

**TECHNICAL MANUAL**

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

**TOPOGRAPHIC SUPPORT SYSTEM  
COMPILATION SECTION  
MODEL ADC-TSS-5  
NSN: 6675-01-105-5755**

**THIS MANUAL SUPERSEDES TM 5-6675-317-14 DATED 15 JUNE 1983**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**4 APRIL 1985**



**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).

For Artificial Respiration refer to FM 21-11.

**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.

**WARNING**

Ensure power switch for equipment is OFF prior to turning any circuit breaker ON or OFF.



CHANGE  
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Operator, Organizational, Direct Support and  
General Support Maintenance Manual

**TOPOGRAPHIC SUPPORT SYSTEM  
COMPILATION SECTION  
MODEL ADC-TSS-5  
NSN 6675-01-105-5755**

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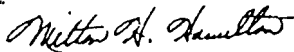
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Operator, Organizational, Direct Support and  
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Operator, Organizational, Direct Support and  
General Support Maintenance Manual

TOPOGRAPHIC SUPPORT SYSTEM  
COMPILATION SECTION  
MODEL ADC-TSS-5  
NSN: 6675-01-105-5755

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D-1/D-2  
E-1 through E-5/E-6

**TM 5-6675-317-14**  
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**OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT  
AND  
GENERAL SUPPORT MAINTENANCE MANUAL**

**COMPILATION SECTION**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

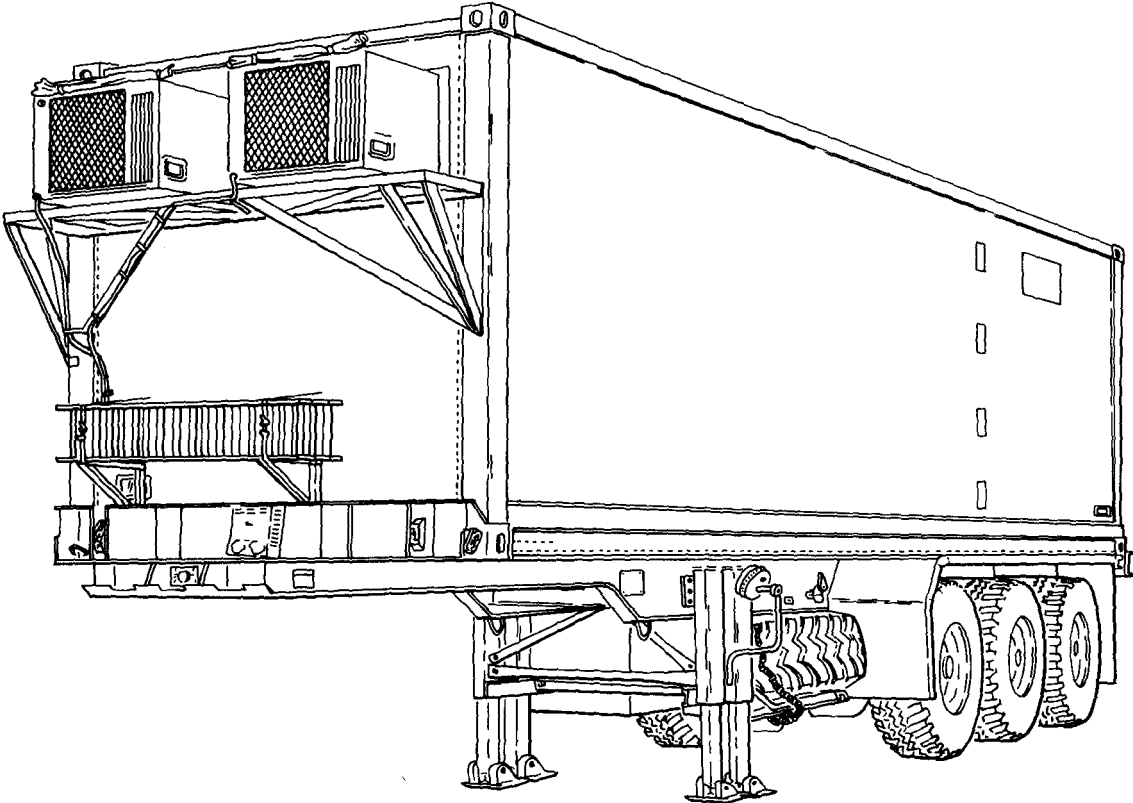
You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop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

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## CHAPTER 1

## COMPI LATION SECTION

## Section I INTRODUCTION

## 1-1. GENERAL INFORMATION.

1-1.1 Scope. This manual contains operating and maintenance instructions for the ADC-TSS-05, Compilation Section, Topographic Support System (TSS). The purpose of the Compilation Section is to provide scribing material, manuscripts, annotated photos, and overlay/overprint material. The trailer chassis is covered in TM 5-2330-305-14, Operator, Organizational, Direct Support and General Support Maintenance Manual, Topographic Support System, Chassis, Semi trailer, ISO Container Transporter. Repair parts and special tools are listed in TM 5-6675-317-24P, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List, Compilation Section, Topographic Support System. Lubrication instructions are contained in LO 5-6675-317-12, Lubrication Order, Compilation 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 preparation of scribing material, manuscripts, annotated photos, and overlay/overprint material.

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. Reporting Equipment Improvements (EIR's). If the Compilation 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-QX, 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 the 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.

1-1.7 Hand Receipt (-HR) Manual. This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). TM 5-6675-317-14-HR consists of preprinted hand receipts (DA Form 2062) that list end item-related equipment (i.e., Components of End Item, Basic Issue Items, and Additional Authorization Lists) for which you must account. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2: The U.S. Army Adjutant General Publications Center, 2800 Eastern Blvd, Baltimore, MD 21220.

## 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.

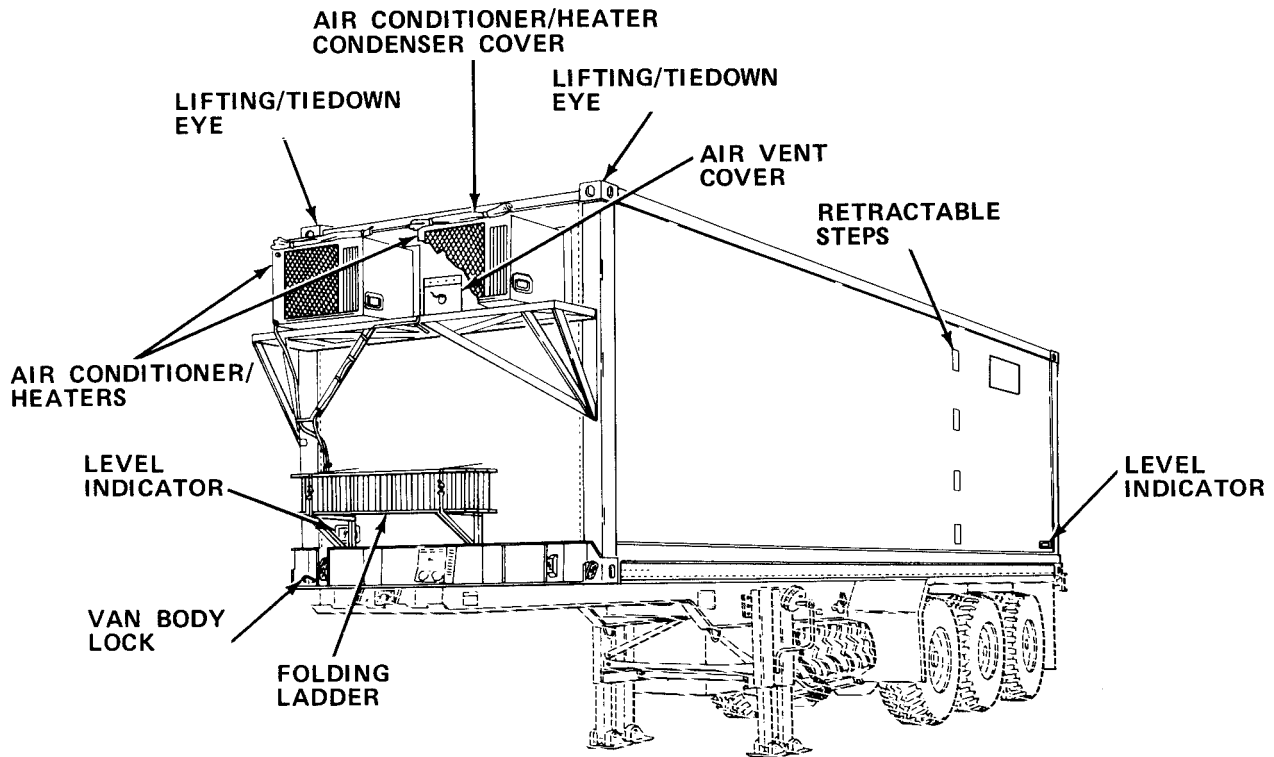
### 1-2.2 Special Considerations.

- 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 section.

**AIR CONDITIONER/HEATER CONDENSER COVERS.** 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.

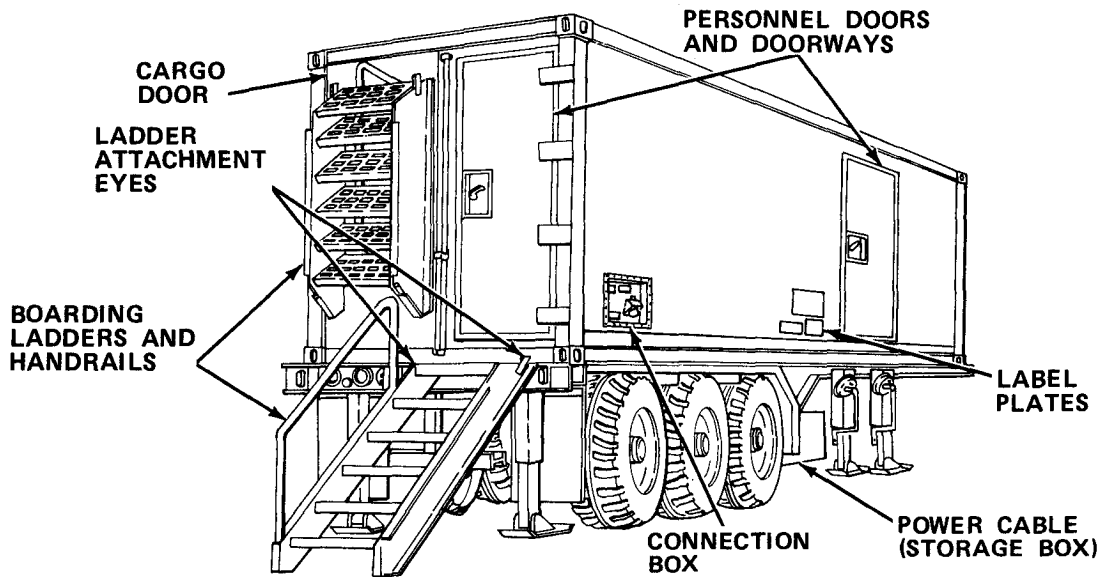
**RETRACTABLE STEPS.** Provide access to roof.

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

**LEVEL INDICATORS.** Indicates section inclination.

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

b. Curbside exterior.



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

**PERSONNEL DOORS.** Door is 35.75 in. (90.8 cm) wide by 86 in. (218.4 cm) high.

**PERSONNEL DOORWAYS.** Doorway is 30.75 in. (78.1 cm) wide by 78.5 in. (199.4 cm) high.

**LABEL PLATES.** Provides 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 grounding cable, power cables, and telephone lines.

**LADDER ATTACHMENT EYES.** Attachment points for boarding ladder.

**BOARDING LADDERS AND HANDRAILS.** Provide access to section.

c. Interior.

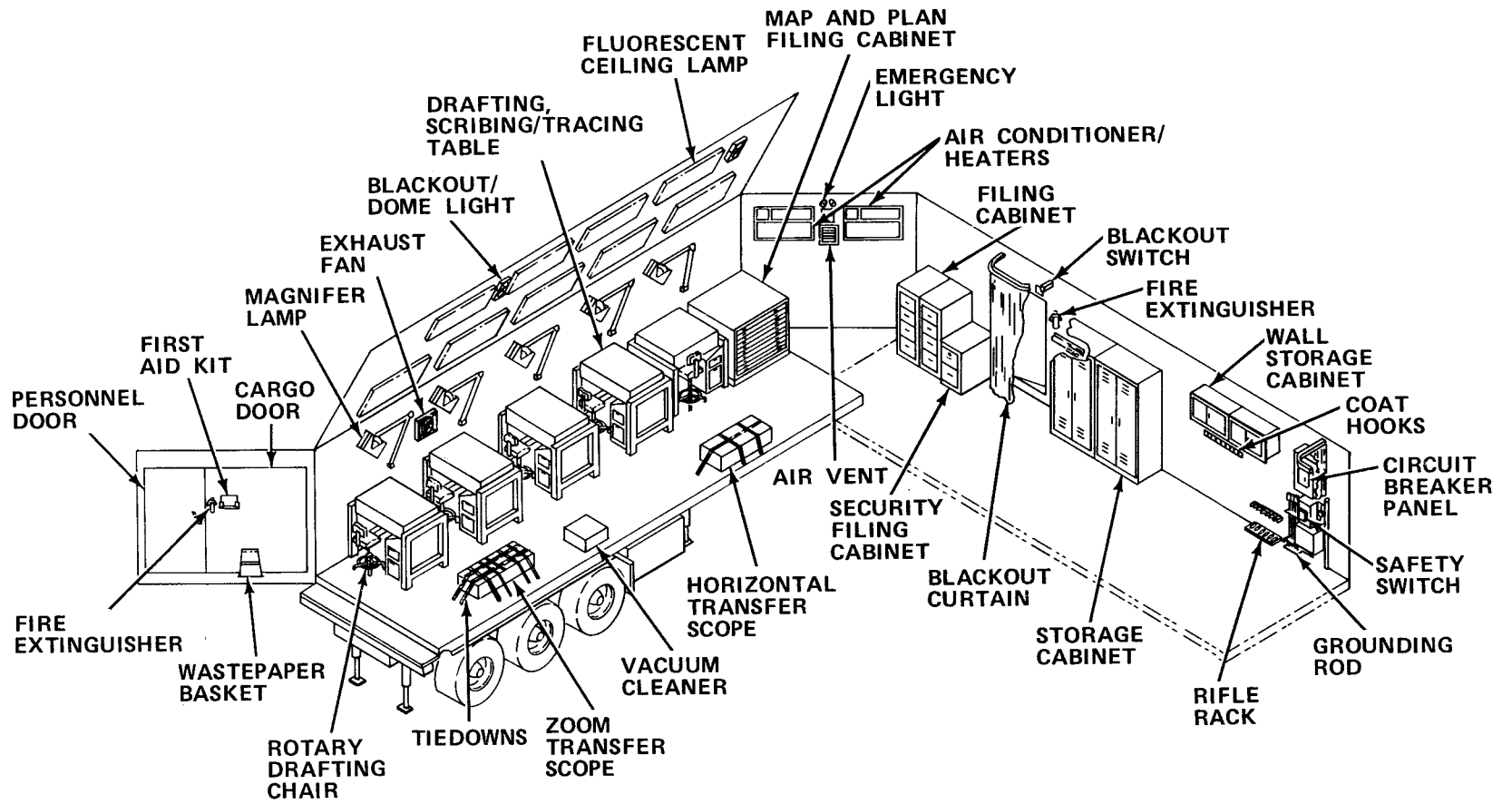
**PERSONNEL DOOR.** Weatherproof fitted with blackout switch.

**FIRST AID KIT.** Limited first aid supplies.

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

**MAGNIFIER LAMP.** Provides illumination and magnification for light table workstation.

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



**TM 5-6675-317-14**

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

DRAFTING, SCRI BING/TRACI NG TABLE. Illuminated tracing board. Turns over for draft-  
ing board.

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

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

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

AIR CONDITIONERS/HEATERS. Internal environmental control.

FILING CABINET. Storage.

BLACKOUT SWITCH. Turns ceiling lights off when activated.

FIRE EXTINGUISHER. Dry-chemical fire extingui sher.

STORAGE CABINET. Storage.

WALL STORAGE CABINET. Storage.

COAT HOOKS. Storage.

**CIRCUIT BREAKER PANEL. Circuit breakers with phase test indicator.**

SAFETY SWITCH. Main power safety disconnect switch.

GROUNDING ROD. Electrical ground for section.

RIFLE RACK. Weapon storage.

BLACKOUT CURTAIN. Lightproof cover for personnel door.

SECURITY FILING CABINET. Securi ty storage.

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

HORI ZONTAL TRANSFER SCOPE. Storage for transport.

VACUUM CLEANER. Cleani ng equi pment.

ZOOM TRANSFER SCOPE. Storage for transport.

TIEDOWNS. Stored inside storage cabinet when not in use.

ROTARY DRAFTING CHAIR. Adj ustabl e-hei ght chai r.

WASTEPAPER BASKET. Storage for transport.

FIRE EXTINGUISHER. Dry-chemi cal fi re extingui sher.

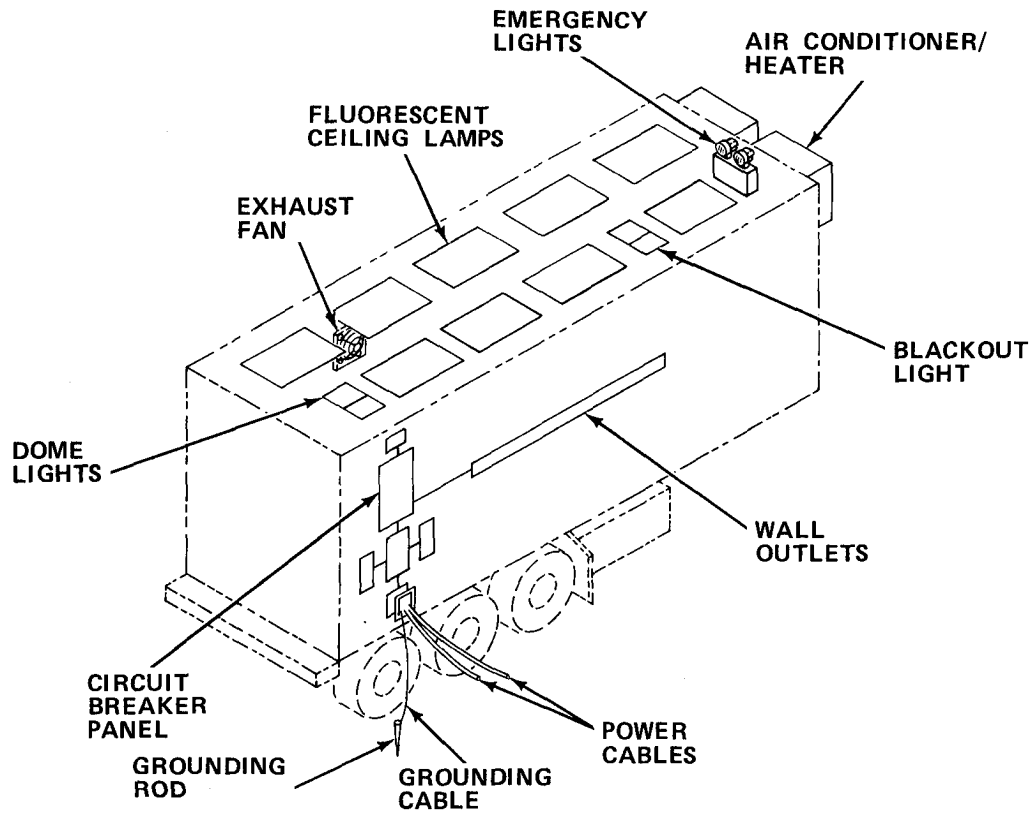
1-2.4 Equipment Data - ISO Container (Unmounted).

Dimensions	
Length	33.66 ft (10.26 m)
Width	8 ft (2.44m)
Height	8 ft (2.44m)
Cubage	2154 ft <sup>3</sup> (61.0 m <sup>3</sup> )
Connections	
Telephones	One Telephone (Three-Post) Connection
Power	16.5 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) Each
Heating	14,300 Btu/hr (4190 W) (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)	25,390 lbs (11,514.37 kg)
Tare (Container Only)	13,950 lbs (6326.33 kg)

1-3. TECHNICAL PRINCIPLES OF OPERATION.

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

1-3.2 Electrical System.



GROUNDING ROD. Used to ground section.

GROUNDING CABLE. Used with grounding rod.

CIRCUIT BREAKER PANEL. Contains voltage indicator, phase monitor, and 13 circuit breakers.

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.

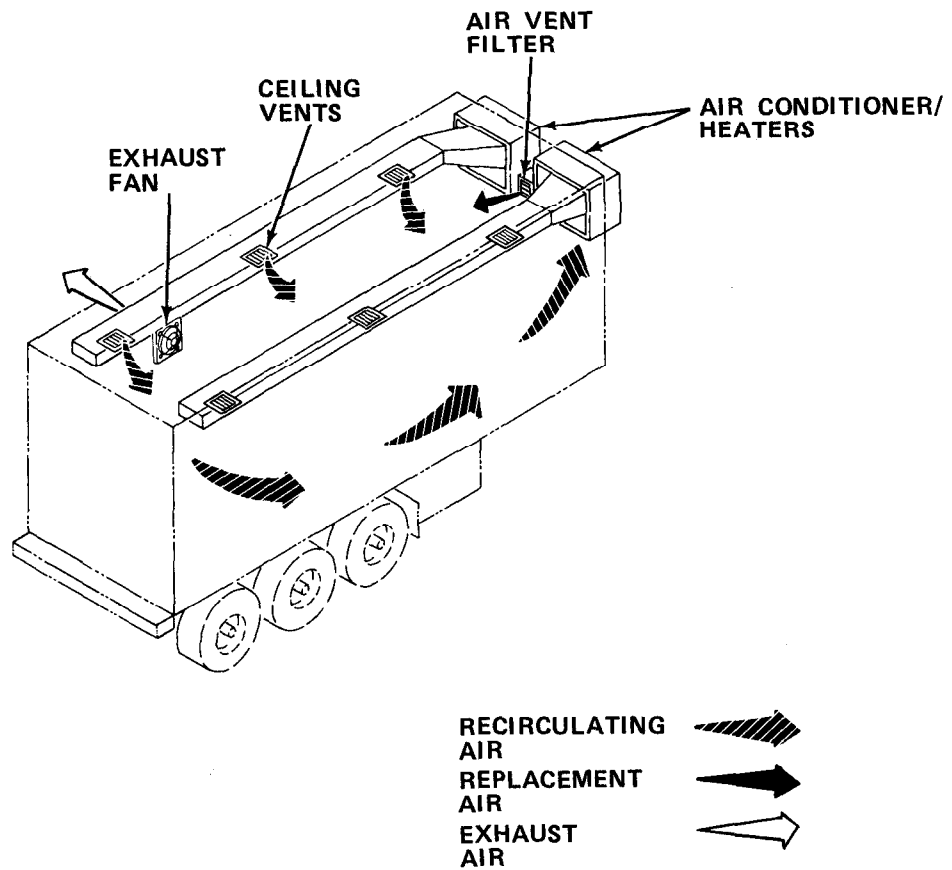
BLACKOUT LIGHTS. Red-lensed, 12 V ac lights actuated when blackout switch operates.

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

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.



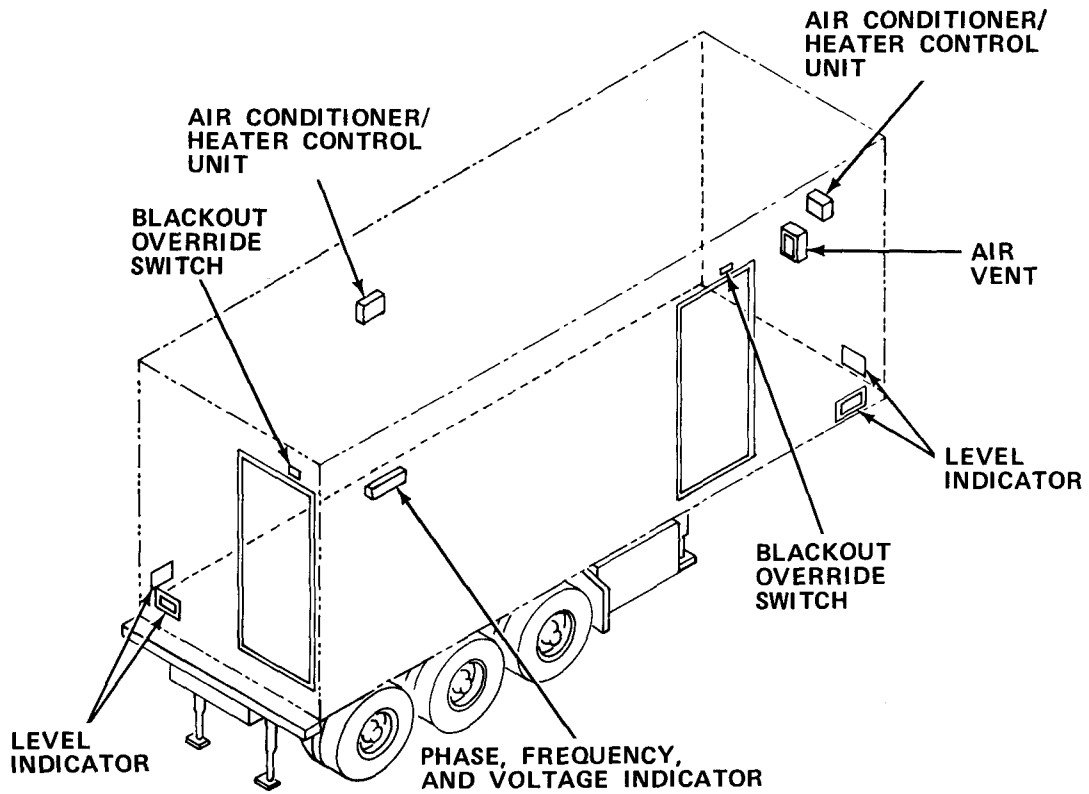
Exhaust fan exhausts air. Replacement air flows into the section through the air vent filter. Recirculating air is filtered as it enters the air conditioners/heaters. From the air conditioners/heaters, it flows through the ceiling vents and into the section.

**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	Turns off illumination when door is 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 section.



## 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. 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>
Wire Brush	1 ea
6 in. Adjustable Wrench	1 ea
Flat Tip Screwdriver	1 ea
Vacuum Cleaner	1 ea
Cheesecloth (Item 16, Appendix E)	ar
General Purpose Detergent (Item 18, Appendix E)	ar
Paint (Item 47, Appendix E)	ar
Paint Brushes	ar



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  PROCEDURE	For Readiness Reporting, Equipment is Not Ready/Available If:
1	B	<p><u>VAN BODY</u></p> <p>Inspect Exterior - Cont</p> <p style="text-align: center;"><u>WARNING</u></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>3. Inspect power cable assembly for dirt or damaged connectors.</p> <p>a. Wipe cable insulation with clean dry cloth to remove dirt.</p> <p>b. Clean corrosion from terminals.</p>	Connector damaged.

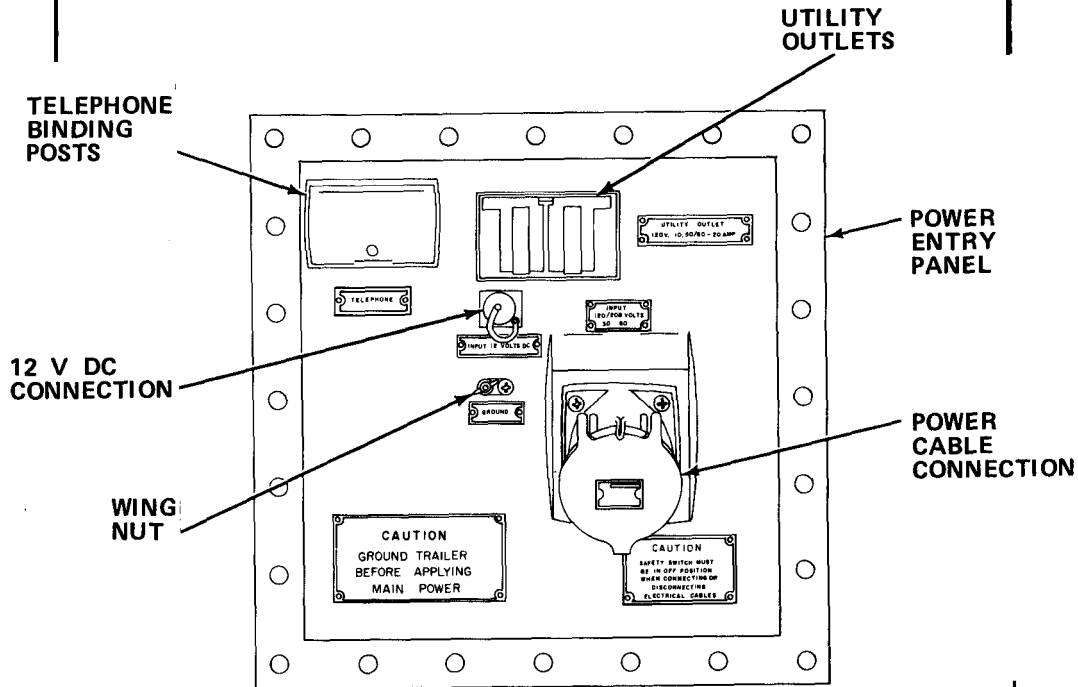


Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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

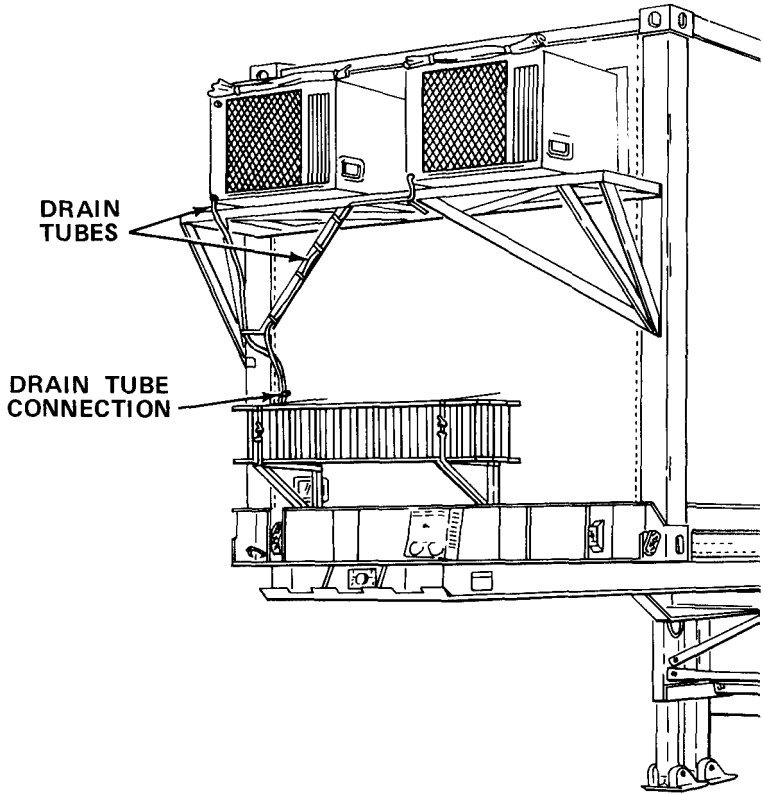
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment is Not Ready/ Available If:
1		<p><u>VAN BODY</u></p> <p>Inspect Exterior - Cont</p> <p>B/W 4. Inspect power entry panel for accumulated dirt, water, or corrosion. Clean power entry panel.</p> <p>B/W 5. Inspect power entry panel to be sure any unused receptacles are covered.</p>  <p>B/W 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>	<p>Missing covers.</p>

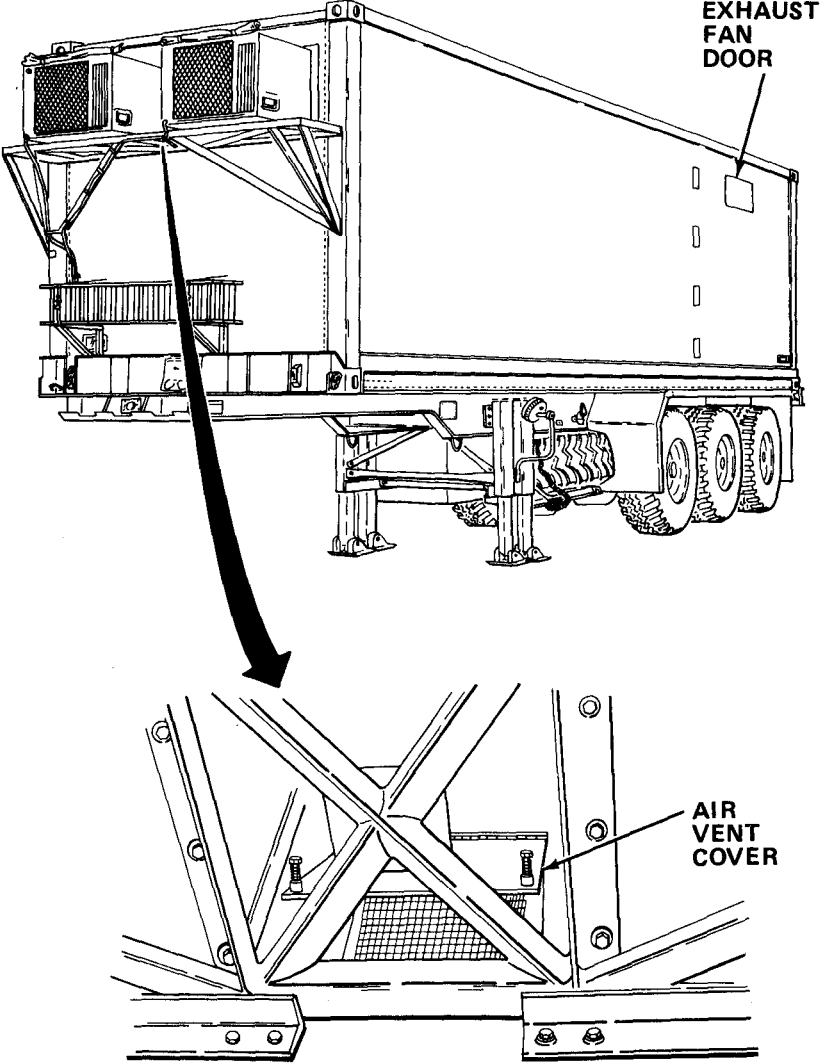
Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semi annually  
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1		<p><u>VAN BODY</u></p> <p><u>Inspect Exterior - Cont</u></p>  <p>EXHAUST FAN DOOR</p> <p>AIR VENT COVER</p> <p>B/W</p> <p>7. Inspect exhaust fan door 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**

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ITEM No.	INTER-VAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B/W	<p><b><u>VAN BODY</u></b></p> <p>Inspect Exterior - Cont</p> <p>8. Visually inspect ground connections to be sure grounding cable is connected to terminal lug and grounding rod. If necessary, clean:</p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p style="text-align: center;">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 grounding lug from grounding rod.</p> <p>c. Clean lug, cable end, and rod with wire brush.</p> <p>d. Reconnect grounding cable lug to rod.</p> <p>e. Disconnect grounding cable end from entry panel.</p> <p>f. Clean terminal and cable end with wire brush.</p> <p>g. Reconnect grounding cable to entry panel.</p> <p>h. Reconnect cable to power source. Turn power on.</p>	Grounding 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.
	B/D /A	<p>10. Inspect front and rear van body locks to be sure locks are fully engaged.</p>	Lock disengaged.

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

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ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<u>VAN BODY</u>			
1	<u>Inspect Exterior - Cont</u>		
	Q	11. Inspect gaskets on personnel doors for leaks or damage.	
	W	11.1 Inspect hinges for proper placement of hinge pins.	Missinge 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 tubes. Replace as required.	
	W	5. Inspect walls, ceilings, 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.
	B/M /A	7. Inspect fire extinguishers. Check that security seals are not broken.	Fire extinguisher is missing or seals are broken.
	Q	8. Inspect circuit breaker panel.	Circuit breaker is defective.





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

B - Before                      W - Weekly                      AN - Annually                      (Number) - Hundreds of Hours  
 D - During                      M - Monthly                      S - Semiannually  
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ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:	
1		<b><u>VAN BODY</u></b>		
		<u>Inspect Exterior - Cont</u>		
	Q	11. Inspect gaskets on personnel doors for leaks or damage.		
	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 tubes. Replace as required.		
W		5. Inspect walls, ceilings, 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.		
B/M /A	7. Inspect fire extinguishers. Check that security seals are not broken.	Fire extinguisher is missing or seals are broken.		
Q	8. Inspect circuit breaker panel.	Circuit breaker is defective.		

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

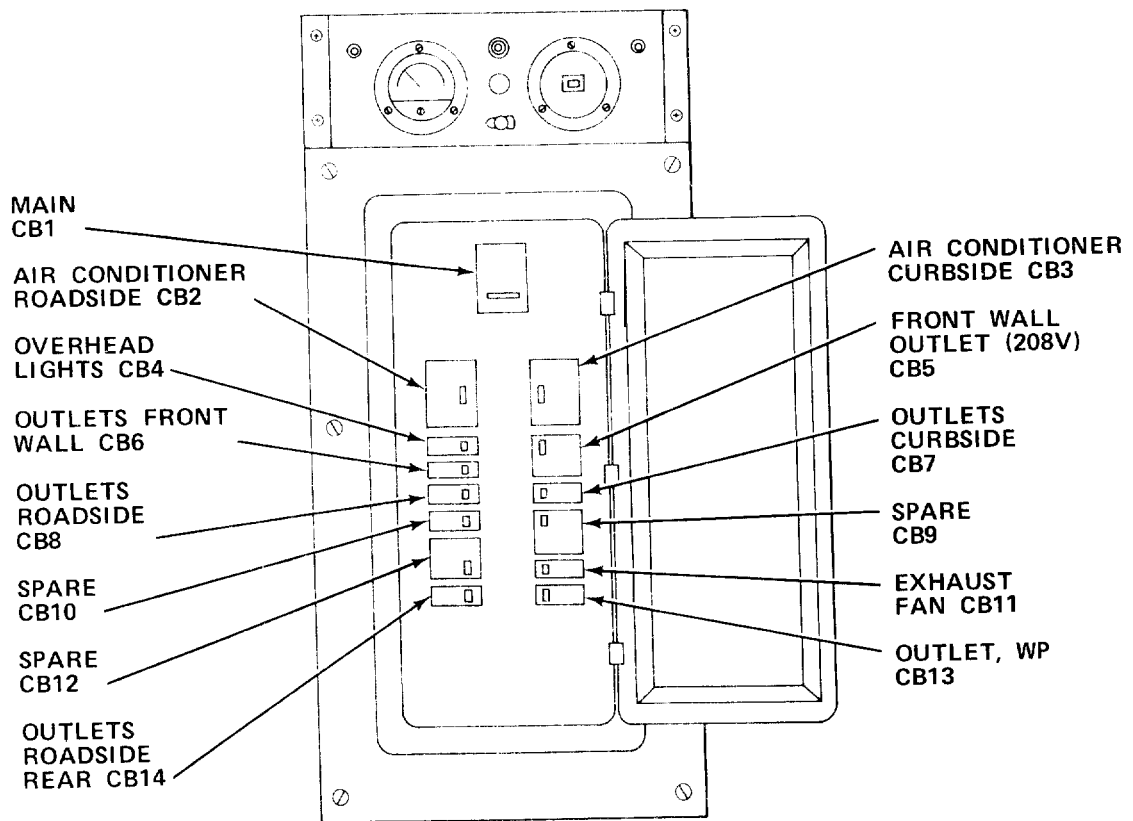
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ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2		VAN BODY	Inspect Interior - Cont.	
			NOTE	
			Inspection is to be conducted on a not-to-interfere basis with work being conducted. Individual equipment will be inspected as directed by the appropriate chapter of this manual.	



- a. Set main circuit breaker to ON.
- b. Set each circuit breaker to OFF, then ON.

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

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ITEM NO.	IN-VAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	Q	<p><u>VAN BODY</u></p> <p><u>Inspect Interior - Cent</u></p> <p>9* Inspect light traps.</p> <p>a. Turn on fluorescent lamps (high level).</p> <p>b. Close entrance doors. Have exhaust fan and air vent open. Inspect for light leakage through vents.</p> <p>c. Turn on light switches and blackout override switches off.</p> <p>d. Open door and make sure internal lights go off.</p> <p>10. Inspect/clean interior.</p> <p style="text-align: center;"><u>WARNING</u></p> <p>Death or serious injury may occur if wet or damp cloth is used to wipe or clean energized equipment, power cords, or cables.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Do not sweep interior. Dislodged dirt or dust will ruin optical, electronic, and photographic equipment and supplies.</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>Light leaks are present.</p> <p>Blackout system is inoperable.</p>

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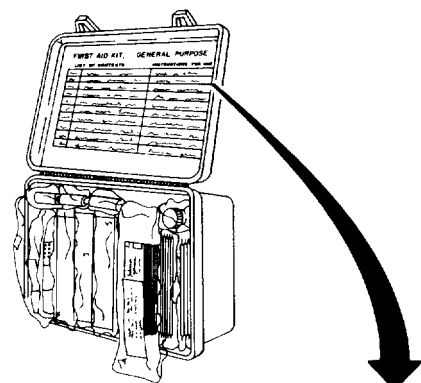
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2	S	<b><u>VAN BODY</u></b>	<u>Inspect Interior - Cont</u>																																											
		c. Vacuum interior of section to remove dirt and Wdste. Pay particular attention to work stations.																																												
		11. Inspect first aid kit.																																												
			<table border="1"> <thead> <tr> <th colspan="2">FIRST AID KIT, GENERAL PURPOSE</th> <th></th> </tr> <tr> <th>LIST OF CONTENTS</th> <th colspan="2">INSTRUCTIONS FOR USE</th> </tr> </thead> <tbody> <tr> <td>3 ROLLS</td> <td>ADHESIVE TAPE, SURGICAL, 1"x1½" YARDS</td> <td>USE FOR MINOR CUTS AND COLTHING REPAIR</td> </tr> <tr> <td>18 EACH</td> <td>BANDAGE, ADHESIVE, W"x3"</td> <td>MINOR CUTS, AS REQUIRED</td> </tr> <tr> <td>2 EACH</td> <td>BANDAGE, GAUZE, COMPRESSED, CAMOUFLAGED, 3"x6" YARDS</td> <td>CUT IN LENGTHS AS REQUIRED FOR BANDAGE INJURIES</td> </tr> <tr> <td>1 EACH</td> <td>BANDAGE, MUSLIN, COMPRESSED, CAMOUFLAGED, 37X37X52 INCH</td> <td>USE FOR SLING</td> </tr> <tr> <td>1 PKG</td> <td>BLADE, SURGICAL PREPARATION RAZOR, STRAIGHT, SINGLE EDGE, 5¢</td> <td>SHAVING HAIR AND OPENING WOUNDS AS REQUIRED</td> </tr> <tr> <td>1 PKG</td> <td>COMPRESS AND BANDAGE, CAMOUFLAGED, 2"x2", 4¢</td> <td>FOR WOUNDS</td> </tr> <tr> <td>3 EACH</td> <td>DRESSING, FIRST AID, FIELD, 4X7 INCHES</td> <td>FOR LARGE WOUNDS, EXCESSIVE BLEEDING</td> </tr> <tr> <td>1 EACH</td> <td>FIRST AID KIT, EYE DRESSING</td> <td>FOR EYE WOUNDS, SEE INSTRUCTIONS</td> </tr> <tr> <td>1 PKG</td> <td>GAUZE, PETROLATUM, 3" X36", 3¢</td> <td>FOR BURNS, APPLY PAD OVER BURN</td> </tr> <tr> <td>1 BTL</td> <td>POVIDONE, IODINE SOLUTION, ¼ OUNCE</td> <td>AS DISINFECTANT AND CLEANSER OF CUTS AND WOUNDS, APPLY BEFORE BANDAGING</td> </tr> <tr> <td>1 EACH</td> <td>AMMONIA INHALANTS</td> <td>CRUSH INHALANT BETWEEN FINGERS. HOLD A FEW INCHES FROM NOSE. HOLD CLOSER AS AMMONIA GETS WEAKER. WHEN TOO WEAK, USE FRESH INHALANT.</td> </tr> <tr> <td>1 EACH</td> <td>INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS</td> <td></td> </tr> </tbody> </table>	FIRST AID KIT, GENERAL PURPOSE			LIST OF CONTENTS	INSTRUCTIONS FOR USE		3 ROLLS	ADHESIVE TAPE, SURGICAL, 1"x1½" YARDS	USE FOR MINOR CUTS AND COLTHING REPAIR	18 EACH	BANDAGE, ADHESIVE, W"x3"	MINOR CUTS, AS REQUIRED	2 EACH	BANDAGE, GAUZE, COMPRESSED, CAMOUFLAGED, 3"x6" YARDS	CUT IN LENGTHS AS REQUIRED FOR BANDAGE INJURIES	1 EACH	BANDAGE, MUSLIN, COMPRESSED, CAMOUFLAGED, 37X37X52 INCH	USE FOR SLING	1 PKG	BLADE, SURGICAL PREPARATION RAZOR, STRAIGHT, SINGLE EDGE, 5¢	SHAVING HAIR AND OPENING WOUNDS AS REQUIRED	1 PKG	COMPRESS AND BANDAGE, CAMOUFLAGED, 2"x2", 4¢	FOR WOUNDS	3 EACH	DRESSING, FIRST AID, FIELD, 4X7 INCHES	FOR LARGE WOUNDS, EXCESSIVE BLEEDING	1 EACH	FIRST AID KIT, EYE DRESSING	FOR EYE WOUNDS, SEE INSTRUCTIONS	1 PKG	GAUZE, PETROLATUM, 3" X36", 3¢	FOR BURNS, APPLY PAD OVER BURN	1 BTL	POVIDONE, IODINE SOLUTION, ¼ OUNCE	AS DISINFECTANT AND CLEANSER OF CUTS AND WOUNDS, APPLY BEFORE BANDAGING	1 EACH	AMMONIA INHALANTS	CRUSH INHALANT BETWEEN FINGERS. HOLD A FEW INCHES FROM NOSE. HOLD CLOSER AS AMMONIA GETS WEAKER. WHEN TOO WEAK, USE FRESH INHALANT.	1 EACH	INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS		
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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

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ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B/W	<p><u>VAN BODY</u></p> <p><u>Inspect Interior - Cent</u></p> <p>d. Inspect contents for damage. Then use check" ist 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>	Curtains damaged.
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;"><u>WARNING</u></p> <p style="text-align: center;">Electrical shock hazard.</p> <p>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 cab' e with electrical insulation tape.</li> <li>4. Reconnect power cable to entry panel.</li> </ol>	

**1-6. OPERATION UNDER USUAL CONDITIONS.** Operation of the compilation 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.

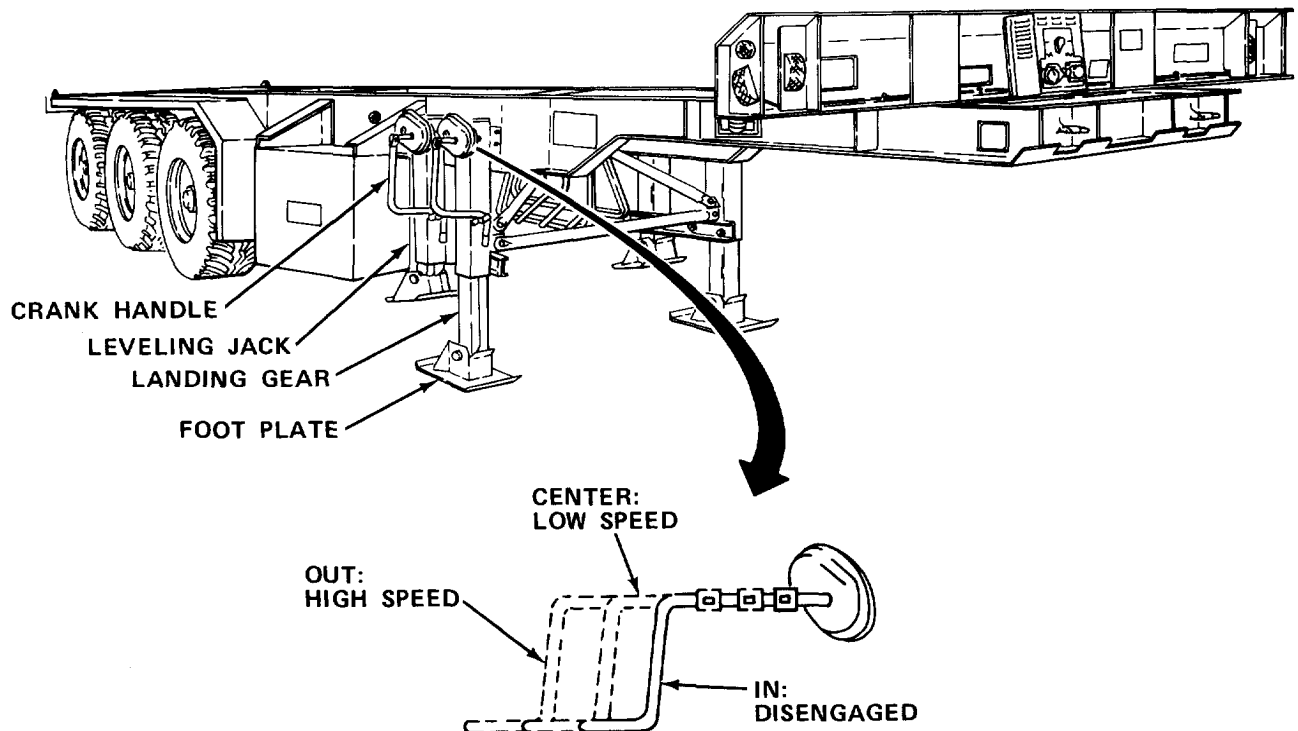
- a. Procedures for Leveling.

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 mud shoes from sinking into surface.
- Be sure that air suspension is deflated as indicated in TM 5-2330-305-14.



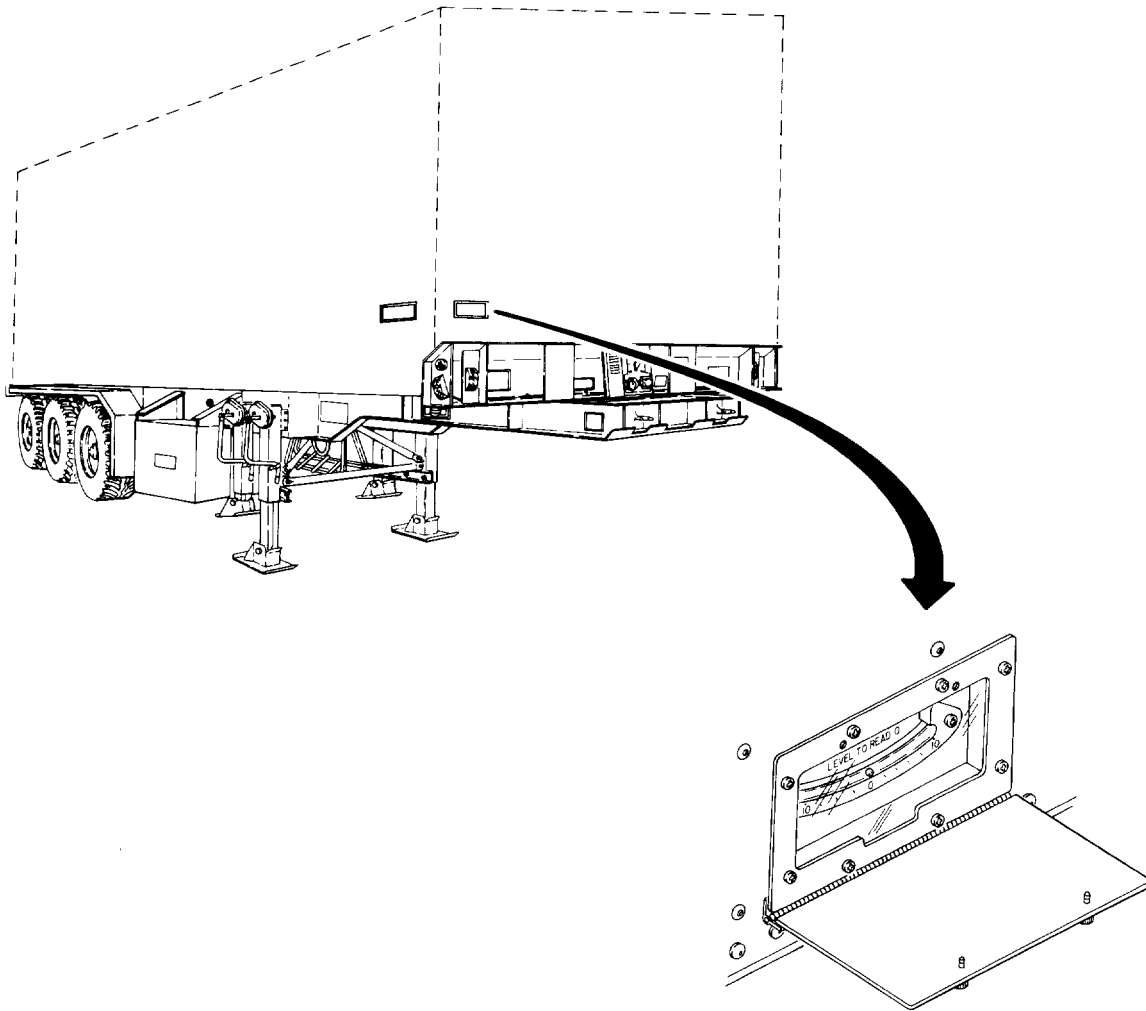
(1) Deflate air suspension in accordance with TM 5-2330-305-14.

(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.



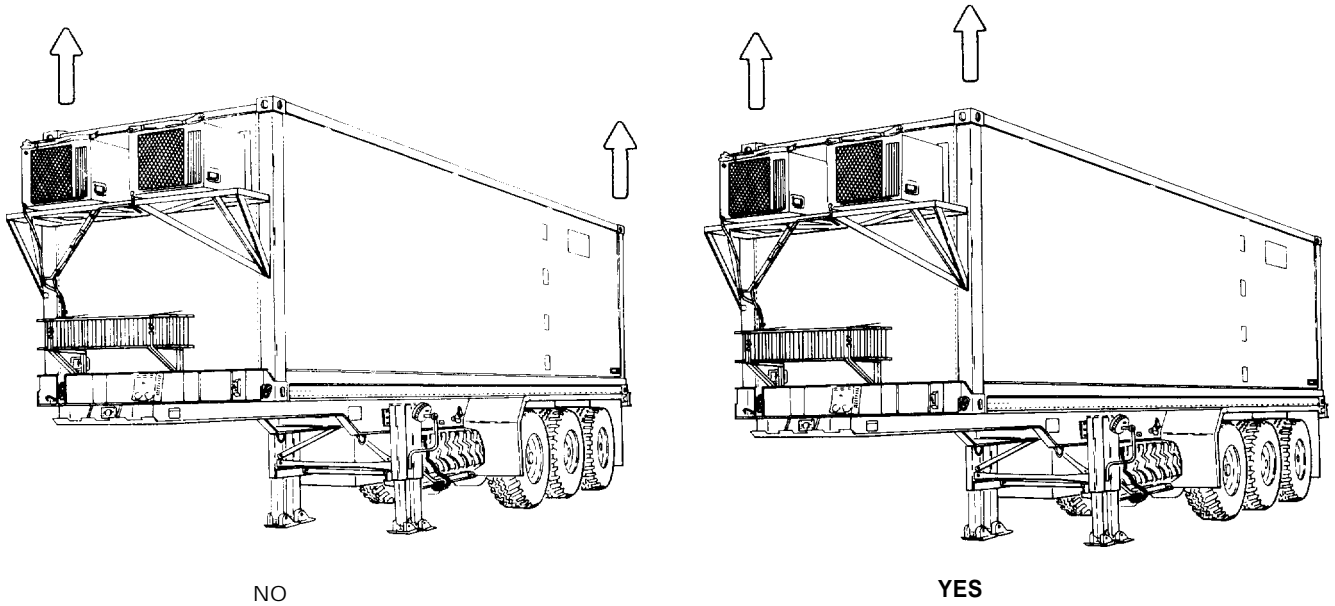
(6) Station personnel to have a clear view of level indicators at both front and rear of van body.

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

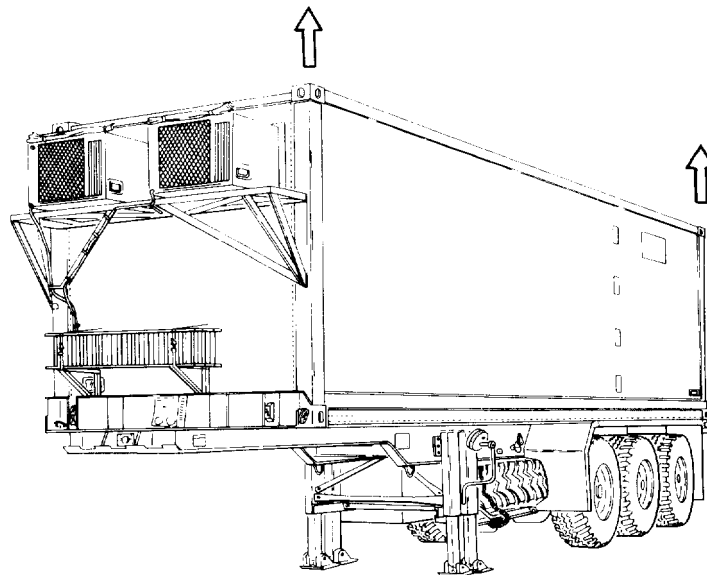


**CAUTION**

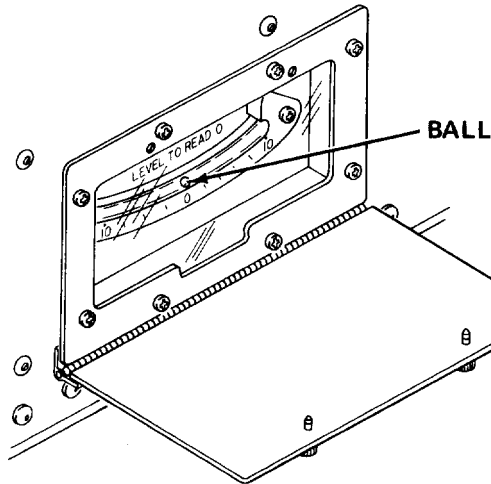
Do not attempt to level section by lifting at diagonal corners, or frame will be twisted.



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



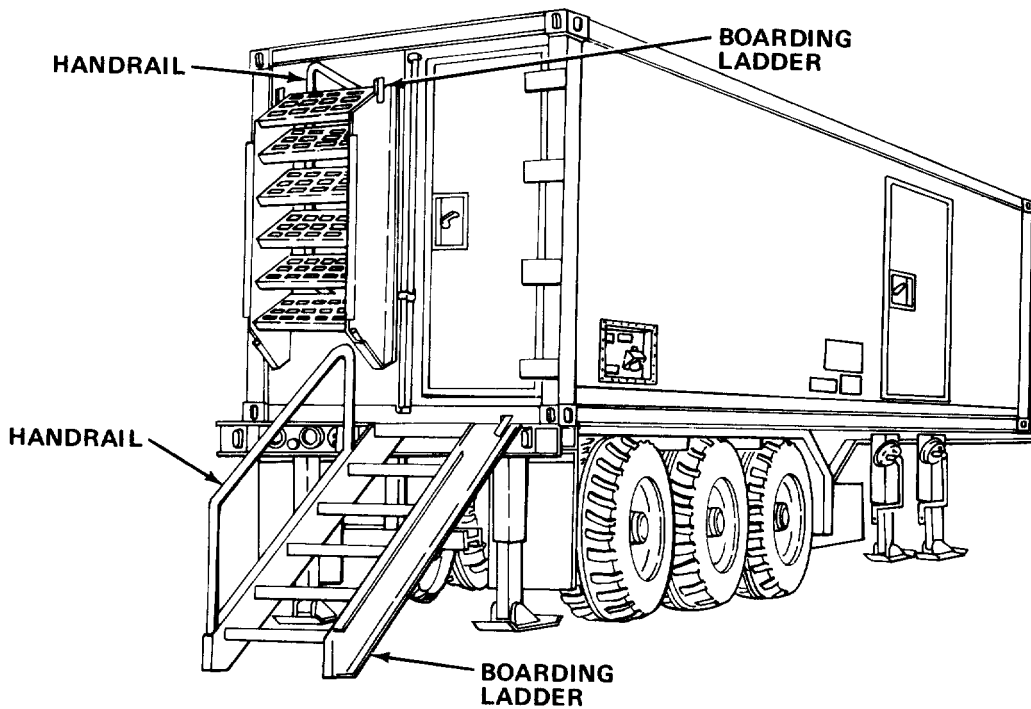
**(9)** Raise low side by extending both leveling jacks at low side.



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

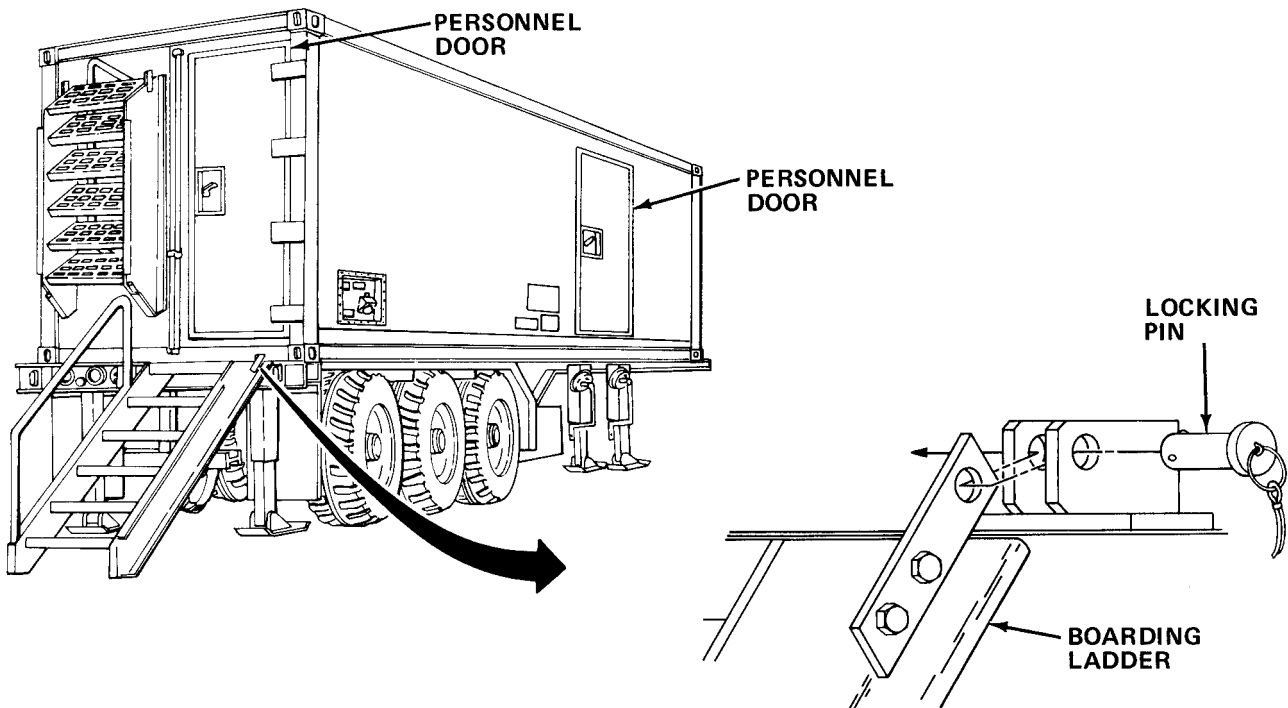
(11) Pull leveling crank handles away from trailer chassis and lower crank handle to stowed position.

b. Procedures to activate section.

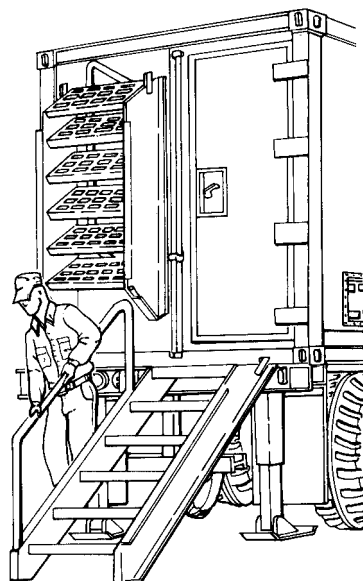


(1) Remove boarding ladders and handrails from rear of section.

(2) Remove handrails from ladders.



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

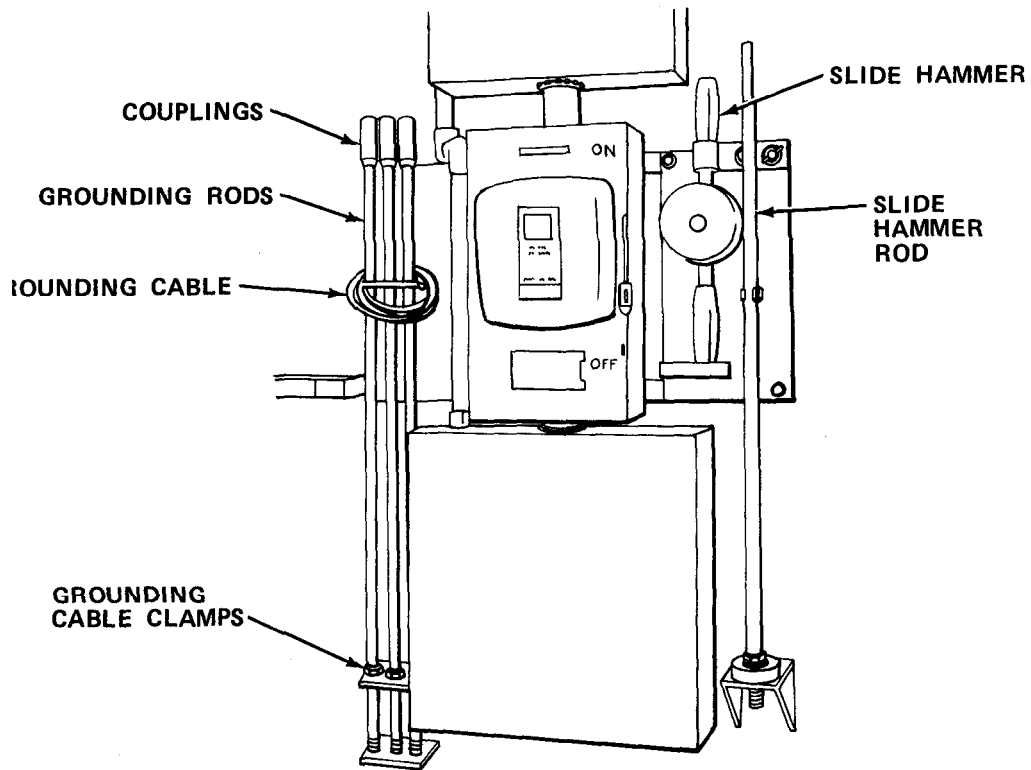


(4) Mount one handrail on each ladder.

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

## WARNING

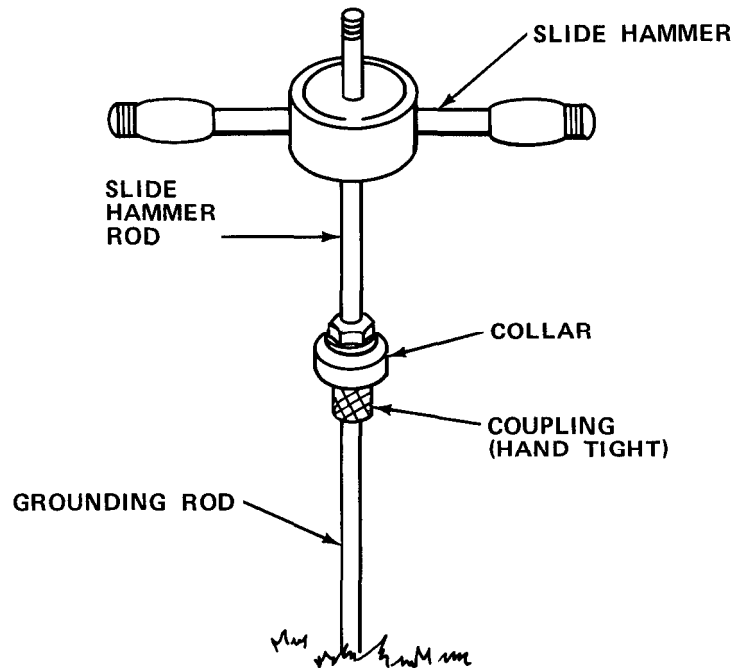
Death or serious injury may result from connecting power cable to section before grounding.



(6) Remove grounding rod, slide hammer, and grounding cable from the 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 grounding 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 grounding rod. Then assemble the first grounding rod and coupling to the slide hammer rod.

### **CAUTION**

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

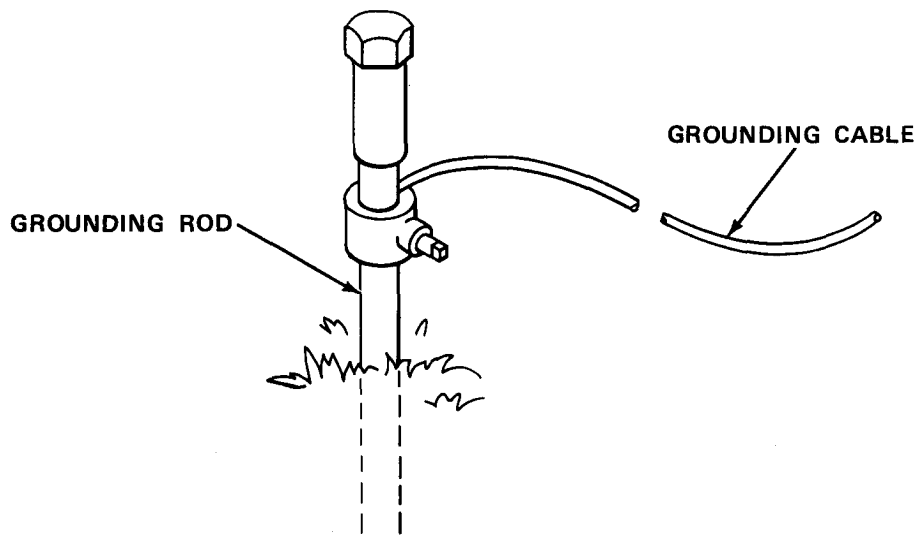
### **NOTE**

Before driving grounding 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 grounding rod into ground. Remove slide hammer rod. Attach slide hammer rod to a new section of grounding 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 grounding cable clamp and grounding cable to grounding rod.

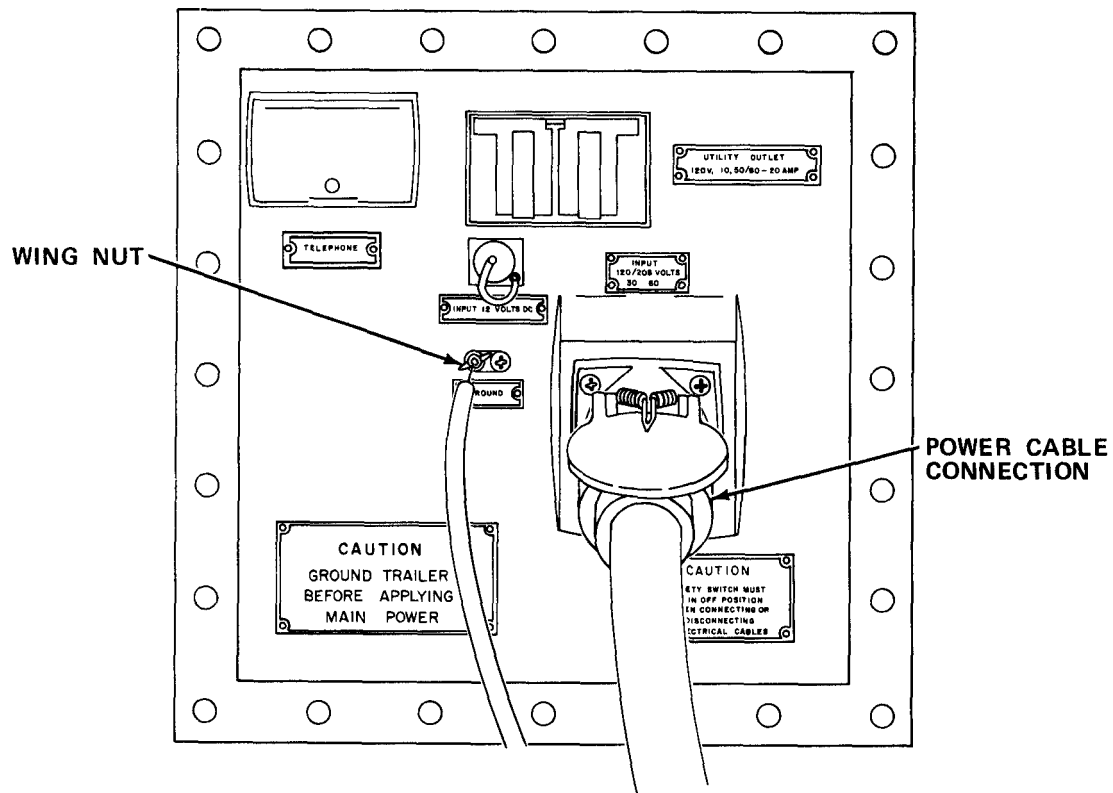


WARNING

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 grounding 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 grounding rod, a suitable alternative ground must be found, such as a buried metal water pipe. See TC 11-6, Grounding Techniques for additional instructions.

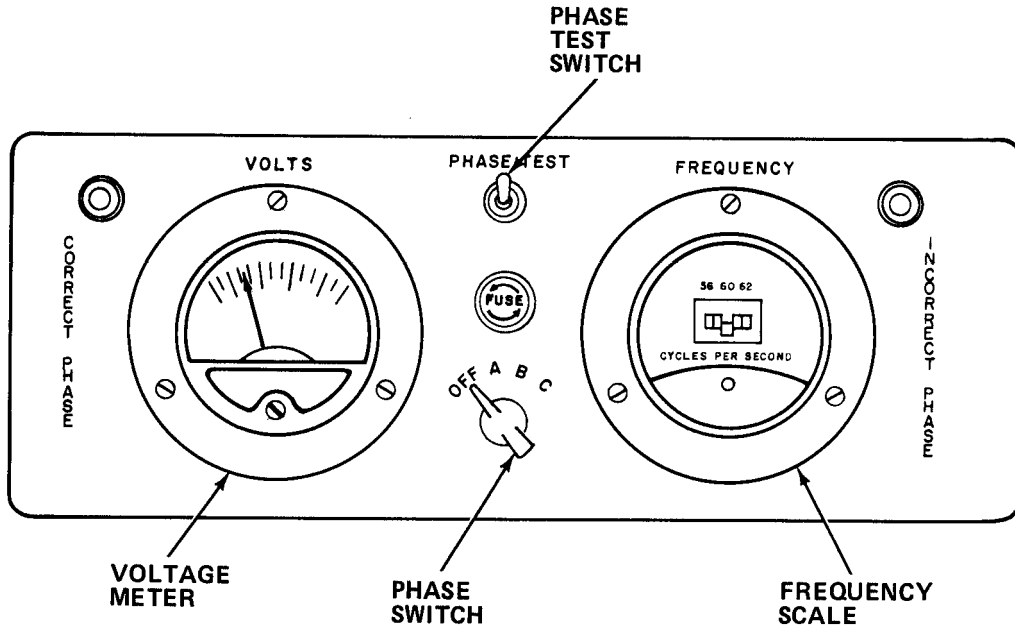


(11) Connect grounding cable to grounding lug with wing nut.

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:

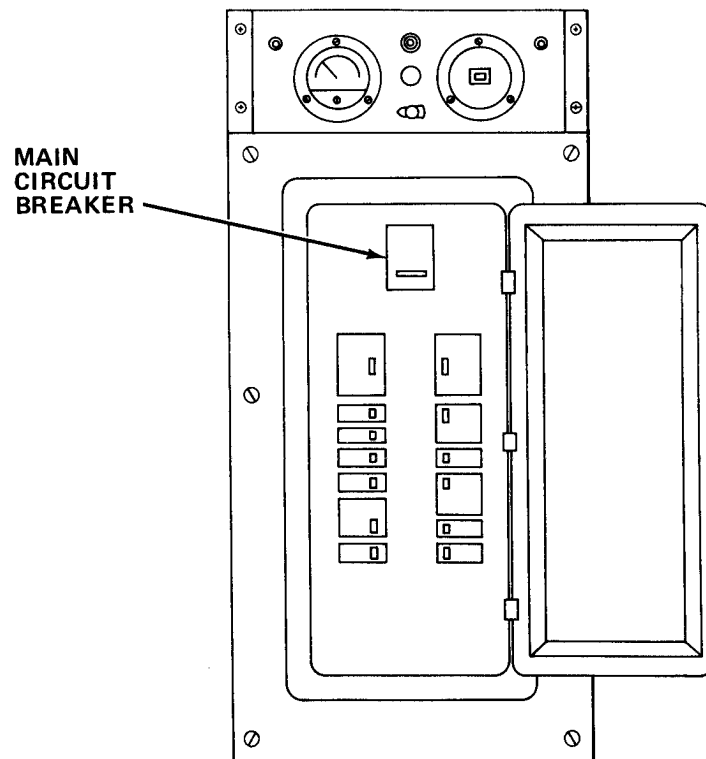
- (a) Push phase test switch. Observe correct phase lamp lights.
- (b) Turn phase switch to A.

**CAUTION**

Voltage must be between 110 and 120 and frequency must be at  $60 \pm 1$  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.

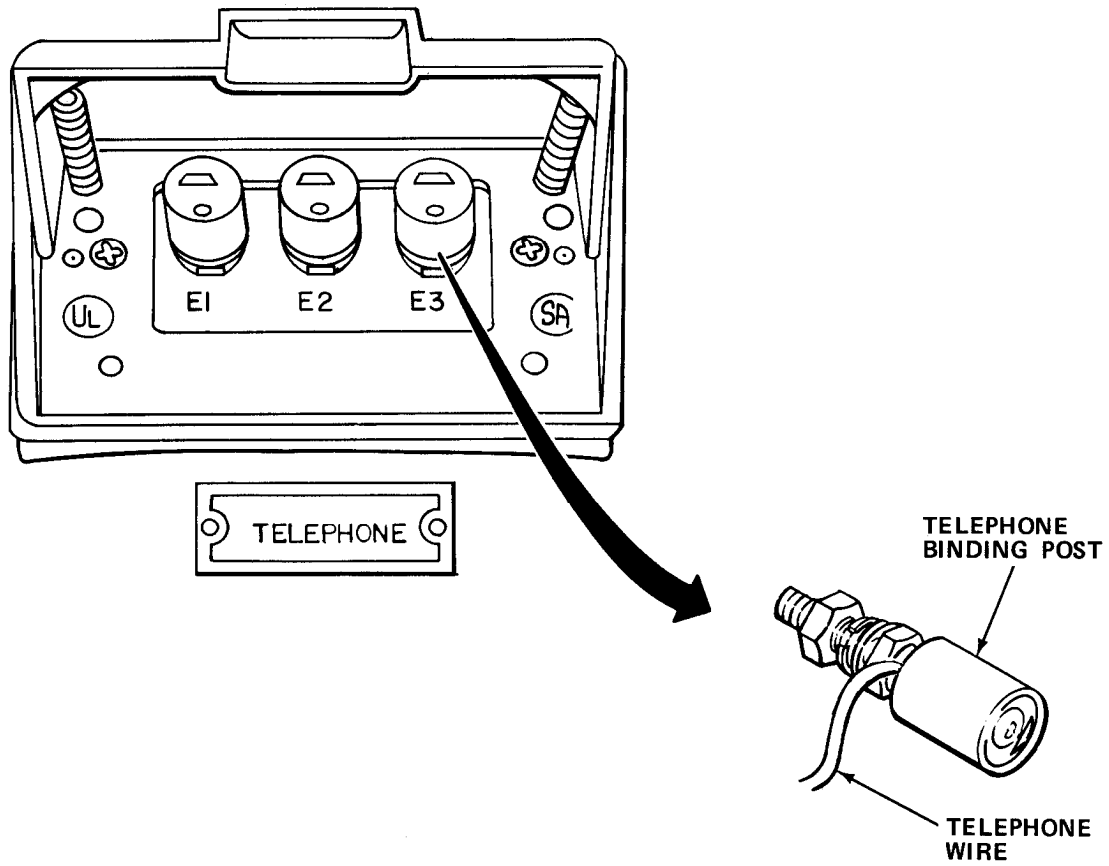
#### NOTE

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:

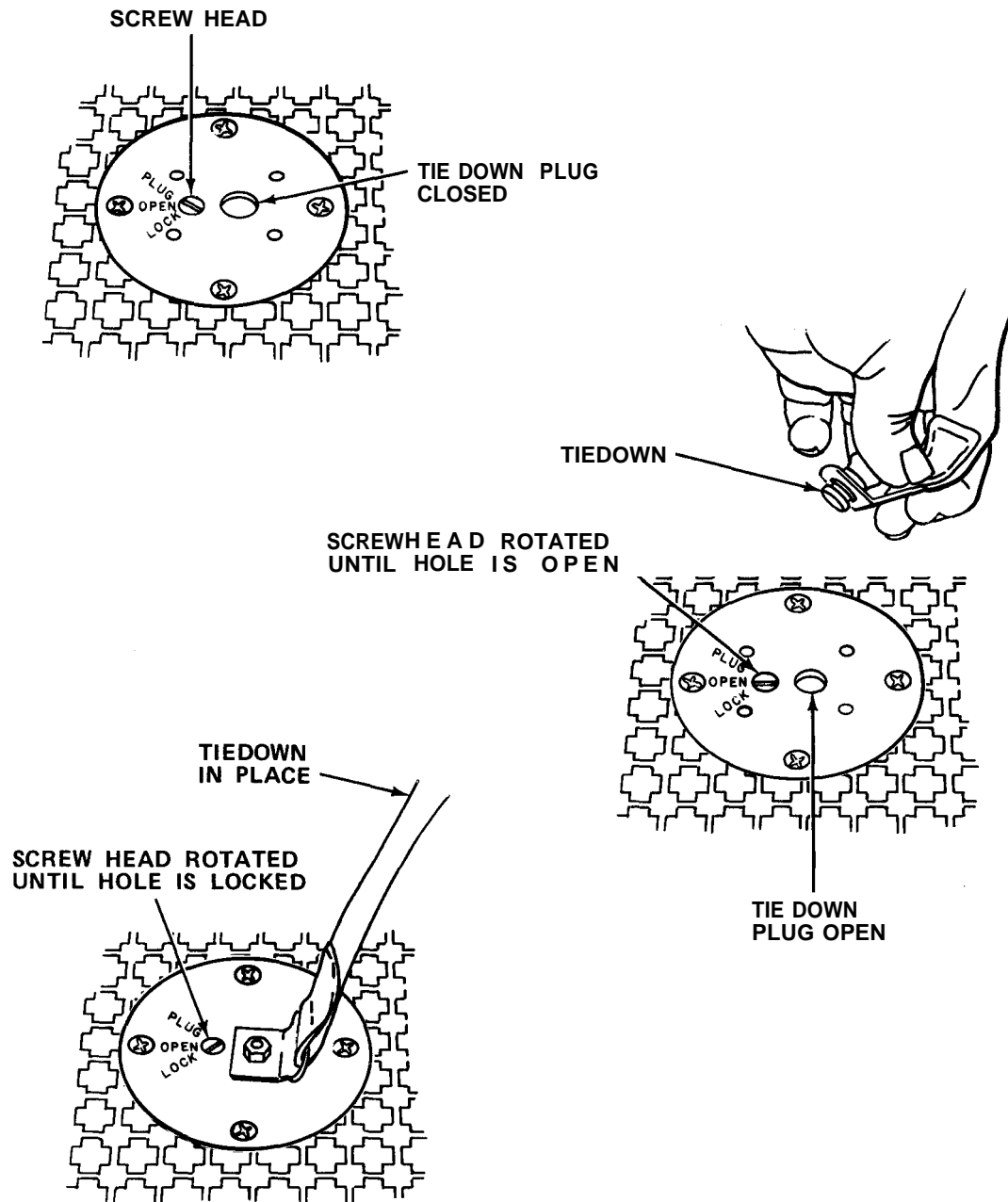
- (a) Individual lighting.
- (b) Curbside and roadside air conditioners/heaters.
- (c) Curbside and roadside receptacles.



- (18) Connect telephone lines to corresponding interior binding posts.
- (19) Check blackout switches.
- (20) Plug in emergency lighting and turn switch to **READY**.

1-6.2 Preparation for Movement.

- a. Inventory equipment and supplies.



- b. Install tiedowns in tiedown sockets.

c. Secure authorized equipment in proper containers or as specified by appropriate chapters.

- d. Secure straps and remove slack from tiedowns.

WARNING

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

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

CAUTION

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

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

NOTE

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

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

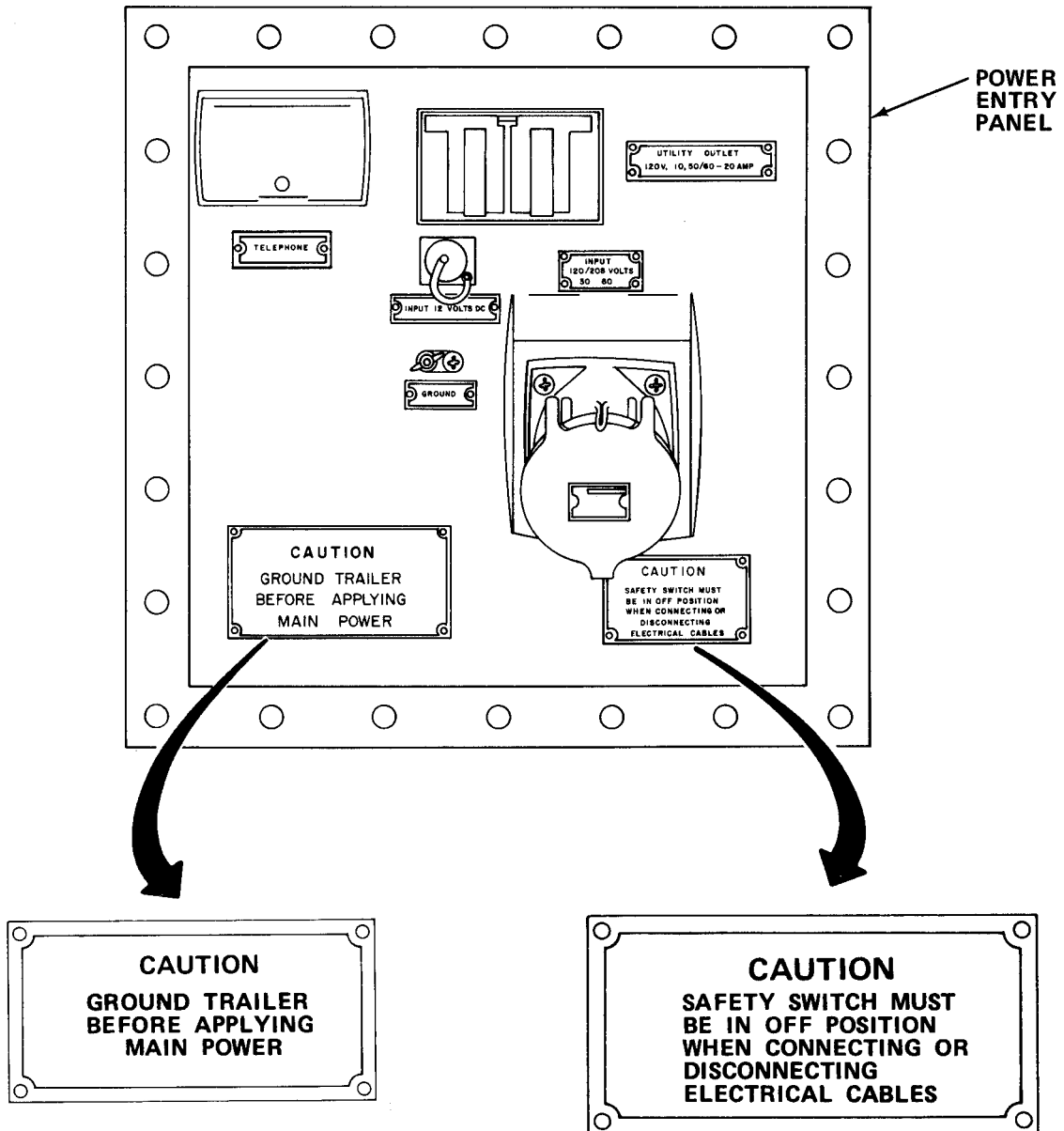
NOTE

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

- n. Remove handrails from boarding ladders.
- o. Remove boarding ladders and insert handrails into back of ladders.
- p. Secure ladders to back of section.
- q. Fully extend landing gear.
- r. Retract leveling jacks.

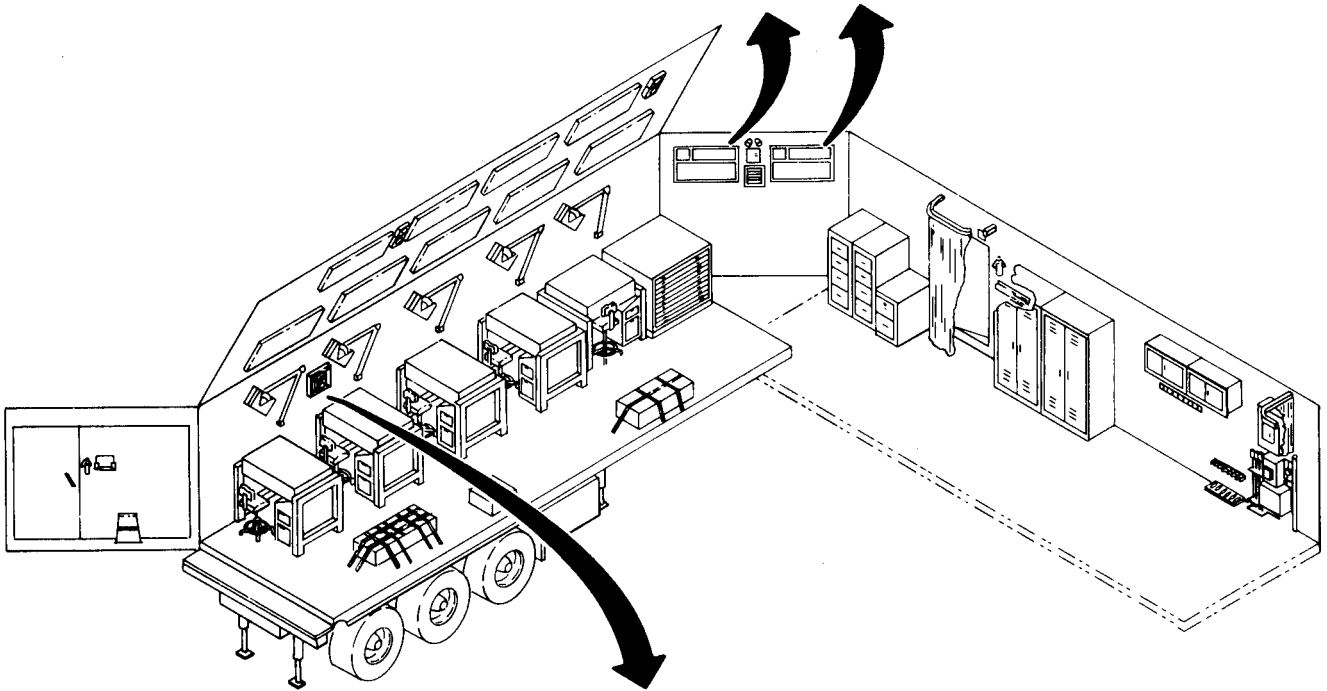
s. Visually inspect section exterior to be sure all equipment and covers are secured.

1-6.3 Operating Instructions on Decals and Instruction Plates.



**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)**

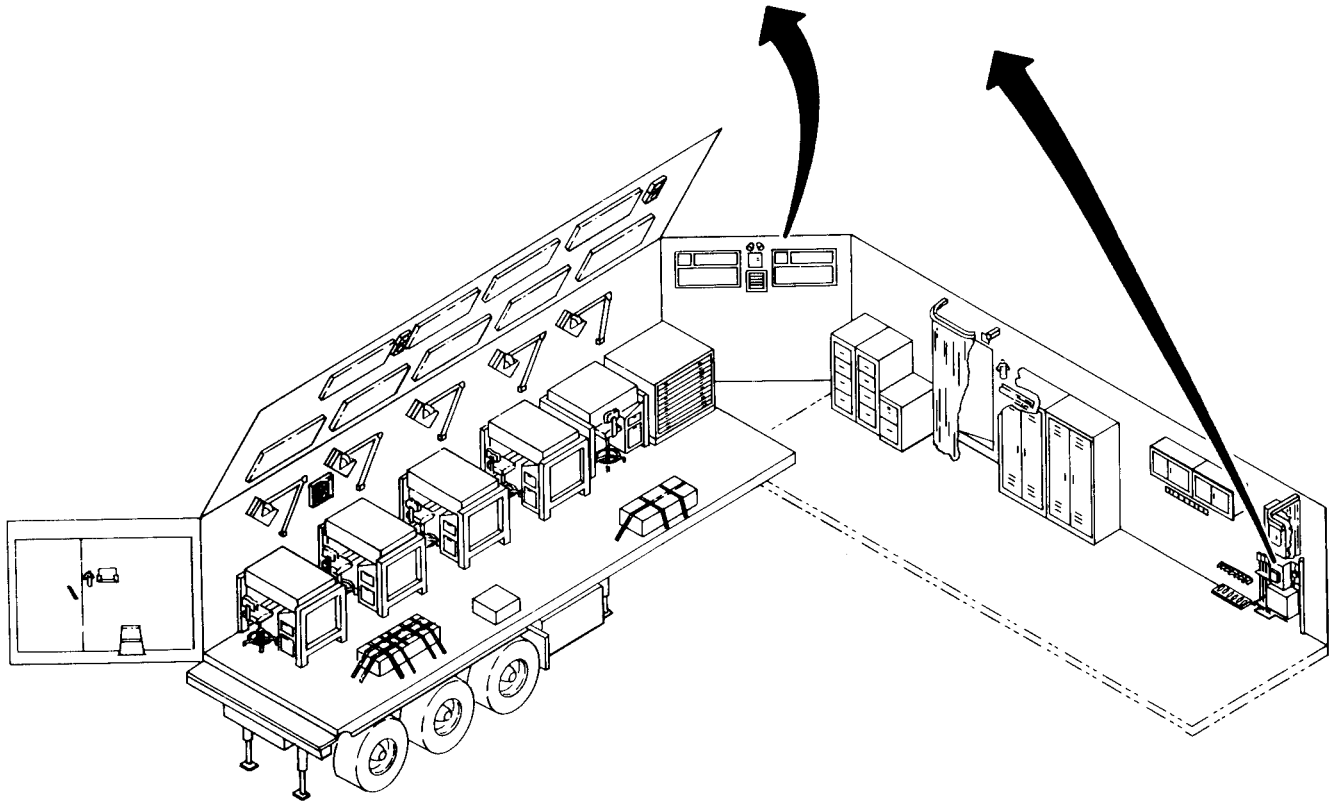


**CAUTION**  
OPEN OUTSIDE VENT BEFORE  
OPERATING FAN

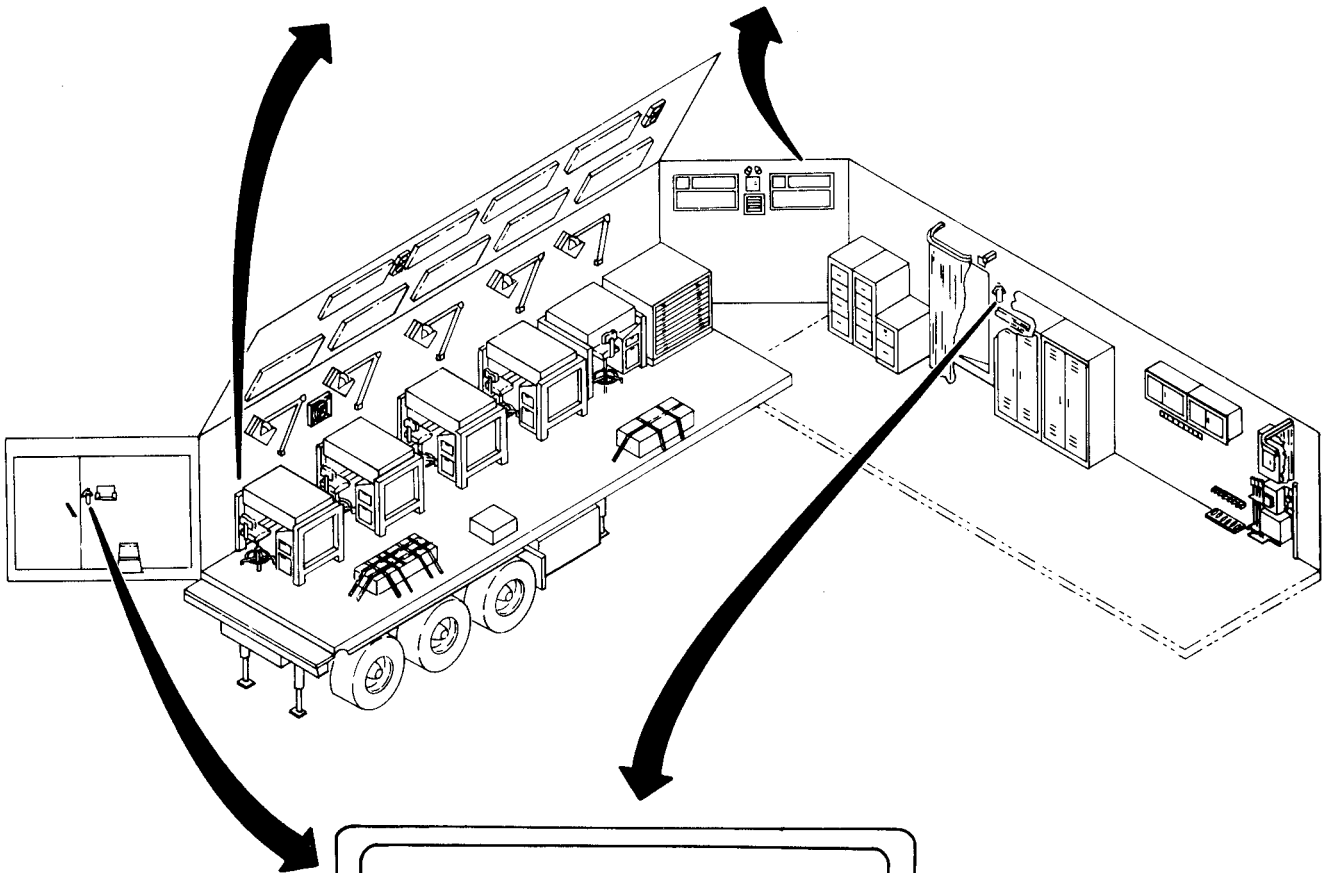
# CAUTION

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



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



**TO OPERATE**

1. PULL RING PIN
2. POINT HORN CLOSE TO BASE OF FIRE
3. DEPRESS TRIGGER FOR DISCHARGE AND KEEP BASE OF FLAMES COVERED
4. AVOID BREATHING OF SMOKE
5. REMOVE VALVE AND HORN ASSEMBLY AND DISCARD USED CYLINDER

**EXTINGUISHER, FIRE, CF<sub>3</sub>BR, 2 3/4 LB**



## 1-7. OPERATION UNDER UNUSUAL CONDITIONS.

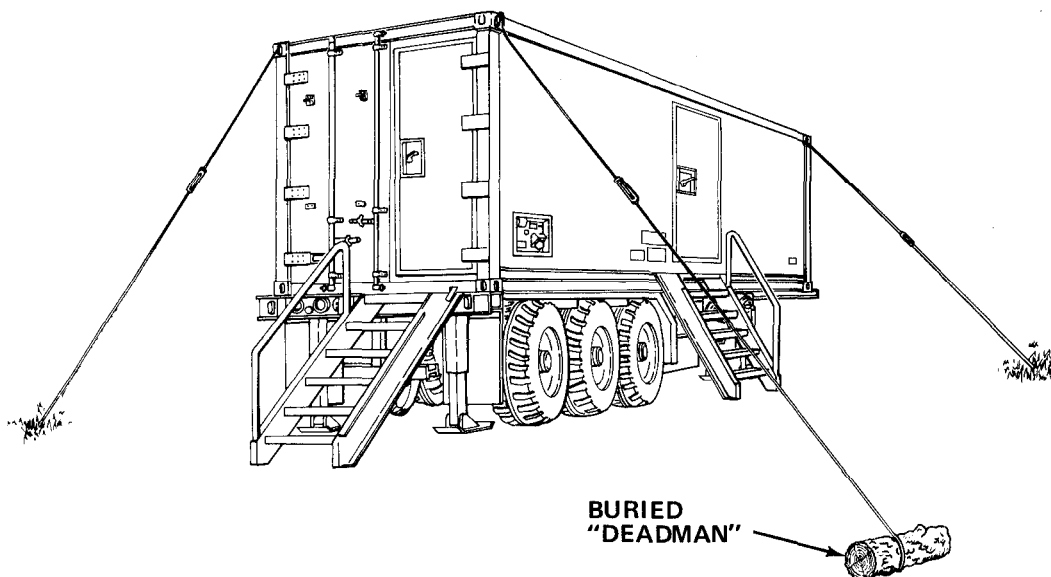
### NOTE

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.

#### SUGGESTED METHOD OF ANCHORING THE SECTION IN HIGH WINDS



- 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 grounding cable will become hard, brittle, and difficult to handle. Be careful when handling the cables when connecting and disconnecting them so 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.

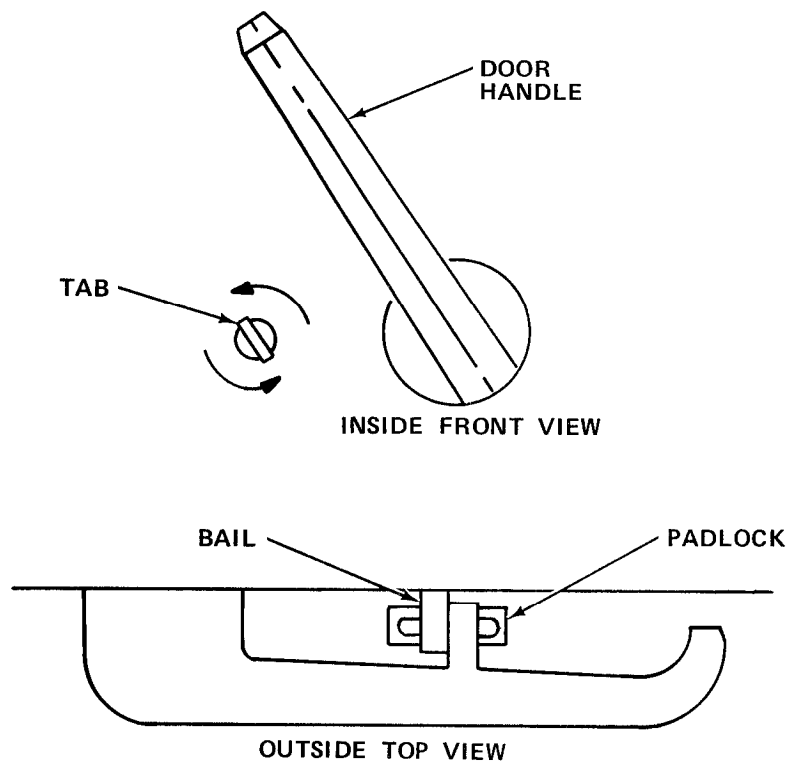
c. When section heaters are not operating or when the section is being transported, liquid consumable supplies may freeze, break their containers, then melt and ruin equipment or documents. Store these items in an area to prevent equipment or document damage.

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. Dust, grit, and sand will ruin supplies, equipment, and documents. Extreme care must be taken to prevent dust, grit, and sand from entering into 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.

## Section III OPERATOR MAINTENANCE

### 1-8. LUBRICATION INSTRUCTIONS.

a. Lubrication instructions for the Compilation Section are contained in LO 5-6675-317-12, Lubrication Order, Compilation Section, Topographic Support System. The intervals and manhours 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 required lubrication 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 Compilation 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 - Cont

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.

- Step 1. Observe voltage and frequency for phases A, B, and C. Read  $115 \pm 5$  V,  $60 \pm 1$  Hz.
  - (a) If voltage and frequency are correct, proceed to step 2.
  - (b) If voltage and frequency are incorrect, notify power supply supervisor.

CAUTION

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.
  - (a) If phases A, B, and C are correct, proceed to step 3.
  - (b) If incorrect phase lamp lights, notify power supply supervisor.

CAUTION

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

- Step 3. Check safety switch position.
  - (a) If safety switch is on, proceed to step 4.
  - (b) If safety switch is off, turn on.

Table 1-2. TROUBLESHOOTING - Cont

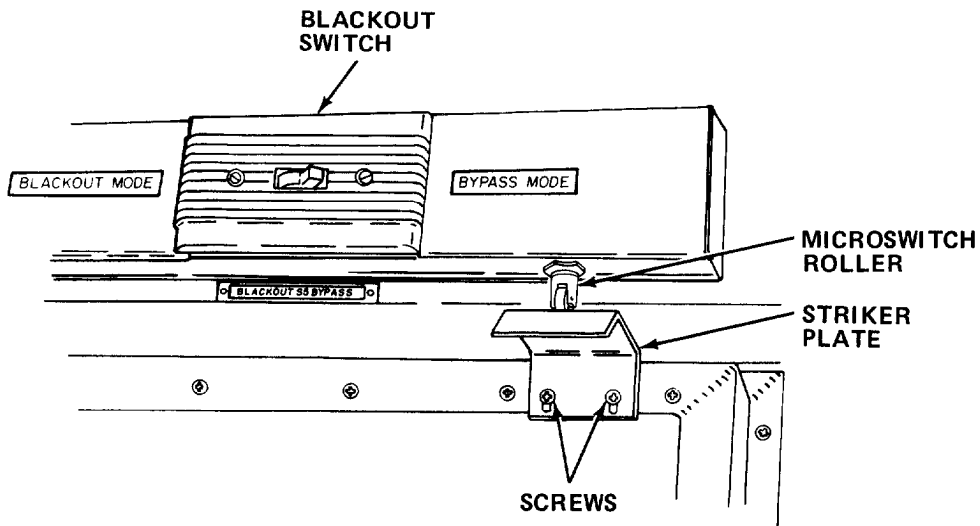
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. NO ELECTRICAL POWER TO SECTION - Cont	Step 4. Check main circuit breaker position.	<ul style="list-style-type: none"> <li>(a) If circuit breakers is ON, refer to direct/general support maintenance.</li> <li>(b) If circuit breaker is OFF, turn ON.</li> <li>(c) If circuit breaker trips repeatedly, notify power supply supervisor.</li> </ul>
2. NO ELECTRICAL POWER TO EQUIPMENT.	Step 1. Check equipment power switch.	<ul style="list-style-type: none"> <li>(a) If power switch is on, proceed to step 2.</li> <li>(b) If power switch is off, turn on.</li> </ul>
	Step 2. Check power cord.	<ul style="list-style-type: none"> <li>(a) If power cord is plugged in, proceed to step 3.</li> <li>(b) If power cord is unplugged, plug in.</li> </ul>
	Step 3. Inspect circuit breaker panel for breakers in OFF position.	<ul style="list-style-type: none"> <li>(a) If all circuit breakers are ON, refer to organizational maintenance.</li> <li>(b) If any circuit breakers are OFF, turn ON.</li> </ul>

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

3. BLACKOUT SWITCH DOES NOT OPERATE.



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 Compilation 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.

I N D E X

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

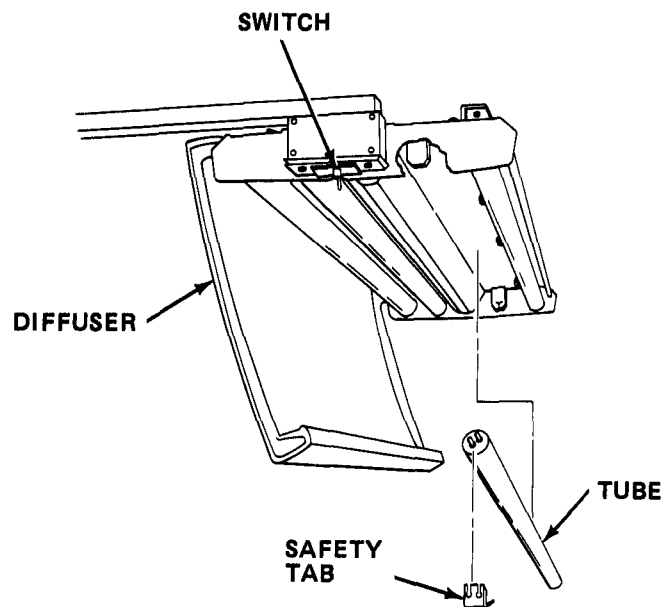
TOOLS: None

SUPPLIES: Fluorescent Lamp

WARNING

Death or serious injury may result if power is left on while servicing lamp.

- a. Turn off switch.



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



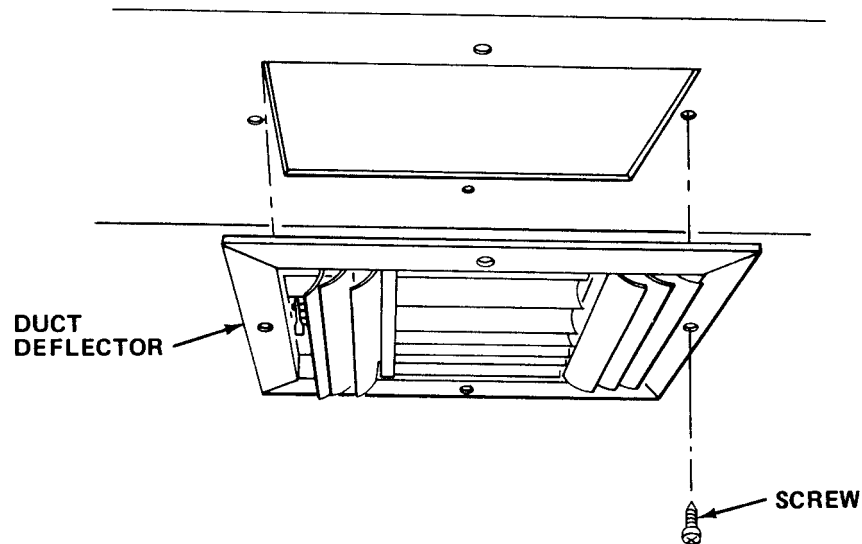
## 1-10.2 Service Ventilation Ducts.

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.

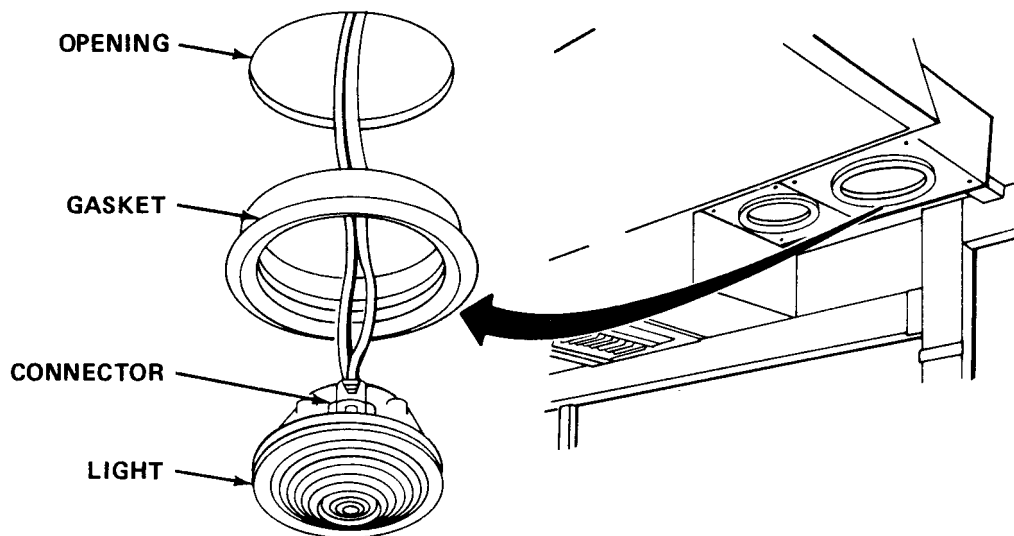
MOS : 81C, Cartographer

TOOLS: None

SUPPLIES: Light (12 V)  
Silicone Spray (Item 73, 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 5-6675-317-24P 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 TM 5-4120-367-14.

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 AR 735-11-20

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 sections 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.

(4) Report damage or discrepancies in accordance with AR 735-11 and AR 735-1-2.

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.

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

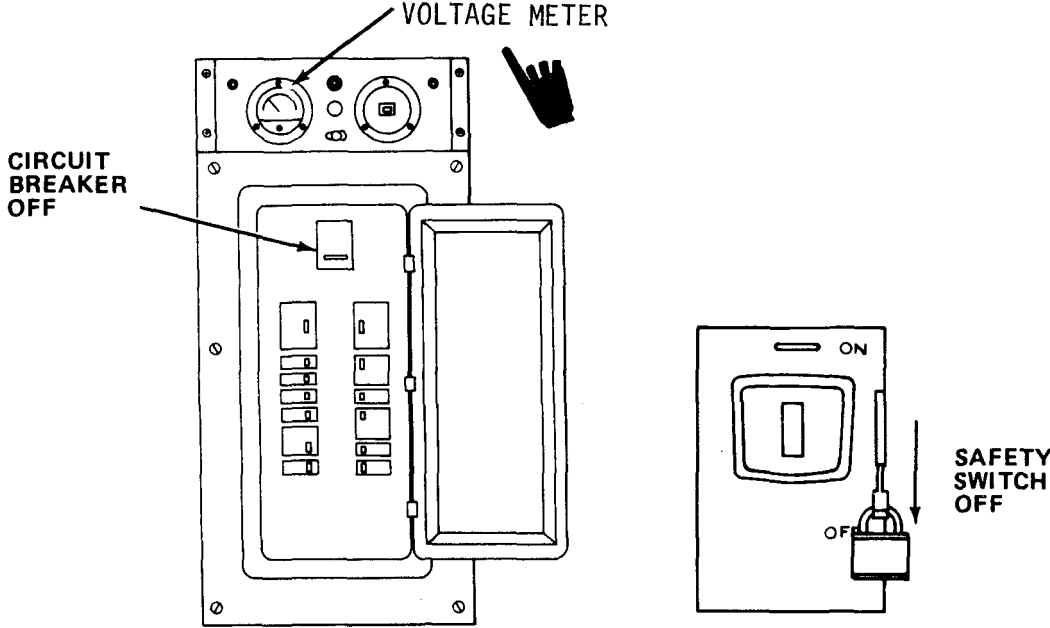
ITEM NO.	IN-VAL	ITEM TO BE INSPECTED	PROCEDURE
<u>VAN BODY</u>			
1	M	Service Air Conditioner/Heater. Refer to TM 5-4120-367-14 for preventive maintenance checks and services.	
2	M	<u>Service Lighting System.</u>	 <p>The diagram shows an electrical control panel. At the top left is a circular gauge labeled 'VOLTAGE METER'. Below it is a rectangular panel with a handle labeled 'CIRCUIT BREAKER OFF'. To the right is a vertical panel with a switch labeled 'SAFETY SWITCH OFF' and a padlock. A hand icon points to the voltage meter.</p>
<u>WARNING</u>			
<p>Do not open 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.</p>			
<p>1. Turn off main circuit breaker. Turn off safety switch.</p>			

Table 1-3. 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                      Q - Quarterly                      BI - Biennially

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE
2	M	<p><u>VAN BODY</u></p> <p><u>Service Lighting System - Cont</u></p> <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 power.</li> </ol>

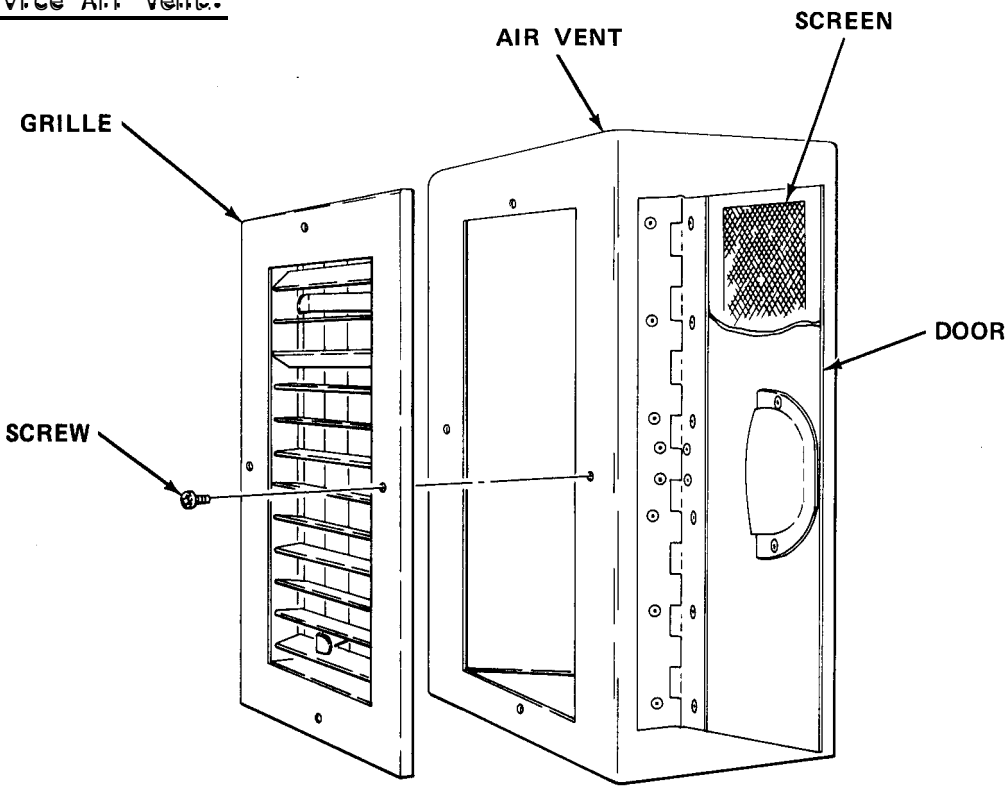
Table 1-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO	I N - VAL	ITEM TO BE INSPECTED  PROCEDURE
3	M	<u>VAN BODY</u>
		<p><u>Service Air Vent.</u></p>  <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
4	M	<b>VAN BODY</b>
		<p>Inspect Fire Extinguisher.</p> <div style="text-align: center;"> </div> <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. Check that 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 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 Compilation 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.

(a) If continuity exists, proceed to step 3.

(b) If continuity does not exist, replace lamp ballast (paragraph 1-16.1).

Step 3. Check for shorts in RF filter.

Replace RF filter (paragraph 1-16.2).

## 2. VENTILATION FAN IS INOPERATIVE.

Check on/off switch for continuity.

(a) If continuity exists, replace fan (paragraph 1-16.9).

(b) If continuity does not exist, replace switch (paragraph 1-16.4).

## 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.

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

(b) If circuit breaker is OFF, turn ON.

(c) If circuit breaker trips repeatedly, notify power supply supervisor.

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. (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. (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). (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 Compilation 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
Replace Telephone Binding Post Assembly . . . . .	1-16.8
Replace Ventilation Fan . . . . .	1-16.9
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1-16.1 Replace Fluorescent Lamp Ballast.

MOS : 83FJ6, Reproduction Equipment Repairer

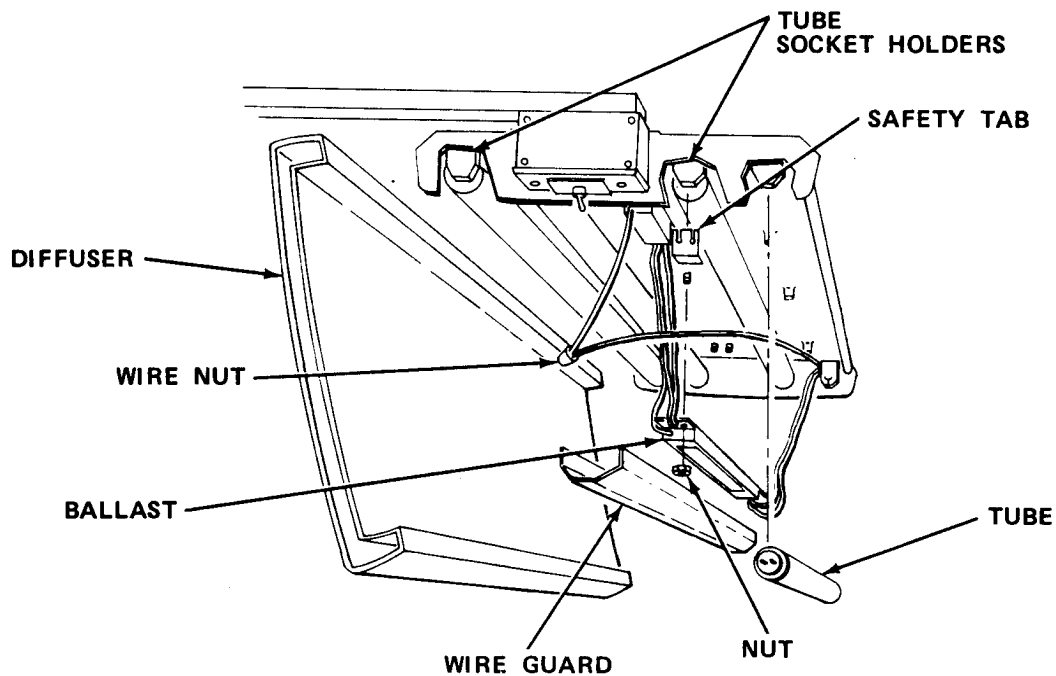
TOOLS: Flat Tip Screwdriver  
1/4 in. Wrench  
1/4 in. Drive Socket Set  
Scribe

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 switch.
- b. Remove diffuser from light fixture.
- c. Remove safety tabs and lamps. Place in diffuser.
- d. Squeeze light wiring 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 light switch.

1-16.2 Replace Radio Frequency (RF) Filter.

MOS: 83FJ6, Reproduction Equipment Repairer

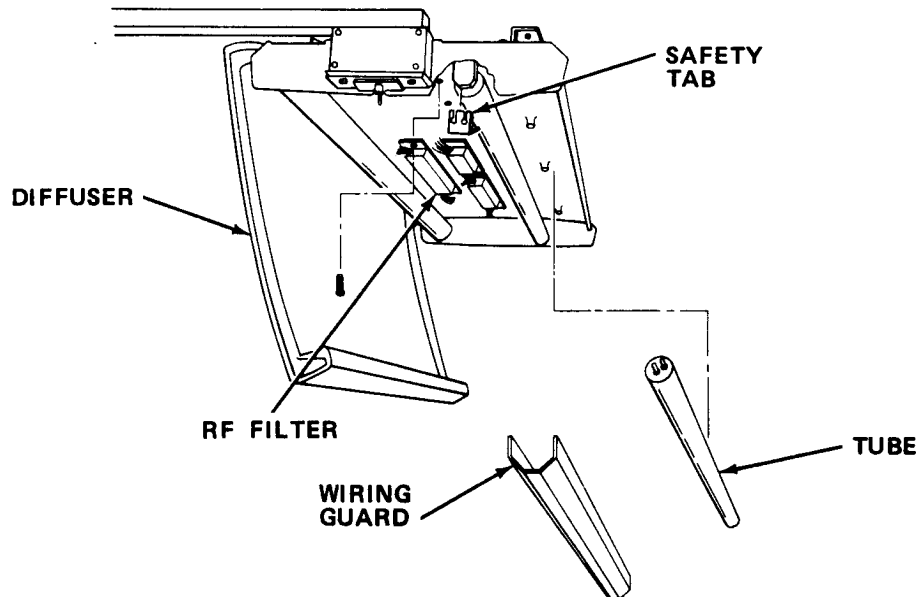
TOOLS : Flat Tip Screwdriver  
1/4 in. Wrench  
1/4 in. Drive Socket Set

SUPPLIES: 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 off overhead light switch.
- b. Remove diffuser from light fixture.
- c. Remove safety tabs and lamps. Place in diffuser.
- d. Squeeze light wiring 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.

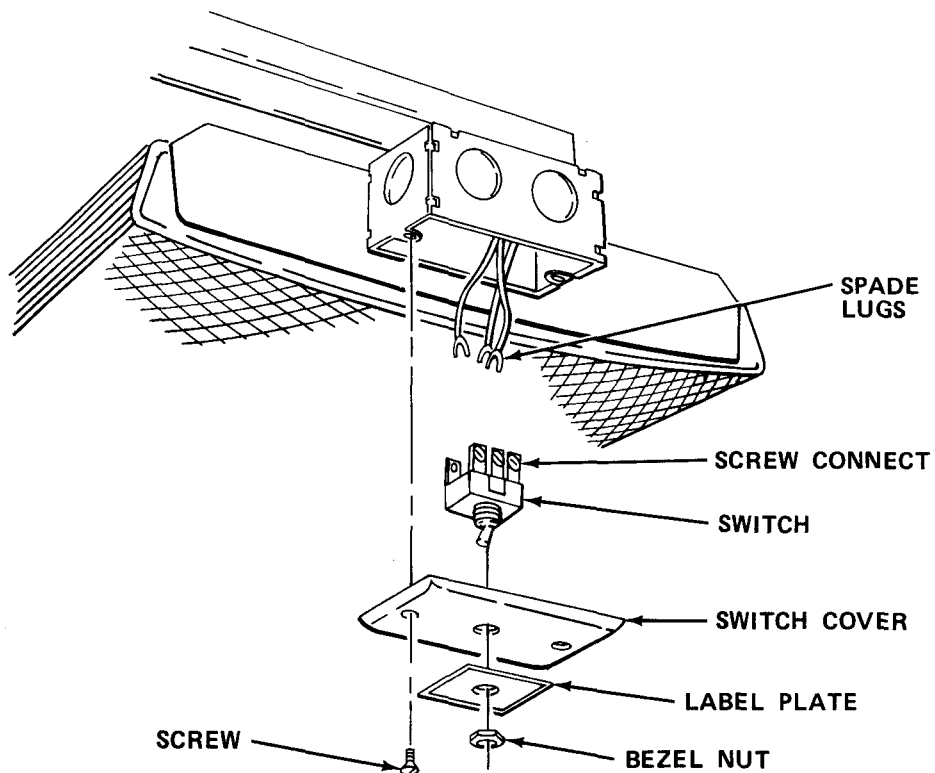
- m. Reinstall wire guard.
- n. Reinstall lamps and safety tabs.
- o. Reinstall diffuser.
- p. Turn on light switch.

1-16.3 Replace Fluorescent Lamp Switch.

MOS: 83FJ6, Reproduction Equipment Repairer

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 off circuit breaker.
- 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. Align cover plate with holes and secure with screws.
- j. Turn on circuit breaker.

1-16.4 Replace On/Off Switch.

MOS : 83FJ6, Reproduction Equipment Repairer

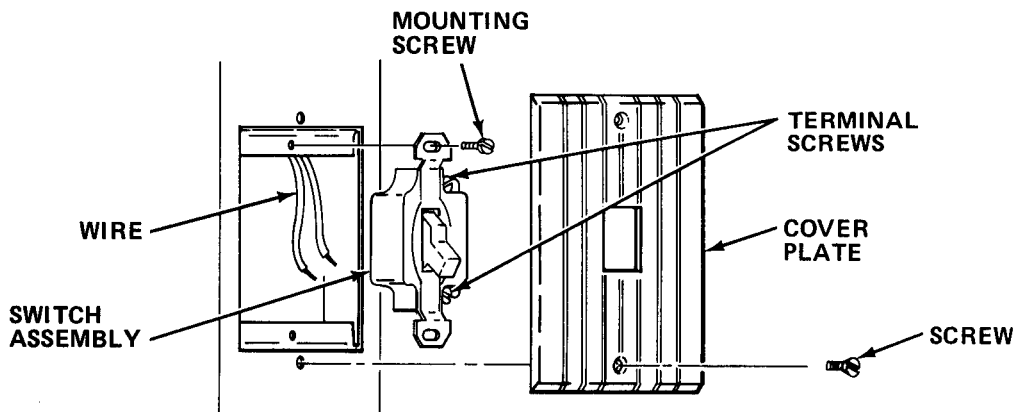
TOOLS: Flat Tip Screwdriver

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, aligning holes.

**NOTE**

Be sure wires are not kinked or strained.

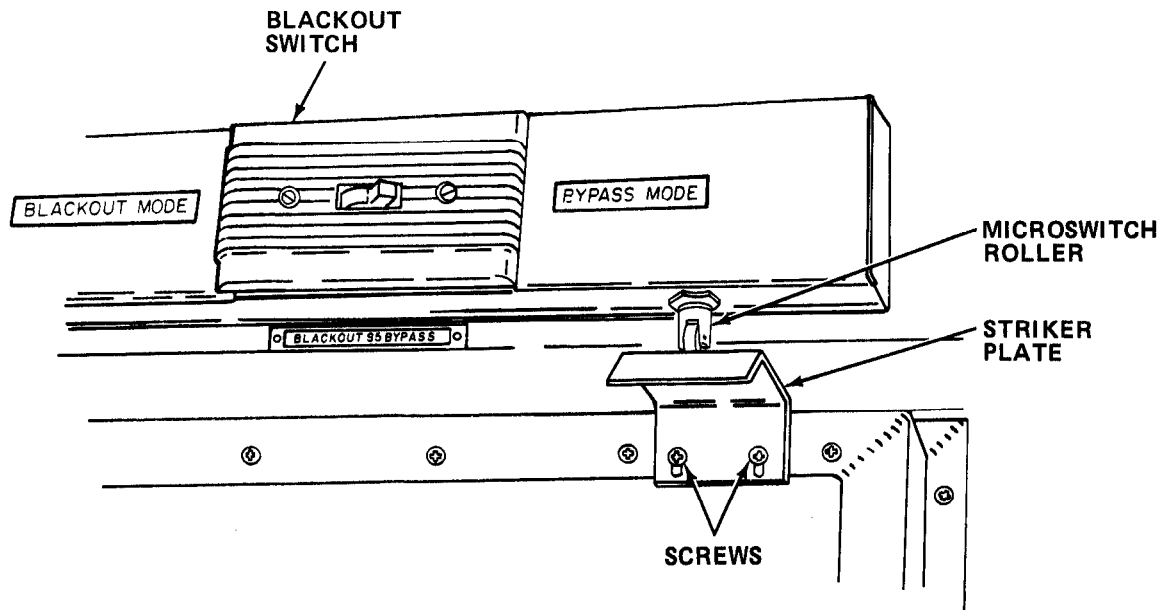
- j. Reinstall mounting screws.
- k. Reinstall cover plate and secure with screws.
- l. Turn on switch circuit breaker.

1-16.5 Replace Blackout/Dome Light Microswitch.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
6 in. Adjustable Wrench

SUPPLIES: Microswitch

WARNING

Death or serious injury may occur from electrical shock unless power is secured 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 rollers.
- h. Re-install conduit cover.
- i. Turn on circuit breaker.

1-16.6 Replace Receptacle.

MOS : 83FJ6, Reproduction Equipment Repairer

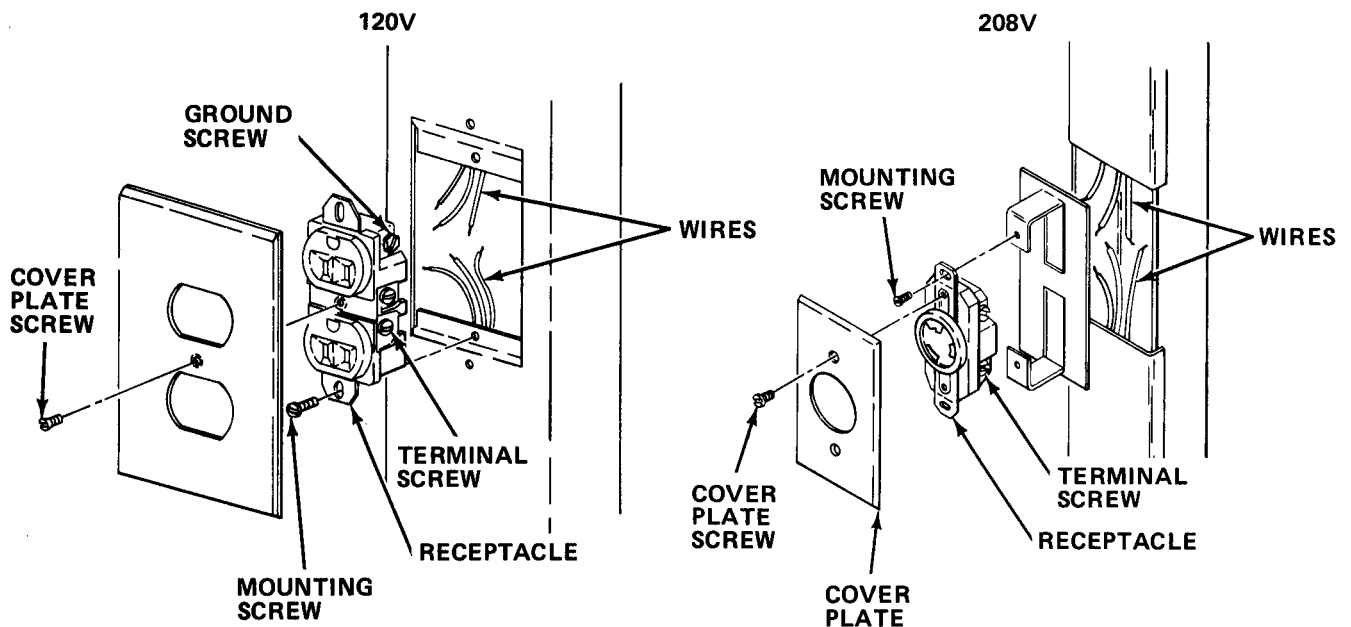
TOOLS: Flat Tip Screwdriver

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. Install new receptacle.
- h. Reconnect wires. Connect green (ground) wire first.
- i. Guide receptacle into wire guide.

**NOTE**

Be sure wires are not kinked or strained.

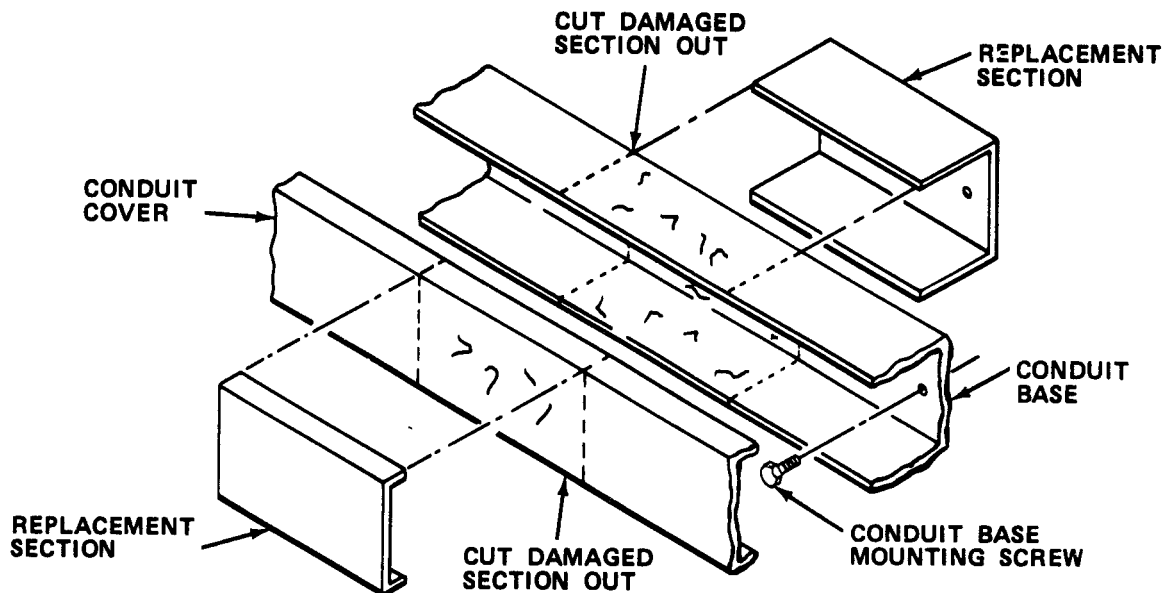
- j. Secure receptacle with screws.
- k. Reinstall cover plate. Secure with screws.
- l. Turn on receptacle circuit breaker.

1-16.7 Replace Wire Molding.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Flat Tip Screwdriver  
Hacksaw  
Flashlight  
Multimeter  
Drill and Bits  
File  
Machinist Rule

SUPPLIES: Paint (Item 47, Appendix E)  
Cheesecloth (Item 16, Appendix E)  
Conduit Base  
Conduit Cover  
Padlock  
Paint Brush



**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.

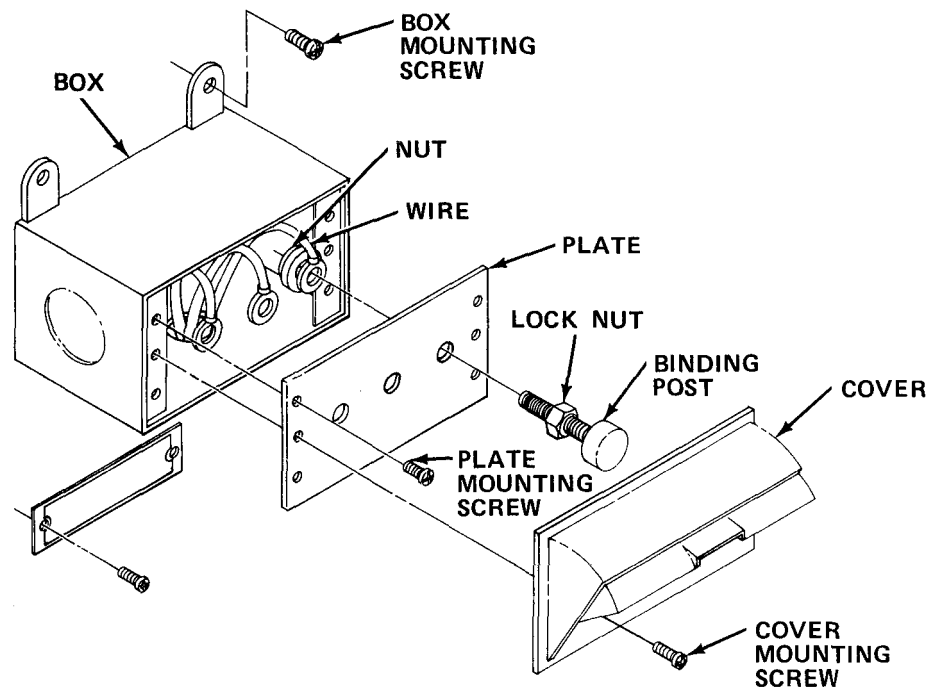
- d. Loosen wiring and carefully pull it from the entire base section.
- e. Remove screws and base from wall.
- f. Mark and measure damaged area on molding. Record measurement.
- g.** Cut damaged area from molding.
- h. Cut section from new molding to the length recorded in step f.
- i. Using damaged 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 Replace Telephone Binding Post Assembly.

MOS : 83FJ6, Reproduction Equipment Repairer

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 Ventilation Fan.

MOS : 83FJ6, Reproduction Equipment Repairer

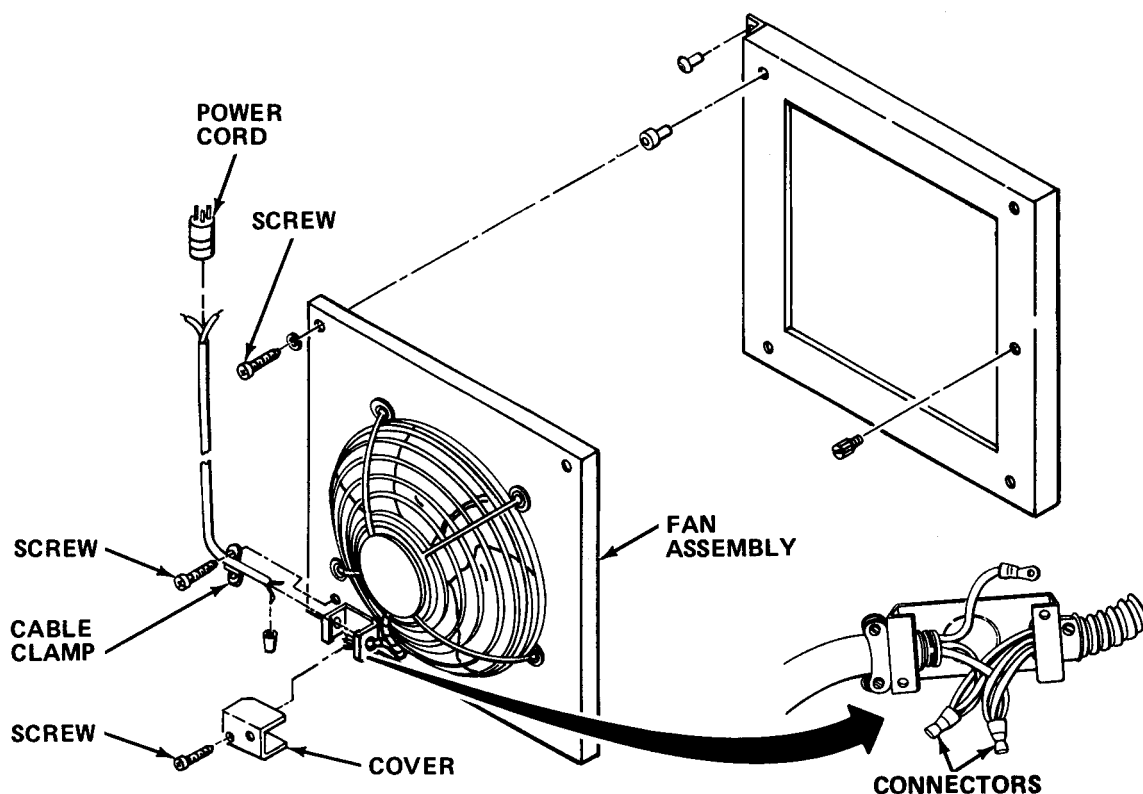
TOOLS : Flat Tip Screwdriver  
Cross Tip Screwdriver  
Wire Cutters

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.

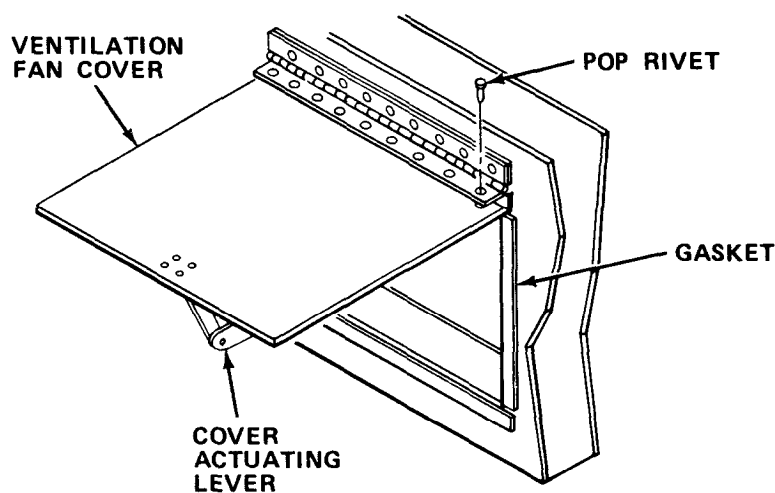
- d. Remove screws and cover.
- e. Tag wires and cut connectors from wires.
- f. Remove power cord from defective fan assembly.
- g. Install new fan.
- h. Install new power cord.
- i. Connect wires with wire nuts and remove tags.
- j. Tighten cable clamp screws.
- k. Reinstall cover. Secure with screws.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

1-16.10 Replace Ventilation Fan Cover.

MOS : 83FJ6, Reproduction Equipment Repairer

TOOLS: Drill and Bits  
Pop Rivet Gun  
Scraper

SUPPLIES: Pop Rivets  
Ventilation Fan Cover  
Gasket  
Solvent P-D-680 (Item 72, Appendix E)  
Adhesive (Item 1, Appendix E)  
Cheesecloth (Item 16, Appendix E)  
Impermeable Gloves  
Goggles



- Drill pop rivets from hinged cover to remove vent cover.
- Remove defective vent 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).

- Scrape gasket off section and clean area with solvent P-D-680.
- Secure new gasket to section with adhesive.
- Align ventilation fan vent cover and pop rivet to hinge.
- Test cover for tightness of closure.

1-16.11 Replace Emergency Light Assembly.

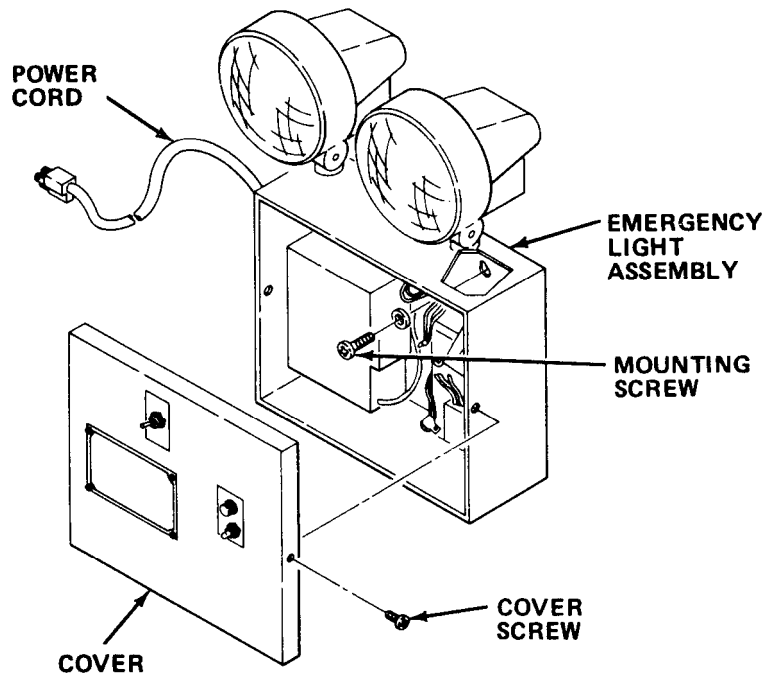
MOS : 83FJ6, Reproduction Equipment Repairer

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.



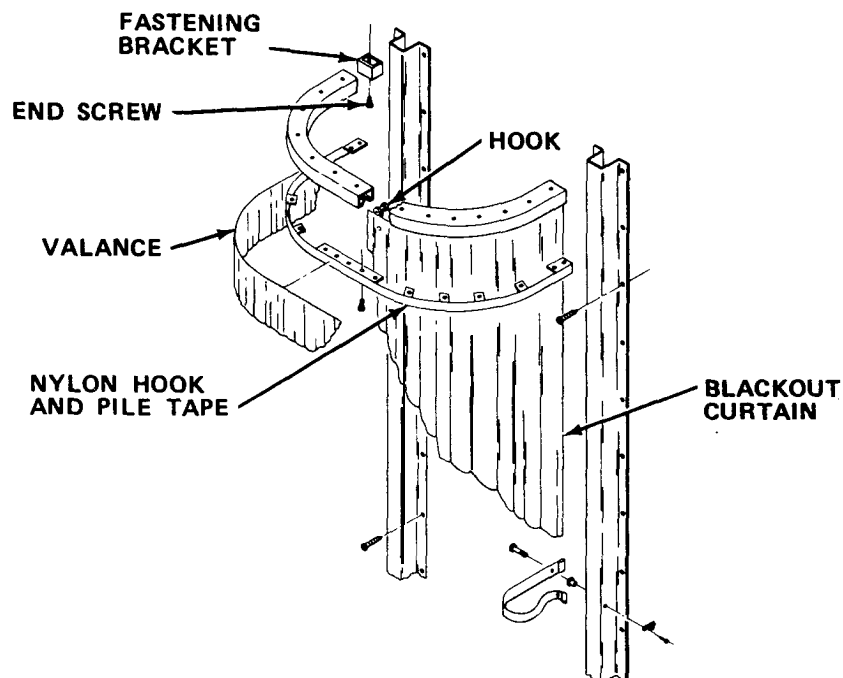
- a. Unplug power cord.
- b. Remove cover screws. Move cover out of way.
- c. Remove mounting screws.
- d. Remove emergency light assembly.
- e. Install new emergency light assembly. Secure with screws.
- f. Secure cover with screws.
- g. Plug in power cord.

1-16.12 Repair Blackout Curtain.

MOS: 83FJ6, Reproduction Equipment Repairer

TOOLS: Cross Tip Screwdriver

SUPPLIES: Hooks  
Valance  
Curtain  
Nylon Hook and Pile Tape  
Adhesive (Item 1, Appendix E)



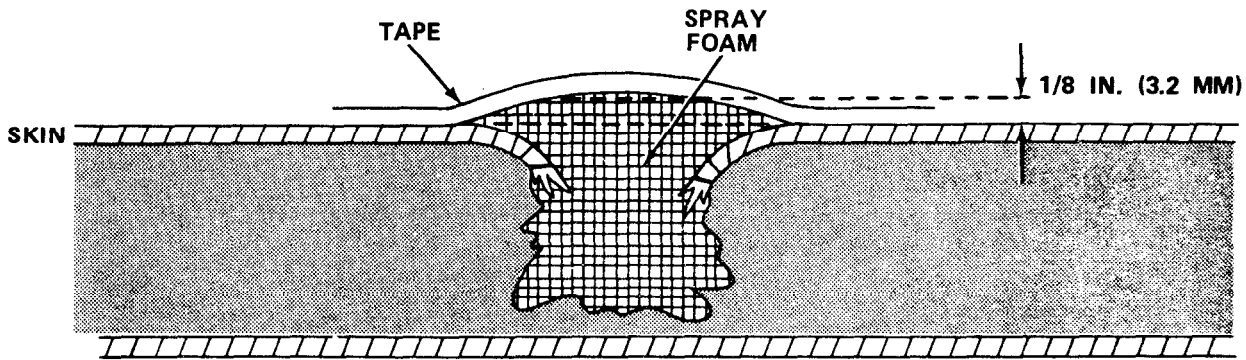
- a. Remove curtain from hooks.
- b. Pull curtain and valance from nylon hook and pile tape.
- c. Remove end screw, lockwasher, and fastening bracket from ceiling.
- d. Replace damaged hooks.
- e. Reinstall fastening bracket with hooks. Fasten with end screw and lockwasher.
- f. Glue loose nylon hook 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 78, Appendix E)  
Silicone Sealant (Item 68, Appendix E)  
Spray foam (Item 74, Appendix E)  
Cheesecloth (Item 16, 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 spray foam into puncture. Mound spray foam 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.



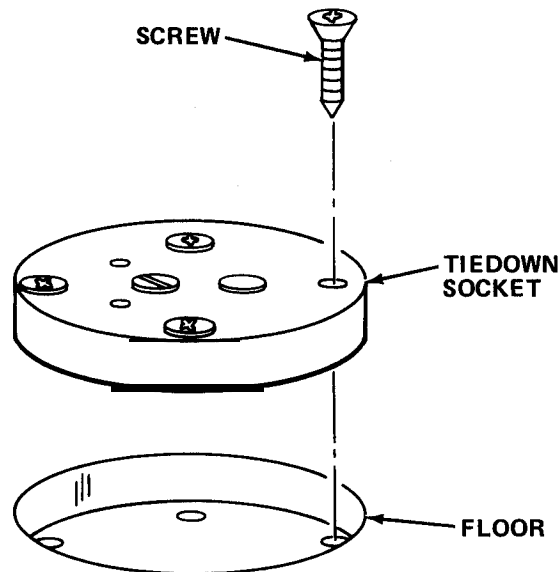
- f. Apply tape, holding it taut, and apply it perpendicular to panel skin. Do not apply with rolling motion either end-to-end or center-to-ends. Do not rub each strip in place individually. Apply all strips lightly with proper overlap and rub into place.
- g. **If** necessary, damaged tape can be replaced; 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

TOOLS: Cross Tip Screwdriver  
Flat Tip Screwdriver

SUPPLIES: Tiedown Socket



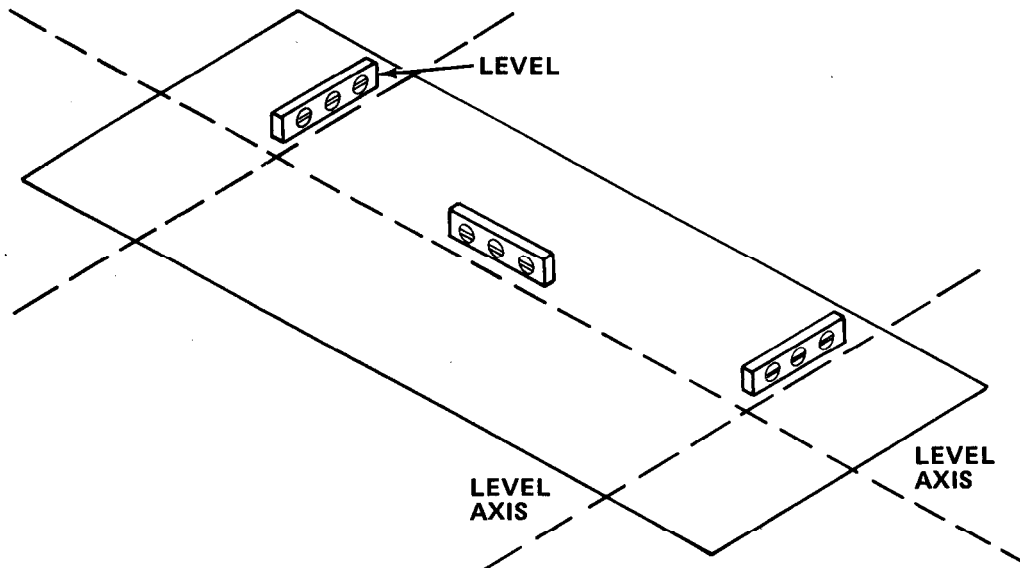
- Remove screws from tiedown socket.
- Pry defective socket from floor.
- Install new tiedown socket. Rotate new tiedown socket enough to avoid installing screws in old screw holes.
- Reinstall screws.

1-16.15 Replace Level Indicator.

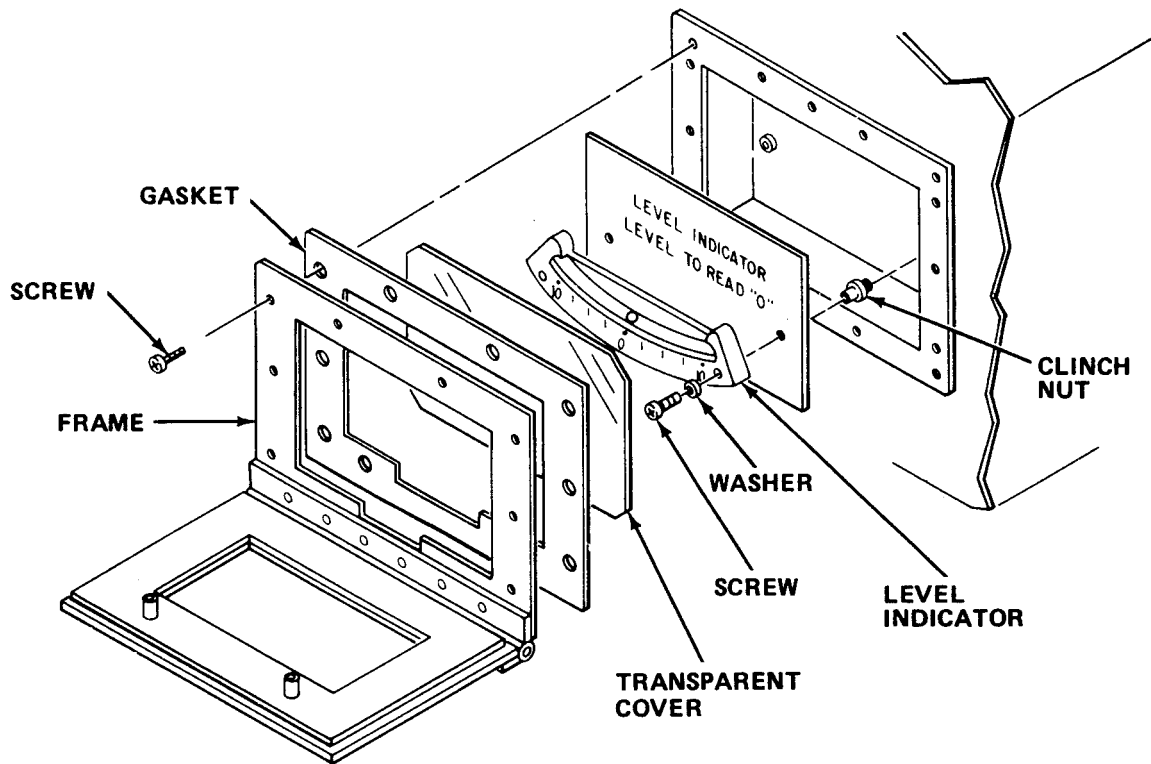
MOS: 83FJ6, Reproduction Equipment Repairer

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 alignment at front-rear and left-right at each end as shown in illustration.



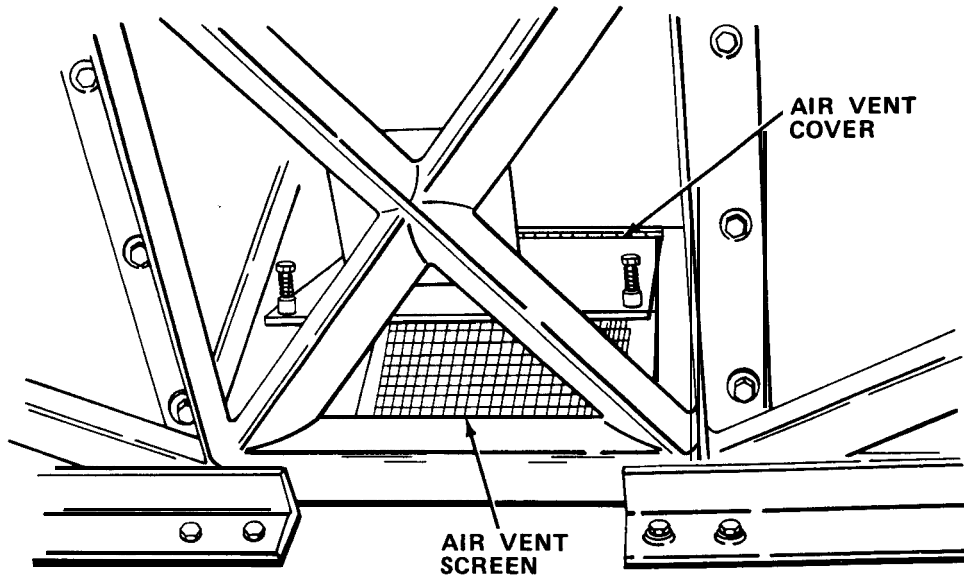
- c. Loosen knurled screws and move cover away from level assembly.
- d. Remove screws and washers to release frame and gasket.
- e. Remove transparent cover.
- f. Remove screws and washers to remove level indicator.
- g. Replace level assembly and secure with screws and washers.
- h. Reinstall transparent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

TOOLS : Cross Tip Screwdriver  
Scissors

SUPPLIES: Rubber Adhesive (Item 1, Appendix E)  
Screen Nylon (Item 67, Appendix E)



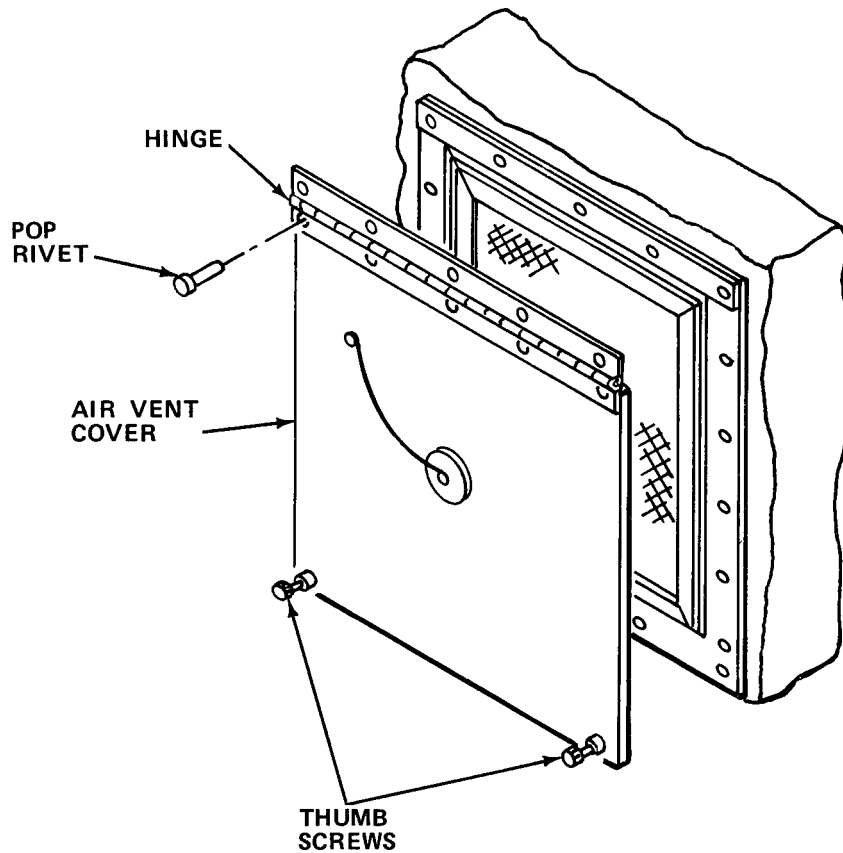
- a. Raise access cover and remove screws holding screen frame to section.
- b. Remove screen and frame.
- c. Clean all old screen material and adhesive from frame.
- d. Cut new screen material to size and attach to frame with adhesive.
- e. Reinstall frame to section and secure with screws. Lower cover.

1-16.17 Replace Air Vent Cover.

MOS : 83FJ6, Reproduction Equipment Repairer

TOOLS: Drill and Bits  
Pop Rivet Gun

SUPPLIES: Vent Cover  
Pop Rivets



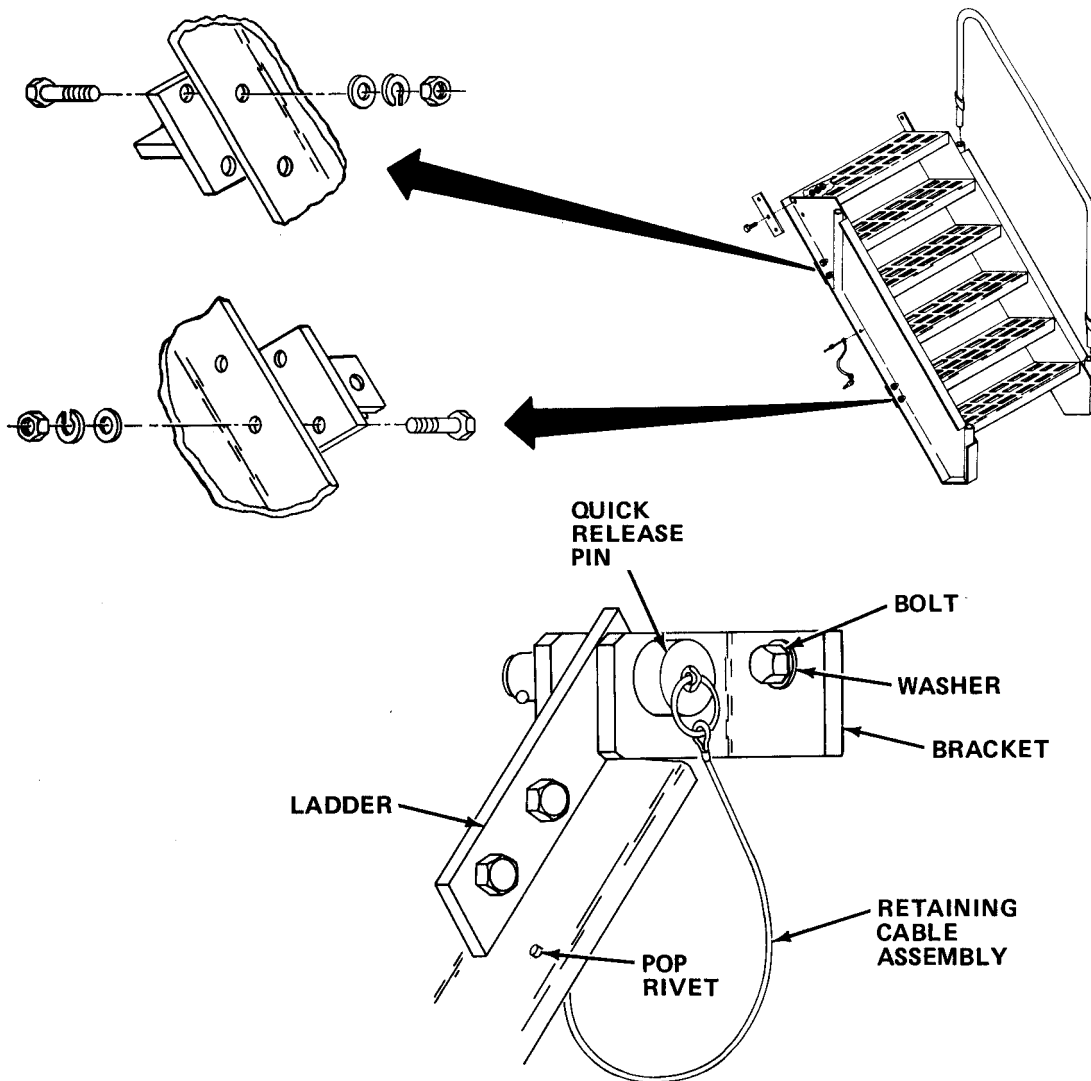
- a. Loosen thumbscrews.
- b. Drill pop rivets from hinge. Remove air vent cover.
- c. Align holes and pop rivet new air vent cover to section.
- d. Tighten thumbscrews.

1-16.18 Repair Personnel Ladder.

MOS: 83FJ6, Reproduction Equipment Repairer

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. Van body 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. Inventory equipment and consumable supplies against Hand Receipt Manual to be sure all accountable material is contained in section. 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 area authorities.

## 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, Support Equipment is listed in the applicable repair 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 5-6675-317-24P 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 at lower level's 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 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 is worn or broken.	Replace door gasket (paragraph 1-20.3).
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.

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

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MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

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

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 1-16.5).

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1-20. MAINTENANCE PROCEDURES.

a. This section contains instruction covering direct/general support maintenance functions for the Compilation 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

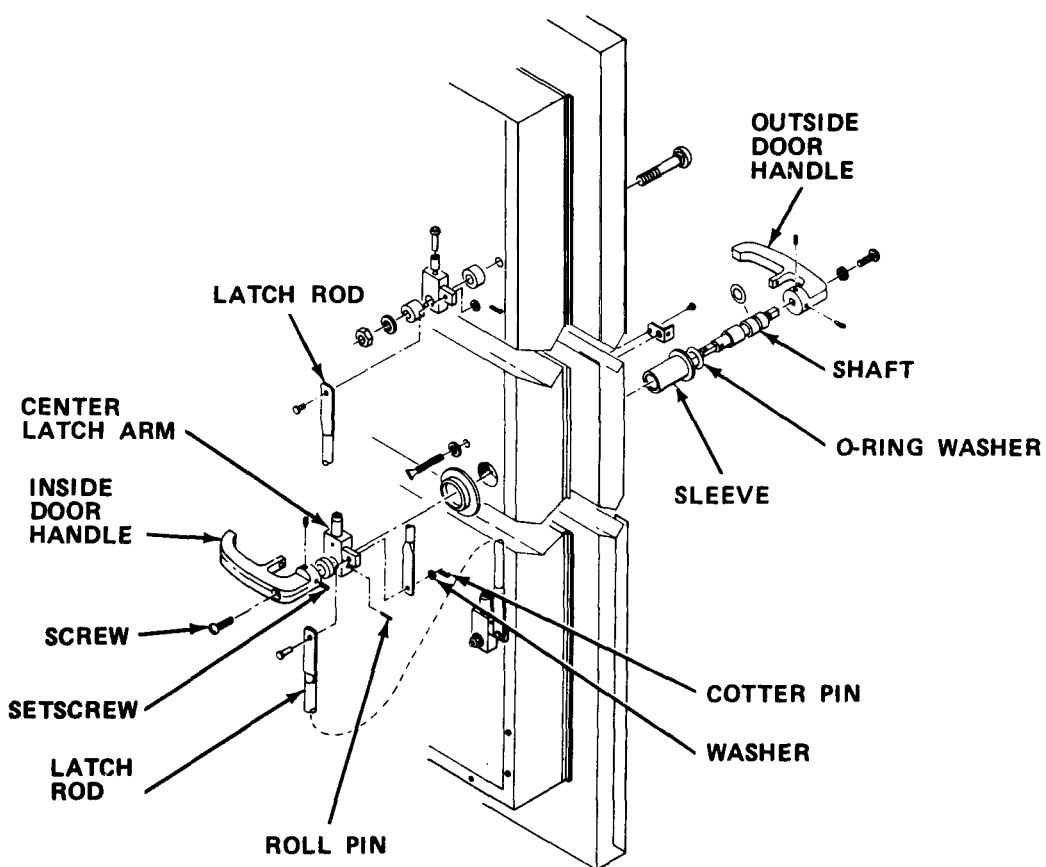
PROCEDURE	PARAGRAPH
Repair Personnel Door Handle . . . . .	1-20.1
Replace Cargo Door Latch Assembly . . . . .	1-20.2
Replace Personnel /Cargo Door Gasket . . . . .	1-20.3
Replace Personnel /Cargo Door . . . . .	1-20.4
Replace Circuit Breaker. . . . .	1-20.5
Repair Floor Covering . . . . .	1-20.6
Repair 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  
1/4 in. Hex Head Key Wrench

SUPPLIES: O-Ring Washer  
Sleeve  
Roll Pin  
Personnel Door Handle  
Cheesecloth (Item 16, Appendix E)  
Oil, Lubricating, General Purpose (Item 44, Appendix E)  
Hand Oiler  
Cotter Pin



- a. Loosen screw and socket head setscrews. Remove defective inside door handle.

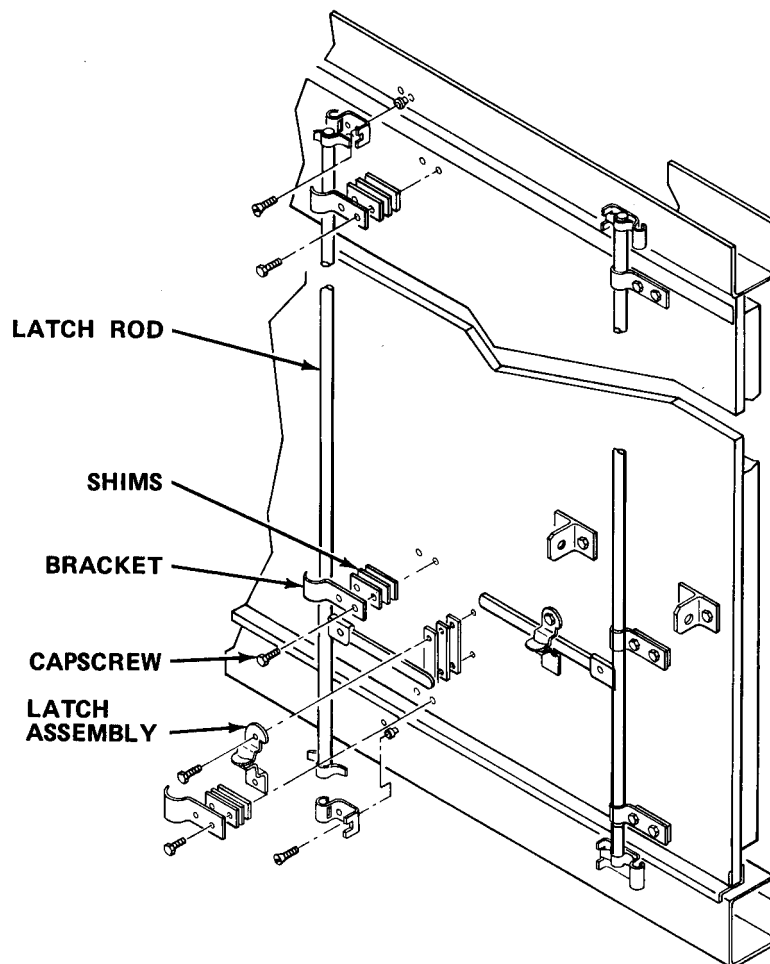
- b. Remove cotter pins from center latch arm assembly.
- c. Move latch rods out of way.
- d. Punch roll pin from center latch arm assembly and pull latch arm assembly from shaft.
- e. Withdraw latch and defective outside door handle.
- f. Inspect all components for wear.
- g. Replace worn O-ring washer and sleeve.
- h. Replace other worn components as needed.
- i. Reinstall shaft and new outside door handle.
- j. Align center latch arm assembly on shaft. Secure with new roll pin.
- k. Align 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



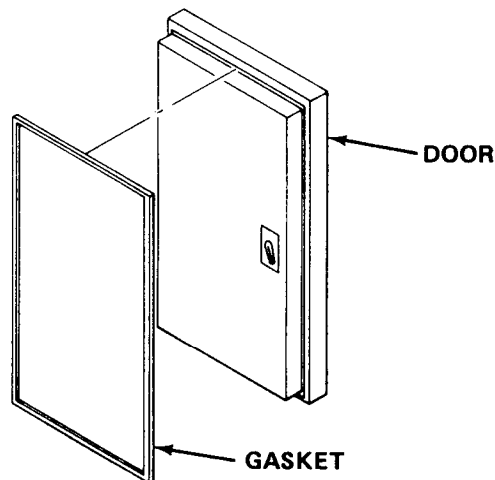
- a. Unlock latch.
- b. Remove capscrews and washers from brackets. Remove brackets and shims.
- c. Remove defective latch assembly and latch rod.
- d. Install new latch assembly and latch rod.
- e. Reinstall shims, brackets, washers, and capscrews.
- f. Check movement at latch rod and latch assembly.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

### 1-20.3 Replace Personnel /Cargo Door Gasket.

MOS : 63W, Wheel Vehicle Repairer

TOOLS: Knife

SUPPLIES: Vinyl Gasket  
Adhesive (Item 1, Appendix E)  
Solvent P-D-680 (Item 18, Appendix E)  
Impermeable Gloves  
Goggles



- 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

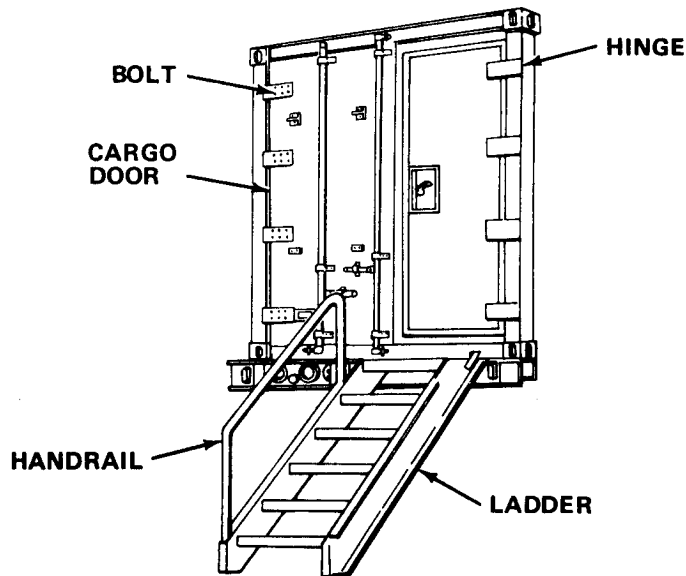
PERSONNEL: Two persons are required to perform this procedure.

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 (Item 47, Appendix E)  
Paint (Items 48, 49 and 50, Appendix E)  
Adhesive (Item 1, Appendix E)  
Cheesecloth (Item 5, Appendix E)

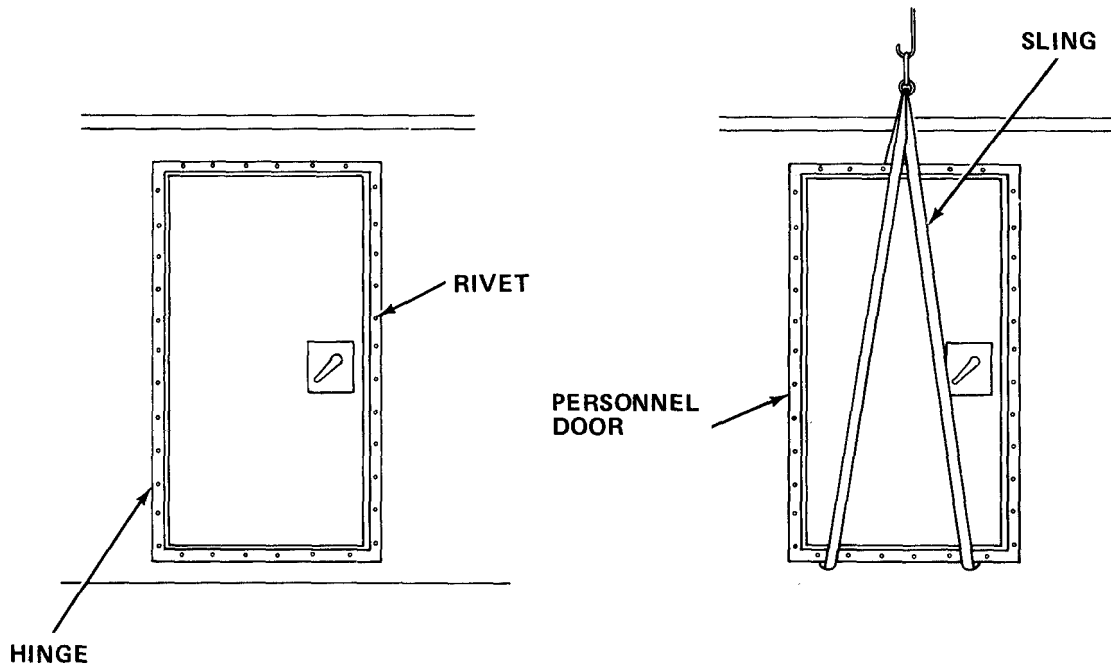
**WARNING**

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 doors are to be replaced.
- b. Unlock and open door to be replaced.





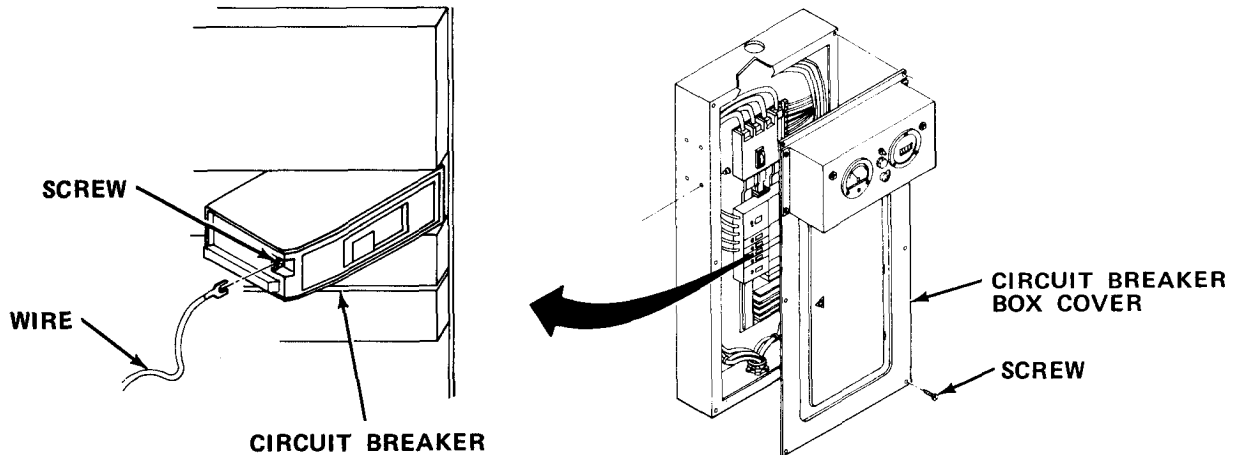
- c. Place sling around door and put a slight strain on hoist to remove weight from hinges.
- d. Remove bolts from hinges on rear personnel doors. On side personnel door, drill out pop rivets from hinge. Remove hinges from door.
- e. Remove damaged door using hoist.
- f. Install new door using hoist.
- 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  
Multimeter

SUPPLIES: Circuit Breaker



**WARNING**

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

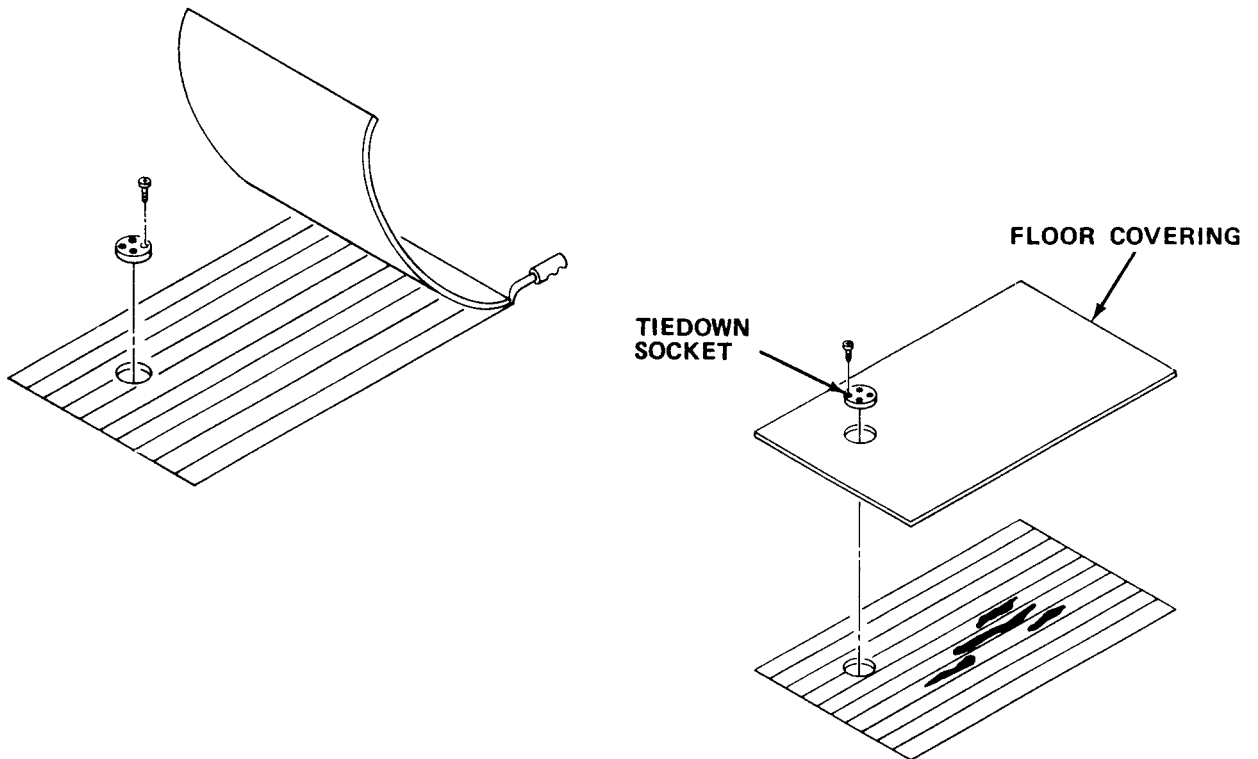
- a. Turn off and padlock safety switch and individual circuit breakers.
- b. Remove circuit breaker box cover.
- c. Use multimeter to make sure voltage is not present.
- d. Remove defective circuit breaker by pushing and snapping out of place.
- e. Tag and remove wires from defective circuit breaker.
- 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 14, Appendix E)  
Floor Patch (Item 8, Appendix E)  
Cheesecloth (Item 5, Appendix E)  
Adhesive (Item 1, 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.

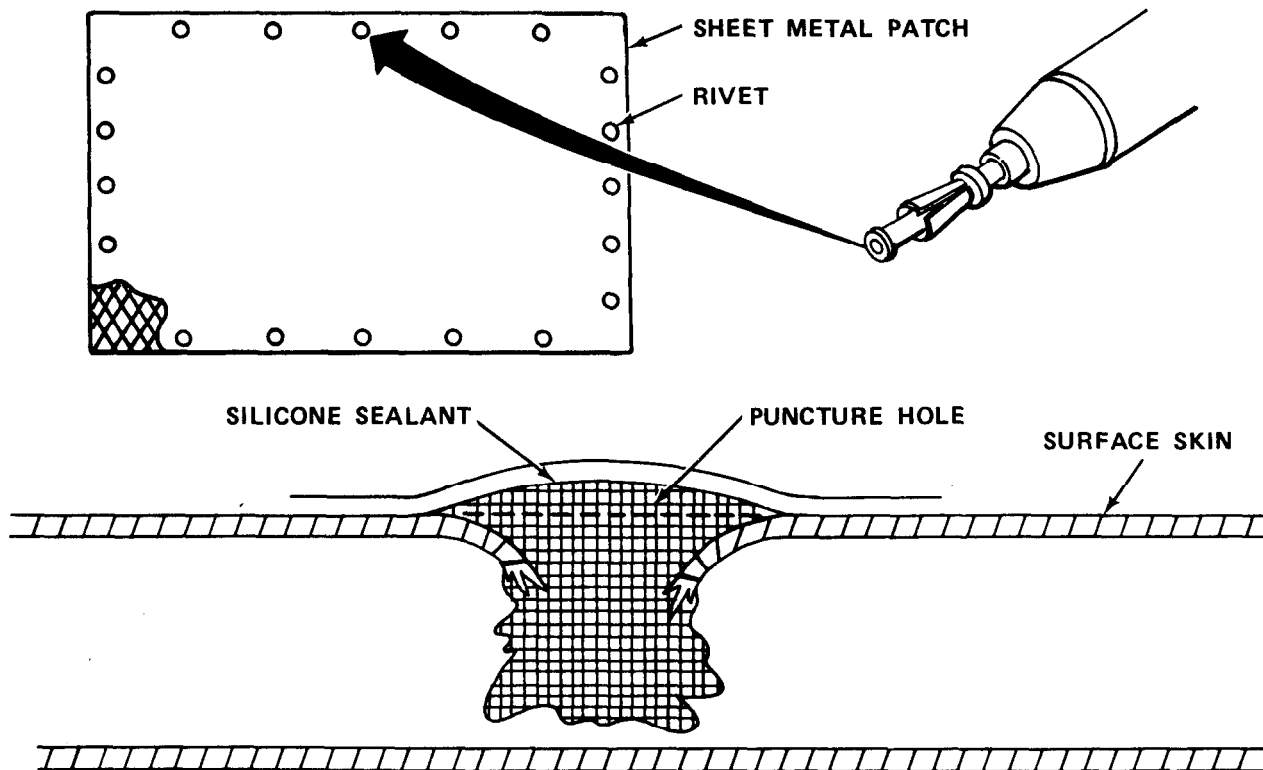
1-20.7 Repair Van Body Skin (Permanent).

MOS : 63W, Wheel Vehicle Repairer

TOOLS : Pop Rivet Gun  
Electric Drill and Bits  
Paint Brush

SUPPLIES: Pop Rivets  
Sprayfoam (Item 74, Appendix E)  
Silicone Sealant (Item 68, Appendix E)  
Sheet Metal  
Paint (Items 48, 49 and 50, Appendix E)  
Cheesecloth (Item 16, 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 spray foam 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.

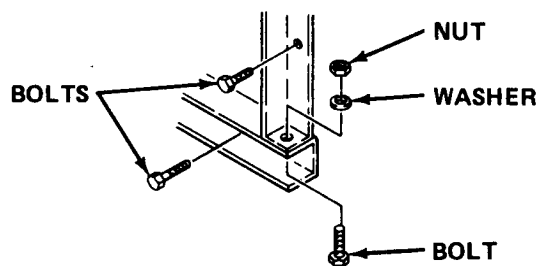
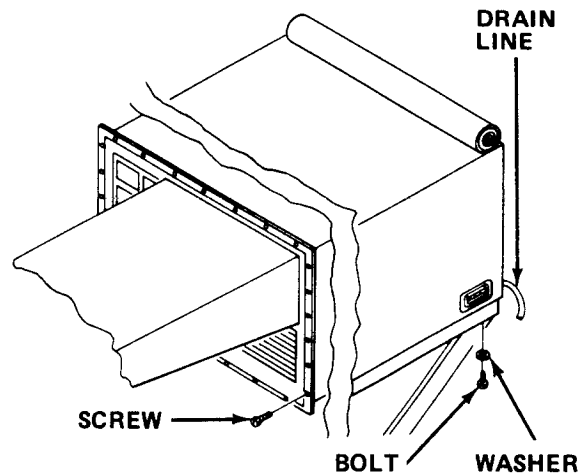
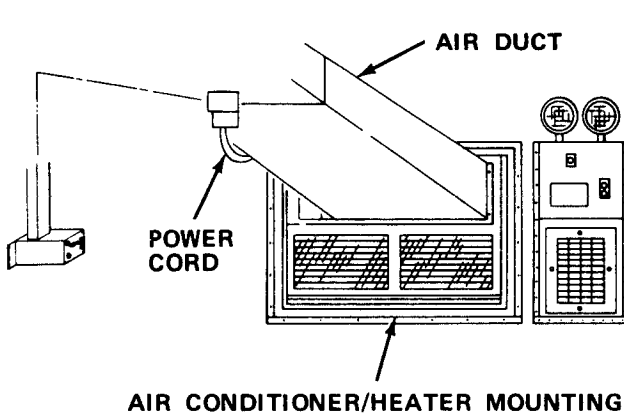
1-20.8 Replace Air Conditioner/Heater.

MOS : 63W, Wheel Vehicle Repairer

PERSONNEL : Two 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 72, Appendix E)  
Gasket  
Sealant (Item 68, Appendix E)  
Adhesive (Item 1, 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 wall.
- 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.

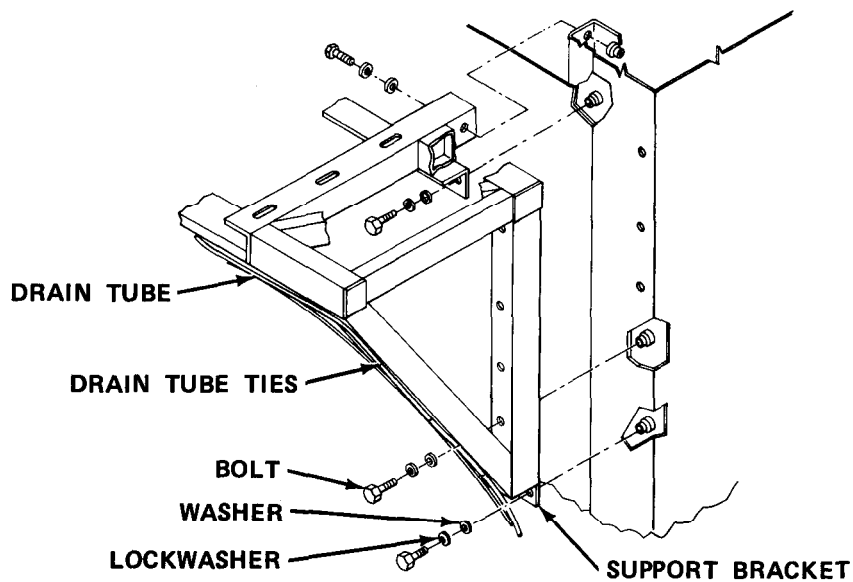
1-20.9 Replace Air Conditioner Support Bracket.

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).



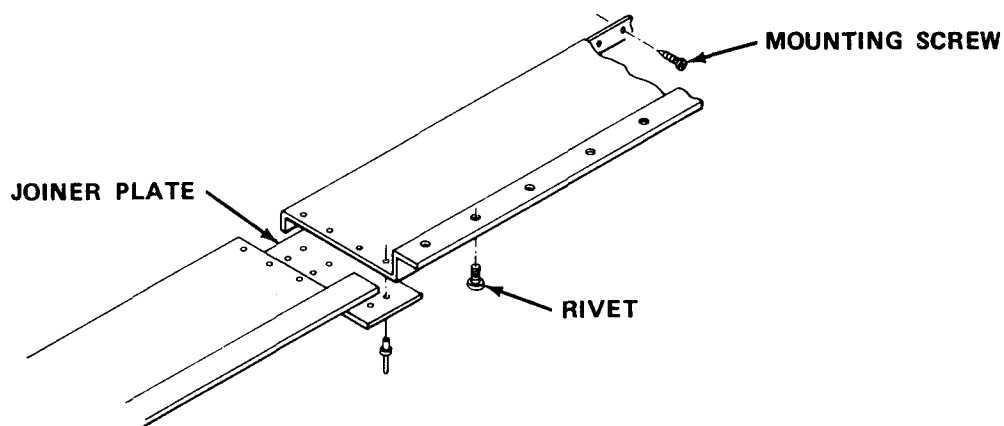
1-20.10 Replace Ventilation Duct.

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 68, Appendix E)  
 Wood Block  
 Pop Rivets  
 Paint (Item 47, Appendix E)  
 Cheesecloth (Item 16, Appendix E)  
 Salvaged Ventilation Duct

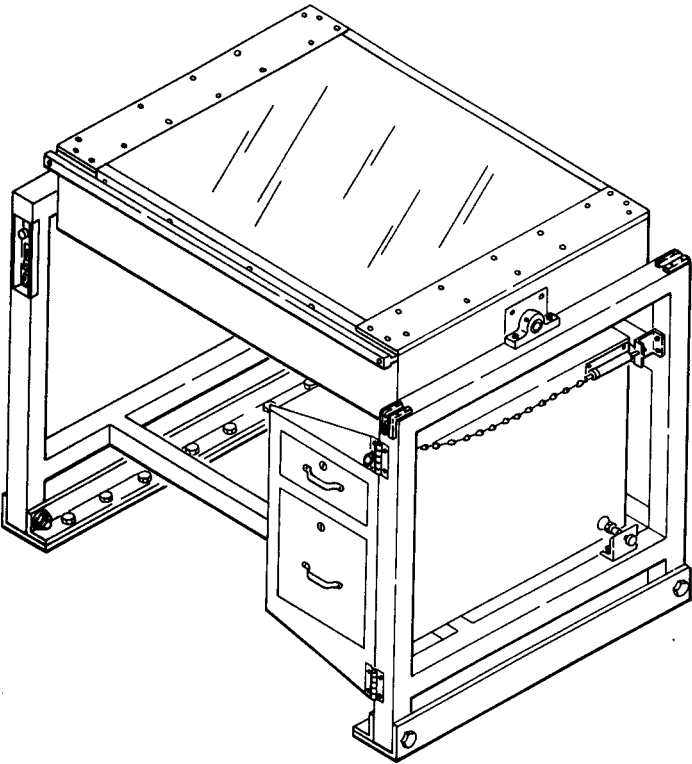
- a. Turn off air conditioner/heater so air will not blow through duct.



- 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  
 e. Place sealant on mounting edges.  
 f. Install new duct section cut from salvaged duct. Secure to van with screws.  
 g. Reinstall joiner plates. Install rivets to secure.  
 h. Paint as necessary.  
 i. Turn on air conditioner/heater.







## CHAPTER 2

## DRAFTING, SCRIBING/TRACING TABLE

## Section 1 INTRODUCTION

## 2-1. GENERAL INFORMATION.

2-1.1 Scope.

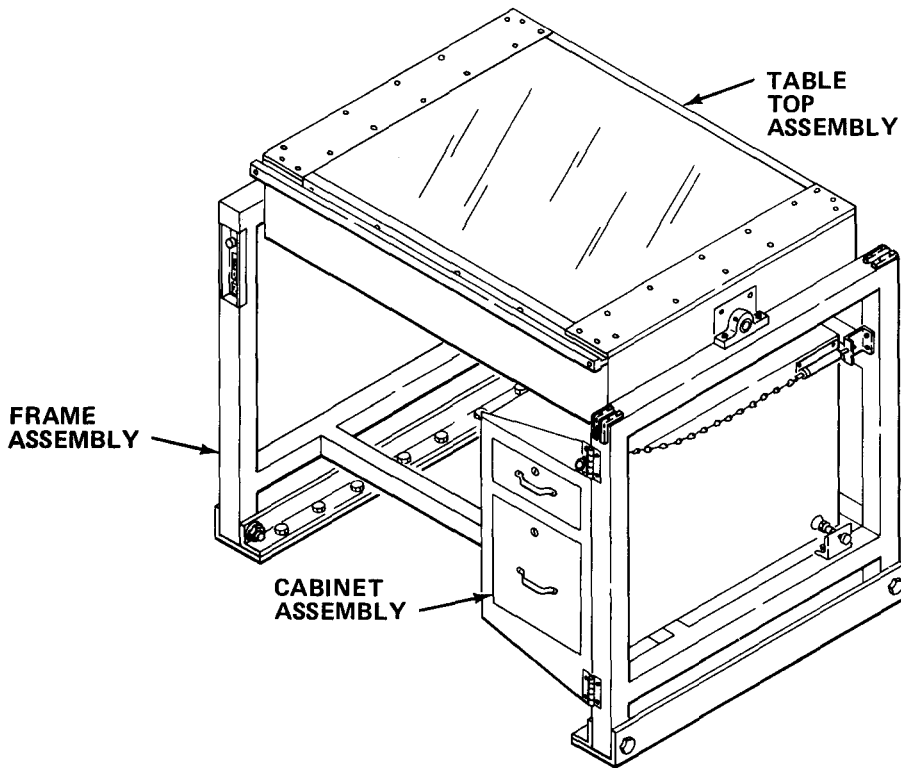
- a. Model Number and Equipment Name. Model 99-9933 Drafting, Scribing/Tracing Table
- b. Purpose of Equipment. To provide user with drafting, scribing, or tracing table in compact unit.

## 2-2. EQUIPMENT DESCRIPTION

2-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Rapid work surface selection.
- b. Auxiliary electrical outlets.
- c. Two drawer storage.
- d. Tilting work surface (0, 5, and 10 degrees).
- e. Easy access to all controls.
- f. Diffused light source.
- g. Drawing guard on front edge of drafting, scribing/tracing table.
- h. Sturdy steel base.

2-2.2 Location and Description of Major Components.



FRAME ASSEMBLY. Supports table top assembly, drawer assembly, control panel, safety stops, and tilt lock.

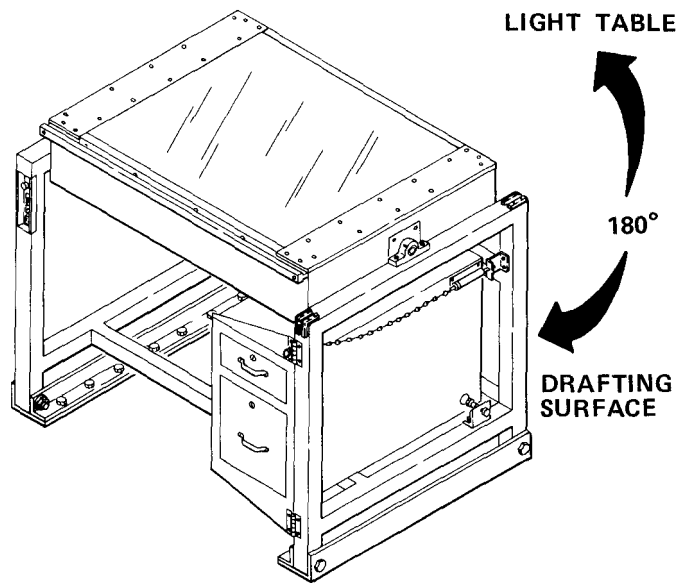
TABLE TOP ASSEMBLY. Consists of drafting board, light board, diffused lighting, and drawing guard.

CABINET ASSEMBLY. Consists of two drawers and drawer lock module.

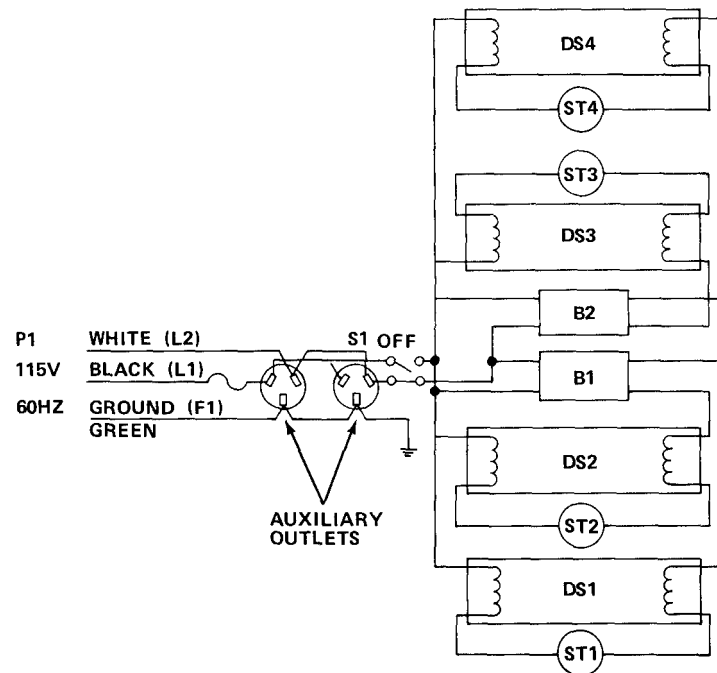
2-2.3 Equipment Data.

Power Requirements	115 V, 60 Hz, Single-Phase
Drafting Surface	42 in. X 31 in. (106.7 cm X 78.7 cm)
Light Table Surface	30 in. X 30 in. (76.2 cm X 76.2 cm)
Dimensions	
Width	47 in. (119.4 cm)
Depth	34 in. (86.4 cm)
Height (Table Flat)	42 in. (106.7 cm)

2-3. TECHNICAL PRINCIPLES OF OPERATION.



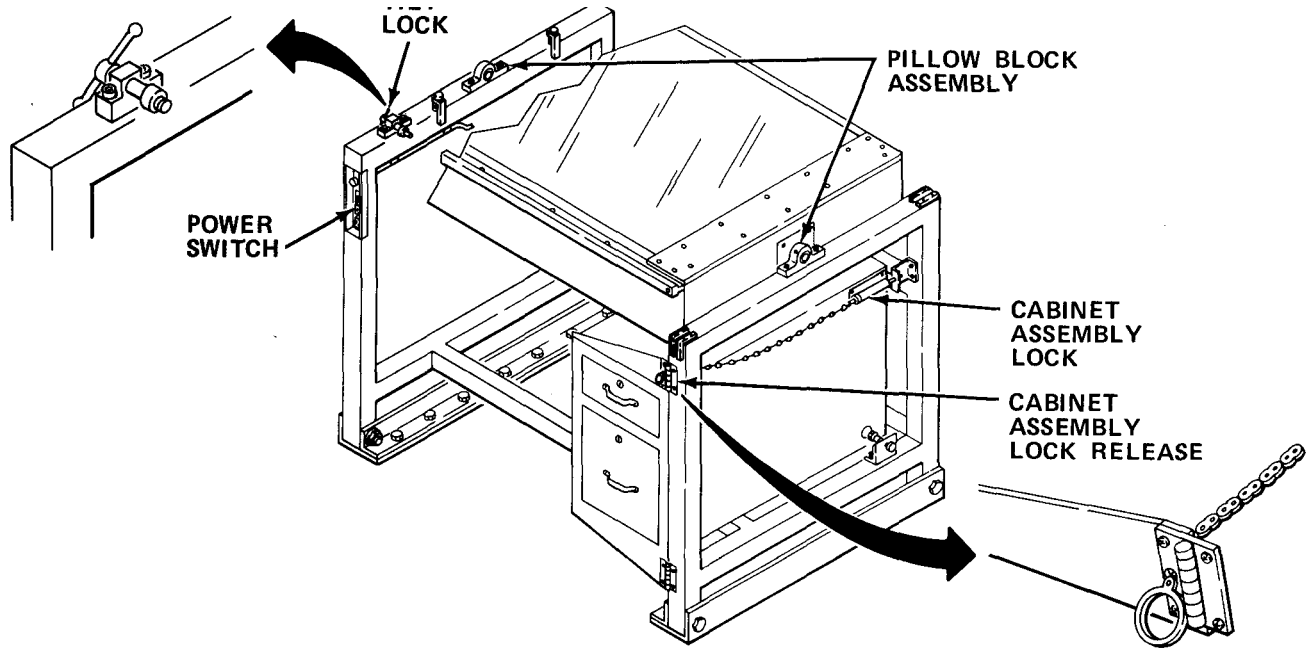
2-3.1 General. The movable top permits selection of drafting surface or light table. Has safety stops so that table top will turn only 180 degrees to prevent damage to electrical wiring. For drafting surface, rotate top away from operator. For light table, rotate top toward operator.



2-3.2 Electrical System. Provides power to the light table and two auxiliary outlets. The auxiliary outlets are located on the control panel. When plug P1 is connected, 120 V ac is applied to auxiliary outlets even if power switch S1 is off.

Section II OPERATING INSTRUCTIONS

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



Control or Indicator	Function
Tilt Lock	Used to change angle of work surface or to change work surface. Loosen tilt lock to change work surface. Tighten to secure in position.
Pillow Block Assembly	Houses the bearing which allows easy rotation of the work surface.
Cabinet Assembly Lock and Cabinet Assembly Lock Release	Located at upper cabinet assembly hinge on right front table leg. To open cabinet assembly, pull cabinet assembly lock release and swing assembly out so it is not under table.
Power Switch	Provides power to light table lamps only.



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. 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>
Liquid Detergent (Item 18, Appendix E)	ar
Cheesecloth (Item 16, Appendix E)	ar

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 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

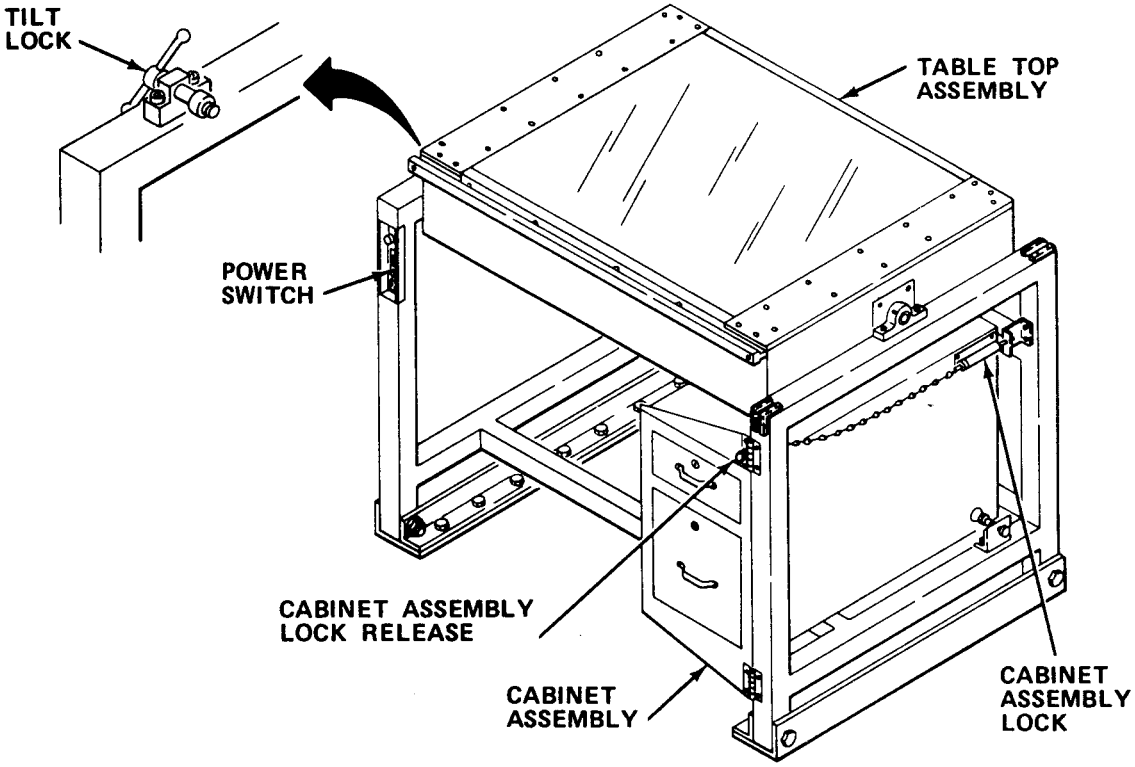
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment is Not Ready/ Available If:
1	B/A	<p><u>DRAFTING, SCRIBING/TRACING TABLE</u></p> <p>Inspect.</p> <ol style="list-style-type: none"> <li>1. Glass table surface.</li> </ol>  <ol style="list-style-type: none"> <li>2. Turn power switch off.</li> </ol>	Glass cracked or broken.

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:
1	B/A	<p><u>DRAFTING. SCRIBING/TRACING TABLE - Cont</u></p> <p><u>Inspect - Cont.</u></p> <p>3. Pull cabinet assembly lock release ring and swing out cabinet assembly.</p> <p>4. Loosen tilt lock until it clears table top assembly.</p> <p>5. Rotate table top 180°.</p> <p>6. Tighten tilt lock to secure table top assembly in position.</p> <p>7. Inspect wooden table top.</p> <p>8. Rotate table top 180° and tighten tilt lock.</p> <p>9. Return cabinet assembly to its normal position under table.</p> <p>10. Press firmly on cabinet assembly front until cabinet assembly lock clicks.</p> <p>11. Turn power switch on. Be sure all table lights are on. Check surface for cracks or breaks.</p> <p>120 Turn off power switch.</p>	<p>Tilt lock is damaged.</p> <p>Table top does not rotate.</p> <p>Table top will not lock in position.</p> <p>Table top has gouges, dents, or cuts.</p> <p>Table lights do not illuminate. Glass is broken. Power switch is broken.</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  
B1 - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<b>DRAFTING, SCRIBING/TRACING TABLE - Cont</b>				
2	B	Service.		Table top does not rotate.
<b><u>WARNING</u></b>				
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.				
<ol style="list-style-type: none"> <li>1. Unplug power cord.</li> <li>2. Pull cabinet assembly lock release ring and swing out cabinet assembly.</li> <li>3. Loosen tilt lock until it clears table top assembly.</li> <li>4. Rotate table top assembly until glass surface is on top.</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.	IN-TER-VAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B	<p><u>DRAFTING, SCRIBING/TRACING TABLE - Cent</u></p> <p><u>Service -Cont</u></p> <p>5. Tighten tilt lock to secure table top assembly in position.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Do not use abrasive cleaner on glass surface. Do not use running water or excessive water on cloth. Use moist cloth. Abrasive cleaner will scratch glass surface. Excessive water can cause equipment damage.</p> <p>6. Wipe glass surface with cheesecloth moistened in mild solution of detergent and water.</p> <p>7. Wipe glass surface with dry cheesecloth to remove streaks and smears.</p> <p>8. Swing cabinet assembly to its normal position under table.</p> <p>9. Plug in power cord.</p>	

## 2-6. OPERATION UNDER USUAL CONDITIONS.

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

- a. Clean work surface.
- b. Plug power cord into electrical receptacle.
- c. Turn power switch on for light table use.

### 2-6.2 Operating Procedures.

- a. Changing work surface.

#### **CAUTION**

Safety stops have been included to prevent overtravel of table top and damage to electrical wiring. If drafting surface is in top position, swing front edge of table top down to change work surface. If light table is in top position, swing front edge up to change work surface. Table cannot be rotated until cabinet assembly is swung out.

- (1) Pull cabinet assembly lock release ring and swing out cabinet assembly.
- (2) Loosen tilt lock until it clears table top assembly.
- (3) Tighten tilt lock to secure table top assembly in position.
- (4) Return cabinet assembly to its normal position under table top assembly.
- (5) Press firmly on cabinet assembly front until cabinet assembly lock clicks.

### 2-6.3 Preparation for Movement.

- a. Turn off power.
- b. Unplug power cord. Coil power cord and tape to table.
- c. Rotate table top assembly, if necessary, to be sure glass surface faces upward.
- d. Tighten tilt lock to secure table top assembly.
- e. Press firmly on cabinet assembly front until cabinet assembly lock clicks.
- f. Check cabinet drawers for open containers and loose items. Seal containers and secure all loose items.
- g. Lock cabinet drawers.

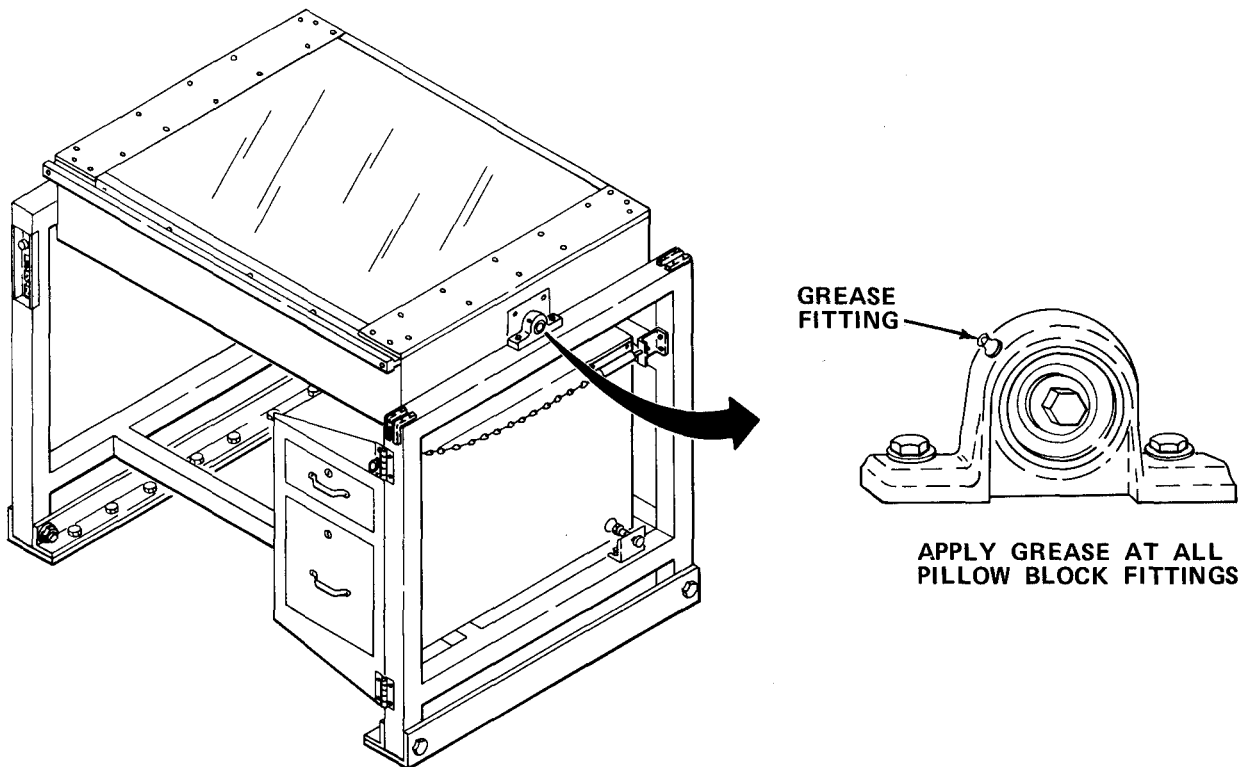
2-7. **OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for operation only in a controlled environment.

## Section III OPERATOR MAINTENANCE

### 2-8. LUBRICATION INSTRUCTIONS.

#### NOTE

These lubrication instructions are mandatory.



2-8.1 Pillow Block Fittings. Apply ball and roller bearing grease (Item 9, Appendix E) to both pillow blocks annually.

- a. Apply grease sparingly using grease gun.
- b. Wipe grease fittings clean after application.

### 2-9. TROUBLESHOOTING PROCEDURES.

a. The table lists the common malfunctions which you may find during operation or maintenance of the drafting, scribing/tracing table, 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 2-2. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. LAMPS DO NOT LIGHT.	Step 1. Check that power switch is on.	(a) If power switch is on, proceed to step 2. (b) Turn on power switch.
	Step 2. Check that power cord is plugged in.	(a) If power cord is plugged in, proceed to step 3. (b) Plug in power cord.
	Step 3. Visually check fuse for broken filament.	(a) Replace fuse (paragraphs 2-10.1) (b) If filament is not broken, refer to organizational maintenance.
2. TABLE DOES NOT LOCK.	Check for loose tilt lock.	(a) If loose, tighten. (b) If tight, refer to organizational maintenance.



**2-10. MAINTENANCE PROCEDURES**

a. This section contains instructions covering operator maintenance functions for the drafting, scribing/tracing table. 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.

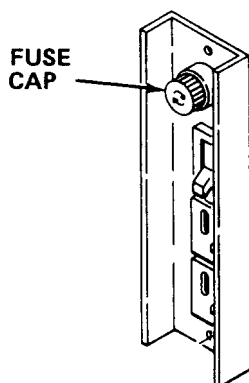
**INDEX**

PROCEDURE	PARAGRAPH
Replace Fuse . . . . .	2-10.1

2-10.1 Replace Fuse.

MOS : 81C, Cartographer

SUPPLIES: Fuse



a. Turn off power switch.

**WARNING**

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

- b. Unplug power cord.
- c. Push in on cap and turn left.
- d. Remove defective fuse.
- e. Install new fuse, push in, and turn right.
- f. Plug in power cord.

## Section IV ORGANIZATIONAL MAINTENANCE

### 2-11. LUBRICATION INSTRUCTIONS.

2-11.1 Pillow Block Fittings. After replacement, apply ball and roller bearing grease to pillow blocks (Item 25, Appendix E).

- a. Apply grease sparingly using grease gun.
- b. Wipe grease fittings clean after application.

### 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 is 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 5-6675-317-24P covering organizational maintenance for this equipment.

2-13. SERVICE UPON RECEIPT. The drafting, scribing/tracing table may be received mounted in the section or in a shipping crate.

#### 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.

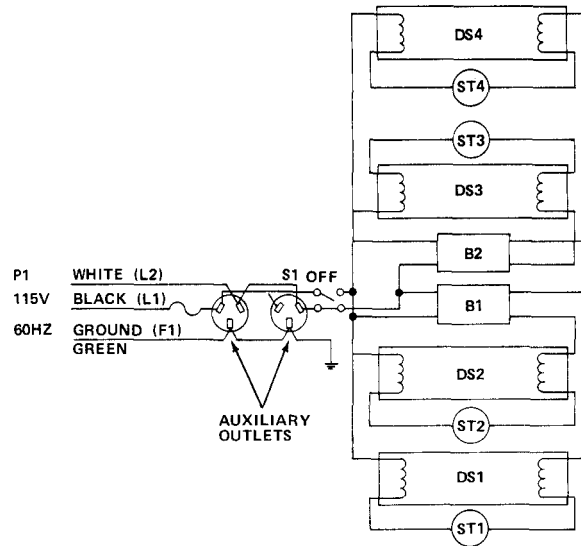
2-14. ORGANIZATIONAL PREVENTATIVE MAINTENANCE CHECKS AND SERVICES. There are no organizational PMCS procedures assigned for this equipment.

### 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 corrected by a listed corrective action, notify your supervisor.

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



d. If the drafting, scribing/tracing table 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 2-3. ORGANIZATIONAL TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. LAMPS DO NOT LIGHT.	Step 1. Check continuity of power switch.	(a) If continuity exists, proceed to step 2. (b) If no continuity exists, replace power switch (paragraph 2-16.1).
	Step 2. Check continuity of power cord.	(a) If no continuity exists, replace power cord (paragraph 2-16.2).

**Table 2-3. ORGANIZATIONAL TROUBLESHOOTING - Cont**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. LAMPS DO NOT LIGHT - Cont	Step 2. Check continuity of power cord - Cont	(b) If continuity exists, replace lamp starter (paragraph 2-16.5).
		(c) If lamps still do not light, replace ballast (paragraph 2-16.4).
2. POWER RECEPTACLES DO NOT WORK.	Step 1. Check continuity of power cord.	(a) If continuity exists, proceed to step 2.
		(b) If no continuity exists, replace power cord (paragraph 2-16.2).
	Step 2. Check continuity of receptacle.	Repair receptacle (paragraph 2-16.3).
3. TABLE DOES NOT LOCK.	Step 1. Check for loose tilt lock.	(a) If tight, proceed to step 2.
		(b) Tighten tilt lock.
	Step 2. Check for defective tilt lock.	(a) If good, proceed to step 3.
		(b) If defective, replace (paragraph 2-16.6).
	Step 3. Check for loose tilt locking block.	(a) If tight, proceed to step 4.
		(b) If loose, tighten.

**Table 2-3. ORGANIZATIONAL TROUBLESHOOTING - Cont**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. TABLE DOES NOT LOCK - Cont	Step 4. Check for defective tilt locking block.	(a) If good, proceed to step 5. (b) If defective, replace (paragraph 2-16.6).
	Step 5. Check for defective tilt locking plate.	If defective, replace (paragraph 2-16.6).

**2-16. MAINTENANCE PROCEDURES.**

This section contains instructions covering organizational maintenance functions for the drafting, scribing/tracing table. 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.

PROCEDURES	INDEX	PARAGRAPH
Replace Power Switch . . . . .		2-16.1
Replace Power Cord . . . . .		2-16.2
Replace Receptacle . . . . .		2-16.3
Replace Lamp Ballast . . . . .		2-16.4
Replace Tube/Starter . . . . .		2-16.5
Repair Tilt Lock Assembly . . . . .		2-16.6
Replace Pillow Block Assembly . . . . .		2-16.7
Remove/Install Drafting, Scribing/Tracing Table . . . . .		2-16.8

2-16.1 Replace Power Switch.

MOS: 83FJ6, Reproduction Equipment Repairer

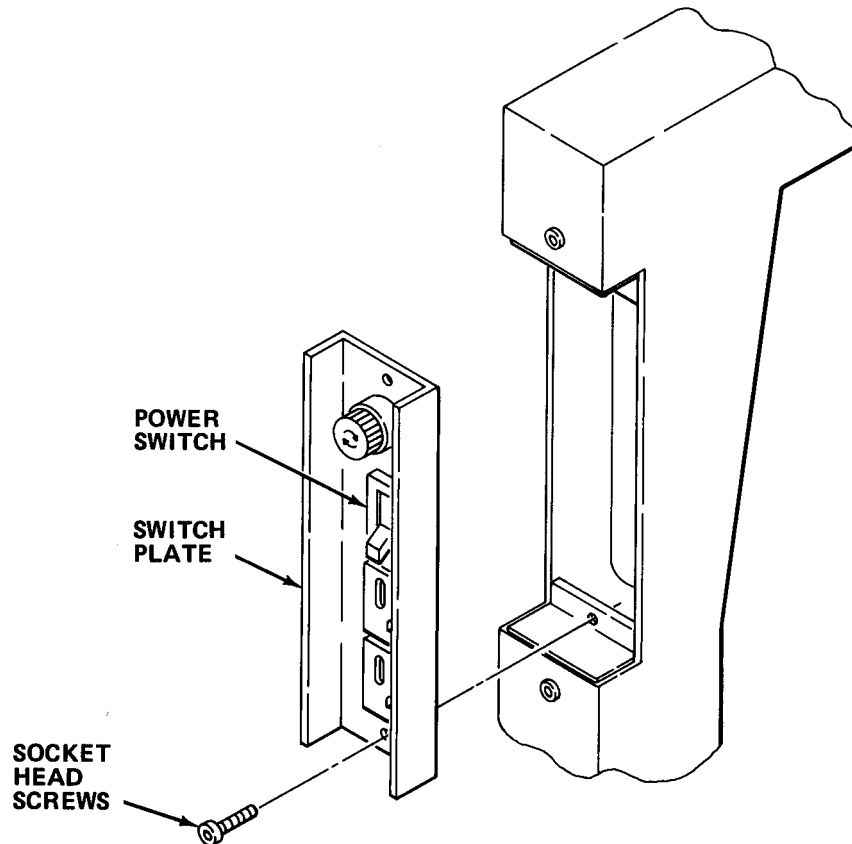
TOOLS: 5/64 in. Hex Head Key Wrench

SUPPLIES: Power Switch

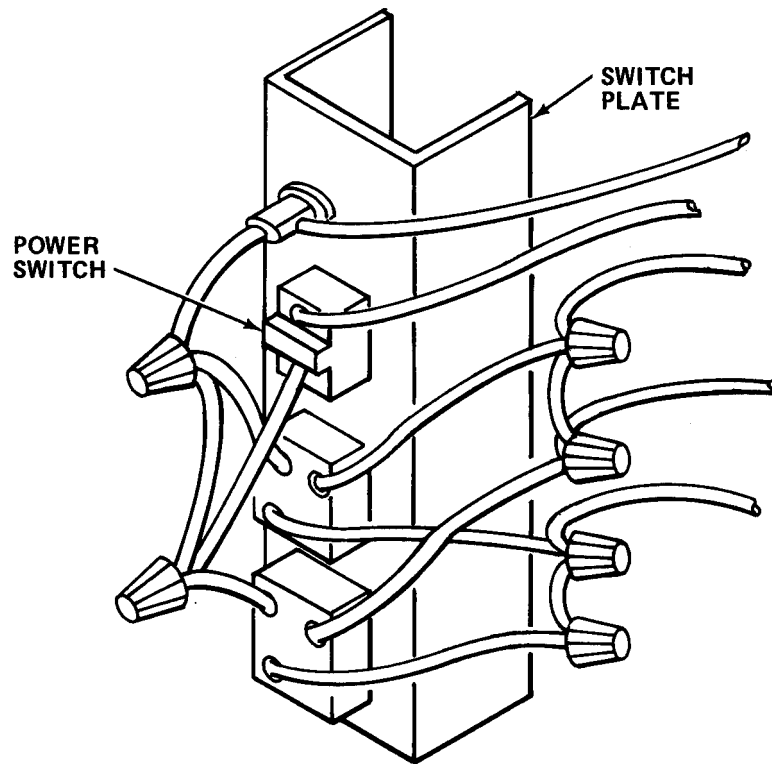
**WARNING**

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

- a. Turn off power switch.
- b. Unplug power cord.



- c. Remove socket head screws and pull switch plate out.



- d. Tag and disconnect wires from power switch.
- e. Remove defective power switch from front of switch plate.
- f. Install new power switch.
- g. Reconnect wires to power switch and remove tags.
- h. Reinstall switch plate and secure with socket head screws.
- i. Plug in power cord.

2-16.2 Replace Power Cord.

MOS: 83FJ6, Reproduction Equipment Repairer

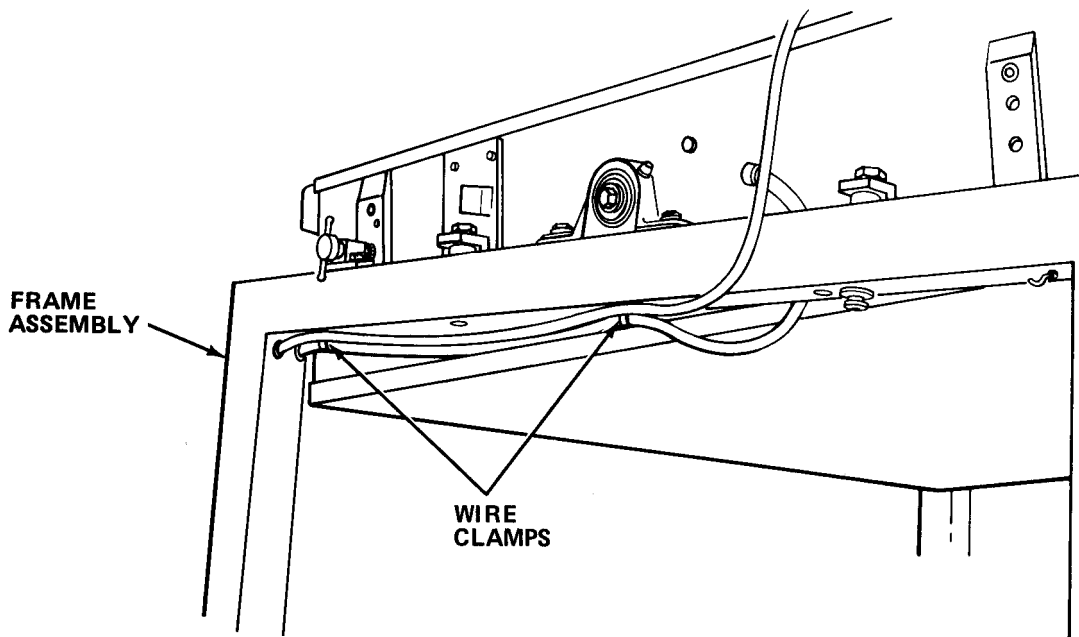
TOOLS: Flat Tip Screwdriver  
Soldering Iron  
5/64 in. Hex Head Key Wrench

SUPPLIES: Power Cord  
Solder

WARNING

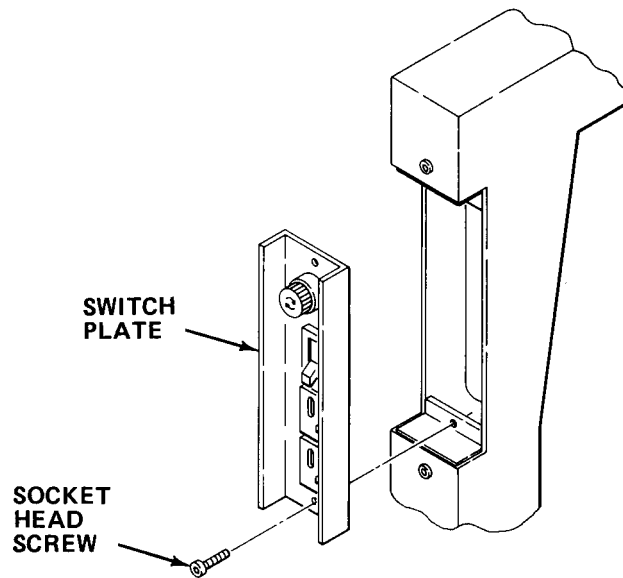
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn off power switch.
- b. Unplug power cord.

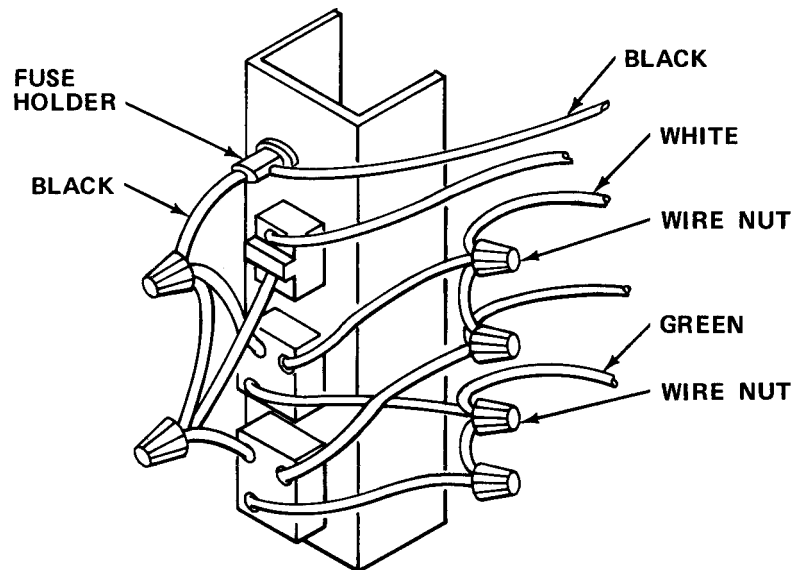


- c. Remove wire clamps located on frame assembly.





- d. Remove socket head screws and pull switch plate out.
- e. Tag wire connections for proper reconnection of wires.



- f. Desolder black power cord lead from fuse holder.
- g. Disconnect white lead and green ground at wire nuts.
- h. Remove power cord.
- i. Insert new power cord through hole in back of leg.
- j. Reconnect white lead and green ground and tighten wire nuts.

- k. Solder black lead to fuse holder.
- l. Reinstall wire clamps.
- m. Reinstall switch plate and secure with socket head screws.
- n. Plug in power cord.

2-16.3 Replace Receptacle.

MOS: 83FJ6, Reproduction Equipment Repairer

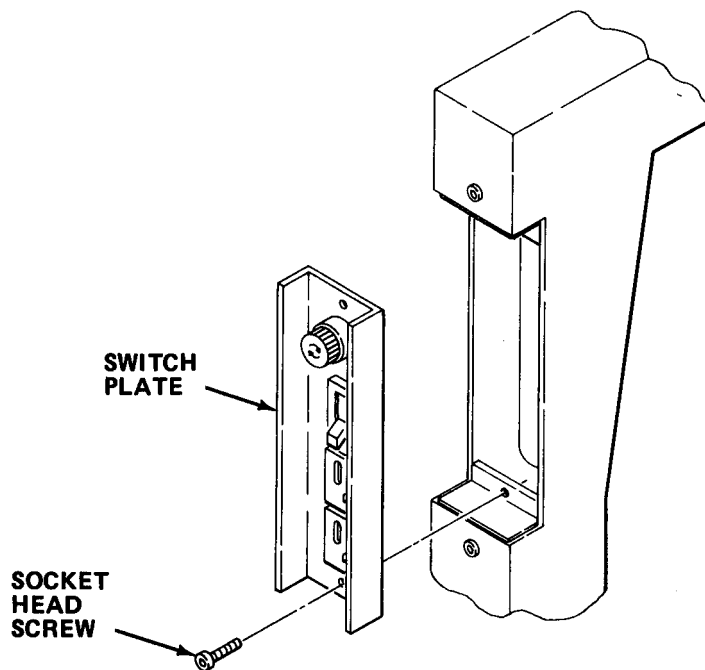
TOOLS: Flat Tip Screwdriver  
5/64 in. Hex Head Key Wrench

SUPPLIES: Receptacle

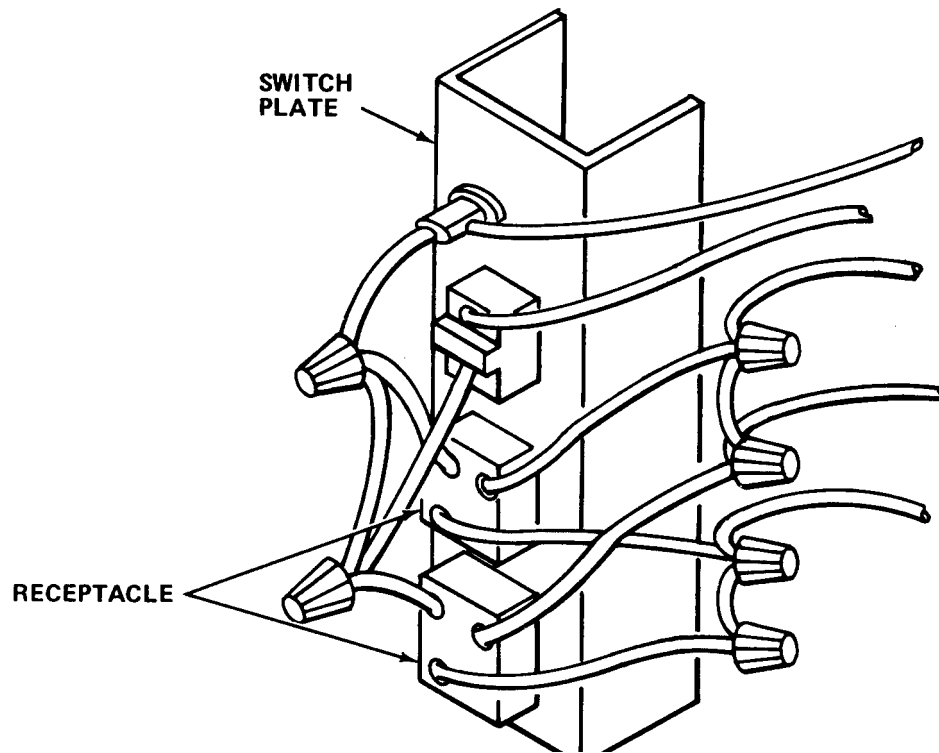
WARNING

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

- a. Turn off power switch.
- b. Unplug power cord.



- c. Remove socket head screws and pull switch plate out.



- d. Tag and disconnect wires from defective receptacle.
- e. Remove defective receptacle from switch assembly.
- f. Install new receptacle and reconnect wires.
- g. Reinstall switch plate and secure with socket head screws.
- h. Plug in power cord.

2-16.4 Replace Lamp Ballast.

MOS : 83FJ6, Reproduction Equipment Repairer

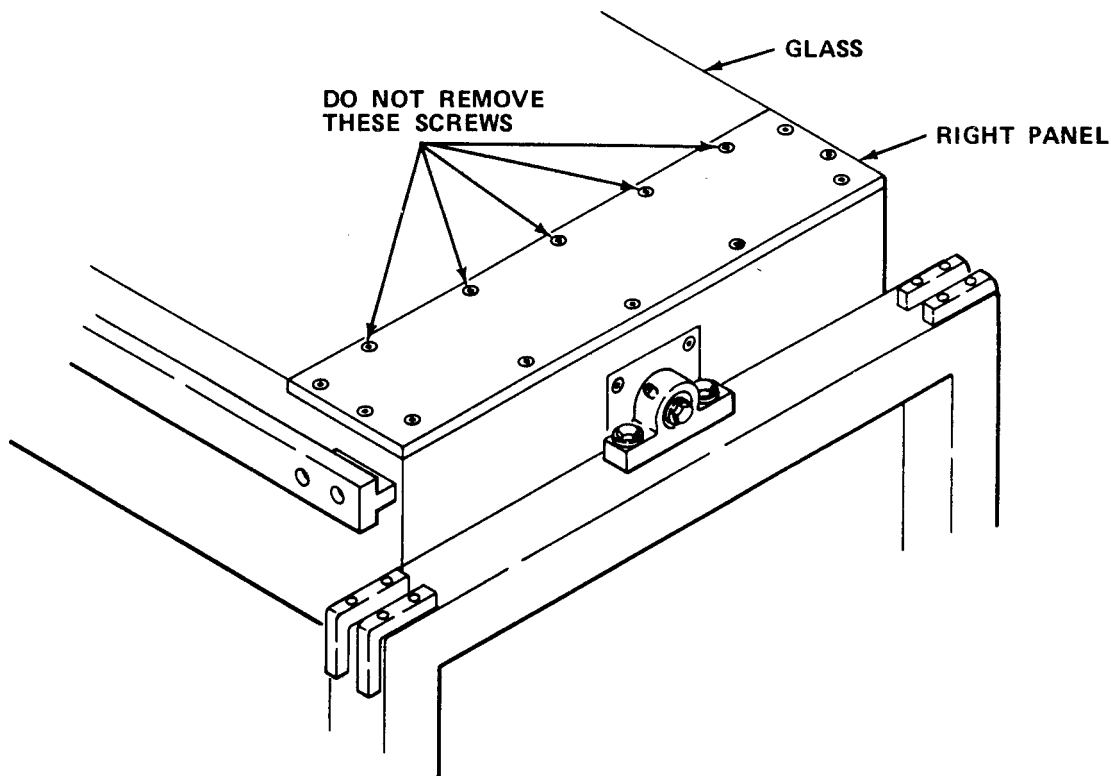
TOOLS: 3/32 in. Hex Head Key Wrench  
1/8 in. Hex Head Key Wrench  
3/8 in. Socket, 1/4 in. drive  
1/4 in. Wrench  
1/4 in. Drive Ratchet

SUPPLIES: Lamp Ballast

**WARNING**

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

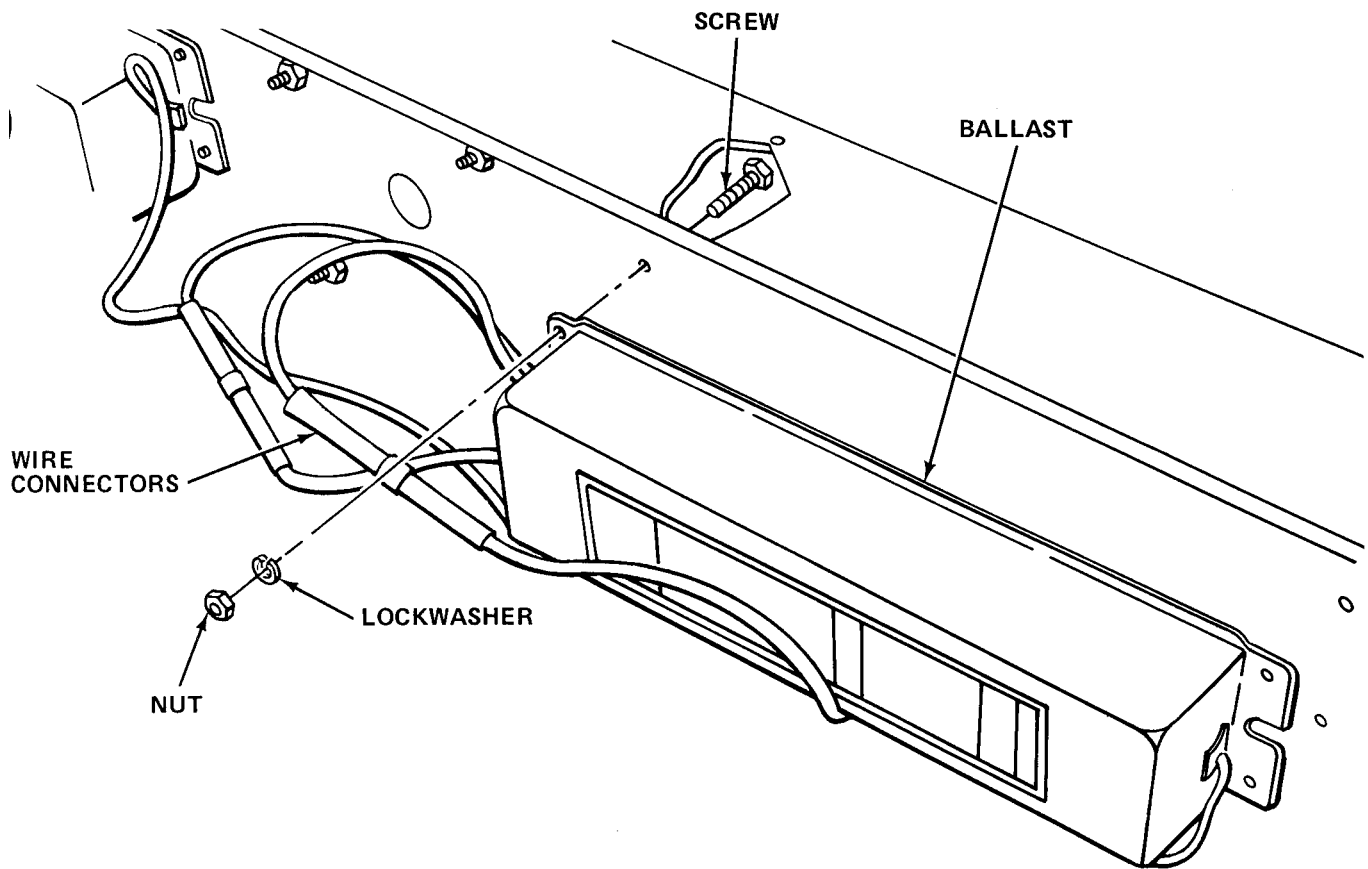
- a. Turn off power switch.
- b. Unplug power cord.



**CAUTION**

Removal of five socket head screws located closest to glass surface may result in damage to equipment.

- c. Remove nine socket head screws and right panel, but do not remove five socket head screws indicated in CAUTION and illustration.



- d. Remove socket head screws, lockwashers, and nuts that secure ballast.
- e. Lift ballast out of table to gain access to wire connectors.
- f. Tag and disconnect all wires.
- g. Install new ballast.

**NOTE**

Be sure wires are not kinked.

- h. Reconnect all wires.
- i. Secure ballast with nuts, lockwashers, and socket head screws.
- j. Reinstall right panel and secure with socket head screws.
- k. Plug in power cord.

2-16.5 Replace Fluorescent Lamp/Starter.

MOS : 83FJ6, Reproduction Equipment Repairer

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

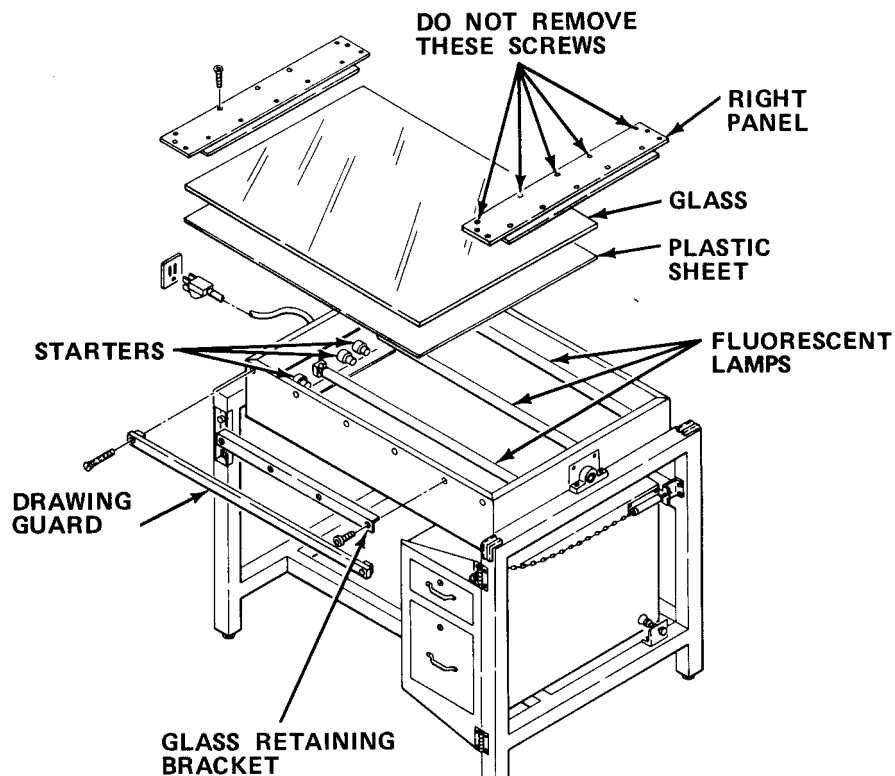
SUPPLIES: Fluorescent Lamp/Starter

- a. Place light surface up, turn on power switch, and note defective lamp.

**WARNING**

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

- b. Turn off power switch and unplug power cord.



**CAUTION**

Removal of five socket head screws located closest to glass surface may result in equipment damage.

- c. Remove nine socket head screws and remove right panel, but do not remove five socket head screws indicated in CAUTION and illustration.
- d. Remove socket head screws and drawing guard.
- e. Remove socket head screws and glass retaining bracket.
- f. Carefully slide glass and plastic sheet from retaining glass bracket and left panel.
- g. Remove defective lamp/starter.
- h. Install new lamp/starter.
- i. Reinstall plastic sheet and glass.
- j. Reinstall right panel and secure with socket head screws.
- k. Reinstall glass retaining bracket and secure with socket head screws.
- l. Reinstall drawing guard and secure with socket head screws.
- m. Plug in power cord.

2-16.6 Repair Tilt Lock Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

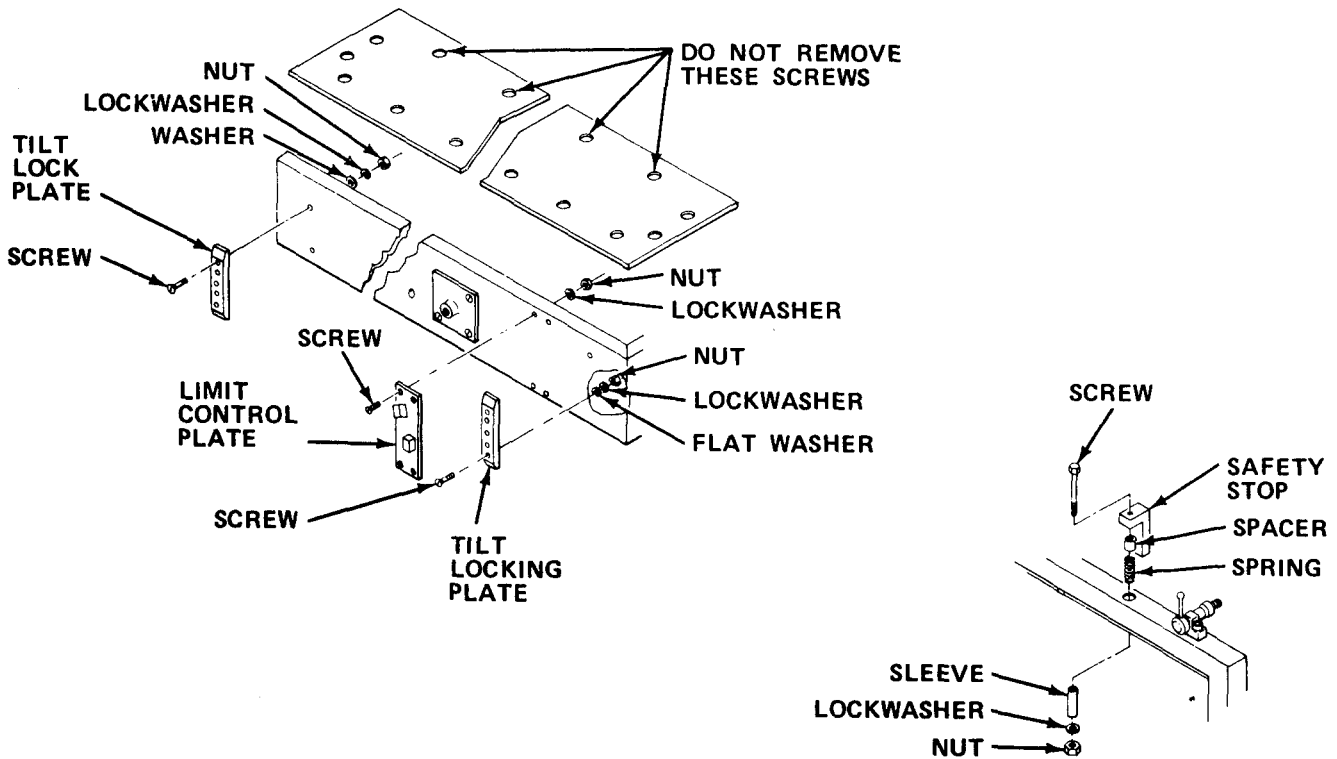
TOOLS: Flat Tip Screwdriver  
7/16 in. Combination Wrench  
9mm Wrench  
3/32 in. Hex Head Key Wrench  
3/16 in. Hex Head Key Wrench  
5/32 in. Hex Head Key Wrench

SUPPLIES: Tilt Plate  
Limit Control Plate  
Safety Stop

**WARNING**

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

- a. Turn off power switch.
- b. Unplug power cord.





**CAUTION**

Removal of five socket head screws located closest to glass surface may result in damage to equipment.

- c. Remove nine socket head screws and left panel, but do not remove five socket head screws indicated in CAUTION and illustration.
- d. Pull cabinet assembly lock release and swing cabinet assembly out so that it is not under table.

**NOTE**

Tilt locking plates are not interchangeable and must be replaced in same positions.

- e. Remove upper screws, nuts, and washers from defective tilt locking plate.
- f. Tilt table top as necessary and remove defective tilt lock plate by removing lower screws, nuts, and washers.
- g. Install new tilt locking plate, and secure with washers, nuts, and screws.
- h. Check position of tilt lock plate and readjust if required.
- i. Remove defective limit control plate by removing screws, washers, and nuts.
- j. Install new limit control plate. Secure with nuts, washers, and screws.
- k. Reinstall left panel and secure with nine socket head screws.

**NOTE**

Use care in disassembly of safety stop to prevent spring from falling inside frame.

- l. Remove defective safety stop by removing nut, lockwasher, sleeve, spring, spacer, and screw.
- m. Install new safety stop. Secure with screw, spacer, spring, sleeve, lockwasher, and nut.
- n. Swing cabinet assembly to its normal position under table.
- o. Plug in power cord.

2-16.7 Replace Pillow Block Assembly.

MOS: 83FJ6, Reproduction Equipment Repairer

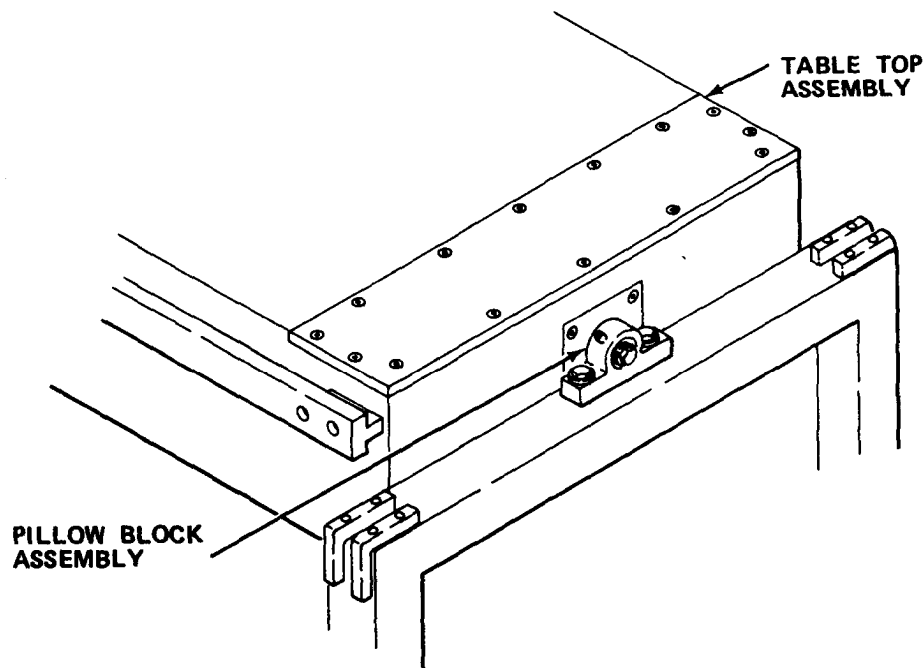
TOOLS: 1/8 in. Hex Head Key Wrench  
9/16 in. Combination Wrench  
1/2 in. Combination Wrench  
Grease Gun

SUPPLIES: Pillow Block Assembly  
GAA Grease (Item 25, Appendix E)

**WARNING**

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

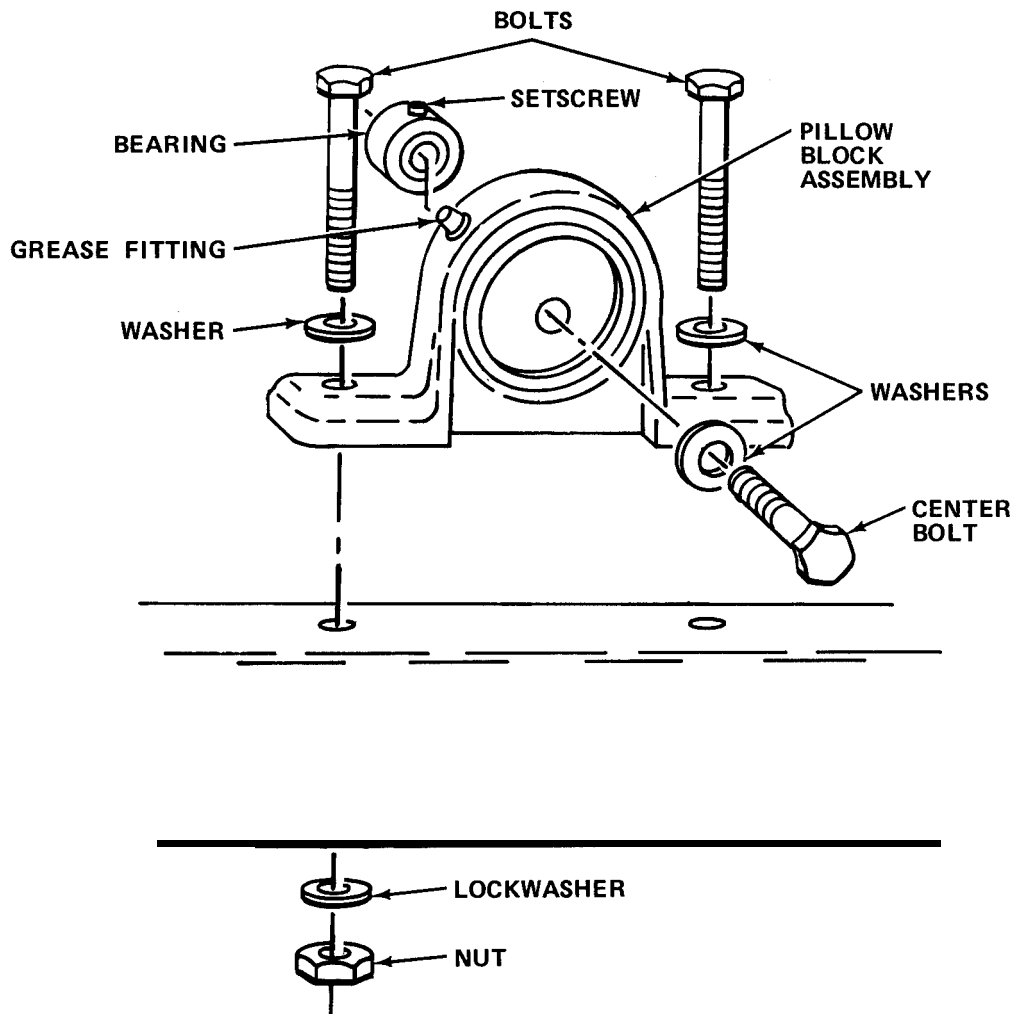
- a. Turn off power switch.
- b. Unplug power cord.



**CAUTION**

Table top assembly must be supported with drafting surface down to prevent table top from falling, causing equipment damage.

- c. Support table top assembly.
- d. Loosen, but do not remove socket head setscrew.



- e. Remove center bolt and washer.
- f. Remove bolts, washers, lockwashers, and nuts. Remove defective pillow block assembly.
- g. Install new pillow block assembly, and secure with nuts, lockwashers, washers, and bolts.
- h. Grease bearing (Paragraph 2-11.1).
- i. Reinstall washer and center bolt.
- j. Tighten socket head setscrew.
- k. Remove table top assembly supports.

2-16.8 Remove/Install Drafting, Scribing/Tracing Table.

MOS : 83FJ6, Reproduction Equipment Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: 1/2 in. Combination Wrench

SUPPLIES: Drafting, Scribing/Tracing Table

WARNING

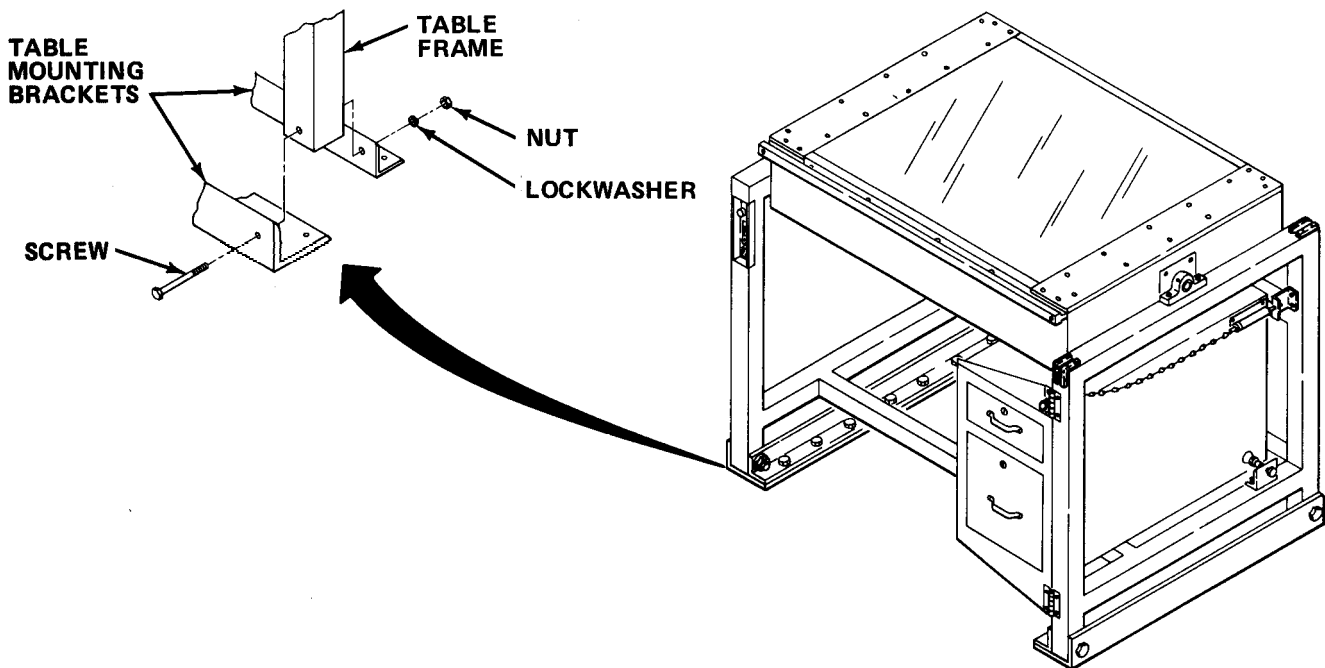
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove screws, lockwashers, and nuts from table mounting brackets.

WARNING

To prevent personal injury, two persons are required to move the drafting, scribing/tracing table.

- c. Carefully pull table away from wall until it clears table mounting



- d. Remove defective table from section.

- e. Position new drafting, scribing/tracing table in front of table mounting bracket.
- f. Slide table between table mounting brackets until holes in table frame are aligned with table mounting bracket holes.
- g. Reinstall screws, lockwashers, and nuts into table mounting brackets.
- h. Plug in power cord.

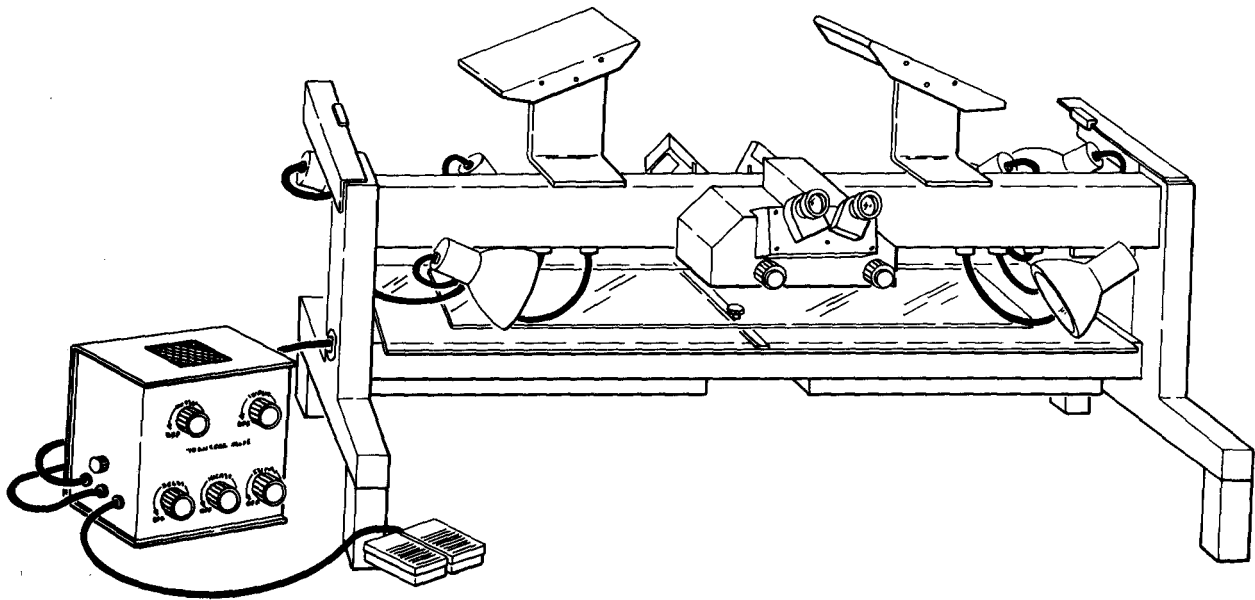
2-17. **PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

#### **Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

There are no direct/general support maintenance procedures assigned for this equipment.









## CHAPTER 3

## STEREO ZOOM TRANSFER SCOPE

## Section I INTRODUCTION

## 3-1. GENERAL INFORMATION.

3-1.1 Scope.

a. Model Number and Equipment Name. Model 53-05-04-20 Stereo Zoom Transfer Scope.

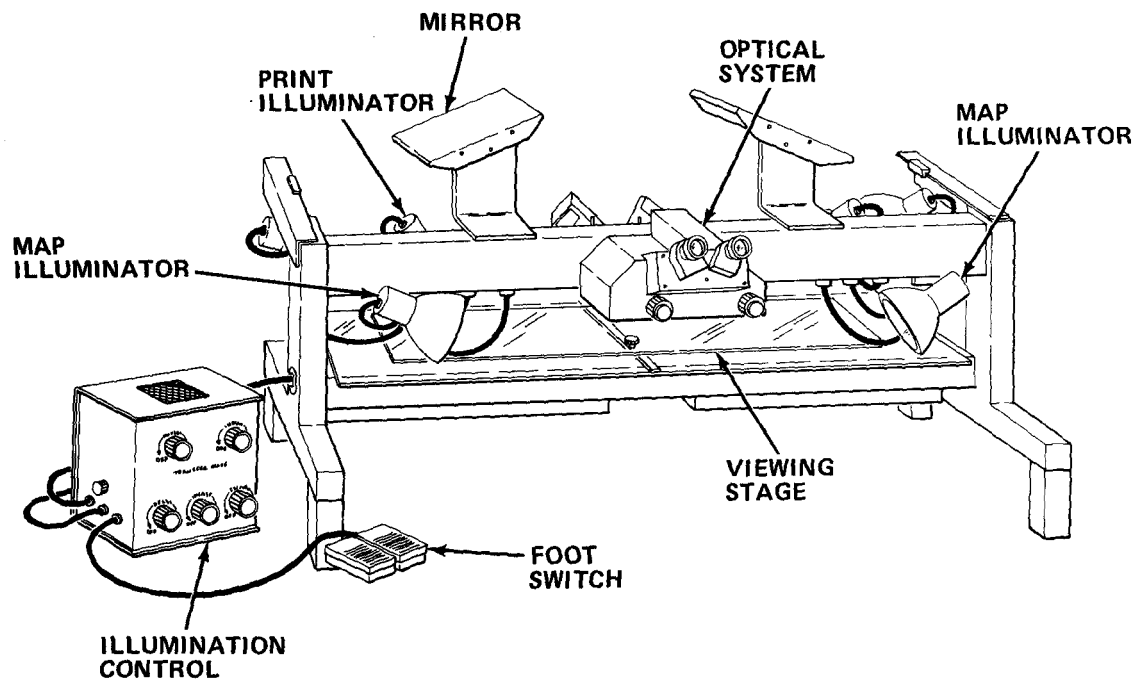
b. Purpose of Equipment. To optically superimpose stereographic image on map or chart.

## 3-2. EQUIPMENT DESCRIPTION.

3-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Optically matches map and photographic scales.
- b. Optically rotates or stretches images.
- c. Uses photographs or transparencies.
- d. Zoom control compensation for elevation scale change.
- e. May be used as stereoscope for analysis.
- f. May be used for monoscopic viewing.

3-2.2 Location and Description of Major Components.



MIRROR. Reflects photographic image to optical system.

OPTICAL SYSTEM. Contains magnification, focusing, rotation, stretch controls, prisms, and lenses.

VIEWING STAGE. Supports photographs and provides transillumination for negatives.

FOOT SWITCH. Interrupts either photograph or map illumination when activated.

ILLUMINATION CONTROL. Controls power and illumination intensity on map, photographs, and transilluminators.

MAP ILLUMINATORS. Illuminate work surface of map or chart.

PRINT ILLUMINATORS. Illuminate surfaces of photographs.

3-2.3 Equipment Data.

Dimensions

Plotter

Width 47.0 in. (119.4 cm)

Depth 32.0 in. (81.3 cm)

Height (without extenders) 15.5 in. (39.4 cm)

Height (with extenders) 21.0 in. (53.3 cm)

Stage

Width 31.0 in. (78.7 cm)

Depth 11.0 in. (27.9 cm)

Zoom Range 1x to 7x

Stage Magnification 0.6X to 4.2X

Field of View 7.5 in. (19.0 cm)

Table Magnification 0.75X to 1x

Image Rotation 360

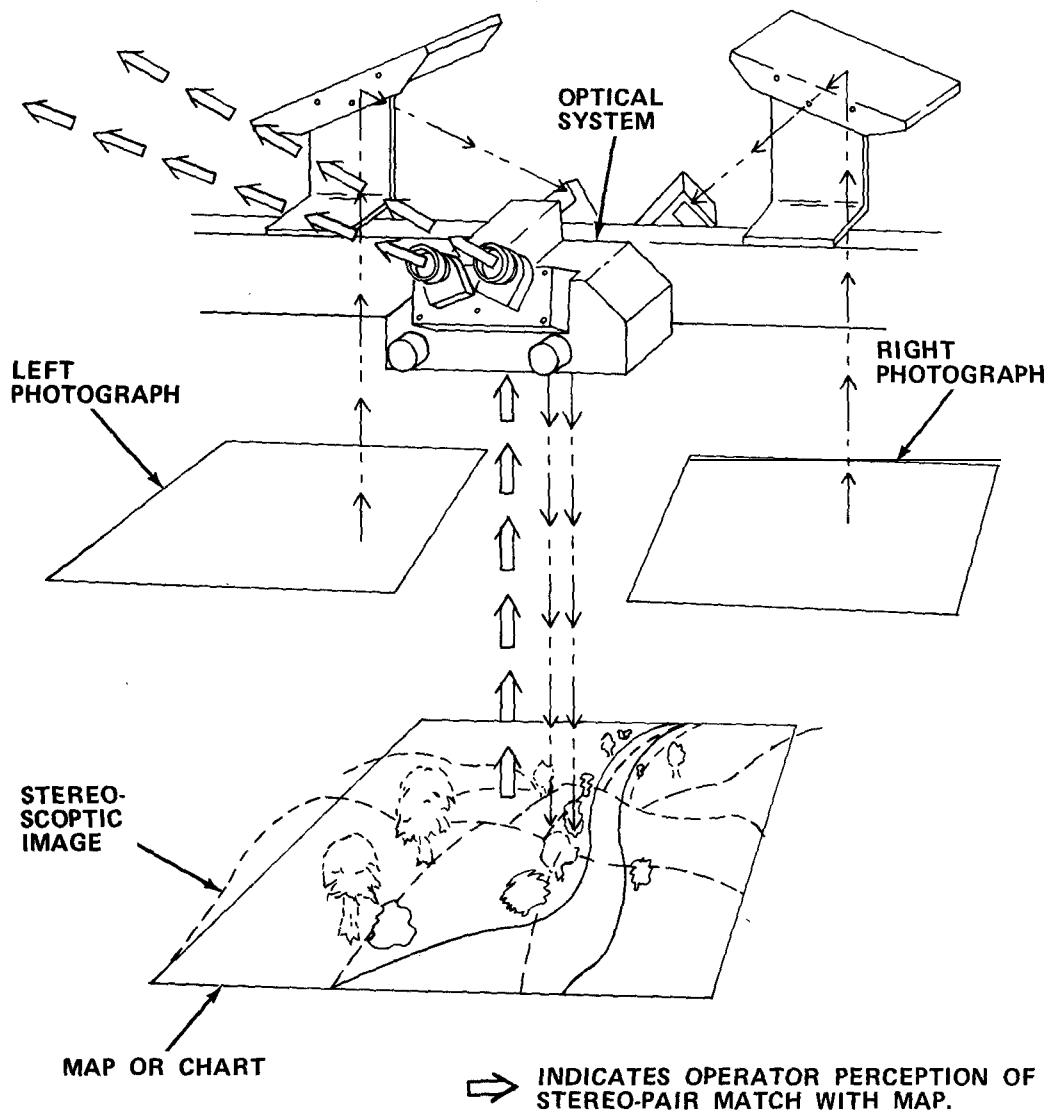
Interpupillary Distance Adjustment 50 mm to 80 mm

Working Distance 8 in. (20cm)

Power Requirements 120 V, 50-60 Hz, 350 W

Weight 93 lbs (41.9 kg)

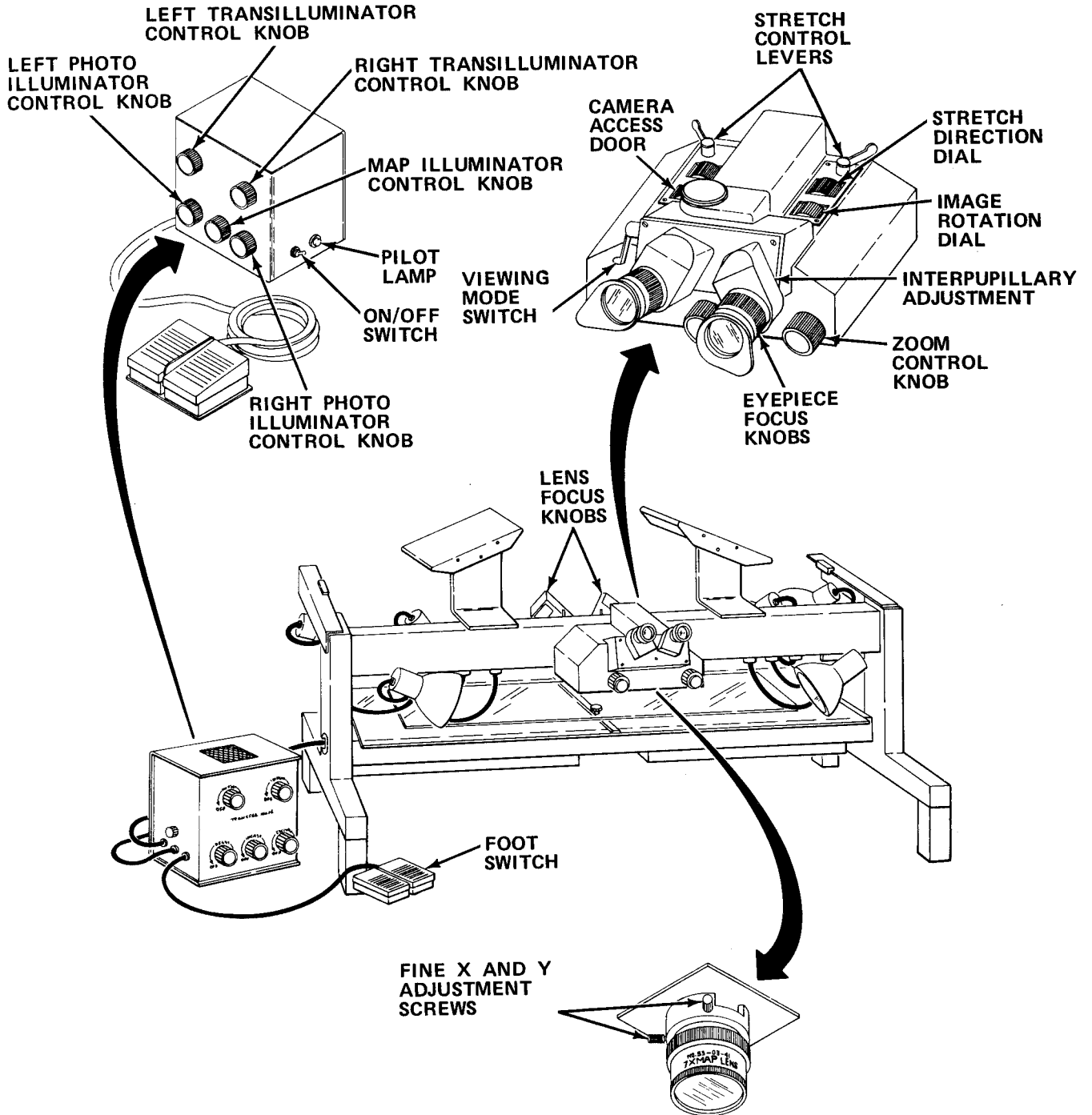
3-3. TECHNICAL PRINCIPLES OF OPERATION.



3-3.1 General. The operator views the map or chart through the optical system. Stereo-pair photographs appear superimposed on the map. The optical controls rotate, magnify and stretch the image to conform to the map or chart, permitting the operator to annotate, correct or change the map. The operator controls illumination of the photographs and map.

Section II OPERATING INSTRUCTIONS

3-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



Control or Indicator	Function
LEFT TRANSILLUMINATOR Control Knob	OFF and LEFT INCREASE control for light inside left viewing stage.
RIGHT TRANSILLUMINATOR Control Knob	OFF and RIGHT INCREASE control for light inside right viewing stage.
Pilot Lamp	Indicates power applied to controller.
ON/OFF Switch	Controls power.
RIGHT PHOTO ILLUMINATOR Control Knob	OFF and PHOTO RIGHT INCREASE control of light shining on right viewing stage.
MAP ILLUMINATOR Control Knob	OFF and MAP INCREASE control of light shining on map or chart.
LEFT PHOTO ILLUMINATOR Control Knob	OFF and PHOTO LEFT INCREASE control of light shining on left viewing stage.
STRETCH CONTROL Levers	Change image size in one direction for left or right print.
STRETCH DIRECTION Dial	Changes image stretch direction for left or right print.
IMAGE ROTATION Dial	Rotates image through 360 degrees.
Interpupillary Adjustment	Moves eyepieces toward or away from each other.
Viewing Mode Switch	MONO position couples images of right viewing stage and map.  PHOTO position couples right viewing stage image (map) and directs image to opening on top.

Control or Indicator	Function
Viewing Mode Switch - Cent	Right eyepiece is independent in STEREO position. Couples images from right and left viewing stages with map image.
ZOOM CONTROL Knobs	Changes photographic image magnification. Turn left for 1X. Turn right for 7X.
Eyepiece Focus Knobs	Individual focus adjustment for each eyepiece.
Lens Focus Knobs	Individual focus for photographic lenses.
Fine X and Y Adjustment Screws	Moves map lens small distance for accurate positioning.
Foot Switch	Turns off illumination to either map or photograph.
Camera Access Door	Not used and not to be removed.

### 3-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

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.

#### 3-5.1 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.

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>
Watchmaker's Blower	1 ea
Chamois	1 ea
Cheesecloth (Item 16, Appendix E)	ar
General Purpose Liquid Detergent (Item 18, Appendix E)	ar
Fresh Water	ar
Lens Tissue (Item 85, Appendix E)	ar
Lens Cleaner (Item 13, Appendix E)	ar
Lens Brush	1 ea



**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  
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:
1	B	<p><b><u>STEREO ZOOM TRANSFER SCOPE</u></b></p> <p>Inspect Wiring.</p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur if the stereo zoom transfer scope is operated with frayed, broken or defective wiring.</p> <p>Inspect wiring for breaks, tears, or loose connections.</p>	<p>Wiring is defective.</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

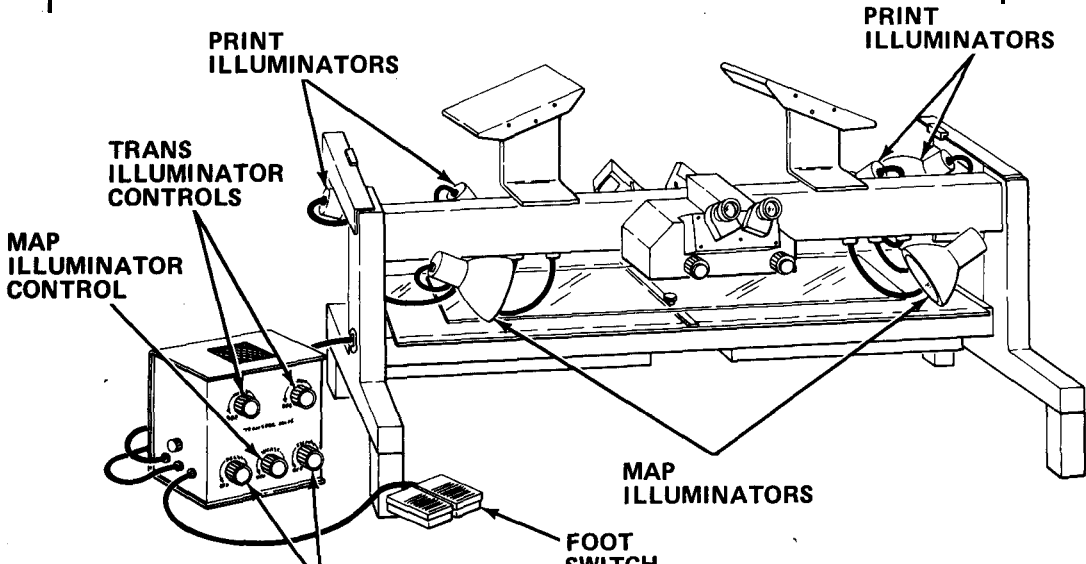
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B	<p><b>STEREO ZOOM TRANSFER SCOPE - Cont</b></p> <p><u>Inspect Illuminators.</u></p> <p>1. Plug in power cord.</p>	
			
<p>2. Turn on power switch.</p> <p>3. Rotate TRANS ILLUMINATOR controls to right. Observe that transilluminators light and increase in intensity.</p> <p>4. Rotate TRANS ILLUMINATOR controls to full left (OFF).</p> <p>5. Rotate MAP ILLUMINATOR control to right. Observe map illuminators light and increase in intensity.</p>			<p><b>Illumination is defective.</b></p>

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

**B - Before**  
**D - During**  
**A - After**

W - Weekly  
 M - Monthly  
**Q - Quarterly**

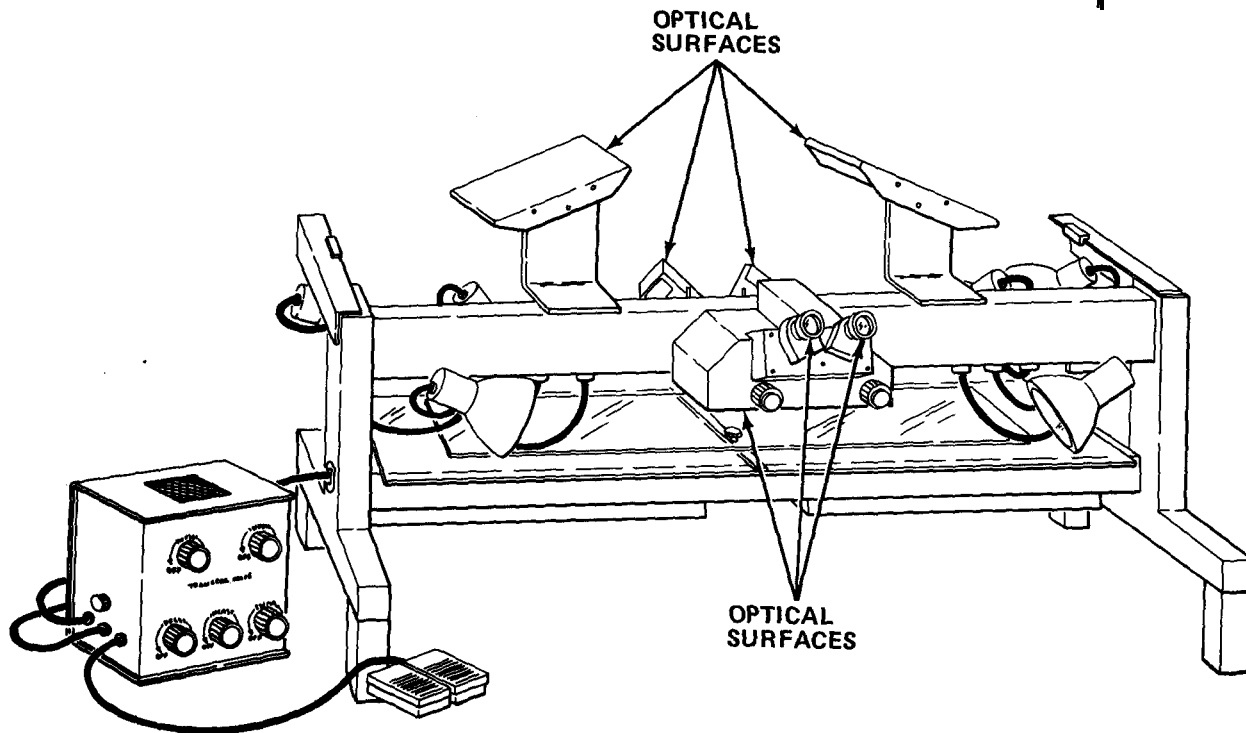
AN - Annually  
 S - Semiannually  
 BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<u>STEREO ZOOM TRANSFER SCOPE - Cont</u>			
2	B	<p><u>Inspect Illuminators - Cont</u></p> <p>6. Rotate PHOTO ILLUMINATOR controls to right. Observe photo illuminators light and increase in intensity.</p> <p>7. Press foot switch alternately from left to right. Observe map illuminators and print illuminators alternate on/off.</p> <p>8. Rotate MAP ILLUMINATOR controls and print illuminator controls to full left (off).</p> <p>9. Turn off power.</p>	
3	B	<p><u>Inspect Exterior.</u></p> <p>1. Inspect for missing bolts, nuts, and screws.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>To prevent damage to coatings do not touch optical surfaces with bare fingers.</p> <div style="text-align: center;"> </div>	

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			PROCEDURE	For Readiness Reporting, Equipment is Not Ready/ Available If:
		STEREO ZOOM TRANSFER SCOPE - Cont				
3	B	Inspect Exterior - Cont			2. Inspect lenses and mirrors for cracks, chips, dust, dirt, and fingerprints.	
4	B	Clean Optical System.				



**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  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
4	B	<b><u>STEREO ZOOM TRANSFER SCOPE - Cont</u></b>	
		<p><u>Clean Optical System - Cont</u></p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>To prevent damage to glass, do not wipe optical surfaces until dust and foreign matter have been removed. Do not touch optical surfaces with bare fingers. Do not use same lens brush on optical surface that is used to clean other surfaces. Do not use lens tissue containing silicone to clean optical surfaces. Any residue left on optical glass will affect performance.</p> <ol style="list-style-type: none"> <li>1. Use watchmaker's blower to carefully remove all dust, dirt, and foreign matter from exposed optical surfaces.</li> <li>2. Slightly dampen lens tissue with lens cleaner.</li> <li>3. Gently wipe one optical surface with moistened lens tissue. Use circular motion starting from center of glass working toward edge. Dispose of lens tissue after cleaning one optical surface.</li> <li>4. Dry optical surface with fresh lens tissue. Use circular motion starting at center and work toward edge.</li> </ol>	

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

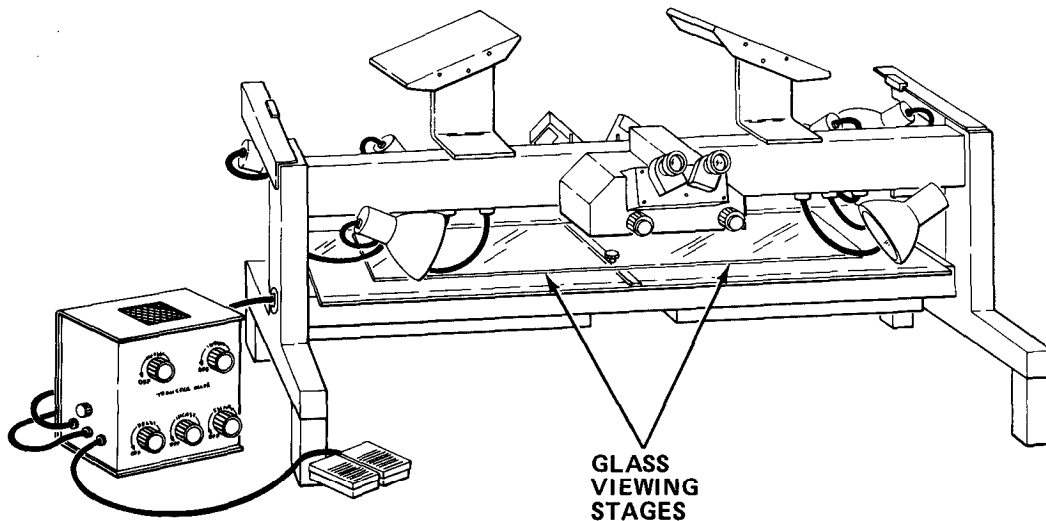
B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
5	B	<p><b>STEREO ZOOM TRANSFER SCOPE - Cont</b></p> <hr/> <p>Clean Glass Viewing Stages.</p>	



**CAUTION**

To prevent damage to electrical components, do not allow moisture to enter glass viewing stages.

1. Moisten cheesecloth in detergent solution and wipe glass viewing stages. Use care not to touch optical surfaces.
2. Wipe glass viewing stages with cheesecloth moistened in fresh water and dry with chamois.

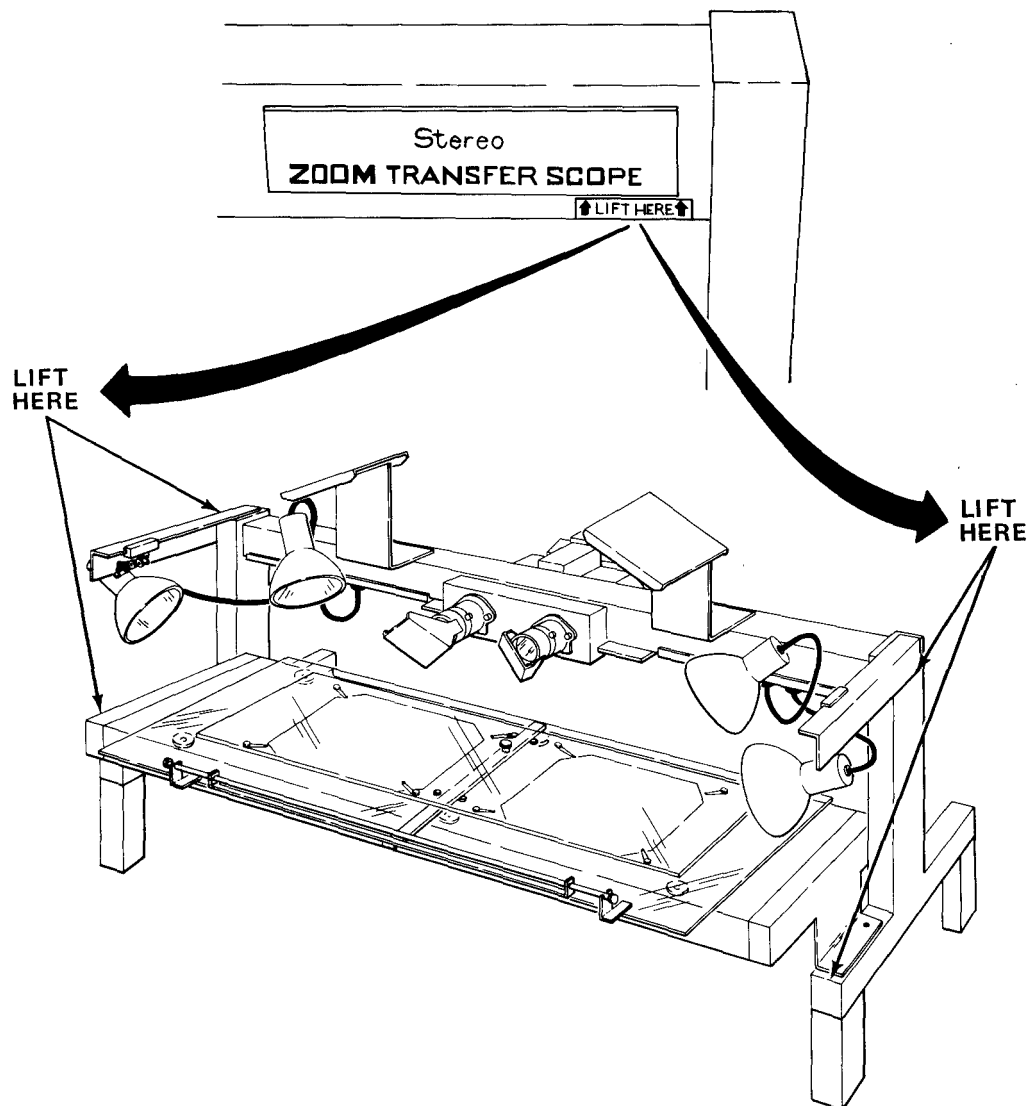
### 3-6. OPERATION UNDER USUAL CONDITIONS.

#### 3-6.1 Assembly and Preparation for Use.

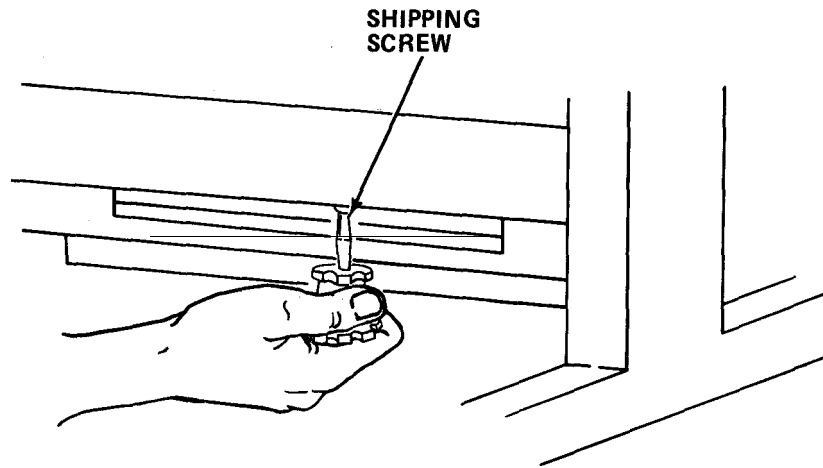
##### NOTE

Two persons are required to assemble the equipment.

- a. Remove stereo zoom transfer scope from transport case.



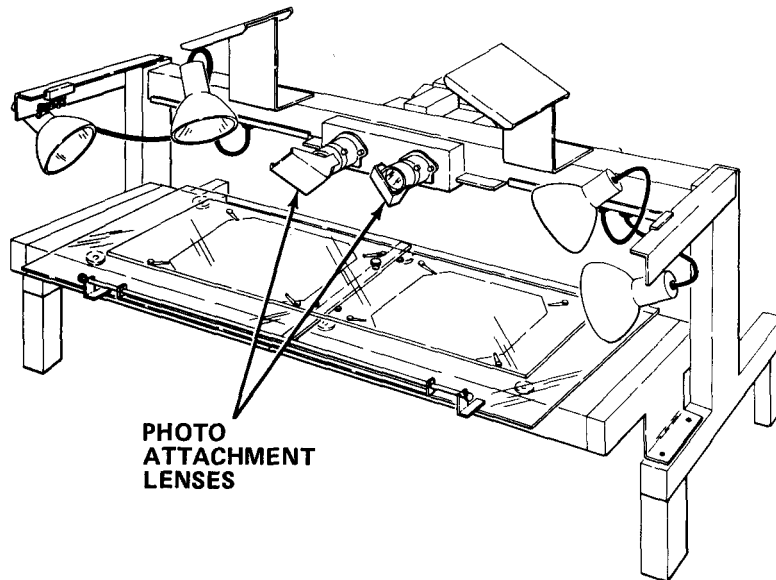
- b. Lift plotter at points labeled LIFT HERE. Place on flat work surface.
- c. Install extender legs.



- d. Remove two shipping screws from each transilluminator and retain for future use.

**NOTE**

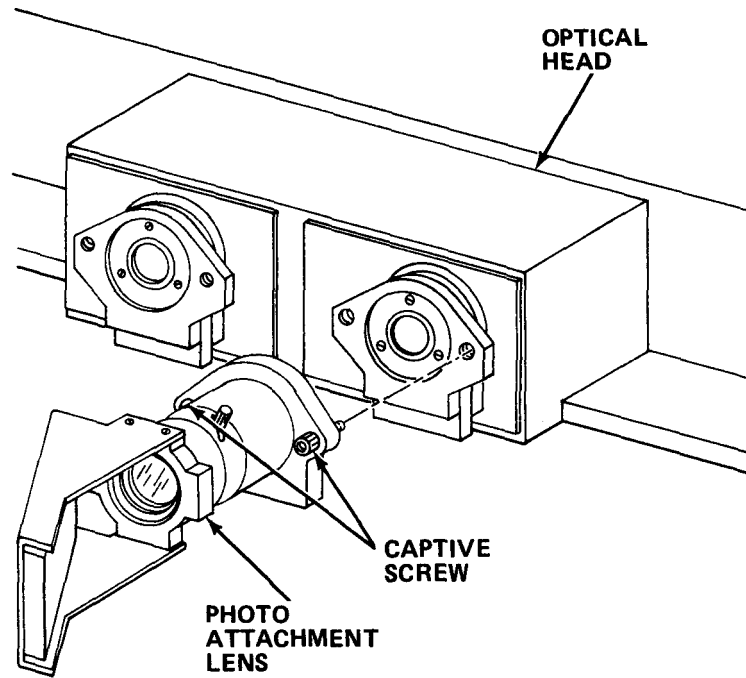
Kinds and quantity of shipping screws vary between equipment.



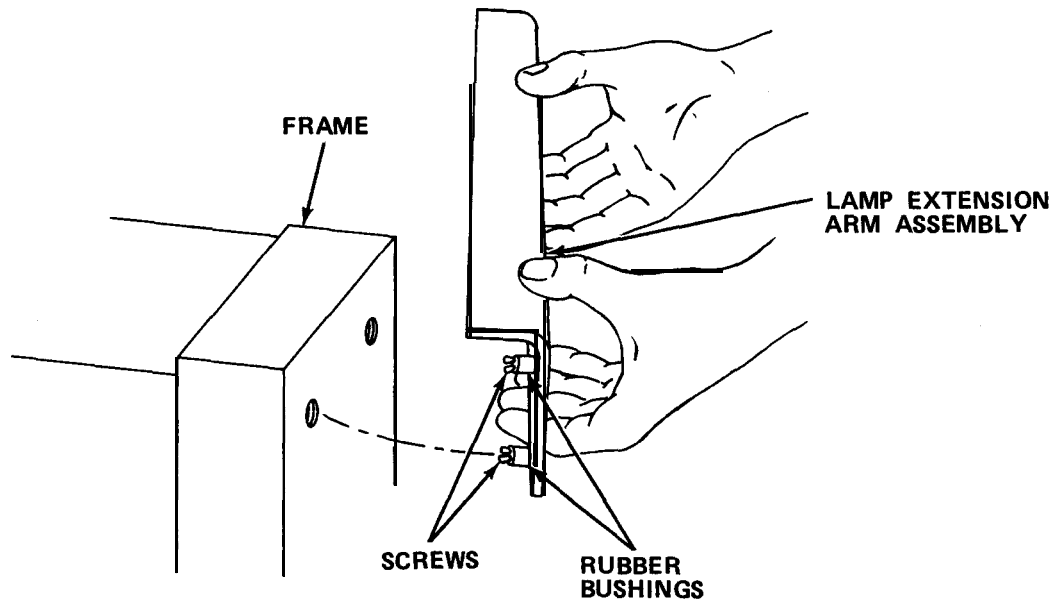
**CAUTION**

Do not touch lens mirrors with bare fingers or damage to equipment may occur.

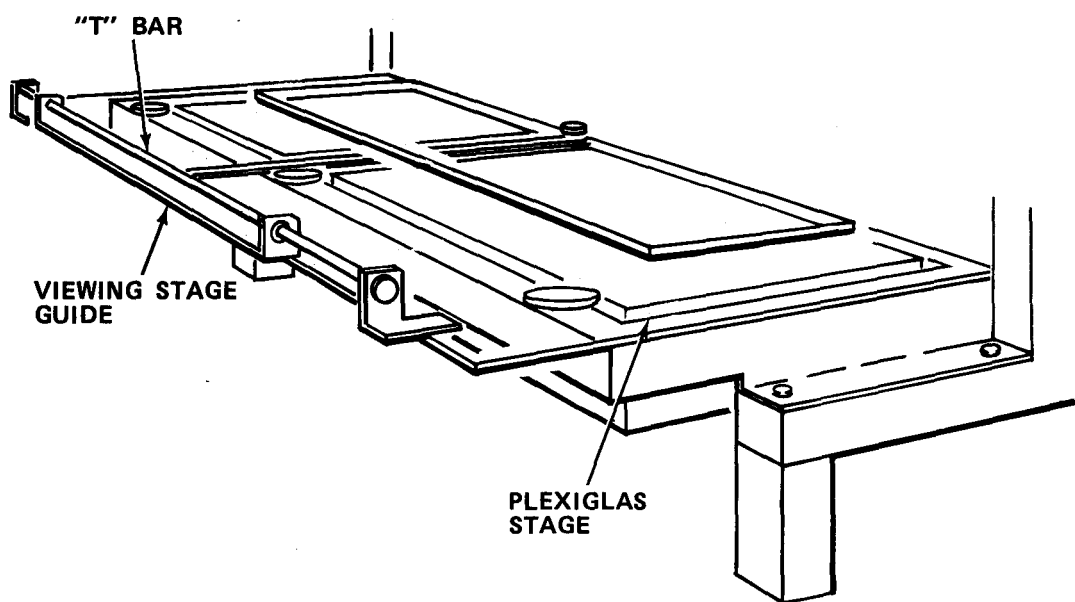




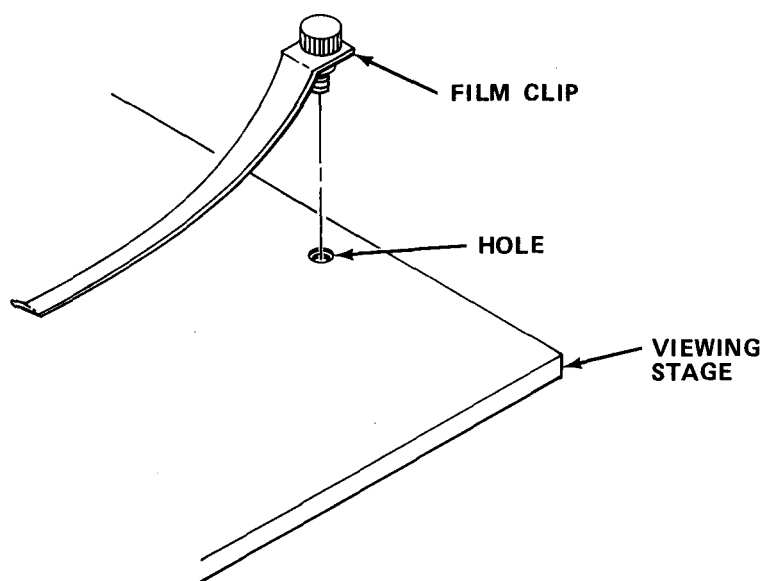
- e. Mount 0.6X to 4.2X photo attachment lenses on optical head.
- f. Secure with captive screws.



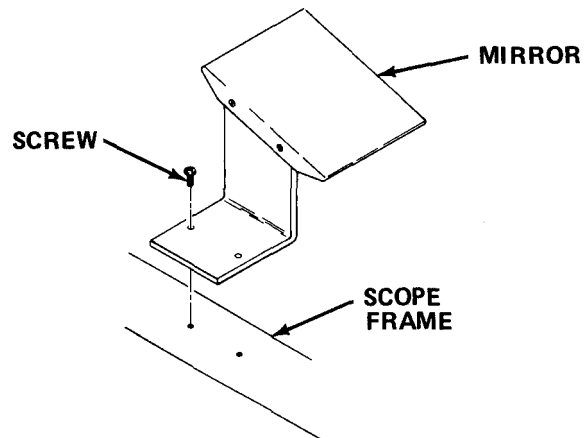
- g. Mount two lamp extension arm assemblies. Place lamp extension arms so that screws are aligned with holes. Tighten screws until rubber bushings are tight against frame.



h. Mounting viewing stage guide and "T" bar. Place plexiglas stage on viewing stage guide.



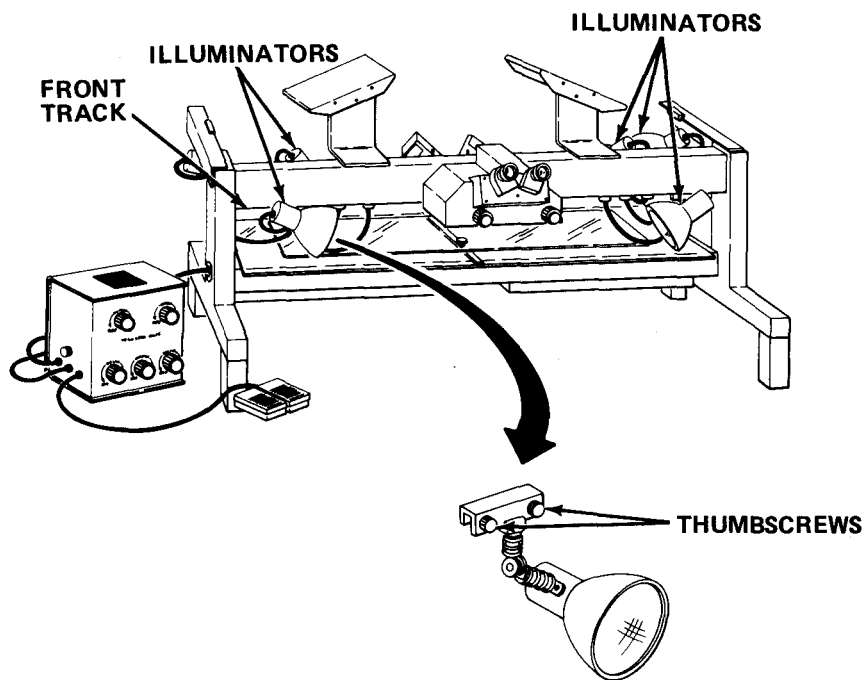
i. Insert film clips into holes on viewing stages.



**CAUTION**

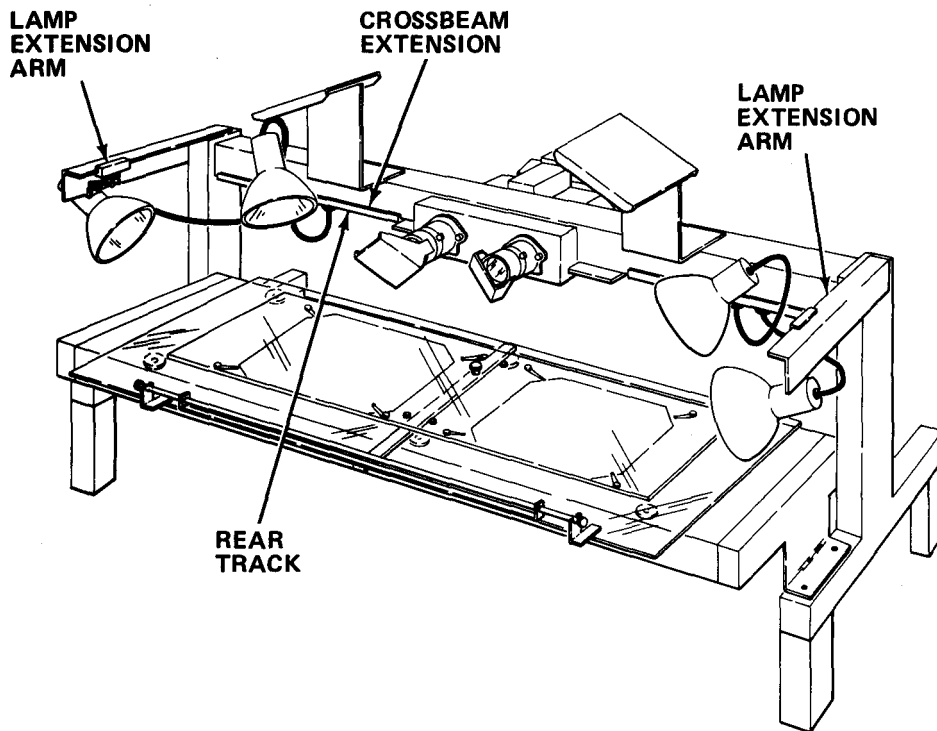
Do not touch mirror surfaces with bare fingers or equipment damage may occur.

- j. Mount two mirrors. Secure with screws attached to scope frame.



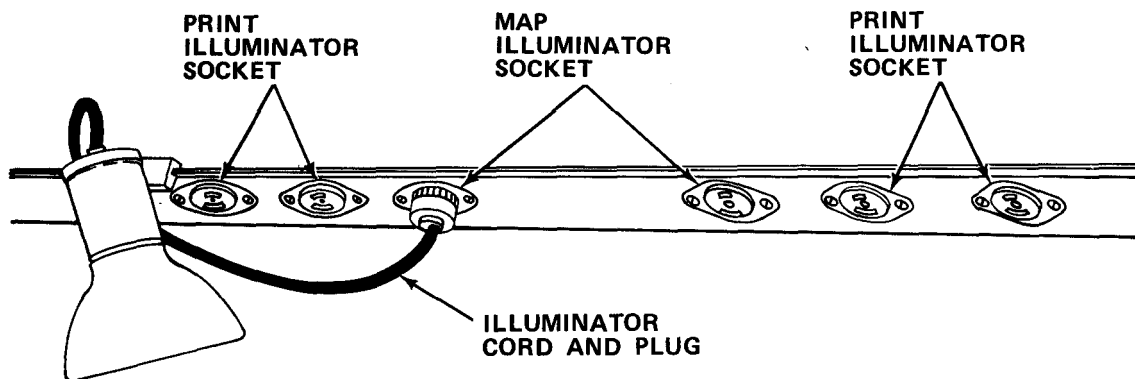
- k. Mount six illuminators.

(1) Mount two illuminators on front track of cross beam. Secure with thumb-screws.



(2) Mount illuminator over each spring position on rear track of cross beam extension.

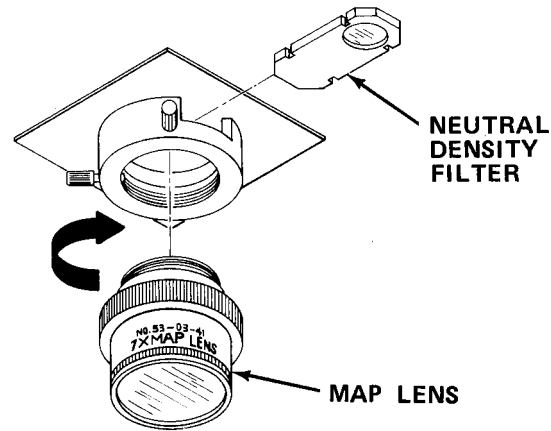
(3) Mount one illuminator on each top track of lamp extension arms.



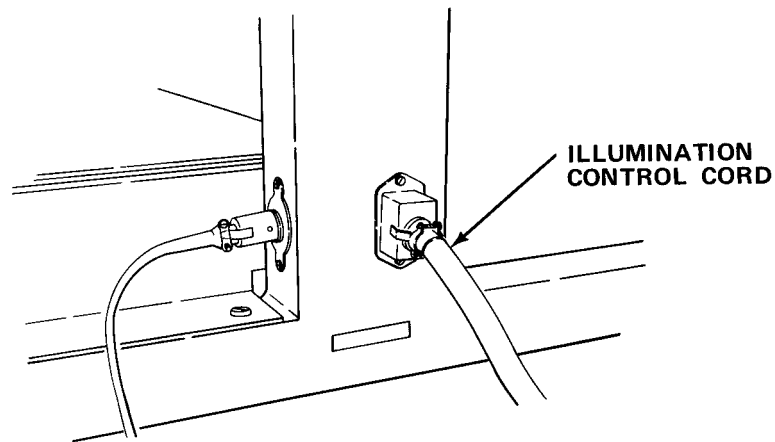
(4) Connect illuminator cords to instruments.

**NOTE**

Plugs are keyed and can only be inserted one way into socket. Twist to **lock**.



- (5) Screw 0.7X-1X MAP LENS in mount. Insert neutral density filter in slot.
- (6) Place illumination control on left side of scope.



- (7) Plug illumination control cord into socket on left end of scope.
- (8) Position foot switch on floor.
- (9) Remove any remaining shipping or packing materials.

**NOTE**

Be sure ON/OFF switch is OFF.

- (10) Plug in power cord.

3-6.2 Operating Procedures.

- a. Preliminary operations.

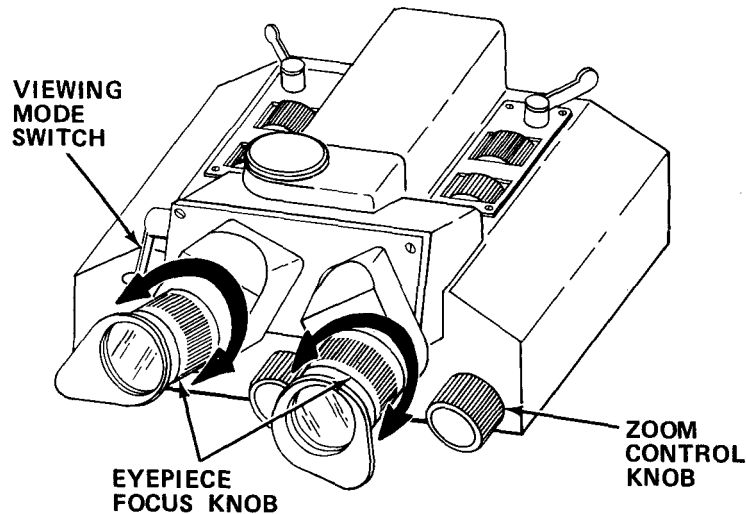
NOTE

Be sure all electrical connections, illuminators, and control and power cord connections are properly made.

- (1) Turn on power.
- (2) Turn TRANSILLUMINATOR controls to right and verify both transilluminators light. Turn left to OFF.
- (3) Turn PHOTO ILLUMINATOR controls to right and verify photo illuminators light. Turn left to OFF.
- (4) Turn MAP ILLUMINATOR control to right, verify map illuminators are on and leave control ON.
- (5) Set VIEWING MODE switch on optical assembly to MONO.
- (6) Place map or chart under map lens.
- (7) Remove eyepiece protectors.
- (8) Adjust interpupillary distance and be sure that each eye has complete field of view without head movement.
- (9) Place eye shield on eyepieces.

NOTE

**If** operator wears glasses that provide small spherical correction, operator may choose to not wear glasses and use eyepiece focusing. When eyeglasses are worn, eye shields may be omitted.



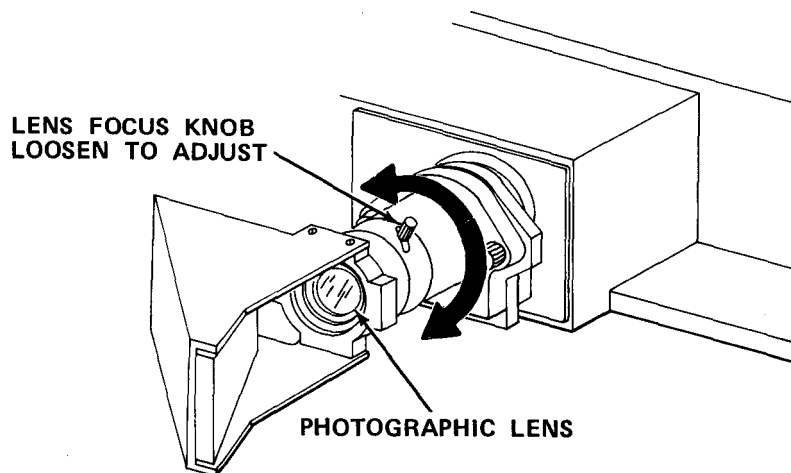
(10) Adjust ZOOM CONTROL knobs to 1X position.

(11) Focus eyepieces for clearest vision in each eye. Blink eyes alternately to verify focus.

(12) Set VIEWING MODE switch to STEREO and ZOOM CONTROL knobs to 7X.

(13) Place object or photograph on right viewing stage.

(14) Turn on right photo illuminator.



(15) Focus right photographic lens:

(a) Loosen LENS FOCUS knob.

(b) Slide LENS FOCUS knob to right or left until object or photograph is clearest.

(c) Tighten LENS FOCUS knob to hold focus.

(16) Place objector photograph on left viewing stage.

(17) Turn RIGHT PHOTO ILLUMINATOR control to OFF and LEFT PHOTO ILLUMINATOR control to ON.

(18) Focus left photographic lens.

(19) Turn MAP ILLUMINATOR control to OFF.

(20) Place photograph on right viewing stage.

(21) Illuminate right photograph.

**NOTE**

Be sure right ZOOM CONTROL knob is at 7X.

(22) Focus right photographic lens as required.

(23) Turn RIGHT PHOTO ILLUMINATOR control to OFF.

(24) Place photograph on left viewing stage.

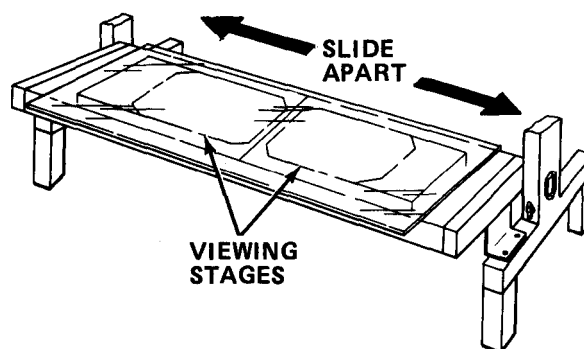
(25) Illuminate left photograph.

**NOTE**

Be sure left ZOOM CONTROL knob is at 7X.

(26) Focus left photographic lens as required.

(27) Turn LEFT PHOTO ILLUMINATOR control to OFF.



**NOTE**

If transparencies are to be used on viewing stage, viewing stages should **be** separated to maximum distance.

(28) If scope is not to be used immediately, cover with dust cover.



- b. Normal operation.

NOTE

Dust cover must be used when scope is not in use.

(1) Investigate major features of area of interest until familiar with topography and landmarks.

(2) Place map or chart (data base) on table under map lens.

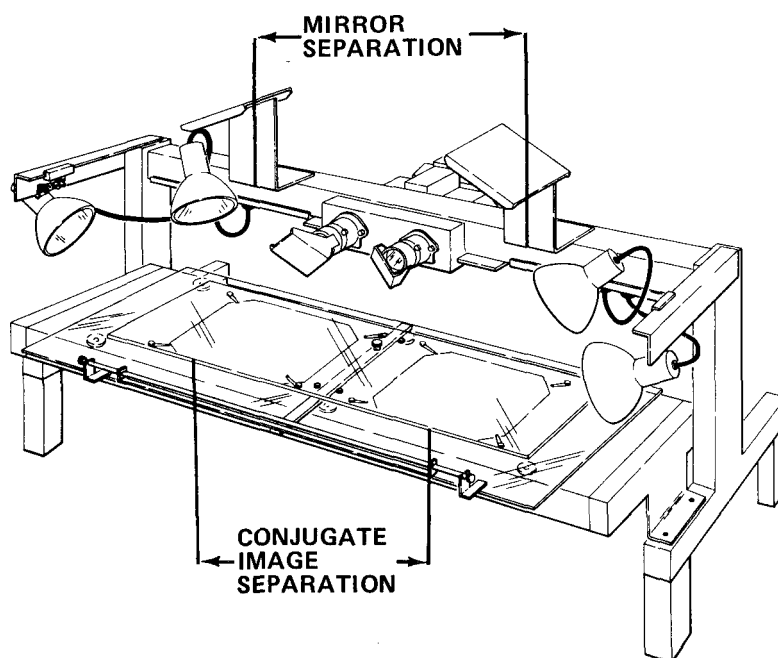
NOTE

If map is visible without illumination, use neutral density filter to reduce light reflected from map.

(3) Place stereo-pair photographs or stereo-pair transparencies on viewing stages.

NOTE

Be sure right photograph is on right viewing stage and left photograph is on left viewing stage to prevent false stereo effect.



(4) Place front edges of photographs against film clips and make certain that conjugate image separation equals mirror separation.

(5) Set ZOOM CONTROL knobs to 1X, STRETCH DIRECTION levers to 1X and STRETCH DIRECTION dial to 0.

(6) Set VIEWING MODE switch to STEREO.

(7) Illuminate right and left photographs.

(8) Rotate IMAGE ROTATION dial and move photographs until images are in stereoscopic orientation.

(9) Set ZOOM CONTROL knobs to 3X.

(10) Adjust IMAGE ROTATION dial and photographs for best stereoscopic orientation.

(11) Set ZOOM CONTROL knobs to 7X.

(12) Continue to adjust IMAGE ROTATION dial and photographs until best view is obtained.

NOTE

Good stereoscopic image at high magnification will be retained throughout entire zoom magnification range.

(13) Set VIEWING MODE switch to MONO.

(14) Illuminate map.

(15) Select three or more different points at the same elevation, both on map and photograph, and match scale of photograph to map.



NOTE

Rotate map for alignment. Do not use IMAGE ROTATION dial.

(16) Set left ZOOM CONTROL knob to same setting as right ZOOM CONTROL knob after step (15) is completed.

### NOTE

Photograph is central conic projection and map is orthographic projection. Large elevation changes require scale-matching changes by small adjustments to zoom control knobs.

(17) Use STRETCH CONTROL levers to distort photograph images to match map when map has been distorted.

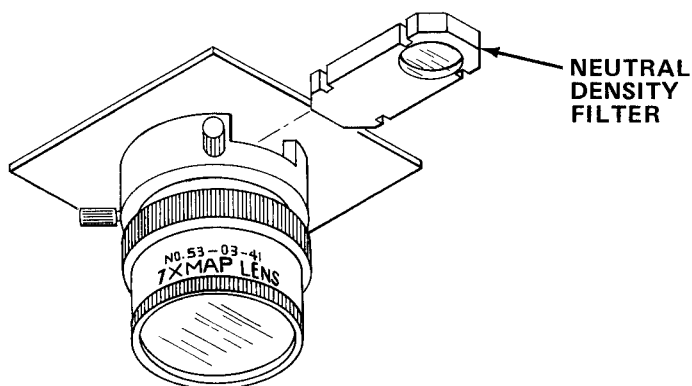
(18) Register images and map by rocking foot on foot switch to alternate turning off map and print illumination. Out-of-register images will move as lights blink.

c. Monoscopic mode of operation. Equipment may be used to view single photograph for map correction or construction.

(1) Set VIEWING MODE switch to MONO.

(2) Removal of viewing stages and "T" bar to place oversized material directly on glass plate is possible; however, the lenses must be refocused.

d. To use as stereoscope.



Reverse neutral density filter to block map image.

### NOTE

- Optical system now only shows stereoscopic stage images. All map images and illumination are blocked from view.
- Cover Scope with dust cover when not in use.

3-6.3 Preparation for Movement.

- a. Turn power switch off.
- b. Unplug power cord.
- c. Insert any necessary shipping or packing materials.
- d. Disconnect illumination controller.
- e. Remove neutral density filter and map lens.
- f. Disconnect illuminator cords from instruments.
- g. Remove illuminators.
- h. Remove mirrors.
- i. Remove film clips.
- j. Remove plexiglas stage, T-bar, and viewing stage guide.
- k. Remove lamp extension arms.
- l. Remove photo attachment lenses.
- m. Reinstall shipping screws.
- n. Remove extender legs.
- o. Store stereo zoom transfer scope and components in transport case and secure case at correct location as shown in paragraph 1-2-3

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. This equipment does not require lubrication.

3-9. TROUBLESHOOTING PROCEDURES.

a. The table lists the common malfunctions which you may find during operation or maintenance of the stereo zoom transfer scope, 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 3-2. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. NO ILLUMINATION.	Step 1. Check that controller to stereoscope power cord is plugged in.	(a) If cord is plugged in, proceed to step 2. (b) Plug in power cord.
	Step 2. Check that the controller power cord is plugged into an active outlet.	(a) If cord is plugged in, proceed to step 3. (b) Plug in power cord.
	Step 3. Check that circuit breaker is ON.	(a) If circuit breaker is ON, proceed to step 4. (b) Reset circuit breaker. (c) If circuit breaker trips repeatedly, notify power supply supervisor.

Table 3-2. TROUBLESHOOTING - Cont

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

## 1. NO ILLUMINATION - Cont

Step 4. Visually inspect fuse.

(a) If fuse filament is broken, replace fuse (paragraph 3-10.1).

(b) Refer to direct/general support maintenance.

## 2. UNEVEN ILLUMINATION.

Step 1. Inspect Photo and MAP illuminators for burned out lamps.

(a) If lamps are good, proceed to step 2.

(b) Replace defective lamps (paragraph 3-10.2).

Step 2. Check illuminator controls for proper adjustment.

(a) If illuminator controls are properly adjusted, proceed to **step 3.**

(b) Adjust illuminator controls.

Step 3. Check electrical plugs for loose connections.

(a) Connect plugs.

(b) Refer to direct/general support maintenance.

## 3. IMAGES ARE BLURRED.

Step 1. Check eyepiece focus.

(a) If focused correctly, proceed to step 2.

(b) Focus eyepiece.

Table 3-2. TROUBLESHOOTING - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. IMAGES ARE BLURRED - Cont		
	Step 2. Check photographic lenses focus.	(a) If focused correctly, proceed to step 3. (b) Focus photographic lenses.
	Step 3. Check MAP LENS for proper setting.	(a) If setting is correct, proceed to step 4. (b) Adjust map lens.
	Step 4. Inspect optics for dust, smudges, or fingerprints.	Clean optics.

3-10. MAINTENANCE PROCEDURES.

a. This section contains instructions covering operator maintenance functions for the stereo zoom transfer scope. 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 . . . . .	3-10.1
Replace Photo/Map Illumination Lamp . . . . .	3-10.2

3-10.1 Replace Fuse.

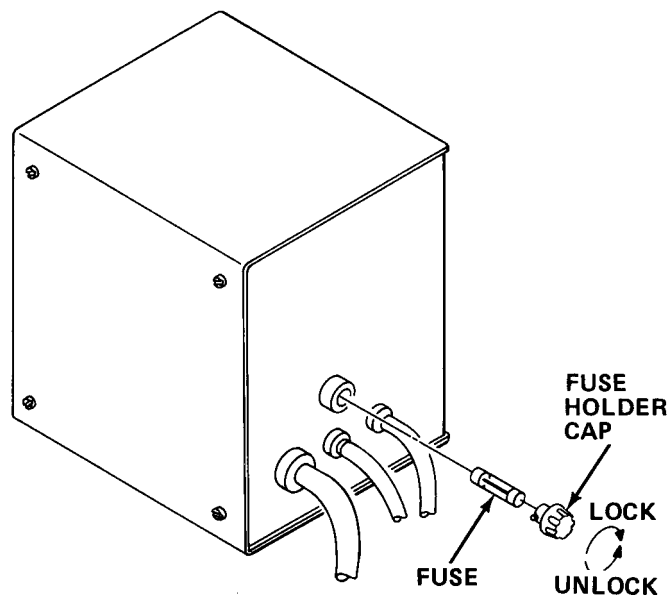
MOS: 81C, Cartographer

SUPPLIES: Fuse

**WARNING**

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

- a. Turn off power switch.
- b. Unplug power cord.



- c. Push in fuse holder cap and twist to left. Defective fuse and fuse holder cap will pop out.
- d. Install new fuse in fuse holder cap.
- e. Push in fuse holder cap and twist to right. Cap will lock.
- f. Plug in power cord.
- g. Turn on power switch.



3-10.2 Replace Photo/Map Illuminator Lamp.

MOS : 81C, Cartographer

SUPPLIES: Map Illuminator

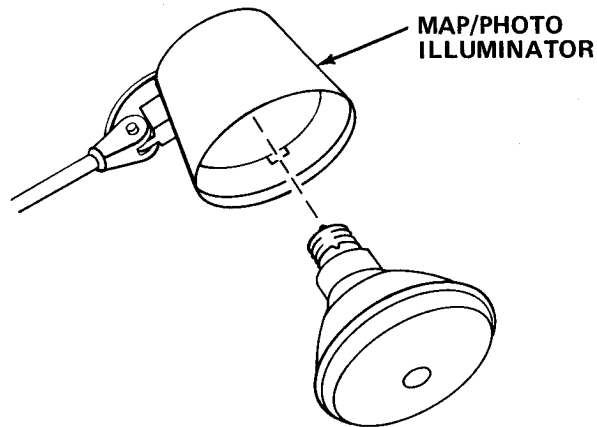
WARNING

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

- a. Turn off power switch.
- b. Unplug power cord.

## NOTE

Map and photo illuminators and lamps are interchangeable.



- c. Unscrew defective illuminator lamp and replace.
- d. Plug in power cord.
- e. Turn on power switch.

## Section IV ORGANIZATIONAL MAINTENANCE

**3-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**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 Support and Equipment (MTOE) applicable to your unit.

3-12.2 Special Tools: Test, Measurement, and Diagnostic Equipment, and Support  
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 Special Tools List, TM 5-6675-317-24P covering organizational support 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 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 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.** There are no organizational troubleshooting procedures assigned for this equipment.

**3-16. MAINTENANCE PROCEDURES.** There are no organizational maintenance procedures assigned for this equipment.

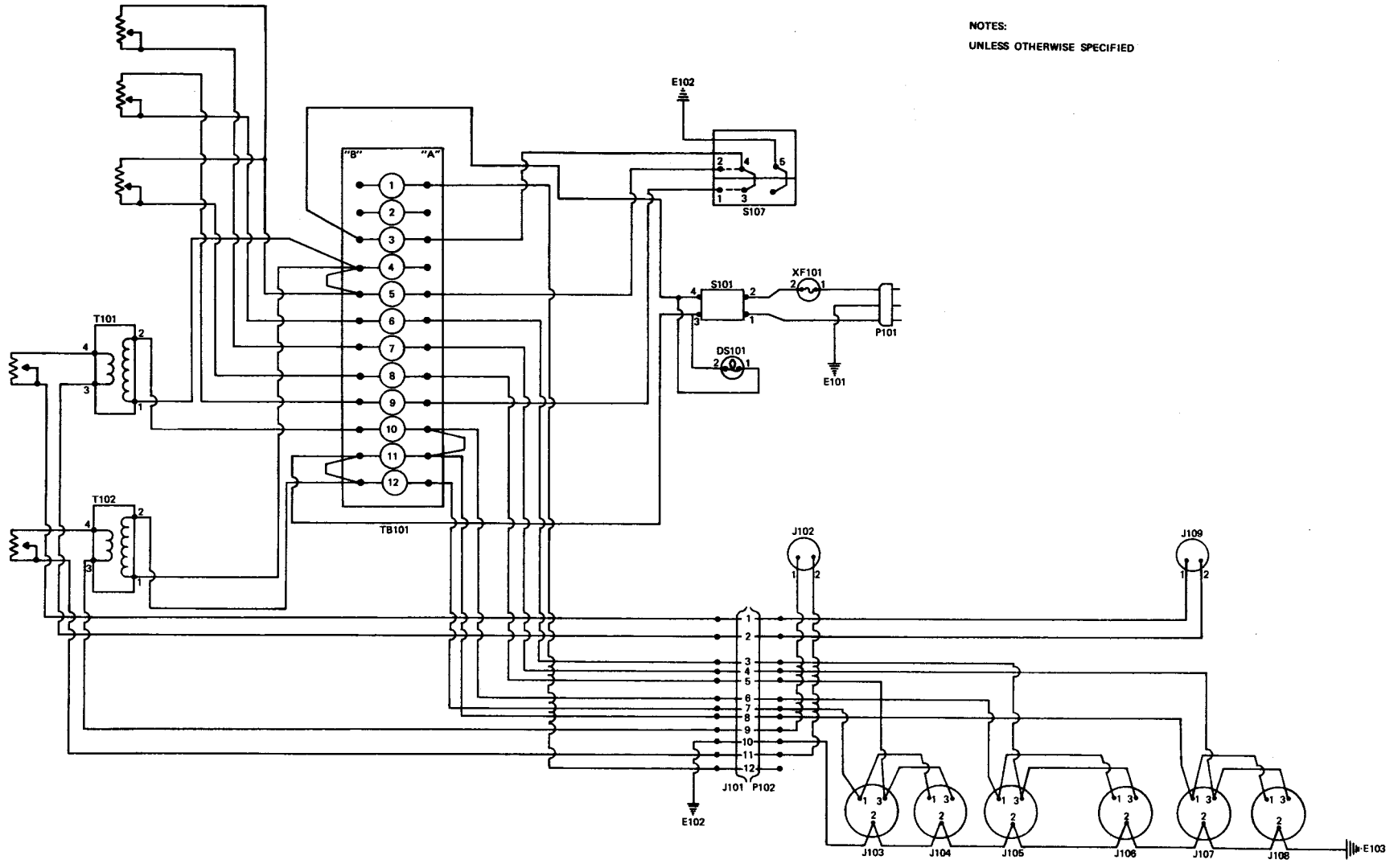
**3-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

**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 5-6675-317-24P covering direct/general support maintenance for this equipment.



NOTES:  
UNLESS OTHERWISE SPECIFIED

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 at lower levels 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 facing schematic or the foldout located at the end of this manual for further fault analysis.

Table 3-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. NO ILLUMINATION.	<p>Step 1. Check fuse with multimeter for continuity.</p> <p>(a) Replace fuse if defective (paragraph 3-10.1).</p> <p>(b) If fuse is good, proceed to step 2.</p> <p>Step 2. Check for 120 V ac output at ON/OFF switch.</p> <p>(a) If 120 V ac is present, replace illumination controller assembly.</p> <p>(b) If voltage is not present, replace switch (paragraph 3-20.3).</p> <p>Step 3. Check for 120 V ac output at receptacle.</p> <p>Perform no power procedures for dead receptacle (Table 1-4).</p>	

Table 3-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. UNEVEN TRANSLUMINATION.

CAUTION

Use cotton gloves when working on transilluminator assemblies. Damage to equipment may occur.

- Step 1. Remove covers and check that both lamps are lighted in each transilluminator.
- (a) If lamps are not defective, proceed to step 2.
  - (b) If lamps are defective, replace as necessary (paragraph 3-20.1).

CAUTION

Be sure that the equipment is unplugged before making continuity checks or damage to meter may result.

- Step 2. Check continuity at potentiometer terminals with multimeter. With multimeter in place, slowly rotate transilluminator knob fully right and then fully left. Observe for multimeter deflection reading of 15 ohms.
- (a) If this condition exists, replace transillumination potentiometer (paragraph 3-20.5).
  - (b) If no deflection is observed, replace illuminator controller.

Table 3-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. UNEVEN ILLUMINATION.	Check continuity at potentiometer terminals with multimeter. With multimeter in place, check map or photo potentiometer continuity and observe for multimeter deflection reading of 15 ohms.	<p>(a) If this deflection exists, replace map or photo illuminator potentiometer (paragraph 3-20.5).</p> <p>(b) If no deflection is observed, replace illuminator controller.</p>
4. ILLUMINATORS DO NOT BLINK WHEN FOOT SWITCH IS ACTIVATED.	Check that foot switch wiring is correctly connected to terminals and ground in the illumination control assembly.	<p>(a) Tighten connections.</p> <p>(b) Change wiring positions on terminals if necessary.</p> <p>(c) Replace foot switch (paragraph 3-20.4).</p>

3-20. MAINTENANCE PROCEDURES.

a. This section contains instructions covering direct/general support maintenance functions for the stereo zoom transfer scope. 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 Trans Illuminator Lamp . . . . .	3-20.1
Rep Replace Pilot Light . . . . .	3-20.2
Rep Replace ON/OFF Switch . . . . .	3-20.3
Replace Foot Switch . . . . .	3-20.4
Replace Illumination Controller Potentiometer(s) . . . . .	3-20.5

3-20.1 Replace Transilluminator Lamp.

MOS: 41B, Topographic Instrument Repair Specialist

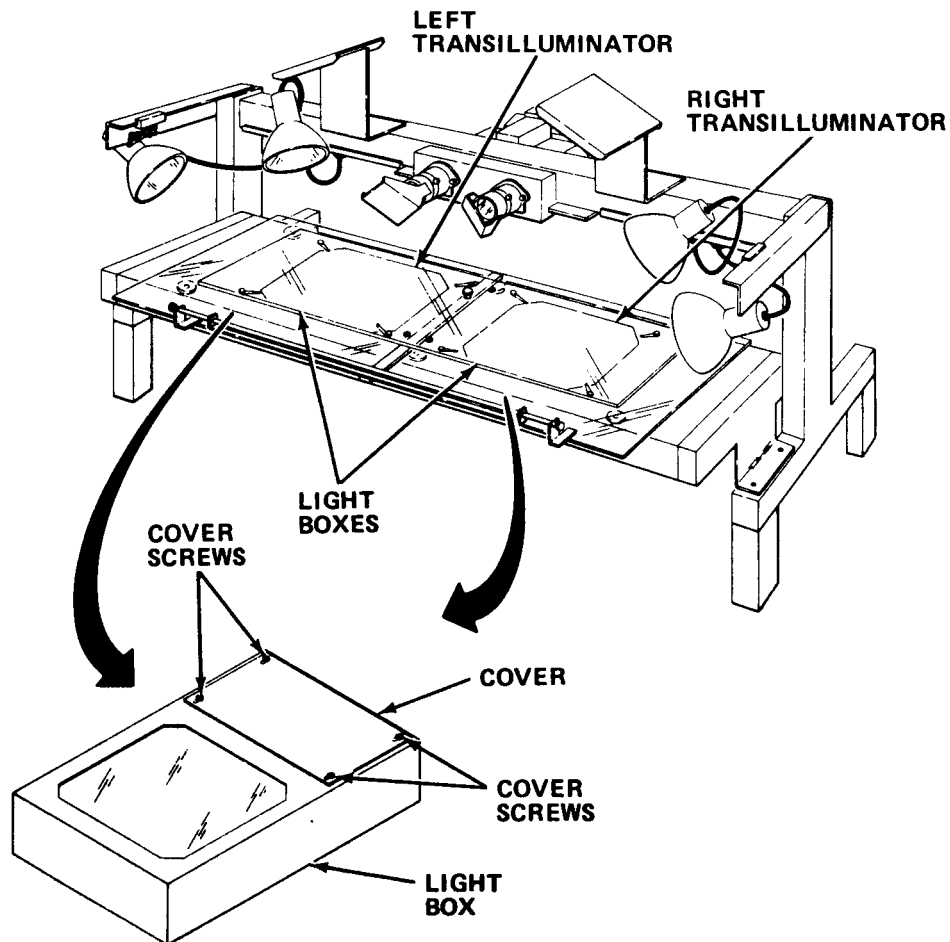
TOOLS: Flat Tip Screwdriver  
Needle Nose Pliers

SUPPLIES: Transilluminator Lamp  
Denatured Alcohol (Item 3 Appendix E)  
Cotton Swabs (Item 17, Appendix E)  
Cotton Gloves

**WARNING**

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

- a. Turn off power switch.
- b. Unplug power cord.





**NOTE**

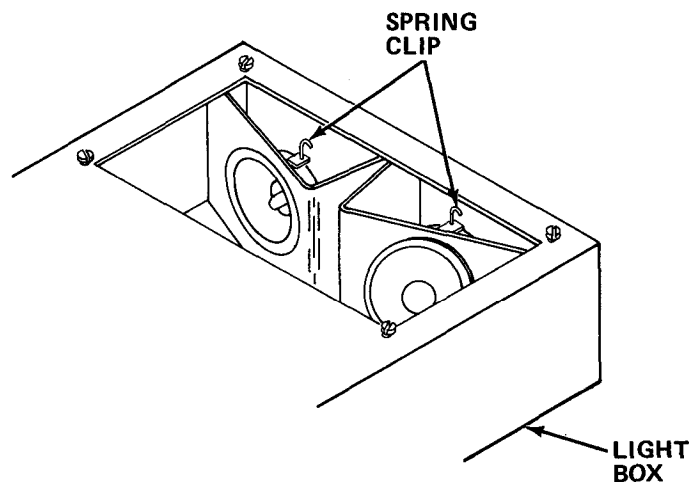
Right transilluminator has two lamps and left transilluminator has one lamp. Procedures for changing lamps are the same for each transilluminator.

- c. Unplug light box cord.
- d. Lift light box from rear until front rail disengages from track. Then lower light box to work surface.
- e. Slide light box out from under scope.
- f. Loosen, but do not remove cover screws.
- g\* Slide cover to release and set cover aside.

**CAUTION**

Fingerprints will damage lamp and cause early failure. Do not touch lamp with fingers. Use cotton gloves.

- h. Pull spade connectors from lamp socket. (Use needle nose pliers as considerable force is required to disconnect.)



- i. Detach spring clip and swing out of way.
- j. Pull lamp socket and lamp from back of reflector with needle nose pliers.
- k. Remove lamp from socket by pulling back on retaining springs.
- l. Place new lamp into socket. Lamp fits only one way.

- m. If lamp has been touched with bare fingers, clean lamp envelope with cotton swab moistened with denatured alcohol.
- n. Insert lamp and socket into reflector, secure with spring clip. Socket fits only one way.
- o. Connect spade connector lugs to socket.
- p. Align cover with large holes over screws. Slide cover into position and tighten screws.
- q. Slide light box under scope.
- r. Plug in light box cord.
- s. Lift light box until front rail is engaged on track. Then lower rear of box.
- t. Plug in power cord.

### 3-20.2 Replace Pilot Light.

MOS : 41B, Topographic Instrument Repair Specialist

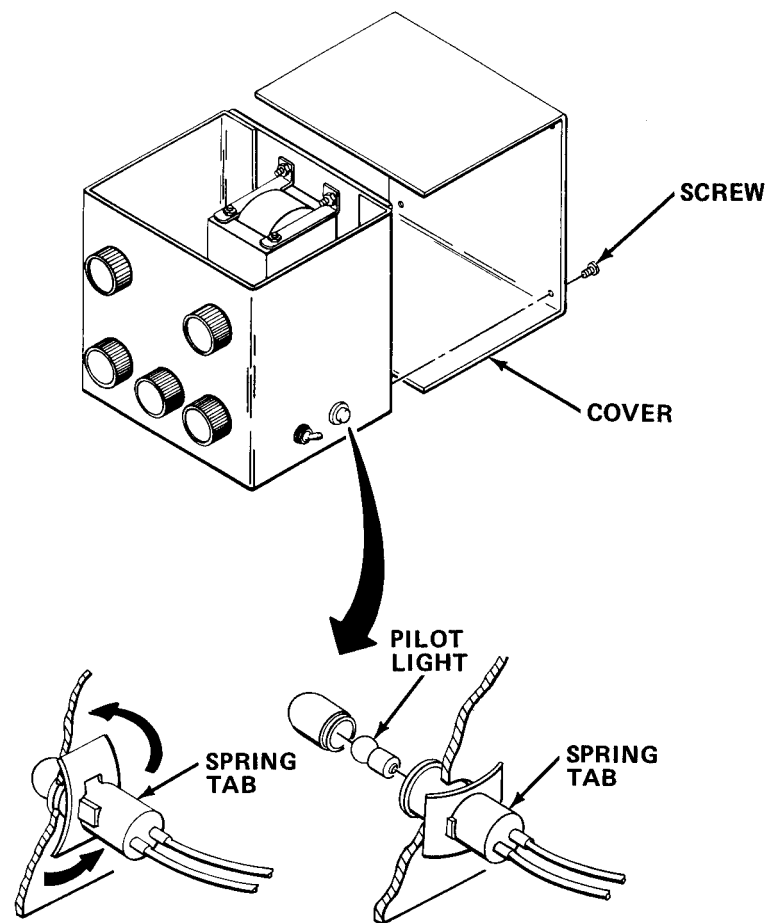
TOOLS : Flat Tip Screwdriver

SUPPLIES: Pilot Light

#### WARNING

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

- a. Turn off power switch.
- b. Unplug power cord.



- c. Remove screws and cover.
- d. Disconnect wiring from defective pilot light.
- e. Pry metal spring tab loose and draw pilot light from box.
- f. Install new pilot light.
- g. Reconnect wiring.
- h. Reinstall spring tab to hold lamp.
- i. Reinstall cover and secure with screws.
- j. Plug in power cord.
- k. Turn on power.

3-20.3 Replace ON/OFF Switch.

MOS: 41B, Topographic Instrument Repair Specialist

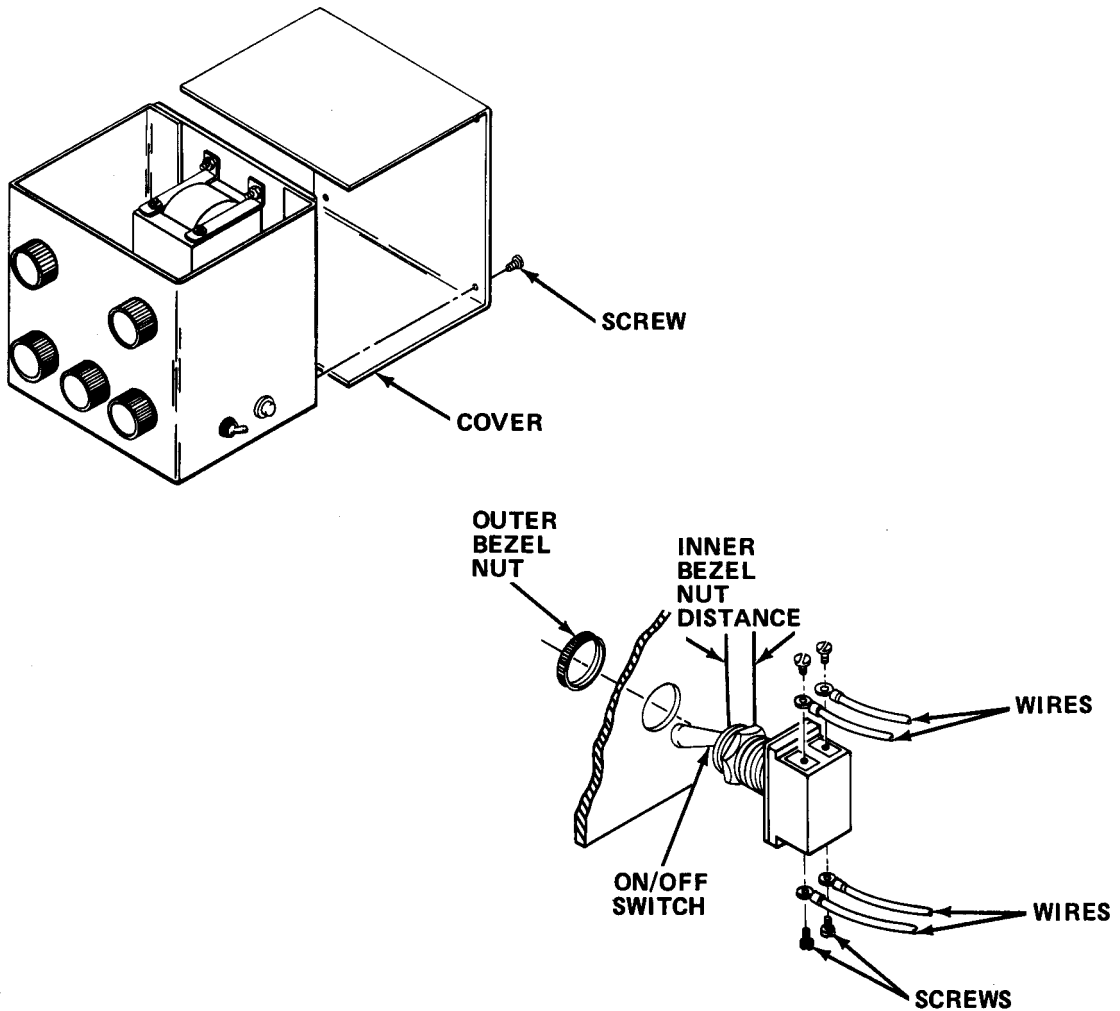
TOOLS: Flat Tip Screwdriver

SUPPLIES: ON/OFF Switch

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 cover.

- c. Unscrew outer knurled bezel nut.
- d. Pull ON/OFF switch into box.
- e. Tag and disconnect wires.
- f. Note position and remove inner bezel nut.
- g. Install inner bezel nut the same distance on new switch shaft as previously noted.
- h. Place new ON/OFF switch in switch hole and align switch so toggle corresponds to OFF position.
- i. Reinstall outer knurled bezel nut and tighten.
- j. Connect wires to new ON/OFF switch.
- k. Reinstall cover and secure with screws.
- l. Plug in power cord.
- m. Turn on power.

3-20.4 Replace Foot Switch.

MOS : 41B, Topographic Instrument Repair Specialist

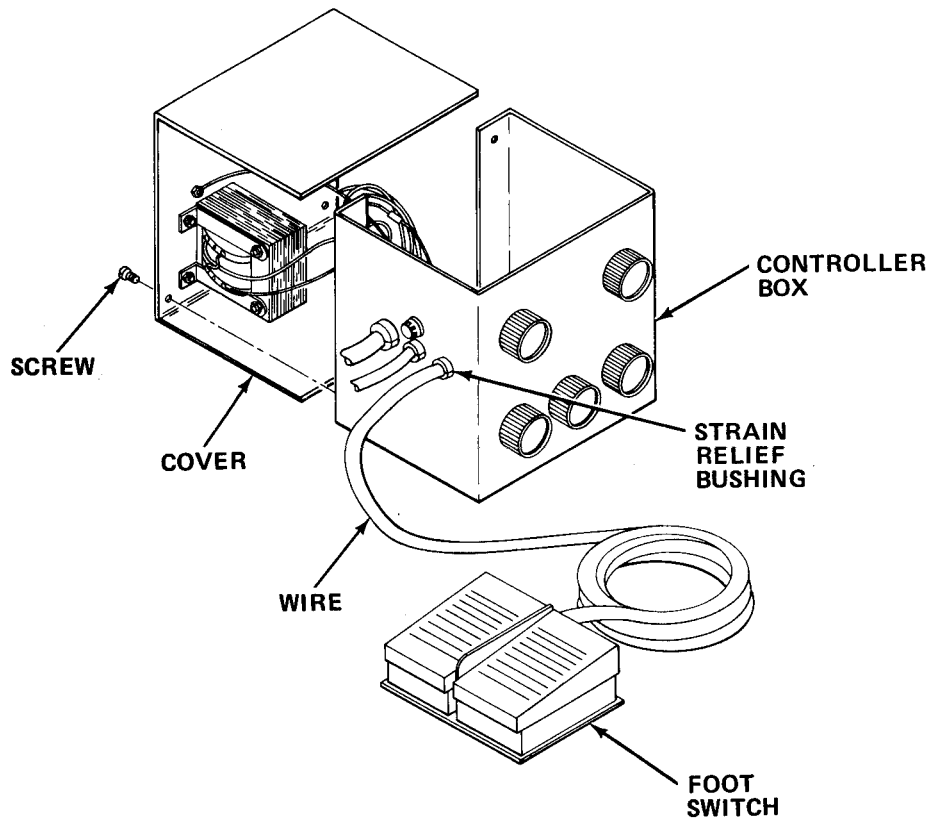
TOOLS: Flat Tip Screwdriver

SUPPLIES: Foot Switch

**WARNING**

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

- a. Turn off power switch.
- b. Unplug power cord.



- c. Remove screws and cover.
- d. Release strain release bushing from controller box and remove from wiring. Retain for use on new switch.
- e. Tag and disconnect wires from foot switch. Note position at terminal.

- f. Disconnect ground wire.
- g. Withdraw defective foot switch and wiring from controller.
- h. Place strain relief bushing on wire to new foot switch.
- i. Reinsert wiring into box and connect to terminals and ground.
- j. Reinstall strain release bushing on wire and lock into box.

#### NOTE

Be sure internal wires have adequate slack.

- k. Adjust strain relief bushing as required.
- l. Reinstall cover and secure with screws.
- m. Plug in power cord.

#### 3-20.5 Replace Illumination Controller Potentiometer(s).

MOS : 41B, Topographic Instrument Repair Specialist

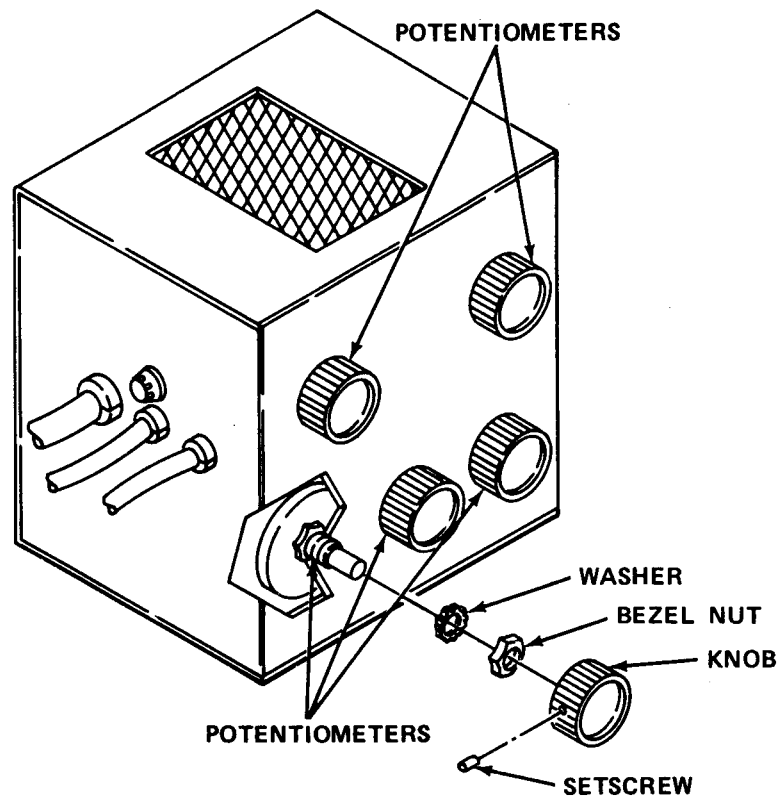
TOOLS: Flat Tip Screwdriver  
 9/16 in. Combination Wrench  
 1/16 in. Hex Head Key Wrench  
 Soldering Iron

SUPPLIES: Potentiometer  
 Solder (Item 71, Appendix E)

#### WARNING

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

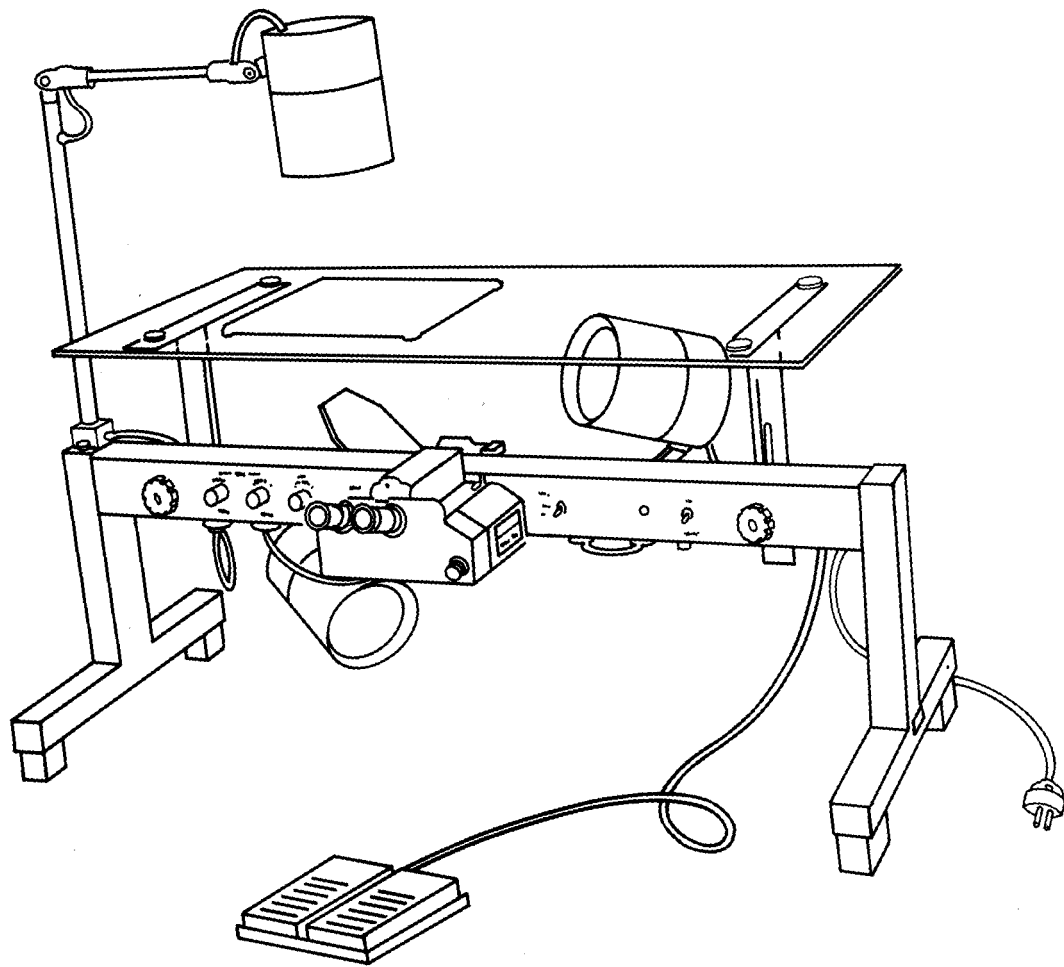
- a. Turn off power switch.
- b. Unplug power cord.



- c. Loosen setscrew and remove knob from defective potentiometer.
- d. Remove screws and illumination controller cover.
- e. Remove bezel nut and washer from defective potentiometer.
- f. Push defective potentiometer through housing.
- g. Tag and desolder defective potentiometer wiring.
- h. Solder wiring to new potentiometer and install potentiometer into controller housing.
- i. Reinstall washer and bezel nut.
- j. Reinstall knob.
- k. Reinstall cover.
- l. Plug in power cord.







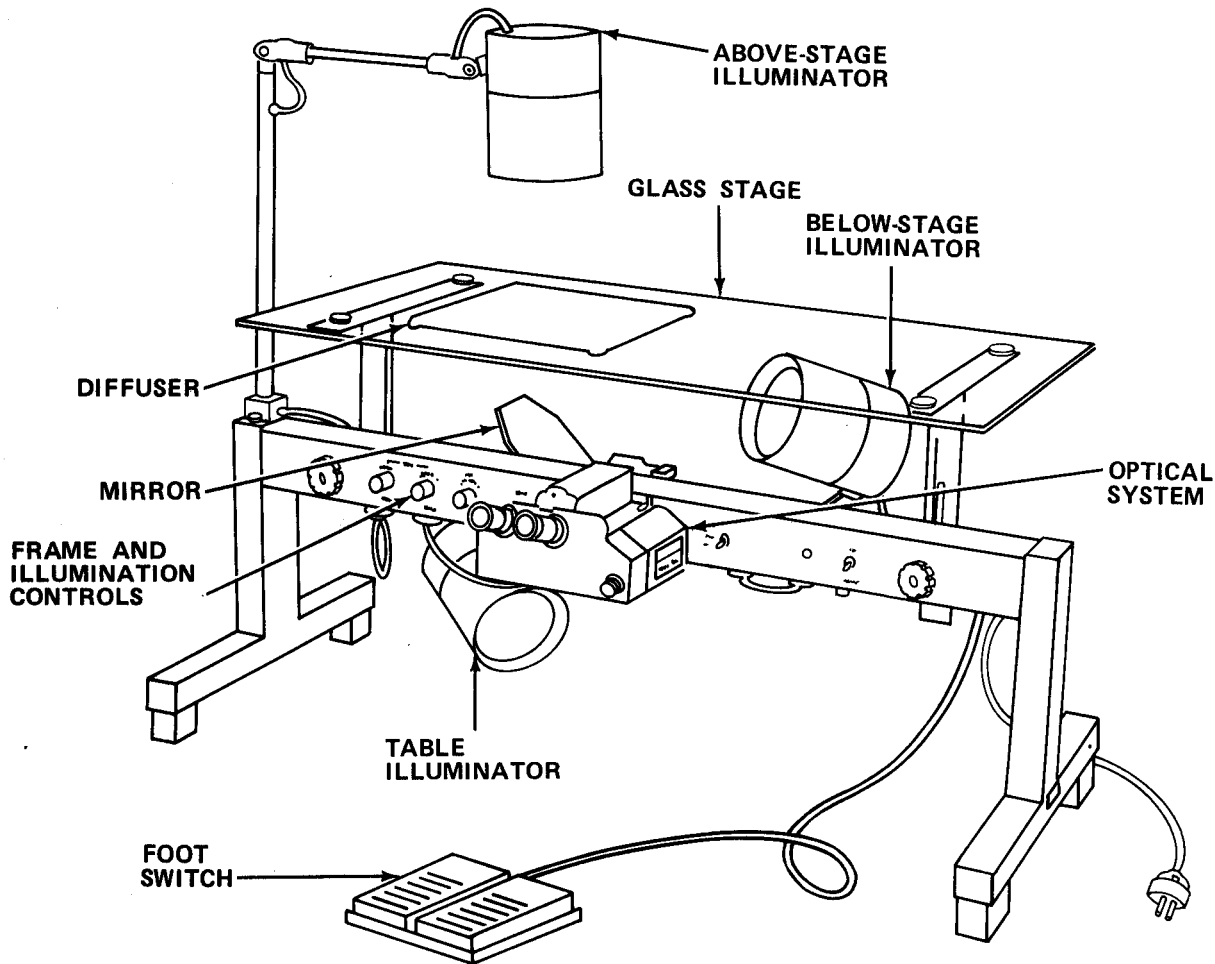
**CHAPTER 4****ZOOM TRANSFER SCOPE****Section I INTRODUCTION****4-1. GENERAL INFORMATION.**4-1.1 Scope.

- a. Model Number and Equipment Name. Model ZT4-H Zoom Transfer Scope.
- b. Purpose of Equipment. To optically superimpose photographic image on map or chart.

**4-2. EQUIPMENT DESCRIPTION.**4-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Optically matches map and photographic scale.
- b. Optically rotates or stretches image.
- c. Uses photographs, transparencies, or other material to form image.
- d. Has zoom control magnification.
- e. Has foot on/off control of illuminators.

4-2.2 Location and Description of Major Components.



ABOVE-STAGE ILLUMINATOR. Illuminates top of glass stage.

GLASS STAGE. Supports item from which image is to be formed. Transparent to permit light to shine through it.

BELOW-STAGE ILLUMINATOR. Illuminates bottom of glass stage.

OPTICAL SYSTEM. Contains magnification, focusing, rotation, and stretch controls, prisms, and lenses.

TABLE ILLUMINATOR. Illuminates work surface and map.

FRAME AND ILLUMINATION CONTROLS. Supports other equipment and contains electrical controls.

FOOT SWITCH. Turns off stage or table illumination when pedal is pressed.

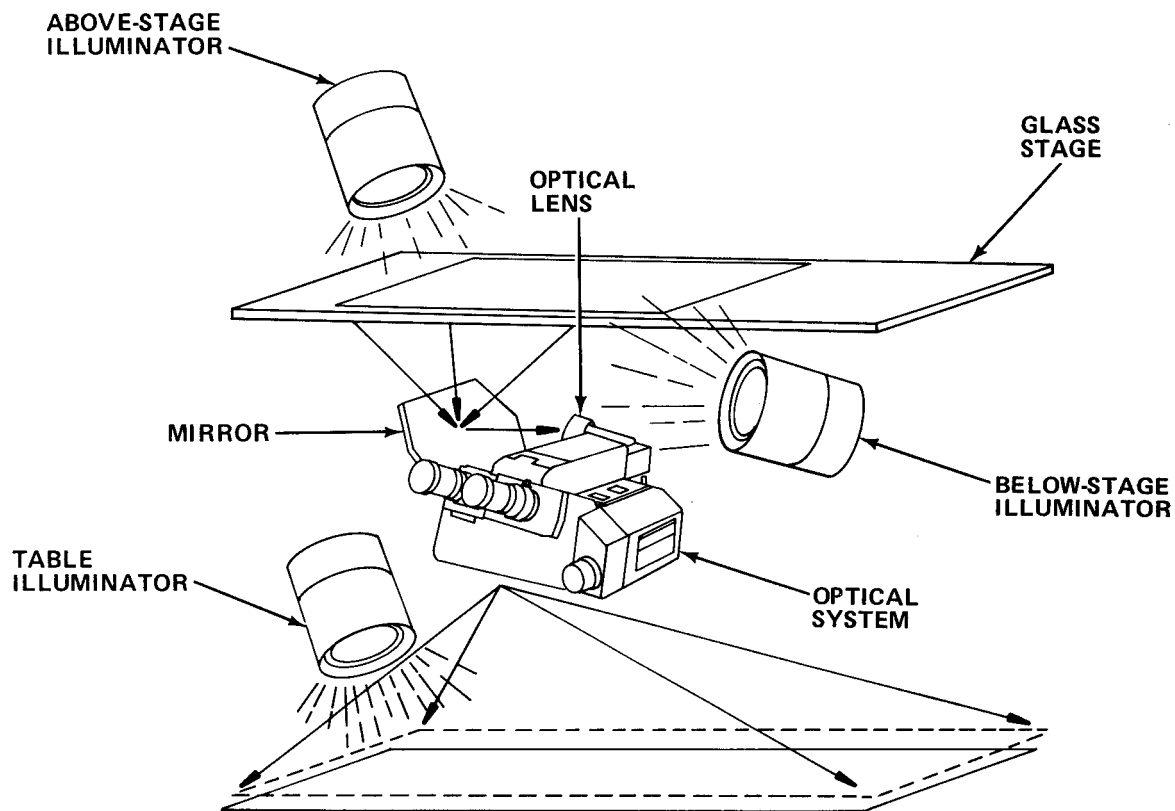
MIRROR. Directs light from glass stage to optical system.

DIFFUSER. Flattens object on glass stage and provides even light on top of stage.

4-2.3 Equipment Data.

Zoom Range	1x to 7x
Optical Rotation	<b>360</b>
Optical Stretch Correction	1:1 to 2:1
Power Requirements	110 V, 60 Hz
Illumination	Three 150 W Flood Lamps
Map Field of View	7.49 in. (19.0 cm)

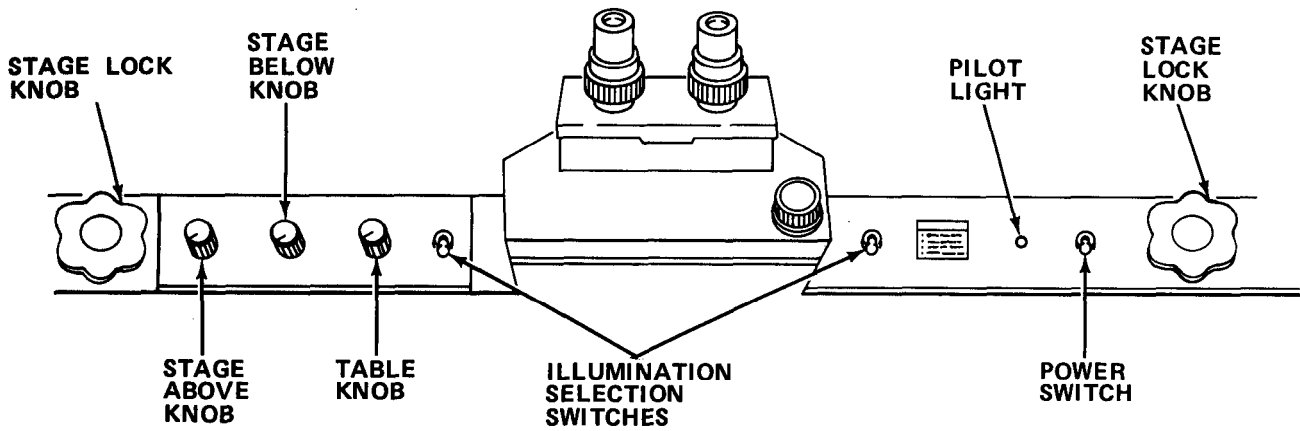
4-3. TECHNICAL PRINCIPLES OF OPERATION.



4-3.1 General. The above-stage illuminator or below-stage illuminator shines light on the transparency or photograph mounted on the glass stage. The image of the transparency or photograph is reflected from the mirror into the optical lens. The optical system magnifies, rotates or distorts the reflected image to match the map. The operator illuminates the map with the map illuminator and views through the optical system. The operator's view of the map has an apparent image of the photograph superimposed on it.

Section II OPERATING INSTRUCTIONS

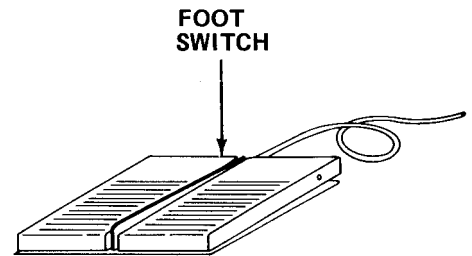
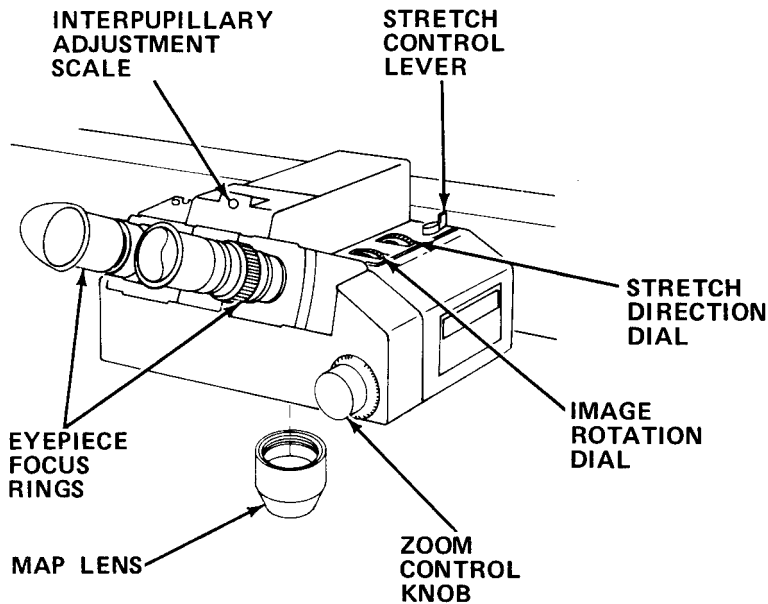
4-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



Control or Indicator	Function
Stage Lock Knobs	Locks glass stage at focusing height.
STAGE-BELOW Knob	Controls on/off and intensity of illuminator shining on underside of glass stage.
Pilot Light	Indicates when power is on.
POWER Switch	Controls power to zoom transfer scope.
Illumination Selector Switches	Selects STAGE illumination, TABLE illumination, or both.
Table Knob	Controls on/off and intensity of illuminator.
Stage Above Knob	Controls on/off and intensity of illuminator shining on top of glass stage.

Control or Indicator

Function



Interpupillary Adjustment Scale

Indicates distance between eyepieces.

Stretch Control Lever

Selects 1- or 2- power distortion or stretch.

Stretch Direction Dial

Rotates direction of distortion or stretch through 360°

IMAGE ROTATION Dial

Rotates image through 360°

ZOOM CONTROL Knob

Selects image magnification.

Map Lens

Adjusts to 1 or 0.7 power.

Eyepiece Focus Rings

Each eyepiece may be focused independently to compensate for operator's eyesight.

Foot Switch

Interrupts illumination to stage or table when activated.

#### 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 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>
Watchmaker's Blower	1 ea
Lens Brush	1 ea
Chamois	1 ea
General Purpose Liquid Detergent (Item 18, Appendix E)	1 btl
Lens Tissue (Item 85, Appendix E)	1 pkg
Lens Cleaner (Item 13, Appendix E)	1 btl
Cheesecloth (Item 16, 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**

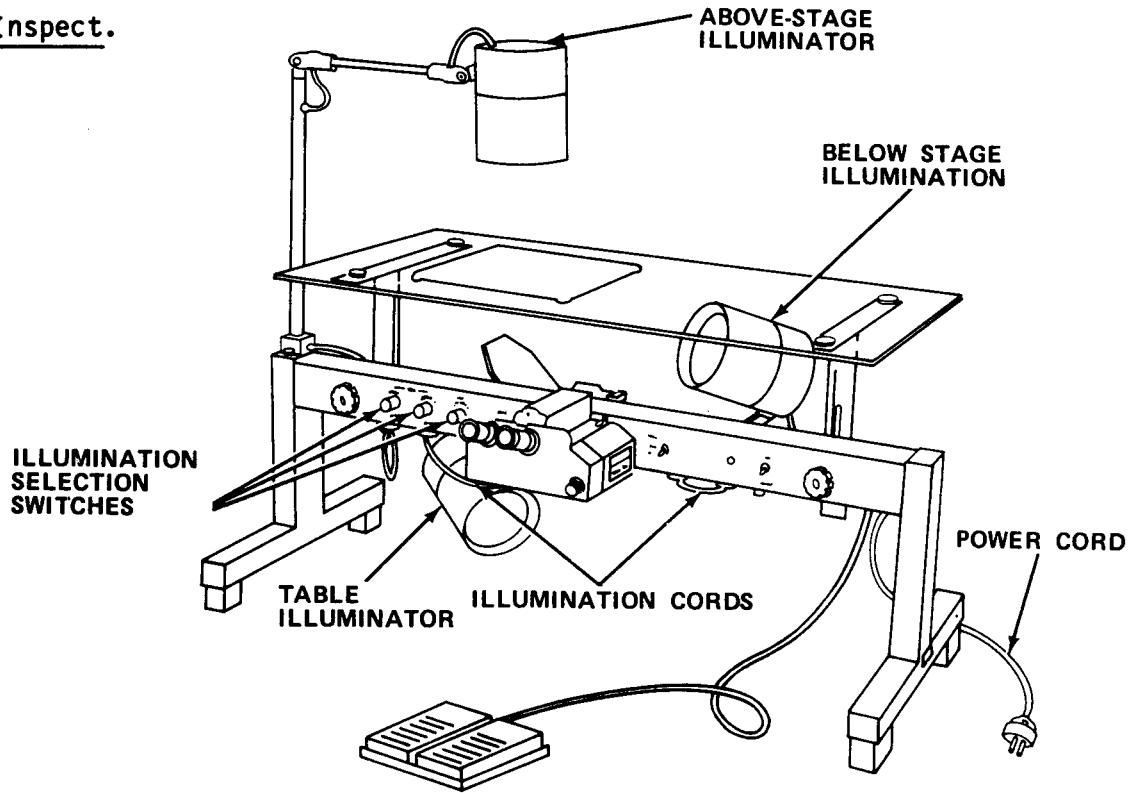
**(Number) - Hundreds of Hours**

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE
----------	----------	---------------------------------------

1 B

**ZOOM TRANSFER SCOPE**

Inspect.



**WARNING**

Do not use equipment with defective wiring or cords. Defective wiring or cords connected to power source can cause death or serious injury.

**Table 4-1. 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.	INTER-VAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<b><u>ZOOM TRANSFER SCOPE - Cont</u></b>			
1	B	<p><u>Inspect - Cont</u></p> <ol style="list-style-type: none"> <li>1. Check illuminator cords, power cord, and wiring for defects, kinks, burns, and broken plugs.</li> <li>2. Check above-stage, below-stage, and table illuminators for working lights.</li> <li>3. Check illuminator selector switches for proper operation. Set illuminator selector switches to STAGE, BOTH, and TABLE. In TABLE position, only the table is illuminated; in STAGE position, only the stage is illuminated; in BOTH position, table and stage are illuminated.</li> </ol> <div style="text-align: center;"> <p>The diagram shows a zoom transfer scope mounted on a table. A lamp is suspended above the table. Labels with arrows point to the ATTACHMENT LENS (top right), MIRROR (left side), EYEPIECES (bottom center), and MAP LENS (bottom center). A foot pedal is connected to the bottom of the device.</p> </div> <ol style="list-style-type: none"> <li>4. Check eyepieces, attachment lens, mirror, and map lens for chips, cracks, dirt, dust, and fingerprints. Clean by carefully wiping with lens tissue.</li> </ol>	<p>Wiring is defective.</p> <p>Illuminators are inoperative.</p> <p>Optics are missing or broken.</p>

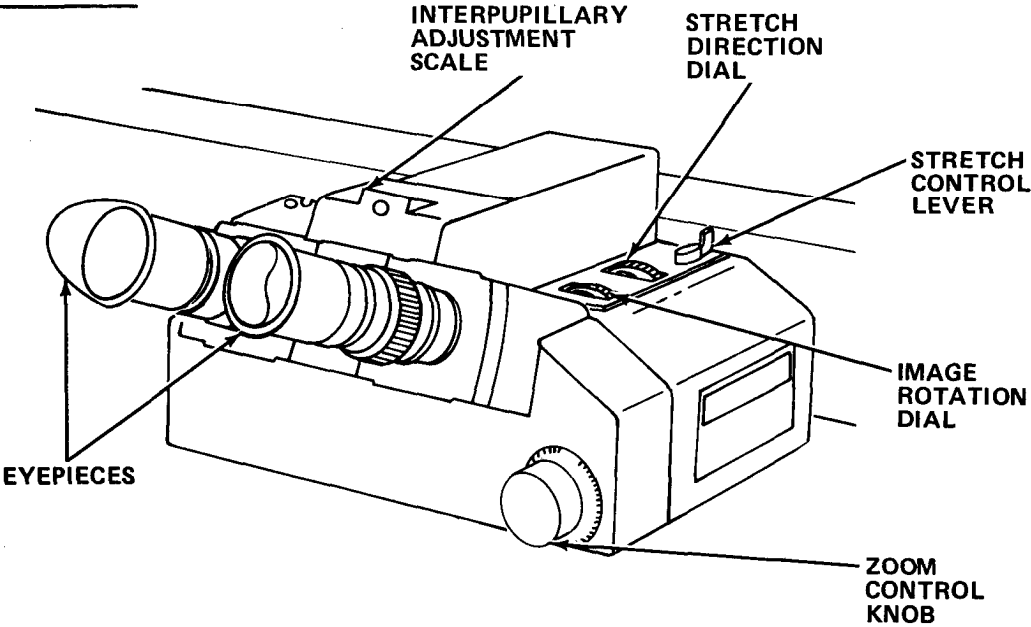
Table 4-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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
<b>ZOOM TRANSFER SCOPE - Cont</b>			
1	B	<u>Inspect - Cont</u>	 <p>5. Check STRETCH CONTROL 1 ever, STRETCH DIRECTION dial, IMAGE ROTATION dial. and ZOOM CONTROL knob for rotation and freedom of movement for each control.</p> <p><b>NOTE</b></p> <p>Do not remove eyepieces.</p> <p>6. Check that each eyepiece moves freely in and out of its eyepiece tube. 7. Check INTERPUPILLARY ADJUSTMENT scale and verify that eyepieces move toward or away from each other.</p>

**Table 4-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont**

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

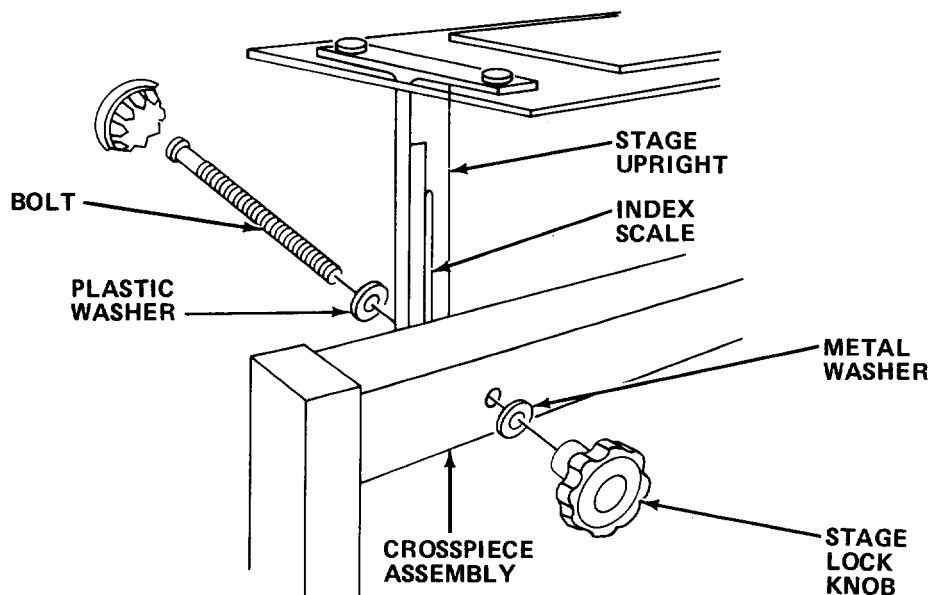
AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

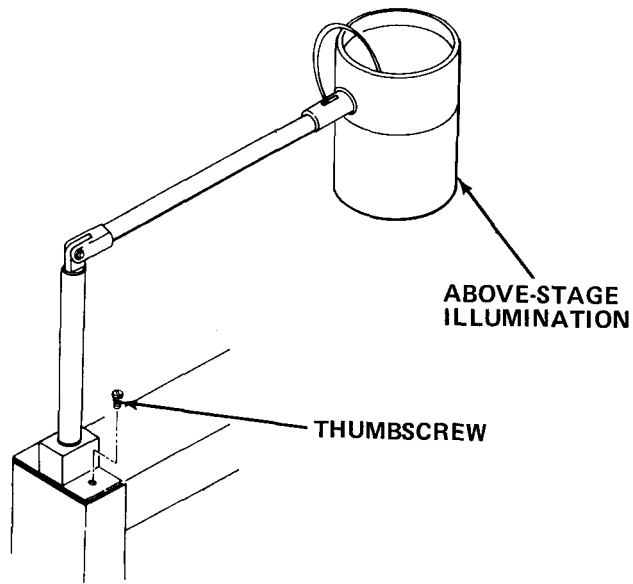
ITEM NO	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE
1	B	<p><b><u>ZOOM TRANSFER SCOPE - Cont</u></b></p> <p><u>Inspect - Cont</u></p> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <ul style="list-style-type: none"> <li>● Dirt and dust on optical surfaces will hinder equipment's performance.</li> <li>● Do not wipe optical surfaces until dust and foreign matter have been removed.</li> <li>● Do not touch optical surfaces with bare fingers.</li> </ul> <p>8. Check top and bottom of glass stage and optical surfaces for dirt, dust, and fingerprints. Use watchmaker's blower to remove dust and dirt from exposed surfaces. Clean with cheesecloth moistened with warm mild liquid dishwashing detergent solution diluted at least 10:1. Use distilled water for dilution if possible. Wipe surface dry with clean absorbent cotton swab. Wipe with chamois to remove water spots.</p>

## 4-6. OPERATION UNDER USUAL CONDITIONS.

### 4-6.1 Assembly and Preparation for Use.

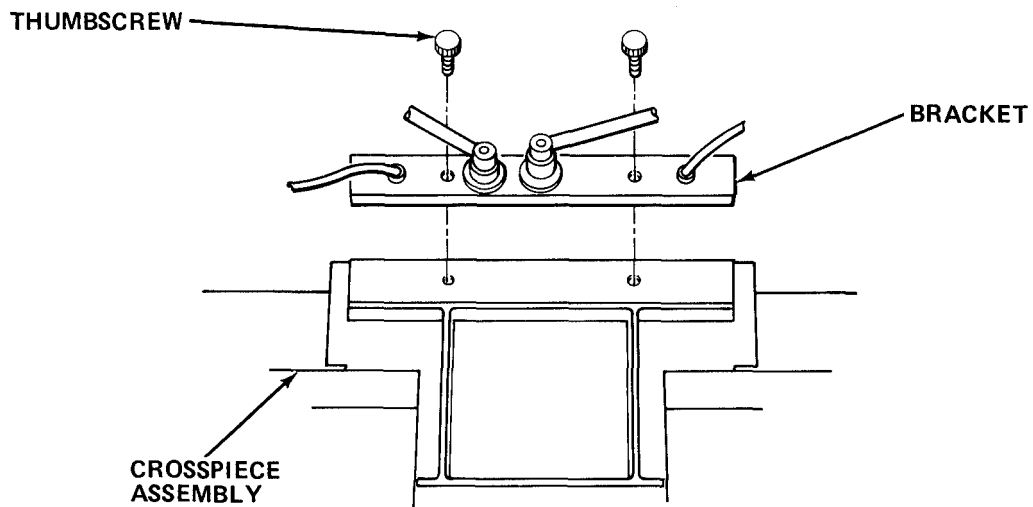


- a. Remove zoom transfer scope from transport case.
- b. Set zoom transfer scope on flat work surface.
- c. Attach glass stage:
  - (1) Remove stage lock knobs, bolts, and washers from crosspiece assembly.
  - (2) Position stage upright with arms facing toward rear.
  - (3) Thread bolts with plastic washers through stage arms and cross piece assembly.
  - (4) Place metal washer and knob on threaded end of bolt. Tighten knob.
  - (5) Observe index (focusing) scale on front of upright, and align prefocused mark or common mark on each upright with top of crosspiece.
  - (6) Place diffuser hold-down plate on glass stage.
- d. Attach above-stage illuminators.



- (1) Mount above-stage illuminator on left side of transfer scope.
- (2) Secure with thumbscrews.
- (3) Plug illuminator cord into receptacle.

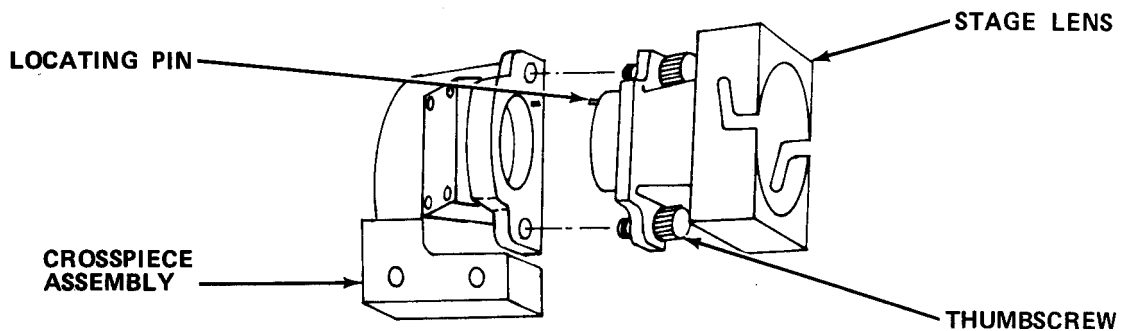
e. Attach table and stage illuminators.



- (1) Attach bracket to underside of crosspiece assembly with thumbscrews.

(2) Plug illuminator cords into receptacles.

f. Attach stage lens to back of crosspiece assembly.

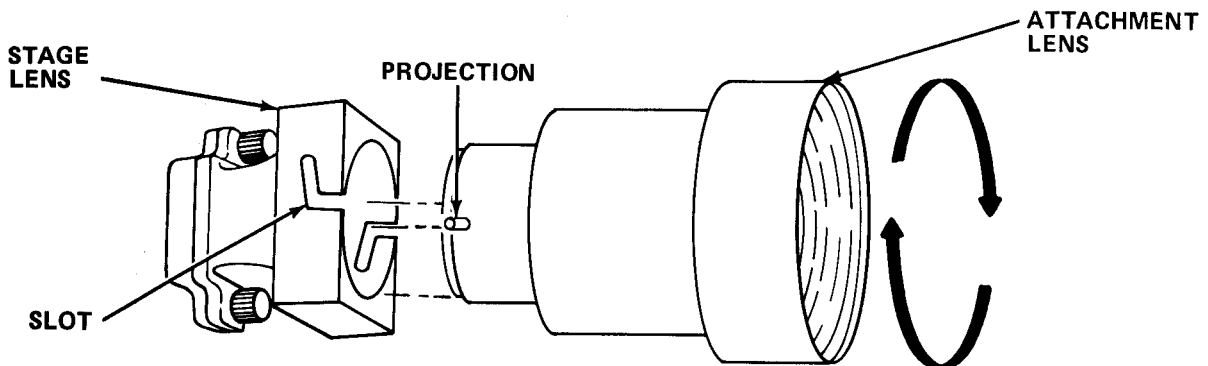


(1) Align stage lens locating pin with hole in mount.

(2) Seat stage lens fully in mount.

(3) Tighten two thumbscrews.

g. Insert attachment lens into stage lens.

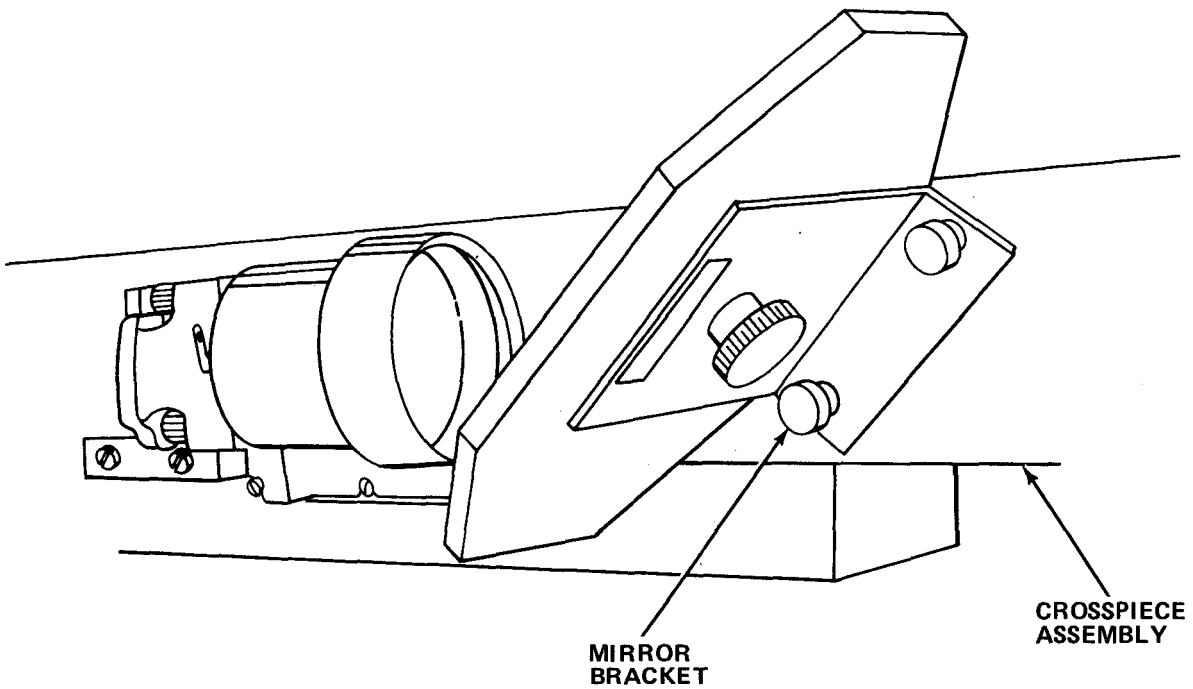


(1) Align projections with slots in stage lens.

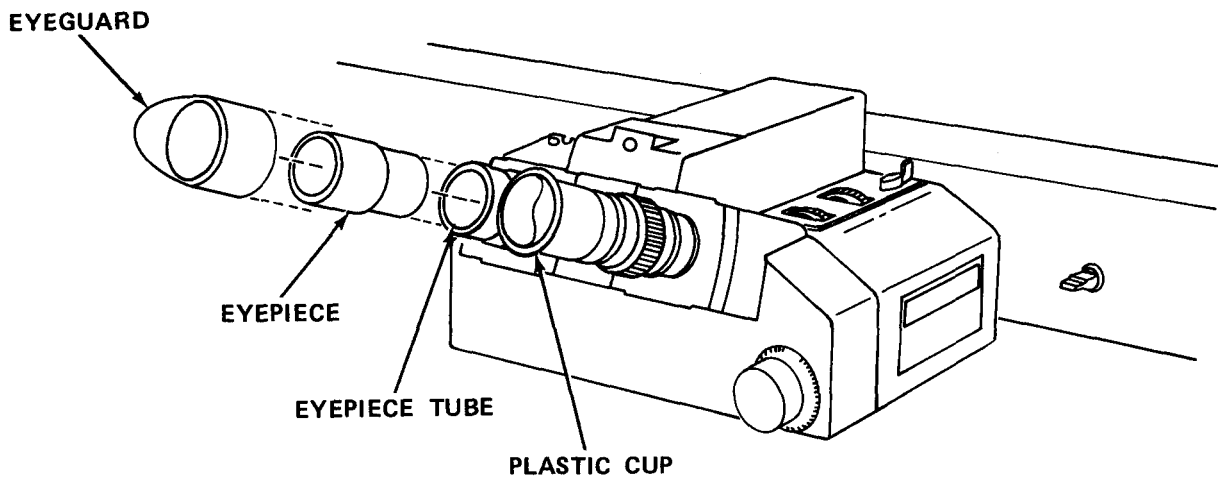
(2) Insert attachment lens.

(3) Twist right to lock.



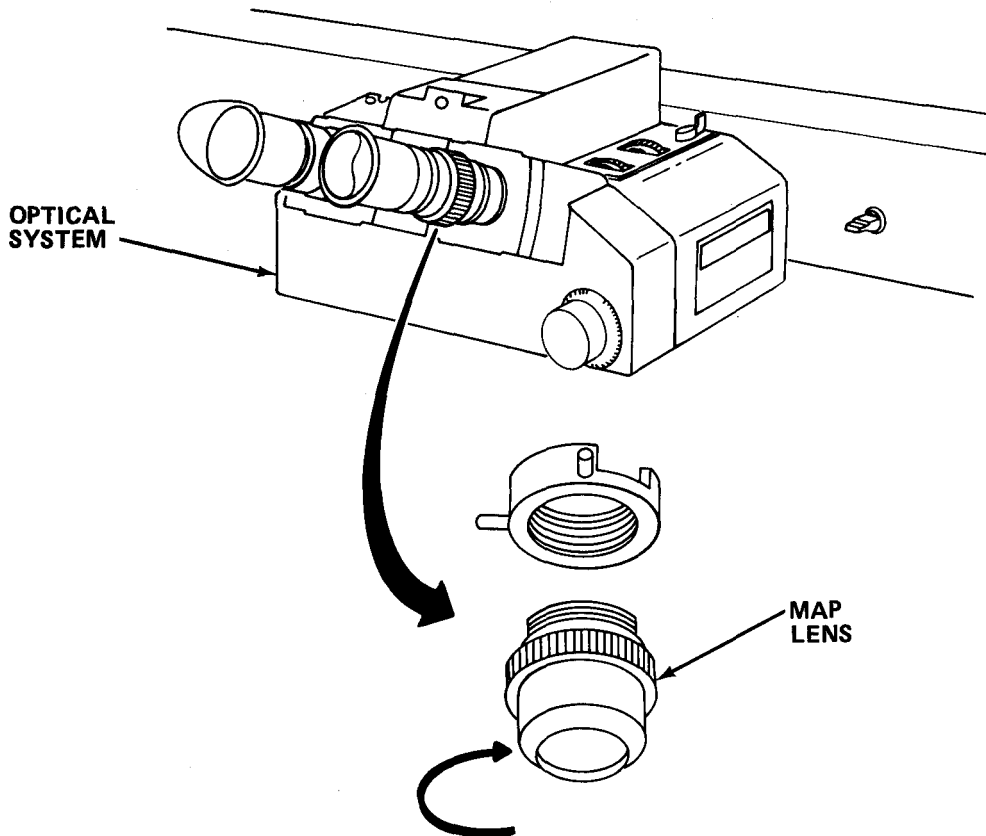


- h. Attach mirror bracket to outer holes on back of crosspiece assembly.
- i. Insert eyepieces.



- (1) Remove plastic cups.
- (2) Insert eyepieces into eyepiece tubes, pushing in until fully seated.
- (3) Place eye guards on eyepieces.

j. Attach map lens.



- (1) Place threaded end into hole located on underside of optical system
- (2) Turn right until lens is fully screwed into fixture.

NOTE

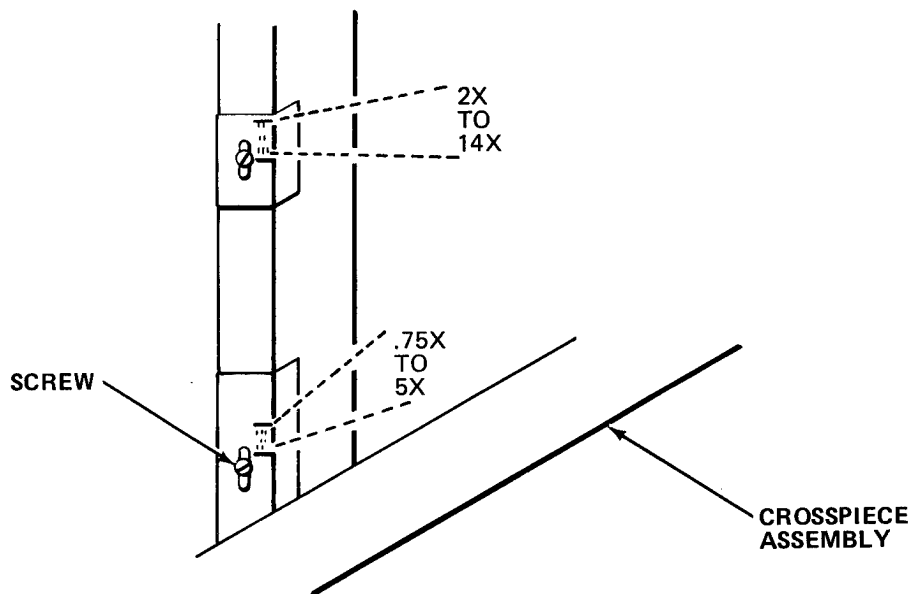
The legs on the end of the zoom transfer scope should be left folded up when the 1X or accessory 2x- or 4x map lens are used. The legs should be extended only if the accessory 0.75X map lens is used.

4-6.2 Operating Procedures.

a. Preliminary Procedures.

- (1) Plug in power cord.
- (2) Turn on power switch.

- (b) Turn TABLE knob left to OFF.
- (c) Turn STAGE BELOW knob to right to illuminate object or target from below.
- (d) Set ZOOM CONTROL knob to highest reading.
- (e) Alternately loosen Stage Lock knobs and move stage up or down keeping readings on each scale equal.
- (f) Record high and low readings where image of stage target just starts to go out of focus.
- (g) Set stage height halfway between high and low reading.
- (10) Adjust index mark.



- (a) Loosen screw.
- (b) Move mark up or down until index line is level with cross piece.
- (c) Tighten screw.

b. Operation.

- (1) Select and position material to be used.

(a) For photographic revision of map, place photograph on glass stage and place map on table.

(b) For map generalization, place large-scale map on glass stage and place small-scale map on table.

(2) Determine photographic and map lens power. Lowest power provides greatest field of view; highest power provides greatest detail.

NOTE

Photograph and map must be at same relative scale in order to make accurate cartographic corrections.

(a) Determine map scale and photograph scale.

Example: 200 Scale: 1 in. on map equals 200 ft of terrain.

1 in. = 1 mi: 1 in. on map equals 1 mi of terrain.

RF 1:24,000: Reduction factor of map. 1 in. of map equals 24,000 in of terrain.

(b) Determine reduction factor (RF) of both photograph and map.

Example: 200 Scale = RF

1 in. = 1 mi = RF

in. of terrain. (1 mi = 5280 ft = 63,360 in.)

(c) Determine matching scale S. Use RF of photograph as I/P and RF of map as I/M. Then the scale S can be expressed as photograph reduction factor (P) over the map reduction factor (M).

$$s = I/M \text{ Divided By } I/P \text{ or } S = P/M$$

Example: Photograph RF = 1:80,000; Map RF = 1:24,000.

Thus P = 80,000; M = 24,000; and  
 $S = 80,000/24,000 = 3.3$

(d) Use the value of S to determine map lens and photograph magnification.

<u>S Value</u>	<u>Map Lens</u>	<u>Photograph Magnification</u>
1-7	1x	1x-7x
2-14	1x	2X-14X

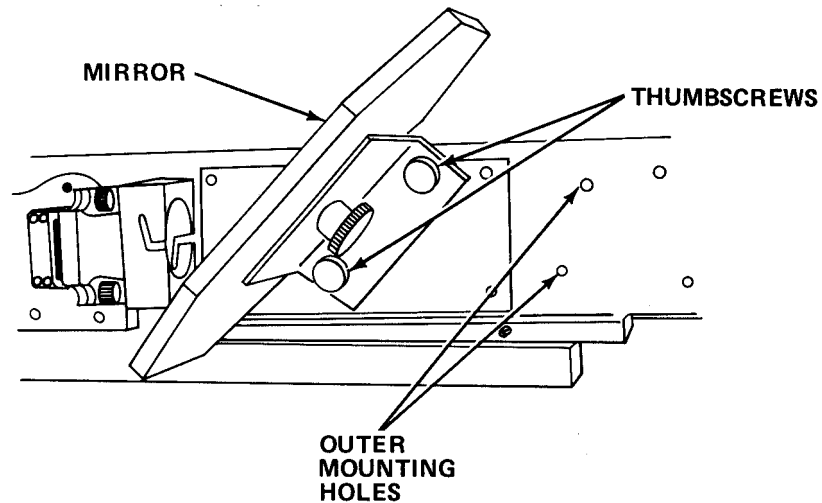
Example: If 3.3 is value of S, then map lens of 1X and either 1X-7X attachment lens or 2X-14X (without attachment lens) may be used.

(3) Set magnification:

**NOTE**

The following steps should be taken if it is necessary to convert the zoom transfer scope to the 2X-14X range of magnification.

(a) Remove attachment lens.

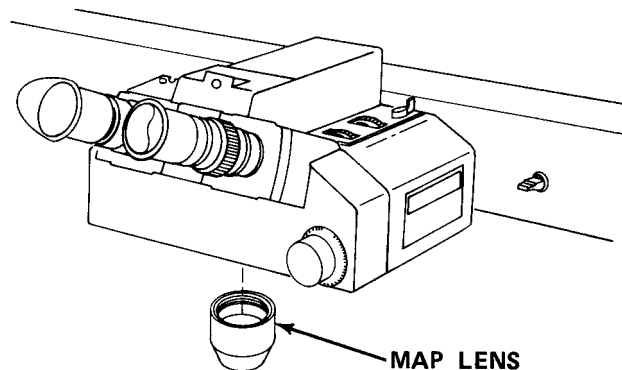


(b) Move mirror from outer mounting holes to inner mounting holes.

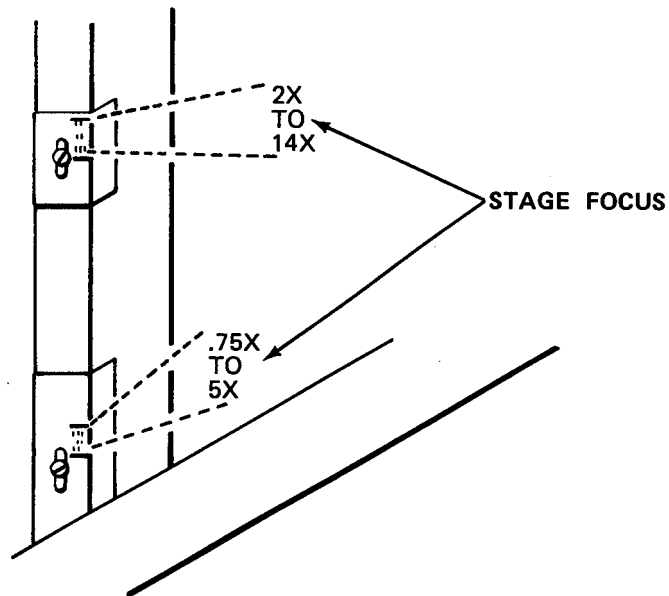
(c) Tighten thumbscrews.

(d) Lower glass stage to 2X to 14X index and refocus glass stage.

(e) Set 2X to 14X index plate.

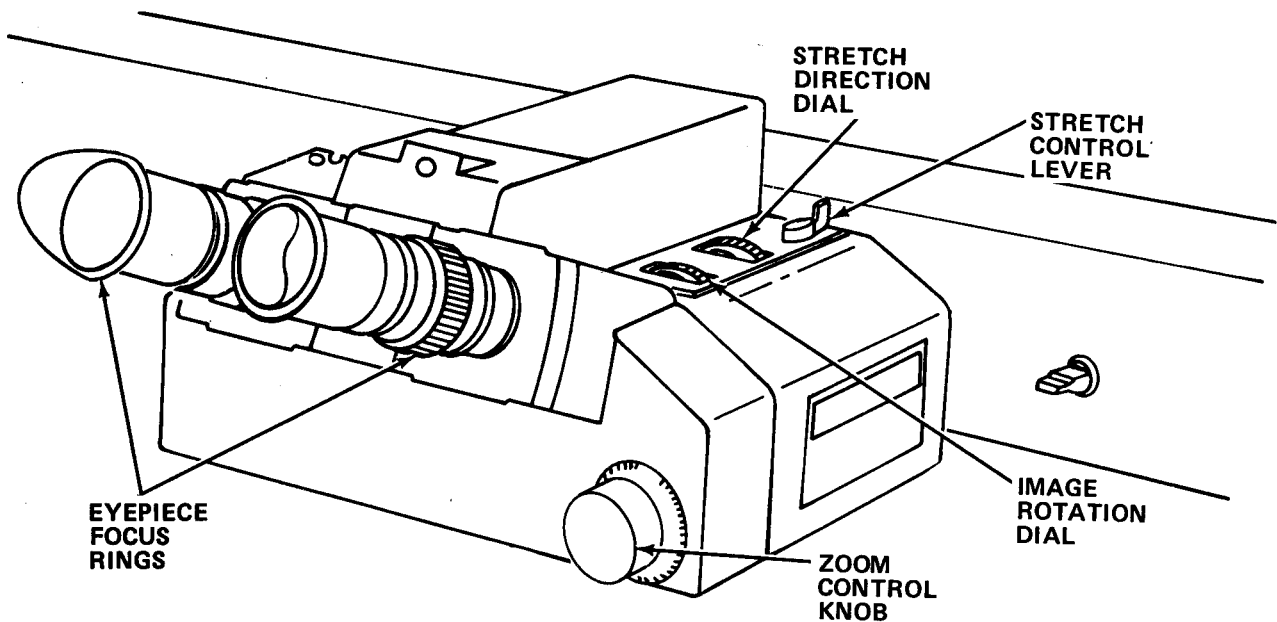


(f) Adjust map lens. Turn lower knurled ring fully left for 1X. Turn lower knurled ring fully right for 0.7X.



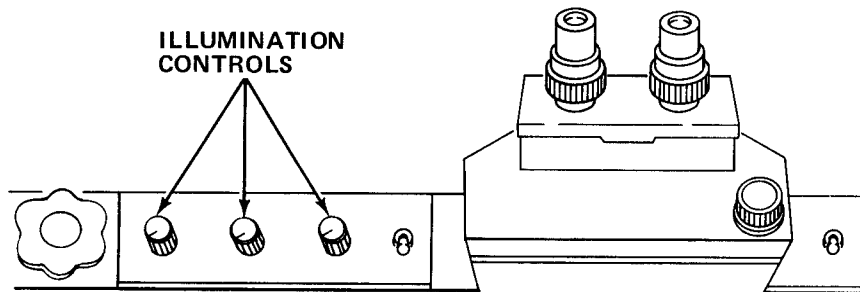
(4) Check that stage focus is at proper magnification setting.

(5) Set optical controls.

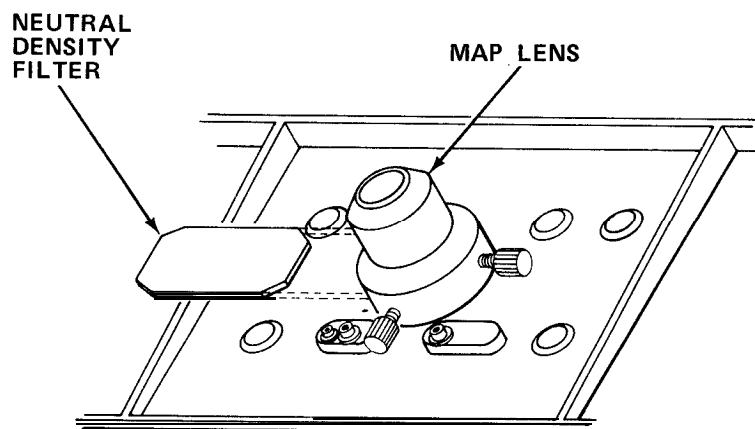


(a) Set IMAGE ROTATION dial to 0 and move object on glass stage to left or right. If image movement is reverse of object's movement, turn IMAGE ROTATION dial until 0 appears again.

- (b) Set Zoom Control knob to 1X.
- (c) Set STRETCH Control Lever to 1X.
- (d) Set STRETCH DIRECTION dial to 0.
- (6) Position lamps so lamps shine on field of view.
- (7) Focus eyepiece if required.



- (8) Adjust intensity. Turn illumination controls until both glass stage and table can be comfortably viewed.



**NOTE**

In brightly lit room, neutral density filter may be inserted in slot above map lens to improve map image.

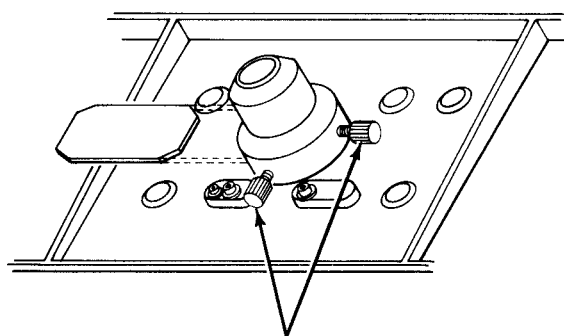
(9) Match images.

**NOTE**

Flipping either ILLUMINATION SELECTOR switch up or down will illuminate glass stage or table. Images not in register will jump. FOOT SWITCH will also turn off either stage or map illuminator when pedal is depressed.

(a) Pick common feature on both maps and place it in center of field of view of each viewing system (stage and table).

(b) Rotate IMAGE ROTATION dial to move images so lines, such as streets, rivers, etc, are parallel. Then be sure adjacent objects are also parallel.



X-AND Y-ADJUSTMENT SCREWS

**CAUTION**

To avoid damage to the map lens, do not overtighten or back adjustment screws out of threads.

(c) Move map on table left, right, forward, or backward to roughly align image in X-Y direction. Then turn X-and Y-adjustment screws for precise alignment.

(10) Match scale of stage image and map.

(a) Pick feature near edge of field of view, and change zoom magnification until both features are aligned.

(b) When point near edge is chosen, pick second point near opposite edge and change zoom magnification until one-half the coincident distance is covered to second point.

(11) Repeat match. Continue to match images. Match scales until best fit between map and image is obtained.



(12) Use STRETCH control lever. Set STRETCH control lever to 1X or 2X and rotate STRETCH DIRECTION dial to improve fit between map and image.

(13) Repeat match using the following summary:

#### NOTE

Each adjustment will change previous adjustments slightly, so matching steps must be repeated until best compromise fit is obtained.

- (a) Image Rotation - Approximate orientation.
- (b) Zoom - Approximate scale.
- (c) Stretch/Stretch Direction - Match shapes.
- (d) Image Rotation - Align lines.
- (e) Stretch Direction - Align lines perpendicular to lines in previous step.
- (f) Stretch - Match shapes.
- (g) Zoom - Match scale.
- (h) Repeat as required.

#### CAUTION

To protect optical system from dust, dirt, and fingerprints when transfer scope is not in use, dust cover must be used.

(14) Cover optical system with dust cover.

4-6.3 Preparation for Movement.

- a. Remove dust cover and place in transport case.
- b. Remove map lens.
- c. Remove eye guards and eyepieces.
- d. Place plastic cups in eyepiece tubes.
- e. Remove mirror.
- f. Remove attachment lens.
- g. Remove stage lens.
- h. Detach table and below-stage illuminators.
- i. Remove above-stage illuminator
- j. Remove diffuser.
- k. Remove glass stage.
1. Place zoom transfer scope and equipment in transport case, and secure case.

4-7. OPERATION UNDER UNUSUAL CONDITIONS. This equipment is designed to operate only in a controlled environment.

Section III OPERATOR MAINTENANCE

4-8. LUBRICATION INSTRUCTION. 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 zoom transfer scope, 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. IMAGES BLURRED, POOR CONTRAST, OR RESOLUTION.	Inspect optical system and glass stage for fingerprints and dirt.	<ul style="list-style-type: none"> <li>(a) Clean optical surfaces and glass stage.</li> <li>(b) If problem remains, notify direct/general support maintenance.</li> </ul>
2. ILLUMINATORS DO NOT WORK. PILOT LIGHT IS OFF.	Step 1. Check if power cord is not plugged in and POWER switch is off.	<ul style="list-style-type: none"> <li>(a) Plug in power cord and turn POWER switch on.</li> <li>(b) Reset circuit breakers.</li> </ul>
	Step 2. Visually check fuses for damage or broken filaments.	<ul style="list-style-type: none"> <li>(a) Replace defective fuses (para 4-10.3).</li> <li>(b) Refer to direct/general support maintenance.</li> </ul>
3. ONE ILLUMINATOR DOES NOT WORK.	Check if illuminator connector is not properly seated in receptacle.	<ul style="list-style-type: none"> <li>(a) Seat connector properly.</li> <li>(b) Replace lamp (paragraph 4-10.2).</li> <li>(c) If problem remains, notify direct/general support maintenance.</li> </ul>
4. ILLUMINATORS WORK. PILOT LIGHT IS OFF.	Notify direct/general support maintenance.	

**4-10. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering operator maintenance functions for the zoom transfer scope. 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.

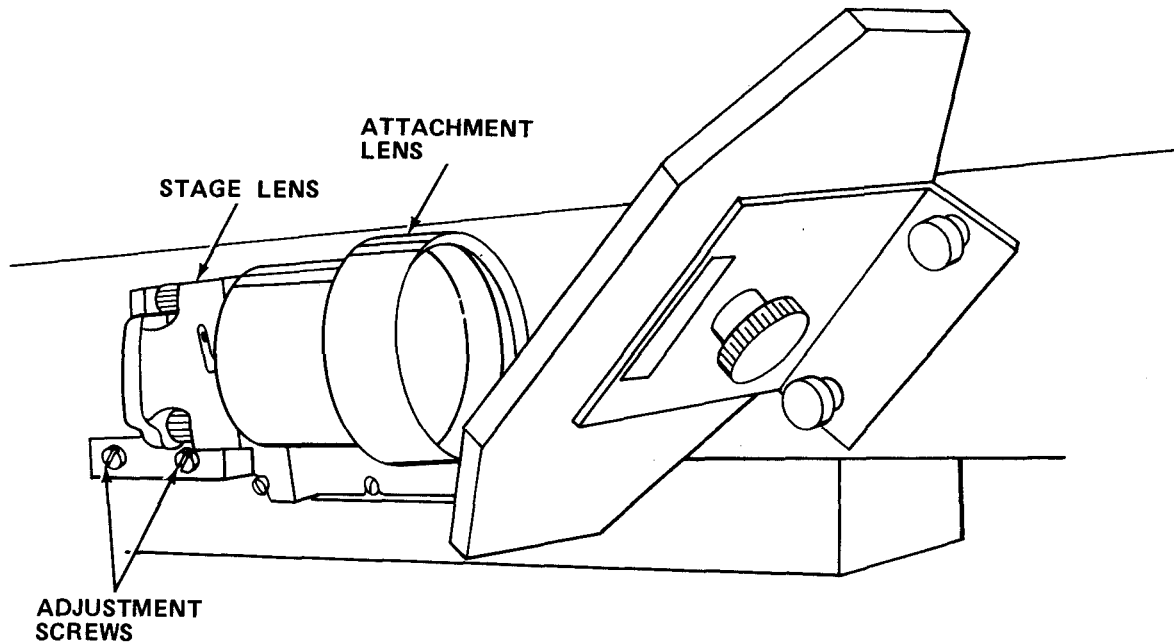
I N D E X

PROCEDURE	PARAGRAPH
Adjust Drag . . . . .	4-10.1
Replace Lamp . . . . .	4-10.2
Replace Fuse . . . . .	4-10.3

4-10.1 Adjust Drag.

MOS : 810, Terrain Analyst

TOOLS: Hex Head Key Wrench Set



- a. Rotate attachment lens and stage lens to vertical and horizontal positions. Observe if gravity pulls lenses down or if tension is too great to easily move lenses.
- b. Use a hex head key wrench on adjustment screws. Turning wrench to right tightens adjustment screw, increasing drag. Turning to left loosens adjustment screw, decreasing drag.
- c. Test adjustment by positioning lenses. Observe that lenses retain position. Movement must be firm but not too tight.

4-10.2 Replace Lamp.

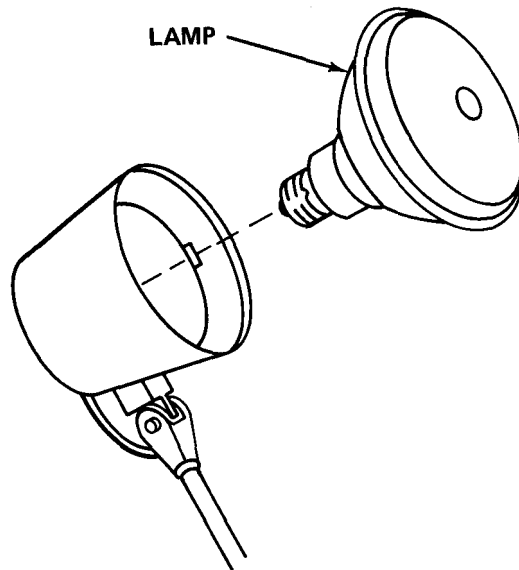
MOS: 810, Terrain Analyst

SUPPLIES: Lamp

WARNING

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing zoom transfer scope.

- a. Turn off power and unplug power cord.



- b. Unscrew and dispose of defective lamp.
- c. Install new lamp.
- d. Plug in power cord and turn on power.

4-10.3 Replace Fuse.

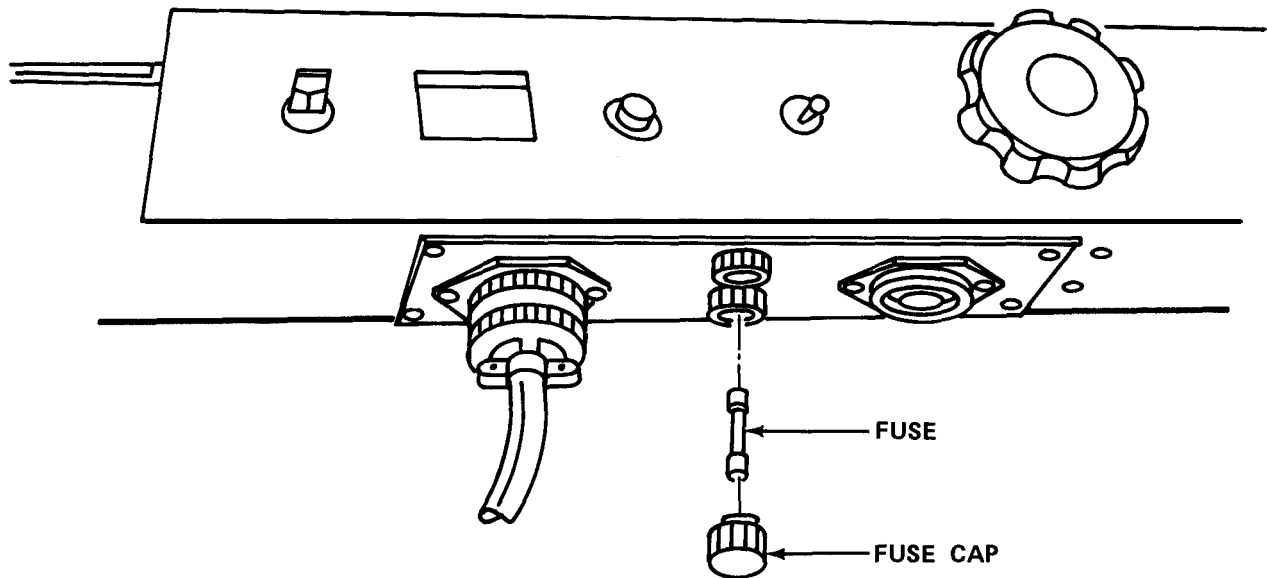
MOS : 810, Terrain Analyst

SUPPLIES: Fuse

**WARNING**

Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing zoom transfer scope.

- a. Turn off power and unplug power cord.



- b. Turn fuse cap left and remove.
- c. Remove defective fuse.
- d. Install new fuse into fuse cap.
- e. Reinstall fuse cap. Turn right to lock.
- f. Plug in power cord and turn on power.

## 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 5-6675-317-24P covering organizational maintenance for this equipment.

### **4-13. SERVICE UPON RECEIPT.**

#### 4-13.1 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.

**4-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.** There are no organizational PMCS procedures assigned to this equipment.

**4-15. ORGANIZATIONAL TROUBLESHOOTING.** There are no organizational troubleshooting procedures assigned for this equipment.

**4-16. MAINTENANCE PROCEDURES.** There are no organizational maintenance procedures assigned for this equipment.

**4-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.



**Section V DIRECT/GENERAL SUPPORT MAINTENANCE****4-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.**

**4-18.1 Common Tools and Equipment.** For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**4-18.2 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.

**4-18.3 Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-317-24P covering direct/general support maintenance for this equipment.

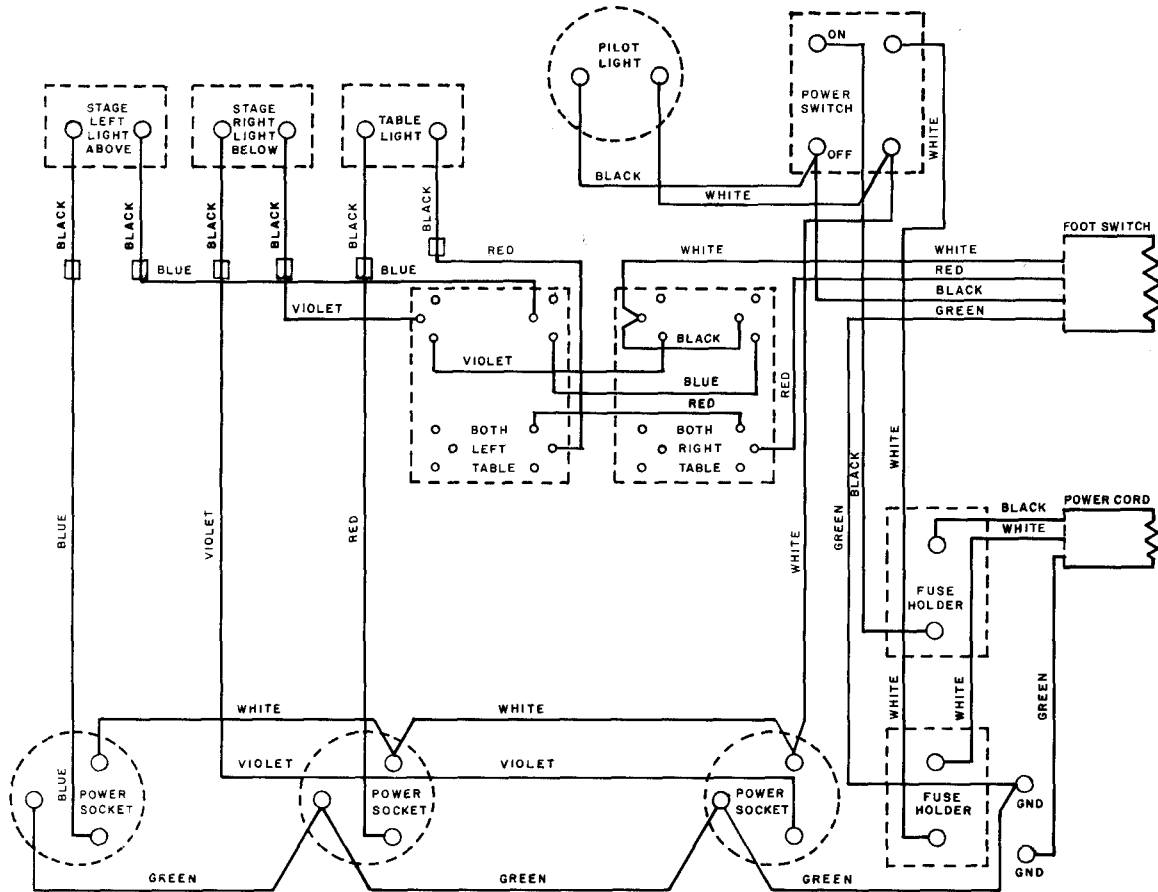
#### 4-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES.

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 at lower levels 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 facing schematic or the foldout located at the end of this manual for further fault analysis.

d. If the zoom transfer scope 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).



ZOOM TRANSFERS SCOPE ZT4-H  
WIRING DIAGRAM

**Table 4-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING**

---

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

1. PILOT LIGHT IS OFF.

Check fuse for continuity with multimeter.

Replace fuse (paragraph 4-10.3).

2. ONE ILLUMINATOR DOES NOT WORK.

Step 1. Check for 120 V ac at illuminator receptacle input.

(a) If voltage is present, replace receptacle (paragraph 4-20.7).

(b) If voltage is not present, proceed to step 2.

Step 2. Check for correct voltage range at the potentiometer output terminals.

(a) With multimeter leads in place, slowly rotate illuminator knob fully right and fully left. Observe for 0-120 V ac between fully left position and fully right position. If correct voltage range is not present, repair or replace wiring between potentiometer and receptacle.

(b) If correct voltage range is present, proceed to step 3.

**Table 4-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. ONE ILLUMINATOR DOES NOT WORK - Cont	Step 3. Check for 120 V ac input at potentiometer.	(a) If correct voltage is not present, proceed to Step 4. (b) If correct voltage is present, replace potentiometer (paragraph 4-20.5).
	Step 4. Check wiring for continuity between switch and potentiometer.	Repair or replace wiring.
3. ILLUMINATORS WORK BUT PILOT LIGHT IS OFF.		<b>Check for correct voltage at pilot light leads.</b> (a) <b>If correct voltage is present, check wiring.</b> (b) <b>If not present, replace pilot light (paragraph 4-20.2).</b>

**4-20. MAINTENANCE PROCEDURES.**

a. This section contains instructions covering direct/general support maintenance functions for the zoom transfer scope. 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 Switch. . . . .	.4-20.1
Replace Pilot Light . . . . .	.4-20.2
Replace Power Cord. . . . .	.4-20.3
Replace Foot Switch . . . . .	.4-20.4

INDEX - Cont

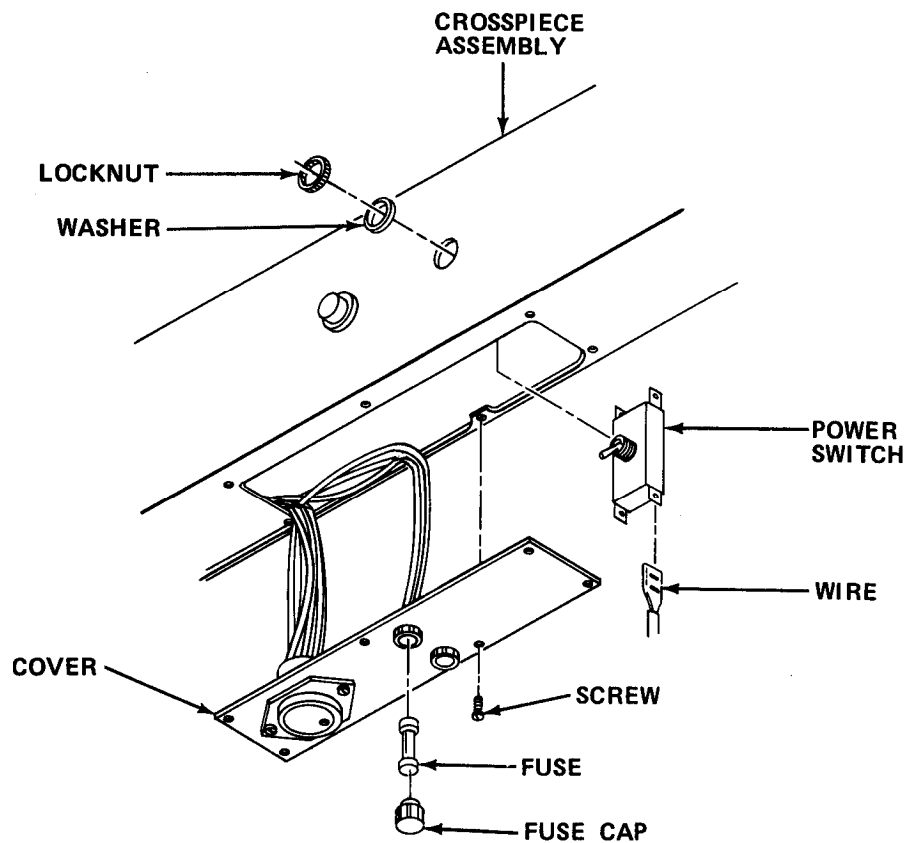
PROCEDURE	PARAGRAPH
Replace Illuminator Control Potentiometer . . . . .	4-20.5
Replace Fuse Holder . . . . .	4-20.6
Replace Illuminator Plug Receptacle . . . . .	4-20.7
Replace Illuminator Selector Switch . . . . .	4-20.8
Replace Optical System. . . . .	4-20.9

4-20.1 Replace Power Switch.

MOS : 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Needle Nose Pliers

SUPPLIES: Power Switch



**WARNING**

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

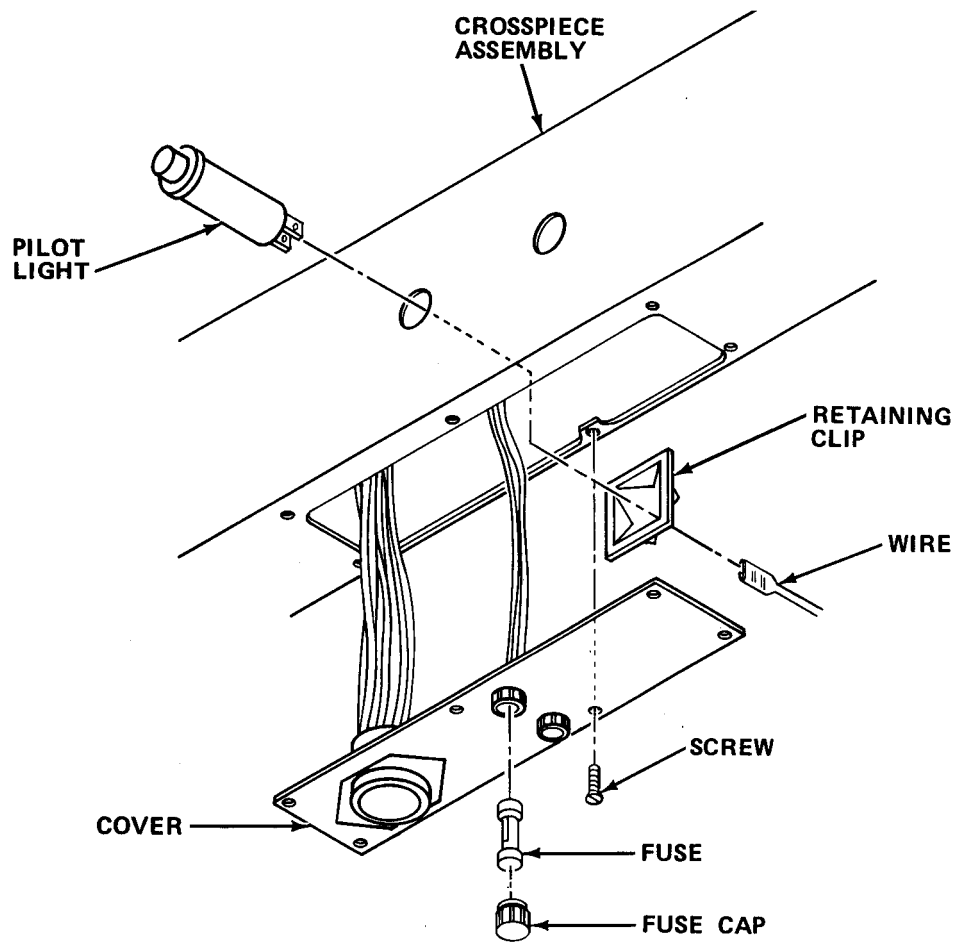
- a. Turn off power switch.
- b. Unplug power cord.
- c. Unplug below-stage illuminator cord.
- d. Remove fuse caps and fuses.
- e. Remove screws from cover on underside of crosspiece assembly. Move cover to allow access to power switch.
- f. Remove locknut and washer securing power switch to control panel.
- g. Remove power switch through underside of crosspiece assembly.
- h. Tag and disconnect wires from defective power switch.
- i. Connect wires to new power switch and remove labels.
- j. Position power switch in crosspiece assembly.
- k. Reinstall washer and locknut securing power switch to control panel.
- l. Reinstall cover on underside of crosspiece assembly.
- m. Reinstall fuses and fuse caps.
- n. Plug in below-stage illuminator cord.
- o. Plug in power cord.
- p. Turn power on.

4-20.2 Replace Pilot Light.

MOS : 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Needle Nose Pliers

SUPPLIES: Pilot Light



**WARNING**

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

- a. Turn off power and unplug power cord.
- b. Unplug below-stage illuminator cord.
- c. Remove fuse caps and fuses.



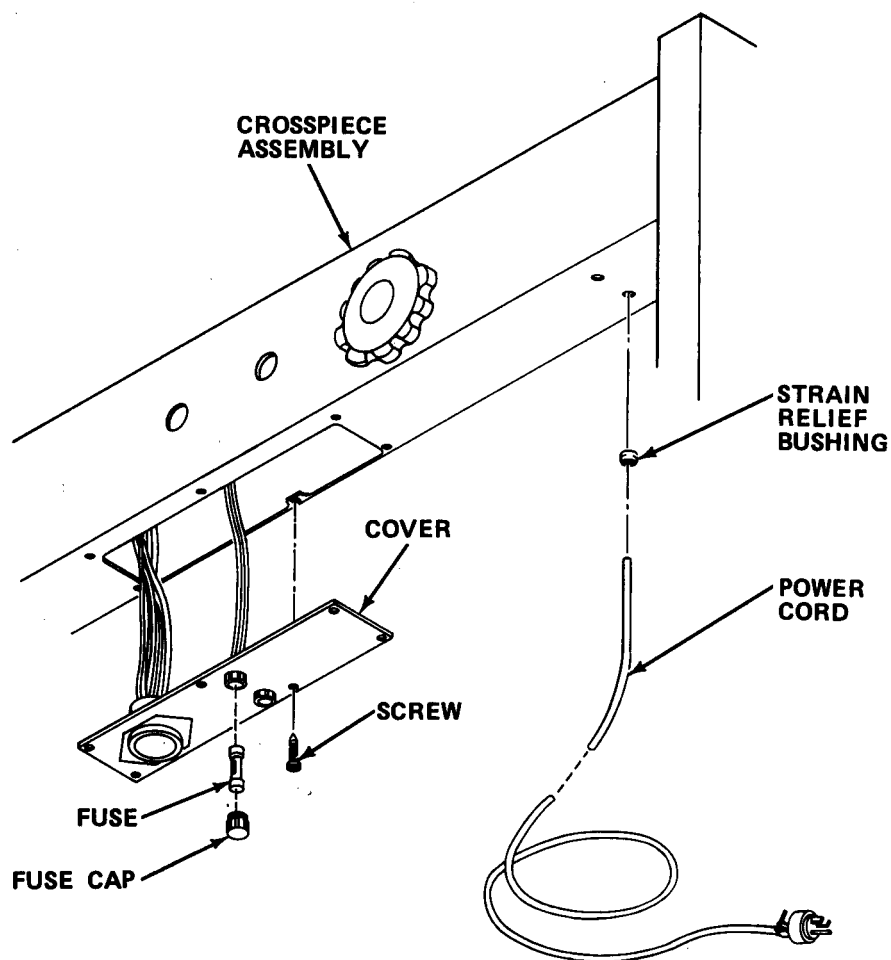
- d. Remove screws from cover on underside of crosspiece assembly. Move cover to allow access to pilot light.
- e. Tag and disconnect wires from pilot light.
- f. Remove retaining clip. Remove defective pilot light.
- g. Position new pilot light through hole on crosspiece assembly.
- h. Reinstall retaining clip.
- i. Connect wires to pilot light.
- j. Reinstall cover on crosspiece assembly and secure with screws.
- k. Reinstall fuses and fuse caps.
- l. Plug in below-stage illuminator cord.
- m. Plug in power cord and turn power on.

### 4-20.3 Replace Power Cord.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Straight 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 off and unplug power cord.
- b. Unplug below-stage illuminator cord.

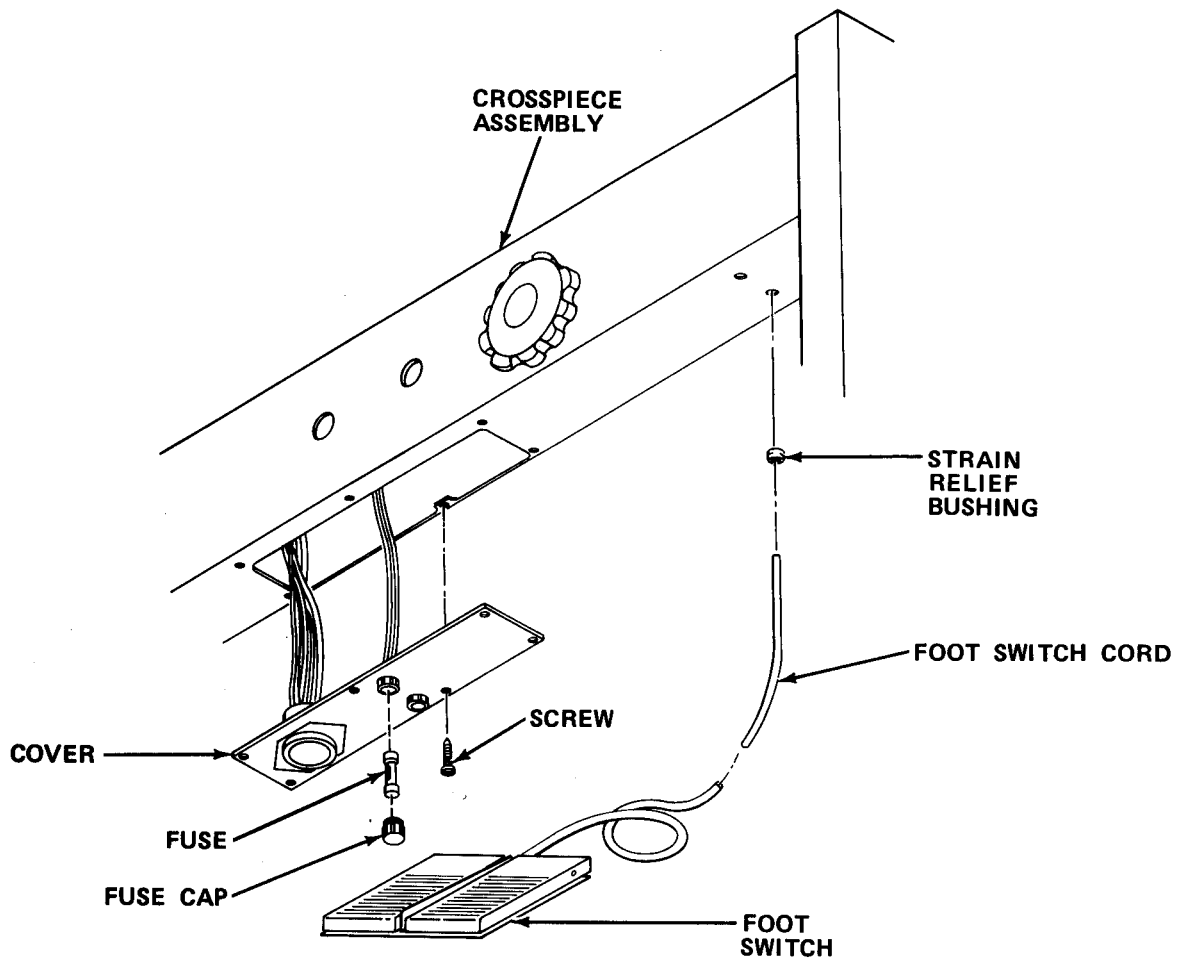
- c. Remove fuse caps and fuses.
- d. Remove screws from cover on underside of crosspiece assembly.
- e. Release strain relief bushing from power cord.
- f. Push sufficient power cord into crosspiece assembly to allow access to terminal connectors.
- g. Tag and disconnect wires from fuse holders and ground.
- h. Remove defective power cord through hole in crosspiece assembly.
- i. Install new power cord through hole in crosspiece assembly.
- j. Connect wires to ground and fuse holders.
- k. Reinstall strain relief bushing on power cord.
- l. Reinstall cover on underside of crosspiece assembly and secure with screws.
- m. Reinstall fuses and fuse caps.
- n. Plug in below-stage illuminator cord.
- o. Plug in power cord and turn power on.

4-20.4 Replace Foot Switch.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Straight Nose Pliers

SUPPLIES: Foot Switch



**WARNING**

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

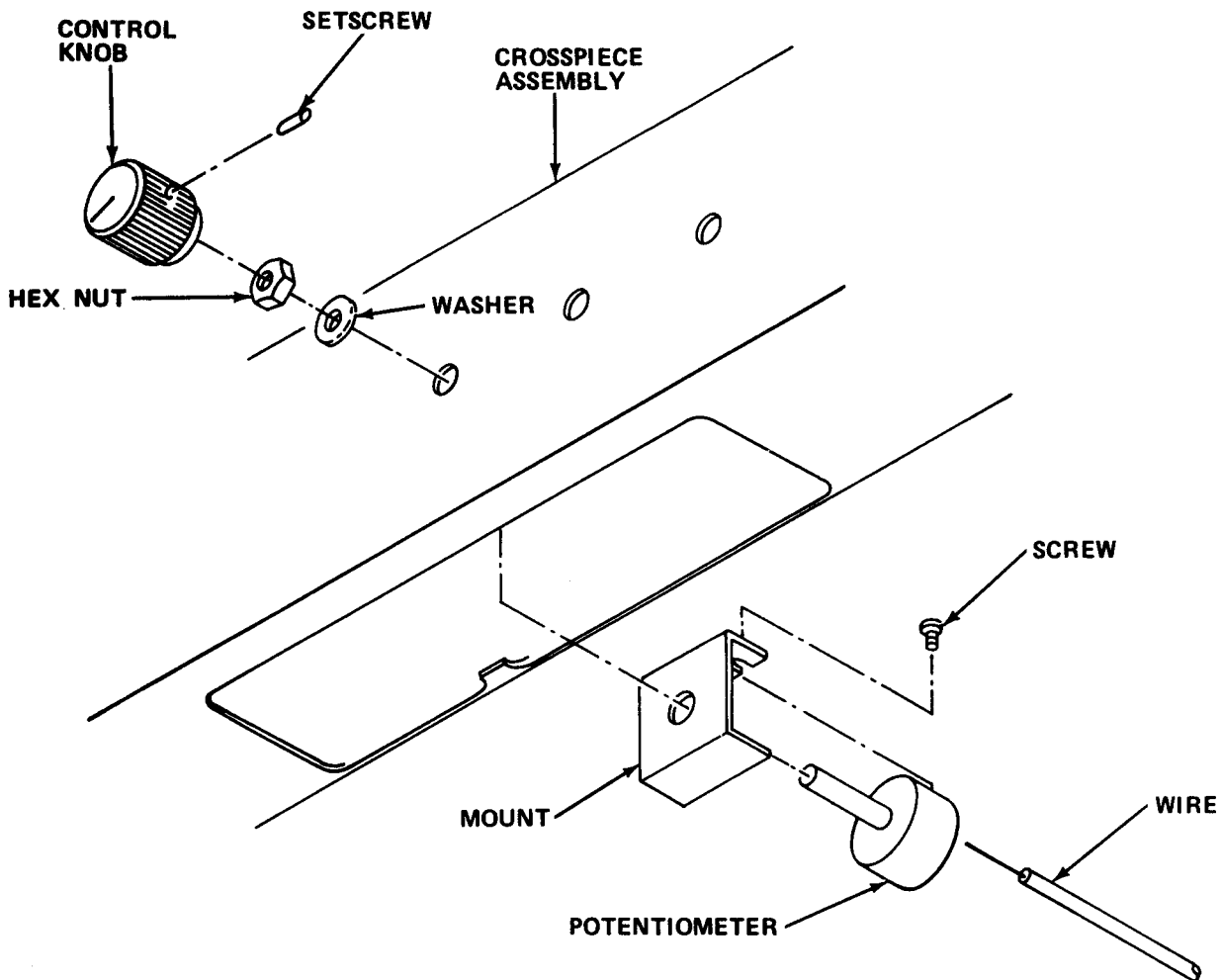
- a. Turn off power and unplug power cord.
- b. Unplug below-stage illuminator cord.
- c. Remove fuse caps and fuses.
- d. Remove screws from cover on underside of crosspiece assembly.
- e. Release strain relief bushing on foot switch cord.
- f. Push foot switch cord into crosspiece assembly to allow for give.
- g. Tag and disconnect foot switch wiring from scope.
- h. Thread foot switch cord through hole in crosspiece assembly and remove defective foot switch.
- i. Install cord for new foot switch through hole in crosspiece assembly.
- j. Connect wiring to scope.
- k. Reinstall strain relief bushing on foot switch cord.
- l. Reinstall cover on underside of crosspiece assembly and secure with screws.
- m. Reinstall fuses and fuse caps.
- n. Plug in below-stage illuminator cord.
- o. Plug in power cord and turn on power.

4-20.5 Replace Illuminator Control Potentiometer.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
Hex Head Key Wrench Set  
9/16 in. Open End Wrench  
Soldering Iron

SUPPLIES: Illuminator Control Potentiometer.  
Solder (Item 71, Appendix E)



**WARNING**

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

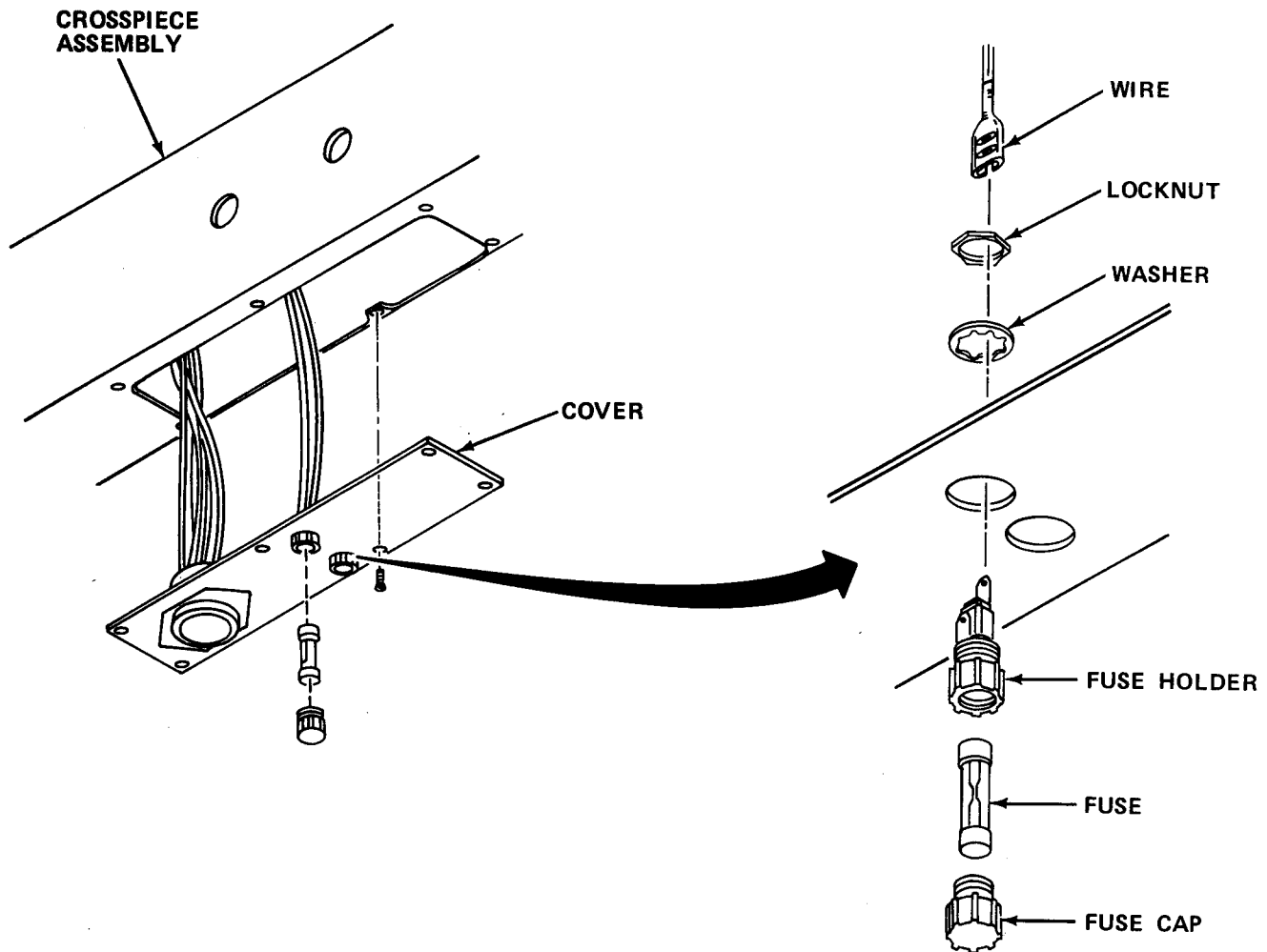
- a. Turn off power switch unplug power cord.
- b. Unplug above-stage and table illuminator cords.
- c. Remove screws from cover on underside of crosspiece assembly. Move cover to allow access to potentiometer.
- d. Loosen setscrews on illuminator control knob. Remove knob, nut, and washer.
- e. Remove potentiometer through underside of crosspiece assembly.
- f. Loosen screw on potentiometer and remove mount.
- g. Tag and desolder wires.
- h. Solder wires to new potentiometer and remove tags.
- i. Reinstall mount and tighten screw.
- j. Position potentiometer in crosspiece assembly.
- k. Reinstall washer and hex nut. Reinstall knob and tighten setscrews.
- l. Reinstall cover on underside of crosspiece assembly and secure with screws.
- m. Plug in above-stage and table illuminator cords.
- n. Plug in power cord and turn on power.

4-20.6 Replace Fuse Holder.

MOS : 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver  
9/16 in. Open End Wrench

SUPPLIES: Fuse Holder



**WARNING**

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

- a. Turn off power and unplug power cord.



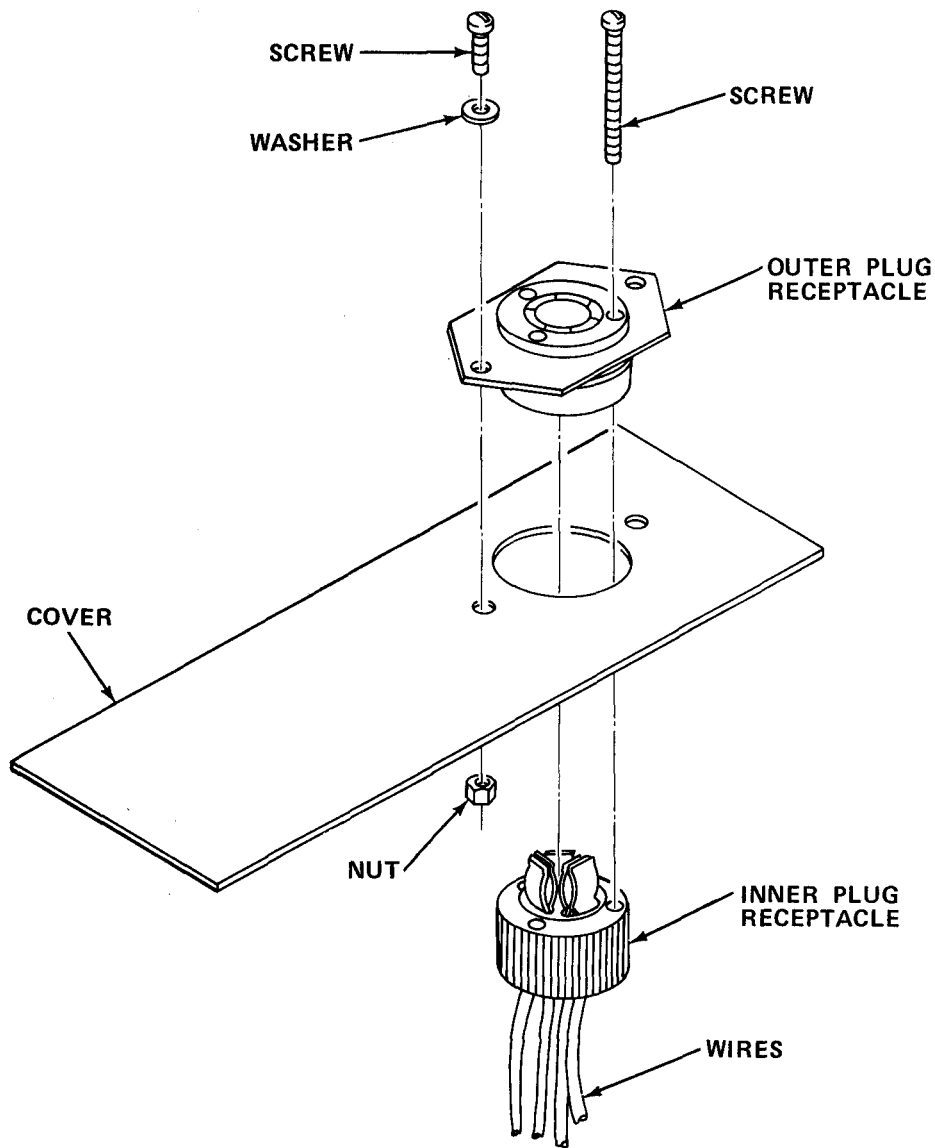
- b. Unplug below-stage illuminator cord.
- c. Remove fuse caps and fuses.
- d. Remove screws from cover on underside of crosspiece assembly. Move cover to allow access to fuse holder.
- e. Tag and disconnect wires from fuse holder.
- f. Remove locknut and washer securing fuse holder to crosspiece assembly. Remove defective fuse holder.
- g. Install new fuse holder and secure with washer and locknut.
- h. Connect wires to fuse holder.
- i. Reinstall cover on underside of crosspiece assembly and secure with screws.
- j. Reinstall fuses and fuse caps.
- k. Plug in below-stage illuminator cord.
- l. Plug in power cord and turn on power.

4-20.7 Replace Illuminator Plug Receptacle.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Illuminator Plug Receptacle



**WARNING**

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

- a. Turn off power and unplug power cord.

- b. Unplug illuminator cord(s).
- c. Remove fuse caps and fuses, if necessary.
- d. Remove screws from cover on underside of crosspiece assembly.
- e. Remove screws securing outer plug receptacle to inner plug receptacle.
- f. Remove screws, washers, and nuts securing outer plug receptacle to cover.
- g. Tag and disconnect wires from inner plug receptacle.
- h. Remove screws securing new outer plug receptacle to new inner plug receptacle.
- i. Connect wires to new inner plug receptacle and tighten screws.
- j. Install new outer plug receptacle on cover, and secure with screws, washers and nuts.
- k. Connect inner and outer plug receptacles and secure with screws.
- l. Reinstall cover on underside of crosspiece assembly and secure with screws.
- m. Replace fuses and fuse caps, if removed.
- n. Plug in illuminator cord(s).
- o. Plug in power cord and turn on power.

4-20.8 Replace Illuminator Selector Switch.

MOS: 41B, Topographic Instrument Repair Specialist

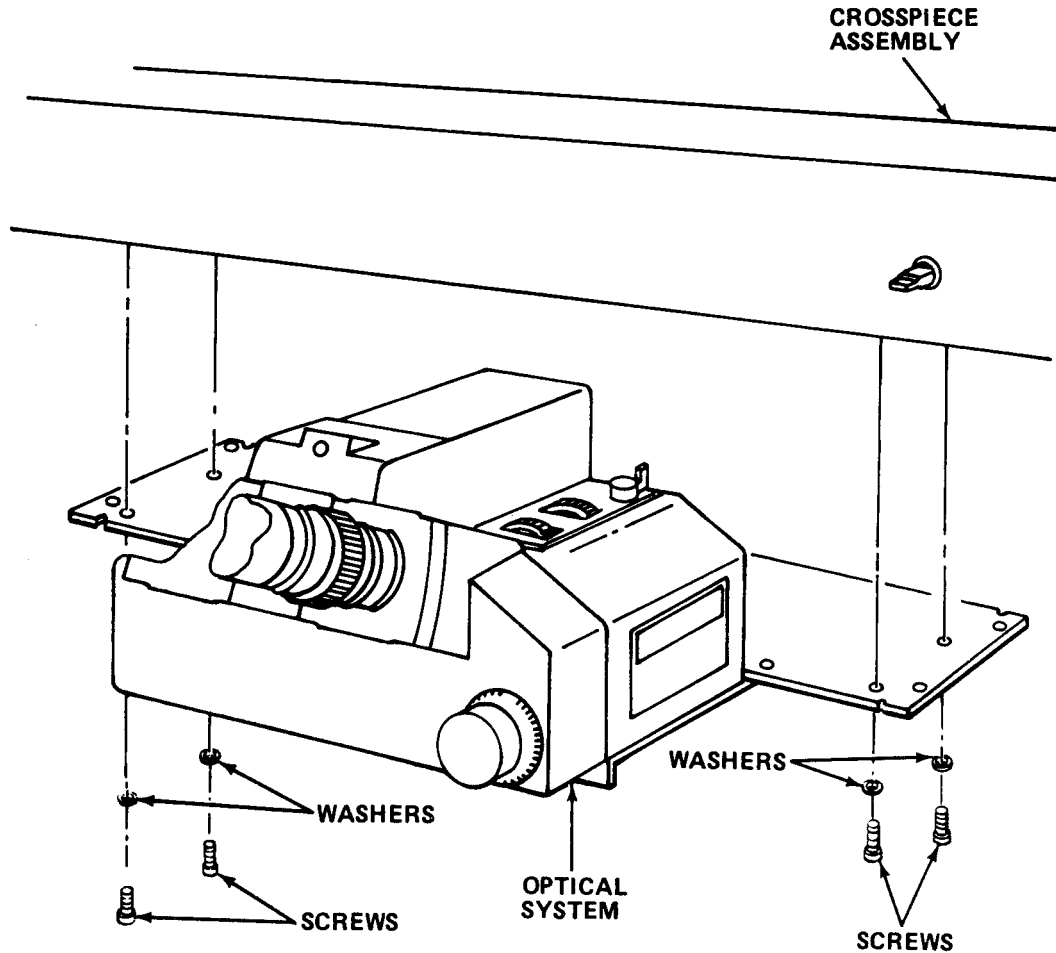
TOOLS : Hex Head Key Wrench Set  
Soldering Iron

SUPPLIES: Illuminator Selector Switch  
Solder (Item 71, Appendix E)

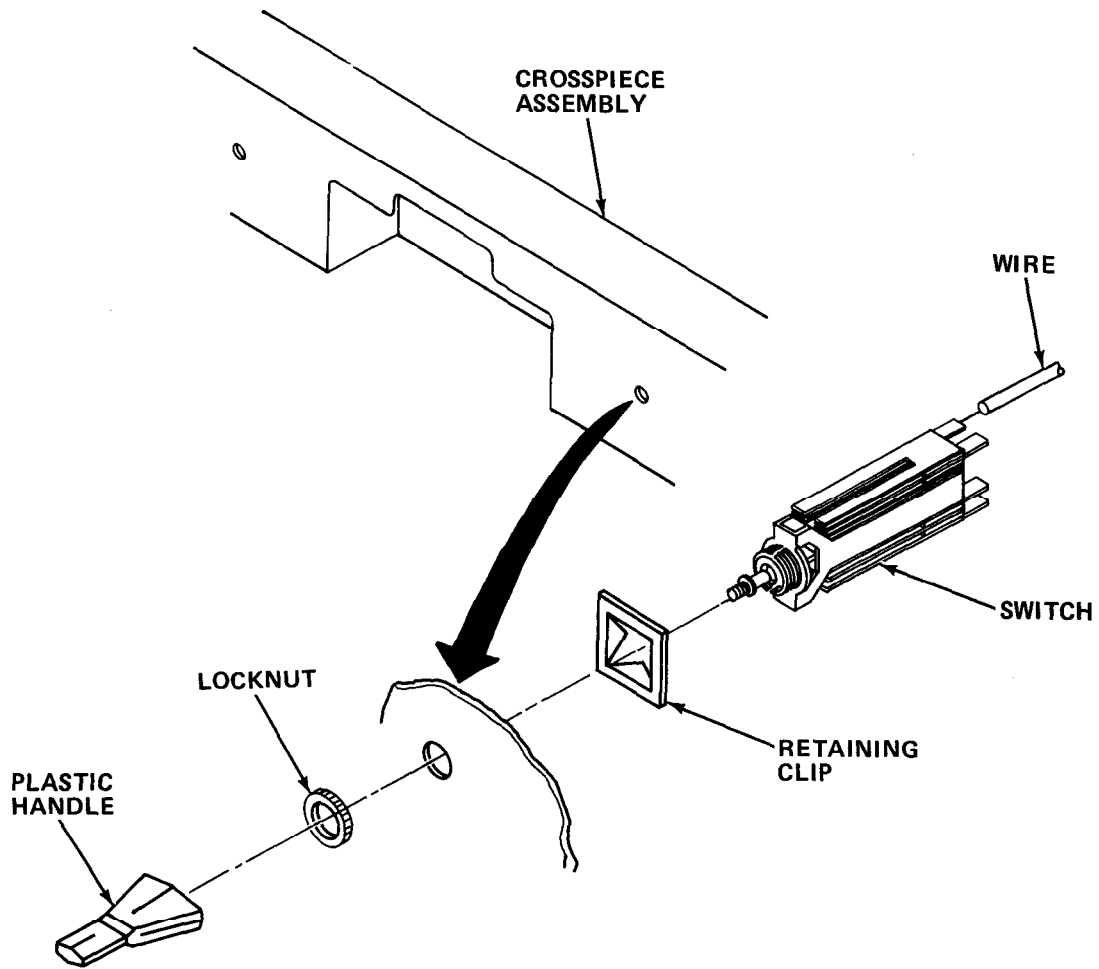
**WARNING**

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

- a. Turn off power and unplug power cord.



- b. Remove screws, washers, and optical system from underside of crosspiece assembly.



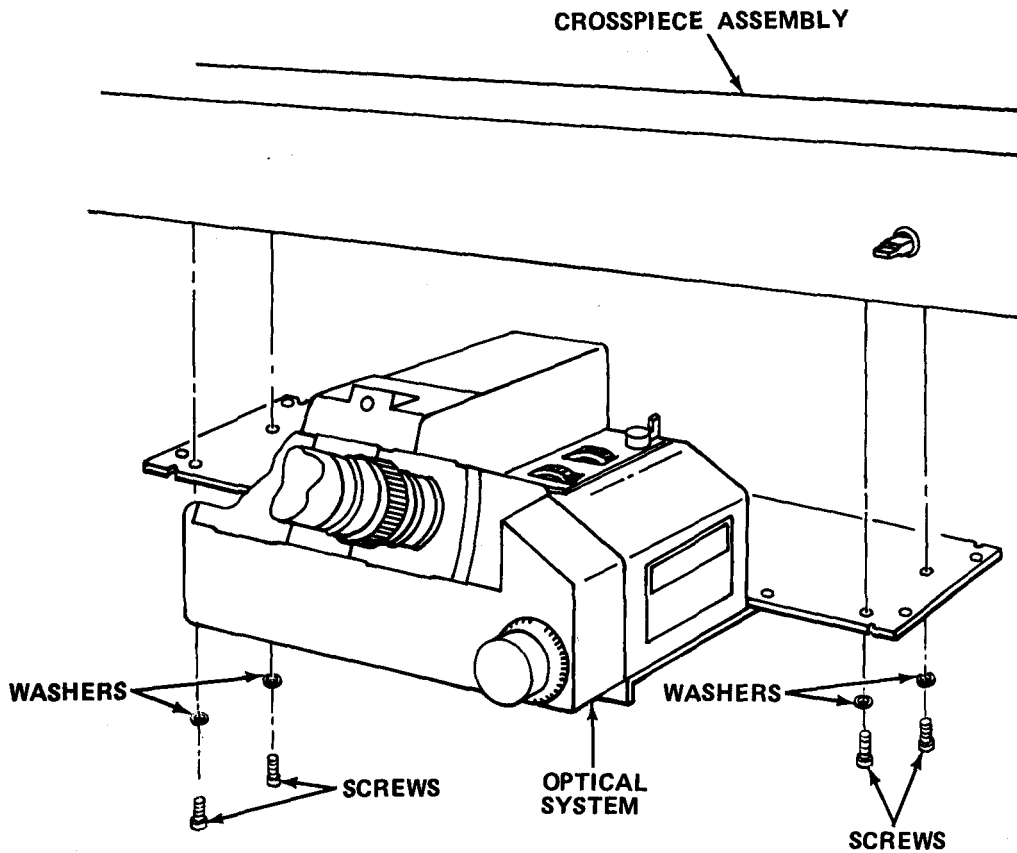
- c. Unscrew plastic handle on switch.
- d. Remove locknut and retaining clip.
- e. Remove switch through underside of crosspiece assembly.
- f. Tag and desolder wires from defective switch.
- g. Solder wires to new switch and remove tags.
- h. Position switch in crosspiece assembly.
- i. Reinstall retaining clip and locknut.
- j. Reinstall plastic handle on switch.
- k. Reinstall optical system and secure with washers and screws.
- l. Plug in power cord and turn on power.

4-20.9 Replace Optical System.

MOS : 41B, Topographic Instrument Repair Specialist

TOOLS: Hex Head Key Wrench Set

SUPPLIES: Optical System

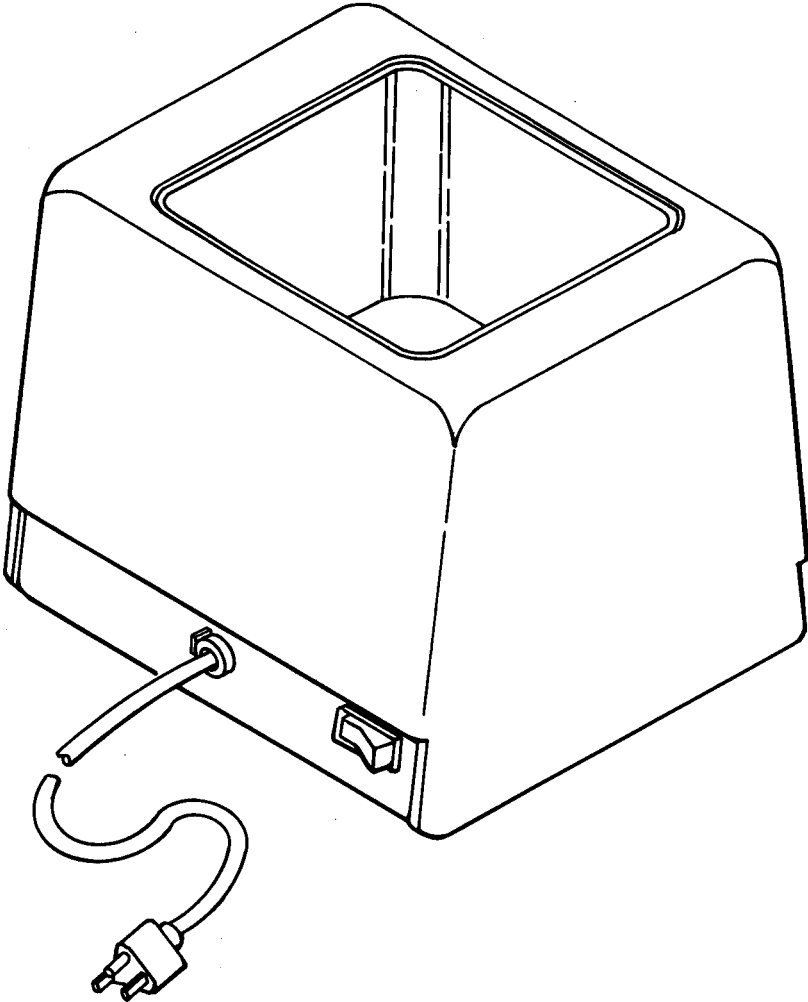


**WARNING**

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

- a. Turn off power and unplug power cord.
- b. Remove screws and washers securing optical system to bottom of crosspiece assembly. Remove defective optical system.
- c. Install new optical system and secure with screws and washers.
- d. Plug in power cord and turn on power.







## CHAPTER 5

### ULTRASONIC CLEANER

#### Section I INTRODUCTION

##### 5-1. GENERAL INFORMATION.

###### 5-1.1 Scope.

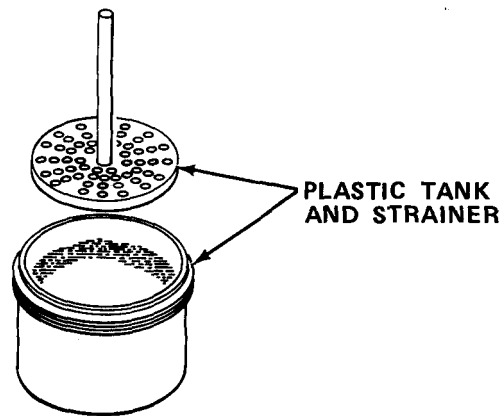
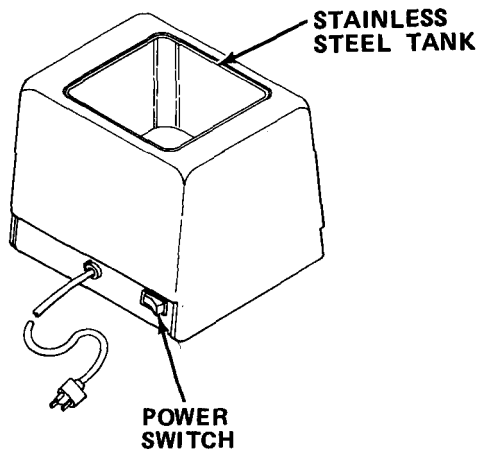
- a. Model Number and Equipment Name. Model 3069USC3 Ultrasonic Cleaner
- b. Purpose of Equipment. To clean drafting/drawing pens.

##### 5-2. EQUIPMENT DESCRIPTION.

###### 5-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Cleans without disassembly.
- b. Removes dried ink.
- c. Portable.

5-2.2 Location and Description of Major Components.



STAINLESS STEEL TANK. Holds water.

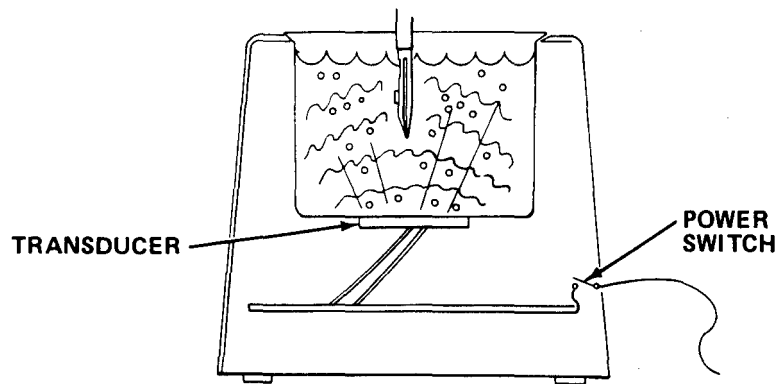
PLASTIC CONTAINER AND STRAINER. Holds small parts in solution for cleaning.

POWER SWITCH. Turns machine on or off.

5-2.3 Equipment Data.

Weight	5.51 lbs (2.5 kg)
Power Requirements	115 V, 60 Hz, 60 W

**5-3. TECHNICAL PRINCIPLES OF OPERATION.**

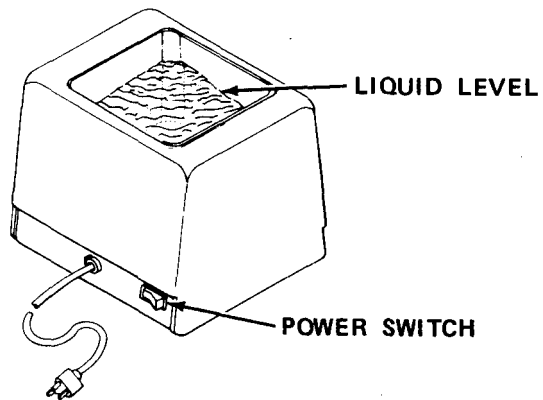


POWER SWITCH. When turned ON, provides power to the transducer.

TRANSDUCER. Generates ultrahigh frequency sound waves.

**Section II OPERATING INSTRUCTIONS**

**5-4. 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.

**TM 5-6675-317-14**

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.
- 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 16, Appendix E)	ar

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

**NOTE**

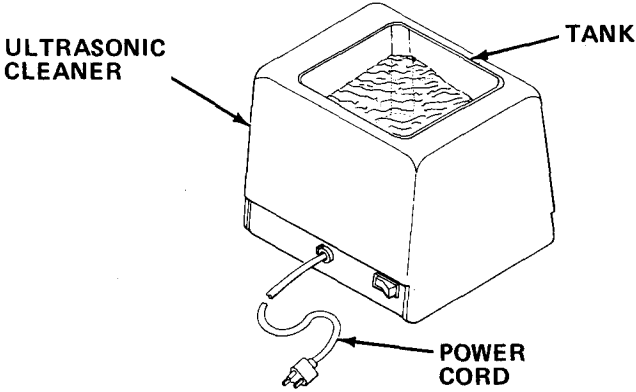
If the equipment must be kept in continuous operation, check and service only those items that can safely be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before  
D - During  
A - After

W - Weekly  
M - Monthly  
Q - Quarterly

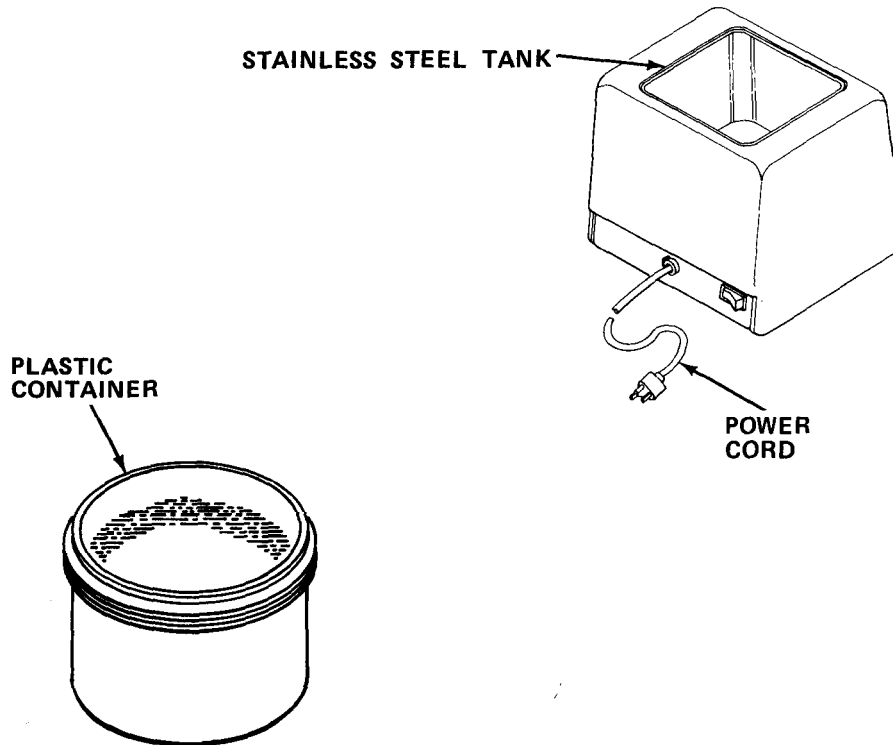
AN - Annually  
S - Semiannually  
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment is Not Ready/ Available If:
1	B	<p><b>ULTRASONIC CLEANER</b></p> <p>Inspect Cleaner.</p> <p style="text-align: center;"><b>WARNING</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;">  </div> <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>

5-6. OPERATION UNDER USUAL CONDITIONS.

5-6.1 Operating Procedure

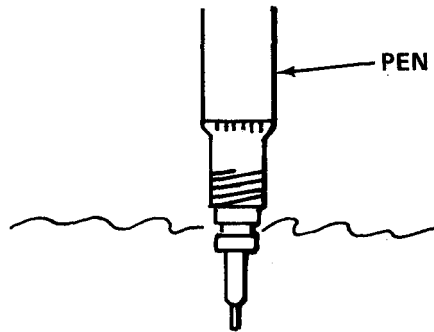


- a. Fill stainless steel tank 1/3 full with fresh, clean water. Fill plastic container with water to within 1/2 in. (12.7 mm) of top.
- b. Add .135 oz (4 ml) of cleaning solution to plastic container.
- c. Plug in power cord to 120 V, 60 Hz grounded outlet.
- d. Turn power on. Be sure water surface 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. (19 mm) in cleaning solution.
- g. Lift pen from cleaning solution. Keeping point downward, shake solution from pen onto cheesecloth.
- 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.

**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. There are no operator troubleshooting procedures assigned for this equipment.

5-10. MAINTENANCE PROCEDURES. operator maintenance is limited to performance of regular preventive maintenance checks and services and replenishment of cleaning solution.

Section IV ORGANIZATIONAL MAINTENANCE

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 5-6675-317-24P 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.**

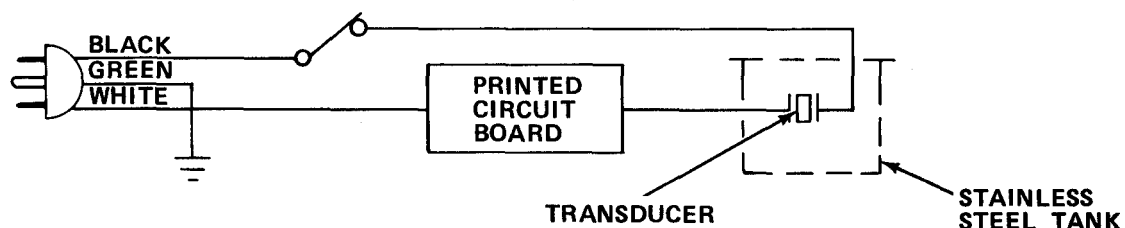
There are no organizational PMCS procedures assigned for this equipment.

**5-15. 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 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 5-2. 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 5-16.3).

**Table 5-2. ORGANIZATIONAL TROUBLESHOOTING - Cont**

---

MALFUNCTION	
TEST OR INSPECTION	
	CORRECTIVE ACTION

---

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 5-16.1).

Step 2. Check continuity of power switch.

- (a) If continuity does not exist, replace power switch (paragraph 5-16.2).
- (b) If continuity does exist, replace circuit board (paragraph 5-16.3).

---

**5-16. 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 . . . . .	5-16.1
Replace Power Switch . . . . .	5-16.2
Replace Circuit Board . . . . .	5-16.3

5-16.1 Replace Power Cord.

MOS : 41B, Topographic Instrument Repair Specialist

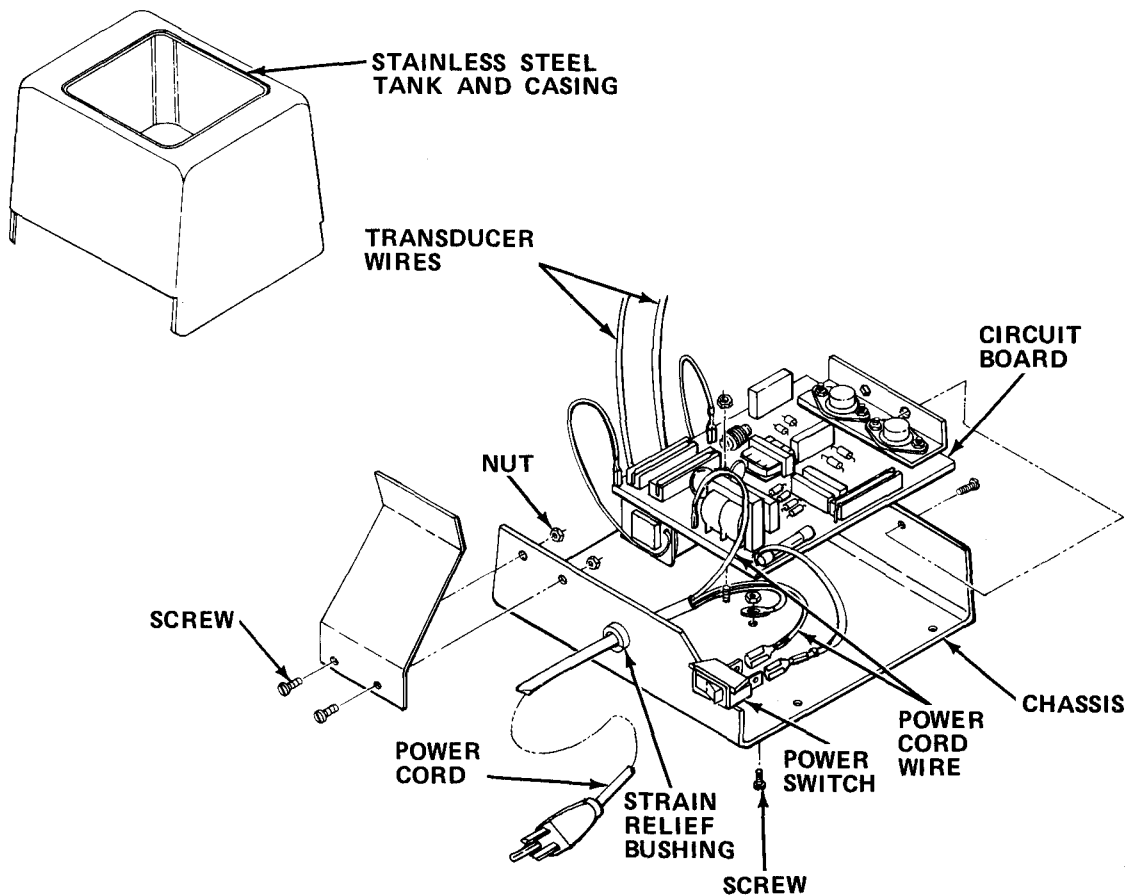
TOOLS: Flat Tip Screwdriver

SUPPLIES: Power Cord

**WARNING**

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

- a. Turn off power 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. Disconnect power cord wires 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 wires to circuit board, chassis, and power switch.
- j. Reinstall circuit board to chassis with three screws, one nut, and one washer.
- 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.

5-16.2 Replace Power Switch.

MOS : 41B, Topographic Instrument Repair Specialist

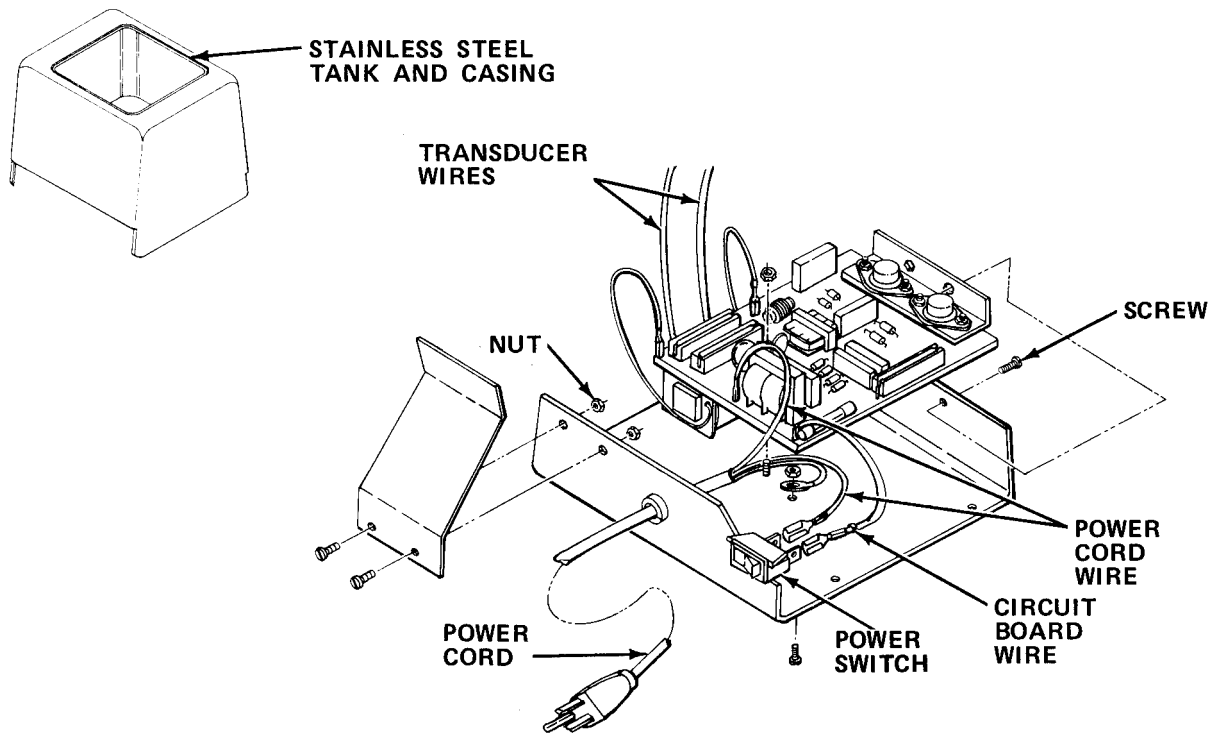
TOOLS: Flat Tip Screwdriver

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.

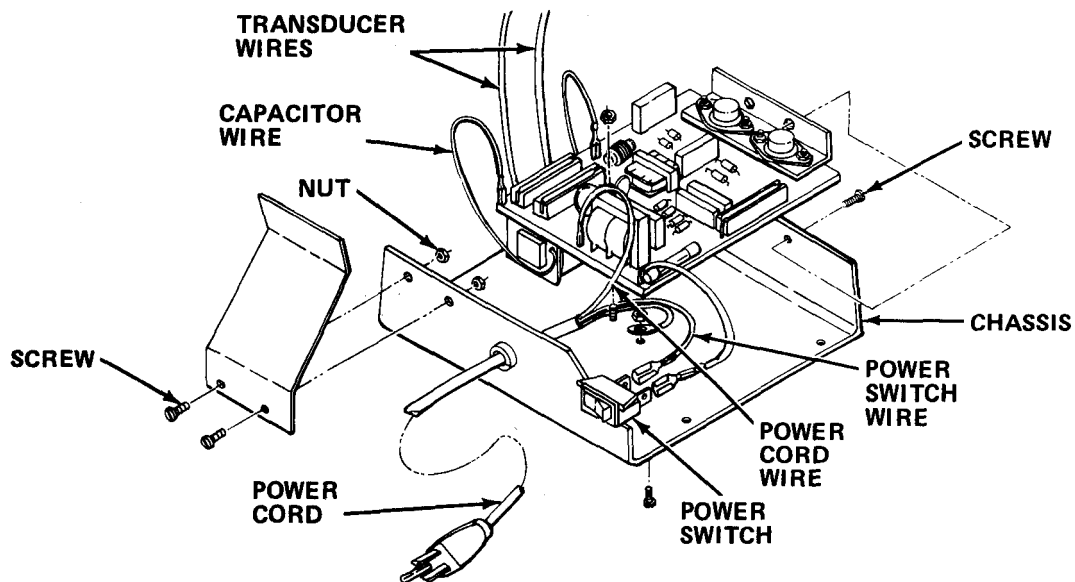
- d. Tag and disconnect power cord wires from power switch.
- e. Press sides of defective power switch and remove from chassis.
- f. Install new power switch in chassis. Push power switch until tabs lock into hole.
- g. Reconnect power cord wires to power switch. Remove tag.
- h. Reinstall stainless 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.

5-16.3 Replace Circuit Board.

MOS : 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver

SUPPLIES: Circuit Board



WARNING

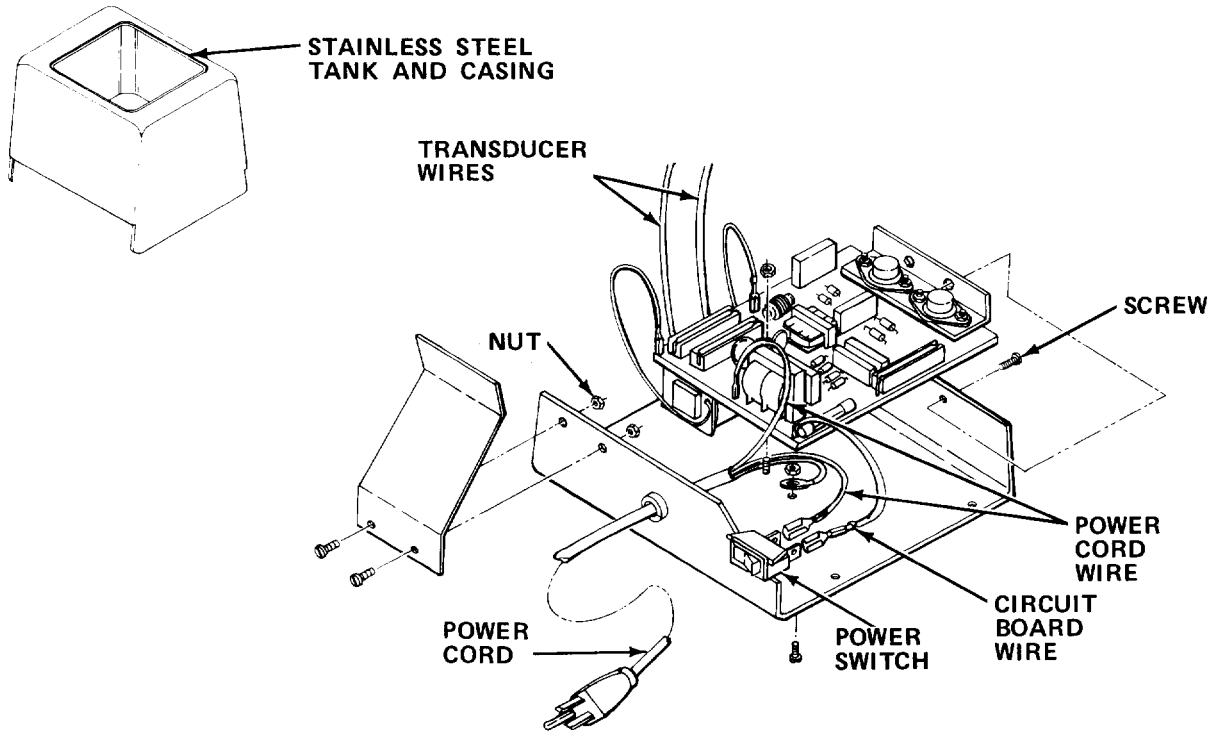
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Turn off power 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 wires and power switch wire from circuit board.



- 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.

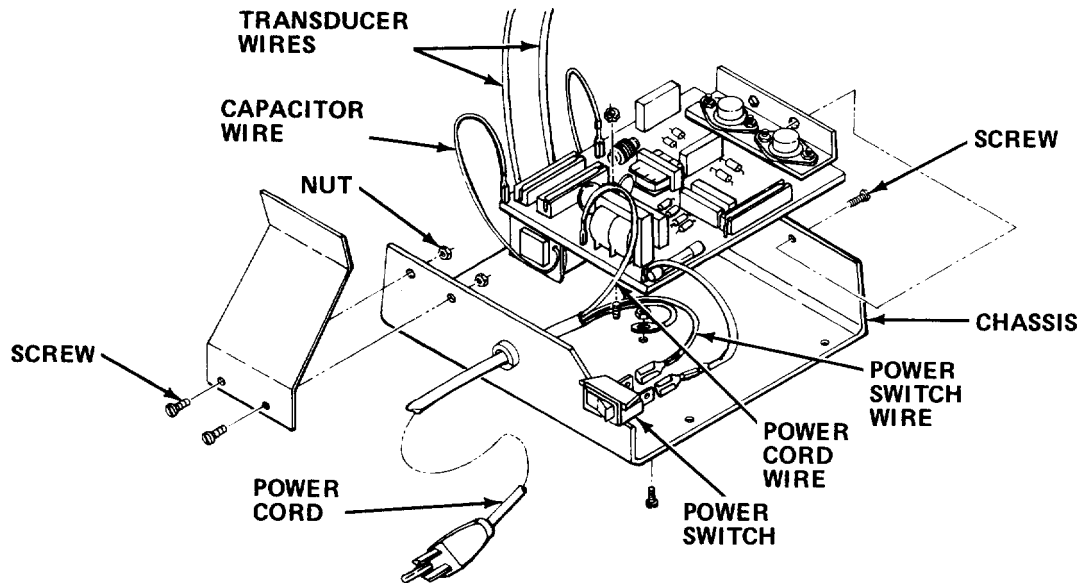
- d. Tag and disconnect power cord wires from power switch.
- e. Press sides of defective power switch and remove from chassis.
- f. Install new power switch in chassis. Push power switch until tabs lock into hole.
- g. Reconnect power cord wires to power switch. Remove tag.
- h. Reinstall stainless 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.

5-16.3 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 off power 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 wires and power switch 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 wire to circuit board.
- l. Reconnect power switch wire and power cord wire to circuit board.
- m. Reinstall three screws, one nut, and one washer 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.

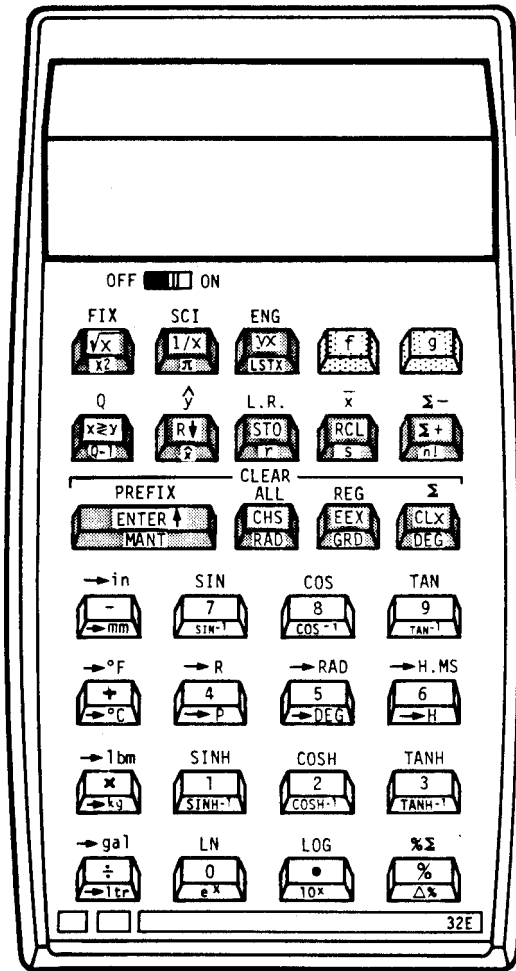
5-17. **PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

## Section V DIRECT/GENERAL SUPPORT MAINTENANCE

There are no direct/general support maintenance procedures assigned for this equipment.







## CHAPTER 6

### POCKET CALCULATOR

#### Section I INTRODUCTION

#### 6-1. GENERAL INFORMATION.

##### 6-1.1 Scope.

- a. Model Number and Equipment Name. Model HP-32E Pocket Calculator.
- b. Purpose of Equipment. To perform mathematical calculations.

#### 6-2. EQUIPMENT DESCRIPTION.

6-2.1 Equipment Characteristics, Capabilities, and Features. Performs mathematical calculations with the following capabilities features.

- a. Rechargeable battery pack.
- b. AC operation.
- c. Trigonometric functions.
- d. Ten-digit display.
- e. Automatic memory stack.
- f. Fifteen storage registers.
- g. Scientific notation.
- h. Logarithmic functions.
- i. Square root.
- j. Fixed-point display.
- k. Engineering display.
- l. Automatic overflow and underflow.
- m. Error display.
- n. Key-selected metric conversions.
- o. Self-Check.

6-2.2 Equipment Data.

Power Requirements

120 V, 60 Hz

Battery Pack:

Recharge Time

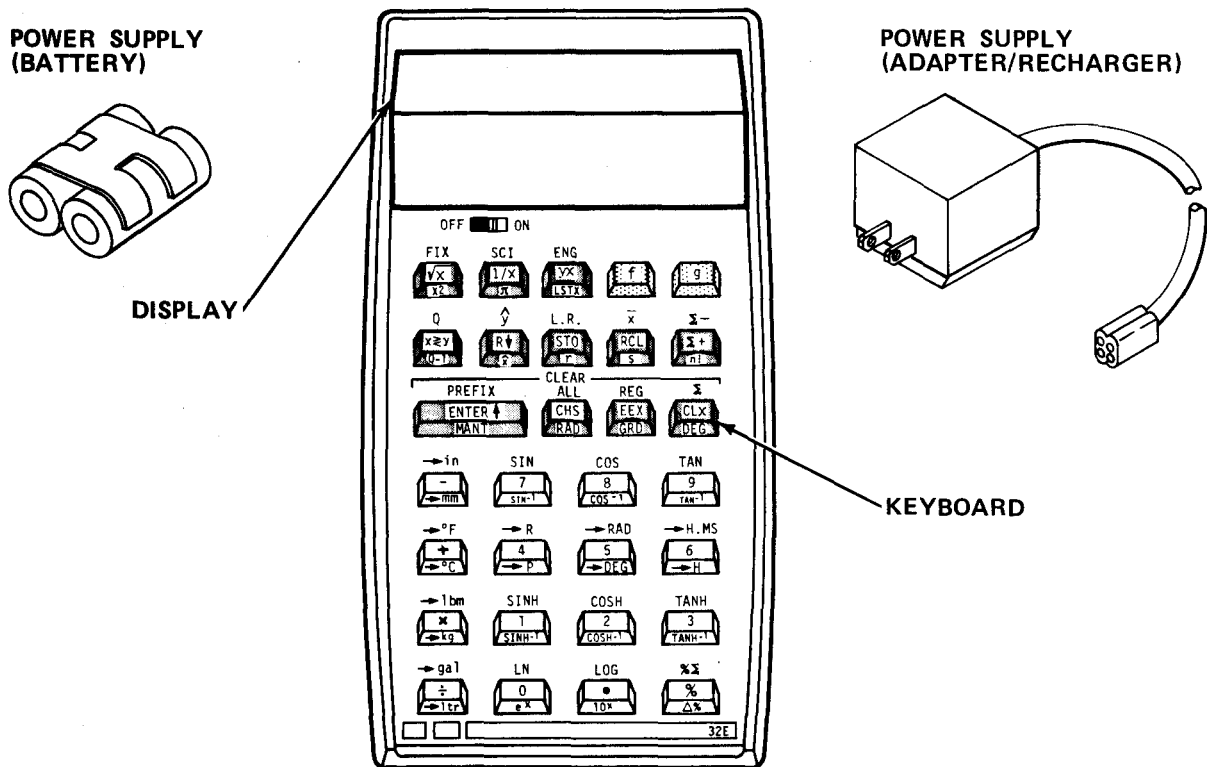
9 hrs, Maximum  
(Calculator off)

17 hrs, Minimum  
(Calculator on)

Operating Time

3 hrs, Maximum

6-3. **TECHNICAL PRINCIPLES OF OPERATION.** The purpose of the HP-32E Calculator is to assist its user in the performance of complex or simple mathematics equations and consists of the following functional parts:



**POWER SUPPLY .** Power is provided to the calculator from either the battery pack or ac adapter/recharger. The battery pack consists of two rechargeable nickel cadmium batteries which give the calculator full portability. The adapter/recharger also provides power to the calculator when plugged into a power outlet. When battery pack is in need of recharging, raised decimal is turned on at the far left of the display. When raised decimal is displayed, there are 1 to 25 minutes of operating time left.

**KEYBOARD.** The keyboard is used to select functions and input numbers into the calculator. All keys, except **f** and **g** keys, perform three functions.

One function is indicated by the symbol on the flat surface of the key, a second by the symbol on the slanted key face, and a third by the symbol written above the key on the calculator case. Function printed on the flat face of the key is selected by pressing the key. Function printed above the key is selected by first pressing prefix key  $\square$  and then the function key. The function printed on the slanted face of the key is selected by first pressing prefix key  $\square$  and then the function key.

**DISPLAY.** The display is the X-register of the automatic memory stack and provides a visual readout of latest numeric entry, operation result, or *error* messages.

**MEMORY.** Memory is divided into two parts; storage registers and automatic memory stack.

a. Storage registers. Storage registers are used to set aside numbers for recall in later calculations. **Numbers are stored by first pressing  $\square$  followed by a number ~thru~ or a decimal point and a number ~thru~.** The number in displayed X-register is then **copied** into the selected register. Recalling a number is accomplished by first pressing  $\square$  followed by a number  $\square$  thru  $\square$  or a decimal point and a number  $\square$  thru  $\square$ . The number that is in the selected register will be copied into the displayed X-register without any change to contents of that register. Storage registers R. through R.5 are used for accumulation of statistical data. Turning calculator off will clear (place zeros in) all storage registers.

b. Automatic memory stack. The automatic memory stack is used to store intermediate results during calculations. The stack consists of four registers designated X, Y, Z and T. The contents of X-register are constantly shown on the calculator display. Numbers are manually entered into the memory stack by pressing  $\square$ . During chain calculations (long equations), intermediate answers are automatically entered in the memory stack. Each new entry into the stack is first entered in the X-register and, with each additional entry, the stack rolls up one and the contents that were in the T-register before roll-up, are lost. The contents of the stack can be viewed by pressing  $\square$  key four times. The contents of T-register are not lost because the stack forms a continuous loop, i.e., the contents of T-register are shifted to the Z-register; Z-register to Y-register; Y-register to X-register; and X-register to T-register. With intermediate answers stored in the stack, operations can be performed with these numbers by pressing the key of the desired operation.

Example: To calculate  $(3 \times 5) + 2$ , press:

$\square$  (3 enters X-register.)

$\square$  (3 is copied to Y-register.)

$\square$  (5 is entered in X-register; 3 stays in Y-register.)

$\square$  (5 is multiplied by 3; result, 15, is placed in X-register; Y-register becomes 0.)

$\square$  (15 moves to Y-register; 2 enters X-register.)

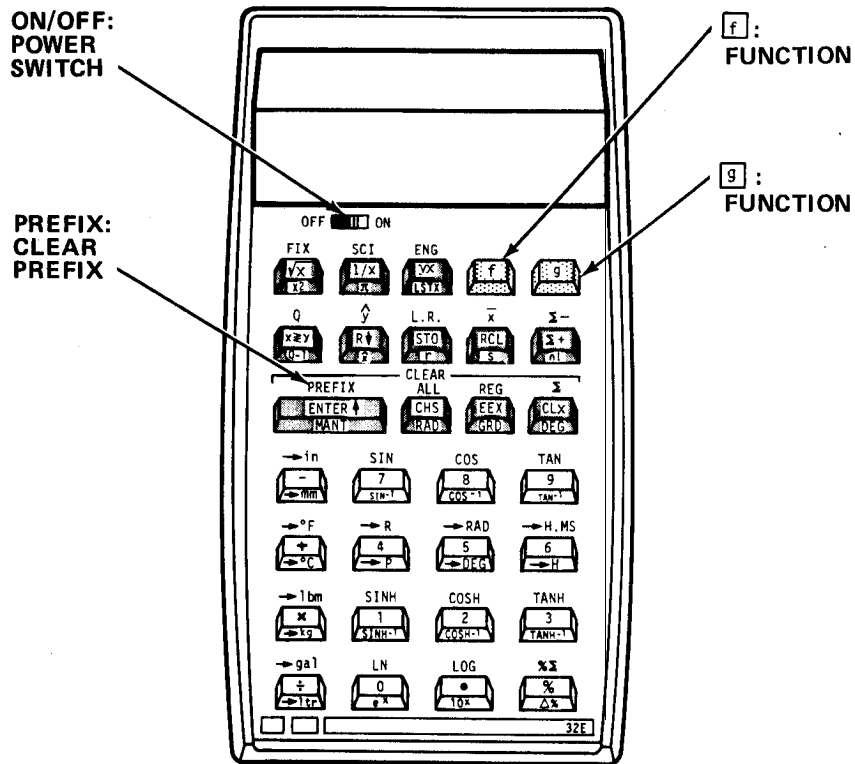
$\square$  (2 is added to 15; result, 17, is placed in X-register; Y-register becomes 0.)

Section II OPERATING INSTRUCTIONS

6-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS,

NOTE

Symbols on flat surface and slanted surface of keys are boxed. Symbols over keys are not boxed.



Key	Control or Indicator	Function
OFF      ON	Power Switch	Turns power on or off.
<b>f</b>	Function	Pressed before another key, it selects function printed above key.
<b>g</b>	Function	Pressed before another key, it selects function printed on slanted face of key.



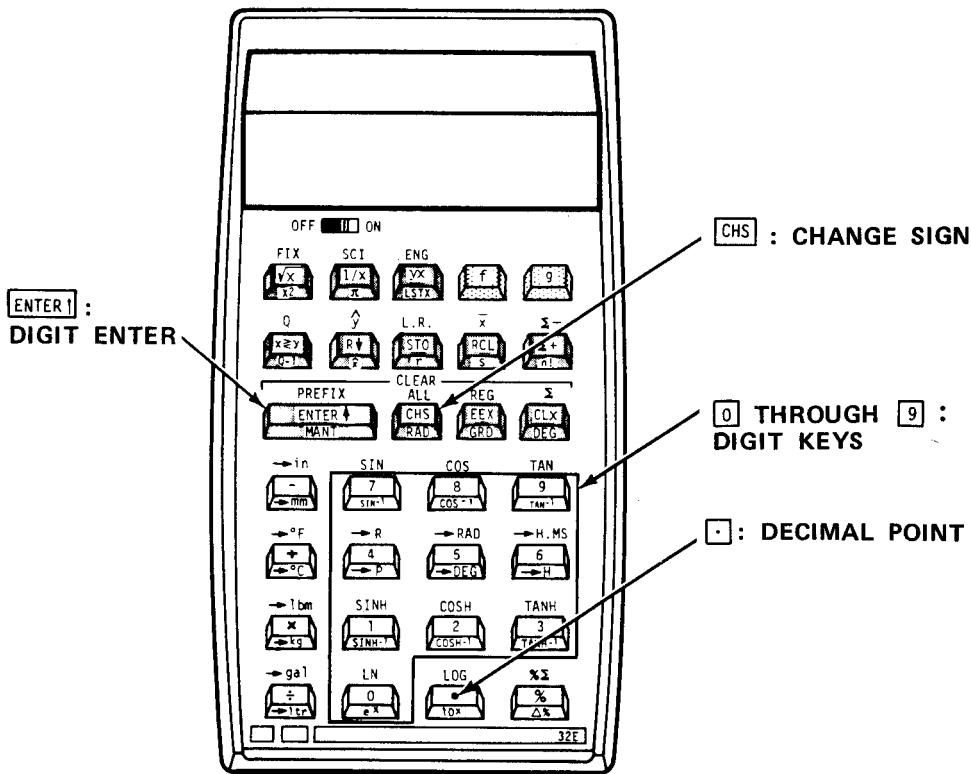
Key	Control or Indicator	Function
-----	----------------------	----------

**PREFIX**

Clear Prefix

Cancel s the following key strokes or sequence of key strokes when pressed after each one:

$\boxed{f}$ ,  $\boxed{g}$ ,  $\boxed{STO}$ ,  $\boxed{RCL}$ ,  
 $\boxed{STO}$   $\boxed{.}$ ,  $\boxed{RCL}$   $\boxed{-}$ ,  
 $\boxed{STO}$   $\boxed{+}$ ,  $\boxed{STO}$   $\boxed{-}$ ,  
 $\boxed{STO}$   $\boxed{x}$ ,  $\boxed{STO}$   $\boxed{+}$ ,  
 $\boxed{STO}$   $\boxed{+}$ ,  $\boxed{.}$ ,  
 $\boxed{STO}$   $\boxed{-}$ ,  $\boxed{.}$ ,  
 $\boxed{STO}$   $\boxed{A}$   $\boxed{x}$ ,  $\boxed{-}$ ,  
 $\boxed{STO}$   $\boxed{+}$ ,  $\boxed{-}$ ,  
 FIX, SCI, ENG.



Digit Entry

$\boxed{0}$  thru  $\boxed{9}$

Digit Keys


Enters digits.

$\boxed{.}$

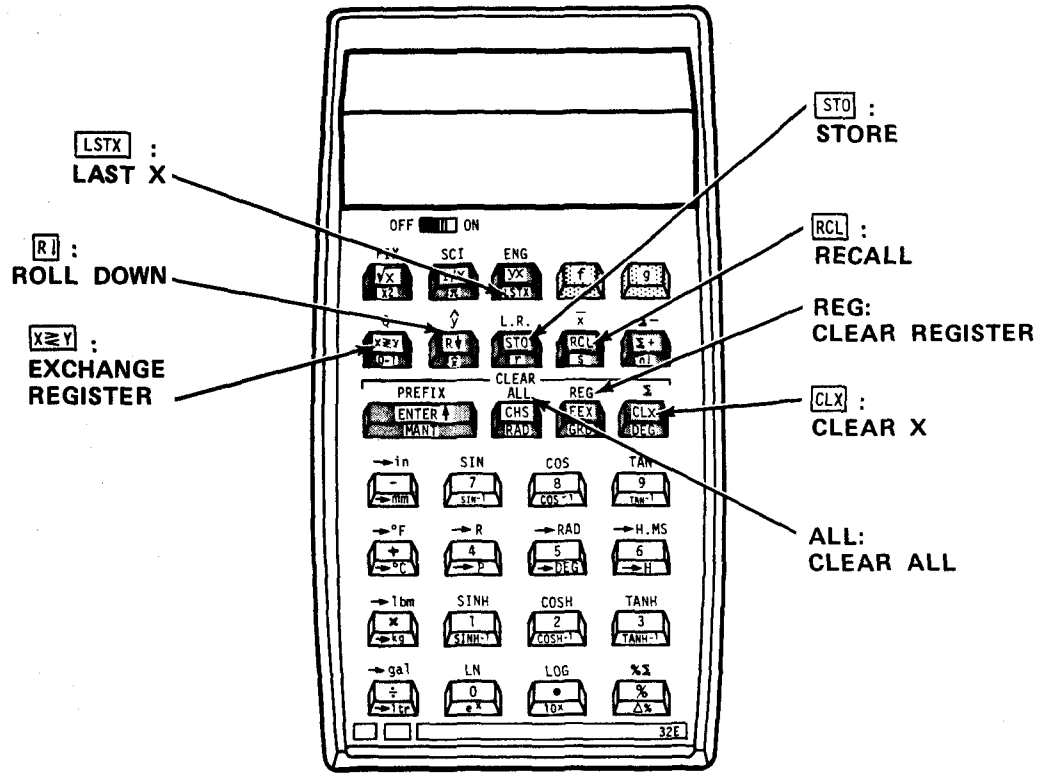
Decimal Point

Enters decimal point.



Key	Control or Indicator	Function
FIX	Fixed Point	Followed by digit key, selects fixed point notation display. Digit entry designates number of digits to be displayed to the right of decimal point.
SCI	Scientific	Followed by the number key that specifies the number of decimal places the display will be rounded to.
ENG	Engineering	Followed by digit key, selects engineering notation display. Digit key specifies number of digits to be displayed to right of decimal point.
	Mantissa	Temporarily displays all 10 digits of mantissa of number in X-register.

Key	Control or Indicator	Function
-----	----------------------	----------



Number Manipulation



Exchange Register

Interchanges contents of X and Y-registers.



Roll Down

Rolls down contents of automatic memory stack for viewing in X-register without loss of data. When pressed, contents of X-register is shifted to T-register, T-register shifts to Z-register, Z-register shifts to Y-register, and Y-register advances to X-register for viewing.

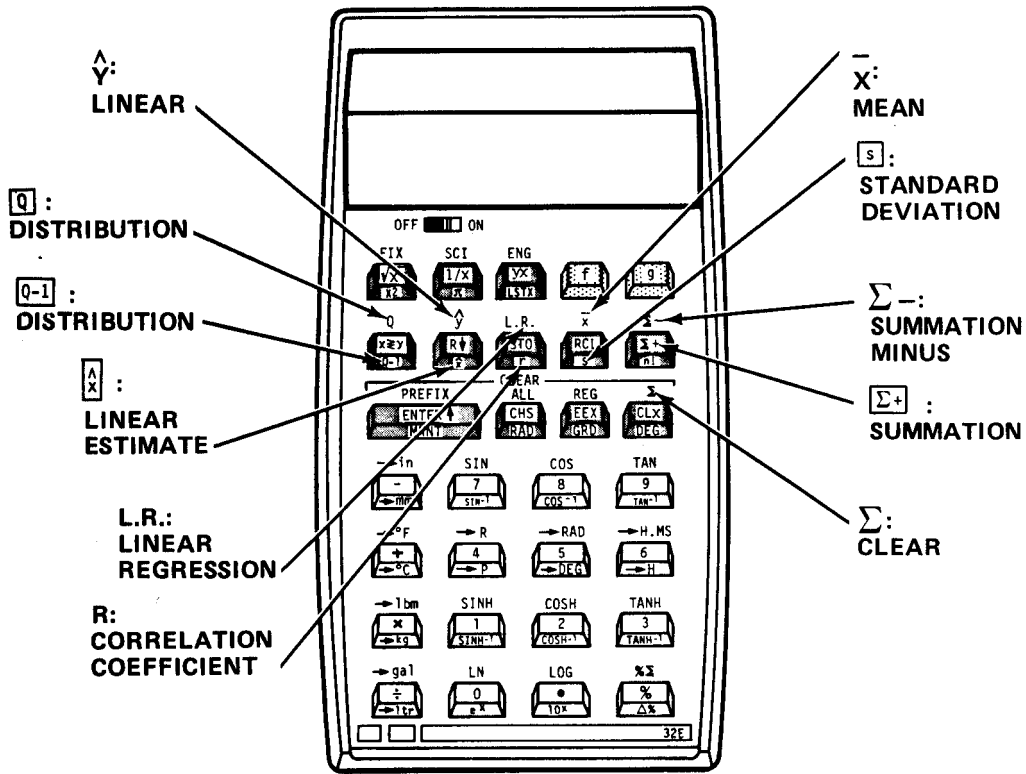


CLEAR X

Clears contents of displayed X-register.

Key	Control or Indicator	Function
ALL	CLEAR ALL	Clears contents of memory stack and all storage registers.
<b>STO</b>	Store	Followed by digit key $\square$ through $\square$ or by a decimal point and a key $\square$ through $\square$ , stores displayed number in that specified location. Also used to perform storage register arithmetic.
<b>RCL</b>	Recall	Followed by digit key $\square$ thru $\square$ or by a decimal point and a digit key $\square$ thru $\square$ , recalls value from specified storage register into the displayed X-register.
REG	CLEAR Register	Clears contents of storage registers R <sub>0</sub> through R <sub>8</sub> . Contents of registers R <sub>0</sub> thru R <sub>5</sub> are unaffected.
<b>LSTX</b>	LAST X	Recalls number displayed before previous operation back into displayed X-register.

Key	Control or Indicator	Function
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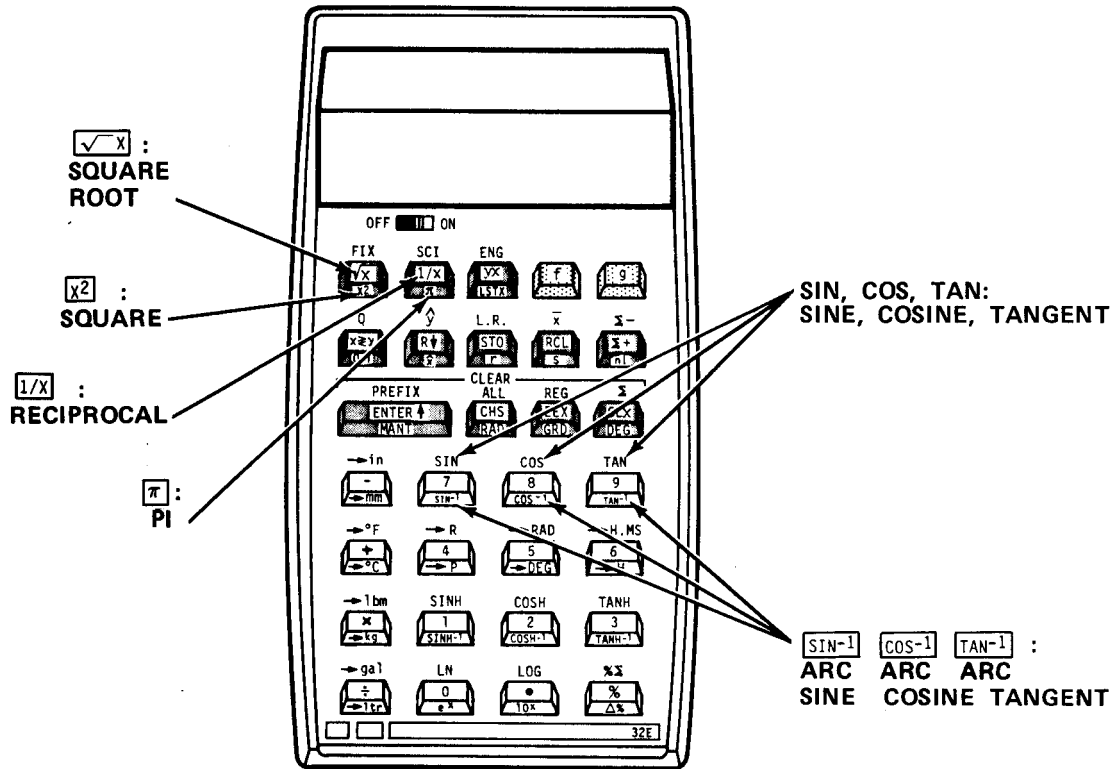


Statistical

$Q$	Distribution	Computes area under standard normal distribution curve to left of $X$ .
$Q-1$	Distribution	Computes $X$ , given area under standard normal distribution curve to left of $X$ .
$\hat{Y}$	Linear Estimate	Computes estimated value of $Y$ for a given value of $X$ .
$\hat{X}$	Linear Estimate	of $X$ for a given value of $X$ .

Key	Control or Indicator	Function
L. R.	Linear Regression	Computes Y-intercept and slope for linear function approximated by X and Y values accumulated using $\Sigma^+$ . Value of slope is placed in Y-register.
$r$	Correlation Coefficient	Computes goodness of fit between X and Y values accumulated using $\Sigma^+$ and linear function which they approximate.
$\bar{X}$	MEAN	Computes mean (average) of X and Y values accumulated using $\Sigma^+$ .
$S$	Standard Deviation	Computes standard deviations of X and Y values accumulated using $\Sigma^+$ .
$\Sigma^+$	Summation	Accumulates statistical data in storage registers R. 0 thru T. 5 using numbers in X- and Y-registers.
$\Sigma^-$	Summation Minus	Subtracts from statistical data in storage registers R. 0 thru R. 5 using numbers in X- and Y-registers.
$\Sigma$	CLEAR	Clears statistical storage registers R. 0 thru R. 5.

Key	Control or Indicator	Function
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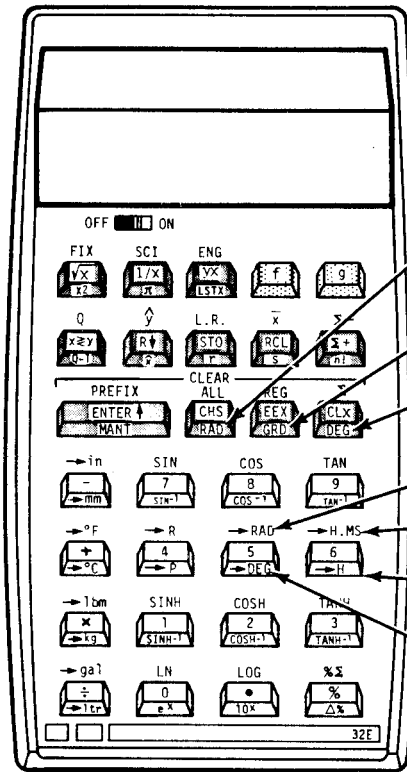


Mathematical

$\sqrt{x}$	Square Root	Computes square root of number in displayed X-register.
$x^2$	Square	Computes square of number in displayed X-register.
$1/x$	Reciprocal	Computes reciprocal of number in displayed X-register.
$\pi$	pi	Places value of pi (3.141592654) into X-register.
SIN, COS, TAN	Sine, Cosine, Tangent	



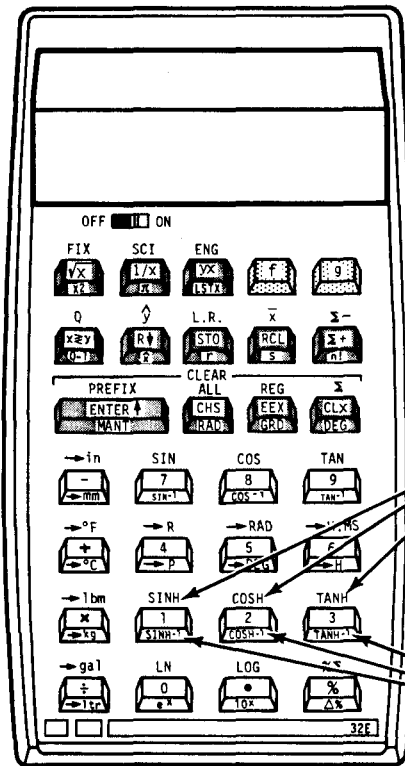
Key	Control or Indicator	Function
$\boxed{\text{SIN}^{-1}}$ , $\boxed{\text{COS}^{-1}}$ , $\boxed{\text{TAN}^{-1}}$	Arc Sine, Arc Cosine, Arc Tangent	Computes arc sine, arc cosine, or arc tangent of number in displayed X-register.



- $\boxed{\text{RAD}}$  : RADIANS
- $\boxed{\text{GRD}}$  : GRADS
- $\boxed{\text{DEG}}$  : DEGREE
- $\rightarrow\text{RAD}$ : TO RADIANS
- $\rightarrow\text{H.MS}$ : HOURS, MINUTES, SECONDS
- $\boxed{\text{H}}$  : TO DECIMAL HOURS OR DEGREES
- $\rightarrow\text{DEG}$  : TO DEGREES

$\boxed{\text{RAD}}$	Radians	Sets radians mode for all trigonometric functions.
$\boxed{\text{GRD}}$	Grads	Sets grads mode for all trigonometric functions.
$\boxed{\text{DEG}}$	Degree	Sets decimal degrees mode for all trigonometric functions.
$\rightarrow\text{RAD}$	To Radians	Converts decimal degrees to radians.
$\rightarrow\text{DEG}$	To Degrees	Converts radians to decimal degrees.

Key	Control or Indicator	Function
$\rightarrow$ H.MS	Hours. Mi nutes Seconds	Converts decimal hours or degrees to hours, minutes, seconds or degrees, minutes, seconds.
$\rightarrow$ H	To Decimal Hours or Degrees	Converts hours, minutes, seconds, or degrees, minutes, seconds to decimal hours or degrees.

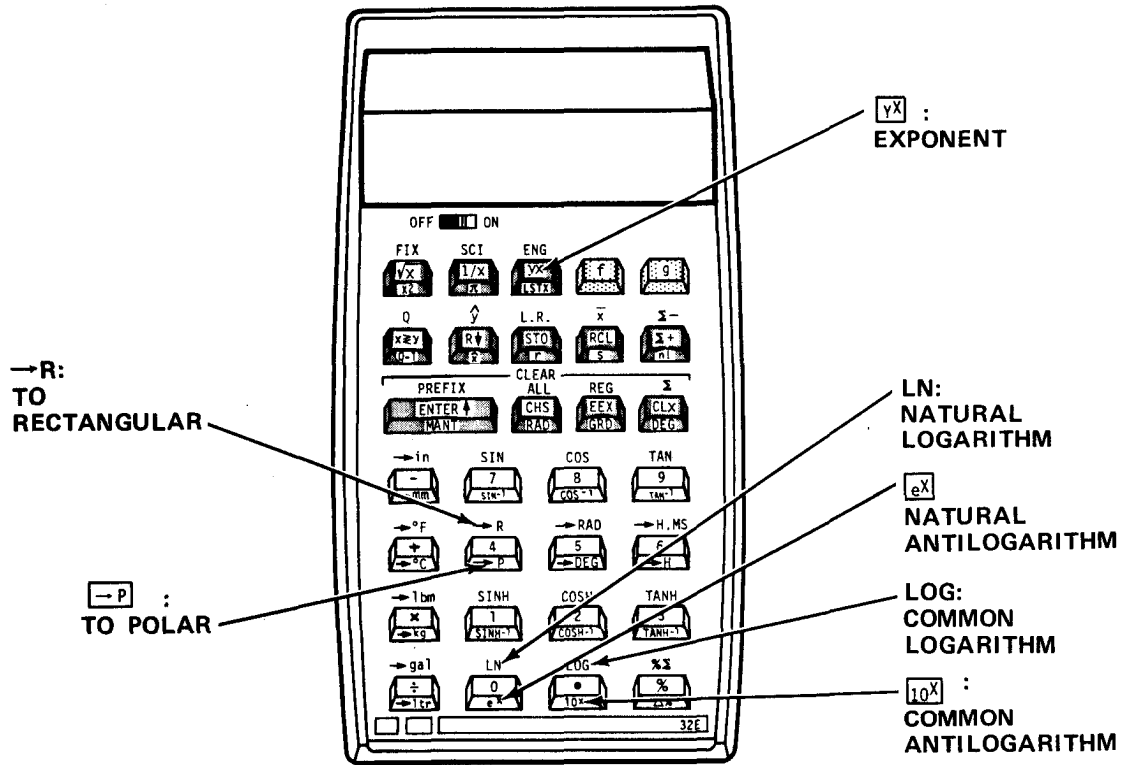


Key	Control or Indicator	Function
Hyperbolic		
SINH, COSH, TANH	Hyperbolic Sine, Cosine, and Tangent	Computes hyperbolic sine, hyperbolic cosine, or hyperbolic tangent of number in displayed X- register.
$\boxed{\text{SINH}^{-1}}$ , $\boxed{\text{COSH}^{-1}}$ , $\boxed{\text{TANH}^{-1}}$	Inverse Hyperbolic Sine, Cosine, Tangent	Computes inverse hyper- bolic sine, inverse hyperbolic cosine, or inverse hyperbolic tangent of number in di s- played X-register.

Key

Control or Indicator

Function

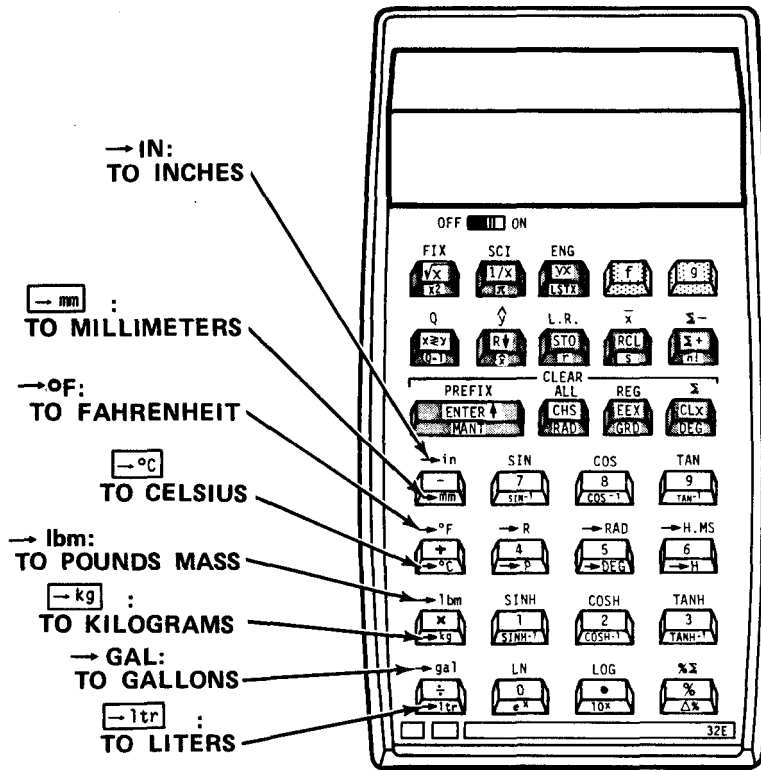


**Logarithmic and Exponential**

$y^x$	Exponent	Raises number in Y-register to power of number in displayed X-register.
LN	Natural Logarithm	Computes natural logarithm (base e) of number in displayed X-register.
$e^x$	Natural Antilogarithm	Raises e to power of number in displayed X-register.
LOG	Common Logarithm	Computes common logarithm (base 10) of number in displayed X-register.

Key	Control or Indicator	Function
$10^X$	Common Antilogarithm	Raises 10 to power of number in displayed X-register.
$\rightarrow P$	To Polar	Converts rectangular (X, Y) or coordinates in X- and Y- registers into polar (R, $\theta$ ) coordinates. Angle $\theta$ stored in Y-register.
$\rightarrow R$	To Rectangular	Converts polar (R, $\theta$ ) coordinates in X- and Y- registers into rectangular (x, Y) coordinates

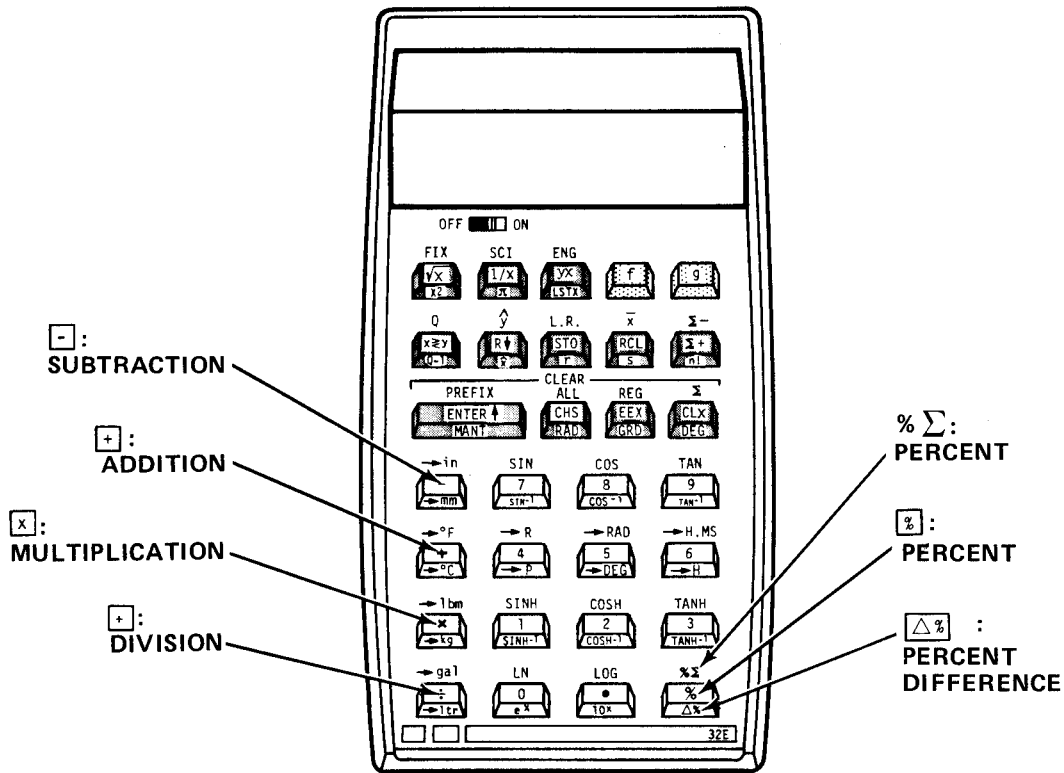
Key	Control or Indicator	Function
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Metric Conversions

→in	To Inches	Converts millimeters to inches.
→mm	To Millimeters	Converts inches to millimeters.
→°F	To Fahrenheit	Converts degrees Celsius to degrees Fahrenheit.
→°C	To Celsius	Converts degrees Fahrenheit to degrees Celsius.
→lbm	To Pounds Mass	Converts kilograms to pounds mass.
→kg	To Kilograms	Converts pounds mass to kilograms.

Key	Control or Indicator	Function
→gal	To Gallons	Converts liters to gallons (U.S.).
←ltr	To Liters	Converts gallons (U.S.) to liters.



Percentage

$\%$	Percent	Computes X-percent of Y.
$\Delta\%$	Percent Difference	Computes percent difference between number in Y-register and number in X-register.
$\% \Sigma$	Percent	Computes percent that X is of the number ( $\Sigma X$ ) in storage register R.1.

Arithmetic Functions

$+$	Addition	Arithmetic functions
$-$	Subtraction	
$\times$	Multiplication	
$\div$	Division	

## 6-5. 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 you 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.

- 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>
Cheesecloth (Item 5, 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 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

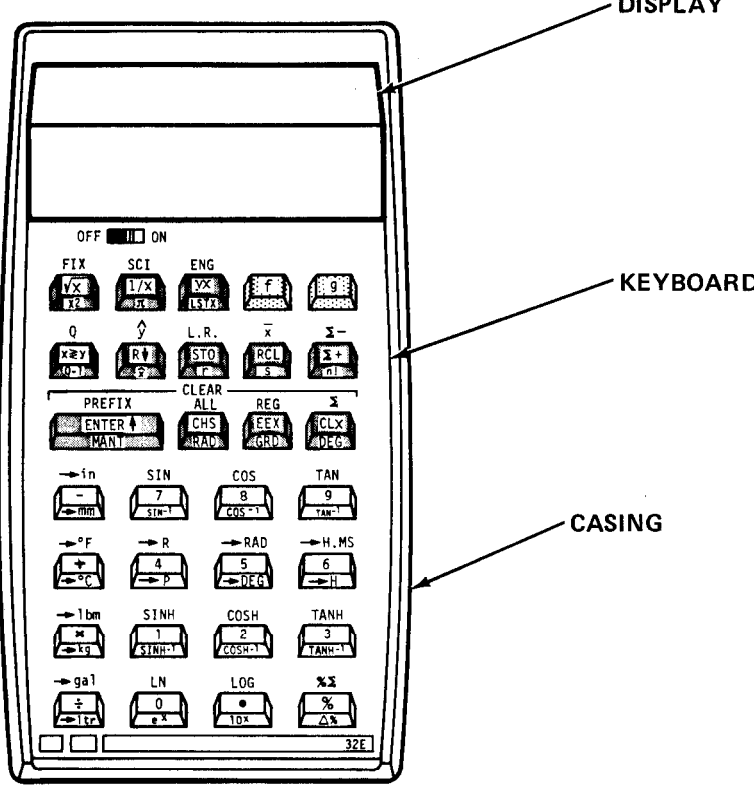
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
	B	<p><b>POCKET CALCULATOR</b></p> <p><u>INSPECT.</u></p>  <p>1. Check keyboard, display, and casing for cracks or breaks. Replace calculator if casing or display is cracked or broken.</p>	<p>Calculator keyboard, display, or casing is damaged.</p>

Table 6-1. 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	For Readiness Reporting, Equipment Is Not Ready/ Available if:
		PROCEDURE	
1	B	POCKET CALCULATOR - Cont	Display does Not show - 8, 8, 8, 8, 8, 8, 8, 8, 8, 8.  Battery pack is defective.  Power cord is damaged.
		INSPECT - Cont	
		2. Connect ac adapter/recharger to calculator and plug in. Turn calculator on. Press <b>STO</b> and <b>ENTER</b> . Display should indicate -8, 8, 8, 8, 8, 8, 8, 8, 8, 8.	
		3. With battery pack in calculator, check operation to be sure calculator turns on. Remove battery pack and check for clean contacts. Wipe clean. Reinstall battery pack.	
		4. Check power cord for kinks, frays or burns.	

6-6. OPERATION UNDER USUAL CONDITIONS.

6-6.1 Operating Procedure.

- a. Selecting a function.

NOTE

Most keys on the keyboard perform three functions. One function is indicated by symbol on top of key, second is above key, and third is on slanted face of key.

(1) To select a function printed on the key, press the key.

(2) To select a function printed above the key, press key **□**, then function key.

Example: To use LOG in calculation, enter number, **□** then LOG.

(3) To select a function printed on slanted face of key, press **□** then function key.

Example: To use **x<sup>2</sup>** in calculations, enter number, **□** then **□**.

b. Keying in numbers.

(1) Press keys corresponding to digits and decimal point in the order that they appear, reading from left to right.

(2) If needed, press **CHS** to make number negative.

c. One-number functions.

(1) Key in number on which operation is to be performed.

(2) Select desired function. Press key.

Example: To calculate square root of 5, press **5** and  **$\sqrt{x}$** .

Answer is 2.2361.

d. Two-number functions.

(1) Key in first number.

(2) Press **ENTER** to separate first number from second number.

(3) Key in second number.

(4) **Select** desired function. Press key.

Example: To calculate 5 percent of 35, press **3**, **5**, **ENTER**, **5**, and **%**.

Answer is 1.75.

e. Exponent key  **$Y^X$** .

NOTE

Exponent key is two-number function.

(1) Key in number for Y. Press **CHS** if it is negative.

(2) Press **ENTER** to send number to Y register in automatic memory stack.

(3) Key in number for X (exponent for Y).

(4) Press  **$\square$**  key.

Example: To calculate  $5^3$ , press **5**, **ENTER**, **3**, and  **$Y^X$** .

Answer is 125.

f. Chain calculations.

## NOTE

Calculator uses reverse polar notation (RPN) logic for chain calculations.

(1) If equation has parenthetical expressions, key in numbers and perform function in first parenthesis. Key in first number, press **ENTER**, key in second number, and press function key for that operation.

(2) Key in numbers and perform function in second parenthesis. Key in first number, press **ENTER**, key in second number, then press function key for that operation.

(3) Press function key for operation indicated between parentheses.

Example: To calculate  $(3 \times 4) \times (5 + 6)$ , press

**3**, **ENTER**, **4**, and **x**  
**5**, **ENTER**, **6**, and **+**  
**x**; answer is 132.

g. Operations with powers of 10.

(1) Key in number being multiplied by power of 10. Press **CHS** if number is negative.

(2) Press **EEX**.

(3) Key in exponent (power) of 10. Press **CHS** if exponent is negative.

(4) Press **m**, and key in exponent.

(5) Press **El**.

Example: To multiply  $15.6 \times 10^{12}$  by 25 press

**1**, **5**, **.**, **6**, **EEX**, and **12**  
**m**, **25**, and **□**; answer is  $3.9000 \times 10^{14}$ .

h. Storage (memory) register arithmetic.

## NOTE

This procedure performs two-number arithmetic functions on number stored in storage register. The displayed X-register is the second number.

(1) Press **STO**.

(2) Press appropriate function key **+**, **-**, **x**, or **□**.

(3) Press **□** through **□** or, **□** • **l** through **□□**, indicating on which register function will be performed.

Example: Pressing **STO**, **□**, and **□** multiplies value of (displayed X-register by contents of storage (memory) register 1. The answer is placed into storage (memory) register 1.

**NOTE**

Value of X-register will not be changed.

i. Clearing storage (memory) register.

(1) To clear single storage (memory) register, press **□**, **STO**, and location of register to be cleared.

Example: To clear register 2, press **□**, **STO**, and **□**.

(2) To clear registers 0 through 8, press **□** and **REG**. To clear registers 0 through 5, press **□** and **□□** to clear all registers (including the automatic memory stack) press **□** and **ALL**.

j. Trigonometric functions.

(1) Enter or calculate value of X, number on which trigonometric function is to be performed.

(2) Press **□** key.

(3) Press **DEG**, **RAD**, or **GRD** to select measurement for answer (degrees, radians, or grads).

(4) Press **□** key.

(5) Press needed function (**SIN**, **COS**, **TAN**) key.

Example: To calculate sine 35, press **3**, **5**, **g**, **DEG**, **f**, and **SIN**. Answer is 0.5736.

k. Polar/rectangular coordinate conversion.

(1) Convert from rectangular (X, Y) to polar coordinates.

**NOTE**

Value for Y is always keyed in first.

(a) Key in value of Y.

(b) press **ENTER**.

(c) Key in value of X.

(d) Press  $\boxed{g}$  then key in  $\boxed{DEG}$  ,  $\boxed{RAD}$  , or  $\boxed{GRD}$  to select measurement for answer (degrees, radians, or grads).

(e) Press  $\boxed{\square}$  and  $\boxed{-P}$  to get R (magnitude). Press  $\boxed{X\leq Y}$  to get angle in radians.

Example: To convert rectangular coordinates 4, 3 to polar with angle in radians, press

$\boxed{3}$  ,  $\boxed{ENTER}$  , and  $\cdot ZI$   
 $\boxed{\square}$  and  $\boxed{RAD}$   
 $\boxed{\square}$  and  $\boxed{-P}$  ; answer is 5.  
 $\boxed{X\leq Y}$  ; answer is .64.

(2) Convert from polar to rectangular coordinates.

(a) Key in angle in radians.

(b) press  $\boxed{ENTER}$  .

(c) Key in value of R (magnitude).

(d) Press  $\boxed{\square}$  then key in  $\boxed{DEG}$  ,  $\boxed{RAD}$  , or  $\boxed{GRD}$  to select measurement of angle (degrees, radians, or grads).

(e) Press  $\boxed{g}$  , R to get X. Press  $\boxed{X\leq Y}$  to get Y.

Example: To convert polar coordinates 5 and .64 to rectangular, press

$\boxed{\square}$  ,  $\boxed{||||}$  ,  $\boxed{\square}$  ,  $\boxed{ENTER}$  , and  $\boxed{\square}$   
 $\boxed{\square}$  and  $\boxed{RAD}$   
 $\boxed{\square}$  and  $\boxed{-R}$  : answer is 4.01.  
 $\boxed{X\leq Y}$  : answer is 2.986.

1. Statistical functions.

(1) Accumulations.

(a) Pressing  $\boxed{\Sigma+}$  key computes sums and products of the values in the X- and Y-registers. Results are automatically accumulated in storage registers R<sub>0</sub> through R<sub>9</sub>. Before starting to calculate accumulations with a new set of x and y values, clear registers by pressing REG.

Key y value into X-register.

press  $\boxed{ENTER}$  to raise y value into Y-register.

Key x value into X-register.

Press  $\boxed{\Sigma+}$  .

(b). If statistical problem involves only one variable (x), clear storage registers R.0 through R.5 and Y-register. Press **[f]**, **[Σ]**, and **[ENTER]**.

Key number into X-register.

Press **[Σ+]**.

**NOTE**

Unlike storage register arithmetic, the accumulation operation allows overflows (i.e., number whose magnitudes are greater than  $9.99999999 \times 10^{99}$ ) in storage registers R.0 through R.5 without indicating Error 1 in the display.

(c). To use any of the accumulations, recall contents of desired storage register into displayed X-register by pressing **[□]** **[□]** followed by the number of the register. If this is done immediately after pressing **[Σ+]** or **[Σ-]**, the accumulation recalled is written over the number of data pair entries (n) in the display. To use both **Σ x** and **Σ y** press **[RCL]** **[Σ+]**. This simultaneously copies **Σ x** from R.1 into displayed X-register and copies **Σ y** from R.3 into Y-register. If this is done immediately after pressing **[+]**, **[Σ-]**, **[CLX]** or **[ENTER]**, the number in the Y-register is first lifted into the Z-register. Otherwise, the numbers in the X- and Y-registers are first lifted into Z- and T- registers, respectively.

Example: To find **Σ x**, **Σ x<sup>2</sup>**, **Σ y**, **Σ y<sup>2</sup>**, and **Σ xy** for the paired values of x and y listed below, press

y	7	5	9
x	5	3	8

Keystrokes	Display
<b>[□]</b> CLEAR <b>[Σ]</b>	0.0000

Clear statistical storage registers. (Display shown assumes no results remain from previous calculations.)

<b>[7]</b>	<b>[ENTER]</b>	7.0000
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<b>[5]</b>	<b>[Σ+]</b>	1.0000
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First pair is accumulated: n=1

<b>[5]</b>	<b>[ENTER]</b>	5.0000
------------	----------------	--------

<b>[3]</b>	<b>[Σ+]</b>	2.0000
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Second pair is accumulated: n=2

<b>[9]</b>	<b>[ENTER]</b>	9.0000
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<b>[8]</b>	<b>[Σ+]</b>	3.0000
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Third pair is accumulated: n=3



<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>RCL</b> <b>.</b> <b>1</b>	16.0000	Sum of x values from register R. 1.
<b>RCL</b> <b>.</b> <b>2</b>	98.0000	Sum of squares of x values from register R. 2.
<b>RCL</b> <b>.</b> <b>3</b>	21.0000	Sum of y values from register R. 3.
<b>RCL</b> <b>.</b> <b>4</b>	155.0000	Sum of squares of y values from register R. 4.
<b>RCL</b> <b>.</b> <b>5</b>	122.0000	Sum of products of x and y values from register R. 5.
<b>RCL</b> <b>.</b> <b>0</b>	3.0000	Number of entries (n=3) from register R. 0.

(2) Deleting and correcting data.

(a) If an incorrect value is keyed in and **Σ+** has not yet been pressed, press **CLX** and key in correct value.

(b) To change one of the values, or if after pressing **□** one of the values was erroneous, correct the accumulations by using **Σ-** (summation minus) key as follows:

Key in incorrect data pair into X- and Y-registers.  
**LSTX** can be used to return a single incorrect data value to displayed X-register.

Press **□** 22- to delete incorrect data.

Key in correct values for x and y. If one value of an (x, y) data pair is incorrect, both values must be deleted and reentered.

Press **Σ** **+** .

Example: If last data pair (8, 9) in previous example should have been (8, 6), correct accumulation as follows, press

<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>9</b> <b>ENTER!</b>	9.0000	Incorrect y value is entered again.
	8.	Correct x value is entered again.
<b>f</b> <b>Σ-</b>	2.0000	Number of entries (n) is now two.

<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>6</b> <b>ENTER</b>	6.0000	Correcty value is entered.
<b>8</b>	8.	x value is entered again.
<b>Σ+</b>	3.0000	Number of entries is again three.

(3) Mean. Pressing **⏏** computes the arithmetic mean (average) of x and y values accumulated in registers **R.1** and **R.3** respectively.

Pressing **⏏** **⏏** causes the following operations to be performed.

The contents of the stack registers are lifted just as they are when pressing **RCL**.

The mean of the x values ( $\hat{x}$ ) is calculated using data accumulated in registers **R1** ( $\Sigma x$ ) and **R.0** (n). The resulting value for x appears in displayed X-register.

The mean of y values ( $\hat{y}$ ) is calculated using data accumulated in registers **R.3** ( $\Sigma y$ ) and **R.0** (n).

The resulting value for y is available in Y-register of stack.

Example: Below is a chart of daily high and low temperatures for a winter week.

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Hi gh	6	11	14	12	5	-2	-9
Low	-22	-17	-15	-9	-24	-29	-35

To find average high and low temperatures for week selected, press;

<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>f</b> <b>CLEAR</b> <b>Σ+</b>	0.0000	Statistical registers cleared. (Display shown assumes no results remain from previous calculations.)
<b>6</b> <b>ENTER</b> <b>22</b>	22.	
<b>CHS</b> <b>Σ+</b>	1.0000	Number of data pairs (n) is now 1.
<b>11</b> <b>ENTER</b> <b>17</b>	17.	
<b>CHS</b> <b>Σ+</b>	2.0000	Number of data pairs (n) is now 2.
<b>14</b> <b>ENTER</b> <b>15</b>	15.	

$\boxed{\text{CHS}}$	$\boxed{\Sigma+}$	3.0000	
$\boxed{12}$	$\boxed{\text{ENTER}}$	$\boxed{9}$	9.
$\boxed{\text{CHS}}$	$\boxed{\Sigma+}$	4.0000	
$\boxed{5}$	$\boxed{\text{ENTER}}$	$\boxed{24}$	24.
$\boxed{\text{CHS}}$	$\boxed{\Sigma+}$	5.0000	
$\boxed{2}$	$\boxed{\text{CHS}}$	$\boxed{\text{ENTER}}$	-2.0000
$\boxed{29}$	$\boxed{\text{CHS}}$	$\boxed{\Sigma+}$	6.0000
$\boxed{9}$	$\boxed{\text{CHS}}$	$\boxed{\text{ENTER}}$	-9.0000
$\boxed{35}$	$\boxed{\text{CHS}}$	$\boxed{\Sigma+}$	7.0000
			Number of data pairs (n) is now 7.
$\boxed{f}$	$\boxed{\bar{X}}$	21.5714	Average low temperature.
$\boxed{X \geq Y}$		5.2857	Average high temperature.

(4) Standard deviation.

(a) Pressing  $\boxed{\sigma}$  computes the standard deviation (a measure of dispersion around the mean) of accumulated data.

(b) When  $\boxed{g}$   $\boxed{s}$  is pressed:

The contents of stack registers are lifted just as they are when pressing  $\boxed{\text{RCL}}$   $\boxed{\Sigma+}$  .

The standard deviation of x values ( $s_x$ ) is calculated using data accumulated in registers R.2 ( $\Sigma^2$ ), **R.1 ( $\Sigma$ )**, and R.0 (n). The result appears in displayed X-register.

The standard deviation of y values ( $s_y$ ) is calculated using data accumulated in registers R.4 ( $y^2$ ), R.3 ( $y$ ), and R.0 (n). The result appears in Y-register.

Example: To determine the standard deviation of the following test scores: 79, 94, 68, 82, 78, 83, and 89, press

<u>Keystrokes</u>	<u>Display</u>	
$\boxed{f}$ CLEAR ALL	0.0000	Clear statistical registers and Y-register for new, one-variable problem.

<u>Keystrokes</u>	<u>Display</u>	
79 $\Sigma^+$	1.0000	First score is entered. Since this problem involves only one variable, y-value does not have to be-entered into Y-register using the <b>ENTER</b> key.
94 $\Sigma^+$	2.0000	Display shows number of scores entered so far.
68 $\Sigma^+$	3.0000	
86 $\Sigma^+$	4.0000	
82 $\Sigma^+$	5.0000	
78 $\Sigma^+$	6.0000	
83 $\Sigma^+$	7.0000	
89 $\Sigma^+$	8.0000	Last score in sample.
<b>g</b> <b>S</b>	7.8365	Standard deviation of test scores.

(5) Linear regression. Linear regression is a statistical method for finding a straight line that best fits a set of data points, thus providing a relationship between two variables.

(a) To use the linear regression function, first key in a series of data points using the  $\Sigma^+$  key. Then press **f** L. R.

(b) When **f** L. R. is pressed:

The contents of the stack registers are lifted just as they are when you press **RCL**  $\Sigma^+$  .

The slope (A) of the least squares line of the data is available in the Y-register of the stack.

The y-intercept (B) of the least squares line of the data appears in the displayed X-register of the stack.

(c) To use value for A or to bring it into displayed X-register, simply shift stack contents with the **X $\leftrightarrow$ Y** .

Example: An oil company wishes to know the slope and y-intercept of a least squares for the consumption of motor fuel in the United States against time since 1945. It knows the data given in the table.

Motor Fuel Demand (Millions of Barrels)	696	994	1330	1512	1750	2162	2243	2382	2484
--	-----	-----	------	------	------	------	------	------	------

Year	1945	1950	1955	1960	1965	1970	1971	1972	1973
------	------	------	------	------	------	------	------	------	------

Solution: Key the data into the calculator using the **Σ+** key, then press **□** L. R.

<u>Keystrokes</u>	<u>Display</u>
<b>f CLEAR</b> <b>Σ+</b>	0.0000

Clear statistical storage registers. (Display shown assumes no results remain from previous calculations).

696 <b>ENTER</b>	696.0000
1945 <b>Σ+</b>	1.0000
994 <b>ENTER</b>	994.0000
<b>1950</b> <b>Σ+</b>	2.0000
1330 <b>ENTER</b>	1,330.0000
1955 <b>Σ+</b>	3.0000
<b>1512</b> <b>ENTER</b>	1,512.0000
1960 <b>Σ+</b>	4.0000
1750 <b>ENTER</b>	1,750.0000
<b>1965</b> <b>Σ+</b>	5.0000
2162 <b>ENTER</b>	2,162.0000
1970 <b>Σ+</b>	6.0000
<b>2243</b> <b>ENTER</b>	2,243.0000
<b>1971</b> <b>Σ+</b>	7.0000
<b>2382</b> <b>ENTER</b>	2,382.0000
<b>1972</b> <b>Σ+</b>	8.0000
2484 <b>ENTER</b>	2,484.0000
1973 <b>Σ+</b>	9.0000

All data pairs have been keyed in.

<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>f</b> L. R.	-118,290.6295	The y-i-ntercept of the line.
<b>X<math>\Rightarrow</math>Y</b>	61.1612	Slope of the line.

(6) Linear estimation. With data accumulated in registers R.0 through R.5 a predicted value for y (denoted  $\hat{y}$ ) can be calculated by keying in a new value for x and pressing **□  $\hat{y}$** . A predicted value for x (denoted  $\hat{x}$ ) can be calculated by keying in a new value for y and pressing **□  $\hat{x}$** .

Example: With data intact from previous example in registers R.0 through R.5 to predict demand for motor fuel for the years 1980 and 2000, key in new x values and press **□  $\hat{y}$** . To determine the year that the demand for motor fuel is expected to pass 3,500 million barrels, key in 3,500 (new value for y) and press **□  $\hat{x}$** .

<u>Keystroke</u>	<u>Di spl ay</u>	
1980 <b>□ <math>\hat{y}</math></b>	2,808.6264	Predicted demand in millions of barrels for the year 1980.
2000 <b>□ <math>\hat{y}</math></b>	4,031.8512	Predicted demand in millions of barrels for the year 2000.
35 <b>□ <math>\hat{x}</math></b>	1,991.3041	The demand is expected to pass 3,500 million barrels during 1992.

(7) Correlation coefficient. Both linear regression and linear estimation presume that the relationship between x and y data values can be approximated, to some degree, by a linear function (a straight line). **□ r** (correlation coefficient) can be used to determine how closely the data "fits" a straight line. The correlation coefficient can range from  $r = +1$  to  $r = -1$ . At  $r = +1$ , data falls exactly onto a straight line with positive slope. While at  $r = -1$ , data falls exactly onto a straight line with negative slope. At  $r = 0$ , data cannot be approximated by a straight line.

Example: To calculate the correlation coefficient for previous example press:

<u>Keystrokes</u>	<u>Di spl ay</u>	
<b>g r</b>	0.9931	The data very closely approximates a straight line.

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 the operation or maintenance of the pocket calculator or its components. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests 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. CALCULATOR DISPLAY IS BLANK.	<p>Step 1. Plug in ac adapter/recharger. Turn calculator on.</p> <p>(a) If display of zeros comes on, proceed to step 2.</p> <p>(b) If display is blank, replace adapter/recharger.</p> <p>(c) If problem remains, replace calculator.</p> <p>Step 2. Check for raised decimal point at far left corner of display. Indicates low power condition.</p> <p>(a) If indicator is on, proceed to step 3.</p> <p>(b) If indicator is off, recharge battery pack.</p> <p>Step 3. Check to see if contacts are dirty.</p> <p>(a) Clean contacts on inside of calculator and battery pack with cotton swab (Item 6, Appendix E) moistened with alcohol (Item 3, Appendix E).</p> <p>(b) Replace battery pack. Open battery pack door. Remove defective battery pack. Install new battery pack. Reinstall battery pack door.</p>	

Table 6-2. TROUBLESHOOTING - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. CALCULATIONS OR DISPLAY ERRATIC.	<p>Step 1. Check for raised decimal point at far left corner of display. Indicates low power condition.</p> <p>(a) Recharge battery pack.</p> <p>(b) Replace battery pack.</p> <p>(c) Replace calculator.</p> <p>Step 2. Press <b>[STO]</b> and <b>[ENTER]</b> to see if display shows -8, 8, 8, 8, 8, 8, 8, 8, not ERROR 9.</p> <p>If ERROR 9 is displayed, replace calculator.</p>	<p>NOTE</p> <p>For error conditions refer to operator's instructions for the HP-32E provided with equipment.</p>

6-10. MAINTENANCE PROCEDURES. There are no operator maintenance procedures assigned for this equipment.

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; AND SUPPORT EQUIPMENT. These items are not required at the organizational level of maintenance.



**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. MAINTENANCE PROCEDURES.** There are no organizational maintenance procedures assigned for this equipment.

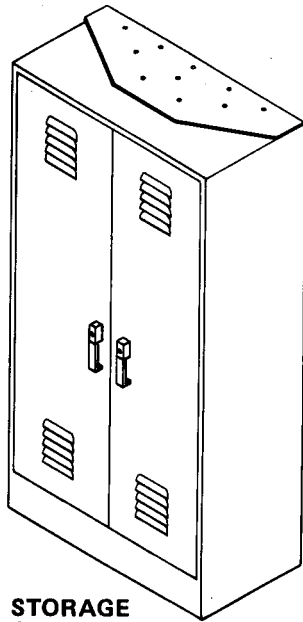
**6-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

**Section V DIRECT/GENERAL SUPPORT MAINTENANCE**

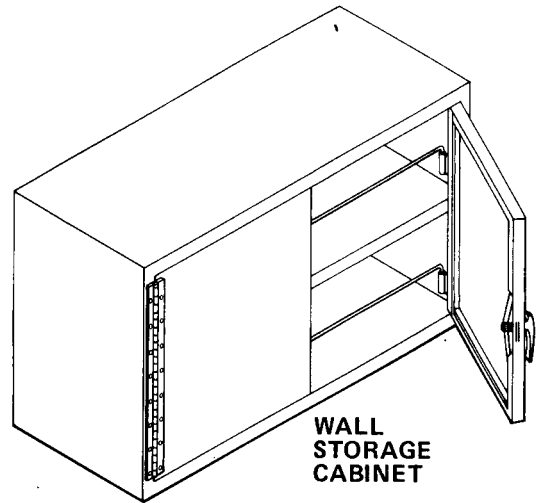
There are no direct/general support maintenance procedures assigned for this equipment.



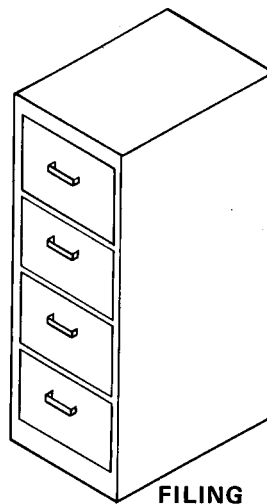




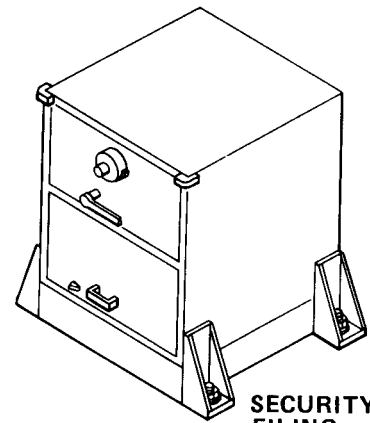
**STORAGE CABINET**



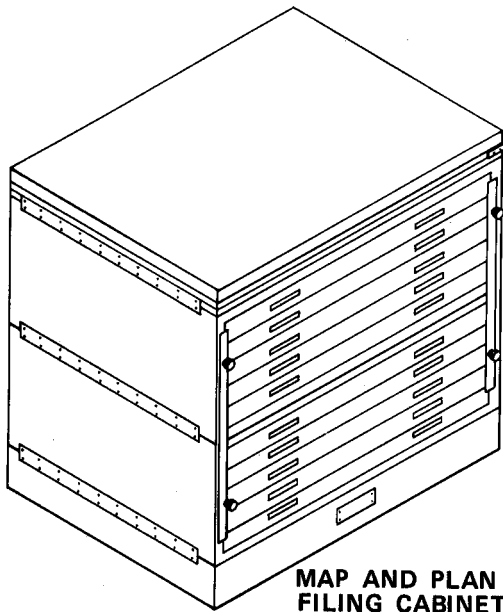
**WALL STORAGE CABINET**



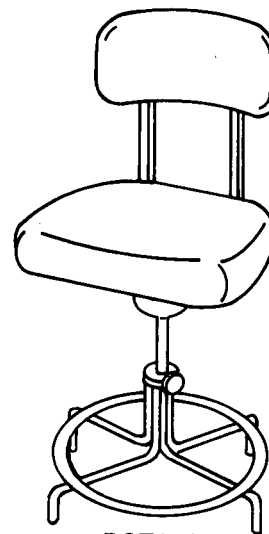
**FILING CABINET**



**SECURITY FILING CABINET**



**MAP AND PLAN FILING CABINET**



**ROTARY DRAFTING CHAIR**

## CHAPTER 7

## FURNITURE AND CABINETS

**Section I** INTRODUCTION

## 7-1. GENERAL INFORMATION.

7-1.1 Scope. This chapter contains the description of all furniture and cabinets contained in this section.

## 7-2. EQUIPMENT DESCRIPTION.

a. STORAGE CABINET. Provides storage for miscellaneous items. Cabinet has two louvered doors with a built-in latch and five shelves. Dimensions:

Width	36 in. (91.4 cm)
Depth	18 in. (45.7 cm)
Height	72 in. (182.8 cm)

b. WALL STORAGE CABINET. Used for miscellaneous storage. There are two shelves. The two doors are held shut by a handle-type latch. Dimensions:

Width	30 in. (76.2 cm)
Depth	12 in. (30.5 cm)
Height	18 in. (45.7 cm)

c. FILING CABINET. Used for the storage of legal-sized documents, correspondence and office supplies. There are four drawers. Dimensions:

Width	18.25 in. (46.3 cm)
Depth	26.63 in. (67.6 cm)
Height	52 in. (132.1 cm)

d. SECURITY FILING CABINET. Used for security storage of classified documents. It has two drawers locked by a latch and combination lock located on the second drawer. Dimensions:

Width	20.75 in. (52.7 cm)
Depth	28 in. (71.2 cm)
Height	26 in. (66.0 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	40.75 in. (103.5 cm)
Depth	28.62 in. (72.7 cm)
Height	41.68 in. (105.7 cm)

f. ROTARY DRAFTING CHAIR. Provides seating for drafting personnel. It has adjustable seat height and back position. Dimensions:

Width	17.12 in. (43.5 cm)
Depth	17.12 in. (43.5 cm)
Height	42 in. (107 cm), Max 36 in. (91.4 cm), Min

7-3. TECHNICAL PRINCIPLES OF OPERATION. There are no specific principles of operation for this equipment.

## Section II OPERATING INSTRUCTIONS

7-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND indicators. This equipment has no operator controls or indicators.

7-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no operator PMCS procedures assigned for this equipment.

7-6. OPERATION UNDER USUAL CONDITIONS.

7-6.1 Preparation for Movement. Check that portable equipment is properly secured with tiedowns provided.

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.** This equipment does not require lubrication.

**7-9. TROUBLESHOOTING PROCEDURES.** There are no operator troubleshooting procedures assigned for this equipment.

#### 7-10. 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.

7-10.1 Inspect Cabinets and Furniture. Inspect furniture and cabinets for structural damage, rust, and proper operation of all latches, hinges, drawer slides, and adjustment mechanisms.

### Section IV ORGANIZATIONAL MAINTENANCE

**7-11. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

#### 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 in 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 5-6675-317-24P 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 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.

7-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS **AND SERVICES.** There are no organizational PMCS procedures assigned for this equipment.

7-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES. There are no organizational troubleshooting procedures assigned for this equipment.

7-16. MAINTENANCE PROCEDURES.

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 Hinge (Piano Hinge) . . . . .	7-16.1
Replace Door Latch (Wall Storage Cabinet) . . . . .	7-16.2
Remove/Install Two Drawer Security Filing Cabinet . . . . .	7-16.3
Remove/Install Map and Plan Filing Cabinet/Portable Drawing Board Assembly . . . . .	7-16.4
Remove/Install Filing Cabinet . . . . .	7-16.5
Remove/Install Wall Storage Cabinet . . . . .	7-16.6
Replace Latch (Storage Cabinet) . . . . .	7-16.7
Remove/Install Storage Cabinet . . . . .	7-16.8



7-16.1 Replace Door Hinge (Piano Hinge).

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

TOOLS: 1/4 in. Electric Drill  
5/32 in. Drill Bit  
Pop Rivet Gun

SUPPLIES: Storage Cabinet Hinge  
5/32 in. Pop Rivets  
8-32 x 1/2 in. Screws (4 required)  
8-32 Nuts (4 required)

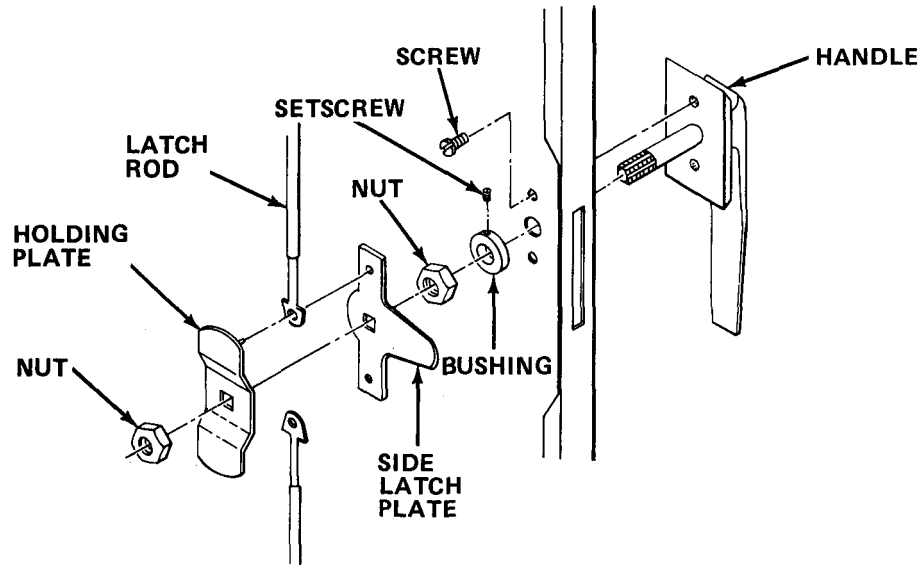
- a. Drill out rivets holding hinge to cabinet and remove hinge.
- b. Install new hinge and temporarily secure with four screws and nuts.
- c. Close and latch cabinet door and install pop rivets.
- d. Remove temporarily installed screws and nuts, and install remaining pop rivets.

7-16.2 Replace Door Latch (Wall Storage Cabinet).

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

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

SUPPLIES: Handle Type Latch



- 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 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.

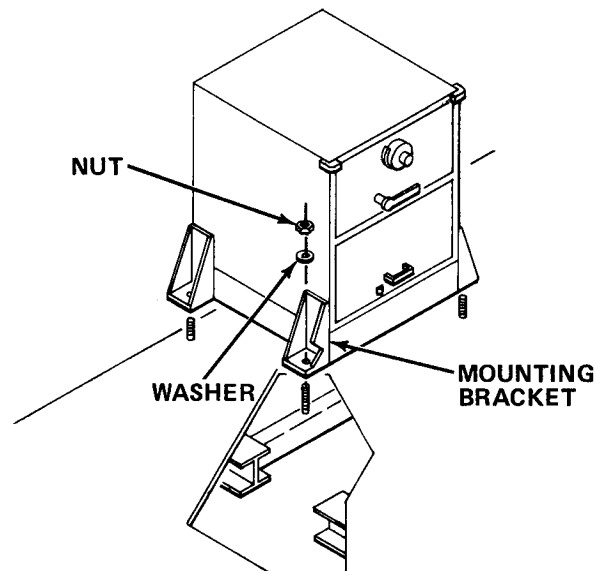
7-16.3 Remove/Install Two Drawer Security Filing Cabinet.

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

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: 1 1/4 in. Socket with 1/2 in. Drive and 1/2 in. Drive Ratchet  
1/2 in. Drive Socket Extension, 3 in. Long  
Materials Handling Equipment

SUPPLIES: Two Drawer Security Filing Cabinet



- a. Move all materials from inside cabinet to secure storage.
- b. Tape lock combination to outside of cabinet.
- c. Remove nuts and washers from mounting brackets.

**WARNING**

Serious personal injury can result unless an adequate number of personnel are used to move two drawer security filing cabinet.

- d. Remove defective two drawer security filing cabinet from section.
- e. Install new two drawer security filing cabinet; secure with nuts and washers.
- f. Enter new combination before storing material inside cabinet.

7-16.4 Remove/Install Map and Plan Filing Cabinet/Portable Drawing Board Assembly.

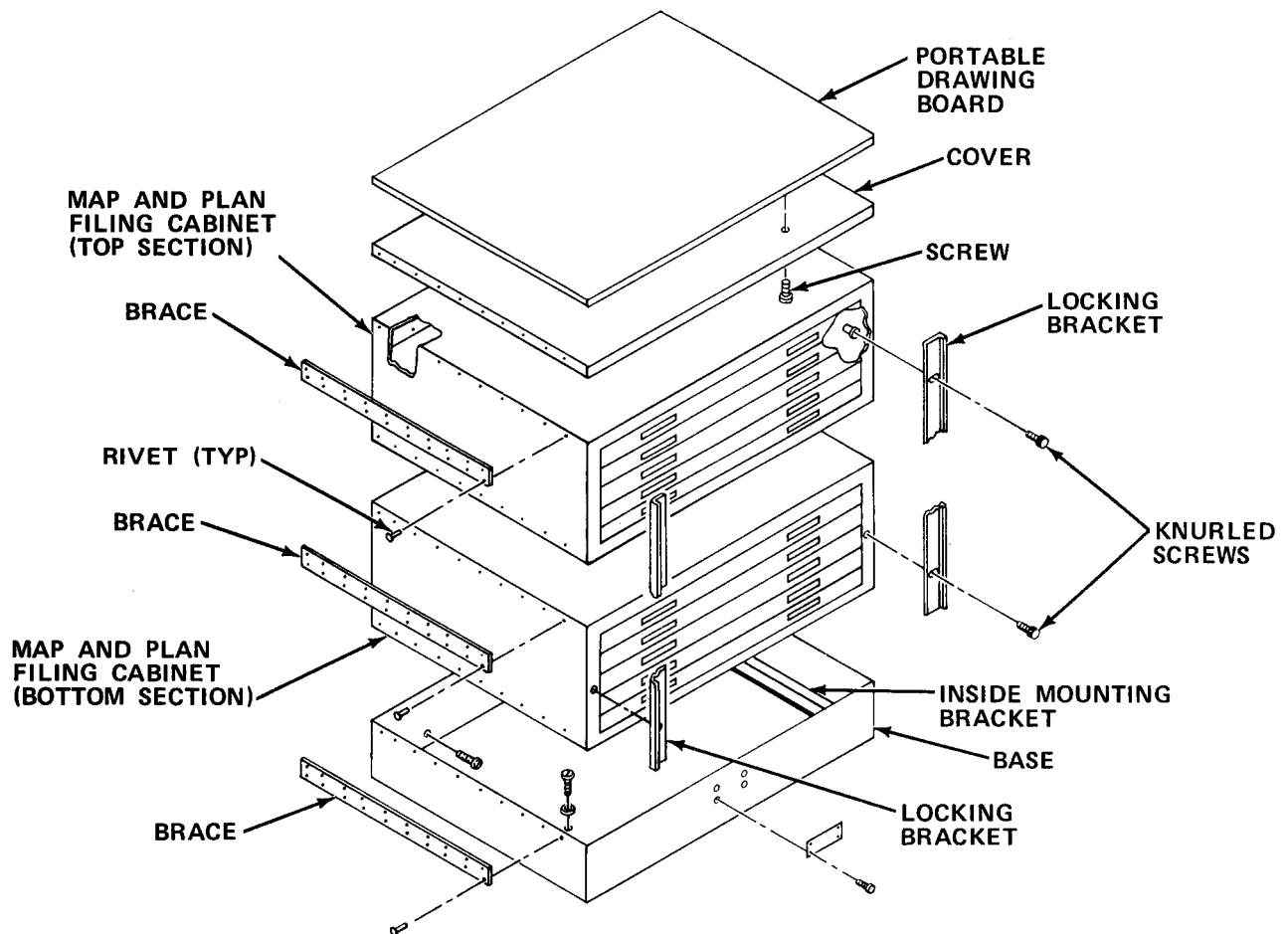
MOS: 41B, Topographic Instrument Repair Specialist  
or  
83FJ6, Reproduction Equipment Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS : Rivet Gun  
Drill and Bits  
Flat Tip Screwdriver

SUPPLIES: Portable Drawing Board  
Map and Plan Filing Cabinet  
Rivets

a. Remove filing cabinet (paragraph 7-16.5).



b. Drill rivets from braces and remove braces.

- c. Remove map and plan filing cabinet cover, turn cover over; remove screws and portable drawing board from cover. Retain screws for reuse.
- d. 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.

- e. Lift top and bottom sections free from base.
- f. Remove screws and base from floor. Retain screws for reuse.
- g. Install new base, top or bottom, map and plan filing cabinet, or drawing board as required.
- h. Reinstall base to floor and secure with screws.
- i. Reinstall bottom section to base and rivet braces to base and bottom sections.
- j. Reinstall top section on bottom section and rivet braces to both top and bottom sections.
- k. Reinstall portable drawing board on cover and secure with screws.
- l. Reinstall cover on top section and rivet braces to both the cover and top section.
- m. Reinstall locking brackets, and secure with knurled screws.
- n. Reinstall filing cabinet (Paragraph 7-16.5).

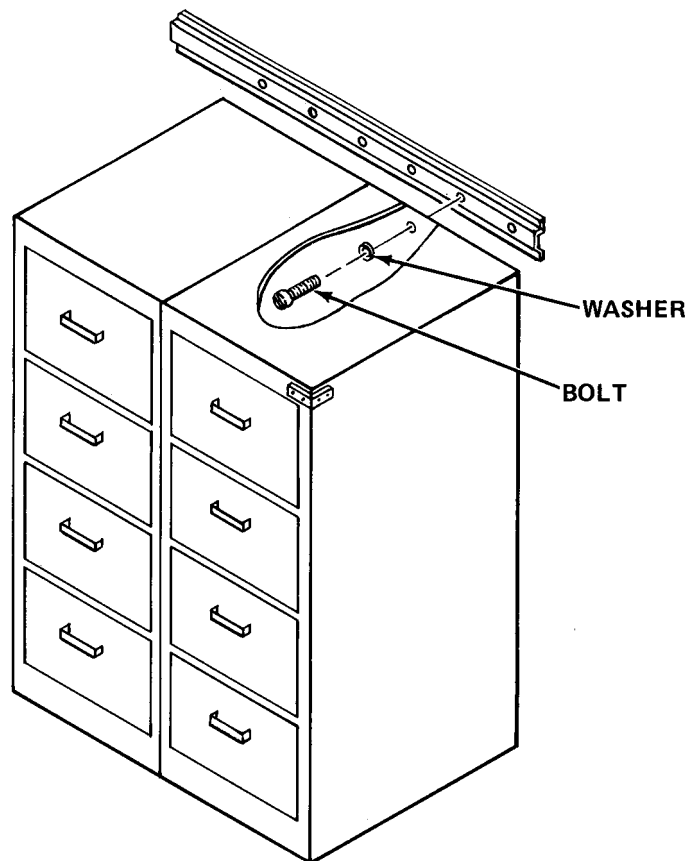
7-16.5 Remove/Install Filing Cabinet.

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

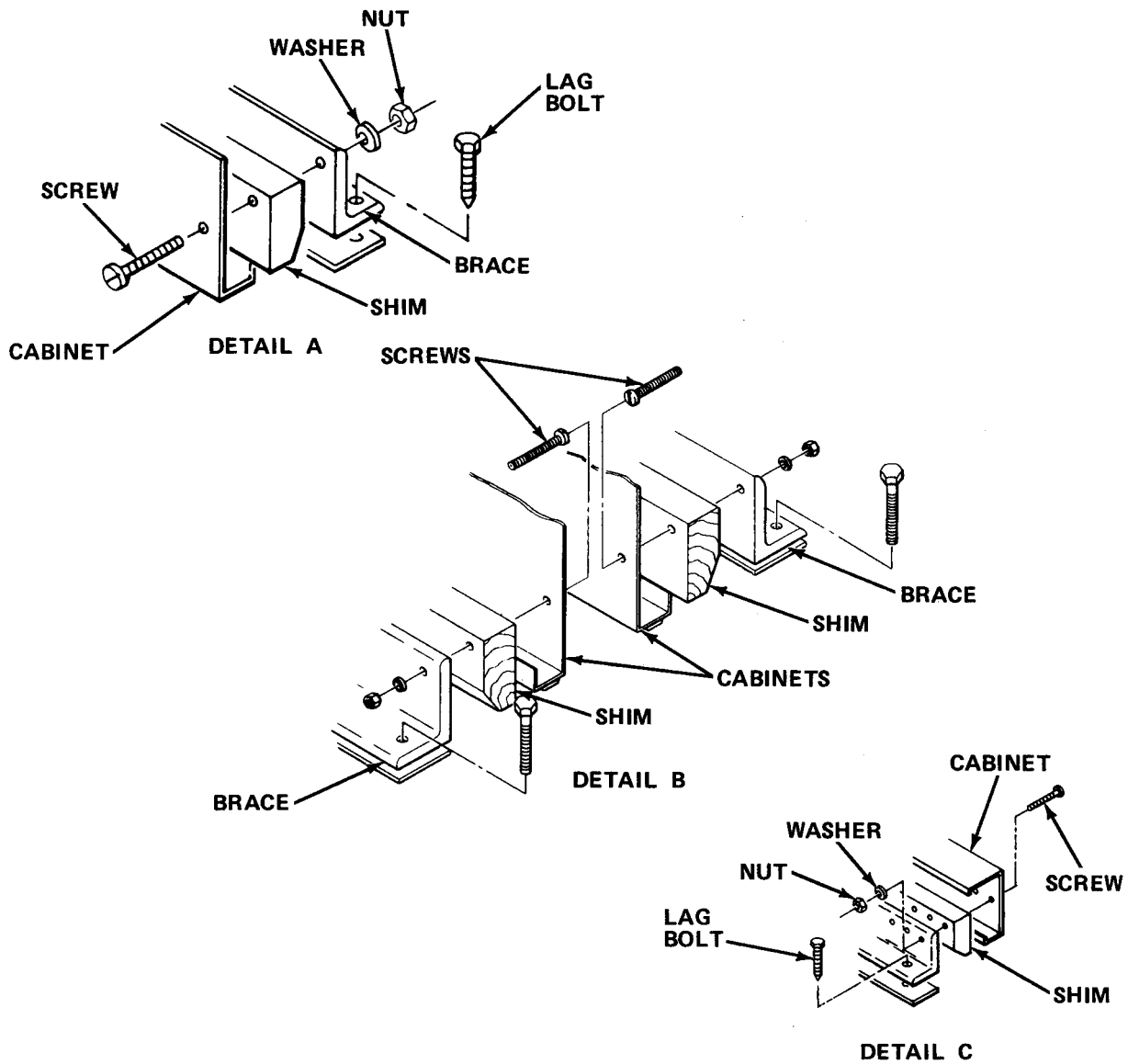
TOOLS : Flat Tip Screwdriver  
1/4 in. Drive Socket Set

SUPPLIES: Filing Cabinet

- a. Remove drawers from filing cabinet.



- b. Remove bolts and washers securing cabinet to wall.



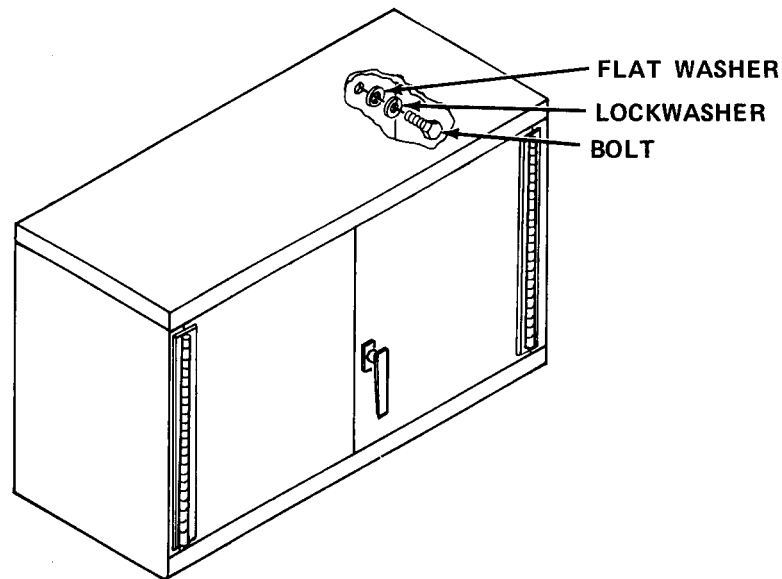
- c. Remove shims and bolts securing braces to floor.
- d. Remove defective cabinet from section.
- e. Remove drawers from new cabinet.
- f. Install braces and shims on new cabinet.
- g. Secure cabinet to floor.
- h. Secure cabinet to wall.
- i. Reinstall drawers in cabinet.

7-16.6 Remove/Install Wall Storage Cabinet.

MOS: 41B, Topographic Instrument Repair Specialist

83FJ6, Reproduction Equipment Repairer

TOOLS: 1/2 in. Socket with 1/2 in. Drive and 1/2 in. Drive Ratchet  
1/2 in. Socket Extension, 2 in. Long



- a. Remove bolts, flat washers, and lockwashers which secure cabinet to wall.
- b. Remove defective cabinet from van.
- c. Install new cabinet and secure to wall with lockwashers, flat washers, and bolts.



7-16.7 Replace Latch (Storage Cabinet).

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

TOOLS : Needle Nose Pliers  
Flat Tip Screwdriver

SUPPLIES: Latch  
Cotter Pin

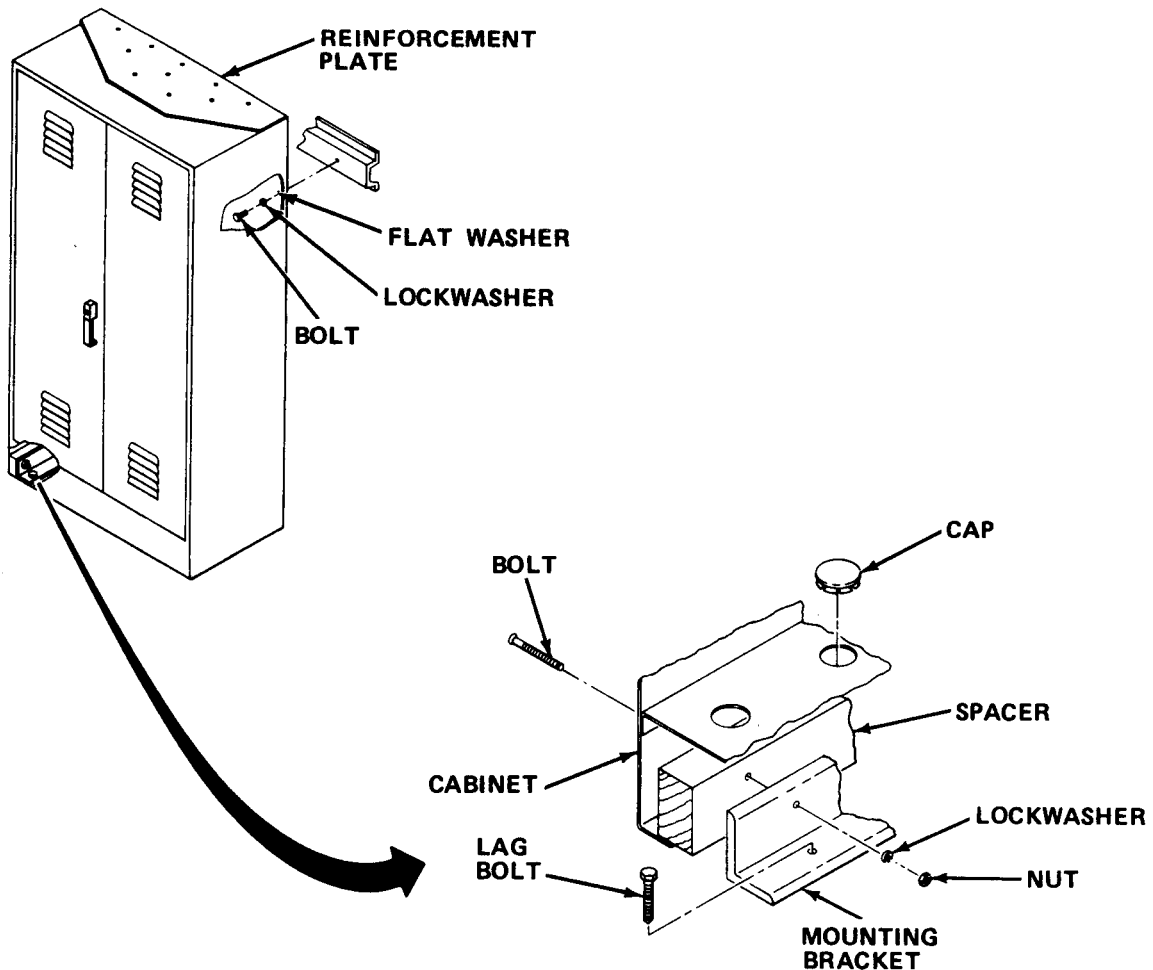
- a. Remove cotter pin which secures rod holding plate to handle shaft.
- b. Remove rods and rod holding plates.
- c. Remove spacer.
- d. Remove screw which secures handle to door and remove handle.
- e. Install new handle and secure to door with screw.
- f. Install spacer.
- g. Install rods and rod holding plates.
- h. Install cotter pin.

7-16.8 Remove/Install Storage Cabinet.

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

TOOLS : 1/4 in. Socket Set  
1/4 in. Socket Extension, 6 in. Long  
1 1/32 in. Combination Wrench  
Flat Tip Screwdriver  
Cross Tip Screwdriver

SUPPLIES: Storage Cabinet



- a. Remove bolts, lockwashers, and flat washers holding cabinet to wall.

- b. Remove caps and lag bolts holding mounting bracket to floor. Remove defective cabinet from section.
- c. Remove bolts, nuts, and lockwashers. Remove mounting bracket and spacer from cabinet. Retain mounting bracket and spacers for use on new cabinet.
- d. Position spacers and mounting bracket on new cabinet. Install but do not tighten bolts, nuts, and lockwashers.
- e. Place new cabinet in position and install but do not tighten lag bolts.
- f. Secure cabinet to wall with three bolts, lockwashers, and flat washers.
- g. Tighten the bracket retaining bolts and nuts.
- h. Tighten the bolts holding the mounting bracket to the floor, and install the caps.

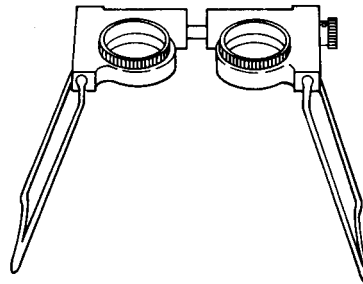
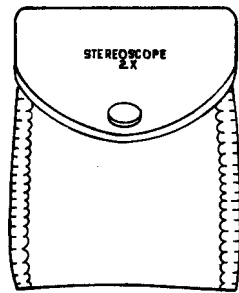
7-17. PREPARATION **FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

#### Section V **DIRECT/GENERAL SUPPORT MAINTENANCE**

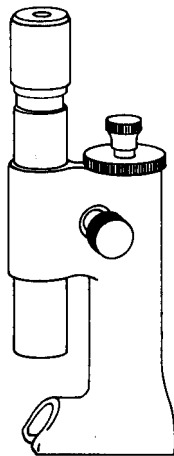
There are no direct/general support maintenance procedures assigned for this equipment.



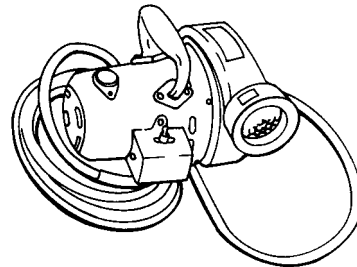




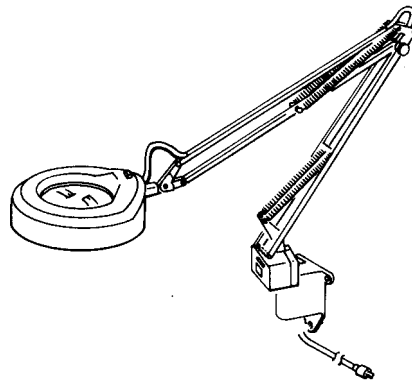
**POCKET STEREOSCOPE**



**OPTICAL  
MACROSCOPE**



**VACUUM CLEANER**



**MAGNIFIER LAMP**

## CHAPTER 8

### SUPPORT ITEMS

#### Section I INTRODUCTION

#### 8-1. GENERAL INFORMATION.

**8-1.1 Scope.** This chapter covers the support items contained in this chapter. The support items consist of the following equipment:

- a. Model LFM1BX5 Magnifier Lamp
- b. Model 3400 Vacuum Cleaner
- c. Type 1 Pocket 2X Stereoscope
- d. Model 31-29-33-35 Optical Microscope

#### 8-2. EQUIPMENT DESCRIPTION.

##### 8-2.1 Equipment Characteristics, Capabilities, and Features.

a. Magnifier Lamp. Adjustable for accurate positioning to provide illuminated magnification of precision work. Provision for both wall and bench mounting.

b. Vacuum Cleaner. High speed, heavy duty, used for general cleaning.

c. Pocket Stereoscope. Optically matches and gives operator an apparent single image of two maps or photographs.

d. Optical Microscope. Provides wide field low power, for use in making observations which require working distances and magnifications beyond the range of conventional magnifiers. Provides image which is right side up and not reversed.

##### 8-2.2 Equipment Data.

a. Magnifier Lamp. Replaceable 115 V ac lamp and diffuser.

b. 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.

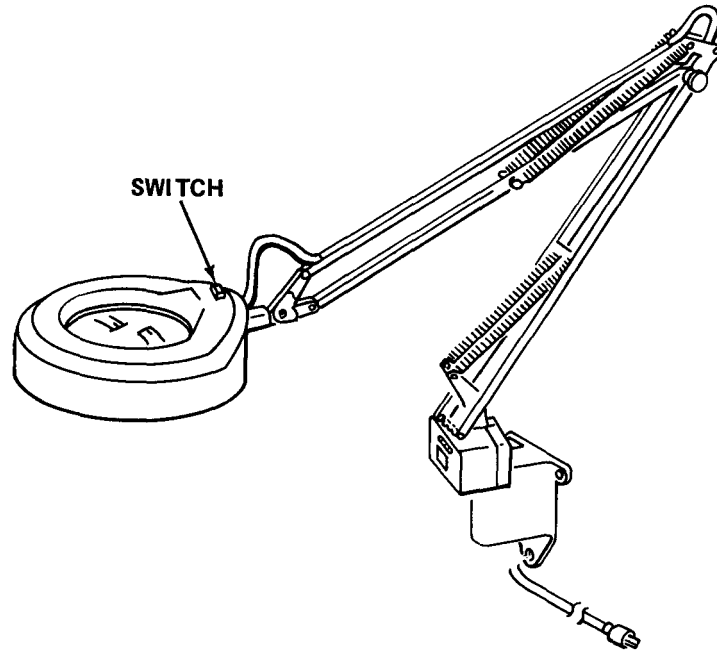
c. Optical Microscope. Received completely assembled with storage case. Two C-cell batteries are included.

**8-3. TECHNICAL PRINCIPLES OF OPERATION.** principles of operation are combined with operator's controls and indicators.

Section II OPERATING INSTRUCTIONS

8-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.

8-4.1 Magnifier Lamp.




---

Control or Indicator

Function

---

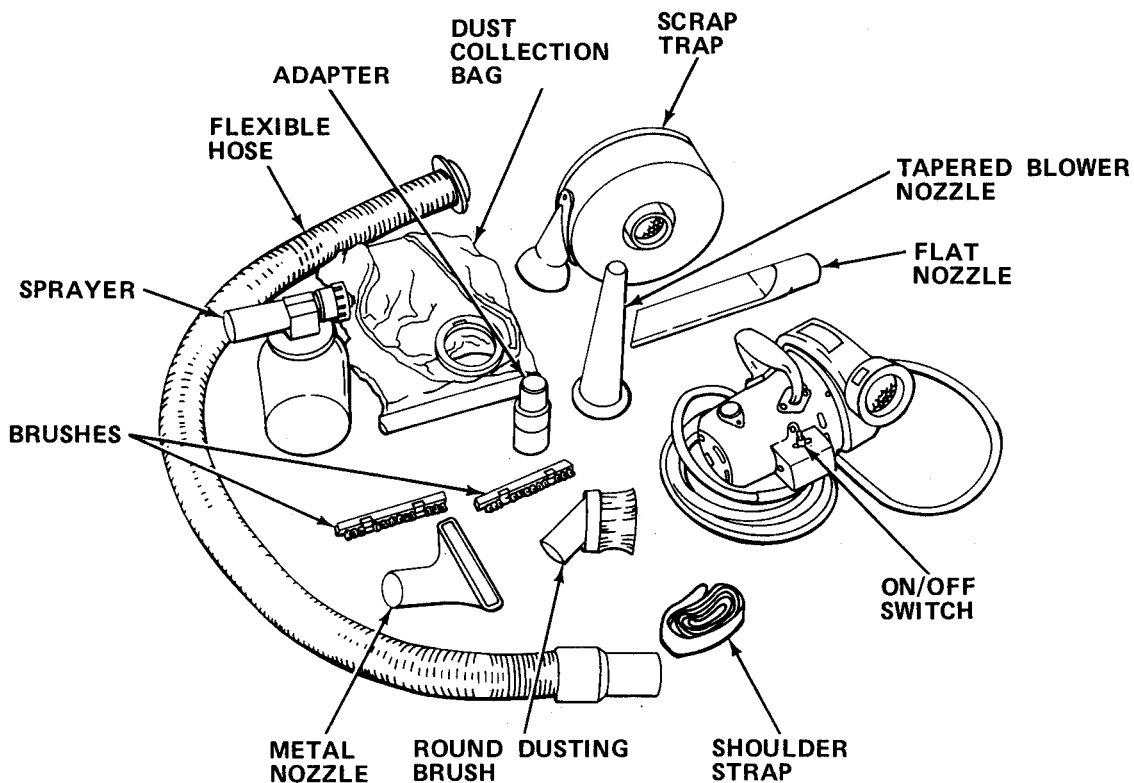
Switch

Turns Lamp on/off.

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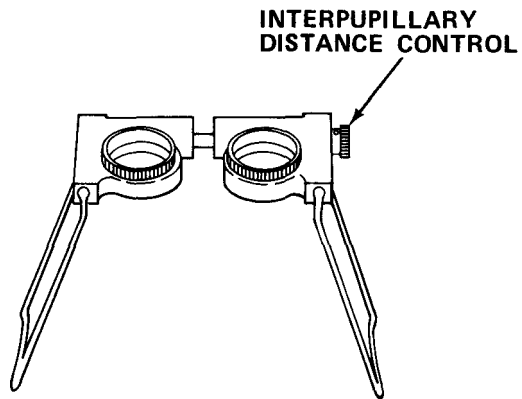
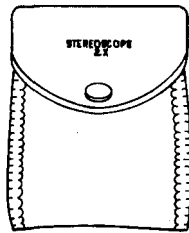
8-4.2 Vacuum Cleaner.



Control or Indicator	Function
Sprayer	Sprays liquids when hooked to blower side of Vacuum Cleaner.
Flexible Hose	Directs airflow in 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.

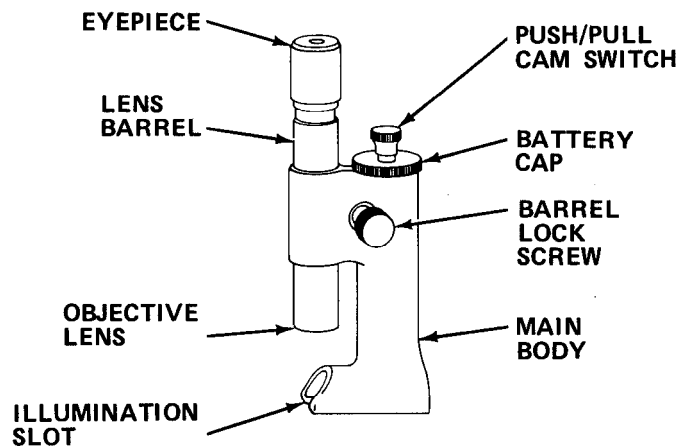
Control or Indicator	Function
Shoulder Strap	Attaches to vacuum cleaner for easier carrying.
Round Dusting Brush	Used for dust and dirt.
Metal Nozzle	Used for large, flat surfaces.
Brushes	Used on metal nozzle.
Adapter	

8-4.3 Pocket Stereoscope.



Control or Indicator	Function
Interpupillary Distance Control	Adjusts interpupillary of lenses to match that of viewer.

8-4.4 Optical Microscope.



Control or Indicator	Function
Push-Pull Cam Switch	Switches lights on and off.
Battery Cap	Removable cap allows two C-cell batteries to be replaced.
Barrel Lock Screw	Locks lens barrel in position when tightened.
Main Body	Battery housing, lens barrel holder, and optical microscope stand.
Illumination Slot	Light from 2.5 V bulb is directed through this slot.
Objective Lens	Fixed lens part of magnifying optics.
Lens Barrel	Provides focusing movement for objective and eyepiece lens assembly.
Eyepiece	Removable eyepiece for observing image.

## 8-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

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.

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>
Magnifier Lamp	Liquid Lens Cleaner (Item 4, Appendix E)	1 btl
	Cheesecloth (Item 5, Appendix E)	ar
Pocket Stereoscope	Lens Tissue (Item 23, Appendix E)	1 pkg
Optical Microscope	Lens Brush	1 ea
	Cheesecloth (Item 5, Appendix E)	ar
	Lens Tissue (Item 23, Appendix E)	1 pkg
	Liquid Lens Cleaner (Item 4, Appendix E)	1 btl

**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 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  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<b><u>SUPPORT ITEMS</u></b>			
1	B	<u>Inspect Magnifier Lamp.</u>  1. Inspect lens for cracks, breaks, or dirt. Clean as required.  2. Inspect arms and bracket for cracks or breaks. Replace as required.	Lens cracked or broken.  Arms or base cracked or broken.
2	B	<u>Clean Magnifier Lamp.</u>  1. Turn off magnifier 1 amp.  2. APPLY small amount of liquid lens cleaner to lens-and wipe clean with cheesecloth.  3. Turn on magnifier lamp.	
3	Q	<u>Inspect Vacuum Cleaner.</u>  Inspect vacuum cleaner for damage to housing, frayed or worn power cord and proper operation of motor.	Cracked or broken housing. Frayed, worn, or damaged power cord or plug. Noisy or improper motor operation.
4	B	<u>Clean Pocket Stereoscope.</u>  1. Inspect lenses for dust, dirt, cracks, or breaks.  2. Clean lenses with lens tissue.  3. Inspect housing and legs for cracks or breaks.	

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 - Biennially

(Number) - Hundreds of Hours

ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<b>SUPPORT ITEMS - Cont</b>			
5	B	<p><u>Inspect Optical Microscope.</u></p> <div style="text-align: center;"> </div> <ol style="list-style-type: none"> <li>1. Inspect exterior of carrying case for scratches or dents.</li> <li>2. Release catch and open cover.</li> </ol> <p style="text-align: center;"><u>CAUTION</u></p> <ul style="list-style-type: none"> <li>● Always place optical microscope on level and stable surface when not in use.</li> <li>● Do not touch lens surfaces with bare hands. Fingerprints can damage lens surfaces. Clean lenses immediately if touched.</li> </ul> <ol style="list-style-type: none"> <li>3. Remove optical microscope from case.</li> </ol>	

**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 - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
5	B	<b><u>SUPPORT ITEMS - Cont</u></b>	
		<p><u>Inspect Optical Microscope - Cont</u></p> <div style="text-align: center;"> </div> <ol style="list-style-type: none"> <li>4. Inspect optical microscope for broken, damaged, or missing parts.</li> <li>5. Inspect lens surfaces for cleanliness.</li> <li>6. Inspect movable controls for security.</li> <li>7. Inspect main body and lens barrel for scratches or dents.</li> </ol> <p style="text-align: center;"><b><u>WARNING</u></b></p> <p>Do not allow battery acid to come in contact with your eyes or skin. In event of contamination, flush affected area with large quantities of fresh water and call for medical assistance.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Leaking or damaged batteries can discharge corrosive and mildly toxic substance which can damage equipment.</p>	



**Table 8-1. 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  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
5	B	<p><u>SUPPORT ITEMS - Cont</u></p> <p><u>Inspect Optical Microscope - Cont</u></p> <div> <p>The diagram shows a side view of an optical microscope. A small cylindrical cap is shown being removed from the top of the microscope's housing. An arrow points from the text 'BATTERY CAP' to this cap.</p> </div> <ol style="list-style-type: none"> <li>8. Unscrew and remove battery cap.</li> <li>9. Place one hand in position to catch batteries, and turn optical microscope upside down to remove batteries.</li> <li>10. Examine batteries for damage or signs of leakage.</li> <li>11. Inspect inside of battery housing for damage or corrosion.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Observe correct polarity when replacing batteries.</p> <ol style="list-style-type: none"> <li>12. Replace batteries.</li> <li>13. Replace battery cap.</li> </ol>	

**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 - Biennially

(Number) - Hundreds of Hours

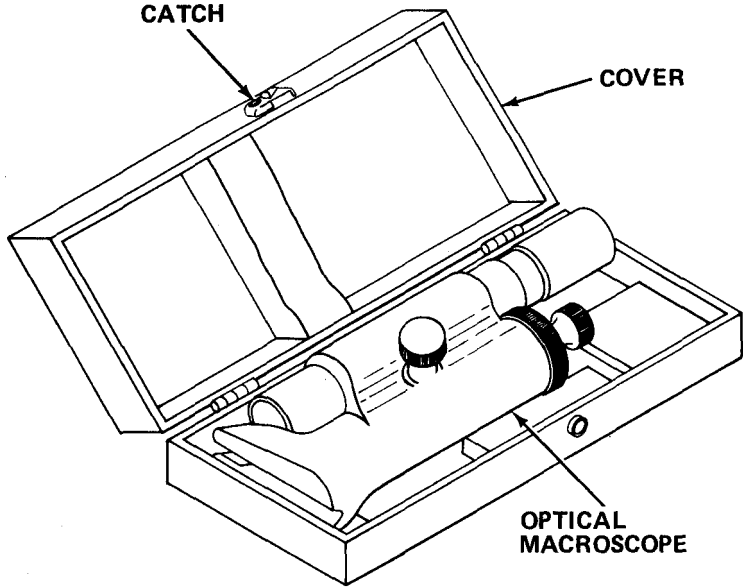
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED  PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
<b>SUPPORT ITEMS - Cont</b>			
6	B	<p><u>Service Optical Microscope</u></p>  <p>1. Release catch and open cover.</p> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <ul style="list-style-type: none"> <li>● Always place optical microscope in case when not in use.</li> <li>● Do not touch lens surfaces with bare hands. Fingermarks can damage lens surfaces. Clean lens immediately if touched.</li> <li>● Use only approved lens cleaner and materials for cleaning lenses,</li> </ul> <p>2. Remove optical microscope from case.</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 - 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>			
6	B	<p><u>Service Optical Microscope - Cont</u></p> <div style="text-align: center;"> <p>The diagram shows a side view of an optical microscope. Labels with arrows point to the following parts: 'EYEPIECE LENS' at the top, 'BARREL' on the upper section, 'OBJECTIVE LENS' on the lower section, and 'BODY' on the main vertical structure.</p> </div> <p><b><u>CAUTION</u></b></p> <p>Use only a mild detergent for cleaning body. Strong solvents will damage parts.</p> <ol style="list-style-type: none"> <li>Using lens brush, remove any dust and dirt from objective lens and eyepiece lens.</li> <li>Remove any remaining dirt using lens tissue and liquid lens cleaner.</li> </ol>	

**8-6. OPERATION UNDER USUAL CONDITIONS.**

8-6.1 Magnifier Lamp.

- a. Move magnifier lamp from mounting bracket and position over object to be examined.
- b. Plug in power cord.
- c. Turn on fluorescent lamp.
- d. Examine object through lens.

8-6.2 Vacuum Cleaner.

- a. Using as vacuum.
  - (1) Attach dust collection bag to air discharge opening.
  - (2) Remove protective screen lock from air intake opening and attach scrap trap to that opening.
  - (3) Attach swivel end of hose to scrap trap by turning lock to right until secure.
  - (4) Attach required tool to other end of hose.
  - (5) Insert plug into 120 V ac wall outlet and turn on/off switch to ON.
- b. Using as blower.
  - (1) Attach tapered rubber nozzle to discharge opening.
  - (2) Attach protective screen lock to air intake opening.
  - (3) Insert plug into 120 V ac wall outlet and turn on/off switch to ON.
- c. Using as sprayer.
  - (1) Attach protective screen lock to air intake opening.
  - (2) Attach swivel end of hose to air discharge opening by turning lock to right until secure.
  - (3) Attach sprayer to other end of hose.

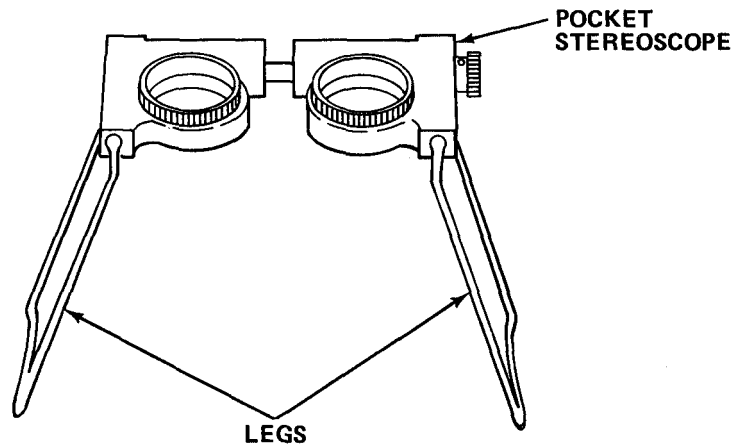
**NOTE**

Size of spray pattern is determined by adjusting screw located on top of sprayer.

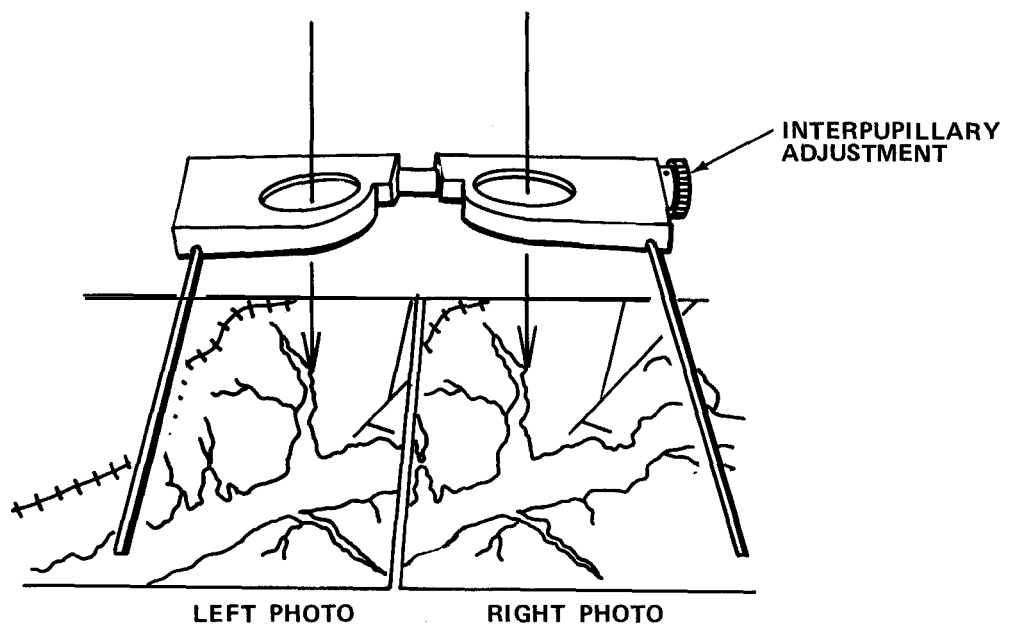
- (4) Insert plug into 120 V ac wall outlet and turn on/off switch to ON.

8-6.3 Pocket Stereoscope.

- a. Position photography for viewing in stereo.



- b. Remove pocket stereoscope



- c. Set pocket stereoscope on photos so that left lens is over left photograph and right lens is over right photograph.

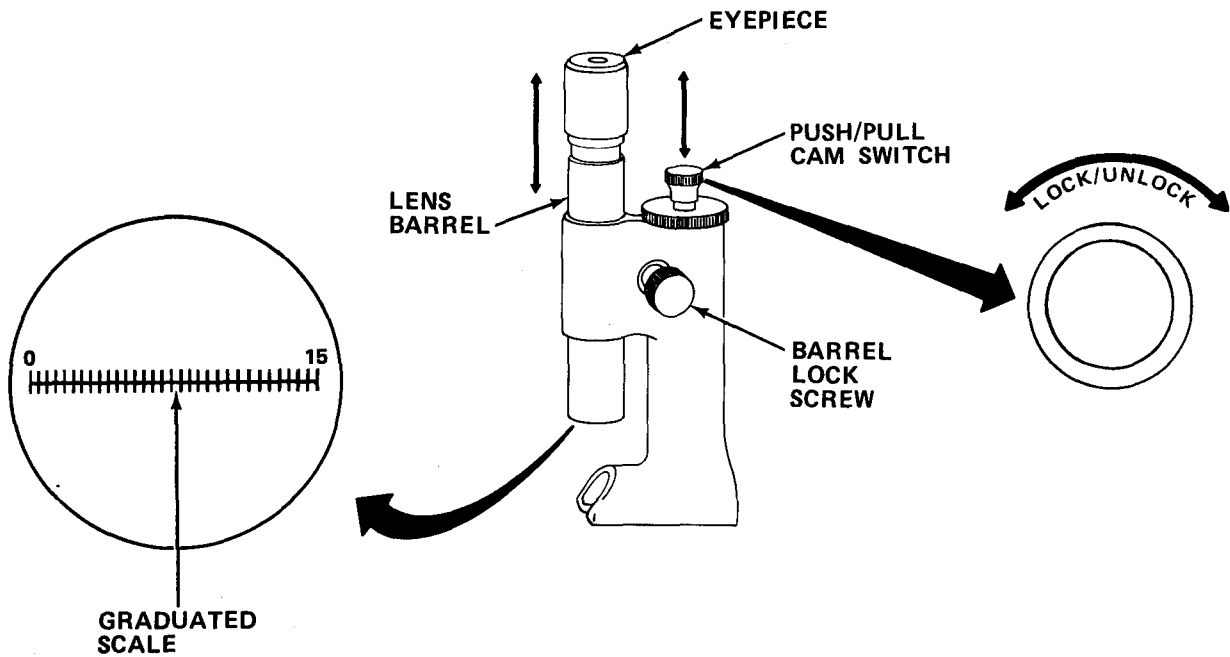
- d. Adjust interpupillary distance between lenses until it matches that of viewer.

e. Locate detail to be viewed on left photograph and center left lens over it.

f. Move right photograph until the same detail is centered under right lens. When viewed simultaneously, two details should merge into one. Adjust photographs until this effect is achieved.

8-6.4 Optical Microscope.

a. Place optical microscope over area to be viewed with illumination slot close to specific area required.



b. Loosen barrel lock screw.

c. Look through eyepiece and depress push/pull cam switch.

d. Grasp lens barrel and move it slowly up and down until area to be viewed is seen clearly and sharply together with graduated scale.

When target and graduated scale appear simultaneously sharp and clear, clamp barrel lock screw.

f. To provide light without keeping push/pull cam switch depressed, turn push/pull cam switch in either direction through 90 degrees to lock it. Rotation in opposite direction will unlock it.

To make measurement, read size of object or target directly from scale. Scale is 0.150 in. in length and is divided into intervals of 0.001 in. With care, estimations of down to 0.0005 in. are possible.

**8-7. OPERATION UNDER UNUSUAL CONDITIONS.** This equipment is designed for use only in a controlled environment.

**Section III OPERATOR MAINTENANCE**

**8-8. LUBRICATION INSTRUCTIONS.** This equipment does not require lubrication.

**8-9. TROUBLESHOOTING PROCEDURES.**

a. The table lists the common malfunctions which you may find during the operator maintenance of the support equipment. You should perform the test/inspection and corrective actions in the order.

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.

**Table 8-2. TROUBLESHOOTING**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. MAGNIFIER LAMP WILL NOT LIGHT.	Check that Magnifier Lamp is plugged into active power outlet. Press switch OFF then ON.	<ul style="list-style-type: none"> <li>(a) If lamp still does not come on, replace tube.</li> <li>(b) If new tube does not light, refer to organizational maintenance.</li> </ul>
2. VACUUM CLEANER MOTOR DOES NOT OPERATE.	Step 1. Check power cord.	<ul style="list-style-type: none"> <li>(a) If plugged in, proceed to step 2.</li> <li>(b) Plug in power cord.</li> </ul>

Table 8-2. TROUBLESHOOTING - Cont

---

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<hr/>		
2. VACUUM CLEANER MOTOR DOES NOT OPERATE - Cent		
	Step 2. Check position of power switch.	
		(a) If turned on, proceed to step 3.
		(b) Turn on power switch.
	Step 3. Check circuit breaker position in circuit breaker box.	
		(a) If turned OFF or tripped, turn circuit breaker ON.
		(b) If turned ON, refer to organizational maintenance.

---



**8-10. 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.

INDEX

PROCEDURE	PARAGRAPH
Replace Tube in Magnifier Lamp . . . . .	8-10.1

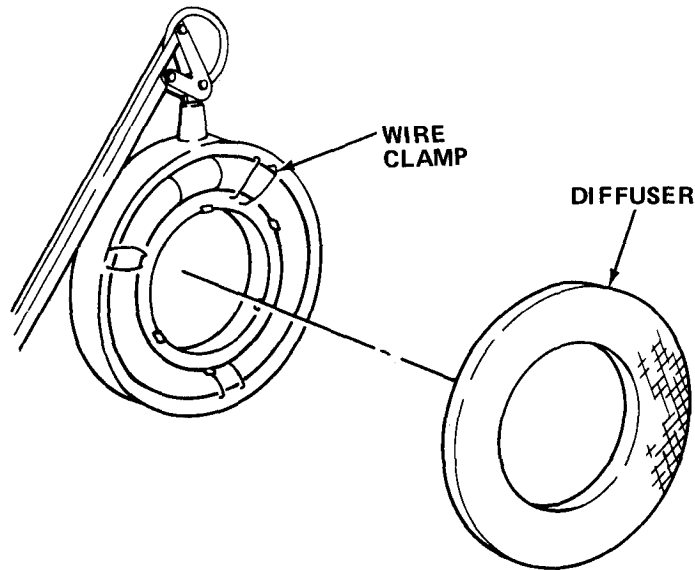
8-10.1 Replace Tube in Magnifier Lamp.

MOS : 81Q, Terrain Analyst

SUPPLIES: Tube (22 W)

**WARNING**

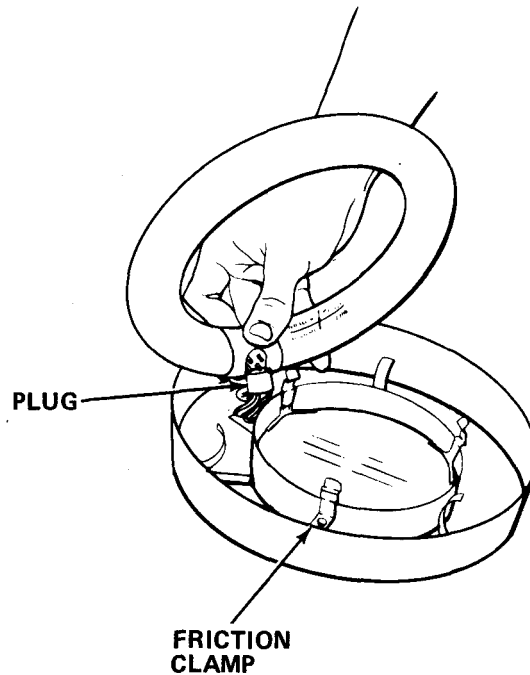
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.



a. Unplug magnifier lamp and remove diffuser.

**NOTE**

On some magnifier lamp models, tube is held in place with friction clamps.



- b. Release wire clamps, pull out tube, and disconnect plug from tube.
- c. Connect plug to new tube and retain tube with wire clamps.
- d. Reinstall diffuser.

#### **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, 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.

8-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-317-24P 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 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 the support item 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 8-3. 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.

1. VACUUM CLEANER MOTOR DOES NOT OPERATE.

Check that the vacuum cleaner is plugged into active outlet. Turn on switch.

If motor does not operate, replace vacuum cleaner.

2. MAGNIFIER LAMP WILL NOT LIGHT.

Check that magnifier lamp is plugged into active power outlet. Press switch OFF then ON.

Replace magnifier lamp assembly (paragraph 8-16.1).

---

8-16. **MAINTENANCE PROCEDURES.**

a. 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.

I N D E X

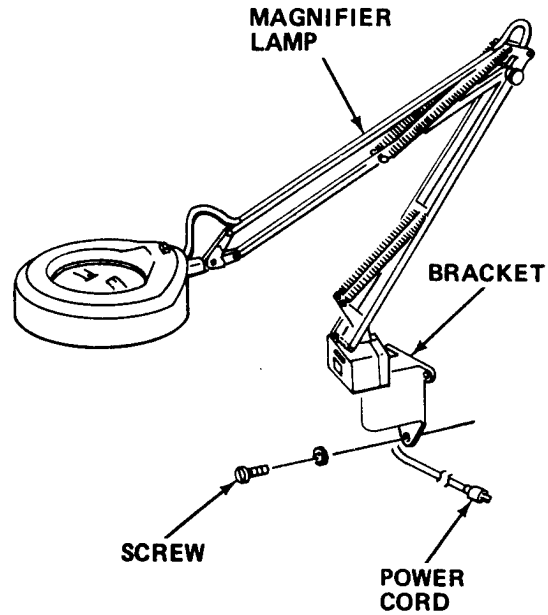
PROCEDURE	PARAGRAPH
Replace Magnifier Lamp Assembly . . . . .	8-16.1

8-16.1 Replace Magnifier Lamp Assembly.

- MOS : 41B, Topographic Instrument Repair Specialist
- TOOLS : Flat Tip Screwdriver
- SUPPLIES: Magnifier Lamp Assembly

**WARNING**

Death or serious injury may occur from electrical shock if power cord is not unplugged before servicing.



- a. Unplug power cord and remove magnifier lamp assembly from bracket.
- b. Install new magnifier lamp assembly in bracket and plug in power cord.

**8-17. PREPARATION FOR STORAGE OR SHIPMENT.** Contact your battalion for packing and shipping instructions.

#### **Section V DIRECT/GENERAL SUPPORT MAINTENANCE INSTRUCTION**

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
Hand Receipt/Annex Number . . . . .	DA Form 2062
Equipment Inspection and Maintenance Worksheet . . . . .	DA Form 2404
Quality Deficiency Report . . . . .	SF 368
The Army Maintenance Management System (TAMMS). . . . .	DA Pam 738-750

A-3. FIELD MANUALS.

Camouflage . . . . .	FM5-20
Nuclear, Biological and Chemical (NBC) Defense (Reprinted w/Basic Inclusion) . . . . .	FM21-40
Basic Cold Weather Manual . . . . .	FM31-70
Northern Operations . . . . .	FM31-71
Metal Body Repair and Related Operations . . . . .	FM43-2

A-4. TECHNICAL MANUALS.

Administrative Storage of Equipment . . . . .	TM 740-90-1
Chemical, Biological and Radiological (CBR) Decontamination . . . . .	TM3-220
Hand Receipt, Covering Contents of Components of End Items (COEI), Basic Issue Items (BII) and Additional Authorization List (AAL) for Compilation Section . . . . .	TM 5-6675-317-14HR

**TM 5-6675-317-14**

- 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) . . . . . TM 5-2330-305-14
- 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 . . . . . TM 5-4120-367-24P
- 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) . . . . . TM 5-2330-305-24P
- Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (RPSTL) (Including Depot Maintenance Repair Parts and Special Tools) for Compilation Section . . . . . TM 5-6675-317-24P
- 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 Compilation Section, Model ADC-TSS-5 . . . . . LO 5-6675-317-12



## 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. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring and diagnostic 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 THE 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.

c. 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, align, 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).

<sup>3</sup>Disassemble/assemble - Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least competency 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 5
- 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.

---

<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.

**6-5. 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) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Cat.					(5) Tools and Eqpt	(6) Remarks
			C	O	F	H	D		
00	COMPILATION SECTION	Overhaul							
01	VAN BODY (ISO CONTAINER)	Inspect Service Repair	0.8 0.9	0.5 1.0	1.5	2.0		9,10,11,1 1,2,6,13	B
	FLUORESCENT LIGHT ASSY	Repair	0.1	0.7				1	
	BLACKOUT/DOME LIGHT ASSY	Repair	0.2						
	EXHAUST FAN ASSY	Repair		0.5	1.5				
	AIR CONDITIONER/ HEATER ASSY	Replace				2.0			A
	ELECTRICAL ASSY	Inspect Repair		0.5 0.9	1.0			1 1,3	
	TELEPHONE BINDING POST ASSY	Replace Repair		0.5 0.7				1 1	
	EMERGENCY LIGHT ASSY	Replace		0.3				1	

\*\* Depot will determine work time

**Section II. MAINTENANCE ALLOCATION CHART - Cent**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Cat.					(5) Tools and Eqpt	(6) Remarks
			C	O	F	H	D		
01	VAN BODY - Cent (ISO Container)								
	TIEDOWN SOCKET ASSY	Replace		0.3				6	
	LEVEL INDICATOR ASSY	Replace		0.6				3,2	
	BLACKOUT CURTAIN ASSY	Repair		1.0				6	
	PERSONNEL LADDER ASSY	Repair		0.8				6,13	B
	PERSONNEL/CARGO DOOR ASSY	Replace Repair				1.5 2.0		6 6	
02	DRAFTING, SCRIBING TRACING TABLE	Inspect	0.2						
		Service	0.4					12	
		Remove/ Install		1.0				1	
	ELECTRICAL SYSTEM	Repair	0.2	0.6					
03	TABLE TOP TILT LOCKING ASSEMBLY	Repair		0.7				1	
	PILLOW BLOCK ASSEMBLY	Replace		0.5				1	
03	ZOOM TRANSFER SCOPE 53-05-04-20	inspect Service	0.2 0.5					7,8 7,8	
	ILLUMINATION SYSTEM	Repair			0.9			4,5	

**Section II. MAINTENANCE ALLOCATION CHART - Cont**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Cat.					(5) Tools and Eqpt	(6) Remarks
			C	O	F	H	D		
04	ZOOM TRANSFER SCOPE Z T4-H	Inspect	0.2					7,8	
		Service	0.5						
	ILLUMINATION SYSTEM	Repair			0.9			4,5	
05	ULTRASONIC CLEANER	Inspect	0.2					1	
		Repair		0.7					
	CIRCUIT BOARD	Replace		0.6				1	
06	POCKET CALCULATOR	Inspect	0.3						
		Repair	0.2						
07	FURNITURE AND CABINETS	Inspect	0.5					1,3	
		Remove/Install		0.9					
		Repair		0.7				1,13	
08	SUPPORT ITEMS	Inspect	0.8					1	
		Service	0.5						
		Repair	0.3						

Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Shop Kit, Automotive Maint & Repair Common #1 Plus Metric Option	4910-00-754-0654	
2	O	Tool Kit, Carpenters Engineer Squad	5180-00-293-2875	
3	O	Tool Kit, General Mechanic's Automotive Plus Metric Option	5180-00-177-7033	
4	F,H	Tool Kit, Electronic Equipment	5180-00-605-0079	
5	F,H	Tool Kit, Electronic Equipment	5180-00-610-8177	
6	O,F,H	Tool Kit, Light Machine Repair	5180-00-596-1540	
7	C	Blower, Watchmakers	5120-00-254-4612	
8	C	Brush, Lens	5920-00-205-0565	
9	C	Brush, Wire	7920-00-291-5815	
10	C	Screwdriver, Flat-tip	5120-00-234-8910	
11	C	Wrench, Adjustable	5120-00-264-3795	
12	O	Gun, Grease	4930-00-965-0288	



**Section III TOOL AND TEST EQUIPMENT REQUIREMENTS - Cont**

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
13	O,F,H	Rivet Gun	5120-00-017-2849	B
14	0	Spring Scale	6670-00-238-9777	B

**Section IV REMARKS**

Reference Code	Remarks
A	See TM 5-4120-367-14 for maintenance procedures.
B	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 LISTS

### Section I INTRODUCTION

#### C-1 . SCOPE.

This appendix lists components of end item and basic issue items for the Compilation 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 Compilation Section in operation, to operate it, and to perform emergency repairs. BII must be with the Compilation 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.

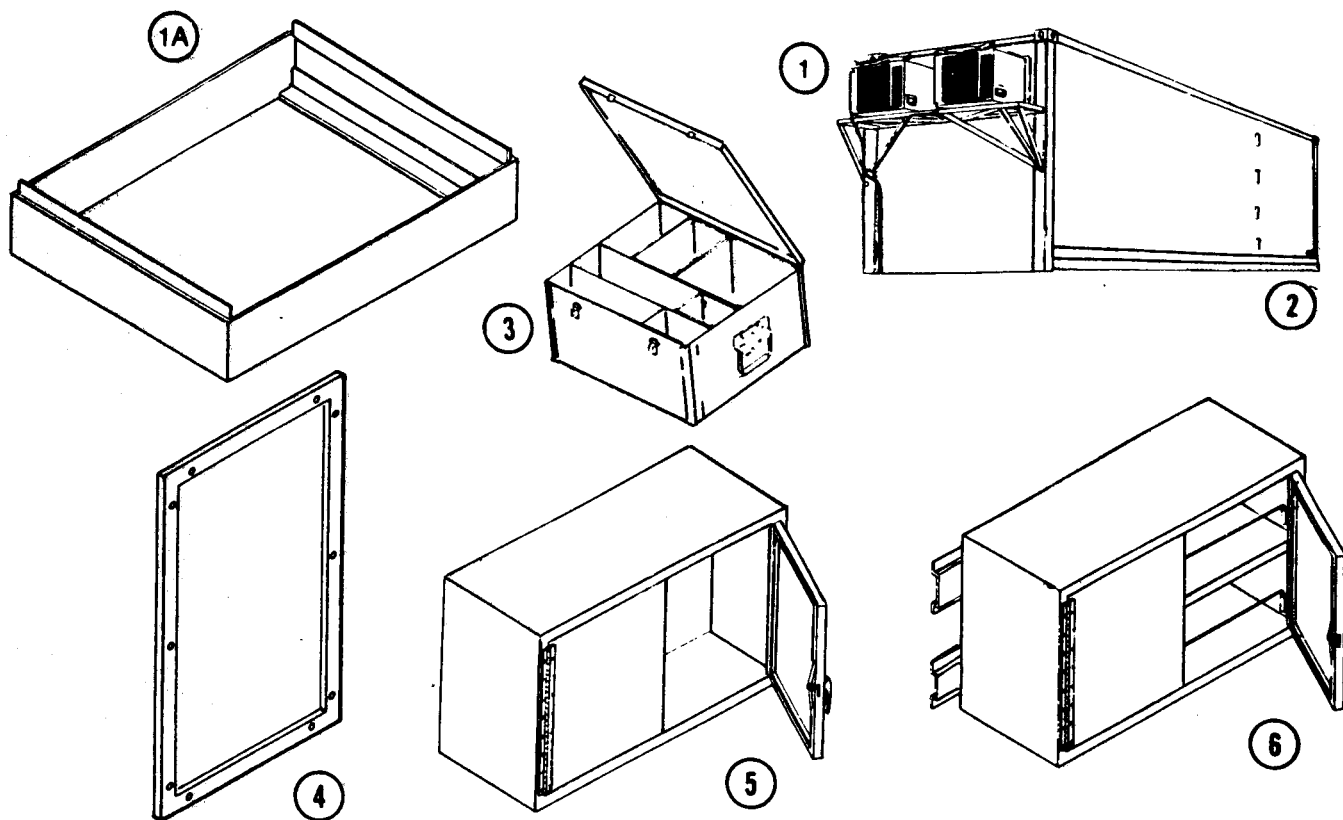
*b. Column (2): National/Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

*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)

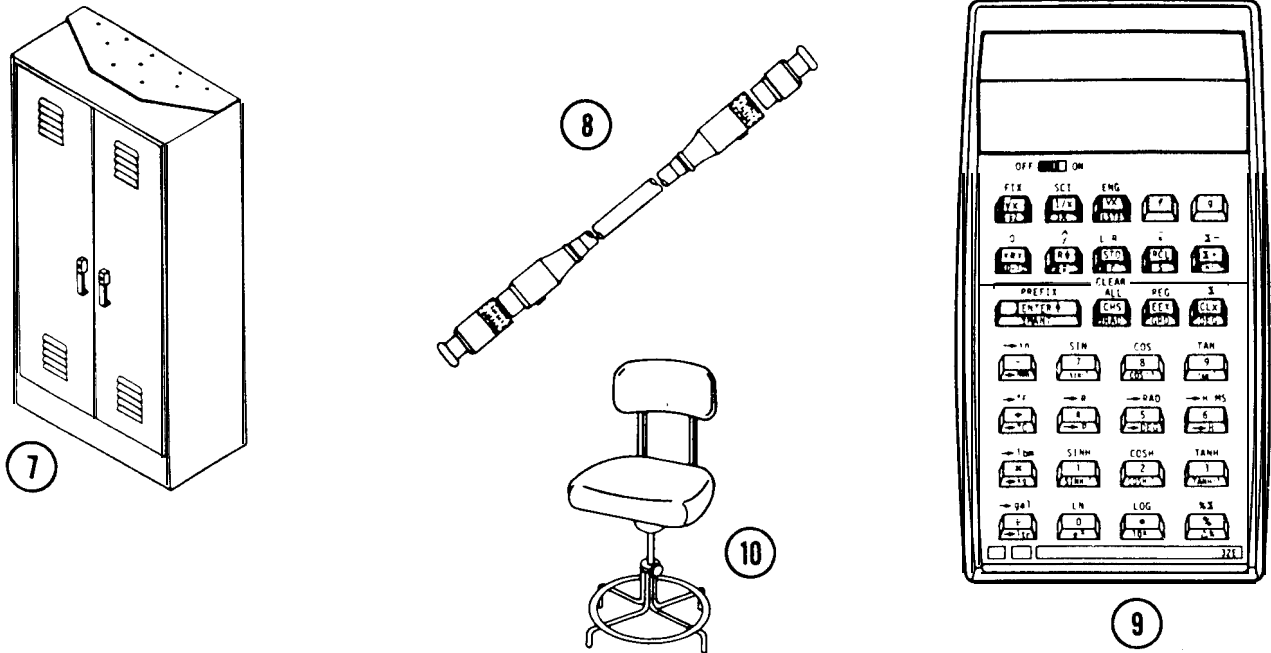
*e. Column (5): Quantity Required (Qty Rqr).* Indicates the quantity of the item authorized to be used with/on the equipment.

Section II COMPONENTS OF END ITEM



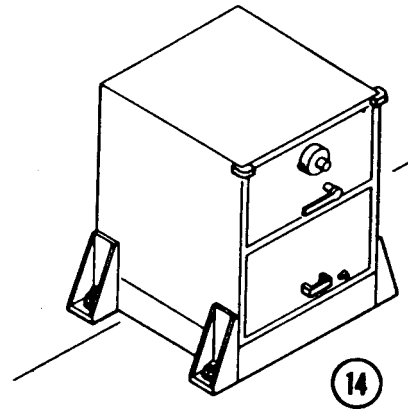
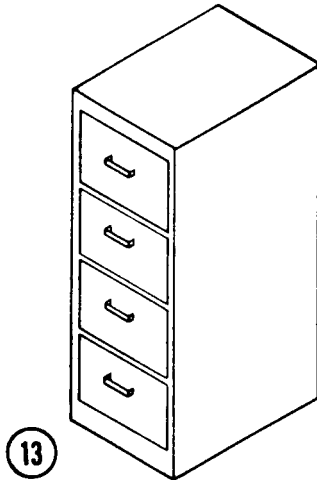
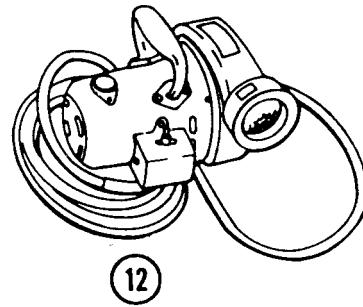
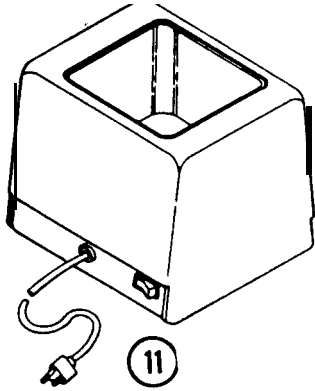
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
1	4120-00-974-7906	AIR CONDITIONER (81 349) MIL-A-52769	EA	2
1A		BASE, FILING CABINET: (8891 5) S4634	EA	1
2	6675-01-221-6008	VAN ASSEMBLY: MODIFIED (97403) 13225E3034	EA	1
3		BOX, VEHICULAR ACCESSORIES for cleaner, vacuum: (97403) 13225E3490	EA	1
4	7195-00-105-7941	BULLETIN BOARD, CORK: (8D190) T5-2303	EA	1
5	7125-00-286-5259	CABINET, STORAGE, WALL: (97403) 13225E31 50	EA	1
6		CABINET, STORAGE, TECH MANUALS: (97403) 13225E4648	EA	1

Section II COMPONENTS OF END ITEM - Cont



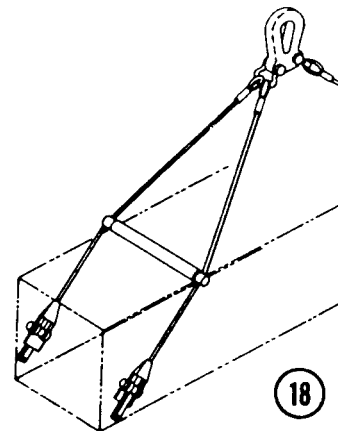
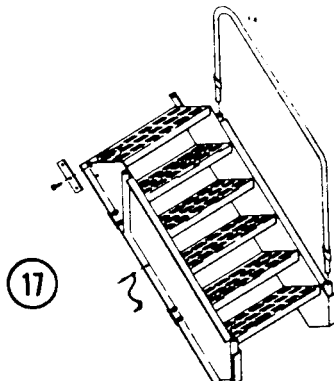
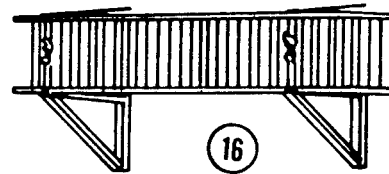
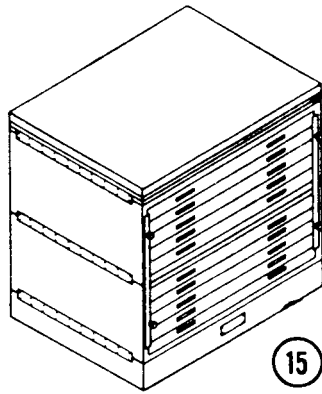
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
7		CABINET, STORAGE: SUPPLY (97403) 13225E3792	EA	
8	6150-00-134-0847	CABLE ASSEMBLY, POWER ELECTRICAL: (901 29) RC 1736-5, except 50.5 ft lg	EA	
9	7420-01-139-7441	CALCULATING MACHINE: (28480) HP-32E	EA	
10	7110-00-281-4472	CHAIR, ROTARY: (8D1 90) UC-D42-L	EA	

Section II COMPONENTS OF END ITEM - Cont



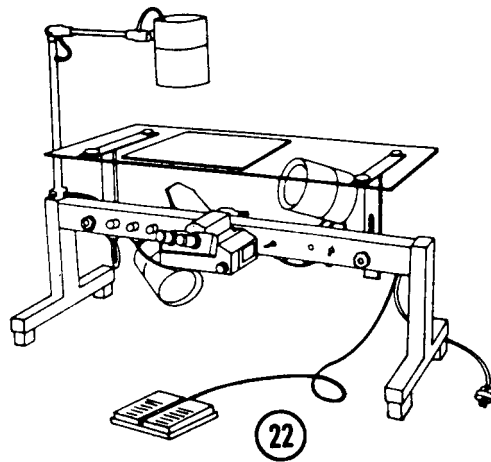
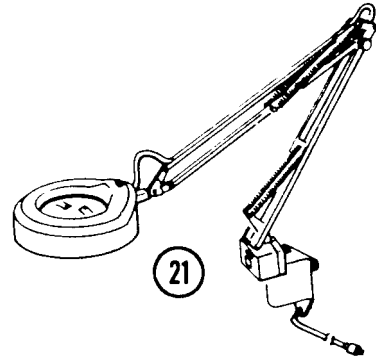
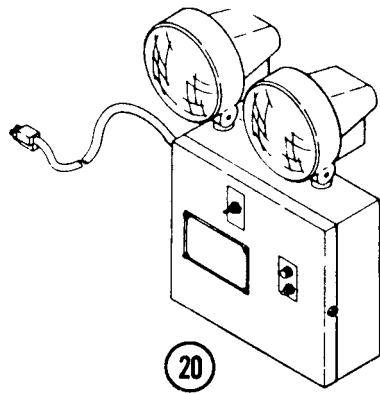
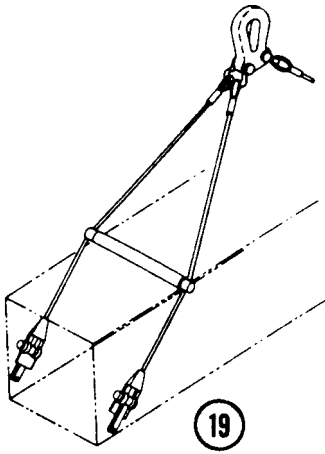
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(5) Qty Rqr
11	4940-00-195-7251	CLEANER, ULTRASONIC: (7981 9) 3069 USC3	1
12	7910-00-205-3400	CLEANER, VACUUM ELECTRIC: (51 745) MVV 3400	1
13	7125-01-210-5701	FILING CABINET: 4 drawer (97403) (13225E3710)	2
14	7110-00-920-9310	FILING CABINET: Security (41 729) AA-F-358, class 6,2 drawer leg size	1

Section II COMPONENTS OF END ITEM - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
15		FILING CABINET, MAP AND PLAN (88915) F3445	EA	2
16	5440-01-152-7751	LADDER, EXTENSION-FOLDING: (39428) 8028T16	EA	1
17	2540-01-133-9726	LADDER, VEHICLE BOARDING: (51 745) 13225E3074	EA	2
18		LIFTING AND TIEDOWN DEVICE, TRANSPORTABLE SHELTER: Left hand (52555) 1390-4	EA	2

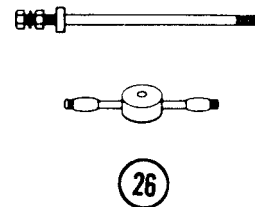
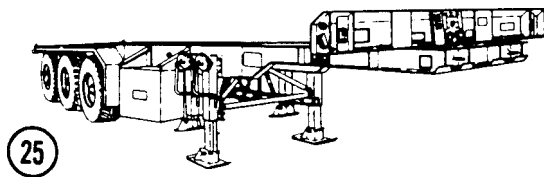
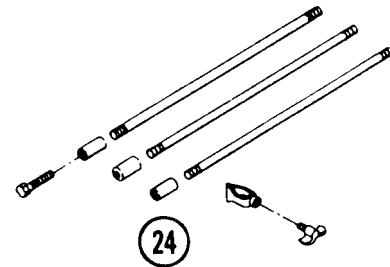
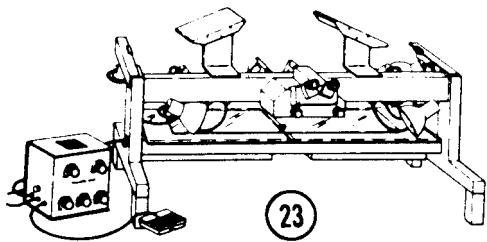
Section II COMPONENTS OF END ITEM - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
19		LIFTING AND TIEDOWN DEVICE, TRANSPORTABLE SHELTER: Right hand (52555) 1390-3	EA	2
20		LIGHT, EMERGENCY ASSEMBLY: (97403) 13225E3396	EA	1
21	6650-00-477-9613	MAGNIFIER: monocular (1 5607) KFM-1B5D	EA	5
22	6675-01-139-4526	PLOTTER, TRANSFER, HORIZONTAL INPUT STAGE (ZOOM): (06175) 53-05-04-04	EA	2

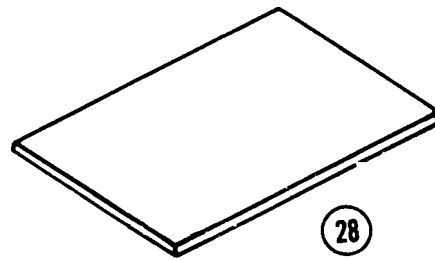
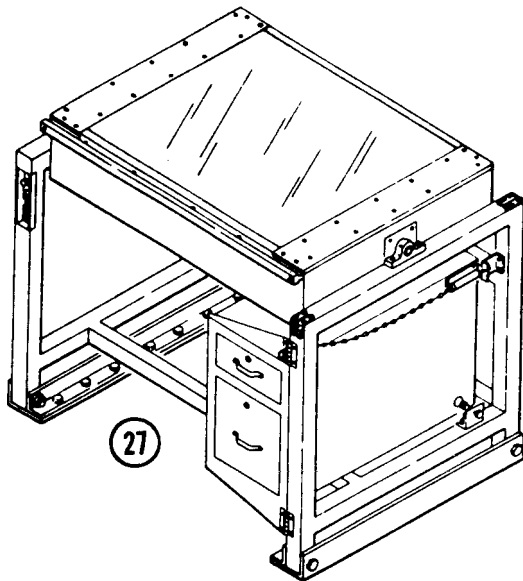


Section II COMPONENTS OF END ITEM - Cont



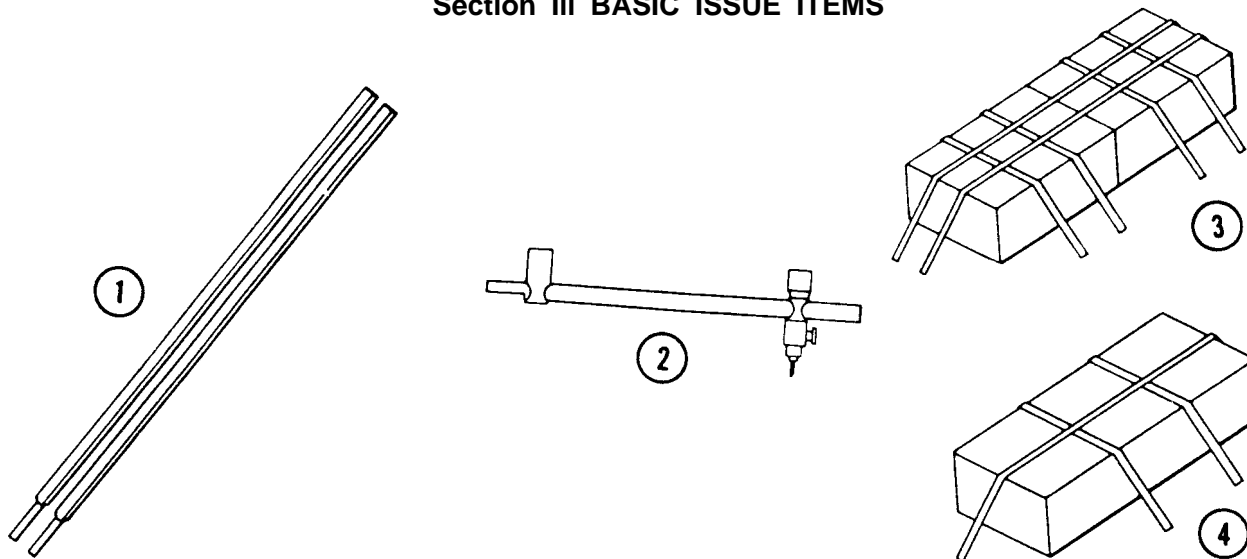
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23	6675-01-043-6139	PLOTTER, TRANSFER, STEREO (ZOOM): (061 75) 53-05-04-20	EA	1
24	5975-00-878-3971	ROD, GROUNDING: [82370) AI 04	EA	1
25	2330-01-076-4797	SEMITRAILER, FLATBED: (97403) TL/MIL-B-13207, par. 3.11, fig. 12, tables III and IV	EA	1
26	5120-01-013-1676	SLIDE HAMMER, GROUND ROD EMPLACEMENT: (45225) P74-144	EA	1

Section II COMPONENTS OF END ITEM - Cont



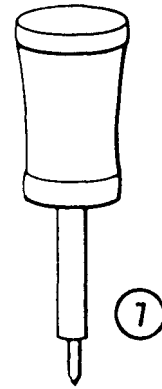
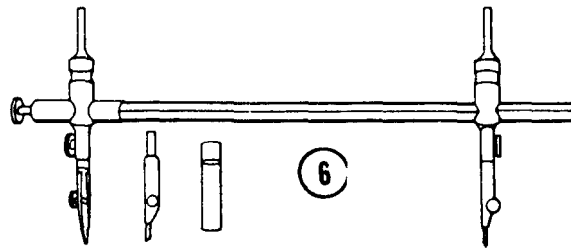
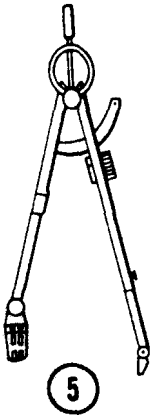
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
27	6675-01-203-1049	TABLE, SCRIBING, TRACING, DRAFTING: (33363) 99-9933	EA	5
28		TOP, FILING CABINET: (8891 5) T3445	EA	1

Section III BASIC ISSUE ITEMS



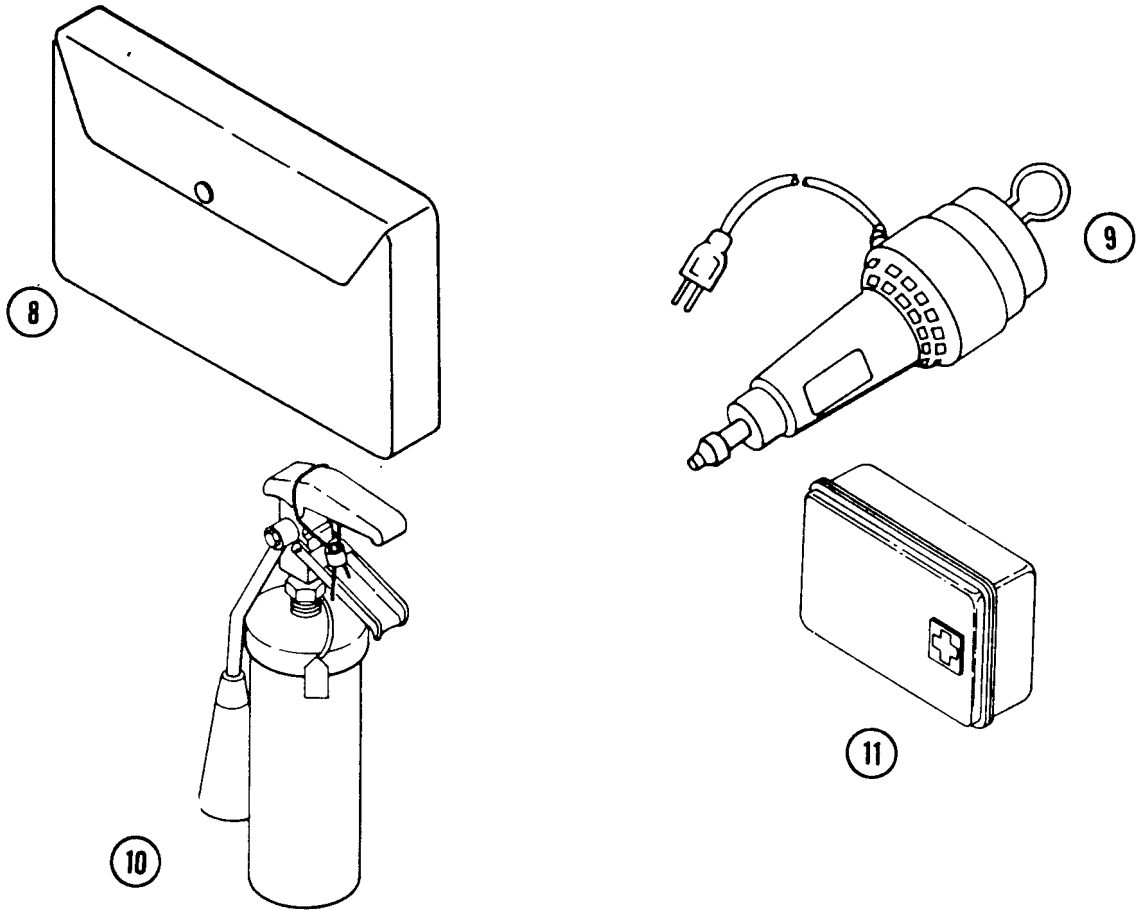
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
1	6675-01-114-7226	BAR, EXTENSION, BEAM, COMPASS: (33363) 55-1818	EA	3
2	6675-01-071-8913	BEAM, ATTACHMENT, DRAFTING COMPASS: (75364) 3175BN	EA	2
	7920-00-291-5812	BRUSH, DUSTING, DRAFTSMAN: (7981 9) Q6-38NB-010	EA	3
	7920-00-205-0565	BRUSH, LENS (1 7866) R698	EA	1
	7920-00-291-5815	BRUSH, WIRE, SCRATCH: (39428) 7187T2	EA	1
3		CASE, STORAGE AND TRANSPORT: u/w Plotter, Transfer, Horizontal Input Stage (Zoom) (30562) M91 -229	EA	2
4		CASE, STORAGE AND TRANSPORT: u/w Plotter, Transfer, Stereo (Zoom) (30562) M91 -228	EA	1

Section III BASIC ISSUE ITEMS - Cont



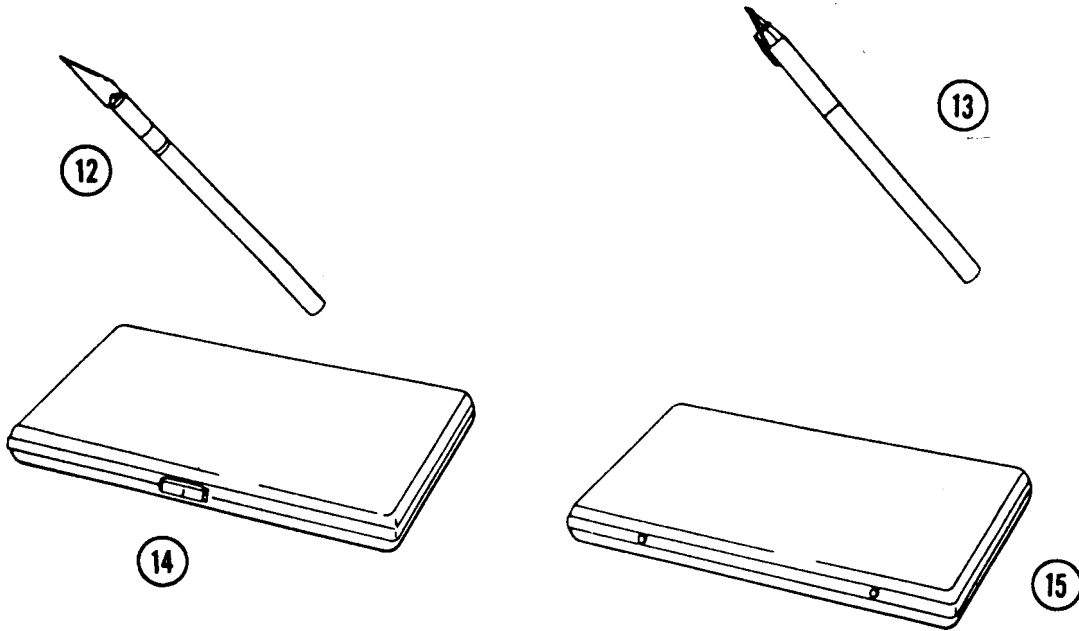
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
5	6675-00-459-8935	COMPASS, DRAFTING BEAM: (79819) 3175-N	EA	3
6	6675-00-904-1947	COMPASS, DRAFTING BEAM: (33363) 55-1806	EA	3
7	6675-01-071-8912	COMPASS, DRAFTING LEAD ATTACHMENT: (7981 9)3175LA	EA	3
		COVER, WORKING SURFACE, BOARD DRAFTING: (33363) 99-9970	EA	7
	6675-00-244-0445	CURVE, DRAFTING, IRREGULAR: French type (7981 9) 8255-F	EA	6
	6675-00-641-3512	DIVIDERS, DRAFTING, PLAIN: (33363) 55-2910	EA	2

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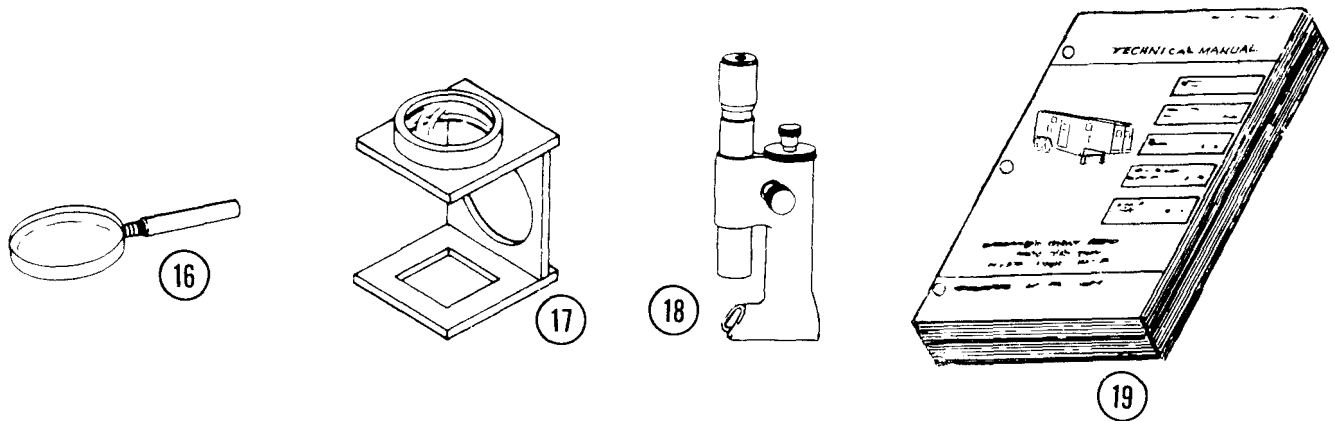
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
8	6675-00-526-7323	DRAFTING EQUIPMENT SET, SUPPLEMENTARY: SC 6675-90-CL-NO6	EA	4
9	7490-00-770-7955	ERASER, ELECTRIC: (33363) 58-0571	EA	3
10	4210-00-555-8837	EXTINGUISHER, FIRE, MONOBROMO- TRIFLUOROMETHANE: (33525) T2	EA	2
11	6545-00-922-1200	FIRST AID KIT, GENERAL PURPOSE: (89875) SC C-6545-IL VOI 2	EA	1

Section III BASIC ISSUE ITEMS - Cont



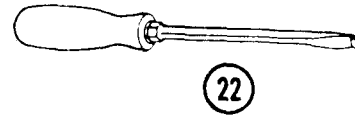
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	4930-00-965-0288	GUN, GREASE (77335) 30-171	EA	1
12	5110-00-595-8400	KNIFE, CRAFTSMAN: stencil (99941) 3001	EA	6
13	5110-00-595-8406	KNIFE, CRAFTSMAN: for frisket, masks or stencil (7981 9) Q5-3041 -2	EA	6
	7520-01-008-7640	LEAD REPOINTER, PENCIL: (7981 9) 992WB	EA	4
	7520-00-295-6170	LEAD REPOINTER, PENCIL: (79819) 234	EA	3
14	6675-01-034-3110	LETTERING SET: Rapidometric (75364) 4001JS9	SE	1
15	6675-01-034-3109	LETTERING SET: Rapidometric (75364) 3036JS5	SE	1

Section III BASIC ISSUE ITEMS - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
16	6650-00-255-8268	MAGNIFIER: monocular (79819)Q8-9518	EA	6
17	6650-00-403-0812	MAGNIFIER: monocular (7981 9) Q8-81 -33-04	EA	1
18	6650-00-299-9681	MACROSCOPE, OPTICAL: (061 75) 31-29-33-35  MANUALS, TECHNICAL	EA	1
19	TM 5-6675-317-14  TM 5-6675-317-24P	OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL, COMPLICATION SECTION  ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS), COMPILATION SECTION	EA  EA	1  1

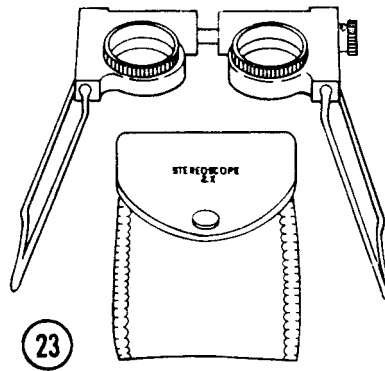
Section III BASIC ISSUE ITEMS - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
20	5340-00-682-1505	PADLOCK SET: (77765) 21313-52	SE	1
	6675-01-013-6697	NEEDLE POINT, DRAFTING INSTRUMENT: (33363) 56-0210	PG	1
21	5210-00-362-5100	RULE, STEEL, MACHINIST: (57163) CME 600	EA	1
	6675-00-641-5727	SCALE, DRAFTING: (33363) 56-3280	EA	6
	6675-00-238-3498	SCALE, DRAFTING: (79819)8230-E12	EA	6
	6675-00-641-5724	SCALE, DRAFTING: (7981 9) 8228-20	EA	6
	6675-00-580-5077	SCALE, PLOTTING: (97403) TL/MIL-S-20197	EA	1
	6675-00-283-0027	SCALE, PLOTTING: (23366) 28/YD, 10 in.	EA	6
	5120-00-234-8910	SCREWDRIVER, FLAT TIP: (78525) 1006	EA	1
	7510-00-224-7242	SHIELD, ERASING: (7981 9) 03-605	DZ	1



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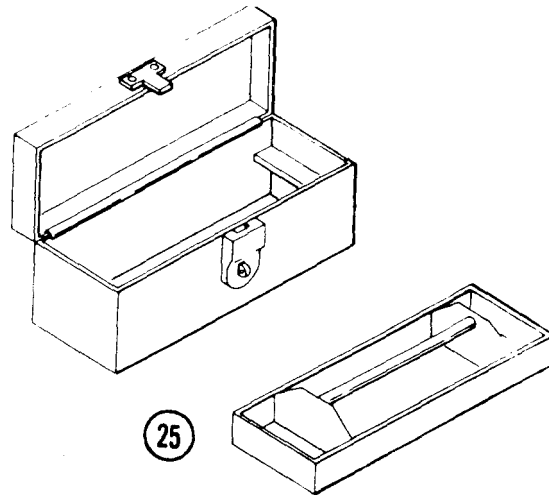
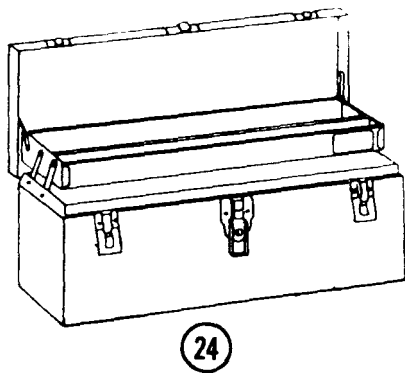


(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
23	6675-00-641-3561	STEREOSCOPE, LENS, AERIAL PHOTOGRAPH INTERPRETATION: (7D560) 51034, Abrams Model SV-1	EA	6
	6675-00-641-5752	STRAIGHTEDGE: (33363) 56-4000,30 in.	EA	2
		STRAIGHTEDGE: (33363) 56-4150	EA	1
		STRAP ASSEMBLY, BUCKLE-END: 6.0 in. (51 745) 1844-104	EA	12
		STRAP ASSEMBLY, BUCKLE-END: 9.0 in. (51 745) 1844-103	EA	2
		STRAP ASSEMBLY, TIP-END: 8.0 in. (51 745) 1845-107	EA	7
		STRAP ASSEMBLY, TIP-END: 36.0 in. (51 745) 1845-106	EA	1

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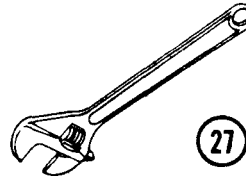
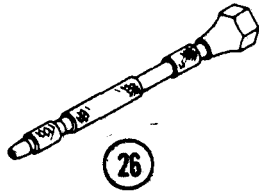
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
		STRAP ASSEMBLY, TIP-END: 40. in. (51 745) 1845-101	EA	4
		STRAP ASSEMBLY, TIP-END: 58.0 in. (51 745) 1845-105	EA	2
		STRAP ASSEMBLY, WEBBING: 30.00 in. (98313) 13225E3695-8	EA	2
		STRAP ASSEMBLY, WEBBING: 35.00 in. (82820) 13225E3695-2	EA	1
		STRAP ASSEMBLY, WEBBING: 45.00 in. (9831 3) 13225E3695-3	EA	2
		STRAP ASSEMBLY, WEBBING: 55.00 in. (98313) 13225E3695-6	EA	5
		STRAP ASSEMBLY, WEBBING: 94.00 in. (98313) 13225E3695-10	EA	5
		STRAP ASSEMBLY, WEBBING: 103.00 in. (9831 3) 13225E3695-9	EA	6
		STRAP ASSEMBLY, WEBBING: 135.00 in. (98313) 13225E3695-1 4	EA	1
		STRAP ASSEMBLY, WEBBING: 180.00 in. (98313) 13225E3695-1 2	EA	2
		STRAP ASSEMBLY, WEBBING: 29.00 in. (98313) 13225E3695-13	EA	2
	6675-00-532-8898	TEMPLATE, DRAFTING: {33363} 61-2300	EA	6

Section III BASIC ISSUE ITEMS - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
24	5140-00-331-5496	TOOL BOX, PORTABLE: 1 fixed hinged tray (75206) CS 19	EA	6
25	5140-00-315-2747	TOOL BOX, PORTABLE: 1 removable tray (75206) CS 16	EA	1
	6675-00-190-5867	TRIANGLE, DRAFTING: 130 deg, 160 deg (33363) 57-0220, size 10	EA	6
	6675-00-190-5862	TRIANGLE, DRAFTING: 245 degs (33363) 57-0292, size 8	EA	6

Section III BASIC ISSUE ITEMS - Cont



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
26	5120-00-224-7271	VISE, PIN: (18037) PVDE	EA	6
	5120-00-754-4612	WATCHMAKER'S BLOWER (64959) R8950	EA	1
27	5120-00-264-3795	WRENCH, ADJUSTABLE: (80244) GGG-W-631-TY1CL1	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 Compilation Section.

**D-2. GENERAL.**

This list identifies items that do not have to accompany the Compilation 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) National Stock Number	(2) Description  FSCM and Part Number	(3)  U/M	(4)  Qty Auth
<b>TOE AUTHORIZED ITEMS</b>			
6115-00-258-1622	Generator, 60kW, DSC Eng TM	EA	1
MIL-9-3629	Stereoscope Prism-Mirror	EA	1
5805-00-543-0012	Telephone Set: TA-312/PT	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 Compilation 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 (7) - 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 - Cont

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) UIM
1	O	8040-00-174-2610	Adhesive, Rubber	cn
2	F	8040-00-152-0063	Adhesive, Waterproof	cn
3	C	6810-00-205-6786	Alcohol, Denatured	qt
4	C	6510-01-097-3905	Ball, Absorbent Cotton	P9
5	C	7520-00-935-7136	Ball Point Pen: black	dz
6	C	7520-00-281-5911	Basket, Wastepaper	ea
7	C	5110-00-359-6478	Blade, Craftsman Knife: Beveled	P9
8	C	5110-00-542-2043	Blade, Craftsman Knife: Curved	P9
9	C	5110-00-542-2044	Blade, Craftsman Knife: Square	P9
10	C	5110-00-765-4144	Blade, Craftsman Knife: Stencil	P9
11	C	5110-00-355-6138	Blade, Craftsman Knife: Swivel	ea
12	C	8330-00-965-1722	Chamois Leather, Sheepskin	ea
13	C	6850-00-592-3283	Cleaner, Lens	bk
14	C	6850-01-007-8073	Cleaning Concentrate	bt
15	C	7510-00-161-4291	Clip, Paper	bx
16	C	8305-00-222-2423	Cloth, Cheesecloth	yd
17	C	6515-00-303-8250	Cotton Swabs	bg
18	C	7930-00-530-8067	Detergent, General Purpose	gl
19	C	7520-00-285-1772	Dispenser, Pressure Sensitive Adhesive Tape:	ea
20	C	7510-01-034-1278	Eraser, Film	bx
21	C	7510-01-035-1317	Eraser, Kit	kt
22	C	7510-00-634-3513	Eraser, Rubber: soft matl	gr
23	C	7510-00-264-3672	Eraser, Rubber: gritty matl	gr



## Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST-Cont

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
24	F	5610-00-618-0258	Floor Patch	gl
25	O	9150-00-190-0904	Grease, GAA	lb
26	C	7510-01-035-8133	Ink, Drawing: Blue	bt
27	C	7510-01-035-8131	Ink, Drawing: Brown	bt
28	C	7510-01-039-5075	Ink, Drawing: Carmine Red	bt
29	C	7510-01-028-2877	Ink, Drawing: for drafting film	bt
30	C	7510-01-035-8132	Ink, Drawing: Green	bt
31	C	7510-01-036-3726	Ink, Drawing: Orange	bt
32	C	7510-01-070-8947	Ink, Drawing: for paper	bt
33	C	7510-01-080-1481	Ink, Drawing: Red	bt
34	C	7510-01-036-3725	Ink, Drawing: Violet	bt
35	C	7510-01-035-8130	Ink, Drawing, Yellow	bt
36	C	7510-00-281-2143	Lead, Pencil, Graphite Artist's and drafting; HB	bx
37	C	7510-00-285-5865	Lead, Pencil, Graphite Artist's and drafting; F	bx
38	C	7510-00-285-5866	Lead, Pencil, Graphite Artist's and drafting; H	bx
39	C	7510-00-285-5863	Lead, Pencil, Graphite Artist's and drafting; 2H	bx
40	C	7510-00-272-9820	Lead, Pencil, Graphite Artist's and drafting; 3H	bx
41	C	7510-00-285-5864	Lead, Pencil, Graphite Artist's and drafting; 4H	bx
42	C	7510-00-285-5862	Lead, Pencil, Graphite Writing HB	pg
43	C	7510-00-285-5847	Lead, Pencil, Graphite Writing 2H	pg

Section II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST - Cont

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
44	F	9150-00-273-2389	Oil, Lubricating, General Purpose	cn
45	C	6750-00-264-6764	Opaque Photographic Film-Plate Retouching	jr
46	C	7530-00-285-3083	Pad, Writing Paper	pg
47	O	8010-00-298-3859	Paint, Light Green, INT.	gl
48	O	8010-01-131-6254	Paint, Black	kt
49	O	8010-01-160-6754	Paint, Brown	kt
50	O	8010-01-162-5578	Paint, Green	kt
51	C	7530-00-466-4196	Paperboard, Drawing	pg
52	C	5350-00-619-9166	Paper, Abrasive	pk
53	C	6640-00-559-1384	Paper, Lens	pg
54	C		Paper, Tracing (33363) 11-3155	pg
55	C	7510-00-286-6985	Paperweight	ea
56	C	7510-00-237-7991	Pen Cleaner, Liquid	jr
57	C	7520-00-161-5664	Pencil, Mechanical: automatic	ea
58	C	7520-01-083-6734	Pencil, Mechanical: non-automatic	ea
59	C	7510-01-030-7427	Pen Point Assortment and Penholder	se
60	C		Plastic Sheet (33363) 44-1037, 24 x 30 in.	pg
61	C	9330-00-606-5462	Plastic Sheet (33363) 44-1057, 24 x 30 in.	pg
62	C		Plastic Sheet (33363) 44-3155, 24 x 30 in.	sh
63	O	8010-01-193-0520	Primer	kt
64	C	7510-00-543-6792	Refill, Ball Point Pen	dz
65	F	8010-01-030-7254	Resin, Epoxy	kt

**Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST - Cont**

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
66	C	7510-00-255-4560	Rubber Band Assortment	bx
67	O		Screen, Nylon (39428) 1017A31	ro
68	O	8040-00-851-0211	Sealant, Silicone	tu
69	C	7520-00-162-6178	Sharpener, Pencil	ea
70	C	5110-00-161-6912	Shears, Straight Trimmers	ea
71	O	3439-00-273-3722	Solder, Rosin Core	sl
72	O	6850-00-274-5421	Solvent, P-D-680	cn
73	C	6850-00-880-1013	Spray, Silicone	cn
74	O		Sprayfoam Sealant (39428) 7627T1	cn
75	C	7520-00-281-5895	Stapler, Paper Fastening, Office: grey	ea
76	C	7510-0-272-9662	Staples, Paper Fastening, Office Type	bx
77	C	5345-00-265-3126	Stone, Sharpening	ea
78	O	5640-00-103-2254	Tape, Cloth, Duct Sealing, 2 in.	ro
79	C	5970-00-926-7218	Tape, Insulating, Electrical	ro
80	C	7510-00-634-1549	Tape, Pressure Sensitive Adhesive: 1.0 in.	ro
81	C	7510-00-551-9824	Tape, Pressure Sensitive Adhesive	ro
82	C	7510-00-285-6403	Tape, Pressure Sensitive Adhesive 0.5 in. w, red	ro
83	C	7510-00-198-5831	Tape, Pressure Sensitive Adhesive	ro
84	C	7510-00-272-6887	Thumbtack	hd
85	C	6640-00-597-6745	Tissue, Lens Cleaning	bk
86	C	7920-00-823-9772	Towel, Paper	mx



GLOSSARY

ABBREVIATION/TERM	DEFINITION
Conic Projection . . . . .	Projection of surface where apparent distances between points decrease away from center.
Conjugate Image Separation . . . . .	Distance between identical points on separate stereo-pair photographs when photographs are alined for viewing with stereoscope.
Interpupillary Distance . . . . .	Distance between centers of operator's eyes.
Monoscopic . . . . .	Two-dimensional or flat view.
Orthographic Projection . . . . .	Projection of surface where all points have correct distances from each other.
Rectification . . . . .	Correction of photographs not taken perpendicular to earth.
Stereo-Pair Photographs . . . . .	Two photographs of same object taken from different positions.
Stereoscope. . . . .	Optical device used to view stereo-pair photographs.
Stereoscopic . . . . .	Apparent three-dimensional image obtained when stereo-pair photographs are viewed.



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**By Order of the Secretary of the Army:**

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COA, 3d ENGINEER BN  
FT. LEONARDWOOD, MA 63108

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TM 5-6675-317-14

PUBLICATION DATE  
4 Apr 85

PUBLICATION TITLE TOPOGRAPHIC SUPPORT  
MODEL ADC-TSS-5

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

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

In line 6 of paragraph 2-1 a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please Correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2 910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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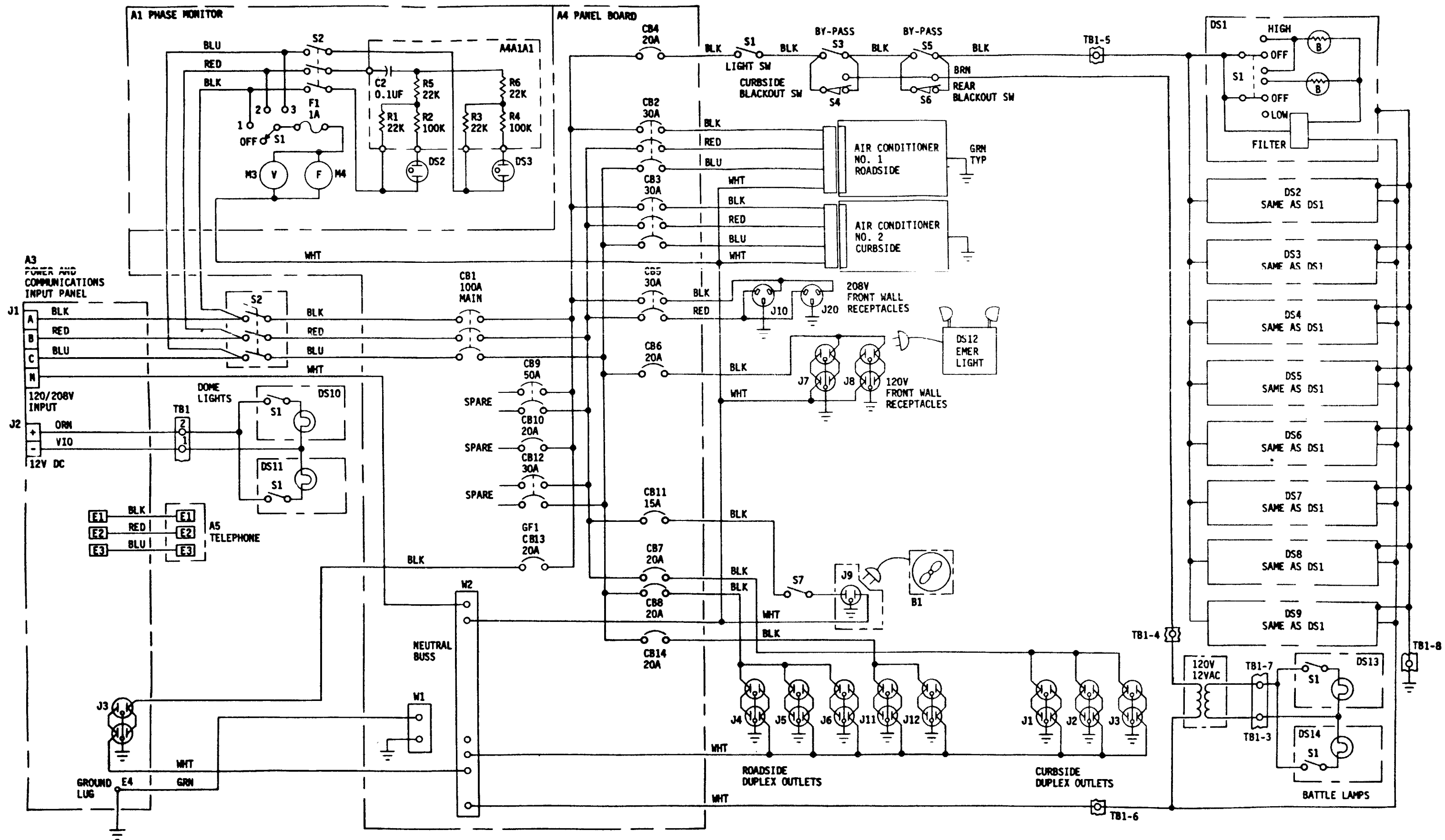
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## The Metric System and Equivalents

### Linear Measure

centimeter = 10 millimeters = .39 inch  
 decimeter = 10 centimeters = 3.94 inches  
 meter = 10 decimeters = 39.37 inches  
 dekameter = 10 meters = 32.8 feet  
 hectometer = 10 dekameters = 328.08 feet  
 kilometer = 10 hectometers = 3,280.8 feet

### Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .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  
 deciliter = 10 centiliters = 3.38 fl. ounces  
 liter = 10 deciliters = 33.81 fl. ounces  
 dekaliter = 10 liters = 2.64 gallons  
 hectoliter = 10 dekaliters = 26.42 gallons  
 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
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