

TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND
GENERAL SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS**

FOR

**THERMAL TIP RECORDER
RD-426A(V)1/U
(HEWLETT-PACKARD MODEL 7418A)**

(N S N 6 6 2 1 - 0 0 - 6 2 1 - 6 5 6 8)

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1977

W A R N I N G

Ac line voltage may be exposed on the underside of the control panel. To avoid shock hazard or serious personal injury, DO NOT contact the control panel PC board or wiring when the recorder is connected with line power.

DONT TAKE CHANCES!

TECHNICAL MANUAL

TM11-6625-2752-14&P

**HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 24 June 1977**

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FOR**

THERMAL TIP RECORDER RD-426A(V)1/U

(NSN 6625-00-621-6568)

REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028-2 (Test) located in the back of the manual. Simply tear out the self-addressed form, fill it out as shown on the sample, fold it where shown, and drop it in the mail.

If there are no blank DA Forms 2028-2 (Test) in the back of your manual, use the standard DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to the Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703. In either case a reply will be furnished direct to you.

This manual is an authentication of the manufacturer's commercial literature which, through usage, has been found to cover the data required to operate and maintain this equipment. Since the manual was not prepared in accordance with military specifications and AR 310-3, the format has not been structured to consider levels of maintenance.

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Section I - Channel Information
Models 7758A, 7418A
07758-1

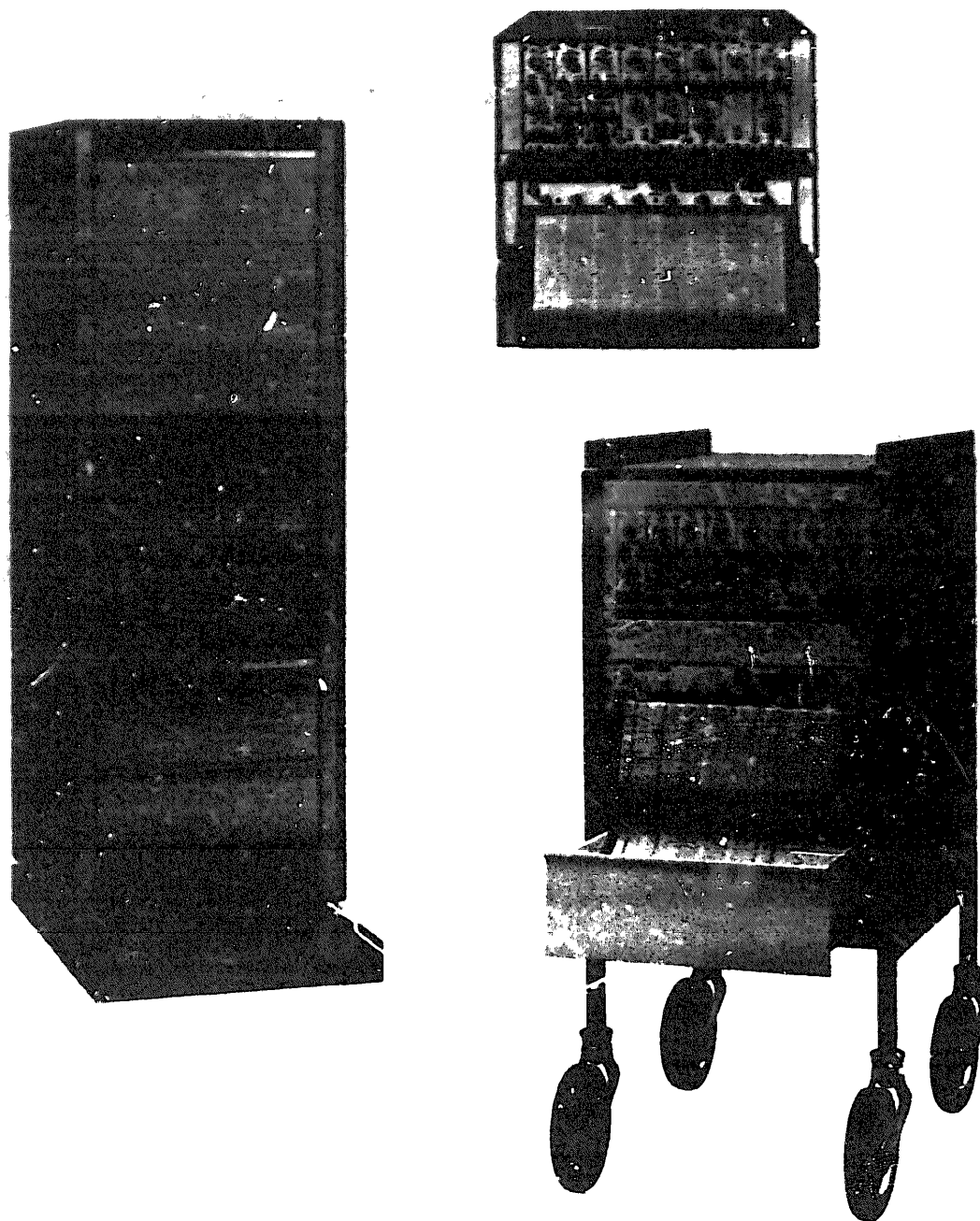


Figure 1-1. Model 7758A and 7418A Recording Systems

SECTION O

0-1. SCOPE.

This manual describes Thermal Tip Recorder RD-426A(V)1/U (fig. 1-1) and provides instructions for operation and maintenance. Throughout this manual, the RD-426A(V)1/U is referred to as Hewlett-Packard Model 7418A.

0-2. INDEXES OF PUBLICATIONS.

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

0-3. FORMS AND RECORDS.

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/KAUSUPINST 4030.29/AFR 71-13/MCO P4030.29A and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAUSUPINST 4610.33A/AFR 75-18/MCO P4610.19B and DSAR 4500.15.

0-4. REPORTING EQUIPMENT IMPROVEMENT (EIR).

EIR's will be prepared using DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

0 - 5 . A D M I N I S T R A T I V E S T O R A G E .

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

0-6. D E S T R U C T I O N O F A R M Y E L E C T R O N I C S M A T E R I E L .

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

SECTION I GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. This manual contains operating and maintenance instructions for your Hewlett-Packard 7418A or 7758A Thermal Tip Recorder. The recorder has eight channels, and produces the recorded trace with heated styli on heat-sensitive Permapaper®. Other manuals, for use with the 8800-Series Preamplifiers and other equipment ordered with the recorder, are provided separately since a variety of preamplifiers, scopes, tape recorders, computer terminals and control units may be installed with the recorder.

1-3. EIGHT-CHANNEL RECORDER.

1-4. The Model 7758A Recorder (Figure 1-1) is supplied mounted in a mobile cart, a bench top enclosure, an upright cabinet, or without an enclosure for mounting in an existing equipment rack.

1-5. The separate 8848A Power Supply (Figure 1-2) houses up to eight 8800-Series preamplifiers and supplies them with operating power. The preamplifiers, selected for each channel and ordered separately, are installed and tested with the recorder at the factory. It is easy to change the function of any channel by loosening two front panel thumb screws and replacing the preamplifier with a different model. In the 7418A System, the Model 8820A or 8821A amplifier may be substituted for the 8848A power supply and 8800-Series preamplifiers. Refer to the separate manual provided for information on the 8820A or 8821A amplifier.

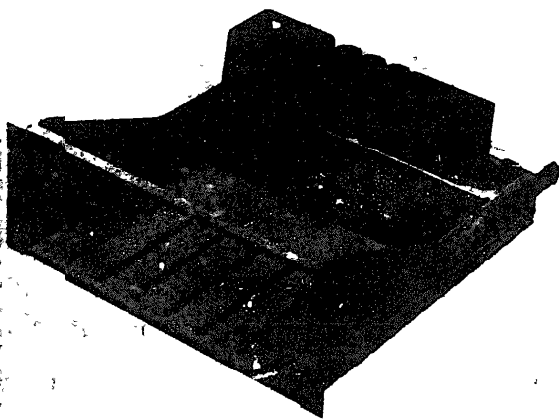


Figure 1-2. Preamplifier Power Supply

1-6. To use the recorder, a transducer must first be connected to the patient to pick up each physiological variable. The transducer electrical output, which is proportional to the variable, is coupled to a preamplifier through the power supply rear panel. The preamplifier output is applied to a power amplifier in the recorder, which drives one stylus. From the preamplifier output on, all eight channels are identical. All electrical adjustments are accessible from the front or top of the Recorder for rapid maintenance, and most assemblies can be removed while the recorder is installed in the equipment rack, mobile cart, or enclosure.

1-7. The Recorder uses Z-fold chart paper for convenient access to any part of the recording. The folded paper facilitates scanning of the record to assess trends or to decide on immediate action. The pages are numbered for ready insertion into notebooks (pages are 11.9 x 15.6 inches or 30.7 x 40.4 cm), or the recording may be filed in the original flat package.

1-8. The Recorder includes one monopolar marker that allows the user to indicate the start and finish of an event, and one that automatically indicates minute or second time intervals. The Recorder may be remotely controlled to mark events, start, or go on standby.

1-9. Applications and Specifications.

With a wide selection of transducers and Hewlett-Packard preamplifiers available for input, a physician or research staff can make many different kinds of physiological measurements. The quality of many of these measurements is enhanced by an unusual lack of hysteresis distortion in this Recorder, making the waveform details uncommonly apparent. This advantage is most useful in measuring electrical phenomena such as ECG, EMG, EEG, EOG, and also in heart sound recording.

1-11. For unusual physiological variables, Hewlett-Packard would be pleased to explore ways of making the needed measurement, and to send information as additional monitors and preamplifiers are developed to provide your recording system with more capabilities. For help in expanding your system, contact the medical field engineer at any Hewlett-Packard Sales/Service Office listed in the back of this manual.

1-12. Specifications for the recorder, less preamplifiers, are provided in Table 1-1. For use with the recorder, preamplifier specifications for frequency response and rise time, found in the separate preamplifier manuals, must be

modified by the frequency response and rise time specifications given for the Recorder. Table 1-2 contains specifications for the Model 8848A Preamplifier Power Supply.

1-13. Accessories and Options.

1-14. Recorder options and recording system options are listed in Table 1-3. For a list of accessories for the Recorder, refer to Table 6-1, Assembly A30, Accessories. Order accessories by their individual part numbers. For other system accessories, refer to the separate equipment manuals provided with the recording system.

1-15. Preamplifier Power Supply 8848A.

1-16. The 8848A Power Supply (Figure 1-2) provides

operating power for up to eight 8800 series preamplifier, serves as a transfer chassis for signal input and output circuits, and contains the preamp' bers. The preamplifiers, which are interchangeable, make all connections needed for operation when they are slid into the preamplifier power supply rack. They are held in place by two thumbcrews.

1-17. The power supply normally ordered contains 440 Hz and 2400 Hz transducer excitation printed circuit cards that provide oscillator signals for use by carrier preamplifiers. The requirement for either card can be added by specifying an option for the system.

Option 004	2400 Hz oscillator
Option 005	440 Hz oscillator

Table 1-1. Specifications

DRIVER AMPLIFIER SENSITIVITY: ± 2.5 volts ± 0.5 volts full scale (adjustable).

FREQUENCY RESPONSE: Flat within $\pm 6\%$ (± 0.5 dB) from DC to 50 Hz. Reference 50 div at 10 Hz. Flat within $\pm 6\%$ (± 0.5 dB) from DC to 50 Hz. Down less than 3 dB at 100 Hz. Reference 10 div. at 10 Hz.

POWER RESPONSE: At 50 Hz: Greater than 50 div. (full scale). At 100 Hz: Greater than 10 divisions.

CHART SPEEDS: Speeds are 0.5, 1, 2.5, 5, 10, 25, 50, 100 and 200 mm/sec. Speed Regulation: $\pm 1\%$. Paper Weave: Less than 0.5 mm. Speeds are electrically selected via front panel pushbuttons.

INPUT IMPEDANCE: Preamplifier loading by driver amplifiers is 50 Kilohms min.

NOISE: None discernible with driver input open or shorted.

GAIN STABILITY: (after one hour warmup) Temperature: 0.25 div per 25°C , between 20°C and 40°C . Line Voltage: 0.25 div over range of 103V-127Vac.

ZERO DRIFT: (after one hour warmup, driver input shorted) Temperature: 0.25 div per 25°C , between 20°C and 40°C . Line Voltage: 0.25 div over range of 103V to 127Vac.

OUTPUT LINEARITY: After calibrating for zero error at center scale and +20 divisions, error is less than ± 0.25 divisions at any point on scale, including hysteresis.

For use with 8808A Log-Audio Preamplifier, calibrate for zero error at lower and upper ends of printed coordinates; error is then less than 0.5 division at any point on scale, including hysteresis.

RISE TIME: Response time, with overshoot adjusted to no more than 4%, is 5 milliseconds over any 20 division range (10% to 90%).

LIMITING: Adjustable electrical limiting keeps stylus within a range of 3 mm beyond edge of channel.

MARKERS: Event marker can be locally or remotely controlled, is installed on right between Channels 7 and 8. Timed marker provides 1 sec or 1 min time indication, is installed on right between Channels 6 and 7. Markers are monopolar.

HYSTERESIS: Less than 0.1 div (included in Output Linearity specification).

DAMPING: Galvanometer damping is adjusted to no more than 4% overshoot.

CROSSTALK: Less than 0.1 div. with full scale square wave on other channels.

CHART PAPER: Eight channels, each 40 mm wide, divided into 50 divisions with time lines every 1 mm, on rectilinear, heat-sensitive Fermapaper®.

Z-fold paper is available in packs of 500 sheets; each sheet is 11.9 in. (30.1 cm) long, and numbered on right side for footage indication and indexing. Chart width 15.8 in. (40.2 cm).

Black grid lines and black trace make the paper suitable for any reproduction process.

PAPER LOADING AND TAKEUP: Paper can be loaded with no threading and in less than 10 seconds. Paper is taken up on a shelf provided with the recorder, or in an optional drawer.

TRACE WIDTH: Trace width varies with heat control settings. Writing quality not affected by line voltage variations.

Table 1-1. Specifications (continued)

STANDARD STYLUS: 0.02 in (0.50 mm), nominal.

FINE LINE STYLUS: 0.01 in (0.25 mm), nominal.

REMOTE OPERATION: Rear panel connector J14 provides for remote operation of chart drive, event marker, and optional extra markers. Circuits operate remotely only when front panel REMOTE button is depressed. Remote connector also supplies -20V.

FRONT PANEL CONTROLS: Power, Chart Drive (Standby, Run, Remote), Chart Speed Selection, Timed Marker (Off, Min, Sec), Event Marker, Individual Channel Heat Controls.

OTHER CONTROLS:

Each Channel: Position (10 div trim), Gain, Damping, High Limit, Low Limit.

POWER REQUIREMENTS: 60 Hz or 50 Hz (optional), 115/230 Vac, 10% Power consumption is less than 5A in 115 Vac operation. Warmup Time: Approximately

DIMENSIONS:

Recorder Alone: Height, 10.5 in. 26.6 (cm) Width, 19.0 in (483 cm), for standard RETMA equivalent rack. Depth, 22.75 in. (57.3 an). Projects 2.5 in. (6.3 an) from front of rack.

Bench Enclosure (Accessory): Height, 11.875 in. (30.2 cm). Width, 20.25 in. (51 cm). Depth, 24 in. (60.5 cm). Paper Takeup Tray projects 11.5 in. (29.2 cm) from front enclosure and hangs down 5.5 in. (13.8 cm).

Mobile Cart: Height, 50.5 in. (128 cm). Width, 21.5 In. (55 cm). Depth, 26 in. (67 cm). Paper Takeup Tray projects 11.5 in. (29.2 cm). Add 6 in. (15 cm) to Width or Depth for caster projections

WEIGHT: Recorder alone: 110 lb (49.9 kg including driver amplifiers. With bench top enclosure: 128 lb (58 kg). In mobile cart with power supply, but less preamplifier: 354 lb (160 kg).

ENVIRONMENT: Maximum ambient temperature (free air circulation) 40 C (104 F); if blocked from free air flow, 25 C (77 F). Location should be reasonably free from dust, explosive or corrosive vapors, and extreme cold.

CONNECTIONS: Signal Input J12 for preamp signals from power supply. Through Signal Monitor J13, preamplifier outputs for monitor scope, tape, and devices are available at the rear to preamplifier inputs and auxiliary inputs, low voltage dc power and remote control functions.

Table 1-2. 8848A Preamplifier Power Supply Specifications

Regulated Outputs:

+12Vdc at 800 mA maximum.

- 12Vdc at 800 mA maximum.

Ripple not more than 4 mV under full load.

Unregulated outputs:

+18Vdc at 600 mA maximum.

-18Vdc at 600 mA maximum.

(Current capacity is 1.4 amperes minus current supplied by regulated output circuits.)

Power Requirements:

115 or 230 volts (switch provided), 50 to 400 Hz, 120 watts full load.

Oscillator Outputs:

440 Hz + 2% floating, 14Vac peak-to-peak, 4 watts maximum. Amplitude stability + 5%.

2400 Hz 2% floating, 10Vac rms, 50 mW maximum. Amplitude stability + 5%.

Weight:

About 26 lbs. (11,8 Kg) less preamplifiers.

Dimensions:

7 in. high x 19 in. wide x 20 1/4 in. front-to-back (178x483x521 mm).

Table 1-3. Recorder Options and System Options

RECORDER OPTIONS

- 003 Fine line Stylus, 0.01 in (0.25 mm) nominal tip.
- 014 With extra event marker between Channels 4 and 5.
- 015 With extra marker between Channels 5 and 6.
- 020 Less Channel 1.
- 021 Less Channel 2.
- 025 Adds MM/MINUTE Speeds, for 50 Hz operation.
- 026 Adds MM/MINUTE Speeds, for 60 Hz operation.

7758-SERIES RECORDING SYSTEMS AND OPTIONS

Benchtop Recording System, Model 7758A. The 7758A Recorder and 8848A Power Supply in stackable, olive-beige, benchtop cases with paper tray. For 115V ac power, 60 Hz; 50 Hz optional.

Cabinet Recording System, Model 7758E. Recorder and Power Supply in the medium-sized 1065A Cabinet, 72.5 inches (182 cm) total height, and front panel space 63 inches by standard 19 inches (160 x 48.3 cm). Cabinet includes a 10-foot (3 meter) power cord, paper tray.

Junction Box Cabinet System, Model 7758C. Recorder and Power Supply in medium-sized cabinet, with external 8823A Junction Box, paper tray.

Option 067: With Reset/Standardization Switch on Junction Box.

Option 069: With 14205A Electrosurgery Protection Unit and cables.

Option 070: With 14206A Bioelectric Signal Distribution Unit, cables (requires Opt. 072).

Option 072: With 8824C Interconnection Tray and cables.

Interconnection Tray Cabinet System Model 7758D. Recorder, Power Supply, and Interconnection Tray 8824C in medium-sized cabinet.

Option 067: With Reset/Standardization Switch on Interconnection Tray Front Panel

Option 069: With 14205A Electrosurgery Protection Unit.

Option 070: With 14206A Bioelectric Signal Distribution Unit.

SYSTEM OPTIONS

- 001 Recorder and Power Supply with standard RMA rack mounting kit, paper tray (No enclosures or cabinets).
- 004 Add 2400 Hz oscillator to Power Supply if 8805A Carrier Preamplifier is to be used.
- 005 Add 440 Hz oscillator to Power Supply if 8803A High Gain Amplifier is to be used.
- 007 With 1308A Monitor Scope.
- 008 For use with 115Vac, 50 Hz power.
- 009 For 230Vac operation.
- 018 Less isolation transformer in 7758B, C, or D System.
- 044 7758B, C, or D System mounted in 1064C
- 045 System installed in 1065B tall cabinet, with
- 051 With writing shelf on right side facing system cabinet or cart.
- 052 With writing shelf on left side facing system cabinet or cart.
- 053 With 1 top-mounted tilt stand for display on 1064C cart or 1065C short cabinet.
- 054 With 14217A Transducer Holder for two 1280-Series Physiological Pressure Transducers, mounts on IV Pole.
- 055 System installed in 1065C short cabinet, with paper tray.
- 057 With 14217-60010 mount for IV pole on right side, facing cart or cabinet. Accepts 0.25 to 0.75 inch (0.63 to 1.9 cm) diameter IV pole. Includes pole for mounting Option 054 Transducer Holder.
- 058 Same as Option 057 except mounted on left side.
- 078 Less 8848A Power Supply and enclosure, 7758A System.
Less 8848A Power Supply, 7758B, C, or D System.
- 079 Add Power Supply Enclosure for 77588 system.
- 080 Replace paper takeup tray with 7-inch high paper takeup drawer on rack mount slides.
- 081 Add 3 1/2-inch supply drawer.
- 082 Add 7-inch supply drawer.

Table 1-3 Recorder Options and System Option (continued)

7418A RECORDING SYSTEM AND OPTIONS

7418A is the industrial version of the 7758A, 8-channel, hot-tip thermal recorder bench top system; 115V, 60 Hz; uses 8800-series preamplifiers; moss-gray benchtop cases. Includes: Recorder 7418A, fine-line stylus, 07758-60351 recorder enclosure, Power Supply 8848A (include 2400 and 400 Hz oscillator cards), 07758-60301 power supply enclosure, and paper tray.

SYSTEM OPTIONS

- 001 Stand alone rack mount recorder with rack mounting hardware and hardware for paper tray (includes 8848A power supply).
- 002 Stand alone rack mount recorder without power supply.
- 008 50 Hz operation.
- 014 Extra marker between channel 4 and 5.

- 015 Extra marker between channel 5 and 6.
- 020 1 channel decrease (starting from channel 1 to channel 2). A maximum of 2 channels can be deleted.
- 025 50 Hz speed reduction: 60:1 reduction.
- 026 60 Hz speed reduction: 60:1 reduction.
- 030 Add 8820A, delete 8848A and its enclosure.
- 031 Add 8821A, delete 8848A and its enclosure.
- 032 Add cabinet 1065A (delete recorder and power supply enclosures).
- 033 Add cabinet 1065C (delete recorder and power supply enclosures).
- 034 Add 1064D cart (moss gray color).
- 009 230V operation.

SECTION II

2-1. INITIAL INSPECTION.

Initial inspection consists of a check for physical damage during shipping, and the completion of performance tests.

2-3. Visual Inspection.

- 2-4. If damage to the shipping carton is evident, do not unpack the recorder unless the carrier's agent is present or called. Upon unpacking, inspect the instrument for physical damage, scratches, dents, broken knobs, or defects. Also check the cushioning materials for signs of stress during handling.

2-5. Performance Tests.

- 2-6. The electrical and mechanical performance of the recorder should be verified upon receipt. An 8800-Series preamplifier must be in place for these tests.

2-7. Damage Claims.

- 2-8. If the instrument is damaged in transit, notify the carrier and the nearest Hewlett-Packard Sales/Service Office immediately. For your convenience, a list of these offices is included in the rear of this manual. Keep the shipping carton and packaging material for the carrier's inspection. The Sales/Service Office will arrange for repair or replacement of the Recorder without waiting for claim settlements at the carrier.

2-9. STORAGE.

- 2-10. If the Recorder is to be stored for a period of time, remove the front panel for protective padding and seal the recorder in a moistureproof covering. Repackage the recorder in a container similar to the original factory packaging. If the Recorder is installed in a bench-top enclosure, remove the Recorder from its enclosure. If it is installed in a system cabinet or mobile cart, remove it from the cart or equipment rack to facilitate moistureproof packaging. If long-term storage or mothballing is anticipated, pull the paper table out at the bottom to unlatch it. This will prevent a flat spot from developing on the drive roller from spring-loaded pressure rollers.

2-11. INSTALLATION.

- 2-12. Recorders installed in the bench-top enclosure require no installation. For access, loosen knobs at front side (Figure 2-1) and raise the top cover. If the recorder

is installed in a cabinet or mobile cart, remove the four front retaining screws (Figure 2-1) to slide the recorder out for receiving inspection and performance checks. The Option 001 Recorder, intended for mounting in an existing equipment rack, requires field installation of the rack slides, Figure 2-10.

2-13. Preamplifier Installation.

- 2-14. The system is shipped with all preamplifiers installed in the 8848A Power Supply. To change preamplifiers:

- Switch off Recorder power.
- Loosen the top and bottom front panel screws and pull the preamplifier straight out.
- Slide replacement preamplifier into channel guide, push in firmly to mate with the connector on the power supply assembly, and tighten the screws at the top and bottom of the front panel.

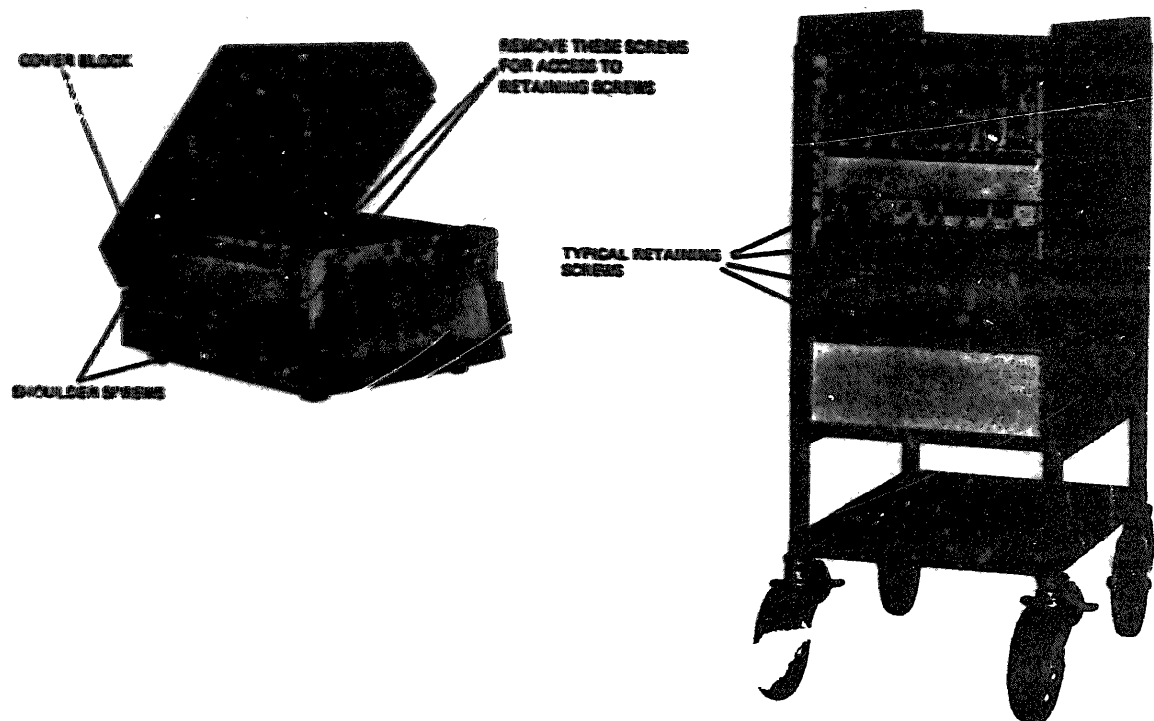
2-15. Power Connections.

- 2-16. Check that the power line frequency is the same as that shown on the recorder nameplate, located on the shelf at the left side of the rear panel (Figure 2-3). System fuses are shown in Figure 2-2.

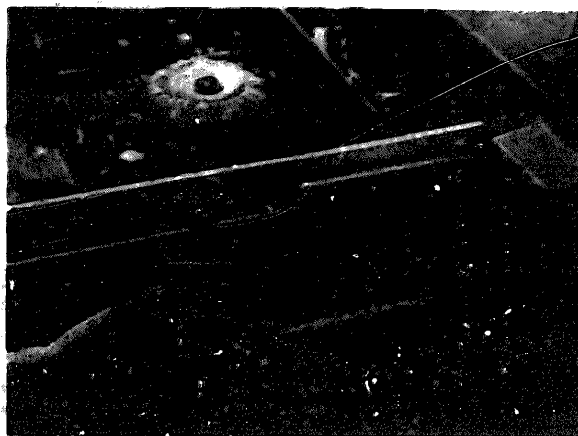
2-17. When making power connections, push the Recorder POWER button so it protrudes from the front panel (a Z-shaped line will appear on the button) to prevent the recorder from running when the power cord is plugged in. Then, inside the system cabinet or mobile cart, plug the power cord into the Recorder power input jack, and into a line power receptacle built into the cart or cabinet (Figure 2-3) connect the preamplifier power supply to a line power receptacle of the cart or cabinet, or to the recorder's outlet in bench top system. Before the cabinet or cart power cord is plugged in, connect the ground wire, as shown, to a good earth ground such as a cold water pipe, or to an equipotential patient reference (EPR) grounding point. The EPR ground is defined in the Patient Safety application note (AN 718), the Operating and Service Manual for the Model 4655A AC Hazard Detector, and other Hewlett-Packard publications. Connect the cabinet or cart power cord to a 3-wire line outlet and power connections are complete.

2-18. Signal Connections.

- 2-19. For information about the preamplifier signal adapters, distribution boxes, and interconnecting cables available for use with the 7758A Recorder, request a copy



WARNING: DO NOT ACTIVATE REAR SLIDE LOCKS UNLESS RECORDER IS SUPPORTED FOR REMOVAL.

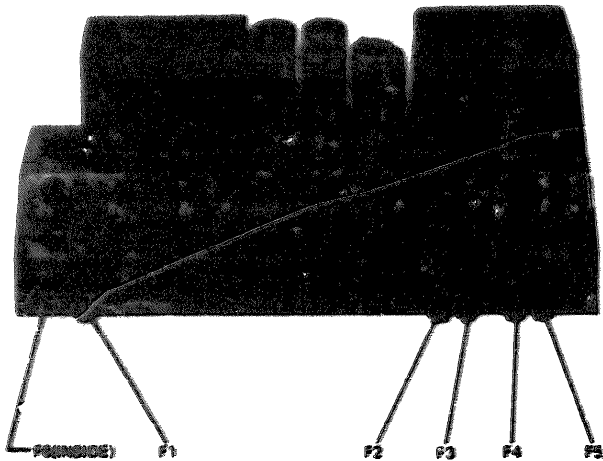


Press front slide locks to slide recorder back into cart or cabinet.



Press rear slide locks to slide recorder completely out of retaining slides.

Figure 2-1. Recorder Access for Receiving Inspection



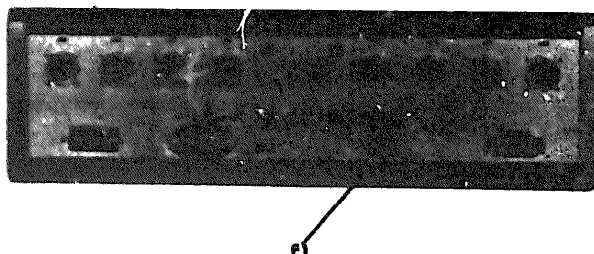
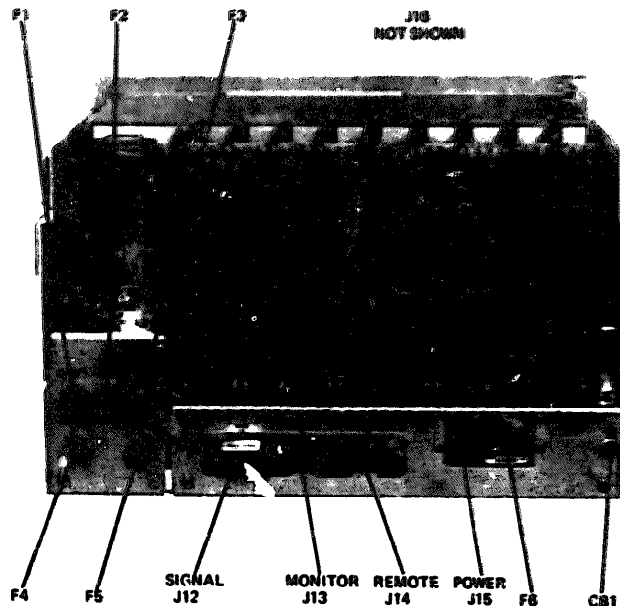
8848A PREAMPLIFIER POWER SUPPLY

Fuse Rating	Circuit	HP Part No.
F1 1A Slow Blow	115V Line	2110-0007
F1* 0.5A Slow Blow	230V Line	2110-0202
F2 1.5A Slow Blow	+18V	2110-0059
F3 1.5A Slow Blow	-18V	2110-0059
F4 1.5A Slow Blow	Osc. Supply	2110-0059
F5 0.1A	Osc. -18V	2110-0234
F6* 2A Slow Blow	115V Line, Series, Pigtail type.	2110-0453

* 0.5AT F1 is for 8848A Option 009 dual-voltage instrument when used in 230V service. F6 is not used in dual-voltage power supply.

7758A RECORDER

Fuse Rating	Circuit	HP Part No.
F1 4A	-20Vdc Heat Voltage	2110-0365
F2 1A	-20Vdc Control Voltage	2110-0007
F3 5A	-20Vdc Amplifiers	2110-0367
F4 4A	+15Vdc Marker Heat V	2110-0365
F5 5A	+20Vdc Amplifiers	2110-0367
F6 6.25A	AC Power, 115V Service	2110-0023
3A	AC Power, 230V Service (Except with stepdown transformer to 115V)	2110-0381
CB1 2A	Motor Reset (Push Reset)	



8820A AMPLIFIER (7418A OPT. 030)

Fuse Rating	Circuit	HP Part No.
F1 0.25A Slow Blow	115V Line	2110-0004
F1* 0.15A Slow Blow	230V Line	2110-0017

8821A AMPLIFIER (7418A OPT. 031)

Fuse Rating	Circuit	HP Part No.
F1 0.5A Slow Blow	115V Line	2110-0012
F1* 0.25A Slow Blow	230V Line	2110-0004

Figure 2-2. Rear Panel Connectors and Fuses

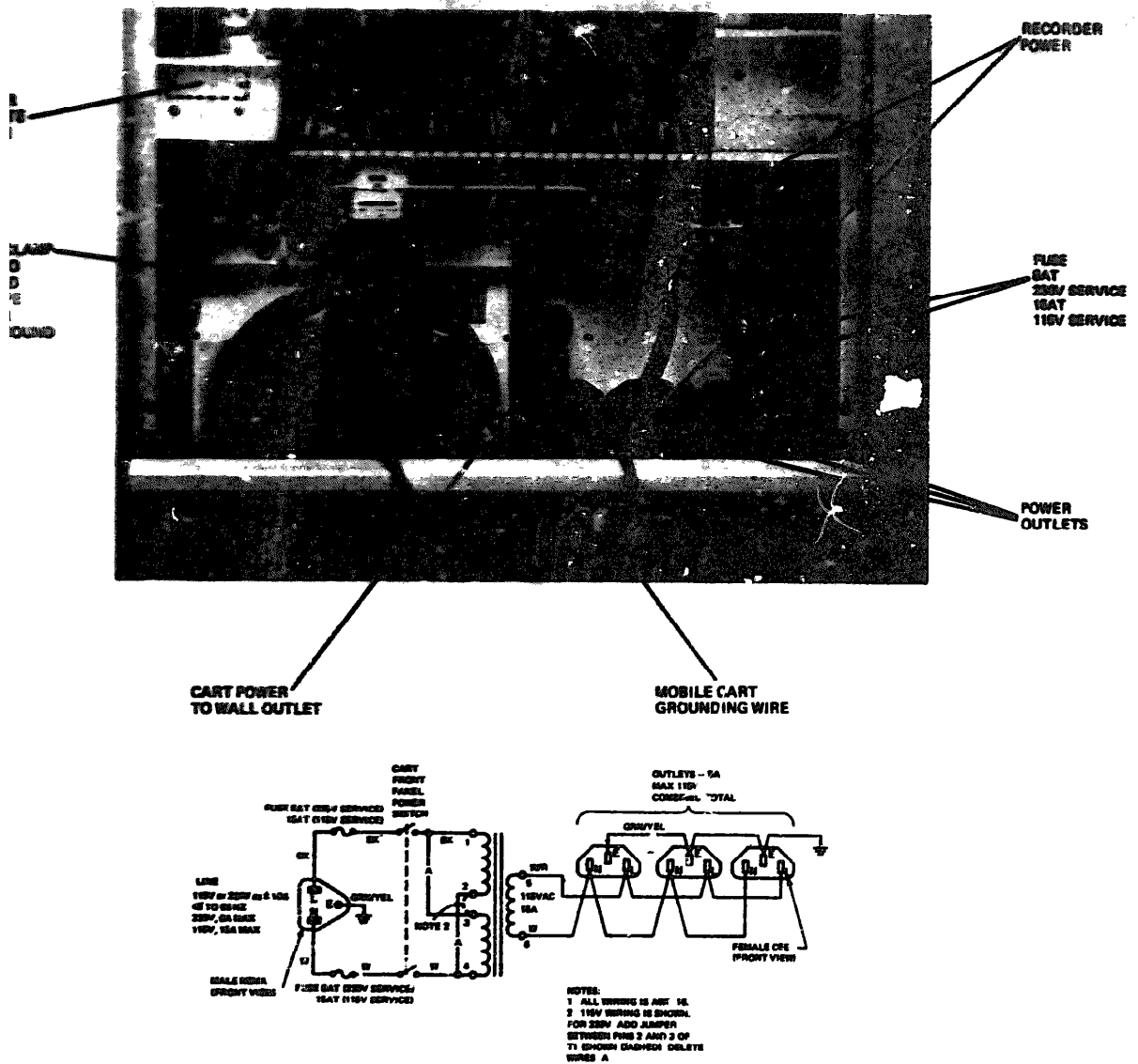


Figure 2-3. Recorder and Mobile Cart Power Connections

of the 8800 Medical Systems Ordering Guide/Illustrated Requirement List.

2-20. For connecting inputs signals and the output signals often connected to auxiliary displays such as scopes, analog-to-digital converters, tape recorders and digital displays, Hewlett-Packard supplies a complete set of internal signal cables with each system.

2-21. Output Adapter 14208A or 14208B (Figure 2-5) can

be used to connect preamplifier outputs in an appropriate manner for the derived signals required.

2-22. Remote Control and Marker Connections.

2-23. A remote control and marker plug is supplied with the Recorder as an accessory. To make remote control connections to run the Recorder and control the event marker, make the cable shown in Figure 2-9, using parts noted in the illustration.

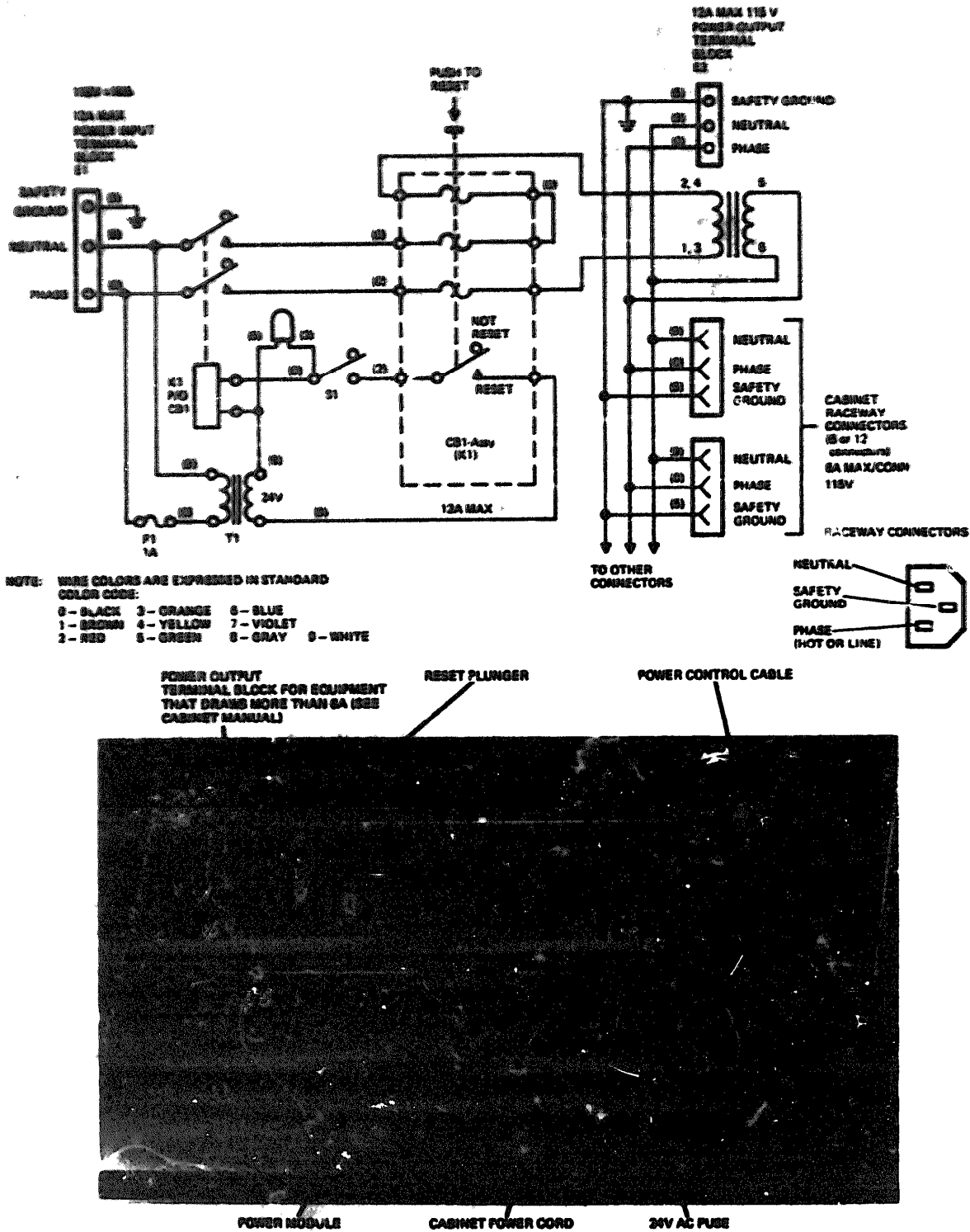


Figure 2-4. 1085-Series Cabinet Module and Schematic Diagram (typical)

DC AMPLIFIERS SENSITIVITY:

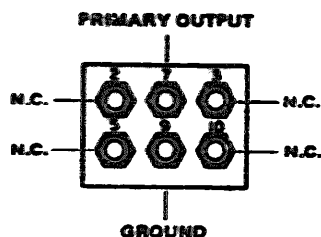
8801A-5 mV to 5000 mV/div

8802A-1 mV to 1000 mV/div

8808A SENSITIVITY:

20 mV/div. to 50 mV/div.

8814A

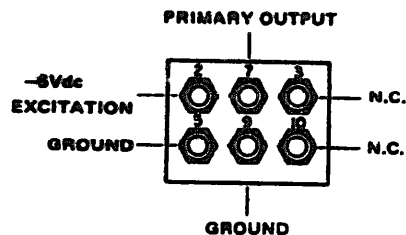


8811A SENSITIVITY:

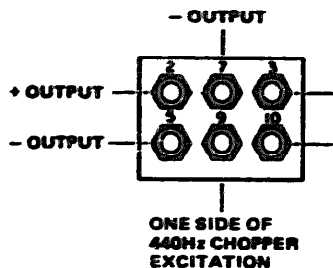
EEG-1 μ V/div to 2 mV/div

AC or ECG-10 μ V/div to 20 mV/div

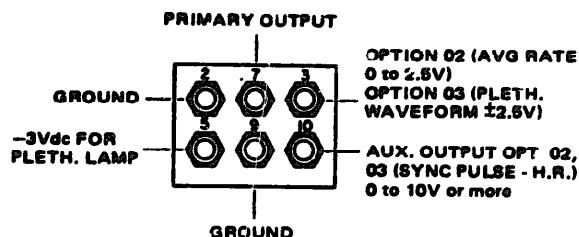
DC-100 μ V/div to 200 mV/div



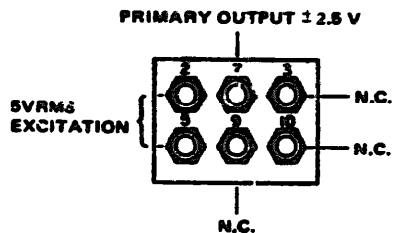
8803A: SENSITIVITY, 1 μ V/div to 5000 mV/div



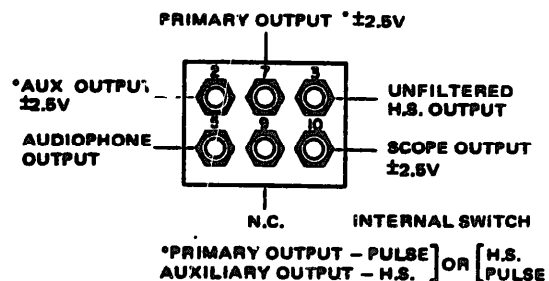
8812A



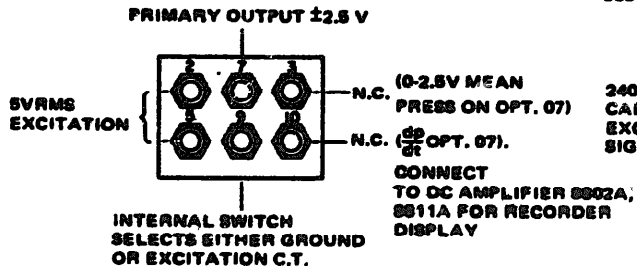
8805A



8813A



8806B



8831A

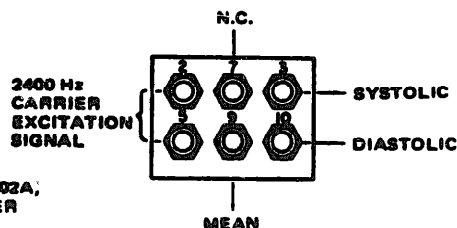


Figure 2-5. Output Adapter 14208A, 14208B

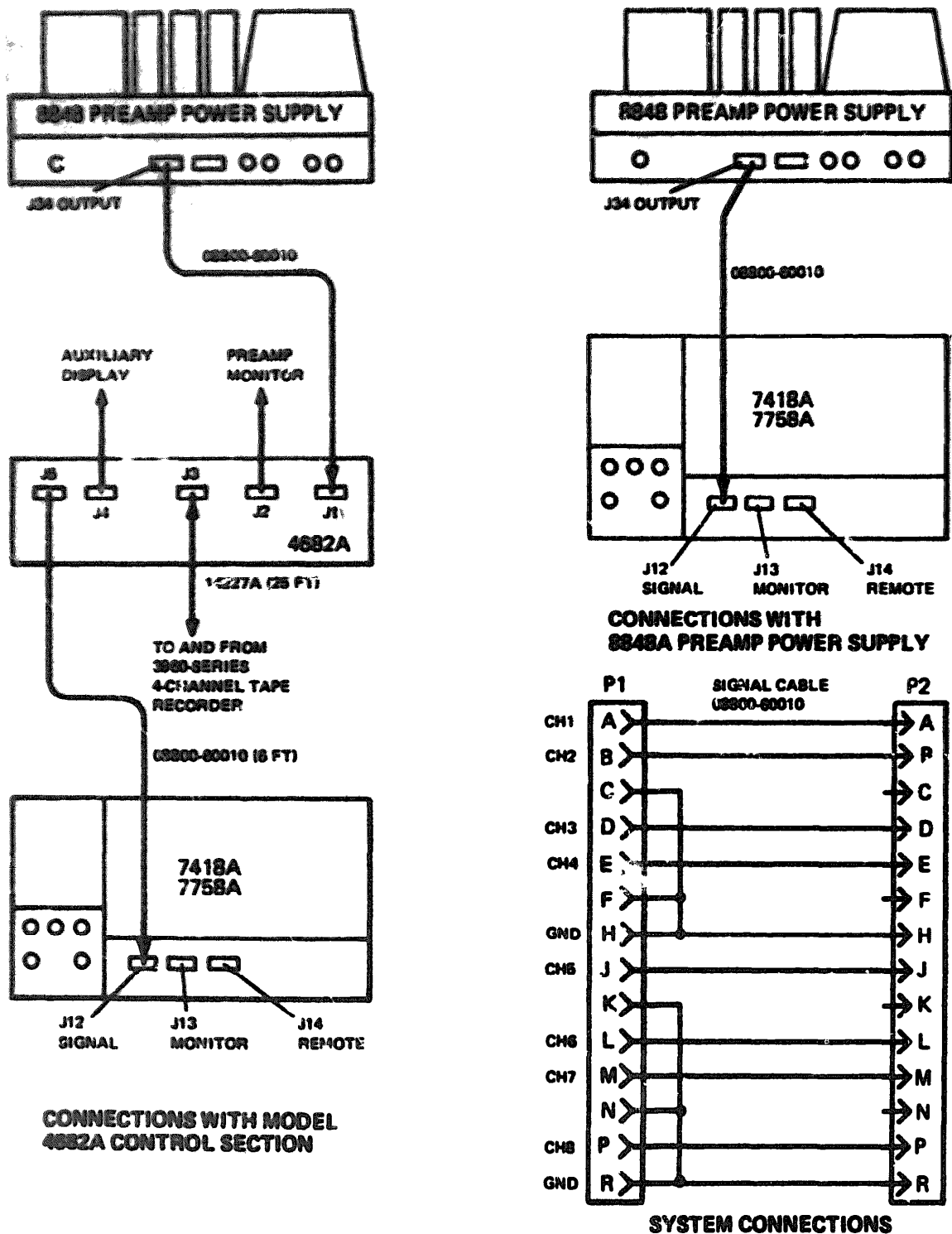
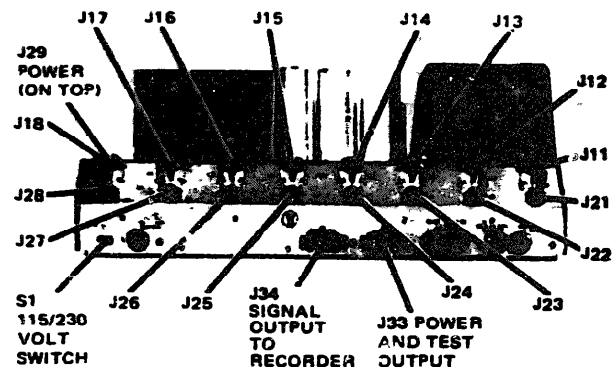


Figure 2-6. System Connections (with Control Section 4682A)

CONNECTOR LOCATIONS

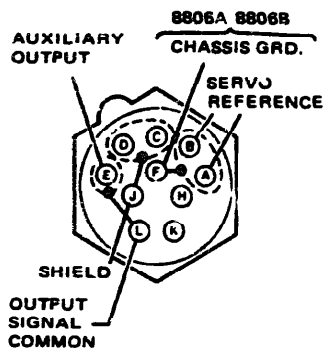
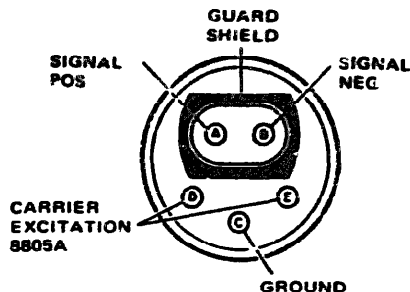
CONNECTOR		8-CH SYSTEM
INPUT	OUTPUT	
J11	J21	ch 1
J12	J22	ch 2
J13	J23	ch 3
J14	J24	ch 4
J15	J25	ch 5
J16	J26	ch 6
J17	J27	ch 7
J18	J28	ch 8



PINS

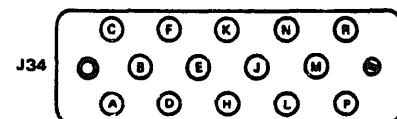
SIGNAL INPUT CONNECTOR 1251-1895
(WIRING END MATES WITH J11-J18)

AUXILIARY CONNECTOR 1251-1944
(WIRING END MATES WITH J21-J28)



OUTPUT CONNECTOR

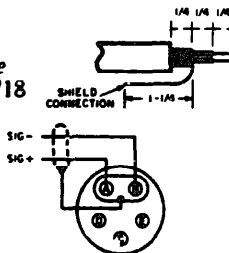
PINS.	FUNCTION	PINS.	FUNCTION
A	Chan 1 Out	J	Chan 5 Out
B	Chan 2 Out	K	—
C	—	L	Chan 6 Out
D	Chan 3 Out	M	Chan 7 Out
E	Chan 4 Out	N	—
F	—	P	Chan 8 Out
H	Gnd	R	Gnd



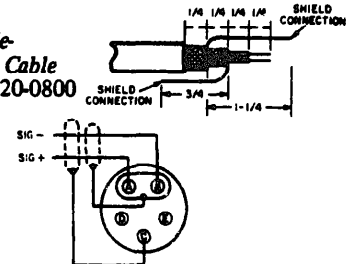
GUARDED CABLE PREPARATION

FOR NON-GUARDED CABLEING, CONNECT PIN C TO GUARD SHIELD. FOR 8806 SERIES CARRIER AND PRESSURE AMPLIFIERS, CONNECT EXCITATION LINE TO D, E.

Single-Shield Cable
HP 8120-0718



Double-Shield Cable
HP 8120-0800



SIGNAL CONNECTOR PREPARATION

- Slide the prepared end of the cable into the cable clamp and through the connector shell. Also slide the end of the cable through the guard shield extension, for guarded input circuits. For non-guarded input circuits, remove and store the guard shield extension.
- Wire the connector according to the diagram below, according to preamplifier to be used. For guarded input circuits, slide the guard shield extension into place after soldering the signal leads to terminals A and B.
- Press the connector block carefully into the connector shell.
- Insert the retaining ring.
- Tighten the cable screws.
- Check with an ohmmeter to determine that the cable shields are not shorted to the connector shell or to each other.

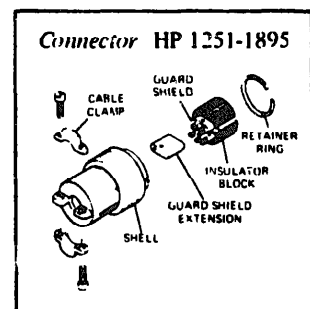
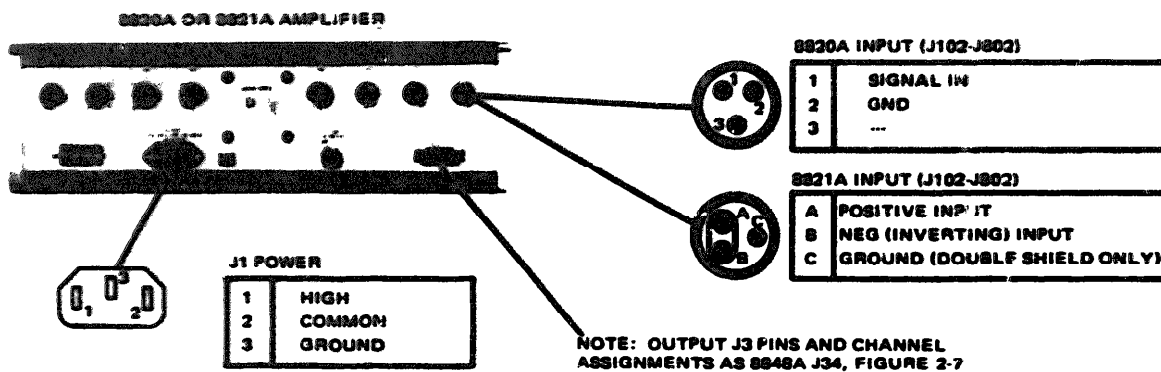
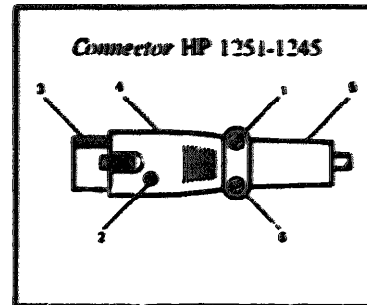


Figure 2-7. Preamplifier Power Supply 2752-14&P, Input and Output Connections

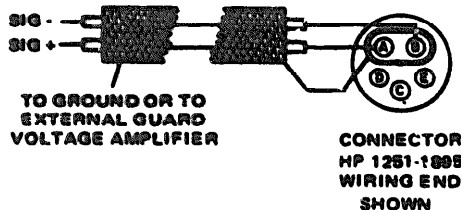
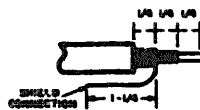
MODEL 8820A/8821A SIGNAL CONNECTOR PREPARATION

- a. Loosen cable clamp screws (1).
- b. Unscrew and remove connector shell screw (2).
- c. Slide connector assembly (3) forward until it clears connector shell (4).
- d. Slide dressed end of cable through bushing (5), cable clamp (6), and connector shell until it is exposed. Be sure that cable passes through insulator.
- e. Solder cable center conductor to pin 1 and shield to pin 2.
- f. Slide connector assembly into connector shell. Pull cable to remove slack.
- g. Replace and tighten connector shell screw.
- h. Tighten cable clamp screws.

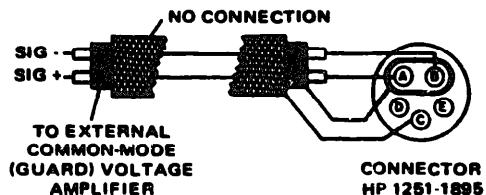


CABLE PREPARATION

Model 8821A
Single-
Shield Cable
HP 8123-0718



Model 8821A
Double-
Shield Cable
HP 8120-0800



Model 8820A
Single-
Shield Cable

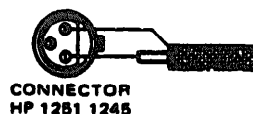
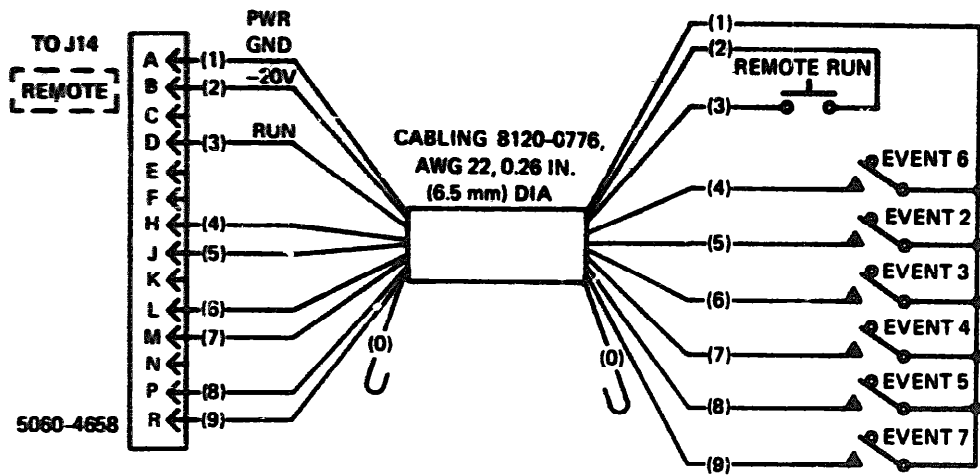
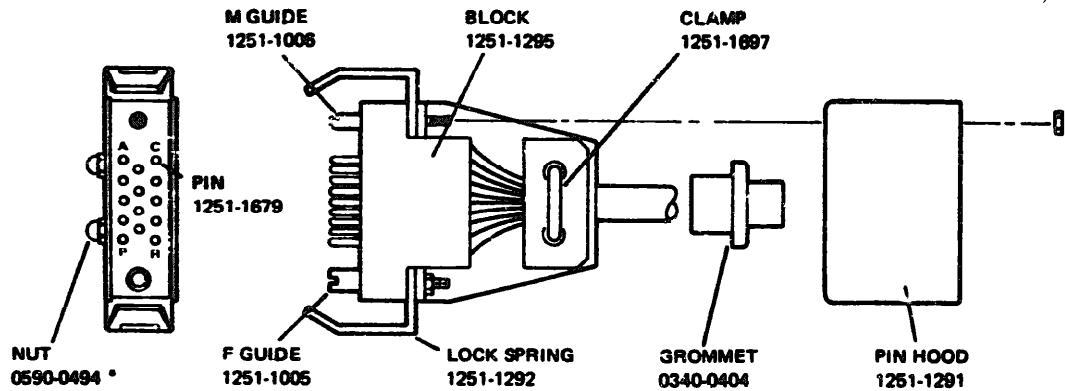


Figure 2-8. 7418A System Input Cable Preparation (Multichannel Amplifier Options 030, 031)



CONNECTOR 5060-4658 KIT FOR MONITOR AND REMOTE



CONNECTOR 5060-4659 KIT FOR SIGNAL INPUT

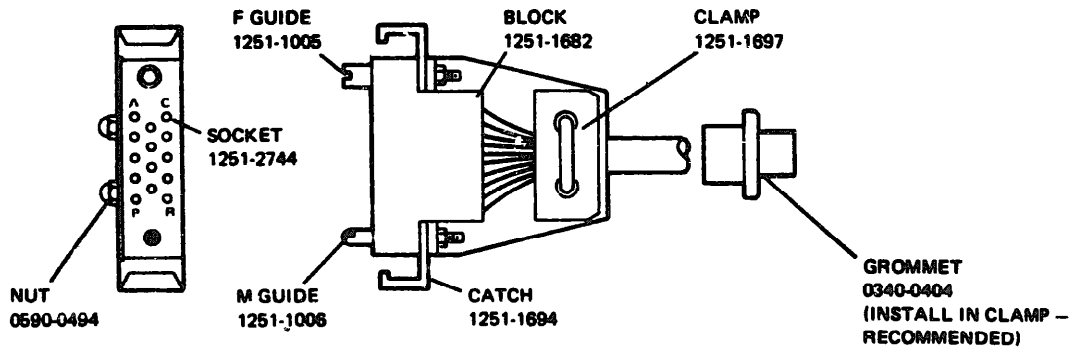
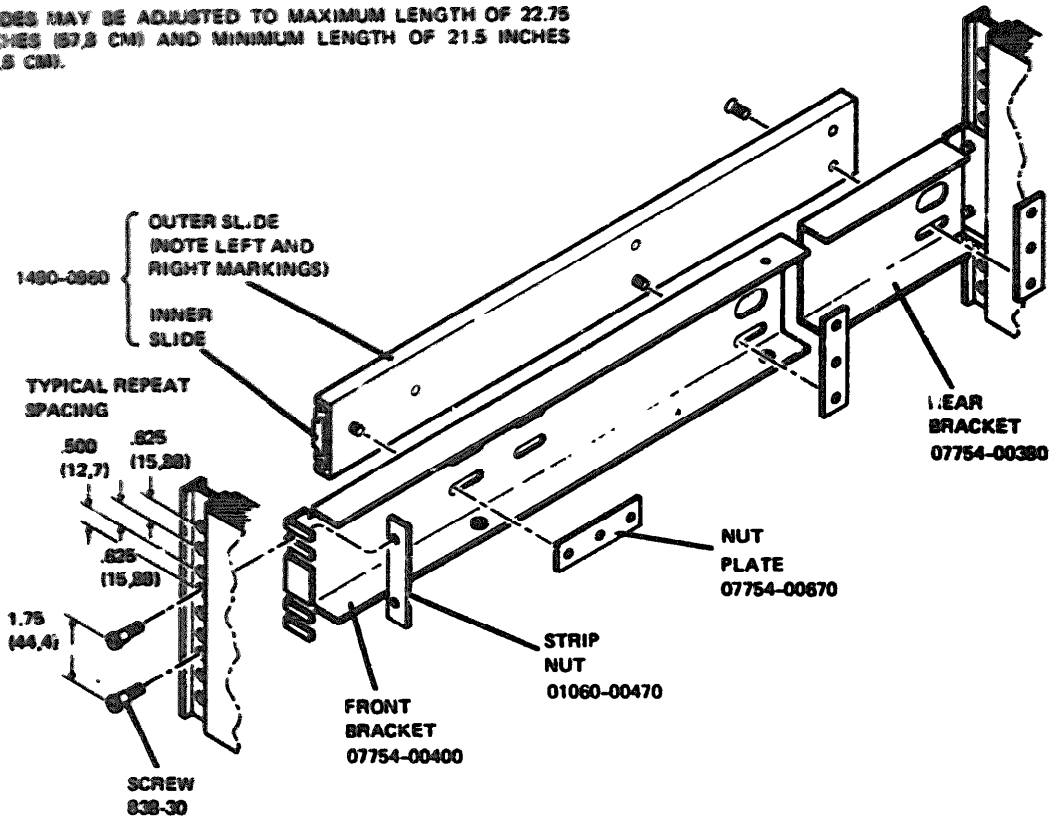


Figure 2-9. Cable and Connector Assembly Diagrams for SIGNAL, MONITOR and REMOTE Rear Panel Connector
 Models 7758A, 7418A

NOTE: DIMENSIONS GIVEN ARE FOR HOLE SPACING IN 19-INCH WIDE, STANDARD RMA EQUIPMENT RACK, AND ARE IN INCHES AND (MILLIMETERS)

SLIDES MAY BE ADJUSTED TO MAXIMUM LENGTH OF 22.75 INCHES (57.8 CM) AND MINIMUM LENGTH OF 21.5 INCHES (54.5 CM).



1. Install inner portion of slide on Recorder chassis. Depress inner slide lock to remove this portion from the assembly.
2. Select the proper set of mounting holes in the RMA Standard cabinet, noting that the top hole is the lower one of a half-inch spaced pair of holes.
3. Install the brackets loosely on the outer portion of the slides, and install the brackets to the cabinet. Tighten the slides on the brackets.
4. Extend the installed slides until the slide locks latch and mate the inner slides on the Recorder with the extended ones on the cabinet. Slide the Recorder into the cabinet, depressing the outer slide locks.
5. Remove the Recorder and readjust the slides in the cabinet if necessary to achieve a proper fit.

Figure 2-10 Option 001,010, Mounting Kit 07758-60400

SECTION III OPERATION

3-1. INTRODUCTION.

3-2. This section provides operating procedures for the recorder. The procedures assume that installation is complete. System operation is controlled entirely from the front panels. For internal adjustments, refer to Section V, Maintenance.

3-3. Control Locations.

3-4. Refer to Figure 3-1 for location and identification of system controls.

3-5. SYSTEM OPERATION.

3-6. When the system is to be operated, first check the paper supply to be sure it is sufficient for the records to be made, and, if necessary, load paper according to the instructions given in Figure 3-2. Then operate the system as follows:

- a. Remove all signals by turning GAIN or ATTENUATOR control of each signal conditioner to minimum signal position (see individual preamplifier manuals for more specific instructions).
- b. Press STDBY button.
- c. Press 25 SPEED MM/SEC button.

d. Press system power switch at top of cabinet or otherwise apply power to Recorder.

e. Press Recorder POWER switch if POWER button is not lit (visual indication: black indicator points to OFF when power is not applied, and to ON when it is applied). Replacement bulb: 2140-0244, T2 type midget flanged base, 95 Vac, 1 mA.

f. Press RUN button, set MM/SEC - MM/MIN switch (if Option 025 or 026) to desired speed range. Allow a few seconds for the styli to heat fully.

g. Adjust POSITION control on each amplifier (or Control Section) to center the corresponding stylus at channel center (zero reference).

h. Calibrate each preamplifier with instructions in its manual, or calibrate the system with Control Section instructions. Set preamplifier attenuators to least sensitive position. Apply input signals (test signal, calibration output of transducer), and reset attenuators as required.

i. Press SPEED button for chart speed best suited to signals.

j. Adjust stylus heat control for best trace width.

k. Press EVENT button to identify points on record, or: 1 SEC or MIN button for periodic marking of record.

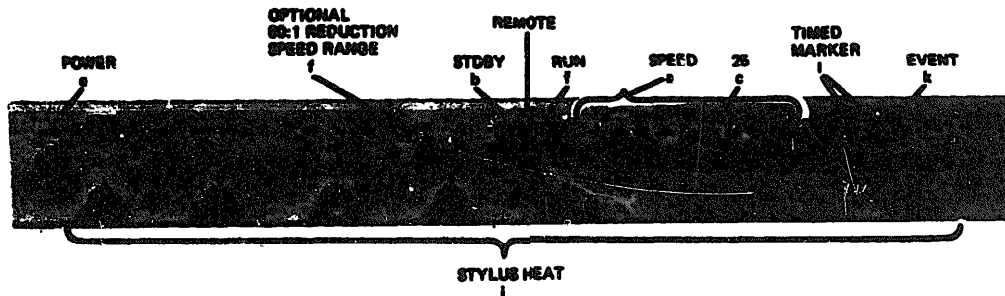
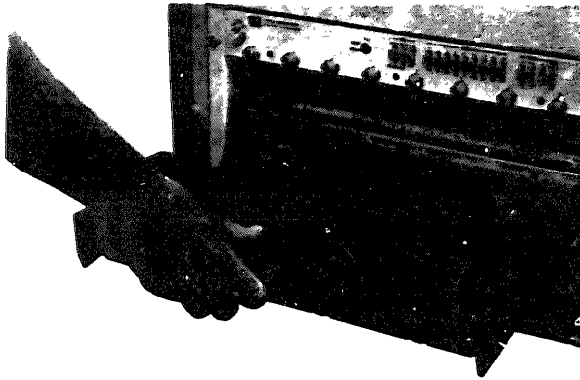
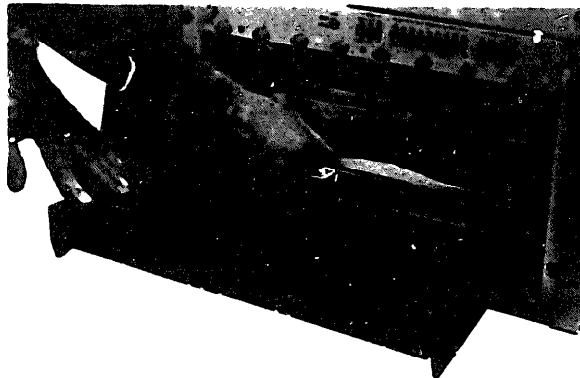


Figure 3-1. Control Locations

1 Take pack of Z-fold paper out of box and remove top cardboard cover, leaving bottom cover under pack. Pull paper table of recorder out at bottom and into horizontal position. With paper pack on lower cardboard, set pack on paper table with cardboard flap behind pack and the even numbers showing at right front corner.



2 Grip front of pack firmly and slide paper and bottom cardboard into recorder, raising front of pack so that the back drops under top of opening. Pack should be all the way in so only about one-half inch (1.5 cm) shows. The pack should be positioned all the way to right, stacked up straight, and should be parallel with front of recorder.



3 Pull top sheet out and drop it straight down through table slot. Be sure it does not go between rollers.

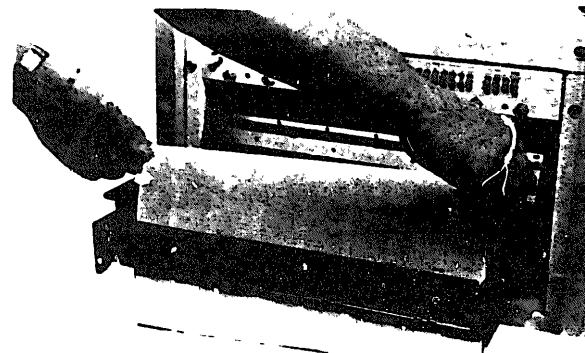
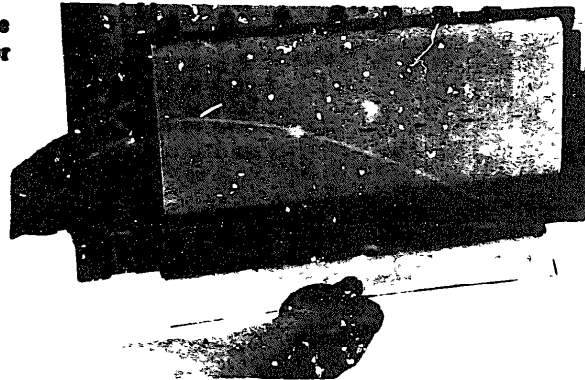


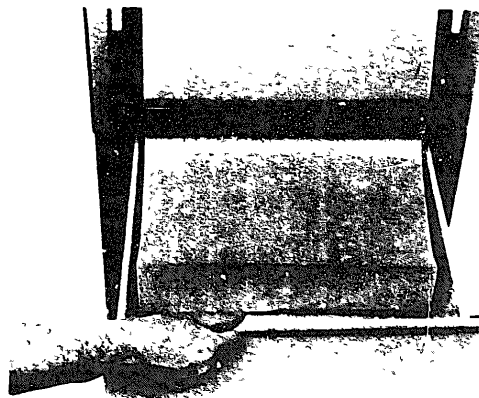
Figure 3-2. Power Loading Procedure, Models 7758A, 7418A

4 Press table in firmly while pulling down slightly on paper and keeping it to right.



5 Install takeup tray on benchtop case, or pull out takeup drawer of cart or cabinet. Paper should fold so odd-numbered sheets are on top. Run several sheets at 25 mm/sec until paper flows smoothly and straight.

NOTE THAT TRAY TAB HOOKS ONTO CASE



CAUTION

DURING ALL LONG-TERM RECORDING, CHECK PERIODICALLY TO ASSURE PAPER IS STACKING EVENLY.

Figure 3-2. Paper Loading Procedure, Models 775BA, 7418A (continued)

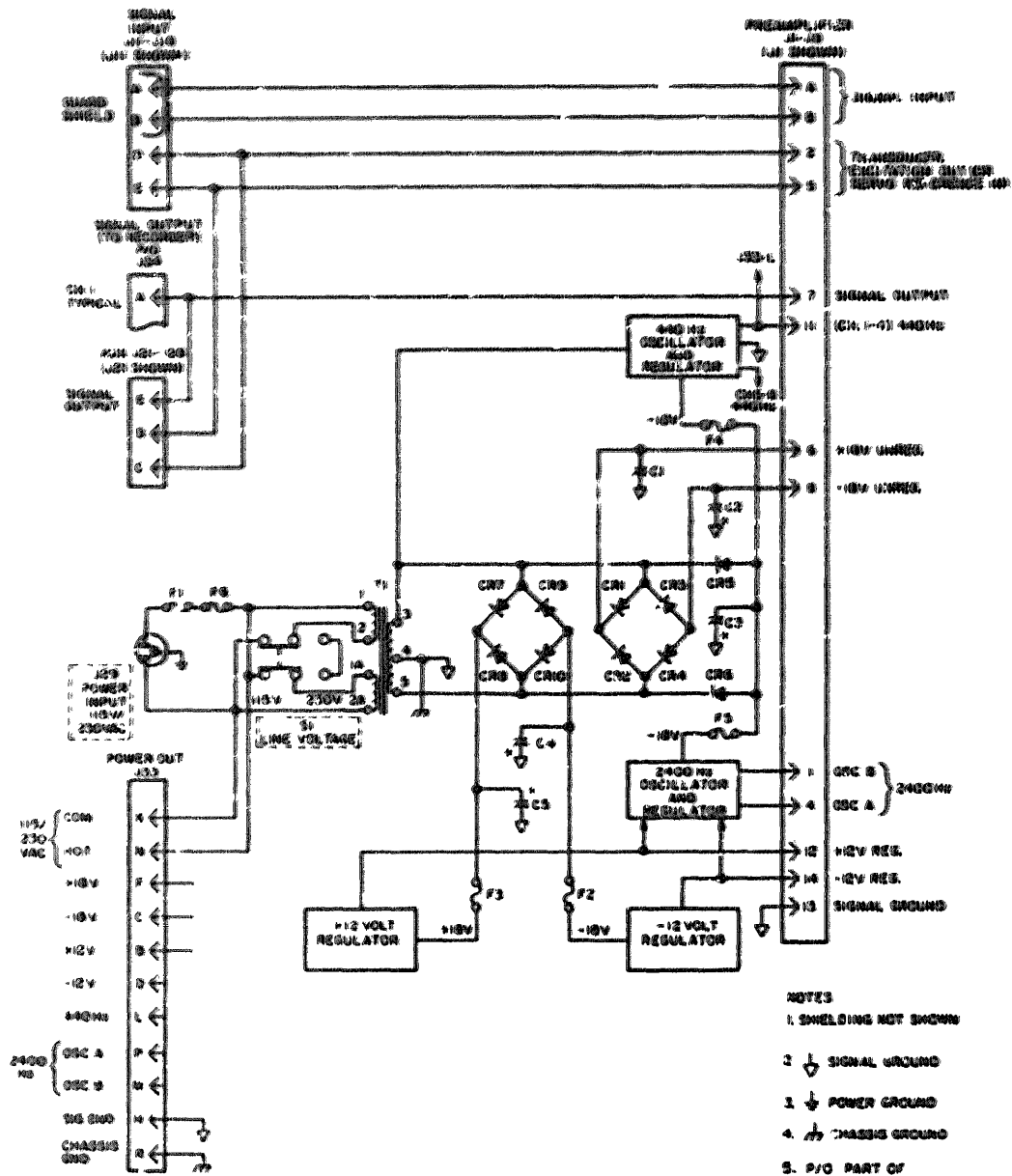


Figure 4-1. Preamplifier, Power Supply, Simplified Diagram

SECTION IV PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

4-2. This section describes the principles of operation of the Preamplifier Power Supply and Thermal Tip recorder signal, power control, and power circuits, and chart drive mechanism. The signal circuits are described for one channel only, as all channels are identical. The power circuits and chart drive are common to all channels. This section provides functional block and schematic diagrams of the Recorder; for complete schematics, refer to Section VI at the rear of the manual.

4-3. As shown in the Block Diagram, Figure 4-7, the preamplifier signal is routed through a jumper cable on the rear panel to the driver amplifier, where it is amplified, limited, and combined with position feedback from the stylus position transducer. It is then amplified further and applied to the galvanometer, which drives the heated signal stylus, producing a trace on the heat-sensitive Permapaper. The Permapaper is pulled through the recorder by a drive roller, which is driven through a variable speed gearbox that is electrically controlled from the front panel. Four solenoids and gear sets are used in various combinations to produce the full range of chart speeds. In conjunction with speed selection, the selector switch varies the stylus heat so it is proportional to the chart speed. Heat adjustment controls on the front panel may be used to further vary the stylus heat to compensate for greater stylus travel caused by increased signal frequency. Other circuits in the recorder include marker, timing, rectifier, regulator and oscillator circuits. A regulated oscillator provides a 200 kHz excitation signal for the position transducer. The block diagram shows the assembly location of these functional component groups as a troubleshooting aid.

4-4. PREAMPLIFIER POWER SUPPLY 8848A.

4-5. Signals from the phenomenon to be studied are conditioned by 8800-Series plug-in preamplifiers housed and powered by a Model 8848A Power Supply. The power supply also provides 440 Hz and 2400 Hz excitation voltages to the 8803 and 8805 series preamplifiers. The power supply has auxiliary connectors for low-voltage dc power, and signal input and output monitoring. See Figure 4-1 for a simplified diagram.

4-6. Signals from the preamplifier power supply are routed directly to the Recorder rear panel SIGNAL INPUT connector, and to the power supply. From there they are applied to the inputs of the eight driver amplifiers.

4-7. Guarded Input Circuits.

4-8. The power supply includes a guard shield in the input signal cabling for use with the 8803A, 8805A, B and C, and 8807A preamplifiers. For a discussion of how preamplifier floating inputs are shielded with a guard voltage refer to the instruction manual covering the preamplifier to be used with the guarded input.

4-9. Unregulated 18 Volt Supplies.

4-10. The power supply has three unregulated 18 volt rectifier circuits: one to supply the 12 volt regulators, one for oscillator operating power and one for preamplifier unregulated operating power.

4-11. **PREAMPLIFIER SUPPLIES** From four full wave rectifiers the preamplifiers receive unregulated plus and minus 18 volt power and plus and minus 12 volt regulated power.

In Figure 4-1, primary ac power enters through fuse F1 and is applied to the rectifier circuit through transformer T1. The output of full wave rectifiers CR1 through CR4 is filtered by C1 and C2 and is routed directly to the preamplifier connectors. The output of full wave rectifier CR7 through CR10, filtered by C4 and C5, proceeds through fuses F2 and F3 to regulator assembly A5, discussed in paragraph 4-16.

4-13. **OSCILLATOR SUPPLY.** The -18 volt oscillator supply is rectified by CR5 and CR6, filtered by C3 and routed through fuses F4 and F5 to the 440 Hz and 2400 Hz oscillators, respectively. Each oscillator circuit contains its own -18 volt regulator as discussed in paragraphs 4-19 and

4-14. Regulated 12 Volt Supplies.

4-15. The 12 volt regulator consists of regulator card assembly A5 and associated circuits which receive 18 volt power through F2 and F3 (Figure 4-2). The 18 volt power, in each polarity, enters the regulator assembly as a supply voltage for the driver transistors, the -18 volt power is reduced and held to -12 volts by series regulator transistor Q1; Q2 serves for +12 volts.

4-16. **REGULATOR ASSEMBLY.** In the regulator assembly (Figure 4-2), both regulated voltages are controlled by -12V ADJ control R4. Differential amplifier Q4, Q5

compares the setting of this control, which represents a fraction of the -12 volt output, with the 6.2 volt standard maintained by breakdown (Zener) diode CR14. If the regulated -12 volts varies slightly, the change appears in the output of R4 and is amplified by differential amplifier Q4, Q5. The change is further amplified by Q3 and is applied to regulator Q1 with a polarity that returns the -12 volt output to its original value.

4-17. The +12 volt regulator circuit operates similarly, but obtains regulated -12 volts as a reference with respect to ground through voltage divider R12, R13. If the regulated +12 volts varies slightly in potential, the change appears at the voltage divider, unbalancing differential amplifier Q7, Q8. The change, which is amplified by Q6, is then applied to series regulator Q2 with such polarity as to return the +12 volt output to its original value.

4-18. 440 Hz Oscillator.

4-19. The 440 Hz oscillator circuit (Figure 4-3) consists of oscillator printed circuit assembly A4 and associated power regulation circuits on the power supply chassis. Power for the oscillator is regulated by Q8 and Q9 from the -18 volt oscillator supply. The base of regulator driver Q8 is held at 16 volts by breakdown diode CR19, which obtains its voltage from the -18 volt supply and voltage-doubler rectifier C13, CR18, which has a pi-type r-c filter consisting

of C11, R36 and C12. Voltage divider R38, R39, R40 senses any change in the output of regulator Q9. The change is sensed by regulator driver Q6 and is applied to the base of Q9 to return the output to its former level.

4-20. Oscillations generated by push-pull oscillator Q12, Q13 are frequency stabilized by C15 and the primary windings of transformer T4, which together form a tank circuit in the oscillator output. Output from the secondary of T4 is controlled in amplitude by diodes CR21 and CR22 at a level determined by breakdown diode CR23. Each side of the T4 secondary is connected to half of push-pull power amplifier Q10, Q11 to drive output transformer T3. The output of T3 is distributed to the preamplifier connectors and the auxiliary power output connector as shown in Figure 4-1.

4-21. 2400 Hz Oscillator.

4-22. The 2400 Hz oscillator furnishes a transducer excitation signal to carrier amplifiers such as the Model 8805A or 8805B. The preamplifiers further amplify the excitation voltage for use with the transducers. Power for the oscillator (Figure 4-4) is provided by the -18 volt oscillator supply through series regulator Q19. The base of Q19 is held at a regulated -12 volts from the preamplifier regulated supply, providing collector voltage to Q20 and Q21 through the primary of T7. This voltage is filtered by capacitor C21.

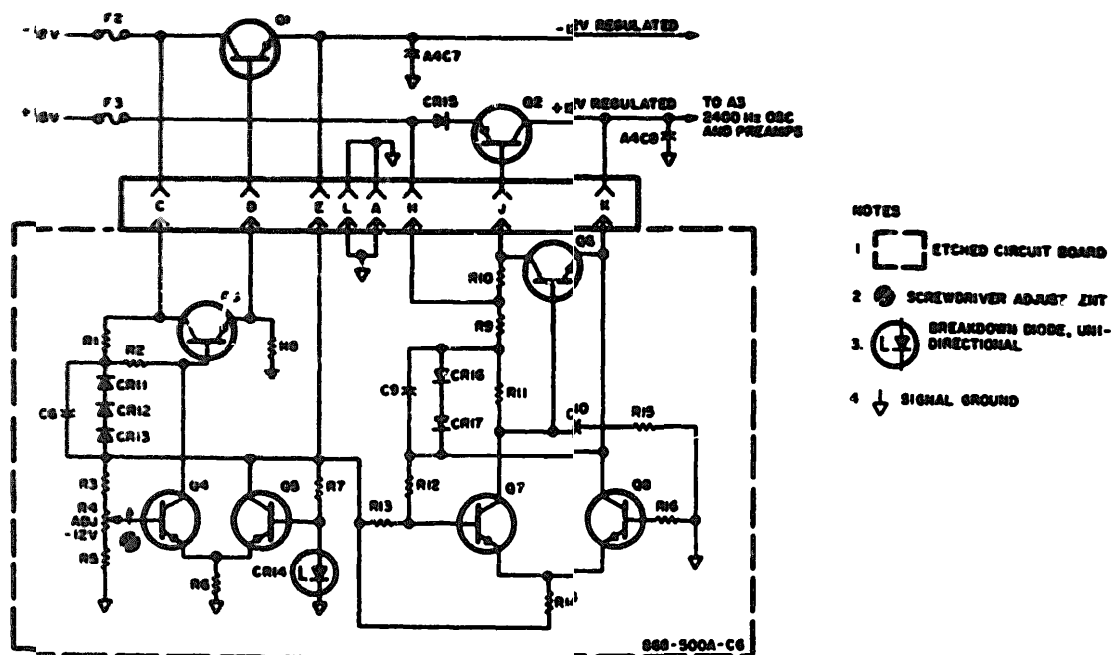


Figure 4-2. 12-Volt Regulator Circuit (Preamplifier Power Supply 8848A)

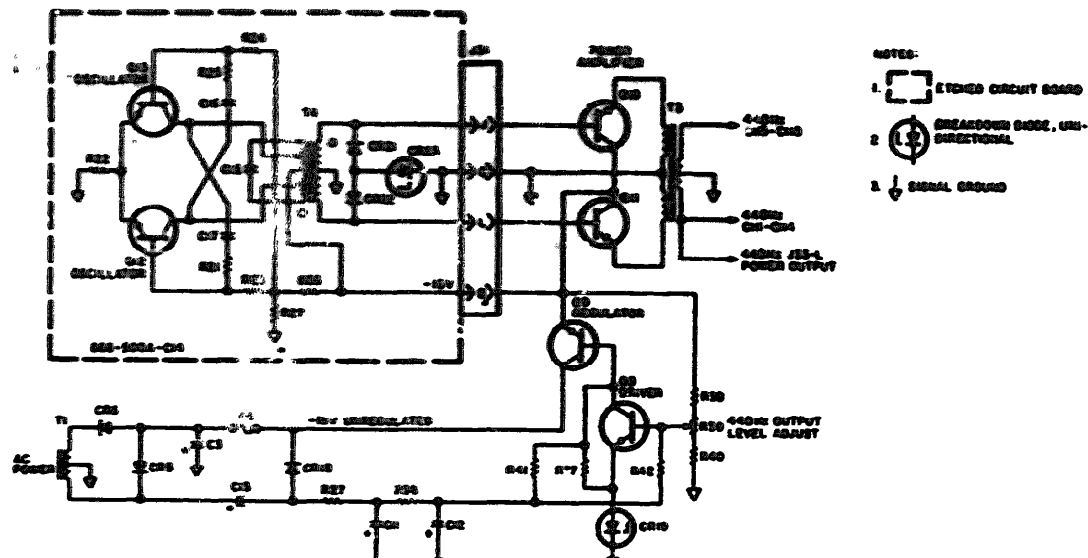


Figure 4-3. 440 Hz Oscillator Circuit (Preamplifier Power Supply 8848)

4-23. Oscillations generated by push-pull oscillator Q20, Q21 are frequency stabilized at 2400 Hz by the primary of oscillation transformer T7, which, with the capacitance of C18 and C19, forms a tank circuit across the oscillator output. Thermistors RT7 and RT8 provide temperature

stability. The output of T7 is a 2400 Hz sine wave balanced with respect to ground, with diodes CR25 and CR26 controlling the oscillation amplitude at a level determined by CR24. The differential signal is distributed to all channels and auxiliary power output connector J33.

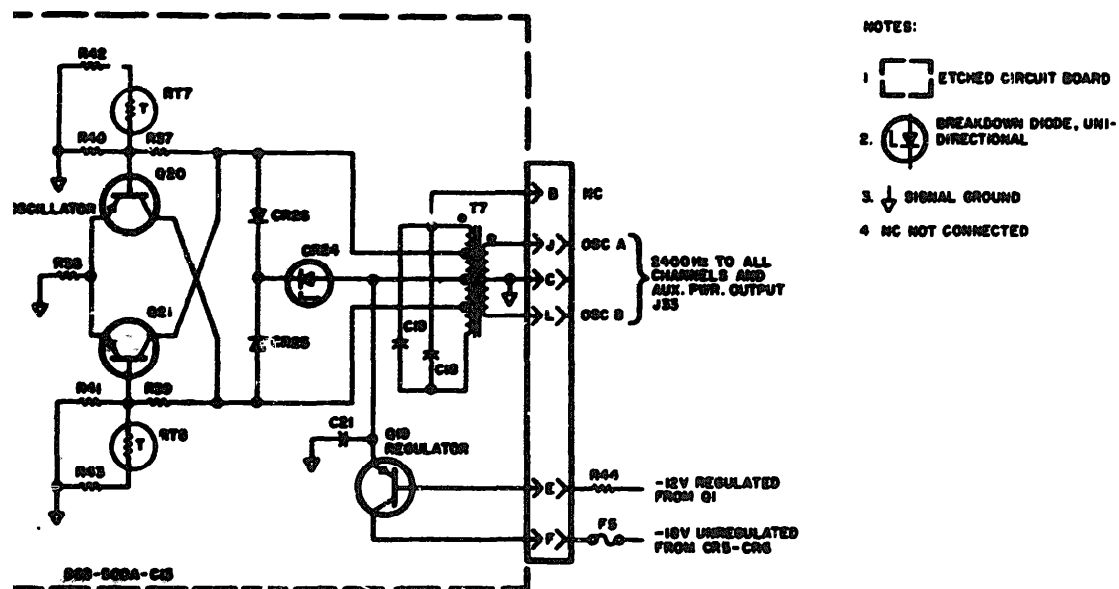


Figure 4-4. 2400 Hz Oscillator Circuit Preamplifier Power Supply 8848A)

4-24. RECORDER SIGNAL CIRCUITS.

4-25. The signal processing circuits consist of the driver amplifiers, one for each channel, and the galvanometers. A simplified schematic diagram of these circuits is presented in Figure 4-6.

4-26. The signal from the preamplifier (or other source that can be connected to the SIGNAL INPUT jack) enters the driver amplifier and is applied to a summing junction with the gain control signal and a transistor switch that shorts the junction to ground when the Recorder is in standby mode. The signal is applied through R5 to voltage amplifier U1 input with position control voltage (± 10 mm on chart) and amplifier feedback being applied at the same point. After amplification, the signal and its control components encounter the limiter diodes, which cut the signal off at adjustable high and low levels. The diodes are powered by emitter follower voltage sources (not shown). High, low, left, right, upscale and downscale are defined on the diagram. The signal, applied through R15 to amplifier driver U2, is then current-limited to 600 mA by transistors Q5 and Q8 and further amplified by power amplifier Q4, Q7 (not shown), Q6, Q9. A feedback circuit around the power amplifier and its driver acts as an output voltage limiter (± 12.5 V).

4-27. The galvanometer circuit receives the driver amplifier output signal, and the drive coil rotates a crank attached to the signal stylus, which marks the recording chart. The galvanometer shaft is also attached to a capacitive position transducer, described in Paragraph 4-34.

4-28. Galvanometer Damping.

4-29. The position feedback signal is fed back to the driver amplifier through R29 and R36. Part of the position voltage is fed back through C6 as velocity information and C4 and C5 as acceleration information. The amount of velocity feedback controls the damping, which is varied with R30.

4-30. **DAMPING.** Damping is a force that is (1) proportional to galvanometer velocity and (2) opposite to the direction of pen motor velocity. Figure 4-5 shows the effects of damping on frequency response and transient response, where underdamping produces peaked and oscillatory waveforms, and overdamping diminishes response. An optimum condition of slight underdamping results in less than 4% overshoot, typically about 1.5%.

4-31. Stylus Linkage.

4-32. The linkage system shown in Figure 4-8 provides a linear motion at the stylus tip from the rotary motion of the galvanometer. The galvanometer moves the end of the crank arm through the arc of a circle, and the end of the crank arm moves the center of the stylus through the same arc. But because the inner end of the stylus frame is constrained by a bearing that can move only toward or away from the chart, the stylus tip moves in a straight line.

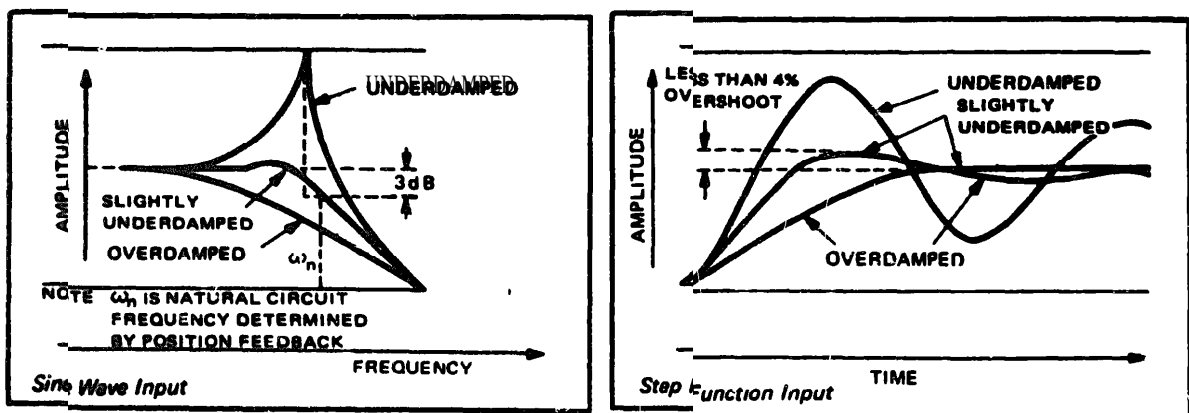


Figure 4-5. Galvanometer Damping

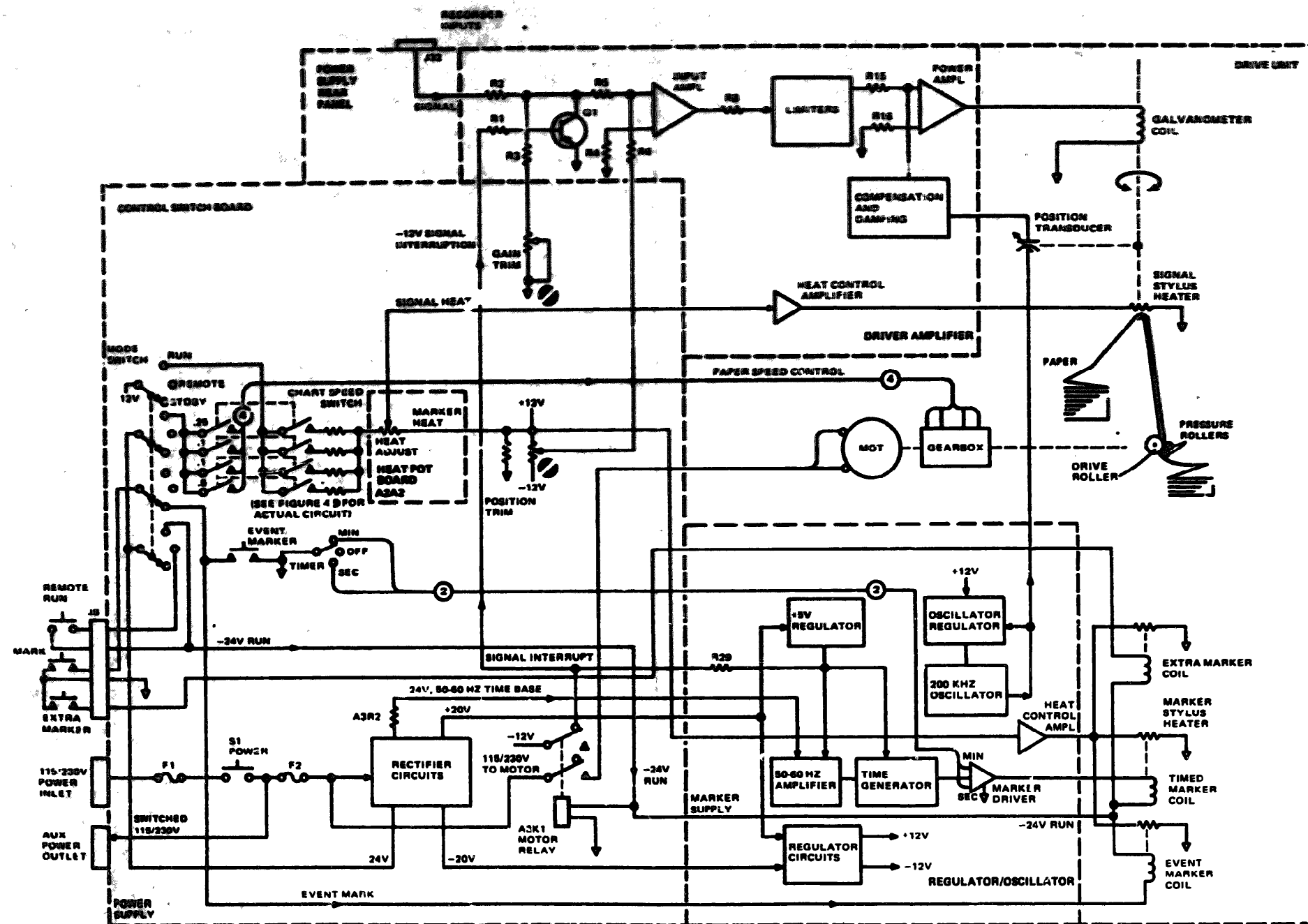


Figure 4-7. Model 7758A/7418A Recorder, Block Diagram



4-5

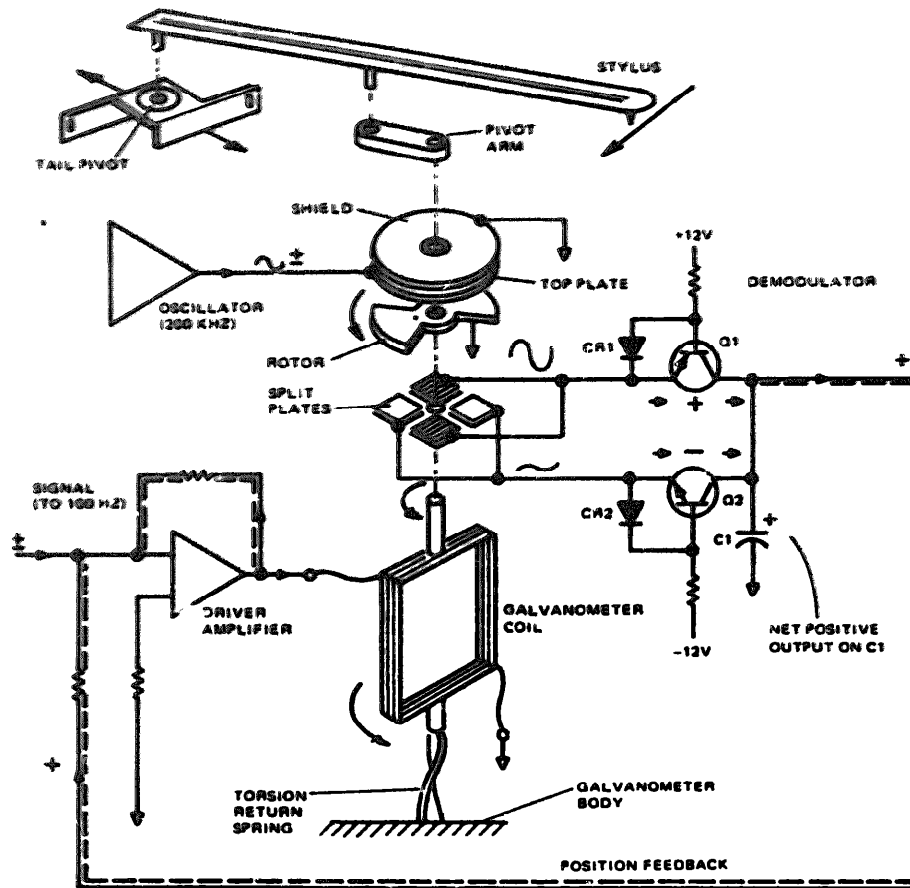


Figure 4-8. Galvanometer Position Feedback Circuit

4-33. Galvanometer Position Feedback.

4-34. The position transducer consists of a capacitor with a split bottom plate, one top plate that excites both bottom plates, and a grounded rotor with apertures to permit passage of the 200 kHz excitation signal. The rotor is attached to the galvanometer shaft. The bottom plate is divided into four sections, connected diagonally (Figure 4-8) so that the excitation is received differentially. This differential action keeps the load on the excitation oscillator constant, to aid the oscillator regulator in maintaining a constant output current. Excitation signal amplitude is important since it affects position transducer sensitivity.

4-35. The demodulator circuit senses the unbalance between the two portions of the position sensing capacitor,

caused by the amount of energy from the oscillator that is coupled through the apertures in the rotor on the galvanometer shaft. If the circuit is balanced, both halves of the position capacitor receive equal amounts of 200 kHz radiation from the oscillator output plate. Refer to Figure 4-8. On the positive excursion of the excitation signal (200 kHz), transistor Q1 conducts, charging C1. Diode CR1 is back-biased, CR2 is on, and Q2 is off during this period. On the negative excursion of the excitation signal, the opposite current flow takes place, with Q2 conducting the same amount as Q1 conducted previously. When the circuit is balanced, C1 thus reflects a net zero voltage output. During an unbalanced condition, either Q1 conducts more or Q2 conducts more to produce an average positive or negative voltage on C1.

4-36. An example of unbalance is shown in Figure 4-8. As the positive signal causes the galvanometer to move the stylus as shown, the rotor moves so that more of the oscillator output is felt on the split capacitor plates/. These plates are connected to the CR1-Q1 half of the demodulator, so that more positive voltage is impressed upon C1. The unshaded plates receive proportionately less of the oscillator output, and so CR2-Q2. the negative side of the demodulator, produces less positive output for C1. C1, then, sends a positive feedback voltage to the driver amplifier, which tends to return the stylus toward the center of the chart. The feedback voltage is sided by a torsion spring that facilitates setting of the stylus mechanical center. For maintenance purposes, note that one volt of position voltage corresponds to 10 divisions of stylus movement

4-37.

4-38. Stylus heat is controlled from the Heat Pot Board, A2A2, on the front panel. The heat control voltage is applied to a simple feedback amplifier located on the driver amplifier assembly. Q11, Q12, and Q13, which has a current limiting circuit similar to that used for the galvanometer. The amplifier output drives the resistive stylus heat element. A good stylus should have about 34 ohms resistance.

4-39. Power Control Circuits

4-40. Power is controlled from the recorder front panel. Figure 4-9 shows recorder power switching together with chart motor control circuits and speed control solenoid circuit.

4-41 Line common reaches the chart drive motor through S1, the power switch and the U1 voltage selector, whenever S1 is on. The high side of line power is applied to the chart drive motor through motor relay K1, which is actuated by the control switch RUN button on the front panel, or a remote run signal (Figure 2-9). The motor is described further in Paragraph 4-46. K1 also turns on **stylus** heat through the control switch.

4-42. The motor drives the gearbox, the speeds of which are controlled by speed selection solenoids L1, L2, L3, and L4. The speed control action of these solenoids is described in Paragraph 4-51. The segments of the control switch are so arranged that the solenoids are energized in the correct combination for each speed desired. The switch is shown in the 5 mm/sec position. As an example of how the switch

works, the -20V supply voltage, applied to the switch via the main feeder line at the top of Figure 4-9 energizes the center contacts of the switch segment. /when the push-button marked "5" is depressed, -20V is applied to solenoids. L3 and L4 through diodes CR5 and CR6, respectively, selecting the proper gear combination. In speeds of 5 mm/sec and higher, the heat control voltage is tied by fixed voltages applied to the heat control potentiometers by the control switch. The heat control potentiometer setting permits front panel adjustment of the trace density through the heat control circuit each driver amplifier.

4-43. CHART DRIVE.

4-44. The recorder chart drive consists of a 115 volt ac motor, a gearbox with four pairs of clutches and speed selection solenoids, a paper drive roller, and a paper brake.

4-45. Chart Motor.

4-46. The chart motor is a continuous duty, synchronous motor with a speed of 1800 rpm for 60 Hz operation. A pulley on the motor shaft engages a drive belt that transmits power to the gearbox. To provide additional electrical safety, the motor is insulated from the recorder chassis by non-conducting spacers.

4-47. Control.

4-48. Chart paper speed is varied by a gear train consisting of sets of four gears, on two shafts (Figure 4-10) These shafts are fixed in place and do not rotate. Each set of four gears (A, B, C, and D) either provides a speed reduction with all four gears transmitting power, or no speed reduction, with power bypassing the reduction gears through a spring clutch that links gears A and D on the primary shaft. Gear D is mechanically part of Gear, A on the next set, so power is directly transmitted to the next set of gears

4-49 When direct drive is desired, the associated solenoid is energized, withdrawing the plunger from the clutch pawls. The clutch then engages, coupling gears A and D. The spring clutch between gears B and C automatically disengages since gear C, being smaller than gear B, rotates faster when gears A and D are in direct drive

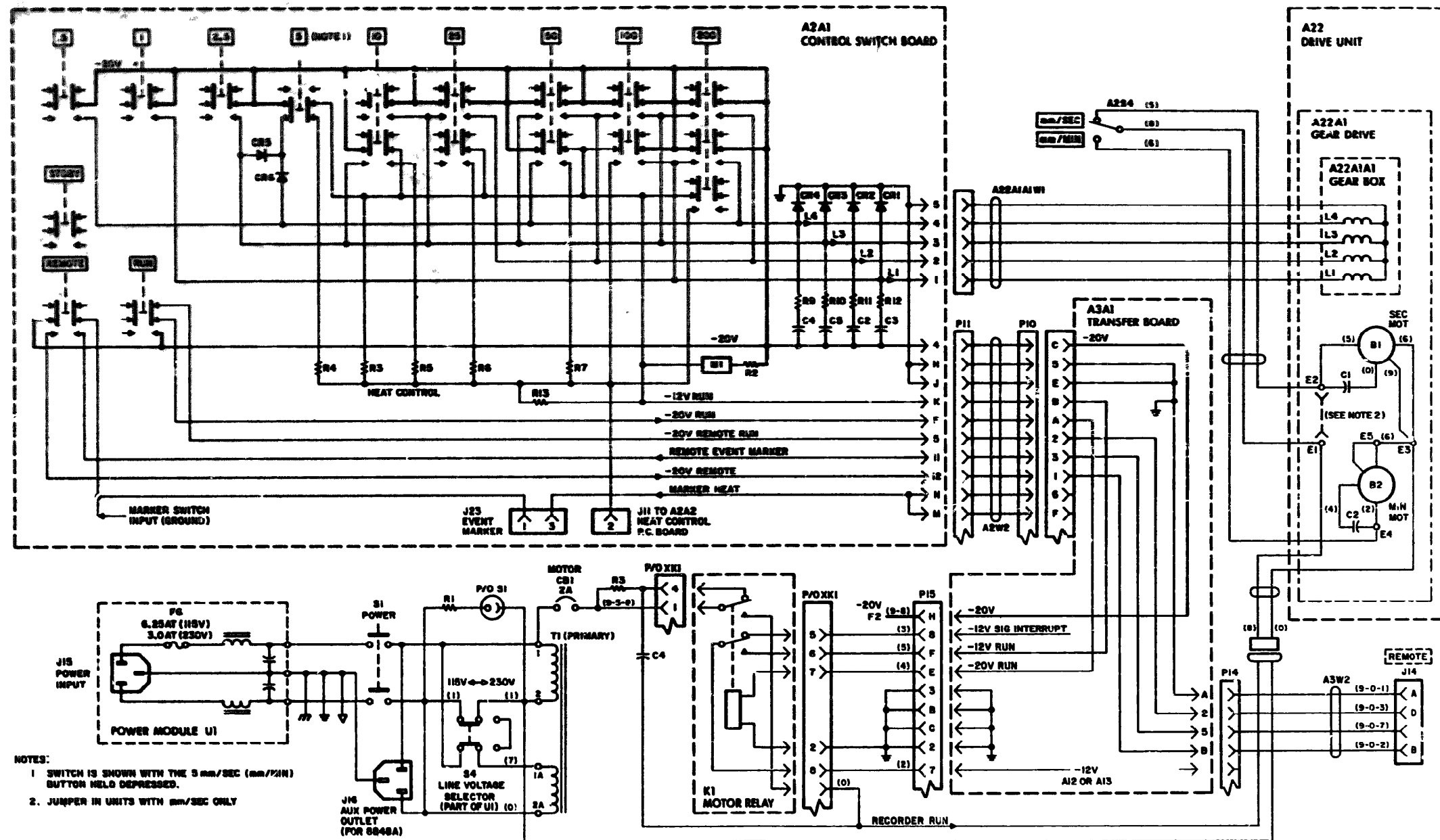
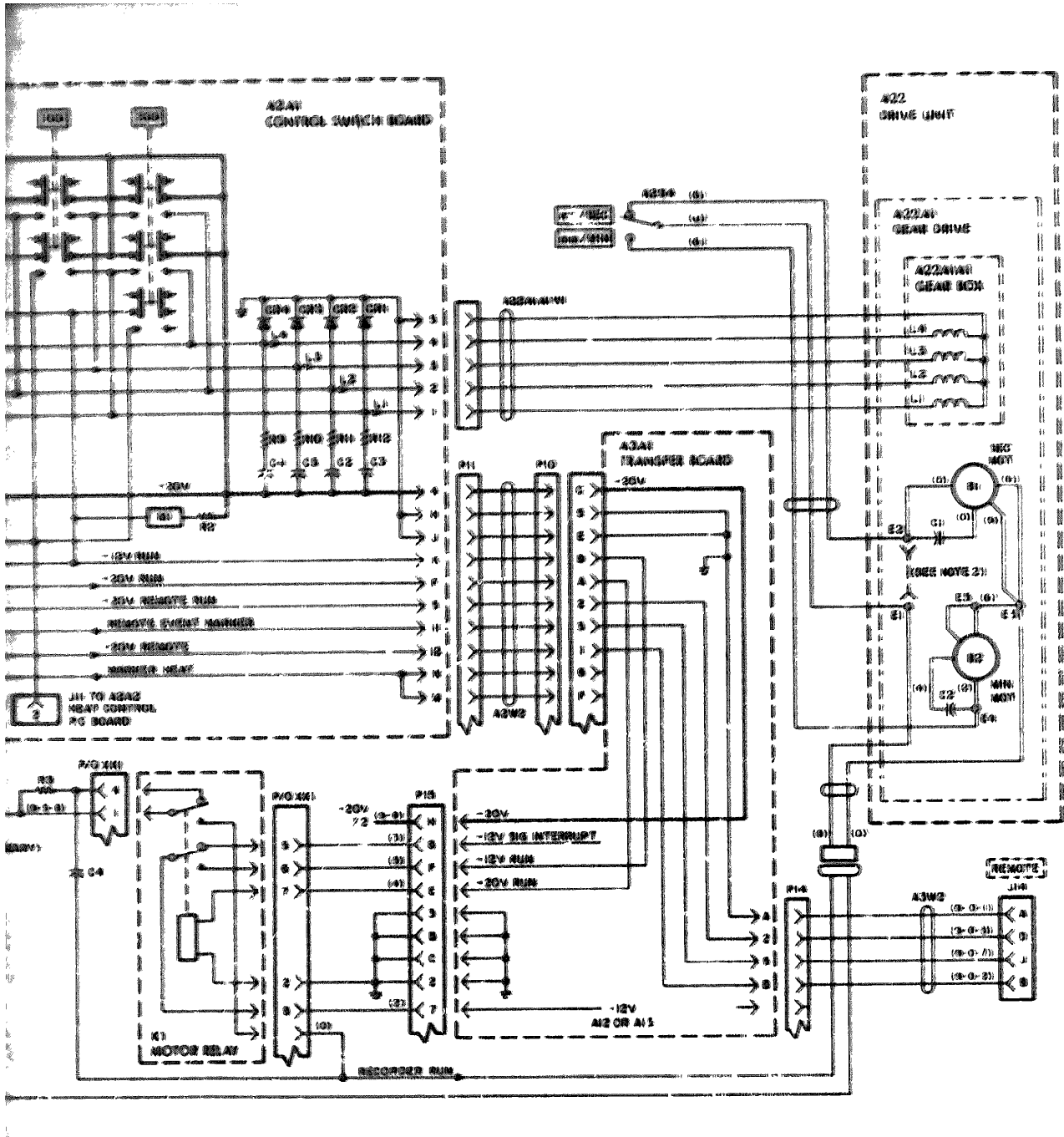


Figure 4-9. Recorder Power Control Circuits, Simplified Diagram

Figure 4-9.



Recorder Power Control Circuits, Simplified Diagram

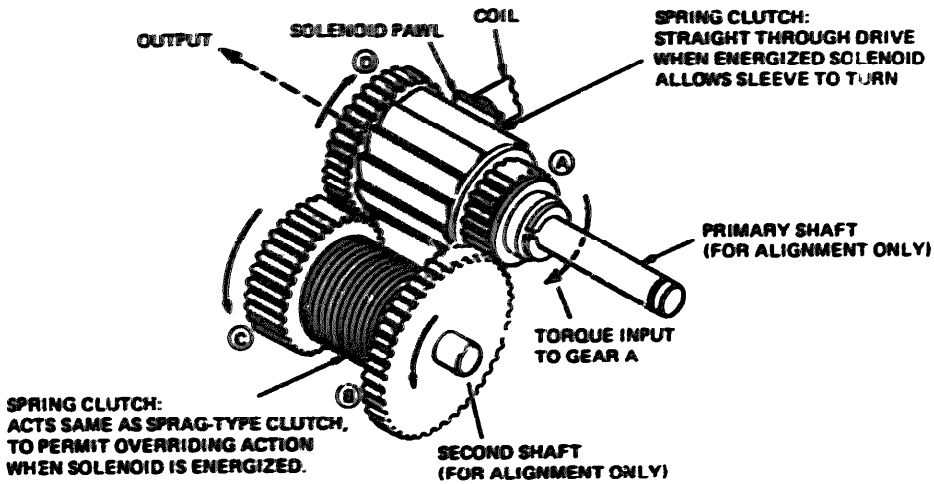
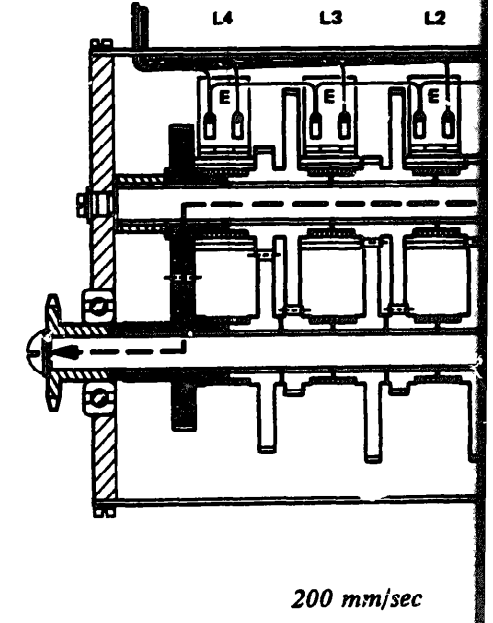
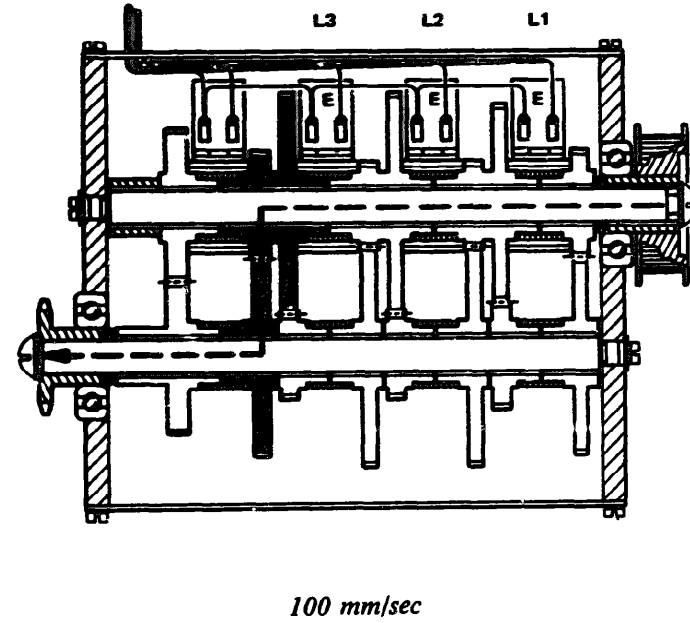
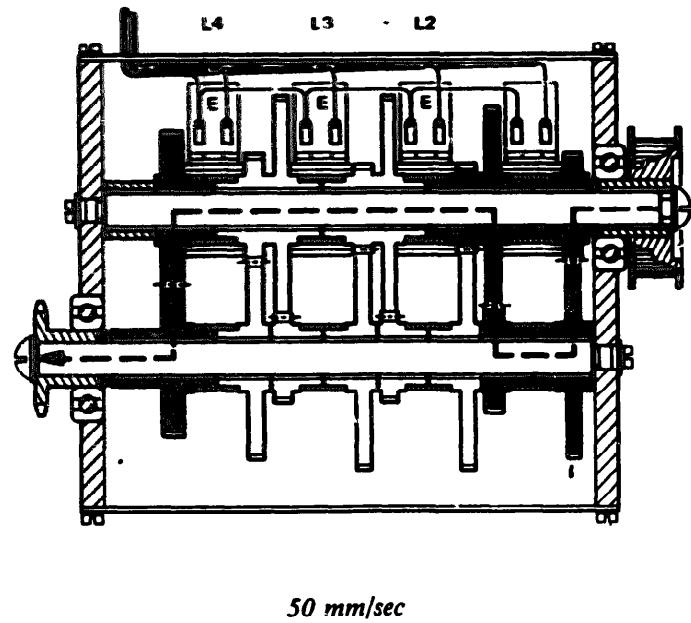
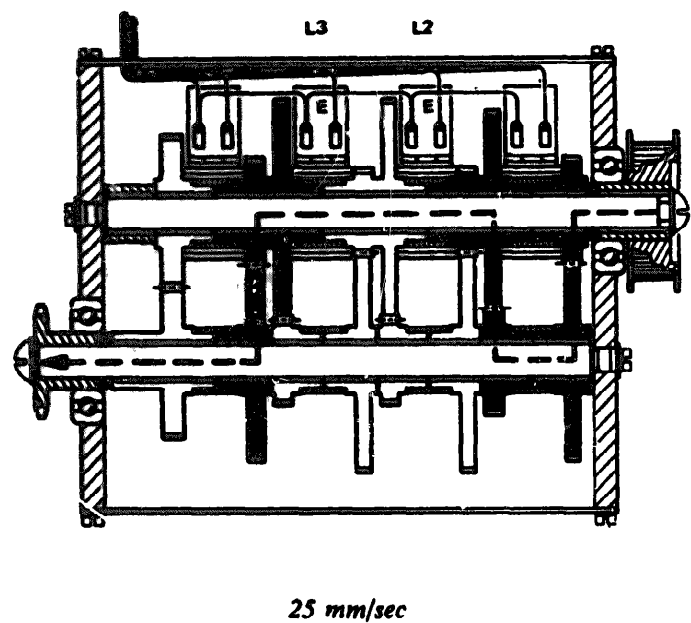
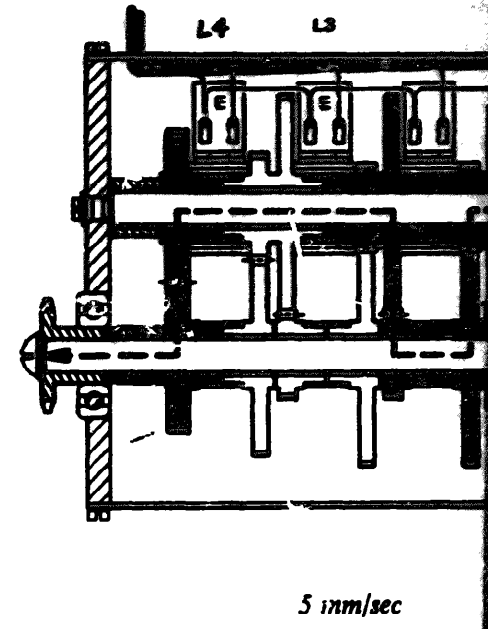
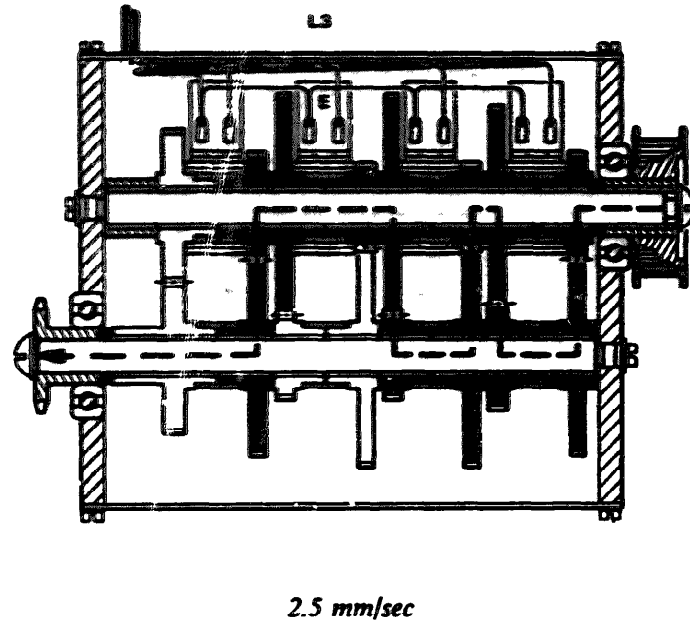
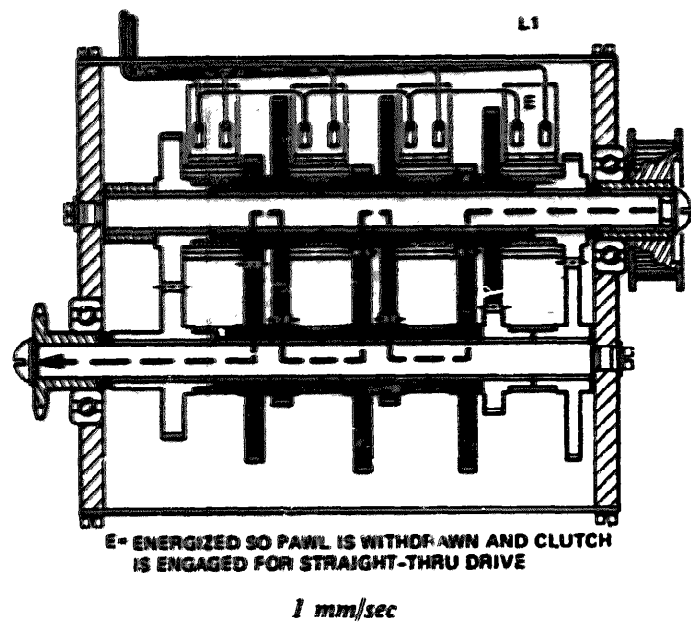
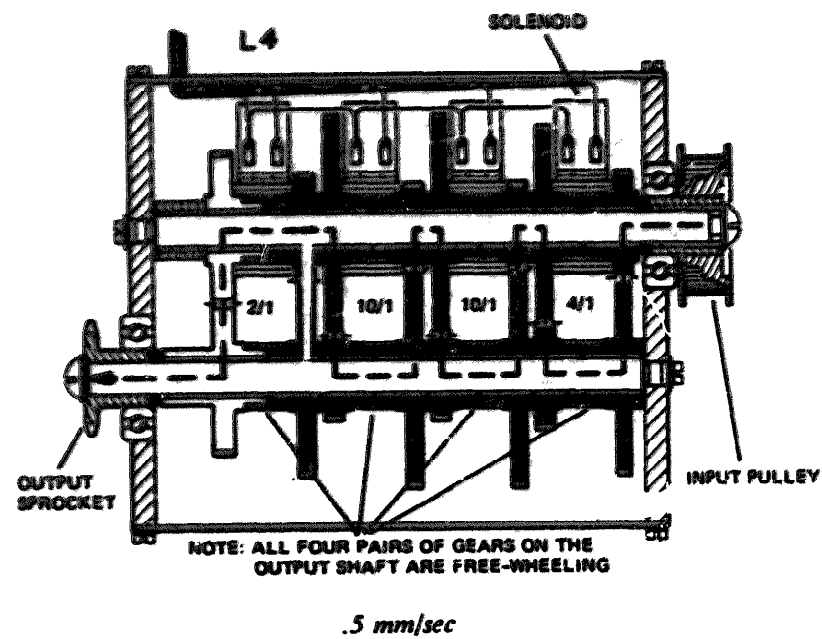


Figure 4-9.

Figure 4-10. Chart Drive Gears



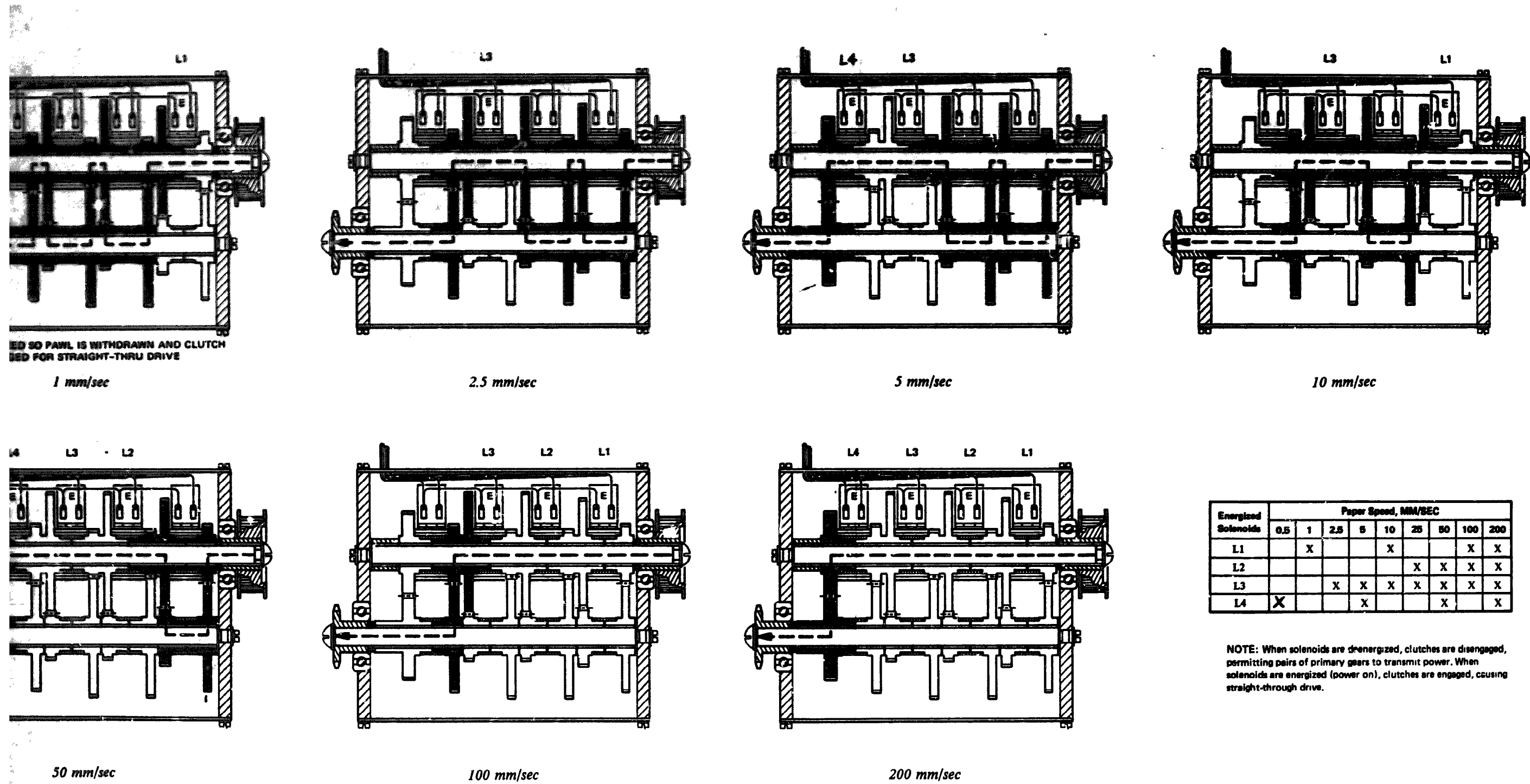


Figure 4-11. Gearbox Power Flow

4-50. **SPEED SELECTION SOLENOIDS.** Solenoids L1, L2, L3 and L4 control the speed reduction. They are energized from Control Switch Assembly A2A1. The paper speeds obtained by energizing different combinations of solenoids are presented in Figure 4-11. Remember that as more solenoids are energized, fewer sets of gears provide speed reduction, and thus the paper goes faster.

4-51. **POWER FLOW.** The mechanical power flow through the gearbox is diagrammed, for each speed, in Figure 4-11. Take the 10 mm/sec speed flow for example (top row). Power input from the drive motor enters the gearbox via the input drive pulley at the right side of the upper (primary) shaft. Since solenoids L1 and L3 are energized, the corresponding gears are directly coupled together by the spring clutches. The other two sets of gears provide speed reductions since L2 and L4 are deenergized and the associ-

ated clutches are kept from rotating by the released plungers. Power thus flows through all the gears in these two gear sets.

4-52. Paper Feed.

4-53. As shown in Figure 4-12, the platen establishes tension across the felt-covered paper brake bar. From the output of the gearbox, a chain drive runs a rubber drive roller. The drive roller pulls the chart paper at a uniform speed, slippage being prevented by two pressure rollers that cause the paper to grip the drive roller. After the Z-fold paper leaves the drive roller, it folds sheet by sheet onto a takeup tray, or into an optional takeup drawer. The consecutively numbered chart pages indicate the amount of paper remaining, and can be used as an index for instant access to any part of the recording.

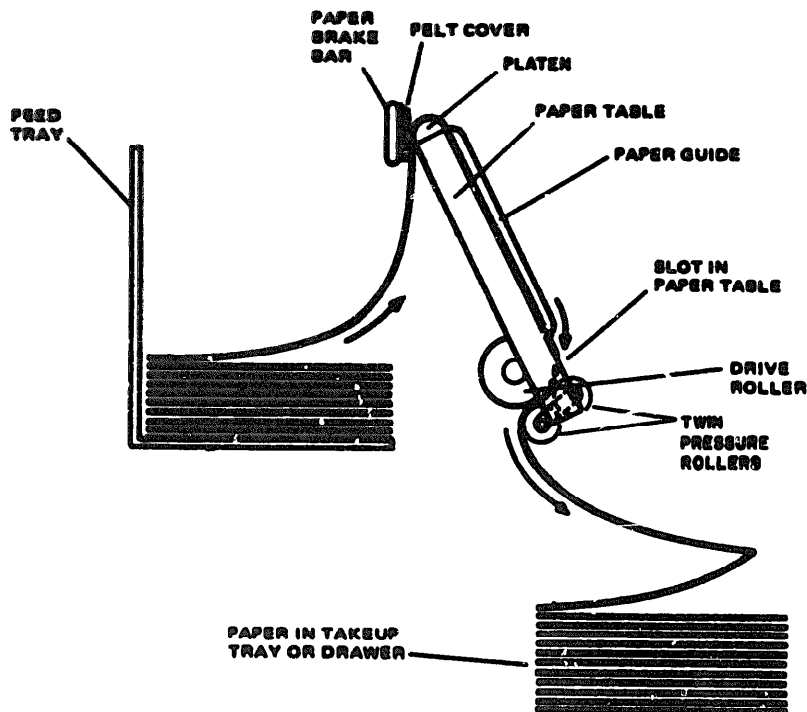


Figure 4-12. Paper Feed Path

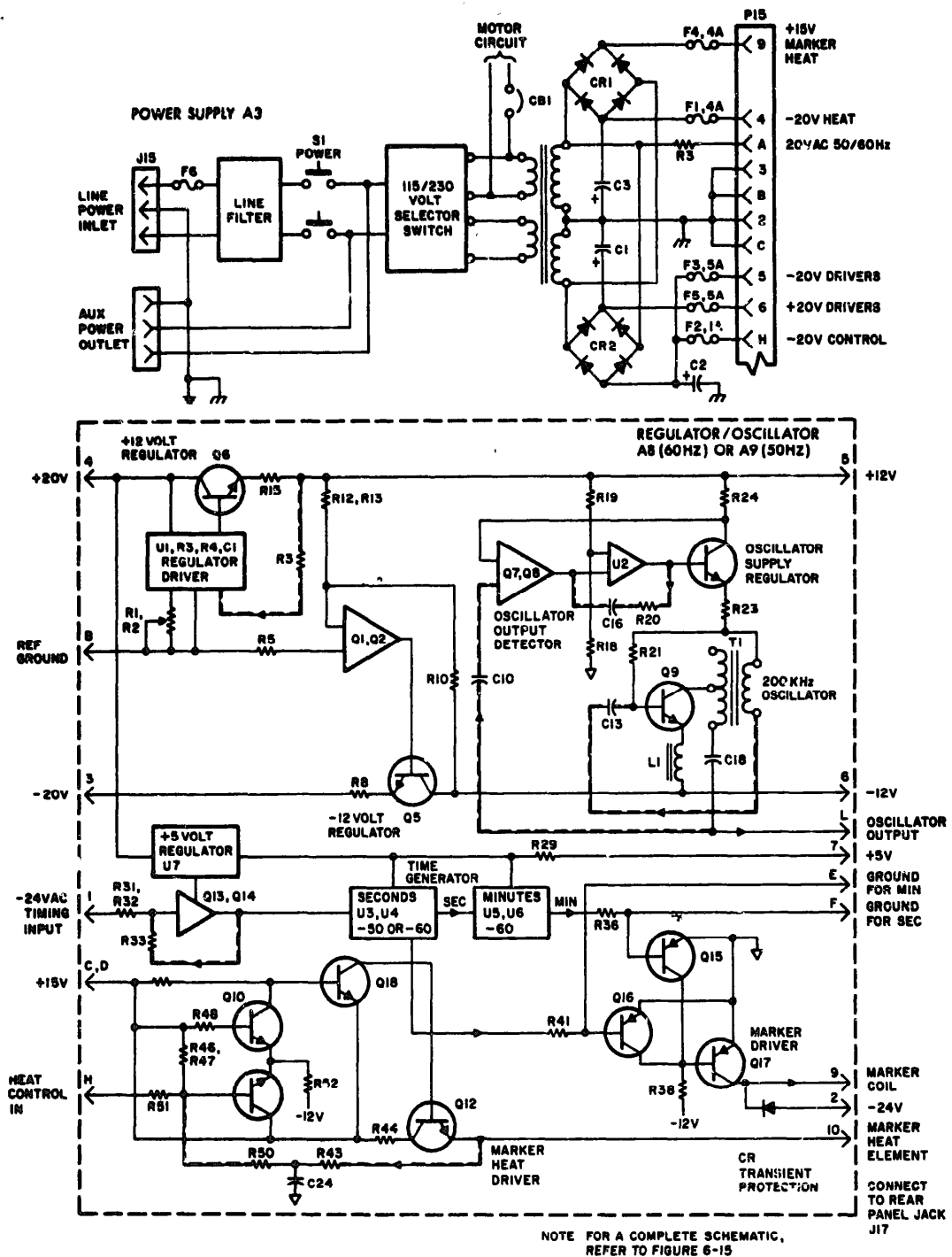


Figure 4-13. Recorder Power Supply and Regulator Circuits, Simplified Diagram

4-54 RECORDER POWER SUPPLY AND REGULATOR CIRCUITS.

4-55. The power supply contains rectifiers, plug-in and regulator circuits, a 200 kHz oscillator for the galvanometer position feedback circuit, and connections for the plug-in driver amplifiers previously described. The oscillator, rectifier and regulator circuits are shown in Figure 4-13. Some elements such as current regulating circuits, bypass and suppression networks, some ground connections, minor feedback loops, filters, and coupling elements are omitted. Refer to Section VI for complete schematic diagrams.

4-56. Recorder DC Power Supplies.

4-57. The Recorder power supply rectifiers provide +20 volts, -20 volts and -24 volts dc as unregulated control and heat supply voltages. The voltages are filtered and fused on the power supply chassis, as shown in Figure 4-13.

4-58. Regulator/Oscillator.

4-59. The Regulator/Oscillator Assembly includes a +5V, a +12V and a -12V voltage regulator, a 200 kHz oscillator with a stabilizing regulator, and the timing circuits for the timed marker stylus. The relationship of these circuits is shown in Figure 4-13.

4-60. **+5 VOLT REGULATOR.** The +5 volt regulated supply is used in the timing generator, and in the signal interruption circuit of each driver amplifier. It is derived from the +20 volt unregulated supply with an integrated circuit voltage regulator that has an independent voltage reference. A resistor in series with the regulator absorbs some of the power dissipated in the regulation process, thereby reducing the amount of heat generated in the regulator.

4-61. **+12 VOLT REGULATOR.** The +12 volt supply is derived from +20 volts with an integrated circuit regulator used as a regulator-driver. Since the IC is not capable of handling the required power, an external power transistor, Q6, acts as the series regulator. The IC regulator incorporates a $\pm 5\%$ voltage reference. To adjust the voltage (within 100 millivolts), the circuit uses potentiometer R2 to reference ground. Resistor R15, one ohm in series with regulating transistor Q6, provides short circuit protection and has a current-sensing function. R4 and C1 form an RC network that improves the stability of the operational amplifier that drives Q6.

4-62. **-12 VOLT REGULATOR.** The -12 volt supply is derived from the -20 volt unregulated output. The -12 volt regulator is another operational amplifier, with the driven, series regulating element as Q5. Q1 and Q2 are the differential components of the amplifier. Q1 base is returned to ground via R5, and the reference input, derived from -12 volts through R12 and R13, is connected to Q2. The amplifier output drives Q5, and is returned to the reference input via feedback resistor R10. Current limiting is provided by R8 and Q4 (not shown in diagram), and RC network R6, C3 aids stability.

4-63. **200 kHz OSCILLATOR.** The high frequency excitation signal, used in the galvanometer position capacitive transducer, is generated by LC Oscillator Q9 and its associated circuitry. Random conductance in Q9 sets up currents in T1 which are fed back, in phase, to the base of Q9 through C13. Since feedback is greater than unity gain, oscillation amplitude is controlled only by saturation of Q9, and reaches nearly the power supply voltage. Oscillator frequency is determined by C15 and the external loading capacitance across the transformer primary together with T1 inductance. Filter choke L1, with C14 (not shown), decouples the oscillator and its harmonics from the -12 volt supply. A step-up winding, connected to C18, increases the oscillator output voltage by about 7 to 1.

4-64. **OSCILLATOR REGULATION CIRCUIT.** Since the position transducers are an important factor in recorder accuracy, the 200 kHz oscillator must remain extremely stable in operation. An indication of oscillator stability, both in frequency of oscillation and in amplitude, can be obtained by detecting the product of frequency and output voltage, and comparing the results with a reference voltage. The LC oscillator circuit, by nature, exhibits frequency changes with variations in load. The oscillator regulation circuit varies the oscillator supply voltage to compensate for loading, which stabilizes the output.

4-65. To do this, the oscillator output detector generates a voltage proportional to frequency and amplitude of the 200 kHz component being removed by C11. This voltage is compared in differential amplifier U2 to a reference voltage (+4.23 volts), derived from the +12 volt supply through voltage divider R18-R19. The comparator output drives a series regulator transistor, part of U2, in such a way that the oscillator will maintain a constant output amplitude, and therefore a constant frequency.

4-66. Marker Circuits.

4-67. The Recorder includes two monopolar markers, one of which is timed, and the other actuated with a front panel or remote pushbutton. The timing circuits for the timed marker are located on the Regulator/Oscillator Assembly,

and operate by dividing 50 or 60 Hz ac input to generate one-second pulses, and then dividing these pulses to obtain pulses at one-minute intervals. The selected set of pulses is then amplified to drive the timed marker.

4-68. Line frequency ac voltage at 24 Vac is obtained from the power transformer and filtered to remove transients and high-frequency noise. Then a threshold detector circuit, Q13-Q14, generates a train of spike waveforms at line frequency to drive the divider TTL logic circuitry. Integrated circuit U3 divides by 5 or 6, and then U4 divides by 10 to achieve a 50:1 or 60:1 division. The seconds output is routed to switch Q16, and also to the minutes divider, which divides by 60 in the same way, using IC's U5 and U6. The minutes output is routed to transistor switch Q15.

4-69. **MARKER SWITCHES.** When the circuit is off, both switches are grounded, stopping conduction in Q15 and Q16 and permitting Q17 to conduct steady-state. When either minute or second marking is selected, the ground is removed from one switch, which conducts and connects the base of Q17 to ground. Once each minute or second, the timing circuit cuts off the switch, thereby restoring the base drive to Q17 momentarily, so the marker coil is energized and the marker makes a jing on the paper. The diode at the

collector of Q17 removes the large transient that results when the marker solenoid stops conducting.

4-70. **MARKER HEAT DRIVER (Figure 4-13).** The marker heat elements are powered from the +15V line through a special, pulsed regulator. This circuit applies current during a period that is complementary to the pulsating dc currents through the rectifier of the regular +20V power supply connected to the same transformer secondary. Switching the current evens out the power supply requirements by making use of unused current at the rise and fall of the waveform, as shown in Figure 4-14.

4-91. To switch the current, differential input circuit is controlled by two things, to turn the current on at the appropriate time. The height of the output voltage pulse, and thus the quantity of current, is determined by the heat control voltage level. It is limited by the point at which the main +15V supply starts (or stops) drawing current. The differential circuit switches series regulator Q18, Q12 to pulse the marker heat current as shown by the shaded areas in Figure 4-14. This provides a pulse on the steep leading and trailing edges of the main waveform, when the capacitive supply is not drawing current. Board exchange instead of troubleshooting is recommended if this circuit is found to be inoperative.

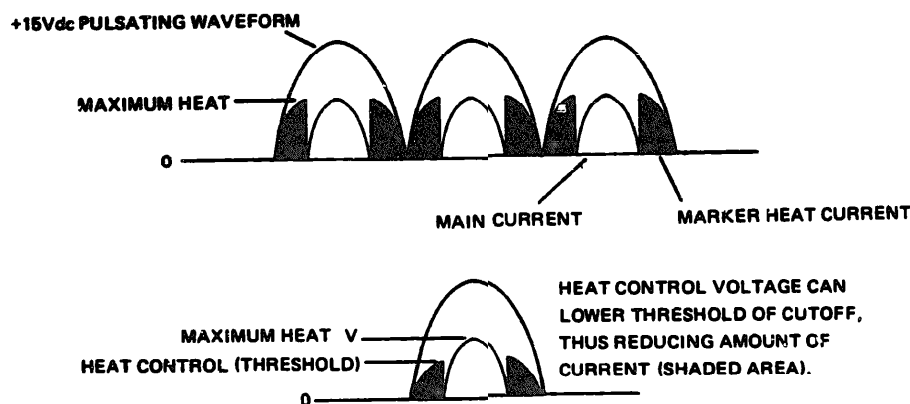


Figure 4-14. Marker Heat Driver Output Current Waveforms

SECTION V MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides maintenance and service information for the Hewlett-Packard 8-Channel Thermal Tip Recorder. Information includes:

Performance Checks	Paragraph 5-5
Preventive Maintenance	Paragraph 5-10
Electrical Checks	Paragraph 5-20
Adjustments and Minor Repairs	Paragraph 5-22
Corrective Maintenance	Paragraph 5-38.

5-3. TEST EQUIPMENT AND LUBRICANTS.

5-4. The test equipment recommended for maintenance is listed in Table 5-1, with the performance characteristics required. Other test equipment may be used if its specifications

equal those listed. For satisfactory performance, use only the lubricants listed in Table 5-2. Lubrication intervals are:

Normal use in upper half of the speed range:
12 months or 2000 hours.

Slow speed use, over extended periods:
6 months or 1000 hours.

For further information, refer to Paragraph 5-52.

5-5. PERFORMANCE CHECKS.

5-6. The performance checks verify specifications and circuit operation, and can be used under the following circumstances:

- As part of an incoming inspection;
- Periodically, where maximum reliability is required;
- To troubleshoot malfunctioning circuits; and
- After repairs or adjustments.

Table 5-1. Recommended Test Equipment

Instrument Type	Required Characteristics	Model Number of Instrument Recommended
Variable Autotransformer	115 or 230 Vac; 0-130 Vac, 5 amperes; 0-260 Vac, 2.5 amperes	General Radio VARIAC
Digital Voltmeter (DVM)	Range: 0-999.9V; Accuracy: $\pm 0.05\%$	HP Model 3440A or equivalent
Function Generator	0.01 Hz — 100 kHz 35V p-p open circuit output; 15V p-p into 600-ohm load.	HP Model 3300A with Model 3301A Auxiliary Plug-in. Used with dual- banana to BNC adapter HP 10110A.
Oscilloscope	Sensitivity 5 mV/division or better. Vertical amplifier dc coupled, dc to 400 kHz or better.	HP Model 140 with Time Base and any 1400-series Vertical Amplifier.
Stylus Pressure Tester	25 grams maximum	HP Part No. 14023A or equivalent
Test Fixtures	PC Board Support for Driver and Regulator/Oscillator	07754-00900 (Figure 5-4)
	Driver Amplifier Extender Board	07754-60920
	Regulator/Oscillator Extender Board	07754-60910
Test Cables	For test signals	To be made, see Figures 5-3, 5-4.

Table 5-2. Lubricants and Solvents Required

Type	Commercial Source, HP Part No.
MACHINE OIL, No. 10	6040-0220
GEAR GREASE	6040-0222
CHAIN GREASE	6040-0223
PENETRATING OIL	Commercial, such Marvel Mystery Oil
SOLVENT AND CLEANER	DOW Chlorothene (1,1-Inhibited Trichloroethane)

5-7. To facilitate by checking the Driver Amplifiers and the Regulator/Oscillator Assembly, extender boards (Table 5-1) are available as accessories.

5-8. Variable Line Voltage.

5-9. *During the performance* checks, the Recorder should be connected to the power source through an adjustable autotransformer so the line voltage can be changed 10% from the nominal 115 or 230 Vac.

CAUTION

TO AVOID DAMAGE, REMOVE POWER FROM THE RECORDER BEFORE DISCONNECTING ASSEMBLIES OR COMPONENTS. NEVER TIP RECORDER ONTO REAR PANEL AREA, TO AVOID DAMAGING THE TRANSFER PC ASSEMBLY AND DRIVER AMPLIFIERS.

5-10. PREVENTIVE MAINTENANCE.

5-11. Preventive maintenance is recommended every six months or 1000 hours of operation, and new procedures may be used as an aid for minor repairs, adjustments and troubleshooting.

5-12. Operational Checks and Inspection.

5-13. Switch Recorder power OFF Inspect the Recorder for evidence of mechanical or electrical overload, dents, rust, and corrosion. Check that all components are securely mounted, including the cable connectors Also check external connecting cables for strain, breaks, and frayed insulation. If the Recorder is installed in a cart or cabinet, the cables should be free when the Recorder is moved in and out.

WARNING

TO PREVENT PERSONAL INJURY IF RECORDER SHOULD SLIDE PARTLY OUT, KEEP RECORDER ATTACHED TO CART OR CABINET WITH SCREWS IN FRONT PANEL AT ALL TIMES EXCEPT DURING MAINTENANCE.

5-14. Operate the Recorder in all speed perform the operating procedure, using all controls listed in Figure 3-1.

5-15. The following steps check operation of the Recorder:

a. *Recorder slides.* Check that the slides roll in and out smoothly and that they lock in the full open position (Figure 2-1).

Paper tension: Run the Recorder at the highest speed and inspect paper travel over the platen at the paper table (see Figure 4-12). The paper should travel snugly over the paper table. Adjust the paper brake if necessary, or replace the brake felt (Paragraph 5-28).

C. Paper tracking Run the Recorder at 25 mm/sec for 5 sheets. Paper should follow the right table guide without weaving or damaging the edge of the paper. A static trace position should not vary more than 0.5 mm from any reference grid line, after 6 to 12 sheets have passed and tracking has settled down. Check several more sheets at 200 mm/second. For tracking adjustments, see paragraph 5-26.

d. *Galvanometer to Paper Parallax* So that all channels will have the same time reference with respect to the paper, all stylus tips must fall on the same time reference line of the paper, ± 0.25 division. To check parallax, apply power to the Recorder, and set to STANDBY mode. With finger pressure, gently move the stylus off center full scale, in the positive and negative directions The trace over the width of each channel should be within ± 0.25 mm of the reference grid line. If not, see Paragraph 5-33 to adjust stylus parallax. All 8 channels should be referenced to the same grid line, that is, all traces should end at the same point when the Recorder stops If not, see Paragraph 5-34 channel time synchronization procedure, which is used to adjust galvanometer parallax, that is, to line up the galvanometers in a straight line so the style will fall on the same time line.

e *Signal Stylus.* each signal stylus for cleanliness and condition. If a stylus is bent or twisted, replace it (Paragraph 5-35).

f. *Stylus Pressure* When stylus pressure is too light, the trace lacks definition, but when pressure is too heavy, friction causes noticeable non-linearity and hysteresis. Refer to Paragraph 5-31 for stylus pressure adjustments.

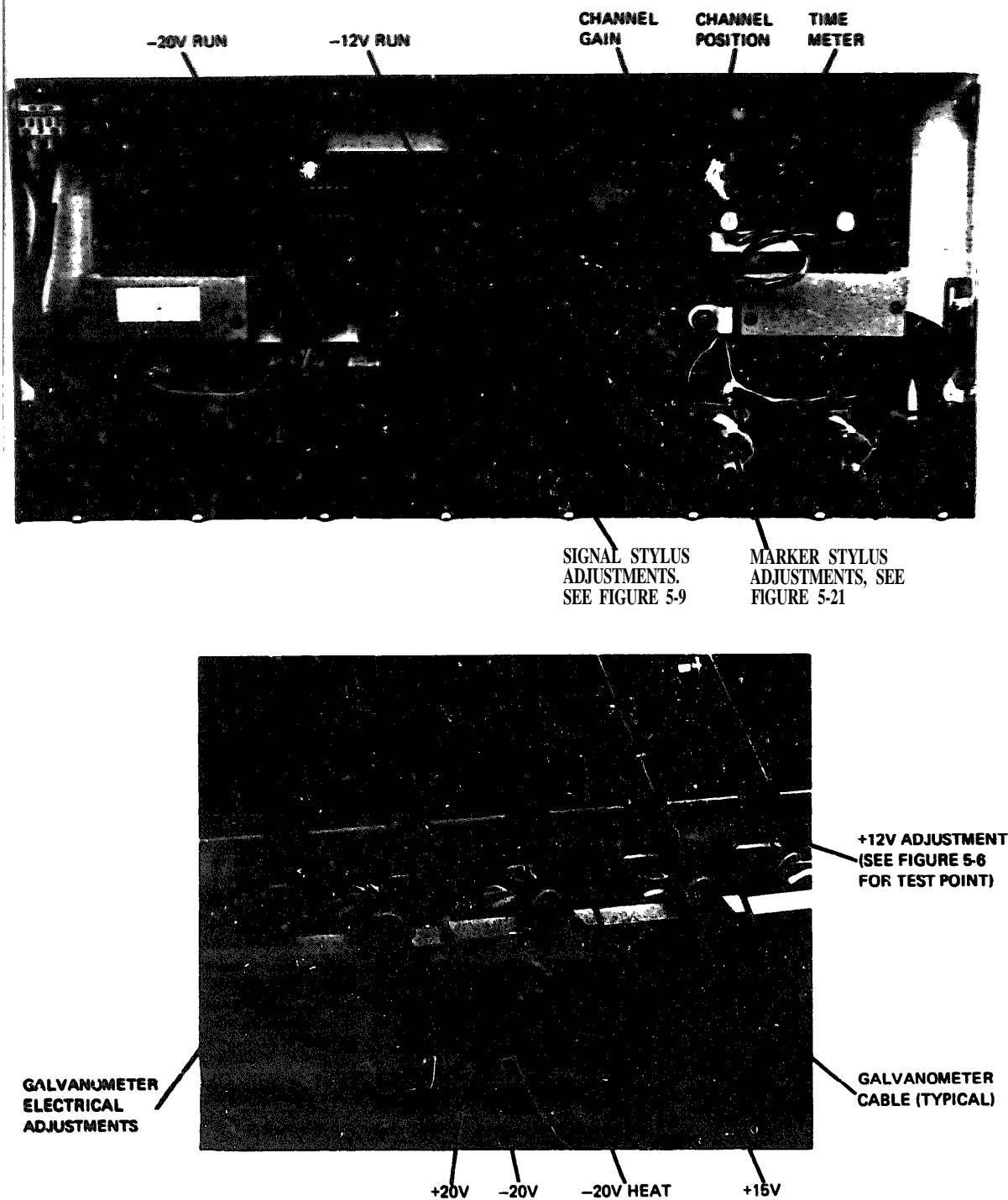


Figure 5-1. Recorder Test and Adjustment Points

Section V-Principles of Operation

Models 7758A, 7418A
0 7 7 5 8 - 1

g. Marker Stylus: Inspect each marker stylus and solenoid for cleanliness and condition. Run a few feet of paper at 100 mm/sec while pressing the EVENT MARKER button, and with the timed marker in SEC mode. If the recording is unsatisfactory, check the marker stylus electrical connections and pressure (Paragraph 5-61). Recheck marker performance. If still unsatisfactory, troubleshoot the marker heat circuit, or replace the marker stylus.

h. Stylus Heat: Turn Recorder power ON, set SPEED to 25 mm/sec, and adjust STYLUS HEAT controls for best trace definition. Lift up the front panel and rotate each channel POSITION potentiometer (Figure 5-1) from one extreme to the other. Trace definition should remain the same over the whole channel width. If not, first check for an unlapped stylus. Then check for defects, improper clamping (Paragraph 5-29), or poor stylus pressure. Return stylus position to channel center.

i. Power Supply Electrical Checks: See Table 5-3.

j. Recorder Electrical Checks: Recorder electrical checks include adjustment of the electrical and mechanical limiting of stylus deflection. See Table 5-4.

5-16. Cleaning

5-17. Depending on environmental conditions, cleaning may be required at much shorter intervals than the regular maintenance intervals:

a. Unplug Recorder power cord. Remove chart paper. Expose top and rear of Recorder, and remove dust with a vacuum hose.

b. Clean Recorder and Preamplifier front panels and controls with a soft, lint-free cloth or a wax-impregnated polishing cloth.

CAUTION

IF A SOLVENT IS NECESSARY TO CLEAN THE PANEL, USE ONLY CHLOROTHENE OR ETHYL ALCOHOL. OTHER SOLVENTS, SUCH AS ACETONE OR ISO-PROPYL ALCOHOL, MAY REMOVE PANEL PAINT OR MARKINGS. IF THE PANEL MUST BE MARKED, FOR INSTANCE WITH CHANNEL IDENTITY, USE ONLY CHINA MARKING WAX CRAYON, OR COLOR-CODED EMBOSSING TAPE. DO NOT USE FELT, NYLON, OR BAMBOO-TIPPED MARKERS ON THE INSTRUMENT PANEL OR THE MARKING MAY DISCOLOR THE PANEL PAINT PERMANENTLY.

c. Pull the paper table out at the bottom (Figure 3-2, Step 1). Clean the surface of the paper table with Chlorothene solvent. Under bottom of the table, clean the metal pressure rollers with Chlorothene. At the bottom front of the Drive Unit, clean the rubber drive roller with Chlorothene (Figures 5-13, 5-15).

d. Carefully clean the writing and marker stylus with Chlorothene. Do not use steel wool or abrasive cleaning compounds. Be careful not to bend the styli vertically, they are easily distorted in the vertical direction.

5-18. Lubrication.

5-19. Minor lubrication should be performed during preventive maintenance. Major lubrication (minor lubrication plus gearbox) is done at overhaul and at regular intervals of 12 months or 2000 hours operation, if used mostly in the upper half of the speed range. If the Recorder is used mostly for low speed operation, more clutches are engaged and more reduction gears are used. Thus, a more frequent lubrication may be required, typically every 6 months or 1000 hours. To help assure uninterrupted service if an extended period of recording is anticipated, overhaul and lubricate the Recorder before placing it in service. Lubricants are listed in Table 5-2, lubrication points are shown in Figure 5-2.

5-20. ELECTRICAL CHECKS.

5-21. To check out the Model 8848A Power Supply, make the cable shown in Figure 5-3, and follow the steps in Table 5-3. To check out the 7758A or 7418A Recorder, follow the procedure in Table 5-4. To facilitate checking, make the cable shown in Figure 5-4. To support the Driver Amplifier or Regulator, Oscillator for testing, fasten the PC board test support shown in Figure 5-4 onto the rear of the heat sink with a No 10 nut (Figure 5-5).

5-22. ADJUSTMENTS AND MINOR REPAIRS.

5-23. Mechanical adjustments are confined to the drive and galvanometer assemblies. Paper drive minor repair and troubleshooting information is presented in Table 5-5. If necessary, galvanometer superficial parts may be replaced only to the extent indicated in the Replaceable Parts List. Do not attempt to disassemble the Galvanometer, but return it to Hewlett-Packard for service.

5-24. Paper Drive Adjustment

5-25. The rubber drive roller pulls paper over the table, where it is aligned by the paper guide. The paper is kept snug on the table by the paper brake felt, which presses the paper against the back of the platen. The paper is kept from slipping on the drive roller by two spring-loaded pressure rollers. To set up the Recorder so that run on the channel centerlines, the paper is first adjusted to run at the right edge of the paper guide, which is fixed in location. Then the stylus position for each channel is adjusted (see Table 5-4), the mechanical limit stops are adjusted, and the electrical limiters are adjusted.

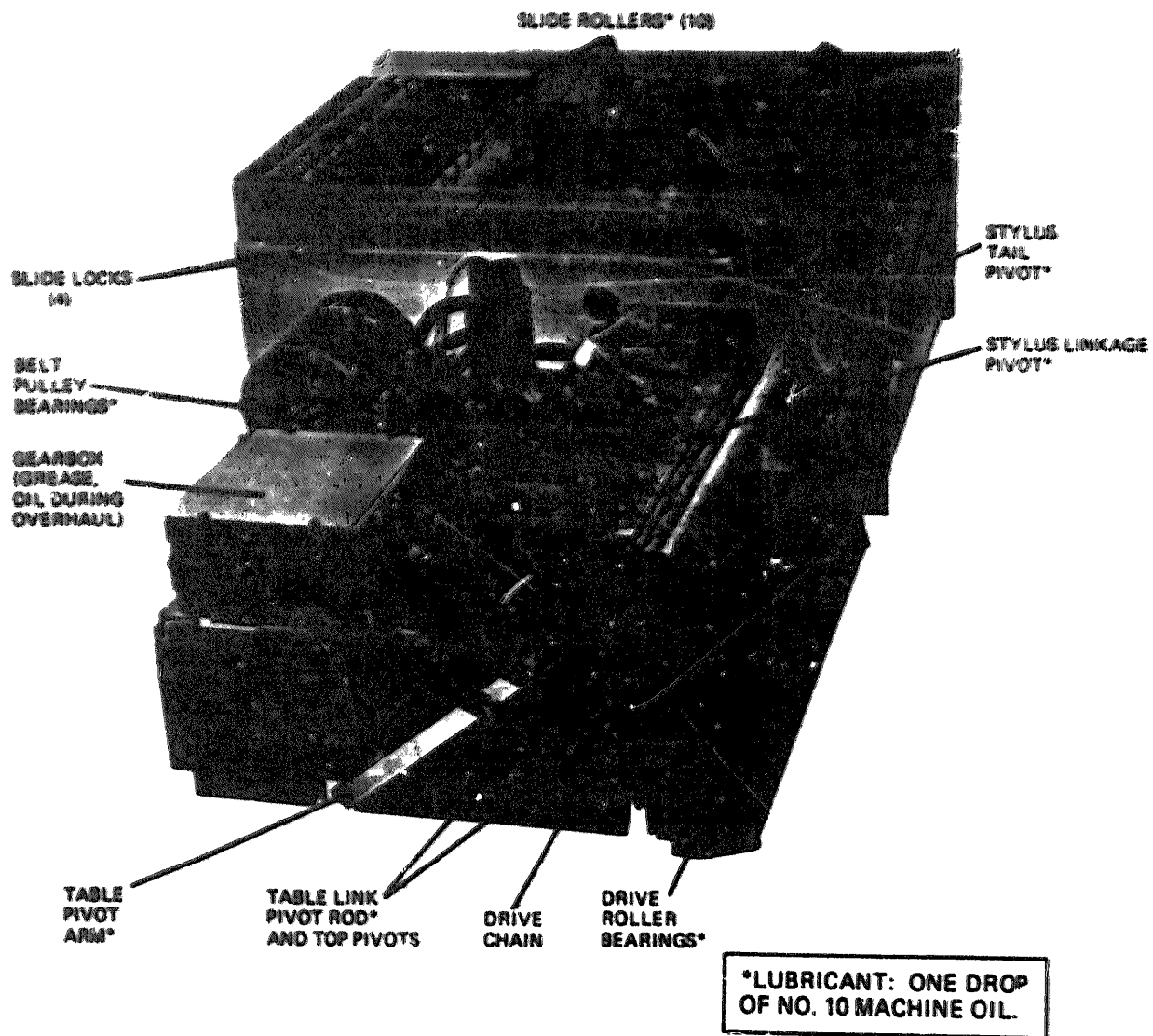


Figure 5-2. Recorder Lubrication Points (Typical)

Table 5-3. Performance Checks Model 8548A Power Supply

A. Power Supply Regulation.

NOTE

Remove power from system each time test probe is changed.

1. Install 6 or 8 typical 8800 Series Preamplifiers into power supply.
2. Connect cabinet power cable to ac power line through Variac and connect ac voltmeter to monitor input power to system. Be sure power is OFF at cabinet, or that power supply is unplugged.
3. Adjust output of Variac to 115 Vac.
4. Connect digital voltmeter to J33-B (see Figure 5-3) and J33-H at power supply rear.
5. Turn system power ON. Reading should be +12V, ± 20 mVdc. (Adjust R4 in power supply if necessary and lock into position.)
6. Increase line voltage from Variac to 127 Vac. Reading should be +12 V ± 140 mVdc.
7. Decrease line voltage to 103 Vac. Reading should be +12 V ± 140 mVdc.
8. Remove ac power from system at cabinet circuit breaker.
9. Connect digital voltmeter to J33-D.
10. Turn system power ON. Reading should be -12V ± 140 mV.
11. Increase line voltage at Variac to 125 Vac. Reading should be -12 V ± 140 mV.
12. Increase line voltage at Variac to 127 Vac. Reading should be -12 V ± 140 mV.
13. Return line voltage to 115 Vac, and disconnect digital voltmeter.

B. Power Supply Ripple.

1. Turn system power OFF at cabinet circuit breaker.
2. Connect oscilloscope to J33-B (+12 Vdc).
3. Turn system power ON at cabinet circuit breaker.
4. Ripple on oscilloscope should be not more than 10 mV peak to peak.
5. Turn system power OFF at cabinet circuit breaker.
6. Connect oscilloscope to J33-D (-12 Vdc).
7. Turn system power ON at cabinet circuit breaker.
8. Ripple on oscilloscope should be not more than 10mV peak to peak. Turn power OFF.

C. 440 Hz Oscillator.

1. Connect oscilloscope and frequency counter to J33-L.
2. Turn system power ON at cabinet circuit breaker.
3. The signal should be at least 14 volts peak to peak with a period between 2.16 ms and 2.39 ms. The frequency counter should read 440 Hz $\pm 5\%$ (between 418 Hz and 462 Hz). Turn power OFF.

D. 2400 Hz Oscillator.

1. Connect oscilloscope and frequency counter to J33-M.
2. Turn system power ON at cabinet circuit breaker.
3. The signal should be between 12.5 and 15.5 volts peak to peak with a period between 0.408 ms and 0.425 ms. The frequency counter should read 2400 Hz $\pm 2\%$ (between 2352 Hz and 2448 Hz).
4. Turn system power OFF.

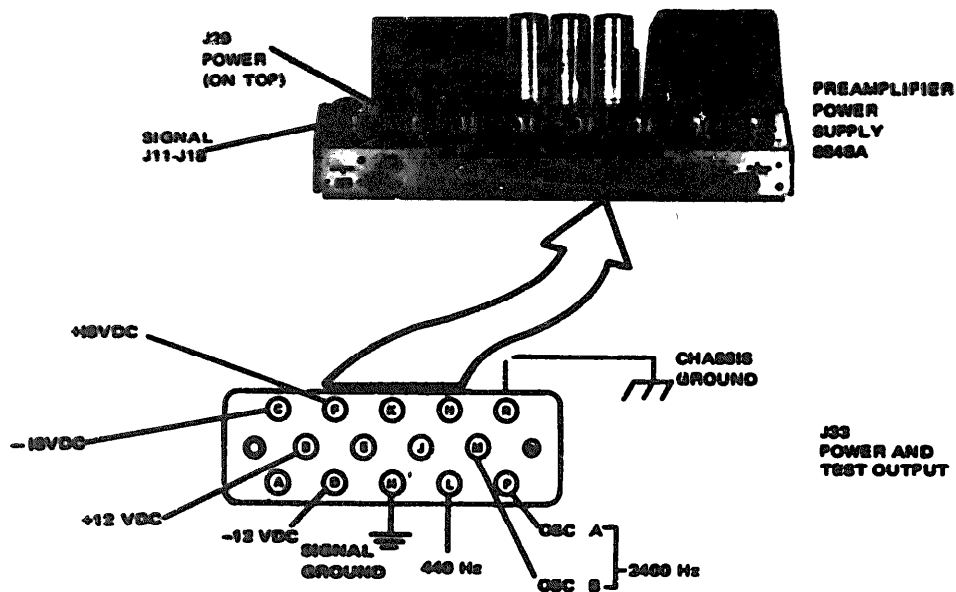
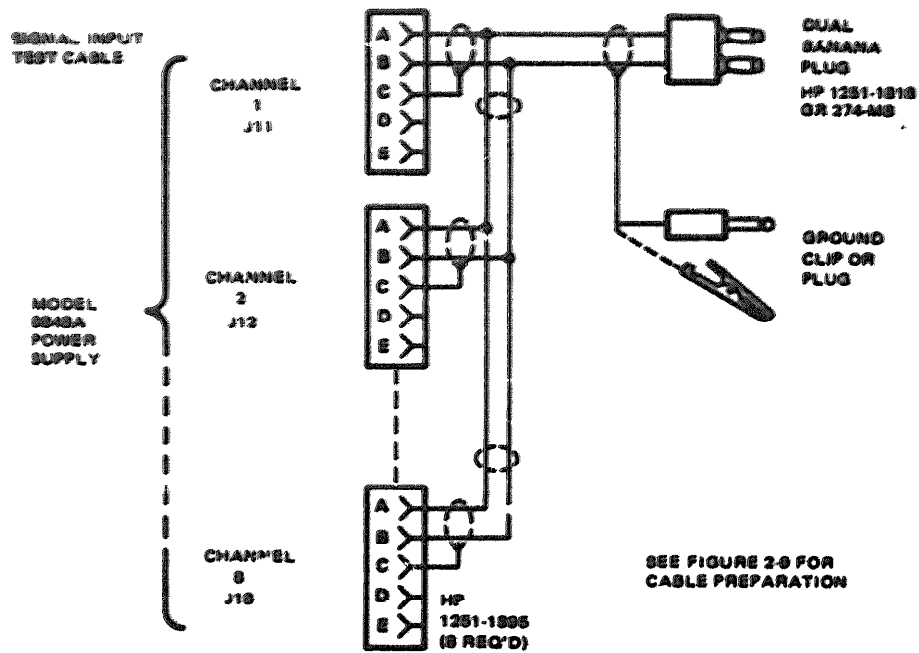
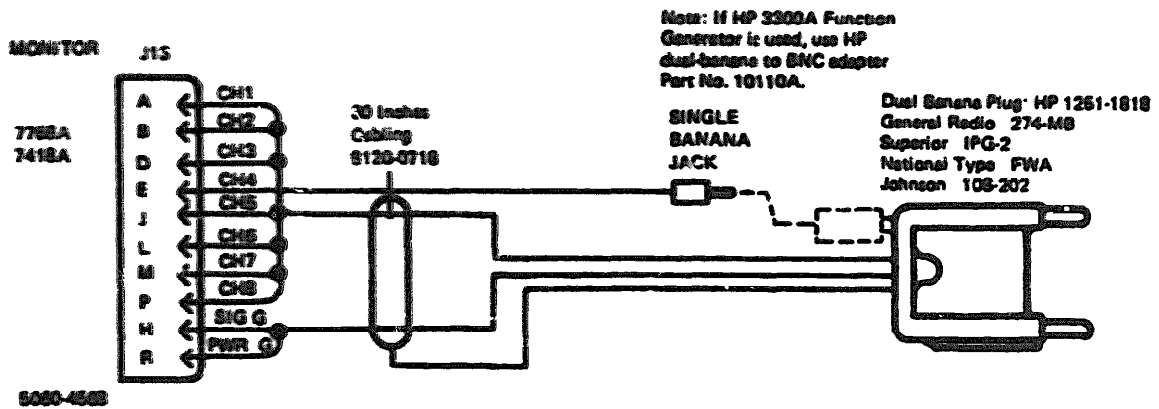
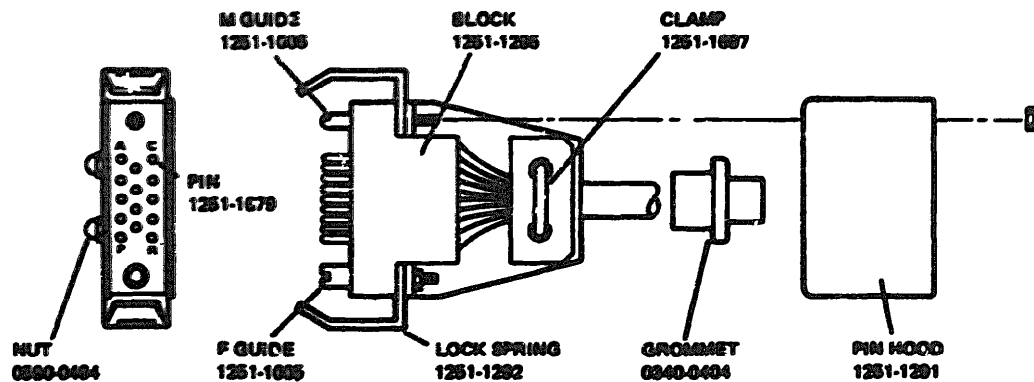


Figure 5-3. Preamplifier Power Supply 8948A, Power Test Points, Test Cable

RECORDER SIGNAL TEST CABLE



CONNECTOR 5080-4650 KIT
 (SAME AS REMOTE, FIGURE 2-7)



PC BOARD TEST FIXTURE 07754-00800

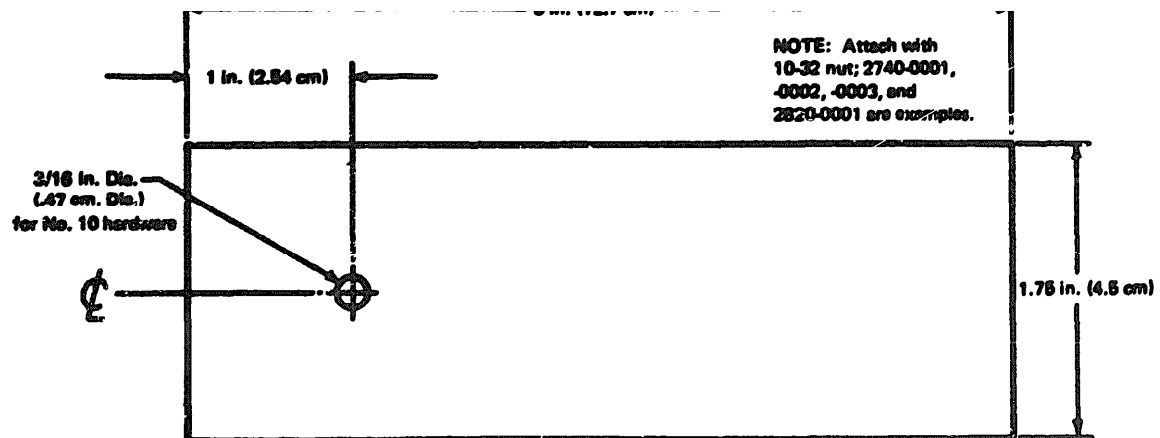


Figure 5-4. Test Cable and Fixture

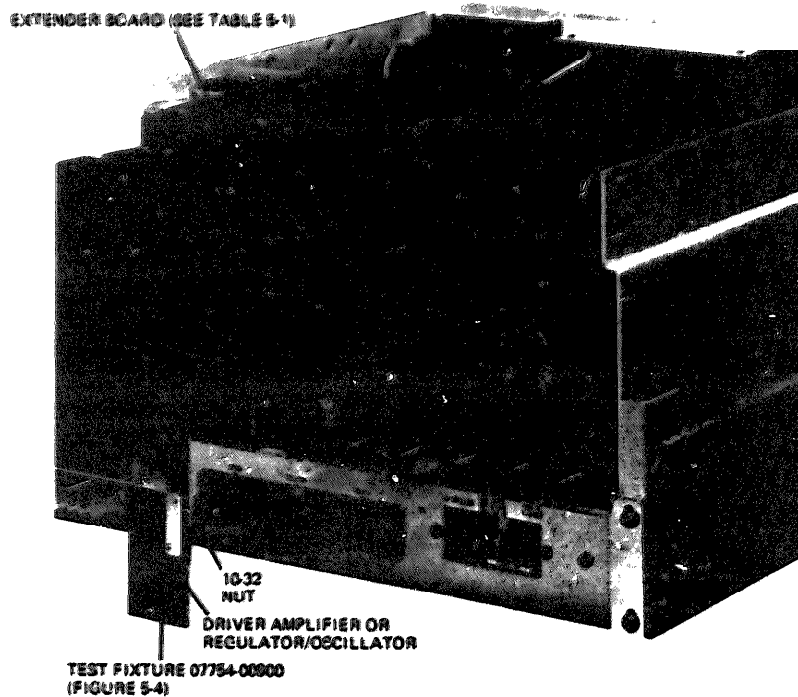


Figure 5-5. Driver or Regulator Board Test Setup

Table 5-4. Electrical Performance Checks and Adjustments for 7758A/7418A Recorder

Preliminary/ Recorder Set-up Procedure

- a. Push Recorder power ON-OFF switch so it pops out (OFF).
- b. Remove four screws securing the Recorder top cover (center brace); remove cover.
- c. Connect test cable to MONITOR connector J13. Remove preamp cable from Recorder J12. Connect free end of test cable to Function Generator (Table 5-1). Plug single jack into dual plug.
- d. Connect power cord of Recorder to variable autotransformer (Table 5-1). Set voltage dial to 115 Vac and push Recorder power switch so it stays in (ON).
- e. Set function generator to 0.1 Hz square wave. Set amplitude control fully counterclockwise (ccw).
- f. Rotate all eight channel STYLUS HEAT controls fully clockwise (cw) to increase heat to a maximum value. Set Recorder SPEED to 2.5 MM/SEC, and MODE to RUN.

A. UNREGULATED POWER SUPPLY CHECK

- a. Adjust Function Generator amplitude control

so stylus motion covers complete chart width (50 divisions on each channel).

- b. Connect DVM test probe to +20V test point (Figure 5-1) on Transfer Board, and ground. Voltage shown on DVM should vary as follows:

- (1) styli at left (top) of chart, about +19 Vdc.
- (2) styli at right (bottom) of chart, about +21 Vdc.

- c. Connect DVM test probes to -20V test point and to ground. Voltage shown on DVM should vary as follows:

- (1) styli at left of chart, about -21 Vdc.
- (2) styli at right of chart, about -19 Vdc.

- d. Set MODE switch to STDBY, and remove test signal cable.

- e. Move DVM test probe to -20V HEAT test point.

- f. Set SPEED switch to 50 MM/SEC, and MODE switch to RUN.

- g. DVM must read a greater negative voltage than -18 Vdc.

Table 5-4. Electrical Performance Checks and Adjustments for 7758A/7418A Recorder (Continued)

h. Set **MODE** to **STDBY**. Be sure oscillator/regulator (center) board is installed.

i. Move DVM test probe to +15V test point, and set **MODE** to **RUN**.

j. DVM must read $+15 \pm 0.5$ Vdc.

k. Set **MODE** and **STDBY**, and remove DVM test probe and ground wire. Reinstall top cover, which must be in place for proper alignment and operation.

B. REGULATOR/OSCILLATOR CHECK AND ADJUSTMENT

1. +12 Volt Regulator Check and Adjustment.

a. Push Recorder power switch so it pops out (OFF).

b. Remove regulator/oscillator board assembly from recorder.

c. As shown in Figure 5-5, install extender board and test fixture with No. 10 nut, 32 threads per inch. Install extender board and regulator/oscillator back into J9. Do not remove screw from No. 8 fiber washer, 7190-0780.

d. Set **SPEED** to 2.5 MM/SEC, **MODE** to **STDBY**, and **POWER** to **ON**.

e. Refer to Figure 5-6 and connect DVM probe to TP1 (+12 Vdc) and ground wire to ground on regulator/oscillator board.

f. Check DVM for reading of $+12 \text{ Vdc} \pm 30 \text{ mV}$, otherwise correct with R2 to same reading.

g. Vary ac line voltage with autotransformer to 103 and 127 Vac. DVM reading must not vary more than $\pm 30 \text{ mV}$. Return autotransformer output to 115 Vac.

h. Disconnect test probe at DVM and connect it to scope.

i. Set scope **INPUT** to **AC**, **SWEEP** to 5 msec/cm, and **SENS** to 5 mV/cm.

j. Ripple on scope waveform must not exceed 5 mV p-p.

k. Disconnect probe from scope and reconnect it to DVM.

2. -12 Volt Regulator Check.

NOTE: Only the +12 volt regulator is adjustable. The -12 volt regulator uses the +12 volt supply as a reference.

a. Connect DVM test probes to TP2 (-12V) and

ground. The DVM must read -12 ± 0.1 Vdc.

b. Change ac line voltage with autotransformer to 103 and 127 Vac. DVM reading must not vary more than ± 0.1 volt. Return line voltage to 115 Vac.

c. Disconnect test probe from DVM and connect it to scope.

d. Set scope **INPUT** to **AC**, **SWEEP** to 5 msec/cm, and **SENS** to 5 mV/cm.

e. Ripple on scope waveform must not exceed 5 mV p-p.

f. Disconnect probe from scope and from TP2 and ground.

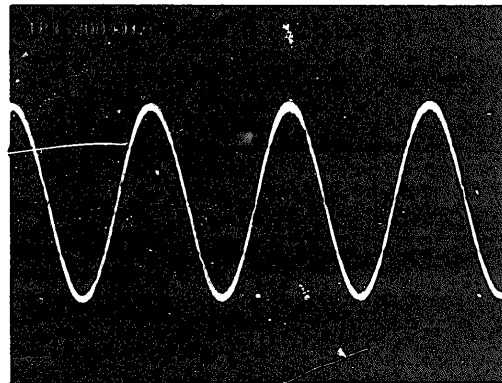
3. 200 KHz Oscillator Output Measurement.

a. Connect a 10:1 attenuator test probe to scope input.

b. Set scope controls as follows

INPUT	AC
SWEEP	2 $\mu\text{sec/cm}$
SENS	10 V/cm
TRIGGER SOURCE	INTERNAL +

c. Connect 10:1 test probe to 200 kHz output (TP3, Figure 5-6), and oscillator ground (TP8). Scope must show pattern in following photo.



d. Remove 10:1 probe from TP3 and from scope.

4. Input to Timing Generator

a. Reinstall 1:1 probe on scope in place of 10:1 probe.

b. Set scope controls same as in Step 3 except **SWEEP** to 10 mSEC/cm.

c. Connect scope between TP4 (24 Vac, 50 Hz or

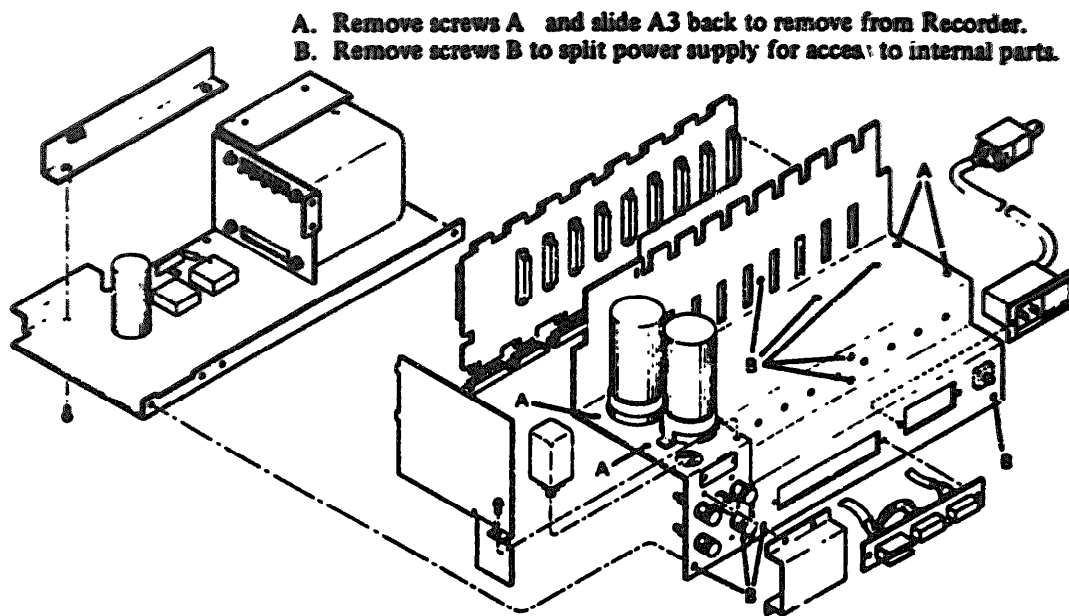


Figure 5-5A. Removal and Disassembly

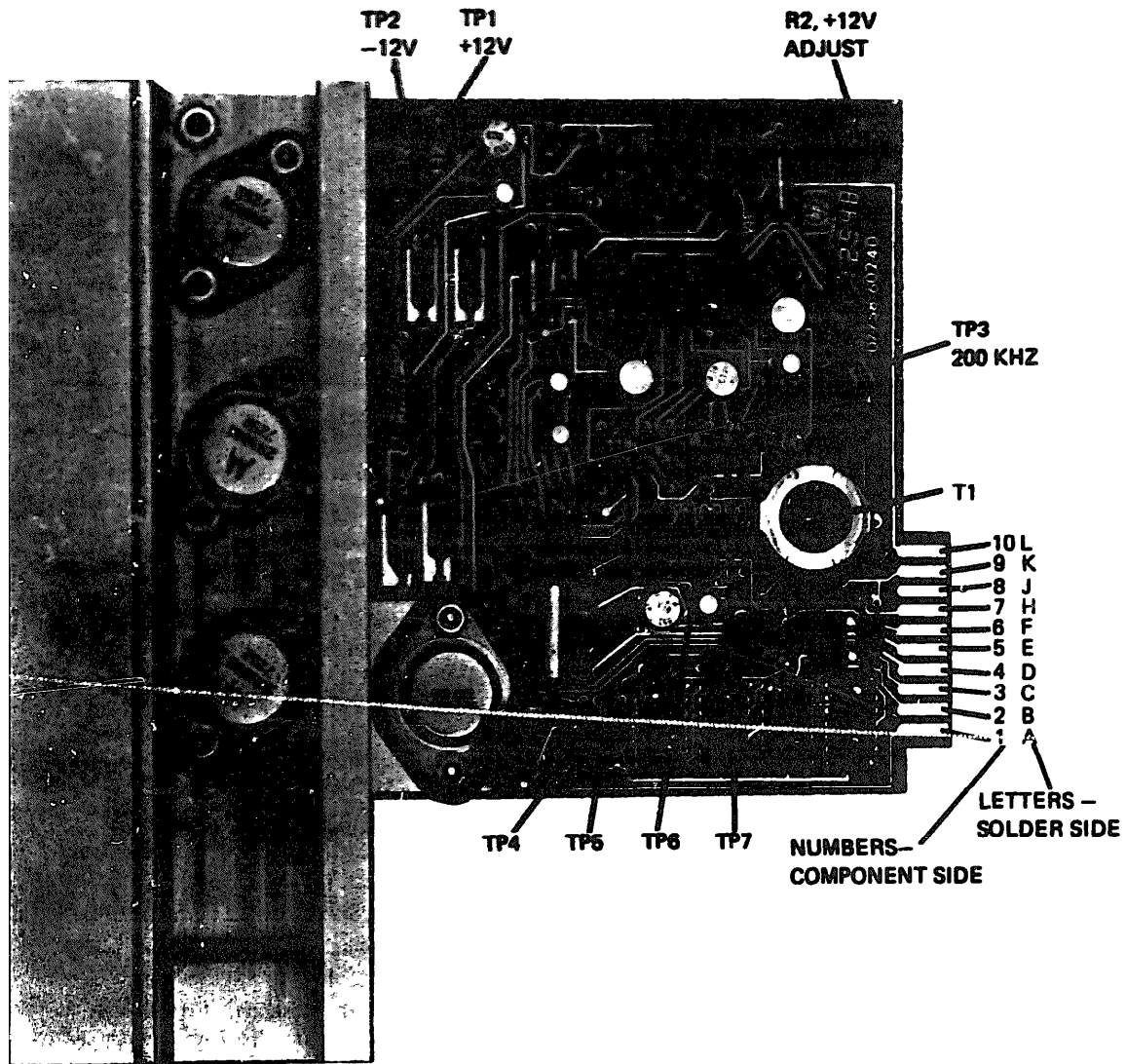


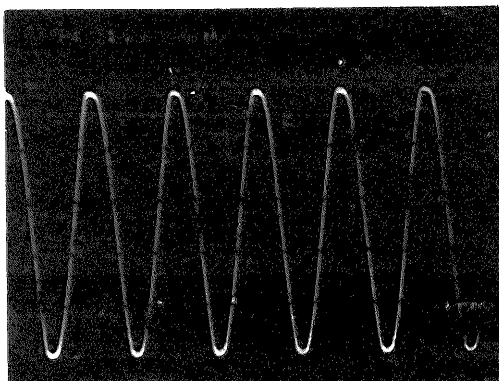
Figure 5-6. Regulator/Oscillator Board Test Points

Table 5-4. Electrical Performance Checks and Adjustments (cont.)

60 Hz), and power ground.

d. Scope must show pattern as in following photograph.

e. Remove scope probe from TP4.



5. Output of Timing Generator

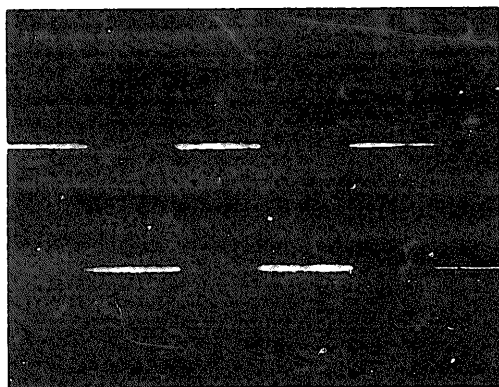
a. Set scope controls as follows:

Switch	Position
INPUT	DC
SWEEP	5 mSEC/cm
SENS	2V/cm

b. Connect scope (1:1 probe) between TP5 (collector of Q14) and power ground.

c. Scope must show a pattern as in following photograph:

d. Connect scope between TP6 and power ground.



e. Set scope controls as follows:

Switch	Position
INPUT	DC
SWEEP	1 SEC/CM
SENS	2V/CM

f. One pulse should appear on the scope every second (centimeter on the scale), of about +3.0V p-p.

g. Connect scope between TP7 and power ground.

h. Set scope SWEEP switch to 5 SEC/CM.

i. One pulse should appear every minute on scope, +3.0V p-p.

j. Set recorder POWER switch to OFF.

k. Remove extender board, Regulator/Oscillator board and support from Recorder. Remove extender and support from board.

l. Reinstall Regulator/Oscillator board into Recorder if satisfactory, otherwise make necessary repairs and retest.

C. POSITION AND GAIN ADJUSTMENTS (A2A1, Control Switch Board 07758-00270)

1. Position Control Adjustments.

NOTE: Figure 5-1 CHAN POS controls are only for trimming channels. To position stylus during operation, use preamplifier POSITION control. Adjust stylus mechanical center (Paragraph 5-32) and pressure (5-31) before this adjustment.

a. Unfasten control panel front and lift up. Disconnect preamplifier signals from Recorder input, J12.

b. Set Recorder SPEED switch to 2.5 MM/SEC.

c. Set MODE switch to RUN, Recorder power ON.

d. Adjust Channel 1 position (CHAN POS 1) control on control switch PC board through its complete range. Stylus 1 should be able to be positioned over ± 10 divisions each side of center.

e. Position stylus 1 to center of chart Channel 1.

f. Repeat steps d and e for remaining channels.

g. Set MODE switch to STDBY position.

2. Gain Control Adjustments.

a. Reconnect signal test cable (shown in Figure 5-4) to J13, and connect the dual banana plug to

Table 5-4. Electrical Performance Checks and Adjustment (cont.)

function generator (Table 5-1), OUTPUT, through HP dual to BNC adapter 10110A.

b. Set output of function generator to 1 Hz square wave, 5 volts p-p.

c. Set MODE switch to RUN.

d. Adjust Channel 1 GAIN control on A2 Switch Board for 50 divisions deflection (full scale).

e. Vary ac line voltage to 103 and 127 Vac. Deflection should not change by more than 0.25 div at both voltage extremes.

f. Repeat steps d and e for remaining channels.

g. Set MODE switch to STDBY.

3. Interechannel Crosstalk Check.

a. Unplug single male contact on dual GR plug of TEST cable shown in Figure 5-4.

b. Set MODE switch to RUN.

c. Check trace on chart channel 4. Trace should not vary more than 0.1 division, total.

d. Set MODE switch to STDBY.

e. Reconnect single male banana plug to test cable plug.

D. STYLUS MECHANICAL LIMIT ADJUSTMENT

a. Set Function Generator frequency to 1 Hz, and output to triangular waveform. set amplitude control to 10.0 volts p-p.

b. Set Recorder MODE switch to RUN.

c. Adjust LIMIT controls and (R) R13, Figure 5-7 inset) on each Driver Amplifier board fully clockwise. to cause all styli to travel at least 1.5 divisions beyond chart channel edge, for channels next to markers, and 3 divisions on all other channels.

d. Adjust Channel 1 right and left bumpers to limit travel of stylus to 2.5 divisions beyond top and bottom line of chart channel.

e. Repeat Step d for remaining chart

NOTE: Stylus travel beyond the edge of the grid must not interfere with any adjacent channel stylus or marker stylus when styli are at maximum excursion toward each other.

E. DRIVER AMPLIFIER ASSEMBLY ADJUSTMENTS. Install extender and support on driver as for the regulator/oscillator.

1. Electrical Limiting Adjustments.

a. Adjust Channel 1 LIMIT L control (R13, Figure 5-7) to limit stylus travel to 1.5 divisions beyond left line of chart.

b. Adjust Channel LIMIT R control (R9 Figure to limit stylus travel to 1.5 divisions beyond line of chart.

c. Repeat Steps a and b for remaining channels

d. Turn amplitude control of Function Generator so stylus travel stops at last grid line of chart top and bottom. Triangular waveform must not limit at either top or bottom of chart.

e. Set MODE switch to STDBY.

2. D

Push Recorder SPEED button for 100 MM/SEC speed.

b. Adjust Function Generator output to 1 Hz square wave.

c. Set Recorder MODE switch RUN.

d. Adjust Function Generator amplitude control to produce a 20 division deflection on Recorder.

e. Adjust Channel 1 DAMPING control (R30, Figure 5-7 inset) so overshoot on chart is between 0.5 and 0.8 division.

f. Set MODE switch to STDBY.

g. Repeat steps b to f for remaining channels.

3.

a. Set Function Generator to 10 Hz sine wave.

b. Push Recorder SPEED button for 5 MM/SEC.

c. Set MODE switch to RUN.

d. Adjust Function Generator amplitude control for a 10 division stylus deflection.

e. Switch Function Generator output from 10 Hz to 100 Hz and back to 10 Hz three times before reading deflection on chart.

f. Stylus must deflect 7.07 divisions (3 dB down) on chart.

g. Set MODE switch to STDBY.

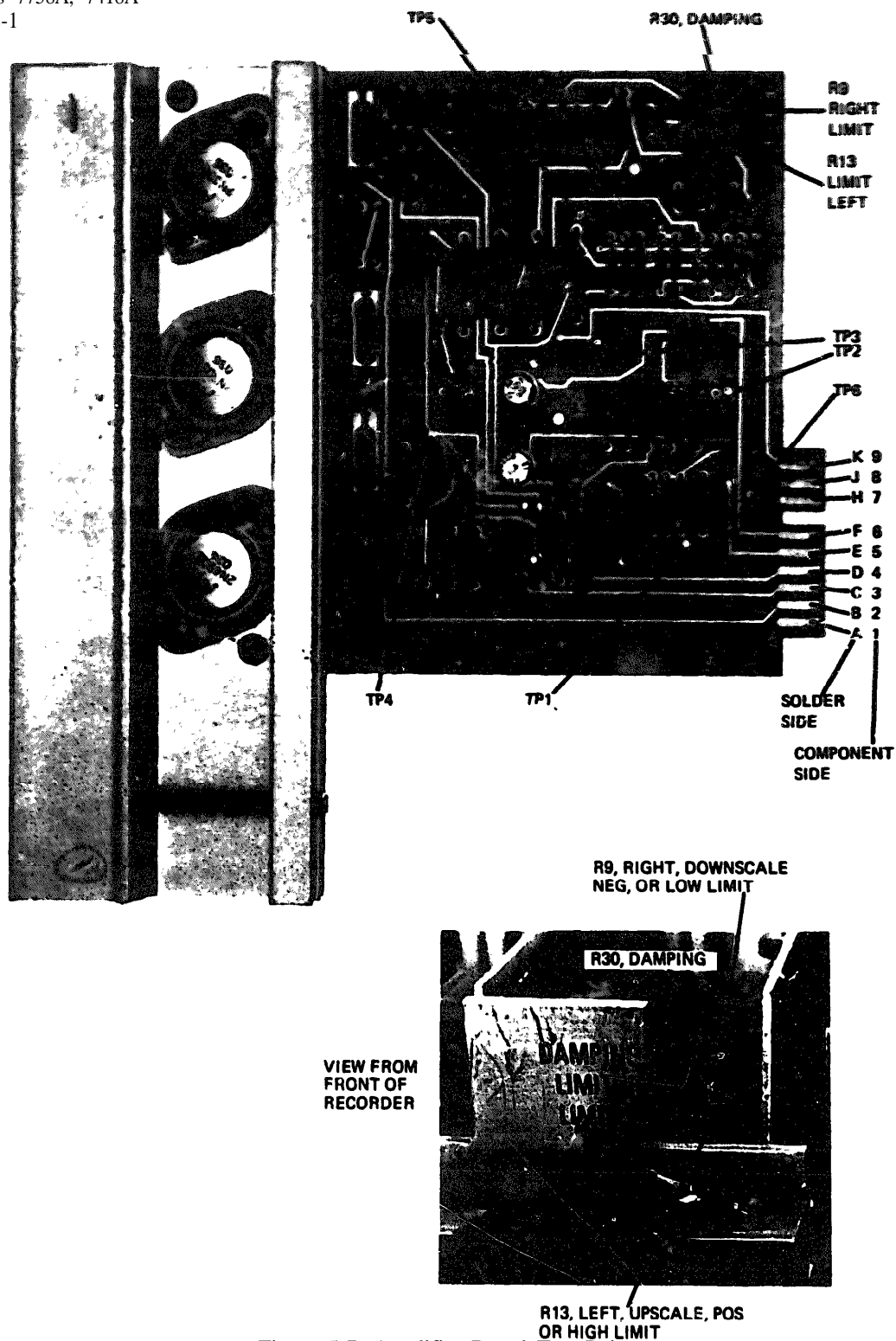


Figure 5-7. Amplifier Board Test Points

Table 5-4. Electrical Performance Checks and Adjustments (cont.)

h. Repeat steps a through g for remaining channels.

4. Dynamic Range Test.

a. Set Function Generator output to 5 Hz sine wave.

b. Set MODE switch to RUN, SPEED to 10 MM/SEC.

c. Adjust Function Generator amplitude control to produce full-scale (50 division) deflection on chart.

d. Set Function Generator output to 50 Hz sine wave; stylus deflection must be no less than 45 divisions.

e. Increase input signal no more than 20% to bring output back up to full scale.

f. Set MODE switch to STDBY.

g. Repeat steps a through f for remaining channels.

5. Linearity Check.

a. Set Function Generator output to 1 Hz triangular waveform.

b. Push Recorder SPEED button for 10 MM/SEC speed.

c. Set MODE switch to RUN.

d. Adjust Function Generator amplitude for full-scale stylus deflection.

e. Stylus must show less than ± 0.25 division deviation from straight line.

f. Set MODE switch to STDBY.

6. Signal Waveform Measurements.

a. Press Recorder POWER switch to remove power (OFF).

b. Remove Driver Amplifier Assembly (07754-60170) from channel to be tested.

c. Install extender board (07754-60920) and plastic support (07754-00900) on Driver Amplifier Assembly.

d. Install extender board, with Driver attached, to Recorder connector from which Driver was removed.

e. Press Recorder POWER switch to apply power (ON).

f. Adjust Function Generator output to 50 Hz sine wave.

g. Set scope controls as follows:

Switch	Position
INPUT	AC
SWEEP	5 MSEC/CM
SENS	0.5 V/CM

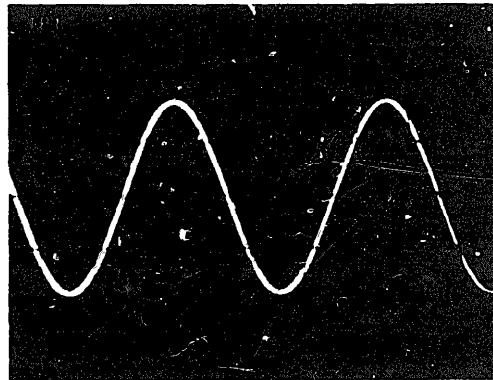
h. Connect scope between TP1 (Figure 5-7) and signal ground.

i. Push Recorder SPEED button for 2.5 MM/SEC.

j. Set MODE switch to RUN.

k. Adjust Function Generator amplitude for full scale stylus deflection.

l. Scope must show a pattern as in the following photo:



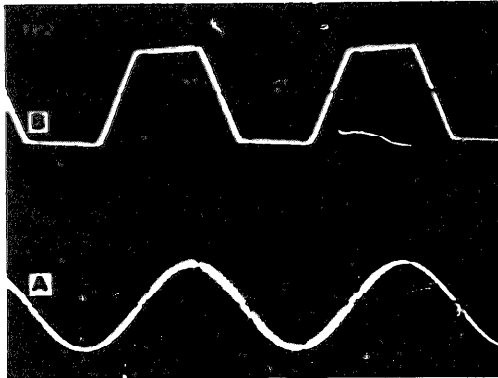
m. Connect scope between TP2 and signal ground.

n. Set scope SENS control to 10V/CM.

o. Scope must show pattern same as "A" in TP2 photo on the next page.

p. Turn Function Generator amplitude control clockwise to cause limiters to limit signal. Scope must show pattern same as "B" in TP2 photo on the next page

Table 5-4. Electrical Performance Checks and Adjustment (cont.)



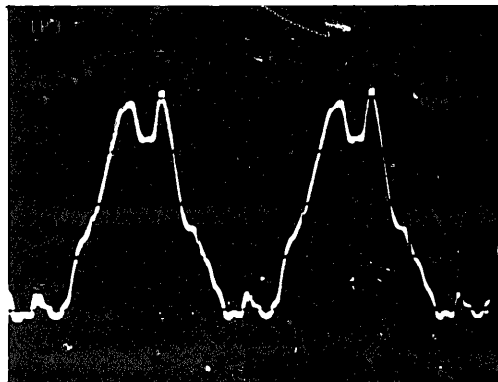
q. Turn Function Generator :mplitude control to produce full scale deflection on chart without limiting.

r. Set Recorder MODE switch to STDBY.

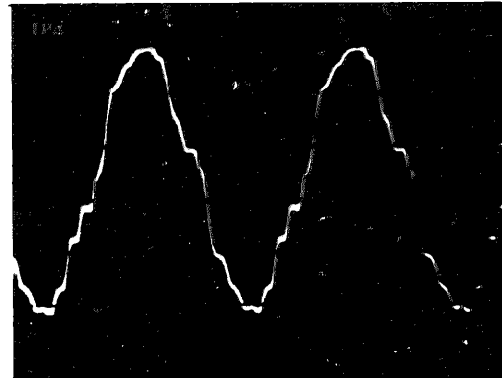
s. Connect scope between TP3 of Driver Amplifier and signal ground, and set Scope controls as follows:

Switch	Position
INPUT	AC
SWEEP	5 MSEC/CM
SENS	1V/CM

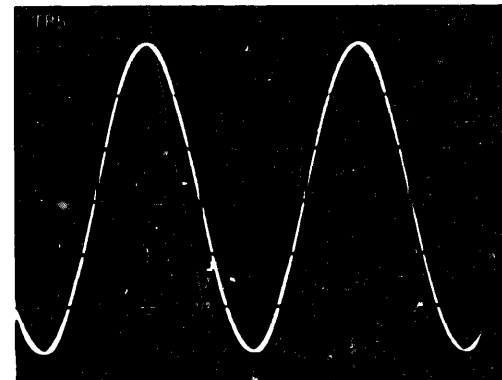
Scope should show pattern as in following photo:



t. Connect scope between TP4 and signal ground, and set scope SENS to 5V/CM. Scope must show pattern as in following photo:



u. Connect Scope between TP5 and signal ground, and set scope SENS control to 1V/CM. Scope must show pattern as in following photo:



v. Set MODE switch to STDBY and remove test cable from J13 on rear of Recorder.

7. Driver Heat Control Amplifier Check.

a. Connect Digital Voltmeter (DVM) between TP6 (Figure 5-7) and power ground.

b. Set all Recorder STYLUS HEAT controls fully clockwise.

c. Push Recorder SPEED button for .5 MM/SEC and set MODE switch to RUN.

d. Push Recorder SPEED buttons in sequence, and observe following readings on DVM; return MODE switch to STDBY for last reading

Table 5-4. Electrical Performance Checks and Adjustments (cont.)

SPEED MM/SEC	DVM	SPEED MM/SEC	DVM
.5	-6.4 Vdc	25	-9.8 Vdc
1	-6.4 Vdc	50	-11.0 Vdc
2.5	-6.4 Vdc	100	-11.9 Vdc
5	-7.7 Vdc	100	-11.9 Vdc
10	-8.4 Vdc	STDBY	-5.7 Vdc

e. Remove Driver board with its support and extender.

f. Remove extender and support from Driver board.

g. Reinstall Driver board into recorder if board is satisfactory.

5-26. **PAPER TRACKING ADJUSTMENT.** The Recorder should pull the paper snugly, but not tightly, over the paper table. Load paper into the Recorder and run it at 25 mm/second. The paper should settle at the right edge of the paper guide. If not, adjust the pressure roller spring tension as follows. Note that in this recorder, the paper brake adjustment is used only to give a slight rightward bias and to set the paper tension, Paragraph 5-28. Adjustment screws are shown in Figure 5-15.

a. Check that the paper table is aligned by tapping on each side. If it raps against the frame, tighten the setscrew on that side until it is stable. If screws are turned in too far, they will lift the pressure rollers away from the drive roller, causing paper slippage. Back screws out and readjust, if necessary.

b. Recheck the paper tracking. If the paper still does not settle properly, climbs the paper guide flange, or shows a weaving tendency, adjust the pressure roller tension by turning one of the pressure roller adjustment setscrews (Figure 5-15 inset). Clockwise rotation of the setscrew pulls the paper toward the setscrew.

5-27. **PAPER TIMING CHECK.** This test checks for roller slippage, using the timed marker to check paper speed accuracy. Since the marker is timed from line frequency and the drive motor is synchronized with line frequency, the paper speed and marker timing should coincide.

a. Set the timer to SEC, the speed to 25 MM/SEC, and the MODE switch to RUN. Turn on the Recorder. Run the Recorder for a little more than 5 seconds. It should have pulled exactly 12.5 cm of paper, within 1% (1.25 mm). Check again at 5 mm/sec and 100 mm/sec, allowing a maximum of 1% error.

b. If timing is now correct, check the position of the

table stop setscrews (Paragraph 5-26, a.), clean drive and pressure rollers with Chlorothene, recheck tracking and timing.

5-28. **PAPER TENSION ADJUSTMENT.** The paper should pull with 3 to 4 lb (1.36 to 1.81 kg) tension over the platen, and may be checked and adjusted as follows:

a. Disengage the paper from the drive roller as shown in Figure 5-8, then:

(1) Place your hand flat on the paper table and, pressing inward, try to slide the paper downward with the same hand. If the hand moves the paper without slipping, the tension is approximately correct. This test will usually be sufficient, since the tension is not critical.

(2) For a more accurate measurement, tape the exposed paper in a down-pointing V to prevent tearing, and pull the paper downward over the platen with a small spring scale.

b. If necessary, adjust the paper tension by evenly turning both adjustment screws (Figure 5-8) in to increase the tension, out to decrease it. When the proper adjustment is obtained, turn the left screw inward 1/4 to 1 additional turn.

NOTE: (1) If the tension cannot be increased to the correct range, remove the springs (A22MP22, MP23) and straighten them slightly, to establish a new "set". If tension cannot be reduced to the correct range, bend the springs slightly by pushing in from the front with a blunt pencil end.

(2) This adjustment should be straightforward, and not difficult or "touchy". If tension is hard to adjust, the felt may be compressed or worn, and thus need replacement. The felt (Part No. 07758-00160, designation A22MP8) may be removed by unfastening retaining clamp A22MP9, shown in Figure 5-8, and cleaning it and its adhesive from the brake bar. New felt need not have adhesive applied. Recheck the paper tension after installing new felt.

5-29. **Stylus Adjustments.**

5-30. The stylus pressure, mechanical centering and parallax may be adjusted. Mechanical stops are adjusted as part of the electrical maintenance procedures, as is galvanometer sensitivity, but the galvanometer itself has no adjustments.

5-31. **STYLUS PRESSURE ADJUSTMENT.** Stylus pressure must be checked at the tip of the stylus only, for accurate readings. For the proper position for the stylus pressure tester, see Figure 5-9.

WARNING

AC LINE VOLTAGE MAY BE EXPOSED ON THE UNDERSIDE OF THE CONTROL PANEL. TO AVOID SHOCK HAZARD OR SERIOUS PERSONAL INJURY, DO NOT CONTACT THE CONTROL PANEL PC BOARD OR WIRING WHEN THE RECORDER IS CONNECTED WITH LINE POWER.

- Swing up the Recorder front panel. Tighten one of the two pivot nuts to hold up the panel, if necessary.
- Run the Recorder at 5 mm/sec. Hook the 14023A Stylus Pressure Tester under the edge of the stylus tip. Lift the tester and stylus. When the stylus stops writing, the tester should read 20 ± 2 grams with respect to the top of the fluted ring.
- If pressure adjustment is required, turn adjusting screw (Figure 5-4).

CAUTION

DO NOT ATTEMPT TO BEND STYLUS.

- If stylus pressure cannot be adjusted, replace stylus (Paragraph 5-25), but only after observing whether stylus is properly mounted, and that pivot arm and retaining clip are locked on.

5-32. **STYLUS CENTER ADJUSTMENT.** Use the following procedure to center the writing stylus in its channel:

- Run chart paper at 25 mm/sec to find correct position on table. Unplug galvanometer cable to permit true mechanical centering (Figure 5-1).
- Loosen pivot arm clamp screw (Figure 5-11), but only enough so pivot arm moves on galvanometer upper suspension with a little resistance.
- Position stylus on exact channel mechanical center. Run chart paper to check stylus position, and correct if necessary. Do not bend stylus upward.
- Slide pivot arm so its upper surface is flush with top of upper coil shaft (Figure 5-11). Tighten pivot arm clamp screw firmly.

CAUTION

USE A SHARP-COIN WRENCH THAT WILL STAY IN SET SCREW HOLE WITHOUT APPLYING SIDE PRESSURE. IF NECESSARY, FILE STRAIGHT ACROSS WRENCH END TO REMOVE WORN PORTION.

- Reconnect galvanometer cable to transfer board assembly.

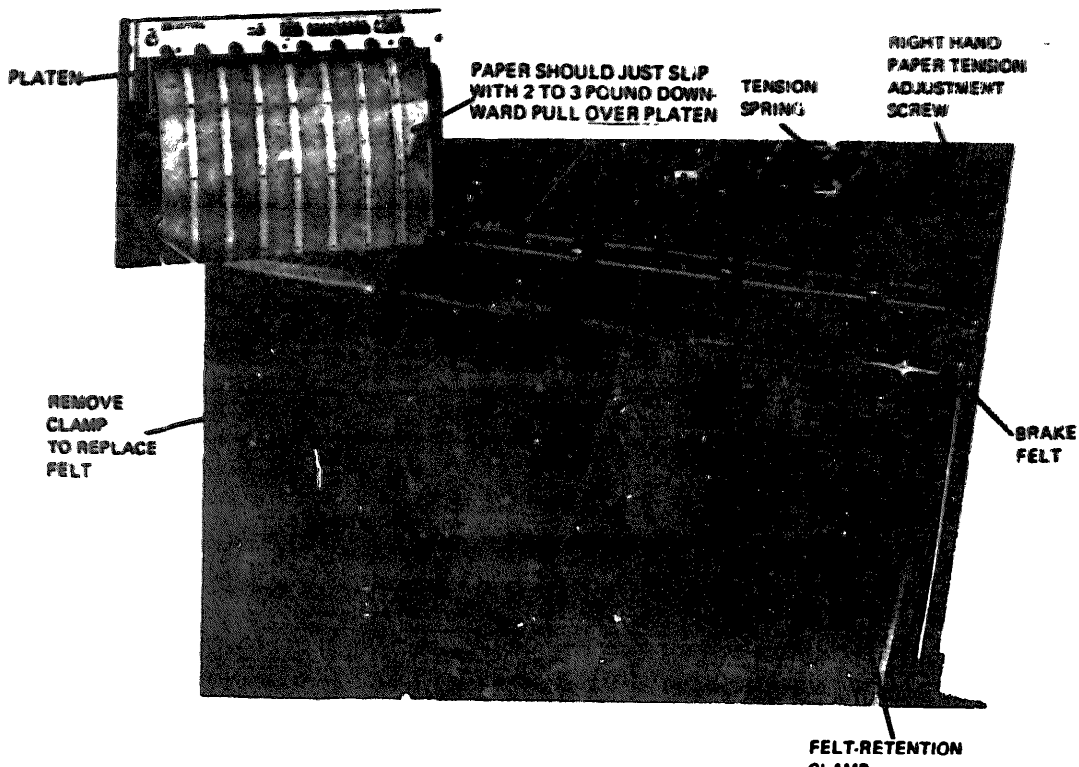


Figure 5-8. Paper Tension Adjustment

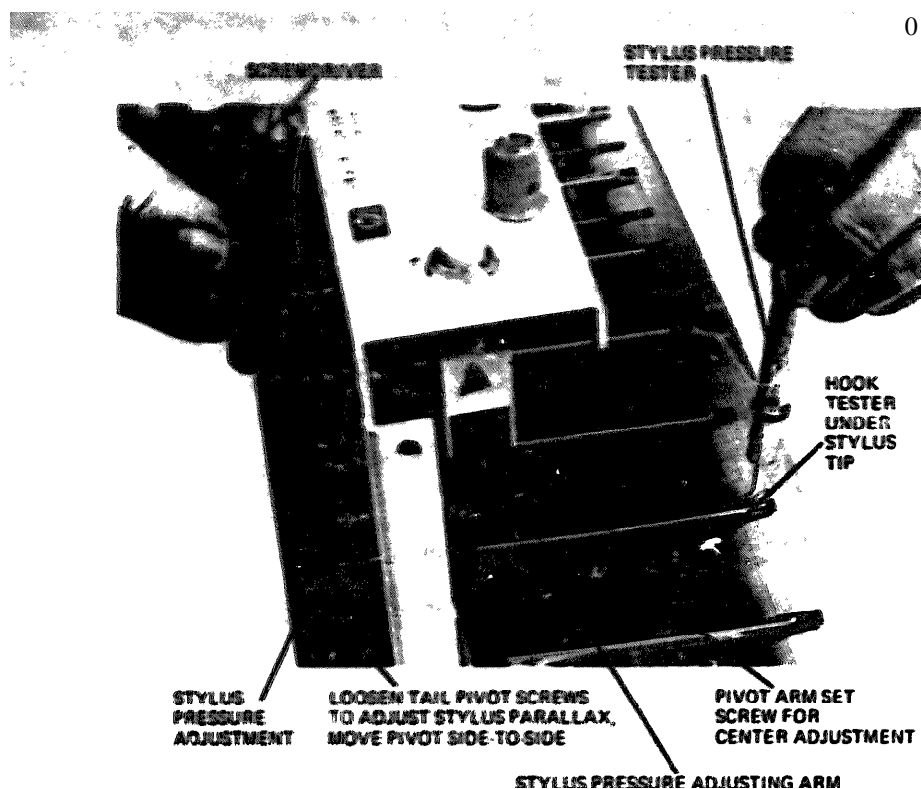


Figure 5-9. Stylus Adjustments

5-33. **STYLUS PARALLAX ADJUSTMENT.** When the stylus has proper parallax, the tail pivot and the stylus tip are on the same line as the chart channel centerline, with the result that square waves drawn by the stylus are exactly parallel to the chart time lines. To adjust the stylus parallax:

a. Loosen two screws indicated in Figure 5-9 and move stylus tail pivot into proper position. Tighten both screws snug but not tight.

b. Test for parallax by moving stylus gently with finger pressure, upscale and downscale, and observing whether stylus markings are parallel to time lines, 0.25 mm across width of each channel.

c. When adjustment is complete, tighten tail pivot screws.

5-34. **CHANNEL TIME SYNCHRONIZATION.** When all channels are synchronized with respect to time, all styli fall on the same time lines of the recording chart, ± 0.25 mm over the width of the entire recording chart. Stylus parallax may have to be readjusted (Paragraph 5-33) after synchronizing channels since galvanometer adjusting screws may have some side play. If necessary, the galvanometers can be lined up as follows (Figure 5-10):

NOTE: The Stylus Parallax Adjustment and Channel Time Synchronization procedure are test and alignment procedures for the galvanometer bank only. The specified test results assume that the chart paper exhibits no irregularity or weaving movement (see para 5-15c), which would displace the paper with respect to the styli. (NOTE continued at bottom of page 5-20)

a. Remove chart paper.

b. With a long Pozidriv® screwdriver, loosen 2 galvanometer hold-down screws (Figure 5-13) in each misaligned channel just enough so galvanometer can be moved backward with adjustment screw, or pulled forward by hand.

c. Adjust with adjustment screws until traces all fall on same time line. This adjustment is by trial and error since chart paper will interfere with adjustment. Retighten hold-down screws.

5-35. **OVAL AND REPLACEMENT.** The stylus is attached to the galvanometer pivot arm with a sliding retainer.

CAUTION

BE EXTRA CAREFUL IN REMOVING STYLUS SINCE IT IS EASILY BENT IN VERTICAL PLANE, ALTHOUGH IT IS EXTREMELY STIFF HORIZONTALLY.

To remove the stylus, perform the following procedure (Figure 5-11):

a. Using long nosed pliers and obtaining some leverage to limit travel of the pull, remove two heater wires from pins on galvanometer.



Note that setscrews only push galvanometers back; they must be pulled forward by hand.

Figure 5-10. Channel Time Synchronization Adjustment

b. Push retaining clip on pivot arm forward, toward Recorder front, as shown.

c. Grip stylus between center attaching pin and tail pivot.

d. Carefully lift stylus free of pivot arm and tail pivot while rocking stylus from side to side.

5-36. After stylus replacement, the tip of the new stylus must be made to conform with the exact angle of the paper surface. This angle varies slightly from stylus to stylus. Styli therefore should never be replaced without lapping.

5-37. **STYLUS LAPPING.** A new or replacement stylus must be lapped so it will have a uniform trace width as it moves across the paper.

a. Connect 30 Hz sine wave signal to input of channel. Run recorder at .25 mm/sec speed, and adjust signal amplitude for about 10 divisions deflection. Stop recorder.

b. Place a piece of lapping paper (07850-01520) under stylus tip so it spans center 10 divisions. Hold lapping paper with one finger on each side of stylus so paper is exactly flat. (Figure 5-12.)

c. Run recorder at .25 mm/sec, slowly moving paper under the stylus tip. Lapping time should be about 15 seconds. Turn off recorder and remove lapping paper.

(NOTE contd): Chart drive and paper irregularities are therefore additive to the test specifications and should be excluded from the results of the test and adjustment procedures.

d. Lapping is complete when stylus leaves uniform trace across entire channel width. Check stylus pressure, as described in Paragraph 5-31. Do not lap excessively since the stylus tip is tapered and will leave a progressively wider trace.

NOTE: The new stylus tip should be on the same time line as the other stylus, ± 0.25 mm, otherwise adjust channel time synchronization, Paragraph 5-34.

5-38. CORRECTIVE MAINTENANCE.

5-39. Instructions for removing and replacing Power Supply Assembly A3 and Driver Amplifier Assemblies A4, A5, A6 and A7 are given in the electrical performance test in Table 5-4. Corrective maintenance procedures cover:

- Galvanometer Removal and Replacement
- Drive Unit Removal and Replacement
- Paper Table Removal and Replacement
- Gearbox Removal, Lubrication and Replacement
- Marker Assembly and Adjustment.

5-40. Galvanometer Removal and Replacement.

5-41. To remove a Galvanometer, perform the following procedure:

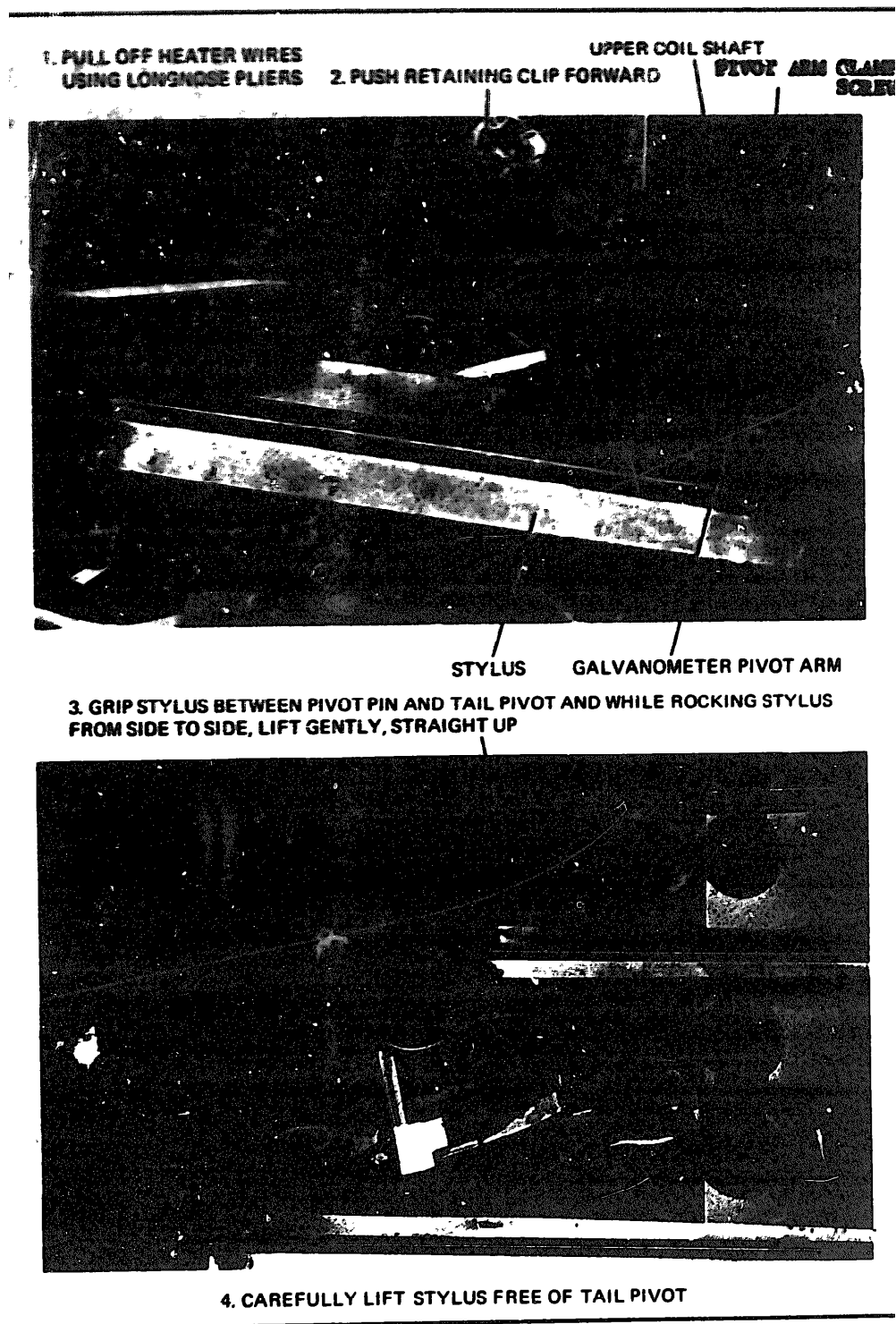


Figure 5-11. Stylus Removal and Replacement

Pressure: 20 grams \pm 2 grams
Signal: 30 Hz sine wave
Amplitude: 10 div deflection
Speed: 0.25 mm/sec
Lapping Time: 15 Seconds
Lapping Paper: 07850-01520 (fine)

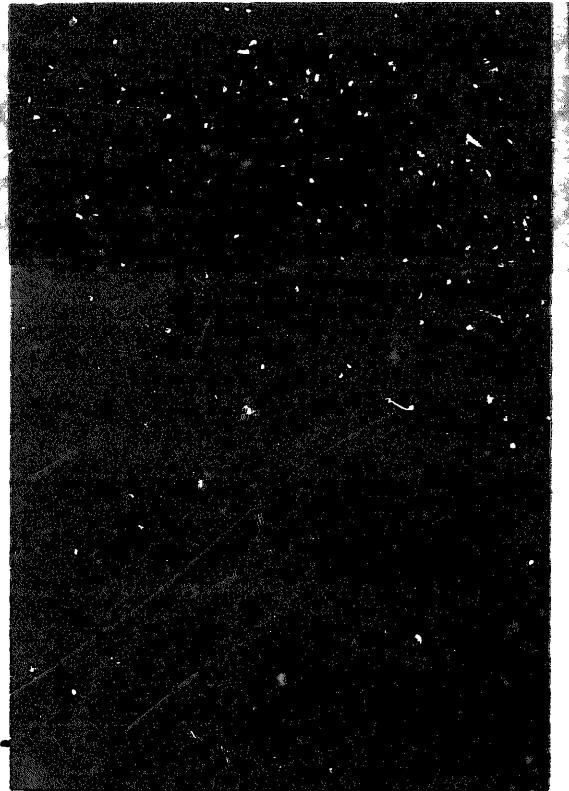
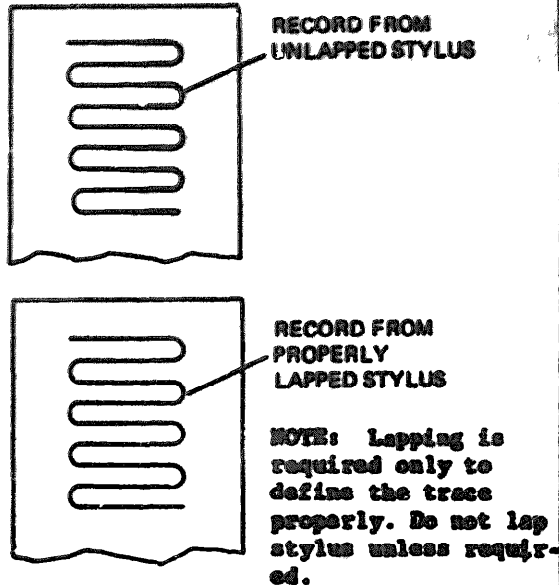


Figure 5-12. Stylus Lapping Procedure

- Remove any marker assemblies attached to Galvanometer, following procedures in Paragraph 5-61.
- Remove galvanometer cable W1 from PC edge connector on Transfer Board Assembly.
- Pull out paper table at bottom, open fully.
- Remove pack of paper from feed tray.
- Remove stylus from Galvanometer (Paragraph 5-35).
- Pass a screwdriver up through galvanometer mounting screw access holes (Figure 5-13) and unfasten two galvanometer mounting screws. Remove timing sync set screw (Figure 5-10).
- Carefully lift Galvanometer free of mounting.

5-42. Replacement of the Galvanometer is the reverse of the removal procedure. Always check the Galvanometer synchronization (position) with respect to the chart timing lines (Timing Sync, Paragraph 5-15, part d) after replacement. Faulty parallax may be corrected with the time synchronization procedure in Paragraph 5-34.

5-43. Drive Unit Removal and Replacement.

5-44. The Drive Unit must be removed to replace the drive roller, and to service the paper table, motor chassis, gearbox, or galvanometers. To remove the drive unit, first take the recorder out of the benchtop case, or fully extend the recorder (Figure 2-1) from a cart or cabinet. Place a table under it to receive the drive unit. Right and left are defined as you face the recorder. (Figure 5-14).

WARNING

AC LINE VOLTAGE IS EXPOSED ON UNDERSIDE OF CONTROL PANEL. DISCONNECT RECORDER FROM LINE POWER BEFORE REMOVING THE DRIVE UNIT.

- Separate the control panel and its wiring from the drive unit:

(1) Unplug the marker cables from the control switch PC assembly. Note that the small connectors each have a key that lines up with a dot on the printed circuit board, for orientation.

CAUTION
RECORDER IS SHOWN TIPPED UP
FOR ILLUSTRATION ONLY. DO
NOT TIP RECORDER WHILE
REMOVING DRIVE UNIT SCREWS.

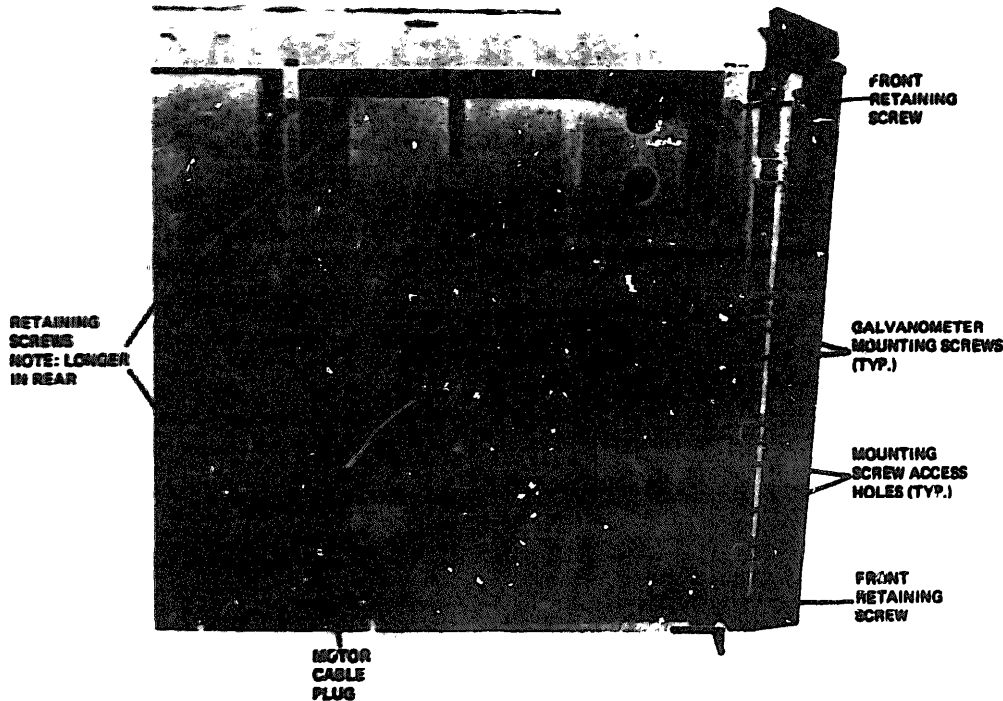


Figure 5-13. Drive Unit and Galvanometer Mounting Screws

(2) Unplug the galvanometer cables; bunch them to prevent catching.

(3) Unplug the gearbox speed control cable from the PC board and slip it out of the cable ties on the left unit housing side plate.

(4) If MM/MIN unit only, remove motor chassis terminal block cover, and mark on the chassis the location of the blue wire (MM/MIN motor) the green wire and the violet wire (MM/SEC motor). Remove these wires (flag terminals) from the terminal block. Small screws are easily lost; do not drop into Recorder.

(5) Unfasten the two screws that hinge the control panel to the unit housing side plates, lift the panel, and place it back on the driver amplifiers.

b. Remove two screws from the bottom of the unit housing front crossbar, and two from the bottom of the rear crossbar. Note that the longer screws are at the rear.

WARNING

DO NOT REMOVE DRIVE UNIT IF YOU HAVE SPINE OR BACK TROUBLE. GET HELP IF NECESSARY. THE DRIVE UNIT WEIGHS 62 POUNDS (28 kg). BE PREPARED TO BEND OVER AND SUPPORT THIS WEIGHT WHEN LIFTING THE DRIVE UNIT FREE OF THE

RECORDER. ALSO, REMOVE WRISTWATCH, IF WORN, BEFORE THE NEXT STEP, TO AVOID DAMAGING THE CRYSTAL OR MAGNETIZING PARTS OF THE WATCH MOVEMENT.

c. Place both hands, palm up, to the paper compartment, as far back as the motor chassis, as shown. Lift the drive unit free of the front crossbar. Only slide it forward approximately six inches. Hold the drive unit steady with one hand.

d. Reach in back of the drive unit and unplug the two-contact motor connector from the bottom of the power supply.

WARNING

DO NOT BALANCE THE DRIVE UNIT ON THE FRONT CROSSBAR UNATTENDED WHEN UNPLUGGING THE MOTOR CONNECTOR, SINCE THE DRIVE UNIT IS NOW UNSUPPORTED AT THE REAR.

e. With one hand supporting the drive unit under the motor chassis and the other under the galvanometer bank, lift the unit clear of the recorder and onto a table.

5 - 4 5
removal.

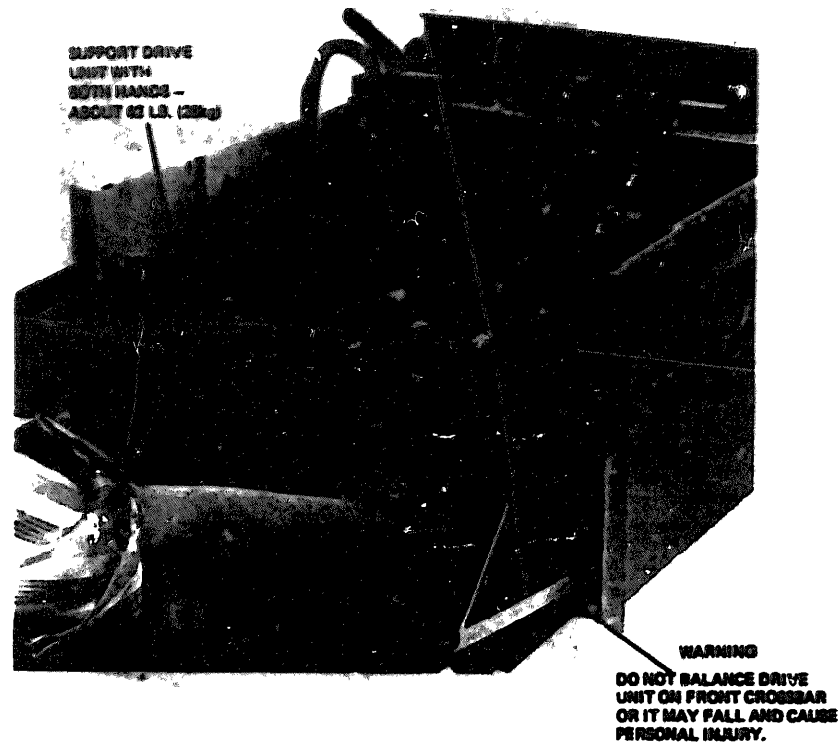


Figure 5-14. Drive Unit Removal and Replacement

5-46. **Paper Table Disassembly.**

5-47. **Paper table disassembly** progressively leads to platen replacement, pressure roller replacement, and drive roller replacement. The drive unit assembly needs to be removed only to service the drive roller (Figures 5-14, 5-15).

5 - 4 8 **PLATEN REPLACEMENT.** To replace the platen, release the paper table top from the recorder as follows:

- a. Using snap-ring pliers, remove the snap rings securing the pivot arm ends to the top of the paper table. Remove the spring links and pivot arms from the top pivot, and spring the ends of the pivot arm outward to remove them.
- b. To remove pressure from the platen, loosen the screw at the top center of the paper table. The platen cover then may be forced off its core. A replacement platen cover should line up with the outer edge of the paper guide flange, at the right side of the paper table.

5-49. **PRESSURE ROLLER REPLACEMENT.** To service pressure rollers and associated parts, continue with the paper table disassembly as follows:

- a. Do 5-48, Step a.

b. Spread the sides of the table link, as shown, with slight pressure. Then, while holding the link pivot rod toward the opposite side (do not bend rod), spring the link off the rod.

c. To remove the twin pressure rollers from the table bottom, remove two springs; slide the center rod out. Spring the rollers out of their bearings.

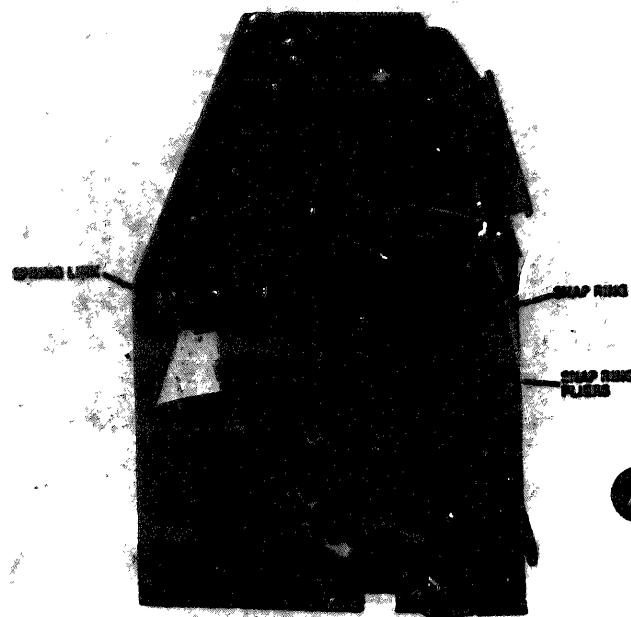
5-50. **DRIVE ROLLER REPLACEMENT.** With the drive unit out of the recorder, continue with the paper table disassembly as follows:

- a. Do 5-48, Step a; 5-49, Step b.

b. Loosen the four screws holding the motor chassis to the drive unit side plates and slide it forward a little to slacken the chain. Roll the chain off the gearbox output sprocket.

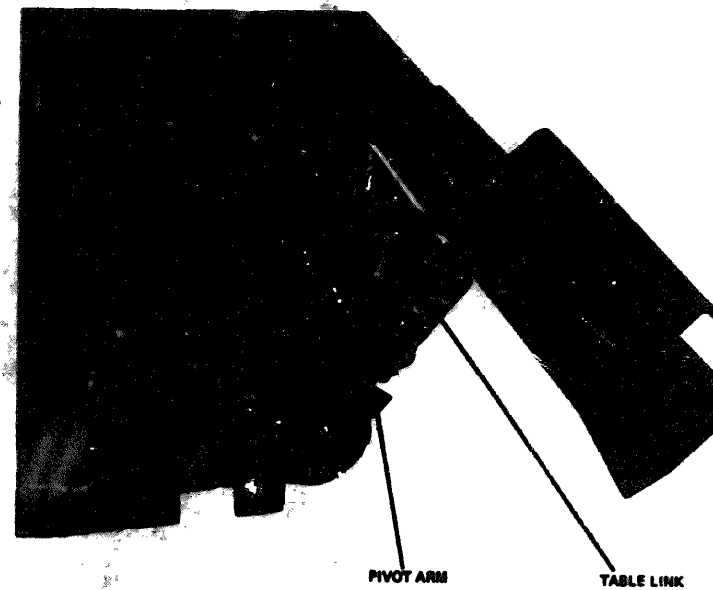
Remove the screw and standoff holding the chain guard at the drive roller sprocket, and pivot the guard down and to the left.

d. (Loosen the drive roller sprocket setscrew (No. 8 spline wrench). Remove sprocket and 0510-1051 shaft key being careful not to lose the key. Count the number of shim washers, if any are required for chain alignment.



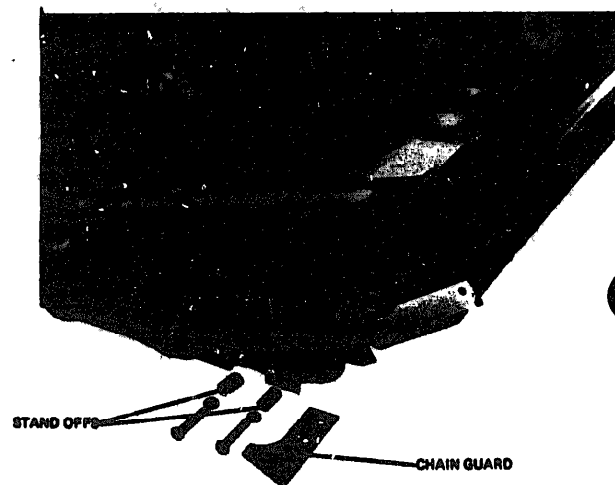
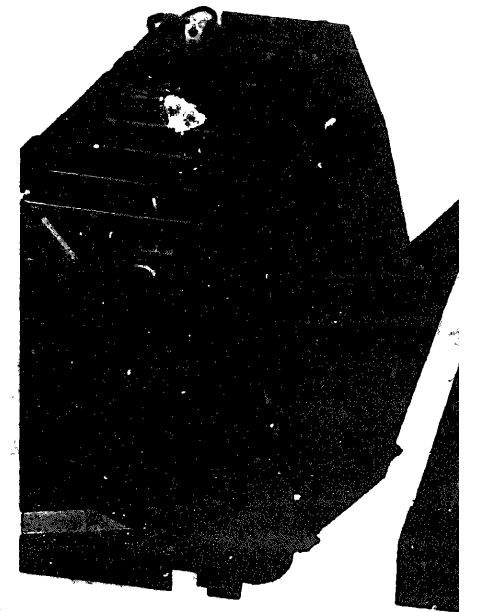
A

REMOVE HINGE
SNAP RING



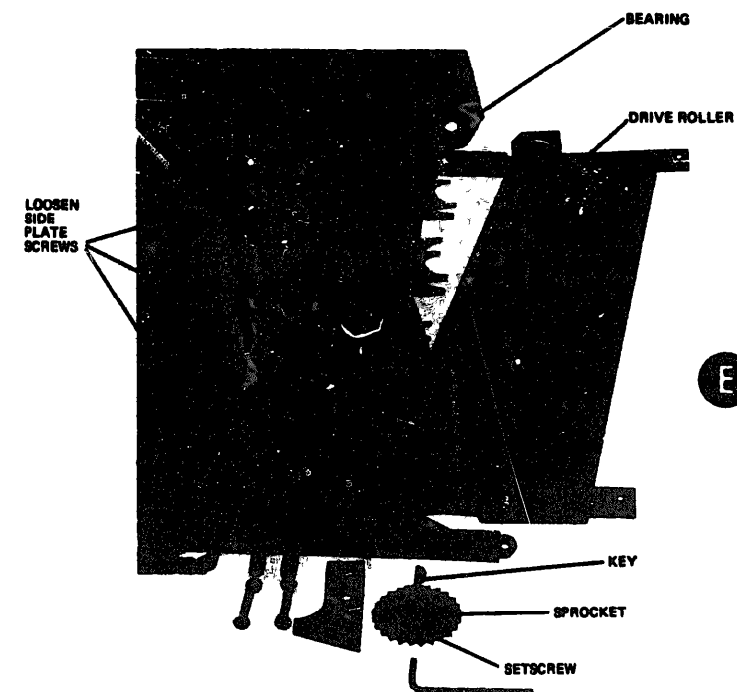
B

GENTLY PRY TABLE
LINK OFF RETAINING
ROD



D

REMOVE CHAIN GUARD
AND STAND OFFS.
MOVE GEAR DRIVE
ASSEMBLY FORWARD TO
SLACKEN CHAIN, AND
SLIP CHAIN OFF SPROCKET



E

REMOVE DRIVE ROLLER
SPROCKET KEY.
LOOSEN SIDE PLATE
SCREWS AND SPRING
PLATE AWAY FROM
BEARING. PULL
ROLLER FORWARD.

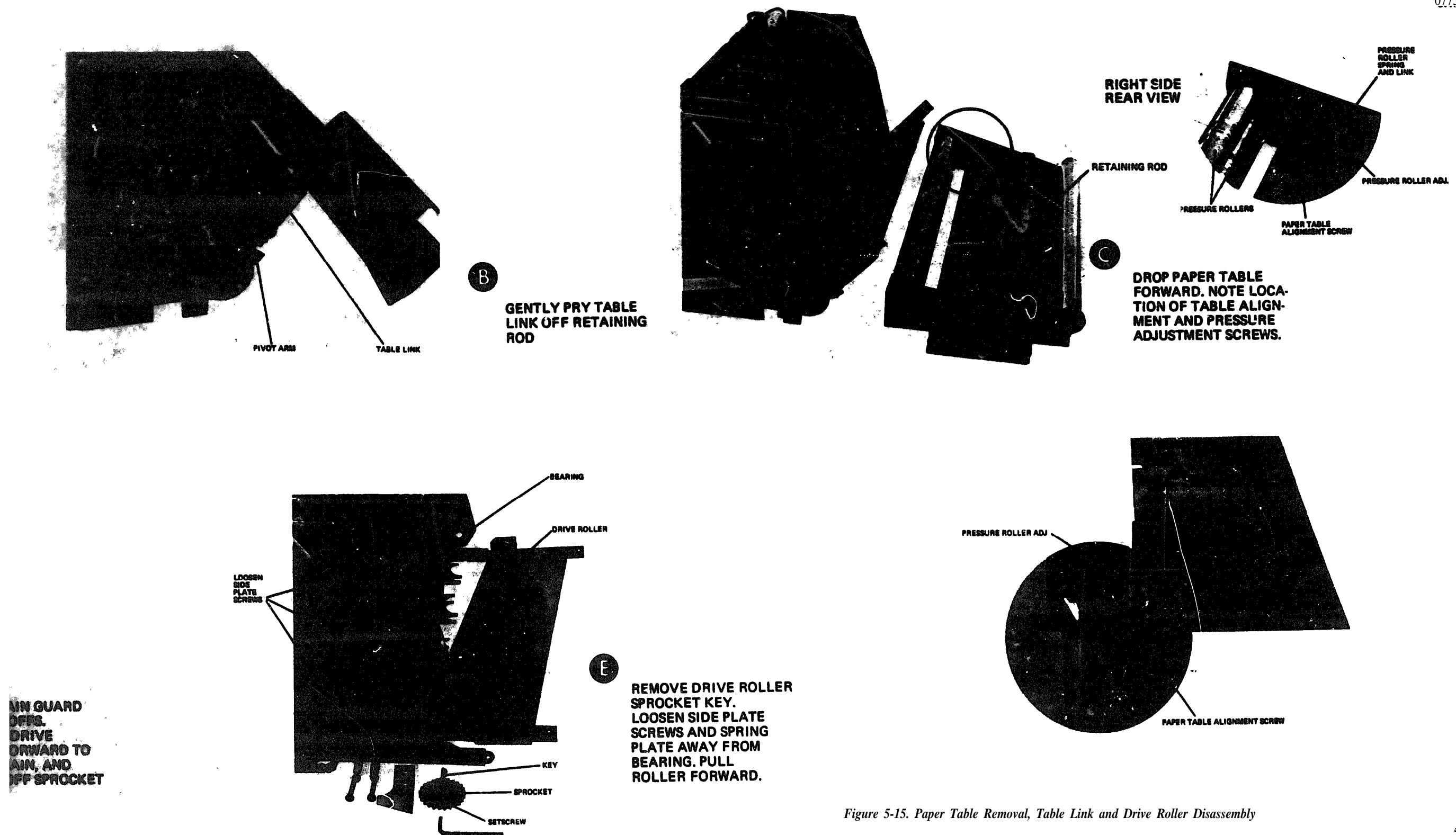
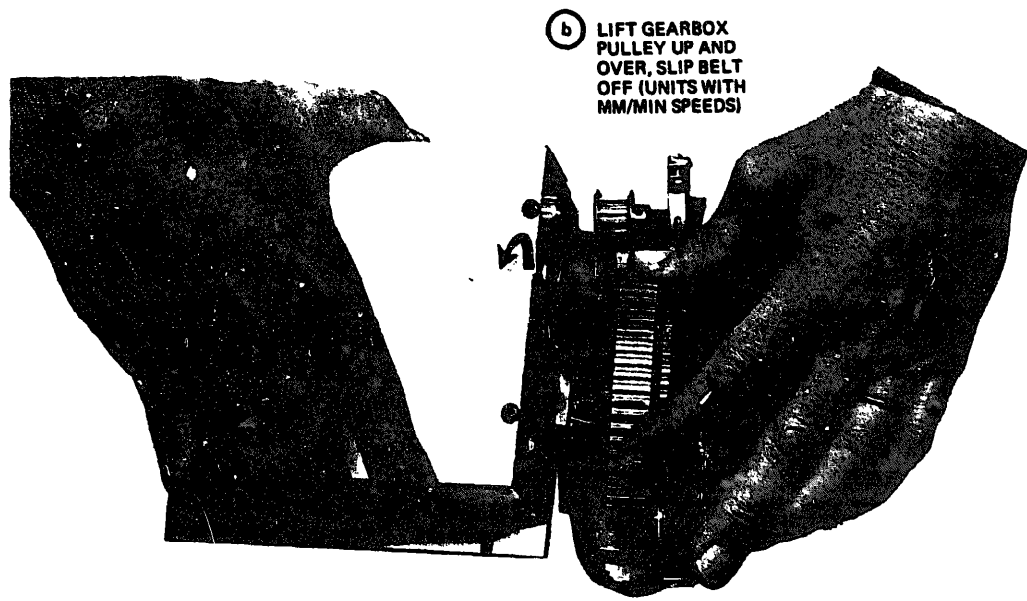
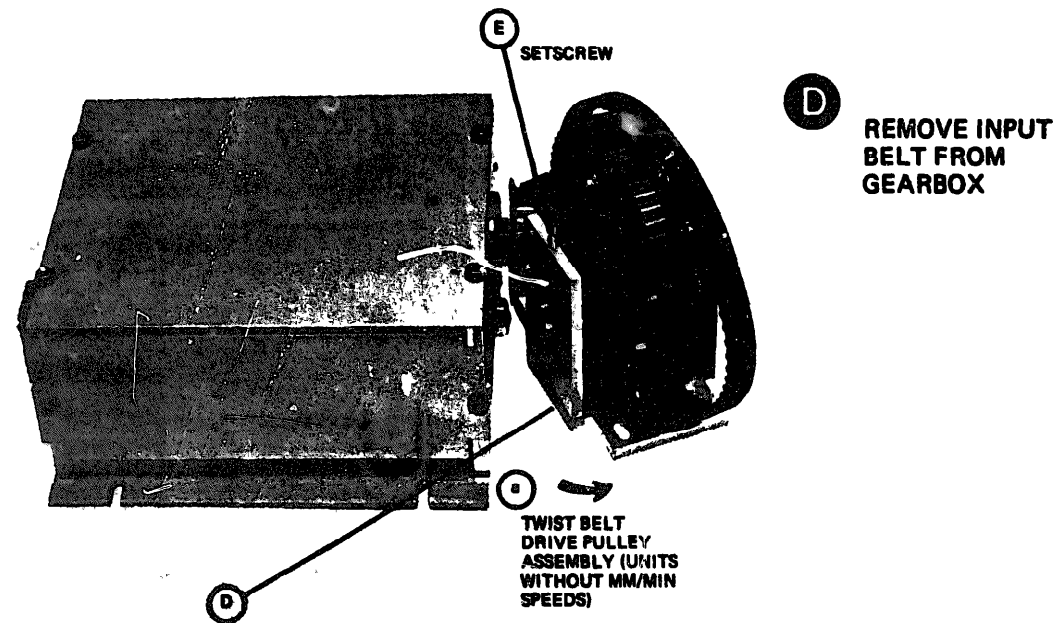
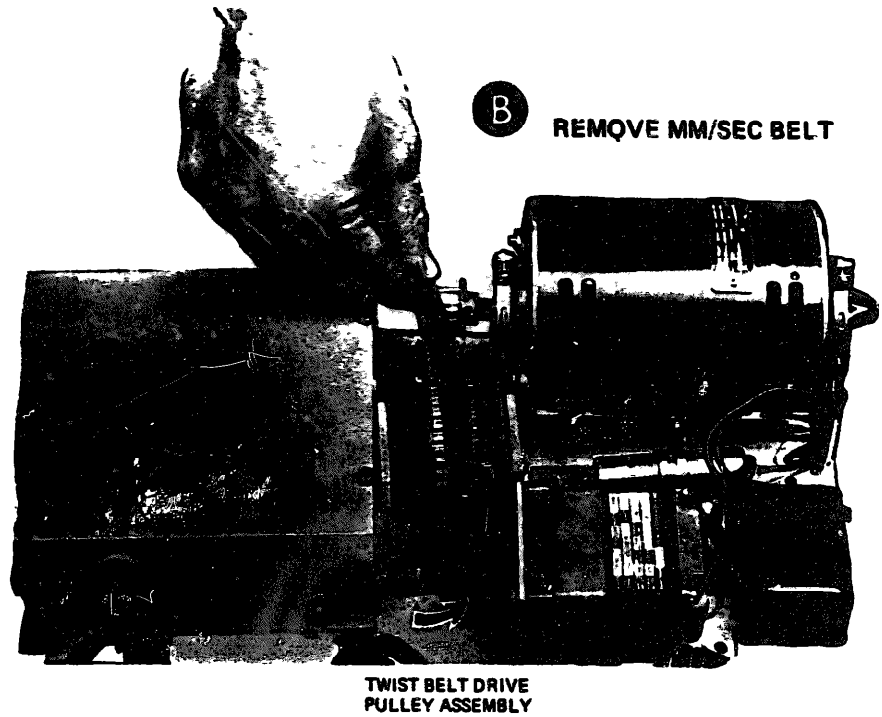
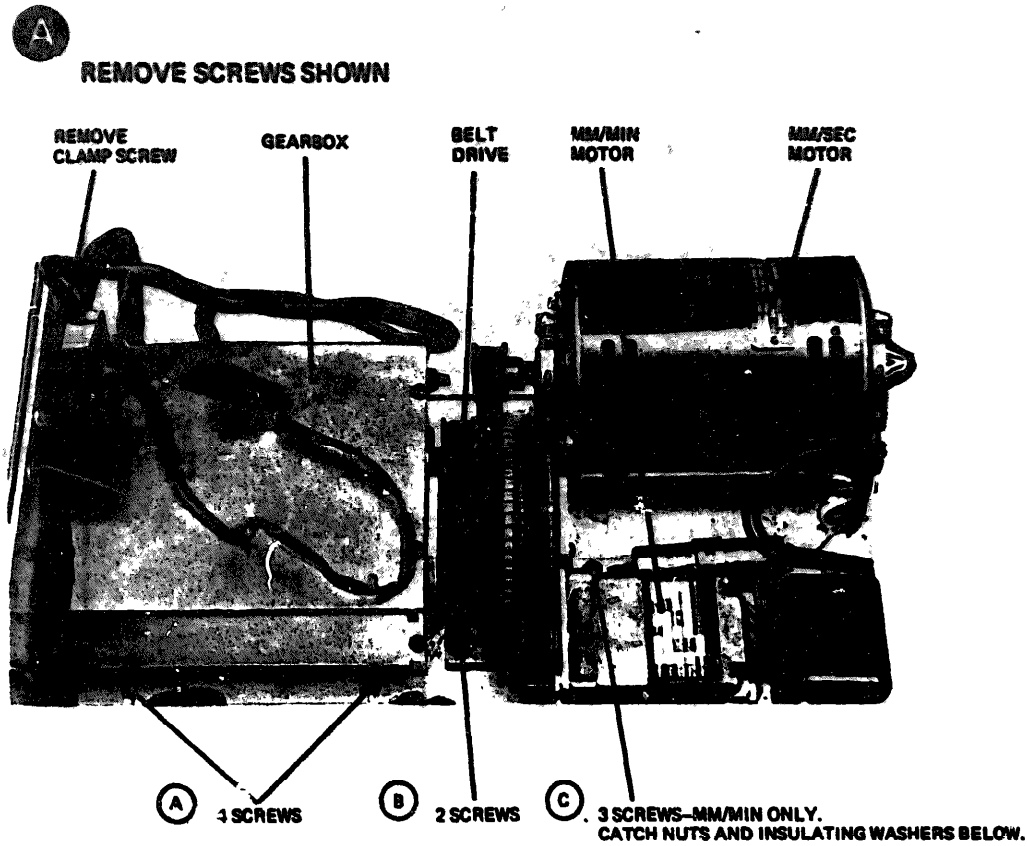
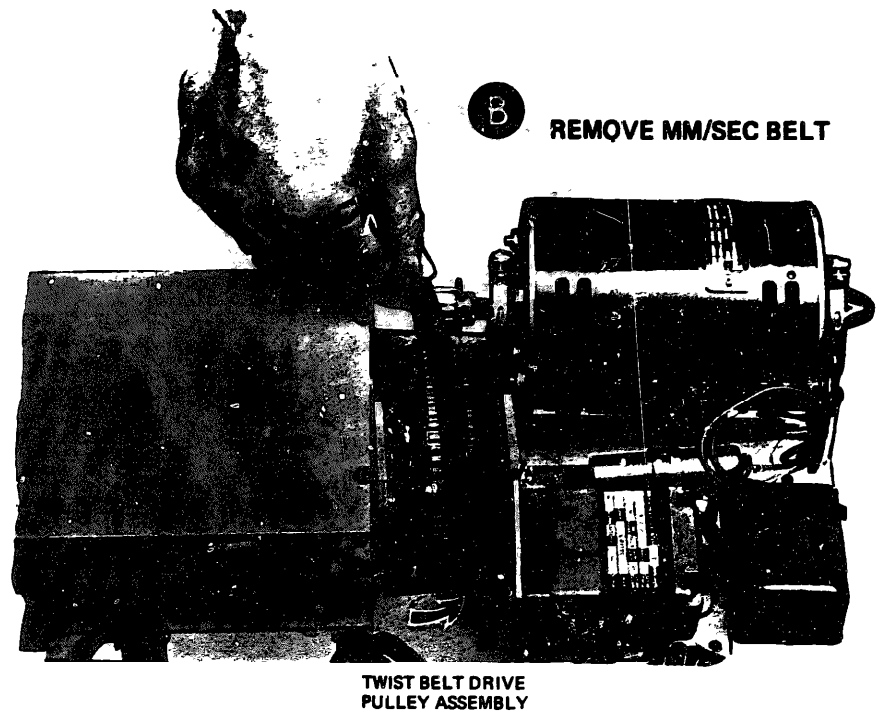


Figure 5-15. Paper Table Removal, Table Link and Drive Roller Disassembly





WASHERS BELOW

E INPUT
ROM
OX

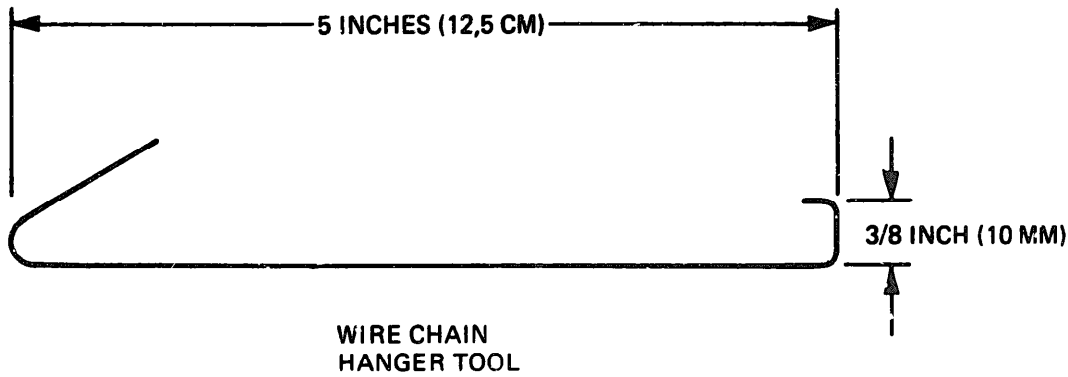


Figure 5- 16. Gearbox Removal

e. Loosen drive unit side plate screws noted in Figure 5-51. Spring the right side plate outward u pressure only, and pull the right end of the drive roller and table link forward to remove them. Then work the *left* end of the drive roller and its shaft out of the bearing in the left side plate. The bearing may come out with the roller &ft. Press the other bearing out of the right side plate.

NOTE For greater clearance while springing the side plates yet still maintaining support of the bank of galvanometers, the two screws holding up galvanometer mount A22MP59 (Figure 6.15) may be temporarily replaced with longer 6-32 x 1 inch screws. Reinstall the original screws

f. Before reinstalling the bearings, clean them as follows.

(1) Wash, but do not soak, the bearings in Chlorothene solvent.

(2) Oil them with penetrating oil (Table 5-2), letting it soak into the porous metal, then with No. 10 lubricating oil.

5-52. The gearbox may be removed without taking the Drive Unit out of the Recorder. A small motor and belt drive may be provided on the bench for gearbox run-m, or the gearbox , may be run in after reinstallation, since it is easily accessible from the top of the recorder.

NOTE. Gearbox Lubrication Intervals The gearbox should be lubricated whenever the recorder is overhauled, in addition to the normal lubrication at 12 months or 2000 hours of operation at varying speeds. Under continued low-speed operation, the gearbox should be lubricated every 6 months or 1000 hours. Whenever an extended period of recording is anticipated, that is. for 30, 60, or 90 days continuous duty, a lubrication and inspection before the recording period will help to assure uninterrupted service For a list of recommended lubricants, see Table 5-2.

5-53. GEARBOX INSPECTION. Before removing the gearbox, take off the top cover and inspect inside for brass particles from the gears If any are found, move the gears by hand and look for excessive wear or damage to the gear teeth.

WARNING

SECURE LONG HAIR, DANGLING NECKTIES, BEADS, SCARVES OR OTHER CLOTHING BEFORE OPERATING THE GEARBOX OR RECORDER WITH THE TOP COVERS REMOVED. TO AVOID LETHAL LINE VOLTAGE SHOCK HAZARD, DO NOT TOUCH THE MM/MIN (SMALLER) MOTOR, ITS CHASSIS, OR ANY TERMINALS WHILE THE RECORDER IS CONNECTED TO LINE VOLTAGE.

While listening as closely as is safely practical gearbox in all chart speeds (selected from the Recorder front panel), and listen for chattering of clutch springs, which indicates a need for lubrication or for replacement of a clutch spring or of a gear, if the gear hub is worn. Replace obviously faulty parts, such as a clutch spring jamming the gearbox, during overhaul.

5-54. GEARBOX REMOVAL.

a. Make a wire chain hanger out of a paper clip or piece of soft wire (Figure 5-16) It will be used in Step e to suspend the gearbox chain from the top of the side plate

b. Remove cables from clamps on left Unit Housing side plate. Remove rear clamp attachment screw from side plate.

c. Refer to Figure 5-16 and remove
4 screws A from gearbox base plate.
2 screws B from drive belt and pulley assembly
In MM/MIN units, 3 screws C from 60.1 motor chassis assembly. Catch nuts and insulators from below.

Note that motor chassis is electrically insulated.

d. Slightly twist belt drive pulley assembly, as shown, and slip the MM/SEC drive belt off its pulley. The MM/SEC motor is the larger motor.

e. Release chain by twisting gearbox and lifting it off output sprocket with screwdriver as shown. Be sure chain is held up by bent wire over side plate.

f. (MM/MIN UNITS) Leave belt drive assembly in recorder, lift gearbox input pulley over belt drive output pulley, and slip belt off gearbox pulley Be careful not to bend pulley flanges while twisting gearbox

(UNITS WITHOUT MM/MIN) Remove belt drive and gearbox together and place on bench Separate belt drive and gearbox by twisting apart, then lift gearbox input pulley over belt drive output pulley and slip belt off gearbox pulley

g. To remove belts from the belt drive assembly, unfasten two screws D on one side, and slip one bearing mount (MP6 or MP7) off the shaft

h. To replace the belt drive bearings, remove setscrew E from either bearing mount, install a new bearing, and retighten the setscrew, set with either Glyptal or Loctite.

1 **Re-installation** Generally the reverse of removal, reinstallation of MM/MIN gearboxes requires that the MM/MIN motor chassis front screw be tightened before the two rear screws, to keep the MM/MIN drive belt tight Reposition cable connector as shown in Figure 5-20 Pull drive belts hand tight only.

WARNING

TO AVOID SERIOUS SHOCK HAZARD, REINSTALL MOTOR ELECTRICAL INSULATING PADS AND WASHERS REMOVED IN PARAGRAPH 5-544, STEP C. SHOULDERS SHOULD BE UPWARDS.

5-55. GEARBOX DISASSEMBLY AND LUBRICATION OVERHAUL). Use the following procedure to disassemble the gearbox, and to inspect for clutch wear. The procedure is illustrated in Figure 5-17. Note that each gear has, in addition to one or two toothed discs, one or two hub sections that fit inside the clutch springs. The hub sections of adjacent gears meet inside the spring, and must fit very closely or else the spring will wind down between the hubs, disabling the gearbox. The shaft end play adjustment, which follows this overhaul procedure, is essential. End play must be adjusted before running the gearbox, to prevent damage.

NOTE Obtain a wooden dowel rod about a foot long (30 cm), and with a diameter of 5/16 inch (0.8 cm) to keep parts in order after cleaning but before lubrication, at which time they will be put back on the gearbox shaft.

- a. Remove the gearbox top cover, and the flat mounting plate (four screws each).
- b. Remove four screws holding the curved bottom cover (solenoid plate). This should leave only the gears, shafts, and gearbox sideplates.
- c. Remove the two round-head, slotted Nylock screws holding the output sprocket and input pulley. Keep the same number of shun washers on each screw. Detach the side plates from each other, leaving one shaft on each side plate. Do not remove the shaft end hex nuts. Note the orientation and position of each component on each of the shafts.

NOTE If gears are to be replaced or components lubricated, remove only one shaft at a time to preserve the order of the gears on the shaft for best wear characteristics.

- d. While holding one end plate in each hand, pull out the primary shaft from the gears (Figure 5-17). Lift the entire primary gear tram out as one unit. Note the orientation and position of each component.
- e. Remove the parts from the gear tram one at a time, and clean each part by brushing it with Chlorothene solvent. Wipe plastic clutch sleeves with Chlorothene-dampened cloth.

CAUTION

ALWAYS BRUSH NON-PLASTIC PARTS; NEVER IMMERSE THEM IN SOLVENT. DO NOT WASH PLASTIC CLUTCH SLEEVES WITH SOLVENT.

f. Inspect each part for damage and wear before lubrication. To check for hub wear; drag a fingernail across hub surface and check for grooves.

g. Arrange each part in order on dowel for proper position during reassembly on the shaft during lubrication.

5-56. GEARBOX LUBRICATION. After all gears are arranged on the dowel, lubricate as follows:

- a. Gil each gear bearing with Mystery Oil (Table 5-2) to soften gum residues.
- b. Primary Shaft Lubrication.
Grease each primary clutch and gear assembly as shown in Figure 5-18 using the following steps to grease each assembly:

- (1) Work grease into coils of each spring, and install on one half of clutch hub. Note that spring tab must be in proper position (Figure 5-18).
- (2) Slip plastic clutch sleeve (with ratchet teeth) over spring; mate sleeve cutout to spring tab.
- (3) Coat mating gear hub with grease and twist hub into assembled clutch and spring. As a test of clutch wear, clutch hub should "grab" spring when twisted in one direction, and slip when twisted in other. Press the hubs together to be sure the hub faces are in contact. If clutch slips in both directions, replace hub and attached gear, or worn spring.

NOTE: Do not over-grease clutches, which may cause them to slip.

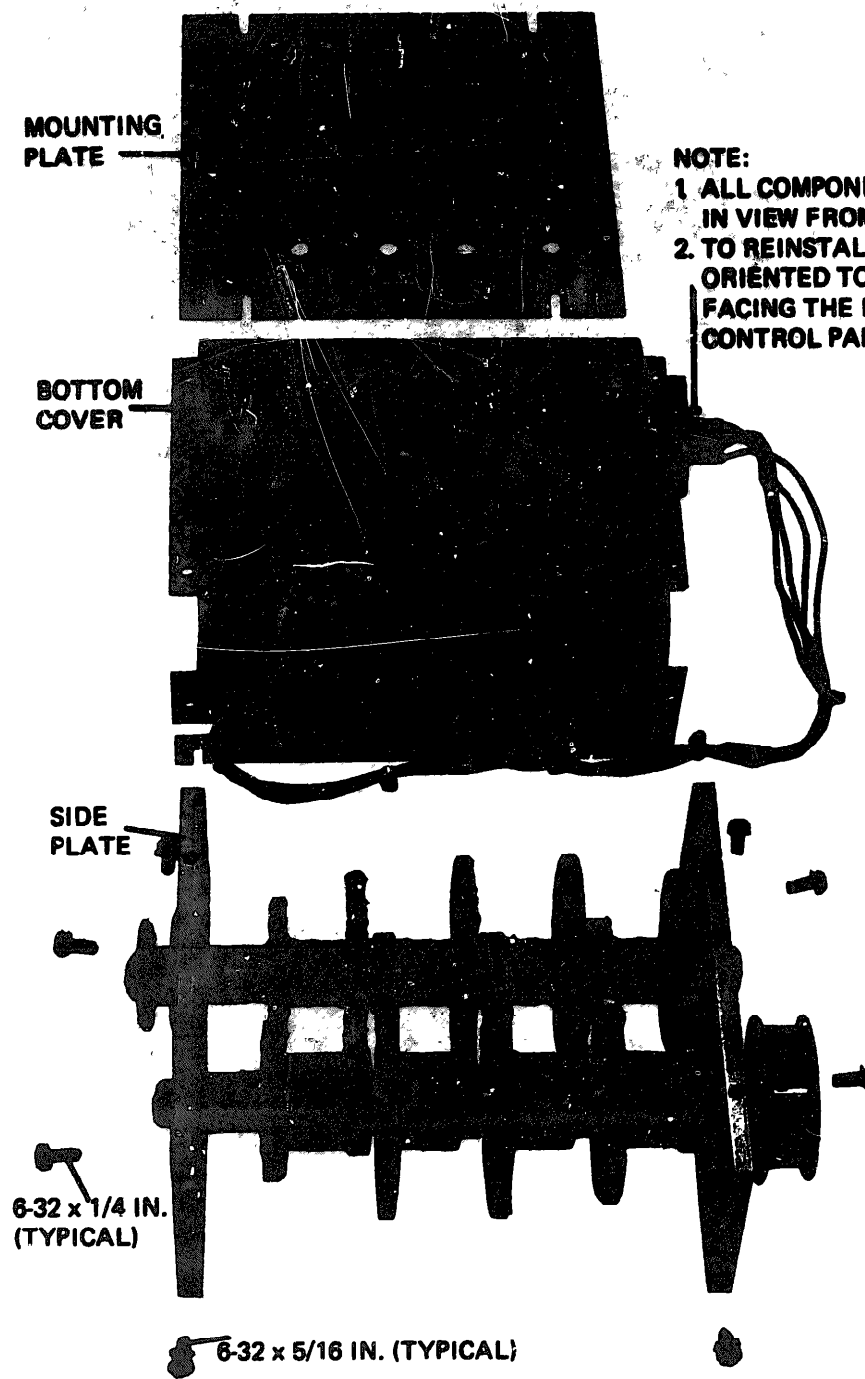
c. When all gears are reassembled onto shaft, slip shaft out as shown in Figure 5-17, leaving gear tram as one unit. Gil shaft lightly with No 10 oil (Table 5-2), and remove excess oil. Note that shaft does not rotate. Steel washer on shaft end must be properly positioned.

d. Remove secondary shaft in same way as primary shaft (Paragraph 5-55), clean gears and spring clutches without submerging them in solvent, and arrange them in order (Figure 5-18). Oil with Mystery Oil (Table 5-2).

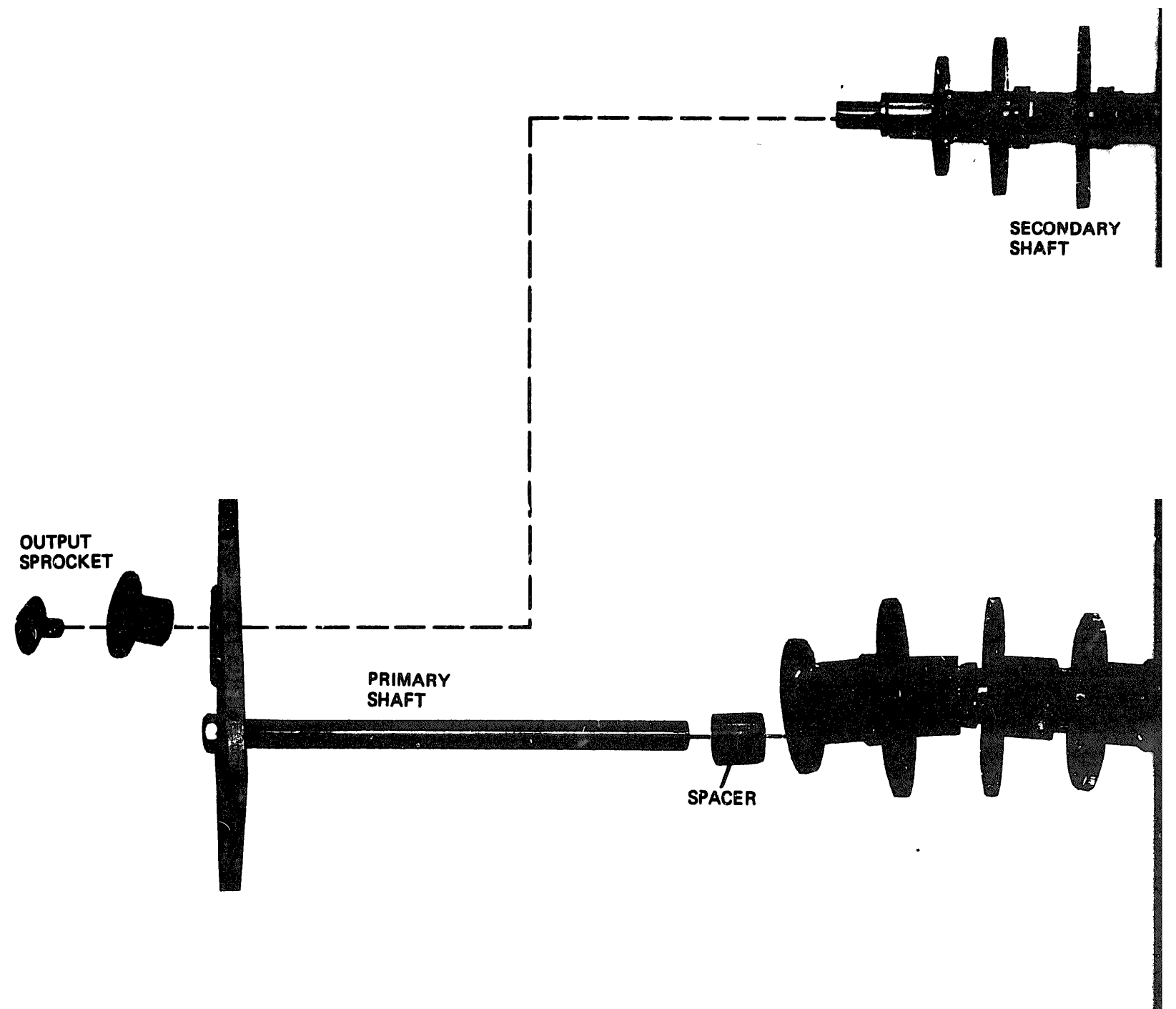
e. Secondary Shaft Lubrication

Grease each secondary clutch and gear assembly as shown in Figure 5-18. Inspect each part for damage or wear before greasing, as noted in illustration. Drag a fingernail across hub surface to inspect for wear grooves. Use following steps to grease springs and hubs:

- (1) Work grease into the coils of each clutch spring
- (2) Grease each clutch hub
- (3) Twist spring and hub together. Remove excess grease. Test clutch hub by twisting in both directions. Press the hubs together to be sure the hub faces are in contact. Hub should "grab" when twisted one way and slip when twisted the other way.



NOTE:
1. ALL COMPONENTS ARE SHOWN
IN VIEW FROM UNDERSIDE.
2. TO REINSTALL, THIS PIN IS
ORIENTED TOWARD LEFT,
FACING THE REAR OF THE
CONTROL PANEL ASSEMBLY.



ALL COMPONENTS ARE SHOWN
 VIEW FROM UNDERSIDE.
 REINSTALL, THIS PIN IS
 ORIENTED TOWARD LEFT,
 INDICATING THE REAR OF THE
 CONTROL PANEL ASSEMBLY.

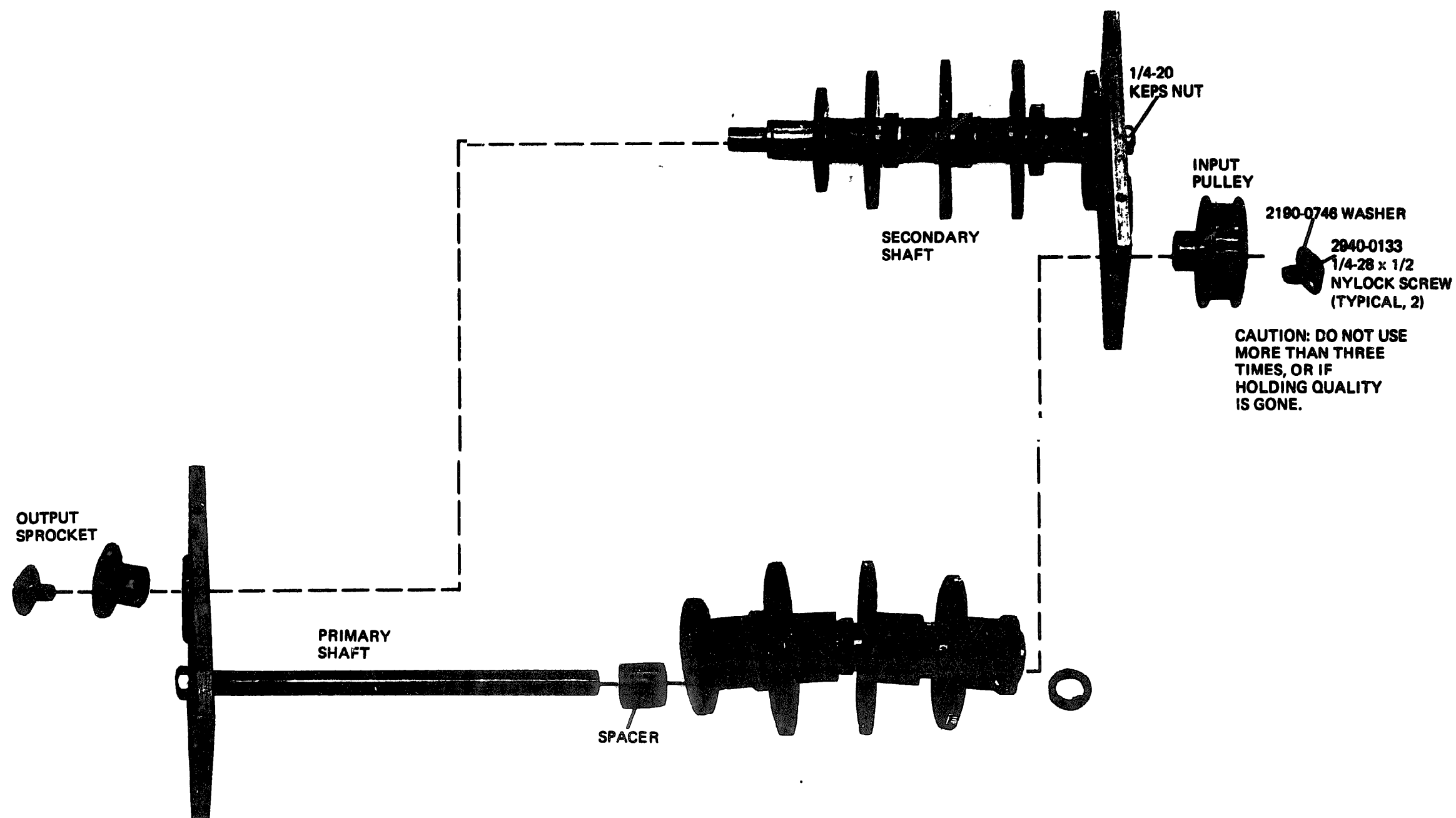


Figure 5-17. Gearbox Disassembly



**CHECK WEAR INSIDE
SPRING BY TWISTING
ON GEAR HUB**

OIL SHAFT BEARINGS WITH MYSTERY OIL (TYPICAL LOCATION) FOR RUN-IN

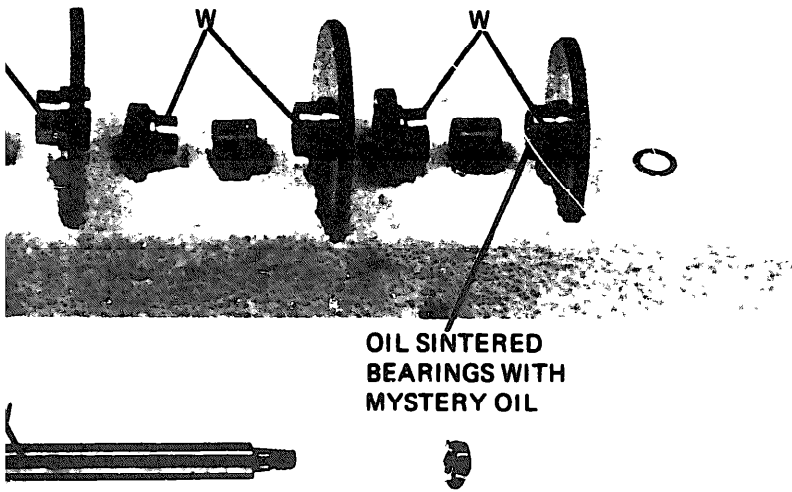
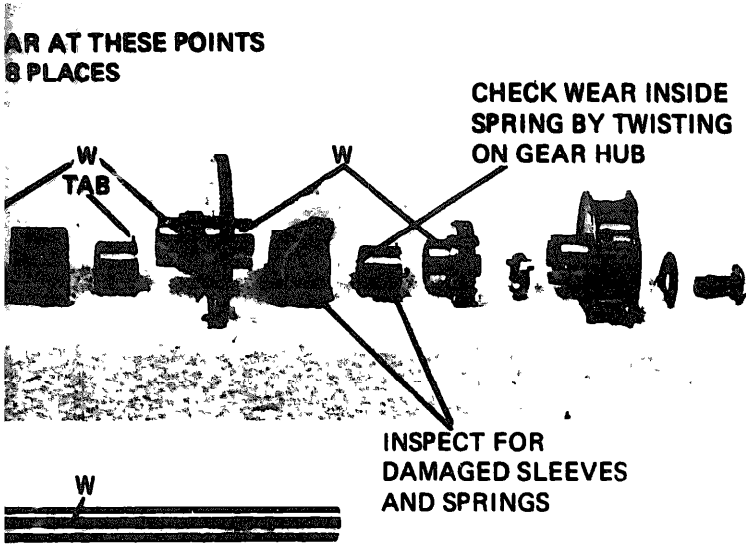
**INSPECT FOR
DAMAGED SLEEVES
AND SPRINGS**



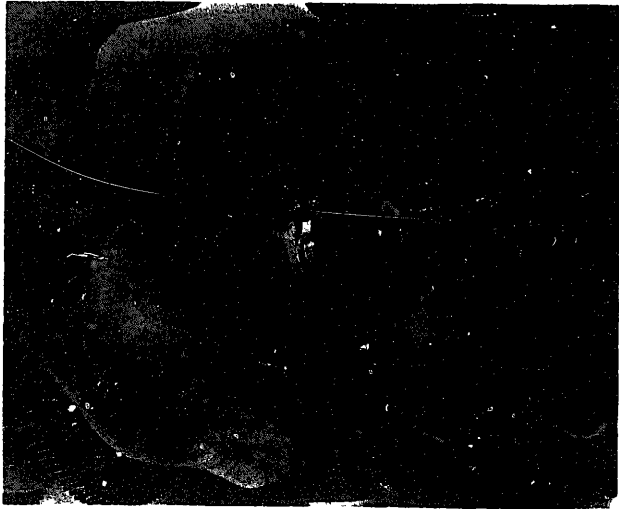
OIL SINTERED BEARINGS WITH MYSTERY OIL



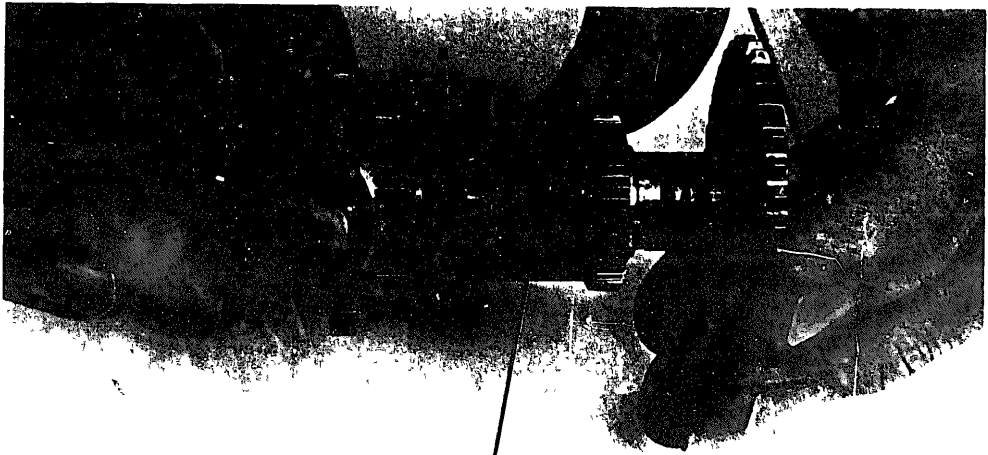
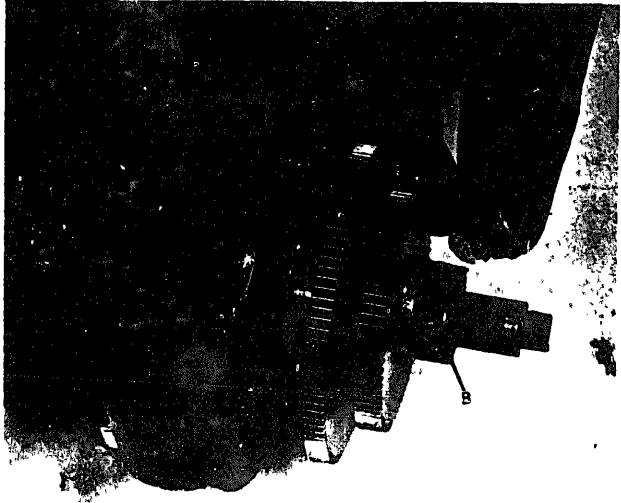
A NOTE
MAY BE
CLUTCH



1 GREASE SPRING (A)



2 GREASE NEXT GEAR HUB (B)



3 TWIST NEXT GEAR HUB
(B) INTO SPRING

A NOTE SPRING A (HIDDEN)
MAY BE WITH OR WITHOUT
CLUTCH SLEEVE OVER IT

Figure 5-18. Clutch Lubrication

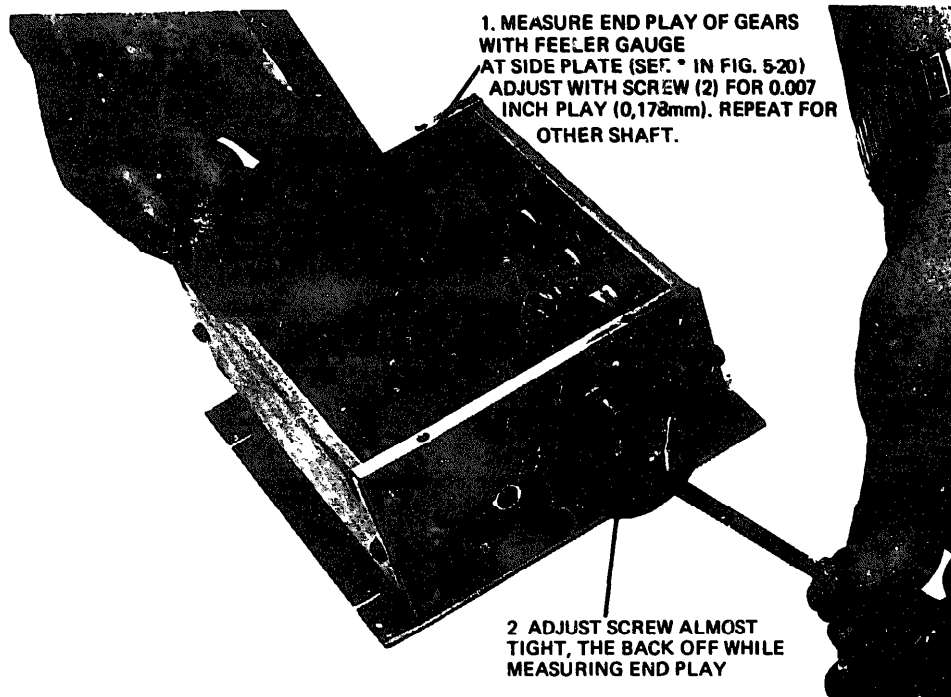


Figure 5-19. Gearbox Shaft End Play Adjustment

f. When all gears are reassembled onto shaft, slip shaft out, leaving gear train as one unit (Figure 5-17). Oil shaft lightly (do not use grease).

g. Reassemble both shafts with the side plates and tighten Nylock® shaft-end screws so gears will just rotate by hand.

h. Grease gearbox gear teeth with HP 6040-0222 gear grease

i. Replace rounded bottom cover (four screws, Figure 5-17); leave screws loose and install mounting plate. Then tighten them.

CAUTION

BOTTOM COVER ACTS AS A SPACER TO KEEP SIDE PLATES A FIXED DISTANCE APART AND PARALLEL, AND THUS SHOULD BE INSTALLED BEFORE ADJUSTING SHAFT END PLAY

5-57. GE OX SHAFT END PLAY ADJUSTMENT. The end play of both gearbox shafts must be adjusted with the gearbox top cover removed, as shown in Figure 5-19.

Tighten the shaft end screw snug, then back off while using a feeler gage at the side plate to obtain 0.007 inch (0.178 mm) end play.

CAUTION

WHEN MEASURING AT THE SIDE PLATE, MAKE SURE THE GAGE REACHES ALL THE WAY IN TO THE

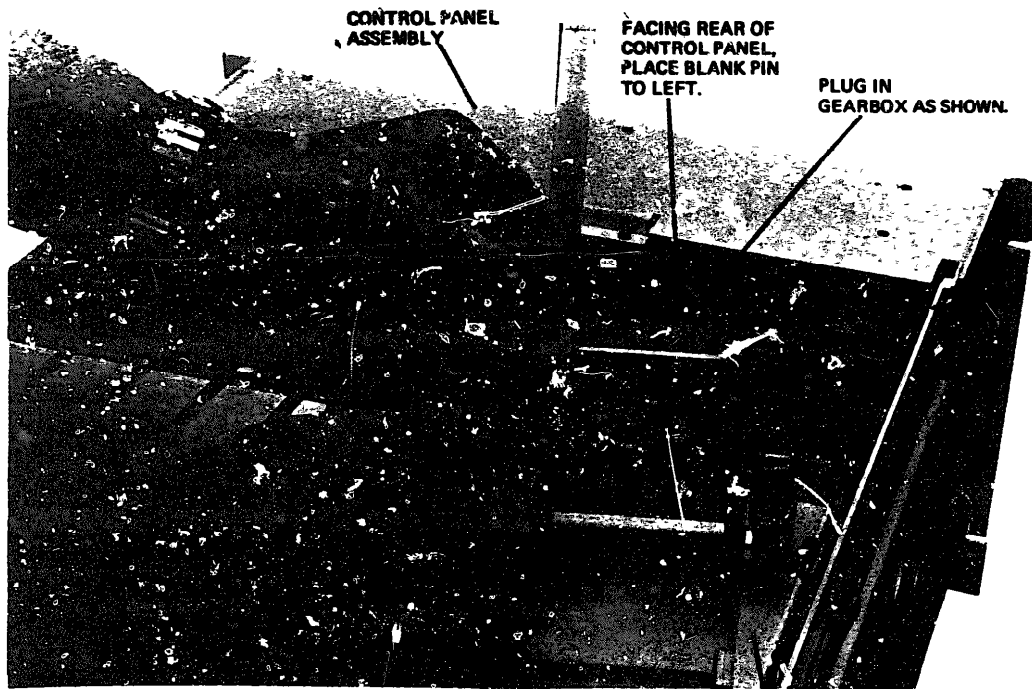
SHAFT, NOT JUST TO THE SPACER WASHER. TOO TIGHT ADJUSTMENT WILL CAUSE BURNOUT. END PLAY MUST BE NO MORE THAN 0.007 INCH (0.178 MM), OTHERWISE CLUTCH SPRINGS WILL WIND DOWN BETWEEN THE HUBS AND DISABLE THE GEARBOX.

5-58. SOLENOID ADJUSTMENT. Position the gearbox on top of the Recorder top cover, which has been slid back onto the driver amplifiers, as shown in Figure 5-20. Plug the speed control cable into the rear of the front panel Control Switch PC Board, with the blank pin to the MM/SEC motor side of the recorder, as shown (left as you face the rear panel). Then select the highest MM/SEC chart speed, apply power to the Recorder, and select STANDBY mode. With all the solenoids thus energized, adjust the clearance between the solenoid pawls and the clutch sleeves with the typical adjustment screw shown. Place an 0.01 inch (.254 mm) feeler gauge between the pawl and sleeve for each adjustment.

5-60. Position the input pulley over the belt drive output pulley, and slip the belt on. Placing the gearbox into position on the motor chassis, twist the output chain onto the output sprocket. Adjust the input and output drive tension by holding (twisting) the gearbox hand-tight against the resistance of its input belt and output chain, while

Table 5-5. Paper Drive Troubleshooting

TROUBLE	PROBABLE CAUSE	SOLUTION
BAD PAPER TRACKING (paper moves to one side or climbs paper guide flange)	Uneven tension on pressure rollers Brake pressure springs came off Worn brake felt or bent paper guide Paper table unevenly adjusted	Provide even tension on paper. Reseat springs. Replace felt or guide. Adjust table comers.
PAPER WEAVES FROM SIDE TO SIDE	Slick or duty paper brake felt or drive roller	Clean drive roller and pressure rollers, or replace brake felt.
PAPER TEARS AT FOLD	Excessive brake pressure (should cause 2-3 lb pull)	Adjust both screws evenly cow for less tension.
PAPER JAMS IN PRESSURE ROLLERS	One pressure roller spring is weaker or misadjusted	Balance tension (NOTE. goes to side with tighter ment) or replace both springs.
IRREGULAR PAPER SPEED	Slick or duty drive roller, loose pressure roller adjustment, or excessive brake tension Gearbox clutch shipping or grabbing	Clean drive roller, or adjust pressure roller or felt brake. Adjust clutch solenoid. D dean clutch, re-lube with twist to check for wear.
INCORRECT BUT STEADY PAPER SPEED	Speed control solenoid malfunction, coil or lead open, felt paper brake misadjusted, or incorrect paper loading	Make sure paper is not be pressure rollers Adjust brake. Check solenoid circuits, also gearbox for Jammed clutch actuators, pawls, clutches
NO PAPER DRIVE	Defective drive motor, broken timing belt or drive roller chain, drive roller sprocket key or setscrew missing Motor power open circuit or blown fuse	Visually check for belt, chain, roller motion, Check motor fuse, and motor cable from bottom of power supply Test connections to motor chassis terminal blocks.
NO SIGNAL ON PAPER	Drive amplifier. oscillator, heat, or galvanometer problem CAUTION GALVANOMETER IS NOT FIELD REPAIRABLE REPLACE ONLY EXTERNAL PARTS SHOWN IN FIGURE 6-14	Refer to Table 5-4 for driver troubleshooting. See text for stylus and galvanometer adjustments



CAUTION:
CENTER BRACE IS PART OF RECORDER
STRUCTURE AND MUST BE REPLACED
FOR PROPER SUPPORT.

PLACE COVER OF
RECORDER (CENTER BRACE)
ON TOP OF DRIVER AMPLIFIERS TO SUPPORT GEARBOX.

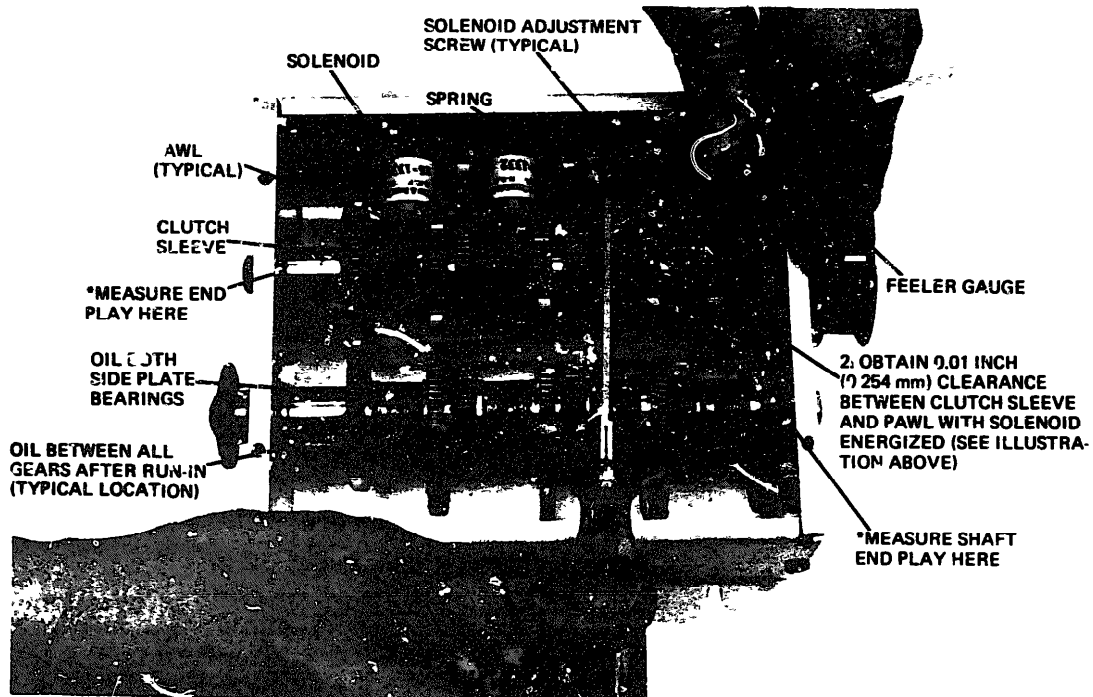


Figure 5-20. Gearbox Solenoid Adjustment

Section V - Maintenance

Models 7758A, 7418A

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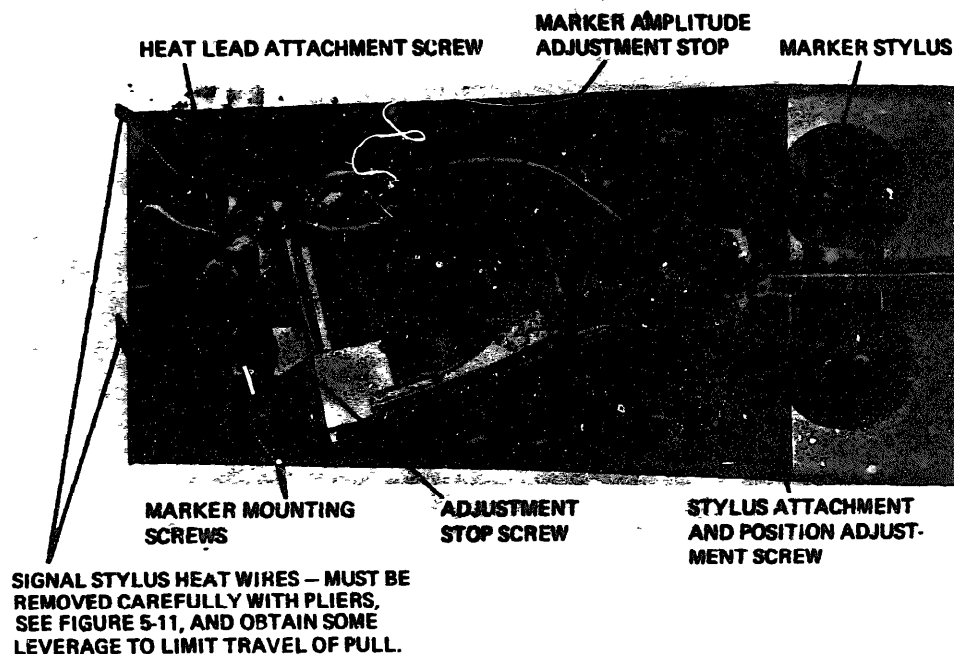


Figure 5-21. Marker Assembly Adjustment and Removal

tightening the mounting plate screws. Re-attach the solenoid control cable. If the input belt tends to "walk" off the pulley, the Gear Drive Assembly probably needs repositioning in its four elongated holes in the Drive Unit side plates. The Gear Drive Assembly is the main motor chassis (see Section VI). Then reposition the gearbox to bring the input pulley back in line with the belt.

5-61. GEARBOX RUN-IN. To disperse excess lubricant and test the gearbox, give it a test run after reinstallation. First, run the gearbox at lowest speed (selected at the recorder control panel). Excess Mystery oil, applied in the procedure in Paragraph 5-56, will run from gears, carrying with it dissolved gum and grease residue. Stop the drive motor and wipe away this residue frequently. After 15 minutes of running run through a complete set of gear changes at the front panel of the recorder while inspecting the action of the gearbox (top cover removed).

All clutches should operate properly and the gears should rotate smoothly. Stop the drive motor and place three No. 10 for drops of No. 10 oil (Table 5-2) between the gears to lubricate the gear bearing (a typical point is indicated in Figure 5-20). Run the gearbox at its lowest speed for several minutes to ensure that the oil will seep down into the gear bearings and be stored for future lubrication. Then run through the gear changes again to see

that all solenoids are operating properly, retracting the pawls fully, and not hanging up on the clutch sleeves.

5-63. The marker assemblies are attached between the galvanometers. To adjust the stylus position, first set the writing stylus bumpers (Table 5-4) and then loosen the attachment screw (Figure 5-21). Position the marker stylus so that it does not hit either bumper during its excursion, and tighten the attachment screw. Unfasten this screw to remove the stylus, and also remove the heat lead and its attachment screw. To increase stylus pressure, move stylus toward paper by loosening the screw in the slotted hole just above mounting screw for stylus. To remove the marker coil, unfasten the marker leads (Figure 5-1) by unplugging a small cable, and unfasten the two marker mounting screws shown in Figure 5-21. Two stylus heat leads also must be disconnected in the marker frame area.

5-62. If the stylus only, less coil, must be replaced, remove heat leads from standoffs on galvanometer and remove Pozidriv screw from marker mounting bracket (Figure 5-21). Install the new stylus on the mounting bracket with the screw, and reinstall the heat leads. Reset stylus pressure with each new installation, and readjust the marker amplitude stop, if necessary.

SECTION VI REPLACEABLE PARTS

6-1. INTRODUCTION.

6-2. This section contains schematics, figures and information for identifying, locating and ordering replace-
ment parts.

and 6-3 list parts in Order of the ref-
 designations (circuit references) and provide the
 information for each item.

a. Description of the part (see list of abbreviations on the
 following page).

b. Typical manufacturer of the part using a five-digit
 See the code list of manufacturers in Table 6-2.

c. Manufacturer's part number.

d. Total quantity used in the instrument (TQ column).

NOTE: Identification of the attaching parts (screws, nuts,
 washers, rivets, etc.) used to secure a component in place is
 entered immediately after the listing of the respective
 component in Table 6-1 or 6-3.

6-4. REFERENCE DESIGNATIONS

6-5. Tables 6-1 and 6-3 are based on an alpha-numerical
 method of listing the end item, assemblies, subassemblies
 and circuit components. These items are defined as
follows:

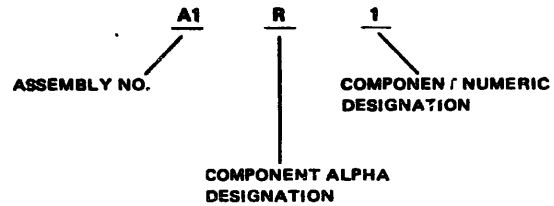
a. AN END ITEM instrument with all the supplied
 accessories. The END ITEM is made up of assemblies to aid
in the location of parts.

that can be purchased have part numbers in the part
 number columns; that cannot be purchased have the
word "Reference" in the column.

capacitor, R1 resistor etc). These parts are prefaced by the
 assembly number (A1C1, A1C2, A1R1, A2R2, etc.) to
 indicate the assembly on which the part is located.

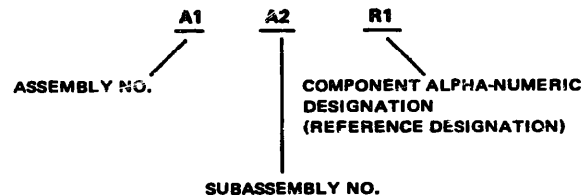
6-6. Examples of the alpha-numeric numbering method
 used to identify assemblies, sub assemblies and circuit
 components follow:

a.



The complete reference designation is read as the first
 resistor (R1) of the first assembly (A1).

b.



The complete reference designation is read as the first
 resistor (R1) of the second subassembly (A2) of the first
 assembly (A1).

6-7. Partial reference designation are normally used on
 equipment and illustrations. The partial reference
 designation consists of the component alpha designation
 and numeric designation. The complete reference
 designations are obtained by placing the proper assembly
 the partial reference designations.

6-8. In this section, these assembly prefix numbers are
 usually shown with each reference designation, in the title
 of the figure or at the bottom of the illustration block
 following the notation "REF DESIG PREFIX". The com-
 plete reference designation should be used to easily locate
 a part and the description in the Parts List.

6-9. For example, to determine the value and the part
 number of resistor R6 in the A2 assembly (A2R6), locate
 the A2 group listing (the second group) in the parts list.
 Then refer to the R (resistor) designations in the group and
 find R6. The value and the part number are in the columns
 adjacent to the description.

TM11-6625-2752-14&P
Section VI - Replaceable Parts
Models 7758A, 7418A
07758-1

6-11. To order a replacement part, address order or inquiry to the local Hewlett-Packard Sales/Service Office (see list of addresses at the rear of the manual) and supply HP part number of the item from Table 6-1 or 6-3.

6-12. To order a part not listed in the table, provide the following information:

a. Model number of the instrument.

b. Complete serial number of the instrument.

c. Description of the part including function and location.

6-13. To order a part from a manufacturer other than Hewlett-Packard Company provide the complete part description and the manufacturer's part number from Table 6-1 or 6-3.

REFERENCE DESIGNATORS

A	= assembly	F	= fuse	Q	= transistor	U	= non repairable assembly
B	= motor	FL	= filter	R	= resistor	V	= vacuum tube
BT	= battery	HR	= heater	RT	= thermistor	W	= cable
C	= capacitor	J	= jack	S	= switch	X	= socket
CP	= coupler	K	= relay	T	= transformer	XDS	= lampholder
CR	= diode	L	= inductor	TB	= terminal board	XF	= fuseholder
DL	= delay line	M	= meter	TC	= thermocouple	Y	= crystal
DS	= device signaling (lamp)	MP	= mechanical part	TP	= test point	Z	= network
E	= miscellaneous electronic part	P	= plug				

ABBREVIATIONS *

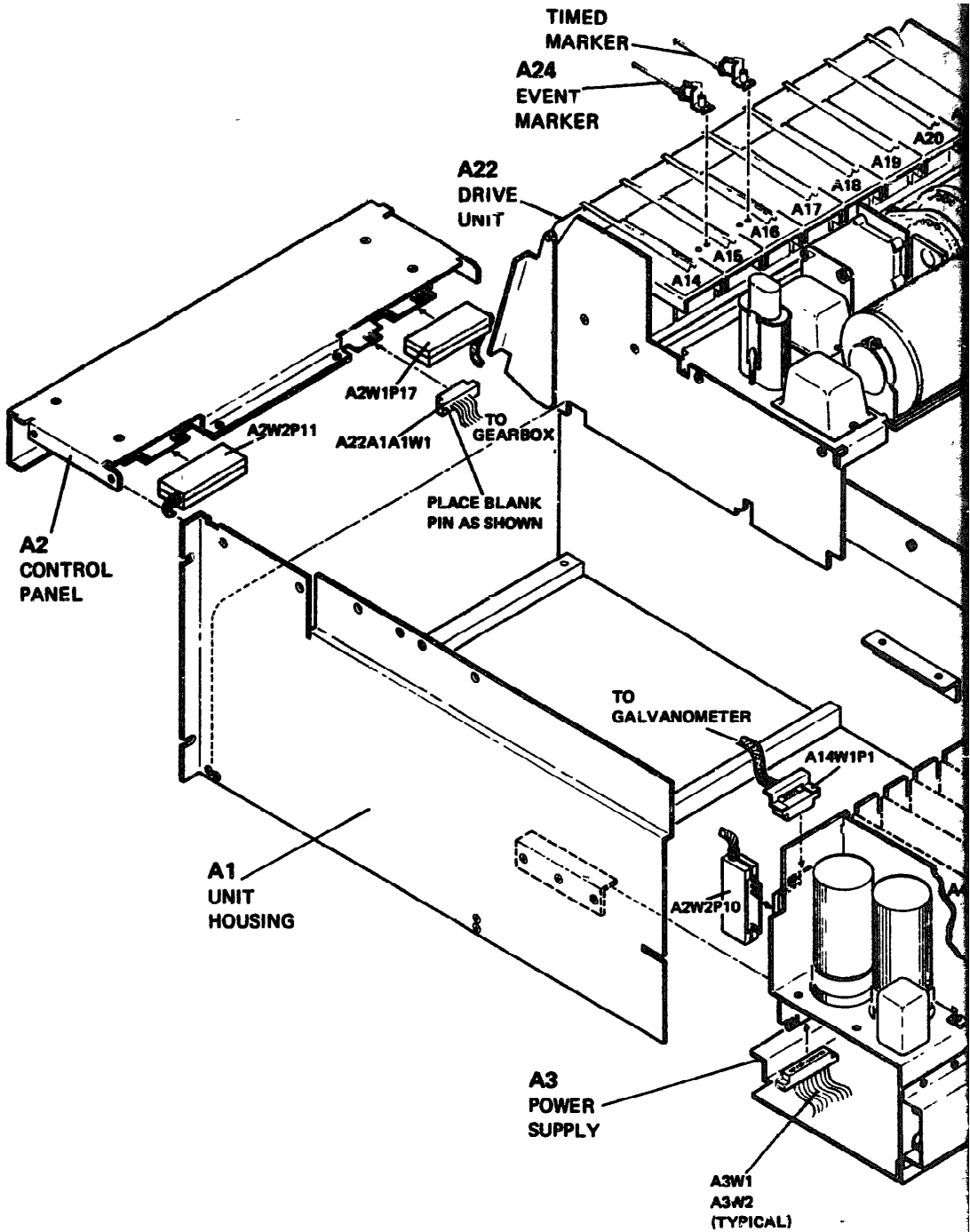
A	= amperes	fil hd	= filament head	n	= nano (10^{-9})	rot	= rotary
ACC	= accessories	filn	= filament	NC	= normally closed	s-b	= slow-blow
AFC	= automatic frequency control	FR	= front	No	= none	scm	= semiconductor
Al	= aluminum	fwd	= forward	NETWRK	= network	Se	= selenium
AMP	= amplifier	fnd	= find	NI PI	= nickel plate	ser	= series
as ord	= as ordered			NO	= normally open	SAMS	= machine s. row with washer
Be Cu	= beryllium copper	G c/s	= gignacycles per second (see G Hz)	NPN	= negative positive negative	seq	= sequential
BFO	= beat frequency oscillator	Ge	= germanium	NPO	= negative positive zero (zero temp. coeff.)	Si	= silicon
bh	= binder head	GEN	= generator	nsr	= not separately	slid	= slide
bp	= bypass	G Hz	= gignacycles per second	obd	= order by description	slid	= slide
brs	= brass	gl	= glass	od	= outside diameter	slid	= slide
		grd	= ground(ed)	ov hd	= oval head	slid	= slide
c/s	= cycles/second (see Hz)	h	= henry(ies)	ox	= oxide	slid	= slide
CALIB	= calibration	hex	= hexagonal	pc	= printed circuit board	slid	= slide
ccw	= counterclockwise	Hg	= mercury	PCBS	= circular press fitted nut	slid	= slide
cd pl	= cadmium plate	imgg	= impregnated	PF	= picofarad (10^{-12} farads)	slid	= slide
cer	= ceramic	ined	= incandescent	PH	= phone	Ta	= tantalum
ch	= channel	ins	= insulation(ed)	ph brz	= phosphor bronze	td	= time delay
cmo	= cabinet mount only	ips	= inches per second	Phil hd	= Phillips head	Ti	= titanium
coef	= coefficient			piv	= peak inverse voltage	tog	= toggle
com	= common	k, K	= kilo (1000)	pk	= peak	tol	= tolerance
comp	= composition	Kc, k c/s	= kilocycles (see k Hz)	PNL	= panel	trim	= trimmer
conn	= connector	KEFS	= hex nut with lockwasher	PNP	= positive negative positive	trt	= traveling wave tube
CRT	= cathode-ray tube	k Hz	= kilocycles/second	poly	= polystyrene		
cw	= clockwise	lin	= linear taper	por	= porcelain	μ or U	= micro (10^{-6})
dB	= decibel	lock	= lockwasher	pos	= position(s)	μ A	= microamperes
dep C	= deposited carbon	log	= logarithmic taper	pot	= potentiometer	μ F	= microfarads
DSP	= display	lp fit	= low-pass filter	pp	= peak-to-peak	μ V	= microvolts
DPDT	= double-pole double-throw			PREAMP	= preamplifier		
DPST	= double-pole single-throw			prec	= precision	V	= volt(s)
EIA	= tubes or transistors meeting Electronic Industries Association standards will normally result in instrument operating within specifications. tubes and transistors selected for best performance will be supplied if ordered by stock numbers	m	= milli (10^{-3})			vac	= vacuum
elect	= electrolytic	mA	= milliamperes	rec	= recorder	Vacw	= volt(s) alternating current working
encap	= encapsulated	mam	= milliammeter	rev	= reverse	var	= variable
F	= farad(s)	M	= mega (10^6)	ri	= radio frequency	Vdcw	= volt(s) direct current working
fet	= field effect transistor	M c/s	= megacycles (see M Hz)	rh	= round head	W	= watt(s)
fh	= flat head	met fln	= metal film	rmo	= rack mount only	w/o	= without
FIG	= figure	mfr	= manufacturer	rms	= root-mean-square	wiv	= voltage
		mH	= millihenry			ww	= wirewound
		M Hz	= megacycles/second			Ω	= ohm
		mini	= miniature				
		mon	= momentary				
		mtg	= mounting				
		mV	= millivolt				
		mW	= milliwatt				
		my	= mylar ®				

* Electric Accounting Machines (EAM) capitalize all abbreviations

Table 6-1. Replaceable Parts

Reference Designation	HP Part Number	Model	Description	Mfr Code	Mfr Part Number
END ITEM	7758A OR 7418A	7758A, 7418A	REORDER (FIGURE 6-1)	28480	7758A OR 7418A
A1	07758-60010	7758A	UNIT HOUSING (FIG. 6-1)	28480	07758-60010
A1	07758-60011	7418A	UNIT HOUSING (FIG. 6-2)	28480	07758-60011
A2	07758-60020	7758A	CONTROL PANEL (FIG. 6-3)	28480	07758-60020
A2	07758-60021	7418A	CONTROL PANEL (FIG. 6-3)	28480	07758-60021
A2W1	07758-60150		FRONT PANEL CABLE	28480	07758-60150
A2W2	07758-60170		CONTROL SWITCH CABLE	28480	07758-60170
A2A1	07758-60270		CONTROL SWITCH PC ASSY (FIG. 6-5)	28480	07758-60270
A2A2	07758-60260		HEAT CONTROL PC ASSY (FIG. 6-5)	28480	07758-60260
A3	07758-60090		POWER SUPPLY (FIG. 6-6)	28480	07758-60090
A3W1	07758-60190		SIGNAL CABLE (INTERNAL)	28480	07758-60190
A2W2	07758-60200		REMOTE CABLE (INTERNAL)	28480	07758-60200
A2A1	07758-60250		TRANSFER PC ASSY (FIG. 6-8)	28480	07758-60250
A4	07754-60170		DRIVER AMPLIFIER CHANNEL 1 (FIG. 6-10)	28480	07754-60170
A5	07754-60170		DRIVER AMPLIFIER CHANNEL 2 (FIG. 6-10)	28480	07754-60170
A6	07754-60170		DRIVER AMPLIFIER CHANNEL 3 (FIG. 6-10)	28480	07754-60170
A7	07754-60170		DRIVER AMPLIFIER CHANNEL 4 (FIG. 6-10)	28480	07754-60170
A8	07754-60170		DRIVER AMPLIFIER CHANNEL 5 (FIG. 6-10)	28480	07754-60170
A9	07754-60170		DRIVER AMPLIFIER CHANNEL 6 (FIG. 6-10)	28480	07754-60170
A10	07754-60170		DRIVER AMPLIFIER CHANNEL 7 (FIG. 6-10)	28480	07754-60170
A11	07754-60170		DRIVER AMPLIFIER CHANNEL 8 (FIG. 6-10)	28480	07754-60170
A12	07758-60240		REGULATOR/OSCILLATOR PC 60 HZ (FIG. 6-12)	28480	07758-60240
A13	07758-60241		REGULATOR/OSCILLATOR PC 50 HZ (OPT 008)	28480	07758-60241
A14	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A14A1	07754-60340	7758A	STYLUS (STANDARD LINE WIDTH)	28480	07758-60340
A14A1	07754-60341	7418A, 7758A OPT 005	STYLUS (FINE LINE)	28480	07758-60341
A15	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A16	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A17	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A18	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A19	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A20	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A21	07754-60070		GALVANOMETER (FIG. 6-14)	28480	07754-60070
A22	07758-60100		DRIVE UNIT (FIG. 6-15)	28480	07758-60100
A22A1	07758-60110		GEAR DRIVE ASSY (RM/SEC, 60HZ), FIG. 6-16	28480	07758-60110
A22A1A1	07758-60120		GEARBOX (FIG. 6-16)	28480	07758-60120
A23	07758-60210		MARKER:TIMED (CHANNEL 7-8) (FIG. 6-19)	28480	07758-60210
A24	07758-60210		MARKER:EVENT (CHANNEL 6-7) (FIG. 6-19)	28480	07758-60210
A25	07758-60210		MARKER:EXTRA (CHANNEL 5-6, OPT 015)	28480	07758-60210
A26	07758-60210		MARKER:EXTRA (CHANNEL 4-5, OPT 014)	28480	07758-60210
A27	07758-60210		MARKER:EXTRA (CHANNEL 3-4, OPT 013)	28480	07758-60210
A28	07758-60210		MARKER:EXTRA (CHANNEL 2-3, OPT 012)	28480	07758-60210
A29	07758-60210		MARKER:EXTRA (CHANNEL 1-2, OPT 011)	28480	07758-60210
A30	07758-63499		ACCESSORIES (FIG. 6-20)	28480	07758-63499
OPTION NO			OPTIONS (REFER TO SECTION I FOR A COMPLETE OPTION LIST)		
001	SEE LIST		RACK MOUNTING KIT, WHITE	28480	07758-60351
002	07758-60351		OPT 002 BENCHTOP ENCLOSURE W/ PDU SHELF (7418A)	28480	07758-60351
003	07758-60351		FINE LINE STYLUS (STD ON 7418A)	28480	07758-60351
004	07758-60351		OSCILLATOR: 2400HZ (SEE 8048A)	28480	07758-60351
005	07758-60351		OSCILLATOR: 4400HZ (SEE 8048A)	28480	07758-60351
006	SEE LIST		50HZ OPERATION		
007	SEE LIST		230V OPERATION		
008	SEE LIST		RACK MOUNTING KIT, GREEN		
009	SEE LIST		NOT ASSIGNED (7758A)		
010	07758-60210		EXTRA MARKER (7418A) A24-A28	28480	07748-60210
011	07758-60210		EXTRA MARKER (7758A) A29	28480	07758-60210
012	07758-60321		MAX/MIN SPEEDS, 30HZ (7758A AND 7418A)	28480	07758-60321
013	07758-60320		MAX/MIN SPEEDS, 60HZ (7758A AND 7418A)	28480	07758-60320
014	07758-60350		BENCHTOP ENCLOSURE W/ PDU SHELF (7758A)	28480	07758-60350
			FOR SYSTEM OPTIONS, REFER TO SYSTEM MANUALS.		

See introduction to this section for ordering information



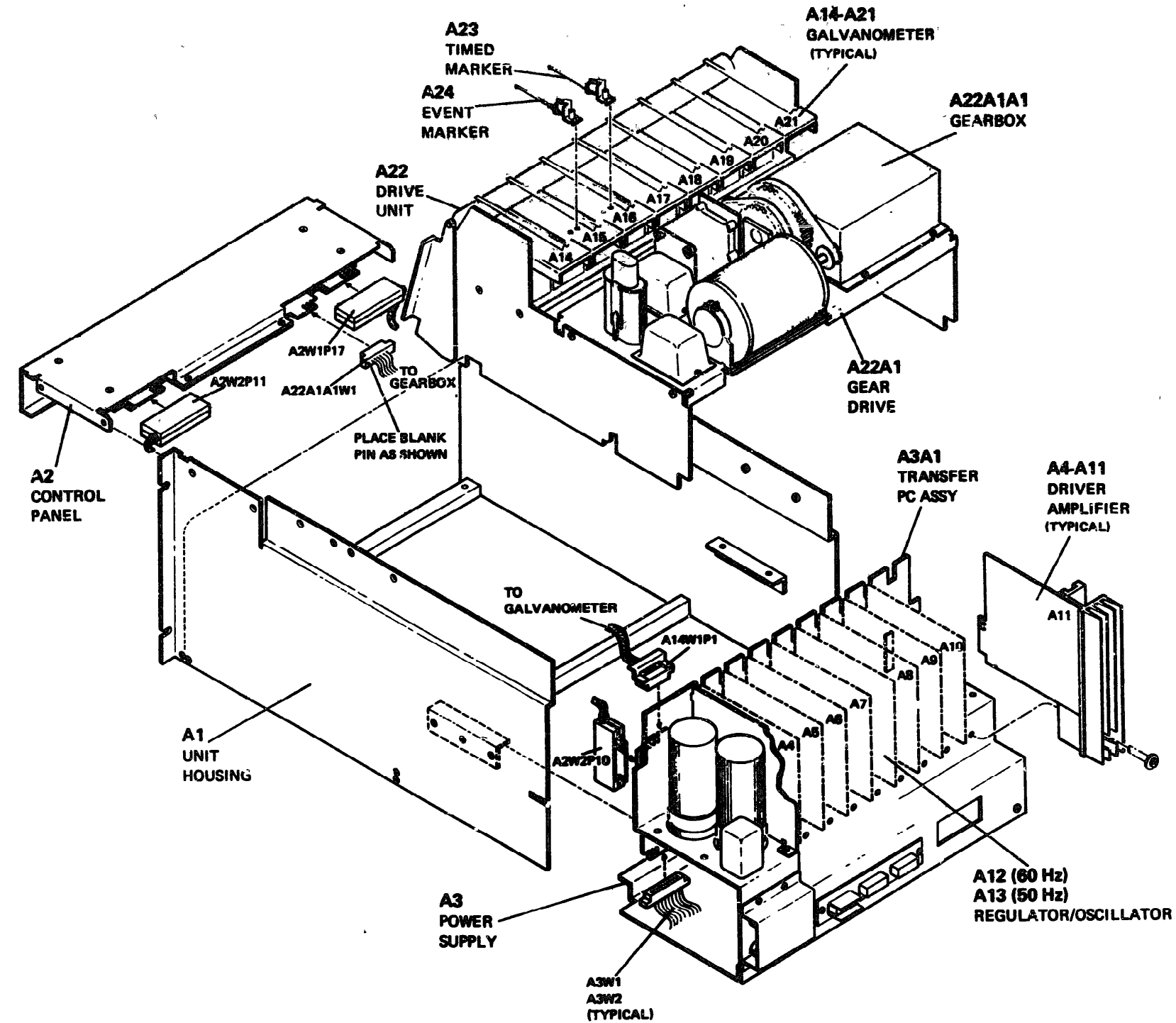


Figure 6-1. Model 7758A, or 7418A Thermal Tip Recorder Assemblies

Table 6-1. Replaceable Parts (continued)

ENCLOSURES	HP PART NO.
BENCHTOP ENCLOSURE W/ PTU SHELF (7758A)	07758-60350
BENCHTOP ENCLOSURE W/ PTU SHELF (7418A)	07758-60351
AMPLIFIER ENCLOSURE FOR 8848A (7758A)	07758-60300
AMPLIFIER ENCLOSURE FOR 8848A (7418A)	07758-60301
ENCLOSURE COMBINING STRAPS (7758A)	07758-00501
ENCLOSURE COMBINING STRAPS (7418A)	07758-00502

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	07750-60010	1	UNIT HOUSING(FIG. 6-2) (7758A INSTRUMENT ONLY)	28480	07758-60010
A1	07750-60011	1	UNIT HOUSING(FIG. 6-2) (7418A INSTRUMENT ONLY)	28480	07758-60011
A1NP1	07750-00062	1	SIDE PANEL:RIGHT (7758A INSTRUMENT ONLY)	28480	07758-00062
A1NP1	07758-00064	1	SIDE PANEL:RIGHT (7418A INSTRUMENT ONLY)	28480	07758-00064
A1NP2	07758-00061	1	SIDE PANEL:LEFT (7758A INSTRUMENT ONLY)	28480	07758-00061
A1NP2	07756-00063	1	SIDE PANEL:LEFT (7418A INSTRUMENT ONLY)	28480	07758-00063
A1NP3	07758-20010 2510-0123	2	BAR LOWER SCREW:FLAT HD POZI DR 8-32 X 0.500" LG	28480 00000	07758-20010 080
A1NP4	07758-20010 2510-0123	2	BAR LOWER SCREW:FLAT HD POZI DR 8-32 X 0.500" LG	28480 00000	07758-20010 080
A1NP5	07754-008070 2516-0123 2560-0086		MOUNT:POWER SUPPLY SCREW:FLAT HD POZI "R 8-32 X 0.500" LG NUT:HEX 8-32 THREAD	28480 28480 00000 78189	07754-008070 080 07754-00070 080 KEP511-081800-00
A1NP6	07754-00070 2510-0123 2580-0086	1	MOUNT:POWER SUPPLY SCREW:FLAT HD POZI DR 8-32 X 0.570" LG NUT:HEX 8-32 THREAD	28480 00000 78189	07754-00070 080 KEP511-081800-00
A1NP7	07758-00320		BRACE:CENTER	28480	07758-00320
A1NP8	1490-0960 2510-0123	1	SLIDES:CHASSIS 17.C" LONG SCREW:FLAT HD POZI DR 8-32 X 0.500" LG	28480 00000	1490-0960 080
A2	07758-60020	1	CONTROL PANEL(FIG. 6-3) (7758A INSTRUMENT ONLY)	28480	07758-60020
A2	07758-60021	1	CONTROL PANEL(FIG. 6-3) (7418A INSTRUMENT ONLY)	28480	07758-60021
A2NP1	2530-0084 2580-0006 07758-00181	4	SCREW:FLAT HD SLOT DR 8-32 X 0.625" LG NUT:HEX 8-32 THREAD	00000 78189	080 KEP511-081800-00
A2NP1	07758-00182	1	PANEL:FRONT, MED (7758A INSTRUMENT ONLY)	28480	07758-00181
A2NP2	07758-00182	1	PANEL:FRONT, INC (7418A INSTRUMENT ONLY)	28480	07758-00182
A2NP2	0370-1005	1	KNOB:JADE GREY	28480	0370-1005
A2NP3	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP4	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP5	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP6	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP7	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP8	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP9	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP9	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP9	0370-1005		KNOB:JADE GREY	28480	0370-1005
A2NP10	07758-00190 0590-0199	1	BRACKET	28480	07758-00190
A2NP11	2200-0166 07758-10360	12	NUT:EXT LOCK W-40 SCREW:ST FLAT HD POZI DR 4-40 X 0.312" STAND-OFF	00000 00000 28480	080 080 07758-20360

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2HP11	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
A2HP12	07758-20360		STAND-OFF	28480	07758-20360
A2HP13	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
	07758-20360		STAND-OFF	28480	07758-20360
	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
A2HP14	07758-20360		STAND-OFF	28480	07758-20360
A2HP15	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
	07750-20360		STAND-OFF	28480	07758-20360
	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
A2HP16	07758-20360		STAND-OFF	28480	07758-20360
A2HP17	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
	07758-20360		STAND-OFF	28480	07758-20360
A2HP18	2200-0166		SCREW: SST FLAT HD POZI DR 4-40 X 0.312"	00000	080
	07758-20360		STAND-OFF	28480	07758-20360
A2HP19	0370-2051	16	KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP20	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP21	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP22	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP23	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP24	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP25	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP26	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP27	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP28	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP29	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP30	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP31	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP32	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP33	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP34	0370-2051		KNOB: PUSHBUTTON, JADE GRAY	28480	0370-2051
A2HP35	6960-0006	1	PLUG BUTTON FOR 1/4" HOLE	28480	6960-0006
A2HP36	7120-1254	1	TRADEMARK	28480	7120-1254
A2W1	07758-60150	1	FRONT PANEL CABLE	28480	07758-60150
A2W2	07758-60170	1	CONTROL SWITCH CABLE	28480	07758-60170
A2A1	07758-60270	1	CONTROL SWITCH PC ASSY (FIG. 6-5)	28480	07758-60270
A2A1	2200-0183	16	SCREW: SST PHD POZI DR 4-40 X 1/4" W/LK	00000	080
A2A1	0360-1730	5	BARRIER BLOCK	28480	0360-1730
A2A1C1	0150-0052	12	C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A
A2A1C2	0150-0052		C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A
A2A1C3	0150-0052		C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A
A2A1C4	0150-0052		C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A
A2A1C5	0150-0052		C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A
A2A1C6	1901-0033	37	DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C7	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C8	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C9	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C10	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C11	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1C12	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A2A1J17	1200-0151	7	SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J18	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J19	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J20	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J21	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J22	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1J23	1200-0151		SOCKET: TRANSISTOR, 4-PIN	91662	05-3308
A2A1R1	0683-2705	1	METER: INDICATOR	18583	MODEL 120 LC
A2A1R2	0683-2705	1	R:FXD COMP 27 OHM 5% 1/4W	01121	CB 2705
	0683-1865	1	R:FXD COMP 18 MEGOHM 5% 1/2W	01121	EB 1865
A2A1R3	0683-1525	1	R:FXD COMP 1500 OHM 5% 1/4W	01121	CB 1525
A2A1R4	0683-4715	3	R:FXD COMP 470 OHM 5% 1/4W	01121	CB 4715
A2A1R5	0683-2715	1	R:FXD COMP 270 OHM 5% 1/4W	01121	CB 2715
A2A1R6	0683-1015	33	R:FXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2A1R7	0683-2705		R:FXD COMP 27 OHM 5% 1/4W	01121	CB 2705

See introduction to this section for ordering information

TM11-6625-2752-14&P
Section VI - Replaceable Parts
Models 7758A, 7418A
07758-1

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2A1R9 A2A1R10 A2A1R11 A2A1R12 A2A1R13	0683-2705 0683-2705 0683-2705 0683-2705 0683-3315	1	R:FXD COMP 27 OHM 5% 1/4W R:FXD COMP 27 OHM 5% 1/4W R:FXD COMP 27 OHM 5% 1/4W R:FXD COMP 27 OHM 5% 1/4W R:FXD COMP 330 OHM 5% 1/4W	01121 01121 01121 01121 01121	CB 2705 CB 2705 CB 2705 CB 2705 CB 3315
A2A1R14 A2A1R15 A2A1R16 A2A1R17 A2A1R18	0683-1815 2100-2031 2100-2031 2100-2031 2100-2031	1 16	R:FXD COMP 180 OHM 5% 1/4W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W	01121 28480 28480 28480 28480	CB 1815 2100-2031 2100-2031 2100-2031 2100-2031
A2A1R19 A2A1R20 A2A1R21 A2A1R22 A2A1R23	2100-2031 2100-2031 2100-2031 2100-2031 2100-2031		R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W	28480 28480 28480 28480 28480	2100-2031 2100-2031 2100-2031 2100-2031 2100-2031
A2A1R24 A2A1R25 A2A1R26 A2A1R27 A2A1R28	2100-2031 2100-2031 2100-2031 2100-2031 2100-2031		R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W	28480 28480 28480 28480 28480	2100-2031 2100-2031 2100-2031 2100-2031 2100-2031
A2A1R29 A2A1R30 A2A1S2 A2A1U1	2100-2031 2100-2031 3101-1289 07758-00270	1 1 1 1	R:VAR 50K OHM 10% LIN 1/2W R:VAR 50K OHM 10% LIN 1/2W SWITCH:PUSHBUTTON BOARD:BLANK P.C.	28480 28480 28480 28480	2100-2031 2100-2031 3101-1289 07758-00270
A2A2	07758-68260	1	HEAT CONTROL PC ASSY(FIG. 6-5)	28480	07758-60260
A2A2J11 A2A2R1	2200-0103 2190-0027 2950-0071 1251-1968 2100-2853	8 8 1 1 8	SCREW:ST F... POZI DR 4-40 X 1/4" W/LK LOCK:INT PH BRZ 15/32 OD NUT:HEX 1/4-32 THREAD CONNECTOR:PC 19 TUNING FORK TYPE CONT R:VAR COMP 1K OHM 20% LIN 1/2W	00000 78189 00000 00000 02660 28480	080 1914 080 143-010-07-1250 2100-2661
A2A2R2 A2A2R3 A2A2R4 A2A2R5 A2A2R6	2100-2853 2100-2853 2100-2853 2100-2853 2100-2853		R:VAR COMP 1K OHM 20% LIN 1/2W R:VAR COMP 1K OHM 20% LIN 1/2W R:VAR COMP 1K OHM 20% LIN 1/2W R:VAR COMP 1K OHM 20% LIN 1/2W R:VAR COMP 1K OHM 20% LIN 1/2W	28480 28480 28480 28480 28480	2100-2661 2100-2661 2100-2661 2100-2661 2100-2661
A2A2R7 A2A2R8 A2A2U1	2100-2853 2100-2853 07758-00260	1 1 1	R:VAR COMP 1K OHM 20% LIN 1/2W R:VAR COMP 1K OHM 20% LIN 1/2W BOARD:BLANK P.C.	28480 28480 28480	2100-2661 2100-2661 07758-00260
A2W1	07758-60150 08821-40011 08821-40012 2200-0147 2340-0001	2 2 5 16	FRONT PANEL CABLE CONNECTOR CAPSULE CONNECTOR CAPSULE SCREW:POZI DR 4-40 X 1/2" NUT:HEX 4-40 X 0.188" ACROSS FLAT	28480 28480 28480 00000 00000	07758-60150 08821-40011 08821-40012 080 080
A2W1P13 A2W1P17	1251-1190 1251-1190	3	CONNECTOR:PC EDGE (2 X 12) 24 CONTACT CONNECTOR:PC EDGE (2 X 12) 24 CONTACT	71785 71785	251-12-30-261 251-12-30-261
A2W2	07758-60170 08821-40011 08821-40012 2200-0147 2340-0001		CONTROL SWITCH CABLE CONNECTOR CAPSULE CONNECTOR CAPSULE SCREW:POZI DR 4-40 X 1/2" NUT:HEX 4-40 X 0.188" ACROSS FLAT	28480 28480 28480 00000 00000	07758-60170 08821-40011 08821-40012 080 080
A2W2P10 A2W2P11	07758-08280 1251-1190	1	BOARD:BLANK P.C. CONNECTOR:PC EDGE (2 X 12) 24 CONTACT	28480 71785	07758-00280 251-12-30-261
A3	07758-60030	1	POWER SUPPLY(FIG. 6-6)	28480	07758-60030
A3C1 A3C2	2530-0004 2580-0006 0180-1873 0180-1873	2	SCREW:FLAT HD SLOT DR 8-32 X 0.625" LG NUT:HEX 8-32 THREAD C:FXD ELECT 21,000UF +75-10% 30VDCW C:FXD ELECT 21,000UF +75-10% 30VDCW	00000 78189 28480 28480	080 KEP511-081800-00 0180-1873 0180-1873

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
ABC1	0180-2529	1	CIRCUIT AL ELECT 3000 UF +75-100 30VDCW	56200	3203020030AB40
ABC4	0180-0052	1	CIRCUIT CER 0.05 UF 250 400VDCW	56200	33C17A
ABC81	3185-0032	1	CIRCUIT BREAKER:2.0A SINGLE POLE 240 AC	06402	44-100
ABC81	1901-0525	2	DICOD ASSY:1 30V PIV PER L66	14099	SCB405
	2510-0145	2	SCREEN:FLAT NE SLOT DR 0-32 X 0.750 LG	00000	000
ABC82	2580-0084	1	NUT:HEX 0-32 THREAD	78109	KEPS11-001000-00
	1901-0525	1	DICOD ASSY:1 30V PIV PER L66	14099	SCB405
	2530-0145	1	SCREEN:FLAT NE SLOT DR 0-32 X 0.750 LG	00000	000
	2580-0086	1	NUT:HEX 0-32 THREAD	78109	KEPS11-001000-00
ABF1	2110-0014	2	FUSE:CARTRIDGE 4 AMP 125V SLOW BLOW	71400	MDX-4
ABF2	2110-0087	1	FUSE:CARTRIDGE 1 AMP 250V SLOW BLOW	75915	313001
	2110-0030	2	FUSE:CARTRIDGE 3 AMP 125V SLOW BLOW (PG EXCEPT OPT 000)	75915	313005
ABF4	2110-0014	1	FUSE:CARTRIDGE 4 AMP 125V SLOW BLOW	71400	MDX-4
ABF5	2110-0030	1	FUSE:CARTRIDGE 3 AMP 125V SLOW BLOW	75915	313005
ABF6	3110-0023	1	FUSE:CARTRIDGE 6.25 AMP 125V SLOW BLOW (EXCEPT OPT 000)	71400	MDX-4.25
	2110-0381	1	FUSE: 3 AMP AT 25V SLOW-BLOW (125V, OPT 000)	71400	MDX-3
ABF7	2110-0303	1	FUSE:CARTRIDGE 2A 250V SLOW-BLOW	71400	MDX-2A
ABJ11	8120-0951	1	CABLE:CONNECTOR 2 FEMALE PIN	20400	8120-0951
ABJ16	1251-2995	1	CONNECTOR:AC POWER OUTLET CEE FEMALE	20400	5090-1-BLK
ABK1	0490-0424	1	RELAY:DPDT 2A AT 125 VAC	78277	42006-25005-SIL
ABRP1	07750-59620	1	CHASSIS:JRMER	20400	07750-00020
	2650-0051	6	SCREEN:PAN NO POZI DR 10-32 X 0.375 LG	00000	000
	2680-0110	2	SCREEN:FLAT NE SLOT DR 10-32 X 0.500 LG	00000	000
ABRP2	07758-00560	1	BRACKET:CONNECTOR	20400	07758-00560
ABRP3	07750-00010	1	CHASSIS:BLANK POWER SUPPLY	20400	07750-00010
ABRP4	07750-00480	1	BRACKET:CONNECTOR	20400	07750-00480
	2200-0185	19	SCREEN:PAN NO POZI DR 4-40 X 0.312 LG	00000	000
ABRP5	07758-00550	1	COVER:FUSE (EXCEPT MODEL 7418A)	20400	07758-00550
ABRP6	07750-00030	1	SHIELD	20400	07750-00030
	2200-0105	1	SCREEN:PAN NO POZI DR 4-40 X 0.312 LG	00000	000
ABRP7	0180-0078	2	CLAMP: CAPACITOR MOUNTING	56200	4506-20
	2510-0045	3	SCREEN:PAN NO POZI DR 0-32 X 0.375 LG	00000	000
	2580-0006	1	NUT:HEX 0-32 THREAD	78109	KEPS11-001000-00
ABRP8	0180-0075	1	CLAMP: CAPACITOR MOUNTING	56200	4506-20
	2510-0045	1	SCREEN:PAN NO POZI DR 0-32 X 0.375 LG	00000	000
	2500-0084	1	NUT:HEX 0-32 THREAD	78109	KEPS11-001000-00
ABRP9	0160-2149	1	CLAMP:CAPACITOR	56200	4506-37A
	2350-0197	1	SCREEN:ST PAN NO 0-32 X .375	00000	000
	2420-0886	12	NUT:HEX 0-32 THREAD	00000	000
ABRP10	7120-0684	1	W/CLATE:SERIAL	20400	7120-0004
ABRP11	7124-1928	1	LABEL:INFORMATION 115/230V	20400	7124-1928
ABRP12	07758-06050	1	RETAINER:UJ MOUNT	20400	07758-06050
	2368-8115	20	SCREEN:PAN NO POZI 0-32 X 5/16 W/LK	00000	000
ABRP13	7124-1605	1	LABEL:60HZ (EXCEPT OPTION 000)	00000	000
ABRP15	1251-0333	1	CONNECTOR:PC(2X10) 20 CONTACT	71705	251-10-30-261
	1251-1005	3	GUIDE:R & P CONNECTOR, SERIES M	00779	200390-4
	1251-1086	3	GUIDE:R & P CONNECTOR, SERIES M	00779	200390-4
	1251-1292	2	SPRINGS:R & P CONNECTOR	00779	201672-1
	1251-1694	4	CATCHES:R & P CONNECTOR	00779	201672-1
ABR1	0683-2735	9	RIFXO COMP 27K OHM 5% 1/4W	01121	CB 2735
ABR2	0686-1515	2	RIFXO COMP 150 OHM 5% 1/2W	01121	EB 1515
ABR3	0686-2225	1	RIFXO COMP 2200 OHM 5% 1/2W	01121	EB 2225
ABR1	3101-1395	1	SWITCH:PUSHBUTTON DPDT-00	76054	50-67200-121/ALH
ABT1	9100-2373	1	TRANSFORMER:POWER	20400	9100-2373
ABU1	0590-0304	3	NUT:HEX STL 1/4-20 THREAD SIZE	00000	000
	5060-1188	1	POWER LINE MODULE/FILTER	20400	5060-1188
ABU1	07750-60190	1	CABLE:SIGNAL	20400	07750-60190
ABU2	07750-60200	1	CABLE:REMOTE	20400	07750-60200
ABUF1	1400-0085	5	FUSEHOLDER	75915	342004
ABUF2	1400-0035	1	FUSEHOLDER	75915	342004
ABUF3	1400-0085	1	FUSEHOLDER	75915	342004
ABUF4	1400-0085	1	FUSEHOLDER	75915	342004
ABUF5	1400-0085	1	FUSEHOLDER	75915	342004
ABUF6	1200-0727	1	SOCKET:TUBE, OCTAL	71705	101-12-10-044
ABU1	0361-0346	1	RIVET:SEMICUBULAR OVAL HEAD	00000	000
ABU1	07750-60250	1	TRANSFER PC ASSY(FIG. C-6)	20400	07750-60250
ABU1C1	0590-0199	10	NUT:EXT LOCK 04-40	00000	000
	2200-0111	5	SCREEN:PAN NO POZI DR 4-40 X 0.500 LG	00000	000
	8168-0153	5	CIRCUIT RV 0.001 UF 100 200VDCW	56200	102P10292-PTS

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	NP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3A1C2	0160-0153	3	C:FXD MY 0.001 UF 102 200VDCW	56209	192P10292-PTS
A3A1C3	0160-0153		C:FXD MY 0.001 UF 102 200VDCW	56209	192P10292-PTS
A3A1C4	0160-0153		C:FXD MY 0.001 UF 102 200VDCW	56209	192P10292-PTS
A3A1C5	0160-0153		C:FXD MY 0.001 UF 102 200VDCW	56209	192P10292-PTS
A3A1C6	0160-0161		C:FXD MY 0.001 UF 102 200VDCW	56209	192P10392-PTS
A3A1J1	1251-0962	9	CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113	9	SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J2	1251-1962	9	CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1291-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J3	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2295		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J4	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-1962		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J5	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J6	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
A3A1J7	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J8	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J9	1251-1962		CONNECTOR:PC (2 X 10) 20 CONTACT	71785	252-10-30-330
	2200-0113		SCREW:PAN HD PZ1 DR 4-40 X 0.625" LG	00000	080
	2340-0001		NUT:HEX 4-40 X 0.188" ACROSS FLAT	00000	080
	1251-2205		KEY:POLARIZING FOR PC CONNECTORS	71785	080
A3A1J10	1251-1626	1	CONNECTOR:PC (2 X 12) 24 CONTACT	71785	252-12-30-300
A3A1J11	07758-08250	1	BOARD:BLANK P.C.	26480	07758-08250
	0403-0062	1	BUMPER:RUBBER BUTTON, PRESS TYPE	73734	FSP 115201
	0360-1730	1	BARRIER BLOCK	28480	0360-1730
A3W1	07758-60190		CABLE:SIGNAL AND MONITOR (EXT. CONN. FIG. 2-9)	28480	07758-60190
A3W1J12	1251-1295	1	BODY:R & P CONNECTOR, 14 POSITION	00779	201335-1
	1251-1292		SPRINGS:R & P CONNECTOR	00779	201672-1
	1251-1679	10	CONNECTOR BLOCK:14 CONTACT	28480	1251-1679
A3W1J13	1251-1291	1	HOOD:R & P CONNECTOR 14 POSITION	00779	201363-4
	1251-1682	2	BODY:R & P CONNECTOR 14 POSITION	00779	201298-1
	1251-2745	19	CONTACT:R & P CONNECTOR, 16 FEMALE	00779	66104-1
	1251-1696		CATCHES:R & P CONNECTOR	00779	201673-1
A3W1P12	1251-0190	10	CONNECTOR:PC EDGE (2 X 6) 12 CONTACT	71785	251-06-30-261
A3W2	07758-60200		CABLE:RENDTE	28480	07758-60200
A3W2J14	1251-1682		BODY:R & P CONNECTOR 14 POSITION	00779	201298-1
	1251-2744	2	CONTACT:R & P CONNECTOR, 16 FEMALE	00779	66104-1
	1400-0249		STRAP:CABLE, GRAY NYLON	59730	178-23H-8
	1251-1694		CATCHES:R & P CONNECTOR	00779	201673-1
	1251-0198		CONNECTOR:PC EDGE (2 X 6) 12 CONTACT	71785	251-06-30-261
A4	07754-60170	6	DRIVER AMPLIFIER (FIGURE 6-13)	28480	07754-60170
	2680-0157	10	SCREW:PAN HD SLOT DR 10-32 X 2.250" LG	00000	080
	2190-0759	10	WASHER:FLAT #10	00000	080
	2190-0780	10	WASHER:FLAT BLACK FIBER #8	00000	080
A4C1	0180-0186	10	C:FXD ELECT 60 UF 20% 6VDCW	28480	0180-0186
A4C2	0180-0196	16	C:FXD ELECT 60 UF 20% 6VDCW	28480	0180-0186

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4C3	0160-0154	8	C:FXD RICA NY 0.0022 UF 108 200VDCN	56289	192P22292-PTS
A4C4	0160-0165	24	C:FXD NY 0.056 UF 108 200VDCN	56289	192P56392-PTS
A4C5	0160-0165		C:FXD NY 0.056 UF 107 200VDCN	56289	192P56392-PTS
A4C6	0160-0165		C:FXD NY 0.056 UF 108 200VDCN	56289	192P56392-PTS
A4C7			NOT ASSIGNED		
A4C8	0160-0207	8	C:FXD MYLAR 0.01UF 58 200VDCN	28480	0160-0207
A4C9	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A4C10	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A4C11	1902-3182	16	DIODE BREAKDOWN: SILICON 12.1V 58	25480	1902-3182
A4C12	1902-3182		DIODE BREAKDOWN: SILICON 12.1V 58	25480	1902-3182
A4C13	1901-0033		DIODE: SILICON 100MA 180MV	07263	F03369
A4C14	2500-0001	37	NUT: HEX 6-32 THREAD	00000	080
A4C15	2680-0157		SCREW: PAN HD SLUT CR 10-32 X 2.250" L6	00000	080
A4C16	07754-20340	9	HEAT SINK	28480	07754-20340
A4C17	2190-0759		WASHER: FLAT #10	00000	080
A4C18	2190-0780		WASHER: FLAT BLACK FIBER #8	00000	080
A4C19	2360-0119	9	SCREW: SST PAN HD POZ DR 6-32 X 7/16"	00000	080
A4C20	1853-0066	32	TSTR: SI PNP	80131	2M4250
A4C21	1854-0071	31	TSTR: SI MPN (SELECTED FROM 2N3704)	28480	1854-0071
A4C22	1853-0066		TSTR: SI PNP	80131	2M4250
A4C23	1854-0039	8	TSTR: SI MPN	80131	2N3053
A4C24	1200-0181	18	MOUNTING: TRANSISTOR PAD	13103	7717-5-N
A4C25	1853-0066		TSTR: SI PNP	80131	2M4250
A4C26	0853-0223	8	TSTR: SI PNP	80131	2M4250
A4C27	0340-0464	28	INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
A4C28	2190-0007	25	WASHER: INT LOCK #6	28480	2190-0007
A4C29	2360-0201	27	SCREW: SST PHIL POZI DR 6-32 X 0.500	00000	080
A4C30	2500-0001		NUT: HEX 6-32 THREAD	00000	080
A4C31	1853-0045	10	TSTR: SI PNP	80131	2M4250
A4C32	1200-0181		MOUNTING: TRANSISTOR PAD	13103	7717-5-N
A4C33	1854-0071		TSTR: SI MPN (SELECTED FROM 2N3704)	28480	1854-0071
A4C34	1854-0063	10	TSTR: SI MPN	80131	2N3053
A4C35	0340-0464		INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
A4C36	2190-0007		WASHER: INT LOCK #6	28480	2190-0007
A4C37	2360-0201		SCREW: SST PHIL POZI DR 6-32 X 0.500	00000	080
A4C38	2500-0001		NUT: HEX 6-32 THREAD	00000	080
A4C39	1854-0409	8	TSTR: SI MPN	80131	2N5210
A4C40	1853-0066		TSTR: SI PNP	80131	2M4250
A4C41	1854-0071		TSTR: SI MPN (SELECTED FROM 2N3704)	28480	1854-0071
A4C42	1854-0063		TSTR: SI MPN	80131	2N3053
A4C43	0046-0464		INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
A4C44	2150-0007		WASHER: INT LOCK #6	28480	2150-0007
A4C45	2360-0201		SCREW: SST PHIL POZI CR 6-32 X 0.500	00000	080
A4C46	2500-0001		NUT: HEX 6-32 THREAD	00000	080
A4C47	0683-1035	41	R:FXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A4C48	0698-6909	24	R:FXD FLN 45.3K OHM 0.5% 1/8W	28480	0698-6909
A4C49	0757-0452	8	R:FXD MET FLN 27.4K OHM 1% 1/8W	28480	0757-0452
A4C50	0683-6835	8	R:FXD COMP 68K OHM 5% 1/4W	01121	CB 6835
A4C51	0698-6909		R:FXD FLN 45.3K OHM 0.5% 1/8W	28480	0698-6909
A4C52	0683-1035	8	R:FXD COMP 1 MEG OHM 5% 1/4W	01121	CB 1035
A4C53	0698-5143	8	R:FXD FLN 395K OHM 0.25% 1/8W	28480	0698-5143
A4C54	0683-1035		R:FXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A4C55	2100-2464	24	R:VAR MW 20K OHM 10% 1W	28480	2100-2464
A4C56	0698-3134	16	R:FXD MET FLN 17.8K OHM 1% 1/8W	28480	0698-3134
A4C57	0683-1035		R:FXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A4C58	0690-3136		R:FXD MET FLN 17.8K OHM 1% 1/8W	28480	0690-3136
A4C59	2100-2464		R:VAR MW 20K OHM 10% 1W	28480	2100-2464
A4C60	0683-1035		R:FXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A4C61	0698-7382	8	R:FXD FLN 103.5K OHM 0.1% 1/8W	28480	0698-7382
A4C62	0083-5635	8	R:FXD COMP 56K OHM 5% 1/4W	01121	CB 5635
A4C63	0683-1515		R:FXD COMP 150 OHM 5% 1/4W	01121	CB 1515
A4C64	0686-5605	25	R:FXD COMP 56 OHM 5% 1/2W	01121	EB 5605
A4C65	0683-1015	16	R:FXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A4C66	0811-2619	8	R:FXD MW 1.2 OHM 1% 3W	28480	0811-2619
A4C67	0761-0026	8	R:FXD MET CR 220 OHM 5% 1W	28480	0761-0026
A4C68	0686-2715	8	R:FXD COMP 270 OHM 5% 1/2W	01121	EB 2715
A4C69	0686-1525	8	R:FXD COMP 1500 OHM 5% 1/2W	01121	EB 1525
A4C70	0686-1825	6	R:FXD COMP 1800 OHM 5% 1/2W	01121	EB 1825
A4C71	0686-5685		R:FXD COMP 56 OHM 5% 1/2W	01121	EB 5685
A4C72	0683-1515		R:FXD COMP 150 OHM 5% 1/4W	01121	CB 1515
A4C73	0683-1015		R:FXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A4C74	0811-1732	18	R:FXD MW 1 OHM 5% 3W	28480	0811-1732
A4C75	0683-2235	16	R:FXD COMP 22K OHM 5% 1/4W	01121	CB 2235
A4C76	2100-2464		R:VAR MW 20K OHM 10% 1W	28480	2100-2464
A4C77	0757-0123	8	R:FXD MET FLN 34.8K OHM 1% 1/8W	28480	0757-0123

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4R32 A4R33 A4R34 A4R35 A4R36	0683-2735 0683-1035 0683-1025 0698-6909	12	R:FXD COMP 27K OHM 5% 1/4W R:FXD COMP 10K OHM 5% 1/4W R:FXD COMP 1000 OHM 5% 1/4W NOT ASSIGNED R:FXD FLN 45.3K OHM 0.5% 1/8W	01121 01121 01121 20400	CB 2735 CB 1035 CB 1025 0698-6909
A4R37 A4R38 A4R39 A4R40 A4R41	0683-1065 0757-0869 0683-2235 0683-1015 0683-1515	8 8	R:FXD COMP 10K OHM 5% 1/4W R:FXD NET FLN 601K OHM 1% 1/2W R:FXD COMP 22K OHM 5% 1/4W R:FXD COMP 100 OHM 5% 1/4W R:FXD COMP 150 OHM 5% 1/4W	01121 20400 01121 01121 01121	CB 1065 0757-0869 CB 2235 CB 1015 CB 1515
A4R42 A4R43 A4R44 A4U1 A4U2	0686-3915 0683-1015 0811-1732 1820-0283 1820-0203	8 16	R:FXD COMP 390 OHM 5% 1/2W R:FXD COMP 100 OHM 5% 1/4W R:FXD MW 1 OHM 5% 3W IC:OPERATIONAL AMPLIFIER IC:OPERATIONAL AMPLIFIER	01121 01121 20400 07263 07263	EB 3915 CB 1015 0811-1732 SL8940 SL8940
A4U3	07754-00170	8	PCARD:BLANK PC	20400	07754-00170
A5	07754-60170		DRIVER AMPLIFIER:CHANNEL 2(FIG. 6-10) SAME AS A4, USE PREFIX A5.	20400	07754-60170
A6	07754-60170		DRIVER AMPLIFIER:CHANNEL 3(FIG. 6-10) SAME AS A4, USE PREFIX A6.	20400	07754-60170
A7	07754-60170		DRIVER AMPLIFIER:CHANNEL 4(FIG. 6-10) SAME AS A4, USE PREFIX A7.	20400	07754-60170
A8	07754-60170		DRIVER AMPLIFIER:CHANNEL 5(FIG. 6-10) SAME AS A4, USE PREFIX A8.	20400	07754-60170
A9	07754-60170		DRIVER AMPLIFIER:CHANNEL 6(FIG. 6-10) SAME AS A4, USE PREFIX A9.	20400	07754-60170
A10	07754-60170		DRIVER AMPLIFIER:CHANNEL 7(FIG. 6-10) SAME AS A4, USE PREFIX A10.	20400	07754-60170
A11 A12	07754-60170		DRIVER AMPLIFIER:CHANNEL 8(FIG. 6-10) SAME AS A4, USE PREFIX A11.	20400	07754-60170
A12	07758-60240	1	REGULATOR/OSCILLATOR PC 60MHZ(FIG. 6-12)	20400	07758-60240
	2680-0157 2190-0758 2190-0780		SCREW:PAN HD SLOT DR 10-32 X 2.250"LG WASHER:FLAT #10 WASHER:FLAT BLACK FIBER #8	00000 00000 00000	080 080 080
A12C1 A12C2 A12C3 A12C4 A12C5	0148-0208 0150-0052 0160-2222 0160-0174 0180-1930	2 2 2 2 1	C:FXD MICA 390 PF 5% C:FXD CER 0.05 UF 20% 400VDCW C:FXD MICA 1500 PF 5% 300VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD ELECT 5.6 UF 10% 35VDCW	72136 56209 20400 56209 56209	R0H15F391-J3C 33C17A 0160-2222 5C11075-CRL 1900406K001082-DYS
A12C6 A12C7 A12C8 A12C9 A12C10	0100-0291 0150-0052 0180-0291 0150-0052 0160-2891	2 2 2 2 1	C:FXD ELECT 1.0 UF 10% 35VDCW C:FXD CER 0.05 UF 20% 400VDCW C:FXD ELECT 1.0 UF 10% 35VDCW C:FXD CER 0.05 UF 20% 400VDCW C:FXD MICA 33 PF 2% 500VDCW	56209 56209 56209 56209 20400	1500105K9035A2-DYS 33C17A 1500105K9035A2-DYS 33C17A 0160-2891
A12C11 A12C12 A12C13 A12C14 A12C15	0150-0052 0160-0174 0160-0161 0160-0174 0140-0280		C:FXD CER 0.05 UF 20% 400VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD MY 0.01 UF 10% 200VDCW C:FXC CER 0.47 UF +30-20% 25VDCW C:FXD MICA 390 PF 5%	56209 56209 56209 56209 72136	33C17A 5C11075-CRL 192P10392-PTS 5C11075-CRL R0H15F391-J3C
A12C16 A12C17 A12C18 A12C19 A12C20	0160-2222 0160-0174 0160-0174 0160-0174 0150-0032		C:FXD MICA 1500 PF 5% 300VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD CER 0.05 UF 20% 400VDCW	20400 56209 56209 56209 56209	0160-2222 5C11075-CRL 5C11075-CRL 5C11075-CRL 33C17A
A12C21 A12C22 A12C23 A12C24 A12C25	0150-0052 0160-0174 0160-0174 0180-2060 0160-8161	2	C:FXD CER 0.05 UF 20% 400VDCW C:FXD CER 0.47 UF +80-20% 25VDCW C:FXD CER 0.47 UF +60-20% 25VDCW C:FXD TANT 40 UF 20% 10VDCW C:FXD MY 0.01 UF 10% 200VDCW	56209 56209 56209 56209 56209	33C17A 5C11075-CRL 5C11075-CRL 1900406K001082-DYS 192P10392-PTS

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12C26	0180-2060	1	C:FXD TANT 40 UF 20% 10VDCW	56289	1500406X001082-DYS
A12C27	0160-0174		C:FXD CER 0.47 UF +80-20% 25VDCW	56289	5C11875-CNL
A12C28	0180-0097		C:FXD TANT. 47 UF 10% 35VDCW	56289	1500476X903952-DYS
A12C31	1901-0033		DIODE:SILICON 100MA 180MV	07263	F03369
A12L1	9140-0210	1	COIL/SHOCK 100 OHM 5% HEAT SINK	82142	15-1315-12J
A12P1	07754-29340	6	TSTR:SI PNP	28480	07754-29340
A12P1	2853-0300		TSTR:SI PNP	28480	1853-0300
A12P2	2853-0300		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1853-0300
A12P3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1C4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q5	1854-0063	4	TSTR:SI NPN	80131	2N3055
	0340-0464		INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
	2190-0088		WASHER:SPLIT LOCK #4	00000	080
	2360-0201		SCREW:SS T PHIL POZI DR 6-32 X 0.500	00000	080
	2500-0081		NUT:HEX 6-32 THREAC	00000	080
A12Q6	1854-0063		TSTR:SI NPN	80131	2N3055
	0340-0464		INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
	2190-0088		WASHER:SPLIT LOCK #4	00000	080
	2360-0201		SCREW:SS T PHIL POZI DR 6-32 X 0.500	00000	080
	2500-0001		NUT:HEX 6-32 THREAC	00000	080
A12Q7	1854-0071	1	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q8	1853-0300		TSTR:SI PNP	28480	1853-0300
A12Q9	1854-0022		TSTR:SI NPN	07263	517843
	1200-0181		MOUNTING:TRANSISTOR PAD	13103	7717-5-N
A12Q10	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q11	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q12	1854-0063		TSTR:SI NPN	80131	2N3055
	0340-0464		INSULATOR FOR TO-3 TRANSISTOR	13103	43-03-1
	2190-0088		WASHER:SPLIT LOCK #4	00000	080
	2360-0201		SCREW:SS T PHIL POZI DR 6-32 X 0.500	00000	080
	2500-0001		NUT:HEX 6-32 THREAC	00000	080
A12Q13	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q14	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A12Q15	1853-0300		TSTR:SI PNP	28480	1853-0300
A12Q16	1853-0300		TSTR:SI PNP	28480	1853-0300
A12Q17	1853-0045		TSTR:SI PNP	80131	2N4036
	1200-0181		MOUNTING:TRANSISTOR PAD	13103	7717-5-N
A12Q18	1853-0045		TSTR:SI PNP	80131	2N4036
A12Q19	1853-0300		TSTR:SI PNP	28480	1853-0300
A12R1	0698-4002	6	R:FXD MET FLM 5K OHM 1% 1/8W	28480	0698-4002
A12R2	2100-1703	1	R:VAR WM 2K OHM 10% 1W	28480	2100-1703
A12R3	0698-5353	2	R:FXD FLM 4K OHM 0.5% 1/8W	28480	0698-5323
A12R4	0683-3325	3	R:FXD COMP 3300 OHM 5% 1/4W	01121	C8 3325
A12R5	0698-4002		R:FXD MET FLM 5K OHM 1% 1/8W	28480	0698-4002
A12R6	0683-1515		R:FXD COMP 150 OHM 5% 1/4W	01121	C8 1515
A12R7	0683-2725	1	R:FXD COMP 2700 OHM 5% 1/4W	01121	C8 2725
A12R8	0811-1732		R:FXD WM 1 OHM 5% 3W	28480	0811-1732
A12R9	0686-1515		R:FXD COMP 150 OHM 5% 1/2W	01121	C8 1515
A12R10	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A12R11	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A12R12	0698-4002	2	R:FXD MET FLM 5K OHM 1% 1/8W	28480	0698-4002
A12R13	0698-4002		R:FXD MET FLM 5K OHM 1% 1/8W	28480	0698-4002
A12R14	0683-4725		R:FXD COMP 4700 OHM 5% 1/4W	01121	C8 4725
A12R15	0811-1732		R:FXD WM 1 OHM 5% 3W	28480	0811-1732
A12R16	0683-1025		R:FXD COMP 1000 OHM 5% 1/4W	01121	C8 1025
A12R17	0698-6273	1	R:FXD FLM 1500 OHM 0.1% 1/8W	28480	0698-6273
A12R18	0698-6866	1	R:FXD FLM 2.182K OHM 0.25% 1/8W	28480	0698-6866
A12R19	0698-5323		R:FXD FLM 4K OHM 0.5% 1/8W	28480	0698-5323
A12R20	0683-4725		R:FXD COMP 4700 OHM 5% 1/4W	01121	C8 4725
A12R21	0683-1245		R:FXD COMP 120K OHM 5% 1/4W	01121	C8 1245
A12R22	0683-5625		R:FXD COMP 5600 OHM 5% 1/4W	01121	C8 5625
A12R23	0683-1505	1	R:FXD COMP 15 OHM 5% 1/4W	01121	C8 1505
A12R24	0761-0025	1	R:FXD MET OK 120 OHM 5% 1W	28480	0761-0025
A12R29	0683-1825	4	R:FXD COMP 1800 OHM 5% 1/4W	01121	C8 1825
A12R30	0811-1202	1	R:FXD WM 50 OHM 5% 3W	28480	0811-1202
A12R31	0683-3335	3	R:FXD COMP 33K OHM 5% 1/4W	01121	C8 3335
A12R32	0683-3335		R:FXD COMP 33K OHM 5% 1/4W	01121	C8 3335
A12R33	0683-3335		R:FXD COMP 33K OHM 5% 1/4W	01121	C8 3335
A12R34	0683-1035		R:FXD COMP 10K OHM 5% 1/4W	01121	C8 1035
A12R35	0683-3335		R:FXD COMP 3300 OHM 5% 1/4W	01121	C8 3325
A12R36	0683-4715		R:FXD COMP 470 OHM 5% 1/4W	01121	C8 4715
A12R37	0683-1245		R:FXD COMP 120K OHM 5% 1/4W	01121	C8 1245
A12R38	0683-1825		R:FXD COMP 1800 OHM 5% 1/4W	01121	C8 1825
A12R39	0683-1825		R:FXD COMP 1800 OHM 5% 1/4W	01121	C8 1825
A12R40	0683-1245		R:FXD COMP 120K OHM 5% 1/4W	01121	C8 1245

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A12R41 A12R42 A12R43 A12R44 A12R45	0683-4715 0683-1825 0690-4002 0812-0072 0683-1025	1	R:FXD COMP 470 OHM 5% 1/4W R:FXD COMP 1800 OHM 5% 1/4W R:FXD NET FLN 5K OHM 1% 1/8W R:FXD WH 0.23 OHM 5% 3W R:FXD COMP 1000 OHM 5% 1/4W	01121 01121 28480 28480 01121	CB 4715 CB 1825 0698-4002 0812-0072 CB 1025
A12R46	0683-1045 0757-0460	2	R:FXC COMP 100K OHMS 5% 1/4W	01121	CB 1045
A12R47	0683-1045	1	R:FXD NET FLN 61.9K OHM 1% 1/8W	28480	0757-0460
A12R49	0683-4745	1	R:FXD COMP 100K OHMS 5% 1/4W	01121	CB 1045
A12R50	0698-4002	1	R:FXD CORR 470K OHM 5% 1/4W R:FXD NET FLN 5K OHM 1% 1/8W	01121 28480	CB 4745 0698-4002
A12R51 A12R52 A12R53 A12R54 A12T1	0757-0442 0683-1025 0683-3325 0683-1025 07754-60470	1	R:FXD NET FLN 10.0K OHM 1% 1/8W R:FXD COMP 1000 OHM 5% 1/4W R:FXD COMP 3300 OHM 5% 1/4W R:FXD COMP 1000 OHM 5% 1/4W TRANSFORMER:OSCILLATOR	28480 01121 01121 01121 28480	0757-0442 CB 1025 CB 3325 CB 1025 07754-60470
A12U1 A12U2 A12U3 A12U4 A12U5	1820-0196 1820-0196 1820-0056 1820-0055 1820-0056	2 2 3	IC:LINEAR VOLTAGE REGULATOR(INPUT) IC:LINEAR VOLTAGE REGULATOR(INPUT) IC:TTL DIVIDE BY 12 10 MHZ MIN. IC:TTL DECADE COUNTER 10 MHZ MIN. IC:TTL DIVIDE BY 12 10 MHZ MIN.	28480 28480 01295 01295 01295	1820-0196 1820-0196 SN7492N SN7490N SN7492N
A12U6 A12U7	1820-0053 1820-0430 0340-0464 2190-0008 2360-0195	1	IC:TTL DECADE COUNTER 10 MHZ MIN. IC:LINEAR VOLTAGE REGULATOR 5V INSULATOR FOR TO-3 TRANSISTOR WASHER:SPILT LOCK #6 SCREW:PAN HD POZI DR 6-32 X 0.312" LG	01295 28480 13103 00000 00000	SN7490N 1820-0430 43-03-1 OBD OBD
A12U8	2500-0001 07758-00240 2190-0758 2190-0780 2360-0119	1	NUT:HEX 6-32 TTHREAD BGARD:BLANK P.C. WASHER:FLAT #10 WASHER:FLAT BLACK FIBER #8 SCREW:SST PAN HD POZ DR 6-32 X 7/16"	00000 28480 00000 00000 00000	OBD 07758-00240 OBD OBD OBD
A12U8 A12U8	2500-0001 2680-0157		NUT:HEX 6-32 TTHREAD SCREW:PAN HD SLOT DR 10-32 X 2.250"LG	00000 00000	OBD OBD
A13	07758-60241	1	PCB:REGULATOR/OSCILLATOR, 50HZ SAME AS A12, 07758-60240, EXCEPT FOR THE FOLLOWING COMPONENTS: ADD: DELETE: A12U3 1820-0056 IC:7492, 1:12.	28480	07758-60241
A13U3	1820-0055		IC:TTL DECADE COUNTER 10 MHZ MIN.	01295	SN7490N
A14	07754-60070	8	GALVANDERMETER(FIG. 6-14)	28480	07754-60070
A14NP1 A14NP1 A14NP2 A14NP3 A14NP4	2680-0055 07754-28630 3030-0044 07754-08550 07754-20600 07754-20600	21 8 8 8 16	SCREW:SST PAN HD POZI DR 10-32 X 0.500" ARM:PIVOT SCREW:SOCKET CAP 2-56 X 0.375" CLIP:STYLUS RETAINER STYLUS BUMPER STYLUS BUMPER	00000 28480 70276 28480 28480 28480	OBD 07754-20630 OBD 07754-00550 07754-20600 07754-20600
A14NP5	07754-00390 2340-0006 2200-0105 3050-0269 07754-60430	8 16 8 8	RETAINER:BUMPER NUT:HEX 4-40 X 0.250" ACROSS FLAT SCREW:PAN HD POZI DR 4-40 X 0.312" LG WASHER:FLAT #5 HDW PIVOT, TAIL	28480 00000 00000 00000 28480	07754-00390 OBD OBD OBD 07754-60430
A14NP6	0520-0173 0610-0002 07754-00040 2360-0107 2360-0111	8 8 8 8 8	SCREW:PAN HD POZI DR 2-56 X 0.188" LG NUT:HEX, BRASS 2-56 TTHREAD ARM:STYLUS PRESSURE ADJUSTING SCREW:PAN HD PHIL DR 6-32 X 1.075" LG SCREW:PAN HD POZI DR 6-32 X 0.188" LG	00000 00000 28480 00000 00000	OBD OBD 07754-00040 OBD OBD
A14NP8 A14N1 A14N1P1	07754-08480 07754-60080 07754-00650 1400-0017 0360-1045	8 8 8 8 8	PLATE:SPACER CABLE:GALVANDERMETER BRACKET:CONNECTOR CLAMP,CABLE NYLON 5/16 LUG:SOI DER FOR #4 SCREW	28480 28480 28480 71616 00000	07754-00480 07754-60080 07754-00650 CPC-1953-58 OBD
	2200-0109 2340-0006 2360-0115 2420-0006 1251-0198	9	SCREW:PAN HD POZI DR 4-40 X 0.438" LG NUT:HEX 4-40 X 0.250" ACROSS FLAT SCREW:PAN HD POZI 6-32 X 5/16 W/LK NUT:HEX 6-32 TTHREAD CONNECTOR:PC EDGE (2 X 6) 12 CONTACT	00000 00000 00000 00000 71785	OBD OBD OBD OBD 251-06-30-261

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Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A14A1	07754-60340	1	STYLUS, STANDARD TIP (7758A INSTRUMENT ONLY)	28480	07758-60340
A14A1	07754-60341	1	STYLUS, FINE-LINE TIP (7418A INSTRUMENT ONLY)	28480	07758-60341
A15	07754-60070		GALVANO-METER (FIG. 6-14) SAME AS A14, USE PREFIX A15.	28480	07754-60070
A15A1	07754-60070		SAME AS A14A1, USE PREFIX A15A1. GALVANO-METER (FIG. 6-14)	28480	07754-60070
A16	07754-60070		SAME AS A14, USE PREFIX A16. SAME AS A14A1, USE PREFIX A16A1. GALVANO-METER (FIG. 6-14)	28480	07754-60070
A16A1	07754-60070		SAME AS A14, USE PREFIX A16A1. GALVANO-METER (FIG. 6-14)	28480	07754-60070
A17	07754-60070		SAME AS A14, USE PREFIX A17. SAME AS A14A1, USE PREFIX A17A1.	28480	07754-60070
A17A1	07754-60070		SAME AS A14A1, USE PREFIX A17A1.	28480	07754-60070
A18	07754-60070		GALVANO-METER (FIG. 6-14) SAME AS A14A1, USE PREFIX A18A1.	28480	07754-60070
A18A1	07754-60070		GALVANO-METER (FIG. 6-14)	28480	07754-60070
A19	07754-60070		SAME AS A14A1, USE PREFIX A19A1.	28480	07754-60070
A19A1	07754-60070		GALVANO-METER (FIG. 6-14) SAME AS A14A1, USE PREFIX A20A1.	28480	07754-60070
A20	07754-60070		GALVANO-METER (FIG. 6-14)	28480	07754-60070
A20A1	07754-60070		SAME AS A14A1, USE PREFIX A20A1.	28480	07754-60070
A21	07754-60070		GALVANO-METER (FIG. 6-14) SAME AS A14A1, USE PREFIX A21A1.	28480	07754-60070
A21A1	07754-60070		GALVANO-METER (FIG. 6-14)	28480	07754-60070
A22	07758-60100	1	DRIVE UNIT (FIG. 6-15)	28480	07758-60100
A22	2510-0053	1	SCREW: PAN HD PGZI DR 8-32 X 0.750" LG	00000	080
A22NP1	1460-1370	2	SPRING: EXTENSION 1.500" LG	00000	080
A22NP2	1460-1370	2	SPRING: EXTENSION 1.500" LG	00000	080
A22NP3	07758-08300	2	ARF. SPRING, TABLE	28480	07758-08300
A22NP4	2200-0101	6	SCREW: PAN HD POZI 4-40 X 3/16 W/LK	00000	080
A22NP4	07758-00300	6	ARM, SPRING, TABLE	28480	07758-00300
A22NP5	2200-0101	1	SCREW: PAN HD POZI 4-40 X 3/16 W/LK	00000	080
A22NP5	07758-20260	1	PLATEN	28480	07758-20260
A22NP6	2200-0167	1	SCREW: FLAT HD POZI DR 4-40 X 0.375" LG	00000	080
A22NP6	07758-20350	1	COVER: PLATEN	28480	07758-20350
A22NP6	0570-0171	1	SCREW: SET (6) SOCKET DRIVE 6-32 X 0.250"	00000	080
A22NP7	07758-00040	1	BRACKET: BRAKE	28480	07758-00040
A22NP8	07758-00160	1	FELT: BRAKE	28480	07758-00160
A22NP9	07758-00420	1	CLAMP: FELT	28480	07758-00420
A22NP10	2200-0181	1	SCREW: PAN HD POZI 4-40 X 3/16 W/LK	00000	080
A22NP10	0510-1051	1	KEY: SHAFT, WOODCRUFF	18042	CA-201
A22NP11	2190-0833	1	WASHER: FLAT 5/16" DIA SHAFT	00000	080
A22NP11	07758-00101	1	SLIDE: TABLE L	28480	07758-00101
A22NP12	2200-0105	1	SCREW: PAN HD POZI DR 4-40 X 0.312" LG	00000	080
A22NP12	07758-00102	1	SLIDE: TABLE R	28480	07758-00102
A22NP12	2200-0105	1	SCREW: PAN HD POZI DR 4-40 X 0.312" LG	00000	080
A22NP13	07758-20280	1	GUIDE: TABLE	28480	07758-20280
A22NP14	07758-20270	1	GUIDE: TABLE	28480	07758-20270
A22NP15	07758-00170	1	BOTTOM: TABLE	28480	07758-00170
A22NP16	2200-0103	1	SCREW: JST PHM POZI DR 4-40 X 1/4" W/LK	00000	080
A22NP16	07758-20230	1	FRONT: TABLE	28480	07758-20230
A22NP17	07758-00120	1	GUIDE: PAPER	28480	07758-00120
A22NP18	0590-0199	1	NUT: EXT LOCK #4-40	00000	080
A22NP18	2200-0168	1	SCREW: FLAT HD POZI DR 4-40 X 0.438" LG	00000	080
A22NP19	07758-08450	2	BRACKET: BRAKE BAR	28480	07758-08450
A22NP19	07758-00450	2	BRACKET: BRAKE BAR	28480	07758-00450

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Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A22MP21	07758-20190 2200-0101 2200-0105	4	SPACER SCREW: PAN HD POZI 4-40 X 3/16 W/LK	28480 00000	07758-20190 080
A22MP22	07758-20190 07758-00440	2	SCREW: PAN HD POZI DR 4-40 X 0.312" LG SPACER SPRING: BRAKE BAR	00000 28480 28480	080 07758-20190 07758-00440
A22MP23	2200-0101 2200-0105		SCREW: PAN HD POZI 4-40 X 3/16 W/LK	30000	080
A22MP24	07758-00440		SCREW: PAN HD POZI DR 4-40 X 0.312" LG	00000	080
A22MP25	1460-1324 1460-1324	2	SPRING: BRAKE BAR SPRING: EXTENSION 2.440" LG SPRING: EXTENSION 2.440" LG	28480 00000 00000	07758-00440 080 080
A22MP26	07758-00090 2360-0115	2	PIVOT: SPRING SCREW: PAN HD POZI 6-32 X 5/16 W/LK	28480 00000	07758-00090 080
A22MP27	07758-20190 07758-00090 2360-0115		SPACER PIVOT: SPRING SCREW: PAN HD POZI 6-32 X 5/16 W/LK	28480 00000 00000	07758-20190 07758-00090 080
A22MP28	07754-20190		SPACER	28480	07758-20190
A22MP29	07758-60070	2	ASSY: PRESSURE ROLLER	28480	07758-60070
A22MP30	07758-60070	1	ASSY: PRESSURE ROLLER	28480	07758-60070
A22MP31	07758-20101 07758-20102	1	SPACER: 0.507" SPACER: 0.274"	28480 28480	07758-20101 07758-20102
A22MP32	07758-20080	1	ROD: PRESS ROLL	28480	07758-20080
A22MP33	07758-20070	1	ROD: LINK TABLE	28480	07758-20070
A22MP34	07758-20290 2360-0115	2	BRACKET: TABLE PIVOT SCREW: PAN HD POZI 6-32 X 5/16 W/LK	28480 00000	07758-20290 080
A22MP35	07758-20290		BRACKET: TABLE PIVOT	28480	07758-20290
A22MP36	2360-0115 07758-00150	1	SCREW: PAN HD POZI 6-32 X 5/16 W/LK	00000	080
A22MP37	07758-20050	1	PIVOT: TABLE	28480	07758-00150
A22MP38	07754-00730	4	DRIVE ROLLER	28480	07758-20050
A22MP39	07754-00730		GUIDE	28480	07754-00730
A22MP40	07754-00730		GUIDE	28480	07754-00730
A22MP41	07754-00730		GUIDE	28480	07754-00730
A22MP42	07758-20020	2	SPACER: FRONT	28480	07758-20020
A22MP43	2360-0183 07758-20020	3	SCREW: FLAT HD POZI DR 6-32 X 0.375" LG SPACER: FRONT	00000 28480	080 07758-20020
A22MP44	2360-0183 07758-00071 0590-0126 0361-0347	1	SCREW: FLAT HD POZI DR 6-32 X 0.375" LG	00000	080
A22MP45	07758-00072	2	SIDE PANEL: LM NUT: ANCHOR, RIGHT-ANGLE	28480 72962	07758-00071 22NA27-22-82
		2	RIVET: SEMITUBULAR, OVAL HD	00000	080
		1	SIDE PANEL: RM	28480	07758-00072
	0361-0547 0590-0126		RIVET: SEMITUBULAR, OVAL HD	00000	080
	07754-20500		NUT: ANCHOR, RIGHT-ANGLE	72962	22NA27-22-82
A22MP46	07754-20500	2	BEARING	28480	07754-20500
A22MP47	1500-0357	1	BEARING	28480	07754-20500
A22MP48			CHAIN: DRIVE 146 PITCH LG	00000	080
	0590-0199 2200-0107 2680-0059	1	NUT: EXT LOCK #4-40	00000	080
A22MP49	1430-0460	1	SCREW: POZI DR 4-40 X 3/8 W/L	00000	080
A22MP50	07750-00530	1	SCREW: SST PAN HD POZI DR 10- SPROCKET: 25 TOOTH 0.1875 PITCH	00000 28480	080 1430-0460
			GUARD: CHAIN	28480	07758-00530
A22MP51	07750-20370	2	SPACER: CHAIN GUARD	28480	07758-20370
A22MP52	07750-20370	2	SPACER: CHAIN GUARD	28480	07758-20370
A22MP53	00758-00140	2	ARM: TABLE	28480	07758-00140
A22MP54	00758-00140		ARM: TABLE	28480	07758-00140
A22MP55	07758-20090	1	ROD: ARM, BACK	28480	07758-20090
A22MP56	07758-20090	1	SPRING: PAPER	28480	07758-00290
A22MP57	0361-0383	2	RIVET: SEMITUBULAR, OVAL HD	00000	080
A22MP58	07758-00460 0361-0383	1	SPRING: BACK	28480	07758-00460
	07758-00110	1	RIVET: SEMITUBULAR, OVAL HD	00000	080
			TRAY: PAPER	28480	07758-00110
A22MP59	07758-20030	1	MOUNT: GALVANOMETER	28480	07758-20030
A22MP60	07758-00130	1	STIFFENER	28480	07758-00130
A22MP61	2360-0183	1	SCREW: FLAT HD POZI DR 6-32 X 0.375" LG	00000	080
A22MP62	07758-00430 07758-20220	2	PLATE: PAPER GUIDE ROD: PRESSURE ROLLER	28480 28480	07758-00430 07758-20220
A22MP63	07758-20220		ROD: PRESSURE ROLLER	28480	07758-20220
A22MP64	07758-00570	1	BRACKET: TOP, RM	28480	07758-00570
A22MP65	2510-0049 07758-00580 2510-0049	2	SCREW: POZI DR 8-32 X 1/2" W/LOCK	00000	080
		1	BRACKET: TOP, LM SCREW: POZI DR 8-32 X 1/2" W/LOCK	28480 00000	07758-00580 080
A22A1	07758-60110	1	GEAR DRIVE ASSY (RM/SEC. 60HZ) (FIG. 6-16)	28480	07758-60110

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Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	2680-0055		SCREW:SST PAN HD POZI DR 10-32 X 0.500"	00000	080
A22A101	3140-0412	1	MOTOR:10C/1500 RPM	28480	5140-0412
	0570-0945	1	SCREW:PAN HC SLOT DR 1/4-20 X 0.500" LG	00000	080
A22A1C1	0160-3118	1	C:FXD PAPER B UF 10X 330 VACN	90201	32A3308
A22A1E1	0660-1289	3	BARRIER BLOCK:2 TERMINALS	98410	35002-3523
	0360-1279	3	TERMINAL:JUMPER FOR #6 SCREW	00000	080
	2360-0211	3	SCREW:FLAT HD POZI DR 6-32 X 0.750" LG	00000	080
	2420-0086		NUT:HEX 6-32 THREAD	00000	080
A22A1E2	0360-1289		BARRIER BLOCK:2 TERMINALS	98410	35002-3523
	0360-1279		TERMINAL:JUMPER FOR #6 SCREW	00000	080
	2360-0211		SCREW:FLAT HD POZI DR 6-32 X 0.750" LG	00000	080
A22A1E3	2420-0006		NUT:HEX 6-32 THREAD	00000	080
	0340-1289		BARRIER BLOCK:2 TERMINALS	98410	35002-3523
	0360-1279		TERMINAL:JUMPER FOR #6 SCREW	00000	080
	2360-0211		SCREW:FLAT HD POZI DR 6-32 X 0.750" LG	00000	080
A22A1MP1	2420-0006		NUT:HEX 6-32 THREAD	00000	080
	07758-00080	1	PAN:MOTOR	28480	07758-00080
	2360-0115		SCREW:PAN HD POZI 6-32 X 5/16 W/LK	00000	080
A22A1MP2	07758-20320	1	PULLEY:10 XL	28480	07758-20320
A22A1MP3	07758-20250	1	PULLEY:12 TEETH 1/5P	28480	1500-0097
A22A1MP4	07758-00490	1	PULLEY:40 XL	28480	07758-20250
A22A1MP5	2510-0045	1	NCUNT:PULLEY	28480	07758-00490
			SCREW:PAN HD POZI DR 8-32 X 0.375" LG	00000	080
A22A1MP6	07758-20340	2	NCUNT:BEARING	28480	07758-20340
	0520-0130	2	SCREW:SST PAN HD POZ DR 2-56 X 3/8"	00000	080
A22A1MP7	07758-20340		NCUNT:BEARING	28480	07758-20340
	0520-0120		SCREW:SST PAN HD POZ DR 2-56 X 3/8"	00000	080
A22A1MP8	1500-0030	1	BELT:TIMING 14.00" LG 0.375" W 70TEETH	90179	140XL037
A22A1MP9	1500-0337	1	BELT:TIMING 7.0" LG 0.375" W 35 teeth	90179	80XL 037
A22A1MP10	1410-0816	2	BEARING:BALL 0.6250" OD	21335	HS-1K007-FS 171
A22A1MP11	1410-0816	2	BEARING:BALL 0.6250" OD	21335	HS-1K007-FS 171
A22A1MP12	07758-20380	1	SPACER:PULLEY MOUNT	28480	07758-20380
A22A1MP13	07758-20150	1	SHAFT:PULLEY	28480	07758-20150
A22A1MP14	07758-20200	1	PAC:NCUTOR	28480	07758-20200
A22A1MP15	07758-20170	1	SPACE:MOTOR MOUNT	28480	07758-20170
A22A1MP16	0160-2963	1	INSULATOR:CAPACITOR, OVAL SHAPED	56289	301-66-02Z
A22A1MP17	0160-0934	2	BRACKET:CAPACITOR, SPADE LUG TYPE	56289	3-50-136H-02Z
	2740-0003	2	NUT:HEX STL 10-32 X 3/8	78189	510-101810-51
A22A1MP18	0160-0934		BRACKET:CAPACITOR, SPADE LUG TYPE	56289	3-50-136H-02Z
	2740-0003		NUT:HEX STL 10-32 X 3/8	78189	510-101810-51
A22A1MP19	07758-40010	1	COVER	28480	07758-40010
	2200-0141	1	SCREW:PAN HD POZI DR 4-40 X 0.312	00000	080
A22A1M1	07758-60390	1	ASSY:CABLE	28480	07758-60390
A22A1M1	8120-0962	1	PLUG:2 CONTACT R, MOTOR	28480	8120-0962
A22A1M1	0362-0167	1	TERMINATION:CRIMP LUG	00000	080
A22A1A1	07758-60120		GEARBOX (FIGURE 6-18)	28480	07758-60120
	2360-0115		SCREW:PAN HD POZI 6-32 X 5/16 W/LK	00000	080
A11A1A1L1	6490-1094	4	RELAY:ACTUATOR(SOLENOID)	77342	R40-E3-L4-V800
	0525-0051	4	SCREW:PAN HD PHIL DR 3-48 X 0.125" LG	00000	080
A22A1A1L2	0490-1094		RELAY:ACTUATOR(SOLENOID)	77342	R40-E3-L4-V800
	0525-0051		SCREW:PAN HC PHIL DR 3-48 X 0.125" LG	00000	080
A22A1A1L3	0490-1094		RELAY:ACTUATOR(SOLENOID)	77342	R40-E3-L4-V800
	0525-0051		SCREW:PAN HC PHIL DR 3-48 X 0.125" LG	00000	080
A22A1A1L4	0490-1094		RELAY:ACTUATOR(SOLENOID)	77342	R40-E3-L4-V800
	0525-0051		SCREW:PAN HD PHIL DR 3-48 X 0.125" LG	00000	080
A22A1A1MP1	07754-20230	2	PLATE:SIDE	28480	07754-20230
A22A1A1MP2	07754-20250		PLATE:SIDE	28480	07754-20230
A22A1A1MP3	1410-0974	2	BEARING:BALL, RADIAL	21335	57X00
A22A1A1MP4	1410-0974		BEARING:BALL, RADIAL	21335	57X00
A22A1A1MP5	07758-00210	1	COVER:GEAR BOX, BOTTOM	28480	07758-00210
A22A1A1MP6	07758-00200	1	PLATE:MOUNTING	28480	07758-00200
A22A1A1MP7	07758-00220	1	COVER:ACCESS, TOP (NOT SHOWN)	28480	07758-00220
	7360-0113	1	SCREW:PAN HD POZI 6-32 X 1/4 W/LK	00000	080
	2360-0115	1	SCREW:PAN HD POZI 6-32 X 5/16 W/LK	00000	080
A22A1A1MP8	07758-20240	1	SPACER: BEAR BOX	28480	07758-20240
A22A1A1MP9	07754-20080	1	GEAR:78 TTOOTH	28480	07754-20080
A22A1A1MP10	07754-48010	4	CLUTCH	28480	07754-48010
A22A1A1MP11	1460-1211	4	SPRING:TORSION	28480	1460-1211
A22A1A1MP12	07758-20110	1	GEAR:32/117T	28480	07758-20110
A22A1A1MP13	07754-40010		CLUTCH	28480	07754-40010

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A22A1A1P14 A22A1A1P15 A22A1A1P16 A22A1A1P17 A22A1A1P18	1460-1211 07754-20130 07754-40010 1460-1211 07753-20060	1 1	SPRING:TORSION GEAR:36 AND 117 TOOTH CLUTCH SPRING:TORSION GEAR:36/104 T	28480 28480 28480 28480 28480	1460-1211 07754-20130 07754-40010 1460-1211 07753-20060
A22A1A1P19 A22A1A1P20 A22A1A1P21 A22A1A1P22 A22A1A1P23	07754-40010 1460-1211 07754-20660 07754-20720 07758-20310	1 1 2 2	CLUTCH SPRING:TORSION GEAR: 52 TOOTH COUPLING PULLEY: 24 XL	28480 28480 28480 28480 28480	07754-40010 1460-1211 07754-20660 07754-20720 07758-20310
A22A1A1P24	0570-0174 07750-60220 07754-20190 0590-0304 01250-21101	1 1 2 2	SCREW:SET SOCKET DR 8-32 X 0.250" LG ASSY:ADAPTER, PULLEY SHAFT:INPUT OR OUTPUT NUT:HEX STL 1/4-20 THREAD SIZE WASHER	00000 28480 28480 00000 28480	080 07754-60220 07754-20190 080 01250-21101
A22A1A1P25 A22A1A1P26 A22A1A1P27 A22A1A1P28	2940-0133 1500-0288 07754-20720 07758-20130 1460-1210	2 1 1 4	SCREW:SLOT OR TRUSS HD 1/4-28 X 0.500" GEAR:SPROCKET 20 TOOTH COUPLING GEAR: 78 T SPRING:TORSION	00000 28480 28480 28480 28480	080 1500-0288 07754-20720 07758-20130 1460-1210
A22A1A1P29 A22A1A1P30 A22A1A1P31 A22A1A1P32 A22A1A1P33	07754-20070 07754-20120 1460-1210 07754-20110 07754-20120	2 2 2	GEAR:104 TOOTH GEAR:39 TOOTH SPRING:TORSION GEAR:120 TOOTH GEAR:39 TOOTH	28480 28480 28480 28480 28480	07754-20070 07754-20120 1460-1210 07754-20110 07754-20120
A22A1A1P34 A22A1A1P35 A22A1A1P36 A22A1A1P37 A22A1A1P38	1460-1210 07754-20110 07758-20120 1460-1210 07754-20070	1 1 1 1 1	SPRING:TORSION GEAR:120 TOOTH GEAR: 52 T SPRING:TORSION GEAR:104 TOOTH	28480 28480 28480 28480 28480	1460-1210 07754-20110 07758-20120 1460-1210 07754-20070
A22A1A1P39	07754-20190 0590-0304 01250-21101 2940-0133 07754-00880	1	SHAFT:INPUT OR OUTPUT NUT:HEX STL 1/4-20 THREAD SIZE WASHER SCREW:SLOT DR TRUSS HD 1/4-28 X 0.500" MOUNTING BRACKET:SOLENOID	28480 00000 28480 00000 28480	07754-20190 080 01250-21101 080 07754-00880
A22A1A1P40	2200-0105 2200-0109 07758-60560 07758-00200 1251-1765	1 1 1 1 1	SCREW:PAN HD POZI DR 4-40 X 0.312" LG SCREW:PAN HD POZI DR 4-40 X 0.438" LG CABLE:GEAR BOX PLATE:MOUNTING CONNECTOR:PC 6 FORK TYPE CONTACT	00000 00000 28480 28480 02660	080 080 07758-60560 07758-00200 143-006-01(1158)
A23	2360-0115 07758-60210	1	SCREW:PAN HD POZI 6-32 X 5/16 W/LK ASSY:MARKER, TIMED, CHANNEL 7-8 (FIG. 6-19)	00000 28480	080 07758-60210
A23L1 A23MP1 A23MP2 A23MP3 A23MP4 A23M1	2200-0105 0490-0417 0550-0045 07754-00440 0380-0787 2190-0007 2200-0165 07754-00450 07754-00830 07754-60310 0520-0185 07758-68180 2200-0071 2200-0101 8120-0974	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SCREW:PAN HD POZI DR 4-40 X 0.312" LG RELAY:24V 3A 8 115 VAC SCREW:SSY PAN HD SLOT DR 5-40 X 0.125" BRACKET:MARKER STANDOFF:INSULATED, HEX BASE WASHER:INT LOCK #6 SCREW:FLAT HD POZI DR 4-40 X 1/4" BRACKET:MARKER BRACKET:LIMIT PEN:MARKER SCREW:PAN HD POZI DR 2-56 X 0.125" LG CABLE MARKER SCREW:FLAT HD SLOT DR 4-J/ X 0.125" LG SCREW:PAN HD POZI 4-40 X 3/16 W/LK SOCKET:14-PIN MALE	00000 77342 00000 28480 00000 28480 00000 28480 28480 00000 00000 28480 00000 00000 00000 28480	080 KS-1087-1 080 07754-00440 080 2190-0007 080 07754-00450 07754-00830 07754-60310 080 07758-60180 080 080 080
A24	07750-60210		MARKER:EVENT (CHANNEL 6-7) FIG. 6-19 SAME AS A23, USE PREFIX A24.	28480	07758-60210
A25	07750-60210		MARKER:EXTRA (CHANNEL 5-6, OPT 015) SAME AS A23, USE PREFIX A25. (OPTIONAL 7758A, 7418A)	28480	07758-60210
A26	07750-60210		MARKER:EXTRA (CHANNEL 4-5, OPT 014) SAME AS A23, USE PREFIX A26. (OPTIONAL 7758A)	28480	07758-60210
A27	07750-60210		MARKER:EXTRA (CHANNEL 3-4, OPT 013) SAME AS A23, USE PREFIX A27. (OPTIONAL 7418A)	28480	07758-60210

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A28	07758-60210		MARKER:EXTRA(CHANNEL 2-3, OPT 012) SAME AS A29, USE PREFIX A28. (OPTIONAL 7418A)	28480	07758-60210
A29	07750-60210		MARKER:EXTRA(CHANNEL 1-2, OPT 011) SAME AS A28, USE PREFIX A29. (OPTIONAL 7418A)	28480	07758-60210
A30	07758-63499	1	ACCESSORIES (FIG. 6-20)	28480	07758-63499
A30NP1	2110-0083	1	FUSE:CARTRIDGE 3 AMP 3 AG	75915	312003
A30NP2	2110-0365	1	FUSE:4A/250V SLOW-BLOW	71400	HDA-4 AMP
A30NP3	2110-0367	1	FUSE:5.0 AMP 250V	71400	HDA-250-5
A30NP4	5060-4658	2	MCNITGR CONNECTOR	28480	5060-4658
A30NP5	5060-4658		MCNITGR CONNECTOR	28480	5060-4658
A30NP6	5060-4658	1	KIT:CONNECTOR, SIGNAL	28480	5060-4659
A30NP7	6040-0220	1	OIL:TURBINE 3/4 OZ.	07829	K674L017
A30NP8	6040-0222	1	LUBRICANT 1 OZ.	00000	080
A30NP9	8120-1385	1	CABLE ASSY:AC POWER CORD(8 FT)	70903	KH-7077
A30NP10	8710-0857	1	WRENCH:ALLEN, HEX KEY	00000	080
A30NP11	8710-0875	1	SCREWDRIVER	00000	080
A30NP12	9270-0920	1	PAPER:PERMA 8-CHANNEL BLK PRINTING (7758A INSTRUMENT ONLY)	28480	9270-0920
A30NP12	9270-0946	1	PAPER:PERMA 8-CHANNEL GREEN PRINTING (7418A INSTRUMENT ONLY)	28480	9270-0946
A30NP13	07758-91999	1	MANUAL (NOT SHOWN)	28480	07758-91999
A30NP14	07850-01520	1	PAPER:STYLUS LAPPING	28480	07850-01520
A30NP15	14023A	1	TESTER:STYLUS PRESSURE	28480	14023A

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Section VI - Replaceable Parts
Models 7758A, 7418A
07758-1

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	07758-60350		BENCHTOP ENCLOSURE W/ PTU SHELF(7758A)	28480	07758-60350
	07758-60351		BENCHTOP ENCLOSURE W/ PTU SHELF(7418A)	28480	07758-60351
	2190-0702	8	WASHER:SHOULDER 0.500" OD 0.206" ID (NO. 10)	00000	080
	2680-0107	8	SCREW:PAN HD POZI DR 10-32 X 0.750" LG	00000	080
	5060-0767	8	FOOT ASSY	28480	5060-0767
	7120-2475	2	INSERT:NAMEPLATE	28480	7120-2475
	07754-00241	1	SHIPPING BRACKET:LEFT	28480	07754-00241
	07754-00242	1	SHIPPING BRACKET:RIGHT	28480	07754-00242
	2680-0051	10	SCREW:PAN HC POZI DR 10-32 X 0.375" LG	00000	080
	07754-00490	1	COVER:UPPER	28480	07754-00490
	07754-00511	1	BRACE:FRONT	28480	07754-00511
	2680-0118	21	SCREW:FLAT HD POZI DR 10-32 X 0.500" LG	00000	080
	07754-00512	1	BRACE:FRONT	28480	07754-00512
	2680-0118	1	SCREW:FLAT HD POZI DR 10-32 X 0.500" LG	00000	080
	07754-00521	1	BRACE:BACK	28480	07754-00521
	2680-0118	1	SCREW:FLAT HC POZI DR 10-32 X 0.500" LG	00000	080
	07754-00522	1	BRACE:BACK	28480	07754-00522
	2680-0118		SCREW:FLAT HD POZI DR 10-32 X 0.500" LG	00000	080
	07754-00570	2	SPRING	28480	07754-00570
	2510-0045	7	SCREW:PAN HD POZI DR 8-32 X 0.375" LG	00000	080
	07754-20670	2	SCREW:SHOULDER	28480	07754-20670
	07754-20710	2	BLACK	28480	07754-20710
	07750-00471	1	TRIM STRIP:MEDICAL (7758A INSTRUMENT ONLY)	28480	07758-00471
	07750-00471	1	TRIM STRIP:INDUSTRIAL (7418A INSTRUMENT ONLY)	28480	07758-00472
	2360-0181	2	SCREW:FLAT HD POZI DR 6-32 X 0.250" LG	00000	080
	07758-68331	1	CASE:BOTTOM, MEDICAL (7758A INSTRUMENT ONLY)	28480	07758-60331
	07758-60332	1	CASE:BOTTOM, INDUSTRIAL (7418A INSTRUMENT ONLY)	28480	07758-60332
	07758-60340	3	ASSY: PAPER TAKEUP (ORDER SEPARATELY)	28480	07758-60340
	07758-60300		AMPLIFIER ENCLOSURE FOR 8848A(7758A) (OPTION 079)	28480	07758-60300
	07758-60301		AMPLIFIER ENCLOSURE FOR 8848A(7418A) (OPTION 079)	28480	07758-60301
	5060-0767		FOOT ASSY	28480	5060-0767
	07754-00570	7	SPRING	28480	07754-00570
	2580-0006		NUT:HEX 8-32 THREAD	78189	KEP511-081800-00
	2510-0045		SCREW:PAN HD POZI DR 8-32 X 0.375" LG	00000	080
	07754-20670		SCREW:SHOULDER	28480	07754-20670
	07754-20710		BLACK	28480	07754-20710
	2510-0045		SCREW:PAN HD POZI DR 8-32 X 0.375" LG	00000	080
	07754-00331	1	BRACE:BACK	28480	07758-00331
	07758-00332	1	BRACE:BACK	28480	07758-00332
	2680-0118		SCREW:FLAT HD POZI DR 10-32 X 0.500" LG	00000	080
	2680-0118		SCREW:FLAT HC POZI DR 10-32 X 0.500" LG	00000	080
	07758-00341	1	BRACE:FRONT	28480	07758-00341
	2680-0118		SCREW:FLAT HC POZI DR 10-32 X 0.500" LG	00000	080
	07758-00342	1	BRACE:FRONT	28480	07758-00342
	2680-0118		SCREW:FLAT HC POZI DR 10-32 X 0.500" LG	00000	080
	07758-00351	1	TRIM STRIP:MEDICAL	28480	07758-00351
	07758-00352	1	(MODEL 7758A) TRIM STRIP:INDUSTRIAL (MODEL 7418A)	28480	07758-00352
	2360-0181		SCREW:FLAT HC POZI DR 6-32 X 0.250" LG	00000	080
	07758-00371	1	COVER:UPPER	28480	07758-00371
	07758-00372	1	(MODEL 7758A) COVER:UPPER	28480	07758-00372
	07758-60311	1	(MODEL 7418A) CASE:BOTTOM, MEDICAL	28480	07758-60311
	07758-60312	1	(MODEL 7758A) CASE:BOTTOM, INDUSTRIAL (MODEL 7418A)	28480	07758-60312

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	07758-60400		OPTION 001-7758A RECORDER RACK MOUNT RACK MOUNTING KIT, AS FOLLOWS:	28480	
	01060-08470 07754-00380	8 4	STRIP NUT BRACKET:BACK	28480 28480	01060-00470 07754-00380
	2680-0051 07754-00400 2680-0051 07754-00670	4 12	SCREW:PAN HD POZI DR 10-32 X 0.375" LG BRACKET:FRONT SCREW:PAN HD POZI DR 10-32 X 0.375" LG NUT:PLATE	00000 28480 00000 28480	080 07754-00400 080 07754-00670
	07758-60370	1	RACK MOUNT PAPER TAKEUP, AS FOLLOWS:	28480	07758-60370
	07758-00511	1	BRACKET:PTU, WHITE	28480	07758-00511
	07758-00521 07758-60340 2190-0702 2190-0758 2510-0049	1 5 6	PANEL:PTU, WHITE ASSY:PTU WASHER:SHOULDER 0.500" OD 0.200" ID WASHER:FLAT 08 SCREW:POZI DR 8-32 X 1/2" W/LOCK	28480 28480 00000 00000 00000	07758-00521 07758-60340 080 080 080
	2500-0006 2680-0107		NUT:HEX 8-32 THREAD SCREW:PAN HD POZI DR 10-32 X 0.750" LG DELETE: ENCLOSURES 8848A POWER SUPPLY	78189 00000	KEP511-081800-10 080
	7124-1604 07758-60241 1500-0334	1 1 1 1	OPTION 008 - 50 HZ OPERATION LABEL:50 HZ PCB:OSCILLATOR/REGULATOR,50HZ SPROCKET:24 TOOTH DELETE: 7124-1605 LABEL: 60 HZ 1500-0288 SPROCKET 07758-60240 P.C. BOARD, 60 HZ, A12	28480 28480 00000	7124-1604 07758-60241 080
F6	2110-0381	1	OPTION 009 - 230V OPERATION FUSE, 3.0 AMP AT 250V SLOW BLOW	71400	MDA-3
F6	07758-00540 6110-0023	1 1	DELETE: OVERLAY:POWER INPUT FUSE 6.25AT	28480 71400	07758-00540 MDF-6.25
	07758-60400 1490-0960 2510-0123 01060-00470 07754-00380 2680-0051 07754-00400 2680-0051 07754-00670	1 1	OPTION 010 - 7418A RECORDER RACK MOUNT RACK MOUNTING KIT, AS FOLLOWS SLIDES:CHASSIS 17.0" LONG SCREW:FLAT T: POZI DR 8-32 X 0.500" LG STRIP NUT BRACKET:BACK	28480 28480 00000 28480 28480	07758-60400 07758-60400 1490-0960 080 01060-00470 07754-00380
	07758-60380	1	SCREW:PAN HD POZI DR 10-32 X 0.375" LG BRACKET:FRONT SCREW:PAN HD POZI DR 10-32 X 0.375" LG NUT:PLATE	00000 28480 00000 28480	080 07754-00400 080 07754-00670
	07758-60380	1	RACK MOUNT PAPER TAKEUP AS FOLLOWS	28480	07758-60380
	07758-00512	1	BRACKET:PTU, GREEN	28480	07758-00512
			(CONTINUED ON NEXT PAGE)		

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Section VI - Replaceable Parts
Models 7758A, 7418A

07758-1

Table 6-1. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	07758-00522 07758-60340 2190-0702 2190-0758 2510-0049 2550-0006 2680-0107	1	PANEL:PTU, GREEN ASSY:PTU WASHER:SHOULDER 0.500" OD 0.200" ID WASHER:FLAT #8 SCREW:POZI DR 8-32 X 1/2" W/LOCK NUT:HEX 8-32 THREAD SCREW:PAN HD POZI DR 10-32 X 0.750" LG	28480 28480 00000 00000 00000 78169 00000	07758-00522 07758-60340 080 080 080 KEP511-081800-00 080
	07758-60210 2200-0105	2	OPTION 011-015 EXTRA MARKER ASSY:MARKER (SAME AS A23) SCREW:PAN HC POZI DR 4-40 X 0.312" LG	28480 00000	07758-60210 080
	00511-00011 00511-00012	2 1	OPTION 020 - ONE CHANNEL DECREASE (CH 1) PANEL:BLANK, 2 X 7", WHITE (EXCEPT OPTION 001), ON 7758A PANEL:BLANK, 2 X 7", GREEN (EXCEPT OPTION 010), ON 7418A. DELETE: 07754-60070 GALVANO-METER 07754-60170 DRIVER AMPLIFIER 07754-60340 STYLUS	28480 28450	00511-00011 00511-00012
			OPTION 021 - ONE CHANNEL DECREASE (CH 2) SAME AS OPTION 020		
A22A1	07758-60321	1	OPTION 025 NR/MIN SPEEDS,50 HZ(7758A)(7418A)(FIG 6-16)	28480	07758-60321
A22A1B2	3140-07777 2510-0053 2580-0006	1 3	MOTOR:SYNCHRONOUS, 2-SPEED SCREW:PAN HD POZI DR 8-32 X 0.750" LG	N/A 00000	N/A 080
A22A1C2	0160-3462 2360-0115	3 1	NUT:HEX 8-32 THREAD C:FXD PAPER 0.75 UF 58 22 VACM SCREW:PAN HD POZI 6-32 X 5/16 W/LK	78169 28480 00000	KEP511-081800-00 0160-3462 080
A22A1E4	0360-1289 0360-1279 2360-0211 3420-0086	2 2 4	BARRIER BLOCK:2 TERMINALS TERMINAL:JUMPER FOR #6 SCREW SCREW:FLAT HC POZI DR 6-32 X 0.750" LG NUT:HEX 8-32 THREAD BARRIER BLOCK:2 TERMINALS	98410 00000 00000 00000 98410	35002-3523 080 080 080 35002-3523
A22A1E5	0360-1279 2360-0211 2420-0086	1 1	TERMINAL:JUMPER FOR #6 SCREW SCREW:FLAT HC POZI DR 6-32 X 0.750" LG NUT:HEX 6-32 THREAD COVER	00000 00000 00000 28480	080 080 080 07758-40010
A22A1NP20	07758-40010 2200-0141	1 1	SCREW:PAN HC POZI DR 4-40 X 0.312	28480 00000	07758-40010 080
A22A1NP21	07758-00230	1	BRACKET	28480	07758-00230
A22A1NP22	07758-20210	1	PAC:MM/MINUTE DRIVE	28480	07758-20210
A22A1NP23	07754-20530	1	SPACER:MOTOR MOUNTING, PLASTIC	28480	07754-20530
A22A1NP24	07758-20160	1	PULLEY: 40 XL	28480	07758-20160
A22A1NP25	07758-20180 1410-0775 9570-0174	1 1 2	BEARING THROST SCREW:SET SOCKET DR 8-32 X 0.250" LG	70417 00000	07758-20180 T-400 080
A22A1NP26	1500-0329	1	BELT:TIMING 10.00" LG 0.375"W 50 TEETH	90179	100XL 037
A22A1NP27	1500-073	1	CLUTCH:ROBLER MINIATURE	00000	080
A22A1M1	07758-60230	1	CABLE: 60:1	28480	07758-60230
A22A1M1S1	3101-1291	1	SWITCH:TOGGLE 3PDT SUB-MINIATURE (FIGURE 6-3) DELETE: A22A1NP12 07758-20380 SPACER A2NP35 6960-8006 BUTTON, 1/4-INCH	09353	7301 PH
	07758-60320	1	NR/MIN SPEEDS,60 HZ(7758A)(7418A) OPTION 026 - (FIGURE 6-16)	28480	07758-60320
	0160-3461	1	EXCEPT C2 IS 0.6 UF AS FOLLOWS: CAPACITOR:0.6 UF 5% OIL	56289	196P318

See Introduction to this section for ordering information

Table 6-2. Code List of Manufacturers

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
00000	NO K/F DESCRIPTION FOR THIS MFG NUMBER		
00000	U.S.A. COMPEN	ANY SUPPLIER OF U.S.A.	
00779	AMP INC. (AIRCRAFT MARINE PROD.)	HARRISBURG, PA.	17101
01121	ALLEN BRADLEY CO.	MILWAUKEE, WIS.	53204
01295	TEXAS INSTRUMENTS INC. SEMICONDUCTOR COMPONENTS DIV.	DALLAS, TEX.	75231
03550	APPENDL CORP.	BROADVIEW, ILL.	60153
04713	MOTOROLA SEMICONDUCTOR PROD. INC.	PHOENIX, ARIZ.	85008
05345	COMPONENTS CORP.	CHICAGO, ILL.	60657
05402	ETA PRODUCTS CO. OF AMERICA	CHICAGO, ILL.	60646
07263	FAIRCHILD CAMERA & INST. CORP. SEMICONDUCTOR DIV.	MOUNTAIN VIEW, CALIF.	94040
07829	MODINE ELECTRIC CO.	CHICAGO, ILL.	60618
13103	THERMALLOY CO.	DALLAS, TEX.	75247
14099	SEITECH CORP.	NEWMARK, CALIF.	91320
14535	CORWELL DUBLIER ELECT. DIV. FEDERAL PACIFIC ELECT. CO.	NEWARK, N.J.	07105
18042	POWER DESIGN PACIFIC INC.	PALO ALTO, CALIF.	94304
18583	CURTIS INSTRUMENTS INC.	MT. KISCO, N.Y.	10549
21335	PAPRUE BEARING CO. THE DIV. TETRON INC.	NEW BRITAIN, CONN.	06050
28480	HEWLETT-PACKARD CO. CORPORATE HQ	YOUR NEAREST HP OFFICE	
36309	SPRAGUE ELECTRIC CO.	N. ADAMS, MASS.	01247
59730	THOMAS & BETTS CO. THE	ELIZABETH, N.J.	07207
70276	ALLEN MFG. CO.	HARTFORD, CONN.	06101
70417	CHRYSLER CORP., AMFLEX DIVISION	DETROIT, MICH.	48211
70503	BELDEN CORP.	CHICAGO, ILL.	60644
71400	MUSSEMAN MFG. DIV. MC GRAM-EDISON CO.	ST. LOUIS, MO.	63017
71616	COMMERCIAL PLASTICS CO.	MUNDELEIN, ILL.	60060
71785	CINCH MFG. CO. DIV TRM INC.	ELK GROVE VILLAGE, ILL.	
72136	ELECTRO MOTIVE MFG. CO. INC.	WILLIMANTIC, CONN.	06226
72562	ELASTIC STOP NUT DIV. AMERACE ESNA CORP.	UNION, N.J.	07083
72982	ERIE TECHNOLOGICAL PROD. INC.	ERIE, PA.	16512
73734	FEDERAL SCREW PROD. INC.	CHICAGO, ILL.	60618
74068	APPENDL CORP. RF DIV.	DANBURY, CONN.	06810
75915	LITTELFUSE INC.	DES PLAINES, ILL.	60016
76530	CINCH MONMOUTH HILLS DIV. TRM INC.	CITY OF INDUSTRY, CALIF.	91746
76854	OAK MFG. CO. DIV. OAK ELECTRO/NETICS CORP.	CRYSTAL LAKE, ILL.	60014
77342	AMERICAN MACHINE & FOUNDRY CO. POTTER & BRUMFIELD DIV.	PRINCETON, IND.	47570
78189	SHAKEPROOF DIV. ILLINOIS TOOL WORKS	ELGIN, ILL.	60120
78277	SIGMA INSTRUMENT INC.	S. BRAINTREE, MASS.	02185
80131	ELECTRONIC INDUSTRIES ASSOCIATION	WASHINGTON, D.C.	20006
82142	AIRCO SPEER ELECT. CORP.	DU BOIS, PA.	15801
83186	VICTORY ENGINEERING CORP.	SPRINGFIELD, N.J.	07081
90179	U.S. RUBBER CO. CONSUMER IND. & PLASTICS PROD. DIV.	PASSAIC, N.J.	07055
90201	MALLORY CAPACITOR CO.	INDIANAPOLIS, IND.	46206
91662	ELCO CORP.	WILLOW GROVE, PA.	19090
98410	ETC INC.	CLEVELAND, OHIO	44103
98970	INTERNATIONAL ELECT. RESEARCH CORP.	BURBANK, CALIF.	91502

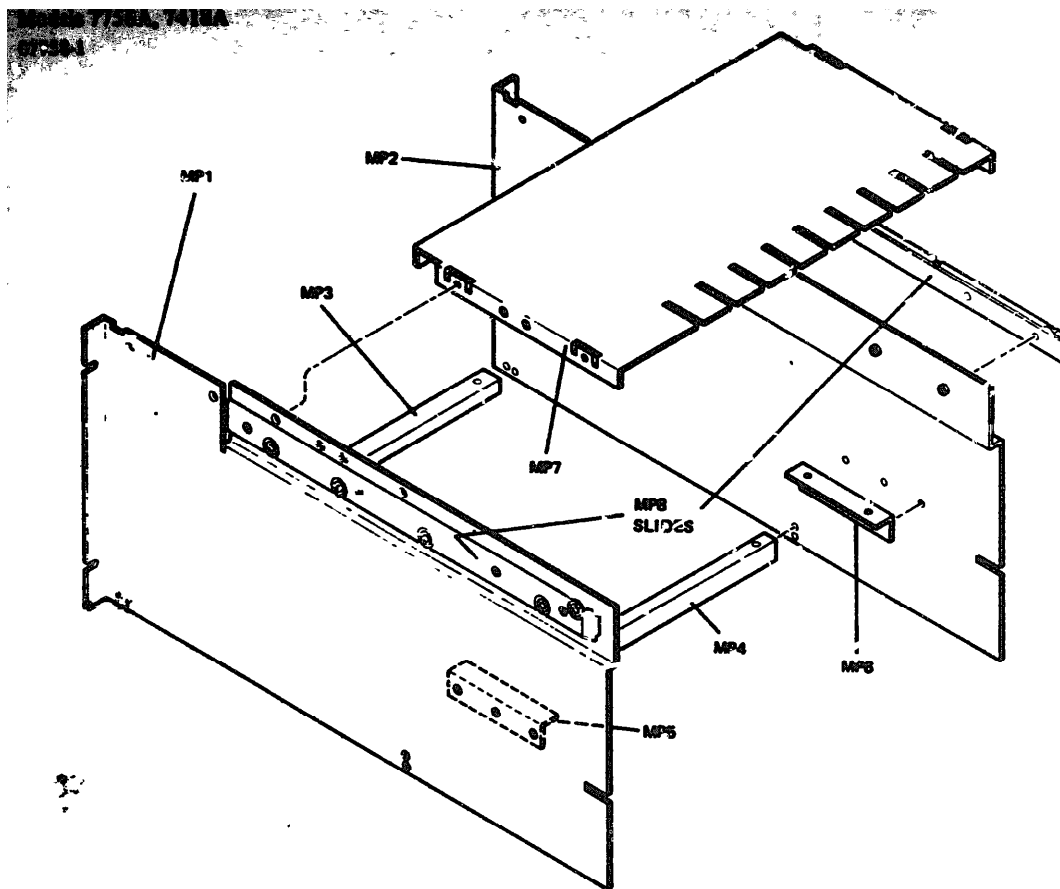


Figure 6-2. Assembly A1, Unit Housing

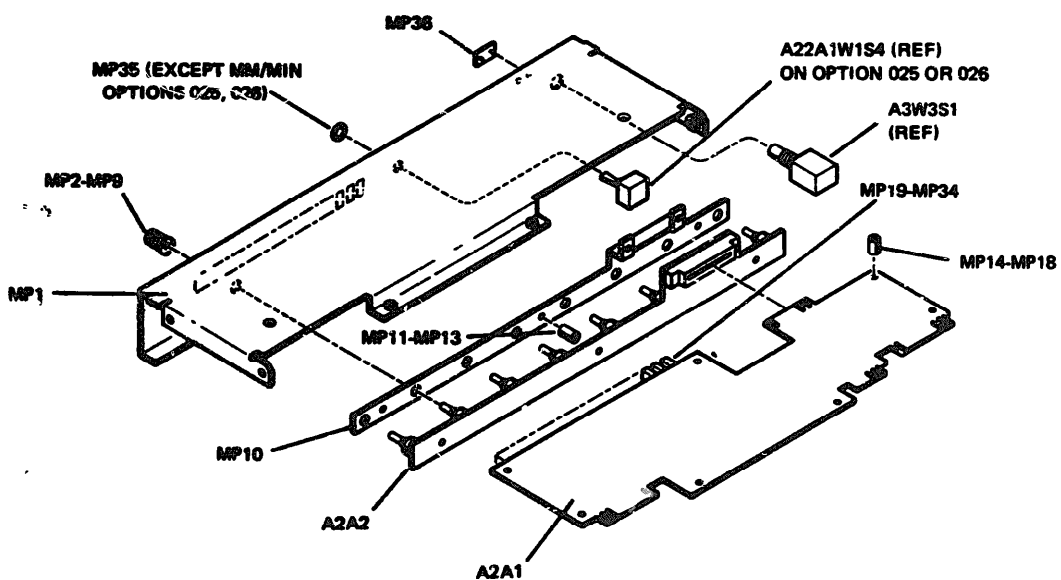


Figure 6-3. Assembly A, Control Panel

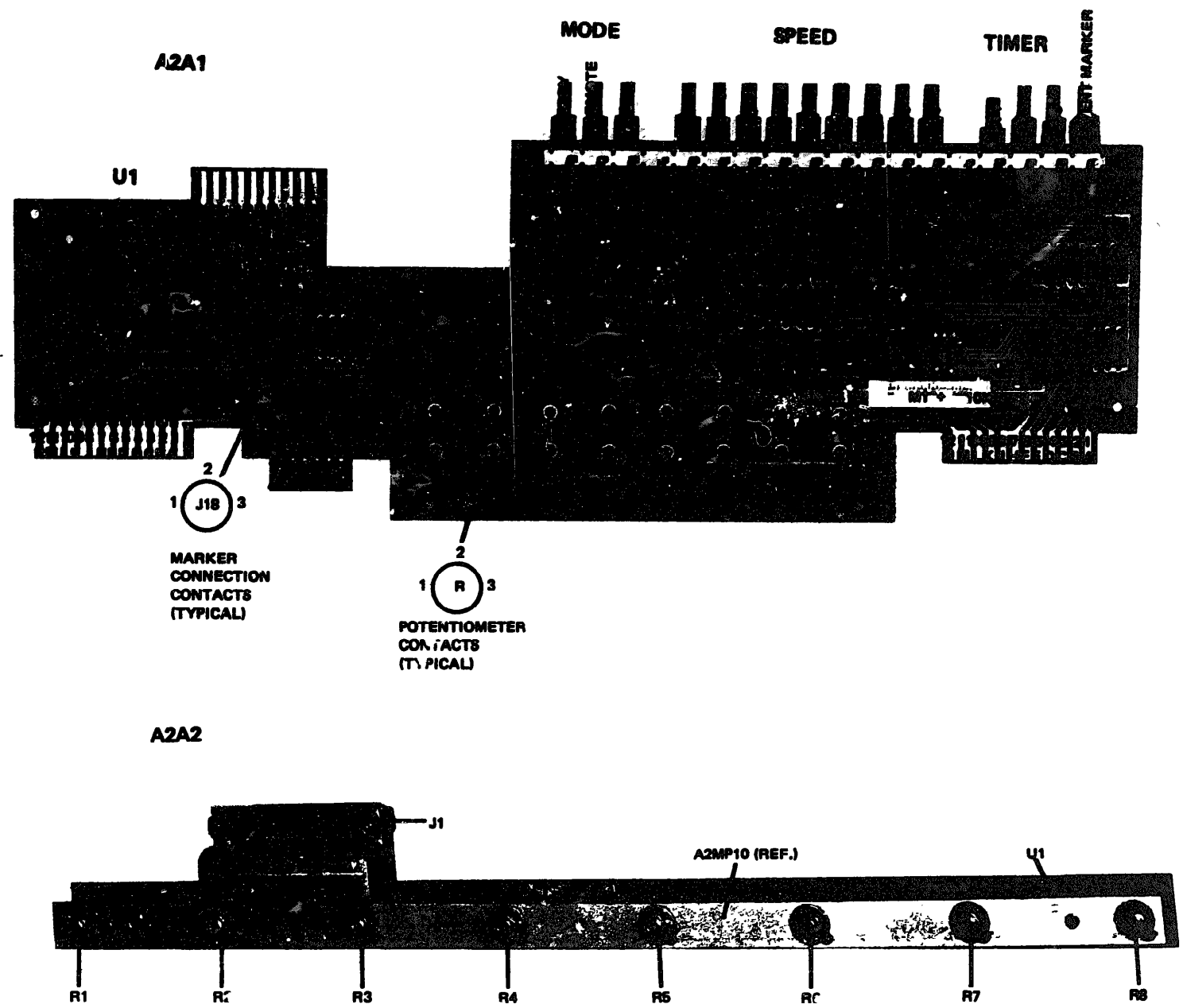
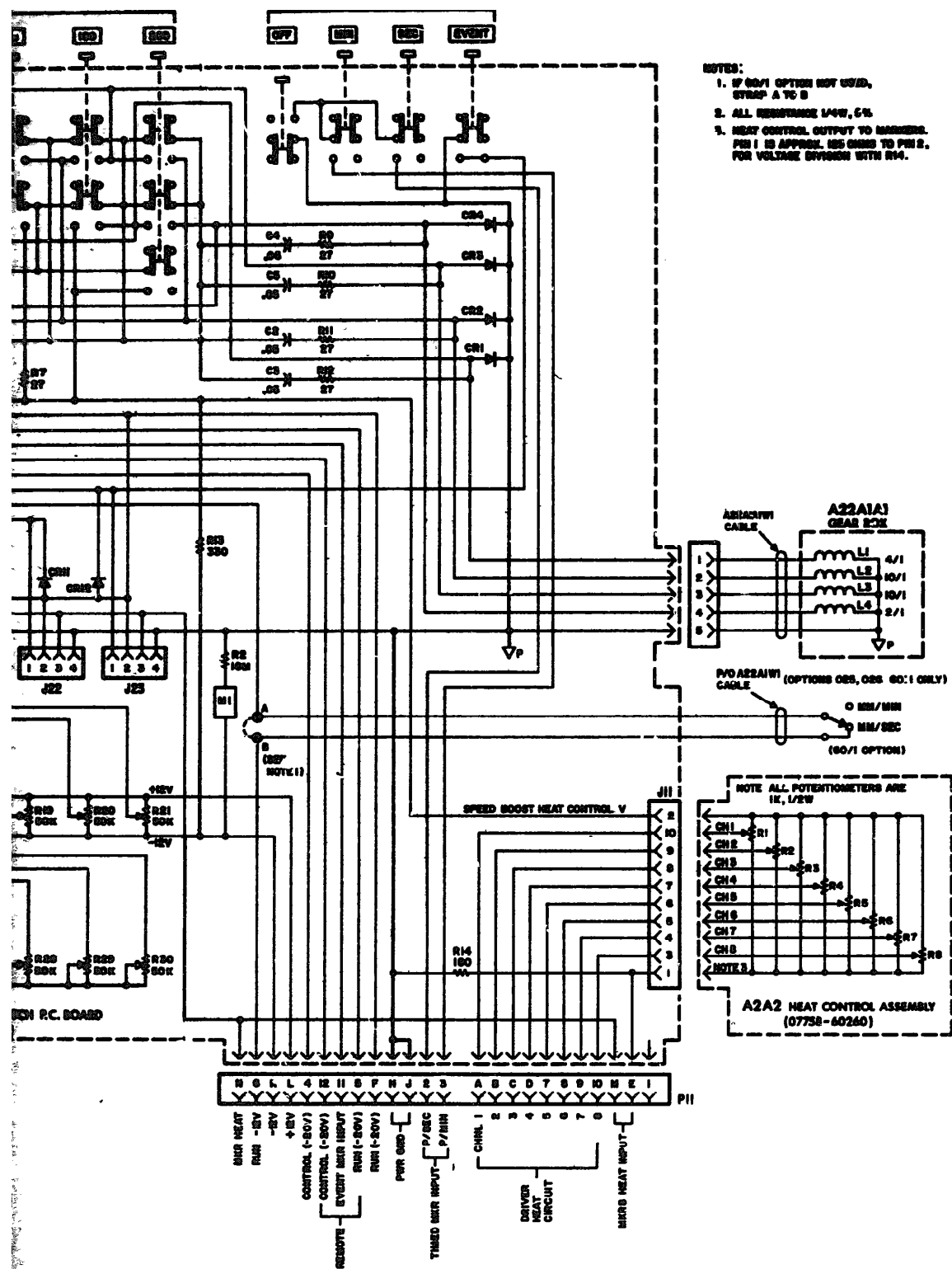
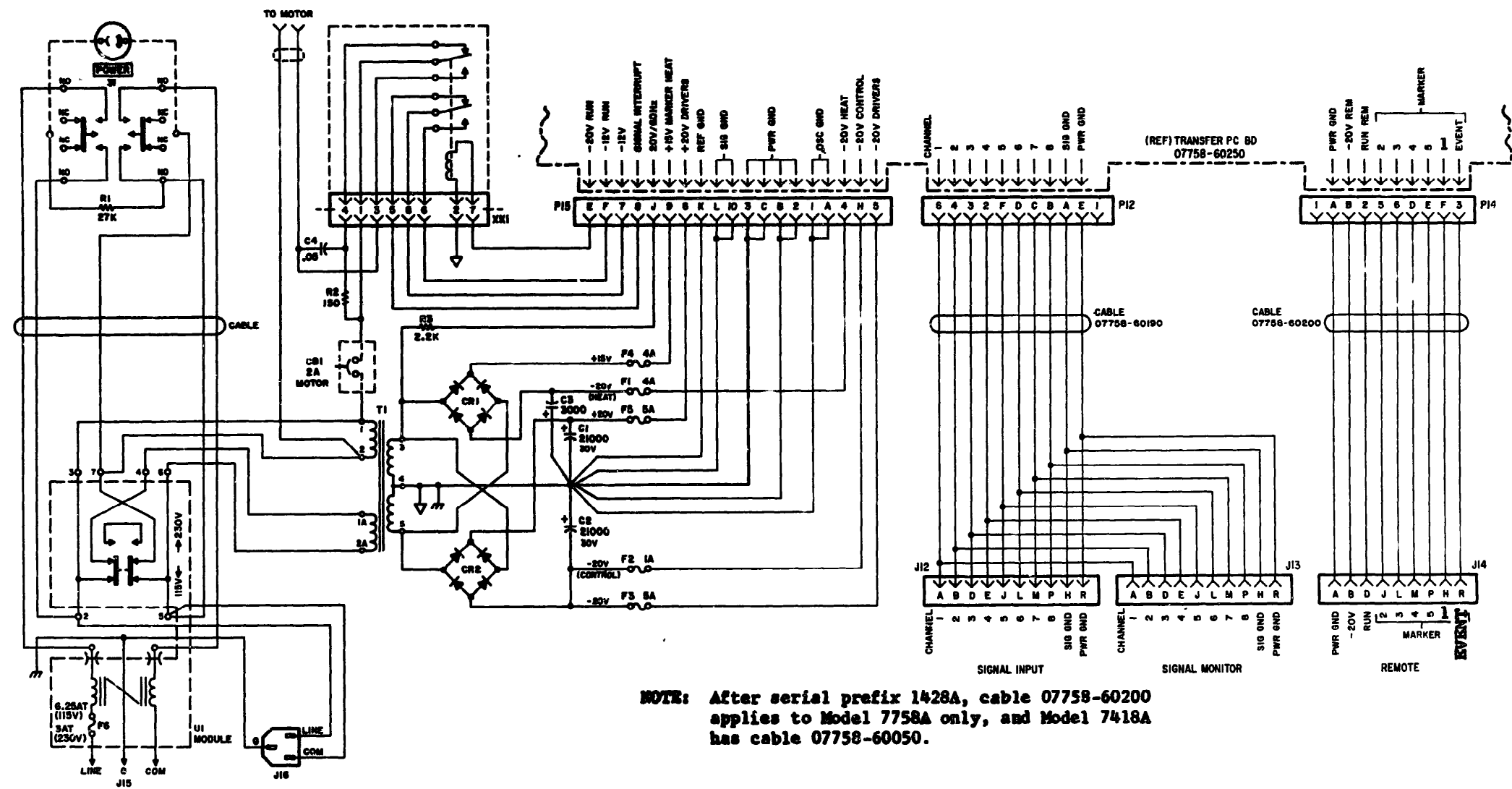


Figure 6-5. Assemblies A2A1, Control Switch, A2A2, Heat Control

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07758-1



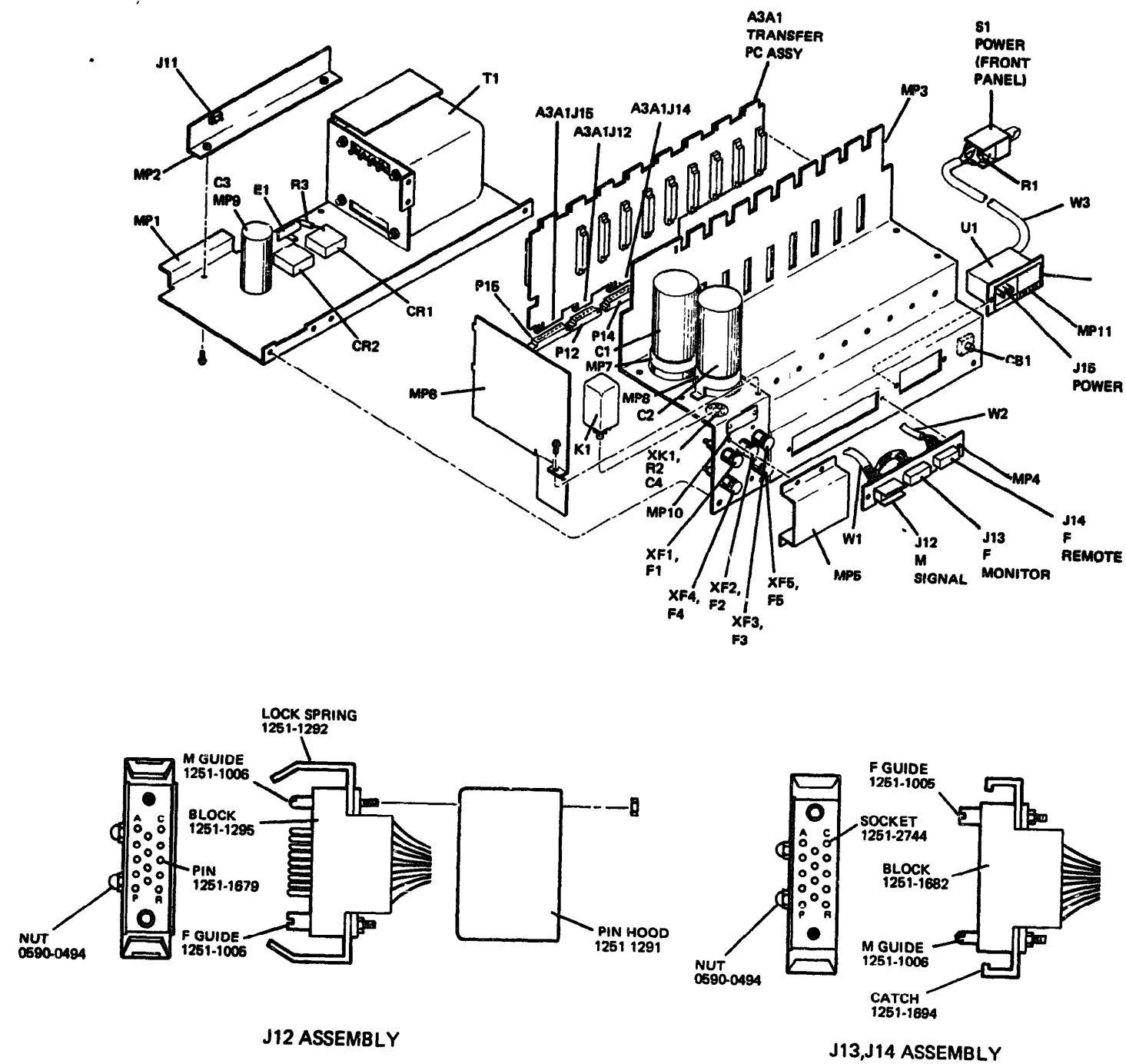


Figure 6-7. Assembly A3, Power Supply

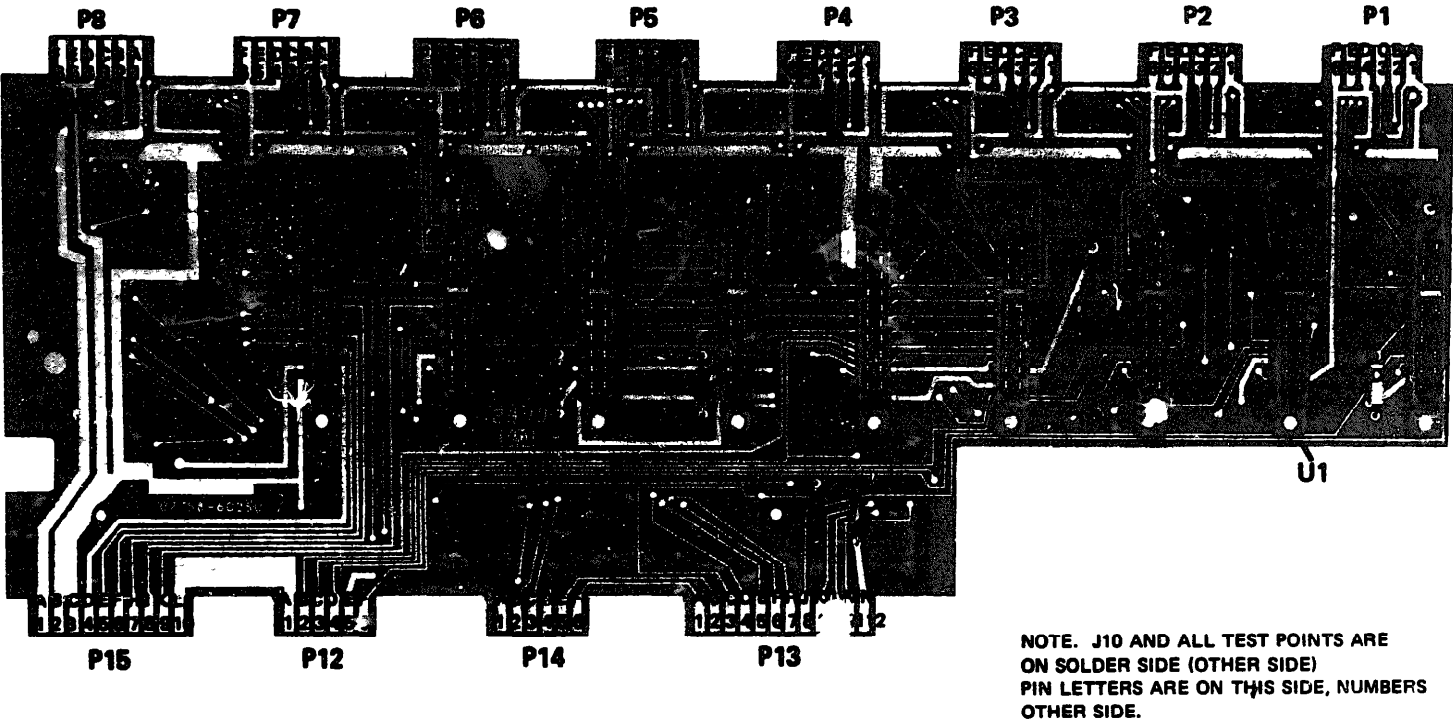


Figure 6-8. Assembly A3A1, Transfer PC, Component Locations

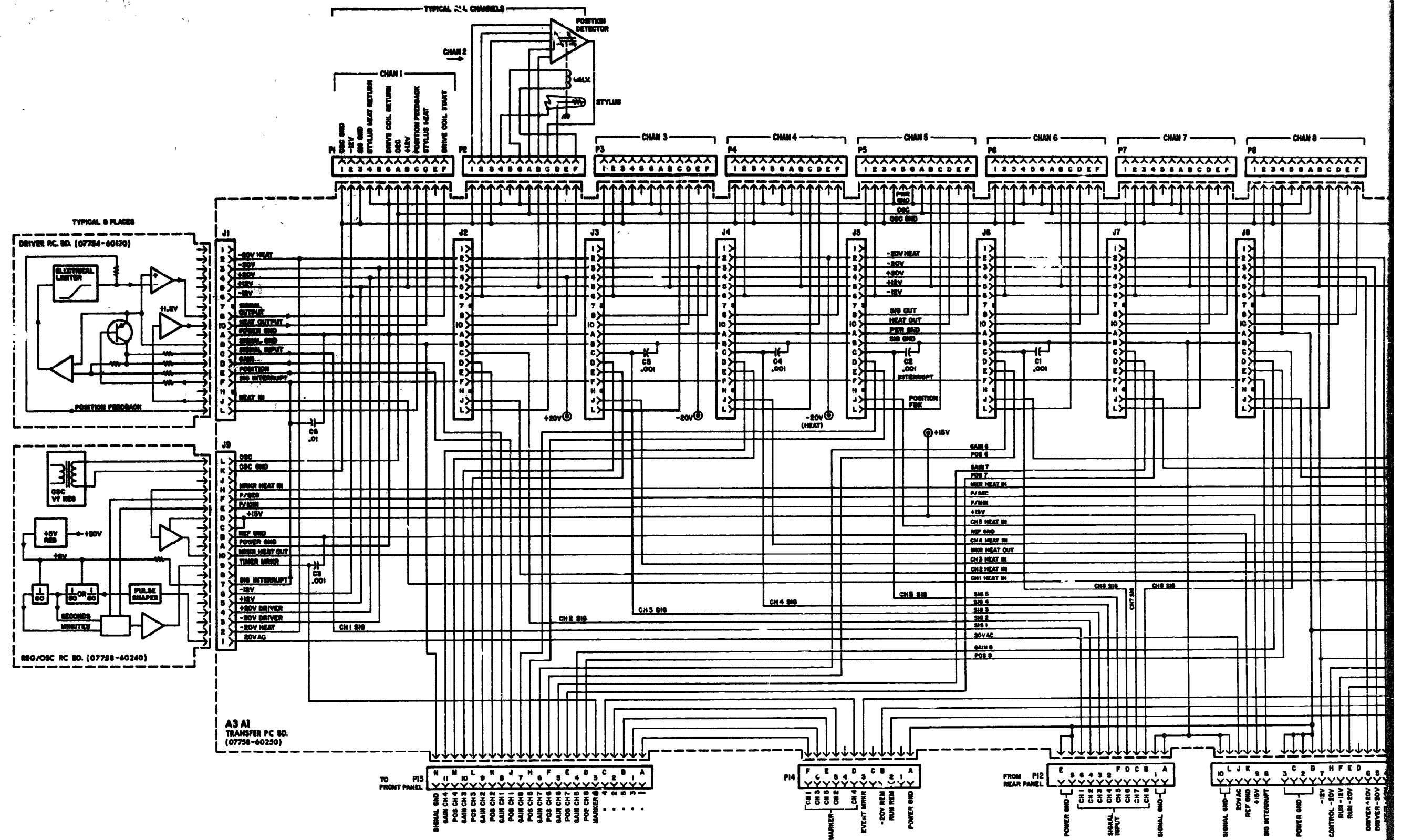


Figure 6-9. Transfer PC Assembly, Schematics

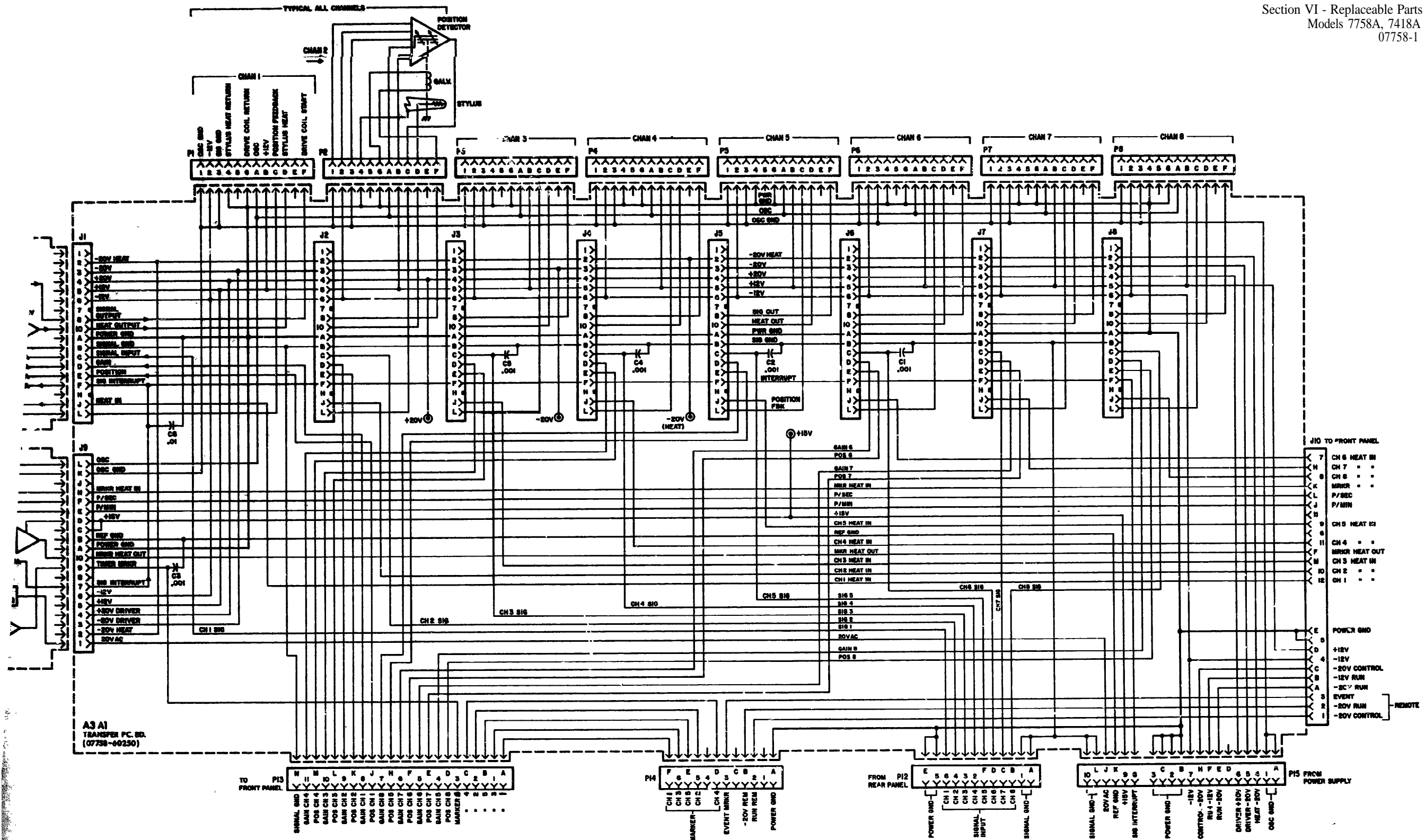


Figure 6-9. Transfer PC Assembly, Schematic Diagram

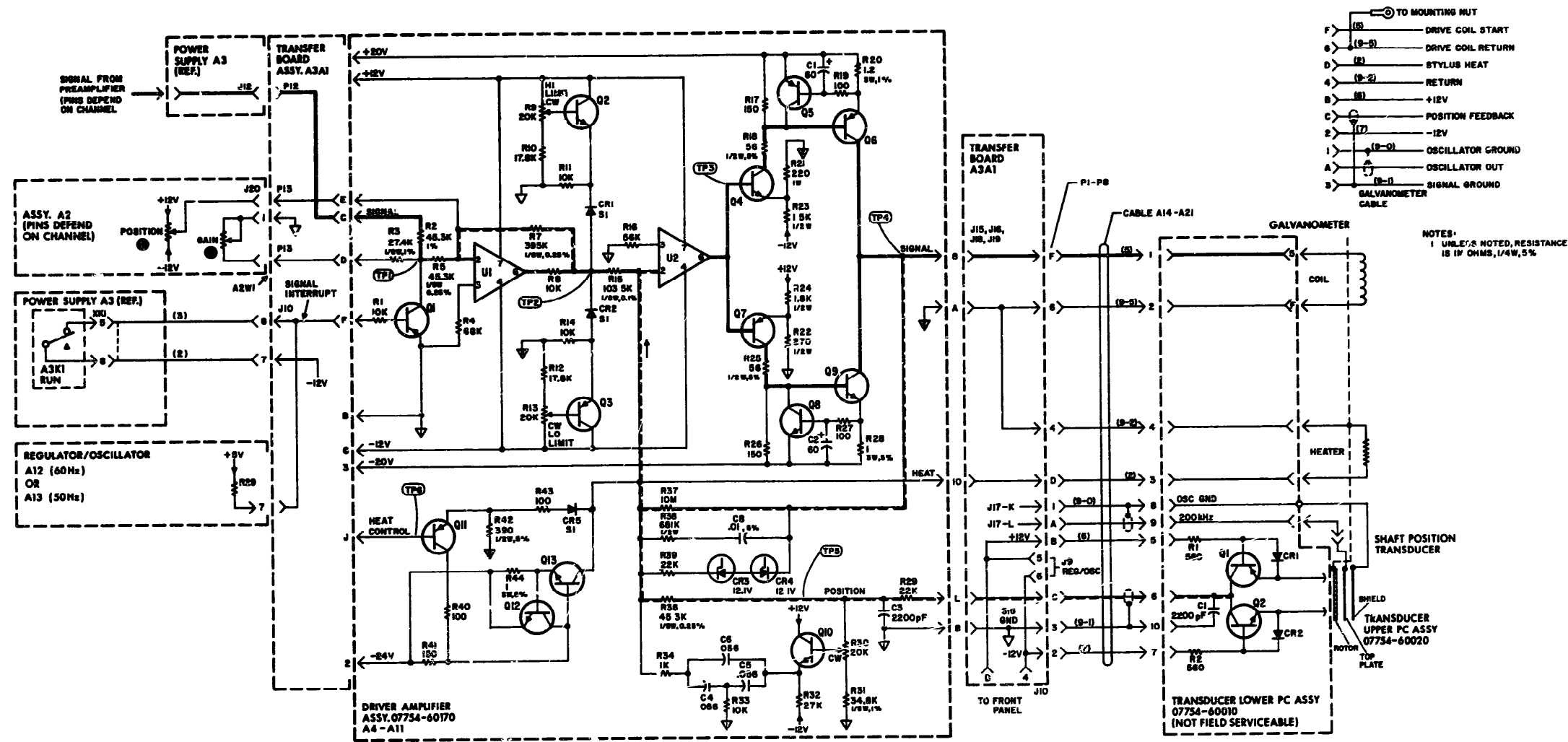


Figure 6-10. Driver Amplifier, Schematic Diagram

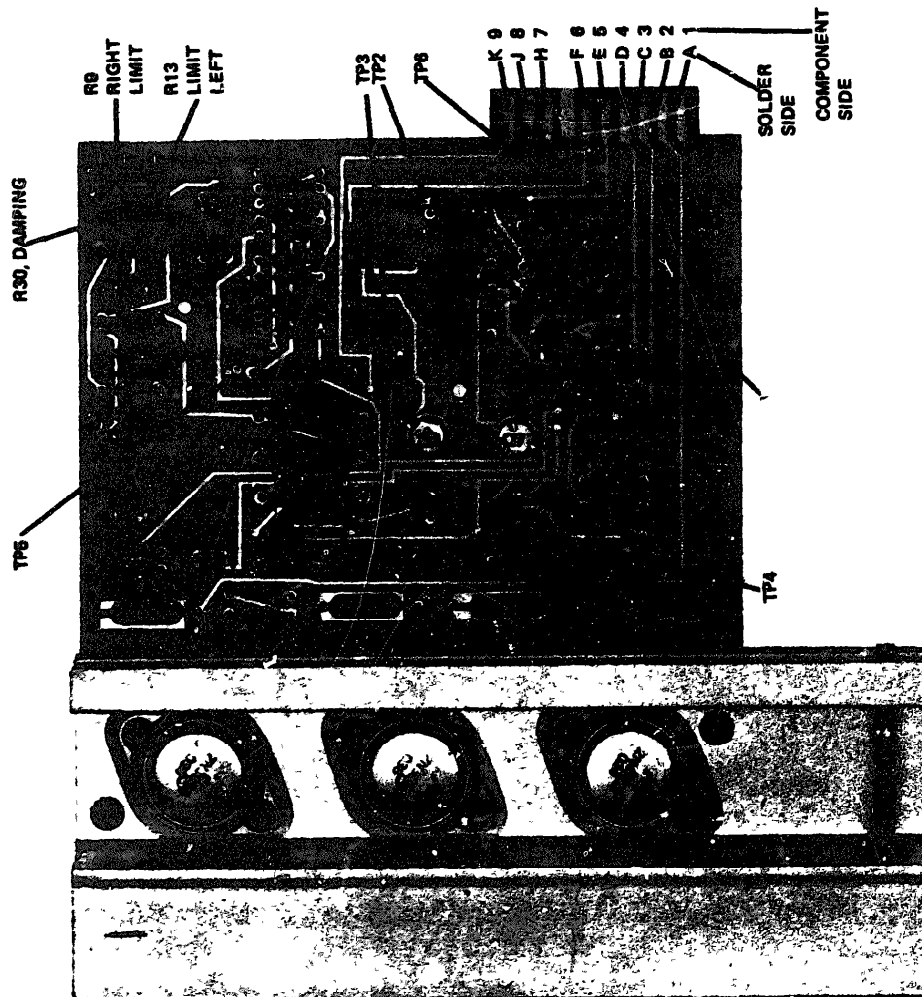


Figure 6-11. Assembly A4 to A11 Driver Amplifier, Component Locations

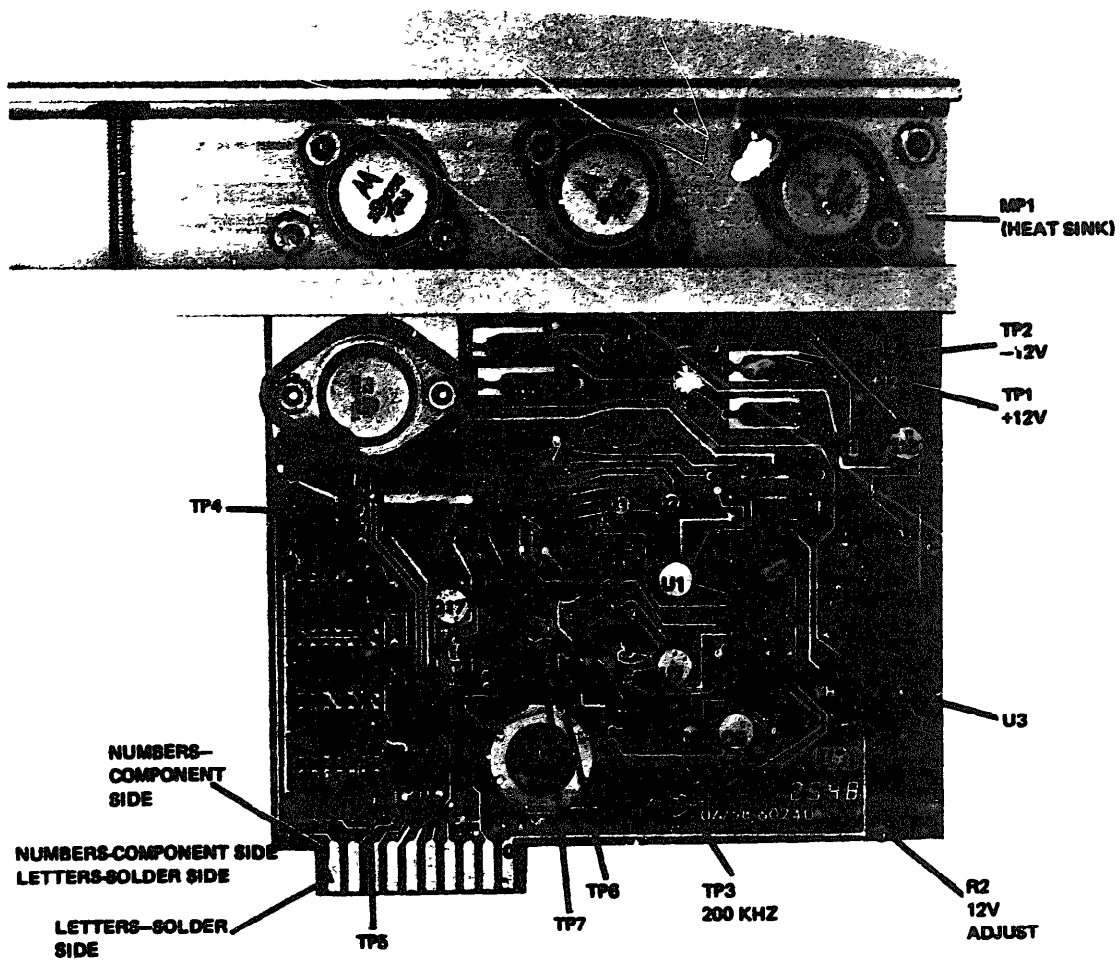


Figure 6-12. Assembly A12 or A13, Regulator/Oscillator PC, Component Locations

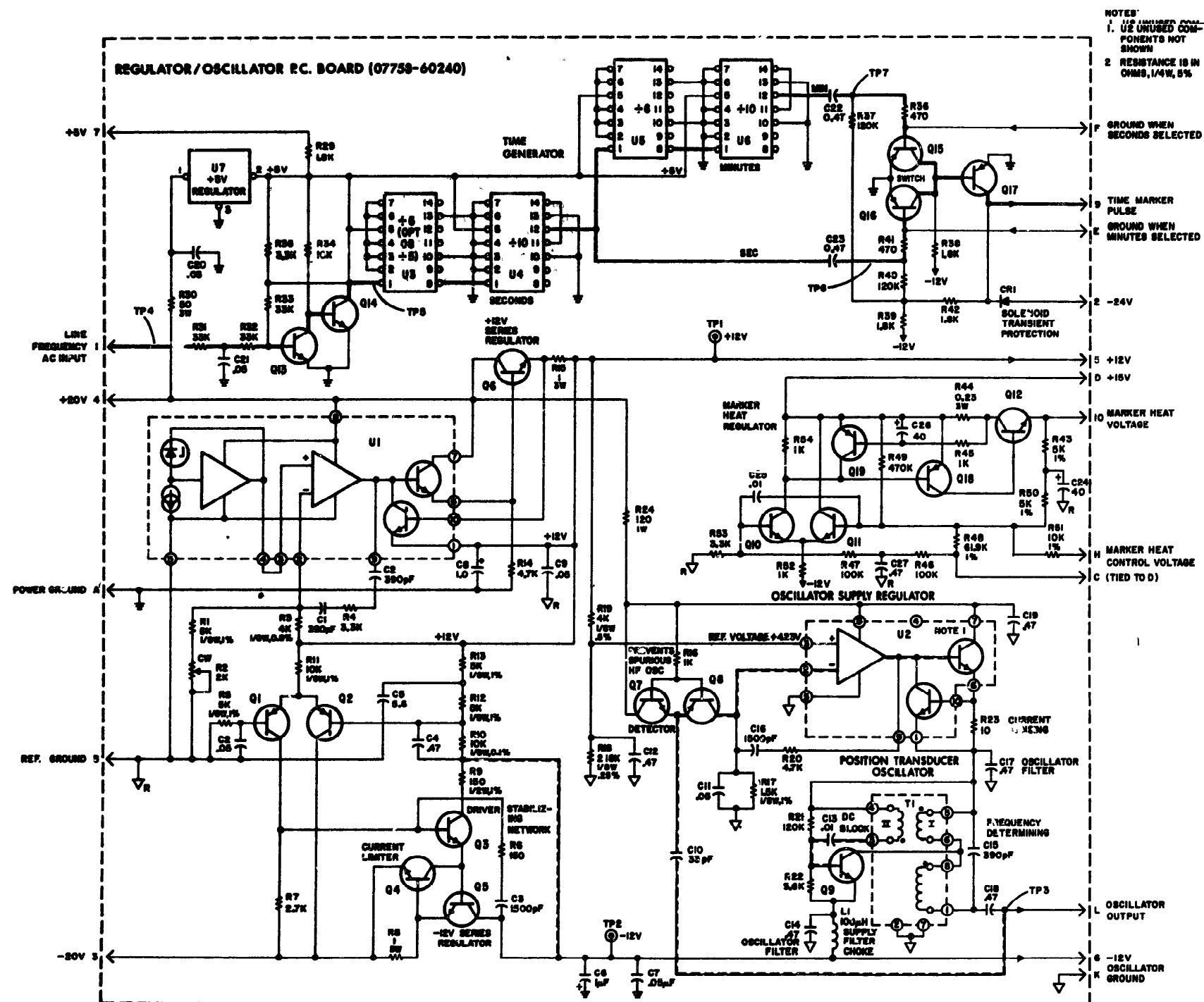


Figure 6-13. Regulator/Oscillator, Schematic Diagram

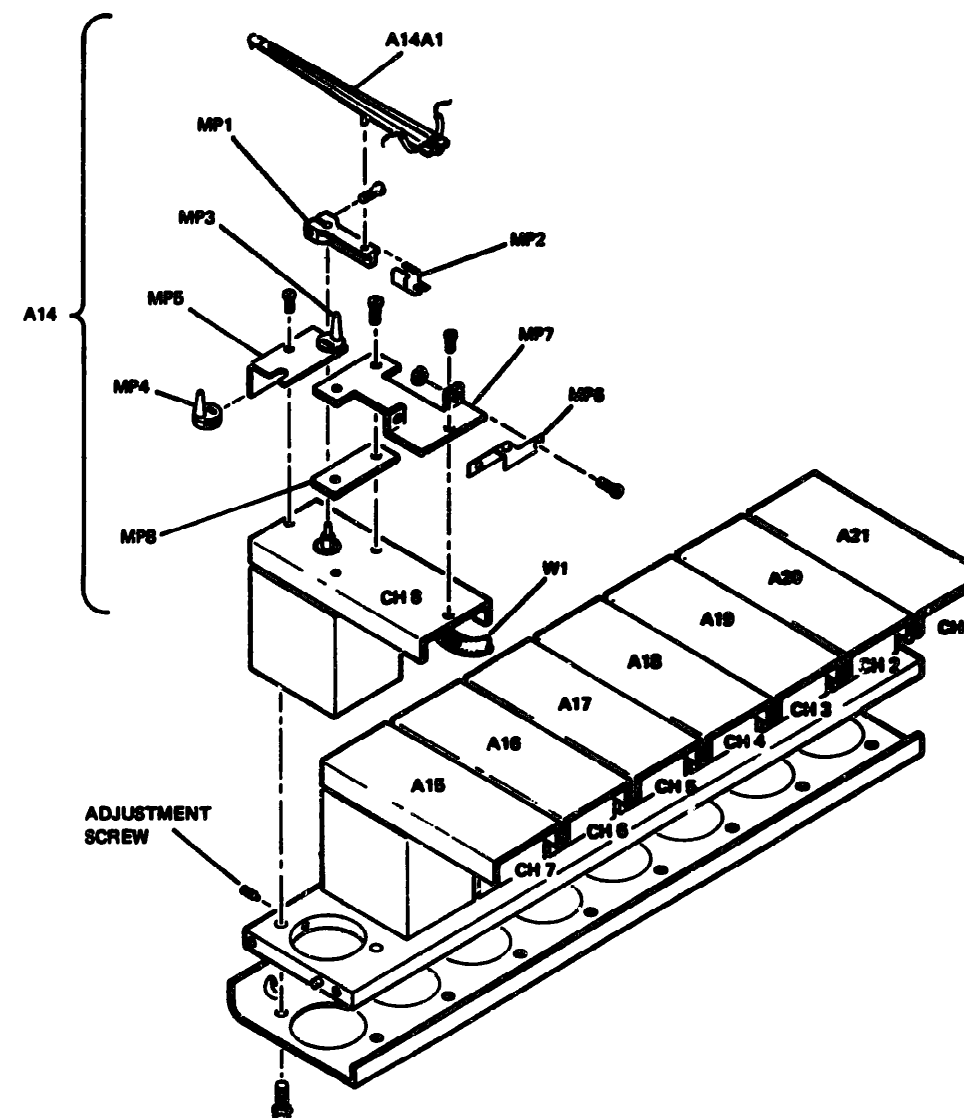


Figure 6-14. Assembly A14, to A21, Galvanometer

Figure 6-13. Regulator/Oscillator, Schematic Diagram

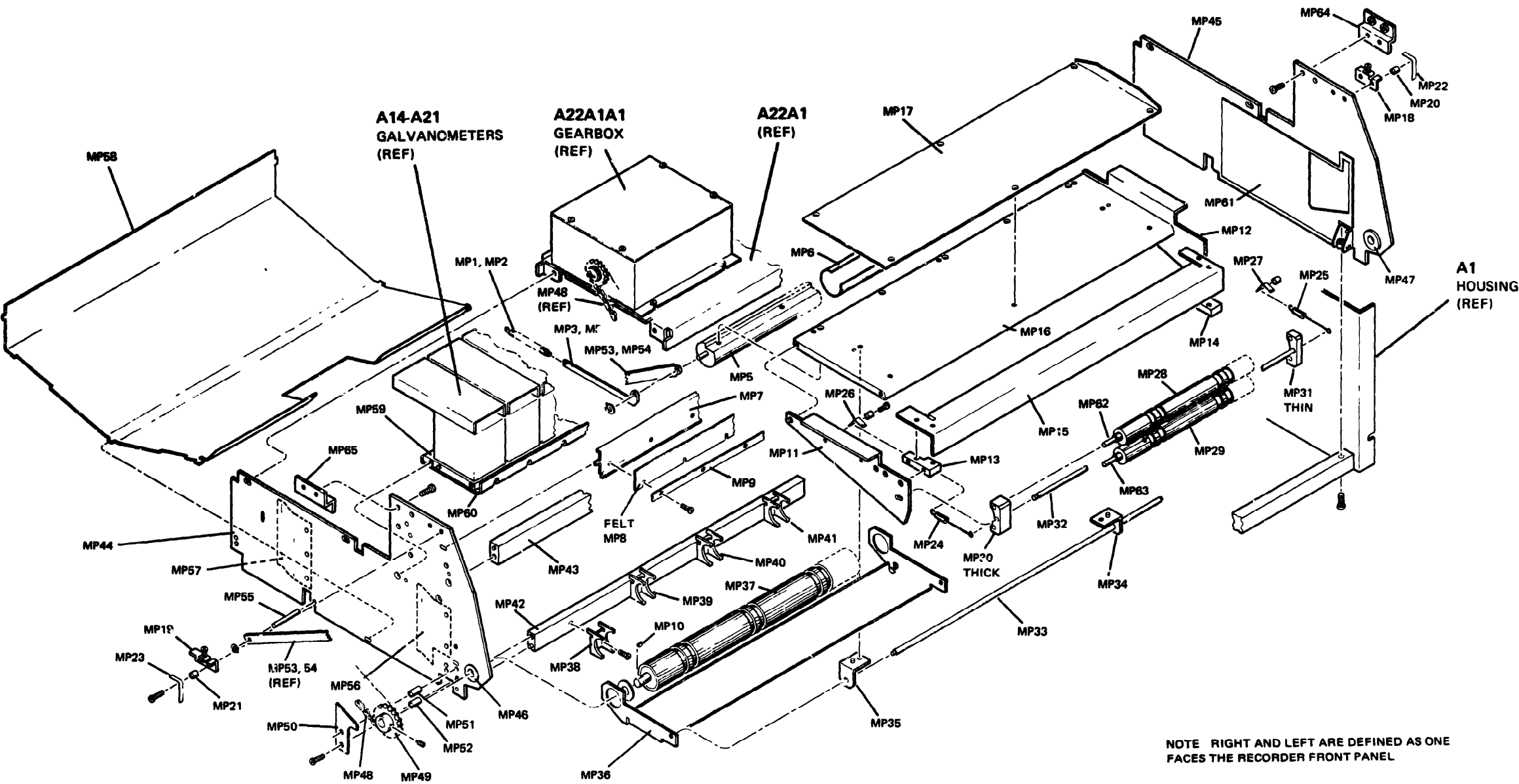
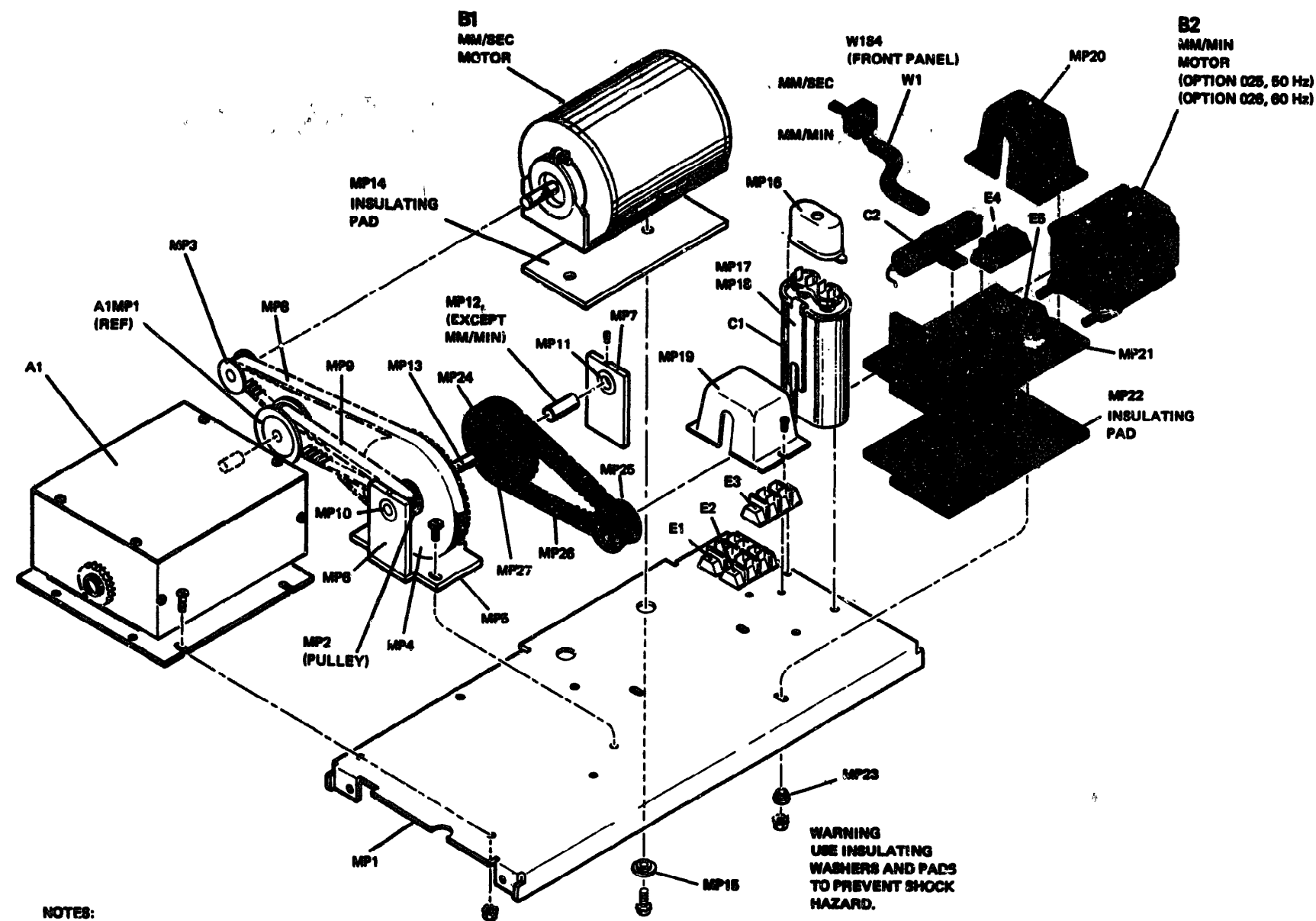


Figure 6-15. Assembly A22, Drive Unit



NOTES:

1. MOST FASTENINGS ARE NOT SHOWN. REFER TO PARTS LIST FOR NUT/BOLT IDENTIFICATION.
2. DESIGNATION B2, C2, E4, E5, MP20-27 (SHADED ITEMS) ARE FOR 60:1 MM/MIN SPEEDS, OPTION 025 (50 Hz) OR OPTION 026 (60 Hz). DELETE MP12 FOR MM/MIN OPTIONS; SUBSTITUTE MP27, WHICH SHOULD LOCK PULLEY COW ROTATION AS VIEWED FROM DIRECTION SHOWN.

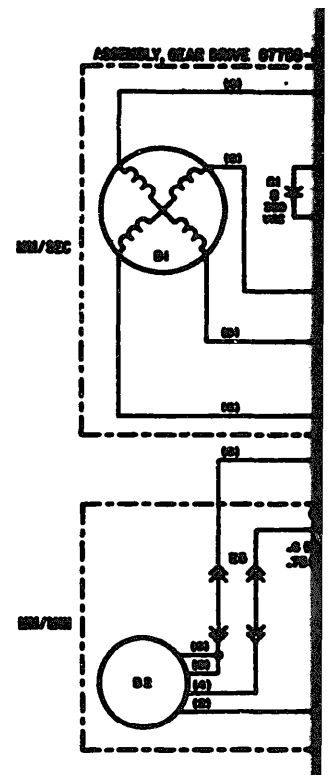


Figure 6-16. Assembly A22A1, Gear Drive Assembly

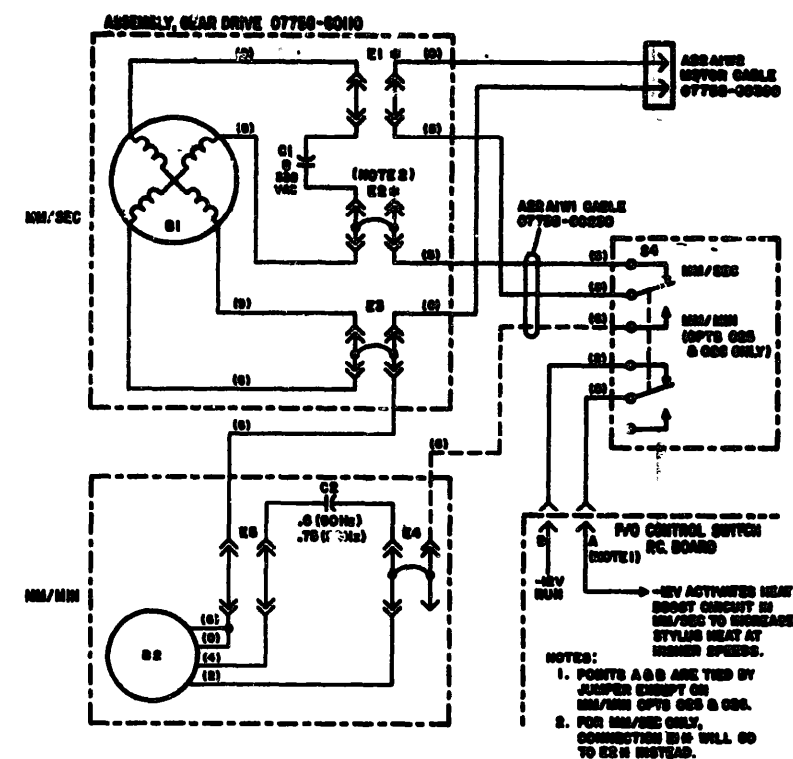
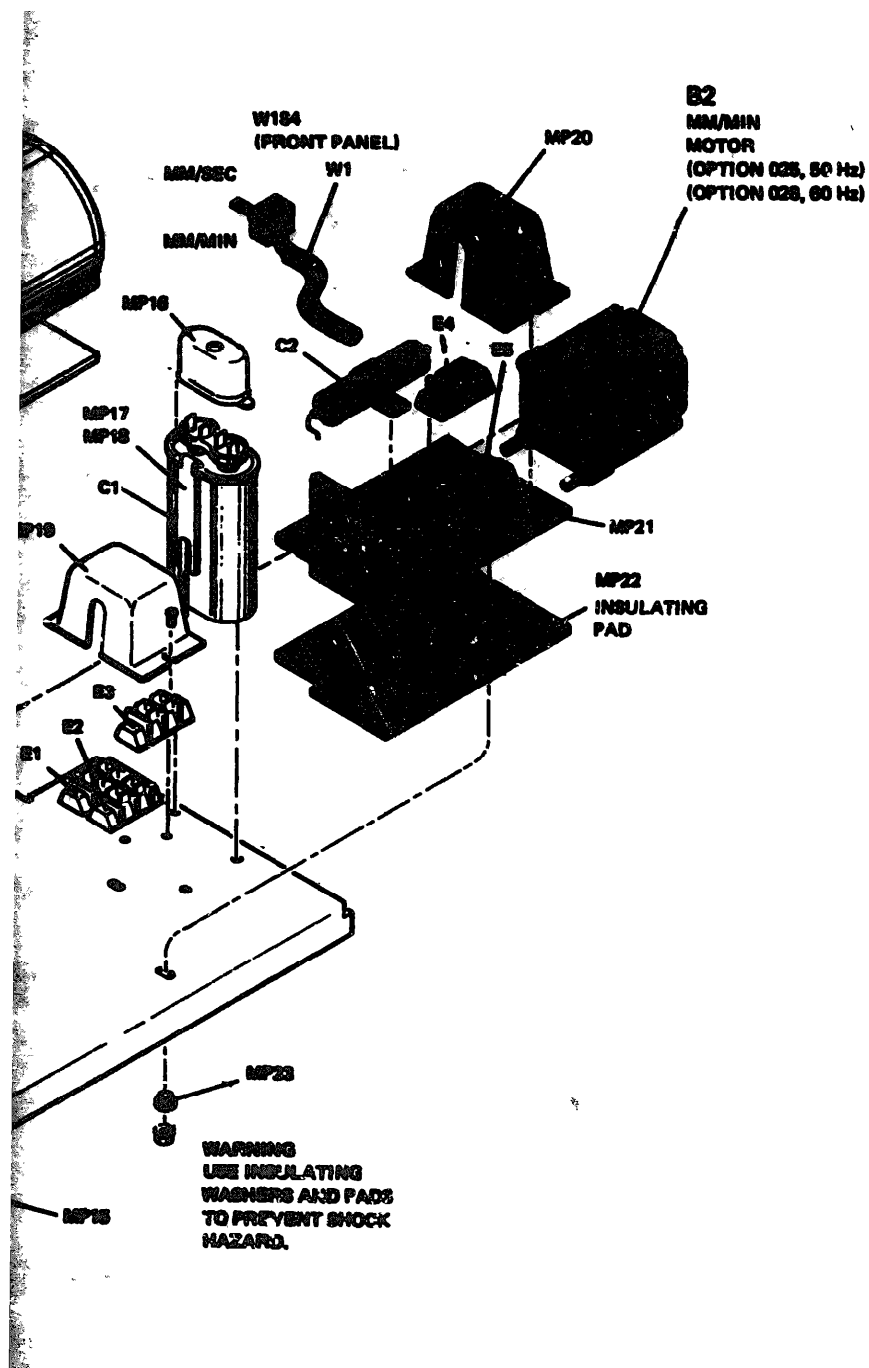
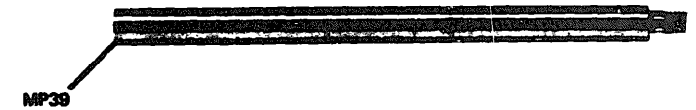
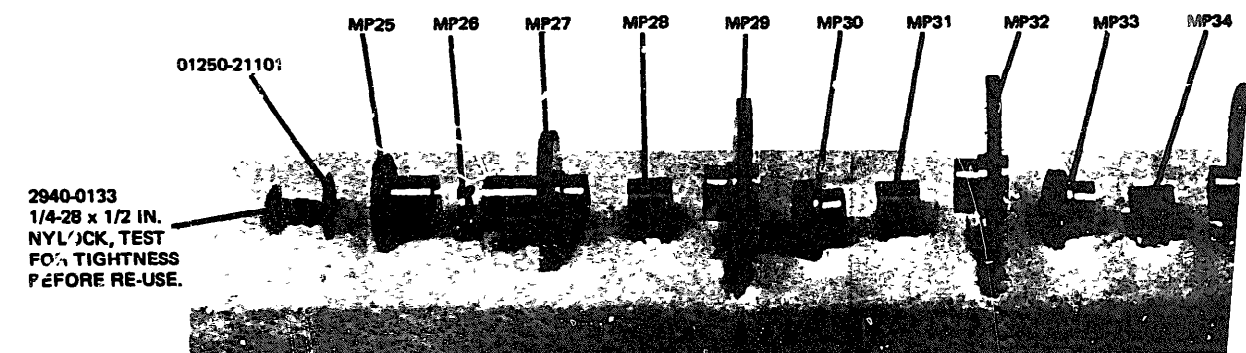
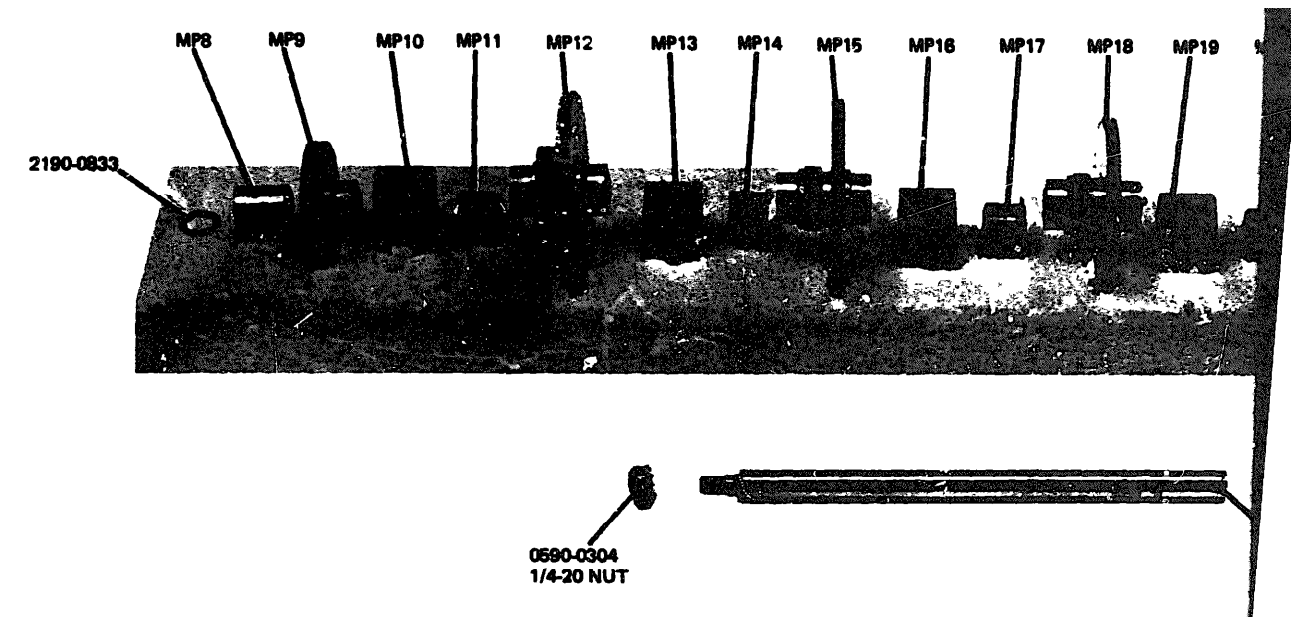
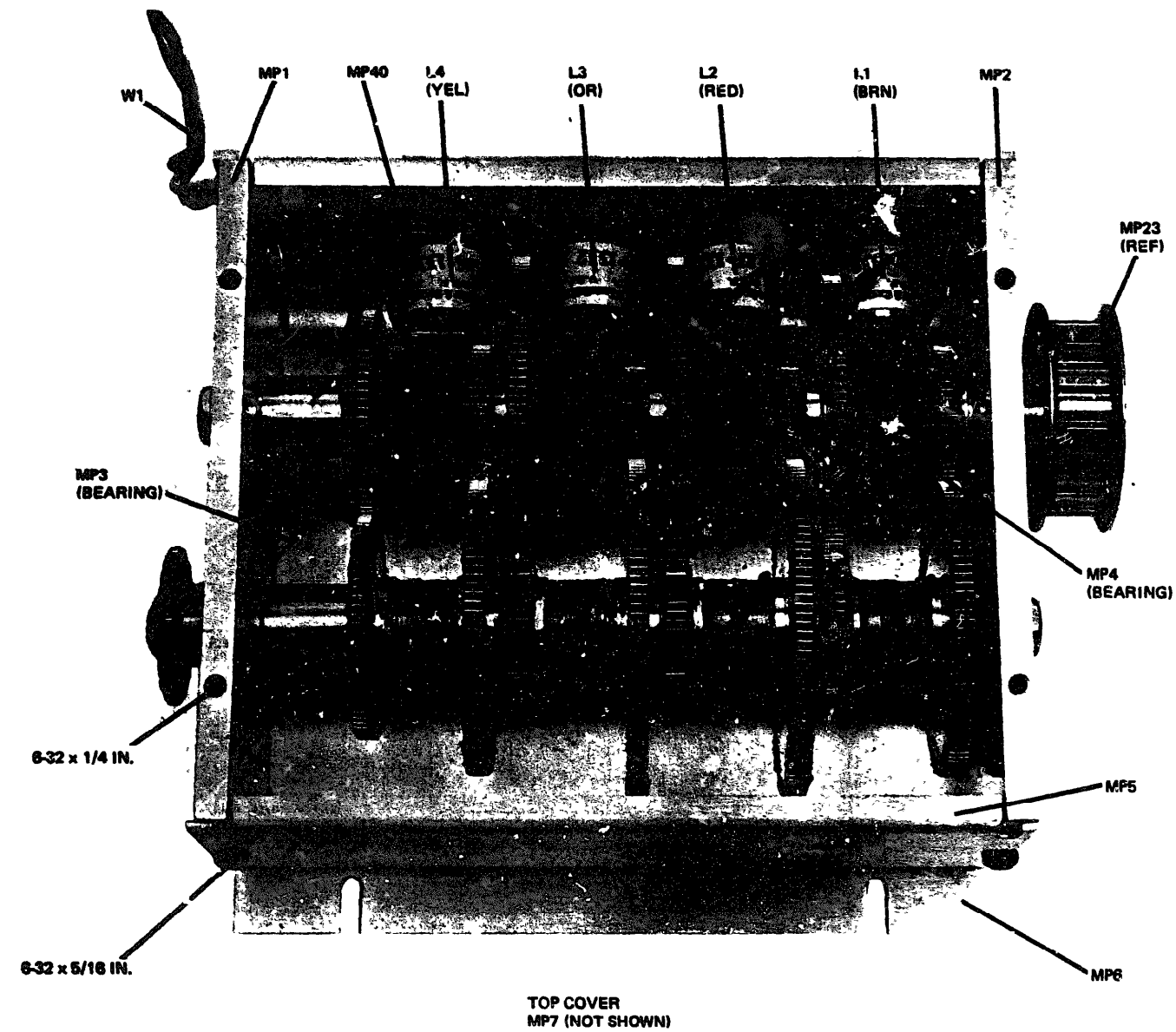


Figure 6-17. Assembly A22A1, Gear Drive, Schematic Diagram



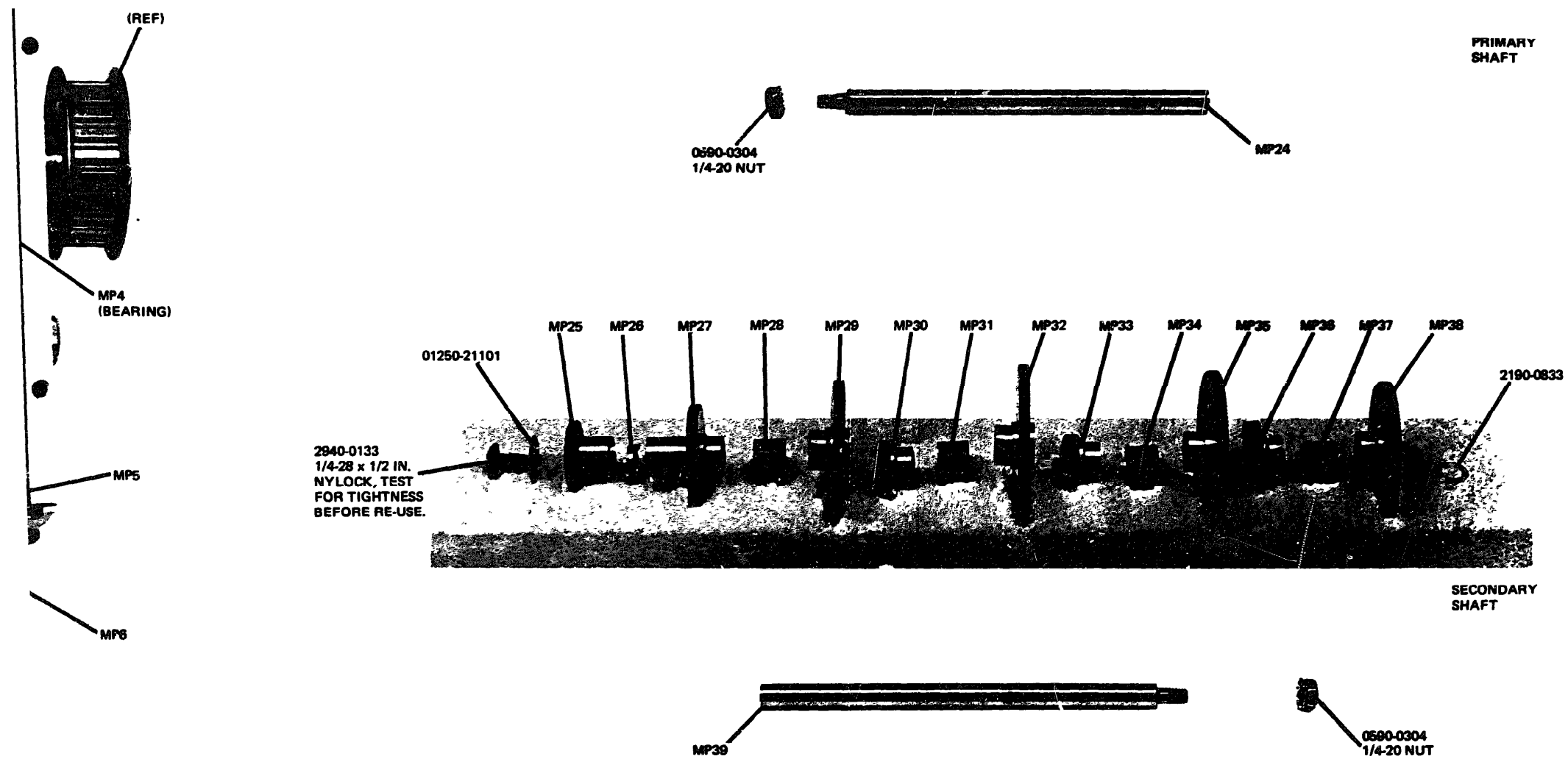


Figure 6-18. Assembly A22A1A1, Gearbox

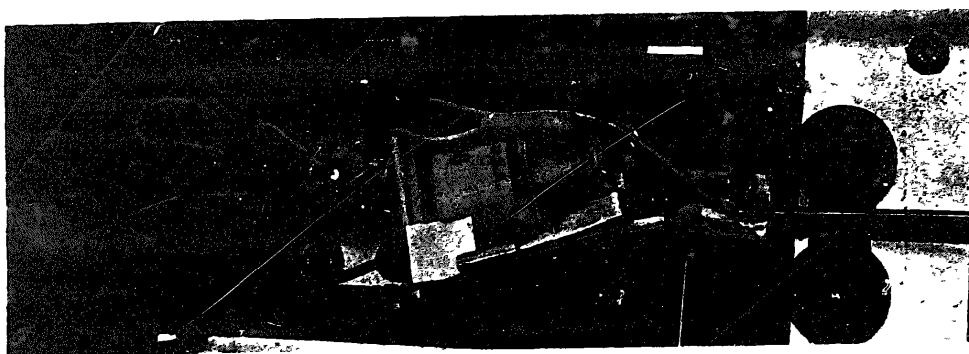


Figure 6-19. Assembly A23 to A29 (Optional, special order)

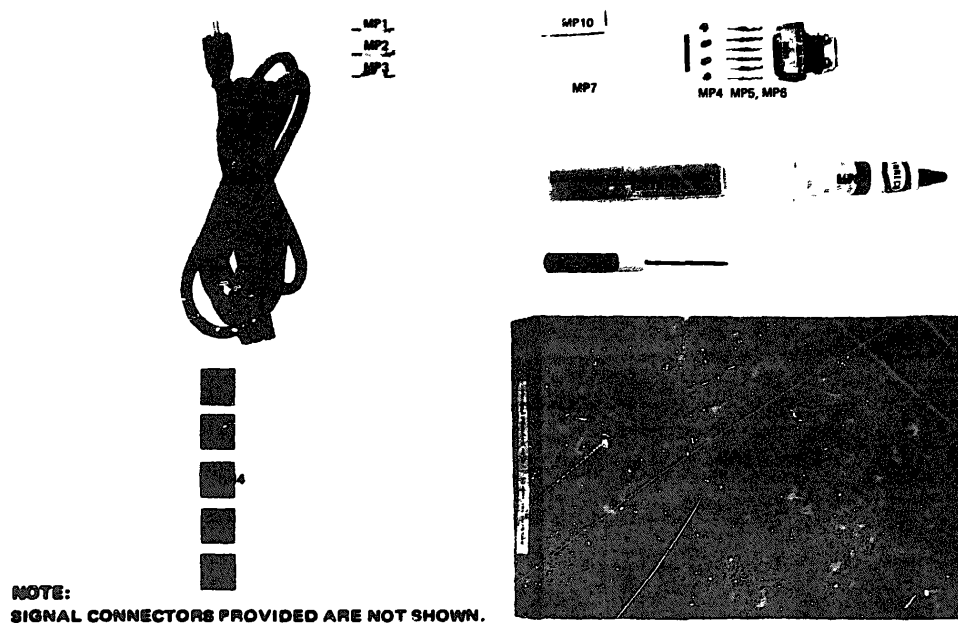


Figure 6-20. Accessories, Recorder Model 7758A or 7418A

TM11-6625-2752-14&P
Section VI - Replaceable Parts
Models 7758A, 7418A
07758-1

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
END ITEM	8848A		PREAMPLIFIER POWER SUPPLY	20480	8848A
A1	00868-63011	1	PREAMPLIFIER RACK (7758A INSTRUMENT ONLY)	20480	00868-63011
A1	00868-63012	1	PREAMPLIFIER RACK (7418A INSTRUMENT ONLY) (FIGURE 6-21)	20480	00868-63012
	354-1114	1	LOCK BRACKET	20480	354-1114
	354-1115	1	LOCK SPRING	20480	354-1115
	354-1116	1	LOCK SPRING	20480	354-1116
	08848-00060	2	BRACKET, SIDE	20480	08848-00060
	08848-00070	2	BRACKET, REAR, ADAPTER	20480	08848-00070
A2	08848-60020	1	CHASSIS ASSY (FOR MODELS 7758A AND 7418A)	20480	08848-60020
A2A1	08848-60030	1	ASSY: P.C. BOARD, MOTHER (FOR MODELS 7758A AND 7418A)	20480	08848-60030
A2A2	08848-60040	1	DIGDE P.C. ASSY (FOR MODELS 7758A AND 7418A)	20480	08848-60040
A3	868-300AC13	1	OSCILLATOR: 2400 HZ (OPT 004, FIG. 6-26) (FOR OPTION 004 AND STANDARD MODEL 7418A)	20480	868-300AC13
A4	868-500AC14	1	OSCILLATOR: 440 HZ (OPT 005, FIG. 6-27) (FOR OPTION 005 AND STANDARD 7418A)	20480	868-500AC14
A5	868-500AC6	1	REGULATOR: P.C. ASSY (FIGURE 6-28)	20480	868-500AC6
END ITEM	8820A		LOW GAIN AMPLIFIER (OPT 030)*	20480	8820A
END ITEM	8821A		MEDIUM-GAIN AMPLIFIER (OPT 031)*	20480	8821A
			* FOR MODEL 8820A, 8821A AMPLIFIER, REFER TO SEPARATE MANUAL PROVIDED WITH AMPLIFIER.		

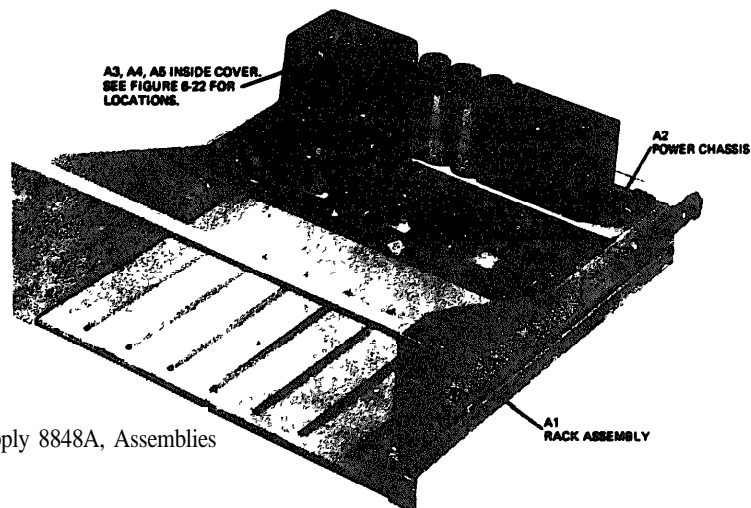


Figure 6-21.
Preamplifier Power Supply 8848A, Assemblies

Table 6-3. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
BND ITEM	8848A		PREAMPLIFIER POWER SUPPLY EXCEPT OPTIONS 030-031 FOR 7418A MODEL. (FIGURE 6-21).	28480	8848A
A1	00868-63011		PREAMPLIFIER RACK (FIGURE 6-21) 7758A MODEL.	28480	00868-63011
A1	00868-63012		PREAMPLIFIER RACK (FIGURE 6-21) 7418A MODEL.	28480	00868-63012
A2	08848-60020		CHASSIS ASSY (FIGURES 6-22, 6-23).	28480	08848-60020
A2C1	0180-2049	5	C:FXD AL ELECT 2000 UF 100% 25VDCW	28480	0180-2049
A2C2	0180-2049		C:FXD AL ELECT 2000 UF 100% 25VDCW	28480	0180-2049
A2C3	0180-2049		C:FXD AL ELECT 2000 UF 100% 25VDCW	28480	0180-2049
A2C4	0180-2049		C:FXD AL ELECT 2000 UF 100% 25VDCW	28480	0180-2049
A2C5	0180-2049		C:FXD AL ELECT 2000 UF 100% 25VDCW	28480	0180-2049
A2C6	1901-0028	16	DICDE: SILICON 0.75A 400PIV	04713	SR1358-9
A2F1	2110-0007	1	FUSE: CARTRIDGE 1 AMP 250V SLOW BLOW	75915	313001
A2F1 (230V)	2110-0202	1	FUSE: CARTRIDGE 0.5A 250V (230V OPT 009 ONLY)	71400	NOL .5
A2F2	2110-0059	3	FUSE: CARTRIDGE 1-1/2A SLO-BLO	71400	NOV 2
	2110-0453	1	TERMINAL: SOLDER LUG: #4-40 INT. THREAD	00000	QBD
A2F3	2110-0059	1	FUSE: CARTRIDGE 1-1/2A SLO-BLO	71400	NOL 1.5
A2F4	2110-0059	1	FUSE: CARTRIDGE 1-1/2A SLO-BLO	71400	NOL 1.5
A2F5	2110-0234	1	FUSE: 0.1 AMP 250V SLOW-BLOW	75915	313.100/5
A2F6	2110-0453	1	FUSE: 2 AMP 125V SLOW-BLOW (FG NOT USED OPT 009)	71400	NOV 2
A2J1	1251-1842	8	CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J2	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J3	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J4	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J5	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J6	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J7	1251-1842		CONNECTOR: 16 FEMALE CONTACT	28480	1251-1842
A2J8	1251-1894	9	CONNECTOR: 5 MALE CONTACT	28480	1251-1894
A2J11	1251-1827	8	EXTENSION: GUARD	28480	1251-1827
A2J12	1251-1828	8	GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
	1251-1894		CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1827		EXTENSION: GUARD	28480	1251-1827
A2J13	1251-1894		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
			CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
A2J14	1251-1828		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
	1251-1894		CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
	1251-1828		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
A2J15	1251-1894		CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
A2J16	1251-1828		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
	1251-1894		CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
A2J17	1251-1828		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
	1251-1894		CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
A2J18	1251-1894		GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
			CONNECTOR: 15 MALE CONTACT	28480	1251-1894
	1251-1824		EXTENSION: GUARD	28480	1251-1827
A2J21	1251-1828	8	GUARD FOR SPECIAL PURPOSE CONNECTOR	05245	5K205
A2J22	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
			CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J23	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J24	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J25	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J26	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J27	1251-1945		CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945

See introduction to this section for ordering information

TM11-6625-2752-14&P
Section VI - Replaceable Parts
Models 7758A, 7418A
07758-1

Table 6-3. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2J28	1251-1945	1	CONNECTOR: 10 FEMALE CONTACT	28480	1251-1945
A2J29	9100-3198		FILTER: LINE	05245	F1492
A2J30	1251-0362		CONNECTOR: PC EDGE 10 CONTACT	74868	143-010-01-(1158)
	1251-1249		KEY: POLARIZING	02660	143-953
A2J31	1251-1676	3	KEYING-PLUG: R & P CONNECTOR	00779	200821-1
	1251-0362		CONNECTOR: PC EDGE 10 CONTACT	74868	143-010-01-(1158)
A2J32	1251-1249	1	KEY: POLARIZING	02660	143-953
	1251-1676		KEYING-PLUG: R & P CONNECTOR	00779	200821-1
	1251-0362		CONNECTOR: PC EDGE 10 CONTACT	74868	143-010-01-(1158)
	1251-1249		KEY: POLARIZING	02660	143-953
	1251-1676		KEYING-PLUG: R & P CONNECTOR	00779	200821-1
A2J33	1251-1005	2	GUIDE: R & P CONNECTOR, SERIES M	00779	200390-4
	1251-1006		GUIDE: R & P CONNECTOR, SERIES M	00779	200399-4
	1251-1682		BODY: R & P CONNECTOR 14 POSITION	00779	201298-1
	1251-1694		CATCHES: R & P CONNECTOR	00779	201673-1
	1251-1005		GUIDE: R & P CONNECTOR, SERIES M	00779	200390-4
A2J34	1251-1006	1	GUIDE: R & P CONNECTOR, SERIES M	00779	200399-4
	1251-1682		BODY: R & P CONNECTOR 14 POSITION	00779	201298-1
A2NP1	1251-1694	1	CATCHES: R & P CONNECTOR	00779	201673-1
A2NP2	08848-00131		CHASSIS	28480	08848-00131
A2NP2	801-158	3	BRACKET	28480	801-158
A2NP3	7120-0084	1	NAMEPLATE: SERIAL	28480	7120-0084
A2NP4	7124-1964		NAMEPLATE	28480	7124-1964
A2NP5	00780-00510	2	SWITCH PLATE	28480	00780-00510
A2NP6	058848-00050		COVER: BOTTOM	28480	058848-00050
A2NP7	08848-40010	1	COVER: TOP P.C.	28480	08848-40010
A2NP8	1200-0041	3	SOCKET: TRANSISTOR	71785	133-32-10-013
A2NP9	858-602		CONTACT STRIP	28480	858-602
A2NP10	1200-0041	1	SOCKET: TRANSISTOR	71785	133-32-10-013
A2NP11	08840-00020		PLATE: REAR, CONNECTOR	28480	08840-00020
A2Q1	1850-0126	5	STRIP: PNP	80131	2N2869
A2Q2	1850-0126	1	STRIP: PNP	80131	2N2869
A2Q3	1850-0126		STRIP: PNP	80131	2N2869
A2Q10	1850-0126		STRIP: PNP	80131	2N2869
A2Q11	1850-0126		STRIP: PNP	80131	2N2869
A2R44	0686-3325		R:FXD COMP 3300 OHM 5% 1/2W	01121	EB 3325
A2T1	9100-2006	1	TRANSFORMER: POWER	28480	9100-2006
A2T3	9100-1925		TRANSFORMER: OUTPUT	28480	9100-1925
A2W1	08848-60050	1	ASSY: CABLE, SIGNAL	28480	08848-60050
A2W2	08848-60060		ASSY: CABLE POWER	28480	08848-60060
A2XF1	1400-0085	5	FUSEHOLDER	75915	342004
A2XF2	1400-0085	1	FUSEHOLDER	75915	342004
A2XF3	1400-0085		FUSEHOLDER	75915	342004
A2XF4	1400-0085		FUSEHOLDER	75915	342004
A2XF5	1400-0085		FUSEHOLDER	75915	342004
A2A1	08848-60030	1	ASSY: P.C. BOARD, MOTHER (FIGURE 6-24).	28480	08848-60030
A2A1C7	0180-0094	4	C:FXD ELECT 100 UF +75-10% 25VDCW	56289	3001076025002-05M
A2A1C8	0180-0094		C:FXD ELECT 100 UF +75-10% 25VDCW	56289	3001076025002-05M
A2A1C11	0180-0094		C:FXD ELECT 100 UF +75-10% 25VDCW	56289	3001076025002-05M
A2A1C12	0180-0094		C:FXD ELECT 100 UF +75-10% 25VDCW	56289	3001076025002-05M
A2A1C13	0180-0141	1	C:FXD ELECT 50 UF +75-10% 50VDCW	56289	300506050002-05M
A2A1CA18	1901-0028	2	DIODE: SILICON 0.75A 400PIV	04713	SR1358-9
A2A1CA19	1902-0551		DIODE BREAKDOWN: 6.19V 5%	28480	1902-0551
A2A1MP1	1205-0011	1	HEAT DISSIPATOR: FOR T0-5 AND T0-9 CASES	98978	TXBF-032-0258
A2A1Q8	1853-0027	1	STRIP: PNP	07263	515545
A2A1R27	0698-3631	1	R:FXD MET OX 330 OHM 5% 2W	28480	0698-3631
A2A1R36	0686-1215	1	R:FXD COMP 120 OHM 5% 1/2W	01121	EB 1215
A2A1R37	0686-1095		R:FXD COMP 10K OHM 5% 1/2W	01121	EB 1035
A2A1R38	0686-5615	3	R:FXD COMP 560 OHM 5% 1/2W	01121	EB 5615
A2A1R39	2100-2094		R:VAR COMP 500 OHM 30% LIN 1/8W	28480	2100-2094
A2A1R40	0686-4715	3	R:FXD COMP 470 OHM 5% 1/2W	01121	EB 4715
A2A1R41	0686-1515	1	R:FXD COMP 150 OHM 5% 1/2W	01121	EB 1515
A2A1R42	0686-1035		R:FXD COMP 10K OHM 5% 1/2W	01121	EB 1035
A2A1U1	08848-00030	1	BOARD: BLANK P.C.	28480	08848-00030
	0360-1491		TERMINAL: SOLDER STUD	28480	0360-1491

See introduction to this section for ordering information

Table 6-3. Replaceable Parts (continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2A2 A2A2C1 A2A2C2 A2A2C3 A2A2C4 A2A2C5 A2A2C6 A2A2C7 A2A2C8 A2A2C9 A2A2C10 A2A2H1	1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 1901-0028 08848-00040 0360-1491	1 1	DIODE P.C. ASSY (FIGURE 6-25). DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV BOARD: BLANK P.C. TERMINAL: SOLDER STUD	28480 04713 04713 04713 04713 04713 04713 04713 04713 04713 04713 28480 28480	08848-00040 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 SR1358-9 08848-00040 0360-1491
A3 A3C18 A3C19 A3C21 A3CR24 A3CR25 A3CR26 A3HP1 A3Q19 A3Q20 A3Q21 A3R37 A3R38 A3R39 A3R40 A3R41 A3R42 A3R43 A3RM7 A3RM8 A3T7 A3U1	86C-500AC13 0160-2838 0160-2771 0160-0158 1902-0551 1901-0028 1901-0028 801-157 1853-0045 1205-0095 1850-0180 1850-0180 0686-6825 0686-1005 0686-6825 0686-5615 0686-5615 0686-4715 0686-4715 0837-0037 0837-0037 9100-1990 7100-1 8360-1491 0362-0215 0380-0747 752-353	1 1 1 1 3 1 1 4 2 1 1 2 1 1 1 1 1 1 1 1 1 1	OSCILLATOR 2400 HZ (FIGURE 6-26) C:FXD PAPER 0.33 UF 10% C:FXD MY 0.022 UF 10% 200VDCW C:FXD MY 0.0056 UF 10% 200VDCW DIODE BREAKDOWN: 6.19V 5% DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV BRACKET TSTR: SI PNP HEAT SINK: TRANSISTOR TSTR: GE PNP TSTR: GE PNP R:FXD COMP 4800 OHM 5% 1/2W R:FXD COMP 10 OHM 5% 1/2W R:FXD COMP 4800 OHM 5% 1/2W R:FXD COMP 560 OHM 5% 1/2W R:FXD COMP 560 OHM 5% 1/2W R:FXD COMP 470 OHM 5% 1/2W R:FXD COMP 470 OHM 5% 1/2W THERMISTOR: 310 OHM 10% THERMISTOR: 310 OHM 10% TRANSFORMER: TGR010AL OSC. WASHER TERMINAL: SOLDER STUD TERMINATION: CRIMP TYPE FGR 0.050" DIA SPACER: POST TYPE 0.200" LG BOARD: BLANK PC	28480 28480 14655 56289 28480 04713 04713 28480 80131 13103 80131 80131 01121 01121 01121 01121 01121 01121 01121 83186 83186 28480 28480 28480 00779 00000 28480	068-500AC13 0160-2838 WVF2522 192P56292-PTS 1902-0551 SR1358-9 SR1358-9 801-157 2M4036 22258 2N1374 2N1374 EB 4825 EB 1005 EB 4825 EB 5615 EB 5615 EB 4715 EB 4715 23E3 23E3 9100-1990 7100-1 0360-1491 60590-6 080 752-353
A4 A4C15 A4C16 A4C17 A4CR21 A4CR22 A4CR23 A4HP1 A4Q12 A4Q13 A4Q21 A4R22 A4R23 A4R24 A4R25 A4R26 A4R27 A4T4 A4U1	868-500AC14 0160-2835 0183-0103 0180-0103 1901-0028 1901-0028 1902-0282 801-157 1050-0181 1850-0181 0686-1815 0811-1903 0686-1825 0686-1825 0686-1815 0686-1825 0686-1825 0340-0197 1200-0080 752-363	1 2 1 3 2 1 3 3 1 1 2 1	OSCILLATOR: 440 HZ (FIGURE 6-27) C:FXD PAPER 2 UF 20% C:FXD AL ELECT 10 UF +75-10% 50VDCW C:FXD AL ELECT 10 UF +75-10% 50VDCW DIODE: SILICON 0.75A 400PIV DIODE: SILICON 0.75A 400PIV DIODE BREAKDOWN: 15.0V 5% 1W BRACKET TSTR: GE PNP TSTR: GE PNP R:FXD COMP 180 OHM 5% 1/2W R:FXD MW 7.5 OHM 5% 3W R:FXD COMP 1800 OHM 5% 1/2W R:FXD COMP 1800 OHM 5% 1/2W R:FXD COMP 180 OHM 5% 1/2W R:FXD COMP 1800 OHM 5% 1/2W R:FXD COMP 1000 OHM 5% 1/2W TRANSFORMER: TGR010AL OSC. INSULATOR: WAFER FOR #8 HDN MTG. INSULATOR: TRANSISTOR MTG. BOARD: BLANK PC	28480 56289 56289 04713 04713 28480 28480 80131 80131 01121 28480 01121 01121 01121 01121 01121 28480 76530 71785 28480	0160-2835 3001066050C32-DSW 3001066050C32-DSW SR1358-9 SR1358-9 1902-0202 801-157 2N2552 2N2552 EB 1815 0811-1903 EB 1825 EB 1825 EB 1815 EB 1825 EB 1825 9100-1967 294832 294834 752-363

See introduction to this section for ordering information

Table 6-3. Replaceable Parts (continued)

See introduction to this section for ordering information

TABLE 6-4
PART NUMBER - NATIONAL STOCK NUMBER
CROSS REFERENCE INDEX

PART NUMBER	FSCM	NATIONAL STOCK NUMBER	REPLACEMENT		NATIONAL STOCK NUMBER
			PART NUMBER	FSCM	
CB1015	01121	5905-00-102-5294	RCR07G101JS	81349	5905-00-141-1183
CB1025	01121	5905-00-577-9495	RLR07C102GR	81349	5905-00-240-2726
CB1035	01121	5905-00-577-9465	RCR07G103JS	81349	5905-00-106-3666
CB1045	01121	5905-00-959-1202			
CB1055	01121	5905-00-577-9667	RCR07G105JS	81349	5905-00-116-8554
CB1065	01121	5905-00-822-2388	RCR07G106JS	81349	5905-00-121-9919
CB1245	01121	5905-00-801-0443	RCR07G124JS	81349	5905-00-400-4528
CB1505	01121	5905-00-905-6277			
CB1515	01121	5905-00-577-9598	RCR07G151JS	81349	5905-00-119-8811
CB1525	01121	5905-00-577-9947	RCR07G152JS	81349	5905-00-106-1356
CB1815	01121	5905-00-141-0742			
CB1825	01121	5905-00-577-9463	RCR07G181JS	81349	5905-00-141-0742
CB2235	01121	5905-00-577-9461	RCR07G223JS	81349	5905-00-116-8556
CB2705	01121	5905-00-801-0466	RCR20G270JS	81349	5905-00-113-4860
CB2725	01121	5905-00-577-9481	RCR07G272JS	81349	5905-00-111-4727
CB2735	01121	5905-00-577-9670	RCR07G273JS	81349	5905-00-119-3504
CB3315	01121	5905-000-841-1575	RCR07G331JS	81349	5905-00-114-0710
CB3325	01121	5905-00-716-4841	RCR07G332JS	81349	5905-00-126-6683
CB3335	01121	5905-00-909-3967			
CB4715	01121	5905-00-577-9494	RCR07G471JS	81349	5905-00-120-9154
CB4725	01121	5905-00-577-9483	RCR07G472JS	81349	5905-00-114-0711
CB4745	01121	5905-00-577-9671	RCR07G474JS	81349	5905-00-105-7767
CB5625	01121	5905-00-691-0195	RCR07G562JS	81349	5905-00-141-0744
CB5635	01121	5905-00-577-9599	RCR07G563JS	81349	5905-00-106-1357
CB6815	01121	5905-00-577-9492	RCR07G681JS	81349	5905-00-135-6046
CB6835	01121	5905-00-716-4852	RCR07G683JS	81349	5905-00-119-3505
CB1005	01121	5905-00-518-9709	RCR20G100JS	81349	5905-00-104-5755
CB1025	01121	5905-00-833-4443	RCR20G102JS	81349	5905-00-110-0196
CB1035	01121	5905-00-688-4702	RCR20G103JS	81349	5905-00-141-0591
CB1215	01121	5905-00-807-7507			
CB1515	01121	5905-00-997-5437	RCR20G151JS	81349	5905-00-108-6922
CB1725	01121	5905-00-081-5216	RCR20G152JS	81349	5905-00-111-4738
CB1815	01121	5905-00-556-5537	RCR20G181JS	81349	5905-00-935-8544
CB1825	01121	5905-00-819-9173	RCR20G182JS	81349	5905-00-141-0593
CB2225	01121	5905-00-195-5533	RCR20G222JS	81349	5905-00-141-1168
CB2715	01121	5905-00-171-2006	RCR20G271JS	81349	5905-00-114-5407
CB3325	01121	5905-00-556-5254	RCR20G332JS	81349	5905-00-104-8348
CB3915	01121	5905-00-909-4235			
CB4715	01121	5905-00-807-6469	RCR20G471JS	81349	5905-00-111-4858
CB5605	01121	5905-00-052-1922	RCR20G560JS	81349	5905-00-104-8345
CB5615	01121	5905-00-716-5411	RCR20G561JS	81349	5905-00-716-5411
CB6825	01121	5905-00-907-4124	RCR20G632JS	81349	5905-00-141-1165
FD3369	07263	5961-00-821-0711			
GA-7077	70903	6150-00-068-7384			
GA-3	71400	5920-00-839-2318			
GA-4AMP	71400	5920-00-823-0624			
GP-6-25	71400	5920-00-280-4958			
GL1/2	71400	5920-00-199-9498			
GL1.5	71400	5920-00-280-9328			
GL-4	71400	5920-00-284-7466			
MD15F391-J3V	72136	5910-00-914-4732	CM10FD391G03	81349	5910-00-018-0918
ML8940	07263	5962-00-483-1956			
MT7490M	01295	5962-00-102-7519	RB5490F	18324	5962-00-162-7505
MT7492M	01295	5962-00-250-9267			
ML358-9	04713	5961-00-951-1505			
ML5548	07263	5961-00-193-4463			

TABLE 6-4 (Cont)
PART NUMBER - NATIONAL STOCK NUMBER
CROSS REFERENCE INDEX

PART NUMBER	FSCM		REPLACEMENT		
			PART NUMBER	FSCM	NATIONAL STOCK NUMBER
817843	07263	5961-00-917-0660			
TXBF-032-0258	98978	5999-00-999-4058			
0160-0207	28480	5910-00-057-8094	192P10352	56289	5910-00-965-9729
0160-2222	28480	5910-00-244-7170			
0160-2835	28480	5910-00-928-1392			
0180-0106	28480	5910-00-127-1668	CB21PE101G	81349	5910-00-952-6437
0180-0161	28480	5910-00-809-8667	M39003-01-3085	81349	5910-00-211-1261
0180-2049	28480	5910-00-928-1378			
0340-0404	28480	3120-00-240-8003			
0360-1418	28480	5940-00-869-2926	SE20XD01	81349	5940-00-082-4652
0360-1491	28480	5940-00-176-0213			
0370-1005	28480	5355-00-100-6778			
0380-0747	28480	5970-00-172-3684			
0698-3136	28480	5905-00-891-4247			
0757-0123	28480	5905-00-954-8684			
0757-0442	28480	5905-00-998-1792			
0757-0452	28480	5905-00-056-0554			
0757-0869	28480	5905-00-221-8311			
08848-40010	28480	6625-00-013-4840			
100XL037	76474	3030-00-984-3965			
101-12-10-044	71785	5935-00-240-3117	223-144	95937	5935-00-847-4641
1251-1842	28480	5935-00-927-6863			
1251-1894	28480	5935-00-173-4391			
1251-1895	28480	5935-00-520-4824			
140XL037	90179	3030-00-927-6492	140XL037	09639	3030-00-927-6492
143-953	02660	5935-00-678-2390			
15-1315-12J	06560	5950-00-431-3215			
1820-0196	28480	5962-00-451-3131			
1854-0071	28480	5961-00-137-4608			
1901-0033	28480	5961-00-821-0710			
1902-0202	28480	5961-00-873-0867			
1902-0551	28480	5961-00-483-6600			
1902-3182	28480	5961-00-892-1009	JAN1N963B	81349	5961-00-229-1966
1914	78189	5310-00-186-7502	MS35333-108	96906	5310-00-022-8834
192P10292-PTS	56289	5910-00-911-9331	192P10252	56289	5910-00965-9728
192P10392-PTS	56289	5910-00-911-9271			
192P22292-PTS	56289	5910-00-879-7210			
192P56292-PTS	56289	5910-00-497-7598			
192P56392-PTS	56289	5910-00-891-4208			
2N1306	80131	5961-00-833-5134	JAN2N1306	81349	5961-00-892-3405
2N1374	80131	5961-00-882-2906			
2N1973	80131	5961-00-954-4540			
2N2552	80131	5961-00-938-5099			
2N2869	80131	5961-00-925-6280			
2N3053	80131	5961-00-985-9073			
2N3055	80131	5961-00-985-9074	JAN2N3055	81349	5961-00-199-6008
2N4036	80131	5961-00-068-1985			
2N4250	80131	5961-00-021-7849			
2N4902	80131	5961-00-107-0736			
200389-4	00779	5935-00-020-9009			
200390-4	00779	5935-00-020-9008			
200821-1	00779	5935-00-134-5747			

TABLE 6-4 (Cont)
PART NUMBER - NATIONAL STOCK NUMBER
CROSS REFERENCE INDEX

			REPLACEMENT		
PART NUMBER	FSCM	NATIONAL STOCK NUMBER	PART NUMBER	FSCM	NATIONAL STOCK NUMBER
201298-1	00779	5935-00-944-3647			
201672-1	00779	5935-00-479-1578			
2100-2031	28480	5905-00-410-1313			
2100-2094	28480	5905-00-929-2882			
2110-0453	28480	5920-00-284-6784			
2190-0007	28480	5310-00-994-8433	FFW100	81348	5310-00-558-8023
2190-0702	28480	5310-00-245-8724			
22NA27-22-82	72962	5310-00-207-8994	NAS1033N08	80205	5310-00-834-4874
2225B	13103	5999-00-498-2035			
2360-0115	28480	5305-00-188-0771			
2360-0183	28480	5305-00-457-1275			
251-06-30-261	71785	5935-00-974-6874			
251-10-30-261	71785	5935-00-463-8066			
251-12-30-261	71785	5935-00-759-7187			
252-12-30-300	71785	5935-00-448-2236			
294834	71785	5961-00-976-4893	294834	76530	5961-00-976-4893
30D506G050DD2D8M	56289	5910-00-879-0123			
312003	3915	5920-00-787-5573	F02A250V3A	81349	5920-00-010-6652
313001	75915	5920-00-794-3215			
313005	75915	5920-00-280-5066			
33-32-10-013	71785	5935-00-885-8598			
342004	75915	5920-00-087-0206	FHN20G	81349	5920-00-556-0144
354-1115	28480	5835-00-834-0190			
354-1116	28480	5835-00-834-0200			
43-03-1	13103	5999-00-113-5083			
4586-2B	56289	5910-00-827-9772			
4586-97A	56289	5910-00-666-5781			
5C11B7S-CML	56289	5910-00-234-9817			
5060-0767	28480	6625-00-903-0348			
5080-3701	28480	5935-00-173-1401			
53-67280-121/AIH	76854	5930-00-164-0850			
66104-1	00779	5935-00-909-8565			
710P-1	28480	5310-00-240-7710			
7717-5-N	13103	5961-00-432-0684			
868-500AC6	52983	4920-00-909-2915			
9100-1925	28480	5950-00-790-2443			
9100-2006	28480	5950-00-197-4741			

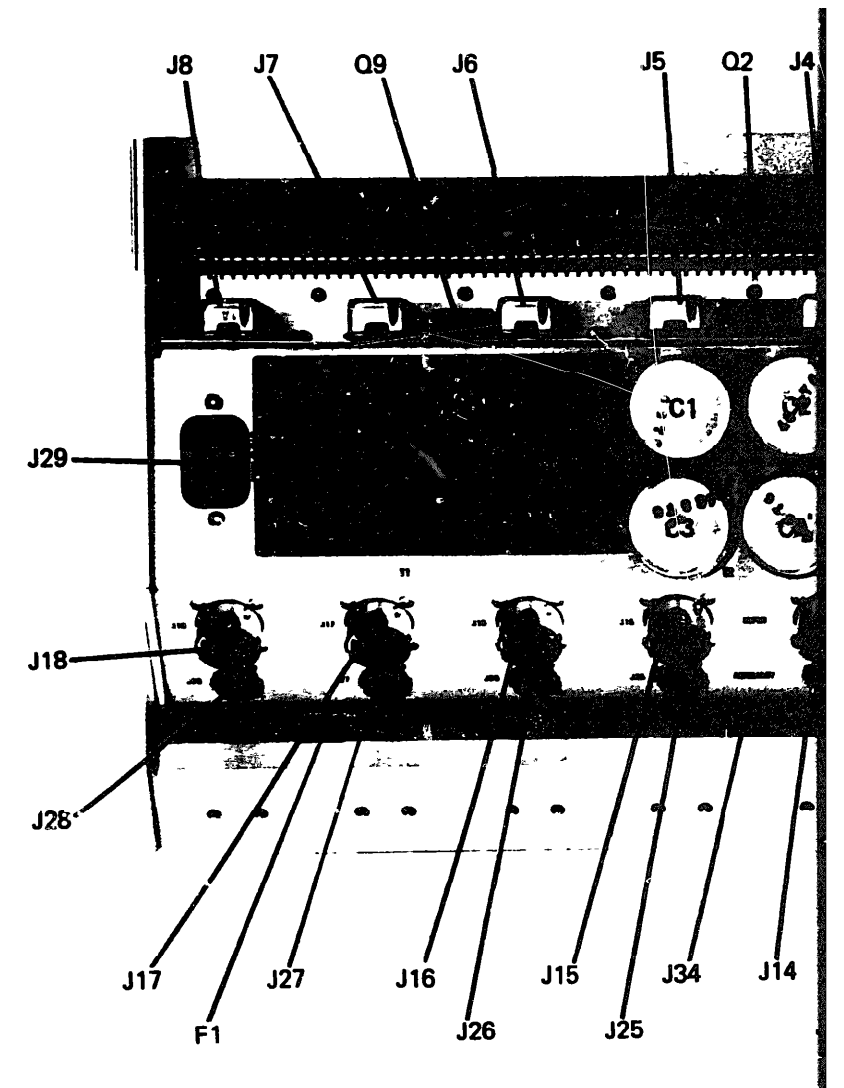
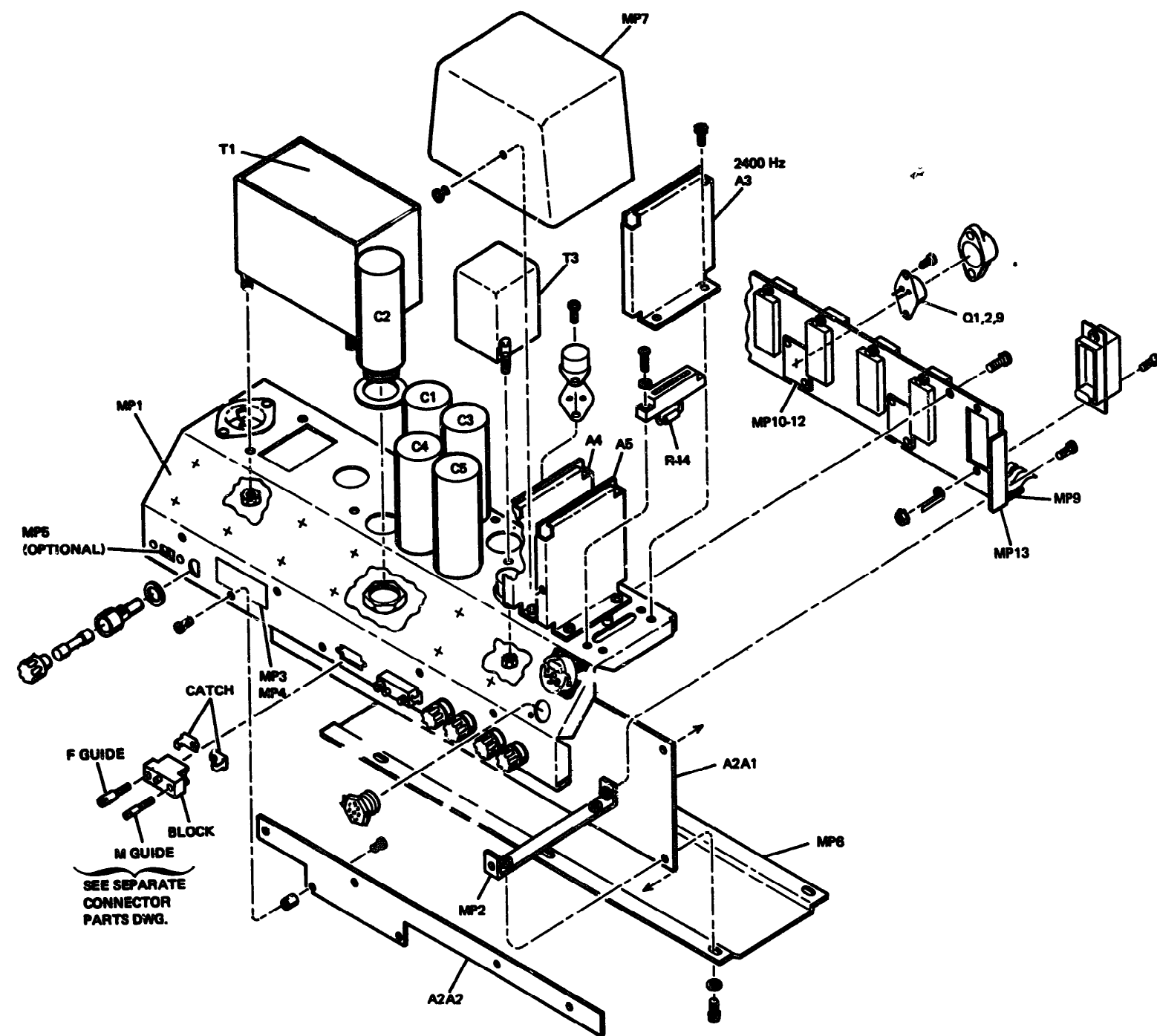


Figure 6-22. 8848A Assembly A2, Power Chassis, Assembly Diagram

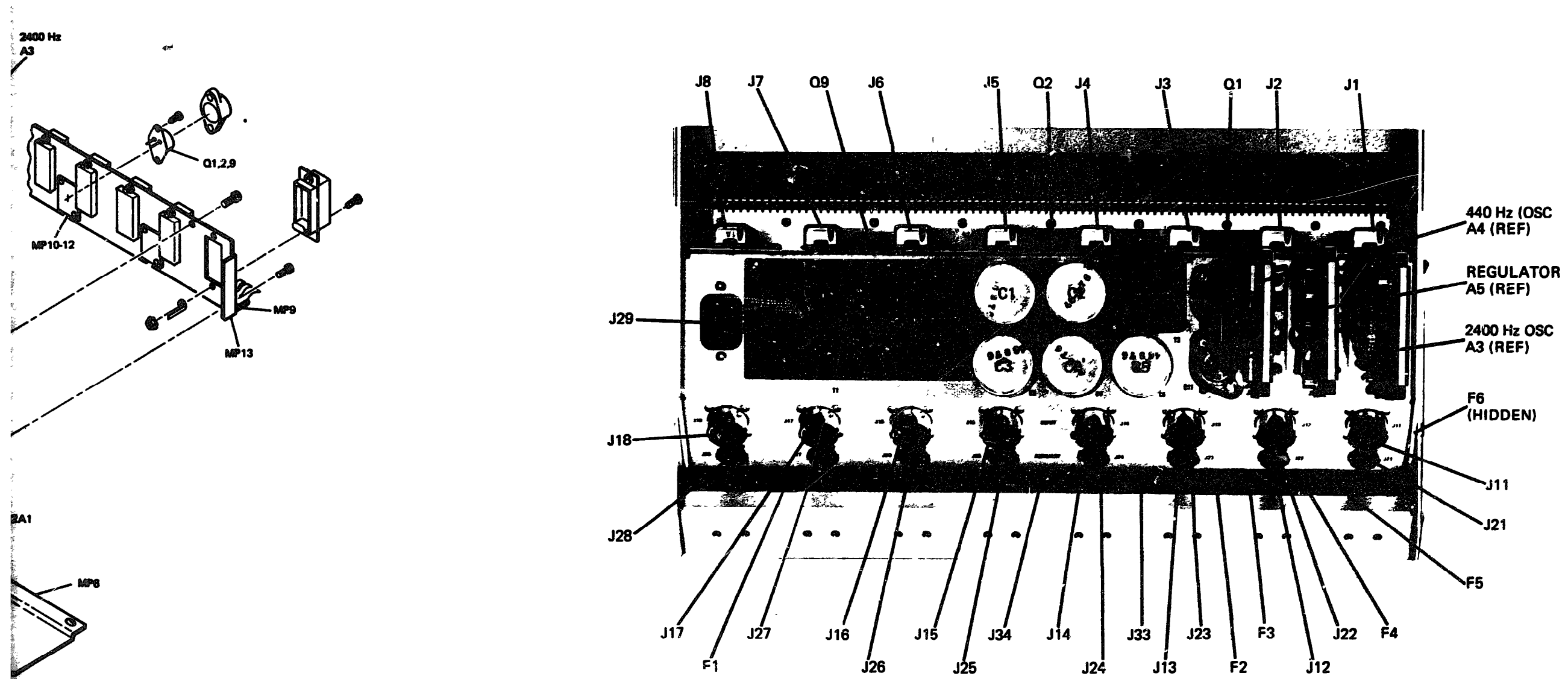


Figure 6-23. 8848A Assembly A2, Power Chassis, Component Locations

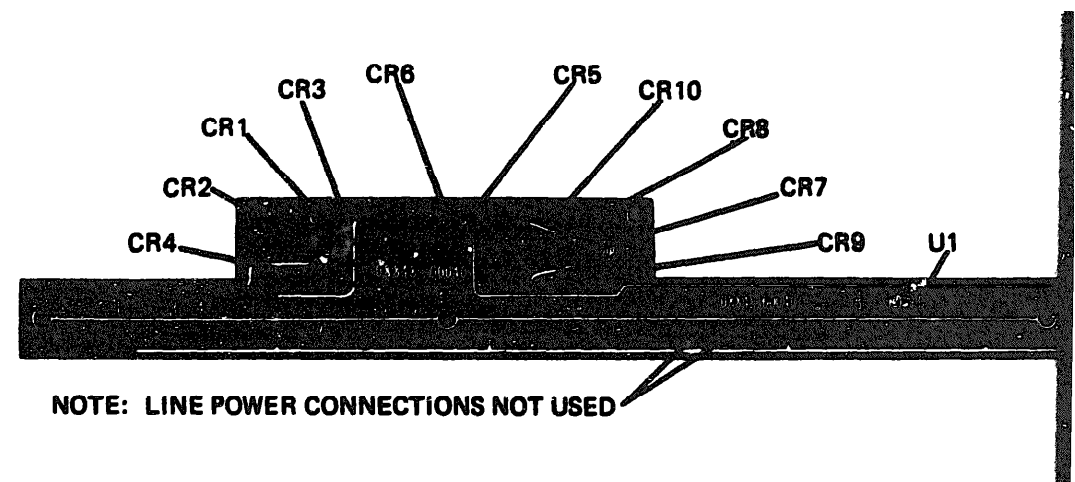
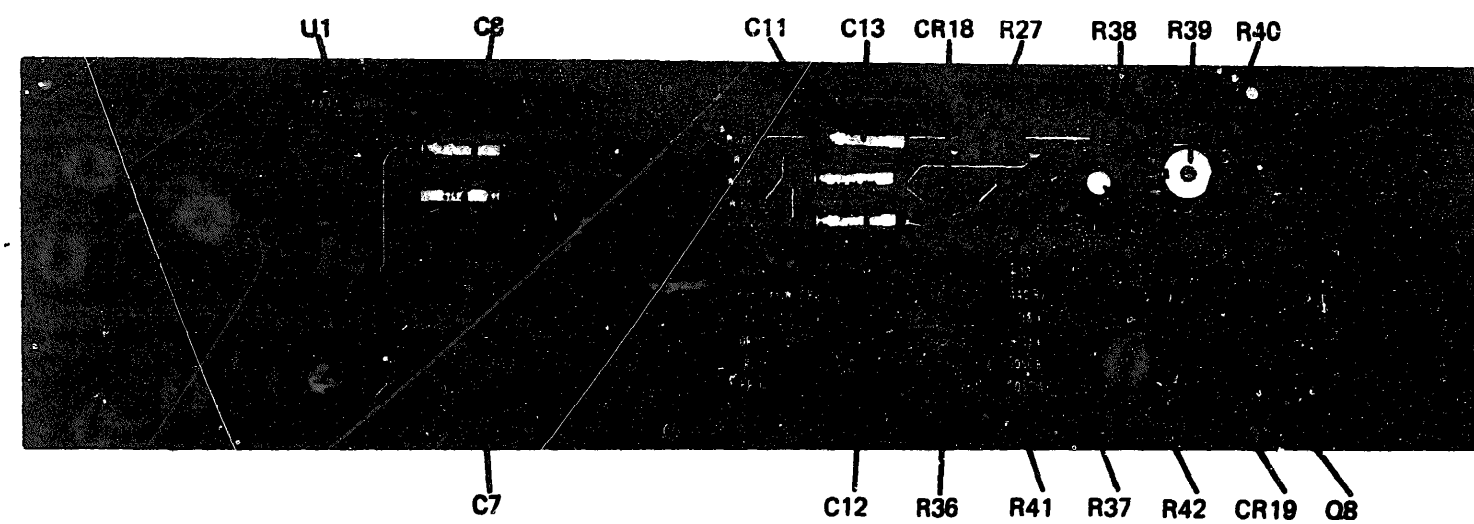


Figure 6-24. 8848A Assembly A2A1, Mother PC, Component Locations

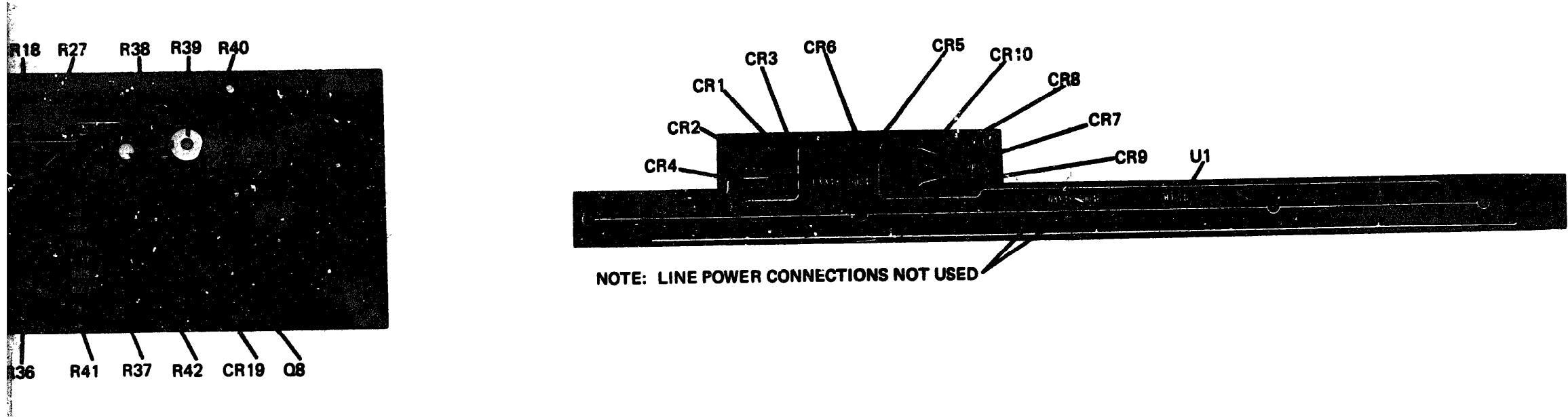


Figure 6-25. 8848A Assembly A2A2, Diode PC, Component Locations

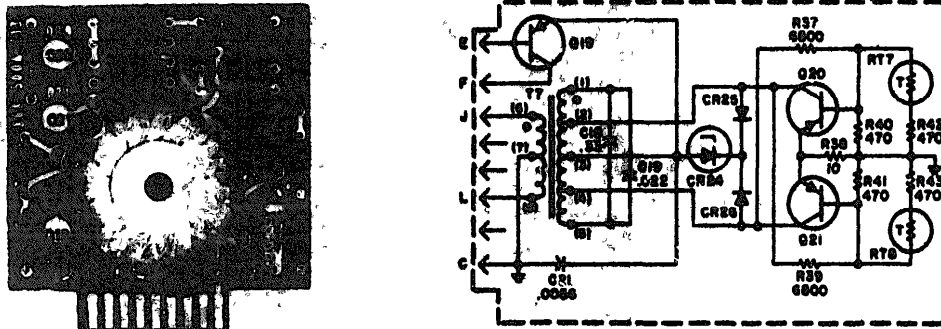


Figure 6-26. 2400 Hz Oscillator (8848A, A3) Schematic and Component Locations

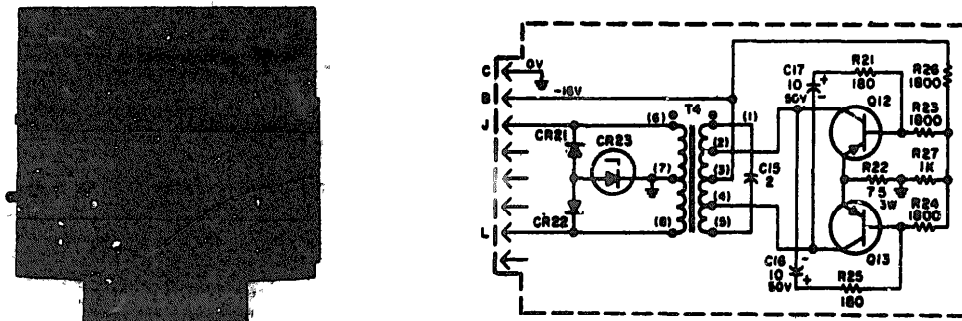


Figure 6-27. 440 Hz Oscillator (8848A, A4). Schematic and Component Locations

TM11-6625-2752-14&P
 Section VI - Replaceable Parts
 Models 7758A, 7418A
 07758-1

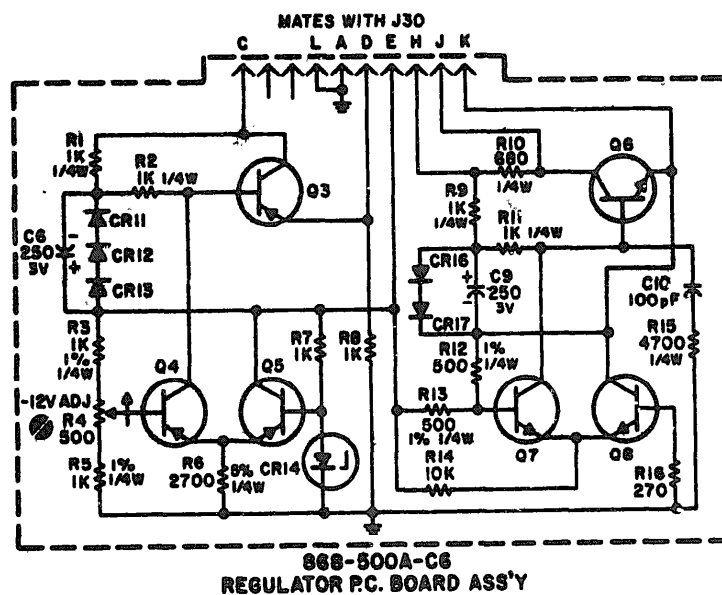
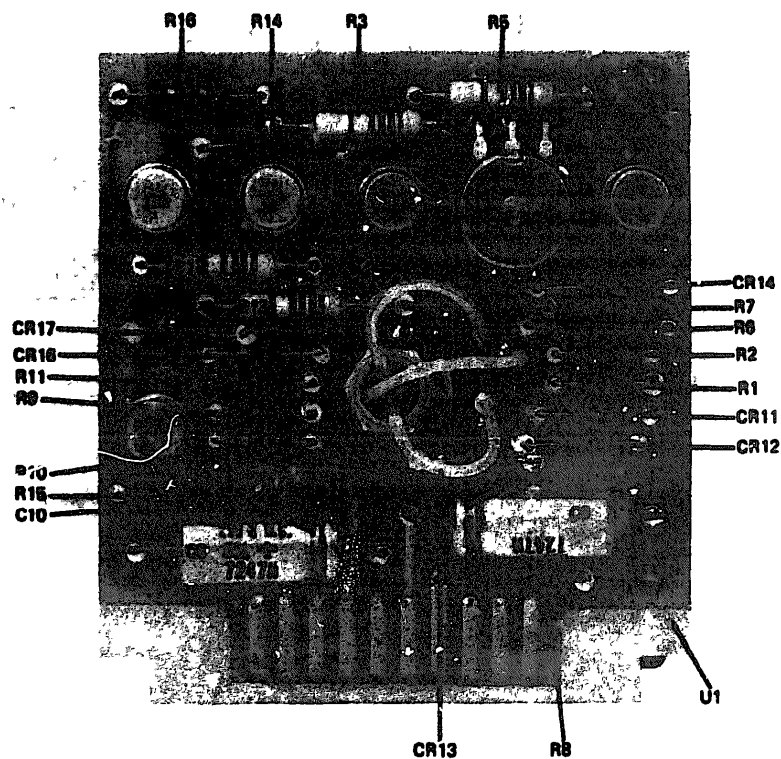


Figure 6-28. 8848A Assembly A5, Regulator PC, Schematic and Component Locations





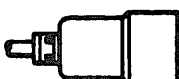
APPENDIX A

DIFFERENCE DATA SHEETS

A-1. POWER CORD SUPPLEMENT.

This section contains descriptions, Hewlett-Packard stock numbers and wire color codes for AC power cord sets that connect to instruments manufactured by HP Medical Electronics Division.

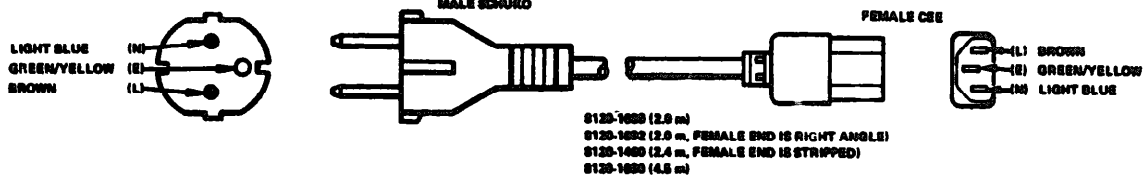
AC POWER CORD SETS (USA)

FEMALE HP (TOWER)  (N) LIGHT BLUE OR WHITE (E) GREEN/YELLOW OR GREEN (L) BROWN OR BLACK		MALE NEMA (MOLDED)  (N) WHITE (E) GREEN/YELLOW OR GREEN (L) BLACK		
FEMALE CEE  (L) BROWN OR BLACK (E) GREEN/YELLOW (N) LIGHT BLUE OR WHITE		MALE NEMA (HARD WIRED)  (N) WHITE (E) GREEN/YELLOW (L) BLACK		
MALE CEE  (L) BROWN OR BLACK (E) GREEN/YELLOW (N) LIGHT BLUE OR WHITE		E - EARTH OR SAFETY GROUND N - NEUTRAL OR IDENTIFIED CONDUCTOR L - LINE OR ACTIVE CONDUCTOR		
HP NUMBER	POWER CORD LENGTH		WIRE SIZE	CONNECTORS
8120-1406	2 1/2 ft.	(76 cm)	18/3	FEMALE HP (TOWER) to MALE CEE
8120-1386*	2 1/2 ft.	(76 cm)	18/3	FEMALE CEE to MALE CEE
8120-1900*	2 1/2 ft.	(76 cm)	18/3	FEMALE CEE to MALE CEE
8120-1626*	8.0 ft.	(2.4 m)	18/3	FEMALE CEE to MALE CEE
*USA OR NON-USA				
8120-1406	2 1/2 ft.	(76 cm)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1348	7 1/2 ft.	(2.2 m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1386	8.0 ft.	(2.4 m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1407	15.0 ft.	(4.5 m)	18/3	FEMALE CEE to MALE NEMA (MOLDED)
8120-1933	2 1/2 ft.	(76 cm)	18/3	STRIPPED ENDS to MALE CEE
8120-1786	4.0 ft.	(1.22 m)	18/3	STRIPPED ENDS to MALE CEE
8120-1234	4.0 ft.	(1.22 m)	18/3	STRIPPED ENDS to MALE CEE
8120-1706	15.0 ft.	(4.5 m)	14/3	STRIPPED ENDS to MALE NEMA (HARD WIRED)
8120-1935	12.0 ft.	(3.6 m)	16/3	STRIPPED ENDS to MALE NEMA (HARD WIRED)
8120-1786	8.0 ft.	(2.4 m)	18/3	FEMALE CEE to MALE NEMA (HARD WIRED)
8120-1931	8.0 ft.	(2.4 m)	16/3	FEMALE CEE to MALE NEMA (HARD WIRED)
8120-1932	12.0 ft.	(3.6 m)	16/3	FEMALE CEE to MALE NEMA (HARD WIRED)

NOTE: OTHER COUNTRIES SUCH AS CANADA, JAPAN (100 or 200 VOLTS), MEXICO, PHILIPPINES, AND TAIWAN MAY USE SOME OF THE ABOVE SETS. CONSULT YOUR NEAREST HP SALES OFFICE.

AC POWER CORD SETS (NON USA)

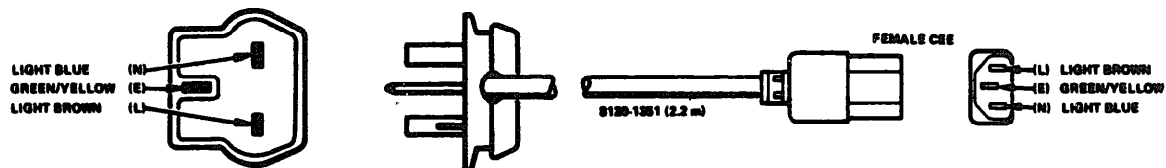
EAST AND WEST EUROPE, SAUDI ARABIA, UNITED ARAB REPUBLIC



AUSTRALIA, NEW ZEALAND



GREAT BRITAIN, CYPRUS, NIGERIA, RHODESIA, SINGAPORE



NOTE:

OTHER COUNTRIES USE MORE THAN ONE OF THE ABOVE POWER CORD CONFIGURATIONS. FOR CORRECT POWER CORD SET IN YOUR AREA, CONSULT YOUR NEAREST HP SALES OFFICE.

A-2. **PRODUCTION CHANGES.**

The following changes must be made to the technical manual as a result of equipment production changes. The extent of the manual changes depends upon the serial prefix of the instrument.

A-3. **TECHNICAL MANUAL CHANGES.**

If the instrument has serial prefix 1428A, make the following changes to the manual:

Page 6-14, Table 6-1:

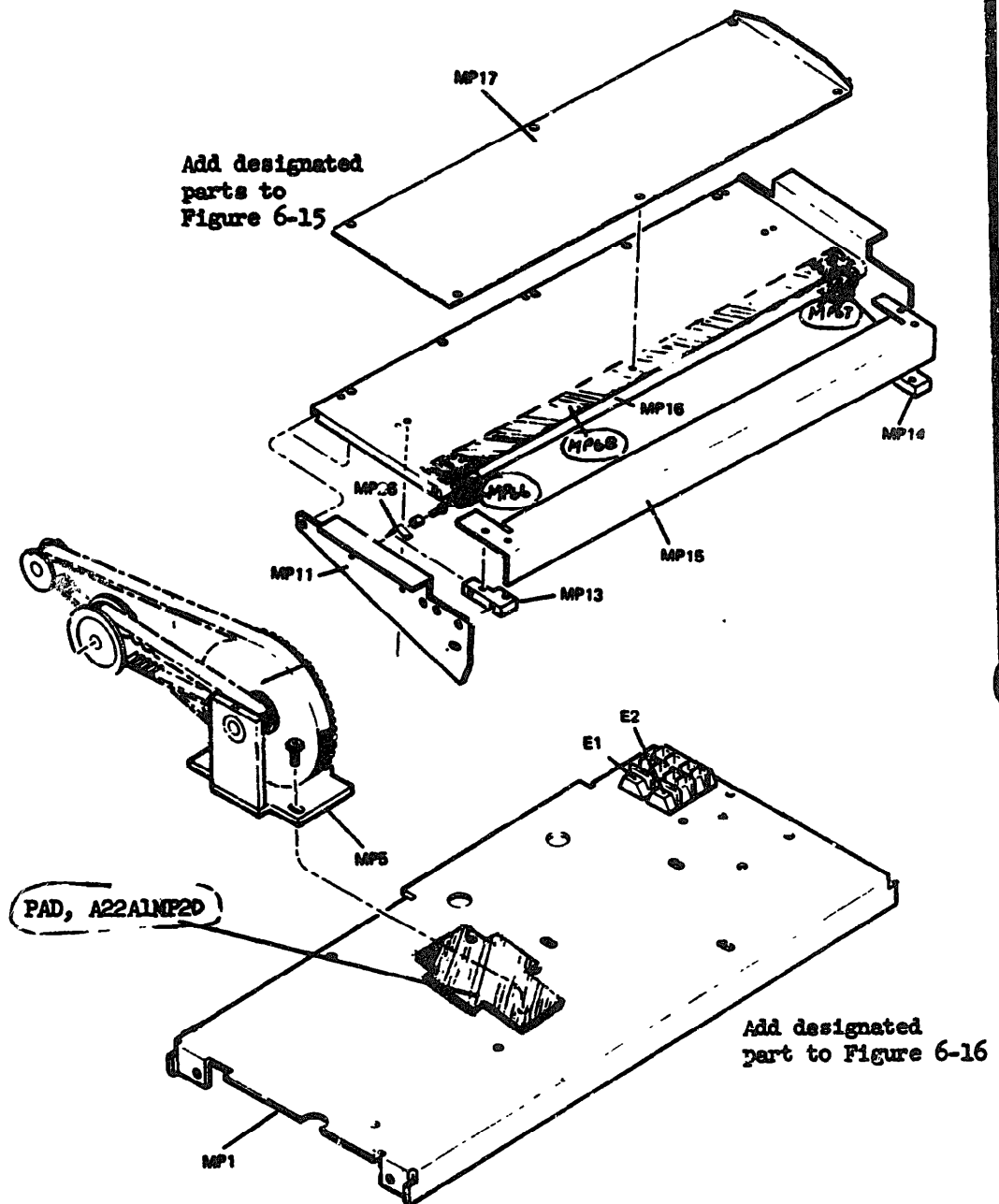
Spring;

Add A22MP68, 07758-20400, Bar, Mfgr.
28480;

Add A22A1MP20, 07758-00650, Pad, Bearing
Mount Isolator, Mfgr. 28480.

Page 6-32, Figure 6-15: Add MP66, MP67, and MP68 as shown on the following illustration.

Page 6-33. Figure 6-16: Add MP20 as shown on the following illustration.



If the instrument has serial prefix 1431A, make the following change to the manual:

Page 6-1: Table 6-1: Change HP Part Number and Description for
A12C8 to 0180-0161, C: Fxd Elect 5.3 UF
10% 35 VDCW.

If the instrument has serial prefix 1448A, make the following changes to the manual:

Page 2-10: Add new Figure 2-10 for Model 7418A Suggested Remote Control Circuit.

Page 2-4: Add new Paragraph 2-24, as follows:

2-24. The Model 7418A Recorder is, in addition, supplied with a remote speed change capability. A suggested remote control circuit is diagrammed in Figure 2-10. The distance for remote operation may be set by the resistance of the connecting wire, which should be no greater than 10 ohms one way for speed control. To check the box for proper wiring, first check the marker switch continuity, then connect the ohmmeter as indicated in the following table. A zero in the table means zero resistance (continuity), a blank means open circuit, and the remaining resistances are in ohms, $\pm 5\%$.

SELECTED SPEED MM/S (SEE NOTE)	OHMMETER CONNECTED BETWEEN CONTROL BOX P14 PINS:				
	B AND C (X2)	B AND F (X4)	B AND K (X10A)	B AND N (X10B)	J AND H (Heat)
0.25					
0.50	0				
1.0		0			
2.5			0		
5.0	0		0		470
10		0	0		270
25			0	0	100
50	0		0	0	20.34
100		0	0	0	0
200	0	0	0	0	0

NOTE: On #6 of the control box, decks A,B, and C control the X2 solenoid in the recorder, D,E and F control the X4 solenoid, G and H control the solenoid X10A. Decks I and J control the X10B solenoid.

CAUTION: Do not apply the ohmmeter to the recorder REMOTE connector, or the ohmmeter battery or meter circuit may be damaged.

Page 6-5, Table 6-1: Add diodes A2A1CR13-CR23, 1901-0033, S11 100 mA, 180 WV.

Page 6-7, Table 6-1: Add A3W2, 07758-60050, Remote cable for Model 7418A.
A3W2 (07758-60200) to Remote cable for Model 7758A.

Page 6-23, Figure 6-4: Add new Figure 6-4A for Model 7418A only (next page).

Page 6-24, Figure 6-6: For Model 7418A only, change the 07758-60200 remote cable to Cable 07758-60050, noting that P14 still goes to Transfer PC Assembly A3A1 and the new pins go to the Control Switch Board, A2A2. This cable permits recorder speed to be controlled remotely.

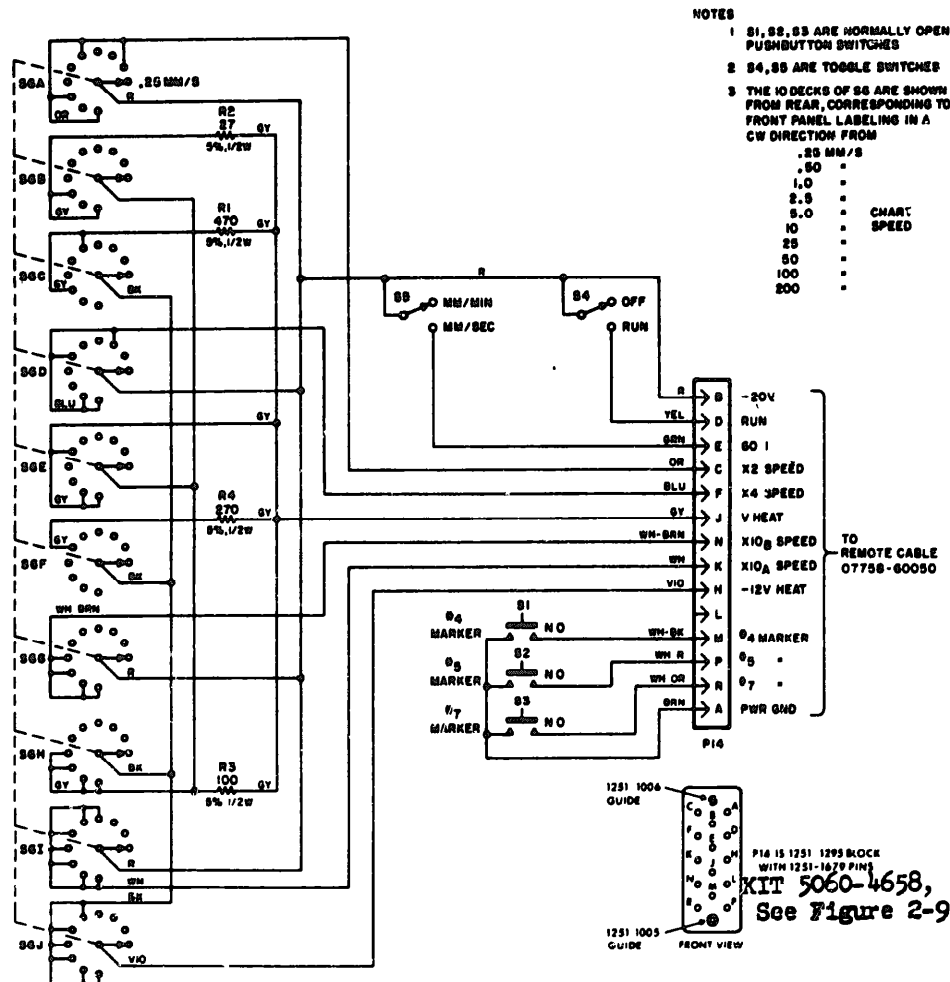
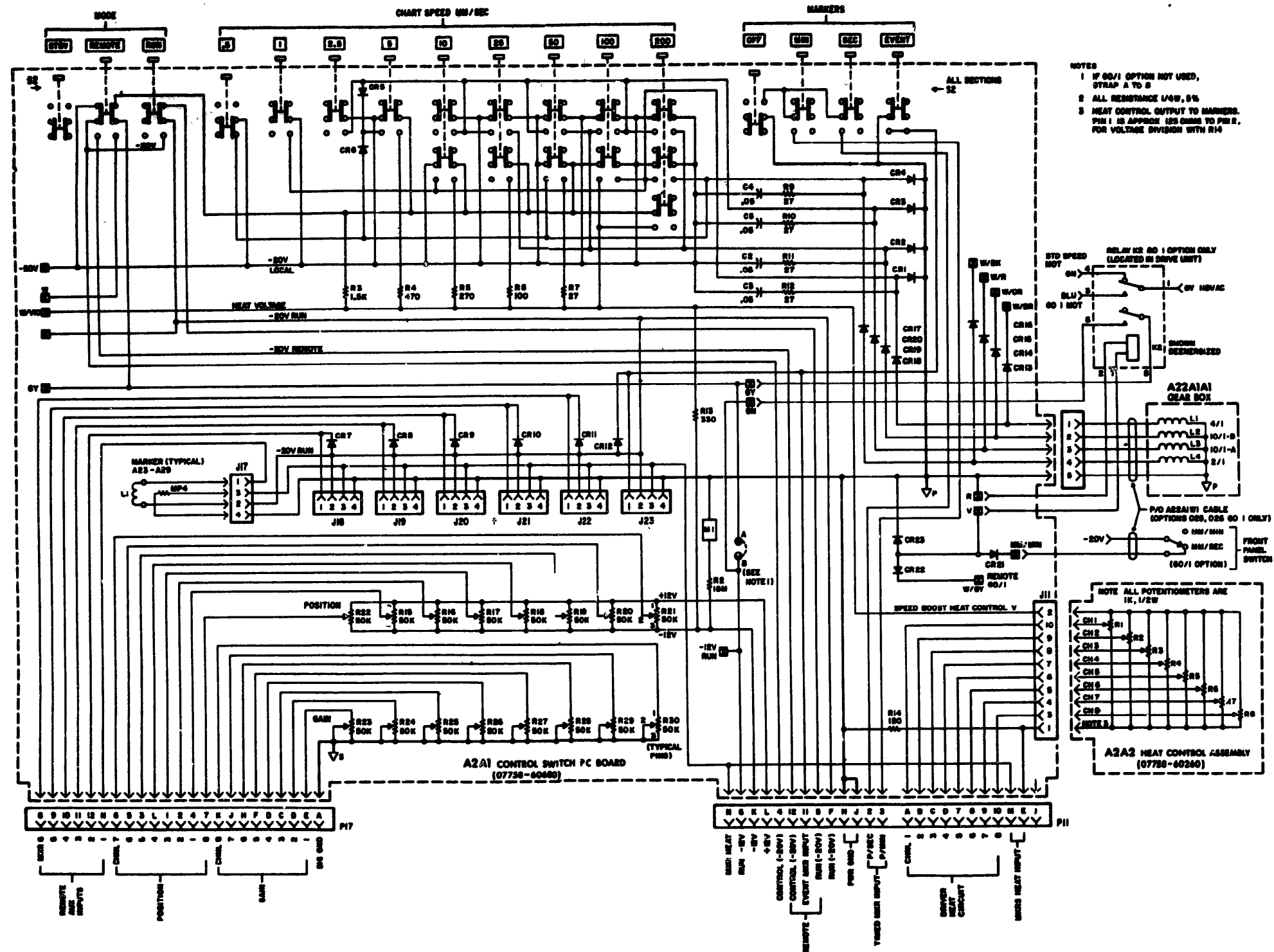


Figure 2-10. Suggested Remote Control Circuit of model 7418A

NOTE: THIS REMOTE CONTROL CIRCUIT IS APPLICABLE TO THE INDUSTRIAL VERSION OF THE RECORDER ONLY, MODEL 7418A.

**List of Circuit Parts for Suggested Remote
Control Box Circuit Shown in Figure 2-10**

<u>Reference Designation</u>	<u>Hewlett-Packard Part Number</u>	<u>Description</u>
R2	0686-2705	Resistor, 27 Ohms
R3	0686-1015	Resistor, 100 Ohms
R4	0686-2715	Resistor, 270 Ohms
R1	0686-4715	Resistor, 470 Ohms
PL4	5060-4658	Connector Kit (See Figure 2-9), supplied as recorder accessory
S1, S2, S3	3101-1075	Switch, SPST Pushbutton (Nut 3101-0126) .25A
S4, S5	3101-0957	Switch, SPDT Center Off (Nut 0590-765) 5.0 A Toggle, Subminiature
Part of S6	PA-1	Switch section (10 required); Centralab No.
Part of S6	PA-302	Switch Index (10 required); Centralab No.
Part of S6	0370-0446	Knob, Black, 0.75 in diameter, for 0.25 inch shaft



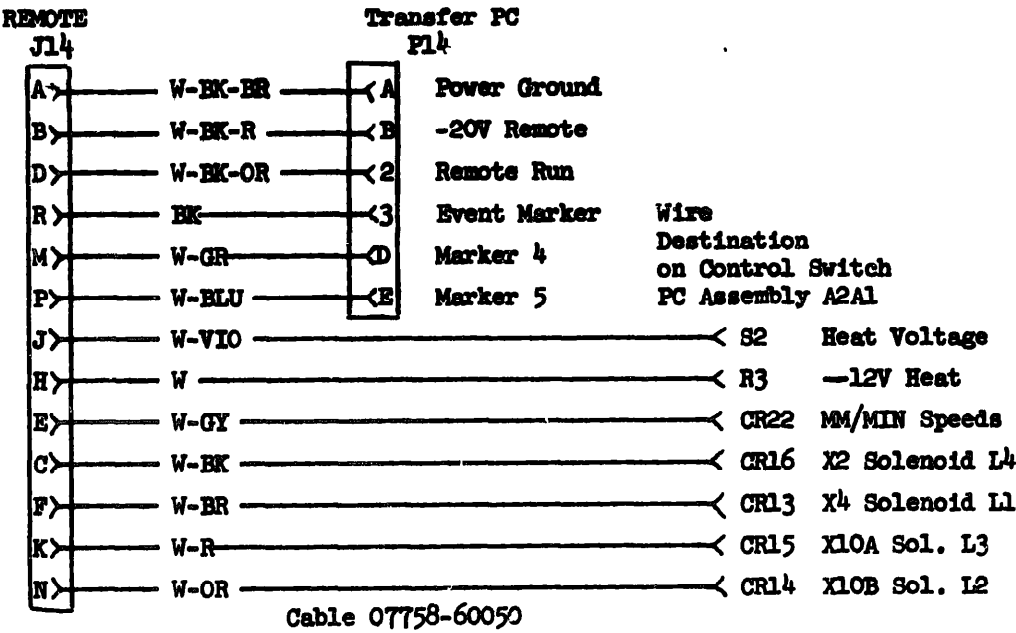


Figure 6-69 (addition). Remote Connector and Internal Cable for Model 7413A (7758A Option 006) Serial Prefix 1428A and Subsequent.

APPENDIX B
REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Military Publications: US Army Equipment Index of Modification Work Orders
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for the RD-426A(V)1/U. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

- a. Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.
- b. Test.* To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.
- d. Adjust.* To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.
- e. Align.* To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments 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.
- g. Install.* The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.
- h. Replace.* The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to 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. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) 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.

k. 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 equipments/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance.

nance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task-hours specified by 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, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C-Operator/Crew
O-Organizational
F-Direct Support
H-General Support
D-Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

C-4. Tool and Test Equipment Requirements (Sect. III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

C-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, Column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is C-3)

SECTION II. MAINTENANCE ALLOCATION CHART

FOR
OSCILLOGRAPHIC RECORDER RD-454A(V)1/U
(12-71201)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP.	(6) REMARKS
			C	O	F	H	D		
00	OSCILLOGRAPHIC RECORDER RD-454A(V)1/U	Inspect		0.2		0.3		10	
		Test						1 thru 4	
		Service				0.5		9	
		Align				0.5		1 thru 4	
		Repair					2.0	9	
		Overhaul					5.0	1 thru 9	

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
OSCILIOGRAPHIC PROCESSOR ED-426A(V)\1/U
(EP-7418A)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	H,D	MULTIMETER AM/USM-223	6625-00-999-7665	
2	H,D	OSCILLOSCOPE AM/USM-281C	6625-00-228-2201	
3	H,D	DIGITAL VOLTMETER AM/USM-64	6625-00-870-2264	
4	H,D	FUNCTION GENERATOR SO-747/U	6625-00-118-6736	
5	D	STYLUS PRESSURE TESTER, HEMLETT-PACKARD P/N 14023A		
6	D	PC BOARD SUPPORT FOR DRIVER AND REGULATOR/OSCILLATOR, HEMLETT-PACKARD P/N 07754-60900		
7	D	EXTENDER BOARD FOR AMPLIFIER, HEMLETT-PACKARD P/N 07754-60920		
8	D	EXTENDER BOARD FOR OSCILLATOR, HEMLETT-PACKARD P/N 07754-60910		
9	H,D	TOOL KIT TK-105/U	5180-00-610-8177	
10	O	TOOLS AND TEST EQUIPMENT AVAILABLE BECAUSE OF ASSIGNED MISSION.		

APPENDIX D

REPAIR PARTS AND SPECIAL TOOLS LISTS

Refer to table 6-4, Part Number-National Stock Number Cross Reference Index, for maintenance repair parts.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS



SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE
DOPE ABOUT IT ON THIS
FORM, TEAR IT OUT, FOLD
IT AND DROP IT IN THE
MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE 10 July 1975

PUBLICATION NUMBER

TM 11-5840-340-12

DATE

23 Jan 74

TITLE

Radar Set AN/SPC-76

BE EXACT... PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PAGE NO.	PARA- GRAPH	FIGURE NO.	TABL. NO.
-------------	----------------	---------------	--------------

2-25	2-28		
------	------	--	--

Recommend that the installation antenna alignment
procedure be changed throughout to specify a 2° IFF
antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag,
the antenna servo system is too sensitive to wind
gusting in excess of 40 knots, and has a tendency to
rapidly accelerate and decelerate as it hunts, causing
strain to the drive train. Hunting is minimized by
adjusting the lag to 2° without degradation of operation.

3-10	3-3		
------	-----	--	--

			3-1
--	--	--	-----

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure for the TRANS POWER
FAULT indicator calls for a 3 db (500 watts) adjust-
ment to light the TRANS POWER FAULT indicator.

5-6	5-8		
-----	-----	--	--

Add new step f.1 to read, "Replace cover plate removed
in step e.1, above."

REASON: To replace the cover plate.

			FO3
--	--	--	-----

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power
supply. + 24 VDC is the input voltage.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SSG I. M. DeSpirito 999-1776

SIGN HERE:

SSG I. M. DeSpirito

DA FORM 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND" MAKE
A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

HISA 1686-75

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PUBLICATION NUMBER

DATE _____

TITLE

BE EXACT...PIN-POINT WHERE IT IS

**IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:**

TABLE NO.	DESCRIPTION
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DATE

TITLE

BE EXACT... PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PAGE
NO.

PARA-
GRAPH

FIGURE
NO.

TABLE
NO.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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FORM, TEAR IT OUT, FOLD
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MAIL!**

DATE _____

PUBLICATION NUMBER

DATE _____

TITLE

BE EXACT. . . PIN-POINT WHERE IT IS

**IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:**

PAGE
NO.

**PARA-
GRAPH**

FIGURE NO.

TABLE
NO.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 2028-2 (TEST)
1 AUG 74

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US Army Electronics Command
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Official:

PAUL T. SMITH

*Major General, United States Army
The Adjutant General*

BERNARD W. ROGERS
*General, United States Army
Chief of Staff*

Distribution:

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TSG (1)
USAAAREND (1)
TRADOC (3)
DARCOM (1)
TECOM (2)
OS Maj Comd (2)
USACC (2)
Armies (1)
Instl (1) except
Ft Gillem (10)
Ft Huachuca (5)

AERNG & USAR: None

For explanation of abbreviations used, see AR 310-50.

Ft Carson (5)
SAAD (30)
TOAC (14)
LEAD (10)
SHAD (3)
HISA (Ft Monmouth) (33)
Ft Richardson (ECON Off) (1)
Sve Colleges (1)
USAERDAA (1)
USAERDAW (1)
Sig FLDMS (1)

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