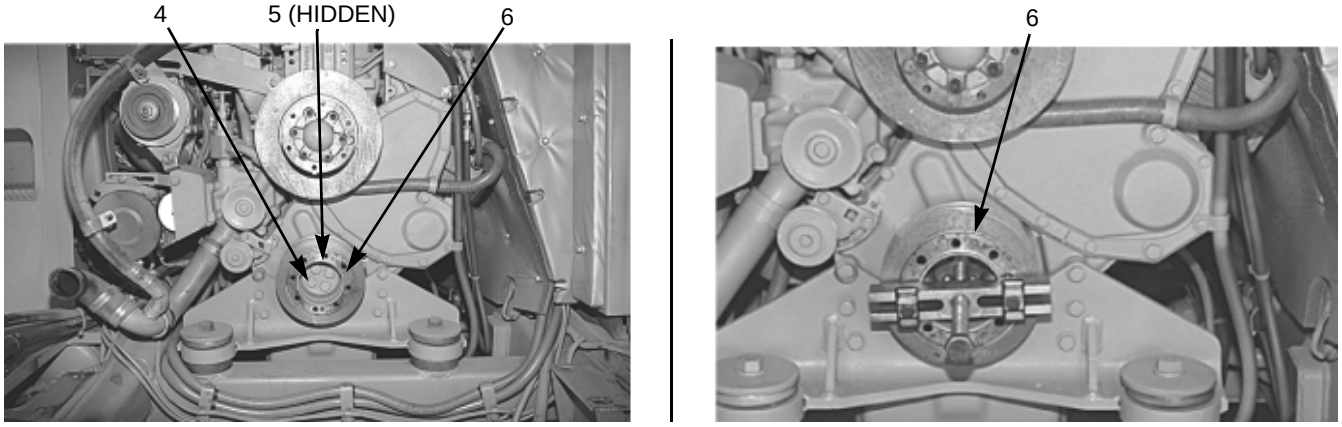
WARNING

Ensure puller is mounted correctly. Keep body to one side of pulley when removing pulley. Failure to follow this warning may result in injury to personnel.

3. Using puller, remove pulley (6) from engine.

INSTALLATION

1. Install pulley (6) on engine. Install retaining plate (5) and four screws (4).



390-1186



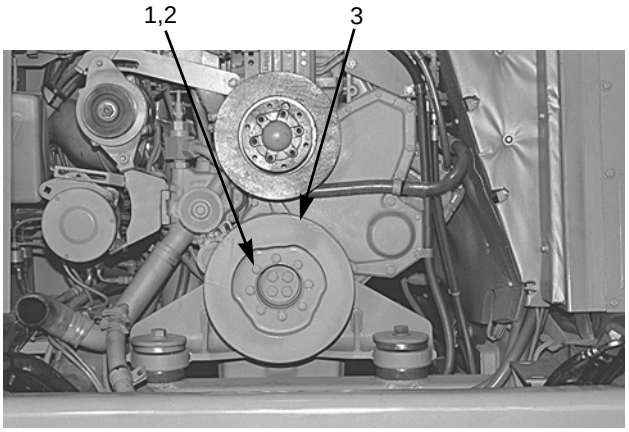
WARNING

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

Vibration damper weighs 40 lb (18 kg).

2. Install vibration damper (3) to pulley with eight new lockwashers (2) and screws (1).
3. Install drive belts (WP 0032 00).
4. Install radiator (WP 0144 00).



390-033

END OF WORK PACKAGE

CRANKSHAFT FRONT SEAL REPLACEMENT 0127 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Distorter, tool group (Item 11, WP 0172 00)

Tools and Special Tools - Continued

Inserter, seal (Item 16, WP 0172 00)

Materials/Parts

Seal

Equipment Condition

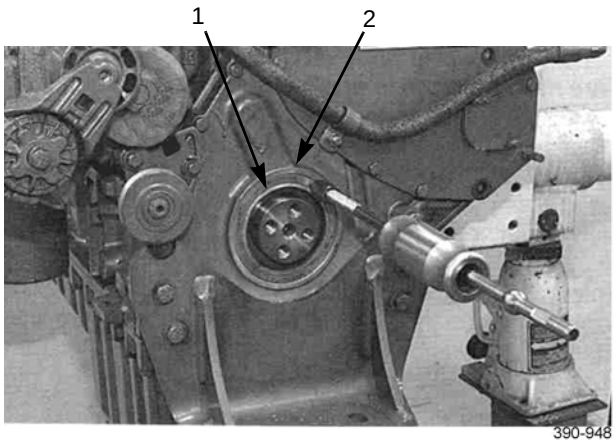
Vibration damper and pulley removed (WP 0126 00)

REMOVAL

CAUTION

- Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.
- Use care not to damage crankshaft flange when removing seal.

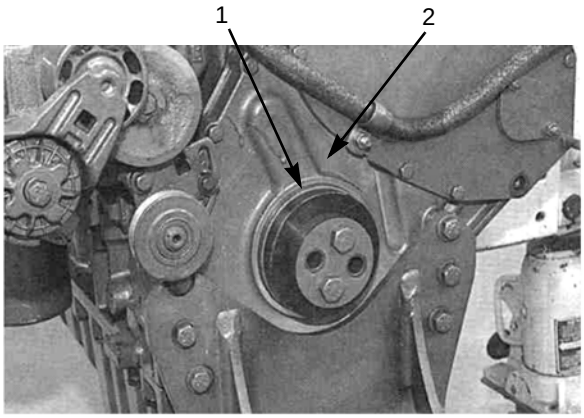
1. Drill three evenly spaced pilot holes in crankshaft front seal (1).
2. Using slide hammer, alternate between drilled holes to remove crankshaft front seal (1) from engine (2). Discard seal.



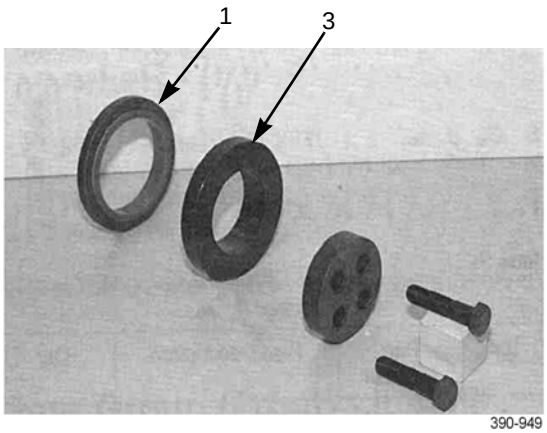
INSTALLATION

NOTE

Ensure that crankshaft flange and front housing are thoroughly clean before installing crankshaft front seal.



390-950



390-949

NOTE

Crankshaft seal is designed to be installed dry.

1. Loosely position new front seal (1) in engine (2).
2. Position installation sleeve (3) on front seal (1) and install front seal.
3. Remove installation sleeve (3) from front seal (1).
4. Ensure that seal surface of crankshaft pulley is in good condition and is thoroughly clean and dry.
5. Install vibration damper and pulley (WP 0126 00).

END OF WORK PACKAGE

CRANKSHAFT REAR SEAL CARRIER REPLACEMENT 0128 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Materials/Parts

Adhesive (Item 1, WP 0171 00)

Gasket

Personnel Required

Two

Equipment Condition

Flywheel housing removed (WP 0130 00)

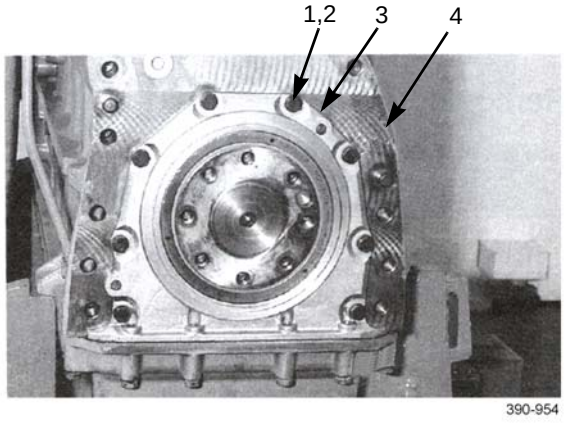
Engine oil pan removed (WP 0014 00)

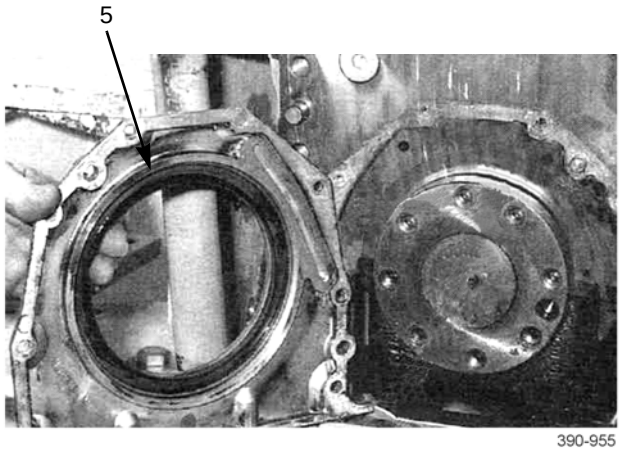
CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

REMOVAL

1. Remove eight bolts (1) and washers (2) from rear seal carrier (3).
2. Carefully pry rear seal carrier (3) from two dowel pins in cylinder block (4).
3. Remove gasket (5) from carrier (3). Discard gasket.





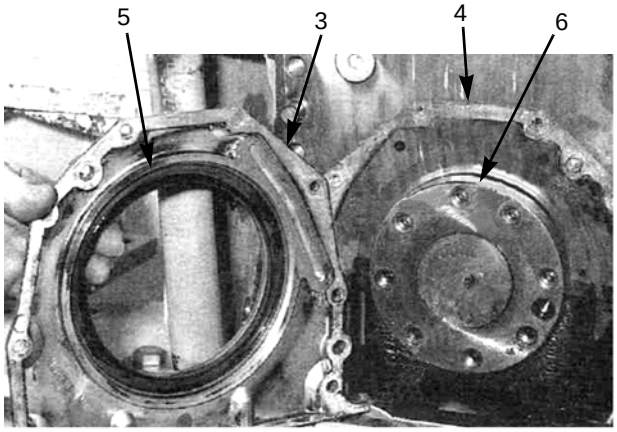
INSTALLATION

1. Install new gasket (5) on seal carrier (3).

CAUTION

Use care not to allow sealant to get into oil passage in mounting face of cylinder block.

2. Clean mounting surfaces of rear seal carrier (3), crankshaft (6) and cylinder block (4).
3. Apply primer and sealant to face of rear seal. Spread sealant uniformly. Allow primer to dry for three to five minutes.

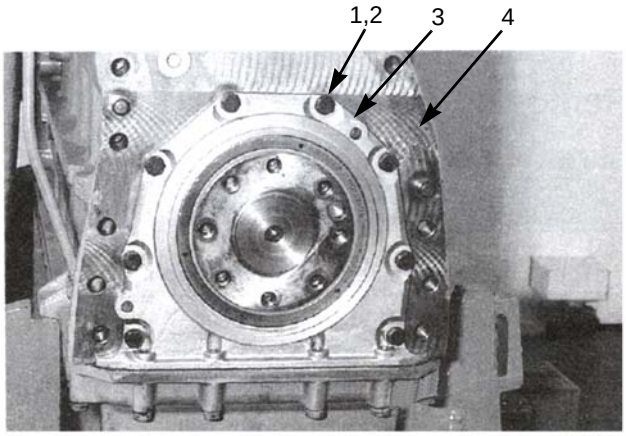


390-955

CAUTION

Rear seal carrier must be installed within 10 minutes of application of sealant.

4. Position rear seal carrier (3) on dowel pins in rear of cylinder block (4). If necessary, use a soft-faced hammer to position rear seal carrier against cylinder block.
5. Apply adhesive to threads of eight bolts (1). Install washers (2) and bolts (1) to secure rear seal carrier (3).
6. Install new gasket and engine oil pan (WP 0014 00).



390-954

7. Install flywheel housing (WP 0130 00).

END OF WORK PACKAGE

CRANKSHAFT REAR SEAL REPLACEMENT 0129 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Distorter, tool group (Item 11, WP 0172 00)

Tools and Special Tools - Continued

Inserter, seal (Item 15, WP 0172 00)

Ring (Item 22, WP 00172 00)

Materials/Parts

Seal

Sleeve, wear

Equipment Condition

Flywheel removed (WP 0131 00)

REMOVAL

NOTE

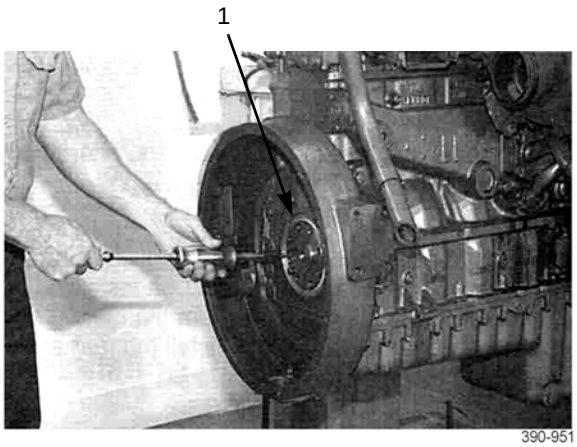
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

1. Drill three evenly spaced pilot holes in crankshaft rear seal (1) assembly.

NOTE

Use care not to damage crankshaft flange when crankshaft rear seal is removed.

2. Using slide hammer, alternate between drilled holes to remove crankshaft rear seal (1) assembly. Discard seal assembly.



INSTALLATION

NOTE

- Replacement rear seal is supplied with a wear sleeve. This wear sleeve must be installed with rear seal. New engines do not have a wear sleeve. Do NOT install rear seal if any of the following conditions exist:

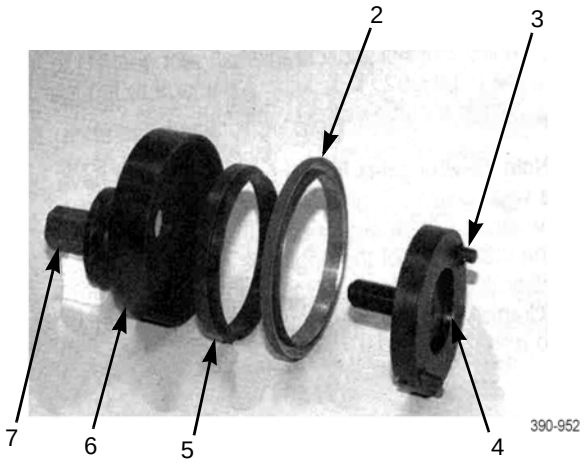
  (1)Crankshaft rear seal has been separated from wear sleeve.

  (2)Rear seal group appears to be damaged; or

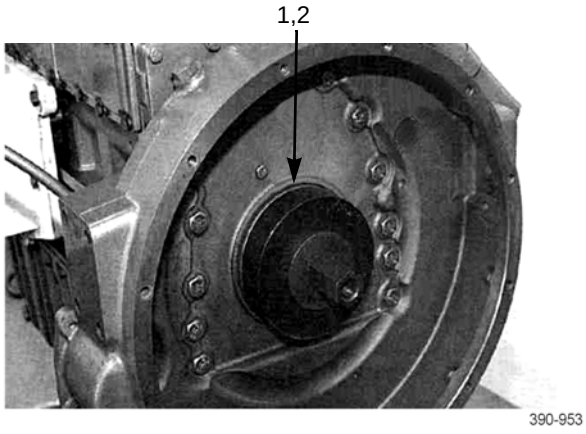
  (3)Crankshaft rear seal has been lubricated. Seal is designed to be installed dry.

- Ensure that rear of crankshaft is thoroughly clean and dry prior to installation of crankshaft rear seal.

1. Fasten seal locator (4) to rear of crankshaft with bolt (3). Hand tighten bolt.
2. Position crankshaft rear seal and crankshaft wear sleeve (2) on seal locator (4). Position sleeve ring (5) on seal locator.



3. Position seal installer (6) over seal locator (4) and sleeve ring (5) and install nut (7). Tighten nut to install crankshaft rear seal and crankshaft wear sleeve.
4. Remove nut (7), seal installer (6), and sleeve ring (5). Turn over sleeve ring. Install sleeve ring, seal installer, and nut. Tighten nut to complete installation of crankshaft rear seal and crankshaft wear sleeve.
5. Remove nut (7) and seal installer (6). Check that faces of sleeve ring (5) and seal locator (4) are flush. This indicates that crankshaft rear seal (1) and crankshaft wear sleeve (2) are installed properly.



6. Install flywheel (WP 0131 00).

END OF WORK PACKAGE

FLYWHEEL HOUSING REPLACEMENT 0130 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Bracket, link (Item 6, WP 0172 00)

Materials/Parts

Adhesive (Item 1, WP 0171 00)

Personnel Required

Two

Equipment Condition

Flywheel removed (WP 0131 00)

CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

1. Fasten two links (1) and hoist to flywheel housing (2).
2. Remove ten bolts (3) and two bolts (4) from flywheel housing and cylinder block.



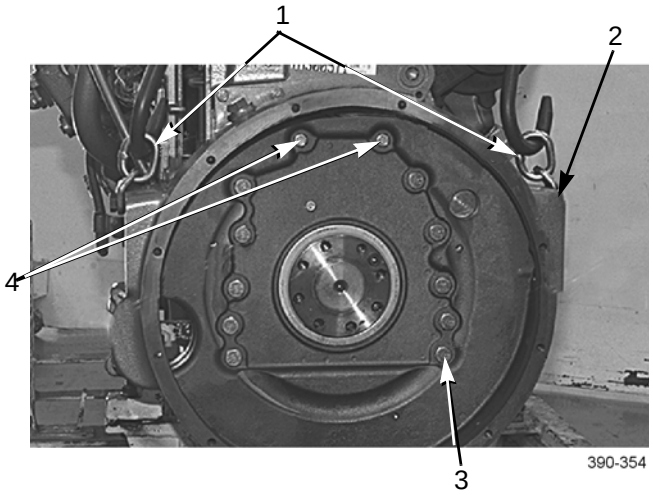
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device is in good condition and of suitable lift 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

Flywheel housing weighs 70 lb (32 kg).

3. Remove flywheel housing (2) from cylinder block.

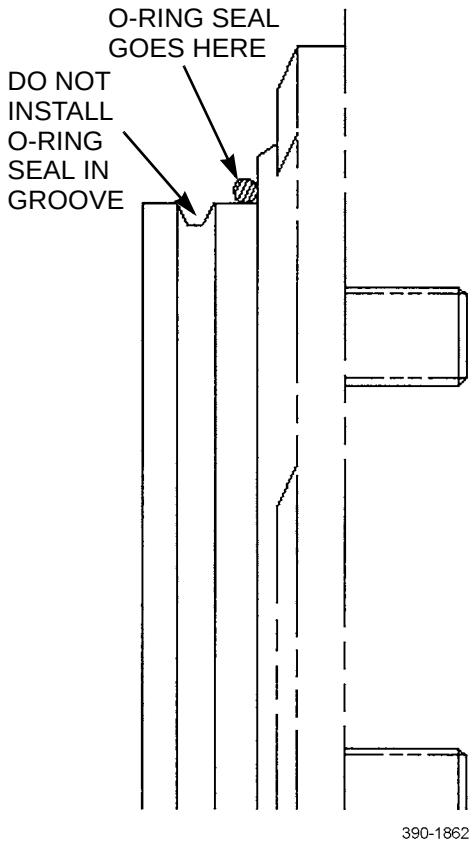


INSTALLATION

CAUTION

Improper installation of O-ring seal will result in leakage of torque converter oil between flywheel housing and cylinder block.

1. Ensure O-ring seal is installed properly on carrier.



NOTE

Ensure that mating surface of flywheel housing and mounting face of cylinder block are thoroughly clean.

2. Apply adhesive to mounting face of flywheel housing (2).

INSTALLATION - CONTINUED



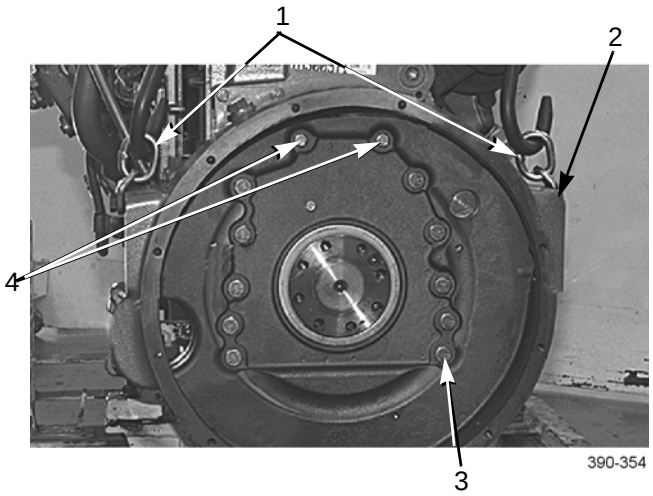
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device is in good condition and of suitable lift 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

Flywheel housing weighs 70 lb (32 kg).

3. Fasten two links (1) and hoist to flywheel housing (2).
4. Install flywheel housing (2) on cylinder block with ten bolts (3) and two bolts (4).
5. Tighten bolts (3) to 118 lb-ft (160 Nm). Tighten bolts (4) to 40 lb-ft (55 Nm).



6. Install flywheel (WP 0131 00).

END OF WORK PACKAGE

FLYWHEEL MAINTENANCE 0131 00

THIS WORK PACKAGE COVERS

Removal, Installation, Flywheel Runout Test

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Bracket, link (Item 6, WP 0172 00)

Materials/Parts

Compound, antiseize (Item 8, WP 0171 00)

Personnel Required

Two

Equipment Condition

Torque converter removed (WP 0146 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 lift 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

Flywheel weighs 75 lb (34 kg).

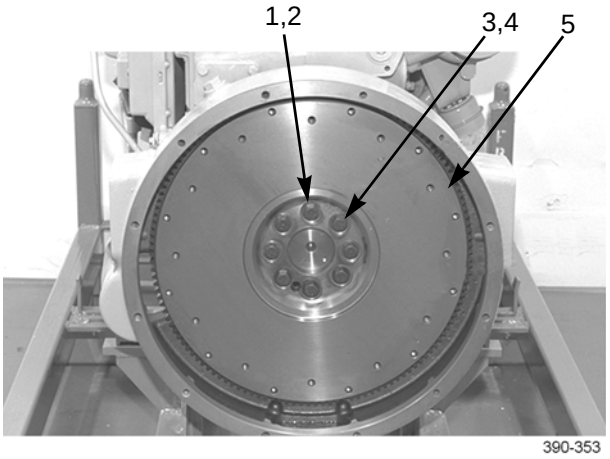
REMOVAL

1. Install link and suitable lifting device on flywheel (5).
2. Remove top bolt (1) and washer (2) from flywheel (5) and install guide bolt that is longer than top bolt.
3. Remove seven remaining bolts (3) and washers (4) from flywheel (5).

NOTE

Note position of flywheel to aid in installation.

4. Remove flywheel (5) from guide bolt and crankshaft.
5. Inspect flywheel ring gear. If flywheel ring gear is damaged, replace flywheel assembly.



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 lift 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

Flywheel weighs 75 lb (34 kg).

NOTE

When tightening and torquing bolts, start with top bolt and tighten/torque every other bolt until all eight bolts are tightened and torqued.

INSTALLATION - CONTINUED

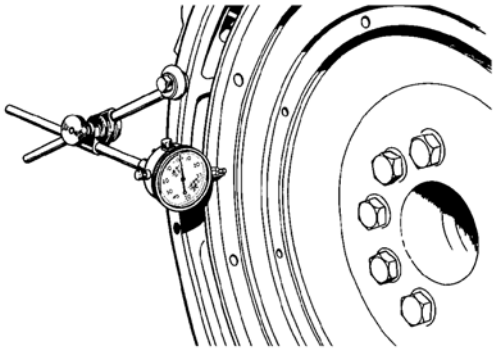
1. Install link and suitable lifting device to flywheel (5).
2. Place flywheel (5) on guide bolt in same position as when removed. Align arrows on flywheel and crankshaft.
3. Apply antiseize compound to threads of seven bolts (3) and install bolts and washers (4).
4. Remove guide bolt.
5. Apply antiseize compound to threads of top bolt (1) and install bolt and washer (2) on flywheel (5).
6. Tighten bolts (1 and 3) evenly to 90 lb-ft (120 Nm).

FLYWHEEL RUNOUT TEST

NOTE

Always apply force on crankshaft in same direction as rotation of flywheel before recording dial indicator measurement. This will remove any crankshaft end clearance.

1. Set dial indicator to 0.0 mm.
2. Turn flywheel to intervals of 90°, 180°, 270°, and 360° and observe and record dial indicator measurement at each point.
3. Difference between lower measurements and higher measurements that are recorded at all four points must not be more than 0.006 in. (0.15 mm).



390-1390

4. If more than 0.006 in. (0.15 mm) is observed at any of four test points, loosen and retorque bolts per *Installation*, step 6. Repeat test.
5. Install torque converter (WP 0146 00).

END OF WORK PACKAGE

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ENGINE FRONT COVER REPLACEMENT 0132 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Gasket

Equipment Condition

Radiator removed (WP 0144 00)

Air compressor removed (WP 0083 00)

NOTE

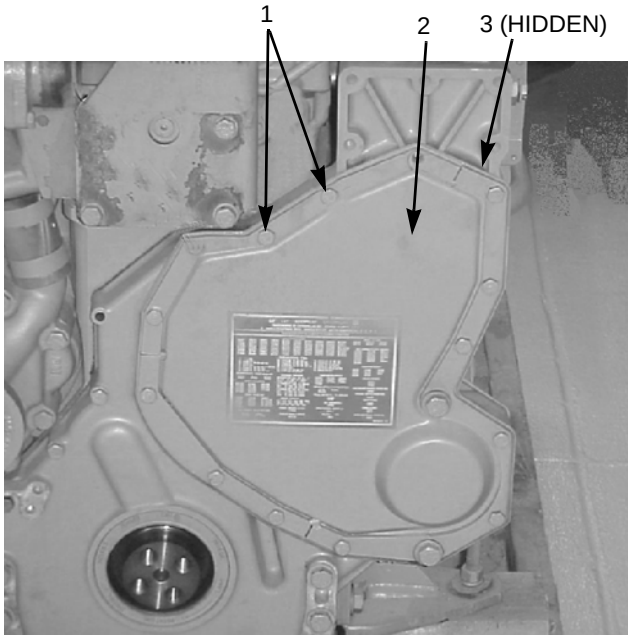
Vibration damper and crankshaft pulley do not need to be removed to replace front cover.

REMOVAL

NOTE

Bolts are not all the same length. Note position of long and short bolts to aid in installation.

1. Remove bolts (1), front cover (2), and gasket (3) from engine. Discard gasket.



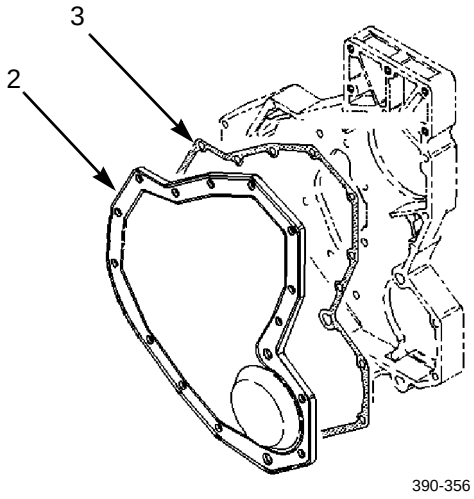
390-355

INSTALLATION

CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

1. Clean mounting surface of front cover (2).
2. Install new gasket (3) on front cover (2).

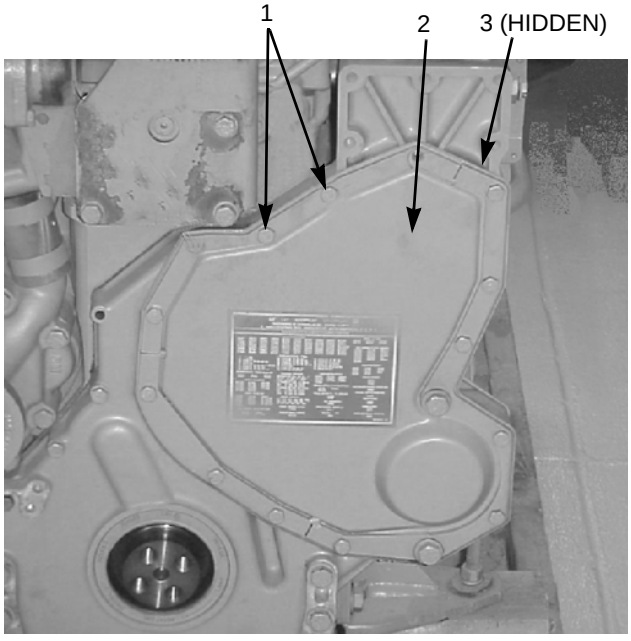


390-356

NOTE

Install long and short bolts in correct location, as noted prior to removal.

3. Install front cover (2) on engine with bolts (1).



390-355

END OF WORK PACKAGE

ROCKER SHAFT GROUP REPLACEMENT 0133 00

THIS WORK PACKAGE COVERS

Removal, Installation, Valve Lash Adjustment

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanics (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Gasket

References

WP 0140 00

Equipment Condition

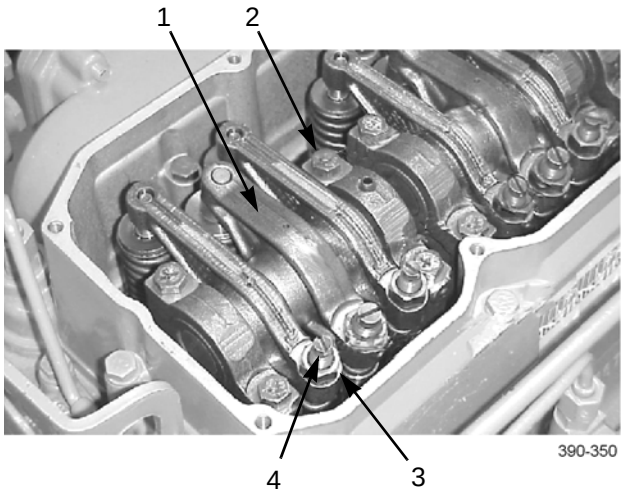
Rocker arm cover removed (WP 0011 00)

CAUTION

Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.

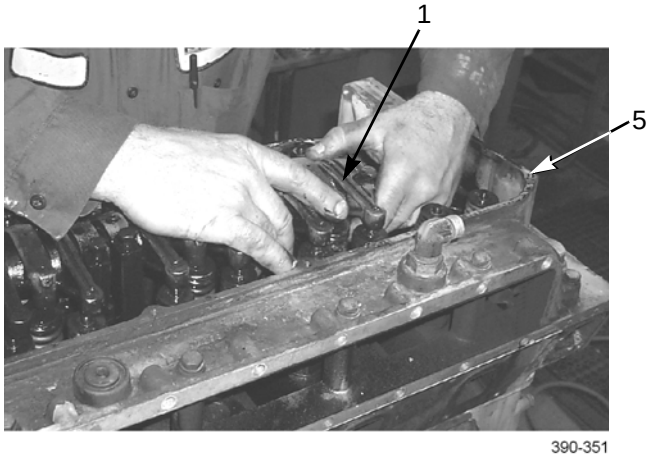
REMOVAL

1. Loosen all nuts (3) and rocker arm adjustment screws (4).
2. Remove four bolts (2) from rocker shaft assembly (1).



REMOVAL - CONTINUED

3. Remove rocker shaft assembly (1) from cylinder head (5).
4. Repeat steps 2 and 3 for each rocker shaft assembly (1).

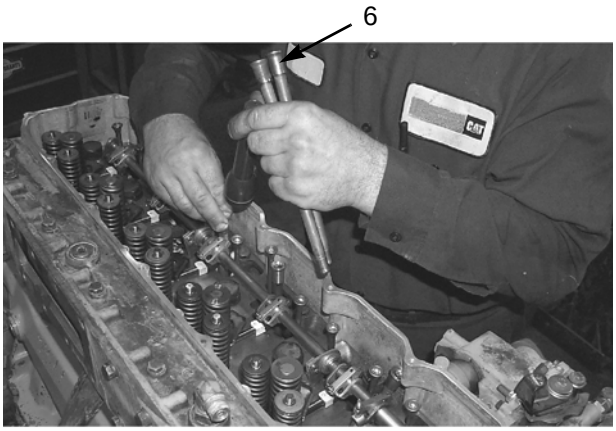


390-351

NOTE

Tag pushrods to aid in installation. Pushrods must be installed in same position.

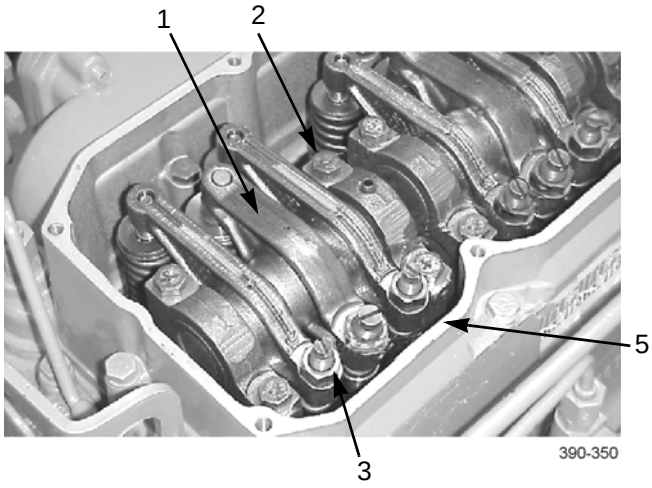
5. Remove pushrods (6).



390-352

INSTALLATION

1. Install pushrods (6) in cylinder head (5), in same position as removed. Base of pushrod should be in seat of pushrod lifter.
2. Position each rocker shaft assembly (1) in cylinder head (5). Line up pushrods with rocker arms.
3. Install four bolts (2) in rocker shaft assembly (1). Tighten bolts to 24 lb-ft (33 Nm).
4. Tighten all nuts (3).
5. Adjust valve lash.



390-350

VALVE LASH ADJUSTMENT

NOTE

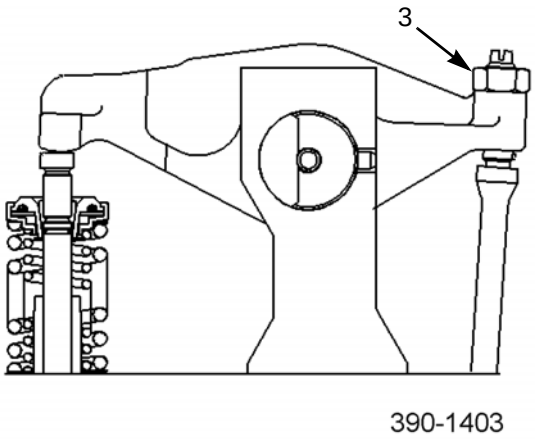
Valve lash should be 0.015 in. (0.38 mm) for inlet valves and 0.025 in. (0.64 mm) for exhaust valves.

1. Position no. 1 piston at top center position on compression stroke (WP 0140 00).

NOTE

Before any actual adjustment is made, lightly tap rocker arm at top of adjustment screw with a soft mallet. This will ensure that lifter roller seats against camshaft's base circle.

2. Loosen adjustment nut (3).

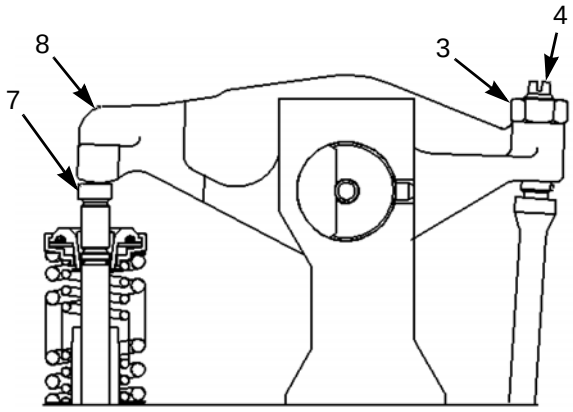


390-1403

NOTE

If there is not enough clearance to insert feeler gage between rocker arm and valve, turn adjustment screw counterclockwise to increase clearance.

3. Insert 0.015 in. (0.38 mm) feeler gage between rocker arm (8) and valve (7) and turn adjustment screw (4) clockwise. Continue turning adjustment screw until a slight drag is felt on feeler gage. Remove feeler gage.



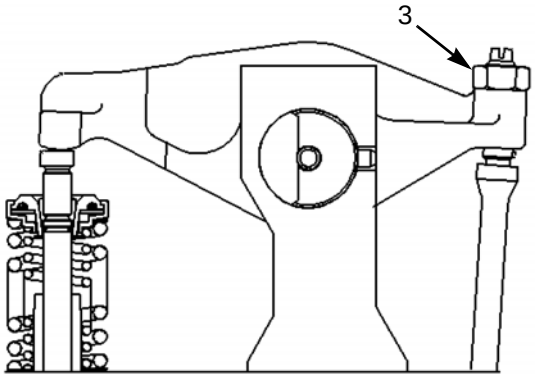
390-1403

VALVE LASH ADJUSTMENT - CONTINUED

NOTE

Do NOT allow adjustment screw to turn while tightening.

4. Tighten adjustment nut (3) to 18 lb-ft (25 Nm). Recheck valve lash after tightening adjustment nut.



390-1403

5. Turn flywheel 360° in direction of engine rotation. This will put no. 6 piston at top center position on compression stroke.
6. Repeat steps 3 through 5 for remaining valves.
7. Verify injector timing (WP 0140 00).
8. Install rocker arm cover (WP 0011 00).

END OF WORK PACKAGE

ENGINE OIL FILTER BASE AND OIL COOLER MAINTENANCE 0134 00

THIS WORK PACKAGE COVERS

Oil Filter Base Bypass Valve: Removal, Installation

Oil Filter Base and Oil Cooler: Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Gasket (2)

O-ring (4)

Packing, preformed (2)

References

WP 0009 00

WP 0010 00

Equipment Condition

Exhaust extension and muffler removed (WP 0025 00)

Aftercooler and air inlet heater removed (WP 0142 00)

Turbocharger removed (WP 0143 00)

Oil filter removed, if removing oil filter base (WP 0013 00)

CAUTION

Keep all parts clean from contaminants which may cause rapid wear and shorten component lift.

NOTE

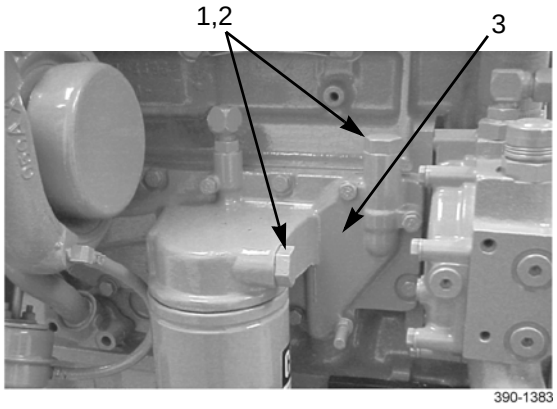
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

OIL FILTER BASE BYPASS VALVE REMOVAL

NOTE

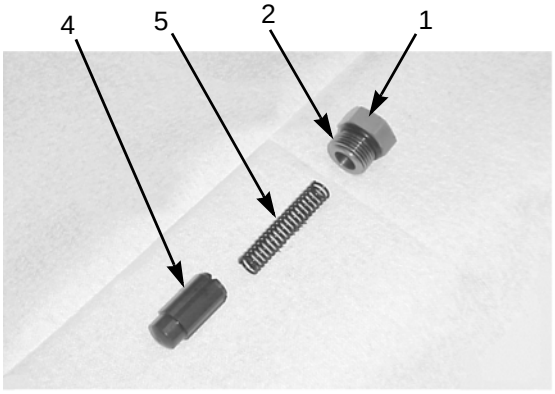
Oil filter ase has two bypass valves. Each bypass valve is removed the same way.

1. Remove plug (1) and preformed packing (2) from oil filter base (3). Discard preformed packing.



390-1383

2. Remove valve spring (5) and bypass valve (4) from oil filter base (3).



390-1384

OIL FILTER BASE BYPASS VALVE INSTALLATION

NOTE

- Oil filter base has two bypass valves. Each bypass valve is installed the same way.
- Coat new preformed packings with clean oil before installation.

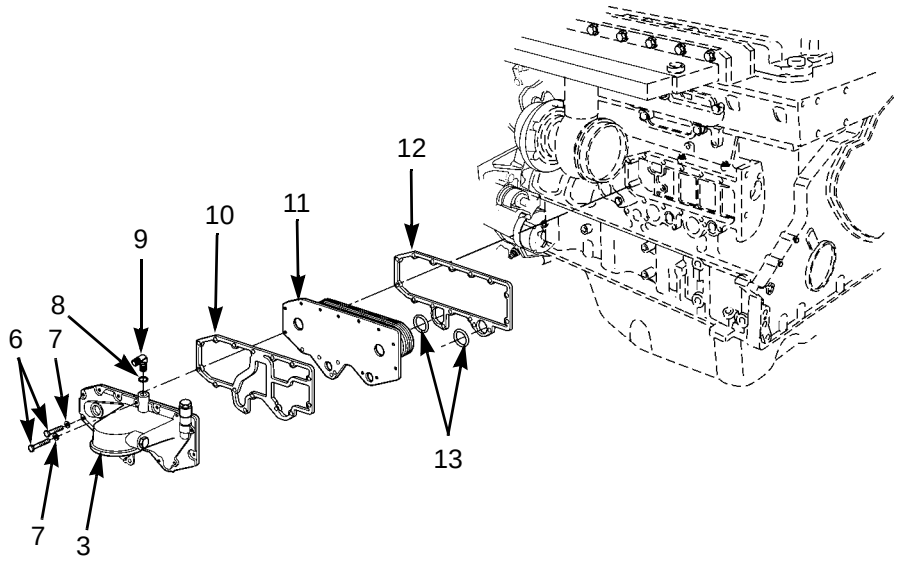
1. Install new preformed packing (2) on plug (1).
2. Install bypass valve (4) and valve spring (5) in oil filter base (3).
3. Install plug (1) in oil filter base (3).

OIL FILTER BASE AND OIL COOLER REMOVAL

1. Remove turbocharger oil supply tube assembly from elbow (9). Remove O-ring from elbow and discard.
2. Remove 14 bolts (6), washers (7), and oil filter base (3).

OIL FILTER BASE AND OIL COOLER REMOVAL - CONTINUED

3. Remove gasket (10) and discard.
4. Remove oil cooler (11) and gasket (12) from engine. Discard gasket.
5. Remove two O-rings (13) from engine. Discard O-rings.
6. Remove bypass valves from oil filter base (3) (refer to *Oil Filter Base Bypass Valve Removal*).
7. Remove elbow (9) and O-ring (8) from oil filter base (3). Discard O-ring.



390-2058

OIL FILTER BASE AND OIL COOLER INSTALLATION

NOTE

Coat new O-rings with clean oil before installation.

1. Install new O-ring (8) and elbow (9) to oil filter base (3).
2. Install bypass valves to oil filter base (3) (refer to *Oil Filter Base Bypass Valves Installation*).
3. Install two new O-rings (13) to engine.
4. Position new gasket (12), oil cooler (11), new gasket (10), and oil filter base (3) to engine.
5. Secure oil filter base (3) and oil cooler (11) to engine with 14 washers (7) and bolts (6).
6. Install new O-ring and turbocharger oil supply tube assembly to elbow (8).
7. If removed, install oil filter (WP 0013 00).
8. Fill engine crankcase (WP 0009 00 and WP 0010 00).
9. Install turbocharger (WP 0143 00).
10. Install air inlet heater and aftercooler (WP 0013 00).
11. Install muffler and exhaust extension (WP 0025 00).

END OF WORK PACKAGE

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ENGINE OIL PUMP ASSEMBLY MAINTENANCE 0135 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 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Materials/Parts - Continued

Rag, wiping (Item 31, WP 0171 00)

Gasket

Lockwasher (2)

O-ring

Packing, preformed

Equipment Condition

Engine oil pan removed (WP 0014 00)

CAUTION

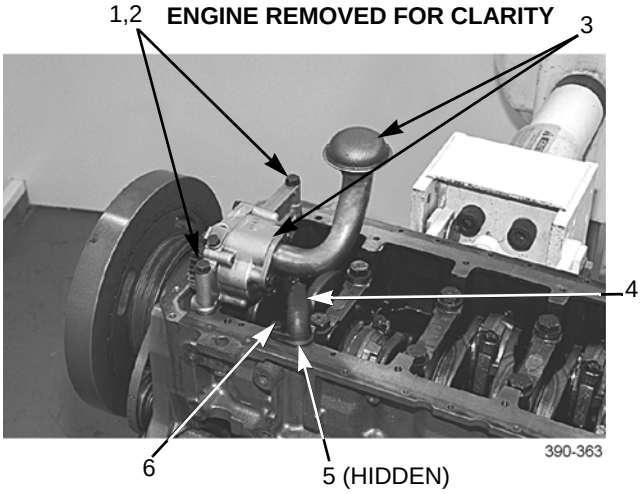
Keep all parts clean from contamination. Contaminants may cause rapid wear and shortened component life.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

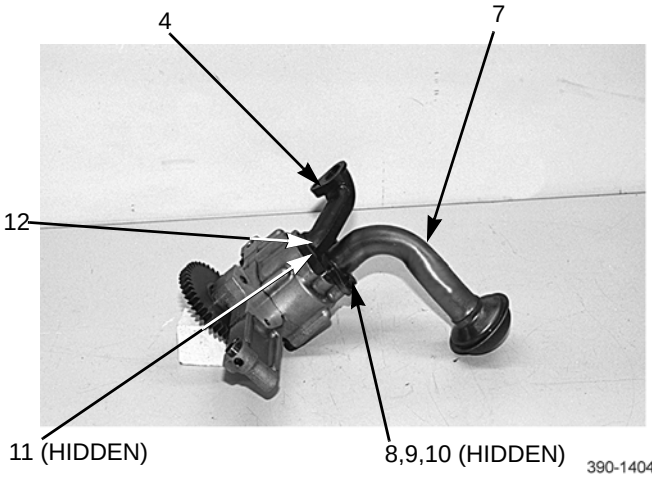
REMOVAL

1. Remove two screws (1), lockwashers (2), screw (6), and engine oil pump assembly (3) from cylinder block. Discard lockwashers.
2. Remove and discard O-ring (5) from between cylinder block and outlet elbow (4).

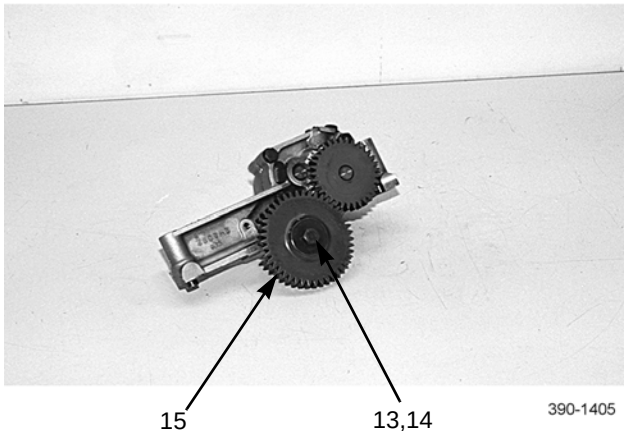


DISASSEMBLY

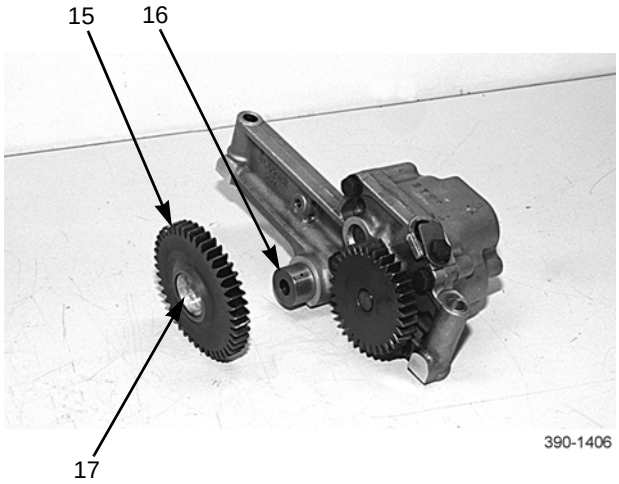
1. Remove two screws (8), washers (9), oil pickup tube (7), and preformed packing (10) from pump. Discard preformed packing.
2. Remove screw (12), outlet elbow (4), and gasket (11) from pump. Discard gasket.



3. Remove screw (13), washer (14), and idler gear (15) from pump.



4. Remove bearing sleeve (17) from idler gear (15) with puller. Discard bearing sleeve.
5. Remove shaft (16) from pump and discard.

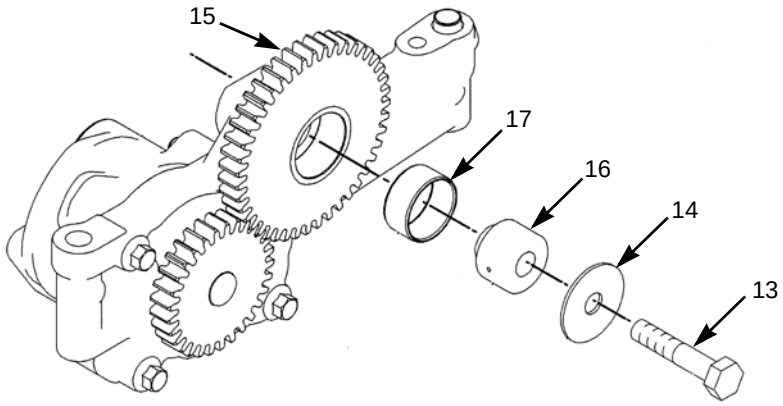


ASSEMBLY

NOTE

Lubricate all internal parts of pump and new O-rings with clean oil prior to assembly.

1. Install new bearing sleeve (17) in idler gear (15).
2. Install shaft (16), washer (14), and screw (13) through idler gear (15) and tighten to pump body. Tighten screw to 52 lb-ft (70 Nm).



390-1407

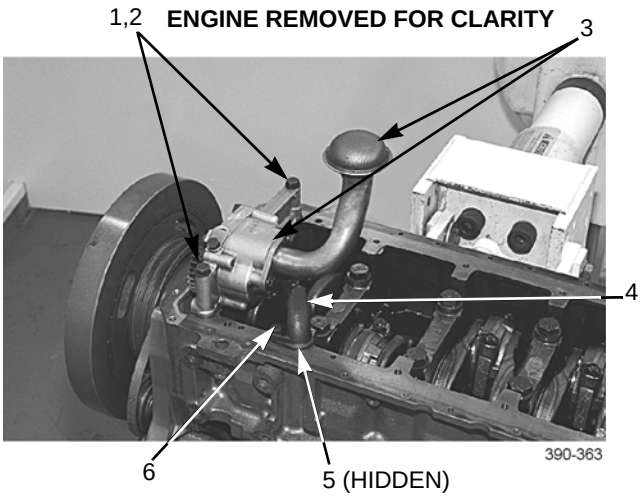
3. Install new gasket (11) and outlet elbow (4) on pump with screw (12).
4. Install new preformed packing (10) and oil pickup tube (7) on pump with two washers (9) and screws (8).

INSTALLATION

NOTE

Ensure mounting surfaces for engine oil pump are thoroughly clean.

1. Position new O-ring (5) between cylinder block and outlet elbow (4).
2. Install engine oil pump assembly (3) on cylinder block with screw (6), two new lockwashers (2), and screws (1).



3. Install engine oil pan (WP 0014 00).

END OF WORK PACKAGE

EXHAUST MANIFOLD REPLACEMENT 0136 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Compound, antiseize (Item 8, WP 0171 00)

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Materials/Parts - Continued

Tag, wiping (Item 31, WP 0171 00)

Sealer, manifold (Item 32, WP 0171 00)

Gasket (3)

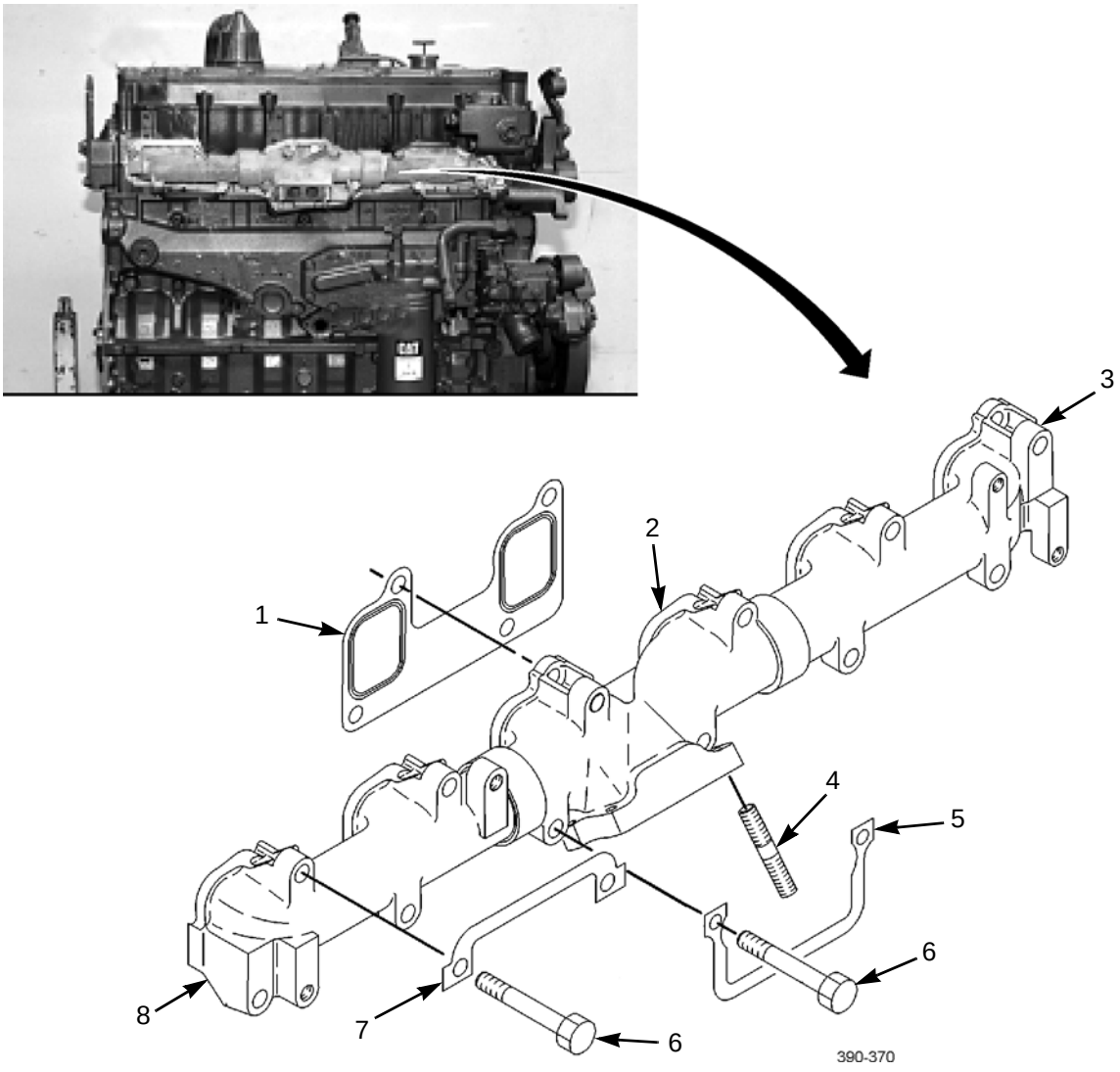
Equipment Condition

Aftercooler and air inlet heater removed (WP 0142 00)

Turbocharger removed (WP 0143 00)

REMOVAL

1. Remove 12 bolts (6), retainer (5), five locks (7), exhaust manifolds (2, 3, and 8), and three gaskets (1) from cylinder head assembly. Discard gaskets.
2. Separate exhaust manifolds (2, 3, and 8).
3. If damaged, remove mounting studs (4) from exhaust manifold (2).

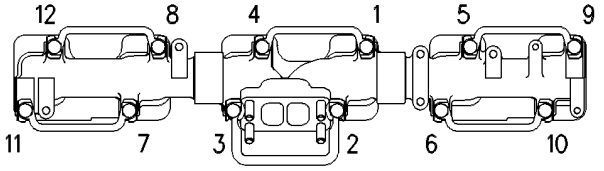


CLEANING AND INSPECTION

1. Thoroughly clean gasket mating surfaces to remove all traces of gasket material.
2. Wipe mating surfaces dry.
3. Inspect for damage to mating surfaces. There must be no damage to block or exhaust manifolds.

INSTALLATION

1. If removed, apply antiseize compound to threads of mounting studs (4) and install mounting studs on exhaust manifold (2). Tighten mounting studs to 26 lb-ft (35 Nm).
2. Apply a thin coat of high-temperature manifold sealer to male ends of exhaust manifolds (2, 3, and 8).
3. Apply a coat of clean engine oil to inside of female ends of exhaust manifolds (2, 3, and 8).
4. Assemble exhaust manifolds (2, 3, and 8) and remove excess sealant from joints.
5. Apply antiseize compound to threads of 12 bolts (6). Position three new gaskets (1) and exhaust manifolds (2, 3, and 8) on cylinder head assembly. Install five locks (7), retainer (5), and bolts.
6. Tighten 12 bolts (1) to 33 lb-ft (45 Nm) in sequence shown.
7. Bend the locking tabs of locks and retainer over each bolt head to lock bolts (1) in position.



390-371

8. Install turbocharger (WP 0143 00).
9. Install air inlet heater and aftercooler (WP 0142 00).

END OF WORK PACKAGE

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INTAKE MANIFOLD REPLACEMENT 0137 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Tag, wiping (Item 31, WP 0171 00)

Gasket

Equipment Condition

Muffler removed (WP 0025 00)

Air cleaner removed (WP 0018 00)

Rocker arm cover removed (WP 0011 00)

Aftercooler and air inlet heater removed (WP 0142 00)

Fuel tube assembly and elbow removed from intake manifold (WP 0016 00)

Ether atomizer removed from intake manifold (WP 0022 00)

CAUTION

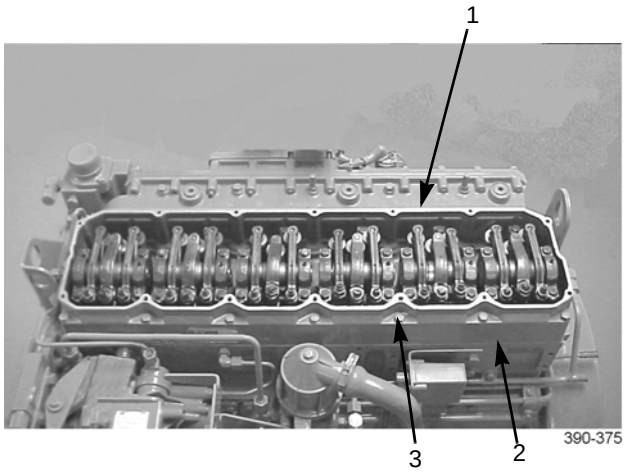
Keep all parts clean from contamination. Contaminants may cause rapid wear and shortened component life.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

1. Remove bolts (3) from intake manifold (1) and cylinder head.
2. Remove intake manifold (1) from cylinder head.
3. Remove gasket (2) and discard.



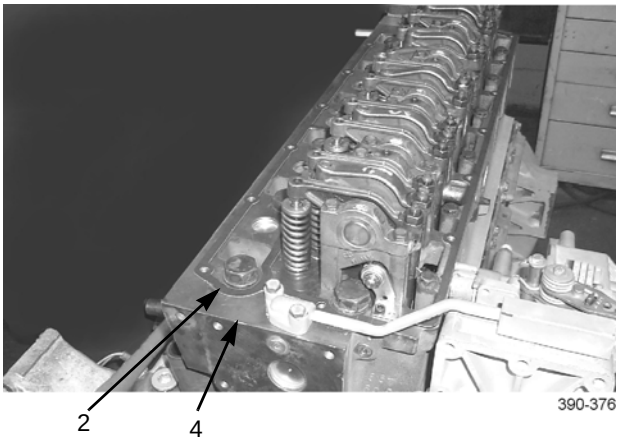
ENGINE REMOVED FOR CLARITY

CLEANING AND INSPECTION

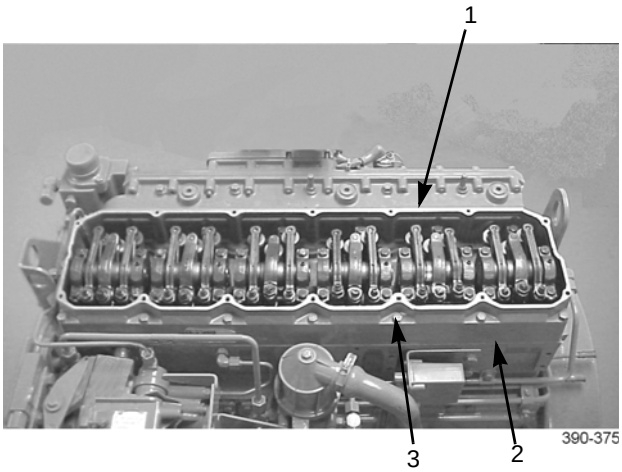
1. Thoroughly clean gasket mating surfaces to remove all traces of gasket material.
2. Wipe mating surfaces dry.
3. Inspect for damage to mating surfaces. There must be no damage to cylinder head or intake manifold.

INSTALLATION

1. Install new gasket (2) on cylinder head (4).



2. Position intake manifold (1) on cylinder head.
3. Install bolts (3). Evenly tighten bolts to 21 lb-ft (28 Nm).
4. Install rocker arm cover (WP 0011 00).
5. Install ether atomizer to intake manifold (WP 0022 00)
6. Install elbow and fuel tube assembly to intake manifold (WP 0016 00).



ENGINE REMOVED FOR CLARITY

7. Install muffler (WP 0025 00).
8. Install air cleaner (WP 0018 00).
9. Install air inlet heater and aftercooler (WP 0142 00).

END OF WORK PACKAGE

FUEL INJECTOR CONTROL LINKAGE REPLACEMENT 0138 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Tool kit, internal combustion engine (Item 34, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Clamp, plier (Item 9, WP 0172 00)

Materials/Parts

Fuel (Item 13, 14 or 15, WP 0171 00)

O-ring (2)

Equipment Condition

Rocker shaft assembly and pushrods removed (WP 0133 00)

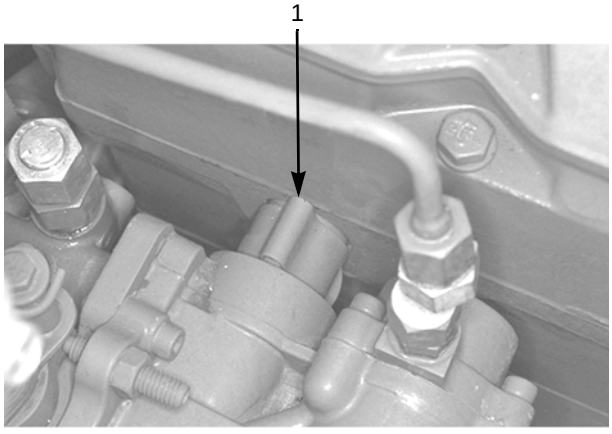
Fuel unit injectors removed (WP 0139 00)

REMOVAL

CAUTION

Keep all parts clean from contamination. Contaminants may cause rapid wear and shortened component life.

1. Remove clip (1) located between governor and cylinder head.



390-377

REMOVAL - CONTINUED

2. Remove governor connection tube (2) from cylinder head.
3. Remove O-ring from governor connection tube and O-ring from cylinder head. Discard O-rings.

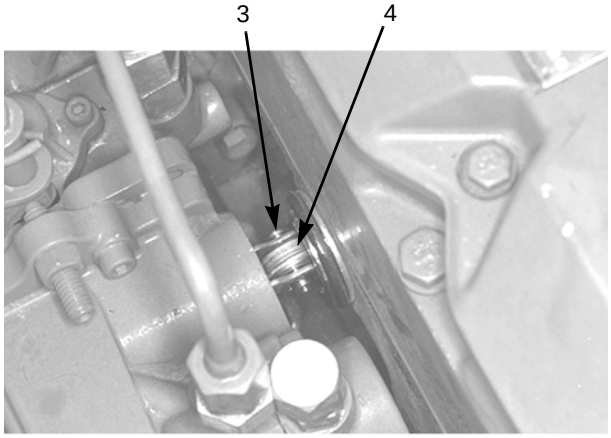


390-393

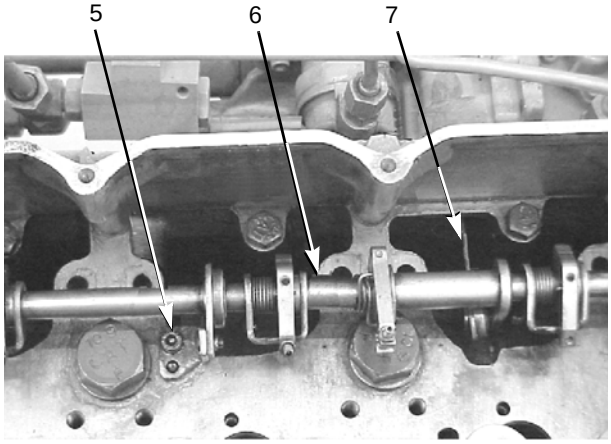
NOTE

Clevis pin must stay with governor in order to be adjusted.

4. Remove clip and clevis pin (3). Clevis pin connects governor to control lever (4) of fuel injector control linkage (6).
5. Remove socket head capscrews (5) and fuel injector control linkage (6). Control lever (4) connects fuel injector control linkage to governor.

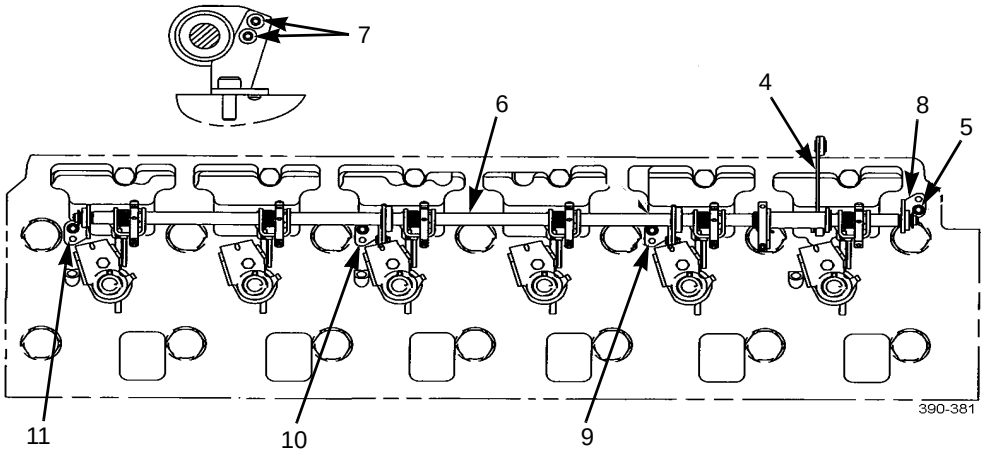


390-379

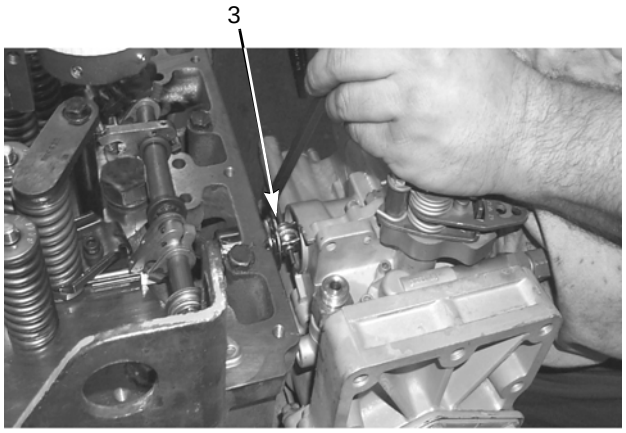


390-380

INSTALLATION



1. Loosen two setscrews (7) on each bracket.
2. Install fuel injector control linkage (6) and install socket head capscrews (5). Use the following sequence in order to tighten socket head capscrews.
3. Tighten socket head capscrews (5) at brackets (8 and 11) to 106 lb-in. (12 Nm).
4. Tighten socket head capscrews (5) at brackets (9 and 10) to 106 lb-in. (12 Nm).
5. Position brackets (9 and 10) in order to allow free rotation of fuel control rod.
6. Use a 0.10 in. (2.5 mm) wrench to tighten two setscrews.
7. On each bracket, tighten setscrews to 31 lb-in. (3.5 Nm). Do NOT overtighten setscrews.
8. Ensure that control rod rotates freely. Control rod should rotate freely when a force of 1 lb (4.4 N) or less is applied to control lever (4).
9. Secure control lever (4) to governor with clevis pin (3) and clip.
10. Install fuel unit injectors (WP 0139 00).
11. Check injector synchronization (WP 0140 00).



INSTALLATION - CONTINUED

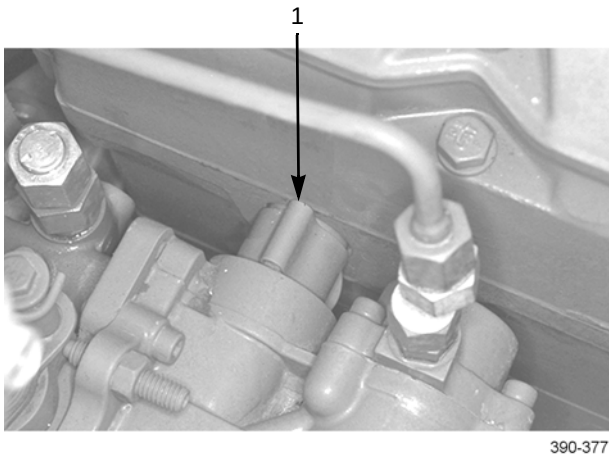
NOTE

Lightly coat new O-rings with clean fuel before installation.

12. Install one new O-ring in cylinder head. Install other new O-ring to governor connection tube (2).
13. Using pin, slide governor connection tube (2) on governor.



14. Install clip (1).



15. Install pushrods and rocker arm assembly (WP 0133 00).

END OF WORK PACKAGE

FUEL UNIT INJECTOR REPLACEMENT 0139 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Tool kit, diesel injector (Item 32, WP 0172 00)

Tool kit, internal combustion engine (Item 34, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 25, 26 or 29, WP 0171 00)

Petrolatum, technical (Item 30, WP 0171 00)

Packing, preformed (2)

References

WP 0140 00

Equipment Condition

Rocker arm cover removed (WP 0011 00)

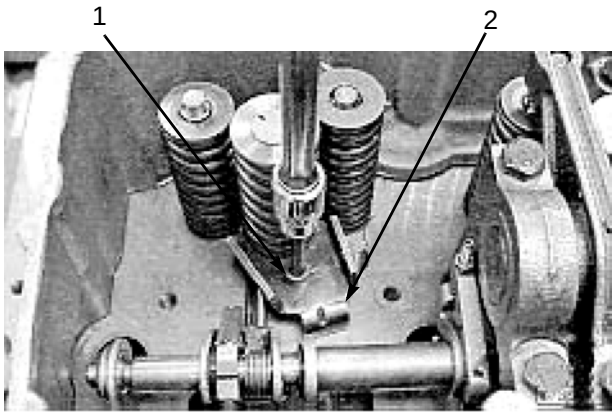
Rocker shaft assembly removed (WP 0133 00)

REMOVAL

CAUTION

Do not pry fuel injector hold-down clamp. Damage to injector could occur. Injector has a notch on opposite side of rack. This notch is used for prying injector loose. Some fuel injector racks move freely when spring is not compressed. Do not move fuel injector rack without compressing fuel injector spring slightly. Failure to follow this caution may result in damage to fuel injector.

1. Remove injector clamp socket head capscrew (1), washer, and clamp (2).



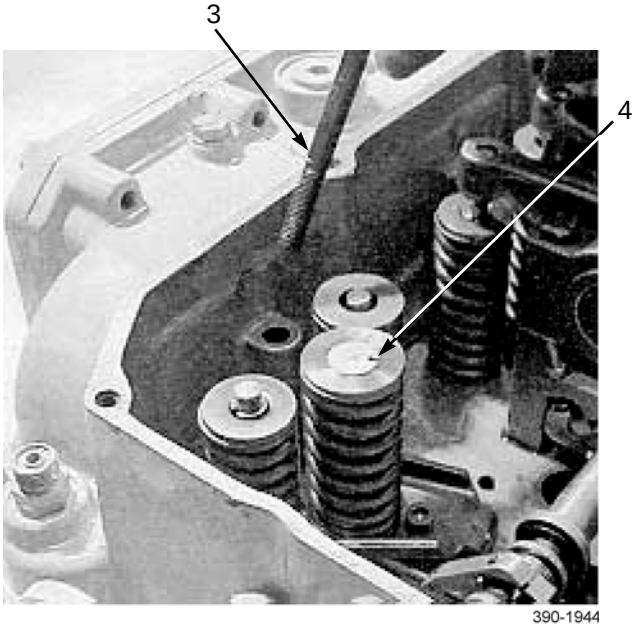
390-1943

REMOVAL - CONTINUED

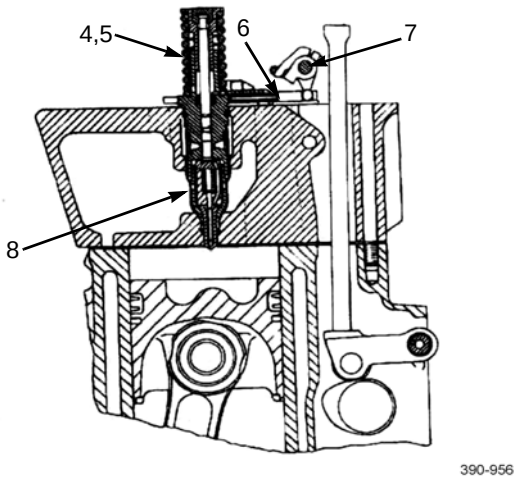
CAUTION

When doing an on-engine procedure, remove only one intake manifold bolt at a time. Removing more than one bolt could weaken manifold/head joint gasket material.

2. Remove intake manifold bolt (3) and washer closest to injector (4).



3. Using injector removal bar, loosen injector (4) and rotate injector to disengage injector rack bar (6) from control linkage (7).
4. Remove injector (4) from injector sleeve (8). Remove preformed packing (5) from injector and discard.
5. Inspect injector sleeve (8) for pitting or carbon tracking. Ream sleeve to clean if required.



INSTALLATION

NOTE

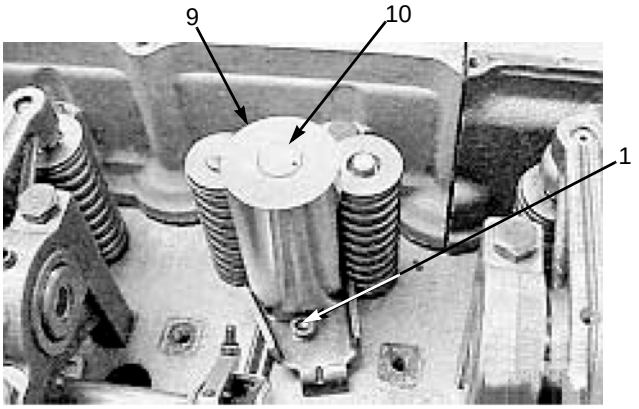
Lubricate new preformed packing with clean oil prior to installation.

1. Install new preformed packing (5) to injector (4).
2. Install injector (4).
3. Install socket head capscrew (1) and washer to clamp (2). Tighten to 9 lb-ft (12 Nm).

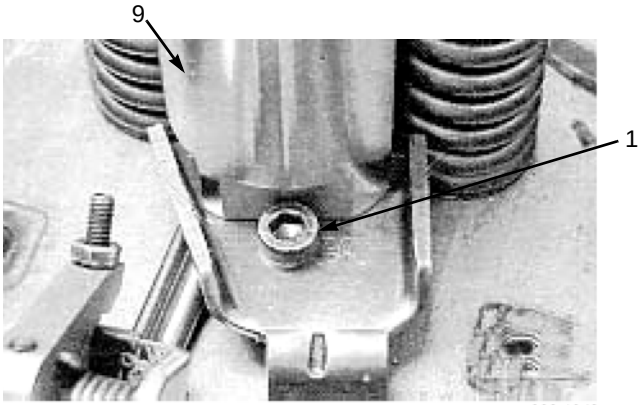
WARNING

Injector forcing cover has two sharp edges due to design of this tool. Be careful not to cut yourself on these sharp edges.

4. Install injector forcing cover (9) with milled surface of cover lined up with injector clamp socket head capscrew (1).



390-1945



390-1948

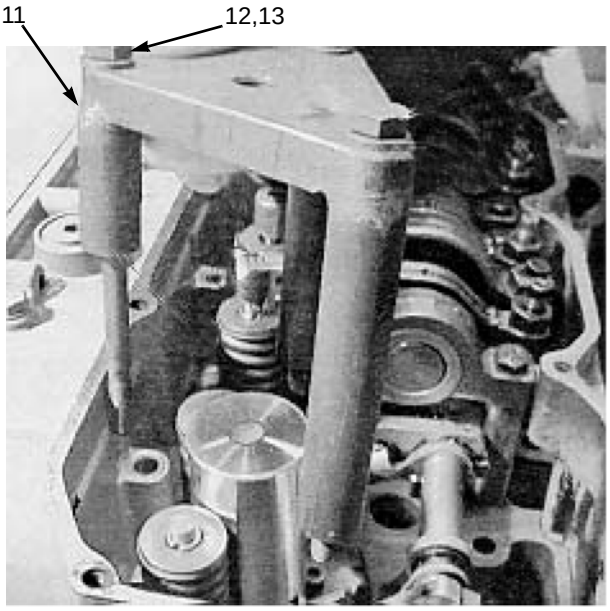
CAUTION

Complete lubrication of wear button must be maintained for each injector seating procedure. Failure to relubricate each wear button before seating next injector may cause premature wear or tool damage.

5. Apply a small amount of petrolatum to top of injector forcing cover wear button (10).

INSTALLATION - CONTINUED

6. Install forcing bridge (11) with three bolts (12) and hard washers (13). Place two long legs of forcing bridge in two vacated rocker arm shaft support holes closest to injector. Short leg of forcing bridge sits on intake manifold bolt boss.



390-1946

CAUTION

Damage to head could occur if bridge mounting bolts are not tightened to specified torque.

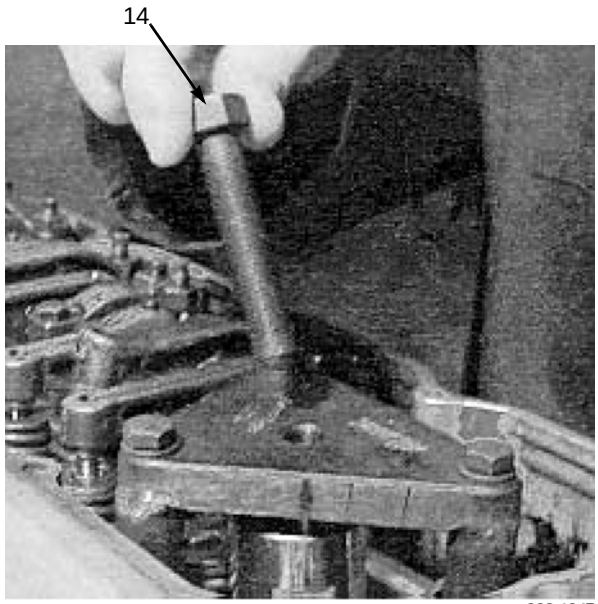
7. Tighten forcing bridge mounting bolts (12) to 21 lb-ft (28 Nm).

CAUTION

- Ensure that forcing bolt turns freely and has no damaged threads.
- Complete lubrication of forcing bolt threads must be maintained for each injector seating procedure. Failure to relubricate before setting next injector may cause premature wear or tool damage.

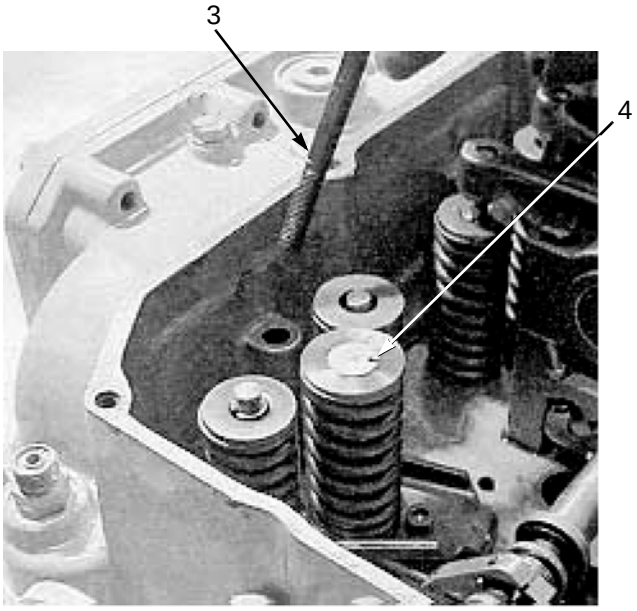
INSTALLATION - CONTINUED

8. Lubricate threads of forcing bolt (14) with petrolatum.



390-1947

9. Install forcing bolt (14) finger tight.
10. Tighten forcing bolt (14) to 18 lb-ft (24 Nm). Wait five seconds and tighten bolt to 25 lb-ft (34 Nm).
11. Remove forcing bolt (14).
12. Remove three bolts (12), hard washers (13), and forcing bridge (11).
13. Install rocker shaft assembly (WP 0133 00).
14. Install washer and intake manifold bolt (3). Tighten bolt to 21 lb-ft (28 Nm).
15. Check injector synchronization (WP 0140 00).
16. Adjust valve lash (WP 0133 00).



390-1944

END OF WORK PACKAGE

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INJECTOR SYNCHRONIZATION, FUEL SETTING, AND FUEL TIMING 0140 00

THIS WORK PACKAGE COVERS

Injector Synchronization, Fuel Setting, Setting Top Center Position (TCP), Fuel Timing

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Tool kit, internal combustion engine (Item 34, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 26, 27 or 28, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Personnel Required

Two

Equipment Condition

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

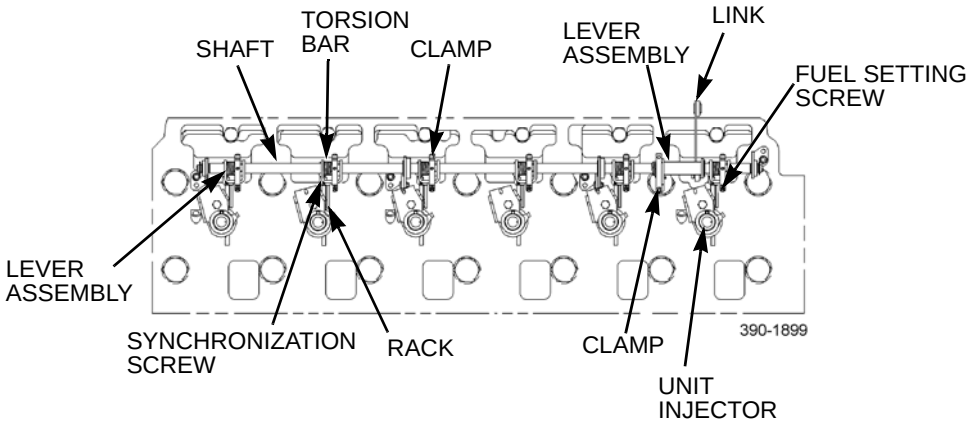
Rocker arm assemblies removed (WP 0133 00)

Fuel shutoff solenoid removed (WP 0017 00)

Front guard plate removed (WP 0100 00)

NOTE

- Injector synchronization is setting of all injector racks to a reference position so each injector gives same amount of fuel to each cylinder. This is accomplished by setting each injector rack to same position while control linkage is in a fixed position.
- Synchronizing injectors is accomplished by placing a Sync Gage Block between injector rack head pin and injector body of no. 1 injector.
- There is no adjustment screw for no. 1 injector since it is the reference point for all other injectors. Therefore, no synchronizing adjustment is made for no. 1 injector.
- Always synchronize an injector after it has been removed and reused or replaced. If no. 1 injector has been removed and reused or replaced, synchronization of ALL injectors must be checked/adjusted.



INJECTOR SYNCHRONIZATION

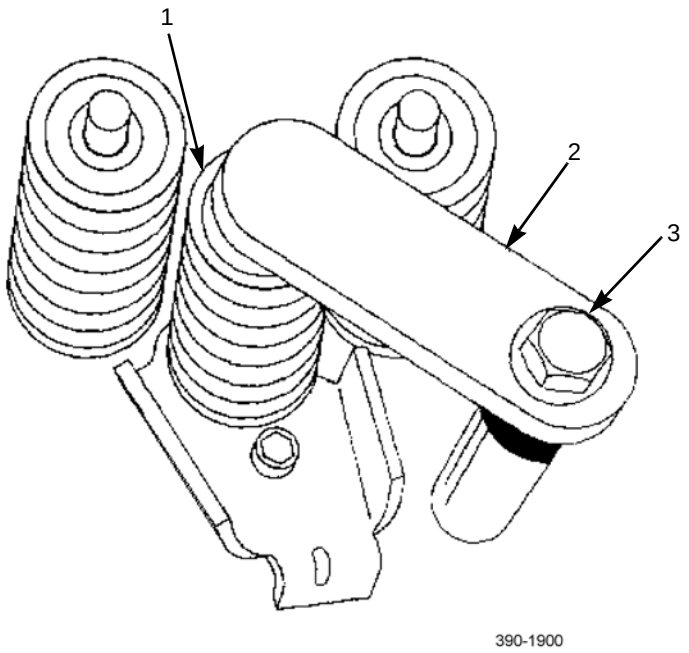
CAUTION

Injector spring must be slightly compressed to allow free movement of injector rack. A spring compressor must be installed on all injectors to prevent internal damage to injectors.

NOTE

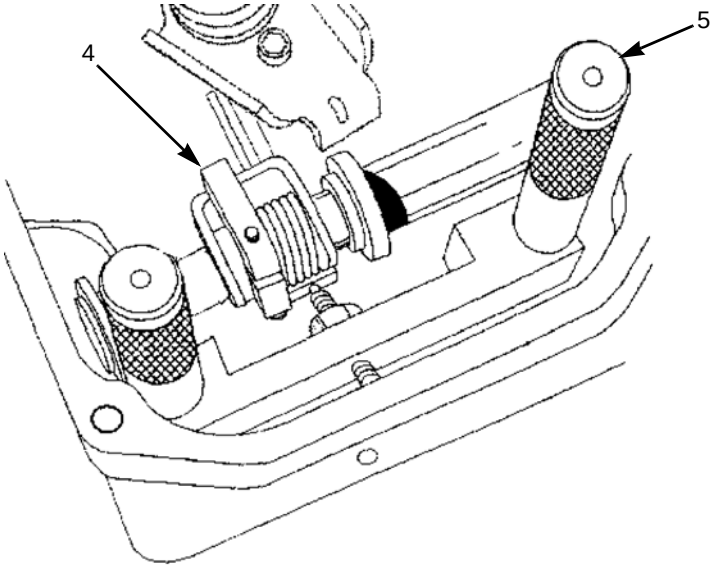
Spring compressor is shown installed on no. 1 injector.

1. Apply a small amount of clean engine oil to top of injector (1) and install spring compressor (2) and bolt (3) into vacated rocker arm bolt hole.



INJECTOR SYNCHRONIZATION - CONTINUED

2. Install injector synchronization fixture group (4) at no. 1 injector (1) by threading two pins (5) of fixture group into vacated rocker arm bolt holes. Tighten pins finger tight.

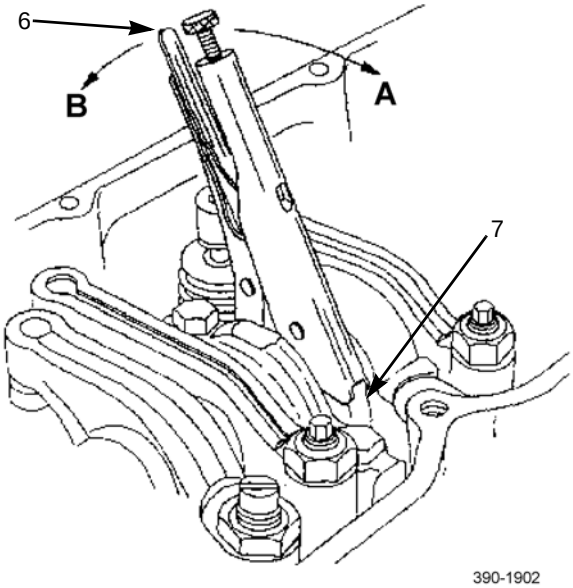


390-1901

NOTE

- Slight marring of control rod by locking pliers is acceptable.
- Do not clamp locking pliers right next to control rod bearing supports.
- Ensure ends of locking pliers do not contact cylinder head bolt under control rod. Locking pliers and control rod must actuate freely and smoothly throughout rack travel range.

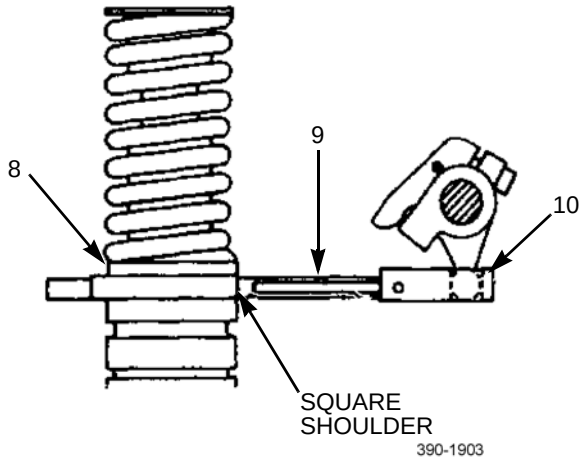
3. Attach locking pliers (6) firmly to control rod (7). Pliers should be attached at an approximate 45 degree angle.



390-1902

INJECTOR SYNCHRONIZATION - CONTINUED

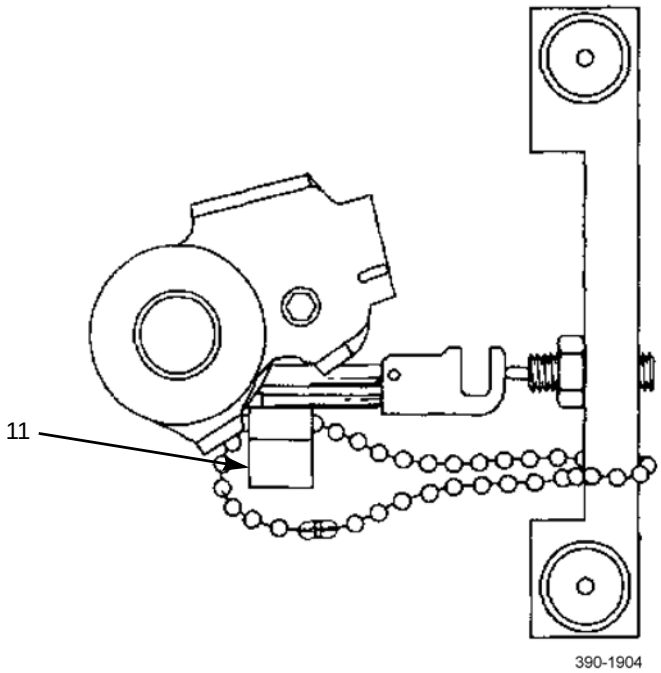
4. Ensure square shoulder on injector body (8), injector rack stop pin (9), and rack head (10) are clean.



NOTE

Synchronization gage block should always be attached with chain to injector synchronization fixture group. This will prevent gage block from being accidentally left inside engine at end of procedure.

5. Install synchronization gage block (11).

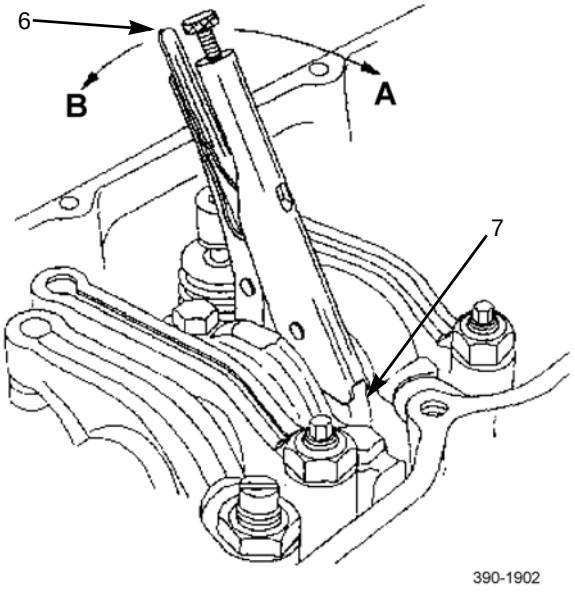


INJECTOR SYNCHRONIZATION - CONTINUED

NOTE

Rotating control rod in “A” direction is FUEL OFF, while rotating control rod in “B” direction is FUEL ON.

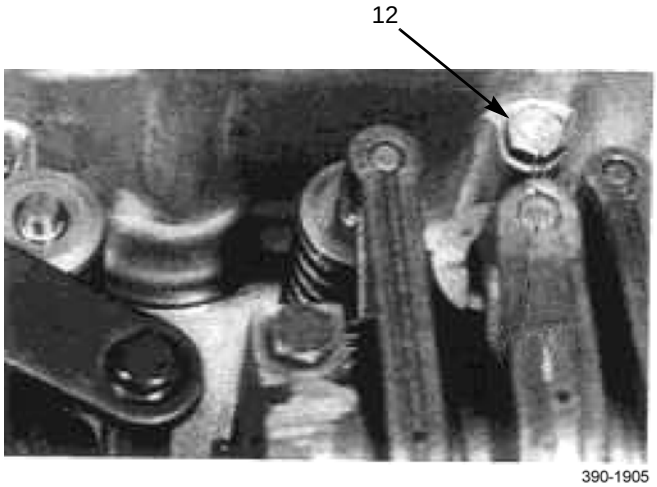
6. Using locking pliers (6), rotate control rod (7) in “B” direction (rack head will pull away from injector).



7. Position gage block (11) with 0.138 in. (3.50 mm) wide finger between injector rack head stop pin (9) and square shoulder on injector body (8).

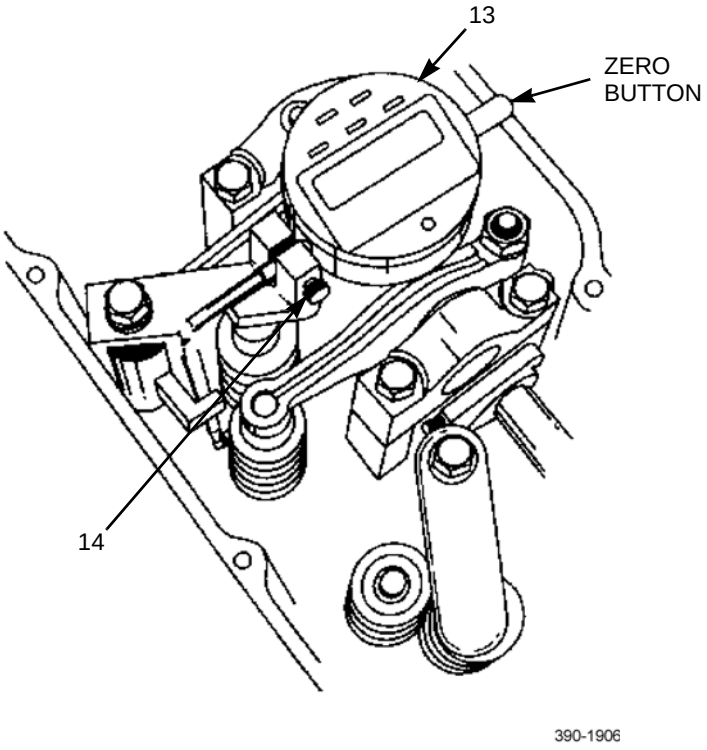
8. Release locking pliers (6) to allow control rod (7) to rotate to “A” direction allowing gage block (11) to be held tightly and squarely against injector body (8).

9. Remove bolt (12) nearest injector to be checked.



INJECTOR SYNCHRONIZATION - CONTINUED

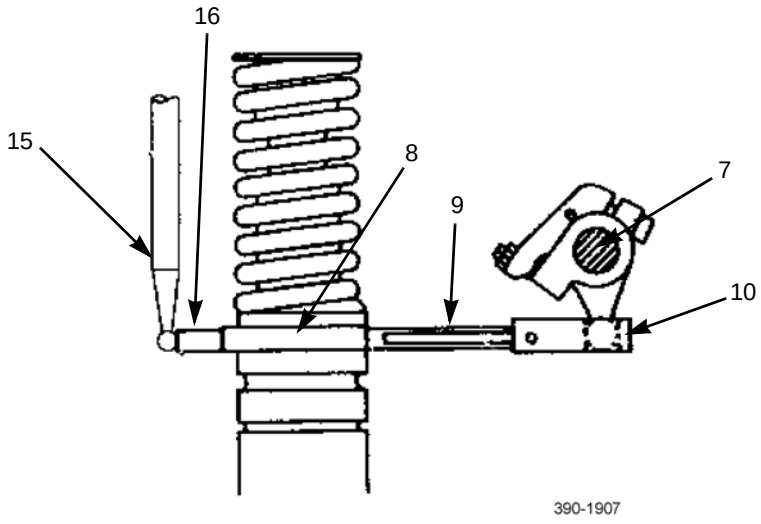
10. Install assembled indicator fixture group (13) at vacated bolt hole.



NOTE

Ensure end face of rack bar is clean.

11. Center indicator stem (15) on end face of rack bar (16) and tighten indicator fixture group bolt (14).



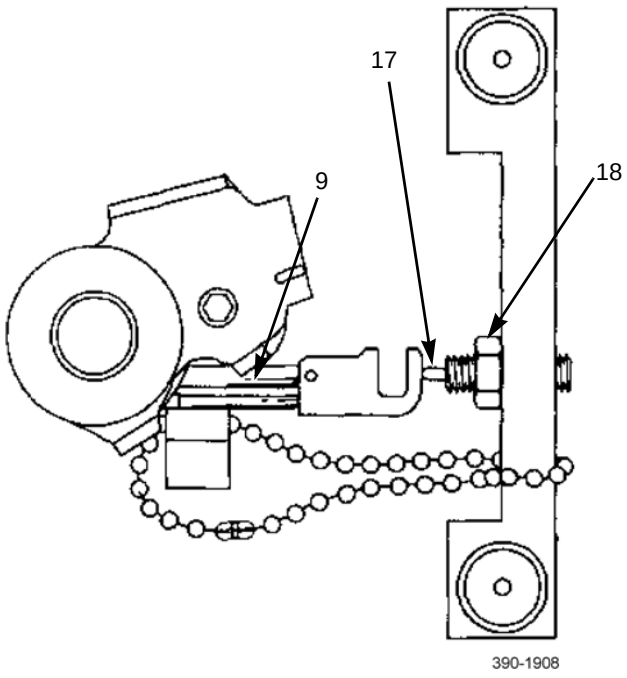
12. Turn indicator ON and set indicator units to MM.

INJECTOR SYNCHRONIZATION - CONTINUED

NOTE

- Push indicator plunger in and out to ensure travel direction is correct. Indicator should indicate positive (+) when plunger moves out.
- Ensure indicator has adequate travel in both directions. Reposition indicator to allow for travel in both directions, if required.

13. Adjust spring plunger for correct travel:
    a. Rotate control rod (7) in “B” direction until linkage hits stop.
    b. Rack head (10) of injector body (8) should now have fully compressed spring plunger (17).
    c. Press ZERO button on indicator (13).
    d. Allow control rod (7) to rotate back in “A” direction until injector rack head stop pin (9) is against sync gage block (11).
    e. Indicator should indicate between 1.25 and 2.25 mm. If indication is not between 1.25 and 2.25 mm, loosen lock-nut (18) on spring plunger (17) and reposition plunger until between 1.25 and 2.25 mm is indicated.



INJECTOR SYNCHRONIZATION - CONTINUED

CAUTION

Contact between injector rack head stop pin and shoulder on injector body is a solid stop. DO NOT use excessive force once contact is made. Excessive force will cause damage to control rod.

14. Rotate control rod (7) in “A” direction until injector rack head stop pin (9) contacts shoulder on injector body (8).
15. Maintain position of control rod (7) and press ZERO SET button on indicator. This is zero-rack (FUEL OFF) position.
16. Allow linkage to spring back and then rotate control rod (7) to “A” position and observe zero position on indicator.
17. Repeat steps 14 through 16 several times until a consistent zero indication is observed.
18. Rotate control rod (7) in “B” direction. Release control rod and observe indicator (13) for an indication between 3.48 to 3.52 mm. Repeat this step several times to confirm consistent indication.
19. If indication is between 3.48 to 3.52 mm, go to step 22. If indication is not between 3.48 to 3.52 mm, go to step 20.

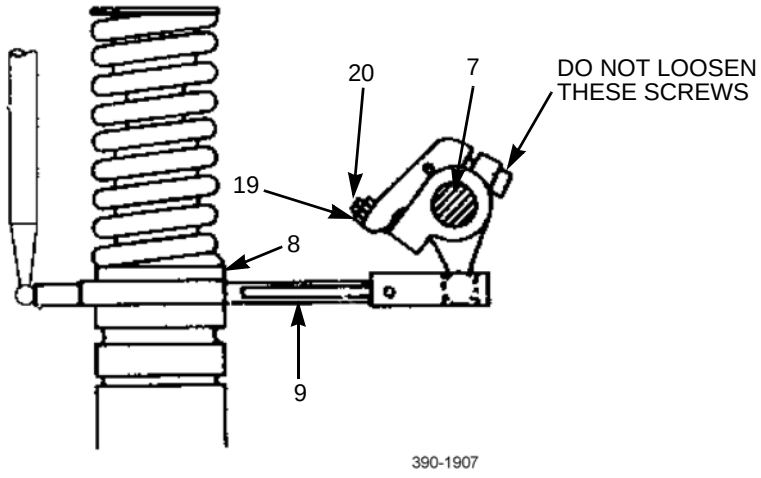
CAUTION

DO NOT loosen screws holding clamps on control rod. Loosening clamps will cause poor engine performance and may damage engine. Clamps are factory preset onto shaft.

NOTE

Turn setscrew clockwise to increase indication or counterclockwise to decrease indication.

20. Loosen locknut (19) and turn setscrew (20) clockwise or counterclockwise until an indication between 3.48 and 3.52 mm is observed on indicator (13). Hold setscrew (20) and tighten locknut (19).
21. Rotate control rod (7) in “B” direction and release. Observe indicator for an indication between 3.48 and 3.52 mm. If indication is not between 3.48 and 3.52 mm, readjust setscrew (20).



22. If injector is synchronized, remove indicator fixture group (13) and install and tighten bolt (12) to 18 lb-ft (25 Nm).
23. Synchronize remaining injectors as required. When synchronization procedure is complete, remove synchronization fixture, sync gage block, locking pliers and spring compressors.

FUEL SETTING

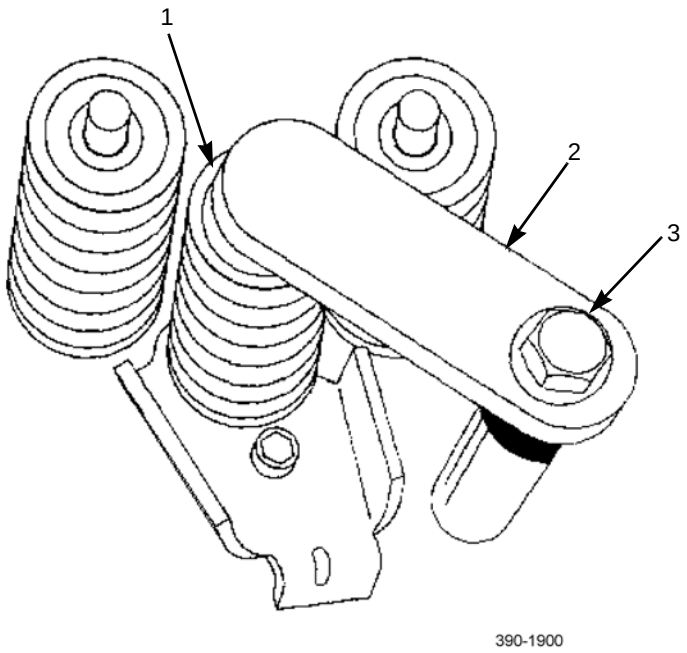
CAUTION

Injector spring must be slightly compressed to allow free movement of injector rack. Either rocker arm assembly or spring compressor must be installed on all injectors to prevent internal damage to injectors.

NOTE

Spring compressor is shown installed on no. 1 injector.

1. Apply a small amount of clean engine oil to top of injector (1) and install spring compressor (2) and bolt (3) into vacated rocker arm bolt hole.



FUEL SETTING - CONTINUED

NOTE

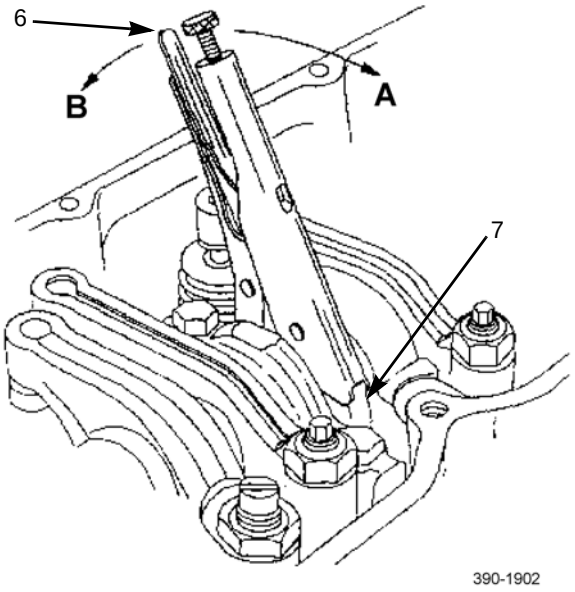
- Slight marring of control rod by locking pliers is acceptable.
- Do not clamp locking pliers right next to control rod bearing supports.
- Ensure ends of locking pliers do not contact cylinder head bolt under control rod. Locking pliers and control rod must actuate freely and smoothly throughout rack travel range.

2. Attach locking pliers (6) firmly to control rod (7). Pliers should be attached at an approximate 45 degree angle.

NOTE

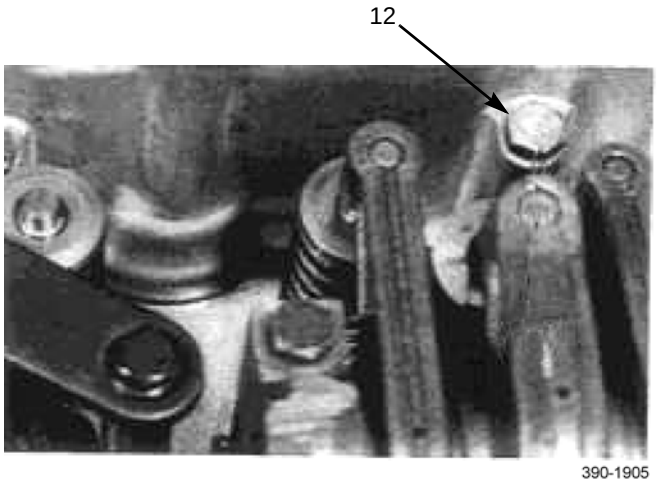
Rotating control rod in “A” direction is FUEL OFF, while rotating control rod in “B” direction is FUEL ON.

3. Rotate control rod (7) until all injector levers are in shut-off position.
4. Using locking pliers (6), rotate control rod (7) in “B” direction (rack head will pull away from injector).

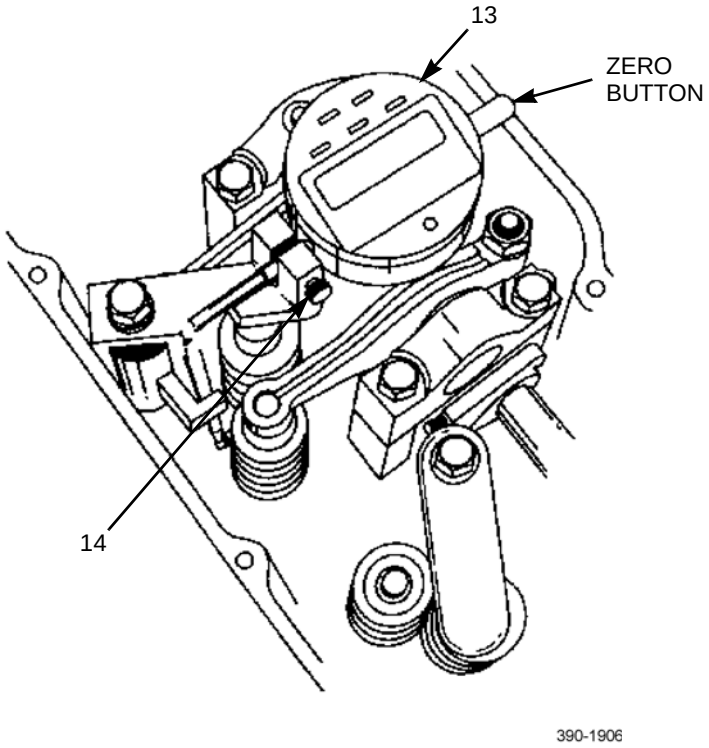


FUEL SETTING - CONTINUED

5. Remove bolt (12) nearest injector to be checked.



6. Install assembled indicator fixture group (13) and tighten indicator fixture group bolt (14) in vacated bolt hole.



FUEL SETTING - CONTINUED

NOTE

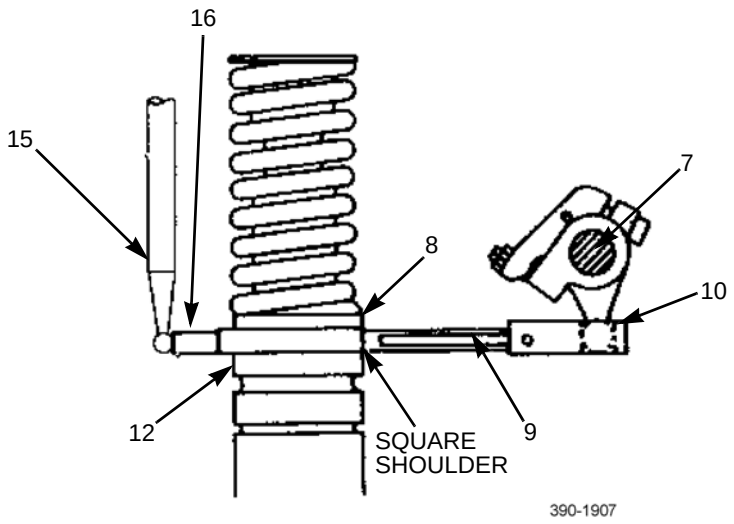
Ensure end face of rack bar is clean.

7. Position indicator group so that indicator stem (15) is on end face of rack bar (16) of no. 1 injector. Lever must contact end face of rack bar.
8. Turn indicator ON and set indicator units to MM.

NOTE

- Push indicator plunger in and out to ensure travel direction is correct. Indicator should indicate positive when plunger moves out.
- Ensure indicator has adequate travel in both directions. Reposition indicator to allow for travel in both directions, if required.

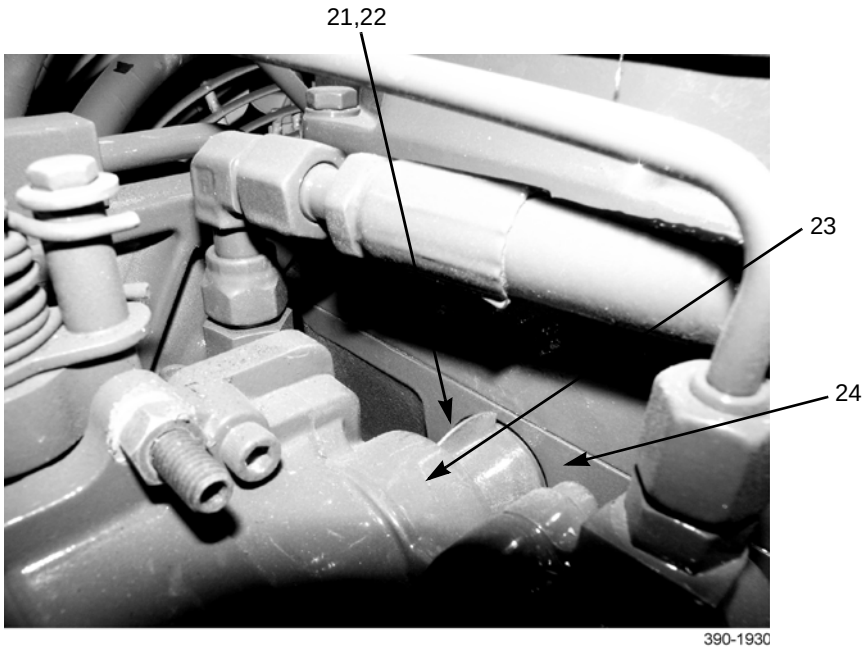
9. Firmly push rack head (10) of no. 1 injector until injector rack head stop pin (9) touches square shoulder of injector body (8) and hold in this position. No. 1 injector is now at FUEL OFF.



10. Press ZERO SET button on indicator to define zero rack at this position.
11. Release control rod (7) then push it back into zero rack. Repeat this several times to ensure consistent zero point has been established.

FUEL SETTING - CONTINUED

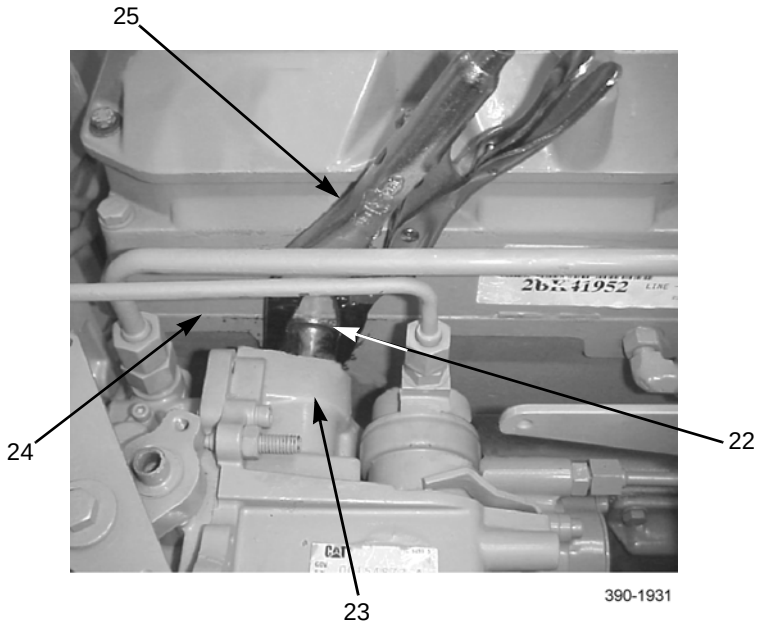
12. Remove clip (21) from sleeve (22) between governor (23) and cylinder head (24).



CAUTION

Do not use hard jaw pliers to move sleeve. Damage to sleeve will result in damage to wiper seal in cylinder head.

13. Using governor connection pliers (25), slide sleeve (22) away from governor (23) and toward cylinder head (24).

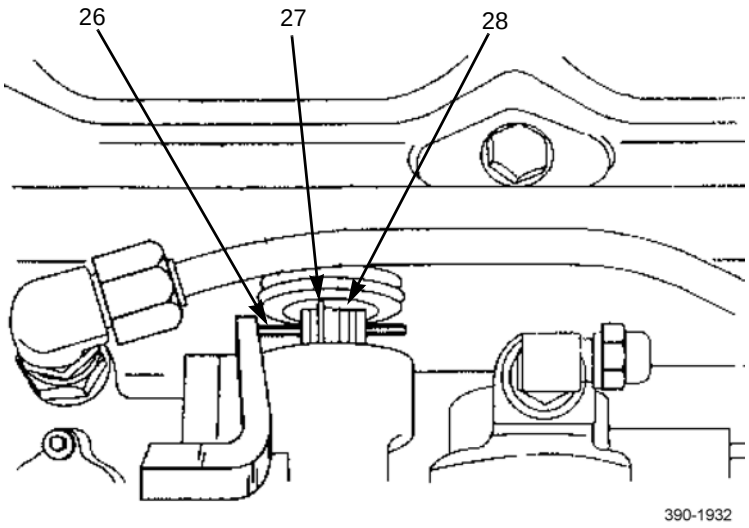


FUEL SETTING - CONTINUED

NOTE

When properly installed, equal lengths of small diameter of pin will extend from both ends of link pin.

14. Install fuel setting pin (26) into link pin (27) on governor output shaft (28).

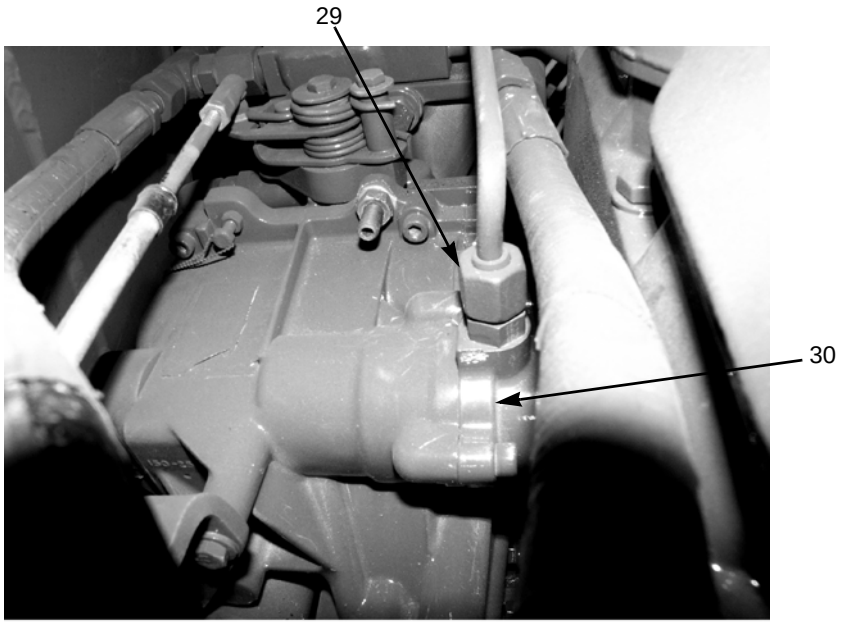


FUEL SETTING - CONTINUED

NOTE

If holding tool is installed too tight, governor can be deflected away from engine, making fuel setting adjustments inaccurate.

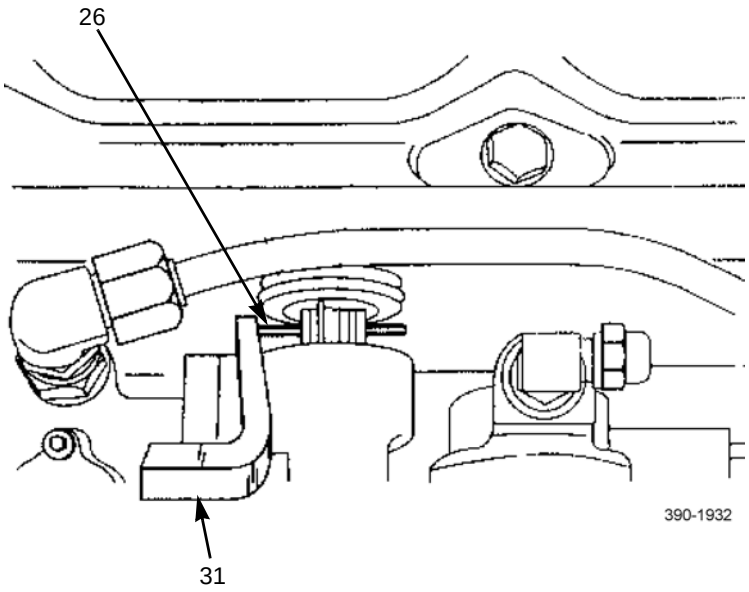
15. If small diameter of fuel setting pin (26) does not contact governor calibration face, perform the following:
    a. Disconnect air line (29) from governor fuel ratio control (30).
    b. Connect a regulated air supply to fuel ratio control (30).
    c. Apply 15 psi (195 kPa) to fuel ratio control (30).
    d. After fuel setting check is completed, remove air supply and connect air line (29).



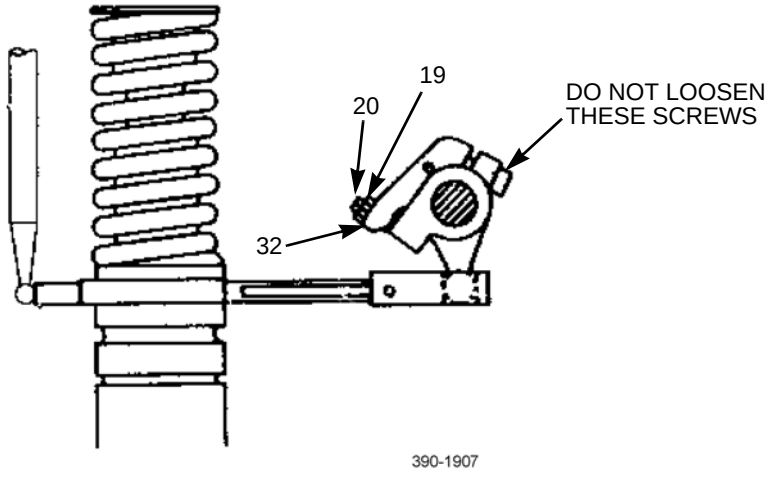
390-1933

FUEL SETTING - CONTINUED

16. Install holding tool (31) to hold fuel setting pin (26) tightly against governor housing face.



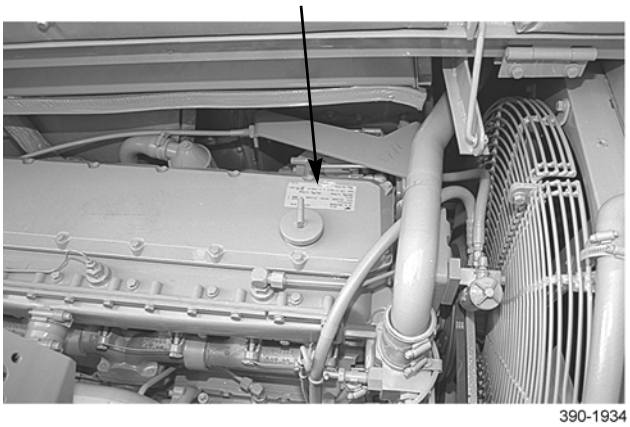
17. Push down and quickly release (flip) rack lever (32). Flip rack lever several times to ensure smooth movement of injector rack.



FUEL SETTING - CONTINUED

NOTE

Refer to engine information plate, located at upper-right hand corner of valve cover, for correct fuel setting.

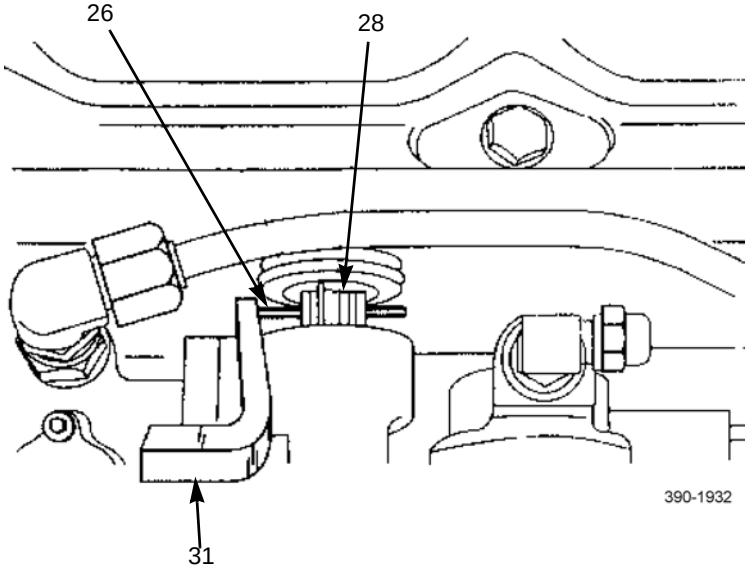


18. If indication on indicator is within 0.25 mm of specified fuel setting, go to step 23. If indication on indicator is not within 0.25 mm of specified fuel setting, go to step 19.
19. Using adjustment wrench, loosen locknut (19) on fuel setting screw (20).
20. Adjust fuel setting screw (20) until indication matches correct fuel setting. Turn screw counterclockwise for more fuel (greater fuel setting) or clockwise for less fuel (lower fuel setting).

CAUTION

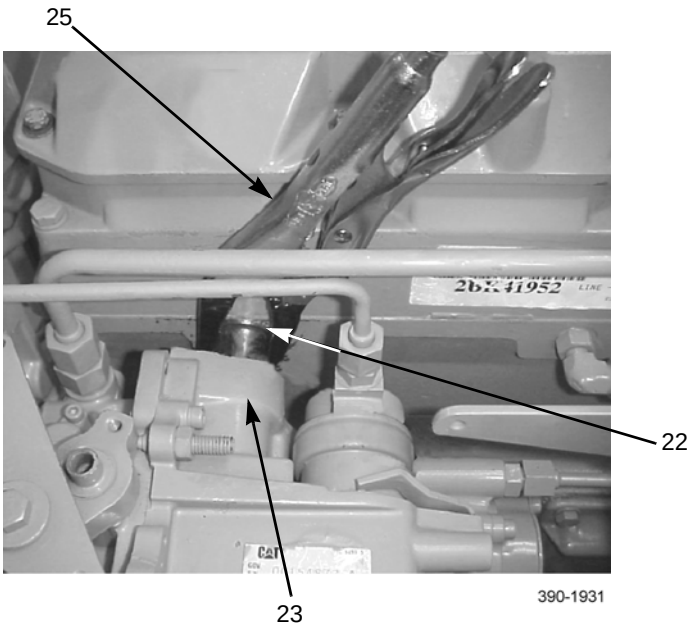
DO NOT loosen screws holding clamps on control rod. Loosening clamps will cause poor engine performance and may damage engine. Clamps are factory preset onto rod.

21. Hold fuel setting pin (26) in place and tighten locknut (19).
22. Recheck fuel setting by “flipping” rack lever (32). Check indication again. If fuel setting is not correct, repeat steps 19 through 21 above until correct setting is obtained.
23. Remove holding tool (31) and fuel setting pin (26) from governor (23).

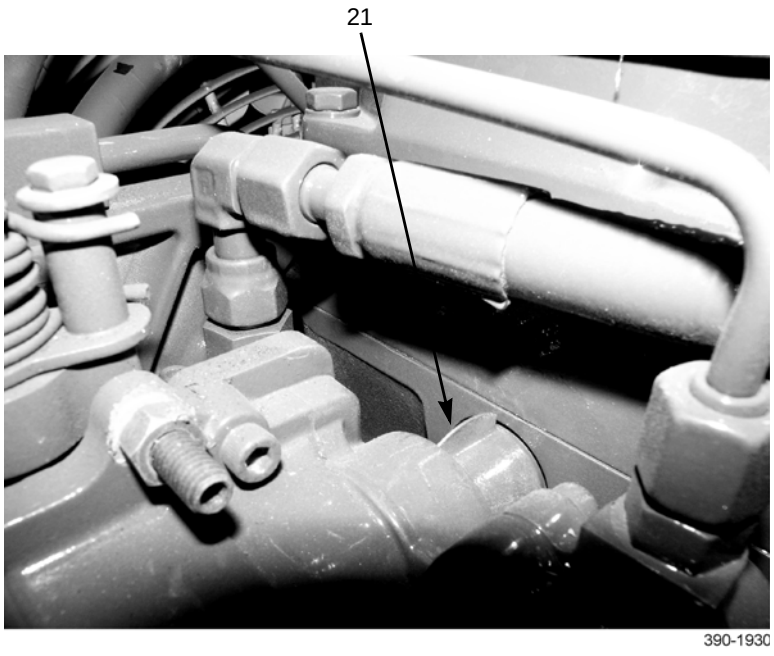


FUEL SETTING - CONTINUED

24. Using connector pliers (25), move sleeve (22) back into governor (23).

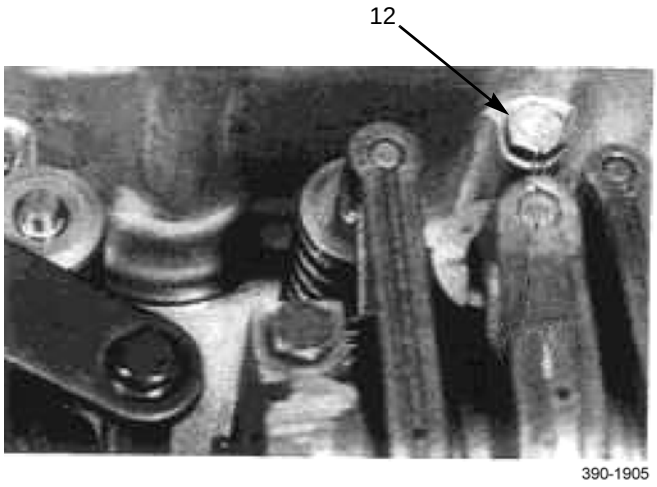


25. Install clip (21).

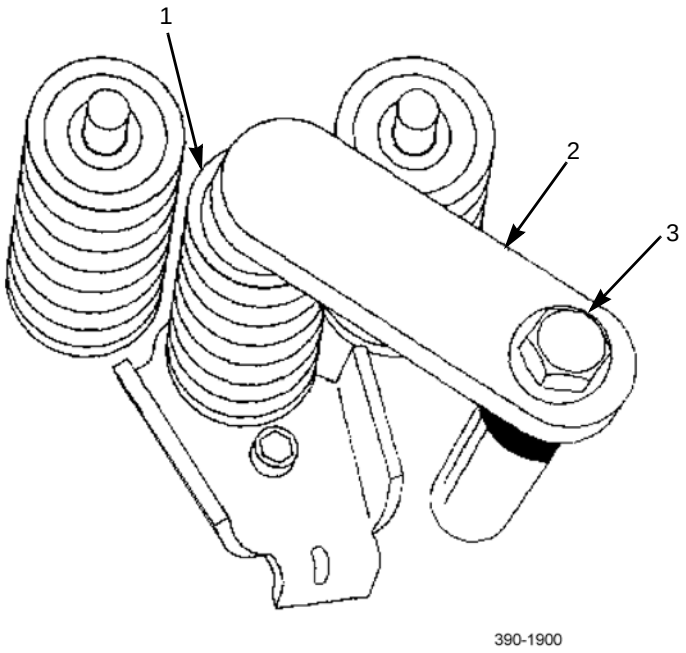


FUEL SETTING - CONTINUED

26. Remove indicator group.
27. Install bolt (12) in intake manifold. Tighten bolt to 18 lb-ft (25 Nm).



28. Remove spring compressor (2) and bolt (3).

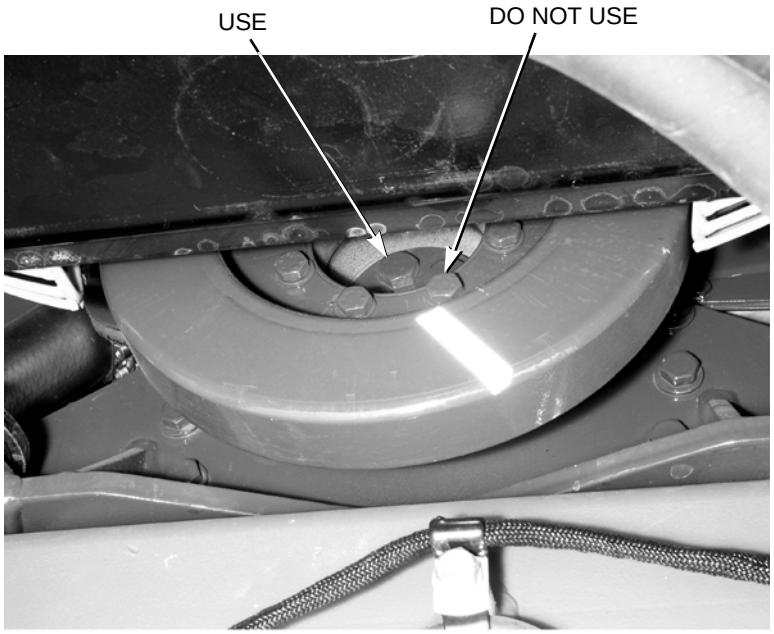


29. Install rocker arm assemblies (WP 0133 00).
30. Install fuel shutoff solenoid (WP 0017 00).

SETTING TOP CENTER POSITION (TCP)

CAUTION

Always rotate engine crankshaft using four large bolts inside of crankshaft pulley. DO NOT use eight smaller bolts on front of crankshaft pulley to rotate crankshaft.



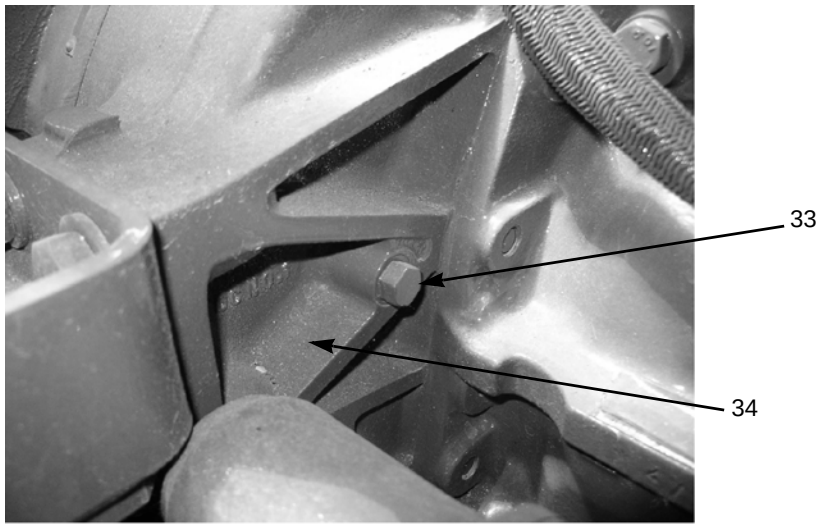
390-1936

1. Place no. 1 piston at top center position as follows:

NOTE

- If no. 1 piston is on compression stroke, injectors 3, 5, and 6 can be set.
- If no. 1 piston is on exhaust stroke, injectors 1, 2, and 4 can be set.

a. Remove timing hole plug (33) located on front side of flywheel housing (34) just above starter.



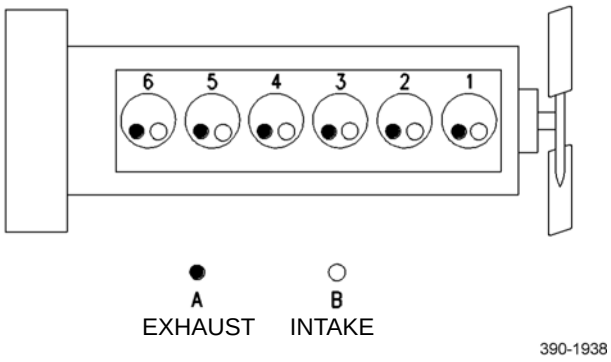
390-1937

SETTING TOP CENTER POSITION (TCP) - CONTINUED

NOTE

- Turn engine in direction of normal engine rotation (to the right, looking from flywheel end). Turn until timing bolt engages threaded hole in flywheel.
- If flywheel is turned beyond point of engagement, flywheel must be turned in direction opposite normal engine rotation. Turn flywheel approximately 30 degrees, then turn flywheel in direction of normal engine rotation until timing bolt engages with threaded hole.

b. Install timing bolt through timing hole in flywheel housing (34) and into flywheel.



NOTE

Inlet valves and exhaust valve for no. 1 cylinder are fully closed when no.1 piston is on compression stroke or rocker arms can be moved by hand. If rocker arms cannot be moved, and valves are slightly open, no. 1 piston is on exhaust stroke.

c. Identify cylinders that require checking/adjusting for stroke position of crankshaft.

d. When intended stroke position is identified and other stroke position is required, remove timing bolt and rotate flywheel 360° in direction of normal engine rotation.

e. Repeat step c above.

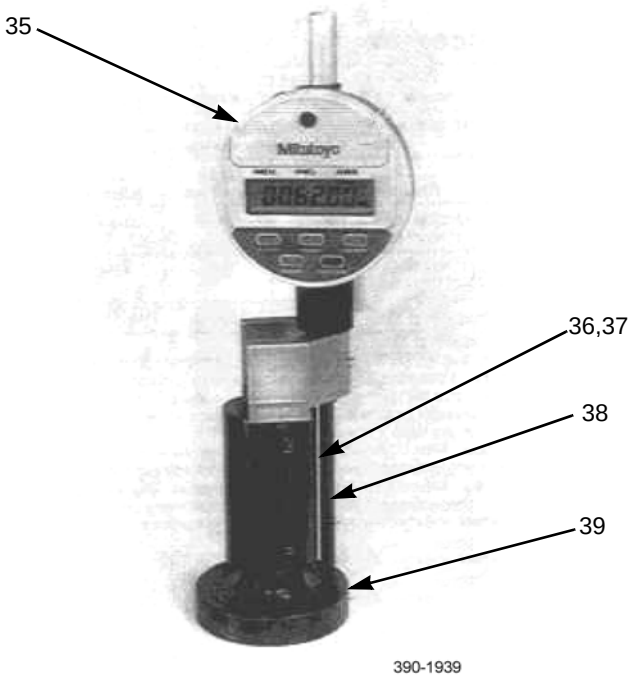
f. Once checks/adjustments are complete, remove timing bolt and install timing hole plug (1) on housing (2).

FUEL TIMING

NOTE

If rocker arm assemblies are removed and installed prior to performing this procedure, rotate crankshaft two complete revolutions to allow rocker arms to properly seat on injectors before performing this procedure.

1. Position no. 1 piston at TCP.
2. Calibrate digital position indicator as follows:
   a. Turn indicator (35) ON.
   b. Press IN/MM button until display indicates millimeters.
   c. A negative sign (-) should be indicated under REV. If space if blank, press "+" button until display indicates (-).
   d. Press and hold PRESET button until a flashing "P" appears in upper right corner of display. Release button.
   e. Press and hold PRESET button until "P" stops flashing, and a flashing indicator bar is observed in lower left corner of display. Release button. Momentarily pushing PRESET button will cause a minus sign to appear or disappear above the flashing indicator. Use PRESET button to make this position blank.
   f. Press and hold PRESET button until flashing indicator begins to flash under first number position (fourth position to left of decimal), then release button. Momentarily pressing PRESET button will cause display number in that position to change. Use PRESET button to make position indicate zero.



   g. Press PRESET button to move flashing indicator and change display numbers until display indicates 0062.00 mm.
   h. Press and hold PRESET button until flashing "P" appears in upper-right corner of display and then release button. Momentarily press PRESET button so flashing "P" and zeros to left of 62.00 mm disappear.
   i. To recall preset number, repeat steps a through d above, then momentarily press PRESET button so flashing "P" and zeros to left of 62.00 mm disappear.
   j. Turn indicator (35) OFF. Indicator will retain preset number in memory. Ensure indicator plunger is extended out all the way. To recall preset number, repeat steps a through d above, then momentarily push PRESET button so flashing "P" and zeros to left of 62.00 mm disappear.
3. Install 85 mm long contact point (36) on indicator stem (37).

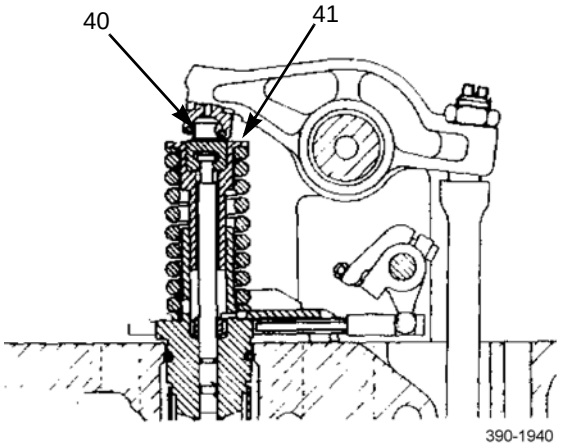
FUEL TIMING - CONTINUED

4. Slide indicator (35) in magnetic base group (38) until it stops.
5. Ensure that magnetic bottom of indicator fixture group is clean of all particles sticking to magnet.
6. Ensure both top and shoulder of timing gage block (39) are clean.
7. Install indicator (35) and base on timing gage block (39).

CAUTION

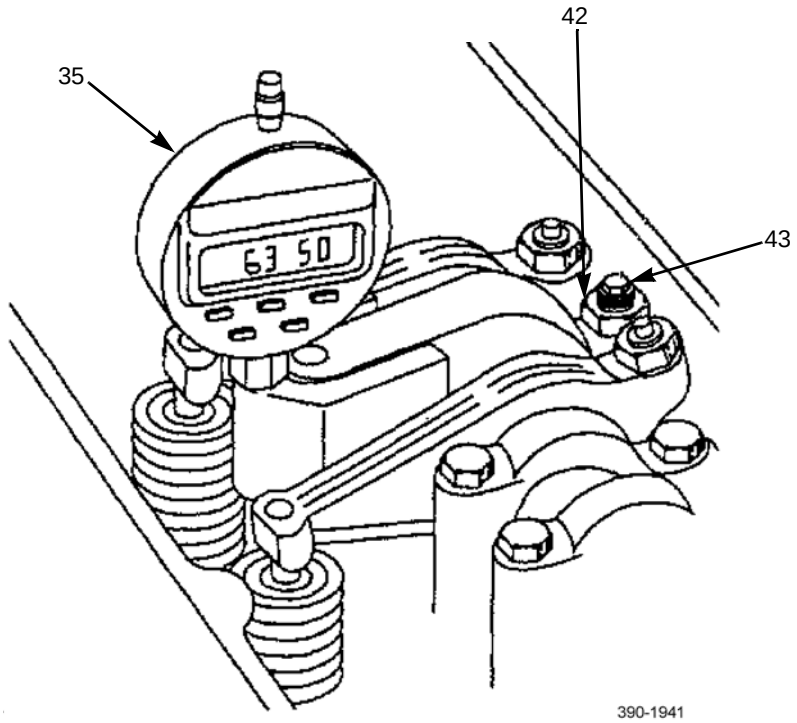
Be careful when attaching magnetic base group to any surface when indicator is attached to base. Magnets in base are very powerful. To reduce possibility of damaging indicator as base “snaps” in place, push indicator plunger to its fully retracted position and hold it. Once base attaches to a surface, let plunger out.

8. Repeat steps 2a through 2c above.
9. Momentarily press PRESET button. Display should now indicate 62.00 mm. Lift up on indicator tip slightly. Displayed numbers should decrease. If this is not the case, repeat steps 2 through 6 above.
10. Ensure top surfaces of injector tappet (40) and shoulder are clean and dry.



FUEL TIMING - CONTINUED

11. Remove indicator (35) and magnetic base from gage block (39) and carefully position it on top of tappet (40) for injector (41) to be checked.



12. Carefully position indicator contact point on shoulder of injector (41). Ensure indicator plunger moves freely and contact point does not bind on injector spring.

NOTE

Refer to engine information plate, located at upper right-hand corner of valve cover, for correct fuel timing setting. Setting must be within +/- 0.20 mm, as indicated on engine information plate.

13. If indicator displays correct setting or is within +/- 0.20 mm checking tolerance, no adjustment is necessary. Go to step 16.
14. If indicator does not indicate correct timing dimension, loosen locknut (42) for adjusting screw (43).
15. Turn screw (43) until correct fuel timing is displayed on indicator. Tighten locknut (42) to 18 lb-ft (25 Nm) and check adjustments again. If necessary, repeat this procedure until adjustment is correct.
16. Sequence for checking fuel timing dimensions is as follows:
    a. Check and adjust fuel timing dimensions on half of cylinders with timing bolt installed.
    b. Remove timing bolt and indicator group.
    c. Rotate flywheel 360° and install timing bolt.
    d. Install indicator group and check/adjust fuel timing.
17. Remove timing bolt from flywheel and install timing plug.
18. Install front guard plate (WP 0100 00).

END OF WORK PACKAGE

FUEL TRANSFER PUMP AND GOVERNOR ASSEMBLY REPLACEMENT 0141 00

THIS WORK PACKAGE COVERS

Removal, Installation, Adjustment

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Tool kit, internal combustion engine (Item 34, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24, 25 or 26, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Gasket

O-ring (2)

Seal

Equipment Condition

Front and middle guard plates removed (WP 0100 00)

Engine access door opened (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fuel. Fuel may ignite causing damage to machine and injury or death to personnel.

CAUTION

Cap hoses to prevent fluid loss and contamination of fuel system. Keep all parts clean from contamination. Contamination may cause rapid wear and shortened component life.

NOTE

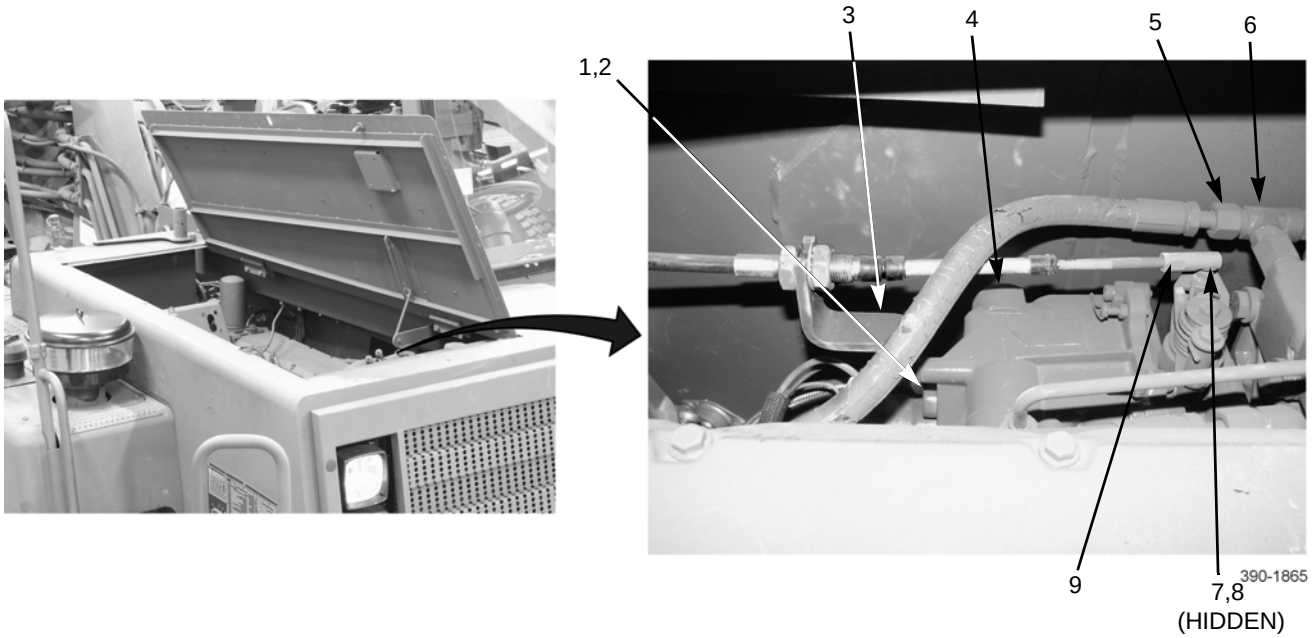
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses to aid in installation.

REMOVAL

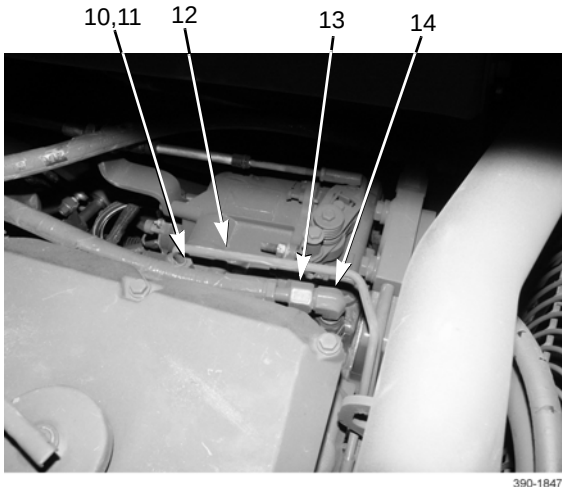
CAUTION

Use line wrenches to disconnect fuel lines, to avoid damage to fittings.

1. Remove two bolts (1), washers (2), and bracket (3) from fuel transfer pump/governor (4).
2. Disconnect hose (5) from tee (6).
3. Remove nut (7) and washer (8) from cable ball joint (9).

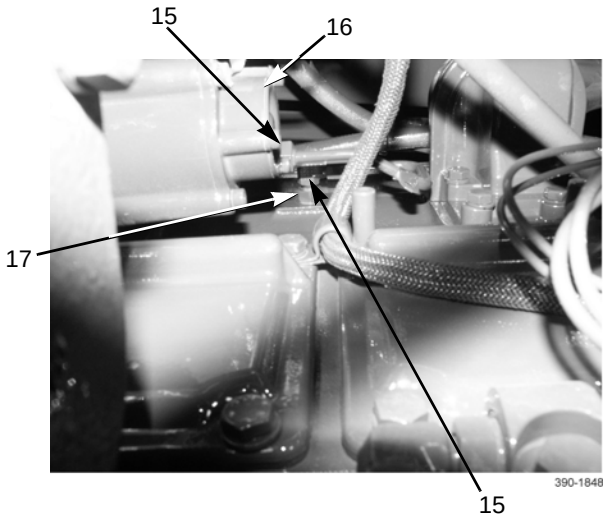


4. Remove nut (10) from adapter (11).
5. Carefully move tube (12) aside.
6. Disconnect hose (13) from elbow (14).

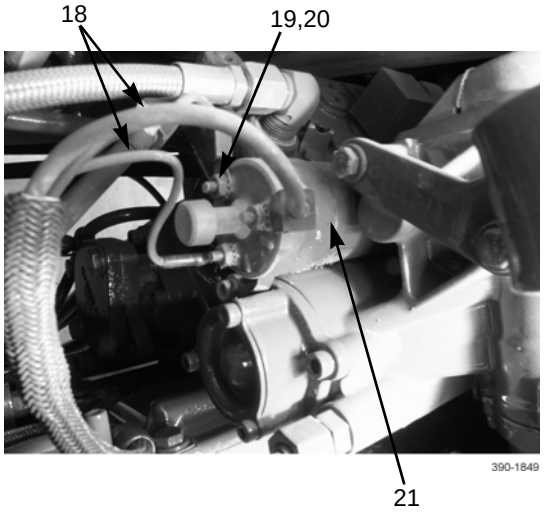


REMOVAL - CONTINUED

7. Remove tube (15) from fuel transfer pump (16) and engine (17) underneath tractor.

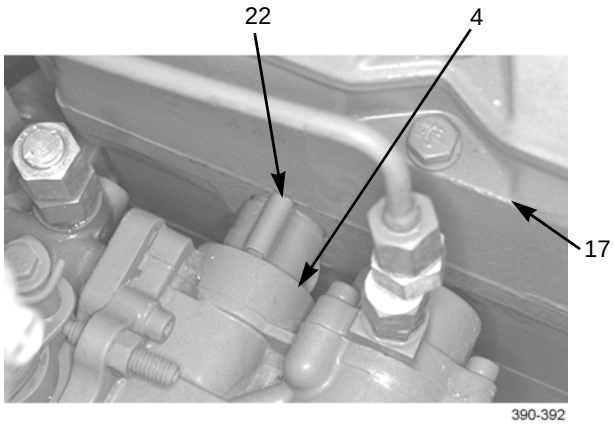


8. Remove three nuts (19), washer, two lockwashers (20), and wires (18) from terminals of fuel shutoff solenoid (21).
9. Using spanner wrench and ratchet wrench, remove fuel shutoff solenoid (21) from fuel transfer pump/ governor (4). Remove seal from fuel shutoff solenoid. Discard seal.



REMOVAL - CONTINUED

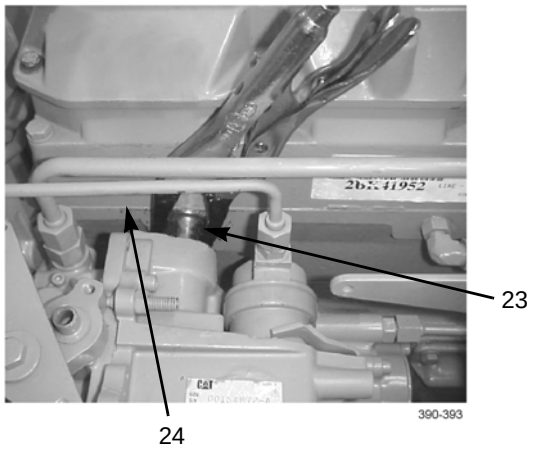
10. Remove clip (22) from between fuel transfer pump/ governor (4) and engine (17).



NOTE

Steps 11 through 15 are shown with engine removed for clarity.

11. Slide connection tube (23) into cylinder head (24).

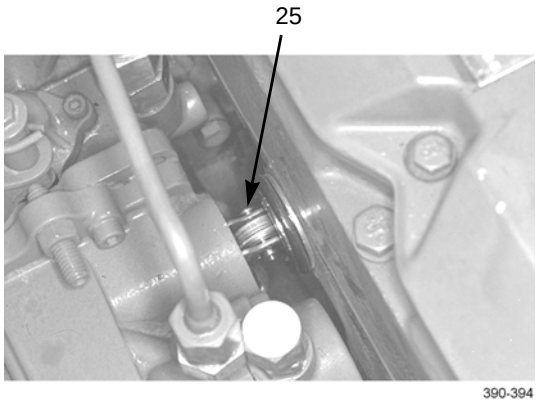


REMOVAL - CONTINUED

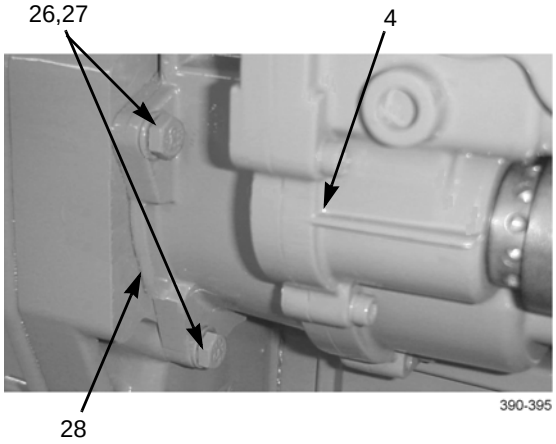
NOTE

Clevis pin must stay with governor in order to be adjusted.

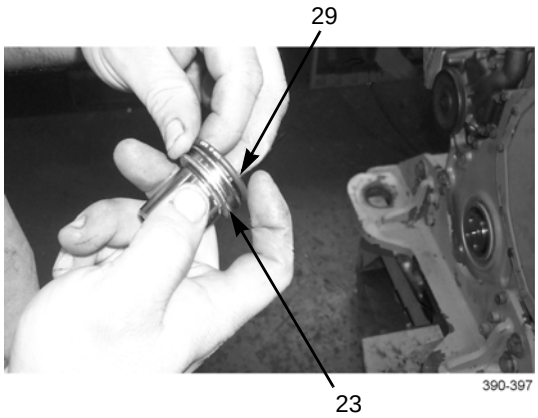
12. Remove clevis pin (25).

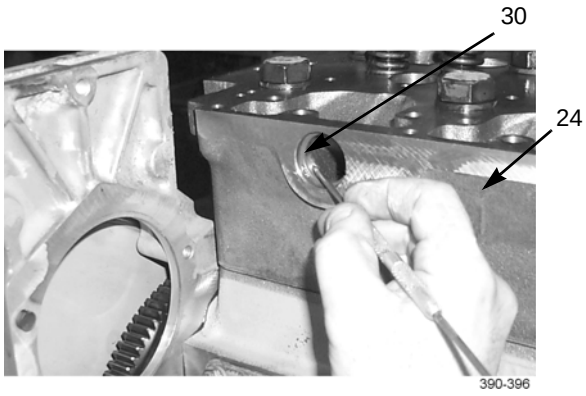


13. Remove three capscrews (26) and washers (27) from fuel transfer pump/governor (4).
14. Carefully remove fuel transfer pump/governor (4) and O-ring (28) from engine. Discard O-ring.



15. Remove connection tube (23) and gasket (30) from cylinder head (24). Remove O-ring (29) from connection tube. Discard gasket and O-ring.





INSTALLATION

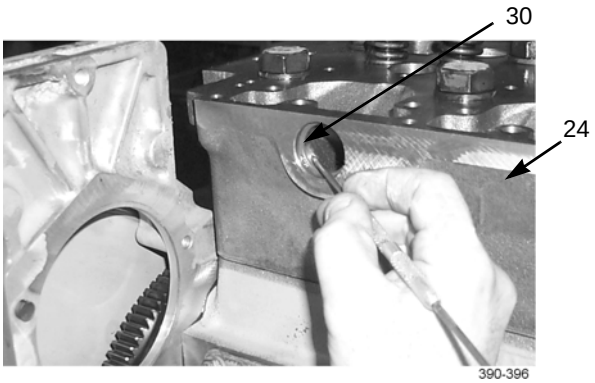
CAUTION

- Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.
- Use line wrenches to connect fuel lines, to avoid damage to fittings.

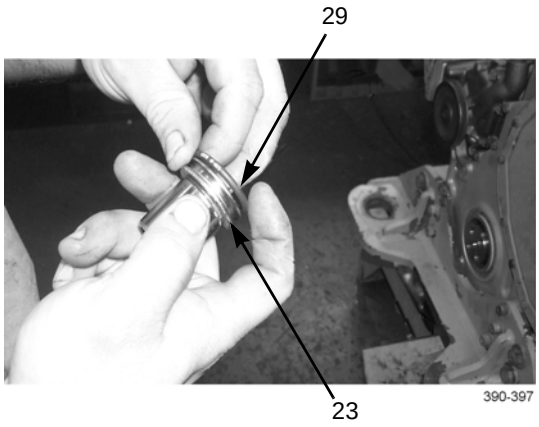
NOTE

Steps 1 through 9 are shown with engine removed for clarity.

1. Apply oil to new gasket (30) and install in cylinder head (24).

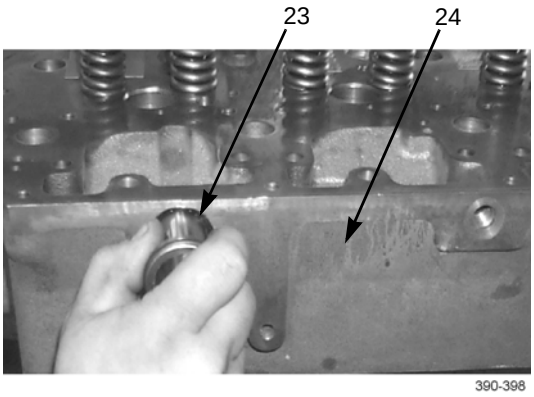


2. Apply oil to new O-ring (29) and install on connection tube (23).

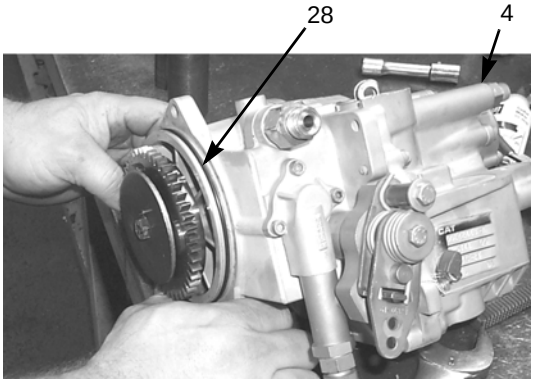


INSTALLATION - CONTINUED

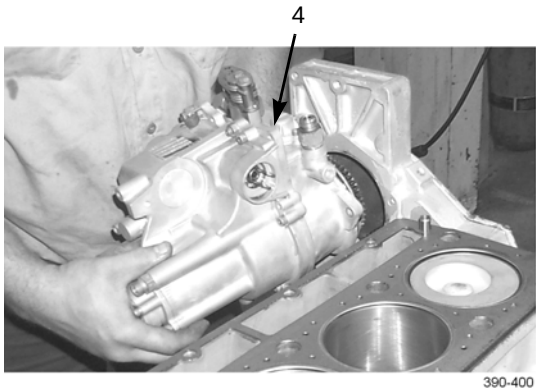
3. Install O-ring (29) and governor connection tube (23) to cylinder head (24).



4. Apply oil to new O-ring (28) and install on fuel transfer pump/governor (4).

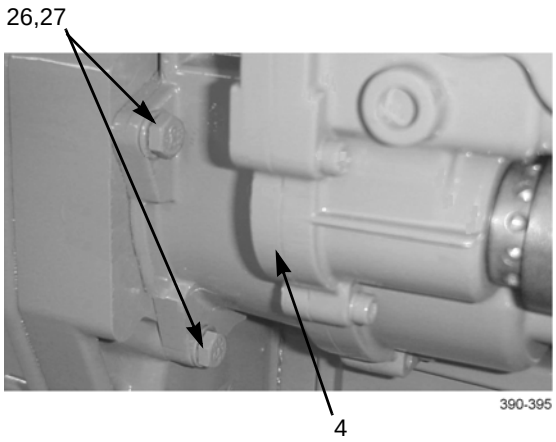


5. Place fuel transfer pump/governor (4) on engine.

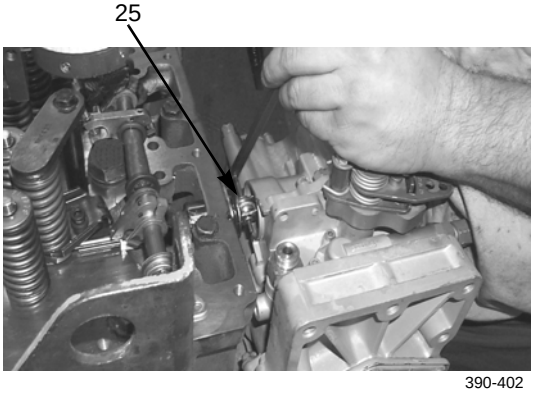


INSTALLATION - CONTINUED

6. Install three capscrews (26) and washers (27) to secure fuel transfer pump/governor (4).



7. Using pin tool, install clevis pin (25) and clip.



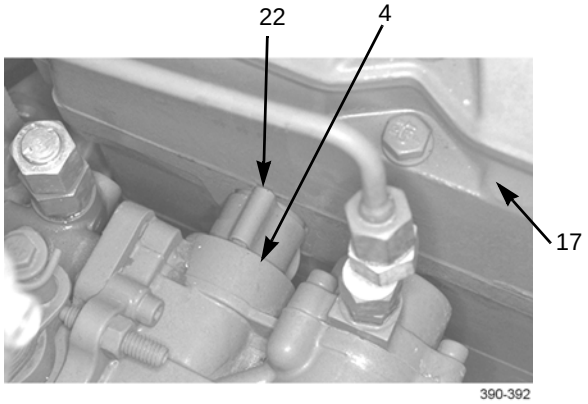
8. Slide connection tube (23) into fuel transfer pump/ governor (4).



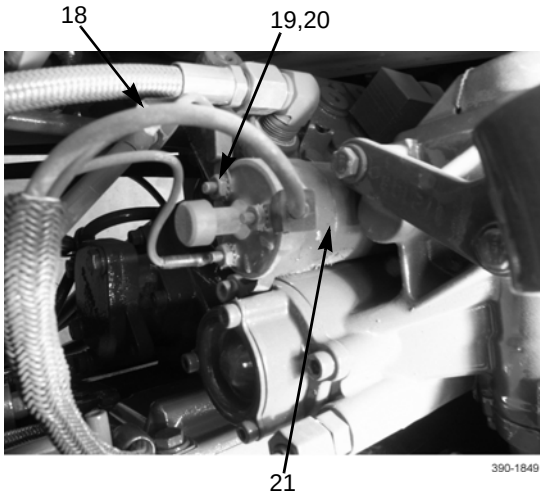
FUEL TRANSFER PUMP AND GOVERNOR ASSEMBLY REPLACEMENT - CONTINUED 0141 00

INSTALLATION - CONTINUED

9. Install clip (22) between fuel transfer pump/governor (4) and engine (17).

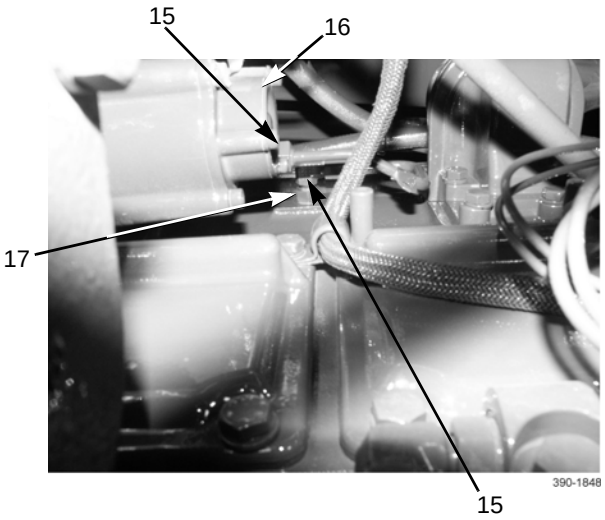


10. Coat new seal with oil and install fuel shutoff solenoid (21) on fuel transfer pump/governor (4).
11. Install three wires (18) on terminals of fuel shufoff solenoid (21) and secure with washer, two lockwashers (20), and three nuts (19).

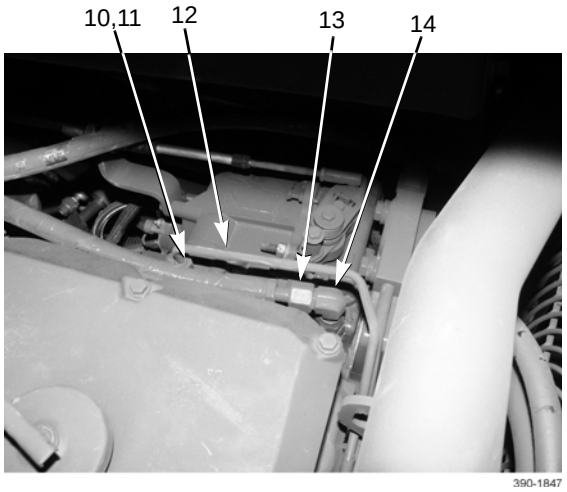


INSTALLATION - CONTINUED

12. Install tube (15) on fuel transfer pump (16) and engine (17) underneath tractor.

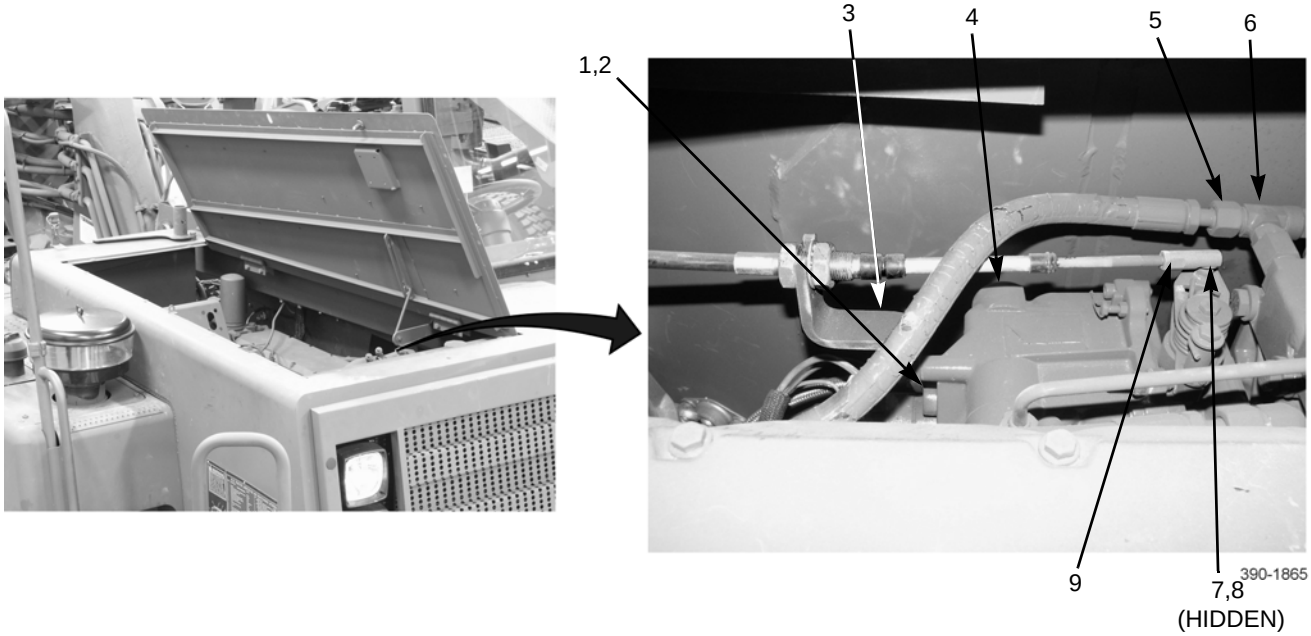


13. Connect hose (13) to elbow (14).
14. Carefully position tube (12) on adapter (11) and tighten nut (10).



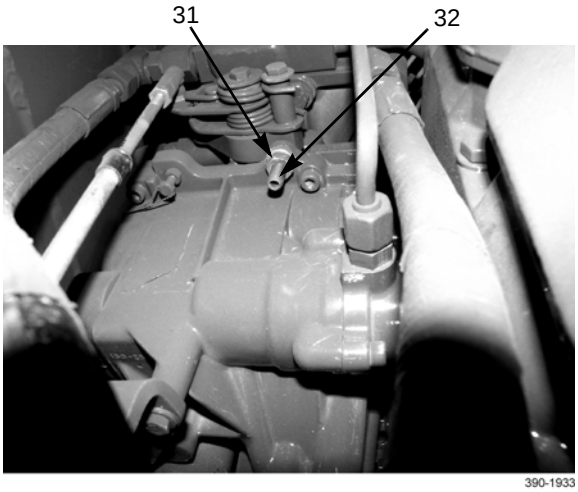
INSTALLATION - CONTINUED

15. Position cable ball joint (9) on lever and secure with nut (7) and washer (8).
16. Connect hose (5) to tee (6).
17. Position bracket (3) on fuel transfer pump/governor (4) and secure with two washers (2) and bolts (1).



ADJUSTMENT

1. Perform fuel setting, fuel timing, and injector synchronization adjustments (WP 0140 00).
2. Start engine (TM 5-3800-302-10-1 or TM 5-3800-205-10-2).
3. With engine at idle speed, loosen locknut (31) and adjust low idle screw (32) until 825 RPM is indicated on instrument panel tachometer.
4. Tighten locknut (31) and recheck low idle setting.
5. Close engine access door (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).



6. Install front and middle guard plates (WP 0100 00).

END OF WORK PACKAGE

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AFTERCOOLER AND AIR INLET HEATER REPLACEMENT 0142 00

THIS WORK PACKAGE COVERS

Removal, Cleaning and Inspection, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Gasket (2)

References

WP 0009 00

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Cooling system drained (WP 0010 00)



WARNING

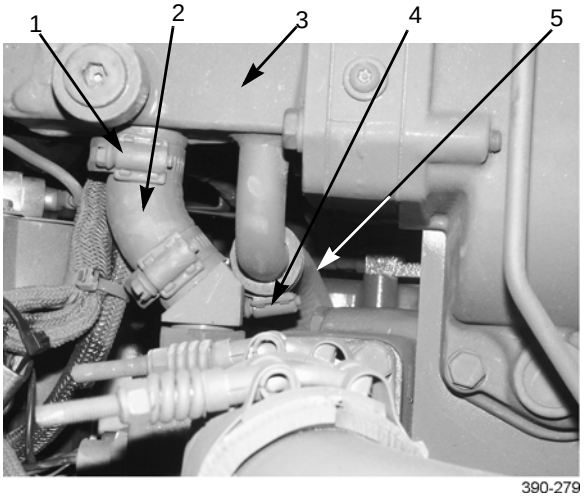
- Personal injury can result from hot coolant and steam.
- At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or engine contain hot coolant or steam. Any contact can cause severe burns.
- Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hands.
- Do not attempt to tighten hose connections when coolant is hot. Hose can come off, causing burns.

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

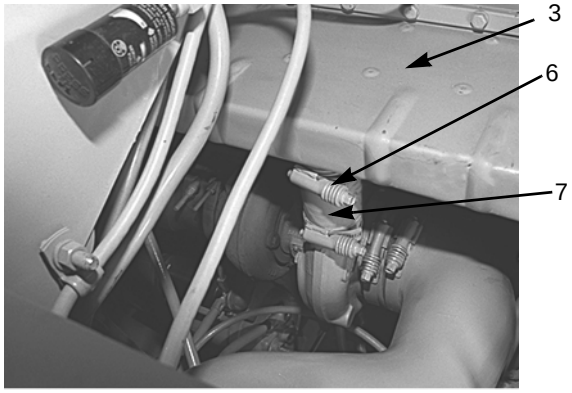
REMOVAL

1. Loosen hose clamp (1) afrom hose (2) and aftercooler (3).
2. Loosen hose clamp (4) from hose (5) and aftercooler (3).



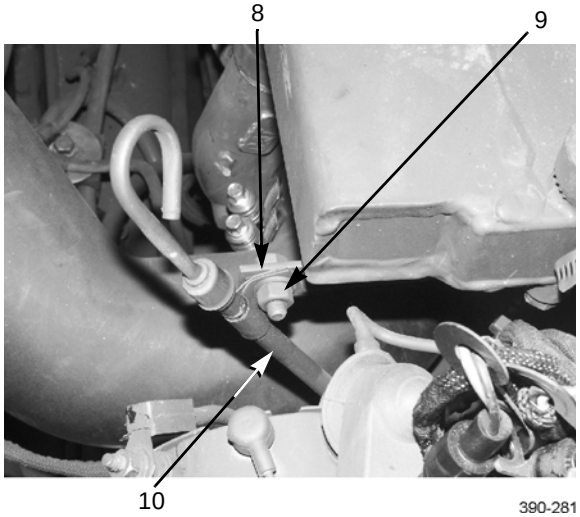
390-279

3. Loosen hose clamp (6) from hose (7) and aftercooler (3).



390-280

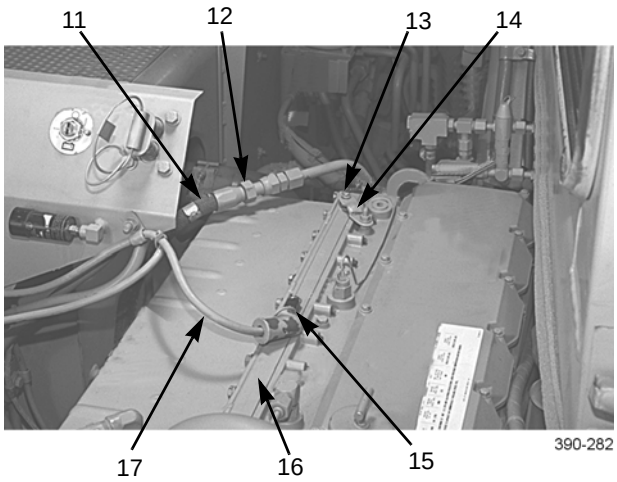
4. Remove nut (9) and dipstick guide tube (10) from bracket (8).



390-281

REMOVAL - CONTINUED

5. Remove nut (15) and disconnect cable assembly (17) from air inlet heater (16). Remove nut (13) and disconnect ground strap (14) from air inlet heater. Loosen nut (12) and disconnect hose (11).





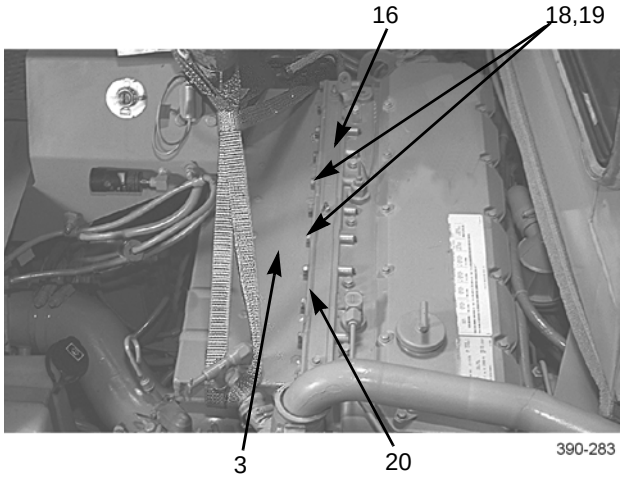
WARNING

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

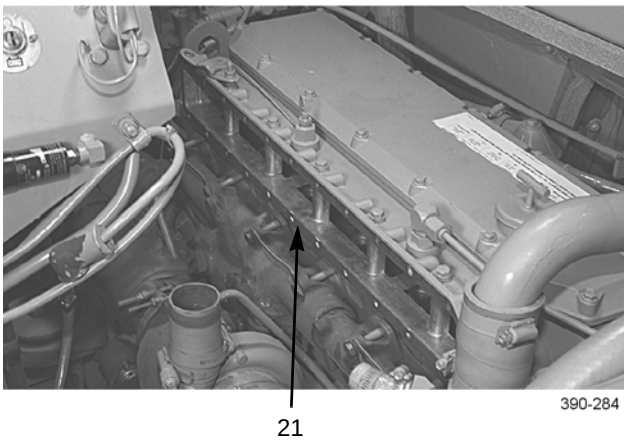
Aftercooler and air inlet heater assembly weigh 35 lb (16 kg).

6. Remove 22 bolts (18) and washers (19) from aftercooler (3), air inlet heater (16), and engine. Using a nylon sling and suitable lifting device and hoist, remove aftercooler and air inlet heater assembly from engine.
7. Separate air inlet heater (16) from aftercooler (3) and remove gasket (20). Discard gasket.



REMOVAL - CONTINUED

8. Remove gasket (21) from engine. Discard gasket.



CLEANING AND INSPECTION

1. Use fresh water to thoroughly flush aftercooler.
2. Inspect for excessive corrosion or other damage that could cause leaks. Replace if damaged.

INSTALLATION

1. Install new gasket (21) on engine.
2. Assemble air inlet heater (16), new gasket (20), and aftercooler (3).



WARNING

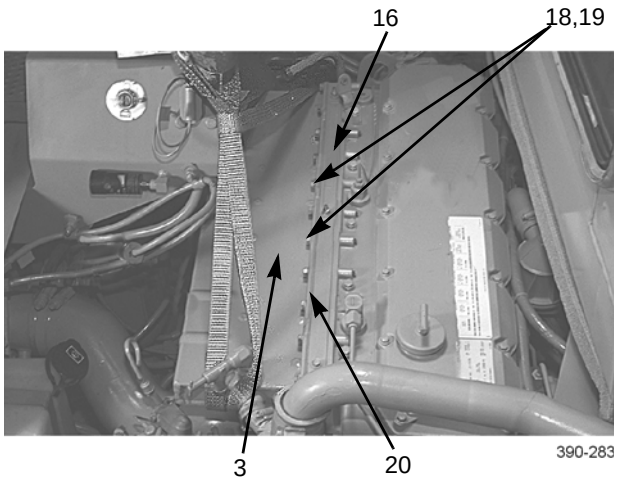
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

NOTE

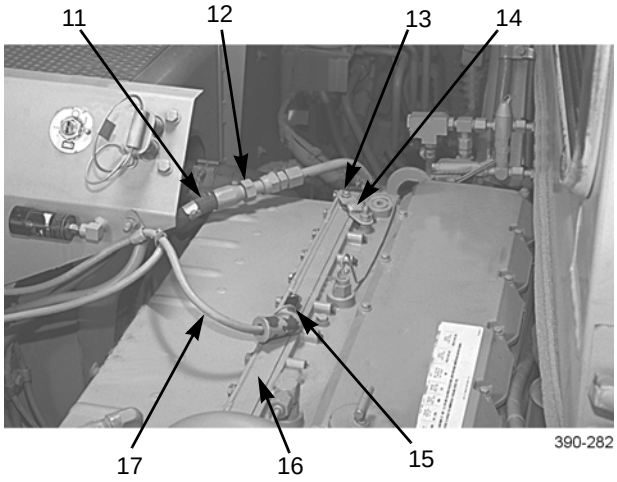
- Aftercooler and air inlet heater assembly weigh 35 lb (16 kg).
- When positioning aftercooler and air inlet heater assembly for installation, line up and loosely install all coolant hoses to aftercooler.

INSTALLATION - CONTINUED

3. Using a nylon sling and suitable lifting device, position aftercooler (3) and air inlet heater (16) to engine.
4. Install 22 bolts (18) and washers (19) to aftercooler (3), air inlet heater (16), and engine.

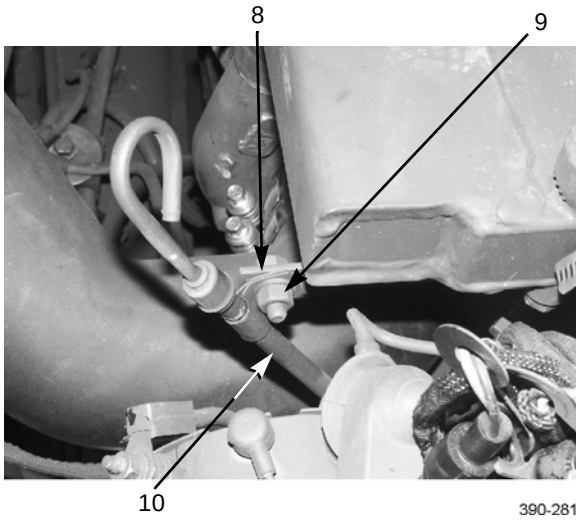


5. Connect cable assembly (17) to air inlet heater (16) and install nut (15). Tighten nut to 69 lb-in. (8 Nm).
6. Connect ground strap (14) and install nut (13) to air inlet heater (16).
7. Connect hose (11) and tighten nut (12). Tighten nut to 69 lb-in. (8 Nm).

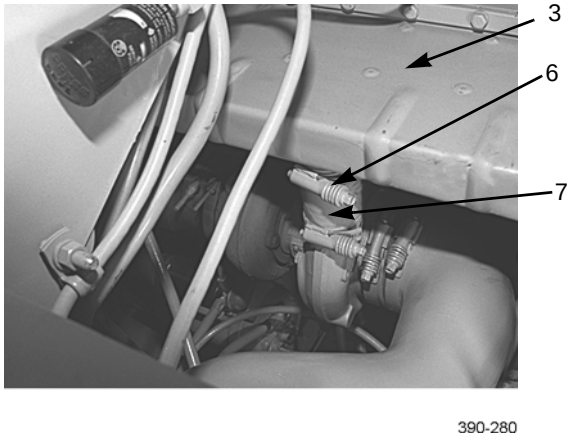


INSTALLATION - CONTINUED

8. Position dipstick guide tube (10) to bracket (8) and install nut (9).

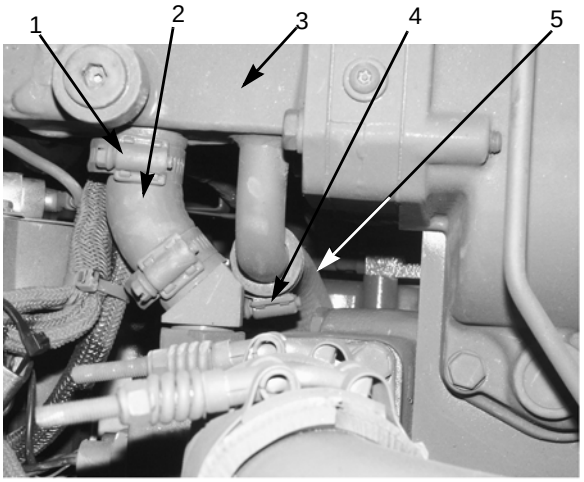


9. Tighten hose clamp (6) on hose (7) and aftercooler (3).



INSTALLATION - CONTINUED

10. Tighten hose clamp (4) on hose (5) and aftercooler (3).
11. Tighten hose clamp (1) on hose (2) and aftercooler (3).



12. Place battery disconnect switch in ON position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
13. Refill cooling system (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

14. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for leaks.

END OF WORK PACKAGE

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TURBOCHARGER REPLACEMENT 0143 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Tag, marker (Item 39, WP 0171 00)

Gasket

Materials/Parts - Continued

Gasket (oil tube) (2)

Nut, self-locking (4)

O-ring (2)

Personnel Required

Two

Equipment Condition

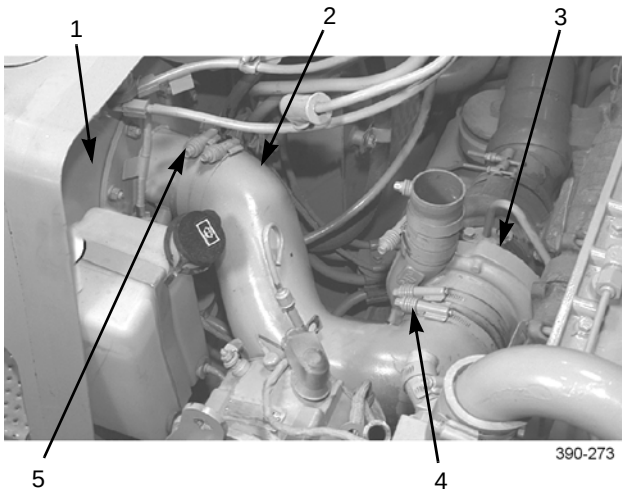
Aftercooler air air inlet heater removed (WP 0142 00)

REMOVAL

NOTE

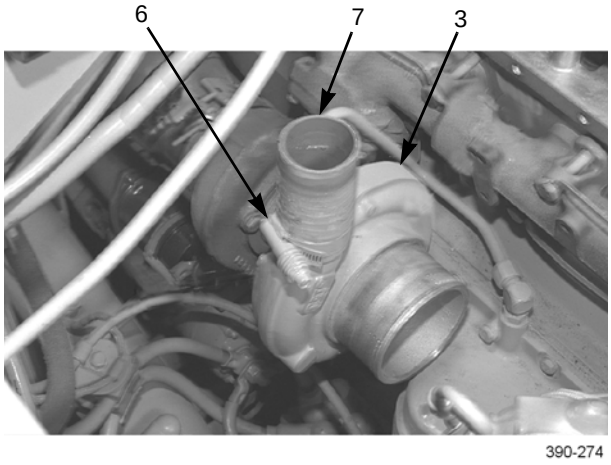
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all lines, hoses, wires, and tubes for installation.

1. Loosen clamps (4 and 5) from hose (2).
2. Remove hose (2) from air cleaner (1) and turbocharger (3).

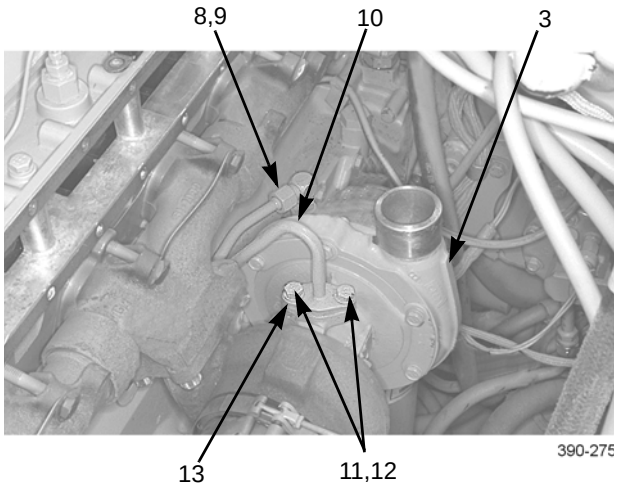


REMOVAL - CONTINUED

3. Loosen hose clamp (6) and remove hose (7) from turbocharger (3).

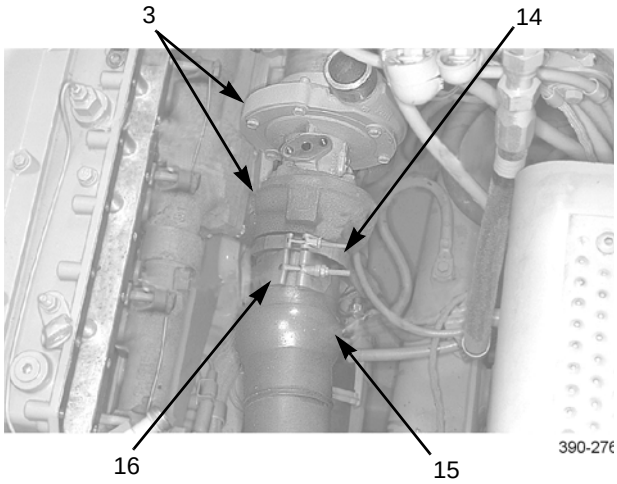


4. Loosen nut (8) and disconnect oil tube assembly (10) intake manifold. Remove and discard O-ring (9).
5. Remove two bolts (11), washers (12), and oil tube assembly (10) from turbocharger (3).
6. Remove and discard gasket (13) located between oil tube assembly (10) and turbocharger (3).

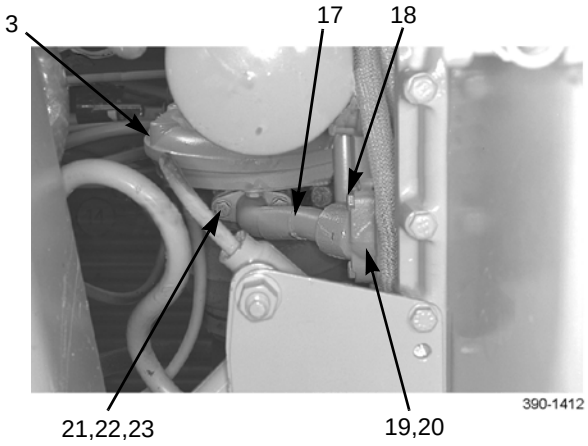


REMOVAL - CONTINUED

7. Loosen exhaust clamp (16) from exhaust pipe (15) and remove retaining clamp (14) that secures exhaust pipe to turbocharger (3).



8. Remove two bolts (21) and hard washers (22) from oil drain line (17). Remove two bolts (18) from adapter (19) and engine block.
9. Remove oil drain line (17) and adapter (19) as a unit from turbocharger (3) and engine block. Remove and discard gasket (23) from underneath oil drain line.
10. Remove and discard O-ring (20) from adapter (19).



REMOVAL - CONTINUED

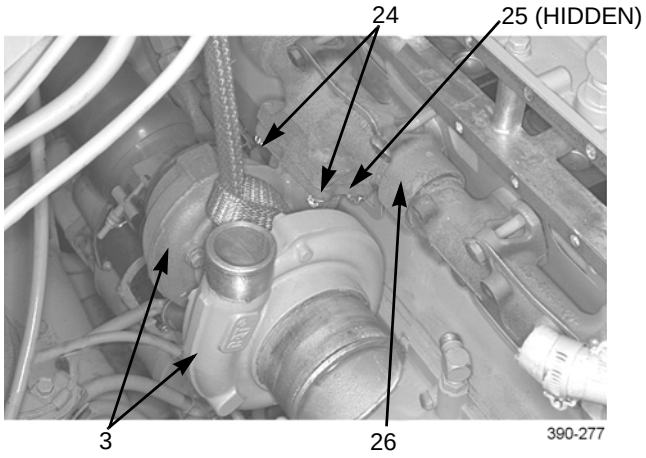
WARNING

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 lift 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

Turbocharger weighs 40 lb (18 kg).

11. Attach a nylon sling and suitable lifting device to turbocharger (3) for support.
12. Remove four self-locking nuts (24) that secure turbocharger (3) to exhaust manifold (26). Remove turbocharger. Discard self-locking nuts.
13. Remove and discard gasket (25) from exhaust manifold (26).



INSTALLATION

1. Attach a nylon sling and suitable lifting device to turbocharger (3).

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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

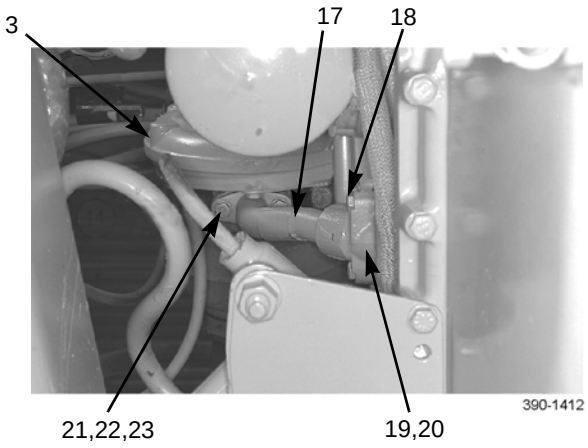
NOTE

Turbocharger weighs 40 lb (18 kg).

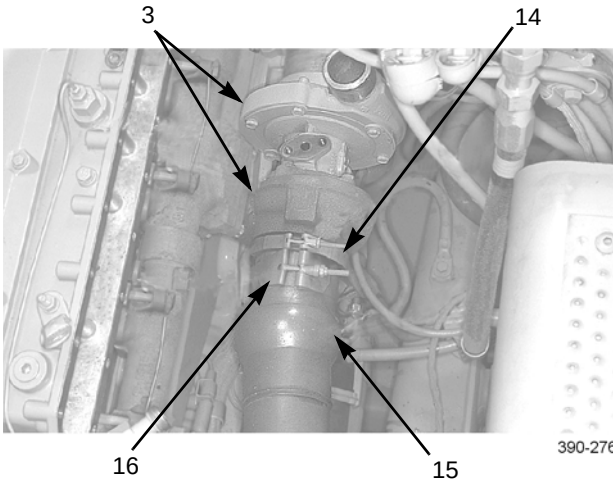
2. Position turbocharger (3) and new gasket (25) to exhaust manifold (26).
3. Install four new self-locking nuts (24) to secure turbocharger (3) to exhaust manifold (26). Tighten self-locking nuts to 40 lb-ft (54 Nm).

INSTALLATION - CONTINUED

4. Remove nylon sling and lifting device.
5. Install new O-ring (20) in adapter (19).
6. Install new gasket (23) between turbocharger (3) and oil drain line (17). Install oil drain line and adapter (19) as a unit to turbocharger (3) and engine block.
7. Install two bolts (21) and hard washers (22) to secure oil drain line (17) to turbocharger (3).
8. Install two bolts (18) to secure adapter (19) to engine block.

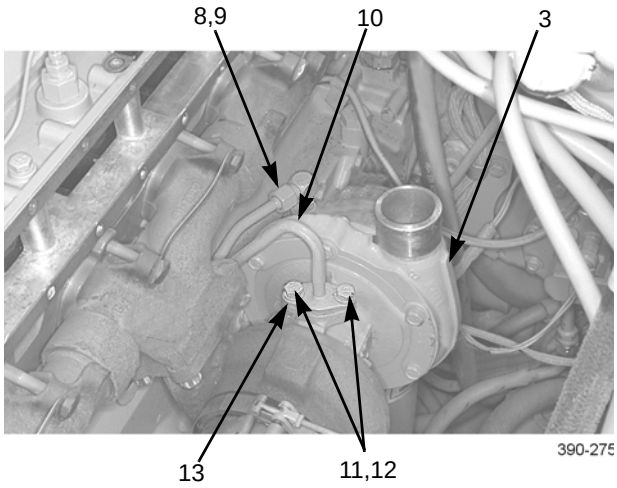


9. Install retaining clamp (14) to secure exhaust pipe (15) to turbocharger (3).
10. Tighten exhaust clamp (16) to exhaust pipe (15).

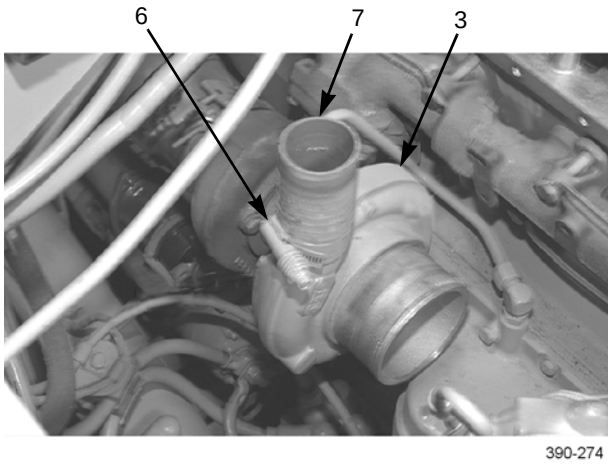


INSTALLATION - CONTINUED

11. Install new gasket (13) between oil tube assembly (10) and turbocharger (3). Position oil tube assembly to turbocharger.
12. Install two bolts (11), washers (12), and oil tube assembly (10) to turbocharger (3).
13. Install new O-ring (9) under nut (8). Connect oil tube assembly (10) to intake manifold and tighten nut.

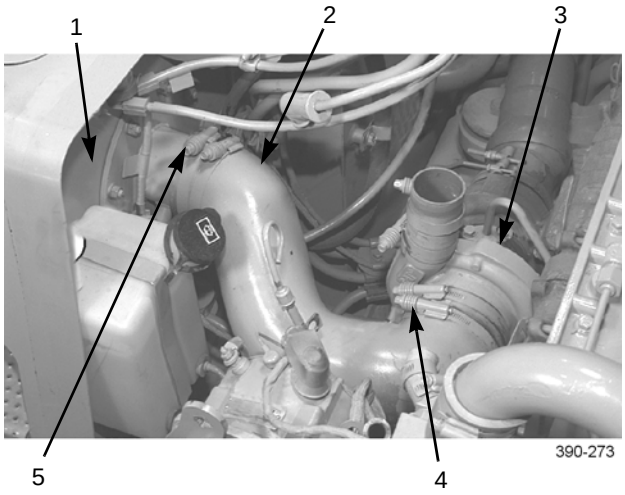


14. Install hose (7) and clamp (6) on turbocharger (3).



INSTALLATION - CONTINUED

15. Install hose (2) and clamps (4 and 5) to air cleaner (1) and turbocharger (3).



16. Install air inlet heater and aftercooler (WP 0142 00).
17. Refill cooling system (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

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RADIATOR REPLACEMENT 0144 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Bracket, link, bearing (Item 4, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

References - Continued

WP 0009 00

Personnel Required

Two

Equipment Condition

Cooling system drained (WP 0010 00)

Transmission oil cooler removed (WP 0074 00)

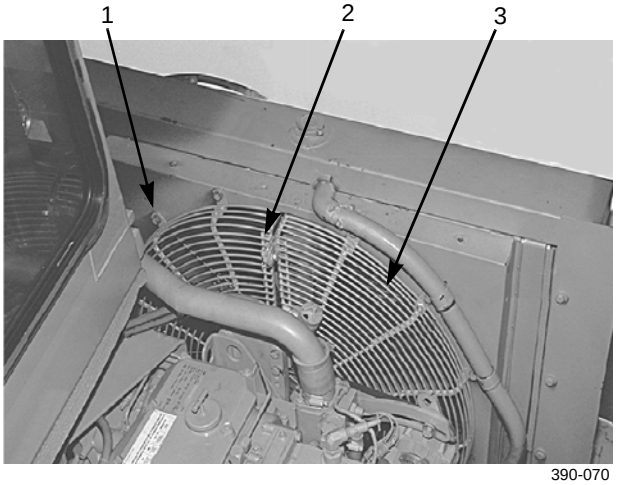
Hydraulic oil cooler removed (WP 0026 00)

Hood assembly removed (WP 0099 00)

Front guard plate removed (WP 0100 00)

REMOVAL

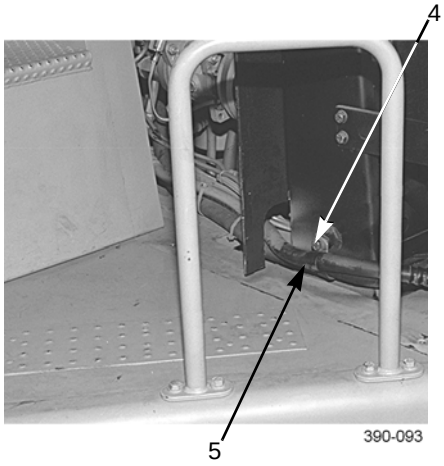
1. Remove two bolts (2), four washers, and two nuts from fan guard (3). Remove ten bolts (1), washers, and fan guard from radiator assembly.



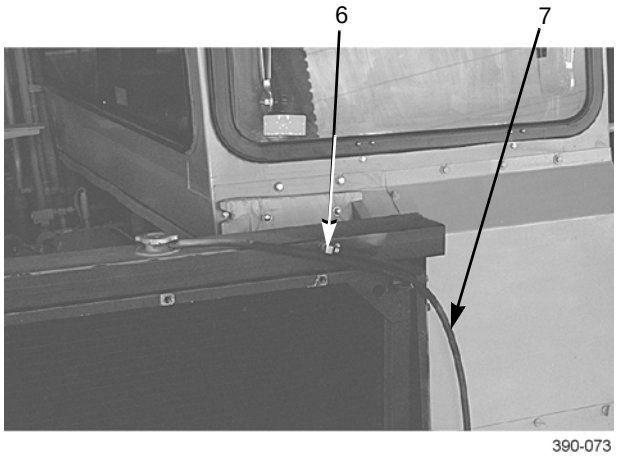
390-070

REMOVAL - CONTINUED

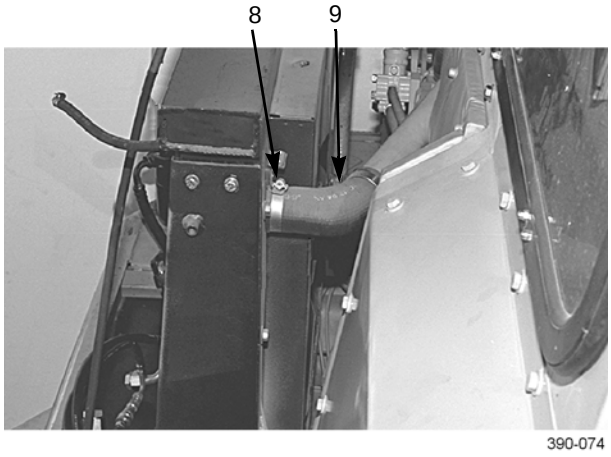
2. Remove bolt (4), washer, and two hose clips (5) from radiator assembly.



3. Loosen hose clamp (6) and disconnect hose (7) from radiator assembly.

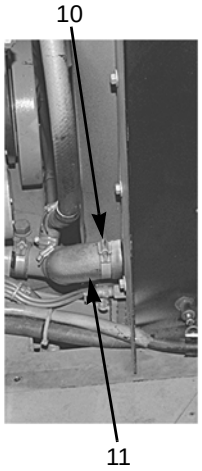


4. Loosen hose clamp (8) and disconnect hose (9) from radiator assembly.



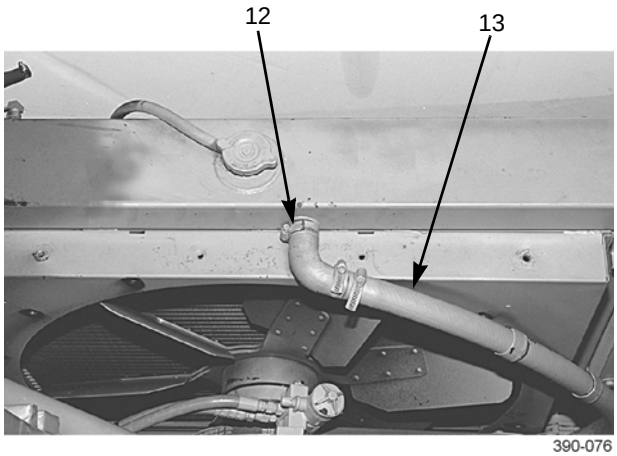
REMOVAL - CONTINUED

5. Loosen hose clamp (10) and disconnect hose (11) from radiator assembly.



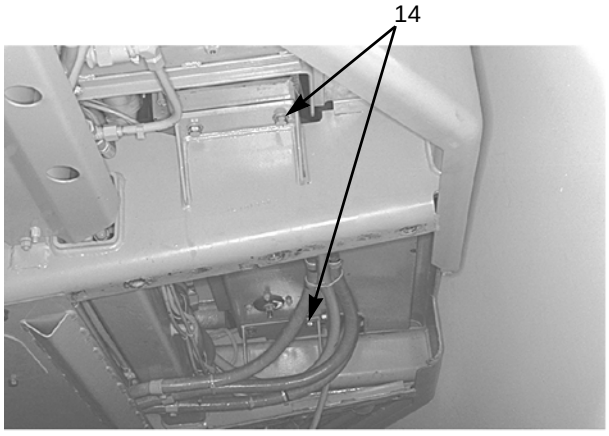
390-075

6. Loosen hose clamp (12) and disconnect hose (13) from radiator assembly.



390-076

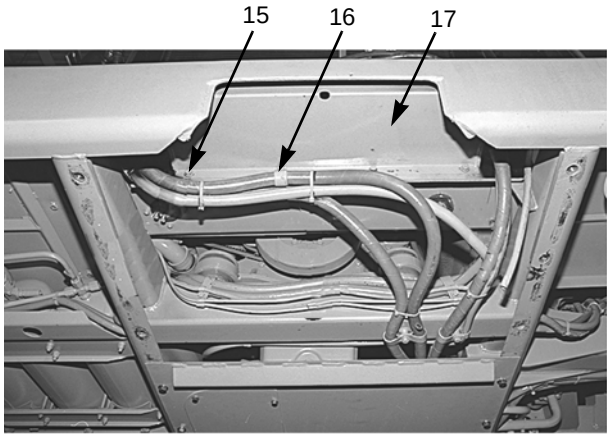
7. Remove four bolts (14) and washers from radiator mounting brackets.



390-080

REMOVAL - CONTINUED

8. Remove four bolts (15), two hose clips (16), eight washers, four nuts, and plate (17) from radiator assembly.



390-081



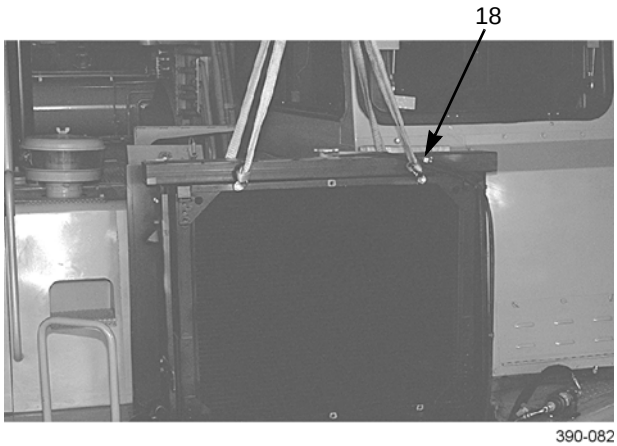
WARNING

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 lift 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

Radiator assembly weighs 295 lb (134 kg).

9. Install four bearing links to radiator assembly (18). Attach nylon slings and a suitable lifting device to bearing links and carefully remove radiator assembly from frame.



390-082

INSTALLATION



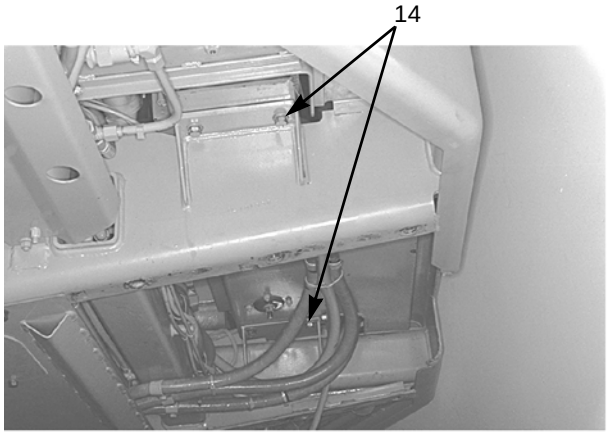
WARNING

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 lift 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

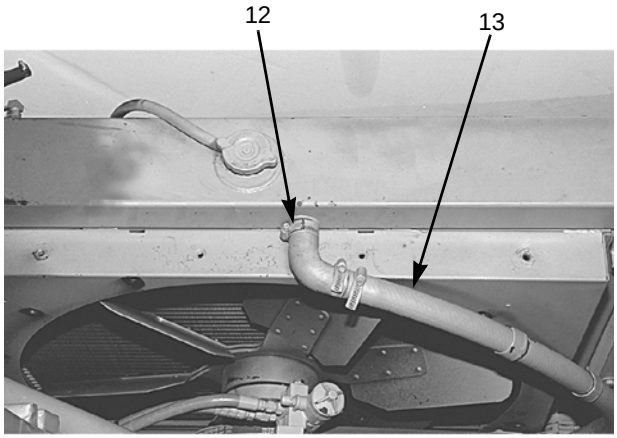
Radiator assembly weighs 295 lb (134 kg).

1. Install four bearing links to radiator assembly (18). Attach nylon slings and a suitable lifting device to bearing links and, with assistance, carefully position radiator assembly on frame.
2. Install plate (17) on radiator assembly with four bolts (15), two hose clips (16), eight washers, and four nuts.
3. Install four bolts (14) and washers to radiator mounting brackets.



390-080

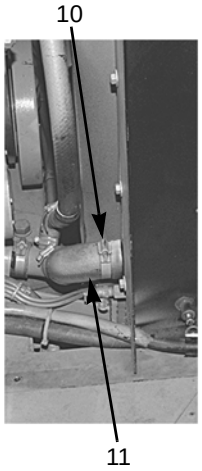
4. Install hose clamp (12) and hose (13) to radiator assembly.



390-076

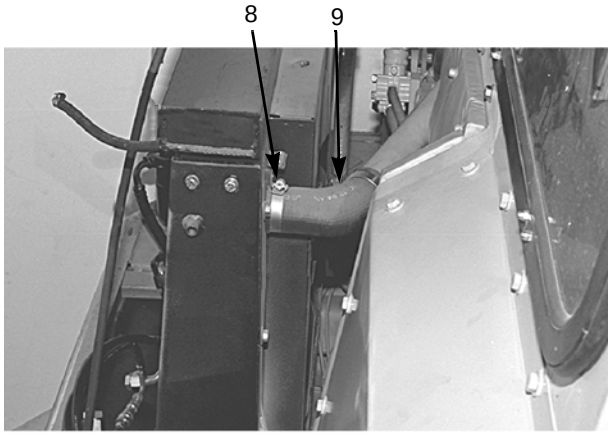
INSTALLATION - CONTINUED

5. Install hose clamp (10) and hose (11) to radiator assembly.



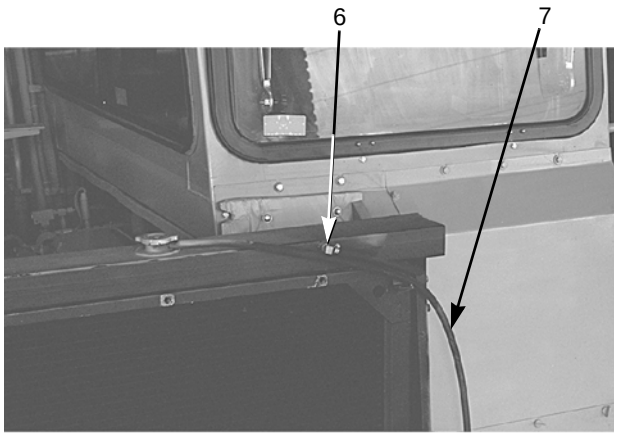
390-075

6. Install hose clamp (8) and hose (9) to radiator assembly.



390-074

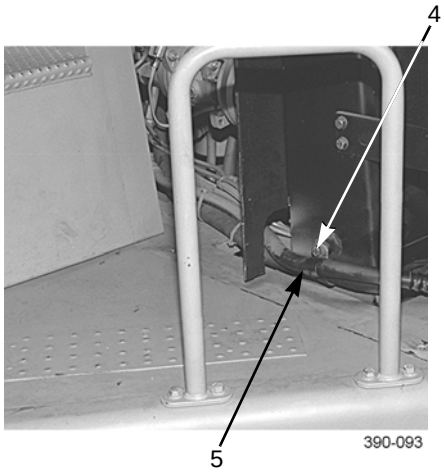
7. Install hose clamp (6) and hose (7) to radiator assembly.



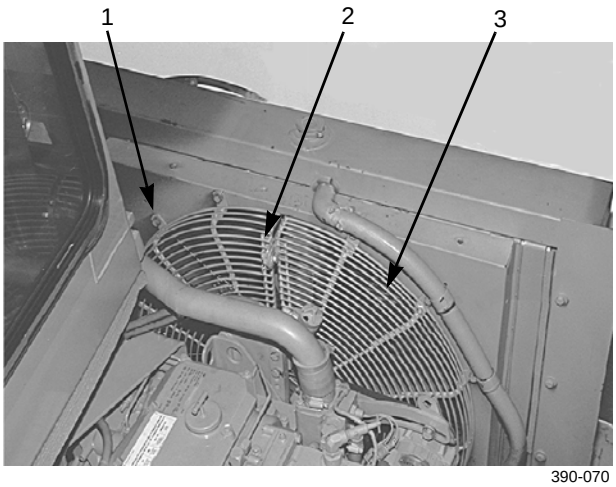
390-073

INSTALLATION - CONTINUED

8. Install bolt (4), washer, and two hose clips (5) to radiator assembly.



9. Install fan guard (3) to radiator assembly with ten bolts (1) and washers. Install two bolts (2), four washers, and two nuts on fan guard.



10. Install front guard plate (WP 0100 00).
11. Install hood assembly (WP 0099 00).
12. Install hydraulic oil cooler (WP 0026 00).
13. Install transmission oil cooler (WP 0074 00).
14. Fill cooling system (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

15. Start engine (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for coolant leaks.

END OF WORK PACKAGE

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FAN DRIVE REPAIR 0145 00

THIS WORK PACKAGE COVERS

Disassembly, Cleaning and Inspection, Assembly

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Cleaning compound, solvent (Item 6, WP 0171 00)

Materials/Parts - Continued

Grease, GAA (Item 16, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

References

WP 0009 00

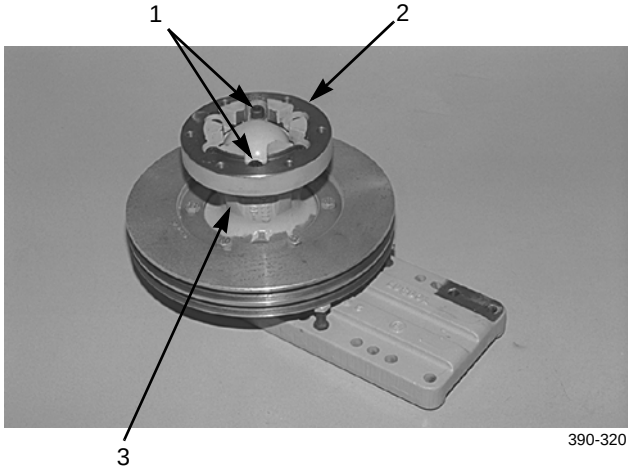
WP 0010 00

Equipment Condition

Fan drive removed (WP 0031 00)

DISASSEMBLY

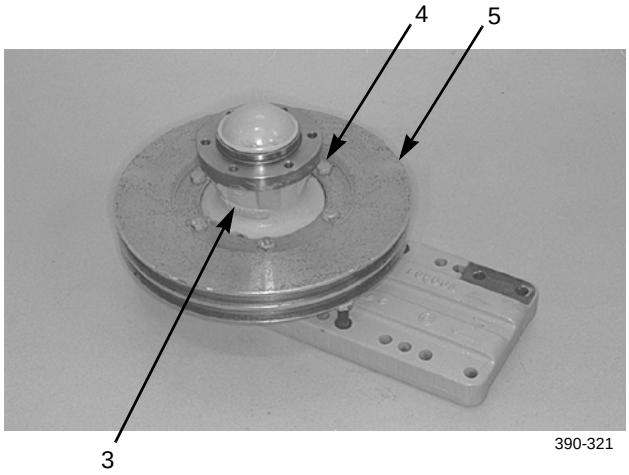
1. Remove six bolts (1) and fan adapter (2) from hub (3).



390-320

DISASSEMBLY - CONTINUED

2. Remove six bolts (4) and fan drive pulley (5) from hub (3).

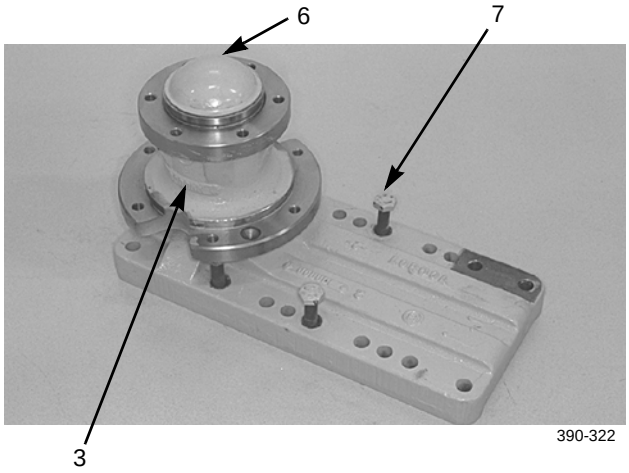


3. Remove cap (6) from hub (3).

NOTE

Note position of bolts to ensure they are assembled in same position.

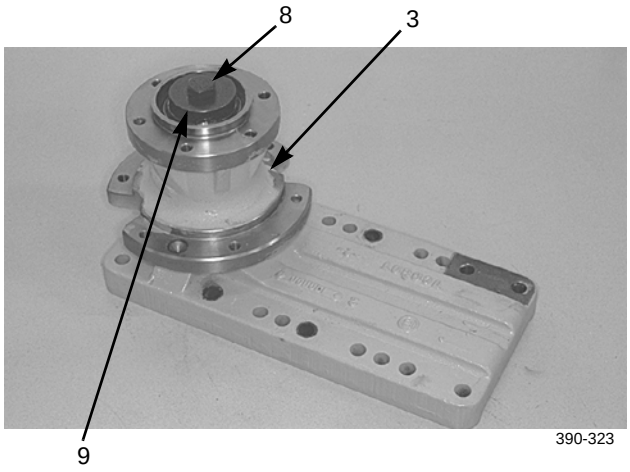
4. Remove four bolts (7).



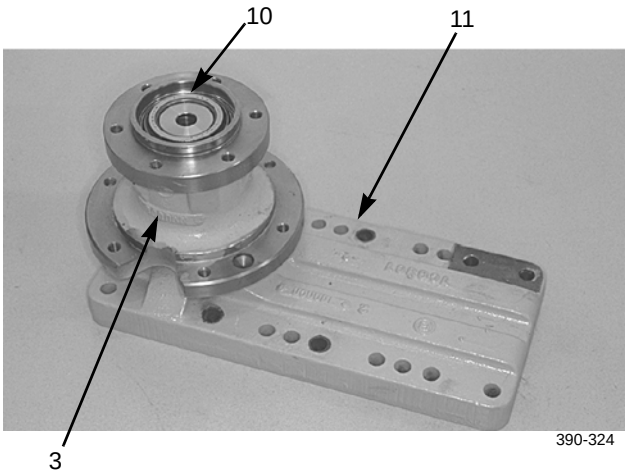
FAN DRIVE REPAIR - CONTINUED 0145 00

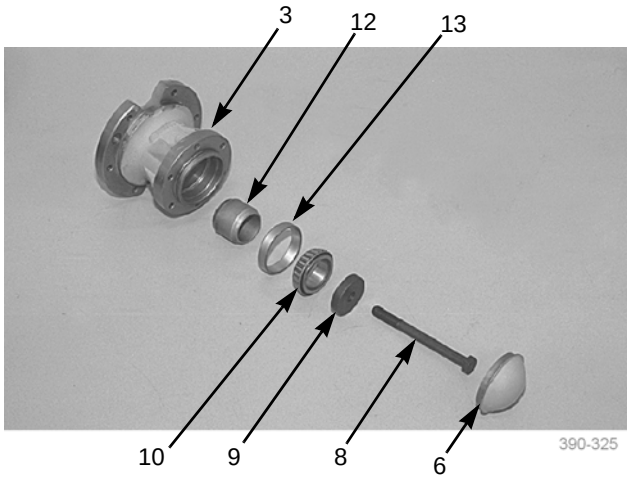
DISASSEMBLY - CONTINUED

5. Remove bolt (8) and plate (9) from hub (3).



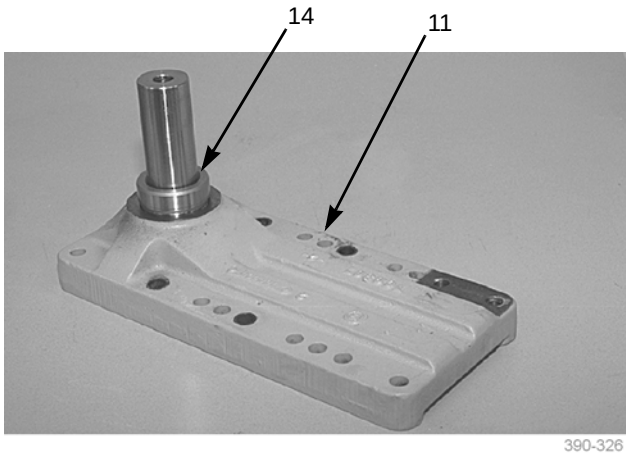
6. Remove roller bearing cone (10) and hub (3) from bracket (11).
7. Remove spacer (12) from hub (3).



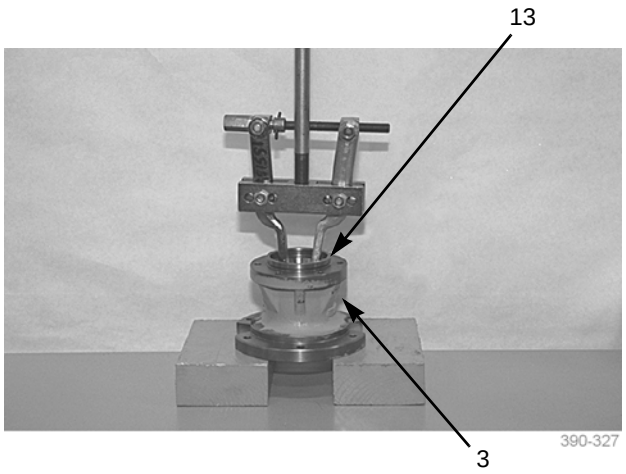


DISASSEMBLY - CONTINUED

8. Remove spacer (14) from bracket (11).

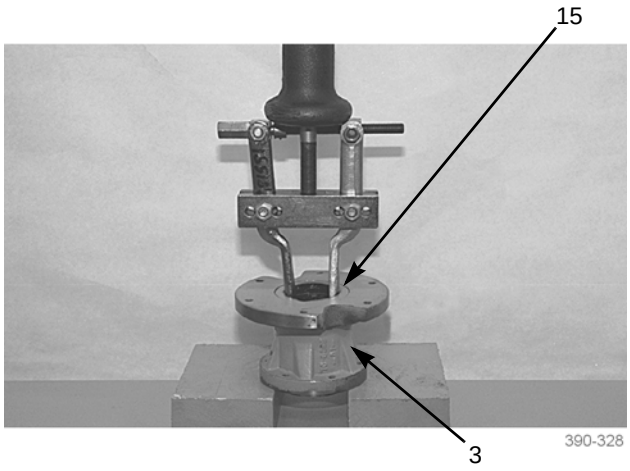


9. Using puller kit, remove roller bearing cup (13) from hub (3).

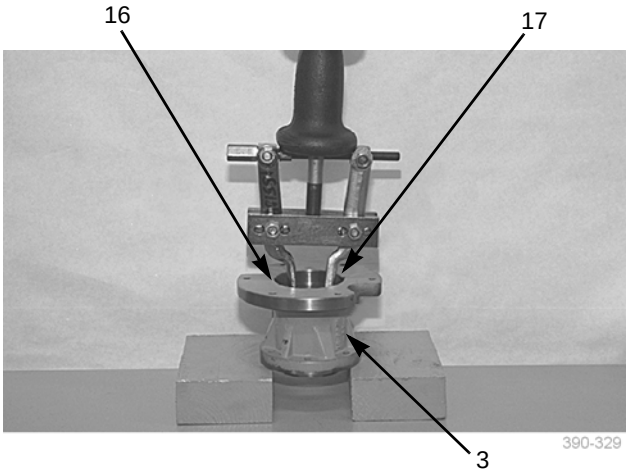


DISASSEMBLY - CONTINUED

10. Using puller kit, remove seal (15) from hub (3). Discard seal.



11. Using puller kit, remove roller bearing cone (16) from hub (3). Remove roller bearing cup (17).



CLEANING AND INSPECTION



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. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition assembly. Failure to do so may result in injury or death to personnel.

1. Clean all removed components with solvent and dry thoroughly.
2. Inspect for wear, cracks or other damage. Replace damaged components.

ASSEMBLY

NOTE

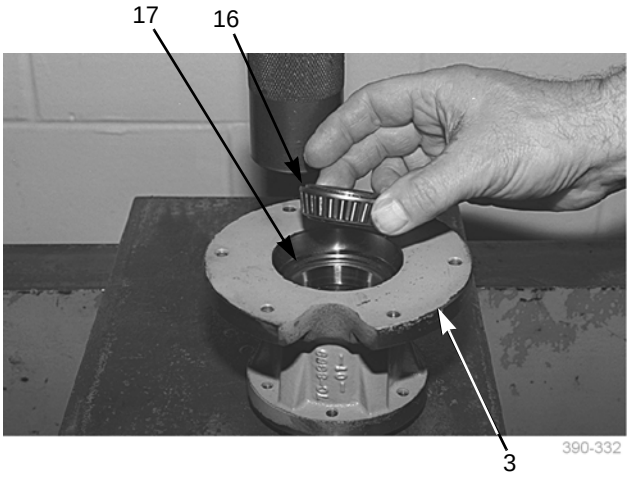
Ensure that thicker end of roller bearing cup is toward hole.

1. Install roller bearing cup (17) into hub (3) until roller bearing cup contacts stop.

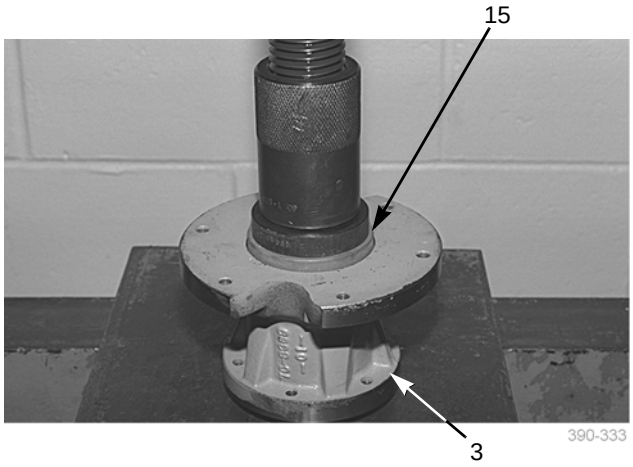
NOTE

Ensure that smaller end of roller bearing cone is toward hub.

2. Apply GAA grease to roller bearing cone (16) and install roller bearing cone in roller bearing cup (17).

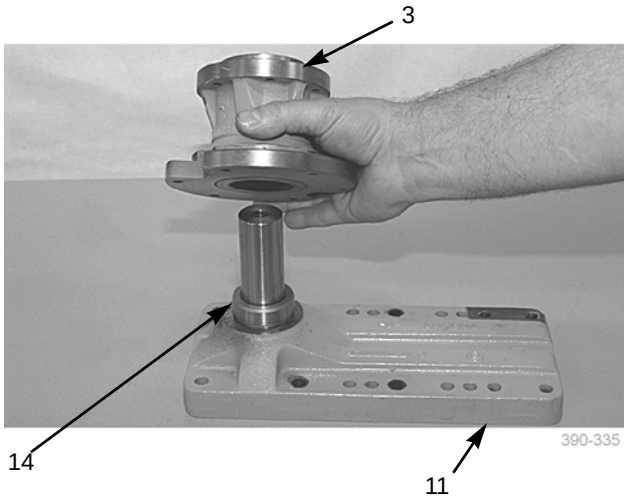


3. Using arbor press, install new seal (15) in hub (3) until seal is flush with back of hub.

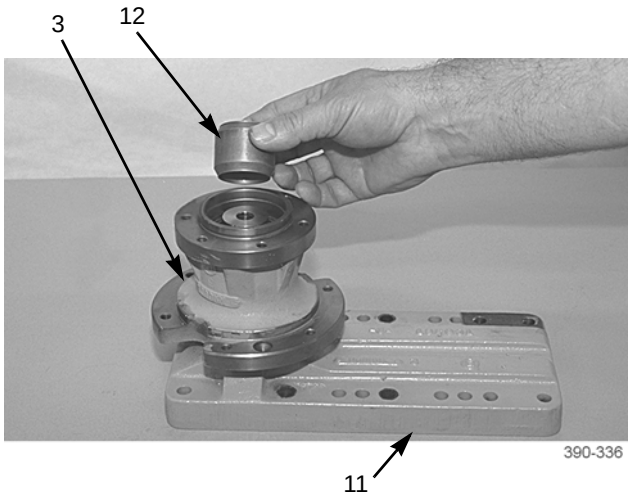


ASSEMBLY - CONTINUED

4. Install spacer (14) onto spindle of bracket (11). Install hub (3) onto spindle. Hub should contain roller bearing cup, roller bearing cone, and seal.



5. Install spacer (12) on bracket (11) inside hub (3).



ASSEMBLY - CONTINUED

NOTE

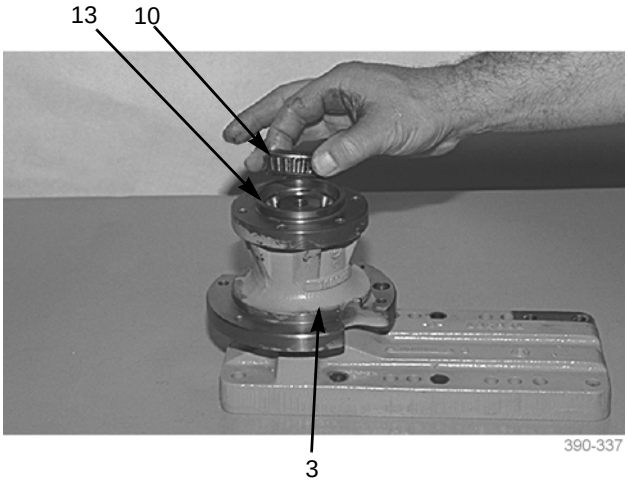
Ensure that thicker end of roller bearing cup is toward hub.

6. Install roller bearing cup (13) into hub (3) until roller bearing cup contacts stop.
7. Use GAA grease to fill cavity between roller bearing cups.

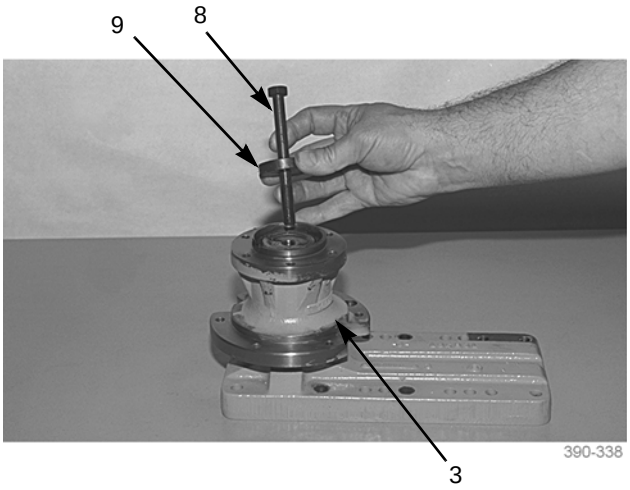
NOTE

Ensure the smaller end of roller bearing cone is toward hub.

8. Apply GAA grease to roller bearing cone (10) and install roller bearing cone in roller bearing cup (13).

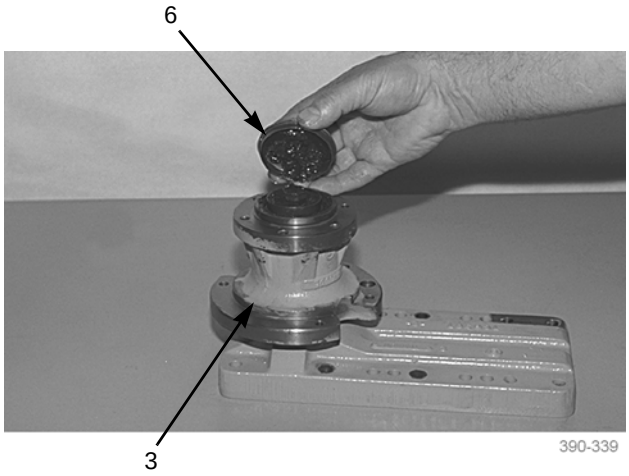


9. Install plate (9) on hub (3) with bolt (8). Thread into spindle of bracket assembly. Tighten bolt.



ASSEMBLY - CONTINUED

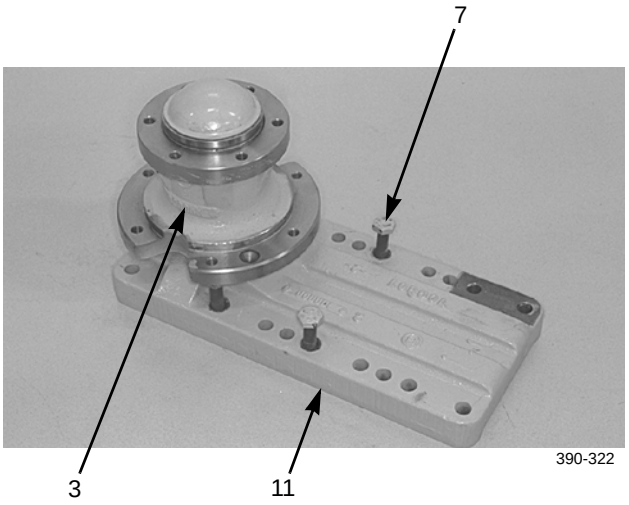
10. Fill cap (6) with GAA grease. Press cap onto hub (3). Wipe any excess bearing lubricant from assembly.



NOTE

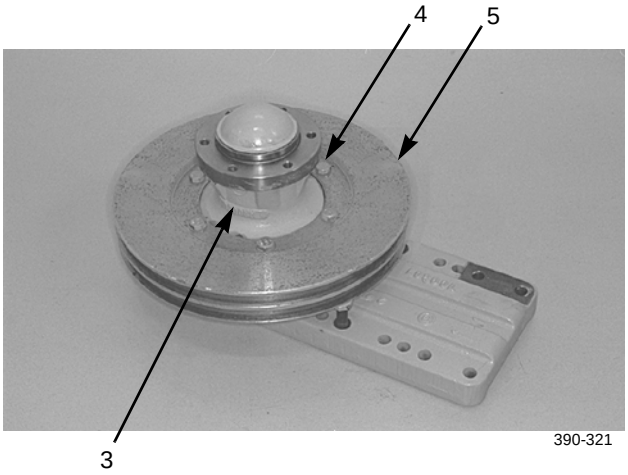
Install bolts in positions noted during disassembly.

11. Install four bolts (7) on bracket (11). Rotate hub (3) as needed to allow placement of two bolts closest to hub.

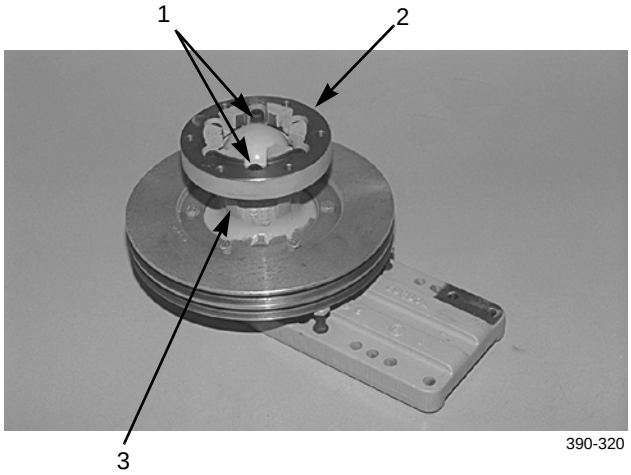


ASSEMBLY - CONTINUED

12. Install six bolts (4) and fan drive pulley (5) to hub (3).



13. Install six bolts (1) and fan adapter (2) to hub (3).



14. Install fan drive (WP 0032 00).
15. Refill cooling system (WP 0009 00 and WP 0010 00).

END OF WORK PACKAGE

TORQUE CONVERTER REPLACEMENT 0146 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Materials/Parts

Seal, O-ring

Personnel Required

Two

Equipment Condition

Engine removed (WP 0122 00)

Hydraulic and steering pump removed (WP 0153 00)

Elevator/water pump removed (WP 0159 00)

Transmission oil and scavenger pump removed (WP 0149 00)

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL



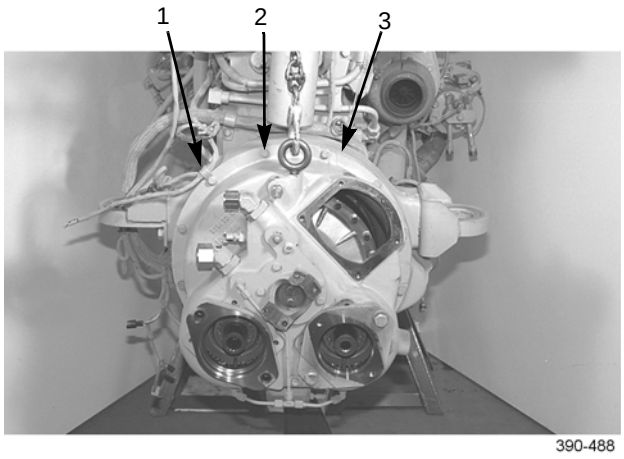
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedrue. Ensure that any lifting device used is in good condition and of suitable lifting capacity. Keep clear of heavy part supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

Torque converter weighs 194 lb (88 kg).

1. Attach a suitable lifting device to support torque converter (3).
2. Remove 12 bolts (2), clip (1), and torque converter (3) from flywheel housing.
3. Remove and discard O-ring seal from torque converter (3).



390-488

INSTALLATION

1. Install new O-ring seal on torque converter.



WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedrue. Ensure that any lifting device used is in good condition and of suitable lifting capacity. Keep clear of heavy part supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

Torque converter weighs 194 lb (88 kg).

2. Attach a suitable lifting device to support torque converter (3).
3. Install torque converter (3) on flywheel housing with 12 bolts (2) and clip (1).
4. Install transmission oil and scavenger pump (WP 0149 00).
5. Install elevator/water pump (WP 0159 00).
6. Install hydraulic and steering pump (WP 0153 00).
7. Install engine (WP 0122 00).

END OF WORK PACKAGE

TRANSMISSION/TRANSFER ASSEMBLY REPLACEMENT 0147 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Bracket, link (2) (Item 5, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring(s)

Personnel Required

Two

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

WP 0009 00

WP 0010 00

Equipment Condition

Steering articulated so that tractor and scraper/water distributor are at 90 degrees to each other

Parking brake actuator removed (WP 0088 00)

Lower prop shaft removed (WP 0076 00)

Transmission fluid drained (WP 0010 00)

Transmission control cable removed from linkage housing (WP 0069 00)

CAUTION

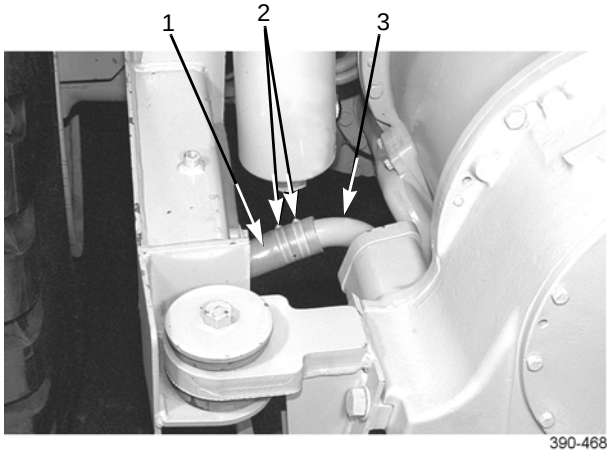
Cap hoses and tubes to prevent fluid loss and contamination of transmission lubrication system.

NOTE

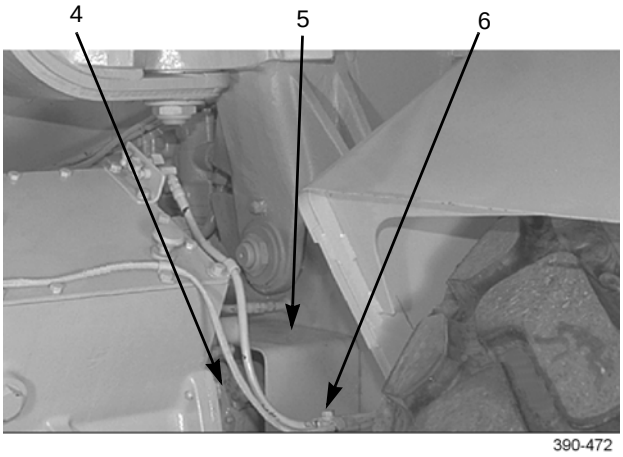
- Care must be taken to ensure that fluids are contained during performance and inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

1. Loosen two hose clamps (2) and remove hose (1) from tube (3).

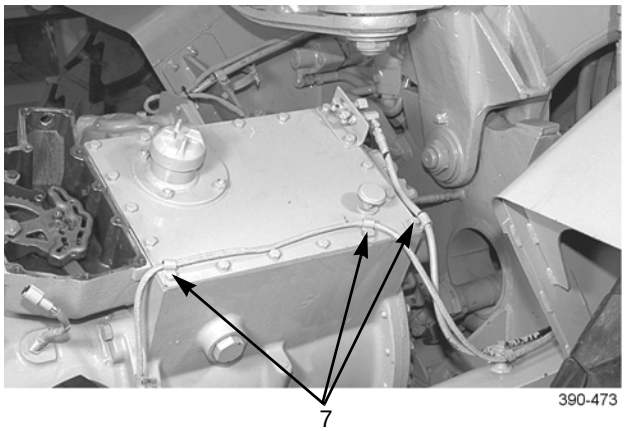


2. Remove two bolts (6) and washers from guard (5). Repeat this procedure for other side. Remove guard.
3. Remove four bolts (4) and washers from drive shaft slip joint. Remove drive shaft slip joint from transmission.



REMOVAL - CONTINUED

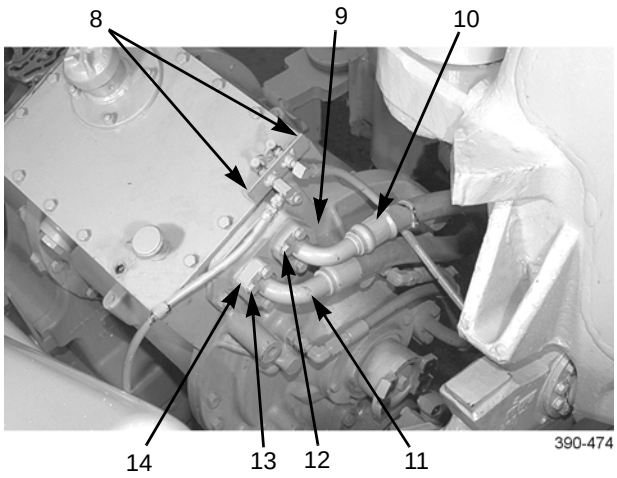
4. Remove three bolts (7) and clips from transmission.



NOTE

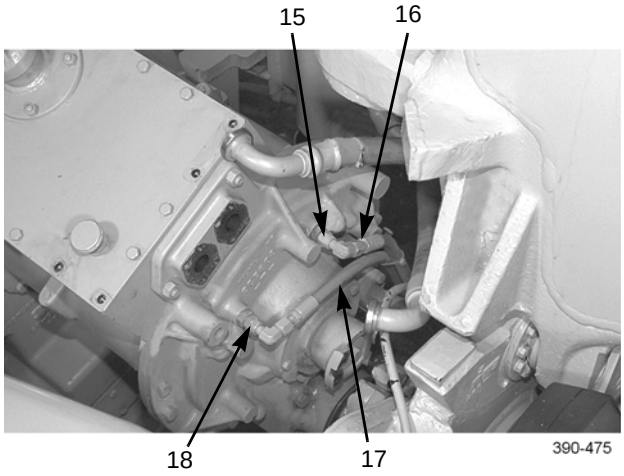
Discard all O-rings removed when hoses and tubes are disconnected from transmission.

5. Remove two bolts (8), washers, and grease fittings and mounting bracket from transmission.
6. Remove four bolts (13), washers, and split flange (14) from transmission.
7. Disconnect hose (11) from transmission.
8. Remove four bolts (12), washers, and split flange (9) from transmission.
9. Disconnect hose (10) from transmission.

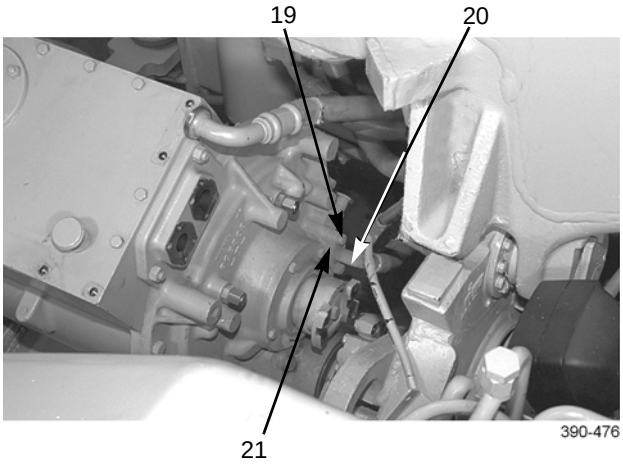


REMOVAL - CONTINUED

10. Disconnect hose (16) from elbow (15). Remove elbow from transmission.
11. Disconnect hose (17) from elbow (18). Remove elbow from transmission.



12. Remove two bolts (19) and split flange (21) from transmission. Disconnect hose (20) from transmission.



REMOVAL - CONTINUED



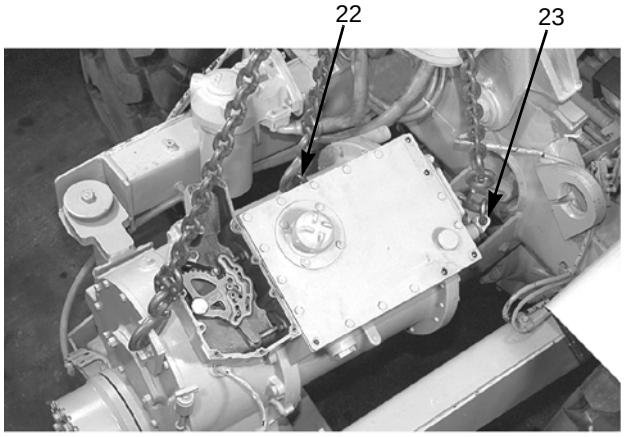
WARNING

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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

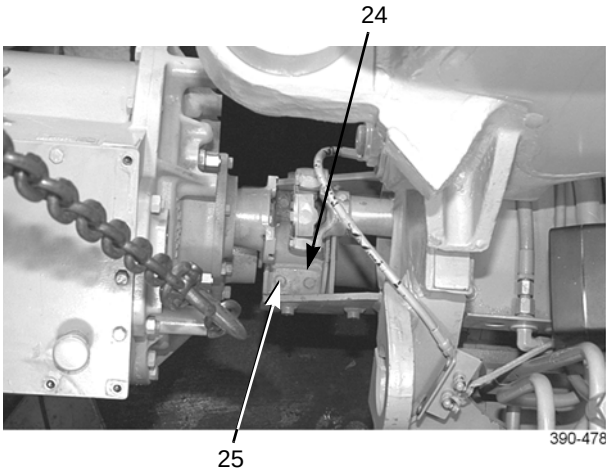
NOTE

Transmission/transfer assembly weighs 1488 lb (675 kg).

13. Install link brackets (22 and 23) to transmission. Attach a suitable three-point lifting chain and hoist to transmission, as shown.



14. Remove four bolts (25), washers, and transmission front mount (24).



REMOVAL - CONTINUED



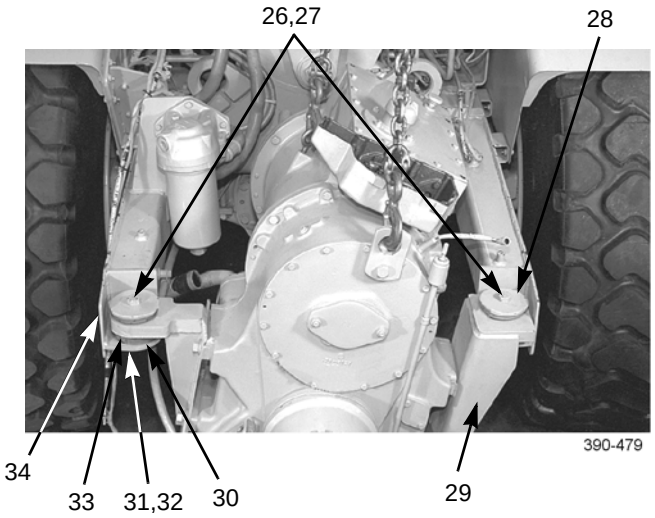
WARNING

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 lift 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

Note position of transmission mount assemblies to aid in installation.

15. Remove two nuts (31), washers (32), bolts (26), washers (27), and large washers (28). Lift transmission/transfer assembly from frame (34) and remove. Place on suitable cribbing or stand.
16. Remove two mount assemblies (33), two mount assemblies (30), and spacers. Inspect for wear or damage and obtain replacements as needed.
17. Remove four bolts, washers, and each mounting bracket (29) from transmission/transfer assembly.



INSTALLATION

1. Install each mounting bracket (29) to transmission/transfer assembly with four washers and bolts. Tighten bolts to 272 lb-ft (370 Nm).
2. Position mount assembly (30) and spacer on each side of frame (34).



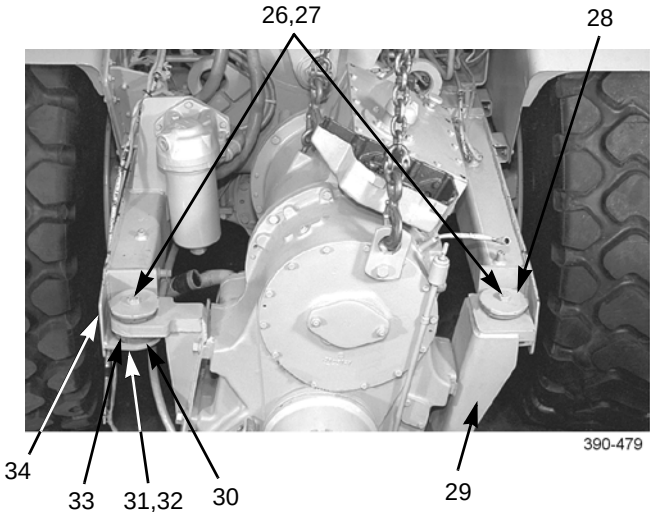
WARNING

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 lift 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

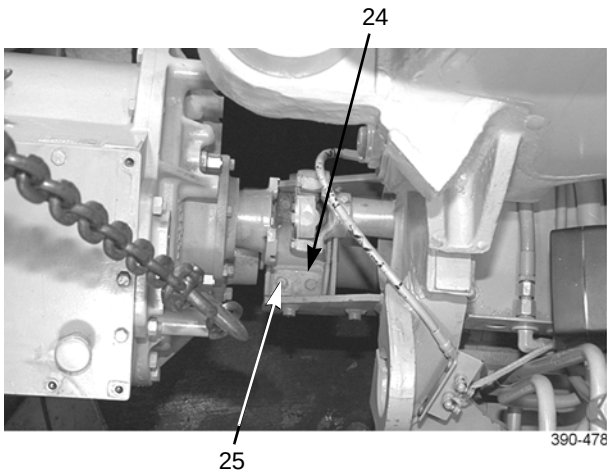
Transmission/transfer assembly weighs 1488 lb (675 kg).

3. Use link bracket, lifting eyebolt, and a suitable three-point lifting chain and hoist to position transmission/transfer assembly on machine.
4. Place mount assembly (33) on each mounting bracket (29). Install large washer (28), washer (27), bolt (26), washer (32), and nut (31) on each rear mount.

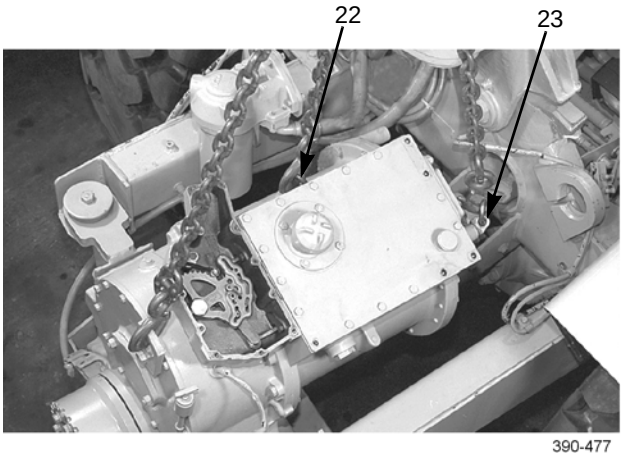


INSTALLATION - CONTINUED

5. Position transmission front mount (24) and secure with four washers and bolts (25).



6. Remove three-point lifting chain, link brackets (23 and 22), and hoist from transmission.

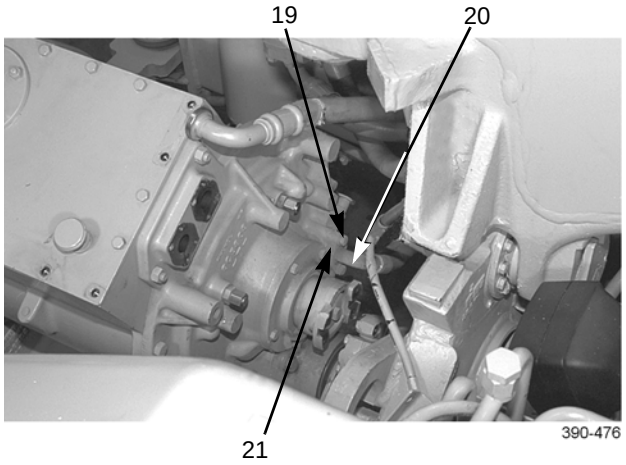


INSTALLATION - CONTINUED

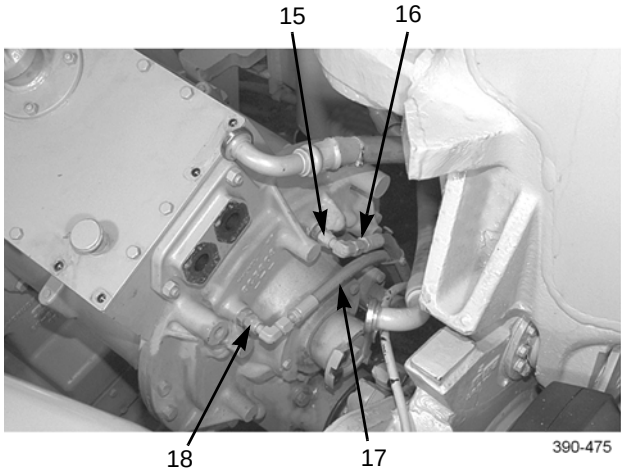
NOTE

Lightly coat new O-ring with clean oil prior to making hose and tube connections to transmission.

7. Connect hose (20) and install split flange (21) and two bolts (19) to transmission.

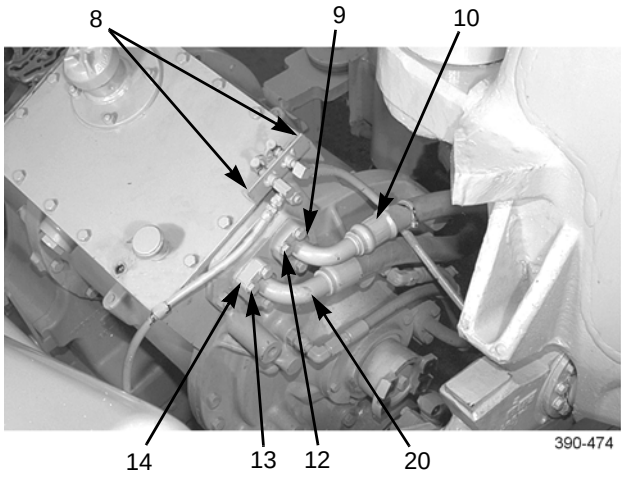


8. Install elbow (15) to transmission. Connect hose (16) to elbow.
9. Install elbow (18) to transmission. Connect hose (17) to elbow.

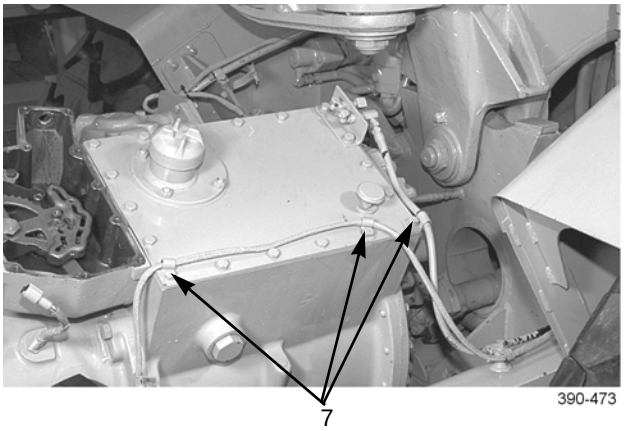


INSTALLATION - CONTINUED

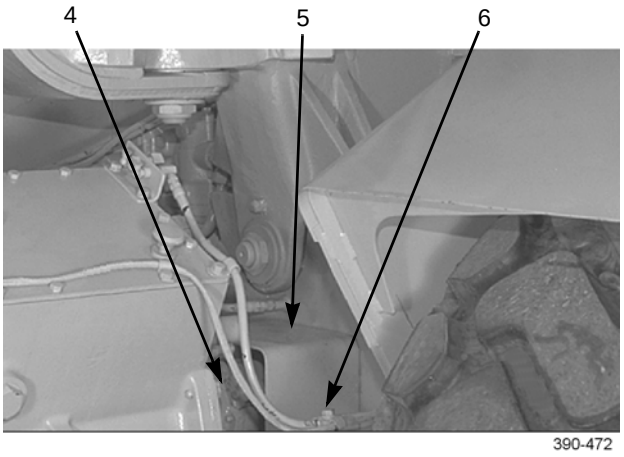
10. Connect hose (10) and install split flange (9) and four bolts (12) to transmission.
11. Connect hose (11) and install split flange (14) and four bolts (13) to transmission.
12. Install grease fittings and mounting bracket to transmission with two bolts (8).



13. Install three bolts (7) and clips to transmission.

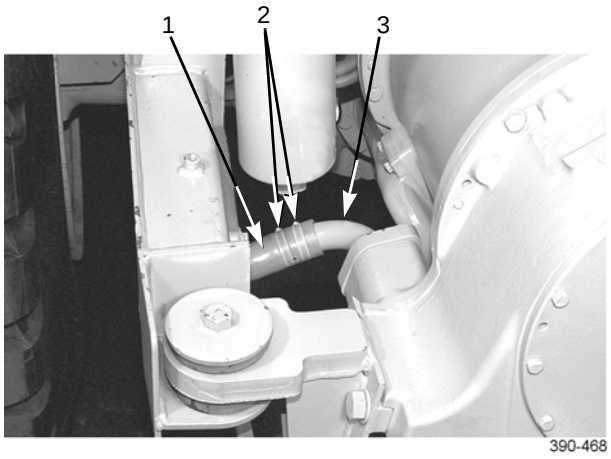


14. Install drive shaft slip joint to transmission with four washers and bolts (4). Tighten bolts to 45 lb-ft (60 Nm).
15. Install guard (5) with four washers and bolts (6).



INSTALLATION - CONTINUED

16. Install hose (1) to tube (3) and tighten hose clamps (2).



17. Install transmission control cable to linkage housing (WP 0069 00).
18. Fill transmission fluid (WP 0009 00 and WP 0010 00).
19. Install lower pump shaft (WP 0076 00).
20. Install parking brake actuator (WP 0088 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

21. Start engine and move transmission shift lever through all ranges (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Check for proper operation and leaks.

END OF WORK PACKAGE

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TRANSMISSION HYDRAULIC CONTROL VALVE REPLACEMENT 0148 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Bracket, link (Item 6, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring (4)

Equipment Condition

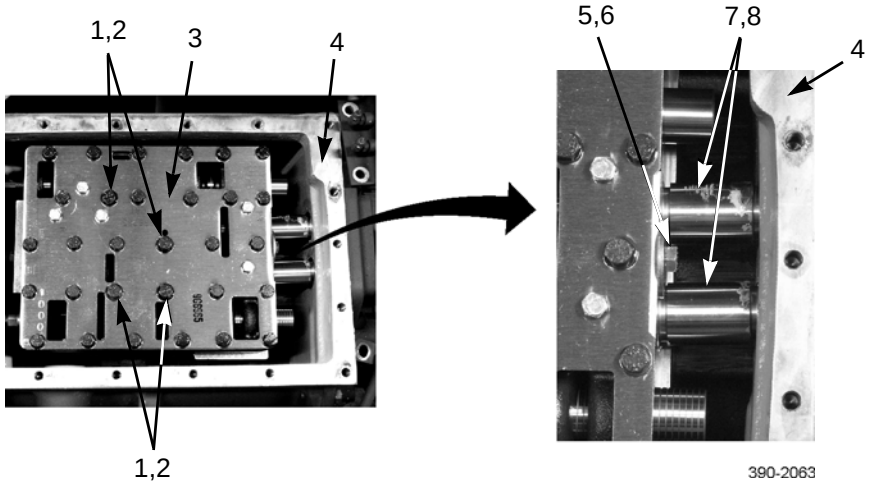
Transmission shift control cam and linkage removed (WP 0088 00)

CAUTION

Use caution to ensure dirt or debris does not fall into transmission case and cause contamination. Cover exposed openings with a clean rag. Contamination of transmission could result in premature failure.

REMOVAL

1. Remove bolt (5) and washer (6) from control valve (3). Move two sleeves (7) away from control valve.
2. Remove four bolts (1) and washers (2) from control valve (3).
3. Install two links in two bolt holes in control valve (3), to provide a balanced lift



REMOVAL - CONTINUED



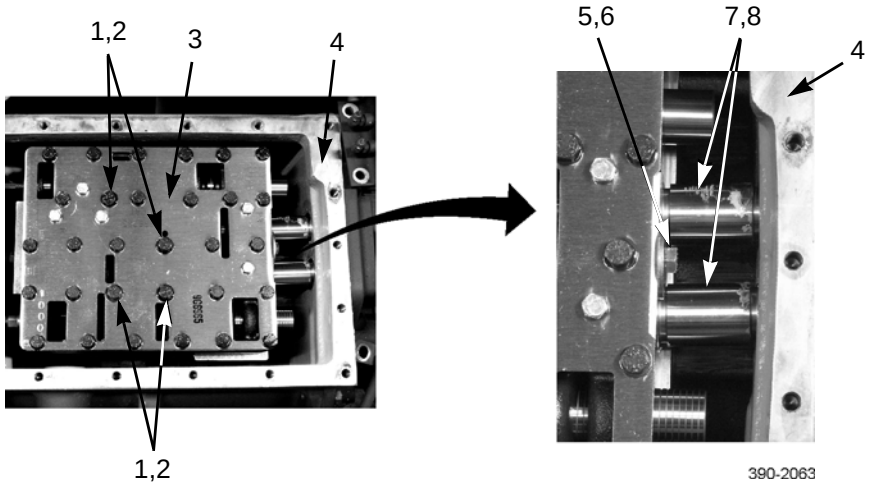
WARNING

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 lift 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

Control valve weighs 70 lb (32 kg).

4. Attach a nylon sling to links and attach sling to a suitable lifting device. Take up slack in sling.
5. Remove control valve (3) from transmission case (4).
6. Remove lifting device, sling, and links from control valve (3).
7. Remove sleeves (7) from transmission case (4). Remove two O-rings (8) from each sleeve. Discard O-rings.



INSTALLATION

NOTE

Coat new O-rings with clean oil before installation.

1. Install two new O-rings (8) on each sleeve (7) and install sleeves in transmission case (4).
2. Install two links in two bolt holes in control valve (3), to provide a balanced lift.



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 lift 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

Control valve weighs 70 lb (32 kg).

3. Attach a nylon sling to links and attach a sling to a suitable lifting device. Take up slack in sling.
4. Lift control valve (3) and position in transmission case (4).
5. Install four washers (2) and bolts (1). Remove lifting device, sling, and links from control valve (3). Tighten bolts to 35 lb-ft (48 Nm).
6. Move two sleeves (7) into control valve (3). Install washer (6) and bolt (5) to secure sleeves.
7. Install transmission shift control cam and linkage (WP 0070 00).

END OF WORK PACKAGE

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TRANSMISSION OIL AND SCAVENGER PUMP REPLACEMENT 0149 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24, 27, 28 or 29, WP 0171 00)

Materials/Parts - Continued

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (5)

Personnel Required

Two

References

WP 0009 00

WP 0010 00

Equipment Condition

Rear guard plate removed (WP 0100 00)



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

Cap all hoses to prevent fluid loss and contamination of system.

NOTE

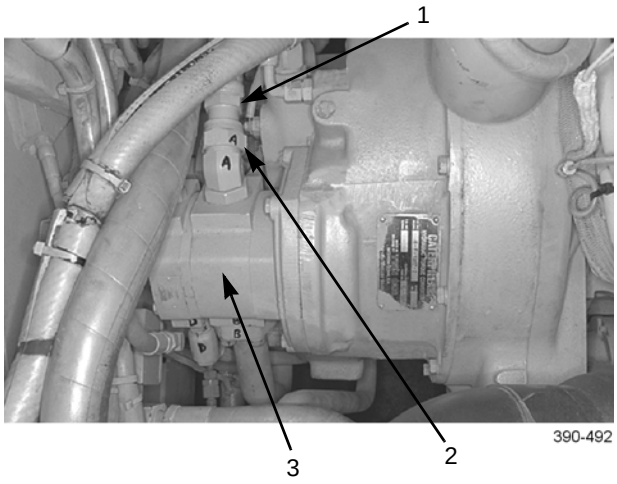
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses to aid in installation.

REMOVAL

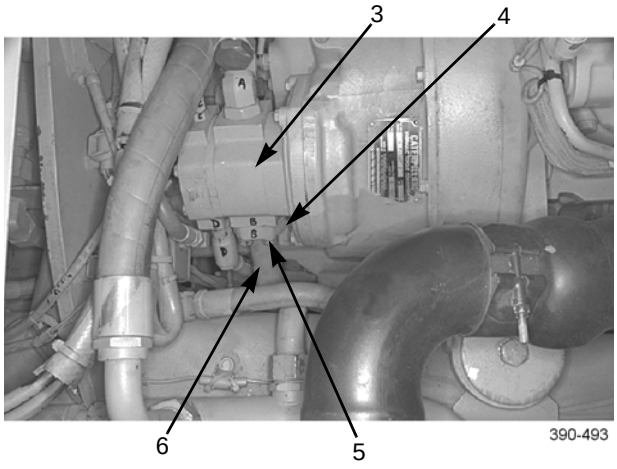
NOTE

Discard all O-rings removed when hoses and tubes are disconnected from pump.

1. Loosen retaining nut (2) and disconnect hose (1) from pump (3).

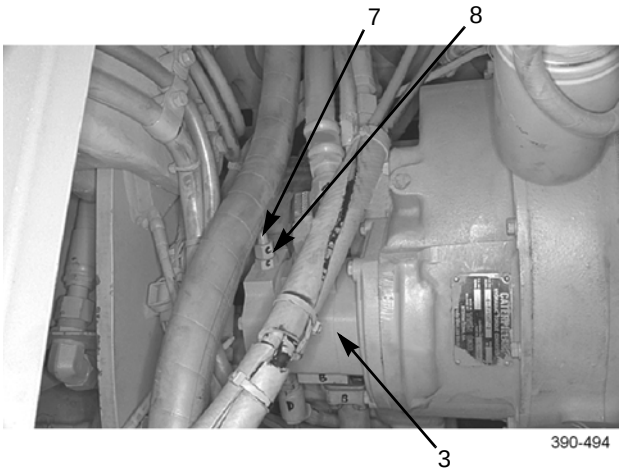


2. Remove four flange bolts (5) and flange (4) from pump (3). Disconnect tube (6) from pump.

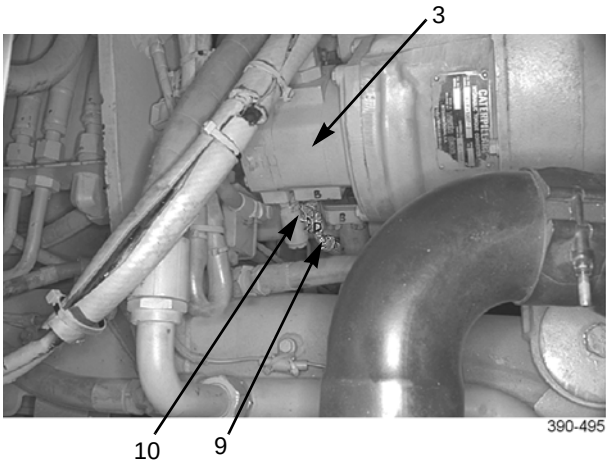


REMOVAL - CONTINUED

3. Loosen retaining nut (8) and disconnect hose (7) from pump (3).



4. Loosen retaining nut (10) and disconnect hose (9) from pump (3).



REMOVAL - CONTINUED



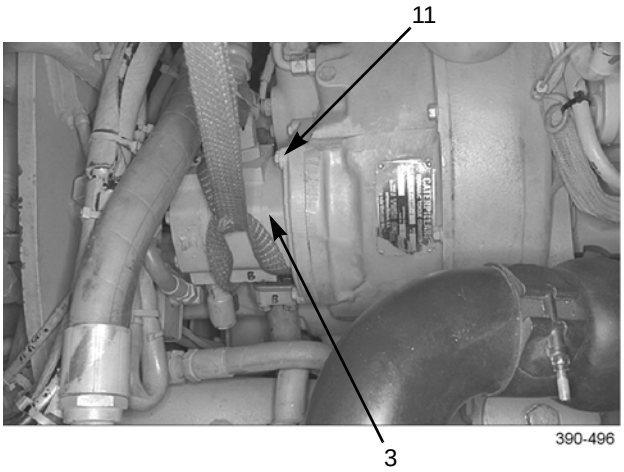
WARNING

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 lift 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

Pump weighs 50 lb (23 kg).

5. Attach a nylon sling and suitable hoist to pump (3). Remove four bolts (11) and pump (3) from torque converter.



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 lift 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

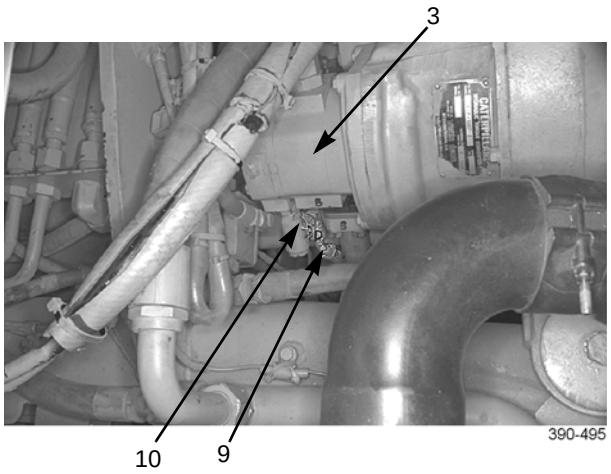
Pump weighs 50 lb (23 kg).

1. Attach a nylon sling and suitable hoist to pump (3) and position pump at torque converter.

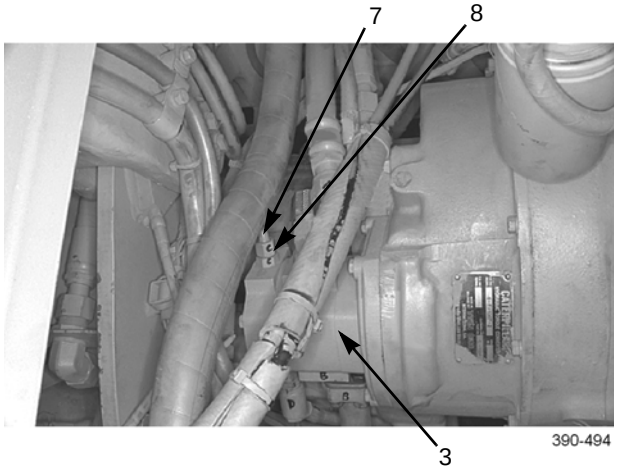
NOTE

Lightly coat new O-rings with clean oil prior to making hose and tube connections to pump.

2. Install pump (3) to torque converter with four bolts (11). Tighten bolts to 36 lb-ft (49 Nm)
3. Connect hose (10) to pump (3) and tighten retaining nut (11).

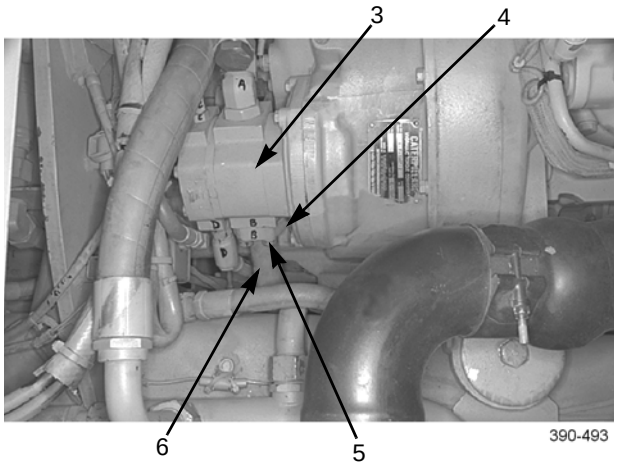


4. Connect hose (7) to pump (3) and tighten retaining nut (8).

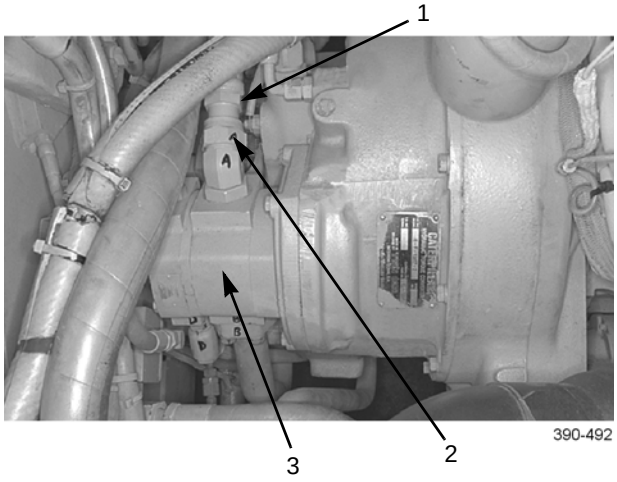


INSTALLATION - CONTINUED

5. Connect tube (6) to pump (3).
6. Install flange (4) on pump (3) with four flange bolts (5).



7. Connect hose (1) to pump (3) and tighten retaining nut (2).



8. Check transmission oil level and fill as necessary (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

9. Operate transmission and check for leaks.
10. Install rear guard plate (WP 0100 00)

END OF WORK PACKAGE

UPPER PROP SHAFT REPLACEMENT 0150 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Materials/Parts - Continued

Rag, wiping (Item 31, WP 0171 00)

References

WP 0010 00

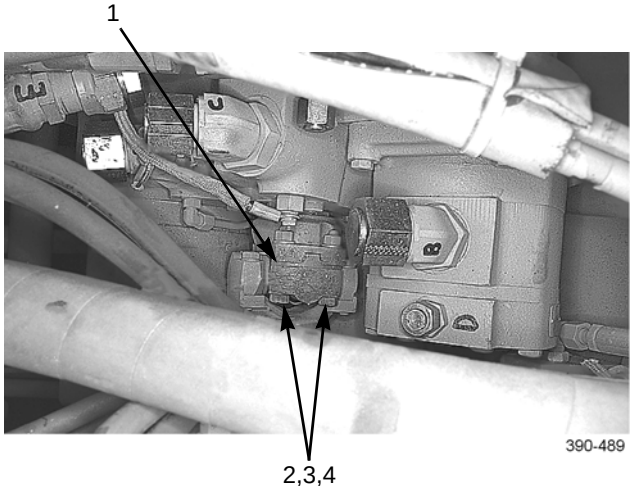
Equipment Condition

Transmission/transfer assembly removed (WP 0147 00)

Rear guard removed (WP 0100 00)

REMOVAL

Remove eight nuts (2), washers (3), bolts (4) and drive shaft slip joint (1) from machine.



INSTALLATION

1. Install drive shaft slip joint (1) on machine with eight bolts (4), washers (3), and nuts (2). Tighten nuts to 40 lb-ft (55 Nm).
2. Apply GAA grease to upper prop shaft grease fitting (WP 0010 00).
3. Install transmission/transfer assembly (WP 0147 00).
4. Install rear guard (WP 0100 00).

END OF WORK PACKAGE

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FRONT AXLE ASSEMBLY REPLACEMENT 0151 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Jack, dolly type, hydraulic (Item 17, WP 0172 00)

Pump, hydraulic ram, hand driven (Item 21, WP 0172 00)

Tools and Special Tools - Continued

Stand assembly (Item 28, WP 0172 00)

Personnel Required

Three

Equipment Condition

Lower prop shaft removed (WP 0076 00)

Final drive removed (WP 0077 00)

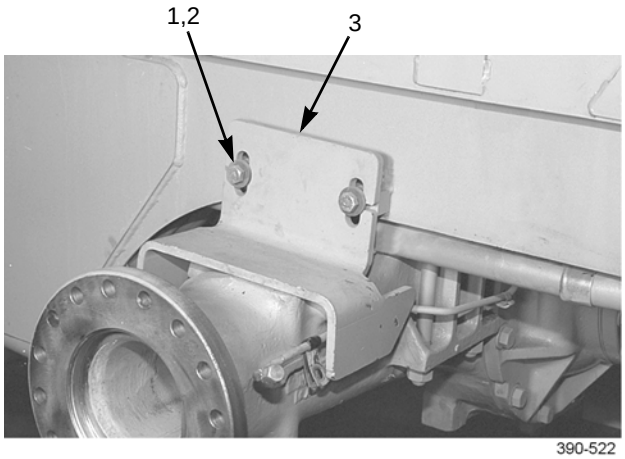
Tires and rims removed (WP 0096 00)

NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

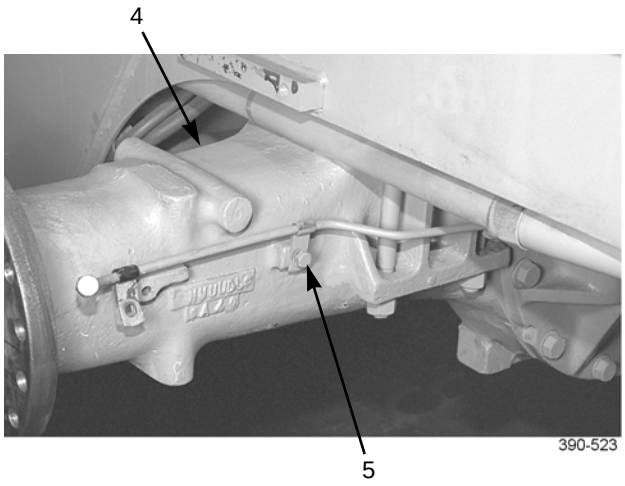
REMOVAL

1. Remove two bolts (1), washers (2), and guard (3) from machine. Repeat for other side of machine.

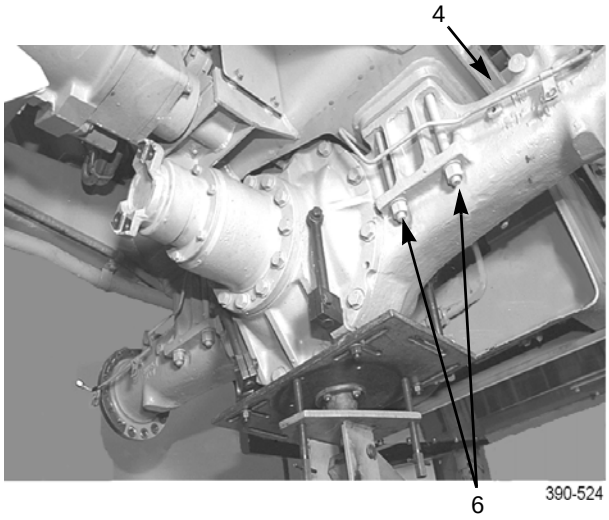


REMOVAL - CONTINUED

2. Remove bolt (5) and clip from axle housing (4). Repeat step on other side of machine.



3. Position hydraulic jack under axle housing (4) and remove four nuts (6) from axle housing. Repeat step on other side of machine.



WARNING

Use extreme care 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 lift 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

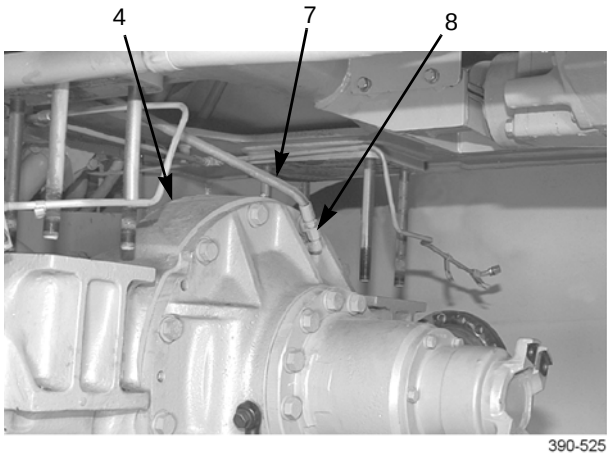
Axle housing weighs 650 lb (295 kg).

REMOVAL - CONTINUED

CAUTION

Use care when lowering axle housing to expose hose. Failure to follow this caution will result in damage to hose.

4. Carefully lower axle housing (4) until differential lock air hose (7) is exposed. Loosen retaining nut (8) and disconnect hose from axle housing. Remove axle assembly from machine.



INSTALLATION



WARNING

Use extreme care 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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

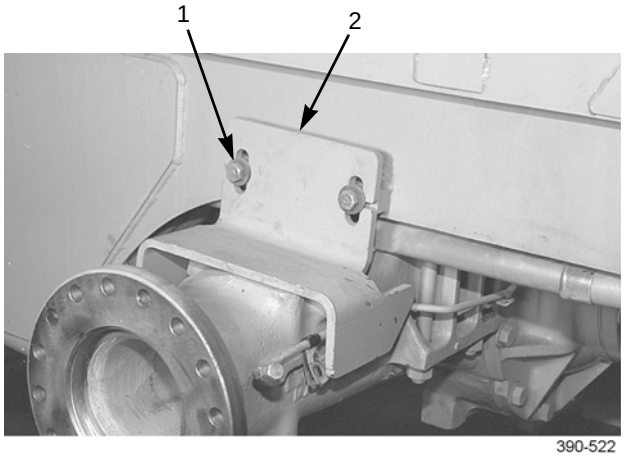
NOTE

Axle housing weighs 650 lb (295 kg).

1. Raise axle assembly to machine until differential lock air hose (7) can be connected to axle housing (4). Tighten retaining nut (8).
2. Install four nuts (6) on axle housing (3). Repeat for other side of machine.
3. Install bolt (5) and clip on axle housing (3). Repeat for other side of machine.

INSTALLATION - CONTINUED

4. Install guard (3) on machine with two washers (2) and bolts (1). Repeat for other side of machine.



5. Install lower prop shaft (WP 0076 00).
6. Install final drive (WP 0077 00).
7. Install tires and rims (WP 0096 00).

END OF WORK PACKAGE

DIFFERENTIAL AND BEVEL GEAR REPLACEMENT 0152 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Adapter, mechanical puller (Item 1, WP 0172 00)

Jack, dolly type, hydraulic (Item 17, WP 0172 00)

Pump, hydraulic ram, hand driven (Item 21, WP 0172 00)

Stand, maintenance (Item 29, WP 0172 00)

Stand, maintenance (Item 30, WP 0172 00)

Pin, guide, threaded, 3/4 in. x 12 in. long (4)

Materials/Parts

Brake fluid (Item 4, WP 0171 00)

Oil, lubricating (Item 21, 22 or 23, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

O-ring

Personnel Required

Two

References

WP 0009 00

Equipment Condition

Differential drained (WP 0010 00)

Front axle shafts removed (WP 0078 00)

Lower prop shaft removed (WP 0076 00)

Rear guard plate removed (WP 0100 00)



WARNING

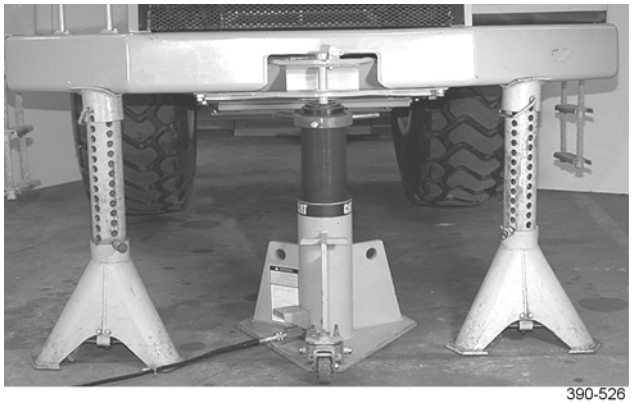
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

NOTE

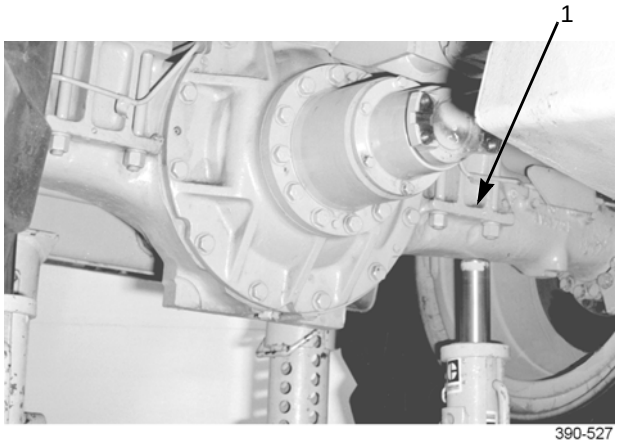
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.

REMOVAL

1. Position lift stands and hydraulic jack under machine frame. Raise machine 4 in. (10 cm).

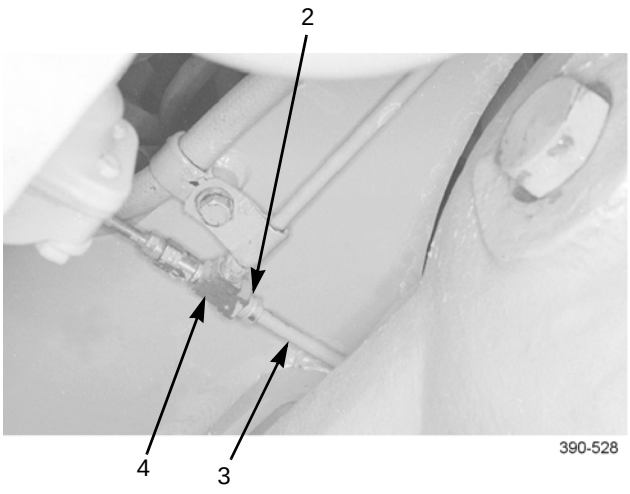

390-526

2. Position hydraulic jack under axle housing (1).



390-527

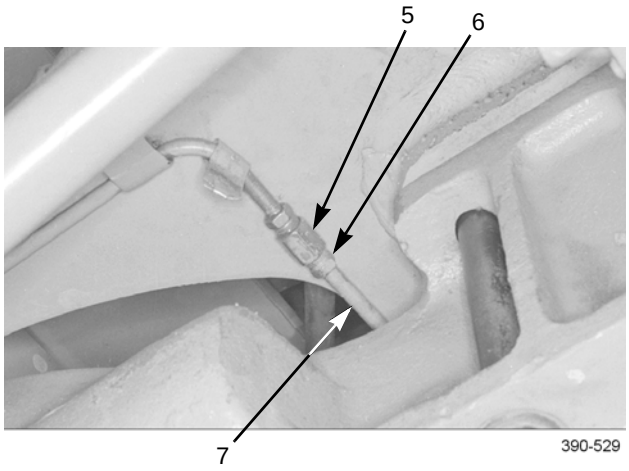
3. Loosen retaining nut (2) and disconnect tube (3) from adapter (4).



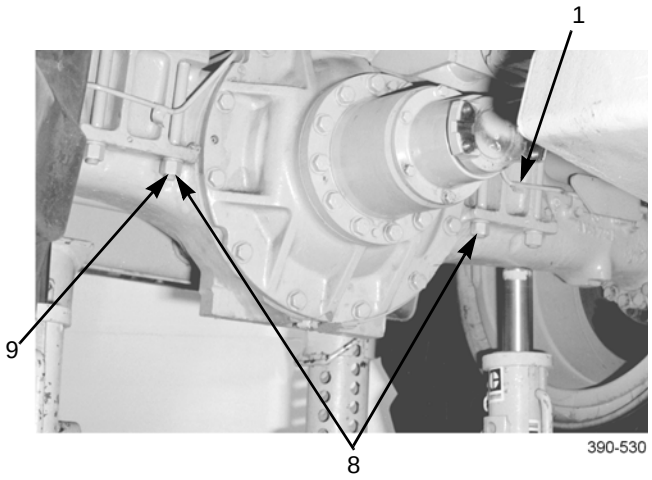
390-528

REMOVAL - CONTINUED

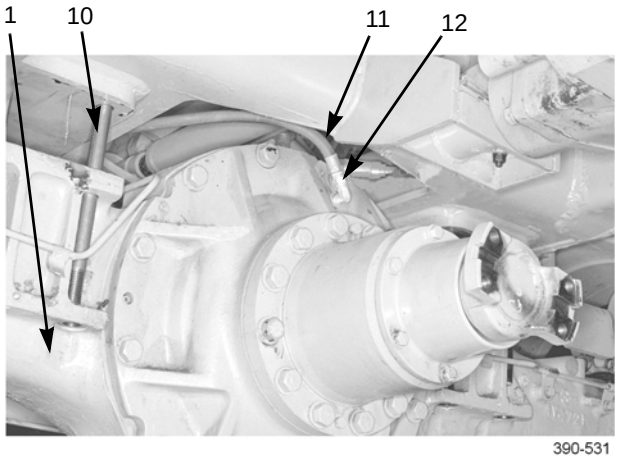
4. Loosen retaining nut (6) and disconnect tube (7) from adapter (5).



5. Remove four inner nuts (8) from the axle housing (1).
6. Remove four inner bolts (9).
7. Install four guide pins (10) in place of removed inner bolts (9).
8. Remove four remaining outer nuts (8).

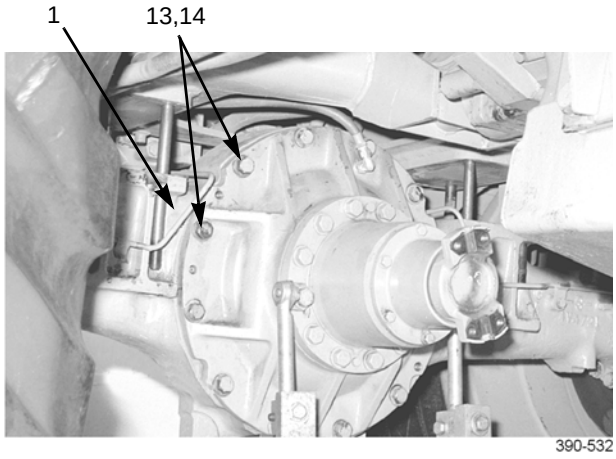


9. Carefully and slowly lower axle housing (1) until hose (11) is exposed. Loosen retaining nut (12) and disconnect hose.



REMOVAL - CONTINUED

10. Position floor jack under differential and remove ten bolts (13) and washers (14). Leave two bolts installed at top of differential to hold differential in axle housing (1).



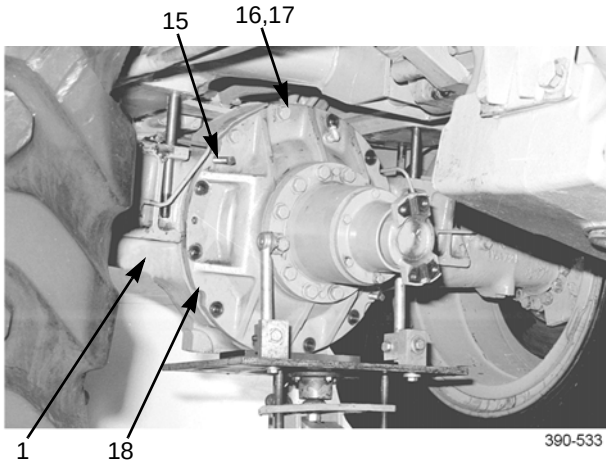
WARNING

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procdure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy suitable lift 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

Differential weighs 450 lb (204 kg).

11. Install two 3/8” - 16 NC forcing screws (15) on differential and remove two remaining in top bolts (16) and washers (17) from differential. Use forcing screws to remove differential from axle housing (1). Remove forcing screws.
12. Remove and discard O-ring (18).



INSTALLATION

1. Coat new O-ring with oil and install.



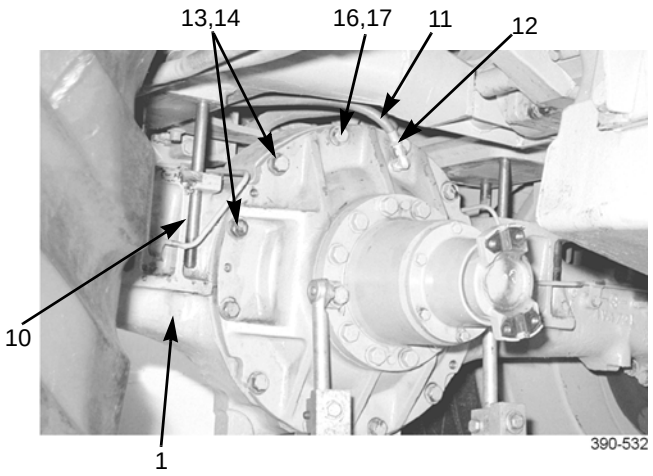
WARNING

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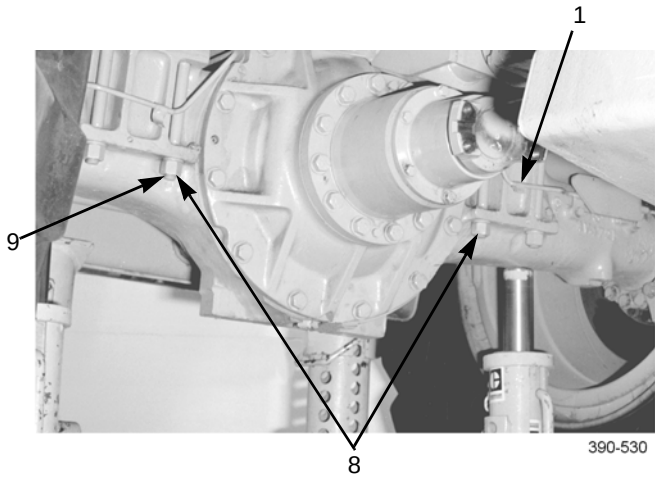
NOTE

Differential weighs 450 lb (204 kg).

2. Install differential on axle housing (1) with ten bolts (13), washers (14), two top bolts (16), and washers (17). Tighten bolts to 200 lb-ft (270 Nm). Remove floor jack from differential.
3. Slowly and carefully raise axle housing (1), using guide pins (10) to assist in aligning axle housing. Connect hose (11) to differential and tighten retaining nut (12).
4. Loosely install four outer nuts (8) on axle housing (1).
5. Remove four guide pins (10) and inner four inner bolts (9).

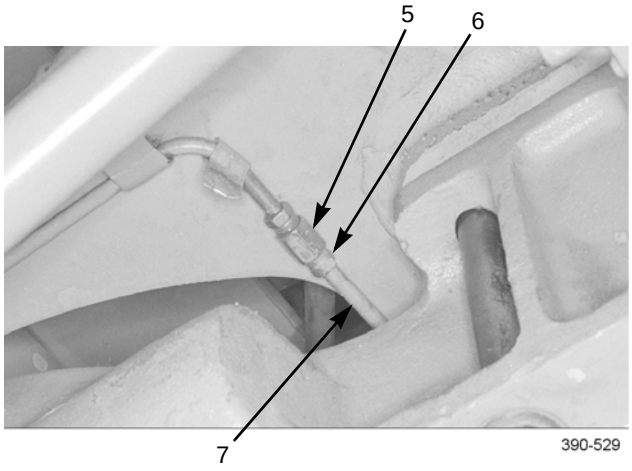


6. Install four inner nuts (8) on axle housing (1). Tighten all eight nuts.

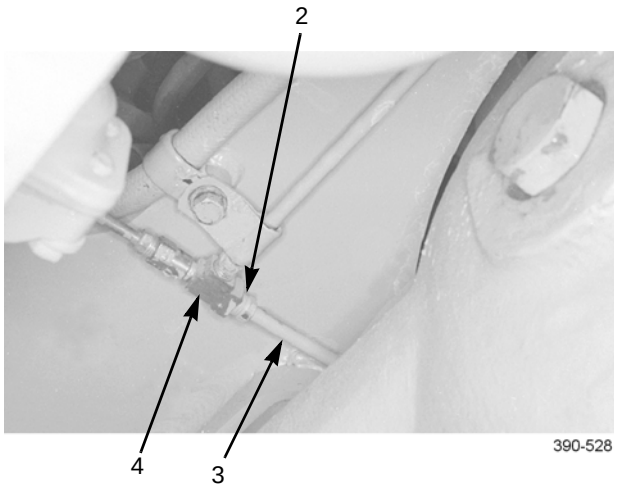


INSTALLATION - CONTINUED

7. Connect tube (7) to adapter (5) and tighten retaining nut (6).



8. Connect tube (3) to adapter (4) and tighten retaining nut (2).



9. Lower machine to ground. Remove floor jacks and hydraulic lift from machine.
10. Fill differential (WP 0009 00 and WP 0010 00).
11. Bleed brake system (WP 0095 00).
12. Install lower prop shaft (WP 0076 00).
13. Install front axle shafts (WP 0078 00).
14. Operate machine and check for leaks.
15. Install rear guard plate (WP 0100 00).

END OF WORK PACKAGE

STEERING HYDRAULIC CYLINDERS REPLACEMENT 0153 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Personnel Required

Two

References

WP 0009 00

WP 0010 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulics. Failure to do so could result in injury.

CAUTION

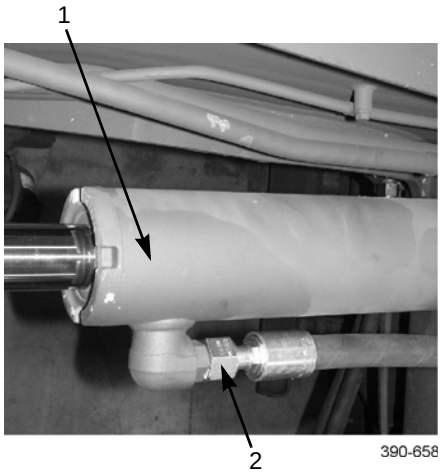
Cap hoses to prevent fluid loss and contamination of hydraulic system.

NOTE

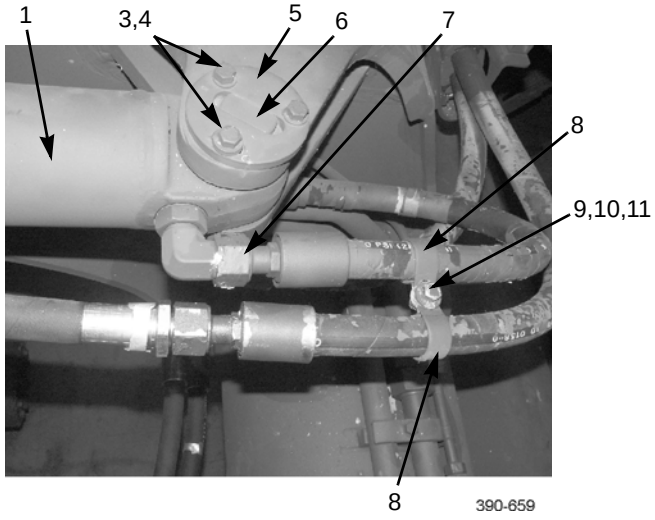
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag hoses, wires to aid in installation.

REMOVAL

1. Relieve hydraulic system pressure by moving steering wheel in both directions.
2. Disconnect hose (2) from steering cylinder (1).



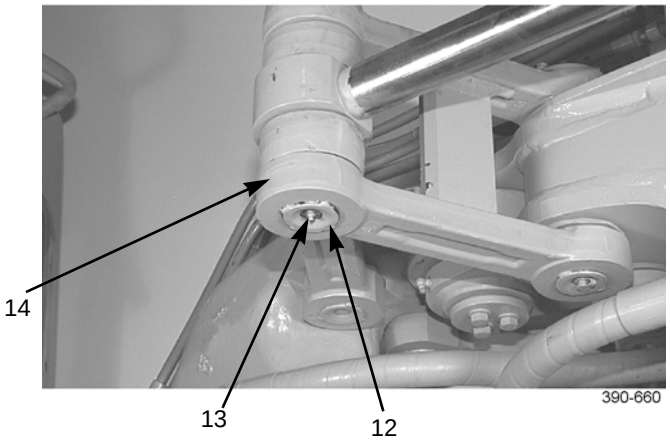
3. Remove nut (9), bolt (10), and washer (11). Separate two clamps (8) to free up hose (7).
4. Disconnect hose (7) from fitting at steering cylinder (1).
5. Attach nylon sling and suitable lifting device to steering cylinder (1) to support cylinder.
6. Remove six bolts (3), washers (4), two plates (5), and shaft (6) from steering cylinder (1).



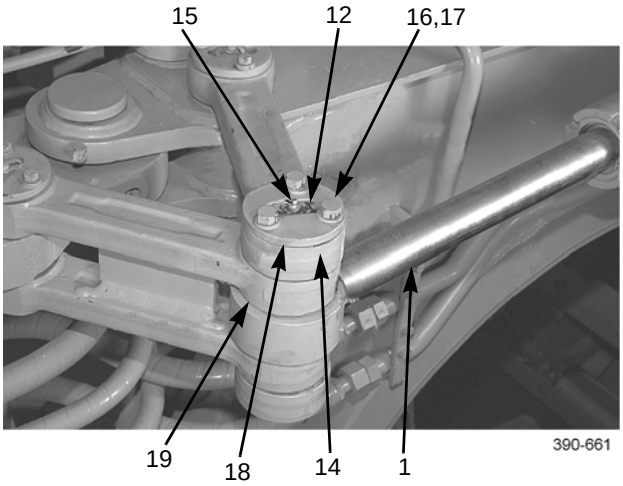
STEERING HYDRAULIC CYLINDERS REPLACEMENT - CONTINUED 0153 00

REMOVAL - CONTINUED

7. Remove grease fitting (13) from shaft (12) on underside of link (4).



8. Remove grease fitting (15) from shaft (12) on top of link (14).
9. Remove three bolts (16), washers (17), and plate (18) from link (14).



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 lift 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

- Steering cylinder weighs 120 lb (54 kg).
- Note quantity, thickness, and location of shims to ensure correct installation.

10. Remove shaft (12) from steering cylinder (1) and lower cylinder to the ground. Remove shims (19).

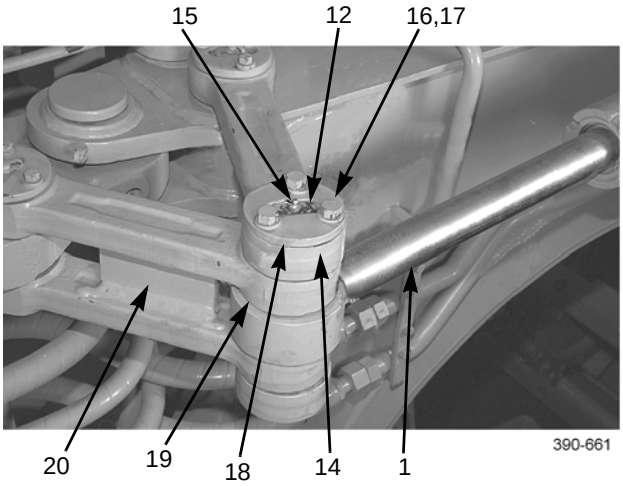
WARNING

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 lift 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

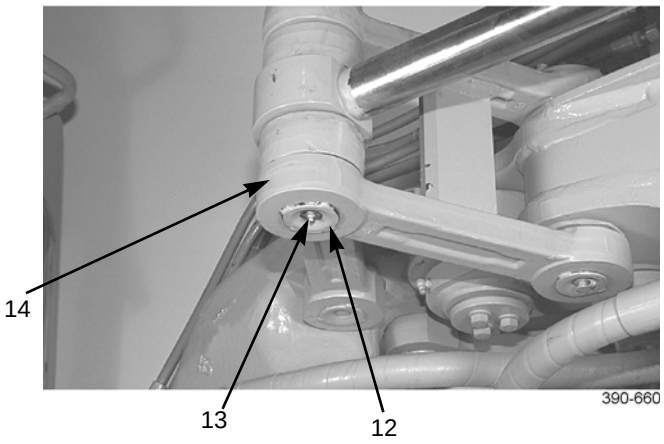
- Steering cylinder weighs 120 lb (54 kg).
- Ensure same quantity and thickness of shims are installed as were removed, and in the same location.

1. Attach nylon sling and a suitable lifting device to steering cylinder (1) and raise into position.
2. Install steering cylinder (1) on steering links (14 and 20) with shaft (12).
3. Install grease fitting (15) on shaft (12).
4. Install plate (18) on link (14) with three washers (17) and bolts (16).

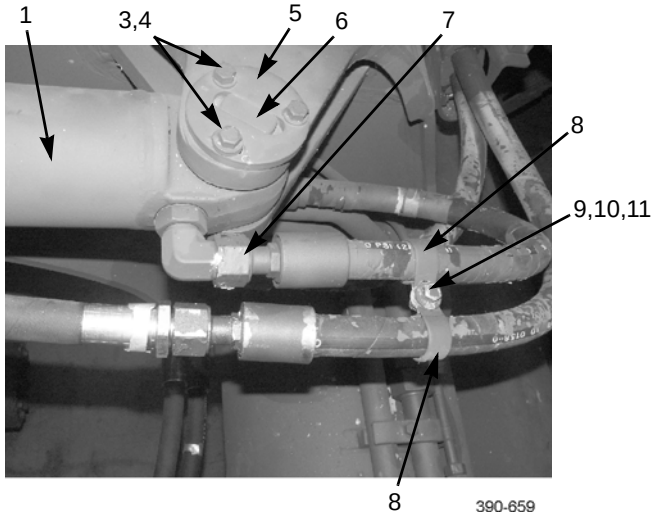


INSTALLATION - CONTINUED

5. Install grease fitting (13) on shaft (12) on underside of link (14).

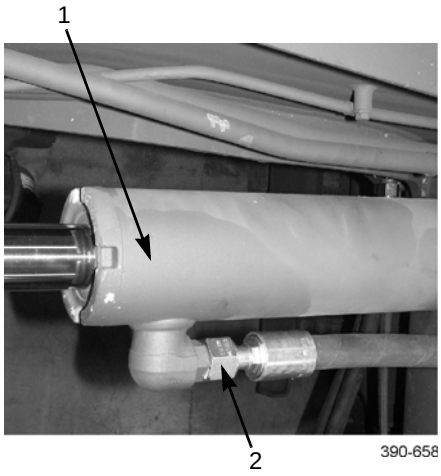


6. Align steering cylinder (1) and install shaft (6).
7. Install two plates (5) with six washers (4) and bolts (3).
8. Remove nylon sling and lifting device from steering cylinder (1).



INSTALLATION - CONTINUED

9. Connect hose (7) to fitting at steering cylinder (1).
10. Connect hose (2) to steering cylinder (1).
11. Install bolt (10), washer (11), and nut (9) to assemble two clamps (8).



12. Check hydraulic oil level in tank and add oil as required (WP 0009 00 and WP 0010 00).
13. Cycle steering system to purge out air and check for leaks.

END OF WORK PACKAGE

STEERING HYDRAULIC CONTROL VALVE REPLACEMENT 0154 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (4)

Personnel Required

Two

References

WP 0009 00

WP 0010 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hydraulic tank drained (WP 0010 00)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- 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.

CAUTION

Cap all hoses and tubes to prevent fluid loss and contamination of oil system.

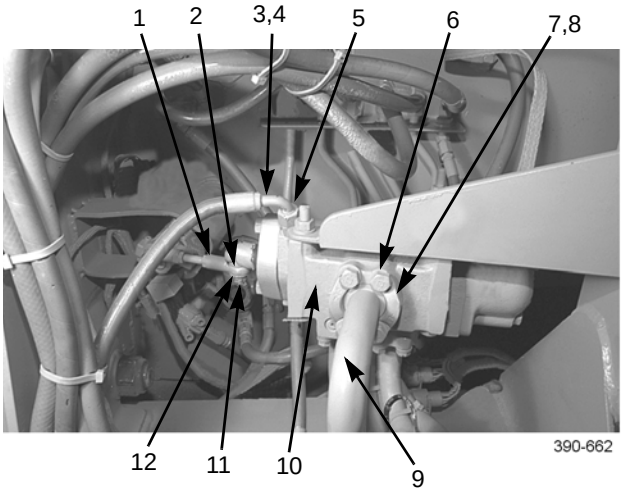
NOTE

- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation. Remove tiedown straps as required and discard.

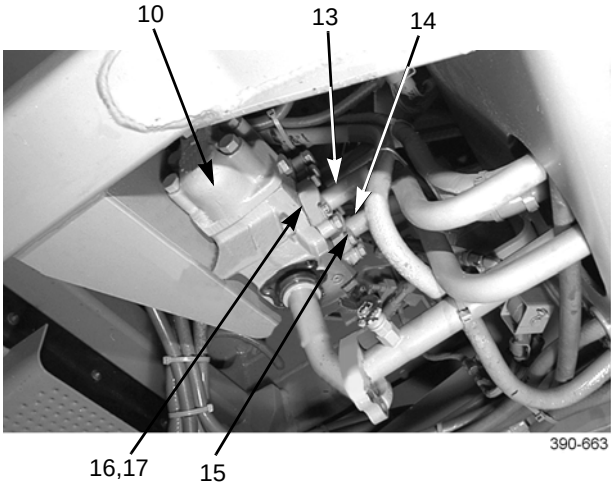
STEERING HYDRAULIC CONTROL VALVE REPLACEMENT - CONTINUED 0154 00

REMOVAL

1. Relieve hydraulic system pressure by moving steering wheel in both directions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove cotter pin (11), nut (12), bolt (2), and yoke rod end (1) from steering control valve (10). Discard cotter pin.
3. Loosen retaining nut (5) and remove hose (3) and O-ring (4) from steering control valve (10). Discard O-ring.
4. Remove four bolts (6), washers, flange (7) and O-ring (8) from steering control valve (10). Discard O-ring.
5. Remove tube (9) from steering control valve (10).

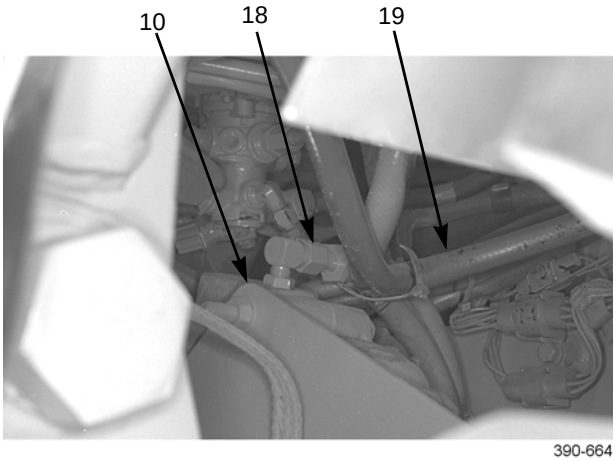


6. Remove four bolts (15), washers, flange (16), and O-ring (17) from steering control valve (10). Discard O-ring.
7. Remove tube (13) from steering control valve (10).
8. Repeat steps 5 and 6 to remove tube (14) from steering control valve (10).



REMOVAL - CONTINUED

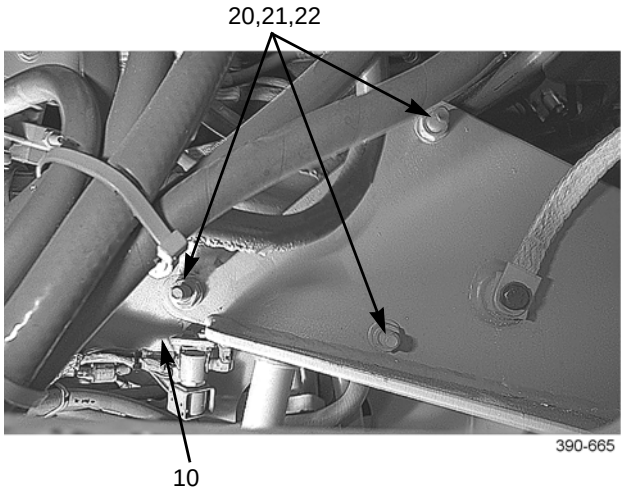
9. Loosen retaining nut (18) and remove hose (19) from steering control valve (10).



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.

10. With assistance, remove three nuts (20), washers (21), bolts (22), and steering control valve (10) from machine.



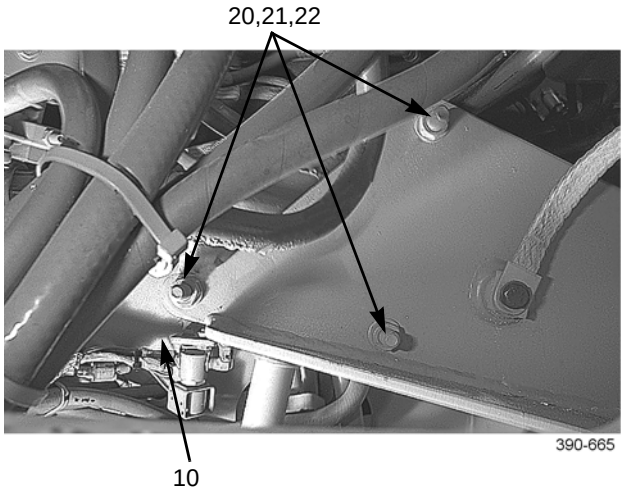
INSTALLATION



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.

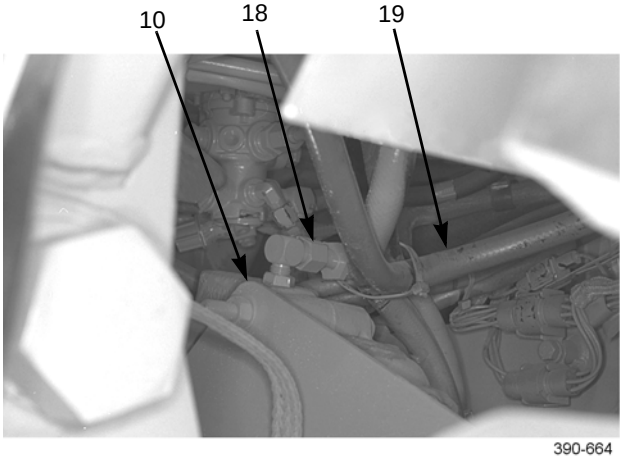
1. With assistance, install steering control valve (10) on machine with three bolts (22), washers (21), and nuts (20).



NOTE

Install new tiedown straps as required.

2. Position hose (19) on steering control valve (10) and tighten retaining nut (18).

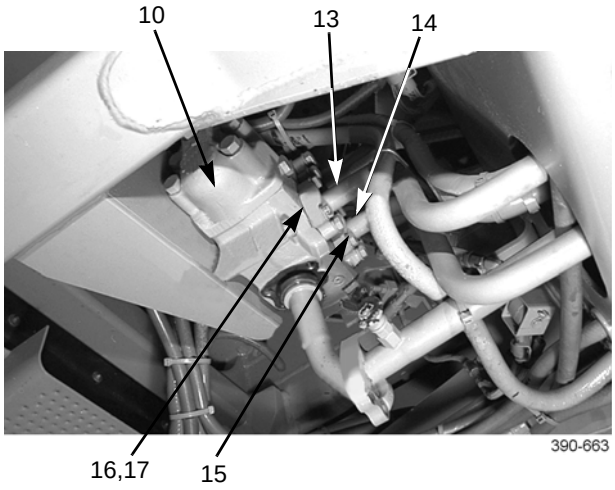


INSTALLATION - CONTINUED

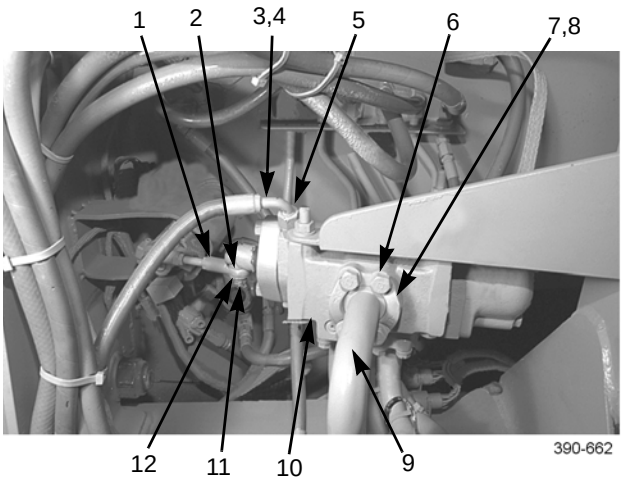
NOTE

Lubricate all new O-rings with clean oil prior to installation.

3. Position tube (13) on steering control valve (10) and install flange (16) and new O-ring (17) with four washers and bolts (15).
4. Repeat step 3 to install tube (14) on steering control valve (10).



5. Position tube (9) on steering control valve (10) and install flange (7) and new o-ring (8) with four washers and bolts (6).
6. Position hose (3) and new O-ring (4) on steering control valve (10) and tighten retaining nut (5).
7. Install yoke rod end (1) on steering control valve (10) with bolt (2), nut (12), and new cotter pin (11).



8. Fill hydraulic tank (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

9. Operate steering system and check for leaks.

END OF WORK PACKAGE

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DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT 0155 00

THIS WORK PACKAGE COVERS

Draft Frame: Draft Frame Removal, Draft Frame Bearings Replacement, Draft Frame Installation

Hitch and Tractor Frame: Hitch Removal, Hitch Bearings Replacement, Tractor Frame Bearings Replacement, Hitch Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Link (Item 17, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Fuel (Item 13, 14 or 15, WP 0171 00)

Grease, GAA (Item 16, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

Lockwasher

O-ring (as required)

Personnel Required

Three

Equipment Condition

Machine on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Rear wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl/water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Draft frame supported by an overhead lift or two lift stands

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake manually released (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Air tanks drained (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Hitch lock block assemblies installed (Refer to *External Air Transport by CH-47 Helicopter*, TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING

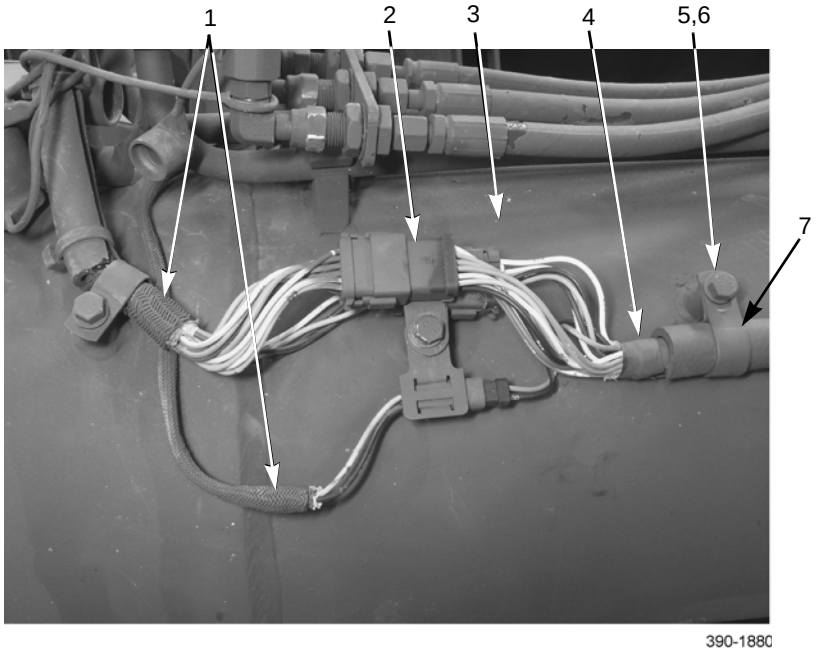
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.
- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fluids. Fuel may ignite, causing damage to machine and injury or death to personnel.
- Do NOT disconnect any air system lines or fittings unless vehicle engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Always wear eye protection when disconnecting air lines. Residual air will be expelled. Failure to follow this warning may result in serious eye injury.

NOTE

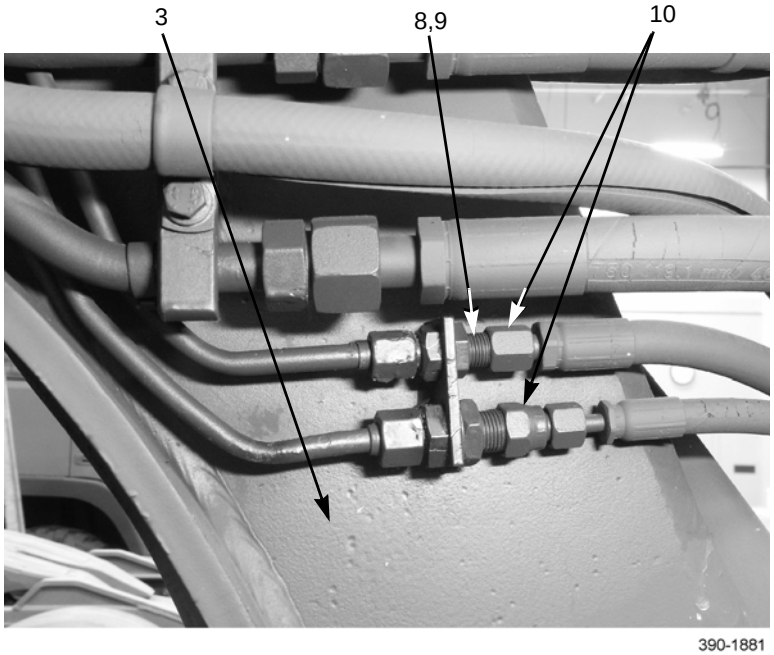
- Tag all lines, hoses, wires, and tubes to aid in installation.
- Cap all lines, hoses and tubes to prevent fluid loss and contamination of oil system.
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Remove tiedown straps as needed and discard. Use new tiedown straps on installation.

DRAFT FRAME REMOVAL

1. At right-front of draft frame (3), disconnect three connectors (2) of tractor wiring harness (4) from two wiring harnesses (1).
2. Remove six screws (5), seven washers (6), nut, and six hose clamps (7) to separate tractor wiring harness (4) from draft frame (3). Coil wiring harness and set aside on tractor.



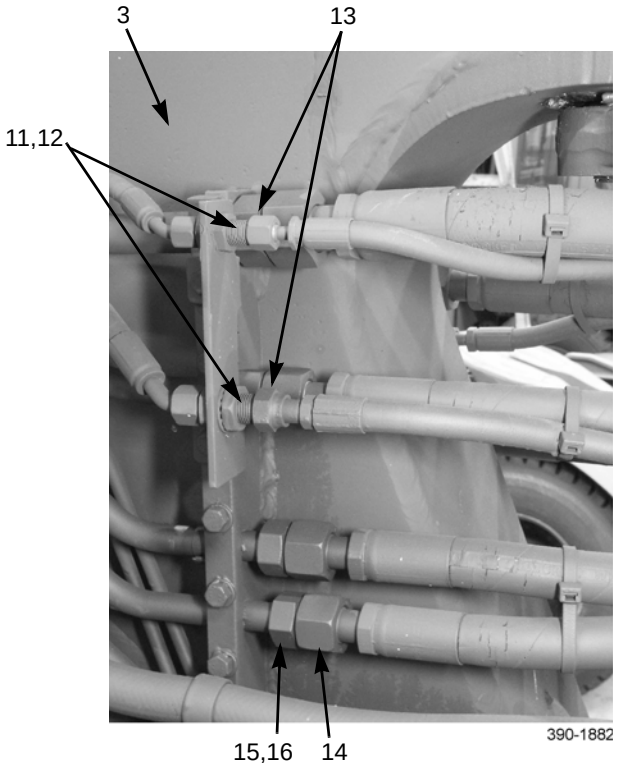
3. At right side of draft frame (3), directly above transmission, tag and disconnect two air hoses (10) from adapters (8). Remove and discard two O-rings (9). Set hoses aside next to hitch.



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

DRAFT FRAME REMOVAL - CONTINUED

4. At upper-right side of draft frame (3), tag and disconnect two fuel hoses (13) from adapters (11). Remove and discard two O-rings (12). Set hoses aside next to hitch.
5. Tag and disconnect five hydraulic hoses (14) from tubes (15). Remove and discard five O-rings (16). Set hoses, including two fuel hoses (13), aside next to hitch.



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

DRAFT FRAME REMOVAL - CONTINUED

6. At left side of draft frame (3), tag and disconnect four hydraulic hoses (17) from tubes (18). Remove and discard four O-rings (19). Move hoses aside out of the way.



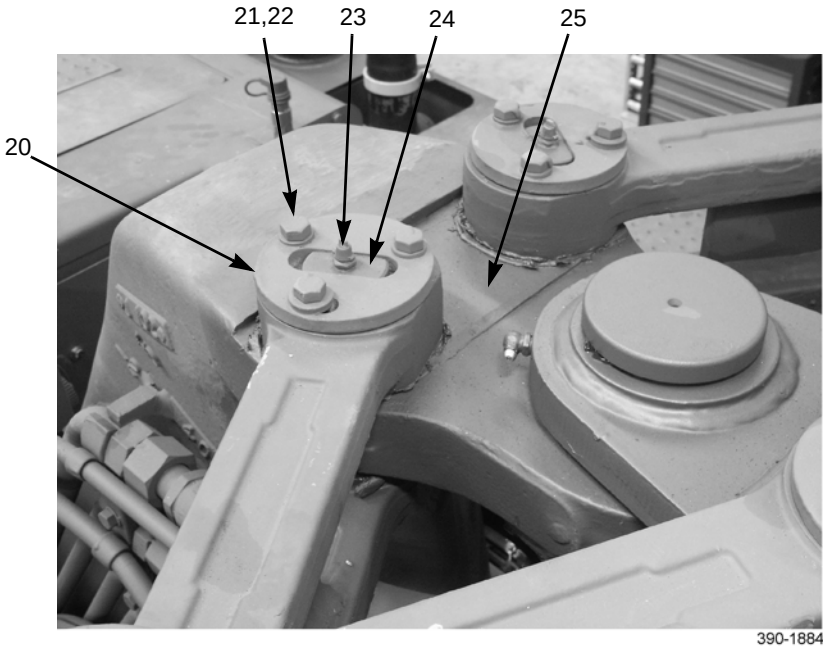
DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

DRAFT FRAME REMOVAL - CONTINUED

NOTE

- Perform following step at two places at top of hitch to disconnect steering linkage from hitch.
- It may be necessary to break or grind off welds to allow removal of bolts.
- Shafts can be removed upward from hitch.

7. Remove grease fitting (23), three bolts (21), washers (22), retainer plate (20), and shaft (24) from hitch (25).



8. Position forklift truck facing machine at front-center of bumper.
9. Raise forks to contact bumper.

CAUTION

Position of chains must secure bumper to forks in a vertical as well as horizontal position. Failure to do so may result in damage to equipment.

10. Attach tiedown chains to secure bumper to forks.

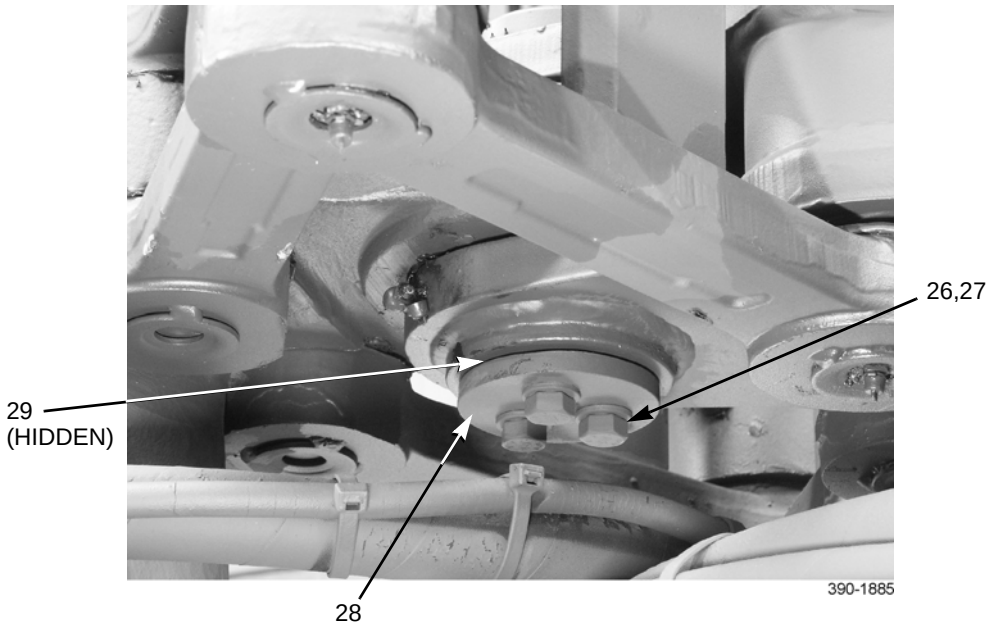
DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

DRAFT FRAME REMOVAL - CONTINUED

NOTE

Perform following steps to remove upper hitch pin holding draft frame to hitch.

11. Remove three bolts (26), washers (27), and retainer plate (28) from upper hitch pin (29).
12. Position wood cribbing and a portable hydraulic jack underneath pin (29). Push upward on hydraulic jack to remove pin.



DRAFT FRAME REMOVAL - CONTINUED

NOTE

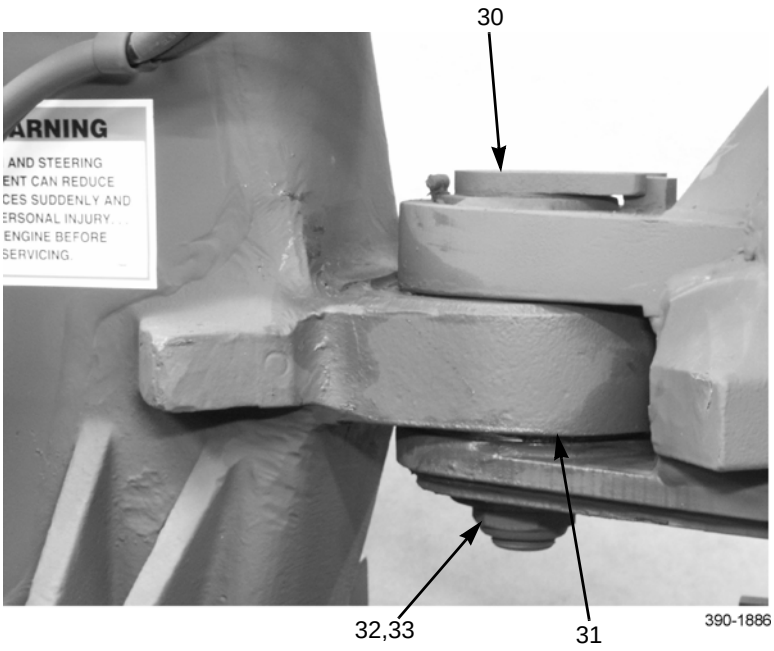
Perform following steps to remove lower hitch pin holding draft frame to hitch.

13. Remove nut (32) and washer (33) from lower hitch pin (30).

NOTE

Note number and position of shims for installation.

14. Using soft-faced hammer, remove lower hitch pin (30) and shims (31).





WARNING

All personnel must stand clear of machine and forklift truck. Failure to follow this warning could result in serious injury or death.

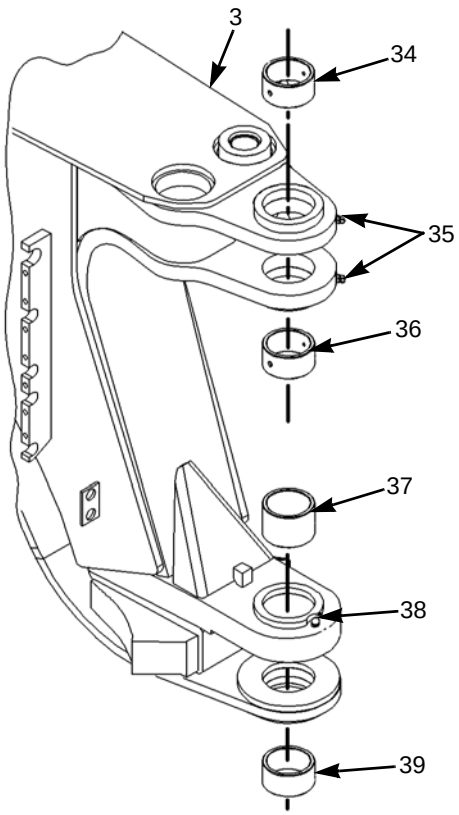
CAUTION

Ensure draft frame is securely supported before separating tractor hitch from draft frame.

15. Using forklift truck, drive in reverse just far enough to separate hitch from draft frame.

DRAFT FRAME BEARINGS REPLACEMENT

1. At lower end of draft frame (3), remove grease fitting (38).
2. Using bearing puller and spacer sleeve, pull upper bearing (37) from draft frame (3).
3. Adjust travel of bearing puller and pull lower bearing (39) from draft frame (3).



NOTE

- Each of two bearings should be centered in draft frame and aligned with grease fitting hole in draft frame.
- Apply GAA grease to bearings before they are installed.

4. Adjust travel of bearing puller and pull lower bearing (39) into draft frame (3).
5. Adjust travel of bearing puller and pull upper bearing (37) into draft frame (3).
6. Install grease fitting (38) to draft frame (3).
7. At upper end of draft frame (3), remove two grease fittings (35).
8. Repeat steps 2 through 5 to replace two bearings (34 and 36) at upper end of draft frame (3).

DRAFT FRAME INSTALLATION



WARNING

All personnel must stand clear of machine and forklift truck. Failure to follow this warning could result in serious injury or death.

NOTE

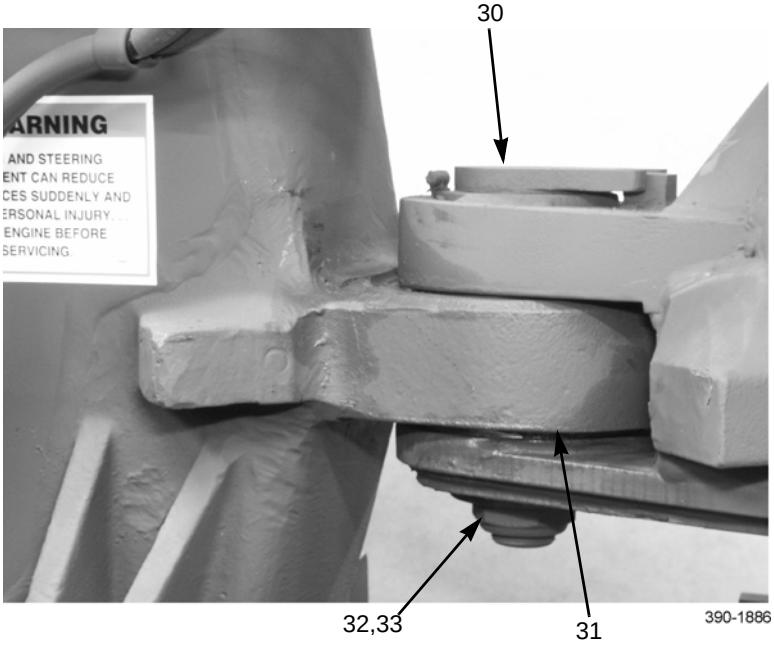
Ensure that two links of steering linkage are positioned to tractor hitch as hitch is installed to draft frame.

1. Using forklift truck, drive forward to join hitch to draft frame.

NOTE

Perform following steps to install lower hitch pin to secure tractor hitch to draft frame.

2. Using soft-faced hammer, install shims (31) and lower hitch pin (30).
3. Install washer (33) and nut (32). Tighten nut to 724-900 lb-ft (980-1220 Nm).



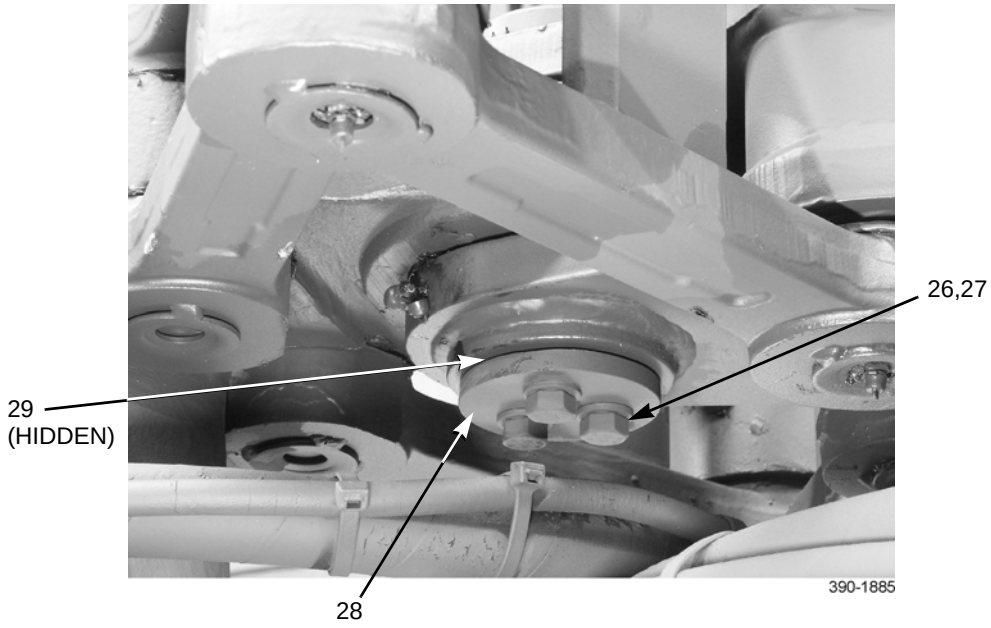
NOTE

Perform following steps to install upper hitch pin to secure tractor hitch to draft frame.

4. Using soft-faced hammer, install upper hitch pin (29).
5. Install retainer plate (28) to pin (29) with three washers (27) and bolts (26).
6. Remove tiedown chains from bumper and forklift truck.
7. Lower forks and remove forklift truck.

DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

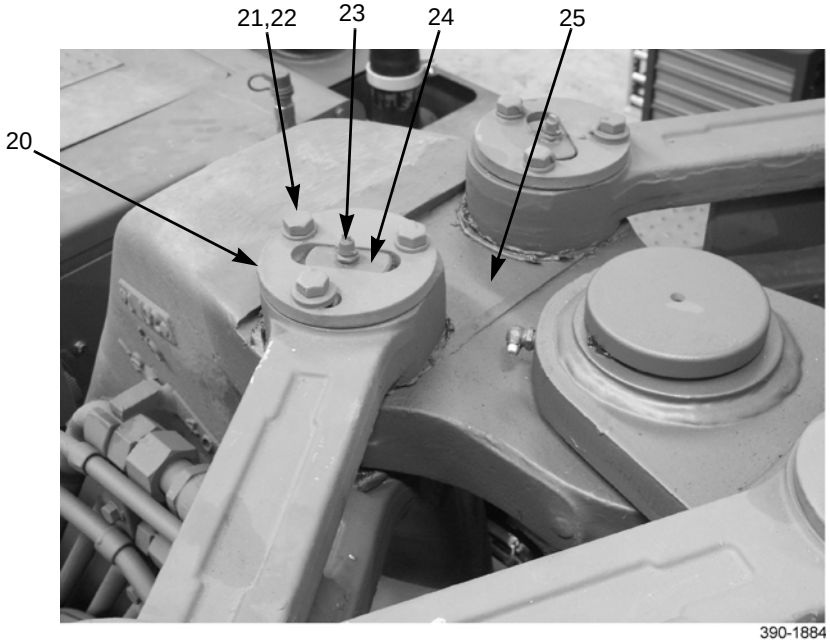
DRAFT FRAME INSTALLATION - CONTINUED



NOTE

- Perform following step at two places at top of tractor hitch to connect steering linkage to hitch.
- Shafts can be installed downward into tractor hitch.

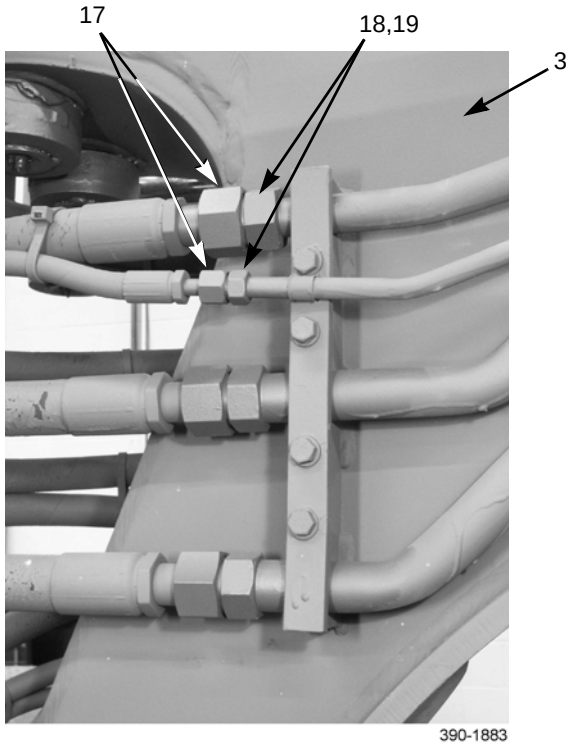
8. Install shaft (24) and retainer plate (20) to hitch (25) with three washers (22) and bolts (21). Install grease fitting (23).



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

DRAFT FRAME INSTALLATION - CONTINUED

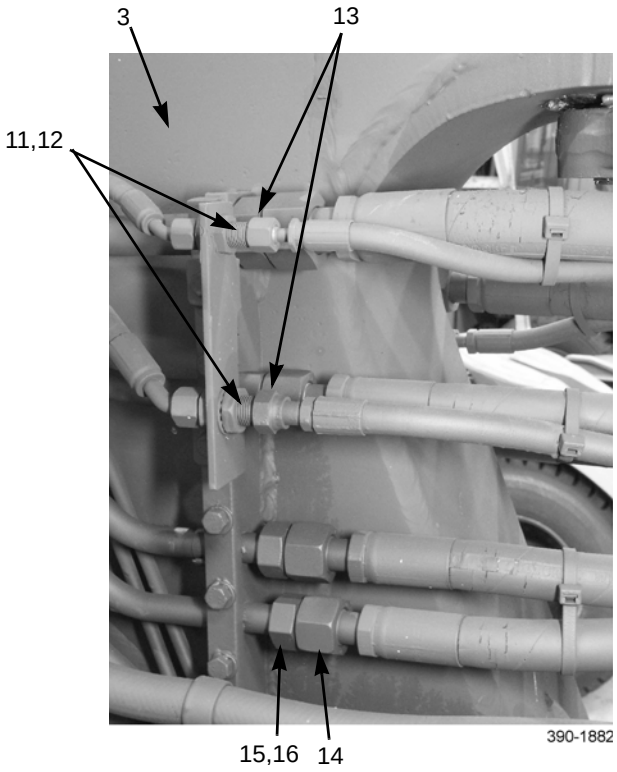
9. At left side of draft frame (3), coat with oil and install four new O-rings (19) and connect four hydraulic hoses (17) to tubes (18).



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

DRAFT FRAME INSTALLATION - CONTINUED

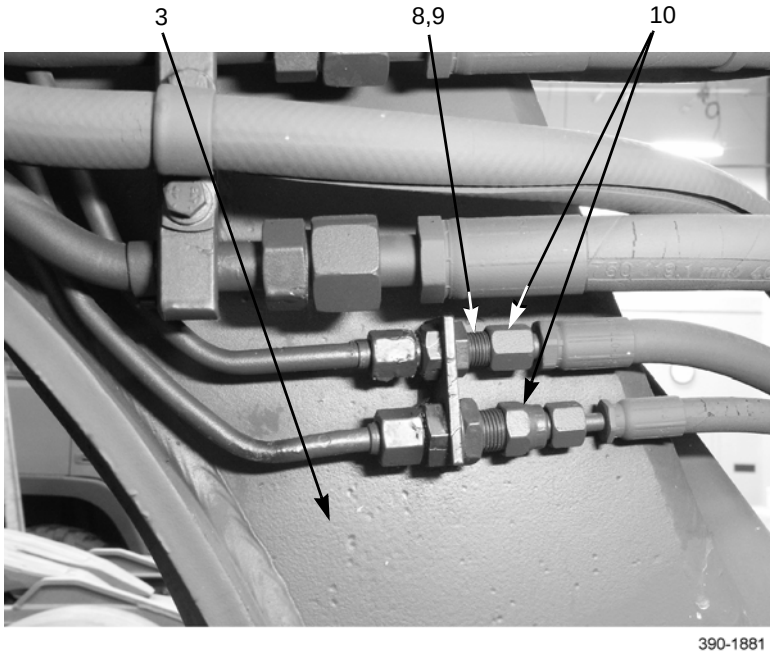
10. At upper-right side of draft frame (3), coat with oil and install five new O-rings (16) and connect five hydraulic hoses (14) to tubes (15).
11. Coat with fuel and install two new O-rings (12) and connect two fuel hoses (13) to adapters (11).



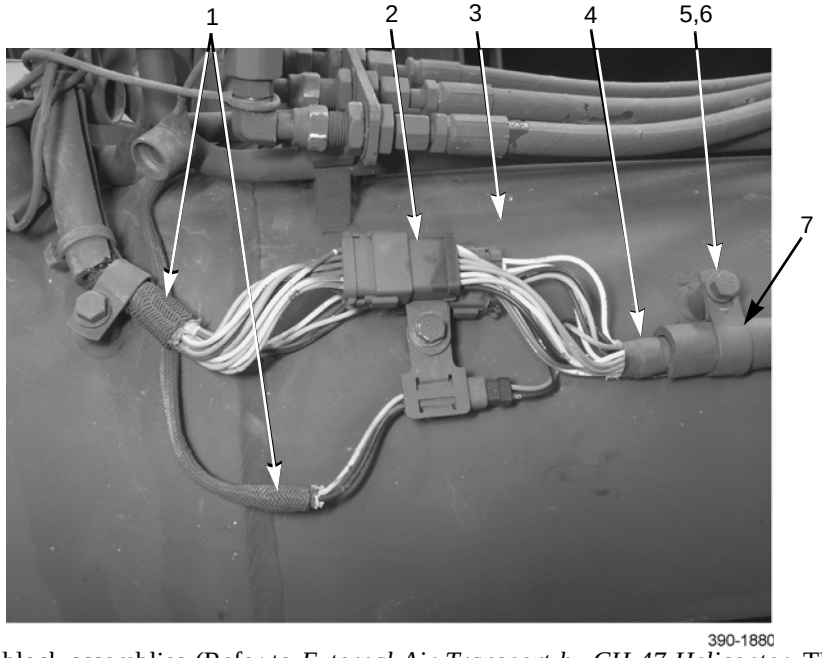
DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

DRAFT FRAME INSTALLATION - CONTINUED

12. At right side of draft frame (3), install two O-rings (9) and connect two air hoses (10) to two adapters (8).



13. Install tractor wiring harness (4) to draft frame (3) with six hose clamps (7), nut, seven washers (6), and six screws (5).
14. Connect three connectors (2) of tractor wiring harness (4) to two wiring harnesses (1).

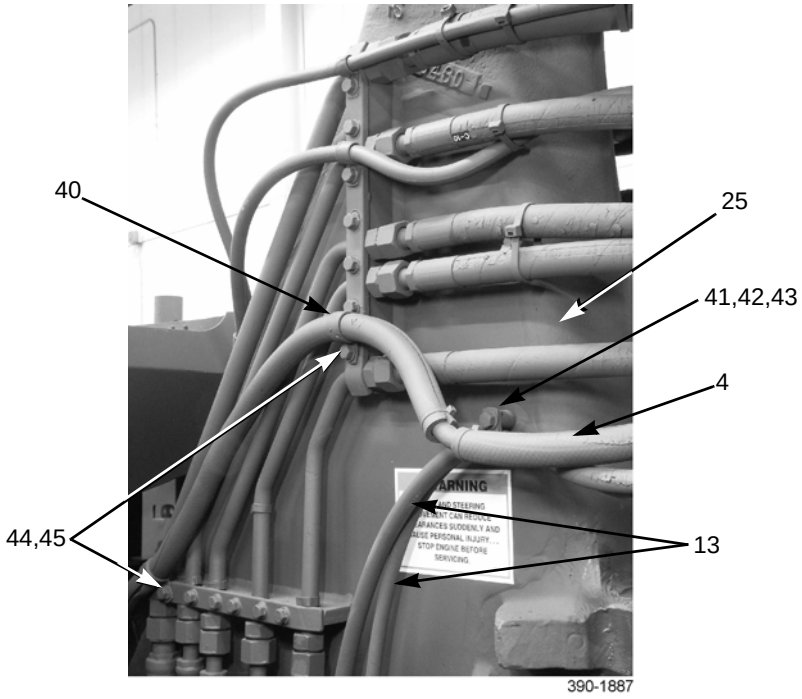


15. Remove hitch lock block assemblies (Refer to *External Air Transport by CH-47 Helicopter*, TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
16. Remove supports from under draft frame.
17. Lubricate hitch and steering linkage grease fittings with GAA grease (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
18. Reconnect parking brake (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

HITCH REMOVAL

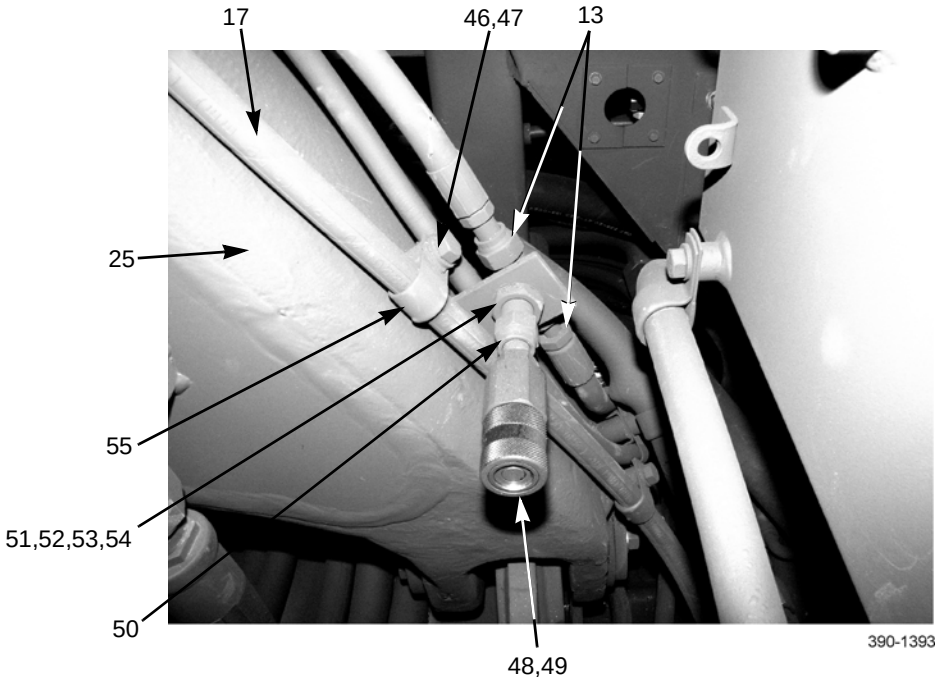
1. Remove draft frame from tractor hitch (Refer to *Draft Frame Removal*).
2. At left side of hitch (25), remove two bolts (44), washers (45), hose clamps (40), and tractor wiring harness (4) from hitch (25). Coil wiring harness and set aside on tractor.
3. Remove two bolts (41), washers (42), four hose clamps (43), and two fuel hoses (13) from hitch (25). Coil hoses and set aside on tractor.



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

HITCH REMOVAL - CONTINUED

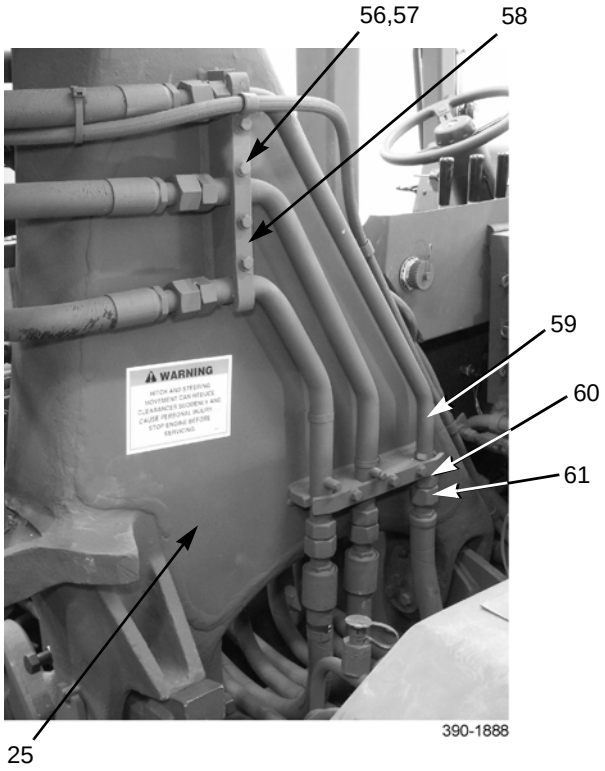
4. At left side and front of hitch (25), remove seven bolts (46), washers (47), eight hose clamps (55), hydraulic hose (17), and two fuel hoses (13) and fuel hose from hitch.
5. Remove auxiliary fuel tank connector (48), O-ring (49), adapter (50), jam nut (51) lockwasher (52) and tee (53) from lower-front of hitch (25). Remove O-ring (54) from tee. Discard O-rings and lockwasher. Coil hoses and set aside on tractor.



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

HITCH REMOVAL - CONTINUED

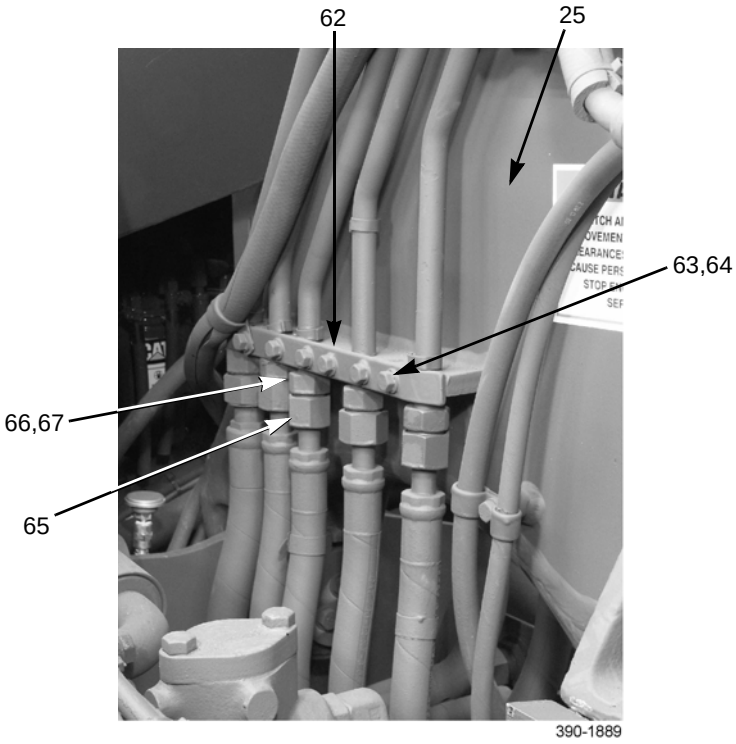
6. At lower-right side of hitch (25), tag and disconnect three hydraulic hoses (61) from tubes (59). Remove and discard three O-rings (60).
7. Remove seven bolts (56), washers (57), two retainers (58), and three tube (59) assemblies from right side of hitch (25).



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

HITCH REMOVAL - CONTINUED

8. At left side of hitch (25), tag and disconnect five hydraulic hoses (65) from tubes (66). Remove and discard five O-rings (67).
9. Remove nine bolts (63), washers (64), two retainers (62), and five tube (66) assemblies from left side of hitch (25).

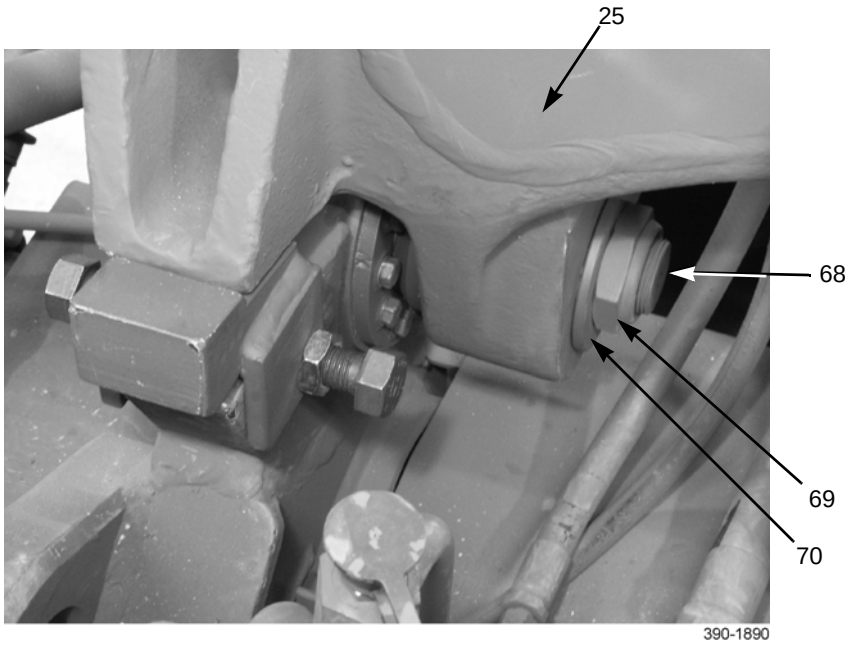


HITCH REMOVAL - CONTINUED

NOTE

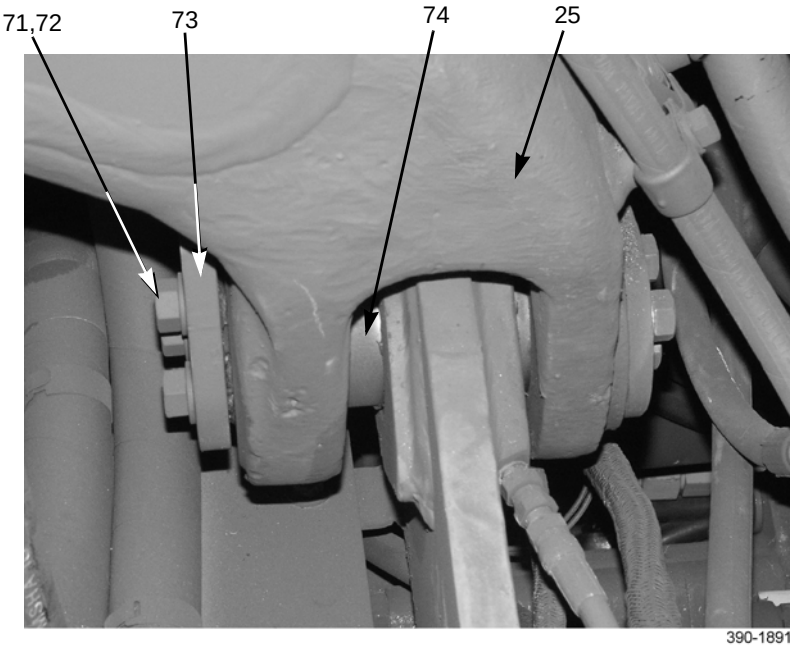
Tractor hitch weighs 625 lb (284 kg).

10. Attach lifting chains and nylon sling to hitch (25) to provide a three-point lift:
    a. Wrap a nylon sling through steering linkage openings at top of hitch.
    b. Install two links to hitch, one on each side, at bottom of hitch.
    c. Attach chains to links and secure chains and nylon sling to overhead lifting device. Take up all slack.
11. At lower-rear of hitch (25), remove nut (69) and washer (70) from pin (68).
12. Using soft-faced hammer, remove pin (68) from hitch (25).



HITCH REMOVAL - CONTINUED

13. At lower-front of hitch (25), remove three bolts (71), washers (72), and retainer plate (73) from each end of pin (74).
14. Using soft-faced hammer, remove pin (74) from hitch (25).





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 or death to personnel.

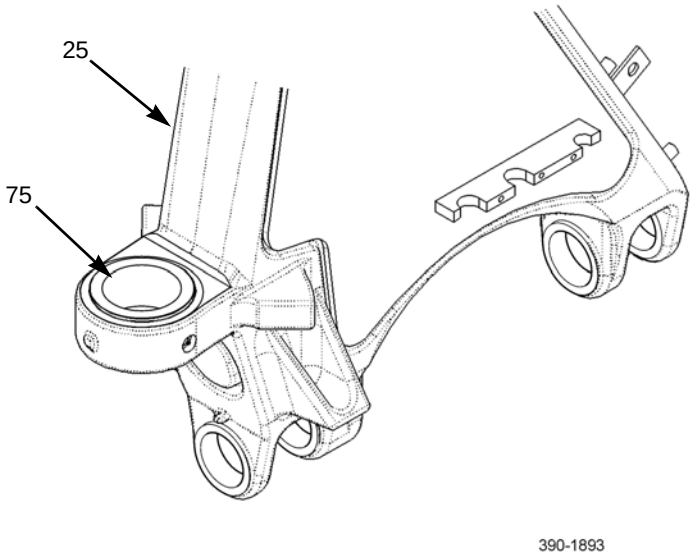
15. Carefully lift hitch (25) from machine and place in safe work area. Remove chains and nylon sling.

HITCH BEARINGS REPLACEMENT

NOTE

Each of two bearings are removed the same way.

1. Using bearing puller and spacer sleeve, pull bearing (75) from hitch (25).



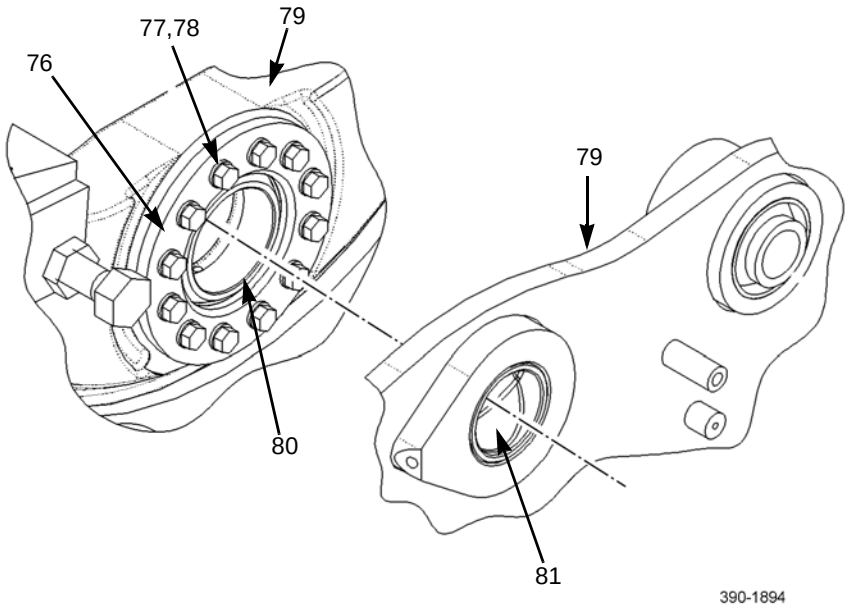
NOTE

- Each of two bearings are installed the same way.
- Apply GAA grease to bearings before they are installed.

2. Adjust travel of bearing puller and turn spacer sleeve around. Pull bearing (75) into hitch (25).

TRACTOR FRAME BEARINGS REPLACEMENT

1. Remove 12 bolts (77), washers (78), and ring (76) from tractor frame (79).
2. Using bearing puller and spacer sleeve, pull spherical bearing (80) from tractor frame (79).
3. Using bearing puller and spacer sleeve, pull bearing (81) from tractor frame (79).



NOTE

Apply GAA grease to bearings before they are installed.

4. Adjust travel of bearing puller and pull bearing (81) into tractor frame (79).
5. Adjust travel of bearing puller and pull spherical bearing (80) into tractor frame (79).
6. Install ring (76) to tractor frame (79) with 12 washers (78) and bolts (77).

HITCH INSTALLATION



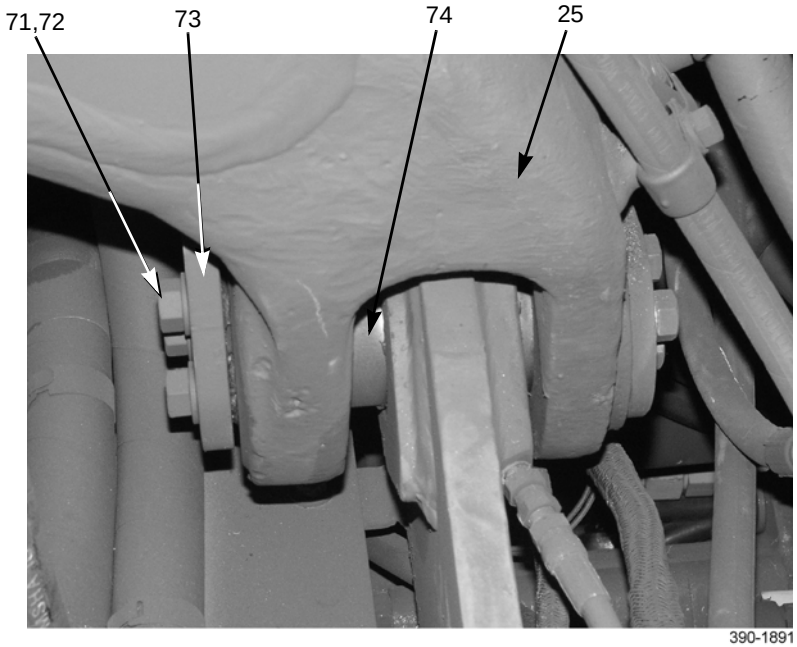
WARNING

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 or death to personnel.

NOTE

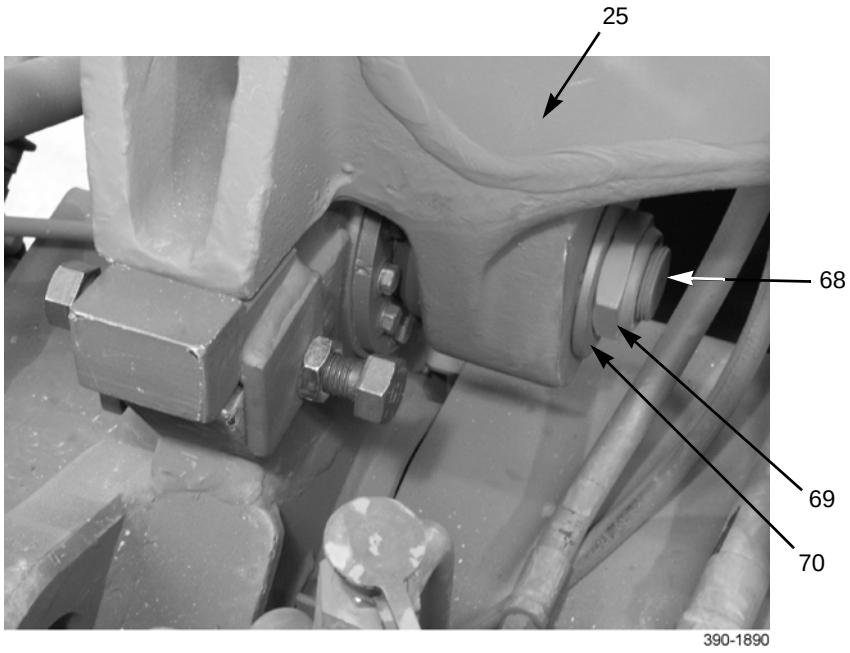
Tractor hitch weighs 625 lb (284 kg).

1. Attach lifting chains and nylon sling to hitch (25) to provide a three-point lift:
   a. Wrap a nylon sling through steering linkage openings at top of hitch.
   b. Install two links to hitch, one on each side, at bottom of hitch.
   c. Attach chains to links and secure chains and nylon sling to overhead lifting device. Take up all slack.
2. Carefully lift hitch (25) and position hitch to machine.
3. At lower-front of hitch (25), use soft-faced hammer to install pin (74) to hitch.
4. Install retainer plate (73) to each end of pin (74) with three washers (72) and bolts (71).



HITCH INSTALLATION - CONTINUED

5. At lower-rear of hitch (25), use soft-faced hammer to install pin (68) to hitch.
6. Install washer (70) and nut (69) to pin (68). Tighten nut to 693-753 lb-ft (940-1020 Nm).



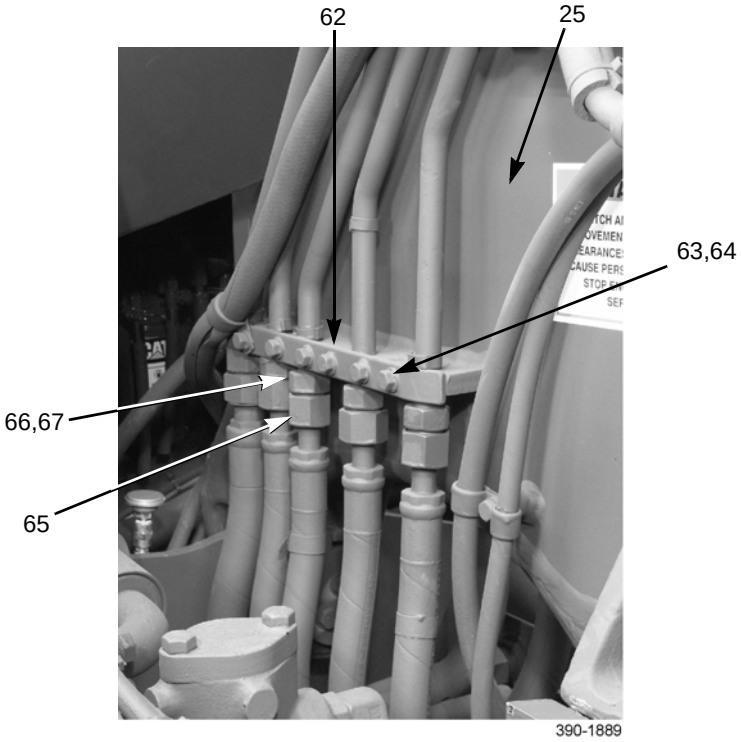
7. Remove chains, links, and nylon sling from hitch (25).
8. At left side of hitch (25), install five tube (66) assemblies with two retainers (62) and nine washers (64) and bolts (63).

NOTE

New O-rings used at hydraulic connections should be lightly coated with oil before installation.

9. Install five new O-rings (67) and five hydraulic hoses (65) to tubes (66).

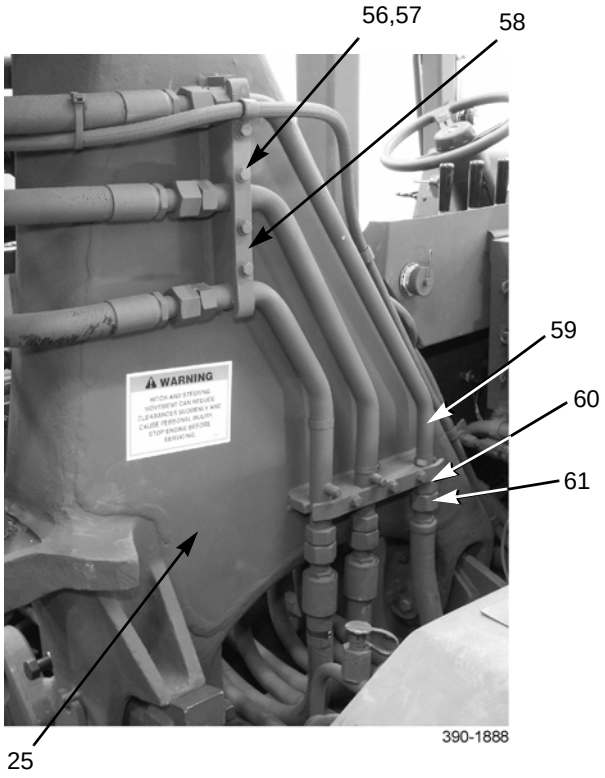
HITCH INSTALLATION - CONTINUED



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

HITCH INSTALLATION - CONTINUED

10. At right side of hitch (25), install three tube (59) assemblies with two retainers (58), six washers (57), and bolts (59).
11. At lower-right side of hitch (25), install three new O-rings (60) and connect three hydraulic hoses (61) to tubes (59).



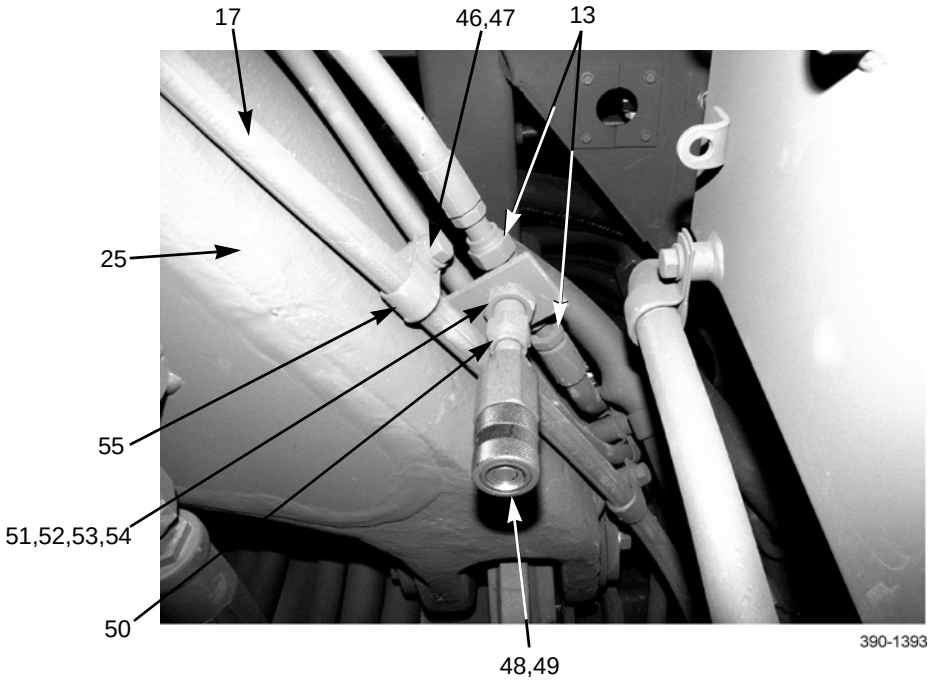
DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED **0155 00**

HITCH INSTALLATION - CONTINUED

NOTE

New O-rings used at fuel connections should be lightly coated with fuel before installation.

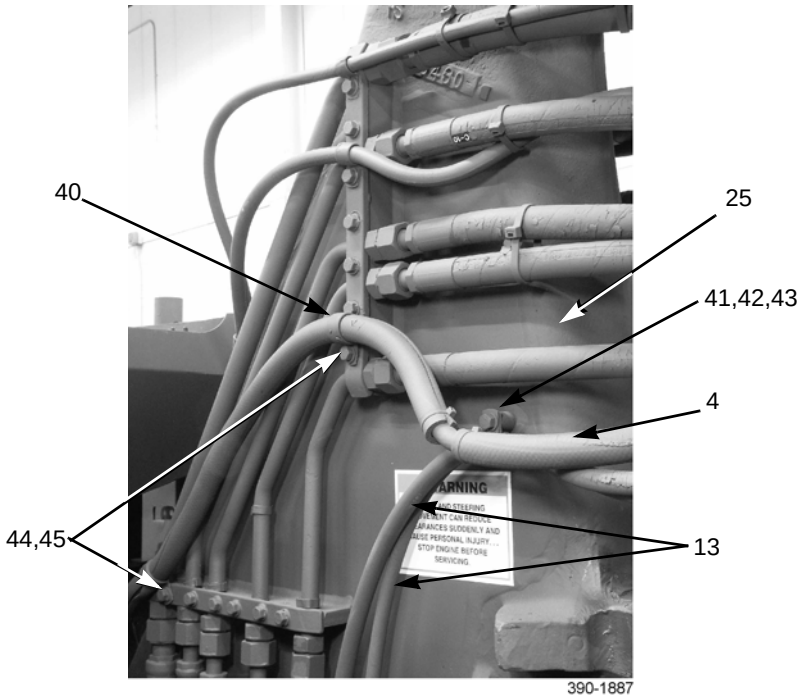
12. At lower-front of hitch (25), install new O-ring (54) to tee (53) and install tee, new lockwasher (52), jamnut (51), adapter (50), new O-ring (49), and auxiliary fuel tank connector (48).
13. At left side and front of hitch (25), install two fuel hoses (13), fuel hose, and hydraulic hose (17) with eight hose clamps (55) and seven washers (47) and bolts (46).



DRAFT FRAME, HITCH, AND TRACTOR FRAME PINS AND BEARINGS REPLACEMENT - CONTINUED 0155 00

HITCH INSTALLATION - CONTINUED

14. At left side of hitch (25), install two fuel hoses (13) with four hose clamps (43), two washers (42), and bolts (41).
15. Install tractor wiring harness (4) to hitch (25) with two hose clamps (40), washers (45), and bolts (44).



16. Install draft frame (Refer to *Draft Frame Installation*).
17. Lubricate hitch grease fittings with GAA grease (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

STEERING LINK REPLACEMENT 0156 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field automotive (Item 23, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Personnel Required

Two

Equipment Condition

Tractor and scraper/water distributor in line with each other

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

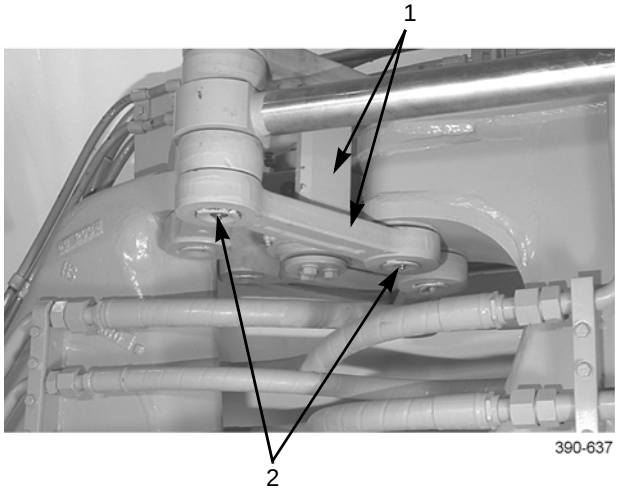
Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

NOTE

This work package describes replacement of two steering links from one side of machine. Steering links on other side are replaced the same way.

REMOVAL

1. Remove two grease fittings (2) from underside of steering link (1).



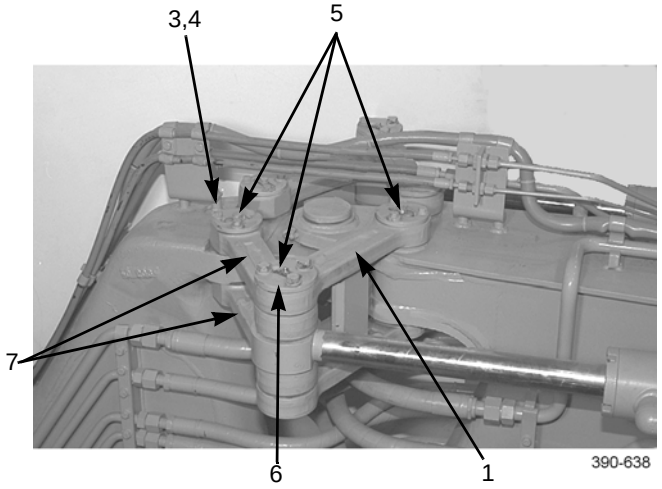
REMOVAL - CONTINUED

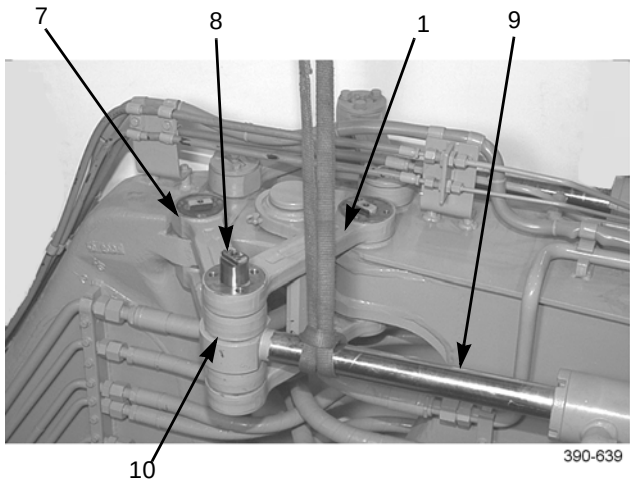
2. Remove three grease fittings (5) from top of steering links (1 and 7).
3. Remove nine bolts (3), washers (4) and three plates (6) from steering links (1 and 7).

NOTE

Note quantity, thickness and location of shims to ensure correct installation.

4. Attach nylon sling and suitable lifting device to steering cylinder (9) to support cylinder. Use a hammer and brass drift to remove shaft (8) and shims (10) from steering links (1 and 7) and steering cylinder (9).







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

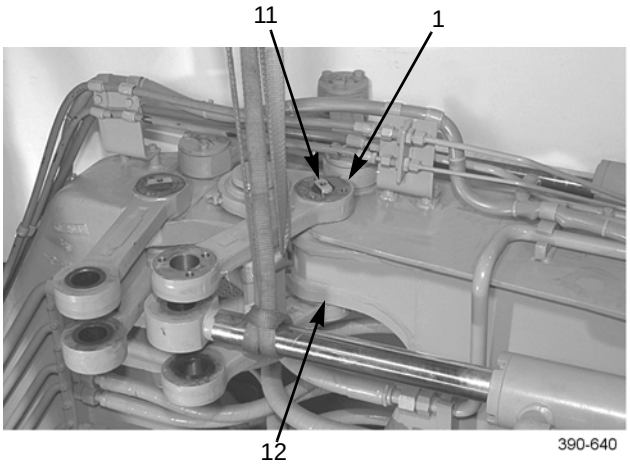
Each steering link weighs 33 lb (15 kg).

5. Attach nylon sling and suitable lifting device to support steering link (1).

NOTE

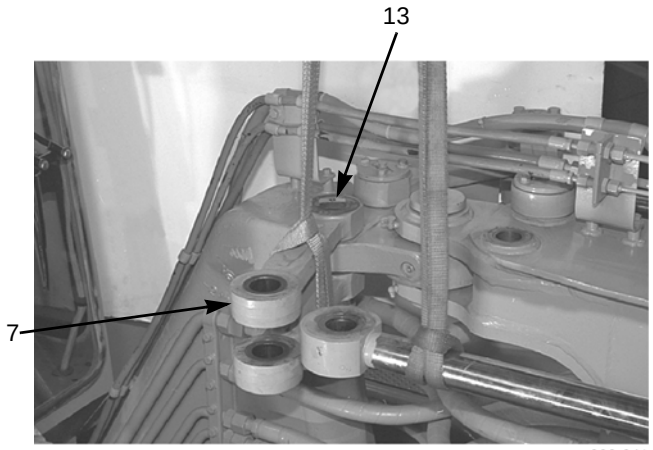
Note quantity, thickness and location of shims to ensure correct installation.

6. Use a hammer and brass drift to remove shaft (11), shims (12), and steering link (1) from machine.

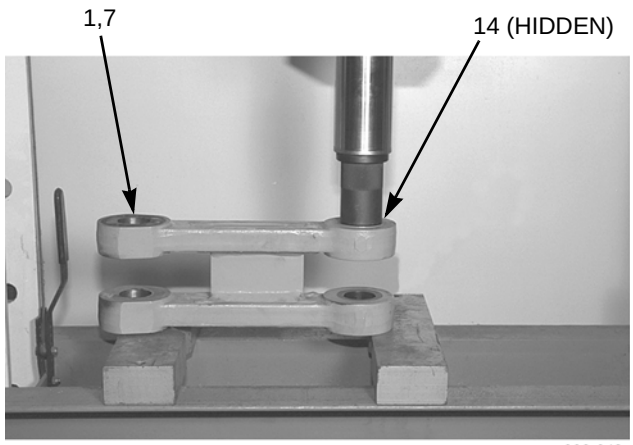


REMOVAL - CONTINUED

7. Attach nylon sling and suitable lifting device to support steering link (7).
8. Use a hammer and brass drift to remove shaft (13) and steering link (7) from machine.
9. If damaged, use a hydraulic press to remove four bearings (14) from steering link (1). Repeat step for steering link (7).



390-641



390-642

INSTALLATION

1. If removed, us a hydraulic press to install four bearings (14) on steering link (7). Repeat step for steering link (1).

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

Each steering link weighs 33 lb (15 kg).

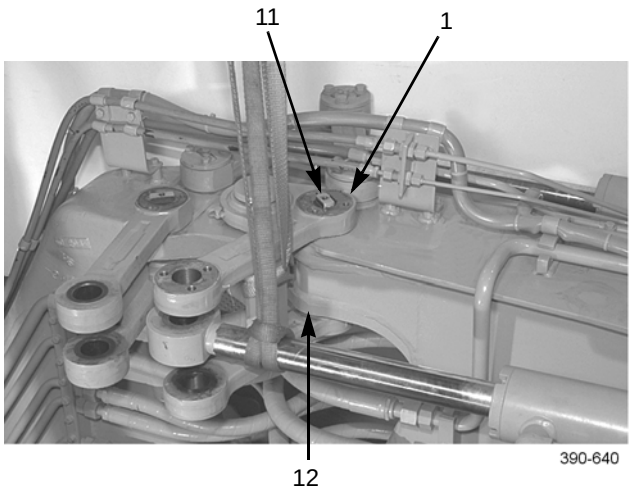
2. Attach nylon sling and suitable lifting device to steering link (7). With assistance, position steering link on machine.
3. Use a soft faced hammer to install shaft (13) on steering link (7). Remove lifting device from steering link.

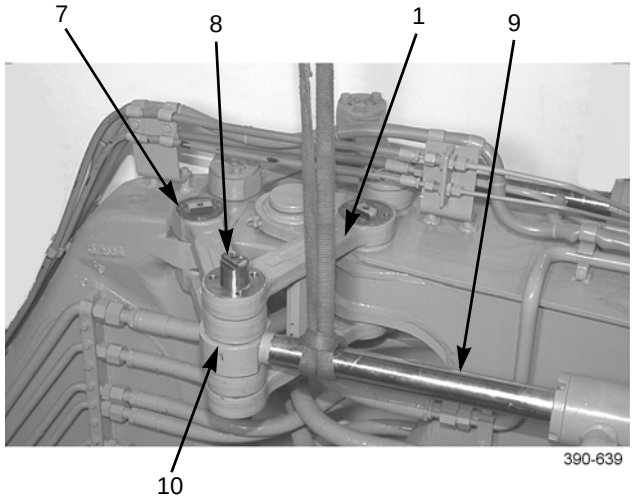
INSTALLATION - CONTINUED

NOTE

Ensure same quantity and thickness of shims are installed as were removed, and in the same location.

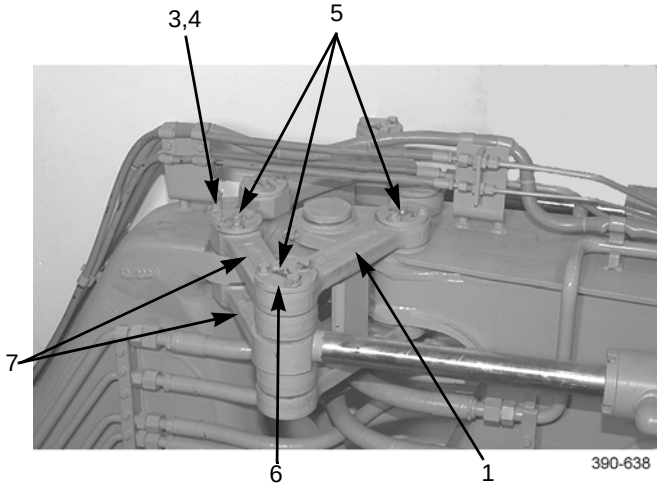
4. Attach nylon sling and suitable lifting device to steering link (1). With assistance, position steering link and shims (12) on machine.
5. Use a soft faced hammer to install shaft (11) on steering link (1). Remove lifting device from steering link.
6. Position steering cylinder (9) and shims (10). Install shaft (8) on steering links (1 and 7) and steering cylinder. Remove lifting device from cylinder.

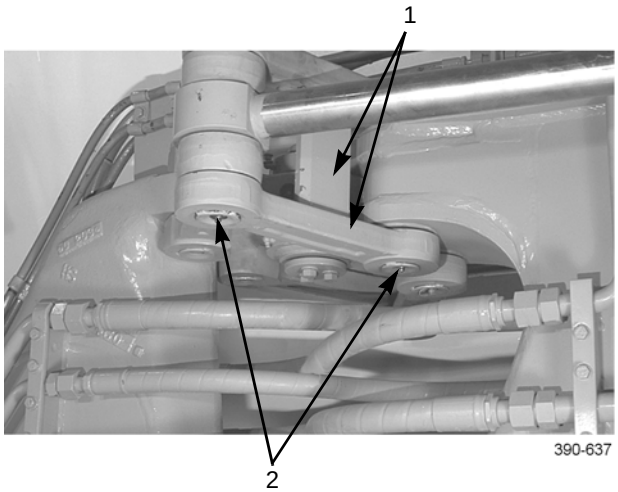




7. Install three plates (6), nine bolts (3), washers (4), and three grease fittings (5) on steering links (1 and 7).
8. Install two grease fittings (2) to underside of the steering link (1).

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9. Lubricate steering links with GAA grease (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

END OF WORK PACKAGE

WINDSHIELD GLASS REPLACEMENT 0157 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, field maintenance (Item 23, WP 0172 00)

Materials/Parts

Seal

Tape

Equipment Condition

Windshield removed (WP 0102 00)



WARNING

Use caution when handling windshield glass. Wear suitable hand and eye protection to protect against sharp edges of broken glass. Failure to do so may result in injury to personnel.

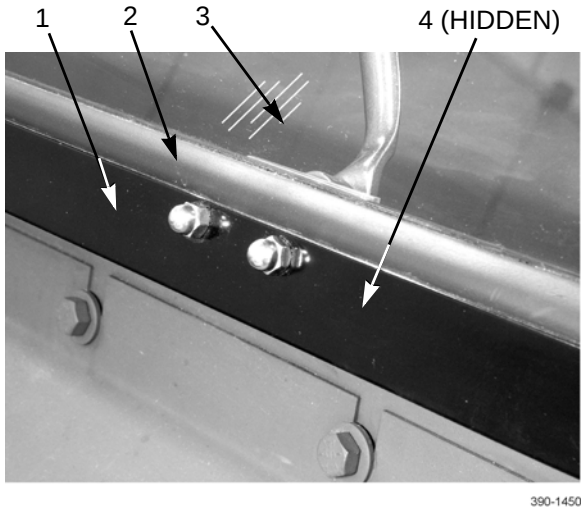
REMOVAL

1. Starting at top-center of windshield frame (1), pry one end of seal (2) out from windshield frame.
2. Continue working seal (2) out from windshield frame (1) until fully removed. Discard seal.

NOTE

Windshield glass, either intact or broken, will continue to adhere to windshield frame when seal is removed.

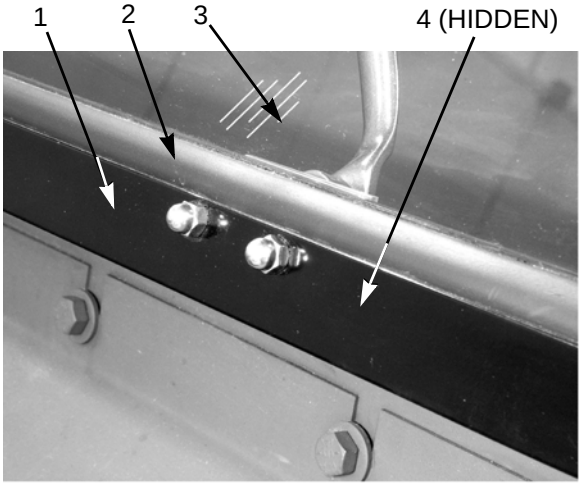
3. Pry windshield glass (3) out from windshield frame (1).
4. Remove tape (4) from windshield frame (1). Discard tape.
5. Thoroughly clean tape adhesive and glass particles from windshield frame (1).



390-1450

INSTALLATION

1. Starting at top-center of windshield frame (1), apply new tape (4) to surface of frame in a smooth, continuous length. Cut tape accurately so that ends join tightly.
2. Position windshield glass (3) into windshield frame (1).
3. Starting at top-center of windshield frame (1), install end of new seal (2) into frame.
4. Continue working seal (2) into windshield frame (1) in a continuous length. Cut seal accurately so that ends join tightly.
5. Install windshield (WP 0102 00).



390-1450

END OF WORK PACKAGE

HYDRAULIC AND STEERING PUMP REPLACEMENT 0158 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Strap, tiedown (Item 38, WP 0171 00)

Materials/Parts - Continued

Tag, marker (Item 39, WP 0171 00)

O-ring (6)

Personnel Required

Two

Referemces

WP 0009 00

WP 0010 00

Equipment Condition

Hydraulic tank drained (WP 0010 00)

Rear guard plate removed (WP 0100 00)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- 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.

CAUTION

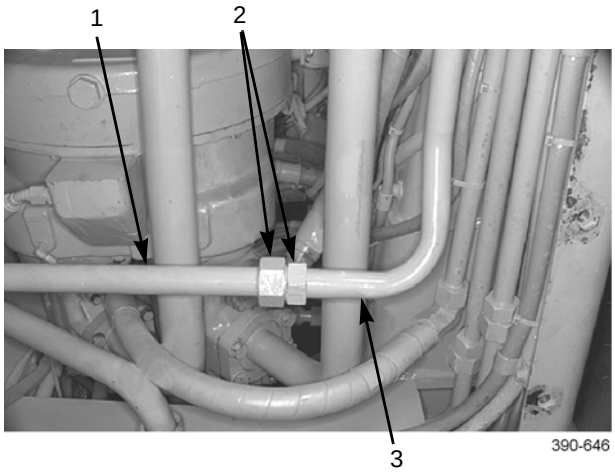
Cap all hoses and tubes to prevent fluid loss and contamination of oil system.

NOTE

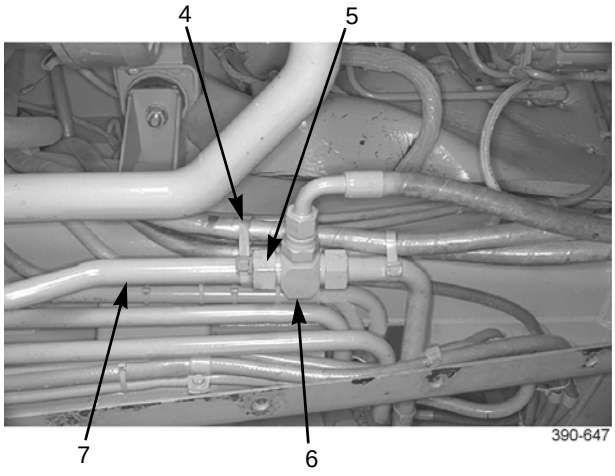
- Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

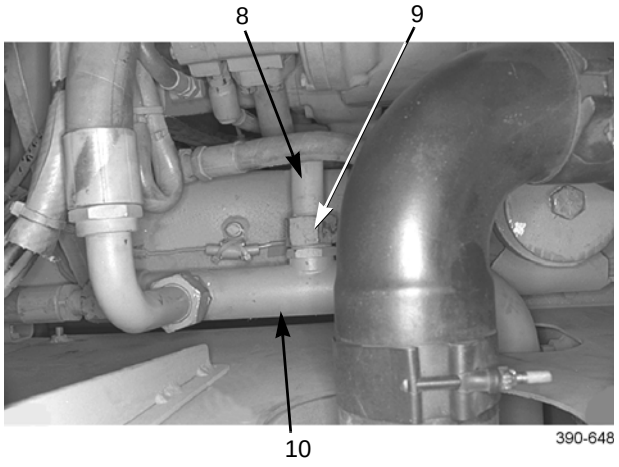
1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Loosen two retaining nuts (2) and remove tube (1) from tube (3).



3. Loosen retaining nut (5) and remove tube (7) from adapter (6). Remove and discard tiedown strap (4) from tube.

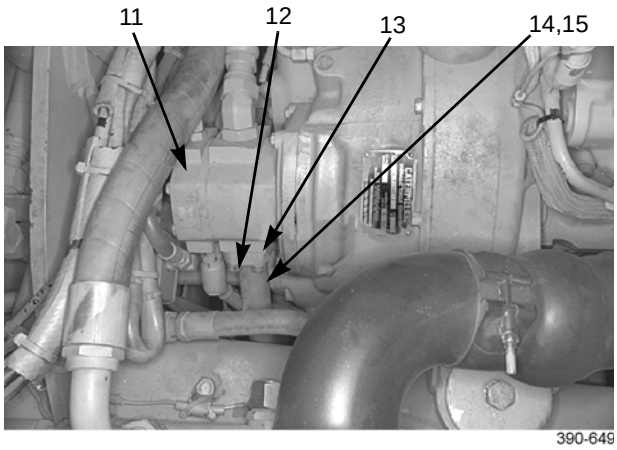


4. Loosen retaining nut (9) and remove tube (8) from tube assembly (10).

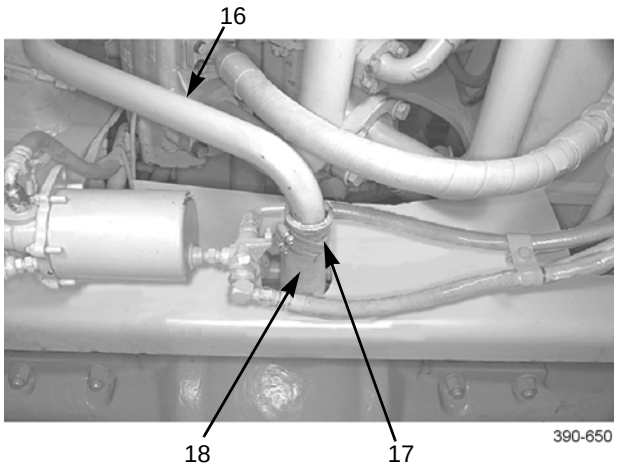


REMOVAL - CONTINUED

5. Remove four bolts (12), washers, and two half flanges (13) from transmission oil pump (11).
6. Remove tube (14) and O-ring (15) from transmission oil pump (11). Discard O-ring.

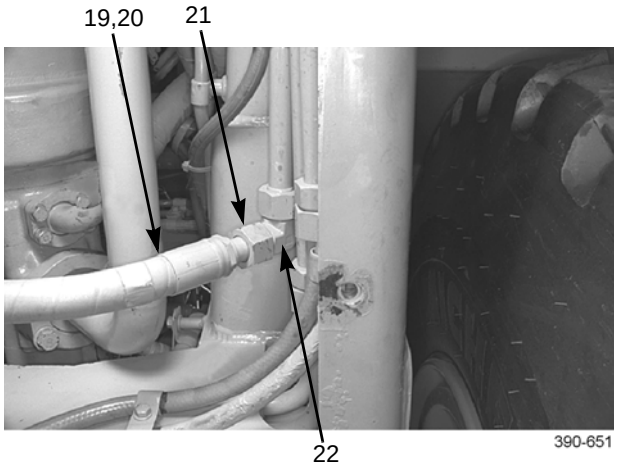


7. Loosen hose clamps (17) and remove tube (16) from hose (18).

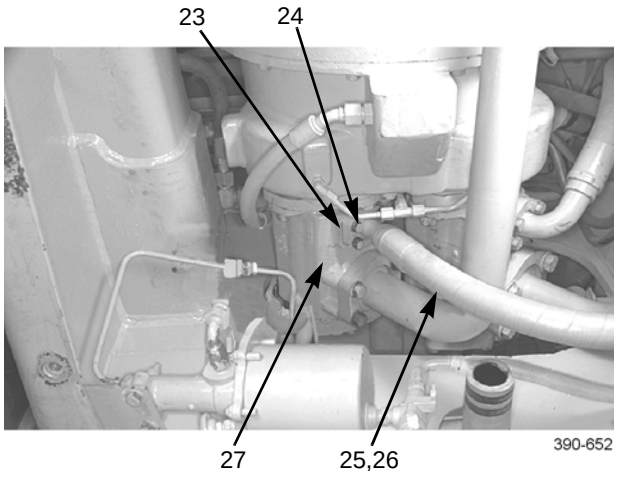


REMOVAL - CONTINUED

8. Loosen retaining nut (21) and remove hose (19) and O-ring (20) from tube (22). Discard O-ring.

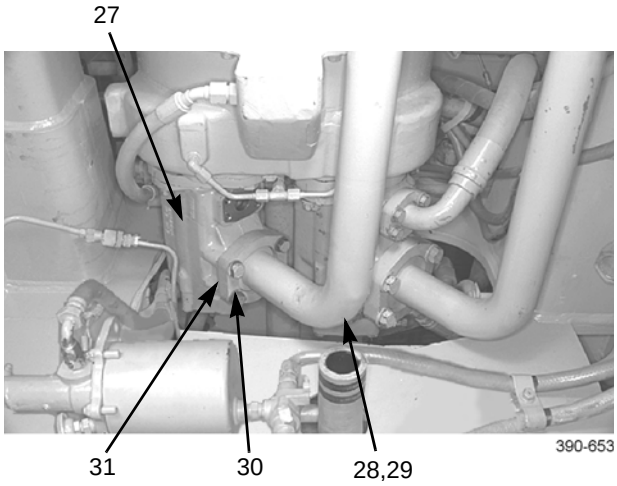


9. Remove four bolts (24), washers, and two half flanges (23) from hydraulic and steering pump (27).
10. Remove hose (25) and O-ring (26) from hydraulic and steering pump (27). Discard O-ring.

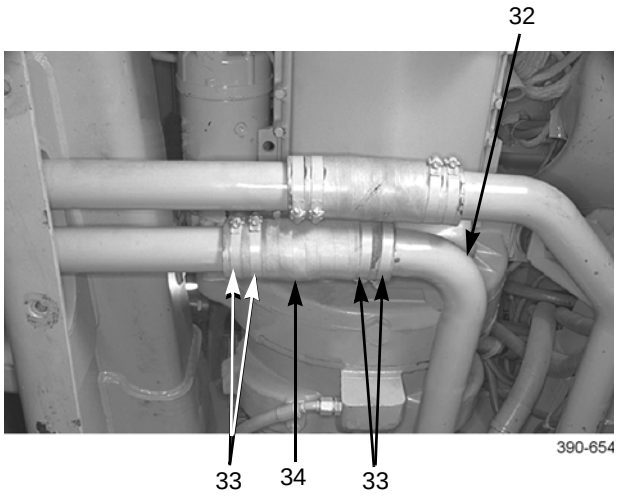


REMOVAL - CONTINUED

11. Remove four bolts (30), washers, and two half flanges (31) from hydraulic and steering pump (27).
12. Remove tube (28) and O-ring (29) from hydraulic and steering pump (27). Discard O-ring.

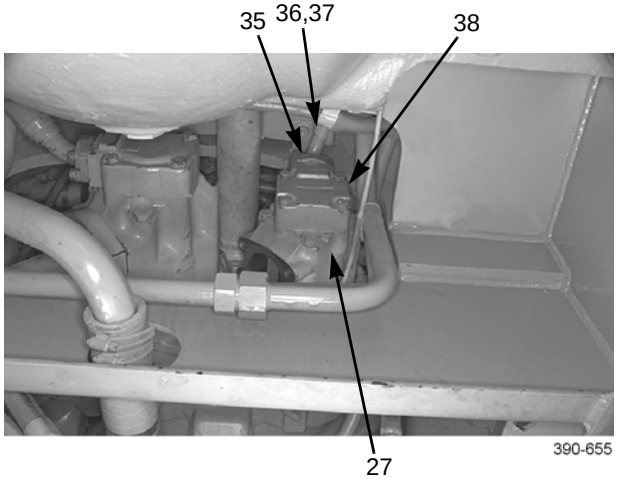


13. Loosen four hose clamps (33) and remove tube (32) from hose (34).



REMOVAL - CONTINUED

14. Remove four bolts (35), washers, and two half flanges (38) from hydraulic and steering pump (27).
15. Remove hose (36) and O-ring (37) from hydraulic and steering pump (27). Discard O-ring.





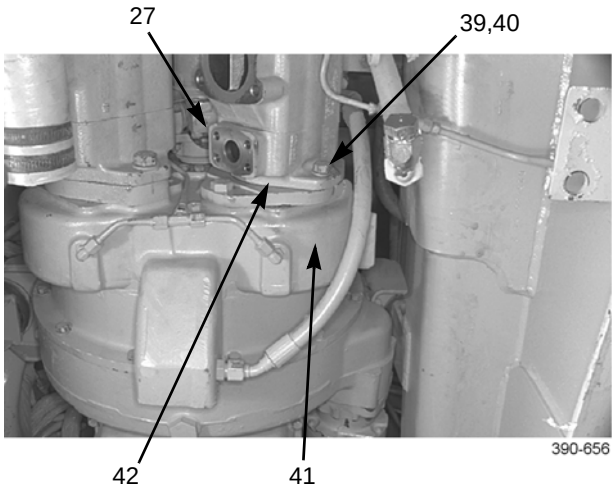
WARNING

Use extreme care when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in death or injury to personnel.

NOTE

Hydraulic and steering pump weighs 50 lb (22 kg).

16. With assistance, remove two bolts (39), washers (40), and hydraulic and steering pump (27) from torque converter (41).
17. Remove O-ring (42) from hydraulic and steering pump (27). Discard O-ring.



INSTALLATION

NOTE

Lightly coat all new O-rings with clean oil before installation.

1. Install new O-ring (42) on hydraulic and steering pump (27).



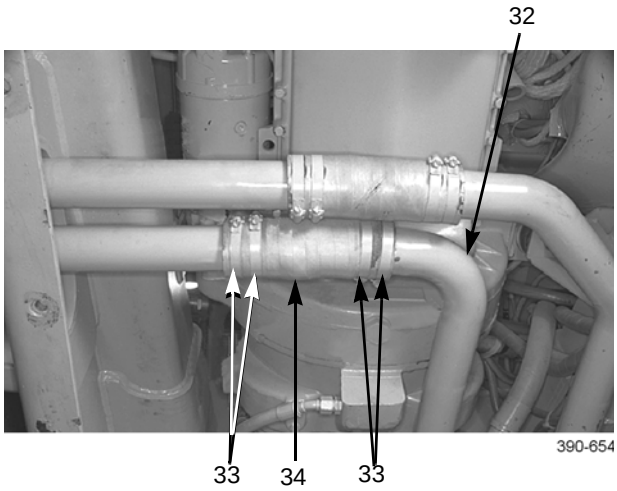
WARNING

Use extreme care when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in death or injury to personnel.

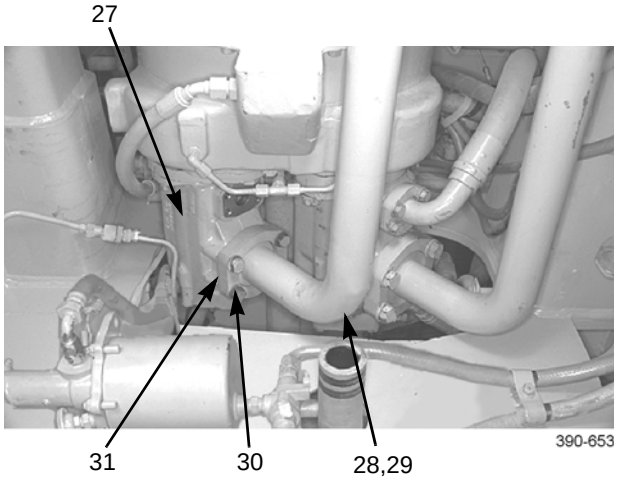
NOTE

Hydraulic and steering pump weighs 50 lb (22 kg).

2. With assistance, install hydraulic and steering pump (27) on torque converter (41) with two washers (40) and bolts (39).
3. Position hose (36) and new O-ring (37) to hydraulic and steering pump (27) and install two half flanges (38) with four washers and bolts (35).
4. Position tube (32) on hose (34) and tighten four hose clamps (33).

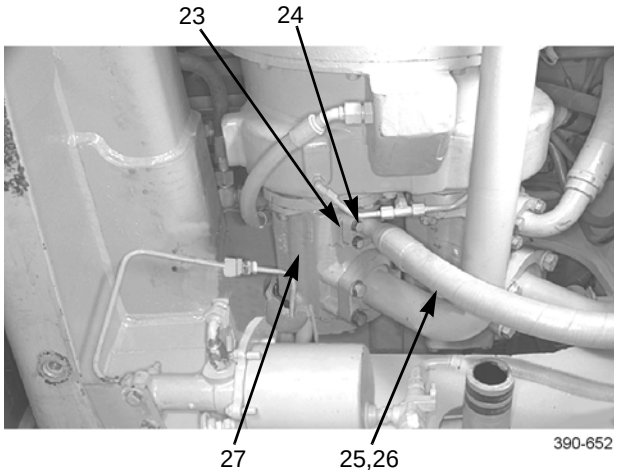


5. Position tube (28) and new O-ring (29) on hydraulic and steering pump (27) and install two half flanges (31) with four washers and bolts (30).

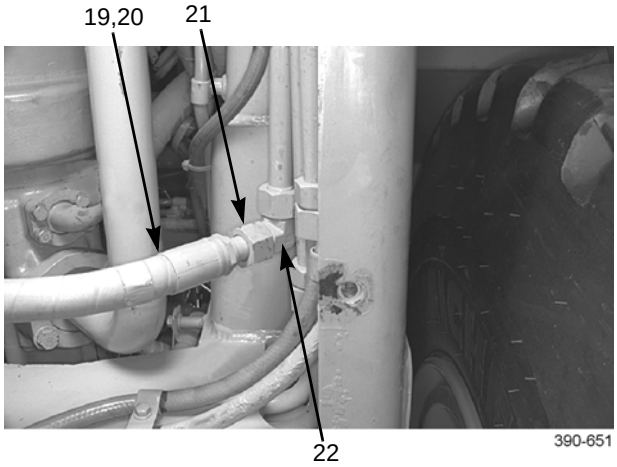


INSTALLATION - CONTINUED

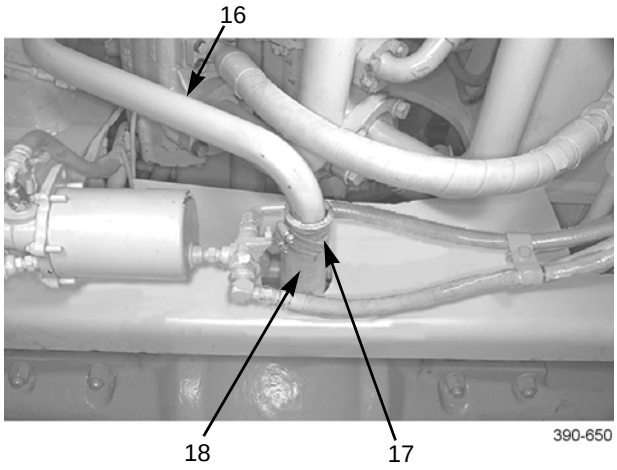
6. Position hose (25) and new O-ring (26) to hydraulic and steering pump (27) and install two half flanges (23) with four washers and bolts (24).



7. Position hose (19) and new O-ring (20) on tube (22) and tighten retaining nut (21).

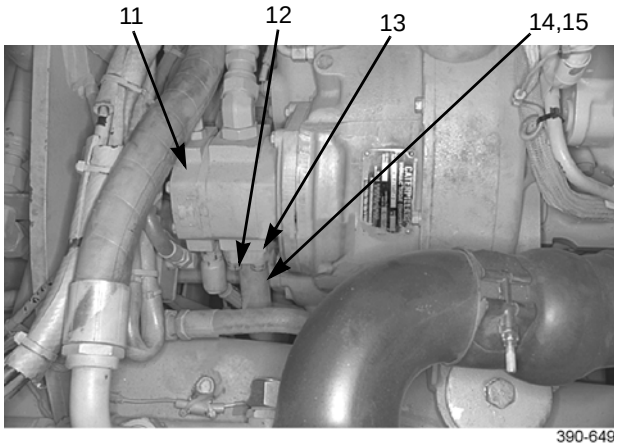


8. Install tube (16) on hose (18) and tighten hose clamps (17).

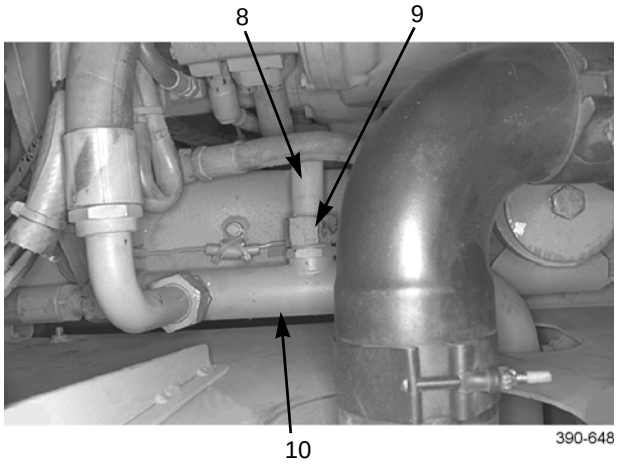


INSTALLATION - CONTINUED

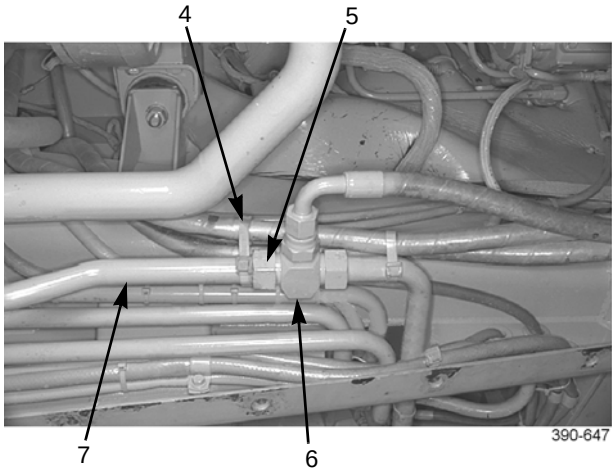
9. Position tube (14) and new O-ring (15) to transmission oil pump (11) and install two half flanges (13) with four washers bolts (12).



10. Position tube (8) on tube assembly (10) and tighten retaining nut (9).

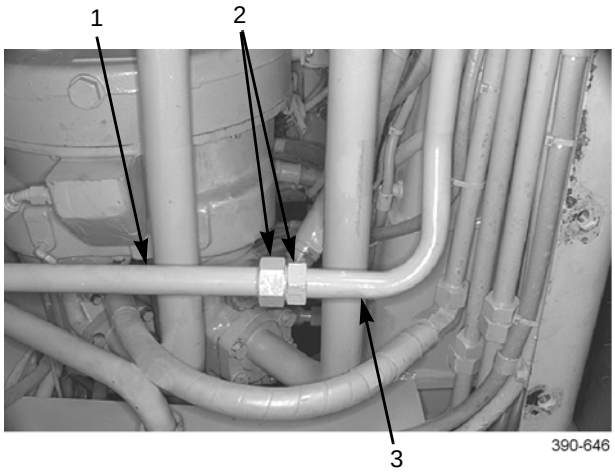


11. Install new tiedown strap (4) on tube (7). Position tube on adapter (6) and tighten retaining nut (5).



INSTALLATION - CONTINUED

12. Position tube (1) on tube (3) and tighten two retaining nuts (2).



13. Fill hydraulic tank (WP 0009 00 and WP 0010 00).
14. Fill transmission fluid (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

15. Operate hydraulic system and check for leaks.
16. Install rear guard plate (WP 0100 00).

END OF WORK PACKAGE

ELEVATOR/WATER HYDRAULIC PUMP REPLACEMENT 0159 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Materials/Parts - Continued

Tag, marker (Item 39, WP 0171 00)

O-ring (4)

Personnel Required

Two

Equipment Condition

Hydraulic and steering pump removed (WP 0158 00)

CATION

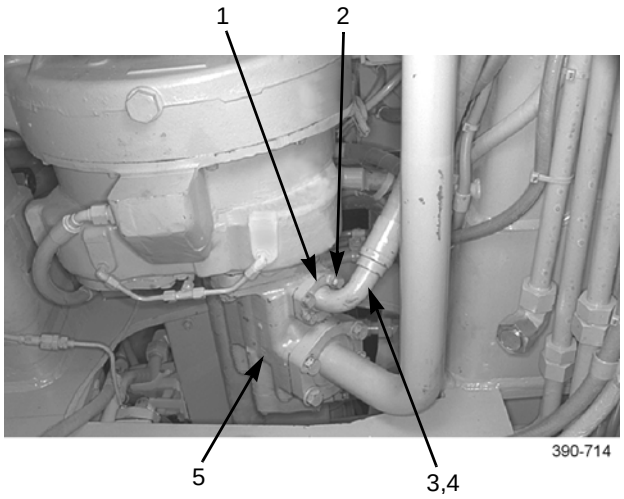
Cap all hoses and tubes to prevent fluid loss and contamination of oil system.

NOTE

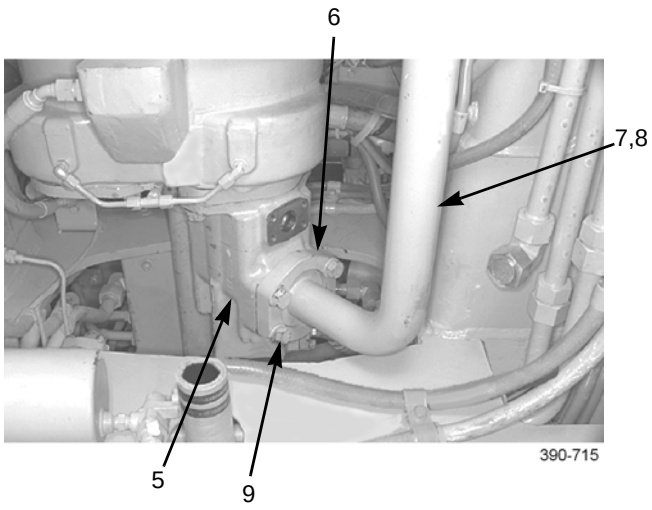
- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

1. Remove four bolts (2), and washers, and two half flanges (1) from pump (5).
2. Remove hose (3) and O-ring (4) from pump (5). Discard O-ring.

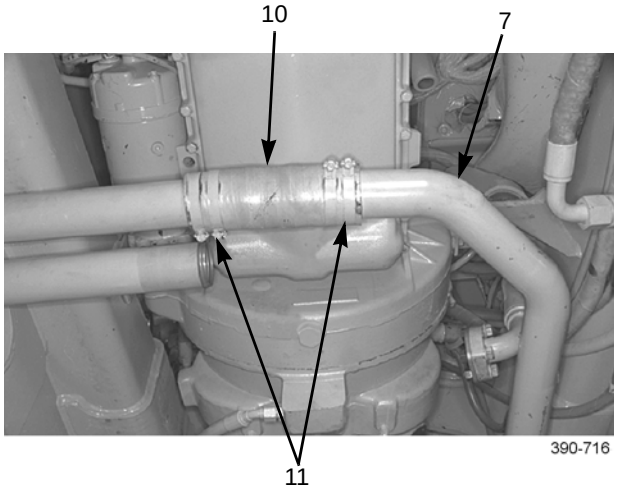


3. Remove four bolts (9), washers, and two half flanges (6) from pump (5).
4. Remove tube (7) and O-ring (8) from pump (5). Discard O-ring.

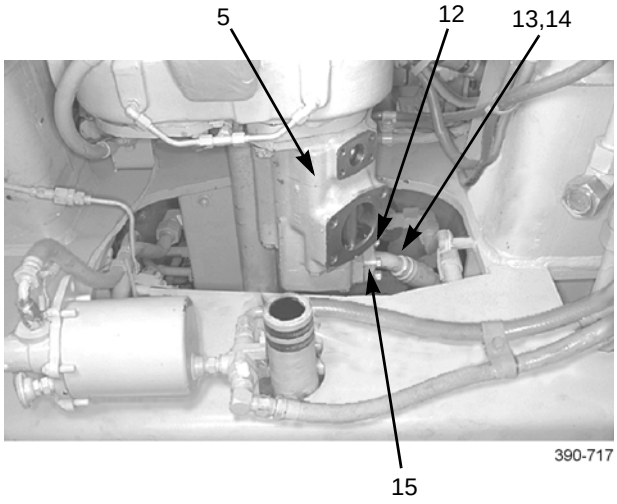


REMOVAL - CONTINUED

5. Loosen four hose clamps (11) and slide hose (7) from tube (10).



6. Remove four bolts (12), washers, and two half flanges (15) from pump (4).
7. Remove hose (13) and O-ring (14) from pump (5). Discard O-ring.





WARNING

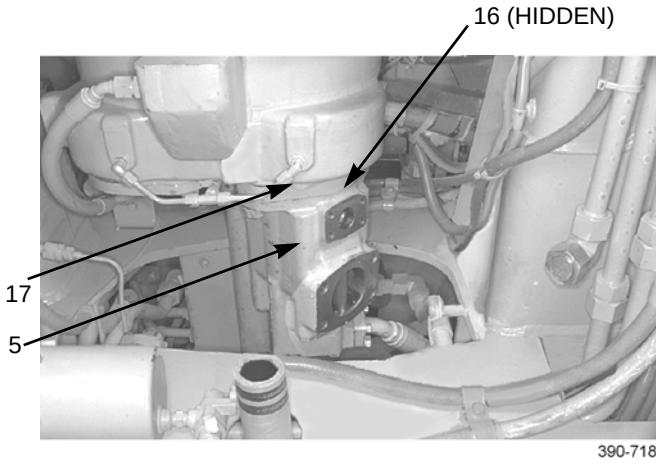
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

NOTE

Elevator pump weighs 77 lb (35 kg).

REMOVAL - CONTINUED

8. With assistance, remove two bolts (17), elevator pump (5), and O-ring (16) from torque converter. Discard O-ring.



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 or death to personnel.

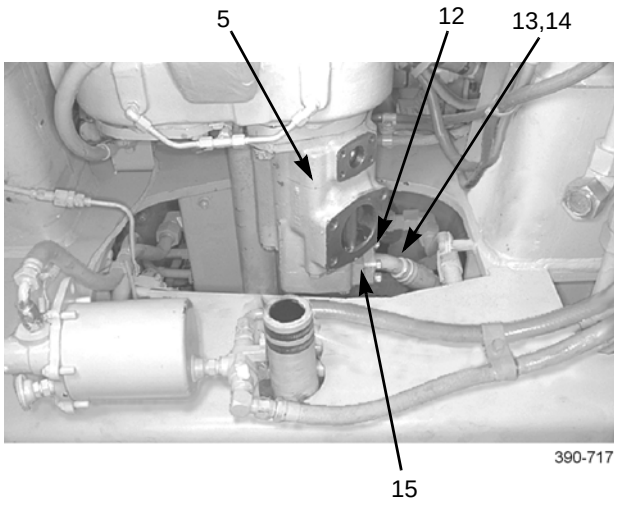
NOTE

- Elevator pump weighs 77 lb (35 kg).
- Lubricate all new O-rings with clean oil before installation.

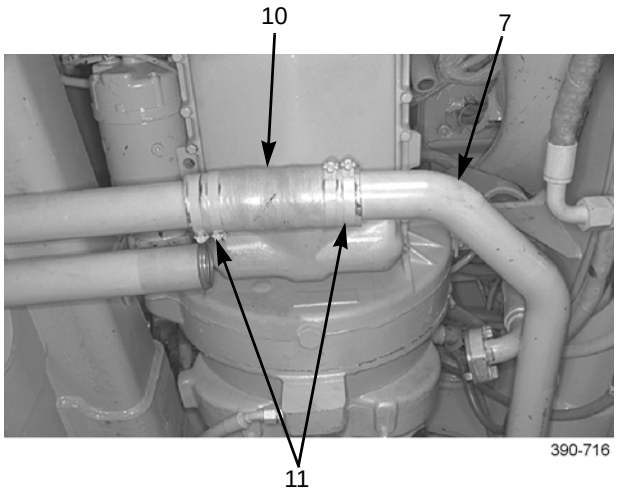
1. With assistance, install new O-ring (16) and elevator pump (5) on torque converter with two bolts (17).

INSTALLATION - CONTINUED

2. Position hose (13) and new O-ring (14) on elevator pump (5) and install two half flanges (15) with four washers and bolts (12).

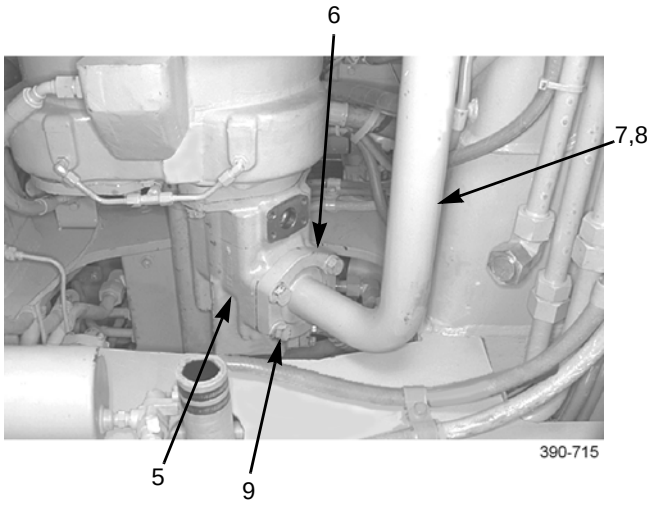


3. Position hose (7) on tube (10) and tighten four hose clamps (11).

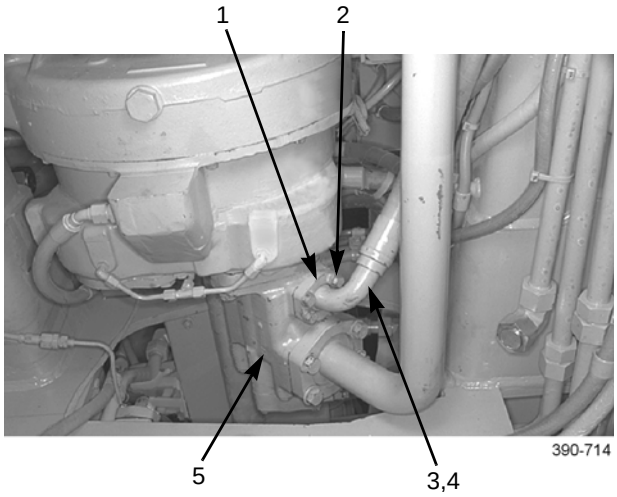


INSTALLATION - CONTINUED

4. Position tube (7) and new O-ring (8) on pump (5) and install two half flanges (6) with four washers and bolts (9).



5. Position hose (3) and new O-ring (4) on pump (5) and install two half flanges (1) with four washers and bolts (2).



6. Install hydraulic and steering pump (WP 0158 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

7. Operate hydraulic system and check for leaks.

END OF WORK PACKAGE

MAIN CONTROL VALVE REPLACEMENT 0160 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (7)

Pin, cotter (2)

References

WP 0009 00

WP 0010 00

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulics. Failure to do so could result in injury.

CAUTION

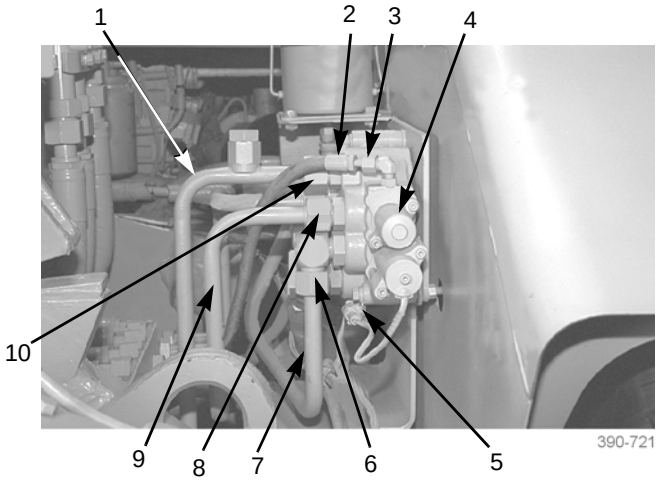
Cap all hoses and tubes to prevent fluid loss and contamination of oil system.

NOTE

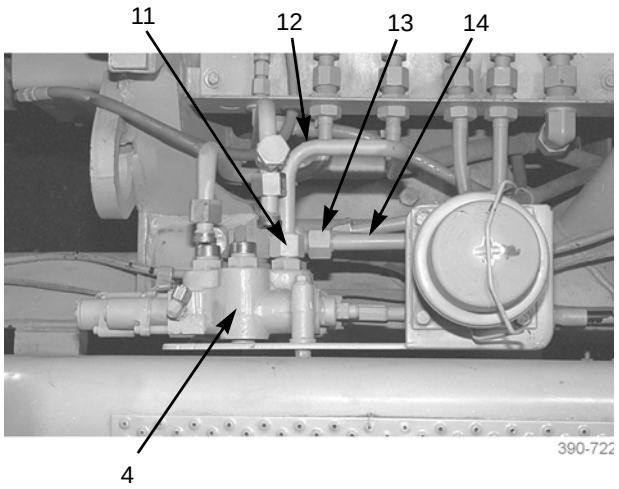
- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Disconnect tube (7) from main control valve (4). Remove O-ring (6) and discard.
3. Disconnect tube (9) from main control valve (4). Remove O-ring (8) and discard.
4. Disconnect tube (1) from main control valve (4). Remove O-ring (10) and discard.
5. Disconnect hose (2) from main control valve (4). Remove O-ring (3) and discard.
6. Disconnect electrical connection (5).

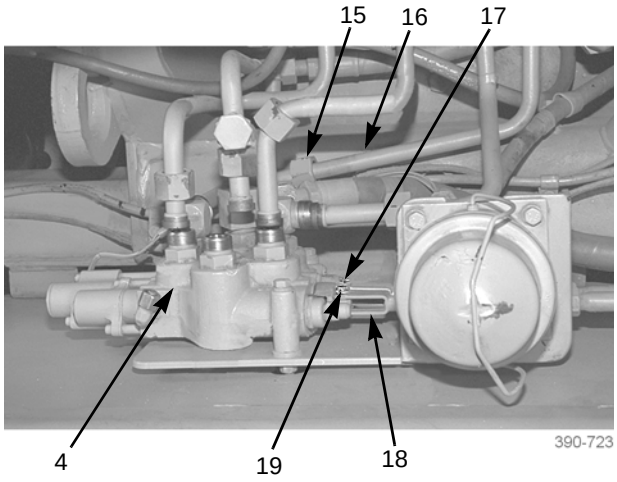


7. Disconnect tube (12) from main control valve (4). Remove O-ring (11) and discard.
8. Disconnect tube (14) from main control valve (4). Remove O-ring (13) and discard.

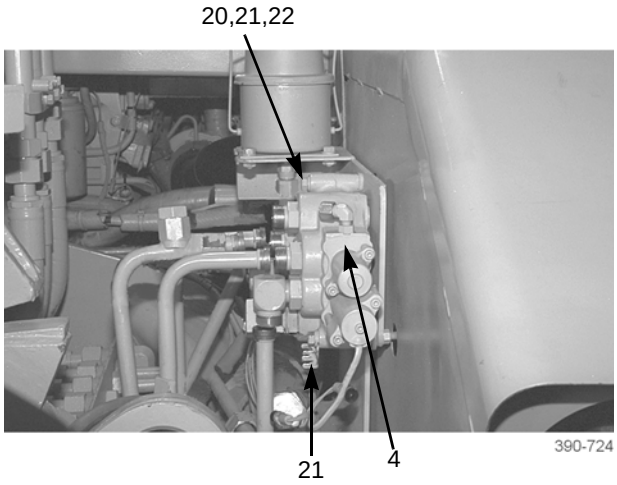


REMOVAL - CONTINUED

9. Remove two cotter pins (19) and clevis pins (17) from yoke ends (18). Discard cotter pins.
10. Disconnect tube (16) from main control valve (4). Remove O-ring (15) and discard.



11. Remove three nuts (22), six washers (21), three bolts (20), clip (21), and main control valve (4) from machine.
12. If replacing main control valve (4), or if fittings are damaged, remove fittings from control valve.

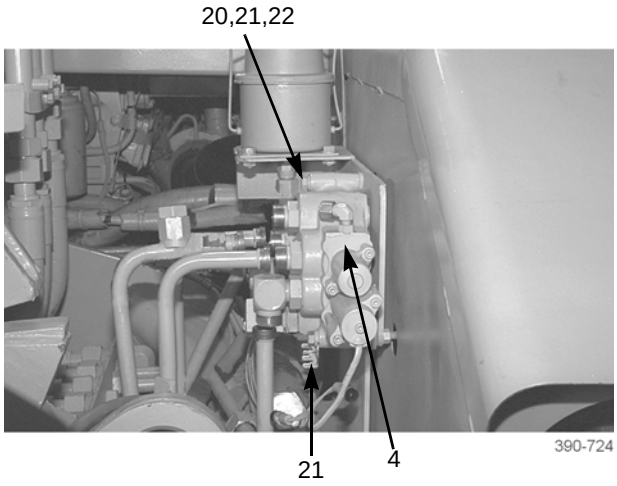


INSTALLATION

1. If removed, install fittings to control valve (4).

INSTALLATION - CONTINUED

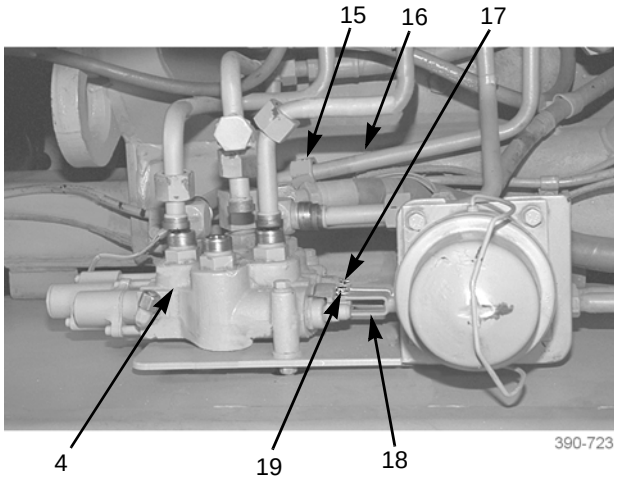
2. Install main control valve (4) and clip (21) on machine with three bolts (20), six washers (21) and three nuts (22).



NOTE

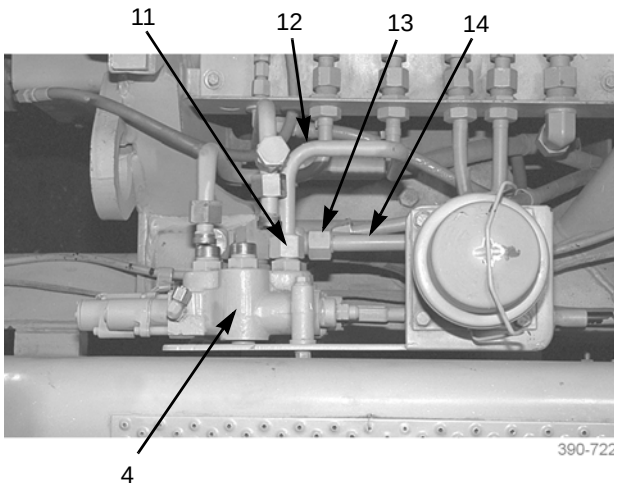
Lubricate all new O-rings with clean oil before installation.

3. Install new O-ring (15) and Connect tube (16) to main control valve (4).
4. Install two clevis pins (17) and new cotter pins (19) to yoke ends (18).

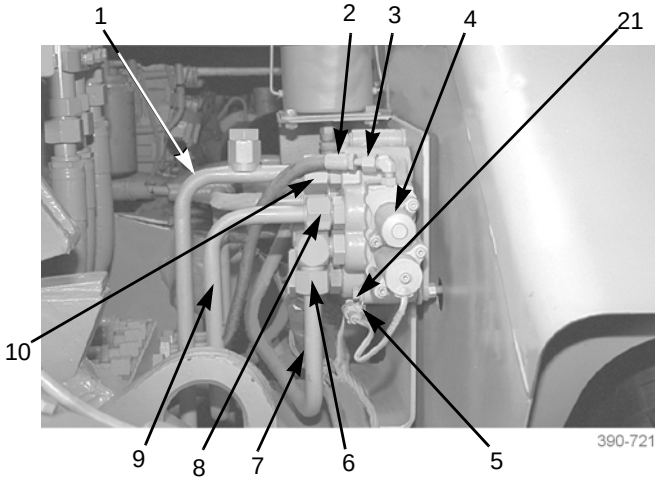


INSTALLATION - CONTINUED

5. Install new O-ring (13) and connect tube (14) to main control valve (4).
6. Install new O-ring (11) and connect tube (12) to main control valve (4).



7. Connect electrical connection (5) and place in clip (21).
8. Install new O-ring (3) and connect tube (2) to main control valve (4).
9. Install new O-ring (10) and connect tube (1) to main control valve (4).
10. Install new O-ring (8) and connect tube (9) to main control valve (4).
11. Install new O-ring (6) and connect tube (7) to main control valve (4).



12. Check and fill hydraulic tank (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

13. Operate hydraulic system and check for leaks.

END OF WORK PACKAGE

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ELEVATOR/WATER PUMP CONTROL VALVE REPLACEMENT 0161 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Sling, nylon (Item 27, WP 0172 00)

Materials/Parts

Set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (8)

Pin, cotter

References

WP 0009 00

WP 0010 00

Personnel Required

Two

Equipment Condition

Machine parked on hard, level surface (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Scraper bowl or water tank lowered to ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Parking brake applied (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Wheels chocked (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)

Battery disconnect switch in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulics. Failure to do so could result in injury.

CAUTION

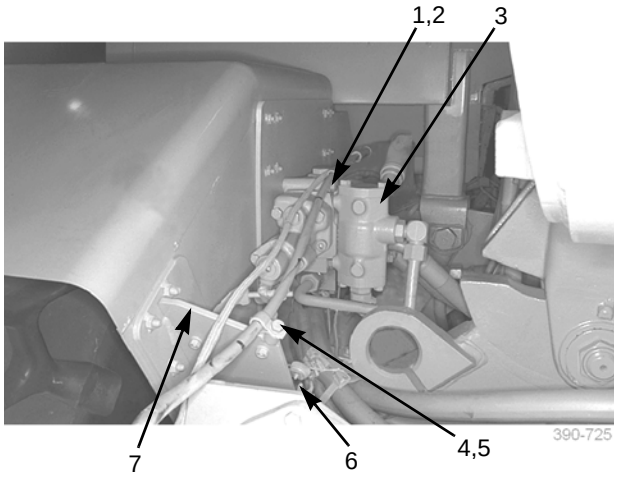
Cap all hoses and tubes to prevent fluid loss and contamination of the oil system.

NOTE

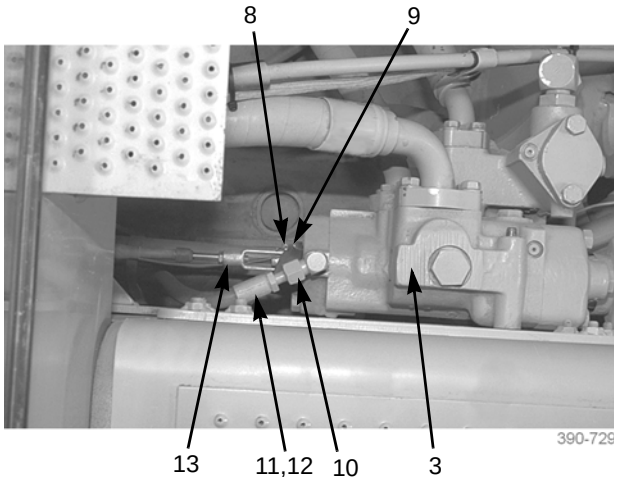
- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove nut (1) and clamp (2) from elevator control valve (3).
3. Remove screw (3) and clamp (5) from bracket (7).
4. Remove electrical connection (6) from clamp (5) and disconnect. Lay cables aside.

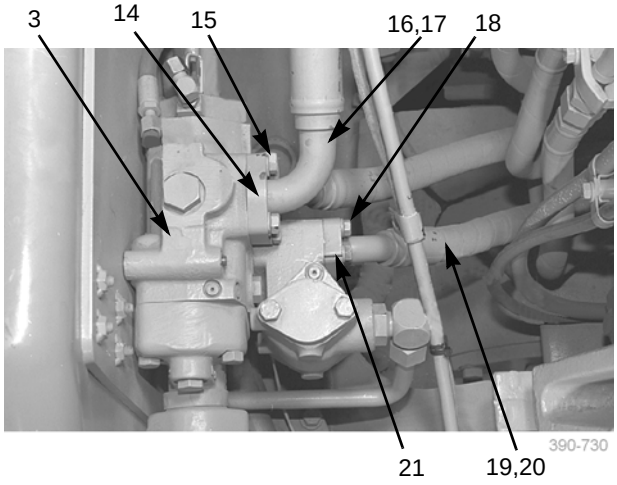


5. Loosen retaining nut (10) and remove hose (11) and O-ring (12) from elevator control valve (3). Discard O-ring.
6. Remove cotter pin (8), pin (9), and yoke rod end (13) from elevator control valve (3). Discard cotter pin.

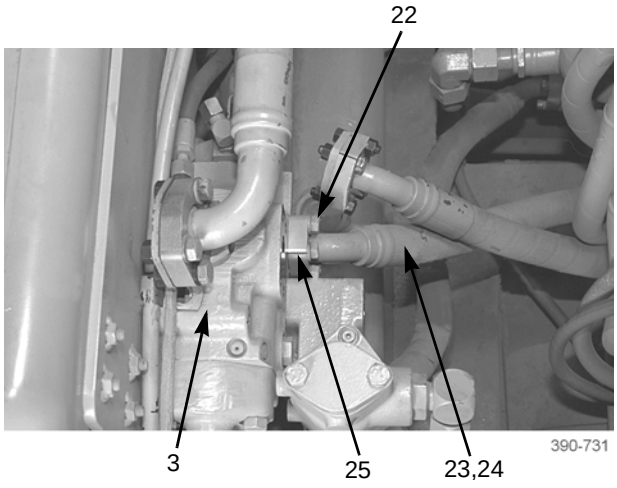


REMOVAL - CONTINUED

7. Remove four bolts (15), washers, and two half flanges (14) from elevator control valve (3).
8. Remove hose (16) and O-ring (17) from elevator control valve (3). Discard O-ring.
9. Remove four bolts (18), washers, and two half flanges (21) from elevator control valve (3).
10. Remove hose (19) and O-ring (20) from elevator control valve (3). Discard O-ring.

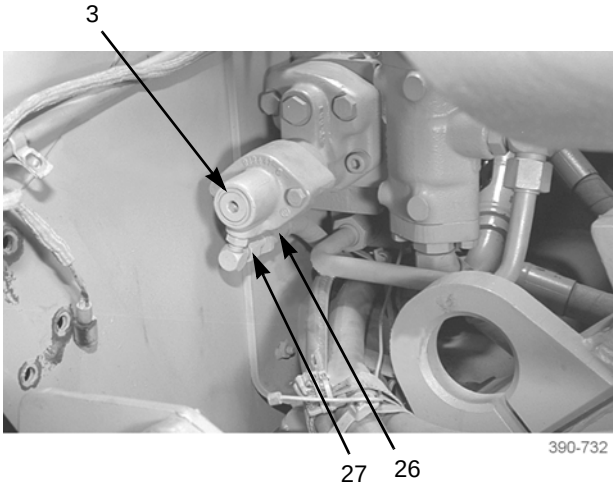


11. Remove four bolts (22), washers, and two half flanges (25) from elevator control valve (3).
12. Remove hose (23) and O-ring (24) from elevator control valve (3). Discard O-ring.

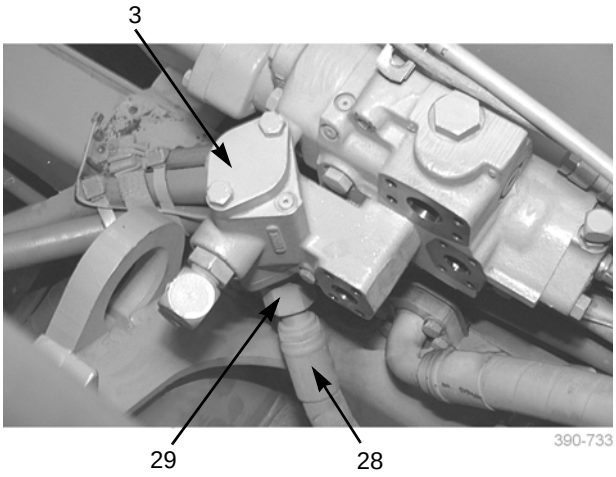


REMOVAL - CONTINUED

13. Disconnect hose (26) from elevator control valve (3). Remove O-ring (27) and discard.

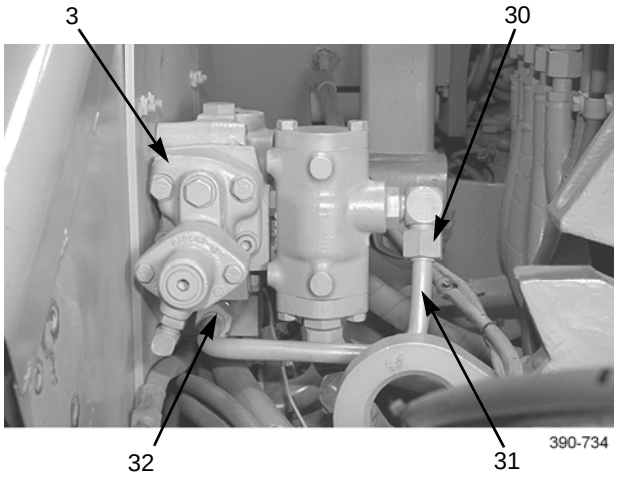


14. Disconnect hose (28) from elevator control valve (3). Remove O-ring (29) and discard.



REMOVAL - CONTINUED

15. Remove tube (31) from elevator control valve (3). Remove O-rings (30 and 32) and discard.





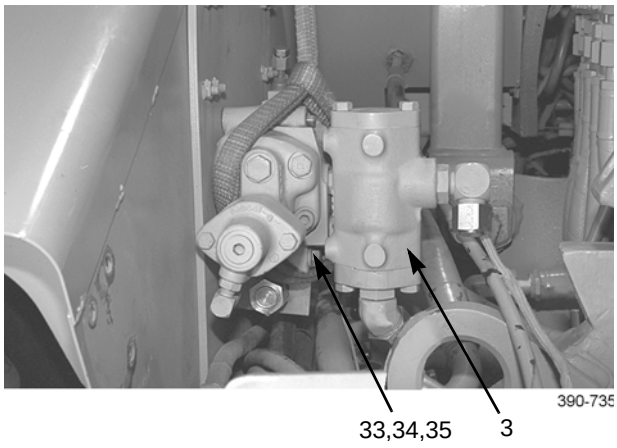
WARNING

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 lift 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

Elevator control valve weighs 77 lb (35 kg).

16. Attach nylon sling and suitable lifting device to elevator control valve (3) remove two nuts (33), four washers (34), and two bolts (35) and elevator control valve from machine.
17. If replacing elevator control valve (3), or if fittings are damaged, remove fittings from control valve.



INSTALLATION

1. If removed, install fittings to elevator control valve (3).



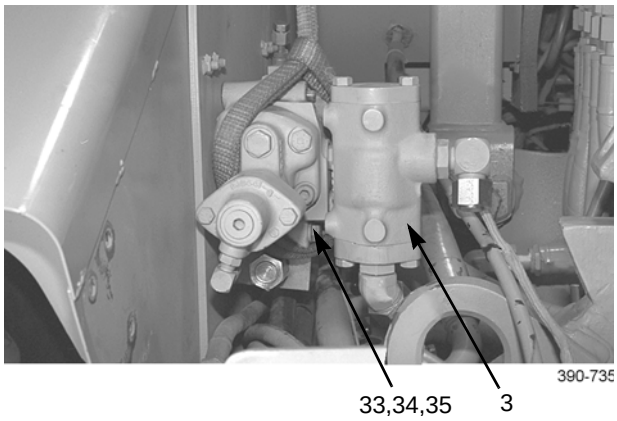
WARNING

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NOTE

Elevator control valve weighs 77 lb (35 kg).

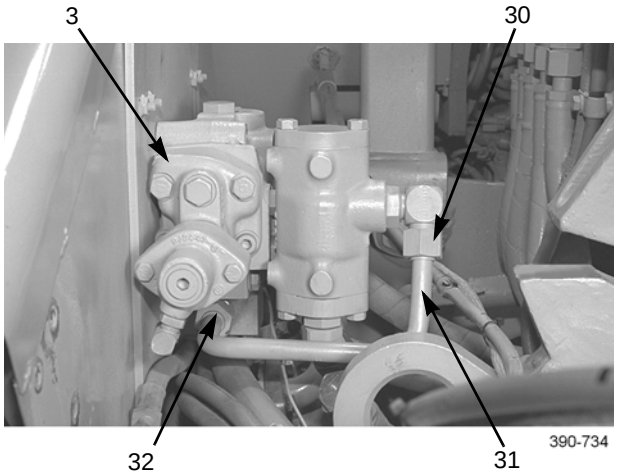
2. Attach nylon sling and suitable lifting device to elevator control valve (3).
3. Install elevator control valve (3) on machine with two bolts (35), four washers (34), and two nuts (33).
4. Remove nylon sling and lifting device from elevator control valve (3).



NOTE

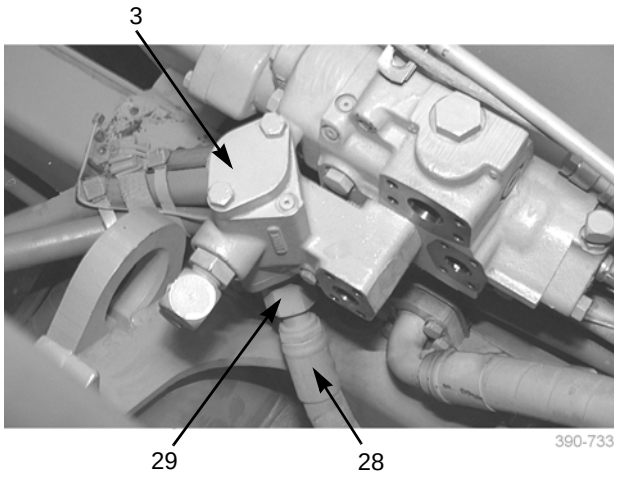
Lubricate all new O-rings with clean lubricating oil before installation.

5. Install new O-rings (30 and 32) and tube (31) on elevator control valve (3).

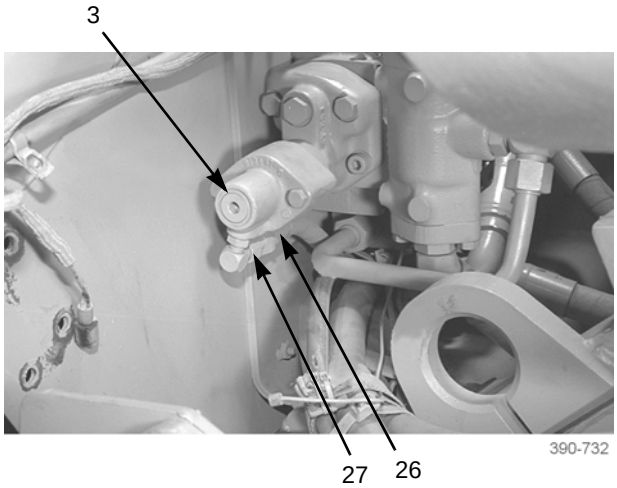


INSTALLATION - CONTINUED

6. Install new O-ring (29) and hose (28) to elevator control valve (3).

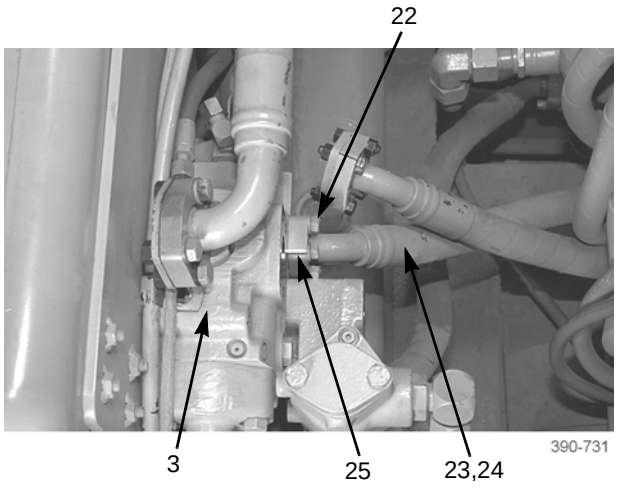


7. Install new O-ring (27) and hose (26) to elevator control valve (3).

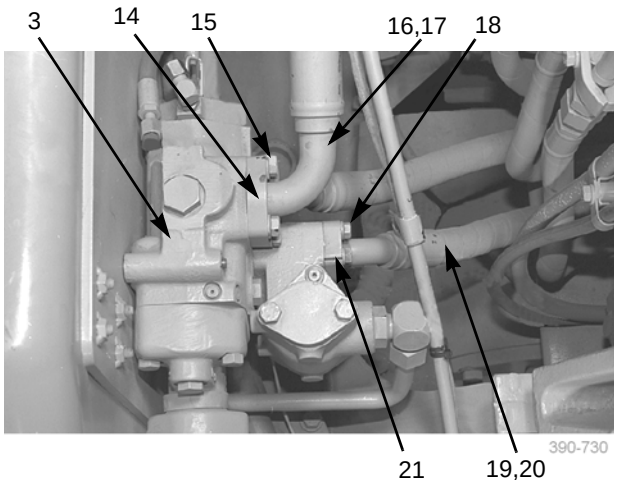


INSTALLATION - CONTINUED

8. Position hose (23) and new O-ring (24) on elevator control valve (3) and install two half flanges (25) with four washers and bolts (22).

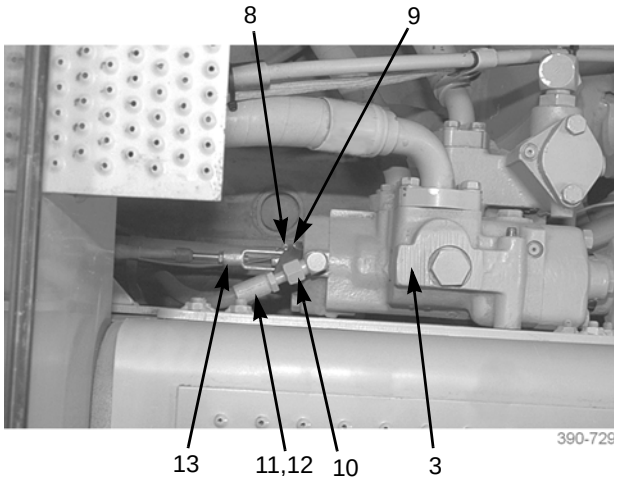


9. Position hose (19) and new O-ring (20) on elevator control valve (3) and install two half flanges (21) with four washers and bolts (18).
10. Position hose (16) and new O-ring (17) on elevator control valve (3) and install two half flanges (14) with four washers and bolts (15).

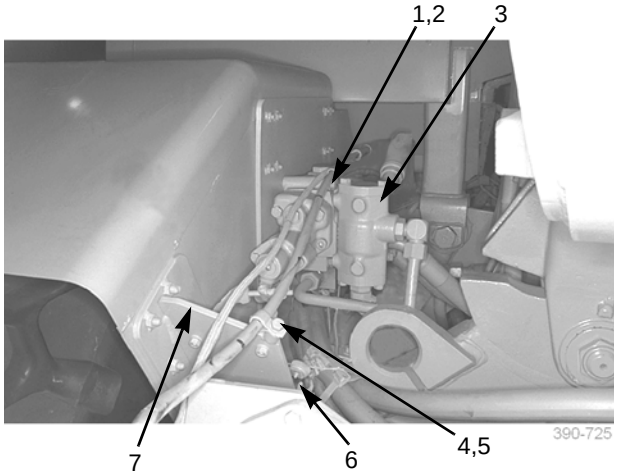


INSTALLATION - CONTINUED

11. Install yoke rod end (13) on elevator control valve (3) with install pin (9) and new cotter pin (8).
12. Position hose (11) and new O-ring (12) on elevator control valve (3) and tighten retaining nut (10).



13. Connect electrical connection (6) and install in clamp (5).
14. Install clamp (5) on bracket (7) with screw (4).
15. Install clamp (2) on elevator control valve (3) with nut (1).



16. Check and fill hydraulic tank (WP 0009 00 and WP 0010 00).



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

17. Operate hydraulic system and check for leaks.

END OF WORK PACKAGE

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HYDRAULIC TANK REPLACEMENT 0162 00

THIS WORK PACKAGE COVERS

Removal, Installation

INITIAL SETUP

Maintenance Level

Direct Support

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Bracket, link (Item 5, WP 0172 00)

Materials/Parts

Cap set, protective (Item 5, WP 0171 00)

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 21, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

O-ring (2)

References

TM 5-3800-205-10-1

TM 5-3800-205-10-2

WP 0009 00

Personnel Required

Two

Equipment Condition

Engine access door removed (WP 0099 00)

Hydraulic tank drained (WP 0010 00)

Air cleaner removed (WP 0018 00)

Right fender removed (WP 0101 00)



WARNING



- Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- At operating temperature hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulics. Failure to do so could result in injury.

CAUTION

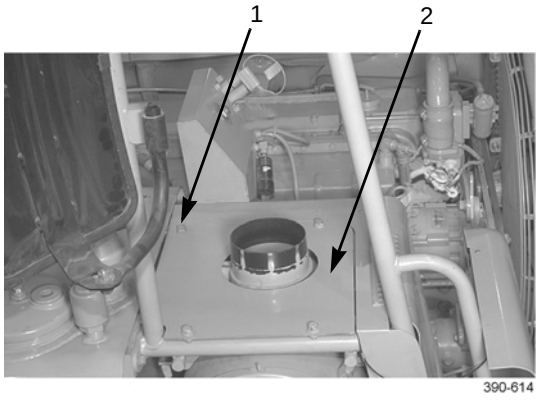
Cap all hoses and tubes to prevent fluid loss and contamination of the oil system.

NOTE

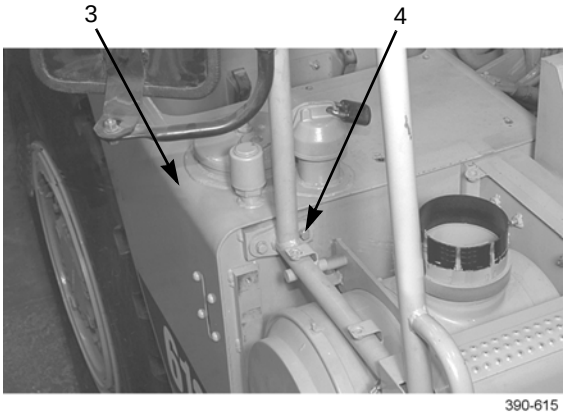
- Ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect fluid with suitable containers before opening any compartment or disassembling any component containing fluids.
- Dispose of all fluids according to local regulations and mandates.
- Tag all hoses and tubes to aid in installation.

REMOVAL

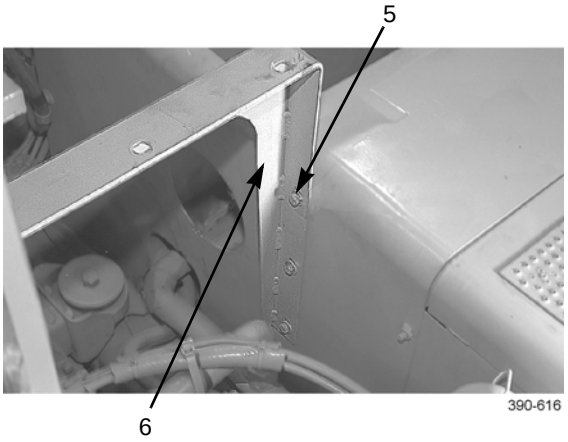
1. Relieve hydraulic system pressure by moving control levers through all positions (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
2. Remove four bolts (1) and plate (2) from machine.



3. Remove two bolts (4) from hydraulic tank (3).

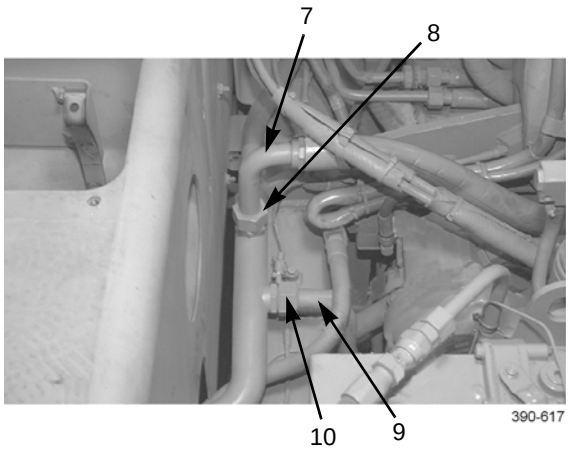


4. Remove three bolts (5) and bracket (6) from machine.

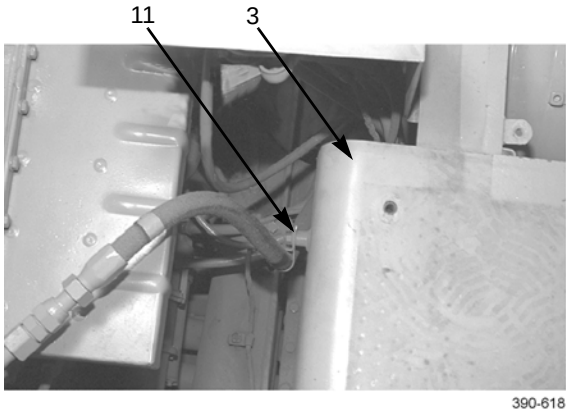


REMOVAL - CONTINUED

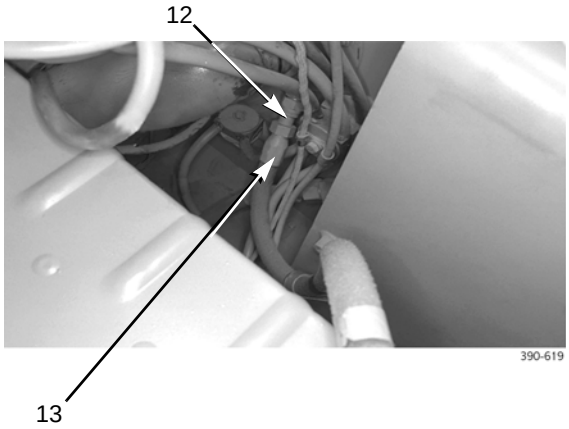
5. Loosen retaining nut (8) and disconnect hose (7). Loosen retaining nut (10) and disconnect hose (9).



6. Remove bolt (11) and clip from hydraulic tank (3).

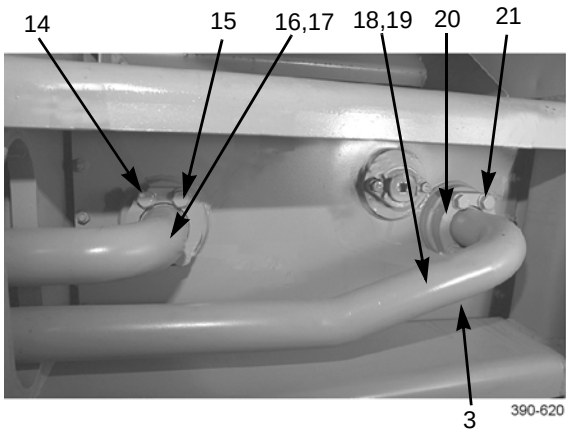


7. Loosen retaining nut (12) and disconnect hose (13).

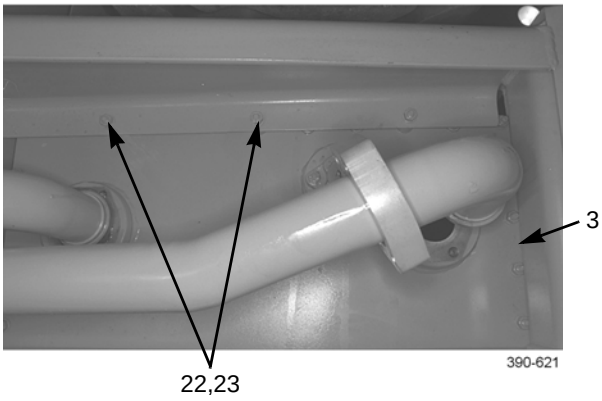


REMOVAL - CONTINUED

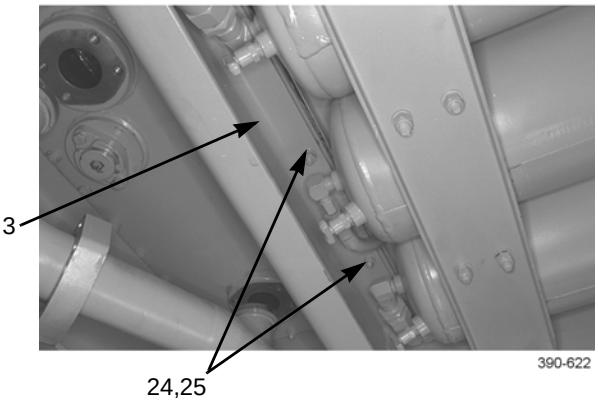
8. Remove four bolts (14), washers, flange (15), tube (16), and O-ring (17) from hydraulic tank (3). Discard O-ring.
9. Remove four bolts (21), washers, flange (20), and tube (18) and O-ring (19) from hydraulic tank (3). Discard O-ring.



10. Remove three bolts (22) and spacers (23) from hydraulic tank (3).



11. Remove four bolts (24) and spacers (25) from hydraulic tank (3).



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 lift 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

Hydraulic tank weighs 165 lb (75 kg).

12. Install link brackets and suitable lifting device to hydraulic tank (3) and remove hydraulic tank from machine.
13. Remove link brackets and lifting device from hydraulic tank (3).



390-626

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 lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

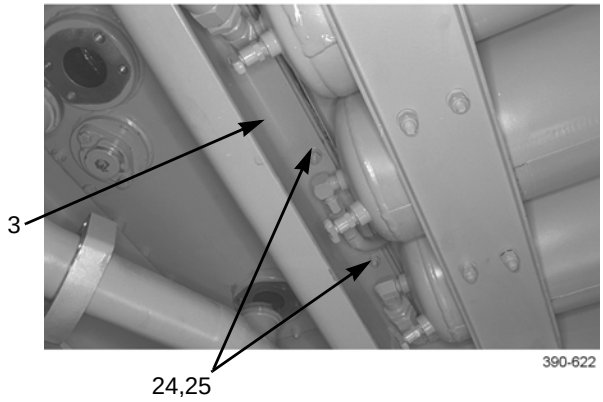
NOTE

Hydraulic tank weighs 165 lb (75 kg).

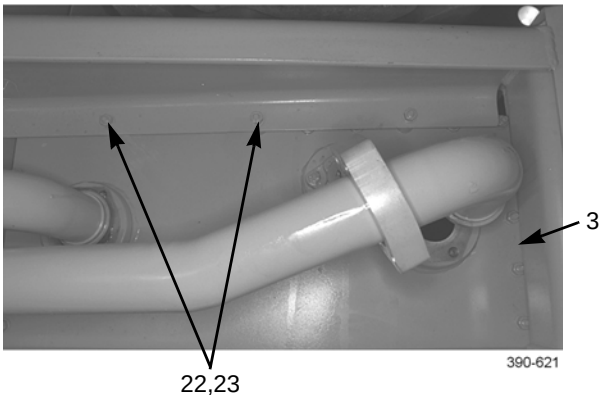
1. Install link brackets and a suitable lifting device to hydraulic tank (3).
2. Position hydraulic tank (3) on machine. Remove link brackets and lifting device.

INSTALLATION - CONTINUED

3. Install four bolts (24) and spacers (25) on hydraulic tank (3).



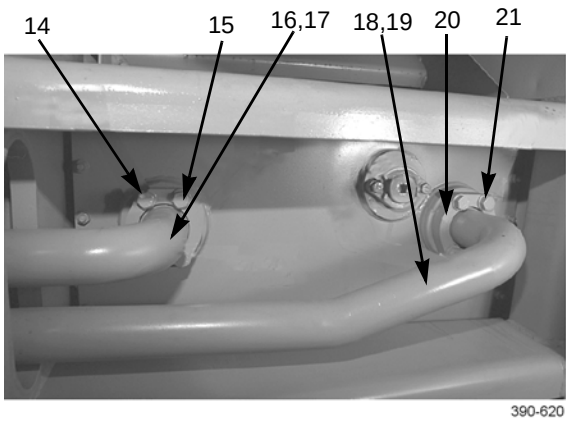
4. Install three bolts (22) and spacers (23) on hydraulic tank (3).



NOTE

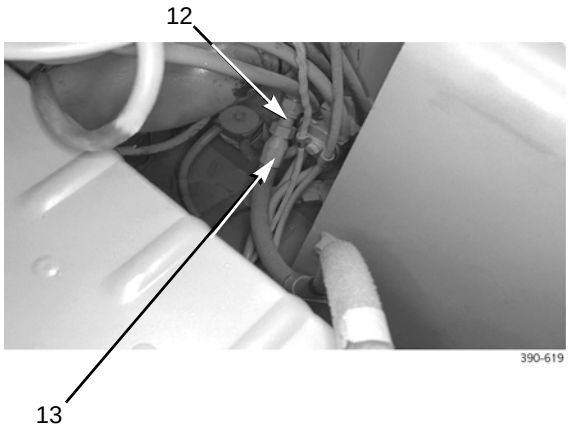
Lubricate new O-rings with clean lubricating oil before installation.

5. Position tube (18) and new O-ring (19) on hydraulic tank (3) and install flange (20) with four washers and bolts (21).
6. Position tube (16) and new o-ring (17) on hydraulic tank (3) and install flange (15) with four washers and bolts (14).

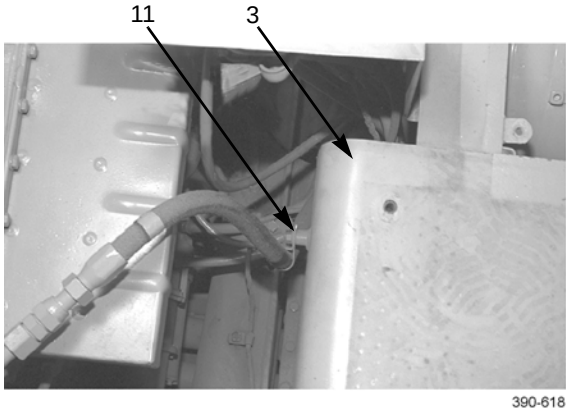


INSTALLATION - CONTINUED

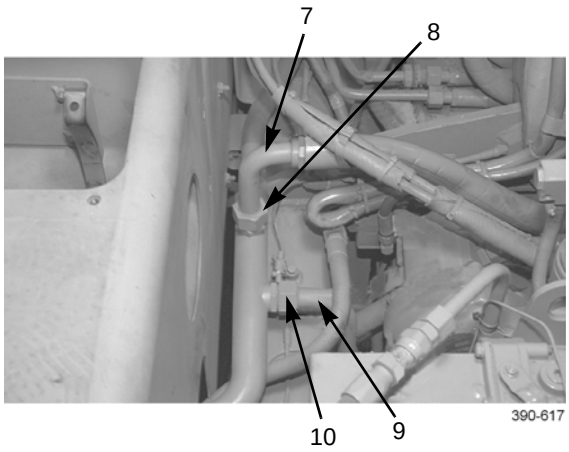
7. Install hose (13) and tighten retaining nut (12).



8. Install bolt (11) and clip to hydraulic tank (3).

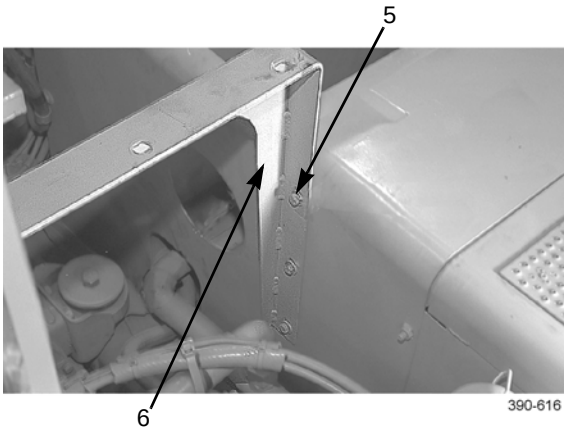


9. Install hose (9) and tighten retaining nut (10).
10. Install hose (7) and tighten retaining nut (8).

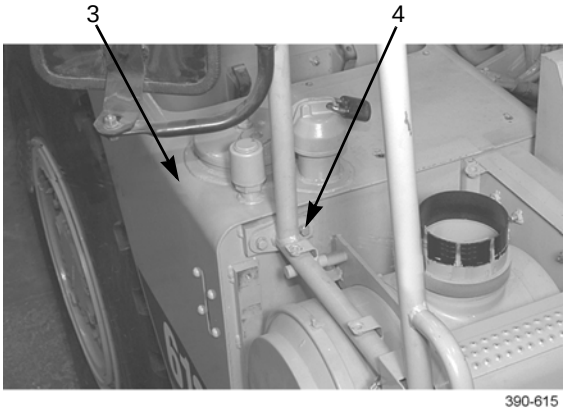


INSTALLATION - CONTINUED

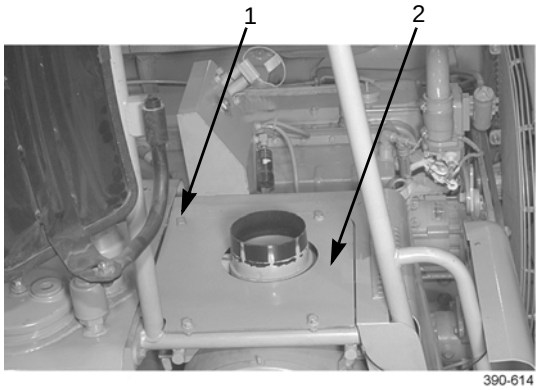
11. Install bracket (6) on machine with three bolts (5).



12. Install two bolts (4) to hydraulic tank (3).



13. Install plate (2) and four bolts (1) to machine.



14. Install air cleaner (WP 0018 00).
15. Install engine access door (WP 0099 00).
16. Fill hydraulic tank (WP 0009 00 and WP 0010 00).
17. Install right fender (WP 0099 00).

INSTALLATION - CONTINUED



WARNING

If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

18. Operate hydraulic system and check for leaks.

END OF WORK PACKAGE

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CHAPTER 6
COMPONENTS OF END ITEM (COEI) MAINTENANCE

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CONTAINER MAINTENANCE 0163 00

THIS WORK PACKAGE COVERS

Door Lock: Removal, Installation

Door: Removal, Installation

HAZMAT Access Door Lock: Removal, Installation

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanics's (Item 33, WP 0172 00)

Personnel Required

Two

Materials/Parts

Adhesive (Item 1, WP 0171 00)

Locknut (49)

Seal, door (3)

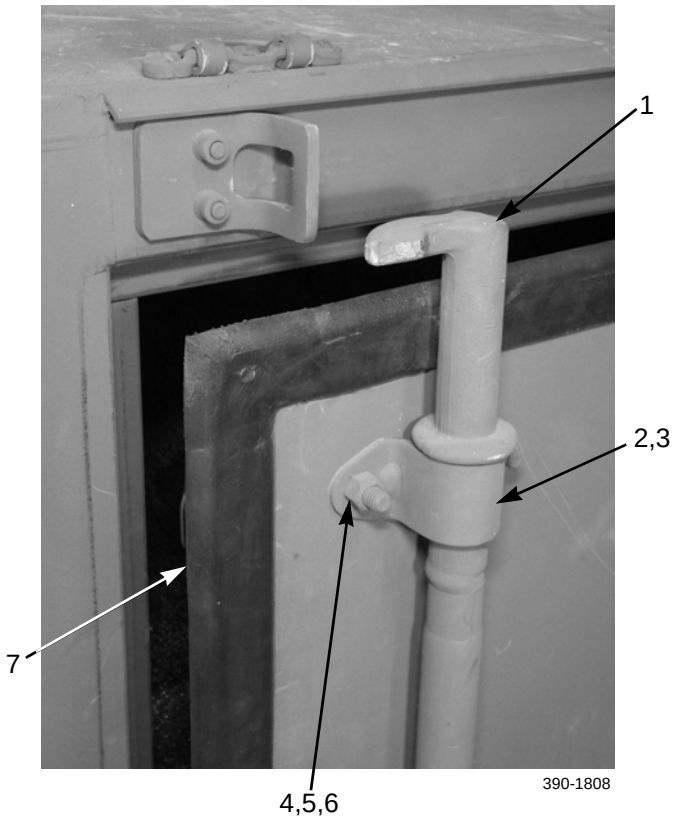
Washer, seal (45)

DOOR LOCK REMOVAL

NOTE

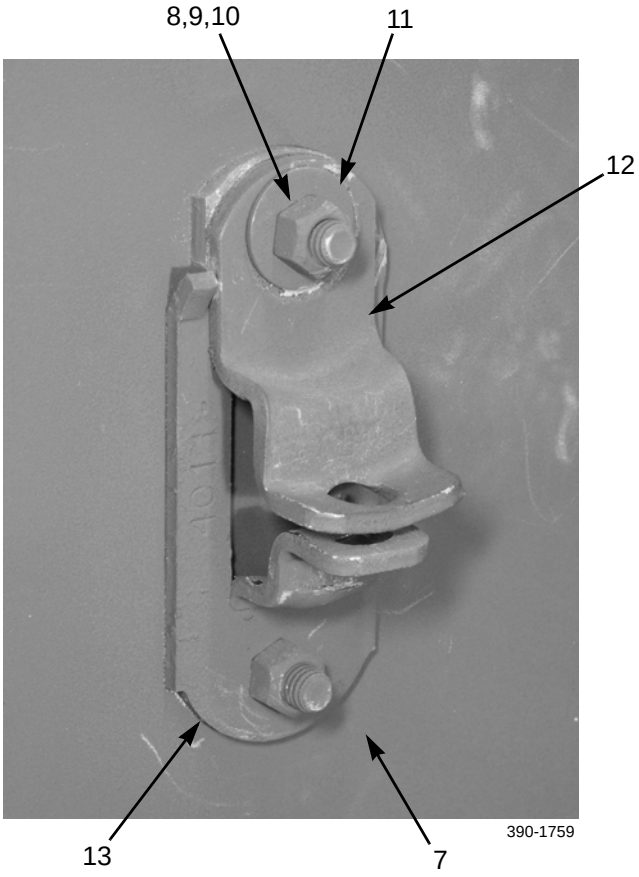
Perform the following steps to replace each of three door locks.

1. With door (7) opened, remove six locknuts (4), bolts (5), seal washers (6), three rod guides (2), door lock (1), and three rod guide backs (3) from door. Discard locknuts and seal washers.



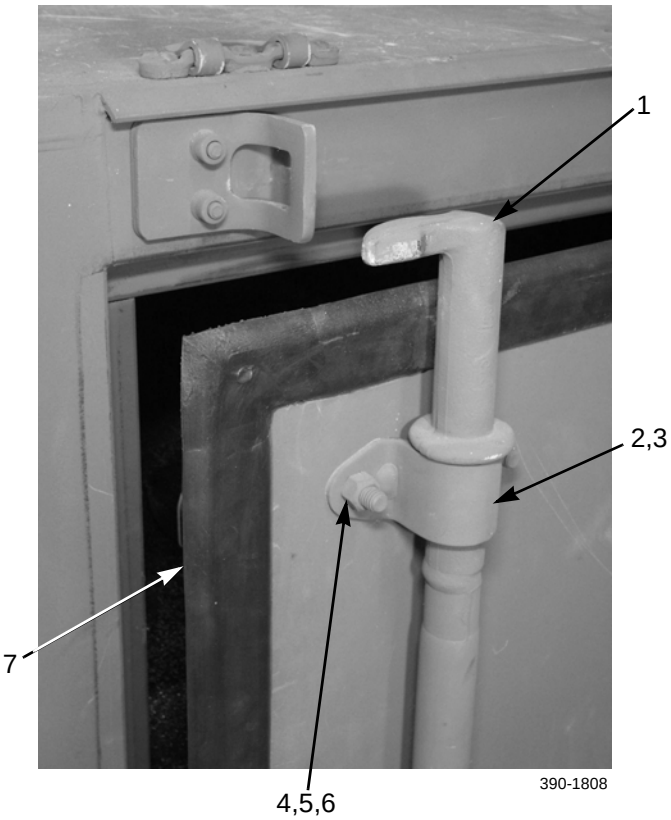
DOOR LOCK REMOVAL - CONTINUED

2. Remove two locknuts (8), one washer (11), two bolts (9), two seal washers (10), latch (12) and latch plate (13) from door (7). Discard locknuts and seal washers.



DOOR LOCK INSTALLATION

1. Install latch plate (13) and latch (12) on door (7) with two seal washers (10), bolts (9), one washer (11), and two new locknuts (8).
2. Install three rod guide backs (3), door lock (1), and three rod guides (2) on door (7) with six new seal washers (6), bolts (5), and new locknuts (4).

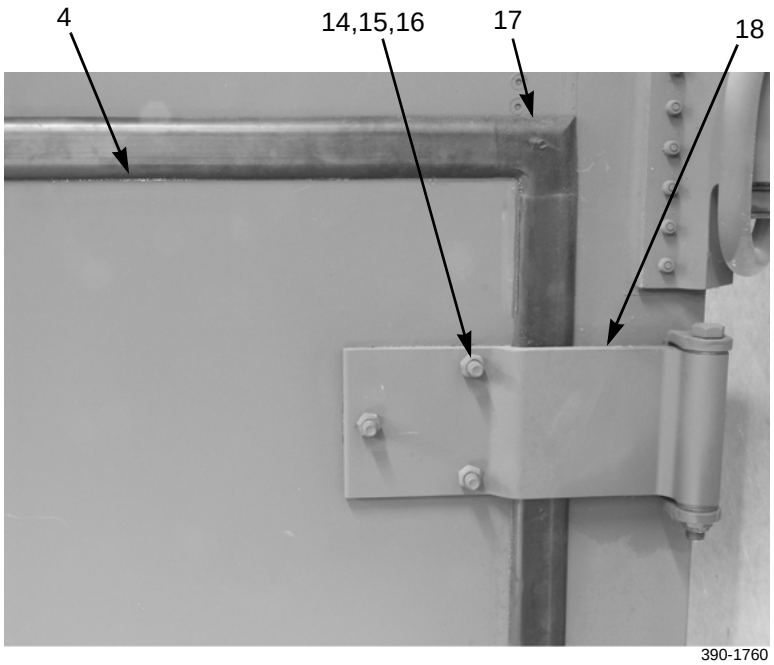


DOOR REMOVAL

NOTE

- Perform following steps to replace each of three doors.
- One door has three hinges. The other two doors have two hinges.

1. Remove door lock (Refer to *Door Lock Removal*).
2. While fully supporting door (4), remove three locknuts (14), bolts (15), and seal washers (16) from door and hinge strap (18). Discard locknuts and seal washers.
3. Remove door (4) from container.
4. If damaged, remove seal (17) from door (4). Discard seal.



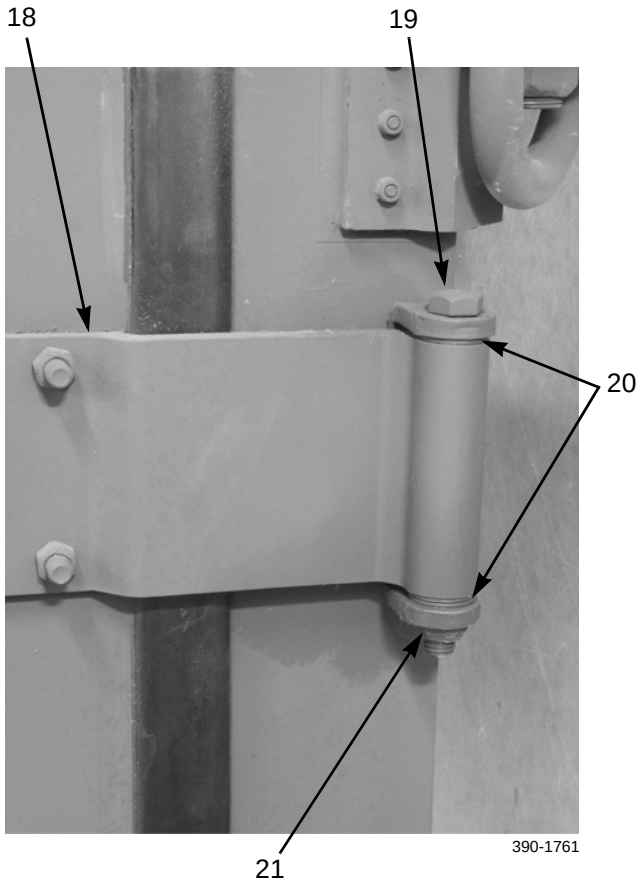
390-1760

DOOR REMOVAL - CONTINUED

NOTE

Washers serve as shims to allow alignment of door. Note quantity and location of washers to aid in installation.

5. Remove locknut (21), bolt (19), washers (20), and hinge strap (18) from container. Discard locknut.



DOOR INSTALLATION

NOTE

Use same quantity of washers (20) (shims) as were removed, and in the same location.

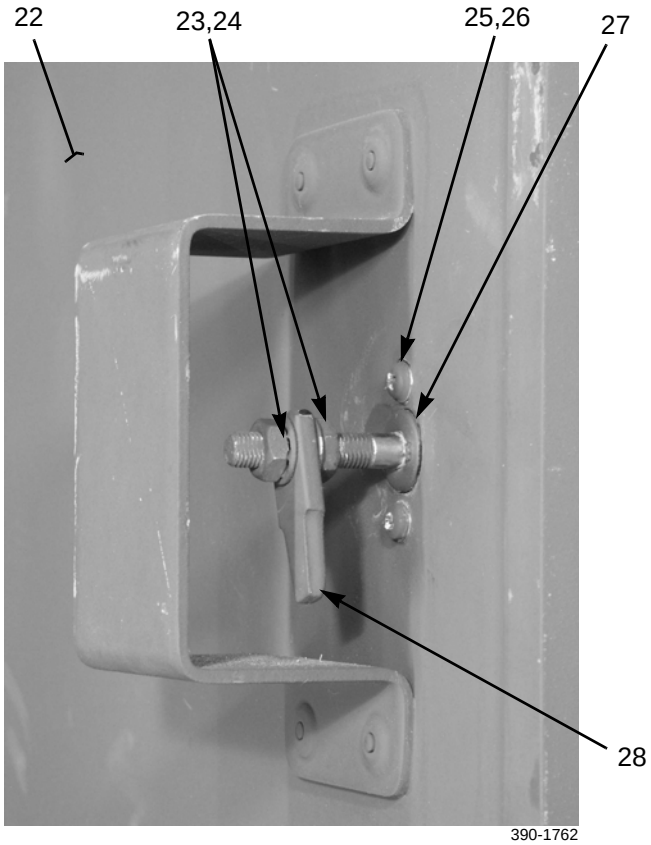
1. Install hinge strap (18) on container with washers (20), bolt (19), and new locknut (21).
2. If removed, apply adhesive to sealing surfaces of new seal (17) and install seal on door (4).
3. Install door (4) on hinge straps (18) with new seal washers (16), bolts (15), and three new locknuts (14).
4. Check for proper alignment of door (4) and tighten all locknuts (14).
5. Install door lock (Refer to *Door Lock Installation*).

HAZMAT ACCESS DOOR LOCK REMOVAL

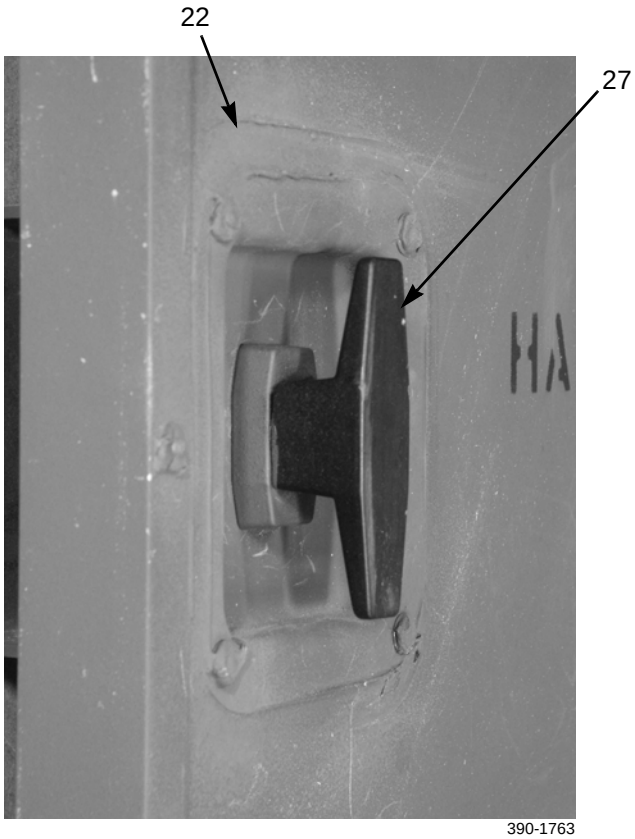
NOTE

- Perform following steps to replace each of two door locks.
- Note position of nuts, lockwashers, and latch for installation.

1. With HAZMAT access door (22) removed from container, remove two nuts (23), lockwashers (24), and latch (28) from shaft of door lock (27).
2. Remove two screws (25), washers (26), and door lock (27) from HAZMAT access door (22).



390-1762



390-1763

HAZMAT ACCESS DOOR LOCK INSTALLATION

1. Install door lock (27) on HAZMAT access door (22) with two washers (26) and screws (25).
2. Install latch (28) on shaft of door lock (27) with two lockwashers (24) and nuts (23).
3. Install HAZMAT access door (22) on container and operate door locks (27). Ensure that door is fastened securely. If door is not secure, adjust position of two nuts (23).

END OF WORK PACKAGE

CONTAINER REPAIR **0164 00**

INTRODUCTION

1. This work package contains repair procedures for the container face/skin: aluminum-bonded material or Fiberglass Reinforced Plastics (FRP) material.
2. In addition, repair of locking lip damage is described.
3. The manufacturer of the ISU container may be consulted as needed:

AAR Mobility System
201 Haynes Street, P.O. Box 550
Cadillac, MI 49601
1-800-355-2015
231-779-4808
231-779-4804 (Fax)
http://www.aarcorp.com

MATERIALS REQUIRED

The following table lists the materials required to perform the repair procedures contained in this work package.

Table 1. Materials List.

NOMENCLATURE	PART NUMBER (CAGE CODE) NATIONAL STOCK NUMBER	DESCRIPTION
Acetone, Technical	ATSM D329 (81346) 6810-00-184-4796	Tool cleanup after container face skin repair
Adhesive	EA 9324 (1JB33)	Container face skin repair
Aluminum Alloy Sheet Stock	QQ-A-250/11 (81348) 9535-00-056-9947	Container face skin repair
Aluminum Powder	MIL-A-82654	Container face skin repair
CARC Paint	MIL-C-46168 (81349) 8010-01-055-2319	Painting of container after repair
Devcon F	Commercially Available	Container face skin repair
Detergent	MIL-D-16791 (83421) 7930-00-282-9699	Cleaning external surface
Diethylenetriamine Activator (DETA)	O-D-1271 (81348) 6810-00-995-4804	Container face skin repair

MATERIALS REQUIRED - CONTINUED

Table 1. Materials List - Continued.

NOMENCLATURE	PART NUMBER (CAGE CODE)NATIONAL STOCK NUMBER	DESCRIPTION
Dowclene EC	PPSPN (6K748) 8135-01-305-2365	Container face skin repair
Dry Cleaning Solvent	P-D-680B (4N760) 6850-01-377-1809	Cleaning of mechanical parts
Emery Paper	Commercially Available	Container face skin repair
Epoxy Primer	MI-P-23377	Painting of container
Epoxy Resin	EA828 (54527) 8030-00-992-3156	Container face skin repair
Isopropyl Alcohol	O-E-760 (51883) 6810-01-259-2505	Cleaning of electrical parts
Low-lint Cleaning Cloth	MIL-C-85043 (58536) 7920-00-165-7195	Cleaning of electrical and mechanical parts
Methyl Ethyl Keytone (MEK)	ASTM-D-740 (81346) 6810-00-281-2762	Container face skin repair
Non-Metallic Brush	H-B-695	Cleaning of adhesives from mechanical parts
Paint Brush	Commercially Available	Cleaning of electrical parts and adhesives from mechanical parts
Rivets	Commercially Available	Container face skin repair
Seal Adhesive	PN 93002-033	Installation of door seal
Sealant, SR150	PN 93077-005	Installation of hinge strap and bolts
Staples	Commercially Available	Installation of door seal
Toluene	Commercially Available	Cleaning of adhesives and anti-seize tape from mechanical parts

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL)

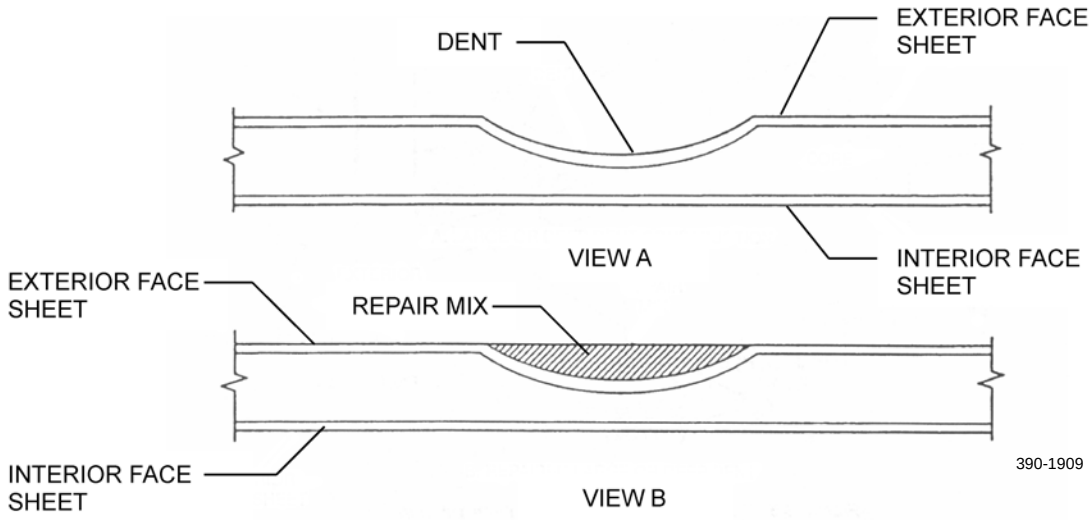
1. **Repair of Dents or Depressions.**

NOTE

The container top, floor, and side panels are constructed of aluminum-bonded material. The following procedures must be used to repair dents or depressions. If the face sheet is not punctured proceed as follows:

a. Sand damaged area with emery paper to remove all traces of paint.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



NOTE:
VIEW A – LARGE OR DEEP DENT CONSTRUCTION
VIEW B – REPAIRED LARGE OR DEEP DENT



Dowclene EC is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

b. Wipe surface with cloth dampened in Dowclene and immediately wipe solvent from surface with clean dry cloth.

c. Mix small quantity of dent filler, Devcon F.

d. Fill in damaged area with dent filler, using spatula or putty knife.

e. Allow dent filler to fully cure.

f. Sand surface of cured dent filler to conform to surrounding area.

g. After repair, touch up with epoxy primer and CARC paint as required.

2. **Repair of Puncture Less Than 1/2 in. (12.70 mm) in Diameter or Depth.**

NOTE

The following procedures should be used to repair skin punctures with a diameter less than 0.25 in. (12.70 mm) or a depth in the core of less than 0.25 in. (12.70 mm).

a. If a patch is not available, make patch as follows:

(1) Cut a rectangular patch from unpainted Aluminum Alloy Sheet Stock, 0.050 in. (1.27 mm) thick. Width and length dimensions must be such that patch extends a minimum of 1 in. (25.40 mm) beyond damaged surface area.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED

(2) Cut or file corners to 0.25 in. (6.35 mm) radius.

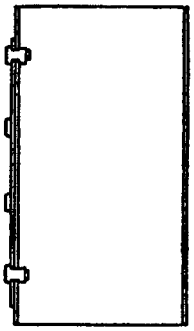
b. Position patch centered over damaged area and lightly scribe or mark outline of patch onto panel face.

c. Remove paint from panel face within marked outline. All traces of paint must be removed and sanded.

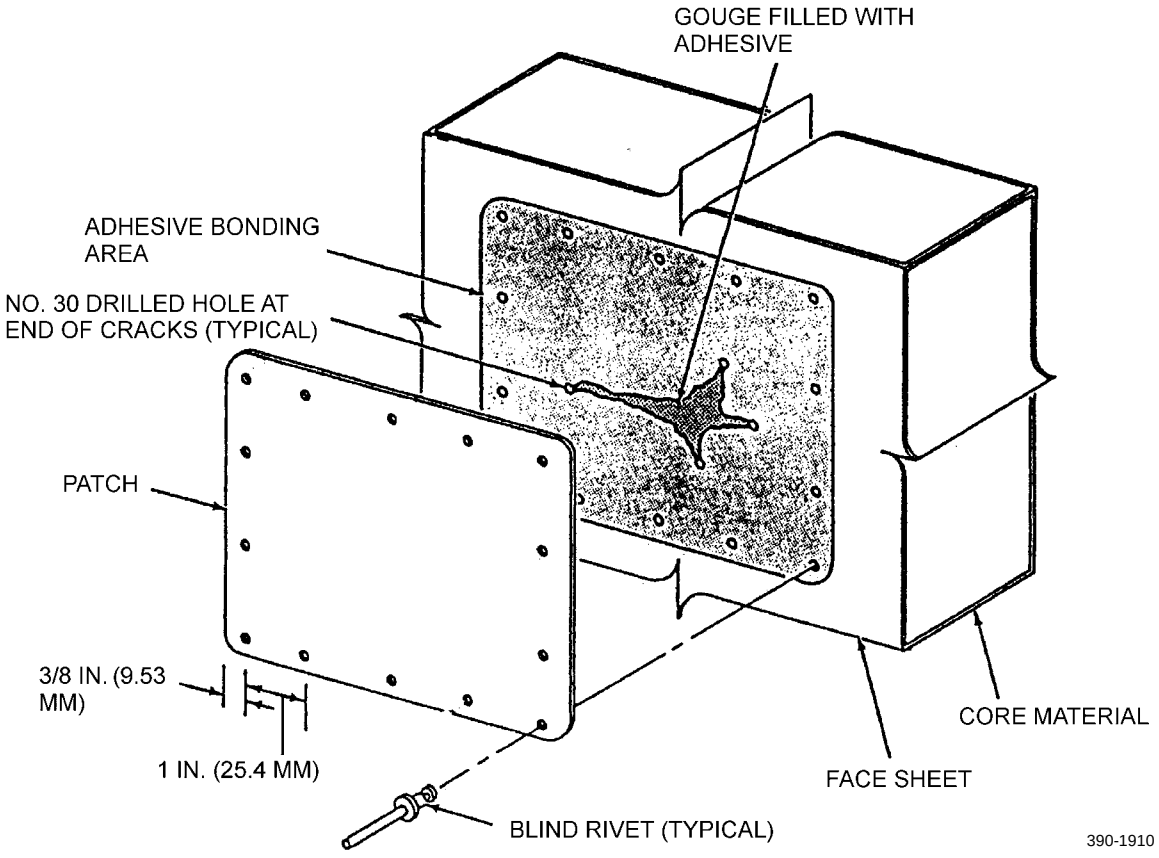
d. Lay out rivet hole pattern around edge of patch as shown.

(1) Use 3/8 in. (9.53 mm) edge distance and 1 in. (25.40 mm) spacing.

(2) Drill holes using no. 30 (0.1285 in.) drill.



CROSS-SECTION OF FINISHED REPAIR



REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED

e. Center patch over cutout panel.

f. Drill through panel face sheet using pre-drilled holes in patch as guide. Sheet fasteners may be used to secure patch temporarily in place while drilling. If sheet fasteners are not available, drill holes using no. 30 (0.1285 in.) drill and insert 1/8 in. (3.18 mm) diameter rivet in each drilled panel hole to keep patch from changing position or slipping. Do not pull or install rivets permanently.

g. Remove patch. Remove all burrs from drilled holes.

h. Prepare bonding surface of panel face sheet by sanding until oxide film is removed and bright surface is exposed.

NOTE

If punctured or gouged area in panel is surrounded by extended cracks, stop drill all cracks using no. 30 drill.

i. Fill cavity panel using dent filler, Devcon F.

j. After dent filler material has hardened, sand material flush with panel face surface.



WARNING

Dowclene EC is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

k. Wipe panel face sheet and patch surfaces with clean cloth soaked in Dowclene EC and immediately wipe solvent from surface with clean cloth. Wear gloves to avoid contaminating surfaces with dirt, oil, or fingerprints.



WARNING

EA9324 adhesive is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Keep away from open flames or other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

l. Apply a thin, even layer of adhesive to bonding surfaces of panel face and patch.

m. Position patch temporarily in place with 1/8 in. (3.18 mm) sheet fasteners.

n. Install 1/8 in. (3.18 mm) universal head blind rivets (closed end) in all drill holes.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



Dowclene EC is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

o. Remove any excess adhesive from outer surface of repair area by wiping with cloth dampened in Dowclene EC.



PRC 1422 B-2 sealant is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

p. Apply bead of PRC 1422 B-2 sealant around patch. Allow approximately 2 to 4 hours for sealant to cure.

q. After repair, touch up with epoxy primer and CARC paint as required.

3. **Repair of Fractures Less Than 1-1/2 x 3 in. (38.10 x 76.20 mm).**

a. Brush area with a stiff wire brush to rid the immediate damaged area of foreign material, grease, and dirt.

b. Stop-drill all tears or cracks in the face skin using no. 30 drill bit.



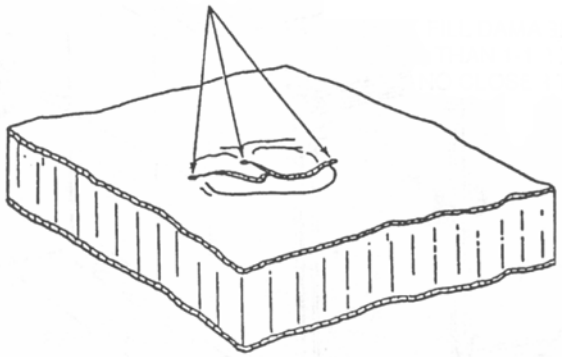
MEK (TT-M-261) is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Keep away from open flames or other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

c. Clean damaged area with MEK (TT-M-261).

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED

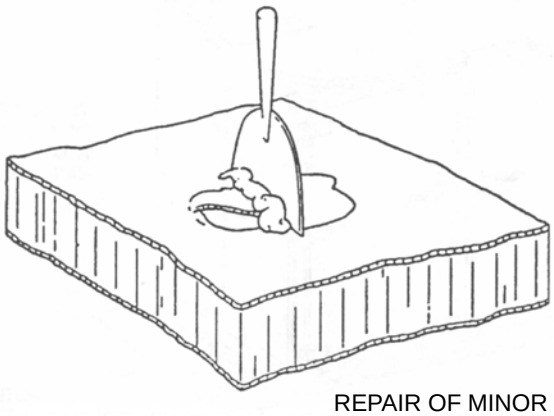
STOP DRILL POINTS

FILL DAMAGE AREA NO LARGER THAN 1-1/2 X 3 INCHES (38.10 MM X 76.20 MM) WIDE AND NO CLOSER THAN TWO (610 MM) FEET APART



NOTE:
LARGER AREA DAMAGE SHOULD BE REFERRED TO AN INTERMEDIATE MAINTENANCE ACTIVITY FOR REPAIR

TYPICAL MINOR DAMAGE TO SINGLE SURFACE



REPAIR OF MINOR DAMAGE TO SINGLE SURFACE

390-1911

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



WARNING

Do not use plastic container for mixing. Heat generated by mixed material may result in melting of container and may cause burns. Mix the Epoxy resin and diethylenetriamine activator in a well ventilated area. The vapor produces is toxic. Avoid breathing vapors and avoid skin contact with the mixture. If the adhesive contacts the skin, flush area with warm water and soap. Failure to follow this warning may result in injury to personnel.

d. Mix epoxy resin and diethylenetriamine activator in ratio of 100 parts of resin to seven parts of activator by weight. Add sufficient aluminum powder (MIL-A-82654) to form a thin paste.

NOTE

This paste will harden in 15 to 20 minutes at room temperature.

e. Pour paste into damaged area. Do not overfill.

f. With 1-1/2 in. (38.10 mm) wide spatula, smooth out paste to create a level fill of damaged area.

g. Cure paste for 24 hours at room temperature.

h. If necessary, sand and paint with epoxy primer and CARC paint as required.

4. Repair of extended punctures (Single Face Sheet).

WARNING

Repair patch areas exceeding size and quantity shown may weaken container. This may result in equipment damage or personal injury when container is used.

NOTE

The following procedures should be used to repair a single face sheet (inside or outside face sheet) when punctures exceed 1/2 in. (12.70 mm) in depth. Repair patches of this type are limited to: one 6 x 6 in. (152.40 x 152.40 mm) patch in a 21 in. (533.40 mm) central strip of the top and side panels; one 12 x 12 in. (305 x 305 mm) patch in 33-1/2 in. (851 mm) strips on the panel edges as shown. Note that only two patches are permitted on the top and on either side panel.

a. On panel face sheet, lay out rectangle with 0.25 in. (6.35 mm) radius rounded corners to encompass damaged area. Use a core plug from repair kits as guide.

b. Cut out face sheet within rectangle, using router bit chucked in 1/4 in. (6.35 mm) electric drill, or use fine tooth keyhole-type hacksaw.

c. Remove damaged face sheet.

d. Cut and remove core material to opposite face sheet.

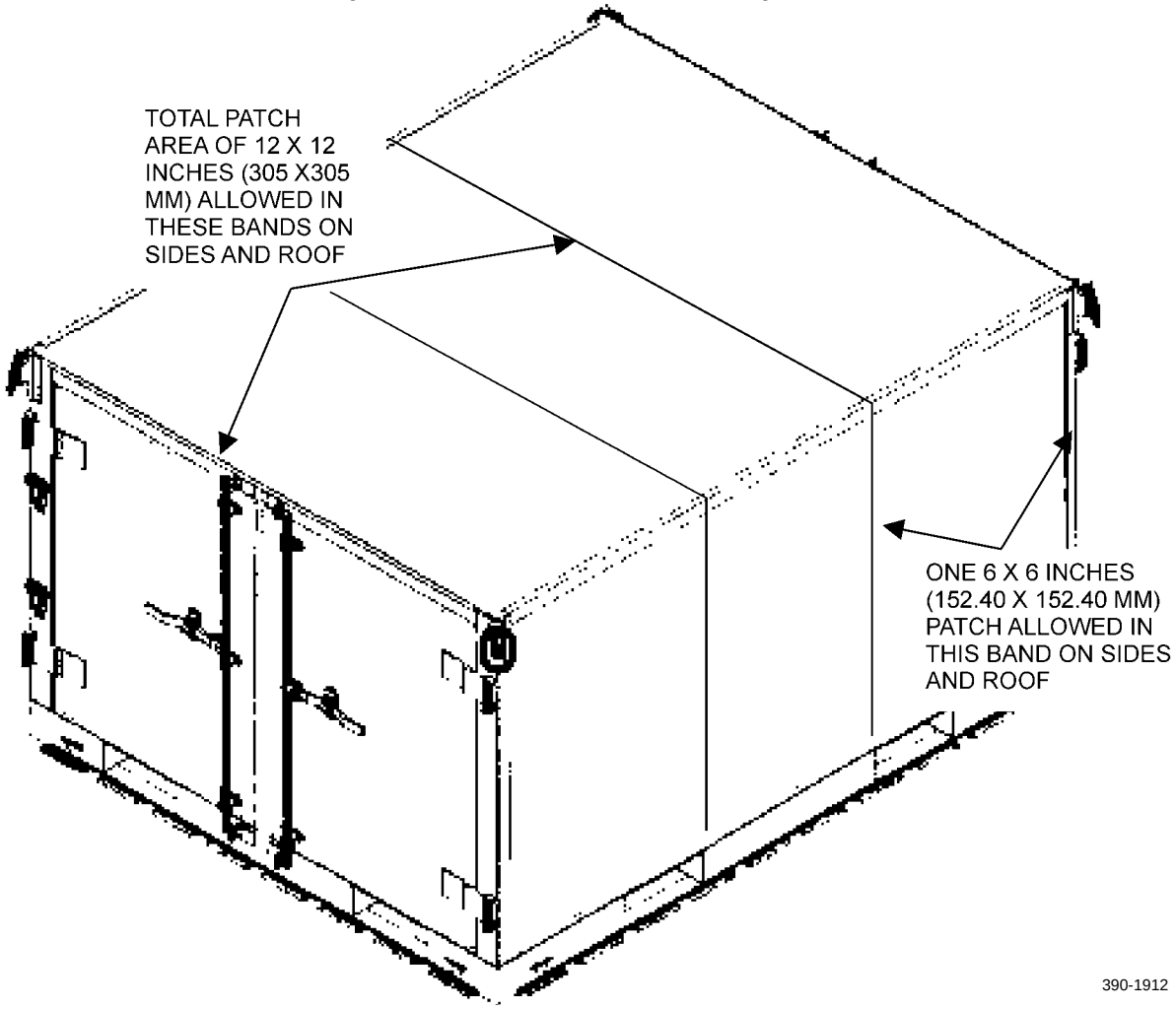
e. File edges of cutout smooth using fine cut, half round or rotary file chucked in 1/4 in. (6.35 mm) electric drill.

f. Remove paint from panel face around cutout for distance of 1-1/4 in. (31.75 mm). Paint can be sanded off. All traces of paint must be removed.

g. Center patch using predrilled holes in patch as guide. Secure patch temporarily with 1/8 in. (3.18 mm) sheet fastener.

h. Lay out hole pattern around edge of patch. Use 3/8 in. (9.53 mm) edge distance and 1 in. (25.40 mm) spacing. Drill holes using no. 30 (0.1285 in.) or no. 31 (0.1200 in.) drill.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



i. Center patch over cutout in panel making certain patch fits flush in cutout.

j. Drill through panel face sheet using predrilled holes in patch as guide. Use 1/8 in. (3.18 mm) sheet fastener to secure patch temporarily in place while drilling.

k. Remove patch and remove all burrs from drilled holes.

l. Cut section of new core material to fit snugly in core cutout.

m. Prepare bonding surfaces of face sheet patch by sanding until oxide film is removed and bright surface is exposed.

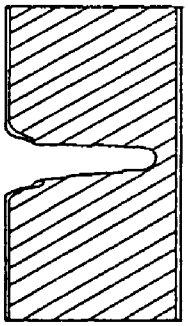


WARNING

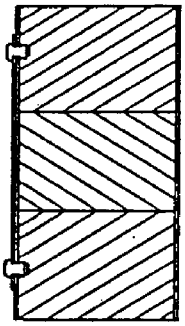
Dowclene EC is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

n. Wipe surfaces with clean cloth soaked in Dowclene EC and immediately wipe solvent from surface with clean cloth. Wear gloves to avoid contaminating surfaces with dirt, oil or fingerprints.

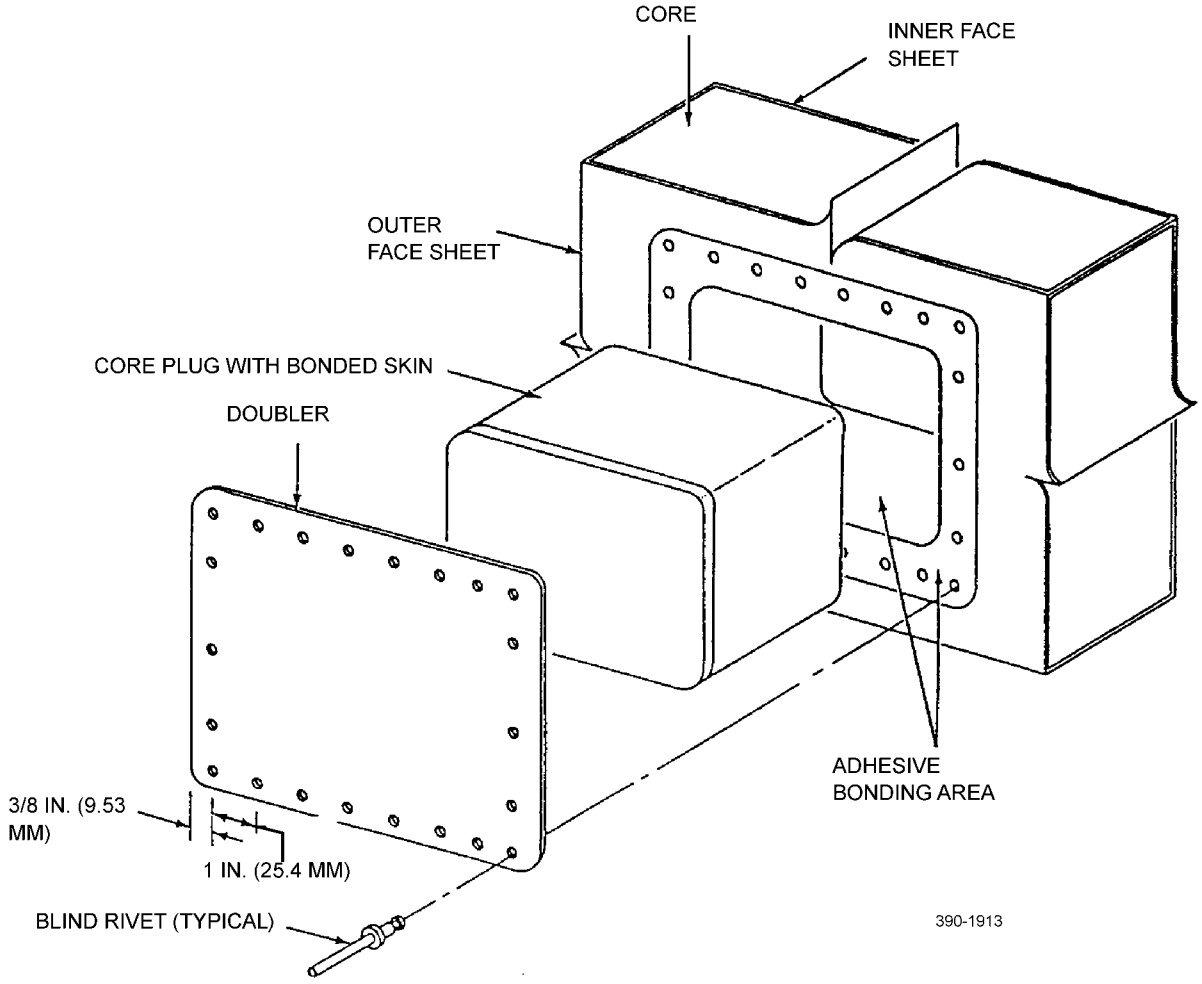
REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



CROSS -SECTION
BEFORE REPAIR



CROSS -SECTION
AFTER REPAIR



REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED



EA9324 adhesive is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Keep away from open flames or other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

o. Mix sufficient quantity of EA9324 adhesive for repair. The adhesive has limited pot life; repair must be completed within that period of time.

p. Apply liberal layer of adhesive to both sides and all edges of new core material and position core material in cutout.

q. Apply thin, even layer of adhesive to bonding surfaces of face sheet and patch. Position patch in place with 1/8 in. (3.18 mm) sheet fasteners.

r. Install 1/8 in. (3.18 mm) universal head blind rivets in all drilled holes.



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s. Remove any excess adhesive from outer surfaces of repair by wiping with cloth dampened in Dowclene EC.

t. Repair will be fully cured after approximately 7 days at 75°F (24°C) or 1 hour at 180°F (82°C). Approximately 70 percent of strength is reached after 24-hour cure at room temperature of 75°F (24°C).



PRC 1422 B-2 sealant is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

u. After repair has cured for 24 hours, coat edges of patch and rivet heads with PRC 1422 B-2 sealant.

v. After repair, touch up with epoxy primer and CARC paint as required.

5. Repair of Extended Punctures (Both Sheets).

NOTE

The following procedure should be used to repair punctures that go through both outside and inside face sheets.

a. On panel face sheet, lay out rectangle with 0.25 in. (6.35 mm) radius rounded corners to encompass damaged area.

b. Cut out face sheet within rectangle, using router bit chucked in 1/4 in. (6.35 mm) electric drill or use fine tooth keyhole-type hacksaw.

c. Remove damaged face sheet.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED

d. Cut and remove core material to opposite face sheet.

e. File edges of cutout smooth using fine cut half round file or rotary file chucked in 1/4 in. (6.35 mm) drill.

f. On opposite side of panel, cut out damaged area in face sheet. Make cutout identical in size and directly opposite cutout made in step b.

g. File edges of cutouts in both face sheets smooth using fine cut, half round file or rotary file chucked in 1/4 in. (6.35 mm) drill.

h. Remove paint from both panel faces around cutout for distance of 1-1/4 in. (31.75 mm). Paint may be sanded off. All traces of paint must be removed.

i. If patches are not available, cut two patches from unpainted Aluminum Alloy Sheet Stock (6061-T6) (QQ-A-250/11). Make patches 1 in. (25.40 mm) larger all around than panel cutout . Patch thickness shall be 0.050 or 0.063 in. (1.27 or 1.60 mm).

j. Lay out hole pattern in patches. Use 3/8 in. (9.53 mm) edge distance and 1 in. (25.40 mm) spacing. Drill holes using no. 30 (0.1285 in) or no. 31 (0.1200 in.) drill.

k. On one side of panel, center patch over cutout and drill through face sheet using predrilled holes in patch as guide. Use temporary 1/8 in. (3.18 mm) sheet fasteners to secure patch in place while drilling.

l. Position patch in cutout face sheet and back drill through patch using predrilled holes in patch as guide. Use temporary 1/8 in. (3.18 mm) sheet fasteners to secure in place while drilling.

m. Repeat procedures in step j and k to drill patch and patch on opposite side of panel.

n. Remove patches and remove burrs from all drilled holes.

o. Cut section of new core material to fit snugly into core cutout.

p. Prepare bonding surfaces of face sheet patches by sanding until oxide film is removed and bright surface is exposed.



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q. Wipe surfaces with clean cloth soaked in Dowclene EC and immediately wipe solvent from surfaces with clean cloth. Wear gloves to avoid contaminating cleaned surfaces with dirt, oil or fingerprints.



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r. Mix sufficient quantity of EA9324 adhesive for repair. The adhesive has limited pot life so repair must be completed within that period of time.

s. Apply liberal layer of adhesive to both sides and all edges of new core material and position core material in cutout.

REPAIR OF FACE SKIN DAMAGE (ALUMINUM-BONDED MATERIAL) - CONTINUED

t. On exterior side of panel, apply thin, even layer of adhesive to bonding surfaces of face sheet and patch. Position patch in place with 1/8 in. (3.18 mm) sheet fasteners.

u. Install 1/8 in. (3.18 mm) universal head blind rivets in all drilled holes.



WARNING

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v. Remove any excess adhesive from outer surfaces of repair by wiping with cloth dampened in Dowclene EC.

w. Repeat procedures in steps t through v for patch on inner side of panel.

x. Repair will be fully cured after approximately 7 days at 75°F (24°C) or 1 hour at 180°F (82°C). Approximately 70 percent of strength is reached after 24-hour cure at room temperature of 75°F (24°C).



WARNING

PRC 1422 B-2 sealant is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. Use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

y. After repair has cured for 24 hours, coat edges of patch and rivet heads with PRC 1422 B-2 sealant.

z. After repair, touch up with epoxy primer and CARC paint as required.

REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL



WARNING

- Fiberglass Reinforced Plastics (FRP) materials, contain minute particles of glass and resin. Appropriate eye and respiratory protection during cutting, grinding and sanding operations is required. Dust particles may cause skin irritation. Failure to follow this warning may result in injury or death to personnel.
- Chemicals in the resins and catalysts may also cause discomfort if prolonged contact is made with the skin. Read all instructions carefully and observe good safety practices. Smoking should be prohibited in the immediate area while working with resins and solvents. Failure to follow this warning may result in injury or death to personnel.

CAUTION

Repairs should be made only to clear and dry surfaces at temperatures above 50°F (10°C). Lower temperatures may prevent effective curing process.

REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

NOTE

- For repair of minor interior damage, filler paste may be used.
- FRP material is used in construction of door assembly and central dividing panel of container. Before beginning a repair, it is essential to identify type of damage so that the appropriate procedures can be carried out. To identify type of repair required, three common types of damaged are classified below.

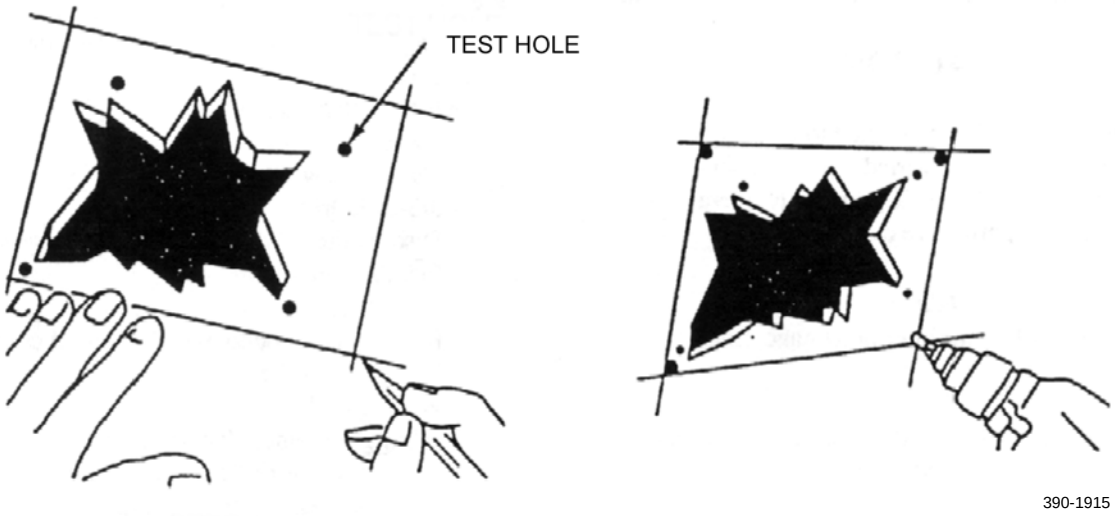
  (a) Structural Damage – This is the most extensive repair and will require all the tools and materials specified. The damaged area must be removed and a replacement section inserted.

  (b) Surface Damage – Includes minor gouging of plywood core.

  (c) Cosmetic Repair – Minor surface scratches.

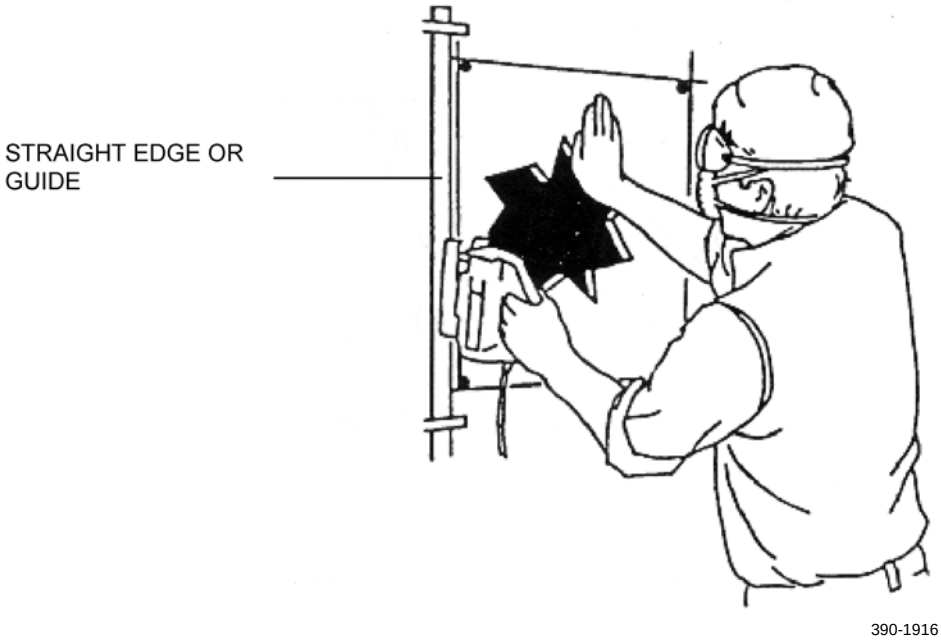


1. Structural damage is best described as a puncture completely through the panel. Generally, a puncture will result in greater damage to one surface than to the other. To determine full extent of the damage, drill a series of test holes around puncture visible from both sides to determine overall size of area to be removed. Tap surrounding area to determine if delamination is present. Mark a rectangle around area to be removed and add about 4 in. (102 mm) for suitable clearance. Drill a 3/8 in. (9.53 mm) hole in each corner to permit insertion of saw blade.



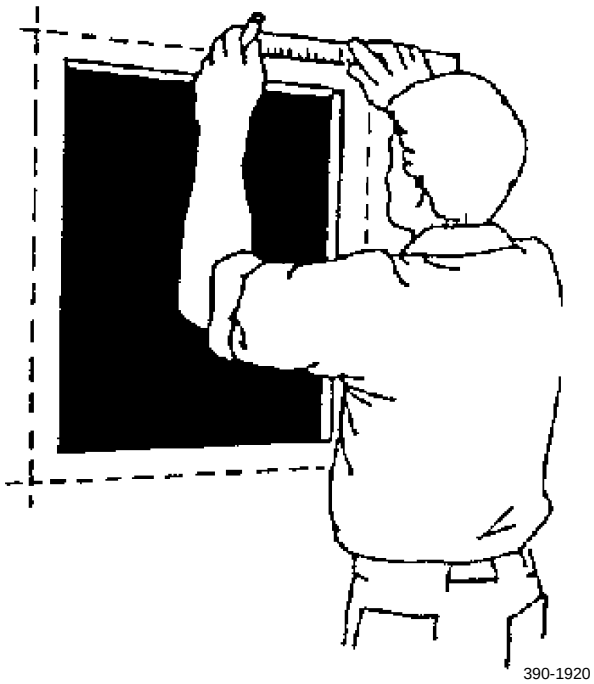
REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

2. Insert sabre saw into starter holes and cut out section to be removed. For accuracy, use a straight edge or guide.
3. Inspect opening for any dampness that may be found in plywood as a result of exposure. A larger hole may have to be cut to remove any damp or rotten core.



390-1916

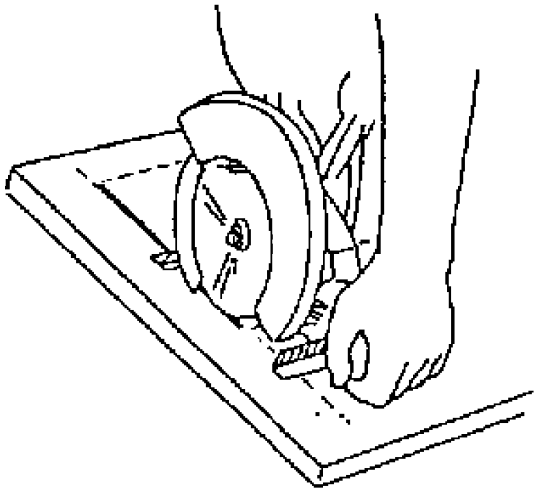
4. From inside of panel, mark a line 2 in. (51 mm) around opening for a ship lap joint as shown.



390-1920

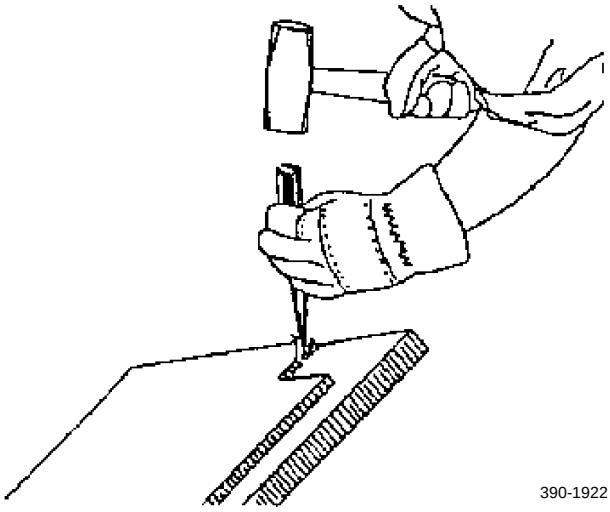
REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

5. Set circular saw to a depth of half the thickness of panel and cut along line.



390-1917

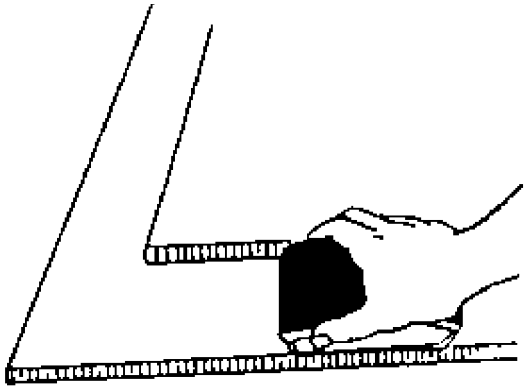
6. Remove cut area with a chisel and sand smooth.



390-1922

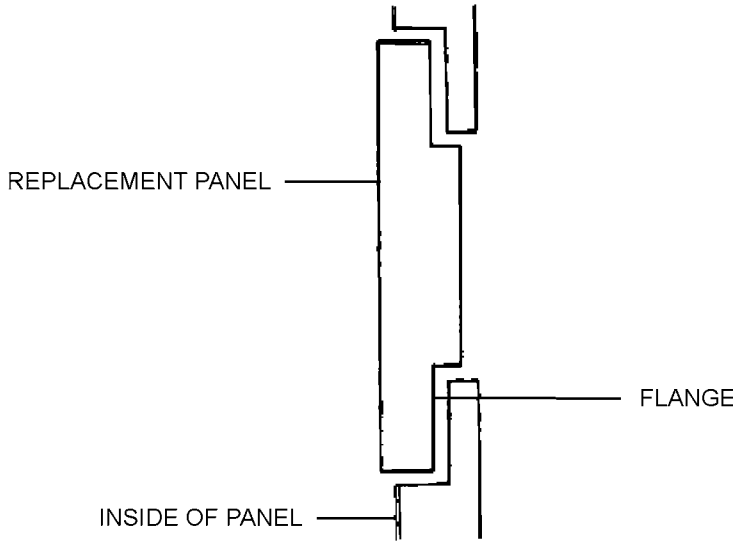
REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

7. Mark and cut replacement FRP panel to maximum size of lap joint, cut back 2 in. (51 mm) to half the thickness of the panel. Remove with chisel and sand smooth. Check fit and make necessary adjustments.



390-1919

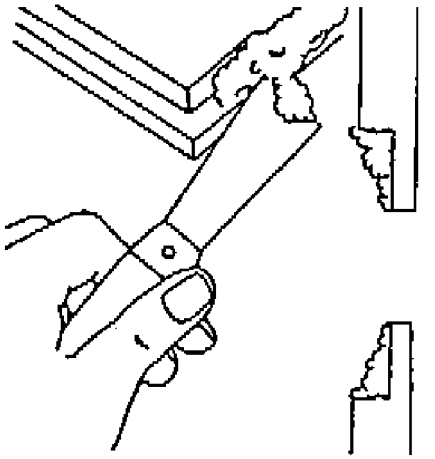
8. All replacement panels should be fitted with the flange on the inside for strength.



390-1925

REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

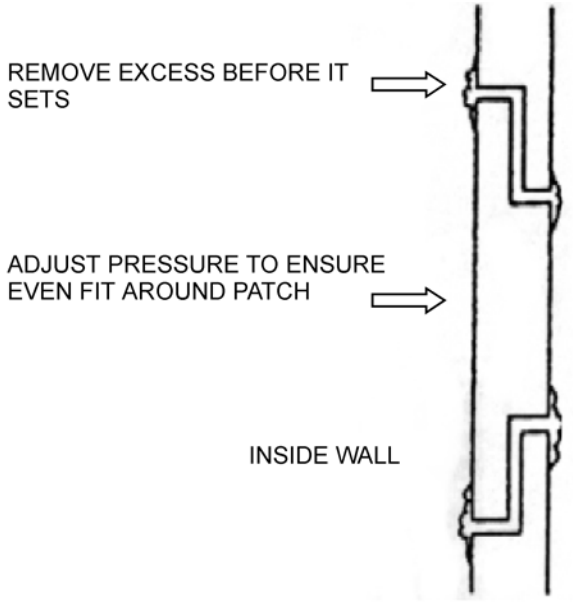
9. Mix sufficient filler paste and catalyst and apply a layer approximately 1/16 in. (1.6 mm) thick to all edges of both opening and patch. Insert patch from inside. Small screws may be used to secure in position.



390-1921

NOTE

On small patch, up to 12 x 12 in. (305 x 305 mm), an additional layer should be applied over entire repair. For larger patches, a second layer of glass reinforcement should be attached over joint area only. This layer should be at least 2 in. (51 mm) wider than first application. Sand area and fill any voids or depressions with filler paste material and allow to harden.

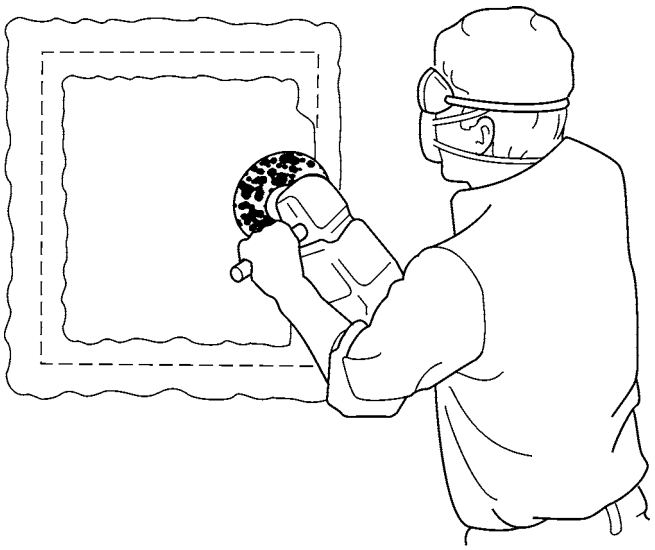


390-1923

REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

10. Check exterior surface to make certain patch is flush with surrounding panel surface. Remove excess filler paste before it hardens. Before proceeding to next step, allow resin paste to fully harden for approximately 12 hours.

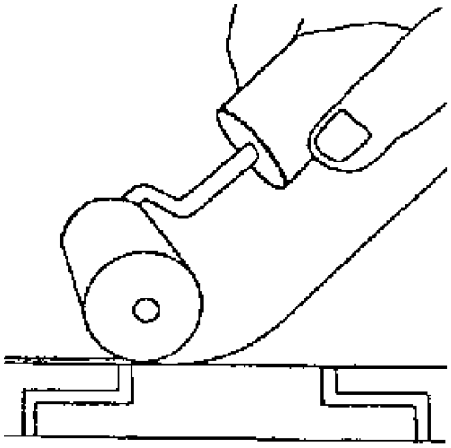
11. Using disc sander, grind inside surface down to plywood core. Mix sufficient resin and curing agent to saturate pre-cut glass reinforcement material. Also, brush coat ground out area. Apply glass reinforcement to area and roll out brush to remove air bubbles.



390-2059

12. Using disc sander, grind outside surface down to plywood core to approximately 4 in. (102 mm) wide around outside joint. Take glass cloth tape, saturated with resin, and roll out.

13. Lightly sand joint and wipe clean. Mix a sufficient amount of surfacing paste and catalyst and apply a brush coat or use a putty knife. Allow to harden and sand smooth. Cut sheet of film approximately 1/2 in. (13 mm) larger around than repair area. Strip off backing sheet and apply it slowly to surface with a seam roller to eliminate all bubbles or wrinkles. Roll outer edges to bond these firmly to panel.



390-1924

REPAIR OF FACE/SKIN DAMAGE TO FIBERGLASS REINFORCED PLASTICS (FRP) MATERIAL - CONTINUED

14. Though this will adequately complete repair for a perfect finish, use a heat gun on edges to soften film. Then use a roller to fuse and blend it into original surface. The seam should disappear. If heat gun is not available, a hand iron or hair dryer can be used.

WARNING

Do NOT pour chemicals or paste into sinks, toilets or garbage containers. Material could set up and clog drains or cause fire in containers having flammable contents, oily rags, etc. Failure to follow this warning may result in injury or death to personnel.

15. Prime paint repaired area with CARC paint as required.

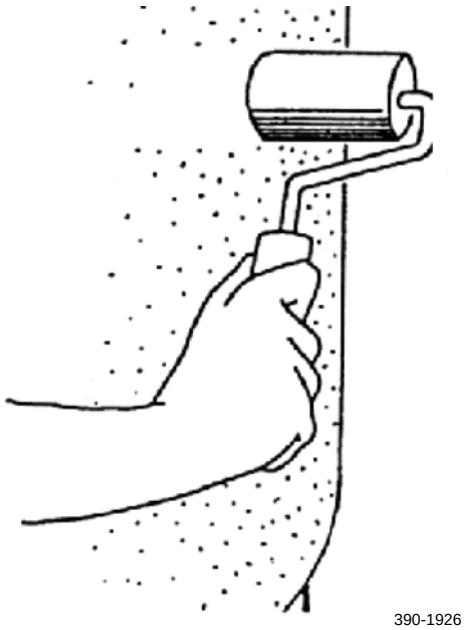
WARNING



WARNING

Acetone is flammable and harmful to eyes, skin, and breathing passages. Observe all fire precautions. use only with adequate ventilation and with approved personal protective equipment. Failure to follow this warning may result in injury or death to personnel.

16. Clean all tools, brushes etc., with acetone. Also, clean up work area and dispose of any resin containing agent after it has set up or hardened.



390-1926

REPAIR OF LOCKING LIP DAMAGE

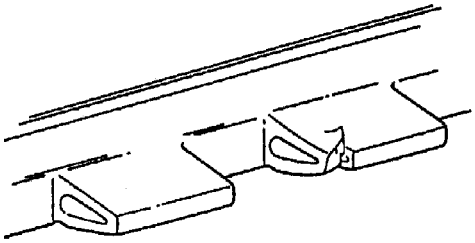
1. If damage to the locking lip is so severe that container will not enter an aircraft restraint system, repair must be made.

2. Deformation of lip that does not involve torn or cracked metal may be repaired by hammering, rasping, grinding or filing lip to make it conform as closely as possible to its original configuration.

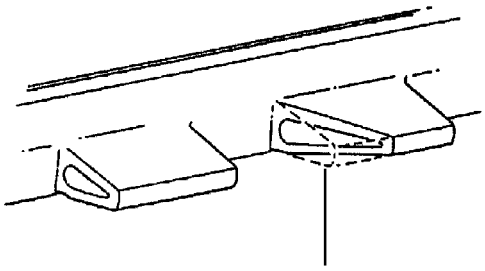


390-1927

3. Damage that involves torn or severely cracked locking lips may be repaired by removing damaged portion of lip. The portion of lip removed for this repair should not exceed 50 percent.



TYPICAL LOCKING LIP DAMAGE



390-1928

END OF WORK PACKAGE

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CUTTING EDGE WHEELS AND LOAD TRANSFER AXLES REPAIR 0165 00

THIS WORK PACKAGE COVERS

Disassembly, Inspection, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Grease, GAA (Item 16, WP 0171 00)

Personnel Required

Two

NOTE

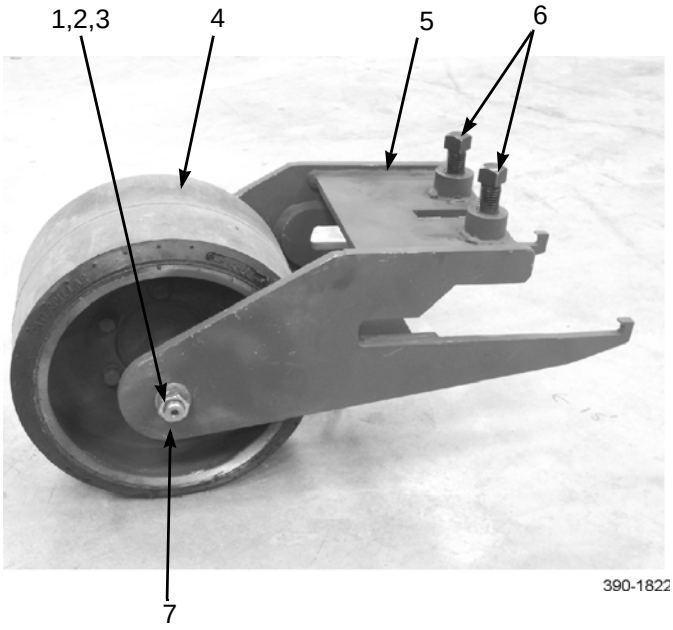
Cutting edge wheels and load transfer axles are repaired the same way except where noted. Cutting edge wheel is shown.

DISASSEMBLY

NOTE

Perform step 1 for cutting edge wheel only.

1. Remove two setscrews (6) from cutting edge wheel frame (5).
2. Remove nut (1), washer (2), two spacers (3), pin (7), and wheel (4) assembly from frame (5).

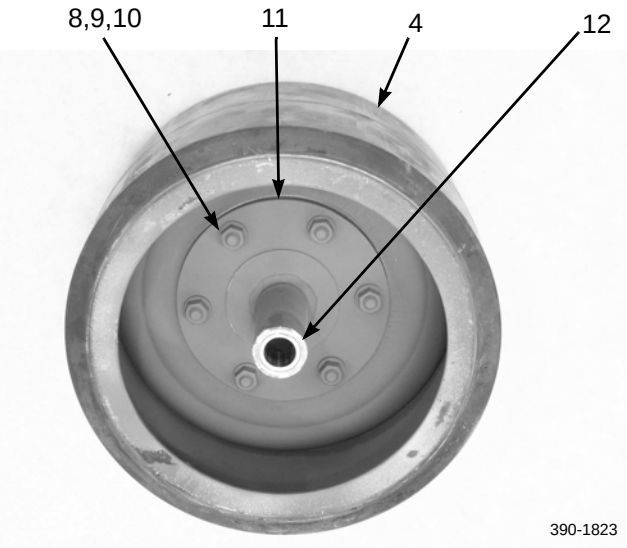


DISASSEMBLY - CONTINUED

NOTE

Note position of axle in wheel for assembly.

3. Remove six nuts (8), 12 washers (9), six screws (10), and axle (11) from wheel (4).



INSPECTION

1. Inspect components for cracks, wear, and damage. Replace any components that are cracked, worn or damaged.
2. Inspect two bushings (12) in axle housing. Replace bushings if loose, worn or damaged.

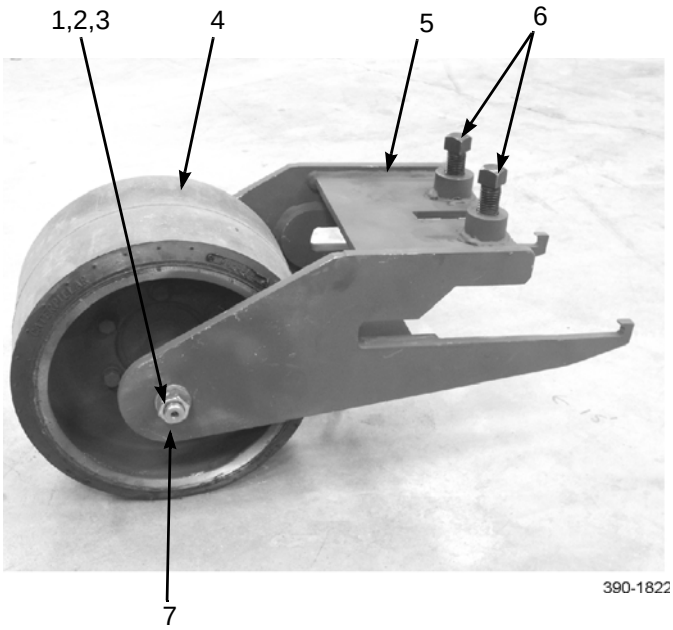
ASSEMBLY

1. Install axle (11) on wheel (4) with six screws (10), 12 washers (9), and six nuts (8).
2. Apply a thin coat of grease to inside surface of two bushings (12).
3. Install wheel (4) assembly and two spacers (3) on frame (5) with pin (7). Install washer (2) and nut (1).

NOTE

Perform step 4 for cutting edge wheel only.

4. Install two setscrews (7) to cutting edge wheel frame (5).



END OF WORK PACKAGE

LOAD TRANSFER PUMP VALVE AND HOSE ASSEMBLY REPAIR 0166 00

THIS WORK PACKAGE COVERS

Disassembly, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Shop equipment, common no. 1 (Item 24, WP 0172 00)

Materials/Parts

Oil, lubricating (Item 24 or 29, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Tag, marker (Item 39, WP 0171 00)

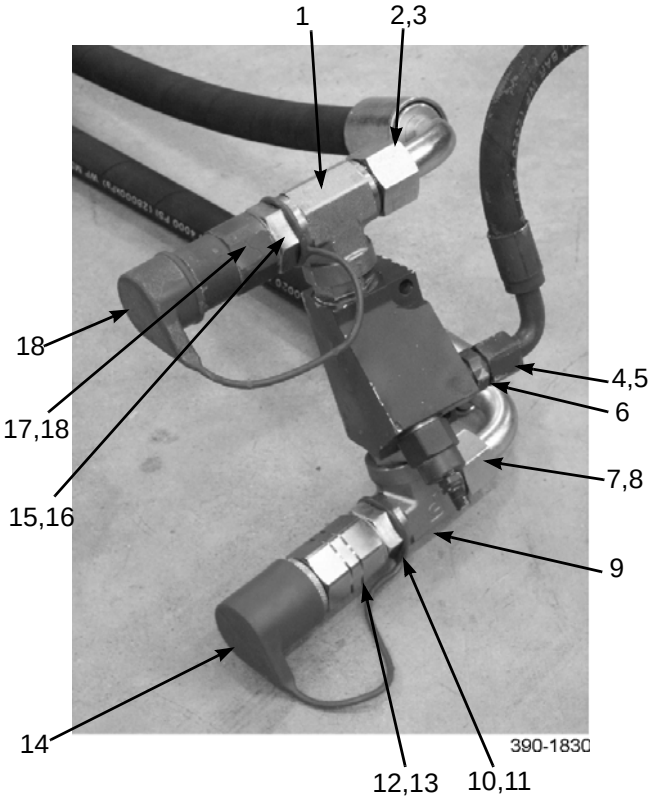
O-ring (as required)

DISASSEMBLY

NOTE

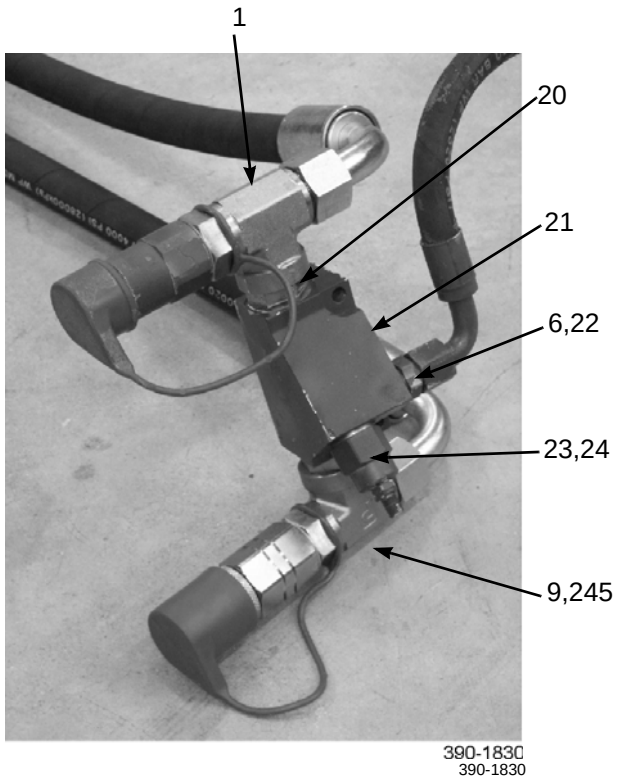
- Prior to disassembly, inspect components of relief valve and cracks, damage or evidence of leaks. Disassembly only as needed to repair relief valve and hose assembly.
- Place assembly in a soft-jawed vise to assist in disassembly.
- Tag and note position of hoses and valve components to aid in assembly.

1. Remove hose assembly (2) and O-ring (3) from tee (1). Discard O-ring.
2. Remove hose assembly (4) and O-ring (5) from adapter (6). Discard O-ring.
3. Remove hose assembly (7) and O-ring (8) from tee (9). Discard O-ring.
4. Remove dust cap (14) from coupler (12).
5. Remove coupler (12) and O-ring (13) from adapter (10). Discard O-ring.
6. Remove adapter (10) and O-ring (11) from tee (9). Discard O-ring.
7. Remove dust cap (14).
8. Repeat steps 4 through 7 to remove dust cap (19), coupler (17), O-ring (18), adapter (15), and O-ring (16) from tee (1). Discard O-rings.

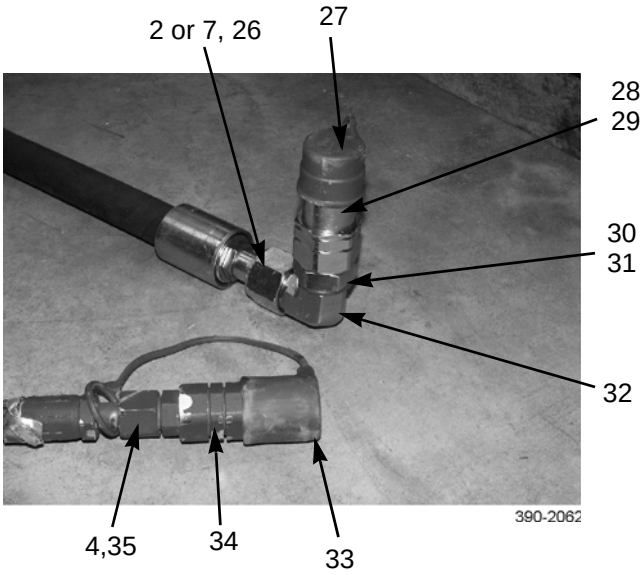


DISASSEMBLY - CONTINUED

9. Remove tee (1) and O-ring (20) from valve manifold (21). Discard O-ring.
10. Remove tee (9) and O-ring (25) from valve manifold (21). Discard O-ring.
11. Remove adapter (6) and O-ring (22) from valve manifold (21). Discard O-ring.
12. Remove relief valve (23) and O-ring (24) from valve manifold (21). Discard O-ring.



13. At other end of hose assembly (2 or 7), remove hose assembly and O-ring (26) from elbow (32). Discard O-ring.
14. Remove dust cap (27) from coupler (28).
15. Disassemble coupler (28), O-ring (29), adapter (30), O-ring (31), and elbow (32). Discard O-rings.
16. At other end of hose assembly (4), remove dust cap (33) from coupler (34). Remove hose assembly and O-ring (35) from coupler (34). Discard O-ring.
17. Remove dust cap (33) from hose assembly (4).

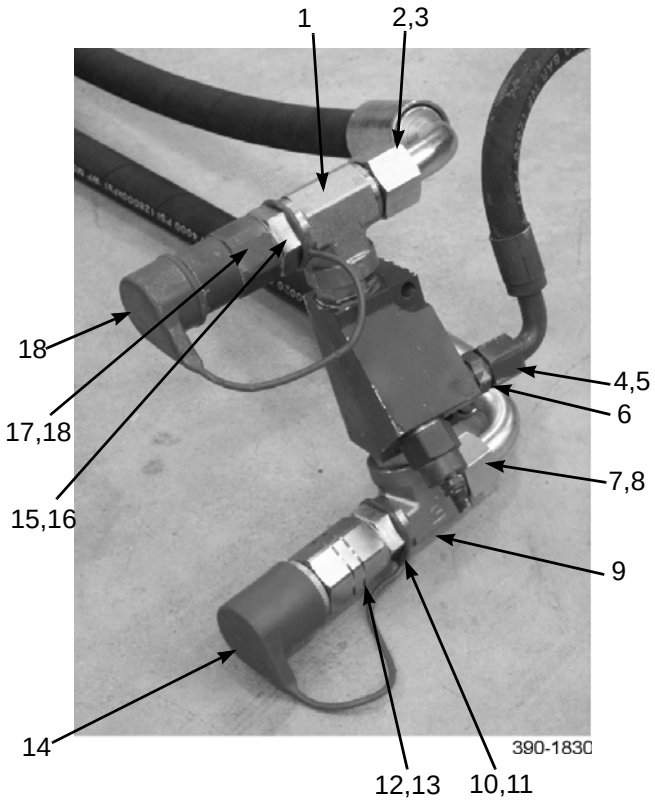


ASSEMBLY

NOTE

Lightly coat all new O-rings with clean oil before installation.

1. Install dust cap (33) on hose assembly (4).
2. Install new O-ring (35) and hose assembly (4) to coupler (34).
3. Install dust cap (33) on coupler (34).
4. Assemble elbow (32), dust cap (27), new O-ring (31), adapter (30), new O-ring (29), and coupler (28).
5. Install dust cap (27) on coupler (28).
6. Install new O-ring (26) and hose assembly (2 or 7) to elbow (32).
7. Install new O-ring (24) and relief valve (23) to valve manifold (21).
8. Install new O-ring (22) and adapter (6) to valve manifold (21).
9. Install new O-ring (25) and tee (9) to valve manifold (21).
10. Install new O-ring (20) and tee (1).
11. Assemble dust cap (19), new O-ring (16), adapter (15), new O-ring (18), and coupler (17) to tee (1).
12. Install dust cap (19) on coupler (17).
13. Repeat steps 11 and 12 to install dust cap (14), new O-ring (11), adapter (10), new O-ring (13), and coupler (12) to tee (9).
14. Install new O-ring (8) and hose assembly (7) to tee (9).
15. Install new O-ring (5) and hose assembly (4) to adapter (6).
16. Install new O-ring (3) and hose assembly (2) to tee (1).



END OF WORK PACKAGE

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AUXILIARY FUEL TANK REPAIR 0167 00

THIS WORK PACKAGE COVERS

Disassembly, Inspection, Assembly

INITIAL SETUP

Maintenance Level

Unit

Tools and Special Tools

Tool kit, general mechanic's (Item 33, WP 0172 00)

Materials/Parts

Fuel (Item 13, 14 or 15, WP 0171 00)

Rag, wiping (Item 31, WP 0171 00)

Sealing compound (Item 36, WP 0171 00)

O-ring (3)



WARNING

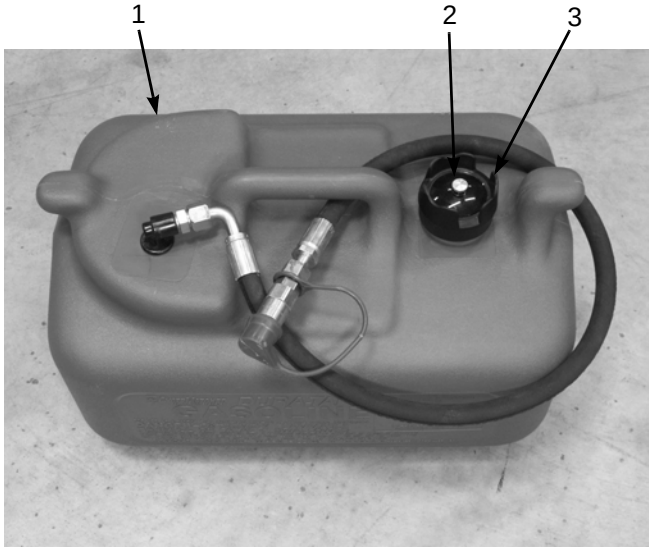
DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Clean up all leaked or spilled fuel. Fuel may ignite, causing damage to machine and injury or death to personnel.

NOTE

Dispose of all fluids according to local regulations and mandates.

DISASSEMBLY

1. Loosen vent screw (2) and allow any pressure in fuel tank (1) to vent.
2. Remove cap (3) from fuel tank (1).



390-1826

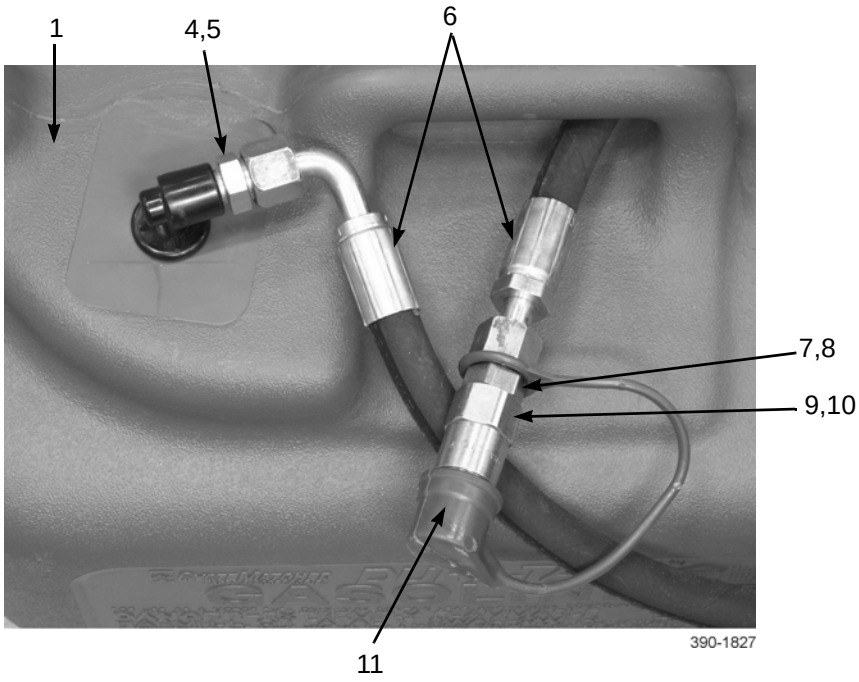
DISASSEMBLY - CONTINUED

3. Remove dust cap (11) from coupler (9).
4. Remove coupler (9), O-ring (10), adapter (7), O-ring (8), and dust cap (11) from hose (6). Discard O-rings.

CAUTION

Use line wrenches to disassemble fittings, to avoid damage to fittings.

5. Remove hose (6), O-ring (5), and adapter (4) from fuel tank (1). Discard O-ring.



INSPECTION

1. Inspect fuel tank for leaks, cracks, and dents. Replace fuel tank if it leaks, is cracked or dented.
2. Inspect hose for wear, cracks, and damage. Replace hose if worn, cracked or damaged.
3. Inspect coupler and adapters for damage. Replace connector or adapters if damaged.
4. Inspect cap for cracks and damage. Replace fuel tank if cap is cracked or damaged.

ASSEMBLY

CAUTION

Use line wrenches to assemble fittings, to aviod damage to fittings.

1. Apply a thin coat of sealing compound to threads of adapter (4) and install adapter on fuel tank (1).

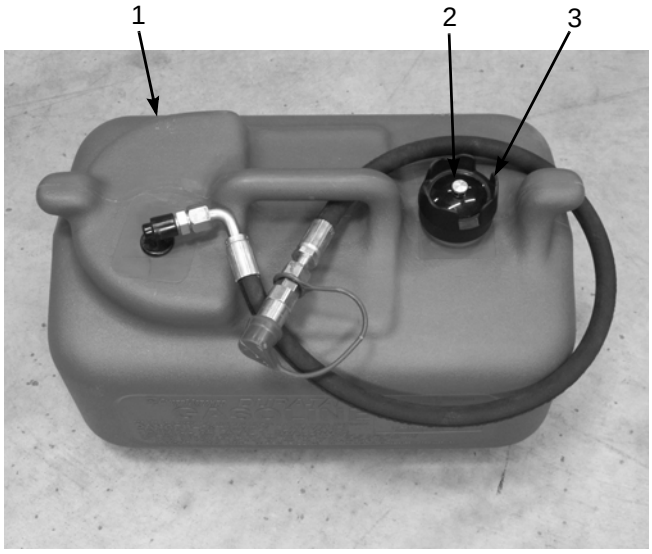
NOTE

Lightly coat new O-rings with clean fuel before installation.

2. Install new O-ring (5) and hose (6) on adapter (4).

ASSEMBLY - CONTINUED

3. Install new O-ring (8), adapter (7), and dust cap (11) on hose (6).
4. Install new O-ring (10) and coupler (9) on adapter (7).
5. Install dust cap (11) on coupler (9).
6. Install cap (3) on fuel tank (1).
7. Close vent screw (2).



390-1826

END OF WORK PACKAGE

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CHAPTER 7
SUPPORTING INFORMATION

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REFERENCES 0168 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 the operation and maintenance of the scraper and water distributor.

PUBLICATION 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 Army Publications and Forms Index. . . . . .DA Pam 25-30

Consolidated Publication of Component Lists . . . . . EM 0074

Functional User's Manual for the Army Maintenance Management System. . . . . .DA Pam 738-750

FORMS

Refer to DA Pam 738-750, *The Army Maintenance Management System (TAMMS)*, for instructions on the use of maintenance forms.

Equipment Inspection and Maintenance Worksheet. . . . . DA Form 2404, DA Form 5988-E

Maintenance Request . . . . . DA Form 2407

Material Receiving and Inspection Report . . . . . DD Form 250

Product Quality Deficiency Report. . . . . SF Form 368

Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028

FIELD MANUALS

Airdrop of Supplies and Equipment . . . . . FM 10-576 Series

Basic Cold Weather Manual . . . . . .FM 31-70

Camouflage, Concealment, and Decoys . . . . . .FM 20-3

Chemical and Biological Contamination Avoidance . . . . . .FM 3-3

Desert Operations . . . . . .FM 90-3

First Aid. . . . . FM 4-25.11

Manual for the Wheeled Vehicle Driver . . . . . .FM 21-305

Multiservice Helicopter Sling Load: Dual-Point Load Rigging Procedures. . . . . FM 10-450-5

NBC Decontamination . . . . . .FM 3-5

Northern Operations . . . . . .FM 31-71

Nuclear Contamination Avoidance . . . . . FM 3-3-1

Operations and Maintenance of Ordnance Materiel in Cold Weather . . . . . .FM 9-207

Unit Air Movement Planning . . . . . .FM 55-9

REFERENCES - CONTINUED **0168 00**

TECHNICAL BULLETINS

CARC Spot Painting . . . . . TB 43-0242

Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment and Materials Handling Equipment . . . . . TB 43-0209

TECHNICAL MANUALS

Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes. . . . . TM 9-2610-200-14

Field Maintenance Manual (Includes Unit and Direct Support Maintenance) for Distributor, Water, Tank Type, 613CWD. . . . . TM 5-3800-205-23-3

Field Maintenance Manual (Includes Unit and Direct Support Maintenance) for Scraper, Tractor, Elevating, 613CS . . . . . TM 5-3800-205-23-2

Field Maintenance RPSTL for Scraper, Tractor, Elevating, Self-Propelled, 613CS and Distibutor, Water, Tank Type, 613CWD . . . . . TM 5-3800-205-23P

Operator's, Unit, Intermediate Direct Support, and Intermediate General Support Maintenance Manual for Lead-Acid Storage Batteries. . . . . TM 9-6140-200-14

Operator's Manual for Distributor, Water, Tank Type, 613CWD . . . . . TM 5-3800-205-10-2

Operator's Manual for Scraper, Tractor, Elevating, Self-Propelled, 613CS . . . . . TM 5-3800-205-10-1

Painting Instructions for Army Materiel . . . . . TM 43-0139

Procedure for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) . . . . . TM 750-244-3

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

Marine Lifting and Lashing Handbook. . . . . MTMCTEA Reference 97-55-22

Prevention of Motor Vehicle Accidents . . . . . AR 385-55

Tiedown Handbook for Rail Movements . . . . . MTMCTEA Pamphlet 55-19

Tiedown Handbook for Truck Movements . . . . . MTMCTEA Pamphlet 55-20

Transportability Criteria MIL-STD-1366D

Vehicle Preparation Handbook for Fixed Wing Air Movements . . . . . MTMCTEA Reference 99-55-24

END OF WORK PACKAGE

MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION 0169 00

THE ARMY MAINTENANCE SYSTEM MAC

1. This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level 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 0170 00) in column (4) as:

   Field - includes subcolumns:

   C - Operator/Crew

   O - Unit

   D - Direct Support

   Sustainment - includes subcolumns:

   H - General Support

   D - Depot
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 Group 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:

Field:

C - Operator/Crew Maintenance

O - Unit Maintenance

D - Direct Support Maintenance

Sustainment:

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.** 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 Requirements, Table 2.
6. **Column (6) - Remarks.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the Remarks, Table 3.

EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS, TABLE 2

1. **Column (1) - Tools 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/NATO Stock Number.** 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) - Reference 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

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MAINTENANCE ALLOCATION CHART (MAC) 0170 00

Table 1. MAC for the 613C ASWDS.

(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**								
0100	Engine Assembly	Inspect	0.3						
		Test		0.5	0.5			37	
		Adjust		1.0				37	
		Service		1.0				28,30,37	
		Replace			40.0			18,21,27,37	A
		Repair		2.0	3.0			27,28,29,37	B
		Overhaul							B
	Engine Supports	Inspect		0.3					
		Replace			1.2			27,37	
		Repair			1.0				
	Lifting Brackets, Rear	Replace			0.2			37	
0101	Crankcase, Cylinder Block, and Head								
	Cylinder Head Assembly	Replace			16.8			27,36,37	
		Repair							B
0102	Rear Main Seal Carrier	Replace			6.0			27,37	
	Rear Main Seal	Replace			6.7			15,26,27,37	
	Front Main Seal	Replace			2.6			16,27,37	
	Vibration Damper and Pulley	Replace		0.8				7,28,37	
0103	Flywheel Assembly								
	Flywheel	Replace			6.4			4,27,37	
	Flywheel Housing	Replace			10.8			4,27,37	
0105	Valves, Camshaft, and Timing System								
	Rocker Shaft Group	Replace			3.9			27,37	
	Intake/Exhaust Valves	Replace			17.5			27,37	
	Rocker Arm Cover	Replace		0.7				37	
	Front Cover	Replace			2.0			37	
0106	Engine Lubrication System								
	Oil Pan and Gasket	Replace		1.8				28,37	
	Oil Filter	Replace		0.3				28,37	
	Oil Filter Base Assembly	Replace			0.6			28,37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
	Crankcase Breather	Service	0.1						
		Replace		0.2				37	
	Oil Pump Assembly	Replace			2.2			27,37	
		Repair			0.5			37	
0108	Manifolds								
	Exhaust Manifold	Replace			3.5			37	
	Intake Manifold	Replace			4.8			37	
03	**FUEL SYSTEM**								
0301	Fuel Injector								
	Injector Nozzle	Replace			3.0			3,36,37	
		Repair							B
	Injector Control Linkage	Replace			6.3			36,37	
		Adjust			5.6			37	
0302	Fuel Transfer Pump and	Adjust			1.0			36	
	Governor Assembly	Replace			4.0			36,37	
		Repair							B
	Fuel Pump, Electric	Replace		0.3				37	
0304	Air Cleaner Assembly	Service	0.2						
		Replace		0.6				37	
		Repair		0.5				37	
	Air Intake Hoses and Tubes	Replace		0.2				37	
0305	Turbocharger Assembly	Replace			4.0			37	
		Repair							B
0306	Fuel Lines and Hoses	Replace		0.2				37	
	Fuel Shutoff Solenoid	Replace		0.2	1.7			28,37,41	
0309	Fuel Filter Base	Replace		0.5				37	
		Repair		0.3				37	
	Fuel Water Separator and	Service	0.2						
	Secondary Fuel Filters	Replace		0.5				37	
		Repair		1.0				37	

Table 1. MAC for the 613C ASWDS - 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
0311	Cold Starting Aid System	Replace		0.2				37	
		Repair		0.3				37	
	Engine Heater	Replace			1.0			37	
0321	Accelerator Pedal and	Replace		0.2				37	
	Linkage	Repair		0.3				37	
04	**EXHAUST SYSTEM**								
0401	Muffler	Inspect	0.1						
		Replace		0.3				37	
	Exhaust Pipes and Clamps	Inspect	0.1						
		Replace		0.3				37	
05	**COOLING SYSTEM**								
0501	Radiator Assembly	Inspect	0.2	0.3					
		Service		1.0				28,30,37	
		Replace			7.0			20,37	
		Repair			3.5			27,28	B,D
	Hydraulic Oil Cooler	Replace		1.0				37	
	Oil Cooler Assembly	Replace			3.9			27,37	B
		Repair			0.5			37	
0503	Temperature Regulator (Thermostats)	Replace		1.0				37	
	Aftercooler Assembly	Replace			1.7			37	
	Hoses, Tubes, and Clamps	Replace		0.2				37	
0504	Engine Water Pump Assembly	Replace		5.0				28,37	
0505	Fan Drive Assembly	Replace		5.5				37	
		Repair			1.0			37	B
	Fan Assembly	Replace		1.5				37	
0505	Fan Drive Belt	Adjust		0.2				37	
		Replace		0.3				37	
	Belt Tightener	Replace		0.8				37	
06	**ELECTRICAL SYSTEM**								
0601	Alternator								
	Alternator Assembly	Test		0.3				37	
		Replace		1.0					
	Drive Belt	Inspect	0.2						
		Adjust		0.3				37	
		Replace		0.3				37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND	
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	EQUIPMENT REF CODE	REMARKS CODE
0603	Starter Assembly	Test		0.3				37	
		Replace		4.5				37	
	Slave Receptacle	Replace		0.3				37	
0605	Battery Disconnect Switch	Replace		0.3				37	
0607	Instrument Panel								
	Instrument Panel	Inspect	0.1						
	Switches,Gages,and Indicator Lights	Replace		0.2				37	
	Fuse, Relay, and Circuit Breakers	Replace		0.3				37	
0609	Lights								
	Headlights	Replace		0.3				37	
	Brake lights	Replace		0.3				37	
		Repair		0.3				37	
	Blackout Lights	Replace		0.3				37	
	Work Lights	Replace		0.3				37	
		Repair		0.3				37	
	Turn Signal Lights	Replace		0.3				37	
0610	Sending Units, Sensors, Warning Switches								
	Temperature Sensors	Test		0.3				37	
		Replace		0.5				37	
	Pressure Sensors	Test		0.3				37	
		Replace		0.5				37	
	Engine Sensors	Test		0.3				37	
		Replace		0.5				37	
	Transmission Sensors	Test		0.3				37	
		Replace		0.5				37	
	Fuel Level Sending Unit	Replace		1.0				37	
	EMS Panel	Test	0.1	0.3					
		Replace		0.5				37	
0611	Horns and Alarms								
	Electric Horn	Replace		0.3				37	
	Backup Alarm	Replace		0.3				37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
0612	Batteries	Inspect	0.2						
		Test		0.5					
		Service		1.0				29,30,37	
		Replace		1.0				37	E
	Battery Cables	Inspect	0.2						
		Replace		0.5				37	
	Battery Disconnect Switch	Replace		0.3				37	
0613	Electrical Harness								
	Cab Harnesses	Test		0.5				37	
		Replace			2.0			37	
		Repair		0.3				28,37	
	Engine Compartment Harnesses	Test		0.5				37	
		Replace			2.0			37	
		Repair		0.3				28,37	
	Hitch and Scraper Bowl Harnesses	Test		0.5				37	
		Replace			2.0			37	
		Repair		0.3				28,37	
	Hitch and Water Distributor Harnesses	Test		0.5				37	
		Replace			2.0			37	
		Repair		0.3				28,37	
07	**TRANSMISSION/ TRANSFER**								
0705	Transmission Shifting Components								
	Shift Control Lever and Lock	Replace		1.0				37	
		Repair		0.5				37	
	Shift Control Cable and Linkage	Adjust		0.3				37	
		Replace		1.5				37	
0708	Torque Converter	Replace			24.0			27,37	
		Repair						27,37	A,B
0710	Transmission/Transfer Group	Inspect	0.2						
		Service		0.5				28,30,37	
		Test		0.3					
		Replace			12.0			6,27,37	A,B
		Repair			1.0			27,37	B
		Overhall							B
0710	Hydraulic Control Valve	Replace			4.0			37	A
		Repair			0.5			37	B

Table 1. MAC for the 613C ASWDS - 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
0721	Gear Pump	Replace			4.0			37	
		Repair			0.5			37	B
	Transmission Oil Cooler	Replace		1.0				37	
	Oil Filter Element	Replace		0.2				28,37	
	Oil Filter Base Assembly	Replace		1.5				28,37	
	Internal Oil Suction Screen (Transfer Gear Case)	Service		1.0					
		Replace		1.0				28,37	
	Oil Lines and Hoses	Replace		0.2				28,37	
09	**PROPELLER AND PROPELLER SHAFTS**								
0900	Propeller Shaft (Upper)	Inspect	0.2						
		Replace			4.0			37	
		Repair			1.0				
	Universal Joint (Lower)	Inspect	0.2						
		Service		0.3				28	
		Replace		2.0				28,37	
		Repair		1.0					
10	**FRONT AXLE**								
1000	Front Axle Assembly	Inspect	0.2						
		Service		0.5				28,30,37	
		Replace			60.0			27,37	A
		Repair			1.0			37	B
1002	Differential Assembly	Replace			10.0			2,25,27,37	A
		Repair			1.0			27,37	B
	Differential Lock	Test		0.3					
1003	Front Axle Shafts	Replace		1.0				27,37	
1003	Front Final Drives (Planetary)	Inspect	0.2						
		Service		1.5				27,30,37	
		Replace		4.0				7,20,28,37	
		Repair		14.0				28,37	
	Front Wheel Spindle, Bearings, and Seals	Replace		4.0				8,28,37	
		Repair		14.0				8,28,37	

Table 1. MAC for the 613C ASWDS - 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**								
1201	Parking Brake Actuator	Inspect	0.2						
		Replace		2.0				37	
		Repair		4.0				7,8,28,37	B
	Parking Brake Shoe	Replace		2.5				37	
1202	Service Brake Pads	Inspect		0.5					
		Replace		2.0				37	
1204	Brake Control Valves	Replace		2.0				37	
	Air/Hydraulic Brake	Inspect	0.2						
	Cylinder Assembly	Replace		2.5				37	
		Repair							B
1204	Brake Caliper Assembly	Inspect		0.5					
		Replace		1.5				4,28,37	
1208	Air Lines,Tanks, and	Inspect	0.2						
	Valves	Replace		2.0				37	
1209	Air Compressor	Inspect	0.2						
		Replace		3.5				37	
		Repair		1.0				37	B
13	**WHEELS**								
1311	Rear Spindle Assembly	Replace		4.0					
	Rear Hub and Disk	Inspect	0.2						
		Replace		3.0				6,28,37	
	Rear Wheel Bearings and Seals	Replace			3.5			6,8,27,37	
	Wheel Assembly	Repair		1.0				29	
1313	Tire	Inspect	0.2						
		Replace		2.0				29,37	
		Repair		4.0				27,37	C
14	**STEERING**								
1401	Steering Wheel and	Replace		2.5				28,37	
	Column	Repair		1.0				37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
1411	Steering Hoses, Lines, and Fittings	Replace		0.5				37	
1412	Pump, Hydraulic (Hydraulic/Steering Systems)	Replace			2.0			37	A
		Repair			1.0			37	B
	Steering Cylinders	Replace			2.0			37	
		Repair			1.0			37	B
1414	Steering Control Valve	Replace			2.5			37	A
		Repair			1.0				B
15	**FRAME, TOWING, AND ARTICULATION SYSTEMS**								
1501	Hitch Assembly	Inspect	0.2						
		Service		0.3				28,30	
		Replace			12.0			19,27,37	A
		Repair			4.0			24,25 27,32,37	
	Oil Cooler Assembly	Replace			3.9			27,37	
		Repair			0.5			37	
1503	Draft Frame	Replace			16.0			27,37	
		Repair			4.0			27,37	
	Steering Links	Replace			4.0			27,37	
18	**BODY, CAB, HOOD**								
1801	Cab Tops and ROPS	Inspect		0.3					
		Replace		0.5				28,37	
	Hood and Guards	Replace		0.5				37	
		Repair		0.5				29,37	
1802	Fenders and Covers	Replace		0.5				37	
		Repair		0.5				29,37	
	Windshield Assembly	Replace		0.5				37	
		Repair			1.5			27,37	
1806	Seat Assembly	Replace		0.3				37	
		Repair		0.5				28,37	
	Seat Belt	Inspect	0.2						
		Replace		0.3				37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
1808	Stowage, Racks and Boxes	Replace							
	Tool Box	Replace		0.3				37	
	Rifle Rack	Replace		0.2				37	
22	**BODY ACCESSORY ITEMS**								
2202	Accessory items								
	Mirrors	Inspect	0.1						
		Adjust	0.2						
		Replace		0.3				37	
	Horn	Replace		0.5				37	
	Windshield Wiper,	Inspect	0.2						
	Motor, and Washer	Replace		.03				37	
	Data Plates	Replace		0.2				37	
24	**HYDRAULIC AND FLUID SYSTEMS**								
2401	Pump and Motors								
	Elevator/Water Pump	Replace			2.5			37	
		Repair						37	B
	Motor Assembly,	Replace			2.0			37	
	Elevator	Repair						37	B
	Motor Assembly, Water Pump	Replace			2.0			37	
2402	Manifolds and Valves								
	Main Control Valve	Replace			2.5			37	A
		Repair						37	B
	Elevator Control Valve	Replace			3.0			37	
		Repair						37	B
	Lift Cylinder Check Valve	Replace			1.0			37	
2403	Hand Controls and Cables	Adjust			0.3			37	
		Replace			1.0			37	
		Repair			1.0			37	
	Floor Check Valve	Replace			1.0			37	
2406	Filters, Strainers, Lines, Hoses, and Fittings								
	Hoses, Lines, and Fittings	Inspect	0.2						
		Replace		0.5				37,39	

Table 1. MAC for the 613C ASWDS - 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
	Filters	Replace		0.5				28,37	
	Oil Sampling Valve	Replace		0.3				37	
2407	Hydraulic Cylinders								
	Lift Cylinders	Replace		2.5				37	
		Repair		0.5				37	B
	Bowl Eject Cylinder	Replace			6.0			20,27,37	
		Repair						37	B
	Bowl Floor Cylinder	Replace			6.0			20,27,37	
		Repair						37	B
2408	Tanks and Reservoirs								
	Hydraulic Tank	Inspect	0.2						
		Service		0.5				28,30	
		Replace			4.0				
		Repair			2.0			27,37	
55	**WATER DISTRIBUTOR COMPONENTS**								
5500	Pump Assembly	Replace			4.0			27,37	
		Repair			2.0			27,37	
5505	Tank Body, Water	Inspect	0.3						
		Repair		1.0	2.0			27,37	
	Inspection Cover	Inspect	0.2						
		Repair		1.0				37	
	Manhole Assembly	Inspect	0.2						
		Replace		1.0				28,37	
		Repair		2.0				28,37	
	Suction and or Discharge System								
	Spray Bar, Upper and	Inspect	0.2						
	Lower	Replace		2.0				37	
		Repair		1.0				28,37	
	Hose Reel Assembly	Inspect	0.2						
		Replace		1.0				28,37	
		Repair		1.0				28,37	
	Hose Assemblies	Inspect	0.3						
		Replace		1.0				28,37	
		Repair		0.5				28,37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
5510	Inlet/Outlet Components								
	Vacuum Valve Assembly, Suction	Replace		3.0				37	
		Repair		1.0				28,37	
	Valve Assembly, Foot	Replace		2.0				37	
		Repair		1.0				28,37	
	Butterfly Valve Assembly, Upper Bar	Replace		3.0				37	
	Butterfly Valve Assembly, Lower Bar	Replace		3.0				37	
	Valve Assembly, Manual	Inspect	0.2						
		Replace		1.0				37	
5513	Control Panel Assembly	Inspect	0.2						
		Replace		1.0				37	
		Repairs		8.0				28,37	
								37	
	Sensor, Water Level	Replace		1.0				37	
74	**SCRAPER COMPONENTS**								
7448	Elevator Assembly	Inspect	0.2						
		Service		0.3				28,30,37	
		Adjust		0.3				28,37	
		Replace			16			6,7,27,37	
	Elevator Flights	Inspect	0.2						
		Replace		1.0				37	
	Elevator Chain and Idler	Inspect	0.2						
		Adjust		1.0				37	
		Replace			2.5			27,37	
		Repair			1.0			7,27,37	
	Elevator Drive Assembly	Service		0.2				30,37	
		Replace			20.0			20,37	
		Repair			2.0			37	B
	Ejector Bowl Rollers and Support	Inspect	0.2						
		Service		0.2				28,30	
		Replace			1.5			28,37	
		Repair			1.0			7,13,18,22, 27,37	

Table 1. MAC for the 613C ASWDS - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DS	GS	DEPOT	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D		
7448	Bowl Sliding Floor	Inspect	0.2						
		Replace			6.0			27,37	
		Repair			2.0			7,13,22,27,37	
	Bowl Sliding Floor Roller, Link and Support	Replace							
	Bowl Sliding Floor Link, and Support	Inspect	0.2						
		Replace		6.0				27,37	
		Repair		2.0				27,37	

Table 2. Tools and Test Equipment Requirement for the 613C ASWDS.

(1) Tools or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	F	Adapter, Mechanical Puller	5120-01-286-8435	1P1835
2	F	Adapter, Mechanical Puller	5120-01-288-2717	5P4184
3	F	Bar, Governor	2815-01-123-5891	5P0302
4	O	Bolt, Guide	3040-01-517-2921	9U-6896
5	O,F	Bearing, Sleeve	5365-01-394-1970	3J9511
6	F	Bracket, Link	5340-01-476-1734	138-7574
7	O,F	Bushing Driver Set	5120-01-030-1626	1P0510
8	O,F	Bushing Driver Set	5120-01-039-4811	1P0520
9	F	Clamp, Plier	5120-01-503-5364	136-4149
10	F	Cylinder, Assembly	3040-01-264-9538	8S7650
11	F	Distorter, Tool Group	5110-01-288-2428	5P7318
12	O	Guard, Safety, Tire Inflation	4910-00-025-0623	64E33077
13	F	Guide Seal	5330-01-517-3296	1P-0774
14	O	Heater, Gun Type, Electric	4940-01-028-7493	EP-SUL
15	F	Inserter, Seal	5120-01-362-2027	1U7598
16	F	Inserter, Seal	5120-01-362-2026	1U7430
17	O,F	Jack, Dolly Type, Hydraulic: 10 ton capacity	4910-00-289-7233	93660
18	F	Leveler, Load: 6000 lb capacity	3940-01-294-0606	6V6146
19	O	Link	4940-01-268-2201	1387573
20	O,F	Link, Bearing	5120-01-451-1401	1387575
21	F	Link, Chain, End	4010-01-268-9869	5P9736
22	F	Puller Attachment, Mechanical	5120-01-293-1430	8B-7554
23	O,F	Puller Kit, Universal	5180-01-124-1903	IP3075
24	F	Puller, Hydraulic	5130-01-296-4277	6V3175
25	O,F	Pump, Hydraulic Ram, Hand Driven	4320-00-374-1403	4C4865
26	F	Ring	5120-01-288-2447	9S8537

Table 2. Tools and Test Equipment Requirements for the 613C ASWDS - Continued.

(1) Tools or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
27	F,H	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance Basic, Less Power	4910-00-754-0705	SC 4910-95-A31 (LIN: T24660)
28	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-754-0654	SC 4910-95-A74 (LIN: W32593)
29	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2	4910-00-754-0650	SC 4910-95-A72 (LIN: W32730)
30	O,F	Shop Equipment, Contact Maintenance	4940-01-333-8470	11B250000 (LIN: S25681)
31	O,F	Sling, Nylon	2835-01-078-2081	4-8FTX2IN
32	F	Spacer	Fabricated Tool	FT-0064
33	O,F	Stand, Maintenance, Automotive Axle: 24,000 lb capacity, height range 33-3/4-44-1/4 in.	4910-01-475-0672	1779A
34	O,F	Stand, Maintenance, Automotive Axle: 24,000 lb capacity, height range 19-29-1/2 in.	4910-01-480-0147	1778A
35	O	Tool, Drain (Nipple, Pipe)		6B3156
36	F	Tool Kit, Diesel Injector	5180-01-480-8942	173-1530
37	O,F,H	Tool Kit, General Mechanic's: Automotive	5180-01-481-8389	SC 5180-95-N26 (LIN: T28688)
38	F	Tool Kit, Internal Combustion Engine	5180-01-356-8155	223-2454
39	O,F	Tool Outfit, Hydraulic Systems (HSTRU)	4940-01-036-5784	13221E6850 (LIN: T30377)
40	F	Wrench Group, Chain		5P-2706
41	O	Wrench, Spanner	5120-01-363-2795	9U5120

Table 3. Remarks for the 613C ASWDS.

(1) Reference Code	(2) Remarks
A	Prior to removing major assembly, contact Specialized Repair Activity (SRA) for further troubleshooting information and/or technical assistance. For SRA support, contact the local Caterpillar dealer (WP 0175 00).
B	• Complete repair and/or overhaul responsibility is assigned to Sustainment Maintenance: H and D levels and/or SRA. • Limited repair may be authorized at Field Maintenance (O and DS levels). • Refer to Repair Parts and Special Tools List (RPSTL) for the assigned Source, Maintenance, and Recoverability (SMR) codes.
C	Local repair of tire and wheel assembly is authorized.
D	Refer to TM 750-254 (cooling systems) for additional information.
E	Refer to TM 9-6140-200-14 (batteries) for additional information.

END OF WORK PACKAGE

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EXPENDABLE AND DURABLE ITEMS LIST 0171 00

SCOPE

This work package lists expendable and durable items you will need to maintain the 613CS Scraper and 613CWD Water Distributor. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by 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 antifreeze (Item 3, WP 0171 00)].
2. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

   C - Operator/Crew

   O - Organizational 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 Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1	O		ADHESIVE (71984) RTV732	
		8040-00-877-9872	3 Ounce Tube	OZ
2	C		ANTIFREEZE: Permanent: Arctic Grade (81349) MILA11755	
		6850-00-174-1806	55 Gallon Drum	GAL
3	C		ANTIFREEZE: Permanent, Ethylene Glycol, Inhibited (81349) MILA46153	
		6850-00-181-7929	1 Gallon Bottle	GAL
		6850-00-181-7933	5 Gallon Can	GAL
		6850-00-181-7940	55 Gallon Drum	GAL
4	O		BRAKE FLUID, AUTOMOTIVE: Silicone	
		9150-01-102-9455	(81349) MIL-B-46176 1 Gallon Can	GAL
		9150-01-123-3152	(81349) MIL-B-46176 5 Gallon Can	GAL
5	O	5340-00-450-5718	CAP SET, PROTECTIVE: Dust and Moisture Seal (19207) 10935405	EA
6	C		CLEANING COMPOUND: Solvent, Type III (81349) MIL-PRF-680	
		6850-01-474-2320	5 Gallon Can	GAL
		6850-01-474-2321	55 Gallon Drum	GAL
7	O		CLOTH: Abrasive, Emery, Fine (80204) ANSI B74.18	
		5350-00-584-4654	50 Sheet Package	EA
8	O		COMPOUND: Antiseize (05972) 76764	
		8030-00-251-3980	1 Pound Can	LB
9	C		COMPOUND: Cleaning, Windshield (0FTT5) 0854000	
		6850-00-926-2275	16 Ounce Bottle	
10	O		COMPOUND: Gasket Forming, Silicone (05972) 77C	OZ
			13 Ounce Cartridge	OZ

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
11	C		DETERGENT: General Purpose, Liquid (83421) 7930-00-282-9699	
		7930-00-282-9699	1 Gallon Can	GAL
12	O		FLUX: Soldering (58536) A-A-51145TY1 FORM A	
		3439-00-255-9935	1 Pound Can	LB
13	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
14	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
15	C	9130-01-031-5816	FUEL, TURBINE: Aviation (81349) MILT83133 GR JP8	GAL
16	C		GREASE: Automotive and Artillery, GAA	
		9150-01-197-7688	(81349) M-10924-A 2-1/4 Ounce Tube	OZ
		9150-01-197-7690	(81349) M-10924-C 1-3/4 Pound Can	LB
		9150-01-197-7692	(81349) M-10924-E 35 Pound Can	LB
		9150-01-197-7693	(81349) M-10924-B 14 Ounce Cartridge	OZ
17	O	9150-01-361-8919	GREASE: Electrically Conductive (53711) 5190179	OZ
18			HOSE: Clear, Neoprene	
19	O		INSULATING VARNISH: Electrical, Dielectric (75037) 1602	
		5970-00-476-6717	13 Ounce Can, Aerosol Spray	OZ
20	O		INSULATING SLEEVING: Electrical (81343) M23053/5-106-0	
		5970-00-815-1295	250 Foot Spool	FT

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
21	C		OIL: Lubricating, GO 75 (81349) MIL-PRF-2105	
		9150-01-035-5390	1 Quart Can	QT
		9150-01-035-5391	5 Gallon Can	GAL
22	C		OIL: Lubricating, GO 80W/90 (81349) MIL-PRF-2105	
		9150-01-035-5392	1 Quart Can	QT
		9150-00-001-9395	5 Gallon Can	GAL
		9150-01-035-5394	55 Gallon Drum	GAL
23	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
24	C		OIL: Lubricating, OE/HDO 10 (81349) MIL-PRF-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
25	C	9150-00-247-0481	OIL: Lubricating, OE/HDO 10W/30 (81349) MIL-L-2104	QT
26	C		OIL: Lubricating, OE/HDO 15W/40 (81349) MIL-PRF-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
27	C		OIL: Lubricating, OE/HDO 30 (81349) MIL-PRF-2104	
		9150-00-186-6681	1 Quart Can	QT
		9150-00-188-9858	5 Gallon Can	GAL
28			OIL: Lubricating, OE/HDO 40 (81349) MIL-PRF-2104	
		9150-00-188-9862	55 Gallon Drum	GAL

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
29	C		OIL: Lubricating, OEA, Arctic	
		9150-00-402-4478	(81349) MIL-L-46167 1 Quart Can	QT
		9150-00-402-2372	(81349) MIL-PRF-46167 5 Gallon Can	GAL
		9150-00-491-7197	(81349) MIL-PRF-46167 55 Gallon Drum	GAL
30	O		PETROLATUM: Technical (82146) 14P1	
		9150-00-250-0926	1.75 Pound Can	LB
31	C		RAG: Wiping (64067) 7920-00-205-1711	
		7290-00-205-1711	50 Pound Bale	LB
32	F	5330-01-485-8999	SEALER: Manifold, High-Temperature (11083) 2P-2333	OZ
33	F		SEALANT: Liquid Gasket (11083) 1U-8846	OZ
34	O		SEALANT: Pipe (15434) 3375066	OZ
35	O		SEALANT: Silicone (11083) 4C-9612	OZ
36	O		SEALING COMPOUND (05972) 07931	
		8030-00-081-2286	50 cc Bottle	CC
37	O		SOLDER: Lead-Tin Alloy, Rosin Core (81348) QQ-S-571	
		3439-00-555-4629	1 Pound Spool	LB
38	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 13.35 Inch Minimum Length, Brown Package of 100	EA

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
39	O		TAG: Marker (64067) 9905-00-537-8954	
		9905-00-537-8954	Pack of 50	EA
40	O		TAPE: Antiseizing (52152) 6195	
		8030-00-889-3535	260 Inch Roll	IN.
41			TAPE: Duct, 2 Inches Wide (39482) 1791K70	
		5640-00-103-2254	60 Yard Roll	YD
		5970-00-815-1295	250 Foot Spool	FT
42	O		WIRE: Nonelectrical (81346) ASTM A641	
		9905-00-596-0191	5 Pound Coil	LB

END OF WORK PACKAGE

TOOL IDENTIFICATION LIST 0172 00

SCOPE

This work package lists all common tools and supplements and special tools/fixtures needed to maintain the 613CS Scraper and 613CWD Water Distributor.

EXPLANATION OF COLUMNS IN THE TOOL IDENTIFICATION LIST

1. **Column (1) - Item Number (No.).** This number is assigned to the entry in the list and is referenced in the initial setup to identify the item (e.g., Tool kit, general mechanic's, Item 33, WP 0172 00).
2. **Column (2) - Item Name.** This column lists the item by noun nomenclature and other descriptive features (e.g., Guide, seal).
3. **Column (3) - National Stock Number.** This is the National Stock Number (NSN) assigned to the item; use it to requisition the item.
4. **Column (4) - Part Number/CAGEC.** Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. The manufacturer's Commercial and Government Entity Code (CAGEC) is also included.
5. **Column (5) - Reference.** This column identifies the authorizing supply catalog or RPSTL for items listed in this work package.

TOOL IDENTIFICATION LIST

Table 1. Tool Identification List.

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER/ CAGEC	(5) REFERENCE
1	Adapter, Mechanical Puller	5120-01-1288-2717	5P4184	TM 5-3800-205-23P
2	Bearing, Sleeve	5365-01-394-1970	3J9511 (11083)	TM 5-3800-205-23P
3	Bolt, Guide	3040-01-517-2921	9U-6896 (11083)	TM 5-3800-205-23P
4	Bracket, Link	5120-01-451-1401	138-7575 (11083)	TM 5-3800-205-23P
5	Bracket, Link	5340-01-476-1734	138-7574 (11083)	TM 5-3800-205-23P
6	Bracket, Link	4940-01-268-2201	1387573 (11083)	TM 5-3800-205-23P
7	Bushing, Driver Set	5120-01-030-1626	1P0510 (11083)	TM 5-3800-205-23P
8	Bushing, Driver Set	5120-01-039-4811	1P0520 (11083)	TM 5-3800-205-23P
9	Clamp, Plier	5120-01-503-5364	136-4149 (11083)	TM 5-3800-205-23P
10	Cylinder Assembly	3040-01-264-9538	857318	TM 5-3800-205-23P
11	Distorter, Tool Group	5110-01-288-2428	5P7318	TM 5-3800-205-23P
12	Guard, Safety, Tire Inflation	4910-00-025-0623	64E33077 (80049)	TM 5-3800-205-23P
13	Guide, Seal	533-01-517-3296	1P-0774 (11083)	TM 5-3800-205-23P
14	Heater, Gun Type, Electric	4940-01-028-7493	EP-5UL (59164)	TM 5-3800-205-23P
15	Inserter, Seal	5120-01-362-2027	1U7598 (11083)	TM 5-3800-205-23P
16	Inserter, Seal	5120-01-362-2026	1U7430 (11083)	TM 5-3800-205-23P
17	Jack, Dolly Type, Hydraulic: 10 ton capacity	4910-00-289-7233	93660 (36251)	TM 5-3800-205-23P
18	Leveler, Load: 6000 lb capacity	3940-01-294-0606	6V6146 (11083)	TM 5-3800-205-23P
19	Link, Chain, End	4010-01-268-9869	5P9736 (11083)	TM 5-3800-205-23P
20	Puller Attachment, Mechanical	5120-01-293-1430	8B-7554 (11083)	TM 5-3800-205-23P
21	Pump, Hydraulic Ram, Hand Driven	4320-00-374-1403	4C4865 (11083)	TM 5-3800-205-23P
22	Ring	5120-01-288-2447	9S8537 (11083)	TM 5-3800-205-23P
23	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance Basic, Less Power	4910-00-754-0705	SC 4910-95CLA31 (19204) (LIN: T24660)	
24	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-754-0654	SC 4910-95CLA74 (19204) (LIN: W32593)	
25	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2	4910-00-754-0650	SC 4910-95CLA72 (19204) (LIN: W32730)	

TOOL IDENTIFICATION LIST - CONTINUED

Table 1. Tool Identification List - Continued.

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER/ CAGEC	(5) REFERENCE
26	Shop Equipment, Contact Maintenance	4940-01-333-8470	11B250000 (59678) (LIN: S25681)	
27	Sling, Nylon	2835-01-078-2081	4-8FTX2IN (91796)	
28	Spacer	Fabricated Tool	FT-0064	
29	Stand, Maintenance, Automotive Axle: 24,000 lb capacity, height range 33-3/4-44-1/4 in.	4910-01-475-0672	1779A (45225)	TM 5-3800-205-23P
30	Stand, Maintenance, Automotive Axle: 24,000 lb capacity, height range 19-29-1/2 in.	4910-01-480-0147	1778A (45225)	TM 5-3800-205-23P
31	Tool, Drain (Nipple, Pipe)		6B3156 (11083)	TM 5-3800-205-23P
32	Tool Kit, Diesel Injector	5180-01-480-8942	173-1530 (11083)	TM 5-3800-205-23P
33	Tool Kit, General Mechanic's: Automotive	5180-01-481-8389	DFP389J (59678) (LIN: T28688)	
34	Tool Kit, Internal Combustion Engine	5180-01-356-8155	223-2454 (11083)	TM 5-3800-205-23P
35	Tool Outfit, Hydraulic Systems (HSTRU)	4940-01-036-5784	13221E6850 (97403) (LIN: T30377)	
36	Wrench Group, Chain		5P-2706 (11083)	TM 5-3800-205-23P
37	Wrench, Spanner	5120-01-363-2795	9U5120 (11083)	TM 5-3800-205-23P

END OF WORK PACKAGE

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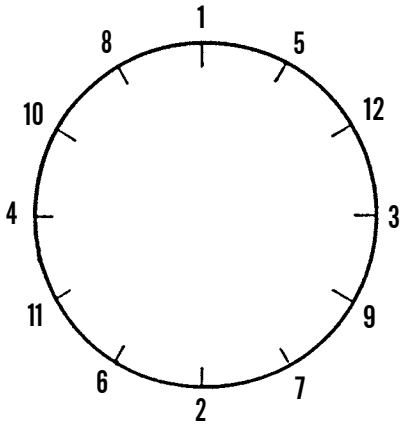
TORQUE LIMITS **0173 00**

SCOPE

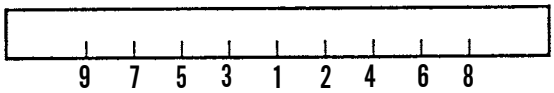
This work package lists standard torque values and provides general information for applying torque. Special torque values and tightening sequences are indicated in the maintenance procedures for applicable components.

GENERAL

1. Always use the torque values listed in Tables 1 and 2 when the maintenance procedure does not give a specific torque value.
   a. Table 1 provides torque limits for SAE standard fasteners.
   b. Table 2 provides torque limits for metric fasteners.
2. Unless otherwise indicated, standard torque tolerance shall be ±10%.
3. Torque values listed are based on clean, dry threads. Reduce torque by 10% when engine oil is used as a lubricant. Reduce torque by 20% 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 un6til final value is reached.
   c. Tighten circular patterns using circular torque pattern and tighten straight patterns using straight torque pattern.



CIRCLULAR 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.

Table 1. Torque Limits - SAE Standard Fasteners.

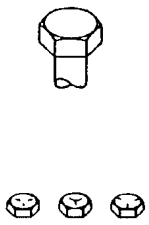
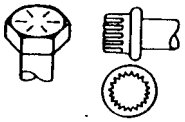
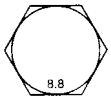
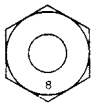
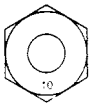
Current Usage	Much Used	Much Used	Used at Times	Used at Times
Quality of Material	Indeterminate	Minimum Commercial	Medium Commercial	Best Commercial
SAE Grade Number	1 or 2	5	6 or 7	8
Capscrew Head Markings Manufacturer's marks may vary These are all SAE Grade 5 (3 line)				
Capscrew Body Size Inches-Thread	Torque lb-ft (NM)	Torque lb-ft (NM)	Torque lb-ft (NM)	Torque lb-ft (NM)
1/4 20	5 (7)	8 (11)	10 (14)	12 (16)
28	6 (8)	10 (14)		14 (19)
5/16 18	11 (15)	17 (23)	19 (26)	24 (33)
24	13 (18)	19 (26)		27 (37)
3/8 16	18 (24)	31 (42)	34 (46)	44 (60)
24	20 (27)	35 (47)		49 (66)
7/16 14	28 (38)	49 (66)	55 (75)	70 (95)
20	30 (41)	55 (75)		78 (106)
1/2 13	39 (53)	75 (102)	85 (115)	105 (142)
20	41 (56)	85 (115)		120 (163)
9/16 12	51 (69)	110 (149)	120 (163)	155 (210)
18	55 (75)	120 (163)		170 (231)
5/8 11	83 (113)	150 (203)	167 (226)	210 (285)
18	95 (129)	170 (231)		240 (325)
3/4 10	105 (142)	270 (366)	280 (380)	375 (508)
16	115 (156)	295 (400)		420 (569)
7/8 9	160 (217)	395 (536)	440 (597)	605 (820)
14	175 (237)	435 (590)		675 (915)
1 8	235 (319)	590 (800)	660 (895)	910 (1234)
14	250 (339)	660 (895)		990 (1342)

Table 2. Torque Limits - Metric Fasteners.

Torque Values for Metric Thread Fasteners with Lubricated* or Plates 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 (1068)	
M30 M30 x 2	715 (969) 792 (1074)		990 (1342) 1096 (1486)	

* All plated and unplated fasteners should 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

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PREPARATION FOR STORAGE OR SHIPMENT 0174 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

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 machine.
2. Perform Operator Preventive Maintenance Checks and Services (PMCS) (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. Fill fuel tank completely to prevent condensation from forming (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
4. Perform Unit PMCS (WP 0009 00 and WP 0010 00).
5. Schedule next PMCS on ULLS-G (Unit Level Logistics System – Ground).
6. Store machine indoors in a dry, protected area with scraper bowl/tank lowered to the ground (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
7. When moderate temperatures are expected, leave batteries in place. If extreme cold is expected, remove batteries (WP 0067 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. Ensure battery disconnect switch is in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
11. Fill in Form DD 1397 completely and attach to a conspicuous part of machine.
12. Drain water tank and water pump (water distributor only).

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 0067 00).
3. Check oil and hydraulic fluid levels in engine crankcase, transmission, front axle differential, wheel end final drives, and hydraulic tank (PMCS in TM 5-3800-205-10-1 or TM 5-3800-205-10-2 and Unit PMCS in TM 5-3800-205-23-1).
4. Check coolant level in radiator (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
5. Start engine and perform machine warmup (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Verify proper operation of all gages, switches, and EMS indicator and warning lights.
6. Ensure fuel tank is full (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
7. Operate machine without a load and check engine, transmission, brakes, steering, and electrical accessories for proper operation (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).

PREPARATION FOR LONG-TERM STORAGE

1. Thoroughly clean machine.
2. Perform Operator Preventive Maintenance Checks and Services (PMCS) (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
3. Perform Unit PMCS (WP 0009 00 and WP 0010 00).
4. Schedule next PMCS on ULLS-G.
5. Inspect machine for corrosion. Use touch-up paint where necessary to prevent rust.
6. Coat all exposed hydraulic cylinder rods with GAA grease (Item 16, WP 0171 00) to protect polished surfaces.

NOTE

If machine has accumulated very low mileage since its last scheduled lubrication service, do not drain and refill transmission and front axle; skip step 7.

7. Drain and refill transmission and front axle differential and wheel end final drives (WP 0009 00 and WP 0010 00).
8. Drain engine crankcase and refill with recommended oil (WP 0009 00 and WP 0010 00).
9. Completely drain fuel tank. Mix a solution of fuel (Item 13, 14 or 15, WP 0171 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.
10. 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.
11. Check engine coolant to ensure coolant has correct mixture for expected temperatures (TB 750-651).
12. Seal all openings in engine, including air intake, exhaust outlet, and crankcase breather tube.
13. Loosen or remove drive belts (WP 0031 00 and WP 0032 00).
14. Ensure battery disconnect switch is in OFF position (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
15. Remove batteries (WP 0067 00). Clean batteries and ensure they are fully charged (TM 9-6140-200-14).
16. Completely drain fuel tank.
17. Drain water tank and water pump (water distributor only) (TM 5-3800-205-10-2 and TM 5-3800-205-23-3).
18. Place blocking under axles to remove weight from tires.
19. Fill in Form DD 1397 completely and attach to a conspicuous part of machine.

PREPARATION FOR RETURN TO SERVICE FROM LONG-TERM STORAGE

1. Ensure tires are inflated to 45 psi (310 kPa).
2. Remove blocking from under axles.
3. Remove GAA grease from exposed hydraulic cylinder rods. Wipe rods clean with a rag (Item 31, WP 0171 00) dipped in lubricating oil (Item 24, WP 0171 00).
4. Fill fuel tank with fuel (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
5. Check oil and hydraulic fluid levels in engine crankcase, transmission, front axle differential, wheel end final drives, and hydraulic tank (PMCS in TM 5-3800-205-10-1 or TM 5-3800-205-10-2 and Unit PMCS in TM 5-3800-205-23-1).

PREPARATION FOR RETURN TO SERVICE FROM LONG-TERM STORAGE - CONTINUED

6. Check coolant level in radiator (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
7. Install fully charged batteries (WP 0067 00).
8. Tighten or install drive belts (WP 0031 00 and WP 0032 00).
9. Remove seals from all engine openings, including air intake, exhaust outlet, and crankcase breather tube.
10. Start engine and perform machine warmup (TM 5-3800-205-10-1 or TM 5-3800-205-10-2). Verify proper operation of all gages, switches, and EMS indicator and warning lights.
11. Operate machine without a load and check engine, transmission, brakes, steering, and electrical accessories for proper operation (TM 5-3800-205-10-1 or TM 5-3800-205-10-2).
12. Check operation of water distributor hydraulic system (TM 5-3800-205-10-2).

END OF WORK PACKAGE

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LIST OF PRINCIPLE CATERPILLAR DEALERS 0175 00

1. Table 1 below provides the name and location of local Caterpillar dealers according to principle machine deployment.
2. In the event of OCONUS deployment or outside of home base area of operation, contact Caterpillar Defense and Federal Products at (309) 578-3295 for Caterpillar dealer support in that theatre of operation.

Table 1. Caterpillar Dealer Listing.

Vehicle Location	Local Caterpillar Dealer
Ft. Bragg, NC	Gregory Poole Equipment Co. 5633 U.S. Highway 301 at NC 59 Hope Mills, NC 28348 PH: (910) 424-4400 Fax: (910) 424-1323 www.gregpoole.com
Ft. Campbell, KY	Whayne Supply Company 651 U.S. Highway 31 W. Bypass Bowling Green, KY 42101 PH: (270) 843-3275 Fax: (270) 843-3285
Cape Girardeau, MO	Fabrick Brothers Equipment Co. 3033 Nash Road Scott City, MO 63780-9791 PH: (573) 332-1122 Fax: (573) 332-7109
St. Cloud, MN	Ziegler Inc. 2225 225th Street St. Cloud, MN 56301-8742 PH: (320) 253-2234 Fax: (320) 253-2187
Greenville, SC	Carolina Tractor and Equipment Co. 40 Interstate Blvd Asheville, NC 28806-2261 PH: (828) 251-2500 Fax: (828) 253-9341
Sharonville, OH	Holt Company of Ohio 11330 Mosteller Road Sharonville, OH 45241-1828 PH: (513) 771-0515 Fax: (513) 672-7658
Northfield, NJ	Giles & Ransome Inc. 600 S. Egg Harbor Road Hammonton, NJ 08037-8602 PH: (609) 561-0308 Fax: (609) 567-3970
Jefferson Banks, MO	John Fabick Tractor Company One Fabick Dr. Fenton, MO 63026-2986 PH: (636) 343-5900 Fax: (636) 343-2186

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NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) AND ELECTROMAGNETIC PULSE (EMP) SUSCEPTIBLE COMPONENTS 0176 00

THREAT OF NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) CONTAMINATION

The machine incorporates a CARC painted exterior. The materials used in the machine are metal, rubber, plastic, fabric and glass. In the event of NBC contamination, the decontaminates for these surfaces and materials are listed in Army FM 3-5. For decontamination procedures, refer to Army FM 3-7. Below are lists of susceptible components. In the event of NBC contamination and resulting decontamination, some components may be damaged. The exposed rubber, plastic and fabric materials may require replacement for the machine to be fully operational.

ELECTROMAGNETIC PULSE (EMP) EXPOSURE

The components listed and designated as EMP susceptible may be damaged by EMP exposure. If the machine is exposed to an EMP incident, verify proper operation and repair as necessary.

Table 1. List of NBC and EMP Susceptible Components - Tractor.

NBC/EMP	Part Number	Description
NBC	1S-6595	GASKET
NBC	1S-7057	GASKET
NBC	1S-7988	FILM-INSTRUCTION
NBC	1T-0904	GASKET
NBC	1V-5044	KNOB
NBC	1W-0613	INDICATOR-SERV
NBC	2A-1736	HANDLE-LEVER
NBC	2G-1134	GROMMET
NBC	2K-5109	GASKET
NBC	2M-6349	MOUNT AS
NBC	2S-1647	GROMMET
NBC	2S-2923	COVER-GOVERNOR
NBC	2S-3747	HOLDER-FUSE
NBC	2T-0141	HOSE
NBC	2T-0774	HOSE AS
NBC	2T-0775	HOSE AS
NBC	2T-0782	HOSE AS
NBC	2T-0825	HOSE
NBC	2T-1036	HOSE AS
NBC	2T-1099	MOUNT
NBC	2T-1150	HOSE AS
NBC	2T-1198	HOSE AS
NBC	2T-1222	HOSE AS
NBC	2T-1250	WIRE AS
NBC	2T-1252	CABLE AS
NBC	2T-1293	HOSE AS
NBC	2T-1314	HOSE AS
NBC	2T-1347	HOSE AS

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	2T-1354	HOSE AS
NBC	2T-1361	VALVE-RESIDUAL
NBC	2T-1411	HOSE AS
NBC	2T-1619	HOSE
NBC	2T-1683	HOSE AS
NBC	2T-2224	HOSE AS
NBC	2T-2262	HOSE AS
NBC	2T-2263	HOSE AS
NBC	2T-2265	HOSE AS
NBC	2T-2268	HOSE AS
NBC	2T-2269	HOSE AS
NBC	2T-2270	HOSE AS
NBC	2T-2271	HOSE AS
NBC	2T-2277	HOSE AS
NBC	2T-2422	HOSE AS
NBC	2T-2423	HOSE AS
NBC	2T-2424	HOSE AS
NBC	2T-2428	HOSE AS
NBC	2T-2429	HOSE AS
NBC	2T-2446	HOSE AS
NBC	2T-2447	HOSE AS
NBC	2T-2448	HOSE AS
NBC	2T-2466	HOSE AS
NBC	2T-2469	HOSE AS
NBC	2T-2472	HOSE AS
NBC	2T-2963	HOSE AS
NBC	2T-3302	HARNESS AS
NBC	2T-3319	WIRE AS

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	2T-3321	CABLE AS
NBC	2T-3322	CABLE AS
NBC	2T-3326	FILM (EMS)
NBC	2T-3360	BUTTON AS-HORN
NBC	2T-3413	SWITCH AS
NBC	2T-3435	GASKET
NBC	2T-3442	WIRE AS (SHUNT)
NBC	2T-3574	HOSE AS
NBC	2T-3583	MAT-FLOORBOARD
NBC	2T-3738	LAMP GP-HEAD
NBC	2T-3739	LAMP GP-HEAD
NBC	2T-3757	FILM-TRANS
NBC	2T-3759	FILM-DASH
NBC	2T-3769	HOSE AS.
NBC	2T-3850	WIRE AS
NBC	2V-3726	BUMPER
NBC	2V-8260	GROMMET
NBC	2W-7212	GASKET-REGULATOR
NBC	2W-9162	BREATHER AS
NBC	3D-5279	GROMMET
NBC	3E-3010	FILM-INSTRUCTION
EMP/NBC	3E-3763	SPEEDOMETER AS
NBC	3E-5239	RELAY AS
NBC	3E-7152	SWITCH AS-ROCKER
NBC	3E-7157	SWITCH AS-ROCKER
NBC	3E-7158	SWITCH AS-ROCKER
NBC	3E-7160	SWITCH AS-ROCKER
NBC	3E-7164	SWITCH AS-ROCKER

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	3E-7171	SWITCH AS-ROCKER
NBC	3E-7240	INDICATOR
NBC	3E-7279	SWITCH AS-MAGC
NBC	3G-1977	HOSE AS
NBC	3G-1980	HOSE AS
NBC	3G-1981	HOSE AS
NBC	3G-2140	HOSE AS
NBC	3G-4011	HOSE AS
NBC	3K-3257	GASKET
NBC	3L-0625	GASKET
NBC	3P-3461	GASKET-COVER
NBC	3S-2093	STRAP-CABLE
NBC	3T-2662	BREAKER AS-CKT
NBC	3T-3048	CLIP AS
NBC	3T-3123	RESISTOR AS
NBC	3T-5760	BATTERY
NBC	3T-8728	BREAKER AS-CKT
NBC	3V-4791	GROMMET
NBC	4D-2619	BEARING
NBC	4F-8386	GASKET
NBC	4J-7002	STRAP
NBC	4M-4299	GASKET
NBC	4P-6379	FILM-IDENT
NBC	4P-8681	FILM-IDENT
NBC	4R-9086	HOSE AS-ORFS
NBC	4R-9999	EXCLUDER-SEAL
NBC	4S-6667	HOSE AS
NBC	4W-0483	INDICATOR AS

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	4W-7592	GASKET
NBC	4Y-7948	TIMER AS
NBC	4Y-9652	GASKET
NBC	5C-8465	SEAL
NBC	5D-6997	PAD
NBC	5P-0580	TUBE
NBC	5P-0738	HOSE
NBC	5P-0743	HOSE
NBC	5P-0747	CABLE-STARTER
NBC	5P-0756	TUBE
NBC	5P-0767	HOSE
NBC	5P-0799	SEAL
NBC	5P-0801	SEAL
NBC	5P-1259	HOSE
NBC	5P-1291	HOSE
NBC	5P-1420	HOSE
NBC	5P-1442	HOSE
NBC	5P-1900	SEAL
NBC	5P-1976	SEAL
NBC	5P-2752	SEAL
NBC	5P-3239	SEAL
NBC	5P-3290	SEAL (BULK)
NBC	5P-5148	STRAP-CABLE
NBC	5P-6419	GROMMET
NBC	5P-8293	SEAL
NBC	5P-8444	GROMMET
NBC	5P-9135	GROMMET
NBC	5P-9796	COMPARTMENT AS

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	5R-4467	RECEPTACLE AS
NBC	5R-4686	WIRE AS
NBC	5R-6749	LAMP AS-BLACKOUT
NBC	5R-7841	CAP-DUST
NBC	5S-5249	V-BELT
NBC	5T-8919	BEARING-ALIGNING
NBC	6D-0856	VALVE AS
NBC	6D-0918	VALVE AS
NBC	6D-1039	VALVE AS
NBC	6G-2256	CLAMP
NBC	6G-4195	SWITCH AS-LIMIT
NBC	6H-3618	PLUG-PROTECTIVE
NBC	6I-2577	CLEANER GP-AIR-B
NBC	6I-3034	GASKET
NBC	6J-1080	GROMMET
NBC	6J-1081	GLASS-SIGHT
NBC	6L-3929	HOSE
NBC	6T-1992	CABLE AS
NBC	6T-2217	RESISTOR AS-CONN
NBC	6T-3642	BREAKER AS-CKT
NBC	6T-5925	SWITCH AS-LIMIT
NBC	6V-0852	CAP-DUST
NBC	6V-6543	BLADE AS-WIPER
NBC	6V-8643	TAPE
NBC	6V-8928	HOOK-COAT
NBC	6W-5698	GROMMET
NBC	6Y-2190	MOUNT AS-BUSHING
NBC	7C-0952	HOSE-DISPOSAL

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	7C-1152	GASKET
NBC	7C-1159	GASKET
NBC	7C-1160	GASKET
NBC	7C-2873	HOSE
NBC	7C-3615	HOSE
NBC	7C-7431	GASKET-TURBO
NBC	7D-5998	HOSE AS
NBC	7E-9817	GASKET
NBC	7G-3737	GASKET
NBC	7I-5539	WHEEL-STEERING
NBC	7I-5567	COVER-LOWER
NBC	7K-1181	STRAP-CABLE
NBC	7N-7779	SOCKET-CONNECTOR
NBC	7N-7782	HOUSING-PLUG
NBC	7S-8461	FILM-WARNING
NBC	7T-1961	CAP
NBC	7T-9074	VALVE GP-SOL
NBC	7U-9768	HOSE AS
NBC	7W-2398	GASKET
NBC	7W-5340	GASKET
NBC	7W-6552	GASKET
NBC	7X-1598	SWITCH AS-PRESS
NBC	7X-2058	LAMP-MINIATURE
NBC	7X-7644	FILM-SYMBOL
NBC	8C-3404	FILM-INST
NBC	8C-3445	CAP-DUST
NBC	8C-3569	SWITCH AS-TEMP
NBC	8C-3973	FILM-INST

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	8D-6044	GASKET
NBC	8H-6591	PLUG-PROTECTIVE
NBC	8I-1310	HOSE-AIR
NBC	8I-1314	HOSE AS
NBC	8I-1317	TANK AS
NBC	8I-1362	HOSE-BULK
NBC	8I-1409	HOSE AS
NBC	8I-1436	WIRE AS
NBC	8I-1437	WIRE AS
NBC	8I-1488	CABLE AS
NBC	8I-1722	HARNESS AS
NBC	8I-1752	KNOB
NBC	8I-1753	KNOB
NBC	8I-2088	HOSE AS
NBC	8I-2173	COLUMN AS.
NBC	8I-2184	COVER
NBC	8J-7844	FITTING-ADAPTER
NBC	8S-7583	GROMMET
NBC	8S-9379	HOSE-RAD INLET
NBC	8T-1363	FILM-WARNING
NBC	8T-3414	FILM-INST
NBC	8T-9793	SWITCH AS-TEMP
NBC	8V-3873	HOSE AS
NBC	8W-1304	KNOB
NBC	8W-4343	HOSE AS
NBC	8W-4984	HOSE AS
NBC	8Y-4032	BELT GP-SEAT
NBC	8Y-7430	HOSE AS (ORFS)

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	9D-5404	HOSE AS
NBC	9G-0747	BLOCK AS-FUSE
NBC	9G-4360	CAP-CONNECTOR
NBC	9G-4365	VALVE AS-START
NBC	9G-5315	SEAL GP-DUO CONE
NBC	9G-6257	GASKET-COVER
NBC	9G-9813	ALARM GP-BASIC
NBC	9J-5248	WASHER-RUBBER
NBC	9W-2111	LAMP-MINATURE
NBC	9W-9930	MOUNT AS
NBC	9X-3496	INDICATOR AS
NBC	9X-8372	FILM-INST
NBC	9Y-1267	WIRE AS
NBC	036-6775	V-BELT
NBC	053-0189	GROMMET
NBC	061-8844	GROMMET
NBC	092-0482	HOSE AS
NBC	101-0742	PIVOT GP
NBC	106-2122	COVER-LOWER
NBC	106-3549	BRACKET
NBC	106-3759	FILM-SHIPPING
NBC	107-0612	SWITCH AS-PRESS
NBC	107-7611	PLUG
NBC	107-7832	GASKET
NBC	108-5746	HOSE
NBC	109-3591	CABLE AS
NBC	113-6250	GASKET
NBC	114-2694	WIRE AS.

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	115-1969	SWITCH AS-ROCKER
NBC	115-4202	GASKET
NBC	119-2921	SEAL GP-CSHFT -A
NBC	119-2940	GASKET
NBC	217-8677	HARNESS AS.
NBC	217-8679	HARNESS AS.
NBC	217-8680	HARNESS AS.
NBC	217-8741	HARNESS AS.
NBC	219-2562	CABLE AS.
NBC	219-2563	CABLE AS.
NBC	220-4312	STRIP-RUBBER
NBC	222-3638	HOSE AS.
NBC	222-3641	HOSE AS.
NBC	222-3642	HOSE AS.
NBC	222-3644	HOSE AS.
NBC	222-3645	HOSE AS.
NBC	223-1123	HOSE AS.
NBC	224-1159	SWITCH-BLACKOUT
EMP/NBC	224-3184	FILM-FUSE PANEL
NBC	224-7488	HOSE AS
NBC	224-7489	HOSE AS
NBC	225-0284	TACHOMETER AS.
EMP/NBC	225-0785	FILM-STEER BRAKE
NBC	225-3246	HARNESS AS.
NBC	225-7842	HOSE
NBC	226-8309	GUARD
NBC	226-9817	HARNESS AS.-SEAT
NBC	230-3614	HOSE AS

Table 1. List of NBC and EMP Susceptible Components - Tractor - Continued.

NBC/EMP	Part Number	Description
NBC	230-3615	HOSE AS
NBC	231-0864	TANK AS
NBC	232-3310	HOSE AS

Table 2. List of NBC and EMP Susceptible Components - Scraper.

NBC/EMP	Part Number	Description
NBC	142-1392	TIRE
NBC	2T-1267	GASKET
NBC	2T-2206	HOSE AS
NBC	2T-2207	HOSE AS
NBC	2T-2208	HOSE AS
NBC	2T-2209	HOSE AS
NBC	2T-2210	HOSE AS
NBC	2T-2211	HOSE AS
NBC	5P-8112	GROMMET
NBC	2T-3873	GASKET
NBC	8J-7843	GASKET
NBC	2B-7559	CORK
NBC	2T-0590	HOSE AS
NBC	6V-8089	GROMMET
NBC	124-4414	HOSE AS
NBC	4V-0611	CLAMP-DOUBLE
NBC	214-1460	HOSE AS.
NBC	2T-2379	HOSE AS
NBC	6V-7359	GROMMET
NBC	7G-3832	GROMMET
NBC	7T-1160	HOSE AS
NBC	8J-5222	SUPPORT AS

Table 2. List of NBC and EMP Susceptible Components - Scraper - Continued.

NBC/EMP	Part Number	Description
NBC	8W-0235	HOSE AS
NBC	113-0734	HOSE AS
NBC	115-0495	HOSE AS
NBC	130-3902	HOSE AS
NBC	144-0338	HOSE AS
NBC	145-1832	HOSE AS
NBC	148-8466	HOSE AS
NBC	161-2560	CAP-DUST
NBC	161-3436	HOSE AS.
NBC	183-5423	HOSE AS
NBC	183-7890	HOSE AS
NBC	187-2655	HOSE AS.
NBC	187-5174	CAP-DUST
NBC	187-5302	CAP-DUST
NBC	208-0990	HOSE AS
NBC	214-1446	CAP-DUST
NBC	214-1452	CAP-DUST
NBC	214-1453	CAP-DUST
NBC	2T-1395	INSERT
NBC	2T-1396	CLAMP
NBC	2T-1397	CLAMP
NBC	2T-1398	CLAMP
NBC	2T-1760	HOSE AS
NBC	2T-2252	HOSE AS
NBC	2T-2253	HOSE AS
NBC	2T-2385	HOSE AS
NBC	8I-2349	HOSE AS.
NBC	118-1467	SEPARATOR GP

Table 2. List of NBC and EMP Susceptible Components - Scraper - Continued.

NBC/EMP	Part Number	Description
NBC	161-2561	CAP-DUST
NBC	214-1447	CAP-DUST
NBC	5T-9895	HARNESS AS
NBC	6H-4005	GROMMET
NBC	7K-1181	STRAP-CABLE
NBC	8Y-4215	GASKET
NBC	153-2073	LAMP GP-FLOOD
NBC	213-9100	ALARM AS-BACK UP
NBC	217-8681	HARNESS AS.
NBC	217-8682	HARNESS AS.
NBC	220-9950	HARNESS AS.
NBC	226-8309	GUARD
NBC	5R-6748	LIGHT AS
NBC	149-5534	LAMP GP-SIGNAL
NBC	149-5535	LAMP GP-SIGNAL
NBC	5P-4654	FILM-WARNING
NBC	163-5580	FILM-CAPACITY

Table 3. List of NBC and EMP Susceptible Components - Water Distributor.

NBC/EMP	Part Number	Description
NBC	213-5658	VALVE AS-CHECK
NBC	233-7098	UNION-TUBE
NBC	233-7099	UNION-TUBE
NBC	233-7100	UNION-TUBE
NBC	233-7101	UNION-TUBE
NBC	233-7064	TUBE
NBC	233-7068	TUBE
NBC	233-7069	TUBE

Table 3. List of NBC and EMP Susceptible Components - Water Distributor - Continued.

NBC/EMP	Part Number	Description
NBC	233-7079	TUBE
NBC	233-6979	TEE
NBC	233-7047	TEE
NBC	233-6174	SWITCH AS
NBC	8W-4857	SWITCH AS
NBC	169-3506	SENSOR KIT-DIAL B
NBC	213-5645	SENSOR AS-LEVEL
NBC	233-8076	SEAL
NBC	233-7059	REDUCER
NBC	213-5499	MUD FLAP
NBC	213-5491	LINES GP-AIR
NBC	233-6018	LIGHT AS
NBC	233-6295	LIGHT AS
NBC	233-6296	LIGHT AS
NBC	5R-6748	LIGHT AS
NBC	2G-9524	LATCH
NBC	149-5534	LAMP GP-SIGNAL
NBC	149-5535	LAMP GP-SIGNAL
NBC	153-2073	LAMP GP-FLOOD
NBC	213-5409	HOSE AS-SUCTION
NBC	201-8762	HOSE AS.
NBC	8I-2349	HOSE AS.
NBC	124-4414	HOSE AS
NBC	213-5484	HOSE AS
NBC	213-5487	HOSE AS
NBC	213-5675	HOSE AS
NBC	233-7194	HOSE AS
NBC	233-7650	HOSE AS

Table 3. List of NBC and EMP Susceptible Components - Water Distributor. - Continued.

NBC/EMP	Part Number	Description
NBC	233-7877	HOSE AS
NBC	2T-0590	HOSE AS
NBC	2T-1760	HOSE AS
NBC	2T-2252	HOSE AS
NBC	2T-2253	HOSE AS
NBC	2T-2385	HOSE AS
NBC	3G-6658	HOSE AS
NBC	213-5411	HOSE
NBC	217-8681	HARNESS AS.
NBC	217-8682	HARNESS AS.
NBC	233-6661	HARNESS AS
NBC	5T-9895	HARNESS AS
NBC	233-6605	GUARD
NBC	6V-8089	GROMMET
NBC	233-6986	FITTING-AIR
NBC	233-7010	FITTING-AIR
NBC	233-6102	FILM-WATER LEVEL
NBC	233-6107	FILM'
NBC	233-6108	FILM'
NBC	233-6104	FILM
NBC	233-6105	FILM
NBC	233-6106	FILM
NBC	233-6109	FILM
NBC	233-6110	FILM
NBC	233-6972	ELBOW
NBC	233-7049	ELBOW
NBC	213-5483	COUPLING AS
NBC	1S-1015	CLIP

Table 3. List of NBC and EMP Susceptible Components - Water Distributor - Continued.

NBC/EMP	Part Number	Description
NBC	123-4182	CLAMP-TWIN
NBC	140-1983	CLAMP-SINGLE
NBC	239-9529	CLAMP AS
NBC	161-2561	CAP-DUST
NBC	214-1446	CAP-DUST
NBC	214-1447	CAP-DUST
NBC	213-9100	ALARM AS-BACK UP

Table 4. List of NBC and EMP Susceptible Components - Transport Box.

NBC/EMP	Part Number	Description
NBC	5R-5772	TANK AS-AUX F
NBC	5R-5809	STRAP AS
NBC	6Y-0595	HOSE AS
NBC	8W-0237	HOSE AS
NBC	8W-4917	HOSE AS
NBC	8W-5149	HOSE AS
NBC	9U-3384	ROLLER AS
NBC	145-6127	HOSE AS.
NBC	161-2561	CAP-DUST
NBC	187-5174	CAP-DUST
NBC	187-5302	CAP-DUST
NBC	213-2958	FUEL GP - AUX
NBC	214-1446	CAP-DUST
NBC	214-1447	CAP-DUST
NBC	218-7400	HOSE-WRAPPING
NBC	223-1694	HAMMER-SLEDGE

END OF WORK PACKAGE

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WARRANTY INFORMATION (CATERPILLAR, INC.) 0177 00

GENERAL WARRANTY INFORMATION

1. The Airborne Scraper and Water Distributor System (ASWDS) is covered by a number of different warranties as described in Table 1. This work package contains information on overall machine, ground engaging tools, battery, and engine specific warranties provided by Caterpillar, including instructions on filing warranty claims. Warranty information for the ISU-60 container and tires is found in WP 0178 00.

Table 1. ASWDS Warranty Information.

Warranted Component	Duration of Warranty	Manufacturer Responsible	Contact Information
Overall Machine	18 Months/1000 Hours	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Ground Engaging Tools	Not limited by time	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Battery	3 Years	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Engine Emission Components (613 ASWDS Engine is EPA Certified)	5 Years/3000 Hours	Caterpillar Inc.	Defense and Federal Products (309) 578-3295
Warranty Information Contained in WP 0178 00			
Tires	5 Years	Bridgestone/Firestone Off Road Tire Company	(800) 572-8905
ISU-60 Container	12 Months	AAR Mobility Systems	(800) 355-2015

2. Scheduled machine maintenance is contained in TM 5-3800-205-10-1, TM 5-3800-205-10-2 and WP 0009 00 and WP 0010 00 of this manual. The fact that the machines are covered by a warranty does not relieve the user of the responsibility for proper vehicle operation, care, and maintenance.

3. The manufacturer's lubrication and service intervals must be followed.

4. A listing of principle Caterpillar dealers is provided at the end of this work package, as is information on locating Caterpillar dealers in the event of OCONUS deployment.

EXPLANATION OF TERMS

1. **Abuse.** The improper use, maintenance, repair, or mishandling of warranted items that may cause the warranty of those items to become void.

2. **Acceptance Date.** The date the equipment is accepted in the Army's inventory as annotated on DD Form 250, *Material Receiving and Inspection Report*.

3. **Acquiring Command or Activity.** An activity that procures the items or material for a user.

4. **Defect.** An imperfection that impairs the worth or utility of the part or component.

5. **Repair.** To restore an item to a serviceable condition without affecting warranty.

6. **Repairable.** An item that may be reconditioned or economically repaired for reuse.

EXPLANATION OF TERMS - CONTINUED

7. **Warranty.** A written agreement between a contractor and the Government that outlines the rights and obligations of both parties for defective supplies.

8. **Warranty Claim.** Action started by the equipment users for authorized warranty repair or reimbursement.

9. **Warranty Period.** Time during which the warranty is in effect.

10. **Warranty Start Date.** The date the warranty is put into effect (stamped on warranty plate). The warranty plate is proof of warranty start date for all warranties.

ADMINISTRATIVE INFORMATION

1. **Machine Registration.** Upon machine handoff to the assigned unit, the warranty plate will be stamped by the local Caterpillar dealer with the machine warranty start and end dates. The warranty start date for each machine will then be entered into the Caterpillar Warranty Database. Entry of the warranty start date activates the coverage for each machine and allows any Caterpillar dealer worldwide to view the warranty coverage for the machine. This data is accessed by Caterpillar machine serial number.

2. **Warranty Questions.** Any questions regarding warranty coverage should be directed to Caterpillar, Defense and Federal Products at (309) 578-3295 or Caterpillar Operator at (309) 675-1000 and ask for Defense and Federal Products.

3. **Local Caterpillar Dealer Contact Information.** To be completed by Caterpillar Dealer at time of machine delivery.

Dealer Name:	
Address:	
Point of Contact:	
Telephone Number:	
Cellular Number:	
E-mail Address:	

4. **To Obtain Warranty Service.** The ASWDS contract provides you with two options (Caterpillar repair or Government repair) for correcting warranty defects. The choice is the responsibility of the local unit or installation.

   a. **Caterpillar Repair.**

      (1) The using unit should contact the local Caterpillar Dealer (locations and phone numbers are available at http://www.cat.com or in Table 2 at the end of this work package) to coordinate delivery of the machine to the dealer for analysis or providing for dealer travel to the machine for analysis.

      (2) The Caterpillar Dealer will evaluate the problem to determine if the required repair is covered by warranty.

         (a) If the required repair is not covered by warranty, the dealer will contact the unit for further instructions and the unit will be responsible for dealer expenses incurred during machine analysis.

         (b) If the required repair is covered by warranty, the dealer will make the repairs and submit claims to Caterpillar for reimbursement.

      (3) The Caterpillar dealer will provide travel time and mileage or transportation of the machine as part of the warrantable repair.

ADMINISTRATIVE INFORMATION - CONTINUED

(4) If the Caterpillar dealer disputes your warranty claim and you feel the claim is valid, contact Caterpillar Defense and Federal Products at (309) 578-3295 for a review of the claim.

b. **Government Repair.**

(1) Any warranty repairs made by the user are at the user's expense.

(2) Government repairs do NOT void Caterpillar warranty. Government is fully responsible for the repair and/or any maintenance induced failures due to the repair.

5. **Warranty Dispute.** If Caterpillar Defense and Federal Products declines to perform repairs on items for which you believe the Government has a valid warranty claim:

a. Perform the repairs yourself; use your own repair parts.

b. Immediately report the situation using DA Form 2407 (or DA Form 5504).

(1) Record "Warranty Dispute" and complete description of the failure.

(2) Enter name, activity, and telephone number of the person submitting the warranty dispute.

(3) Enter the name, address, and telephone number of the Caterpillar representative or dealership that refused the service.

(4) Give specific reasons for the refusal.

(5) Enter the specific facts/evidence that you feel will disprove Caterpillar's reason for refusal. Include photographs and sketches as appropriate.

(6) Submit copies of DA Form 2407 (or DA Form 5504) to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-AF-CE, 6501 E. 11 Mile Road, Warren, MI 48397-5000.

6. **Caterpillar Responsibilities.** If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Caterpillar dealer or other source approved by Caterpillar:

a. Provide (at Caterpillar's choice) new, remanufactured, or Caterpillar-approved repaired parts or assembled components needed to correct the defect. Items replaced under this warranty become the property of Caterpillar.

b. Replace lubricating oil, filters, antifreeze, and other service items made unusable by the defect.

c. Provide reasonable and customary labor needed to correct the defect.

7. **User Responsibilities.**

The user is responsible for the following:

a. Providing proof of the warranty start date if warranty data plate is not available.

b. Labor costs, except as stated under "Caterpillar Responsibilities".

c. Local taxes, if applicable.

d. Parts shipping charged in excess of those which are usual and customary.

e. Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.

f. Performance of the required maintenance (including use of proper fuel, oil, lubricants and coolant) and replacement of items due to normal wear and tear. Failures caused by contaminated fluids are not covered by warranty.

8. **Limitations.**

Caterpillar is not responsible for failures resulting from:

a. Any use or installation which Caterpillar judges improper.

b. Attachments, accessory items, and parts not sold or approved by Caterpillar.

c. Abuse, neglect, and/or improper repair.

ADMINISTRATION INFORMATION - CONTINUED

d. User's delay in making the product available after being notified of a potential product problem.

e. Unauthorized repair or adjustments, and unauthorized fuel setting changes.

f. Breakage of Ground Engaging Tools (GET) due to worn mating components or those that have been hardfaced or improperly welded.

g. Remedies under this warranty are limited to providing parts and labor as stated above. Caterpillar is not responsible for incidental or consequential damages.

OVERALL MACHINE WARRANTY

1. **General.**
   a. The ASWDS machines are covered by Caterpillar's material and workmanship machine for a period of 18 months or 1,000 hours, whichever occurs first.
   b. The warranty period begins on the date of machine handoff to the first using unit. Check the machine data plate for warranty start date.
2. **To Obtain Warranty Service.** To obtain warranty service, follow procedures outlined above in *Administrative Information.*

GROUND ENGAGING TOOLS (GET) WARRANTY

1. **General.**
   a. Caterpillar GET is covered by warranty by Caterpillar Inc.
   b. The warranty period is not limited by time and is applicable throughout the *useful life* of the ground engaging tools covered. GET is considered worn out when it is no longer protecting the structural surface to which the GET is mounted.
2. **To Obtain Warranty Service.** To obtain warranty service on GET, follow procedures outlined above in *Administrative Information.*
3. **Specific Warranty Information.**
   a. The Caterpillar warranty is applicable after the expiration of any standard machine or parts warranty. The following Caterpillar GET are covered:
      (1) Cutting edge (P/N 4T6611)
      (2) Cutting edge (P/N 4T6613)
      (3) Router bits (P/N 4T4336)
   b. After the machine warranty period, the unit is responsible for all labor (including welding) and hardware costs associated with removal and installation of GET. The unit is also responsible for delivering the hardware to the dealer and getting replacement GET.

BATTERY WARRANTY

1. **General.** The battery is covered by 3 year warranty by Caterpillar Inc.
2. **To Obtain Warranty Service.** To obtain warranty service on the battery, follow procedures outlined above in *Administrative Information.*
3. **Specific Warranty Information.**
   a. Caterpillar will replace the battery which it finds to be defective in material or workmanship with a new battery at the following cost to the user:
      (1) For the first 12 months from machine warranty start date there is not charge to the user.

BATTERY WARRANTY - CONTINUED

(2) After 12 months from machine warranty start date, user cost is determined by the following formula:

$$\frac{\text{Current Customer's Battery Price x Months in Service}}{\text{36 (months in battery warranty)}} = \text{User Cost}$$

b. This warranty will be honored upon return of the battery, during normal working hours, to a Caterpillar dealer or other source approved by Caterpillar.

EMISSIONS WARRANTY

NOTE

- **California users must also refer to *Emission Control Warranty for California*.**
- **Certification tags illustrated are sample tags only and may not reflect the tags found on your machine.**
- **Items covered by the emission warranty are:**
  - **Fuel injector group**
  - **Fuel-air ratio control (FRC) and FRC boost line**
  - **Unit injector governor group**
  - **Fuel injector control assembly**
  - **Turbocharger and gasket**
  - **Intake manifold and gasket**
  - **Exhaust manifold and gasket**
  - **Turbocharger-to-aftercooler hoses and clamps**
  - **Engine inlet air aftercooler and gasket.**

1. **General.**

a. Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants that certified nonroad diesel engine (powering mobile machinery) are:

(1) Designed, built, and equipped so as to conform, at the time of sale, with all applicable regulations adopted by the United States Environmental Protection Agency (EPA).

(2) Free from defects in materials and workmanship in specific emission-related parts for a period of 60 months, or 3,000 hours of operation, whichever occurs first, after the date of delivery to the first user.

b. If an emission-related part fails during the warranty period, it will be repaired, or replaced. Any such part repaired or replaced under warranty is warranted for the remainder of the warranty period.

c. The engine is certified if it has a special certification label. A Caterpillar dealer can also inform you if the engine is certified.

d. During the term of this warranty, Caterpillar will provide, through a Caterpillar dealer or other source approved by it, repair or replacement of any warranted part at no charge.

e. In an emergency, repairs may be performed at any service establishment, or by the user. Caterpillar will reimburse the user for their expenses, including diagnostic charges for such emergency repair. These expenses shall not exceed Caterpillar's suggested retail price for all warranted parts replaced, and labor charges based on Caterpillar's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate.

f. A part not being available within 30 days or a repair not being complete within 30 days constitutes an emergency.

EMISSIONS WARRANTY - CONTINUED

g. As a condition of reimbursement, replaced parts and validated invoices must be presented at a place of business of a Caterpillar dealer or other source approved by Caterpillar.

2. **Responsibilities and Limitations.** The warranty is subject to the following:

   a. **Caterpillar Responsibilities.** During the emission warranty period, if a defect in material or workmanship of an emission-related part or component is found, Caterpillar will provide:

      (1) New, remanufactured, or repaired parts and/or components, approved pursuant to EPA Regulations, required to correct the defect.

      (2) Note: Items replaced under warranty become the property of Caterpillar.

      (3) Reasonable or customary labor, during normal working hours, needed to correct the defect, including labor for removal and installation when necessary to make the repair.

   b. **User Responsibilities.** During the emission warranty period, the user is responsible for:

      (1) Providing proof of the delivery date to the first user.

      (2) Premium or overtime labor costs.

      (3) Costs to investigate complaints which are not caused by a defect in Caterpillar material or workmanship.

      (4) Providing timely notice or a warrantable failure and promptly making the product available for repair.

      (5) Performance of the required maintenance and use of proper fuel, oil, lubricants and coolant.

      (6) Maintenance, replacement, or repair of the emission control devices and systems may be performed by any non-road engine repair establishment or individual using certified nonroad engine parts.

3. **Limitations.**

   a. Caterpillar is not responsible for resultant damages to an emission-related part of component resulting from:

      (1) Any use or installation which Caterpillar judges improper.

      (2) Attachments, accessory items and parts not sold or approved by Caterpillar.

      (3) Abuse, neglect and/or improper engine repair.

      (4) User’s delay in making the product available after being notified of a potential product problem.

      (5) Unauthorized repair or adjustments and unauthorized fuel setting changes.

   b. This warranty is in addition to Caterpillar’s standard warranty, applicable to the nonroad diesel engine product involved.

   c. NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

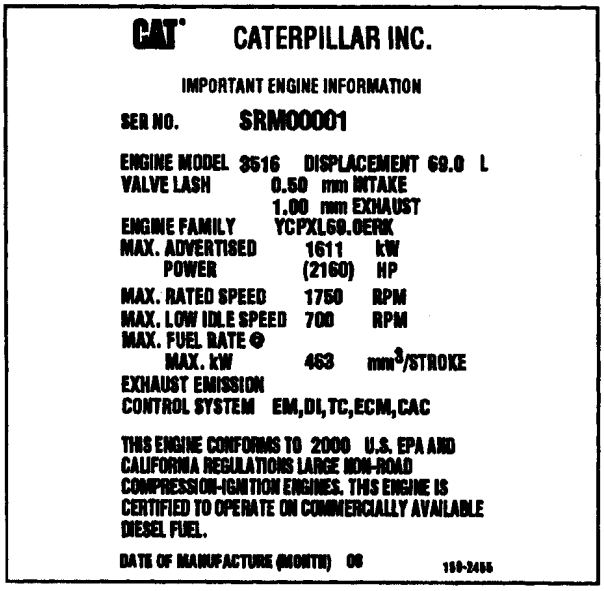
   d. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

4. **Maintenance Recommendations.**

   a. Some Caterpillar nonroad diesel engines are certified by the United States Environmental Protection Agency (EPA) to comply with smoke and gaseous emission standards prescribed by Federal laws at the time of manufacture.

EMISSIONS WARRANTY - CONTINUED

b. The engine is certified if it has a special certification label. Two types of labels that are used by Caterpillar are illustrated. A Caterpillar dealer can also inform you if the engine is certified.


CAT CATERPILLAR INC.

IMPORTANT ENGINE INFORMATION

SER NO. SRM00001

ENGINE MODEL 3516 DISPLACEMENT 69.0 L
VALVE LASH 0.50 mm INTAKE
1.00 mm EXHAUST
ENGINE FAMILY YCPXL69.0ERK
MAX. ADVERTISED POWER 1611 kW (2160) HP
MAX. RATED SPEED 1750 RPM
MAX. LOW IDLE SPEED 700 RPM
MAX. FUEL RATE @ MAX. kW 463 mm^3/STROKE
EXHAUST EMISSION CONTROL SYSTEM EM,DI,TC,ECM,CAC

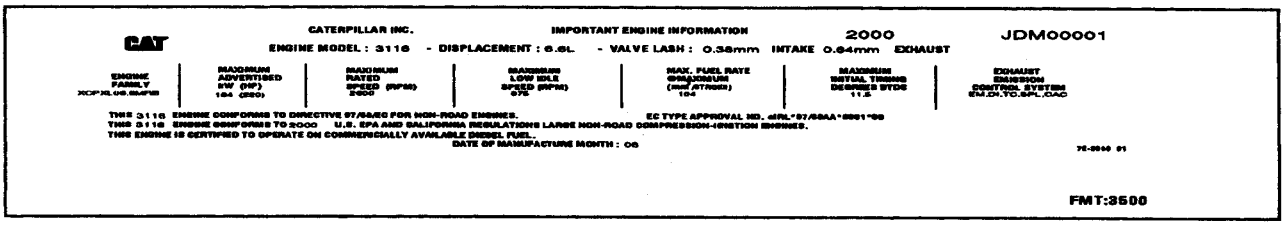
THIS ENGINE CONFORMS TO 2000 U.S. EPA AND CALIFORNIA REGULATIONS LARGE NON-ROAD COMPRESSION-IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALLY AVAILABLE DIESEL FUEL.

DATE OF MANUFACTURE (MONTH) 08

159-2455

c. Efficiency of emission control and engine performance depends on adherence to proper operation and maintenance recommendations AND use of recommended fuels and lubricating oils. It is recommended that major adjustments and repair be made by your authorized Caterpillar dealer.

d. Various chemical fuel additives, which claim to reduce visible smoke, are available commercially. Although additives have been used by individuals to solve some isolated smoke problems in the field, they are not recommended for general use. Federal smoke regulations require that engines be certified without smoke depressants.


CAT CATERPILLAR INC. IMPORTANT ENGINE INFORMATION 2000 JDM00001

ENGINE MODEL : 3116 - DISPLACEMENT : 6.6L - VALVE LASH : 0.38mm INTAKE 0.64mm EXHAUST

ENGINE FAMILY	MAXIMUM ADVERTISED HP (DIN) 184 (250)	MAXIMUM RATED SPEED (RPM) 2500	MAXIMUM LOW IDLE SPEED (RPM) 675	MAX. FUEL RATE @MAXIMUM (mm³/STROKE) 104	MAXIMUM INITIAL TIMING DEGREES BTDC 11.5	EXHAUST EMISSION CONTROL SYSTEM EM,DI,TC,SPL,CAC

THIS 3116 ENGINE CONFORMS TO DIRECTIVE 97/68/EC FOR NON-ROAD ENGINES. EC TYPE APPROVAL NO. e4RL*97/68AA*0001*00
THIS 3116 ENGINE CONFORMS TO 2000 U.S. EPA AND CALIFORNIA REGULATIONS LARGE NON-ROAD COMPRESSION-IGNITION ENGINES.
THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALLY AVAILABLE DIESEL FUEL.
DATE OF MANUFACTURE MONTH : 08

FMT:3500

e. The corrective steps taken immediately upon discovery of worn parts, which may affect emission levels, will help assure proper operation of emission control systems. The use of genuine Caterpillar parts is recommended. Suppliers of non-Caterpillar parts must assure the owner that the use of such parts will not adversely affect emission levels.

f. Regular maintenance intervals, along with special emphasis on the following items, are necessary to keep exhaust emissions within acceptable limits for the useful life of the engine. If the engine is operating under severe conditions, adjust the maintenance schedule accordingly.

g. See your authorized Caterpillar dealer to help analyze your specific application, operating environment and maintenance schedule adjustments.

h. The following is an explanation of maintenance for emission-related components.

(1) *Fuel Injectors or Nozzles*. Fuel injectors or nozzles are subject to tip wear as a result of fuel contamination. This damage can cause an increase in fuel consumption, the engine to emit black smoke, misfire or run rough. Inspect, test, and replace if necessary. Fuel injectors can be tested by an authorized Caterpillar dealer.

(2) *Turbocharger*. Check for any unusual sound or vibration in the turbocharger. Inspect inlet and exhaust piping and connections.

(3) *Air/fuel Ratio Control*.

EMISSIONS WARRANTY - CONTINUED

(a) This component is a device to control the black smoke emission of an engine during its operation when low inlet manifold pressure exists.

(b) Slow engine response and low power may indicate a need for adjustment or repair. Your Caterpillar dealer is equipped with the necessary tools, personnel, and procedures to perform this service.

(c) The owner is encouraged to keep adequate maintenance records, but the absence of such, in and of itself, will not invalidate the warranty.

(d) The machine or equipment owner may perform routine maintenance, repairs and other non-warranty work or have it done at any repair facility. Such non-warranty work need not be performed at a designated warranty station in order for the warranty to remain in force.

5. **Customer Assistance - Emission Control Systems Warranty.**

a. Caterpillar Inc. aims to ensure that the Emission Control System warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control Systems Warranty, call or write: Caterpillar, Manager of Warranty Systems, Peoria, IL 61629-1250; (309) 675-4037.

b. Authorized dealers are recommended for major maintenance and repair work as they are staffed with trained personnel, proper tools and are aware of the latest maintenance methods and procedures. Owners and others who desire to perform their own work should purchase a Service Manual and obtain current service information from their Caterpillar dealer.

EMISSION CONTROL WARRANTY FOR CALIFORNIA

1. **Owner Warranty Rights and Obligations.**

a. The California Air Resources Board (CARB) and Caterpillar are pleased to explain the emission control system warranty on your 2000 or later certified heavy duty off-road diesel engine. The engine is certified if it has a special certification label. Two types of labels that are used by Caterpillar are shown on previous pages. A Caterpillar dealer can also inform you if the engine is certified.

b. In California, new heavy duty off-road diesel engines must be designed, built, and equipped to meet the state's stringent anti-smog standards. Caterpillar must warrant the emission control system on your engine for the duration of time listed below provided there has been no abuse, neglect, or improper maintenance on your engine.

c. Your emission control system may include parts such as the fuel injection system, air induction system, and engine computer, if equipped. Also included may be hoses, connectors, clamps, and other emission-related components.

d. Where a warrantable condition exists, Caterpillar will repair the heavy duty off-road diesel engine at no cost to the owner including diagnosis, parts, and labor.

2. **Manufacturer's Warranty Coverage.**

a. The emissions warranty period for new heavy duty off-road diesel engines is a duration of 60 months, or 3,000 hours of operation, whichever occurs first after date of delivery to the initial owner.

b. If an emission-related part or component on your diesel engine is defective, the part or component will be repaired, or replaced by Caterpillar. This is your emission control system WARRANTY.

c. This warranty covers the following emission-related parts and components:

(1) Charge Air Cooling System (if equipped)

(2) Fuel Injection System

(3) Intake Manifold

(4) Exhaust Manifold

(5) Turbocharger System

(6) Air-Fuel Ratio Control System

(7) Electronic Control Module including Sensors and Personality Module (if equipped)

EMISSION CONTROL WARRANTY FOR CALIFORNIA - CONTINUED

(8) Miscellaneous hoses, clamps, connectors and sealing devices used in the above systems.

d. Any replacement part may be used for maintenance or repairs. The owner should ensure that such parts are equivalent in design and durability to genuine Caterpillar parts. Use of non-genuine Caterpillar parts does not invalidate the warranty. However, Caterpillar is not liable for parts which are not genuine Caterpillar parts.

3. **Owner's Warranty Responsibilities.**

a. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the owner's manual (Operation and Maintenance Manual). Caterpillar recommends that you retain all records covering the maintenance on your engine, but cannot deny warranty solely for lack of receipts and records or for failure to ensure the performance of all scheduled maintenance.

b. As the heavy duty off-road diesel engine owner, you should also be aware that Caterpillar may deny you warranty coverage if your heavy duty off-road diesel engine, or an emission components, or part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

c. Your engine is designed to operate on commercial diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emission requirements.

d. You are responsible for contacting your Caterpillar dealer as soon as any engine problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

e. If you have questions regarding your warranty rights and responsibilities contact: Caterpillar Manager, Warranty Operations, Peoria, IL 61629-1250, phone: (309) 675-4037 or California Air Resources Board (CARB), 9528 Telstar Ave., El Monte, CA 91731.

LIST OF PRINCIPLE CATERPILLAR DEALERS

1. Table 2 below provides the name and location of local Caterpillar dealers according to principle vehicle deployment.
2. In the event of OCONUS deployment or outside of home base area of operation, contact Caterpillar Defense and Federal Products at (309) 578-3295 for Caterpillar dealer support in that theatre of operation.

Table 2. Caterpillar Dealer Listing.

Vehicle Location	Local Caterpillar Dealer
Ft. Bragg, NC	Gregory Poole Equipment Co. 5633 U.S. Highway 301 at NC 59 Hope Mills, NC 28348 PH: (910) 424-4400 Fax: (910) 424-1323 www.gregpoole.com
Ft. Campbell, KY	Whayne Supply Company 651 U.S. Highway 31 W. Bypass Bowling Green, KY 42101 PH: (270) 843-3275 Fax: (270) 843-3285
Cape Girardeau, MO	Fabrick Brothers Equipment Co. 3033 Nash Road Scott City, MO 63780-9791 PH: (573) 332-1122 Fax: (573) 332-7109
St. Cloud, MN	Ziegler Inc. 2225 225th Street St. Cloud, MN 56301-8742 PH: (320) 253-2234 Fax: (320) 253-2187
Greenville, SC	Carolina Tractor and Equipment Co. 40 Interstate Blvd Asheville, NC 28806-2261 PH: (828) 251-2500 Fax: (828) 253-9341
Sharonville, OH	Holt Company of Ohio 11330 Mosteller Road Sharonville, OH 45241-1828 PH: (513) 771-0515 Fax: (513) 672-7658
Northfield, NJ	Giles & Ransome Inc. 600 S. Egg Harbor Road Hammonton, NJ 08037-8602 PH: (609) 561-0308 Fax: (609) 567-3970
Jefferson Banks, MO	John Fabick Tractor Company One Fabick Dr. Fenton, MO 63026-2986 PH: (636) 343-5900 Fax: (636) 343-2186

END OF WORK PACKAGE

WARRANTY INFORMATION (ALL EXCEPT CATERPILLAR, INC.) 0178 00

GENERAL WARRANTY INFORMATION

1. The Airborne Scraper and Water Distributor System (ASWDS) is covered by a number of different warranties as described in Table 1. This work package contains information on warranties for the tires and ISU-60 container, including instructions on filing warranty claims. Information on overall machine and engine specific warranties (covered by Caterpillar Inc.) is found in WP 0177 00.

Table 1. ASWDS Warranty Information.

Warranted Component	Duration of Warranty	Manufacturer Responsible	Contact Information
Tires	5 Years	Bridgestone/Firestone Off Road Tire Company	(800) 572-8905
ISU-60 Container	12 Months	AAR Mobility Systems	(800) 355-2015
	Warranty Information Contained in WP 0177 00		
Overall Machine	18 Months/1000 Hours	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Ground Engaging Tools	Not limited by time	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Battery	3 Years	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Engine Emission Components (613 ASWDS Engine is EPA Certified)	5 Years/3000 Hours	Caterpillar Inc.	Defense and Federal Products (309) 675-4037

2. The warranties covered in this work package are arranged by manufacturer. For example, for information on the ISU-60 container warranty, look for the heading titled *AAR Mobility Systems (ISU-60 Container Warranty)*. Paragraphs under this heading contain all information on the ISU-60 warranty, including administrative and claim filing instructions.
3. Scheduled vehicle maintenance is contained in TM 5-3800-205-10-1, TM 5-3800-205-10-2 and WP 0009 00 and WP 0010 00 of this manual. The fact that the machines are covered by a warranty does not relieve the user of the responsibility for proper machine operation, care, and maintenance.
4. The manufacturer's lubrication and service intervals must be followed.

EXPLANATION OF TERMS

1. **Abuse.** The improper use, maintenance, repair, or mishandling of warranted items that may cause the warranty of those items to become void.
2. **Acceptance Date.** The date the equipment is accepted in the Army's inventory as annotated on DD Form 250, *Material Receiving and Inspection Report*.
3. **Acquiring Command or Activity.** An activity that procures the items or material for a user.
4. **Defect.** An imperfection that impairs the worth or utility of the part or component.
5. **Repair.** To restore an item to a serviceable condition without affecting warranty.

EXPLANATION OF TERMS - CONTINUED

6. **Repairable.** An item that may be reconditioned or economically repaired for reuse.
7. **Warranty.** A written agreement between a contractor and the Government that outlines the rights and obligations of both parties for defective supplies.
8. **Warranty Claim.** Action started by the equipment users for authorized warranty repair or reimbursement.
9. **Warranty Period.** Time during which the warranty is in effect.
10. **Warranty Start Date.** The date the warranty is put into effect (stamped on warranty plate). The warranty plate is proof of warranty start date for all warranties.
11. **Ton-Mile-Per-Hour.** A rating used to describe the tires ability to carry a load at a given speed; exceeding this will damage the tire.

BRIDGETONE/FIRESTONE OFF ROAD TIRE COMPANY (TIRE WARRANTY)

1. **General.**
   a. ASWDS tires are warranted on a prorated basis by Bridgestone/Firestone Off Road Tire Company (BFOR) for a period of 5 years. Refer to Table 2. for information on prorating tires.
   b. Contact the local BFOR or TACOM-Team Tire for information regarding tire warranty. To find the closest Firestone dealer, use www.bfor.com or call 1-800-572-8905. The original tire on the ASWDS machine is a Super Ground Grip Loader Dozer L-2 Nylon 16 ply rating size 23.5-25.
2. **To Obtain Warranty Service.**
   a. Contact an authorized Bridgestone, Firestone, or America OTR dealer. Please be prepared to provide proof of purchase of the product and purchase date.
   b. The authorized dealer will contact BFOR to arrange for a tire inspection and claim processing. The dealer does NOT have authority/responsibility to make the determination as to eligibility for coverage under this warranty.
3. **Limited Warranty Exclusions - All Tires and Tubes.** All tire and tube warranties are subject to the following exclusions:

NOTE

Overloading tires voids the warranty.

   a. All limited warranties of BFOR are limited to the original purchaser and are not assignable to subsequent purchasers.
   b. Costs of mounting and balancing following prorated replacement or repair of tires or tubes, and applicable federal, state, and local taxes.
   c. Warranties do not cover damage resulting from misuse, improper mounting, misapplication, use of non-approved rims, improper inflation, overloading, running flat, misalignment or imbalance of wheels/rims, defective brakes or shock absorbers, abuse, willful damage, oil, chemical action, fire or externally - generated heat, use of tire chains, use of studs, water or other material entrapped inside the tire during mounting, vehicle damage or road hazards (such as rock cuts, punctures, cut separations, impacts, flex breaks).
   d. Claims for irregular wear are not covered.
   e. Any tire which is operated above its ton-mile per-hour (TMPH) rating, is not covered.
   f. All tube-type tires should be used with proper size Bridgestone/Firestone tubes exclusively.
   g. Warranties apply to original usable tread depth and do not extend to retreaded tires.
   h. Any modifications to the tire (added buttress shoulders, regrooving, relugging, etc.) voids all warranties.
   i. Any material added to the tire (tire fill, sealer, balancer, etc.) is not covered by this warranty and will not be compensated for in case of credit being issued for the tire. Use of solid type fill (such as urethane) voids all warranties.

BRIDGETONE/FIRESTONE OFF ROAD TIRE COMPANY (TIRE WARRANTY) - CONTINUED

j. Any costs associated with the repair of tires are not covered, unless previously approved by the appropriate BFOR employee.

k. Warranties are valid only for tires and tubes purchased and used in the United States.

l. ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED TO THE DURATION OF THIS LIMITED WARRANTY.

m. ALL OBLIGATIONS OR LIABILITIES FOR INCIDENTAL OR CONSEQUENTIAL DAMAGE ARE HEREBY EXCLUDED, INCLUDING LOSS OF USE OF VEHICLE AND LOSS OF TIME.

n. Some states do not allow limitations in how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above such limitations or exclusions may not apply to you.

o. No Bridgestone, Firestone, or America OTR dealer has the authority to make or imply any representation, promise or agreement which in any way varies or extends the terms of this warranty.

Table 2. Tire Warranty Information.

AMOUNT OF CREDIT ISSUED TO THE CUSTOMER FOR WORKMANSHIP AND MATERIAL CONDITIONS								
	Percentage of Original Tread Depth Remaining							
AGE OF TIRE	**81% to 100%**	**71% to 80%**	**61% to 70%**	**51% to 60%**	**41% to 50%**	**31% to 40%**	**21% to 30%**	**0% to 20%**
Less than 180 days	Actual%	70%	60%	50%	40%	30%	20%	0%
180 days to one year	80%	70%	60%	50%	40%	30%	10%	0%
Less than two years	75%	65%	60%	50%	40%	30%	10%	0%
Less than three years	50%	50%	40%	40%	40%	30%	10%	0%
Less than four years	40%	30%	30%	30%	30%	20%	10%	0%
Less than five years	20%	20%	20%	20%	20%	20%	10%	0%
More than five years	0%	0%	0%	0%	0%	0%	0%	0%

AAR MOBILITY SYSTEMS (ISU-60 CONTAINER WARRANTY)

1. **General.** The ISU-60 container is covered by a 12-month materials and workmanship warranty by AAR Mobility Systems.
2. **To Obtain Warranty Service.** Contact AAR Mobility Systems at 1-800-355-2015.

AAR MOBILITY SYSTEMS (ISU-60 CONTAINER WARRANTY) - CONTINUED

3. **ISU-60 Container Warranty.** AAR warrants to the Army that its new goods, excluding components not made by AAR, are free from defects in material and workmanship under normal use and service. AAR's obligation under this warranty is limited to repair or at AAR's option, replacement of any part or parts which are within 12 months after delivery to the Army returned to AAR's place of manufacture and which after examination appears to AAR's satisfaction to be defective under the above warranty. In the event a part is replaced, the aforementioned warranty term shall not be extended beyond one year after the delivery of the original manufactured part to the Army. All costs of shipping any defective goods to AAR and returning them to the Army shall be borne entirely by the Army. AAR shall use its good faith efforts to obtain, in its subcontract with each supplier of components not made by AAR, a provision that the subcontractor's standard warranty, if any, shall survive AAR's inspection, acceptance and payment and shall run to AAR, its successors, assigns and customers. AAR MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY FITNESS FOR ANY SPECIAL USE OR FUNCTION OR LIFE AFTER SALE TO THE ARMY AND/OR TO SUBSEQUENT BUYERS OR USERS OF THE GOODS, BEYOND THE EXPRESSED TERMS OF THIS AGREEMENT. THERE ARE NO WARRANTIES EXPRESSED OR IMPLIED, ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE OR USAGE OF TRADE, WHICH EXTEND BEYOND THE FACE OF THIS AGREEMENT. AAR neither assumes nor authorizes any person to assume for it any other liability in connection with the sale of its goods.

END OF WORK PACKAGE

INDEX

Subject	Work Package/Page
A	
Abbreviations/Acronyms, List of	0001 00-2
Accelerator Pedal Replacement	0023 00-1
Aftercooler Replacement	0142 00-1
Air and Brake Systems, Theory of Operation	0003 00-4
Air Cleaner Assembly Maintenance	0018 00-1
Air Compressor Governor Replacement	0083 00-1
Air Compressor Maintenance	0083 00-1
Air Horn Replacement	0111 00-1
Air Horn Solenoid Replacement	0112 00-1
Air Horn Switch Replacement	0113 00-1
Air Hoses and Tubes Replacement	0093 00-1
Air Inlet Heater Replacement	0142 00-1
Air Intake Heater Relay Replacement	0045 00-1
Air Intake Heater Timer Replacement	0056 00-1
Air Intake Hose Replacement	0019 00-1
Air Tanks Replacement	0094 00-1
Air/Hydraulic Brake Cylinder Replacement	0086 00-1
Alternator Belt Replacement	0032 00-1
Alternator Replacement	0034 00-1
Auxiliary Fuel Tank Repair	0167 00-1
B	
Backup Alarm Switch Replacement	0036 00-1
Battery and Battery Cables Maintenance	0067 00-1
Battery Disconnect Switch Replacement	0037 00-1
Belt Tightener Replacement	0030 00-1
Blackout Drive Light Maintenance	0052 00-1
Blackout Marker Light Maintenance	0050 00-1
Brake Caliper Replacement	0087 00-1
Brakeshoes Replacement, Front Service	0084 00-1
Bypass Valve Maintenance	0115 00-1
Bypass Valve Replacement, Oil Filter Base	0134 00-1

INDEX - Continued

Subject	Work Package/Page
C	
Circuit Breakers Replacement	0038 00-1
Cold Start Aid System Maintenance, Ether	0022 00-1
Container	
Maintenance	0163 00-1
Repair	0164 00-1
Coolant Temperature Sender Replacement	0061 00-1
Corrosion Prevention and Control (CPC)	0001 00-1
Crankcase Breather Replacement	0012 00-1
Crankshaft Front Seal Replacement	0127 00-1
Crankshaft Rear Seal Carrier Replacement	0128 00-1
Crankshaft Rear Seal Replacement	0129 00-1
Cutting Edge Wheels and Load Transfer Axles Repair	0165 00-1
Cylinder Head Replacement	0125 00-1
D	
Data Plate and Decal Replacement	0108 00-1
Dealers, Principle Caterpillar	0175 00-1
Destruction of Army Materiel to Prevent Enemy Use	0001 00-2
Differential and Bevel Gear Replacement	0152 00-1
Differential Lock Control Maintenance	0081 00-1
Dimmer Switch Replacement	0053 00-1
Direction Control and Hydraulic Control Levers Replacement	0114 00-1
Double Check Valves Replacement	0092 00-1
Draft Frame Replacement	0155 00-1
E	
Ejector Detent Pressure Switch Replacement	0064 00-1
Electrical General Maintenance Instructions	0033 00-1
Electrical System, Theory of Operation	0003 00-6
Elevator/Water Hydraulic Pump Replacement	0159 00-1
Elevator/Water Pump Control Valve Replacement	0161 00-1
Emergency Brake Control Valve Replacement	0089 00-1
Emergency Brake Pressure Switch Replacement	0047 00-1
EMS Panel Replacement	0039 00-1

INDEX - Continued

Subject	Work Package/Page

E - Continued

EMS Alarm Replacement	0055 00-1
Engine Front and Rear Lifting Brackets Replacement	0124 00-1
Engine Front Cover Replacement	0132 00-1
Engine Fuel System Pressure Switch Replacement	0065 00-1
Engine Grille, Access Door, and Hood Assembly Replacement	0099 00-1
Engine Oil Filter Base and Oil Cooler Maintenance	0134 00-1
Engine Oil Filter Replacement	0013 00-1
Engine Oil Pan Replacement	0014 00-1
Engine Oil Pressure Switch Replacement	0064 00-1
Engine Oil Pump Assembly Maintenance	0135 00-1
Engine Oil Sampling Valve Replacement	0015 00-1
Engine Replacement	0122 00-1
Engine Speed Sensor Replacement	0062 00-1
Engine Temperature and Ether Start Aid Temperature Switch Replacement	0063 00-1
Engine, Theory of Operation	0003 00-1
Equipment Characteristics, Capabilities, and Features - Water Distributor	0002 00-2
Equipment Characteristics, Capabilities, and Features (Scraper)	0002 00-1
Equipment Data	0002 00-16
Equipment Description and Data	0002 00-1
Equipment Improvement Recommendations, Reporting (EIRs)	0001 00-1
Ether Cold Start Aid System Maintenance	0022 00-1
Exhaust Guard, Exhaust Pipe, and Muffler Replacement	0025 00-1
Exhaust Manifold Replacement	0136 00-1
Expendable and Durable Items List	0171 00-1

F

Fan and Fan Drive Replacement	0031 00-1
Fan Belt Replacement	0032 00-1
Fan Drive Repair	0145 00-1
Fenders Replacement	0101 00-1
Final Drive Maintenance	0077 00-1
Fire Extinguisher and Bracket Replacement	0106 00-1
Flywheel Housing Replacement	0130 00-1

INDEX - Continued

Subject	Work Package/Page
F - Continued	
Flywheel Maintenance	0131 00-1
Forms, Records, and Reports, Maintenance	0001 00-1
Front and Rear Engine Supports Replacement	0123 00-1
Front Axle Assembly Replacement	0151 00-1
Front Axle Shafts Replacement	0078 00-1
Front Service Brakeshoes Replacement	0084 00-1
Front Spindle Assembly Maintenance	0079 00-1
Front Tire and Rim Replacement	0096 00-1
Fuel Filters and Base Replacement, Secondary	0021 00-1
Fuel Governor Hoses and Lines Replacement	0020 00-1
Fuel Injector Control Linkage Replacement	0138 00-1
Fuel Level Relay Pressure Switch Replacement	0064 00-1
Fuel Lines and Fittings Replacement	0016 00-1
Fuel Setting	0140 00-1
Fuel Shutoff Solenoid Replacement	0017 00-1
Fuel Timing	0140 00-1
Fuel Transfer Pump and Governor Assembly Replacement	0141 00-1
Fuel Unit Injector Replacement	0139 00-1
Fuse Replacement	0040 00-1
G	
General Lubrication Procedures	0009 00-2
General Maintenance Instructions, Electrical	0033 00-1
Guard Plates Replacement	0100 00-1
H	
Hazard Flasher Unit Replacement	0041 00-1
Headlights Replacement	0054 00-1
Hitch Replacement	0155 00-1
Hydraulic Lines and Fittings Replacement	0116 00-1
Hydraulic Oil Cooler Replacement	0026 00-1
Hydraulic Oil Filters Maintenance	0115 00-1
Hydraulic Oil Switch Replacement	0121 00-1
Hydraulic Pump Replacement	0158 00-1

INDEX - Continued

Subject **Work Package/Page**

H - Continued

Hydraulic System Oil Sampling Valve Replacement 0117 00-1
Hydraulic System, Theory of Operation 0003 00-7
Hydraulic Tank Filler Cap Repair 0120 00-1
Hydraulic Tank Replacement 0162 00-1
Hydraulic Tank Safety Relief Valve Assembly Maintenance 0118 00-1
Hydraulic Tank Sight Gage Replacement 0119 00-1

I

Injector Synchronization 0140 00-1
Instrument Panel Gages and Bulbs Replacement 0042 00-1
Intake Manifold Replacement 0137 00-1

K

Key Start Switch Replacement 0043 00-1

L

Light Switch and Ground Cable Replacement 0044 00-1
List of Abbreviations/Acronyms 0001 00-2
Load Transfer Axles and Cutting Edge Wheels Repair 0165 00-1
Load Transfer Relief Valve and Hose Assembly Repair 0166 00-1
Location and Description of Major Components 0002 00-4
Lower Prop Shaft Maintenance 0076 00-1
Lubrication Procedures, General 0009 00-2

M

Main Control Valve Replacement 0160 00-1
Main Relay Replacement
Fuel Pump Relay Replacement 0045 00-1
Maintenance Allocation Chart (MAC) 0170 00-1
Introduction 0169 00-1
Maintenance Forms, Records, and Reports 0001 00-1
Major Components, Location and Description of 0002 00-4

N

Neutral Start Switches Replacement 0046 00-1

O

Oil Filter Base Replacement 0072 00-1

INDEX - Continued

Subject	Work Package/Page

O - Continued

Ozone Depleting Substances 0001 00-2

P

Parking Brake Actuator Replacement 0088 00-1

Parking Brake Assembly Maintenance 0082 00-1

Parking Brake Control Valve Replacement 0089 00-1

Parking Brake Pressure Switch Replacement 0047 00-1

Parking Light/Blackout Marker Light Maintenance 0050 00-1

PMCS Introduction 0009 00-1

Power Train, Theory of Operation 0003 00-2

Preparation for
- Long-Term Storage 0174 00-2
- Short-Term Storage 0174 00-1
- Storage or Shipment 0001 00-2

Preparation for Return to Service from
- Long-Term Storage 0174 00-2
- Short-Term Storage 0174 00-1

Pressure Protection Valve Replacement 0091 00-1

Preventive Maintenance Checks and Services (PMCS) 0010 00-1

Principle Caterpillar Dealers 0175 00-1

R

Radiator Replacement 0144 00-1

Radiator Hoses, Tubes, and Clamps Replacement 0027 00-1

Rearview Mirror Replacement 0107 00-1

References 0168 00-1

Relay Replacement 0048 00-1

Reporting Equipment Improvement Recommendations (EIRs) 0001 00-1

Rifle Rack Replacement 0105 00-1

Rocker Arm Cover Replacement 0011 00-1

Rocker Shaft Group Replacement 0133 00-1

Rocker Switches Replacement 0049 00-1

ROPS/FOPS Replacement 0098 00-1

INDEX - Continued

Subject	Work Package/Page

S

Seat
- Repair 0104 00-1
- Replacement 0103 00-1

Secondary Fuel Filters and Base Replacement 0021 00-1

Service Brake Air Supply Block Solenoid Valve Replacement 0066 00-1

Service Brake Bleeding 0095 00-1

Service Brake Control Valve Replacement 0090 00-1

Service Upon Receipt 0008 00-1
- Inspection Instructions 0008 00-1
- Servicing Instructions 0008 00-1

Side Mirror Replacement 0107 00-1

Skid Steer Control and Air Lines Replacement 0085 00-1

Slave Start Receptacle and Cables Replacement 0068 00-1

Start Relay Replacement 0045 00-1

Steering Hydraulic Control Valve Replacement 0154 00-1

Steering Hydraulic Cylinders Replacement 0153 00-1

Steering Link Replacement 0156 00-1

Steering Pump Replacement 0158 00-1

Steering Wheel and Column Replacement 0097 00-1

Stop Lamp Pressure Switch Replacement 0058 00-1

Storage or Shipment, Preparation for 0001 00-2

T

Tests, Inspections, and Adjustments 0005 00-1

Theory of Operation
- Air and Brake Systems 0003 00-4
- Electrical System 0003 00-6
- Engine 0003 00-1
- Hydraulic System 0003 00-7
- Power Train 0003 00-2

Thermostat Replacement 0028 00-1

Throttle Control Cable Replacement 0024 00-1

Tire and Rim Replacement, Front 0096 00-1

Tool Identification List 0172 00-1

Torque Converter Replacement 0146 00-1

Torque Converter Temperature Switch Replacement 0059 00-1

INDEX - Continued

Subject	Work Package/Page
T - Continued	
Torque Limits	0173 00-1
Tractor Frame Pins and Bearings Replacement	0155 00-1
Transmission Hydraulic Control Valve Replacement	0148 00-1
Transmission Oil Sampling Valve Replacement	0073 00-1
Transmission Oil and Scavenger Pump Replacement	0149 00-1
Transmission Oil Cooler Replacement	0074 00-1
Transmission Oil Filter Replacement	0072 00-1
Transmission Oil Suction Screen and Tube Assembly (Magnetic Screen) Replacement	0075 00-1
Transmission Shift Control Cable Replacement	0069 00-1
Transmission Shift Control Cam and Linkage Replacement	0070 00-1
Transmission Shift Linkage and Lock Replacement	0071 00-1
Transmission Speed Sensor Replacement	0062 00-1
Transmission/Transfer Assembly Replacement	0147 00-1
Troubleshooting	
Symptom Index	0006 00-1
Troubleshooting Introduction	0004 00-1
Turbocharger Replacement	0143 00-1
Turn Signal/Hazard Flasher Switch Replacement	0051 00-1
U	
Upper Prop Shaft Replacement	0150 00-1
V	
Valve and Hose Assembly Repair, Load Transfer Ready	0166 00-1
Vibration Damper and Pulley Replacement	0126 00-1
W	
Warranty Information	0001 00-2
Warranty Information (All Except Caterpillar, Inc.)	0178 00-1
Warranty Information (Caterpillar, Inc.)	0177 00-1
Water Pump	
Drive Belt Replacement	0032 00-1
Replacement	0029 00-1
Windshield Glass Replacement	0157 00-1
Windshield Maintenance	0102 00-1
Windshield Washer Reservoir and Pump Replacement	0109 00-1

INDEX - Continued

Subject **Work Package/Page**

W - Continued

Windshield Wiper Arm Replacement 0110 00-1
Windshield Wiper Motor Replacement 0110 00-1
Work Light Maintenance 0057 00-1

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By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
0514505

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 25-30; the proponent agency is ODISC4.

Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE: 1 July 2005

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*
AMSTA-LC-CI/TECH PUBS, TACOM-RI
1 Rock Island Arsenal
Rock Island, IL 61299-7630

FROM: *(Activity and location) (Include ZIP Code)*
125th Transportation Company
ATTN: Motor SGT (SGT Wilson)
Ft. Riley, KA 78665-4000

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-3800-205-23-1	15 July 2005	Field Maintenance Manual (Includes Unit and Direct Support Maintenance)for Scraper, Tractor, Model 613CS andDistributor, Water, Model 613CWD)

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	0035 00-1	Initial Setup				Item number for Oil, Lubricating is not correct.

SAMPLE

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Johnny Wilson, E-5, MOTOR SGT	DSN 867-7967	

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE

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

SAMPLE

PART III - REMARK *(Use this part for any explanatory 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)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-3800-205-23-1	15 July 2005	Field Maintenance Manual (Includes Unit and Direct Support Maintenance)for Scraper, Tractor, Model 613CS andDistributor, Water, Model 613CWD)

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. APD V4.00

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE

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)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

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THE METRIC SYSTEM AND EQUIVALENTS

Linear Measure

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
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 Inches
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 Inches
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