

**TM 5-6675-319-14**

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**TECHNICAL MANUAL**

**OPERATOR'S, ORGANIZATIONAL, DIRECT  
SUPPORT AND GENERAL SUPPORT  
MAINTENANCE MANUAL**

**TOPOGRAPHIC SUPPORT SYSTEM  
RECTIFIER I SECTION  
MODEL ADC-TSS-8  
NSN: 6675-01-105-5758**

**THIS MANUAL SUPERSEDES TM 5-6675-319-14 DATED 20 JUNE 1983**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**3 SEPTEMBER 1985**



CHANGE

NO. 4

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Operator's, Organizational, Direct Support and  
General Support Maintenance Manual

**TOPOGRAPHIC SUPPORT SYSTEM  
RECTIFIER I SECTION, MODEL ADC-TSS-8  
NSN: 6675-01-105-5758**

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Operator, Organizational, Direct Support and  
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TOPOGRAPHIC SUPPORT SYSTEM  
RECTIFIER 1 SECTION  
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MODEL ADC-TSS-8  
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HEADQUARTERS  
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Operator's, Organizational, Direct  
Support and General Support  
Maintenance Manual

TOPOGRAPHIC SUPPORT SYSTEM  
RECTIFIER 1 SECTION  
MODEL ADC-TSS-8  
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E-1 through E-7/E-8

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**WARNING**

HIGH VOLTAGE is used in this equipment. DEATH ON CONTACT or severe injury may result if personnel fail to observe safety precautions.

Do not be misled by the term LOW VOLTAGE. Low voltage can cause serious injury or death.

Test procedures requiring the operator or maintenance personnel to investigate equipment or restore casualties with interlocks disconnected or covers removed may result in DEATH ON CONTACT if personnel fail to observe safety precautions.

Voltages in switches and circuit breaker panels may result in DEATH ON CONTACT if personnel fail to observe safety precautions.

Failure to ground the section or equipment may result in DEATH ON CONTACT if personnel fail to observe safety procedures.

For Artificial Respiration refer to FM 21-11.

**WARNING**

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent-impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).

**WARNING**

Fumes and chemicals used may result in DEATH or BLINDNESS if personnel do not operate equipment with proper ventilation.

Chemicals used in reproduction and photographic processes may result in BLINDNESS if personnel do not use eye protection when required.

**WARNING**

Rotating and spinning equipment may snag loose clothing, hair or jewelry resulting in SEVERE PERSONNEL INJURY.

**WARNING**

Attempting to move overweight or top heavy equipment that is unsecured may result in SEVERE PERSONNEL INJURY. Always have sufficient personnel and equipment to accomplish the task.



Operator's, Organizational, Direct Support and  
General Support Maintenance Manual

TOPOGRAPHIC SUPPORT SYSTEM  
RECTIFIER I SECTION, MODEL ADC-TSS-8  
NSN: 6675-01-105-5758

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MMTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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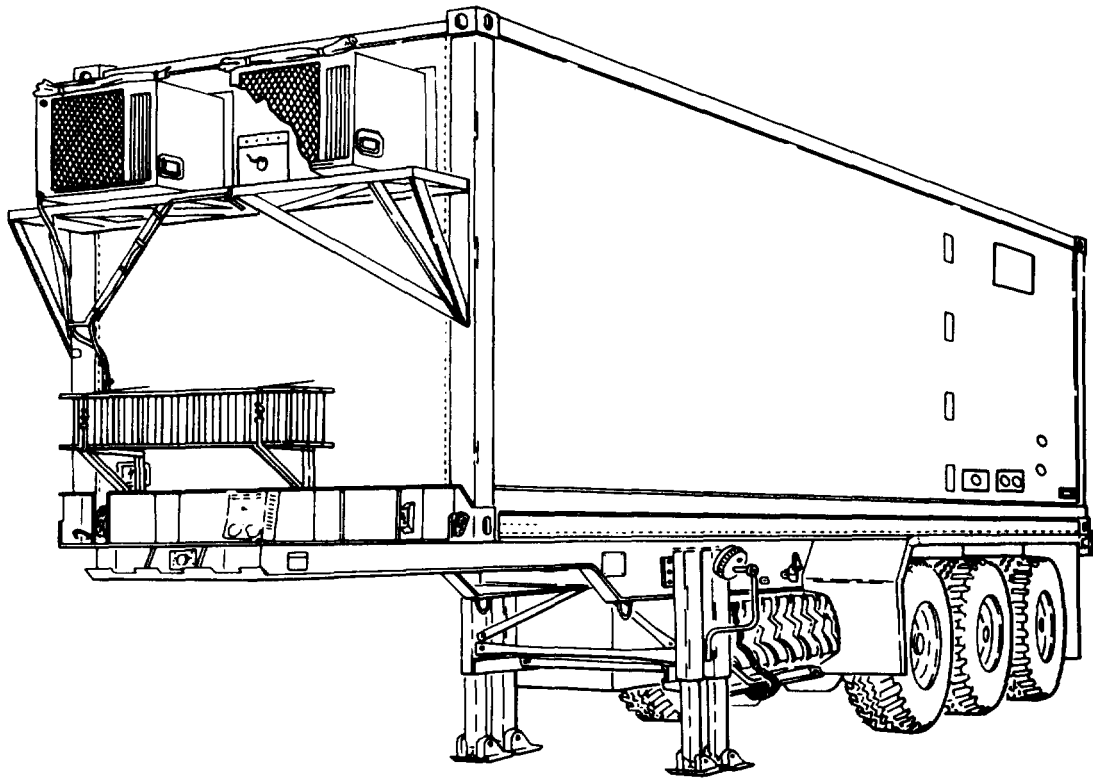
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## CHAPTER 1

## RECTIFIER I SECTION

## Section I INTRODUCTION

**1-1. GENERAL INFORMATION.**

1-1.1 Scope. This manual contains operating and maintenance instructions for the ADC-TSS-08, Rectifier I Section, Topographic Support System (TSS). The purpose of the Rectifier I Section is to produce both rectified and unrectified prints and films. The trailer chassis is covered in TM 5-2330-305-14, Operator, Organizational, Direct Support and General Support Maintenance Manual, Topographic Support System, Chassis, Semitrailer, ISO Container Transporter. Repair parts and special tools are listed in TM 5-6675-319-24P, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List, Rectifier I Section, Topographic Support System. Lubrication instructions are contained in LO 5-6675-319-12, Lubrication Order, Rectifier I Section, Topographic Support System. All authorized equipment, supplies, and their locations for transport are shown in Location and Description of Major Components of this manual.

1-1.2 Purpose of Equipment. To provide a transportable facility for producing rectified and unrectified prints and films from roll or sheet film images and for processing exposed film for use in the TSS.

1-1.3 Maintenance Forms and Records. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, the Army Maintenance Management System (TAMMS).

1-1.4 Report Equipment Improvements (EIR's). If the Rectifier I Section needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: U.S. Army Troop Support Command, ATTN: AMSTR-MOF, 4300 Goodfellow Blvd., St. Louis, MO 63120. We will send you a reply.

1-1.5 Destruction of Material to Prevent Enemy Use. For information on destruction of material to prevent enemy use, refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

1-1.6 Preparation for Storage or Shipment.

- a. Perform your preparation for movement procedures.
- b. For administrative storage of equipment, refer to TM 740-90-1.
- c. The chapters of this manual describe special shipping instructions for major components located in this section.
- d. In the event this equipment must be removed from the section for repair or replacement, contact your battalion for packing and shipping instructions.

**1-2. EQUIPMENT DESCRIPTION.**

1-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Air and sea transportable.
- b. Transportable cross-country capability when mounted on trailer chassis.
- c. Controlled internal environment.

1-2.2 Special Considerations.

a. Site must permit section to be leveled within  $\pm 2^\circ$ , be well drained, and provide adequate overhead concealment. Wooded areas and other obstacles must not impede movement of transporters.

b. Dispersal of topographic sections is limited to the length of electric power transmission cable available for unit generators.

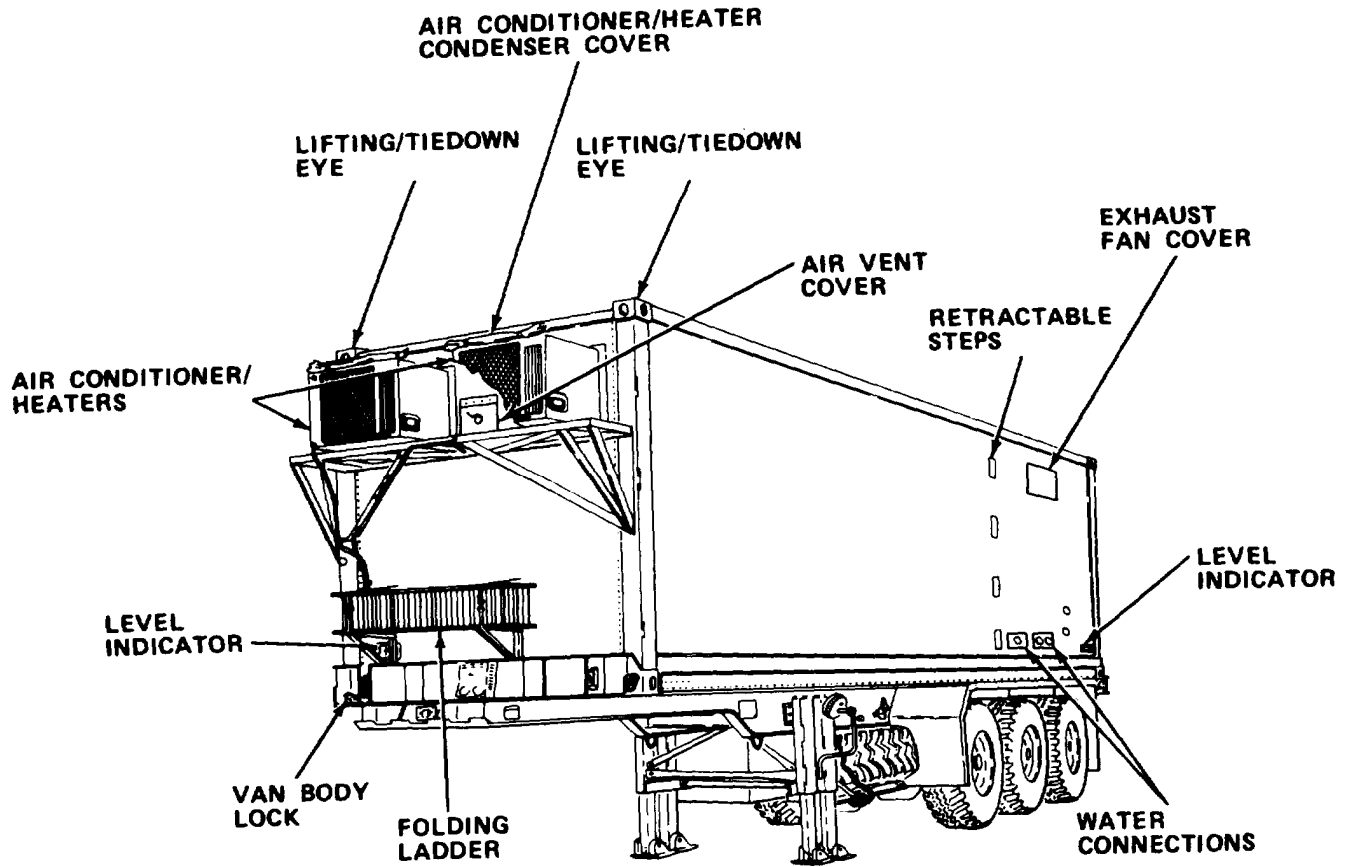
c. During site selection, avoid overhead power transmission lines to prevent danger from electric shock or electromagnetic interference.

d. Power is normally supplied by 60 kW generators. Commercial electric power should be used if it is compatible and available.

e. Cross-country capability of sections and transporters is limited. Relocation should be accomplished over hard-surfaced, all-weather roads whenever possible.

1-2.3 Location and Description of Major Components.

a. Roadside Exterior.



**VAN BODY LOCK.** Locks van body to trailer chassis.

**AIR CONDITIONERS/HEATERS.** Two air conditioner/heater units for internal environmental control.

**LIFTING/TIEDOWN EYES.** Attachment point for lifting or tying down van body.

**AIR CONDITIONER/HEATER CONDENSER COVER.** Covers air conditioner/heater condenser to prevent water/air entering air conditioner/heater unit when in transport or storage.

**AIR VENT COVER.** Covers air vent opening.

**RETRACTABLE STEPS.** Provide access to roof.

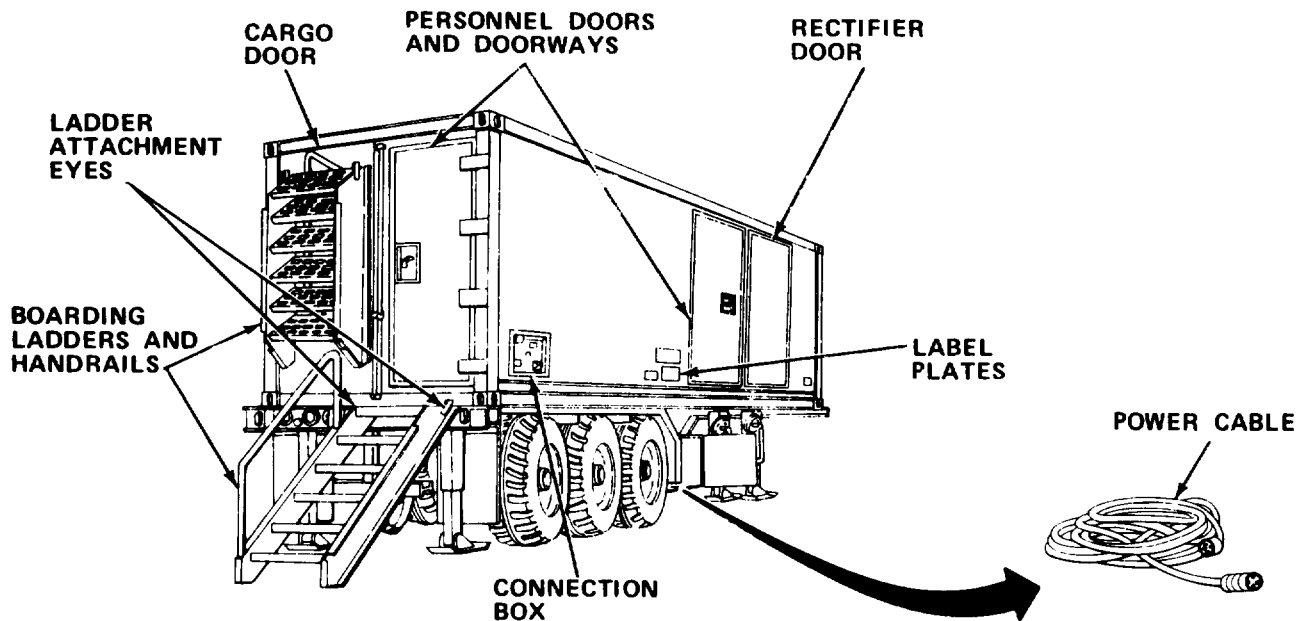
**EXHAUST FAN COVER.** Covers exhaust fan opening.

**LEVEL INDICATORS.** Indicate van body inclination.

**WATER CONNECTIONS.** Connections to fill or drain the recycling tank and storage tank.

**FOLDING LADDER.** Allows access to air conditioners and top of van.

b. Curbside Exterior.



**CARGO DOOR.** Access for equipment removal/installation.

**PERSONNEL DOORS.**

(1) Rear personnel door is 35.75 in. (90.8 cm) wide by 86 in. (218.4 cm) high.

(2) Side personnel door is 32.75 in. (83.2 cm) wide by 73.5 in. (186.7 cm) high.

PERSONNEL DOORWAYS.

(1) Rear personnel doorway is 32 in. (81.3 cm) wide by 78 in. (198 cm) high.

(2) Side personnel doorway is 31.75 in. (80.7 cm) wide by 69.5 in. (176.5 cm) high.

RECTIFIER DOOR. Access for remove/install maintenance functions for photogrammetric rectifier.

LABEL PLATES. Provide weight/moment data.

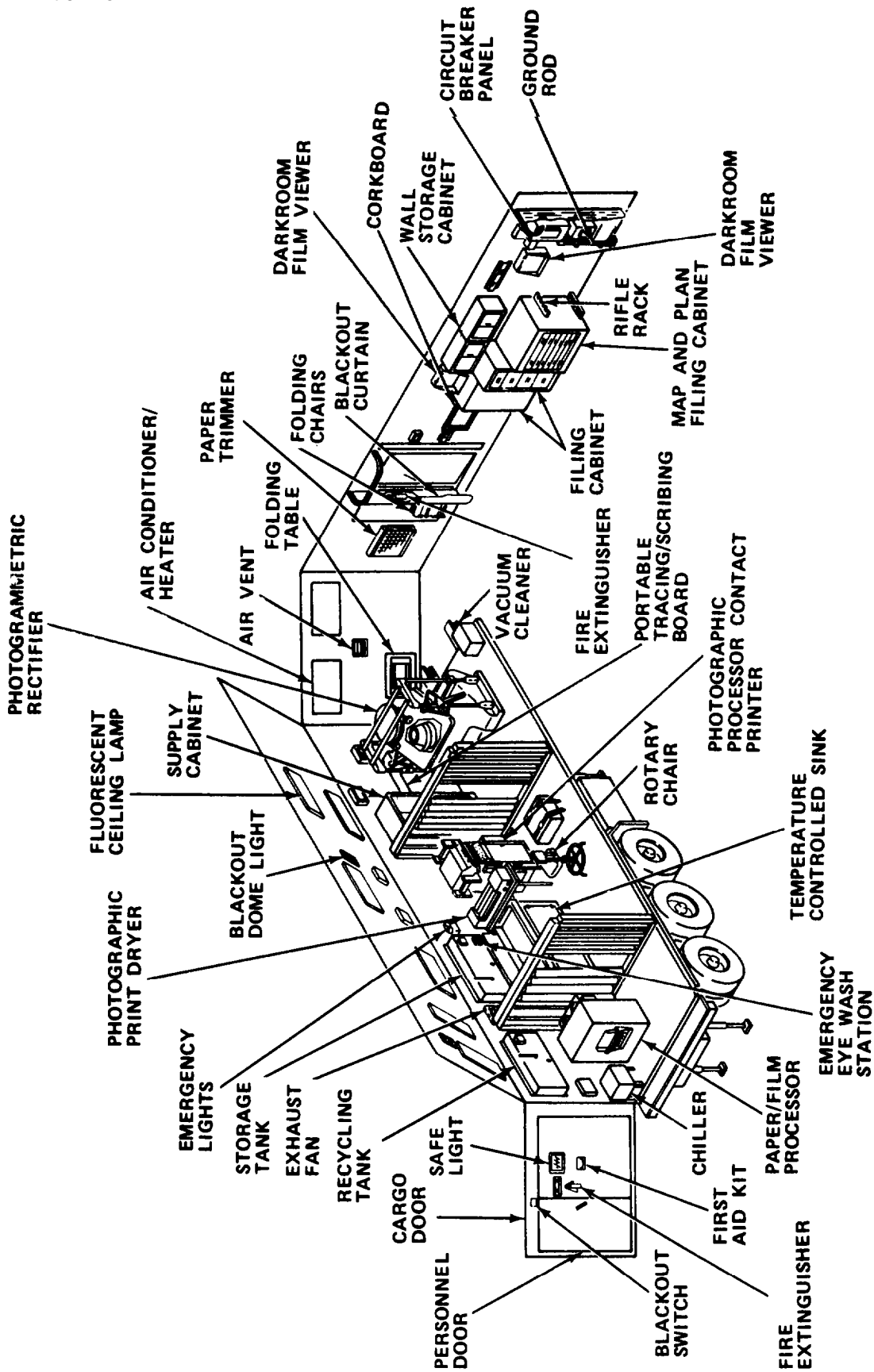
POWER CABLE. Power cable is in 50 ft (15.2 m) sections. (Stored in trailer chassis storage box.)

CONNECTION BOX. Contains terminals for ground cable, power cables, and telephone lines.

LADDER ATTACHMENT EYES. Attachment points for boarding ladders.

BOARDING LADDERS AND HANDRAILS. Provide access to section.

c. Interior





PERSONNEL DOOR. Weatherproof, fitted with blackout switch.

BLACKOUT SWITCH. Turns ceiling lights off when activated.

CARGO DOOR. Access for equipment removal/installation.

SAFELIGHT. Used when processing film to protect undeveloped film.

RECYCLING TANK. Reservoir for recirculating filtered liquids from film/paper processor. Liquid is warmed by immersion heater.

EXHAUST FAN. Provides ventilation. Fitted with lightproof louvers and weatherproof cover.

STORAGE TANK. Water supply for film/paper processor and processor sink.

EMERGENCY LIGHTS. Battery-powered lighting actuated by power failure.

PHOTOGRAPHIC PRINT DRIER. Dries wet photographic prints.

BLACKOUT DOME LIGHT. Red-lensed, white-lensed 12 V ac light actuated when blackout switch operates, or from external power.

FLUORESCENT CEILING LAMP. White, two-level (high/low) overhead light.

SUPPLY CABINET. Storage.

PHOTOGRAMMETRIC RECTIFIER. Rectifies aerial photographs to compensate for camera tilt or earth curvature.

AIR CONDITIONER/HEATER. Internal environmental control.

AIR VENT. Permits filtered make-up air to enter section.

FOLDING TABLE. Auxiliary work space.

PAPER TRIMMER. Trims sheet paper.

FOLDING CHAIRS. Storage for transport.

BLACKOUT CURTAIN. Lightproof cover for personnel door.

DARKROOM FILM VIEWER. Used to view exposed and processed negatives.

CORKBOARD. Vertical display board.

FILING CABINET. Storage.

WALL STORAGE CABINET. Storage.

CIRCUIT BREAKER PANEL. Circuit breakers with phase test indicator.

SAFETY SWITCH. Main power safety disconnect switch.

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GROUND ROD. Electrical ground for section.

RIFLE RACK. Weapon storage.

MAP AND PLAN FILING CABINET. Storage for maps/topographic products.

VACUUM CLEANER. Storage for transport.

PORTABLE TRACING/SCRIBING BOARD. Illuminated board for tracing/scribing.

PHOTOGRAPHIC PROCESSOR CONTACT PRINTER. Electronic optical printer/enlarger.

ROTARY CHAIR. Seating.

TEMPERATURE CONTROLLED SINK. Chemical-mixing, film-developing work station.

EMERGENCY EYEWASH STATION. Equipment to irrigate eyes if chemicals are splashed in them.

FILM/PAPER PROCESSOR. Processes (develops) paper.

CHILLER. Conditions (cools) water for film/paper processor.

FIRST AID KIT. Limited first aid supplies.

FIRE EXTINGUISHER. Dry chemical fire extinguisher.

1-2.4 Equipment Data - ISO Container (Unmounted).

Dimensions

|        |   |
|--------|---|
| Length | 31.75 ft (9.68m)                            |
| Width  | 8 ft (2.44m)                                |
| Height | 8 ft (2.44m)                                |
| Cubage | 2038 ft <sup>3</sup> (57.7 m <sup>3</sup> ) |

Connections

|            |  |
|------------|--|
| Telephones | One telephone (three-post) connection  |
| Power      | 22.1 kW. One 120/208 V, three-phase, four-wire connection and one 12 V dc connection |
| Ground     | Ground lug   |

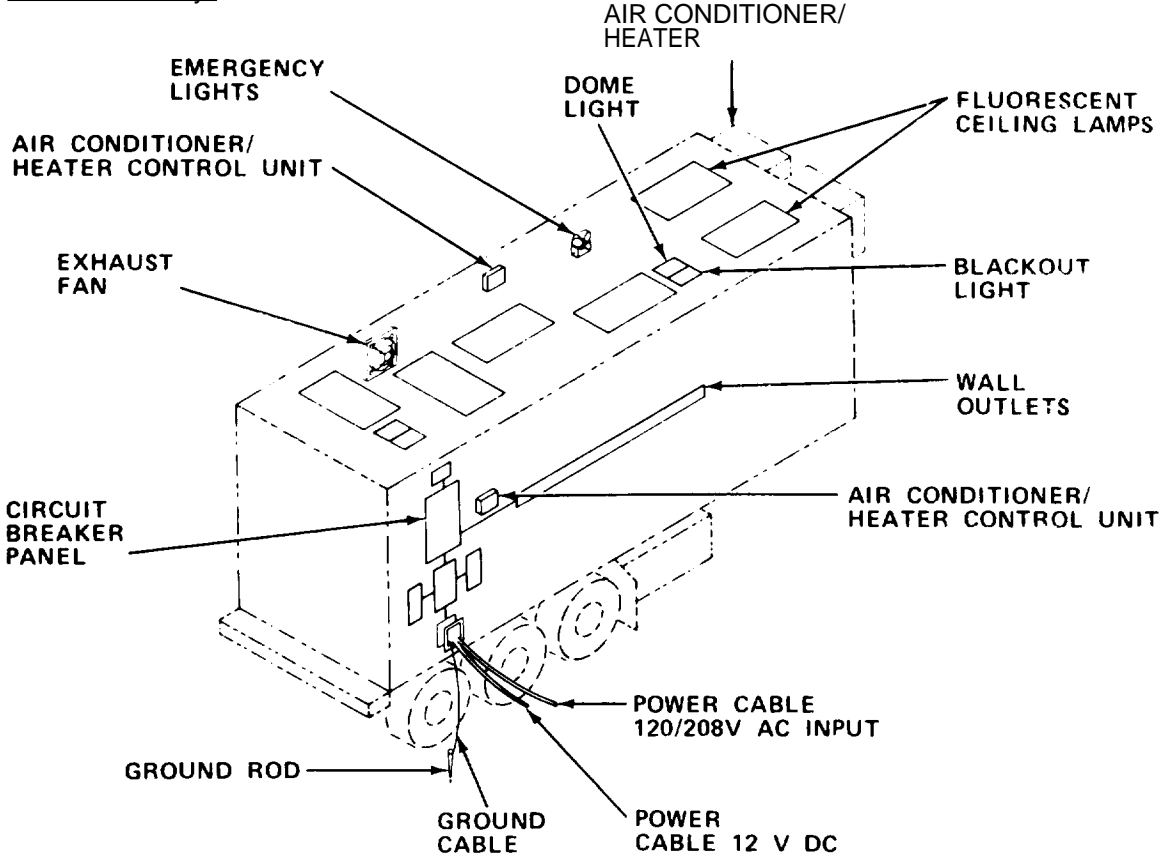
Air Conditioner/Heater (Two Units)

|                               |   |
|-------------------------------|---|
| Cooling                       | 18,000 Btu/hr (5274 W)<br>each                      |
| Heating                       | 14,300 Btu/hr (4190 W)<br>(Max) each                |
| Power Requirements            | 208 V, 60 Hz, three-phase                           |
| Exhaust Fan                   | 289 ft <sup>3</sup> /min (8.18 m <sup>3</sup> /min) |
| Air Vent                      | 289 ft <sup>3</sup> /min (8.18 m <sup>3</sup> /min) |
| Weight                        |   |
| Gross (Container and Chassis) | 27,090 lbs (12,285.32 kg)                           |
| Tare (Container Only)         | 15,650 lbs (7097.28 kg)                             |

1-3. TECHNICAL PRINCIPLES OF OPERATION.

1-3.1 General. The operation of major components located within the section are explained in the appropriate chapter for that equipment.

1-3.2 Electrical System.



**TM 5-5675-319-14**

GROUND ROD. Used to ground section.

GROUND CABLE. Used with ground rod.

CIRCUIT BREAKER PANEL. Contains voltage indicator, phase monitor, and circuit breakers.

WALL OUTLETS. Provide grounded outlets for portable or plug-in equipment.

DOME LIGHTS. White-lensed, 12 V dc lights powered from external source. Separately switched and fused.

EXHAUST FAN. Plug-in fan, Separately fused.

FLUORESCENT CEILING LAMPS, Two-level (high/low) overhead lights with blackout override switches.

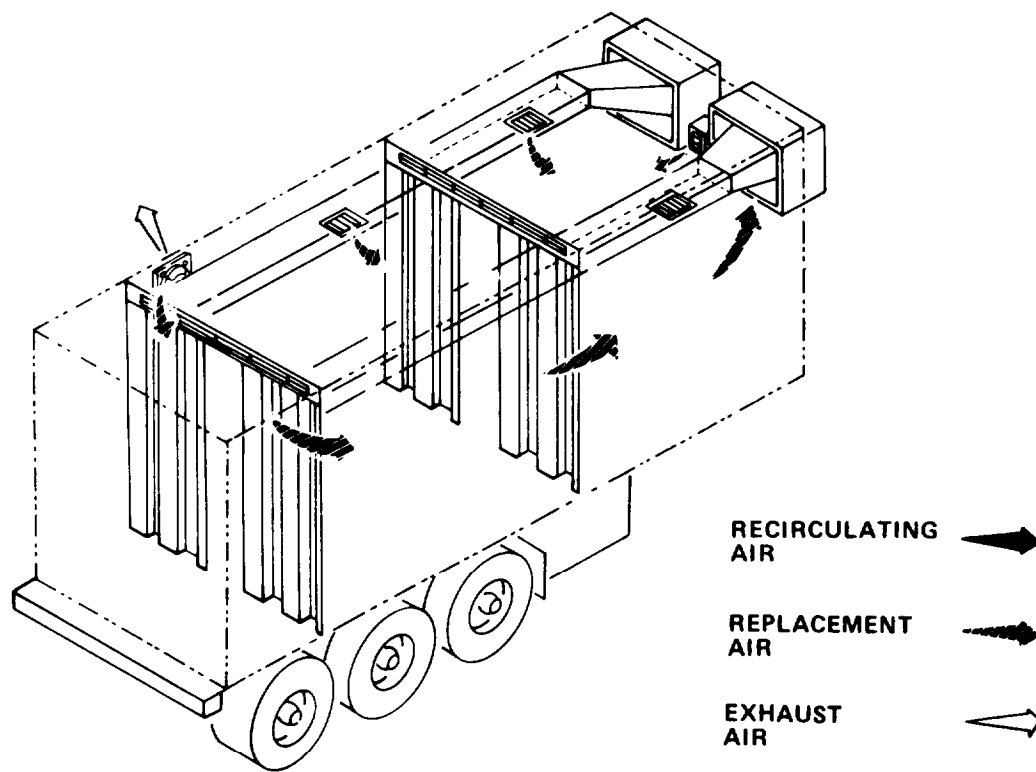
EMERGENCY LIGHTS. Battery powered. Activated by power loss.

AIR CONDITIONER/HEATER. Air conditioner and electrical heater powered by three-phase, 208 V, 30 amp current.

BLACKOUT LIGHTS. Red-lensed, 12 V ac lights actuated when blackout switch operates.

POWER CABLES. Power input (120/208 V ac and 12 V dc).

1-3.3 Wiring Diagram. A foldout wiring diagram is provided at the end of this manual.

1-3.4 Ventilation System.

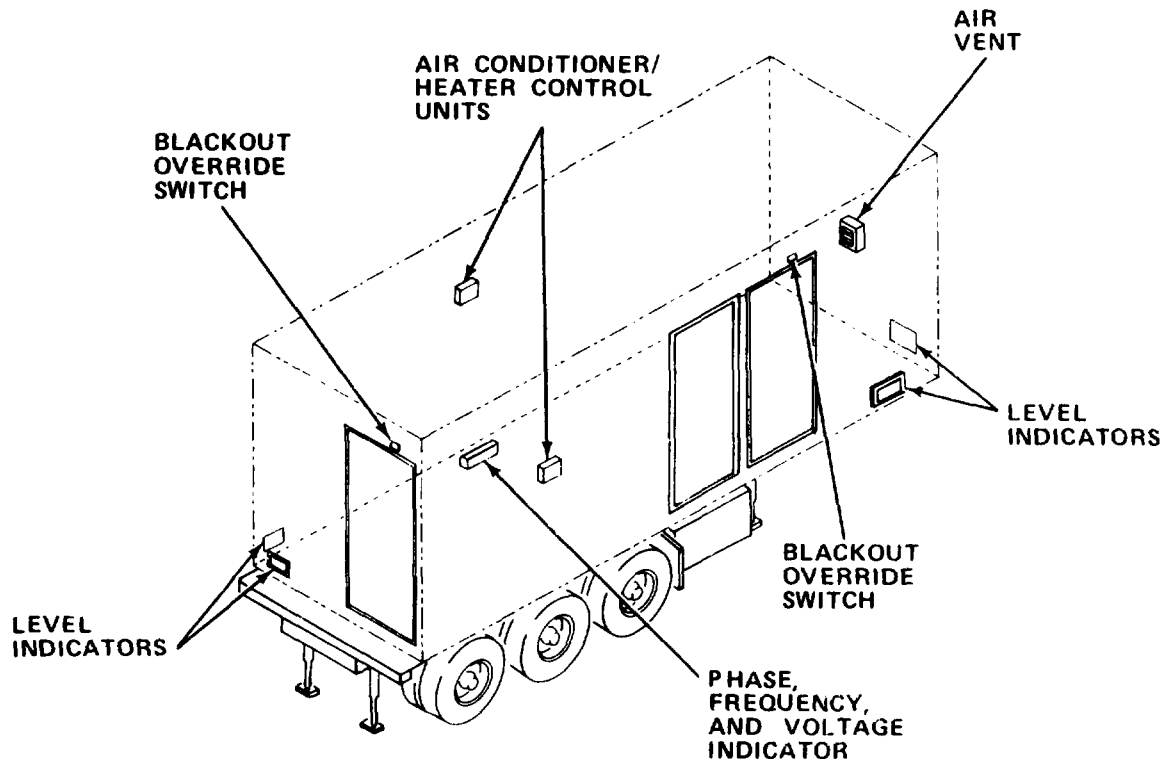
Exhaust fan exhausts air. Replacement air flows into the section through the air vent filter. Recirculating air is filtered as it enters the air conditioners/heaters. From the air conditioners/heaters, it flows through the ceiling vents and into the section.

**NOTE**

Detailed description of air conditioner/heater operation is contained in TM 5-4120-367-14, Operator, Organizational, Direct Support, and General Support Maintenance Manual, Air Conditioner, Horizontal, Compact, 18,000 Btu/hr Cooling, and TM 5-4120-367-24P, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair) for Air Conditioner, Horizontal, Compact, 18,000 Btu/hr (5274W).

Section II OPERATING INSTRUCTIONS

1-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



Control or Indicator

Function

Blackout Override Switches

Turn off illumination when doors are opened.

Air Vent

Permits make-up air to enter as required.

Air Conditioner/Heater Control Unit

Permits selection of air conditioner or heater mode of operation and temperature.

Phase, Frequency, and Voltage Indicator

Monitors electrical power, phase, frequency, and voltage.

Level Indicators

Used to level van body.

**1-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

**1-5.1 PMCS Procedures.**

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Leakage definitions for operator PMCS shall be classified as follows:
  - (1) Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
  - (2) Class II Leakage of fluid great enough to form drops but not enough to cause drops to drip from the item being checked/inspected.
  - (3) Class 111 Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

**CAUTION**

- Equipment operation is allowable with minor leakage (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.
- When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.
- Class III leaks should be reported to your supervisor or organizational maintenance.

g. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

h. Interval columns. This column determines the time period designated to perform your PMCS.

i. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

j. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

k. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                                    | <u>Quantity</u> |
|--|-----------------|
| Wire Brush                                     | 1 ea            |
| 6 in. Adjustable Wrench                        | 1 ea            |
| Flat Tip Screwdriver                           | 1 ea            |
| Vacuum Cleaner                                 | 1 ea            |
| Cheesecloth (Item 7, Appendix E)               | ar              |
| General Purpose Detergent (Item 8, Appendix E) | ar              |
| ■ Paint (Items 22, 22A and 22B Appendix E)     | ar              |
| Paint Brushes                                  | ar              |



Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

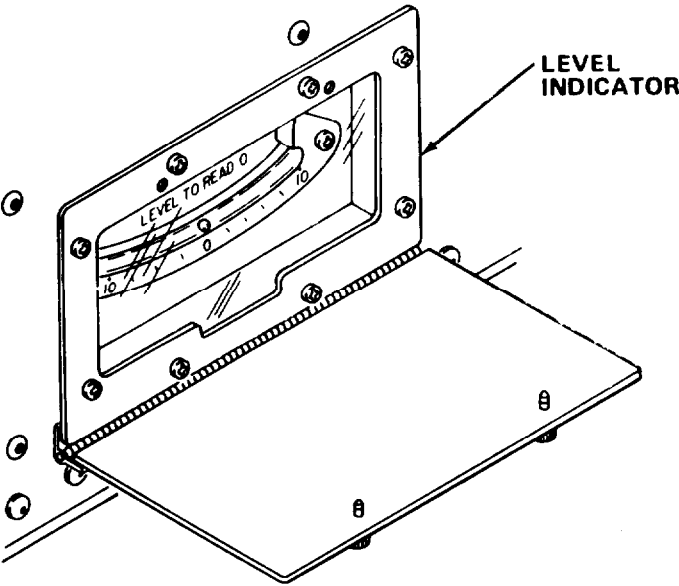
|          |          | B - Before<br>D - During<br>A - After   | W - Weekly<br>M - Monthly<br>(Q - Quarterly) | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours   |  |
|----------|----------|---|--|--|--|--|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED  |  |  | PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
| 1        | B/W      | <u>VAN BODY</u>   |  |  | <p>Inspect Exterior.</p> <p>1. Inspect surfaces for punctures, cracks, or open seams that could permit moisture to enter wall.</p> | <p>Punctures, cracks, or open seams are present.</p>           |
|          |          |  |  |  |  |  |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKSAND SERVICES - Cont

B - Before  
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(Number) - Hundreds of Hours

| ITEM NO. | IN-TER. VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|-------------|---|--|
| 1        |             | <p><b><u>VAN BODY - Cont</u></b></p> <p><u>Inspect Exterior - Cont</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p style="text-align: center;">To prevent death or serious injury, do not handle or clean power cable or connectors when cable is connected to power source.</p> <p>B 3. Inspect power cable assembly for dirt or damaged connectors.</p> <p style="padding-left: 20px;">a. Wipe cable insulation with clean, dry cloth to remove dirt.</p> <p style="padding-left: 20px;">b. Clean corrosion from terminals.</p> | Connector damaged.   |
| 2        |             | <p>B/W 4. Inspect power entry panel for accumulated dirt, water, or corrosion.</p> <p style="padding-left: 40px;">Clean power entry panel.</p> <p>B/W 5. Inspect power entry panel to be sure any unused receptacles are covered.</p>   | Missing covers.  |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|---|---|
| 1        |          | <p>VAN BODY - Cont</p> <p>Inspect Exterior - Cont</p> <div> </div> <p>B/W</p> <p>6. Inspect air conditioner/heater drain tube to be sure tube is positioned as shown. Check for breaks and crimps in hose and check connections for damage or leakage.</p> |   |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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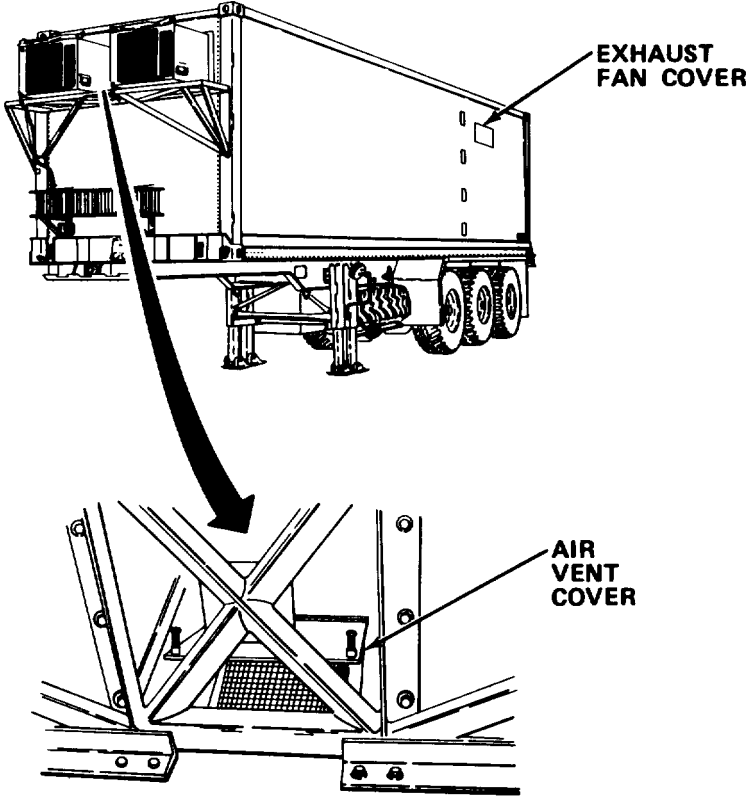
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 1        | B/W      | <p><b>VAN BODY - Cont</b></p> <p><u>Inspect Exterior - Cont</u></p>  <p>7. Inspect exhaust fan and air vent covers to be sure they are not blocked or clogged. Clean as required. Clean screen with vacuum cleaner as necessary.</p> |  |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

|          |                                  | B - Before<br>D During<br>A After | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially  | (Number) - Hundreds of Hours   |  |
|----------|----------------------------------|-----------------------------------|--|---|--|--|
| ITEM NO. | INTER-VAL                        | ITEM TO BE INSPECTED              |  |   | PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
| 1        |                                  | <b><u>VAN BODY - Cont</u></b>     |  |   |  |  |
|          | B/W                              | <u>Inspect Exterior - Cont</u>    |  |   | <p>8. Visually inspect ground connections to be sure ground cable is connected to terminal lug and ground rod. If necessary, clean.</p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Electrical shock hazard. Power cable must be de-energized before servicing entry panel connections. Death can result from failure to observe these safety precautions.</p> <ol style="list-style-type: none"> <li>a. Turn power off to cable. Disconnect from power source.</li> <li>b. Disconnect ground lug from ground rod.</li> <li>c. Clean lug, cable end, and rod with wire brush.</li> <li>d. Reconnect ground cable lug to rod.</li> <li>e. Disconnect ground cable end from entry panel.</li> <li>f. Clean terminal and cable end with wire brush.</li> <li>g. Reconnect ground cable to entry panel.</li> <li>h. Reconnect cable to power source. Turn power on.</li> </ol> | Ground connections are broken or missing.                      |
| B        | 9. Inspect boarding ladders for: |                                   |  | <ol style="list-style-type: none"> <li>a. Secure attachment of handrails.</li> <li>b. Steps not broken.</li> <li>c. Locking pins in place.</li> </ol> | Steps are broken or will not lock in place.  |  |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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| ITEM NO.               | INTERVAL                       | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|------------------------|--------------------------------|--|---|
| <u>VAN BODY - Cont</u> |                                |  |   |
| 1                      | <u>Inspect Exterior - Cont</u> |  |   |
|                        | B/D/A                          | 10. Inspect front and rear van body locks to be sure locks are fully engaged.  | Lock dis-engaged.   |
|                        | Q                              | 11. Inspect gaskets on personnel doors for leaks or damage.  |   |
|                        | W                              | 11.1 Inspect hinges for proper placement of hinge pins.  | Missing hinge pins.   |
|                        | Q                              | 12. Clean and paint blistered, pitted, or flaking areas and bare metal spots in accordance with instructions contained in TM 43-0139, Painting Instructions for Field Use. |   |
| 2                      | <u>Inspect Interior.</u>       |  |   |
|                        | B/D                            | 1. Test emergency lights by pressing test button.  | Emergency lights do not light.                                |
|                        | W                              | 2. Inspect power cords and cables to be sure wires are not kinked, cut, or cracked.  | Wires or cables are cracked or cut.                           |
|                        | W                              | 3. Inspect plug connectors to be sure all plug connectors are tight and firmly seated. Tighten if necessary.   |   |
|                        | D                              | 4. Inspect for burned out light bulbs and fluorescent lamps. Replace as required.  |   |
|                        | W                              | 5. Inspect walls, ceiling, and floor for holes, open seams, or signs of seepage or leaks.  | Leaks are present.  |
|                        | D                              | 6. Check storage cabinets for broken hinges, latches, and locks.   | Hinge, latch, or lock is broken.                              |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent

|          |          | B - Before<br>D - During<br>A - After   | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours                                   |
|----------|----------|---|--|--|--|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |  |  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
| 1        | B/W      | <b><u>VAN BODY - Cont</u></b>   |  |  |  |
|          |          | <u>Inspect Exterior - Cont-</u>   |  |  |  |
|          |          | <p>8. Visually inspect ground connections to be sure ground cable is connected to terminal lug and ground rod. If necessary, clean.</p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Electrical shock hazard. Power cable must be de-energized before servicing entry panel connections. Death can result from failure to observe these safety precautions.</p> <p>a. Turn power off to cable. Disconnect from power source.</p> <p>b. Disconnect ground lug from ground rod.</p> <p>c. Clean lug, cable end, and rod with wire brush.</p> <p>d. Reconnect ground cable lug to rod.</p> <p>e. Disconnect ground cable end from entry panel.</p> <p>f. Clean terminal and cable end with wire brush.</p> <p>g. Reconnect ground cable to entry panel.</p> <p>h. Reconnect cable to power source. Turn power on.</p> |  |  | Ground connections are broken or missing.                      |
|          | B        | <p>9. Inspect boarding ladders for:</p> <p>a. Secure attachment of handrails.</p> <p>b. Steps not broken.</p> <p>c. Locking pins in place.</p>  |  |  | Steps are broken or will not lock in place.                    |

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If:   |
|----------|----------|---|---|
| 1        | B/D/A    | <p><b><u>VAN BODY - Cont</u></b></p> <p><u>Inspect Exterior - Cont</u></p> <p>10. Inspect front and rear van body locks to be sure locks are fully engaged.</p> <p>Q 11. Inspect gaskets on personnel doors for leaks or damage.</p> <p>Q 12. Clean and paint blistered, pitted, or flaking areas and bare metal spots in accordance with instructions contained in TM 43-0139, Painting Instructions for Field Use.</p>  | Lock disengaged.  |
| 2        | B/D      | <p><u>Inspect Interior.</u></p> <p>1. Test emergency lights by pressing test button.</p> <p>W 2. Inspect power cords and cables to be sure wires are-not kinked, cut, or cracked.</p> <p>W 3. Inspect plug connectors to be sure all plug connectors are tight and firmly seated. Tighten if necessary.</p> <p>D 4. Inspect for burned out light bulbs and fluorescent lamps. Replace as required.</p> <p>W 5. Inspect walls, ceiling, and floor for holes, open seams, or signs of seepage or leaks.</p> <p>D 6. Check storage cabinets for broken hinges, latches, and locks.</p> | <p>Emergency lights do not light.</p> <p>Wires or cables are cracked or cut .</p> <p>Leaks are present.</p> <p>Hinge, latch, or lock is broken.</p> |



Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

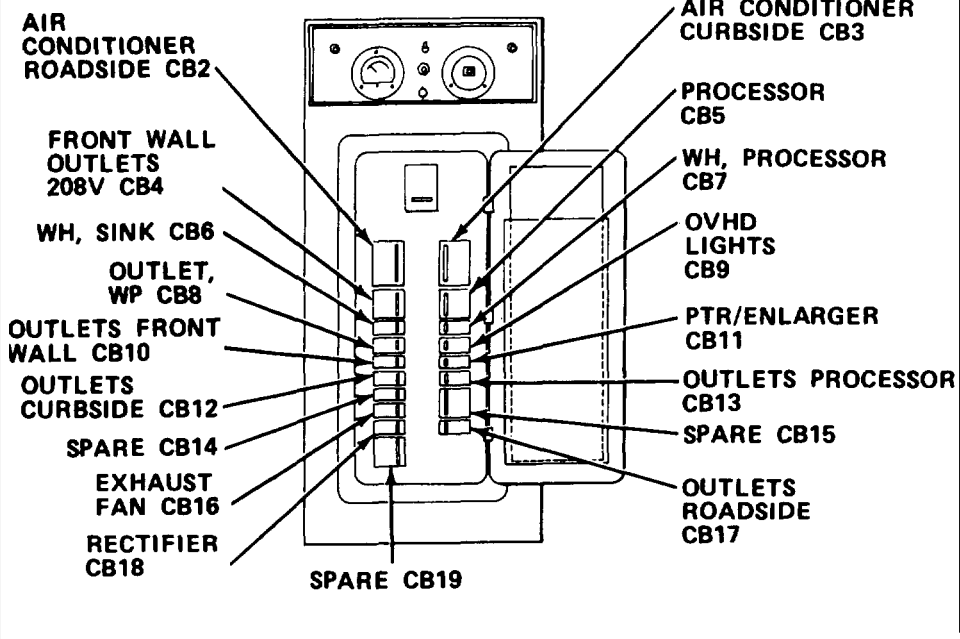
| ITEM NO.  | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE                                     | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|---|--|
| <b>VAN BODY - Cont</b>  |          |   |  |
| 2   |          | <b>Inspect Interior - Cont</b>  |  |
|   | B/M/A    | 7. Inspect fire extinguishers. Be sure security seals are not broken. | Fire extinguisher is missing or seals are broken.              |
|   | Q        | 8. Inspect circuit breaker panel.                                     | Circuit breaker is defective.                                  |
| <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Inspection is to be conducted on a not-to-interfere basis with work being conducted. Individual equipment will be inspected as directed by the appropriate chapter of this manual.</p>  |          |   |  |
|  <p>The diagram shows a vertical circuit breaker panel with 19 individual breakers. Each breaker is labeled with a specific piece of equipment it controls. The labels are as follows:</p> <ul style="list-style-type: none"> <li>AIR CONDITIONER ROADSIDE CB2</li> <li>FRONT WALL OUTLETS 208V CB4</li> <li>WH, SINK CB6</li> <li>OUTLET, WP CB8</li> <li>OUTLETS FRONT WALL CB10</li> <li>OUTLETS CURBSIDE CB12</li> <li>SPARE CB14</li> <li>EXHAUST FAN CB16</li> <li>RECTIFIER CB18</li> <li>SPARE CB19</li> <li>AIR CONDITIONER CURBSIDE CB3</li> <li>PROCESSOR CB5</li> <li>WH, PROCESSOR CB7</li> <li>OVHD LIGHTS CB9</li> <li>PTR/ENLARGER CB11</li> <li>OUTLETS PROCESSOR CB13</li> <li>SPARE CB15</li> <li>OUTLETS ROADSIDE CB17</li> </ul> |          |   |  |



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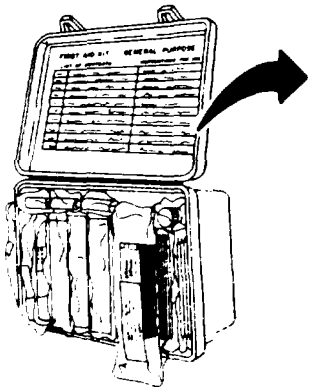
| ITEM NO.  | INTERVAL  | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
|---|---|---|--|----------------------|---|--|----------------------------------|------------------------|---|---|---|---------------|---|---|---|------------|--|--------------------------------------|-----------------------------------|----------------------------------|--------------------------------------|--------------------------------|---|--|-----------------------------|---|---|--|--|
| 2   |   | <p><b>VAN BODY - Cont</b></p> <p><u>Inspect Interior - Cont</u></p> <p>a. Wipe vertical and horizontal painted surfaces with cleaning cloth moistened with solution of general purpose detergent and fresh water until soil is removed from painted surfaces.</p> <p>b. Dry vertical and horizontal painted surfaces with clean cloth.</p> <p>c. Vacuum interior of section to remove dirt and waste. Pay particular attention to work stations.</p> <p>S 11. Inspect first aid kit.</p> <div style="display: flex; align-items: center; margin-top: 20px;">  <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>FIRST AID KIT, GENERAL PURPOSE</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">LIST OF CONTENTS</th> <th style="width: 50%;">INSTRUCTIONS FOR USE</th> </tr> </thead> <tbody> <tr> <td>1 ROLL ADHESIVE TAPE SURGICAL 1" X 1/2" YARDS</td> <td>USE FOR MINOR CUTS AND CLOTHING REPAIR</td> </tr> <tr> <td>10 EACH BANDAID ADHESIVE 3" X 7"</td> <td>MINOR CUTS AS REQUIRED</td> </tr> <tr> <td>2 EACH BANDAID GAUZE COMPRESSED CAMOUFLAGED 7" X 6" YARDS</td> <td>CUT IN LENGTHS AS REQUIRED FOR BANDAID WOUNDS</td> </tr> <tr> <td>1 EACH BANDAID MUSLIN COMPRESSED CAMOUFLAGED FOLDED 10" X 10"</td> <td>USE FOR SLUGS</td> </tr> <tr> <td>1 PEG BLADE SURGICAL PREPARATION RAZOR STRAIGHT</td> <td>SHAVING HAIR AND OPENING WOUNDS AS REQUIRED</td> </tr> <tr> <td>1 PEG COMPRESS AND BANDAID CAMOUFLAGED 2" X 2" X 1/4"</td> <td>FOR WOUNDS</td> </tr> <tr> <td>1 EACH COMPRESS FIRST AID FIELD 4 1/2" X 10"</td> <td>FOR LARGE WOUNDS, EXCESSIVE BLEEDING</td> </tr> <tr> <td>1 EACH FIRST AID KIT EYE DRESSING</td> <td>FOR EYE WOUNDS, SEE INSTRUCTIONS</td> </tr> <tr> <td>1 PEG GAUZE PETROLIUM 2" X 3" X 1/4"</td> <td>FOR BURNS, APPLY PAD OVER BURN</td> </tr> <tr> <td>1 BTL POWDERED IODINE SOLUTION 4 OUNCES</td> <td>AS DISINFECTANT AND CLEANSER OF CUTS AND WOUNDS, APPLY BEFORE BANDAIDING</td> </tr> <tr> <td>1 EACH ANKOR-A-MORAL 2 1/2"</td> <td>CLEANS WOUNDS BETWEEN FINGER, HOLD 2-3 INCHES FROM WOUND, HOLD CLOSER AS ANKOR-A-MORAL RELEASES, USE TOO WEAK, USE FRESH PINNACET</td> </tr> <tr> <td>1 EACH INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS</td> <td></td> </tr> </tbody> </table> </div> </div> | LIST OF CONTENTS   | INSTRUCTIONS FOR USE | 1 ROLL ADHESIVE TAPE SURGICAL 1" X 1/2" YARDS | USE FOR MINOR CUTS AND CLOTHING REPAIR | 10 EACH BANDAID ADHESIVE 3" X 7" | MINOR CUTS AS REQUIRED | 2 EACH BANDAID GAUZE COMPRESSED CAMOUFLAGED 7" X 6" YARDS | CUT IN LENGTHS AS REQUIRED FOR BANDAID WOUNDS | 1 EACH BANDAID MUSLIN COMPRESSED CAMOUFLAGED FOLDED 10" X 10" | USE FOR SLUGS | 1 PEG BLADE SURGICAL PREPARATION RAZOR STRAIGHT | SHAVING HAIR AND OPENING WOUNDS AS REQUIRED | 1 PEG COMPRESS AND BANDAID CAMOUFLAGED 2" X 2" X 1/4" | FOR WOUNDS | 1 EACH COMPRESS FIRST AID FIELD 4 1/2" X 10" | FOR LARGE WOUNDS, EXCESSIVE BLEEDING | 1 EACH FIRST AID KIT EYE DRESSING | FOR EYE WOUNDS, SEE INSTRUCTIONS | 1 PEG GAUZE PETROLIUM 2" X 3" X 1/4" | FOR BURNS, APPLY PAD OVER BURN | 1 BTL POWDERED IODINE SOLUTION 4 OUNCES | AS DISINFECTANT AND CLEANSER OF CUTS AND WOUNDS, APPLY BEFORE BANDAIDING | 1 EACH ANKOR-A-MORAL 2 1/2" | CLEANS WOUNDS BETWEEN FINGER, HOLD 2-3 INCHES FROM WOUND, HOLD CLOSER AS ANKOR-A-MORAL RELEASES, USE TOO WEAK, USE FRESH PINNACET | 1 EACH INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS |  |  |
| LIST OF CONTENTS  | INSTRUCTIONS FOR USE  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 ROLL ADHESIVE TAPE SURGICAL 1" X 1/2" YARDS                 | USE FOR MINOR CUTS AND CLOTHING REPAIR  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 10 EACH BANDAID ADHESIVE 3" X 7"                              | MINOR CUTS AS REQUIRED  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 2 EACH BANDAID GAUZE COMPRESSED CAMOUFLAGED 7" X 6" YARDS     | CUT IN LENGTHS AS REQUIRED FOR BANDAID WOUNDS   |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 EACH BANDAID MUSLIN COMPRESSED CAMOUFLAGED FOLDED 10" X 10" | USE FOR SLUGS   |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 PEG BLADE SURGICAL PREPARATION RAZOR STRAIGHT               | SHAVING HAIR AND OPENING WOUNDS AS REQUIRED   |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 PEG COMPRESS AND BANDAID CAMOUFLAGED 2" X 2" X 1/4"         | FOR WOUNDS  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 EACH COMPRESS FIRST AID FIELD 4 1/2" X 10"                  | FOR LARGE WOUNDS, EXCESSIVE BLEEDING  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 EACH FIRST AID KIT EYE DRESSING                             | FOR EYE WOUNDS, SEE INSTRUCTIONS  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 PEG GAUZE PETROLIUM 2" X 3" X 1/4"                          | FOR BURNS, APPLY PAD OVER BURN  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 BTL POWDERED IODINE SOLUTION 4 OUNCES                       | AS DISINFECTANT AND CLEANSER OF CUTS AND WOUNDS, APPLY BEFORE BANDAIDING  |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 EACH ANKOR-A-MORAL 2 1/2"                                   | CLEANS WOUNDS BETWEEN FINGER, HOLD 2-3 INCHES FROM WOUND, HOLD CLOSER AS ANKOR-A-MORAL RELEASES, USE TOO WEAK, USE FRESH PINNACET |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
| 1 EACH INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS         |   |   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |
|   |   | <p>a. Remove first aid kit from bracket.</p> <p>b. Remove contents.</p> <p>c. Inspect container for damage.</p>   |  |                      |   |  |                                  |                        |   |   |   |               |   |   |   |            |  |                                      |                                   |                                  |                                      |                                |   |  |                             |   |   |  |  |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If:      |
|----------|----------|--|---|
| 2        | B/W      | <p><b><u>VAN BODY - Cont</u></b></p> <p><b><u>Inspect Interior - Cont</u></b></p> <p>d. Inspect contents for damage. Then use checklist to inventory contents.</p> <p>e. Replace damaged or missing items.</p> <p>f. Repack kit.</p> <p>g. Reinstall kit.</p> <p>12. Inspect blackout curtains.</p> <p>a. Inspect blackout curtains and valances for tears, missing hooks, or broken eyelets.</p> <p>b. Inspect nylon hook and pile tape on curtain and wall for security of attachment.</p> <p>13. Inspect eyewash station.</p> <div> </div> <p>Check the eyewash bottle is in place and full of solution.</p> | <p>Curtains damaged.</p> <p>Eyewash bottle is missing or empty.</p> |

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B Before  
 D - During  
 A - After

W - Weekly  
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 BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
|          |          | <p><b><u>VAN BODY - Cont</u></b></p>  |  |
| 3        | B        | <p><u>Inspect Air Conditioner/Heater.</u> Refer to TM 5-4120-367-14 for preventive maintenance checks and services.</p>   |  |
| 4        | M        | <p><u>Service Power Cable.</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Electrical shock hazard. Power cable must be de-energized before servicing. Death or serious injury may occur from failure to observe this safety precaution.</p> <ol style="list-style-type: none"> <li>1. Turn off safety switch.</li> <li>2. Disconnect cable from power entry panel.</li> <li>3. Wrap any cuts or abrasions in cable with electrical insulation tape.</li> <li>4. Reconnect power cable to entry panel.</li> </ol> |  |

**1-6. OPERATION UNDER USUAL CONDITIONS.** Operation of the Rectifier I Section consists of activation of power after the section has been located at the operation site and 12 V dc power disconnected.

**1-6.1 Preparation for Use.**

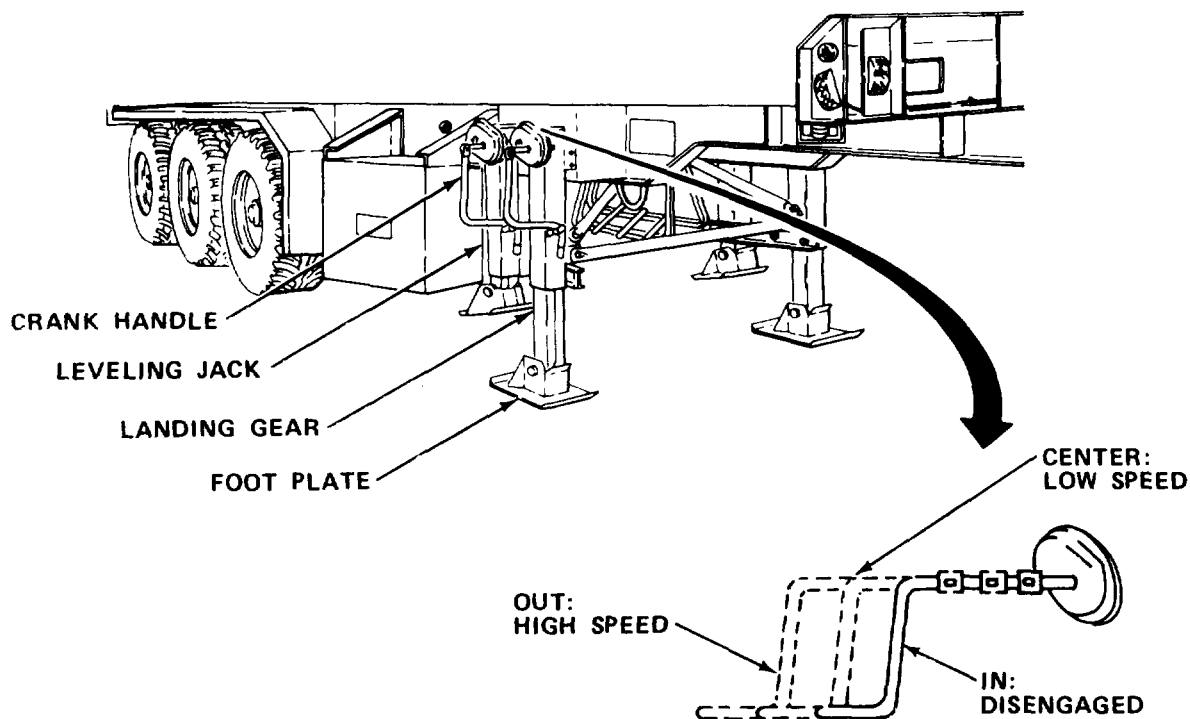
- a. Procedures for leveling.

**CAUTION**

Trailer-mounted section must be on surface that is approximately level to avoid unnecessary stress or twisting of chassis when section is leveled.

**NOTE**

- Snow or ice should be removed from under leveling foot plate before attempting to level section.
- Sand, soft ground, or mud requires that shoring or scrap material be placed under leveling foot plate to increase surface area and prevent sinking into surface.
- Be sure that air suspension is deflated as indicated in TM 5-2330-305-14.



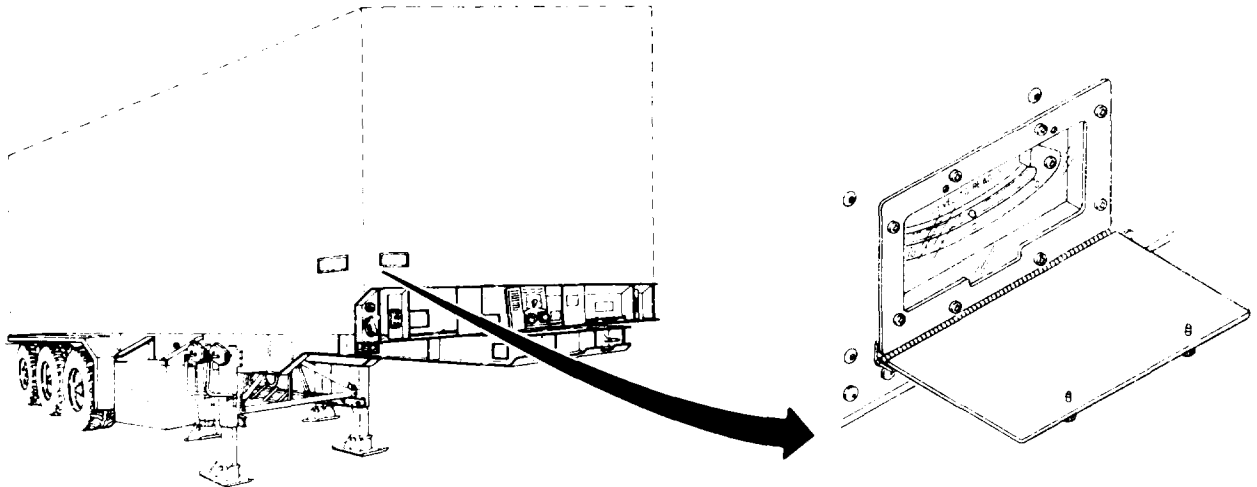
(1) Deflate air suspension in accordance with TM 5-2330-305-14.

(2) Approximately level trailer chassis by raising or lowering landing gear.

(3) Move handle from secured location and swing out.

(4) Pull crank handle on each leveling jack all the way out and engage. There are two positions when handle is engaged. Fully out is high speed. Partially out is low speed.

(5) Lower each leveling jack by turning crank to right at high speed until foot plate just contacts ground.

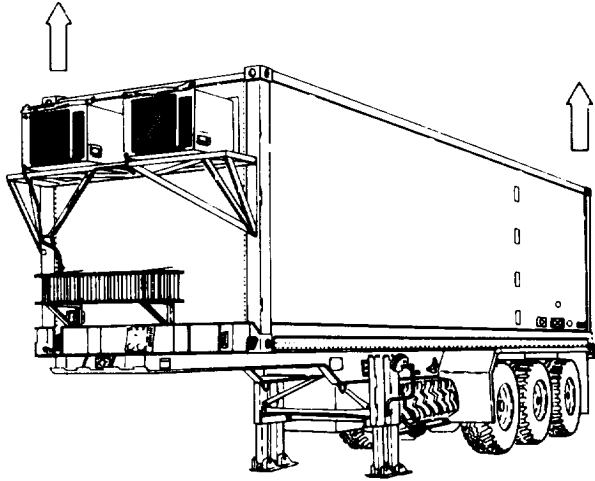


(6) Station personnel to have a clear view of level indicators at both front and rear of section.

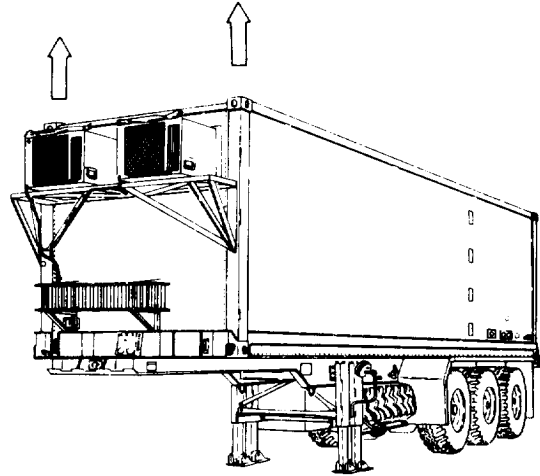
(7) Observe level indicators to determine which end and side must be raised.

**CAUTION**

Do not attempt to level section by lifting at diagonal corners, or frame will be twisted.

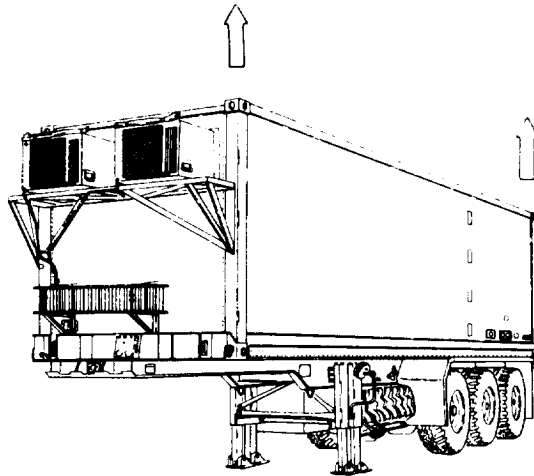


NO



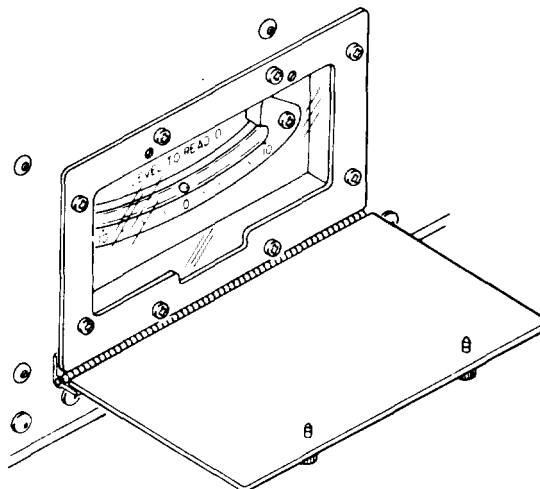
YES

(8) Raise low end by extending both leveling jacks at low end. Use low speed.



(9) Raise low side by extending both leveling jacks at low side.



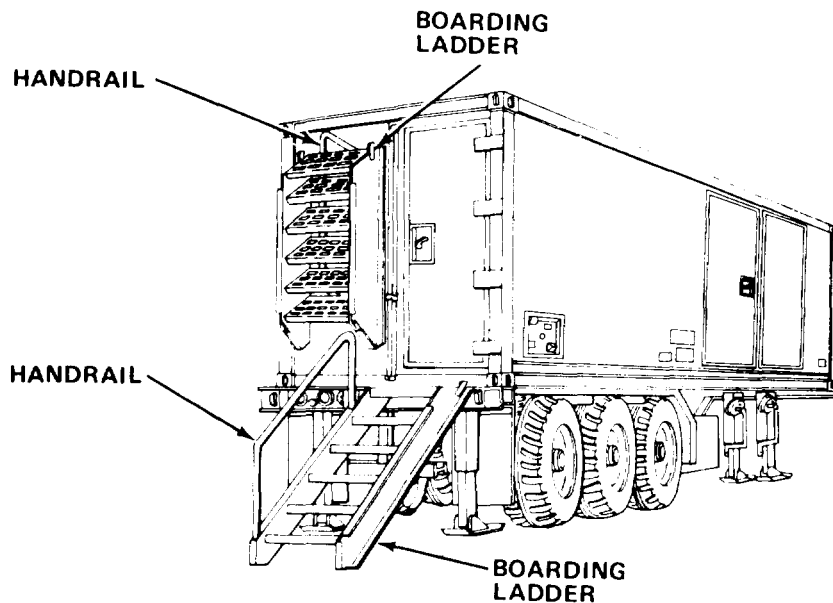


**NOTE**

Be sure ball is centered on all four level indicators  $\pm 2^\circ$ .

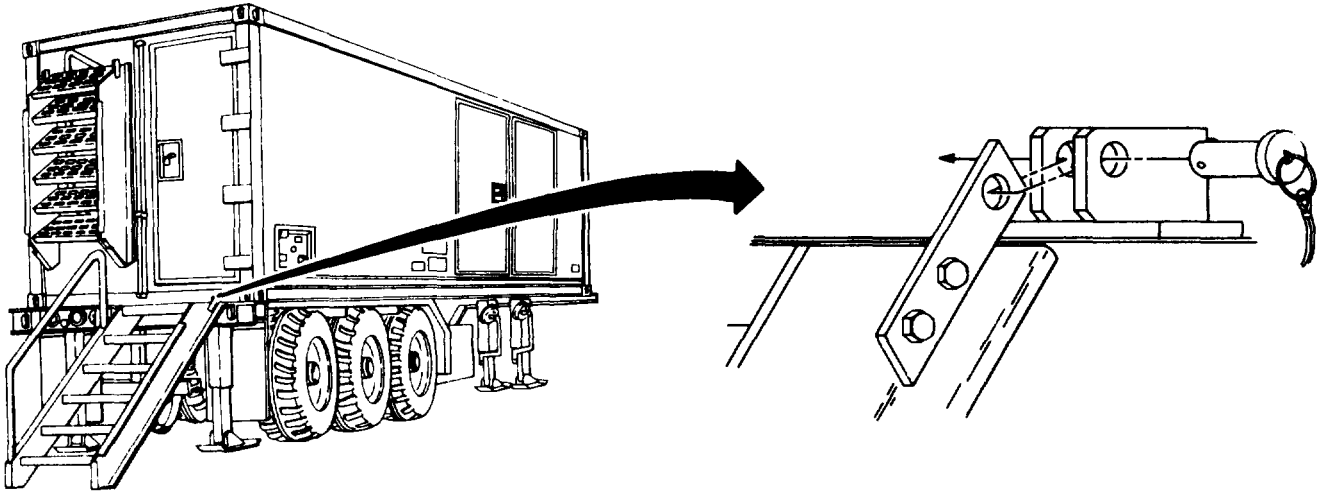
(10) Pull leveling crank handles away from trailer chassis, and lower crank handle to stowed position.

b. Procedures to activate section.

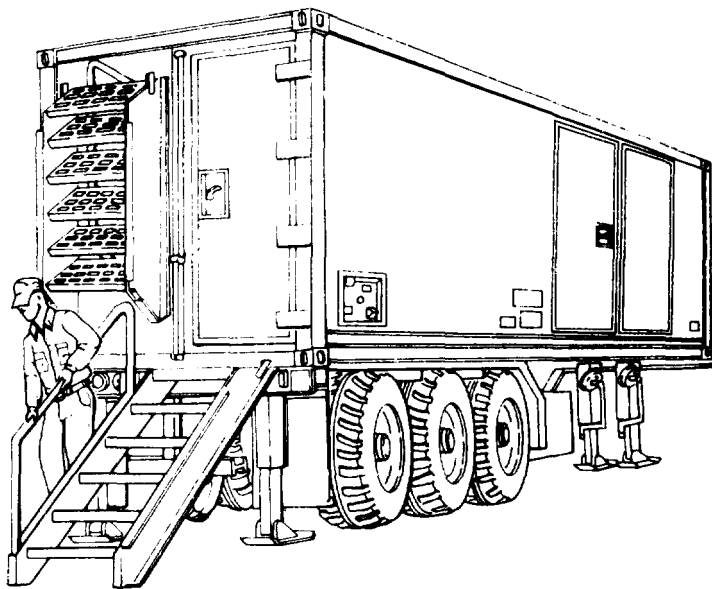


(1) Remove boarding ladders and handrails from rear of section.

(2) Remove handrails from ladders.



(3) Mount ladders at personnel doors and secure with locking pins.

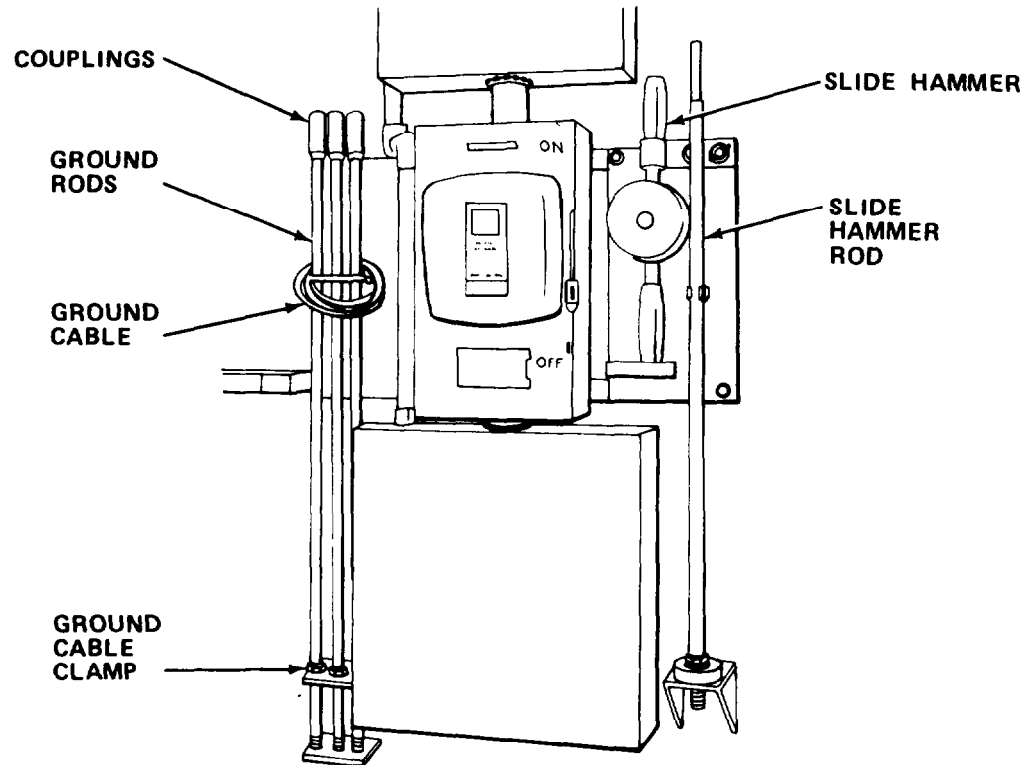


(4) Mount one handrail on each ladder.

(5) Enter section and check that safety switch, main circuit breaker, and all equipment power supply switches are off.

**WARNING**

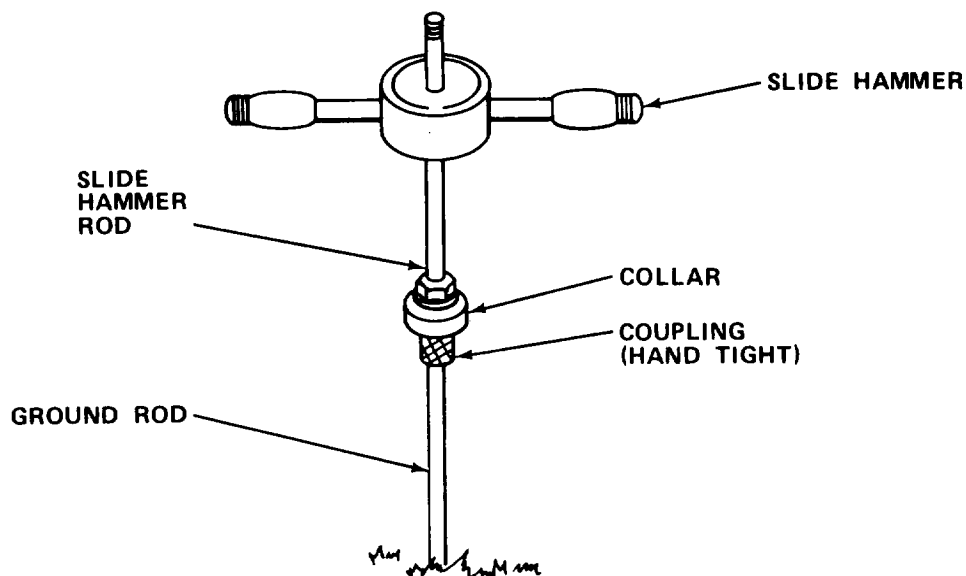
Death or serious injury may occur from connecting power cable to section before grounding.



(6) Remove ground rod, slide hammer, and ground cable from section.

**NOTE**

- Apply a thin film of grease to threaded ends of rods before driving into ground. This will permit easy disassembly upon removal from ground.
- Bottom ground rod must be numbered or identified so that it will always be the first rod driven into the ground.
- These instructions supplement TC 11-6, Grounding Techniques.



(7) Select an area as close to power entry panel as possible to install ground rod. Then assemble the first ground rod and coupling to the slide hammer rod.

**CAUTION**

Do not allow ground rod to rotate when removing the slide hammer rod. Rods must be kept screwed together to make a good electrical ground.

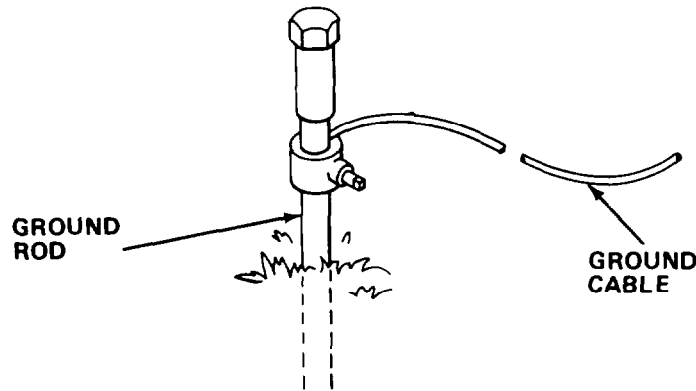
**NOTE**

Before driving ground rod be certain that rods meet inside coupling. Be sure collar is handtight against coupling.

(8) Place slide hammer on hammer rod end, and drive ground rod into ground. Remove slide hammer rod. Attach slide hammer rod to a new section of ground rod, and repeat procedure until only 12 in. (30.5 cm) of the third rod is above ground.

(9) Remove slide hammer and hammer rod, and place in section.

(10) Secure ground cable clamp and ground cable to ground rod.

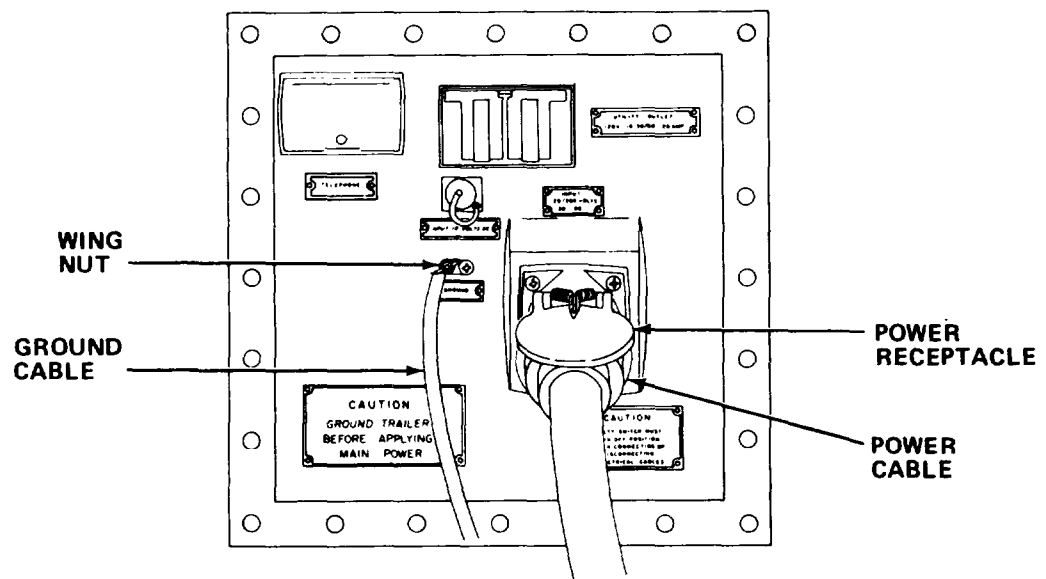


**WARNING**

To prevent death or serious injury, do not handle or clean power cable or connectors when cable is connected to power source.

**NOTE**

The section must be properly grounded before power is connected. If it is not possible to drive the three sections of ground rod fully into ground, the rods may each be driven into the ground separately and connected in series. If it is impossible to drive a ground rod, a suitable alternative ground must be found, such as a buried metal water pipe. See TC 11-6, Grounding Techniques for additional instructions.



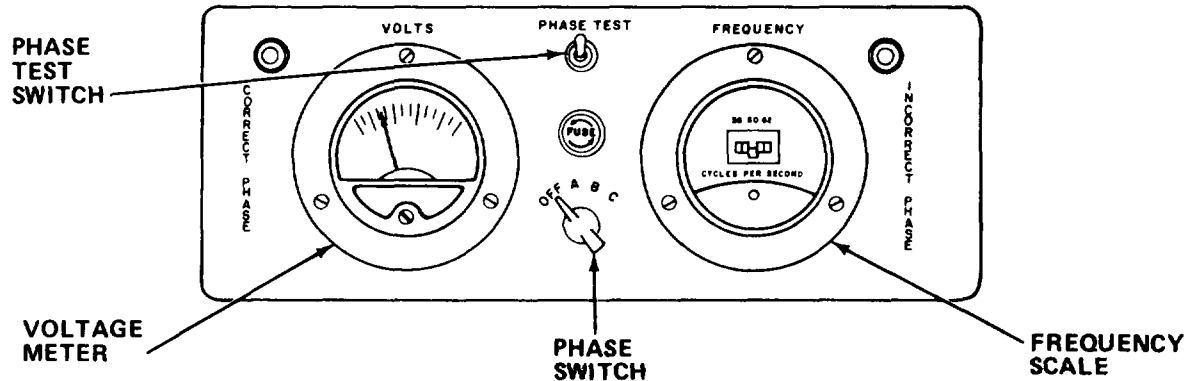
(11) Connect ground cable to ground lug with wing nut.

**CAUTION**

Be sure safety switch is off before connecting power cable to avoid equipment damage.

(12) Firmly connect the power cable to the power receptacle.

(13) Turn on safety switch.



**CAUTION**

Do not energize section if incorrect phase lamp lights. Damage to equipment may result.

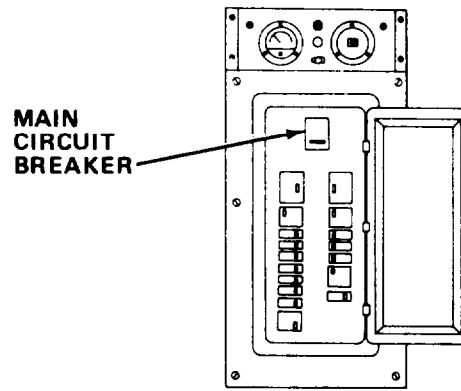
(14) Check voltage and frequency as follows:

- (a) Push phase test switch. Observe correct phase lamp lights.
- (b) Turn phase switch to A.

**CAUTION**

Voltage must be between 110 and 120, and frequency must be at 60 +1 Hz on each leg before turning on main circuit breaker or damage to equipment may result.

- (c) Read voltage on meter.
- (d) Read frequency on scale.
- (e) Repeat for positions B and C on phase switch.



(15) Set main circuit breaker ON.

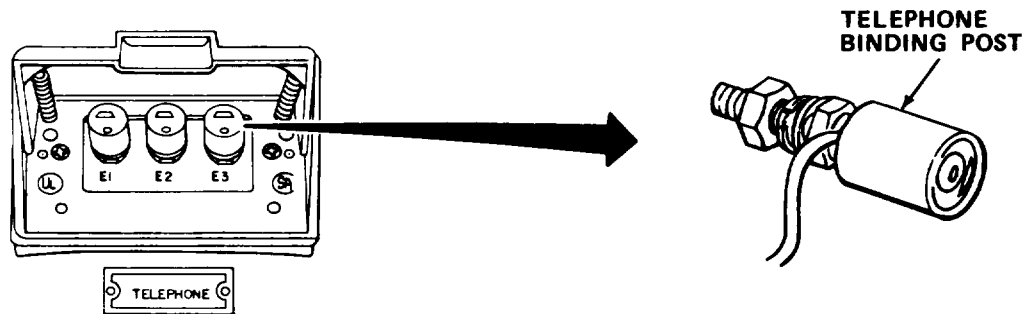
**NOTE**

This step must be accomplished if section is placed in operation in darkness, fog, mist, or under blackout conditions.

(16) Close blackout curtains, if required.

(17) Turn on circuit breakers in following order:

- (a) Individual lighting.
- (b) Curbside and roadside airconditioners/heaters.
- (c) Curbside and roadside receptacles.



(18) Connect telephone lines to corresponding interior binding posts.

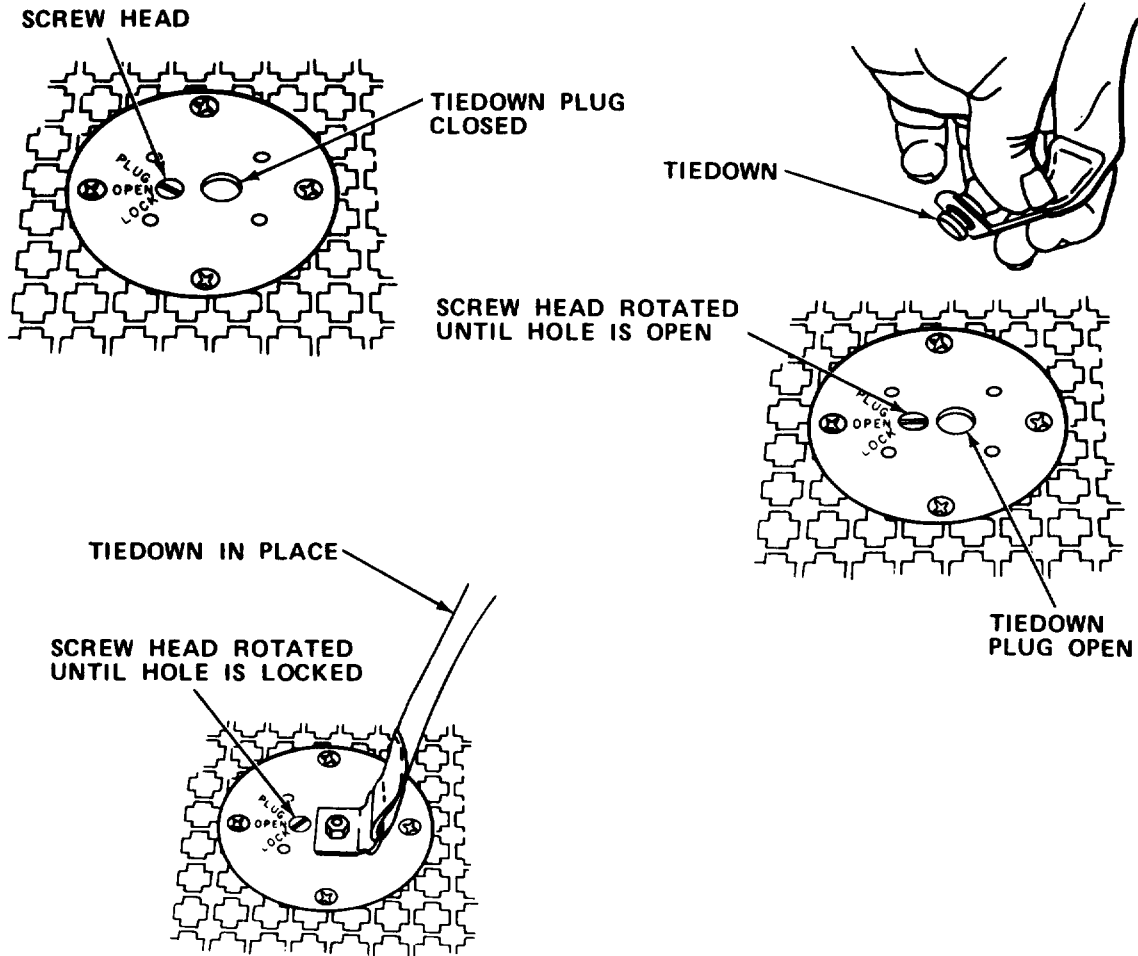
(19) Check blackout switches.

(20) Plug in emergency lighting and turn switch to READY.

(21) Fully deflate air shocks until film/paper processor, contact printer, and rectifier rests on air shocks.

1-6.2 Preparation for Movement.

- a. Inventory equipment and supplies.
- b. Drain plumbing. (Refer to Chapter 2, Film/Paper Processor.)



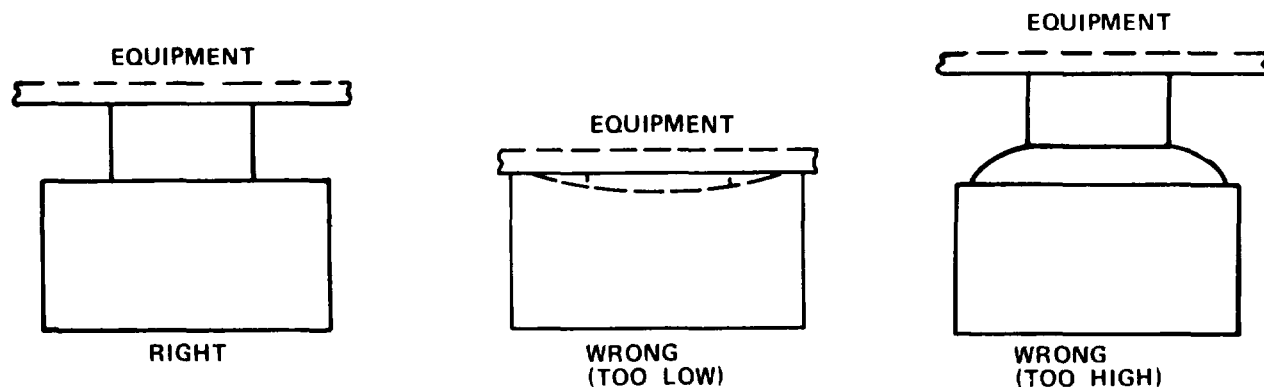
- c. Install tiedowns in tiedown sockets.
- d. Secure authorized equipment in proper containers or as specified by appropriate chapters.
- e. Secure straps and remove slack from tiedowns.
- f. Inflate shock absorbers.
  - (1) Remove all valve caps.



**CAUTION**

To prevent damage to equipment or air shocks during transportation, inflate air shocks correctly. Do not exceed 90 psi (620 kPa).

- (2) Connect air hose to valve.



- (3) Inflate each mount until top of diagram is level as shown. diaphragm is level as shown.
- (4) Reinstall valve caps.

**WARNING**

Death or serious injury may occur if power cable is disconnected while power is on.

- g. Turn equipment switches off.
- h. Turn main circuit breaker off.
- i. Turn safety switch off.
- j. Have power cable disconnected at power supply end. Then disconnect power cable from receptacle. Put cable in storage box on trailer chassis.
- k. Turn emergency light switch off.
- l. Disconnect telephone cables from power entry panel.

**CAUTION**

To prevent loss of rod or thread damage, do not allow ground rod to rotate and unscrew when removing the slide hammer rod.

- m. Remove ground rod with slide hammer, and put ground rods, couplings, and slide hammer inside section. Clean threads on each ground rod before storing.

**NOTE**

Be certain exhaust fan and air vent covers are securely closed.

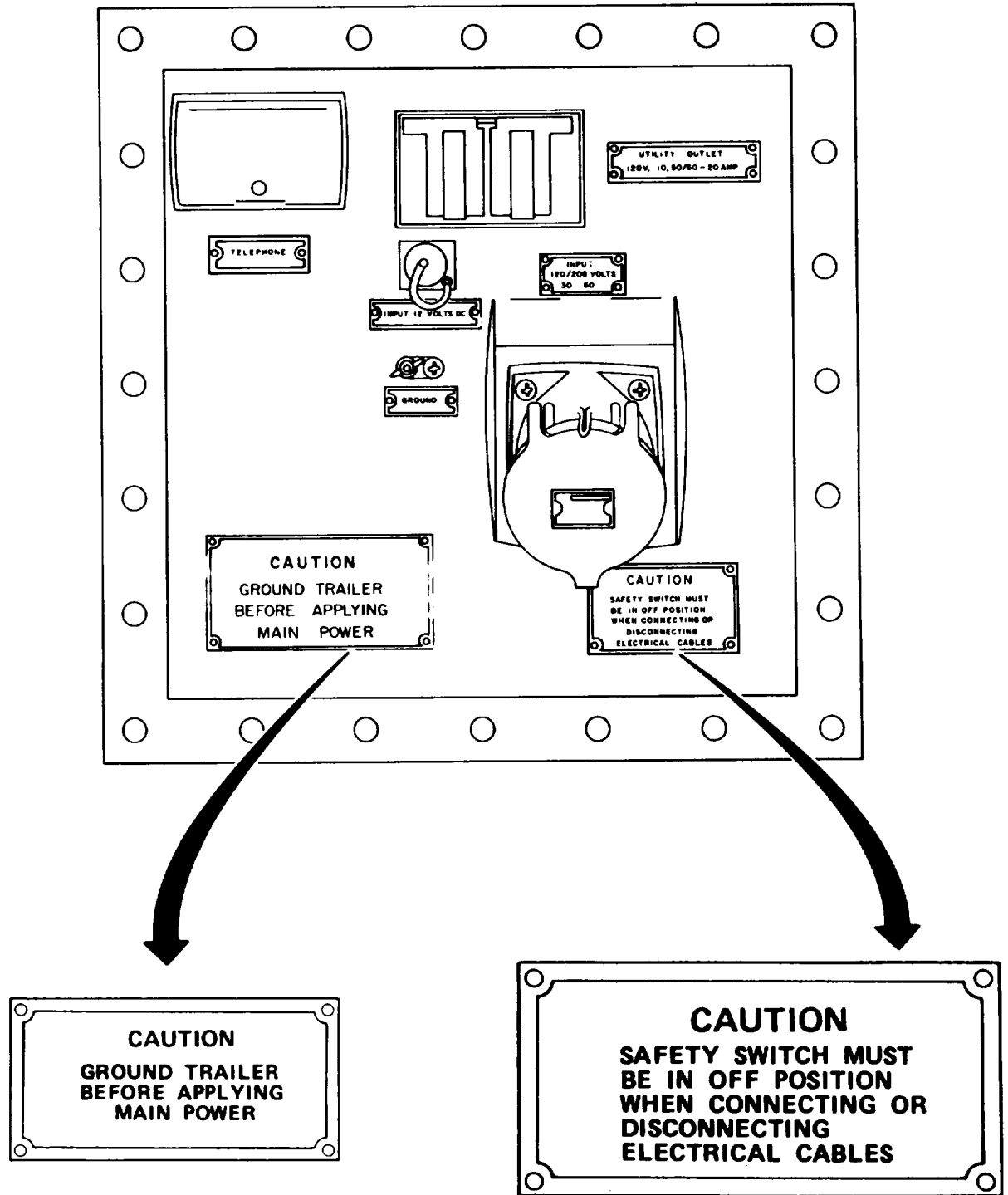
- n. Reinspect section interior for loose equipment and close all vents.
- o. Close section. Secure and lock all personnel doors and cargo door.

**NOTE**

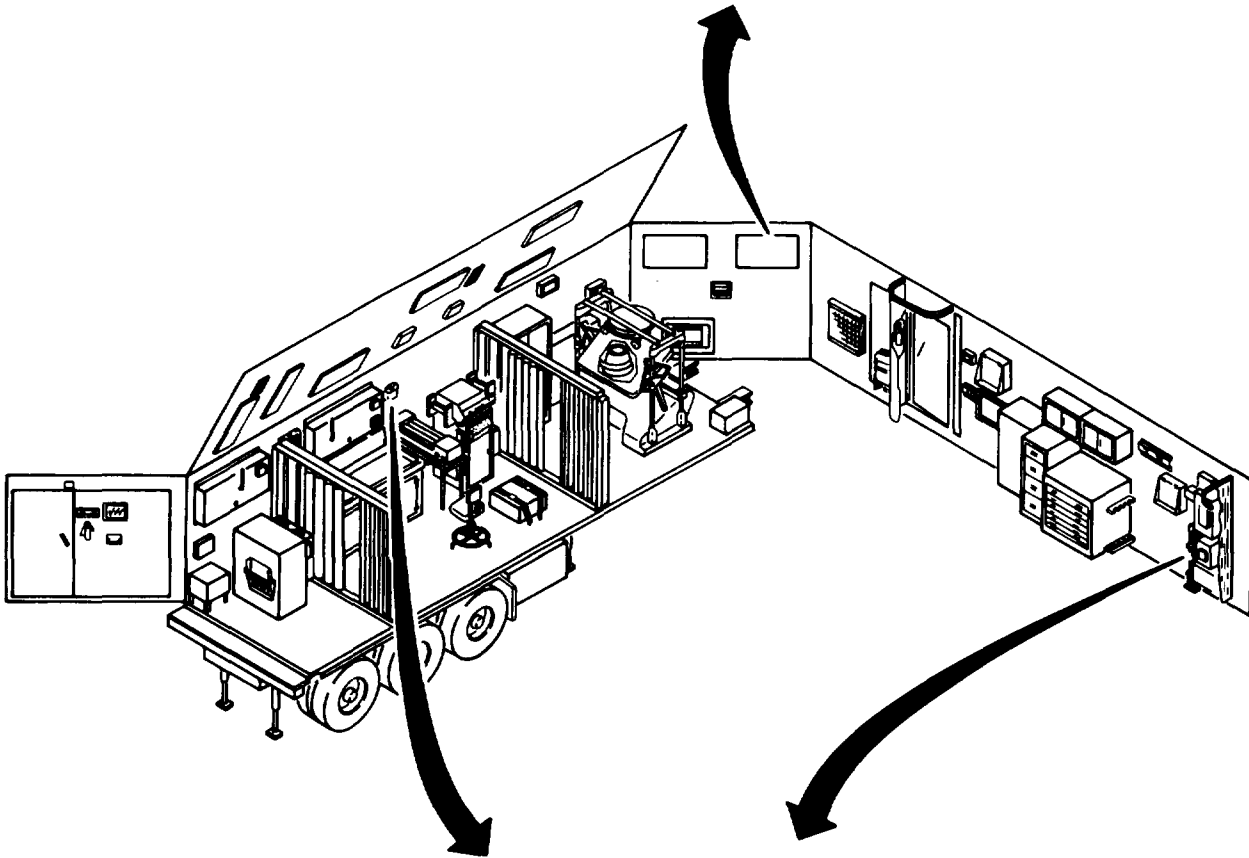
Be sure air conditioner/heater covers are down and secured.

- p. Remove handrails from boarding ladders.
- q. Remove boarding ladders and insert handrails into back of ladders.
- r. Secure ladders to back of section.
- s. Fully extend landing gear.
- t. Retract leveling jacks.
- u. Visually inspect section exterior to be sure all equipment and covers are secured.

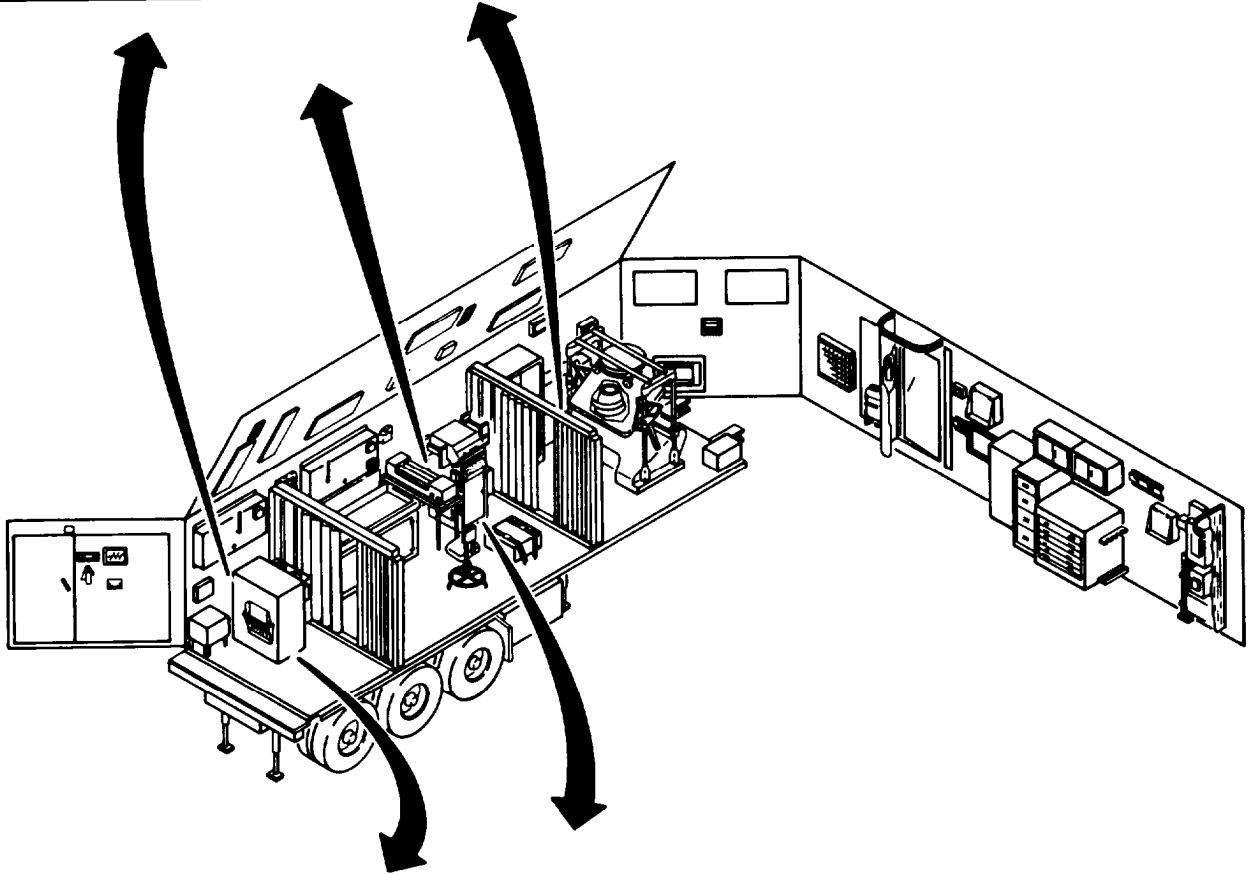
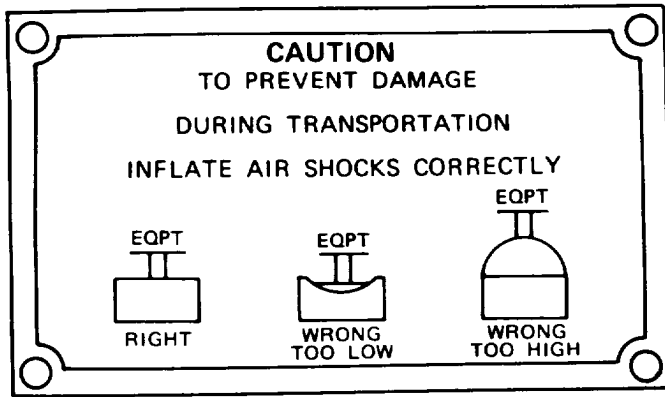
1-6.3 Operating Instructions on Decals and Instruction Plates.



**CAUTION**  
**OPEN OUTSIDE FLAPS**  
**PRIOR**  
**TO OPERATING AIR COND**



**CAUTION**  
**EMERGENCY LIGHT SWITCH**  
**MUST BE IN THE OFF POSITION**  
**WHEN ELECTRICAL POWER**  
**IS INTENTIONALLY DISCONNECTED**  
  
**SWITCH MUST BE IN THE READY**  
**POSITION FOR NORMAL EMERGENCY**  
**LIGHT OPERATION**



LOAD MUST BE PLACED ATOP MOUNT BEFORE INFLATING.  
 MAXIMUM INFLATION PRESSURES MUST NOT BE EXCEEDED.  
 MOUNT MUST BE DEFLATED BEFORE REMOVAL OF LOAD.

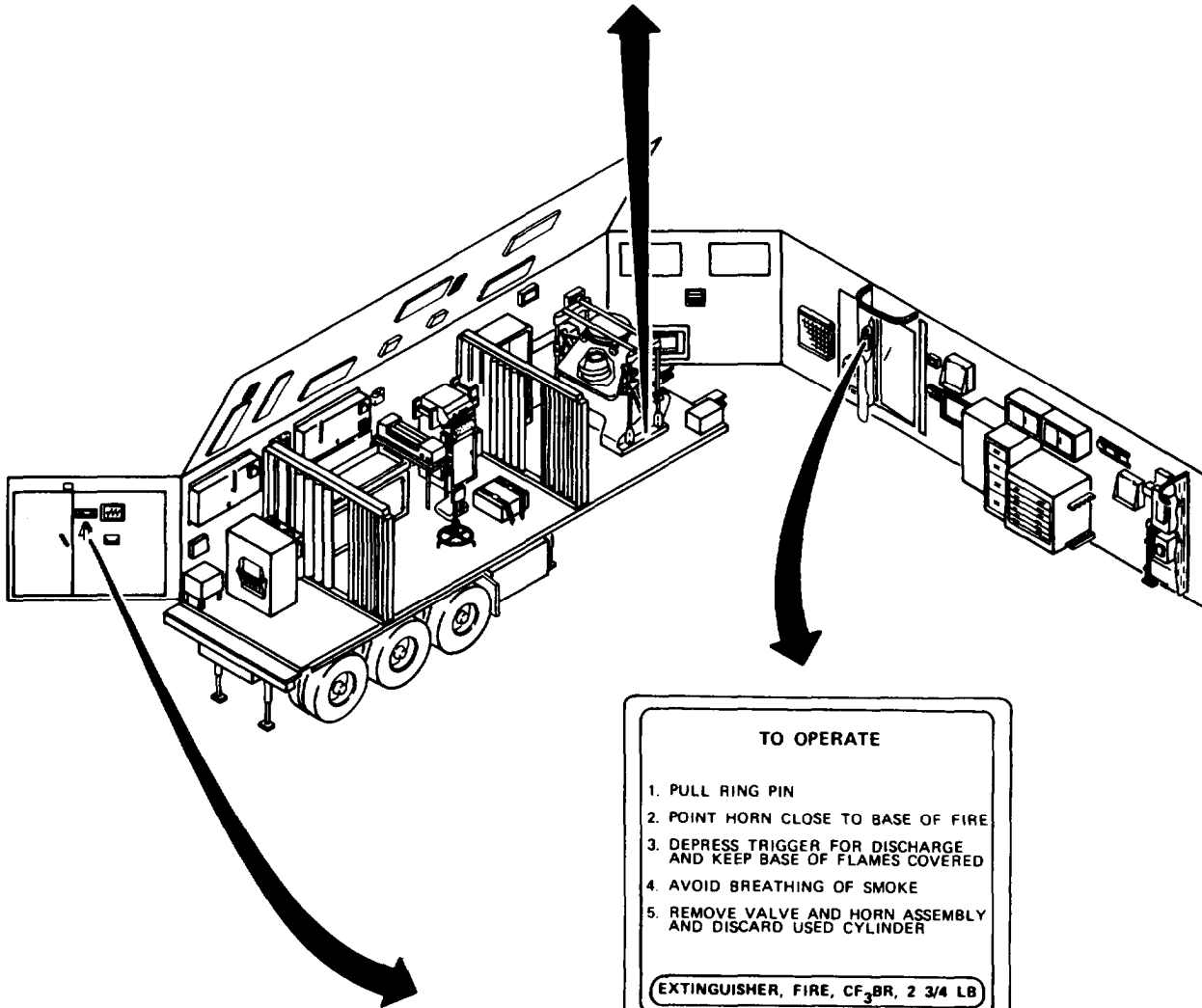
BARRY STABL-LEVEL SLM-6  
 LOAD RATING: 150 to 600 LBS.  
 MAX. INFLATION 90 P.S.I.

EQUIPMENT LOAD ON MOUNT MUST BE WITHIN LOAD RATING.  
 EQUIPMENT MOUNTING SURFACE MUST BE, OR ADAPTED TO BE FLAT  
 AND OF SIZE TO COVER ENTIRE OUTSIDE DIAMETER OF MOUNT.

LOAD MUST BE PLACED ATOP MOUNT BEFORE INFLATING.  
MAXIMUM INFLATION PRESSURES MUST NOT BE EXCEEDED.  
MOUNT MUST BE DEFLATED BEFORE REMOVAL OF LOAD.

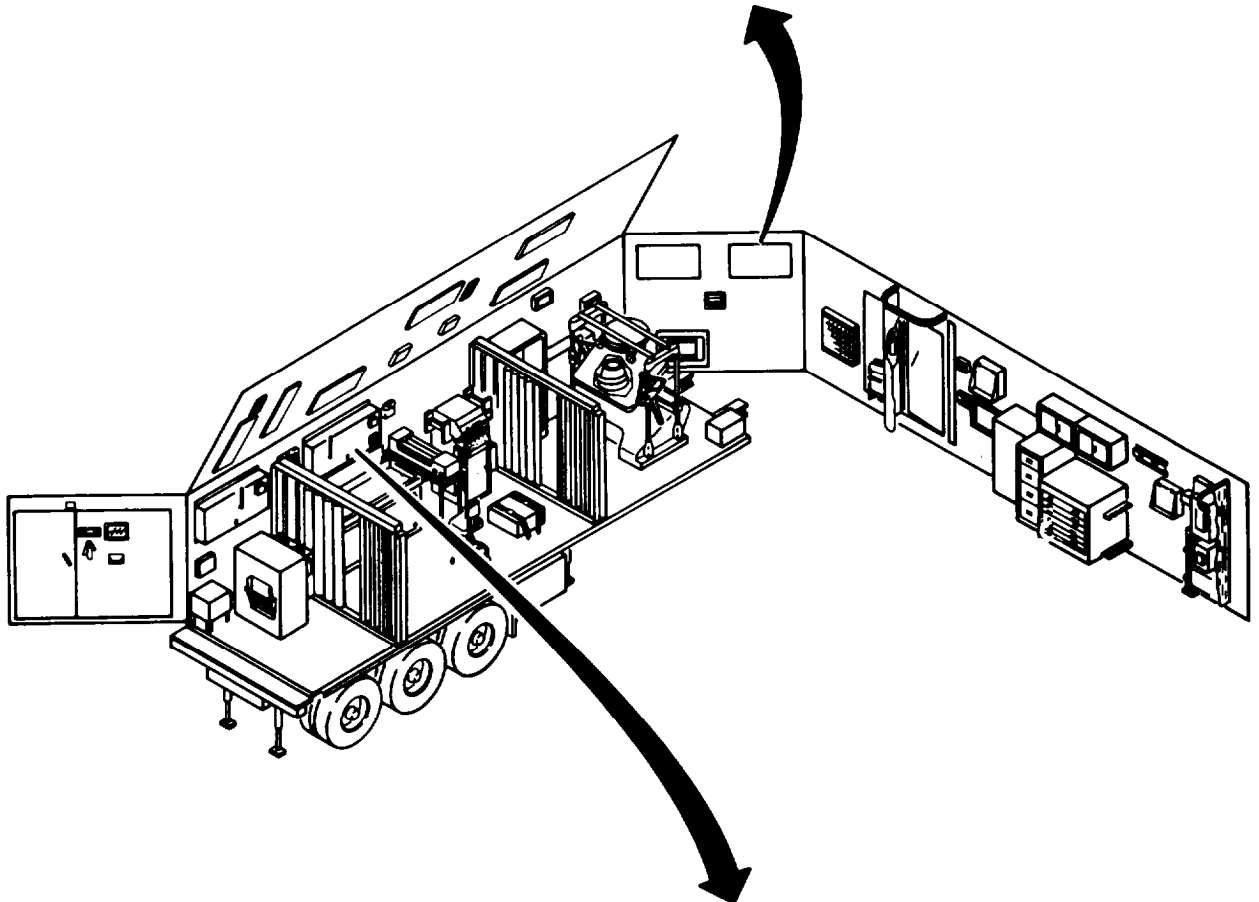
BARRY STABL-LEVL SLM-24  
LOAD RATING: 600 to 2400 LBS.  
MAX. INFLATION 90 P.S.I.

EQUIPMENT LOAD ON MOUNT MUST BE WITHIN LOAD RATING.  
EQUIPMENT MOUNTING SURFACE MUST BE, OR ADAPTED TO BE FLAT  
AND OF SIZE TO COVER ENTIRE OUTSIDE DIAMETER OF MOUNT.

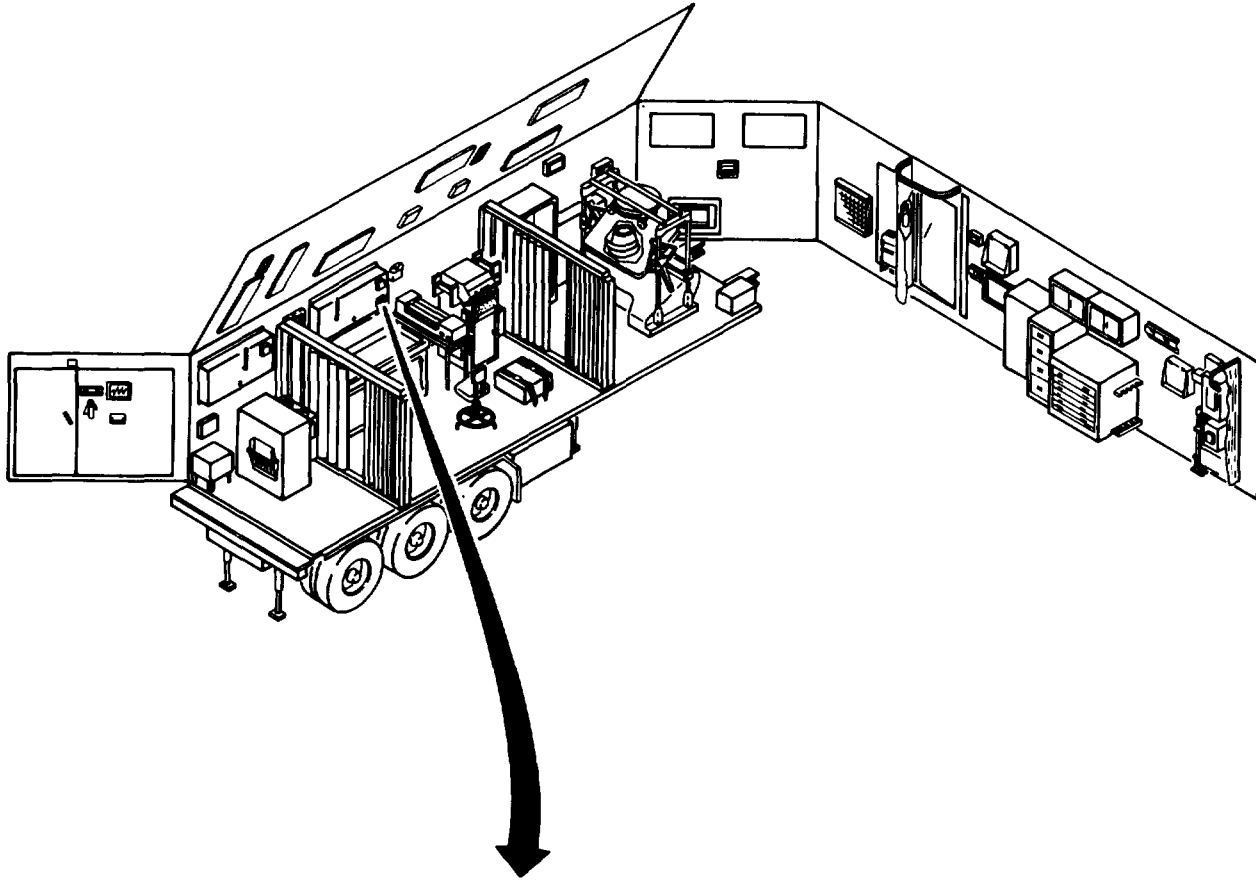


**CAUTION**  
FOR SAFE OPERATION  
SEE TM FOR PROPER  
INTERNAL AND EXTERNAL  
GROUNDING

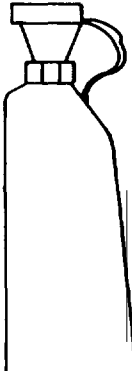
**CAUTION TO START UNIT ON "COOL"  
MODE AT 0°F AMBIENT  
JUMPER LACO SWITCH (S-5)**



**CAUTION**  
OPEN OUTSIDE VENT BEFORE  
OPERATING FAN



**EMERGENCY  
EYE WASH STATION**

|   |   |   |
|---|---|---|
| <p><b>Slight Chemical Burns:</b><br/>Draw eyelids apart with thumb and index finger. Bend over bottle and press eye-cup gently against eye socket. Keeping eye open, rinse thoroughly by repeatedly squeezing wall of bottle.</p>   |  | <p><b>Lying Down:</b> Helper must unscrew top of bottle, pull out hose in bottle. Screw top on. Rinse thoroughly, same as in standing position, with eye-cup 3 to 4 inches from eye.</p> <p>Be sure to rinse upper lid everytime.</p> |
| <p><b>Severe Chemical Burns:</b><br/>Eyelids shut reflexly, nearest person should give following assistance:<br/><b>Standing or Sitting:</b> Helper opens eyelid with thumb and index finger. Hold eye-cup 3 to 4 inches from eye, so effect can be seen. Rinse thoroughly by squeezing bottle.</p> |   | <p><b>BARIKOS</b><br/>Parma Distributing<br/>Div. of Grand Rapids<br/>Fabricators, Inc.<br/>Grand Rapids, Mi.<br/>49503</p>   |

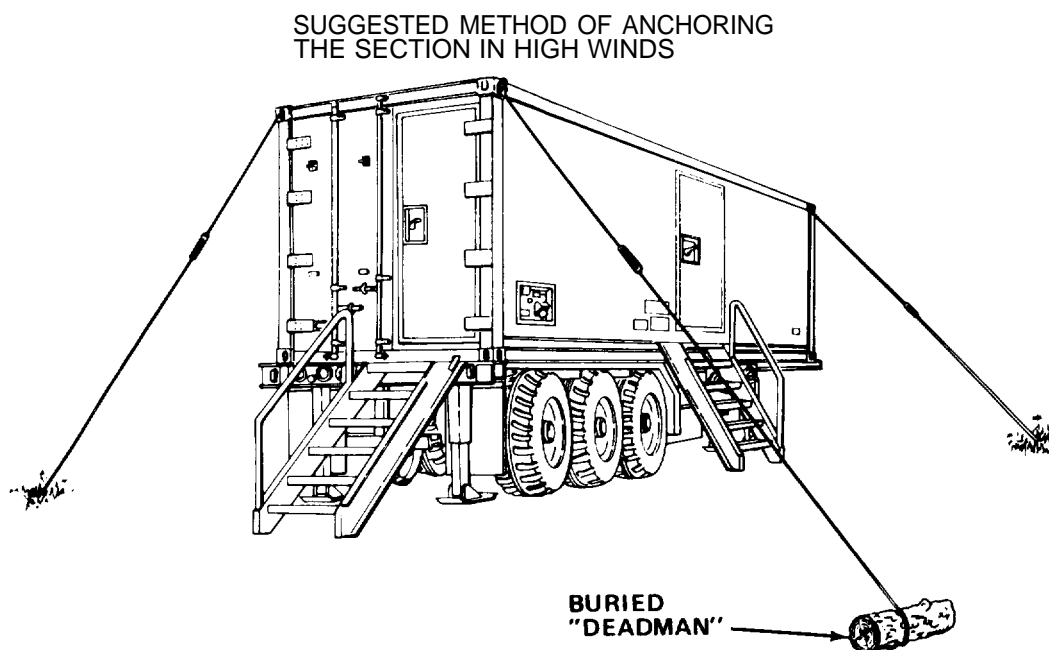


1-7. OPERATION UNDER UNUSUAL CONDITIONS.**NOTE**

Damage to container permitting light leaks, water, or dirt entry must be temporarily repaired using available material on hand. Maintenance personnel will conduct permanent repairs; however, crew must maintain operational capability of section.

1-7.1 Operation in High Wind or Storm Conditions.

- a. Relocate section if trees or structures present hazard.



- b. Secure section corners at lifting eyes to deadmen or substantial objects.
- c. Remove all loose objects from area.

1-7.2 Operation in Cold Weather.

- a. The operation of the internal equipment is performed within environmentally controlled conditions; however, in extreme cold, the main power supply cable and ground cable will become hard, brittle, and difficult to handle. When connecting or disconnecting cables, be careful that kinks and unnecessary loops will not result in permanent damage.

- b. Make certain that connections and cable receptacles on the outside of the section are free of frost, snow, and ice.

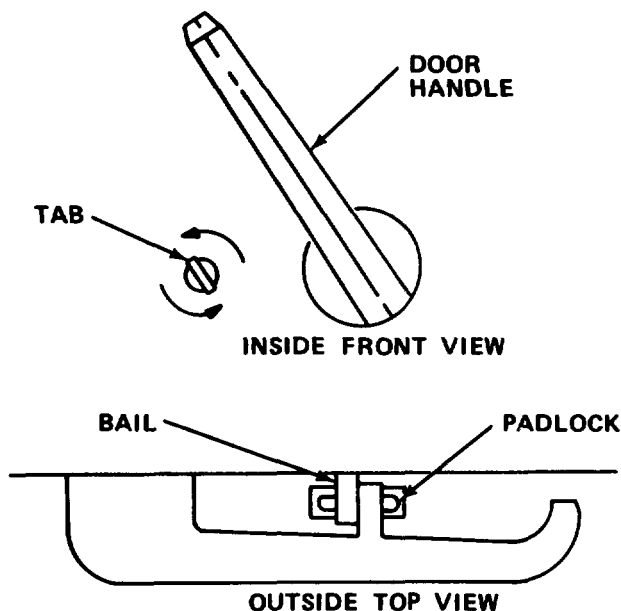
When section heaters are not operating or when the section is being transported, liquid consumable supplies may freeze, break their containers, then melt, and ruin equipment or documents. Store these items in an area to prevent equipment and document damage.

1-7.3 Operation in Extreme Heat. The operation of the internal equipment is performed within environmentally controlled conditions; however, during transportation or when air conditioning units are not operating, consumable supplies may suffer reduced shelf life, and internal components may have accelerated deterioration of gaskets, seals, or insulation.

1-7.4 Operation in Tropical Conditions. Fungi, mildew, or mold will form on and in equipment, documents, and supplies if internal environmental control equipment is not operating and outside heat and humidity are allowed to enter the section.

1-7.5 Operation in Desert Conditions. Oust, grit, and sand will ruin supplies, equipment, and documents. Extreme care must be taken to prevent dust, grit, and sand from entering the section. Air filters will be changed whenever airflow is restricted, and cleaning of section interior must be conducted more frequently than specified by PMCS schedules.

1-7.6 Emergency Procedures. There are no specific emergency procedures for operation of the section.



1-7.7 Emergency Means of Exit. In the event personnel are locked in the section, the tab may be turned to the left until the bail on the padlock falls free. The door handle is now free to turn.

1-7.8 Emergency Eyewash. If chemicals are accidentally splashed into eyes, the emergency eyewash station provides a means to flush chemicals from the eyes. Immediate action is required to minimize injury. Personnel must use the eyewash station to wash their eyes thoroughly, then report for medical treatment.

**Section III OPERATOR MAINTENANCE**

**1-8. LUBRICATION INSTRUCTIONS.**

a. Lubrication instructions for the Rectifier I Section are contained in LO 5-6675-319-12, Lubrication Order, Rectifier I Section, Topographic Support System. The intervals and man-hours specified in the Lubrication Order are based on normal operations. During inactive periods, lubrication periods may be extended with adequate preservation.

b. Topographic equipment and all optical equipment require special care in lubrication. When a specified lubricant is called for, substitutions are not authorized. Minimum amounts of lubricant are to be used and all excess lubricant is to be immediately removed. Spray lubricants must not be used in the vicinity of optical equipment unless optics are completely protected. No lubricant is to be applied unless a thorough cleaning is conducted first to remove dirt, dust, or abrasive material.

c. Be sure that you refer to the appropriate chapter before any equipment is stored after use, that the temperature has stabilized, and that lubrication required after use is accomplished.

**1-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the Rectifier I Section, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**Table 1-2. TROUBLESHOOTING**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

1. NO ELECTRICAL POWER TO SECTION.

**WARNING**

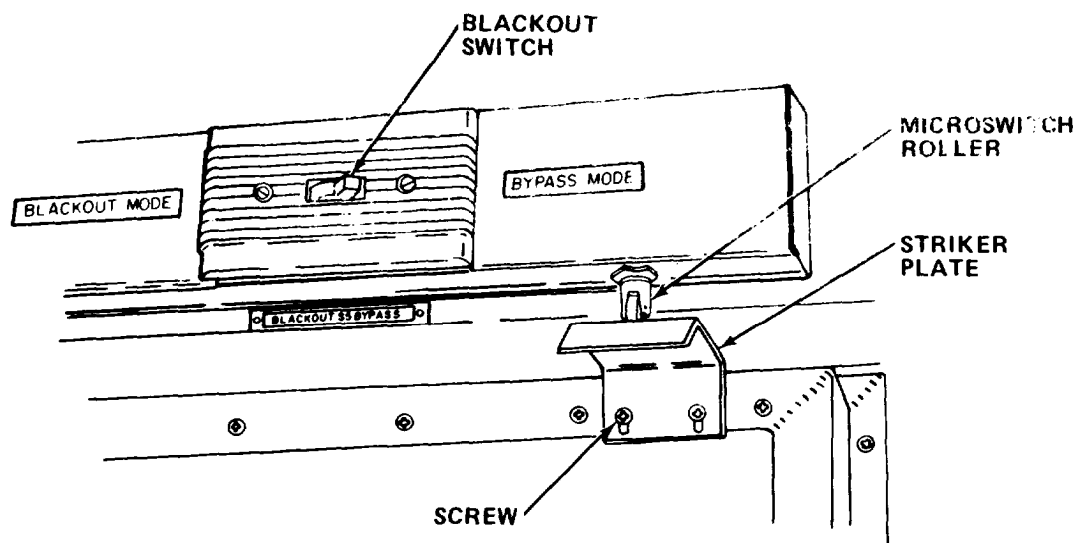
Death or serious injury may result. Do not perform any electrical maintenance or make electrical connections or disconnections at main power receptacle when power cable is energized.

Table 1-2. TROUBLESHOOTING - Cont

| MALFUNCTION   | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|---|--|---|
| 1. NO ELECTRICAL POWER TO SECTION - Cont  | Step 1. Observe voltage and frequency for phases A, B, and C. Read 115 + 5 V, 60 + 1 Hz. | <ul style="list-style-type: none"> <li>(a) If voltage and frequency are correct, proceed to step 2.</li> <li>(b) If voltage and frequency are incorrect, notify power supply supervisor.</li> </ul>   |
| <b><u>CAUTION</u></b>   |  |   |
| Do not energize section if voltage or frequency is not correct. Damage to equipment may result. |  |   |
|   | Step 2. Press phase test switch on power panel for A, B, and C.                          | <ul style="list-style-type: none"> <li>(a) If phases A, B, and C are correct, proceed to step 3.</li> <li>(b) If incorrect phase lamp lights, notify power supply supervisor.</li> </ul>  |
| <b><u>CAUTION</u></b>   |  |   |
| Do not energize section if incorrect phase lamp lights. Damage to equipment may result.         |  |   |
|   | Step 3. Check safety switch position.  | <ul style="list-style-type: none"> <li>(a) If safety switch is ON, proceed to step 4.</li> <li>(b) If safety switch is OFF, turn ON.</li> </ul>   |
|   | Step 4. Check main circuit breaker position.   | <ul style="list-style-type: none"> <li>(a) If circuit breaker is ON, refer to direct/general support maintenance.</li> <li>(b) If circuit breaker is OFF, turn ON.</li> <li>(c) If circuit breaker trips repeatedly, notify power supply supervisor.</li> </ul> |

Table 1-2. TROUBLESHOOTING - Cont

| MALFUNCTION                          | TEST OR INSPECTION  | CORRECTIVE ACTION |
|--------------------------------------|---|-------------------|
| 2. NO ELECTRICAL POWER TO EQUIPMENT. | <p>Step 1. Check equipment power switch.</p> <p>(a) If power switch is ON, proceed to step 2.</p> <p>(b) If power switch is OFF, turn ON.</p> <p>Step 2. Check power cord.</p> <p>(a) If power cord is plugged in, proceed to step 3.</p> <p>(b) If power cord is unplugged, plug in.</p> <p>Step 3. Inspect circuit breaker panel for breakers in OFF position.</p> <p>(a) If all circuit breakers are ON, refer to direct/general support maintenance.</p> <p>(b) If any circuit breakers are OFF, turn ON.</p> |                   |
| 3. BLACKOUT SWITCH DOES NOT OPERATE. |   |                   |



**Table 1-2. TROUBLESHOOTING - Cont**

---

|                    |                   |  |
|--------------------|-------------------|--|
| MALFUNCTION        |                   |  |
| TEST OR INSPECTION |                   |  |
|                    | CORRECTIVE ACTION |  |

---

3. BLACKOUT SWITCH DOES NOT OPERATE - Cont

Step 1. Check blackout switch position.

(a) If switch is ON, proceed to step 2.

(b) If switch is OFF, reset switch to BLACKOUT.

Step 2. Check to see that striker plate contacts roller on microswitch.

(a) Loosen screws and move plate up or down until microswitch operates.

(b) If blackout switch still fails to operate, refer to organizational maintenance.

---

**1-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the Rectifier I Section. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE                             | PARAGRAPH |
|---------------------------------------|-----------|
| Replace Fluorescent Lamp . . . . .    | 1-10.1    |
| Service Ventilation Ducts . . . . .   | 1-10.2    |
| Replace Blackout/Dome Light . . . . . | 1-10.3    |

1-10.1 Replace Fluorescent Lamp.

MOS: 81C, Cartographer

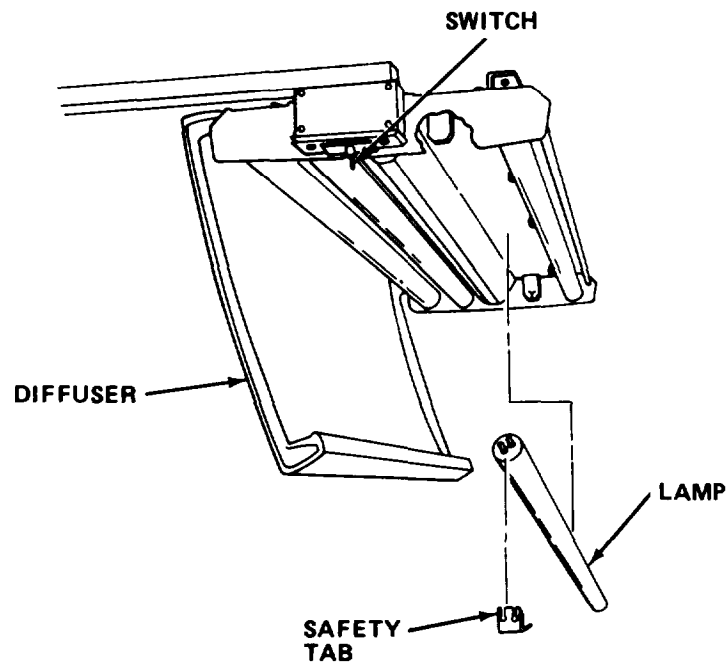
TOOLS: None

SUPPLIES: Fluorescent Lamp

**WARNING**

Death or serious injury may occur if power is left on while servicing 1 amp.

## a. Turn switch OFF.



- b. Gently pull diffuser from light bracket, and place diffuser out of the way to prevent damage.
- c. Remove safety tab from 1amp socket.
- d. Rotate defective 1amp until prongs are free from slot and remove.
- e. Insert new lamp prongs into slot and rotate 90 degrees.
- f. Reinstall safety tab into 1amp socket.
- g. Reinstall diffuser.
- h. Turn power ON.

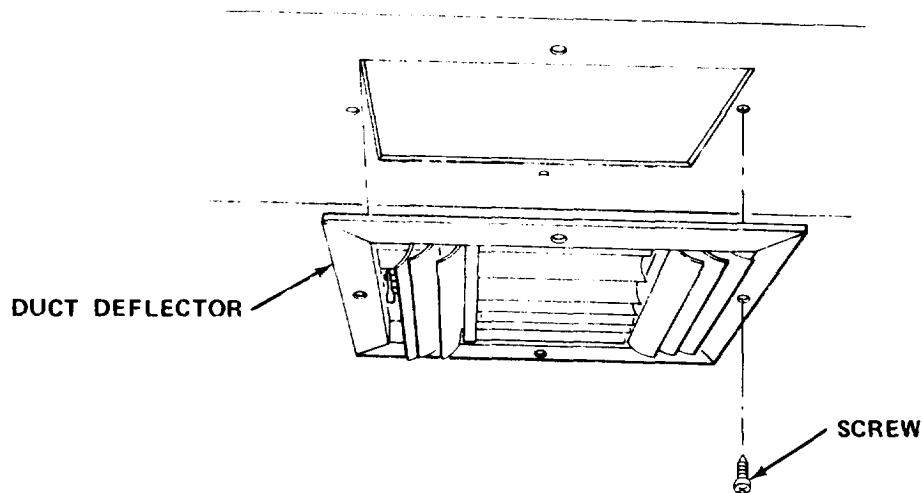
1-10.2 Service Ventilation Ducts.

MOS: 81C, Cartographer

TOOLS: Vacuum Cleaner  
Flat Tip Screwdriver

SUPPLIES: None

- a. Cover equipment to prevent dust from entering equipment.
- b. Close all doors and cabinets.
- c. Remove any documents or other work that may be damaged by dirt/dust.
- d. Turn off air conditioner/heater.



- e. Remove four screws from each ventilation duct deflector.
- f. Remove all duct deflectors.
- g. Vacuum dirt or dust from deflector louvers.
- h. Insert vacuum cleaner probe into ventilation duct at each deflector hole, and vacuum as far as probe will reach.
- i. Reinstall deflectors and secure with four screws.
- j. Turn on air conditioner/heater.
- k. Vacuum any dislodged dirt or dust from interior of section.
- l. Remove covers for operation.



1-10.3 Replace Blackout/Dome Light.

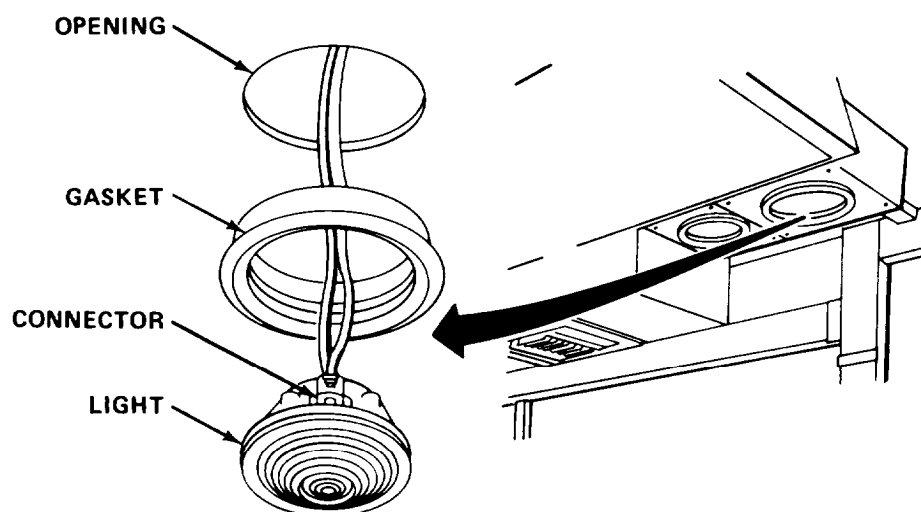
MOS: 81C, Cartographer

TOOLS: None

SUPPLIES: Light (12 V)  
 Silicone Spray (Item 33, Appendix E)

**NOTE**

Blackout light and dome light are sealed units. No bulb replacement is possible. Complete light must be replaced.



- a. Push light and gasket up into opening.
- b. Tilt and remove light and gasket from opening.
- c. Disconnect defective light from connector.
- d. Connect new light to connector.
- e. Reinstall gasket in opening.

**NOTE**

The use of silicone spray on the gasket will help to position light.

- f. Position light in gasket and push in.

## Section IV ORGANIZATIONAL MAINTENANCE

**1-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication at this level of maintenance.

**1-12. REPAIR PARTS, SPECIAL TOOLS: TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

1-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

1-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

1-12.3 Repair Parts. Repair parts for this equipment are listed in the Repair Parts and Special Tools List. TM 5-6675-319-24P covering organizational maintenance for this equipment.

**1-13. SERVICE UPON RECEIPT.**

### NOTE

The section may be received mounted on a chassis, or as a van body for mounting on an available transporter, or on site. Inspection of the chassis is covered in TM 5-2330-305-14. Inspection of the air conditioner/heater is covered in TM5-4120-367-14.

1-13.1 Checking Unpacked Equipment.

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

(1) Visually inspect the section exterior starting at the rear to cover rear, curbside, roadside, front, top, and bottom. Inspect for damage, tears, breaks or corrosion.

(2) Enter section and inspect for broken equipment, tool boxes, chairs, or equipment loose and not secured.

(3) Close doors and vents to determine if light leaks exist.

(4) Inspect doors for damage, torn or rotted seals, and tightness of closure.

(5) Inspect interior for evidence of water damage, fungi, mildew or corrosion.

(6) Report damage or discrepancies in accordance with AR 735-11 and AR735-11-2.

b. Check the equipment against the packing list to see if shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

(1) Inventory section against Components of End Item and Basic Issue Items Lists (Appendix C).

(2) Inventory expendable supplies contained in section as shown in Appendix E.

(3) Conduct operational checks on equipment in accordance with the chapters in this manual when operators are available and power can be safely provided to the section.

c. Check to see whether the equipment has been modified.

**1-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

a. PMCS are designed to keep the equipment in good working condition by performing certain tests, inspections, and services. The intervals provide you, the organizational technician, with time schedules that determine when to perform specified tasks.

b. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording the results of PMCS.

Interval columns. This column determines the time period designated to perform your PMCS.

d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or *service* procedure follows the specific item to be inspected.

Preventive maintenance checks and services for the air conditioners/heaters are contained in TM 5-4120-367-14.

f. List of tools and materials required for PMCS is as follows:

| <u>Item</u>             | <u>Quantity</u> |
|-------------------------|-----------------|
| Vacuum Cleaner          | 1 ea            |
| 8 in. Adjustable Wrench | 1 ea            |
| Cross Tip Screwdriver   | 1 ea            |
| Flat Tip Screwdriver    | 1 ea            |
| Spring Scale            | 1 ea            |
| Padlock                 | 1 ea            |
| Flashlight              | 1 ea            |

Table 1-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - Before  
 D - During  
 A - After

w - weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 s - Semiannually  
 BI - Biennially

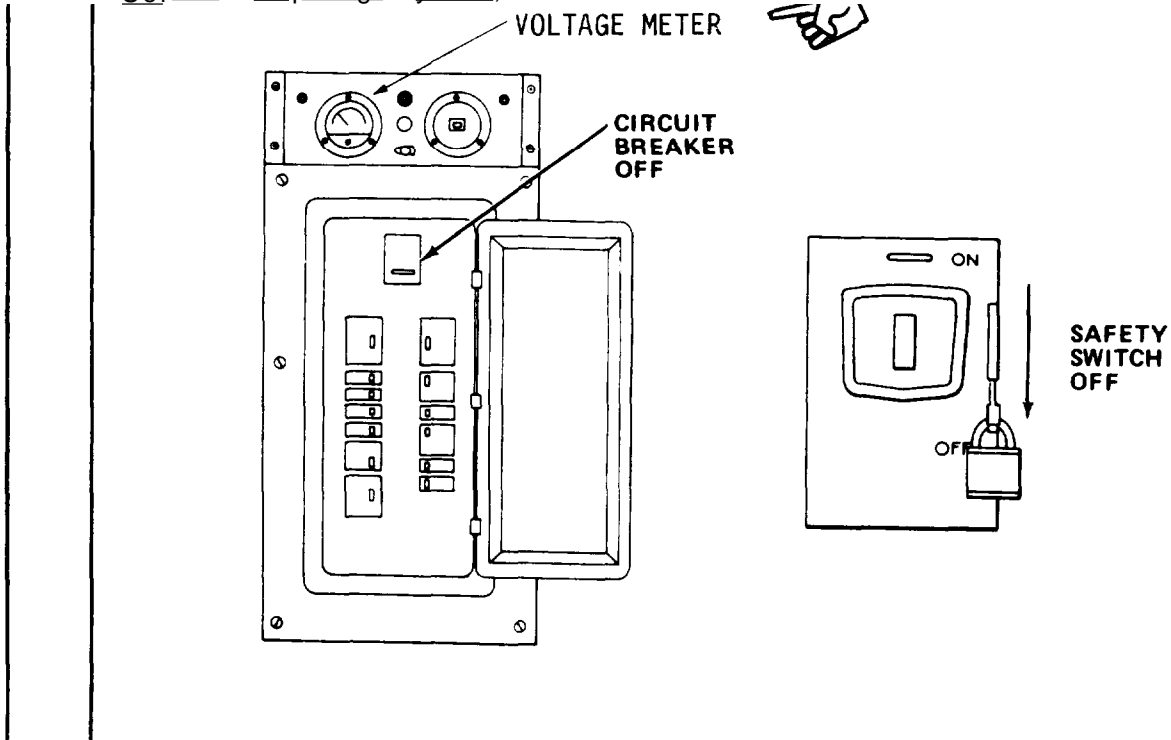
(Number) - Hundreds of Hours.

| ITEM NO. | IN-TER-VAL | ITEM TO BE INSPECTED | PROCEDURE |
|----------|------------|----------------------|-----------|
|----------|------------|----------------------|-----------|

**VAN BODY**

1 M Service Air Conditioner/Heater. Refer to TM 5-4120-367-14 for preventive maintenance checks and services.

2 M Service Lighting System,



**WARNING**

**Do not open circuit breaker panel or service electrical connections, cables, or switches until main power is off, and voltage meter confirms circuit is not energized. Death may result from failure to observe these safety precautions.**

1. Turn off main circuit breaker. Turn off safety switch.

Table 1-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

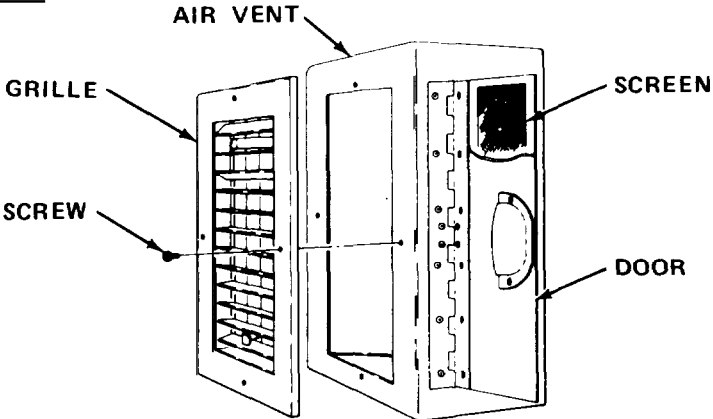
|                               |           | B - Before<br>D - During<br>A - After        | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>s - Semiannually<br>BI - Biennially  | (Number) - Hundreds of Hours |
|-------------------------------|-----------|--|--|---|------------------------------|
| ITEM NO.                      | N-TER-VAL | ITEM TO BE INSPECTED                         |  | PROCEDURE   |                              |
| <b><u>VAN BODY - Cont</u></b> |           |  |  |   |                              |
| 2                             | M         | <b><u>Service Lighting System - Cont</u></b> |  | <ol style="list-style-type: none"> <li>2. Padlock safety switch.</li> <li>3. Tighten all loose screws, bolts, and clamps.</li> <li>4. Check which switches, switch plate outlets, receptacles, and posts require repair.</li> <li>5. Check for loose screws and nuts on ceiling, console lights, circuit breaker panels, and conduits.</li> <li>6. Remove padlock.</li> <li>7. Turn on main circuit breaker and safety switch.</li> </ol> |                              |
| 3                             | M         | <b><u>Service Air Vent</u></b>               |  |  <ol style="list-style-type: none"> <li>1. Remove screws from front of grille.</li> <li>2. Remove front grille.</li> <li>3. Using vacuum cleaner, clean screens on side doors. Vacuum inside of air vent.</li> <li>4. Reinstall grille and secure with screws.</li> </ol>   |                              |

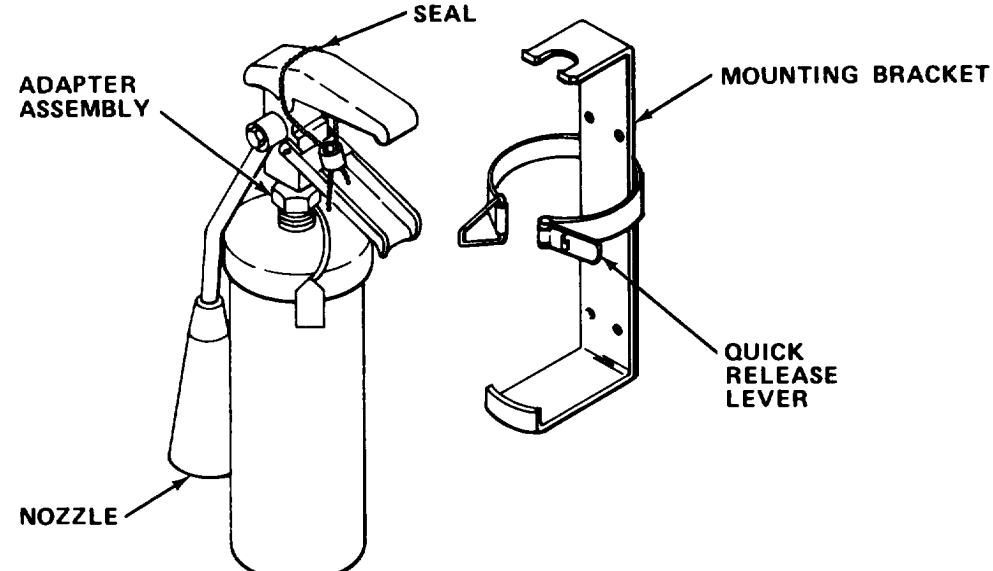
Table 1-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) . Hundreds of Hours

| ITEM NO.               | INTERVAL | ITEM TO BE INSPECTED              | PROCEDURE   |
|------------------------|----------|-----------------------------------|---|
| <u>VAN BODY - Cont</u> |          |                                   |   |
| 4                      | M        | <u>Inspect Fire Extinguisher.</u> |  <ol style="list-style-type: none"> <li>1. Remove from mounting bracket. Check free movement of bracket.</li> <li>2. Inspect nozzle and adapter assembly for damage.</li> <li>3. Inspect seal. Be sure it is not broken.</li> <li>4. Weigh cylinder. Replace if gross weight has decreased by 6 oz (170 g) or more.</li> </ol> |
|                        | S        |                                   |   |

**1-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the facing schematic or the foldout located at the end of this manual for further fault analysis.

d. If any component of the Rectifier I Section does not power up when turned on, verify that 120 V ac is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power troubleshooting procedures for dead receptacle (Table 1-4).

**Table 1-4. ORGANIZATIONAL TROUBLESHOOTING**

---

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

**WARNING**

Electrical shock hazard. Be sure power is off when checking continuity at troubleshooting points. Death or serious injury could result from failure to do so.

1. FLUORESCENT CEILING LAMP IS INOPERATIVE.

Step 1. Check for continuity of fluorescent lamp switch.

(a) If continuity exists, proceed to step 2.

(b) If continuity does not exist, replace switch (paragraph 1-16.3).

Table 1-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION                                       | TEST OR INSPECTION                             | CORRECTIVE ACTION   |
|---|--|---|
| 1. FLUORESCENT CEILING LAMP IS INOPERATIVE - Cont | Step 2. Check for continuity of lamp ballast.  | <ul style="list-style-type: none"> <li>(a) If continuity exists, proceed to step 3.</li> <li>(b) If continuity does not exist, replace lamp ballast (paragraph 1-16.1)</li> </ul>   |
|   | Step 3. Check for shorts in RF filter.         | Replace RF filter (paragraph 1-16.2).   |
| 2. EXHAUST FAN IS INOPERATIVE.                    | Check on/off switch for continuity.            | <ul style="list-style-type: none"> <li>(a) If continuity exists, replace fan (paragraph 1-16.9).</li> <li>(b) If continuity does not exist, replace switch (paragraph 1-16.4).</li> </ul>   |
| 3. EMERGENCY LIGHTS ARE INOPERATIVE.              | Press in test indicator.                       | If lamps do not light, replace emergency light assembly (paragraph 1-16.11).  |
| 4. NO POWER TO EQUIPMENT.                         | Step 1. Check circuit breaker ON/OFF position. | <ul style="list-style-type: none"> <li>(a) If circuit breaker is ON, proceed to step 2.</li> <li>(b) If circuit breaker is OFF, turn ON.</li> <li>(c) If circuit breaker trips repeatedly, notify power supply supervisor.</li> </ul> |



**Table 1-4. ORGANIZATIONAL TROUBLESHOOTING - Cont**

| MALFUNCTION                     | TEST OR INSPECTION                                      | CORRECTIVE ACTION   |
|---------------------------------|---|---|
| 4. NO POWER TO EQUIPMENT - Cont | Step 2. Check circuit breaker input for 120 V ac.       | (a) If input voltage is present, proceed to step 3.<br>(b) If input voltage is not present, refer to direct/general support maintenance for repair or replacement of defective wiring.        |
|                                 | Step 3. Check circuit breaker output for 120 V ac.      | (a) If output voltage is present, proceed to step 4.<br>(b) If output voltage is not present, refer to direct/general support maintenance for circuit breaker replacement (paragraph 1-20.5). |
|                                 | Step 4. Remove receptacle and check for 120 V ac input. | (a) If present, replace receptacle (paragraph 1-16.6).<br>(b) If not present, refer to direct/general support maintenance for repair or replacement of defective wiring.                      |

**1-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the Rectifier I Section. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE   | PARAGRAPH |
|---|-----------|
| Replace Fluorescent Lamp Ballast . . . . .        | 1-16.1    |
| Replace Radio Frequency (RF) Filter . . . . .     | 1-16.2    |
| Replace Fluorescent Lamp Switch . . . . .         | 1-16.3    |
| Replace On/Off Switch . . . . .                   | 1-16.4    |
| Replace Blackout/Dome Light Microswitch . . . . . | 1-16.5    |
| Replace Receptacle . . . . .                      | 1-16.6    |
| Replace Wire Molding . . . . .                    | 1-16.7    |
| Repair Telephone Binding Post Assembly . . . . .  | 1-16.8    |
| Replace Exhaust Fan . . . . .                     | 1-16.9    |
| Replace Exhaust Fan Cover . . . . .               | 1-16.10   |
| Replace Emergency Light Assembly . . . . .        | 1-16.11   |
| Repair Blackout Curtain . . . . .                 | 1-16.12   |
| Repair Van Body Skin (Temporary) . . . . .        | 1-16.13   |
| Replace Tiedown Socket . . . . .                  | 1-16.14   |
| Repair Level Indicator . . . . .                  | 1-16.15   |
| Replace Air Vent Screen . . . . .                 | 1-16.16   |
| Replace Air Vent Cover . . . . .                  | 1-16.17   |
| Repair Personnel Ladder . . . . .                 | 1-16.18   |

1-16.1 Replace Fluorescent Lamp Ballast.

MOS: 83FJ6, Reproduction Equipment Repairer

416, Topographic Instrument Repair Specialist

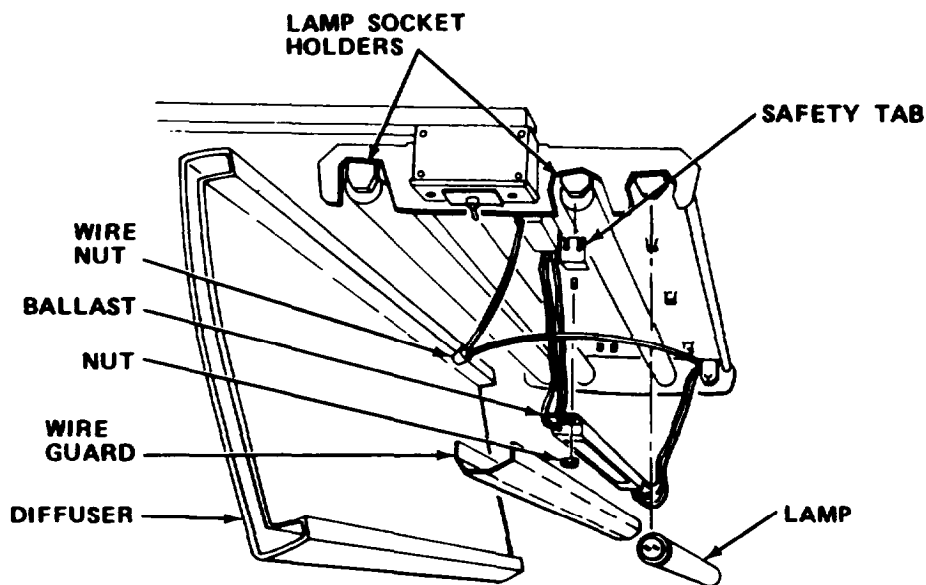
TOOLS: Flat Tip Screwdriver  
 1/4 in. Wrench  
 1/4 in. Drive Socket Set  
 Scribe

SUPPLIES: Lamp Ballast  
 Wire Ties

**WARNING**

Death or serious injury may occur unless overhead light circuit breaker and main circuit breaker are turned off before working on light fixture.

- a. Turn off overhead light, circuit breaker and main circuit breaker.



- b. Remove diffuser from light fixture.
- c. Remove safety tabs and lamps. Place in diffuser.
- d. Squeeze light wire guard and remove.
- e. Remove wire ties as required.
- f. Tag wires from ballast for reference.

- g. Disconnect ballast wire from wire nut connection.
- h. Pry out lamp socket holder with flat tip screwdriver.
- i. Using scribe, depress wire clips and disconnect ballast wiring.
- j. Remove nut and defective ballast.
- k. Install new ballast and connect wires to corresponding lamp socket holders.
- l. Secure with-nut.
- m. Reconnect ballast wire to wire nut connection.
- n. Remove tags.
- o. Install new wire ties.

**NOTE**

Be sure wires are free of kinks and do not interfere with placement of wire guard.

- p. Reinstall wire guard.
- q. Reinstall lamp and safety tabs.
- r. Reinstall diffuser.
- s. Turn on overhead light circuit breaker and main circuit breaker.

1-16.2 Replace Radio Frequency (RF) Filter.

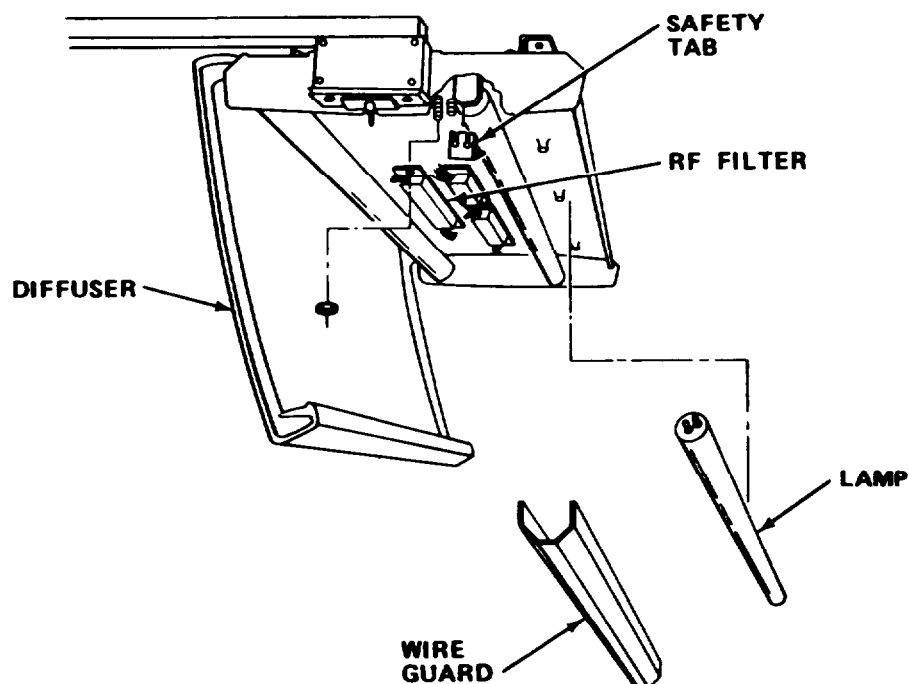
MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
1/4 in. Wrench  
1/4 in. Drive Socket SetSUPPLIES: RF Filter  
Wire Ties**WARNING**

Death or serious injury may occur unless overhead light switch is turned OFF before working on light fixture.

- a. Turn overhead light switch OFF.



- b. Remove diffuser from light fixture.  
c. Remove safety tabs and lamps. Place in diffuser.  
d. Squeeze light wire guard and remove.

- e. Remove wire ties as required.
- f. Tag wires to filter.
- g. Remove wire nuts and disconnect filter wires.
- h. Remove nuts and defective filter.
- i. Install new filter. Secure with nuts.
- j. Reconnect filter wires and secure with wire nuts.
- k. Remove tags.
- l. Install new wire ties.

**NOTE**

Be sure wires are free of kinks and do not interfere with placement of wire guard.

- m. Reinstall wire guard.
- n. Reinstall lamps and safety tabs.
- o. Reinstall diffuser.
- p. Turn on light switch.

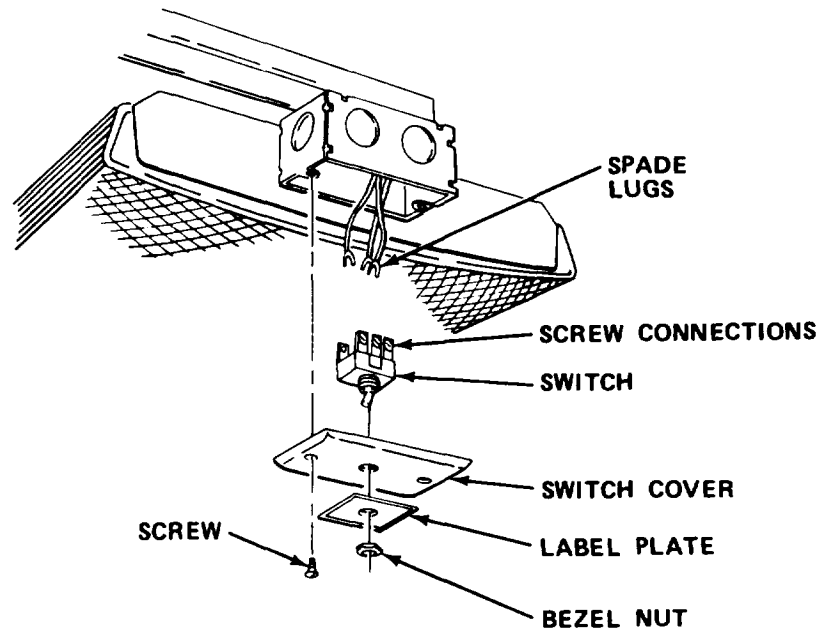
1-16.3 Replace Fluorescent Lamp Switch.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
 Needle Nose Pliers  
 Flashlight

SUPPLIES: Switch Assembly

**WARNING**

Death or serious injury may occur if lighting circuit breaker is not turned off before working on lamp assembly.

**NOTE**

Alternate lighting is required to perform this task.

- a. Turn circuit breaker OFF.
- b. Remove bezel nut.
- c. Note notch on label plate and remove label plate.
- d. Loosen screws.

**NOTE**

Note position of cover and reinstall as noted.

- e. Remove cover plate.
- f. Tag and disconnect wires from defective switch.
- g. Install new switch and connect wires.
- h. Insert switch through cover plate and label plate.

**NOTE**

Be sure label plate is in same direction as when removed. Secure with bezel nut.

- i. Aline cover plate with holes and secure with screws.
- j. Turn circuit breaker ON.



1-16.4 Replace On/Off Switch.

MOS: 83FJ6, Reproduction Equipment Repairer  
 or  
 41B, Topographic Instrument Repair Specialist

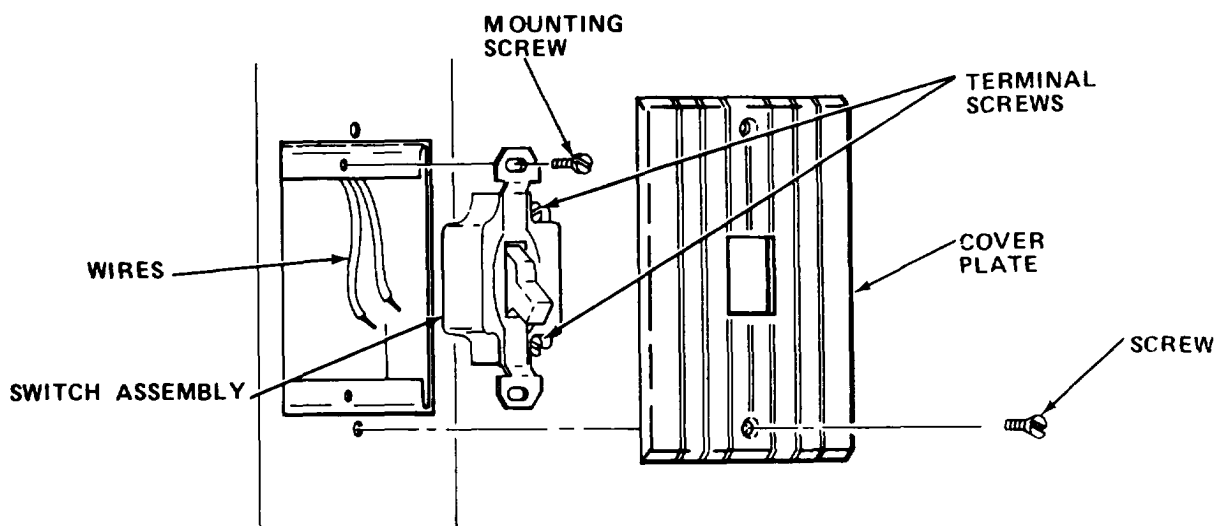
TOOLS: Flat Tip Screwdriver

SUPPLIES: Switch

**WARNING**

Death or serious injury may occur if switch circuit breaker is not turned off before working on switch.

- a. Turn off appropriate circuit breaker.



- b. Remove screws.
- c. Remove cover plate.
- d. Remove mounting screws.
- e. Pull switch assembly from wire guide to gain access to wires.
- f. Loosen terminal screws; then disconnect wires.
- g. Install new switch.

- h. Reconnect wires.
- i. Guide switch into wire guide, alining holes.

**NOTE**

Be sure wires are not kinked or strained.

- j. Reinstall mounting screws.
- k. Reinstall cover plate and secure with screw.
- l. Turn on switch circuit breaker.

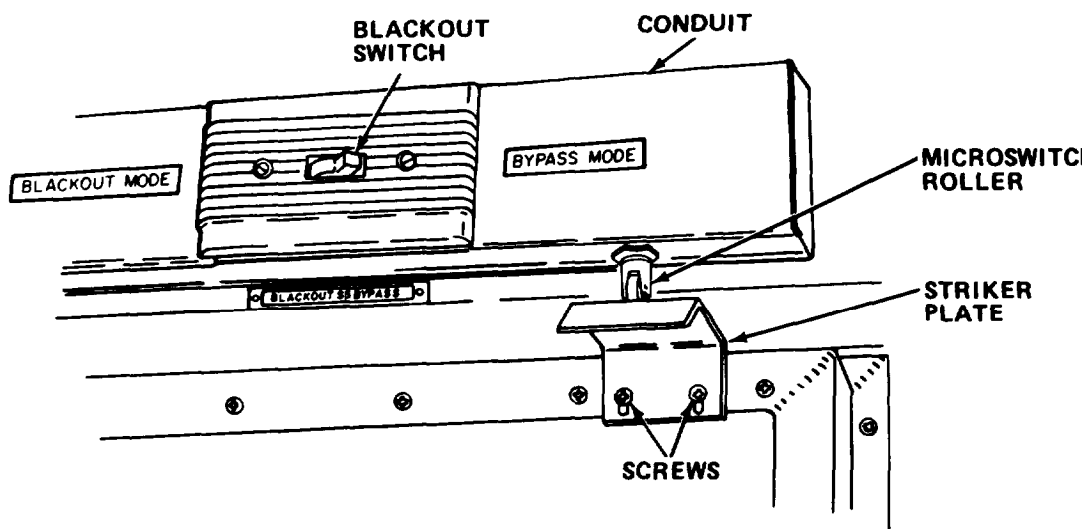
1-16.5 Replace Blackout/Dome Light Microswitch

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
6 in. Adjustable Wrench

SUPPLIES: Microswitch

**WARNING**

Death or serious injury may occur from electrical shock unless power is off before servicing.

- a. Turn off blackout/dome light circuit breaker.
- b. Remove conduit cover.
- c. Remove nut and pull out switch to expose wiring.
- d. Disconnect wires from defective switch.
- e. Connect wires to new switch.
- f. Install switch and secure with nut.
- g. Adjust striker plate until plate contacts roller.
- h. Reinstall conduit cover.
- i. Turn *on* circuit breaker.

1-16.6 Replace Receptacle.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

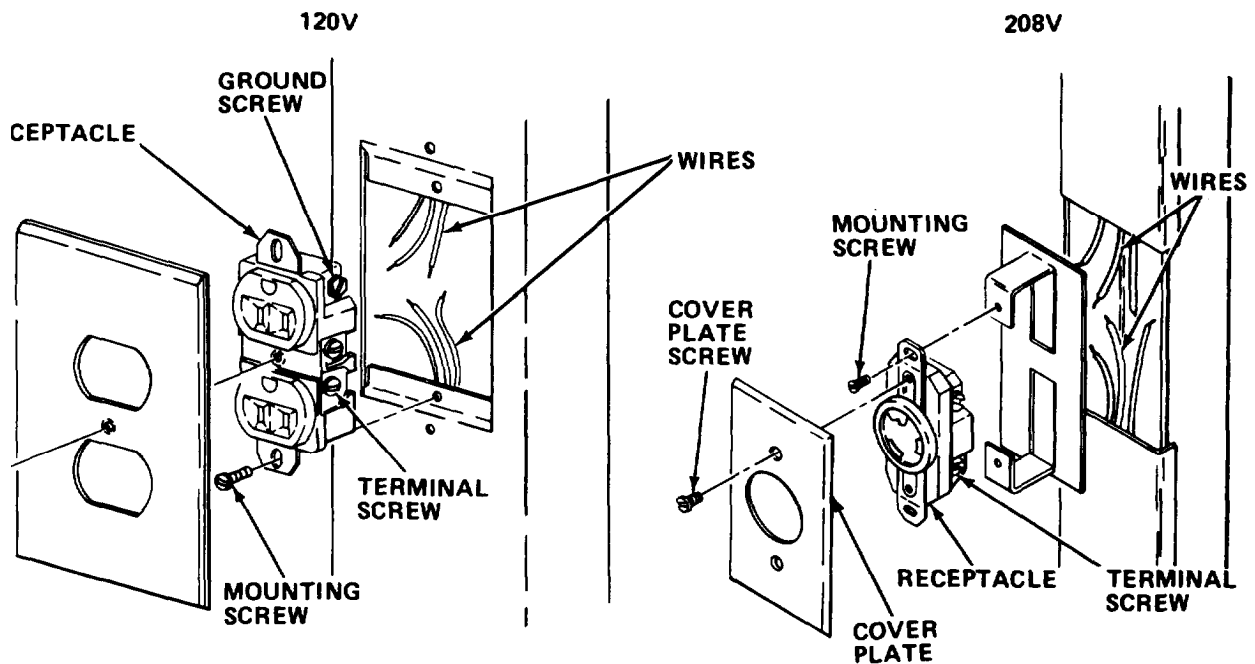
TOOLS: Flat Tip Screwdriver

SUPPLIES: Receptacle

**WARNING**

Death or serious injury may occur if receptacle circuit breaker is not turned off before working on receptacle.

- a. Turn off receptacle circuit breaker.



- b. Remove cover plate screws.
- c. Remove cover plate.
- d. Remove mounting screws.
- e. Withdraw receptacle to gain access to wires.
- f. Loosen terminal screws and ground screw. Then disconnect wires.
- g. Reconnect wires. Connect green (ground) wire first.

- h. Install new receptacle.
- i. Guide receptacle into wire guide.

**NOTE**

Be sure wires are not kinked or strained.

- j. Secure receptacle with screws.
- k. Reinstall cover plate. Secure with screw.
- l. Turn on receptacle circuit breaker.

1-16.7 Replace Wire Molding.

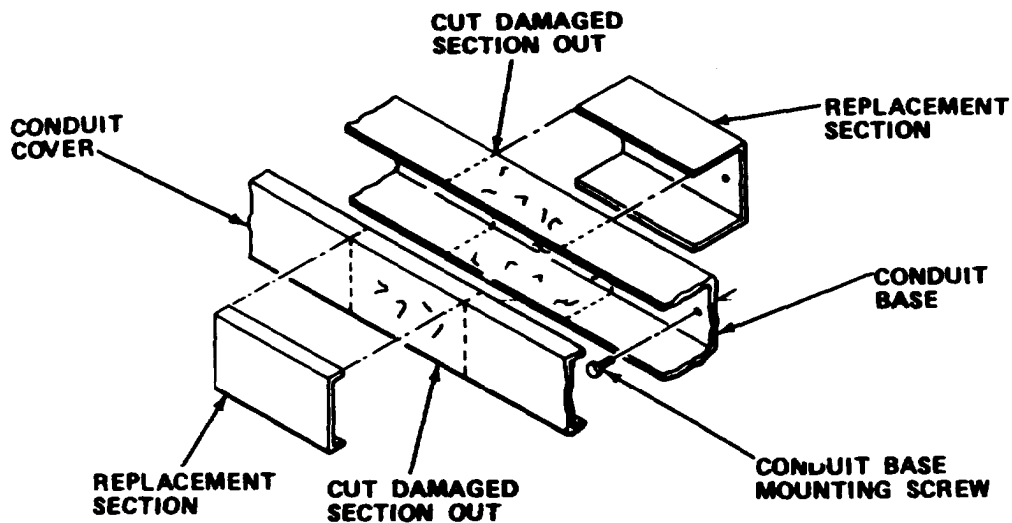
MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

- Hacksaw
- Flashlight
- Paint Brush
- Multimeter
- Drill and Bits
- File
- Machinist Rule

SUPPLIES: Paint (Item 23, Appendix E)  
 Cheesecloth (Item 7, Appendix E)  
 Conduit Base  
 Conduit Cover  
 Padlock



**WARNING**

Death or serious injury may occur from failure to turn off and padlock safety switch before repairing molding.

**NOTE**

Alternate lighting is required to perform this task.

- a. Turn off and padlock safety switch.
- b. Remove conduit cover.
- c. Inspect wires for damage.

**NOTE**

Refer to direct support maintenance for wiring repair if necessary.

- d. Loosen wiring and carefully pull it from the entire base section.
- e. Remove screws and base from wall.
- f. Mark and measure damaged area on molding. Record measurement.
- g. Cut damaged area from molding.
- h. Cut section from new molding to the length recorded in step f.
- i. Using damaged area as a template, mark mounting holes on new piece.
- j. With a number 25 drill bit, drill holes in new molding.
- k. With file, remove all burred edges.
- l. Paint base section as required.
- m. Reinstall conduit base on wall with screws.
- n. Carefully place wiring back in conduit base.
- o. Reinstall cover on base.
- p. Test wiring for continuity between power wires and conduit. If there is continuity, determine and correct grounding fault.
- q. Test wiring with power on.

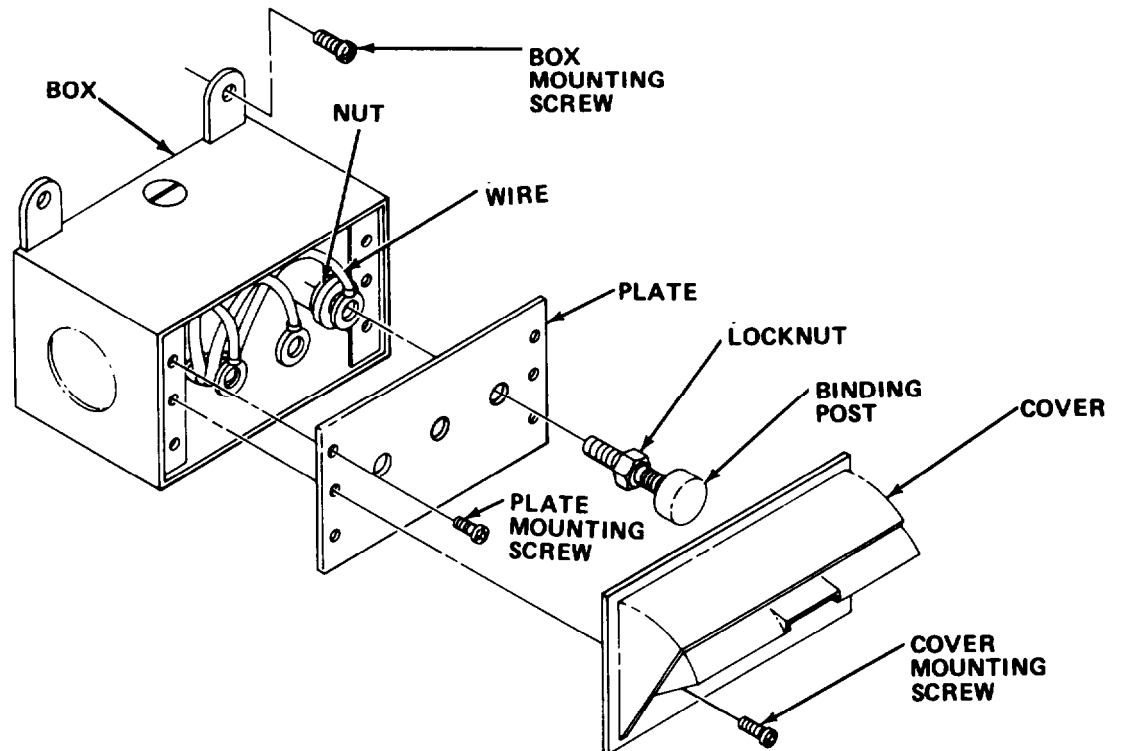
1-16.8 Repair Telephone Binding Post Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver  
1/2 in. Combination Wrench

SUPPLIES: Binding Post Box  
Binding Posts



- a. Remove cover mounting screws. Remove cover.
- b. Remove plate mounting screws to gain access to back of plate.
- c. Tag wires for identification.
- d. Remove nuts and wires from binding posts.
- e. If required, remove box mounting screws and replace box.
- f. Replace any defective binding posts. Secure wires to new posts and remove tags.
- g. Reinstall box assembly and plate, and secure plate with screws.
- h. Secure cover with screws.

1-16.9 Replace Exhaust Fan.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument, Repair Specialist

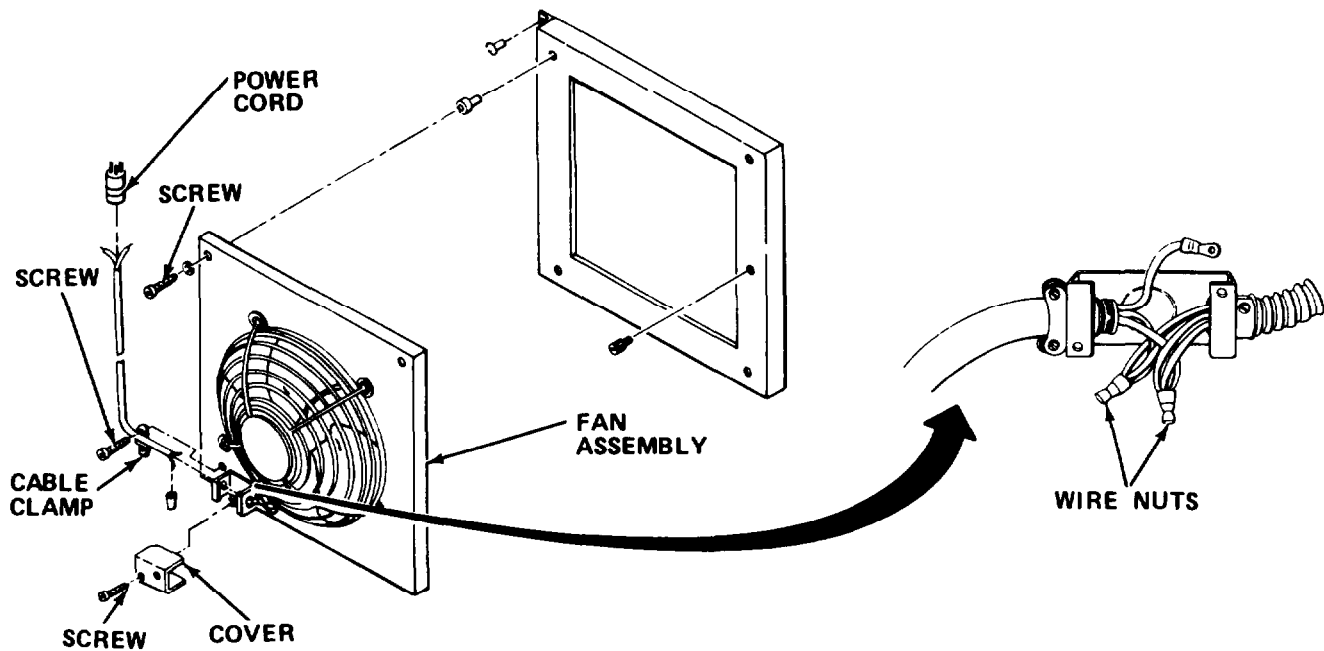
TOOLS: Flat Tip Screwdriver  
Cross Tip Screwdriver  
Wire Cutters

SUPPLIES: Fan Assembly  
Wire Nuts  
Power Cord

**WARNING**

Death or serious injury may occur if power is left on. Turn fan switch OFF and unplug power cord before working on ventilation fan.

- a. Unplug power cord.



- b. Remove screws and place fan assembly on work surface.  
c. Loosen screws on cable clamp.  
d. Remove screws and cover.  
e. Tag wires and cut connectors from wires.



- f. Remove power cord from defective fan assembly.
- g. Install new fan.
- h. Install new power cord.
- i. Connect wires with wire nuts and remove tags.
- j. Tighten cable clamp screws.
- k. Reinstall cover. Secure with screws.
- l. Reinstall fan assembly. Secure with screws.
- m. Plug in power cord.

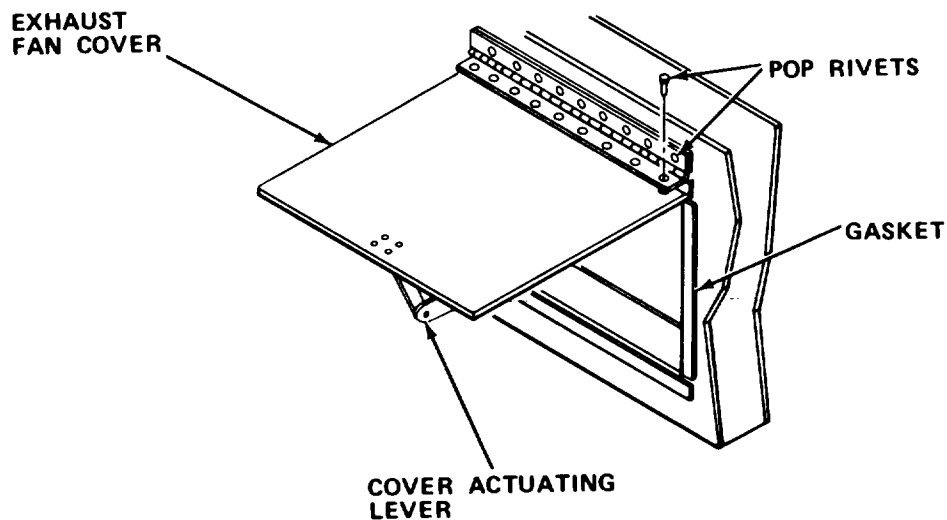
1-16.10 Replace Exhaust Fan Cover.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Drill and Bits  
 Pop Rivet Gun  
 Scraper

SUPPLIES: Pop Rivets  
 Exhaust Fan Cover  
 Gasket  
 Solvent P-D-680 (Item 31, Appendix E)  
 Adhesive (Item 2, Appendix E)  
 Cheesecloth (Item 7, Appendix E)  
 Impermeable Gloves  
 Goggles



- a. Drill pop rivets from hinged cover to remove cover.
- b. Remove defective cover and transfer mounted hardware to new cover.

**WARNING**

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent-impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).

- c. Scrape gasket off section and clean area with solvent P-D-680.
- d. Secure new gasket to section with adhesive.
- e. Aline exhaust fan cover and pop rivet to hinge.
- f. Test cover for tightness of closure.

1-16.11 Replace Emergency Light Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

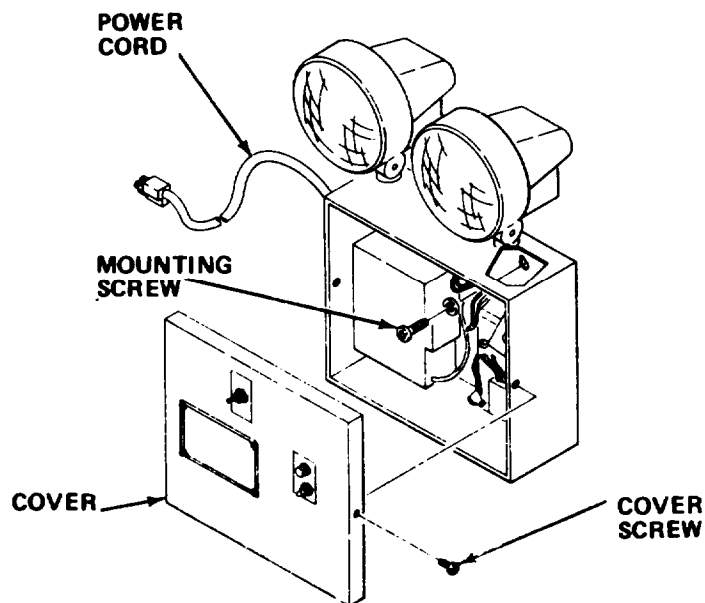
41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver

SUPPLIES: Emergency Light Assembly

**WARNING**

Death or serious injury may occur if power cord is not unplugged before servicing light.



- a. Unplug power cord.
- b. Remove cover screws. Move cover out of way.
- c. Remove mounting screws.
- d. Remove emergency light assembly.
- e. Install new emergency light assembly. Secure with screws.
- f. Secure cover with screws.
- g. Plug in power cord.

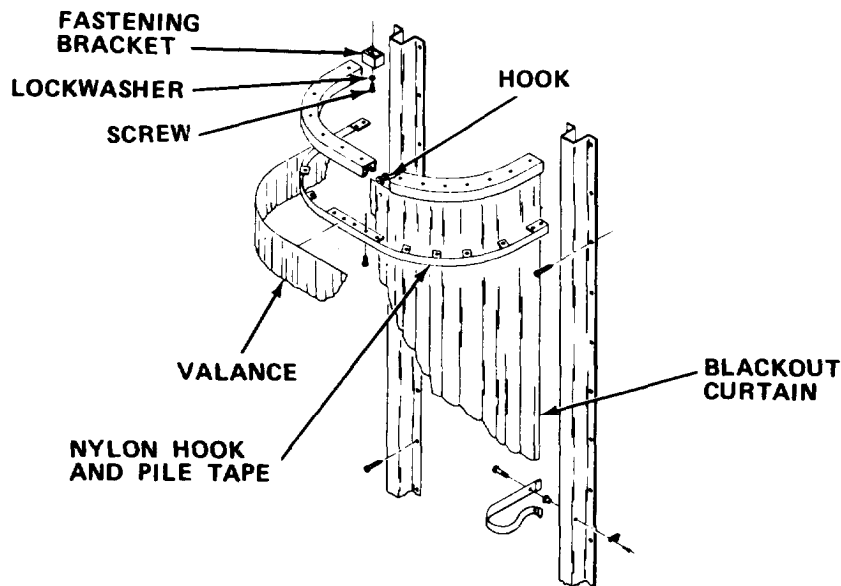
1-16.12 Repair Blackout Curtain.

MOS: 83FJ6, Reproduction Equipment Repairer

41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver

SUPPLIES: Hooks  
Valance  
Curtain  
Nylon Hook and Pile Tape  
Adhesive (Item 2, Appendix E)



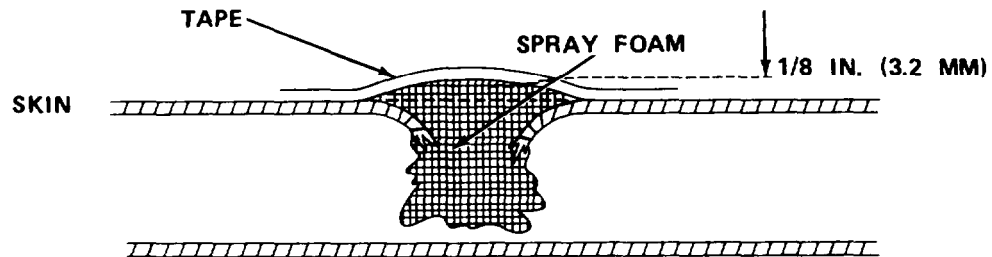
- a. Remove curtain from hooks.
- b. Pull curtain and valance from nylon hook and pile tape.
- c. Remove end screw, lockwasher, and fastening bracket from ceiling.
- d. Replace damaged hooks.
- e. Reinstall fastening bracket with hooks. Fasten with end screw and lockwasher.
- f. Glue loose nylon hook and pile tape to wall or bracket. Replace tape if worn out.
- g. Hook curtain to bracket.
- h. Attach valance.
- i. Check curtain for free movement.

1-16.13 Repair Van Body Skin (Temporary).

MOS: 52C, Utilities Equipment Repairer

TOOLS: Pliers  
Ball Peen Hammer  
Scissors or Utility Knife

SUPPLIES: Cloth Duct Sealing Tape (Item 35, Appendix E)  
Silicone Sealant (Item 29, Appendix E)  
Sprayfoam (Item 34, Appendix E)  
Cheesecloth, (Item 7, Appendix E)



- a. Bend broken edges of punctured skin inward into puncture hole. Do not attempt to remove fragments of skin by bending or pulling outward. Bend skin inward only enough to put broken edges below surface of unbroken skin.
- b. Remove any loose fragments of foam which are not now held in place by bent broken skin. Removing small pieces of foam or dust is more important than removing chunks.
- c. Using cloth slightly dampened with water, wipe area around puncture to remove any dirt or mud and wipe dry.
- d. Inject sprayfoam into puncture. Mound sprayfoam to about 1/8 in. (3.2 mm) above surface of unbroken skin. Apply bead of sealant about 1/4 in. (6.4 mm) wide over all cuts in skin leading out from puncture. Do not smooth out sealant.
- e. Plan how puncture is to be covered with tape before applying any tape. Length and width of tape, number of tape strips, overlapping, and how tape is applied will affect sealing capability of repair. Each piece of tape should extend about 1-1/2 in. (3.81 cm) beyond sealant it will cover. If this will require more than one strip of tape, tape should overlap about 1/2 in. (12.7 mm). If three or more strips of tape are required, center strip should be applied first.
- f. Holding it taut, apply tape perpendicular to panel skin. Do not apply with rolling motion either end-to-end or center-to-ends. Do not rub each strip in place individually. Apply all strips lightly with proper overlap and rub into place.

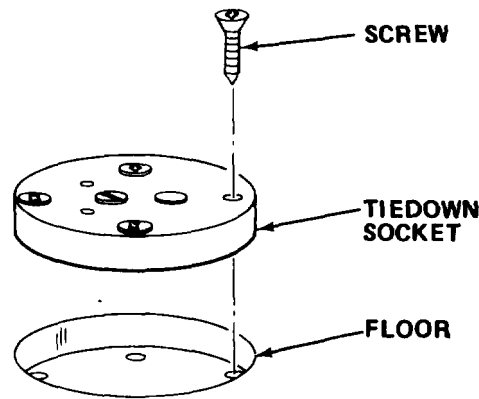
- g. If necessary, damaged tape can be replaced; however, it should be removed with careful peeling motion to avoid damage to sealant. If sealant also peels back, new sealant should be applied. Complete removal of old sealant is not necessary. Permanent repair by direct support, or higher category of maintenance, should be made as soon as possible.

1-16.14 Replace Tiedown Socket.

MOS: 83FJ6, Reproduction Equipment Repairer  
or  
41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver

SUPPLIES: Tiedown Socket



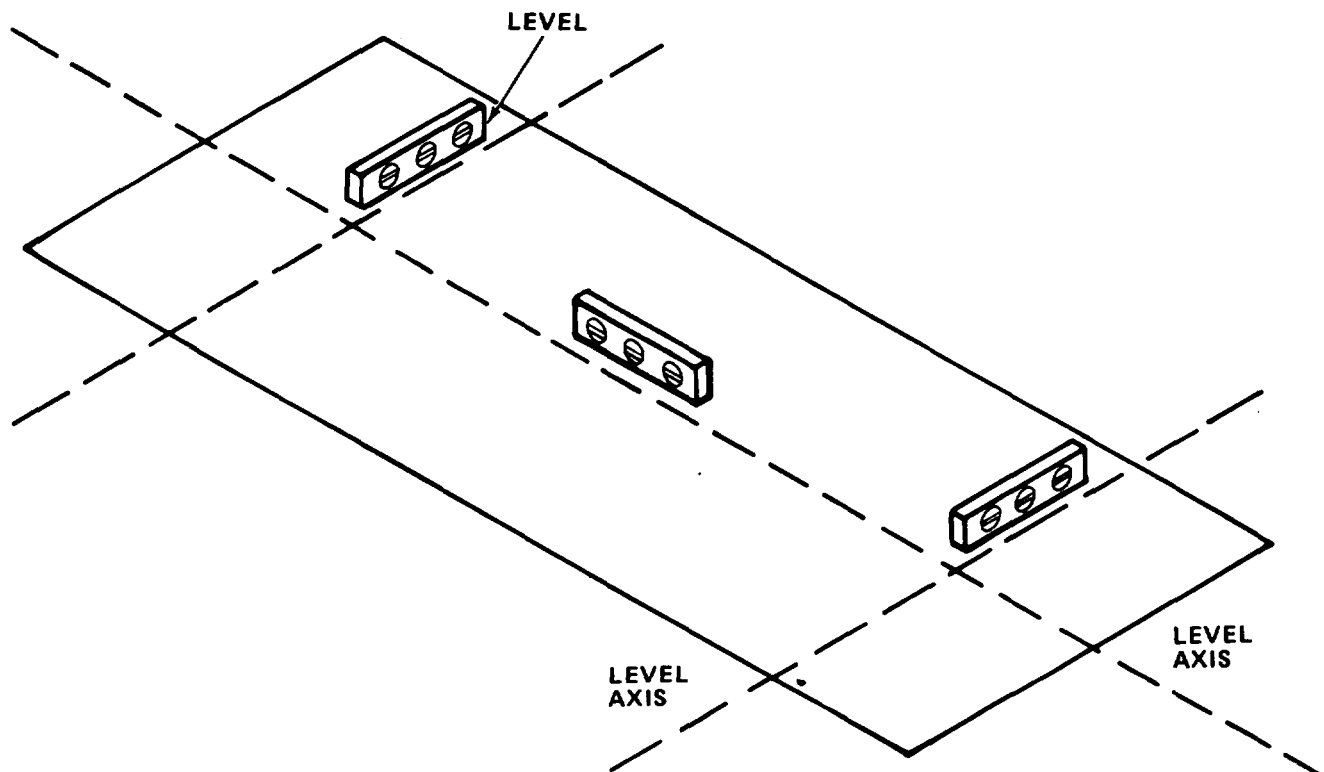
- a. Remove screws from tiedown socket.
- b. Pry defective socket from floor.
- c. Install new tiedown socket. Rotate new tiedown socket enough to avoid installing screws in old screw holes.
- d. Reinstall screws.

1-16.15 Repair Level Indicator.

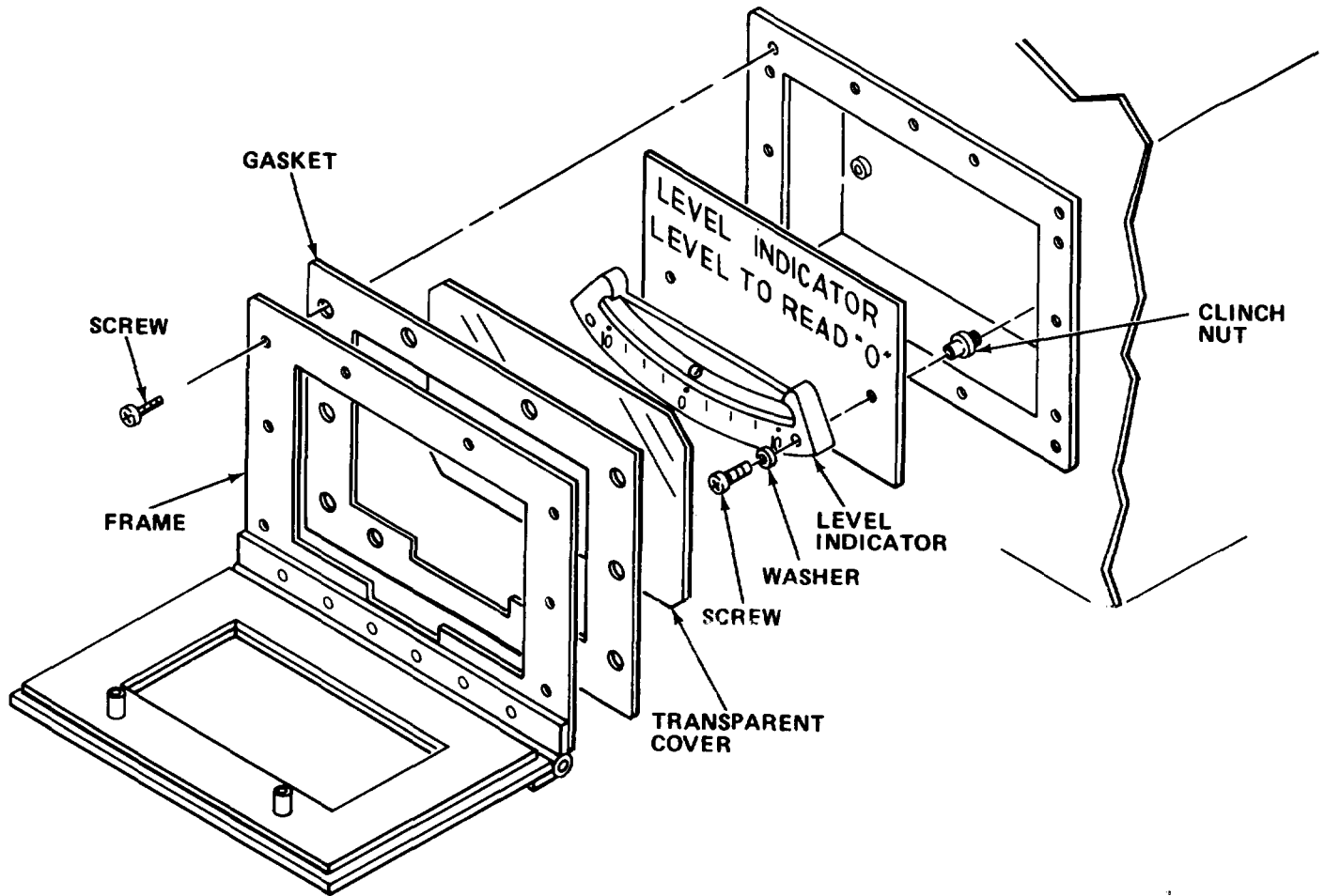
MOS: 83FJ6, Reproduction Equipment Repairer  
 or  
 41B, Topographic Instrument Repair Specialist

TOOLS: Carpenter's Level  
 Cross Tip Screwdriver  
 Knife, TL-29

SUPPLIES: Level Indicator  
 Gasket



- a. Level section using level indicators. Then confirm section is level by using carpenter's level on floor inside section.
- b. Adjust section leveling jacks until section is level as indicated by carpenter's level at front-rear and left-right at each end as shown in illustration.



- c. Loosen knurled screws and move cover away from level assembly.
- d. Remove screws and washers to release frame and gasket.
- e. Remove transparent cover.
- f. Remove screws and washers to remove level indicator.
- g. Replace level assembly and secure with screws and washers.
- h. Reinstall transparent cover.
- i. Install new gasket.
- j. Reinstall frame and secure with screws and washers.

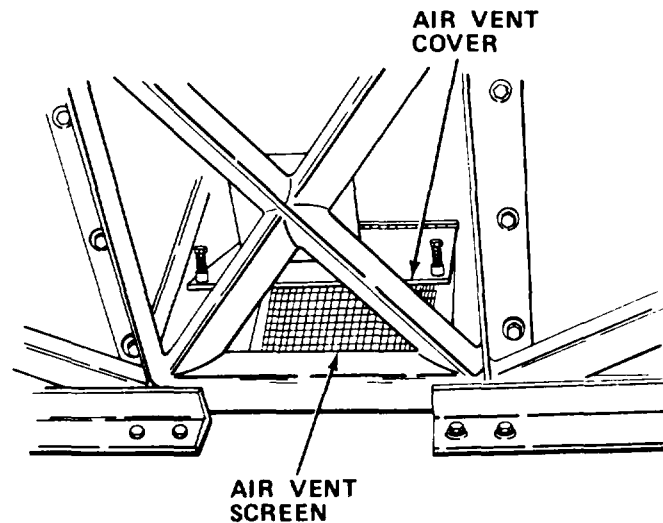


1-16.16 Replace Air Vent Screen.

MOS: 83FJ6, Reproduction Equipment Repairer  
o r  
41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver  
Scissors

SUPPLIES: Rubber Adhesive (Item 2, Appendix E)  
Nylon Screen (Item 28, Appendix E)



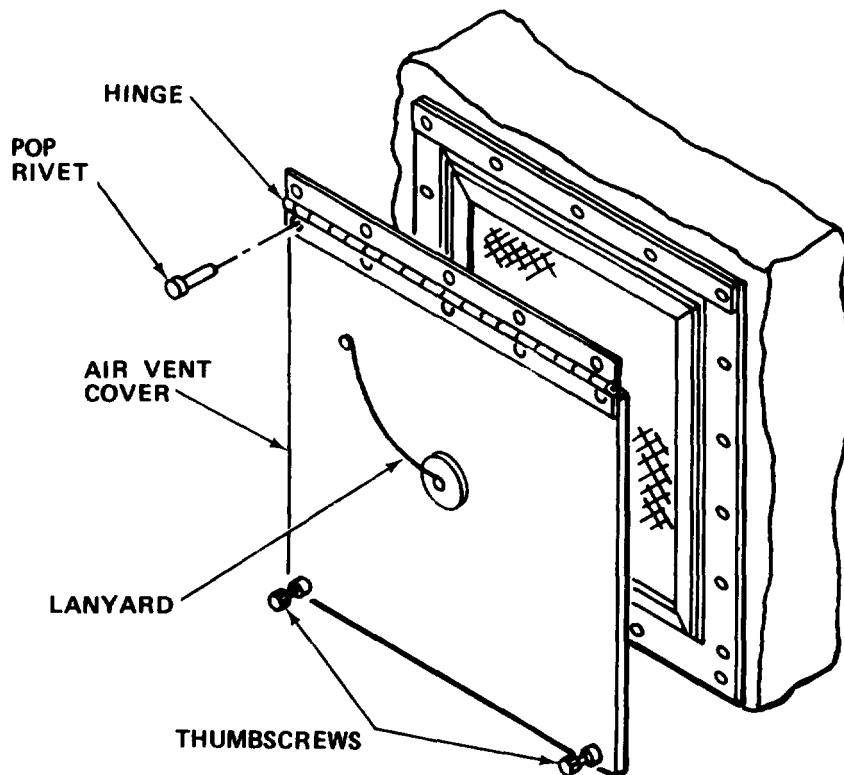
- a. Raise access cover and remove screws holding screen frame to section.
- b. Remove screen and frame.
- c. Clean all old screen material and adhesive from frame.
- d. Cut new screen material to size and attach to frame with adhesive.
- e. Reinstall frame to section and secure with screws. Lower cover.

1-16.17 Replace Air Vent Cover.

MOS: 83FJ6, Reproduction Equipment Repairer  
o r  
41B, Topographic Instrument Repair Specialist

TOOLS: Drill and Bits  
Pop Rivet Gun

SUPPLIES: Vent Cover  
Pop Rivets



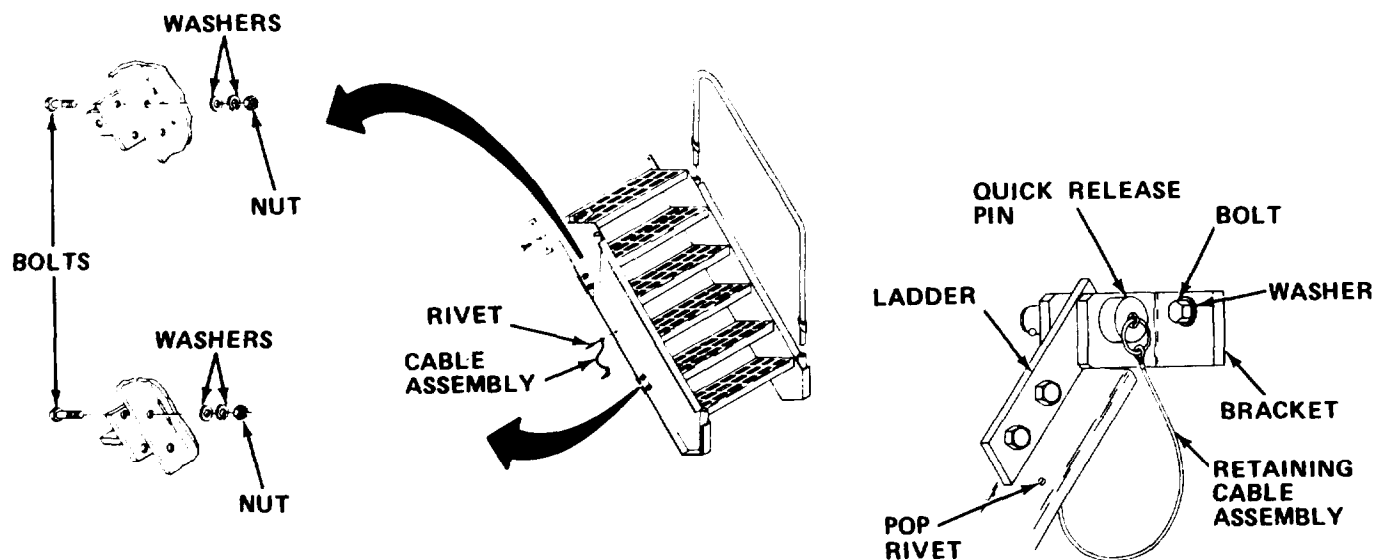
- a. Loosen thumbscrews.
- b. Drill pop rivets from hinge. Remove air vent cover.
- c. Aline holes and pop rivet new air vent cover to section.
- d. Tighten thumbscrews.

1-16.18 Repair Personnel Ladder.

MOS: 83FJ6, Reproduction Equipment Repairer  
 o r  
 41B, Topographic Instrument Repair Specialist

TOOLS: Drill and Bits  
 Pop Rivet Gun  
 9/16 in. Combination Wrench  
 8 in. Adjustable Wrench

SUPPLIES: Cable Assembly  
 Quick Release Pins  
 Pop Rivets  
 Mounting Brackets



- a. Remove ladder from mounting bracket.
- b. Remove bolts, washers, and nuts securing damaged mounting brackets to ladder.
- c. Remove damaged cable assembly from ladder by drilling out rivet.
- d. Reinstall or install new mounting brackets. Secure with bolts, washers, and nuts.
- e. Rivet new cable assembly to ladder.

**NOTE**

Be sure ladder mounting brackets fit section on rear door and under personnel doors.

- f. Reinstall ladder on mounting bracket.

#### 1-17. PREPARATION FOR STORAGE OR SHIPMENT.

a. Section may be stored or shipped either mounted on trailer chassis or unmounted. Preparation of trailer chassis is covered in TM 5-2330-305-14 and should be referred to when trailer-mounted section is prepared for storage and shipment. TM 5-4120-367-14 must be reviewed for instructions covering air conditioner/heater.

b. Remove consumable supplies that have limited shelf life or broken seals. Replace missing items and be sure that all remaining consumable supplies are at authorized levels. Be sure all major components are operational.

c. Remove all unauthorized or personal equipment from section.

d. Move all classified material or sensitive data to proper storage. Complete all accountability and/or transfer of documents.

e. Refer to Preparation for Movement (paragraph 1-6.2) and follow applicable steps and any additional steps directed by proper authority.

### Section V DIRECT/GENERAL SUPPORT MAINTENANCE

#### 1-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.

1-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

1-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

1-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering direct/general support maintenance for this equipment.

1-18.4 Electrical System. Direct/general support level of maintenance for the repair of the section's electrical system will consist of electrical wiring repair using standard electrical wiring repair procedures.

#### 1-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES.

a. Direct/general support troubleshooting procedures cover the most common malfunctions that may be repaired at the direct/general support level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by lower level maintenance should be conducted in addition to the direct/general support troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the facing schematic or the foldout located at the end of this manual for further fault analysis.

**Table 1-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING**

| MALFUNCTION                                       | TEST OR INSPECTION                                     | CORRECTIVE ACTION                      |
|---|--|--|
| 1. PERSONNEL/CARGO DOORS DO NOT CLOSE COMPLETELY. | Step 1. Check that latch rollers rotate freely.        | Replace latches (paragraph 1-20.2).    |
|   | Step 2. Check to see if latch rods are bent.           | Replace latch rods (paragraph 1-20.2). |
|   | Step 3. Check to see if door gasket is torn or broken. | Replace door gasket (paragraph 1-20.3) |
| 2. PERSONNEL/CARGO DOORS DO NOT LATCH PROPERLY.   | Check door latch for missing or damaged components.    | Replace door latch (paragraph 1-20.2)  |
| 3. AIR OR WATER ENTERS SECTION AROUND DOOR.       | Check to see if door gasket if worn or broken.         | Replace door gasket (paragraph 1-20.3) |

Table 1-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

4. RECEPTACLES DO NOT OPERATE BUT CIRCUIT BREAKERS ARE ON.

**WARNING**

Turn off main circuit breaker before inspecting or servicing circuit breakers or receptacles. Failure to do so may result in death or serious injury.

Step 1. Check to see if power cable is firmly connected to power entry panel.

Connect power cable.

Step 2. Check to see if voltage meter and frequency scale and INCORRECT PHASE or CORRECT PHASE lamp indicate necessary power.

Notify your supervisor for service of power supply at source.

5. CIRCUIT BREAKERS TRIP CONTINUALLY.

**WARNING**

Turn off and padlock safety switch before inspecting or servicing circuit breakers or receptacles. Failure to do so may result in death or serious injury.

Step 1. Check to see if receptacles are overloaded.

Reconnect equipment to different receptacles.

Step 2. Check to see if receptacles are damaged.

Replace receptacles (paragraph 1-16.6)

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**1-20. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering direct/general support maintenance functions for the Rectifier I Section. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

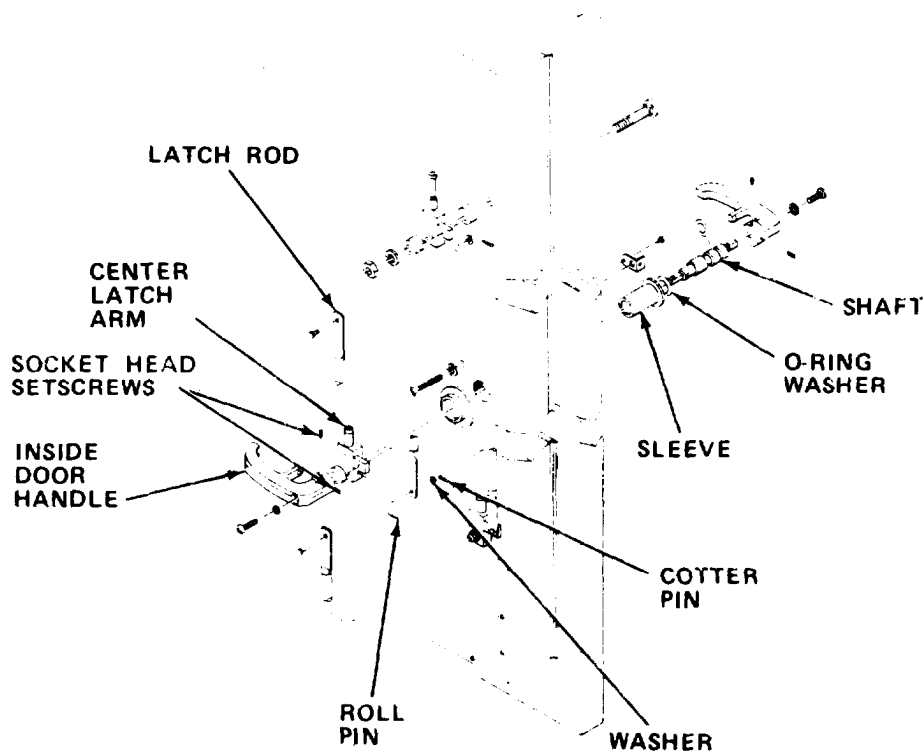
| PROCEDURE   | PARAGRAPH |
|---|-----------|
| Repair Personnel Door Handle. . . . .             | 1-20.1    |
| Replace Cargo Door Latch Assembly . . . . .       | 1-20.2    |
| Replace Personnel/Cargo Door Gasket . . . . .     | 1-20.3    |
| Replace Personnel/Cargo Door . . . . .            | 1-20.4    |
| Replace Circuit Breaker. . . . .                  | 1-20.5    |
| Repair Floor Covering . . . . .                   | 1-20.6    |
| Repair Van Body Skin (Permanent) . . . . .        | 1-20.7    |
| Replace Air Conditioner/Heater . . . . .          | 1-20.8    |
| Replace Air Conditioner Support Bracket . . . . . | 1-20.9    |
| Replace Ventilation Duct . . . . .                | 1-20.10   |

1-20.1 Repair Personnel Door Handle.

MOS: 63W, Wheel Vehicle Repairer

TOOLS: Cross Tip Screwdriver  
Needle Nose Pliers  
15/16 in. Combination Wrench  
Hammer  
Center Punch  
1/8 in. Hex Head Key Wrench

SUPPLIES: O-Ring Washer  
Sleeve  
Roll Pin  
Personnel Door Handle  
Cheesecloth (Item 7, Appendix E)  
Oil, Lubricating, General Purpose (Item 18, Appendix E)  
Hand Oiler  
Cotter Pin



- a. Loosen screw and socket head setscrews. Remove defective inside door handle.
- b. Remove cotter pin and pins from center latch arm assembly.
- c. Move latch rods out of way.



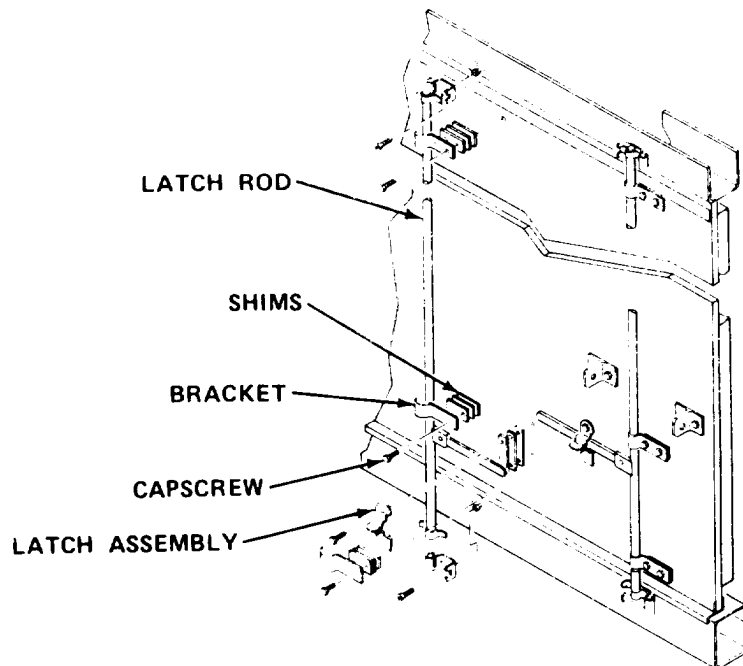
- d. Punch roll pin from center latch arm assembly and pull latch arm assembly from shaft.
- e. Withdraw latch and defective door handle.
- f. Inspect all components for wear.
- g. Replace worn O-ring washer and sleeve.
- h. Replace other worn components as needed.
- i. Reinstall latch and new door handle.
- j. Aline center latch arm assembly on shaft. Secure with new roll pin.
- k. Aline latch rods. Attach to latch arms with pins, washers, and new cotter pin.
- l. Reinstall new inside door handle.
- m. Lightly oil all moving parts. Wipe up surplus oil.

#### 1-20.2 Replace Cargo Door Latch Assembly.

MOS: 63W, Wheel Vehicle Repairer

TOOLS: 9/16 in. Combination Wrench

SUPPLIES: Cargo Door Latch Assembly



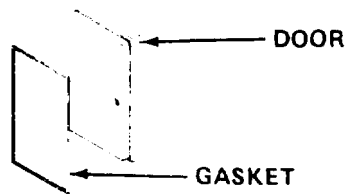
- a. Unlock latch.
- b. Remove capscrews and washers from brackets. Remove brackets and shims.
- c. Remove defective latch assembly and latch rod.
- d. Install new latch assembly and latch rod.
- e. Reinstall shims, brackets, washers, and capscrews.
- f. Check movement of latch rod and latch assembly. Lock latch.

1-20.3 Replace Personnel/Cargo Door Gasket.

MOS: 63W, Wheel Vehicle Repairer

TOOLS: Knife

SUPPLIES: Vinyl Gasket  
Adhesive (Item 3, Appendix E)  
Solvent P-D-680 (Item 31, Appendix E)  
Impermeable Gloves  
Goggles  
Cheesecloth (Item 7, Appendix E)



- a. Open door completely and secure in open position.

**WARNING**

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent-impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138° F (38°C to 59°C).

- b. Remove defective gasket by prying gasket from door. Scrape traces of gasket and adhesive from door. Wash with solvent P-D-680.
- c. Coat gasket area on door with adhesive.
- d. Firmly press new gasket onto door.
- e. Wipe excess adhesive from gasket.
- f. Close door and wipe excess adhesive from door and frame.
- g. Allow adhesive to dry before using door.

#### 1-20.4 Replace Personnel/Cargo Doors.

MOS: 63W, Wheel Vehicle Repairer

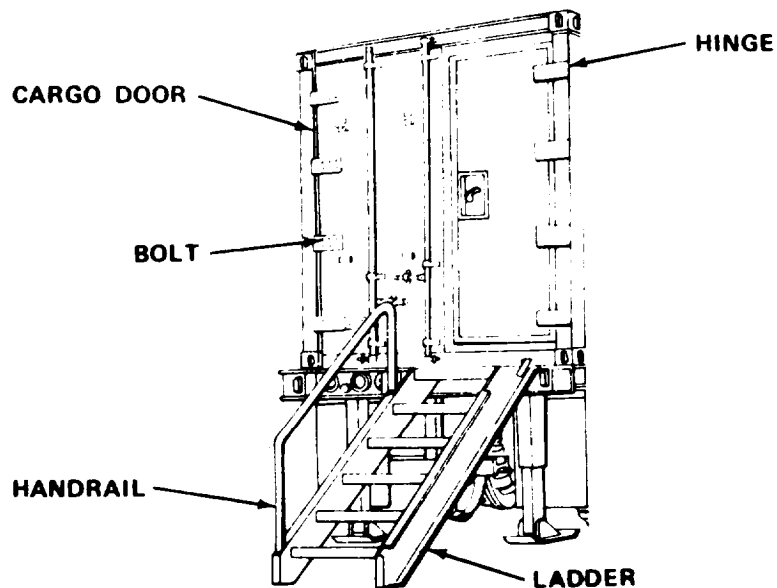
PERSONNEL: Two persons are required to perform this procedure.

TOOLS: Pop Rivet Gun  
Electric Drill and Bits  
Hoist  
3/4 in. Combination Wrench  
Paint Brush

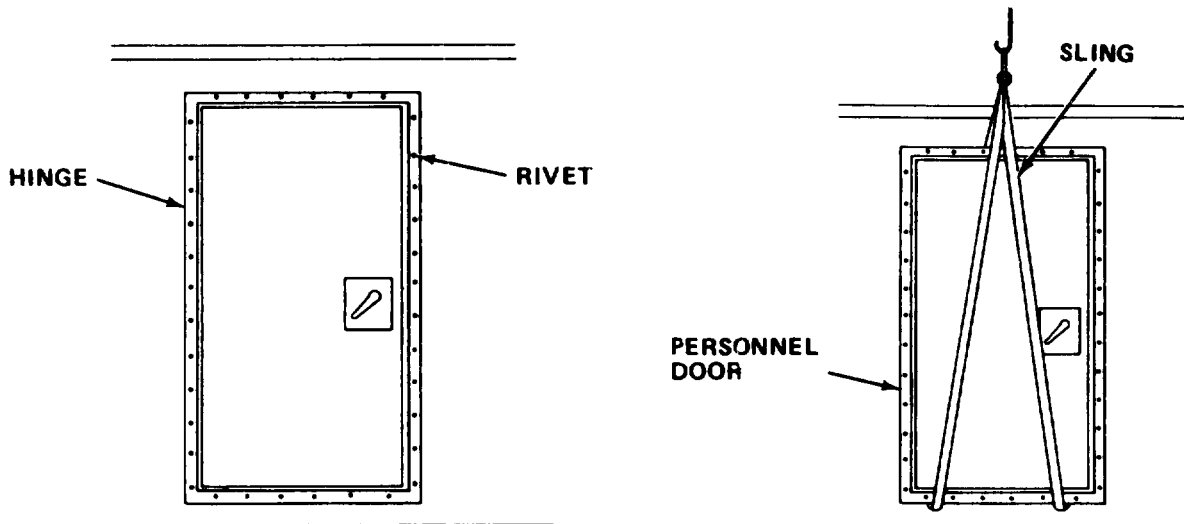
SUPPLIES: Personnel/Cargo Door  
Pop Rivets  
Vinyl Gasket  
Paint (Items 22, 22A and 226 Appendix E)  
Paint (Item 23, Appendix E)  
Adhesive (Item 3, Appendix E)  
Cheesecloth (Item 7, Appendix E)

#### WARNING

To prevent personal injury or equipment damage, do not attempt to remove doors unless suitable lifting equipment and hoist are available.



- a. Remove handrails and ladders if rear cargo door is to be replaced.
- b. Unlock and open door to be replaced.



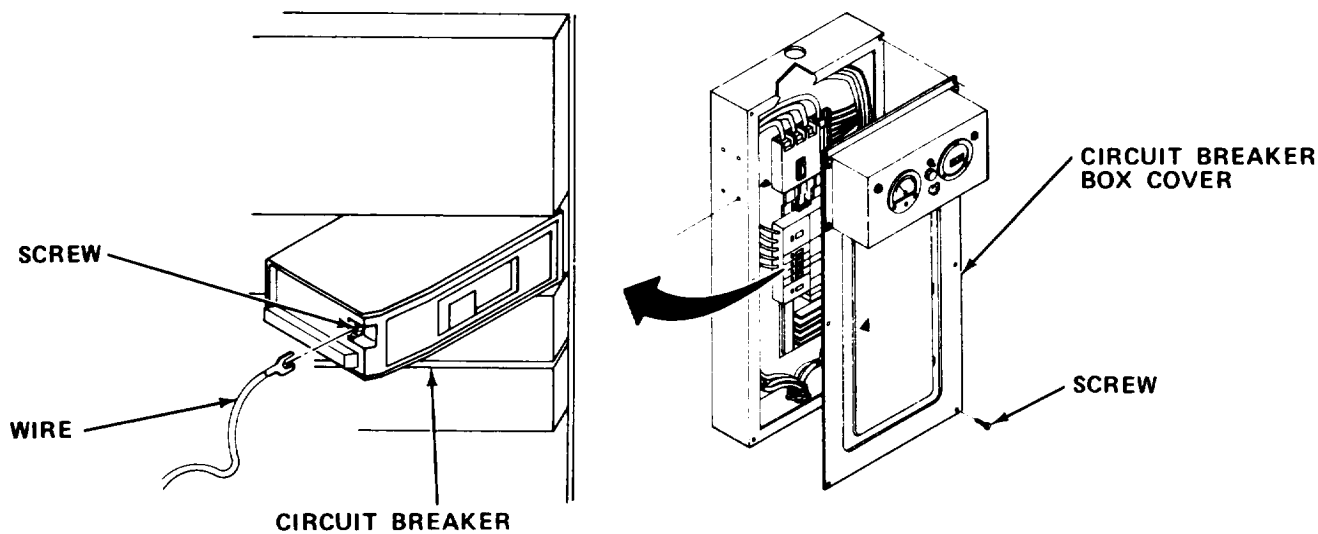
- c. Place sling around door and put a slight strain on hoist to remove weight from hinges.
- d. Remove bolts from hinges on rear personnel door. On side personnel door, drill out pop rivets from hinge. Remove hinges from door.
- e. Remove damaged door using hoist.
- f. Install new door using hoist.
- g. Reinstall hinges on rear personnel door. Secure with bolts. Reinstall hinges on side personnel door. Secure with pop rivets.
- h. Remove sling from door.
- i. Install new gaskets on door after it is mounted (paragraph 1-20.3).
- j. Repaint as needed.
- k. Close and lock door.

1-20.5 Replace Circuit Breaker.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Multi meter

SUPPLIES: Circuit Breaker

**WARNING**

Turn off and padlock safety switch. Turn off all individual circuit breakers before inspecting or servicing circuit breakers. Failure to do so may result in death or serious injury.

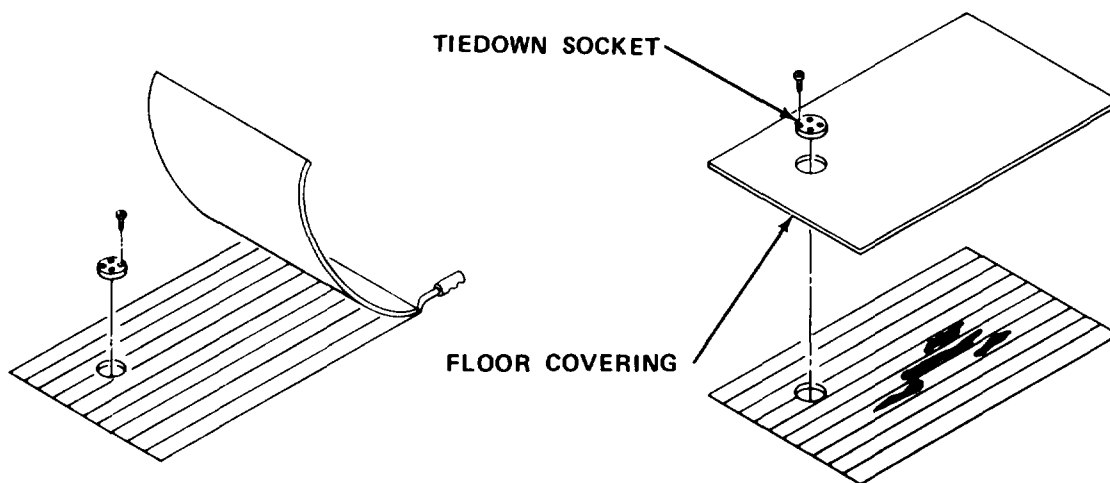
- a. Turn off and padlock safety switch. Turn off individual circuit breakers.
- b. Remove circuit breaker box cover.
- c. Use multimeter to make sure voltage is not present.
- d. Remove defective circuit breaker by pushing and snapping out of place.
- e. Tag and remove wires from defective circuit breaker.
- f. Pull circuit breaker from panel.
- g. Reconnect wires to new circuit breaker. Secure wires with screws.
- h. Install new circuit breaker by pushing and snapping into place.
- i. Reinstall circuit breaker box cover.
- j. Remove padlock and turn on safety switch and individual circuit breakers.

1-20.6 Repair Floor Covering.

MOS: 52C, Utilities Equipment Repairer

TOOLS: Utility Knife  
Cross Tip Screwdriver  
Scraper  
Straightedge

SUPPLIES: Vinyl Floor Covering  
Epoxy Resin (Item 26, Appendix E)  
Floor Patch (Item 13, Appendix E)  
Cheesecloth (Item 7, Appendix E)  
Adhesive (Item 3, Appendix E)



- a. Cut a rectangular area from damaged floor covering.
- b. Remove tiedown socket. Remove damaged floor covering.
- c. Cut new floor covering to fit. Apply adhesive to floor. Press down new floor covering.
- d. Reinstall tiedown socket.

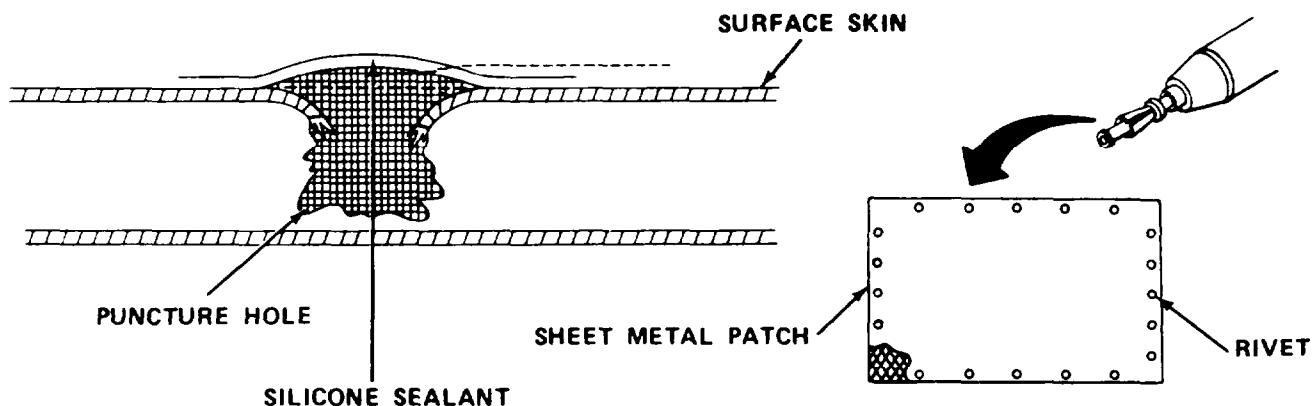
1-20.7 Repair Van Body Skin (Permanent).

MOS: 63W, Wheel Vehicle Repairer

TOOLS: Pop Rivet Gun  
Electric Drill and Bits  
Paint Brush

SUPPLIES: Pop Rivets  
Sprayfoam (Item 34, Appendix E)  
Silicone Sealant (Item 29, Appendix E)  
Sheet Metal  
Paint (Items 22, 22A and 22B Appendix E)  
Cheesecloth (Item 7, Appendix E)

- a. Bend broken edges of skin inward into puncture hole. Do not attempt to remove fragments of skin by bending or pulling out.
- b. Remove any loose fragments of foam.
- c. Use cloth dampened with water to clean area around puncture. Wipe dry.
- d. Inject sprayfoam into puncture. Fill to 1/8 in. (3.2 mm) above surface of unbroken skin. Apply sealant to cracks leading to puncture.



- e. Prepare sheet metal patch large enough to cover damaged area with overlap.
- f. Place patch over damaged area and mark all around edges of patch.
- g. Drill holes 1 in. (25.4 mm) apart.
- h. Apply sealant to edges of patch.
- i. Apply patch to van body.
- j. Install pop rivets beginning at center of each side. Rivets should be placed 1 in. (25.4 mm) apart.
- k. Paint as needed.

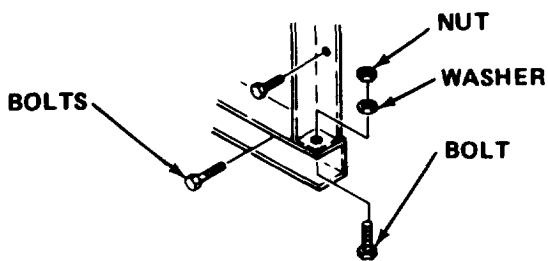
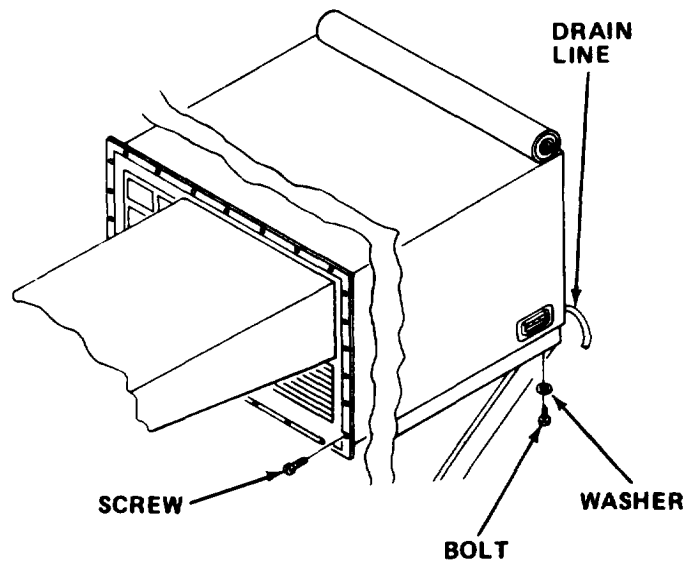
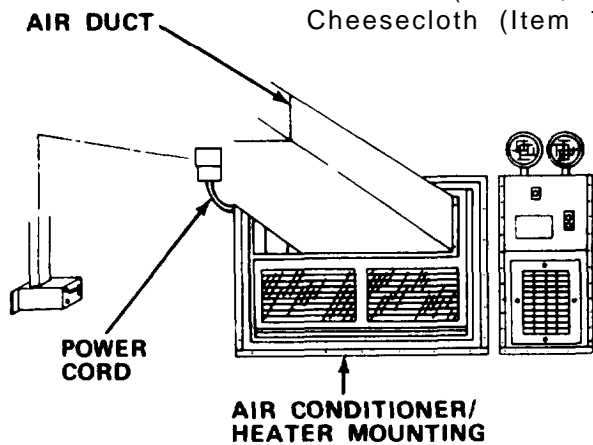
1-20.8 Replace Air Conditioner/Heater.

MOS: 63W, Wheel Vehicle Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: Cross Tip Screwdriver  
Lifting Equipment  
8 in. Adjustable Wrench  
7/16 in. Combination Wrench

SUPPLIES: Air Conditioner/Heater  
Solvent P-D-680 (Item 31, Appendix E)  
Gasket  
Sealant (Item 29, Appendix E)  
Adhesive (Item 3, Appendix E)  
Cheesecloth (Item 7, Appendix E)



**WARNING**

- Use hoist or proper lifting equipment to replace air conditioner/heater. Failure to do so may result in death or serious injury.
- Turn off air conditioner/heater circuit breaker and unplug power cord. Failure to do so may result in death or serious injury.



- a. Turn off air conditioner/heater circuit breaker. Unplug or disconnect power cord as appropriate.
- b. Remove screws holding air duct to air conditioner/heater.
- c. Remove nut, washer, and screw from each corner of air conditioner/heater mounting. Remove screws securing mounting to section.
- d. Disconnect drain line from air conditioner/heater.
- e. Attach sling to lifting handles. Raise hoist enough to remove slack from sling.
- f. Remove mounting bolts and washers.
- g. Slide out air conditioner until other lifting handles are free. Attach sling to handles.
- h. Raise defective air conditioner/heater with hoist until unit is free from brackets and section.
- i. Place air conditioner/heater on flat-bed truck or pallet.

**WARNING**

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent-impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38°C to 59°C).

- j. Clean sealant from opening using dry cleaning solvent P-D-680.
- k. Remove damaged gasket and replace with new gasket.
- l. Raise air conditioner/heater until it rests on air conditioner/heater brackets.
- m. Remove two sling hooks as unit is eased into hole until grille touches duct.
- n. Remove remaining sling.
- o. Reinstall washers and mounting bolts.
- p. Reconnect drain lines.
- q. Reinstall screws securing air conditioner/heater mounting to section wall. Reinstall screw, washer, and nut to each corner of mounting.
- r. Reinstall screws securing air duct to air conditioner/heater.
- s. Reconnect or plug in power cord. Turn on air conditioner/heater circuit breaker.

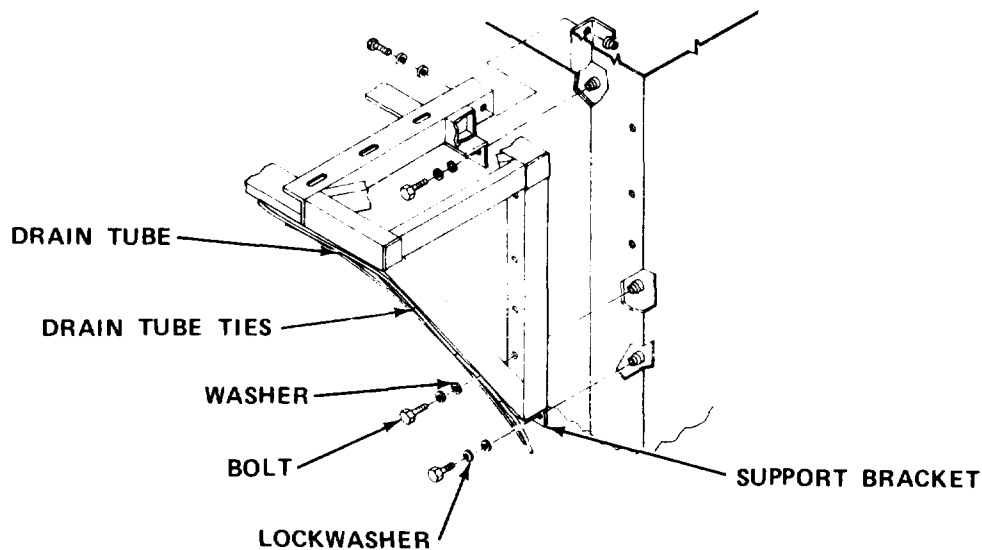
1-20.9 Replace Air Conditioner Support Bracket.

MOS: 63W, Wheel Vehicle Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: 9/16 in. Combination Wrench  
Lifting Equipment  
Knife, TL-29

SUPPLIES: Air Conditioner Support Bracket  
Drain Tube Ties



**WARNING**

Serious injury to personnel or damage to equipment may occur unless two or more personnel are used to remove and replace air conditioner/heater because of weight and balance of air conditioner/heater.

- a. Remove air conditioner/heater (paragraph 1-20.8).
- b. Cut drain tube ties, and remove drain tube from support bracket.
- c. Remove bolts, lockwashers, and washers securing support bracket.
- d. Remove defective support bracket.
- e. Install new support bracket. Secure to section with bolts, lockwashers, and washers.
- f. Reinstall drain tube on support bracket, and secure with new ties.
- g. Reinstall air conditioner/heater (paragraph 1-20.8).

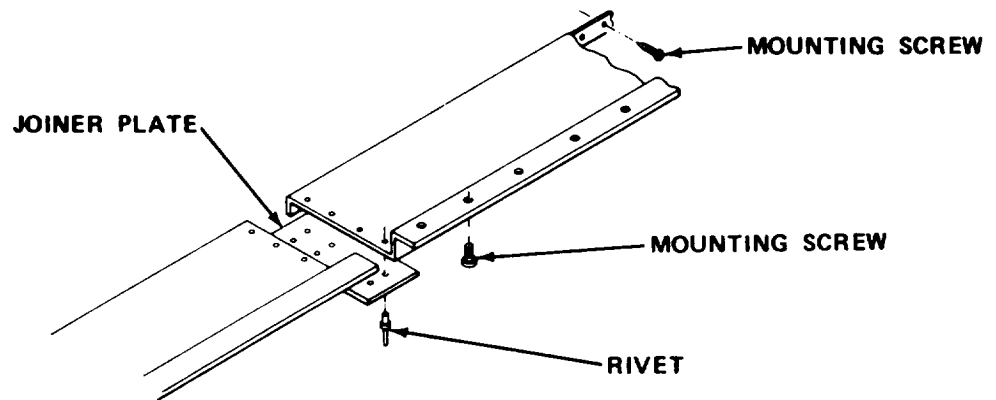
1-20.10 Replace Ventilation Duct.

MOS: 52C, Utilities Equipment Repairer

TOOLS: Hacksaw  
 Electric Drill and Bits  
 Ball Peen Hammer  
 Pop Rivet Gun  
 Paint Brush  
 Cross Tip Screwdriver

SUPPLIES: Sealant (Item 29, Appendix E)  
 Hood Block  
 Pop Rivets  
 Paint (Items 22, 22A and 22B Appendix E)  
 Cheesecloth (Item 7, Appendix E)  
 Salvaged Ventilation Duct

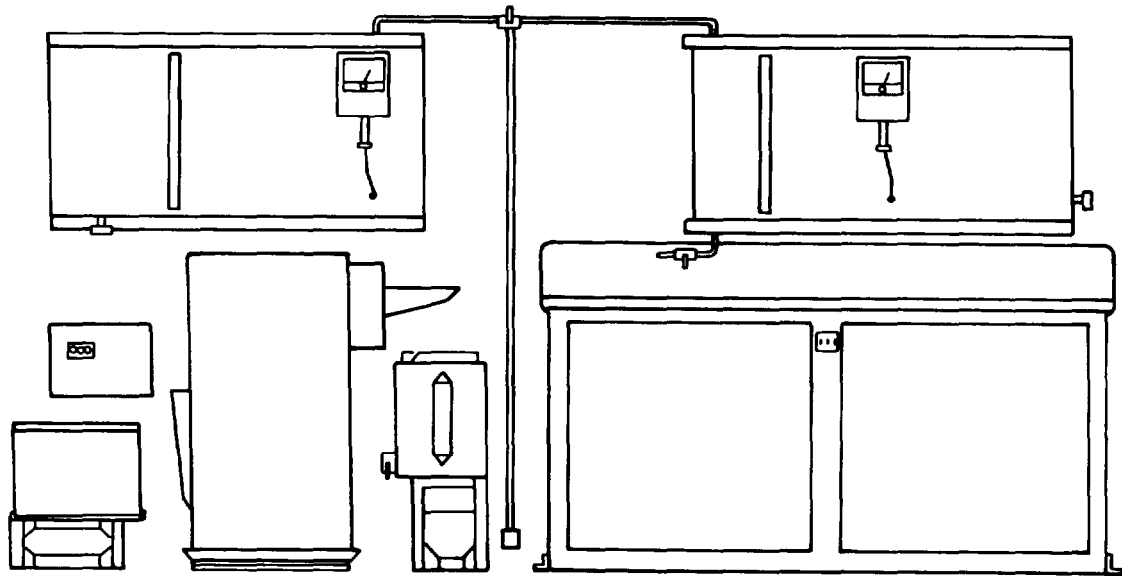
- a. Turn off air conditioner/heater so air will not blow through duct.



- b. Drill rivets from damaged section of duct. Remove joiner plates.  
 c. Remove mounting screws to remove damaged sections of duct.  
 d. Straighten remaining sections of duct at edges using hammer and wood block.  
 e. Place sealant on mounting edges.  
 f. Install new duct section cut from salvaged duct. Secure with screws.  
 g. Reinstall joiner plates. Install rivets to secure.  
 h. Paint as necessary.  
 i. Turn on air conditioner/heater.







## CHAPTER 2

### FILM/PAPER PROCESSOR SYSTEM

#### Section I INTRODUCTION

##### 2-1. GENERAL INFORMATION.

###### 2-1.1 Scope.

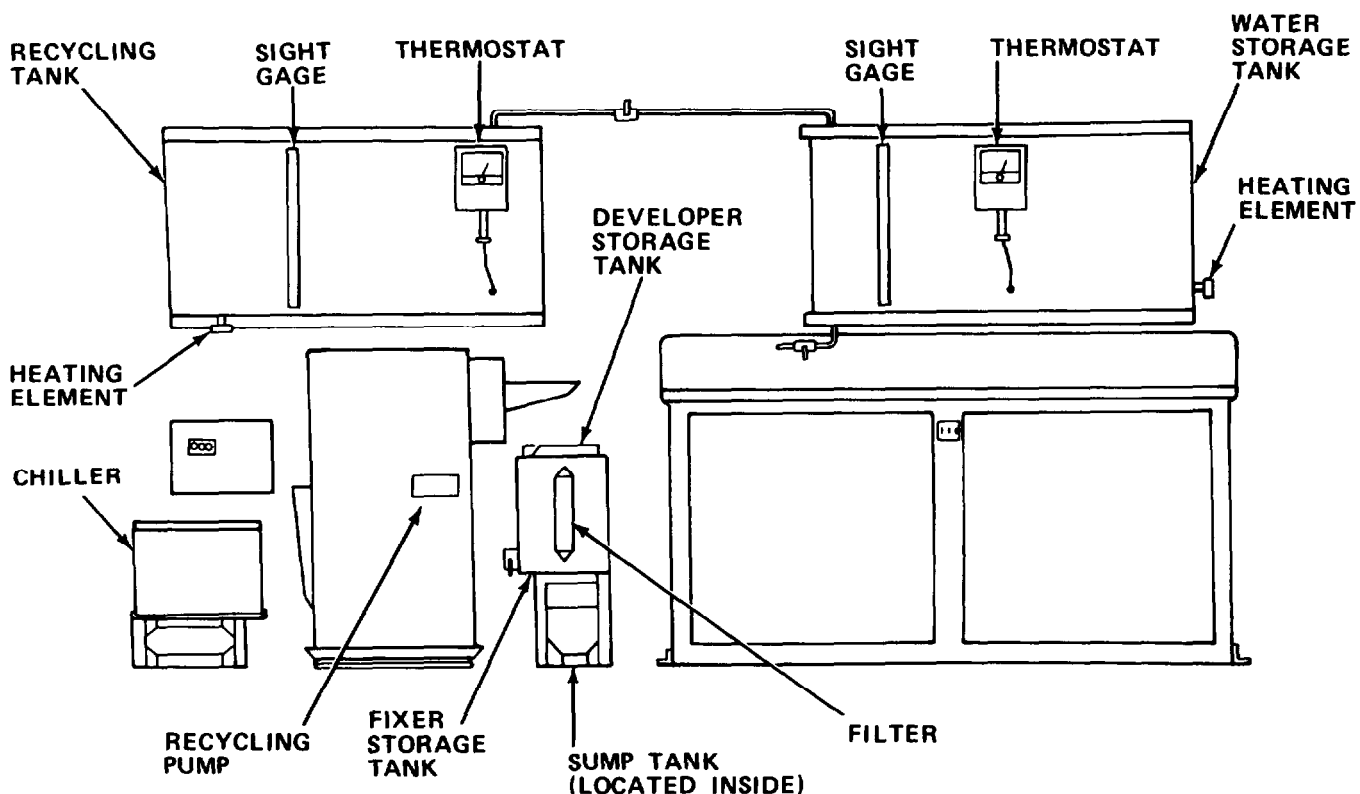
- a. Model Number and Equipment Name. Model 317 C-N Film/Paper Processor.
- b. Purpose of Equipment. To automatically process paper prints.

##### 2-2. EQUIPMENT DESCRIPTION.

###### 2-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Develops, fixes, washes, and dries photographic paper.
- b. Replenishment mechanism automatically starts when paper is fed and stops when paper has entered processor.
- c. Lift-out roller assemblies provide fast, easy cleaning.
- d. Built-in flowmeters allow quick, easy adjustment of developer and fixer flow rates for replenishment.
- e. External recycling and sump pumps.
- f. Wall mounted, thermostatically controlled water recycling tank with water level indicator.
- g. Auxiliary chiller cools developer solution before entering processor.
- h. Recycled water is filtered before reentering processor.
- i. Multiple valves allow convenient flushing and/or draining of processing system.
- j. Contains three baths; will handle paper up to 17 inches wide.

2-2.2 Location and Description of Major Components.



CHILLER. Cools developer solution before entering developer tank of processor.

RECYCLING TANK. Stores recycled wash water.

HEATING ELEMENT. Resistance element heats water in tank.

SIGHT GAGE. Indicates water level from empty to full in tank.

THERMOSTAT. Controls heating element and indicates water temperature.

DEVELOPER STORAGE TANK. Stores developer fluid to replenish developer system.

FIXER STORAGE TANK. Stores fixer fluid to replenish fixer system.

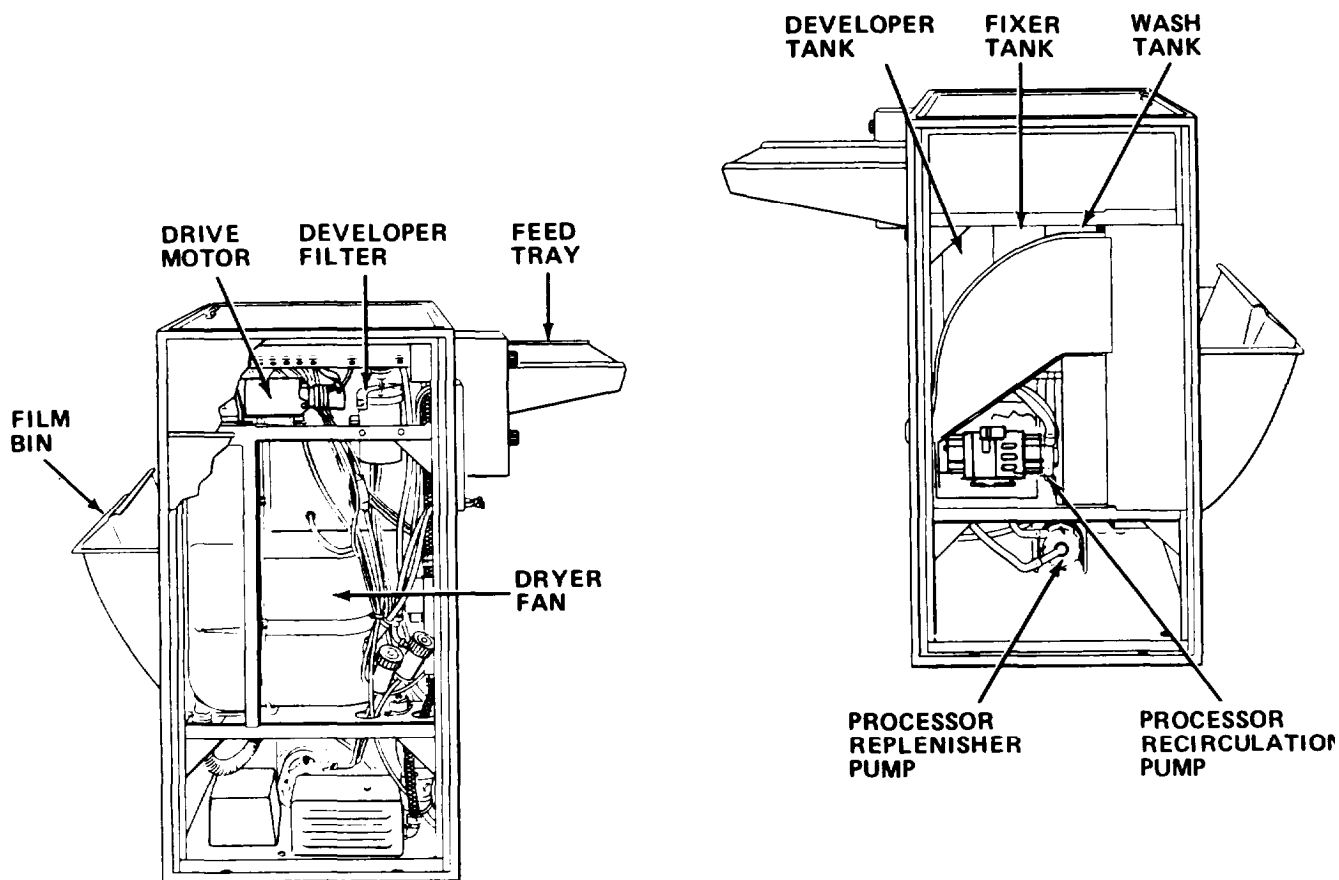
RECYCLING PUMP. Recycles water from recycling tank, through the recycling filter into processor wash system.

SUMP TANK. Receives water and chemicals from internal overflow trough and processor drain.

SUMP PUMP. Pumps water and chemicals from sump tank to the recycling tank or to external drain.

RECYCLING FILTER. Filters recycled wash water before reentering processor.





FILM BIN. Receives developed prints after exiting processor.

DEVELOPER FILTER. Filters the developer fluid before returning it to developer tank.

FEED TRAY. Positions and guides paper into processor.

DRIVE MOTOR. Provides power for transport system.

DRYER FAN. Provides air flow for drying system.

DEVELOPER TANK. Contains developer fluid and developer transport rollers.

FIXER TANK. Contains fixer fluid and fixer transport rollers.

WASH TANK. Contains wash water and wash transport rollers.

PROCESSOR REPLENISH PUMP. Replenishes developer and fixer solutions.

PROCESSOR RECIRCULATION PUMP. Recirculates developer and fixer fluids in their tanks.

2-2.3 Equipment Data.

|                                 |   |
|---------------------------------|---|
| Manufacturer                    | Eastman Kodak Company                                 |
| Model                           | 317 C-N   |
| Weight, Dry                     | 425 lbs (192.8 kg)                                    |
| Weight, Wet                     | 525 lbs (238 kg)                                      |
| Height                          | 42.5 in. (108 cm)                                     |
| Width                           | 30 in. (76.2 cm)                                      |
| Length                          | 27.5 in. (69.8 cm) Without receiving bin or feed tray |
| Electrical                      | 115 V, 60 Hz, three wire, single-phase                |
| Recycling Tank Capacity         | 50 gal. (189.27 L)                                    |
| Developer Storage Tank Capacity | 5 gal. (18.93 L)                                      |
| Fixer Storage Tank Capacity     | 5 gal. (18.93 L)                                      |
| Recycling Pump Capacity         | 12.5 gpm (47.32 Lpm)                                  |

**2-3. TECHNICAL PRINCIPLES OF OPERATION.** The purpose of the paper processor system is to process paper prints. It is composed of the following:

- Film Transport System
- Processing Fluid System
- Drying System
- Electrical System
- Recycling Tank System
- Storage Tank System
- Developer Chiller System

2-3.1 Film/Paper Transport System. Transports the paper through the various processing systems of the unit. It is composed of the following assemblies:

- a. Film detector crossover. Detects introduction of paper into processor by detector switches. Either detector switch signals replenisher pumps to start and a timer bell to signal when more paper can be fed into processor.
- b. Developer rack. Transports paper through developer solution.
- c. Fixer rack. Transports paper through fixer solution.
- d. Wash rack. Transports paper through a wash water bath to remove excess developer and fixer solution.
- e. Rack crossovers. Transports paper between developer/fixer and fixer/wash racks.
- f. Squeegee assembly. Removes excess water from paper after it leaves wash rack and before entering the dryer rollers.
- g. Dryer rollers. Transports paper between air tubes to dry remaining water from paper surface.
- h. Dryer turnaround. Transports paper from dryer rollers to film bin.

2-3.2 Processing Fluid System. Provides developer, fixer, and wash solutions, their recirculation, replenishment, and filtering. It is composed of the following components:

- a. Developer tank. Contains developer fluid and rack. Paper enters developer as the first step in processing.
- b. Fixer tank. Contains fixer fluid and rack. Paper enters fixer tank after exiting developer tank as the second step in processing.
- c. Wash tank. Contains wash rack and filtered water to wash excess developer and fixer fluids from the paper prior to entering drying system.
- d. Recirculation pump. Contains two centrifugal pumps and a common motor which recirculates developer and fixer solutions. Developer is drawn from tank and pumped through a temperature controller, filter, heater, or chiller and back into developer rack where it is evenly dispersed throughout the tank. Fixer is drawn out of its tank, through its recirculation system, and pumped back into bottom of fixer tank.
- e. Replenisher pump. Contains two centrifugal pumps and a common motor. Replenisher pumps are turned on whenever a piece of paper passes through detector rollers and trips detector switches above the rollers. Pumps then move developer and fixer replenishment solutions from their external storage tanks, through strainers, then through flowmeters where flow rate is governed before passing into processor tanks. Pumps cease operating after paper has entered processor.

2-3.3 Drying System. Directs warm, dry air to both sides of film/paper as it passes through dryer rollers. It is composed of the following components:

a. Dryer fan. A centrifugal fan draws air past heater element and pumps it through a plenum to air tubes and air nozzle.

b. Heater. Consists of an electric heating element which heats air entering dryer fan. Warm air dries paper passing through drying system.

c. Air tubes and nozzle. Directs heated air from dryer fan onto surface of paper as it passes through dryer rollers. This air blast dries remaining wash water from the paper.

2-3.4 Electrical System. Provides power for processor controls, indicators, drive motor, dryer fan, dryer heater, pumps, and gage illumination. It is composed of the following electrical systems:

a. Transport drive circuit. Controls on/off operation and speed of transport drive motor. A switch controls on/off operation of the motor while a variable-speed knob controls its speed. A speed indicator dial indicates speed of transport mechanism in inches per minute.

b. Developer heater circuit. Consists of a developer thermostat which controls operation of developer heater and maintains a preset temperature which is monitored by developer thermometer. Developer heater circuit is activated when pump switch is on.

c. Dryer circuit. Controlled by a switch which activates centrifugal dryer fan. The switch also activates dryer heater element. Dryer heater element temperature is controlled by dryer thermostat and monitored by dryer thermometer.

d. Developer and fixer recirculation pump circuit. Provides power to developer and fixer recirculation pump. The developer and fixer recirculation pump circuit is activated by the PUMP switch.

e. Developer and fixer replenisher pump circuit. Provides power to the developer and fixer replenisher pump. The circuit is activated by placing the PUMP switch to on and activating detector switches in paper detector crossover. Developer and fixer replenisher pumps will deactivate after paper has entered processor.

f. Timer bell circuit. It is activated by PUMP switch. The circuit senses when paper has passed through the detector switches and signals a bell after a predetermined time interval to indicate when more paper may be fed into processor.

g. Gage illumination circuit. Provides indirect lighting for the gages and flowmeter and is controlled by the instrument light switch.

h. Wash water recirculation pump circuit. The circuit is activated by the RECYCLING PUMP switch, located external to the processor, which provides power for an external wash water recirculation pump.

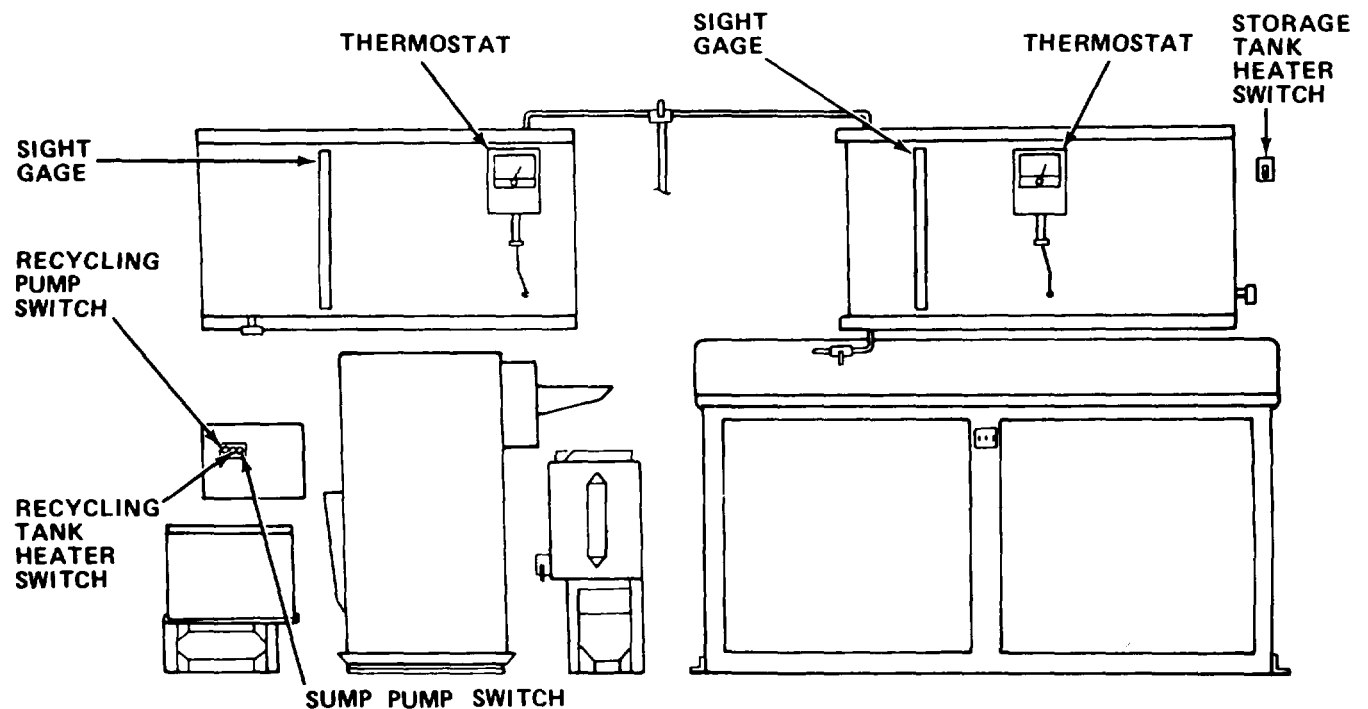
2-3.5 Recycling Tank System. Recycles and filters wash water from processor. It consists of the following components:

- a. Recycling tank. Contains recycled wash water to be used in the wash system of processor. It contains a sight gage to monitor water level and a thermostatically controlled heating element to maintain water at a preset temperature.
- b. Sump tank. Receives water and chemicals from internal overflow trough and processor drain.
- c. Sump pump. Pumps water and chemicals from sump tank to recycling tank or to external drain.
- d. Recycling pump. Pumps wash water from *recycling* tank via the recycling directional flow valve, through the filter, and into water inlet of processor.
- e. Recycling filter. Filters wash water before entering processor.

2-3.6 Developer Chiller System. Cools developer automatically to maintain proper fluid temperature. It consists of a small, self-contained refrigeration unit and heat exchanger to cool developer before reentering processing system.

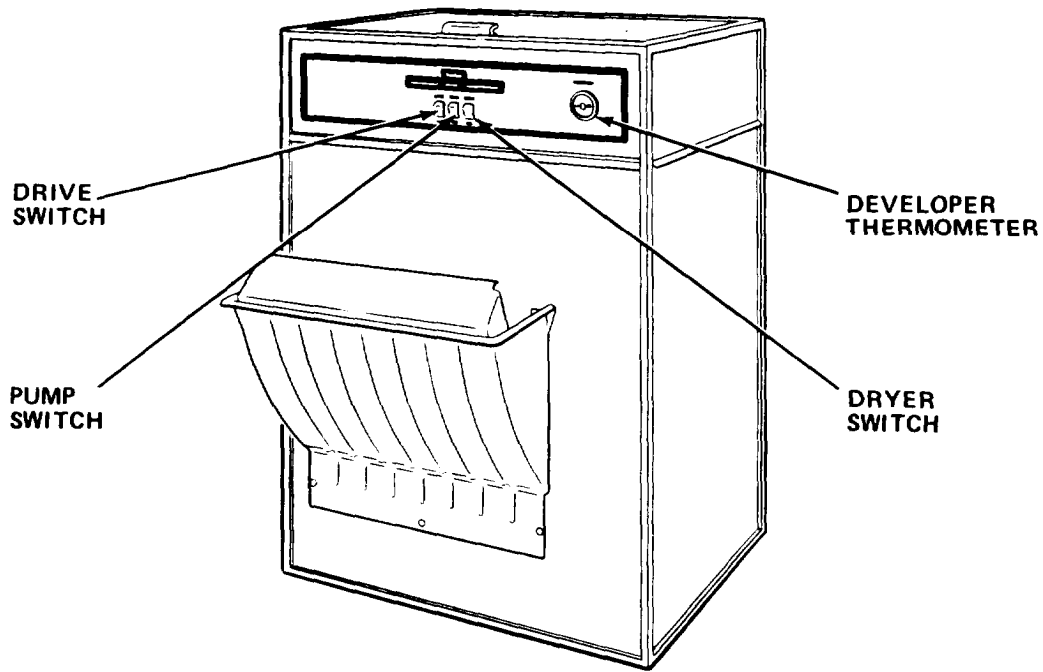
**Section II OPERATING INSTRUCTIONS**

**2-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.**



| Control or Indicator | Function   |
|----------------------|--|
| Sight Gage           | Indicates water level from empty to full in the recycling and storage tanks. |

| Control or Indicator  | Function  |
|-----------------------|---|
| Thermostat            | Controls activation of heating element. Black needle indicates water temperature and red needle is controlled by knob to set desired temperature. |
| HEATER Switches       | Activate power to heating elements via thermostat.  |
| SUMP PUMP Switch      | Activates sump pump via water level sensor in the sump tank.  |
| RECYCLING PUMP Switch | Activates recycling pump.   |

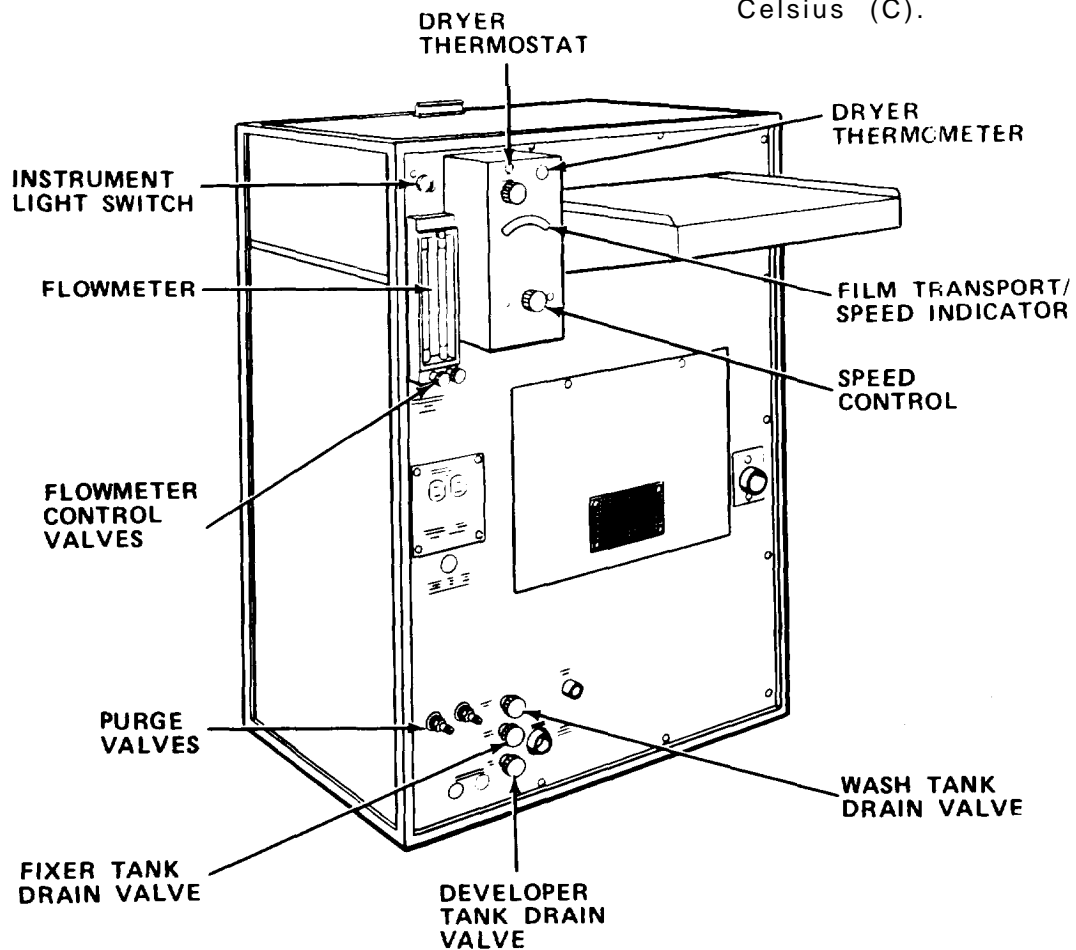


DRIVE Switch

Provides power to the roller drive system.

ON - Switch up.  
OFF - Switch down.

| Control or Indicator  | Function   |
|-----------------------|--|
| PUMP Switch           | <p>Provides power to the developer heater and the replenisher and recirculation pumps for developer and fixer solutions.</p> <p>ON - Switch up.<br/>OFF - Switch down.</p> |
| DRYER Switch          | <p>Provides power to dryer heater relay and dryer fan motor.</p> <p>ON - Switch up.<br/>OFF - Switch down.</p>   |
| Developer Thermometer | <p>Indicates developer solution temperature in degrees Fahrenheit (F) and degrees Celsius (C).</p>   |



| Control or Indicator           | Function   |
|--------------------------------|--|
| Instrument Light Switch        | Provides illumination for dryer thermostat dial, dryer thermometer, transport speed indicator dial and flowmeters.   |
| Dryer Thermostat               | Controls temperature of air supply for drying system.  |
| Dryer Thermometer              | Indicates temperature of air in drying system in degrees Fahrenheit (F) and degrees Celsius (C).                     |
| Film Transport Speed Indicator | Indicates speed of film transport in inches per minute as long as DRIVE switch is on.                                |
| Speed Control                  | Increases transport speed if rotated to right and decreases transport speed if rotated to left.                      |
| Flowmeter Control Valves       | Controls developer and fixer replenishment flow rates.   |
| Flowmeter                      | Indicates rate of flow of replenishment fluids in cubic centimeters per minute (cc/min).                             |
| WASH Tank Drain Valve          | Drains wash tank to the sump tank via processor drain.   |
| FIXER Tank Drain Valve         | Drains fixer tank to the sump tank via processor drain.  |
| DEVELOPER Tank Drain Valve     | Drains developer tank to the sump tank via processor drain.  |
| Purge Valves                   | Allow removal of air from replenishment hoses, and provide capability of blowing chemicals from replenishment hoses. |



**2-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

**2-5.1 PMCS Procedures.**

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Leakage definitions for operator PMCS shall be classified as follows:

Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II Leakage of fluid great enough to form drops but not enough to cause drops to drip from the item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

**CAUTION**

Equipment operation is not allowed with any class of leak. For Class I or II leakage, refer to PMCS. For Class III leakage, notify your supervisor or organizational maintenance.

g. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

h. Interval columns. This column determines the time period designated to perform your PMCS.

i. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

j. Equipment is Not Ready/Available If: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

k. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                           | <u>Quantity</u> |
|---------------------------------------|-----------------|
| Sponge (Item 32, Appendix E)          | ar              |
| Flat Tip Screwdriver                  | 2 ea            |
| Cross Tip Screwdriver                 | 1 ea            |
| Hose Clamp Pliers                     | 1 ea            |
| 10 in. Adjustable Wrench              | 1 ea            |
| 9/16 in. Combination Wrench           | 1 ea            |
| Plastic Pail                          | 1 ea            |
| Cheesecloth (Item 7, Appendix E)      | ar              |
| Glass Cleaner (Item 14, Appendix E)   | ar              |
| Plastic Tubing, 3/8 in. (9.5 mm) I.D. | 2 ea            |
| Graduated Cylinders                   | 2 ea            |

**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**NOTE**

If the equipment must be kept in continuous operation, check and service only those items that can be safely checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 1        | B        | <p><u>FILM/PAPER PROCESSOR SYSTEM</u></p> <p><u>Inspect Recycling Tank Thermostat.</u></p> <div> <p>The diagram shows a rectangular thermostat with a circular gauge in the center. The gauge has a scale from 0 to 120 with major markings every 10 units. A needle points to the 75-degree mark. Labels 'THERMOSTAT' and 'POINTER ON 75 DEGREES' with arrows point to the device and the needle respectively. The thermostat is mounted on a vertical stem with a hook at the bottom.</p> </div> <p>Check water temperature. Should read 75°F ± 2°F.</p> | <p>Thermostat does not read 75°F ± 2°F.</p>                    |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
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(Number) - Hundreds of Hours

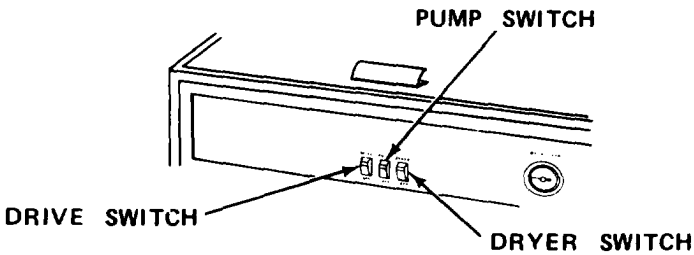
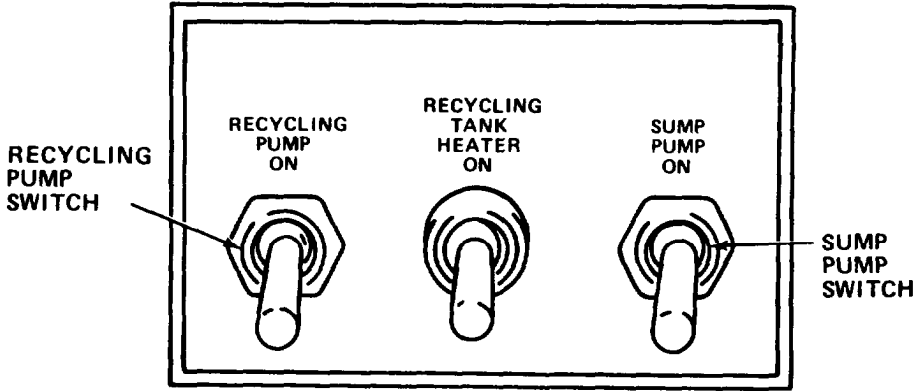
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 2        | B        | <p><b>FILM/PAPER PROCESSOR SYSTEM - Cont</b></p> <p><u>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies.</u></p> <p style="text-align: center;"><b>WARNING</b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p>   <ol style="list-style-type: none"> <li>1. Turn off DRIVE, PUMP, and DRYER switches on processor, and RECYCLING and SUMP PUMP switches.</li> <li>2. Turn off circuit breaker.</li> <li>3. Remove top cover from machine.</li> </ol> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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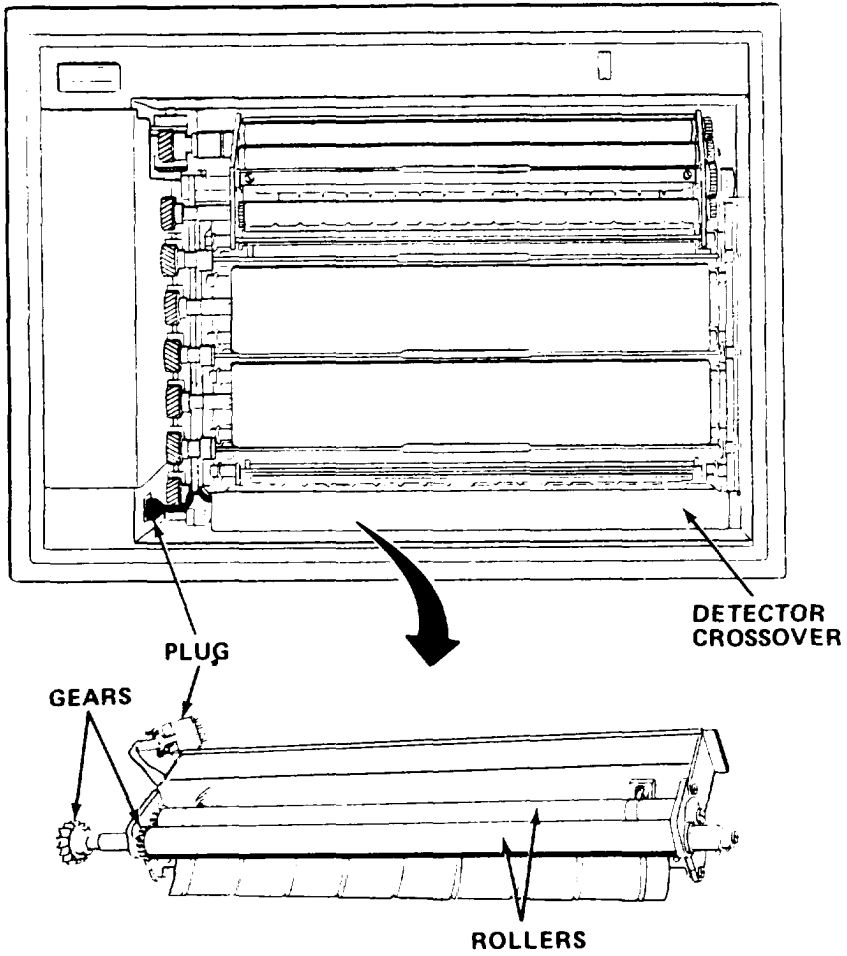
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 2        | B        | <b>FILM//PAPER PROCESSOR SYSTEM - Cont</b>  |  |
|          |          | <p>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies - Cont</p>  <p>                     4. Disconnect detector crossover plug from socket.<br/>                     5. Remove detector crossover assembly from unit.                 </p> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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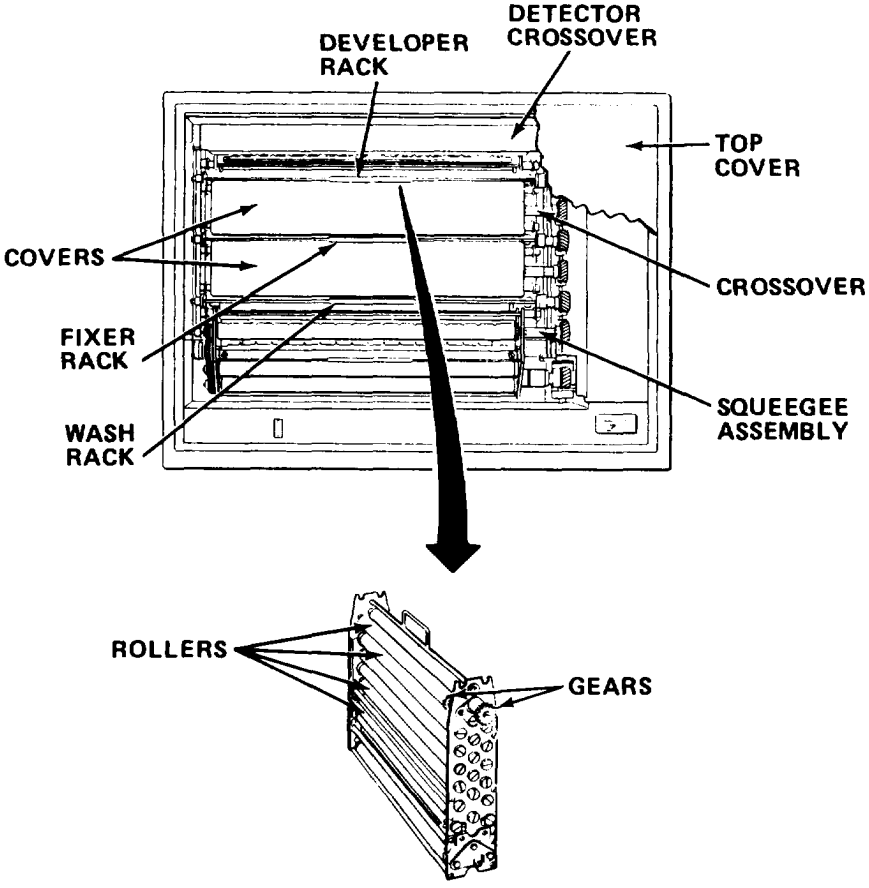
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 2        | B        | <p><b>FILM/PAPER PROCESSOR SYSTEM - Cont</b></p> <p><u>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies - Cont</u></p>  <ol style="list-style-type: none"> <li>6. Remove tank covers and crossover assemblies.</li> <li>7. Remove squeegee assembly from processor.</li> <li>8. Remove all rack assemblies, noting the position of each.</li> </ol> |  |

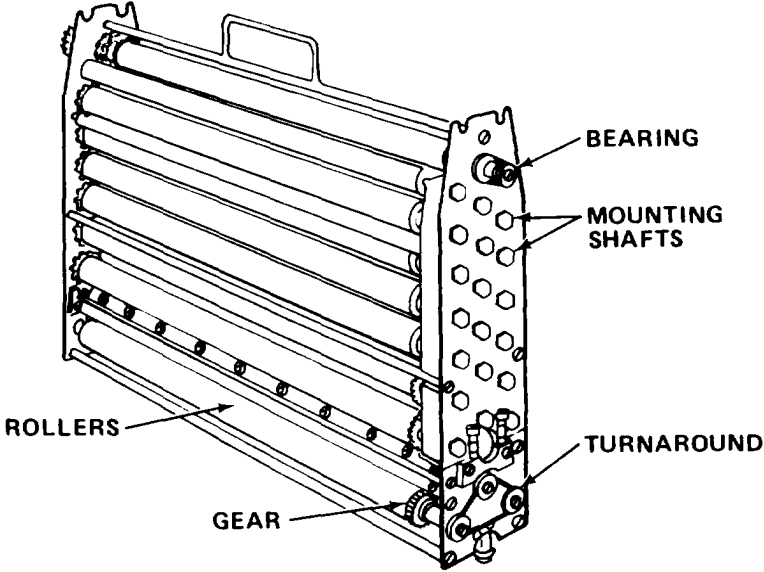
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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A - After

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AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTER-IAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|-----------|---|--|
| 2        | B         | <p><b>FILM/PAPER PROCESSOR SYSTEM - Cont</b></p> <p><u>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies - Cont</u></p>  <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Do not use any hard or metal object to remove foreign material. Damage to equipment may occur.</p> <p>9. Inspect rollers on all assemblies for damage, freedom of movement, and presence of foreign material. Remove any foreign material.</p> | <p>Rollers are damaged or do not move freely.</p>              |

**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

B - Before  
D - During  
A - After

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M - Monthly  
Q - Quarterly

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BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 2        | B        | <b><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></b>  |  |
|          |          | <p><u>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies - Cont</u></p> <p>10. Inspect gears for broken teeth and visible signs of damage.</p> <p>11. Lay racks on flat surface, and inspect rack for warpage.</p> <p>12. Inspect rollers for looseness with respect to mounting shaft or bearing.</p> <p>13. Check for missing or loose screws. Tighten screws if necessary.</p> <p>14. Visually check for out-of-round rollers.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>When cleaning detector roller assembly, keep electrical wiring and connector dry. Wipe detector roller assembly with damp sponge. Do not soak assemblies.</p> <p>15. Rinse all roller racks and crossover assemblies (except detector roller assembly) with hot water. Wipe excess water from assemblies with clean damp sponge.</p> <p>16. Clean interior of processor tanks with damp sponge.</p> |  |



**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      s - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

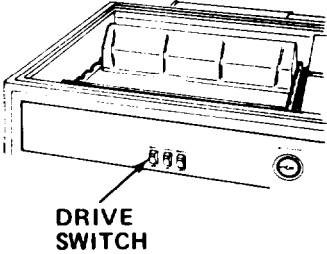
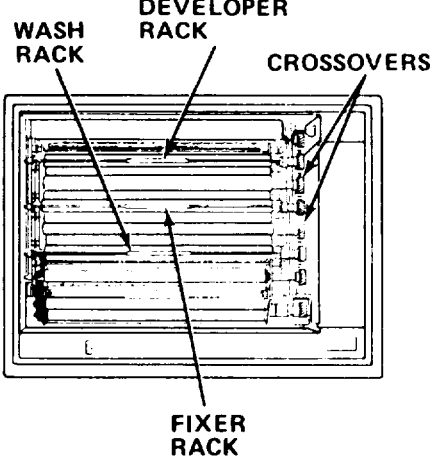
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 2        | B        | <p><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></p> <p><u>Inspect and Clean Crossovers, Racks, and Turnaround Assemblies - Cont</u></p> <p>17. Reinstall all rack assemblies as noted in step 8.</p> <p>18. Reinstall squeegee assembly.</p> <p>19. Reinstall crossover assembly and tank covers.</p> <p>20. Reinstall detector crossover assembly and reconnect plug.</p> <p>21. Reinstall top cover on machine.</p>  |  |
| 3        | B        | <p><u>Inspect Roller Drive System.</u></p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>1. Turn on circuit breaker.</p> <p>2. Remove top cover and tank covers.</p> <p>3. Turn on DRIVE switch and check all rollers for rotation.</p> | <p>Rollers are not rotating.</p>                               |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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(Number) - Hundreds of Hours

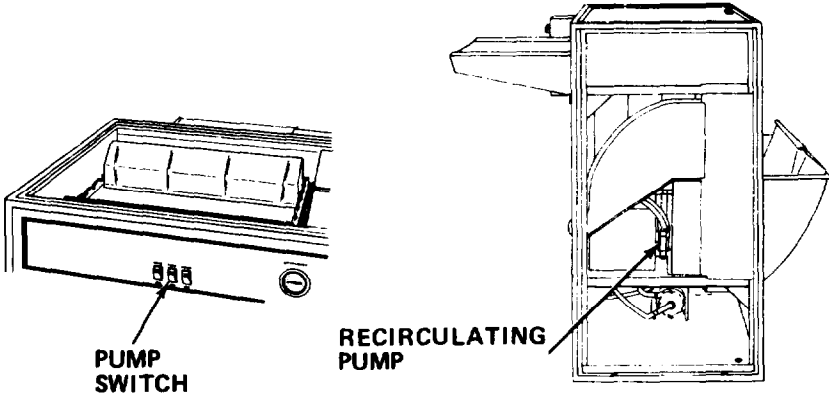
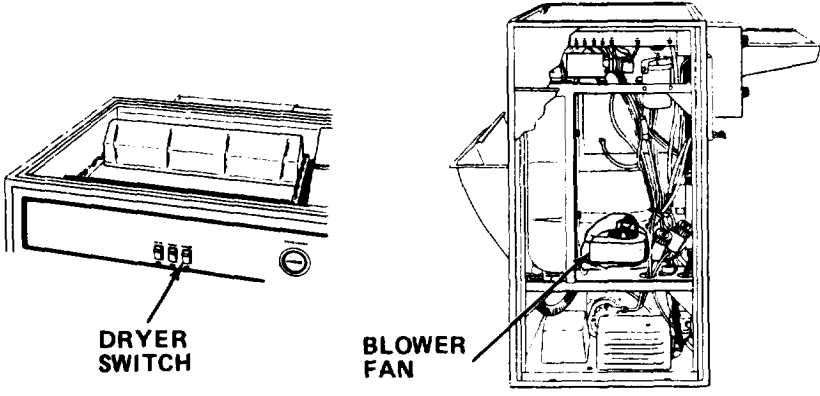
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|--|--|
| <u>FILM/PAPER PROCESSOR SYSTEM - Cont</u> |          |  |  |
| 4   | B        | <p><u>Inspect Internal Recirculating Pump System.</u></p> <div>  <p>PUMP SWITCH</p> <p>RECIRCULATING PUMP</p> </div> <p>Turn on PUMP switch and listen for operation.</p> | Pump does not operate.   |
| 5   | B        | <p><u>Inspect Dryer System.</u></p> <div>  <p>DRYER SWITCH</p> <p>BLOWER FAN</p> </div>   |  |

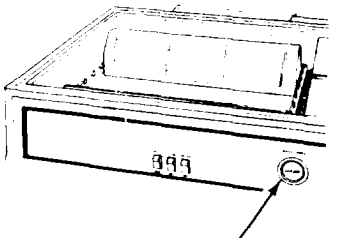
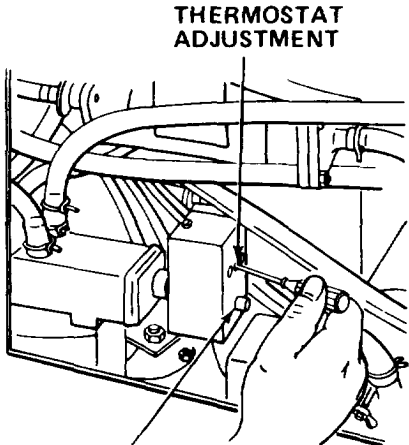
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
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(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 5        | B        | <p><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></p> <p><u>Inspect Dryer System - Cont</u></p> <p>Turn on DRYER switch. Blower fan should rotate.</p>   | Blower fan does not rotate.                                    |
| 6        | B        | <p><u>Inspect Developer Thermometer.</u></p> <p style="text-align: center;"><b>NOTE</b></p> <p>Allow processor to run for 30 minutes to stabilize developer temperature.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>DEVELOPER THERMOMETER</b></p> </div> <div style="text-align: center;">  <p><b>THERMOSTAT ADJUSTMENT</b></p> <p><b>GLOW LAMP</b></p> </div> </div> <p>Check developer temperature with DEVELOPER thermometer and verify temperature is 80°F (27°C). If not, remove cover and adjust temperature by turning DEVELOPER thermostat to right for more heat and to left for less heat. Glow lamp indicates developer heater is on.</p> | Temperature cannot be adjusted.                                |

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 7        | B        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>  |  |
|          |          | <p>Inspect Dryer Temperature Control.</p> <div> <p>The diagram shows a front view of a rectangular metal cabinet. On the top right, a control panel is visible with a dial and a gauge. A label 'DRYER THERMOSTAT' points to the dial, and 'DRYER THERMOMETER' points to the gauge. Below the control panel is a large rectangular window. At the bottom of the cabinet, there are several electrical outlets and switches. A tray is partially visible on the right side of the cabinet.</p> </div> <p>Check DRYER THERMOMETER. Adjust temperature with DRYER THERMOSTAT in accordance with paper manufacturer's data sheet.</p> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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(Number) - Hundreds of Hours

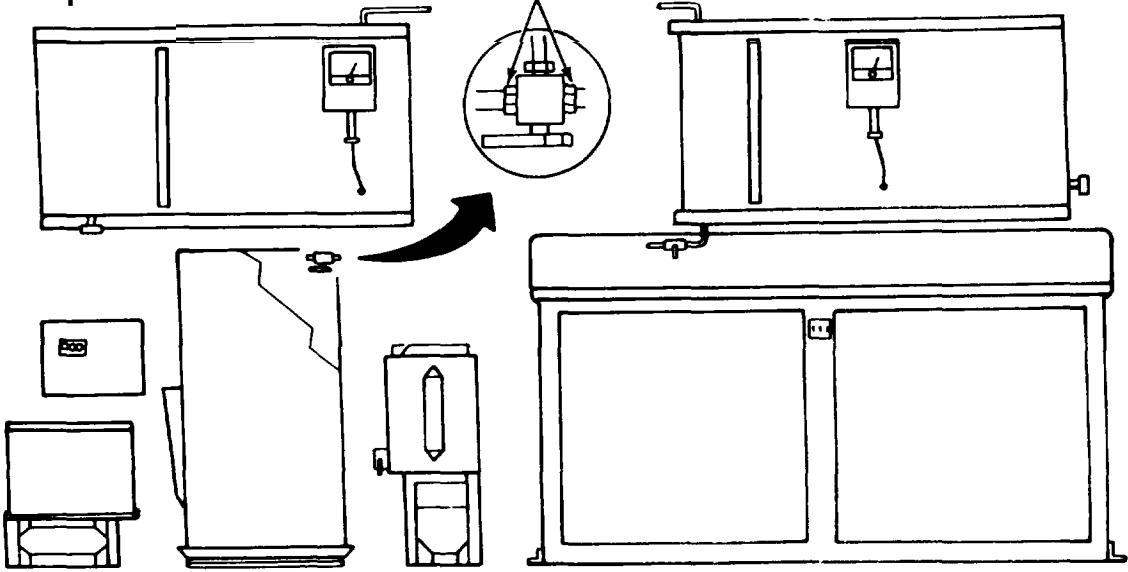
| ITEM NO.   | INTERVAL  | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|--|-----------|---|--|
| 8  | B/D/<br>A | <p><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></p> <p><u>Inspect Plumbing Fittings.</u></p> |  |
|  <p>The diagram shows a film/paper processor system. It includes a top unit with a control panel, a large vertical tank, a smaller unit, and a base cabinet. A circular callout labeled "CHECK FOR LEAKS" points to a specific fitting on the top unit. An arrow also points from the callout to the fitting on the top unit.</p> |           |   |  |
| <p>Check all fittings and hoses for leaks. Tighten fittings if Class I or II leaks are observed.</p>   |           |   | <p>Leaks can not be stopped.</p>                               |

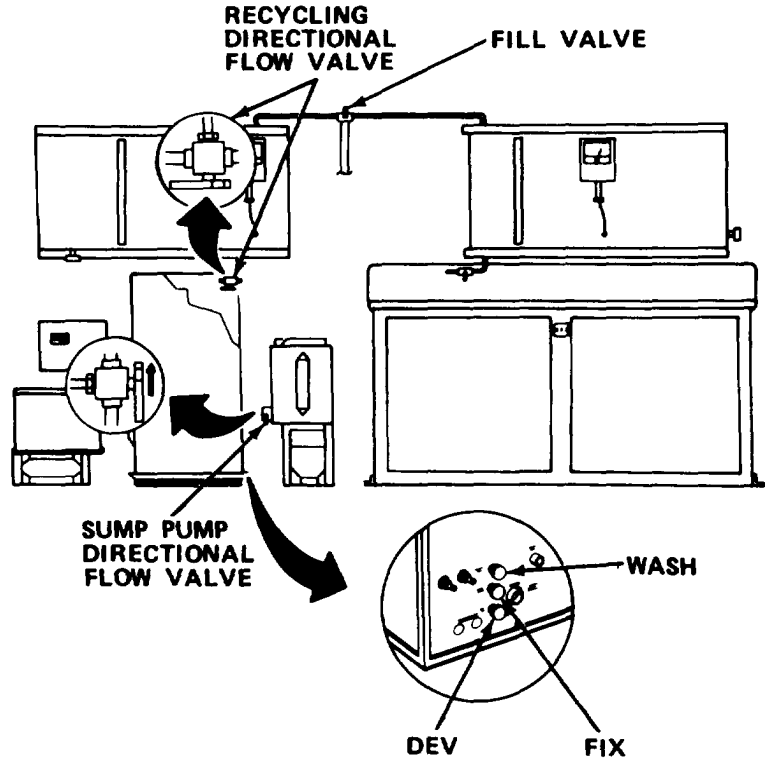
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
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(Number) - Hundreds of Hours

| ITEM NO.                                  | IN-TER-VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|------------|---|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |            |   |  |
| 9   | B          | <p><u>Inspect for Proper Valve Positioning.</u></p>  <p>Check that all valves are in proper operating position as indicated below. Reposition if necessary.</p> <p>WASH, FIX, DEV - closed</p> <p>Sump pump directional flow - recycling position<br/>Recycling directional flow - pump position<br/>FILL - OFF position</p> |  |
| 10  | M          | <p><u>Reolace Recvcling Filter.</u></p> <p>Replace in accordance with paragraph 2-10.6.</p>   |  |

**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**  
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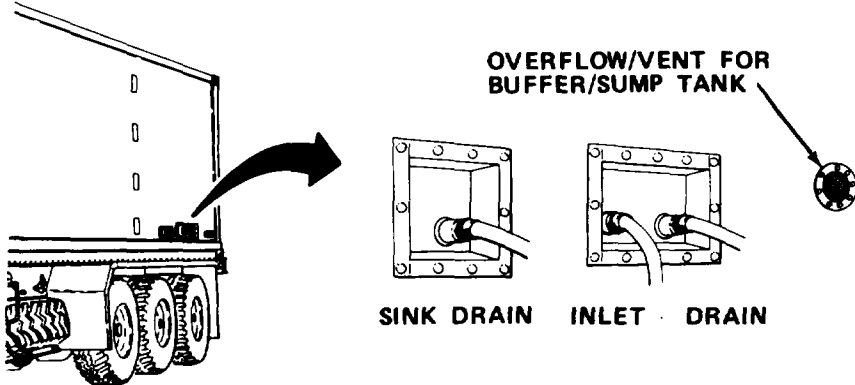
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 11       | B        | <p><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></p> <p><u>Service Recycling and Storage Tanks.</u></p>  <p>1. Connect water supply line to external fill inlet.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Prior to disposal of recycling water, field users should contact their local environmental coordinator, or their industrial hygienist for instructions on disposal of chemicals.</p> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 11       | B        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>   |  |
|          |          | <p><u>Service Recycling and Storage Tanks - Cont</u></p> <p>2. Connect hoses to external drains.</p> <div> </div> <p>3. Rotate recycling directional flow valve to drain position and drain recycling tank.</p> <p>4. After recycling tank is drained, place recycling directional flow valve to pump position.</p> <p>5. Turn on water supply.</p> |  |



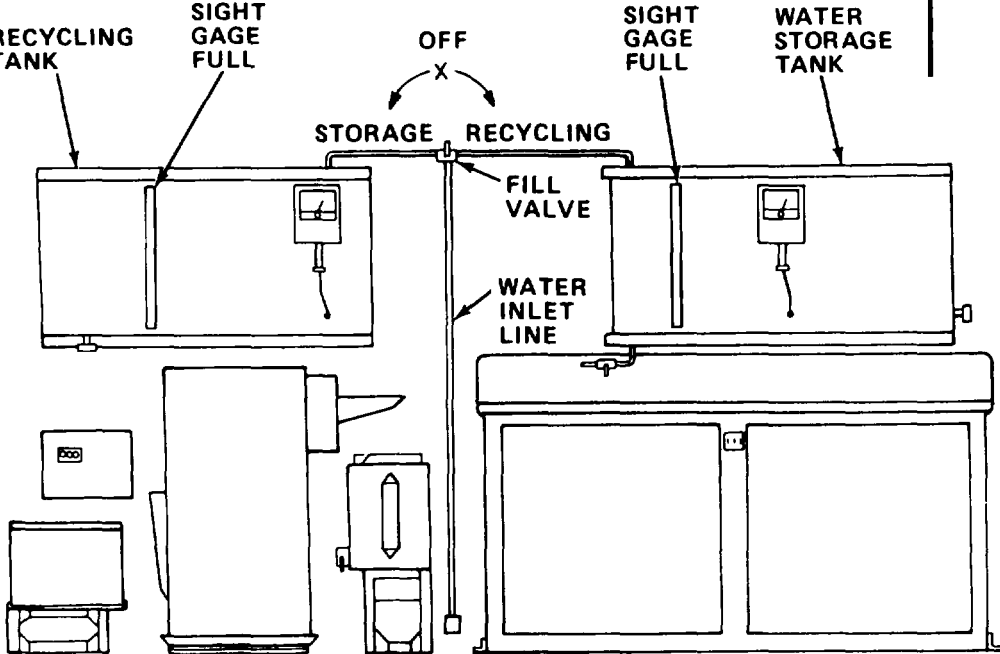
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 11       | B        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>   |  |
|          |          | <p><u>Service Recycling and Storage Tanks - Cont</u></p>  <p><b>NOTE</b></p> <p>Watch sight gage carefully and switch tank filling process when water level in sight gage is 1 inch below top.</p> <ol style="list-style-type: none"> <li>Place fill valve to recycling tank position.</li> <li>Switch fill valve to storage tank position when sight gage indicates recycling tank is full.</li> </ol> |  |

Recycling tank does not fill.

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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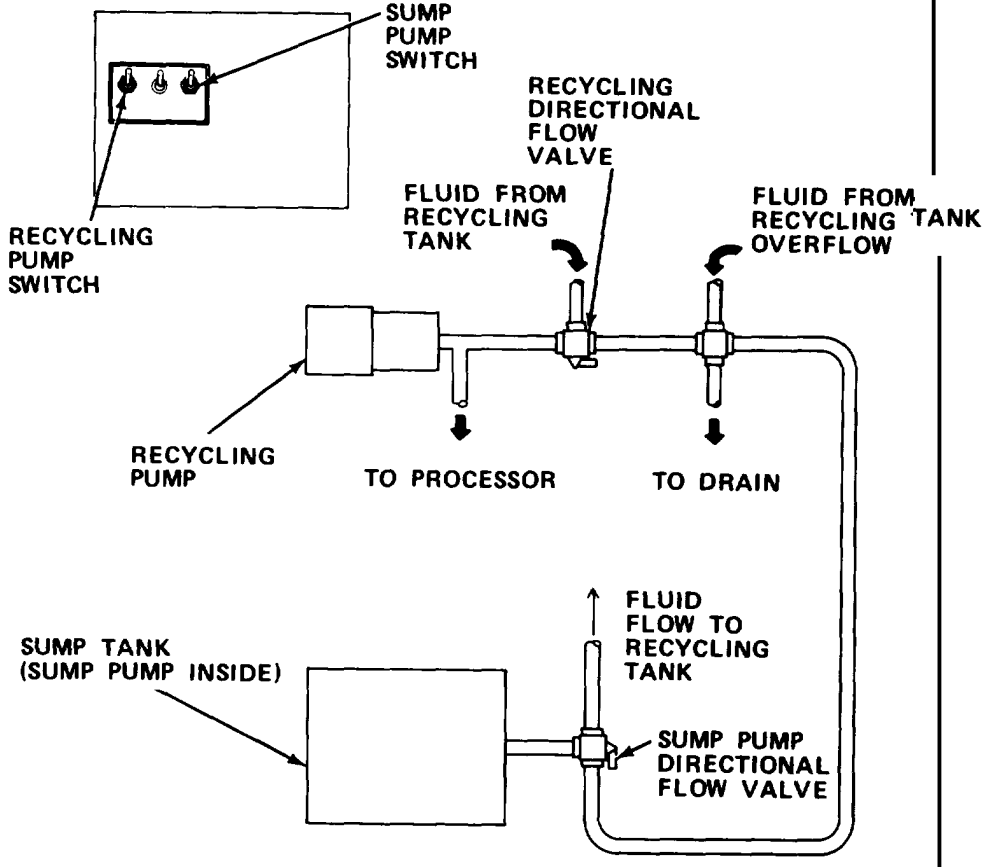
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|--|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |  |  |
| 11  | B        | <p><u>Service Recycling and Storage Tanks - Cont</u></p> <p>8. Close fill valve when sight gage indicates storage tank is full.</p> <p>9. Turn off water supply.</p> <p>10. Disconnect external water supply line.</p> <p>11. Disconnect drain lines and reinstall caps.</p> | Storage tank does not fill.                                    |
| 12  | D        | <p><u>Inspect Recycling Pump and Sump Pump.</u></p>   |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If:            |
|----------|----------|--|---|
|          |          | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>  |   |
| 12       | D        | <p><u>Inspect Recycling Pump and Sump Pump - Cont</u></p> <ol style="list-style-type: none"> <li>1. Turn on RECYCLING PUMP and SUMP PUMP switches.</li> <li>2. Turn recycling directional flow valve to pump position and place sump pump directional flow valve to recycling position.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Indication of sump pump operation will be fluid flowing up from sump pump directional flow valve to the recycling tank.</p> <ol style="list-style-type: none"> <li>3. Check recycling pump and sump pump for operation.</li> </ol> | <p>One or both pumps fail to operate.</p> |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont  
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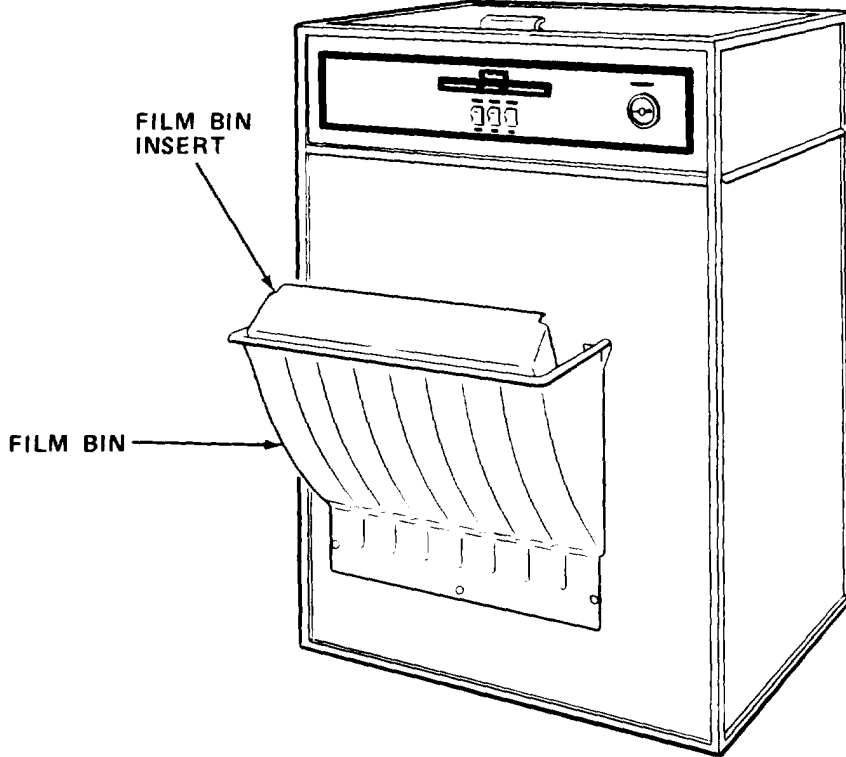
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 13       | A        | <p><b>FILM/PAPER PROCESSOR SYSTEM - Cont</b></p> <p><u>Inspect Transport System.</u></p>  <p>Check that all paper or film has cleared machine exit and has been deposited in film bin.</p> | <p>Paper still in processor.</p>                               |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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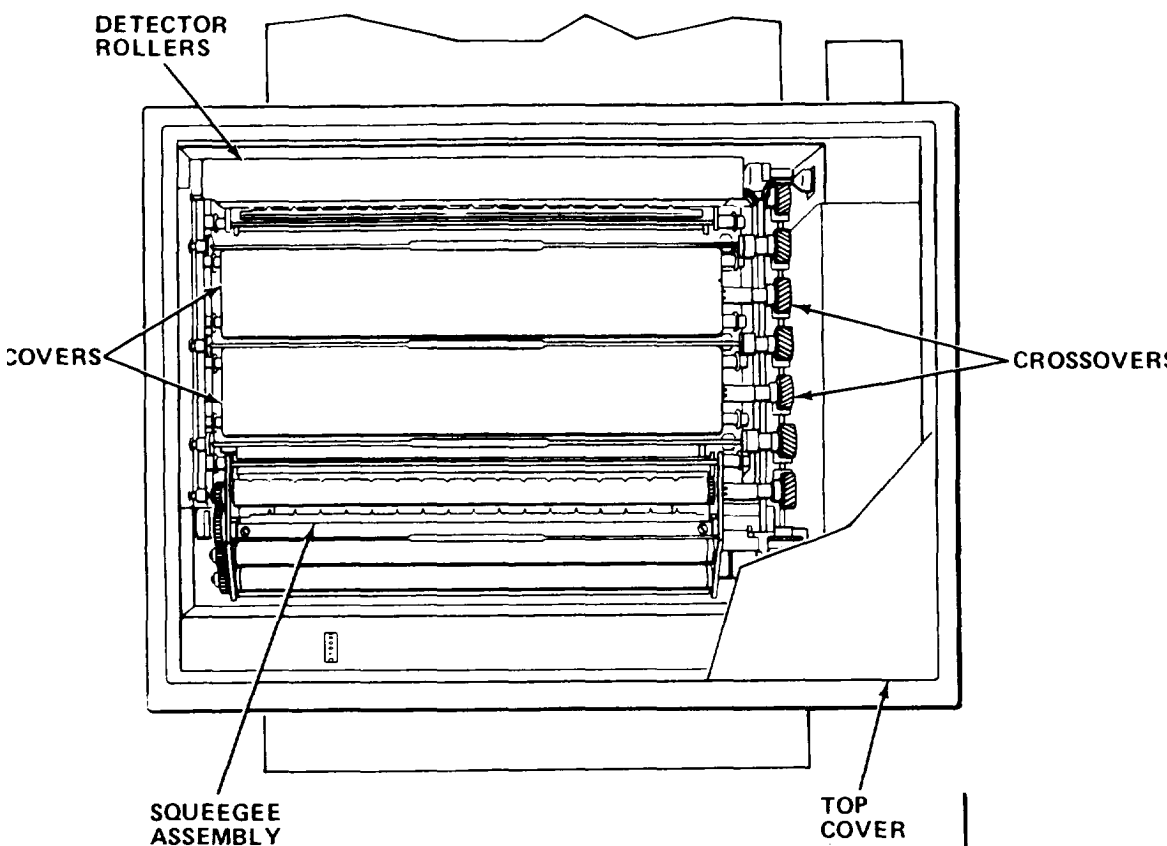
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|---|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |   |  |
| 14  | A        | <p>Inspect and Clean Processing System.</p>  <ol style="list-style-type: none"> <li>1. Remove covers.</li> <li>2. Remove squeegee assembly, crossover assemblies and detector rollers.</li> <li>3. Check crossover assemblies, squeegee assembly, and detector rollers for chemical deposits. Wipe with damp sponge and rinse with warm fresh water.</li> </ol> |  |

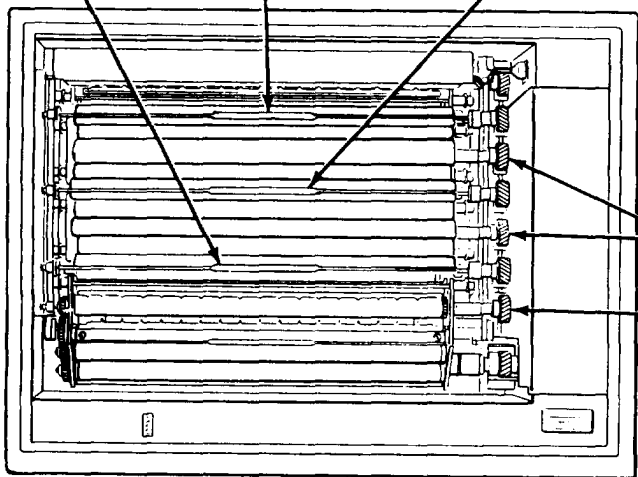
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
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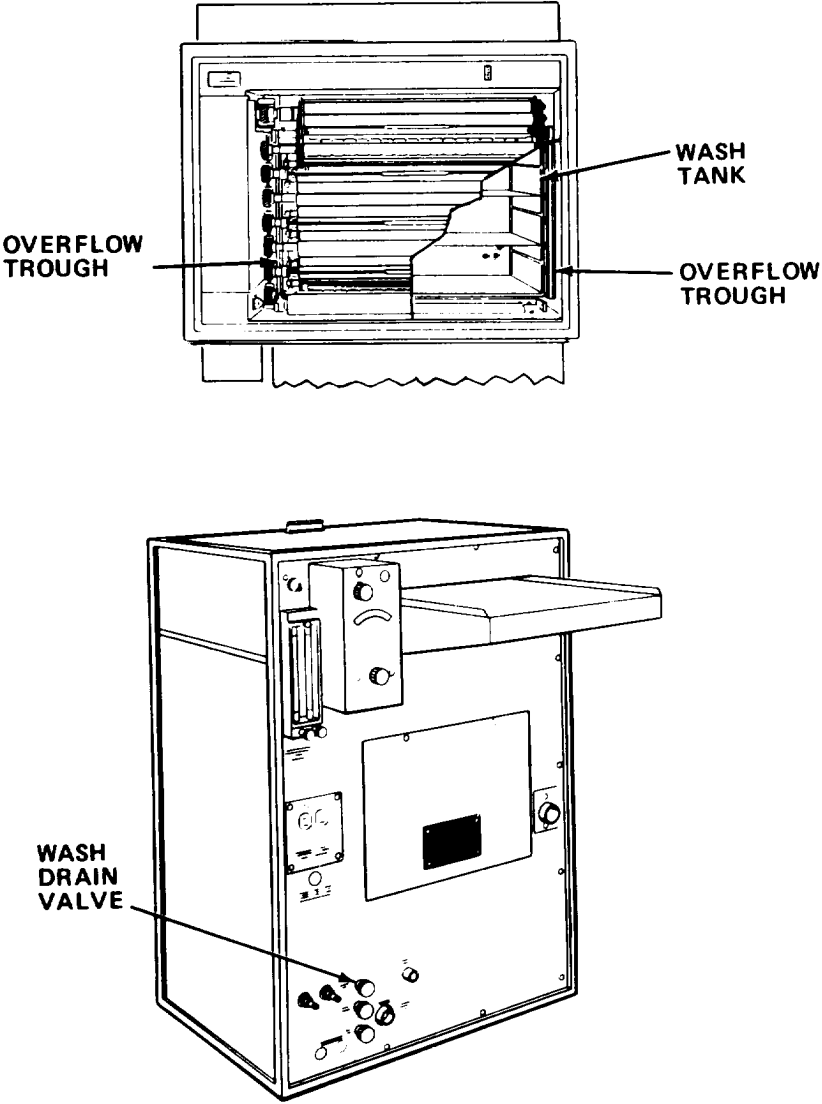
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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 14       | A        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>  |  |
|          |          | <p>Inspect and Clean Processing System - Cont</p> <div style="text-align: center;">  <p>The diagram shows a cross-section of a film/paper processor. It features three main racks: a WASH RACK on the left, a DEVELOPER RACK in the center, and a FIXER RACK on the right. On the right side, there are two additional components: CROSSOVERS and a SQUEEGEE ASSEMBLY. Arrows point from the labels to the corresponding parts in the diagram.</p> </div> <p><b>NOTE</b></p> <p>To avoid contamination, wipe developer rack, then fixer rack, then wash rack.</p> <p>4. Without removing the racks, wipe off developer rack, fixer rack, and wash rack above the solution levels with a damp sponge.</p> |  |

**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**  
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|----------|---|---|--|
| 14       | A | <p><b><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></b></p> <p><u>Inspect and Clean Processing System - Cont</u></p>  <p>The diagram consists of two parts. The upper part is a cross-sectional view of the processor's internal chamber, showing a central film tray with rollers. Labels with leader lines point to the 'WASH TANK' on the right side and 'OVERFLOW TROUGH' on both the left and right sides. The lower part is a perspective view of the external processor unit, showing a control panel with various knobs and switches. A label 'WASH DRAIN VALVE' with a leader line points to a valve located at the bottom left of the front panel.</p> <p>5. Rinse overflow trough with fresh water.</p> |  |

**Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

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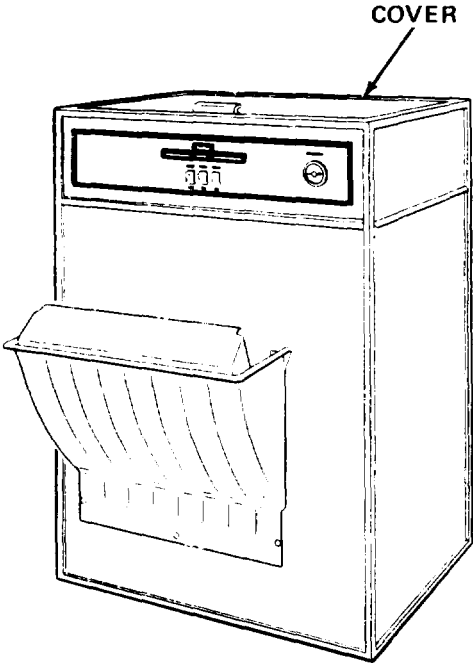
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available if: |
|----------|----------|---|--|
| 14       | A        | <p><b><u>FILM/PAPER PROCESSOR SYSTEM - Cont</u></b></p> <p><u>Inspect and Clean Processing System - Cont</u></p> <p>6. Drain wash tank by opening WASH tank drain valve.</p> <p>7. Reinstall squeegee assembly and crossovers.</p> <p>8. Reinstall covers.</p> <p>9. Close WASH tank drain valve after wash tank is drained.</p>    |  |
| 15       | A        | <p><u>Service Processor Cover.</u></p> <div style="text-align: center;">  </div> <p>Open processor cover approximately 2 in. (5.8 cm) to allow chemical-laden fumes to escape from processing tanks to prevent corrosion of metal components.</p> |  |



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| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 16       | Q        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>   |  |
|          |          | <p><u>Inspect Internal Plumbing.</u></p> <div> </div> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p> <ol style="list-style-type: none"> <li>1. Remove left and right side panels.</li> <li>2. Inspect all plumbing for visible signs of damage, leaks, and obstructions. If Class I or II leaks are present, tighten fittings.</li> </ol> |  |

Class III leaks are present or hoses are damaged.

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

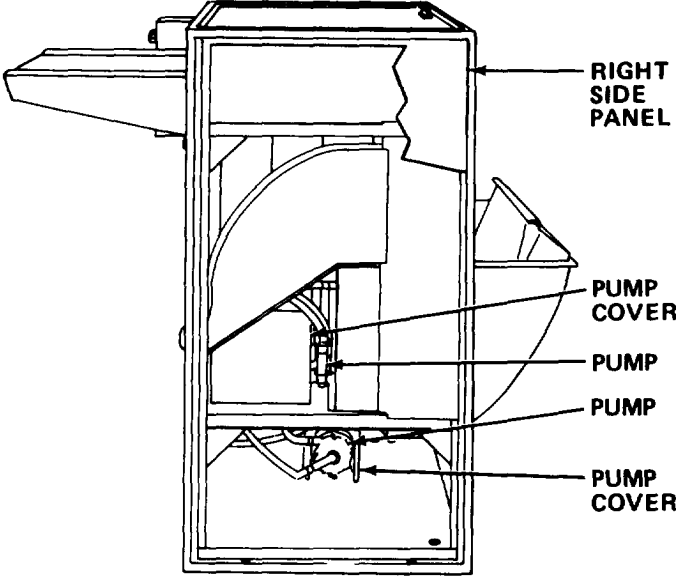
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|---|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |   |  |
| 16  | Q        | <u>Inspect Internal Plumbing - Cont</u><br><br>3. Reinstall left and right side panels.   |  |
| 17  | S        | <u>Inspect Centrifugal Pump Assembly.</u><br><br><p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p>  <p>1. Remove right side panel and pump covers.</p> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|---|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |   |  |
| 17  | S        | <u>Inspect Centrifugal Pump Assembly - Cont</u><br><br>2. Inspect security of mountings on pumps. Tighten bolts as necessary.<br><br>3. Inspect motor leads for visible damage.<br><br>4. Reinstall pump covers and right side panel.   | Motor leads are damaged.                                       |
| 18  | M        | <u>Inspect Flowmeter.</u><br><br>1. Inspect flowmeter for visible damage.<br><br>2. Inspect flowmeter for visibility of graduations and obstructions. Clean glass shield with cheesecloth and glass cleaner.  | Flowmeters are damaged.  |
| 19  | S        | <u>Inspect Flowmeter and Check Flow Rates.</u><br><br><p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Flowmeter adjustment reference data must be generated at initial startup of the processing unit. This data shall be retained and used as the standard for quarterly adjustment.</p> 1. Remove left side panel.<br><br><p style="text-align: center;"><b>CAUTION</b></p> <p style="text-align: center;">Fasten disconnected tubes so that the ends are higher than the solution levels in the tank or damage to equipment may occur.</p> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

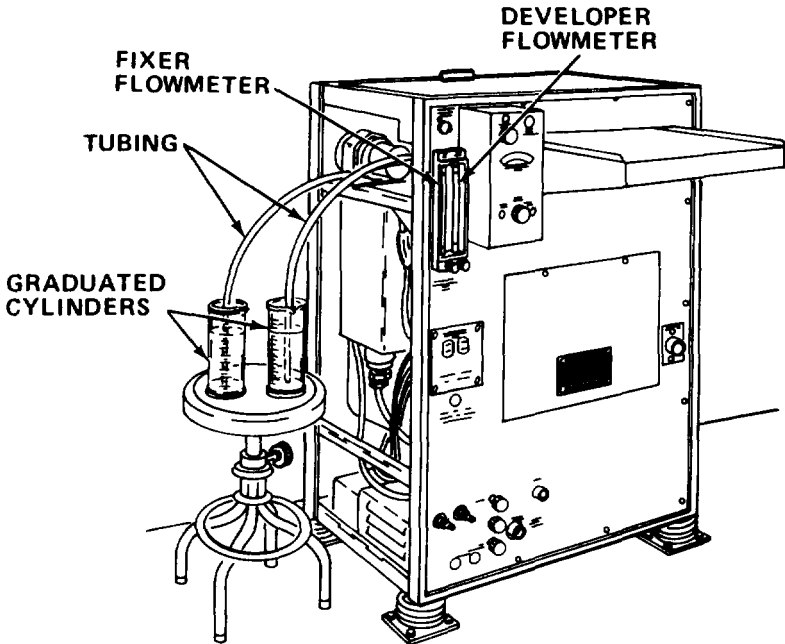
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|---|----------|--|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |  |  |
| 19  | S        | <p><u>Inspect Flowmeter and Check Flow Rates - Cont</u></p> <ol style="list-style-type: none"> <li>2. Disconnect tubing from outlets at top of developer and fixer flowmeters.</li> </ol>  <ol style="list-style-type: none"> <li>3. Attach two tubes of 3/8 in. (9.5 mm) ID to outlets of developer and fixer flowmeters. Tubing should be long enough to reach two graduated cylinders located on a stool beside the processor.</li> <li>4. First, manually operate the replenisher pump by manually overriding detector roller and turning PUMP switch on and off to clear air from the tubing. Direct flow from both tubes to a pail.</li> </ol> |  |

Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.          | INTERVAL | ITEM TO BE INSPECTED                                 | PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
|-------------------|----------|--|---|--|-------|------------------|----|----|----|----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|                   |          | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>            |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 19                | S        | <u>Inspect Flowmeter and Check Flow Rates - Cont</u> | <p>5. Turn on PUMP switch and adjust flowmeters to a reading of 10,40, 70, 100, or 130 as required, using the center of the flowmeter float balls as reference points.</p> <p>6. Insert each tube into the graduated cylinder. Turn on PUMP switch for 1 minute, then turn off PUMP switch and measure fluid levels in graduated cylinders. Record readings for each setting as shown in sample below.</p> <p style="text-align: center;">SAMPLE OF FLOWMETER DATA</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">Flowmeter Setting</th> <th style="text-align: left;">Fixer</th> <th style="text-align: left;">ML/MIN Developer</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">30</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">95</td> <td style="text-align: center;">190</td> </tr> <tr> <td style="text-align: center;">70</td> <td style="text-align: center;">215</td> <td style="text-align: center;">350</td> </tr> <tr> <td style="text-align: center;">100</td> <td style="text-align: center;">300</td> <td style="text-align: center;">520</td> </tr> <tr> <td style="text-align: center;">130</td> <td style="text-align: center;">415</td> <td style="text-align: center;">670</td> </tr> </tbody> </table> <p>7. Repeat steps 5 and 6 until all flowmeter reading levels have been completed.</p> <p>8. Using data recorded above, plot the actual flow rates against flowmeter settings. See sample on the following page:</p> | Flowmeter Setting  | Fixer | ML/MIN Developer | 10 | 30 | 30 | 40 | 95 | 190 | 70 | 215 | 350 | 100 | 300 | 520 | 130 | 415 | 670 |  |
| Flowmeter Setting | Fixer    | ML/MIN Developer                                     |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 10                | 30       | 30   |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 40                | 95       | 190  |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 70                | 215      | 350  |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 100               | 300      | 520  |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |
| 130               | 415      | 670  |   |  |       |                  |    |    |    |    |    |     |    |     |     |     |     |     |     |     |     |  |

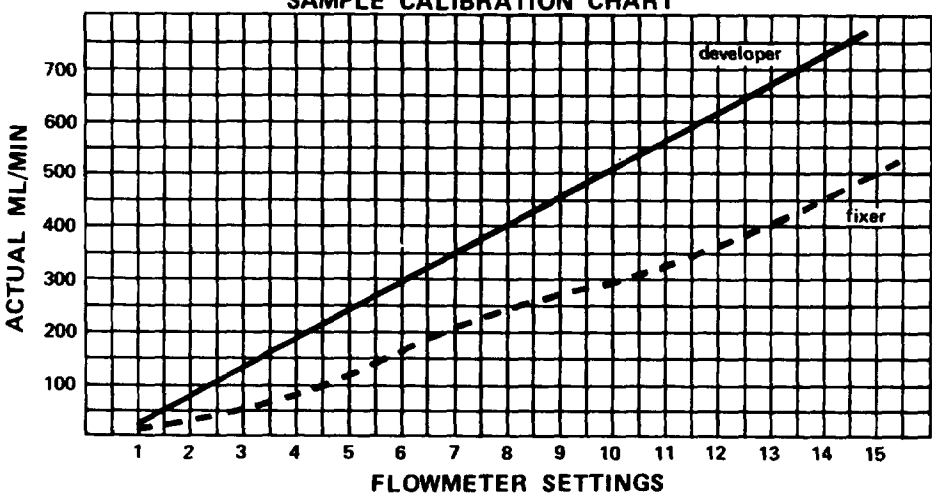
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

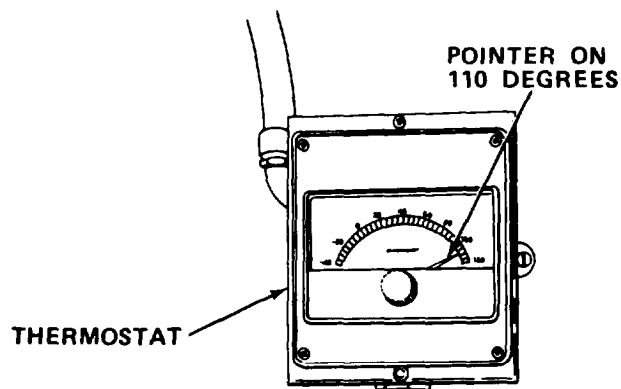
(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 19       | S        | <p><b>FILM/PAPER PROCESSOR SYSTEM - Cont</b></p>  |  |
|          |          | <p>Inspect Flowmeter and Check Flow Rates - Cont</p> <div style="text-align: center;"> <p><b>SAMPLE CALIBRATION CHART</b></p>  <p><b>NOTE</b></p> <p>Store tubing for future use.</p> <p>9. Disconnect tubes from developer and fixer flowmeters and reconnect outlet tubes to both flowmeters.</p> <p>10. Reinstall left side panel.</p> </div> |  |

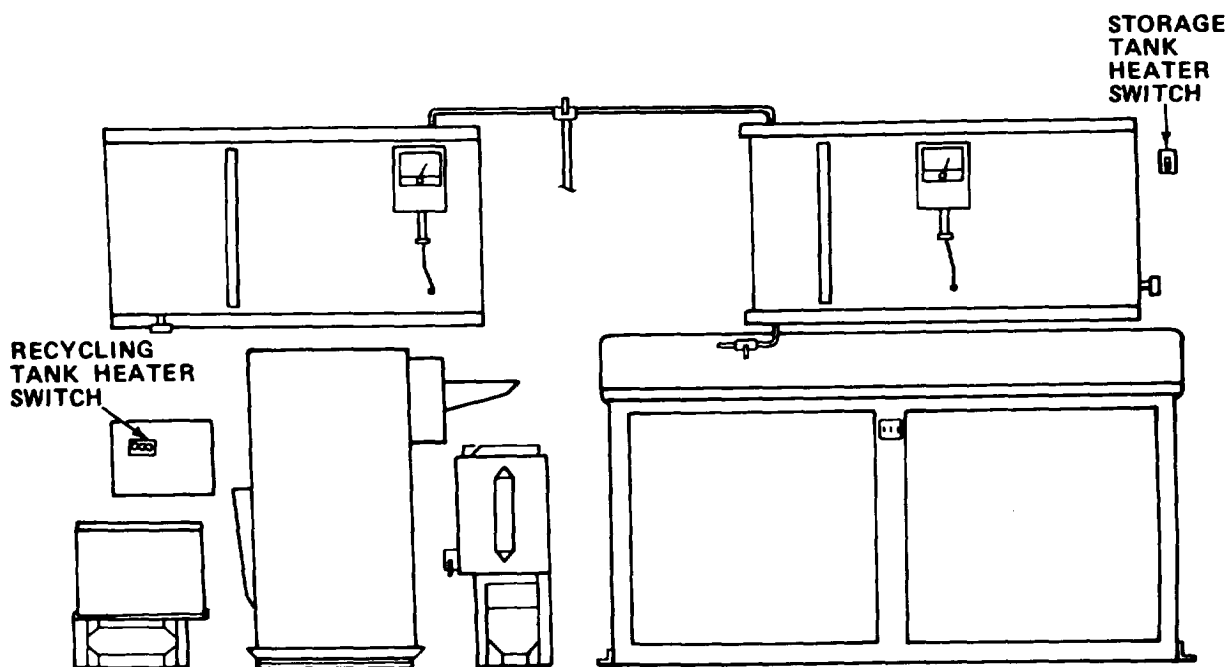
**2-6. OPERATION UNDER USUAL CONDITIONS.**

**2-6.1 Assembly and Preparation for Use.**

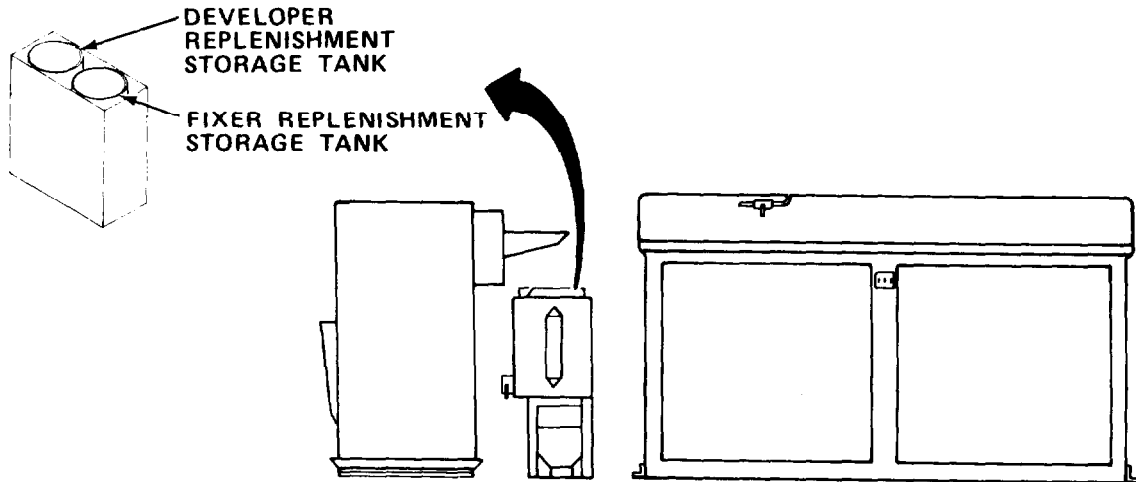
- a. Perform before operation (B) PMCS (Table 2-1).
- b. Install new developer filter (paragraph 2-10.3).



- c. Set storage tank thermostat to 110°F (43.3°C) ± 5°F (± 2.5°C).



- d. Turn on heating element circuit breakers. Turn on heater switches.



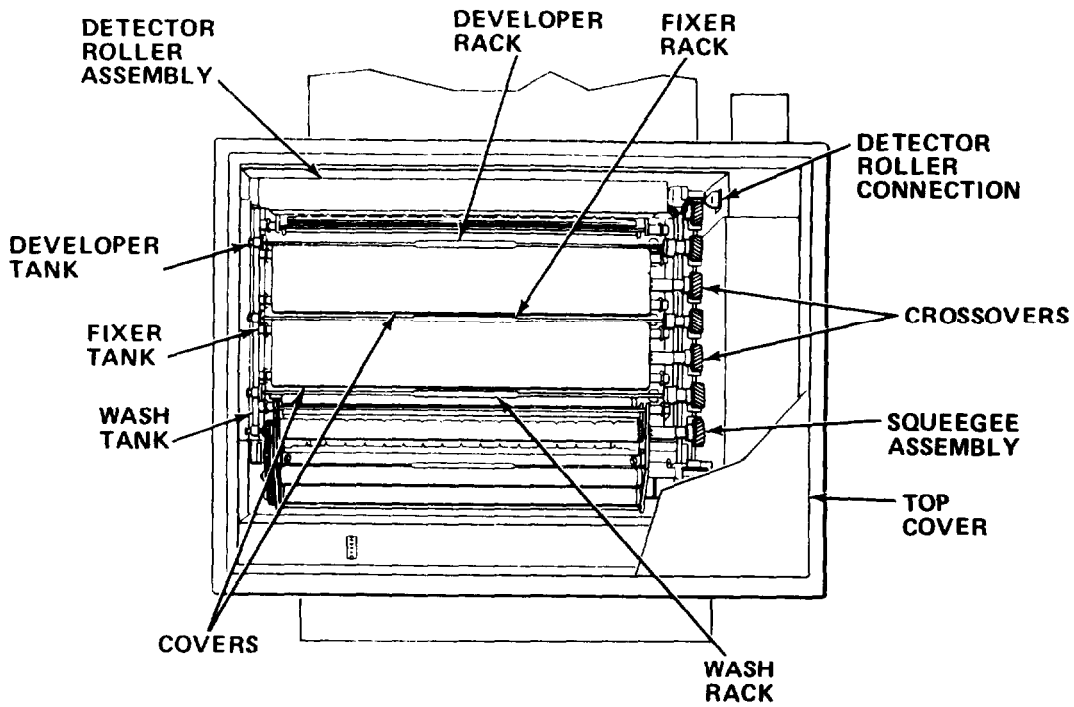
e. Remove replenisher storage tank covers and clean inside of tanks with damp sponge.

**CAUTION**

Always use face shield or goggles when handling chemicals to prevent injury to eyes.

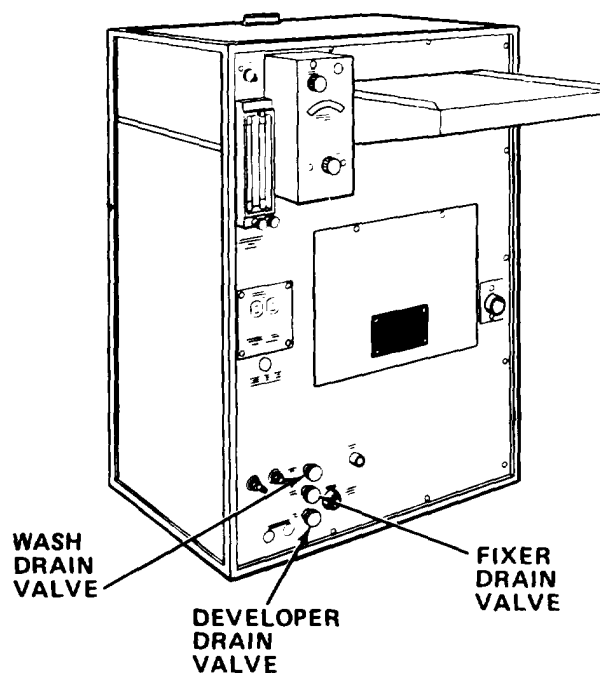
f. Prepare required chemistry according to manufacturer's directions.

g. Put required chemistry in appropriate replenishment storage tanks, then reinstall covers.

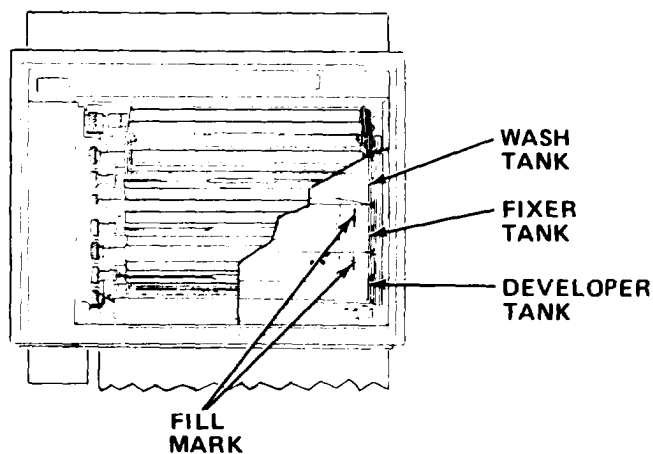




- h. Unplug detector roller connection and remove roller assembly.
- i. Remove covers and squeegee assembly.
- j. Remove remaining crossover and rack assemblies, being sure to note removal sequence.
- k. Install developer splash guard.



- l. Close washer, fixer, and developer drain valves on rear of processor.



**NOTE**

Be sure fixer solution does not splash, and that all drive and worm gears are meshed.

- m. Fill fixer tank to fill mark and reinstall fixer rack.

**NOTE**

Fixer will contaminate developer.

- n. Wipe interior of developer tank with a clean damp sponge.
- o. Remove developer splash guard and fill developer tank to fill mark.

**NOTE**

Be sure chemicals do not splash and that all drive and worm gears are meshed.

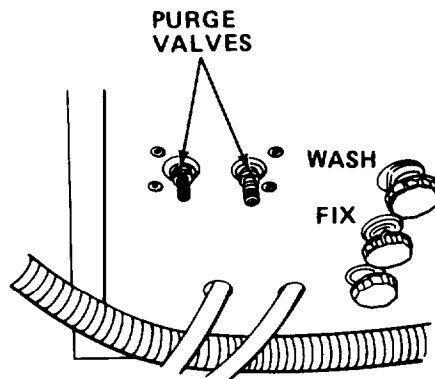
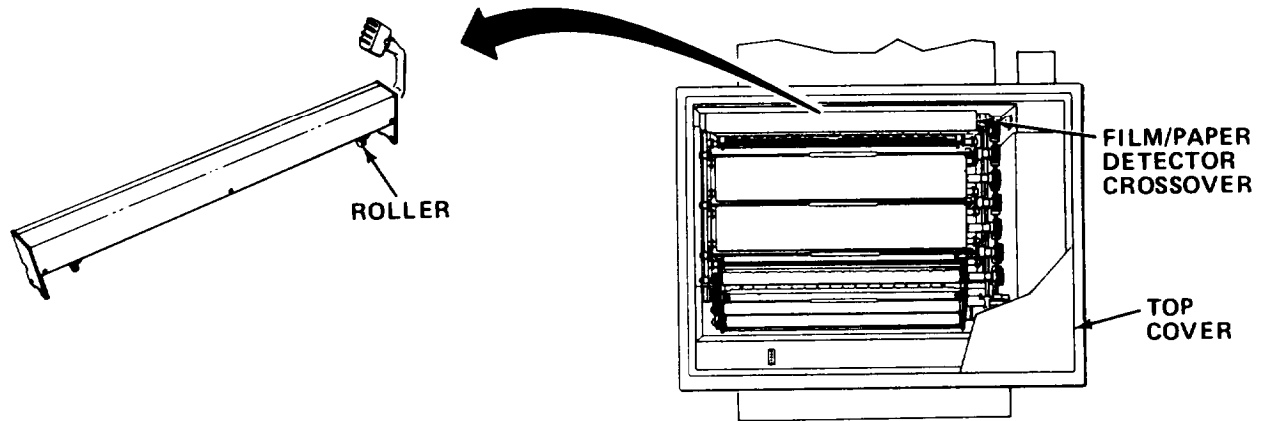
- p. Carefully reinstall developer and wash racks and all crossover assemblies.
- q. Plug in detector roller electrical connector.
- r. Turn on SUMP PUMP and RECYCLING PUMP switches.
- s. Turn recycling directional flow valve to pump position.
- t. Turn sump pump directional flow valve to recycling position.
- u. Turn on DRIVE, PUMP, and DRYER switches and allow developer temperature to stabilize at 80°F (26.6°C).

**CAUTION**

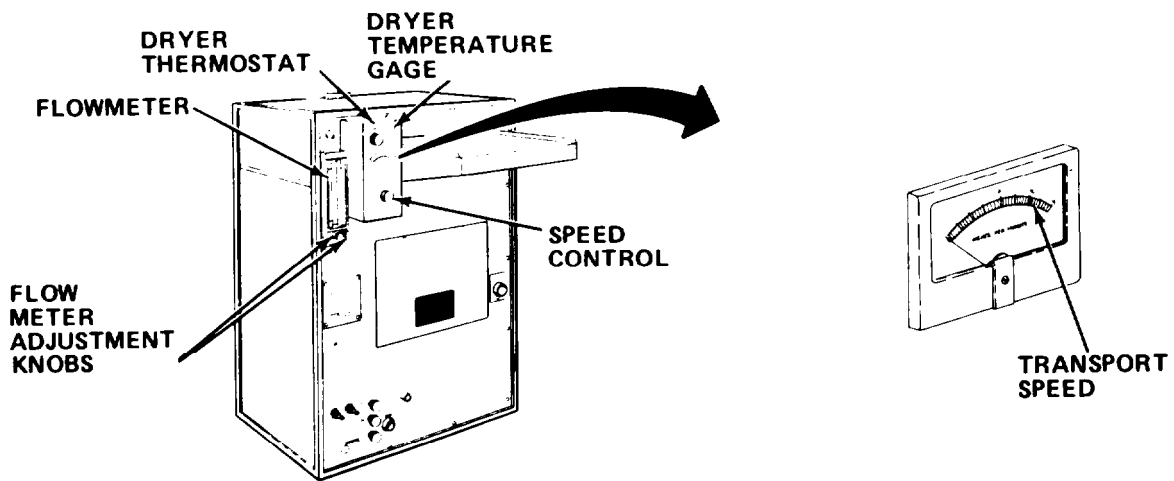
Be sure to place rag under developer and fixer purge valves to prevent chemicals from spilling on floor.

**NOTE**

Manually override detector roller switch before performing following step.



v. Prime developer and fixer replenishment pumps by bleeding air through the purge valves.



w. Adjust flowmeters to desired replenishment rate.

**NOTE**

Be sure manual override device is removed before proceeding to next step.

- x. Rotate speed control until desired transport speed is set on indicator.
- y. Set dryer thermostat to desired temperature.

**NOTE**

Be sure that dryer temperature is stabilized before processing paper.

- z. Reinstall all covers and begin processing paper.

2-6.2 Operating Procedures. The operating procedures for the processor are simple when preparation for use procedures have been completed.

- a. Process paper as follows:

(1) Insert paper to be printed into processor through left side of feed tray; emulsion side down.

**NOTE**

Be sure that flowmeter balls rise to setting established during initial set-up.

(2) Timer bell will ring when additional paper may be fed into processor.

(3) When process is complete, extract print from bin and evaluate results.

**NOTE**

- If results are unsatisfactory, change controls on either the contact printer or rectifier, and process exposure for new prints.
- Repeat paper processing until acceptable print is obtained. It may be necessary to change types of print paper.

(4) If processing is complete, and additional processing is anticipated within 12 hours, perform step b.

(5) If processing is complete, and additional processing is not anticipated within 12 hours, or chemicals are contaminated, perform steps b. and c.

b. Shutdown processor as follows:

- (1) Perform after operation (A) PMCS.
- (2) Turn off DRIVE, PUMP, and DRYER switches.
- (3) Turn off RECYCLING PUMP, and recycling tank HEATER switches.
- (4) Place recycling directional flow valve to the recycling position.
- (5) Turn off storage tank HEATER switch and SUMP PUMP switch when sump tank has been pumped empty.

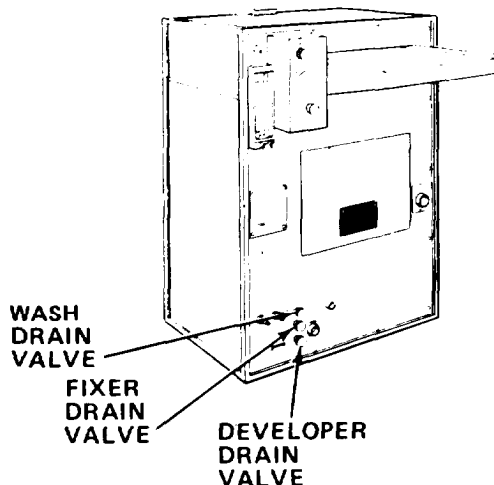
c. Drain processor as follows:

- (1) Rotate sump pump directional flow valve to drain position.

### CAUTION

Prior to disposal of developer and fixer, field users should contact their local environmental coordinator, or their local industrial hygienist for instructions on disposal of chemicals.

- (2) Turn on SUMP PUMP switch.

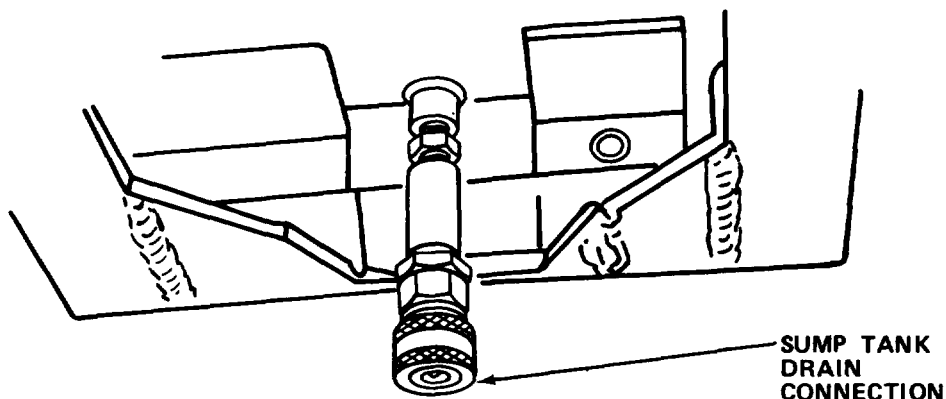


(3) Drain the developer tank of processor by opening DEV drain valve on rear of processor.

(4) After developer tank is drained, open FIX drain valve on rear of processor and drain fixer tank.

(5) After fixer tank is drained, open WASH drain valve on rear of processor and drain wash tank.

(6) If processor will be exposed to freezing temperatures, perform steps k., l., and m. of paragraph 2-6.3, Preparation for Movement.



(7) Connect a drain hose with a male quick-disconnect fitting into the drain line of the sump tank, and drain tank into a container.

### 2-6.3 Preparation for Movement.

- a. Check to be sure that all paper has exited the processor.
- b. Turn off DRIVE, PUMP, and DRYER switches on the processor.
- c. Turn off HEATER switches for recycling and storage tanks.
- d. Turn off RECYCLING and SUMP PUMP switches.

### **CAUTION**

Prior to disposal of developer and fixer, field users should contact their local environmental coordinator, or their industrial hygienist for instructions on disposal of chemicals.

- e. Remove drain caps on outside of van for both the recycling and storage tanks.
- f. Rotate sump pump directional flow valve to recycling position.
- g. Rotate recycling directional flow valve to drain position and drain recycling tank.
- h. Open storage tank drain valve and drain storage tank.
- i. Drain developer and fixer replenishment storage tanks by disconnecting the quick-disconnects going to processor and then connect a drain hose to them.
- j. After developer and fixer replenishment tanks are drained, reconnect the quick-disconnects.

**CAUTION**

Always use a face shield or goggles when handling chemicals to prevent injury to eyes.

**NOTE**

For the following steps, use the model 34-2025 air compressor or equivalent. (Maximum output 30 psi.)

- k. Open the flow rate control valves on the flowmeter to the fully open position.
- l. After draining solution from developer and fixer tanks, use the purge valves located on the rear panel of the processor and connect the air compressor and blow remaining solution from solution lines.
- m. Wipe solution from the processor tanks with a damp sponge.
- n. Drain the sump tank by connecting a drain hose to the quick-disconnect fitting.
- o. Drain the chiller by connecting a drain hose to the quick-disconnect fittings.
- p. Turn off circuit breaker for processor, chiller, and heaters.
- q. Remove water supply and drain hoses and store in chassis tool box.

**2-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

### Section III OPERATOR MAINTENANCE

#### 2-8. LUBRICATION INSTRUCTIONS.

##### WARNING

Serious injury may occur if fingers, clothing or other materials are caught in moving parts.

##### CAUTION

Do not get oil or grease on the racks or crossovers, or in the solution tanks. Damage to equipment may occur.

##### NOTE

These lubrication instructions are mandatory.

2-8.1. Main Drive Chain. Apply a small amount of ball and roller bearing grease (Item 5, Appendix E) to chain surface once a month.

2-8.2 Worm Drive Gears. Semiannually, apply a small amount of ball and roller bearing grease (Item 5, Appendix E) to surface of gear teeth.

2-8.3 Main Drive Motor. Semiannually, apply four to five drops of light oil (nondetergent) (Item 21, Appendix E) into oil cups on top of bearing housings.

2-8.4 Microswitch Plunger and Roller. Semiannually, apply a small amount of light oil (nondetergent) (Item 21, Appendix E) to plunger and roller. Wipe off excessive oil.

2-8.5 Wash Squeegee Driver Gears. Semiannually, apply a small amount of ball and roller bearing grease (Item 5, Appendix E) to surface of gear teeth.

#### 2-9. TROUBLESHOOTING PROCEDURES.

a. The table lists the common malfunctions which you may find during operations or maintenance of the film/paper processor system. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.



Table 2-2. TROUBLESHOOTING

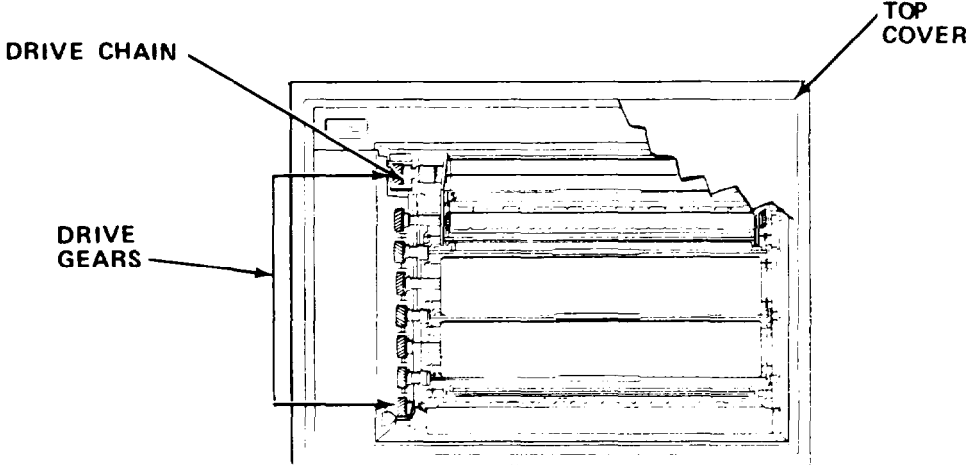
| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|--|--|---|
| 1. ROLLERS DO NOT ROTATE WHEN DRIVE SWITCH IS TURNED ON. | <p>Step 1. Check that circuit breaker is on.</p> <p>(a) If circuit breaker is on, proceed to step 2.</p> <p>(b) If circuit breaker is off, turn on circuit breaker.</p> <p>Step 2. Check motor SPEED control setting.</p> <p>(a) If SPEED control setting is correct, proceed to step 3.</p> <p>(b) If SPEED control setting is too low, rotate SPEED control clockwise.</p> |  |
|  | <p>Step 3. Check that toothed gears on rack assemblies are properly meshed.</p> <p>(a) If gears are aligned correctly, proceed to step 4.</p> <p>(b) If gears are misaligned, reposition rack assemblies.</p>  |   |
|  | <p>Step 4. Check that drive chain is properly positioned.</p> <p>(a) If drive chain is misaligned, reposition drive chain.</p> <p>(b) If malfunction persists, refer to organizational maintenance.</p>  |   |

Table 2-2. TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

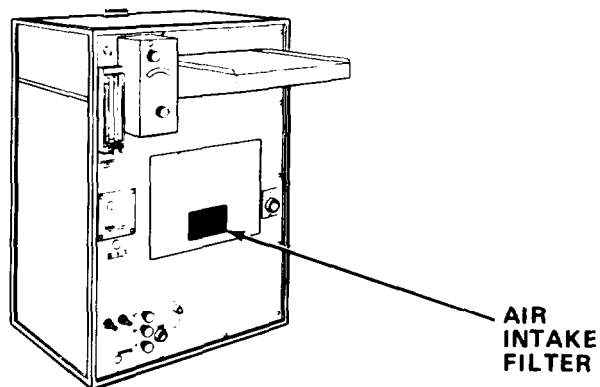
2. DRYER FAN DOES NOT BLOW AIR.

Step 1. Check that DRYER switch is on.

- (a) If DRYER switch is on, proceed to step 2.
- (b) If DRYER switch is off, turn on DRYER switch.

Step 2. Check for clogged air intake filter.

- (a) If intake filter is clogged, replace intake filter as follows:



- (1) Remove four screws and filter cover.
  - (2) Remove filter and discard.
  - (3) Install new filter.
  - (4) Reinstall filter cover and secure with screws.
- (b) If malfunction persists, refer to organizational maintenance.

Table 2-2. TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

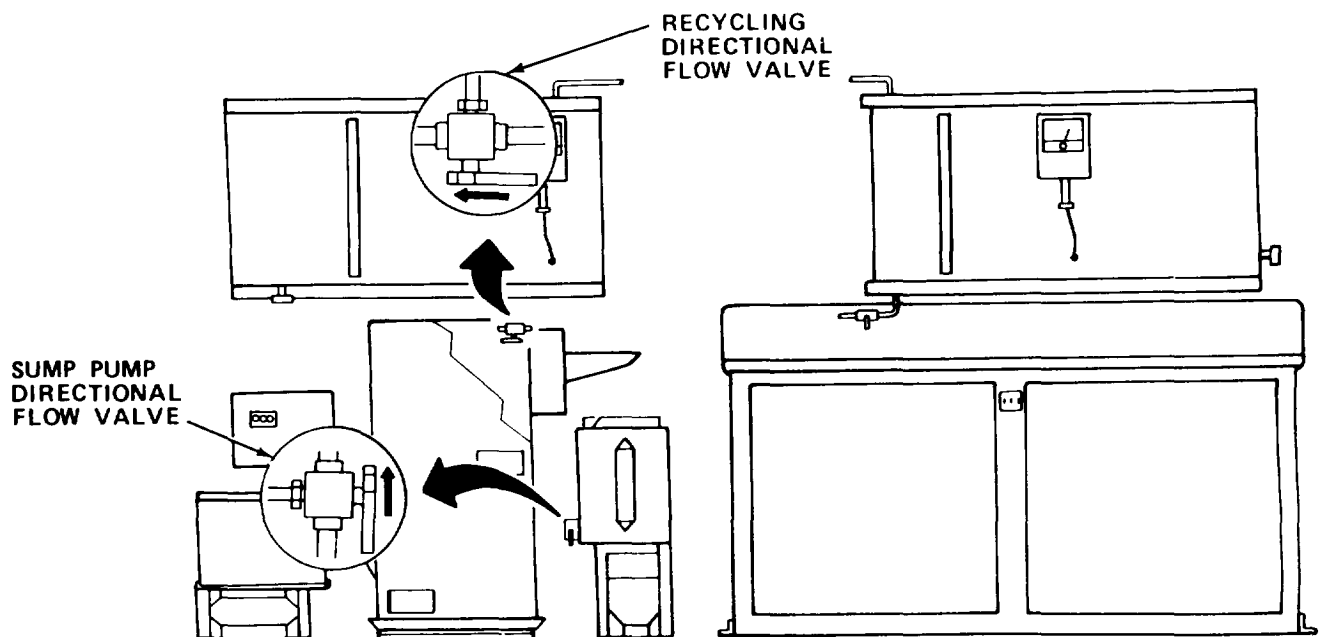
CORRECTIVE ACTION

3. RECYCLING AND/OR REPLENISHMENT PUMPS DO NOT OPERATE WHEN PAPER IS FED INTO PROCESSOR.

Check that PUMP switch is on.

- (a) If PUMP switch is off, turn on PUMP switch.
- (b) If malfunction persists, refer to organizational maintenance.

4. RECYCLED WASH WATER DOES NOT ENTER PROCESSOR.



Step 1. Check that RECYCLING PUMP switch is on.

- (a) If on, proceed to step 2.
- (b) If not on, turn on RECYCLING PUMP switch.

Table 2-2. TROUBLESHOOTING - Cont

---

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

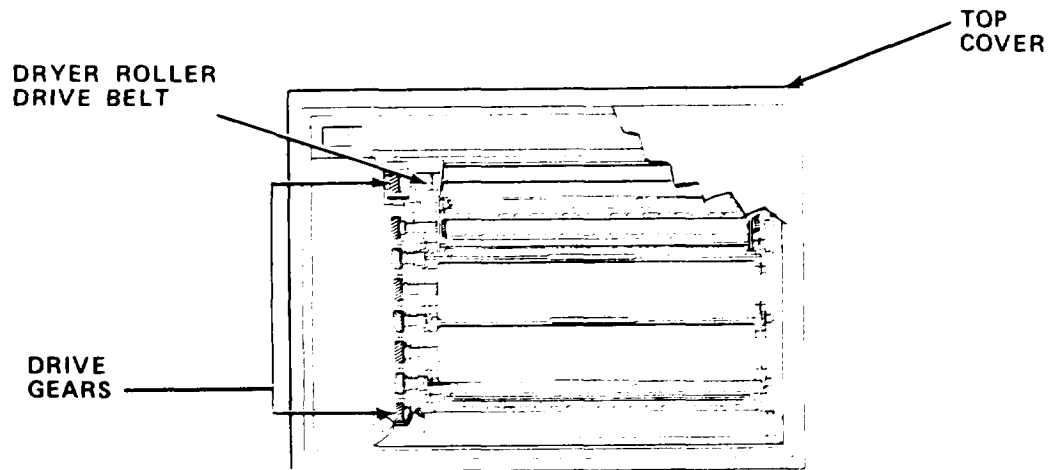
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|   |   |  |
|---|---|--|
| 4. RECYCLED WASH WATER DOES NOT ENTER PROCESSOR - Cont  | Step 2. Check that the recycling directional flow valve is in pump position.<br>(a) If in pump position, proceed to step 3.<br>(b) If not in pump position, rotate recycling directional flow valve to pump position. | Step 3. Check for clogged recycling hoses.<br>(a) If hoses are clogged, clean hoses.<br>(b) If hoses are not clogged, replace recycling filter (paragraph 2-10.6). |
| 5. CHILLER DOES NOT OPERATE WHEN MAIN POWER SWITCH IS ON.                                     | Check for unplugged power supply cord.<br>(a) If unplugged, plug power supply cord in.<br>(b) If malfunction persists, refer to organizational maintenance.   |  |
| 6. WITH MAIN POWER SWITCH ON, HEATING ELEMENTS WILL NOT MAINTAIN PRESET TEMPERATURE IN TANKS. | Check for HEATER switch in OFF position.<br>(a) If switch is off, turn on HEATER switch.<br>(b) If malfunction persists, refer to organizational maintenance.   |  |

Table 2-2. TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

## 7. PAPER NOT PROPERLY FEEDING THROUGH PROCESSOR.



Step 1. Check dryer roller drive belt to see if belt is rotating dryer transport rollers.

- (a) If belt is driving dryer transport rollers, proceed to step 2.
- (b) If belt is not rotating transport rollers, adjust dryer roller belt (paragraph 2-10.1).
- (c) If belt is broken, refer to organizational maintenance for replacement.

Step 2. Check if feed tray is aligned correctly.

- (a) If tray is misaligned, adjust feed tray (paragraph 2-10.5).
- (b) If malfunction persists, refer to organizational maintenance.

## 8. PAPER IS SPOTTED OR SHOWS SURFACE DEFECTS.

Check roller racks for residue accumulations.

**Table 2-2. TROUBLESHOOTING - Cont**

| MALFUNCTION   | TEST OR INSPECTION                | CORRECTIVE ACTION  |
|---|-----------------------------------|--|
| 8. PAPER IS SPOTTED OR SHOWS SURFACE DEFECTS - Cont       |                                   | <ul style="list-style-type: none"> <li>(a) If roller racks are contaminated, clean in accordance with operator PMCS (Table 2-1).</li> <li>(b) If roller racks are clean or malfunction persists, service processing tanks (paragraph 2-10.2).</li> </ul> |
| 9. FIXER TANK OR DEVELOPER TANK DOES NOT DRAIN CORRECTLY. | Check for obstructed drain lines. | <ul style="list-style-type: none"> <li>(a) If drain lines are clear, service strainers (paragraph 2-10.4).</li> <li>(b) If drain lines are obstructed, refer to organizational maintenance for cleaning.</li> </ul>                                      |

**2-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the film/paper processor. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

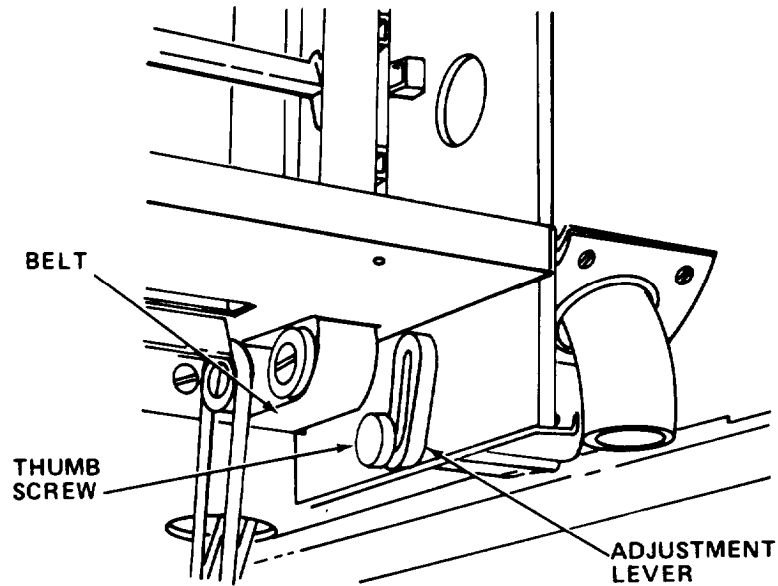
INDEX

| PROCEDURE                          | PARAGRAPH |
|------------------------------------|-----------|
| Adjust Dryer Roller Belt . . . . . | 2-10.1    |
| Service Processing Tanks . . . . . | 2-10.2    |
| Replace Developer Filter . . . . . | 2-10.3    |
| Service Strainers. . . . .         | 2-10.4    |
| Adjust Feed Tray . . . . .         | 2-10.5    |
| Replace Recycling Filter . . . . . | 2-10.6    |

2-10.1 Adjust Dryer Roller Belt.

MOS: 83E, Photo and Layout Specialist

- a. Turn off processor DRIVE switch.
- b. Remove front panel by lifting off.

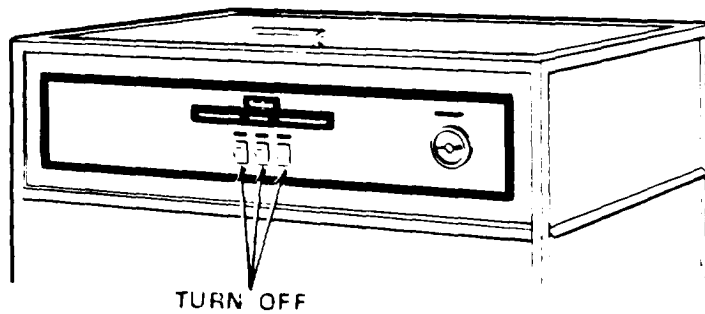


- c. Loosen the thumbscrew on the adjustment lever.
- d. Press lever downward until belt deflects approximately 1/4 to 1/2 in. (6.35 - 12.7 mm).
- e. Tighten thumbscrew securely.
- f. Reinstall front panel.

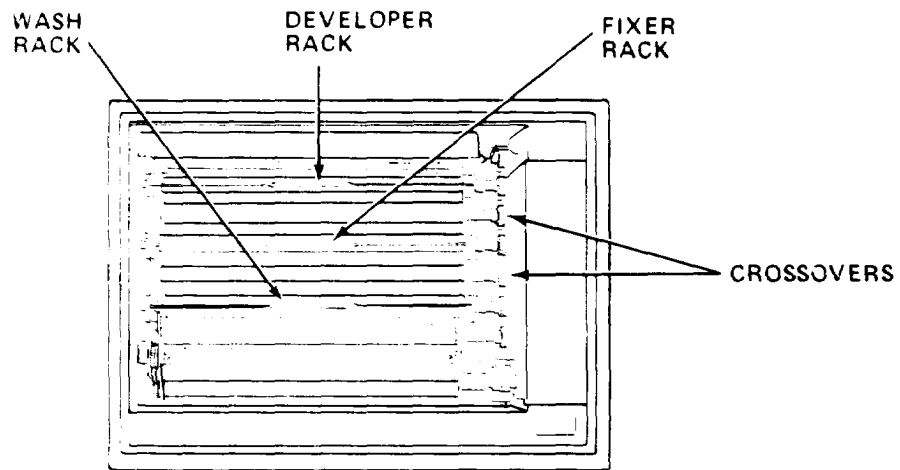
2-10.2 Service Processing Tanks.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: Developer System Cleaner (Item 9, Appendix E)  
Fixer System Cleaner (Item 12, Appendix E)  
Developer Solution (Item 10, Appendix E)  
Fixer Solution (Item 11, Appendix E)



- a. Turn off all processor power switches.

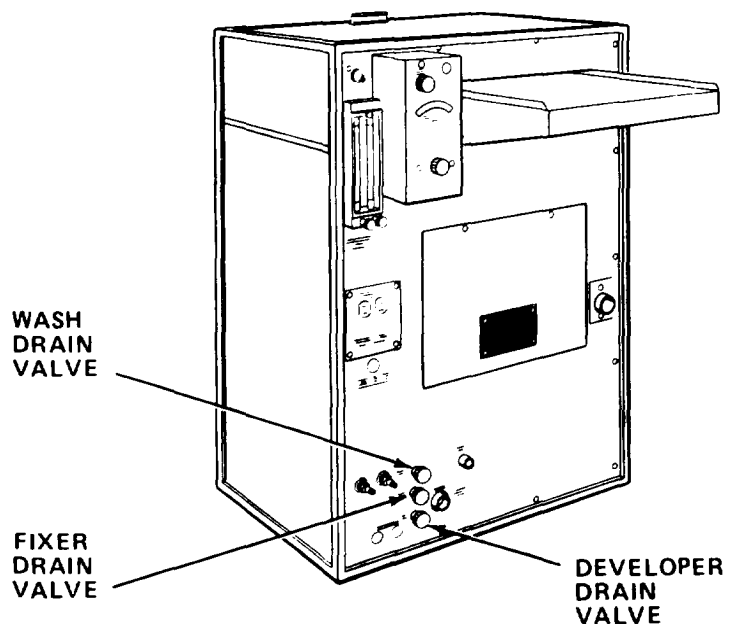


- b. Remove covers and crossover assemblies.

**WARNING**

Do not get system cleaners in eyes, on your skin, or on your clothing, or severe injury may occur.





- c. Drain system by opening DEV, FIX, and WASH drain valves, and rotating sump pump directional flow valve to DRAIN position.
- d. Close all drain valves and fill wash tank with water.
- e. Clean and drain wash tank. Close WASH drain valve.
- f. Remove developer filter element (paragraph 2-10.3).

#### **CAUTION**

- Use developer cleaner only in developer tank and fixer cleaner only in fixer tank. Follow manufacturer's instructions for cleaner mixing ratios.
  - Use splash guards when servicing processor or serious contamination of unit will result.
- g. Fill developer tank with developer system cleaner.
  - h. Fill fixer tank with fixer system cleaner.

#### **CAUTION**

Do not immerse racks in cleaning solutions longer than 15 minutes or damage may result.

- i. Turn on PUMP and DRIVE switches on front panel, and run unit for approximately 15 minutes.
- j. Drain system by opening DEV and FIX drain valves. Close valves after draining.
- k. Remove and clean wash, fixer, and developer rack assemblies.
- l. Fill wash, developer, and fixer tanks with clean water.
- m. Turn PUMP and DRIVE switches on, and run unit for 5 minutes; then turn off both switches.
- n. Open DEV, FIX, and WASH drain valves, and drain system. Close valves.
- o. Reinstall wash, fixer, and developer rack assemblies.
- p. Refill tanks with clean water.
- q. Turn PUMP and DRIVE switches on, and run unit for 10 minutes; then turn off both switches.
- r. Open DEV, FIX, and WASH drain valves, and drain system. Close all valves and rotate the sump pump directional flow valve to RECYCLE position.
- s. Install new developer filter element (paragraph 2-10.3).

**CAUTION**

Use splash guard when filling developer and fixer tanks to prevent contamination of solutions.

- t. Refill tanks with fresh developer and fixer solutions (paragraph 2-6.1).

2-10.3 Replace Developer Filter.

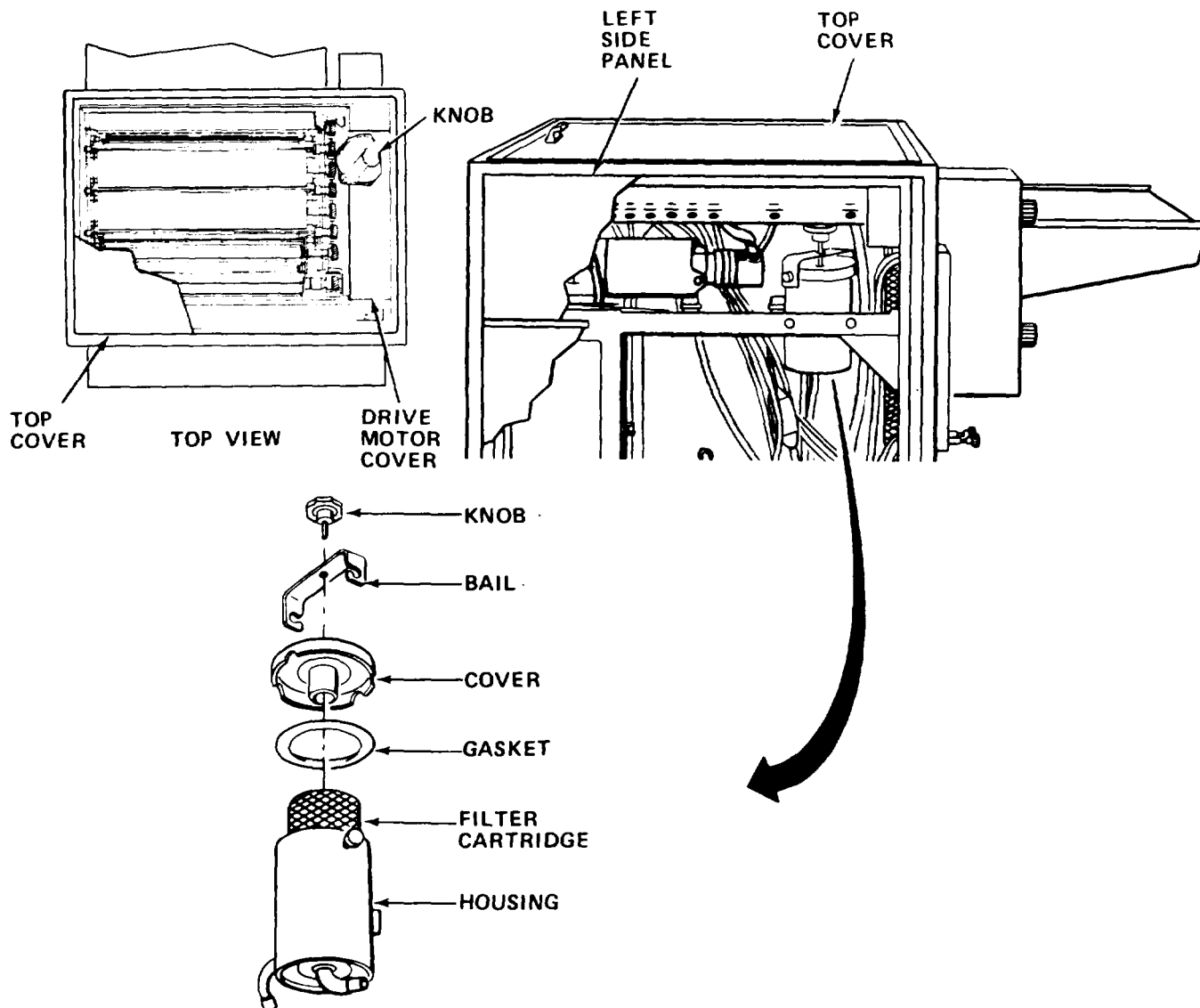
MOS: 83E, Photo and Layout Specialist

SUPPLIES: Filter Cartridge  
Gasket

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off all processor power switches and RECYCLING PUMP switch.



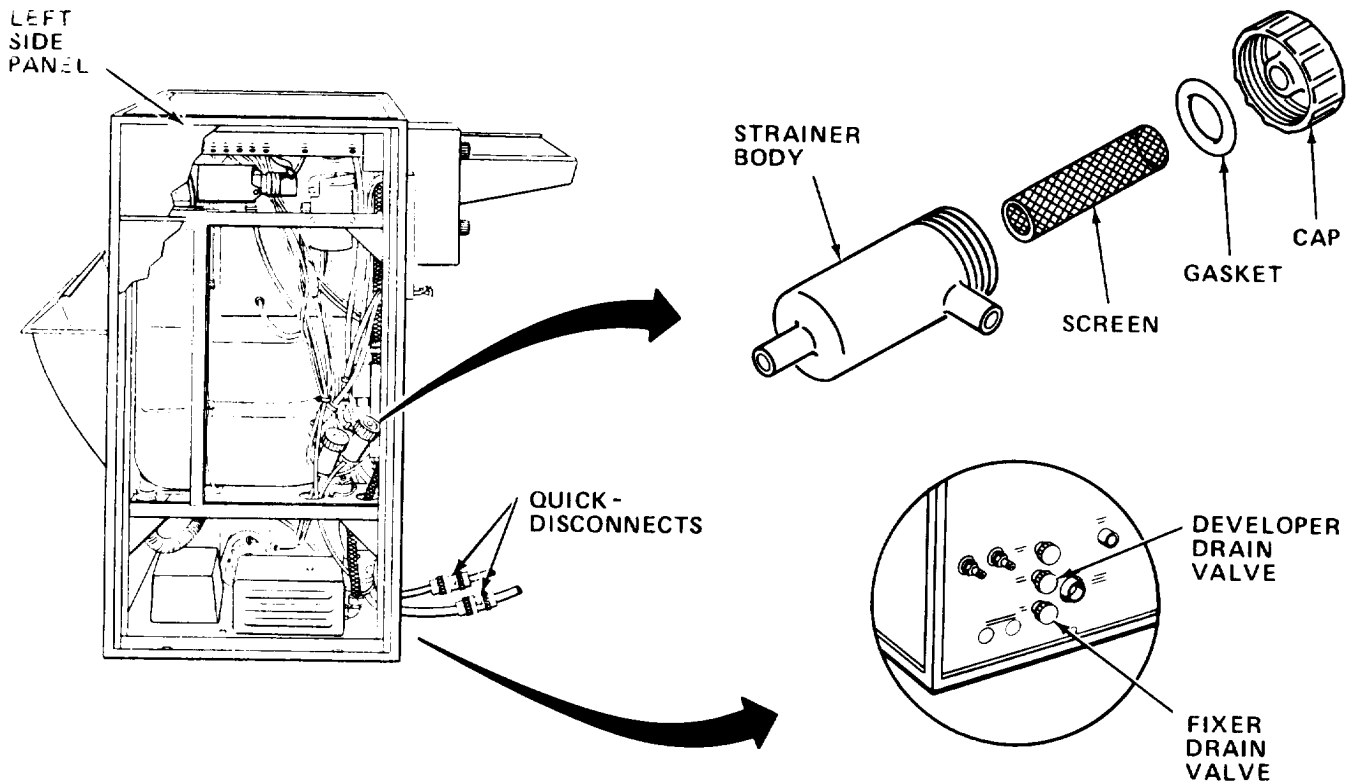
- b. Remove left side panel, top cover, and drive motor cover.
- c. Unscrew knob.
- d. Remove bail, cover, gasket, and filter cartridge. Retain gasket and discard filter cartridge.
- e. Inspect gasket; replace if defective.
- f. Insert new filter cartridge into housing.
- g. Reinstall gasket, cover, bail, and knob.
- h. Reinstall covers and side panel.

2-10.4 Service Strainers.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: Strainer Gaskets  
Pail

a. Turn off all processor switches and RECYCLING PUMP switch.



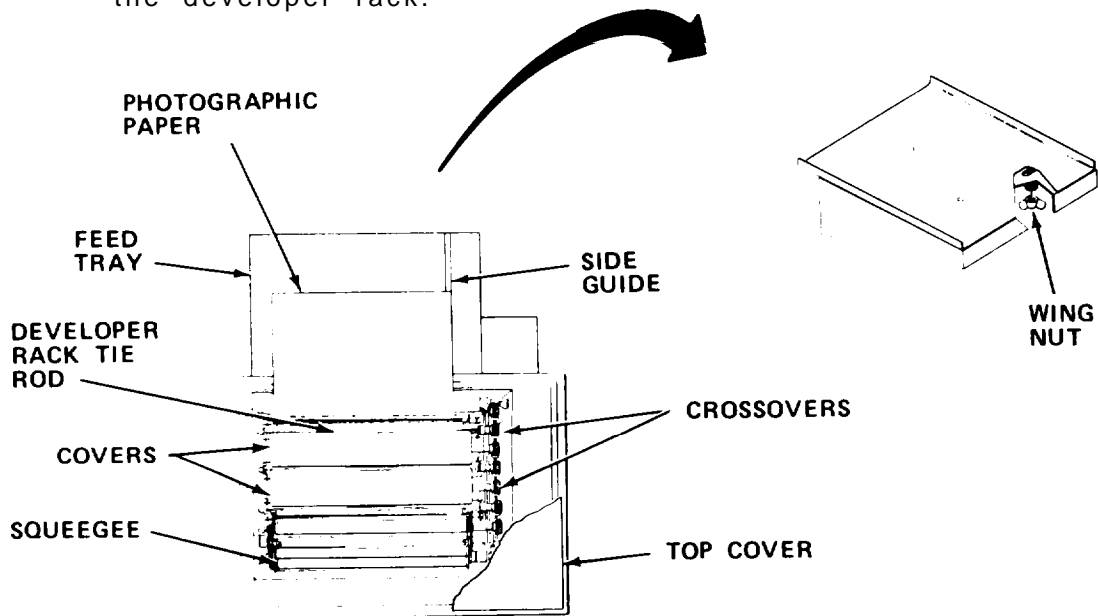
- b. Remove left side panel.
- c. Drain developer and fixer tanks by opening DEV and FIX drain valves.
- d. Disconnect developer and fixer replenishment lines at quick-disconnects.
- e. Unscrew strainer caps. Remove gaskets and screens. Discard gaskets.
- f. Wash screens in warm water.
- g. Install screens, new gaskets, and caps on strainer bodies.
- h. Replace side panel.
- i. Reconnect developer and fixer replenishment lines.
- j. Refill developer and fixer tanks, and check for leaks.

2-10.5 Adjust Feed Tray.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: Photographic Paper

- a. Turn off DRIVE switch for processor.
- b. Remove top cover and crossover covers.
- c. Disconnect cable and remove detector rack assembly.
- d. Remove squeegee and crossovers.
- e. Verify that feed tray is square with tie rod of developer rack assembly. Place a sheet of paper against the side guide of the feed tray, and manually feed approximately 1 in. (25.4 mm) of paper into the unit.
- f. Pull the leading edge of the paper up to and square with the tie rod of the developer rack.



- g. If paper is not square with the side guide, loosen the wing nuts under the feed tray. Square tray with edge of paper.
- h. Tighten wing nuts.
- i. Reinstall squeegee and crossovers.
- j. Reinstall detector rack assembly and reconnect wiring.
- k. Reinstall crossover covers and top cover.

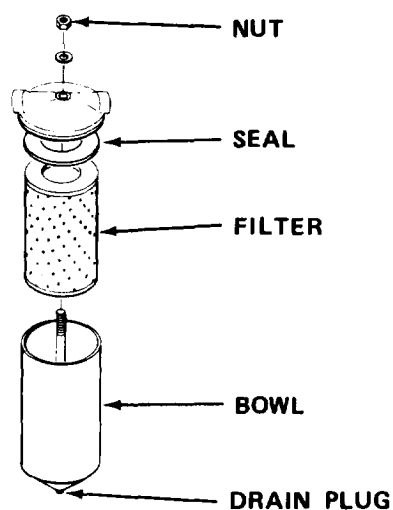
2-10.6 Replace Recycling Filter.

MOS: 83E, Photo and Layout Specialist

TOOLS: Cross Tip Screwdriver  
10 in. Adjustable Wrench

SUPPLIES: Pail  
Filter  
Seal

- a. Turn off RECYCLING PUMP switch.
- b. Position recycling directional flow valve to recycle tank position.



- c. Drain recycling filter by placing pail under filter and removing drain plug.
- d. Loosen "U" shaped retaining bracket.
- e. Loosen top nut and remove bowl, filter, and seal.
- f. Remove filter from bowl and discard.
- g. Clean bowl with water.
- h. Install new filter in bowl.
- i. Install new seal, (if required), bowl, and filter. Tighten retaining nut.
- j. Tighten retaining bracket.
- k. Reinstall drain plug.
- l. Position recycling directional flow valve to pump position.

**Section IV ORGANIZATIONAL MAINTENANCE****2-11. LUBRICATION INSTRUCTIONS.****WARNING**

Serious injury may occur if fingers, clothing, or other materials are caught in moving parts.

**CAUTION**

Do not get oil or grease on the racks or crossovers, or in the solution tank. Damage to equipment may occur.

**NOTE**

These lubrication instructions are mandatory.

2-11.1 Replenisher and Recirculation Motors. Semiannually, apply several drops of light oil (nondetergent) (Item 21, Appendix E) into each of the oil wells.

**2-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ; AND SUPPORT EQUIPMENT.**

2-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-12.2 Special Tools; Test Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment are listed in the applicable repair parts and special tools list and in Appendix B of this manual.

2-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**2-13. SERVICE UPON RECEIPT.****2-13.1 Checking Unpacked Equipment.**

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**2-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

a. PMCS are designed to keep the equipment in good working condition by performing certain tests, inspections, and services. The intervals provide you, the organizational technician, with time schedules that determine when to perform specified tasks.

b. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording the results of PMCS.

c. Interval columns. This column determines the time period designated to perform your PMCS.

d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

e. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                          | <u>Quantity</u> |
|--------------------------------------|-----------------|
| Bimetallic Thermometer               | 1 ea            |
| Cross Tip Screwdriver                | 1 ea            |
| Flat Tip Screwdriver                 | 2 ea            |
| 10 in. Adjustable Wrench             | 1 ea            |
| Thread Sealant (Item 37, Appendix E) | ar              |
| Plastic Pail                         | 1 ea            |
| 3/64 in. Hex Head Key Wrench         | 1 ea            |



**Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**NOTE**

If the equipment must be kept in continuous operation, check and service only those items that can safely be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B- Before  
D - During  
A - After

W- Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  |
|----------|----------|--|
| 1        | M        | <p><b>FILM/PAPER PROCESSOR SYSTEM</b></p> <p><u>Adjust Developer Temperature.</u></p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Do not use mercury-filled thermometer to check temperature. Accidental breakage could result in serious mercury contamination of unit.</p> <ol style="list-style-type: none"> <li>1. Adjust water temperature at the recycling tank thermostat to maintain a temperature of 75°F (23.8°C).</li> <li>2. Turn on DRIVE, PUMP, and DRYER switches.</li> <li>3. Set DRYER THERMOSTAT to 110°F (43.3°C) and FILM TRANSPORT SPEED indicator to 30 in. per minute.</li> <li>4. Run unit for at least 30 minutes to allow developer solution to reach the recommended operating temperature of 80°F (26.6°C).</li> </ol> |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

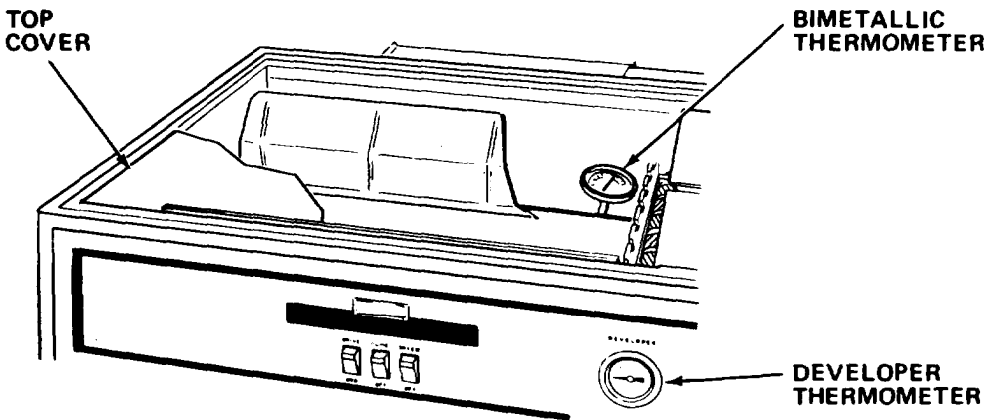
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED                       | PROCEDURE   |
|---|----------|--|---|
| <u>FILM/PAPER PROCESSOR SYSTEM - Cont</u> |          |  |   |
| 1   | M        | <u>Adjust Developer Temperature - Cont</u> |  <p>5. Verify developer temperature with self-indicating bimetallic thermometer. If temperature varies by more than <math>\pm 1^{\circ}\text{F}</math> (<math>0.6^{\circ}\text{C}</math>), adjust DEVELOPER thermostat (paragraph 2-16.6).</p>                            |
| 2   | S        | <u>Inspect Centrifugal Fan Motor Belt</u>  | <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p> <ol style="list-style-type: none"> <li>1. Turn off all processor switches.</li> <li>2. Turn off circuit breaker.</li> </ol> |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

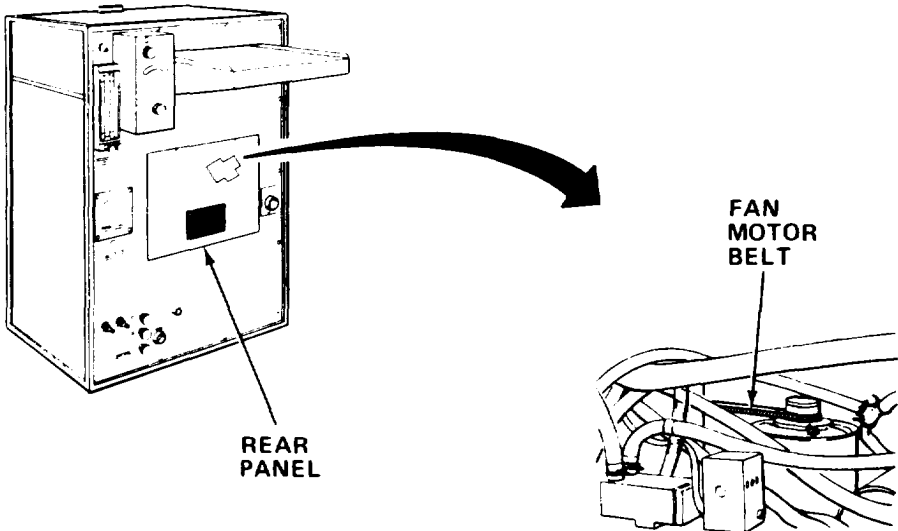
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED                             | PROCEDURE  |
|---|----------|--|--|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |  |  |
| 2   | S        | <u>Inspect Centrifugal Fan Motor Belt - Cont</u> |  <p>                     3. Remove rear panel.<br/>                     4. Check for correct belt adjustment by pressing belt. Belt should deflect maximum 1/4 in. (6.35 mm). If belt is loose, adjust belt as necessary (paragraph 2-16.2).<br/>                     5. Reinstall rear panel.<br/>                     6. Turn on circuit breaker.                 </p> |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
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W - Weekly  
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(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|----------|----------|---|
| 3        | Q        | <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b>   |
|          |          | <p><u>Inspect Tanks (Storage and Recycling).</u></p> <ol style="list-style-type: none"> <li>1. Check mountings for loose or missing bolts.</li> </ol> <div> <p>The diagram illustrates a film/paper processor system. It includes a large rectangular tank with a control panel on the right side, a smaller tank below it, a vertical component, and a chair. A circular callout labeled 'CHECK FOR LEAKS' with a magnifying glass icon points to a specific fitting on the top of the large tank. An arrow points from this callout to the corresponding fitting on the main tank.</p> </div> <ol style="list-style-type: none"> <li>2. Check fittings for leaks.</li> <li>3. Check for cracks or visible damage.</li> </ol> |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

|   |            | B - Before<br>D - During<br>A - After  | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours |
|---|------------|--|--|--|------------------------------|
| ITEM NO.                                  | IN-TER-VAL | ITEM TO BE INSPECTED   |  |  |                              |
|   |            | PROCEDURE  |  |  |                              |
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |            |  |  |  |                              |
| 4   | Q          | <p><u>Service Tanks (Storage and Recycling).</u></p> <ol style="list-style-type: none"> <li>1. Check thermometer reading for recycling tank as follows:               <ol style="list-style-type: none"> <li>a. Turn recycling directional flow valve to recycling tank position.</li> <li>b. Disconnect tubing on drain side of recycling directional flow valve.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p>Water is under pressure in tank. It may be necessary to place pail at an angle to avoid spilling water.</p> <ol style="list-style-type: none"> <li>c. Turn recycling directional flow valve to drain position and fill pail with water.</li> <li>d. Insert thermometer into pail, and read temperature after thermometer has stabilized.</li> <li>e. Reconnect drain hose.</li> <li>f. If temperature varies from tank thermometer reading, proceed to step 3. If correct, proceed to step 2.</li> </ol> </li> <li>2. Check thermometer reading for storage tank as follows:               <ol style="list-style-type: none"> <li>a. Drain spigot line into sink.</li> <li>b. Open spigot valve and fill pail with water from tank.</li> </ol> </li> </ol> |  |  |                              |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

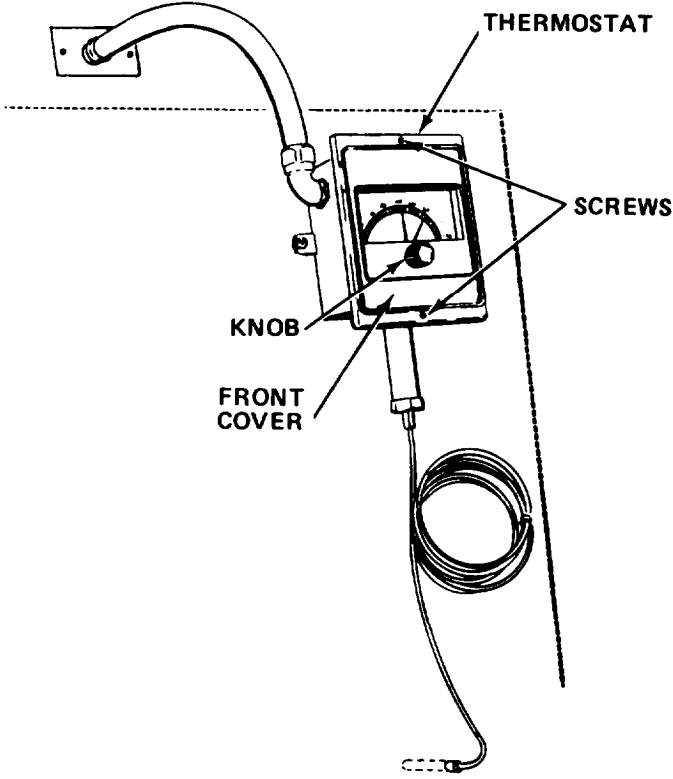
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|---|----------|---|
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |   |
| 4   | Q        | <p><u>Service Tanks (Storage and Recycling) - Cont</u></p> <p>c. Insert thermometer into pail and read temperature after thermometer has stabilized.</p> <p>d. If temperature varies from tank thermometer reading, proceed to next step.</p> <p>3. Adjust tank thermostat, as follows:</p>  |

Table 2-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

|   |          | B - Before<br>D - During<br>A - After  | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours |
|---|----------|--|--|--|------------------------------|
| ITEM NO.                                  | INTERVAL | ITEM TO BE INSPECTED   |  |  |                              |
|   |          | PROCEDURE  |  |  |                              |
| <b>FILM/PAPER PROCESSOR SYSTEM - Cont</b> |          |  |  |  |                              |
| 4   | Q        | <u>Service Tanks (Storage and Recycling) - Cont</u>  |  |  |                              |
|   |          | <ul style="list-style-type: none"> <li>a. Loosen setscrew and remove knob.</li> <li>b. Remove four screws and thermostat cover.</li> <li>c. Loosen adjusting screw, and move red needle to proper temperature indicated on thermometer. in pail.</li> <li>d. Tighten screw, using care not to move red needle.</li> <li>e. Reinstall thermostat cover and knob.</li> </ul> |  |  |                              |

**2-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the following schematic or the foldout located at the end of this manual for further fault analysis.

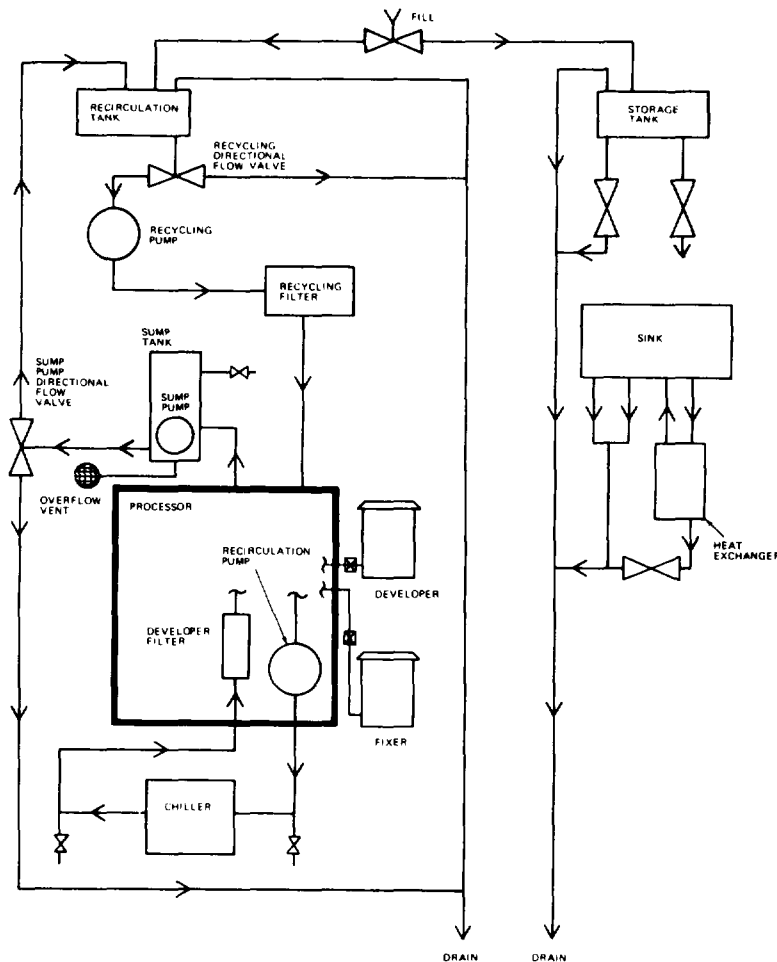




Table 2-4. ORGANIZATIONAL TROUBLESHOOTING

| MALFUNCTION  | TEST OR INSPECTION                       | CORRECTIVE ACTION  |
|--|--|--|
| 1. ROLLERS DO NOT ROTATE WHEN CIRCUIT BREAKER AND DRIVE SWITCHES ARE ON. | Step 1. Check for blown fuse as follows: | <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p> <p>(a) Turn circuit breaker off.</p> <div> </div> <p>(b) Remove retaining screws and front panel.</p> <p>(c) Remove fuse FU4 from holder.</p> <p>(d) Connect multimeter probes to fuse and check for continuity.</p> |

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. ROLLERS DO NOT ROTATE WHEN CIRCUIT BREAKER AND DRIVE SWITCHES ARE ON - Cont

- (1) If fuse is good, proceed to step 2.
- (2) If fuse is open, replace fuse.

Step 2. Check continuity of drive switch.

- (a) If switch is defective, replace drive switch (paragraph 2-16.8).
- (b) If switch is not defective, refer to direct/general support maintenance.

2. CENTRIFUGAL FAN DOES NOT BLOW AIR WHEN MAIN POWER AND DRYER SWITCHES ARE ON.

Step 1. Check for blown FU1 or FU2 fuse.

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- (a) Turn off circuit breaker.

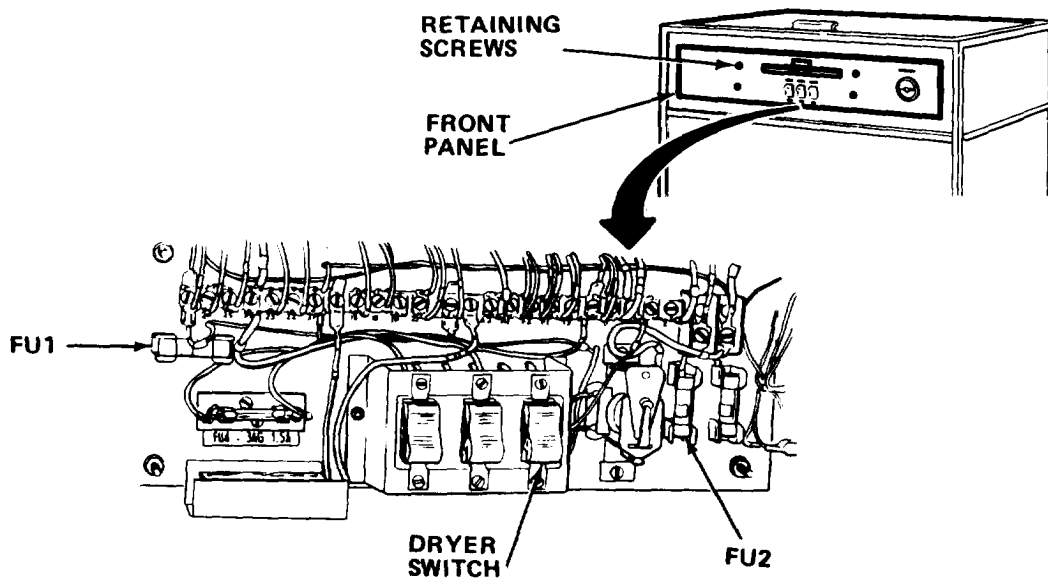


Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION   | TEST OR INSPECTION  | CORRECTIVE ACTION   |
|---|---|---|
| 2. CENTRIFUGAL FAN DOES NOT BLOW AIR WHEN MAIN POWER AND DRYER SWITCHES ARE ON - Cont | <ul style="list-style-type: none"> <li>(b) Remove retaining screws and front cover.</li> <li>(c) Remove fuse from holder.</li> <li>(d) Connect multimeter probes to fuse and check for continuity.</li> </ul> | <ul style="list-style-type: none"> <li>(1) If both fuses are good, proceed to step 2.</li> <li>(2) If one or both fuses are bad, replace fuse(s).</li> </ul>  |
|   | Step 2. Check for broken or improperly adjusted centrifugal fan belt.   | <ul style="list-style-type: none"> <li>(a) If centrifugal fan belt is improperly adjusted, adjust belt (paragraph 2-16.2).</li> <li>(b) If centrifugal fan belt is broken, replace belt (paragraph 2-16.2).</li> <li>(c) If belt is not broken, proceed to step 3.</li> </ul> |
|   | Step 3. Check continuity of DRYER switch.   | <ul style="list-style-type: none"> <li>(a) If switch continuity is incorrect, replace dryer switch (paragraph 2-16.8).</li> <li>(b) If continuity is correct, refer to direct/general support maintenance for replacement of centrifugal fan motor.</li> </ul>                |

## 3. DRYER HEATER DOES NOT WARM DRYING AIR.

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

Step 1. Check for defective fuse.

- (a) Turn off circuit breaker.

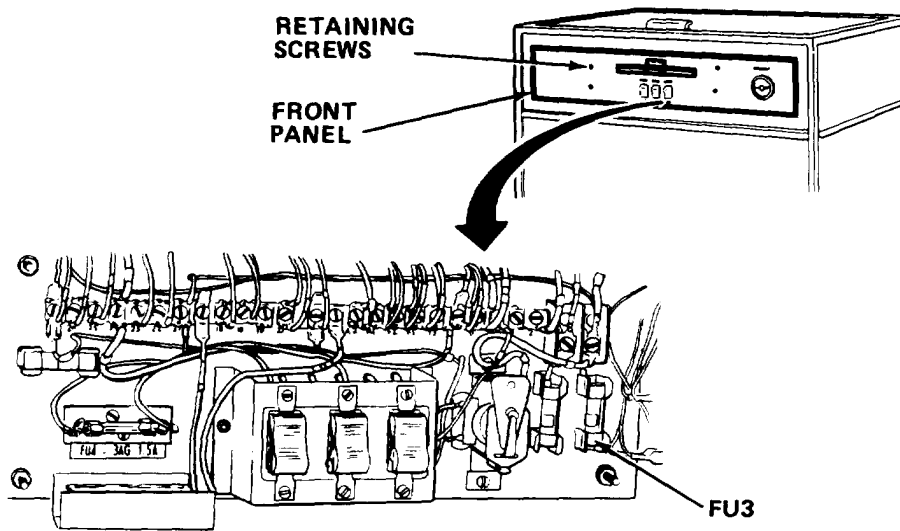
Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

3. DRYER HEATER DOES NOT WARM DRYING AIR - Cont



- (b) Remove retaining screws and front cover.
- (c) Remove fuse FU3 from holder.
- (d) Connect multimeter probes to fuse and check for continuity.
  - (1) If continuity is present, proceed to Step 2.
  - (2) Replace fuse if no continuity is present.

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

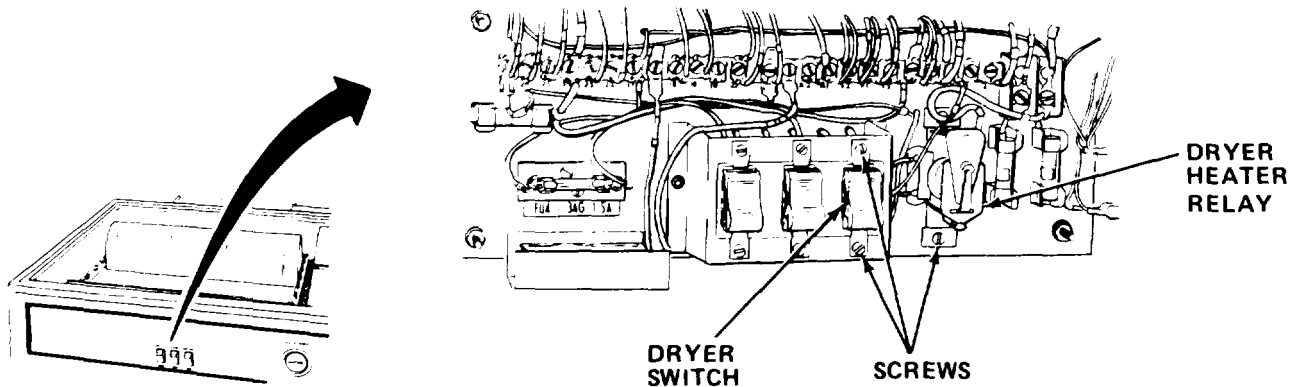
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

## 3. DRYER HEATER DOES NOT WARM DRYING AIR - Cont

Step 2. Check DRYER switch for continuity.



(a) If switch is not defective, proceed to step 3.

(b) If switch is defective, replace switch.

Step 3. Check dryer heater relay for proper operation.

(a) Turn on circuit breaker.

(b) Visually check relay for actuation when DRYER switch is turned on and off.

(1) If relay actuates, proceed to step 4.

(2) If relay does not actuate, refer to direct/general support maintenance for replacement of relay.

Step 4. Check dryer thermostat with multimeter for continuity.

(a) Turn off circuit breaker and DRYER switch.

(b) Set dryer thermostat at 100°F (37.8°C).

(c) Check for continuity between terminals 9 and 39 on power distribution terminal board.

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION   | TEST OR INSPECTION  | CORRECTIVE ACTION  |
|---|---|--|
| 3. DRYER HEATER DOES NOT WARM DRYING AIR - Cont                           |   | <ul style="list-style-type: none"> <li>(1) If no continuity exists, replace thermostat.</li> <li>(2) If continuity is present, refer to direct/general support maintenance for replacement of dryer over temperature thermostat or dryer heater (paragraph 2-20.9).</li> </ul>   |
| 4. PAPER DOES NOT TRAVEL AT SPEED INDICATED ON TRANSPORT SPEED INDICATOR. | Check for improperly adjusted TRANSPORT SPEED indicator as follows: | <ul style="list-style-type: none"> <li>(a) Turn on circuit breaker and DRIVE switch.</li> <li>(b) Mark several sheets of photographic paper at 12 in. intervals.</li> <li>(c) Set TRANSPORT SPEED at 12 in. per minute.</li> <li>(d) Feed paper into processor, noting time required for 12 in. to pass a reference point.</li> <li>(e) Compute speed of paper travel in inches per minute.</li> </ul> <p style="margin-left: 40px;">Adjust transport speed if computation varies from TRANSPORT SPEED indicator (paragraph 2-16.3).</p> |
| 5. AFTER WARM-UP, DEVELOPER THERMOMETER DOES NOT READ 80°F (26.6°C).      | Step 1. Check DEVELOPER thermometer reading.                        | <ul style="list-style-type: none"> <li>(a) With processor activated and PUMP switch on, remove top cover and developer/fixer crossover.</li> </ul>   |

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION

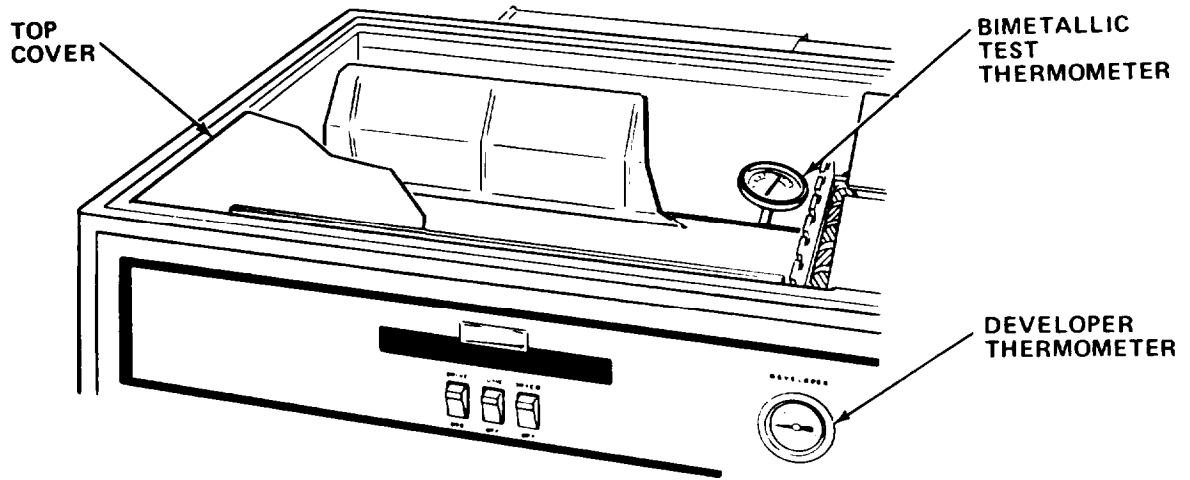
TEST OR INSPECTION

CORRECTIVE ACTION

5. AFTER WARM-UP, DEVELOPER THERMOMETER DOES NOT READ 80°F (26.6°C) - Cont

**CAUTION**

Do not use mercury-filled thermometer to check temperature. Breakage may result in serious mercury contamination of unit.



- (b) Insert thermometer into developer solution tank.
- (c) Compare DEVELOPER thermometer reading with reading on thermometer in solution tank.
- (d) Adjust DEVELOPER thermometer if reading varies (paragraph 2-16.4).
- (e) If DEVELOPER thermometer and thermometer in solution tank are the same temperature, proceed to step 2.

Step 2. Check for improperly adjusted developer heater thermostat while processor is activated.

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

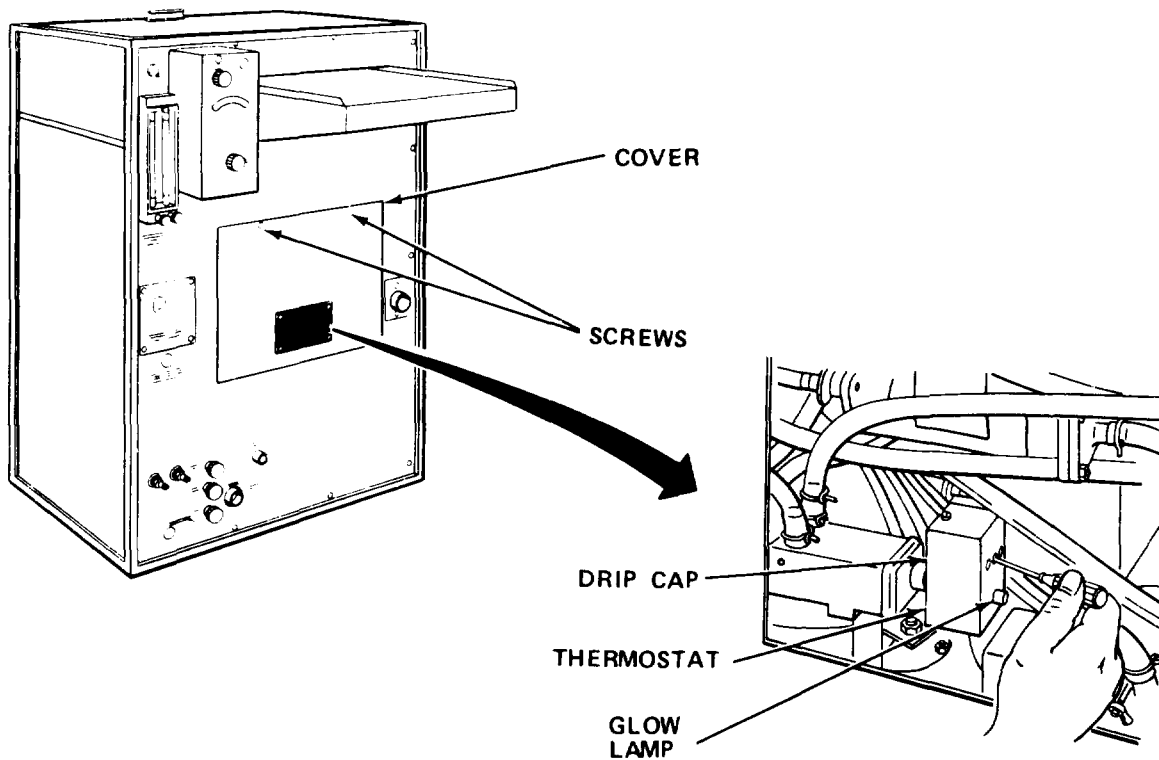
CORRECTIVE ACTION

5. AFTER WARM-UP, DEVELOPER THERMOMETER DOES NOT READ 80°F (26.6°C) - Cont

**NOTE**

Adjustment shall be performed with DRYER THERMOSTAT set at 110°F (43.3°C) and FILM TRANSPORT SPEED indicator set at 30 in. per minute.

(a) Remove retaining screws and rear cover.



(b) Remove drip cap from thermostat housing.

(c) Check glow lamp for activation which indicates heater element is activated.

Adjust DEVELOPER thermostat (paragraph 2-16.6).



Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION  | TEST OR INSPECTION  | CORRECTIVE ACTION  |
|--|---|--|
| 6. AFTER WARM-UP, DEVELOPER SOLUTION TEMPERATURE IS ABOVE 80°F (26.6°C) AND DEVELOPER HEATER IS NOT ACTIVATED. |   | Replace chiller (paragraph 2-16.10).   |
| 7. REPLENISHMENT PUMP DOES NOT ACTIVATE WHEN PAPER IS FED.   | Step 1. Check for improperly adjusted film detector crossover as follows:                         |  |
|  | (a) Remove top cover.   |  |
|  | (b) Turn off DRIVE switch.  |  |
|  | (c) Turn on PUMP switch.  |  |
|  | (d) Lift up on detector switch located above roller and listen for replenishment pump activation. |  |
|  |   | (1) If pump does not activate, proceed to step 2.                                  |
|  |   | (2) If pump activates, adjust film detector crossover assembly (paragraph 2-16.7). |

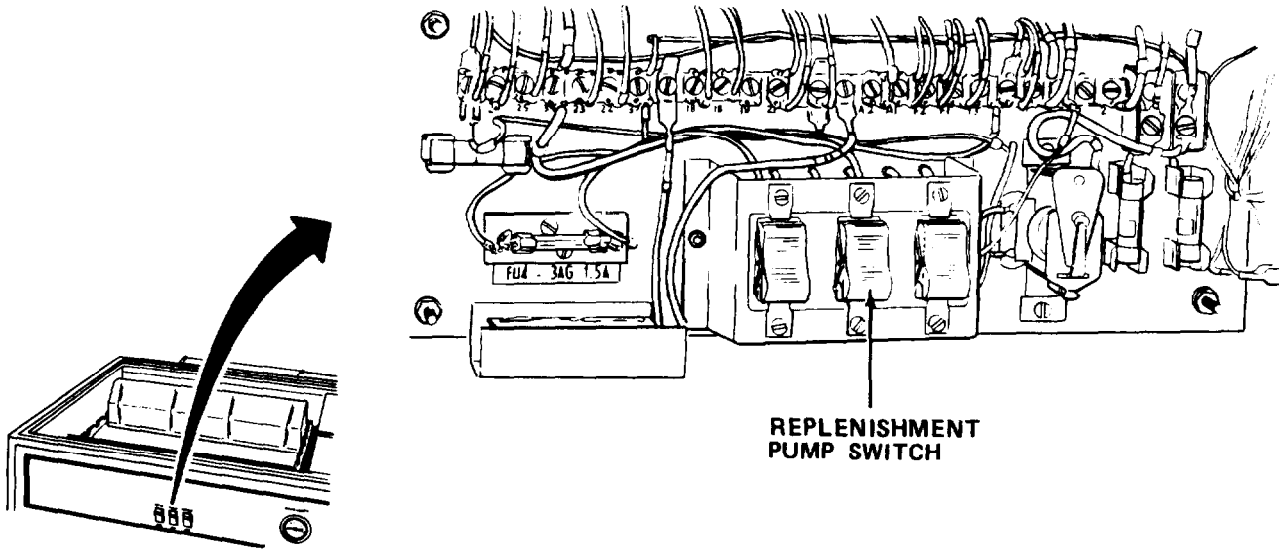
Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

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| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

---

7. REPLENISHMENT PUMP DOES NOT ACTIVATE WHEN PAPER IS FED - Cont



Step 2. Check PUMP switch for continuity.

- (a) If continuity is not present, replace PUMP switch (paragraph 2-16.8).
- (b) If continuity is present, replace replenishment pump (paragraph 2-16.12).
- (c) If malfunction persists, refer to direct/general support maintenance for replacement of detector roller microswitch (paragraph 2-20.1).

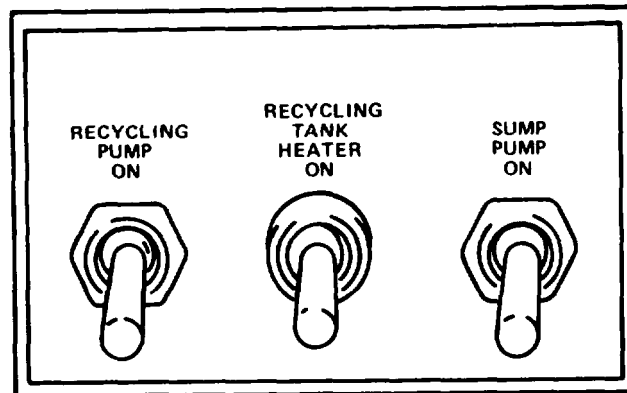
Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

---

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

8. RECYCLING PUMP DOES NOT PUMP WATER WHEN TURNED ON.



Check RECYCLING PUMP switch for continuity.

- (a) If continuity is not present, replace switch (paragraph 2-16.11).
- (b) If continuity is present, replace recycling pump (paragraph 2-16.13).

9. SUMP PUMP DOES NOT PUMP WATER WHEN TURNED ON.

Step 1. Check SUMP PUMP switch for continuity.

- (a) If continuity is present, proceed to step 2.

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

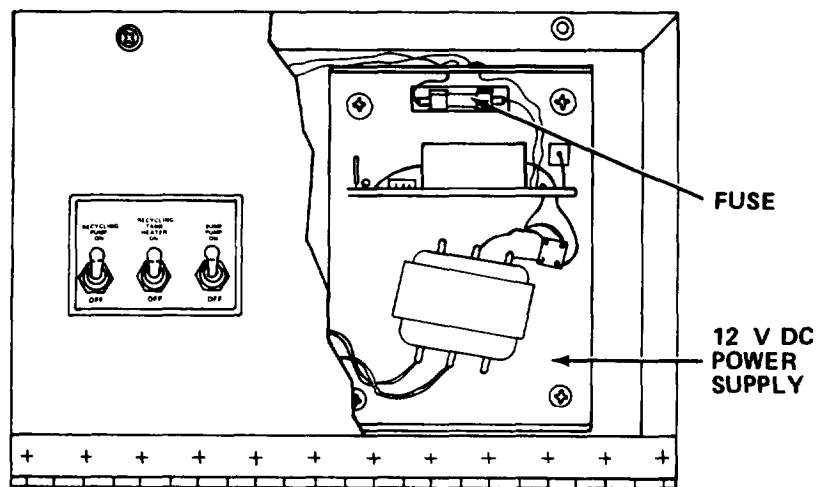
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

9. SUMP PUMP DOES NOT PUMP WATER WHEN TURNED ON - Cont

- (b) If continuity is not present, replace SUMP PUMP switch (paragraph 2-16.11).



Step 2. Check fuse in 12 V dc power supply.

- (a) If fuse is not defective, proceed to step 3.
- (b) If fuse is defective, replace fuse.

**WARNING**

Electrical shock hazard. You must stand on rubber matting while performing this procedure. Death or serious injury may occur.

Step 3. Check voltage output of 12 V dc power supply.

- (a) If voltage is not present or incorrect, replace 12 V dc power supply (paragraph 2-16.15).
- (b) If voltage is correct, replace sump pump (paragraph 2-16.14).

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

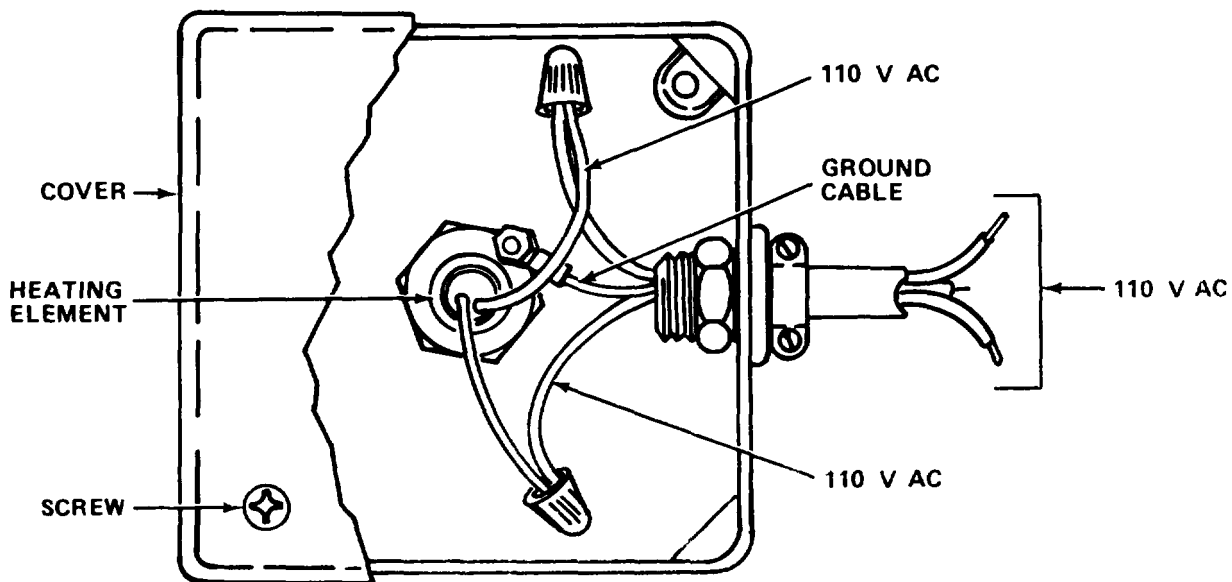
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

10. WATER IN RECYCLING TANK DOES NOT MAINTAIN TEMPERATURE OF THERMOSTAT SETTING WHEN ACTIVATED.

Step 1. Check RECYCLING TANK HEATER switch for continuity.

(a) If switch is not defective, proceed to step 2.

(b) If switch is defective, replace RECYCLING TANK HEATER switch (paragraph 2-16.11).



Step 2. Check heating element for continuity.

(a) If heating element is not defective, proceed to step 3.

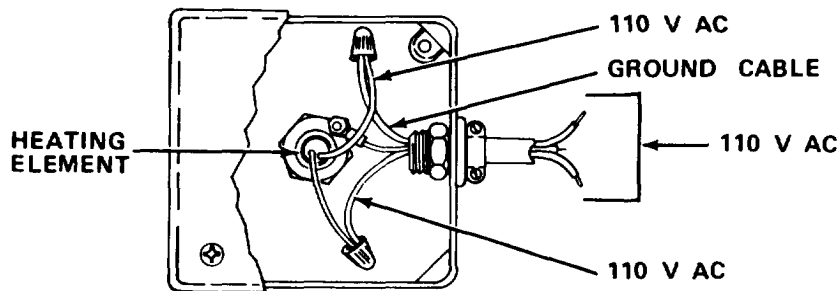
(b) If heating element is defective, replace heating element (paragraph 2-16.19).

Table 2-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

10. WATER IN RECYCLING TANK DOES NOT MAINTAIN TEMPERATURE OF THERMOSTAT SETTING WHEN ACTIVATED - Cont

Step 3. Check thermostat for proper operation as follows:



(a) Remove retaining screws and heating element cover.

**WARNING**

Electrical shock hazard. You must stand on rubber matting as a protective measure while performing this procedure. Death or serious injury may occur.

(b) Adjust thermostat setting above the temperature indicated by the black needle and check for voltage at the heating element.

(1) Replace thermostat if 110 V ac is not present (paragraph 2-16.20).

(2) If 110 V ac is present, replace heating element (paragraph 2-16.19).

**2-16. ORGANIZATIONAL MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the film/paper processor system. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

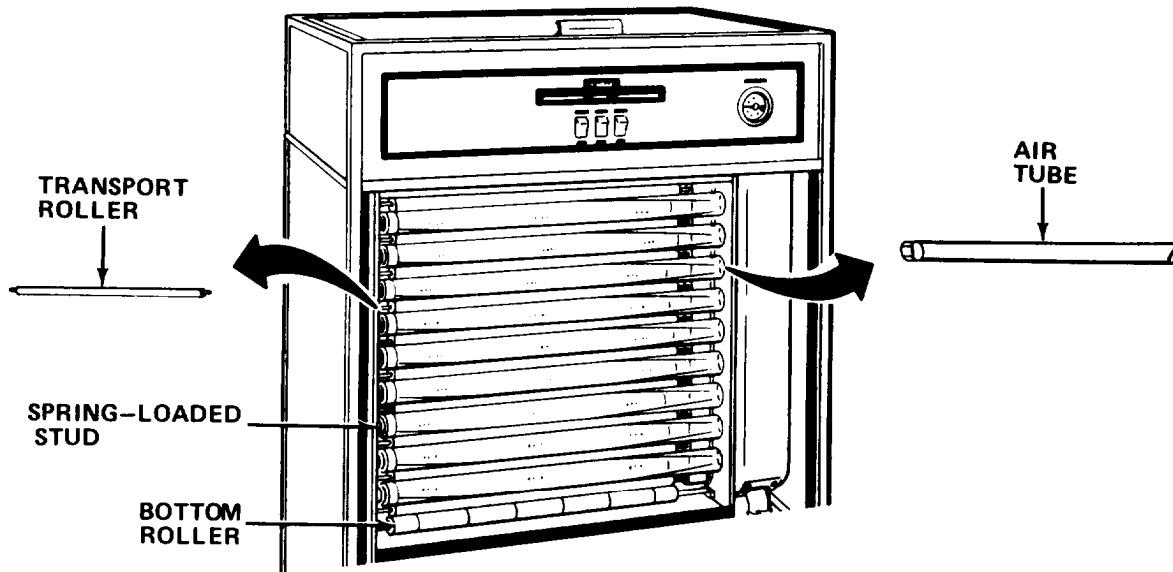
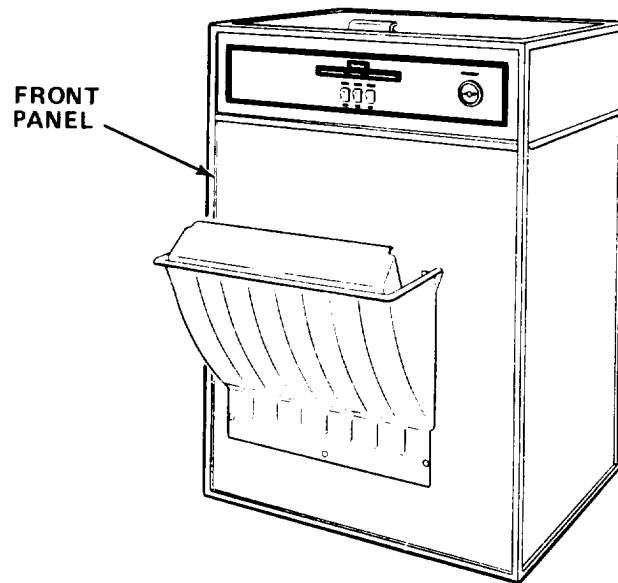
| PROCEDURE   | PARAGRAPH |
|---|-----------|
| Service Dryer Transport Rollers . . . . .                                   | 2-16.1    |
| Adjust or Replace Centrifugal Fan Belt. . . . .                             | 2-16.2    |
| Adjust Transport Speed. . . . .   | 2-16.3    |
| Adjust Developer Thermometer . . . . .                                      | 2-16.4    |
| Adjust FeedSignalTimer. . . . .   | 2-16.5    |
| Adjust Developer Thermostat. . . . .  | 2-16.6    |
| Adjust Film Detector Crossover Assembly . . . . .                           | 2-16.7    |
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| Replace Recycling Pump . . . . .  | 2-16.13   |
| Replace Sump Pump. . . . .  | 2-16.14   |
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| Replace Tubing . . . . .  | 2-16.16   |
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| Replace Controller . . . . .  | 2-16.18   |
| Replace Tank Heating Element . . . . .                                      | 2-16.19   |
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| Replace Dryer Thermometer. . . . .  | 2-16.22   |
| Replace Transport Speed Indicator . . . . .                                 | 2-16.23   |
| Replace Paper Processor. . . . .  | 2-16.24   |

2-16.1 Service Dryer Transport Rollers.

MOS: 83FJ6, Reproduction Equipment Repairer

SUPPLIES: Cheesecloth (Item 7, Appendix E)  
Sponge (Item 32, Appendix E)

- a. Turn off all processor switches and RECYCLING PUMP switch.
- b. Remove front panel.





- c. Remove 10 front air tubes by pressing each tube left against the spring-loaded stud and clearing tube from right side frame hole.
- d. Remove 22 transport rollers by lifting each roller from its supports.
- e. Remove bottom roller by lifting roller from bearing blocks.
- f. Loosen dryer roller drive belt.
- g. Remove 10 rear air tubes in the same manner as the front air tubes.
- h. Clean rollers with sponge soaked in water. Dry rollers and shafts with clean cheesecloth.
- i. Clean roller supports at each side of frame with cheesecloth.
- j. Rinse air tubes with warm water. Air-dry tubes.

**NOTE**

Five tubes with plugs are installed at the bottom front.

- k. Reinstall rear air tubes, transport rollers, and bottom roller.
- l. Tighten dryer drive belt to remove all slack.
- m. Reinstall front air tubes.
- n. Reinstall front panel.

2-16.2 Adjust or Replace Centrifugal Fan Belt.

MOS: 83FJ6, Reproduction Equipment Repairer

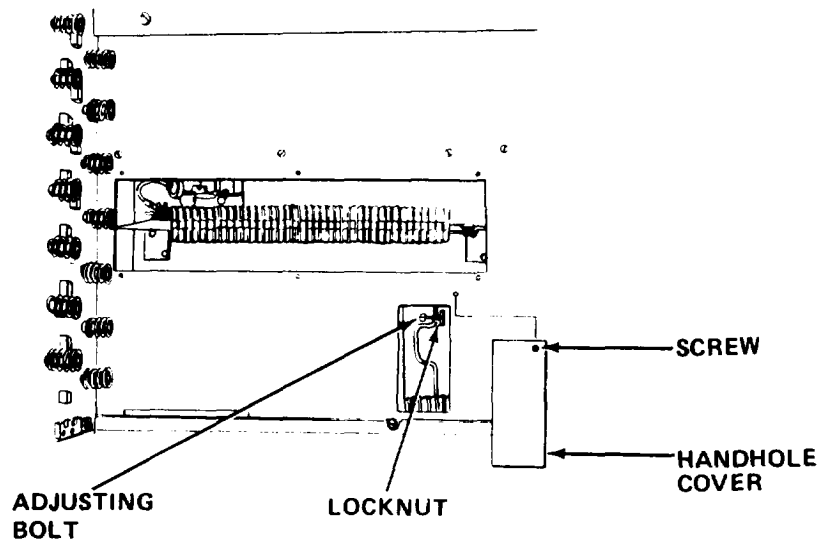
TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench  
1/2 in. Combination Wrench

SUPPLIES: Belt

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

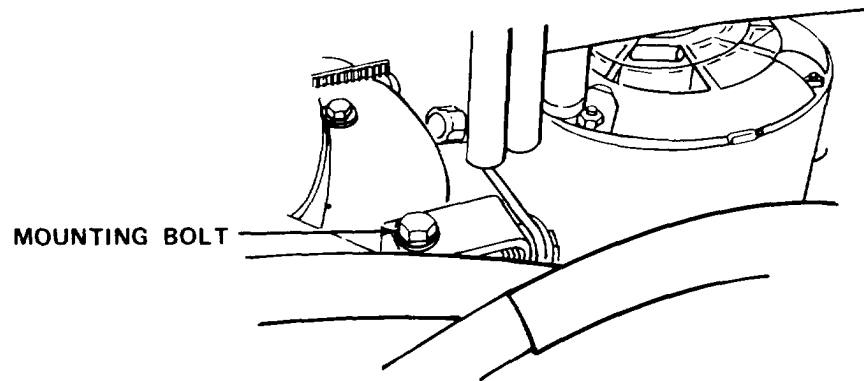
- a. Turn off all processor switches and RECYCLING PUMP switch.
- b. Turn off circuit breaker.
- c. Remove left side panel.
- d. Remove front and rear panels.
- e. Remove air tubes and transport rollers.



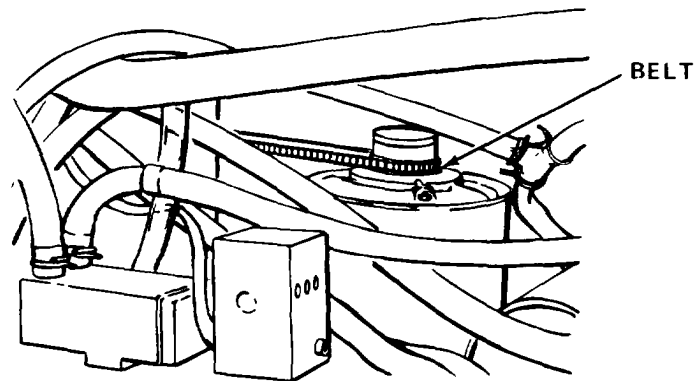
- f. Remove screw and handhole cover.

**NOTE**

Motor assembly can only be moved as far as the air duct.



- g. Loosen top and bottom motor bracket bolts.



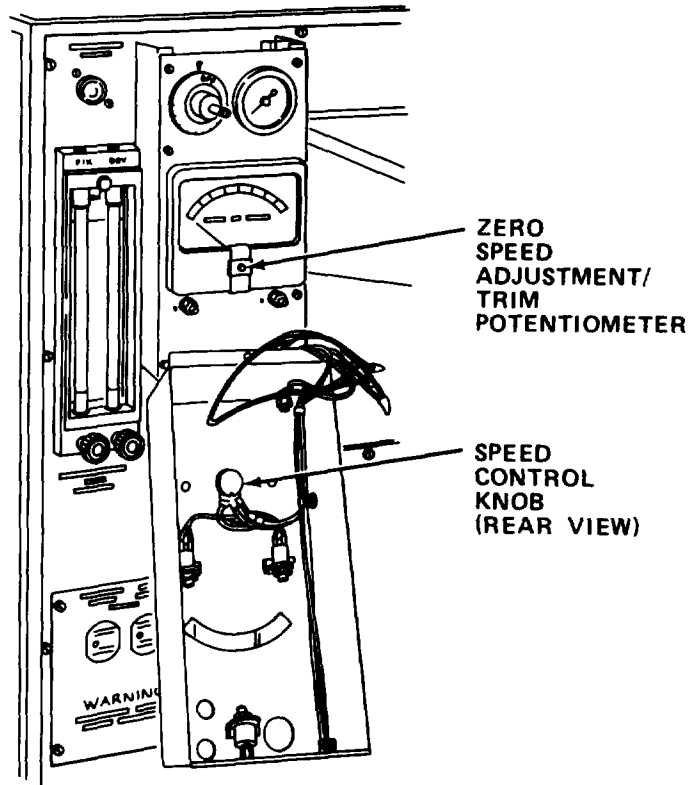
- h. If belt is to be replaced, loosen locking nut and turn adjusting bolt to left to loosen belt. Remove defective belt and replace.
- i. Turn adjusting bolt right to increase belt tension.
- j. Verify adjustment by pressing belt. Belt should deflect approximately 1/4 in. (6.35mm) maximum.
- k. Tighten locknut securely.
- l. Tighten top and bottom motor bracket bolts.
- m. Reinstall handhole cover using screw.
- n. Reinstall air tubes and transport rollers.
- o. Reinstall panels.
- p. Turn on circuit breaker.

2-16.3 Adjust Transport Speed.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Stop Watch  
Ruler

SUPPLIES: Photographic Paper



- a. Zero SPEED indicator by adjusting the screw directly below the indicator face.
- b. Mark a test piece of processing paper at 12 in. intervals.
- c. Switch on the processor and set SPEED control knob for 24 in./minute speed (approximately mid-scale).
- d. Put paper in feed tray, and note time required for the measured portion of paper to pass the feed tray edge.
- e. From the following elapsed time chart, obtain actual processor speed.

## Elapsed Time Chart

| Time to Transport<br>12 Inches of Film | Actual<br>Processor<br>Speed | Time to Transport<br>12 Inches of Film | Actual<br>Processor<br>Speed |
|--|------------------------------|--|------------------------------|
| 18 sec                                 | 40.0 in./min                 | 27 sec                                 | 26.7 in./min                 |
| 19 sec                                 | 38.0 in./min                 | 28 sec                                 | 25.8 in./min                 |
| 20 sec                                 | 36.0 in./min                 | 29 sec                                 | 24.8 in./min                 |
| 21 sec                                 | 34.3 in./min                 | 30 sec                                 | 24.0 in./min                 |
| 22 sec                                 | 32.8 in./min                 | 31 sec                                 | 23.2 in./min                 |
| 23 sec                                 | 31.3 in./min                 | 32 sec                                 | 22.5 in./min                 |
| 24 sec                                 | 30.0 in./min                 | 33 sec                                 | 21.8 in./min                 |
| 25 sec                                 | 28.8 in./min                 | 34 sec                                 | 21.2 in./min                 |
| 26 sec                                 | 27.7 in./min                 | 35 sec                                 | 20.6 in./min                 |

- f. Set the TRANSPORT SPEED indicator to actual processor speed by adjusting trim potentiometer with a screwdriver.
- g. Repeat steps c. through e. until 12 in. of film passes the feed tray edge in 30 seconds.

2-16.4 Adjust Developer Thermometer.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Bimetallic Thermometer

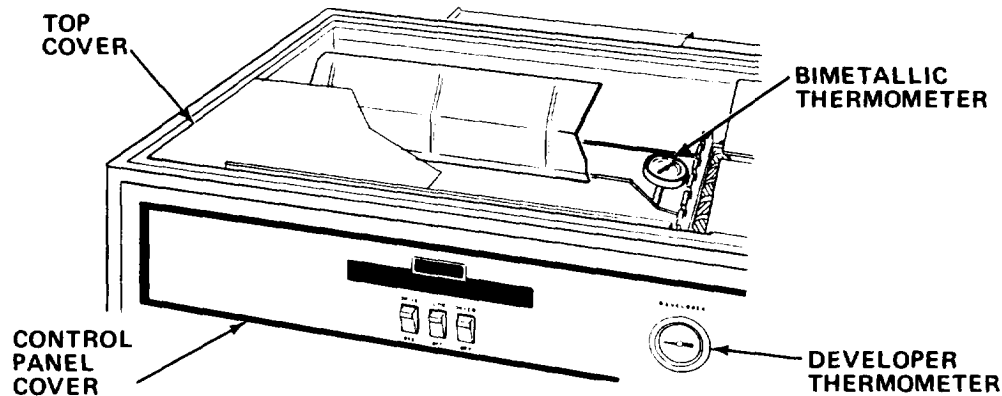
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Do not use mercury-filled thermometer to check temperature. Breakage may result in serious mercury contamination of unit.

- a. Turn off circuit breaker.
- b. Remove top cover from unit.



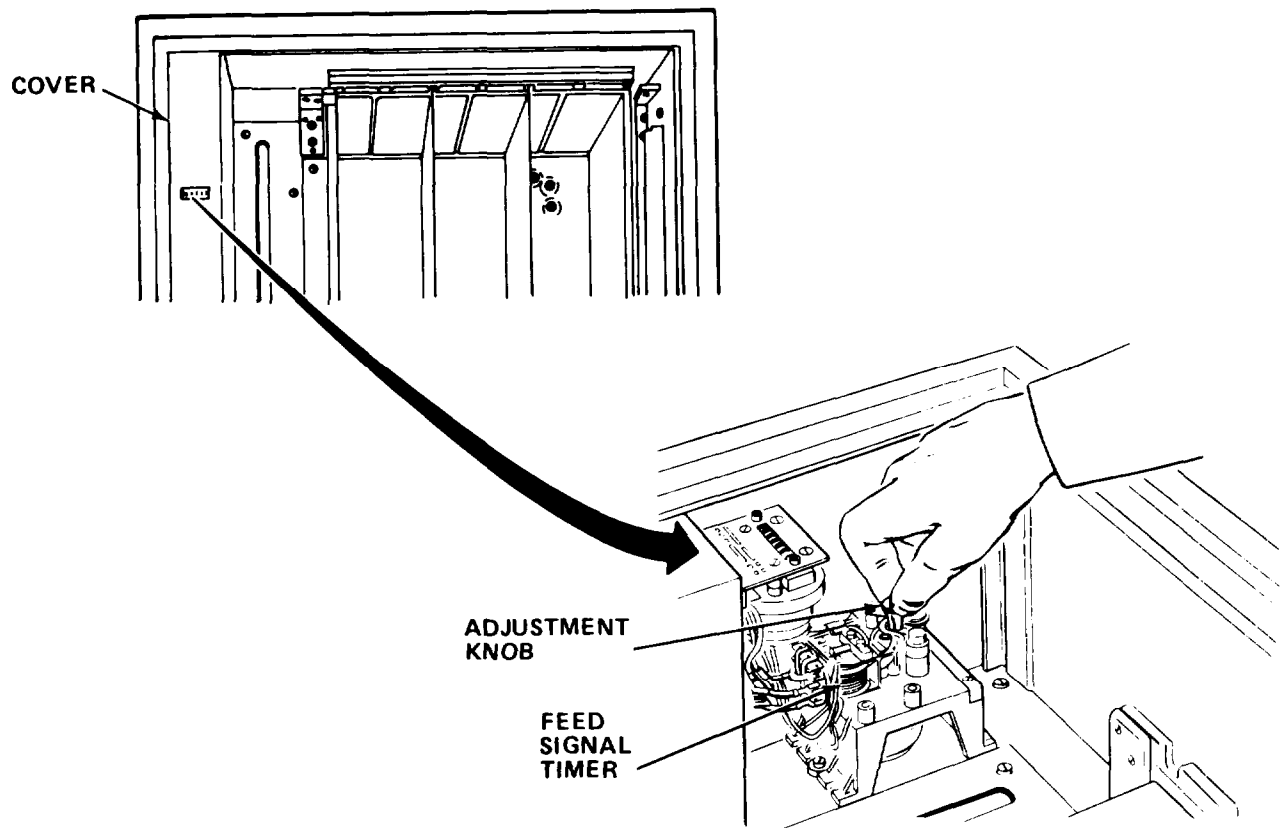
- c. Remove control panel cover.
- d. Remove glass cover from DEVELOPER thermometer with screwdriver.
- e. Insert bimetallic thermometer in developer solution.
- f. Compare bimetallic thermometer reading with DEVELOPER thermometer reading. If temperature varies, adjust DEVELOPER thermometer.
- g. Hold DEVELOPER thermometer pointer stationary. Turn screw on dial face to the right to raise reading or left to lower reading.
- h. Replace glass cover on thermometer.
- i. Replace top cover and control panel cover.
- j. Turn on circuit breaker.

2-16.5 Adjust Feed Signal Timer.

MOS: 83FJ6, Reproduction Equipment Repairer

SUPPLIES: Photographic Paper  
Rubber Matting**WARNING**

High voltage is present in this equipment. Avoid contact with wired terminal lugs on feed signal timer. Stand on rubber matting while performing this procedure.



- With unit energized, remove top and inside covers.
- Turn knob to the left to decrease time interval and to right to increase interval.
- Check time setting by feeding test paper and noting time it takes for timer bell to ring. Bell should ring approximately 20 seconds after paper has passed through the detector.
- Reinstall covers.

2-16.6 Adjust Developer Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Bimetallic Thermometer

SUPPLIES: Rubber Matting

**WARNING**

Electrical shock hazard. You must stand on rubber matting while performing this this procedure. Death or serious injury may occur.

**CAUTION**

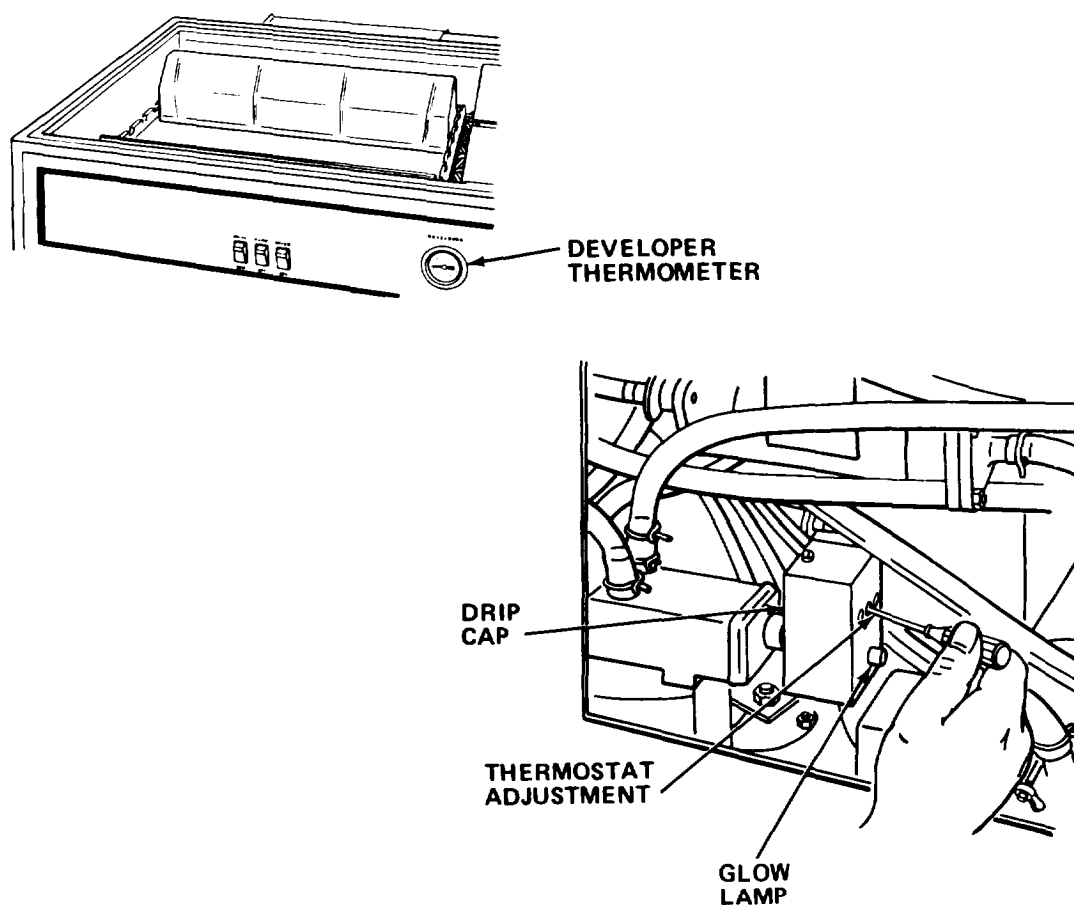
Do not use mercury-filled thermometer to check temperature. Breakage could result and cause serious mercury contamination of unit.

**NOTE**

Adjustment shall be performed with DRYER THERMOSTAT set at 110°F (43.3°C) and FILM TRANSPORT SPEED indicator set at 30 in. per min.

- a. Turn on processor and allow developer temperature to stabilize.
- b. Remove screws and rear access cover.
- c. Remove plastic drip cap from DEVELOPER heater thermostat.





- d. With a screwdriver, turn the thermostat adjusting screw. Turn to right to raise, to left to lower temperature. Glow lamp will light when the developer heater is energized. Monitor DEVELOPER thermometer. Temperature indicated should be 80°F (26.6°C).
- e. Check temperature with self-indicating bimetallic thermometer.
- f. Reinstall drip cap.

#### NOTE

If developer temperature other than 80°F (26.6°C) is required, recycling tank thermostat must be set to 5°F (3°C) less than required developer temperature before being adjusted.

- g. If DEVELOPER thermometer reading still does not match the bimetallic thermometer reading of 80°F (26.6°C), the DEVELOPER thermometer must be adjusted (paragraph 2-16.4).
- h. Reinstall rear access cover.

2-16.7 Adjust Film Detector Crossover Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 6 in. Adjustable Wrench

SUPPLIES: Photographic Paper

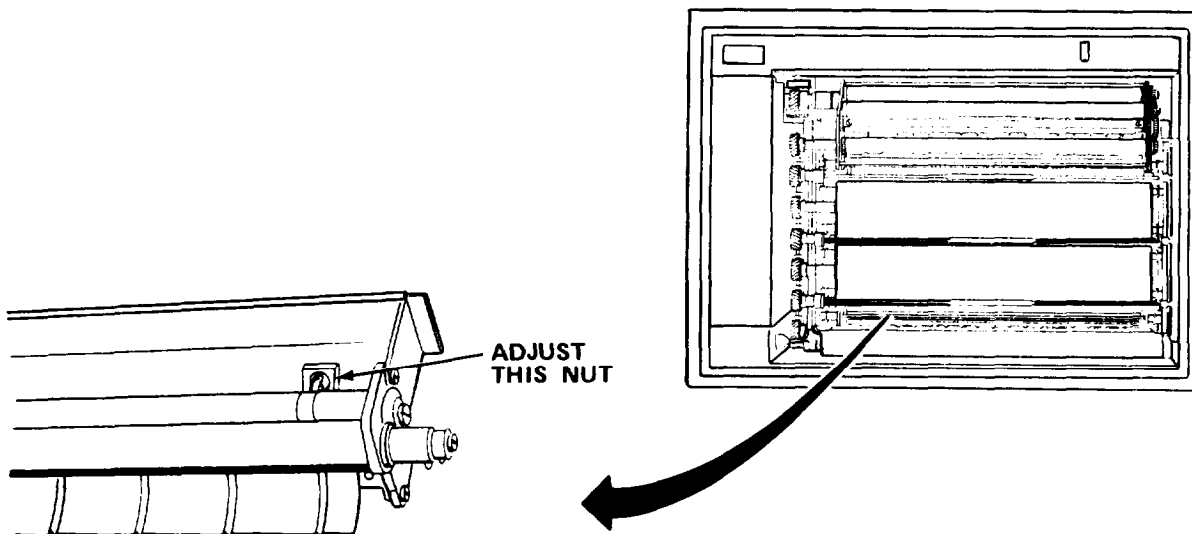
**CAUTION**

Use light pressure when closing flowmeter control valves or damage will result.

**NOTE**

Flowmeter control valves must be closed for adjustment of detector roller microswitches.

- a. Turn on PUMP switch and close flowmeter valves. Remove top cover.
- b. Insert photographic paper to one side, between the detector crossover entrance rollers.



- c. Tighten the adjusting nut until the pumps operate. Then tighten nut an additional one-sixth turn.
- d. Repeat procedure for other side of rollers.
- e. Remove paper strip and open flowmeter valves.
- f. Turn off PUMP switch and replace top cover.

2-16.8 Replace DRIVE/PUMP/DRYER Switch(es).

MOS: 83FJ6, Reproduction Equipment Repairer

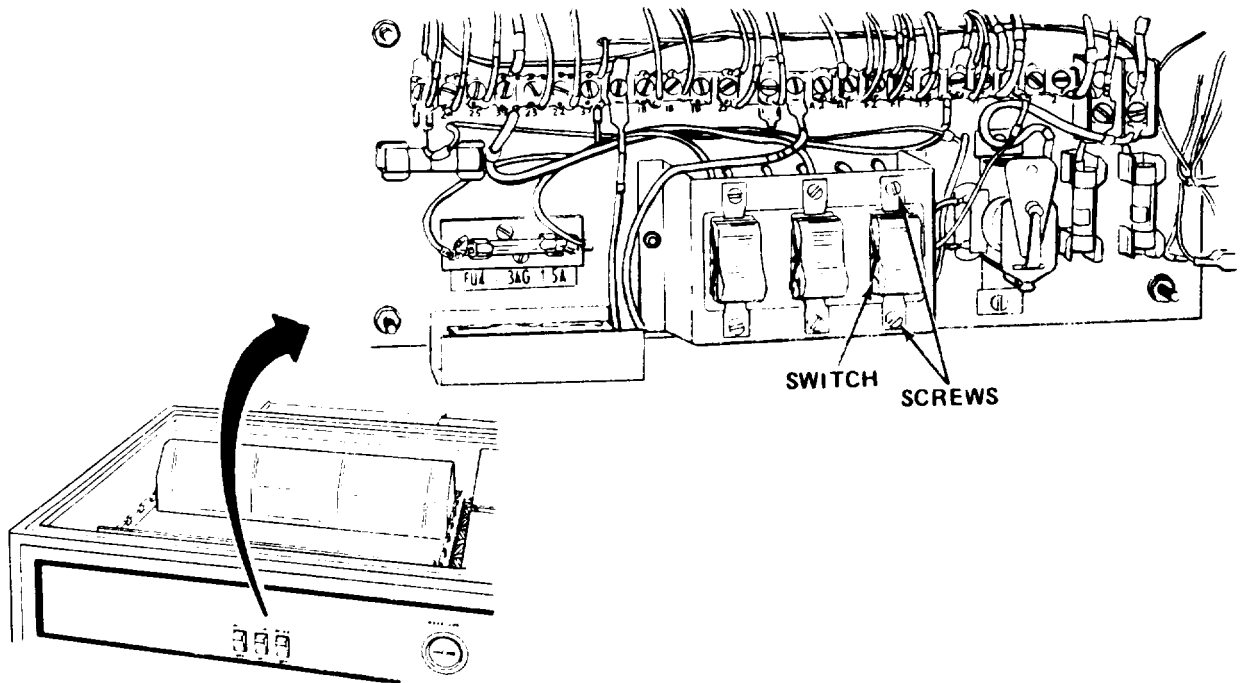
TOOLS: Flat Tip Screwdriver

SUPPLIES: Switch

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Remove panel cover retaining screws. Remove control panel cover.



- c. Remove screws retaining switch to panel. Remove switch.
- d. Tag and disconnect wiring to switch.
- e. Reconnect wiring to new switch.
- f. Install new switch. Reinstall screws and tighten.
- g. Reinstall panel with retaining screws and tighten.
- h. Turn on circuit breaker.

2-16.9 Repair Flowmeter.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Cross Tip Screwdriver  
Hose Clamp Pliers  
6 in. Adjustable Wrench  
Tube Cleaning Brush  
5/32 in. Hex Head Key Wrench

SUPPLIES: Flowmeter Tube Kit (Developer & Fixer)  
Valve Assembly O-Rings

**WARNING**

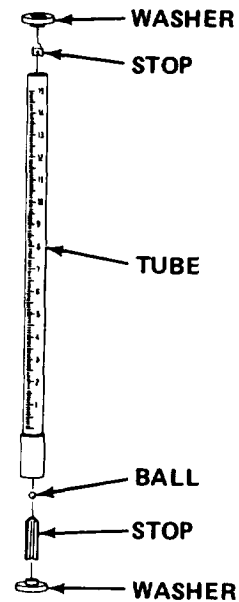
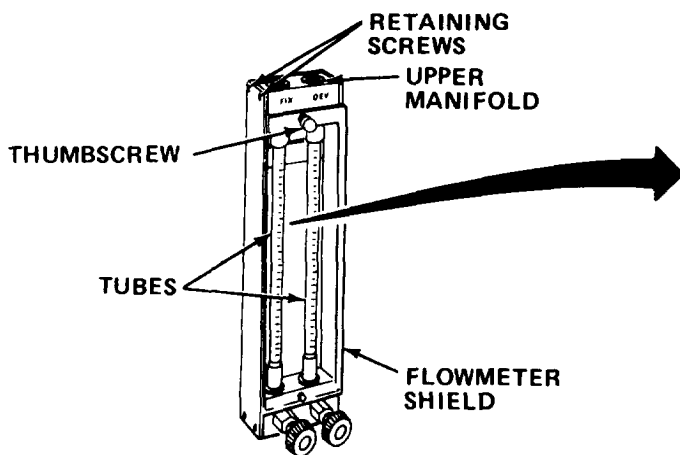
Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.

**NOTE**

Perform this maintenance procedure only when tanks are drained.

- b. Remove left side panel.
- c. Disconnect input and output lines from rear of flowmeter with clamp pliers.



- d. Remove thumbscrew and remove flowmeter shield.
- e. Remove retaining nuts securing flowmeter to processor housing.
- f. Remove screws from upper manifold.
- g. Remove retaining screw and upper manifold from assembly.
- h. Loosen hex head screws and remove flowmeter tubes from housing. Remove stops and ball from tube.
- i. Clean flowmeter tube with warm water and tube cleaning brush.
- j. Install new ball and stops in flowmeter tubes.
- k. Remove control valves from flowmeter.
  1. Remove O-rings and washers from control valves, and replace.
- m. Reinstall control valves in flowmeter.
- n. Reinstall upper manifold and retaining screws.
- o. Remove flowmeter assembly on processor frame. Then reinstall flowmeter tubes.
- p. Reinstall shield and tighten thumbscrew.
- q. Reconnect input and output lines.
- r. Check flowmeter flow rates (Table 2-1, PMCS item 19).
- s. Reinstall right side panel.
- t. Turn on power.

2-16.10 Replace Chiller.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Safety Glasses

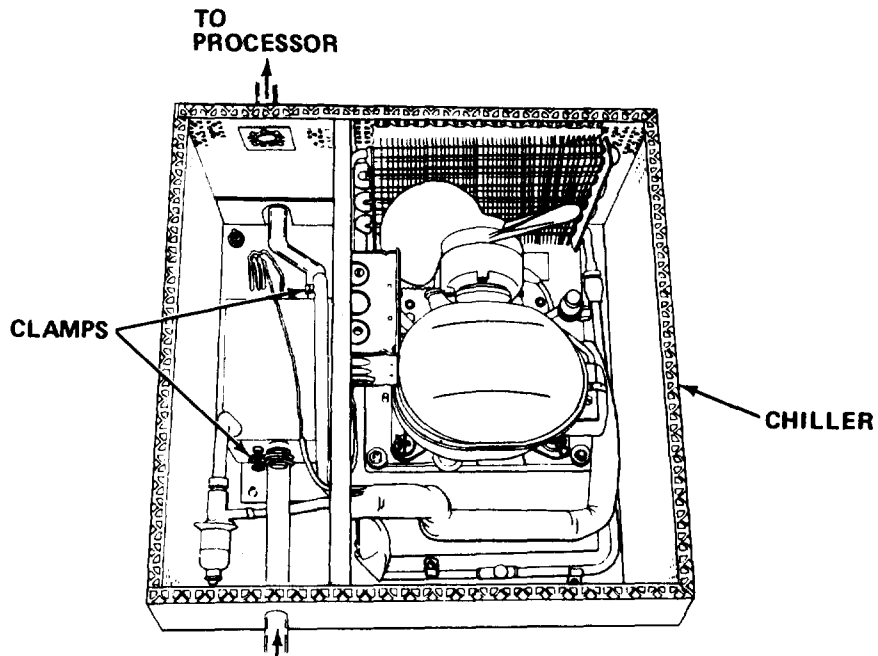
SUPPLIES: Chiller  
Hose Clamps  
Plugs (3/8 in.)

- a. Unplug power cord.

**WARNING**

- Eye protection must be worn when performing this procedure or serious injury may occur.
- If chemicals get in your eyes, wash them with plenty of water and get medical help immediately.
- Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- b. Remove retaining straps, retaining screws, and top cover.



- c. Loosen two clamps and one hose support clamp. Remove processor hoses and plug hoses to prevent developer loss.
- d. Remove chiller.
- e. Install new chiller.
- f. Remove plugs and reinstall two processor hoses. Secure with hose clamps and support clamp.
- g. Reinstall top cover, retaining screws, and retaining straps.
- h. Plug in power cord.

2-16.11 Replace RECYCLING TANK HEATER/RECYCLING PUMP/SUMP PUMP Switch(es).

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver  
9/16 in. Combination Wrench

SUPPLIES: Switch(es)

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off all panel switches.
- b. Turn off circuit breaker.
- c. Remove switch box cover.
- d. Remove retaining nut on defective switch.
- e. Tag and disconnect wiring on defective switch.
- f. Reconnect wiring to new switch and install switch in panel cover.
- g. Secure switch with retaining nut.
- h. Reinstall switch box cover.
- i. Turn on circuit breaker.

2-16.12 Replace Pump Assembly.

MOS: 83FJ6, Reproduct on Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Hose Clamp Pliers  
5/16 in. Combination Wrench

SUPPLIES: Centrifugal Pump  
5/8 in. Drain Tubing, 6 ft. Long (2)

- a. Drain system by opening drain valve.

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

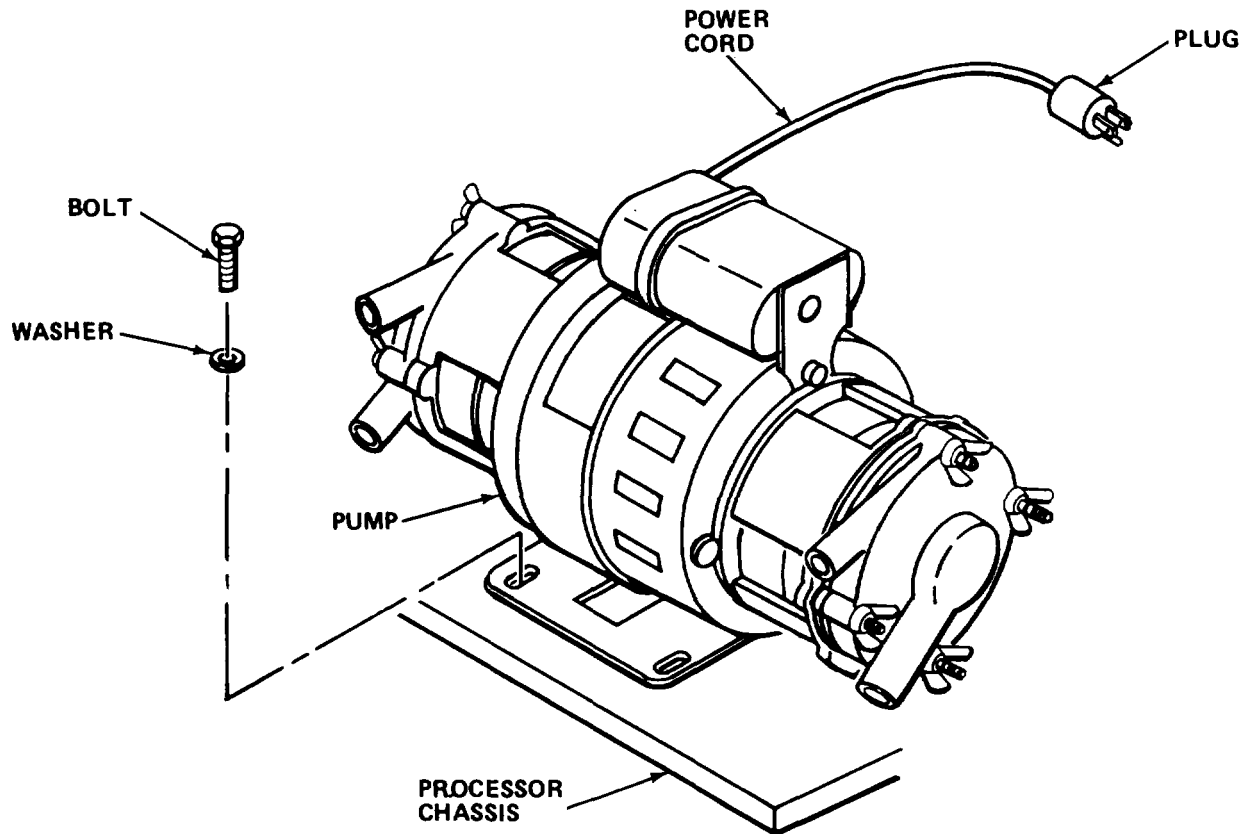
- b. Turn off circuit breaker.
- c. Remove side panels and appropriate pump cover.
- d. Unplug pump motor.

**CAUTION**

Do not open spring clamp more than necessary to slip it off and over the piping, or clamp may break.

- e. Drain all internal tanks (paragraph 2-6.2, step c.).
- f. Disconnect replenishment tanks quick-disconnects.
- g. Tag and disconnect tubing from pump. Drain all hoses and tubing.





- h. Remove bolts and flat washers that attach pump unit to chassis and remove defective pump.
- i. Reconnect tubing to new pump.
- j. Reconnect replenishment tanks quick-disconnects.
- k. Secure new pump to chassis with bolts and washers.
- l. Plug in pump motor.
- m. Reinstall pump cover and side panel.

2-16.13 Replace Recycling Pump.

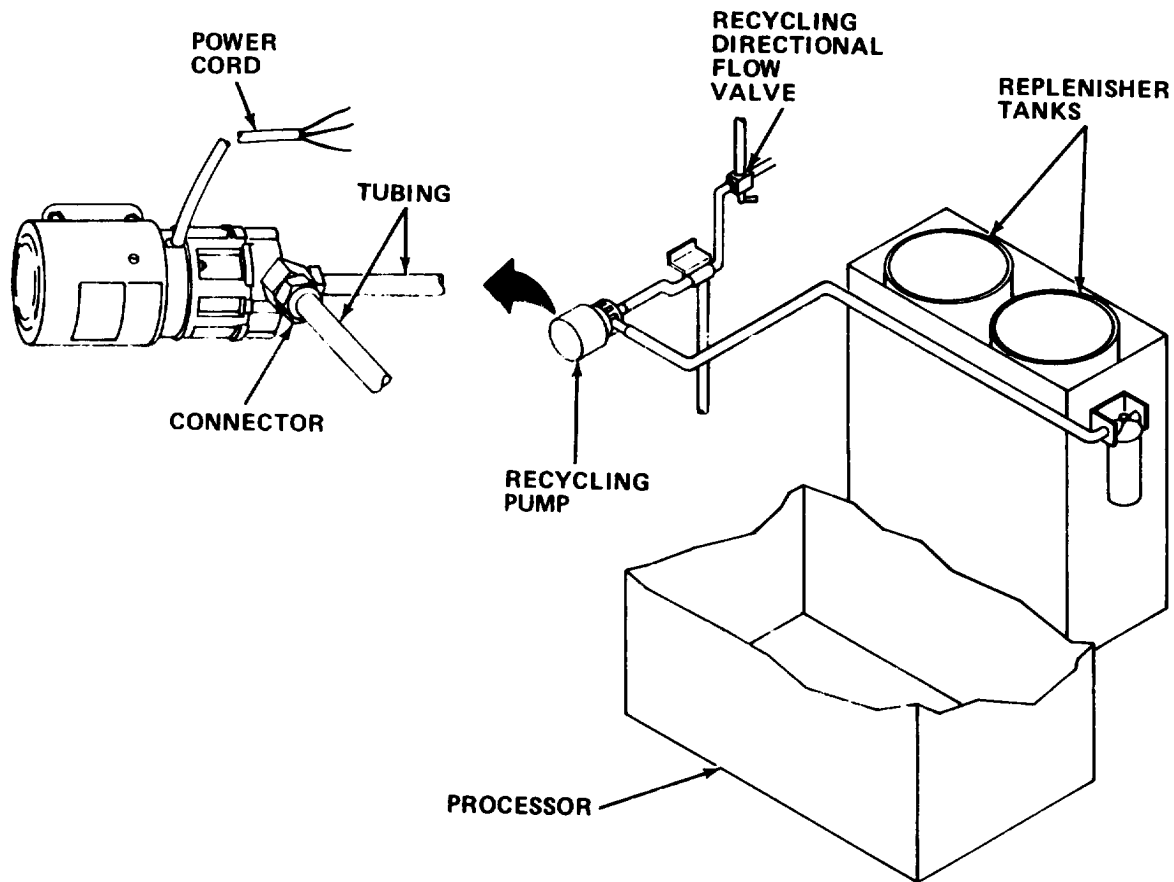
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 12 in. Adjustable Wrench  
Flat Tip Screwdriver  
Cross Tip Screwdriver

SUPPLIES: Pump  
Pail

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.



- a. Remove two screws and lower cover on the switch box assembly.
- b. Tag and disconnect power cord.
- c. Place recycling directional flow valve to recycle position.
- d. Loosen connectors at pump and drain tubing into pail. Then remove tubing from pump.

- e. Remove retaining and defective pump from mounting bracket.
- f. Install new pump to mounting bracket and retain with screws.

**CAUTION**

Be sure to reconnect tubing in proper positions.

- g. Reinstall inlet and outlet tubing to pump, and tighten clamps.
- h. Place recycling directional flow valve to pump position.
- i. Reconnect power cord.

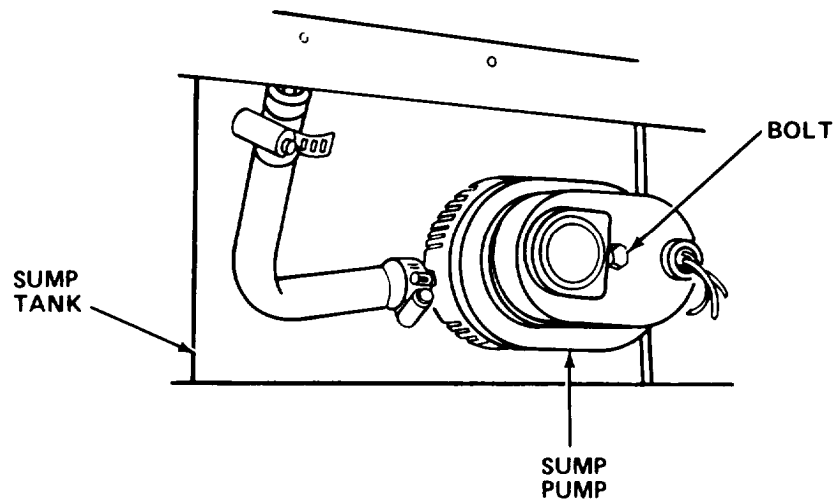
2-16.14 Replace Sump Pump.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
7/16 in. Socket, 1/4 in. Drive  
1/2 in. Socket, 1/4 in. Drive  
1/4 in. Drive Ratchet  
12 in. Adjustable Wrench  
Cross Tip Screwdriver

SUPPLIES: Sump Pump

- a. Turn off all processor, RECYCLING PUMP, and SUMP PUMP switches.
- b. Drain sump tank and replenishment tanks.
- c. Disconnect processor replenishment lines at quick-disconnect.
- d. Disconnect processor drain line from sump tank.
- e. Place a pail under the output side of the recycling filter. Tag and remove hose.
- f. Tie hose high enough to keep hose from draining.
- g. Place a pail under input line hose of recycling filter. Tag and disconnect hose.
- h. Tag and disconnect hoses from sump pump directional flow valve.
- i. Tag and disconnect sump tank overflow hose.
- j. Remove replenishment tanks rack mounting bolts.
- k. Remove sump tank mounting bolts.
- l. Move replenishment rack toward sink and maneuver sump tank out from under rack. Place rack clear of work area.
- m. Remove cover from sump tank.
- n. Remove nut on conduit flex tubing and remove tubing.
- o. Pull wires out of tubing until splices are present.
- p. Tag and disconnect pump wires at splices.



- q. Remove bolt on top of pump and remove pump from sump tank by pulling wires through nut and rubber grommet.
- r. If bottom of pump housing is to be replaced, remove screws and hose from housing. Remove housing from sump tank.
- s. If necessary, install new housing.
- t. Install new pump into sump tank.
- u. Feed wires through rubber grommet and nut. Connect wires.
- v. Push pump wires back into flex tubing.
- w. Reconnect flex tubing to mounting bracket on sump tank.
- x. Reinstall sump tank cover.
- y. Place replenishment tank rack by sink.
- z. Replace sump tank under rack.
- aa. Reinstall rack and sump tank over mounting bolt holes and replace bolts.
- ab. Reconnect sump tank overflow hose.
- ac. Reconnect sump pump directional flow valve hoses.
- ad. Reconnect hoses to recycling filter.
- ae. Reconnect processor drain line to sump tank.
- af. Reconnect quick-disconnects on replenishment lines.
- ag. Refill replenishment tanks.

2-16.15 Replace 12 V dc Power Supply.

MOS: 83FJ6, Reproduction Equipment Repairer

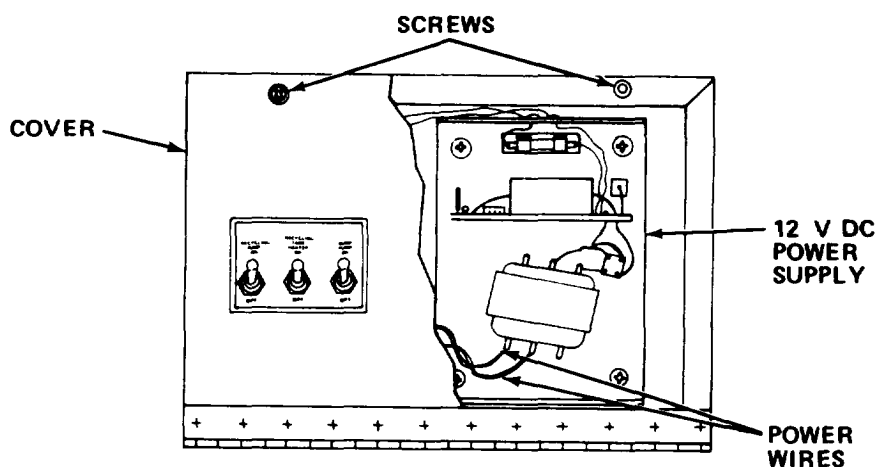
TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver

SUPPLIES: 12 V dc Power Supply

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off both processor circuit breakers.



- b. Remove screws and lower switch box cover.
- c. Tag and disconnect power wires for 12 V dc power supply.
- d. Remove mounting screws and 12 V dc power supply.
- e. Tag and disconnect 12 V dc output leads to sump pump.
- f. Reconnect 12 V dc power wires to new power supply.
- g. Reconnect 12 V dc output leads to sump pump.
- h. Reinstall mounting bolts and new power supply.
- i. Reconnect input power lines.
- j. Reinstall switch box cover.
- k. Turn on circuit breakers.

2-16.16 Replace Tubing.

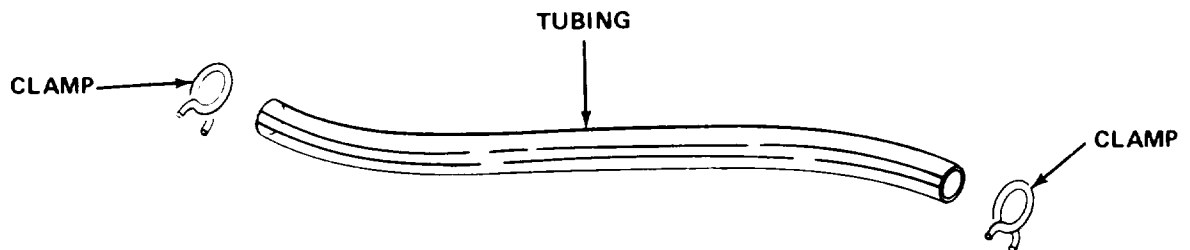
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Hose Clamp Pliers  
Safety Glasses

SUPPLIES: Screws  
Clamp  
Plastic Pail  
Tubing

**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- Exercise care when removing or installing spring-type clamps. Use safety glasses. Do not open clamp more than necessary to slip it off or over tubing, or clamp will break.
  - a. Turn off circuit breaker.
  - b. Drain tank section with leaking tubing by opening the corresponding drain valve.
  - c. Remove side panels.
  - d. Place plastic pail under tubing to be removed to catch spillage.



- e. Use hose clamp pliers to remove clamps. Disconnect tubing.
- f. Use removed tubing as guide for sizing and cutting new tubing.
- g. Install new tubing and clamps. Inspect connections.
- h. Reinstall side panels.

2-16.17 Replace Dryer Heater Relay

MOS: 83FJ6, Reproduction Equipment Repairer

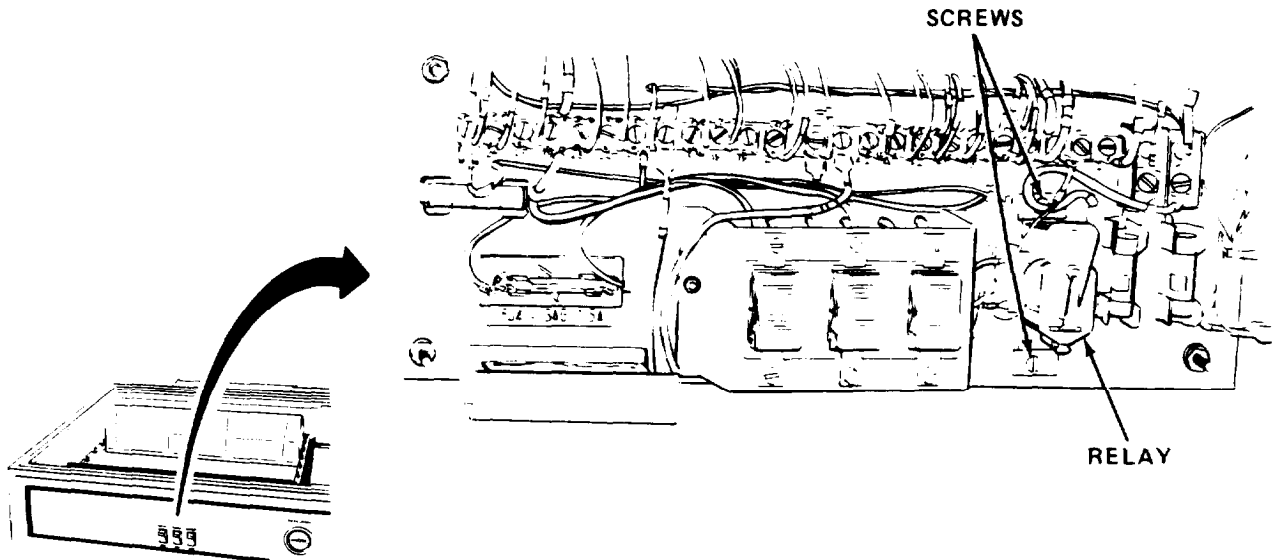
TOOLS: Flat Tip Screwdriver  
Soldering Iron

SUPPLIES: Relay  
Solder (Item 30, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Remove screws and control panel cover.



- c. Tag and desolder wiring to relay.
- d. Remove screws and defective relay from panel.
- e. Solder wiring to new relay.
- f. Install new relay and secure with screws.
- g. Reinstall cover.
- h. Turn on circuit breaker.



2-16.18 Replace Controller.

MOS: 83FJ6, Reproduction Equipment Repairer

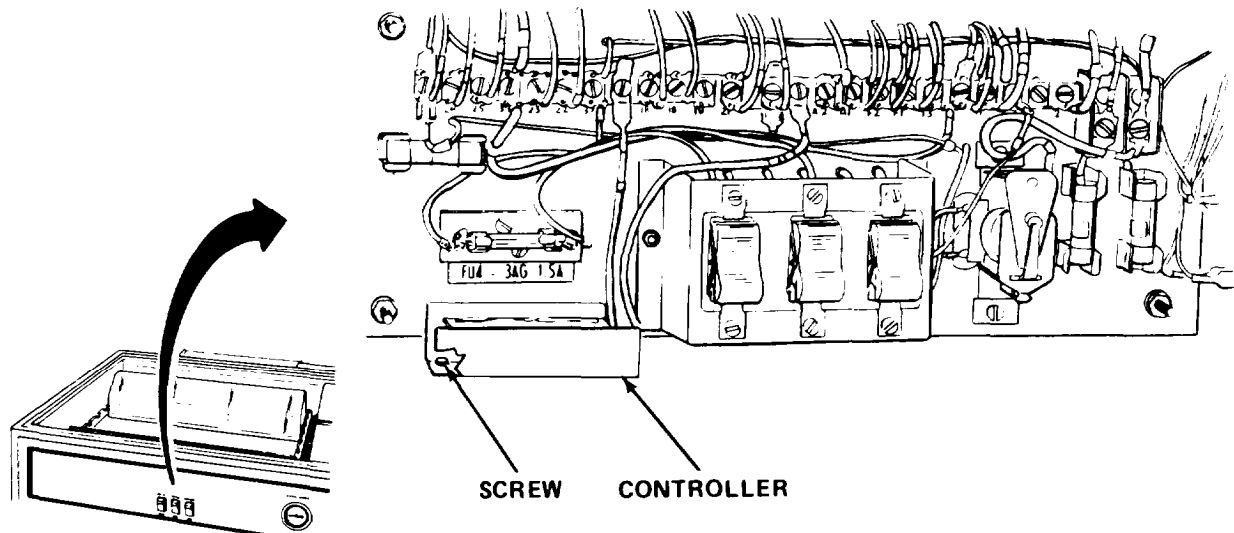
TOOLS: Flat Tip Screwdriver  
Soldering Iron

SUPPLIES: Controller  
Solder (Item 30, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Remove control panel cover retaining screws.



- c. Tag and desolder wiring from controller.
- d. Remove screws and controller from panel.
- e. Install new controller.
- f. Solder wiring to new controller.
- g. Reinstall cover.
- h. Turn on circuit breaker.

2-16.19 Replace Tank Heating Element.

MOS: 83FJ6, Reproduction Equipment Repairer

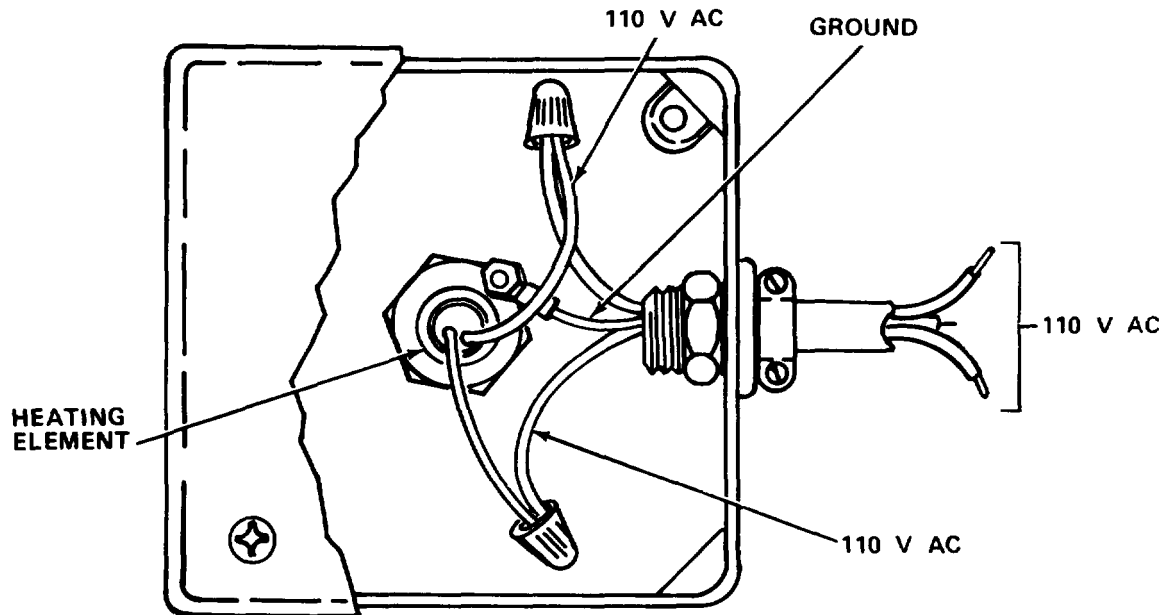
TOOLS: Flat Tip Screwdriver  
No. 2 Cross Tip Screwdriver  
3/8 in. Nut Driver  
3/4 in. Nut Driver  
14 in. Pipe Wrench

SUPPLIES: Heating Element  
Thread Sealer (Item 37, Appendix E)  
Plastic Pail

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Drain water from tank (paragraph 2-6.3, steps a. through h.).
- c. Remove cover from heating element housing.

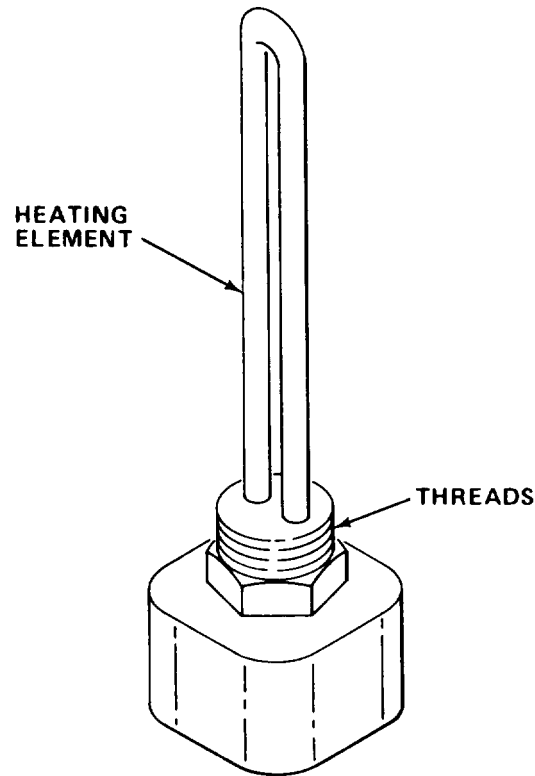


- d. Tag and disconnect heating element wiring.
- e. Remove retaining nut and electrical box from heating element.

**NOTE**

Some water may be present in tank. Use pail to collect water.

- f. Unscrew defective heating element and remove.



- g. Coat threads of new element with sealer and install.
- h. Reinstall electrical box and wires to element housing with nut.
- i. Reconnect wiring and reinstall cover.

**CAUTION**

Do not turn on circuit breaker or heater switch until tank is filled with water or heating element will be damaged.

- j. Fill tank with water.
- k. Turn on circuit breaker.

2-16.20 Replace Tank Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

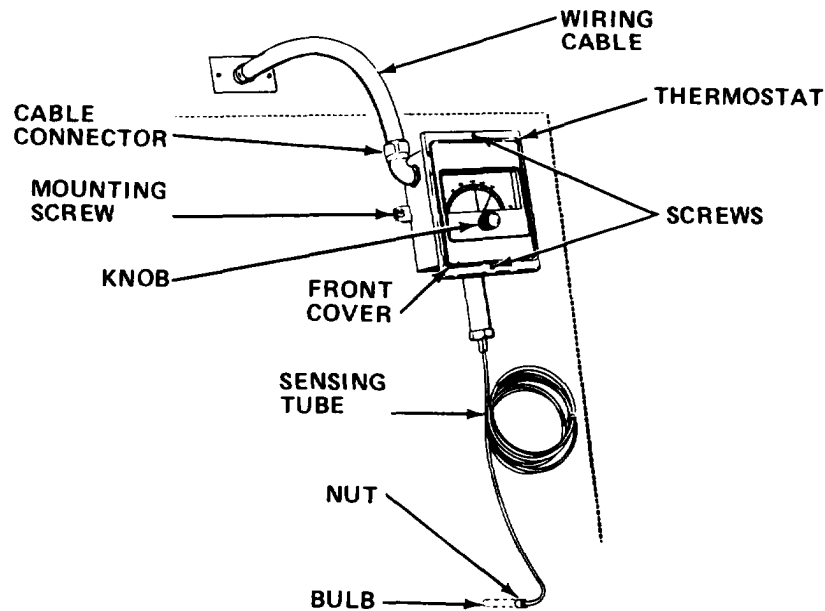
TOOLS: Cross Tip Screwdriver  
5/64 in. Hex Head Key Wrench  
12 in. Adjustable Wrench

SUPPLIES: Thermostat  
Wire nuts

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.



- b. Loosen hex head setscrew on knob and remove knob.
- c. Remove screws and front thermostat cover.
- d. Tag and disconnect wiring from thermostat.
- e. Remove nut and cable connector from box.
- f. Drain water from tank (paragraph 2-6.3, steps a. through h.).

**CAUTION**

Use care when removing bulb to avoid damaging sensing tub.

- g. Loosen nut and remove sensing bulb.
- h. Remove mounting screws and housing screw. Remove thermostate.
- i. Install new thermostat with mounting screws and housing screw.
- j. Reinstall thermostat sensing bulb connector in tank and tighten retaining nut.
- k. Reconnect cable and cable connector to box and secure with nut.
- l. Reconnect thermostat wiring.
- m. Reinstall front cover and secure with screws.

**CAUTION**

Do not turn on circuit breaker or heater switch until tank is refilled or heating element will be damaged.

- n. Fill tank with water.
- o. Turn on circuit breaker.

2-16.21 Replace Dryer Temperature Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

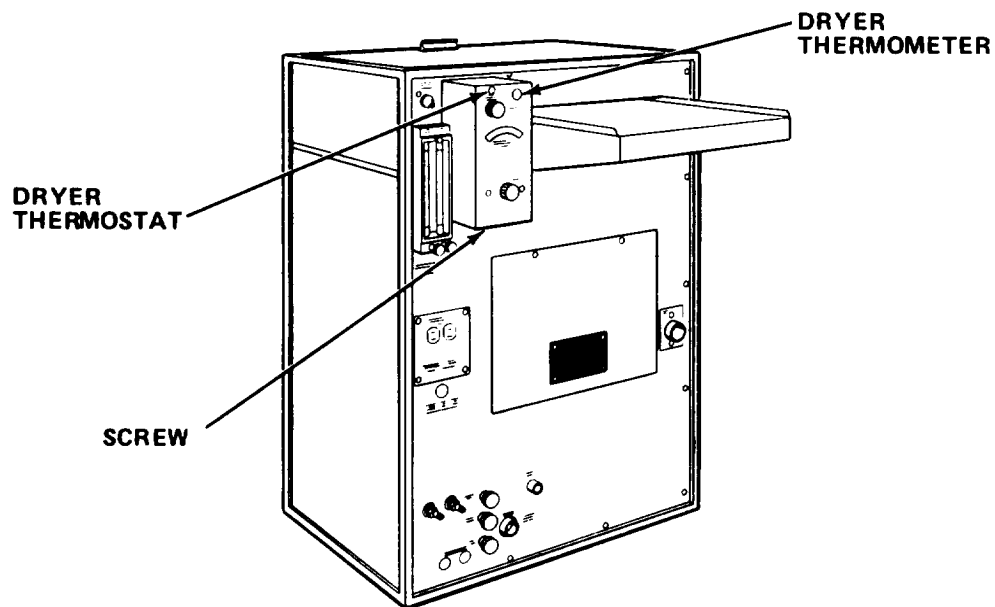
TOOLS: Flat Tip Screwdriver  
3/32 in. Hex Head Key Wrench  
5/64 in. Hex Head Key Wrench

SUPPLIES: Thermostat

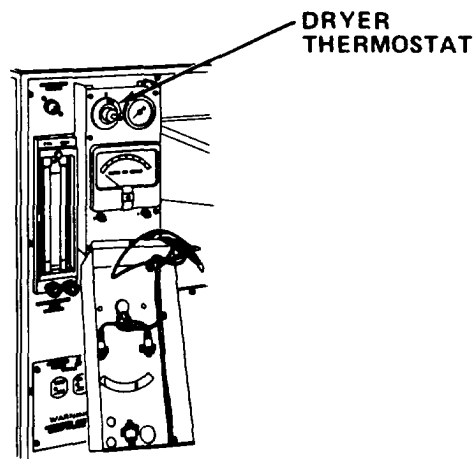
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

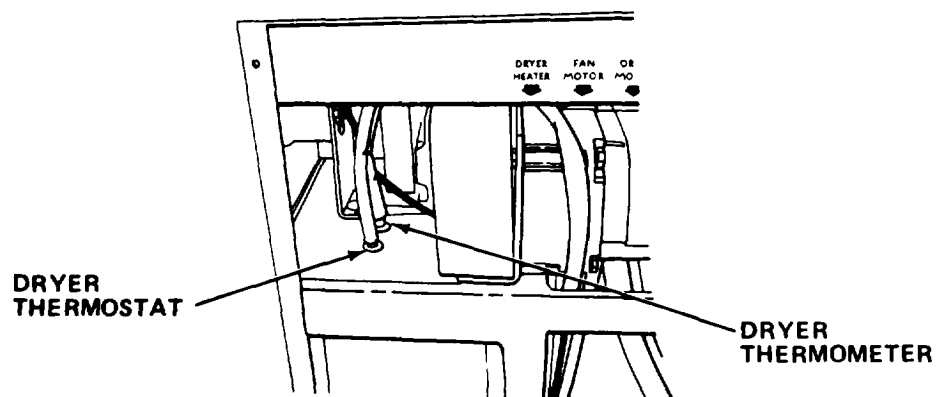
- a. Turn off circuit breaker.
- b. Remove knob on dryer temperature thermostat.



- c. Remove cover panel.
- d. Remove dryer temperature thermostat dial by loosening inside set screw.



- e. Remove mounting screws and dryer thermostat.
- f. Tag and disconnect wires.
- g. Remove processor top cover.
- h. Remove right side panel.
- i. Remove cable box cover.



- j. Remove sensing element dryer thermostat from air plenum.
- k. Carefully feed sensing element and thermostat out of processor.
- l. Carefully feed new sensing element into processor and install in air plenum.
- m. Reinstall cable box cover.

- n. Reinstall right side panel.
- o. Reinstall processor top cover.
- p. Connect wires to new thermostat.
- q. Install new thermostat and secure in place with mounting screws.
- r. Reinstall dryer temperature thermostat dial.
- s. Reinstall cover panel.
- t. Reinstall knob on dryer temperature thermostat.
- u. Turn on circuit breaker.
- v. Adjust dryer thermostat.

2-16.22 Replace Dryer Thermometer.

MOS: 83FJ6, Reproduction Equipment Repairer

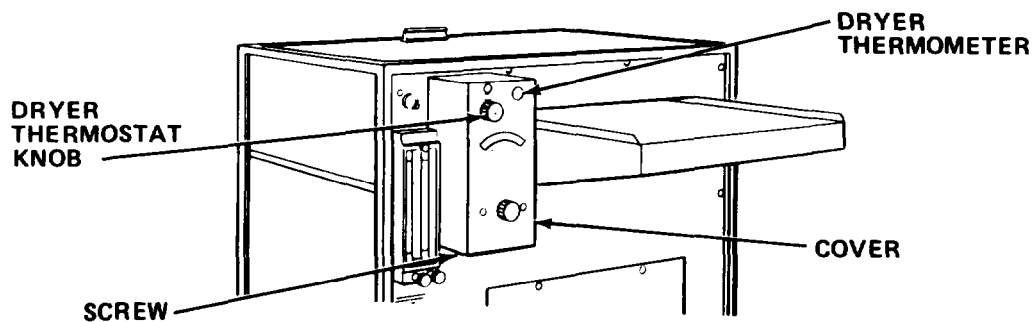
TOOLS: Flat Tip Screwdriver  
3/32 in. Hex Head Key Wrench

SUPPLIES: Sensing Element  
Thermometer

**WARNING**

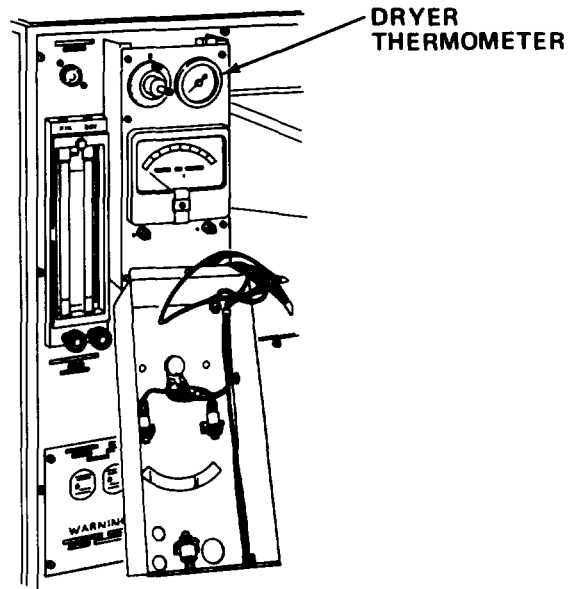
Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.

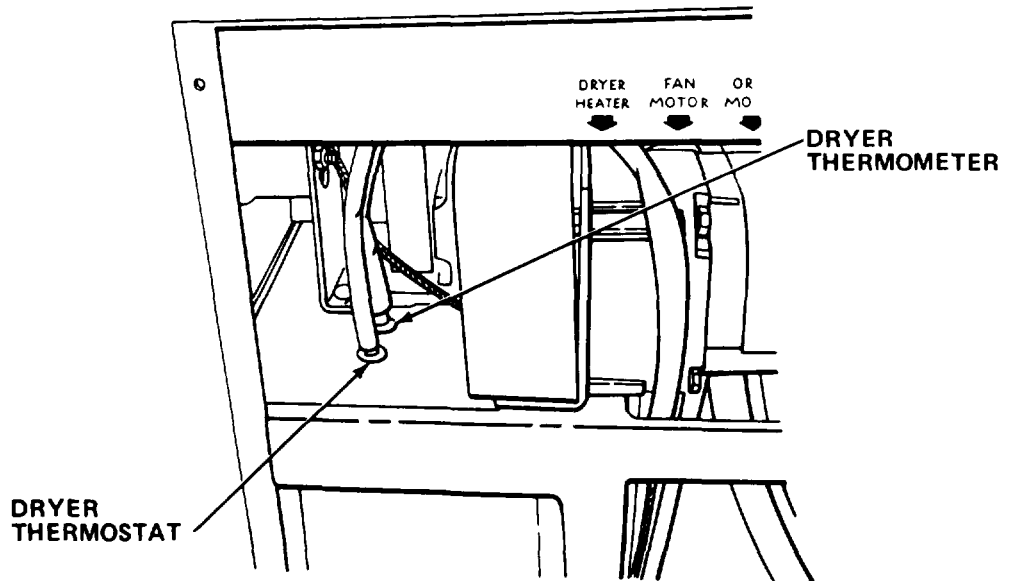


- b. Remove knob on dryer temperature thermostat.
- c. Remove cover panel by gently lifting and pulling.





- d. Remove mounting bolts and thermometer.
- e. Remove processor top cover.
- f. Remove left side panel.
- g. Remove cable box cover.



- h. Remove sensing element from air plenum.
- i. Carefully feed sensing element out of processor.

- j. Carefully feed new sensing element through processor and install in air plenum.
- k. Reinstall cable box cover.
- l. Reinstall side panel.
- m. Reinstall processor top cover.
- n. Install new thermometer and secure with mounting bolts.
- o. Reinstall cover panel.
- p. Reinstall knob on dryer temperature thermostat.
- q. Turn on circuit breaker.

2-16.23 Replace Transport Speed Indicator.

MOS: 83FJ6, Reproduction Equipment Repairer

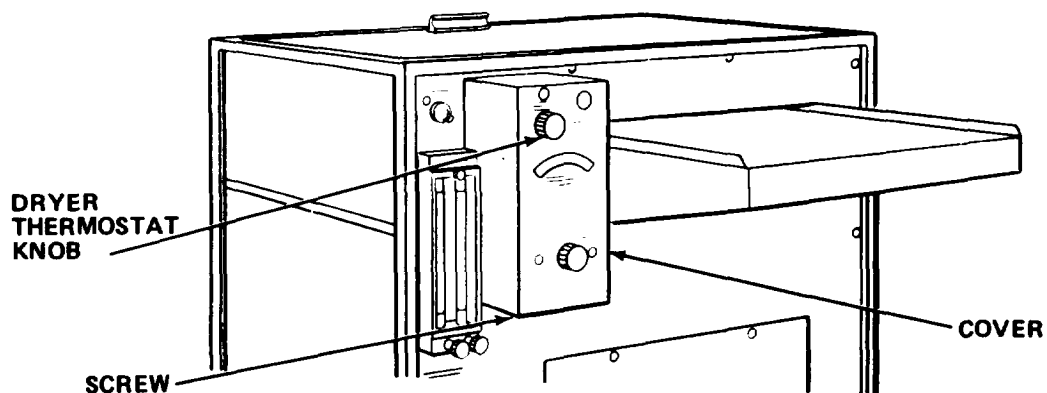
TOOLS: Flat Tip Screwdriver  
5/16 in. Nut Driver  
3/32 in. Hex Head Key Wrench

SUPPLIES: Circuit Board  
Transport Speed Indicator

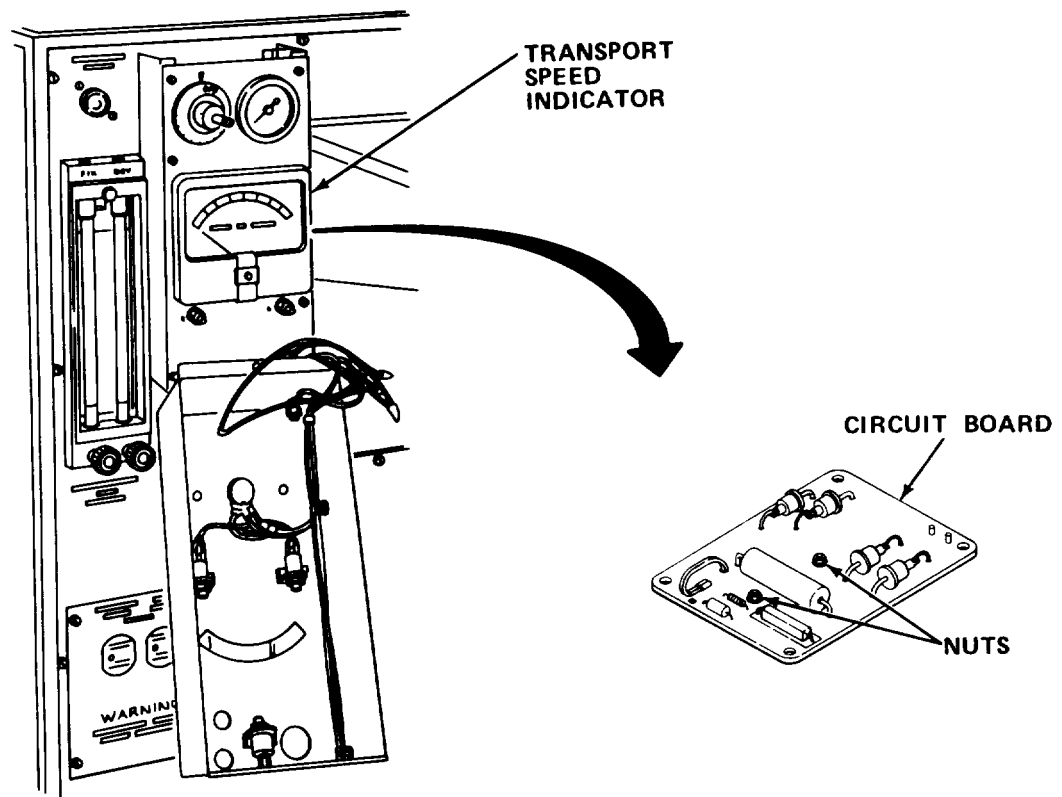
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.



- b. Remove knob on dryer thermostat.
- c. Remove cover panel.



- d. Tag and disconnect wires from circuit board on back of speed indicator.
- e. Remove nuts and circuit board.
- f. Remove bolts, nuts, lockwashers, and transport speed indicator.
- g. Replace circuit board and/or speed indicator.
- h. Reinstall speed indicator and secure in place with bolts, nuts, and lockwashers.
- i. Reinstall circuit board.
- j. Reconnect circuit board wiring.
- k. Reinstall cover panel.
- l. Reinstall knob on dryer thermostat.
- m. Adjust transport speed indicator (paragraph 2-16.3).

2-16.24 Replace Paper Processor.

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: Hose Clamp Pliers  
12 in. Adjustable Wrench  
9/16 in. Combination Wrench  
3/4 in. Combination Wrench  
5/16 in. Combination Wrench  
Flat Tip Screwdriver

SUPPLIES: Pail  
Hose Clamps  
Rags (Item 25, Appendix E)

---

**WARNING**

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Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Remove processor power access cover. Tag and disconnect electrical connections to processor.
- c. Loosen conduit retaining nut and slide away from connection.

---

**WARNING**

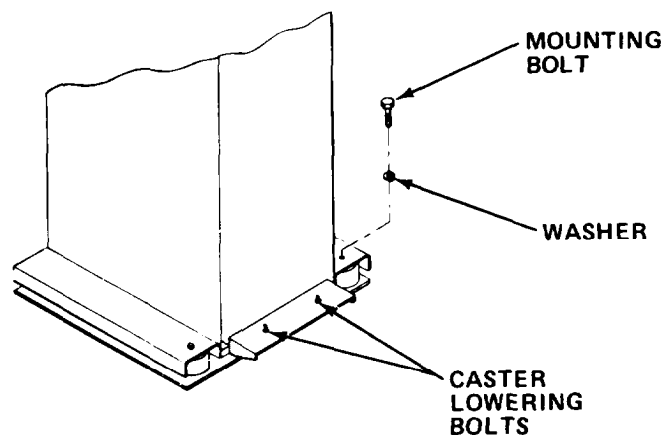
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Injury from chemical burns or blindness may occur if photographic chemicals splash in eyes or on sensitive skin areas. Wear eye protection and be sure eyewash and running water is available before working on processor.

- d. Drain chemical solutions from processor (paragraphs 2-6.2 and 2-6.3).

**NOTE**

Last of chemical solutions will have to be drained into plastic pail or drip pan as lowest points will not normally flow into drains.



- e. Remove mounting bolts and washers from shock mountings, then lower casters.

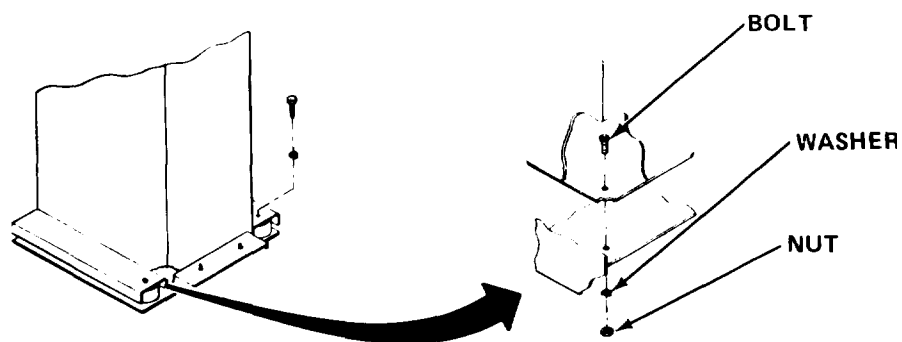
**WARNING**

Wipe all spills quickly to prevent serious injury or damage to equipment.

**NOTE**

Tag all tubing before disconnecting tubing.

- f. Disconnect chiller tubing from inside processor cabinet.  
 g. Disconnect replenishment tanks tubing from processor cabinet.  
 h. Disconnect sump tank tubing from processor cabinet.  
 i. Disconnect recycling pump tubing from processor cabinet.  
 j. Remove hose tie and disconnect heater exhaust hose from processor cabinet.



- k. Remove bolts securing processor to mounting frame.

- l. Remove processor from frame and remove from the section through rear doors.
- m. Install new processor on mounting frame and secure with bolts,
- n. Connect external tubing.
- o. Reinstall heater exhaust hose.
- p. Position processor over air shocks, raise casters, and install four bolts and washers.
- q. Connect power cable terminals and reinstall processor power access cover.

**2-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

## **Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

### **2-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ; AND SUPPORT EQUIPMENT.**

2-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

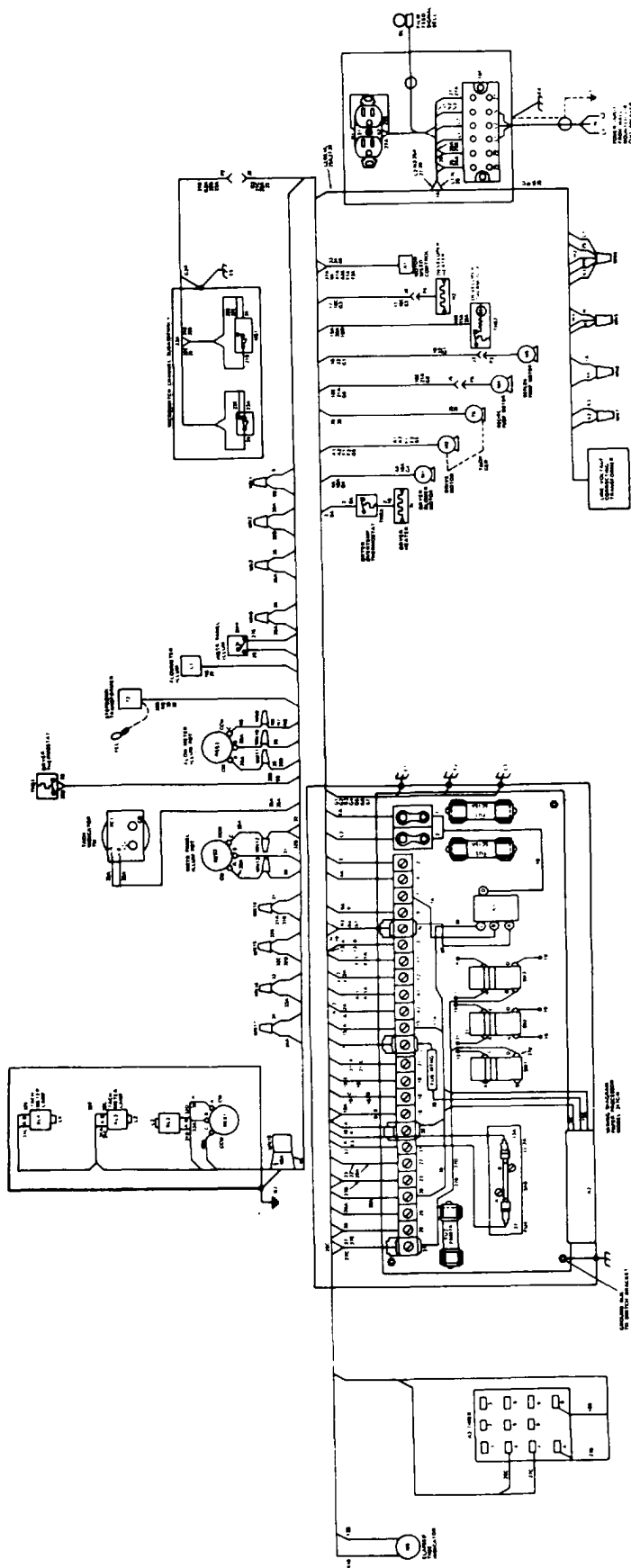
2-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering direct/general support maintenance for this equipment.

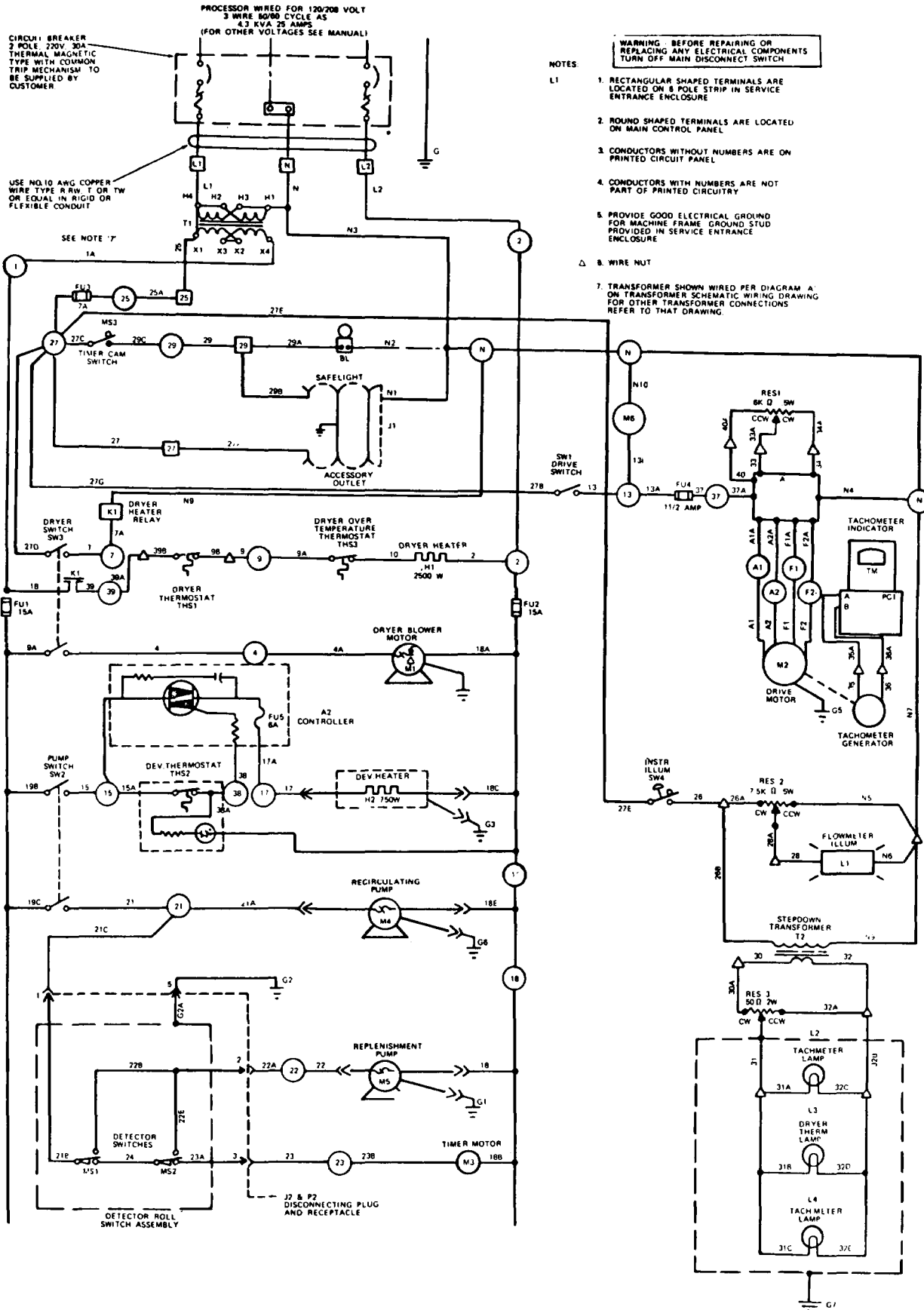
### **2-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES.**

a. Direct/general support troubleshooting procedures cover the most common malfunctions that may be repaired at the direct/general support level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by lower level maintenance should be conducted in addition to the direct/general support troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions use the following schematics or the foldout located at the end of this manual for further fault analysis.







**Table 2-6. DIRECT/GENERAL SUPPORT TROUBLESHOOTING**

| MALFUNCTION   |
|---|
| TEST OR INSPECTION  |
| CORRECTIVE ACTION   |
| <p>RECIRCULATING AND REPLENISHMENT PUMPS OPERATE BUT DO NOT MOVE LIQUIDS.</p> <p>Check for damaged impellers in pumps.</p> <p>Remove, inspect, and repair pump as necessary (paragraph 2-20.4).</p> |

**2-20. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering direct/general support maintenance functions for the film/paper processor system. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES  | PARAGRAPH |
|---|-----------|
| Repair Detector Crossover Assembly . . . . .                            | 2-20.1    |
| Repair Crossover Assembly . . . . .                                     | 2-20.2    |
| Repair Squeegee Assembly . . . . .                                      | 2-20.3    |
| Repair Pump Assembly . . . . .  | 2-20.4    |
| Replace/Repair Centrifugal Fan Assembly . . . . .                       | 2-20.5    |
| Remove/Install Recycling and Storage Tank . . . . .                     | 2-20.6    |
| Repair Fixer/Wash Rack and Turnaround . . . . .                         | 2-20.7    |
| Repair Developer Rack Assembly . . . . .                                | 2-20.8    |
| Replace Dryer Heater and/or Dryer Over Temperature Thermostat . . . . . | 2-20.9    |

2-20.1 Repair Detector Crossover Assembly

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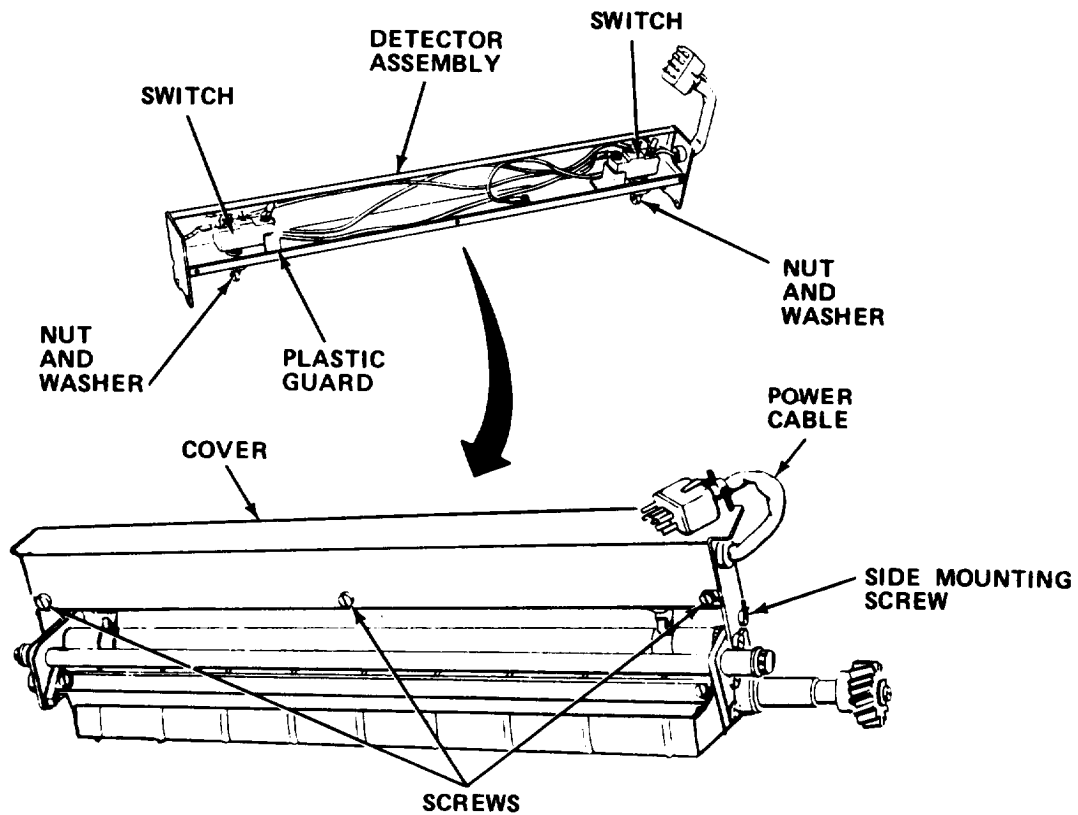
TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench

SUPPLIES: Switch  
Gear  
Bearing  
Upper Roller Assembly  
Lower Roller Assembly

**NOTE**

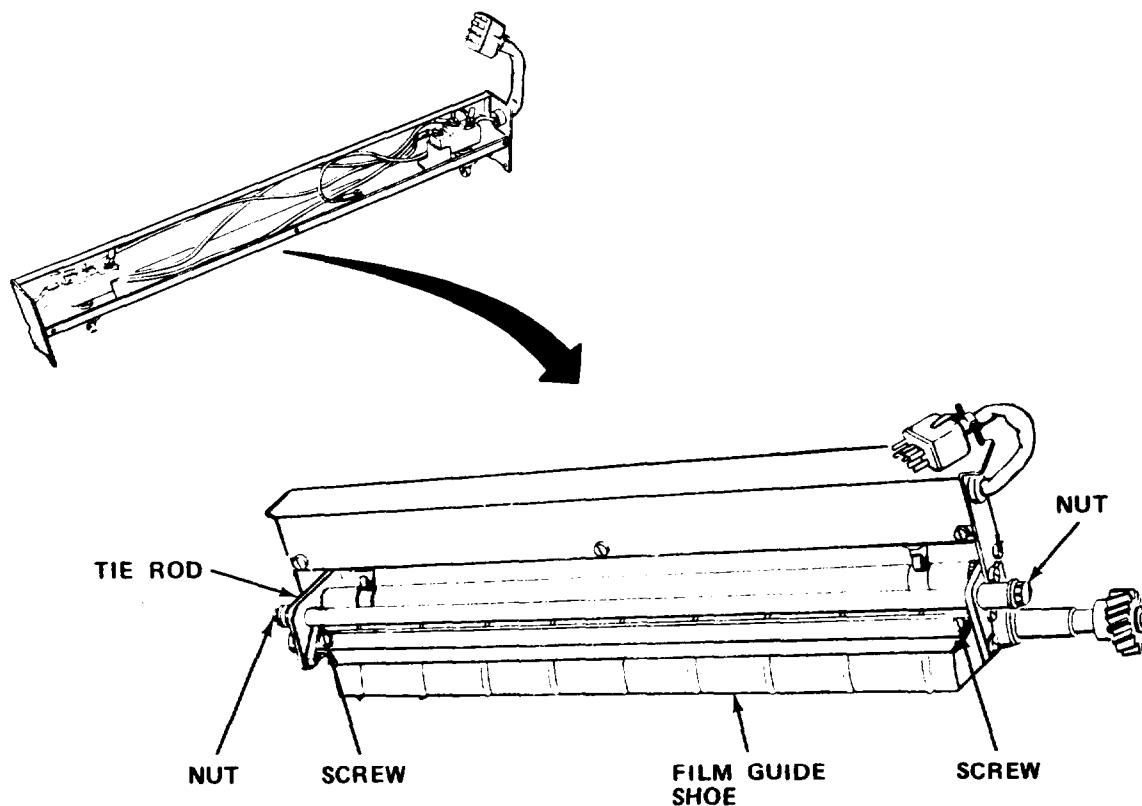
The following procedure is in disassembly/assembly sequence. Disassemble the detector crossover only as far as necessary to perform the repair.

- a. Turn off all processor and pump switches.

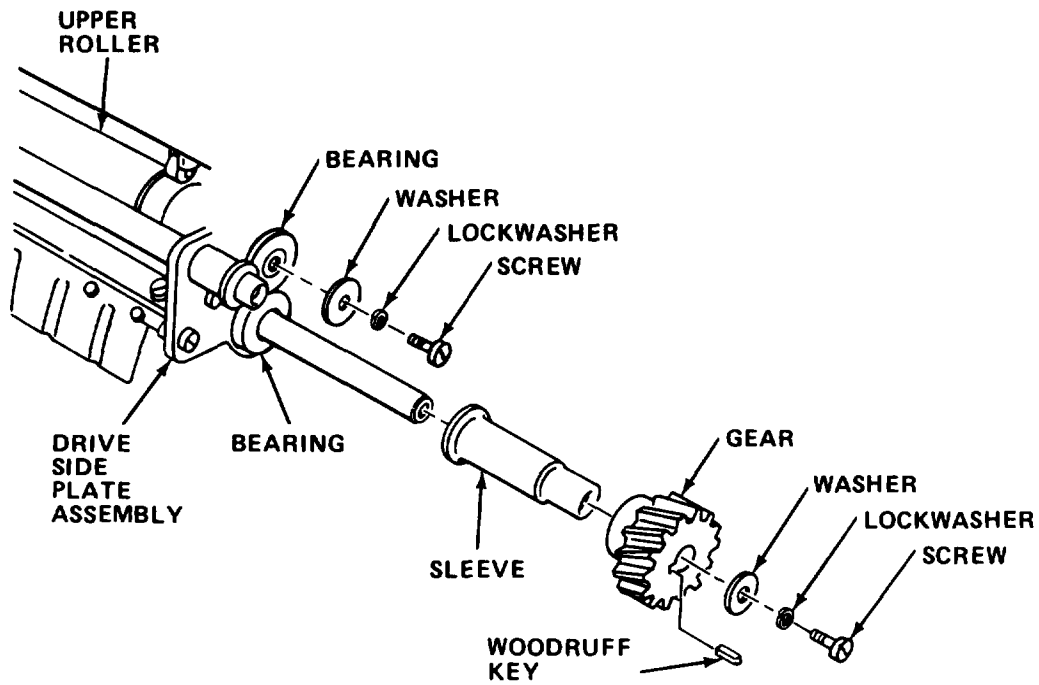


- b. Disconnect power cable and remove detector crossover assembly from processor.

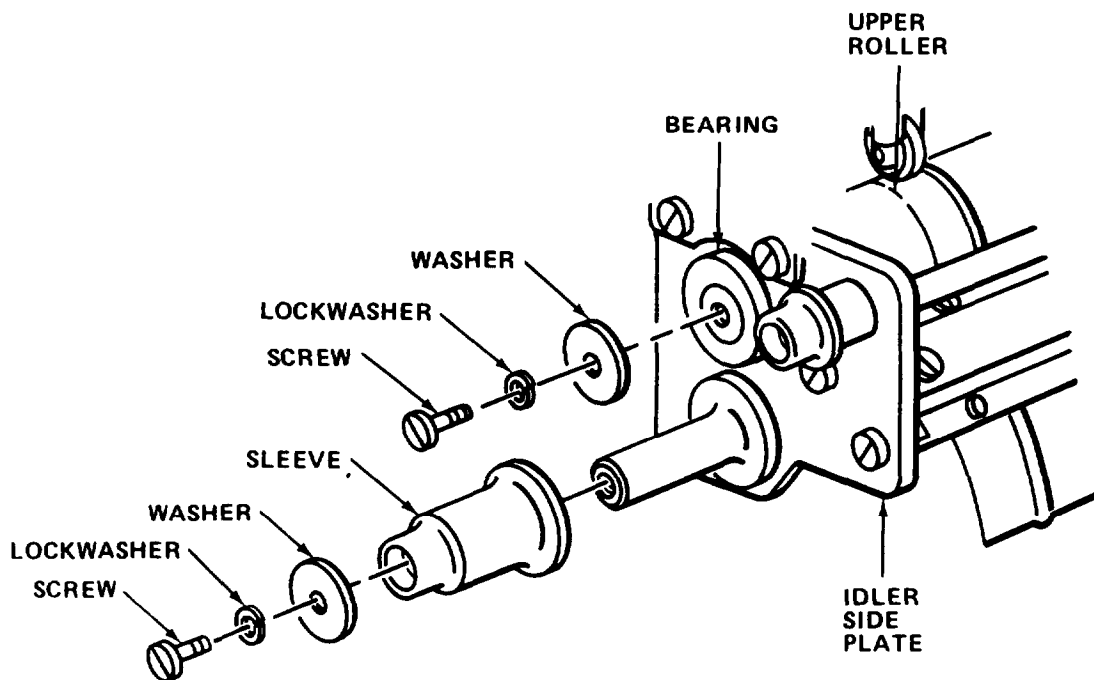
- c. Remove side mounting screws and remove detector assembly.
- d. To replace detector microswitches, proceed as follows:
  - (1) Remove cover screws and cover.
  - (2) Remove nut and washer from detector roller.
  - (3) Remove defective switch.
  - (4) Tag and disconnect wiring from defective switch.
  - (5) Reconnect wiring to new switch.
  - (6) Install new switch into detector assembly and retain with nut and washer.
  - (7) Reinstall detector cover and proceed to step v.



- e. Remove screws and film guide shoe.
- f. Remove nuts from ends of tie rods.



- g. Remove screw, lockwasher, washer, gear with woodruff key, sleeve, and bearing from drive side plate.
- h. Remove screw, washer, and bearing from upper roller on drive side plate.
- i. Remove remaining screws and drive side plate.



- j. Remove screw, lockwasher, washer, and bearing from upper roller on idle side plate.
- k. Remove screw, lockwasher, washer, sleeve, and bearing from lower roller on idle side plate.

#### NOTE

When idle side plate is removed, tie rod and upper and lower roller assemblies will be unattached.

- l. Remove remaining screws and idle side plate.
- m. Detector crossover assembly is now disassembled. Inspect all parts for damage or wear. Replace defective components as necessary.
- n. Reinstall tie rod, upper and lower roller assemblies, and all screws and hardware removed in step l, on idle side plate.
- o. Reinstall bearing, sleeve, washer, and lockwasher on lower roller assembly shaft and secure with screw.
- p. Reinstall bearing, washer, and lockwasher on upper roller assembly shaft and secure with screw.
- q. Reinstall drive side plate and all screws and hardware removed in step i.
- r. Reinstall nuts on tie rod shaft.
- s. Reinstall bearing, sleeve, gear with woodruff key, washer, and lockwasher on lower roller assembly shaft and secure with screw.
- t. Reinstall bearing, washer, and lockwasher on upper roller assembly shaft and secure with screw.
- u. Reinstall film guide shoe assembly and secure with screws.
- v. Reinstall film detector assembly and secure with screws.
- w. Reinstall film detector crossover assembly in the processor.

2-20.2 Repair Crossover Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

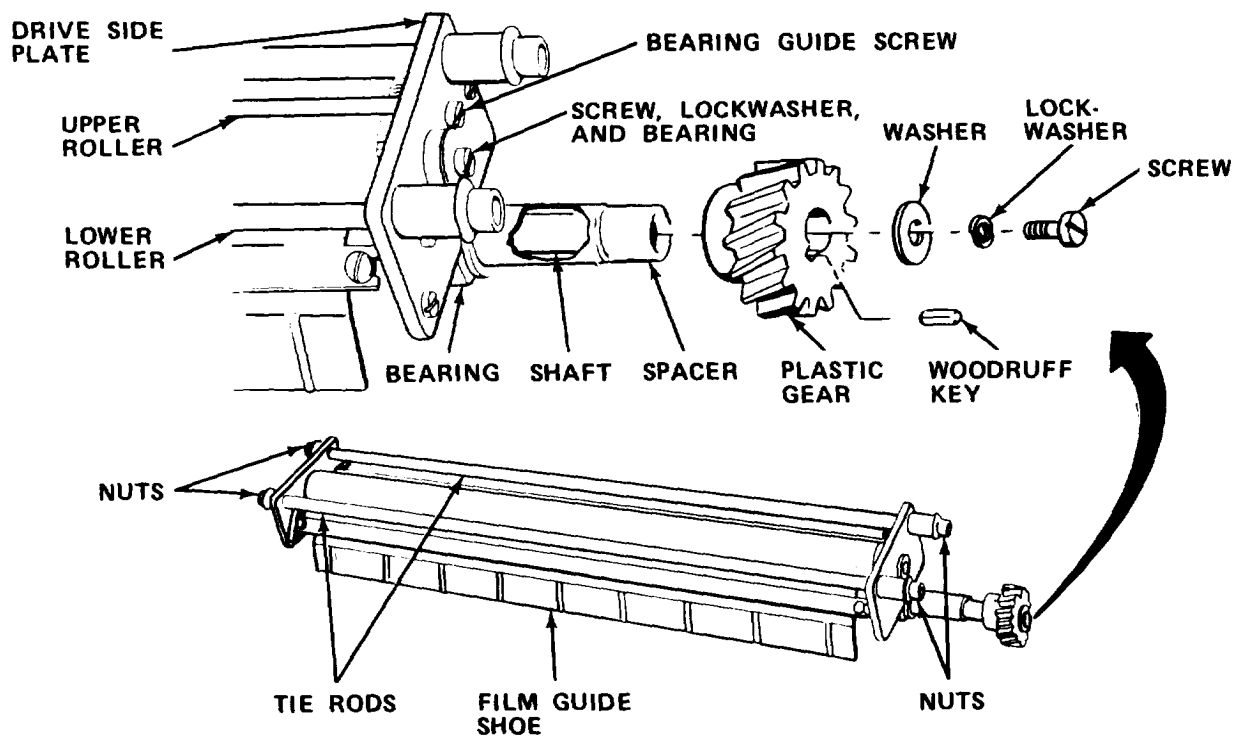
TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench

SUPPLIES: As Required

**NOTE**

The following procedure is in disassembly/assembly sequence. Disassemble the crossover assembly only as far as necessary to perform the repair.

- a. Turn off DRIVE switch on processor.



- b. Remove screws and both film guide shoes.
- c. Remove screw, lockwasher, washer, plastic gear with woodruff key, spacer, and bearing from lower roller shaft.
- d. Remove nuts from tie rod shafts on drive side plate.

**NOTE**

Washer removed in next step is identification washer and must be reinstalled in same place.

- e. Remove screw, lockwasher, washer, and bearing from upper roller shaft on drive side plate.
- f. Remove screw and bearing guide and then remove drive side plate.
- g. Remove screw, lockwasher, washer, and bearing from upper roller shaft on idle side plate.
- h. Remove nuts and tie rods on idle side plate.

**NOTE**

Tie rod retaining nuts on idle side are shorter than nuts on drive side.

- i. Remove screw and bearing guide from idle side plate.
- j. Remove screw, lockwasher, washer, bearing from lower roller and then remove idle side plate.
- k. Crossover is now completely disassembled. Inspect all parts for damage or wear. Replace defective components as necessary.
- l. Reinstall lower roller on idle side plate and reinstall bearing, washer, lockwasher, and secure with screw.
- m. Reinstall upper roller on idle side plate and reinstall bearing, washer, lockwasher and secure with screw. Be sure flat surface of bearing faces bearing guide.
- n. Reinstall bearing guide and secure with screw on idle side plate.
- o. Reinstall tie rods on idle side plate and secure with short nuts.
- p. Reinstall drive side plate and position rollers, tie rods, and film guide shoe in appropriate hole. Secure tie rods with two nuts.

**NOTE**

Be sure that washer installed in next step is the Identification washer removed in step e., and is installed with identification letter out.

- q. Reinstall bearing on upper roller and secure with washer, lockwasher, and screw. Be sure flat side of bearing faces bearing guide.
- r. Reinstall bearing guide and secure with screw.
- s. Reinstall bearing, sleeve, gear with woodruff key on lower roller and secure with washer, lockwasher, and screw.
- t. Reinstall remaining film guide shoe and secure with screws.
- u. Reinstall crossover assembly in processor.

2-20.3 Repair Squeegee Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

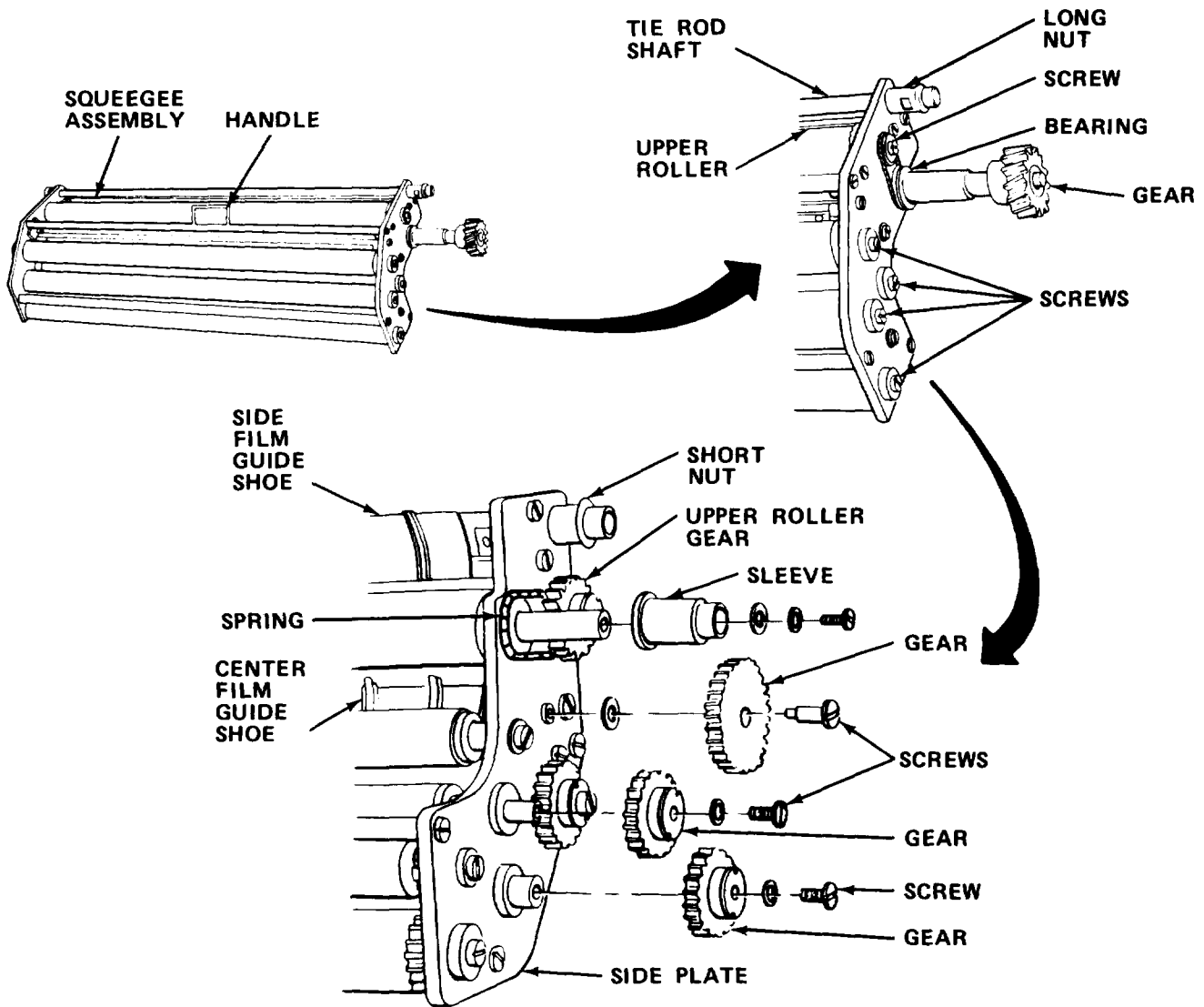
TOOLS: Flat Tip Screwdriver

SUPPLIES: As Required

**NOTE**

The following procedure is in disassembly/assembly sequence, drive side first. Disassemble the squeegee assembly only as far as necessary to perform the repair.

- a. Turn off processor DRIVE switch.
- b. Remove squeegee assembly from processor.





- c. Remove screw, lockwasher, washer, gear with woodruff key, spacer, spring, and bearing from roller shaft on drive side plate.
- d. Remove long nut from tie rod shaft on drive side plate.
- e. Remove screws, lockwashers, washers, and bearings if required from all roller shafts on drive side plate, noting location and size of each.
- f. Remove screw from tie rod handle shaft.
- g. Remove screws from tie rod shafts on drive side plate.
- h. Remove short nut from tie rod shaft on idle side.
- i. Remove screw, intermediate gear, and washer from idle side plate.
- d. Remove screw, lockwasher, and gear from upper roller shaft on idle side.
- k. Remove screw, lockwasher, washer, sleeve, and spring from lower roller shaft. Then remove bearings from upper and lower roller shafts.
- l. Remove three screws, three lockwashers, and three gears from upper and lower roller shafts. Then remove three bearings.
- m. Remove screw, lockwasher, washer, and bearings if required from all roller shafts on idle side plate.
- n. Remove screws from remaining three tie rod shafts.
- o. Remove screws and center film guide shoe.

#### NOTE

- Side plates are now free from rollers and tie rods. Side guide shoe is still attached to side plates.
  - Be sure you note position of all rollers, tie rods and guide shoes before removing side guide shoe. When either side plate is removed, entire assembly will separate.
- p. Remove screws and side film guide shoe. Then remove idle and drive side plates.
  - q. Squeegee assembly is now completely disassembled. Inspect all parts for damage or wear. Replace defective components as necessary.
  - r. Reinstall side film guide shoe and secure with screws.
  - s. Reinstall center film guide shoe and secure with screws.
  - t. Reinstall all tie rods and secure with screws and nut.

- u. Reinstall all rollers and secure with screws, lockwashers, and washers and bearings if required on idle side plate.

**NOTE**

Gears on two upper rollers are larger than gear on lower roller. Be sure to position gears correctly.

- v. Reinstall two upper rollers, bearings, gears, lockwashers, and secure with screws.
- w. Reinstall lower roller, bearing, gear, lockwasher, and secure with screw.
- x. Reinstall washer and intermediate gear; secure with screw.
- y. Reinstall spring.
- z. Reinstall upper roller, gear, and lockwasher; secure with screw on idle side plate.
- aa. Reinstall sleeve washer, lockwasher, and secure with screw.
- ab. Secure all tie rods with screws and nuts. Begin reassembly on drive side.
- ac. Reinstall all rollers and secure with washers, lockwashers, bearings if required, and secure with screws.
- ad. Reinstall drive roller, bearing, spring, sleeve, gear with woodruff key, washer, lockwasher, and secure with screw.
- ae. Rotate rollers and observe proper operation.
- af. Reinstall squeegee assembly into processor.

2-20.4 Repair Pump Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

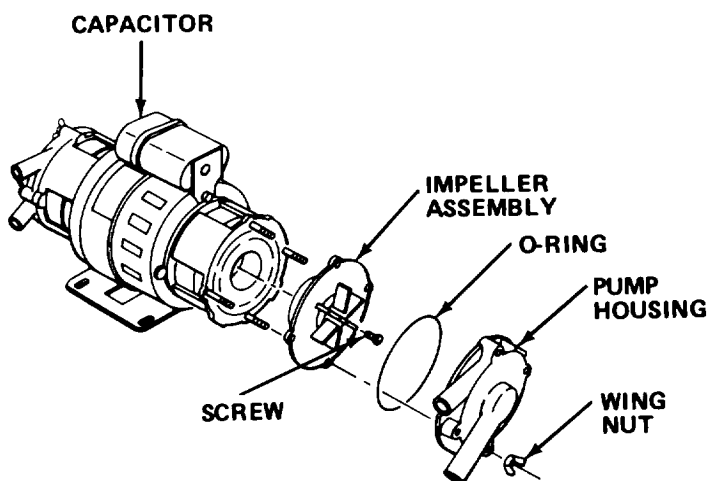
TOOLS: Flat Tip Screwdriver  
Hose Clamp Pliers  
10 in. Adjustable Wrench  
5/16 in. Combination Wrench

SUPPLIES: O-Ring  
Motor and capacitor  
Impeller assembly  
5/8 in. Drain Tubing, 6 ft. long (2)

**NOTE**

The following procedure is in a disassembly/assembly sequence. Disassemble the pump assembly only as far as necessary to perform the repair.

- a. Remove pump from processor (paragraph 2-16.12 steps a. through h).

**NOTE**

Note position of pump housing before disassembly.

- b. Remove wing nuts, and remove right and left pump housings.
- c. Remove and discard O-rings.
- d. Remove screws and impeller assemblies.
- e. Remove capacitor from motor.
- f. Install new capacitor.
- g. Reinstall new impeller assemblies and new O-rings on motor assembly.
- h. Reinstall left and right pump housings, and secure with wing nuts. Make sure that pump housings are properly positioned.
- i. Replace pump motor assembly in processor (paragraph 2-20.12 steps i. through k).

2-20.5 Repair/Replace Centrifugal Fan Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

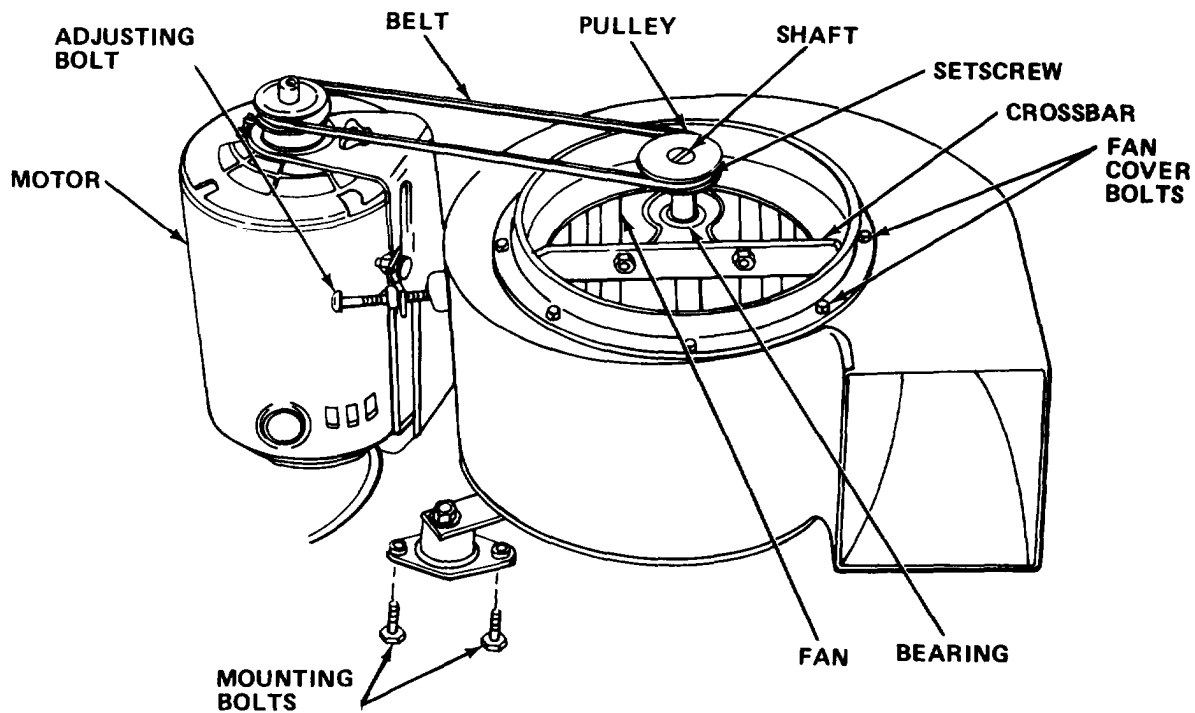
TOOLS: Flat Tip Screwdriver  
8 in. Adjustable Wrench  
1/2 in. Combination Wrench  
1/8 in. Hex Head Key Wrench  
Bearing Puller  
Hammer, Plastic Head  
5/16 in. Socket, 1/4 in. Drive  
1/4 in. Drive Ratchet

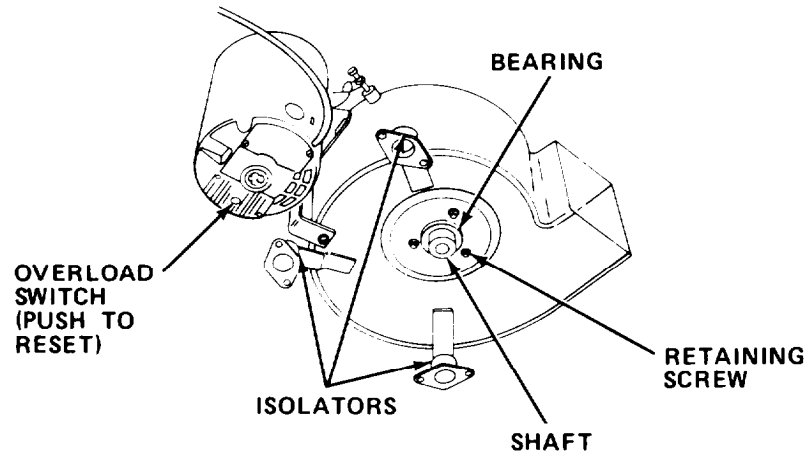
SUPPLIES: Bearing Assembly  
Motor  
Bearing  
Fan

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off circuit breaker.
- b. Remove right side cover.
- c. Remove centrifugal fan belt (paragraph 2-16.2).





- d. Remove set screw and pulley from centrifugal fan.
- e. Remove screws, nuts, washers, and lockwashers that secure top bearing to welded cross bar.

### **CAUTION**

Be careful when removing centrifugal fan/motor assembly to prevent damaging wiring and tubing.

- f. Remove mounting bolts, lockwashers, washers, for isolators and remove centrifugal fan/motor assembly.
- g. Loosen setscrews and remove top bearing from shaft.
- h. Loosen setscrew and remove locking plate.
- i. Remove fan cover from housing and remove fan.
- j. Remove bolts, washers, nuts, and shaft with bottom bearing attached.
- k. Loosen setscrews and remove bottom bearing.
- l. Inspect components and replace defective parts.

### **NOTE**

Check that overload switch (red) on bottom of motor is reset. Push to be sure it is reset.

- m. Reinstall bottom bearing on shaft and tighten with setscrews.
- n. Reinstall bottom bearing and shaft in fan housing and secure with bolts, washers, and nuts.
- o. Reinstall fan and fan cover.
- p. Reinstall top bearing on shaft and tighten with setscrews.

**NOTE**

Do not tighten mounting bolts and nuts. Slack is required to reinstall centrifugal fan belt.

- q. Secure top bearing and shaft to welded cross bar and verify that fan spins freely.

**CAUTION**

Be careful not to damage tubing or wiring during reinstallation of centrifugal fan/motor assembly.

- r. Reinstall centrifugal fan/motor assembly into processor and secure with mounting bolts.
- s. Reinstall pulley on shaft and tighten with setscrew.
- t. Reinstall belt on pulleys and adjust (paragraph 2-16.2).

2-20.6 Remove/Install Recycling and Storage Tank.

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Four persons are required to perform this procedure.

TOOLS: 12 in. Adjustable Wrench  
1 1/16 in. Combination Wrench  
14 in. Pipe Wrench  
1/2 in. Drive Socket Set  
1/4 in. Drill  
1/4 in. Drill Bit  
Pop Rivet Gun

SUPPLIES: Thread Sealant (Item 37, Appendix E)  
Storage Tank  
Recycling Tank  
1/4 in. Pop Rivets  
Silicone Sealant (Item 29, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Safe lights may be removed to prevent breakage while removing storage tank.

**NOTE**

This procedure is written to allow for removal of either tank.

- (1) Turn off circuit breaker(s).
- (2) Drain water from tank (paragraph 2-6.2, step c.).
- (3) Tag and disconnect thermostat wiring (paragraph 2-16.20 steps b.through e.).
- (4) Tag and disconnect heating element wiring (paragraph 2-16.19, steps c.through e.).

**NOTE**

Before removing fittings, close all valves.

- (5) Disconnect all recycling/storage tank plumbing.
- (5) Using drill and drill bit, remove rivets and covers on the outside
- (6) of van that cover mounting bolt holes for tank.

**WARNING**

Serious injury may occur if insufficient number of personnel are used to move these tanks. These tanks weigh approximately 150 lbs (68 kg).

- (7) Support tank and remove mounting bolts.
- (8) Remove all remaining hardware and replace defective tank.

**NOTE**

Apply thread sealant to all plumbing fittings during reinstallation.

- (9) Reinstall all hardware removed in step (8) onto new tank.

**WARNING**

Serious injury may occur if insufficient number of personnel are used to move these tanks. These tanks weigh approximately 150 lbs (68 kg).

- (10) Support tank and reinstall mounting bolts.
- (11) Place silicone sealant on bolt hole covers and reinstall covers on outside of van.
- (12) Reconnect all tank plumbing.
- (13) Reconnect heating element wiring (paragraph 2-16.19, steps h. and i.).
- (14) Reconnect thermostat wiring (paragraph 2-16.20, steps k.through m.).

**NOTE**

Open all valves previously shut.

- (20) Refill tank (Table 2-1).
- (21) Turn on circuit breaker.

2-20.7 Repair Fixer/Wash Rack and Turnaround Assemblies.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
1/4 in. Drive Socket Set  
Stud Remover  
Spring Hook

SUPPLIES: As Required

**CAUTION**

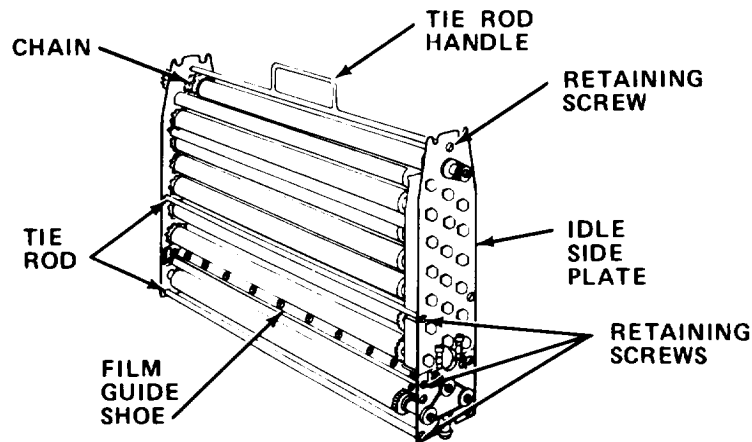
Always use splash guard when removing fixer rack to prevent developer tank contamination.

**NOTE**

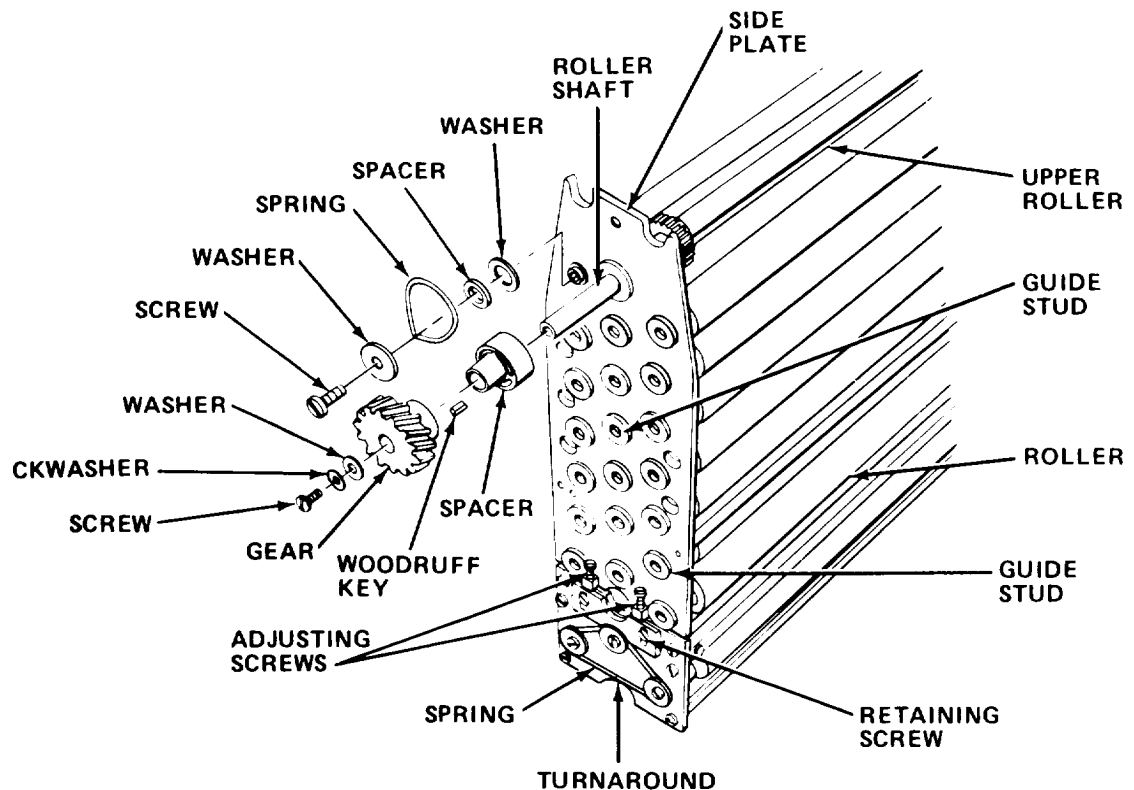
The following procedure is in disassembly/assembly sequence. Disassemble the rack/turnaround assembly only as far as necessary to perform the repair.



- a. Turn off all processor switches.
- b. Remove top cover, tank covers, and crossovers.
- c. Slowly remove rack assembly by lifting upward. Allow time for excess fluid to drip back into tank and place rack on table.
- d. Rinse rack assembly with running water. Wipe with a damp sponge or cloth.



- e. Remove screws and washers retaining tie rod handle to side plates. Remove tie rod handle.



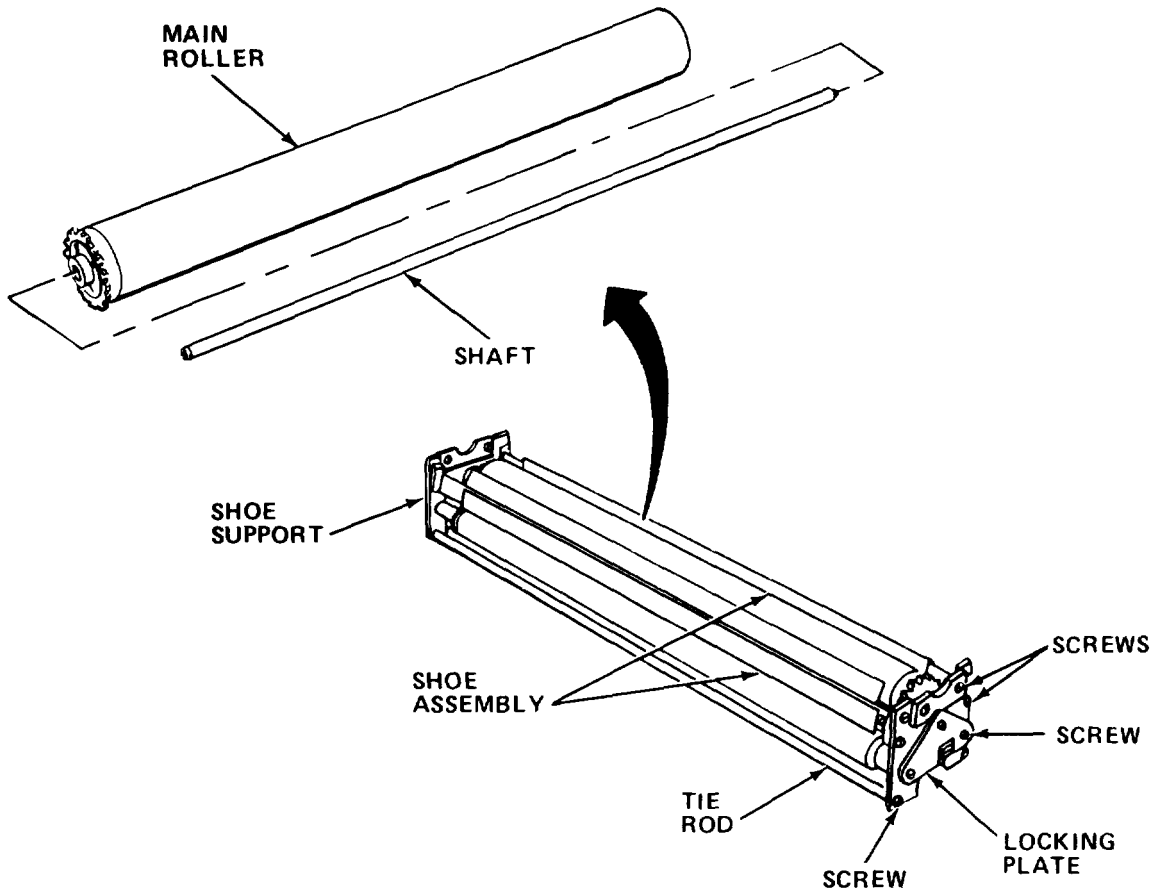
- f. Remove screw, lockwasher, washer, gear with woodruff key, and spacer from roller shaft.

- g. Remove spring, screw, locking plate, spacers, and washer from side plate.
- h. Remove screws from four tie rods.
- i. Remove screws and film guide shoes. (Two are located on sides of assembly and one on bottom).

**NOTE**

Note position and location of rollers before removal to be sure reinstallation is correct. Lay out rollers in removal sequence.

- j. Remove guide studs and rollers from assembly.



- k. Remove screw, locking plate, washer, and spring from turnaround.
- l. Remove bolts, washers, and spacers from turnaround roller.

**NOTE**

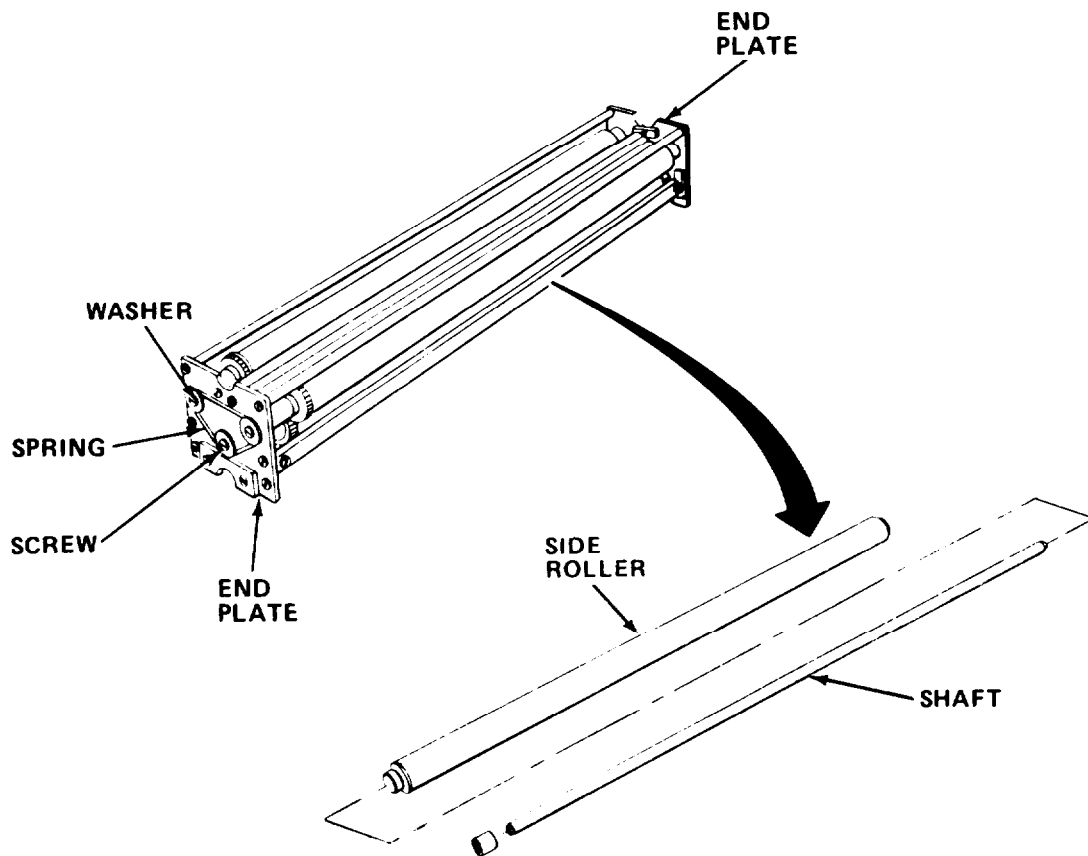
When either side plate is removed, entire assembly will separate.

- m. Remove drive side plate and drive chain.

**NOTE**

Side plates must be slightly spread to allow removal of main drive roller.

- n. Remove spring, screw, lockwasher, spacer, and main drive roller from side plates.
- o. Remove screw, locking plate, spacers, washer, metal roller, and small roller from side plates.



- p. Remove spring, screws, washers, spacers, washers, and turnaround rollers from idle side plate.

- q. Remove screws and adjustable plates from side plates.
- r. Rack/turnaround assembly is now disassembled. Inspect all parts for damage or wear. Replace defective components as necessary.
- s. Reinstall adjustable plates on side plates and secure with screws.
- t. Reinstall main turnaround roller between side plates with drive chain attached to appropriate socket.
- u. Reinstall bottom two rollers and secure to side plates with turnaround plate assemblies and springs.
- v. Reinstall film guide shoes and tie rods.
- w. Reinstall top drive roller and slide drive chain over drive gear.
- x. Reinstall center row of rollers between drive chain and secure with studs.
- y. Reinstall remaining rollers and secure with studs.
- z. Reinstall metal and small rollers and secure with spacers, locking plates, and screws.
- aa. Reinstall drive gear assembly, spacer assembly, springs, and secure with screws.
- ab. Reinstall tie rod handle.
- ac. Using adjusting screws, adjust chain tension to remove slack in chain.
- ad. Verify that all rollers rotate easily when drive gear is rotated.
- ae. Reinstall rack assembly into processor.
- af. Reinstall crossovers, covers, and top cover.

2-20.8 Repair Developer Rack Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS : Flat Tip Screwdriver  
1/4 in. Drive Socket Set  
5/8 in. Combination Wrench  
1/2 in. Combination Wrench  
Stud Remover  
Spring Hook

SUPPLIES: As Required

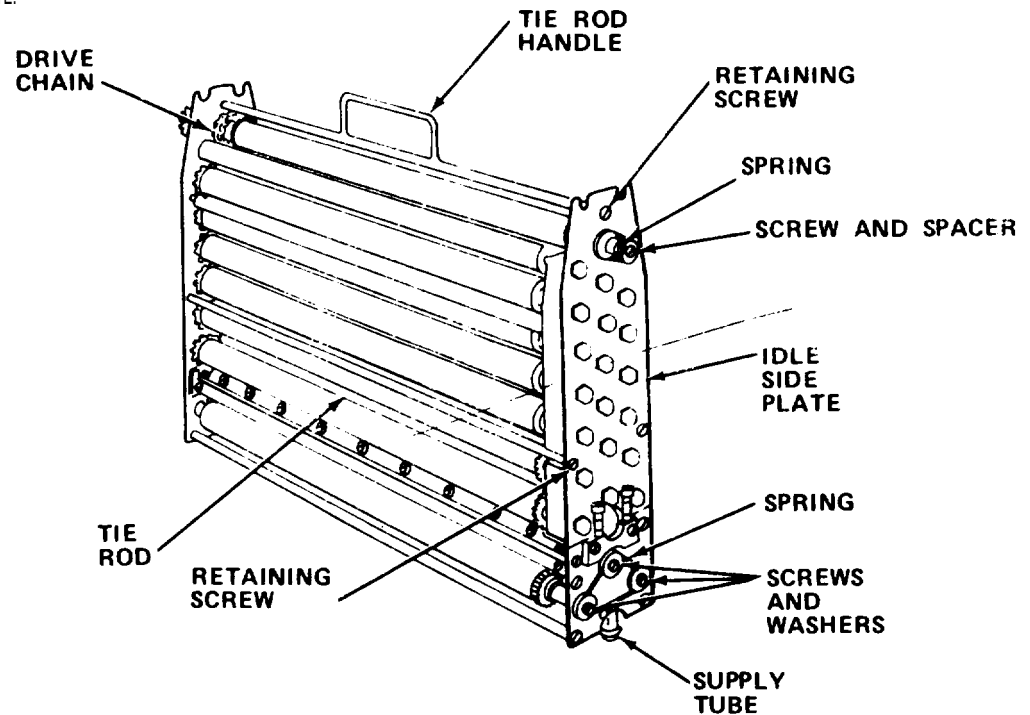
**NOTE**

The following procedure is a disassembly/assembly sequence. Only disassemble the developer rack as far as necessary to perform the repair.

- a. Turn off all processor switches.
- b. Remove top cover, tank covers, and crossovers.
- c. Slowly remove rack assembly by lifting upward. Allow time for excess fluid to drip back into tank and place rack on table.
- d. Rinse rack assembly with water. Wipe with damp sponge.

**NOTE**

- The developer rack assembly is identical to the fixer rack/turnaround assembly with the following exceptions:
- This assembly contains a developer spray system which consists of perforated tubing and supply tube.
- The other exception is the manner in which the rollers are attached to the idle side plate.



- e. Remove screws and tie rod handle.
- f. Remove screw and spacer from drive roller shaft on idle side plate.

- g. Remove spring and locking plate assembly from metal and small roller shafts on idle side plate.
- h. Remove spring, screws, and washers from bottom and turnaround roller shafts.
- i. Remove tie rod screws.
- j. Remove retaining screws and perforated tubing.

**NOTE**

Note position and location of rollers before removal to be sure reinstallation is correct. Lay out rollers in removal sequence.

- k. Remove studs, locking nuts, and rollers from assembly.

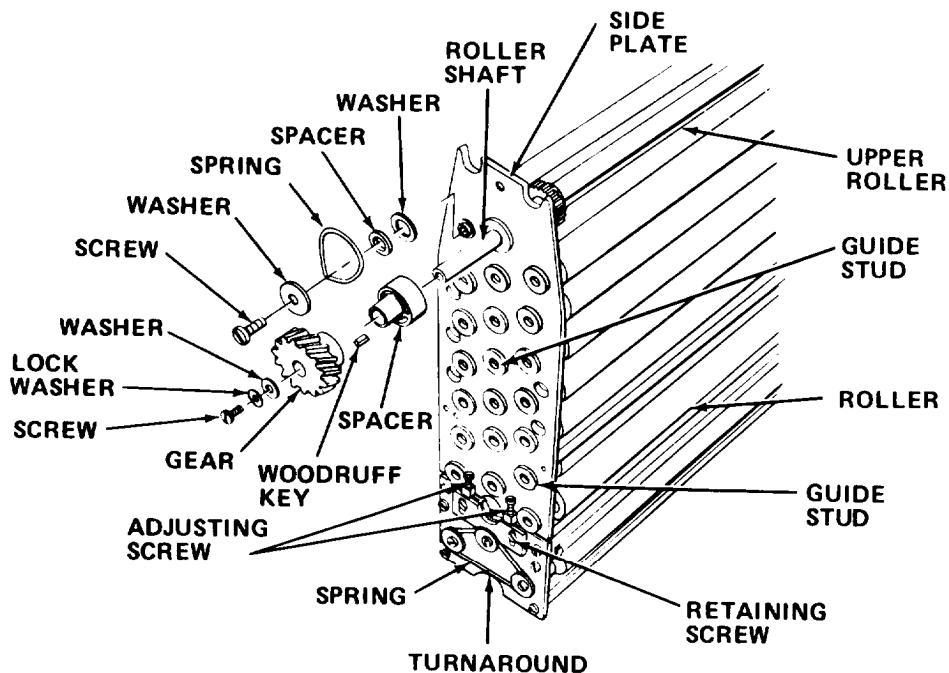
**NOTE**

When idle side plate is removed, entire assembly will separate.

- l. Remove film guide shoes and idle side plate.

**NOTE**

Remaining disassembly for drive side is identical to fixer/wash rack assembly (paragraph 2-20.7).



- m. Developer rack assembly is now disassembled. Inspect all parts for damage or wear. Replace defective components as necessary.

- n. Reassemble drive side components to a point where the developer spray assembly is reinstalled.

#### NOTE

Be sure perforated holes are pointing down on upper spray tubing, and the bottom tubing pointing up.

- o. Reinstall perforated developer spray tubes.
- p. Reinstall center rollers between drive chain and secure with nuts and studs.
- q. Reinstall bottom rollers and turnaround roller and secure with spring assembly.
- r. Reinstall film guide shoes and tie rods.
- s. Reinstall small and metal rollers and secure with spring and locking plate assemblies.
- t. Reinstall remaining rollers and secure with studs and nuts.
- u. Reinstall drive roller and secure with spacer assembly.
- v. Reinstall tie rod handle.
- w. When adjusting screws, adjust chain tension to remove slack in chain.
- x. Verify that all rollers rotate easily when drive gear is rotated.
- y. Reinstall rack assembly into processor.
- z. Reinstall crossovers, covers, and top cover.

2-20.9 Replace Dryer Heater and/or Dryer Over Temperature Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

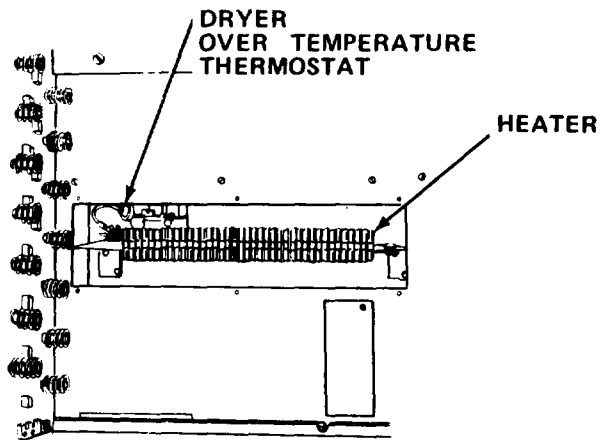
TOOLS: Flat Tip Screwdriver

SUPPLIES: Dryer Heater  
Dryer Over Temperature Thermostat

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off prior to servicing.

- a. Turn off circuit breaker.
- b. Remove front panel.
- c. Remove 10 front air tubes.
- d. Remove 22 transport rollers.
- e. Remove bottom roller by lifting roller from bearing blocks.
- f. Remove 10 rear air tubes.
- g. Remove both side covers.



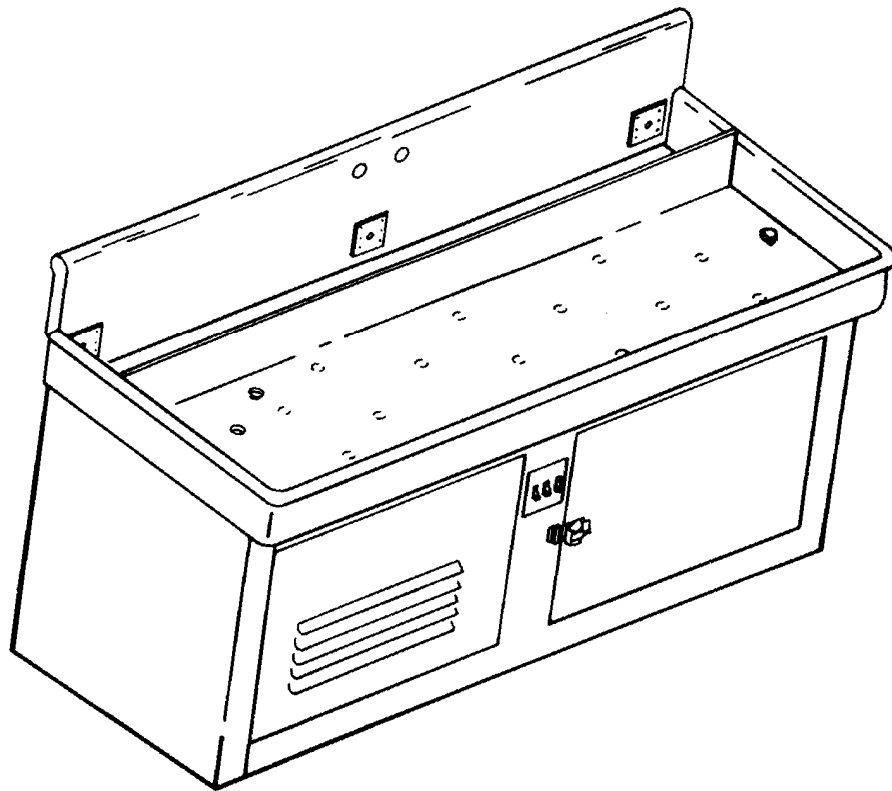
- h. Remove screw holding cover for heater element and dryer over temperature thermostat.
- i. Tag and disconnect wires for defective heater element and/or defective dryer over temperature thermostat.



- j. Remove screws and defective heater element and/or defective dryer over temperature thermostat.
- k. Install new heater element and/or new dryer over temperature thermostat and secure with screws.
- l. Reconnect wires.
- m. Reinstall cover for heater element and dryer over temperature thermostat.
- n. Reinstall side covers.
- o. Reinstall 10 rear air tubes.
- p. Reinstall bottom roller.
- q. Reinstall 22 transport rollers.
- r. Reinstall 10 front air tubes.
- s. Reinstall front panel.
- t. Turn on circuit breaker.







**CHAPTER 3**  
**PHOTOGRAPHIC PROCESSING SINK**

**Section I INTRODUCTION**

**3-1. GENERAL INFORMATION.**

3-1.1 Scope.

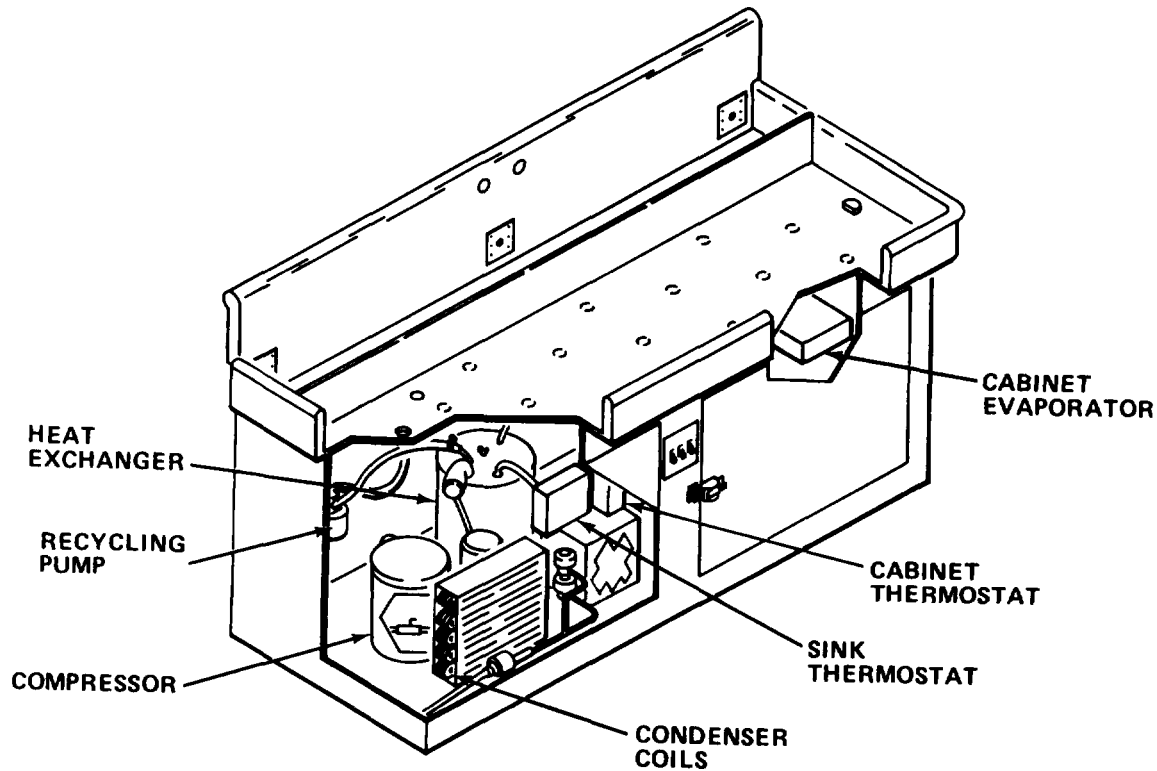
- a. Model Number and Equipment Name. Model 71-RC Photographic Processing Sink.
- b. Purpose of Equipment. To provide a constant water bath temperature for stabilizing photographic chemicals.

**3-2. EQUIPMENT DESCRIPTION.**

3-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Thermostatically controlled refrigeration storage cabinet for photographic chemicals.
- b. Heat exchanger maintains preset recycling water temperature.
- c. Stainless-steel sink construction.
- d. Magnetic-drive recycling pump.

3-2.2 Location and Description of Major Components.



**COMPRESSOR.** Compresses freon gas to perform refrigeration process.

**CONDENSER COILS.** Air-cooled condenser coils remove heat from compressed freon gas.

**HEAT EXCHANGER.** Contains refrigeration evaporator coils for cooling and electrical heater for warming water.

**RECYCLING PUMP.** Magnetic-drive, centrifugal pump used to circulate water through heat exchanger and into sink.

**CABINET EVAPORATOR.** Cools cabinet through expansion of freon gas from compressor. It has a fan to aid airflow through coils.

**CABINET THERMOSTAT.** Controls refrigeration cabinet temperature. Adjustable.

**SINK THERMOSTAT.** Controls temperature of water in sink. Adjustable.

**3-2.3 Equipment Data.**

|                             |  |
|-----------------------------|--|
| Dimensions                  |  |
| Overall                     | Length 80 in. (203.2 cm)<br>Width 35 in. (88.9 cm)<br>Height 46 in. (116.8 cm) |
| Refrigeration Cabinet       | Length 28 in. (71.1 cm)<br>Width 29 in. (73.7 cm)<br>Height 27 in. (68.6 cm)   |
| Sink                        | Length 75 in. (190.5 cm)<br>Width 26 in. (66.0 cm)<br>Depth 3-7/8 in. (9.8cm)  |
| Power Requirements          | 115 V, 60Hz, 16 amps   |
| Thermostat Settings         |  |
| Cabinet                     | 68°F (20°C) ±2° F (±1° C)<br>60°F (15.5°C)                                     |
| Refrigerant                 | Freon R-12   |
| Compressor Motor Horsepower | 1/2 hp   |

**3-3. TECHNICAL PRINCIPLES OF OPERATION.** The purpose of the processing sink is to provide a temperature-controlled medium for photolithographic chemistry. It is comprised of:

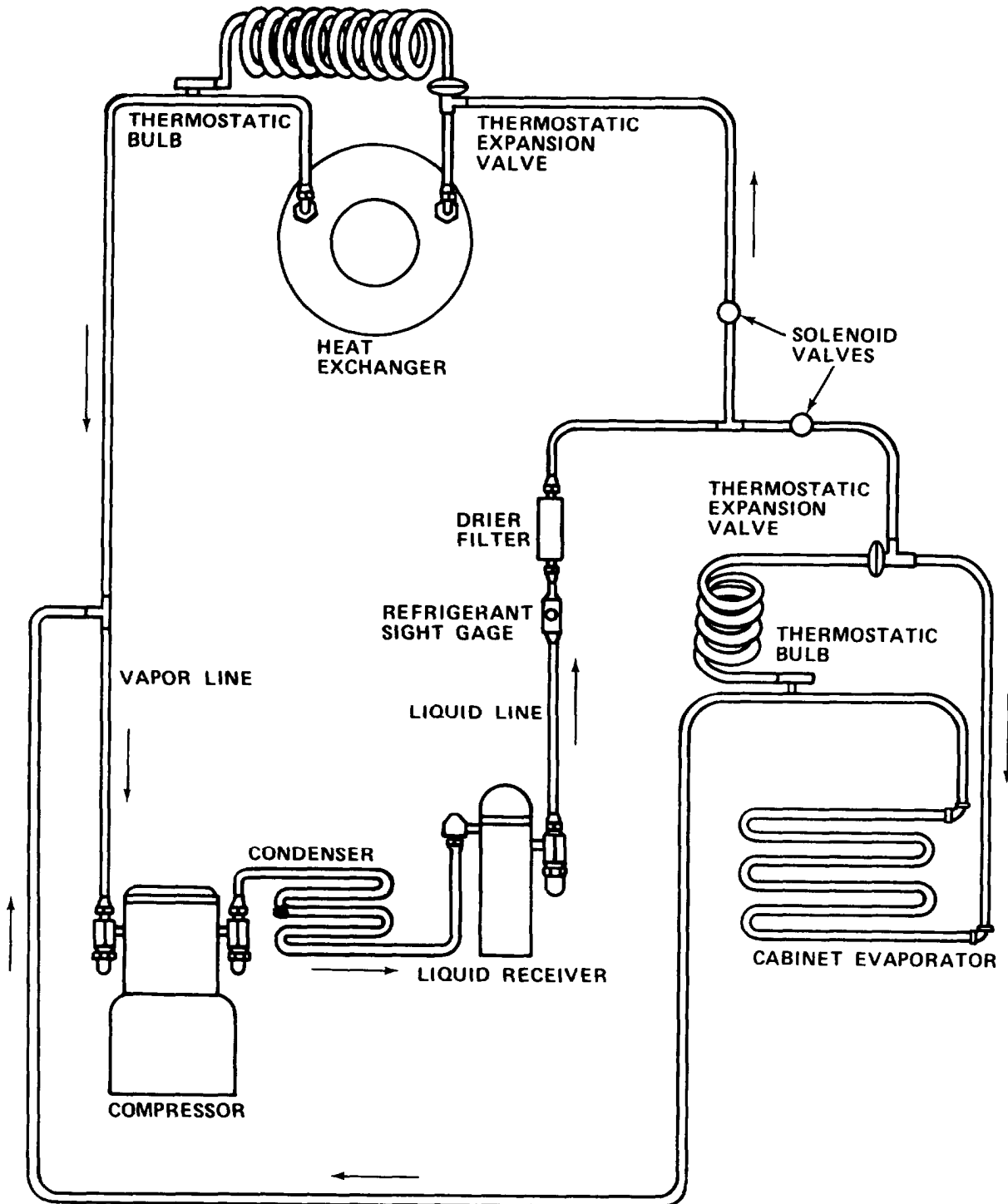
Refrigeration System

Recycling System

Heating System

Electrical System

3-3.1 Refrigeration System. Removes heat from recycling water and refrigeration cabinet. It is comprised of:





a. Compressor. Compresses freon gas for refrigeration process. It is a sealed unit driven by an electric motor.

b. Condenser. Contains the compressed liquid refrigerant. After exiting the compressor unit, the compressed refrigerant gives up heat through the air-cooled condenser coils.

c. Liquid receiver. Acts as a storage tank and contains approximately 1 lb of liquid refrigerant in excess of actual requirements.

d. Refrigerant sight gage. Indicates if freon lines are charged to capacity. With compressor running, a solid stream of liquid refrigerant should be visible in the sight gage. If bubbles are present, the system is not fully charged.

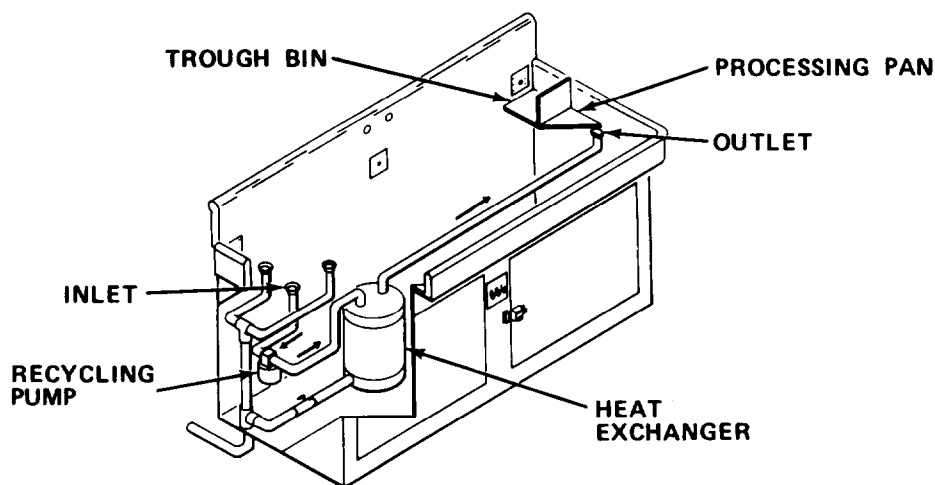
e. Dryer filter. Removes moisture from liquid refrigerant lines between liquid receiver and thermostatic expansion valves.

f. Solenoid valves. Control liquid refrigerant flow to heat exchanger and cabinet evaporator coils.

g. Thermostatic expansion valve. Thermostatically and pressure-regulated ball valve creates a pressure drop in refrigerant flow. The pressure drop changes the refrigerant from liquid to gas, and heat is absorbed during the process.

h. Cabinet evaporator. Located in the refrigeration cabinet. Its coils absorb heat from the cabinet. The evaporator coils contain refrigerant which is vaporized by its expansion valve.

i. Heat exchanger. Contains evaporator coils inside a solid housing which absorbs heat from water pumped through housing. The evaporator coils contain refrigerant which is vaporized by an expansion valve. The heat exchanger also contains an immersion-type resistance heater to warm the water if temperature is too low.

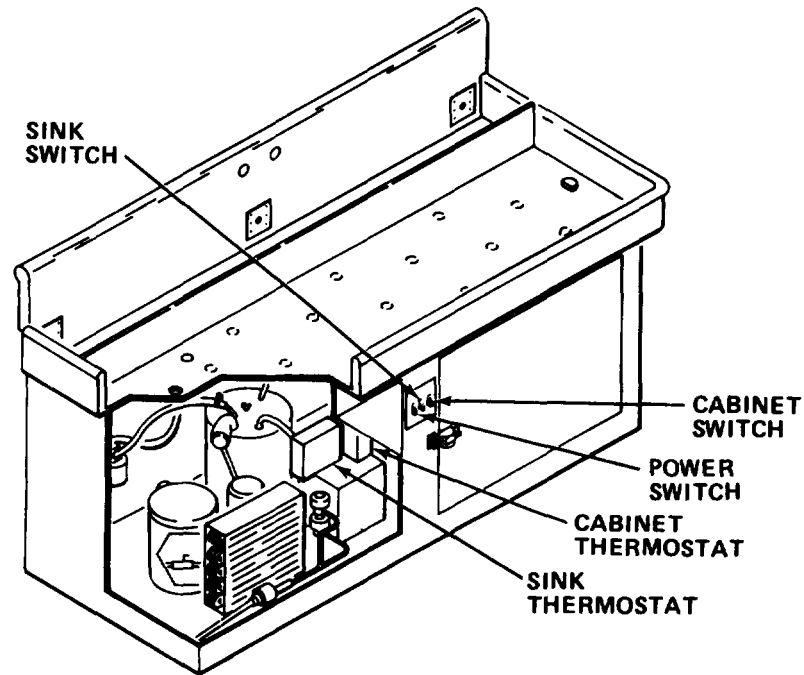


PLUMBING DIAGRAM—RECYCLING SYSTEM

**3-3.2 Recycling System.** Provides a temperature-controlled water bath to maintain a proper processing temperature for solution trays located in the sink. It consists of a magnetic-drive, centrifugal pump which recirculates water from the sink, through the heat exchanger, and back to the sink.

3-3.3 Heating System. A controlled, electrical heating system for the circulating water. Consists of an electrical immersion-type element submerged in the water of the heat exchanger and controlled by the heater thermostat.

3-3.4 Electrical System. Provides power to various systems. It consists of:



a. Sink thermostat. Controls temperature of water in sink. Monitors water temperature through a liquid-filled copper element connected to a diaphragm. The diaphragm operates contacts which energize the heater or open solenoid valve in the refrigeration system.

b. Cabinet thermostat. Controls the temperature in the refrigeration cabinet. Activates the solenoid valve in the refrigerant line to allow liquid refrigerant to flow to the cabinet evaporator.

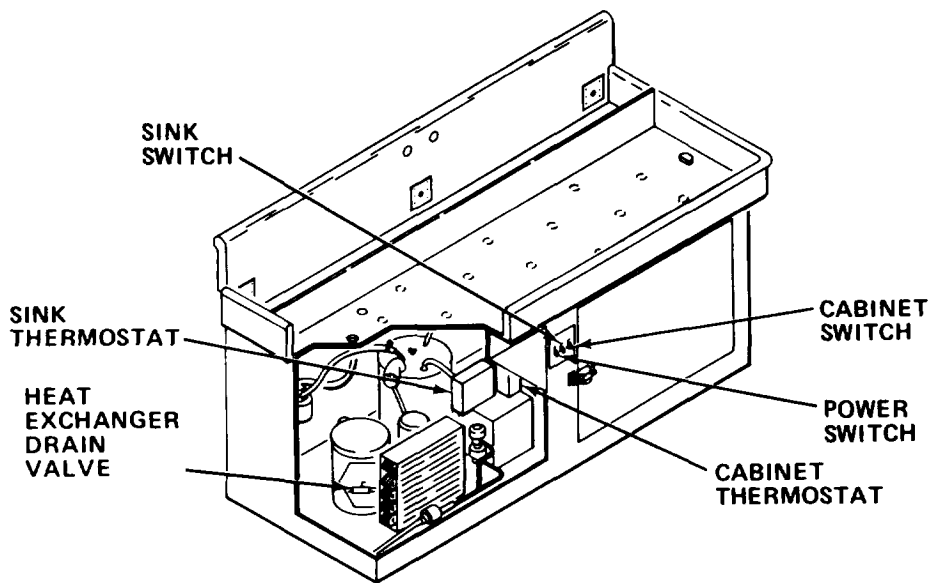
c. Power switch. Master switch for the processing sink. With the switch on, power is supplied to the sink cabinet switches and compressor.

d. Sink switch. Supplies power to the recycling pump and sink thermostat.

e. Cabinet switch. Supplies power to the cabinet thermostat which maintains preset temperature.

Section II OPERATING INSTRUCTIONS

3-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



| Control or Indicator       | Function   |
|----------------------------|--|
| Sink Thermostat            | Controls circulating water temperature in heat exchanger.                      |
| Cabinet Thermostat         | Controls temperature in refrigeration cabinet.                                 |
| POWER Switch               | Controls activation of sink systems.   |
| SINK Switch                | Activates recycling pump and sink thermostat.                                  |
| CABINET Switch             | Activates refrigeration cabinet thermostat.                                    |
| Heat Exchanger Drain Valve | Allows for a complete drain of the heat exchanger and plumbing under the sink. |

### 3-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform you before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with the proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

#### 3-5.1 PMCS Procedures.

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Leakage definitions for operator PMCS shall be classified as follows:
  - (1) Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
  - (2) Class II Leakage of fluid great enough for drops to form, but not enough to cause drops to drip from item being checked/inspected.
  - (3) Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

#### **CAUTION**

- Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.
- When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.
- Class III leaks should be reported to your supervisor or organizational maintenance.

g. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

h. Interval columns. This column determines the time period designated to perform your PMCS.

i. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

j. Equipment Is Not Ready/Available If: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

k. List of tools and materials required for PMCS is as follows:

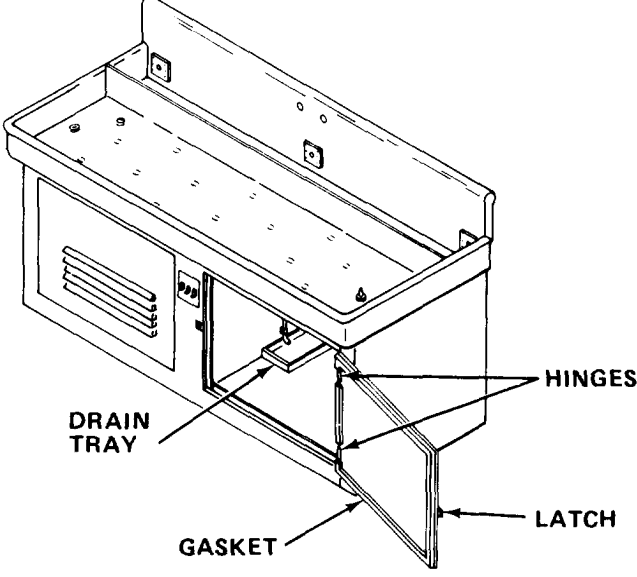
| <u>Item</u>                  | <u>Quantity</u> |
|------------------------------|-----------------|
| Flat Tip Screwdriver         | 1 ea            |
| Sponge (Item 32, Appendix E) | ar              |

**Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**NOTE**

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 1        | W        | <p><b>PHOTOGRAPHIC PROCESSING SINK</b></p> <p>Inspect Refrigeration Cabinet.</p>  <p>1. Check hinges and latches for loose, damaged, or missing screws or mountings. Tighten hinges and latches as necessary.</p> <p>2. Check cabinet door gasket for holes or tears.</p> <p>3. Check drain tray in cabinet for water accumulation. Clean with sponge if necessary.</p> | Gasket is damaged.   |

**Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**  
 B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

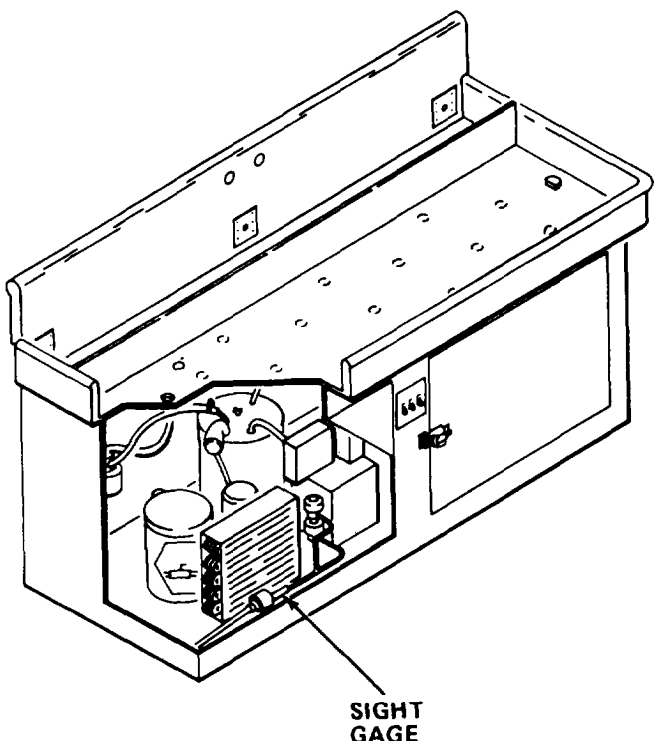
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|--|---|
| 2        | M        | <p><b><u>PHOTOGRAPHIC PROCESSING SINK - Cont</u></b></p> <p><u>Inspect Sight Gage.</u></p> <ol style="list-style-type: none"> <li>1. Turn on POWER switch.</li> <li>2. Remove retaining screws and front cover.</li> </ol>  <ol style="list-style-type: none"> <li>3. Check refrigerant line sight gage for presence of bubbles which indicate inadequate refrigerant charge. (Check with compressor running.)</li> <li>4. Reinstall front cover and retaining screws.</li> </ol> | <p>Bubbles are present.</p>                                   |

Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 3        | M        | <p><u>PHOTOGRAPHIC PROCESSING SINK - Cont</u></p> <p><u>Inspect Condenser Fan.</u></p> <ol style="list-style-type: none"> <li>Remove retaining screws and front cover.</li> </ol> <div style="text-align: center;"> <p>CONDENSER FAN (BEHIND COILS)</p> </div> <ol style="list-style-type: none"> <li>Check condenser fan for smooth and free operation.</li> <li>Reinstall front cover and retaining screws.</li> </ol> | <p>Condenser fan does not operate smoothly or freely.</p>      |



Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

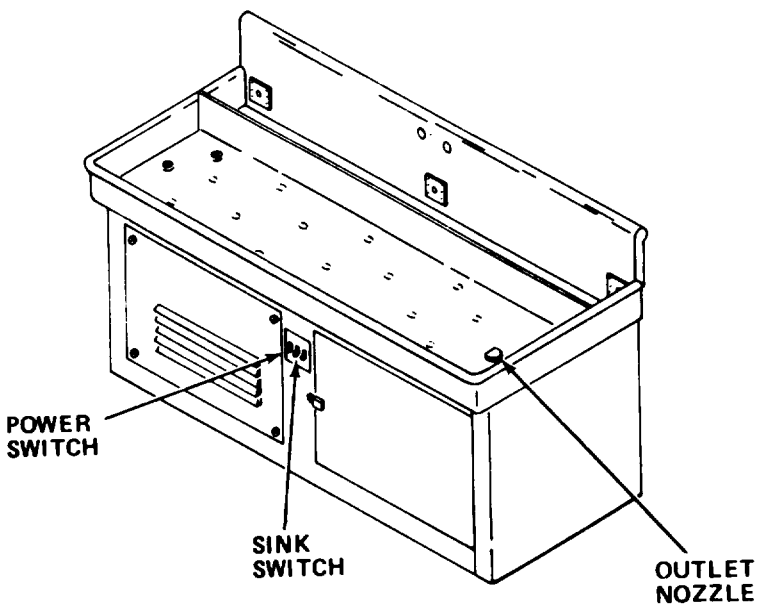
| ITEM NO. | INTERVAL  | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|-----------|--|--|
| 4        | B/<br>D/A | <p><b>PHOTOGRAPHIC PROCESSING SINK - Cont</b></p> <p><u>Inspect Recycling System.</u></p>  <p>1. Turn on POWER switch.</p> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Do not overfill and allow trays to float.</p> <p>2. Fill sink until water exiting nozzle does not splash. Do not overfill.</p> |  |

Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
 D - During  
 A - After

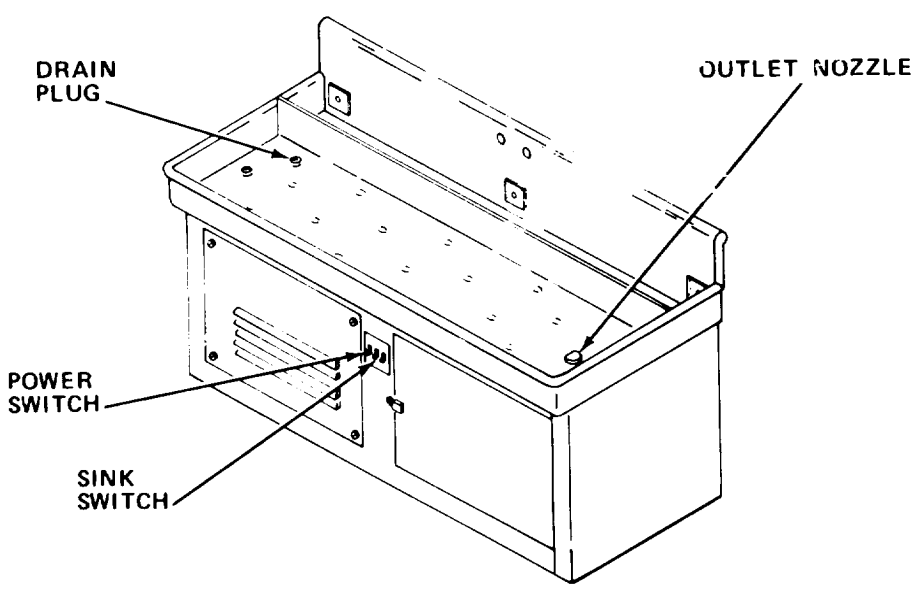
W - Weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 S - semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | IN-TER-VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|------------|---|--|
| 4        | B/<br>D/A  | <p><b><u>PHOTOGRAPHIC PROCESSING SINK - Cont</u></b></p> <p><u>Inspect Recvcling System - Cont</u></p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p style="text-align: center;">Do not turn on sink switch unless water is in sink or recycling pump may be damaged.</p> <p>3. Turn on SINK switch.</p> <p>4. Check pump operation by observing water exiting outlet nozzle.</p> | Water does not exit nozzle.                                    |
| 5        | W          | <p><u>Inspect Plumbing.</u></p> <p>1. Remove retaining screws and front cover.</p> <p>2. Check all hoses and fittings for leaks.</p> <p>3. Tighten clamps if Class I or Class II leaks are observed.</p> <p>4. Replace front cover and retaining screws.</p>  | Class III leaks are present.                                   |

**Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**  
 B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 6        | M        | <p><u>PHOTOGRAPHIC PROCESSING SINK - Cont</u></p> <p><u>Inspect Recycling System</u></p>  <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Do not turn on SINK switch unless water is in sink, or recycling pump may be damaged.</p> <ol style="list-style-type: none"> <li>1. Turn on POWER and SINK switches.</li> <li>2. Remove drain plug.</li> <li>3. Run fresh water into sink until fresh, clean water exits outlet nozzle.</li> <li>4. Reinstall drain plug and fill sink to proper water level.</li> </ol> |  |

**3-6. OPERATION UNDER USUAL CONDITIONS.**

3-6.1 Operating Procedures.

- a. Start up procedures.
  - (1) Close storage tank drain valve.
  - (2) Remove drain cap on outside of section.
  - (3) Place fill valve to storage tank position.
  - (4) Connect hose to section and water source.
  - (5) Fill storage tank. When full, place full valve to off position.
  - (6) Reinstall drain cap on outside of section.

**CAUTION**

Be sure all switches are off prior to plugging in power cord.

- (7) Check that heat exchanger drain valve is closed.
- (8) Plug in sink power cord.
- (9) Put processing trays in sink and add chemistry.

**CAUTION**

Do not turn sink on unless water is in sink or recycling pump may be damaged.

- (10) Fill sink until trays move easily but do not float.
- (11) Turn on POWER and SINK switches.

**NOTE**

If refrigeration cabinet is to be used, turn on CABINET switch.

- (12) Place thermometer in developer tray. Monitor temperature until temperature is stabilized to 68°F (20°C), ±2°F (±1°C).
- (13) When these procedures are complete and the chemistry has stabilized, the sink is ready for operation.

## b. Shutting unit down

- (1) Turn off POWER and SINK switches.

**CAUTION**

Prior to disposal of developer and fixer, field users should contact their local environmental coordinator or their local industrial hygienist for instructions on disposal of chemicals.

- (2) Place container, if required, under drain on outside of section and remove drain cap.
- (3) Dispose of used chemicals into trough bin at rear of processing sink and remove trays.
- (4) Rinse trays and flush trough bin.
- (5) Remove drain plug and drain sink.
- (6) Reinstall outside drain cap.

3-6.2 Preparation for Movement.

## a. Drain storage tank as follows:

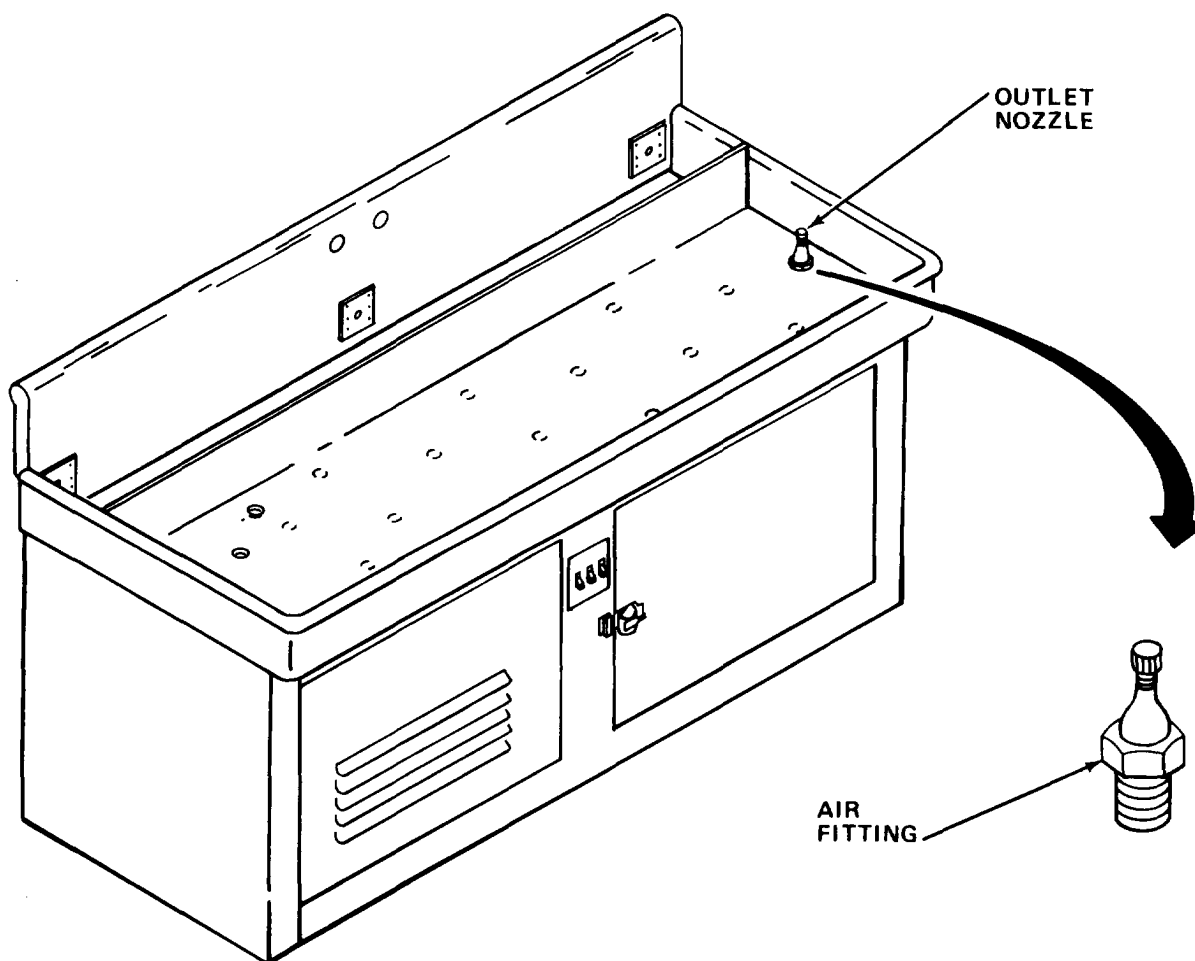
- (1) Turn off storage tank heater switch.
- (2) Remove storage tank drain cap from drain connection on outside of section.
- (3) Open storage tank drain valve and drain tank.
- (4) After storage tank is drained, open spigot for sink and drain hose into sink trough bin.

## b. Drain sink as follows:

- (1) Turn off POWER, SINK, and CABINET switches.
- (2) Secure any loose items that have been stored in refrigeration cabinet.
- (3) Remove sink and trough bin drain plugs.
- (4) Open drain valve for heat exchanger.

**NOTE**

Use air compressor model 34-2025 or equivalent (maximum output 30 psi).



(5) Remove outlet nozzle and connect air fitting and compressor to outlet port and blow remaining water from system.

(6) Reinstall outlet nozzle.

(7) Close heat exchanger drain valve

(8) Wipe sink and trough bin dry.

(9) Disconnect sink power cord.

**3-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**3-8. LUBRICATION INSTRUCTIONS.**

**NOTE**

The following lubrication instructions are mandatory.

**3-8.1 Lubricate Hinges.** Weekly, lubricate hinges with a few drops of lubricating oil (Item 18, Appendix E).

**3-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the photographic processing sink. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all the possible malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**Table 3-2. TROUBLESHOOTING**

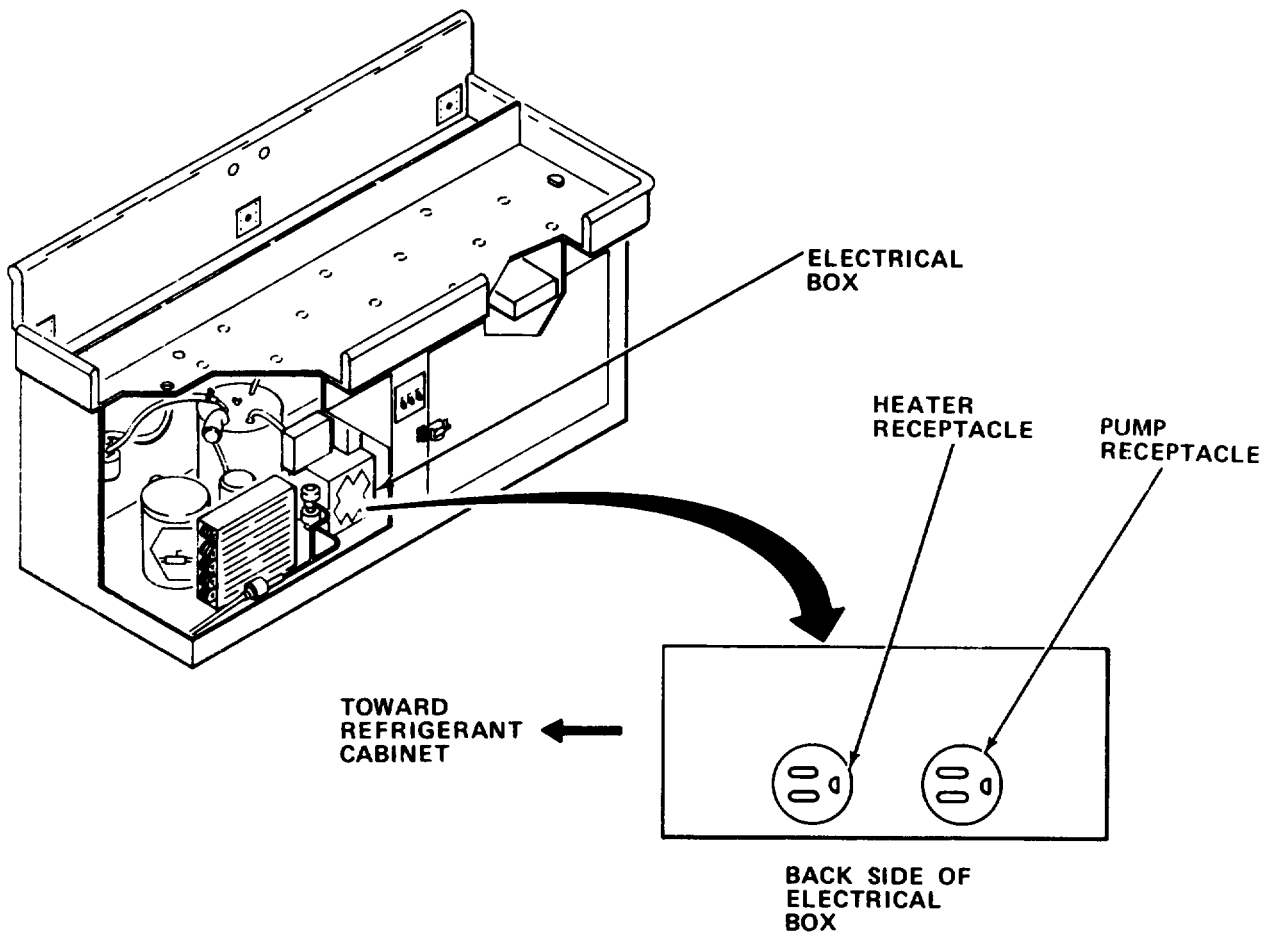
| MALFUNCTION                          | TEST OR INSPECTION  | CORRECTIVE ACTION |
|--------------------------------------|---|-------------------|
| 1. WATER IN SINK DOES NOT CIRCULATE. | <p>Step 1. Check that POWER and SINK switches are on.</p> <p>(a) If switches are on, proceed to step 2.</p> <p>(b) Turn POWER and SINK switches on.</p> <p>Step 2. Check for unplugged sink power cord.</p> <p>(a) If plug is plugged in, proceed to step 3.</p> <p>(b) Plug in power cord.</p> |                   |

Table 3-2. TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

1. WATER IN SINK DOES NOT CIRCULATE - Cont

Step 3. Check for recycling pump power cord plugged into wrong receptacle or unplugged.



- (a) If power cord is unplugged, plug into proper receptacle.
- (b) If power cord is plugged into wrong receptacle, plug into proper receptacle.
- (c) If malfunction persists, proceed to step 4.



Table 3-2. TROUBLESHOOTING - Cont

| MALFUNCTION                                | TEST OR INSPECTION                  | CORRECTIVE ACTION  |
|--|-------------------------------------|--|
| 1. WATER IN SINK DOES NOT CIRCULATE - Cont | Step 4. Check pump for trapped air. | (a) Prime recycling pump as follows: <div> <p>The diagram shows a perspective view of a rectangular sink unit. On the left side, a hose is connected to an inlet. On the front panel, there are two switches labeled 'POWER SWITCH' and 'SINK SWITCH'. On the right side, there is an outlet nozzle. The sink basin contains several small circular holes representing jets.</p> </div> |
|  |                                     | <ol style="list-style-type: none"> <li>(1) Fill sink with water until water level is approximately 1/2 inch above inlet and outlet nozzle.</li> <li>(2) Place spigot over inlet hole and allow water to flow through recycling system until no air bubbles exit outlet nozzle.</li> <li>(3) Turn POWER and SINK switches ON.</li> <li>(4) Observe water is recycling.</li> </ol>   |
|  |                                     | (b) If malfunction persists, refer to organizational maintenance.  |

Table 3-2. TROUBLESHOOTING - Cont

---

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

---

2. REFRIGERATED CABINET DOES NOT MAINTAIN PRESET TEMPERATURE.

Step 1. Check that POWER and CABINET switches are on.

- (a) If switches are on, proceed to step 2.
- (b) Turn POWER and CABINET switches on.

Step 2. Check for unplugged sink power cord.

- (a) If plug is plugged in, proceed to step 3.
- (b) Plug power cord into service outlet.

Step 3. Check for improperly adjusted cabinet thermostat.

- (a) If thermostat is improperly adjusted, adjust cabinet thermostat (paragraph 3-10.2).
- (b) If malfunction persists, refer to organizational maintenance.

3. WATER CIRCULATES BUT IS TOO HOT OR COLD.

Step 1. Check for improperly adjusted sink thermostat.

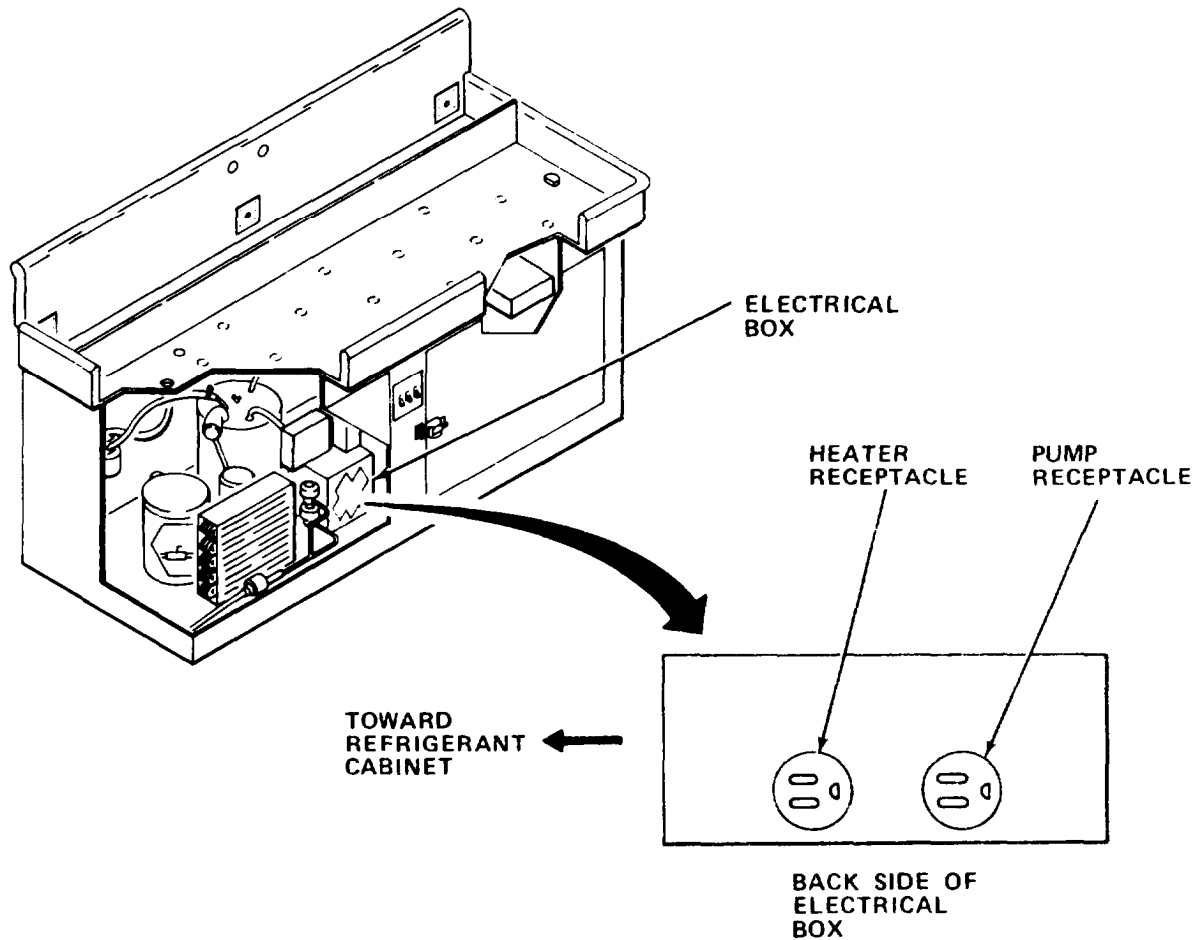
- (a) If thermostat is properly adjusted, proceed to step 2.
- (b) Adjust sink thermostat (paragraph 3-10.1).

Step 2. Check for heat exchanger power cord unplugged or plugged into wrong receptacle.

Table 3-2. TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

3. WATER CIRCULATES BUT IS TOO HOT OR COLD - Cont



- (a) If power cord is unplugged, plug power cord into receptacle.
- (b) If power cord is plugged into wrong receptacle, plug into proper receptacle.
- (c) If malfunction persists, refer to organizational maintenance.

**3-10. MAINTENANCE PROCEDURES.**

This section contains instructions covering operator maintenance functions for the photographic processing sink. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

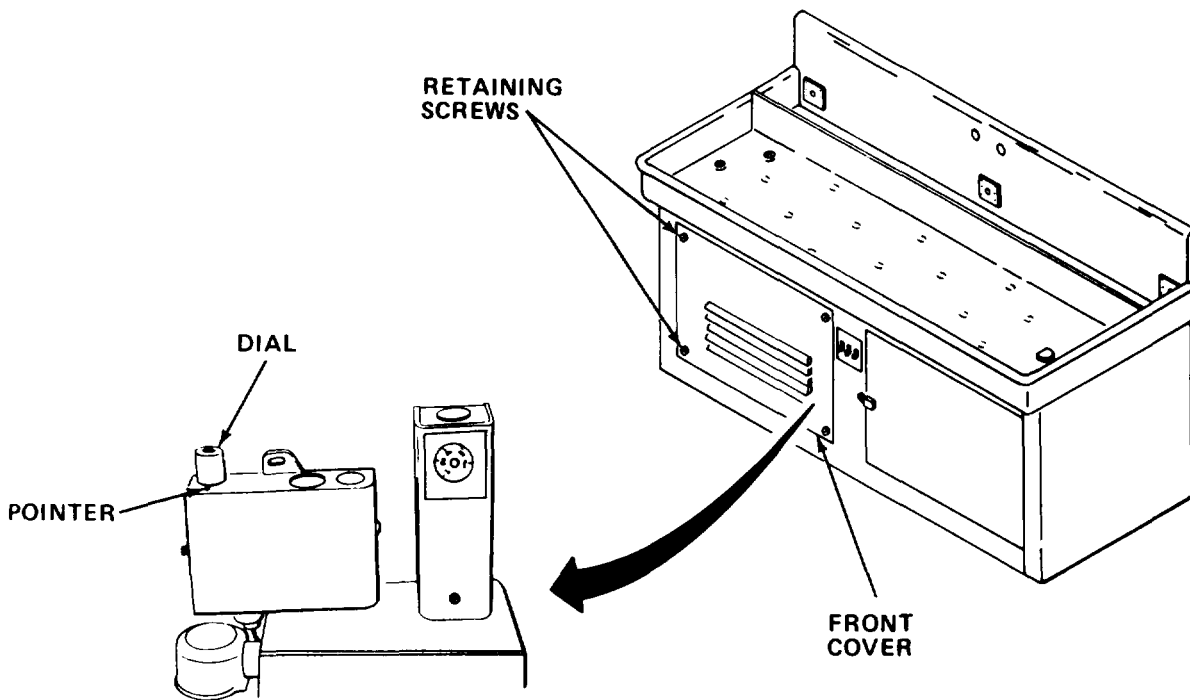
INDEX

| PROCEDURES                         | PARAGRAPH |
|------------------------------------|-----------|
| Adjust Sink Thermostat . . . . .   | 3-10.1    |
| Adjust Cabinet Thermostat. . . . . | 3-10.2    |

**3-10.1 Adjust Sink Thermostat.**

MOS: 83E, Photo and Layout Specialist

TOOLS: Flat Tip Screwdriver

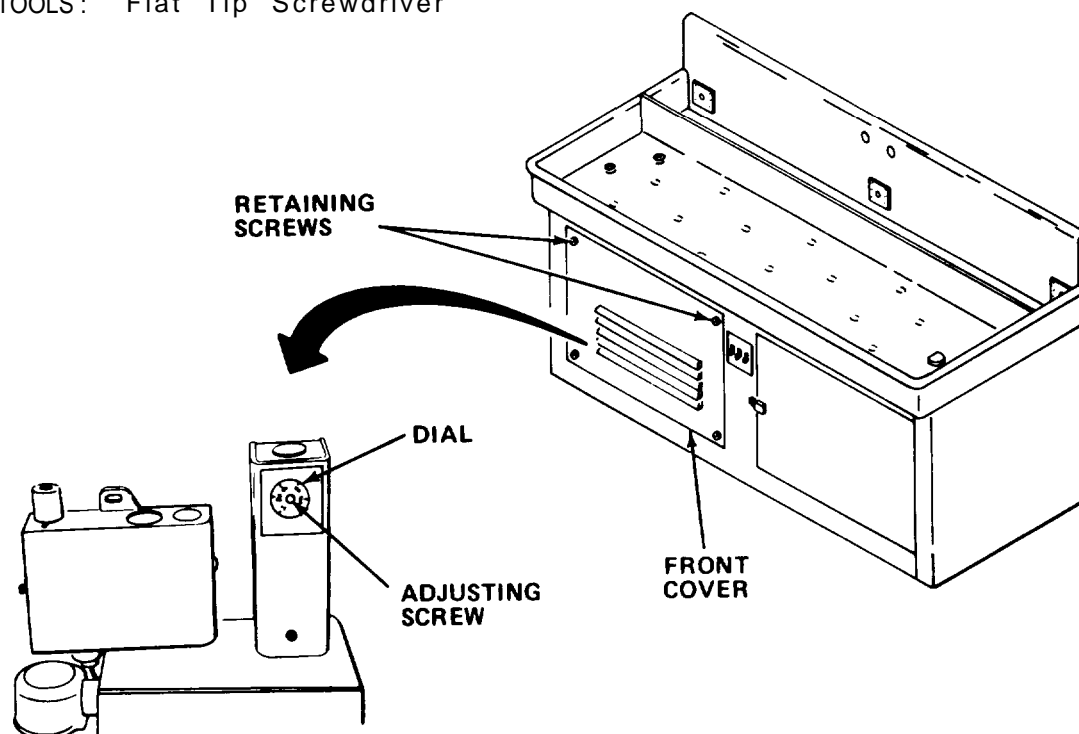


- a. Remove retaining screws and front cover.
- b. Rotate dial until desired temperature corresponds with pointer reading.
- c. Reinstall front cover and retaining screws.

### 3-10.2 Adjust Cabinet Thermostat.

MOS: 83E, Photo and Layout Specialist

TOOLS: Flat Tip Screwdriver



- a. Remove retaining screws and front cover.

#### NOTE

Minimum cabinet temperature possible is 55°F (13°C).

- b. Rotate adjusting screw until desired temperature is indicated on dial.
- c. Reinstall front cover and retaining screws.

## Section IV ORGANIZATIONAL MAINTENANCE

**3-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication at the organizational level of maintenance.

**3-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

3-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

3-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

3-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Specials Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**3-13. SERVICE UPON RECEIPT.**

3-13.1 Checking Unpacked Equipment.

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**3-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

**3-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the facing schematics and/or the foldouts located at the end of this manual for further fault analysis.

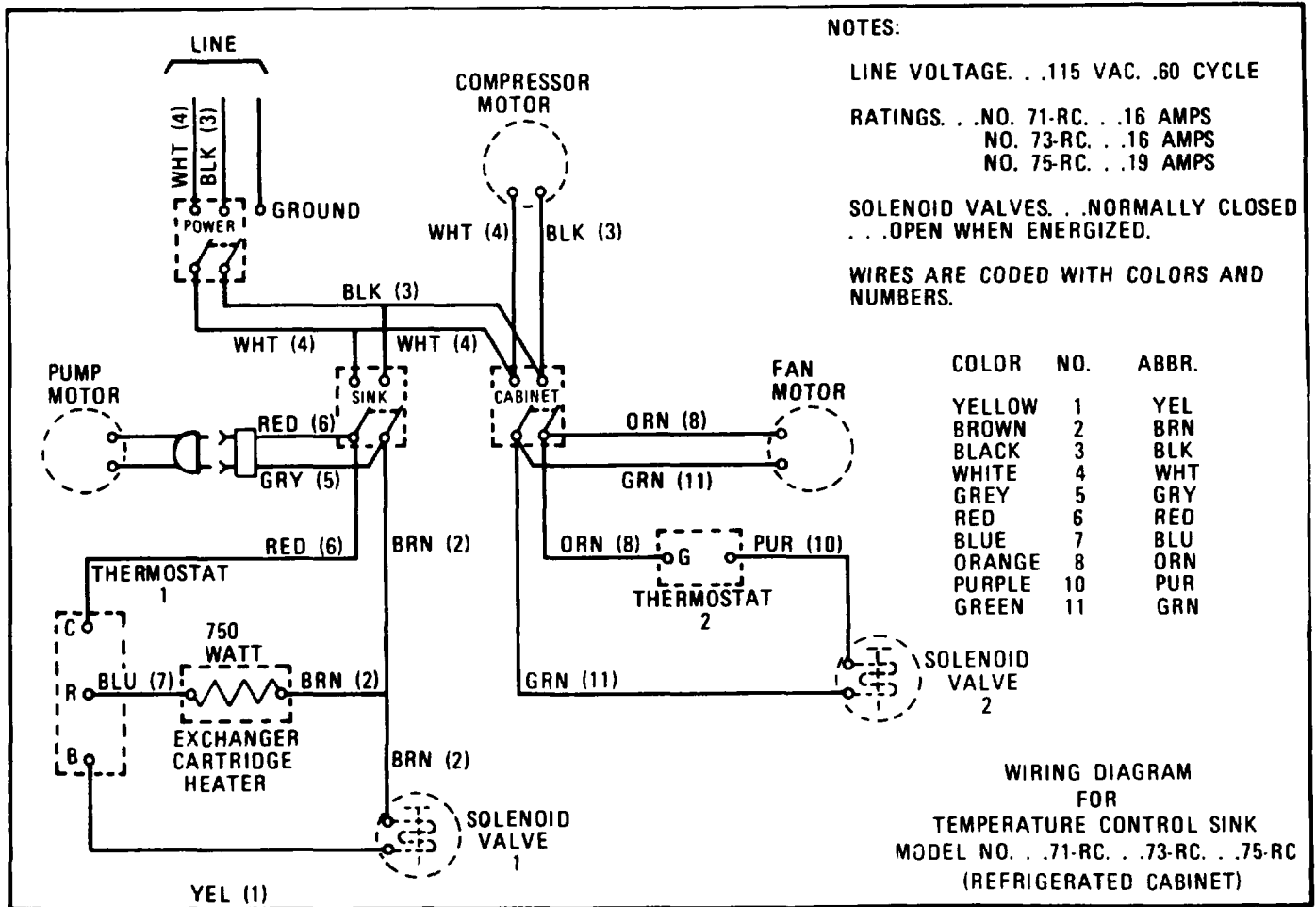


Table 3-3. ORGANIZATIONAL TROUBLESHOOTING

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

1. WATER DOES NOT CIRCULATE.

Step 1. Check that recycling pump is plugged in securely to the correct receptacle.

(a) If plug is plugged in securely, proceed to step 2.

(b) Tighten plug connection.

**Table 3-3. ORGANIZATIONAL TROUBLESHOOTING - Cont**

| MALFUNCTION   | TEST OR INSPECTION  | CORRECTIVE ACTION  |
|---|---|--|
| 1. WATER DOES NOT CIRCULATE - Cont                            | Step 2. Check SINK switch with multimeter for continuity when switch is on. | <ul style="list-style-type: none"> <li>(a) If switch does not indicate continuity when on, replace defective switch (paragraph 3-16.6).</li> <li>(b) If switch tests good, then replace or repair recycling pump (paragraph 3-16.4 or 3-16.5).</li> </ul>  |
| 2. WATER CIRCULATES BUT IS TOO HOT OR COLD.                   | Step 1. Check for improperly calibrated sink thermostat.                    | <ul style="list-style-type: none"> <li>(a) If properly calibrated, proceed to step 2.</li> <li>(b) If improperly calibrated, calibrate thermostat (paragraph 3-16.1).</li> </ul>   |
|   | Step 2. Check for continuity of heating element.                            | <ul style="list-style-type: none"> <li>(a) If continuity is present, proceed to step 3.</li> <li>(b) Replace heating element if continuity is not observed (paragraph 3-16.9).</li> </ul>  |
|   | Step 3. Check condenser fan for operation when compressor runs.             | <ul style="list-style-type: none"> <li>(a) If condenser fan does not run, check condenser fan motor. If motor is bad, replace condenser fan motor (paragraph 3-16.7).</li> <li>(b) If condenser fan does not run, check thermostat. If thermostat is bad, replace thermostat (paragraph 3-16.2).</li> <li>(c) If malfunction persists, refer to direct/general support maintenance.</li> </ul> |
| 3. REFRIGERATED CABINET DOES NOT MAINTAIN PRESET TEMPERATURE. | Step 1. Check refrigerant level.  | <ul style="list-style-type: none"> <li>(a) If refrigerant level is correct, proceed to step 2.</li> </ul>  |



Table 3-3, ORGANIZATIONAL TROUBLESHOOTING - Cont

---

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

---

|   |  |  |
|---|--|--|
| 3. REFRIGERATED CABINET DOES NOT MAINTAIN PRESET TEMPERATURE - Cont |  |  |
|   |  | (b) If refrigerant level is low, charge system to correct pressure of 150 psi (1034.2 KPa) lowside and 235 psi (1620.3 KPa) high side. |
|   | Step 2. Check CABINET switch for continuity when the switch is on. |  |
|   |  | (a) If continuity is correct, proceed to step 3.   |
|   |  | (b) If switch does not indicate continuity when on, replace defective CABINET switch (paragraph 3-16.6).                               |
|   | Step 3. Check for defective cabinet thermostat.                    |  |
|   |  | (a) If thermostat is not defective, proceed to step 4.   |
|   |  | (b) If thermostat is defective, replace cabinet thermostat (paragraph 3-16.3).   |
|   | Step 4. Check cabinet evaporator fan for operation.                |  |
|   |  | (a) If fan does not operate, replace evaporator fan motor (paragraph 3-16.8).  |
|   |  | (b) If fan operates, refer to direct/general support maintenance.  |

---

**3-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the photographic processing sink. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES  | PARAGRAPH |
|---|-----------|
| Calibrate Sink Thermostat . . . . .                   | 3-16.1    |
| Replace Sink Thermostat. . . . .                      | 3-16.2    |
| Replace Cabinet Thermostat . . . . .                  | 3-16.3    |
| Repair Recycling Pump. . . . .                        | 3-16.4    |
| Replace Recycling Pump . . . . .                      | 3-16.5    |
| Replace Cabinet, Power, or Sink Switch(es). . . . .   | 3-16.6    |
| Replace Condenser Fan Motor . . . . .                 | 3-16.7    |
| Replace Evaporator Fan Motor . . . . .                | 3-16.8    |
| Replace Heating Element. . . . .                      | 3-16.9    |
| Remove/Install Photographic Processing Sink . . . . . | 3-16.10   |

**3-16.1 Calibrate Sink Thermostat.**

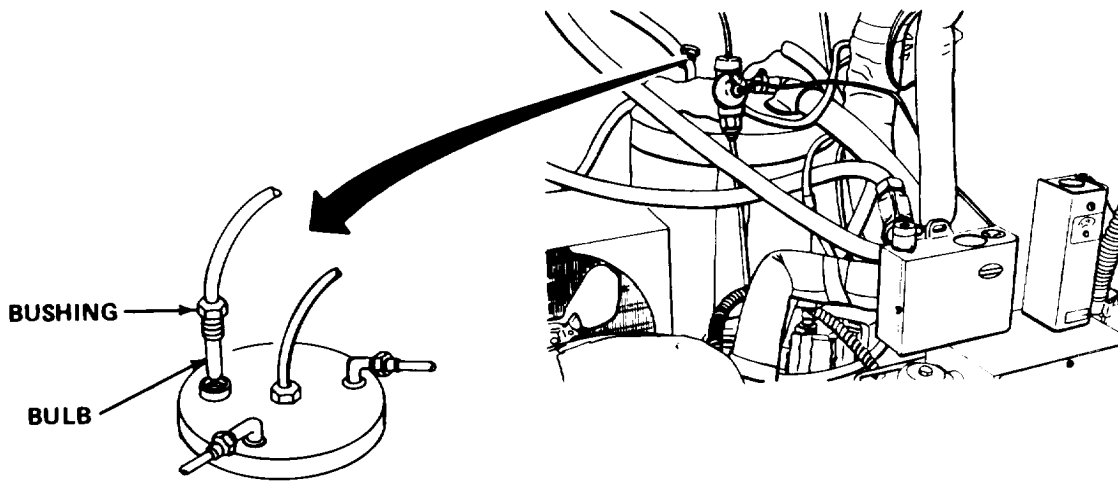
MOS: 83FJ6, Reproduction Equipment Repairer

- TOOLS: Bimetallic Thermometer  
 Flat Tip Screwdriver  
 11/16 in. Combination Wrench  
 3/16 in. Combination Wrench

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

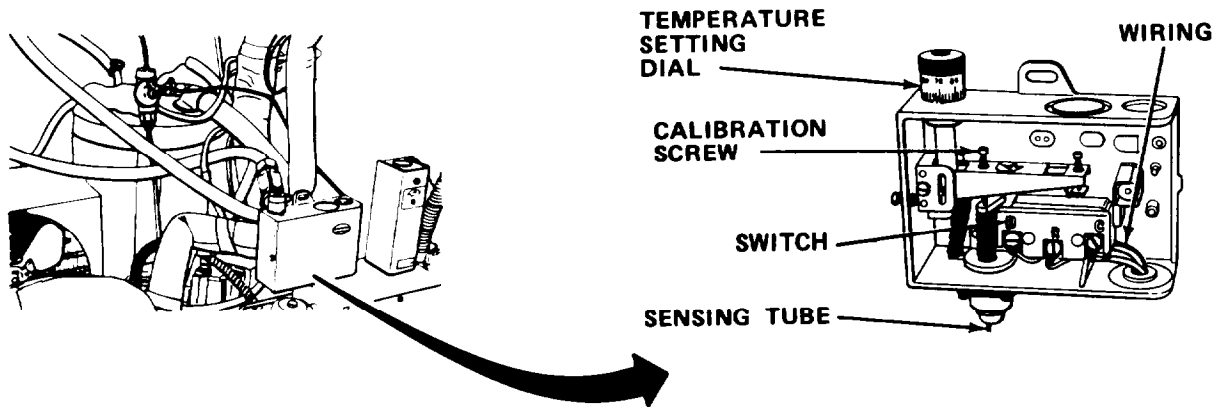
- a. Unplug sink power cord.
- b. Remove plug and drain water from sink.
- c. Remove retaining screws and front cover.



**CAUTION**

Use care when removing sensing bulb to avoid equipment damage.

- d. Carefully remove sensing bulb from heat exchanger.
- e. Immerse sensing bulb into water of known temperature (approximately 70°F (21°C)) for about 10 min.



- f. Remove retaining screws and thermostat cover.
- g. Rotate dial to setting corresponding to water temperature.

**NOTE**

Turning adjustment screw to right lowers control point temperature, and turning to left raises control point temperature.

- h. Turn adjustment screw as required until switch clicks.

- i. Rotate adjustment screw in opposite direction until switch clicks again.

**NOTE**

One full turn of adjustment screw represents approximately 12°F (7.2°C).

- j. Set adjustment screw halfway between points where switch clicked.
- k. Reinstall thermostat cover.

**NOTE**

Be sure bulb gasket seats properly in bushing.

- l. Reinstall bulb and gasket in heat exchanger.
- m. Reinstall front cover.
- n. Refill sink with water to proper level.
- o. Plug in sink power cord.

3-16.2 Replace Sink Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Two persons are required to perform this procedure.

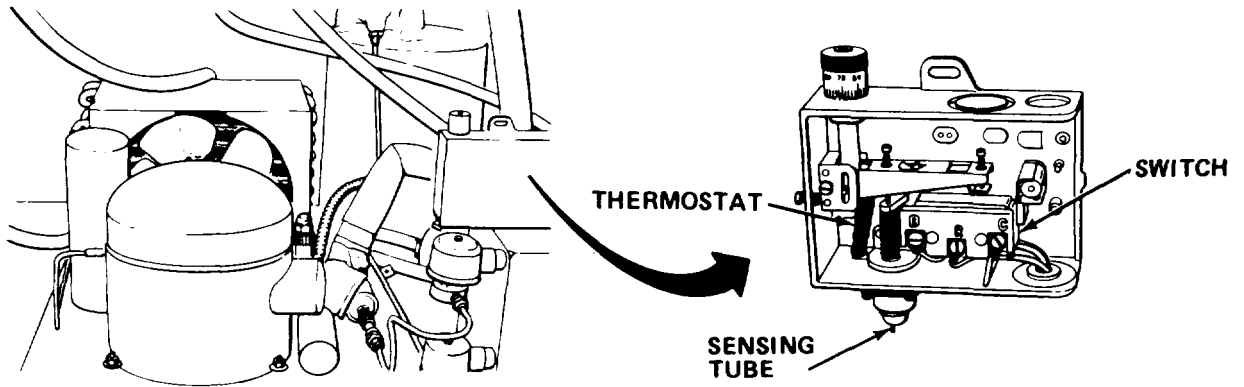
TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver  
11/16 in. Combination Wrench

SUPPLIES: Sink Thermostat

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove drain plug and drain water from sink.
- c. Remove front cover.



- d. Remove thermostat cover.
- e. Remove electrical junction box cover.
- f. Tag and disconnect wiring from switch.
- g. Remove screws, nuts, and defective thermostat.

#### CAUTION

Sensing tube is spring loaded. Use care in removing bulb or equipment damage may occur.

- h. Remove tube and sensing assembly.
- i. Reinstall sensing tube on new thermostat.
- j. Install new thermostat and secure with retaining screws and nuts.
- k. Reconnect wiring to switch.
- l. Reinstall electrical junction box cover.
- m. Calibrate new thermostat (paragraph 3-16.1).

3-16.3 Replace Cabinet Thermostat.

MOS: 83FJ6, Reproduction Equipment Repairer

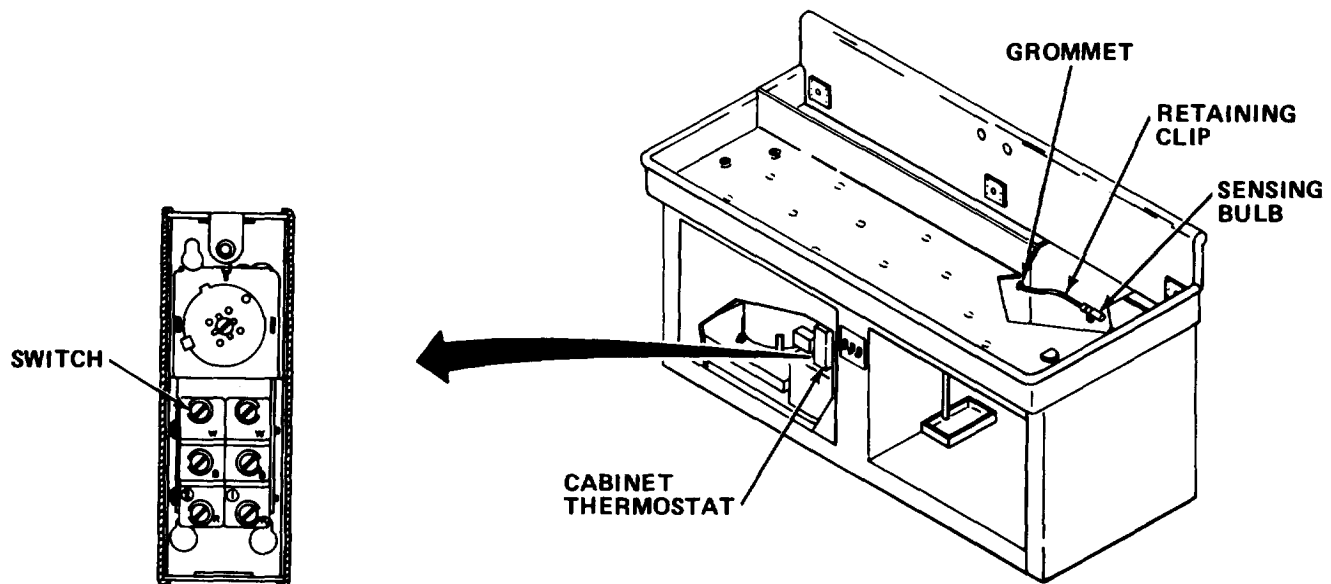
TOOLS: Flat Tip Screwdriver

SUPPLIES: Cabinet Thermostat

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove front cover.
- c. Remove thermostat cover.



**CAUTION**

Use care when removing sensing bulb to avoid equipment damage.

- d. Remove retaining clips and cabinet grommet. Carefully remove sensing bulb and tube from cabinet.
- e. Tag and disconnect wiring from thermostat switch terminals.
- f. Remove retaining screws and defective thermostat.
- g. Install new thermostat and tighten retaining screws.

- h. Reconnect electrical wiring to thermostat switch terminals.
- i. Using care to avoid damaging sensing tube, insert sensing bulb and tube through cabinet wall and retain with clips and grommet.
- j. Reinstall thermostat cover.
- k. Adjust thermostat to 60°F (15.5°C).
- l. Reinstall front cover.
- m. Plug in sink power cord.

#### 3-16.4 Repair Recycling Pump.

MOS: 83FJ6, Reproduction Equipment Repairer

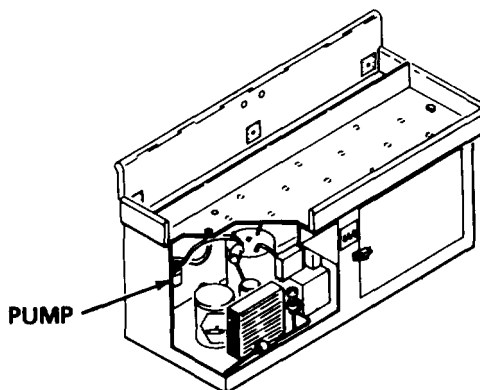
TOOLS: Flat Tip Screwdriver  
Cross Tip Screwdriver

SUPPLIES: Impeller Assembly  
Housing O-Ring  
Bracket O-Ring  
Thrust Washer

#### WARNING

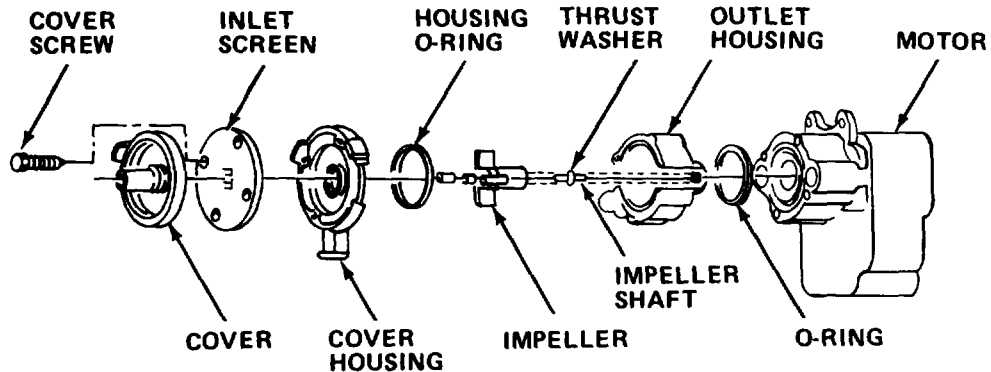
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove plug and drain water from sink.
- c. Remove front cover.



- d. Loosen clamps and remove hoses from pump.

- e. Unplug pump power cord.
- f. Remove mounting screws and pump mounting bracket, with pump attached, from sink.



- g. Remove four pump impeller cover screws, cover, and inlet screen.
- h. Remove cover housing and housing O-ring.
- i. Remove impeller, impeller shaft, and thrust washer.
- j. Remove outlet housing and O-ring.
- k. Replace any defective parts.
- l. Install new O-ring and reinstall outlet housing.
- m. Install impeller shaft, new thrust washer, and impeller.
- n. Install new housing O-ring and cover housing.
- o. Reinstall inlet screen, impeller cover, and retaining screws.
- p. Reinstall pump and pump mounting bracket and secure with screws.
- q. Plug in pump power cord.
- r. Reinstall hoses and tighten clamps securely.
- s. Reinstall front cover.
- t. Reinstall sink drain plug and fill sink with water to proper level.
- u. Plug in sink power cord.



3-16.5 Replace Recycling Pump.

MOS: 83FJ6, Reproduction Equipment Repairer

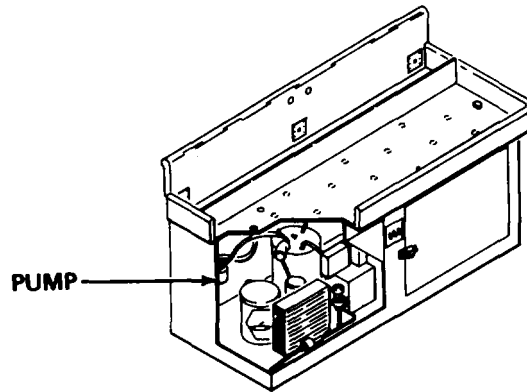
TOOLS: Flat Tip Screwdriver

SUPPLIES: Recycling Pump

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove drain plug and drain water from sink.
- c. Remove front cover.



- d. Loosen clamps and remove hoses from pump.
- e. Unplug pump power cord.
- f. Remove screws and mounting bracket with pump attached.
- g. Remove mounting bracket from defective pump and install on new pump.
- h. Reinstall pump and mounting bracket on sink as an assembly.
- i. Reinstall hoses and tighten clamps securely.
- j. Plug in pump power cord.
- k. Reinstall front cover.
- l. Reinstall sink drain plug and fill sink with water to proper level.
- m. Plug in sink power cord.

3-16.6 Replace Cabinet, Power, or Sink Switch(es).

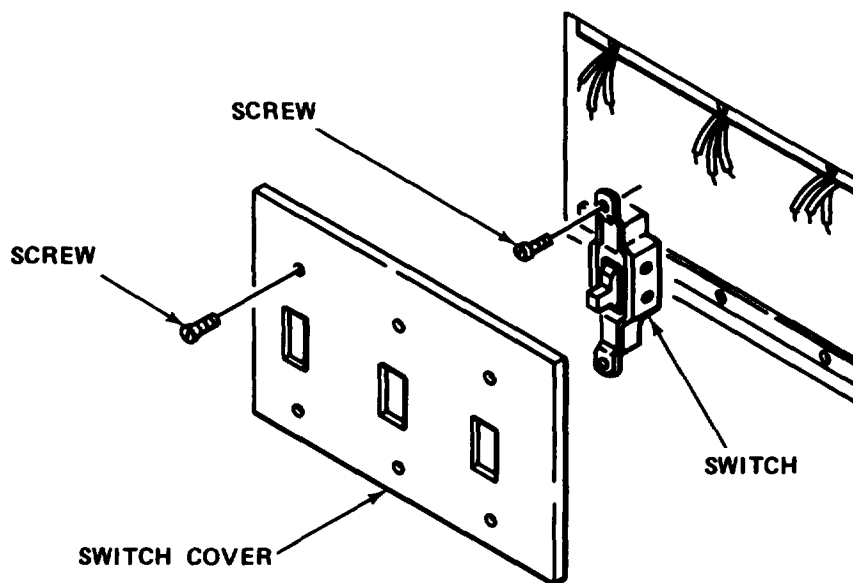
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Switch(es)

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.



- b. Remove switch cover.
- c. Loosen terminal screws; tag and disconnect wires from defective switch.
- d. Reconnect wiring to new switch and tighten terminal screws.
- e. Install new switch and tighten retaining screws.
- f. Reinstall switch cover.
- g. Plug in sink power cord.

### 3-16.7 Replace Condenser Fan Motor.

MOS: 83FJ6, Reproduction Equipment Repairer

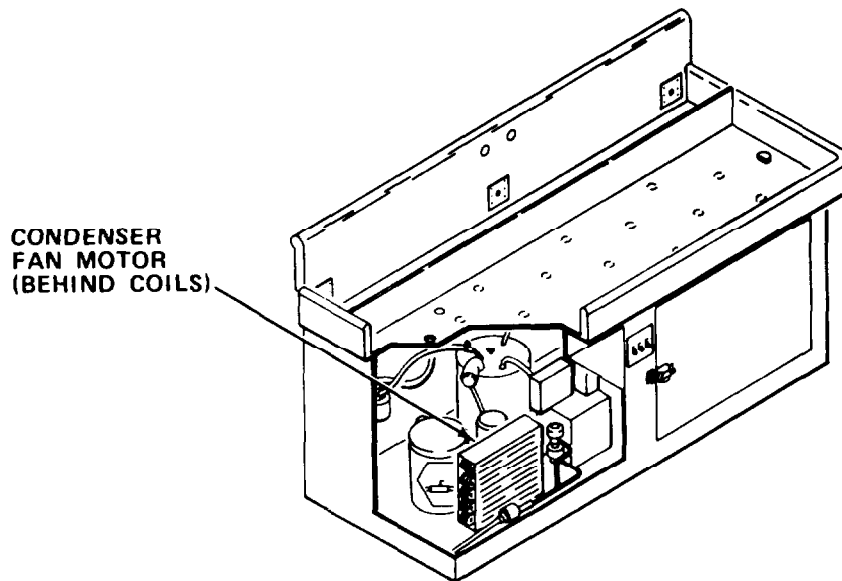
TOOLS: Flat Tip Screwdriver  
1/4 in. Drive Socket Set

SUPPLIES: Fan Motor

#### **WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove front cover.



- c. Tag and disconnect wiring from defective fan motor.
- d. Remove mounting bracket with fan attached.
- e. Remove mounting bracket from defective fan motor and install on new fan motor.
- f. Install mounting bracket and motor on sink as an assembly.
- g. Reconnect wiring.
- h. Reinstall front cover.
- i. Plug in sink power cord.

3-16.8 Replace Evaporator Fan Motor.

MOS: 83FJ6, Reproduction Equipment Repairer

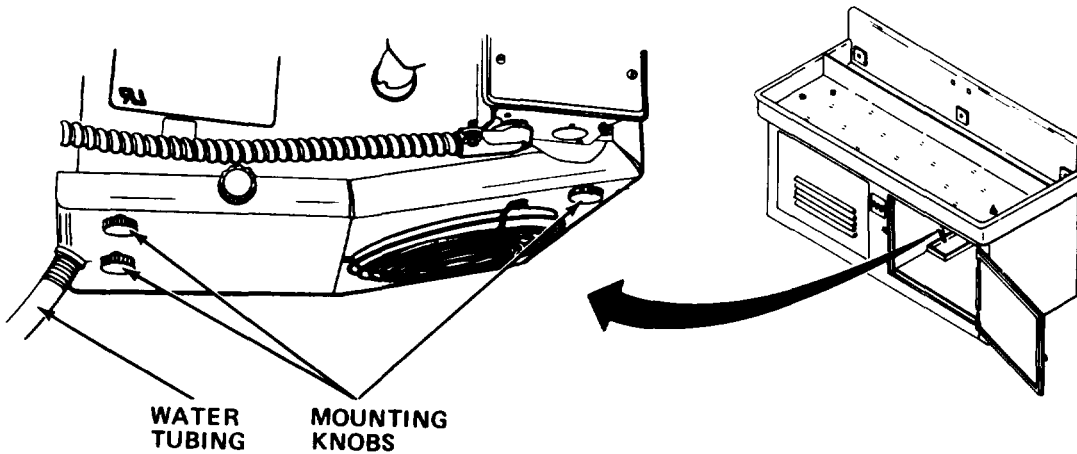
TOOLS: Cross Tip Screwdriver

SUPPLIES: Fan Assembly

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Open refrigeration cabinet door.



- c. Disconnect water tubing.
- d. Loosen knob and remove fan assembly.
- e. Unplug fan.
- f. Remove fan motor from mounting bracket.
- g. Plug in new fan.
- h. Install new fan motor on mounting bracket.
- i. Reinstall fan assembly.
- j. Reconnect water tubing.
- k. Plug in sink power cord.

### 3-16.9 Replace Heating Element.

MOS: 83FJ6, Reproduction Equipment Repairer

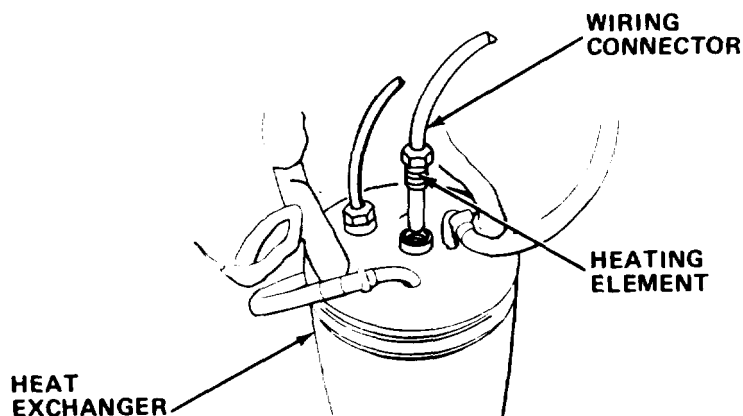
TOOLS: Flat Tip Screwdriver

SUPPLIES: Heating Element  
Thread Sealant (Item 37, Appendix E)

#### WARNING

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove front cover.
- c. Remove plug and drain water from sink.



- d. Tag and disconnect wiring from heating element.
- e. Unscrew and remove defective heating element from heat exchanger.
- f. Coat threads of new heating element with sealant. Install securely into heat exchanger.
- g. Reconnect wiring to new heating element.
- h. Reinstall plug and fill sink with water to proper level.
- i. Reinstall front cover.
- j. Plug in sink power cord.

3-16.10 Remove/Install Photographic Processing Sink.

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Four persons are required to perform this procedure.

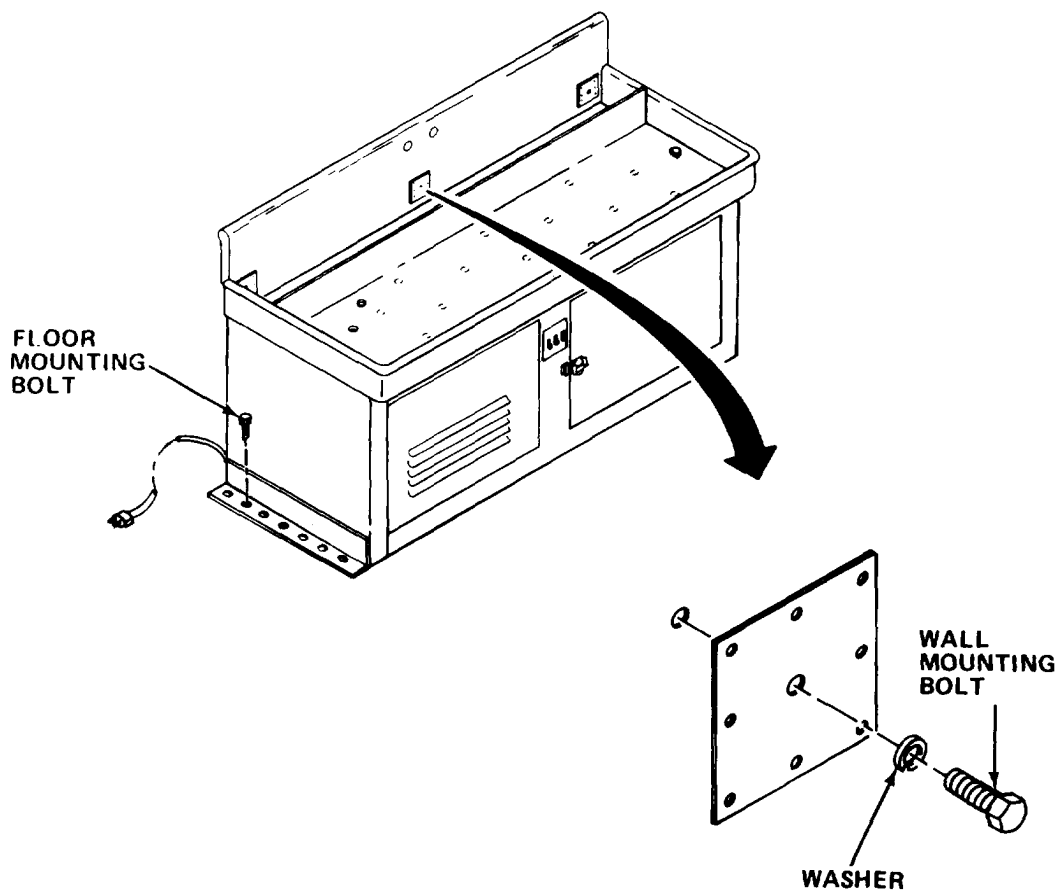
TOOLS: 1/2 in. Socket, 1/2 in. Drive  
1/2 in. Drive Ratchet

SUPPLIES: Photographic Processing Sink  
Rags (Item 25, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove left cover and disconnect heat exchanger and sink common drain lines from tee. Wipe up any spilled fluid.



- c. Remove wall mounting bolts and washers from wall.
- d. Remove floor mounting bolts and washers from floor.
- e. Remove film/paper processor (paragraph 2-16.24).
- f. Remove bolts securing replenisher tank and sump tank assemblies to floor. Place assemblies to side out of way.
- g. Remove sink from van through cargo door.
- h. Install new sink to floor with mounting bolts. Connect drains to tee.
- i. Secure sink to wall with mounting bolts and washers.
- j. Plug in sink power cord.
- k. Test operation of refrigeration unit.
- l. Test drain system for leaks.
- m. Reinstall replenisher tank and sump tank assemblies.
- n. Reinstall film/paper processor (paragraph 2-16.24).

**3-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

## Section V DIRECT/GENERAL SUPPORT MAINTENANCE

### **3-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

3-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

3-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

3-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering direct/general support maintenance for this equipment.

3-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES.

a. Direct/general support troubleshooting procedures cover the most common malfunctions that may be repaired at the direct/general support level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by lower level maintenance should be conducted in addition to the direct/general support troubleshooting procedures.

b. For unidentified malfunctions, use the following schematic and/or foldouts located at the end of this manual for further fault analysis.

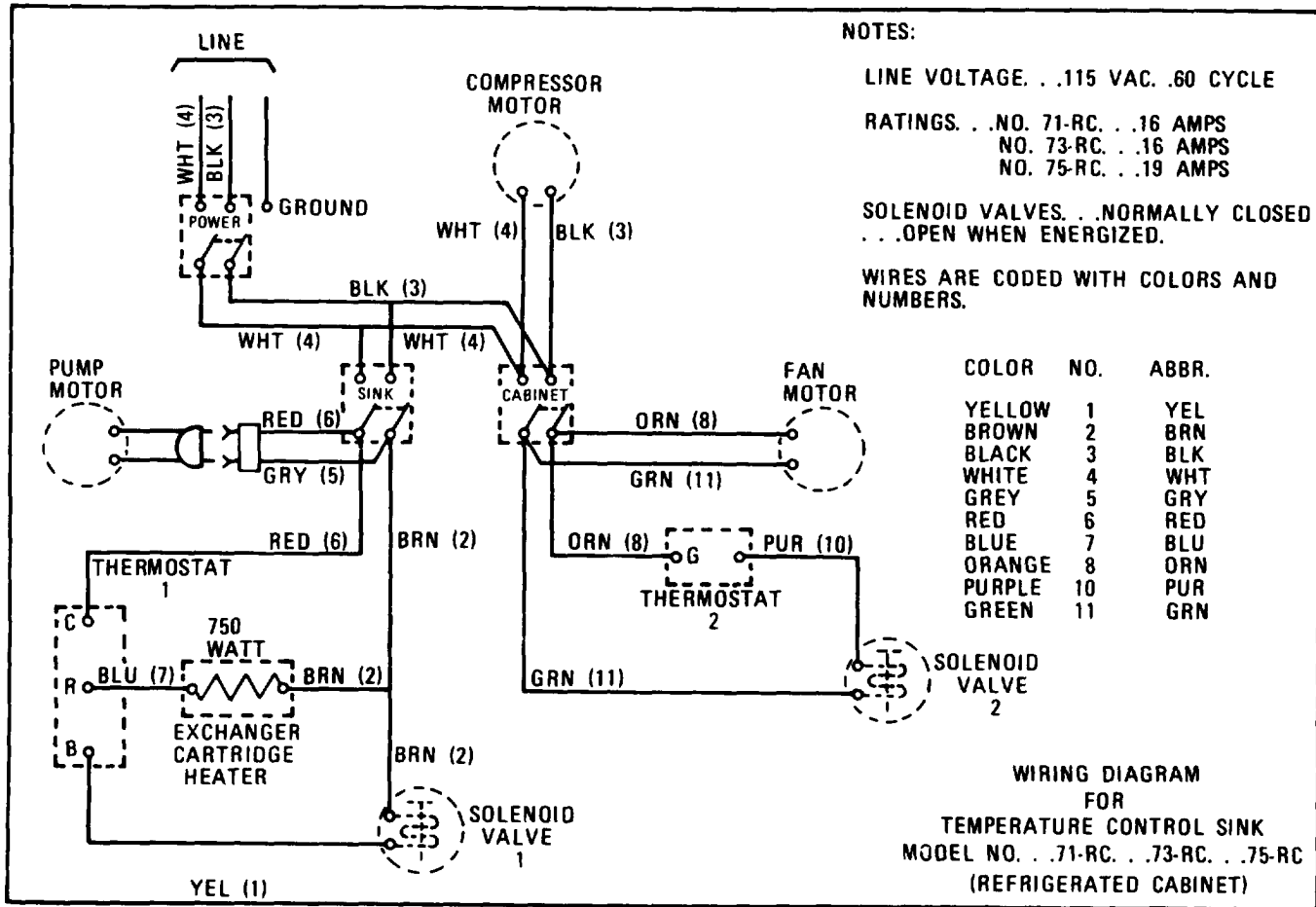




Table 3-4. DIRECT/GENERAL SUPPORT TROUBLESHOOTING

---

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

1. COMPRESSOR RUNS BUT DOES NOT COOL CABINET AND WATER.
  - Check for insufficient refrigerant charge.
    - Recharge system with freon R-12 refrigerant.
  
2. COMPRESSOR COOLS EITHER CABINET OR WATER, BUT NOT BOTH.
  - Step 1. Check for inoperable solenoid valve as follows:
    - (a) Remove front cover.
    - (b) Rotate applicable thermostat adjustment knob back and forth while listening for solenoid valve to click while activating and deactivating. This indicates proper operation of solenoid valve.
      - (1) If click is heard, proceed to step 2.
      - (2) If no click is heard, replace defective solenoid valve (paragraph 3-20.3) and recharge refrigerant.
  - Step 2. Check for defective thermostatic expansion valve.
    - (a) If defective, replace thermostatic expansion valve (paragraph 3-20.2).
    - (b) If malfunction persists, refer to electrical diagrams.
  
3. COMPRESSOR DOES NOT OPERATE OR RUNS NOISILY.
  - Check for defective compressor.
    - (a) If defective, replace compressor assembly (paragraph 3-20.1).
    - (b) If malfunction persists, refer to electrical diagrams.

---

**3-20. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering direct/general maintenance functions for the photographic processing sink. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE                                      | PARAGRAPH |
|--|-----------|
| Replace Compressor Assembly . . . . .          | 3-20.1    |
| Replace Thermostatic Expansion Valve . . . . . | 3-20.2    |
| Replace Solenoid Valve.... . . . .             | 3-20.3    |

3-20.1 Replace Compressor Assembly.

MOS: 52C, Utilities Equipment Repairer

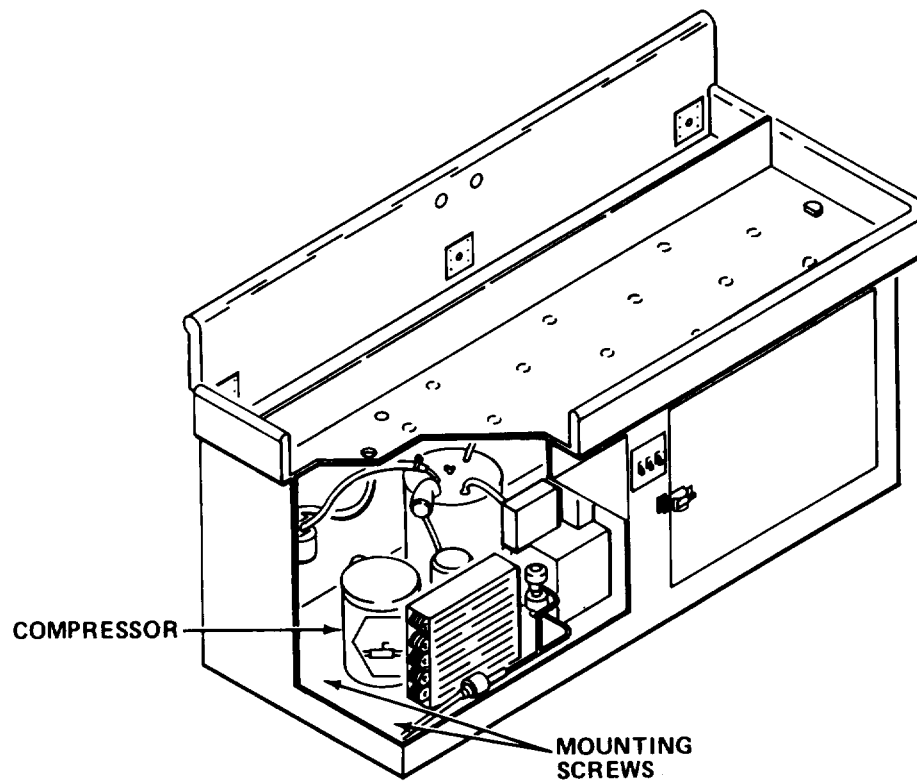
TOOLS: Flat Tip Screwdriver  
8 in. Adjustable Wrench  
Propane Torch  
AC Service Set

SUPPLIES: Rosin Core Solder (Item 30, Appendix E)  
Freon R-12  
Compressor Assembly  
Thermal Protective Gloves  
Goggles

**WARNING**

- A dangerous chemical is used in this equipment. Death or serious injury may occur if personnel fail to observe safety precautions.
- Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage may occur from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin and eye contact is possible.
- Do not allow refrigerant to come in contact with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.
- Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug sink power cord.
- b. Remove front cover.



- c. Tag and disconnect wiring to compressor motor and fan.
- d. Remove mounting screws from base.
- e. Evacuate refrigerant from system.
- f. Disconnect or desolder refrigerant lines from compressor assembly and remove compressor.
- g. Install new compressor and reconnect or solder refrigerant lines.
- h. Reinstall mounting screws.
- i. Evacuate refrigerant lines and recharge system with freon R-12.
- j. Reconnect wiring to compressor motor and fan.
- k. Reinstall front cover.
- l. Plug in sink power cord.

3-20.2 Replace Thermostatic Expansion Valve.

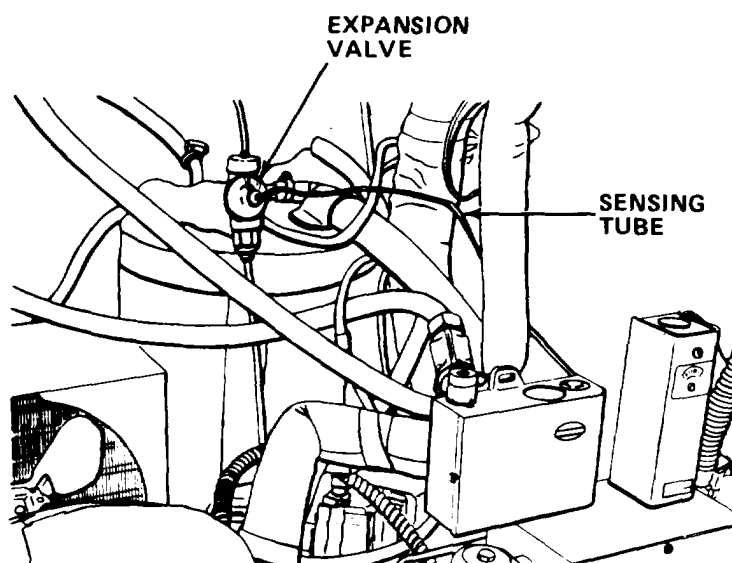
MOS: 52C, Utilities Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Propane Torch  
AC Service Set  
12 in. Adjustable Wrench  
8 in. Adjustable Wrench  
Knife, TL-29

SUPPLIES: Rosin Core Solder (Item 30, Appendix E)  
Freon R-12  
Expansion Valve  
Electrical Tape (Item 36, Appendix E)  
Thermal Gloves  
Goggles  
Electrical Ties  
Thermal Mastic Heat Transfer Compound (Item 16, Appendix E)

**WARNING**

- A dangerous chemical is used in this equipment. Death or serious injury may occur if personnel fail to observe safety precautions.
- Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage may occur from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin and eye contact is possible.
- Do not allow refrigerant to come in contact with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.
- Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.
  - a. Unplug sink power cord.
  - b. Remove front cover.
  - c. Evacuate freon from refrigerant lines.



- d. Disconnect heat exchanger, sensing tube, and two refrigerant lines.

#### **CAUTION**

Use care when removing or installing valve to avoid damaging sensing tube,

- e. Loosen necessary insulation.
- f. Loosen clips and remove sensing bulb from refrigerant line.
- g. Remove defective thermostat expansion valve.
- h. Reconnect sensing bulb to refrigerant line.
- i. Apply heat transfer compound to inside of sensor well. Push sensor bulb into well. Push up and down to eliminate trapped air.

#### **NOTE**

Compound should ooze out at top indicating enough has been used.

- j. Install new valve and reconnect refrigerant lines.
- k. Evacuate refrigerant lines and recharge with freon R-12.
- l. Reinsulate lines as necessary.
- m. Reinstall covers.
- n. Plug in sink power cord.

3-20.3 Replace Solenoid Valve.

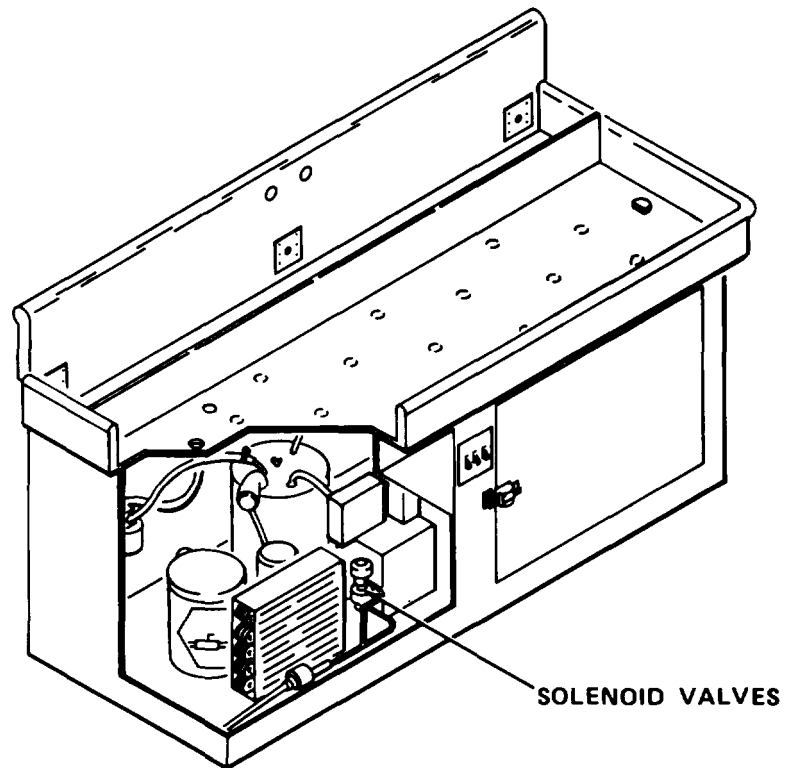
MOS: 52C, Utilities Equipment Repairer

TOOLS: Flat Tip Screwdriver  
5/8 in. Combination Wrench

SUPPLIES: Solenoid Valve  
Thermal Gloves  
Goggles

**WARNING**

- A dangerous chemical is used in this equipment. Death or serious injury may occur if personnel fail to observe safety precautions.
- Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage may occur from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin and eye contact is possible.
- Do not allow refrigerant to come in contact with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.
- Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.
  - a. Unplug sink power cord.
  - b. Remove cover.
  - c. Remove electrical junction box cover.
  - d. Tag and disconnect defective solenoid wiring.
  - e. Repressurize refrigerant system.
  - f. Disconnect refrigerant lines.
  - g. Remove retaining nut and defective solenoid.

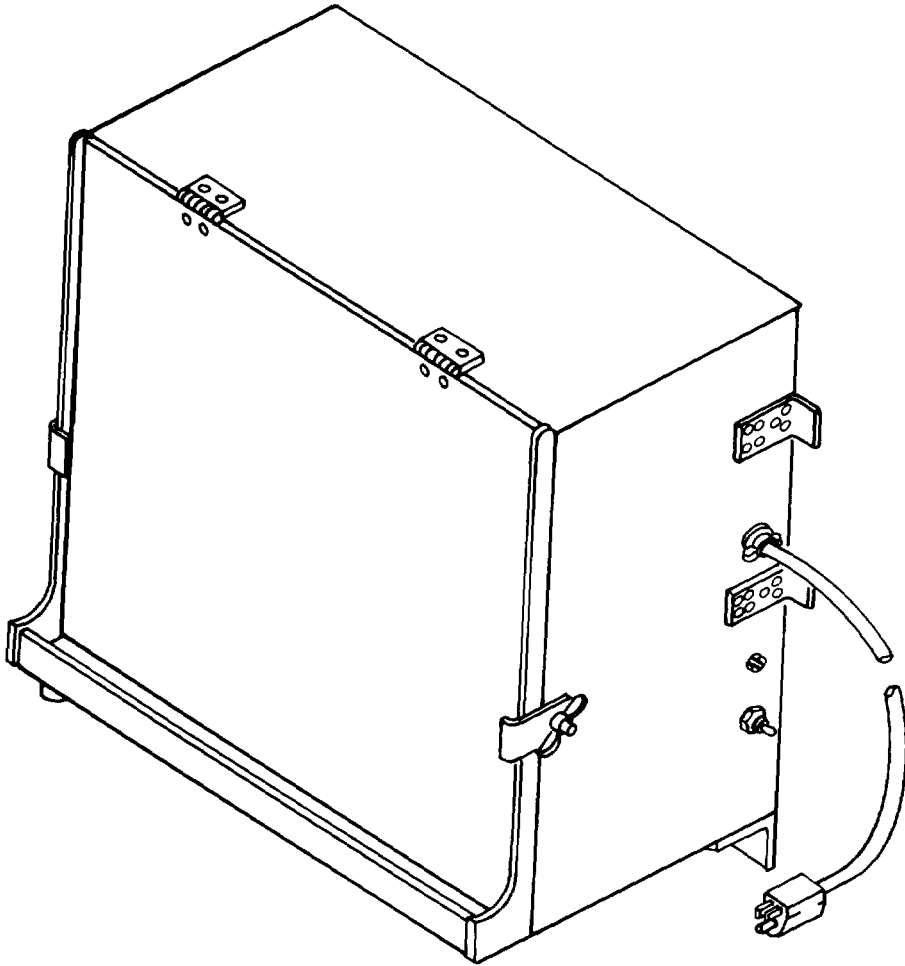


- h. Install new solenoid and secure with retaining nut.
- i. Reconnect refrigerant lines.
- j. Reconnect wiring to solenoid.
- k. Reinstall junction box cover.
- l. Recharge refrigerant system.
- m. Reinstall cover.
- n. Plug in sink power cord.









CHAPTER 4

DARKROOM FILM VIEWER

Section I INTRODUCTION

4-1. GENERAL INFORMATION.

4-1.1 Scope.

- a. Model Number and Equipment Name. Model DLV 20 Darkroom Film Viewer.
- b. Purpose of Equipment. To view positives and/or negatives.

4-1.2 Glossary

Ortho-Safe Light . . . . . Illumination that will not register on orthochromatic film.

4-2. EQUIPMENT DESCRIPTION.

4-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Resistant to normal darkroom moisture.
- b. White light or ortho-safe light viewing.

4-2.2 Equipment Data.

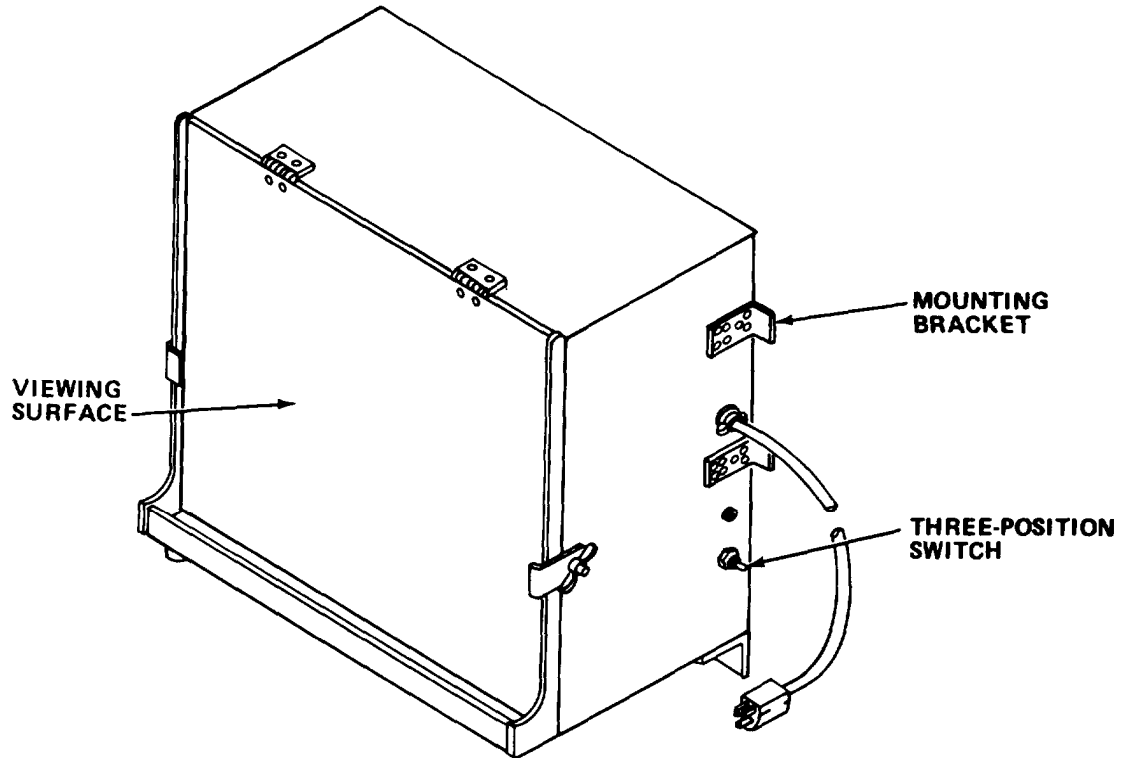
Dimensions

|                    |  |
|--------------------|--|
| Width              | 20 in. (50.8 cm)                       |
| Height             | 19 in. (48.3 cm)                       |
| Depth              | 10 in. (25.4 cm)                       |
| Power Requirements | 110-148 V, 60 Hz,<br>single-phase      |
| White Light        | Two 15 W fluorescent lamps             |
| Ortho-Safe Light   | One 15 W fluorescent lamp,<br>filtered |
| Viewing Surface    | 17 in. X 19 in. (43.2 cm<br>X 48.3 cm) |

4-3. **TECHNICAL PRINCIPLES OF OPERATION.** Technical principles of operation are combined with operator's controls and indicators for this equipment.

**Section II OPERATING INSTRUCTIONS**

4-4. **DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.**



| Control or Indicator  | Function  |
|-----------------------|---|
| Viewing Surface       | Transparent plexiglass cover with drain.          |
| Mounting Brackets     | Brackets for mounting on vertical surface.        |
| Three-Position Switch | Off, ortho-safe light, and white light positions. |

**4-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

4-5.1 PMCS Procedures.

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval columns. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.
- i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.
- j. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                      | <u>Quantity</u> |
|----------------------------------|-----------------|
| Cheesecloth (Item 7, Appendix E) | ar              |

Table 4-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
 D - During  
 A -After

W - Weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

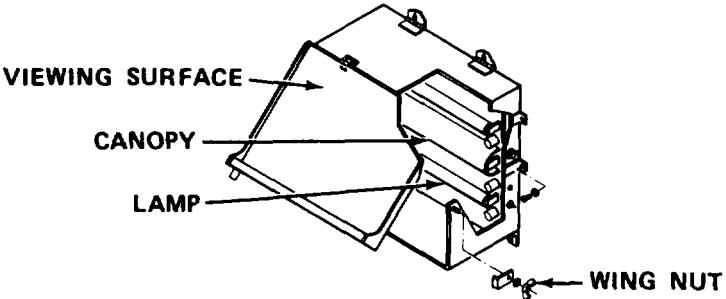
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 1        | B        | <p><b><u>DARKROOM FILM VIEWER</u></b></p> <p><u>Inspect Viewing Surface.</u></p> <p>Inspect for cracked or broken viewing surface.</p>   | Viewing surface is cracked or broken.                          |
| 2        | B        | <p><u>Service Viewing Surface</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.</p> <div style="text-align: center;">  <p>The diagram shows a perspective view of a darkroom film viewer. It has a rectangular body with a hinged lid (canopy) on top. A viewing window is on the front. A lamp is mounted on the side. A wing nut is used to adjust the viewing surface. Labels with arrows point to the viewing surface, canopy, lamp, and wing nut.</p> </div> <p>1. Turn off power and unplug power cord.</p> |  |

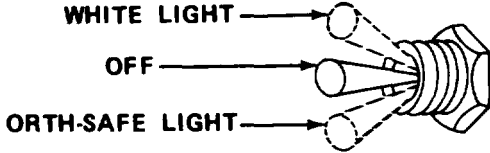
Table 4-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

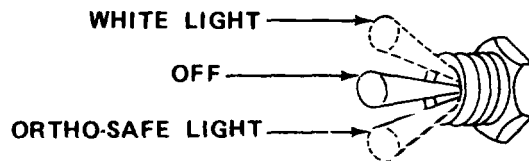
W - Weekly  
M - Monthly  
O - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | IN-TER. VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|-------------|--|--|
| 2        | B           | <p><b><u>DARKROOM FILM VIEWER - Cont</u></b></p> <p><u>Service Viewing Surface - Cont</u></p> <ol style="list-style-type: none"> <li>Loosen wingnuts, lower brackets, and raise viewing surface.</li> <li>Inspect top compartment for moisture. Dry with cheesecloth. Wipe lamp and canopy.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Canopy covers center lamp.</p> <ol style="list-style-type: none"> <li>Wipe both sides of viewing surface with cheesecloth. Close viewing surface.</li> </ol>  |  |
| 3        | B           | <p><u>Inspect Electrical System.</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.</p> <ol style="list-style-type: none"> <li>Unplug power cord.</li> <li>Inspect power cord for kinks, breaks, and tears. Plug in power cord.</li> </ol> <div style="text-align: center;">  </div> <ol style="list-style-type: none"> <li>Turn on lights. Switch in down position: Ortho-safe lights light. Switch in up position: white light lights. Switch in center position: lights are out.</li> </ol> | <p>Insulation is broken.</p> <p>Lights are inoperative.</p>    |

**4-6. OPERATION UNDER USUAL CONDITIONS.**



**CAUTION**

White light will expose undeveloped film.

**4-6.1 Operating Instructions.**

- a. Position switch at midpoint (off).
- b. Plug in power cord.
- c. Position switch for desired light.
- d. On completion of use, unplug power cord.

**4-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**4-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**4-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the darkroom film viewer, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.



Table 4-2. TROUBLESHOOTING

| MALFUNCTION                   | TEST OR INSPECTION                           | CORRECTIVE ACTION  |
|-------------------------------|--|--|
| 1. LAMPS INOPERATIVE.         | Step 1. Check that power cord is plugged in. | (a) If power cord is plugged in, proceed to step 2.<br>(b) Plug in power cord.                     |
|                               | Step 2. Check for switch in proper position. | (a) If switch is in proper position, proceed to step 3.<br>(b) Position switch.                    |
|                               | Step 3. Check for defective lamp.            | (a) If lamp is not defective, proceed to step 4.<br>(b) Replace defective lamp (paragraph 4-10.1). |
|                               | Step 4. Check for defective starter.         | Replace starter (paragraph 4-10.2).  |
| 2. ONE OR MORE LAMPS FLICKER. | Step 1. Check for defective lamp.            | (a) If lamp is not defective, proceed to step 2.<br>(b) Replace lamp (paragraph 4-10.1).           |
|                               | Step 2. Check for defective starter.         | Replace starter (paragraph 4-10.2)   |

**4-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the darkroom film reviewer. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES                | PARAGRAPH |
|---------------------------|-----------|
| Replace Lamp . . . . .    | 4-10.1    |
| Replace Starter . . . . . | 4-10.2    |
| Replace Ballast. . . . .  | 4-10.3    |

4-10.1 Replace Lamp.

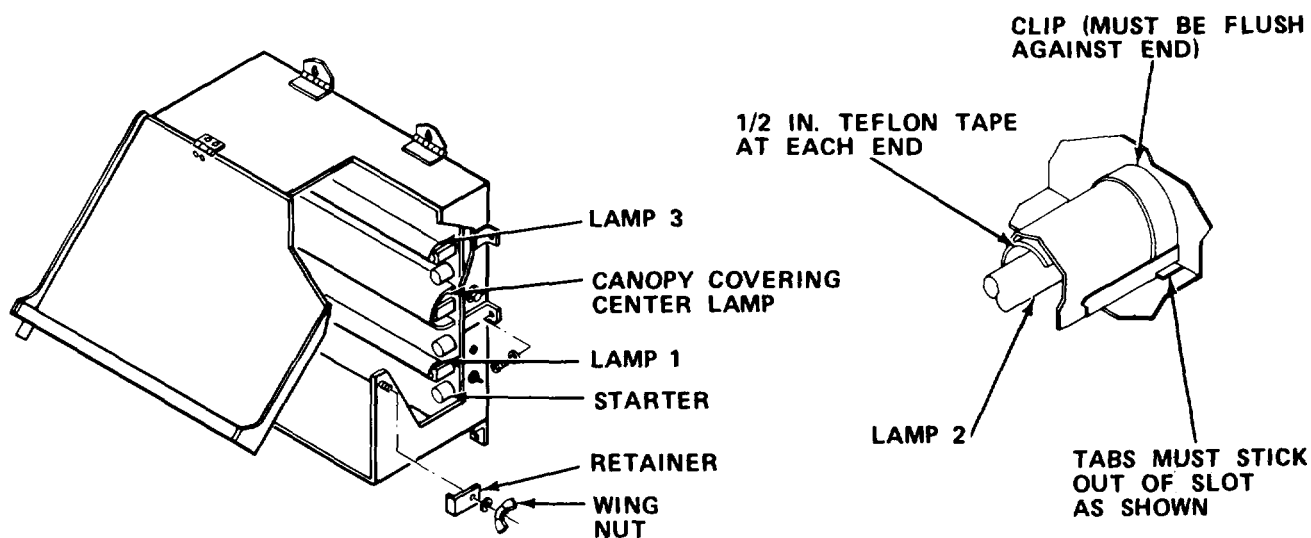
MOS: 83E, Photo and Layout Specialist

SUPPLIES: Fluorescent Lamp (15 W)

**WARNING**

- Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.
- Coating on the inside of fluorescent lamps may cause injury to personnel if lamp is broken. Careful handling of new lamps and proper disposal of old lamps is required to prevent injury.

a. Unplug power cord.



- b. Open top viewing surface by removing wingnuts and retainers.
- c. Remove and properly dispose of defective lamp.

#### NOTE

Lamps 1 and 3 may be removed by pushing lamp against socket spring-tension and lifting other end free. To remove lamp 2, first gently squeeze canopy clips between thumb and forefinger until clip is free of slot. Remove clips and canopy. Then remove lamp.

- d. Install new lamp by inserting prongs in one socket and pushing until prongs on other end can be inserted into other socket.
- e. Lamp 2: Gently squeeze canopy clips until clips fit in slots. Clips must be flush against ends of viewer.
- f. Close viewing surface, and secure with wing nuts and retainers.
- g. Plug in power cord.

4-10.2 Replace Starter.

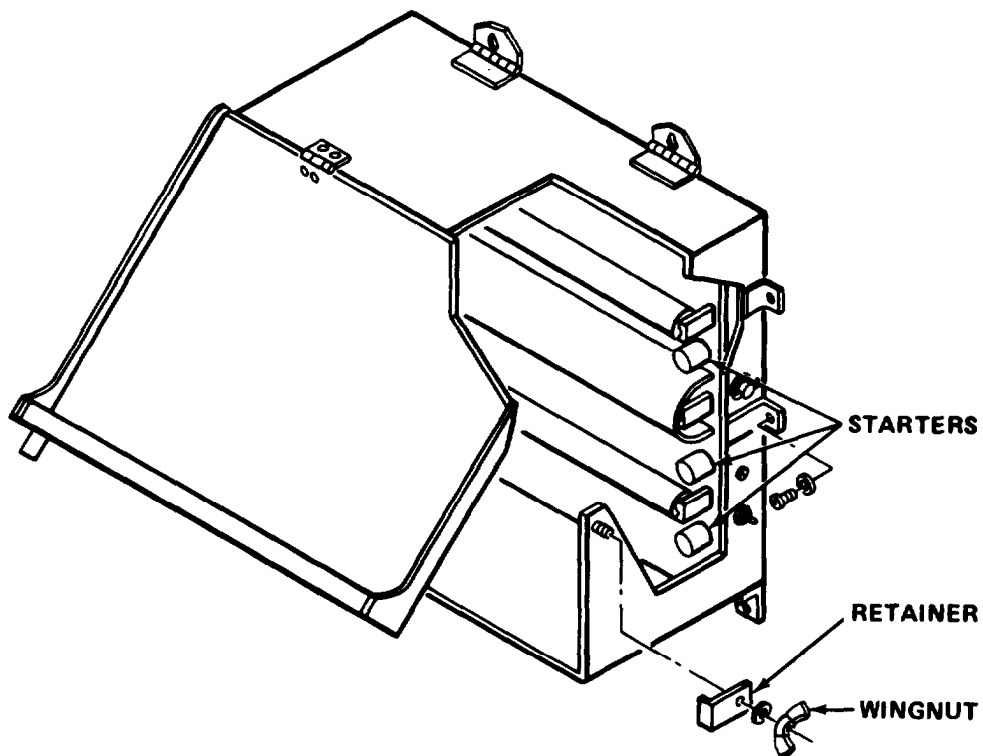
MOS: 83E, Photo and Layout Specialist

SUPPLIES: Fluorescent Lamp Starter

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Open viewing surface by removing wingnuts and retainers.



- c. Push in starter. Turn to left and remove.
- d. Insert new starter into socket and twist to right until locked.
- e. Close cover and secure with wingnuts and retainers.
- f. Plug in power cord.

4-10.3 Replace Ballast

MOS: 83E, Photo and Layout Specialist

TOOLS: No. 2 Cross Tip Screwdriver  
1/4 in. Wrench  
3/8 in. Combination Wrench

SUPPLIES: Ballast

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove four screws and remove film viewer from wall.
- c. Remove back panel.
- d. Tag and disconnect wiring from defective ballast.
- e. Remove two nuts and defective ballast.
- f. Install new ballast and secure with nuts.
- g. Connect wiring to new ballast.
- h. Reinstall back panel.
- i. Mount viewer on wall Plug in power cord.

## Section IV ORGANIZATIONAL MAINTENANCE

**4-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

### **4-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT**

4-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-12.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

4-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

### **4-13. SERVICE UPON RECEIPT.**

#### 4-13.1 Checking Unpacked Equipment.

Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

4-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no Organizational PMCS procedures assigned for this equipment.

### **4-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

**Table 4-3. ORGANIZATIONAL TROUBLESHOOTING**

| MALFUNCTION  | TEST OR INSPECTION  | CORRECTIVE ACTION   |
|--|---|---|
| 1. LAMPS FAIL TO LIGHT IN EITHER WHITE LIGHT OR ORTHO-SAFE LIGHT POSITION. | Check switch.   | Replace defective switch (paragraph 4-16.1).                                      |
| 2. NO LAMPS LIGHT.   | Step 1. Check switch.<br><br>(a) If switch is not defective, proceed to step 2.<br>(b) Replace defective switch (paragraph 4-16.1). | Step 2. Check power cord.<br><br>Replace defective power cord (paragraph 4-16.2). |

**4-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the darkroom film viewer. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES                                    | PARAGRAPH |
|---|-----------|
| Replace Switch . . . . .                      | 4-16.1    |
| Replace Power Cord . . . . .                  | 4-16.2    |
| Remove/Install Darkroom Film Viewer . . . . . | 4-16.3    |

4-16.1 Replace Switch.

MOS: 83FJ6, Reproduction Equipment Repairer

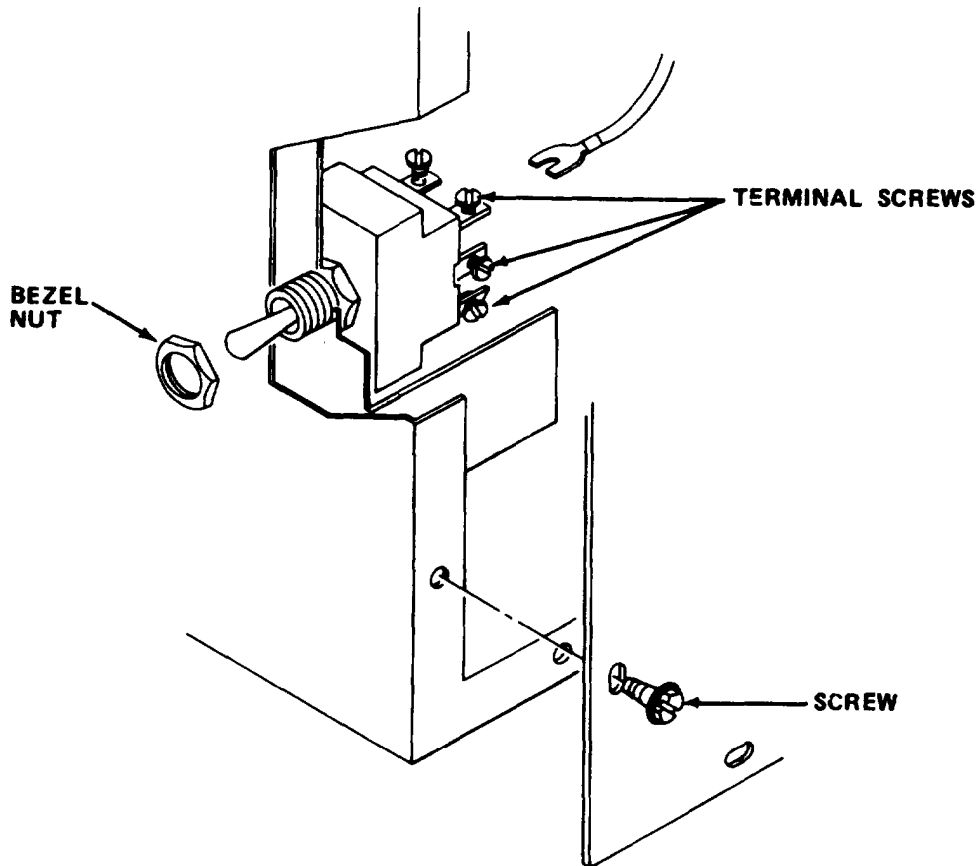
TOOLS: Flat Tip Screwdriver  
Cross Tip Screwdriver  
1/4 in. Wrench  
8 in. Adjustable Wrench

SUPPLIES: Toggle Switch

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove viewer from wall.





- c. Remove hex head screws and back cover.
- d. Remove bezel nut from switch.
- e. Draw switch into cabinet and remove insulator.
- f. Tag wires and loosen terminal screws.
- g. Connect wires to new switch and tighten terminal screws. Place insulator on new switch.
- h. Push switch assembly through switch hole.
- i. Reinstall bezel nut.
- j. Reinstall back cover.
- k. Remount viewer on wall.
- l. Plug in power cord.

#### 4-16.2 Replace Power Cord.

MOS: 83FJ6, Reproduction Equipment Repairer

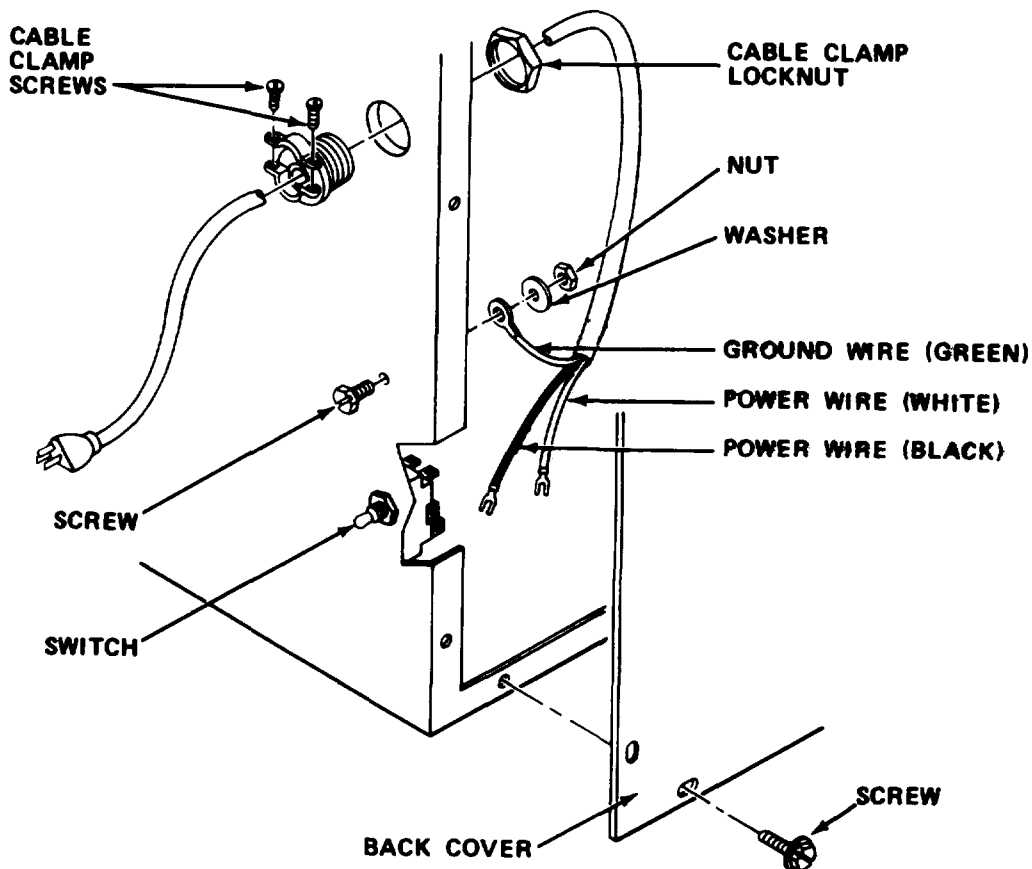
TOOLS: Flat Tip Screwdriver  
Cross Tip Screwdriver  
1/4 in. Wrench  
11/32 in. Nut Driver

SUPPLIES: Power Cord

### WARNING

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove viewer from wall.



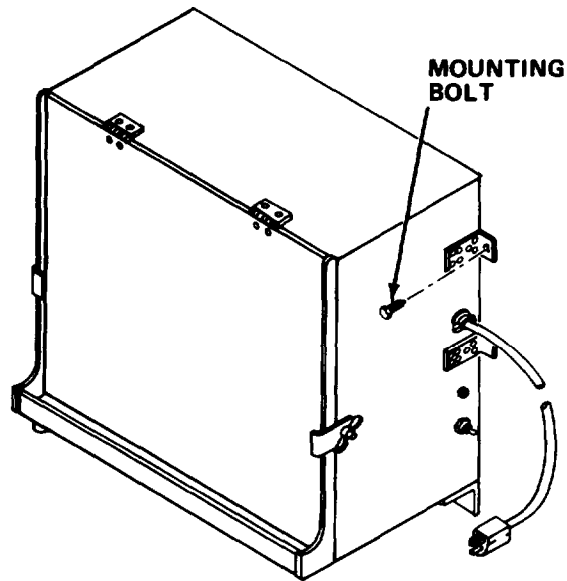
- c. Remove back cover.
- d. Loosen screws from cable clamp.
- e. Remove nut, lockwasher, and ground screw from green (ground) wire.
- f. Remove white and black wires from switch by loosening terminal screws.
- g. Loosen clamp locknut to remove power cord from cabinet, and pull cord through cable clamp. Remove power cord from cabinet.
- h. Thread terminal end of new power cord through cable clamp.
- i. Connect wires and tighten terminal screws.
- j. Reconnect ground wire.
- k. Remove slack from cable. Tighten clamp screws.
- l. Reinstall back cover.
- m. Remount viewer on wall.
- n. Plug in power cord.

**4-16.3 Remove/Install Darkroom Film Viewer**

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/2 in. Drive Socket Set

SUPPLIES: Darkroom Film Viewer



**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

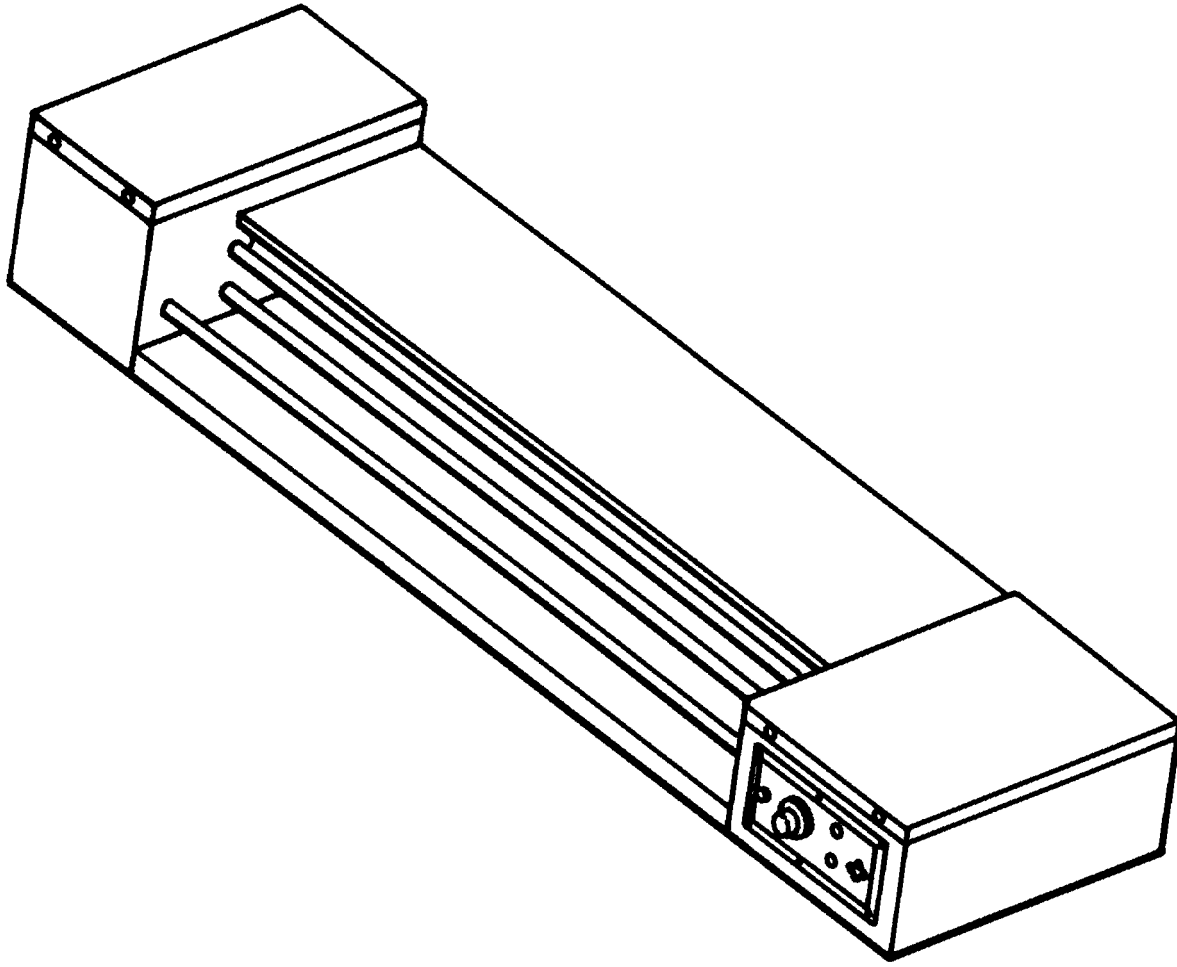
- a. Unplug power cord.
- b. Remove mounting bolts.
- c. Remove defective film viewer.
- d. Install new film viewer with mounting bolts.

**4-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.





**CHAPTER 5**  
**PHOTOGRAPHIC PRINT DRYER**

**Section I INTRODUCTION**

**5-1. GENERAL INFORMATION.**

5-1.1 Scope.

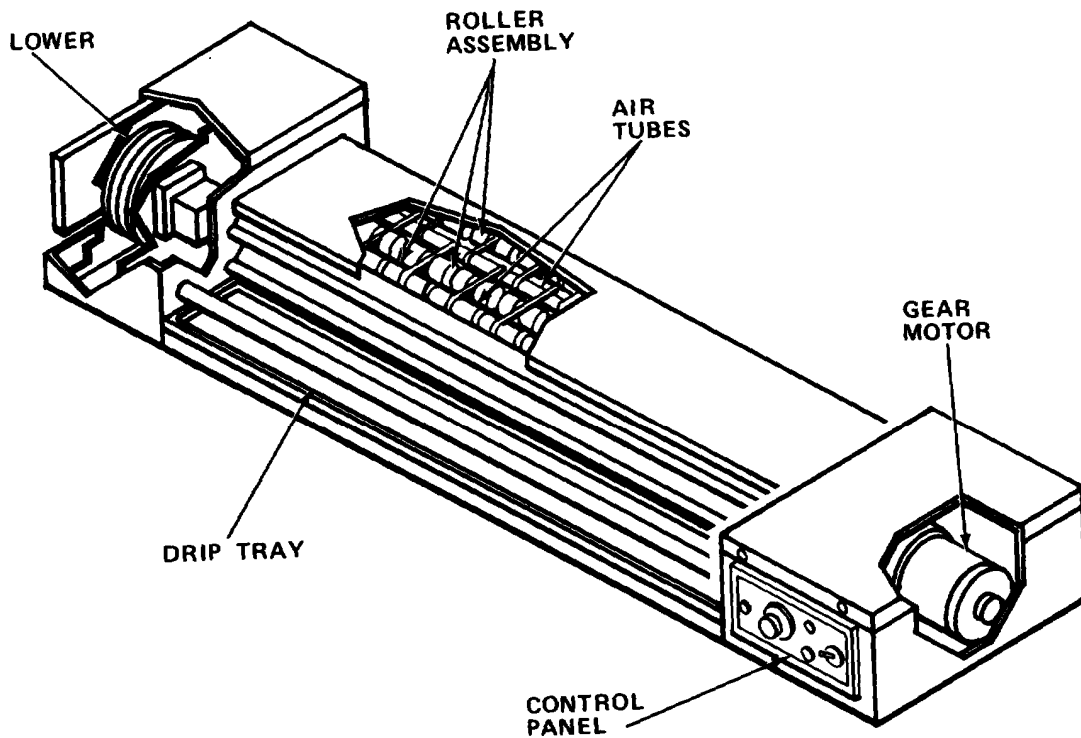
- a. Model Number and Equipment name. Model 3040 Photographic Print Dryer.
- b. Purpose of equipment. To dry photographic prints.

**5-2. EQUIPMENT DESCRIPTION.**

5-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Variable-speed drive motor adjusts for various drying conditions.
- b. Reversible motor ejects jammed material.
- c. Corrosion-resistant, easily cleaned.
- d. Nylon bearings require no lubrication.
- e. Low power drain.

5-2.2 Location and Description of Major Components.



GEAR MOTOR. Provides geared-down rotary motion to drive rollers.

ROLLER ASSEMBLY. Transports wet paper through machine.

AIR TUBES. Provide concentrated blast of air to dry paper.

BLOWER. Provides high-volume air to air tubes.

CONTROL PANEL. Contains power switch, motor speed control, FWD/REV switch, fuse and holder, and fuse indicator lamp.

DRIP TRAY. Catches excess fluid that has been removed by squeegee rollers.



5-2.3 Equipment Data.

|                    |  |
|--------------------|--|
| Manufacturer       | Buckingham Graphics, Inc.              |
| Weight             | 35 lbs (15.91 kg)                      |
| Width              | 47.3 in. (120.1 cm)                    |
| Height             | 7.0 in. (17.78 cm)                     |
| Depth              | 12.5 in. (31.75 cm)                    |
| Feed Capacity      | 30.0 in. (76.2 cm)                     |
| Power Requirements | 120 V, 60 Hz, 13 amps,<br>single-phase |

**5-3. TECHNICAL PRINCIPLES OF OPERATION.** The purpose of the print dryer is to dry lithographic paper after processing. It is composed of:

Transport System

Drying System

Electrical System

5-3.1 Transport System. Moves the paper through the drying system of the print dryer. It is composed of:

a. Squeegee rollers. Squeeze excess water from the paper as it enters the print dryer. The excess water is collected in a removable drip tray under the squeegee rollers.

b. Transport rollers. Guide the paper through the drying system and out through the rear of the print dryer.

c. Gear motor. Drives the squeegee rollers and transport rollers.

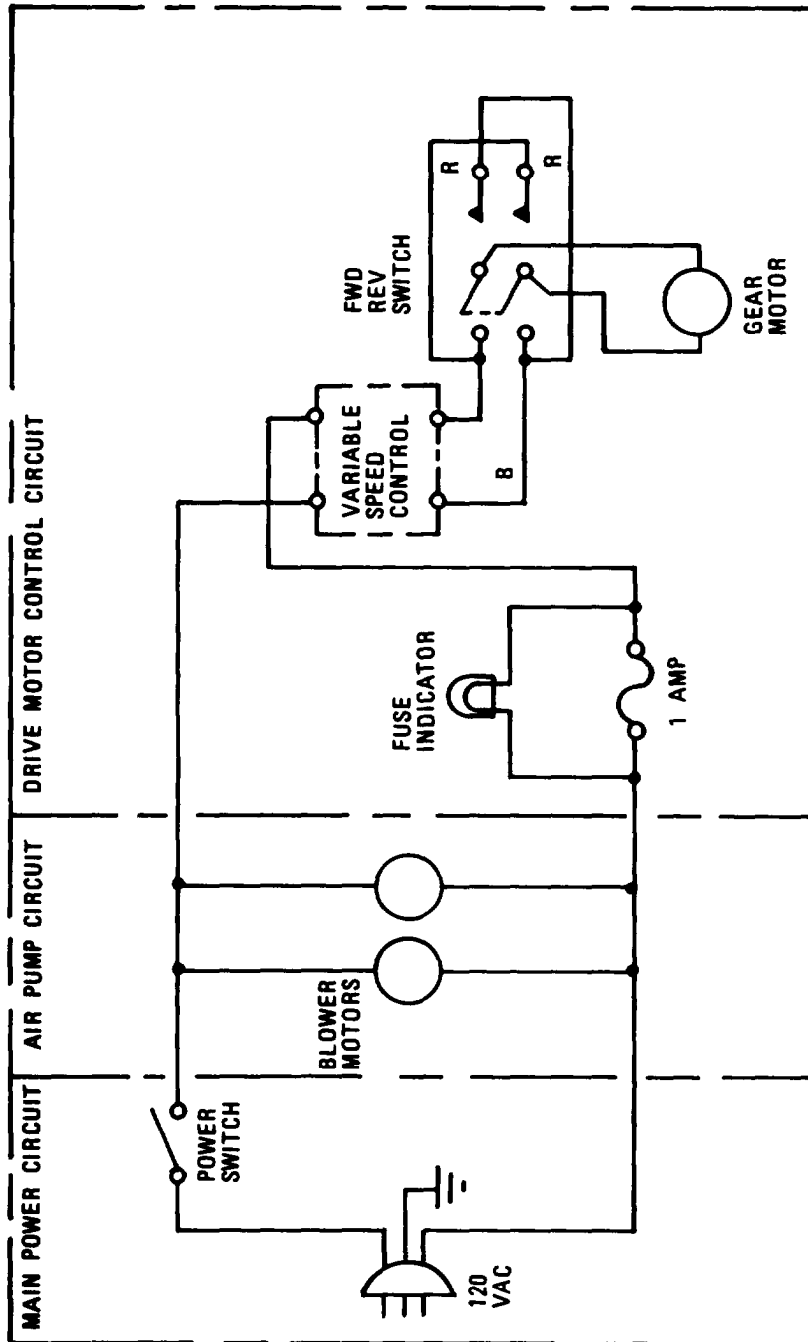
5-3.2 Drying System. Removes the remaining fluid from the print using jets of air directed at the surface of the print. It consists of:

a. Blower. Draws fresh air from outside the case and channels it to the air tubes.

b. Air tubes. Direct the airflow over the surface of the print through a series of holes drilled in the tubes and directed toward the surface.

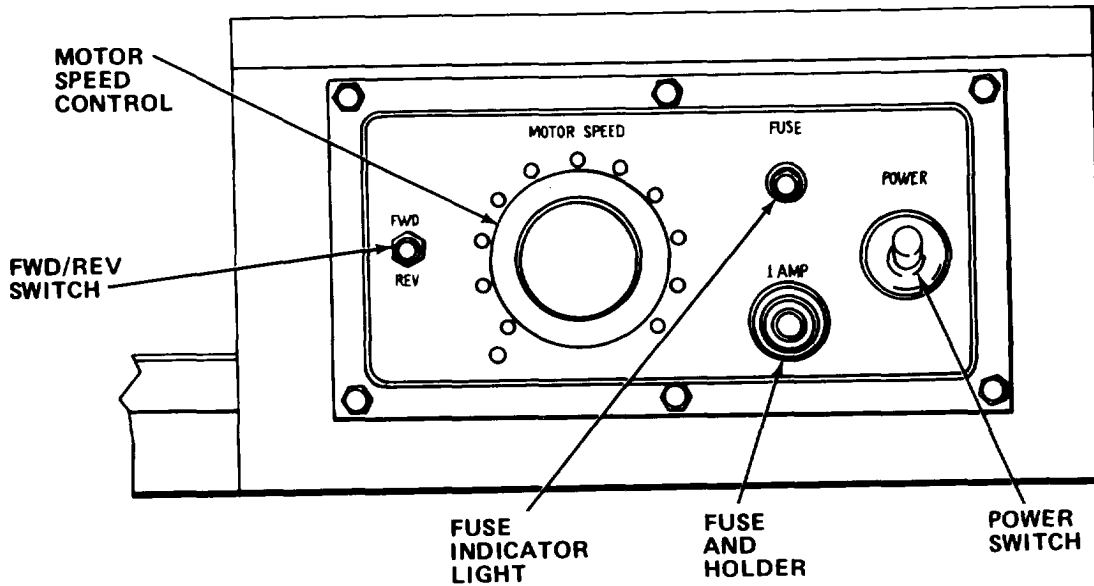
c. Buffer rings. Are located on the front air tubes to keep the paper traveling in a straight line between the air tubes and transport rollers.

**5-3.3 Electrical System.** The power switch supplies power to the two blower motors and the gear motor control circuit. The gear motor is controlled by a variable MOTOR SPEED control and a FWD/REV switch. The gear motor circuit is protected by a 1 AMP fuse. A FUSE indicator lights if the fuse is blown.



Section II. OPERATING INSTRUCTIONS

5-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



| Control or Indicator | Function   |
|----------------------|--|
| MOTOR SPEED Control  | Determines transport speed.<br><br>LEFT: Decreases speed.<br><br>RIGHT: Increases speed.                                   |
| FUSE Indicator Light | Indicates blown fuse.  |
| Fuse and Holder      | Provides protection for electrical circuitry in transport system.  |
| POWER Switch         | Provides power for gear motor and drying blowers.  |
| FWD/REV Switch       | Controls direction of transport mechanism. Normal operating position is FWD. REV position is used to free jammed material. |

## 5-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.

b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.

c. After You Operate. Be sure to perform your after (A) PMCS.

d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

### 5-5.1 PMCS Procedures.

a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.

b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.

c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.

d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.

e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.

f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

g. Interval column. This column determines the time period designated to perform your PMCS.

h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

j. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                          | <u>Quantity</u> |
|--------------------------------------|-----------------|
| 1/4 in. Wrench                       | 1 ea            |
| Roller Cleaner (Item 27, Appendix E) | a r             |
| Cheesecloth (Item 7, Appendix E)     | a r             |
| Photographic Paper                   | a r             |
| Blower Filter                        | 1 ea            |

Table 5-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation. Check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biannially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE                  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 1        | W        | <p><u>PHOTOGRAPHIC PRINT DRYER</u></p> <p>Inspect.</p> |  |

Table 5-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

w - weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 1        | W        | <b><u>PHOTOGRAPHIC PRINT DRYER - Cont</u></b>   |  |
|          |          | <u>Inspect - Cont</u><br><br>1. Check rollers for chemical residue. Clean with cheesecloth dampened with roller cleaner.<br><br>2. Check drip tray for cleanliness. Empty if necessary.<br><br>3. Remove screws and blower cover. Remove spacer and filter. Check filter for cleanliness. Replace filter if required.<br><br>4. Check grommets and seals for wear or damage.<br><br>5. Reinstall cover. Cover must seal against air leaks. Check all covers for leaks, cracks and missing screws. |  |

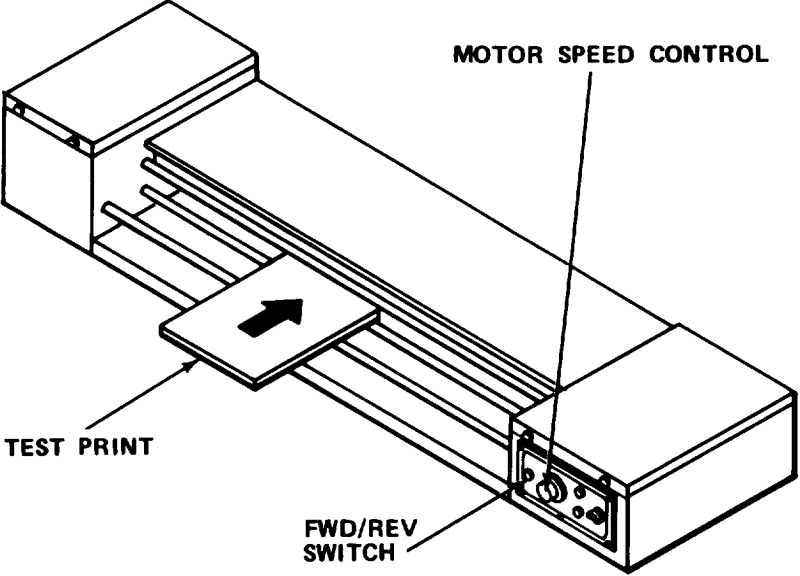
Table 5-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.                               | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If:     |
|--|----------|--|--|
| <b>PHOTOGRAPHIC PRINT DRYER - Cont</b> |          |  |  |
| 2                                      | B        | <p>Test.</p>  <p>1. Check control panel for damaged knobs or switches.</p> <p>(a) Turn on print dryer. Check for roller rotation and airflow.</p> <p>(b) Adjust MOTOR SPEED control from slow to fast. Observe roller speed changes.</p> <p>(c) Move FWD/REV switch to REV position. Observe roller direction changes.</p> <p>2. Dry several prints and inspect each for signs of pulling, stretching, spotting, streaking, or distortion of image. Check for rips and tears.</p> | <p>Speed does not change.</p> <p>Prints are torn or distorted.</p> |



**5-6. OPERATION UNDER USUAL CONDITIONS.****5-6.1 Assembly and Preparation For Use.**

- a. Release securing strap.
- b. Pull bottom out and upward.
- c. Lower leg and lock into position.

**5-6.2 Operating Procedures.**

- a. Starting unit.
  - (1) Plug in power cord.
  - (2) Move POWER switch to on position.
  - (3) Check that FWD/REV switch is in FWD position.
  - (4) Adjust MOTOR SPEED control for satisfactory drying.
- b. Operating unit.

**NOTE**

Do not squeegee paper. Feed into machine dripping wet.

- (1) Center material to be dried, and squarely insert between two squeegee rollers.

**NOTE**

Guide large or long material from rear of print dryer. Do not pull.

- (2) Remove material from rear of print dryer.
- c. Stopping unit. Turn off POWER switch.
- d. Removing jammed material.
  - (1) With POWER switch in on position, move FWD/REV switch to REV position.
  - (2) When material is ejected, move switch to FWD position.

**5-6.3 Preparation for Movement.**

- a. Unlock leg and fold up.
- b. Raise left end upward until print dryer is vertical.
- c. Attach securing strap.

**5-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**5-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**5-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the photographic print dryer, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

**Table 5-2. TROUBLESHOOTING**

---

| MALFUNCTION                                   | TEST OR INSPECTION   | CORRECTIVE ACTION |
|---|--|-------------------|
| 1. ROLLERS DO NOT ROTATE.                     | Step 1. Check for unplugged power cord.<br>(a) If power cord is plugged in, proceed to step 2.<br>(b) Plug in power cord.<br>Step 2. Check for tripped circuit breaker switch.<br>(a) If circuit breaker is not tripped, proceed to step 3.<br>(b) Reset circuit breaker.<br>Step 3. Check FUSE indicator light.<br>Replace fuse (paragraph 5-10.1). |                   |
| 2. ROLLERS ROTATE BUT AIR FLOW IS RESTRICTED. | Check for dirty filter.<br>Replace filter (paragraph 5-10.2).  |                   |

---

**5-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the photographic print dryer. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE                | PARAGRAPH |
|--------------------------|-----------|
| Replace Fuse . . . . .   | 5-10.1    |
| Replace Filter . . . . . | 5-10.2    |

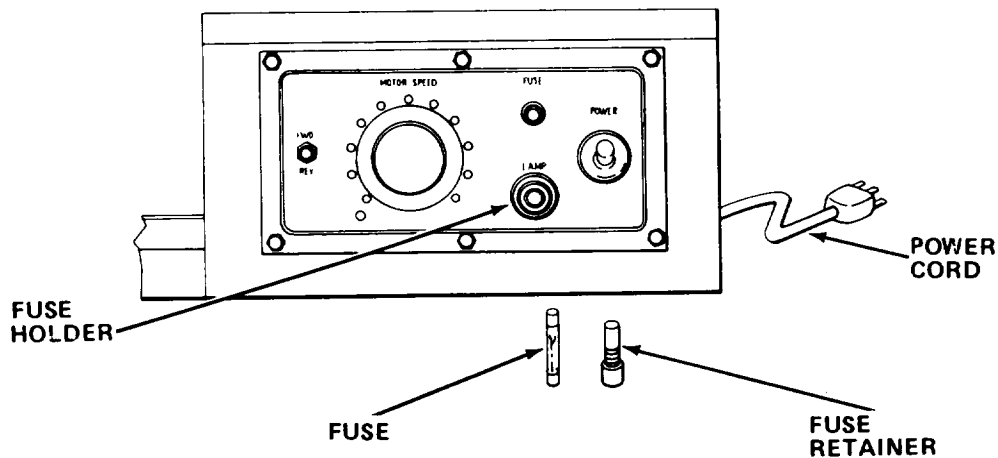
5-10.1 Replace Fuse.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: Fuse, 1 amp

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Unplug power cord.
- b. Unscrew fuse retainer and fuse from fuse holder. Remove fuse from fuse retainer.
- c. Insert new fuse and retainer into fuse holder. Tighten securely.

5-10.2 Replace Filter.

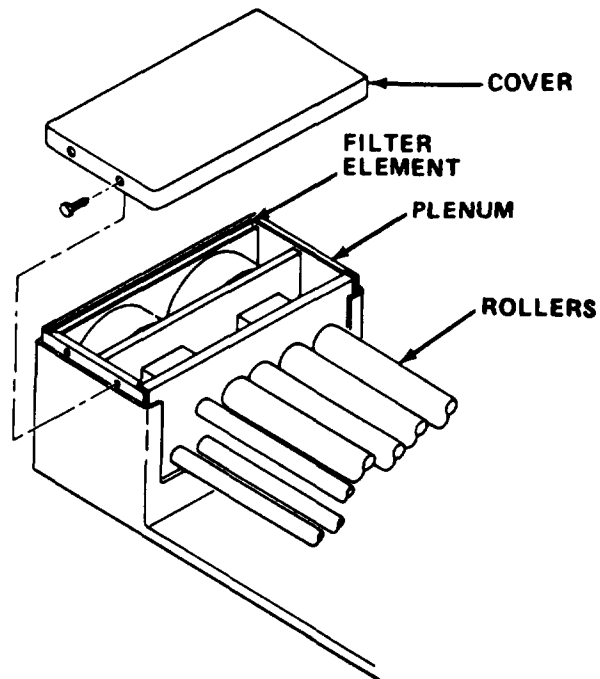
MOS: 83E, Photo and Layout Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Filter

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Unplug power cord.
- b. Remove four retaining screws and lift plenum cover.
- c. Remove filter and discard.
- d. Install new filter.
- e. Reinstall plenum cover and retaining screws.
- f. Plug in power cord.

## Section IV ORGANIZATIONAL MAINTENANCE

**5-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**5-12. REPAIR PARTS, SPECIAL TOOLS: TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

5-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

5-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**5-13. SERVICE UPON RECEIPT.**

5-13.1 Checking Unpacked Equipment.

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**5-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

a. PMCS are designed to keep the equipment in good working condition by performing certain tests, inspections, and services. The intervals provide you, the organizational technician, with time schedules that determine when to perform specified tasks.

b. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording the results of PMCS.

c. Interval columns. This column determines the time period designated to perform your PMCS.

d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

e. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                           | <u>Quantity</u> |
|---------------------------------------|-----------------|
| Hand Air Pump                         | 1 ea            |
| Flat Tip Screwdriver                  | 1 ea            |
| 5/32 in. Hex Head Key Wrench          | 1 ea            |
| 1/4 in. Wrench                        | 1 ea            |
| Liquid Detergent (Item 8, Appendix E) | a r             |
| Sponge (Item 32, Appendix E)          | a r             |
| Tube Corks                            | a r             |
| Buffer Ring                           | a r             |
| Ty-Belt                               | a r             |
| Rubber Grommets                       | a r             |
| Blower Motor Gasket                   | a r             |
| Nylon Drive Gear                      | a r             |
| Nylon Bearing                         | a r             |
| Filter                                | a r             |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

|  |          | B - Before<br>D - During<br>A - After | W - Weekly<br>M - Monthly<br>Q-Quarterly | AN - Annually<br>S . Semiannually<br>BI - Biennially       | (Number) - Hundreds of Hours |
|--|----------|---------------------------------------|--|--|------------------------------|
| ITEM NO.   | INTERVAL | ITEM TO BE INSPECTED                  |  | PROCEDURE  |                              |
|  |          | 1                                     | S  | <del>PHOTOGRAPHIC PRINT DRYER</del><br>Service Print Dryer |                              |
| <b><u>WARNING</u></b>  |          |                                       |  |  |                              |
| Death or serious Injury may occur from electrical shock unless power cord is unplugged before servicing.   |          |                                       |  |  |                              |
| <b>NOTE</b>  |          |                                       |  |  |                              |
| Servicing of print dryer will require extensive disassembly and assembly.  |          |                                       |  |  |                              |
| <ol style="list-style-type: none"> <li>1. Unplug power cord.</li> <li>2. Remove drip tray.</li> <li>3. Remove screws and right cover.</li> <li>4. Remove screws and blower cover.</li> </ol> |          |                                       |  |  |                              |
| <b>NOTE</b>  |          |                                       |  |  |                              |
| It may be necessary to pry up on side stations to assist in removal of roller assemblies.  |          |                                       |  |  |                              |
| <ol style="list-style-type: none"> <li>5. Remove screws and top roller assembly.</li> </ol>  |          |                                       |  |  |                              |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES -Cont

B - Before  
 D - During  
 A - After

W - Weekly  
 M - Monthly  
 Q - Quarterly

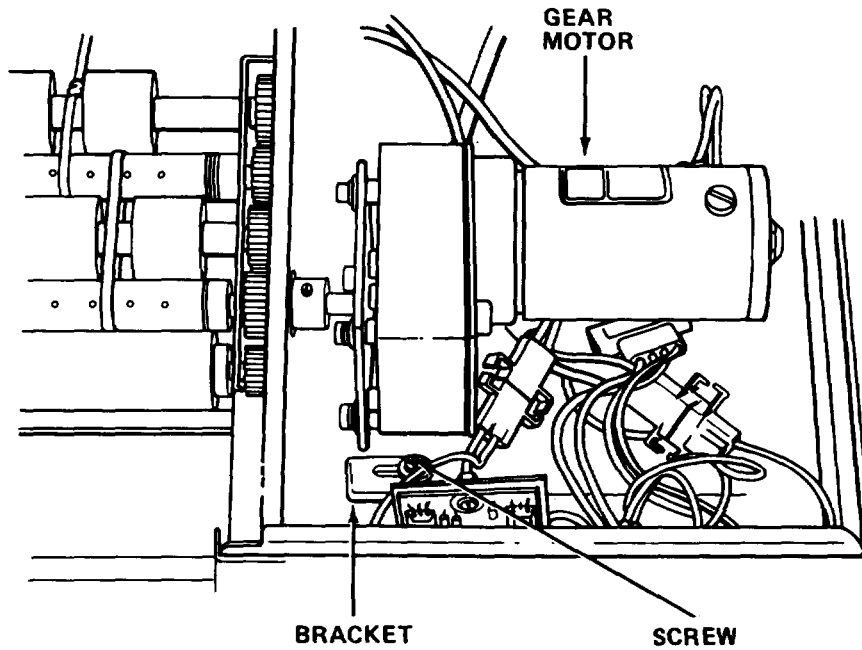
AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED | PROCEDURE |
|----------|----------|----------------------|-----------|
|----------|----------|----------------------|-----------|

PHOTOGRAPHIC PRINT DRYER - Cont

1 s Service Print Dryer - Cont



6. Loosen (but do not remove) screws securing gear motor and bracket to cabinet.
7. Slide gear motor and bracket to right to free gear coupling from roller drive gear.
8. Remove bottom roller assembly by lifting bottom right and left side stations upward and free of their tracks.



Table 53. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
s - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

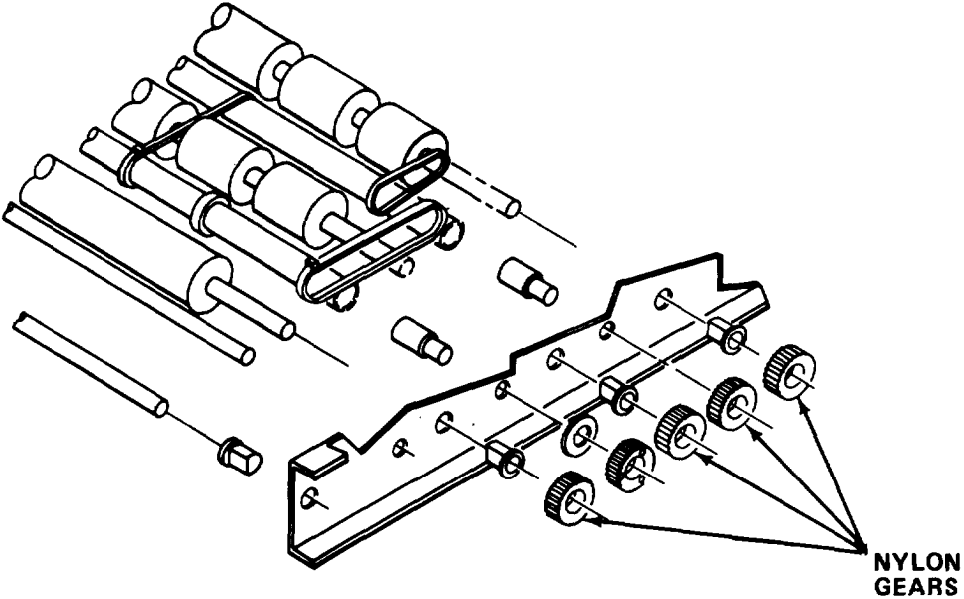
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|----------|----------|---|
|          |          | <p><b>PHOTOGRAPHIC PRINT DRYER -Cont</b></p>  |
| 1        | S        | <p><u>Service Print Dryer - Cont</u></p>  <p>9. Remove four nylon gears from bottom roller assembly. Visually inspect for wear and replace if necessary.</p> |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

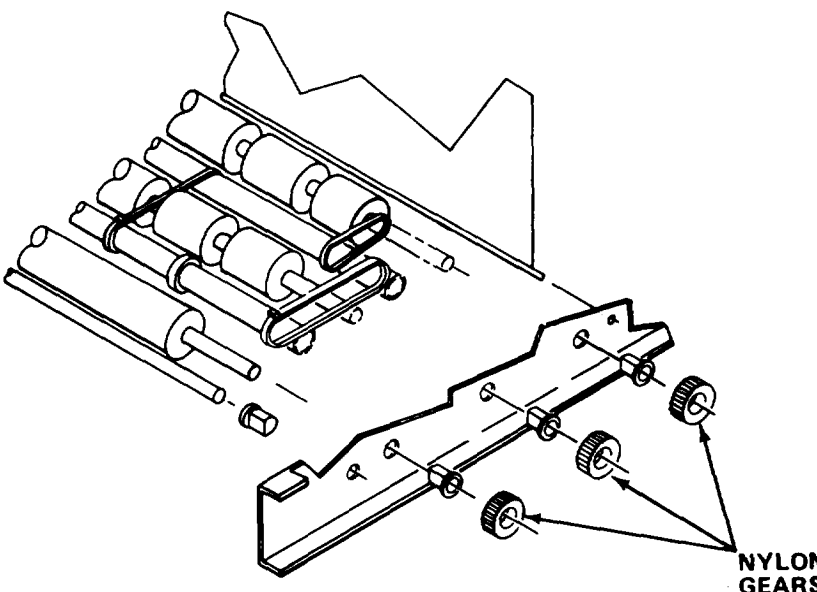
|          |          | B - Before<br>D - During<br>A - After  | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>s - Semiannually<br>BI - Biennially  | (Number) - Hundreds of Hours |
|----------|----------|--|--|---|------------------------------|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED                   |  | PROCEDURE   |                              |
|          |          | <b>PHOTOGRAPHIC PRINT DRYER - Cont</b> |  |   |                              |
| 1        | S        | Service Print Dryer - Cont             |  |  <p>10. Remove three nylon drive gears from upper roller assembly. Visually inspect for wear and replace if necessary.</p> <p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>● Mark position of air tubes and rollers with respect to their location before disassembly.</li> <li>● Before removing side stations, note position and quantities of washers on retaining rod of roller lid. Be sure quantities are matched on both ends.</li> </ul> |                              |

Table 53. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
 D - During  
 A - After

W - Weeklv  
 M - Monthly  
 Q - Quarterly

AN - Annuallv  
 S - Semiannually  
 BI - Biennially

(Number) . Hundreds of Hours

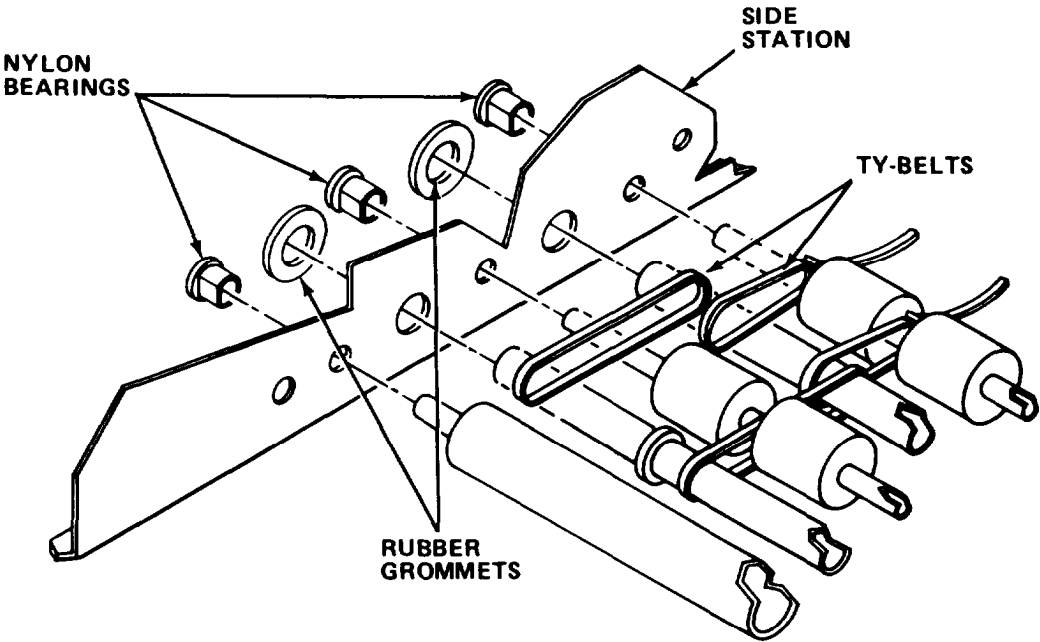
| ITEM NO. | IN-TER-VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  |
|----------|------------|--|
| 1        | S          | <p><b><u>PHOTOGRAPHIC PRINT DRYER - Cont</u></b></p> <p><u>Service Print Dryer - Cont</u></p> <p>11. Remove side stations from bottom roller assembly.</p> <p>12. Remove side stations from upper roller assembly.</p>  <p>13. Visually inspect nylon bearing and rubber grommets in side stations for wear. Replace if necessary.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>Your machine may not contain buffer rings or air tube corks. Perform following procedures accordingly.</p> |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

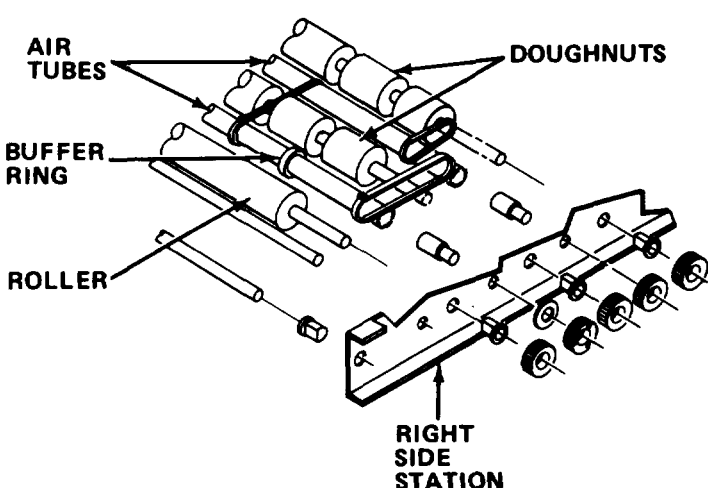
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|----------|----------|---|
| 1        | S        | <p><b><u>PHOTOGRAPHIC PRINT DRYER - Cont</u></b></p> <p><u>Service Print Dryer - Cont</u></p> <ol style="list-style-type: none"> <li>14. Remove buffer rings and air tube corks. Visually inspect and replace if worn or damaged.</li> <li>15. Cut ty-belts and discard.</li> <li>16. Wash rollers, buffer rings, and drip tray with water and mild detergent. Rinse thoroughly.</li> <li>17. Reinstall air tubes in rubber grommets of stations in their correct positions.</li> <li>18. Reinstall nylon bearings and rollers into left stations of top and bottom roller assemblies.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p>Rubber doughnuts nearest the front transport rollers are closer to the drive motor than those in the rear.</p>  <p>The diagram shows an exploded view of a roller assembly. Labels include: AIR TUBES (pointing to the top cylindrical components), DOUGHNUTS (pointing to the small circular rubber components), BUFFER RING (pointing to the ring-like component), ROLLER (pointing to the main cylindrical roller), and RIGHT SIDE STATION (pointing to the metal frame component on the right).</p> |

Table 53. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND -CONT

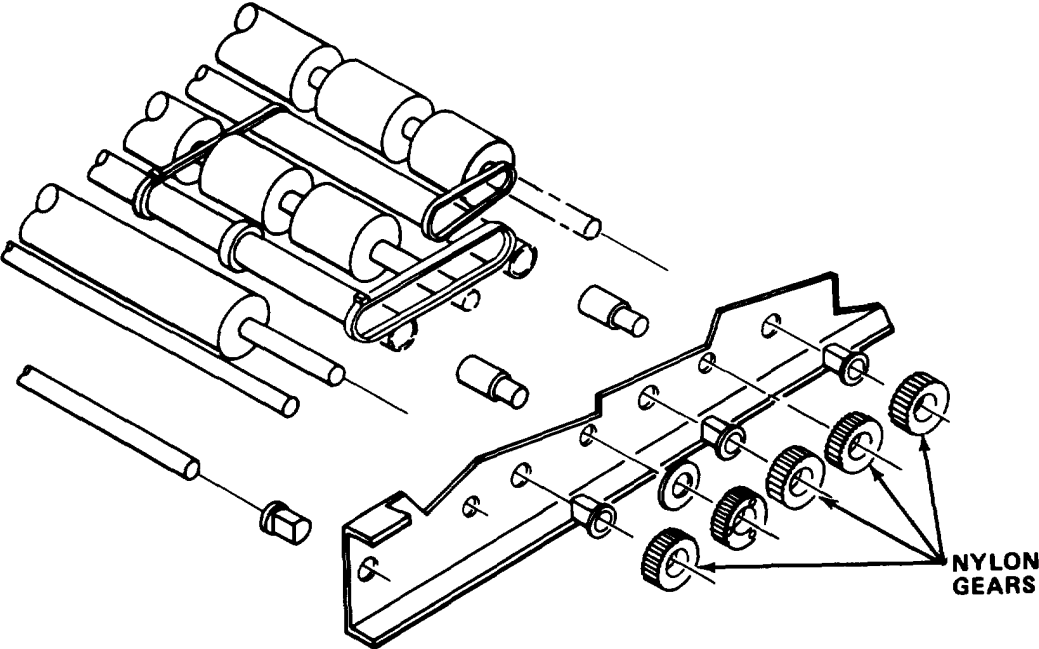
|   |            | B - Before<br>D - During<br>A . After | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially   | (Number - Hundreds of Hours |
|---|------------|---------------------------------------|--|--|-----------------------------|
| ITEM NO.  | IN-TER-VAL | ITEM TO BE INSPECTED                  |  | PROCEDURE  |                             |
| <b>PHOTOGRAPHIC PRINT DRYER - Cont</b>  |            |                                       |  |  |                             |
| 1   | S          | <u>Service Print Dryer - Cont</u>     |  | <p>19. Install buffer rings on each front air tube.</p> <p>20. Position buffer rings to left of every other doughnut on front of transport roller.</p> <p>21. Reinstall right end stations to rollers and air tubes. Rotate each air tube until end slot matches key in station.</p> |                             |
|  <p>The diagram shows an exploded view of a transport roller assembly. It includes a main metal frame with several rollers and air tubes. A separate component, labeled 'NYLON GEARS', consists of several gears of different sizes mounted on a metal plate. Arrows point from the text 'NYLON GEARS' to these gears. The diagram illustrates how the gears are installed on the rollers and air tubes.</p> |            |                                       |  |  |                             |
|   |            |                                       |  | <p>22. Reinstall nylon gears on bottom right side station.</p>   |                             |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - Before  
D - During  
A - After

W - Weekly  
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Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

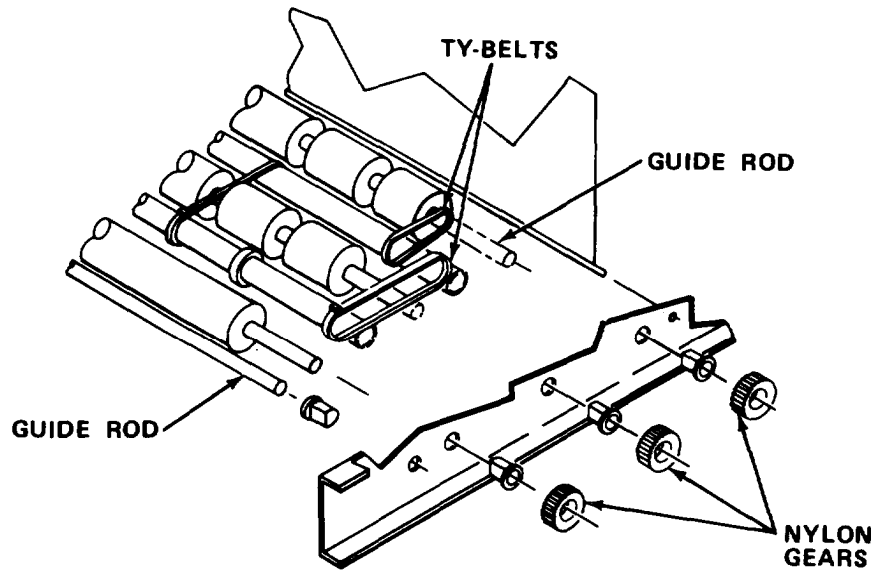
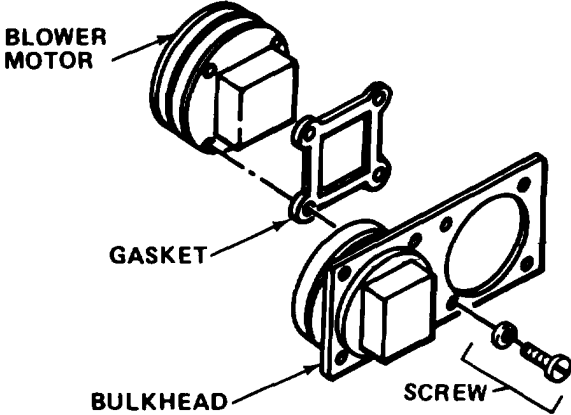
| ITEM NO.                               | INTER-VAL | ITEM TO BE INSPECTED<br>PROCEDURE   |
|--|-----------|---|
| <b>PHOTOGRAPHIC PRINT DRYER - Cont</b> |           |   |
| 1                                      | S         | <p><u>Service Print Dryer - Cont</u></p>  <p>                     23. Reinstall three nylon gears on upper roller assembly.<br/>                     24. Reinstall guide rods.<br/>                     25. Install ty-belts.<br/>                     26. Replace filter.                 </p> |

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

| ITEM NO.                               | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE  |
|--|----------|--|
| <b>PHOTOGRAPHIC PRINT DRYER - Cont</b> |          |  |
| 1                                      | S        | <p><u>Service Print Dryer - Cont</u></p>  <ol style="list-style-type: none"> <li>27. Remove blower motor bulkhead and blower motors by pulling upward.</li> <li>28. Disconnect blower motor electrical connections.</li> <li>29. Remove screws and blower motors from bulkhead. Inspect gaskets and replace as necessary.</li> <li>30. Clean blower motors with hand air pump to remove dust and dirt. Reinstall blower motors to bulkhead and reinstall assembly in cabinet.</li> <li>31. Reinstall bottom roller assembly.</li> <li>32. Slide gear motor and bracket to left to engage roller drive gear and coupling.</li> <li>33. Tighten gear motor mounting screws.</li> </ol> |

**Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

|          |          | B - Before<br>D - During<br>A - After | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially                            | (Number) - Hundreds of Hours   |
|----------|----------|---------------------------------------|--|---|--|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED                  |  | PROCEDURE   |  |
|          |          | 1                                     | S  | <u>PHOTOGRAPHIC PRINT DRYER - Cont</u><br><br><u>Service Print Dryer - Cont</u> | 34. Reinstall top roller assembly and secure with screws.<br><br>35. Reinstall blower cover and screws.<br><br>36. Replace drip tray and plug in power cord. |

**5-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES**

Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action notify your supervisor.

For unidentified malfunctions, use the facing schematic or the foldout located at the end of this manual for further fault analysis.

d. If any component of the print dryer does not power up when turned on, verify that 120 V is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power troubleshooting procedures for dead receptacle (Table 1-4).



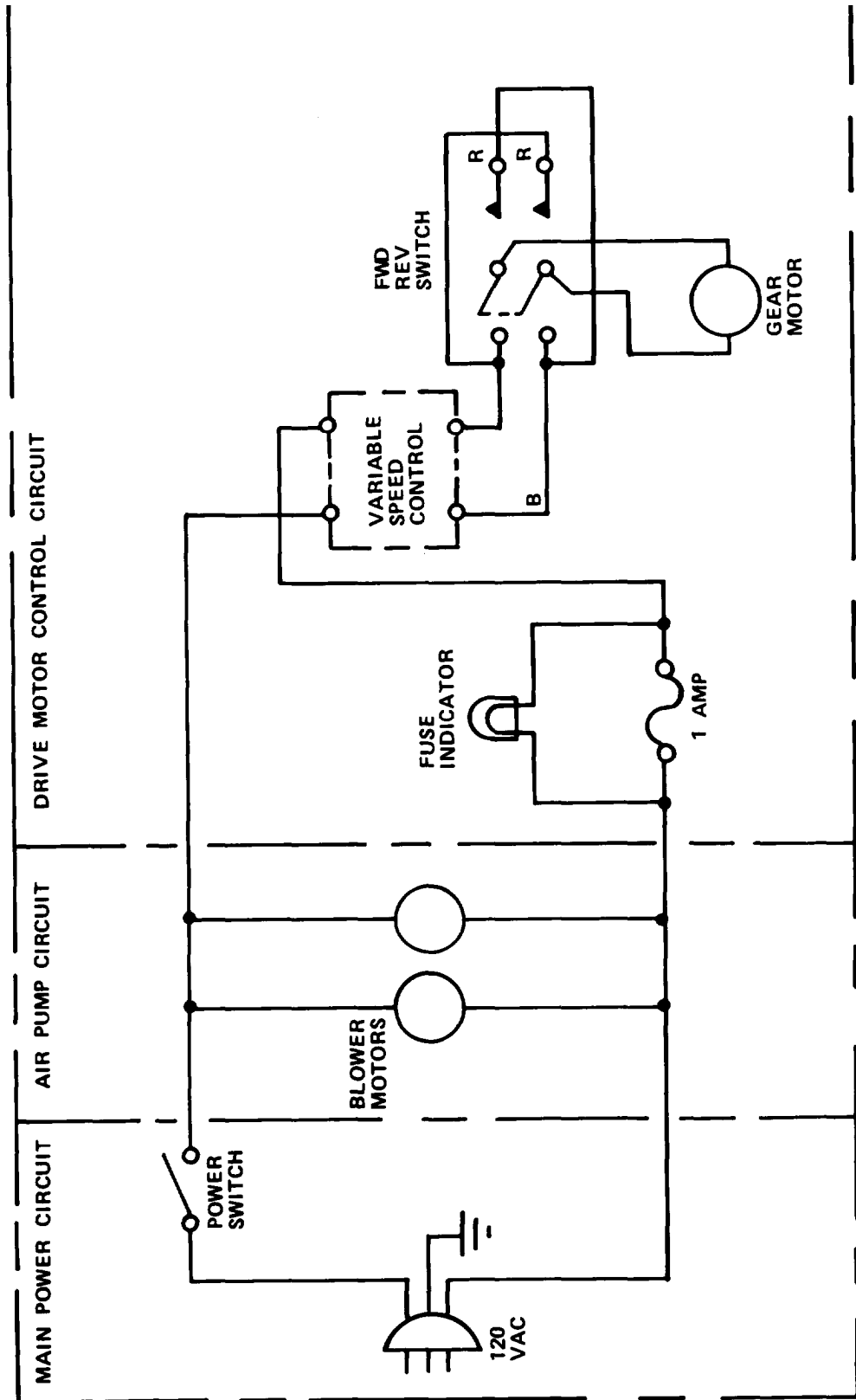


Table 5-4. ORGANIZATIONAL TROUBLESHOOTING

MALFUNCTION

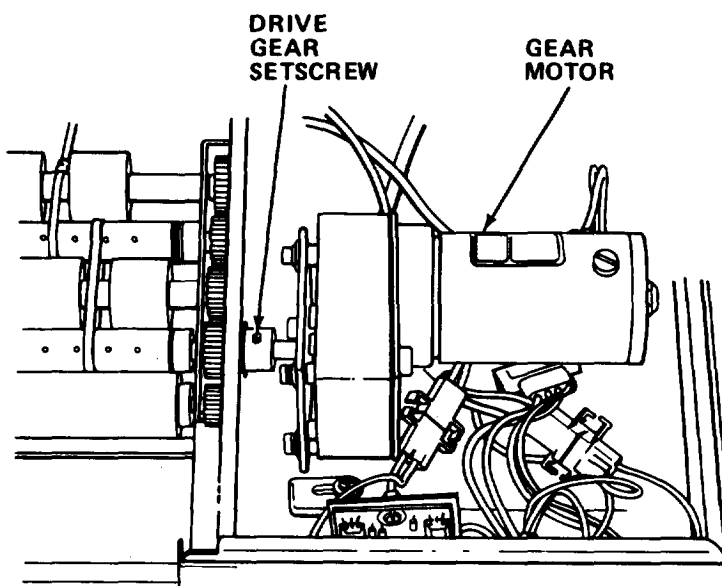
TEST OR INSPECTION

CORRECTIVE ACTION

1. ROLLERS DO NOT OPERATE BUT BLOWERS DO.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- Step 1. Check that aluminum drive gear setscrew is tight.
  - (a) If setscrew is tight, proceed to step 2.
  - (b) Tighten drive gear setscrew.
- Step 2. Check that gear motor assembly adjustment plate is at far left position and mounting screws are tight.
  - (a) If plate is mounted correctly and screws are tight, proceed to step 3.
  - (b) Adjust to far left and tighten screws.

Table 54. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION                                     | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|---|--|---|
| 1. ROLLERS DO NOT OPERATE BUT BLOWERS DO - Cont | Step 3. Check that motor connector is tight.   | <ul style="list-style-type: none"> <li>(a) If motor connector is tight, proceed to step 4.</li> <li>(b) Tighten motor connector.</li> </ul>   |
|   | Step 4. Check motor continuity as follows:   | <ul style="list-style-type: none"> <li>(a) Separate connector.</li> <li>(b) Using multimeter, connect leads to female terminals. Reading should be 50 ohms <math>\pm</math> 10 ohms.</li> <li>(c) If reading is correct, proceed to step 5.</li> <li>(d) Replace motor (paragraph 5-16.3).</li> </ul>   |
|   | Step 5. Check continuity on FWD/REV switch in both positions.  | <ul style="list-style-type: none"> <li>(a) If continuity is present, proceed to step 6.</li> <li>(b) Replace switch (paragraph 5-16.2).</li> </ul>  |
|   | Step 6. Check continuity on MOTOR SPEED control as follows:  | <ul style="list-style-type: none"> <li>(a) Set multimeter to RX10 scale.</li> <li>(b) Connect multimeter leads to the two terminals on the MOTOR SPEED control. Turn MOTOR SPEED control fully right. Meter should read 0. Slowly turn MOTOR SPEED control to the full left position. Meter reading should increase accordingly.</li> <li>(c) If readings are correct, proceed to step 7.</li> <li>(d) Replace MOTOR SPEED control (paragraph 5-16.2).</li> </ul> |
|   | Step 7. Check that wire end connector to power switch from bottom of MOTOR SPEED control is connected. | Connect wire end connector.   |

Table 5-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. ROLLERS OPERATE BUT BLOWERS DO NOT.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

Step 1. Check that two blower wire connectors in the plenum are connected properly.

(a) If wires are properly connected, proceed to step 2.

(b) Reconnect blower wire connectors.

Step 2. Check that wire connector from POWER switch to the two blower wires is properly connected.

(a) If connection is properly made, proceed to step 3.

(b) Reconnect wire connector.

Step 3. Check for loose wire from POWER switch to blower connector.

Reattach wires.

---

**5-16. MAINTENANCE PROCEDURES .**

This section contains instructions covering organizational maintenance functions for the photographic print dryer. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

**INDEX**

| PROCEDURES  | PARAGRAPH |
|---|-----------|
| Replace Controls . . . . .  | 5-16.1    |
| Replace Main Drive Gear. . . . .                                      | 5-16.2    |
| Replace Blower Motor . . . . .  | 5-16.3    |
| Replace Gear Motor. . . . .   | 5-16.4    |
| Remove/Install Photographic Print Dryer and Mounting Assembly . . . . | 5-16.5    |

5-16.1 Replace Controls.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 5/64 in. Hex Head Key Wrench  
1/4 in. Wrench  
5/16 in. Combination Wrench  
1/2 in. Combination Wrench  
9/16 in. Combination Wrench  
Soldering Iron

SUPPLIES: Motor Speed Control  
Power Switch  
Fuse Indicator Lamp  
FWD/REV Switch  
Solder (Item 30, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove screws and right cover.
- c. Remove screws securing control panel to cabinet.
- d. Tag and disconnect wiring at connectors and remove control cabinet.

**NOTE**

Tag electrical connections to be sure of proper reassembly.

- e. Unscrew and remove power switch protective cover and remove defective switch from rear of control panel.
- f. Tag and disconnect wiring.
- g. Reconnect wiring to new switch and install switch.
- h. Reinstall protective cover.
- i. Loosen setscrew on motor speed control knob. Remove knob and securing nut. Remove control from rear of control panel.
- j. Tag and disconnect wiring.
- k. Connect wiring on new control and install.

**NOTE**

Be sure control is set all the way to left and knob is pointing to zero.

- l. Reinstall nut and control knob.
- m. Remove securing nut from FMD/REV switch.
- n. Solder wiring on new switch and install switch. Secure with retaining nut.
- o. Remove securing clip from fuse Indicator light at rear of control panel. Tag and desolder wiring and remove indicator light from front of control panel.
- p. Install new fuse indicator light from front of control panel. Slip retaining clip over wiring and secure light to rear of panel, Resolder wiring.
- q. Reconnect electrical connections. Reinstall control panel in cabinet and reinstall right cover.

5-16.2 Replace Main Drive Gear.

MOS: 83FJ6, Reproduction Equipment Repairer

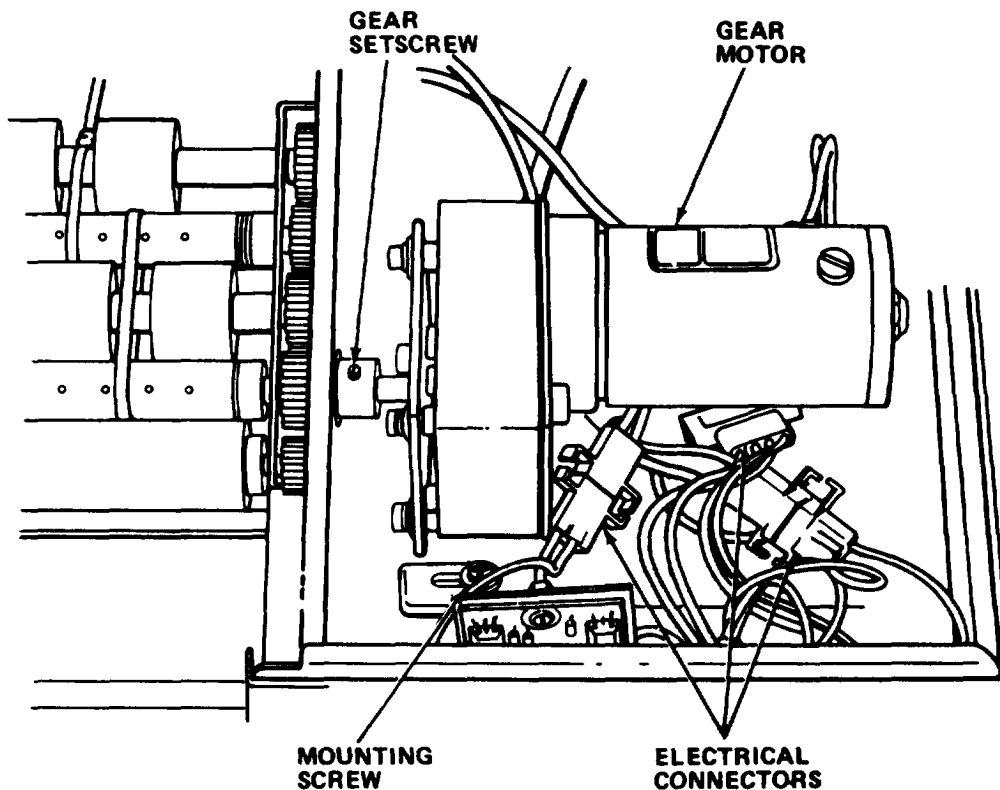
TOOLS: 1/4 in. Wrench  
5/32 in. Hex Head Key Wrench  
1/8 in. Hex Head Key Wrench

SUPPLIES: Main Drive Gear

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord and remove drip tray.
- b. Remove right cover.



- c. Tag and disconnect three electrical connectors.

**NOTE**

Note position of ground wire (green) on drive motor mount.



- d. Disconnect ground wire.
- e. Remove mounting screws.
- f. Remove gear motor assembly from cabinet.
- g. Remove setscrew from main drive gear.

**NOTE**

Note position of main gear location on gear motor shaft.

- h. Remove defective gear.
- i. Install new main drive gear in correct position and tighten setscrew.
- j. Reinstall gear motor assembly in cabinet and mesh main drive gear with roller drive gears.
- k. Reconnect ground wire and secure gear motor assembly with mounting screws.
- l. Reconnect electrical connections.
- m. Reinstall right cover.
- n. Reinstall drip tray.
- o. Plug in power cord.

5-16.3 Replace Blower Motor

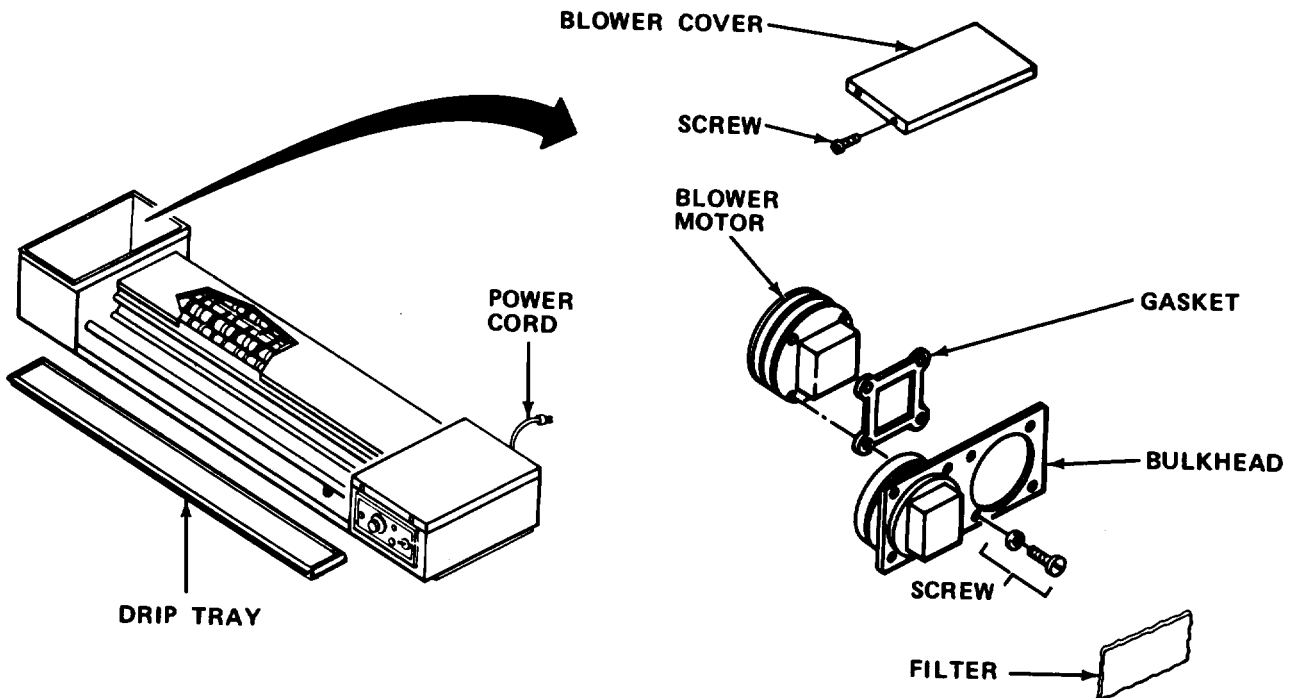
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Hex Head Key Wrench Set

SUPPLIES: Blower Motor  
Blower Motor Gasket

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Unplug power cord and remove drip tray.
- b. Remove blower cover.
- c. Remove blower motor bulkhead containing blower motors by pulling upward.
- d. Disconnect electrical connection.
- e. Remove defective blower motor from bulkhead. Check gasket and replace if necessary.
- f. Install new blower motor and gasket to bulkhead.
- g. Reconnect electrical connections.
- h. Reinstall blower cover.

5-16.4 Replace Gear Motor.

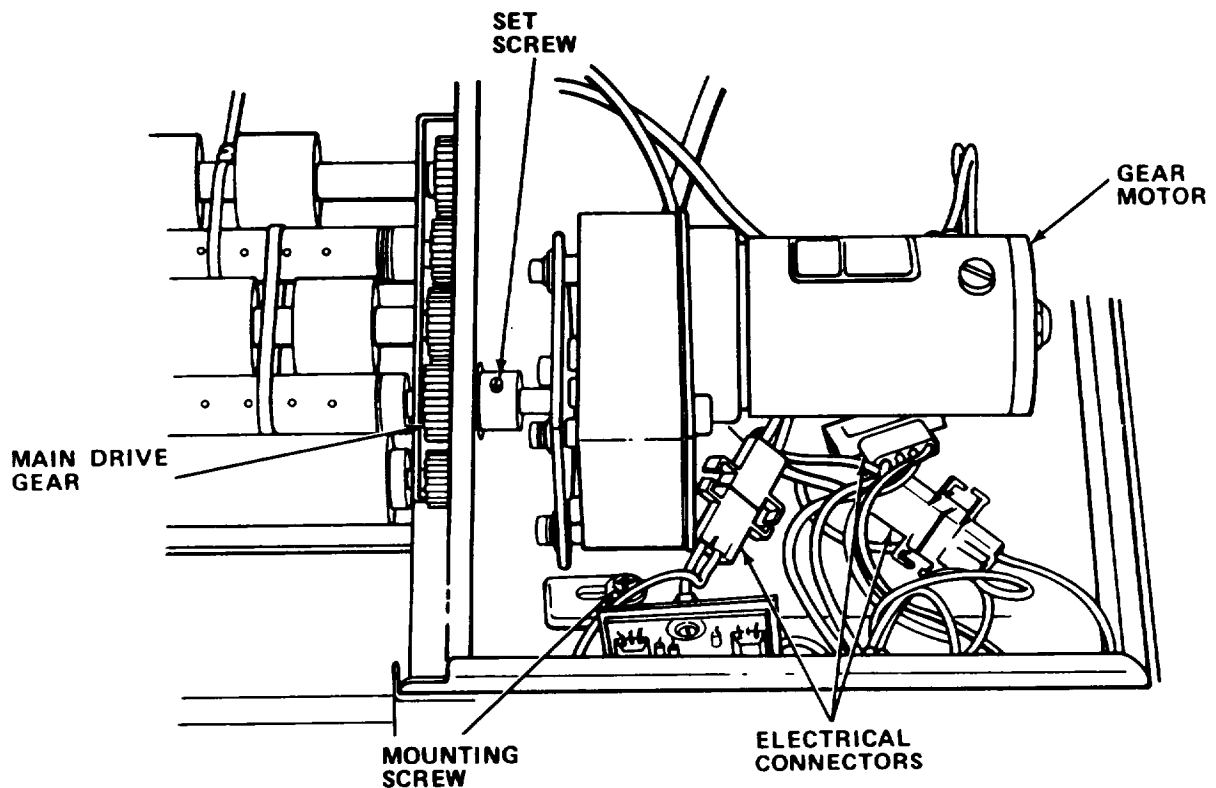
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/4 in. Wrench  
1/8 in. Hex Head Key Wrench

SUPPLIES: Gear Motor

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Unplug power cord.
- b. Remove right cover.
- c. Disconnect three electrical connections.

**NOTE**

Note position of ground wire (green).

- d. Remove mounting screws and defective gear motor assembly from cabinet.

- e. Loosen setscrew and remove main drive gear.
- f. Install main drive gear on new gear motor and tighten setscrew.
- g. Reinstall gear motor assembly and mesh main drive gear with roller drive gear.
- h. Reconnect ground wire (green) and secure gear motor assembly with mounting screws.
- i. Reconnect electrical connections.
- j. Reinstall cover.
- k. Plug in power cord.

5-16.5 Remove/Install Photographic Print Dryer and Mounting Assembly.

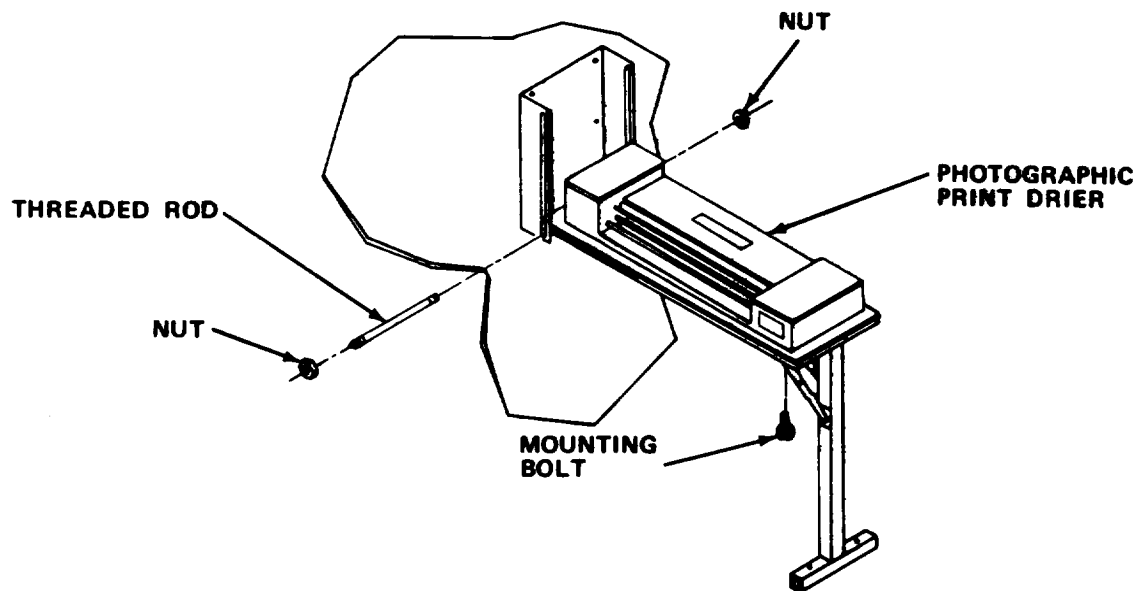
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 8 in. Adjustable Wrench

SUPPLIES: Photographic Print Dryer  
Mounting Assembly

**NOTE**

If only the print dryer is to be replaced, perform steps a. and i.



- a. Unplug power cord.
- b. Unbolt and remove photographic print dryer from mounting assembly.
- c. Remove nuts and threaded rod from table.
- d. Remove table.
- e. Unbolt bracket from wall.
- f. Inspect table and bracket for damaged or broken parts.

**NOTE**

Parts of table are repairable and may be replaced instead of replacing the entire table or bracket.

- g. Replace bracket on wall and secure with wall mounting bolts.
- h. Replace table and secure threaded rod and nuts to wall bracket.
- i. Check operation of table and be sure that it folds up and down properly.
- j. Bolt photographic print dryer to table.
- k. Plug in power cord.

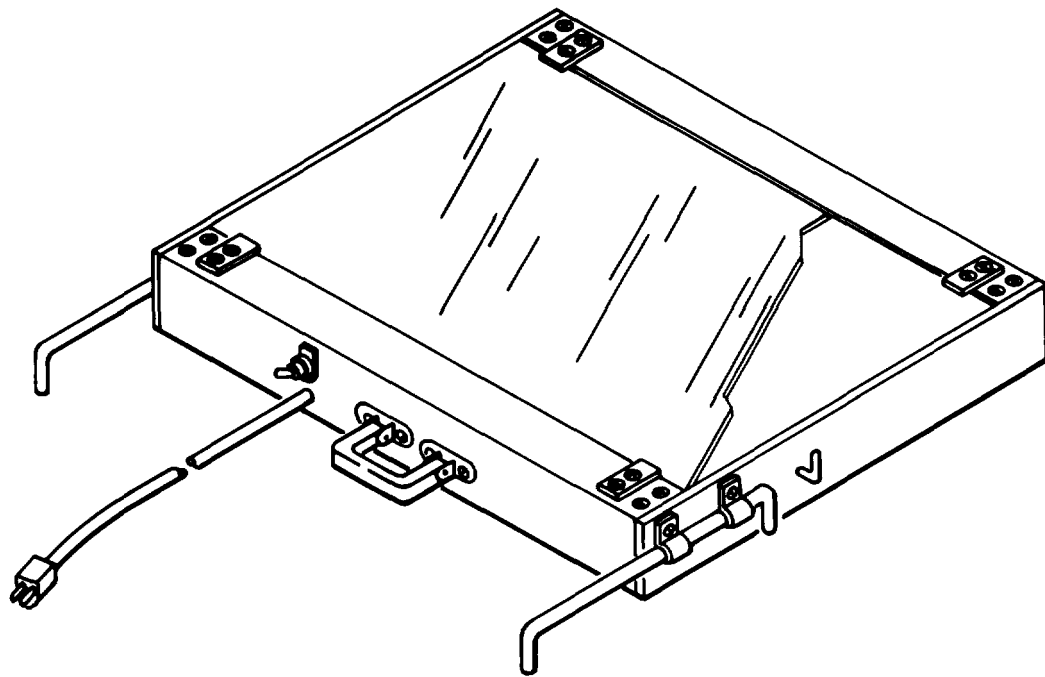
**5-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.









**CHAPTER 6**  
**PORTABLE TRACING/SCRIBING BOARD**

**Section I INTRODUCTION**

**6-1. GENERAL INFORMATION.**

6-1.1 Scope.

- a. Model Number and Equipment Name. Model 51J3 Portable Tracing/Scribing Board.
- b. Purpose of Equipment. To provide illuminated work surface for tracing or scribing.

**6-2. EQUIPMENT DESCRIPTION.**

6-2.1 Equipment Characteristics, Capabilities, and Features. Provides lightweight, portable, and diffused light source. Used as work surface for tracing or scribing.

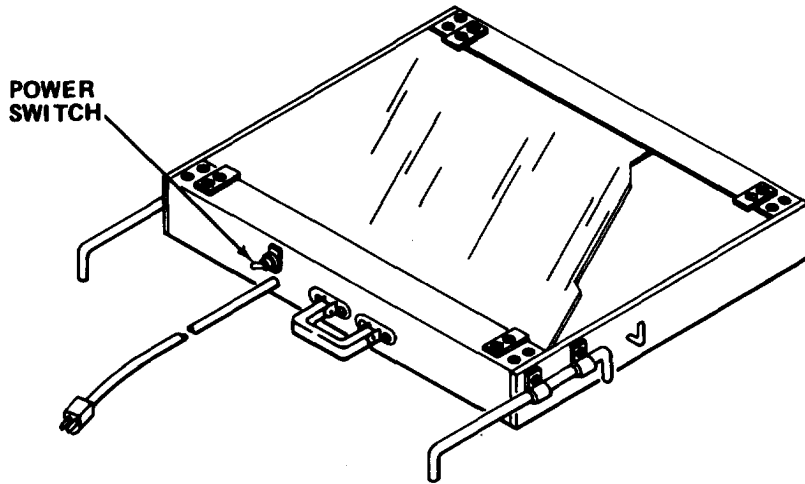
**6-2.2 Equipment Data.**

|                    |  |
|--------------------|--|
| Power Requirements | 110 V, 60 Hz                               |
| Illumination       | Two 30 W fluorescent lamps.                |
| Work Surface       | 36.0 in. X 23.5 in.<br>(91.4 cm X 59.7 cm) |

**6-3. TECHNICAL PRINCIPLES OF OPERATION.** Principles of operation are combined with operator's controls and indicators for this equipment.

Section II OPERATING INSTRUCTIONS

6-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



| Control or Indicator | Function  |
|----------------------|---|
| POWER SWITCH         | Two-position toggle switch to control illumination. |

6-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform you before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS AND CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If your equipment fails to operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

6-5.1 PMCS Procedures.

PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.

- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.

c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.

d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.

e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.

f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

g. Interval columns. This column determines the time period designated to perform your PMCS.

h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

j. List of tools and materials required for PMCS is as follows.

| <u>Item</u>                      | <u>Quantity</u> |
|----------------------------------|-----------------|
| Cheesecloth (Item 7, Appendix E) | ar              |

Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make complete checks and services when the equipment can be shut down.

B Before  
 D During  
 A After

W - Weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

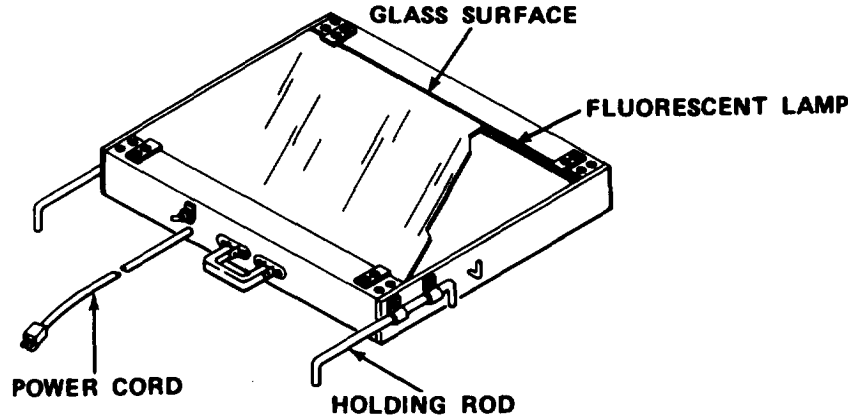
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 1        | B        | <p><b><u>PORTABLE TRACING/SCRIBING BOARD</u></b></p>  <p><u>Inspect/Clean.</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.</p> <ol style="list-style-type: none"> <li>1. Rotate each holding rod to check for freedom of movement.</li> </ol> |  |

Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
 D - During  
 A After

W - Weekly  
 M - Monthly  
 Q - Quarterly

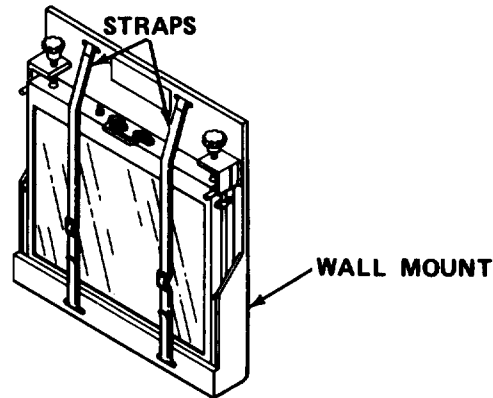
AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If:  |
|----------|----------|--|---|
| 1        | B        | <p><b><u>PORTABLE TRACING/SCRIBING BOARD - Cont</u></b></p> <p><u>Inspect/Clean - Cont</u></p> <ol style="list-style-type: none"> <li>2. Check power cord for kinks, frays, or burns. If power cord is defective, notify organizational maintenance.</li> <li>3. Check fluorescent lamps for partial lighting. Replace as needed (paragraph 6-10.2).</li> <li>4. Check glass surface for dust and dirt. Wipe glass surface with moistened cheesecloth. Wipe surface with clean dry cheesecloth to remove smears or streaks. Check glass surface for cracks or scratches. Replace as needed.</li> </ol> | <p>Power cord is damaged.</p> <p>Fluorescent lamp is defective.</p> <p>Glass surface is cracked or scratched.</p> |

**6-6. OPERATION UNDER USUAL CONDITIONS.**

**6-6.1 Assembly and Preparation for Use.**



a. Remove portable tracing/scribing board from wall mount by loosening straps. Place board on work surface.

b. Plug in power cord, and turn power switch on.

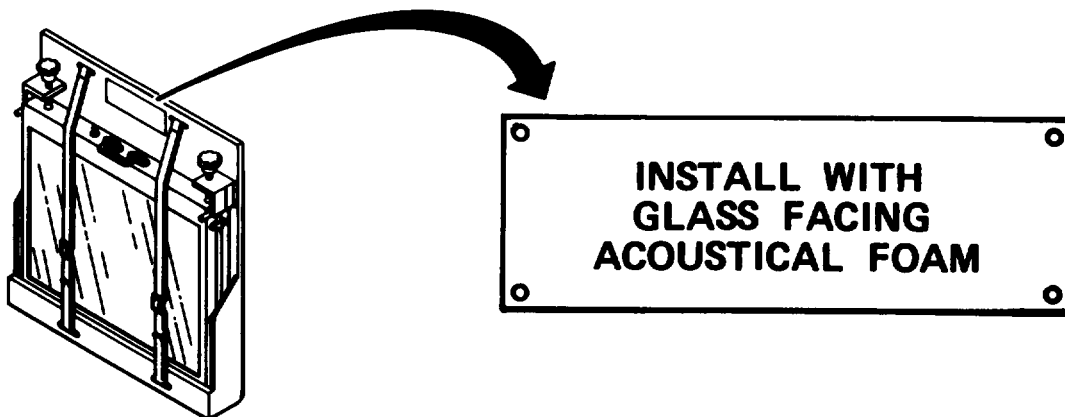
**6-6.2 Preparation for Movement.**

a. Turn power switch off, and unplug power cord.

b. Place board in wall mount with glass surface facing padded mount.

c. Secure board in wall mount with straps.

**6-6.3 Operating Instructions on Decals and Instructions Plates.**



**6-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**6-8. LUBRICATION INSTRUCTIONS .** This equipment does not require lubrication.

**6-9. TROUBLESHOOTING PROCEDURES.**

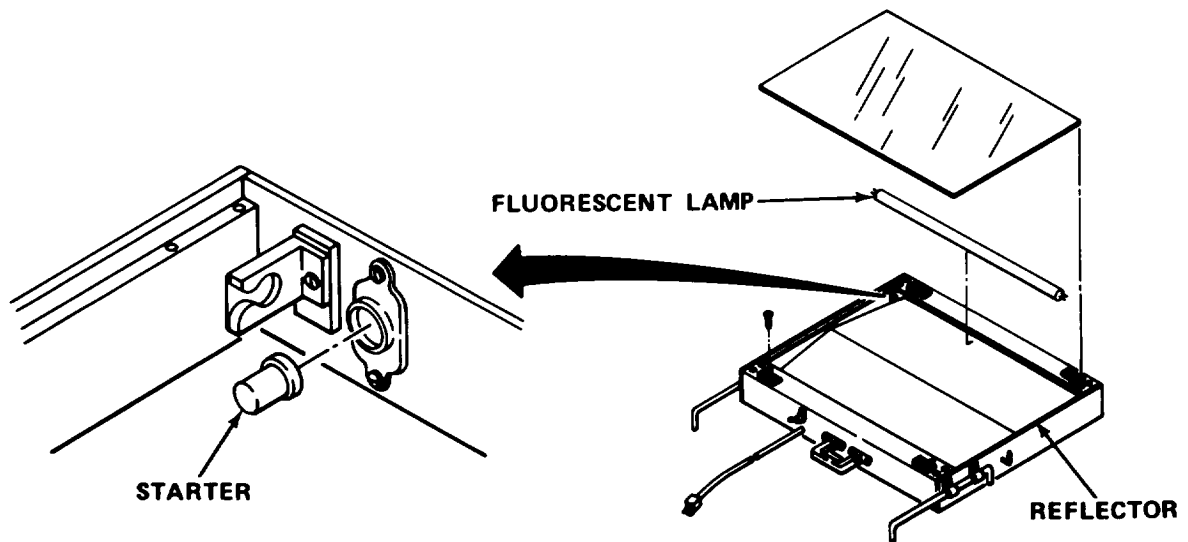
a. The table lists the common malfunctions which you may find during operation or maintenance of the portable tracing/scribing board, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**Table 6-2. TROUBLESHOOTING**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

1. ILLUMINATION UNEVEN.



**WARNING**

Use care when power is connected during inspections or corrective actions. Death or serious injury may result.

Step 1. Check to see if reflector behind fluorescent lamps is dirty.

Clean reflector (paragraph 6-10.1).

Table 6-2. TROUBLESHOOTING - Cont

---

|                    |                   |  |
|--------------------|-------------------|--|
| MALFUNCTION        |                   |  |
| TEST OR INSPECTION |                   |  |
|                    | CORRECTIVE ACTION |  |

---

**1. ILLUMINATION UNEVEN - Cont**

Step 2. Check to see if one fluorescent lamp is partially lighted or is dark.

Replace fluorescent lamp (paragraph 6-10.2).

Step 3. Check to see if either fluorescent lamp is partially lighted.

Replace defective starter (paragraph 6-10.3).

---

**6-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the portable tracing/scribing board. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE                           | PARAGRAPH |
|-------------------------------------|-----------|
| Clean Reflector . . . . .           | 6-10.1    |
| Replace Fluorescent Lamp... . . . . | 6-10.2    |
| Replace Starter . . . . .           | 6-10.3    |
| Replace Glass Surface . . . . .     | 6-10.4    |

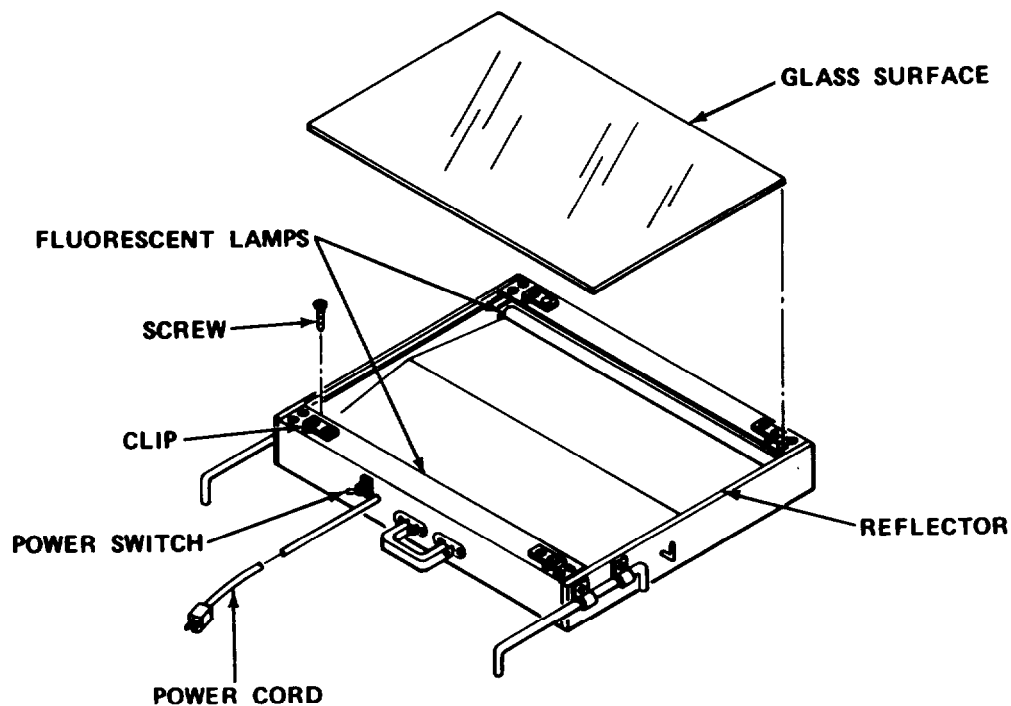


6-10.1 Clean Reflector.

MOS: 81C, Cartographer

TOOLS: Cross Tip Screwdriver  
Vacuum Cleaner

SUPPLIES: Cheesecloth (Item 7, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to right or left.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

- d. Remove glass surface.
- e. Vacuum reflector surface and fluorescent lamps with brush attachment on vacuum cleaner.

**NOTE**

Be sure fluorescent lamps are secure in their sockets.

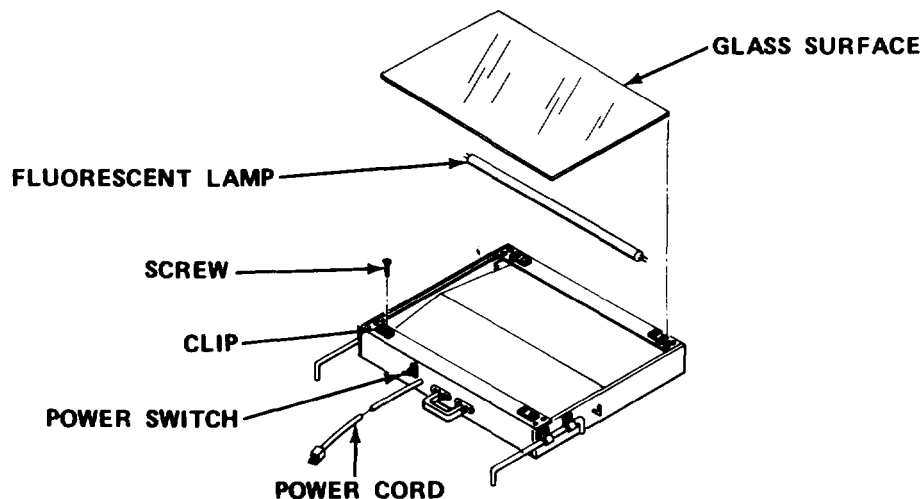
- f. Wipe reflector and lamps with moistened cheesecloth.
- g. Wipe or vacuum both sides of glass surface.
- h. Reinstall glass surface.
- i. Turn clips to secure glass surface. Aline holes, and reinstall screws. Tighten all screws.
- j. Plug in power cord, and turn power switch on.

6-10.2 Replace Fluorescent Lamp.

MOS: 81C, Cartographer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Fluorescent Lamp (30 W)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to right or left.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

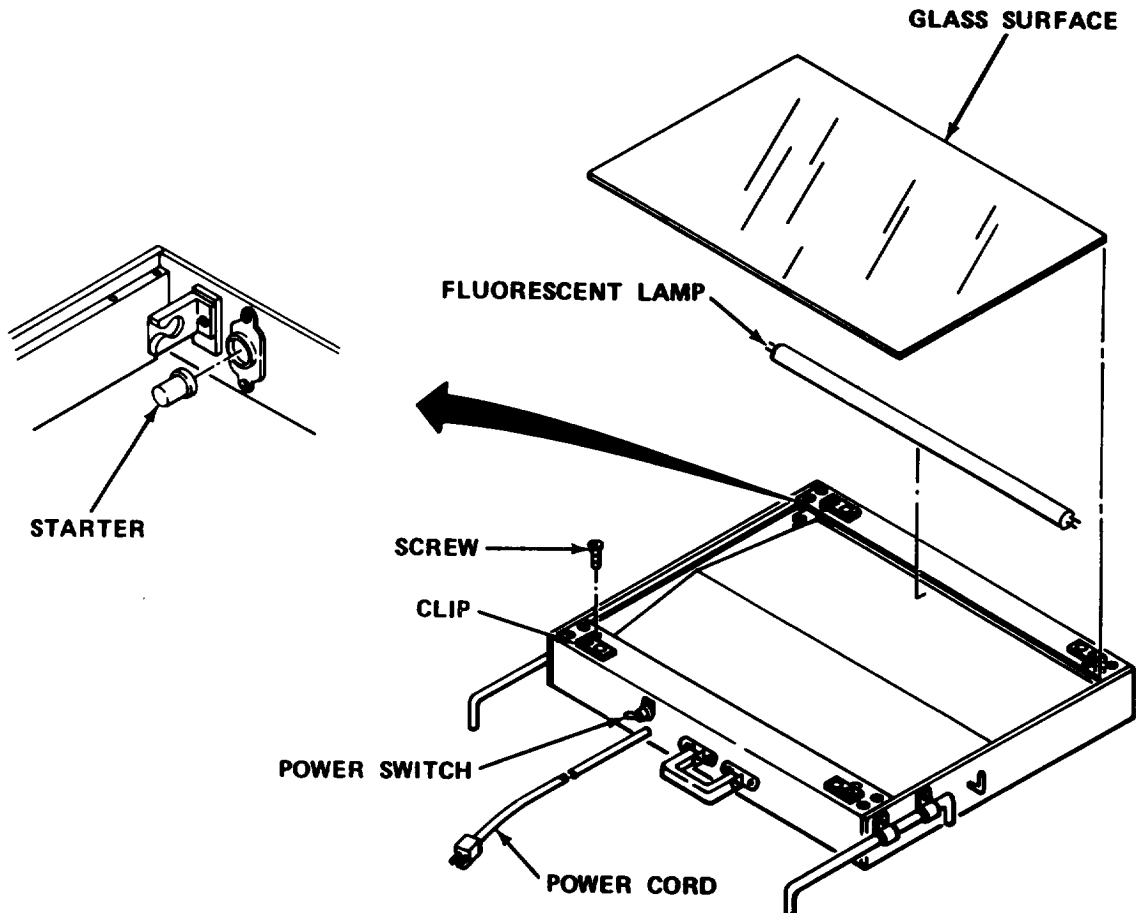
- d. Remove glass surface.
- e. Remove defective fluorescent lamp.
- f. Install new fluorescent lamp.
- g. Reinstall glass surface.
- h. Turn clips to secure glass surface. Aline holes, and reinstall screws. Tighten all screws.
- i. Plug in power cord, and turn power switch on.

6-10.3 Replace Starter.

Mos: 81C, Cartographer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Starter



**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to right or left.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

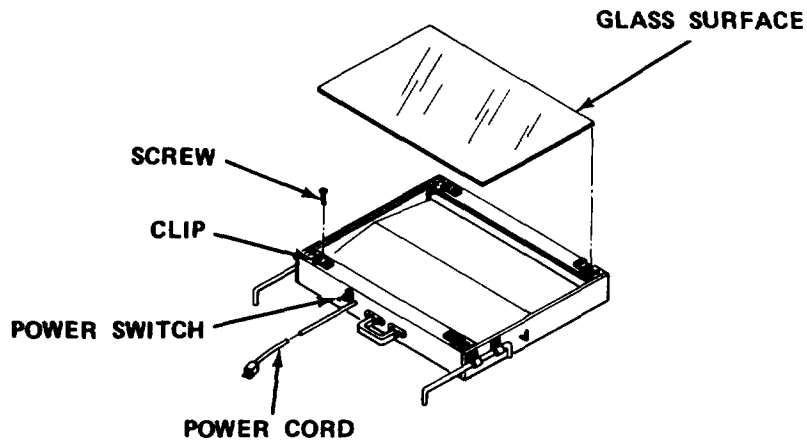
- d. Remove glass surface.
- e. Remove fluorescent lamp in front of starter.
- f. Remove starter by pushing in and turning left until free.
- g. Install new starter in socket by pushing in and turning right until locked.
- h. Reinstall fluorescent lamp.
- i. Reinstall glass surface.
- j. Turn clips to secure glass surface. Align holes, and reinstall screws. Tighten all screws.
- k. Plug in power cord, and turn power switch on.

6-10.4 Replace Glass Surface.

MOS: 81C, Cartographer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Glass Surface



**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to left or right.

**WARNING**

Use care when handling damaged glass. Failure to do so may result in serious cuts.

- d. Remove damaged glass surface.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

- e. Install new glass surface.
- f. Turn clips to secure glass surface. Aline holes, and reinstall screws. Tighten all screws.
- g. Plug in power cord, and turn power switch on.

## Section IV ORGANIZATIONAL MAINTENANCE

**6-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**6-12. REPAIR PARTS, SPECIAL TOOLS: TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

6-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

6-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

6-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools list, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**6-13. SERVICE UPON RECEIPT.**

6-13.1 Checking Unpacked Equipment.

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**6-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

**6-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.** There are no organizational troubleshooting procedures assigned for this equipment.

**6-16. ORGANIZATIONAL MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the portable tracing/scribing board. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

### NOTE

The maintenance procedures for the portable tracing/scribing board consist of replacing three different electrical components. A multimeter is needed to determine which component is defective and needs replacement.

INDEX

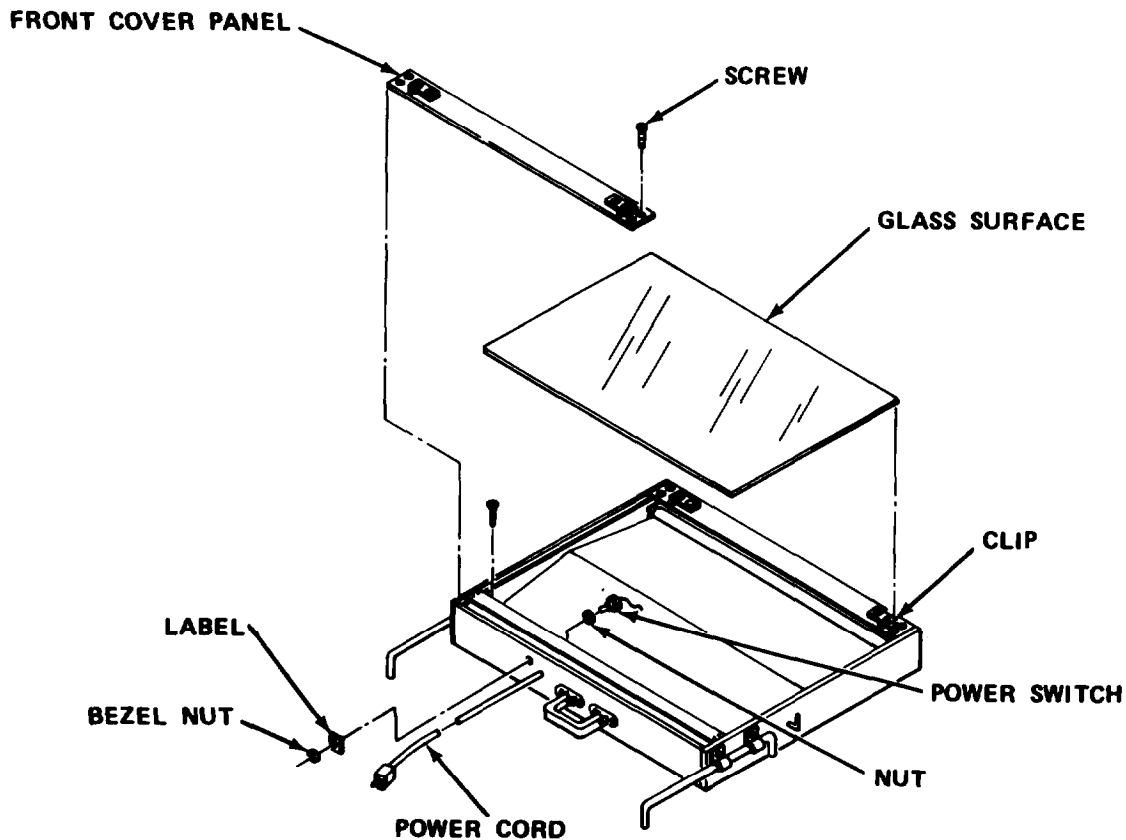
| PROCEDURE                                 | PARAGRAPH |
|---|-----------|
| Replace Power Switch . . . . .            | 6-16.1    |
| Replace Power Cord . . . . .              | 6-16.2    |
| Replace Ballast Transformer . . . . .     | 6-16.3    |
| Remove/Install Mounting Bracket . . . . . | 6-16.4    |

6-16.1 Replace Power Switch.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver  
6 in. Adjustable Wrench

SUPPLIES: Power Switch





**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to left or right.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

- d. Remove glass surface and set aside.
- e. Remove screws and front cover panel.
- f. Remove bezel nut, label, and nut from power switch.

**NOTE**

Ground wire is not connected to switch. Mark position for reinstallation.

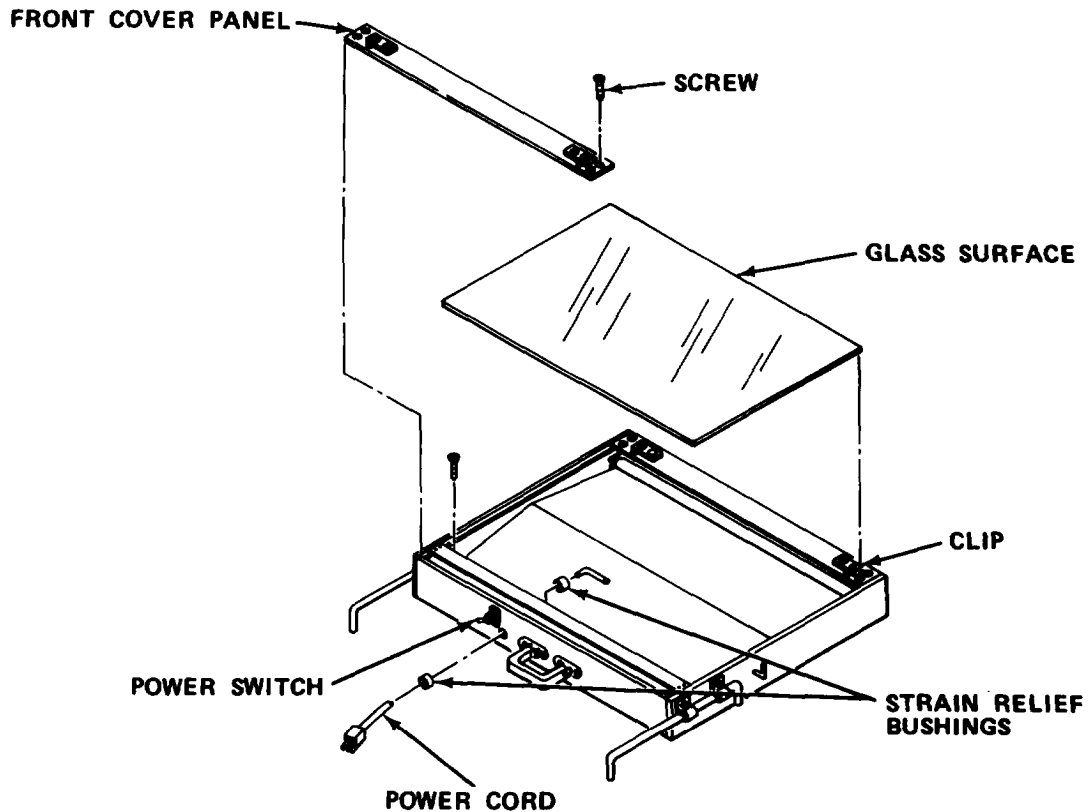
- g. To remove defective power switch, pull to inside of board. Tag and disconnect wires.
- h. Remove defective switch.
- i. Connect wiring to new power switch and remove tags.
- j. Reinstall nut, label, and bezel nut. Adjust for proper positioning of power switch.
- k. Reinstall front cover panel and secure with screws.
- l. Reinstall glass surface.
- m. Turn clips 90° to secure glass surface.
- n. Reinstall screws on clips. Tighten all screws.
- o. Plug in power cord, and turn power switch on.

6-16.2 Replace Power Cord.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver  
Needle Nose Pliers

SUPPLIES: Power Cord



**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to left or right.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

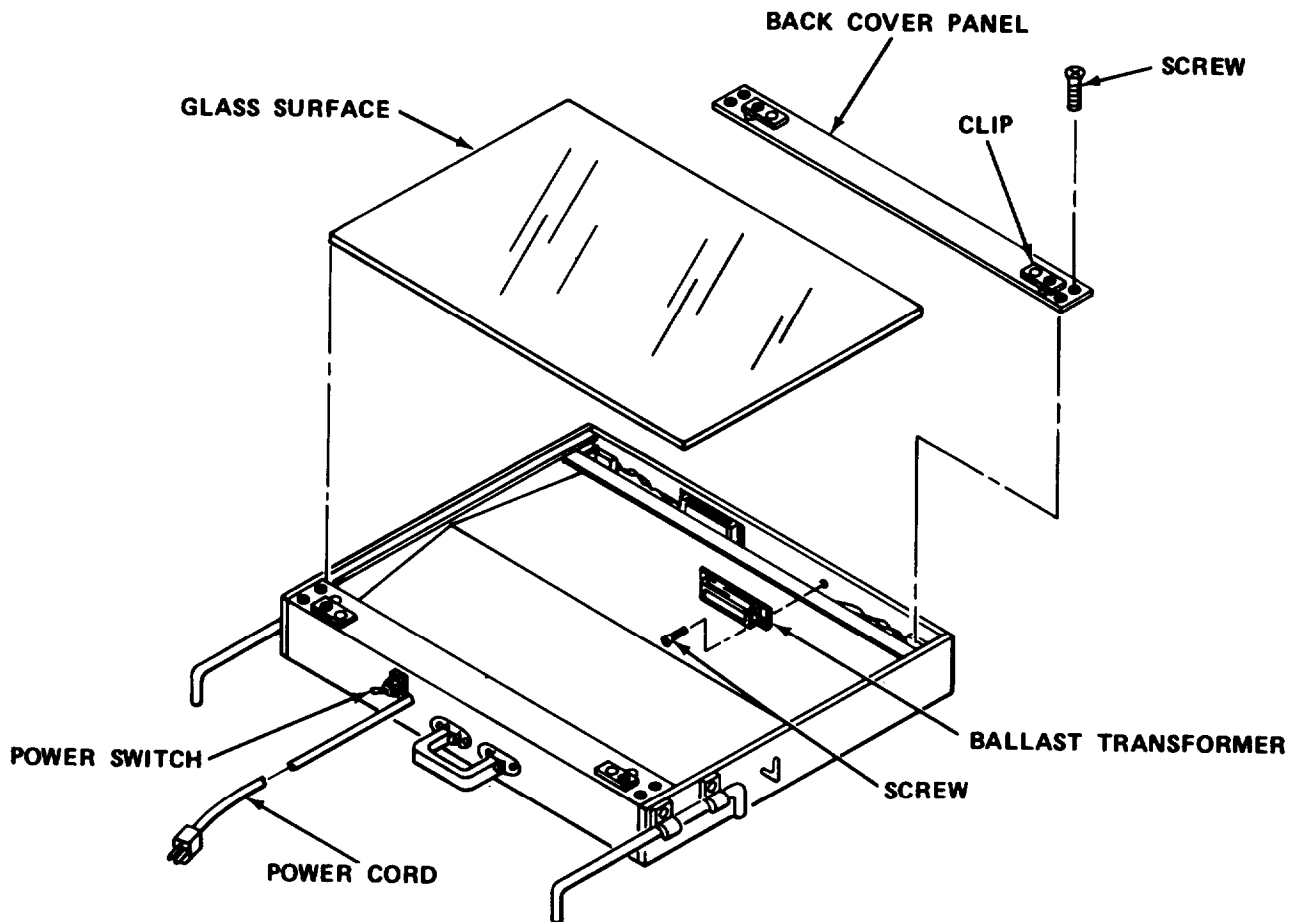
- d. Remove glass surface and set aside.
- e. Remove screws and front cover panel.
- f. Tag and disconnect wires to remove defective power cord.
- g. Remove inner and outer strain relief bushings and remove defective power cord.
- h. Reinstall inner and outer strain relief bushings on new power cord.
- i. To install, connect wires to power cord, and remove tags.
- j. Reinstall front cover panel, and secure with screws.
- k. Reinstall glass surface.
- l. Turn clips 90° to secure glass surface.
- m. Reinstall screws on clips. Tighten all screws.
- n. Plug in power cord, and turn power switch on.

6-16.3 Replace Ballast Transformer.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Ballast Transformer



**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power switch off, and unplug power cord.
- b. Remove one screw from each of four clips. Loosen other screws.
- c. Turn clips 90° to left or right.

**CAUTION**

Glass surface must be handled with care to avoid chipping or breaking.

- d. Remove glass surface and set aside.
- e. Remove screws and back cover panel.
- f. Remove screws and defective ballast transformer.
- g. Disconnect and tag wires from ballast transformer.
- h. Connect wiring on new ballast transformer, and remove tags.
- i. Install new ballast transformer, and secure with screws.
- j. Reinstall back cover panel, and secure with screws.
- k. Reinstall glass surface.
- l. Turn clips 90° to secure glass surface.
- m. Reinstall screws on clips. Tighten all screws.
- n. Plug in power cord, and turn power switch on.

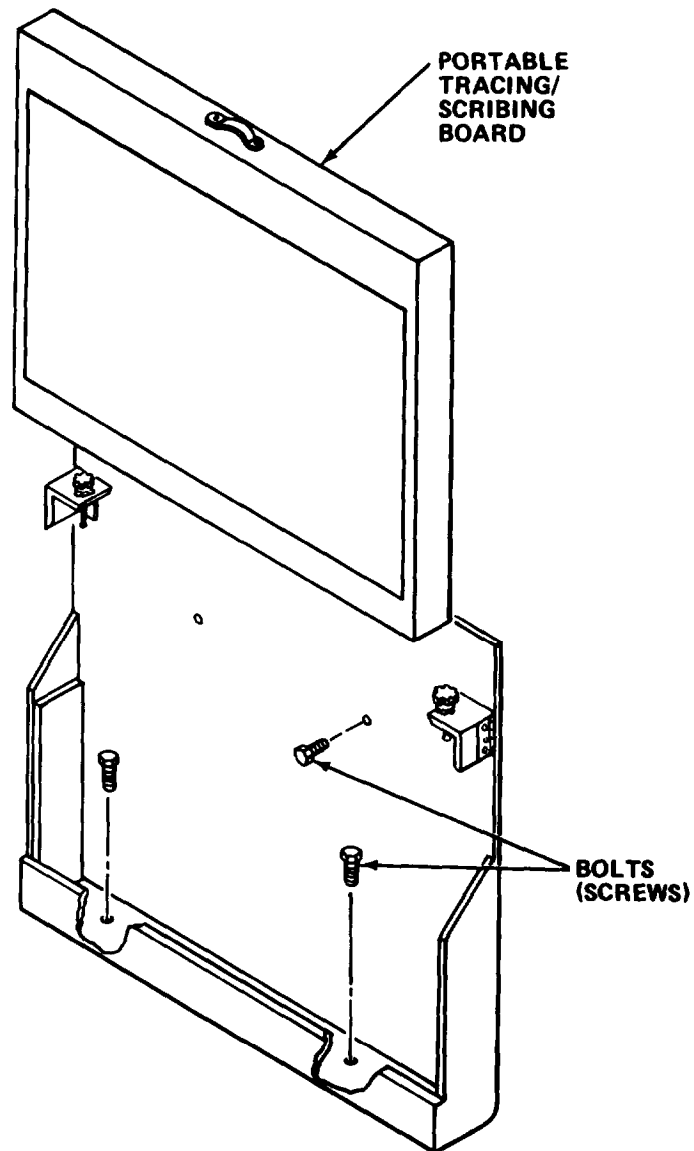
6-16.4 Remove/Install Mounting Bracket.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/4 in. Socket Set  
Cross Tip Screwdriver

SUPPLIES: Mounting Bracket

- a. Remove portable tracing/scribing board from mounting bracket.



- b. Remove attaching hardware securing defective mounting bracket to wall.
- c. Remove attaching hardware securing defective mounting bracket to floor.
- d. Remove defective mounting bracket.
- e. Secure new mounting bracket to wall with attaching hardware.
- f. Secure new mounting bracket to floor with attaching hardware.
- g. Reinstall portable tracing/scribing board.

**6-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

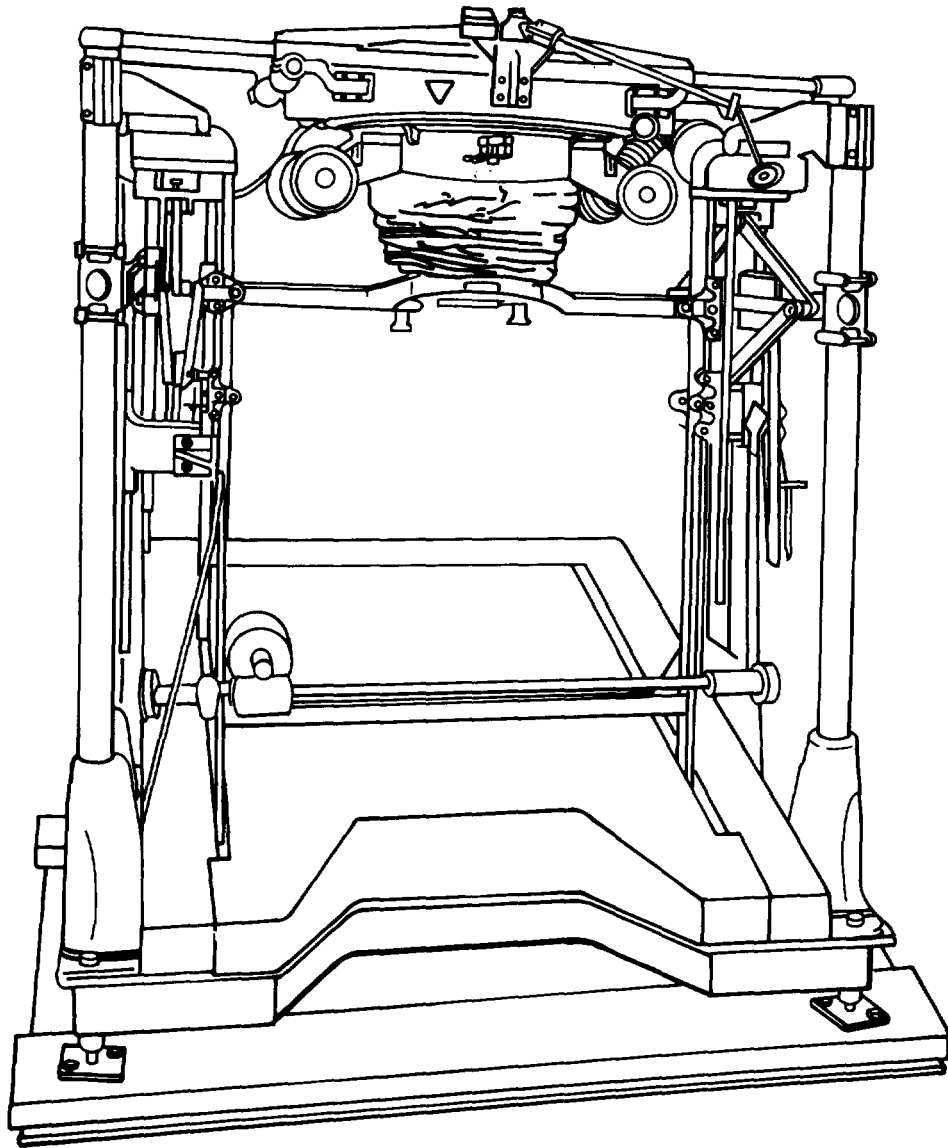
#### **Section V DIRECT GENERAL SUPPORT MAINTENANCE**

There are no direct/ general support maintenance procedures assigned for this equipment.









## CHAPTER 7

## PHOTOGRAMMETRIC RECTIFIER

## Section I INTRODUCTION

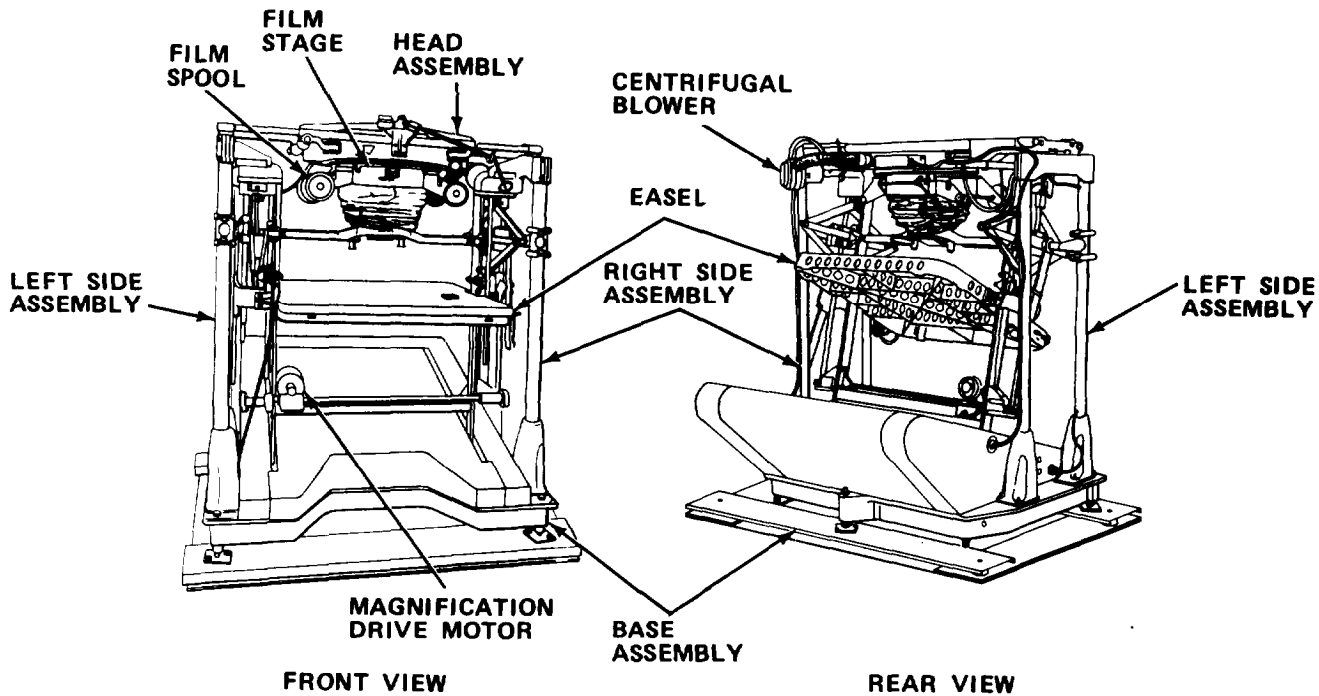
**7-1. GENERAL INFORMATION.**7-1.1 Scope.

- a. Model Number and Equipment Name. Model 53-31-03 Photogrammetric Rectifier.
- b. Purpose of Equipment. To transform near vertical or low oblique aerial negatives into scaled and untilted positives.

**7-2. EQUIPMENT DESCRIPTION.**7-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Rapidly rectifies 6 in. to 12 in. (15.24 cm and 30.48 cm) aerial photographs taken at tilt of less than 20 degrees.
- b. Magnification range is 0.6 to 3.5 times size of negative.
- c. Sharp focus condition is automatically maintained throughout magnification and tilt range.
- d. Uses sheet or roll negatives.
- e. Positive material can be used to assemble photomosaics.
- f. Dynamic braking.
- g. Nine-speed electronic shutter.

7-2.2 Location and Description of Major Components.



**HEAD ASSEMBLY.** Consists of X- and Y-drive shafts, brackets, and screws which control movement of negative right, left, front, and rear. Lamphouse provides light source using grid of fluorescent lamps which produces light of high visual intensity and distributes it uniformly over image area.

**FILM STAGE.** Aerial negative is held in film stage for projection of image onto easel. Stage consists of two glass plates, stage plate, and pressure plate. Negative is held flat against stage plate by pressure plate.

**CENTRIFUGAL BLOWER.** Used to circulate filtered air through lamphouse. This prevents increase of temperatures at the film stage from the light grid which could affect dimensional stability of film.

**EASEL.** Provides projection plane upon which photosensitive material is positioned. Permanently magnetized paperweights are used to hold photosensitive material in place during exposure. Trough at front edge of easel prevents water from dripping into base when wet photosensitive paper is used. Trough is drained by opening valve to which rubber hose can be attached.

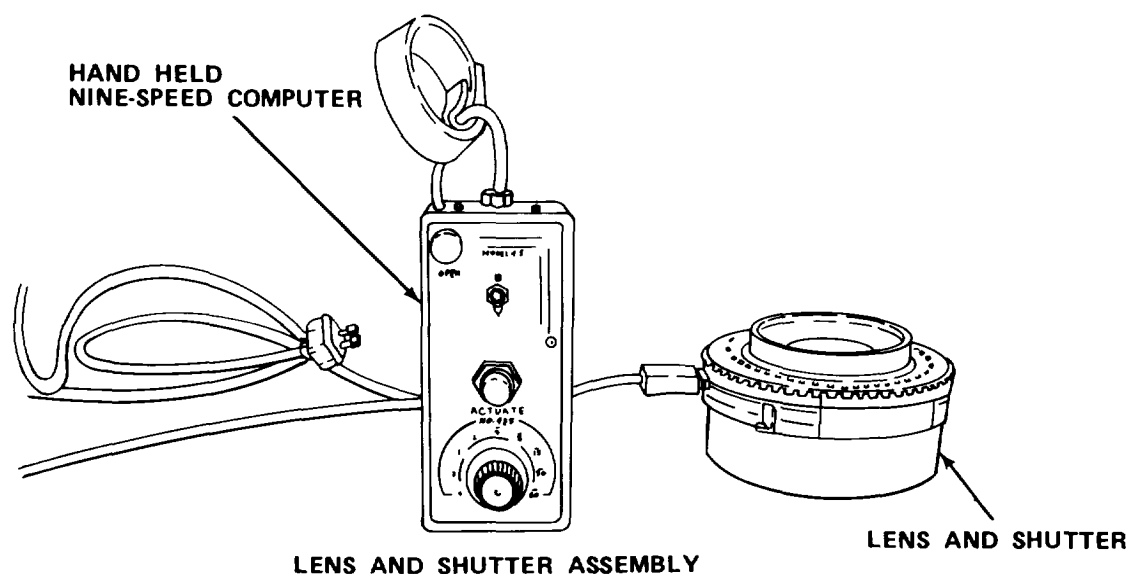
**RIGHT SIDE ASSEMBLY.** Consists of column header, inverter unit, and tilt control mechanism. Column header maintains correct spacing of each column. Inverter unit and tilt control are mechanical linkage systems that move lens support arm and easel along guide bars in proper correlation to maintain sharp focus at easel during magnification and tilt operations.

**BASE ASSEMBLY.** Supports rectifier. Contains tilt motor, tilt limit switches, left and right tilt drive spindles, high voltage transformer for grid of fluorescent lamps, electrical outlets, circuit breaker, and tilt and mag drive motor electronics. Leveling feet and stabilizing support bolts are used to level rectifier and prevent possibility of unbalancing rectifier.

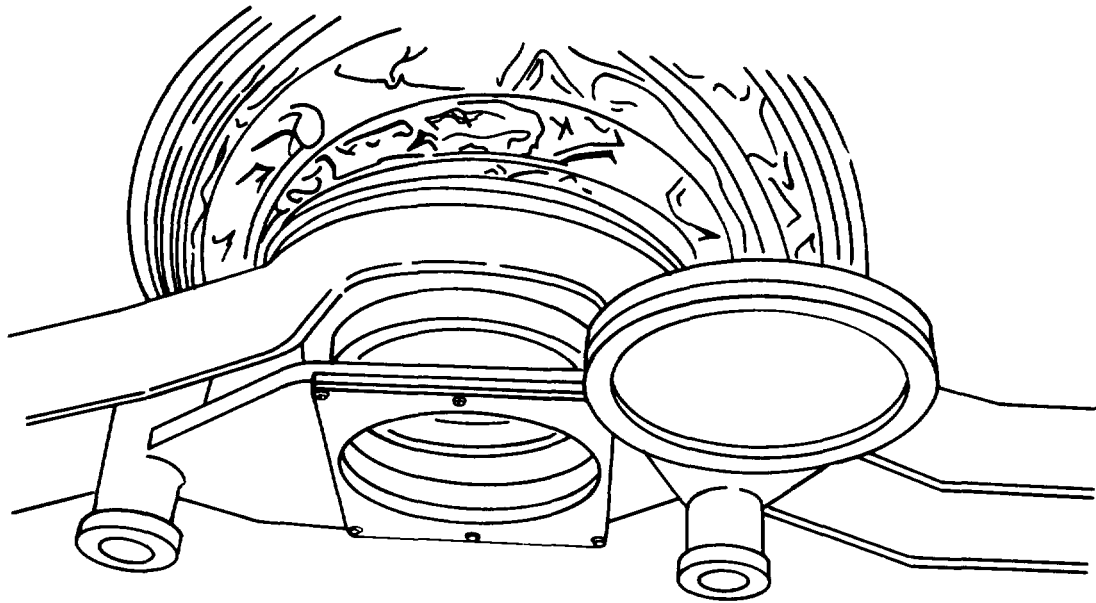
**MAGNIFICATION DRIVE MOTOR.** Controls reduction or enlargement of image size. Motor activates inverter units through driving members to control image size.

**LEFT SIDE ASSEMBLY.** Consists of column headers, inverter unit, and tilt control mechanism. Column headers maintain correct spacing of each pair of columns. Inverter unit and tilt control is a mechanical linkage system which move lens support arm and easel along guide bars in proper correlation to maintain sharp focus condition at easel during magnification and tilt operation.

**FILM SPOOLS.** Mounted on shafts on either side of film stage. One is a take-up spool; other, a supply spool.



**LENS AND SHUTTER ASSEMBLY.** Attached to lens support arm. Lens and shutter are manufactured to form an inseparable unit. Lens is 5.5 in. (13.97 cm) enlarging Metrogon with a between lens Compur-type shutter, permitting time and instantaneous exposures. Stops vary between f/5.6 and f/32 and are indicated on the aperture scale. The calibrated focal length is engraved on the shutter.



**FILTER MOUNT ASSEMBLY**

FILTER MOUNT ASSEMBLY. Attached to lens support arm. One filter mount contains red filter. The other mount is designed to receive cardboard-framed, gelatin filters.

7-2.3 Equipment Data.

|                     |   |
|---------------------|---|
| Power Requirements  | 115 V, 60 Hz                                |
| Dimensions          |   |
| Width               | 55 in. (139.7 cm)                           |
| Depth               | 52 in. (132.08 cm)                          |
| Height              | 71 in. (180.34 cm)                          |
| Weight              | 1000 lbs (454 kg)                           |
| Magnification Range | 0.6-3.5 at 0 tilt                           |
| Light Source        | Fluorescent lamps                           |
| Cooling             | Forced air                                  |
| Lens                |   |
| Type                | 5.5 in. enlarging<br>Metrogon (13.97 cm)    |
| Operational Stops   | f/5.6-f/32                                  |
| Shutter Speeds      | Time and instantaneous<br>1/60 to 4 seconds |

Safety Features

- Mechanical movement (magnification and tilt limit switches)
- Mechanical overload (magnification motor shear pin)
- Electrical overload (circuit breaker 8.2 amp thermal heater)

Accessory Equipment:

| <u>Equipment</u>      | <u>Quantity</u> |
|-----------------------|-----------------|
| Take-Up Spool         | 1               |
| Hand Magnifier        | 1               |
| Magnetic Paperweights | 4               |
| Dust Cover            | 1               |

**7-3. TECHNICAL PRINCIPLES OF OPERATION.**

7-3.1 General. Rarely can aerial negatives be used for the assembly of controlled photomosaics without first passing through a rectification process whereby their scale is corrected and the effect of camera tilt removed. To fulfill all requirements demanded, five freedoms of adjustment are necessary. The five freedoms of adjustment are:

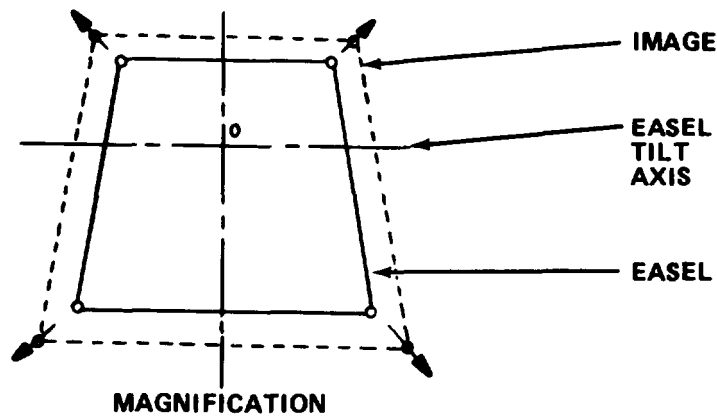
Magnification

Tilt

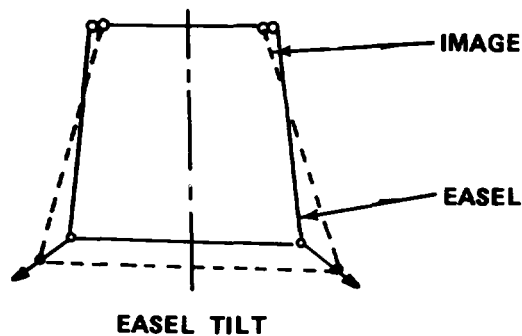
Rotation of Negative in Its Plane (Swing Drive)

Negative Displacement Transverse to Tilt Axis (Y-Drive)

Negative Displacement Parallel to Tilt Axis (X-Drive)

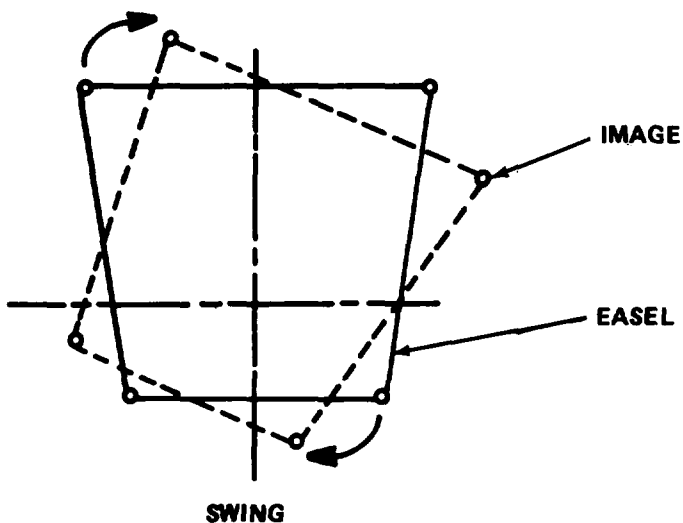


a. Magnification. The magnification adjustment controls the scale of projection. If the negatives are free from tilt, it is only necessary to enlarge or reduce them in order to obtain prints that possess the correct scale.

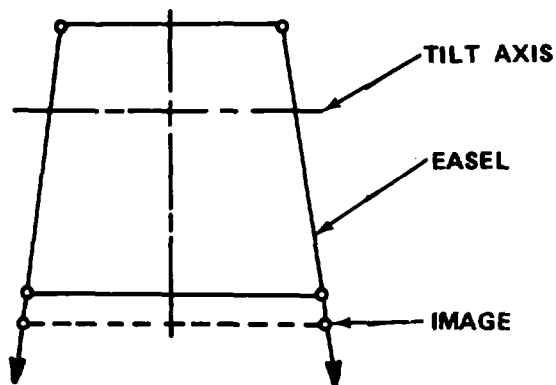


b. Tilt. The tilt adjustment controls the axis of image projection and produces a projected image from which the tilt of the negative is removed.

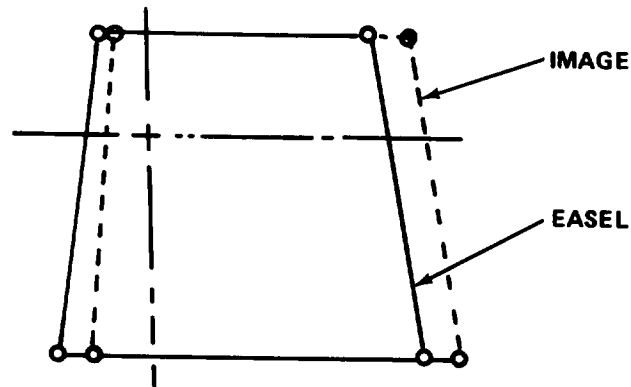




c. Rotation of the negative in its plane. The negative rotation adjustment is used to align the axis of tilt of the negative (at time of exposure) with the mechanical axis of tilt of the rectifier.

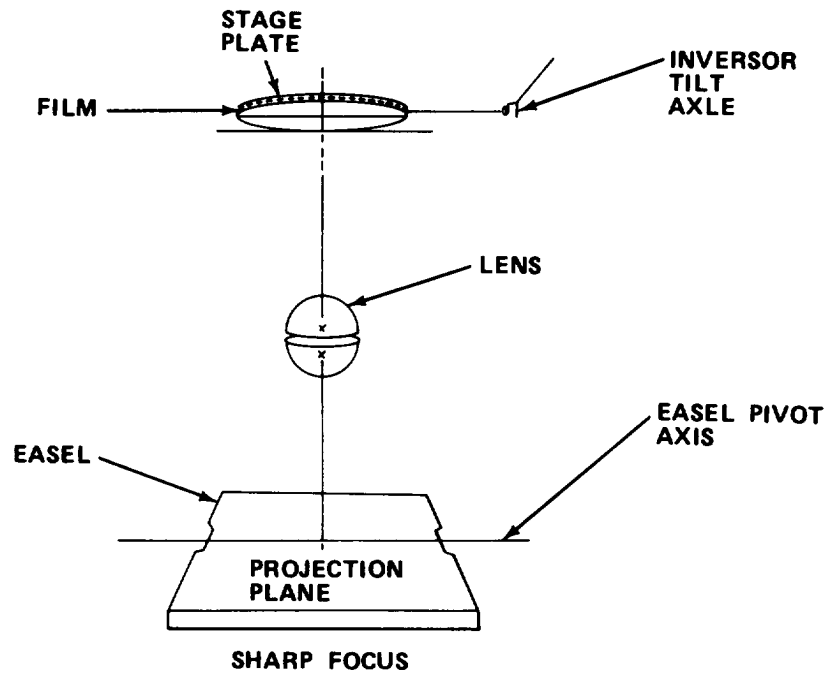


d. Negative displacement transverse to tilt axis. In all rectification problems, the negative must be located in the film stage so that its horizon line coincides with the horizon line of the rectifier setting. This requires the displacement of the principal point of the negative, transverse to the rectifier's tilt axis.

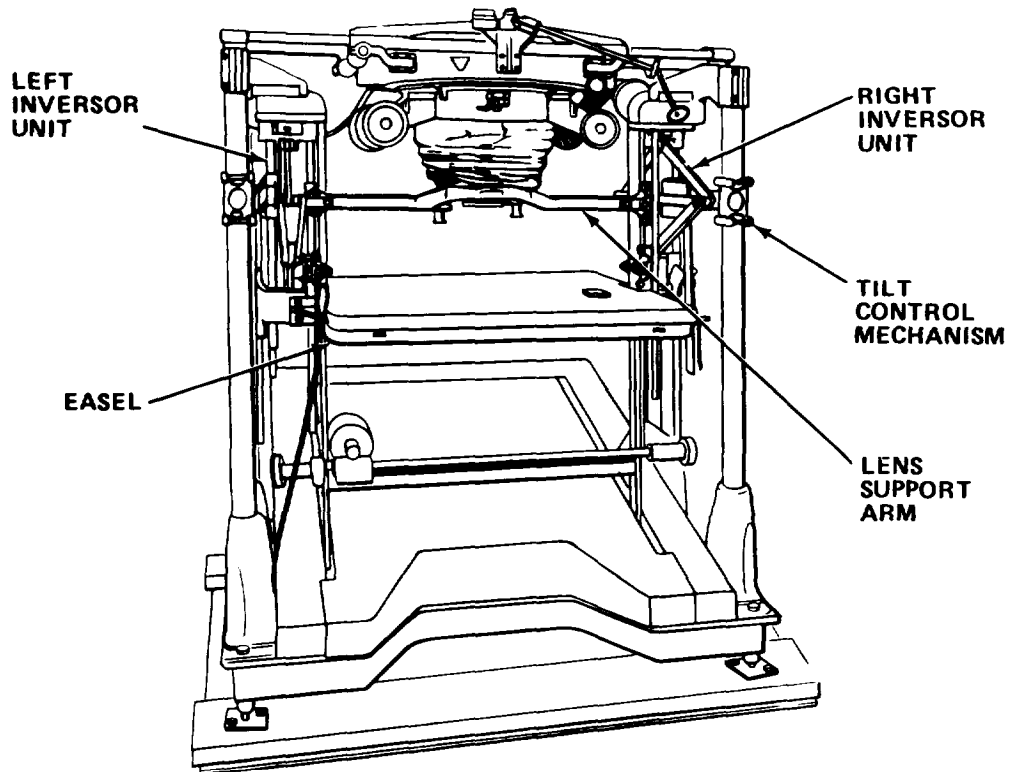


e. Negative displacement parallel to tilt axis. When rectifying in a reference plane that is tilted, it is necessary to move the negative right or left of the rectifier's center.

7-3.2 Detailed.



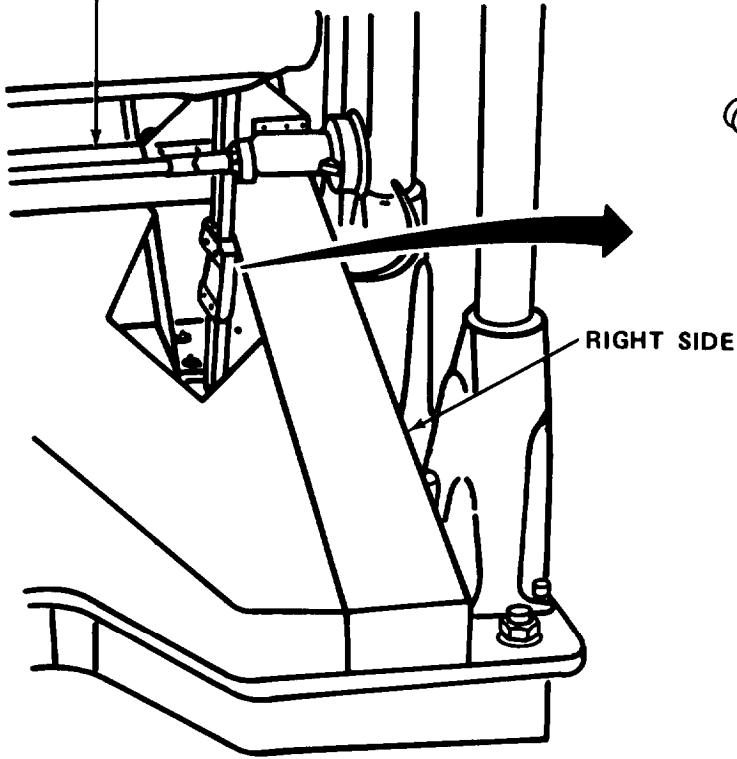
The rectifier is designed to automatically retain a sharp focus throughout its magnification range, regardless of the angle of tilt. Sharp focus is achieved only when the extension of negative, lens, and easel planes intersect at a common line and if at least one image point is in sharp focus.



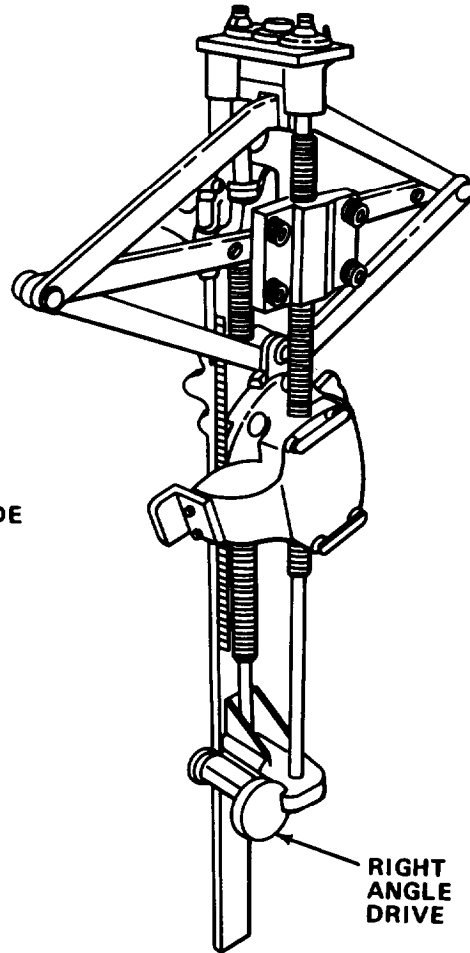
FRONT VIEW

a. Autofocusing. Accomplished by interaction of the right and left inverter units and the tilt control mechanism (left and right). The inverter units are mechanical linkage systems which move the lens support arm and easel in proper correlation to retain sharp focus condition at the easel during magnification operation. When the inverter units are tilted from their 0 degree position, the easel arm pivot assemblies maintain a common line of intersection of the three critical planes. The inverter units are actuated by the magnification drive.

MAGNIFICATION  
TIE ROD  
ASSEMBLY

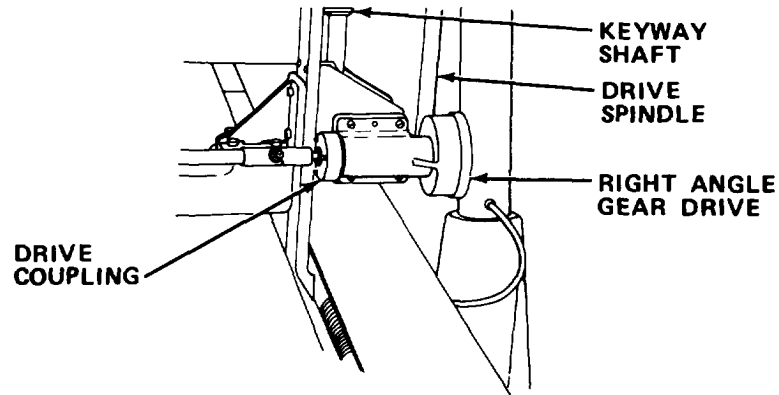


MAGNIFICATION DRIVE

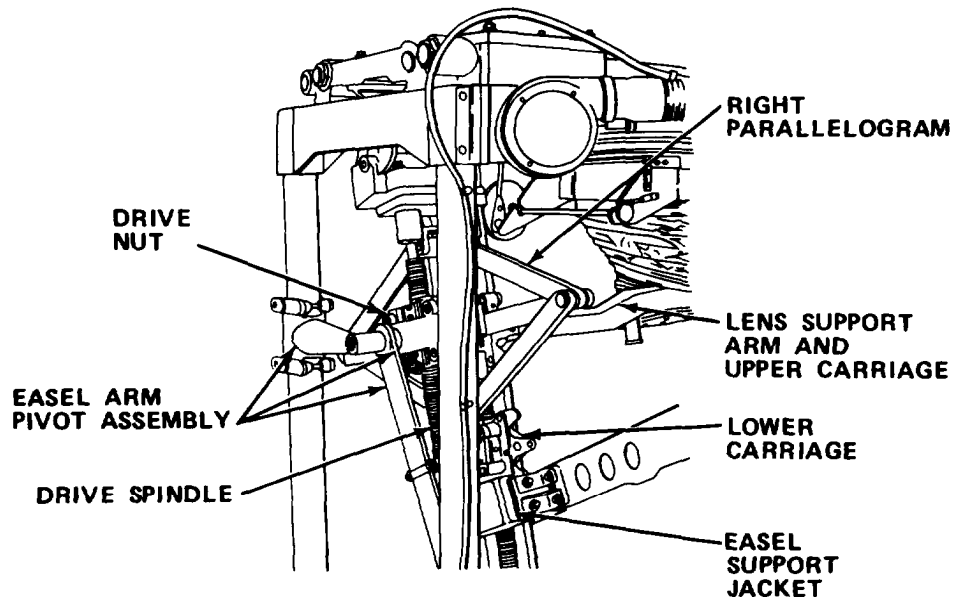


RIGHT INVERSOR UNIT

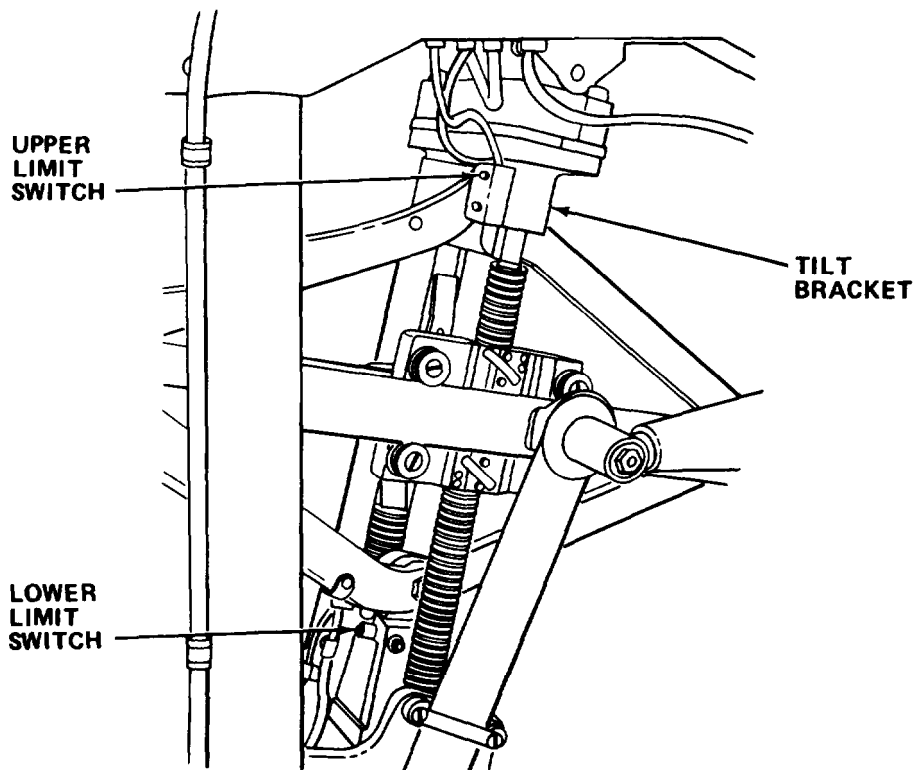
(1) Magnification drive. The inversor units are actuated by their driving members to accomplish enlargement or reduction in image size. These driving members are operated by a gear reduction motor (magnification drive motor) through the magnification tie rod, right angle drives (left and right), and drive spindles.



(a) The right angle gear coupling drives a drive spindle and keyway shaft.



(b) The drive nuts, mounted on the drive spindle, are linked to the center member of the parallelogram. As the spindles rotate, the drive nut moves, causing expansion or contraction of the parallelogram and indirectly raising or lowering the easel. The easel is suspended from the lower end of the parallelogram by the easel support brackets and lower carriage. The lens support arm is controlled by the drive spindles which are free to move along the keyway drive shaft. The lens support arm is suspended between the upper carriages. Vertical movement is induced by a ball bearing nut built into the lower carriage. The drive spindles are threaded into the lower carriage. Since each lower carriage is hinged to its inversor parallelogram, the nut imparts a vertical movement to the drive spindles as the parallelogram is actuated. The actual amount of movement which the drive screw accomplishes is the sum of these two independent motions. This action results in the correlated movement between the lens and easel. At the same time, the drive screw is being rotated by the drive shafts so that it is being threaded vertically through the drive nut.



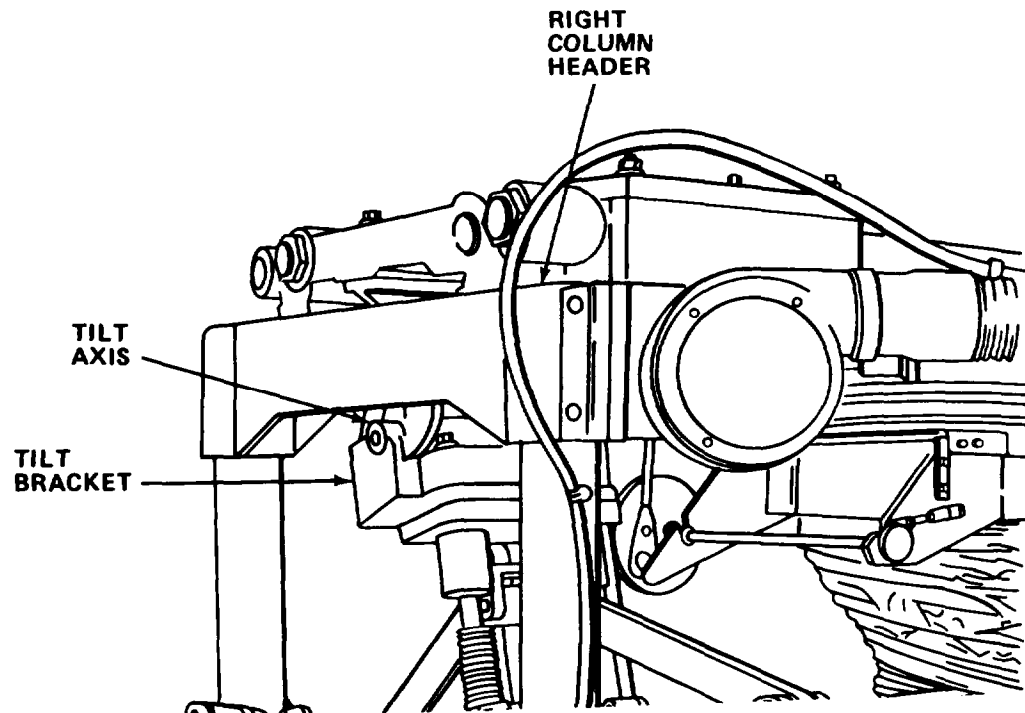
(c) To restrict the movement of magnification drive and prevent collision or overriding of threads, magnification limit switches are used. The limit switches are operated by adjustable actuators mounted on the inverter drive nut.

(d) As the inverter nut moves upward, its actuator causes the roller on the limit switch to close, stopping the upward movement of the inverter nut. The lower magnification switch is open, enabling the magnification drive motor to be reversed. Mechanical overload protection is provided by shear pin in the gear reduction portion of the magnification drive motor.

(2) Magnification motor controller.

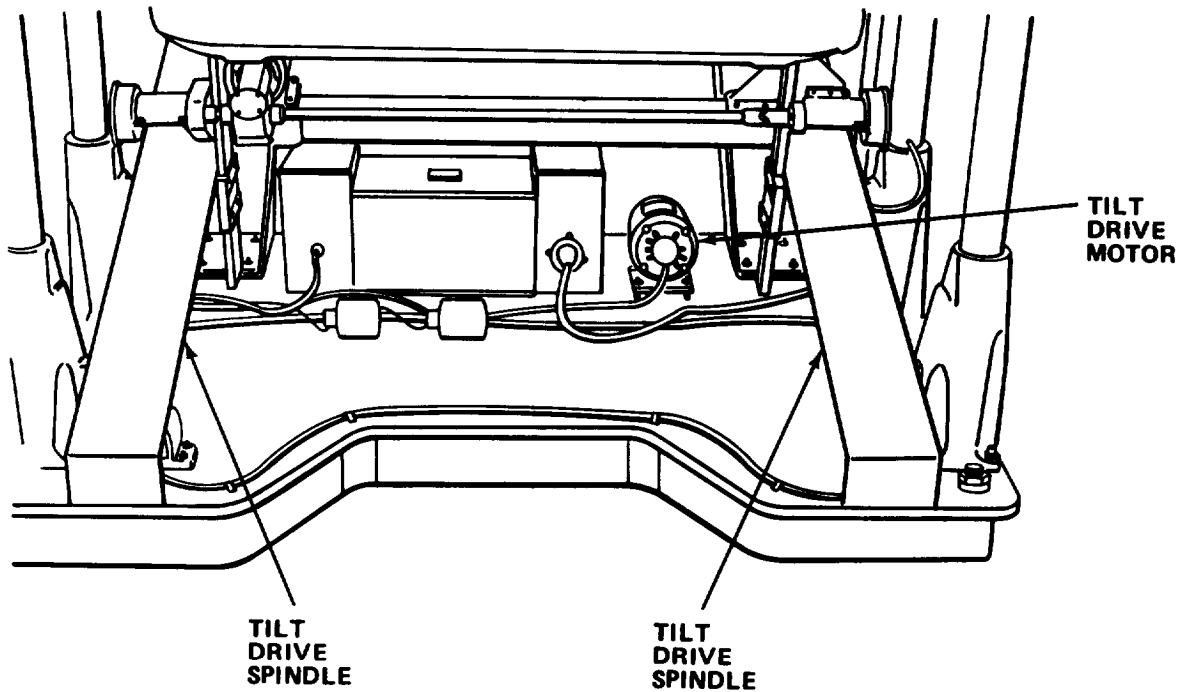
(a) When the negative (-) switch on the MAG assembly is depressed, low is present on pin 5 of IC1. IC1 pin 9 output goes low, turning on Q2. This energizes K2. K2 energized contacts apply L1 (115 V ac) to one side of K4, energizing IC3, Q3 and bridge rectifier (D6 through D9) form a dc to dc converter. The bridge rectifier output is applied to TB2 A1 and A2. The direction of rotation is controlled by relay K4. K4 feeds the armature power supply from TB2 + (positive) through its lower contacts to TB2 pin A2. The dc outputs from TB2 pins A1 and A2 are applied to chassis TB1 pins 8 and 9 then to the dc motor armature. The dc motor turns left. This causes the easel to rise, reducing image size. The dc motor will continue to run until the - switch is released or limit switch in the motor circuit opens.

(b) If the positive (+) switch on the MAG assembly is depressed, a low is present on pin 6 of IC1. IC1 pin 10 output goes low turning on Q1. This energizes relay K1. K1 contacts apply L1 (115 V ac) to one side of K3, energizing it. The output of the dc to dc converter is applied to TB2 pins A1 and A2. The direction of rotation is controlled by relay K3. K3 feeds the armature supply from TB2 + through its lower contacts to TB2 pin A1. The dc outputs from TB2 pins A1 and A2 are fed to chassis TB1 pins 8 and 9 to the dc motor armature. The dc motor turns right increasing image size until the positive (+) switch is released or the limit switch in the motor circuit opens. When the positive (+) switch is released, pin 6 and pin 10 of IC1 go high. This cuts off Q1 and de-energizes relays K1 and K3.

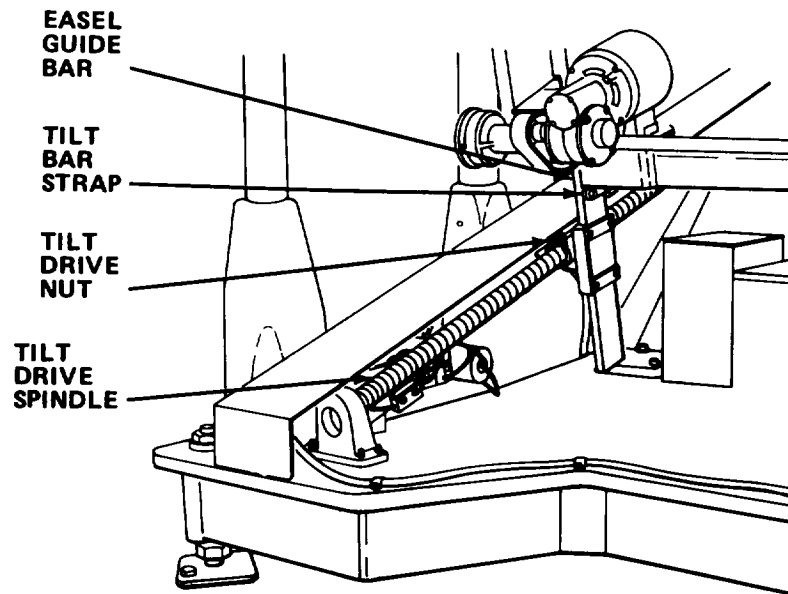


(3) Tilt drive.

(a) The axes of tilt pass through the plane of the negative. Tilt brackets are attached to the left and right column headers. Support bars, attached to the brackets, extend vertically from the tilt brackets and provide guidance for the inversors, easel, and easel arm pivot assemblies. The lower end of the support bars are connected through sliding brackets to nuts on the tilt drive spindles mounted in the base of the instrument. The spindles provide tilt motion to the support bars.

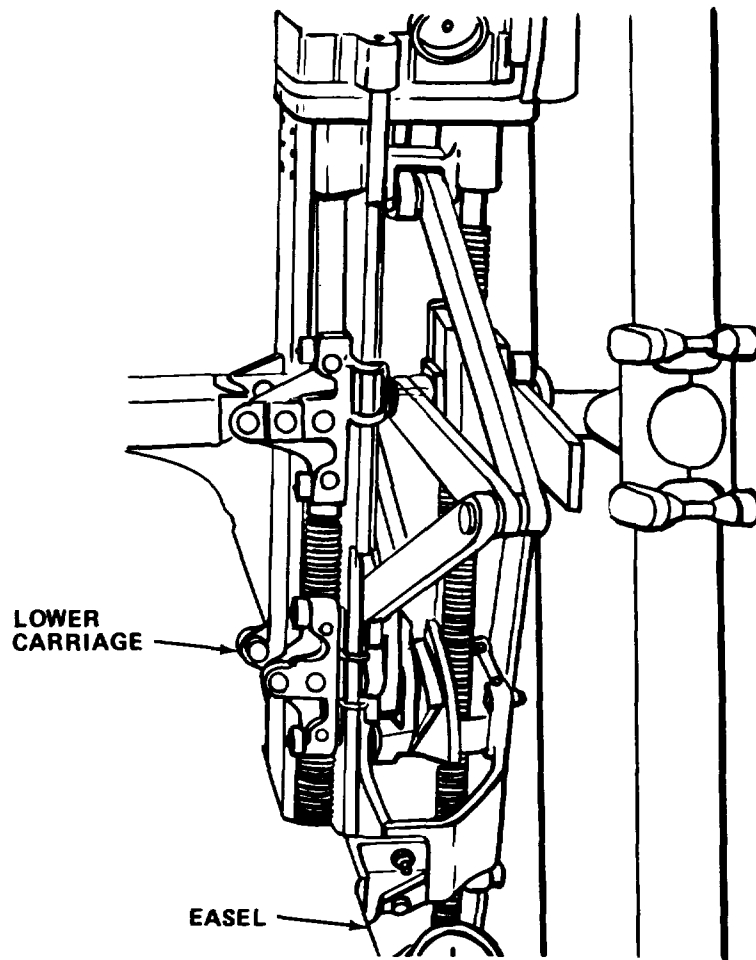


(b) The tilt drive motor is a gear reduction motor. Motion is transmitted from the motor to the center shaft via pulley and V-belt, then to the miter gears and the inclined drive spindles.



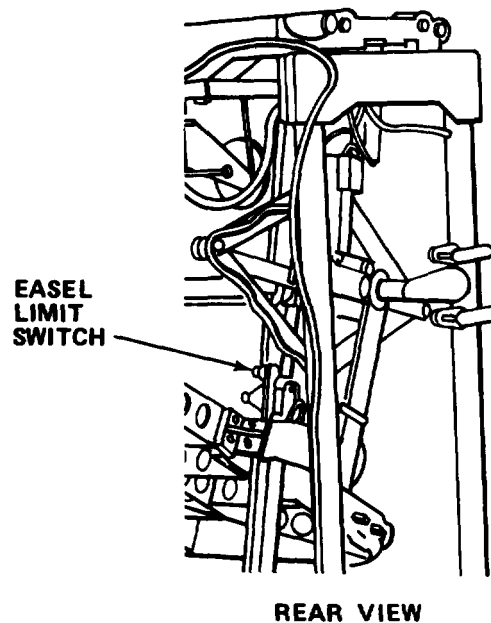
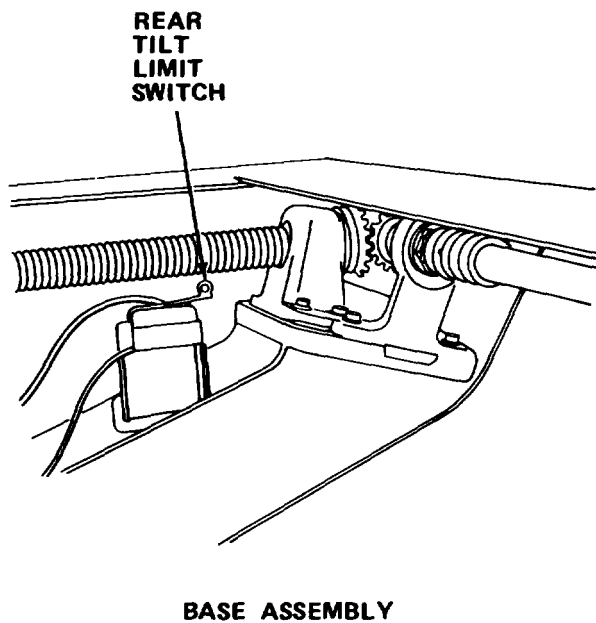
As the drive spindles rotate, the drive nuts are moved along the spindles, pulling the easel guide bars with them, thereby tilting the easel and the lens.





**FRONT QUARTER VIEW  
RIGHT SIDE ASSEMBLY**

As the tilt drive nut moves along the tilt spindle, the motion causes the easel to move toward the front or rear of the rectifier. The lower carriage acts as a suspension point, thus changing the angle of easel tilt. A tilt motion is also imparted to the easel through the easel arm pivot assembly. The net effects produce an integrated tilt of the easel. The combined action maintains a common point of intersection of the lens, negative, and easel planes.



(c) To restrict the movement of the easel and lens drive, and prevent collision and overriding of the threads, limit switches are employed. The tilt limit switches are located on the left side of the base assembly. The easel limit switches are located at the rear of the left side of the rectifier. The inverter limit switches are also located on the left side of the instrument. As the angle of the easel increases, an actuator mounted on the easel pivot coupling causes the easel switches to activate, stopping the tilt and magnification drive motors from further increasing the tilt angle or magnification. The tilt limit switches have their actuators mounted on the tilt drive nut. As the tilt drive nut moves along the tilt spindle, its actuator causes the limit switch to close, stopping the tilt motor. The direction of movement can be reversed. The inverter limit switches limit the maximum and minimum magnification.

(4) Tilt motor controller.

(a) When the positive (+) switch on the TILT assembly is depressed, a low is felt on pin 6 and pin 10 of IC1. Q1's conduction causes relay K1 to energize. The contacts of K1 apply L1 (115 V ac) to one side of K3, energizing it. The dc to dc converter output is applied to TB2 A1 and A2. The direction of rotation is controlled by relay K3. K3 feeds the armature power supply from TB2 + (positive) through its lower contacts to TB2A1. The dc output from TB2 pins A1 and A2 is applied to chassis TB1 pin 8 and 9 then to the dc motor armature. The dc motor turns right, increasing tilt until the + switch is released or until the rear tilt or easel limit switches open.

(b) When the negative (-) switch on the TILT assembly is depressed a low is felt on pins 5 and 9 of IC1. Q2's conduction causes relay K2 to energize. The contacts of K2 apply L1 (115 V ac) to one side of relay K4, energizing it. The dc to dc converter output is applied to TB A1 and A2. The direction of rotation is controlled by relay K4. K4 feeds the armature power supply from TB + (positive) through its lower contacts to TB2 A2. The dc output from pins A1 and A2 on TB2 is applied to chassis TB1 pin 8 and 9 then to the dc motor armature.

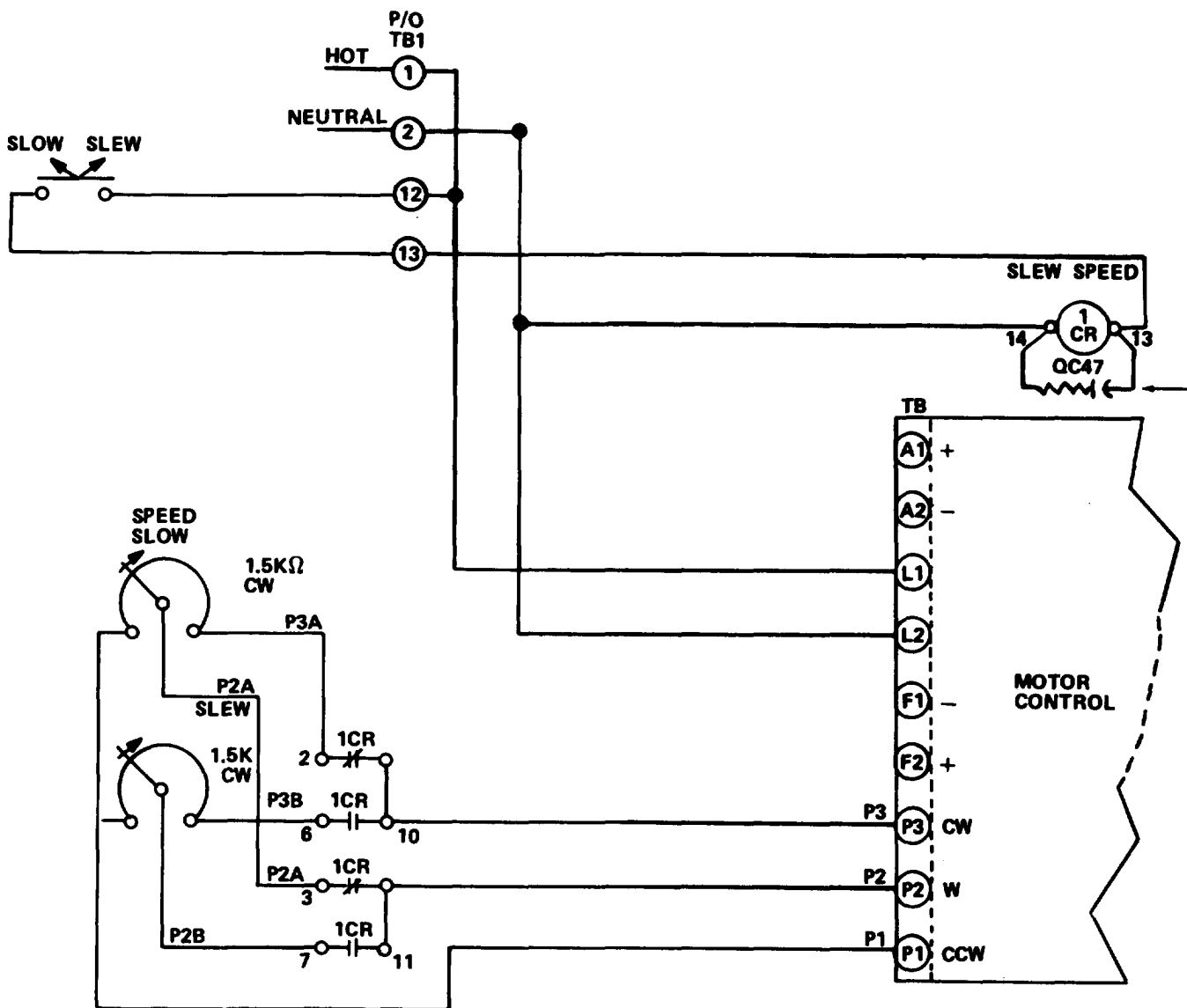
(c) The motor will turn left, decreasing tilt until the - switch is released or the front tilt limit switch opens. When the - switch is released, pins 5 and 9 of IC1 output goes high. This cuts off Q2 and de-energizes relays K2 and K4.

(5) Tilt motor drive dynamic braking circuit.

(a) Relays K1 thru K4 are de-energized. The armature power supply output is removed from the armature. The armature power supply is fed through the de-energized contacts of K2 and K1 to current limiting resistor R15. The dc to dc converter's output is fed through the de-energized contacts of K3 and K4 to dynamic braking resistor R16. The output of motor control bridge rectifier remains connected to pin F1 to the field winding via chassis TB pin 14, field weakening resistor (F resistor), chassis TB1 pin 11 and pin F2. The interaction of the rapidly weakening armature field and the field winding magnetic fields attempts to reverse the motor's direction rapidly. The effect is to dynamically brake the motor to a complete stop. Since the ac variations are decreasing in amplitude, this decrease is felt on motor control TB pin A2 and is fed to reversing contactor TB3 pin 7 through relay K1 and K2 and out TB3 pin 6 to motor control TB pin P2. This reverse biases Q2 which holds Q1 and the SCR off, ensuring that the motor cannot increase speed during braking operations. If one or more of the limit switches opens, the sequence of events just described occurs.

(b) Tilt drive motor SLOW and SLEW speed operations are identical to mag drive motor description. Tilt drive motor control adjustments are identical to the mag drive motor description.

(6) Magnification dynamic drive braking. Relays K1 through K4 are de-energized. The armature power supply output is removed from the armature. The armature power supply is fed through the de-energized contacts of K2 and K1 to current limiting resistor R15. The dc to dc converter output is fed through the de-energized contacts of K3 and K4 to dynamic braking resistor R16. The output of the motor control bridge rectifier consisting of diodes K1 thru K4 and transient supresor SP1 is connected to pin F1 to field winding via chassis TB1 pin 14, field weakening resistor (F resistor), chassis TB1 pin 11 and pin F2. The interaction of the rapidly weakening armature field and the field winding magnetic field attempts to reverse the motor's direction rapidly. The effect is to dynamically brake the motor to a complete stop. Since the ac variations are decreasing in amplitude, this decrease is felt on motor control TB pin A2 and is fed to reversing contactor TB3 pin 7 through relays K2 and K1 and out TB pin 6 to motor control TB pin P2. This reverse biases Q2, which holds Q1 and SCR off, ensuring that the motor does not attempt to increase speed during braking operations. If one or more of the limit switches opens, the operation identical to the one just described occurs.



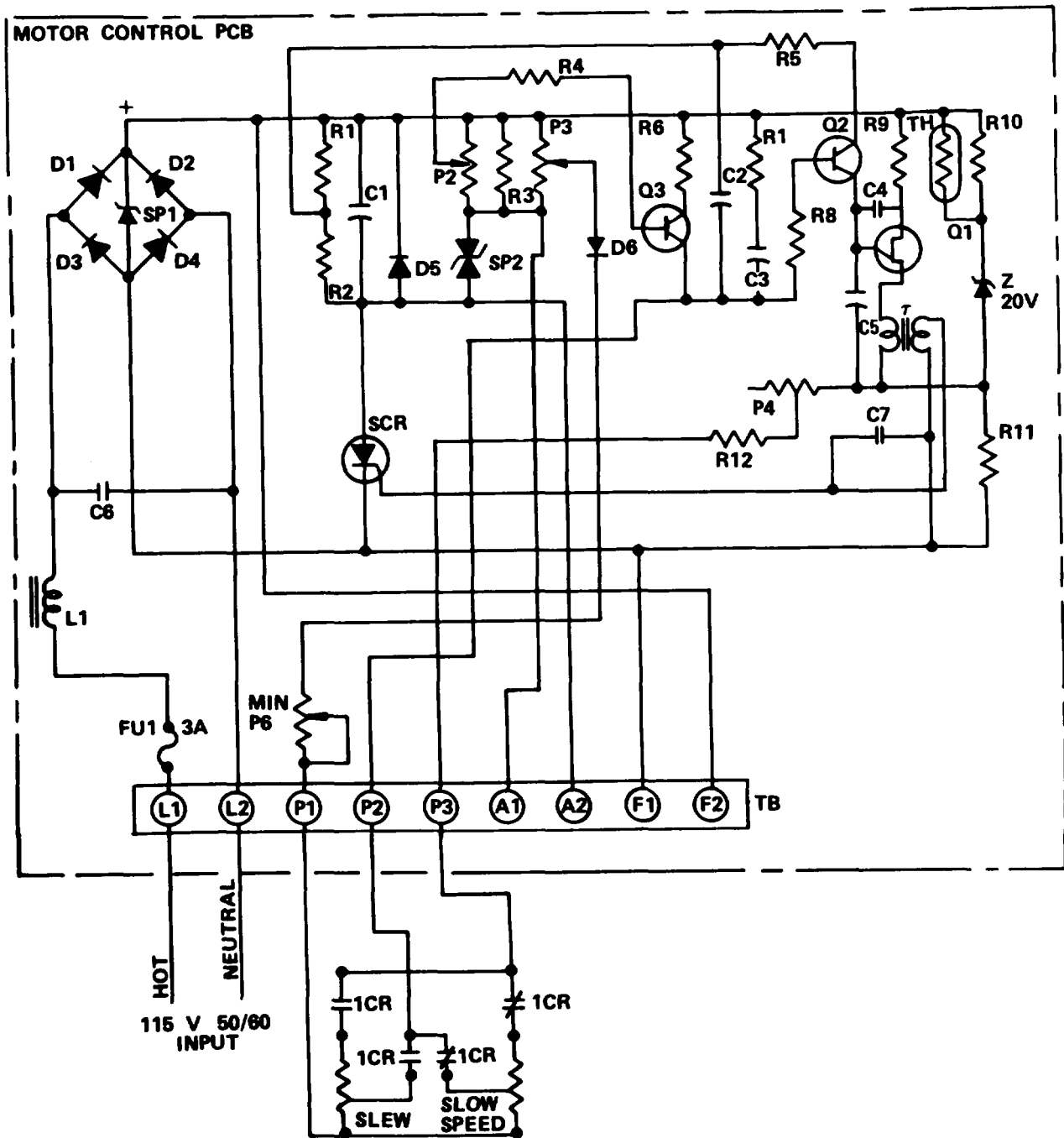
(7) Speed control circuit. There are two speeds available on MAG and TILT assemblies.

SLOW

FAST (SLEW)

(a) When SLOW switch is depressed on the MAG or TILT assemblies, 115 V ac is removed from 1CR, de-energizing it. The dc output of the motor control is connected through the normally closed contacts of 1CR. The dial setting on the SLOW speed potentiometer controls the motor speed. The SLOW speed is generally 10 - 15% of maximum rated motor speed.

(b) When FAST (SLEW) speed is selected, 115 V ac is applied to relay 1CR, energizing it. The normally closed contacts of 1CR open, and the normally open contacts of 1CR close. This connects to SLEW speed potentiometer to the dc output of the motor control.



(c) When SLOW speed is selected the SLOW speed potentiometer is connected to P1, P2 and P3 of the motor control TB. A voltage divider network consisting of R10, TH (thermistor), Zener diode, maximum speed potentiometer P4, R12, Slow speed potentiometer, minimum speed potentiometer P5, torque potentiometer P3, and the dc motor armature is established. Maximum speed potentiometer P4 is adjusted for an armature voltage of 125 V dc. Minimum speed potentiometer P5 is normally set fully left and torque potentiometer P3 limits motor current and is normally set fully right. The SLOW speed potentiometer establishes the bias on Q2 during slow speed operation. The conduction of Q2 controls the charging rate of C5. As the armature rotates the ac wave is felt on the base of Q2. If Q2's conduction is increased, the charging rate of C5 increases. When the charging voltage of C5 is approximately 2/3 Q2's collector voltage, Q1 conducts, discharging C5. The discharge of C5 is coupled to the secondary of pulse transformer T1. The SCR conducts and motor speed increases due to increased armature current. If Q2's conduction is decreased, the charging rate of C5 decreases. Q1 and SCR remain off and motor speed remains constant. The motor speed is regulated by conduction or nonconduction time of the SCR. The slower the motor turns, the lower the ac signal amplitude; thus the conduction of the SCR is less.

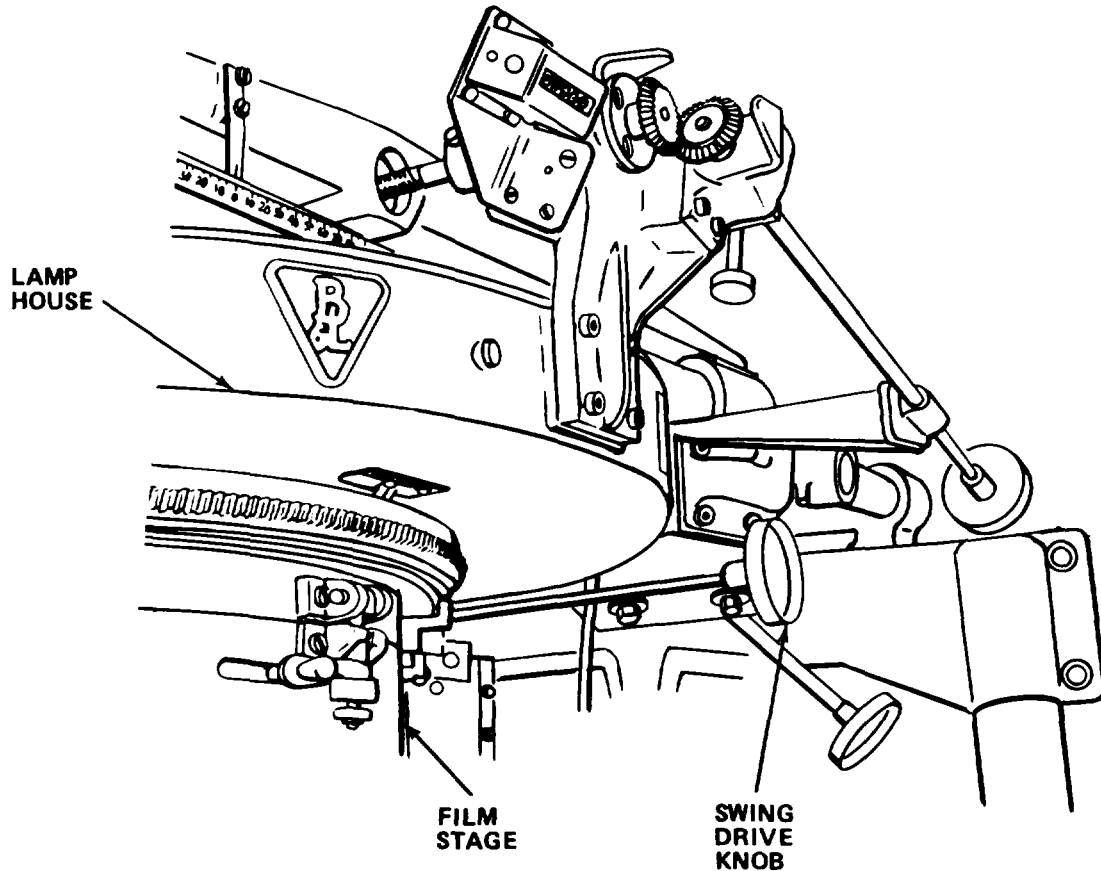
(d) When FAST (SLEW) speed is selected the SLEW speed potentiometer is connected to P1, P2 and P3 of motor control TB. The voltage divider network is established. The SLEW speed potentiometer dial is set to 100 (right). Q2's conduction increases, C5 charging rate increases, causing the SCR to conduct more frequently. This increases armature current and motor speed. The ac signal amplitude increases, which causes the SCR to conduct for long periods of time. Torque potentiometer P2 is used to prevent hunting when the motor is stopped.

b. Rectification. To rectify photographs, it is necessary to rotate the negative in its plane, align the negative horizon with the rectifier, and move the negative right or left. These movements are accomplished by:

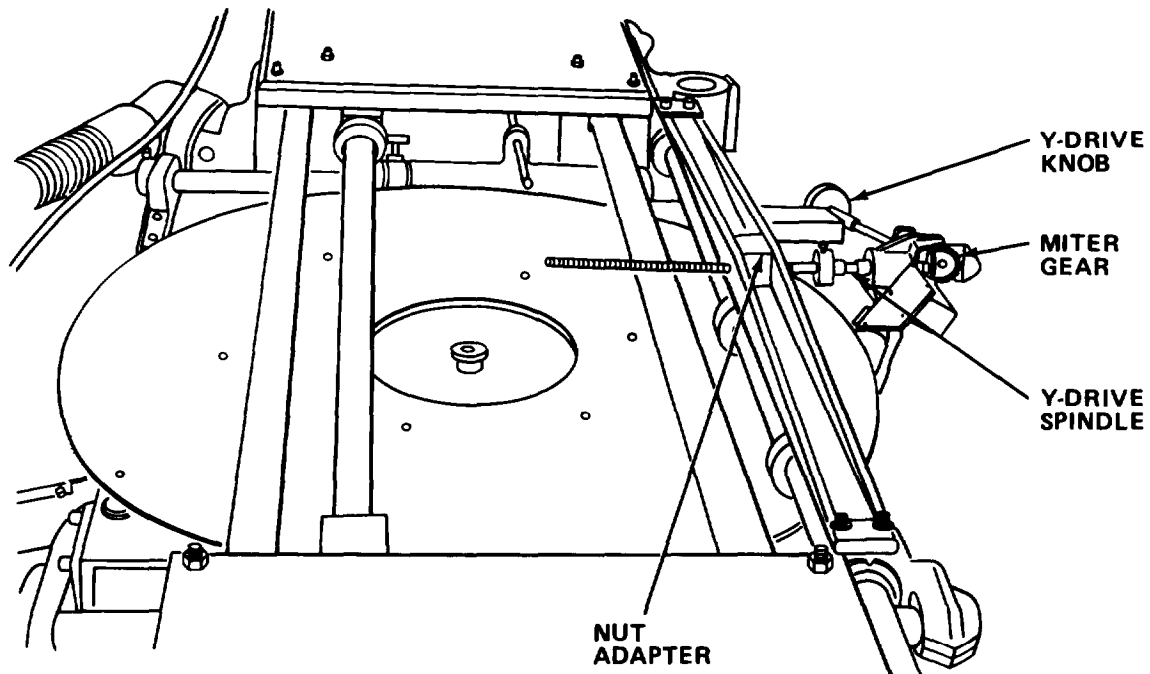
Swing Drive

Y-Drive

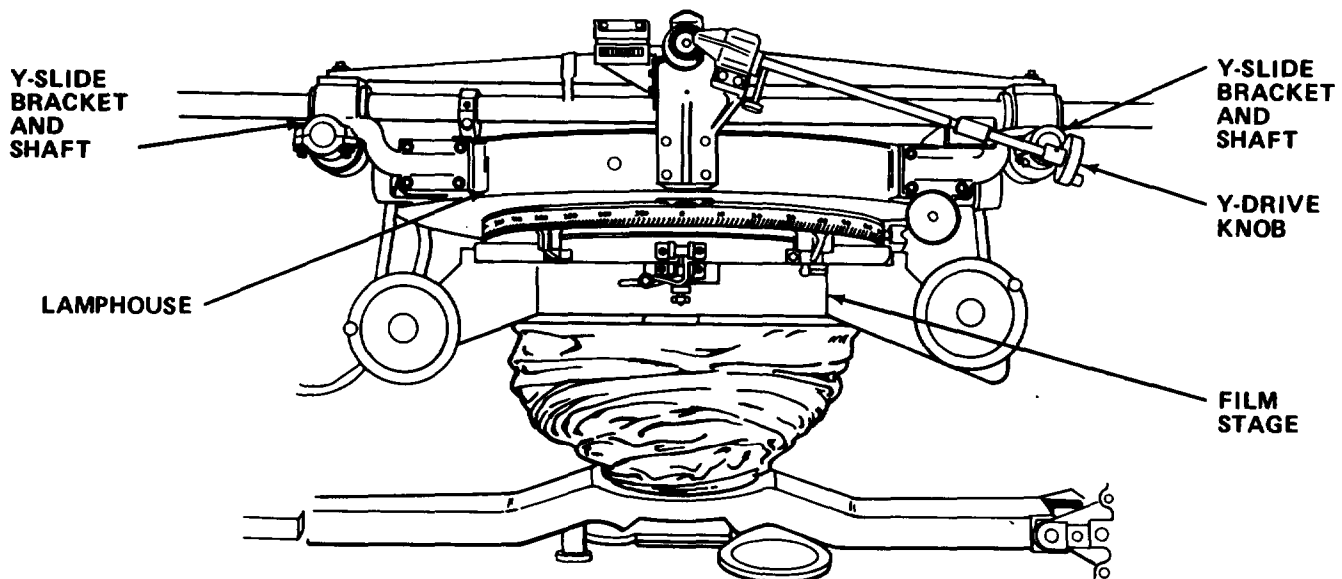
X-Drive



(1) Swing drive. The rotational adjustment of the negative in its plane is controlled by the swing drive. The drive element consists of a worm gear which is actuated by turning the swing drive knob. As the knob is turned, the entire film stage pivots in the lamp house. This rotates the negative in its plane and provides for the alignment of the negative's axis of tilt with that of the rectifier. For rapid movement of the swing circle, the worm drive may be disengaged by pivoting the knob and shaft to the right. The film stage can then be rotated by hand through a full circle.

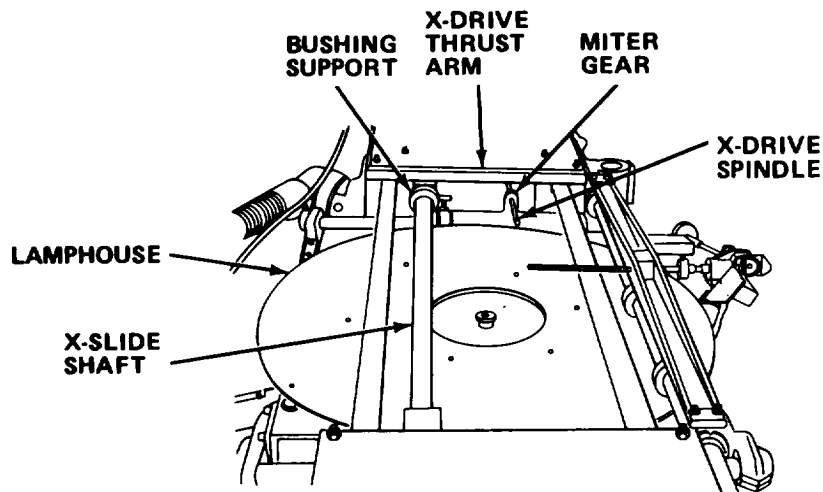


(2) Y-Drive. The negative's movement transverse to the tilt axis is controlled by the Y-drive. The primary driving member of this movement is the Y - drive spindle which is actuated through miter gears by cranking the Y-drive knob. As the Y-drive spindle rotates, it is threaded either in or out of a stationary nut secured in the nut adapter.

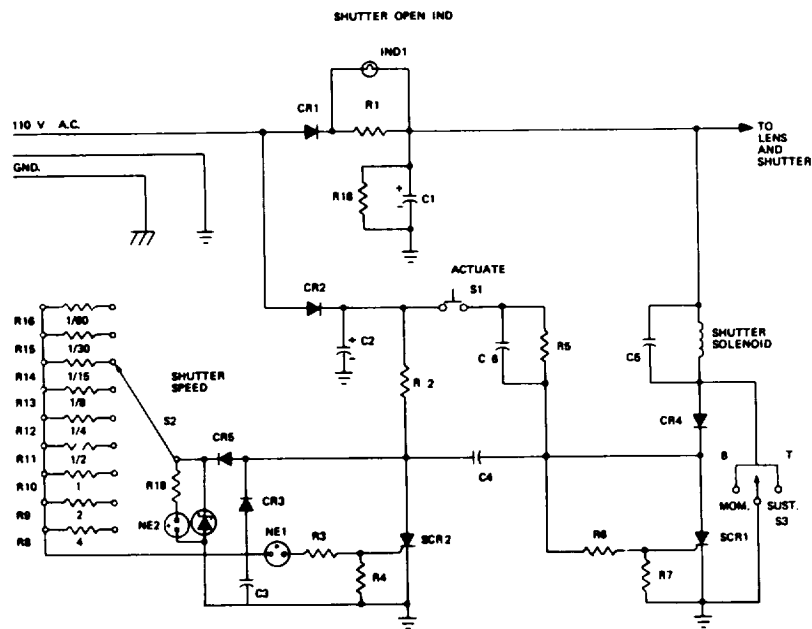


Since the Y-drive members are all attached to the lamphouse, the lamphouse is moved with the Y-drive spindle by sliding through the bushing supports on the Y - slide shafts. The film stage is attached to the lamphouse and moves with it.





(3) X-Drive. Movement of the negative parallel to the tilt axis is controlled by the X-drive. The primary driving member is the X-drive spindle which is actuated through miter gears by rotating the X-drive knob. As the X-drive spindle rotates, movement is transmitted to the X-drive thrust arm by an internally mounted nut. The thrust arm is held between the right bushing supports which move with it. Since the lamphouse is suspended from the four bushing supports by Y-slide shafts, it will move with the bushings as they slide along the X-slide shafts. This displaces the film stage in a lateral direction.

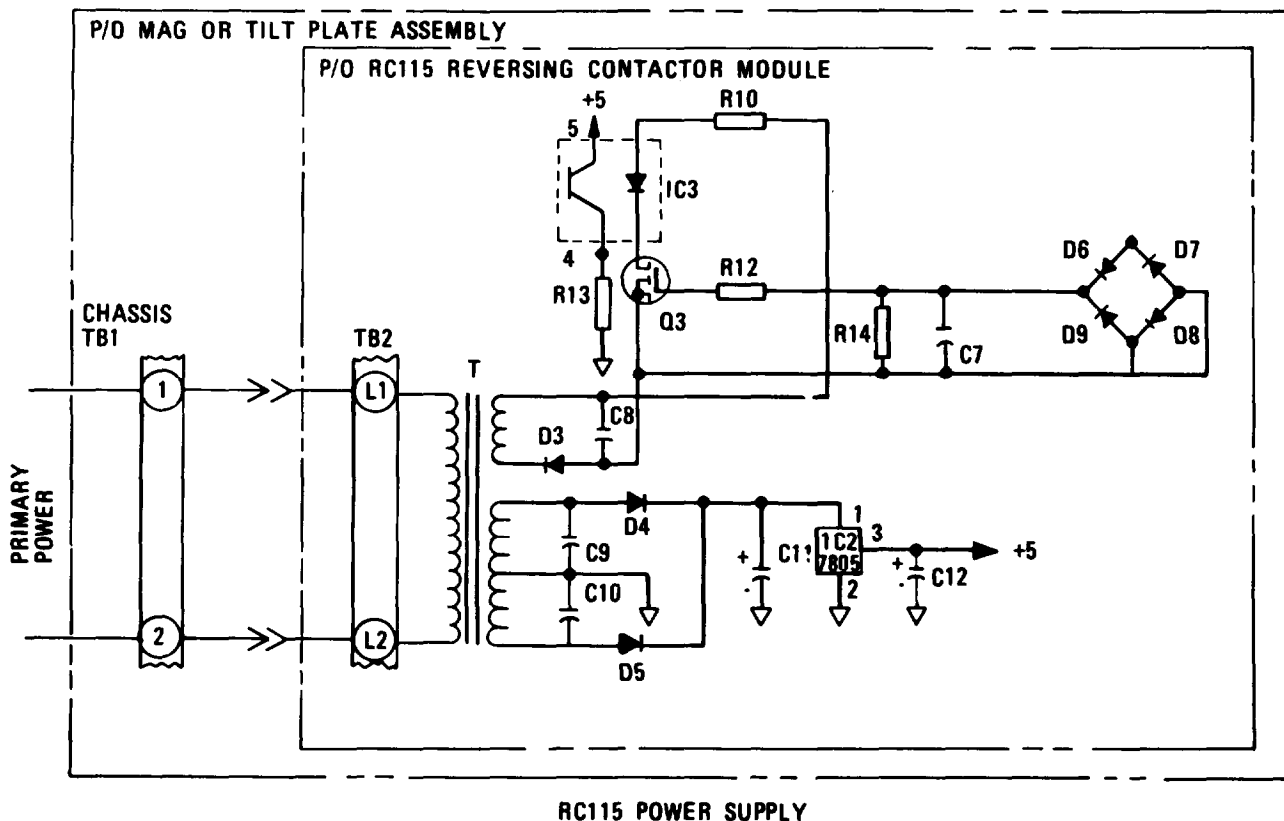


c. Lens and electronic shutter assembly. 110V ac is applied to CR1 and CR2. The output of CR2 is filtered by C2 and coupled to R2 and CR5. CR6 limits input voltage to shutter speed control to 120 V. NE2 indicates the presence of voltage when it glows. C3 is charged through the resistor in the SHUTTER SPEED control.

When the charge on C3 is high enough to forward bias SCR2. SCR2 conducts and NE1 indicates charging circuit is functioning. SCR2 will conduct until the charge on C3 causes it to reverse bias. The output pulse is coupled through C4 to CR4. When the ACTUATE pushbutton is depressed, SCR1 and CR4 conduct. The shutter solenoid voltage increases to approximately 192V for 3 to 5 ms to open the shutter. The output then decreases to approximately 24V to hold the shutter open for the length of time the ACTUATE pushbutton is depressed. When shutter solenoid is energized, the SHUTTER OPEN IND is on, indicating shutter is open. Toggle S3 is a three-position switch. In bulb (B), the shutter is open as long as the spring load switch is in B. In time (T), the shutter is open indefinitely. In the center position, the shutter is closed.

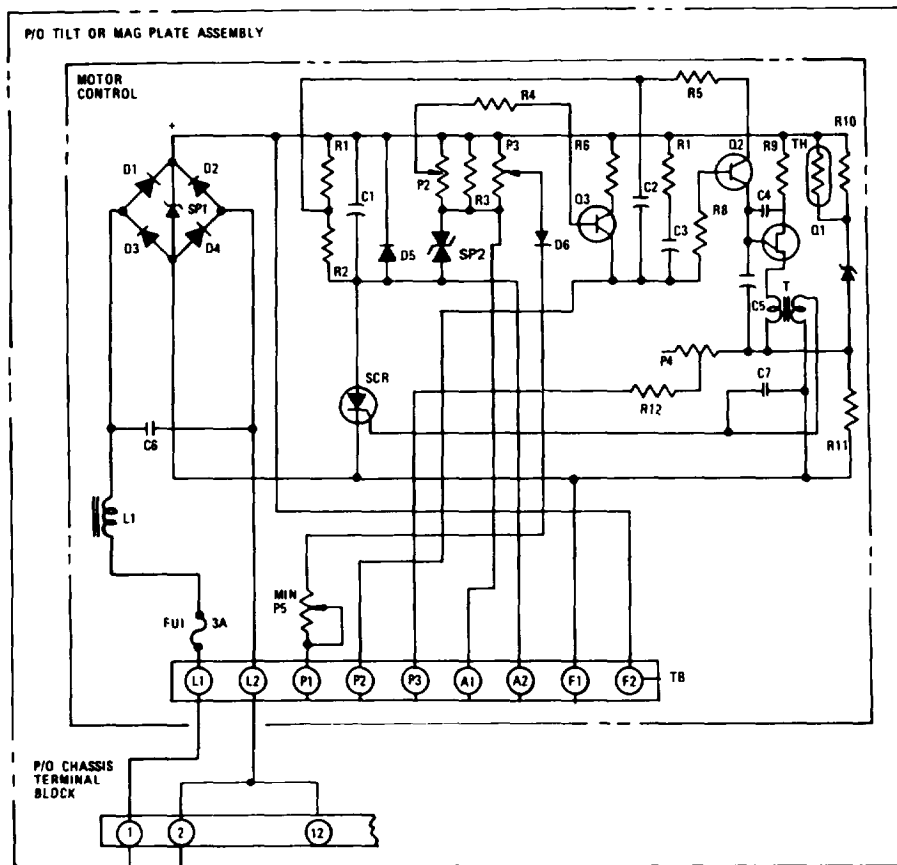
d. Electrical system.

(1) When primary power is applied and circuit breaker CB1 is closed, power is applied to the blower motor power switch, high voltage transformer, mag controller assembly, tilt controller assembly, receptacle on the right column for the electronic shutter and the receptacle on the base assembly for the hand held magnifier. The high voltage transformer provides 12 kV ac at 112 mA to the light grid assembly. The light grid assembly consists of fluorescent lamps which provide the light source for the rectifier. The blower power switch controls the operation of the blower. The blower provides filtered air to the fluorescent lamps to prevent overheating of the film stage. The electrical system is protected from electrical overloads by a circuit breaker with an 8.2 ampere thermal overload heater. Radio frequency interference is reduced by grounding straps located in the base and lamp-house assemblies.



(2) Primary power is applied to tilt and mag block pins 1 and 2, reversing contactor modules TB2 pins L1 and L2 and transformer T1.

(3) Half wave rectification and filtering is accomplished by diode D3 and capacitor C8. This output is used by the dc to dc converter consisting of R10, R13, IC3, Q3, R12, R14, C7 and bridge rectifier D6 through D9. A full wave rectifier consisting of diodes D4 and D5, filters C9, C10, C11 provides an unregulated output to regulator IC2. IC2 regulates the output to 5 V dc and is nonadjustable.



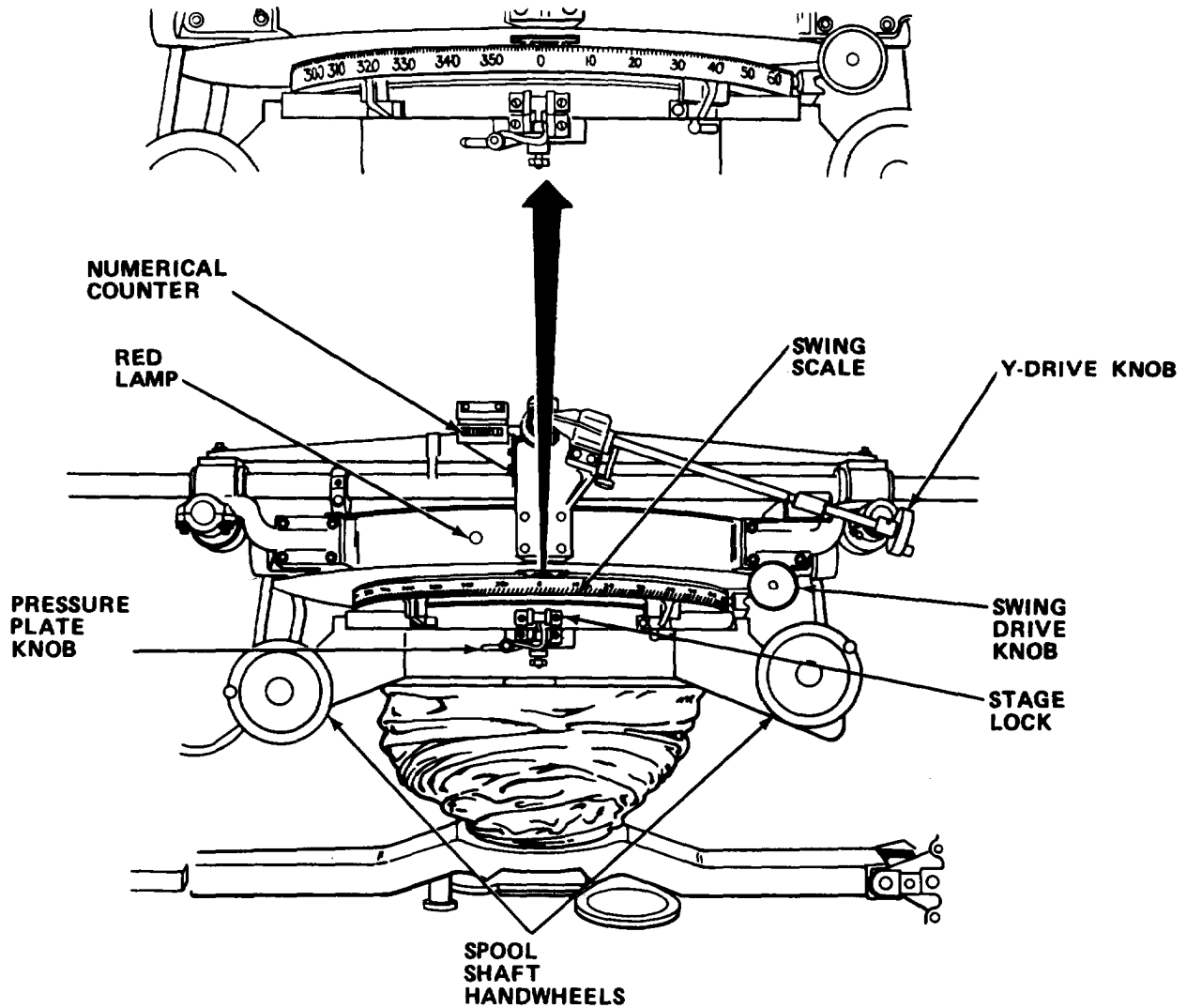
(4) Primary power is applied to tilt and mag chassis terminal blocks pins 1 and 2, motor control terminal blocks pins L1 and L2, 3 amp fuse FU1, a filter network consisting of L1 and C6 and the bridge rectifier. The bridge rectifier consists of diodes D1 thru D4 and transient suppressor SP1. The output of the bridge rectifier provides dc voltages for the field winding and armature power supply. The field winding power supply consists of bridge rectifier, field weakening resistor (F. Res.), and the field winding. The field winding power supply provides 100 V dc at 200 mA. The armature power supply consists of voltage divider network consisting of R1, R2, the motor armature, P3, P5, SLOW or SLEW speed potentiometer R12, P4 and R11. The dc motor speed and armature current is regulated by the SLEW or SLOW speed wiper arm Q2, Q1, T1 and SCR. Q3 provides a referenced level when the motor is stopped. The armature power supply provides an output of 125 V dc at 700 mA when the motor is not rotating. A rotating armature voltage can be from 0-115 V dc. The motor control is protected by a three ampere fast blow fuse.

Section II OPERATING INSTRUCTIONS

7-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.

Control or Indicator

Function



Numerical Counter

Indicates amount of Y-displacement in millimeters.

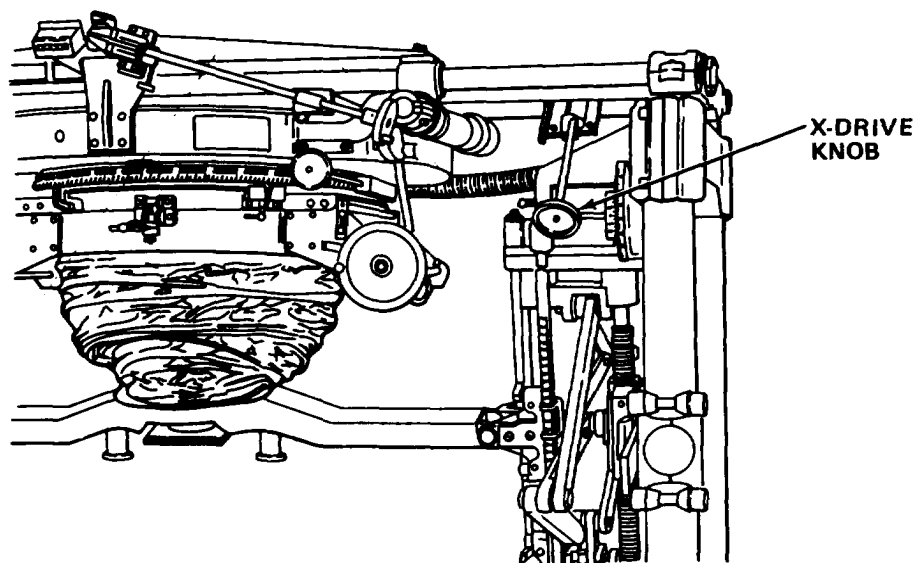
Red Lamp

Power on indicator.

Swing Scale

Indicates degrees that negative has rotated in its plane.

| Control or Indicator  | Function  |
|-----------------------|---|
| Y-Drive Knob          | Moves lamphouse forward and rearward.                     |
| Swing Drive Knob      | Rotates lamphouse and negative.                           |
| Stage Lock            | Latches film stage to lamphouse.                          |
| Spool Shaft Handwheel | Advances roll negative onto film stage.                   |
| Pressure Plate Knob   | Raises and lowers pressure plate. Holds film in position. |



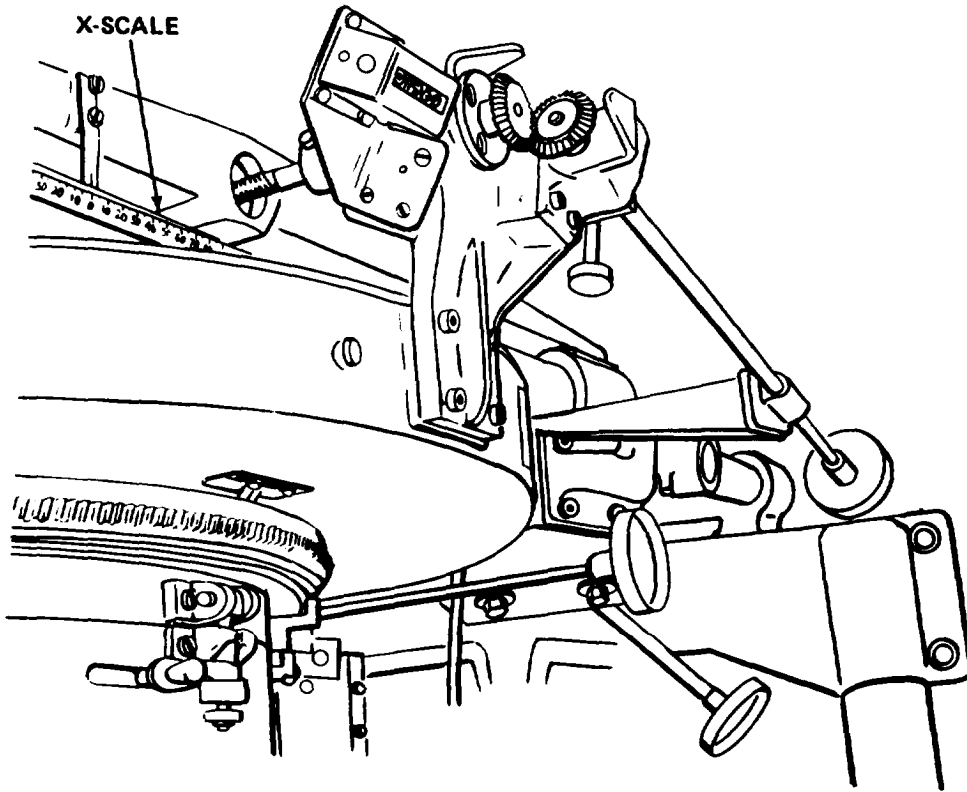
X-Drive Knob

Controls amount of left-right movement of lamphouse.

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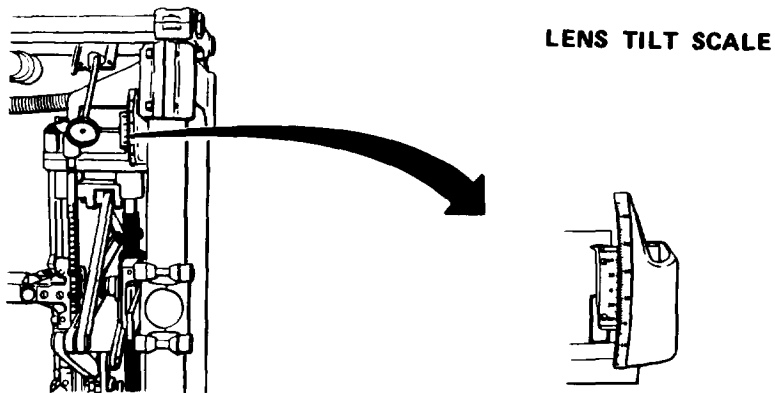
| Control or Indicator | Function |
|----------------------|----------|
|----------------------|----------|

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X-Scale

Indicates movement of lamphouse in millimeters.

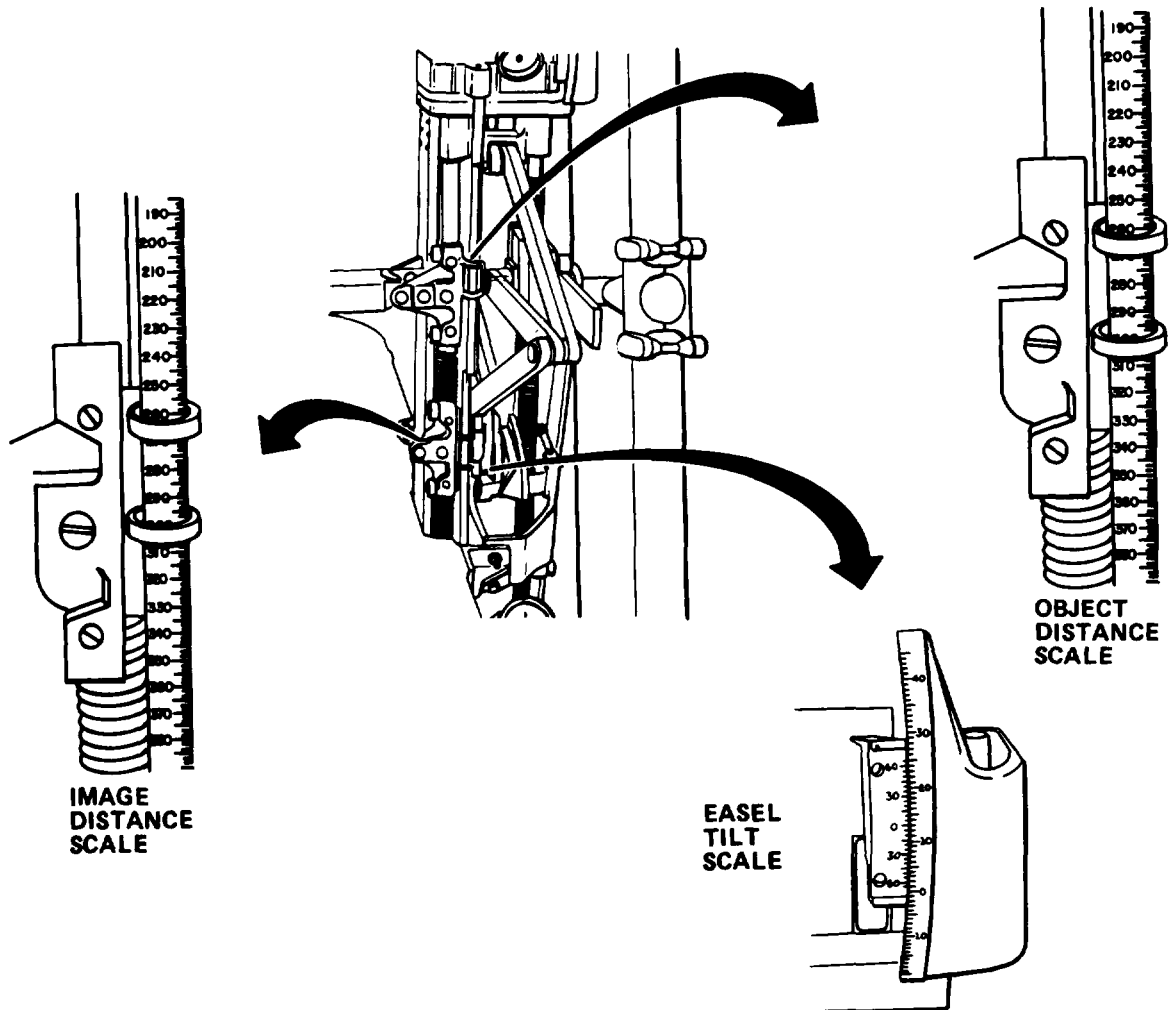


Control or Indicator

Function

Lens Tilt Scale

Indicates tilt angle of lens in degrees and minutes.



Easel Tilt Scale

Indicates tilt angle of easel in degrees and minutes.

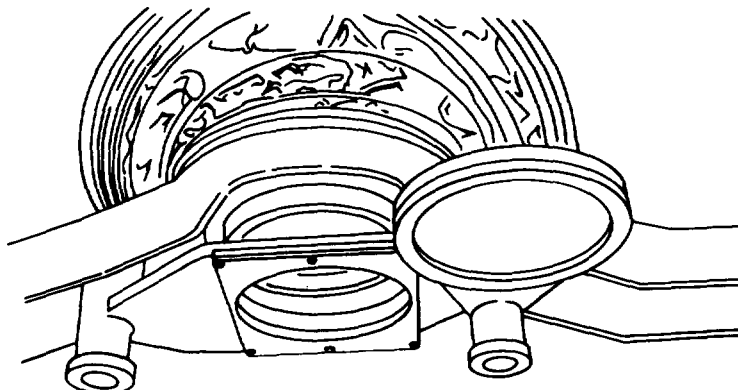
Image Distance Scale

Indicates distance of lens to easel in millimeters.

Object Distance Scale

Indicates distance in millimeters from lens to negative stage. Object distance and image distance determines magnification ratio.

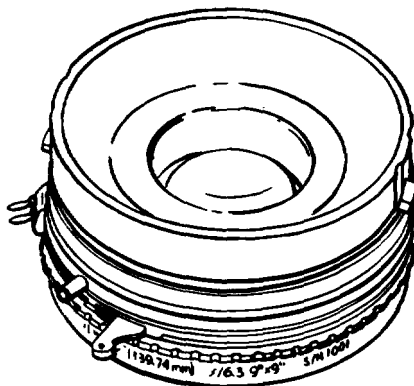
| Control or Indicator | Function |
|----------------------|----------|
|----------------------|----------|



FILTER MOUNT ASSEMBLY

Filter Mounts

One contains red filter; the other can receive cardboard gelatin filters.



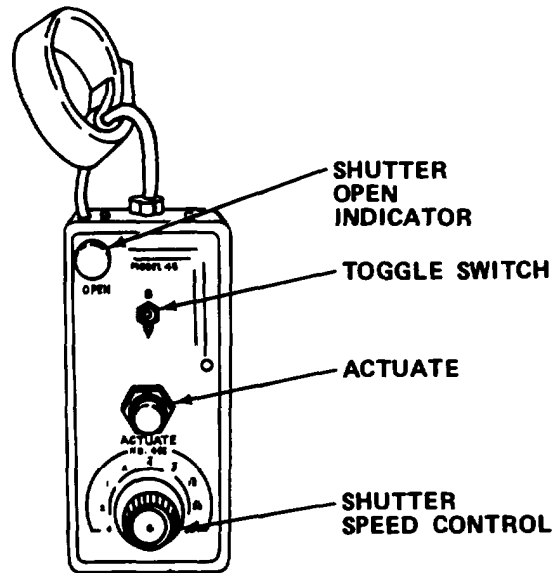
Lens and Shutter

Refract and control amount of light to easel. Permits timer and instantaneous exposures. Operational stops vary between f/5.6 and f/32.



Control or Indicator

Function



Nine-Speed Computer

Controls shutter speed of lens and shutter. Operational speeds 1/60 to 4 seconds.

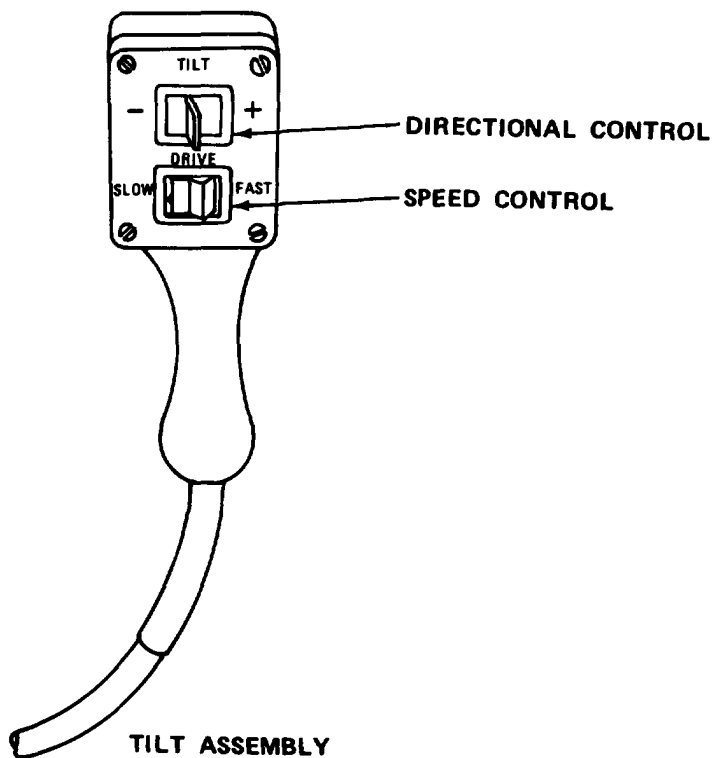
Shutter open indicator:  
Glowes when shutter is open.

Toggle switch: Spring-loaded in B (bulb) position. Controls shutter opening. T (time): Opens shutter. Center position: Shutter closed.

ACTUATE: When pressed, starts electronic control of shutter speed.

Shutter speed control:  
Nine-position switch. Shutter speed selectable from 1/60 to 4 seconds.

| Control or Indicator | Function |
|----------------------|----------|
|----------------------|----------|



TILT Assembly

Used to vary tilt of easel. Switch is marked TILT.

Has directional control:  
A spring-loaded switch.  
+ : Increases angle by lowering forward edge of easel.

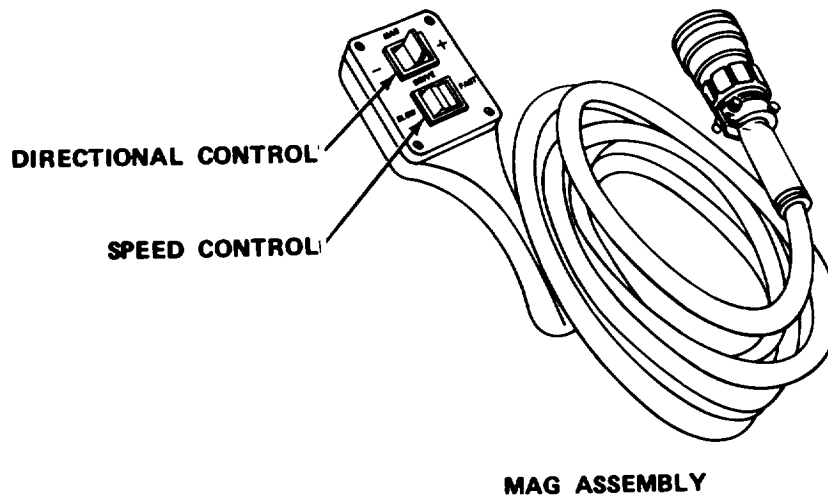
- : Reduces angle.

Speed Control  
FAST: Rapid easel movement.

SLOW: Allows precise positioning of easel on vernier scale.

Control or Indicator

Function



MAG Assembly

Controls image size. Magnification ratio can be determined from object distance and image distance. Switch is marked MAG. Has two functions:

Spring-loaded switch for directional control.

+: Increases image size.

-: Reduces image size.

Speed control

FAST: Rapid movement of lens support arm.

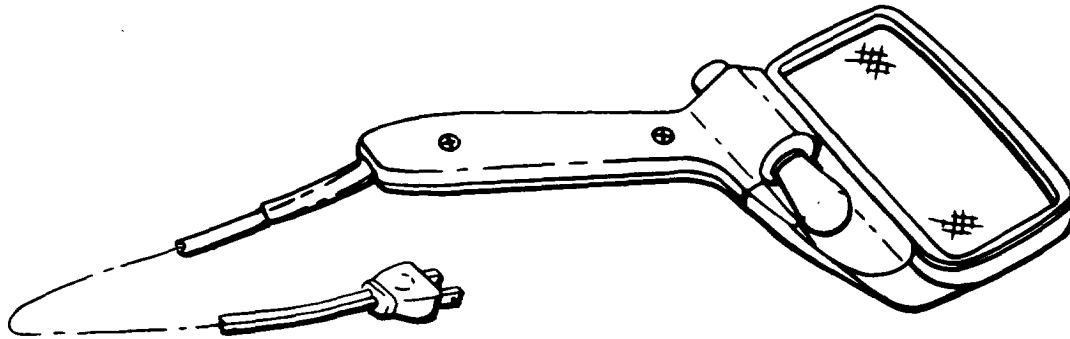
SLOW: Final adjustment and positioning of lens support arm.

---

Control or Indicator

Function

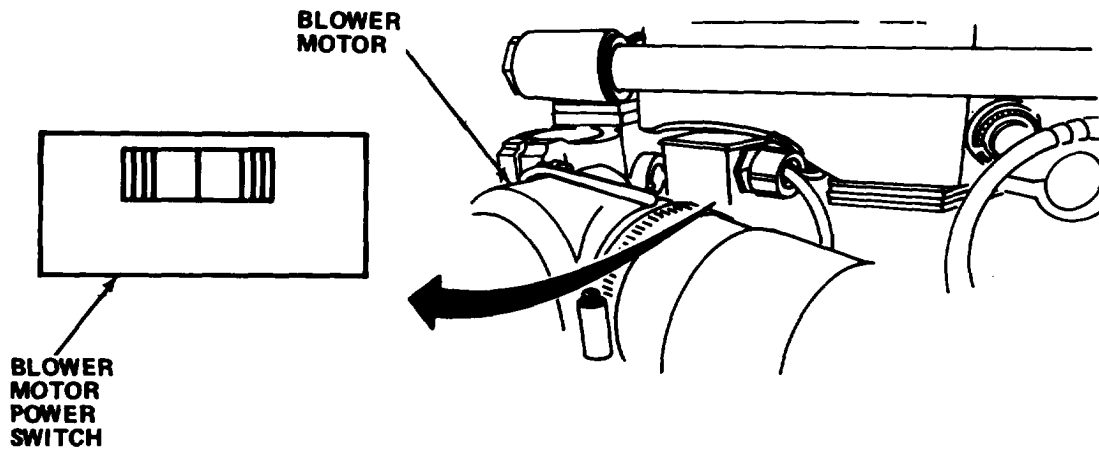
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**HAND MAGNIFIER**

Hand Magnifier

Enables operator to read various scales during rectification process. Illuminated by red bulb.



Blower Motor Power Switch

Applies power to blower motor.

## 7-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If your equipment fails to operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

### 7-5.1 PMCS Procedures.

PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.

- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval columns. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.
- i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

j . List of tools and materials required for PMCS is as follows:

| <u>Item</u>                                     | <u>Quantity</u> |
|---|-----------------|
| Flat Tip Screwdriver                            | 1 ea            |
| Cheesecloth (Item 7, Appendix E)                | ar              |
| Lens Cleaner (Item 6, Appendix E)               | ar              |
| Camel Hair Brush                                | 1 ea            |
| Cellulose Sponge (Item 32, Appendix E)          | ar              |
| Ball Socket Hex Head Key Wrench Set             | 1 ea            |
| Hex Head Key Wrench Set                         | 1 ea            |
| Stepladder                                      | 1 ea            |
| Surveyors Rod Level                             | 1 ea            |
| Watchmaker's Blower                             | 1 ea            |
| Lens Tissue (Item 17, Appendix E)               | ar              |
| Cleaning Solvent, P-D-680 (item 31, Appendix E) | ar              |
| Denatured Alcohol (Item 4, Appendix E)          | ar              |

**Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**NOTE**

If the equipment must be kept in continuous operation. Check and service only those items that can be checked and serviced without disturbing the operation. Make the complete checks and services when the equipment can be shut down.

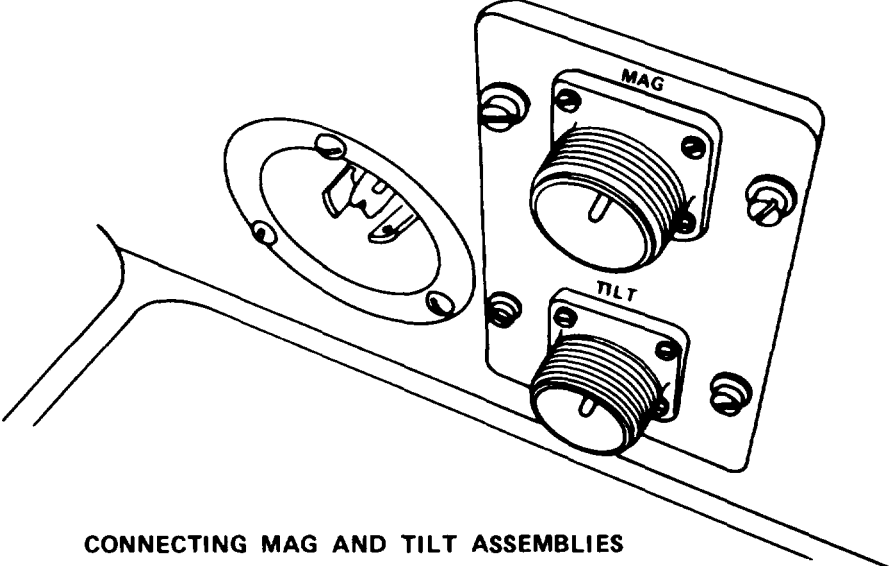
|          |            | B - Before<br>D - During<br>A - After  | W - Weekly<br>M . Monthly<br>Q . Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number)- Hundreds of Hours |   |
|----------|------------|--|--|--|-----------------------------|---|
| ITEM NO. | IN-TER-VAL | ITEM TO BE INSPECTED   |  |  | PROCEDURE                   | For Readiness Reporting, Equipment Is Not Ready Available If: |
| 1        | B          | <u>PHOTOGRANHETRIC RECTIFIER.</u>  |  |  |                             |   |
|          |            | <u>Test Limit Switches.</u><br>1. Remove dust cover. <div style="text-align: center;">  <p><b>CONNECTING MAG AND TILT ASSEMBLIES</b></p> </div> |  |  |                             |   |
|          |            | 2. Plug MAG and TILT control switches into receptacles marked MAG and TILT.  |  |  |                             | MAG and/or TILT assembly missing.<br>Power cord missing.      |

Table 7-1, OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

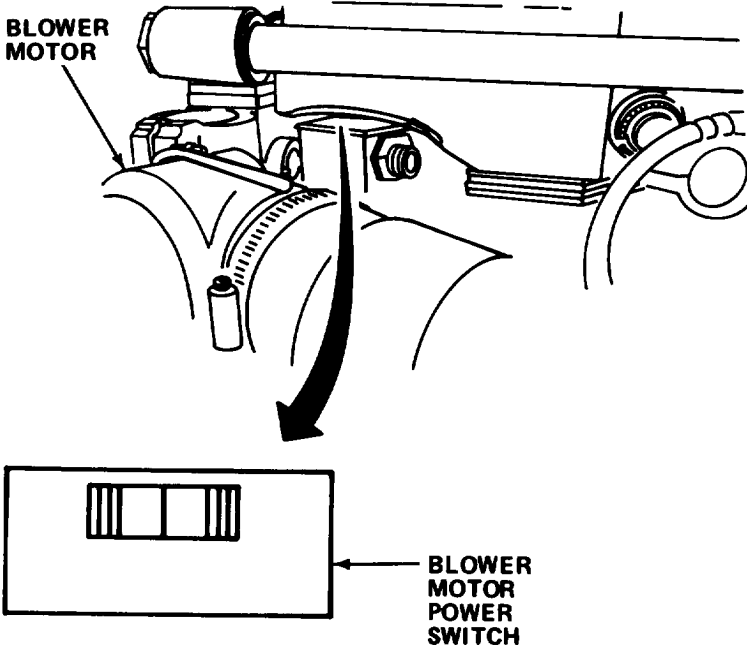
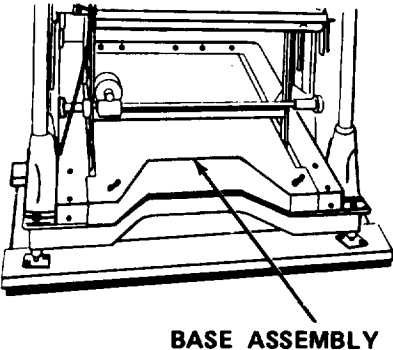
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available if: |
|----------|----------|--|--|
| 1        | B        | <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u>  |  |
|          |          | <p><u>Test Limit Switches - Cont</u></p> <div>  <p><b>BLOWER MOTOR</b></p> <p><b>BLOWER MOTOR POWER SWITCH</b></p> </div> <p>3. Turn on blower motor switch.</p> <div>  <p><b>BASE ASSEMBLY</b></p> </div> <p>4. Remove base assembly cover.</p> |  |



Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|---|---|
| 1        | B        | <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u>   |   |
|          |          | <p><u>Test Limit Switches - Cont</u></p> <div style="text-align: center;"> </div> <ol style="list-style-type: none"> <li>5. Connect magnification drive motor plug into receptacle located on right side support bar.</li> <li>6. Plug in power cord.</li> </ol> |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

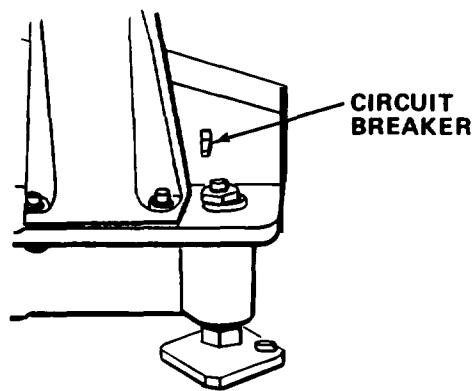
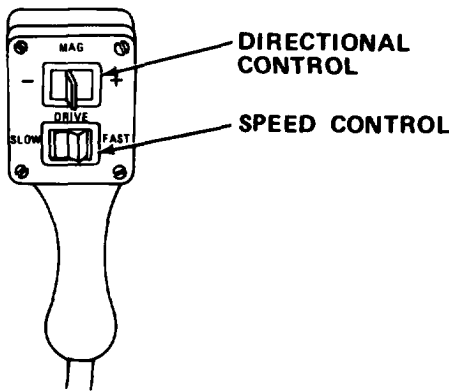
| ITEM<br>NC                              | IN-<br>TER<br>VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness<br>Reporting,<br>Equipment Is<br>Not Ready/<br>Available If: |
|---|-------------------|---|--|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b> |                   |   |  |
| 1                                       | B                 | <p><u>Test Limit Switches - Cont</u></p>  <p>7. Turn on circuit breaker.</p>  <p><b>MAG ASSEMBLY</b></p> |  |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

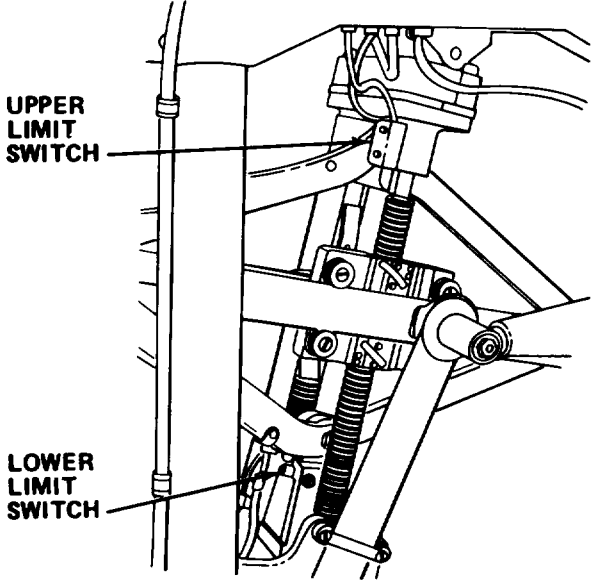
|   |          | B - Before<br>D - During<br>A - After | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours    |  |
|---|----------|---------------------------------------|--|--|---------------------------------|--|
| ITEM NO.  | INTERVAL | ITEM TO BE INSPECTED                  |  |  | PROCEDURE                       | For Readiness Reporting, Equipment Is Not Ready/ Available if: |
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b>   |          |                                       |  |  |                                 |  |
| 1   | B        | Test Limit Switches - Cont            |  |  |                                 |  |
| <b>NOTE</b>   |          |                                       |  |  |                                 |  |
| Select slow speed on TILT and MAG assemblies.                                       |          |                                       |  |  |                                 |  |
| 8. Grasp MAG assembly and press directional switch to minus (-).                    |          |                                       |  |  |                                 |  |
|  |          |                                       |  |  |                                 |  |
| 9. Depress upper limit switch. Motor should stop.                                   |          |                                       |  |  |                                 |  |
| 10. Press MAG assembly directional switch to plus (+).                              |          |                                       |  |  |                                 |  |
|   |          |                                       |  |  | Lens support arm does not move. |  |
|   |          |                                       |  |  | Motor does not stop.            |  |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready Available If: |
|----------|----------|--|--|
| 1        | B        | <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b>  |  |
|          |          | <p><u>Test Limit Switches - Cont</u></p> <p>11. Depress lower limit switch. Motor should stop. Depress outside easel tilt limit switch. Motor should stop.</p> <p>12. Release directional switch.</p> <div style="text-align: center;"> <p><b>TILT ASSEMBLY</b></p> </div> <p>13. Grasp TILT assembly and press directional switch to minus (-).</p> |  |

Motor does not stop.

Easel does not move.

**Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent**  
 (Number) - Hundreds of Hours

B - Before  
 D - During  
 A - After

W - Weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 S - Semiannually  
 BI - Biennially

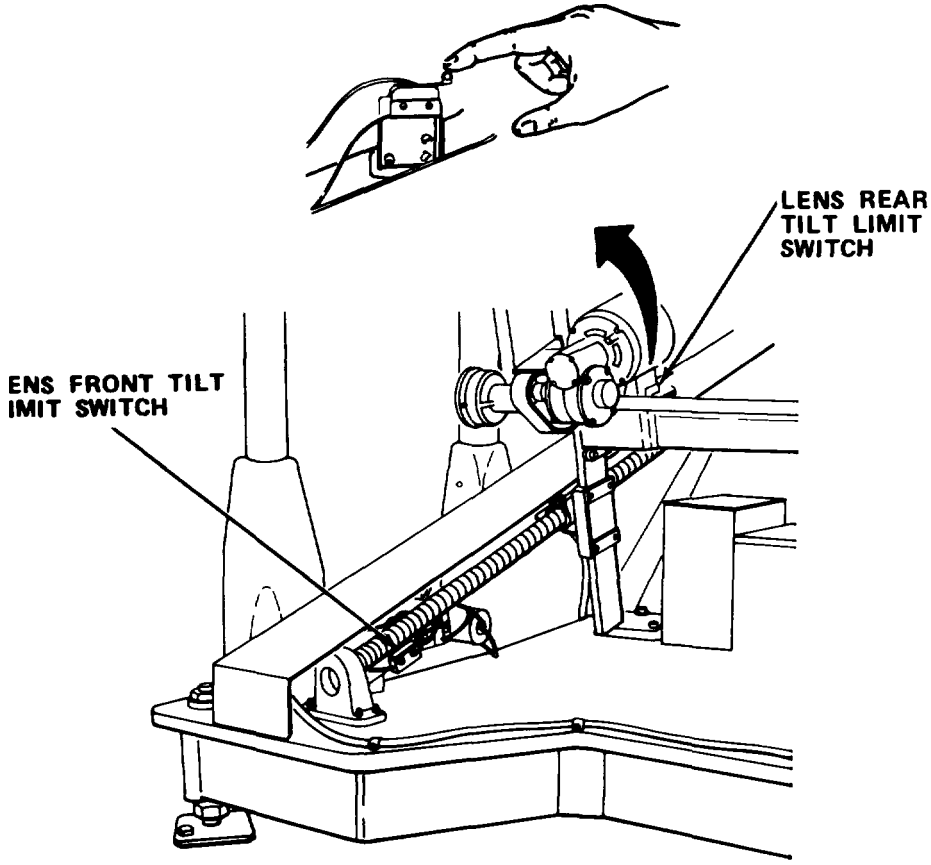
| ITEM NO.                                | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|---|----------|---|---|
| <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u> |          |   |   |
| 1                                       | B        | <p><u>Test Limit Switches - Cont</u></p>  <p><b>LENS FRONT TILT LIMIT SWITCH</b></p> <p><b>LENS REAR TILT LIMIT SWITCH</b></p> <ol style="list-style-type: none"> <li>14. Depress front limit switch roller. Motor should stop.</li> <li>15. Press TILT assembly directional switch to plus (+).</li> </ol> | <p>Motor does not stop.</p>   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weely  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.                                       | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|--|----------|--|---|
| <b><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></b> |          |  |   |
| 1  | B        | <p><u>Test Limit Switches - Cont</u></p> <p>16. Depress rear limit switch roller. Motor should stop. Depress inside easel tilt limit switch. Motor should stop.</p> <p>17. Turn off circuit breaker.</p> <p>18. Replace base assembly.</p> <p>19. Unplug power cord and TILT and MAG control switches, and store them in spare parts box.</p> <p>20. Reinstall dust cover.</p> | Motor does not stop.  |
| 2  | B        | <p><u>Check Machine Level.</u></p> <p>1. Obtain surveyor's rod level.</p> <div style="text-align: center;"> <p>The diagram shows a vertical rod level with a bubble level at the top. An arrow labeled 'ROD LEVEL' points to the top of the rod. The rod is positioned against a vertical surface of a machine, which is shown in a partial view at the bottom of the diagram.</p> </div>  |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.                                | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|---|----------|--|---|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b> |          |  |   |
| 2                                       | B        | <p><u>Inspect and Service - Cont</u></p> <ol style="list-style-type: none"> <li>2. Hold surveyor's rod level against each of two front columns.</li> <li>3. Take level reading at each column.</li> <li>4. If not level, refer to paragraph 7-6.1 for leveling procedures.</li> </ol>  |   |
| 3                                       | B        | <p><u>Inspect and Service.</u></p> <ol style="list-style-type: none"> <li>1. Turn off circuit breaker.</li> <li>2. Unplug power cord.</li> </ol> <div style="text-align: center;"> <p>The diagram shows a mechanical assembly with a lamp housing at the top. A strap is attached to the lamp housing and labeled 'LAMPHOUSE GROUND STRAP'. Another strap is attached to the base of the assembly and labeled 'BASE GROUND STRAP'. The lamp housing itself is labeled 'LAMPHOUSE'.</p> </div> <ol style="list-style-type: none"> <li>3. Check ground connections to be sure that they are tight.</li> </ol> | <p>Ground connections loose or missing.</p>                   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

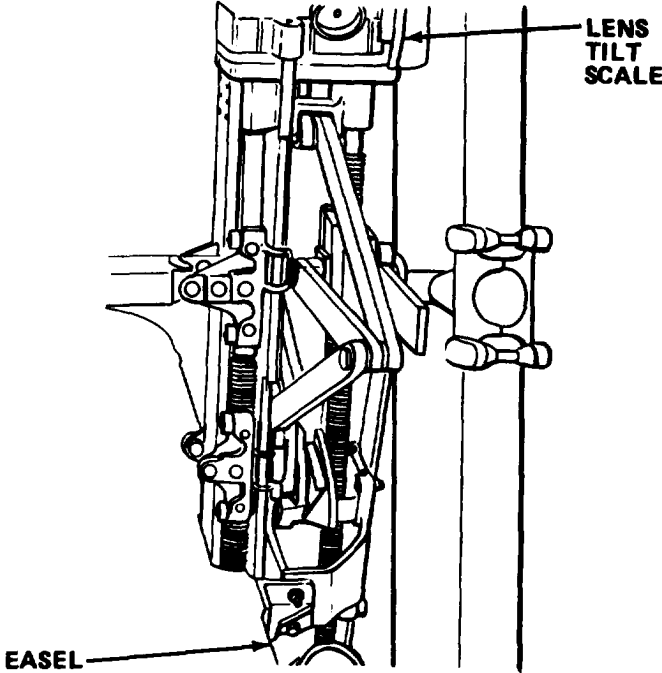
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|---|---|
| 3        | B        | <p><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></p> <p><u>Inspect and Service - Cont</u></p> <ol style="list-style-type: none"> <li>4. Check TILT control assembly, HAG assembly, and power cord for frayed wires and tight connections.</li> <li>5. Plug-in power cord.</li> <li>6. Turn on circuit breaker.</li> </ol>  <ol style="list-style-type: none"> <li>7. Use TILT assembly to adjust lens tilt scale for reading of 0 degree.</li> </ol> | <p>Damaged power cord, TILT or MAG assembly.</p>              |



Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
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AN - Annually  
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BI - Biennially

(Number) - Hundreds of Hours

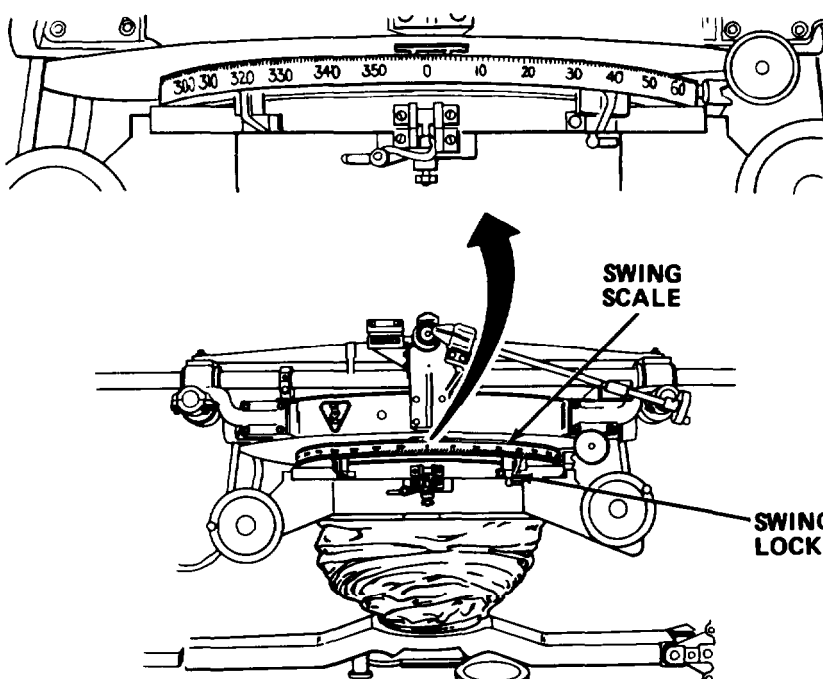
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|---|---|
| 3        | B        | <p><b>PHOTOGRAPHIC RECTIFIER - Cont</b></p> <p><u>Inspect and Service - Cont</u></p>  <p>8. Set swing scale to 0 degree and lock swing movement by rotating swing lock to right.</p> <p>9. Turn off circuit breaker.</p> |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO   | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready! Available If: |
|---|----------|---|---|
| 3   | B        | <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u> |   |
|   |          | <u>Inspect and Service - Cont</u>       |   |
|   |          |   |   |
| <p>10. Attach balance pulls to spool brackets.</p> <p>11. Hold film stage up and rotate thumbscrew to release stage lock.</p> <p>12. Slowly lower film stage.</p> |          |   | <p>Balance pulls missing.</p>                                 |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

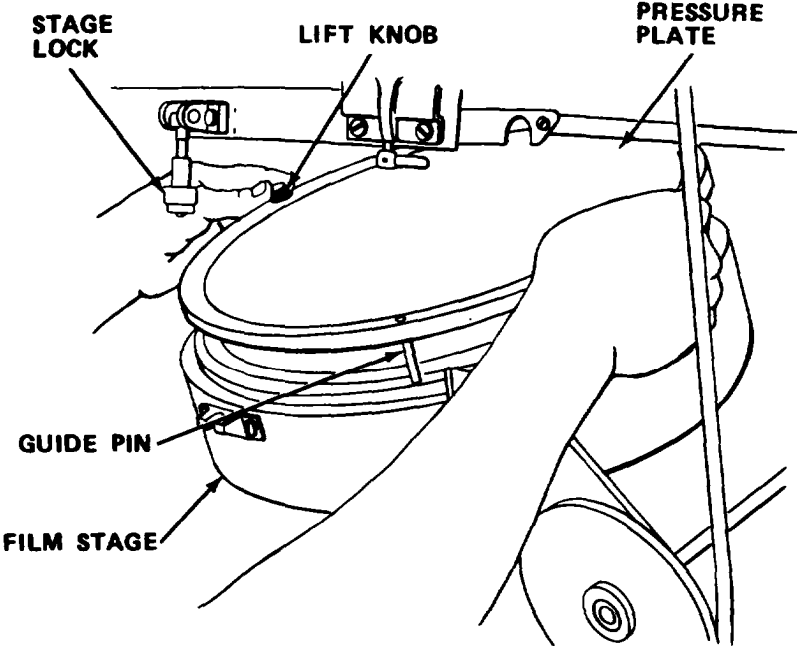
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|---|---|
|          |          | <p>3</p> <p>B</p> <p><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></p> <p><u>Inspect and Service - Cont</u></p>  <p><b>CAUTION</b></p> <p>Do not strike fluorescent lamps with metal rim of pressure plate. Fluorescent lamps will break.</p> <p>13. Lift pressure plate by knurled knobs, and withdraw guide pins from their seats in film stage.</p> <p>14. Place pressure plate on flat surface.</p> |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

{Number} - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|--|---|
| 3        | B        | <u>PHOTOGRAPHIC RECTIFIER - Cont</u>   |   |
|          |          | <p><u>Inspect and Service - Cont</u></p> <p>15. Use cheesecloth to clean film rollers on both sides of film stage and outside of lamphouse.</p> <p>16. Clean both sides of pressure plate and top surface of stage plate with lens tissue and lens cleaner.</p> <p>17. Install pressure plate. Raise film stage to its original position. Secure with stage lock.</p> <div> </div> <p>18. Unclamp upper end of bellows from film stage.</p> |   |

Bellows damaged,

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

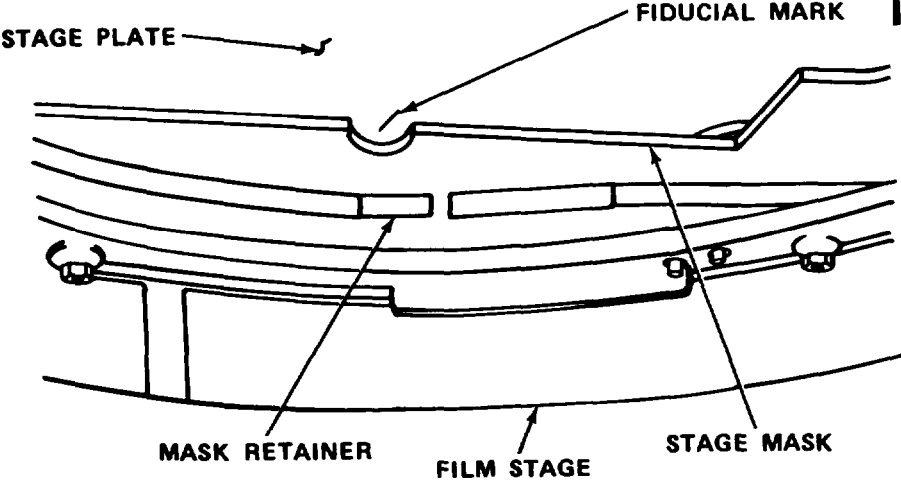
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE  | For Raaciness Reporting, Equipment h Not Ready/ Available If: |
|----------|----------|--|---|
| 3        | B        | <p><b>PHOTOGRAMMETRIC RECTIFIER - Cont</b></p> <p>Inspect and Service - Cont</p>  <ol style="list-style-type: none"> <li>19. Turn spring-loaded mask retainers so they permit stage mask to be lowered and removed.</li> <li>20. Clean lower surface of stage plate with lens tissue and lens cleaner.</li> <li>21. Reinstall stage mask so that fiducial lines are in center of cutouts.</li> <li>22. Rotate mask retainers so that they hold mask against stage plate.</li> <li>23. Reconnect the bellows.</li> </ol> | <p>Stage plate cracked.</p>                                   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
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W - Weekly  
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S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

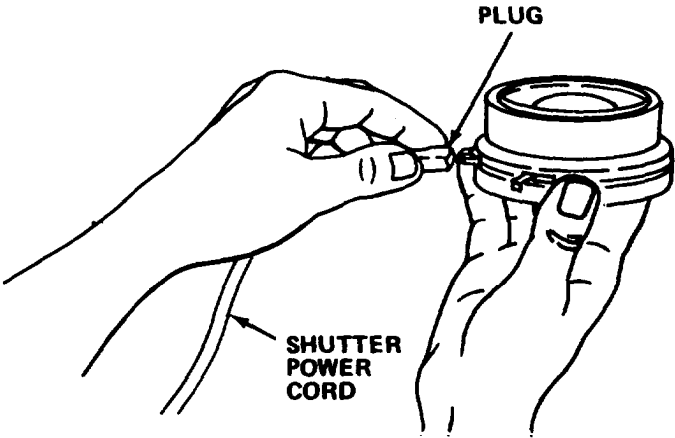
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready Available If: |
|----------|----------|---|--|
| 3        | B        | <p><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></p> <p><u>Inspect and Service - Cont</u></p>  <p>24. Remove plug from shutter and remove shutter power cord from lens support arm.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Hold lens firmly when rotating lock ring. Lens will fall when lock ring is turned to un lock position for release.</p> |  |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

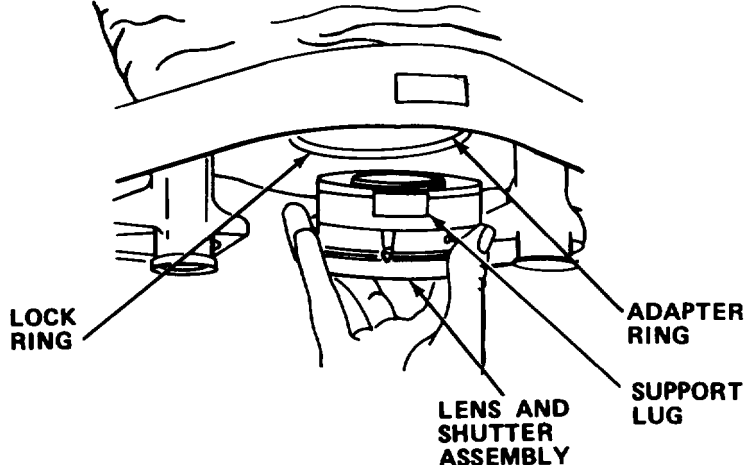
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE   | Fur Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 3        | B        | <p><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></p> <p><u>Inspect and Service - Cont</u></p>  <p>                     25. Rotate lock ring to unlock lens.<br/>                     26. Remove lens from adapter ring.<br/>                     27. Use watchmaker's blower to remove dust from lens.<br/> <p style="text-align: center;"><b><u>CAUTION</u></b></p>                     Use only approved lens cleaning solution to prevent damage to lens.<br/>                     28. Apply a few drops of lens cleaner on lens tissue and wipe glass very lightly.<br/>                     29. Rotate lock ring to aline its notches with those in adapter ring.                 </p> |  |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

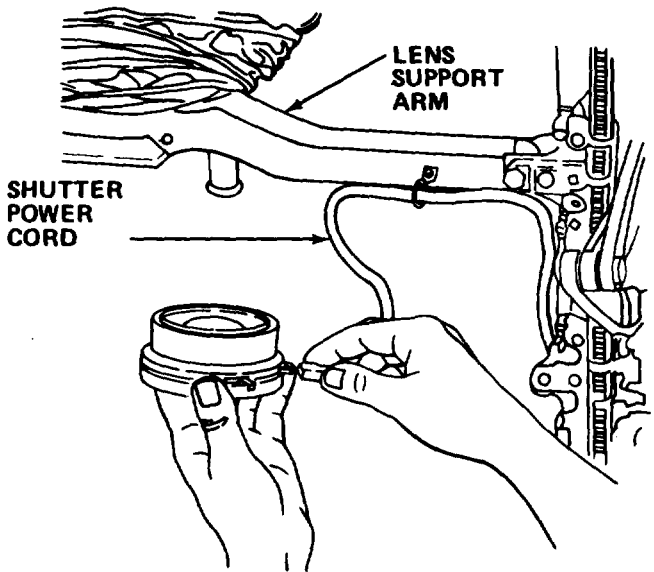
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment h Not Ready/ Available If:                     |
|----------|----------|--|--|
| 3        | B        | <p><b>PHOTOGRAMMETRIC RECTIFIER - Cont</b></p> <p><u>Inspect and Service - Cont</u></p>  <p>35. Inspect blower hose for rips or tears.</p> <p>36. Check blower hose clamps for tight fit.</p> <p>37. Check blower power cord for frayed wires.</p> <p>38. Unlock swing movement by rotating swing lock to left.</p> <p>39. Turn on circuit breaker.</p> | <p>Blower hose has rips or tears.</p> <p>Blower power cord has frayed wires.</p> |



Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent

| ITEM NO.   | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|--|----------|---|--|
| <p>B - Before<br/>D - During<br/>A - After</p> <p>W - Weekly<br/>M - Monthly<br/>Q - Quarterly</p> <p>AN - Annually<br/>S - Semiannually<br/>BI - Biennially</p> <p>(Number) - Hundreds of Hours</p> |          |   |  |
| <p><u>PHOTOGRAMMETRIC RECTIFIER - Cont</u></p>   |          |   |  |
| 3  | B        | <p><u>Inspect and Service - Cont</u></p> <p>10. Slip lens into adapter ring, allowing support lugs to enter notches.</p> <p>11. Rotate lock ring to secure lens into position.</p> <div style="text-align: center;"> </div> <p>32. Insert strap on speed computer through clamp on lens support arm.</p> <p>33. Plug shutter power cord into shutter.</p> <p>34. Plug shutter power cord into receptacle.</p> | <p>Shutter hand control missing.</p>                           |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

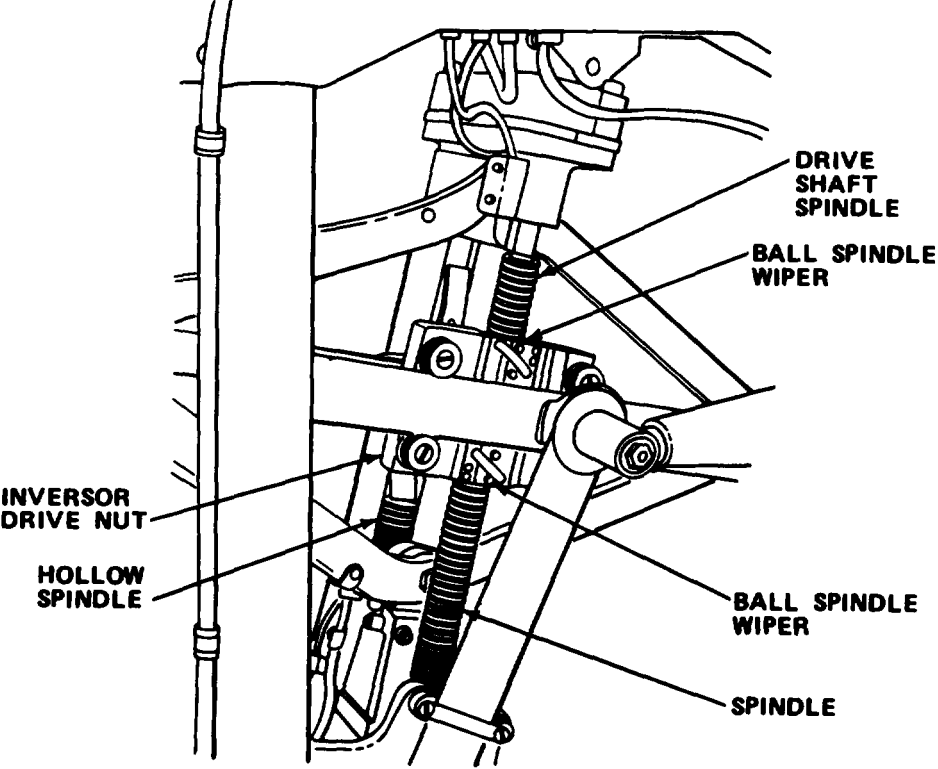
| ITEM NO.                                | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If:                         |
|---|----------|---|---|
| <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u> |          |   |   |
| 4                                       | Q        | <p><u>Clean Inversor Spindle and Guide Bars.</u></p> <p>1. Unplug power cord.</p>  |   |
|   |          | <p>2. Use cheesecloth to wipe drive shaft, inversor drive nut, ball spindle wiper and guide bars.</p>  | <p>Drive shaft nicked. Hollow spindle has cracks.</p> |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

|          |          | B- Before<br>D - During<br>A - After  | W - Weakly<br>M - Monthly<br>G - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours |   |
|----------|----------|---|--|--|------------------------------|---|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED  |  |  | PROCEDURE                    | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|          |          | <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u>   |  |  |                              |   |
| 4        | 1        | <u>Clean Inversor Spindle and Guide Bars - Cont</u>   |  |  |                              |   |
|          |          | <u>WARNING</u>  |  |  |                              |   |
|          |          | <p>Dry cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flashpoint of solvent is 100°F to 138°F (38°C to 59°C).</p> |  |  |                              |   |
|          |          | <p>3. Remove ball spindle wipers and clean them in solvent. If felt is worn, replace wiper.</p>   |  |  |                              | Ball spindle wipers missing.                                  |
|          |          | <p>4. Reinstall ball spindle wipers.</p>  |  |  |                              |   |
|          |          | <p>5. Plug in power cord.</p>   |  |  |                              |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cent

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

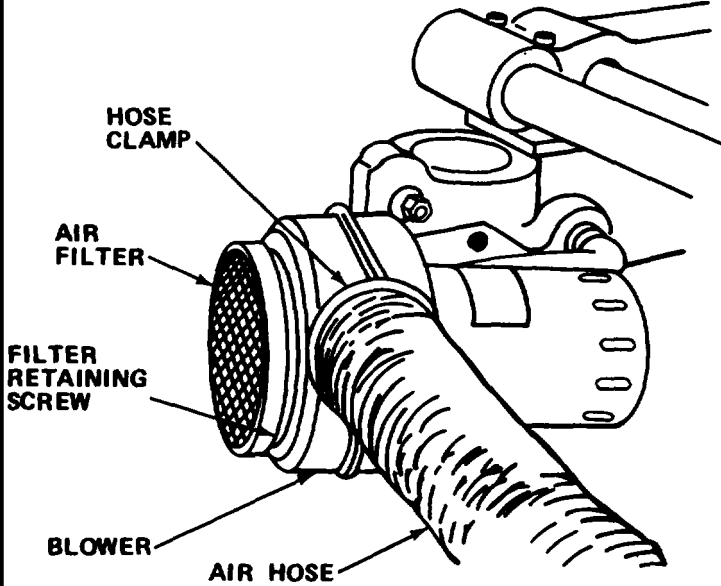
| ITEM NO                                 | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Readyf Available If: |
|---|----------|--|---|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b> |          |  |   |
| 5                                       | M        | <p><u>Service Blower.</u></p> <ol style="list-style-type: none"> <li>Unplug power cord.</li> </ol>  <ol style="list-style-type: none"> <li>Remove filter retaining screws and remove air filter.</li> <li>Shake filter in container filled with denatured alcohol. Then look through filter in direction of a light source. When thoroughly clean, no cloudy areas will be seen. Allow to dry.</li> <li>Position filter on blower. Aline holes and reinstall retaining screws.</li> <li>Plug in power cord.</li> </ol> |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

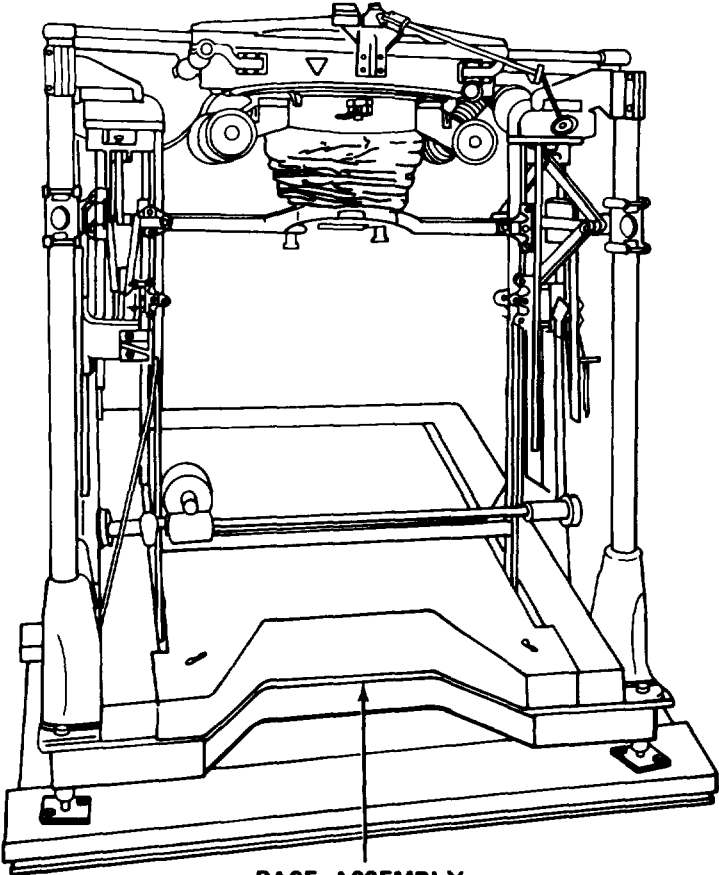
| ITEM NO.                                | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|---|----------|---|---|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b> |          |   |   |
| 6                                       | Q        | <p><u>Service Tilt Drive, V-Belt and Interior.</u></p> <ol style="list-style-type: none"> <li>1. Unplug power cord.</li> </ol> <div style="text-align: center;">  <p><b>BASE ASSEMBLY COVER</b></p> </div> <ol style="list-style-type: none"> <li>2. Remove base assembly cover.</li> </ol> |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

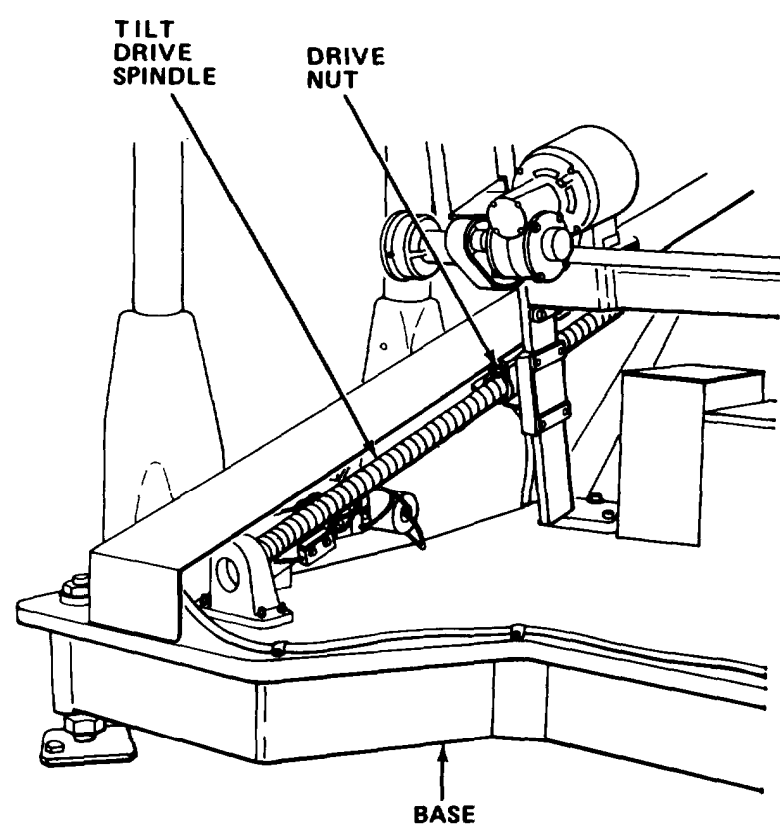
| ITEM NO                                 | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|---|----------|---|---|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b> |          |   |   |
| 6                                       | Q        | <u>Service Tilt Drive, V-Belt and Interior - Cont</u>   |   |
|   |          |    |   |
|   |          | <ol style="list-style-type: none"> <li>3. Using dry cheesecloth, remove dust, dirt and moisture from interior of base.</li> <li>4. Using dry cheesecloth, remove dust and dirt, from tilt drive spindle, drive nut, and support bar.</li> </ol> | Corrosion in base interior.                                   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

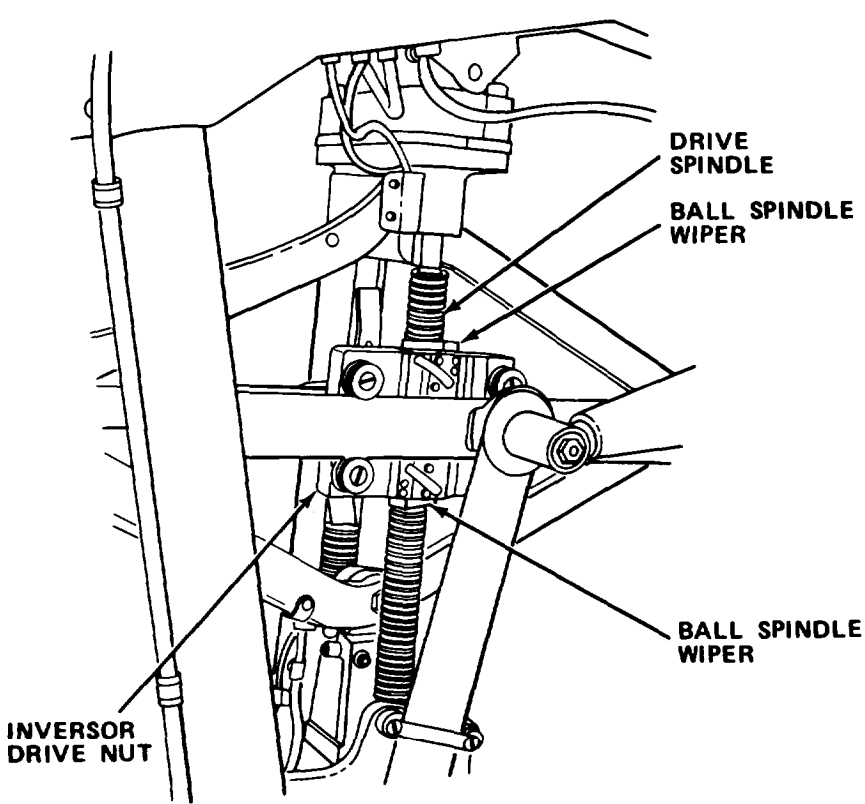
| ITEM NO.  | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE         | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|---|----------|---|---|
| <b>PHOTOGRAMMETRIC RECTIFIER - Cont</b>   |          |   |   |
| 6   | Q        | Service Tilt Drive V-Belt and Interior - Cont |   |
|  |          |   |   |
| <p>5. Remove screws, lockwashers, and wipers.</p>                                   |          |   |   |

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

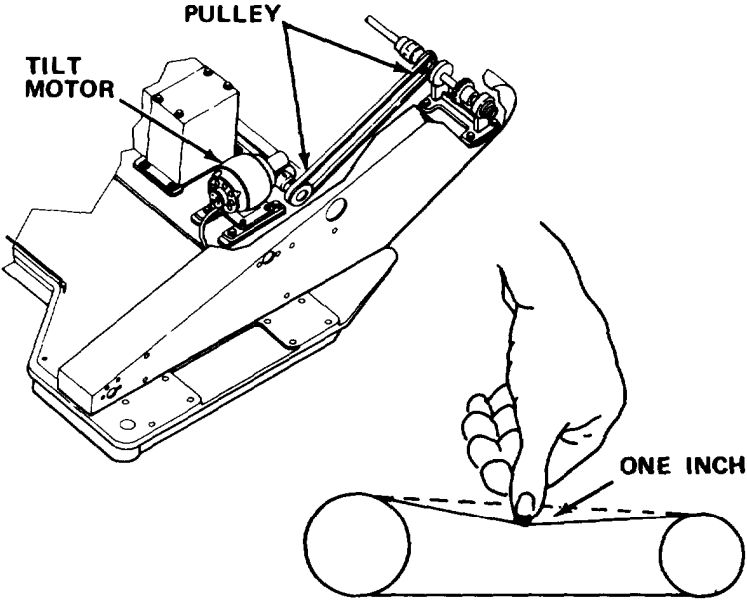
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|----------|----------|--|---|
| 6        | Q        | <u>PHOTOGRAMMETRIC RECTIFIER - Cont</u>  |   |
|          |          | <p><u>Service Tilt Drive V-Belt and Interior - Cont</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Dry cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Wear solvent impermeable gloves and eye/face protective equipment when using solvent. Do not use near open flame or excessive heat. Flashpoint of solvent is 100°F to 138°F (38°C to 59°C).</p> <ol style="list-style-type: none"> <li>6. If wipers are worn, replace them. If not, soak them in solvent and dry.</li> <li>7. Reinstall wipers.</li> </ol>  <p>The diagram shows a mechanical assembly with a 'TILT MOTOR' and a 'PULLEY'. Below it, a hand is shown measuring a cylindrical component (likely a wiper) against a scale marked 'ONE INCH'.</p> |   |



Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

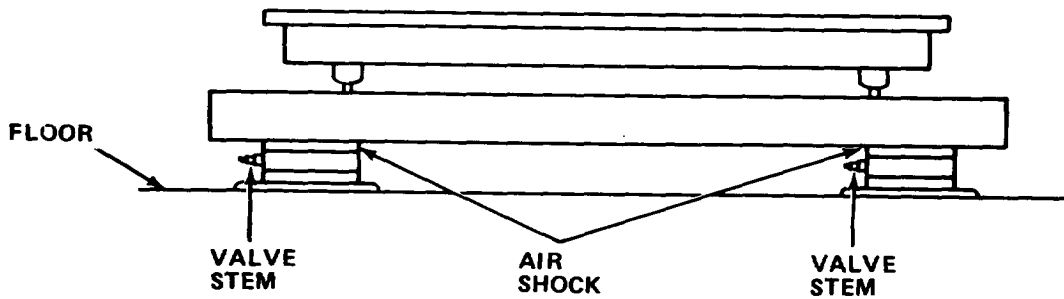
|          |          | B . Before<br>D - During<br>A - After   | W . Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours                                  |
|----------|----------|---|--|--|---|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED  |  |  | For Readiness Reporting Equipment Is Not Ready/ Available If: |
|          |          | PROCEDURE   |  |  |   |
| 6        | Q        | PHOTOGRAMMETRIC RECTIFIER - Cont  |  |  |   |
|          |          | <u>Service Tilt Drive, V-Belt and Interior - Cont</u><br>8. Place thumb on V-belt halfway between pulleys.<br>9. If belt is depressed approximately 1 in. by thumb pressure, tension is correct.<br>10. If proper tension is not obtained, refer to operator maintenance (paragraph 7-10.1).<br>11. Reinstall base assembly cover.<br>12. Plug in power cord. |  |  |   |

7-6. OPERATION UNDER USUAL CONDITIONS.

7-6.1 Assembly and Preparation for Use.



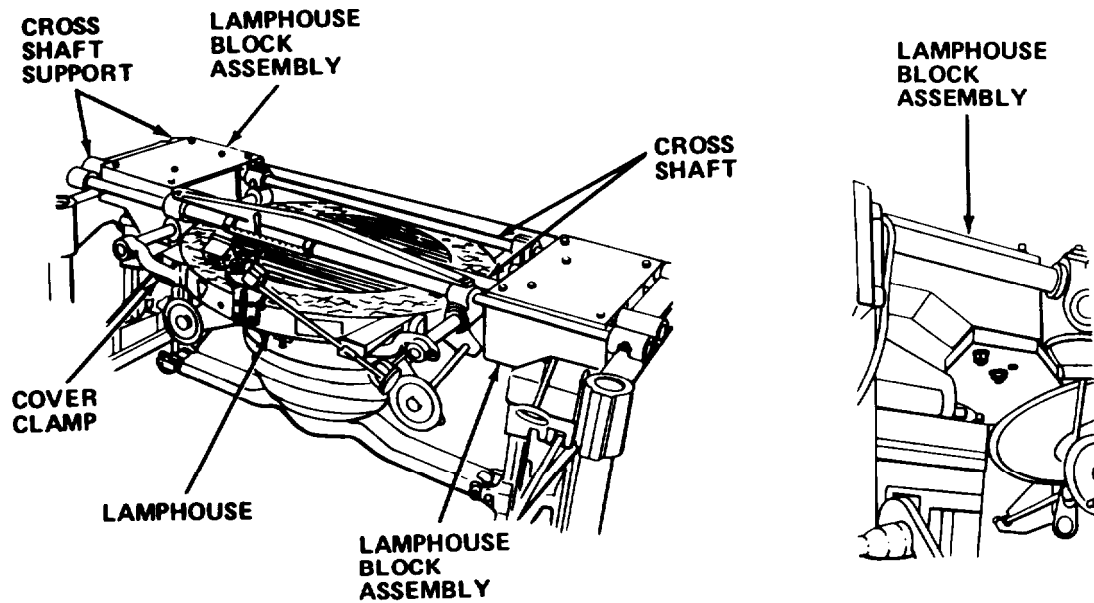
- a. Remove dust cover.



- b. Deflate air shocks (paragraph 1-6.1).
- c. Shipping blocks removal:

**NOTE**

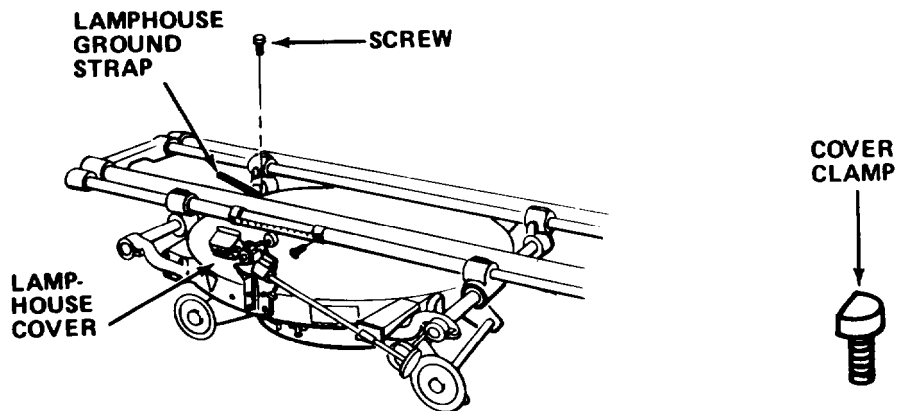
- Label position of block assemblies with magic marker. Use an 8" adjustable wrench.
- Bolts near outside edge of lamphouse block assemblies will fall when nuts are removed.
- As soon as block assemblies are removed, reassemble in mounted position and store behind rectifier.



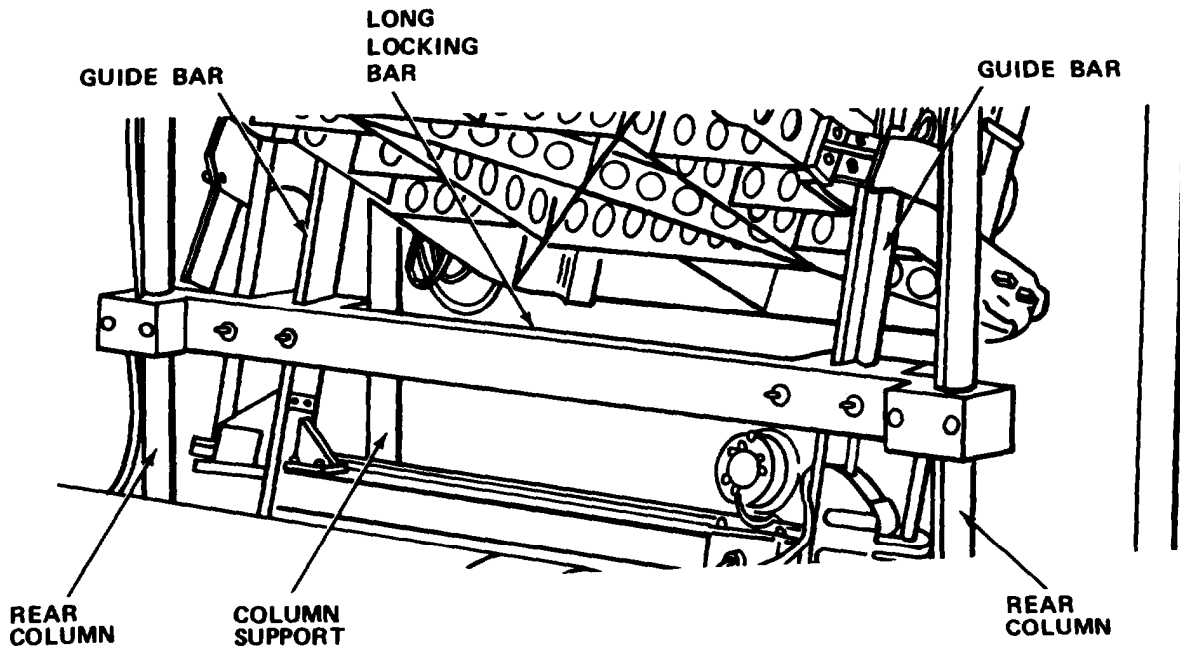
- (1) Remove lamphouse block assemblies attached to both sides of cross shaft.

**NOTE**

Rectifier is not normally shipped with cushioning material. Use this procedure only if cushioning material is installed.



- (2) Disconnect lamphouse ground strap from lamphouse cover.
- (3) Rotate cover clamp so that flat side of washer is next to cover's edge.
- (4) Raise lamphouse cover slightly.
- (5) Remove cushioning material.
- (6) Retighten cover clamps to hold lamphouse cover in place.
- (7) Reinstall lamphouse ground strap.



(8) Remove tilt block assembly and store.

(a) Remove nuts and bolts from inner and outer block shoes.

**WARNING**

Shock hazard. Be sure that rectifier frame is grounded to van body or serious personal injury may occur.

(b) Connect power cord.

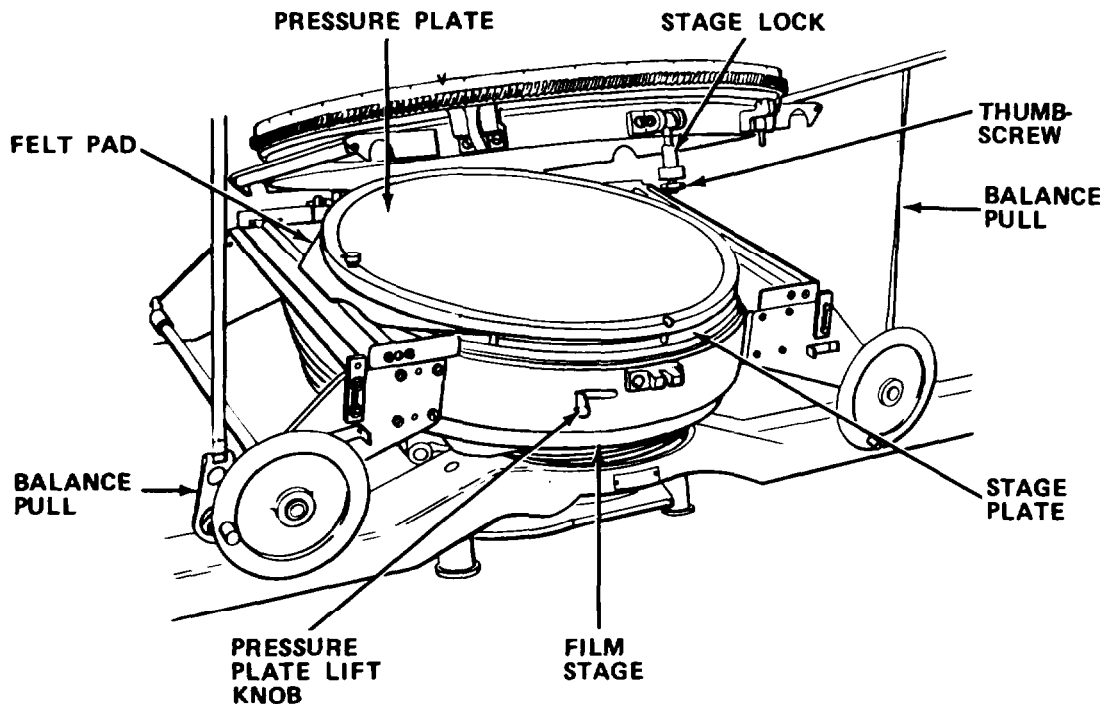
(c) Connect TILT drive switch.

(d) Turn power on. Drive tilt in negative (-) direction to free the long locking bar from rear column and guide bars. Remove bar.

(e) Turn off power and unplug power cord.

(f) Reassemble locking bar assemblies and store behind rectifier.

d. Removal of felt shipping pads.



- (1) Connect balance pulls to spool brackets.

**NOTE**

Support film stage only by placing hand under spool bracket.

- (2) Support film stage with one hand.
- (3) Loosen thumbscrew to release stage lock.
- (4) Carefully lower film stage.

**CAUTION**

Be careful not to touch light grid when removing rear screw. Damage to light grid may occur.

- (5) Remove socket head screws holding pressure plate for shipment. Retain and store screws for future use.
- (6) Move pressure plate lift knob to left.

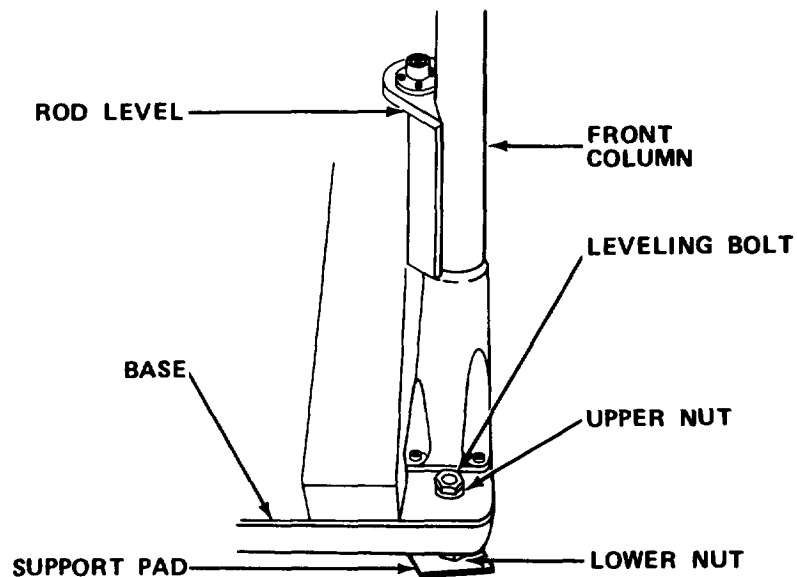
**CAUTION**

Felt could contain contaminants which may scratch the stage plate. Use extreme care during removal or equipment damage could occur.

- (7) Carefully remove felt pad.
  - (8) Move pressure plate lift knob to right.
  - (9) Raise film stage to original position.
  - (10) Tighten thumbscrew to secure stage lock.
- e. Leveling the photogrammetric rectifier.

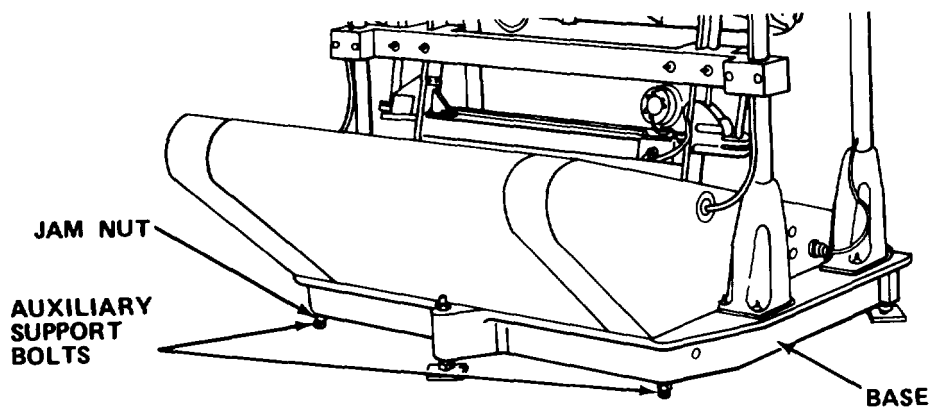
**NOTE**

For initial installation or replacement only. Be sure van is level before performing this task.

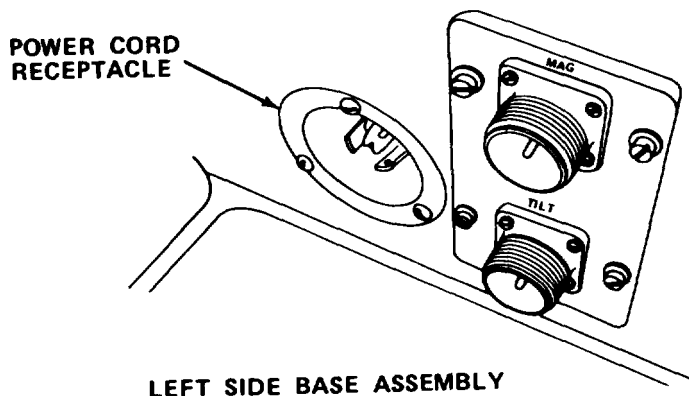


- (1) Level section (paragraph 1-6.1).
- (2) Loosen upper nuts on front leveling bolts.
- (3) Loosen jam nuts and raise auxiliary support bolts at rear of rectifier so rectifier is supported by leveling bolts only.
- (4) Hold the surveyor's rod level against each of the two front columns.

- (5) Level rectifier by rotating lower nut to raise or lower a corner.
- (6) Take level readings at each front column.
- (7) When rectifier is level tighten upper nut on each leveling bolt.

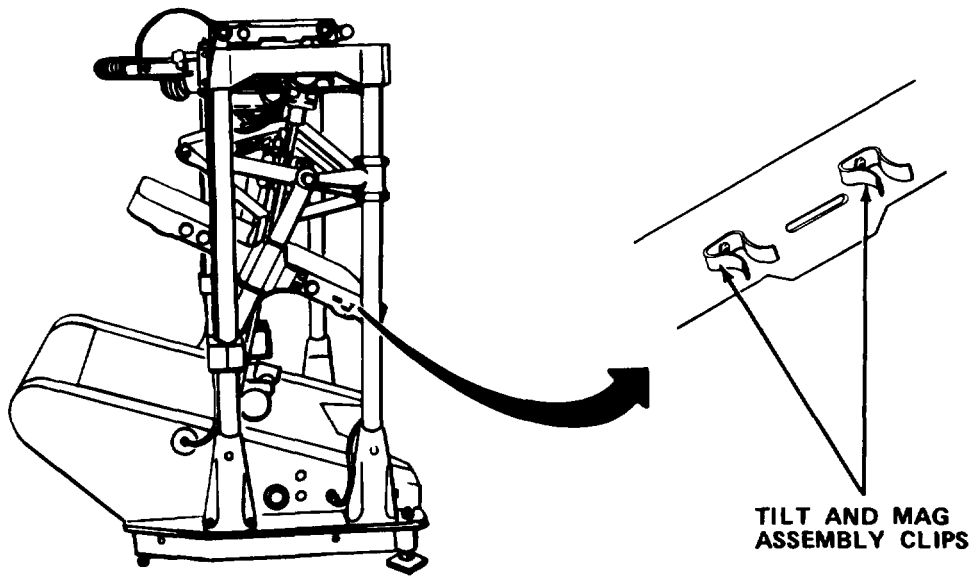


- (8) Adjust auxiliary support bolts until they barely contact mounting frame; then tighten jam nuts.

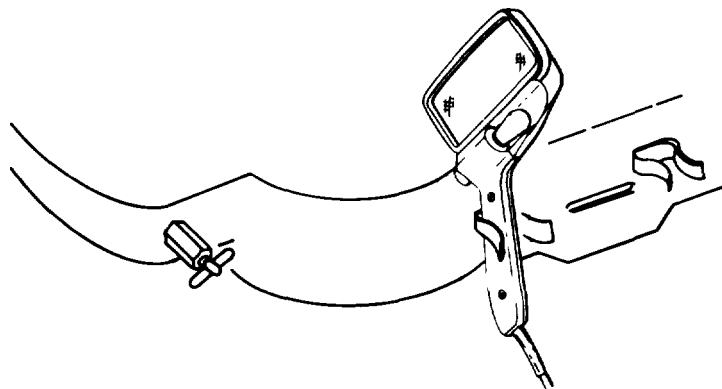


f. Remove power cord from spare parts box, and connect it between wall outlet and receptacle labeled 115 V, 60 Hz on left side shield.

Remove MAG and TILT assemblies from spare parts box and connect them to receptacles labeled MAG and TILT.



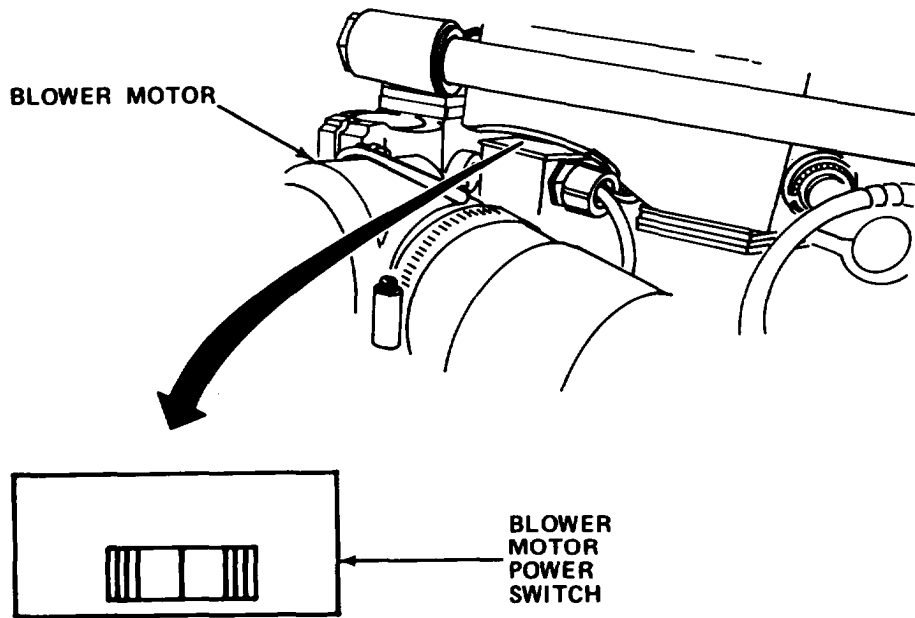
- h. Place MAG and TILT assemblies in clips on left side of easel.
- i. Remove hand magnifier from spare parts box and plug it into receptacle on right side base assembly.



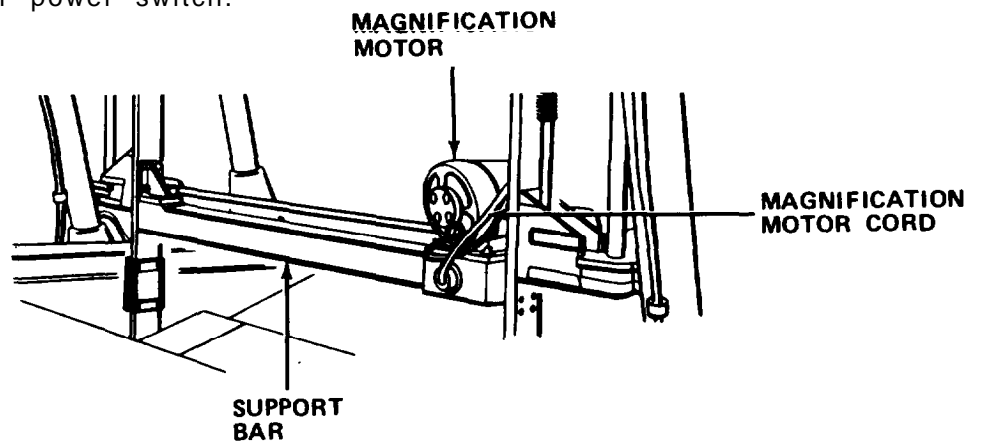
**FRONT VIEW OF EASEL**

- j. Place magnifier in clip on right side of easel.





k. Turn on blower power switch.



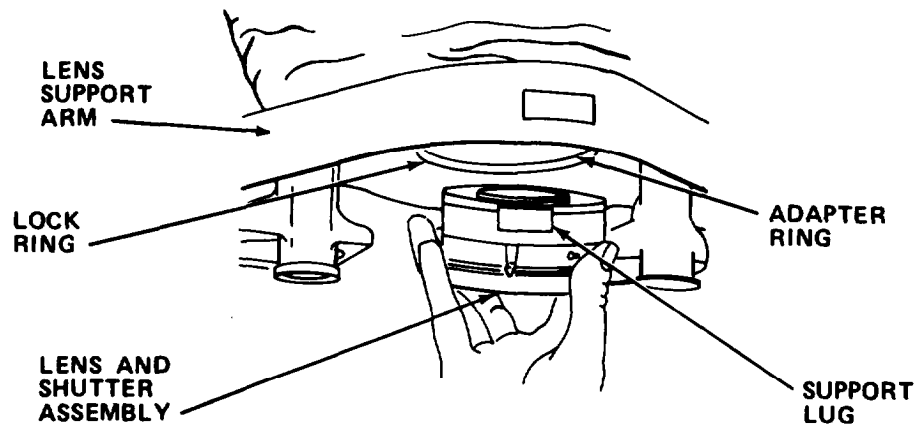
l. Check that magnification motor cord is plugged in on support bar.

**NOTE**

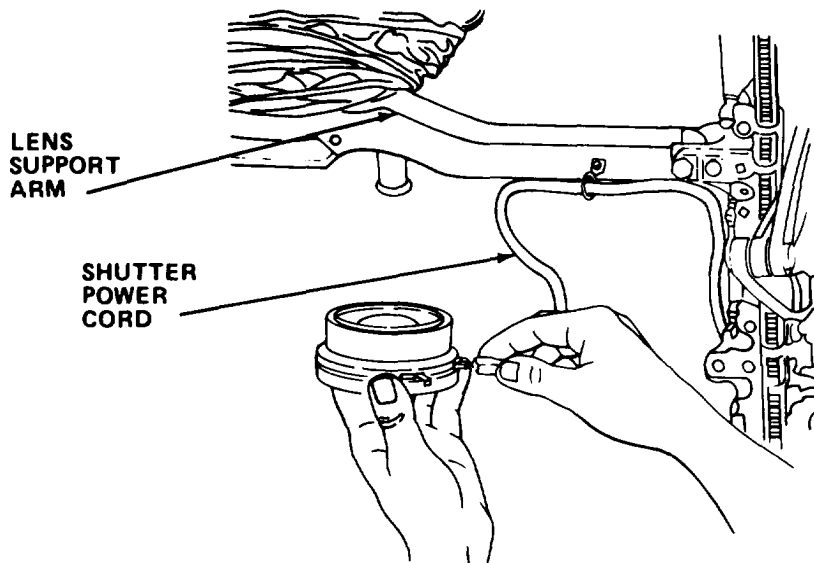
Be sure serial number on lens and shutter assembly is identical to serial number of rectifier. Rectifier is calibrated to focal length of a particular lens.

m. Remove sealed lens container from spare parts box.

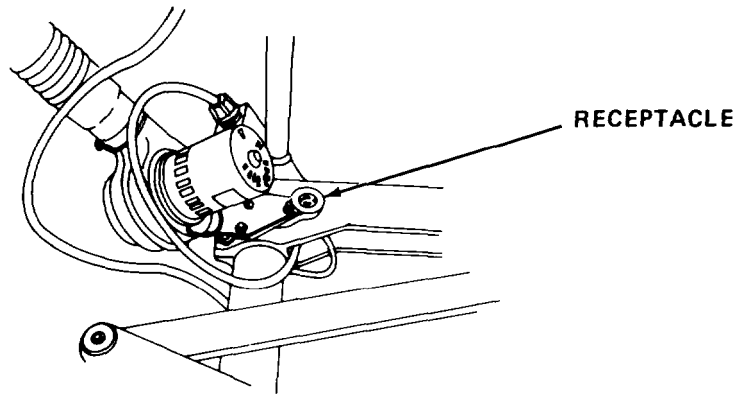
n. Remove nine-speed computer, lens and shutter assembly from sealed container.



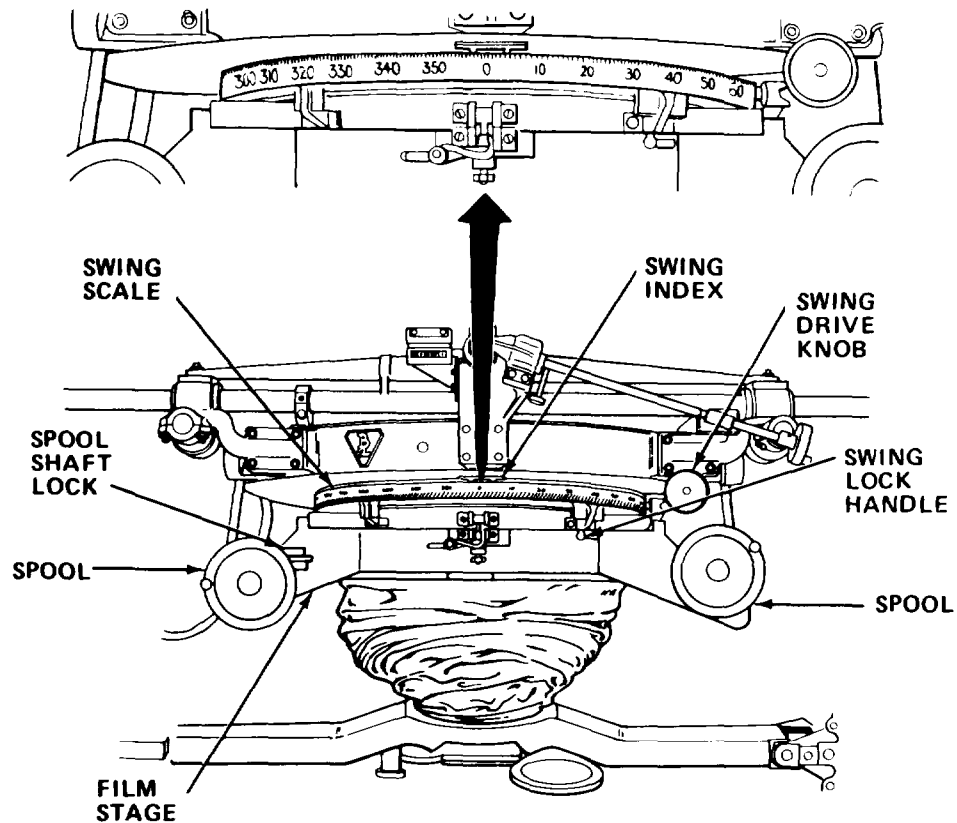
- o. Rotate filter mounts to rear of support arm.
- p. Rotate lock ring to align its notches with those in adapter ring.
- q. Slip lens into adapter ring, allowing support lugs to enter notches, with focal length and serial number toward the front.
- r. Rotate lock ring to secure lens in position.



- s. Insert strap on speed computer through clamp on lens support arm, and plug cord into shutter.



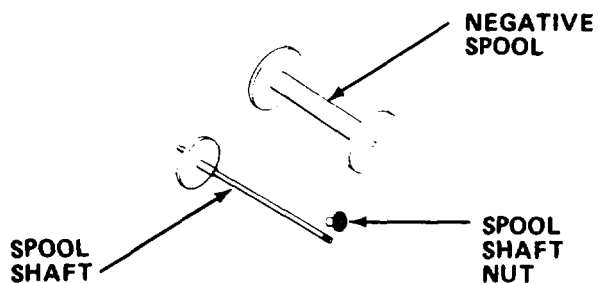
t. Plug shutter power cord into rectifier receptacle on right column header near blower.



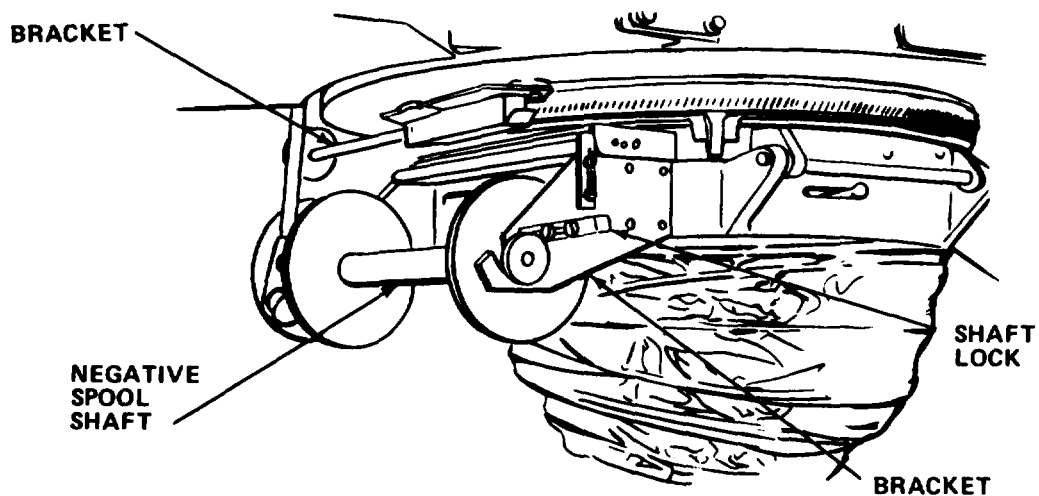
- u. Turn swing drive knob until swing index is in line with 0 degree position of swing scale.
- v. Rotate swing lock handle to right to hold setting.
- w. Draw four spool shaft locks toward film stage and remove both spool shafts.

**NOTE**

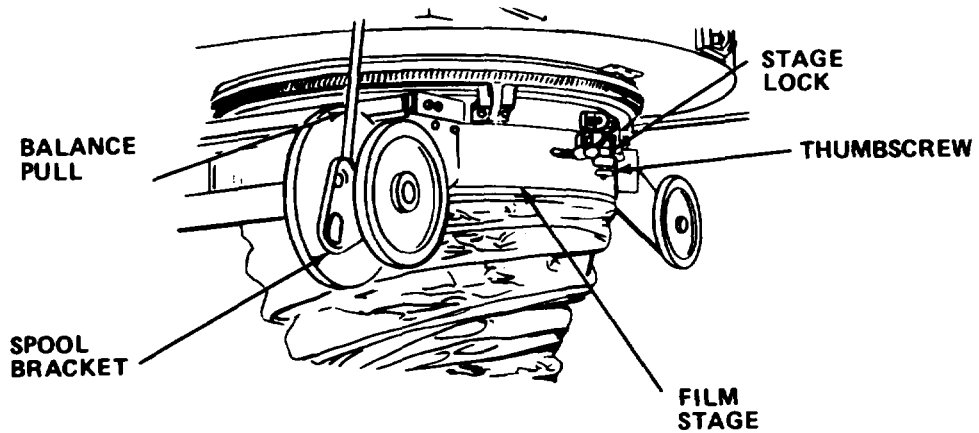
Detach balance pulls from film spool support bracket before installing film spools.



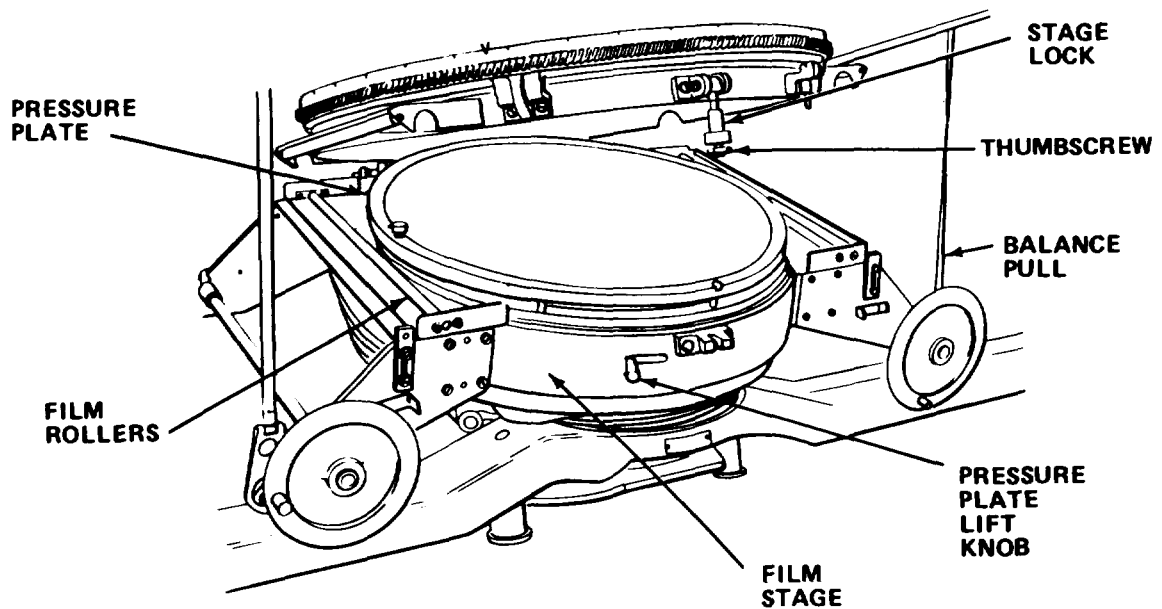
- x. Unscrew negative spool shaft nuts from shafts.
- y. Install negative spools on shafts with keys engaging flange recesses.
- z. Reinstall spool shaft nuts.



- aa. Reinstall negative spool shafts, in brackets, and slide shaft locks into place.



- ab. Attach both balance pulls to spool bracket.
- ac. Support film stage by spool bracket and rotate thumbscrew to release stage lock.
- ad. Carefully lower film stage.



- ae. Move pressure plate lift knob to left.
- af. Thread negative end over negative rollers, under pressure plate, and onto take-up spool.

ag. Negative film end may be taped to take-up spool or passed through slot provided.

ah. Raise film stage by spool bracket and secure stage lock by tightening thumbscrew.

ai. Release two balance pulls.

**NOTE**

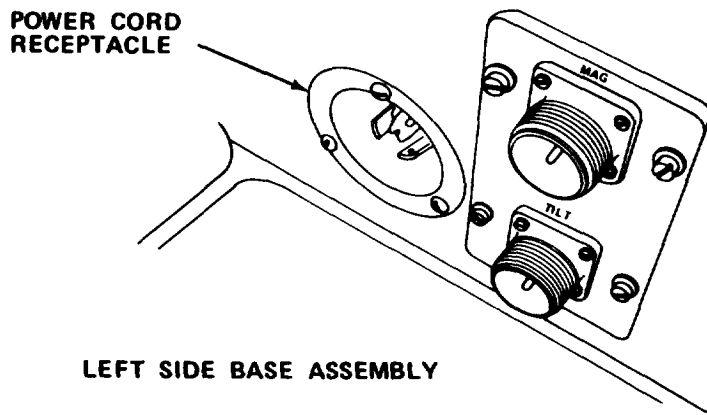
When the film stage is locked, upper and lower film shields and rollers act as trap to prevent emission of light from lamphouse.

aj. Move pressure plate lift knob to right.

**7-6.2 Initial Adjustments, Daily Checks, and Self Tests.**

a. Check zero position of film stage.

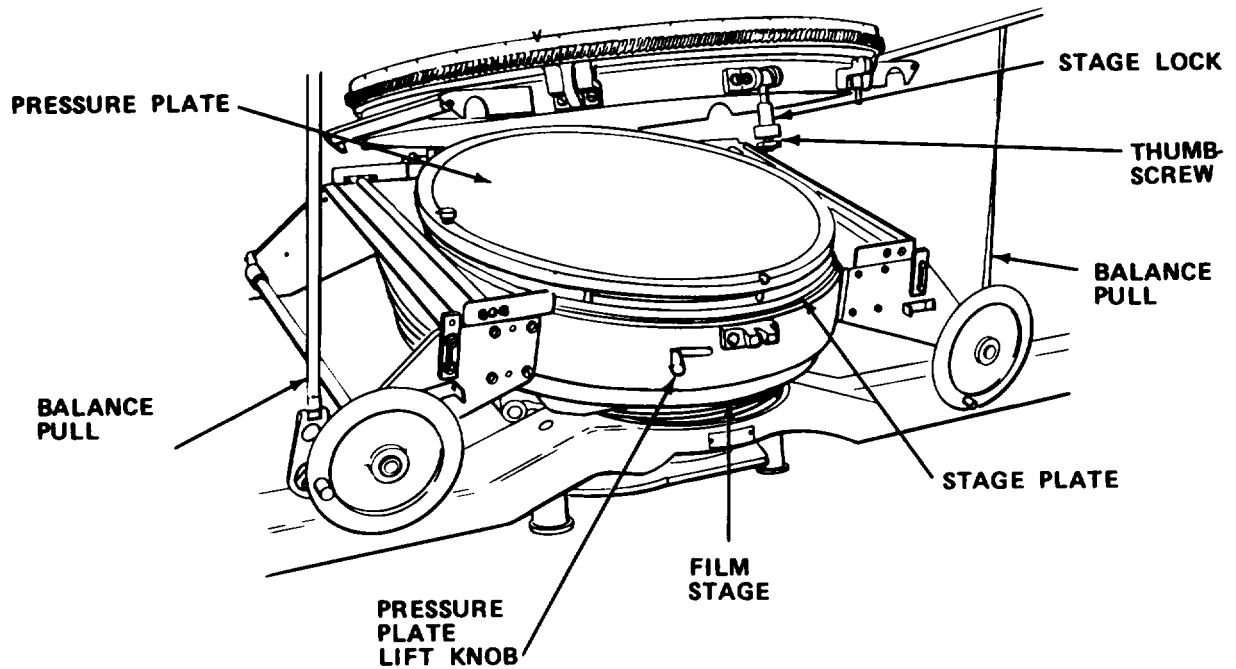
(1) Remove dust cover.



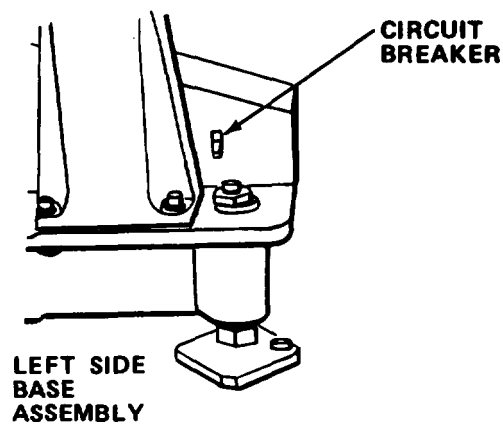
**LEFT SIDE BASE ASSEMBLY**

(2) Remove power cord from spare parts box and connect to receptacle on left side shield and wall receptacle.

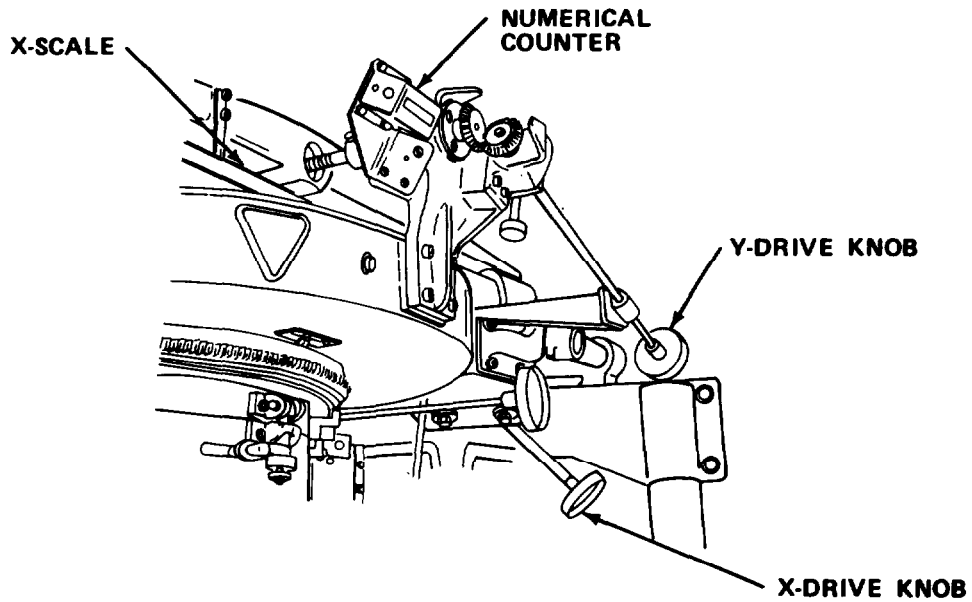
(3) Connect TILT and MAG assemblies.



- (4) Attach balance pulls to spool brackets.
- (5) Hold film stage and loosen thumbscrew.
- (6) Swing stage lock clear.
- (7) Slowly lower film stage.
- (8) Move pressure plate lift knob to left.
- (9) Make a template 8 in. (20.32 cm) square with a 1 in. (2.54 cm) grid.
- (10) Place template between pressure and stage plates with drafted grid downward.
- (11) Raise film stage, lower stage lock and tighten thumbscrew.
- (12) Turn off white lights.
- (13) Turn on circuit breaker and open manual aperture.
- (14) Center grid template fiducial lines to fiducial marks on stage plate.



- (15) Move pressure lift knob to right.
- (16) Place white paper on easel and secure with magnets.
- (17) Use magnification assembly to raise easel to maximum height.
- (18) Set easel tilt angle to 0 degree.



- (19) Set X-displacement to 0 mm and lock in place. Set Y-displacement to 00100 mm and lock in place.
- (20) Mark intersection of fiducial axes.



(21) Use MAG drive to move easel to maximum (+) magnification.

(22) Mark same intersection of fiducial axes.

(23) Measure distance between the two points. If the distance is more than one mm, proceed to step (24). If distance is less than one mm, proceed to step (34) .

(24) Position easel to its lowest setting (maximum magnification). Adjust X and Y settings of film stage so that projected image moves to position it attained at minimum magnification setting.

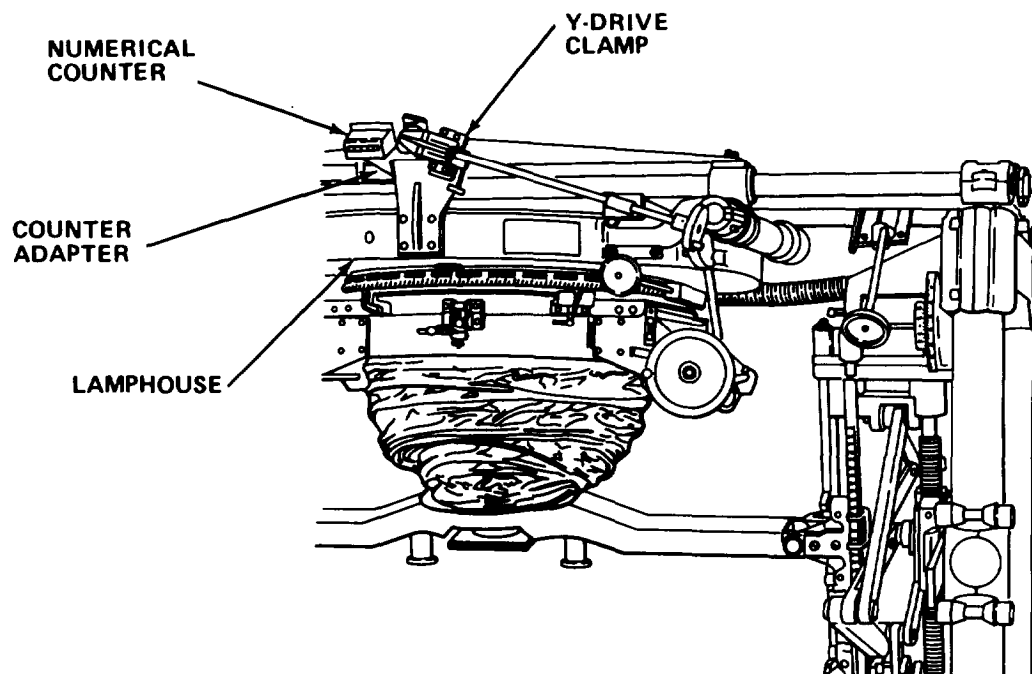
(25) Overcorrect this movement by three tenths of distance between two marks.

(26) Position easel to its highest setting. (Minimum magnification)

(27) Mark new location of projected image on paper.

(28) Measure distance between original point and final point (at minimum magnification).

(29) Repeat steps (20) - (29) until image points stay within a distance of one millimeter.



(30) When correct adjustment is obtained, loosen securing screws of numerical counters.

(31) Move counters to left to disengage gears.

(32) Turn counter's shaft until reading of 00100 is indicated in window of Y-counter and 0 for X-counter.

(33) Move counter to right to engage gears.

(34) Remove paper from easel.

(35) Turn off circuit breaker.

(36) Turn on white lights.

(37) Move pressure plate lift knob to left.

(38) Remove film template.

(39) Move pressure plate lift knob to right.

(40) Disconnect TILT and MAG assemblies and store.

(41) Disconnect power cord and store.

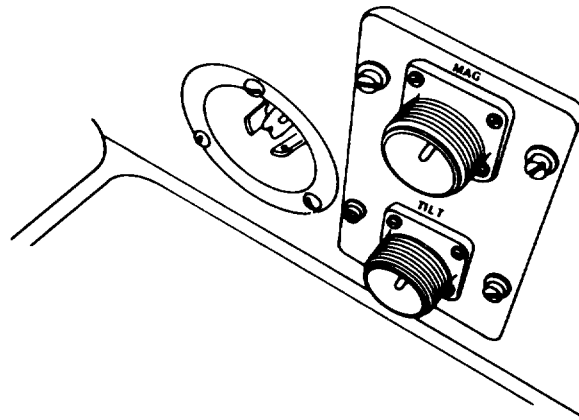
(42) Reinstall dust cover.

b. Check swing circle.

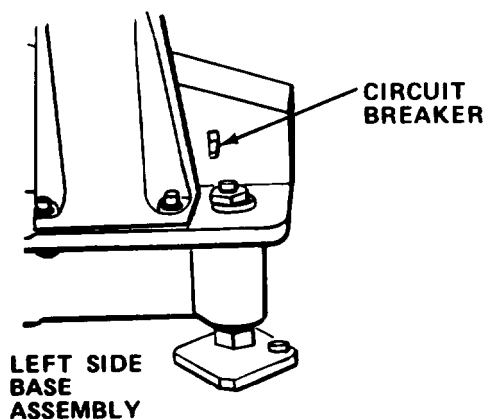
(1) Remove dust cover.

(2) Plug in power cord.

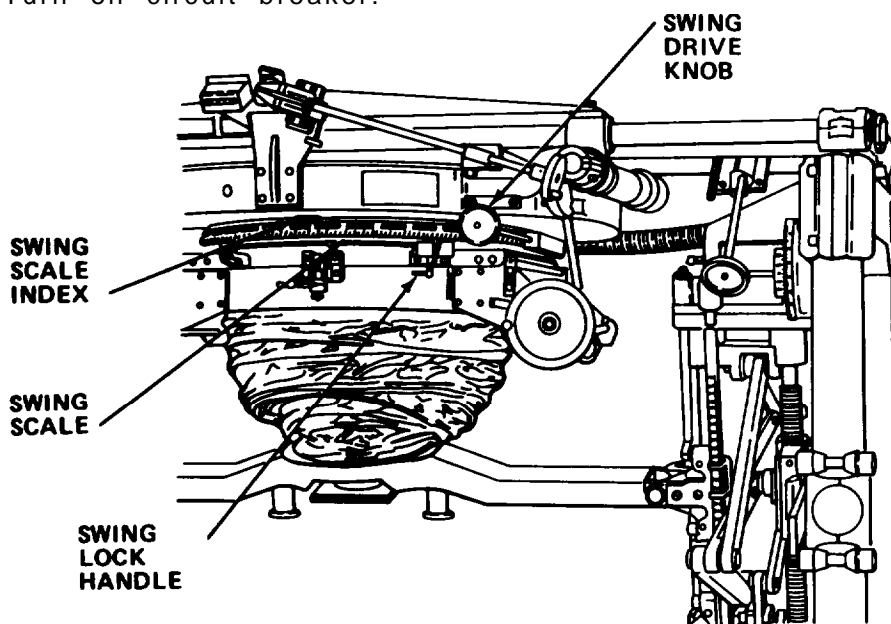
(3) Tape large piece of white paper to easel's projection surface.



(4) Connect TILT and MAG assemblies.



- (5) Turn on circuit breaker.

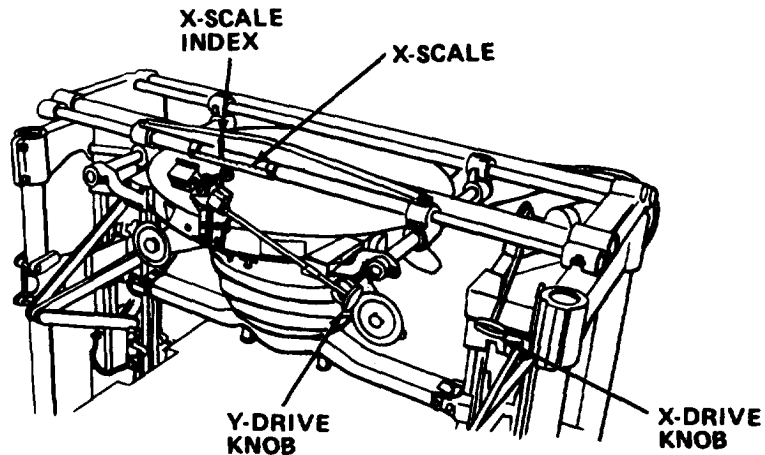


- (6) Turn off all white lights. Rotate swing drive knob until film stage is in its 0 degree swing position.
- (7) Lock setting by rotating swing lock handle to right.
- (8) Set rectifier to 0 degree tilt.
- (9) Open manual aperture.

**NOTE**

Ratio of 1.5:1 is achieved when length of any one of the projected fiducial lines is  $25 \pm 0.5$  mm.

(10) Operate magnification movement to obtain magnification ratio of 1.5:1.



(11) Crank Y-drive knob until images of left and right fiducial marks are about midway between width of guide bars.

(12) Rotate X-drive knob to position film stage at least 70 mm to left of its zero position.

(13) On paper, mark images of left and right fiducial marks.

(14) Shift film stage right, beyond its zero position the same distance as the left.

(15) On paper, mark images of left and right fiducial marks.

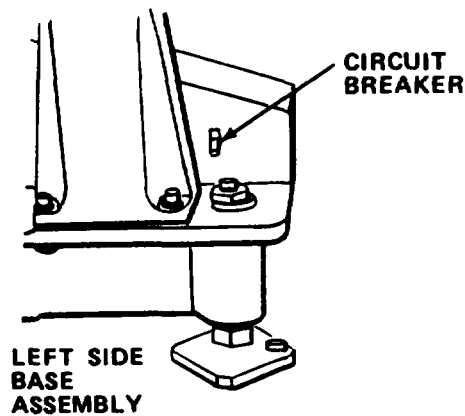
(16) With a ruler, draw a straight line through two outer plots of fiducial marks. Any departure of two inner markings from drawn line indicates direction of rotation to be applied to film stage to correct its zero position. If adjustment is required, proceed to next step. If adjustment is not required, proceed to step (19).

(17) Unlock swing drive and rotate film stage toward straight line, approximately one-half distance of departure. If separated marking is required, move paper on easel.

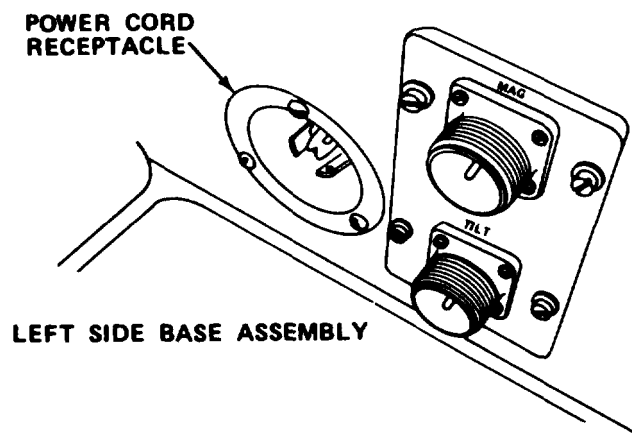
(18) Lock film stage in new setting, and repeat steps (12) through (17) until there is no departure of fiducial mark images from last line drawn. Loosen two screws for index of swing scale, adjust to zero, and tighten screws.

(19) Disconnect TILT and MAG assemblies and store.

- (20) Turn off circuit breaker.
  - (21) Remove paper from easel's projection surface.
  - (22) Turn on room lights.
  - (23) Unplug power cord.
  - (24) Replace dust cover.
- c. Adjust lens easel tilt circles and conjugate distance scales.
- (1) Remove dust cover.
  - (2) Turn off circuit breaker.



- (3) Plug in power cord.



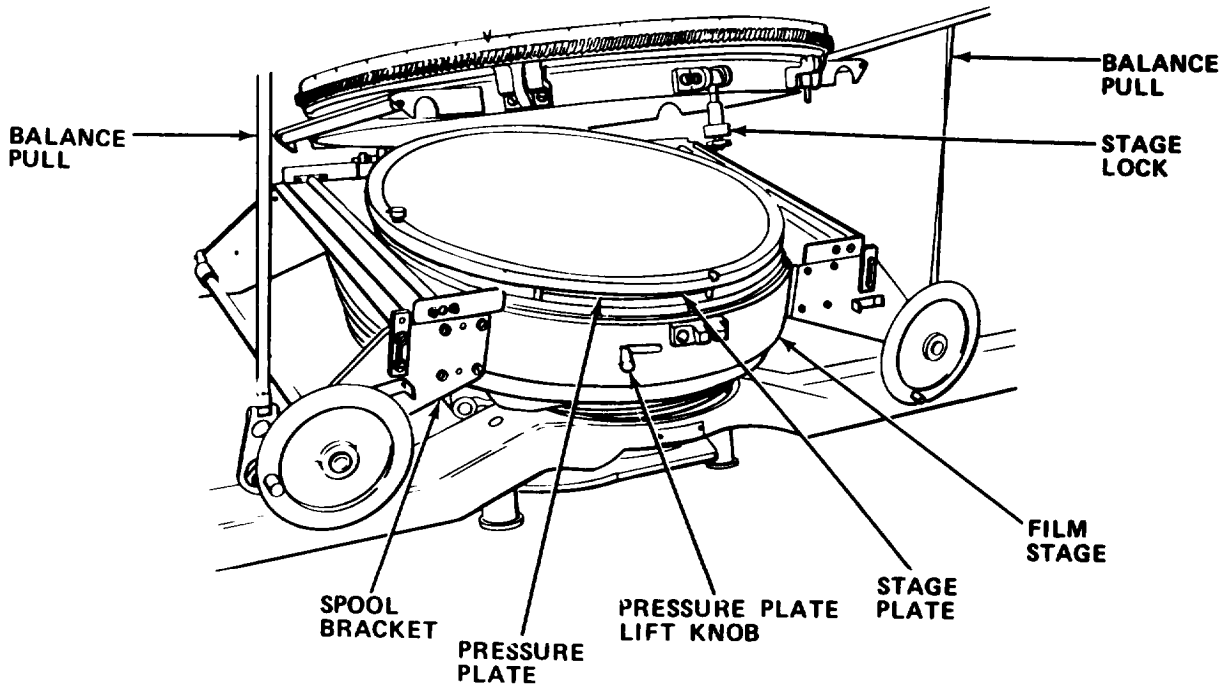
- (4) Connect TILT and MAG assemblies and hand magnifier.

**NOTE**

Be sure all electrical plugs are connected to their proper receptacles.

(5) Make a template 8 in. (20.32 cm) square with a 1 in. (2.54 cm) grid.

(6) Use machinist rule scaled in millimeters to measure length of sides accurately.



(7) Attach balance pulls to spool brackets.

(8) Hold film stage upward and rotate thumbscrew to release the stage lock.

(9) Carefully lower film stage.

(10) Raise pressure plate and position template on stage plate,

(11) Close film stage, tighten thumbscrew and remove balance pulls.

(12) Turn off white lights.

(13) Turn on circuit breaker.

(14) Center the film template to fiducial marks and then lower pressure plate. Adjust easel to position which reflects 8 in. (20.32 cm) square.

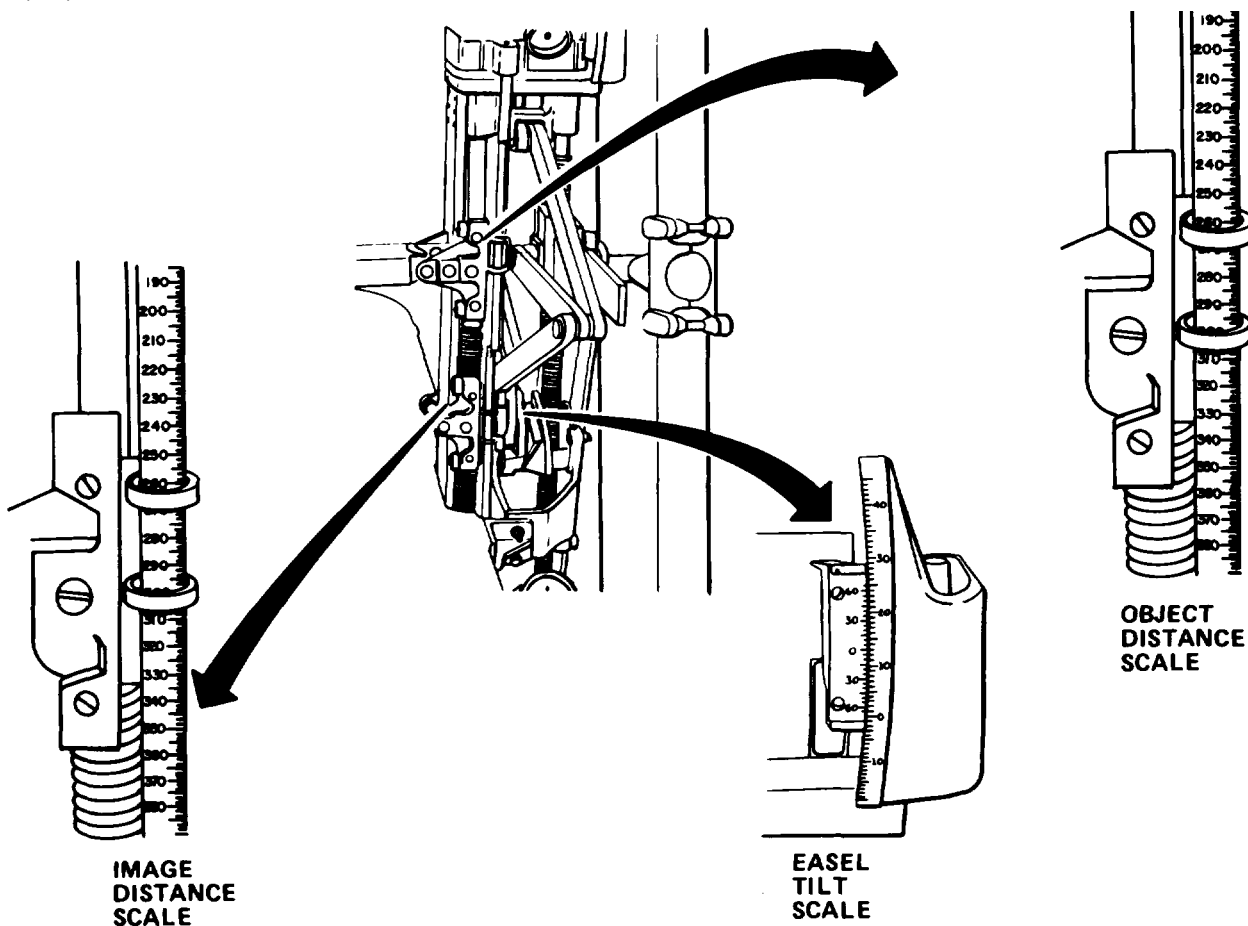
(15) Operate tilt drive to change easel tilt so that projected image is a true square. All lengths are 8 in. (20.32 cm) square,  $\pm 0.5$  mm.

- (16) When a true square is projected on easel, check both lens and easel tilt scales for 0 degree reading.
- (17) If scales read 0 degree, proceed to step (21).
- (18) If scales do not read 0 degree, loosen vernier securing screws and shift verniers in elongated holes to obtain 0 degree reading.
- (19) Insert sheet of bond paper between vernier and main scale to provide clearance between moving parts.
- (20) Tighten vernier securing screws.

**NOTE**

Focal length inscribed on front retaining ring of lens.

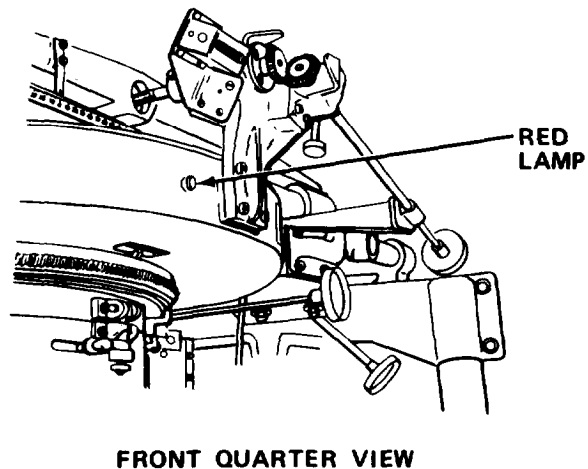
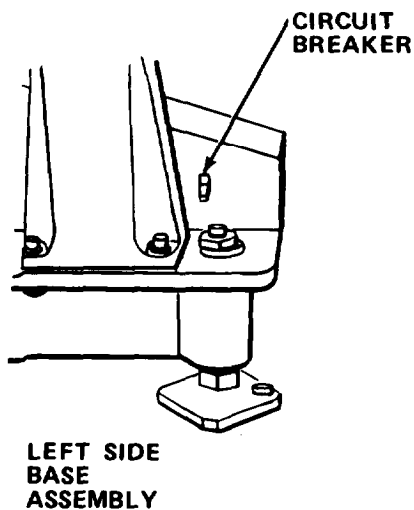
- (21) Set scales to indicate the focal length of the lens.
- (22) Check conjugate distance scales for reading of twice the focal length of lens. If scales are correct, go to step (27). If scales are not correct, go to step (23)



- (23) To adjust both scales, loosen vernier securing screws.

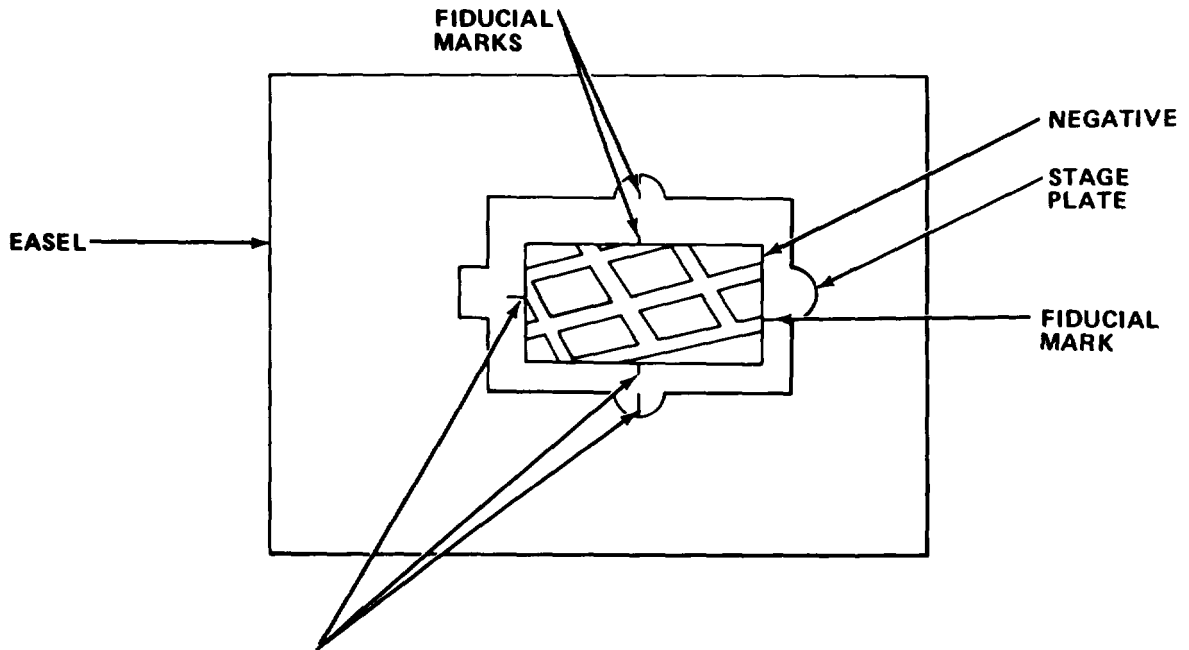
- (24) Shift verniers in elongated holes to obtain correct scale readings.
- (25) Slip piece of bond paper between vernier and main scale to provide clearance between moving parts.
- (26) Tighten vernier securing screws.
- (27) Disconnect MAG, TILT assemblies and hand magnifier.
- (28) Turn off circuit breaker.
- (29) Move pressure lift knob left, raise pressure plate and remove film template.
- (30) Reinstall dust cover.
- (31) Turn on normal room lights.

7-6.3 Operating Procedures.

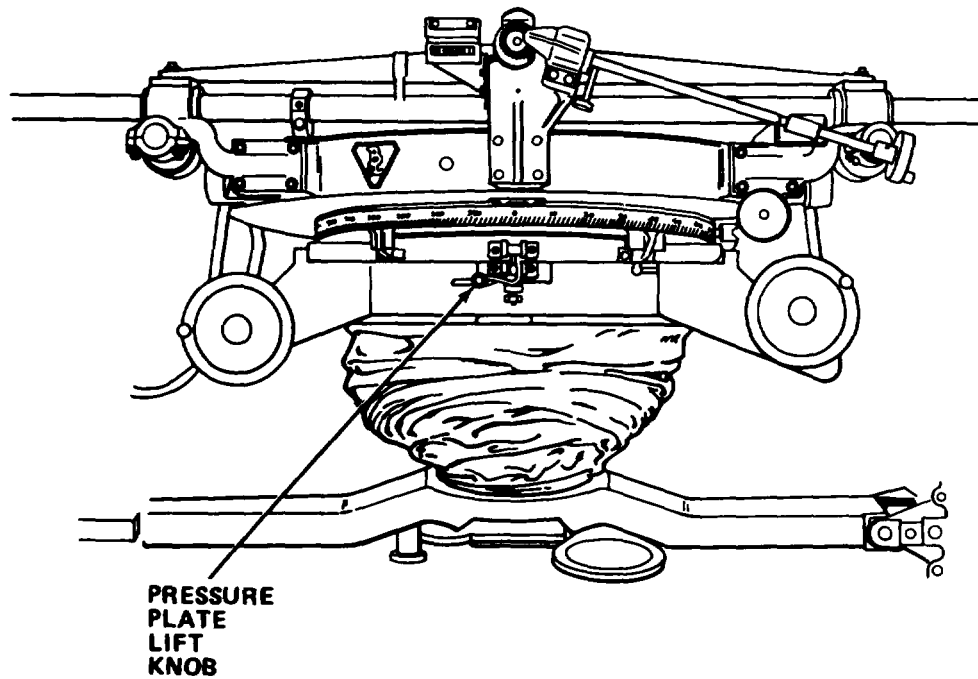


- a. Turn on circuit breaker. Red lamp will light.
- b. Set nine-speed computer for bulb and lens aperture at f/5.6.
- c. Turn take-up spool until selected negative for rectification is on film stage.





d. Raise pressure plate and adjust position of negative by hand so that fiducial marks on film coincide with those of stage plate.



e. Be sure pressure plate lift knob is to right.

**CAUTION**

- When moving film, place pressure plate lift knob to the left. This raises pressure plate and prevents scratching film on pressure plate or stage grid during movement.
- Easel is coated with acid-resistant enamel and planed to an exact tolerance. Use of sharp objects in proximity to this surface will damage it. When using magnetic paperweights, be careful in placing them on easel. Protective covering should be placed over this surface when rectifier is not in use.

**NOTE**

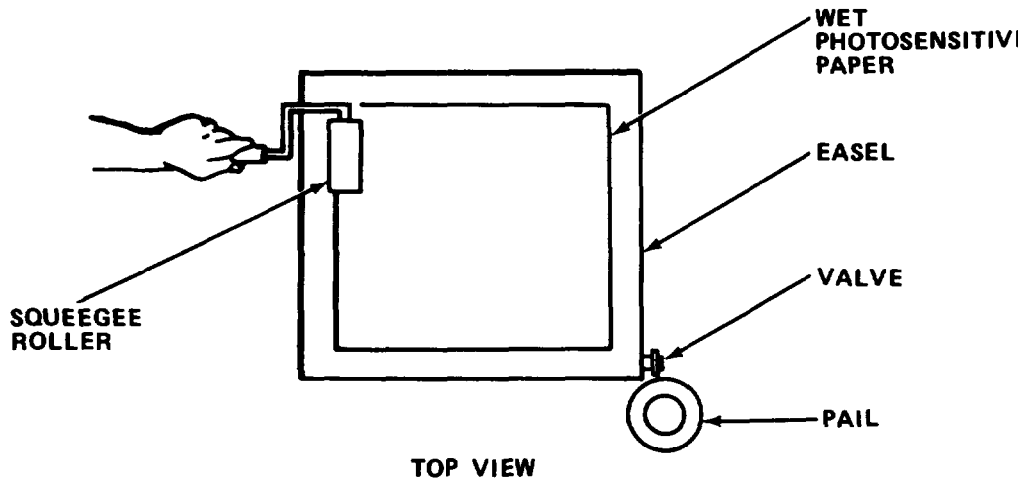
- There are three methods commonly used to rectify an aerial negative:

Control template on easel in conjunction with aerial negative in rectifier. Control points are sometimes difficult to identify due to extraneous detail in image.

Two-Template Method: Control template on easel in conjunction with transparent overlay of aerial negative in rectifier. This method is easier than the above method because extraneous detail is eliminated on transparent overlay.

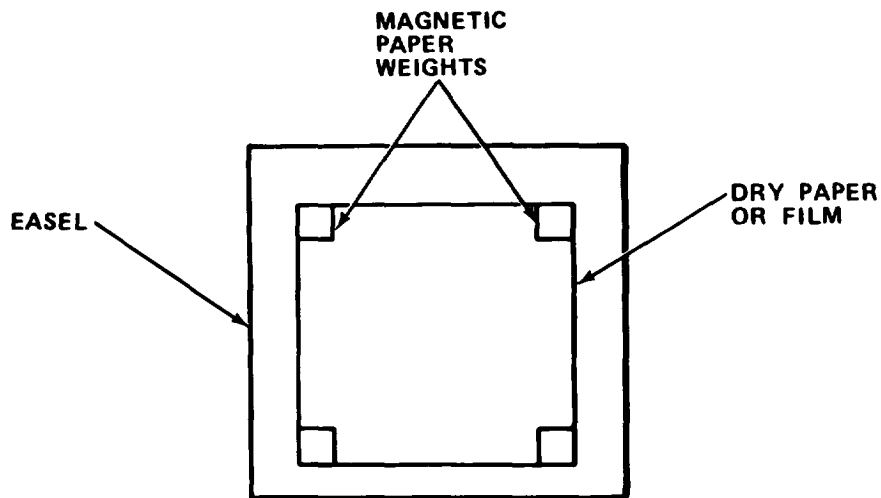
Computed Data Method: Requires that amount of tilt and its direction in aerial photograph be known, as well as focal length of aerial camera, focal length of rectifier lens and magnification ratio. These values are substituted into equations which determine settings for magnification tilt, swing, X-and Y-drive settings. This method is simpler since it requires only setting movement scales to computed values.

- If film or dry paper is to be used, proceed to step h.



- f. Place wet photosensitive paper, emulsion side up, on easel. Use squeegee roller to make uniform contact between easel and paper.

- g. Drain excess water from trough by opening valve, allowing water to drain in pail.

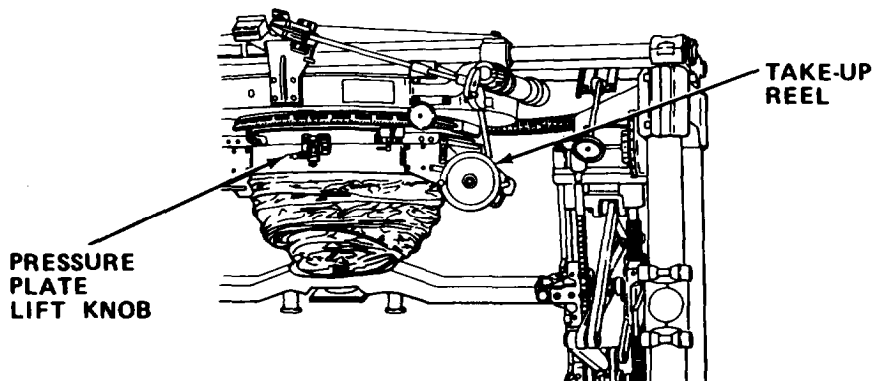


- h. Place dry paper or film, emulsion side up, on easel.
- i. Place magnetic paperweights as needed.

**NOTE**

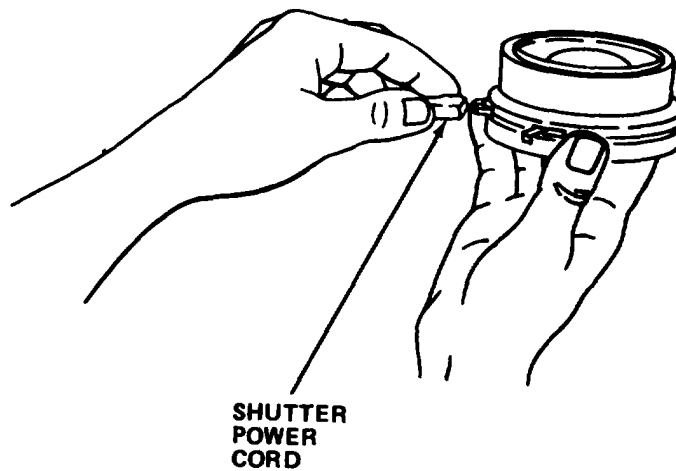
If shutter is to remain in operation for long periods, open with manual open lever on side of lens. This prevents excessive heat in speed control.

- j. Adjust shutter to desired setting and begin exposure.
- k. After exposure, remove paper for processing.

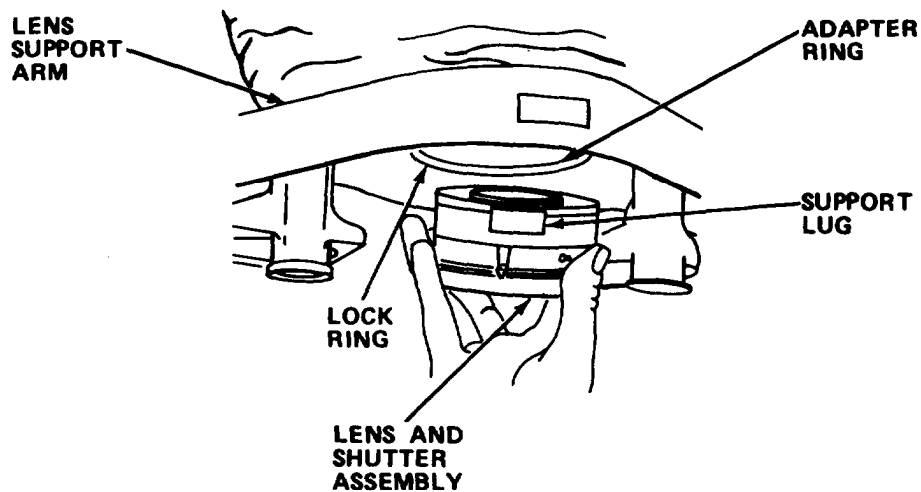


- l. Move pressure plate knob to left.
- m. Turn take-up reel to advance negative. Complete remaining exposures.
- n. Remove supply and take-up reel.

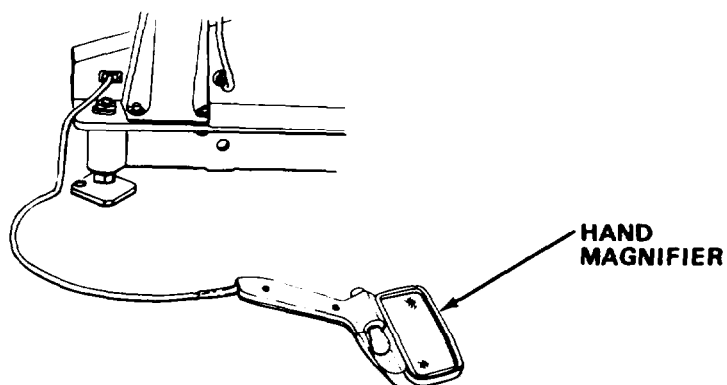
7-6.4 Preparation for Movement.



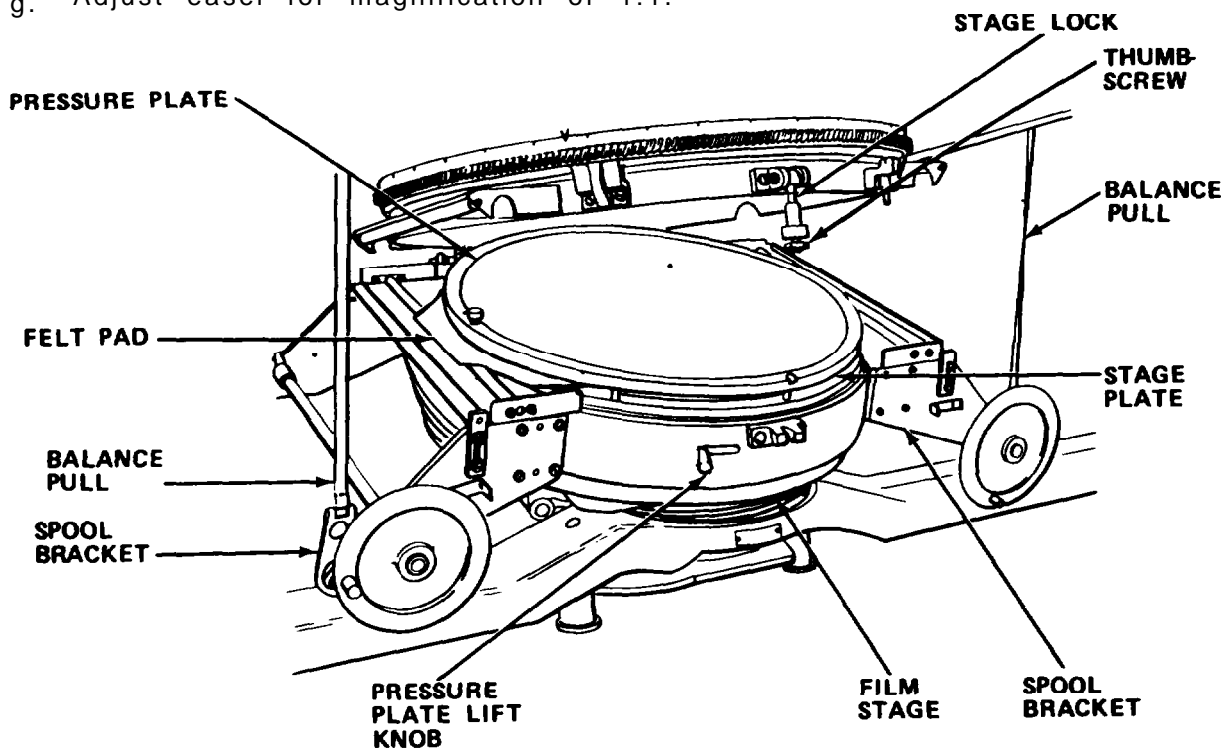
- a. Unplug shutter power cord from receptacle.
- b. Unplug shutter power cord from shutter.



- c. Turn lock ring until notches are in line with support lugs on lens and shutter.
- d. Remove lens and shutter.
- e. Store nine-speed computer, lens and shutter in their sealed containers.

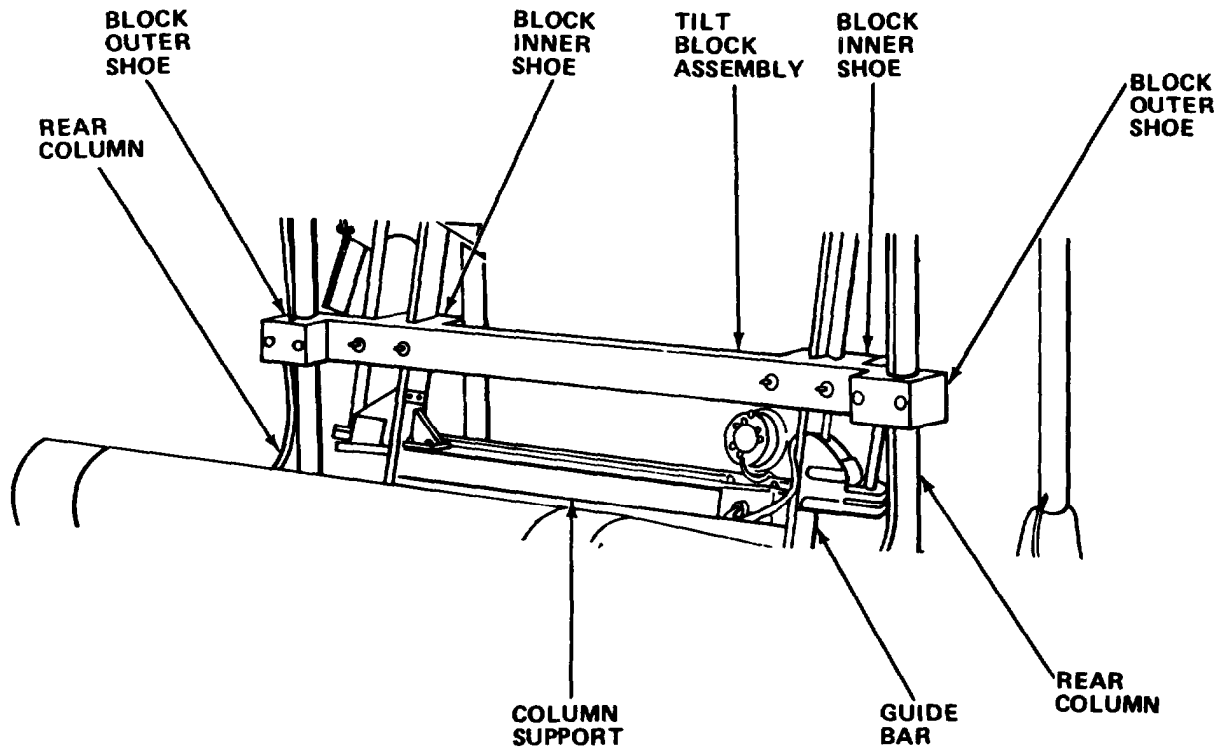


- f. Disconnect hand magnifier and store.
- g. Adjust easel for magnification of 1:1.



- h. Connect balance pulls to spool brackets.
- i. Support film stage by spool bracket with one hand.
- j. Loosen thumbscrew to release stage lock.
- k. Carefully lower film stage.

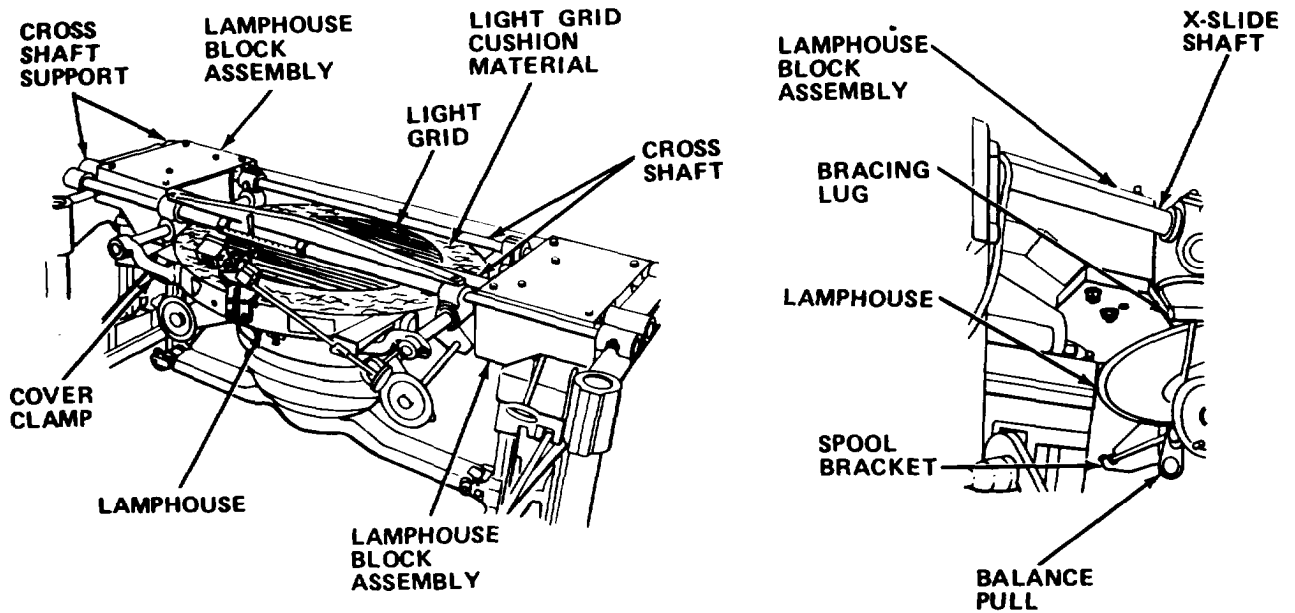
- l. Remove pressure plate.
- m. Place felt pad on stage plate and reinstall pressure plate.
- n. Reinstall two hex head holddown screws in pressure plate.
- o. Raise film stage to original position.
- p. Tighten thumbscrew to secure stage lock.



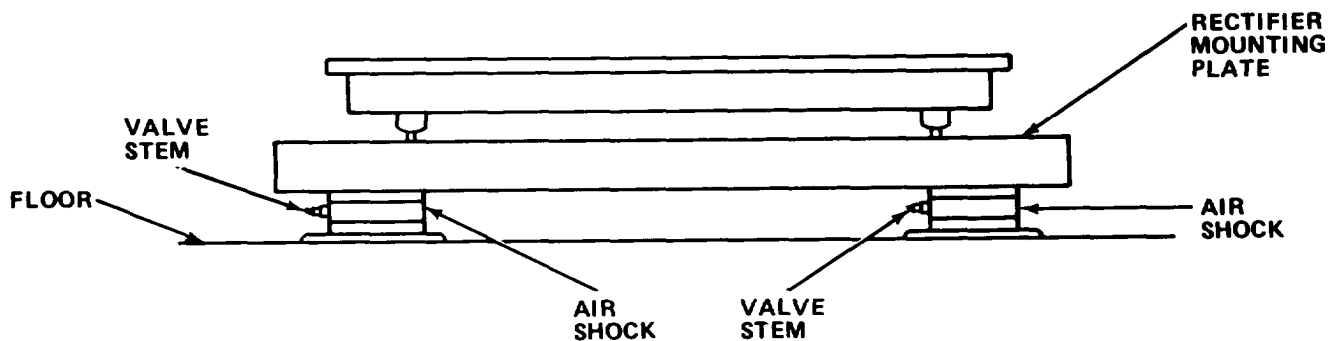
**NOTE**

Easel/tilt scale to read approximately 13.5 with tilt block assembly in position.

- q. Install tilt block assembly.
- r. Turn off circuit breaker,
- s. Remove and store MAG and TILT assemblies, and main power cable.

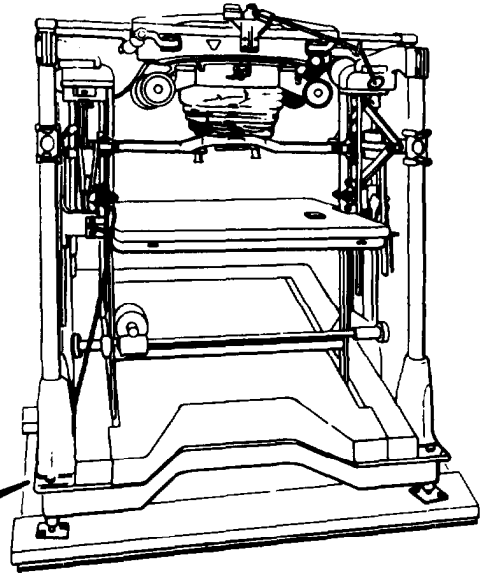


- t. Place bottom section of right side lamphouse block assembly in place.
- u. Use X- and/or Y-drive to position lamphouse firmly against lower lamphouse block assembly.
- v. Position upper half of right side lamphouse block assembly.
- w. Secure assemblies with nuts and bolts.
- x. Install left side lamphouse block assembly. Use X- and/or Y-drive as necessary to obtain a proper fit.



- y. Inflate air shocks (paragraph 1-6.1).
- z. Install dust cover.

7-6.5 Operating Instructions on Decals and Instruction Plates.



**CAUTION**  
12000VOLTS - AC  
GROUND INSTRUMENT BEFORE  
USING  
DISCONNECT LINE BEFORE  
DISASSEMBLY

**7-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

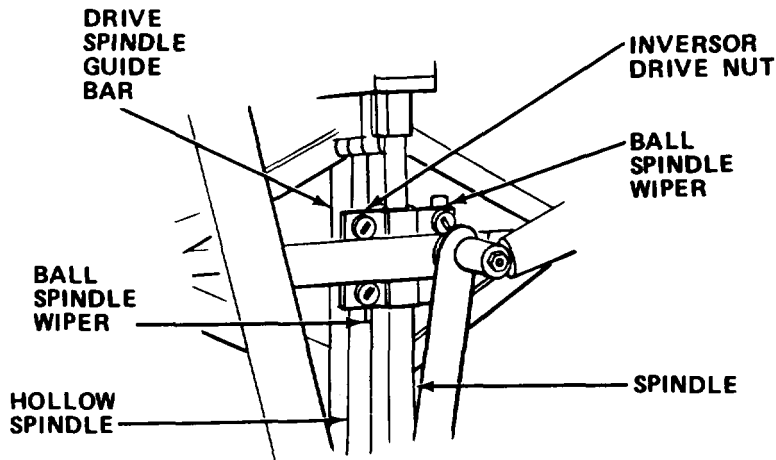


Section III OPERATOR MAINTENANCE

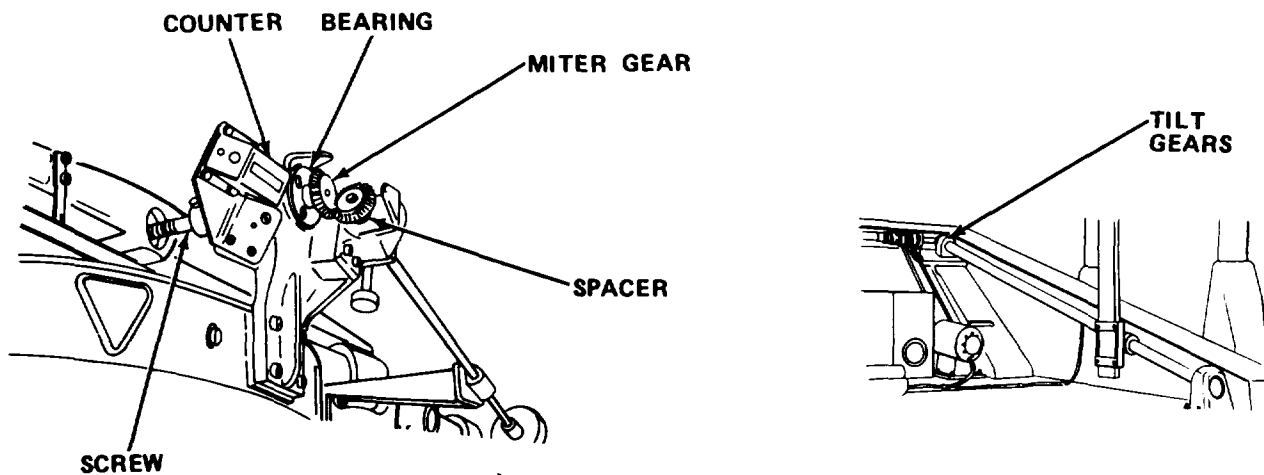
7-8. LUBRICATION INSTRUCTIONS.

NOTE

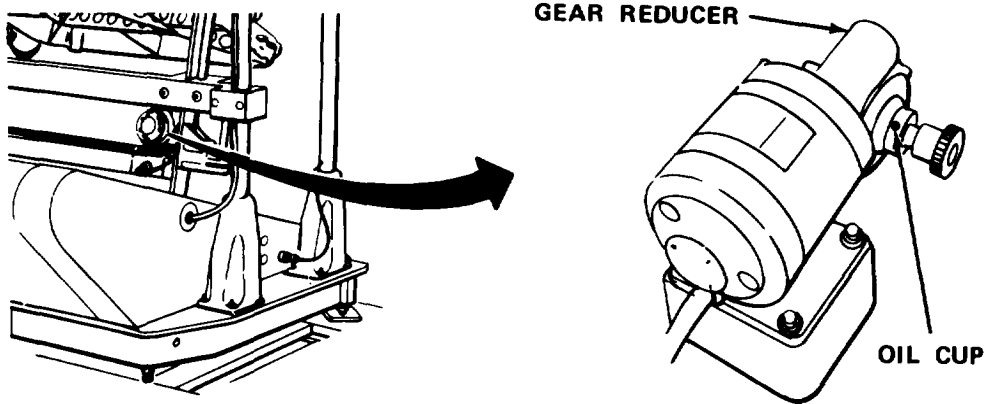
These lubrication instructions are mandatory.



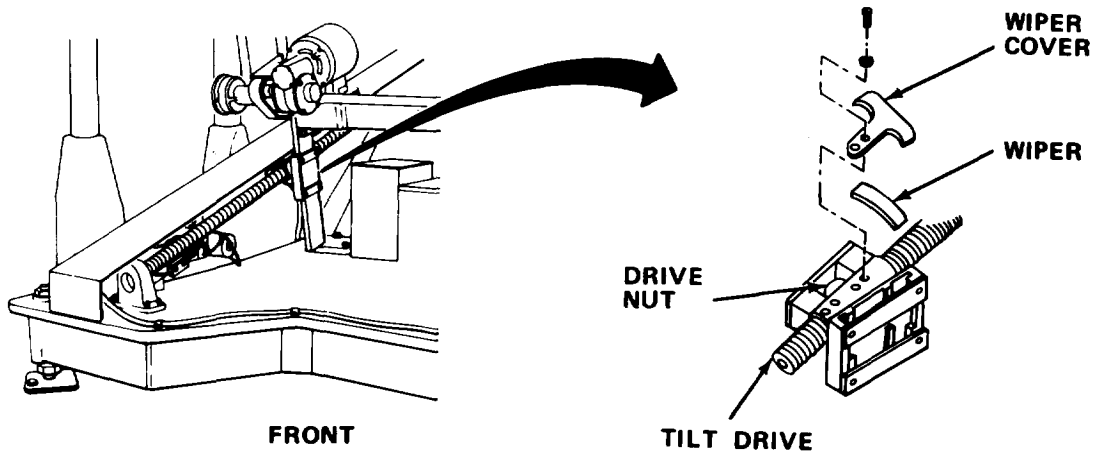
7-8.1 Inversor Spindle and Guide Bars. Grease inversor spindle and guide bars quarterly. Apply a thin coat of GAA grease (Item 15, Appendix E) to spindle guide bars, hollow spindle, drive spindle and drive nut.



7-8.2 Gears. Grease gears semiannually. Lightly grease shaft, bushing, miter gear, spindle, bearing, and tilt gears with GAA grease (Item 15, Appendix E).



7-8.3 Drive Motors. Lubricate drive motors annually. Add 5 or 6 drops of oil (Item 18, Appendix E) to oil cups on tilt and magnification motor gear reducers. Wipe off excess oil.



7-8.4 Tilt Drive. Grease tilt drive quarterly. Lightly grease tilt drive spindle, drive nut and support bar with GAA grease (Item 15, Appendix E).

## 7-9. TROUBLESHOOTING PROCEDURES,

a. The table lists the common malfunctions which you may find during operation or maintenance of the photogrammetric rectifier, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**Table 7-2. TROUBLESHOOTING**

| MALFUNCTION             | TEST OR INSPECTION  | CORRECTIVE ACTION   |
|-------------------------|---|---|
| 1. LAMP WILL NOT LIGHT. | Step 1. Check power cord.                                       | <ul style="list-style-type: none"> <li>(a) If power cord is plugged in, proceed to step 2.</li> <li>(b) Plug in power cord.</li> </ul>  |
|                         | Step 2. Check position of rectifier circuit breaker.            | <ul style="list-style-type: none"> <li>(a) If circuit breaker is turned on, proceed to step 3.</li> <li>(b) Turn on circuit breaker.</li> </ul>   |
|                         | Step 3. Check position of van circuit breaker on power panel.   | <ul style="list-style-type: none"> <li>(a) If turned on, proceed to step 4.</li> <li>(b) Turn on van circuit breaker.</li> </ul>  |
|                         | Step 4. Visually inspect thermofuse in CB1 for cracks or chips. | <ul style="list-style-type: none"> <li>(a) If thermofuse appears intact, proceed to step 5.</li> <li>(b) If thermofuse is cracked or chipped, refer to organizational maintenance.</li> </ul> |
|                         | Step 5. Check light grid assembly.                              | Replace light grid assembly (paragraph 7-10.4).   |

Table 7-2. TROUBLESHOOTING - Cont

| MALFUNCTION                                      | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|--|--|--|
| 2. LIGHT FLICKERS.                               | Check position of blower motor power switch.   | Turn on blower motor power switch.   |
| 3. WHITE SPOTS ON FILM.                          | Check fluorescent lamps for local darkening.   | <ul style="list-style-type: none"> <li>(a) Turn off blower and allow dark spots to clear from lamps.</li> <li>(b) Replace fluorescent lamps (paragraph 7-10.4).</li> </ul> |
| 4. MAGNIFICATION OR TILT MOTOR WILL NOT OPERATE. | <p><b>Step 1. Check to see if TILT and MAG assemblies are properly plugged in.</b></p> <ul style="list-style-type: none"> <li>(a) If TILT and MAG assemblies are properly plugged in, proceed to step 2.</li> <li>(b) Plug in TILT and MAG assemblies.</li> <li>(c) Reverse TILT and MAG assembly plugs to correct fault.</li> </ul> <p>Step 2. Visually check fuses FU-1 and FU-2.</p> <ul style="list-style-type: none"> <li>(a) If fuses are intact, proceed to step 3.</li> <li>(b) Refer to organizational maintenance.</li> </ul> <p>Step 3. Check for broken shear pin.</p> <p>Refer to organizational maintenance.</p> |  |

Table 7-2. TROUBLESHOOTING - Cont

| MALFUNCTION                             | TEST OR INSPECTION  | CORRECTIVE ACTION   |
|---|---|---|
| 5. TILT DRIVE SLUGGISH.                 | Step 1. Check for slipping V-belt.                                    | (a) If V-belt is properly adjusted, proceed to step 2.<br>(b) Adjust V-belt (paragraph 7-10.1).       |
|   | Step 2. Check for worn V-belt.  | Replace V-belt (paragraph 7-10. 1).   |
| 6. BLEMISHES APPEAR ON RECTIFIED PRINT. | Step 1. Check for foreign deposits on stage, pressure plate and lens. | (a) If clean, proceed to step 2.<br>(b) Clean glass plates and lens.                                  |
|   | Step 2. Check for outdated paper.                                     | (a) If paper is in date, proceed to step 3.<br>(b) Replace paper.                                     |
|   | Step 3. Check stage plate for scratches.                              | (a) If stage plate is unscratched, proceed to step 4.<br>(b) Replace stage plate (paragraph 7-10 .8). |
|   | Step 4. Check pressure plate for scratches.                           | Replace pressure plate (paragraph 7-10.5).  |

**Table 7-2. TROUBLESHOOTING - Cont**

| MALFUNCTION                        | TEST OR INSPECTION                  | CORRECTIVE ACTION   |
|------------------------------------|-------------------------------------|---|
| 7. SPEED CONTROL IS NOT OPERATING. | Check speed control indicator lamp. | (a) Replace speed control indicator lamp (paragraph 7-10.3).<br>(b) Replace nine-speed computer (paragraph 7-10.7). |
| 8. LENS SHUTTER DOES NOT OPEN.     | Check nine-speed computer.          | Replace computer (paragraph 7-10.7).  |

**7-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator performed maintenance functions for the photogrammetric rectifier. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES                                     | PARAGRAPH |
|--|-----------|
| Replace Tilt Motor V-Belt. . . . .             | 7-10.1    |
| Replace Bulb in Magnifier. . . . .             | 7-10.2    |
| Replace Speed Control Indicator Lamp . . . . . | 7-10.3    |
| Replace Light Grid Assembly. . . . .           | 7-10.4    |
| Replace Pressure Plate . . . . .               | 7-10.5    |
| Replace Counterbalance Assembly . . . . .      | 7-10.6    |
| Replace Nine-Speed Computer. . . . .           | 7-10.7    |
| Replace Stage Plate. . . . .                   | 7-10.8    |

7-10.1 Replace Tilt Motor V-Belt.

MOS: 81C, Cartographer

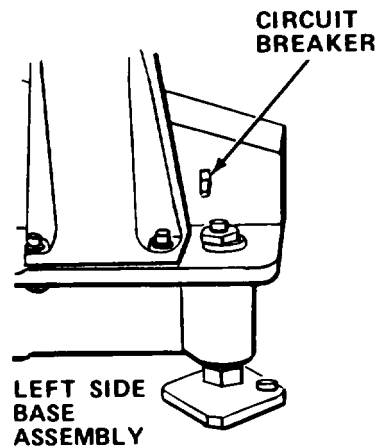
TOOLS: Flat Tip Screwdriver  
3/16 in. Hex Head Key Wrench

SUPPLIES: V-Belt

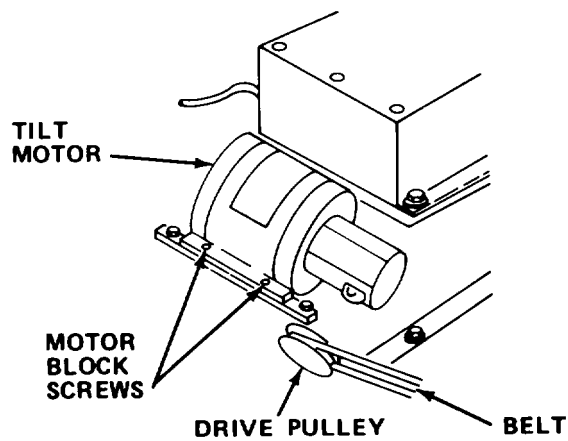
**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Remove dust cover.

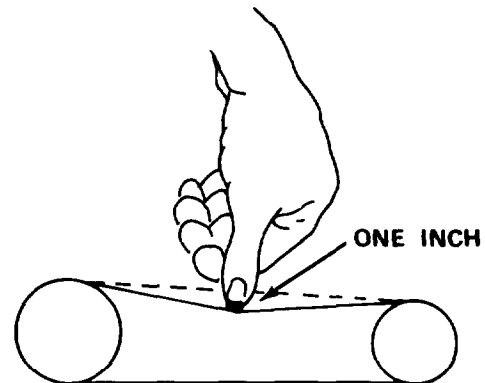
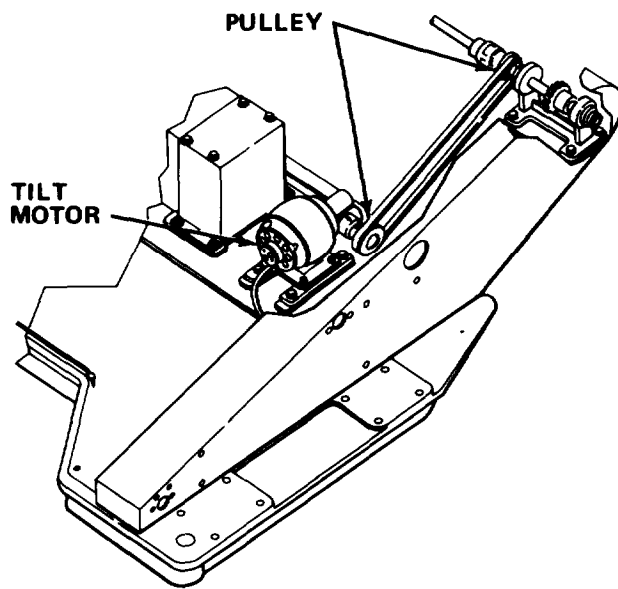


- b. Turn off circuit breaker.  
c. Unplug power cord.  
d. Remove base assembly cover.



- e. Loosen motor screws.

- f. Move tilt motor so that belt can be slipped off drive pulley.
- g. Remove defective belt.
- h. Open three belt clamps by removing attaching hardware, and slide out one of spare belts.
- i. Secure remaining belts in clamps.
- j. Slide new belt down center shaft, and install it on shaft drive pulley.
- k. Slip opposite end over motor drive pulley.
- l. Pull tilt motor toward front of rectifier to increase tension of belt.



- m. Tension is correct when you place your thumb halfway between pulley, and belt depresses one inch.
- n. When correct tension is obtained, tighten motor mounting screws.
- o. Recheck tension.
- p. Reinstall base cover assembly.
- q. Plug in power cord and turn on circuit breaker.
- r. Reinstall dust cover.



### 7-10.2 Replace Bulb in Magnifier.

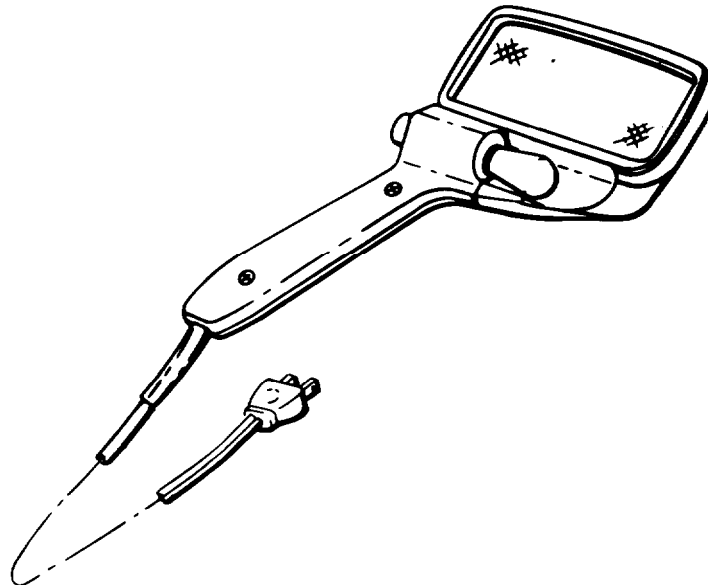
MOS: 81C, Cartographer

SUPPLIES: Bulb, GE 656 CW

#### WARNING

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug magnifier electrical lead from receptacle.



- b. Remove magnifier from clip on right side of easel.
- c. Remove defective red bulb.
- d. Install new bulb.
- e. Place magnifier in clip on right side of easel.
- f. Plug magnifier electrical lead in receptacle.

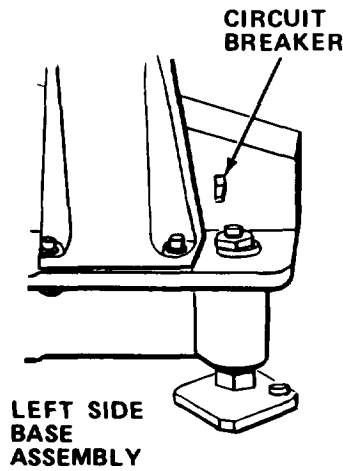
7-10.3 Replace Speed Control Indicator Lamp.

MOS: 81C, Cartographer

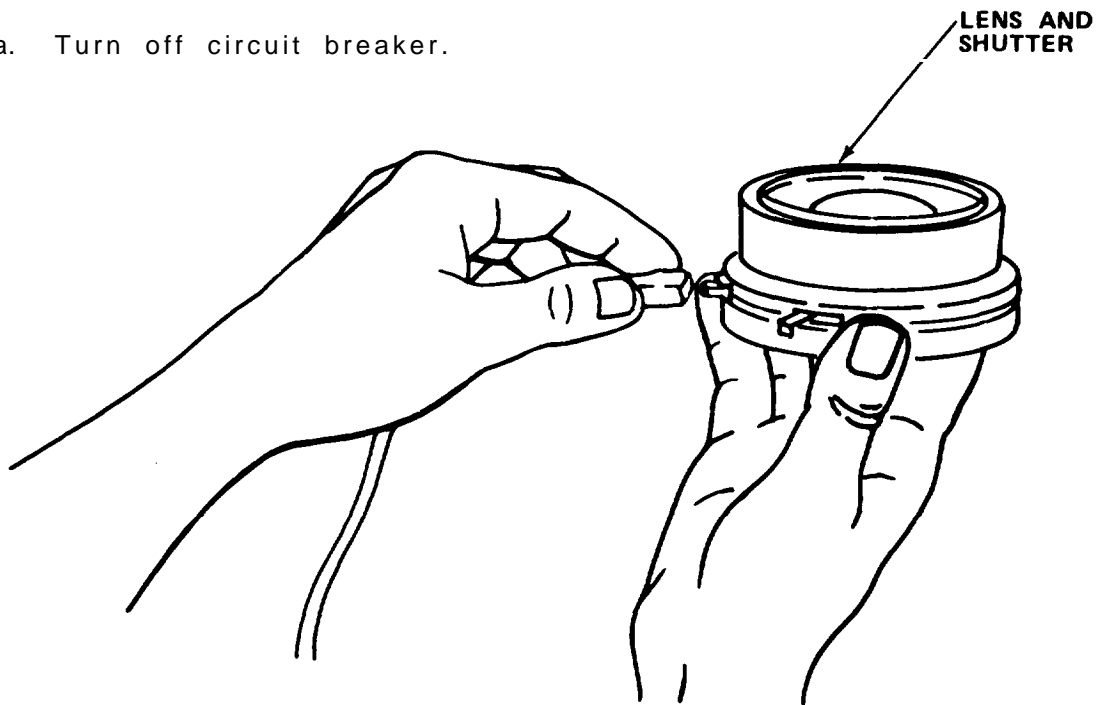
SUPPLIES: Incandescent Lamp

**WARNING**

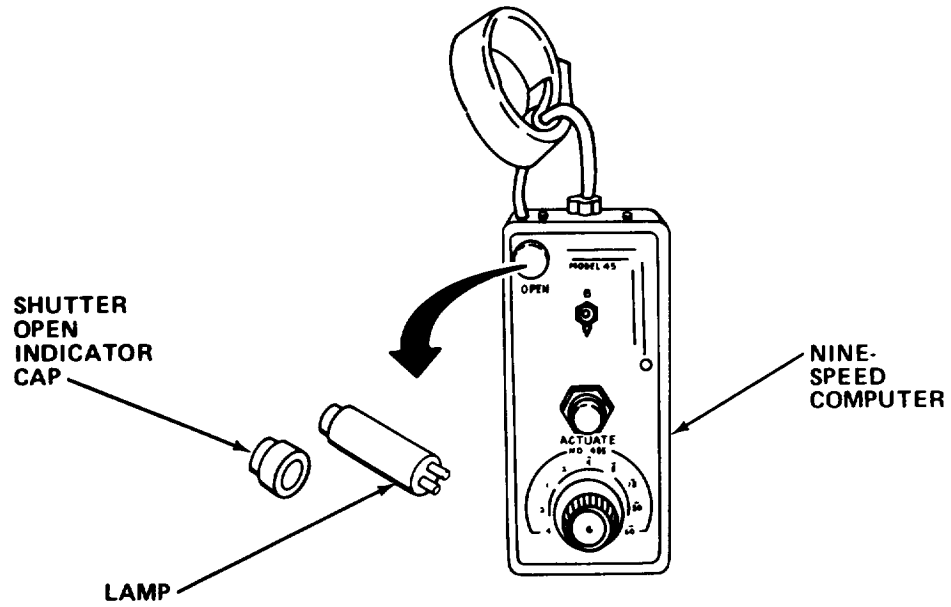
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Turn off circuit breaker.



- b. Unplug nine-speed computer from receptacle and lens and shutter.



- c. Remove shutter open indicator cap and remove defective lamp.
- d. Install new lamp. Reinstall shutter open indicator cap.
- e. Plug nine-speed computer into receptacle and lens and shutter.

7-10.4 Replace Light Grid Assembly.

MOS: 81C, Cartographer

PERSONNEL: Two persons are required to perform this procedure.

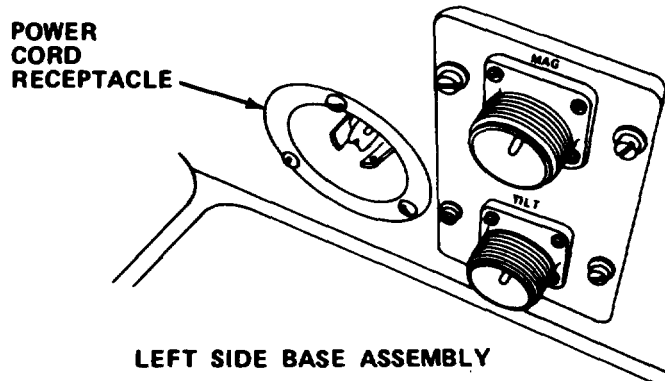
TOOLS: Flat Tip Screwdriver  
5/64 in. Hex Head Key Wrench  
3/16 in. Hex Head Key Wrench

SUPPLIES: Light Grid Assembly

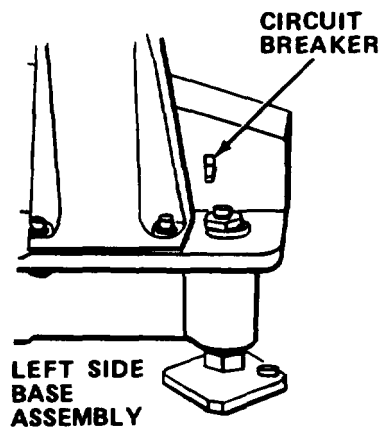
**CAUTION**

Two people are required for this task to prevent damage to lamphouse when it is lowered and raised.

- a. Remove bellows from lamphouse.
- b. Remove blower duct from lamphouse and blower motor.



- c. Plug in power cord and MAG assembly.

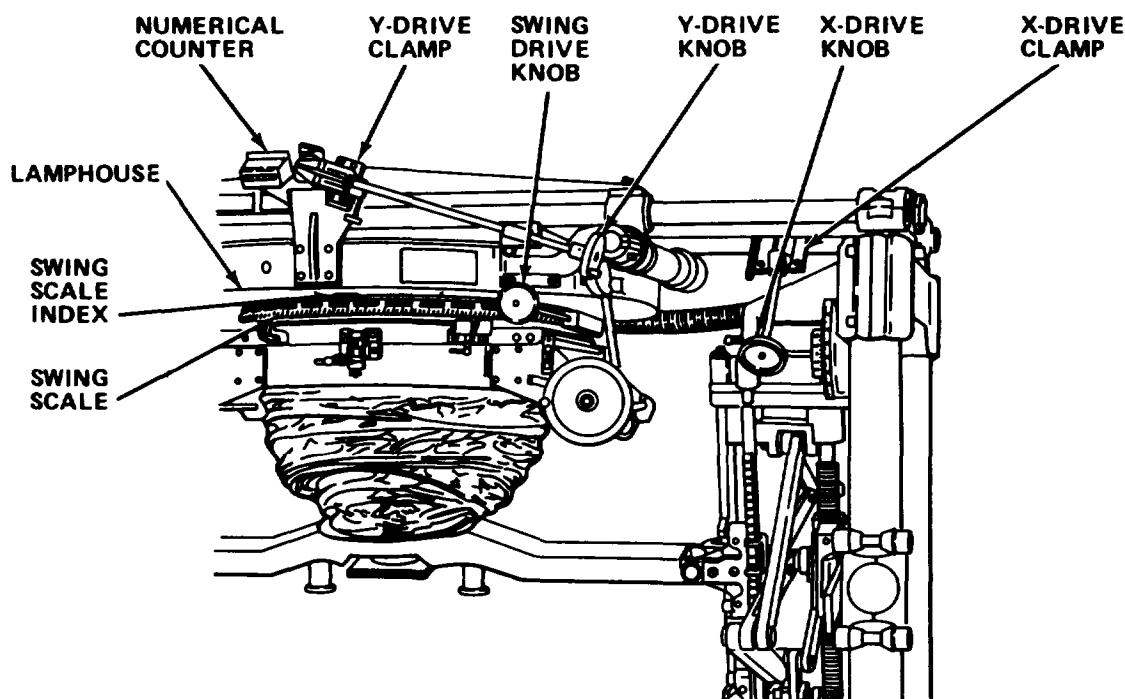


- d. Turn on circuit breaker.
- e. Set easel for minimum magnification.

**WARNING**

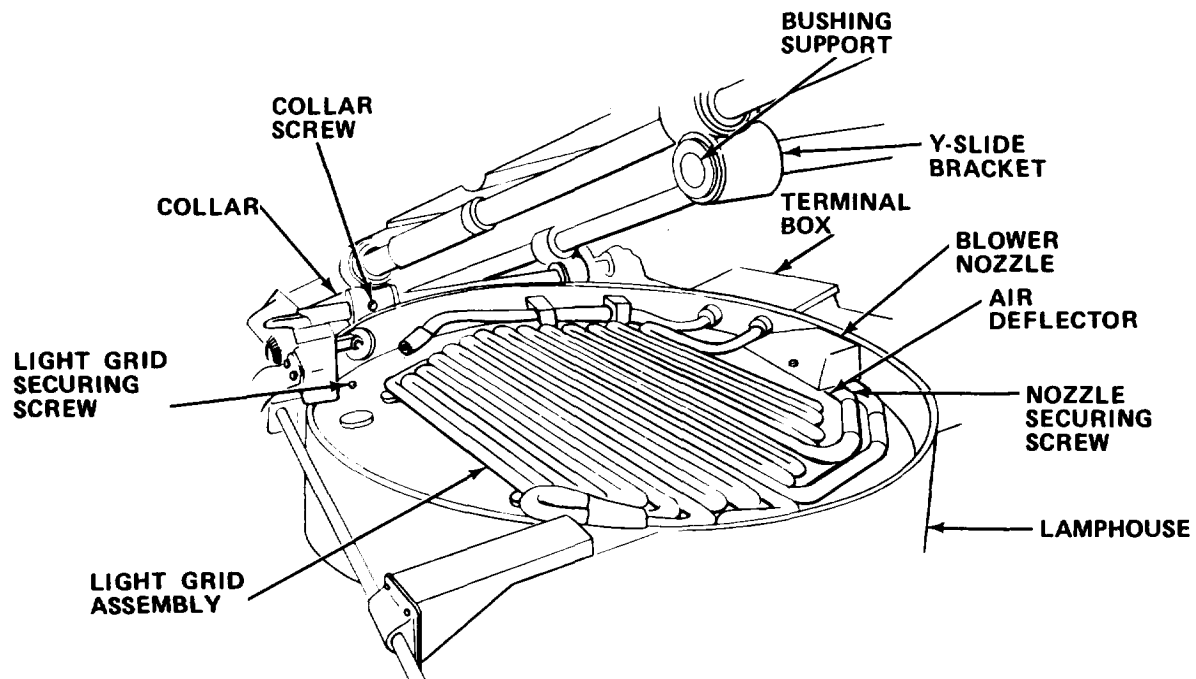
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- f. Turn off circuit breaker.
- g. Unplug power cord.
- h. Unclamp power cable from lamphouse assembly and position power cable to the rear of the motor.

**NOTE**

Be sure balance pulls are not attached to lamphouse.

- i. Turn swing drive knob until swing scale indicates 90 degrees.
- j. Rotate swing drive knob to right to lock setting.
- k. Loosen locking knob and turn X-drive knob until film stage is at extreme left displacement.
- l. Tighten X-drive locking knob.
- m. Crank Y-drive until film stage is at its extreme rear Y-displacement.
- n. Tighten Y-drive clamp to lock movement.



**CAUTION**

In order to retain zero-point calibration when reassembling, Y-drive spindle must not be rotated while it is disconnected from universal joint.

- o. Detach collar on universal joint from Y-drive spindle by loosening collar screw. Secure Y-drive spindle to support arm with tape.
- p. Pull lamphouse forward to approximate midway position of Y-movement.

**NOTE**

For proper reassembly, bracket caps must be marked before disassembly.

- q. Remove capscrews and lockwashers, and withdraw bracket caps from two Y-slide brackets at right side of lamphouse.
- r. Hold lamphouse up and withdraw Y-slide from bushing supports.
- s. Lower lamphouse to rest on lens support arm.
- t. Remove screw and lamphouse cover ground strap.

**CAUTION**

Use care not to break light lamps. Broken glass can cause additional equipment damage.

- u. Remove lamphouse cover from rear of rectifier by rotating four cover clamps so that flat edges are next to cover edge.
- v. Remove screws, washers, and blower hose adapter.

**NOTE**

One light grid screw also connects grounding strap.

- w. Remove light grid securing screws.
- x. Slide assembly over sloping rim and, at same time, allow it to rotate slightly. Flexible terminals will slide out of tubular receptacles of terminal box.

**CAUTION**

Use care not to break light grid. Broken glass can cause additional equipment damage.

- y. Lay lamp on flat surface.
- z. Use dry, lint-free cloth to clean interior of lamphouse.
- aa. Slide replacement light grid assembly over sloping rim. At same time, rotate it slightly to allow flexible terminals to sit in tubular receptacles of terminal box.
- ab. Reinstall light grid screws. Reconnect grounding strap.
- ac. Reinstall blower hose adapter.
- ad. Reinstall cover and check that flat edges of clamp are next to cover.
- ae. Reconnect lamphouse ground strap.
- af. Raise lamphouse and hold it in place while inserting Y-slide shaft through bushing supports.

**NOTE**

For proper reassembly, install bracket caps to original locations.

- ag. Reinstall capscrews and lockwashers to the two Y-slide brackets at the right side of the lamphouse. Check that shaft is flush with cap brackets.

- ah. Reinstall power cable clamp on lamphouse assembly and place power cable forward of the blower motor.
- ai. Reinstall the collar (on the universal joint) on the Y-drive screw and tighten the collar screw.
- aj. Loosen Y-drive clamp and X-drive locks.
- ak. Move swing drive knob to the left and move swing drive to zero and lock in place.
- al. Rotate Y-knob and X-knob until lamphouse is at 100 mm on Y-axis and zero on X-axis.
- am. Reconnect blower duct to lamphouse and blower motor.
- an. Reinstall bellows.
- ao. Reconnect power cord.
- ap. Check zero position of film stage (paragraph 7-6.2).

7-10.5 Replace pressure Plate.

MOS: 81C, Cartographer

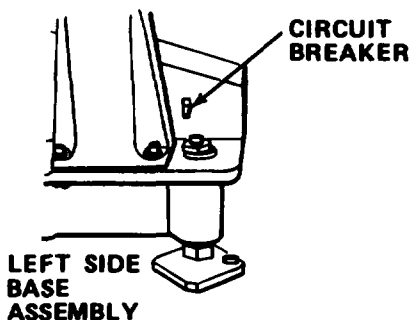
TOOLS: Flat Tip Screwdriver  
Hex Head Key Wrench Set

SUPPLIES: Pressure Plate  
Lens Cleaner (Item 6, Appendix E)  
Lens Tissue (Item 17, Appendix E)

**WARNING**

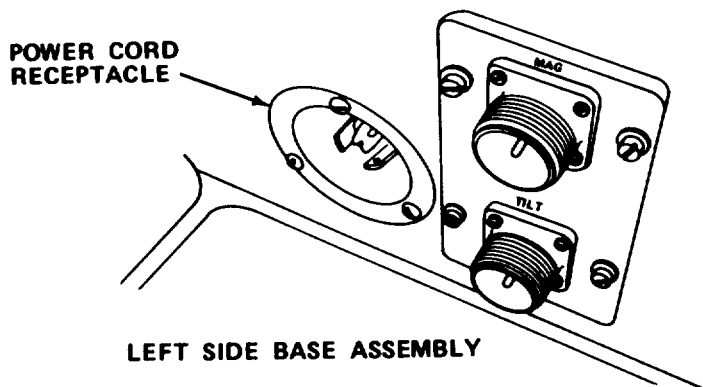
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Remove dust cover.

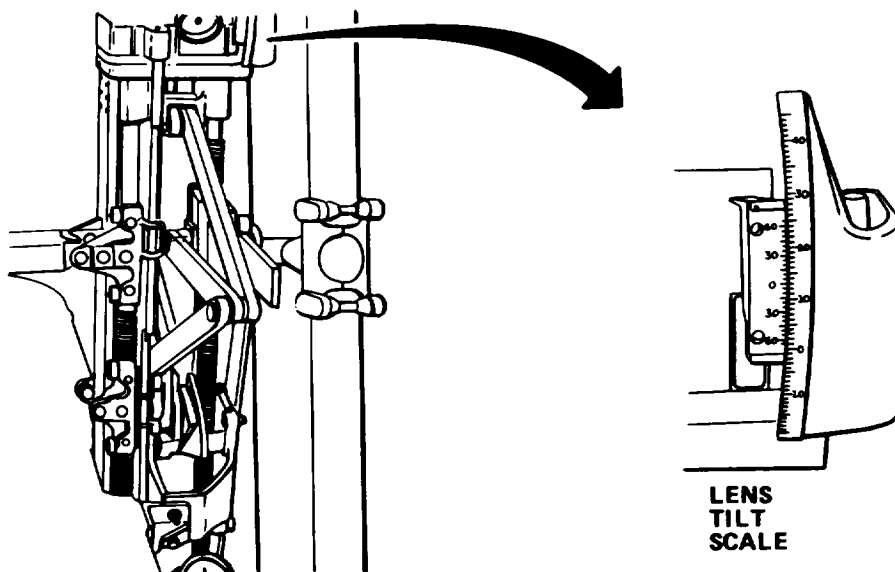




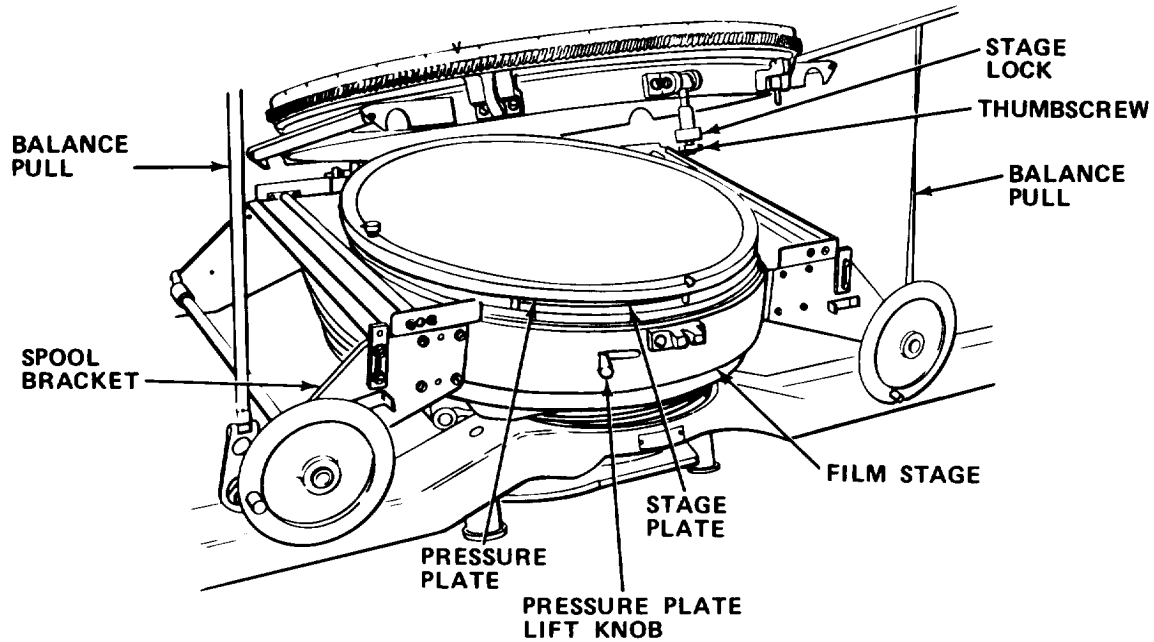
- b. Turn off circuit breaker.



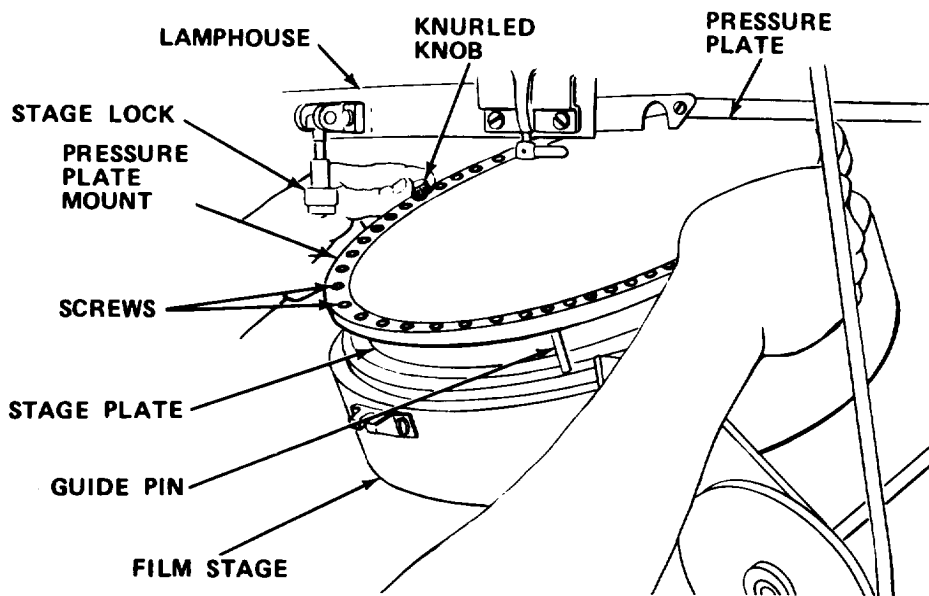
- c. Plug in power cord.  
 d. Plug in TILT and MAG assembly.  
 e. Turn on circuit breaker.



- f. Use TILT assembly to adjust lens tilt scale for 0 degree indication.  
 g. Turn off circuit breaker. Unplug power cord.  
 h. Set swing scale to 0 degree, and lock swing movement by rotating swing drive to right.



- i. Move Y axis where lamphouse assembly is in a maximum forward position.
- j. Attach balance pulls to spool brackets.
- k. Hold film stage up and rotate thumbscrew to release stage lock.
- l. Open film stage carefully.



- m. Lift pressure plate by knurled knobs, withdrawing guide pins from their seats in film stage.

**NOTE**

Glass pressure plate is held in its mount by metal retainer secured to underside of mount.

- n. Remove screws holding ring in position.
- o. Lift defective pressure plate from mount.

**NOTE**

Pressure plate is to be installed in mount so that its ground glass surface will face light source.

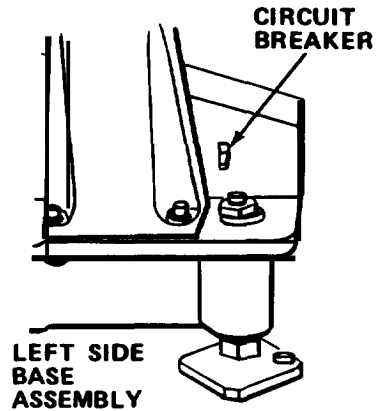
- p. Install new pressure plate in its mount and secure with screws.
- q. Lift pressure plate by knurled knobs and inspect plate for dirt, dust and fingerprints.
- r. Use lens tissue and lens cleaner to clean pressure plate.
- s. Reinstall pressure plate in film stage.
- t. Close film stage, lower stage lock and tighten thumbscrew.
- u. Remove balance pulls from spool brackets.
- v. Unlock swing movement by moving swing drive to left.
- w. Move lamphouse assembly to 100 on Y-axis.
- x. Plug in power cord. Turn on circuit breaker.
- y. Replace dust cover.

7-10.6 Replace Counterbalance Assembly.

MOS: 81C, Cartographer

TOOLS: 7/32 in. Hex Head Key Wrench

SUPPLIES: Counterbalance Assembly

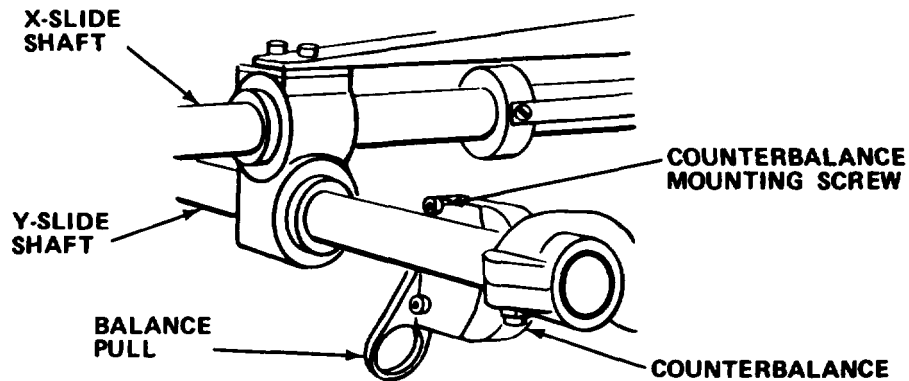


- a. Remove dust cover.
- b. Turn off circuit breaker.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- c. Unplug power cord.



- d. Remove two counterbalance screws.

- e. Remove defective counterbalance.
- f. Position replacement counterbalance against lamphouse so that balance pulls are rearward.
- g. Aline holes in counterbalance with those in lamphouse.
- h. Reinstall two counterbalance screws.
- i. Plug in power cord.
- j. Replace dust cover.

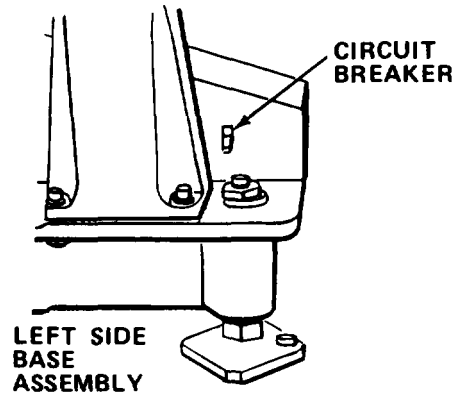
7-10.7 Replace Nine-Speed Computer.

MOS: 81C, Cartographer

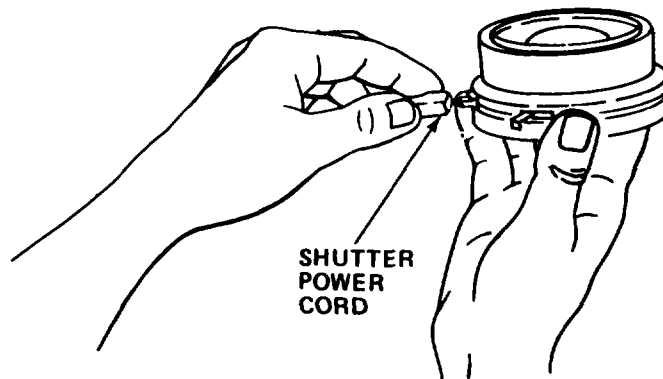
SUPPLIES: Nine-Speed Computer

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- a. Turn off circuit breaker.
- b. Unplug power cord.



- c. Unplug defective speed computer shutter power cord from receptacle and lens and shutter.
- d. Plug new speed computer shutter power cord to receptacle and lens and shutter.
- e. Plug in power cord.

7-10.8 Replace Stage Plate.

MOS: 81C, Cartographer

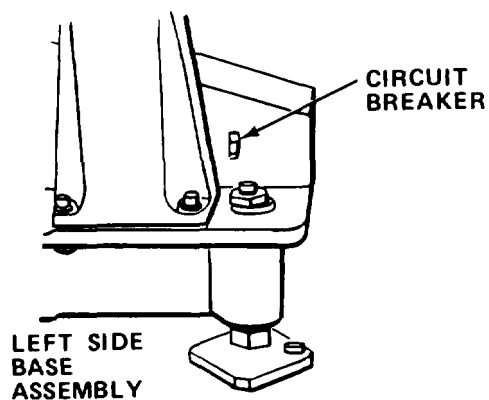
TOOLS: Flat Tip Screwdriver  
Scribe

SUPPLIES: Stage Plate

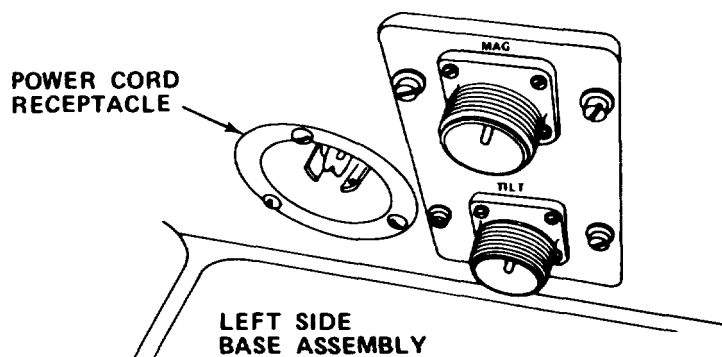
**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Remove dust cover.



- b. Turn off circuit breaker.



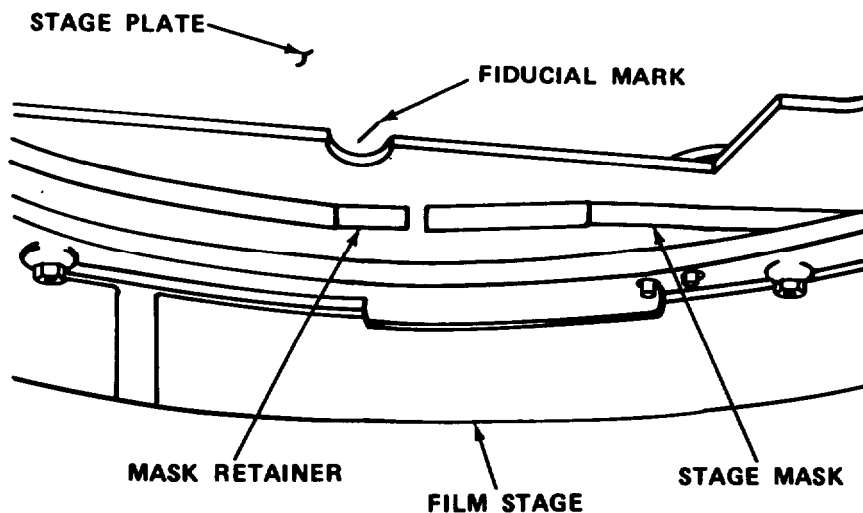
- c. Plug in power cord.

- d. Plug in TILT and MAG assemblies.
- e. Turn on circuit breaker.
- f. Use TILT assembly to adjust lens tilt scale for a 0 degree indication.

**NOTE**

For magnification ratio of 1:1, both scales must read twice focal length of rectifier lens. This is engraved on lens and shutter assembly.

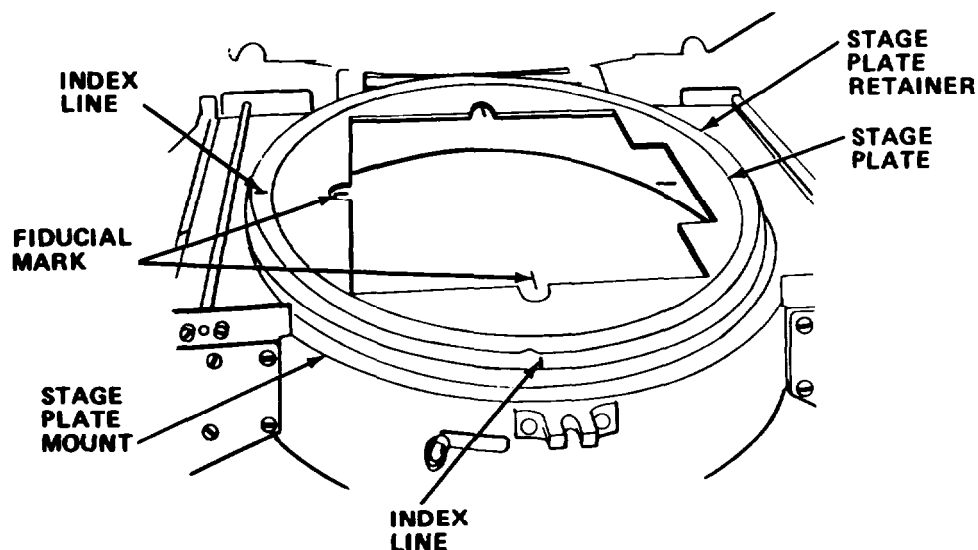
- g. Use MAG assembly to obtain magnification ratio of 1:1. Then turn off circuit breaker and unplug power cord.
- h. Set swing scale to 0, and lock swing movement by rotating swing lock to right.
- i. Attach balance pulls to spool brackets.
- j. Move lamphouse assembly to maximum forward position.
- k. Hold film stage upward and rotate thumbscrew to release stage lock.
- l. Lower film stage carefully.
- m. Lift pressure plate by knurled knobs, withdrawing guide pins from their seats in film stage. Place pressure plate on flat surface.





**NOTE**

Scribe marks on stage plate mount which indicate position of fiducial marks.



- n. Remove stage plate mounting screws and defective stage plate.
- o. Install new stage plate in film stage.
- p. Use straightedge to align index and fiducial marks.
- q. Hold stage plate in position and place retainer ring against mount.

**NOTE**

Stage plate bevel should be showing same height above retaining ring for all 360 degrees.

- r. Reinstall mounting screws and tighten them uniformly.
- s. Reinstall pressure plate. Close film stage and secure it with stage lock.
- t. Remove balance pulls from spool brackets.
- u. Perform swing circle adjustment (paragraph 7-6.2).
- v. Replace dust cover.

## Section IV ORGANIZATIONAL MAINTENANCE

**7-11. LUBRICATION INSTRUCTIONS.** This equipment requires no lubrication at the organizational level.

**7-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ; AND SUPPORT EQUIPMENT.**

7-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

7-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special tools, TMDE and Support Equipment is listed in the applicable repair parts and special tools list and appendix B of this manual.

7-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**7-13. SERVICE UPON RECEIPT.**

7-13.1 Checking Unpacked Equipment.

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**7-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no Organizational PMCS procedures assigned to this equipment.

**7-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions use the facing schematic or the foldout located at the end of this manual for further fault analysis.

d. If the photogrammetric rectifier does not power up when turned on, verify that 120 V ac is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power procedures for dead receptacle (Table 1-4).

**Table 7-4. ORGANIZATIONAL TROUBLESHOOTING**

| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|--|--|---|
| 1. MAGNIFICATION MOTOR WILL NOT OPERATE.                     | Check for a broken shear pin.  | Replace shear pin (paragraph 7-16.3).   |
| 2. TILT AND MAGNIFICATION MOVEMENTS OVERRIDING THEIR LIMITS. | Check limit switch(es) for correct operation.                                    | Replace limit switch(es) (paragraphs 7-16.7 and 7-16.8).  |
| 3. CIRCUIT BREAKER WILL NOT RESET.                           | Check thermal overload heater for continuity.                                    | Replace thermal overload heater (paragraph 7-16.11).  |
| 4. DRIVE MOTOR INOPERATIVE                                   | Step 1. Check directional control switch on TILT or MAG assembly for continuity. | (a) If continuity is present, proceed to step 2.<br>(b) Replace directional control switch (paragraph 7-16.10). |
|  | Step 2. Check for defective wiring.  | (a) If wiring is correct, proceed to step 3.<br>(b) Repair or replace defective wiring.                         |

Table 7-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

4. DRIVE MOTOR INOPERATIVE - Cent

Step 3. Check motor control fuse FU1 for continuity.

(a) If continuity does not exist, replace fuse (paragraph 7-16.1).

(b) If continuity exists, replace TILT and MAG controller.

5. MOTOR CONTROL FUSE FU-1 FAILS CONTINUALLY IN SLOW SPEED.

Step 1. Check motor cable lead for shorts or grounds.

(a) If cable is good, proceed to step 2.

(b) Repair or replace cable.

Step 2. Check drive motor field for shorts or grounds. Measure resistance across chassis terminal block pins 10 and 11, if 950 ohms is not obtained.

Replace drive motor (paragraph 7-16.4)

6. MOTOR CONTROL FUSE FU-1 CONTINUALLY FAILS IN SLEW SPEED.

Step 1. Check motor cable for shorts or grounds.

(a) If cable is good, proceed to step 2.

(b) Repair or replace cable.

Step 2. Check motor armature for shorts.

(a) Measure resistance across chassis terminal block pins 8 and 9. If a 5 to 9 ohm reading is obtained, proceed to step 3.

(b) If 5 to 9 ohms is not obtained, replace drive motor (paragraph 7-16.4).

Step 3. Check motor armature for grounds.

Measure resistance from chassis terminal block pins 8 and 9 to ground. If a high resistance reading is not obtained, replace drive motor.

**Table 7-4 ORGANIZATIONAL TROUBLESHOOTING - Cont**

| MALFUNCTION  | TEST OR INSPECTION | CORRECTIVE ACTION  |
|--|--------------------|--|
| 7. MOTOR RUNS AT SLOW SPEED REGARDLESS OF SPEED CONTROL SETTING. |                    | <p>Check speed control switch on TILT and MAG assembly for continuity.</p> <p>If continuity is not present, replace switch (paragraph 7-16.9).</p>   |
| 8. BLOWER MOTOR INOPERATIVE.                                     |                    | <p>Check for 115 V ac at blower motor power cord plug.</p> <p>(a) If 115 V ac is not present, locate and repair broken lead.</p> <p>(b) If 115 V ac is present, replace blower motor (paragraph . . . .)</p> |

**7-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the photogrammetric rectifier. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE  | PARAGRAPH |
|--|-----------|
| Replace Motor Control Fuse FU-1 . . . . .                      | 7-16.1    |
| Replace Tilt Drive Motor. . . . .                              | 7-16.2    |
| Replace Magnification Drive Motor Shear Pin/Spur Gear. . . . . | 7-16.3    |
| Replace Magnification Drive Motor . . . . .                    | 7-16.4    |
| Replace Blower Motor. . . . .                                  | 7-16.5    |

INDEX - Cont

| PROCEDURE  | PARAGRAPH |
|--|-----------|
| Replace Magnification Limit Switch(es) . . . . .                     | 7-16.6    |
| Replace Tilt Limit Switch(es) . . . . .                              | 7-16.7    |
| Replace Speed Control Switch in TILT or MAG Assembly . . . . .       | 7-16.8    |
| Replace Directional Control Switch in TILT or MAG Assembly . . . . . | 7-16.9    |
| Replace Thermal Overload Heater . . . . .                            | 7-16.10   |
| Adjust Motor Speed Controls for Tilt or Mag Drive Motor . . . . .    | 7-16.11   |
| Replace Tilt or Mag Controller . . . . .                             | 7-16.12   |
| Remove/Install Photogrammetric Rectifier . . . . .                   | 7-16.13   |

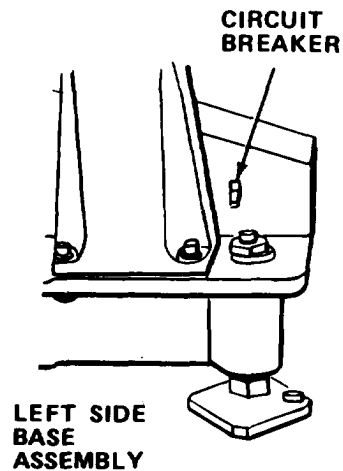
7-16.1 Replace Motor Control Fuse FU-1.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Fuse 3 amp

- a. Remove dust cover.

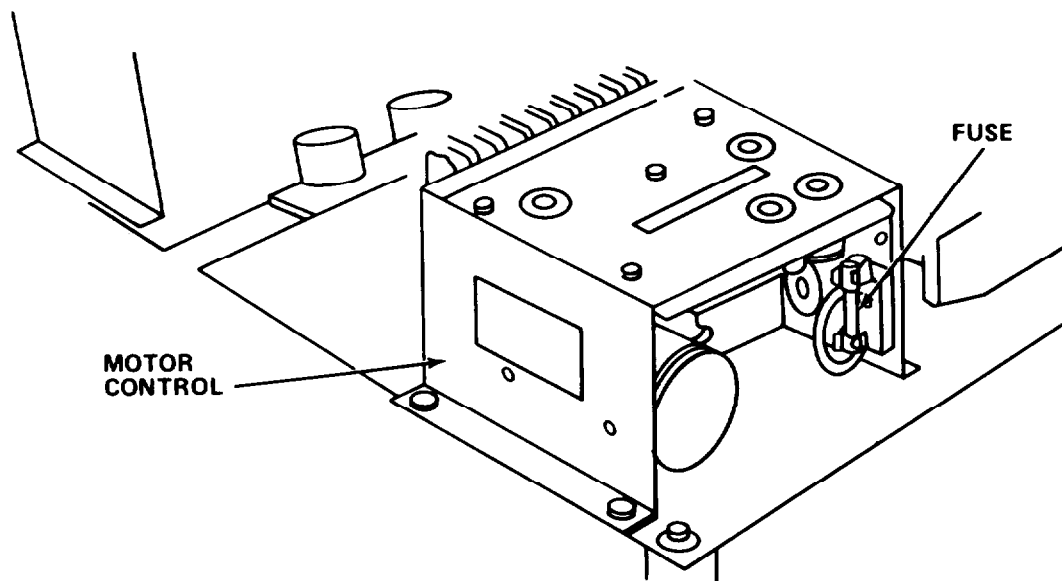


- b. Turn circuit breaker off.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- c. Unplug power cord.
- d. Remove base assembly cover.
- e. Remove plate.



- f. Remove defective fuse from motor control.
- g. Install new fuse.
- h. Reinstall plate.
- i. Reinstall base assembly cover.
- j. Plug in power cord.
- k. Turn on circuit breaker.

7-16.2 Replace Tilt Drive Motor.

MOS: 41B, Topographic Instrument Repair Specialist

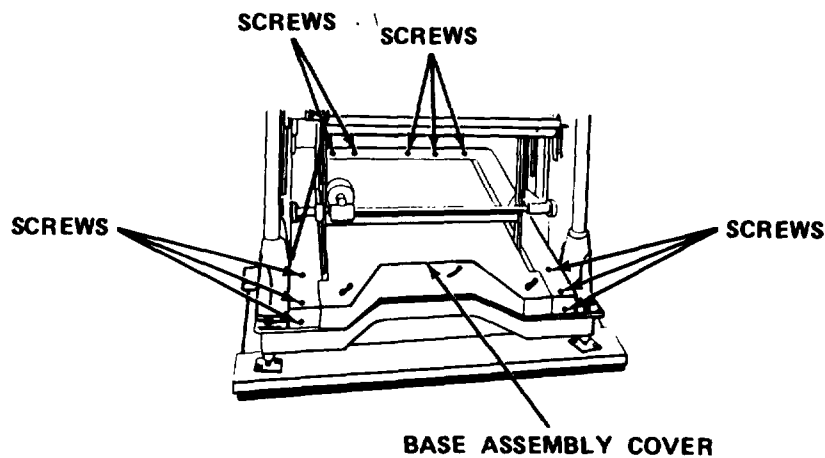
TOOLS: Flat Tip Screwdriver  
3/16 in. Hex Head Key Wrench  
Pin Punch  
Ball Peen Hammer

SUPPLIES: Gear Motor  
Cable Ties (6)  
Terminal Lug (4)

**WARNING**

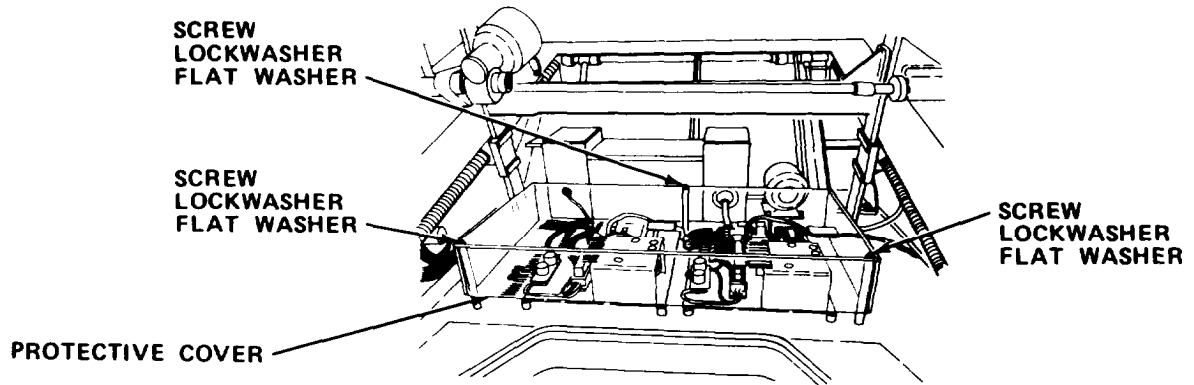
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn off circuit breaker, and unplug power cord.

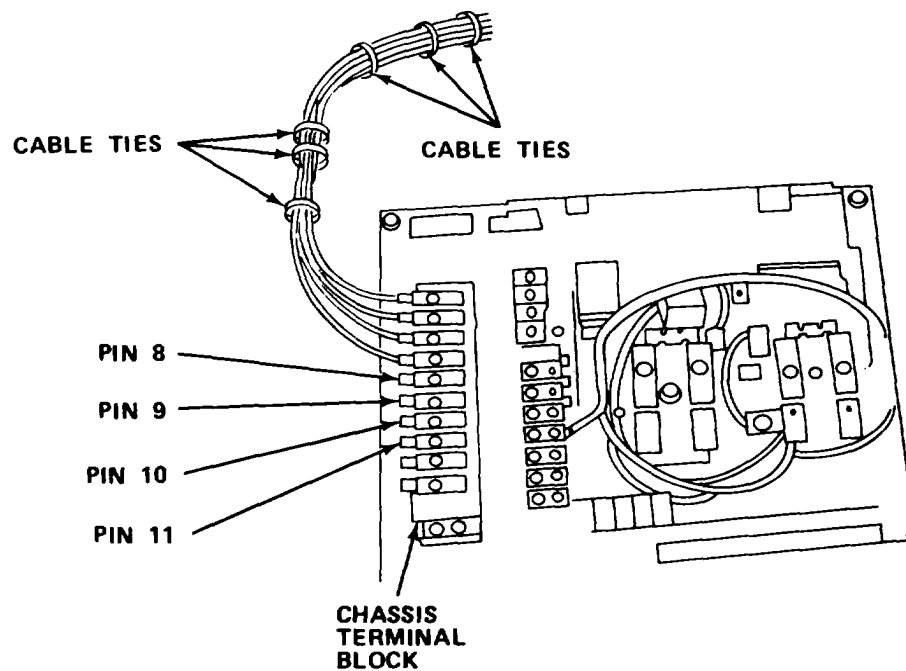


- b. Loosen wing nuts, remove screws and base cover assembly.
- c. Remove V-belt (paragraph 7-10.1).
- d. Remove motor mounting bolts.





- e. Remove protective cover.
- f. Cut cable ties.



- g. Tag and disconnect motor leads from chassis terminal block pins 8, 9, 10 and 11.
- h. Disconnect ground wire from mounting base.
- i. Remove defective motor.
- j. Remove pulley and install on new motor.

- k. Install new motor and secure loosely with mounting bolts.
- l. Reinstall drive motor V-belt and tighten motor mounting bolts.
- m. Route motor cable to chassis terminal block and reconnect wiring.
- n. Install cable ties.
- o. Reconnect ground wire.
- p. Reinstall protective cover.
- q. Reinstall base cover assembly.
- r. Plug in power cord and turn on circuit breaker.

7-16.3 Replace Magnification Drive Motor Shear Pin/Spur Gear.

MOS: 41B, Topographic Instrument Repair Specialist

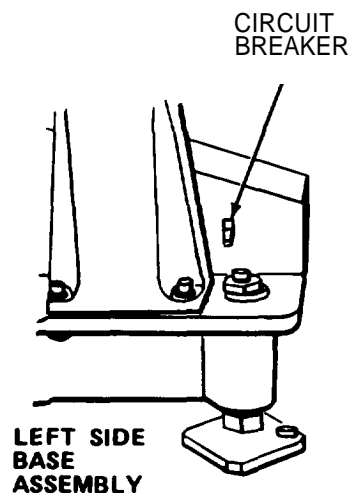
TOOLS: Pin Punch  
Ball Socket Hex Head Key Wrench Set  
Ball Peen Hammer

SUPPLIES: Brass Pin  
Spur Gear  
Rubber Matting

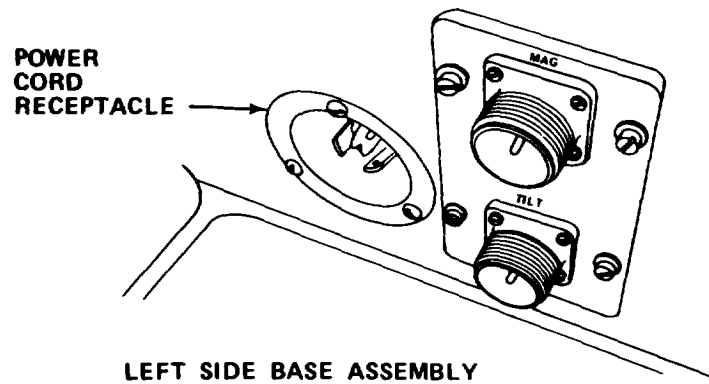
**WARNING**

Electrical shock hazard. You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.

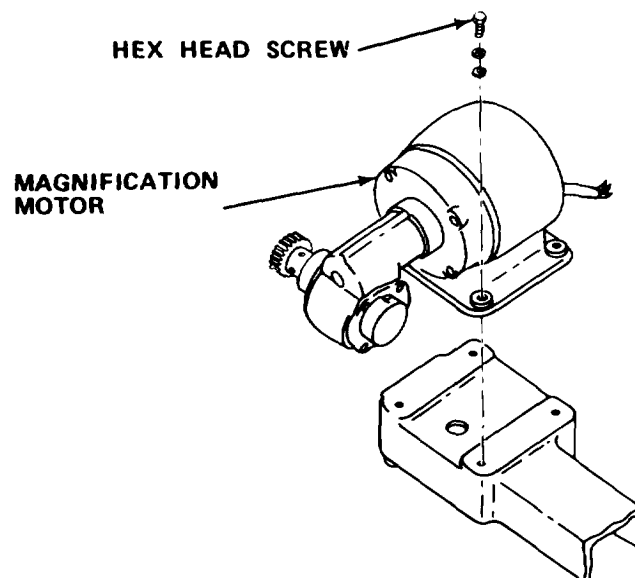
- a. Remove dust cover.



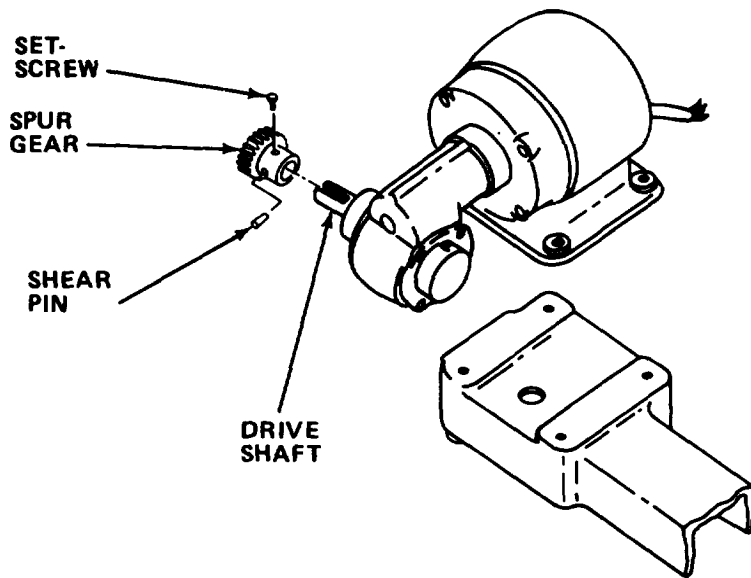
- b. Turn off circuit breaker.



- c. Plug in power cord.
- d. Plug in TILT assembly.
- e. Turn on circuit breaker.
- f. Use TILT assembly to adjust tilt angle to approximately 0 degree.
- g. Turn off circuit breaker.
- h. Unplug power cord.



- i. Remove magnification motor hex head screws.
- j. Disengage spur gears by moving motor sideways.



**NOTE**

Setscrew in spur gear hub has no function in this assembly. Be sure setscrew is not protruding from inner surface of gear.

- k. Drive shear pin segments from gear and shaft.

**NOTE**

If spur gear is to be replaced, perform steps 1. and m. If not, proceed to step n.

- l. Pull defective spur gear from motor drive shaft.
- m. Install new spur gear on drive shaft so that tapered holes in gear hub and motor shaft are alined.
- n. Drive replacement shear pin into tapered holes.
- o. Move motor back to its mounted position and allow two spur gears to engage.

**NOTE**

Before tightening mounting screws, check for proper alinement and meshing of gears.

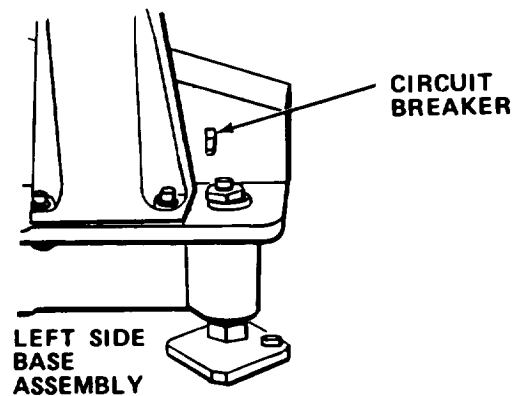
- p. Install and tighten motor hex head screws to support bar.
- q. Plug in power cord.
- r. Replace dust cover.

7-16.4 Replace Magnification Drive Motor.

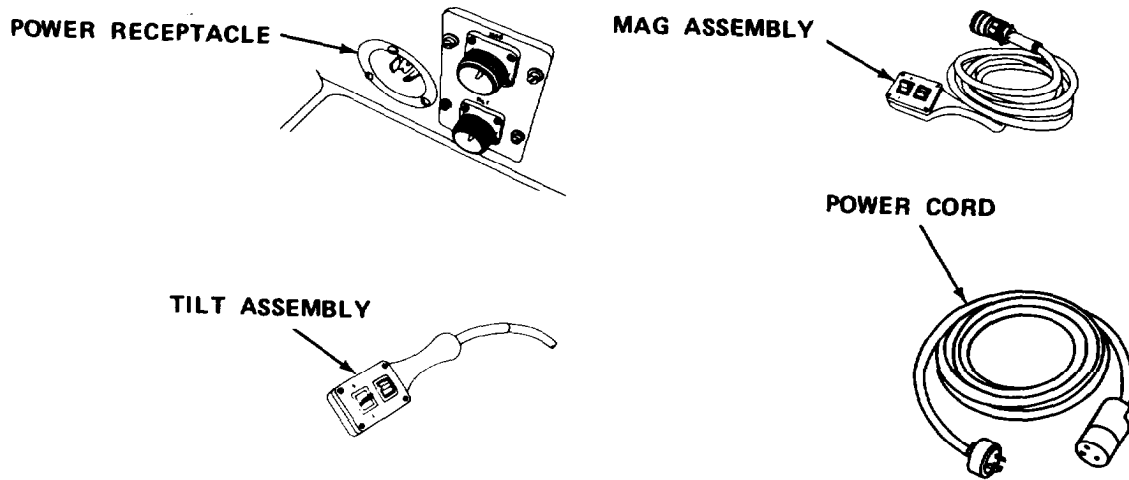
MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Pin Punch Set  
Ball Peen Hammer  
3/16 in. Hex Head Key Wrench  
Electric Drill  
Drill Bits

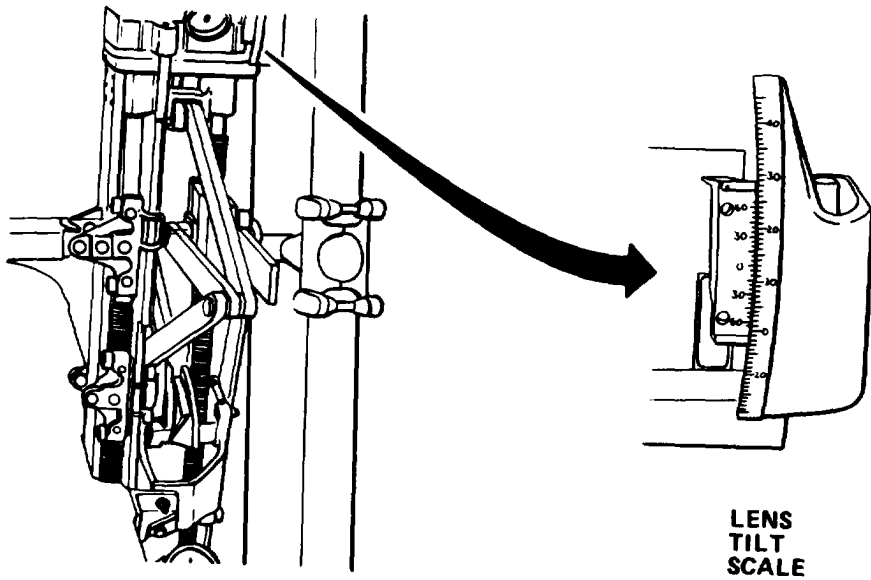
SUPPLIES: Drive Motor



- a. Turn off circuit breaker.



- b. Plug in power cord, TILT and MAG assemblies.
- c. Turn on circuit breaker.

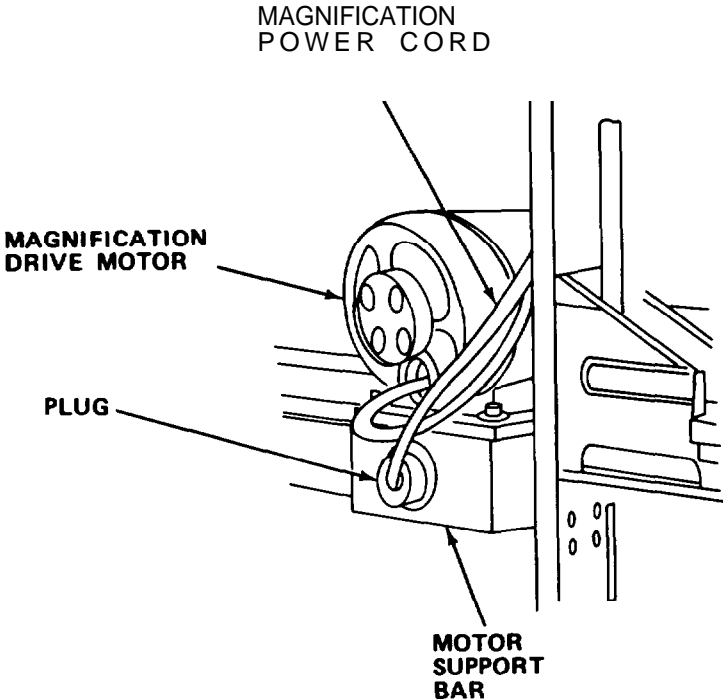


- d. Set speed control to **SLOW** on TILT assembly.
- e. Use directional control to adjust easel tilt angle to 0 degree.
- f. Turn off circuit breaker.

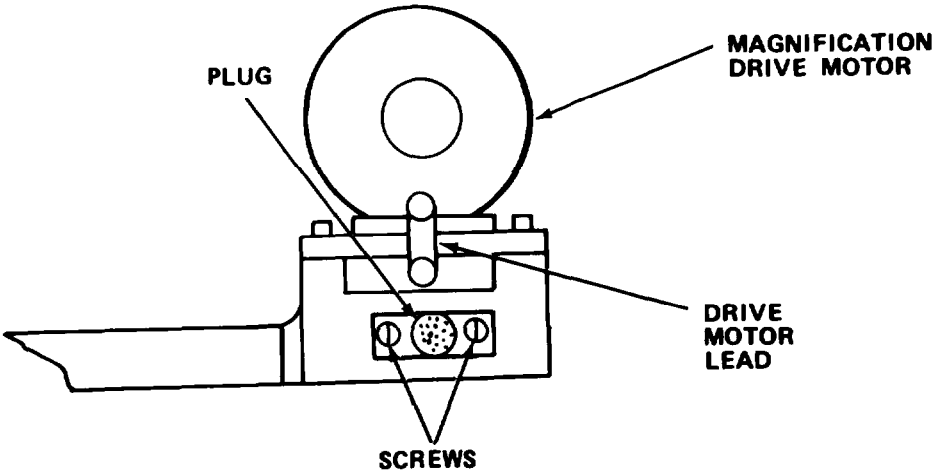
**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

g. Unplug power cord.



h. Disconnect magnification motor power cord from plug.

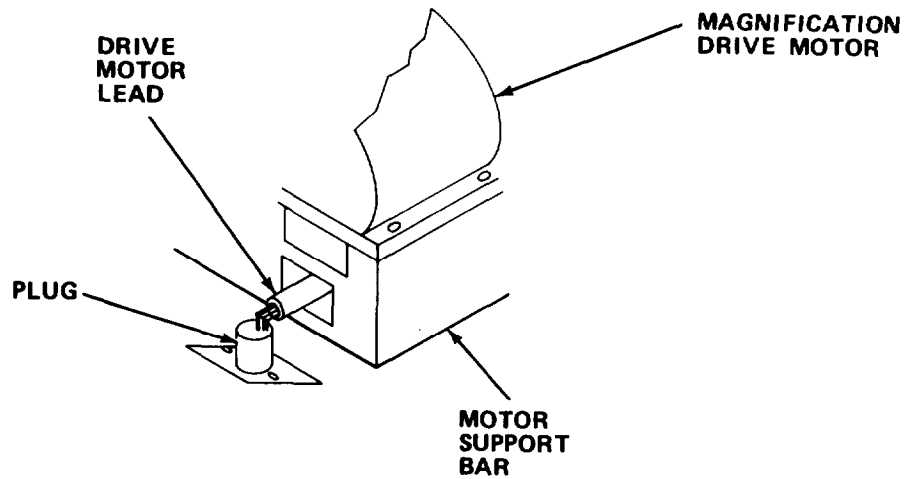


i. Remove screws from plug.

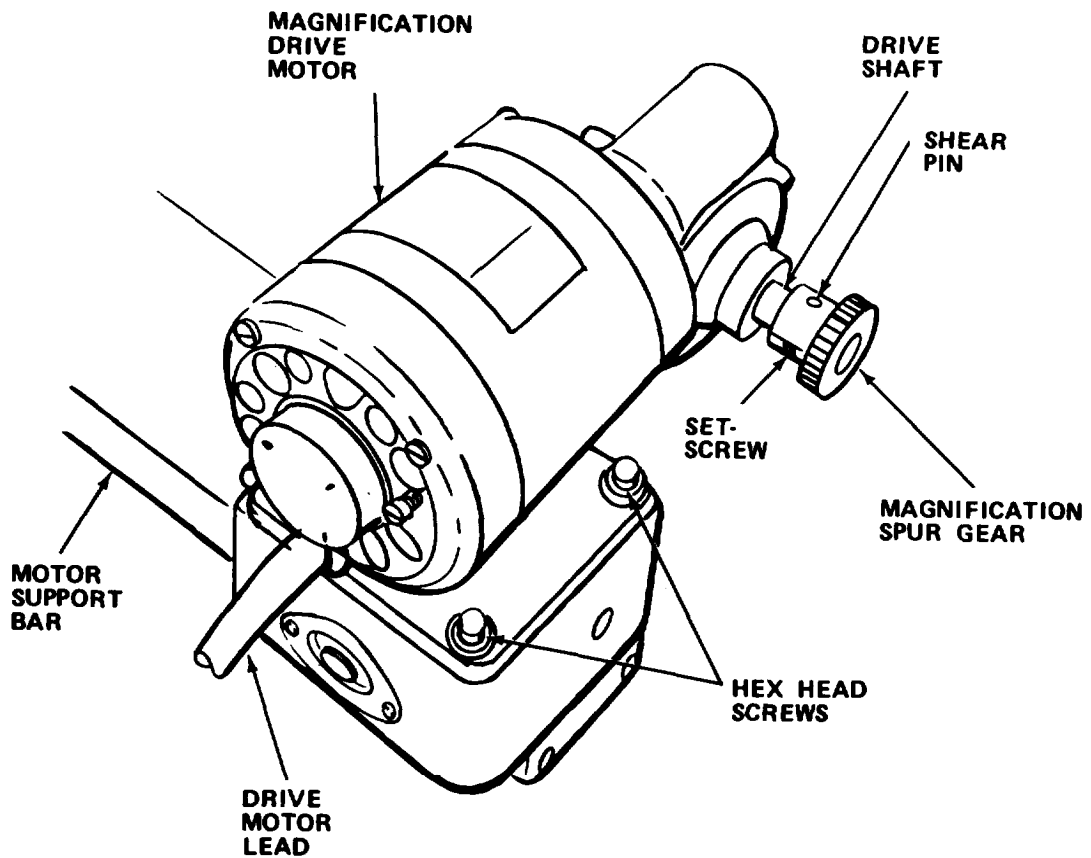
**CAUTION**

Do not pull hard on plug. Drive motor lead is soldered to the rear of the plug. excessive force will break leads.

- j. Pull plug away from motor support bar.



- k. Tag and desolder drive motor leads from rear of plug.





- l. Remove four hex head screws, flat washers and lockwashers.
- m. Move motor sideways to disengage spur gears; then remove defective motor.
- n. Remove brass shear pin from magnification spur gear.

**NOTE**

Replacement motor will be received without hole drilled in motor shaft.

- o. Position spur gear on new motor drive shaft. Tighten gear on shaft with set screws. Drill hole through shaft and spur gear collar.
- p. Drive in shear pin.
- q. Position new motor on motor support bar and allow spur gears to engage.

**CAUTION**

Before tightening hex head screws, check for proper alignment and meshing of gears to avoid damage to gears.

- r. Tighten four hex head screws.
- s. Solder drive motor leads to rear of plug.
- t. Reconnect magnification cord to plug.

7-16.5 Replace Blower Motor.

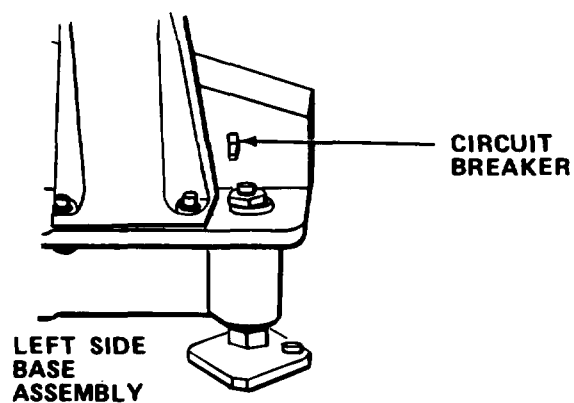
MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Offset Flat Tip Screwdriver  
3/16 in. Hex Head Key Wrench

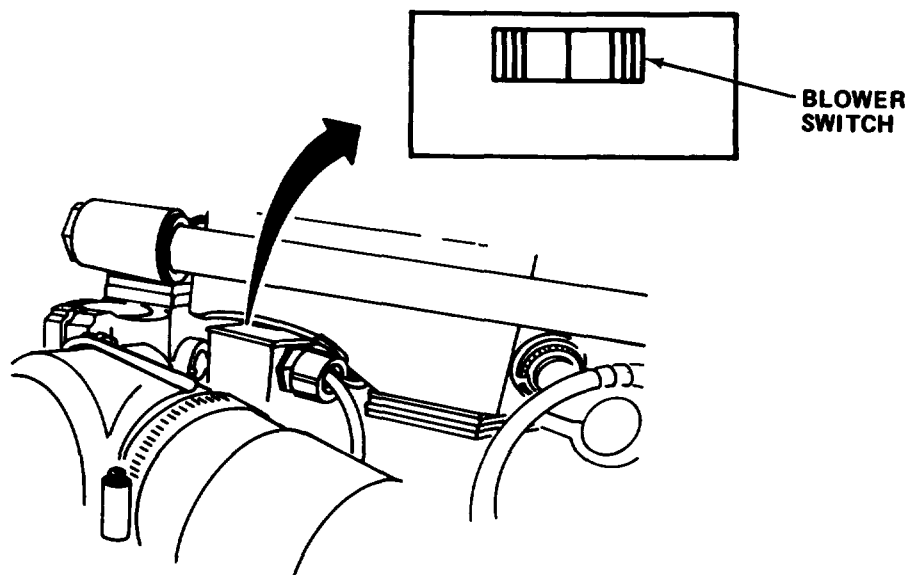
SUPPLIES: Blower Motor

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



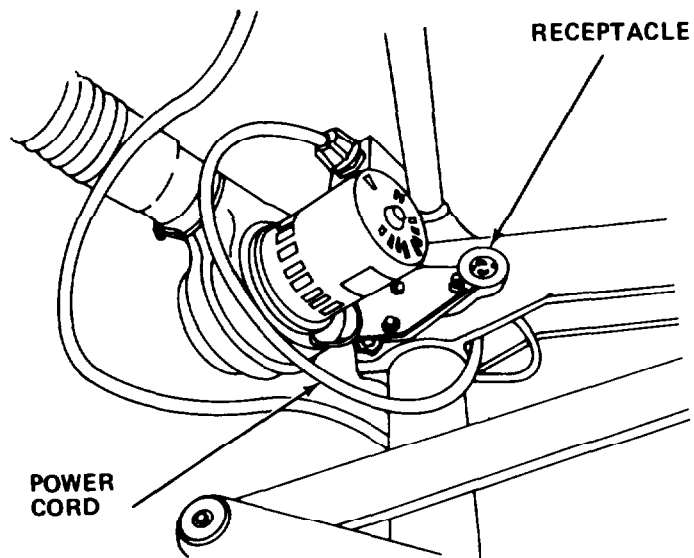
- a. Turn off circuit breaker and unplug power cord.



- b. Turn off blower switch.

**CAUTION**

Support blower while removing screws. Damage to equipment may occur.



- d. Remove two screws and disconnect power cord.
- e. Remove two screws and disconnect ground lead.
- f. Remove defective blower motor.
- g. Install new blower motor.
- h. Reinstall two screws and ground lead.
- i. Connect power cord.

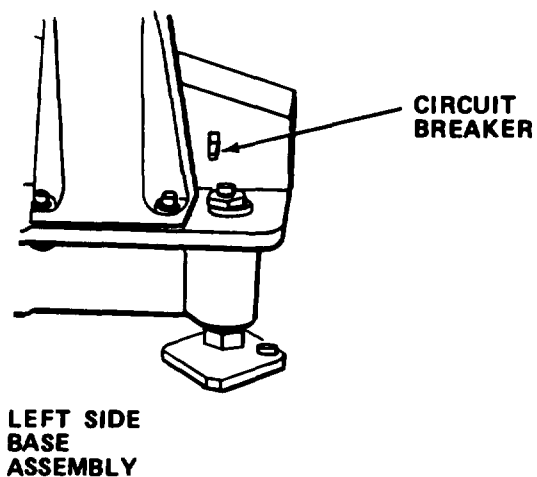
7-16.6 Replace Magnification Limit Switch (es)

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Soldering Iron

SUPPLIES: Magnification Limit Switch  
Solder (Item 30, Appendix E)

- a. Remove dust cover.

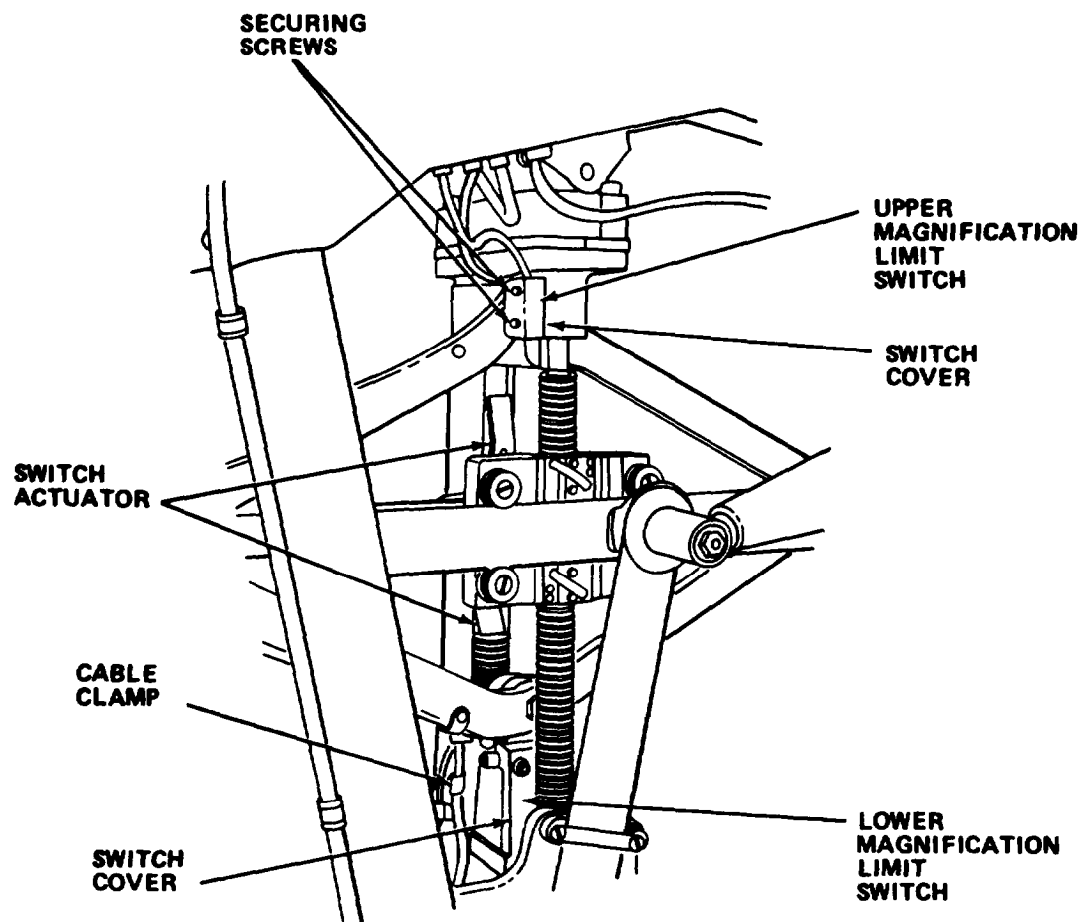


- b. Turn off circuit breaker.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- c. Unplug power cord.



- d. If removing upper magnification switch, remove clamp immediately above the switch.
- e. Remove switch.
- f. Remove switch covers.
- g. Tag and desolder leads from defective switch.
- h. Solder leads to new switch.
- i. Install switch, switch cover(s) and cable clamps.
- j. Plug in power cord.
- k. Replace dust cover.

7-16.7 Replace Tilt Limit Switch(es).

MOS: 41B, Topographic Instrument Repair Specialist

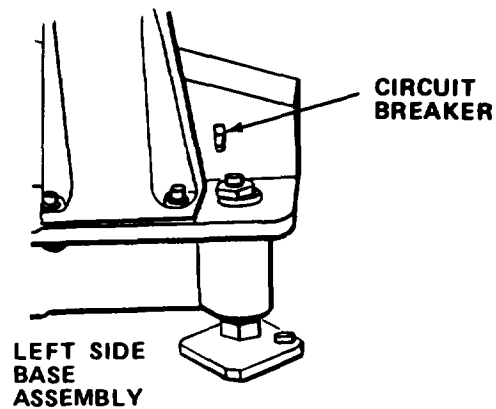
TOOLS: Soldering Iron  
Flat Tip Screwdriver  
3/16 in. Hex Head Key Wrench (ground down on short side)

SUPPLIES: Microswitch  
Tilt Limit Switch  
Solder (Item 30, Appendix E)

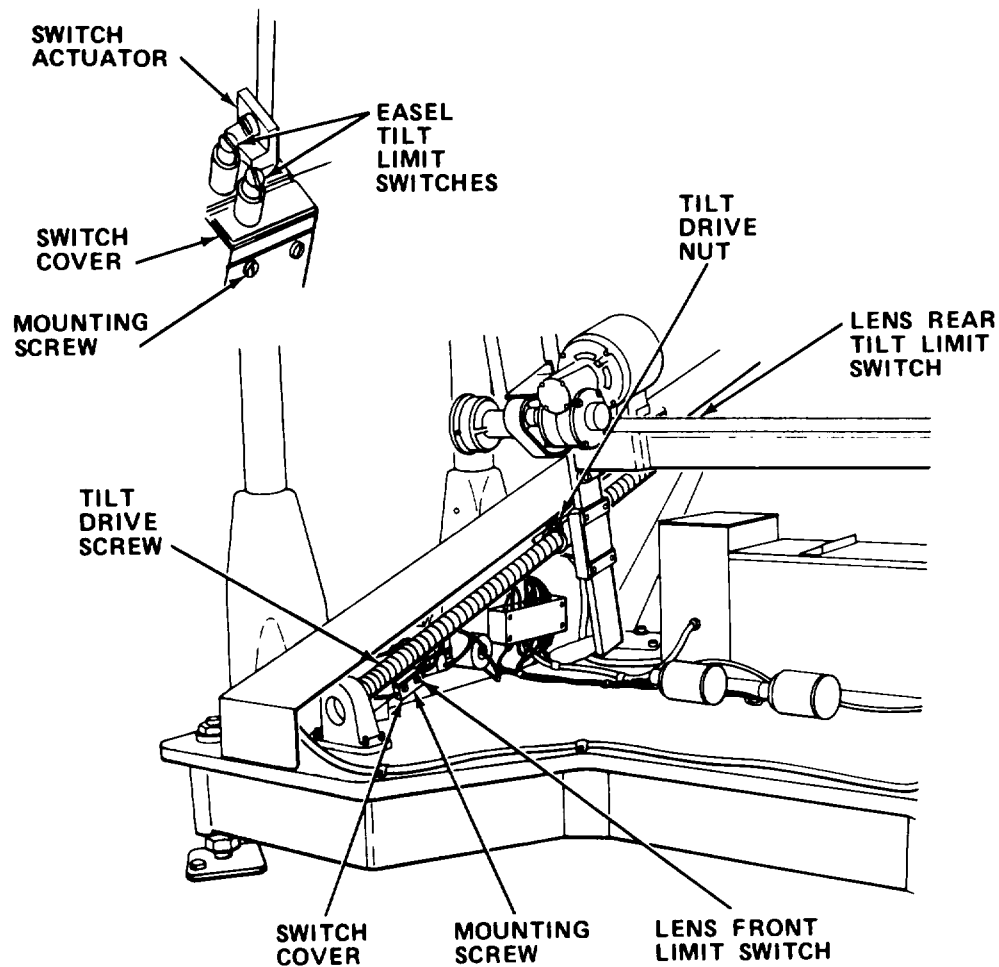
- a. Remove dust cover.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- b. Turn off circuit breaker and unplug power cord.
- c. Remove base assembly cover.



#### NOTE

position of rear tilt limit switch is adjustable. Mounting bracket to which it is secured is provided with slotted holes to make this adjustment. When removing this switch, be sure to mark position of screws in these slots so that correct switch location is retained.

- d. Remove defective switch.
- e. Remove switch cover(s).
- f. Tag and desolder leads from underside of switch body.
- g. Solder leads to new switch.
- h. Install switch(es) in switch cover(s), and aline holes with those in mounting.
- i. Reinstall base assembly cover.
- j. Replace dust cover.

7-16.8 Replace Speed Control Switch in TILT or MAG Assembly.

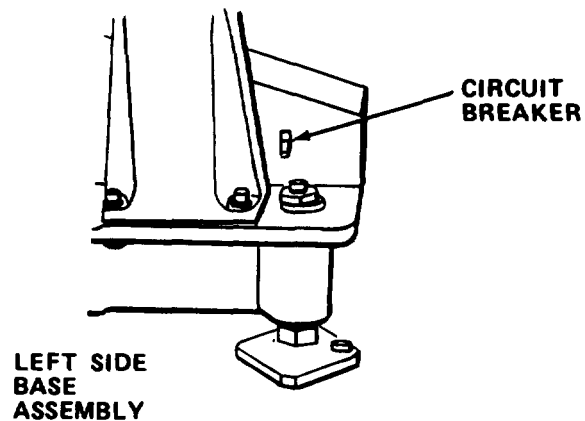
MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Solder/Desolder Set

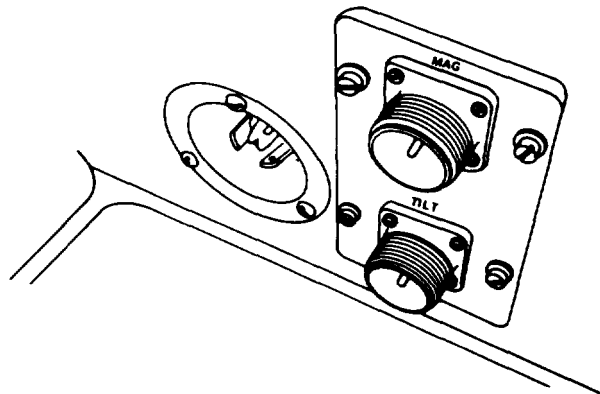
SUPPLIES: Rocker Switch  
Solder (Item 30, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

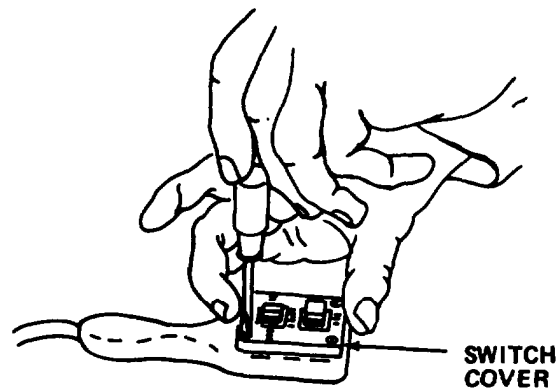


- a. Turn off circuit breaker and unplug power cord.

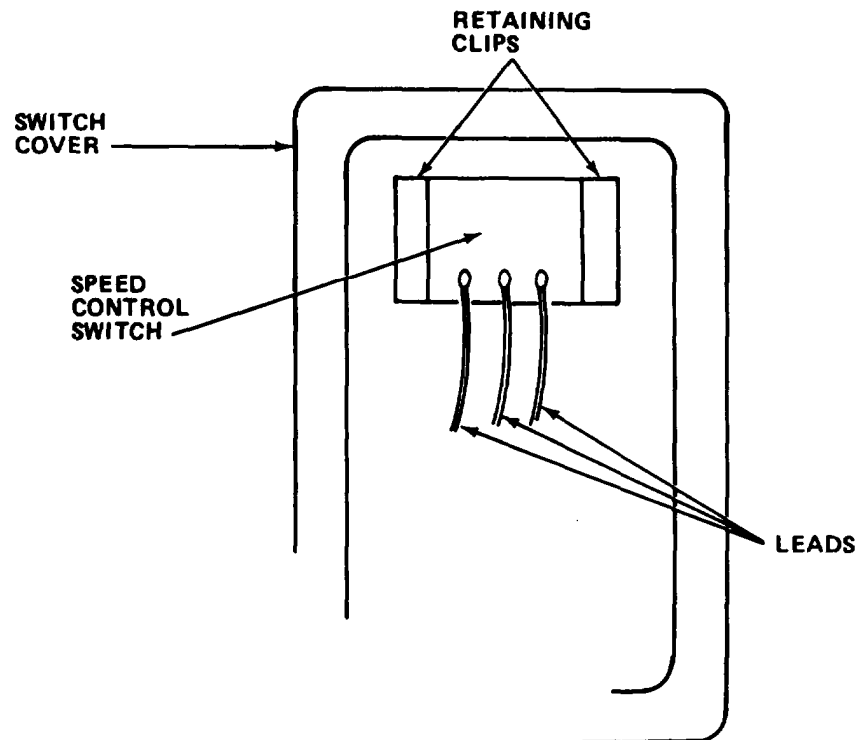


- b. Unplug MAG or TILT assembly.

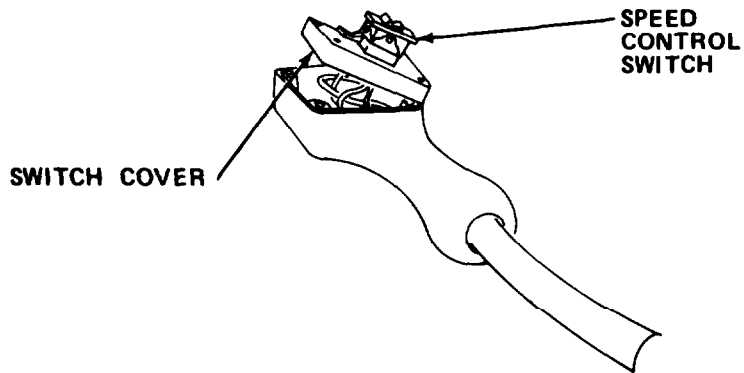




- c. Remove switch cover.



- d. Tag and desolder leads from speed control switch.
- e. Squeeze retaining clips and push defective speed control switch through switch cover.



- f. Push new speed control switch through switch cover.
- g. Solder leads to speed control switch.
- h. Reinstall switch cover.
- i. Plug in MAG or TILT assembly.

7-16.9 Replace Directional Control in MAG or TILT Assembly.

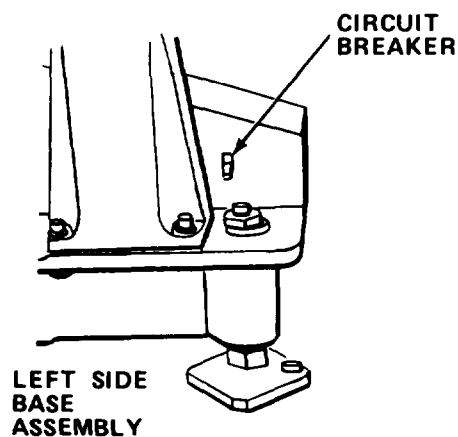
MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Solder/Desolder Set

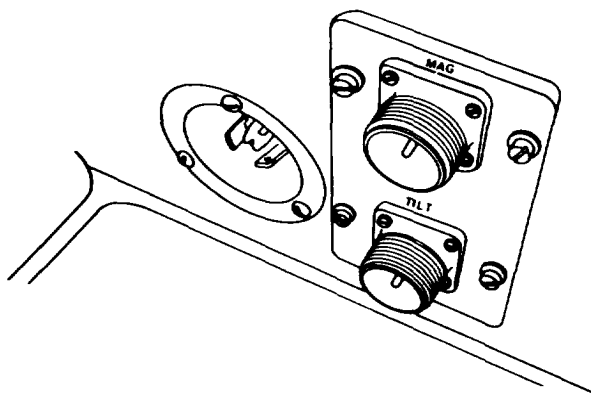
SUPPLIES: Switch  
Solder (Item 30, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



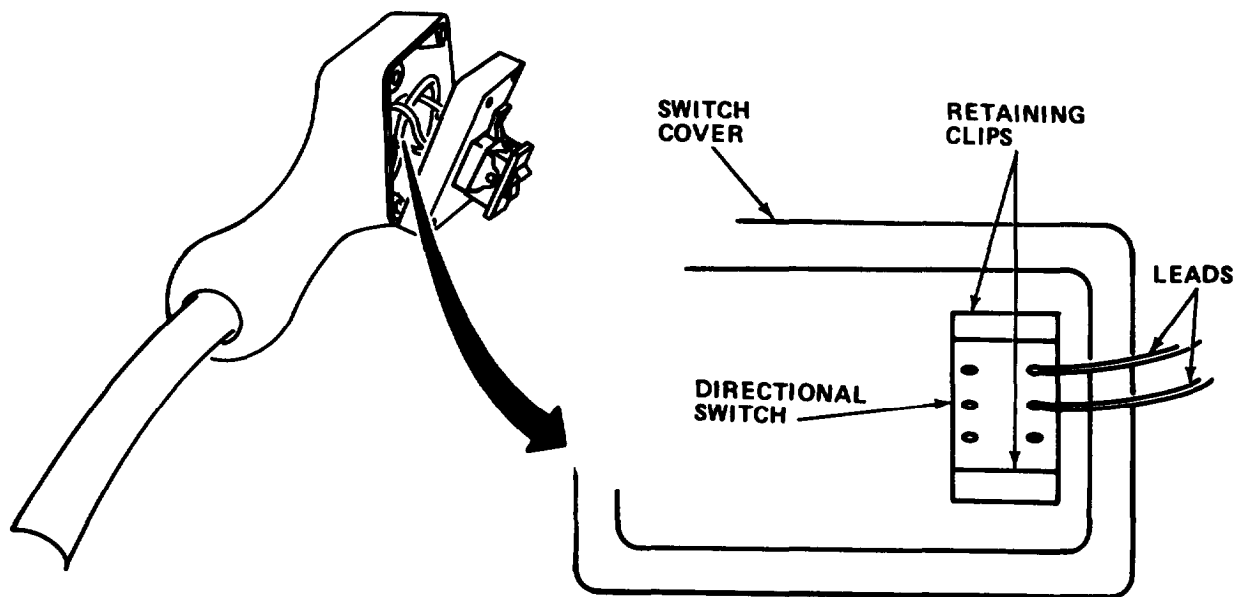
- a. Turn off circuit breaker and unplug power cord.



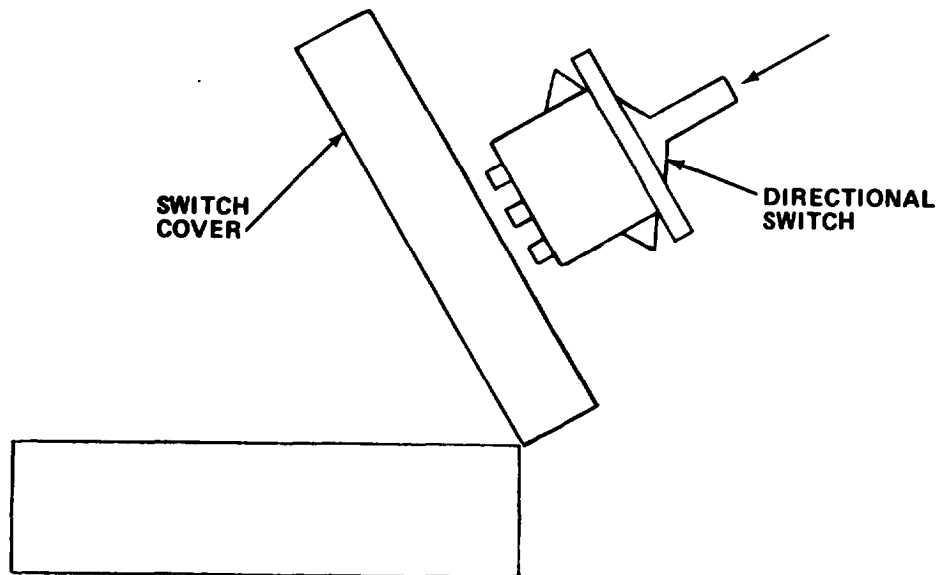
- b. Unplug MAG or TILT switch assembly.



- c. Remove switch assembly.



- d. Tag and desolder leads from directional switch.
- e. Squeeze retaining clips and push defective directional switch through switch cover.



- f. Push new directional switch through switch cover.
- g. Solder leads to directional switch.
- h. Reinstall switch cover.
- i. Plug in MAG or TILT switch assembly.

7-16.10 Replace Thermal Overload Heater.

MOS: 35E, Special Electronic Devices Repairer

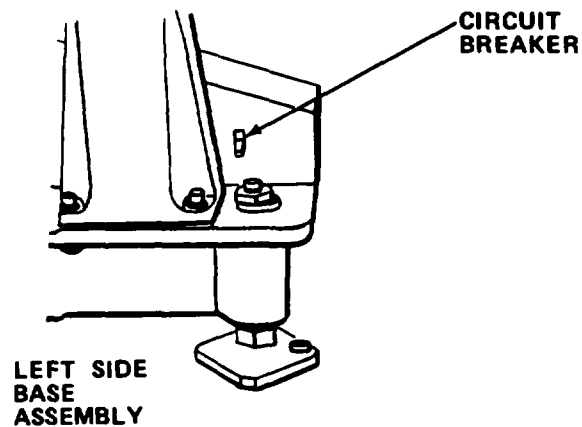
TOOLS: Flat Tip Screwdriver  
Pliers

SUPPLIES: Thermal Overload Heater

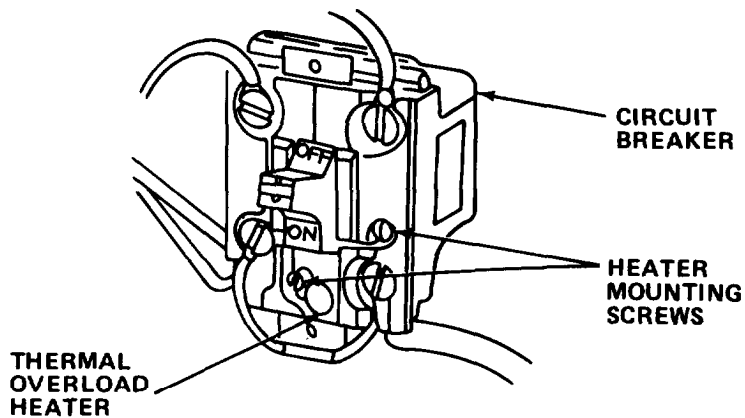
- a. Remove dust cover.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



- b. Turn off circuit breaker and unplug power cord.
- c. Remove base assembly cover.
- d. Remove two breaker securing screws.



- e. Pull circuit breaker from its installed position and place it on base assembly. Remove cover from front of circuit breaker.
- f. Use pliers to remove plug-in heater from front of circuit breaker.
- g. Install new plug-in heater in heater circuit.
- h. Reinstall circuit breaker and cover in position on left side of shield so that control lever protrudes.
- i. Reinstall base assembly cover.
- j. Plug in power cord and turn on circuit breaker.
- k. Replace dust cover.

7-16.11 Adjust Motor Speed Controls for Tilt or Mag Drive Motor

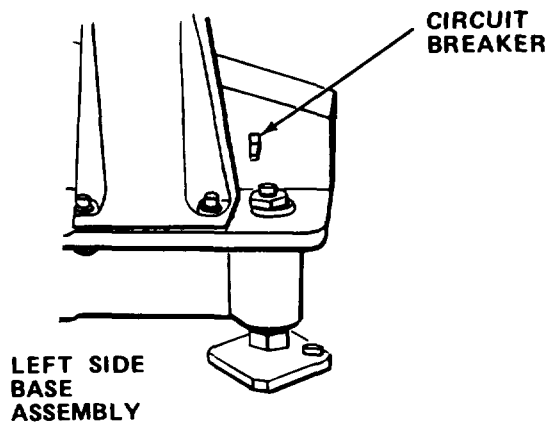
MOS: 35E, Special Electronic Devices Repairer

TOOLS: Multimeter  
Ball Socket Hex Head Key Wrench Set  
Non-Metallic Screwdriver  
Flat Tip Screwdriver**WARNING**

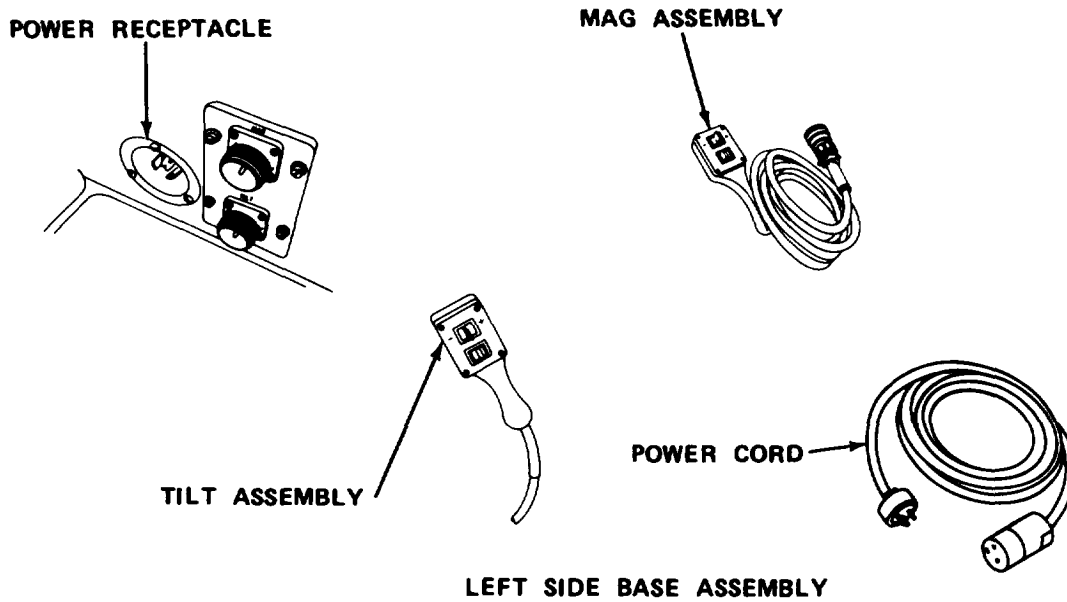
- Death or serious injury may occur from electrical shock unless circuit breaker is turned off before servicing.
- Use only insulated or non-metallic screwdriver for these adjustments. Circuit components are not at ground potential. Serious injury and damage may occur.

**NOTE**

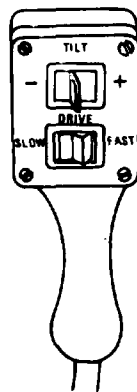
If MAG drive motor control circuits are to be adjusted, perform steps a.-l., n.-aa., and ac.-ai. If TILT drive motor control circuits are to be adjusted, perform steps a.-g., l.-ab., and ac.-ai.



- a. Turn off circuit breaker.



- b. Plug in power cord, TILT and MAG assemblies.
- c. Turn on circuit breaker.



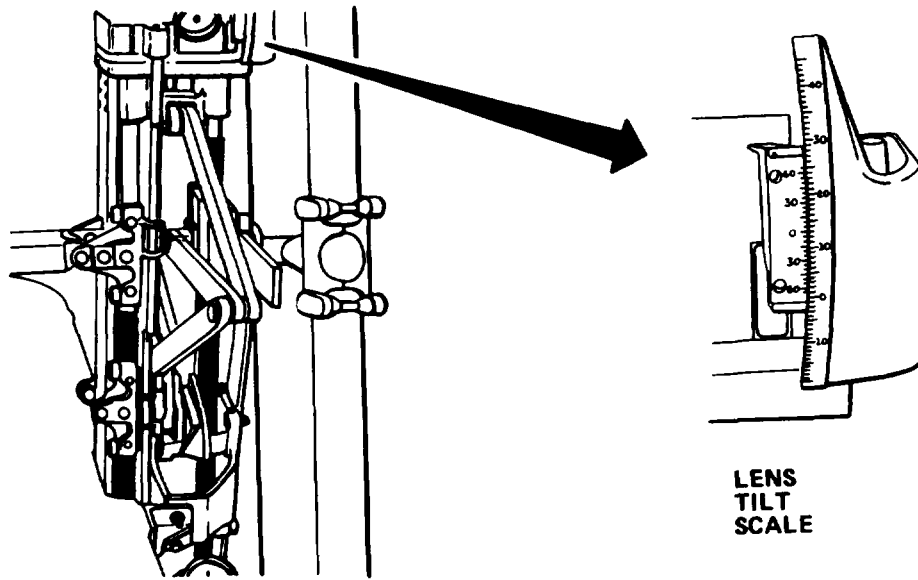
- d. Set MAG and TILT assemblies speed control to fast.

**NOTE**

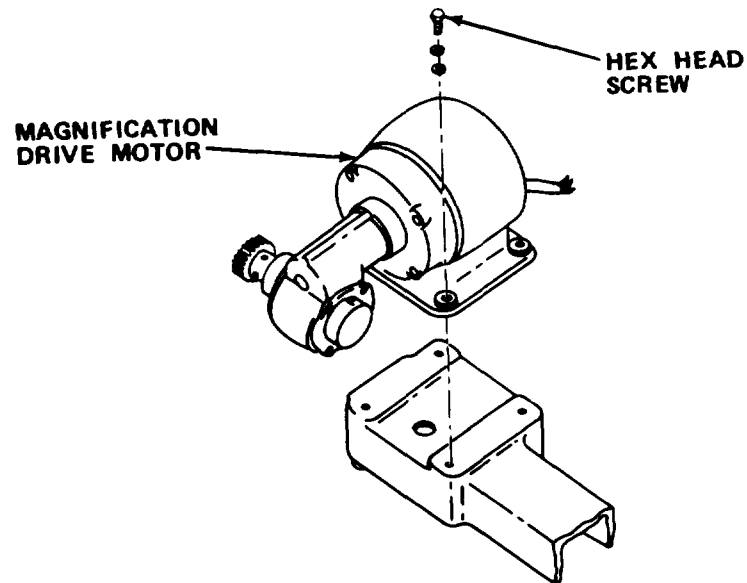
The following two steps are required only to give maximum clearance for access to motors and controllers.

- e. Use MAG control to drive easel to highest position, minimum magnification direction.

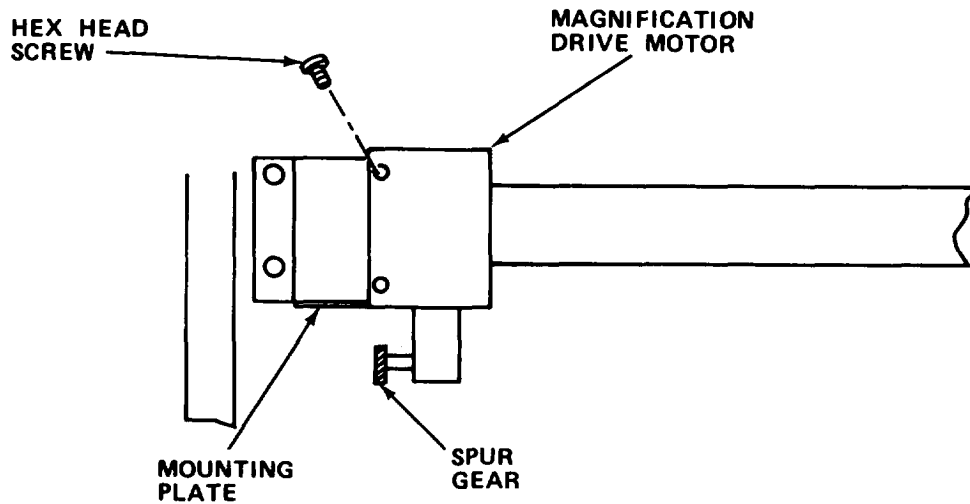




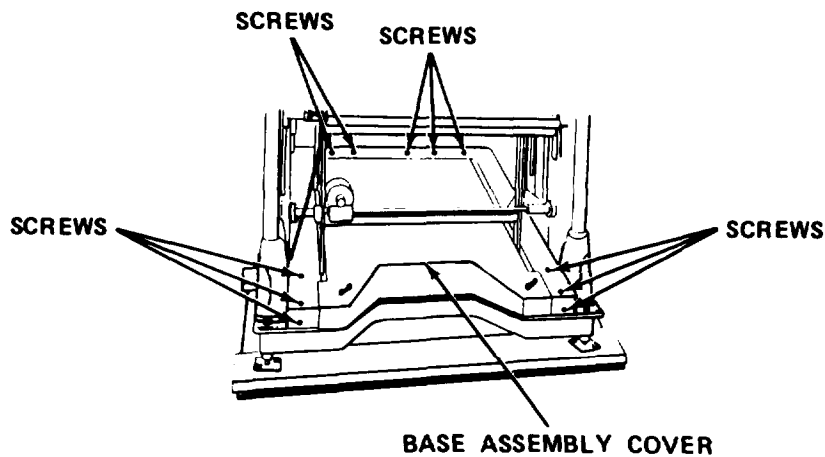
- f. Use TILT control to adjust easel tilt angle to 0 degree.
- g. Turn off circuit breaker.



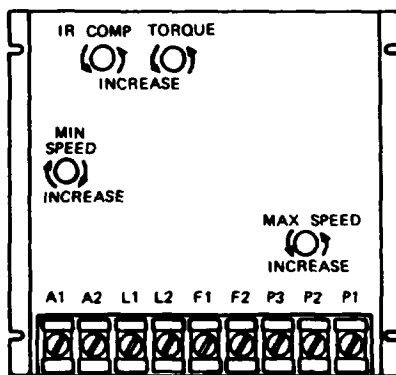
- h. Remove magnification drive motor hex head mounting screws.
- i. Disengage spur gears by rotating motor slightly



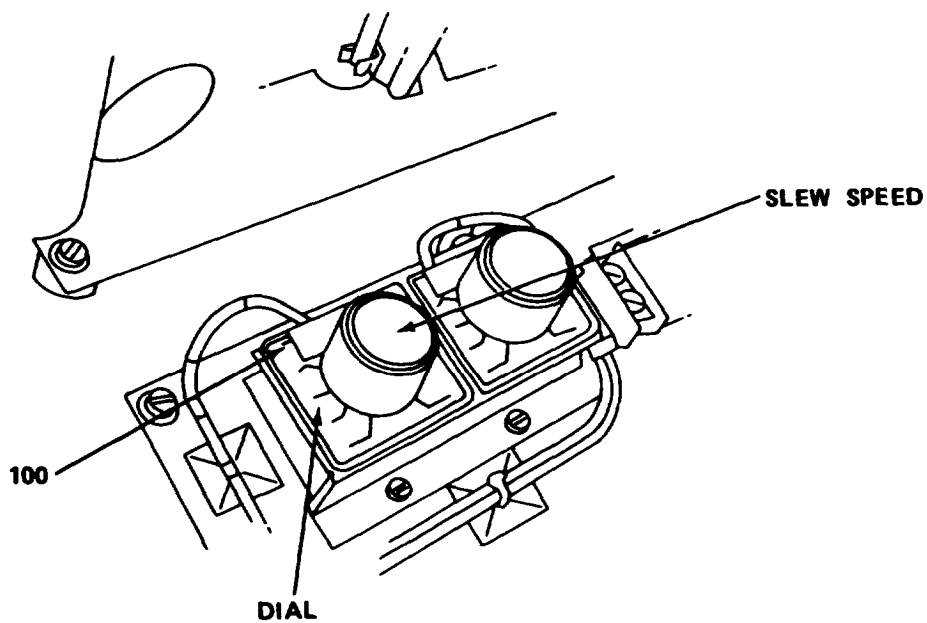
- j. Slide magnification drive motor to the right until left motor mounting holes are aligned with the right taped mounting holes in the motor support.
- k. Reinstall two hex head screws to hold motor in this offset position.



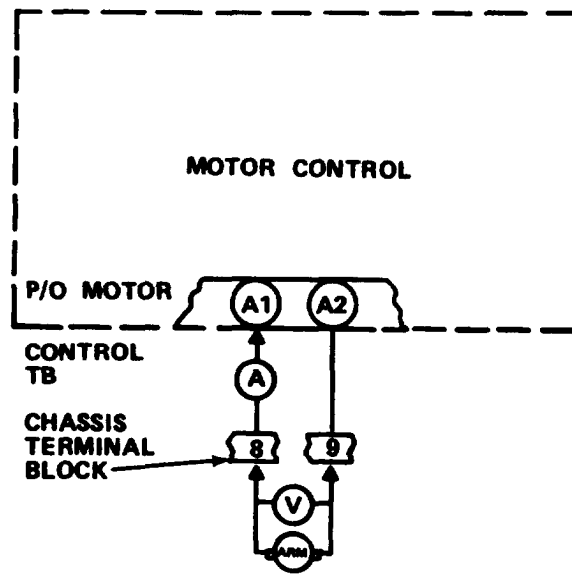
- l. Remove base assembly cover.
- m. Remove TILT drive motor V-belt (paragraph 7-10.1).
- n. Remove protective cover.



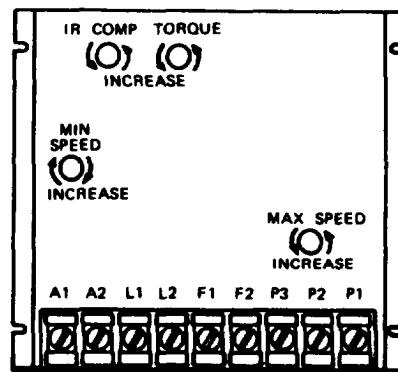
- o. Set MIN SPEED potentiometer fully left.
- p. Set MAX SPEED potentiometer fully right.
- q. Set TORQUE potentiometer fully right; then rotate left approximately 120 degrees.
- r. Set IR COMP potentiometer halfway between full right and full left.



- s. Set SLEW and SLOW speed potentiometer fully right.

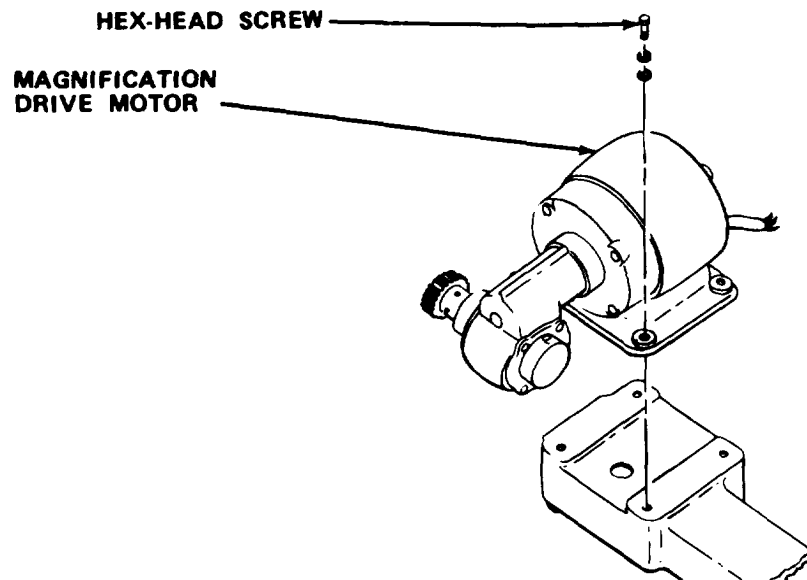


- t. Connect multimeter (0-150 V dc scale) as shown.
- u. Turn on circuit breaker.
- v. Hold drive switch on TILT or NAG control in (+) direction.



- w. Adjust MAX SPEED potentiometer for a multimeter indication of 125 V dc.
- x. Set MAG and TILT assemblies speed control to SLOW.
- y. Adjust MIN speed potentiometer for a multimeter indication of 40 V.

- z. Turn off circuit breaker.
- aa. Disconnect multimeter.
- ab. Reinstall TILT drive motor V-belt (paragraph 7-10.1).



- ac. Remove two hex head screws holding magnification drive motor.
- ad. Slide magnification drive motor to the left until motor base bolt holes are aligned with mounting holes support bar.

### **CAUTION**

Before tightening hex head screws, check for proper alignment and meshing of gears to avoid damage to gears.

- ae. Install and tighten drive motor hex head screws.
- af. Set speed control to fast.
- ag. Adjust SLEW speed potentiometer to desired fast operating speed for tilt or magnification drive.
- ah. Reinstall protective cover.
- ai. Reinstall base assembly cover.

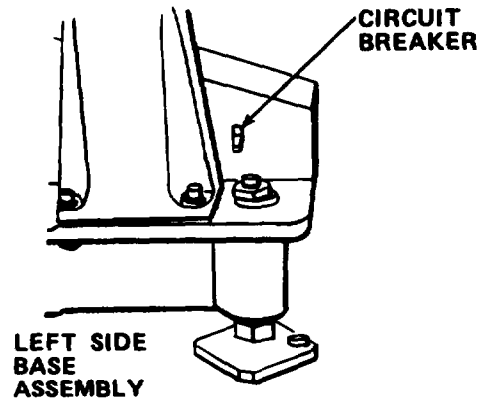
7-16.12 Replace Tilt and Mag Controller.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Tilt and Mag Controller

- a. Remove dust cover.



- b. Turn off circuit breaker.

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- c. Unplug power cord.
- d. Remove base assembly cover.
- e. Remove protective cover.
- f. Tag and remove 13 wires from chassis terminal board.
- g. Remove mounting screws, flat washer, lockwashers and defective TILT and MAG controller.
- h. Install new TILT and MAG controller.
- i. Reinstall screws, flat washer and lockwashers.
- j. Connect wires to chassis terminal board.
- k. Reinstall plastic protective cover.
- l. Reinstall base assembly cover.
- m. Reinstall dust cover.

7-16.13 Remove/Install Photogrammetric Rectifier.

MOS: 41B, Topographic Instrument Repair Specialist

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: 3/16 in. Socket Head Key Wrench  
 3/4 in. Socket with 1/2 in. Drive and 1/2 in. Drive Ratchet  
 3/4 in. Combination Wrench  
 1 1/2 in. Combination Wrench  
 1/2 in. Combination Wrench  
 3/4 in. Deep Well Socket with 1/2 in. Drive  
 Hand Air Pump  
 Pry Bar, four feet long  
 Long Tine Fork Lift

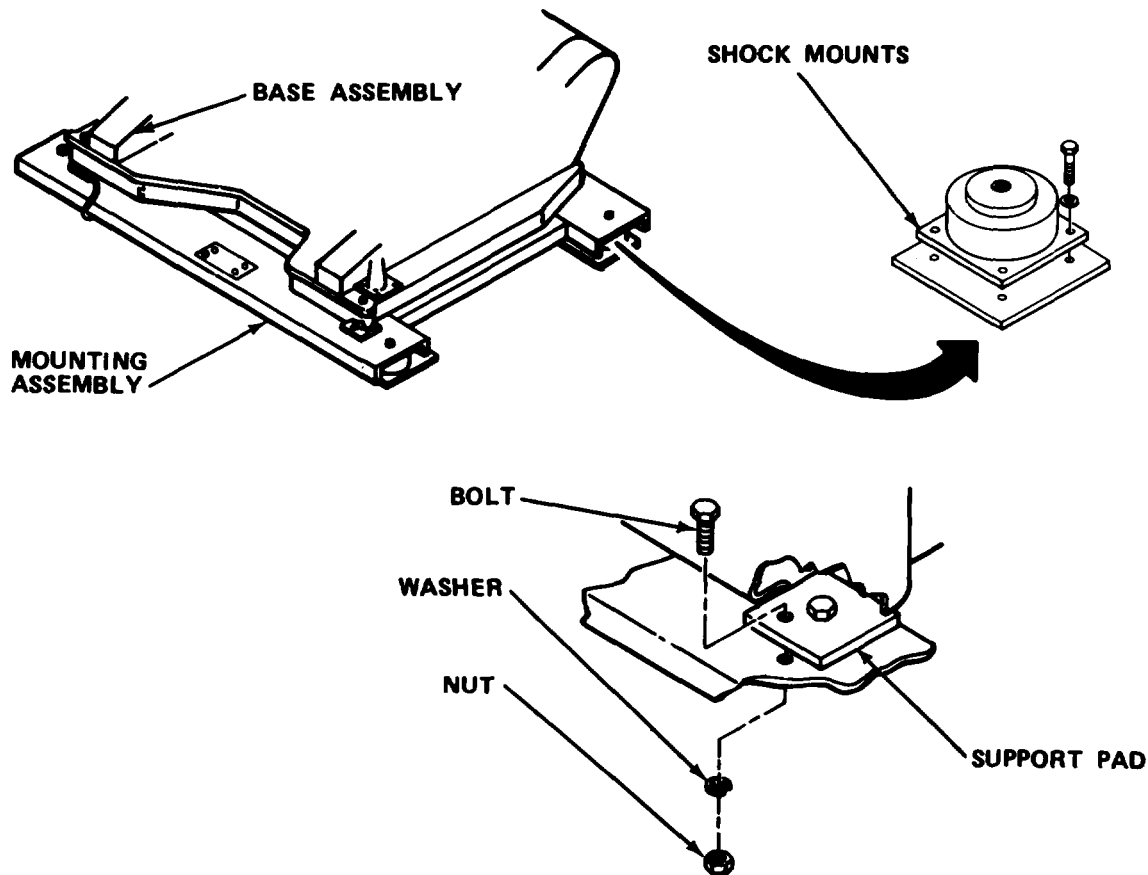
SUPPLIES: Photogrammetric Rectifier  
 Steel Pipe, 3/4 in. diameter, four feet long  
 2 x 4 lumber, four feet long, 4 each  
 2 x 4 lumber, ten inches long, 4 each

- a. Remove the following items and their mounting hardware:
  - (1) Folding Chairs
  - (2) Metal Storage Cabinet
  - (3) Blackout Microswitch
- b. Remove eight screws and center post from side door.
- c. Install shipping blocks on photogrammetric rectifier (7-6.1).

**WARNING**

Death or serious Injury may occur from electrical shock unless power cord is unplugged before moving equipment.

- d. Turn off circuit breaker.
- e. Disconnect power cord, MAG and TILT control switches, hand magnifier and store.
- f. Inflate air shocks to maximum height. Place 3/4 inch steel pipes under rear and both sides of shock mounting frame.
- g. Loosen, but do not remove shock mounting bolts. Deflate air shocks.
- h. Remove four shock mounting bolts.



- i. Remove eight rectifier mounting bolts from rear floor plates.
- j. Using four-foot lengths of lumber as levers, raise each rear corner of rectifier and shock mounting frame to remove air shocks.
- k. Remove eight rectifier mounting bolts from front floor plates. Using levers, raise each front corner of rectifier and shock mounting frame and remove front air shocks.

**WARNING**

Serious injury may result if inadequate number of personnel are used to move the rectifier. This equipment weighs 1000 pounds.

- l. Slide rectifier and shock mounting frame on pipes toward rear of van until side of rectifier is centered in doorway.
- m. Slide rectifier laterally toward doorway until leading edges of mounting plate are within two inches of door sill.



**NOTE**

Both front and rear of rectifier will have to be raised 4-1/2 inches with levers in order to remove stabilizing support bolts and nuts beneath leveling plates and front leveling nut.

**WARNING**

Serious injury could result if rectifier slips from levers while nuts are being removed from beneath mounting plates. Additional short lengths of 2 x 4 lumber should be placed beneath mounting plate to provide stability.

- n. Remove all three leveling nuts.
- o. Using levers to raise rectifier, remove mounting bolts from two leveling plates in rear of rectifier and one leveling plate in front center.
- p. Using levers to raise rectifier, remove two stabilizing support bolts from beneath each forward corner of rectifier. Rectifier is now free of shock mounting frame.
- q. Remove side access ladder from van.
- r. Move fork lift to van so that front edges of tines are exactly level with, and touching door sill.

**CAUTION**

A piece of sheet metal or other hard, thin material should be placed over door sill to facilitate movement of rectifier and prevent damage to screw heads.

- s. Slide defective rectifier carefully out of door, onto tines of fork lift, ensuring that rectifier is properly balanced on tines.
- t. Slowly back fork lift away from van and lower tines with defective rectifier to ground.
- u. Raise new rectifier to a level even with door sill. Move fork lift to van so that tines are touching sill.
- v. Pull rectifier carefully across sheet metal plate and onto shock mounting frame.
- w. Using 2 x 4 levers and pry bar, align all bolt holes in rectifier with corresponding holes in shock mounting frame.
- x. Reinstall stabilizing support bolts beneath each corner of rectifier.

- y. Reinstall six mounting bolts into two leveling plates at rear corners of rectifier and one plate in front center. Tighten nuts.
- z. Reinstall three leveling nuts.
- aa. Slide rectifier and shock mounting frame laterally, away from doorway, until the equipment is centered and aligned with floor plates.
- ab. Move one length of 3/4 in. steel pipe from beneath rear of shock mounting to beneath forward side, pointing directly toward front wall of van.

**WARNING**

Serious injury may result if inadequate number of personnel are used to move the rectifier. This equipment weighs 1000 pounds.

- ac. Slide rectifier and mounting frame forward on steel pipe until mounting bolt holes in frame are aligned with corresponding holes in floor plates.
- ad. Using levers, raise rectifier and remove steel pipe from beneath sides and front of mounting frame.
- ae. Raise each front corner of mounting frame and reinstall front air shocks . Then reinstall four rectifier mounting bolts in each forward floor mounting plate.
- af. Using levers, raise each rear corner of mounting frame and reinstall rear air shocks. Then reinstall four rectifier mounting bolts in each rear floor mounting plate.
- ag. Reinstall four shock mounting bolts.
- ah. Reconnect power cord, MAG and TILT control switches, hand magnifier and store.
- ai. Level the rectifier (paragraph 7-6.1).
- aj. Remove shipping blocks from rectifier (paragraph 7-6.1).
- ak. Reinstall center post on side door.
- al. Reinstall metal storage cabinet, blackout microswitch and folding chairs.
- am. Turn on circuit breaker.

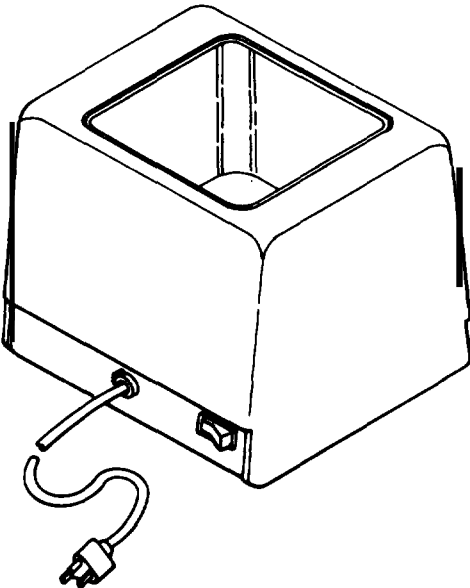
**7-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.







## CHAPTER 8

### ULTRASONIC CLEANER

#### Section I INTRODUCTION

##### 8-1. GENERAL INFORMATION.

###### 8-1.1 Scope.

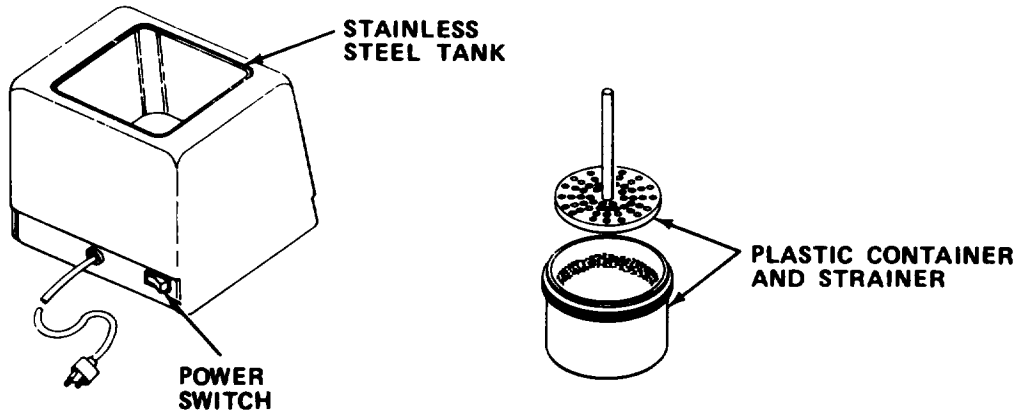
- a. Model Number and Equipment Name. Model 3069USC3 Ultrasonic Cleaner.
- b. Purpose of Equipment. To clean drafting/drawing pens.

##### 8-2. EQUIPMENT DESCRIPTION.

###### 8-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Cleans without disassembly.
- b. Removes dried ink.
- c. Portable.

8-2.2 Location and Description of Major Components.



STAINLESS STEEL TANK. Holds water.

PLASTIC CONTAINER AND STRAINER. Holds small parts in solution for cleaning.

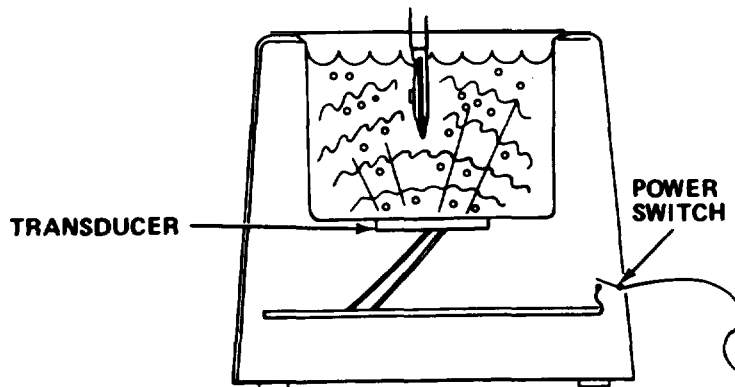
POWER SWITCH. Turns machine on or off.

8-2.3 Equipment Data.

|                    |                       |
|--------------------|-----------------------|
| Weight             | 5.51 lbs (2.5 kg)     |
| Power Requirements | 115 V, 60 Hz,<br>60 W |



8-3. TECHNICAL PRINCIPLES OF OPERATION.

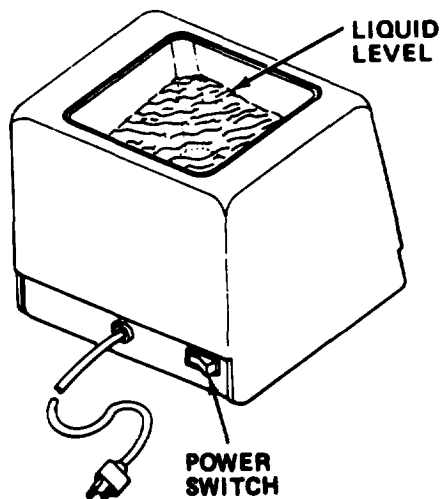


POWER SWITCH. When turned on, provides power to the transducer.

TRANSDUCER. Generates ultrahigh frequency sound waves.

Section II OPERATING INSTRUCTIONS

8-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



| Control or Indicator | Function  |
|----------------------|---|
| Liquid Level         | Level of liquid in stainless steel tank must be 1/3 full. |
| Power Switch         | Turns power on or off.                                    |

**8-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

**8-5.1 PMCS Procedures.**

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide You, the operator, with time schedules that determine when to perform specified-service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval columns. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.
- i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.
- j. List of tools and materials required for PMCS is as follows:

ITEM

Quantity

Cheesecloth (Item 7, Appendix E)

ar

**Table 8-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**NOTE**

If the equipment must be kept in continuous operation, check and service only those items that can safely be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

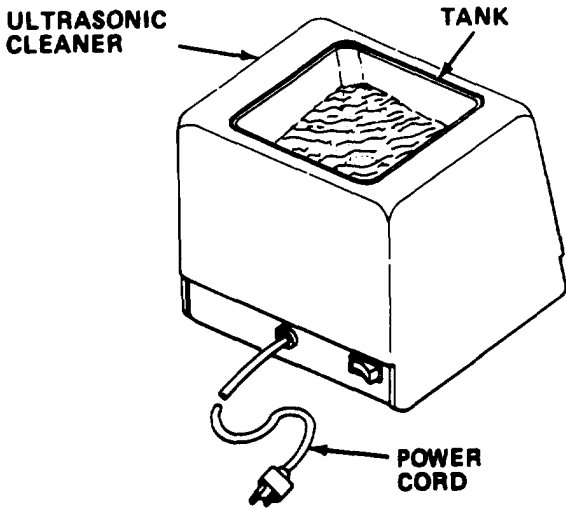
|   |                     | B- Before<br>o- During<br>A- After | w - weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>B I - Biennially | (Number) - Hundreds of Hours |  |
|---|---------------------|------------------------------------|--|---|------------------------------|--|
| ITEM NO   | I N - T E R - V A L | ITEM TO BE INSPECTED               |  |   | PROCEDURE                    | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
| 1   | B                   | <u>ULTRASONIC CLEANER</u>          |  |   | Inspect Cleaner.             |  |
| <p><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.</p>  |                     |                                    |  |   |                              |  |

Table 8-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

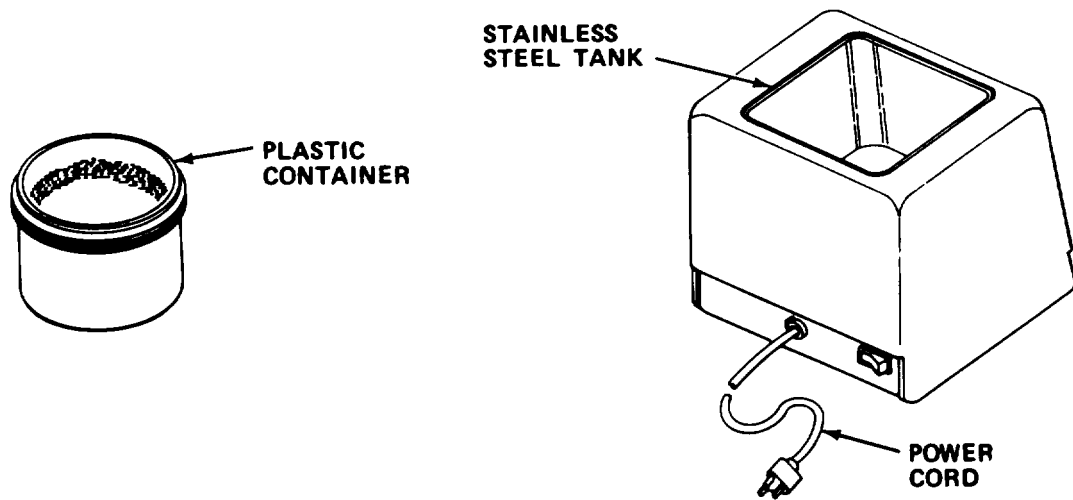
AN - Annually  
S - Semiannually  
BI - Biannially

(Number) - Hundreds of Hours

| ITEM NO, | INTER-VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Not Ready/ Available If:           |
|----------|-----------|--|--|
| 1        | B         | <p><b>ULTRASONIC CLEANER - Cont</b></p> <p><u>Inspect Cleaner - Cont</u></p> <ol style="list-style-type: none"> <li>1. Check power cord for kinks, frays, or burns. If power cord is defective, notify organizational maintenance.</li> <li>2. Check tank for dirt or chemical residue. Clean tank by wiping with cheesecloth moistened with water.</li> <li>3. Check for agitation of water surface.</li> </ol> | <p>Power cord is damaged.</p> <p>Water surface is not agitating.</p> |

## 8-6. OPERATION UNDER USUAL CONDITIONS.

### 8-6.1 Operating Procedure

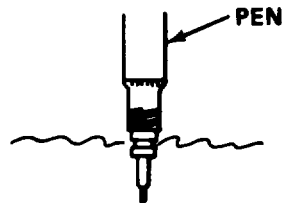


- a. Fill stainless steel tank 1/3 full with fresh, clean water. Fill plastic container with water to within 1/2 in. (12.7 mm) of top.
- b. Add .135 oz (4 ml) of cleaning solution to plastic container.
- c. Plug in power cord to 120 V, 60 Hz grounded outlet.
- d. Turn power on. Be sure water surface in stainless steel tank is agitating.

### **WARNING**

Do not place fingers in stainless steel tank when ultrasonic cleaner is operating. Cleaning solution may be driven through skin or ultrasonic waves may cause injury to body tissue.

- e. Prepare cleaning solution by operating ultrasonic cleaner for one minute before cleaning pen tips.



**CAUTION**

Do not immerse pen beyond cap threads. Damage to pen may result.

f. Dip pen about 3/4 in. (19mm) in cleaning solution.

Lift pen from cleaning solution. Keeping point downward, shake solution from pen onto cheesecloth (Item 7, Appendix E).

h. Wipe pen.

i. Draw pen over scrap paper until ink flows freely and shows uniform color.

j. Turn power off. Unplug power cord.

k. Dispose of cleaning solution when dirty.

**CAUTION**

Avoid getting water into body of ultrasonic cleaner. Damage to circuit board can result.

l. Carefully rinse stainless steel tank.

m. Wipe stainless steel tank dry with cheesecloth (Item 7, Appendix E).

**8-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**8-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**8-9. TROUBLESHOOTING PROCEDURES.** There are no operator troubleshooting procedures assigned for this equipment.

**8-10. MAINTENANCE PROCEDURES.** Operator maintenance is limited to performance of regular preventive maintenance checks and services and replenishment of cleaning solution.

**Section IV ORGANIZATIONAL MAINTENANCE**

**8-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**8-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT**

**8-12.1 Common Tools and Equipment.** For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**8-12.2 Special Tools; Test Measurements, and Diagnostic Equipment; and support** Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

**8-12.3 Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**8-13. SERVICE UPON RECEIPT.**

**8-13.1 Checking Unpacked Equipment.**

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

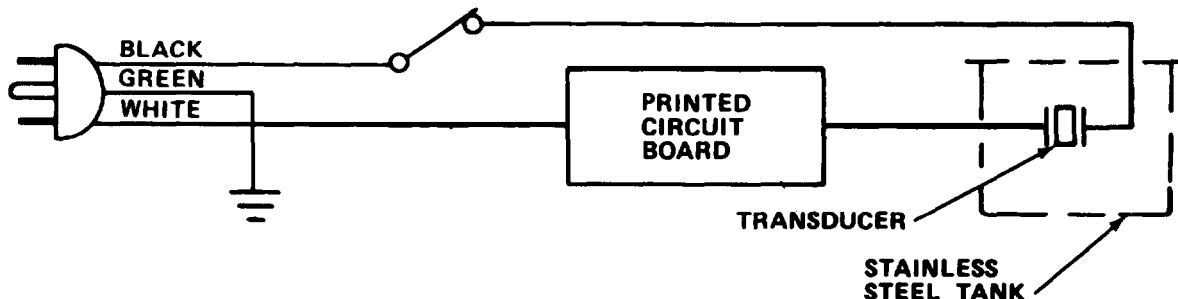
**8-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

**8-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the following schematic or the foldout located at the end of this manual for further fault analysis.



d. If the ultrasonic cleaner does not power up when turned on, verify that 120 V ac is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power procedure for dead receptacle (Table 1-4).

**Table B-2. ORGANIZATIONAL TROUBLESHOOTING**

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

**1. NO CLEANING ACTION, WATER AGITATES.**

Check cleaning action using fresh cleaning solution.

- (a) If test was satisfactory, instruct operator to change cleaning solution when dirty.
- (b) If test was not satisfactory, replace circuit board (paragraph 8-16.3).

**2. NO WATER AGITATION.**

Step 1. Using multimeter, check for continuity of power cord.

- (a) If continuity exists, proceed to step 2.
- (b) If continuity does not exist, replace power cord (paragraph 8-16.1).



**Table 8-2. ORGANIZATIONAL TROUBLESHOOTING - Cont**

---

|                    |  |  |
|--------------------|--|--|
| MALFUNCTION        |  |  |
| TEST OR INSPECTION |  |  |
| CORRECTIVE ACTION  |  |  |

---

**2. NO WATER AGITATION - Cont**

Step 2. Check continuity of power switch.

- (a) If continuity does not exist, replace power switch (paragraph 8-16.2).
- (b) If continuity does exist, replace circuit board (paragraph 8-16.3).

---

**8-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the ultrasonic cleaner. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

**INDEX**

| PROCEDURE                       | PARAGRAPH |
|---------------------------------|-----------|
| Replace Power Cord . . . . .    | 8-16.1    |
| Replace Power Switch . . . . .  | 8-16.2    |
| Replace Circuit Board . . . . . | 8-16.3    |

8-16.1 Replace Power Cord

MOS: 41B, Topographic Instrument Repair Specialist

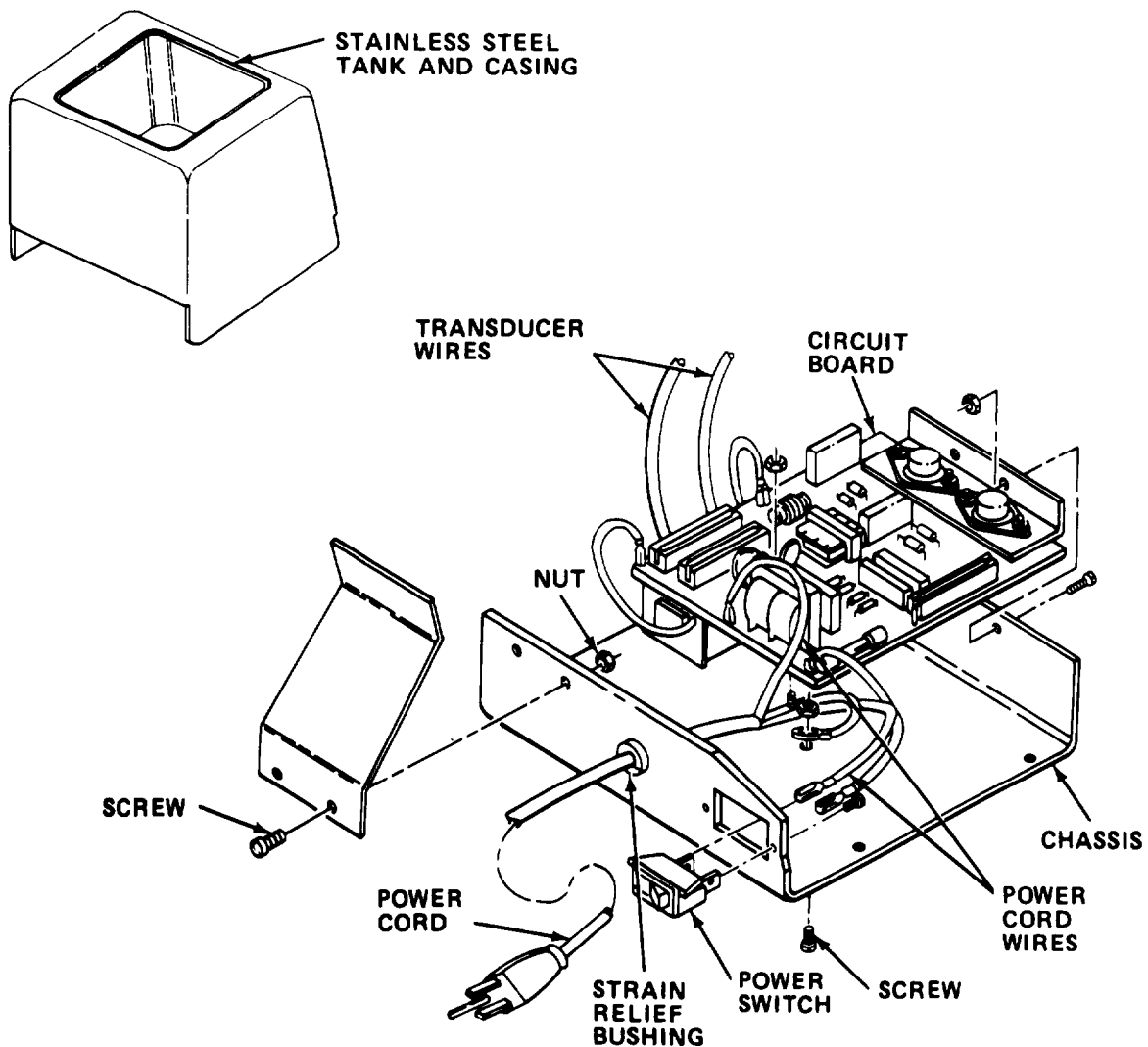
TOOLS: Flat Tip Screwdriver

SUPPLIES: Power Cord  
Wire Clips

**WARNING**

Death or serious injury may occur if power cord is not unplugged before servicing.

- a. Turn power off. Unplug power cord.



- b. Remove screws and washers holding stainless steel tank and casing to chassis.
- c. Lift stainless steel tank and casing free. Set aside.

**NOTE**

Do not disconnect wires to transducer.

- d. Remove three screws, one nut, and one washer holding circuit board to chassis.
- e. Disconnect power cord wire from power switch, chassis ground, and circuit board.
- f. Loosen strain relief bushing from chassis and remove defective power cord.
- g. Install strain relief bushing on new power cord. Insert terminal ends of cord into chassis.
- h. Fit strain relief bushing into chassis.
- i. Reconnect power cord wire to circuit board, chassis, and power switch.
- j. Reinstall circuit board into chassis and secure with one washer, one nut, and three screws.
- k. Reinstall stainless steel tank and casing. Secure with screws and washers.
- l. Fill stainless steel tank 1/3 full with water.
- m. Plug in power cord and turn power on. Check that water surface agitates.

8-16.2 Replace Power Switch.

MOS: 41B, Topographic Instrument Repair Specialist

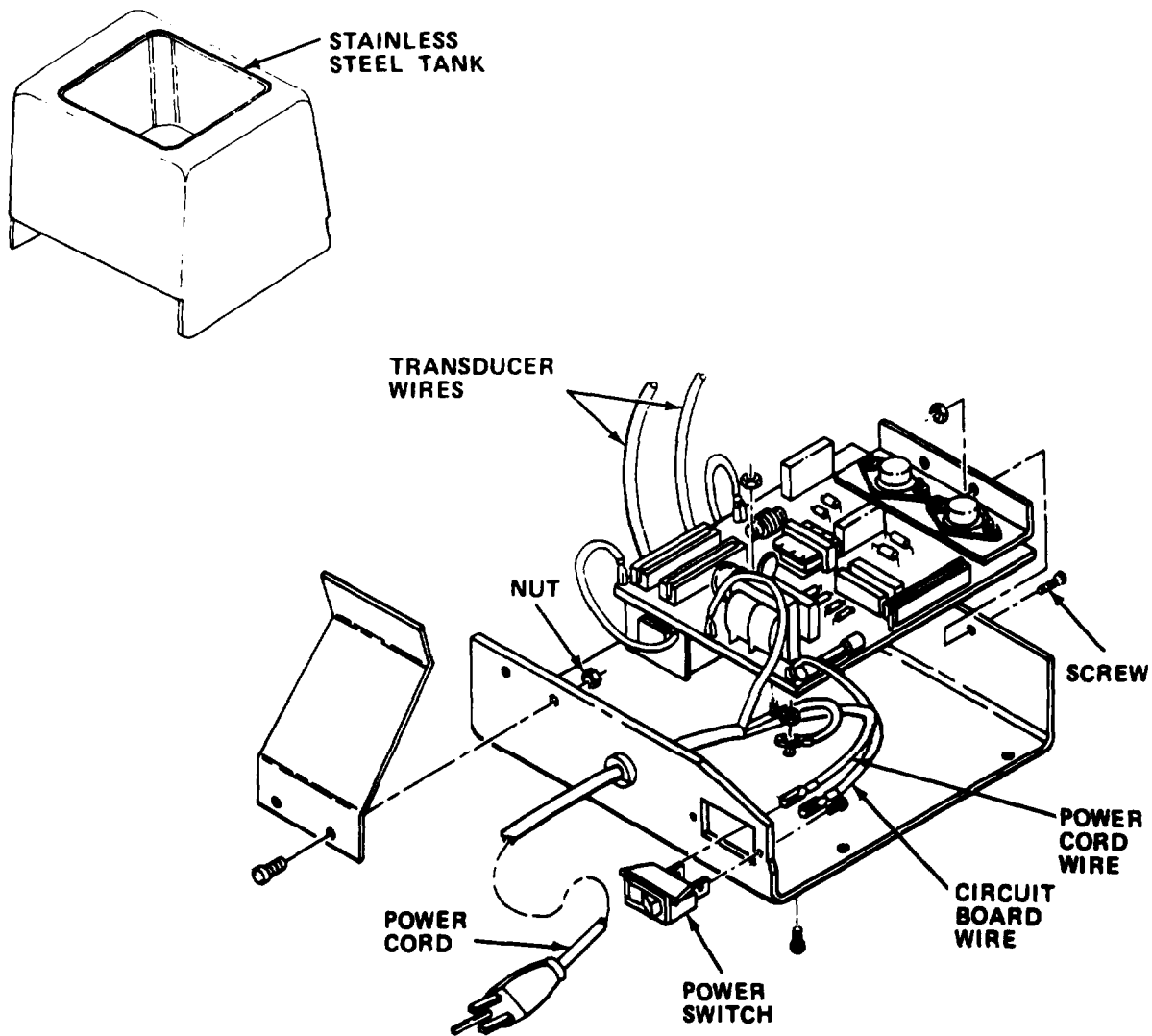
TOOLS: Flat Tip Screwdriver

SUPPLIES: Switch

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power off and unplug power cord.



- b. Remove screws and washers holding stainless steel tank and casing to chassis.
- c. Lift stainless steel tank and casing free. Set aside.

**NOTE**

Do not disconnect wires to transducer.

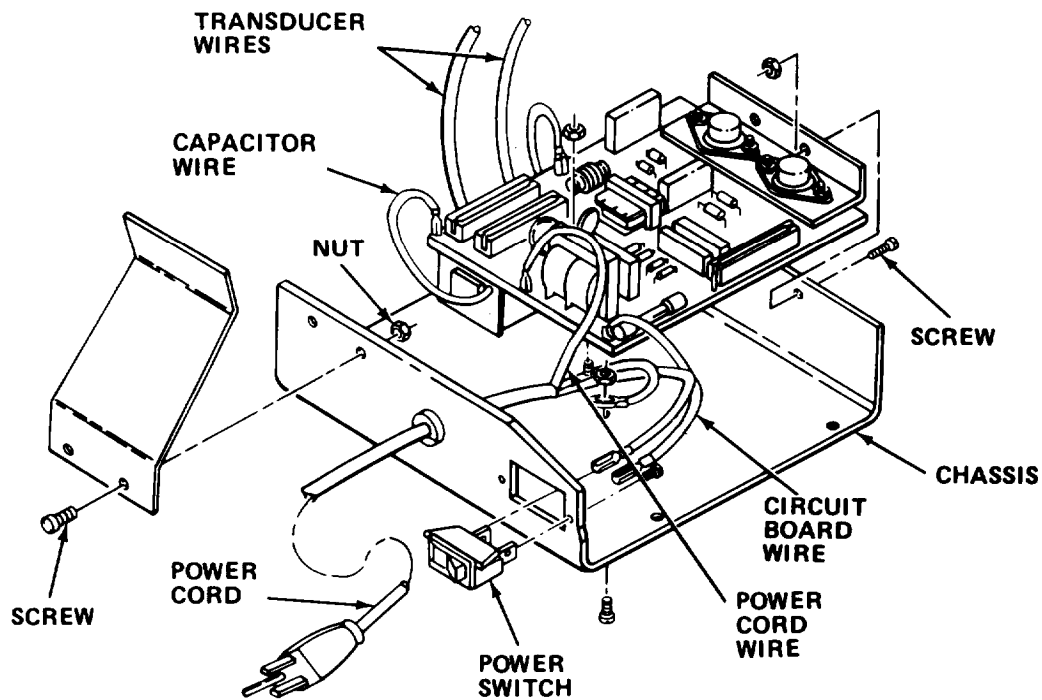
- d. Tag and disconnect power cord wire and circuit board wire from power switch.
- e. Press sides of defective power switch and remove from chassis.
- f. Install new power switch in chassis. Push power switch until tabs lock into hole.
- g. Reconnect wires to power switch.
- h. Reinstall stainless steel tank and casing. Secure with screws and washers.
- i. Fill stainless steel tank 1/3 full with water.
- j. Plug in power cord and turn power on. Check that water surface agitates.

### 8-16.3 Replace Circuit Board

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Circuit Board



#### WARNING

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn power off and unplug power cord.
- b. Remove screws and washers holding stainless steel tank and casing to chassis.
- c. Lift stainless steel tank and casing free. Set aside.

**NOTE**

Do not disconnect wires to transducer.

- d. Remove three screws, one nut, and one washer holding circuit board to chassis.
- e. Tag and disconnect power cord wire and circuit board wire from circuit board.
- f. Disconnect capacitor wires from circuit board.
- g. Tag and disconnect two transducer wires from circuit board.
- h. Remove defective circuit board.
- i. Install new circuit board.
- j. Reconnect two transducer wires to circuit board.
- k. Reconnect capacitor wires to circuit board.
- l. Reconnect circuit board wire and power cord wire to circuit board.
- m. Reinstall one washer, one nut, and three screws holding circuit board to chassis.
- n. Reinstall stainless steel tank and casing. Secure with screws and washers.
- o. Fill stainless steel tank 1/3 full with water.
- p. Plug in power cord and turn power on. Check that water surface agitates.

**8-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

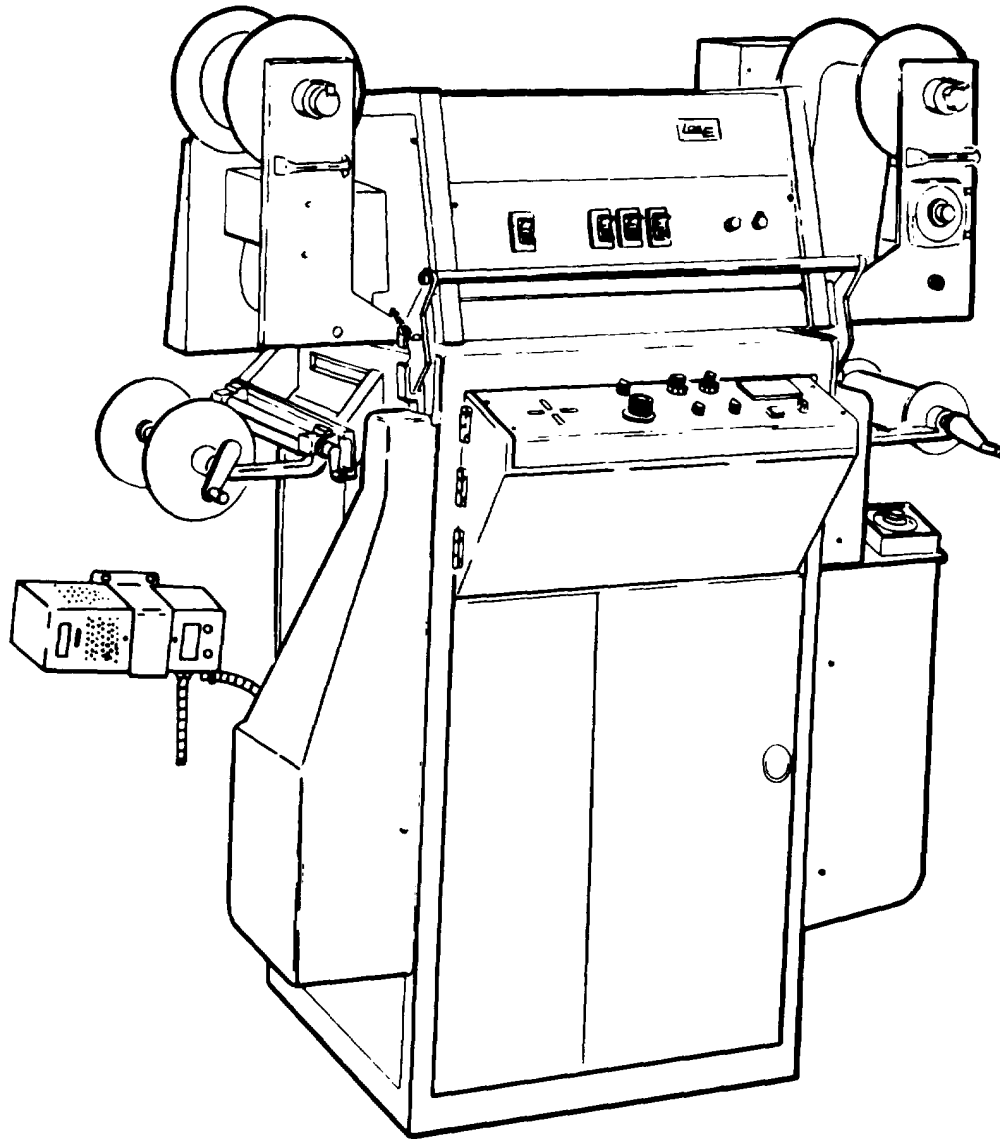
**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.









**CHAPTER 9**  
**CONTACT PRINTER/ENLARGER**  
**Section I INTRODUCTION**

**9-1. GENERAL INFORMATION.**

9-1.1 Scope.

a. *Model Number and Equipment Name.* Mark IV R5A Contact Printer/Enlarger.

b. *Purpose of Equipment.* To produce contact prints and approximately double-size enlargements of photographs in specified sizes with maximum detail in all areas.

9-1.2 List of Abbreviations.

|     |                         |
|-----|-------------------------|
| APL | Automatic Platen Lifter |
| CRT | Cathode Ray Tube        |
| EXP | Exposure                |
| RPT | Photomultiplier Tube    |
|     | Roll Paper Transport    |

9-1.3 Glossary.

|                                   |   |
|-----------------------------------|---|
| Automatic Platen Lifter . . . . . | Motor driven mechanism that raises and lowers the hood.   |
| Cathode Ray Tube . . . . .        | Vacuum tube in which an electron beam is projected on a phosphorous screen to produce a bright spot.                        |
| Chopper Inverter . . . . .        | Device that interrupts direct current at short regular intervals and converts it to an alternating current                  |
| Continuous Tone . . . . .         | Tone variation in a negative or print, due to variations in blackness (density) such as those seen in an ordinary snapshot. |

|                                 |           |  |
|---------------------------------|-----------|--|
| Contrast . . . . .              | . . . . . | A term used to describe the separation of tones in a negative or print. A picture which has only a slight increase in density from tone to tone for a given increase in exposure is termed "low in contrast": one which has a large increase for the same increase in exposure is said to be "high in contrast". |
| Density . . . . .               | . . . . . | A numerical measure of the blackening, or light-stopping ability, of a photographic image.   |
| Densitometer . . . . .          | . . . . . | An instrument for making density measurements.   |
| Density Range . . . . .         | . . . . . | The measured difference between the maximum and minimum densities of a particular negative or positive.  |
| Dodging . . . . .               | . . . . . | Process of holding back light from certain areas of a sensitized surface to avoid overprinting those areas; also to avoid underprinting other areas.   |
| Edge Enhancement. . . . .       | . . . . . | Increase density and contrast of a photographic image by chemical treatment.   |
| Emulsion. . . . .               | . . . . . | The light-sensitive coating of a photographic material, mainly silver salts suspended in gelatin.  |
| Emulsion Speed. . . . .         | . . . . . | The rate of response of a photographic emulsion to light, determined under standard conditions of exposure and subsequent development.   |
| Exposure. . . . .               | . . . . . | The quantity of light which is allowed to act on a photographic material. Numerically, the product of the intensity and the duration of the light acting upon the film.  |
| Exposure Meter. . . . .         | . . . . . | An instrument used to determine the intensity of light falling on, or reflected by, a subject which is to be photographed.   |
| Fast Axis Control Loop. . . . . | . . . . . | Controls speed at which a spot of light sweeps in horizontal direction.  |
| Film. . . . .                   | . . . . . | A photographic emulsion coated on a flexible translucent or transparent plastic base.  |
| Filter. . . . .                 | . . . . . | A square piece of gelatin or glass—placed between the copy and the photographic material—that reduces or stops light of certain colors while allowing light of other colors to reach the emulsion.   |

|                                  |  |
|----------------------------------|--|
| Filter Factor . . . . .          | A number indicating the exposure increase necessary to compensate for the light-stopping power of a filter. For example, a filter with a factor of 4 requires an exposure increase of 4X or from 12 to 48 seconds.   |
| Flare . . . . .                  | Non-image light which reaches the film during camera exposures and reduces contrast of the resulting image. Sources are windows that face the camera lens, overhead lights, dirty lens surfaces, or bright glaring surfaces that reflect the camera lamps into the lens. |
| Grain . . . . .                  | Minute variations of density caused by irregular distribution of the silver crystals in a developed photographic emulsion.   |
| Halftone . . . . .               | An image composed of dots of uniform density by varying size. When viewed from a normal reading distance, the dots seem to disappear, giving an illusion of continuous tones. A dot area of small dots will appear lighter than a dot area of large dots.                |
| Highlight . . . . .              | The lightest portion of picture or, in a negative, the areas of highest density (since these correspond to the lightest areas of the original).  |
| Linear Signal . . . . .          | Output that is directly proportional to its input  |
| Logarithmic Amplifier . . . . .  | Amplifier with a constant output level with input signal level either increasing, decreasing, or remaining constant.   |
| MASK . . . . .                   | A photographic image mounted in register with a negative or positive to modify or knock out certain tones or colors.   |
| Middletones . . . . .            | In general, the tones in a picture or reproduction between the highlights and the shadows.   |
| Negative . . . . .               | The image obtained from the original scene, item, or copy in a conventional photographic process. The tones are the reverse (darks are light and lights are dark) of those in the original subject: opposite of positive.  |
| Neutral-Density Filter . . . . . | A filter that, by its lack of color but presence of density, reduces all colors of light by the same amount.   |
| Paper Core Adapter . . . . .     | Hub which permits different diameter cores to be used.   |

|   |   |
|---|---|
| Phosphor . . . . .                        | . Substance that emits light when excited electrically.   |
| Photomultiplier Tube . . . . .            | .. Electron multiplier in which electrons released by photoelectric emission are multiplied in successive stages by dynodes that produce secondary emission.  |
| Positive . . . . .                        | A photographic image, usually made from a negative, in which the tones are not reversed as in a negative. A positive on paper is usually called a "print": on a transparent base, such as film, a positive is called a "Transparency".        |
| Raster Control Potentiometer. . . . .     | Allows individual control of the four raster edge positions.  |
| Roll paper Transport . . . . .            | In automatic print mode advances paper when hood is raised.   |
| Run/Stop Flip-Flop . . . . .              | . Multivibrator capable of assuming either of two stable states.  |
| Safelight . . . . .                       | . A darkroom lamp with filters that transmit light of a "safe" color which will not expose a photographic emulsion within a reasonable time. Photo materials require different safelight filters. See instruction sheet packed with the film. |
| Shadow . . . . .                          | . . . . The darkest portions of a picture. In a negative, the low-density areas are called the "shadow areas", because they correspond to the high-density (dark portions of the original.  |
| Slow Axis Control Loop . . . . .          | Determines number of lines to expose entire negative and spacing between lines.   |
| Staircase Current . . . . .               | .Series of step currents whose overall waveform resembles a staircase.  |
| Step Wedge Negative (Grey Scale). . . . . | . Strip of film whose transparency changes in graduated steps from one end to the other.  |
| Velocity . . . . .                        | Time rate of linear motion in a given direction.  |

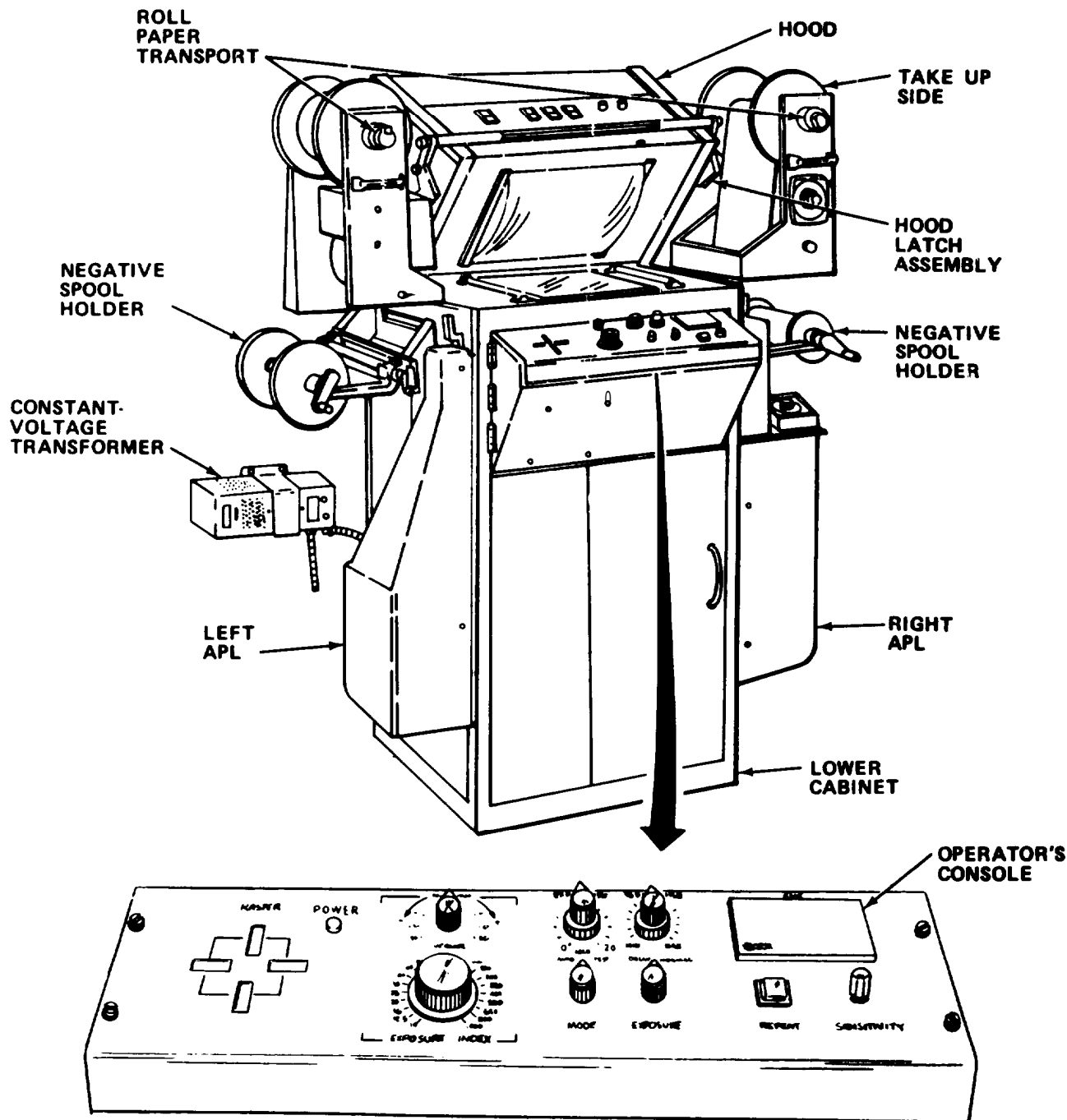
## 9-2. EQUIPMENT DESCRIPTION.

### 9-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Contact prints black-and-white negatives in roll form up to 10 in. X 10 in. (25.4 cm X 25.4 cm).
- b. Prints on single weight, double weight, or waterproof roll paper or film.
- c. Multiple-print feature allows up to 119 copies of original.
- d. Uses emulsion-to-emulsion contact form of printing.
- e. Automatic dodging allows print contrasts to be varied from minimum to maximum.
- f. Uses cathode ray tube (CRT) as light source.
- g. All electronics are solid printed circuits except CRT and photomultiplier tube (PMT), mercury and mechanical switches.
- h. Must be operated in darkroom safelight environment.
- i. Printing material must not have opaque backing.

### 9-2.2 Location and Description of Major Components.

*LOWER CAB/NET.* Houses CRT, lens box assembly, negative carrier, power supply assemblies, elapsed time meter, safe and white lights, CRT high-voltage box, CRT controls, and additional lens.



AUTOMATIC PLATEN LIFTER (APL) . Consists of left and right assemblies connected by shaft that runs through bottom of cabinet. APL is used in multiple-print operation to automatically lift hood and allow printing material to advance after each exposure. Left assembly contains APL motor. Right assembly contains electronics and operator controls and print counter that allow up to 119 copies to be made of selected negative.

OPERATOR'S CONSOLE. Houses majority of printer operator's controls. Also contains electronic control circuits on printed circuit cards.



NEGATIVE SPOOL HOLDER. Negative spool holder left and right sides hold negative roll material to be copied. Adjustable in width from 2.75 to 9.5 in. (7 to 24.1 cm). Can hold roll negatives up to maximum of 1000 ft (304.8 m). Is manually operated.

HOOD LATCH ASSEMBLY. Consists of latch (platen) handle and associated hardware. As hood is lowered, latch assembly locks hood to APL and triggers printer into exposure mode.

ROLL PAPER TRANSPORT (RPT). Holds roll printing material in lengths up to 500 ft (152.4 m) and widths from 2.75 to 9.5 in. (7 to 24.1 cm). Supply side contains drag brake to keep positive pressure on printing material.

TAKE-UP SIDE. Side contains motor and control circuits to automatically advance printing material upon completion of exposure. Advance distance may be varied from 8 to 20 in. (20.3 to 50.8 cm).

HOOD. Contains transport pressure platen, printer power controls, SAFE/WHITE VIEW LIGHTS switch, and SAFE VIEW LIGHTS DIM control.

MARKER ASSEMBLY. When in the engaged position automatically places identifying mark on positive material as hood is lowered. It is used when setting roll paper take-up controls for desired paper advance.

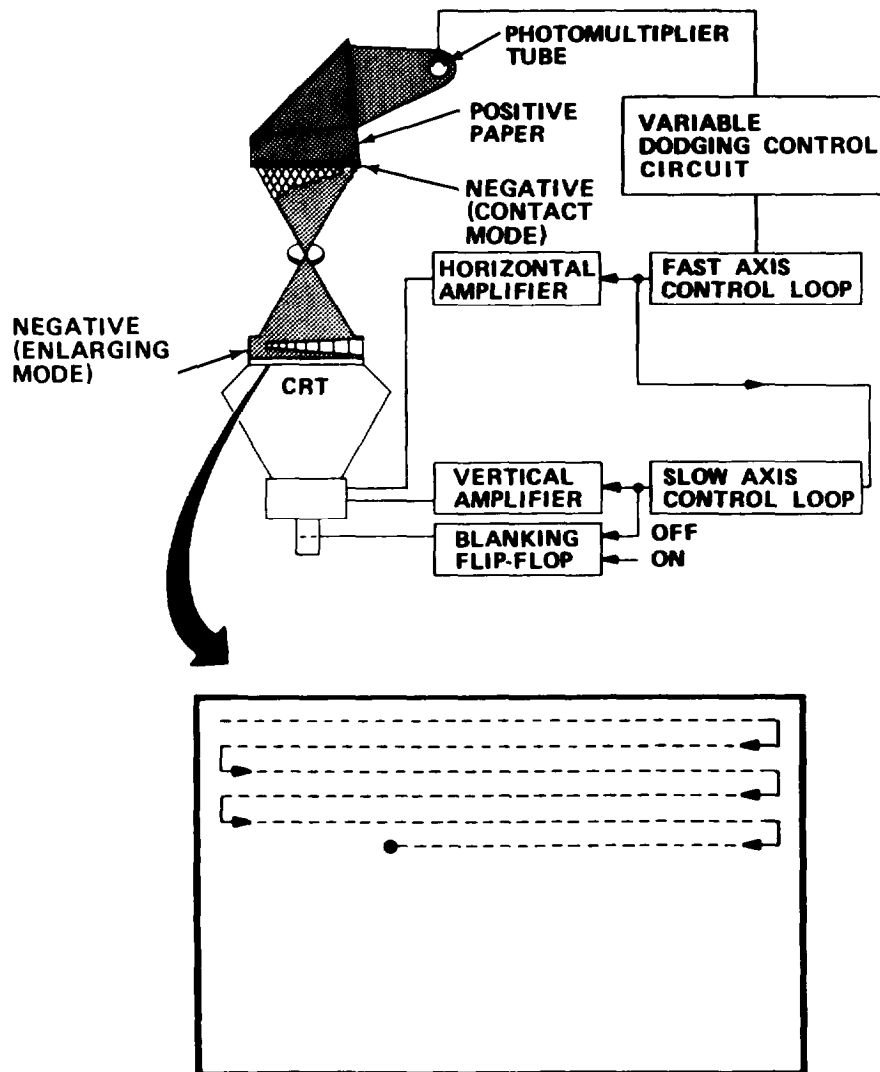
CONSTANT-VOLTAGE TRANSFORMER. Provides regulated voltage to printer/enlarger.

9-2.3 Equipment Data.

|                              |   |
|------------------------------|---|
| Power Requirements           | 120 V, 50/60 Hz, single-phase, 4 amp average current provided by a constant voltage transformer |
| Constant-Voltage Transformer |   |
| Input                        | 90 to 175 V ac  |
| output                       | 120 V ac  |
| Optics                       |   |
| Contact Mode                 | 112mm, f/2.8  |
| Enlargement Mode             | 138mm, f/4.5  |
| CRT                          |   |
| Phosphor                     | P11FA2  |
| Dimensions                   |   |
| Hood Lowered                 |   |
| Width                        | 48 in. (121.92 cm)  |
| Depth                        | 32 in. (81.28 cm)   |
| Height                       | 57 in. (144.78 cm)  |

|   |                            |
|---|----------------------------|
| Hood Raised   |                            |
| Width   | 48 in. (121.92 cm)         |
| Depth   | 38 in. (96.52 cm)          |
| Height  | 65 in. (165.1 cm)          |
| Weight  | Approx 525 lbs (238.25 kg) |
| <u>Accessory~ Equipment</u>                               | Quantity                   |
| Step Wedge Negative                                       | 1                          |
| Calibration Prints<br>(One 100% Dodged and One 0% Dodged) | 1 set                      |
| Power Cable   | 1                          |
| Ground Adapter  | 1                          |
| Pump  | 1                          |
| Masking Material (Red)                                    | 2                          |
| Masking Material (Green)                                  | 2                          |
| Masking Material (Blue)                                   | 2                          |
| Masking Material (Matte)                                  | 1                          |
| Masking Material (Amber)                                  | 1                          |
| Paper Core Adapter  | 1                          |
| Neutral Density Filter<br>(0.3, 0.6, 0.9)                 | 1 Set                      |
| Fixed Aperture  | 1                          |
| Ratchet Arm (Spare)                                       | 1                          |
| Ring Adapter (3 in.)                                      | 2                          |
| Contact Printer/Enlarger Cover                            | 1                          |

9-3. TECHNICAL PRINCIPLES OF OPERATION.



9-3.1 General. The printer operates by exposing a small portion of the original at a time while electronically controlling the exposure time of each small area. A moving spot of light from the CRT sweeps the negative in a series of back and forth movements until exposure is complete. The speed at which the light moves back and forth is controlled by the fast axis control loop. The number of lines used to expose the entire negative and the spacing between lines are controlled by the slow axis control loop. The PMT, located behind the printing material, senses the light transmitted through the negative and positive material. It sends a signal to the fast axis control loop.

9-3.2 Detailed. The printer consists of the following:

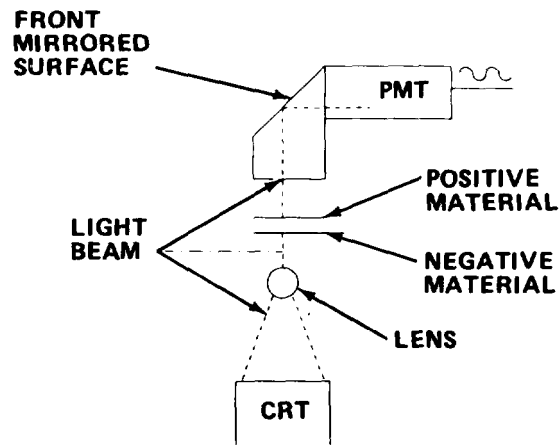
- Fast Axis Control Loop
- Slow Axis Control Loop
- Automatic Platen Lifter (APL)
- Roll Paper Transport (RPT)
- Control and Power System

a. Fast axis control loop. Consists of the following components and circuits:

- CRT and Lens
- Negative and Positive Printing Material
- PMT and Dodging Circuits
- Fast Axis RASTER Edge Control Potentiometers (Horizontal Controls)
- Fast Axis Toggle

**NOTE**

For purposes of clarity in text, original is assumed to be negative and reproduction is positive. Printer is equally capable of printing negative reproduction of positive original. Also, assume hood is lowered and locked, and printer is in exposure and automatic modes.



(1) Exposure starts when the hood is lowered and locked. The hood activates a microswitch which triggers the run/stop flip-flop. This causes the CRT to unblank.

The CRT is the light source, and the lens controls the focus of the light beam. During the scanning of a line, the light beam from the CRT passes through a small area of the negative, exposing the positive printing material. Light passing through the printing material is focused by the front mirrored surface into the PMT, where it is converted into an amplitude-modulated dc signal. If the light spot received is low, the PMT output is low. When the PMT output is low, the light spot slows down. If the negative being scanned has low density, the PMT senses more light, the PMT output is higher and the light spot speeds up. Thus, the light spot velocity is instantaneously modulated in accordance with the density of the negative.

(2) The current signal from the PMT is applied to the input of the variable dodging circuits on card VDSF2. Amplifiers A4B and A5 change the linear signal to a logarithmic signal. This signal is applied to amplifier A6, where it is amplified by a factor of 15. The signal is passed through the % DODGING control potentiometer R129 and compared with EXP LEVEL control potentiometer R128 at amplifier A7A. The signal continues through A8A and is sent to A4A for current amplification. The signal is then applied to the chopper inverter on control card 3C2. The output from control card 3C2 is applied to the fast axis integrator circuits, consisting of operational amplifier A1 and current amplifiers Q3, Q4, Q5, and Q6 on fast axis deflection card 3D2. The fast axis integrator integrates the signal, making the current through the yoke change at a rate proportional to the amplitude of the chopper inverter output. The rate of change of yoke current and the speed of the CRT spot are directly proportional to the amplitude of the inverter output. The amplitude of the inverter output changes the speed of the CRT spot. Since the current flow through sampling resistors R12 and R13 is the same as the current flow through the yoke, the voltage across these resistors is proportional to the yoke current. The voltage across R12 and R13 is applied to the sweep failure detector on the variable dodging card and to the fast axis raster circuits on raster edge card 3CC1. Fast axis raster edge card 3CC1 consists of two independent voltage comparators which monitor the voltage from R12 and R13. When the voltage exceeds the levels set by right and left RASTER edge control potentiometers R135 and R136, a signal is developed and applied to the fast axis toggle circuit on the fast axis deflection card.

(3) The fast axis toggle, consisting of Q7 thru Q10, is a modified Schmitt trigger with an output of positive and negative pulses. This output is fed back to the chopper inverter on card 3C2 and to the input of the slow axis control circuits. During the sweep to the right, the feedback is positive and the PMT output is inverted. When the sweep is to the left, the feedback negative, and the PMT output is not inverted. When the spot of light reaches the left or right limits set by RASTER control potentiometers, the polarity is reversed and the inverter causes the spot of light to sweep in the opposite direction. The fast axis toggle output is also felt across keep-alive resistor R11 on card 3C2. Resistor R11 acts as a protective circuit for the CRT. If the PMT output decreases to zero, the voltage dropped across resistor R11 provides a small amount of current that enables the CRT to slowly continue its sweep. This prevents damage to the CRT phosphor.

b. Slow axis control loop. Consists of the following components circuits.

Differentiator Circuit

Slow Axis Integrator

Exposure Index Circuit

Slow Axis Raster Edge Control

Slow Axis Toggle

Reset Network

Run/Stop Flip-Flop

Blanking Network

(1) The input to the slow axis control loop is from the fast axis toggle which consists of a series of positive and negative pulses. These positive and negative pulses are applied to the input of a differentiator consisting of C11, CR16, CR19, and R500 on the printed card chassis. The differentiator produces a positive spike when the input level changes. The amplitude of these positive spikes has one of three levels as determined by the EXPOSURE INDEX switch setting. The largest amplitude occurs for an EXPOSURE INDEX switch setting of 10 and integral multiples of 10. An intermediate amplitude occurs for a setting of 12.5 and multiples of 12.5. The lowest amplitude occurs for a setting of 16 and integral multiples of 16.

(2) The differentiated output is applied to the slow axis integrator which consists of operational amplifier A1 and current amplifiers Q3, Q4, Q5, and Q6 on slow axis deflection card 3D2. The slow axis integrator converts the pulses into a staircase current through CRT yoke L101B and R37. The horizontal portions of the staircase are called "treads" and the vertical portions "risers." When the integrator receives a positive pulse, the output is stepped down (riser). The interval between input pulses, which form the tread, is the time of the fast axis sweep. The staircase current produces the slow axis sweep which moves the spot along the slow axis at the end of each fast axis sweep. The voltage across R37 on card 3C2 is applied to the slow axis raster edge controls on card 3CC1.

(3) The exposure index circuit consists of C104 thru C111, EXPOSURE INDEX switch S108, EXPOSURE INDEX VERNIER switch S102, and vernier resistors R139 thru R147. Changing the setting selects different values of capacitance for the exposure of the negative. The value of capacitance determines the rise in the slow axis staircase. The larger the capacitance, the smaller the step and, therefore, the more scans per square inch over the complete raster. As the number of scans increases, the time it takes to completely expose the negative increases. Exposure index can be varied to produce any exposure pitch from 10 to 1000 scans per square inch. EXPOSURE INDEX VERNIER switch S102 adjusts the exposure control in five percent increments.

(4) The slow edge raster controls consist of voltage comparators Q3 and Q4 on card 3CC1 and front panel RASTER edge control potentiometers R137 and R138. The circuits allow the top and bottom rasters to be independently controlled. The input signal is the staircase voltage across R37.

(5) The slow axis toggle is a modified Schmitt trigger. The output is positive during exposure and negative when the exposure mode is complete. The positive and negative outputs are applied to the run/stop flip-flop and the CRT blanking circuit.

(6) The run/stop flip-flop consists of Q6 thru Q8 on card 3C2. The flip-flop is triggered "on" by platen handle microswitches S107 and S201 during multiple-print operation. It is triggered "off" by a negative pulse from the slow axis toggle. Unless affected by the time delay circuits, exposure begins when the hood is lowered and locked, and ends when the slow axis sweep reaches the bottom raster edge limit. The run/stop flip-flop output is applied to the reset network and the APL Control circuits.

(7) The reset network consists of Q1 and Q2 on no. 2 card 3D2. When the run/stop flip-flop is triggered "off", the output of the reset network disables the input to operational amplifier A1. When the run/stop flip-flop is triggered for the next exposure, the reset network starts the slow axis integrator again.

(8) The CRT blanking circuit consists of Q1 and Q2 on card VDSF2. Inputs are from the slow axis toggle and sweep failure detection circuits. If either circuit is enabled, the CRT Blanking circuit is activated and the CRT is blanked.

(9) Sweep failure detector A1A, A1B, A2A, and A2B monitors the fast axis sweep. If the sweep rate drops too low, the failure detector activates and supplies a signal to the CRT blanking circuit. Test switch S104 and reset switch S105 are used to check the sweep failure detection circuit for proper operation.

(10) Time delay circuit: A time delay on exposure delay card EDC1 permits exposure to start after a 3 to 6 sec time delay. The time delay is useful when printing glass plates, as it allows for a more positive contact with the printing surface before exposure starts.

(11) With EXPOSURE DELAY/NORMAL switch S102A set to NORMAL and the hood up, relay K1 is energized by +12.5 V applied to Q2 thru S107 (platen handle micro-switch). With K1 energized, +12.5 V is removed from the run/stop flip-flop and applied to the reset network through MODE switch S103. The +12.5 V ensures that the slow axis deflection circuits are disabled and the CRT is blanked while the hood is up.

(12) When the hood is down and EXPOSURE DELAY/NORMAL switch S102A is in the NORMAL position, S107 removes +12.5 V from Q2. Relay K1 de-energizes, the reset network is deactivated, the slow axis deflection circuits are enabled and the CRT is unblanked. The +12.5 V is applied to the run/stop flip-flop as a start pulse, thus beginning the exposure cycle.

(13) With EXPOSURE DELAY/NORMAL switch S102A set to DELAY and the hood down, +12.5 V is applied through S107 and S201. This causes Q1 to conduct and Q3 cuts off. C1 and C2 charge, keeping Q3 off. With Q3 off, +12.5V is applied to Q2, keeping Q2 on and K1 energized. After approximately 3 to 6 sec, Q3 conducts and Q2 cuts off, de-energizing K1. The reset network is deactivated, run/stop flip-flop is enabled, and the CRT is unblanked.

c. Automatic platen lifter (APL). The APL raises the hood after the first printing, allowing the transport control to advance the paper. Then it lowers the hood for the next exposure. The APL control circuits ensure that the APL does not operate during exposure, RPT operation, and single-print operation.

#### NOTE

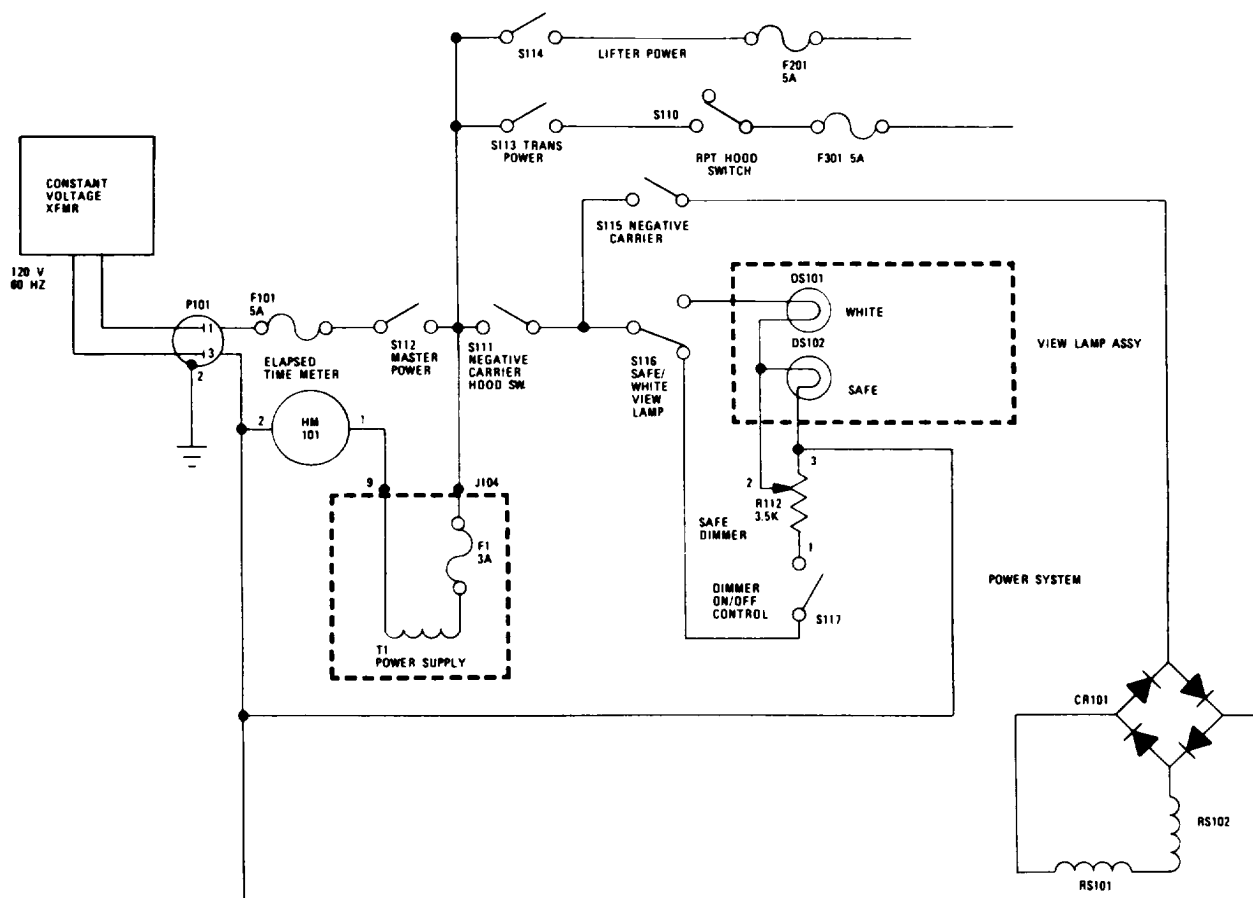
For discussion purposes, printer is in process of completing exposure cycle.

Upon completion of the first exposure, exposure lamp DS107 goes out and the slow axis toggle resets the run/stop flip-flop. The run/stop flip-flop triggers electronic switch Q3 and Q4 on card 4TC1. The switch is turned on and energizes relay K201. Relay K201 applies 120 V ac primary power to APL motor B201 and solenoid LS201. The motor starts and lifts the hood clear of the print stage. When solenoid LS201 is energized, it applies +12.5 V through its contacts to the relay control circuits on exposure delay card EDC1. Relay K1 energizes and prevents the run/stop flip-flop from being triggered when the hood is up. When the hood clears the print stage by approximately 2 in., the RPT hood microswitch S110 closes, applying 120 V ac through the K301 contact to repeat revolution counter CTR302. Repeat revolution counter CTR302 energizes the auto timer which removes +12.5 V from card 4TC1 via print counter CTR201 and APL single/multiple print switch S203. Electronic switch Q3 and Q4 then shuts off and de-energizes relay K201. The APL motor stops while the RPT is advancing. Upon completion of the paper advance, +12.5 V is reapplied to electronic switch Q3 and Q4 on card 4TC1. Electronic switch Q3 and Q4 re-energizes relay K201 and turns on the APL motor. The motor in turn operates the APL to close the printer hood. As the hood closes, cycle switch S202 applies a ground to a 150 msec, one-shot multivibrator consisting of Q1 and Q2 on card 4TC1. The multivibrator shuts off electronic switch Q3 and Q4 and ensures it remains off for a 150 msec period. Relay K201 de-energizes and removes primary power from the APL motor, solenoid LS201, and S201. When the solenoid de-energizes, it causes Q2 and K1 on card EDC1 to de-energize. K1 contacts then apply a +12.5 V start pulse to activate the run/stop flip-flop through REPEAT switch S106. The run/stop flip-flop starts the next exposure cycle. The printer continues to cycle until APL print counter CTR201 counts the desired number of prints. Once the desired number of prints is reached, an internal switch opens in CTR201. This removes the +12.5 V from the APL control circuits and APL operation is terminated.



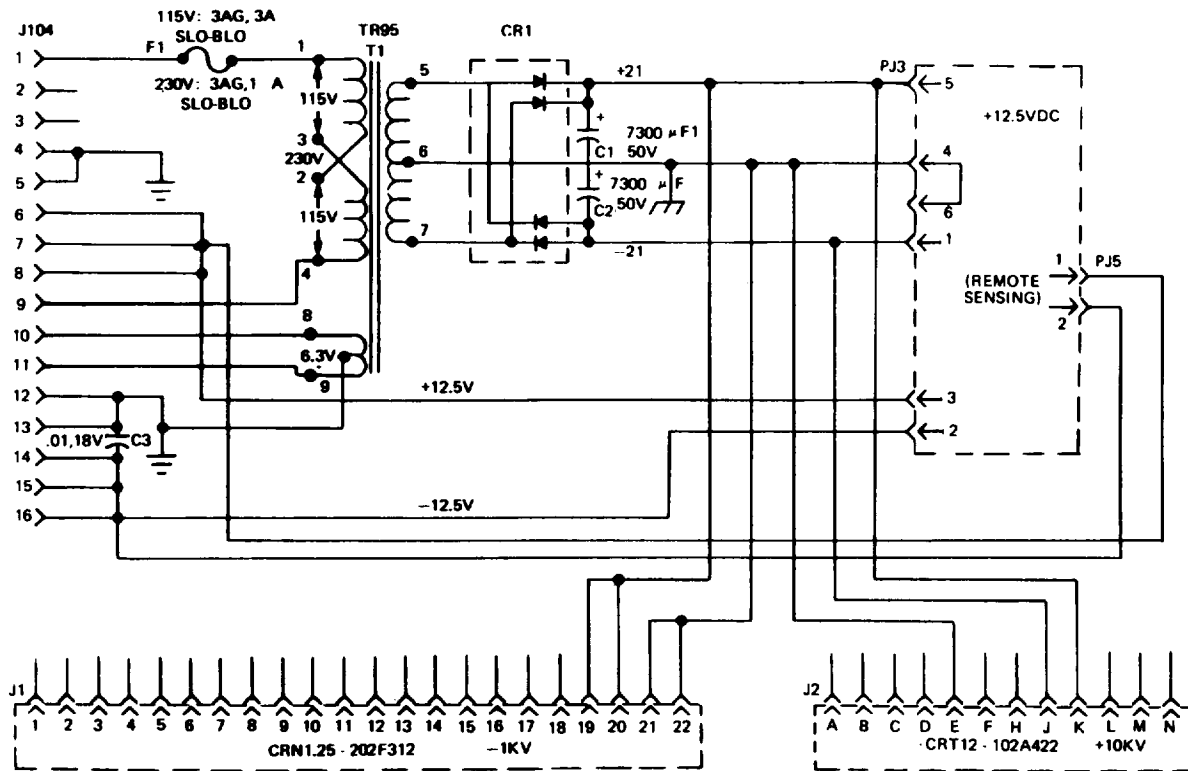
d. Roll paper transport (RPT). The RPT circuits begin operation when the platen air bag and stiffener have cleared the printing stage. As the APL circuits lift the hood and platen, RPT hood switch S110 closes and applies 120 V ac power to the APL circuits. Power is applied to repeat revolution counter CTR302, paper drive motor B301, paper stop solenoid LS301, and print counter CTR301. Paper stop solenoid LS301 activates, allowing the paper rewind roller to turn, and paper drive motor B301 starts advancing the printing material. Repeat revolution counter CTR302 energizes an auto timer that removes +12.5 V from the APL circuits to stop the APL and keep the hood open. During paper advance, the count in repeat revolution counter CTR302 is reduced by one. When the hood is lowered, the RPT hood switch S110 opens and removes primary power from the RPT circuits until the next cycle. When the count in repeat revolution counter CTR302 reaches 0, the auto timer contacts close, applying 120 V ac to K301, and +12.5 V is reapplied to the APL control circuits. K301 energizes and removes power from repeat revolution counter CTR302, paper stop solenoid, paper drive motor, and the RPT print counter. The RPT motor and paper stop solenoid prevent any further paper advance.

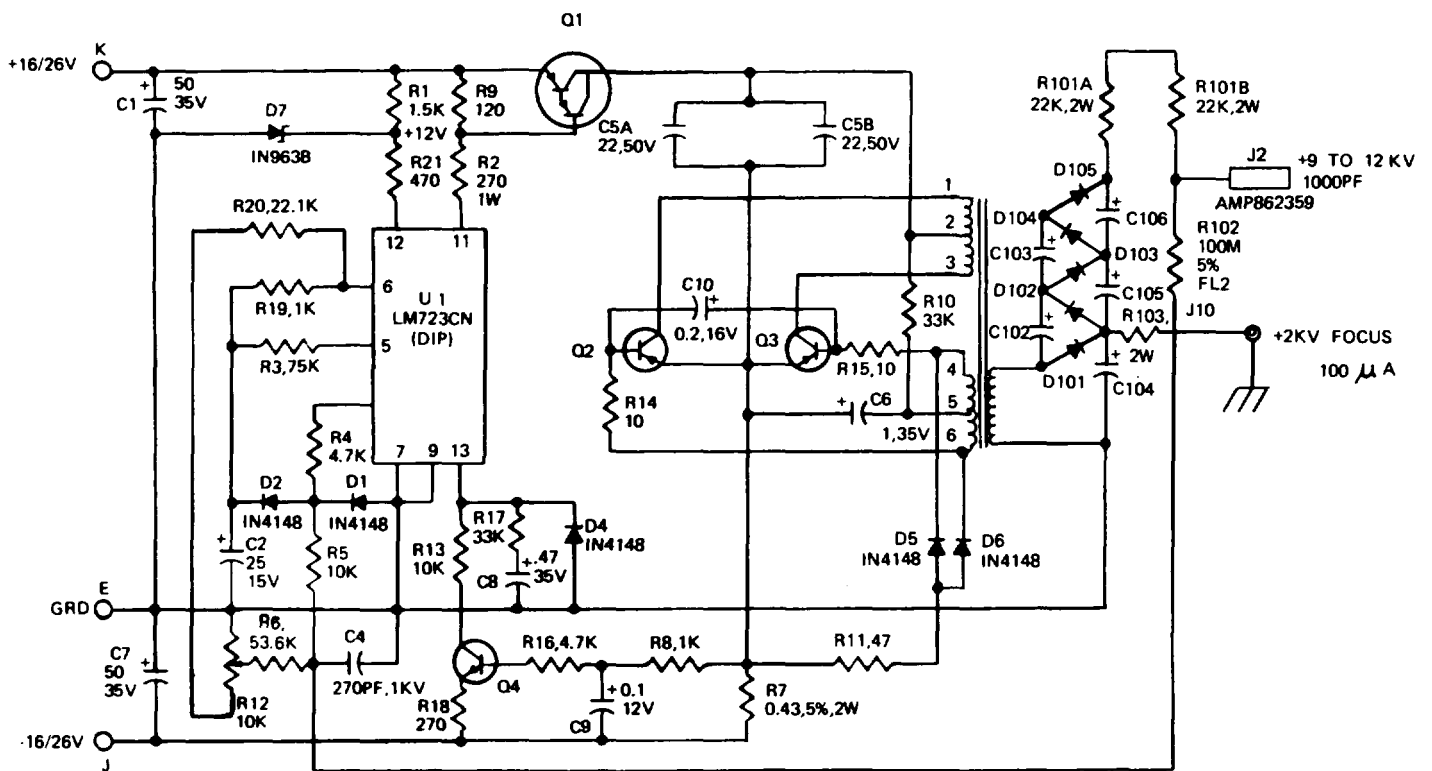
e. Control and power system.



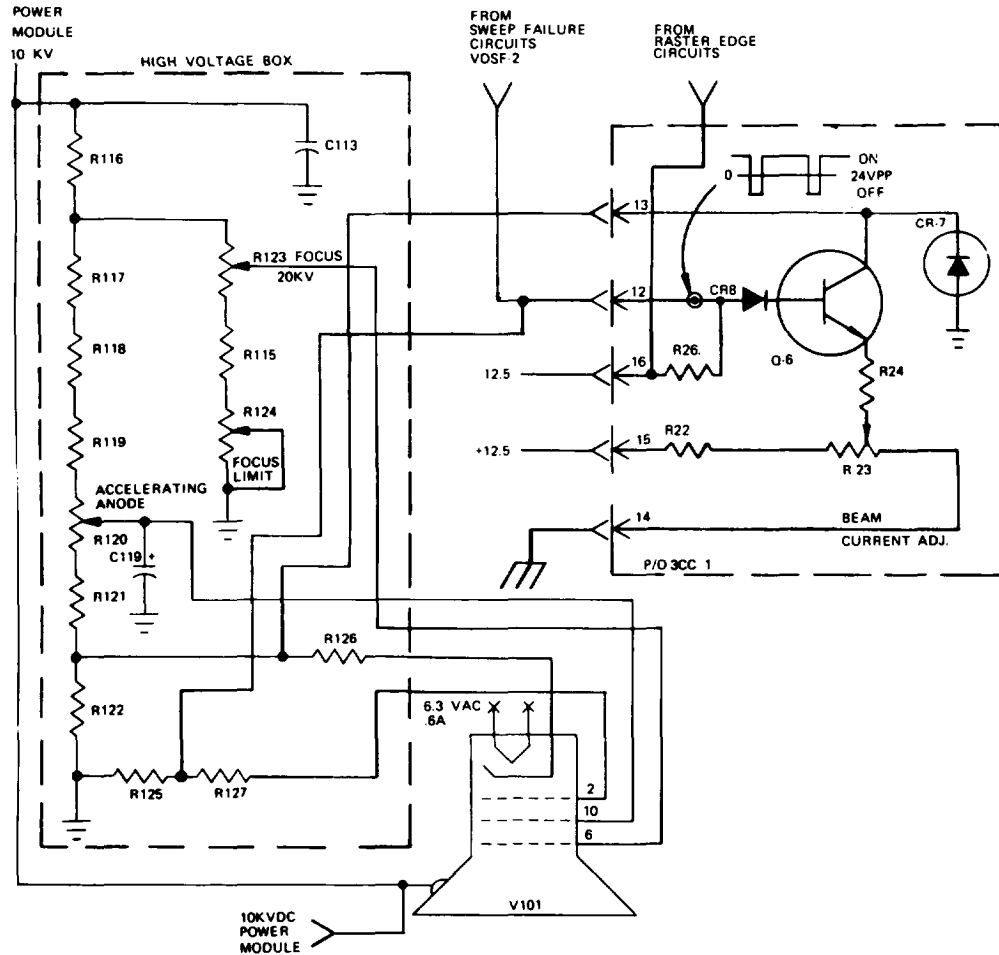
(1) Primary power is applied from the constant-voltage transformer to P101 and fuse F101 to MASTER POWER switch S112 and elapsed time meter HM101. When MASTER POWER switch S112 is closed, it provides power to the LIFTER POWER switch S114. LIFTER POWER switch S114 provides power to the RPT and is protected by fuse F201. TRANSPORT POWER switch S113 provides power to the APL and is protected by F301. Primary power is also applied through negative carrier hood switch S111 to NEGATIVE CARRIER power switch S115. When the NEGATIVE CARRIER power switch is placed to the ON position, rectifier CR101 provides voltage to solenoids RS101 on the filter assembly and RS102 on the negative carrier located on the lens box assembly. The constant-voltage transformer maintains a constant 120 V, 60 Hz to the equipment, regardless of main power voltage fluctuation.

(2) Primary power is applied to SAFE/WHITE VIEW LIGHTS switch S116, dimmer on/off control S117, SAFE VIEW LIGHTS DIM control R112 and view light assembly consisting of DS101 and DS102. When orthochromatic emulsions are used, SAFE/WHITE VIEW LIGHTS switch is set to SAFE, dimmer control on and SAFE VIEW LIGHTS DIM control R112 is used to adjust the intensity of the safe light.





(3) The power supply assembly receives its power through J104 pins 1 and 9 to T1. The power supply is protected by F1 and consists of regulated power supplies of +12.5 V dc, -12.5 V, -1 kV, and +10 kV. The  $\pm 12.5$  V power supply supplies power to all the printer cards. The -1 kV power supply supplies the PMT. The +10 kV power supply is the high-voltage supply for the CRT. Transformer T1 also provides 6.3 V ac, 600 mA as filament voltage for the CRT.



(4) The +10 kV power supply is not field-repairable and must be replaced as a unit. It is located at the bottom rear of the printer subassembly. The high-voltage box, located in the front of the printer subassembly, has the following adjustments: Accelerating anode calibration adjust R120 is used to adjust for the presence of light on the CRT. Focus control adjust R123 adjusts for fine raster lines. Focus calibration adjust R124 (factory set) is used to adjust raster lines until they touch. Beam current adjust R23, located on card 3CC1, is used to control the CRT beam current, normally 200-250 MA, in the test mode.

(5) PMT digital meter M101 is used to monitor the PMT current when calibrating in the test mode for density of printing material. PMT SENSITIVITY adjust R106 is used to adjust PMT current to  $-50\mu\text{A}$ .

(6) The test mode of operation is selected by setting MODE switch S103 to TEST. The test mode is utilized when setting the printer up for various printing operations and testing. In the test mode, the PMKT output is not used to drive the fast axis sweep. The PMT output is applied to PMT digital meter M101 to set PMT static current. The fast axis sweep is driven by a gating circuit, consisting of Q3, Q4, and associated circuitry, on card 3C2. The gating circuit supplies a fixed current of  $-50\mu\text{A}$  to drive the fast axis integrator and causes the spot to sweep the CRT at a higher fixed rate. In TEST, MODE switch S103 applies  $-12.5\text{ V}$  to the output

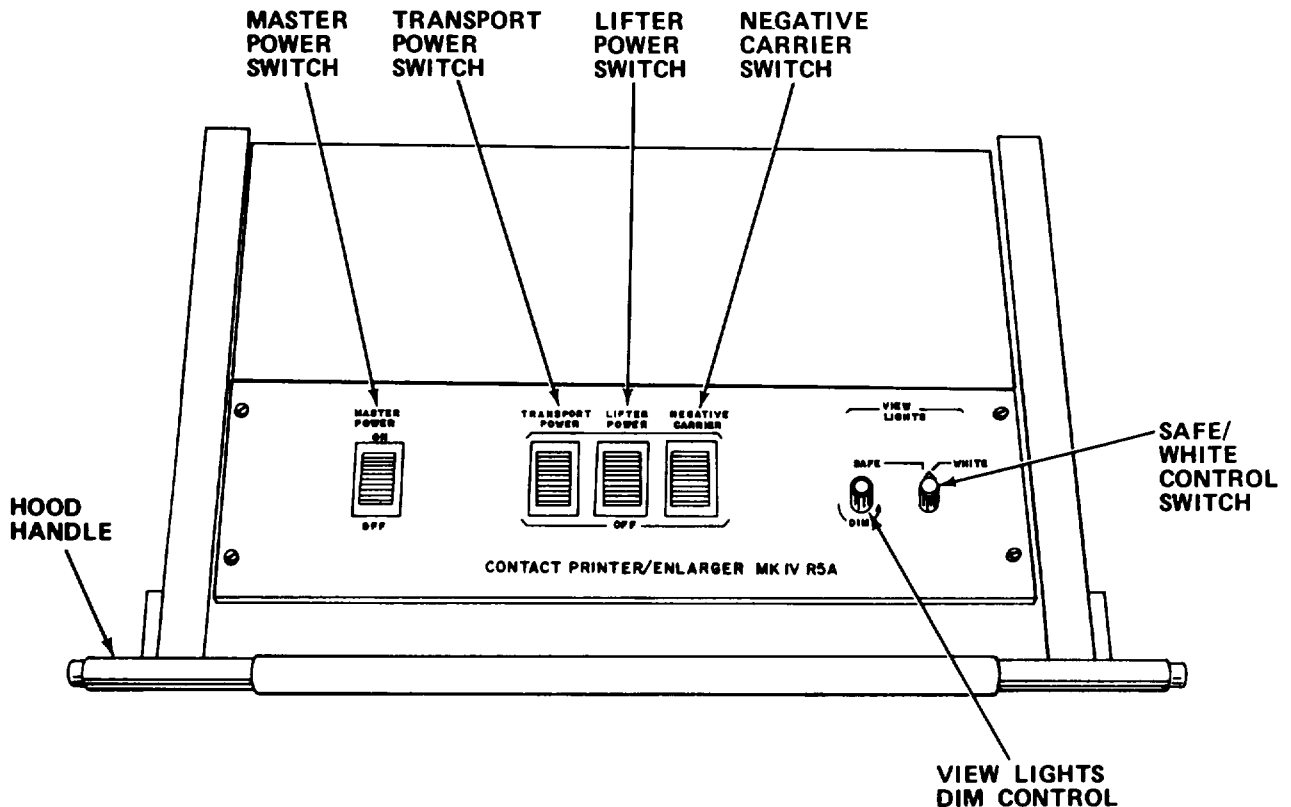
of the run/stop flip-flop and the reset network. This inhibits the run/stop flip-flop and reset network and allows the slow axis integrator to recycle continuously so that the CRT will display a well-defined raster.

(7) The manual mode of operation is selected by setting MODE switch S103 to MAN. The manual mode is used when it is desired to make an undodged printout of a dodged negative. The dodging circuit output is grounded through MODE switch S103. The fast axis integrator is driven at a fixed rate by the gating circuit on card 3C2. The manual mode is not used when processing aerial film.

**Section II OPERATING INSTRUCTIONS**

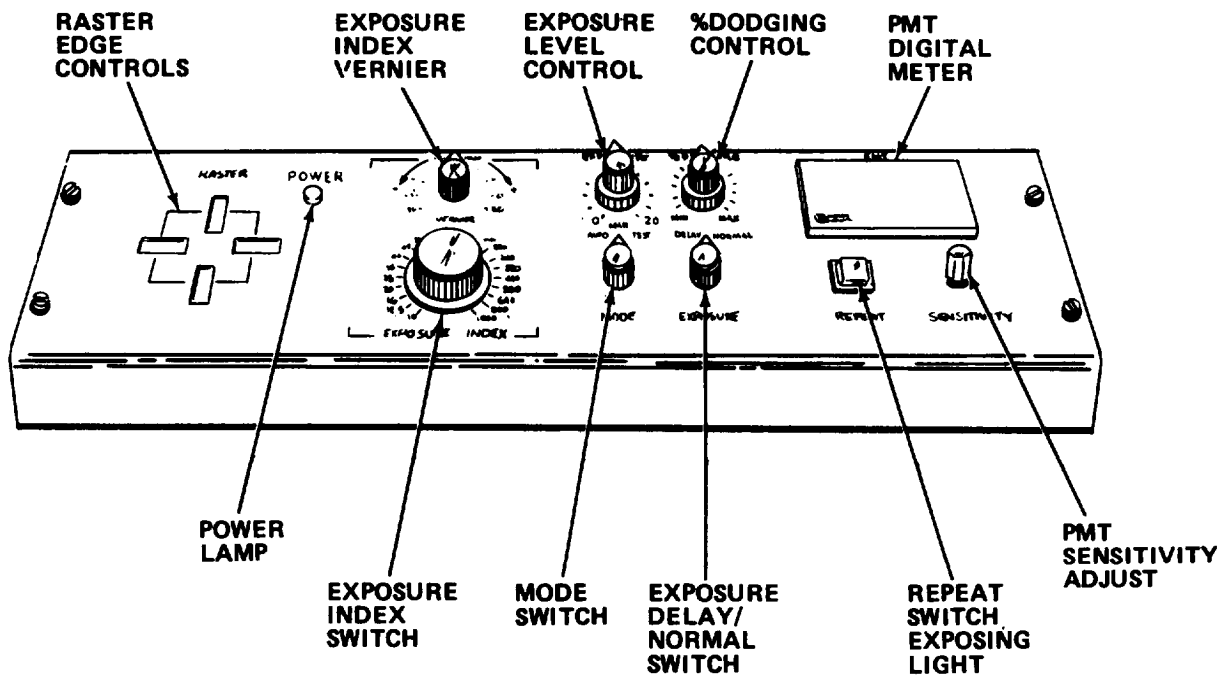
**9-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.**

9-4.1 Power Control Panel.



| Control or Indicator          | Function   |
|-------------------------------|--|
| MASTER POWER Switch           | Controls 120 V ac input power to printer.  |
| TRANSPORT POWER Switch        | Controls 120 V ac power to RPT and APL switch.                                       |
| LIFTER POWER Switch           | Controls 120 V ac power to APL.  |
| NEGATIVE CARRIER Power Switch | Controls power to negative carrier and filter holder solenoids at lens box assembly. |
| SAFE VIEW LIGHTS DIM Control  | Varies safe light intensity.   |
| SAFE/WHITE VIEW LIGHTS Switch | Selects white or safe view lights.   |
| Hood Handle                   | Latches hood down and starts exposure.   |

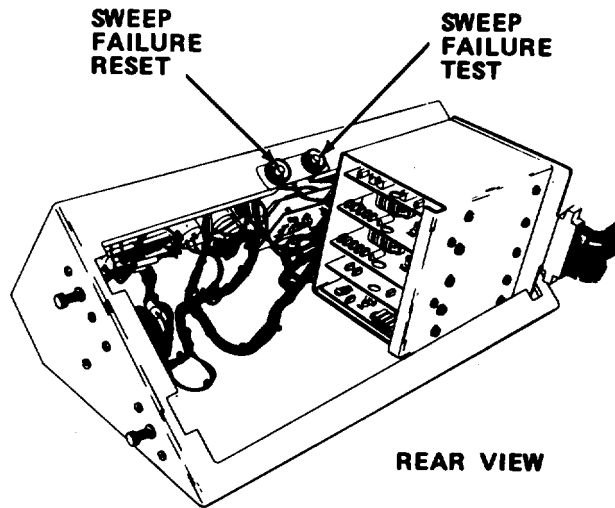
9-4.2 Operator's Control Panel



| Control or Indicator          | Function  |
|-------------------------------|---|
| RASTER Edge Controls          | Allow individual selection of raster edge positions.  |
| EXPOSURE INDEX VERNIER Switch | Provides fine adjustment of the exposure control setting in 5-percent increments.                         |
| EXP LEVEL Control             | Allows adjustment for midtone or average density. May be locked in position.                              |
| % DODGING Control             | Provides selection for different amounts of dodging. May be locked into position.                         |
| PMT Digital Meter             | Measures PMT current when calibrating in test mode for density of printing material.                      |
| PMT SENSITIVITY Adjust        | Adjusts gain of PMT.  |
| REPEAT Switch                 | Allows repeat exposures without moving hood.  |
| Exposing Light                | Glowes when exposure is occurring.  |
| EXPOSURE DELAY/NORMAL Switch  | Allows exposure to start when hood is lowered or delayed 3-6 seconds when glass plates are to be printed. |
| MODE Switch                   | Provides choice of AUTO, TEST, or MAN mode of operation.  |
| EXPOSURE INDEX Switch         | Provides calibrated exposure adjustments from 10-1000 units.  |
| POWER Light                   | Glowes when MASTER POWER switch is in ON position.  |

Control or Indicator

Function



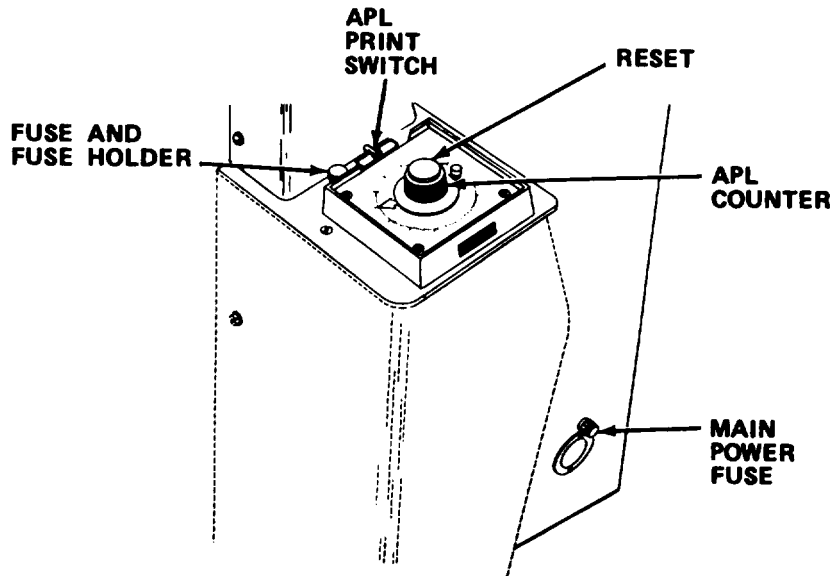
Sweep Failure Test Switch

Simulates sweep failure and blanks CRT.

Sweep Failure Reset Switch

Restarts CRT sweep after test.

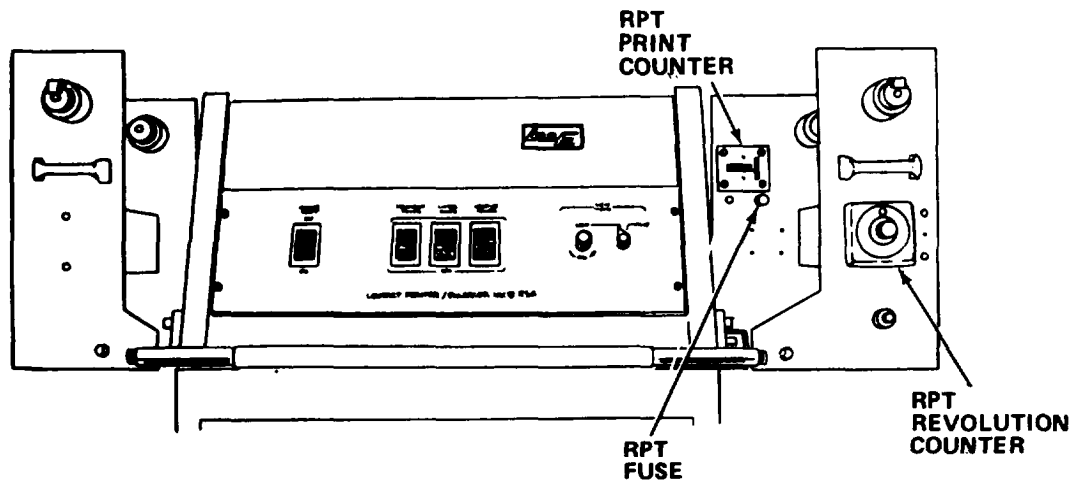
9-4.3 Cabinet.





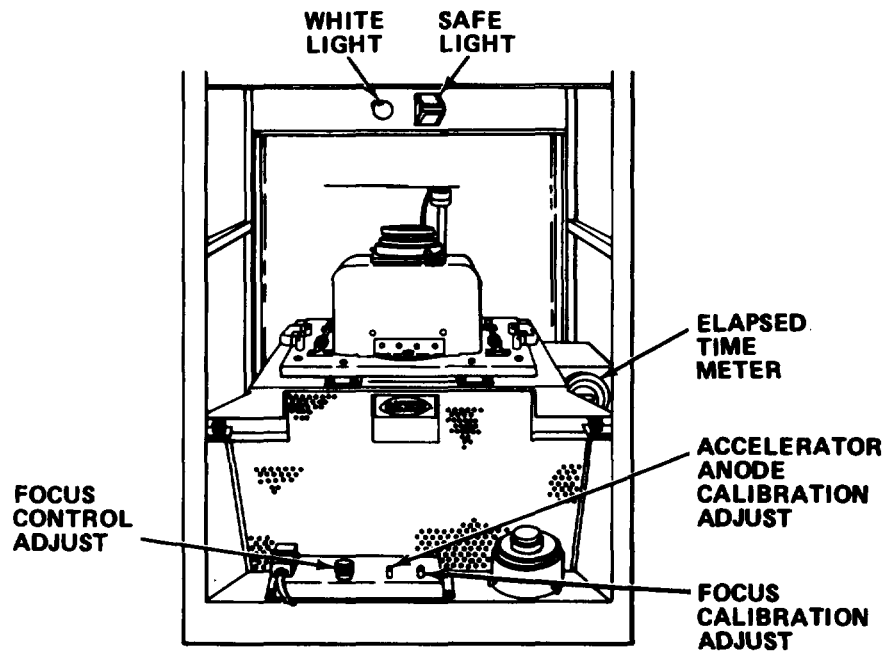
| Control or Indicator                    | Function   |
|---|--|
| APL Fuse Holder and Fuse                | Protects APL circuits from overloading. Fuse is 5 amp slo-blo.                   |
| APL Single/Multiple Print Switch        | Disables APL motor control circuit for single-print operation.                   |
| APL Print Counter Reset Switch          | Start switch for automatic repeat operation.                                     |
| APL Print Counter                       | Allows number of desired prints to be dialed in for automatic repeat operations. |
| Printer Main Power Fuse Holder and Fuse | Provides protection for printer circuits. Fuse is 5 amp slo-blo.                 |

9-4.4 RPT.



| Control or Indicator     | Function  |
|--------------------------|---|
| RPT Fuse Holder and Fuse | Protects RPT circuits. Fuse is 5 amp slo-blo.   |
| RPT Print Counter        | Number of RPT advances. Can be reset to 0 by thumbwheel.                                      |
| RPT Revolution Counter   | Provides adjustment of paper advance 8-20 in. (20.32-50.8 cm) $\pm 1/8$ in. ( $\pm 3.18$ mm). |

9-4.5 Printer Internal View



| Control or Indicator | Function   |
|----------------------|--|
| Elapsed Time Meter   | Elapsed time indicator. Nonresettable, running time meter. |

| Control or Indicator          | Function   |
|-------------------------------|--|
| Focus Calibration Adjust      | Provides setting for minimum safe spot size. Factory-set.            |
| Accelerator Anode Calibration | Eliminates CRT grid emission when CRT is blanked.                    |
| Focus Control Adjust          | Provides control of electronic spot size above a calibrated minimum. |
| White Light                   | Provides interior lighting to service or troubleshoot printer.       |
| Safe Light                    | Provides safe illumination for handling positive emulsions.          |

#### 9-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your before (B) PMCS.

b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.

c. After You Operate. Be sure to perform your after (A) PMCS.

d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

##### 9-5.1 PMCS Procedures.

a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.

b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.

c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.

d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.

e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.

f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

Interval columns. This column determines the time period designated to perform your PMCS.

h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

j. List of tools and materials required for PMCS is as follows:

| <u>Item</u>                       | <u>Quantity</u> |
|-----------------------------------|-----------------|
| Lens Tissue (Item 17, Appendix E) | ar              |
| Lens Cleaner (Item 6, Appendix E) | ar              |
| Watchmaker's Blower               | 1 ea            |
| Spring Scale                      | 1 ea            |
| Hand Air Pump                     | 1 ea            |
| Cheesecloth (Item 7, Appendix E)  | ar              |
| Camel's Hair Brush                | 1 ea            |
| Photosensitive Material           | ar              |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

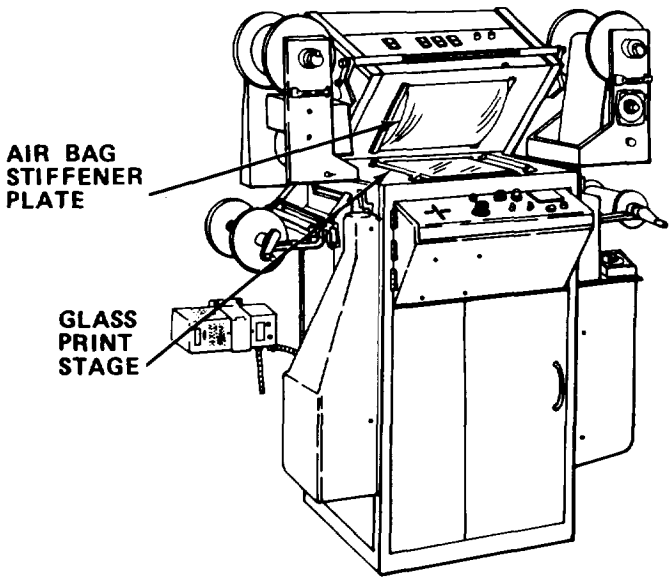
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 1        | B        | <p><u>CONTACT PRINTER/ENLARGER</u></p> <p><u>Inspect Light Source Components.</u></p> <ol style="list-style-type: none"> <li>1. Remove protective dust cover from printer.</li> </ol> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p> <ol style="list-style-type: none"> <li>2. Check that MASTER POWER switch is off.</li> </ol> <div style="text-align: center;">  </div> |  |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D During  
A After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

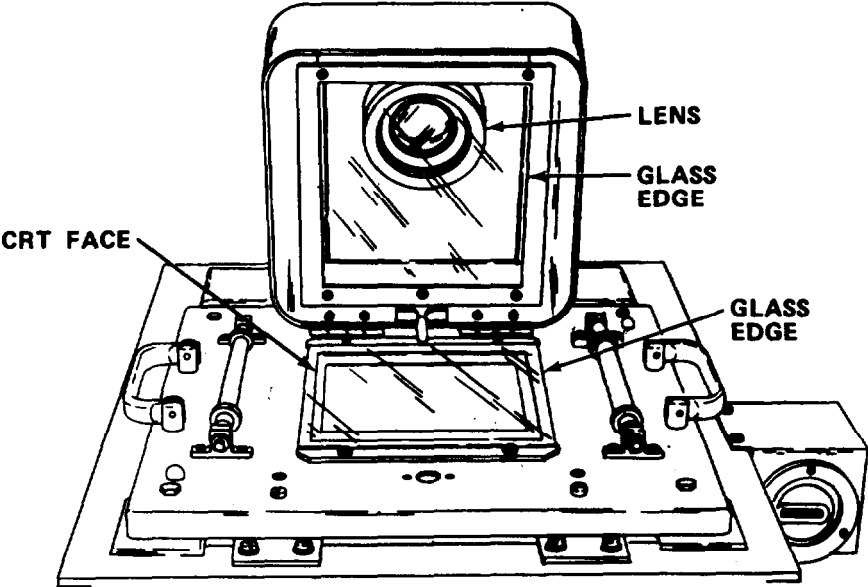
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting Equipment Is Not Ready/ Available If:                                       |
|----------|----------|--|---|
| 1        | B        | <p><b>CONTACT PRINTER/ENLARGER - Cont</b></p> <p><u>Inspect Light Source Components - Cont</u></p> <ol style="list-style-type: none"> <li>3. Use camel's hair brush to remove dust or foreign matter from airbag stiffener plate and glass print stage.</li> <li>4. Moisten several lens tissues with lens cleaner, and clean underside of airbag stiffener plate and both sides of glass print stage.</li> <li>5. Use several fresh lens tissues to dry underside of airbag stiffener plate and both sides of glass print stage.</li> <li>6. Check print stage for cracks and pits.</li> </ol>  | <p>Air bag stiffener is scratched. CRT has dark spots or scratches.</p> <p>Print Stage cracked.</p> |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 1        | B        | <p><u>CONTACT PRINTER/ENLARGER - Cont</u></p> <p><u>Inspect Light Source Components - Cont</u></p> <p style="text-align: center;"><b>NOTE</b></p> <p>Lens cover must be removed for PMCS and reinstalled when equipment is not in operation.</p> <p>7. Remove lens cover and use watchmaker's blower to remove any dust or foreign matter from top of lens.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>Apply lens cleaner to tissue. Use only small amount of cleaner.</p> <p>8. Clean top surface of lens by using circular motion.</p> <p>9. Use fresh lens tissue and dry top surface of lens by using circular motion.</p> <p>10. Unlatch and open lens box.</p> <p>11. Use watchmaker's blower to remove any dust or foreign matter from bottom side of lens and CRT face.</p> <p>12. Moisten several lens tissues with lens cleaner, and clean bottom side of lens and top of CRT face.</p> <p>13. Use several fresh lens tissues and dry bottom side of lens and top of CRT face.</p> <p>14. Check top and bottom surfaces of lens for dust or scratches.</p> | <p>Lens is cracked or scratched.</p>                           |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

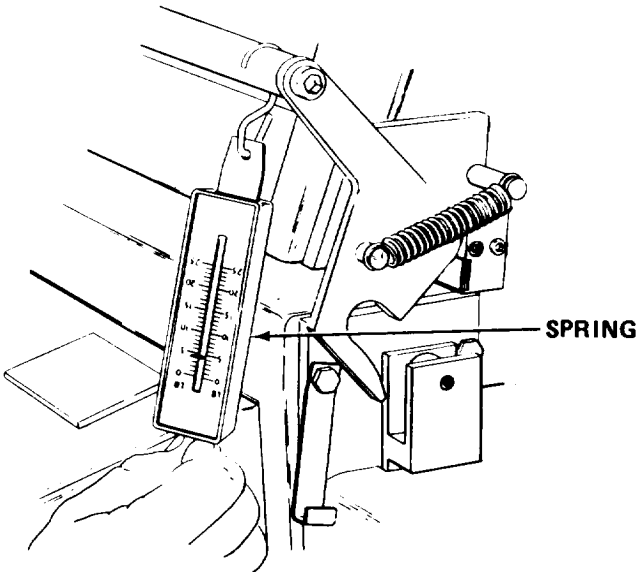
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br>PROCEDURE  | For Readiness Reporting, Equipment is Not Ready/ Available If: |
|----------|----------|--|--|
| 1        | B        | <p><b>CONTACT PRINTER/ENLARGER - Cont</b></p> <p><u>Inspect Light Source Components - Cont</u></p> <p>15. Check CRT face for dust, scratches, or dark spots.</p> <p>16. Close and latch lens box and reinstall lens cover.</p>   | <p>CRT is scratched or has dark spots present.</p>             |
| 2        | B        | <p><u>Test Platen Airbag Pressure.</u></p> <p>1. Check that MASTER POWER switch is off.</p> <p>2. Turn off circuit breaker.</p> <p>3. Place sample of negative and printing material to be used on print stage.</p>  |  |



Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

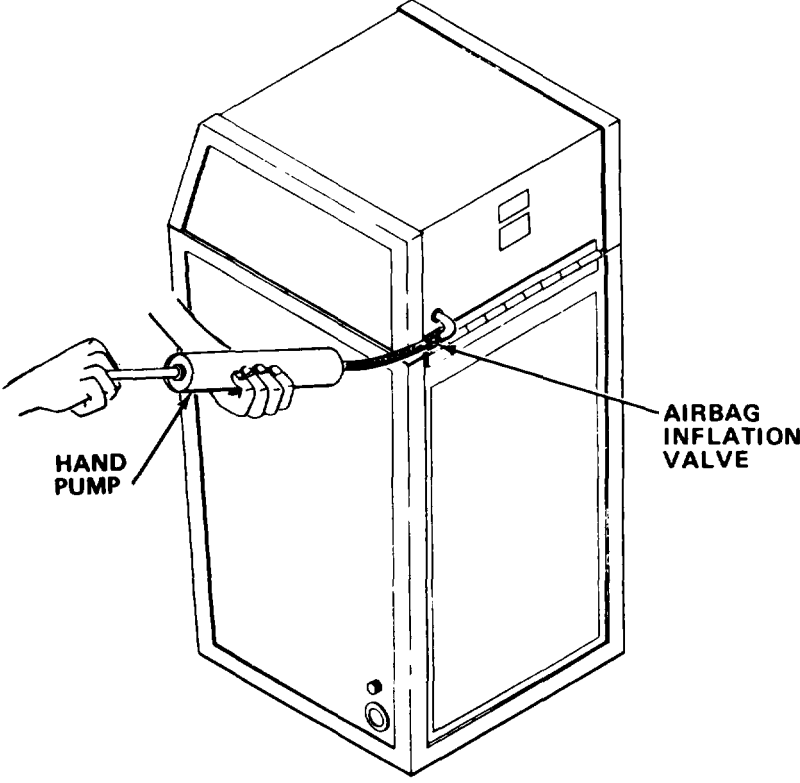
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|---|--|
| 2        | B        | <p><u>CONTACT PRINTER/ENLARGER - Cont</u></p> <p><u>Test Platen Airbag Pressure - Cont</u></p> <p>4. Attach spring scale to platen handle.</p> <p>5. Close and lock hood by pulling on weight of spring scale. Do this several times.</p> <p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Hood should lock at indication of 8-12 lbs.</li> <li>• If airbag pressure is low, follow steps 6-11.</li> <li>• If airbag pressure is high, follow steps 12-15.</li> </ul> <div style="text-align: center;">  <p>The diagram illustrates the process of testing the airbag pressure. A hand is shown operating a hand pump, which is connected via a hose to an airbag inflation valve located on the side of the machine's hood. The hood is shown in a partially open position, and the valve is clearly labeled with a leader line.</p> </div> |  |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If: |
|----------|----------|--|--|
| 2        | B        | <p><b><u>CONTACT PRINTER/ENLARGER - Cont</u></b></p> <p><u>Test Platen Airbag Pressure - Cont</u></p> <p>6. Attach hand air pump to airbag inflation valve.</p> <p>7. Open airbag inflation valve by turning knurled lock to left.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p style="padding-left: 40px;">Inflate airbag slowly. Airbag will rupture if overinflated.</p> <p>8. Slowly operate hand air pump to increase airbag pressure.</p> <p>9. Close airbag inflation valve by turning knurled lock to right.</p> <p>10. Recheck airbag pressure by repeating steps 4 and 5.</p> <p>11. When airbag pressure indicates 8-12 lbs, disconnect hand air pump.</p> <p>12. Slowly open airbag inflation valve by turning knurled lock to left.</p> <p>13. Bleed slight amount of air from airbag.</p> <p>14. Close airbag inflation valve by turning knurled lock to right.</p> <p style="text-align: center;"><b><u>NOTE</u></b></p> <p style="padding-left: 40px;">Platen air pressure must be checked each time thickness of printing material changes.</p> <p>15. Recheck airbag pressure by repeating steps 4 and 5.</p> | <p>Airbag fails to inflate.</p>                                |

Table 9-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      Q - Quarterly                      BI - Biennially

| ITEM IN NO. TER-VAL | ITEM TO BE INSPECTED                   | PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If:                |
|---------------------|--|---|---|
| 3                   | <u>CONTACT PRINTER/ENLARGER - Cont</u> | <p><u>Service Printer.</u></p> <ol style="list-style-type: none"> <li>1. Use cheesecloth to clean RPT supply and take-up.</li> <li>2. Check that all meter and control markings are legible and clean.</li> </ol> | <p>Meter or control markings are illegible.</p> |

**9-6. OPERATION UNDER USUAL CONDITIONS.** The printer can be operated in either of two modes: the contact mode or the enlargement mode. Separate instructions are provided for each mode in the following paragraphs, followed by a paragraph on the techniques used in masking and overscan, focusing, and variable dodging.

9-6.1 Operating Procedures.

a. Lens changing. The printer comes supplied with two different lenses. The 112 mm lens is called the contact lens and is used in the contact mode. The 138 mm lens is called the enlargement lens and is used in the enlargement mode. The following procedure is used to change the lens:

**NOTE**

- The contact printer is shipped from the manufacturer with 112 mm lens in the lens box. The enlargement lens (138 mm) will be securely mounted in the lower right corner of the cabinet.
- Always be sure lens caps are on lenses when equipment is not in operation or lenses are not being used.

(1) Install lens cap on lens installed in lens box.

(2) Remove knurled screws on lens assembly installed in lens box and remove lens.

(3) Remove knurled screws on lens mounted in cabinet. Remove lens and install in lens box, securing with knurled screws. If lens is to be used, remove lens cap.

**NOTE**

It may be necessary to rotate lens completely to secure flush with cabinet base.

(4) Install changed lens in lower right corner and secure with knurled screws. Be sure lens cap is installed.

b. Contact mode. This operating procedure contains the procedural steps for setting up and operating the printer, using cut or roll negatives and cut-sheet or roll-paper printing material in the contact mode. This procedure also describes the multiple-print feature using roll paper.

(1) Turn off LIFTER POWER switch.

(2) Turn off TRANSPORT POWER switch.

(3) Check optical and light system cleanliness (Table 9-1).

(4) Check platen airbag pressure (Table 9-1).

**NOTE**

Be sure 112 mm contact lens with aperture plate is in lens box assembly. For prints up to 10 in. X 10 in. (25.4 cm X 25.4 cm) in contact mode, 138 mm enlarging lens may be used (paragraph 9-6.1).

- (5) Set MODE switch to TEST.
- (6) Unlatch and raise printer hood.

**CAUTION**

Never have hood down with power on and normal room lights on. This condition will damage PMT.

- (7) Turn on MASTER POWER switch.

**NOTE**

If lens has been changed, optical spot size adjustment must be performed (paragraph 9-6.1f).

- (8) Check CRT blanking circuit operation as follows:

**WARNING**

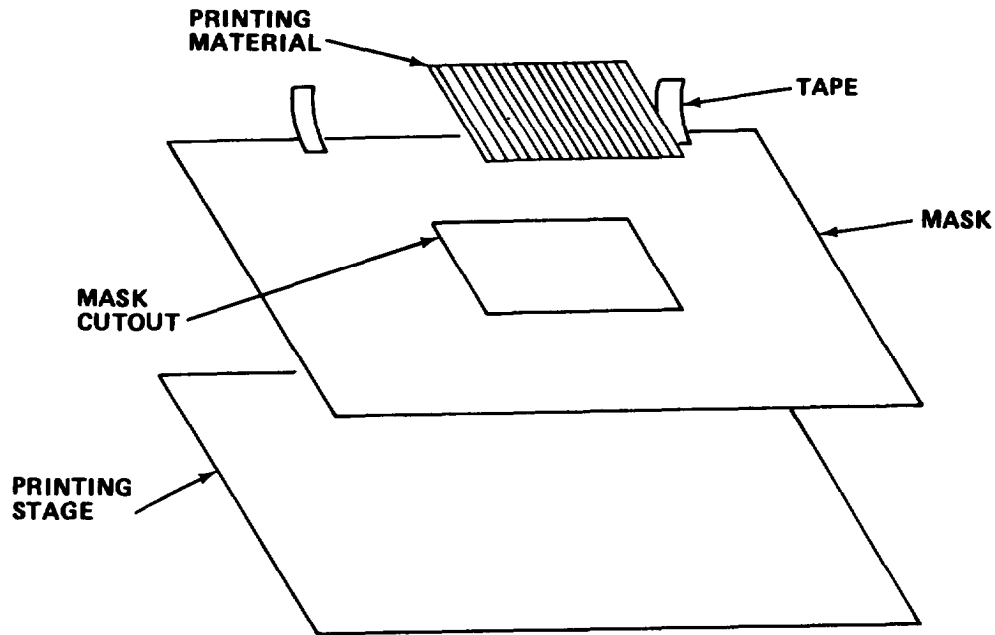
High voltages capable of causing death are used in this equipment. Use extreme caution when performing tasks inside the printer cabinet.

- (a) Open operator's console and lower cabinet door.

**NOTE**

Be sure shipping lock screws are removed.

- (b) Unlatch and open lens box.
- (c) Depress sweep failure test switch. CRT raster should blank.
- (d) Depress sweep failure reset switch. CRT raster should return.
- (e) Close and latch lens box.
- (f) Close operator's console and lower cabinet door.



(9) Select mask of proper size and density and secure it to print stage with transparent tape.

(10) Set SAFE/WHITE VIEW LIGHTS switch to SAFE.

(11) Turn off all normal van lighting except allowable safe lights.

(12) Adjust SAFE VIEW LIGHTS DIM control for level of desired brightness.

(13) Adjust RASTER edge controls for raster that falls just inside mask cutout on all sides.

(14) Place sample of unexposed printing material to be used (cut sheet or cutoff portion of roll paper) emulsion side down over the cutout.

**NOTE**

Printing material sample must overlap mask cutout on all four sides.

(15) Set % DODGING control to MAX.

**NOTE**

EXP LEVEL control has no stop; simply set to zero.

- (16) Set EXP LEVEL control to 0.
- (17) Close and lock printer hood.
- (18) Unscrew plastic cap from PMT SENSITIVITY adjust.
- (19) Set PMT SENSITIVITY adjust for reading of 50 on PMT digital meter.

**NOTE**

- PMT digital meter reading should remain within range of 45 to 55 for period of 5 minutes. If meter drifts outside this range, refer to troubleshooting procedures.
- PMT sensitivity must be readjusted for each type of printing material used and any change of lens setting.

- (20) Reinstall plastic cap on PMT SENSITIVITY adjust.
- (21) Unlock and raise printer hood.

**NOTE**

- Ignore PMT meter reading from this point on.
- Be sure MODE switch is in TEST position.

- (22) Adjust RASTER edge control for correct height and width as follows:
  - (a) Place sheet of thin, translucent material (matte) on top of mask and tape down with transparent tape.
  - (b) Adjust RASTER edge control for raster that extends approximately 1/2 in. (12.7 mm) beyond cutout area on all sides.

**NOTE**

Do not touch RASTER edge controls for remainder of this procedure.

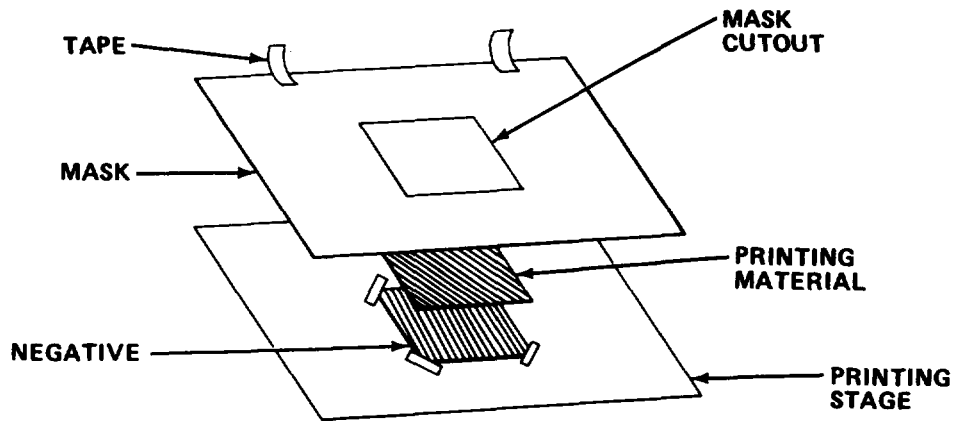
- (c) Set MODE switch to AUTO.
- (d) Remove translucent material from mask.

**NOTE**

- If exposure index for printing material to be used is not known, proceed to step (23).
- If exposure index for printing material to be used is known, proceed to step (24).

(23) Determine correct EXPOSURE INDEX switch setting as follows:

(a) Select test negative, same size as mask cutout area, with average density and some detail.



(b) Place negative (emulsion side up) under mask in center of print stage and tape down with transparent tape at each corner.

(c) Place piece of printing material (emulsion side down) under mask and over negative.

**NOTE**

Image edges of negative should coincide with mask cutout edges.

- (d) Set% DODGING control to MAX.
- (e) Set% CHANGE switch to 0.
- (f) Check that MODE switch is on AUTO.
- (g) Lower and lock printer hood.



**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

- (h) When exposure is complete, unlock and open hood.
- (i) Remove and process exposed printing material.
- (j) If processed Print is too light, increase EXPOSURE INDEX switch setting and repeat (f) through (k). If processed print is too dark, decrease EXPOSURE INDEX switch setting and repeat same substeps.
- (k) When desired exposure index is obtained, proceed to step 24.

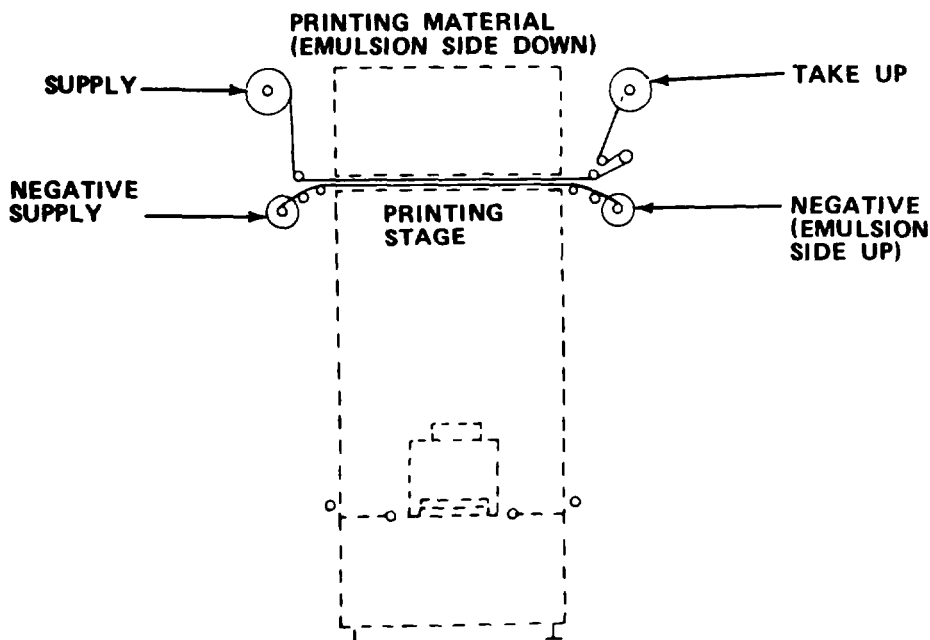
**NOTE**

Normal room lighting may be used for step 24.

(24) Remove test negative and place negative to be copied on print stage as follows:

(a) If negative is in cut form, place negative (emulsion side up) under mask cutout area. Tape negative to print stage with transparent tape.

(b) If negative is in roll form, proceed as follows:



(c) Place negative roll on negative spool holder at left side of print stage.

(d) Insert empty spool holder on right side.

(e) Feed negative (emulsion side up) over rollers, under mask, and thread onto empty spool.

(f) Position negative to be copied so image area coincides with mask cutout.

(25) Turn off all lighting except allowable safe lamps.

**NOTE**

- If roll-paper printing material is used, follow steps (26) through (35).
- If cut-sheet printing material is to be used, proceed to step (36).

(26) Thread roll -paper printing material on printer as follows:

(a) Insert empty spool on holder at right side of RPT.

(b) Insert roll-paper printing material on holder at left side of RPT.

(c) Thread printing material (emulsion side down) through left roller assembly, over mask, through right roller assembly, and onto empty spool.

(27) Set APL single/multiple print switch to SINGLE.

(28) Turn on TRANSPORT POWER switch.

(29) Check for proper paper advance spacing as follows:

(a) Loosen thumbscrew and slide marker assembly from hood.

(b) Reinstall assembly with graphite wheel down.

(c) Aline graphite wheel with marker table at print stage.

(d) Set RPT revolution counter to proper number, which is approximately 96 for 10 in. (25.4 cm) wide original with 3/4 in. (19.05 mm) spacing between prints.

(e) Mark paper by lowering hood without locking platen handle. Then raise hood.

**NOTE**

When hood is lowered, marker assembly will place mark on paper.

(f) After paper advances, again lower hood without locking platen handle and mark paper.

(g) Measure distance between two marks and adjust paper advance accordingly.

(h) Reverse marker assembly.

#### **NOTE**

If single copy of negative is required, follow steps (30) through (34).  
If multiple copies of negative are required, proceed to step (35).

(30) Lower and lock hood, and expose printing material.

#### **NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

(31) After exposure is complete, unlock and raise hood.

(32) After paper advances, cut exposed material from roll and process.

(33) Rethread printing material to RPT take-up roll.

(34) If prints of other negatives are required, position next negative on print stage and repeat steps (30) through (33).

#### **NOTE**

If printing process is complete, proceed to step (36) for printer securing operations.

(35) When multiple prints of selected negative are desired, proceed as follows:

#### **CAUTION**

APL print counter should not be manually moved in negative direction.  
This causes excessive wear in APL print counter.

(a) Set APL print counter to one more than desired number of prints.

(b) Turn on LIFTER POWER switch.

(c) Press button on APL print counter.

(d) Close and lock printer hood.

(e) Set APL single/multiple print switch to MULTIPLE and printing operation becomes automatic.

**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

(f) When multiple-print process is complete, unlock and open printer hood.

(g) If multiple copies of other negatives are required, position next negative on print stage and repeat step (35), (a) through (f).

(h) When multiple-print operation is complete, set LIFTER POWER switch to OFF.

(i) Set APL single/multiple print switch to SINGLE.

**NOTE**

The APL must be turned off at bottom of its stroke or printer will not operate in manual or automatic mode.

(j) Turn off TRANSPORT POWER switch.

(k) Remove exposed printing material from roll and process.

(l) Remove roll printing material from printer and store.

(m) When roll-paper printing operation is complete, proceed to step (j) for printer securing operations.

(36) Print cut-sheet material as follows:

(a) Place cut sheet to be printed (emulsion side down) over negative.

**NOTE**

When cut-sheet printing material is used, white border is obtained by placing printing material over mask. If black border is required, place printing material under mask.

(b) Lower and lock printer hood.

**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

(c) When exposure is complete, unlock and raise hood.

(d) Remove exposed printing material and process.

(e) If cut-sheet prints of other negatives are required, position next negative on print stage and repeat step (36) (a) through (d).

(f) When printing operations are complete, proceed to step 11 for printer securing operations.

(37) Reinstall lens cover.

(38) Turn off MASTER POWER switch.

(39) Remove negative material and mask from printer.

### **CAUTION**

Be sure printer hood is not locked. If hood is locked and MASTER POWER switch is turned on, damage to CRT will occur.

(40) Lower, but do not lock, printer hood.

(41) Place protective cover over printer.

c. Enlargement Mode. This operating procedure contains the procedural steps for setting up and operating the printer using cut or roll negatives and cut-sheet or roll-paper printing material in the enlargement mode. This procedure also describes the multiple-print feature using roll paper.

(1) Turn off MASTER POWER switch.

(2) Turn off LIFTER POWER switch.

(3) Turn off TRANSPORT POWER switch.

(4) Check optical and light system cleanliness (Table 9-1).

(5) Check platen airbag pressure (Table 9-1).

### **NOTE**

- Be sure 138 mm enlargement lens is securely in place in lens box assembly. (See paragraph 9-6.1a for lens changing procedures.)
- Be sure f-stop of 138 mm enlargement lens is set to f/4.5.

(6) Set MODE switch to TEST.

(7) Unlatch and raise printer hood.

**CAUTION**

Never have hood down with power on and normal room lights on. This condition will damage PMT.

- (8) Turn on MASTER POWER switch.

**NOTE**

If lens has been changed, optical spot size adjustment must be performed. (paragraph 9-6.1f).

- (9) Check CRT blanking circuit operation as follows:

**WARNING**

High voltages capable of causing death are used in this equipment. Use extreme care when performing tasks inside the printer cabinet.

- (a) Open operator's console and lower cabinet door.

**NOTE**

Be sure shipping lock screws are removed.

- (b) Unlatch and open lens box.
- (c) Depress sweep failure test switch. CRT raster should blank.
- (d) Depress sweep failure reset switch. CRT raster should return.
- (e) Close and latch lens box.
- (f) Close operator's console and lower cabinet door.

- (10) Select mask of proper size and density and secure it to print stage with transparent tape.
- (11) Turn SAFE/WHITE VIEW LIGHTS switch to SAFE.
- (12) Turn off all normal van lighting except allowable safe lights.
- (13) Adjust SAFE VIEW LIGHTS DIM control for level of desired brightness.
- (14) Adjust RASTER edge control for a raster that falls just inside mask cutout on all sides.
- (15) Place sample of unexposed printing material to be used (cut sheet or cutoff portion of roll paper) emulsion side down over cutout.

**NOTE**

Printing material sample must overlap mask cutout on all four sides.

- (16) Set % DODGING control to MAX.
- (17) Set EXP LEVEL control to 0.
- (18) Close and lock printer hood.
- (19) Unscrew plastic cap from PMT SENSITIVITY adjust.
- (20) Set PMT SENSITIVITY adjust for reading of 50 on PMT digital meter.

**NOTE**

- PMT digital meter M101 reading should remain within range of 45 to 55 for period of 5 minutes. If meter drifts outside this range, refer to troubleshooting procedures.

PMT sensitivity must be readjusted for each type of printing material used and any change of lens setting.

- (21) Reinstall plastic cap on PMT SENSITIVITY adjust.
- (22) Unlock and raise printer hood.

**NOTE**

Ignore PMT meter reading from this point on.

Be sure MODE Switch is in TEST position.

(23) Remove printing material sample and mask from print stage.

(24) Adjust RASTER edge control for correct height and width as follows:

(a) Place sheet of thin, translucent material (matte) on top of print stage and tape down with transparent tape.

(b) Check that MODE switch is in TEST.

(c) Adjust RASTER edge until raster edges barely extend beyond outline of projected negative carrier image.

(d) Place a mask over translucent material.

#### NOTE

Outside edges of mask should extend beyond glass print stage.

(e) Mark mask to coincide with outline of projected negative carrier image.

(f) Remove mask and cut out marked area.

(g) Place translucent material on top of mask.

(h) Position mask to coincide with edges of projected negative carrier image.

(i) Tape mask and translucent material to print stage.

#### NOTE

- Do not touch RASTER edge controls for remainder of this procedure.
- If exposure index for printing material to be used is not known, proceed to step (25).
- If exposure index for printing material to be used is known, proceed to step (26).

(25) Determine the correct EXPOSURE INDEX switch setting as follows:

(a) Obtain test negative equal in size to mask cutout area with leader extending on left and right sides.

(b) Open lower cabinet door. Unlatch and open lens box.

(c) Center test negative (emulsion side up) in negative carrier.

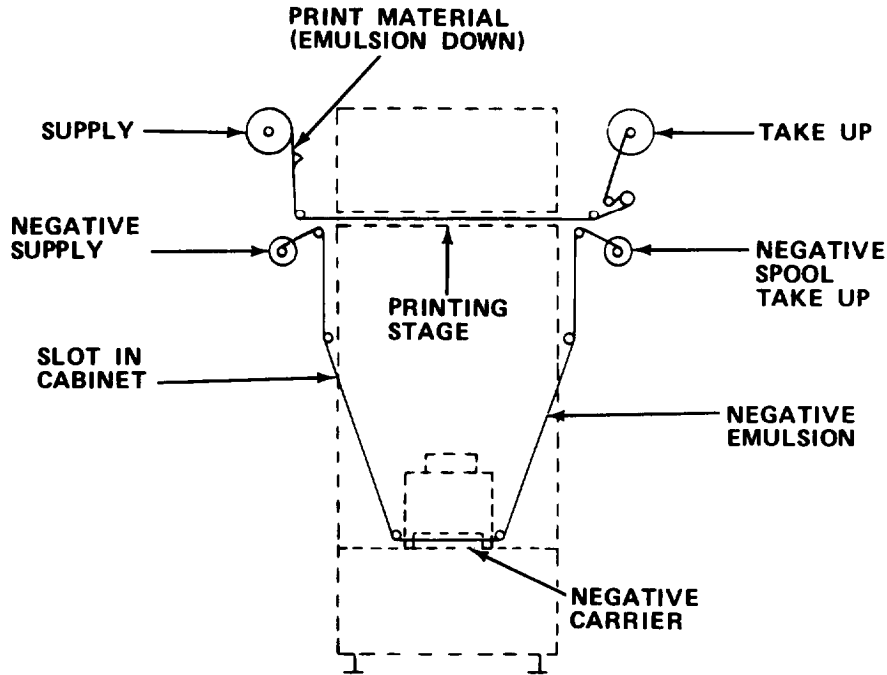


- (d) Close and latch lens box.
- (e) Turn on NEGATIVE CARRIER switch.
- (f) Adjust position of negative by leader until projected image is centered in cutout area on print stage.
- (g) Turn off NEGATIVE CARRIER switch.
- (h) Close lower cabinet door.
- (i) Set MODE switch to AUTO.
- (j) Set % DODGING control to MAX.
- (k) Set % CHANGE switch to 0.
- (l) Obtain several pieces of printing material to be used (cut sheets or several pieces of roll paper) that are a little larger than mask cutout.
- (m) Place printing material (emulsion side down) over mask cutout.
- (n) Lower and lock printer hood.

**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

- (o) When exposure is complete, unlock and open hood.
- (p) Remove and process exposed printing material.
- (q) If processed print is too light, increase EXPOSURE INDEX switch setting and if processed print is too dark, decrease EXPOSURE INDEX switch setting; repeat steps (m) through (p) above.
- (r) When desired exposure is obtained, proceed to step (26).
- (26) Open lower cabinet door.
- (27) Unlatch and open lens box.
- (28) Remove test negative from printer.
- (29) Negative positioning.
- (a) If negative to be copied is in cut form, center cut negative (emulsion side up), on negative carrier. Then proceed to step (30).



(b) If negative to be copied is in roll form, thread negative (emulsion side up), as shown in threading diagram above. Then turn take-up spool until negative is firmly engaged, and proceed to next step.

(30) Negative copy set-up.

- (a) Close and latch lens box.
- (b) Set MODE switch to TEST.
- (c) Place piece of translucent material over mask.
- (d) Turn off all lighting except allowable safe lights.
- (e) Turn on NEGATIVE CARRIER switch.
- (f) Position selected negative for proper projection on print stage.
- (g) Turn off NEGATIVE CARRIER switch.
- (h) Remove translucent material from print stage.

(31) Set MODE switch to AUTO.

**NOTE**

If roll-paper printing material is to be used, follow steps (32) through (34). If cut-sheet printing material is to be used, proceed to step (39).

- (32) Thread roll-paper printing material on printer as follows:
- (a) Install empty spool on holder at right side of RPT.
  - (b) Install roll-paper printing material on holder at left side of RPT.
  - (c) Thread printing material (emulsion side down) as shown in threading diagram.
- (33) Check that APL single/multiple print switch is on SINGLE.
- (34) Turn on TRANSPORT POWER switch.
- (35) Check for proper paper advance spacing as follows:
- (a) Loosen thumbscrew and slide marker assembly from hood.
  - (b) Reinstall assembly with graphite wheel down.
  - (c) Aline graphite wheel with marker table at printer stage.
  - (d) Set RPT revolution counter to proper number, which is approximately 96 for 10 in. (25.4 cm) wide original with 3/4 in. (19.05 mm) spacing between prints.
  - (e) Mark paper by lowering hood without locking platen handle. Then raise hood.

#### NOTE

When hood is lowered, marker assembly will place mark on printing material.

- (f) After paper advances, again lower hood without locking platen handle and mark paper.
- (g) Measure distance between two marks and adjust paper advance accordingly.
- (h) Reverse marker assembly.

#### NOTE

- If single copy of negative is required, follow steps (36) through (38).
- If multiple copies of negative are required, proceed to step (39).

- (36) Lower and lock hood, and expose printing material.

**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

(37) After exposure is complete, unlock and raise hood.

**NOTE**

- RPT will advance paper when hood is raised.

Ž If prints of other negatives are required, position next negative to be printed by repeating steps (29) - (38) for type of negative and printing material.

(38) When printing of selected negatives is complete, cut exposed printing material from roll and process.

**NOTE**

- If multiple copies of negative are required, proceed to step (39).
- If printing process is complete, proceed to step (41) for printer securing operations.

(39) When multiple copies of selected negative are required, proceed as follows:

**CAUTION**

APL printer counter should not be manually moved in negative direction. This causes excessive wear of print counter.

- (a) Set APL print counter to one more than desired number of prints.
- (b) Turn on LIFTER POWER switch.
- (c) Press button on APL printer counter.
- (d) Close and lock printer hood.

(e) Set APL single/multiple print switch to MULTIPLE and printing operation becomes automatic.

**NOTE**

- Exposure light glows during exposure and is extinguished when exposure is complete.
- Ž When multiple-print process is complete, printer automatically stops. If multiple copies of other negatives are required, repeat step for type of negative being copied and step (39), (a) through (e).

(f) When multiple-print operation is complete, turn off LIFTER POWER switch.

(g) Set APL single/multiple print switch to SINGLE.

**NOTE**

The APL must be turned off at bottom of its stroke or printer will not operate in manual or automatic mode.

(h) Turn off TRANSPORT POWER switch.

(i) Remove exposed printing material from roll and process.

(j) Remove negative roll from printer and store.

(l) When roll-paper printing operation is complete, proceed to step (41) for printer securing operations.

(40) Print cut-sheet material as follows:

(a) Place cut-sheet to be printed (emulsion side down) over mask cutout on print stage.

**NOTE**

When cut-sheet printing material is used, white border is obtained by placing printing material over mask. If black border is desired, place printing material under mask.

(b) Lower and lock printer hood.

**NOTE**

Exposure light glows during exposure and is extinguished when exposure is complete.

- (c) When exposure is complete, unlock and raise printer hood.
- (d) Remove exposed printing material and process.

**NOTE**

If copies of other negatives are desired, repeat step (29) for type of negative being copied and step (39), (a) through (d).

(e) When cut-sheet printing operations are complete, proceed to step (41) for printer securing operations.

- (41) Reinstall lens cover.
- (42) Turn off MASTER POWER switch.
- (43) Remove negative material from printer.

**NOTE**

Be sure printer hood is not locked. If hood is locked and MASTER POWER switch is turned on damage to CRT will occur.

- (44) Lower, but do not lock, printer hood.
- (45) Place protective cover over printer.

d. Masking and overscan. The image area of the print stage is masked for two reasons: (1) to prevent unwanted light (glare, reflection) from reaching the PMT, thereby reducing exposure control and dodging; and (2) to minimize border enhancement caused by the scanning spot projecting through the transparent border of the negative. Neither effort can be totally successful, but careful masking will produce adequate results. Generally, one mask is sufficient and should be approximately the same density as the negative. The mask opening must extend 1/2- 3/4 in. (12.7-19.05 mm) outward from the image area of the negative. The mask must also extend beyond the outer edge of raster overscan.

**NOTE**

If desired, second mask may also be used. Second mask should be essentially opaque and extend to edge of print stage. Second mask opening must be large enough so that no part of raster is covered.

Raster overscan is required in order to prevent a black border at the left and right edges of the print. Some overscan is also required at the top and bottom edges because the starting and ending lines of the raster are seldom complete. The overscan must be at least 1-1/2 times the diameter of the CRT spot. The usual overscan is between 3/8-1/2 in. (9.53-12.7 mm).

**CAUTION**

No part of raster should be masked by opaque area. If scanning spot is masked out of view of PMT, spot will slow down, possibly burning CRT phosphor.

e. Focusing. The printer is focused in two ways: electronically and optically. The <sup>electronic</sup> focus adjusts the size of the CRT light spot, and the optical focus defines the resolution of the spot on the print stage. A fine electronic focus will generally decrease the useful life of the CRT; therefore, the minimum spot size is a factory setting.

f. Adjust CRT optical spot size.

**WARNING**

Death or serious injury may occur if safety precautions are not observed while working on energized equipment. Voltages in excess of 10 kV are present when the MASTER POWER switch is on.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- (1) Raise printer hood.
- (2) Set MODE switch to TEST.
- (3) Set EXPOSURE INDEX switch to 1000.
- (4) Turn off all van lighting except allowable safe lights.
- (5) Turn on MASTER POWER switch.
- (6) Set RASTER edge controls to maximum stretch both horizontally and vertically.
- (7) Place piece of translucent material (matte) on print stage.
- (8) Close and latch hood.
- (9) Open lower cabinet door.
- (10) Look up at print stage from about lens level, and screw lens in or out until projected image on print stage becomes focused.
- (11) Screw lens in or out until projected image goes slightly out of focus.

**NOTE**

Slight out-of-focus condition is required so that dust, dirt, or imperfections on CRT face are not projected on print.

- (12) Close lower cabinet door.
- (13) Unlatch and raise hood.
- (14) Turn on MASTER POWER switch.
- (15) Remove translucent material from print stage.

g. Variable dodging. One of the following variable dodging techniques may be used when prints produced at maximum or 100-percent dodging are too flat and it is not practical to print on a higher contrast paper:

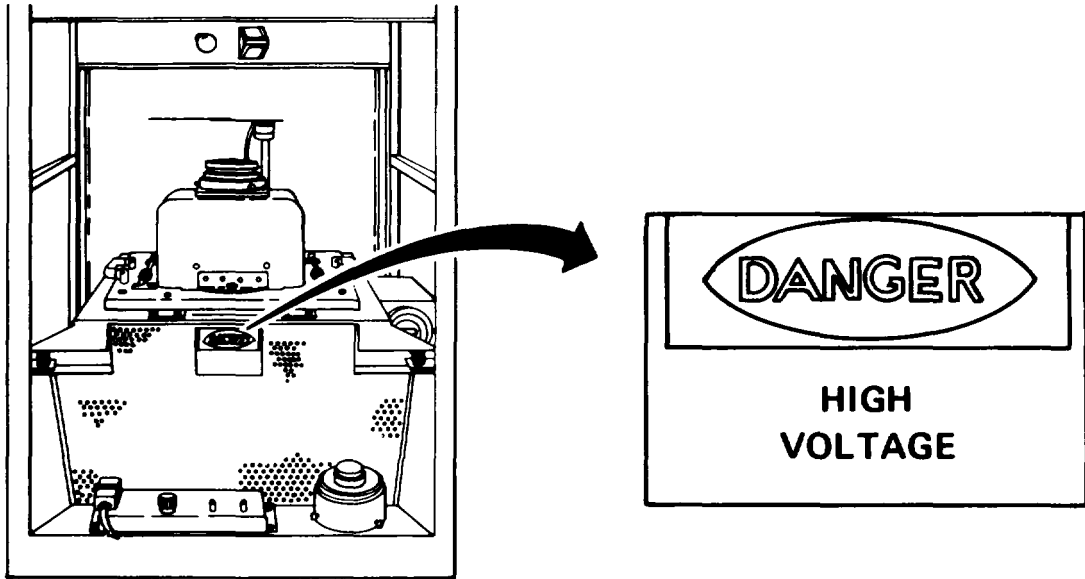
(1) Set EXP LEVEL control by estimating negative midtone: 0.3 for thin negative, 0.6 for negative with medium density, and 0.9 for dense negative. Alter these settings as experience dictates. Set % DODGING control as required for emulsion grade and density range.

**NOTE**

- Do not change exposure index if exposure is incorrect. Set EXP LEVEL control to lower values if prints are dark or to higher values if prints are light.
- Density range of test prints increases as percent dodging is increased.

(2) Set EXP LEVEL control to 0.25 and % DODGING control to MIN. Select emulsion and make print using step wedge as negative. Adjust only EXP INDEX control to increase or decrease densities or 0.25 exposure setting. Once satisfactory EXPOSURE INDEX switch setting is obtained, make series of exposures at 25-, 50- and 75-percent and maximum dodging. Exposure of 0.25 step should stay essentially constant for series of test prints.



9-6.2 Operating Instructions on Decals and Instruction Plates.

**9-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

### Section III OPERATOR MAINTENANCE

**9-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication at this level of maintenance.

**9-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the contact printer/enlarger, or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all the possible malfunctions that may occur, nor all test or inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

Table 9-2. TROUBLESHOOTING

| MALFUNCTION  | TEST OR INSPECTION | CORRECTIVE ACTION   |
|--|--------------------|---|
| <b><u>WARNING</u></b>  |                    |   |
| Death or serious injury may occur if safety precautions are not observed while working on energized equipment. Voltages in excess of 10 kV are present when the MASTER POWER switch is on. |                    |   |
| 1. NO POWER ON INDICATION.   |                    | <p>Step 1. Check position of MASTER POWER switch.</p> <p>(a) If turned on, proceed to step 2.</p> <p>(b) Turn on MASTER POWER switch.</p> <p>Step 2. Visually inspect main power fuse for broken filament.</p> <p>(a) If filament is intact, proceed to step 3.</p> <p>(b) Replace main power fuse (paragraph 9-10.3).</p> <p>Step 3. Check position of circuit breaker on power panel.</p> <p>(a) If turned on, proceed to step 4.</p> <p>(b) Turn on circuit breaker.</p> <p>Step 4. Check power panel indicators for correct voltage, frequency, and phase.</p> <p>(a) If voltage, frequency and phase are correct, refer to organizational maintenance.</p> <p>(b) If voltage, frequency, and phase are incorrect, notify power supply supervisor.</p> |
| 2. NO APL OPERATION. MACHINE WORKS NORMALLY IN SINGLE-PRINT OPERATION.   |                    | <p>Step 1. Check position of LIFTER POWER switch.</p> <p>(a) If LIFTER POWER switch is turned on, proceed to step 2.</p> <p>(b) Turn on LIFTER POWER switch.</p>   |

Table 9-2. TROUBLESHOOTING

| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|--|--|--|
| 2. NO APL OPERATION.   | MACHINE WORKS NORMALLY IN SINGLE-PRINT OPERATION - Cont                    |  |
|  | Step 2. Visually check APL fuse for broken filament.                       | If filament is defective, replace APL fuse (paragraph 9-10.4).                   |
| 3. NO RPT OPERATION.   |  |  |
|  | Step 1. Check position of TRANSPORT POWER switch.                          |  |
|  |  | (a) If TRANSPORT POWER switch is on, proceed to step 2.                          |
|  |  | (b) Turn on TRANSPORT POWER switch.  |
|  | Step 2. Visually check RPT fuse filament for defective filament.           |  |
|  |  | If filament is defective, replace RPT fuse (paragraph 9-10.5).                   |
| 4. WHITE LAMP DOES NOT ILLUMINATE BUT MASTER POWER SWITCH IS ON. |  |  |
|  | Step 1. Check position of SAFE/WHITE VIEW LIGHTS switch to WHITE position. |  |
|  |  | (a) Turn SAFE/WHITE VIEW LIGHTS switch to WHITE position.                        |
|  |  | (b) Replace white light (paragraph 9-10.2).                                      |
|  |  | (c) Refer to organizational maintenance.   |
| 5. SAFE LIGHT DOES NOT ILLUMINATE. MASTER POWER SWITCH IS ON.    |  |  |
|  | Step 1. Check position of SAFE/WHITE VIEW light switch.                    |  |
|  |  | (a) If SAFE/WHITE VIEW LIGHTS switch is in the SAFE position, proceed to step 2. |
|  |  | (b) Turn SAFE/WHITE VIEW LIGHTS switch to SAFE.                                  |

**Table 9-2. TROUBLESHOOTING**

| MALFUNCTION   | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|---|--|---|
| 5. SAFE LIGHT DOES NOT ILLUMINATE. MASTER POWER SWITCH IS ON - Cont   | Step 2. Visually check safe light bulb filament.                 | <ul style="list-style-type: none"> <li>(a) If filament is good, proceed to step 3.</li> <li>(b) Replace incandescent bulb (paragraph 9-10.2).</li> </ul>  |
|   | Step 3. Check adjustment of safe view light potentiometer.       | <ul style="list-style-type: none"> <li>(a) Adjust safe view light potentiometer for proper illumination.</li> <li>(b) If unable to correct malfunction, refer to organizational maintenance.</li> </ul>   |
| 6. EXACT AMOUNT OF PAPER ADVANCE CANNOT BE DETERMINED.  | Check graphite marking wheel for wear.                           | Replace worn graphite marking wheel (paragraph 9-10.1).   |
| 7. PRINTER WORKS CORRECTLY IN TEST AND MULTIPLE-PRINT OPERATION BUT WILL NOT EXPOSE IN EITHER MANUAL OR AUTOMATIC FOR SINGLE-PRINT OPERATION. | Step 1. Check position of APL single/multiple print switch.      | <ul style="list-style-type: none"> <li>(a) If APL single/multiple print switch is on SINGLE, proceed to step 2.</li> <li>(b) Turn single/multiple print switch to SINGLE.</li> </ul>  |
|   | Step 2. Check for proper positioning of APL at bottom of stroke. | <ul style="list-style-type: none"> <li>(a) If APL is not properly positioned, perform (1) through (6).                             <ul style="list-style-type: none"> <li>(1) Set APL print counter to 0.</li> <li>(2) Turn APL single/multiple print switch to MULTIPLE.</li> <li>(3) Turn on TRANSPORT POWER switch.</li> <li>(4) Turn on LIFTER POWER switch.</li> </ul> </li> </ul> |

**Table 9-2. TROUBLESHOOTING**

| MALFUNCTION   | TEST OR INSPECTION | CORRECTIVE ACTION  |
|---|--------------------|--|
| 7. PRINTER WORKS CORRECTLY IN TEST AND MULTIPLE-PRINT OPERATION BUT WILL NOT EXPOSE IN EITHER MANUAL OR AUTOMATIC FOR SINGLE-PRINT OPERATION - Cont |                    | <p>(5) Press white button on APL print counter.</p> <p>(6) Cycle APL to bottom of stroke, and set APL SINGLE/multiple print switch to SINGLE.</p> <p>(b) If malfunction is not corrected, refer to organizational maintenance.</p> |
| 8. MOTTLE OR GRAIN IN CLEAR AREAS OF PRINT.   |                    | <p>Check to see if contact printing lens is focused on CRT phosphor.</p> <p>Perform optical spot size adjustment (paragraph 9-6.1f).</p>   |

**9-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the contact/printer enlarger. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURE                                | PARAGRAPH |
|--|-----------|
| Replace Graphite Marking Wheel . . . . . | 9-10.1    |
| Replace Incandescent Lamp(s). . . . .    | 9-10.2    |
| Replace Master Power Fuse. . . . .       | 9-10.3    |
| Replace APL Fuse . . . . .               | 9-10.4    |
| Replace RPT Fuse . . . . .               | 9-10.5    |

9-10.1 Replace Graphite Marking Wheel.

MOS: 83E, Photo and Layout Specialist

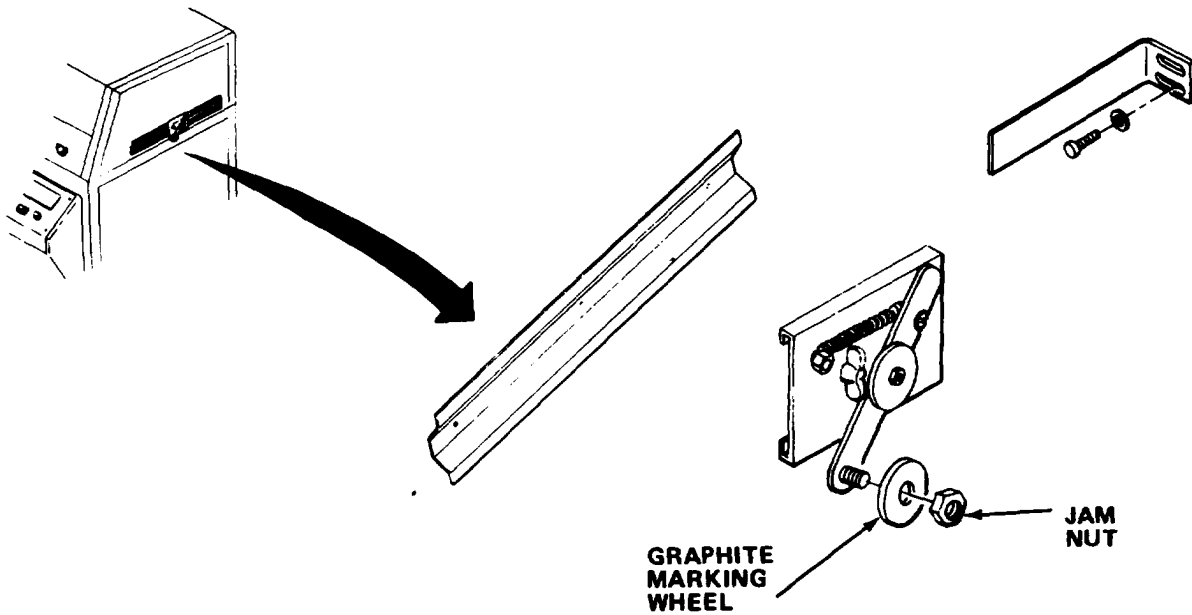
TOOLS: 8 in. Adjustable Wrench

SUPPLIES: Graphite Wheel

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove graphite marking assembly from hood.
- d. Loosen jam nut.
- e. Remove graphite marking wheel.
- f. Install new wheel and tighten nut.
- g. Reinstall marking assembly.
- h. Turn on circuit breaker.
- i. Turn on MASTER POWER switch.

9-10.2 Replace Incandescent Lamp(s).

MOS: 83E, Photo and Layout Specialist

SUPPLIES: Incandescent Lamp (15 W)

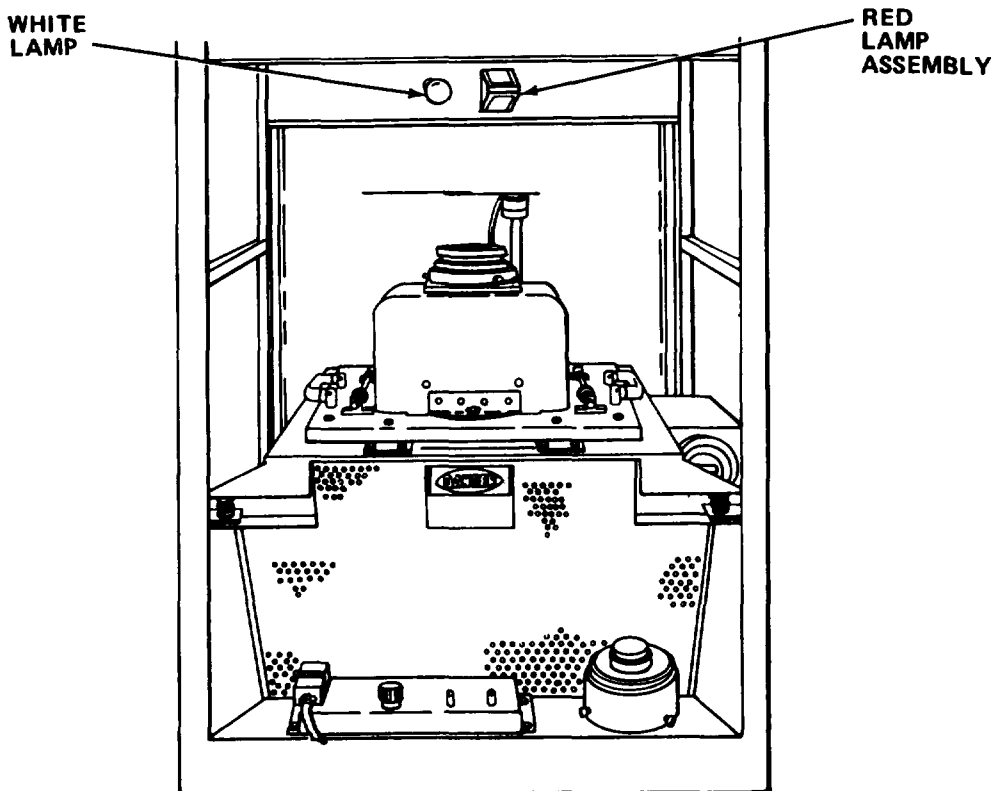
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Open operator's console and lower cabinet door.

- d. Remove defective lamp or lamp assembly.
- e. If red bulb is defective, replace lamp as follows:
  - (1) Remove clamp and retaining cover.
  - (2) Remove red glass filter.
  - (3) Replace defective lamp.
  - (4) Reinstall glass filter.
  - (5) Reinstall retaining cover and clamp.

**NOTE**

Be sure red filter is up.

- f. If white lamp is defective, remove and install new lamp.
- g. Close operator's console and lower cabinet door.
- h. Turn on circuit breaker.
- i. Turn on MASTER POWER Switch.

9-10.3 Replace Master Power Fuse.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: 5 AMP Fuse

**WARNING**

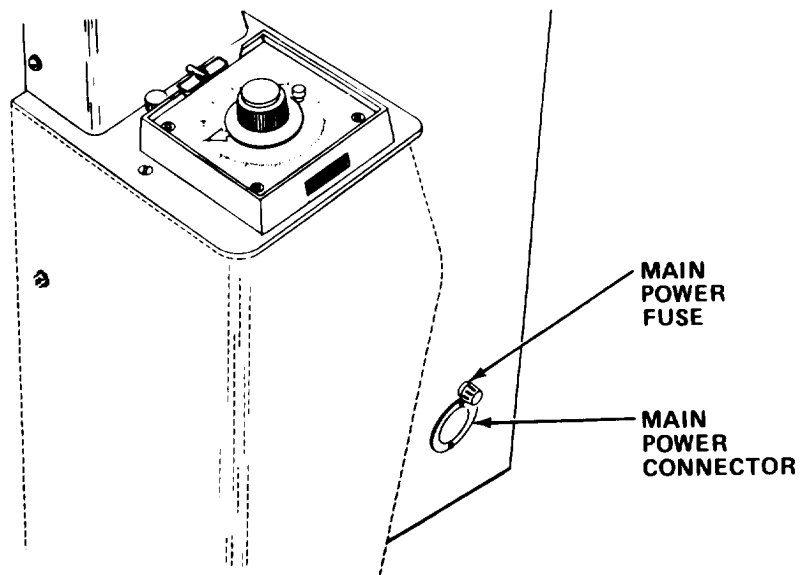
Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.





- b. Turn off circuit breaker.

**NOTE**

Fuse is located at lower right side of printer.

- c. Remove fuse by pushing inward and turning left.
- d. Install new fuse by pushing inward and turning right.
- e. Turn on circuit breaker.
- f. Turn on MASTER POWER switch.

9-10.4 Replace APL Fuse.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: 5 AMP Fuse

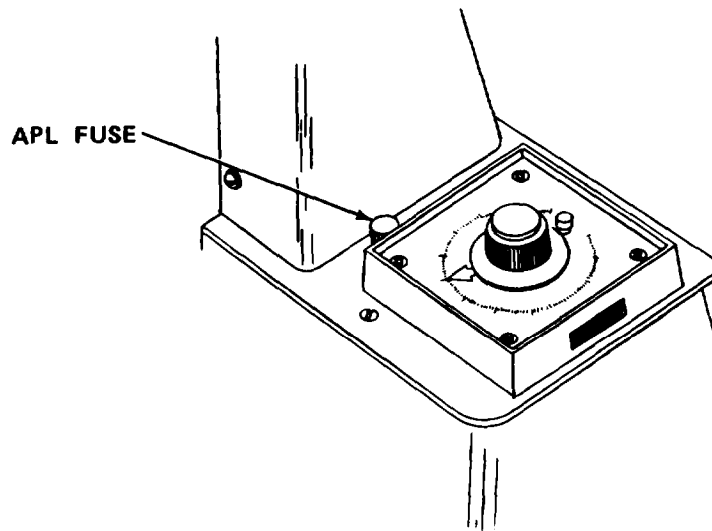
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



- b. Turn off circuit breaker.
- c. Remove fuse by pushing inward and turning left.
- d. Install new fuse by pushing inward and turning right.
- e. Turn on circuit breaker.
- f. Turn on MASTER POWER switch.

9-10.5 Replace RPT Fuse.

MOS: 83E, Photo and Layout Specialist

SUPPLIES: 5 AMP Fuse

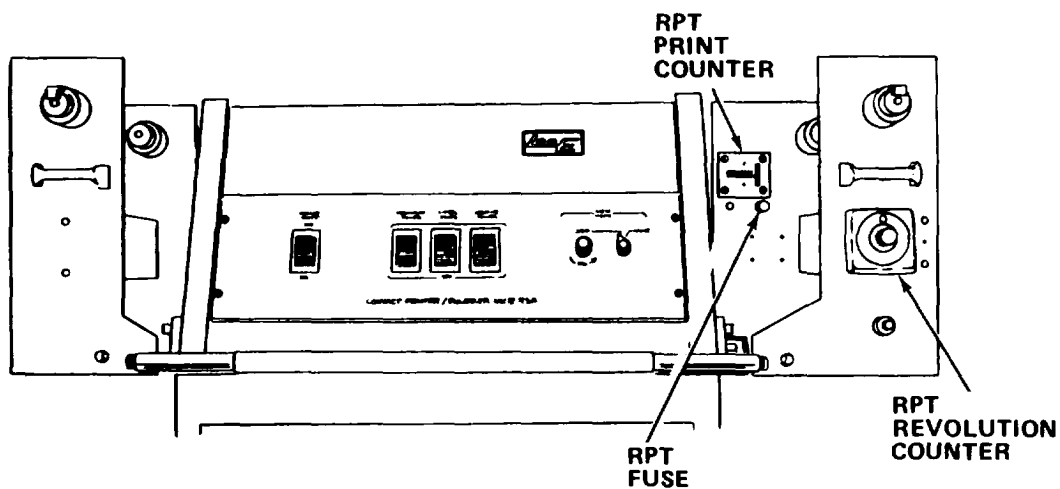
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



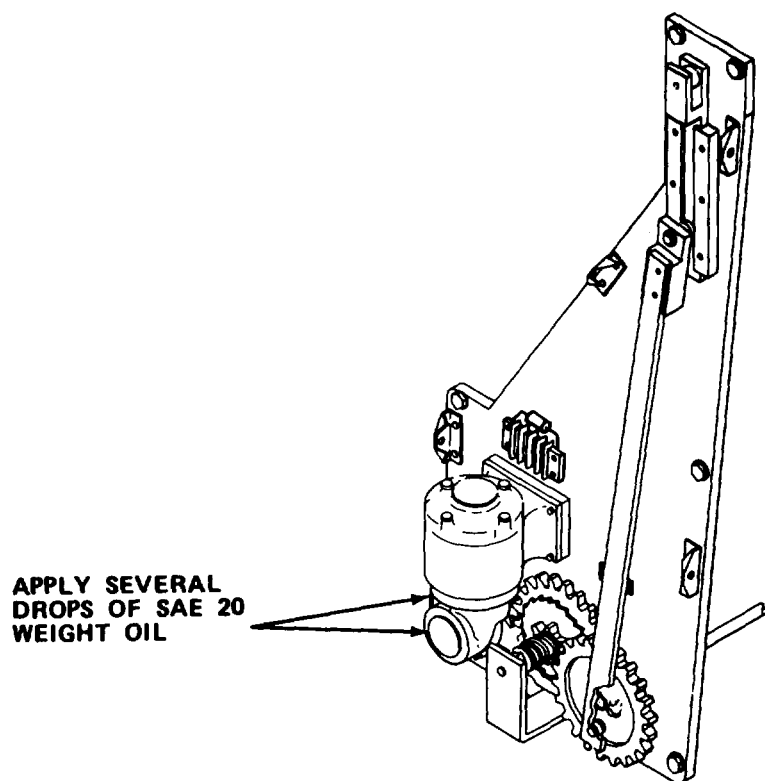
- b. Turn off circuit breaker.
- c. To remove fuse, push inward and turn left.
- d. To replace fuse, push inward and turn right.
- e. Turn on circuit breaker.
- f. Turn on MASTER POWER switch.

Section IV ORGANIZATIONAL MAINTENANCE

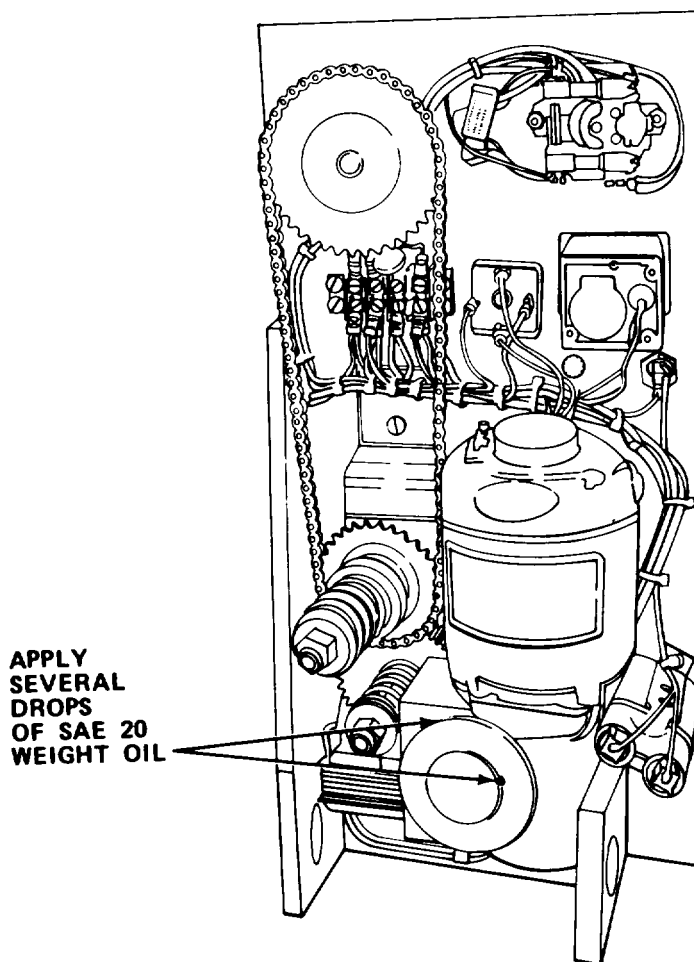
9-11. LUBRICATION INSTRUCTIONS.

NOTE

The following lubrication instructions are mandatory.



9-11.1 APL Motor. On receipt and semiannually add several drops of SAE 20 weight oil (Item 20, Appendix E) to two APL motor lubrication fittings.



9-11.2 RPT Motor. On receipt and semiannually add several drops of SAE 20 weight oil (Item 20, Appendix E) to two APL motor lubrication fittings.

**9-12. REPAIR PARTS, SPECIAL TOOLS: TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

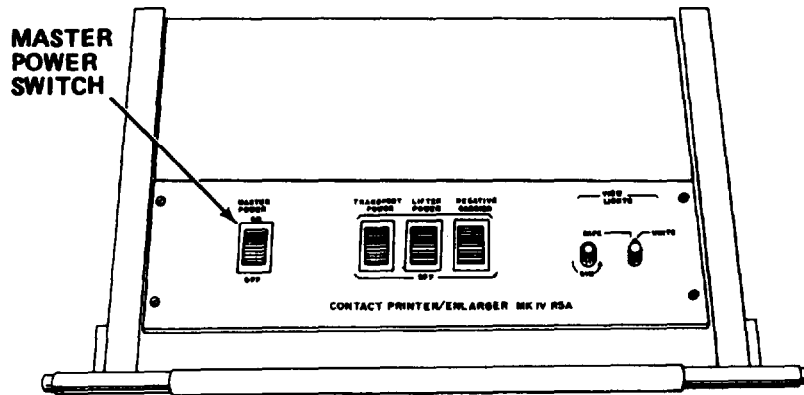
9-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

9-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

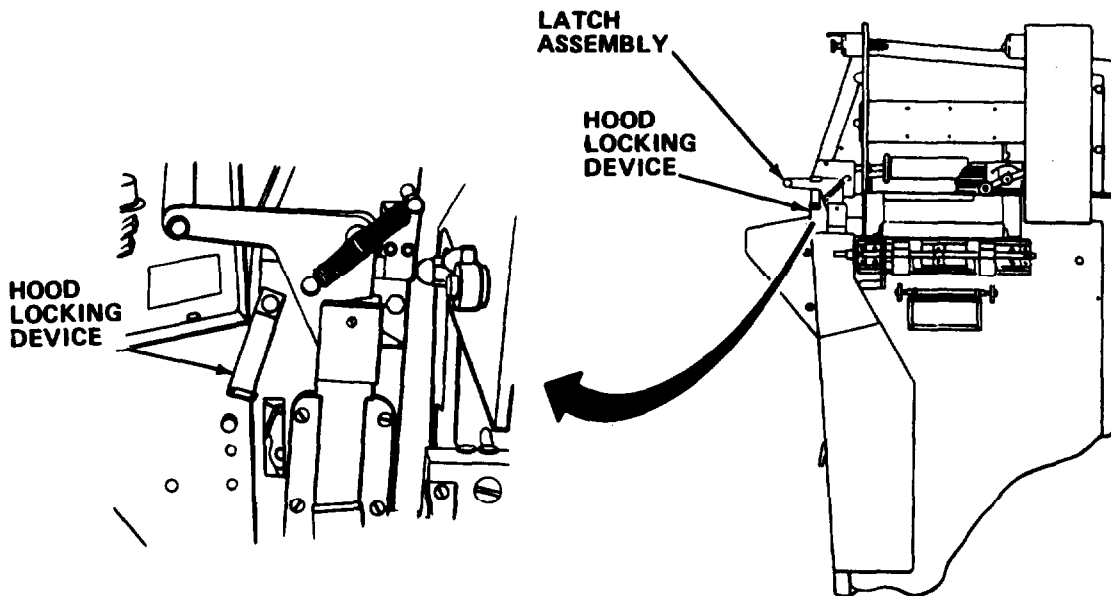
9-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

9-13. SERVICE UPON RECEIPT.

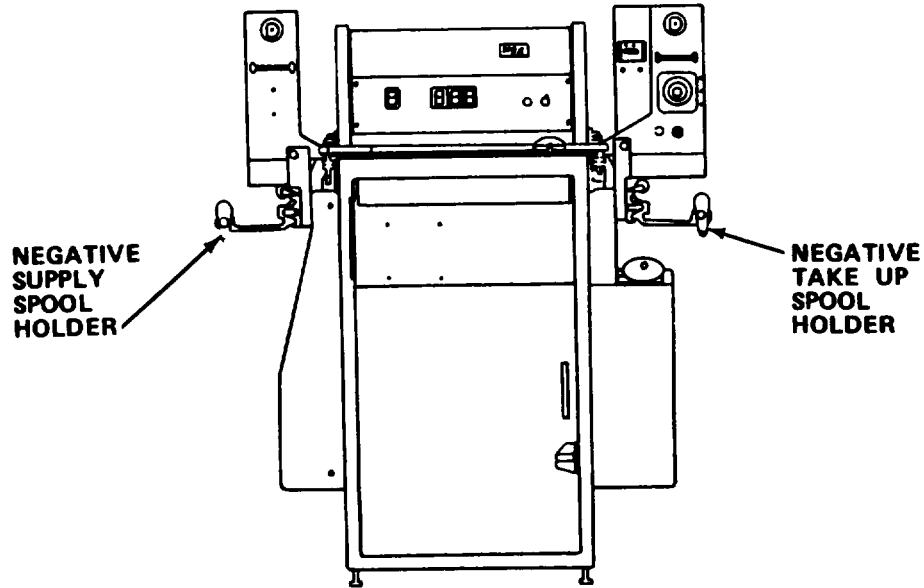
- a. Remove cover.



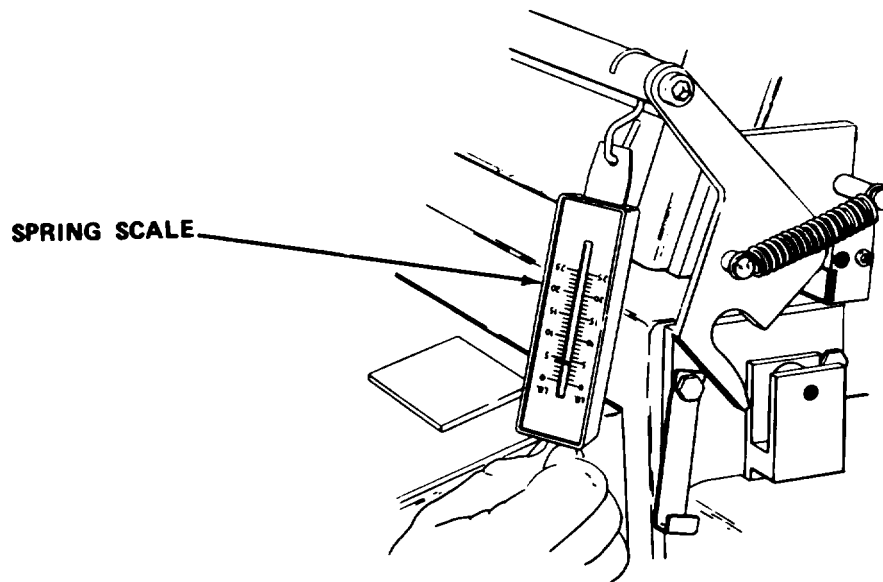
- b. Turn off MASTER POWER switch.
- c. Turn off circuit breaker.



- d. Loosen and swing hood locking device out of way on latch assembly.
- e. Tighten braces.

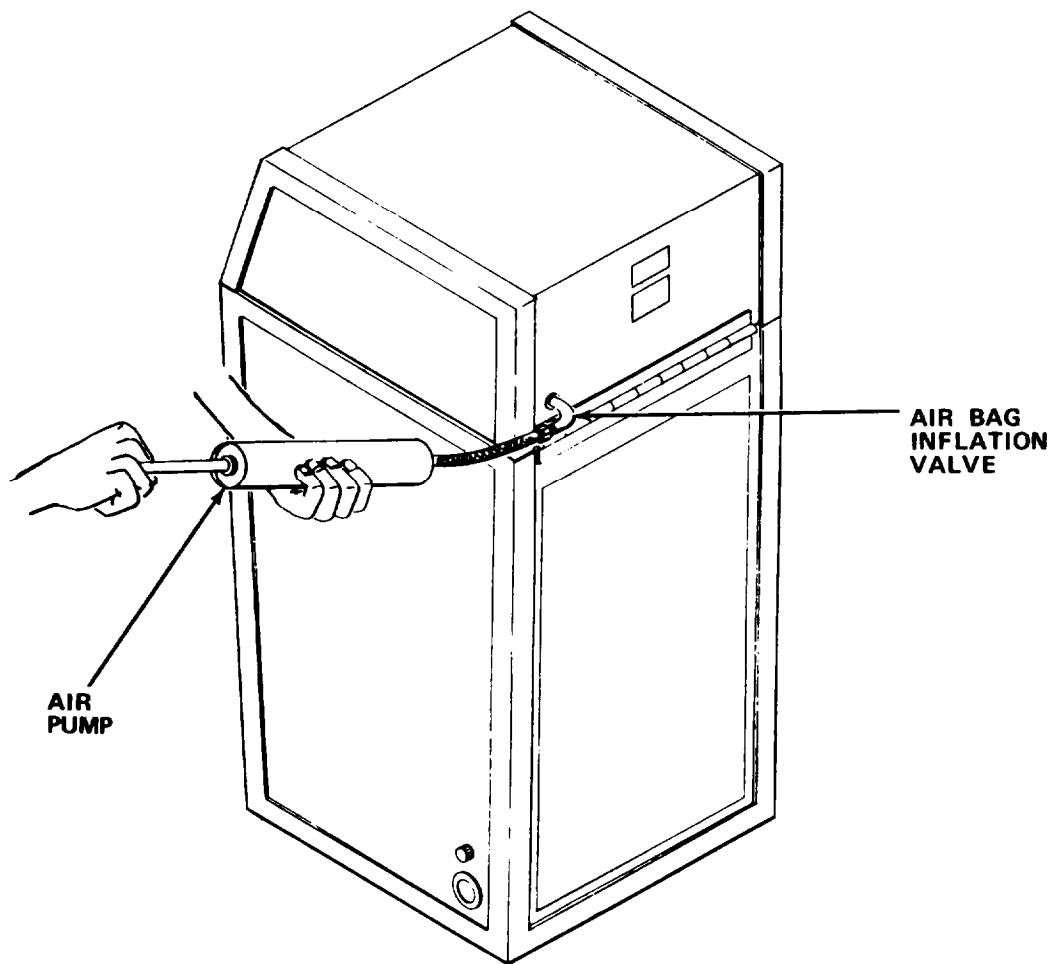


f. Rotate negative spool holders to see if they rotate freely.



g. Attach spring scale to platen handle.

h. Close and lock hood by pulling on weight of spring scale. Do this several times. Hood should lock at an indication of 8 to 12 pounds.



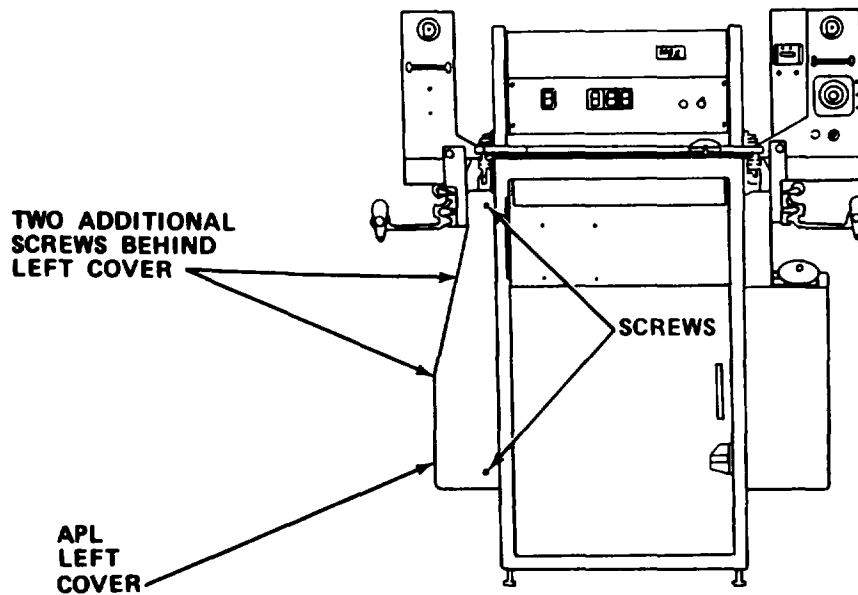
- i. Attach hand air pump to airbag inflation valve.
- j. Open airbag inflation valve by turning knurled lock to left.

**CAUTION**

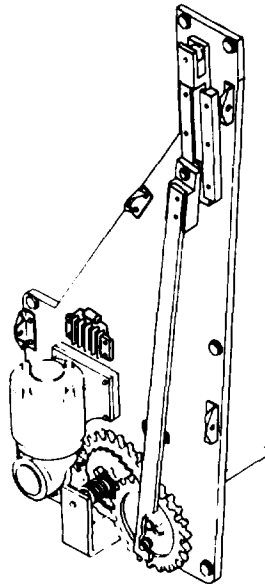
Inflate airbag slowly. Airbag will rupture if overinflated.

- k. Slowly operate hand air pump to increase airbag pressure.
- l. Close airbag inflation valve by turning knurled lock to right.
- m. Recheck airbag pressure by repeating steps g. and h.
- n. When airbag pressure indicates 8-12 lbs, disconnect hand air pump.

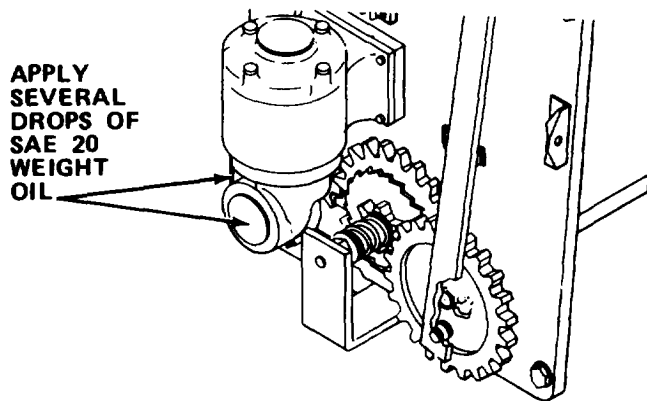




- o. Remove four screws and washers to remove APL left cover.



- p. Check that all parts are securely fastened.
- q. Use vacuum cleaner to remove any dust or foreign matter adhering to chassis components.



r. Add several drops of SAE 20 weight oil (Item 20, Appendix E) to two APL motor lubrication fittings.

s. Use cheesecloth to remove any oil or grease deposits from components.

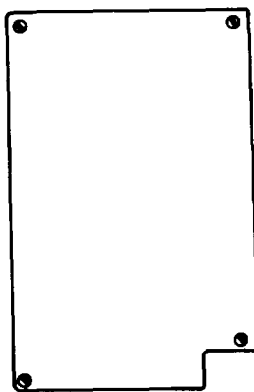
t. Check that insulation and wiring are not damaged or broken.

u. Check that wiring is not stretched between terminals or around sharp edges.

v. Reinstall APL left cover, and secure with four screws and washers.

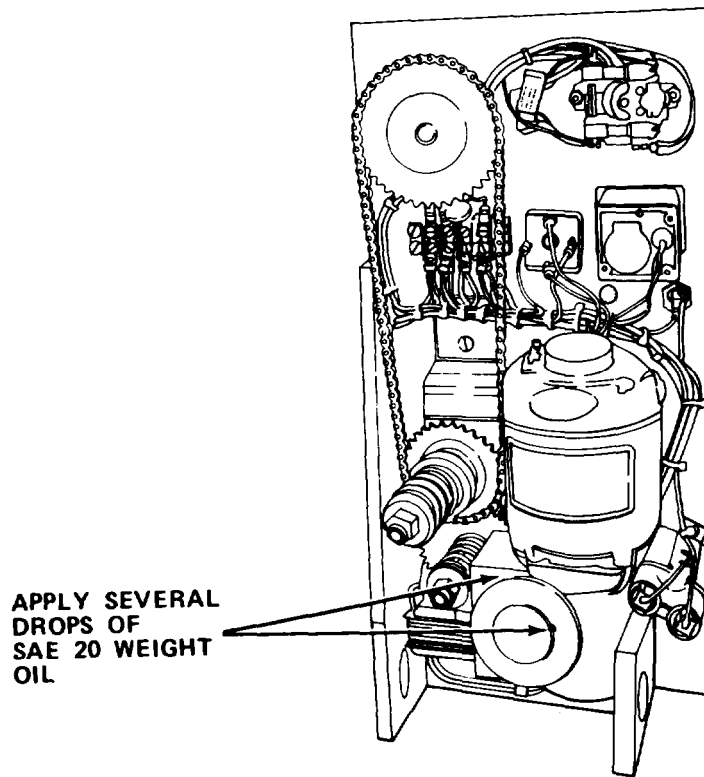
**WARNING**

To prevent serious injury, two men are required to move equipment for maintenance operations. Equipment weighs approximately 500 lbs.



**RPT REAR COVER**

- w. Loosen four screws and remove RPT rear cover.
- x. Use vacuum cleaner to remove any dust or foreign matter adhering to chassis components.



- y. Add several drops of SAE 20 weight oil (Item 20, Appendix E) to two RPT motor lubrication fittings.
- z. Use cheesecloth to remove any oil or grease deposits from components.
- aa. Check that all parts are securely fastened.
- ab. Check that insulation and wiring are not damaged or broken.
- ac. Check that wiring is not stretched between terminals or around sharp corners.
- ad. Reinstall RPT rear cover, and secure by tightening four screws.
- ae. Check that casters roll freely.
- af. Check that air shocks function properly and are not damaged.
- ag. Check transformer for external damage.

**9-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**

a. PMCS are designed to keep the equipment in good working condition by performing certain tests, inspections, and services. The intervals provide you, the organizational technician, with time schedules that determine when to perform specified tasks.

b. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording the results of PMCS.

c. Interval columns. This column determines the time period designated to perform your PMCS.

d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

e. List of tools and materials required for PMCS is as follows:

| <u>I t e m</u>                   | <u>Q u a n t i t y</u> |
|----------------------------------|------------------------|
| Vacuum Cleaner                   | 1 ea                   |
| Cheesecloth (Item 7, Appendix E) | ar                     |
| Flat Tip Screwdriver             | 1 ea                   |
| 8 in. Adjustable Wrench          | 1 ea                   |

Table 9-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

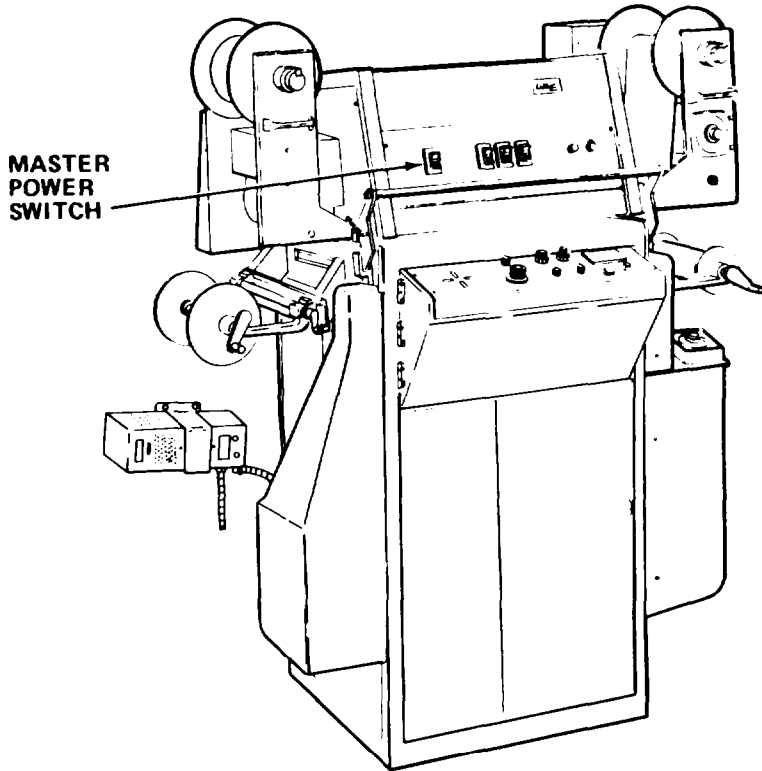
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|----------|----------|---|
| 1        | S        | <p><b>CONTACT PRINTER/ENLARGER</b></p> <p><u>Service Printer.</u></p>  <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power is turned off before servicing.</p> <ol style="list-style-type: none"> <li>1. Turn off MASTER POWER switch.</li> <li>2. Turn off circuit breaker.</li> </ol> |

Table 9-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

|          |          | B - Before<br>D - During<br>A - After  | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours |
|----------|----------|--|--|--|------------------------------|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED   |  |  |                              |
|          |          | PROCEDURE  |  |  |                              |
|          |          | <u>CONTACT PRINTER/ENLARGER - Cont</u>   |  |  |                              |
| 1        | S        | <u>Service Printer - Cont</u>  |  |  |                              |
|          |          | <p>The diagram illustrates the removal of a contact printer/enlarger from a wall. It shows a perspective view of the equipment's base. A bolt is shown being removed from the top of the equipment, passing through a washer. The equipment is supported by air shocks and casters. Labels with arrows point to the BOLT, WASHER, CONTACT PRINTER/ENLARGER, AIR SHOCK, and CASTER.</p> |  |  |                              |
|          |          | <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>To prevent serious injury, two men are required to move equipment for maintenance operations. Equipment weighs approximately 500 lbs.</p> <ol style="list-style-type: none"> <li>3. Deflate air shocks, remove bolts and washers and lower casters.</li> <li>4. Pull printer/enlarger away from wall.</li> </ol>           |  |  |                              |

Table 9-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

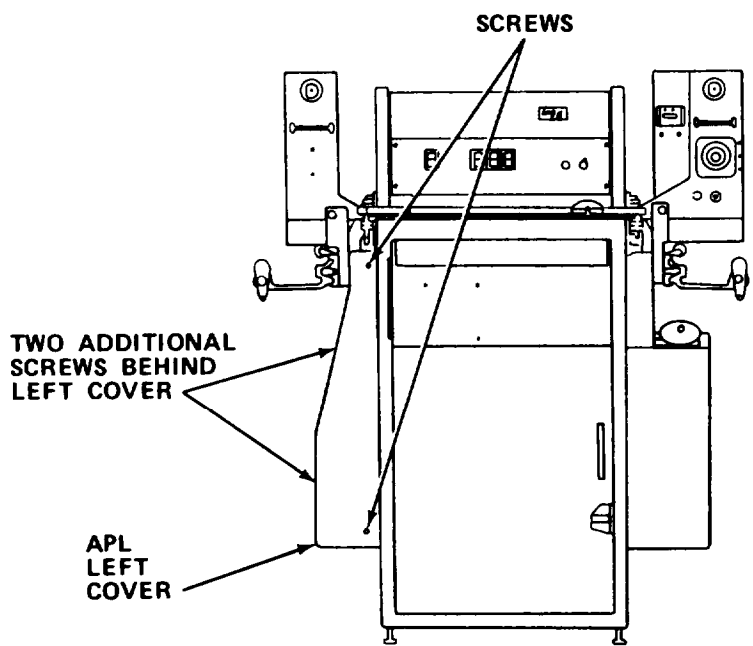
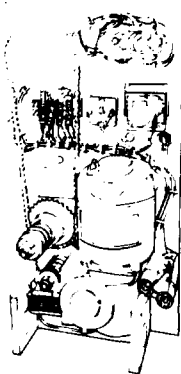
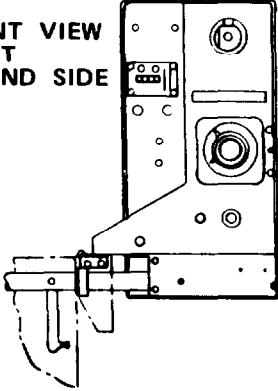
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   |
|----------|----------|---|
| 1        | S        | <p><b>CONTACT PRINTER/ENLARGER - Cont</b></p> <p><u>Service Printer - Cont</u></p>  <p>The diagram shows a side view of the printer's chassis. A large rectangular cover is attached to the left side. Three arrows point to the top edge of this cover, with labels: 'SCREWS' (pointing to the top edge), 'TWO ADDITIONAL SCREWS BEHIND LEFT COVER' (pointing to the top edge), and 'APL LEFT COVER' (pointing to the cover itself). The chassis has various components on top, including a control panel with buttons and a dial.</p> <ol style="list-style-type: none"> <li>5. Remove screws and washers to remove APL left cover.</li> <li>6. Check that all parts are securely fastened.</li> <li>7. Use vacuum cleaner to remove any dust or foreign matter adhering to chassis components.</li> <li>8. Use cheesecloth to remove any oil or grease deposits from components.</li> <li>9. Check that insulation and wiring are not damaged or broken.</li> </ol> |

Table 9-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
 A - After                      O - Quarterly                      BI - Biennially

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  |
|----------|----------|--|
| 1        | S        | <b>CONTACT PRINTER/ENLARGER - Cont</b>   |
|          |          | <p><u>Service Printer - Cont</u></p> <p>10. Check that wiring is not stretched between terminals or around sharp edges.</p> <p>11. Reinstall APL left cover and secure with screws and washers.</p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>To prevent serious injury, two men are required to move equipment for maintenance operations. Equipment weighs approximately 500 lbs.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><b>REAR VIEW<br/>RIGHT<br/>REWIND SIDE</b></p>  </div> <div style="text-align: center;"> <p><b>FRONT VIEW<br/>RIGHT<br/>REWIND SIDE</b></p>  </div> </div> <p>12. Loosen screws and remove RPT rear cover.</p> <p>13. Use vacuum cleaner to remove any dust or foreign matter adhering to chassis components.</p> |



**Table 9-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

|          |          | B - Before<br>D - During<br>A - After  | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours |
|----------|----------|--|--|--|------------------------------|
| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED   |  |  |                              |
|          |          | PROCEDURE  |  |  |                              |
|          |          | <b><u>CONTACT PRINTER/ENLARGER - Cont</u></b>  |  |  |                              |
| 1        | S        | <u>Service Printer - Cont</u>  |  |  |                              |
|          |          | 15. Check that all parts are securely fastened.  |  |  |                              |
|          |          | 16. Check that insulation and wiring are not damaged or broken.                                  |  |  |                              |
|          |          | 17. Check that wiring is not stretched between terminals or around sharp corners.                |  |  |                              |
|          |          | 18. Reinstall RPT rear cover and secure by tightening screws.                                    |  |  |                              |
|          |          | 19. Reposition printer/enlarger over air shocks, raise casters, and reinstall bolts and washers. |  |  |                              |
|          |          | 20. Turn on circuit breaker.   |  |  |                              |

**9-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a. Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by the operator should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the facing schematic or the foldout located at the end of this manual for further fault analysis.

d. If the contact printer enlarger does not power-up when turned on, verify that 120 V ac is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power procedures for dead receptacle (Table 1-4).

Table 9-4. ORGANIZATIONAL TROUBLESHOOTING

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

**WARNING**

Death or serious injury could result by failure to observe this warning. Voltages in excess of 10 kV are present when the MASTER POWER switch is on. Observe safety precautions if work must be performed on energized equipment.

1. POWER ON LAMP DOES NOT ILLUMINATE.

Step 1. Check main power fuse for continuity.

(a) If continuity is present, proceed to step 2.

(b) If continuity is not present, refer to direct/general support maintenance.

Step 2. Check for the presence of 120 V ac at P101; output side of constant voltage transformer.

(a) If 120 V ac is present, proceed to step 3.

(b) If 120 V ac is not present, refer to direct/general support maintenance.

Step 3. Check MASTER POWER switch for continuity.

(a) If continuity is present, proceed to step 4.

(b) If continuity is not present, replace MASTER POWER switch (paragraph 9-16.12).

Step 4. Check continuity of elapsed time meter HM101.

(a) If continuity is present, proceed to step 5.

(b) If continuity is not present, replace elapsed time meter (paragraph 9-16.10).

Table 9-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION                                    | TEST OR INSPECTION                                 | CORRECTIVE ACTION  |
|--|--|--|
| 1. POWER ON LAMP DOES NOT ILLUMINATE - Cont    | Step 5. Check power supply fuse F1 for continuity. | (a) If continuity is present, proceed to step 6.<br>(b) If continuity is not present, refer to direct/general support maintenance.     |
| 2. APL MOTOR WILL NOT RUN UNDER ANY CONDITION. | Step 1. Check LIFTER POWER switch for continuity.  | (a) If continuity is present, proceed to step 2.<br>(b) If continuity is not present, replace LIFTER POWER switch (paragraph 9-16.12). |
|  | Step 2. Check continuity of relay RY301.           | If continuity is not present, replace relay RY301 (paragraph 9-16.1).  |
| 3. RPT MOTOR WILL NOT RUN UNDER ANY CONDITION. | Check continuity of TRANSPORT POWER switch.        | If continuity is not present, replace TRANSPORT POWER switch (paragraph 9-16.12).  |

Table 9-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

---

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

---

|   |  |   |
|---|--|---|
| 4. FILTER ARM ASSEMBLY AND NEGATIVE CARRIER DO NOT MOVE WHEN NEGATIVE CARRIER SWITCH IS ON.               |  |   |
|   | Step 1. Check to see if P104 is plugged in.                    |   |
|   |  | (a) If plugged in, proceed to step 2.   |
|   |  | (b) Plug in P104.   |
|   | Step 2. Check continuity of negative carrier hood switch.      |   |
|   |  | (a) If continuity is present, proceed to step 3.  |
|   |  | (b) If continuity is not present, replace negative carrier hood switch (paragraph 9-16.12). |
|   | Step 3. Check output of rectifier CR101.                       |   |
|   |  | If output is not present, replace rectifier (paragraph 9-16.11).                            |
| 5. FILTER ARM ASSEMBLY DOES NOT MOVE WHEN NEGATIVE CARRIER SWITCH IS ON. NEGATIVE CARRIER WORKS NORMALLY. |  |   |
|   | Check continuity of filter solenoid RS102.                     |   |
|   |  | Replace filter solenoid (paragraph 9-16.9).   |
| 6. NEGATIVE CARRIER ASSEMBLY DOES NOT MOVE WHEN NEGATIVE CARRIER SWITCH IS TURNED ON.                     |  |   |
|   | Check for proper operation of negative carrier solenoid RS101. |   |
|   |  | Replace defective negative carrier solenoid (paragraph 9-16.9).                             |

Table 9-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|--|--|--|
| 7. IN MULTIPLE-PRINT OPERATION, APL CONTINUES TO CLOSE HOOD BEFORE PAPER ADVANCE IS COMPLETE. OPERATES NORMALLY DURING SINGLE-PRINT OPERATION. | Check for proper operation of RPT revolution counter CTR302.   | Replace defective RPT revolution counter (paragraph 9-16.6). |
| 8. APL MOTOR WILL NOT RUN UNDER ANY CONDITION. MACHINE WORKS NORMALLY IN SINGLE-PRINT. RPT WORKS.  | <p>Step 1. Check relay RY201 for continuity.</p> <p>(a) If continuity is present, proceed to step 2.</p> <p>(b) If continuity is not present, replace RY201 relay (paragraph 9-16.7).</p> <p>Step 2. Check APL single/multiple print switch for continuity.</p> <p>(a) If continuity is present, proceed to step 3.</p> <p>(b) If continuity is not present, replace single/multiple print switch (paragraph 9-16.7).</p> <p>Step 3. Check impulse counter for continuity.</p> <p>(a) If continuity is present, proceed to step 4.</p> <p>(b) If continuity is not present, replace impulse counter (paragraph 9-16.7).</p> |  |

Table 94. ORGANIZATIONAL TROUBLESHOOTING - Cont

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| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

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8. APL MOTOR WILL NOT RUN UNDER ANY CONDITION. MACHINE WORKS NORMALLY IN SINGLE-PRINT. RPT WORKS - Cont

Step 4. Check capacitor C202.

- (a) If capacitor is not defective, proceed to step 5.
- (b) Replace defective capacitor C202 (paragraph 9-16.7).

Step 5. Check continuity of voltage resistor THY201.

- (a) If continuity is present, proceed to step 6.
- (b) Replace defective voltage resistor THY201 (paragraph 9-16.7).

Step 6. Check for proper operation of repeat revolution counter.

Replace defective repeat revolution counter (paragraph 9-16.6).

9. ROLL PAPER TRANSPORT FUSE F301 BLOWS AS SOON AS HOOD RISES, PREVENTING RPT OPERATION. APL WORKS NORMALLY IN SINGLE-PRINT OPERATION.

Step 1. Check capacitor C301.

- (a) If capacitor is not defective, proceed to step 2.
- (b) Replace defective capacitor C301 (paragraph 9-16.5).

Step 2. Check repeat revolution counter for continuity.

- (a) If continuity exists, proceed to step 3.
- (b) Replace defective repeat revolution counter (paragraph 9-16.6).

**Table 9-4. ORGANIZATIONAL TROUBLESHOOTING - Cont**

| MALFUNCTION  | TEST OR INSPECTION                                 | CORRECTIVE ACTION   |
|--|--|---|
| 9. ROLL PAPER TRANSPORT FUSE F301 BLOWS AS SOON AS HOOD RISES, PREVENTING RPT OPERATION. APL WORKS NORMALLY IN SINGLE-PRINT OPERATION - Cont | Step 3. Check print counter CTR301 for continuity. | If continuity does not exist, replace defective print counter (paragraph 9-16.2). |
| 10. RPT PAPER FEED ROLLERS DO NOT TURN   | Check paper stop solenoid LS301 for continuity.    | Replace defective paper stop solenoid LS301 (paragraph 9-16.3)                    |
| 11. REVOLUTION COUNTER DOES NOT COUNT DOWN.  | Check revolution counter for continuity.           | Replace defective repeat revolution counter (paragraph 9-16.6).                   |
| 12. RPT PAPER DRIVE SYSTEM CONTINUES TO OPERATE UNTIL HOOD IS CLOSED.  | Check relay RY301 for continuity.                  | Replace defective relay RY301 (paragraph 9-16.1).                                 |

**9-16. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering organizational maintenance functions for the contact printer/enlarger. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

| PROCEDURES   | PARAGRAPH |
|--|-----------|
| Replace Relay RY301 . . . . .                          | 9-16.1    |
| Replace Print Counter CTR301 . . . . .                 | 9-16.2    |
| Replace Paper Stop Solenoid LS301 . . . . .            | 9-16.3    |
| Replace Bridge Rectifier CR301 . . . . .               | 9-16.4    |
| Replace Capacitor C301 . . . . .                       | 9-16.5    |
| Replace Repeat Revolution Counter CTR302 . . . . .     | 9-16.6    |
| Repair Right APL Assembly. . . . .                     | 9-16.7    |
| Replace Solenoid LS201 . . . . .                       | 9-16.8    |
| Replace Electrical Solenoids RS101 and RS102 . . . . . | 9-16.9    |
| Replace Elapsed Time Meter HM101 . . . . .             | 9-16.10   |
| Replace Rectifier CR101. . . . .                       | 9-16.11   |
| Replace Power Panel Switch(es) . . . . .               | 9-16.12   |



9-16.1 Replace Relay RY301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 5/16 in. Combination Wrench  
Flat Tip Screwdriver  
Soldering Iron

SUPPLIES: Relay  
Solder (Item 30, Appendix E)

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**WARNING**

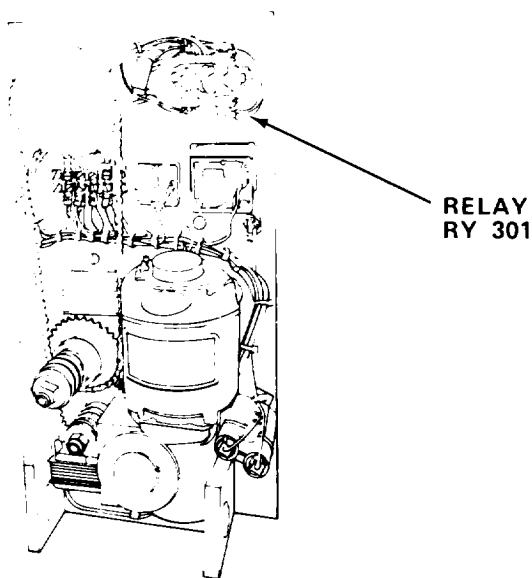
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Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



- b. Turn off circuit breaker.
- c. Loosen cover screws and remove RPT rear cover.
- d. Tag and desolder defective relay wiring.

- e. Remove bolts, washers, and defective relay assembly.

**WARNING**

High voltages that are capable of causing death may be stored in capacitor after power is removed. Be sure capacitor is discharged and reduced to zero volts.

- f. Note position and desolder two capacitors from defective relay.
- g. Replace defective relay.
- h. Solder capacitors to new relay.
- i. Install relay assembly and secure with bolts and washers.
- j. Resolder wires to relay.
- k. Reinstall cover and tighten screws.
- l. Turn on circuit breaker.
- m. Turn on MASTER POWER switch.

9-16.2 Replace Print Counter CTR301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Wire Cutters

SUPPLIES: Print Counter  
Cotter Pin  
Wire Ties

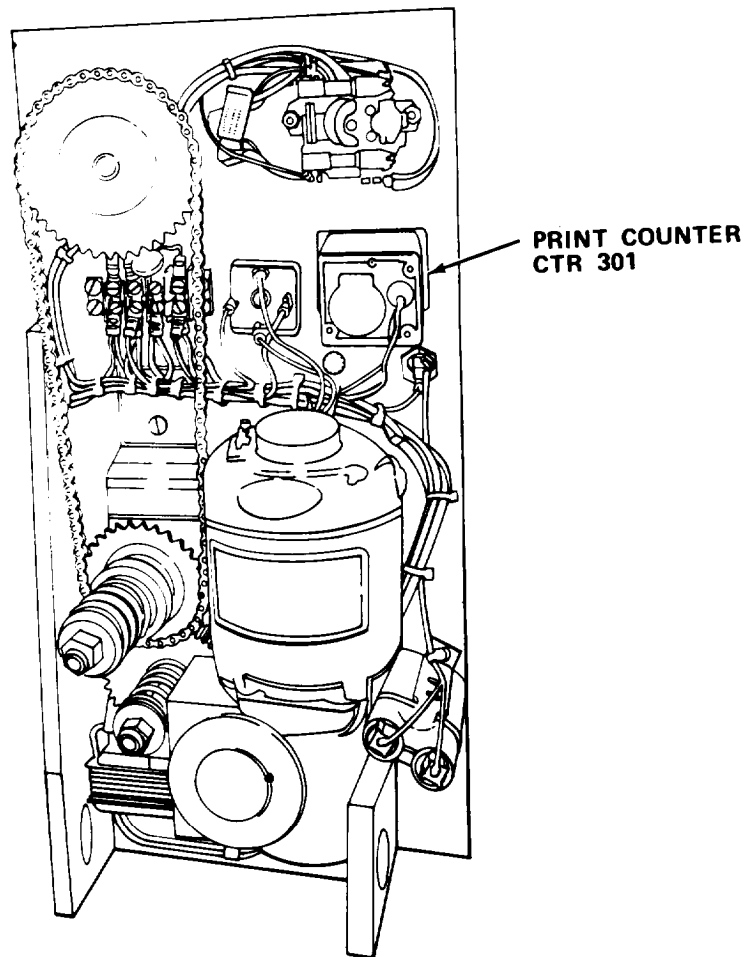
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Loosen screws holding cover and remove RPT cover.



- d. Cut wire ties.
- e. Remove print counter wiring from terminal board.
- f. Remove screws and defective print counter.
- g. Install new print counter and secure with screws.
- h. Reconnect print counter wiring to terminal board.
- i. Install new wire ties.
- j. Reinstall cover and tighten screws.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-16.3 Replace Paper Stop Solenoid LS301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 4 in. Flat Tip Screwdriver

SUPPLIES: Cotter Pin

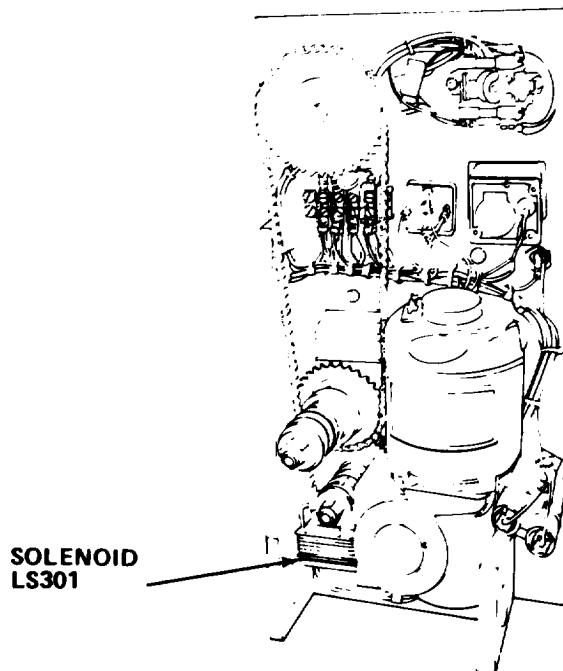
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Loosen screws holding cover in place and remove RPT cover.



- d. Remove cotter pin from solenoid.

- e. Remove solenoid wires from solenoid.
- f. Remove screws and remove defective solenoid.
- g. Install new solenoid with screws.
- h. Reconnect wiring.
- i. Install new cotter pin.
- j. Reinstall cover and tighten screws.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-16.4 Replace Bridge Rectifier CR301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 4 in. Flat Tip Screwdriver

SUPPLIES: Bridge Rectifier

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove RPT cover.
  
- d. Tag and disconnect wires from rectifier.
- e. Remove rectifier mounting screw, washer, and defective rectifier.
- f. Install new rectifier and secure with mounting screw and washer.
- g. Reconnect rectifier wiring.
- h. Reinstall cover.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-16.5 Replace Capacitor C301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 4 in. Flat Tip Screwdriver

SUPPLIES: Capacitor

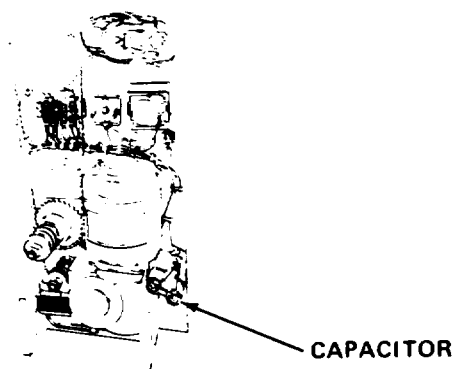
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



- b. Turn off circuit breaker.
- c. Loosen screws and remove RPT cover.

**WARNING**

High voltages that are capable of causing death may be stored in capacitor after power is removed. Be sure capacitor is discharged and reduced to zero volts.

- d. Remove screw and defective capacitor.
- e. Install new capacitor and secure with screw.
- f. Reinstall cover and tighten screws.
- g. Turn on circuit breaker.
- h. Turn on MASTER POWER switch.

Replace Repeat Revolution Counter CTR302.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 4 in. Flat Tip Screwdriver  
5/64 in. Hex Head Key Wrench

SUPPLIES: Revolution Counter

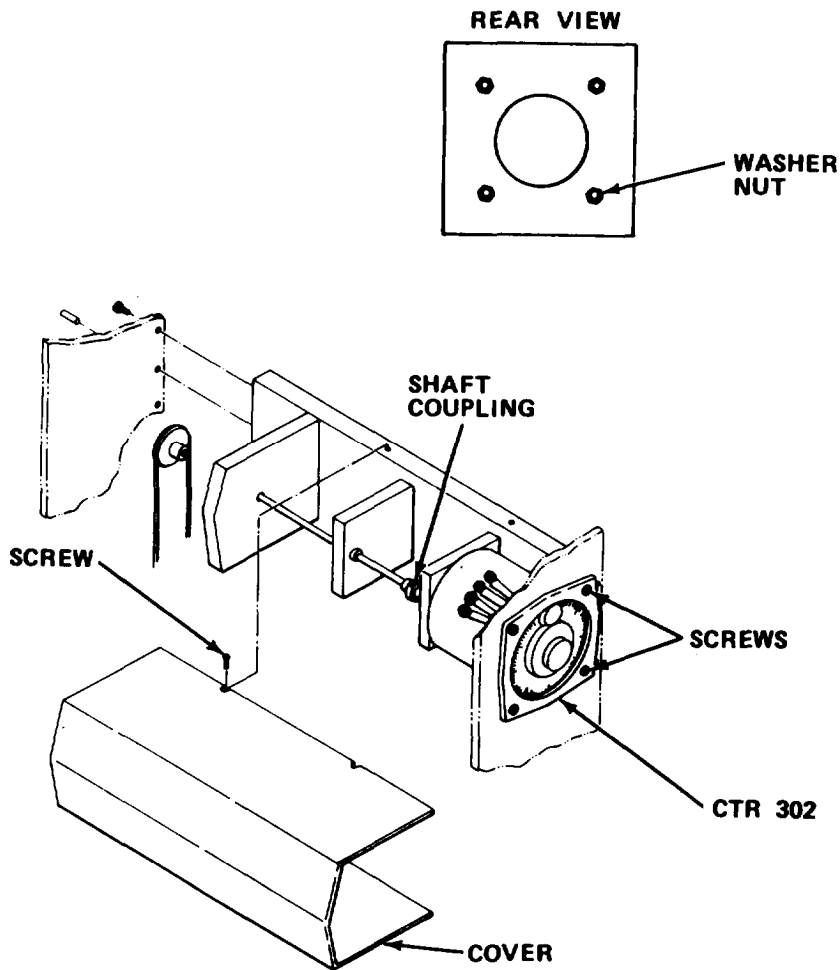
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.





- b. Turn off circuit breaker.
- c. Loosen screws and remove cover.
- d. Tag and disconnect counter wiring.
- e. Loosen shaft coupling nearest counter on shaft.
- f. Loosen screws and remove defective counter CTR302.
- g. Install new counter and tighten screws.
- h. Tighten setscrew on shaft coupling.
- i. Reconnect counter wiring.
- j. Reinstall cover and tighten screws.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-16.7 Repair Right APL Assembly

MOS: 83FJ6, Reproduction Equipment Repairer

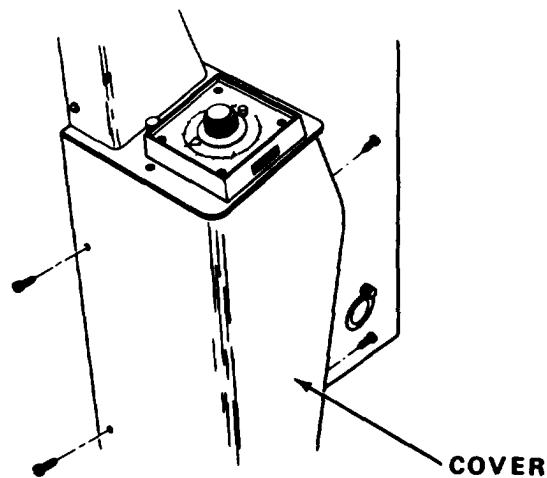
TOOLS: Flat Tip Screwdriver, wide tip  
Flat Tip Screwdriver, narrow tip  
Insulated Screwdriver, 10 in. blade  
9/16 in. Combination Wrench  
5/16 in. Combination Wrench  
11/16 in. Combination Wrench  
Soldering Iron

SUPPLIES: Relay  
APL Counter  
Single/Multiple Print Switch  
Fuse Holder  
Voltage Resistor  
Solder (Item 30, Appendix E)  
Capacitor

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Replace relay.
  - (1) Turn off MASTER POWER SWITCH.
  - (2) Turn off circuit breaker.

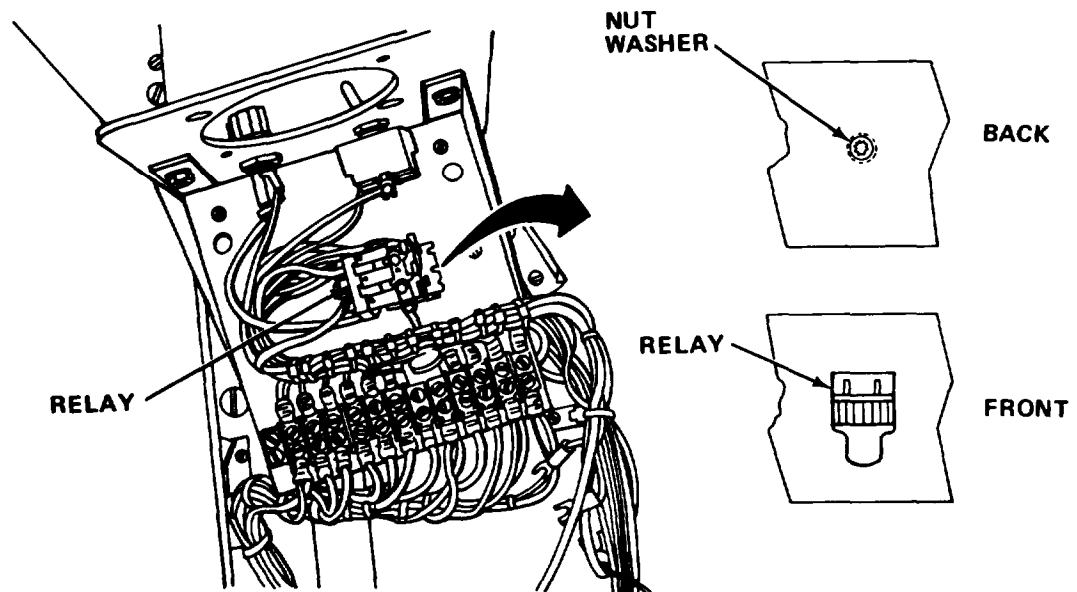


- (3) Remove screws and cover.
- (4) Remove screws and pull APL counter straight out.

**WARNING**

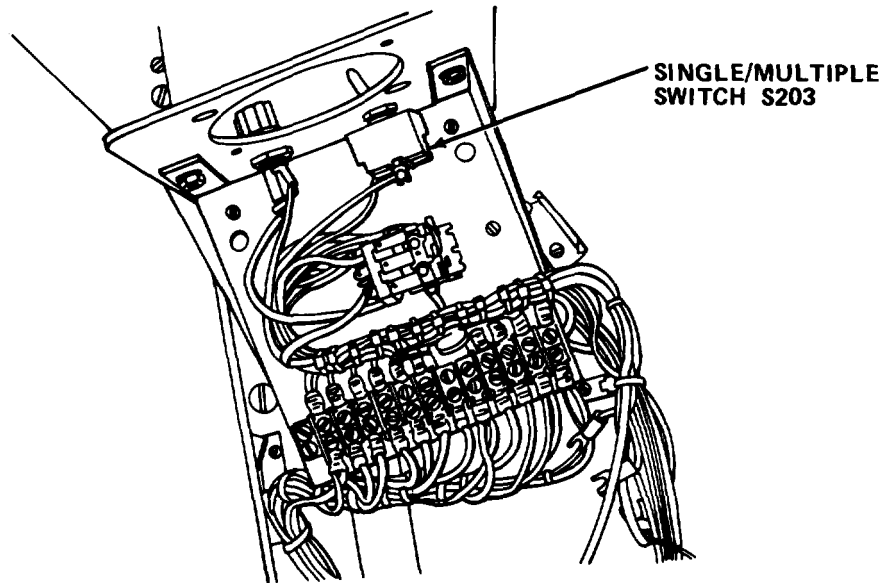
Ground and discharge capacitor before disconnecting. Personal injury may occur from failure to do so.

- (5) Using insulated screwdriver, ground capacitor by touching screwdriver shaft against housing post 8 and machine frame.
- (6) Tag and disconnect wiring from housing post 4, 6, 7, and 8.
- (7) Remove nuts, bolts, washers, and APL counter housing.

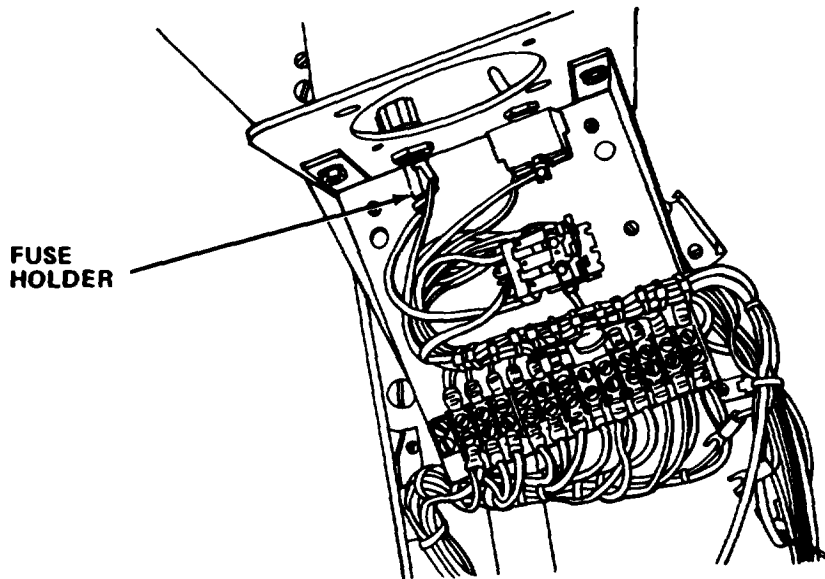


- (8) Remove nut securing relay to plate and remove relay.
- (9) Tag and desolder wiring from defective relay.
- (10) Solder wiring to new relay, install and secure with nut.
- (11) Reinstall APL counter housing and secure with bolts, washers, and nuts,
- (12) Reconnect wiring to APL counter housing.
- (13) Reinstall APL counter and secure with screws.

- (14) Reinstall cover.
  - (15) Turn on circuit breaker.
  - (16) Turn on MASTER POWER switch.
- b. Replace single/multiple switch.
- (1) Turn off MASTER POWER switch.
  - (2) Turn off circuit breaker.



- (3) Perform steps (3) through (7) in paragraph 9-16.7a.
  - (4) Remove retaining nut from top of switch and push switch through mounting bracket.
  - (5) Tag and desolder wires from defective switch.
  - (6) Solder wires to new switch, install in mounting bracket, and secure with retaining nut.
  - (7) Perform steps (11) through (16) paragraph 9-16.7a.
- c. Replace fuse holder.
- (1) Turn off MASTER POWER switch.
  - (2) Turn off circuit breaker.



- (3) Perform steps (3) through (7) in paragraph 9-16.7a.
  - (4) Tag and desolder fuse holder wiring.
  - (5) Remove nut and defective fuse holder.
  - (6) Install new fuse holder and secure with nut.
  - (7) Solder wiring to fuse holder.
  - (8) Perform steps (11) through (16) in paragraph 9-16.7a.
- d. Replace voltage resistor.
- (1) Turn off MASTER POWER switch.
  - (2) Turn off circuit breaker.
  - (3) Remove screws and cover.
  - (4) Disconnect voltage resistor wires from terminal posts 5 and 11.

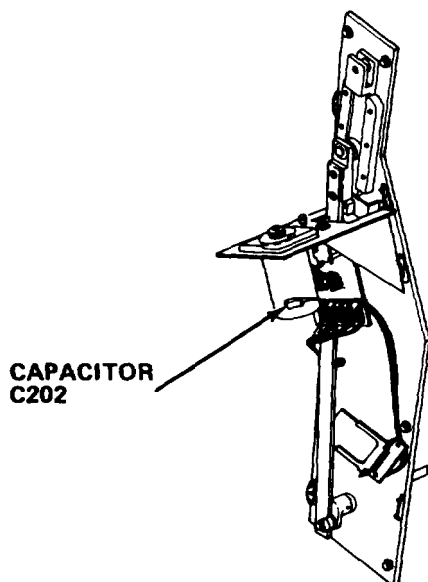
#### **NOTE**

Before installing new resistor, be sure all wires are properly connected to terminal posts.

- (5) Install new resistor and reconnect wiring.
  - (6) Reinstall cover.
  - (7) Turn on circuit breaker.
  - (8) Turn on MASTER POWER switch.
- e. Replace capacitor.
- (1) Turn off MASTER POWER switch.
  - (2) Turn off circuit breaker.
  - (3) Remove screws and cover.

**WARNING**

Ground and discharge capacitor before cutting capacitor leads.  
Personal injury may occur from failure to do so.



- (4) Using insulated screwdriver, ground capacitor by touching screwdriver shaft against housing post 8 and machine frame.
- (5) Cut defective capacitor lead wires as close to terminal as possible.
- (6) Connect new capacitor lead wires to terminal posts 7 and 8.

(7) Reinstall cover and secure with screws.

(8) Turn on circuit breaker.

(9) Turn on MASTER POWER switch.

f. Replace APL counter.

(1) Turn off MASTER POWER switch.

(2) Turn off circuit breaker.

(3) Loosen screws and remove defective APL counter by pulling straight.

(4) Install new counter and secure with screws.

(5) Turn on circuit breaker.

(6) Turn on MASTER POWER switch.

9-16.8 Replace Solenoid LS201

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Pliers

SUPPLIES: Solenoid  
Cotter Pin

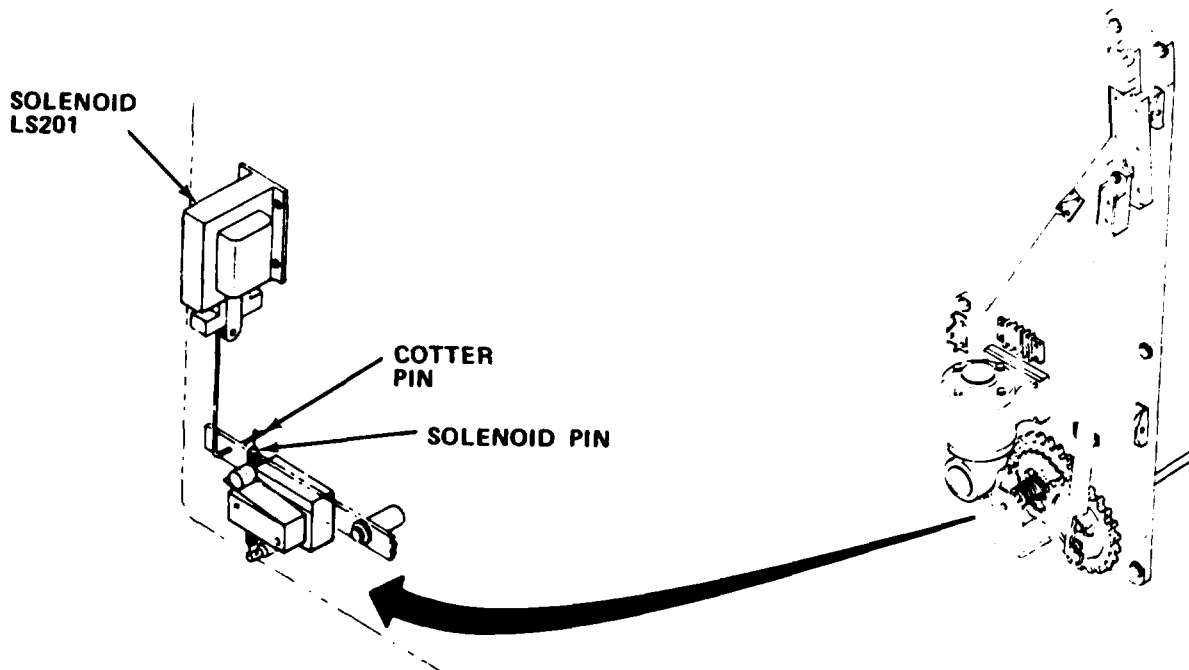
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove screws and cover.





- d. Remove cotter pin from solenoid link and remove solenoid pin.
- e. Remove screws and defective solenoid.
- f. Tag and disconnect wiring on solenoid.
- g. Reconnect wiring to new solenoid.
- h. Install new solenoid link using solenoid pin and new cotter pin.
- i. Attach solenoid link using solenoid pin and new cotter pin.
- j. Reinstall cover.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-16.9 Replace Electrical Solenoids RS101 and RS102.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1 in. Flat Tip Screwdriver  
5/16 in. Combination Wrench

SUPPLIES: Electrical Solenoids  
Electrical Tape (Item 36, Appendix E)

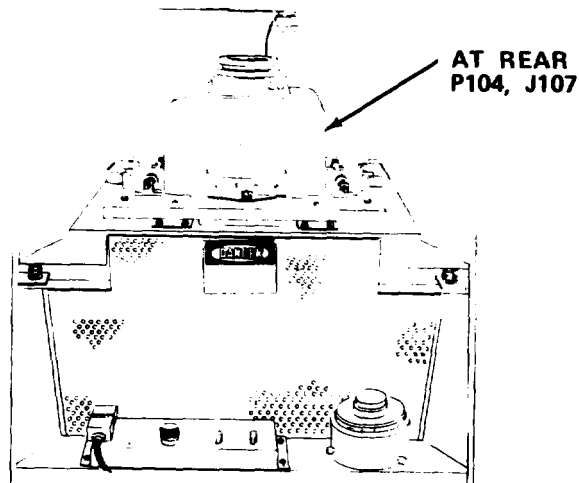
**WARNING**

Death or serious injury may occur from electrical shock unless power is secured before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console and lower cabinet door.



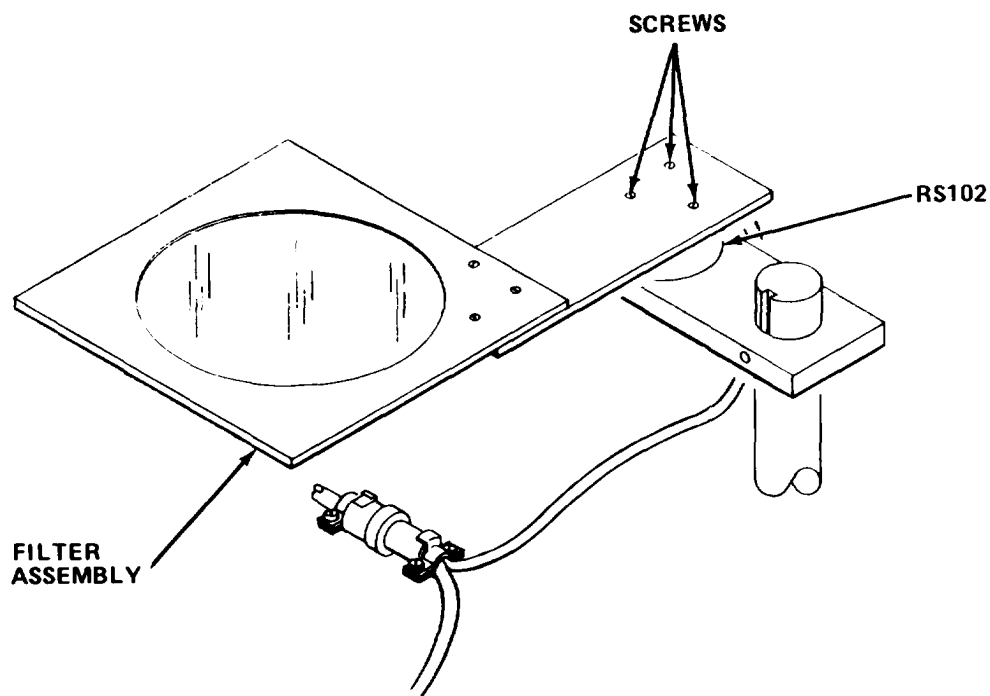
**NOTE**

P104 and J107 are located behind lens box assembly.

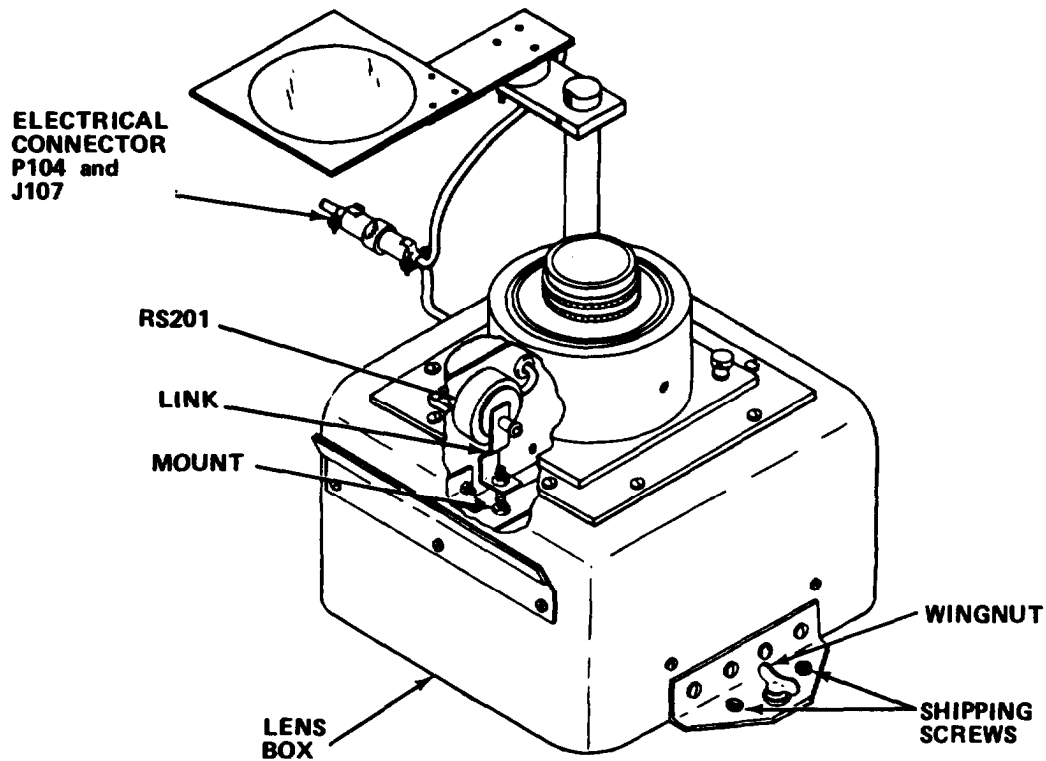
- d. Disconnect P104 from J107.

**NOTE**

- If solenoid RS102 is defective, proceed to step e.
- If solenoid RS101 is defective, proceed to step f.



- e. To install new solenoid RS102, perform the following:
- (1) Remove screws and nuts from top arm of filter assembly.
  - (2) Remove bottom screws from solenoid mounting plate.
  - (3) Cut solenoid lead wire.
  - (4) Install new solenoid and reconnect wires.
  - (5) Reinstall filter arm and secure with screws.



- f. To install new solenoid RS101, perform the following:
  - (1) Loosen wingnut and remove shipping lock screws.
  - (2) Remove screws that secure solenoid on back of lens box.
  - (3) Raise lens box assembly.
  - (4) Remove screw that holds link to solenoid.
  - (5) Tag and cut wiring from defective solenoid.
  - (6) Reconnect wiring to new solenoid.
  - (7) Reinstall link to solenoid.
  - (8) Reinstall solenoid to lens box using screws.
  - (9) Secure lens box with wingnut and shipping lock screws.
- g. Reconnect P104 to J107.
- h. Close operator's console and lower cabinet door.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-16.10 Replace Elapsed Time Meter HM101

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Time Meter

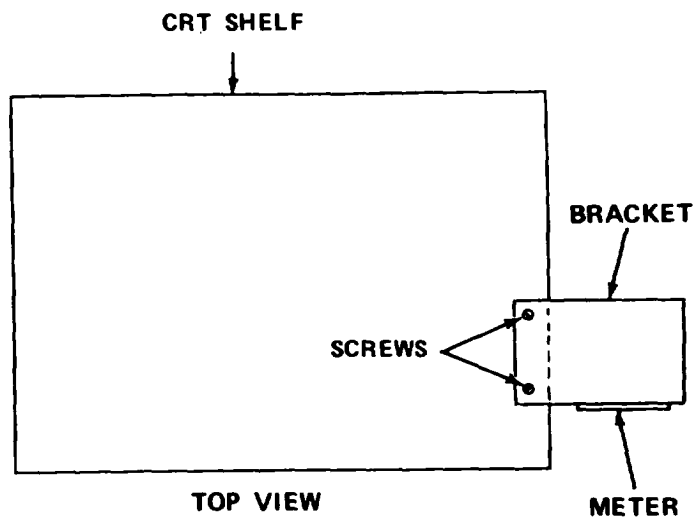
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

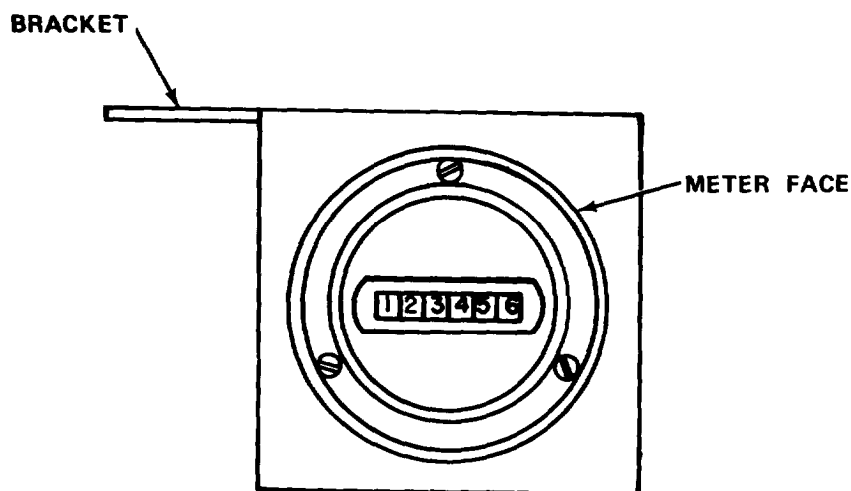
**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console and lower cabinet door.



- d. Remove screws and washers that hold meter bracket to CRT shelf.



- e. Remove screws from the meter face.
- f. Tag and disconnect meter leads.
- g. Remove screw and junction connector.
- h. Replace defective elapsed time meter.
- i. Reinstall junction connector.
- j. Reconnect wires to rear of new elapsed time meter.
- k. Reinstall meter on bracket and secure with screws.
- l. Reinstall meter bracket to CRT shelf using screws.
- m. Close operator's console and lower cabinet door.
- n. Turn on circuit breaker.
- o. Turn on MASTER POWER switch.

9-16.11 Replace Rectifier CR101

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Rectifier

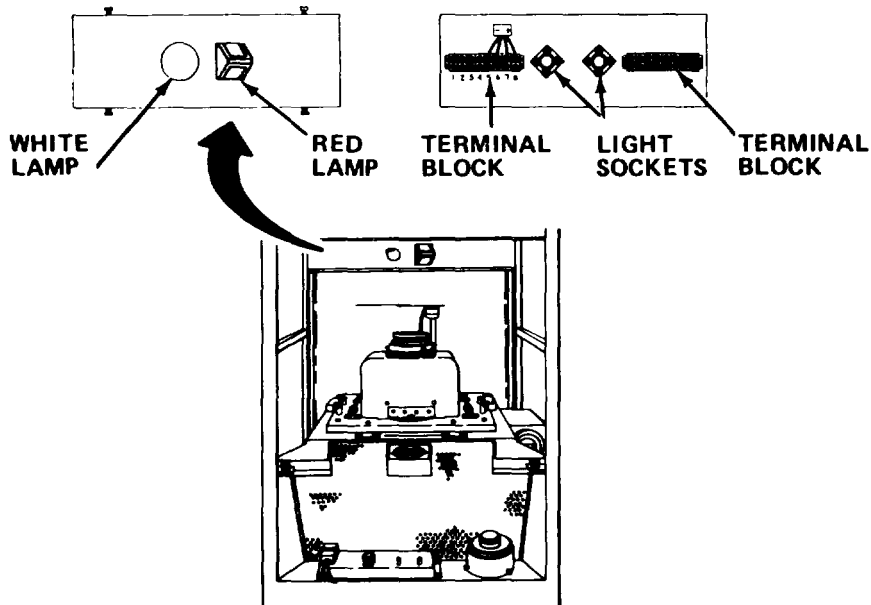
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console and lower cabinet door.
- d. Remove white lamp.



- e. Remove red light filter assembly.
- f. Loosen, but do not remove screws; remove panel.

**NOTE**

- Rectifier is located behind panel.
  - Negative lead on rectifier goes to pin 5 on terminal block.
- g. Remove screws and replace defective rectifier.
  - h. Reinstall panel.
  - i. Reinstall lightbulbs and red light filter assembly.
  - j. Close operator's console and lower cabinet door.
  - k. Turn on circuit breaker.
  - l. Turn on MASTER POWER switch.

9-16.12 Replace Power Panel Switch (es).

Mos: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver

SUPPLIES:

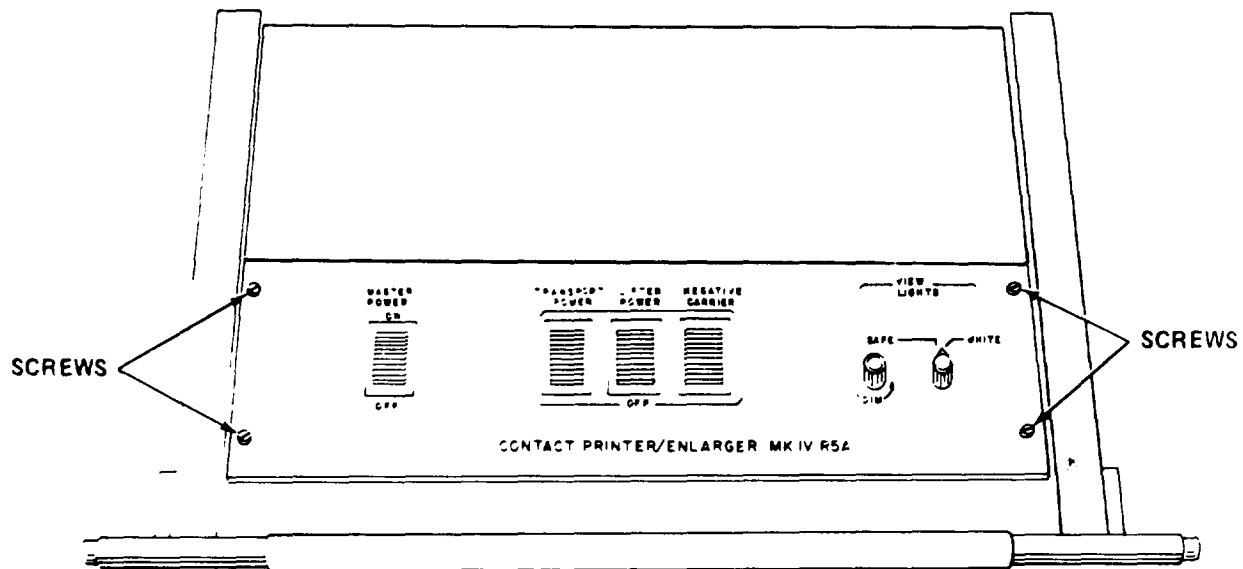
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



- b. Turn off circuit breaker.
- c. Remove screws and plastic washers that hold power panel to hood.

**CAUTION**

Wires can be broken if panel is pulled too far from hood.



- d. Carefully lower power panel out of hood.
- e. Tag and disconnect all wiring from switch.
- f. Remove defective switch.
- g. Install new switch(es) and reconnect wiring.
- h. Carefully reinstall power panel into hood and secure with screws.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-17. **PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

## Section V DIRECT/GENERAL-SUPPORT MAINTENANCE

### 9-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.

9-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

9-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special tools; TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

9-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

### 9-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES,

a. Direct/general support troubleshooting procedures cover the most common malfunctions that may be repaired at the direct/general support level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by lower level maintenance should be conducted in addition to the direct/general support troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or is not corrected by a listed corrective action, notify your supervisor.

c. For unidentified malfunctions, use the facing schematic or the foldout located at the end of this manual for further fault analysis.

#### NOTE

Sufficient data is not available for you to test or troubleshoot printed circuit boards. When associated wiring, ribbon cables, power cords and other related electrical components have been eliminated as possible faults, then the printed circuit boards must be substituted, one for one, until the fault is isolated.

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Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING

---

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

**WARNING**

Death or serious injury may occur from electrical shock unless power is is turned off before servicing.

1. NO POWER TO CONTACT PRINTER.

Step 1. Check power supply fuse F1 for continuity.

- (a) If continuity exists, proceed to step 2.
- (b) If continuity does not exist, replace defective fuse (paragraph 9-20. 15).

Step 2. Check power supply ground lead for continuity.

- (a) If continuity is present, proceed to step 3.
- (b) If continuity is not present, repair power supply ground lead.

Step 3. Check output of 12.5 V module.

- (a) If output is correct, proceed to step 4.
- (b) If output is incorrect, replace ace 12.5 V module (paragraph 9-20.14)

Step 4. Check output of constant voltage transformer.

If output is incorrect, replace constant voltage transformer (paragraph 9-20.28).

Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION  | TEST OR INSPECTION                                      | CORRECTIVE ACTION  |
|--|---|--|
| 2. FILTER ASSEMBLY AND NEGATIVE CARRIER DO NOT MOVE WHEN NEGATIVE CARRIER SWITCH IS TURNED ON. | Check negative carrier hood switch S111 for continuity. | If continuity is not present, replace negative carrier hood switch S111 (paragraph 9-20.19).                                 |
| 3. NO PMT METER INDICATION IN TEST MODE; HOWEVER, PRINTER APPEARS TO FUNCTION NORMALLY.        | Step 1. Check PMT meter for continuity.                 | (a) If continuity is present, proceed to step 2.<br>(b) If continuity is not present, replace PMT meter (paragraph 9-20.11). |
|  | Step 2. Check continuity of choke L102.                 | If continuity is not present, replace choke L102 (paragraph 9-20.10),  |
| 4. PMT METER READING DOES NOT VARY WHEN SENSITIVITY CONTROL IS ADJUSTED.                       | Step 1. Check output of PMT.                            | (a) If output is correct, proceed to step 2.<br>(b) If output is incorrect, replace PMT (paragraph 9-20.20).                 |
|  | Step 2. Check continuity of mercury switch S109.        | (a) If continuity is present, proceed to step 3.   |

**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION  | TEST OR INSPECTION  | CORRECTIVE ACTION |
|--|---|-------------------|
| 4. PMT METER READING DOES NOT VARY WHEN SENSITIVITY CONTROL IS ADJUSTED - Cont                       | (b) If continuity is not present, replace mercury switch (paragraph 9-20. 16).                          |                   |
| Step 3. Check continuity of PMT SENSITIVITY adjustment potentiometer.                                | (a) If continuity exists, proceed to step 4.  |                   |
|  | (b) If continuity does not exist, replace PMT SENSITIVITY adjustment potentiometer (paragraph 9-20.30). |                   |
| Step 4. Check continuity of cable between -1 kV power supply and mercury switch S109.                | (a) If continuity exists, proceed to step 5.  |                   |
|  | (b) If continuity does not exist, repair cable.   |                   |
| Step 5. Check output of -1 kV power supply.  | If output is not correct, replace -1 kV power supply (paragraph 9-20.14).                               |                   |
| 5. EXPOSURE LAMP LIGHTS IN TEST AND MANUAL MODES ONLY. PRINTS ARE UNEXPOSED IN MANUAL AND AUTOMATIC. | Step 1. Check output of VDSF-2 CRT blanking circuit.  |                   |
|  | (a) If output is correct, proceed to step 2.  |                   |
|  | (b) If o'.tput is incorrect, replace printed circuit card VDSF-2 (paragraph 9-20.21).                   |                   |

Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

---

| MALFUNCTION        |
|--------------------|
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

5. EXPOSURE LAMP LIGHTS IN TEST AND MANUAL MODES ONLY. PRINTS ARE UNEXPOSED IN MANUAL AND AUTOMATIC - Cont

Step 2. Check VDSF-2 sweep detector output.

- (a) If output is correct, proceed to step 3.
- (b) If the output is incorrect, replace printed circuit card VDSF-2 (paragraph 9-20.21).

Step 3. Check output of printed circuit card 3CC-1.

- (a) If output is correct, proceed to step 4.
- (b) If output is incorrect, replace printed circuit card 3CC-1 (paragraph 9-20.21).

Step 4. Check output of +10 kV power supply.

- (a) If output is correct, proceed to step 5.
- (b) If output is incorrect, replace +10 kV power supply (paragraph 9-20.14).

Step 5. Check continuity of lead between power supply and high voltage box.

- (a) If continuity is present, proceed to step 6.
- (b) If continuity is not present, repairable.

**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION   | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|---|--|--|
| <p>5. EXPOSURE LAMP LIGHTS IN TEST AND MANUAL MODES ONLY. PRINTS ARE UNEXPOSED IN MANUAL AND AUTOMATIC - Cont</p> | <p>Step 6. Check output of high voltage box.</p>                                   | <p>(a) If output is correct, proceed to step 7.<br/>                     (b) If output is not correct, replace high voltage box (paragraph</p>             |
|   | <p>Step 7. Check CRT operation.</p>  | <p>(a) If operation is correct, proceed to step 8.<br/>                     (b) If operation is not correct, replace CRT (paragraph 9-20.8).</p>           |
|   | <p>Step 8. Check output of PMT.</p>  | <p>(a) If output is correct, proceed to step 9.<br/>                     (b) If output is incorrect, replace PMT (paragraph 9-20.20).</p>                  |
|   | <p>Step 9. Check output of -1 kV power supply.</p>                                 | <p>If output is incorrect, replace -1 kV power supply (paragraph 9-20.14).</p>   |
| <p>6. SUPPLY RPT ROLLERS FAIL TO MAINTAIN TENSION ON PRINTING MATERIAL.</p>                                       | <p>Check operation of drag brake on supply RPT.</p>                                | <p>Replace defective drag brake (paragraph 9-20.7).</p>  |
| <p>7. PRINTER WORKS IN ALL MODES EXCEPT AUTOMATIC. PRINTS ARE OVEREXPOSED IN AUTOMATIC SWEEP AT LOW RATE.</p>     | <p>Step 1. Check operation of dodging circuits on VDSF-2 printed circuit card.</p> | <p>(a) If operation is correct, proceed to step 2.<br/>                     (b) If incorrect, replace VDSF-2 printed circuit card (paragraph 9-20.21).</p> |



Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|--|--|---|
| 7. PRINTER WORKS IN ALL MODES EXCEPT AUTOMATIC. PRINTS ARE OVEREXPOSED IN AUTOMATIC SWEEP AT LOW RATE - Cont | Step 2. Check operation of PMT.                                | (a) If operation is correct, proceed to step 3.<br>(b) If operation is incorrect, replace PMT (paragraph 9-20.20).            |
|  | Step 3. Check output of -1 kV power supply.                    | (a) If output is correct, proceed to step 4.<br>(b) If output is incorrect, replace -1 kV power supply (paragraph 9-20.14).   |
|  | Step 4. Check output of printed circuit card 3C2.              | If output is incorrect, replace printed circuit card (paragraph 9-20.21).   |
| 8. PRINTER WORKS NORMALLY EXCEPT UNABLE TO VARY LENGTH OF HORIZONTAL SWEEP.                                  | Step 1. Check output of raster edge card 3CC-1.                | (a) If output is correct, proceed to step 2.<br>(b) If output is incorrect, replace printed circuit card (paragraph 9-20.21). |
|  | Step 2. Check continuity of raster edge control potentiometer. | If not present, replace raster edge control potentiometer (paragraph 9-20. 13) .  |

**Table 95. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION  | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|--|--|---|
| 9. PRINTER WORKS NORMALLY EXCEPT UNABLE TO CONTROL VERTICAL RASTER SWEEP LENGTH.   | Step 1. Check output of raster edge card 3CC-1.                | (a) If output is correct, proceed to step 2.<br>(b) If output is incorrect, replace 3CC-1 printed circuit card (paragraph 9-20.21). |
|  | Step 2. Check continuity of raster edge control potentiometer. | If continuity is not present, replace raster edge control potentiometer (paragraph 9-20.13).  |
| 10. EXPOSURE IS NOT DELAYED WHEN EXPOSURE DELAY NORMAL IS PLACED TO DELAY.   | Check EDC-1 card for proper operation.                         | If delay switching operation is not correct, replace EDC-1 card (paragraph 9-20.12).  |
| 11. PRINTER WORKS CORRECTLY IN TEST, BUT WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES FOR SINGLE OR MULTIPLE PRINT OPERATION. EXPOSURE LIGHT WILL NOT LIGHT. | Step 1. Check TP3 on circuit card 3C2 for -10 V.               | (a) If -10 V is present, proceed to step 2.<br>(b) If -10 V is not present, replace circuit card (paragraph 9-20.21).               |

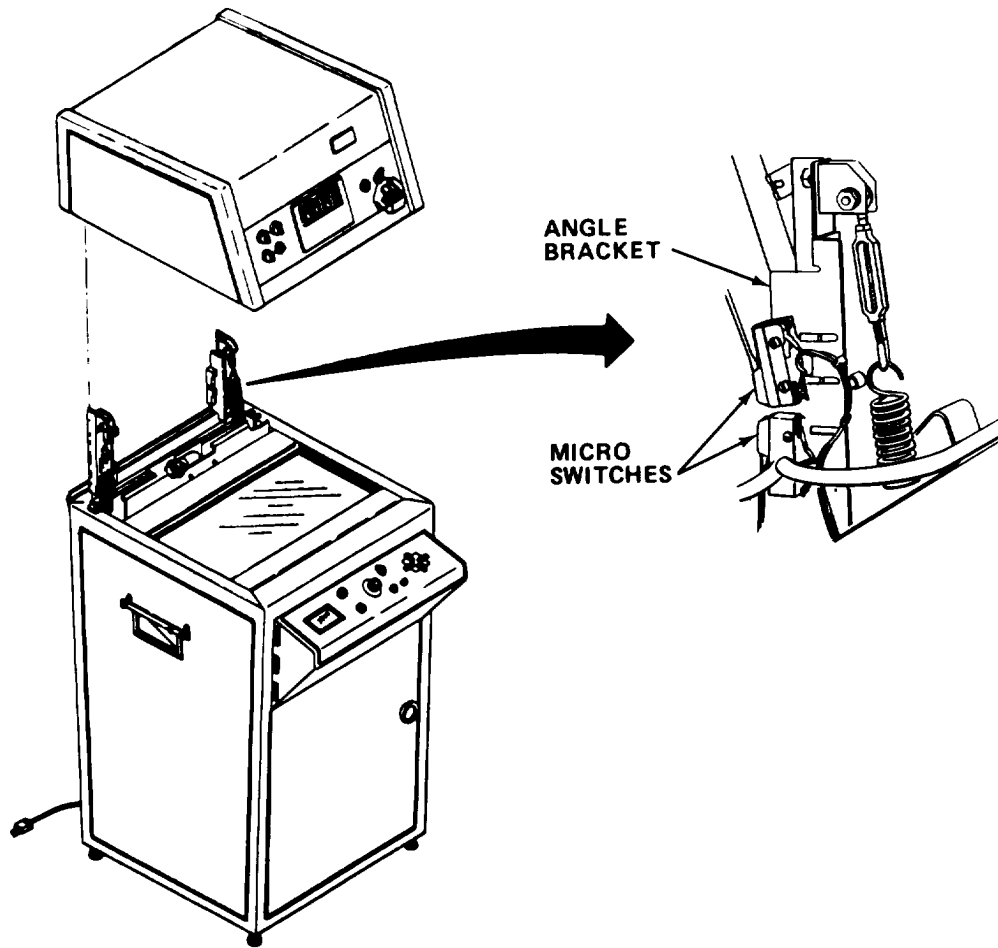
Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

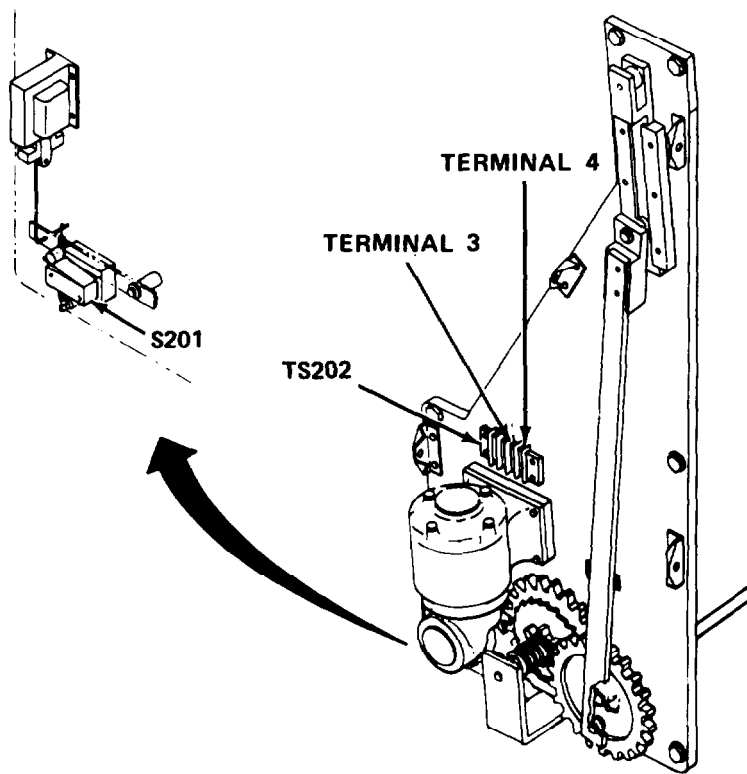
11. PRINTER WORKS CORRECTLY IN TEST, BUT WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES FOR SINGLE OR MULTIPLE PRINT OPERATION. EXPOSURE LIGHT WILL NOT LIGHT.  
- Cont



- Step 2. With hood closed and locked, check for continuity between J102-10 and TS202-3.

Table 9-5, DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION  | TEST OR INSPECTION | CORRECTIVE ACTION   |
|--|--------------------|---|
| 11. PRINTER WORKS CORRECTLY IN TEST, BUT WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES FOR SINGLE OR MULTIPLE PRINT OPERATION. EXPOSURE LIGHT WILL NOT LIGHT.<br>- Cont |                    | (a) If continuity is present, proceed to step 3.<br><br>(b) If continuity is not present, replace S107 (paragraph 9-20.19). |



- Step 3. Check for continuity between terminals 3 and 4 of TS202.
- (a) If continuity is present, proceed to step 4.
  - (b) If continuity is not present, replace S201 (paragraph 9-20.5).

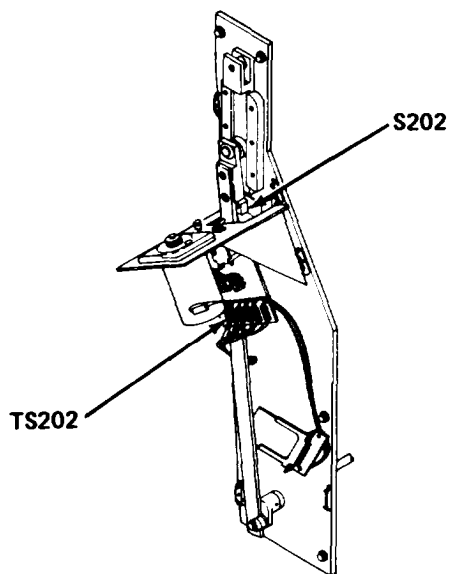
**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

11. PRINTER WORKS CORRECTLY IN TEST, BUT WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES FOR SINGLE OR MULTIPLE PRINT OPERATION. EXPOSURE LIGHT WILL NOT LIGHT.  
- Cont



Step 4. Check for continuity between TS201-12 and J201-10.

If continuity is not obtained, replace S202 (paragraph 9-20.3).

12. PRINTER IS FUNCTIONING NORMALLY, BUT WILL NOT EXPOSE. EXPOSURE LAMP INDICATES CORRECTLY.

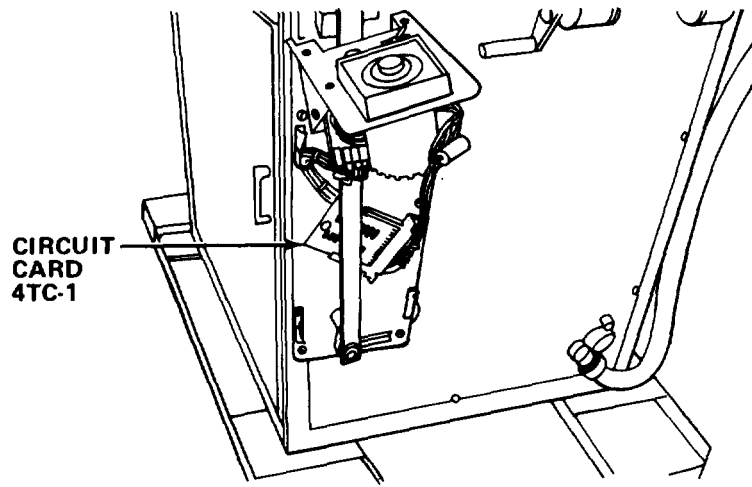
Check for failure of sweep failure detection circuit.

- (a) Replace VDSF-2 card (paragraph 9-20.21).
- (b) Replace switch S104 (paragraph 9-20. 18)..
- (c) Replace switch S105 (paragraph 9-20.18).

Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

13. APL MOTOR RUNS CONTINUOUSLY WHEN LIFTER POWER IS ON. WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES WITH LIFTER POWER OFF.



Check for proper operation of 4TC-1 card.

If operation is incorrect, replace 4TC - 1 card (paragraph 9-20.2).

14. APL MOTOR CYCLES THROUGH EXPOSURE MODE WITHOUT STOPPING. STOPS ON RPT ADVANCE. WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES. OPERATES CORRECTLY IN TEST.

Step 1. Check that cycle switch S202 closes at bottom of APL stroke.

- (a) If S202 is correctly adjusted, proceed to step 2.
- (b) Adjust S202.

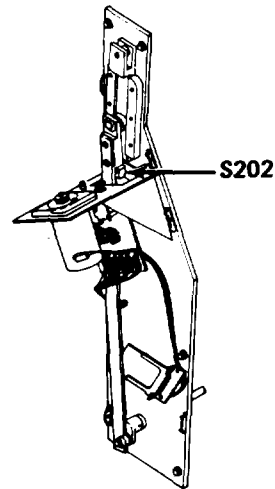
Step 2. With power OFF, check for continuity between TS201-12 to J201-10.

If no continuity is present, replace S202 (paragraph 9-20.3).

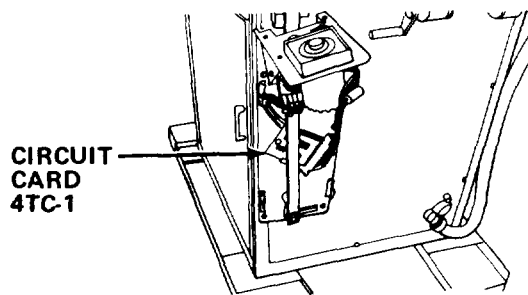
Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

14. APL MOTOR CYCLES THROUGH EXPOSURE MODE WITHOUT STOPPING . STOPS ON RPT ADVANCE. WILL NOT EXPOSE IN AUTOMATIC OR MANUAL MODES. OPERATES CORRECTLY IN TEST - Cont



15. APL MOTOR WILL NOT RUN UNDER ANY CONDITION. PRINTER WORKS NORMALLY IN SINGLE-PRINT OPERATION. RPT WORKS.



- Step 1. With power on and printer set for operation, check for the presence of +8 to +12 V at J201-4.
- (a) If voltage is present, proceed to step 2.
  - (b) If voltage is not present, replace circuit card 4TC-1 (paragraph 9-20.2).

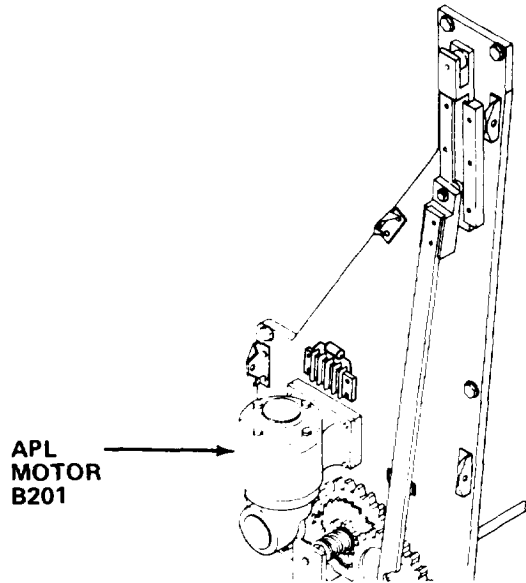
Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

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|                    |
|--------------------|
| MALFUNCTION        |
| TEST OR INSPECTION |
| CORRECTIVE ACTION  |

---

15. APL MOTOR WILL NOT RUN UNDER ANY CONDITION . PRINTER WORKS NORMALLY IN SINGLE-PRINT OPERATION. RPT WORKS - Cont



Step 2. With power on and equipment set for APL operation, check for the presence of 115 V ac.

If 115 V ac is present, replace APL motor B201 (paragraph 9-20.4).

16. INAPL OPERATION, DOUBLE OR TRIPLE EXPOSURE FREQUENTLY OCCURS. PRINTER WORKS CORRECTLY FOR SINGLE-PRINT OPERATION.

Step 1. Check output of printed circuit card 4TC-1.

(a) If output is correct, proceed to step 2.

(b) If incorrect, replace 4TC-1 card (paragraph 9-20.2).

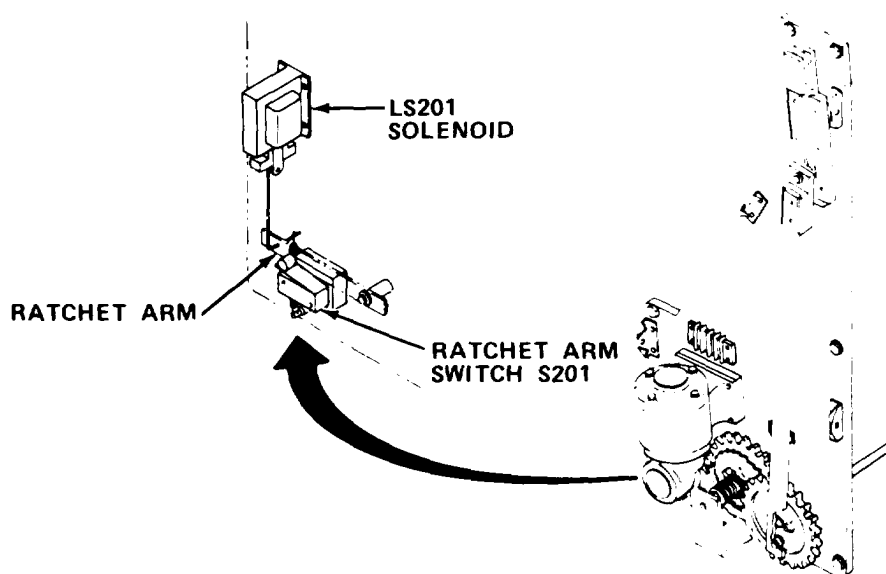
Step 2. Check operation of APL motor B201 .

If operation is incorrect, replace APL motor (paragraph 9-20.4).



Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

| MALFUNCTION   | TEST OR INSPECTION  | CORRECTIVE ACTION   |
|---|---|---|
| 17. IN APL OPERATION, BOUNCING OR GRINDING SOUNDS COME FROM APL MOTOR AREA. PRINTER OCCASIONALLY SKIPS EXPOSURE CYCLE IN APL OPERATION. | <p>Step 1. Check ratchet wheel for worn or missing teeth.</p> <p>(a) If ratchet wheel is not worn or broken, proceed to Step 2.</p> <p>(b) Replace ratchet wheel (paragraph 9-20.31).</p> | <p>Step 2. Check adjustment of ratchet arm switch S201.</p> |



If necessary, adjust ratchet arm switch.

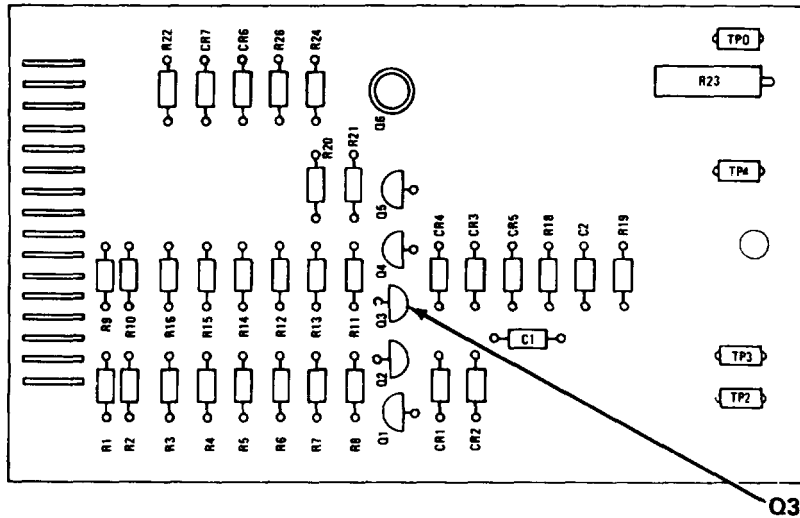
Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

18. AFTER SWITCHING FROM TEST TO MANUAL, CONTINUOUS BRIGHT LINE SCAN APPEARS ACROSS CENTER OF CRT.



Check output of Q3 on 3CC1 circuit card.

Replace 3CC1 circuit card (paragraph 9-20.21).

19. AFTER SWITCHING FROM TEST TO AUTOMATIC OR MANUAL, A FAINT TRACE ACROSS CENTER OF CRT MAY OCCUR.

Step 1. Check adjustment of accelerator anode adjustment R120.

(a) If adjustment is correct, proceed to step 2.

(b) If incorrect, perform accelerator anode adjustment (paragraph 9-20.26).

Step 2. Check for defective CRT.

If defective, replace CRT (paragraph 9-20.8).

Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

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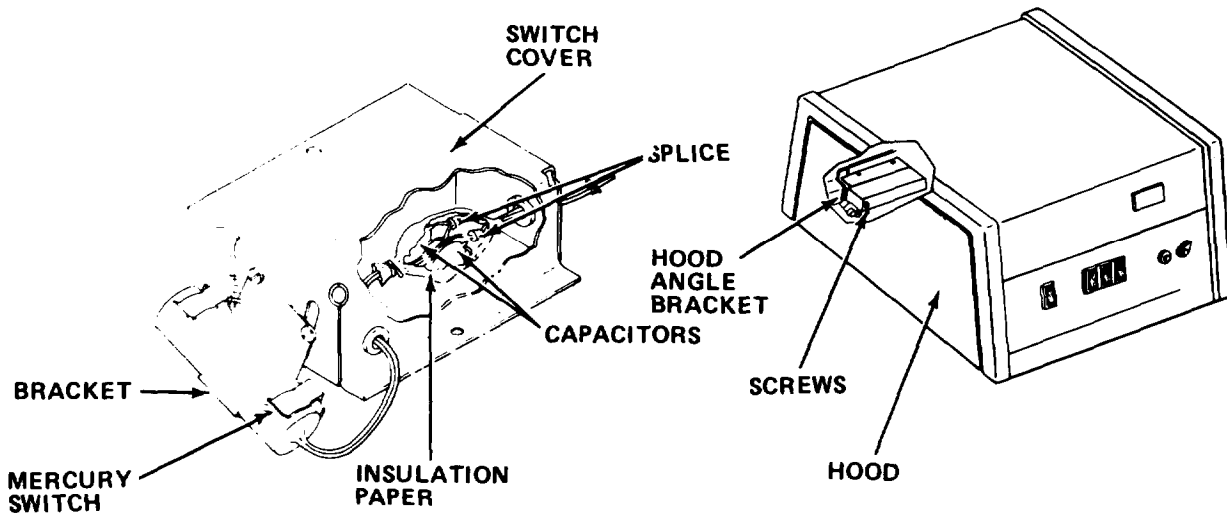
| MALFUNCTION | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|-------------|--|--|
| 20.         | PRINTER FUNCTIONS CORRECTLY IN TEST AND MANUAL MODES. PRINTS ARE OVER-EXPOSED IN AUTOMATIC MODE. CRT SWEEPS ARE VERY SLOW IN AUTOMATIC MODE. | <p>Step 1. Check PMT for proper operation.</p> <ul style="list-style-type: none"><li>(a) If PMT operates correctly, proceed to step 2.</li><li>(b) If operation is incorrect, replace defective PMT (paragraph . . . . .)</li></ul> <p>Step 2. Check output of -1 KV power supply.</p> <ul style="list-style-type: none"><li>(a) If output is correct. proceed to step 2.</li><li>(b) If output is not correct, adjust -1 KV power supply (paragraph 9-20.22).</li></ul> <p>Step 3. With power off, check continuity from J105 on -1 KV power supply to pin 1 of mercury switch S109.</p> <ul style="list-style-type: none"><li>(a) If continuity is present, proceed to step 4.</li><li>(b) If continuity is not present, replace -1 KV power supply and cable (paragraph 9-20.14).</li></ul> |

---

**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--------------------|-------------------|
|-------------|--------------------|-------------------|

20. PRINTER FUNCTIONS CORRECTLY IN TEST AND MANUAL MODES. PRINTS ARE OVER-EXPOSED IN AUTOMATIC MODE. CRT SWEEPS ARE VERY SLOW IN AUTOMATIC MODE - Cont



Step 4. With power off, check for continuity between pins 1 and 2 of switch S109 when hood is approximately one-half of the way down.

- (a) If continuity is present, proceed to step 5.
- (b) If continuity is not present, adjust switch S109.

Step 5. With power off and any two leads lifted from PMT sensitivity potentiometer R106, check for 250 k ohms +10% between pins 1 and 3.

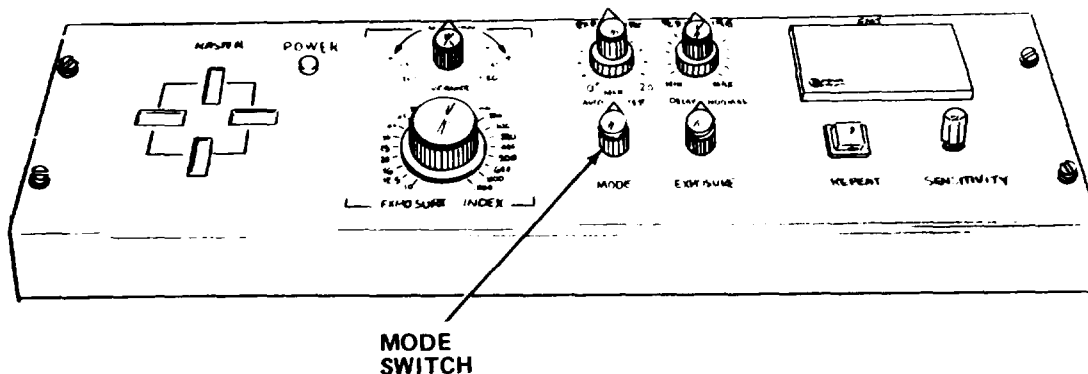
- (a) If proper reading is obtained, proceed to step 6.
- (b) If ohmic value is incorrect, replace R106 (paragraph 9-20.30).

**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION | TEST OR INSPECTION   | CORRECTIVE ACTION   |
|-------------|--|---|
| 20.         | PRINTER FUNCTIONS CORRECTLY IN TEST AND MANUAL MODES. PRINTS ARE OVER-EXPOSED IN AUTOMATIC MODE. CRT SWEEPS ARE VERY SLOW IN AUTOMATIC MODE - Cont | <p>Step 6. Check resistance between pins 1 and 2 of PMT sensitivity adjustment potentiometer R106 while varying resistance from maximum to minimum. Reading should be from 0 to 250 k ohms.</p> <p>(a) If resistance reading is correct, proceed to step 7.</p> <p>(b) If reading is incorrect, replace PMT sensitivity adjustment potentiometer (paragraph 9-20.30).</p> <p>Step 7. Check output of circuit card 3C2.</p> <p>(a) If output is correct, proceed to step 8.</p> <p>(b) If output is incorrect, replace circuit card 3C2 (paragraph 9-20.21).</p> |

**NOTE**

Perform maximum scan rate and exposure index adjustments after replacing circuit card 3C2.



Step 8. With power off and MODE switch S103 set to AUTO, check for continuity between pins 1 and IL of MODE switch wafer X.

If continuity is not present, replace S103 (paragraph 9-20.29).

**Table 9-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont**

| MALFUNCTION  | TEST OR INSPECTION                                     | CORRECTIVE ACTION                           |
|--|--|---|
| 21. CRT SWEEP IN TEST IS VERY SLOW BUT OF UNIFORM VELOCITY.                                  | Check maximum scan rate adjust R4 on circuit card 3C2. | Adjust R4 fully left for maximum scan rate. |
| 22. WHITE SPOT APPEARS ON ALL PRINTS AT SAME POINT; DARK SPOT ON CRT FACE AT SAME LOCATION . | Check for burned CRT phosphor.                         | Replace defective CRT (paragraph 9-20.8).   |

**9-20. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering direct/general support maintenance functions for the contact printer/enlarger. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

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| Replace APL Motor B201 . . . . .            | 9-20.4    |
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9-20.1 Replace RPT Motor B301.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Wire Cutters  
1/8 in. Punch  
Ball Peen Hammer

SUPPLIES: RPT Motor

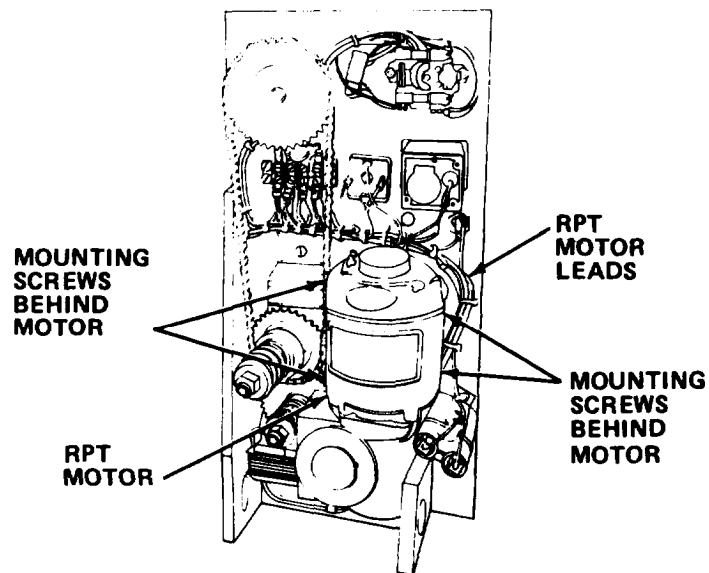
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove screws and RPT cover.





- d. Tag and disconnect wires on rectifier.
- e. Cut wire tie and remove wire from terminal.
- f. Remove screws and defective motor including mounts.
- g. Remove spur gear from defective motor.
- h. Reinstall spur gear to new motor.
- i. Install new motor and motor mounts to frame and secure with screws.
- j. Reconnect motor electrical wiring.
- k. Reinstall cover and tighten screws.
- l. Turn on circuit breaker.
- m. Turn on MASTER POWER switch.

9-20.2 Replace Printed Circuit Card 4TC1

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: 4TC1 Card Assembly

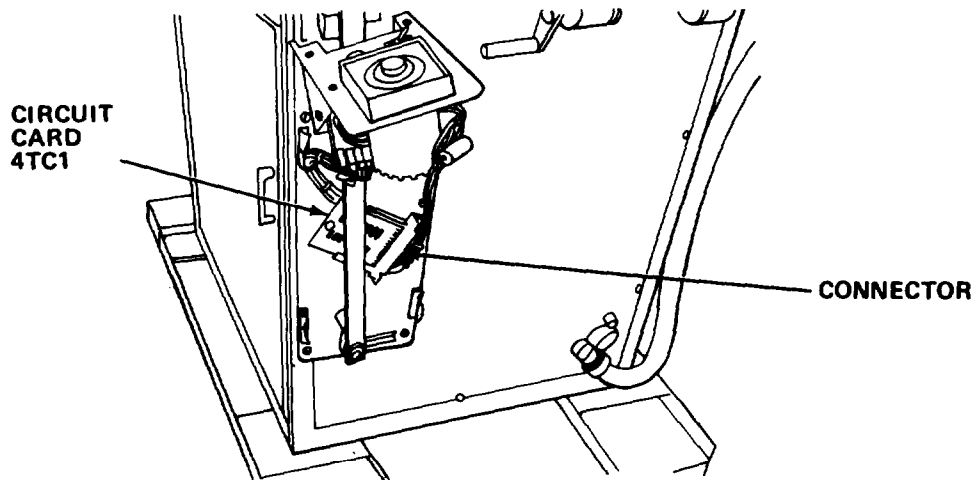
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove screws and cover.



- d. Remove defective 4TC1 card from connector.

**CAUTION**

Any misalignment in contacts will damage card 4TC1.

- e. Install new card 4TC1 halfway into connector.
- f. When proper alignment is obtained, push in card 4TC1 the rest of the way.
- g. Reinstall cover and secure with screws.
- h. Turn on circuit breaker.
- i. Turn on MASTER POWER switch.

9-20.3 Replace Cycle Switch S202.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench  
5/16 in. Combination Wrench

SUPPLIES: Microswitch

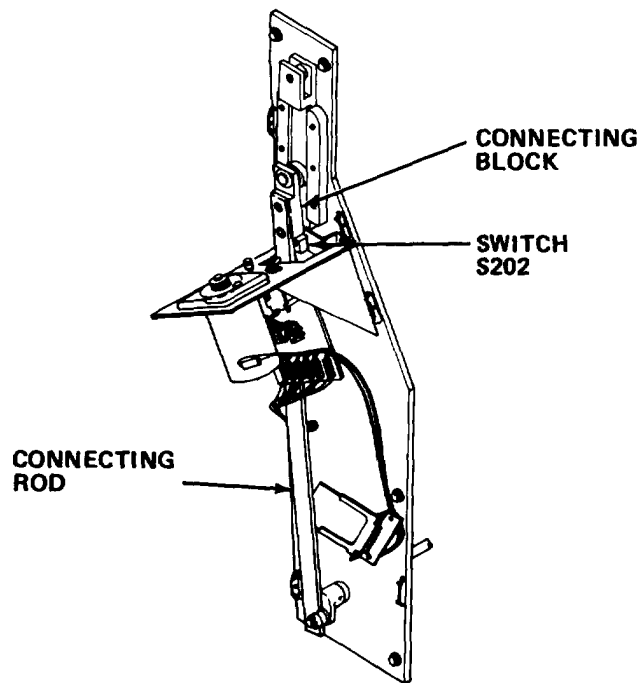
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove screws and cover.



**CAUTION**

Do not stop machine in midcycle to gain access to switch. Damage to machine will result.

**NOTE**

Note position of connecting rod.

- d. Remove bolts and washers from connecting block, and slide connecting rod as required to gain access to microswitch S202.
- e. Remove screws and washers holding microswitch bracket.
- f. Remove screws and washers holding microswitch in place.
- g. Tag and disconnect microswitch wiring and remove defective switch.
- h. Reconnect wiring and secure microswitch to mounting bracket.
- i. Reinstall mounting bracket to frame.
- j. Reposition connecting rod and secure to connecting block.
- k. Adjust microswitch to close position by moving mounting bracket up or down.
- 1. Reinstall side cover.
- m. Turn on circuit breaker.
- n. Turn on MASTER POWER switch.

9-20.4 Replace APL Motor B201.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench  
Ball Peen Hammer

SUPPLIES: AC Motor

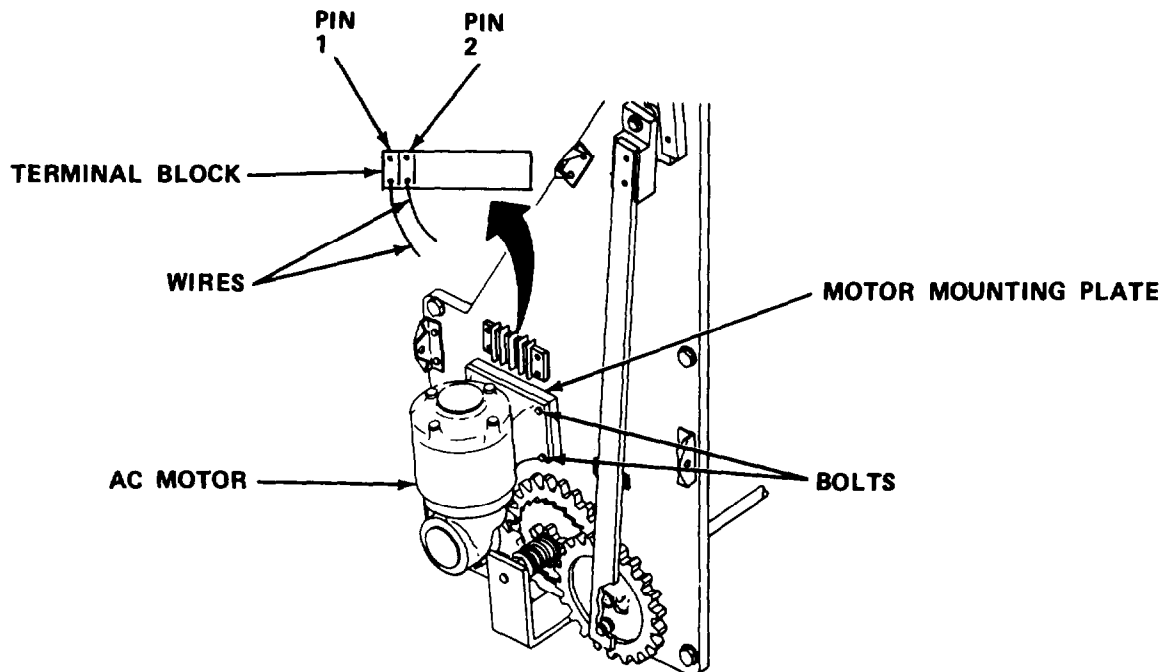
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove screws and cover.
- d. Tag and disconnect wires from pins 1 and 2 on terminal block.

- e. Remove bolts from motor mounting plate.
- f. Lift ac motor clear of assembly.
- g. Remove spur gear from defective motor prior to discarding motor.

**NOTE**

Be sure gear teeth are properly meshed before tightening motor mounting bolts.

- h. Reinstall spur gear to new ac motor.
- i. Install new ac motor to motor mounting plate using bolts.
- j. Connect two wires to pins 1 and 2 on terminal block.
- k. Reinstall side cover.
- l. Turn on circuit breaker.
- m. Turn on MASTER POWER switch.

9-20.5 Replace Ratchet Arm Switch S201

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Microswitch

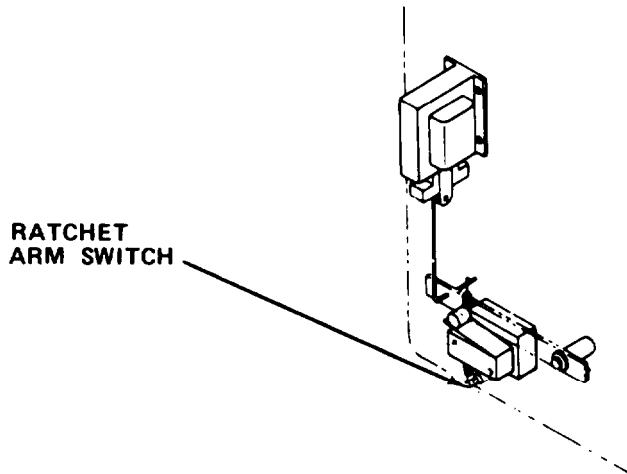
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove side cover.



- d. Tag and disconnect wiring and remove defective microswitch.
- e. Install new microswitch and reconnect wiring.
- f. Reinstall side cover.
- g. Turn on circuit breaker.
- h. Turn on MASTER POWER switch.



9-20.6 Replace Ratchet Arm.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
1/8 in. Hex Head Key Wrench  
Pliers

SUPPLIES: Ratchet Arm  
Cotter Pin

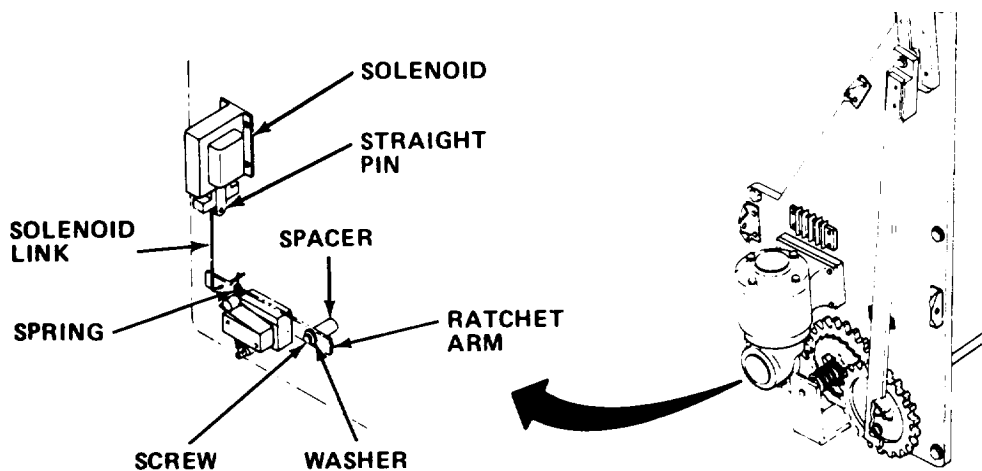
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove screws and cover.



- d. Disconnect spring from solenoid link.
- e. Remove cotter pin, straight pin, solenoid link, and solenoid.
- f. Remove spacer screw, washer, spacer, and ratchet arm.

**NOTE**

Be sure solenoid spring is depressed before installing new arm.

- g. Replace defective ratchet arm.
- h. Reinstall spacer, washer, and spacer screw on new ratchet arm.
- i. Reinstall solenoid link to new ratchet arm and solenoid with straight pin, cotter pin, and spring.
- j. Reinstall side cover.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-20.7 Repair Drag Brake Assembly.

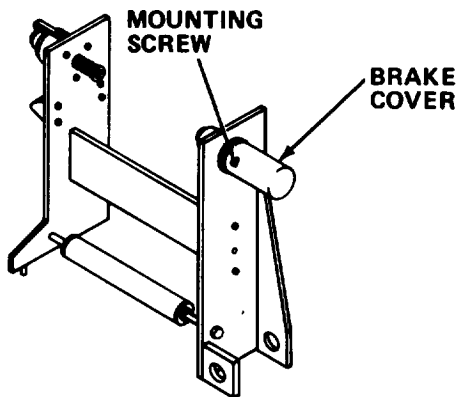
MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
9/16 in. Combination Wrench  
Pliers

SUPPLIES: Drag Brake  
Friction Drag Plate

**CAUTION**

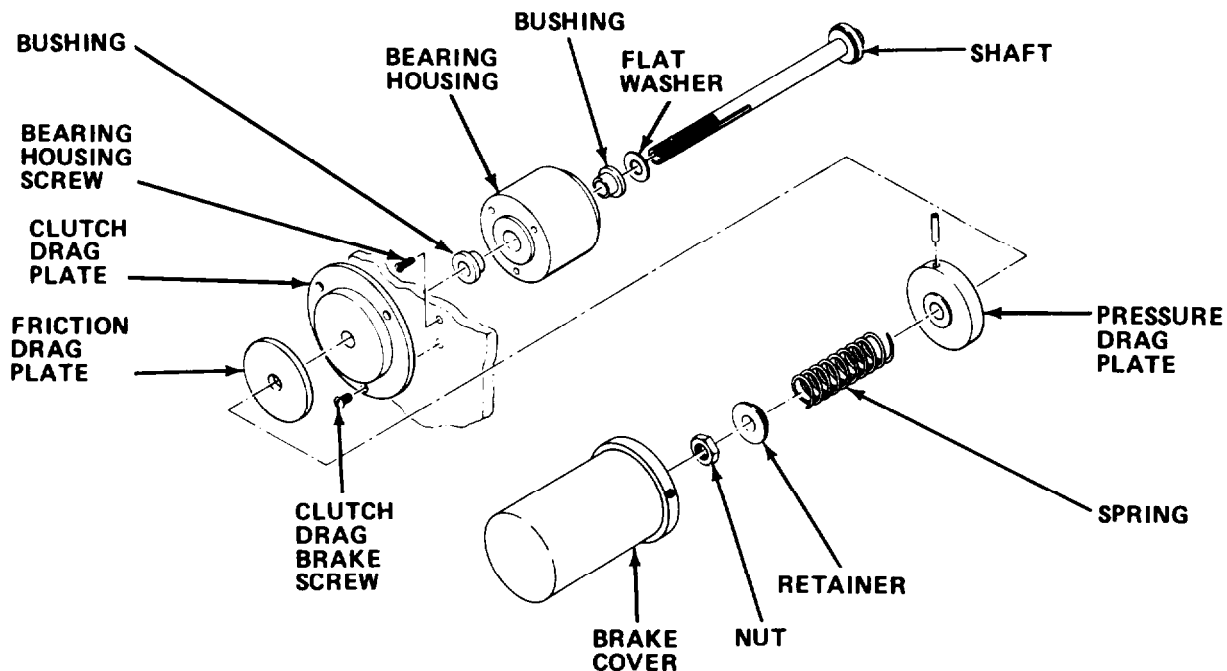
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.



- a. Remove drag brake cover by removing three mounting screws.

## NOTE

Opposite end of shaft must be held while removing nut.



- b. Remove drag brake by slowly removing nut on end of shaft.
- c. Remove spring retainer, spring, pressure drag plate, and friction drag plate.
- d. Remove clutch drag plate by removing screws and key washers.
- e. Remove shaft, flat washer, and screws from bearing housing.
- f. After bearing housing is removed, remove bronze bushings.
- g. Replace defective parts.
- h. Reinstall bronze bushings.
- i. Reassemble shaft assembly by reinstalling flat washer onto shaft and screws into bearing housing.
- j. Reinstall clutch drag plate and screws.
- k. Assemble drag brake assembly by installing new friction drag brake, pressure drag plate, spring, spring retainer, and self-locking nut.
- l. Reinstall drag brake cover.

9-20.8 Replace CRT.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
3/8 in. Combination Wrench  
5/16 in. Combination Wrench  
7/16 in. Combination Wrench  
Goggles/Face Shield

SUPPLIES: Electronic CRT

**WARNING**

High voltages capable of causing death are used in this equipment. Use extreme care when performing tasks inside the cabinet. Be sure power is turned off before servicing.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.

**WARNING**

To prevent personal injury, face shield or goggles should be worn when handling CRT.

**CAUTION**

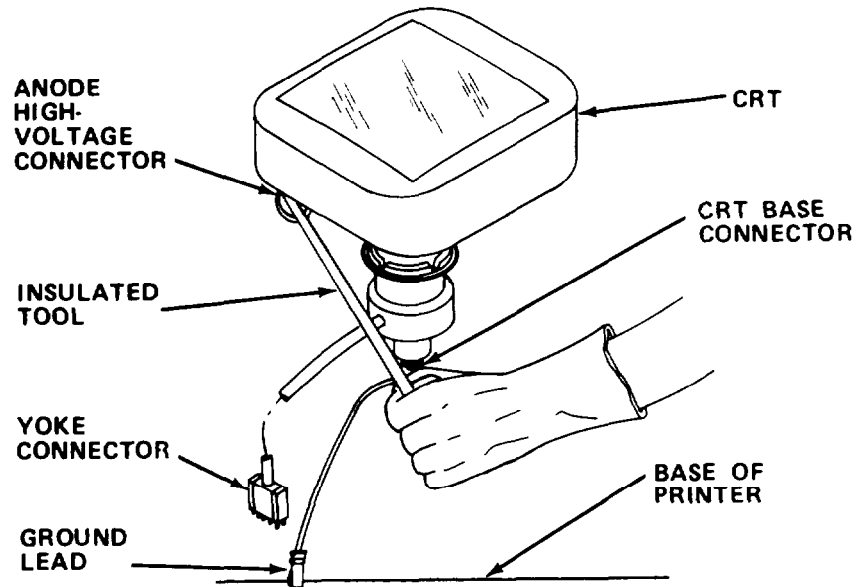
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- c. Open lower cabinet door, operator's console, and hood.

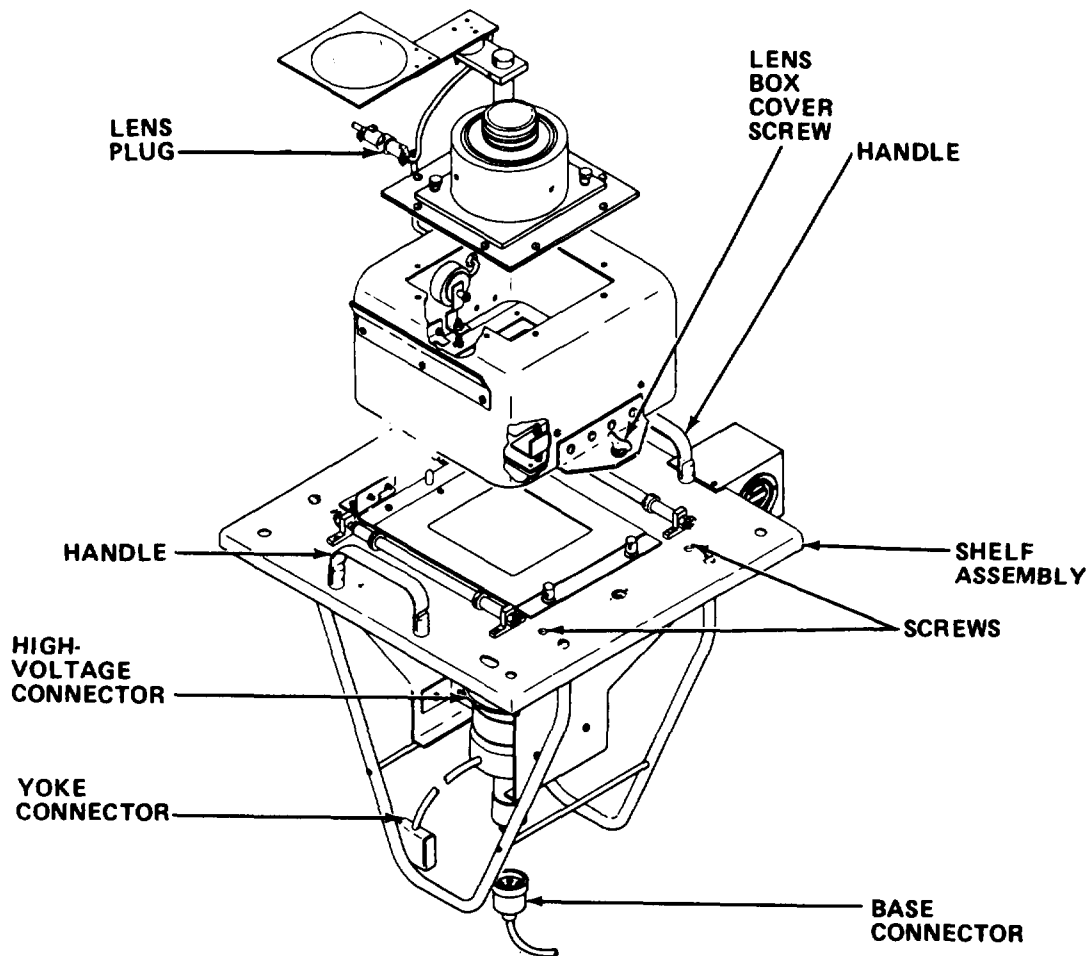
**WARNING**

High voltages that are capable of causing death may be stored in CRT after power is removed. Be sure CRT is discharged and reduced to zero volts.

- d. Remove high-voltage screen by removing screws.



- e. To remove voltage from CRT, short anode to ground using insulated tool.
- f. Disconnect CRT yoke connector, CRT base connector, high-voltage connector and lens shelf plug.
- g. Remove bolt at each corner of lens shelf.
- h. Remove entire assembly from cabinet.



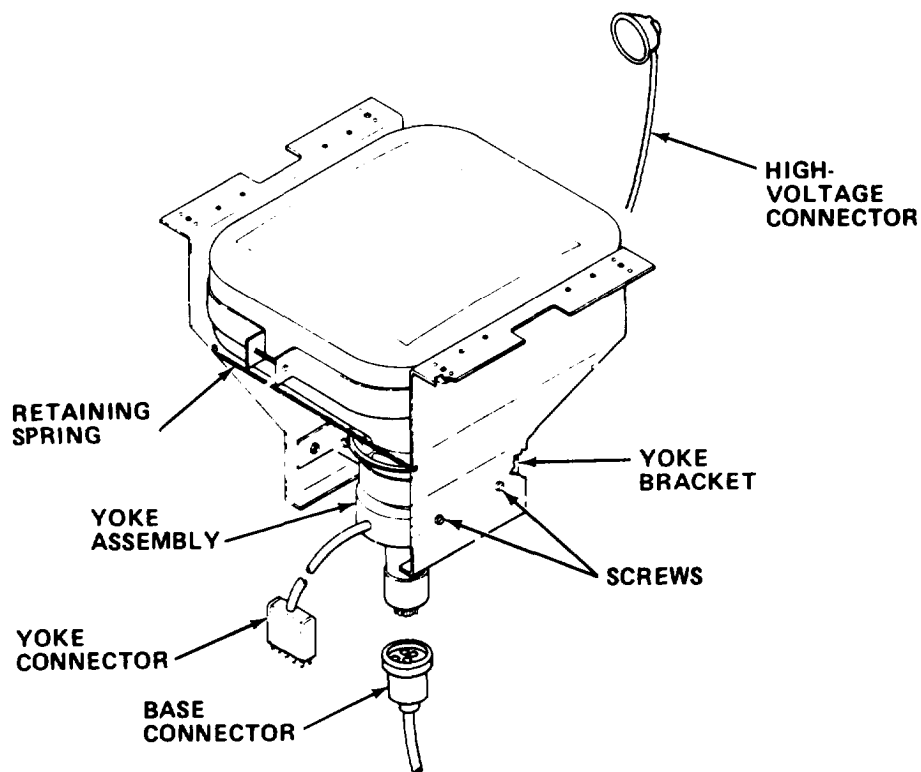
- i. Loosen one side of retaining spring by removing screw and nut.
- j. Remove screws, flat washers, lockwashers, and nuts from yoke brackets.

**NOTE**

Tag yoke brackets and CRT frame to ensure proper reinstallation.

- k. Turn yoke assembly half right and carefully lift from CRT.
- l. Mark position of CRT anode with respect to shelf assembly to ensure proper reinstallation.
- m. Remove CRT frame by removing screws, self-locking washers and nuts.
- n. Replace defective CRT.

- o. After installing new CRT, reinstall and secure CRT frame.
- p. Reinstall yoke assembly, turn to original position and secure with screws, flat washers, lockwashers, and nuts.



- q. Reinstall retaining spring assembly.
- r. Reinstall entire CRT assembly.
- s. Reinstall corner bolts.
- t. Reconnect CRT yoke connector, CRT base connector, high-voltage connector and lens plug.
- u. Reinstall high-voltage screen.
- v. Close all cabinet doors.
- w. Turn on circuit breakers.
- x. Turn on MASTER POWER switch.

9-20.9 Replace High-Voltage Box Assembly.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Solder/Desolder Set

SUPPLIES: High-Voltage Box Assembly  
Solder (Item 30, Appendix E)

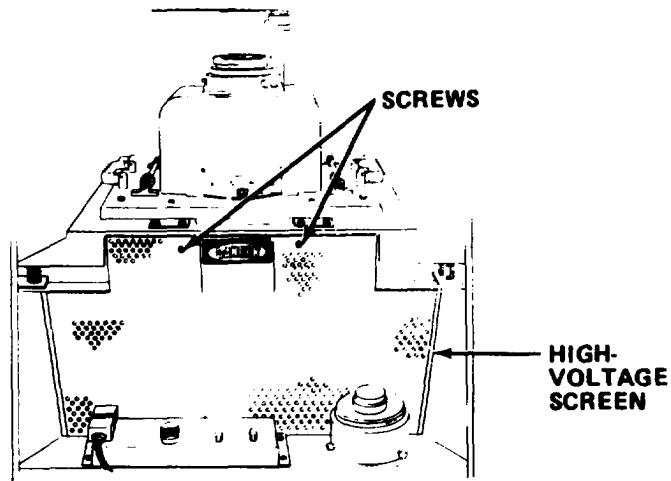
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

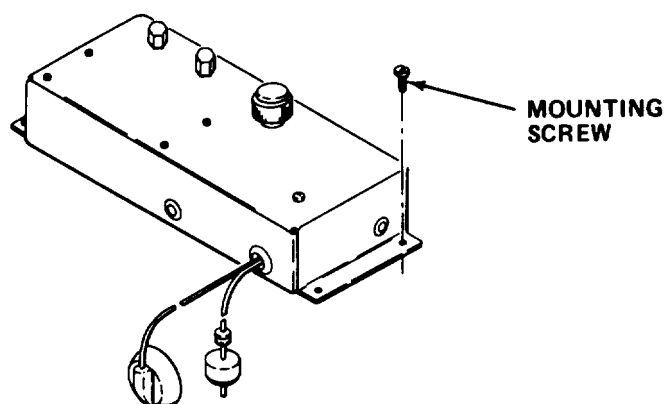
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console and lower cabinet door.



- d. Remove screws and high-voltage screen.

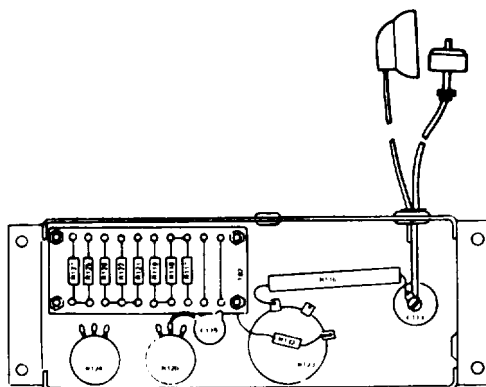




- e. Remove high-voltage box mounting screws.

**NOTE**

Be sure there is slack in wires from high-voltage box assembly.



- f. Turn over assembly to expose components.
- g. Tag and disconnect component wiring.
- h. Replace defective high-voltage box assembly.
- i. Reconnect component wiring.
- j. Reinstall assembly into lower cabinet.
- k. Reinstall high-voltage screen.

**NOTE**

After installation of high-voltage box assembly, perform +10 kV adjustment, (paragraph 9-20.22) accelerator anode calibration adjust R120, (paragraph 9-20.26) beam current adjust R23, (paragraph 9-20.22) and electronic CRT spot adjust (paragraph 9-20.27).

- l. Close operator's console and lower cabinet door.
- m. Turn on circuit breaker.
- n. Turn on MASTER POWER switch.

9-20.10 Replace Choke L102.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Solder/Desolder Set  
1/4 in. Socket Set

SUPPLIES: Choke  
Solder (Item 30, Appendix E)

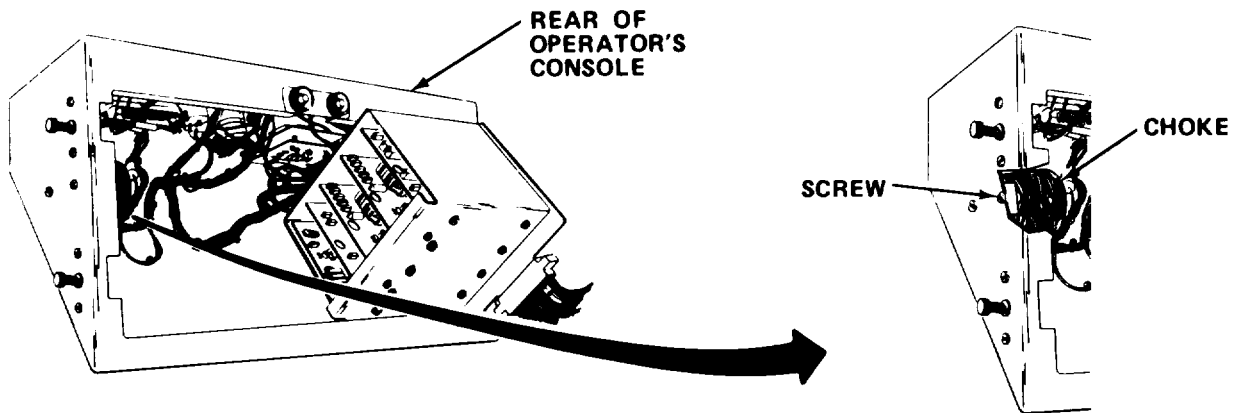
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console.



- d. Remove choke by removing screws, washers, and nuts.
- e. Tag and desolder choke wiring.
- f. Solder wiring to new choke.
- g. Install new choke.
- h. Close operator's console.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-20.11 Replace PMT Digital Meter M101.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: None

SUPPLIES: Digital Meter

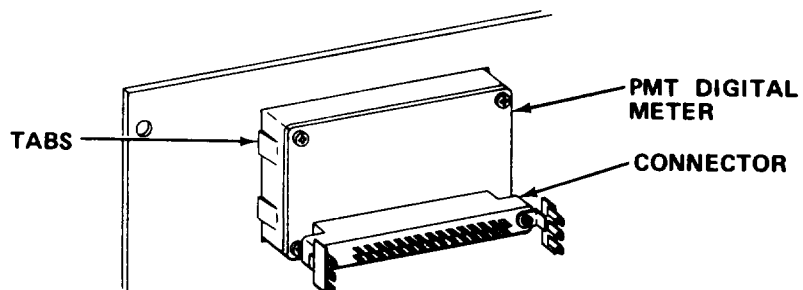
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open operator's console.



- d. Disconnect PMT meter connector.
- e. Remove PMT digital meter. Squeeze tabs and push meter upward.
- f. Replace defective PMT digital meter. Tabs will lock meter in place.
- g. Reconnect PMT meter connector.
- h. Close operator's console and lock.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-20.12 Replace Printed Circuit Card EDC1.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
3/16 in. Nut Driver  
Solder/Desolder Set

SUPPLIES: Printed Circuit Card EDC1  
Solder (Item 30, Appendix E)

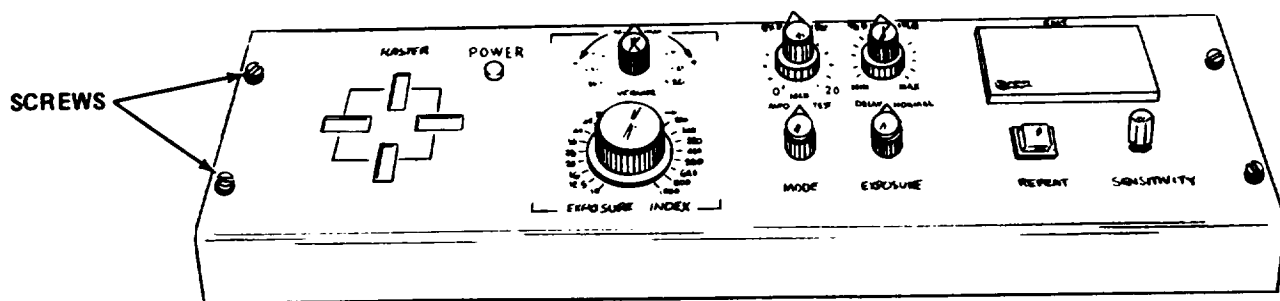
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

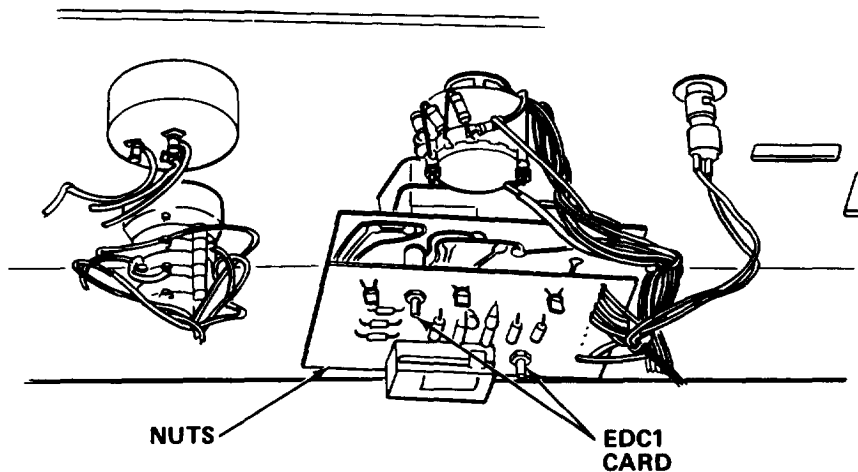
**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove screws holding control panel to frame.



- d. Lift control panel clear of frame, being careful not to break any wires.
- e. Remove nuts with plastic washers and carefully lift EDC1 card from console.
- f. Tag and desolder wires from card.
- g. Replace defective card.
- h. Solder wiring to new card and install into console.
- i. Reinstall control panel to frame.
- j. Turn on circuit breaker.
- k. Turn on MASTER POWER switch.

9-20.13 Replace Raster Edge Control Potentiometer.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
Solder/Desolder Set  
1/16 in. Hex Head Key Wrench  
1/2 in. Combination Wrench

SUPPLIES: Modified Potentiometer  
Solder (Item 30, Appendix E)

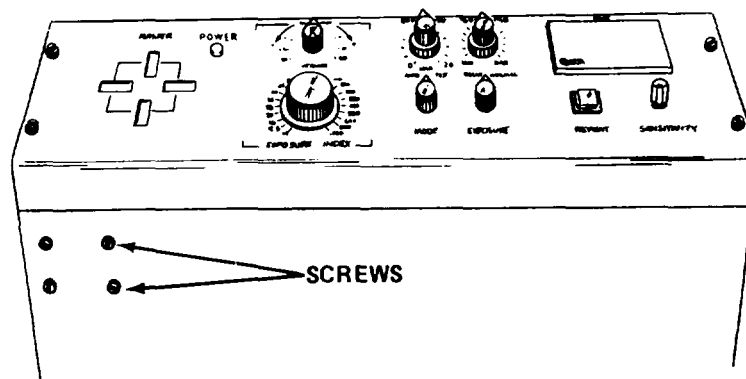
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

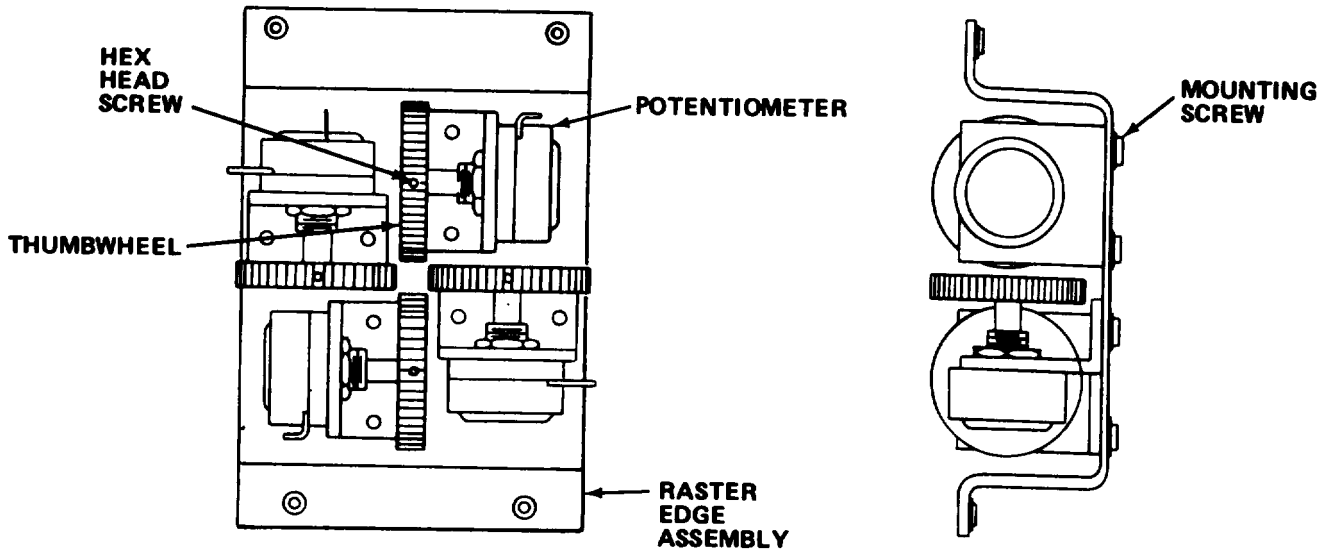
**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove screws holding operator's console to frame.
- d. Move control panel so that you have easy access to RASTER edge control assembly.
- e. Remove screws that mount circuit card rack to operator's console, and move rack assembly aside being careful not to break any wires.
- f. Remove screws that mount RASTER edge control assembly to operator's console.
- g. Open operator's console.
- h. Tag and desolder wiring to defective RASTER edge control potentiometer.



- i. Loosen hex head screw that holds thumbwheel to shaft of RASTER edge control potentiometer.
- j. Remove nuts, washers, and defective potentiometer.
- k. Solder wiring to new potentiometer. Install potentiometer using washers and nuts.
- l. Reinstall thumbwheel.
- m. Install RASTER edge control assembly into operator's console.
- n. Reinstall circuit card rack.
- o. Reinstall operator's console cover.
- p. Turn on circuit breaker.
- q. Turn on MASTER POWER switch.



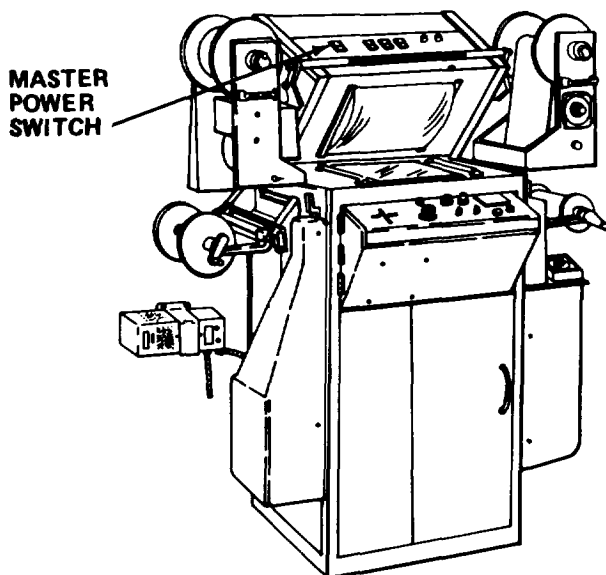
9-20.14 Repair Power Supply Assembly.

MOS: 35E, Special Electronic Devices Repairer

PERSONNEL: Two persons are required to perform this procedure

TOOLS: Cross Tip Screwdriver  
 3/4 in. Combination Wrench  
 3/8 in. Combination Wrench  
 7/16 in. Combination Wrench

SUPPLIES: Power Supply Assembly  
 12.5 V Power Supply Module  
 -1 K V Power Supply  
 +10 K V Power Supply  
 Rubber Matting



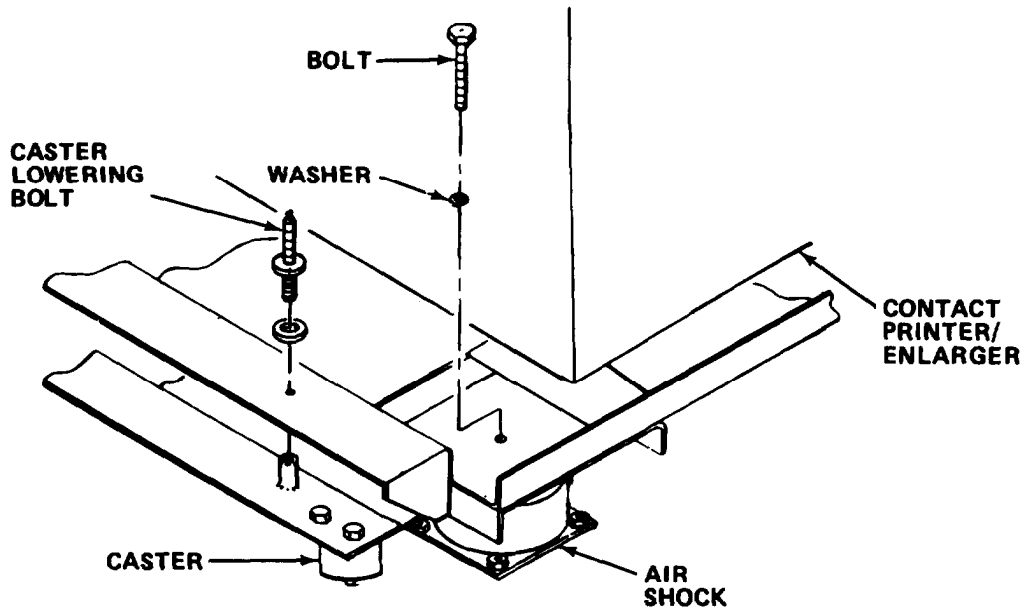
**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- Ž You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

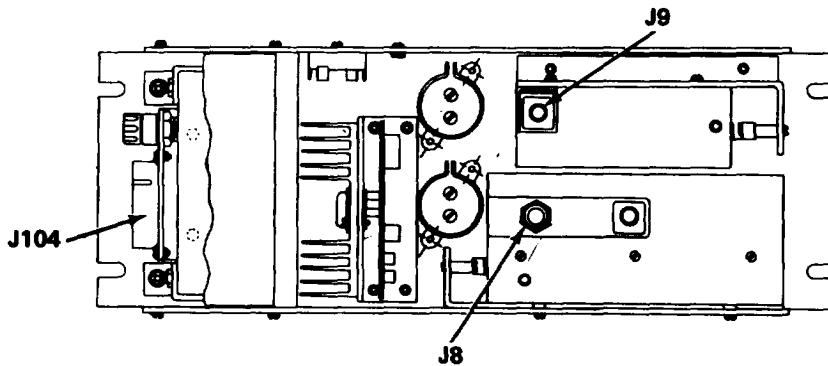
- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



**WARNING**

To prevent serious injury, two men are required to move equipment for maintenance operations. This equipment weighs approximately 500 lbs.

- c. Deflate air shocks, remove bolts and washers; lower casters.
- d. Move contact printer/enlarger away from wall.
- e. Remove back panel.



- f. Disconnect J104 (power distribution), J9 (-1 kV), and J8 (10 kV).
- g. Remove defective power supply assembly.
- h. Disconnect plug-ins and remove 12.5 V power supply module.
- i. Remove 10 kv dc power supply module.
- j. Remove -1 kv dc power supply module.
- k. Replace defective module.
- l. Reinstall modules into power supply assembly.
- m. Reinstall power supply assembly.
- n. Reconnect J104, J8, and J9.

**NOTE**

Perform power supply adjustments (paragraph 9-20.22).

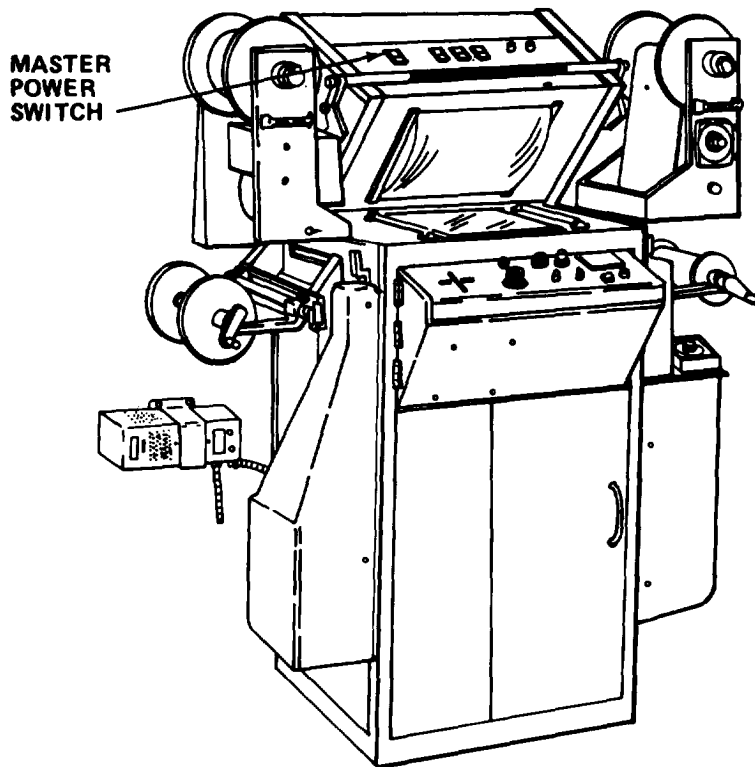
- o. Reinstall back panel.
- p. Reposition printer/enlarger over air shocks, raise casters and reinstall bolts and washers.
- q. Turn on circuit breaker.
- r. Turn on MASTER POWER switch.

9-20.15 Replace Power Supply Fuse F-1.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: No. 1 Cross Tip Screwdriver

SUPPLIES: Fuse, 3 amp Slo-Blo



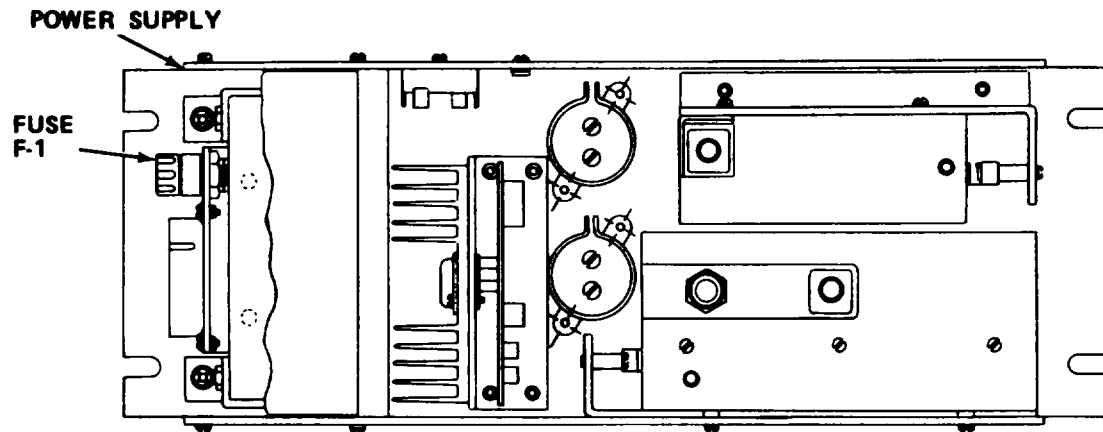
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove back panel.



- d. Replace defective fuse.
- e. Reinstall back panel.
- f. Turn on circuit breaker.
- g. Turn on MASTER POWER switch.

9-20.16 Replace Mercury Switch S109.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Cross Tip Screwdriver  
3/8 in. Nut Driver

SUPPLIES: Mercury Switch  
Cable Tie

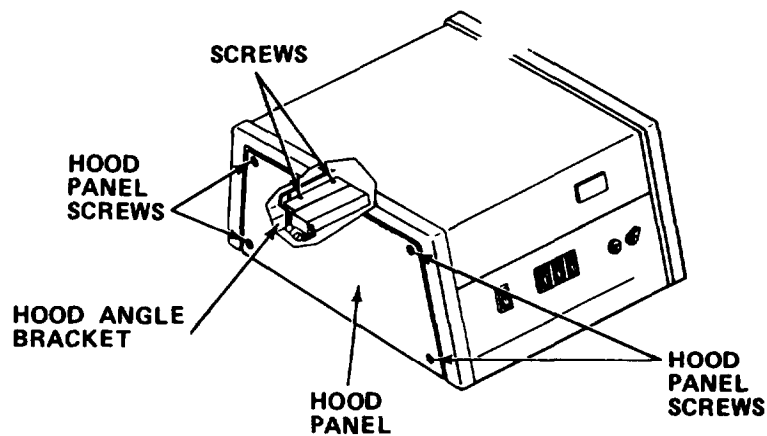
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

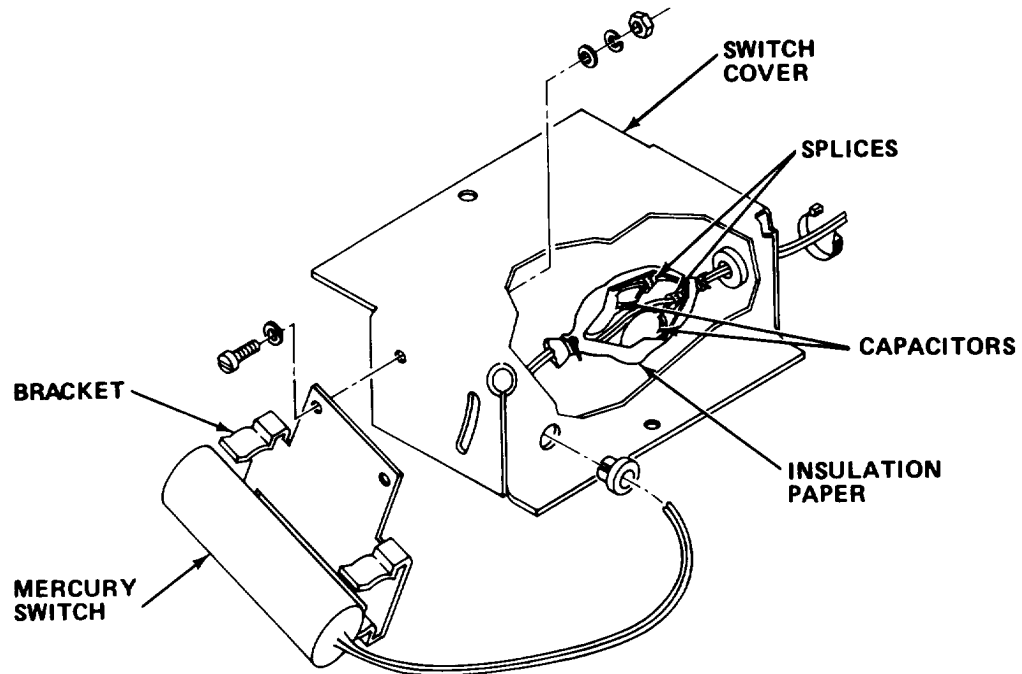
**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove hood panel.
- d. Remove screws holding switch assembly to rear cover hood angle bracket.



- e. Remove switch cover.
- f. Remove insulation paper.
- g. Disconnect wires from mercury switch at splice and capacitors.
- h. Remove defective mercury switch from bracket.
- i. Install new mercury switch.
- j. Reconnect wires.
- k. Cover splice and capacitors with insulation paper. Check that insulation paper is securely in place.
- l. Reinstall switch cover with mounting hardware.
- m. Reinstall switch assembly to hood angle bracket.
- n. Reinstall hood panel.
- o. Lower hood.
- p. Turn on circuit breaker.
- q. Turn on MASTER POWER switch.

9-20.17 Replace Platen Airbag.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver  
3/8 in. Nut Driver

SUPPLIES: Platen Airbag

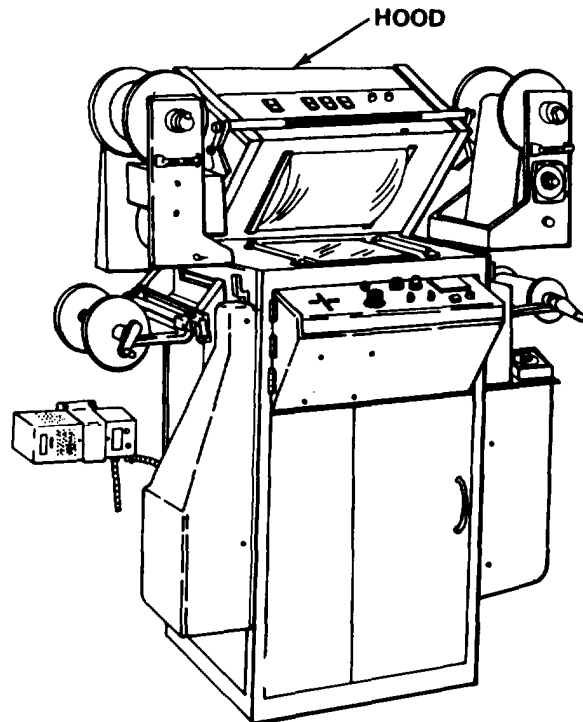
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

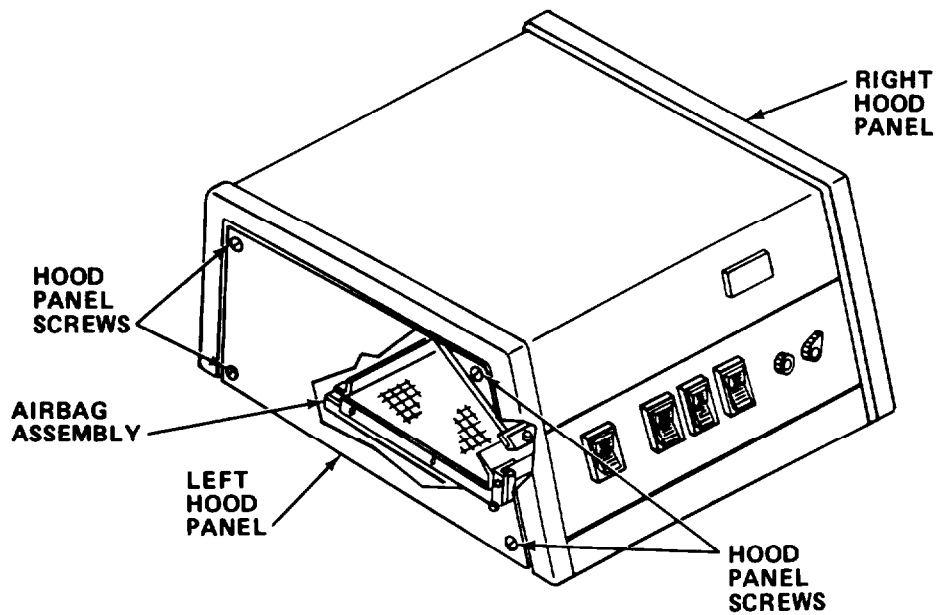
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Lift hood panel.



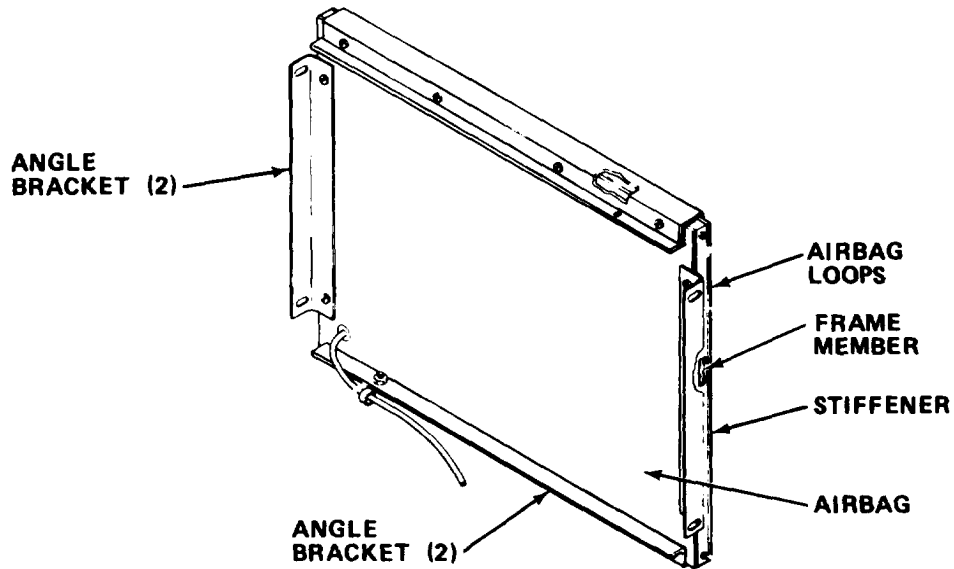


- d. Remove left and right hood side panels.

**NOTE**

Hold airbag assembly so that it does not fall on stage plate.

- e. Remove screws, lockwashers and nuts from airbag assembly.
- f. Remove defective airbag assembly.
- g. Remove loop clamp and tubing.
- h. Remove angle brackets, and diffuser.



**NOTE**

Your airbag may or may not come with a frame.

- i. Remove platen frames if necessary.
- j. Remove defective platen airbag.
- k. Install platen frames to platen airbag if necessary.
- l. Reinstall platen stiffener, clips, and diffuser to platen airbag.
- m. Reinstall angle brackets.
- n. Reinstall loop clamp and hose assembly.
- o. Reinstall airbag assembly.
- p. Reinstall left and right hood panels.
- q. Lower hood.
- r. Turn on circuit breaker.
- s. Turn on MASTER POWER switch.

9-20.18 Replace Sweep Failure Test/Reset Switch S104/S105.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Solder/Desolder Set

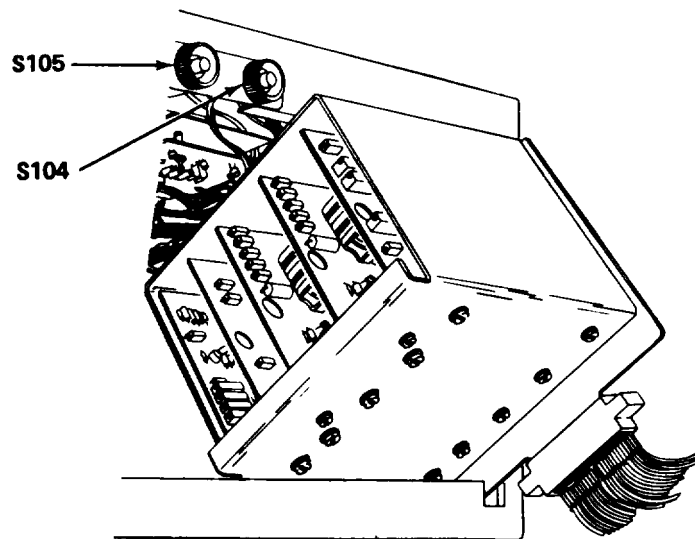
SUPPLIES: Switch  
Solder (Item 30, Appendix E)**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

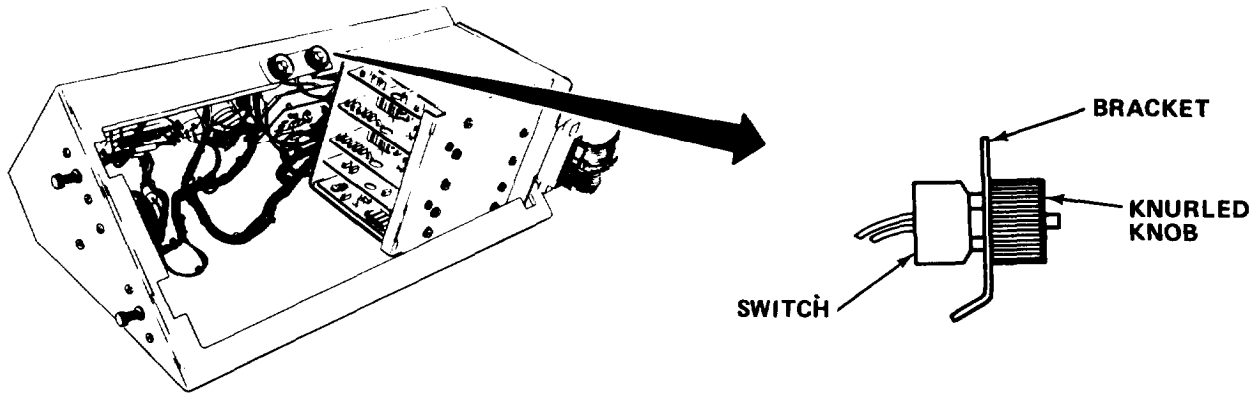
**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.



- b. Turn off circuit breaker.
- c. Open operator's console and lower cabinet door.
- d. Unscrew knurled knob around switch.
- e. Push switch clear of mounting bracket.
- f. Tag and desolder switch wiring.



- g. Solder wiring to new switch.
- h. Reinstall switch into mounting bracket and tighten knurled knob.
- i. Close and lock operator's console and lower cabinet door.
- j. Turn on circuit breaker.
- k. Turn on MASTER POWER switch.

9-20.19 Replace Microswitch(es) S101/S107/S110/S111.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver  
7/16 in. Combination Wrench

SUPPLIES: Microswitch

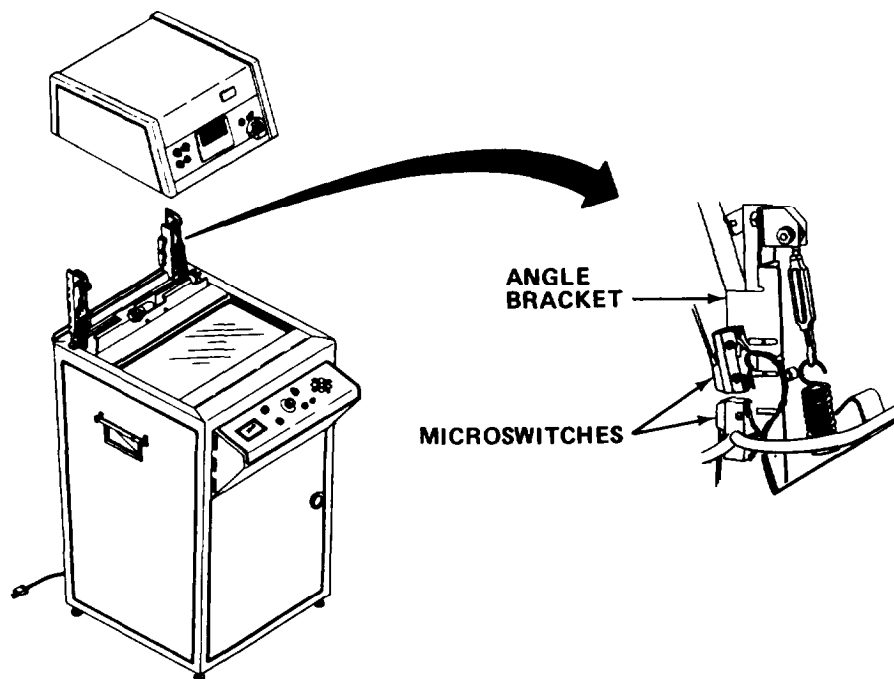
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open hood.



- d. Remove left and right hood panels.
- e. Loosen turnbuckle as much as possible.

**WARNING**

When removing spring mounting bracket, release spring tension by loosening turnbuckle. Spring will still be under tension. Serious injury may occur unless bracket is held tightly when removing nut.

- f. Remove spring mounting bracket.
- g. Remove defective switch, tag and desolder wiring.
- h. Solder wiring to new switch and install on bracket.
- i. Reinstall spring and spring mounting bracket, and tighten spring turnbuckle.
- j. Reinstall side cover.
- k. Close hood.
- l. Turn on circuit breaker.
- m. Turn on MASTER POWER switch.

9-20.20 Replace Photomultiplier Tube

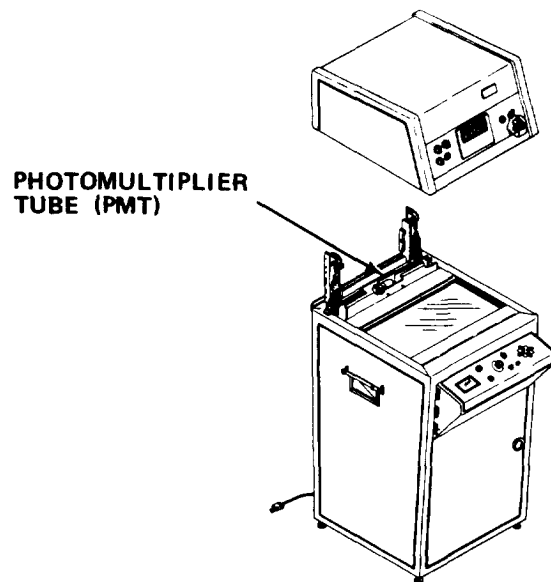
MOS: 35E, Special Electronic Devices Repairer

SUPPLIES: PMT  
Gloves

**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Open hood.



**CAUTION**

Use gloves to handle PMT. Fingerprints will damage tube.

- d. Remove defective PMT with tube puller.
- e. Aline PMT pins with socket and insert new PMT.
- f. Lower hood.
- g. Turn on circuit breaker.
- h. Turn on MASTER POWER switch.

9-20.21 Replace Printed Circuit Card(S).

MOS: 35E, Special Electronic Devices Repairer

TOOLS: None Required

SUPPLIES: Printed Circuit Card 3C2  
Printed Circuit Card 3D2  
Printed Circuit Card 3CC1  
Printed Circuit Card VDSF-2  
Rubber Matting

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.

**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.

**CAUTION**

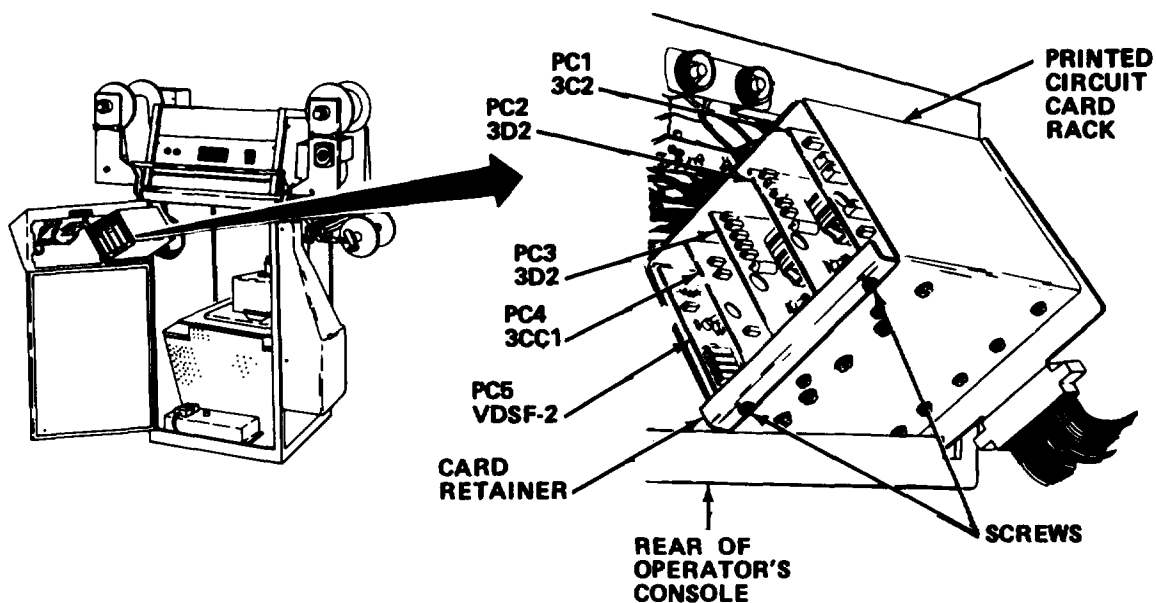
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- c. Open operator's console and lower cabinet door.
- d. Remove screws and card retainer.

**CAUTION**

Before making any adjustments check all power supply voltages or machine damage could occur.

- e. Replace defective printed circuit card.



**NOTE**

- Be sure that contacts on printed circuit card and printed circuit card rack are properly aligned and that printed circuit card edges are in correct slots.
- Replacement of the following cards will require adjustment as shown in referenced paragraph.

| Printed Circuit Card | Adjustment      | Refer to Paragraph |
|----------------------|-----------------|--------------------|
| VDSF-2               | Dodging Circuit | 9-20.23            |
| 3D2                  | Zero Balance    | 9-20.24            |
| 3C2                  | Scan Rate       | 9-20.25            |

- Before making any adjustments, check all power supply voltages.

- Close operator's console and lower cabinet door.
- Turn on circuit breaker.
- Turn on MASTER POWER switch.
- Perform necessary adjustments.



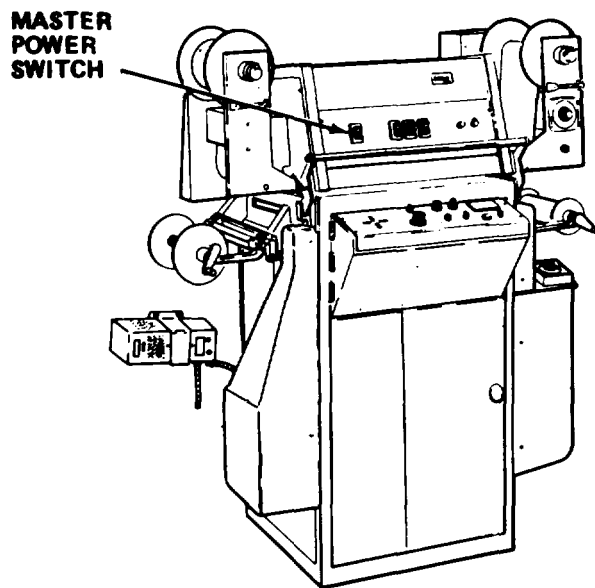
9-20.22 Adjust Power Supplies.

MOS: 35E, Special Electronic Devices Repairer

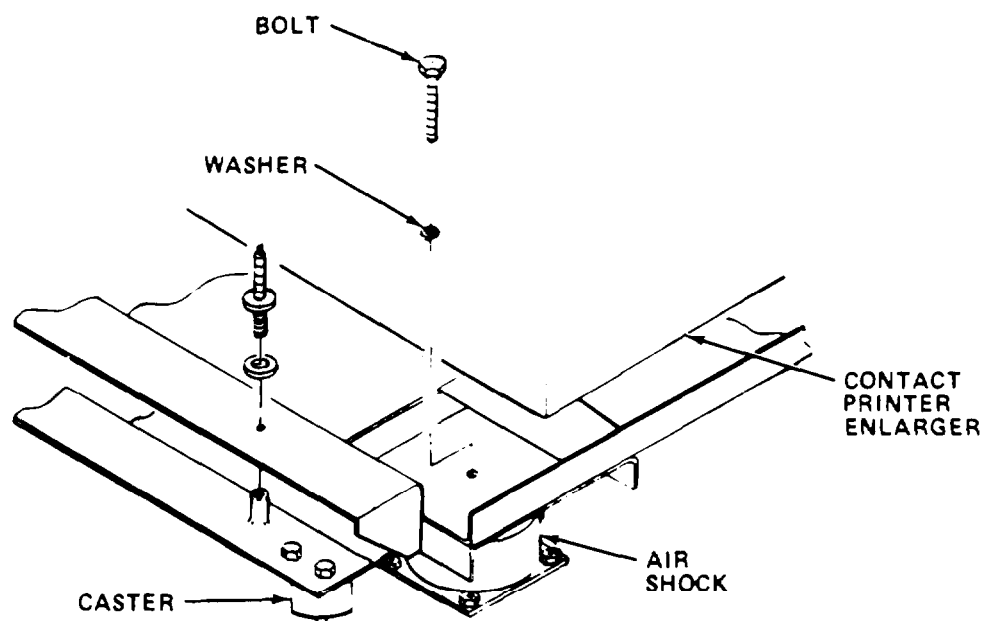
PERSONNEL: Two persons are required to perform this procedure.

TOOLS: High Voltage Probe  
Multimeter  
Electronic Tool Kit  
Extender Board

SUPPLIES: Rubber Matting

**WARNING**

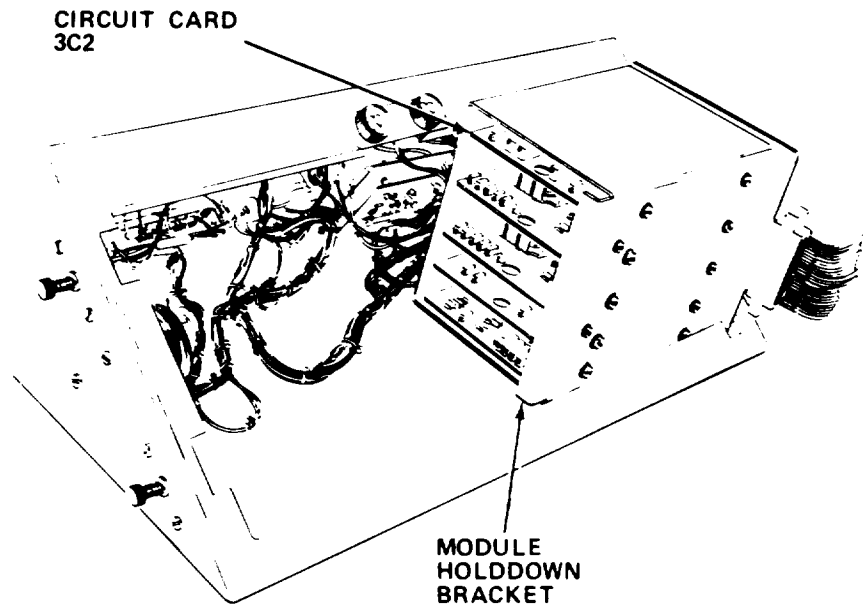
- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.
  - a. Turn off MASTER POWER switch.
  - b. Turn off circuit breaker.



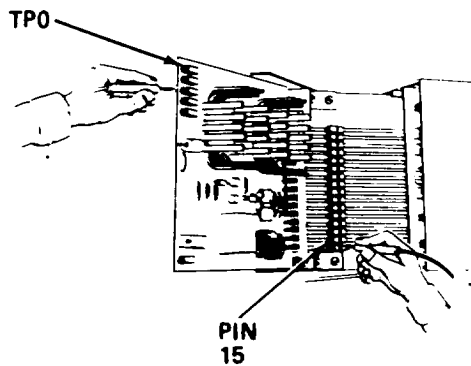
**WARNING**

To prevent serious injury, two men are required to move equipment for maintenance operations. This equipment weighs approximately 500 lbs.

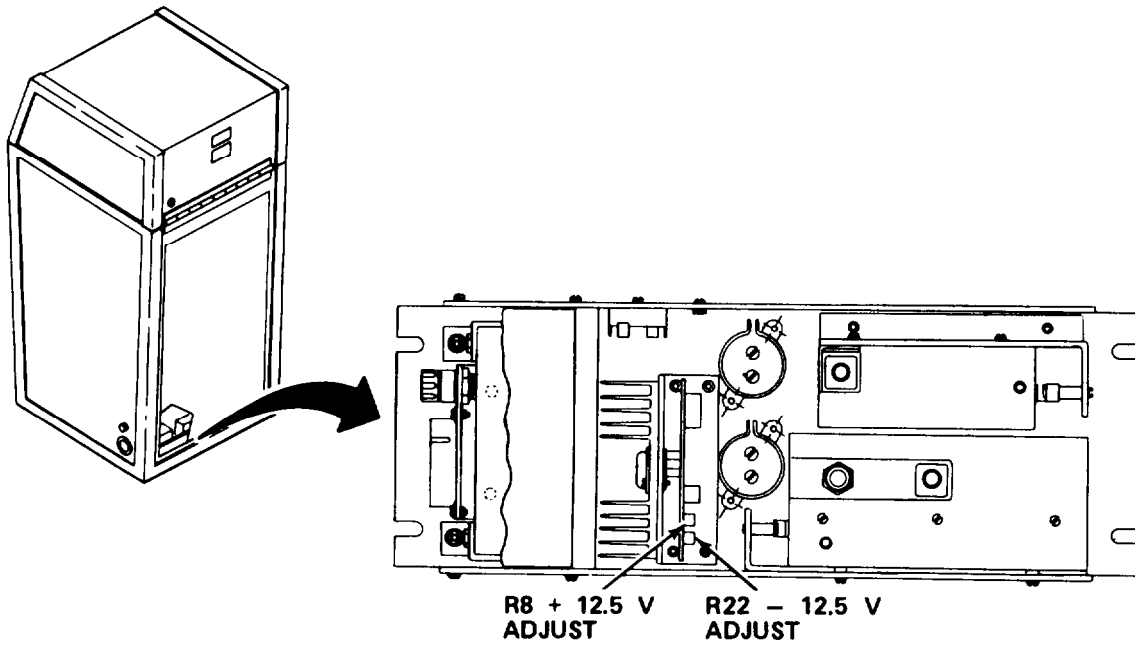
- c. Deflate air shocks, remove bolts and washers.
- d. Lower casters.
- e. Pull printer/enlarger away from wall.
- f. Remove rear panel.
- g. Unlatch and raise hood.
- h. Place rubber matting in front of and behind printer/enlarger.
- i. Set MODE switch to TEST.
- j. Open operator's console.



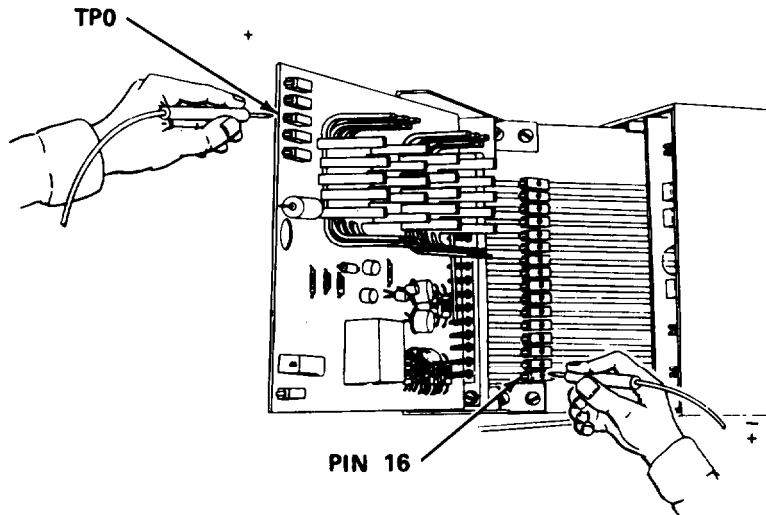
- k. Remove screws, and remove module
- l. Remove circuit card 3C2 from circuit card assembly (paragraph 9-20.22).
- m. Insert extender board into 3C2 slot.
- n. Insert 3C2 into extender board.
- o. Set multimeter controls to measure +12.5 V.



- p. Connect multimeter common lead to TPO or ground of circuit card 3C2.
- q. Connect multimeter positive lead to pin 15 of extender board.
- r. Turn on circuit breaker and MASTER POWER switch; allow 10 minutes for equipment warm up.



- s. Use insulated alignment tool and adjust R8 on +12.5 V power supply for reading of +12.5 V.
- t. Disconnect positive and negative multimeter leads.



- u. Set multimeter controls to measure -12.5 V.
- v. Connect common lead to pin 16 of extender board and positive lead to TPO or ground of card 3C2.
- w. Use insulated tool to adjust R22 on -12.5 V power supply for a meter reading of -12.5 V.

- x. Turn off MASTER POWER switch.
- y. Disconnect multimeter leads from circuit.
- z. Remove circuit card 3C2 from extender board.
- aa. Reinstall circuit card 3C2 into circuit card assembly.

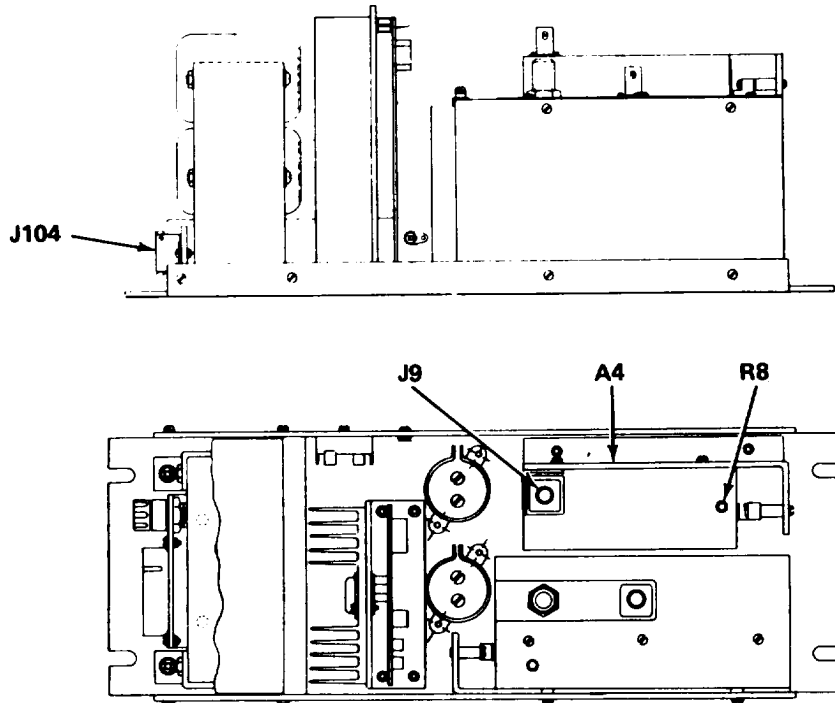
**WARNING**

High voltages capable of causing death are used in this equipment. Use extreme caution performing tasks inside cabinet.

- ab. Remove PMT from tube socket.
- ac. Set multimeter to measure -1000 V.
- ad. Connect multimeter positive lead to ground with alligator clip.
- ae. Insert multimeter common lead into PMT tube socket pin 11.

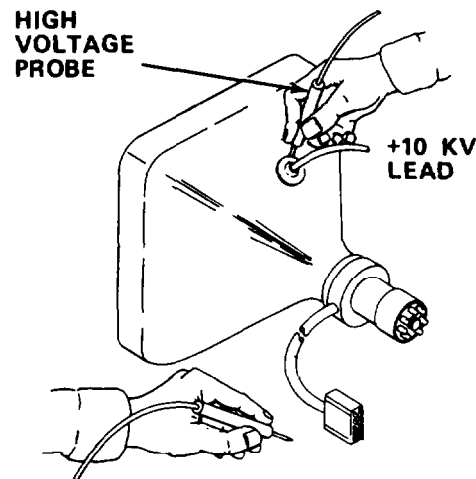
**WARNING**

Do not touch multimeter until MASTER POWER switch is in OFF position. Death or serious injury may occur.



- af. Turn on MASTER POWER switch.

- ag. Use insulated alignment tool and adjust R8 on A4 module of the power supply for meter reading of -1 kV.
- ah. Turn off MASTER POWER switch and wait 1 minute.
- ai. Disconnect multimeter leads from ground and pin 11 of PMT socket.
- aj. Install PMT in tube socket.
- ak. Remove high voltage safety screen by removing screws at top of screen.
- al. Connect high voltage probe to multimeter.
- am. Set multimeter controls to measure +10 kV.
- an. Connect multimeter common lead to ground with an alligator clip. (Use same ground as in step at.)
- ao. Turn beam current adjust R23 on circuit card 3CC1 fully right.



- ap. Slide multimeter high voltage probe under rubber suction cup on CRT high voltage connector.

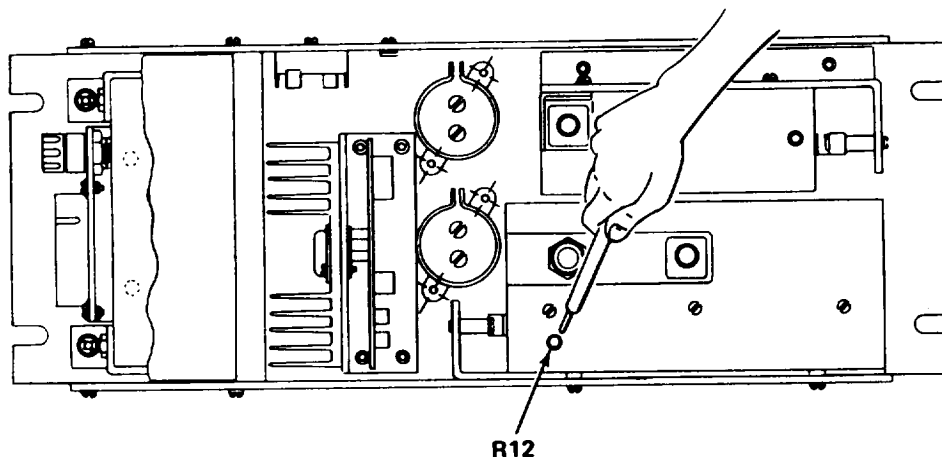
**WARNING**

+10 kV can arc 3/4 in. and cause death or serious injury.

**CAUTION**

Be sure multimeter is properly set up to measure +10 kV or damage to equipment and multimeter will result.

- aq. Turn on MASTER POWER switch and wait 1 minute.
- ar. Use insulated alignment tool and adjust R12 on power supply assembly for meter reading of +10 kV.
- as. Turn off MASTER POWER switch and wait 1 minute.



- at. Disconnect multimeter.
- au. Replace high voltage safety screen and secure with screws.
- av. Reinstall module holddown bracket and secure with screws.
- aw. Close operator's console and cabinet front door.
- ax. Install printer rear panel.
- ay. Close and latch hood. Set circuit breaker OFF.
- az. Reposition printer/enlarger over air shocks, raise casters and reinstall bolts and washers.
- ba. Turn on circuit breaker.
- bb. Turn on MASTER POWER switch.

9-20.23 Adjust Variable Dodging Circuits.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Multimeter  
Flat Tip Screwdriver  
Extender Board

SUPPLIES: Rubber Matting

**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

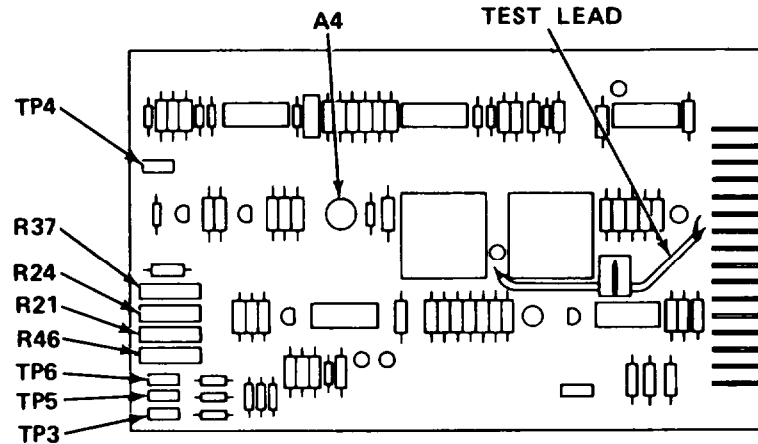
- a. Raise printer hood.
- b. Set MODE switch to TEST.
- c. Turn on circuit breaker.
- d. Turn on MASTER POWER switch and allow printer to warm up for 10 minutes.

**NOTE**

If printer was in power-on condition prior to this test, 10 minute warm-up period may be eliminated.

- e. Turn off MASTER POWER switch.
- f. Turn off circuit breaker.
- g. Remove PMT (paragraph 9-20.20).
- h. Set % DODGING control to max.
- i. Open operator's console.
- j. Tag and remove all circuit cards from their slots.
- k. Insert extender board into card VDSF-2 (bottom) slot of circuit card assembly.





- l. Remove circuit component A4 from card VDSF-2.
- m. Insert VDSF-2 card into extender board.
- n. Use alinement tool (jeweler's screwdriver) and turn R37 left.
- o. Turn on circuit breaker.
- p. Turn on MASTER POWER switch.
- q. Observe PMT digital meter M101 for display of 00.0.

**NOTE**

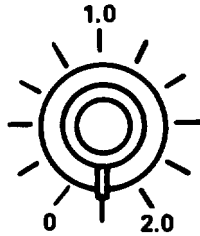
If PMT digital meter does not display 00.0, either meter or card VDSF-2 is defective.

- r. Test PMT digital meter M101 and current source as follows, using test

| <u>Inject into TP4</u>  | <u>PMT Meter Reading</u> |
|-------------------------|--------------------------|
| 1. 50 $\mu$ A from TP3  | 50 $\mu$ A $\pm$ 1%      |
| 2. 5.0 $\mu$ A from TP5 | 5.0 $\mu$ A $\pm$ 1%     |
| 3. 0.5 $\mu$ A from TP6 | 0.5 $\mu$ A $\pm$ 1%     |

- s. Turn off MASTER POWER switch.
- t. Turn off circuit breaker.

- u. Reinstall circuit component A4 on card VDSF-2.
- v. Install test card lead on TP1 on card VDSF-2.
- w. Set multimeter on lowest resistance scale. Connect between pins 13 and 14 of extender board.
- x. Rotate EXP LEVEL control to minimum resistance.



NOTE

EXP LEVEL control should now be positioned between 0 and 2.0, pointing in opposite direction from 1.0.

- y. Disconnect multimeter leads from circuit.
- z. Turn on circuit breaker.
- aa. Turn on MASTER POWER switch.
- ab. Adjust dodging and exposure level circuits as follows:

| <u>Inject into</u><br><u>TPI</u> | <u>Set %</u><br><u>Dodging to</u> | <u>Set</u><br><u>Exposure</u><br><u>Level to</u> | <u>Adjust</u> | <u>PMT Meter</u><br><u>Reading</u> |
|----------------------------------|-----------------------------------|--|---------------|------------------------------------|
| (1) 50 $\mu$ A from TP3          | MAX                               | 0  | R46           | 50 $\mu$ A                         |
| (2) 0.5 $\mu$ A from TP6         | MIN                               | 2.0  | R24           | 0.5 $\mu$ A                        |
| (3) 50 $\mu$ A from TP3          | MIN                               | 0  | R21           | 50 $\mu$ A                         |
| (4) No Input Current             | MAX                               | 2.0  | R37           | 0.4 $\mu$ A                        |

NOTE

Step 1 adjusts output stage of variable dodging circuit. Steps 2 and 3 match exposure level circuit to dynamic range of logging transistor A4B. Step 4 sets lower limit of output current (scan rate limit) from circuit.

ac. Check accuracy of Dodging and Exposure circuits as follows:

| <u>Inject into<br/>TPI</u> | <u>Set %<br/>Dodging to</u> | <u>Set<br/>Exposure<br/>Level to</u> | <u>PMT Meter<br/>Reading</u> | <u>Tolerance</u> |
|----------------------------|-----------------------------|--------------------------------------|------------------------------|------------------|
| (1) No Input Current       | MIN                         | 0.0                                  | 50 $\mu$ A                   | 5%               |
| (2) No Input Current       | MIN                         | 1.0                                  | 5.0 $\mu$ A                  | 5%               |
| (3) No Input Current       | MIN                         | 2.0                                  | 0.5 $\mu$ A                  | 5%               |
| (4) 50 $\mu$ A from TP33   | MAX                         | Vary Betw<br>0.2 and 2.0             | 50 $\mu$ A                   | 10%              |
| (5) 5.0 $\mu$ A from TP55  | MAX                         | Vary Betw<br>0.2 and 2.0             | 5.0 $\mu$ A                  | 10%              |
| (6) 0.5 $\mu$ A from TP6   | MAX                         | Vary Betw<br>0.2 and 2.0             | 0.5 $\mu$ A                  | 10%              |

ad. Turn off MASTER POWER switch.

ae. Turn off circuit breaker.

af. Remove circuit card VDSF-2 from extender board.

ag. Remove test lead from TP1.

ah. Reinstall all circuit cards in their proper locations in circuit card assembly.

ai. Reinstall circuit card holddown bracket on circuit card assembly and secure with two screws.

aj. Close operator's console.

ak. Replace PMT (paragraph 9-20.20).

al. Lower and latch hood.

am. Turn on circuit breaker.

an. Raise hood.

ao. Turn on MASTER POWER switch.

9-20.24 Adjust Sweep Circuit Zero Balance.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Multimeter  
Alinement Tool (or Jeweler's Screwdriver)

SUPPLIES: Rubber Matting

**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting as a protective measure' before performing this procedure. Death or serious injury may occur.

**CAUTION**

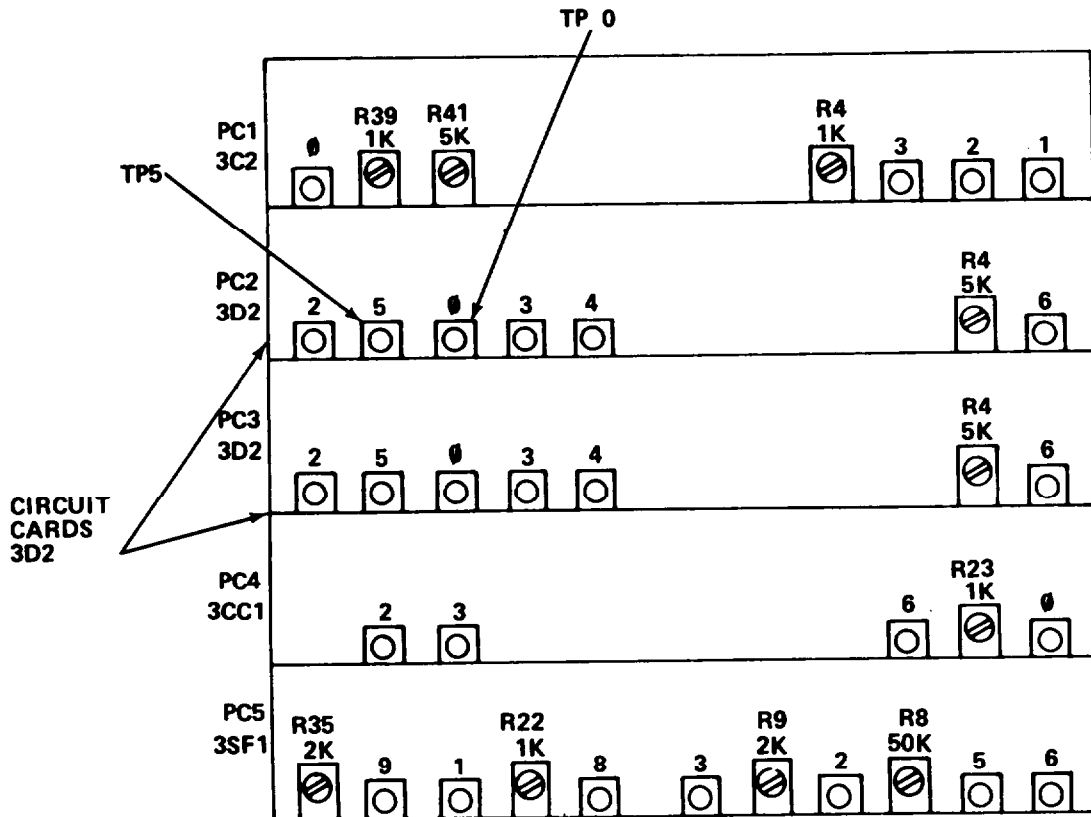
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Raise printer hood.
- b. Set MODE switch to TEST.
- c. Turn on circuit breaker.
- d. Turn on MASTER POWER switch. Allow printer to warm up for 10 minutes.
- e. Open operator's console.

**NOTE**

The following procedure is used to adjust both 302 cards.

- f. Set multimeter controls to lowest +dc scale.
- g. Connect multimeter common lead to TPO (black) and positive lead to TP5 (green) on card 3D2.



- h. Adjust R4 on card 3D2 until multimeter reads  $0 \pm 0.1$  V.
- i. Remove multimeter leads from card 3D2.
- j. Close operator's console.
- k. Turn off MASTER POWER switch.
- l. Turn off circuit breaker.

9-20.25 Adjust Sweep Circuit Max Scan Rate.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Alinement Tool

SUPPLIES: Rubber Matting

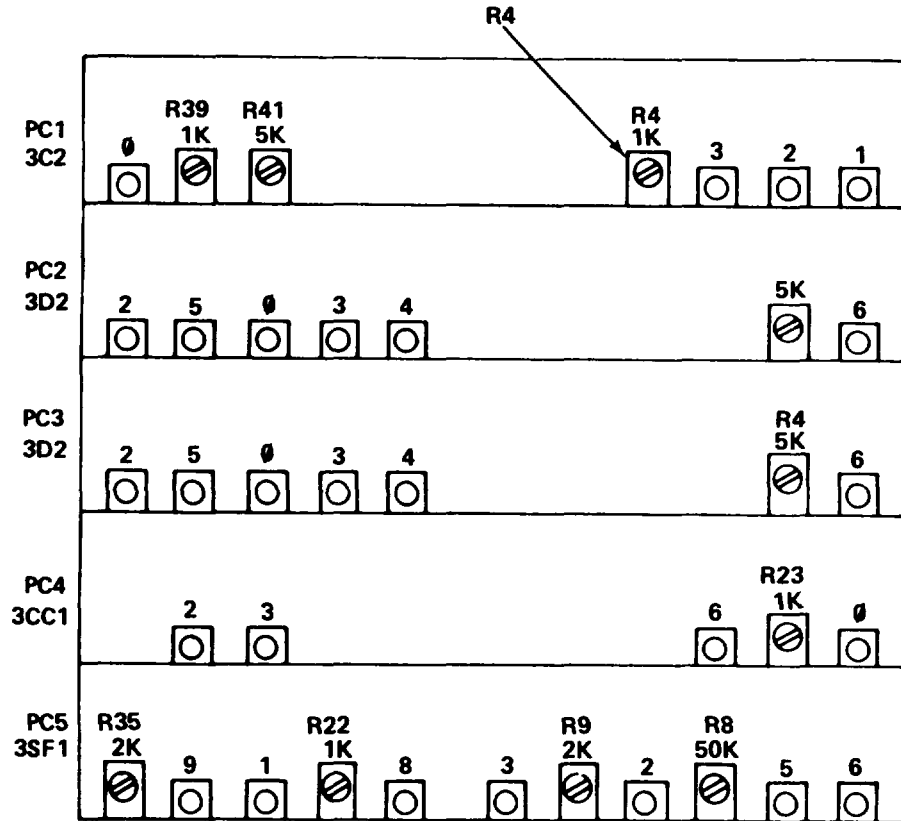
**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting before performing this procedure. Death or serious injury may occur.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage the PMT.

- a. Raise printer hood.
- b. Turn MODE switch to TEST.
- c. Turn on circuit breaker.
- d. Turn on MASTER POWER switch and allow printer to warm up for 10 minutes.
- e. Open operator's console.



- f. Use small alignment tool to turn R4 fully to the left. This will attain maximum scan rate.
- g. Close operator's console.
- h. Turn off MASTER POWER switch.
- i. Turn off circuit breaker.

9-20.26 Adjust CRT Accelerator Anode Circuit.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Rubber Matting

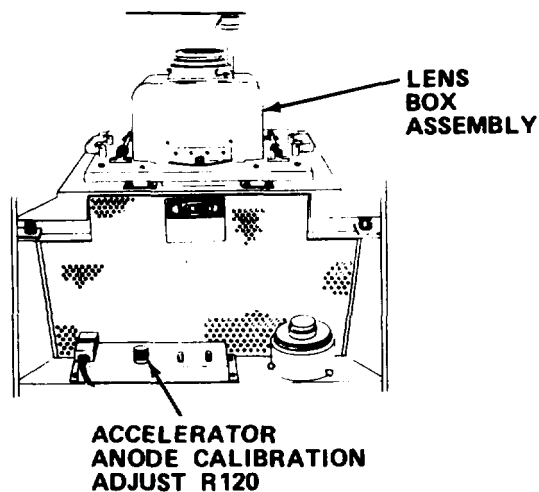
**WARNING**

- Death or serious injury may occur from electrical shock unless power is turned off before servicing.
- You must stand on rubber matting as a protective measure before performing this procedure. Death or serious injury may occur.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Set MODE switch to TEST.
- b. Turn on circuit breaker.
- c. Turn on MASTER POWER switch, and allow printer to warm up for 10 minutes.
- d. Open lower cabinet door.



- e. Unlatch and open lens box assembly.
- f. Unscrew black plastic cap from accelerator anode calibration adjust R120.



- g. Turn accelerator anode calibration adjust R120 fully left.
- h. Set MODE switch to MAN.
- i. If any light is present on CRT screen, adjust R120 fully right.
- j. Close and secure lens box assembly.
- k. Reinstall plastic cap on accelerator anode calibration adjust R120.
- l. Close lower cabinet doors.
- m. Turn off MASTER POWER switch.
- n. Turn off circuit breaker.

9-20.27 Adjust CRT Electronic Spot Size.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Rubber Matting

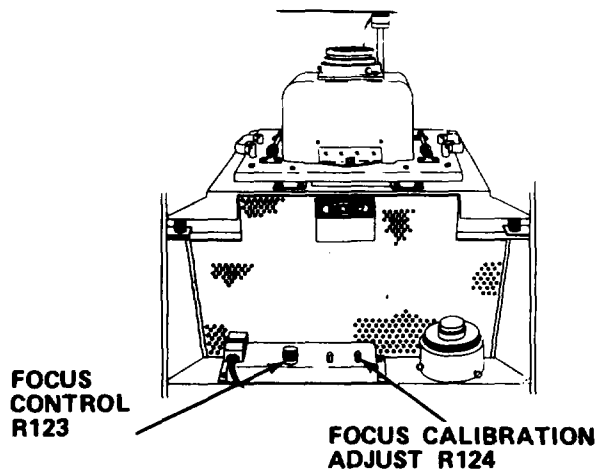
**WARNING**

- Death or serious injury may occur from electrical shock unless power is secured before servicing.
- You must stand on rubber matting as a protective measure before performing this procedure. Death or serious may occur.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Raise printer hood.
- b. Set MODE switch to TEST.
- c. Turn on circuit breaker.
- d. Turn on MASTER POWER switch.
- e. Open lower cabinet door.



- f. Open and unlatch lens box.

- g. Adjust focus control adjust R123 until raster lines are as fine as possible.
- h. Unscrew black plastic cap from focus calibration adjust R124.
- i. Adjust focus calibration adjust R124 until raster lines just touch.
- j. Reinstall plastic cap on focus calibration adjust R124 and tighten finger tight.
- k. Readjust focus control adjust R123 until raster lines slightly overlap.
- l. Close and latch lens box.
- m. Close lower cabinet door.
- n. Turn off MASTER POWER switch.
- o. Turn off circuit breaker.
- p. Lower printer hood.

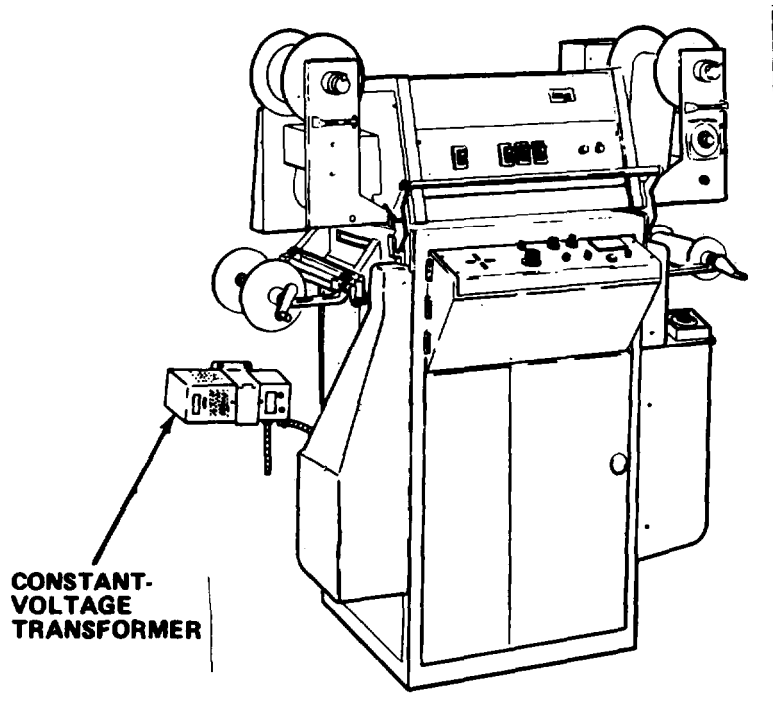
9-20.28 Replace Constant Voltage Transformer.

MOS: 35E, Special Electronic Devices Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: Flat Tip Screwdriver  
3/4 in. Combination Wrench  
3/8 in. Combination Wrench  
12 in. Adjustable Wrench

SUPPLIES: Constant-Voltage Transformer

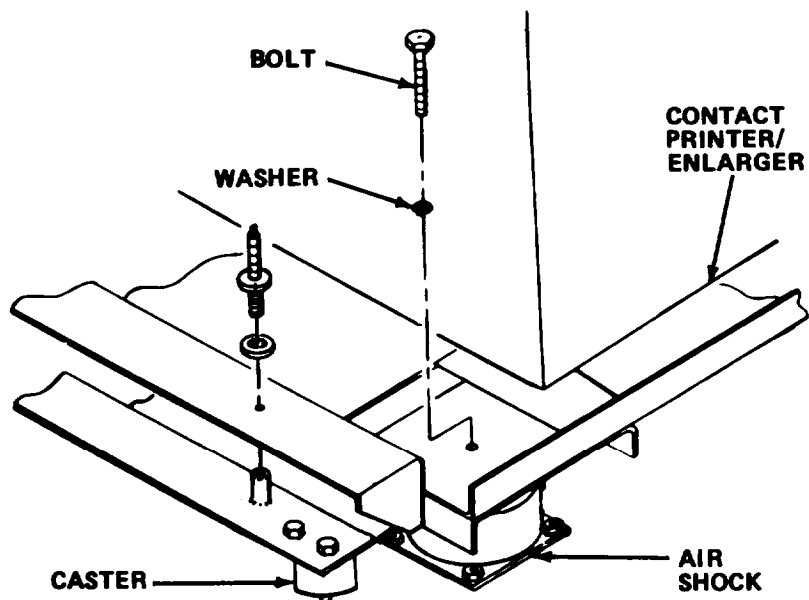


Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

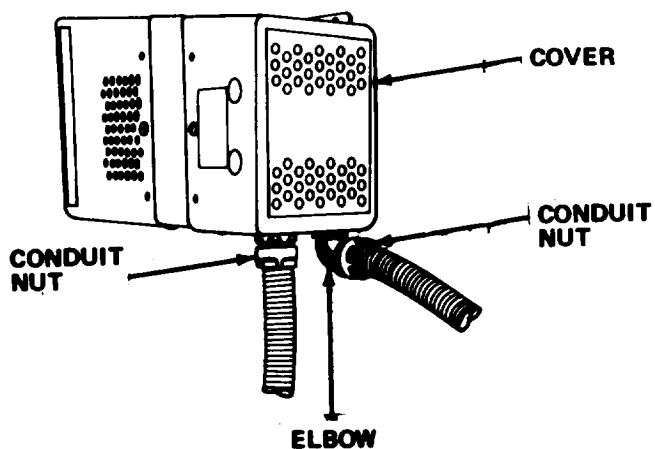
- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



**WARNING**

To prevent serious injury, two men are required to move equipment for maintenance operations. This equipment weighs approximately 500 lbs.

- c. Deflate air shocks, remove four bolts and washers. Lower casters.
- d. Move contact printer/enlarger away from wall.
- e. Remove end plate.

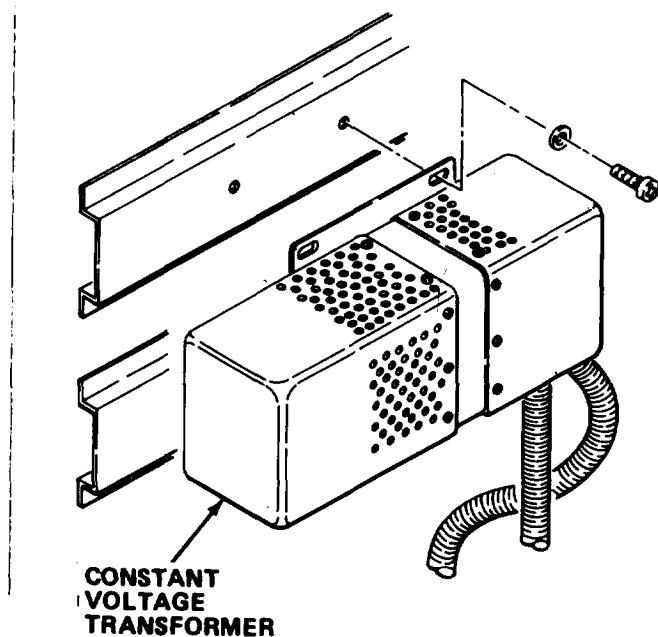


- f. Loosen conduit nuts.

**NOTE**

Note input and output wire color coding.

- g. Tag and disconnect input/output wires from transformer.
- h. Remove transformer and bracket from wall.



- i. Mount new transformer assembly to wall.
- j. Reconnect wiring.
- k. Tighten conduit nuts.
- l. Reinstall end cover.
- m. Reposition printer/enlarger over air shocks. Raise casters and reinstall bolts and washers.
- n. Turn on circuit breaker.
- o. Turn on MASTER POWER switch.

9-20.29 Replace Mode Switch.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver  
 1/16 in. Hex Head Key Wrench  
 1/2 in. Combination Wench  
 Solder/Resoldering Set

SUPPLIES: Rotary Switch  
 Solder (Item 30, Appendix E)

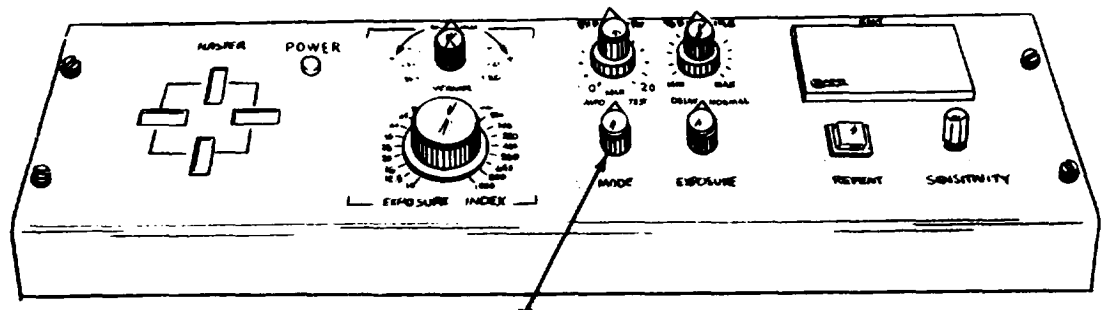
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.

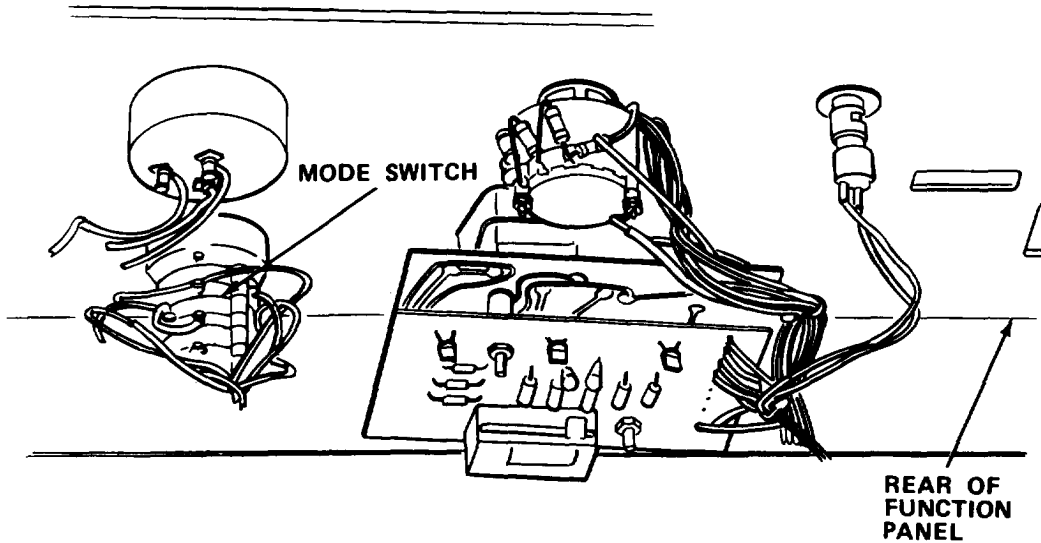


- c. Remove knob and switch retaining nut and push switch through panel.

**CAUTION**

Do not break wires. Lift operator panel slowly to prevent breaking wires.

- d. Remove screws and carefully lift operator's console to gain access to switch wiring.



- e. Tag and desolder defective MODE switch wiring.
- f. Solder wiring to new switch and install in console.
- g. Reinstall lockwasher and control knob.
- h. Carefully lower and secure operator's console.
- i. Turn on circuit breaker.
- j. Turn on MASTER POWER switch.

9-20.30 Replace PMT SENSITIVITY Adjust Potentiometer

MOS: 35E, Special Electronic Devices Repairer

TOOLS 1/2 in. Combination Wrench  
Solder/Desoldering Set

SUPPLIES: Variable Resistor  
Solder (Item 30, Appendix E)

**WARNING**

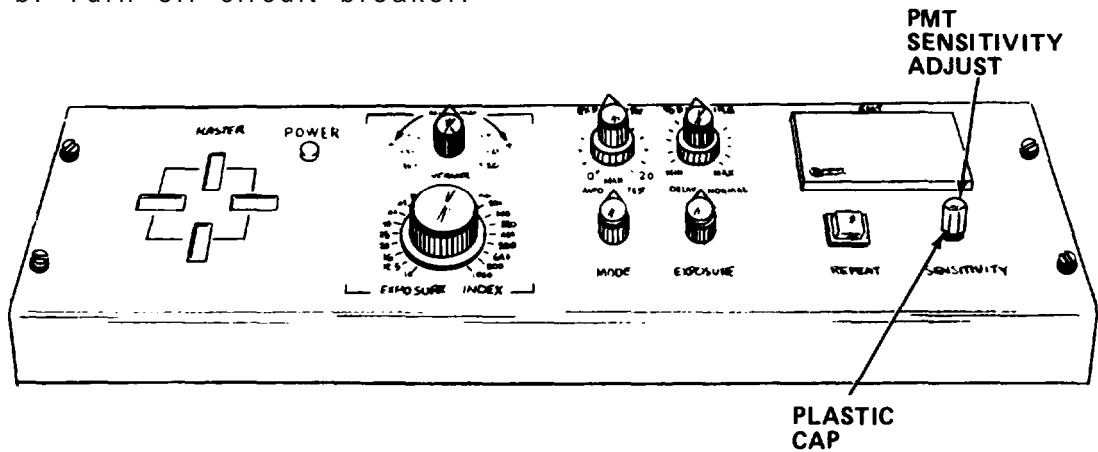
Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

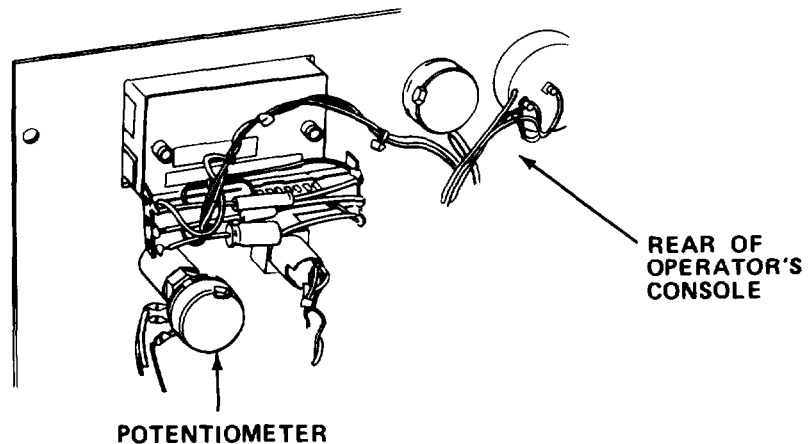
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.



- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



- c. Remove black plastic cap and potentiometer retaining nut.
- d. Open operator's console.



- e. Tag and desolder wires from defective resistor.
- f. Remove insulated shaft from defective resistor.
- g. Install insulated shaft on new resistor.
- h. Solder wires to new resistor and install in operator's console.
- i. Reinstall lockwasher, nut and plastic cap.
- j. Close operator's console.
- k. Turn on circuit breaker.
- l. Turn on MASTER POWER switch.

9-20.31 Repair Ratchet Wheel Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
9/16 in. Combination Wrench  
11/16 in. Combination Wrench  
Punch  
Ball Peen Hammer  
Gear Puller

SUPPLIES: Ratchet Wheel  
Clutch Pad

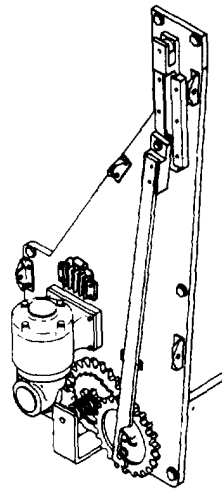
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

**CAUTION**

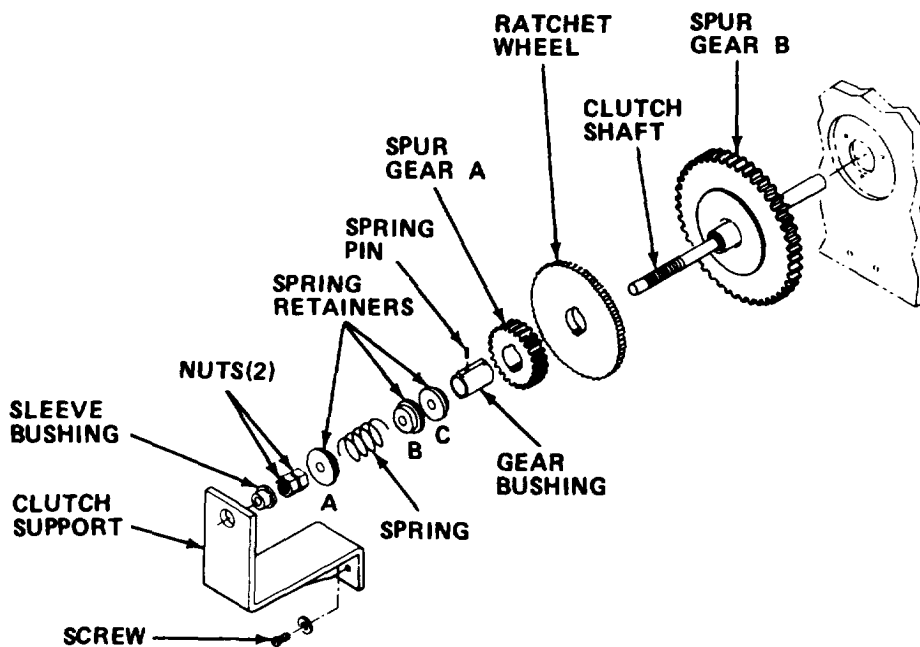
Never have printer hood down with power on and normal room lights on. This condition will damage PMT.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.



**CLUTCH ASSEMBLY**

- c. Remove cover.



- d. Remove clutch support.
- e. Remove sleeve bushing and nuts.
- f. Remove spring retainer A, spring, and spring retainers B and C.
- g. Remove motor assembly (paragraph 9-20.4).
- h. Remove ratchet arm (paragraph 9-20.5).
- i. Remove spring clip from hood drive gear shaft.
- j. Move connecting rod aside.

**NOTE**

Hood must be in down position and secured with locking device before hood drive gear can be removed.

- k. Remove nut, release hood locking device, hood drive gear, and woodruff key.
- l. Remove spur gear (A), gear bushing, ratchet wheel, clutch pads, spur gear (B), and friction disk.
- m. Reinstall friction disk, spur gear (B), new clutch pad, new ratchet wheel, gear bushing, and spur gear (A).

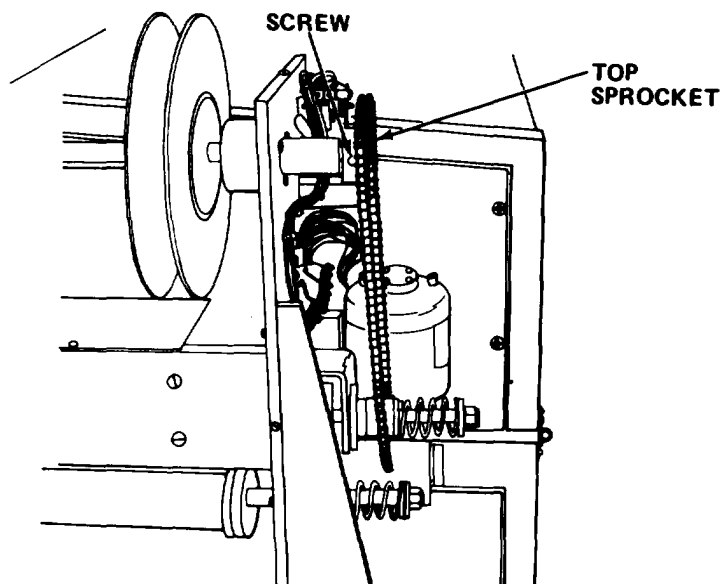
- n. Secure hood locking device, hood drive gear, woodruff key, and nut.
- o. Reinstall hood drive gear shaft spring clip.
- p. Reinstall ratchet arm and motor assembly.
- q. Reinstall spring retainers B and C, spring, and spring retainer A.
- r. Reinstall nuts, sleeve bushing, and clutch support.
- s. Reinstall left side APL cover.
- t. Turn on circuit breaker.
- u. Turn on MASTER POWER switch.

9-20.32 Replace Drive Belt and Chain

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
9/16 in. Combination Wrench  
1/8 in. Hex Head Key Wrench  
3/32 in. Hex Head Key Wrench  
Locking Pliers

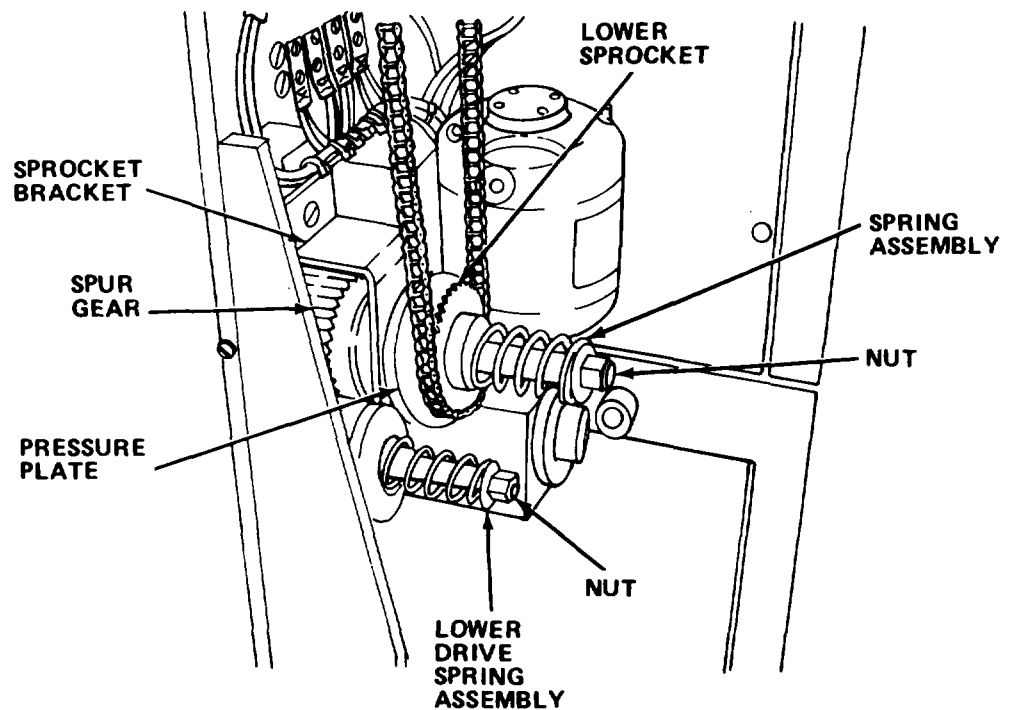
SUPPLIES: Drive Chain  
Drive Belt  
General Purpose Grease (Item 15, Appendix E)



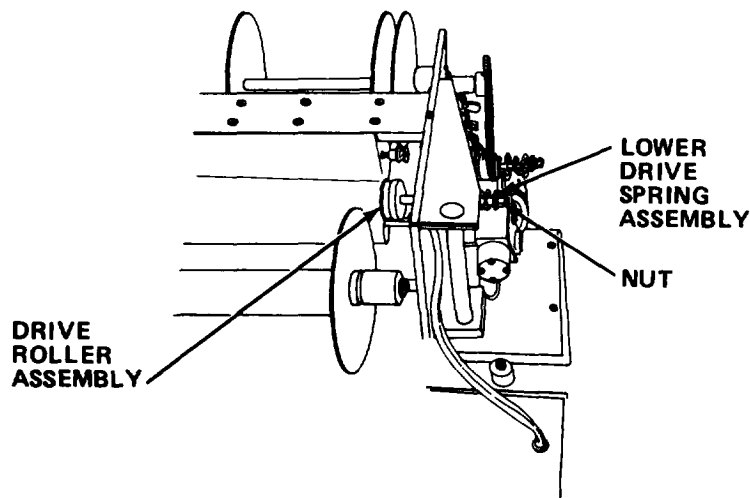
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing.

- a. Turn off MASTER POWER switch.
- b. Turn off circuit breaker.
- c. Remove cover.
- d. Remove RPT motor (paragraph 9-20.1).
- e. Loosen hex head screw on top sprocket. Then slide sprocket from drive chain shaft.



- f. Replace defective drive chain with new drive chain as necessary.
- g. Remove nut and spring assembly from lower sprocket shaft.
- h. Remove lower sprocket and pressure plate from shaft.
- i. Remove sprocket bracket and spur gear assembly.
- j. Remove nut and lower drive spring assembly.
- k. Remove pressure plate, friction disc, and lower gear.



- l. Loosen hex head setscrew and remove retaining collar at opposite end of shaft.
- m. Slide drive roller assembly to rear and thread defective drive belt from roller.
- n. Install new drive belt on roller assembly, and slide drive roller assembly back in place.
- o. Reinstall retaining collar and tighten hex head setscrew.
- p. Reinstall lower gear, friction disc, and pressure plate.
- q. Reinstall lower drive spring assembly and secure with nut.
- r. Reinstall spur gear assembly and sprocket bracket.
- s. Reinstall pressure plate to shaft and lower sprocket.
- t. Reinstall spring assembly on lower sprocket shaft and secure with nut.
- u. Reinstall drive chain; then slide top sprocket on drive chain shaft and tighten in place with hex head setscrew.
- v. Reinstall RPT Motor (paragraph 9-20.1).
- w. Reinstall cover.
- x. Turn on circuit breaker.
- y. Turn on MASTER POWER switch.

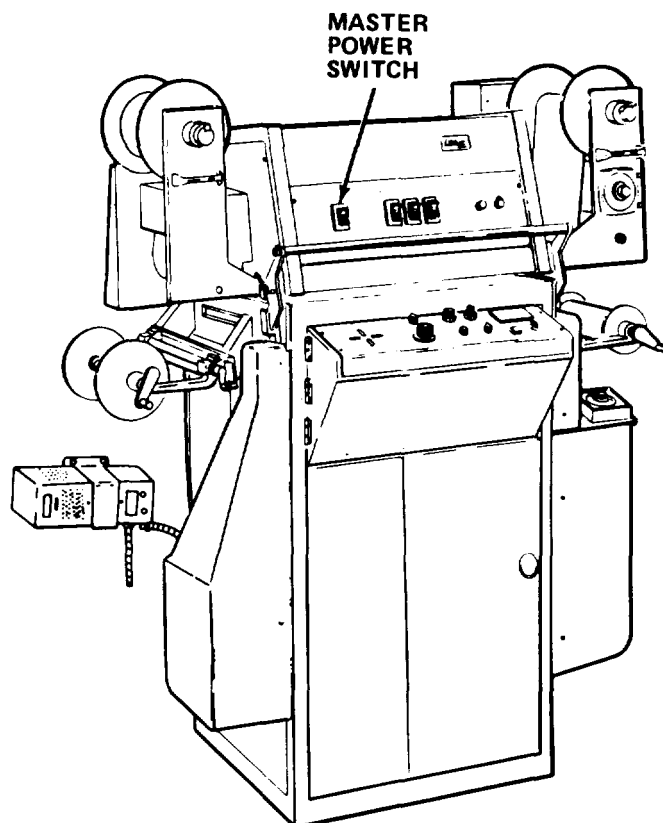
9-20.33 Remove/Install Contact Printer/Enlarger

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Four persons are required to perform this procedure.

TOOLS: Cross Tip Screwdriver  
5/16 in. Combination Wrench  
3/4 in. combination Wrench

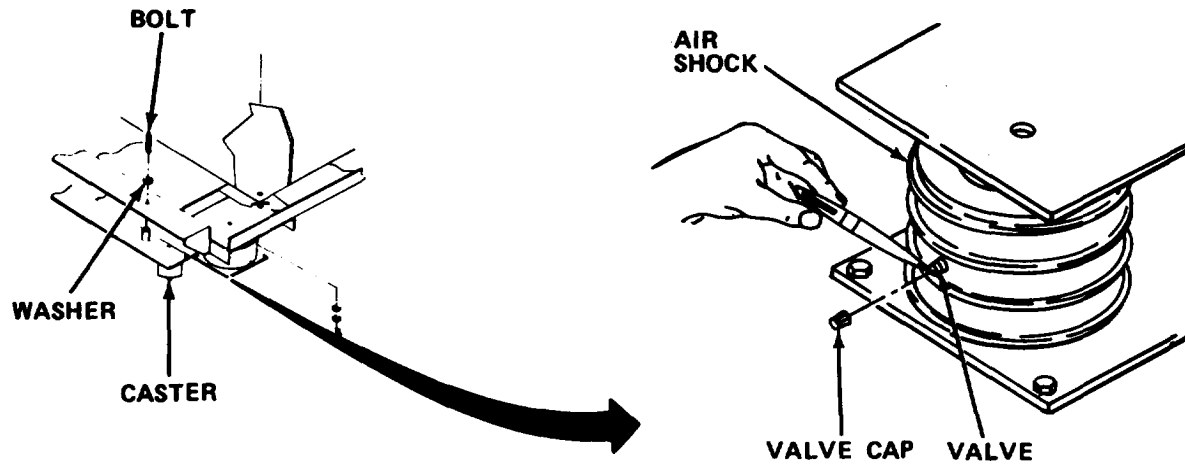
SUPPLIES: Contact Printer/Enlarger



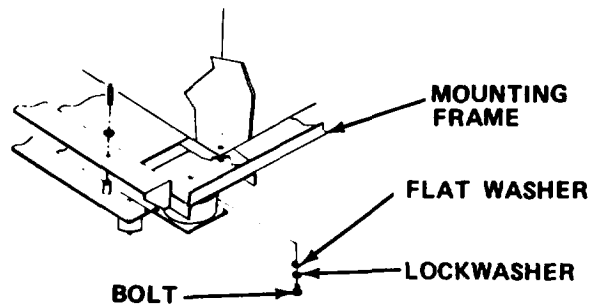
**WARNING**

Death or serious injury may occur from electrical shock unless power is turned off before servicing this equipment.

- a. Turn off circuit breaker.
- b. Turn off MASTER POWER switch.



- c. Deflate air shocks, remove bolts and washers; lower casters.
- d. Pull printer/enlarger away from wall.
- e. Remove rear panel. Tag and disconnect wires from power source at machine. Remove conduit nut and pull elbow and conduit from machine.



- f. Remove bolts, lockwashers, and flat washers from mounting frame.

**WARNING**

Serious injury may occur if four men are not used to move the printer/enlarger. It weighs 500 pounds.

- g. Lift the printer/enlarger from mounting frame.



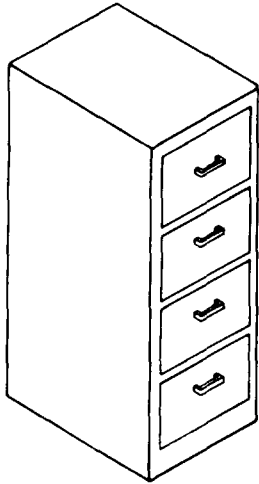
**NOTE**

It may be necessary to remove center door column.

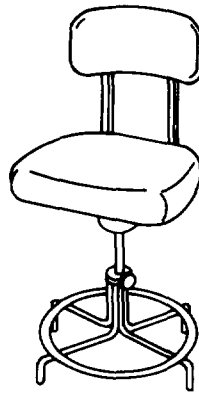
- h. Move printer/enlarger out of section through side door.
- i. Mount the replacement printer/enlarger on the mounting frame. Secure with bolts, lockwashers, and flat washers.
- j. Remove rear panel. Install conduit and elbow and secure with conduit nut. Reconnect wiring.
- k. Reinstall rear panel.
- l. Position printer/enlarger over air shocks, raise casters and install bolts and washers.
- m. Turn on circuit breaker.
- n. Turn on MASTER POWER switch.



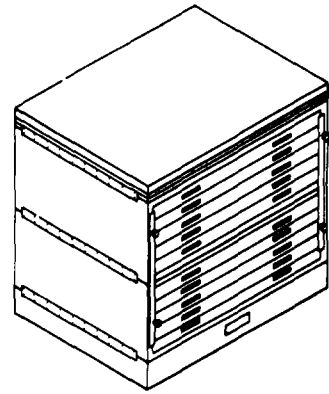




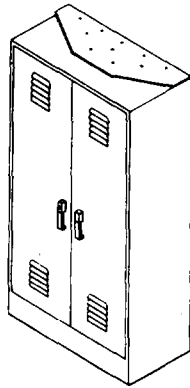
**FILING  
CABINET**



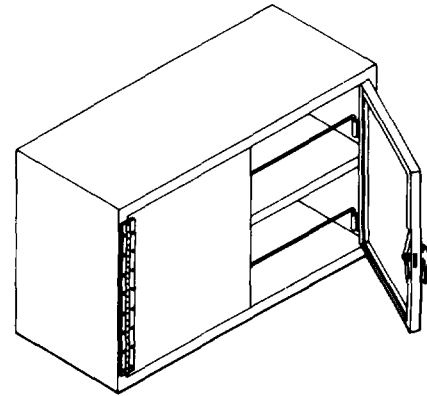
**ROTARY  
DRAFTING  
CHAIR**



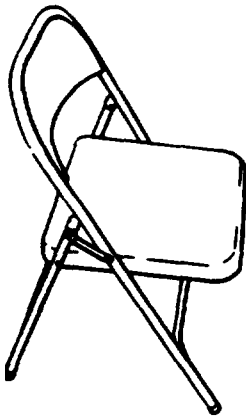
**MAP AND PLAN  
FILING CABINET**



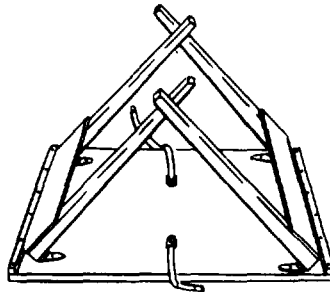
**SUPPLY  
CABINET**



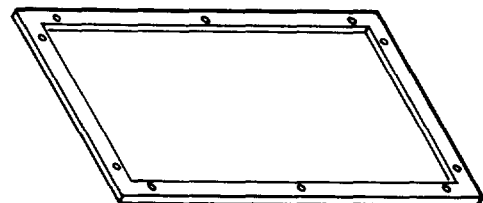
**WALL  
STORAGE  
CABINET**



**FOLDING  
CHAIR**



**FOLDING  
FIELD  
TABLE**



**CORKBOARD**

## CHAPTER 10

## FURNITURE AND CABINETS

## Section I INTRODUCTION

**10-1. GENERAL INFORMATION.**

10-1.1 Scope. This chapter contains the description of all furniture and cabinets contained in this section.

**10-2. EQUIPMENT DESCRIPTION.**

a. Folding field table. Provides additional work space. Folds flat for storage. Dimensions:

|        |                     |
|--------|---------------------|
| Width  | 36.0 in. (91.4 cm)  |
| Depth  | 24.0 in. (60.96 cm) |
| Height | 27.5 in. (69.85 cm) |

b. Wall storage cabinet. Provides for miscellaneous storage. There are two shelves. The two doors are held shut by a handle-type latch. Dimensions:

|        |                    |
|--------|--------------------|
| Width  | 30.0 in. (76.2 cm) |
| Depth  | 12.0 in. (30.5 cm) |
| Height | 18.0 in. (45.7 cm) |

c. Supply cabinet. Provides storage for miscellaneous items. It has two louvered doors with a built-in latch and four shelves. Dimensions:

|        |                     |
|--------|---------------------|
| Width  | 36.0 in. (91.4 cm)  |
| Depth  | 18.0 in. (45.7 cm)  |
| Height | 72.0 in. (182.8 cm) |

d. Filing cabinet. Provides storage for documents, correspondence and office supplies. It has four drawers which can be locked. Dimensions:

|        |                     |
|--------|---------------------|
| Width  | 18.3 in. (46.4 cm)  |
| Depth  | 26.6 in. (67.6 cm)  |
| Height | 52.0 in. (132.1 cm) |

e. Map and plan filing cabinet. Used for flat, horizontal storage of maps, blueprints, charts and plans of various sizes. The ten drawers are held shut by two locking bars located on either side of the front of the cabinet. Dimensions:

|        |                     |
|--------|---------------------|
| Width  | 40.8 in. (103.6 cm) |
| Depth  | 28.6 in. (72.7 cm)  |
| Height | 41.7 in. (105.9 cm) |

f. folding chair. Provides general seating. Folds flat for storage. Dimensions:

|        |                     |
|--------|---------------------|
| Width  | 18.0 in. (45.7 cm)  |
| Depth  | 20.0 in. (50.8 cm)  |
| Height | 32.0 in. (81.28 cm) |

g. Rotary drafting chair. Provides seating for drafting personnel. It has adjustable seat height and back position. Dimensions:

|        |   |
|--------|---|
| Width  | 17.1 in. (43.5 cm)                                  |
| Depth  | 17.1 in. (43.5 cm)                                  |
| Height | 42.0 in. (106.7 cm), Max<br>36.0 in. (91.4 cm), Min |

h. Corkboard. Wall mounted. Dimensions:

|        |                    |
|--------|--------------------|
| Width  | 18.0 in. (45.7 cm) |
| Height | 30.0 in. (76.2 cm) |

**10-3. TECHNICAL PRINCIPLES OF OPERATION.** There are no specific principles of operation for this equipment.

## Section II OPERATING INSTRUCTIONS

**10-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.** This equipment has no operator's controls or indicators.

**10-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no operator PMCS procedures assigned for this equipment.

**10-6. OPERATION UNDER USUAL CONDITIONS.** There are no specific operational procedures for this equipment.

10-6.1 Preparation for Movement. Check that portable equipment is properly secured with tiedowns provided.

**10-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

### Section III OPERATOR MAINTENANCE

**10-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**10-9. TROUBLESHOOTING PROCEDURES.** There are no operator troubleshooting procedures assigned for this equipment.

**10-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the furniture and cabinets. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

10-10.1 Inspect Furniture and Cabinets. Inspect furniture and cabinets for structural damage, rust, and proper operation of all latches, hinges, and adjustment mechanisms.

### Section IV ORGANIZATIONAL MAINTENANCE

**10-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**10-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ; AND SUPPORT EQUIPMENT.**

10-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

10-12.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

10-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**10-13. SERVICE UPON RECEIPT.**

10-13.1 Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.
- c. Check to see whether the equipment has been modified.

**10-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

**10-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.** There are no organizational troubleshooting procedures assigned for this equipment.

**10-16. MAINTENANCE PROCEDURES.**

- a. This section contains instructions covering organizational maintenance functions for the furniture and cabinets. Personnel required are listed only if the task requires more than one.
- b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

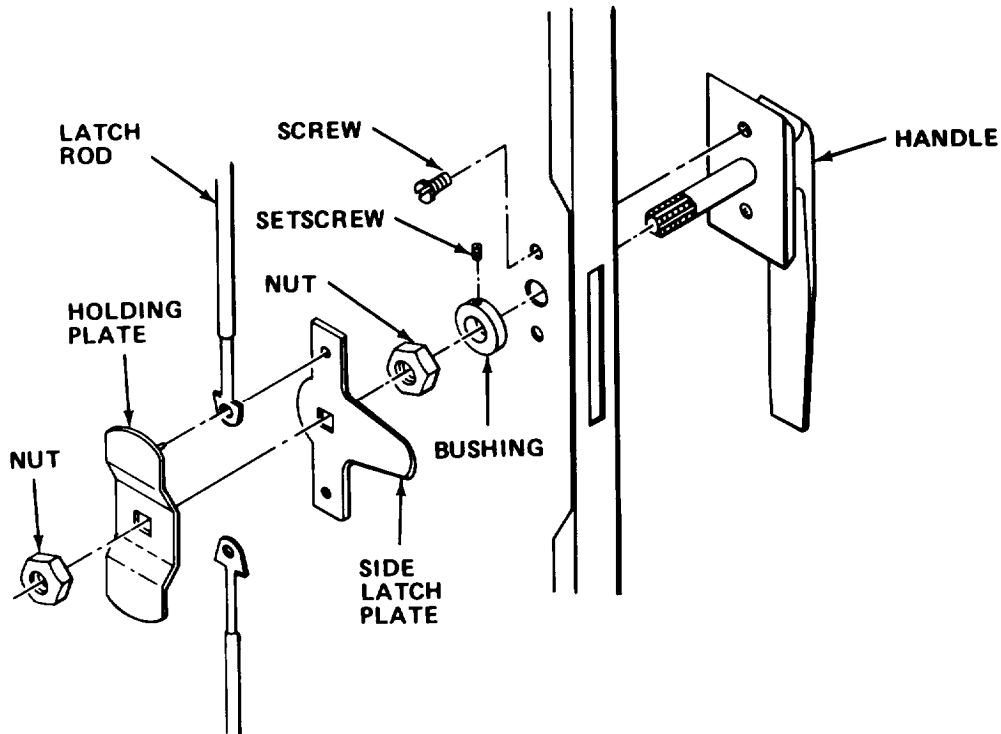
**INDEX**

| PROCEDURE  | PARAGRAPH |
|--|-----------|
| Replace Door Latch (Wall Storage Cabinet) . . . . .                                  | 10-16.1   |
| Replace Door Hinge (Piano Hinge). . . . .  | 10-16.2   |
| Remove/Install Map and Plan Filing Cabinet/Portable Drawing Board Assembly . . . . . | 10-16.3   |
| Remove/Install Wall Storage Cabinet . . . . .  | 10-16.4   |
| Remove/Install Supply Cabinet . . . . .  | 10-16.5   |
| Remove/Install Filing Cabinet . . . . .  | 10-16.6   |
| Remove/Install Corkboard . . . . .   | 10-16.7   |



## 10-16.1 Replace Door Latch (Wall Storage Cabinet).

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 9/16 in. Combination Wrench  
Flat Tip Screwdriver

- a. Remove holding plate retaining nut.
- b. Remove holding plate and latch rods.
- c. Remove side latch plate.
- d. Remove handle retaining nut.
- e. Loosen setscrew and remove bushing from handle shaft.
- f. Remove two handle retaining screws and remove handle.
- g. Install new handle and secure with two screws.
- h. Reinstall bushing on handle shaft and tighten setscrew.
- i. Reinstall handle retaining nut.
- j. Reinstall side latch plate.
- k. Reinstall latch rod holding plate and latch rods.
- l. Reinstall holding plate retaining nut.

10-16.2 Replace Door Hinge (Piano Hinge).

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/4 in. Electric Drill  
5/32 in. Drill Bit  
Pop Rivet Gun

SUPPLIES: Piano Hinge  
5/32 in. Pop Rivets  
8-32 x 1/2 in. Screws (4 required)  
8-32 Nuts (4 required)

- a. Drill out pop rivets holding hinge to cabinet and remove hinge.
- b. Install new hinge and temporarily secure with four screws and nuts.
- c. Close and latch cabinet door and install pop rivets.
- d. Remove temporarily installed screws and nuts, and install remaining pop rivets.

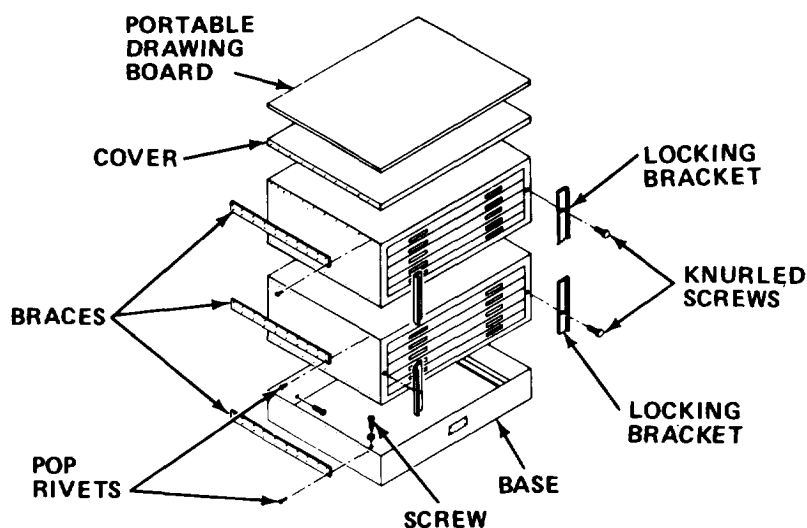
10-16.3 Remove/Install Map and Plan Filing Cabinet/Portable Drawing Board Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: Pop Rivet Gun  
Drill and Bits  
Flat Tip Screwdriver

SUPPLIES: Portable Drawing Board  
Map and Plan Filing Cabinet  
Pop Rivets



- a. Drill pop rivets from braces and remove braces.
- b. Remove map and plan filing cabinet cover, turn cover over, remove screws and portable drawing board from cover. Retain screws for reuse.
- c. Remove knurled screws from locking bracket on each side of front. Then remove locking bracket.

#### WARNING

Serious personal injury can result if an inadequate number of personnel are used to move the map and plan filing cabinet.

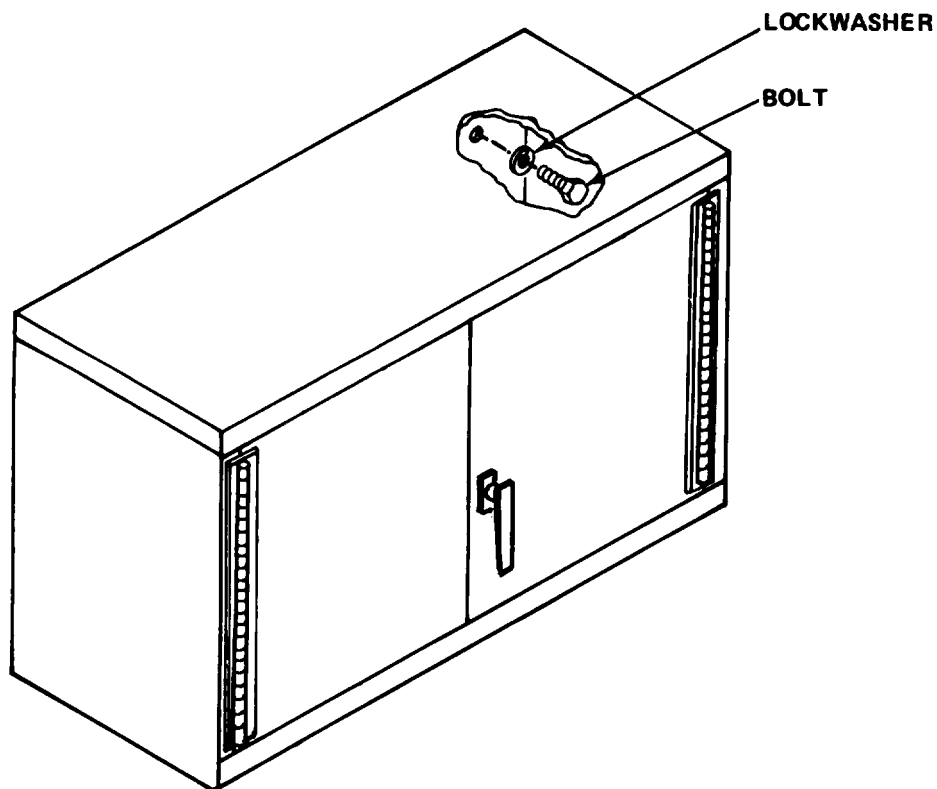
- d. Lift top and bottom sections free from base.
- e. Remove screws and base from floor. Retain screws for reuse.
- f. Install new base, and both top and bottom sections of map and plan filing cabinet.
- g. Reinstall base to floor and secure with screws.
- h. Reinstall bottom section to base and pop rivet braces to base and bottom section.
- i. Reinstall top section on bottom section and pop rivet braces to both top and bottom sections.
- j. Reinstall portable drawing board on cover and secure with screws.
- k. Reinstall cover on top section and pop rivet braces to both the cover and top section.
- l. Reinstall locking brackets and secure with knurled screws.

10-16.4 Remove/Install Wall Storage Cabinet.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/2 in. Socket, 1/2 in. Drive  
1/2 in. Drive Ratchet  
1/2 in. Socket Extension, 2 in. long

SUPPLIES: Wall Storage Cabinet



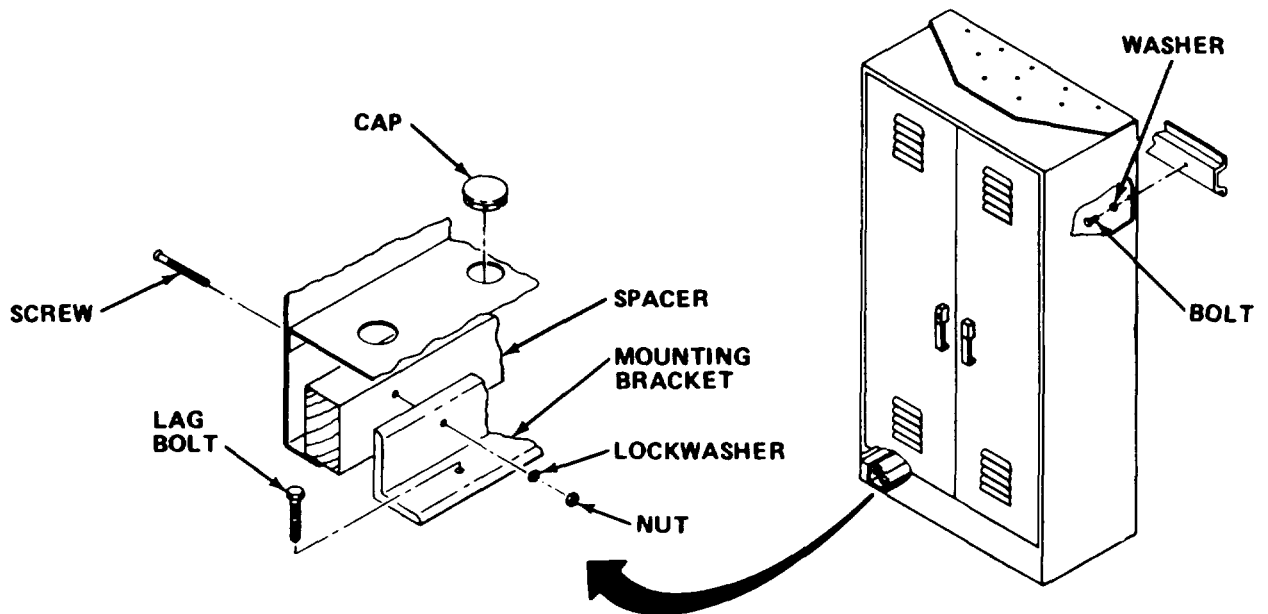
- a. Remove bolts and lockwashers which secure cabinet to wall.
- b. Remove defective cabinet.
- c. Install new cabinet and secure to wall with lockwashers and bolts.

10-16.5 Remove/Install Supply Cabinet.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: 1/4 in. Socket Set  
 1/4 in. Socket Extension, 6 in. long  
 11/32 in. Combination Wrench  
 Cross Tip Screwdriver

SUPPLIES: Supply Cabinet



- a. Remove bolts and washers holding cabinet to wall.
- b. Remove caps and lag bolts holding mounting bracket to floor and remove cabinet.
- c. Remove screws, lockwashers, nuts, mounting brackets, and spacers from cabinet. Retain mounting brackets and spacers for use on new cabinet.
- d. Position spacers and mounting brackets on new cabinet. Install but do not tighten screws, lockwashers, and nuts.
- e. Place new cabinet in position and install, but do not tighten lag bolts.
- f. Secure cabinet to wall with lockwashers and bolts.
- g. Tighten the bracket retaining bolts and nuts.
- h. Tighten bolts holding mounting brackets to floor, and install the caps.

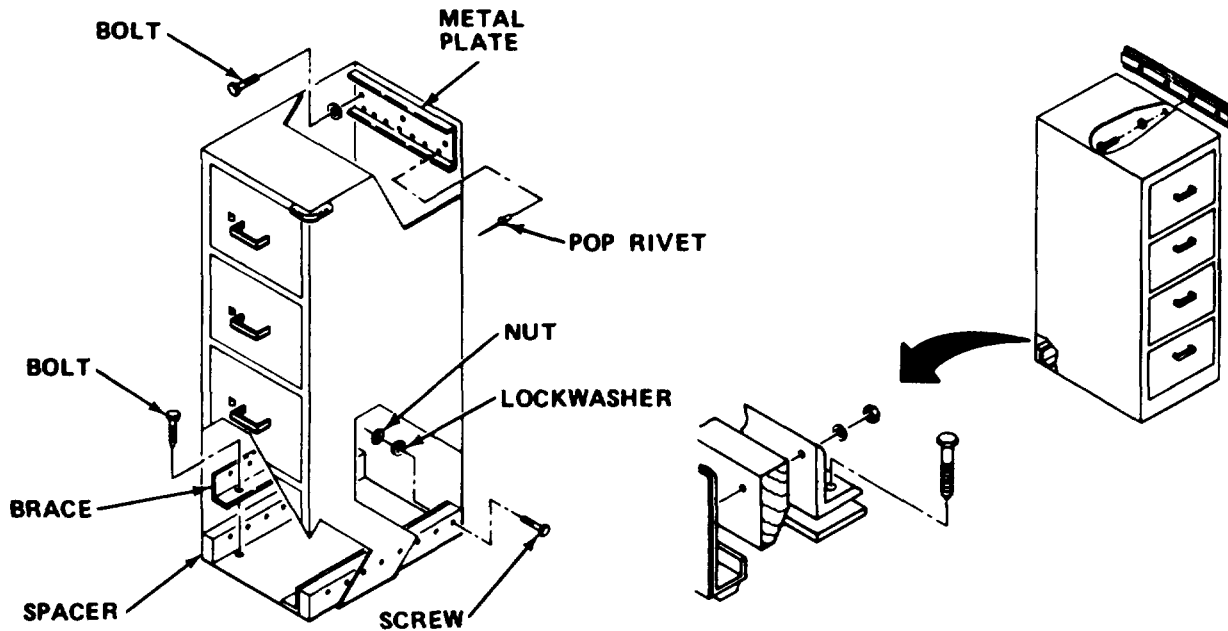
10-16.6 Remove/Install Filing Cabinet.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
1/2 in. Socket, 1/2 in. Drive  
1/2 in. Drive Ratchet

SUPPLIES: Filing Cabinet

a. Remove drawers from cabinet.



**NOTE**

Mounting of cabinets vary from section to section.

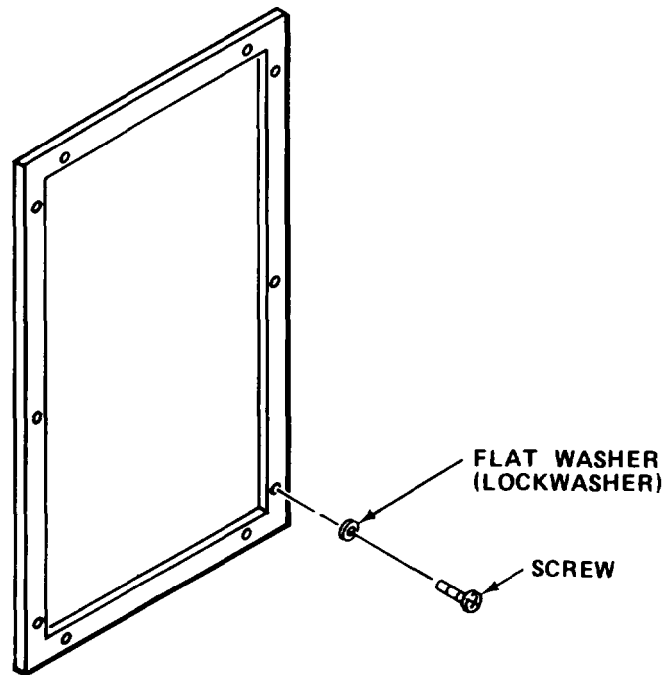
- b. Remove upper mounting bolts and washers.
- c. Remove lower mounting bolt, washer, and brace.
- d. Remove filing cabinet.
- e. Reinstall drawers.
- f. Remove drawers from new cabinet.
- g. Line up new cabinet over mounting holes.
- h. Secure cabinet with upper bolts and washers, and lower brace, bolts, and washers.
- i. Reinstall drawers.

**10-16.7 Remove/Install Corkboard.**

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Corkboard



- a. Remove attaching hardware securing defective corkboard to wall.
- b. Remove defective corkboard.
- c. Position new corkboard and align mounting holes.
- d. Secure new corkboard to wall with attaching hardware.

**10-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

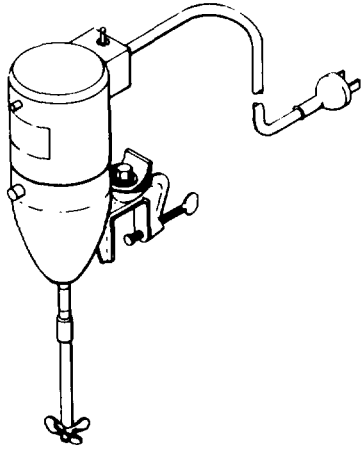
**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.

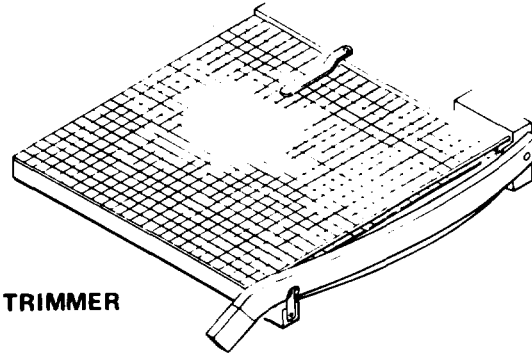




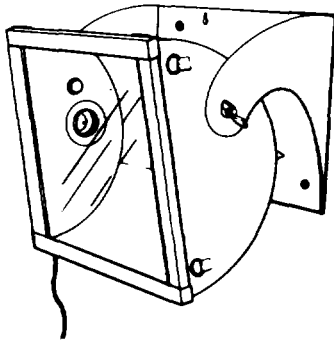




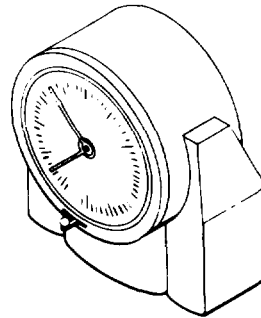
**LIQUID MIXER**



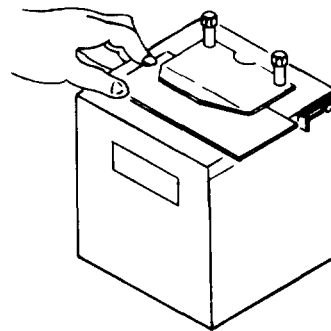
**PAPER TRIMMER**



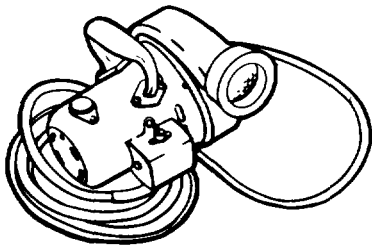
**UTILITY SAFELIGHT**



**PHOTO TIMER**



**SENSITOMETER**



**VACUUM CLEANER**

**CHAPTER 11**  
**SUPPORT ITEMS**

**Section I INTRODUCTION**

**11-1. GENERAL INFORMATION.**

11-1.1 Scope. This chapter covers the support items contained in this section. The support items consist of the following equipment:

- a. Model FED-97-T-678 Paper Trimmer.
- b. Model 152-3612 Photo Timer.
- c. Model 3400 Vacuum Cleaner.
- d. Model M-25 Liquid Mixer.
- e. Model D Utility Safelight.
- f. Model S Sensitometer.

**11-2. EQUIPMENT DESCRIPTION.**

11-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Photo timer. For timing film processing.
- b. Paper trimmer. Cuts paper up to 24 in. wide.
- c. Vacuum cleaner. High speed, heavy duty, used for general cleaning.
- d. Liquid mixer. Used for mixing liquids.
- e. Utility safelight. Special illumination for use in darkroom environment.
- f. Sensitometer. Electronically controlled against line voltage fluctuations. Can be used for photo type, camera, or contact work. Suitable for tray development and automatic processing. Suitable for lithographic or high speed materials.

11-2.2 Equipment Data.

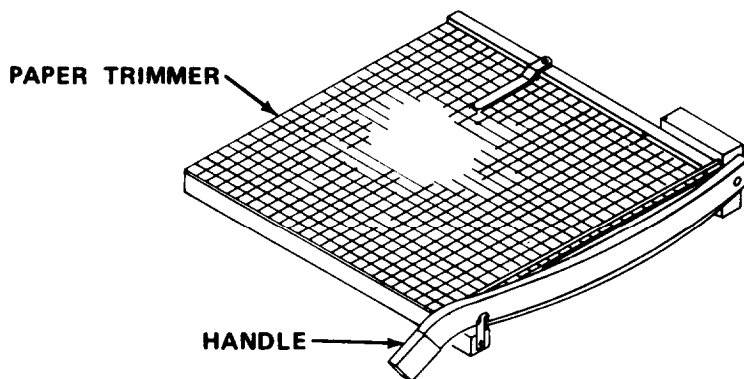
- a. Vacuum cleaner. Packed in storage box containing hose, various vacuum and blowing attachments, liquid spray attachments, and motor repair kit containing motor bearings and brushes.

**11-3. TECHNICAL PRINCIPLES OF OPERATION.** Principles of operation are combined with operator's controls and indicators.

Section II OPERATING INSTRUCTIONS

11-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.

11-4.1 Paper Trimmer.




---

Control or Indicator

Function

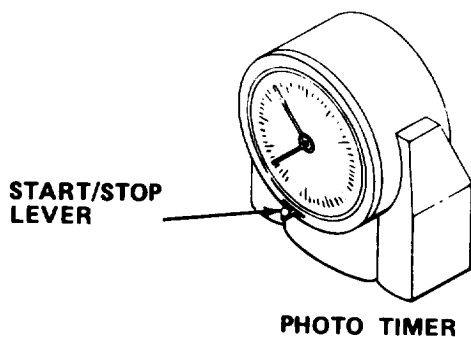
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Handle

Operates cutter

---

11-4.2 Photo Timer.




---

Control or Indicator

Function

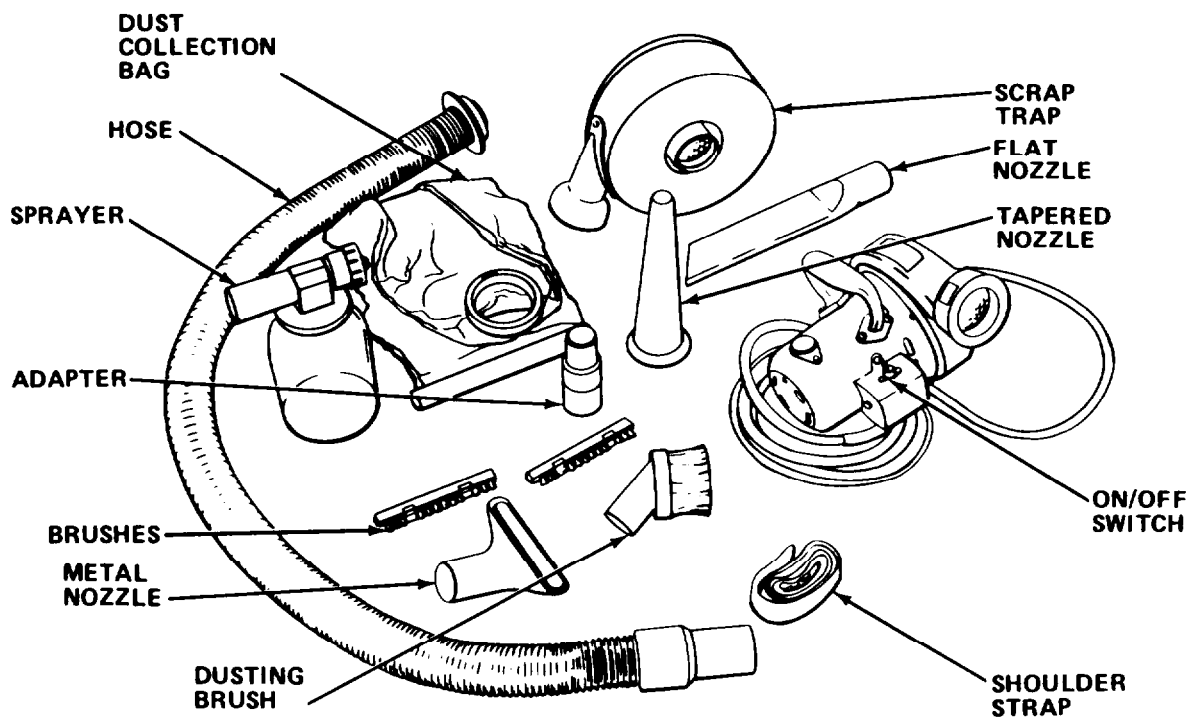
---

Stop/Start Lever

Operates timer.

---

11-4.3 Vacuum Cleaner.



Control or Indicator

Function

Sprayer

Sprays liquids when hooked to blower side of vacuum cleaner.

Flexible Hose

Directs airflow to hard-to-reach areas.

Dust Collection Bag

Collects and holds dust and dirt.

Scrap Trap

Traps large particles before they enter fan.

Flat Nozzle

Used for hard-to-reach areas.

Tapered Blower Nozzle

Directs airflow.

On/Off Switch

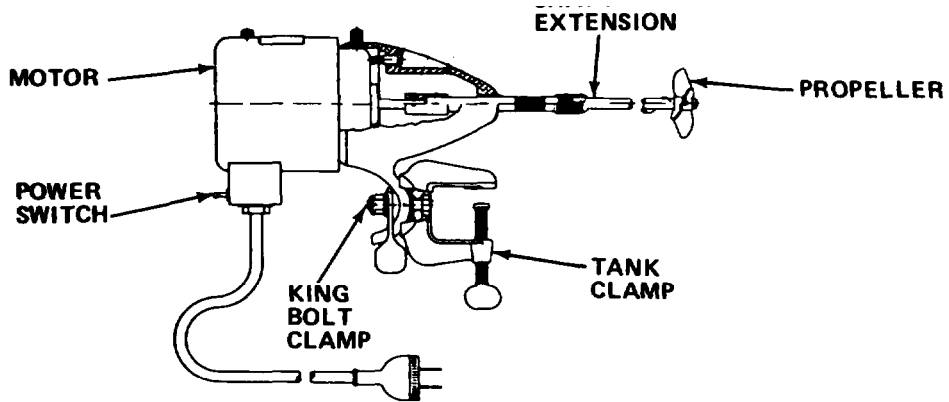
Turns power on or off.

Shoulder Strap

Attaches to vacuum cleaner for easier carrying.

| Control or Indicator | Function                              |
|----------------------|---------------------------------------|
| Round Dusting Brush  | Used for light dust and dirt.         |
| Metal Nozzle         | Used for large, flat surfaces.        |
| Brushes              | Used on metal nozzle.                 |
| Adapter              | Connects various attachments to hose. |

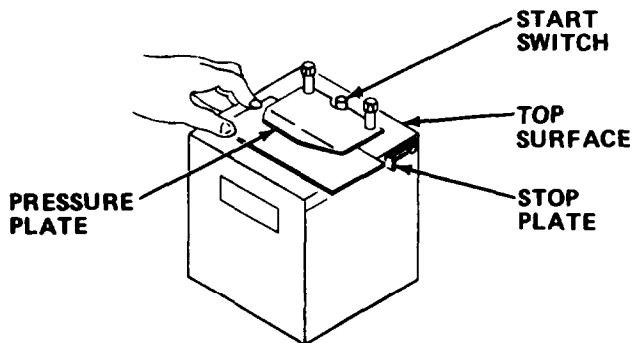
11-4.4 Liquid Mixer.



| Control or Indicator      | Function  |
|---------------------------|---|
| POWER Switch              | Controls electrical current to motor.   |
| Motor                     | Supplies power to propeller. Motor must rotate in direction indicated by arrow on mixer.                                |
| Propeller Shaft Extension | Extends propeller to optimum mixing position.<br><br>ADJUST: Loosen knurled chuck, adjust shaft length and tighten nut. |

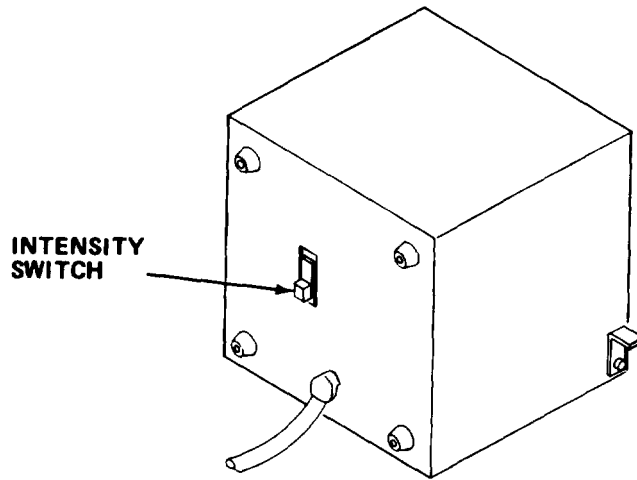
| Control or Indicator | Function   |
|----------------------|--|
| Propeller            | <p>Moves solution linearly to agitate and mix. Propeller must rotate in direction of arrow on mixer, thrusting solution downward.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>After running several minutes, motor will normally become very warm.</p> |
| Tank Clamp           | C-clamp-type bracket retains and positions mixer on tank's top edge.   |
| King Bolt Clamp      | <p>Allows mixer to move in relation to tank clamp.</p> <p><b>TIGHTEN:</b> Rotate clamp lever to right.</p>   |

,11-4.5 Densitometer.



| Control or Indicator | Function   |
|----------------------|--|
| Pressure Plate       | Holds exposure in place.   |
| START Switch         | When depressed, power is applied to 2.5 second program timer that starts exposure cycle. |

| Control or Indicator | Function                                 |
|----------------------|--|
| Top Surface          | Contains sensitometric strip.            |
| Stop Plate           | Used to position exposure where desired. |



|                  |  |
|------------------|--|
| INTENSITY Switch | Two position switch allows choice of LOW or HIGH lamp intensity. Normally operated on LOW. |
|------------------|--|

### 11-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- a. Before You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform you before (B) PMCS.
- b. While You Operate. Always keep in mind the WARNINGS and CAUTIONS. Perform your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails To Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

#### 11-5.1 PMCS Procedures.

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.



b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.

c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.

d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.

e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.

f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.

g. Interval columns. This column determines the time period designated to perform your PMCS.

h. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.

i. Equipment is not ready/available if: column. This column indicates the reason or cause why your equipment is not ready/available to perform its primary mission.

j. List of tools and materials required for PMCS is as follows:

| <u>Equipment</u>  | <u>Items</u>                     | <u>Quantity</u> |
|-------------------|----------------------------------|-----------------|
| Sensitometer      | Cheesecloth (Item 7, Appendix E) | ar              |
| Utility Safelight | Cheesecloth (Item 7, Appendix E) | ar              |

Table 11-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number - Hundreds of Hours)

| ITEM NO.                    | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready/ Available If:   |
|-----------------------------|----------|---|--|
| <b><u>SUPPORT ITEMS</u></b> |          |   |  |
| 1                           | B        | <p><u>Paper Trimmer.</u></p> <p>Inspect paper trimmer for structural damage and proper operation of blade.</p>                        | Blade will not operate.  |
| 2                           | Q        | <p><u>Vacuum Cleaner.</u> Inspect vacuum cleaner for damage to housing, frayed or worn power cord, and proper operation of motor.</p> | <p>Housing is cracked or broken.<br/>Power cord is frayed, worn or damaged.<br/>Motor is noisy or operates improperly.</p> |

Table 11-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

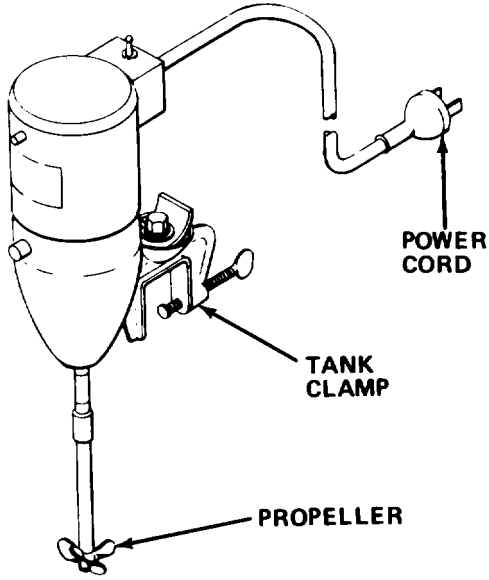
|                             |          | B - Before<br>D - During<br>A - After | W - Weekly<br>M - Monthly<br>Q - Quarterly | AN - Annually<br>S - Semiannually<br>BI - Biennially | (Number) - Hundreds of Hours   |  |   |
|-----------------------------|----------|---------------------------------------|--|--|--|--|---|
| ITEM NO.                    | INTERVAL | ITEM TO BE INSPECTED                  |  |  | PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available If:   |   |
| <b>SUPPORT ITEMS - Cont</b> |          |                                       |  |  |  |  |   |
| 3                           | M        | Inspect Liquid Mixer.                 |  |  |  <p>The diagram shows a cylindrical tank with a propeller at the bottom. A power cord is connected to the top of the tank. A clamp is used to secure the tank. Labels with arrows point to the 'POWER CORD', 'TANK CLAMP', and 'PROPELLER'.</p> | <ol style="list-style-type: none"> <li>1. Unplug power cord.</li> <li>2. Loosen tank clamp and remove liquid mixer from tank.</li> <li>3. Inspect propeller for damage or loose retaining pin.</li> <li>4. Check housing bolts for tightness.</li> </ol> | Propeller is damaged or retaining pin is loose. |

Table 11-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN . Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.                    | IN-TER. VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readines Reporting, Equipment Is Not Ready/ Available If:  |
|-----------------------------|-------------|---|--|
| <u>SUPPORT ITEMS - Cont</u> |             |   |  |
| 3                           | M           | <u>Inspect Liquid Mixer - Cont</u><br><br>5. Check power cord for damaged insulation or loose plug.<br><br>6. Reinstall liquid mixer to tank and tighten tank clamp.<br><br>7. Plug in power cord.  | Power plug insulation is damaged or plug is loose.   |
| 4                           | M           | <u>Inspect Sensitometer.</u><br><br>1. Unplug power cord.<br><br>2. Visually inspect power cord for kinks, frayed or broken wires, rips, discolored covering, or cracked plug.<br><br>3. Inspect unit for loose or missing parts. Replace or tighten as required.<br><br>4. Plug in power cord. | Power cord is kinked, frayed, ripped or has broken wires, discolored covering or cracked plug .<br><br>Mixer has loose or missing parts. |

Table 11-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO.                    | IN. TER- VAL | ITEM TO BE INSPECTED<br><br>PROCEDURE   | For Readiness Reporting, Equipment Is Not Ready! Available If: |
|-----------------------------|--------------|---|--|
| <b>SUPPORT ITEMS - Cont</b> |              |   |  |
| 5                           | M            | Service Top Surface of Sensitometer.  |  |
|                             |              | 1. Unplug power cord.   |  |
|                             |              |   |  |
|                             |              | 2. Unscrew capnuts. Remove pressure plate springs and washers.                |  |
|                             |              | 3. Remove pressure plate.   |  |
|                             |              | 4. Using clean, moist cheesecloth, wipe top surface.                          |  |
|                             |              | 5. With dry cheesecloth, wipe top surface to remove streaks and any moisture. |  |
|                             |              | 6. Place pressure plate on top surface.                                       |  |
|                             |              | 7. Install washers, pressure plate springs, and capnuts.                      |  |
|                             |              | 8. Plug in power cord.  |  |

Table 11-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
 D - During  
 A - After

W - Weekly  
 M - Monthly  
 Q - Quarterly

AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

| ITEM NO. | INTERVAL | ITEM TO BE INSPECTED<br><br>PROCEDURE  | For Readiness Reporting, Equipment Is Not Ready/ Available if: |
|----------|----------|--|--|
| 6        | B        | <b><u>SUPPORT ITEMS - Cont</u></b>   |  |
|          |          | <u>Inspect Utility Safelight.</u><br><br>1. Inspect filter and housing for cracks, breaks, and dirt. Clean outside of filter as required.<br><br>2. Remove filter. Inspect inside of filter and interior of utility safelight for cracks, breaks, and dirt. Clean interior and inside of filter as required. |  |
| 7        | B        | <u>Inspect Photo Timer.</u> Inspect photo timer for damage to housing and proper operation of clock and alarm mechanisms.  |  |

**11-6. OPERATION UNDER USUAL CONDITIONS.**

11-6.1 Assembly and Preparation for Use.

a. Liquid mixer.

(1) Starting unit.

(a) Clamp liquid mixer firmly to top edge of tank and adjust shaft so it extends to at least two-thirds the depth of liquid. Tighten chuck securely.

(b) Adjust clamp so that shaft is about 25 percent off vertical and slightly to right of center.

**NOTE**

Make sure shaft rotates in direction indicated by arrow on motor housing.

(c) Plug in power cord.

(d) Turn on power switch.

(2) Shutting unit down.

(a) Turn off power switch.

(b) Unplug power cord.

(c) Loosen clamp and remove liquid mixer from tank.

b. Sensitometer.

**NOTE**

If lithographic emulsions are being used, set intensity switch to HIGH. For other types of film, including high speed, use LOW position.

(1) Plug in densitometer to 120 V ac.

**NOTE**

Strap or block unit in place to prevent knocking unit over in dark.

(2) Turn off room lights.

(3) Lift pressure plate and insert film exposure, emulsion side down, until film hits two stops squarely.

**NOTE**

Film edge in sensitometric area should not be fogged or otherwise exposed.

(4) Adjust stops using thumbnuts to position exposure at very edge of film or 0.5 in. (12.7 mm) in from edge of film.

**NOTE**

Unit will hum slightly during exposure cycle. For multiple exposures, keep start switch depressed for more than 1.5 seconds.

(5) Momentarily depress start switch.

(6) After exposure cycle is complete, lift pressure plate and remove film. Film is now ready to be processed manually or automatically.

**CAUTION**

On successive exposures to obtain maximum exposure reproducibility, allow at least 10 seconds between exposures to allow lamp elements to cool.

**NOTE**

For sensitometric measurement of intermediate gray, it may be desirable to eliminate inherent grain of silver gray in sensitometer. Simply reduce light intensity using resistor until suitable gray value appears at clear step of wedge, and then measure value. Another method is to tape suitably valued gray filter on top of diffuser to obtain same results.

11-6.2 Operating Procedures.

a. Vacuum cleaner.

(1) Using as vacuum.

(a) Attach dust collection bag to air discharge opening.

(b) Remove protective screen lock from air intake opening and attach scrap trap to that opening.

(c) Attach swivel end of hose to scrap trap by turning lock to right until secure.

(d) Attach required tool to other end of hose.

(e) Insert plug into 120 V ac wall outlet and turn on/off switch to on.

(2) Using as blower.

(a) Attach tapered rubber nozzle to discharge opening.

(b) Attach protective screen lock to air intake opening.

(c) Insert plug into 120 V ac wall outlet and position on/off switch to on.

(3) Using as sprayer.

(a) Attach protective screen lock to air intake opening.

(b) Attach swivel end of hose to air discharge opening by turning lock to right until secure.

(c) Attach sprayer to other end of hose.

**NOTE**

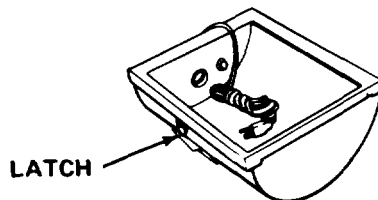
Size of spray pattern is determined by adjusting screw located on top of sprayer.



on. (d) Insert plug into 120 V ac wall outlet and turn on/off switch to

b. Utility safelight.

(1) Inserting filter and bulb.



(a) Open hinged top latch.

(b) Lift hinged top.

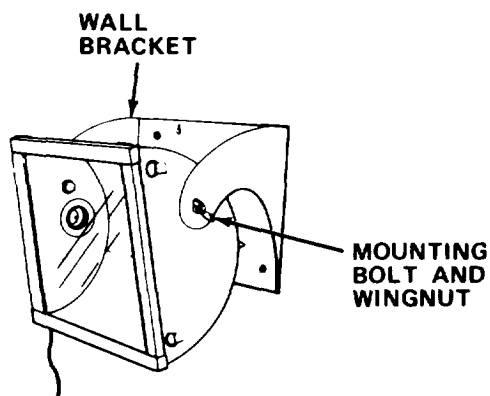
(c) Screw bulb into socket.

(d) Lay filter glass inside so that filter identification can be read from outside.

(e) Close and latch hinge top.

(2) Mounting.

(a) Plug utility safelight into outlet on separate circuit from that controlling ceiling lights.



(b) Insert mounting bolts on sides of utility safelight into holes in wall bracket.

(c) Position utility safelight so that it provides desired illumination. For direct illumination, utility safelight should face work area. For indirect illumination, it should face wall.

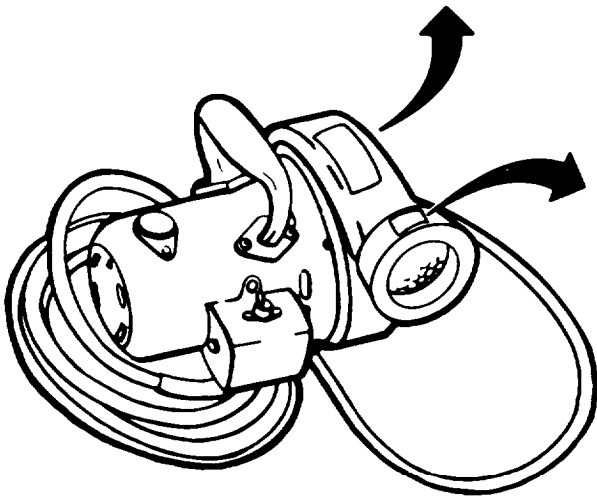
(d) Tighten wingnuts on mounting bolts to hold light in place.

11-6.3 Preparation For Movement. Check that portable equipment is secured with tiedowns provided.

11-6.4 Operating Instructions on Decals and Instruction Plates.

**WARNING**

THIS DEVICE IS NOT TO BE USED IN "HAZARDOUS LOCATIONS" AS DEFINED BY UNDERWRITERS LABORATORIES. IT SHOULD BE GROUNDED IN ACCORDANCE WITH PROVISIONS OF THE NATIONAL ELECTRIC CODE, OR ANY APPLICABLE LOCAL CODE, AND MAINTAINED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



**WARNING!**

ELECTRIC SHOCK COULD OCCUR IF USED ON WET SURFACES. DO NOT EXPOSE TO RAIN. STORE INDOORS.

**11-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for use only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**11-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**11-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during operation or maintenance of the vacuum cleaner. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**Table 11-2. TROUBLESHOOTING**

| MALFUNCTION                            | TEST OR INSPECTION   | CORRECTIVE ACTION  |
|--|--|--|
| VACUUM CLEANER MOTOR DOES NOT OPERATE. |  |  |
|  | Step 1. Check power cord.                                      | (a) If plugged in, proceed to step 2.<br>(b) Plug in power cord.   |
|  | Step 2. Check position of power switch.                        | (a) If turned on, proceed to step 3.<br>(b) Turn power switch on.  |
|  | Step 3. Check circuit breaker position in circuit breaker box. | (a) If turned off or tripped, turn circuit breaker on.<br>(b) If turned on, refer to organizational maintenance. |

**11-10. MAINTENANCE PROCEDURES .**

a. This section contains instructions covering operator maintenance functions for the support items. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

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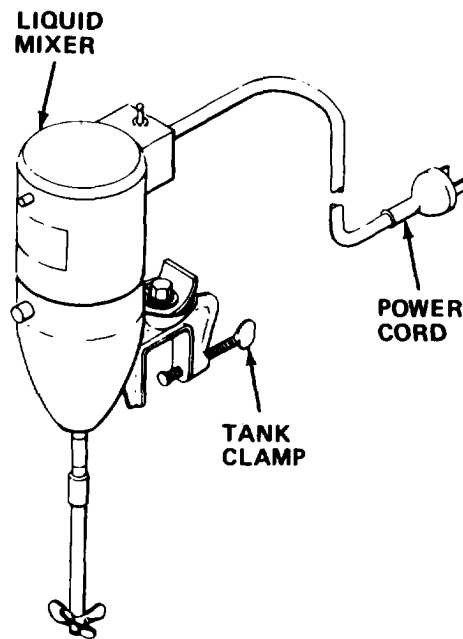
| PROCEDURE                      | PARAGRAPH |
|--------------------------------|-----------|
| Replace Liquid Mixer . . . . . | 11-10.1   |

**11-10.1 Replace Liquid Mixer.**

MOS: 83E, Photo and Layout Specialist

TOOLS: None

SUPPLIES: Liquid Mixer



- a. Unplug power cord.
- b. Loosen tank clamp and remove liquid mixer from tank.
- c. Install new liquid mixer on tank and tighten tank clamp.
- d. Plug in power cord.

## Section IV ORGANIZATIONAL MAINTENANCE

**11-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**11-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ; AND SUPPORT EQUIPMENT.**

11-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

11-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

11-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-319-24P covering organizational maintenance for this equipment.

**11-13. SERVICE UPON RECEIPT.**

11-13.1 Checking Unpacked Equipment.

a . Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

c. Check to see whether the equipment has been modified.

**11-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

**11-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.**

a . Organizational troubleshooting procedures cover the most common malfunctions that may be repaired at the organizational level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used by lower level maintenance should be conducted in addition to the organizational troubleshooting procedures.

b. This manual cannot list all the possible malfunctions or every possible test/inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.

c. If any component of the support items does not power up when turned on, verify that 120 V ac is present at the receptacle. If voltage is not present, plug equipment into receptacle with power available and proceed with equipment troubleshooting. Perform no-power procedure for dead receptacle (Table 1-4).

Table 11-3. ORGANIZATIONAL TROUBLESHOOTING

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

VACUUM CLEANER MOTOR DOES NOT OPERATE.

Check that vacuum cleaner is plugged into active outlet. Turn switch on.

If motor does not operate, replace vacuum cleaner.

**11-16. MAINTENANCE PROCEDURES.**

This section contains instructions covering organizational maintenance functions for the support items. Personnel required are listed only if the task requires more than one.

b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

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| PROCEDURE                                  | PARAGRAPH |
|--|-----------|
| Remove/Install Utility Safelight . . . . . | 11-16.1   |

11-16.1 Remove/Install Utility Safelight

MOS: 83FJ6, Reproduction Equipment Repairer

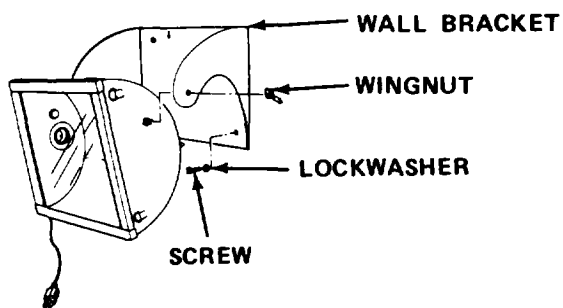
TOOLS: Cross Tip Screwdriver

SUPPLIES: Utility Safelight

**WARNING**

Death or serious injury may occur from electrical shock if power cord is not unplugged before servicing.

- a. Unplug darkroom safelight.



- b. Remove mounting wingnuts.
- c. Remove defective safelight from wall bracket.
- d. Remove screws and lockwashers from bracket.
- e. Remove bracket.
- f. Position new bracket and align holes.
- g. Secure bracket with lockwashers and screws.
- h. Secure new safelight with wingnuts.
- i. Plug in new safelight.

**11-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

### Section V DIRECT/GENERAL SUPPORT MAINTENANCE

There are no direct/general support maintenance procedures assigned for this equipment.





APPENDIX A

REFERENCES

**A-1. SCOPE.**

This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual.

**A-2. FORMS.**

Recommended Changes to Publications and Blank Forms . . . . . DA Form 2028

Recommended Changes to Equipment Technical Publications . . . . . DA Form 2028-2

Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404

The Army Maintenance Management System (TAMMS). . . . . DA Pam 738-750

Quality Deficiency Report... . . . . SF 368

**A-3. FIELD MANUALS.**

Camouflage. . . . . FM 5-20

First Aid for Soldiers. . . . . FM 21-11

Nuclear, Biological and Chemical (NBC)  
 Defense (Reprintedw/Basic Incl C1) . . . . . FM 21-40

Basic Cold Weather Manual . . . . . FM 31-70

Northern Operations . . . . . FM 31-71

Metal Body Repair and Related Operations . . . . . FM 43-2

**A-4. TECHNICAL MANUALS .**

Administrative Storage of Equipment . . . . . TM 740-90-1

Chemical, Biological and Radiological (CBR)  
 Decontamination . . . . . TM 3-220

Operator, Organizational, Direct Support and General  
 Support Maintenance Manual: Air Conditioner, Horizontal,  
 Compact, 208-Volt, 3-Phase, 18,000 Btu Cooling, 12,000  
 Btu Heating. . . . . TM5-4120-367-14

Operator, Organizational, Direct Support and  
 General Support Maintenance Manual for Chassis,  
 Semi -Trailer, Container Transporter (ADCOR) . . . . . TM5-2330-305-14

**TM 5-6675-319-14**

Organizational, Direct Support and General Support  
Maintenance Repair Parts and Special Tools List  
(Including Depot Maintenance Repair Parts and  
Special Tools) for Air Conditioner/Heater . . . . . TM5-4120-367-24p

Organizational, Direct Support and General Support  
Maintenance Repair Parts and Special Tools List  
(Including Depot Maintenance Repair Parts and  
Special Tools) for Chassis, Semi-Trailer,  
Container Transporter (ADCOR) . . . . . TM5-2330-305-24P

Organizational, Direct Support and General Support  
Maintenance Repair Parts and Special Tools List  
(RPSTL) (Including Depot Maintenance Repair Parts  
and Special Tools) for Rectifier I Section. . . . . TM5-6675-319-24P

Painting Instructions for Field Use . . . . . TM 43-0139

Procedure for the Destruction of Equipment to  
Prevent Enemy Use . . . . . TM750-244-3

Use and Care of Hand Tools and Measuring Tools . . . . . TM 9-243

**A-5. MISCELLANEOUS PUBLICATIONS.**

Lubrication Order: Topographic Support" System  
Rectifier I Section, Model ADC-TSS-08 . . . . . LO 5-6675-319-12

Lubrication Order: Topographic Support  
System Chassis, Semi-Trailer, Container  
Transporter (ADCOR) . . . . . LO 5-2330-305-12

## APPENDIX B

## MAINTENANCE ALLOCATION CHART

## Section I INTRODUCTION

**B-1. GENERAL.**

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

**B-2. MAINTENANCE FUNCTIONS.** 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 (e.g., by sight, sound, or feel).

b. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic 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 (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. **Aline.** 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 equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services<sup>1</sup>, including fault location/troubleshooting<sup>2</sup>, removal/installation, and disassembly/assembly<sup>3</sup> procedures, and maintenance actions<sup>4</sup> to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). 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 material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

### **B-3. EXPLANATION OF COLUMNS IN THEN MAC, SECTION II.**

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies and modules with the next higher assembly. End item group number shall be "00."

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

Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

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<sup>1</sup>Services - Inspect, test, service, adjust, aline, calibrate and/or replace.

<sup>2</sup>Fault locate/troubleshoot-The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

<sup>4</sup>Actions - Welding, grinding, riveting, straightening, facing, remachining and/or resurfacing.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance 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 varies at different maintenance categories, appropriate work time figures will be shown for each category. 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 operation conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location 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. The symbol designations for the various maintenance categories are as follows:

- C . . . . Operator or Crew
- O . . . . Organizational Maintenance
- F . . . . Direct Support Maintenance
- H . . . . General Support Maintenance
- L . . . . Specialized Repair Activity <sup>5</sup>
- D . . . . Depot Maintenance

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

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetical order, which shall be keyed to the remarks contained in Section IV.

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<sup>5</sup>This maintenance category is not included in Section II, column (4) of the Maintenance Allocation Chart. To identify functions to this category of maintenance, enter a work time figure in the "H" column of Section II, column (4), and use an associated reference code in the Remarks column (6). Key the code to Section IV, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

**B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III**

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

**B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.**

a. Column 1, Reference Code. The code recorded in Column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

| (1)<br>Group Number      | (2)<br>Component/Assembly | (3)<br>Maintenance Function  | (4)<br>Maintenance Cat. |     |     |      |     | (5)<br>Tools and Eqpt | (6)<br>Remarks |
|--------------------------|---------------------------|------------------------------|-------------------------|-----|-----|------|-----|-----------------------|----------------|
|                          |                           |                              | C                       | O   | F   | H    | D   |                       |                |
| 00                       | RECTIFIER I SECTION       | Overhaul                     |                         |     |     |      |     |                       |                |
| 01                       | VAN BODY (ISO CONTAINER)  | Inspect                      | 0.8                     |     |     |      |     |                       |                |
|                          |                           | Service                      | 0.9                     | 0.5 |     |      |     | 1,17,35,40            | C              |
|                          |                           | Repair                       |                         | 1.0 | 1.5 | 2.0  |     | 2,3,6,34              | C              |
|                          |                           | FLUROESCENT LIGHT ASSY       | Repair                  | 0.1 | 0.7 |      |     | 2                     |                |
|                          |                           | BLACKOUT/DOME LIGHT ASSY     | Repair                  | 0.2 |     |      |     |                       |                |
|                          |                           | EXHAUST FAN ASSEMBLY         | Repair                  |     | 0.5 |      |     | 2                     |                |
|                          |                           | AIR CONDITIONER/ HEATER ASSY | Replace                 |     |     |      | 2.0 | 1                     | B              |
|                          |                           | ELECTRICAL ASSY              | Inspect                 |     | 0.5 |      |     | 1                     |                |
|                          |                           |                              | Repair                  |     | 0.9 | 1.0  |     | 2,3                   |                |
|                          |                           | TELEPHONE BINDING POST ASSY  | Repair                  |     | 0.7 |      |     | 2                     |                |
|                          |                           | EMERGENCY LIGHT ASSY         | Replace                 |     | 0.3 |      |     | 2                     |                |
|                          |                           | TIEDOWN SOCKET ASSY          | Replace                 |     | 0.3 |      |     | 6                     |                |
|                          |                           | LEVEL INDICATOR ASSY         | Repair                  |     | 0.6 |      |     |                       |                |
|                          |                           | BLACKOUT CURTAIN ASSY        | Repair                  |     | 1.0 |      |     | 6                     |                |
| PERSONNEL LADDER ASSY    | Repair                    |                              | 0.8                     |     |     | 6,34 | C   |                       |                |
| PERSONNE/CARGO DOOR ASSY | Replace                   |                              |                         | 1.5 |     | 6    |     |                       |                |
|                          | Repair                    |                              |                         | 2.0 |     | 6    |     |                       |                |

\*\* Depot will determine work time.

Section II. MAINTENANCE ALLOCATION CHART - Cont

| (1)<br>Group<br>Number | (2)<br>Component/Assembly     | (3)<br>Maintenance<br>Function | (4)<br>Maintenance Cat. |     |     |     |         | (5)<br>Tools<br>and<br>Eqpt | (6)<br>Remarks                  |
|------------------------|-------------------------------|--------------------------------|-------------------------|-----|-----|-----|---------|-----------------------------|---------------------------------|
|                        |                               |                                | C                       | O   | F   | H   | D       |                             |                                 |
| 02                     | FILM PAPER<br>PROCESSOR       | Inspect                        | 1,3                     | 0.5 |     |     |         | 16,17,24                    |                                 |
|                        |                               | Service                        | 0.8                     | 0.3 |     |     |         | 12,14,16,<br>24             |                                 |
|                        |                               | Adjust                         | 0.5                     | 1.3 |     |     |         | 4,37                        | C                               |
|                        |                               | ELECTRICAL SYSTEM              | Replace                 |     | 1.0 |     |         | 3                           |                                 |
|                        |                               |                                | Repair                  | 0.5 | 2.5 | 3.5 |         |                             | 2,3,4,10,<br>16,22,34,<br>36,37 |
|                        |                               |                                | Repair                  |     | 2.0 |     |         | 4,37                        | C                               |
|                        |                               | WASH RACK ASSEMBLY             | Service                 | 0.8 |     |     |         | 16                          |                                 |
|                        |                               | SQUEEGE ASSEMBLY               | Repair                  |     |     | 0.5 |         | 2                           |                                 |
|                        |                               | CENTRIFUGAL FAN<br>ASSEMBLY    | Adjust                  |     | 0.3 |     |         | 2                           |                                 |
|                        |                               |                                | Replace                 |     |     | 0.8 |         | 2                           |                                 |
|                        | Repair                        |                                |                         |     | 0.8 |     | 2       |                             |                                 |
|                        | DRYER ROLLER<br>BELT ASSEMBLY | Adjust                         | 0.5                     |     |     |     | 16,17   |                             |                                 |
|                        | CROSSOVER ASSEMBLY            | Repair                         |                         |     | 0.5 |     | 2       |                             |                                 |
|                        |                               | Adjust                         |                         | 0.3 |     |     | 2       |                             |                                 |
|                        | CENTRIFUGAL<br>PUMP ASSEMBLY  | Repair                         |                         |     | 1.0 |     | 2       |                             |                                 |
|                        |                               | Replace                        |                         | 0.5 |     |     | 4       | C                           |                                 |
|                        | RACK/TURNAROUND<br>ASSEMBLY   | Repair                         | 0.2                     |     | 0.8 |     | 3       |                             |                                 |
|                        |                               |                                |                         |     | 2.5 |     | 2,30,39 | C                           |                                 |



Section II. MAINTENANCE ALLOCATION CHART - Cont

| (1)<br>Group<br>Number | (2)<br>Component/Assembly                   | (3)<br>Maintenance<br>Function   | (4)<br>Maintenance Cat. |     |     |   |   | (5)<br>Tools<br>and<br>Eqpt | (6)<br>Remarks |   |
|------------------------|---|----------------------------------|-------------------------|-----|-----|---|---|-----------------------------|----------------|---|
|                        |   |                                  | C                       | O   | F   | H | D |                             |                |   |
| 03                     | PHOTOGRAPHIC<br>PROCESSING SINK             | inspect                          | 0.3                     |     |     |   |   | 17                          |                |   |
|                        |   | Service                          | 0.3                     |     |     |   |   |                             |                |   |
|                        |   | Adjust                           | 0.3                     | 0.5 |     |   |   | 4,17,37                     | C              |   |
|                        |   | Remove/<br>Install               |                         | 1.5 |     |   |   | 6                           | C              |   |
|                        |   | Repair                           |                         | 3.0 | 3.0 |   |   | 4                           | C              |   |
|                        |   | RECYCLING PUMP<br>ASSEMBLY       | Repair                  |     | 0.3 |   |   |                             | 4              | C |
|                        |   | Replace                          |                         | 0.5 |     |   |   | 4                           | C              |   |
|                        |   | CONDENSER FAN<br>MOTOR ASSEMBLY  | Replace                 |     | 0.5 |   |   |                             | 4              | C |
|                        |   | EVAPORATOR FAN<br>MOTOR ASSEMBLY | Replace                 |     | 0.3 |   |   |                             | 4              | C |
|                        |   | HEATING ASSEMBLY                 | Repair                  |     | 0.5 |   |   |                             | 4              | C |
|                        |   |                                  | Replace                 |     | 0.5 |   |   |                             | 4              | C |
|                        | COMPRESSOR<br>ASSEMBLY                      | Repair                           |                         |     | 0.5 |   |   | 4                           | C              |   |
|                        |   | Replace                          |                         |     | 1.5 |   |   | 3,7                         |                |   |
|                        | THERMOSTATIC<br>EXPANSION VALVE<br>ASSEMBLY | Replace                          |                         |     | 1.0 |   |   | 3,7                         |                |   |
| 04                     | DARKROOM FILM<br>VIEWER                     | Inspect                          | 0.2                     |     |     |   |   |                             |                |   |
|                        |   | Remove/<br>Install               |                         | 0.3 |     |   |   |                             | 6              |   |
|                        |   | Repair                           | 0.3                     | 0.5 |     |   |   | 4,16,23,<br>27              | C              |   |
|                        | POWER CORD                                  | Replace                          |                         | 0.3 |     |   |   | 4                           | C              |   |
| 05                     | PHOTOGRAPHIC<br>PRINT DRYER                 | Inspect                          | 0.3                     |     |     |   |   | 27                          |                |   |
|                        |   | Test                             | 0.3                     |     |     |   |   |                             |                |   |
|                        |   | Service                          | 0.2                     | 1.6 |     |   |   | 4,8                         | C              |   |
|                        |   | Remove/<br>Install               |                         | 0.5 |     |   |   | 6                           |                |   |
|                        |   | Repair                           | 0.5                     | 2.3 |     |   |   | 4,17                        | C              |   |

Section II. MAINTENANCE ALLOCATION CHART - Cont

| (1)<br>Group Number | (2)<br>Component/Assembly           | (3)<br>Maintenance Function | (4)<br>Maintenance Cat. |     |   |   |   | (5)<br>Tools and Eqpt | (6)<br>Remarks |
|---------------------|-------------------------------------|-----------------------------|-------------------------|-----|---|---|---|-----------------------|----------------|
|                     |                                     |                             | C                       | O   | F | H | D |                       |                |
| 06                  | PORTABLE TRACING/<br>SCRIBING BOARD | Inspect                     | 0.2                     |     |   |   |   | 3,16                  |                |
|                     |                                     | Service                     | 0.2                     |     |   |   |   |                       |                |
| 07                  | PHOTOGRAMMETRIC<br>RECTIFIER        | Repair                      | 0.3                     | 0.5 |   |   |   |                       |                |
|                     |                                     | inspect                     | 0.3                     |     |   |   |   |                       |                |
|                     |                                     | Test                        | 0.3                     |     |   |   |   | 13,17,20,<br>25,26    |                |
|                     |                                     | Service                     | 0.5                     |     |   |   |   | 6,15,29,33.           | C              |
|                     |                                     | Remove/<br>install          |                         | 1.8 |   |   |   |                       |                |
|                     |                                     | Repair                      | 1.0                     | 2.0 |   |   |   | 4,17,26               | C              |
|                     | NINE-SPEED<br>COMPUTER              | Repair                      | 0.3                     |     |   |   |   |                       |                |
|                     |                                     | Replace                     | 0.4                     |     |   |   |   |                       |                |
|                     | TILT ASSEMBLY                       | Repair                      |                         | 0.3 |   |   |   | 4                     | C              |
|                     | MAG ASSEMBLY                        | Repair                      |                         | 0.3 |   |   |   | 4                     | C              |
|                     | PRESSURE PLATE<br>MOUNTING ASSEMBLY | Repair                      | 0.7                     |     |   |   |   | 17,18,26              |                |
|                     | MAGNIFICATION DRIVE<br>MOTOR        | Adjust                      |                         | 0.3 |   |   |   | 4                     | C              |
|                     |                                     | Repair                      |                         | 0.3 |   |   |   | 1,25                  | C              |
|                     |                                     | Replace                     |                         | 0.3 |   |   |   | 1                     |                |
|                     | TILT DRIVE MOTOR                    | Adjust                      |                         | 0.3 |   |   |   | 4                     | C              |
|                     |                                     | Replace                     |                         | 0.3 |   |   |   | 1                     |                |
|                     | BLOWER MOTOR                        | Replace                     |                         | 0.3 |   |   |   | 4                     | C              |
|                     | LAMPHOUSE ASSEMBLY                  | Repair                      | 1.2                     |     |   |   |   | 17,26                 |                |
|                     | TILT AND MAG<br>MOTOR CONTROLLER    | Replace                     |                         | 0.7 |   |   |   | 4                     | C              |
| 08                  | ULTRASONIC CLEANER                  | Inspect                     | 0.2                     |     |   |   |   | 2                     |                |
|                     |                                     | Repair                      |                         | 0.7 |   |   |   |                       |                |
|                     | CIRCUIT BOARD                       | Replace                     |                         | 0.6 |   |   |   | 2                     | A              |

Section II. MAINTENANCE ALLOCATION CHART - Cont

| (1)<br>Group Number | (2)<br>Component/Assembly | (3)<br>Maintenance Function | (4)<br>Maintenance Cat. |     |     |     |     | (5)<br>Tools and Eqpt | (6)<br>Remarks |
|---------------------|---------------------------|-----------------------------|-------------------------|-----|-----|-----|-----|-----------------------|----------------|
|                     |                           |                             | C                       | O   | F   | H   | D   |                       |                |
| 09                  | CONTACT PRINTER-ENLARGER  | Inspect                     | 0.3                     |     |     |     |     | 3,20                  |                |
|                     |                           | Test                        | 0.3                     |     |     |     |     | 3,19                  |                |
|                     |                           | Service                     | 0.3                     | 0.3 |     |     |     | 1                     | C              |
|                     |                           | Adjust                      |                         |     | 2.0 |     |     | 4                     | C              |
|                     |                           | Remove/Install              |                         |     | 1.0 |     |     | 4                     | C              |
|                     |                           |                             | Repair                  | 0.3 | 2.0 | 5.0 |     | 1,4,21,28             | C              |
|                     |                           | AUTOMATIC PLATEN LIFTER     | Repair                  |     | 0.8 | 2.0 |     | 4                     | C              |
|                     |                           | ROLL PAPER TRANSPORT        | Repair                  |     | 1.0 | 3.0 |     | 1,4,31                | C              |
|                     |                           | PRINTED CIRCUIT CARD 4TC1   | Replace                 |     |     | 0.8 |     | 4                     | A,C            |
|                     |                           | DRAG BRAKE                  | Repair                  |     |     | 0.5 |     | 4                     | C              |
| 10                  | FURNITURE AND CABINETS    | Adjust                      |                         |     | 2.0 |     |     | 4,32,38               | C              |
|                     |                           | Repair                      |                         | 1.0 | 4.0 |     | 4,6 | C                     |                |
|                     |                           | Inspect                     | 0.3                     |     |     |     |     |                       |                |
| 11                  | SUPPORT ITEMS             | Replace                     |                         |     | 1.0 |     |     | 1,32                  | A              |
|                     |                           | High Voltage Box Assembly   |                         |     | 0.8 |     |     | 4                     | C              |
|                     |                           | Remove/Install              |                         |     | 0.8 |     |     | 2,3                   |                |
|                     |                           | Repair                      |                         | 0.8 |     |     | 34  |                       |                |
|                     |                           | Inspect                     | 0.5                     |     |     |     |     |                       |                |
|                     |                           | Service                     | 0.5                     |     |     |     |     |                       |                |
|                     |                           | Remove/Install              |                         | 0.5 |     |     | 2   |                       |                |
|                     |                           | Replace                     | 0.2                     |     |     |     |     |                       |                |



Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

| (1)<br>Reference<br>Code | (2)<br>Maintenance<br>Category | (3)<br>Nomenclature   | (4)<br>National/NATO<br>Stock Number | (5)<br>Tool<br>Number |
|--------------------------|--------------------------------|---|--------------------------------------|-----------------------|
| 1                        | 0                              | Tool Kit, Precision Instrument Repair                         | 5180-00-596-1538                     |                       |
| 2                        | 0                              | Tool Kit, Automotive Maint & Repair Common Plus Metric Option | 4910-00-754-0654                     |                       |
| 3                        | 0                              | Tool Kit, General Mechanic's Automotive Plus Metric Option    | 5180-00-177-7033                     |                       |
| 4                        | O,F,H                          | Tool Kit, Electronic Equipment                                | 5180-00-605-0079                     |                       |
| 5                        | F,H                            | Tool Kit. Carpenters Engineer Squad                           | 5180-00-293-2875                     |                       |
| 6                        | F,H                            | Tool Kit, Light Machine Repair                                | 5180-00-596-1540                     |                       |
| 7                        | F,H                            | Tool Kit, Service, Refrigeration Unit                         | 5180-00-596-1474                     |                       |
| 8                        | C,O                            | Air Pump, Hand  |                                      | (9R315)<br>500-19-00  |
| 9                        | C                              | Brush, Lens   | 7920-00-205-0565                     |                       |
| 10                       | C                              | Brush, Tube Cleaning  | 7920-00-282-7783                     |                       |
| 11                       | C                              | Brush, Wire   | 7920-00-291-5815                     |                       |
| 12                       | C                              | Cylinder, Graduated   | 6640-00-427-5250                     |                       |
| 13                       | C                              | Level, Rod  | 6675-00-244-0446                     |                       |
| 14                       | C                              | Pliers, Hose Clamp  | 5120-00-537-3375                     |                       |
| 15                       | C                              | Pump, Inflating   |                                      | (53800)<br>6A49454    |
| 16                       | C                              | Screwdriver, Cross Tip  | 5120-00-234-8913                     |                       |
| 17                       | C                              | Screwdriver, Flat Tip   | 5120-00-234-8910                     |                       |
| 18                       | C                              | Scriber, Machinist's  | 5120-00-224-9728                     |                       |

Section III TOOL AND TEST EQUIPMENT REQUIREMENTS - Cont

| (1)<br>Reference<br>Code | (2)<br>Maintenance<br>Category | (3)<br>Nomenclature                  | (4)<br>National/NATO<br>Stock Number | (5)<br>Tool<br>Number |
|--------------------------|--------------------------------|--------------------------------------|--------------------------------------|-----------------------|
| 19                       | C                              | Spring Scale                         |                                      | (39428)<br>1757T16    |
| 20                       | C                              | Watchmaker's Blower                  | 5120-00-254-4612                     |                       |
| 21                       | C                              | Wrench, Adjustable, 8 in.            | 5120-00-240-5328                     |                       |
| 22                       | C                              | Wrench, Adjustable, 10 in,           | 5120-00-449-8083                     |                       |
| 23                       | C                              | Wrench, Comb. 3/8 in.                | 5120-00-228-9504                     |                       |
| 24                       | C                              | Wrench, Comb. 9/1 6 in.              | 5120-00-228-9507                     |                       |
| 25                       | C                              | Wrench Set, Ball Socket<br>Key       |                                      | (3M532)<br>9RY46672   |
| 26                       | C                              | Wrench Set, Hex Hed Key              | 5120-01-022-6250                     |                       |
| 27                       | C                              | Wrench Set, Single Socket<br>Spinner | 5120-00-089-3663                     |                       |
| 28                       | F                              | Face Shield                          | 4240-00-439-3450                     |                       |
| 29                       | O                              | Wrench, Combination 1 1/2 in.        | 5120-00-277-8834                     |                       |
| 30                       | F                              | Stud Remover                         | 5120-00-772-3470                     |                       |
| 31                       | O                              | Locking Pliers                       | 5120-00-277-4243                     |                       |
| 32                       | O                              | Multimeter                           | 5625-01-128-8015                     |                       |
| 33                       | O                              | Pry Bar                              | 5120-00-257-0303                     |                       |
| 34                       | O                              | Rivet gun                            | 5120-00-017-2849                     |                       |
| 35                       | O                              | Spring Scale                         | 6670-00-238-9777                     |                       |
| 36                       | O                              | Stopwatch                            | 5645-00-899-1235                     |                       |
| 37                       | O                              | Thermometer, Bimetallic              | 5685-00-174-6239                     |                       |
| 38                       | F                              | High Voltage Probe                   | 6625-01 -070-2312                    |                       |

**Section III TOOL AND TEST EQUIPMENT REQUIREMENTS - Cont**

| (1)<br>Reference<br>Code | (2)<br>Maintenance<br>Category | (3)<br>Nomenclature         | (4)<br>National/NATO<br>Stock Number | (5)<br>Tool<br>Number |
|--------------------------|--------------------------------|-----------------------------|--------------------------------------|-----------------------|
| 39                       | F                              | Spring Hook                 | 6120-00-901-7270                     |                       |
| 40                       | C                              | Wrench, Adjustable 6 In. Lg | 5120-00-264-3795                     |                       |

**Section IV REMARKS**

| Reference Code | Remarks  |
|----------------|--|
| A              | <p>Replacement of printed circuit boards authorized by the MAC are those identified as damaged or otherwise defective which —</p> <ul style="list-style-type: none"> <li>a) Can be readily removed/installed with easy to use tools.</li> <li>b) Do not require critical adjustment, calibration, or alinement before or after installation</li> </ul> |
| B              | See TM 5-4120-367-14 for maintenance procedures.   |
| C              | Maintenance personnel and TSS Section 7 maintenance van (which carries the required tools) are authorized by HHC TOE 05336 H600.   |





## APPENDIX C

### COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

#### Section I INTRODUCTION

##### C-1. SCOPE.

This appendix lists components of end item and basic issue items for the Rectifier I Section to help you inventory items required for safe and efficient operation.

##### C-2. GENERAL.

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

*a. Section II: Components of End Item.* This listing is for informational purposes only, and is not authority to requisition replacements. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

*b. Section III: Basic Issue Items.* These are the minimum essential items required to place the Rectifier I Section in operation, to operate it, and to perform emergency repairs. BII must be with the Rectifier I Section during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII based on TOE/MTOE authorization of the end item.

##### C-3. EXPLANATION OF COLUMNS.

The following provides an explanation of columns found in the tabular listings:

*a. Column (1): Illustration Number (Illus Number).* This column indicates the number of the illustration in which the item is shown.

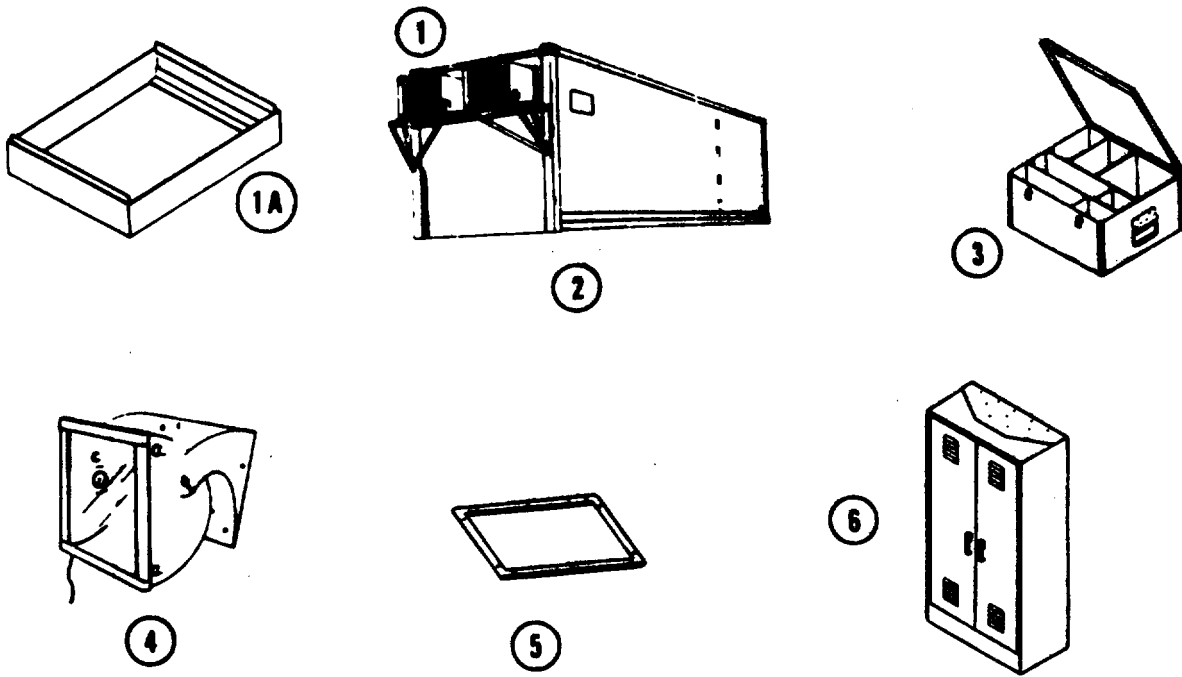
*b. Column (2): National Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

*c. Column (3): Description.* Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

*d. Column (4): Unit of Measure (U/M).* Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

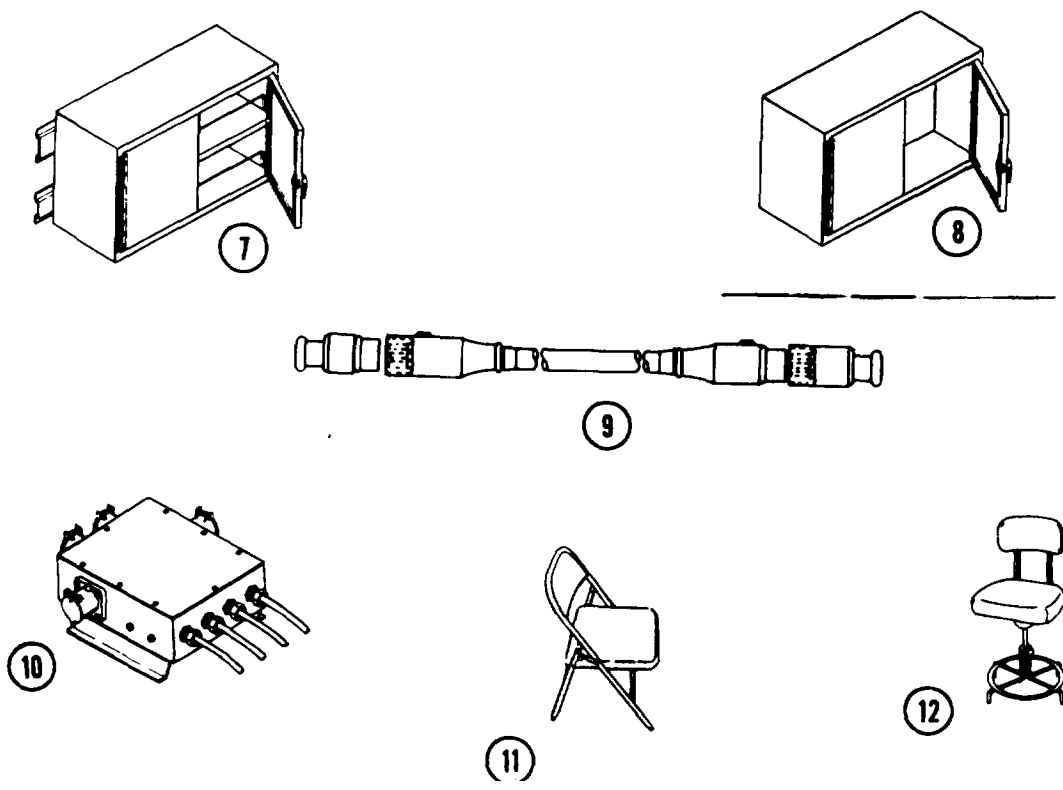
*e. Column (s): Quantity Required (Qty Rqr).* Indicates the quantity of the item authorized to be used With/on the equipment.

Section II. COMPONENT'S OF END ITEM



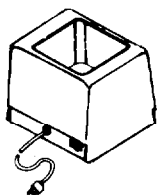
| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                              | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
| 1                      | 4120-00-474-9206                | AIR CONDITIONER<br>(81349) MILA-52767                                   | ea         | 2                 |
| 1 A                    |                                 | BASE, FILING CABINET:<br>(86915) S4634                                  | ea         | 1                 |
| 2                      | 6675-01-216-7305                | VAN ASSEMBLY, MODIFIER:<br>(97403) 13225E3033                           | ea         | 1                 |
| 3                      |                                 | BOX VEHICULAR, ACCESSORIES: for<br>vacuum cleaner<br>(97403) 13225E3490 | ea         | 1                 |
| 4                      |                                 | BRACKET, MOUNTING, SAFELIGHT:<br>(19139) 152-1194                       | ea         | 5                 |
| 6                      | 7195-00-105-7941                | BULLETIN BOARD:<br>(79819) T5-2303                                      | ea         | 1                 |
| 6                      | 7125-00-269-8534                | CABINET, SUPPLY<br>(97403) 13225E3792                                   | ea         | 1                 |

Section II COMPONENTS OF END ITEM - Cont

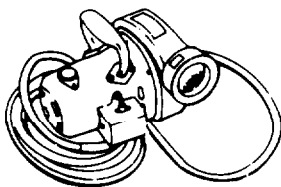


| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number   | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 7                      | 7125-00-286-5259                | CABINET, WALL STORAGE:<br>(78252) MIL-C-40060/1, type I                                  | ea         | 1                 |
| 8                      |                                 | CABINET, TECH MANUAL STORAGE:<br>(51745) 13225E4648                                      | ea         | 1                 |
| 9                      | 6150-01-134-0847                | CABLE ASSEMBLY, POWER ELECTRICAL:<br>(90129) RC 1736-5, 50.5 ft lg.                      | ea         | 2                 |
| 10                     | 6150-01-081-9264                | CABLE TERMINAL BOX ASSEMBLY,<br>ELECTRICAL, SPECIAL PURPOSE:<br>(551745) TL/TA13222E6250 | ea         | 1                 |
| 11                     | 7105-00-269-8463                | CHAIR, FOLDING:<br>(04718) 42-699/9DL  | ea         | 5                 |
| 12                     | 7110-00-281-4472                | CHAIR, ROTARY:<br>(3K866) D42L   | ea         | 1                 |

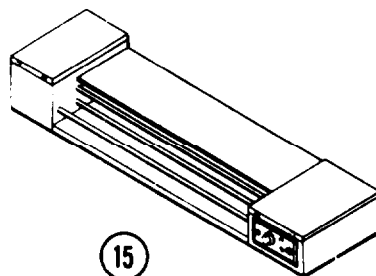
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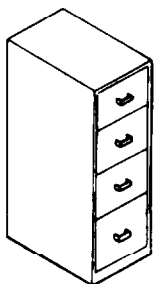
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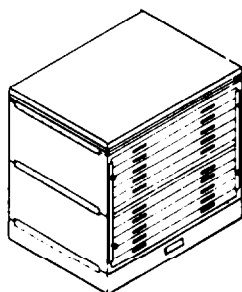
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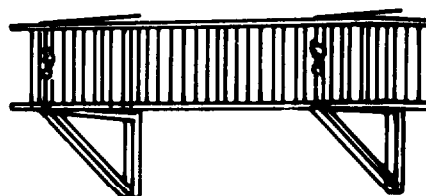
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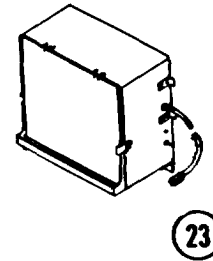
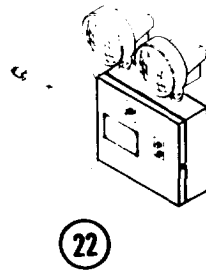
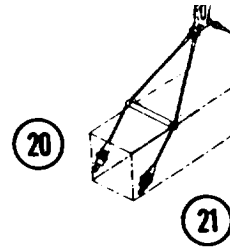
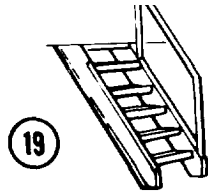
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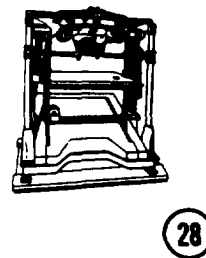
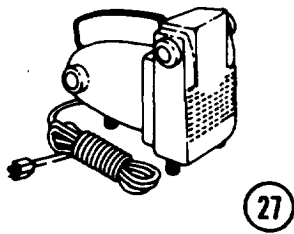
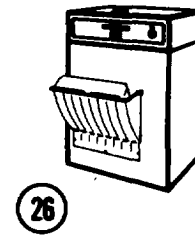
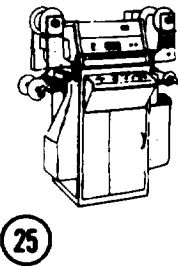
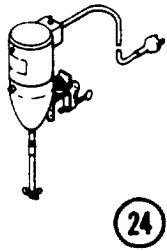
| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number           | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 13                     | 4940-00-195-7251                | CLEANER, ULTRASONIC:<br>(75364) 3069 USC3            | ea         | 1                 |
| 14                     | 7910-00-205-3400                | CLEANER, VACUUM, ELECTRIC:<br>(51 745) MVV 3400      | ea         | 1                 |
| 15                     |                                 | DRIER, PHOTOGRAPHIC PRINT:<br>(591 66) 3040          | ea         | 1                 |
| 16                     | 7125-01-210-5701                | FILING CABINET, 4 DRAWER:<br>(97403) 13225 E3710     | ea         | 2                 |
| 17                     |                                 | FILING CABINET, MAP AND PLAN:<br>(97403) 13225E31 38 | ea         | 1                 |
| 18                     | 5440-01-152-7751                | LADDER, EXTENSION – FOLDING:<br>(39428) 8028T16      | ea         | 1                 |

Section II COMPONENTS OF END ITEM - Cont



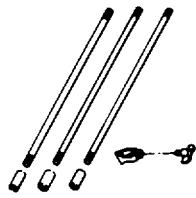
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|------------------------|---------------------------------|--|------------|-------------------|
| 19                     | 2540-01-133-9726                | LADDER, VEHICLE BOARDING:<br>(97403) 13225E3074                                    | ea         | 2                 |
| 20                     |                                 | LIFTING AND TIEDOWN DEVICE,<br>TRANSPORTABLE SHELTER: Left hand<br>(52555) 1390-4  | ea         | 2                 |
| 21                     |                                 | LIFTING AND TIEDOWN DEVICE,<br>TRANSPORTABLE SHELTER: Right hand<br>(52555) 1390-3 | ea         | 2                 |
| 22                     |                                 | LIGHT, EMERGENCY:<br>(97403) 13225E3396  | ea         | 1                 |
| 23                     |                                 | LIGHT, VIEWING:<br>(93791 ) DLV 20   | ea         | 1                 |

Section II COMPONENTS OF END ITEM - Cont

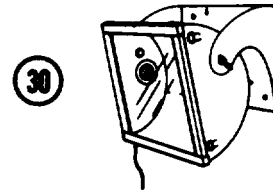


| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                              | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
| 24                     | 4940-00-360-2728                | MIXER, LIQUID, REVOLVING SHAFT:<br>(91313) M-25                         | ea         | 1                 |
| 25                     | 6740-01-016-4527                | PRINTER, PHOTOGRAPHIC:<br>(01205) MKIVR5A                               | ea         | 1                 |
| 26                     | 6740-01-118-5406                | PROCESSING MACHINE, PHOTOGRAPHIC FILM<br>AND PAPER:<br>(19139) 317 C-N  | ea         | 1                 |
| 27                     | 4320-01-098-0156                | PUMP UNIT, CENTRIFUGAL:<br>(39428) 9962K11, 40 GPM at 22 Head<br>Feet   | ea         | 1                 |
| 28                     | 6675-00-526-6542                | RECTIFIER, PROJECTION PRINTING:<br>PHOTOGRAMMETRIC:<br>(06175) 53-31-03 | ea         | 1                 |

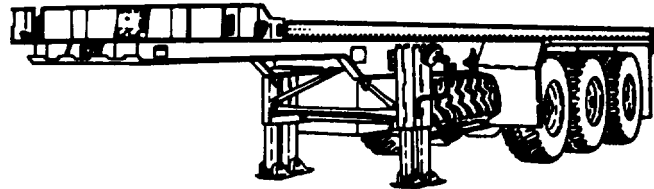
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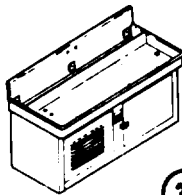
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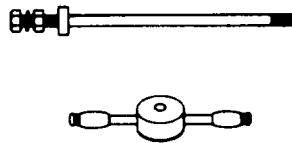
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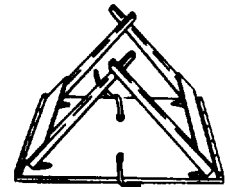
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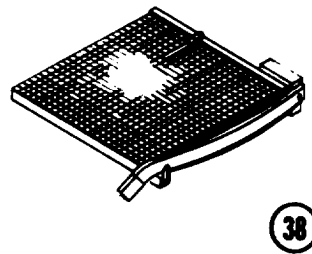
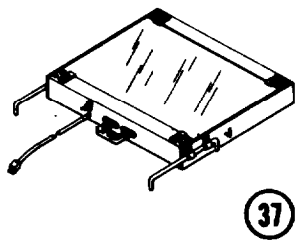
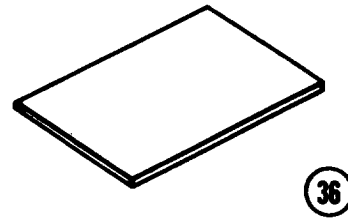
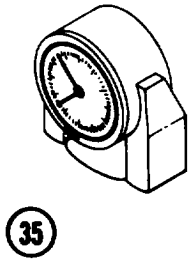
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| (1)<br>Illustration Number | (2)<br>National Stock Number | (3)<br>Description<br>FSCM and Part Number  | (4)<br>U/M | (5)<br>Qty Rqr |
|----------------------------|------------------------------|---|------------|----------------|
| 29                         | 5975-00-878-3791             | ROD, GROUND:<br>(82370) A104  | ea         | 1              |
| 30                         | 6740-01-058-7423             | SAFELIGHT, DARKROOM PHOTOGRAPHIC:<br>(19139) 141-2261                                     | ea         | 5              |
| 31                         | 2330-01-076-4797             | SEMITRAILER, FLATBED:<br>(97403) TL/MIL-B-13207, par. 3.11,<br>fig. 12, tables III and IV | ea         | 1              |
| 32                         | 6740-00-291-9391             | SINK, PHOTOGRAPHIC PROCESSING:<br>(91313) 71RC  | ea         | 1              |
| 33                         | 5120-01-013-1676             | SLIDE HAMMER, GROUND ROD EMPLACEMENT:<br>(45225) P74-144                                  | ea         | 1              |
| 34                         | 7105-00-269-9275             | TABLE, FOLDING:<br>(90589) MIL-T-3338   | ea         | 1              |

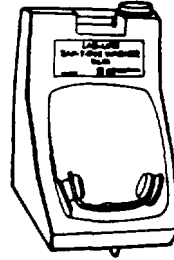
Section II COMPONENTS OF END ITEM - Cont



| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                     | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 35                     | 6645-00-243-9470                | TIMER, STOP:<br>(19139) 152-3612                               | ea         | 2                 |
| 36                     |                                 | TOP, FILING CABINET:<br>(88915) T3445                          | ea         | 1                 |
| 37                     | 6675-00-221-7121                | TRACING BOARD:<br>(26954) 51J3                                 | ea         | 1                 |
| 38                     | 7520-00-224-7621                | TRIMMER, PAPER, DROP KNIFE:<br>(81348) GG-T-678-TYPE-1 Class 5 | ea         | 1                 |



Section III. BASIC ISSUE ITEMS



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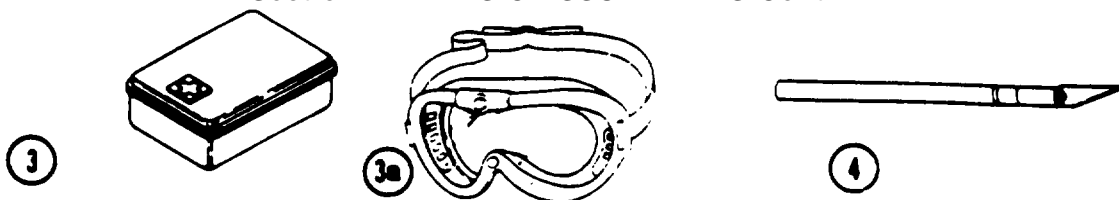
| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number              | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
|                        |                                 | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(39428) 7469T1       | ea         | 2                 |
|                        |                                 | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(39428) 7468T1       | ea         | 2                 |
|                        |                                 | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(39428) 7467T2       | ea         | 1                 |
|                        | 4730-00-542-40438               | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(72216) E21503X12X12 | ea         | 2                 |
|                        |                                 | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(39428) 7468T2       | ea         | 2                 |
|                        | 4730-00-542-4029                | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(05646) 296          | ea         | 1                 |
|                        | 4730-00-293-7883                | ADAPTER, STRAIGHT, PIPE TO HOSE<br>(39428) 5346K28      | ea         | 2                 |
|                        |                                 | AIR PUMP, HAND:<br>(9R315) 500-19-00                    | ea         | 1                 |
|                        | 8415-00-100-7742                | APRON, LABORATORY:<br>(85491) 1130                      | bx         | 1                 |
| 1                      | 4240-01-298-9317                | EYE WASH STATION<br>(95632) 98                          | ea         | 1                 |
|                        | 7920-00-291-5812                | BRUSH, DUSTING, DRAFTSMAN'S:<br>(79819) Q6-38NB-010     | ea         |                   |

Section III BASiC ISSUE ITEMS



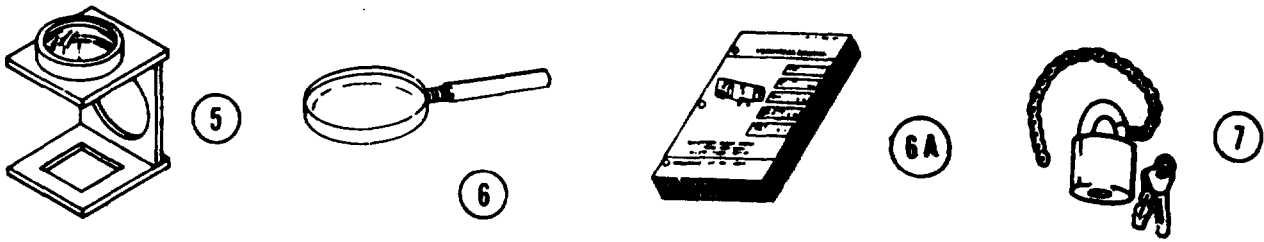
| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                          | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
|                        | 7920-00-205-0565                | BRUSH, DUSTINGS, LENS<br>AND PHOTOGRAPHIC NEGATIVE:<br>(17866) R698 | ea         | 3                 |
|                        | 7920-00-282-7783                | BRUSH, TEST TUBE:<br>(81348) H-B-1051                               | ea         | 1                 |
|                        | 7920-00-291-5815                | BRUSH, WIRE, SCRATCH:<br>(39428) 7187T2                             | ea         | 1                 |
|                        | 4730-00-202-6672                | BUSHING, PIPE 1-½ IN. 11-½ NPT<br>(81348) WW-P471 TY2 STYA          | ea         | 2                 |
|                        | 4730-00-193-0879                | BUSHING, PIPE 1 IN. -11-½ NPT<br>(81348) WW-P471 TY2 STYA           | ea         | 2                 |
|                        | 4730-00-231-2412                | CAP, PIPE, M/I 3/4 IN. -14 NPT INT THD<br>(81348) WW-P-521 TY1      | ea         | 1                 |
|                        | 4730-00-231-2413                | CAP, PIPE, M/I 1 IN. -11½ NPT INT THD<br>(81348) WW-P-521 TY1       | ea         | 1                 |
|                        |                                 | COUPLING, HOSE<br>(20266) HUS 11-6                                  | ea         | 2                 |
|                        |                                 | COUPLING, HOSE<br>(77860) 351425                                    | ea         | 2                 |
|                        | 4730-00-253-5763                | ELBOW, PIPE<br>(81348) WW-P-460 CLA P/R 1                           |            |                   |
| 2                      | 4210-00-555-8837                | EXTINGUISHER, FIRE,<br>MONOBROMOTRIFLUOROMETHANE:<br>(33525) T2     | ea         | 2                 |
|                        |                                 | FILTER, CARTRIDGE:<br>(19139) 562790                                | ea         | 24                |

Section III. BASIC ISSUE ITEMS-Cont.



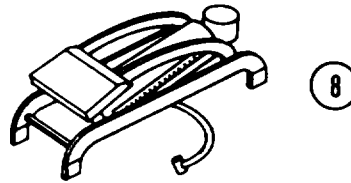
| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number   | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
|                        | 4330-00-089-6694                | FILTER ELEMENT, FLUID, PRESSURE:<br>(13800) W15R10TZV  | ea         | 2                 |
|                        | 6740-00-577-5837                | FILTER, PHOTOGRAPHIC DARKROOM<br>SAFELIGHT: Light Amber Color; wratten no. 13<br>(19139) 179-6721        | ea         | 6                 |
|                        | 6740-00-141-6561                | FILTER, PHOTOGRAPHIC DARKROOM<br>SAFELIGHT: Orange red color; wratten no. 23A<br>(19139) 23A, 10X 12 in. | ea         | 16                |
| 3                      | 6545-00-922-1200                | FIRST AID KIT, GENERAL PURPOSE:<br>(89875) SC C-6545-IL vol 2  | ea         | 1                 |
|                        | 5330-00-599-7516                | GASKET:<br>(02413) Alfcogaskets  | ea         | 12                |
|                        | 5330-00-551-3996                | GASKET<br>(25472) Gasket   | ea         | 32                |
| 3a                     | 4240-00-052-3776                | GOGGLES, INDUSTRIAL<br>(81348) A-A-1110  | pr         | 4 pr              |
|                        | 6640-00-427-5250                | GRADUATE, LIQUID, LABORATORY<br>(05668) 6138-80  | ea         | 2                 |
|                        | 4720-00-202-6722                | HOSE ASSEMBLY, NONMETALLIC<br>(81348) L-H-520 TY1SZ 3/4  | ea         | 3                 |
|                        | 4720-00-202-8659                | HOSE ASSEMBLY, NONMETALLIC<br>(81348) ZZ-H-601GR1SZ 3/4  | ea         | 2                 |
|                        | 4720-00-202-6483                | HOSE ASSEMBLY, NONMETALLIC<br>(81348) ZZ-H-561 GRBTY1  | ea         | 1                 |
|                        |                                 | KEY SET, BALL SOCKET<br>(3M532) 9RY46672   | ea         | 1                 |
|                        | 5120-01-022-6250                | KEY SET, SOCKET HEAD SCREW<br>(55719) AW-9K, w/case  | se         | 1                 |
| 4                      | 5110-00-595-8400                | KNIFE, CRAFTSMAN'S: stencil etching<br>and cutting style; removable blade type<br>(99941)3001            | ea         | 2                 |

Section III BASIC ISSUE ITEMS - Cont



| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number  | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
|                        | 5110-00-595-8406                | KNIFE, CRAFTSMAN'S: Stencil; detachable swivel blade; for cutting frisket, masks or stencil (79819) Q5-3041-2   | ea         | 2                 |
|                        | 7520-01-008-7640                | LEAD REPOINTER, PENCIL: (79819) 992WB   | ea         | 1                 |
|                        | 6675-00-244-0446                | LEVEL, ROD: (81349) MIL-C-11566C  | ea         | 1                 |
| 5                      | 6640-00-255-8268                | MAGNIFIER: monocular; linen tester (79819) Q8-9518  | ea         | 2                 |
| 6                      | 6650-00-256-9060                | MAGNIFIER: monocular; reading type (79619) Q8-9526  | ea         | 1                 |
| 6A                     |                                 | MANUALS, TECHNICAL:<br><br>LO 5-6675-319-12, LUBRICATION ORDER, TSS, Section 8<br><br>TM 5-6675-319-14, Operator's, ,Organizational, DS and GS Maintenance Manual for TSS, Section 8<br><br>TM 5-6675-319-24P, Repair Parts and Special Tools List for TSS, Section 8 | ea         | 1                 |
|                        | 4730-00-277-9981                | NIPPLE, PIPE (81346) WW-N-351 TY1   | ea         | 1                 |
| 7                      | 530-00-682-1505                 | PADLOCK SET: (77765) MS21313-52   | se         | 1                 |
|                        | 7510-01-030-7427                | PEN POINT ASSORTMENT AND PENHOLDER: (79819) 3165-JDCS-9   | se         | 1                 |

Section III BASIC ISSUE ITEMS - Cont



| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number             | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 8                      | 5120-00-537-3375                | PLIERS, HOSE CLAMP:<br>(93389) 252                     | ea         | 1                 |
|                        | 6740-00-550-2112                | PRINT PADDLE, PHOTOGRAPHIC:<br>(19139) 150-4372        | ea         | 1                 |
|                        |                                 | PUMP, INFLATING, MANUAL:<br>[53800] 6 A 49454          | ea         | 1                 |
|                        |                                 | PUMP, PORTABLE, MOTOR DRIVEN:<br>(39428) 9962K11       | ea         | 1                 |
|                        | 4730-00-277-5539                | REDUCER, PIPE<br>(81348) WW-P-501TY1CL125              | ea         | 2                 |
|                        | 4730-00-277-5536                | REDUCER, PIPE<br>(82666) 179                           | ea         | 2                 |
|                        | 4730-00-227-6929                | REDUCER, PIPE<br>(81348) WW-P-521TY1                   | ea         | 2                 |
|                        | 4730-00-227-6933                | REDUCER, PIPE<br>(81348) WV-P-521TY1                   | ea         | 2                 |
|                        | 4730-00-227-6935                | REDUCER, PIPE<br>(81346) WW-P-521TY1                   | ea         | 2                 |
|                        | 4730-00-231-5661                | REDUCER, PIPE<br>(96906) MS39232-15                    | ea         | 2                 |
|                        | 4730-00-825-0927                | REDUCER, PIPE<br>(81348) VVW-P-521TY2                  | ea         | 2                 |
|                        | 6640-00-634-9313                | ROD, STIRRING, LABORATORY:<br>(64484) 540097-F         | ea         | 2                 |
|                        | 6675-00-641-5727                | SCALE, DRAFTING: 30.000 centimeters<br>(33363) 56-3280 | ea         | 1                 |

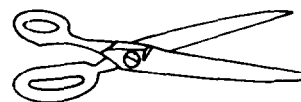
Section III BASIC ISSUE ITEMS - Cont



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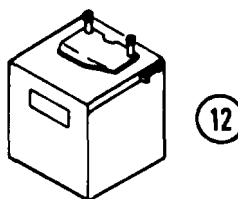
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| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number              | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|---|------------|-------------------|
|                        | 6675-00-238-3498                | SCALE, DRAFTING: 12.00 in.<br>(79819) 8230-E12          | ea         | 1                 |
| 9                      | 5120-00-234-8913                | SCREWDRIVER, CROSS TIP: size 2<br>(81348) GGG-S-121     | ea         | 1                 |
| 10                     | 5120-00-234-8910                | SCREWDRIVER, FLAT TIP:<br>(78525) 1006                  | ea         | 1                 |
|                        | 5120-00-224-9728                | SCRIBER, MACHINIST'S:<br>(81348) GGG-S-131              | ea         | 1                 |
|                        | 7520-00-162-6178                | SHARPENER, PENCIL:<br>(79819) U8-1031 Model KS          | ea         | 1                 |
| 11                     | 5110-00-161-6912                | SHEARS, STRAIGHT TRIMMERS:<br>(0137) 509-S9             | ea         | 1                 |
|                        |                                 | SPRING SCALE:<br>(39428) 1757T16                        | ea         | 1                 |
|                        | 6675-00-641-5752                | STRAIGHTEDGE:<br>(09177) 70-285,30.0 in. lg             | ea         | 1                 |
|                        |                                 | STRAP ASSEMBLY, BUCKLE-END: 6.0 in.<br>(51745) 1844-104 | ea         | 8                 |
|                        |                                 | STRAP ASSEMBLY, BUCKLE-END: 8.0 in.<br>(51745) 1844-101 | ea         | 4                 |
|                        |                                 | STRAP ASSEMBLY, BUCKLE-END: 9.0 in.<br>(51745) 1844-103 | ea         | 8                 |
|                        |                                 | STRAP ASSEMBLY, TIP-END: 23.0 in.<br>(51745) 1845-103   | ea         | 1                 |
|                        |                                 | STRAP ASSEMBLY, TIP-END: 36.0 in.<br>(51745) 1845-106   | ea         | 2                 |

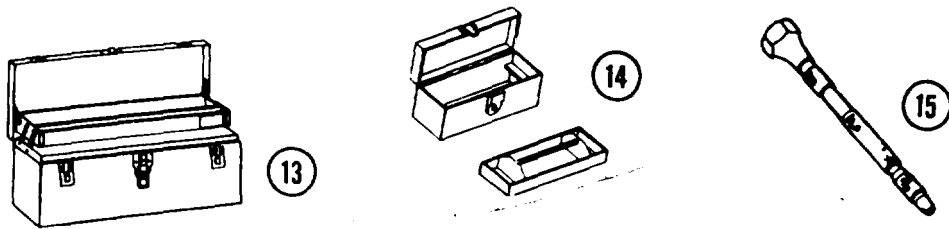
Section III BASIC ISSUE ITEMS - Cont



| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                           | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 12                     | 6740-014392-1469                | STRAP ASSEMBLY, TIP-END: 40.0 in.<br>(51745) 1845-101                | ea         | 6                 |
|                        |                                 | STRAP ASSEMBLY, TIP-END: 58.0 in.<br>(51745) 1845-105                | ea         | 11                |
|                        |                                 | 5STRAP ASSEMBLY, WEBBING: 30.00 in.<br>(98313) 13225E3695-8          | ea         | 2                 |
|                        |                                 | STRAP ASSEMBLY, WEBBING: 55.00 in.<br>(98313) 13225E3695-6           | ea         | 1                 |
|                        |                                 | STRAP ASSEMBLY, WEBBING: 55.00 in.<br>(98313) 13225E3695-4           | ea         | 4                 |
|                        |                                 | Deleted  |            |                   |
|                        |                                 | STRAP ASSEMBLY, WEBBING: 35.00 in.<br>(98313) 13225E3695-2           | ea         | 1                 |
|                        |                                 | STRAP ASSEMBLY, WEBBING: 45.00 in.<br>(98313) 13225E3695-3           | ea         | 3                 |
|                        |                                 | STRAP ASSEMBLY, WEBBING: 29.00 in.<br>(98313) 13225E3695-13          | ea         | 2                 |
|                        | 6685-00-74-6239                 | TESTING MACHINE, EXPOSURE,<br>PHOTOGRAPHIC:<br>(25257) WEJEX Model S | ea         | 1                 |
|                        |                                 | THERMOMETER, SELF-INDICATING,<br>BIMETALLIC:<br>(98773) G207         | ea         | 2                 |

U.S. Government printing Office: 1990-754-029/20239

Section III BASIC ISSUE ITEMS - Cont



| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                                     | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 13                     | 5140-00-331-5496                | TOOL BOX, PORTABLE: 1 fixed hinged tray<br>(75206) CS 19                       | ea         | 1                 |
| 14                     | 5140-00-315-2747                | TOOL BOX, PORTABLE: 1 removable tray<br>(75206) CS 16                          | ea         | 1                 |
|                        |                                 | TRAY, PROCESSING, PHOTOGRAPHIC:<br>(08215) 2024-3                              | ea         | 4                 |
|                        | 6675-00-190-5867                | TRIANGLE, DRAFTING: 130 deg;<br>1 60 deg; 1 90 deg<br>(33363) 57-0220, size 10 | ea         | 1                 |
|                        | 6675-00-190-5863                | TRIANGLE, DRAFTING: 245 degs;<br>1 90 deg<br>(33363) 57-0292, size 10          | ea         | 1 <sup>a</sup>    |
| 15                     | 5120-00-224-7271                | VISE, PIN:<br>(18037) PVDE   | ea         | 1                 |
|                        | 5120-00-254-4612                | WATCHMAKER'S BLOWER<br>(19200) 8284021   | ea         | 1                 |
|                        | 5120-00-264-3795                | WRENCH, ADJUSTABLE<br>(80244) GGG-W-631 TY1 , CL1                              | ea         | 1                 |



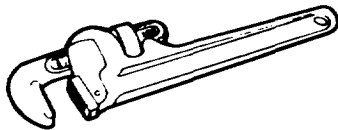
Section III BASIC ISSUE ITEMS - Cont



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| (1)<br>Illus<br>Number | (2)<br>National Stock<br>Number | (3)<br>Description<br>FSCM and Part Number                 | (4)<br>U/M | (5)<br>Qty<br>Rqr |
|------------------------|---------------------------------|--|------------|-------------------|
| 16                     | 5120-00-449-8083                | WRENCH, ADJUSTABLE: 10 in. lg<br>(80244) GGG-W-631 TY1 CL1 | ea         | 1                 |
| 17                     | 5120-00-240-5328                | WRENCH, ADJUSTABLE: 8.0 in. lg<br>(92878) 1500559          | ea         | 1                 |
|                        | 5120-00-228-9504                | WRENCH, COMB: 3/8 in.<br>(93389) 1212                      | ea         | 1                 |
|                        | 5120-00-228-9507                | WRENCH, COMB: 9/16 in.<br>(93389) 1218                     | ea         | 1                 |
| 18                     | 5120-00-277-1478                | WRENCH, PIPE:<br>(39428) 5361A4                            | ea         | 2                 |
|                        | 5120-00-009-3663                | WRENCH SET, SINGLE SOCKET SPINNER:<br>~) P S - 1 2 0       | ea         | 1                 |



**APPENDIX D  
 ADDITIONAL AUTHORIZATION LIST  
 Section I INTRODUCTION**

**D-1 . SCOPE.**

This appendix lists additional items you are authorized for the support of the Rectifier I Section.

**D-2. GENERAL.**

This list identifies items that do not have to accompany the Rectifier I Section and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA or JTA.

**D-3. EXPLANATION OF LISTING.**

National stock numbers, descriptions and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you.

Section II ADDITIONAL AUTHORIZATION LIST

| (1)<br>National<br>Stock<br>Number | (2)<br>Description<br><br>FSCM and Part Number | (3)<br><br>U/M | (4)<br><br>Qty<br>Auth |
|------------------------------------|--|----------------|------------------------|
|                                    | <u>TOE AUTHORIZED ITEMS</u>                    |                |                        |
| 6115-00-283-9051                   | Generator Set, DSL Eng TM:60 kW                | ea             | 1                      |
| 4320-00-554-7321                   | Pump Centrif: Shlw Well                        | ea             | 2                      |
| 5805-00-543-0012                   | Telephone Set: TA-312/PT                       | ea             | 1                      |
| 2330-00-832-8801                   | Trailer Tank: Water 400 gal                    | ea             | 1                      |



## APPENDIX E EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

### Section I INTRODUCTION

#### E-1 . SCOPE.

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the Rectifier I Section. This listing is for information purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

#### E-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 5, Appendix E.").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Organizational Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by two-character alphabetical abbreviations (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

**Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST**

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description                                      | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
| 1                     | C            | 6810-00-223-2739                   | Acetone, Technical                                      | cn         |
| 2                     | O            | 8040-00-174-2610                   | Adhesive, Rubber  | cn         |
| 3                     | F            | 8040-00-152-0063                   | Adhesive, Waterproof                                    | cn         |
| 4                     | O            | 6810-00-201-0906                   | Alcohol Denatured                                       | pt         |
| 5                     | O            |                                    | Ball and Roller Bearing Grease<br>(19139) 760614        | tu         |
|                       | C            | 7520-00-935-7136                   | Ball Point Pen<br>(32988) VV-7621, black                | dz         |
|                       | C            | 7520-00-281-5911                   | Basket, Wastepaper<br>(8D190) H10-34                    | ea         |
|                       | C            | 5110-00-359-6478                   | Blade, Craftsman's Knife: Beveled<br>(99941) 11         | pk         |
|                       | C            | 5110-00-542-2043                   | Blade, Craftsman's Knife: Curved<br>(99941) 10          | pk         |
|                       | C            | 5110-00-542-2044                   | Blade, Craftsman's Knife: Square<br>(99941) 17          | pk         |
|                       | C            | 5110-00-765-4144                   | Blade, Craftsman's Knife: Stencil<br>(99941) 16         | pk         |
|                       | C            | 5110-00-355-6138                   | Blade, Craftsman's Knife: Swivel<br>(7981 9) Q5-0841 -2 | ea         |
| 6                     | C            | 6850-00-592-3283                   | Cleaner, Lens   | bk         |
|                       | C            | 6850-01-007-8073                   | Cleaning Concentrate<br>(75364) 3068                    | bt         |
|                       | C            | 7510-00-161-4291                   | Clip, Paper<br>(79829) P2-72620                         | bx         |
| 7                     | C            | 8305-00-222-2423                   | Cloth, Cheesecloth                                      | yd         |
| 8                     | C            | 7930-00-530-8067                   | Detergent, General Purpose                              | gl         |
| 9                     | C            |                                    | Developer Cleaner<br>(19139) 101-3259                   | pg         |
| 10                    | C            | 6750-01-036-9582                   | Developer, Photographic                                 | pg         |

## Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST-Cont

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description  | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
|                       | C            | 7520-00-2851772                    | Dispenser, Pressure Sensitive<br>Adhesive Tape<br>(79819) C-22          | ea         |
|                       | C            |                                    | Film, Photographic: duplicating<br>reproduction<br>(19139) 120-2449     | bx         |
| 11                    | C            | 6750-00-802-5471                   | Fixing Bath, Photographic   | pg         |
| 12                    | C            | 6750-00-037-9099                   | Fixer/Wash System Cleaner   | bt         |
| 13                    | F            | 5610-00-618-0258                   | Floor Patch   | gl         |
| 14                    | C            | 7930-00-664-6910                   | Glass Cleaner   | co         |
|                       | C            | 8415-00-248-3228                   | Gloves, Disposable<br>(80011) 11-394-1 10B                              | bx         |
| 15                    | O            | 9150-00190-0904                    | Grease, GAA   | lb         |
|                       | C            | 8520-00-965-2109                   | Hand Cleaner<br>(06608) 224200  | lb         |
| 16                    | F            |                                    | Heat Transfer Compound<br>(01139) G643                                  | tu         |
|                       | C            | 7510-01-028-2877                   | Ink Drawing: for drafting film<br>(79819) 3080-F1                       | bt         |
|                       | C            | 7510-01-070-8947                   | Ink Drawing: for paper and cloth<br>(79819) 3084-F                      | bt         |
|                       | C            |                                    | Lamp, Fluorescent: red<br>(93791) EY8                                   | ea         |
|                       | C            |                                    | Lamp, Fluorescent: white<br>(93791)VE186                                | ea         |
|                       | C            | 7510-00-281-2143                   | Lead, Pencil, Graphite: artist's<br>and drafting; HB<br>(79819) 2200-HB | bx         |
|                       | C            | 7510-00-285-5865                   | Lead, Pencil, Graphite: artist's<br>and drafting; F<br>(79819) 2200-F   | bx         |

Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST - Cont

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description  | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
|                       | C            | 7510-00-285-5863                   | Lead, Pencil, Graphite: artist's and drafting; 2H<br>(7981 9) 2200-2H | bx         |
|                       | C            | 7510-00-285-5864                   | Lead, Pencil, Graphite: artist's and drafting; 4H<br>(79819) 2200-4H  | bx         |
|                       | C            | 7510-00-285-5866                   | Lead Pencil, Graphite H<br>(79819) 2200-H                             | bx         |
|                       | C            | 7510-00-285-5862                   | Lead, Pencil, Graphite: HB<br>(8D190) U2-F370-HB                      | pg         |
|                       | C            | 7510-00-285-5847                   | Lead, Pencil, Graphite: 2H<br>(8D190) U2-F350-2H                      | pg         |
|                       | C            | 7510-00-272-9820                   | Lead Pencil, Graphite: 3H<br>(79819) 2200-3H                          | bx         |
| 17                    | C            | 6640-00-597-6715                   | Lens Tissue   | bk         |
|                       | O            | 8315-01-163-1556                   | Needle, Dressmaker's<br>(02187) H1, size 10                           | pk         |
| 18                    | F            | 9150-00-273-2389                   | Oil, Lubricating, General Purpose                                     | cn         |
| 19                    | C            | 9150-00-189-6727                   | Oil, Lubricating, 10 WT   | qt         |
| 20                    | O            | 9150-00-240-2235                   | Oil, Lubricating, Grade M   | pt         |
| 21                    | O            |                                    | Oil, Lubricating, 20 WT, Nondetergent<br>(19139) TL2199               |            |
|                       | C            | 7530-00-285-3083                   | Pad, Writing Paper<br>(8D190)M9-21-112                                | pg         |
|                       | C            | 7240-00-060-6006                   | Pail, Utility<br>(05668) 6270-10                                      | ea         |
| 22                    | O            | 8010-01-131-6254                   | Paint, Black  | kt         |
| 22A                   | O            | 8010-01-160-6745                   | Paint, Brown  | kt         |
| 22B                   | O            | 8010-01-162-5578                   | Paint, Green  | kt         |
| 23                    | O            | 8010-00-298-3859                   | Paint, Light Green, INT.  | gl         |



Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST-Cont

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description  | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
| 24                    | C            | 5350-00-619-9166                   | Paper, Abrasive   | pk         |
|                       | C            | 6750-00-316-2509                   | Paper, Dry Silver, Photographic:<br>(94862) 7742, Dry Silver, 8.5 x<br>11.0 in.               | bx         |
|                       | C            | 6750-00-255-0465                   | Paper, Photographic: AZO paper type;<br>F2 surface and contrast<br>(19139) 142-0306           | bx         |
|                       | C            | 6750-00-998-0556                   | Paper, Photographic: AZO paper type;<br>F3 surface and contrast<br>(19139) 142-1064           | bx         |
|                       | C            | 6750-00-924-5465                   | Paper, Photographic: Kodabromide<br>paper type; F2 surface and contrast<br>(19139) 143-6922   | bx         |
|                       | C            | 6750-00-9654841                    | Paper, Photographic: Kodabromide<br>paper type; F3 surface and contrast<br>(19139) 143-7706   | bx         |
|                       | C            |                                    | Paper, Photographic: Kodabromide<br>paper type; F2 surface and contrast<br>(19139) 143-7029   | bx         |
|                       | C            |                                    | Paper, Photographic: Kodabrome II<br>paper type; N-H surface and contrast<br>(19139) 192-3473 | bx         |
|                       | C            | 6750-01-028-6741                   | Paper, Photographic: Kodabrome II<br>paper type; N-H surface and contrast<br>(19139) 138-6325 | bx         |
|                       | C            |                                    | Paper, Photographic: N-3H surface<br>and contrast<br>(19139) 192-3978                         | bx         |
|                       | C            |                                    | Paper, Photographic: N-M surface<br>and contrast<br>(19139) 193-3580                          | bx         |
|                       | C            |                                    | Paper, Photographic: N-UH surface<br>and contrast<br>(19139) 193-6378                         | bx         |

**Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST - Cent**

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description  | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
|                       | C            | 7520-01-083-6734                   | Pencil, Mechanical<br>(79819)5611                                 | ea         |
|                       | O            | 8010-01-193-0520                   | Primer  | kt         |
| 25                    | O            | 7920-00-205-1711                   | Rags  | be         |
|                       | C            | 7510-00-543-6792                   | Refill, Ball Point Pen<br>(79819) VER-4                           | dz         |
| 26                    | F            | 8010-01-030-7254                   | Resin, Epoxy  | kt         |
| 27                    | C            | 7590-00-286-6993                   | Roller Cleaner  | bt         |
|                       | C            | 7510-00-243-3435                   | Rubber Band<br>(25472) 8366-64                                    | bx         |
| 28                    | O            | FSCM 39428                         | Screen, Nylon (P/N 1017A31)                                       | r0         |
| 29                    | O            | 8040-00-851-0211                   | Sealant, Silicone   | tu         |
| 30                    | O            | 3439-00-555-4629                   | Solder, Rosin Core  | ea         |
| 31                    | O            | 6850-00-274-5421                   | Solvent, P-D-680  | cn         |
| 32                    | C            | 7920-00-240-2555                   | Sponge  | ea         |
| 33                    | C            | 6850-00-880-1013                   | Spray, Silicone   | cn         |
| 34                    | O            | FSCM 39428                         | Sprayfoam Sealant (P/N 7627T1 )                                   | cn         |
|                       | C            | 7520-00-281-5895                   | Stapler, Paper Fastening, Office<br>(8D190) X8-27, grey           | ea         |
|                       | C            | 7510-00-272-9662                   | Staples, Paper Fastening,<br>Office Type<br>(8D190) 8-SF4-5M      | bx         |
|                       | C            | 6740-00-488-4561                   | Tank, Mixing, Photographic Chemical<br>Solution:<br>(08212) PRT-5 | ea         |
| 35                    | O            | 5640-00-103-2254                   | Tape, Cloth, Duct Sealing, 2 in.                                  | ro         |
| 36                    | O            | 5970-00-419-4290                   | Tape, Insulation, Electric  | ea         |

## Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST - Cont

| (1)<br>Item<br>Number | (2)<br>Level | (3)<br>National<br>Stock<br>Number | (4)<br>Description                                | (5)<br>U/M |
|-----------------------|--------------|------------------------------------|---|------------|
| 37                    | C            | 7510-00-551-9824                   | Tape, Pressure Sensitive Adhesive:<br>transparent | ro         |
|                       | C            | 7510-00-285-6403                   | Tape, Pressure Sensitive Adhesive:<br>red         | ro         |
|                       | C            | 7510-00-198-5831                   | Tape, Pressure Sensitive Adhesive:<br>opaque      | ro         |
|                       | O            | 8300-00-999-6313                   | Thread Sealant                                    | tu         |
|                       | C            | 7510-00-272-6887                   | Thumbtack:<br>(79819) V6-53                       | hd         |
|                       | C            | 7920-00-823-9772                   | Towel, Paper:<br>(95135)DW61-1000-22              | mx         |



## GLOSSARY

| ABBREVIATION/TERM                 | DEFINITION   |
|-----------------------------------|--|
| Actuator . . . . .                | Mechanism for moving or controlling something indirectly instead of by hand.                                 |
| Amplitude. . . . .                | Maximum departure of the value of an alternating current or wave from the average value.                     |
| Angstrom . . . . .                | Unit of wave length of light equal to one ten-billionth of a meter.  |
| APL . . . . .                     | Automatic Platen Lifter.   |
| Automatic Platen Lifter . . . . . | Motor-driven mechanism that raises and lowers the hood.  |
| Cathode Ray Tube . . . . .        | Vacuum tube in which an electron beam is projected on a fluorescent screen to produce a bright spot.         |
| CRT . . . . .                     | Cathode Ray Tube.  |
| Chopper Inverter . . . . .        | Device that interrupts direct current at short regular intervals and converts it to an alternating current.  |
| Dodging. . . . .                  | Process of holding back light from certain areas of a sensitized surface to avoid overprinting those areas.  |
| Enhancement. . . . .              | Increase density and contrast of a photographic image by chemical treatment.                                 |
| EXP . . . . .                     | Exposure.  |
| Fast Axis Control Loop . . . . .  | Controls speed at which a spot of light sweeps in horizontal direction.                                      |
| FC . . . . .                      | Footcandle. A unit for measuring illumination.   |
| Latitude . . . . .                | Range of exposures within which a film or plate will produce a negative or positive of satisfactory quality. |
| Linear Signal . . . . .           | Output that is directly proportional to its input.   |

**GLOSSARY - Cont**

| ABBREVIATION/TERM                      | DEFINITION  |
|--|---|
| Logarithmic Amplifier . . . . .        | Amplifier with a constant output level with input signal level either increasing, decreasing, or remaining constant.                                      |
| Modulation . . . . .                   | Process of varying the amplitude, frequency, or phase of a carrier or signal.   |
| Neutral Density Filter . . . . .       | Increases contrasts.  |
| Ortho-Safelight . . . . .              | Illumination that will not register on orthochromatic film.   |
| Paper Core Adapter . . . . .           | Hub which permits different diameter cores to be used.  |
| Phosphor . . . . .                     | Substance that emits light when excited by radiation.   |
| Photomultiplier Tube . . . . .         | Electron multiplier in which electrons released by photoelectric emission are multiplied in successive stages by dynodes that produce secondary emission. |
| PMT. . . . .                           | Photomultiplier Tube.   |
| Potentiometer . . . . .                | Device for measuring and controlling electromotive forces.  |
| Raster control Potentiometer . . . . . | Allows individual selection of raster edge position by varying resistance.  |
| Roll Paper Transport . . . . .         | Automatically advances paper when hood is raised.   |
| RPT. . . . .                           | Roll Paper Transport.   |
| Run/Stop Flip-Flop . . . . .           | Multivibrator capable of assuming either of two stable states.  |
| Slow Axis Control Loop . . . . .       | Determines number of lines to expose entire negative and spacing between lines.   |
| Spectral Emission . . . . .            | Array of components of emission or wave separated and arranged in order of some varying characteristic, such as wave length mass or energy.               |

GLOSSARY - Cont

| ABBREVIATION/TERM             | DEFINITION  |
|-------------------------------|---|
| Staircase Current . . . . .   | Series of step currents whose overall waveform resembles a staircase.   |
| Step Wedge Negative . . . . . | Strip of film whose transparency diminishes in graduated steps from one end to the other. Used to determine density of photographic copy. |
| Velocity . . . . .            | Time rate of linear motion in a given direction.  |





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DOD 314



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U S ARMY TROOP SUPPORT COMMAND  
ATTN: AMSTR-MCTS  
4300 GOODFELLOW BOULEVARD  
ST. LOUIS, MO 63120-1798

TEAR ALONG PERFORATED LINE

# The Metric System and Equivalents

## Linear Measure

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

## Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigram = .035 ounce  
 1 dekagram = 10 grams = .35 ounce  
 1 hectogram = 10 dekagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

## Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

## Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

## Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

| To change     | To                 | Multiply by | To change          | To            | Multiply by |
|---------------|--------------------|-------------|--------------------|---------------|-------------|
| inches        | centimeters        | 2.540       | ounce-inches       | newton-meters | .007062     |
| feet          | meters             | .305        | centimeters        | inches        | .394        |
| yards         | meters             | .914        | meters             | feet          | 3.280       |
| miles         | kilometers         | 1.609       | meters             | yards         | 1.094       |
| square inches | square centimeters | 6.451       | kilometers         | miles         | .621        |
| square feet   | square meters      | .093        | square centimeters | square inches | .155        |
| square yards  | square meters      | .836        | square meters      | square feet   | 10.764      |
| square miles  | square kilometers  | 2.590       | square meters      | square yards  | 1.196       |
| acres         | square hectometers | .405        | square kilometers  | square miles  | .386        |
| cubic feet    | cubic meters       | .028        | square hectometers | acres         | 2.471       |
| cubic yards   | cubic meters       | .765        | cubic meters       | cubic feet    | 35.315      |
| fluid ounces  | milliliters        | 29.573      | cubic meters       | cubic yards   | 1.308       |
| pints         | liters             | .473        | milliliters        | fluid ounces  | .034        |
| quarts        | liters             | .946        | liters             | pints         | 2.113       |
| gallons       | liters             | 3.785       | liters             | quarts        | 1.057       |
| ounces        | grams              | 28.349      | liters             | gallons       | .264        |
| pounds        | kilograms          | .454        | grams              | ounces        | .035        |
| short tons    | metric tons        | .907        | kilograms          | pounds        | 2.205       |
| pound-feet    | newton-meters      | 1.356       | metric tons        | short tons    | 1.102       |
| pound-inches  | newton-meters      | .11296      |                    |               |             |

## Temperature (Exact)

|    |                        |                            |                     |    |
|----|------------------------|----------------------------|---------------------|----|
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |
|----|------------------------|----------------------------|---------------------|----|

