

TECHNICAL MANUAL

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

**TOPOGRAPHIC SUPPORT SYSTEM
MAINTENANCE SECTION
MODEL ADC-TSS-7
NSN :6675-01-105-5757**

THIS MANUAL SUPERSEDES TM 5-6675-328-14 DATED 7 JUNE 1983

**HEADQUARTERS, DEPARTMENT OF THE ARMY
17 MAY 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 test or repair equipment 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.

For Artificial Respiration refer to FM 21-11.

WARNING

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

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

WARNING

Grinding and drilling operations may result in BLINDNESS if eye protection is not worn.

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

WARNING

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

Change

No. 4

**Operator's, Unit, Direct Support and General Support
Maintenance Manual
Topographic Support System
Maintenance Section, Model ADC-TSS-7
(NSN 6675-01-105-5757) (EIC: YTS)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. We'd prefer that you submit your recommended changes electronically, either by e-mail (AMSEL-LC-LEO-PUBS-CHG@mail1.monmouth.army.mil) or online (<http://edm.monmouth.army.mil/pubs/2028.html>). Alternatively, you may mail or fax your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-ED, Fort Monmouth, NJ 07703-5006. The fax number is 732-532-3421, DSN 992-3421.

In any case, we will send you a reply.

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TM 5-6675-328-14, dated 17 May 1985, is changed as follows:

1. Title of manual is changed as shown above.
2. Appendix B., Maintenance Allocation Chart, has been revised to implement Army Maintenance Transformation and changes the Maintenance Allocation Chart (MAC) to support Field and Sustainment Maintenance. Because the entire Appendix is revised, no change bars/hands are used.

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Operator's, Organizational, Direct Support and
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**TOPOGRAPHIC SUPPORT SYSTEM
MAINTENANCE SECTION
MODEL ADC-TSS-7
NSN 6675-01-105-5757**

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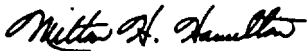
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TOPOGRAPHIC SUPPORT SYSTEM
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TOPOGRAPHIC SUPPORT SYSTEM
MAINTENANCE SECTION
MODEL ADC-TSS-7
NSN: 6675-01-105-5757

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iii/iv
1-13 and 1-14
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1-99 and 1-100
2-51 and 2-52
2-73 and 2-74
4-19 and 4-20
9-7 and 9-8
B-5 through B-11/B-12
C-1 through C-45/C-46
D-1/D-2
E-1 through E-3/E-4

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iii/iv
1-13 and 1-14
1-55 and 1-56
1-61 through 1-64
1-71 and 1-72
1-95 and 1-96
1-99 and 1-100
2-51 and 2-52
2-73 and 2-74
4-19 and 4-20
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LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES

Dates of issue for original is:

Original 17 May 1985
 Change 1 2 September 1986
 Change 2 14 April 1988
 Change 3 18 May 1992
Change 4 1 September 2005

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 486 CONSISTING OF THE FOLLOWING:

Page	*Change No.	Page	*Change No.
Cover	0	7-0 through 7-25	0
a and b	4	8-0 and 8-1	0
i	2	9-0 through 9-7	0
ii	0	9-8	1
iii	0	9-9 through 9-24	0
1-0 through 1-12	0	10-0 through 10-32	0
1-13	1	A-1 through A-9/(A-10 Blank)	0
1-14 through 1-18	0	B-1 through B-9/(B-10 Blank)	4
1-19	2	C-1	1
1-20 through 1-55	0	C-2	3
1-56	1	C-3 through C-26	1
1-57 through 1-61	0	C-27	3
1-62	1	C-28 through C-35/(C-36 Blank)	1
1-63	0	D-1/(D-2 Blank)	1
1-64	1	E-1 through E-5/(E-6 Blank)	1
1-65 through 1-71	0	Glossary-1 and Glossary-2	0
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1-73 through 1-95	0	FP-1/(FP-2 Blank)	0
1-96	1		
1-97 through 1-99	0		
1-100	1		
1-101 through 1-105	0		
2-0 through 2-50	0		
2-51	1		
2-52 through 2-72	0		
2-73	1		
2-74 and 2-75	0		
3-0 through 3-21	0		
4-0 through 4-19	0		
4-20	1		
5-1 through 5-38	0		
6-0 through 6-11	0		

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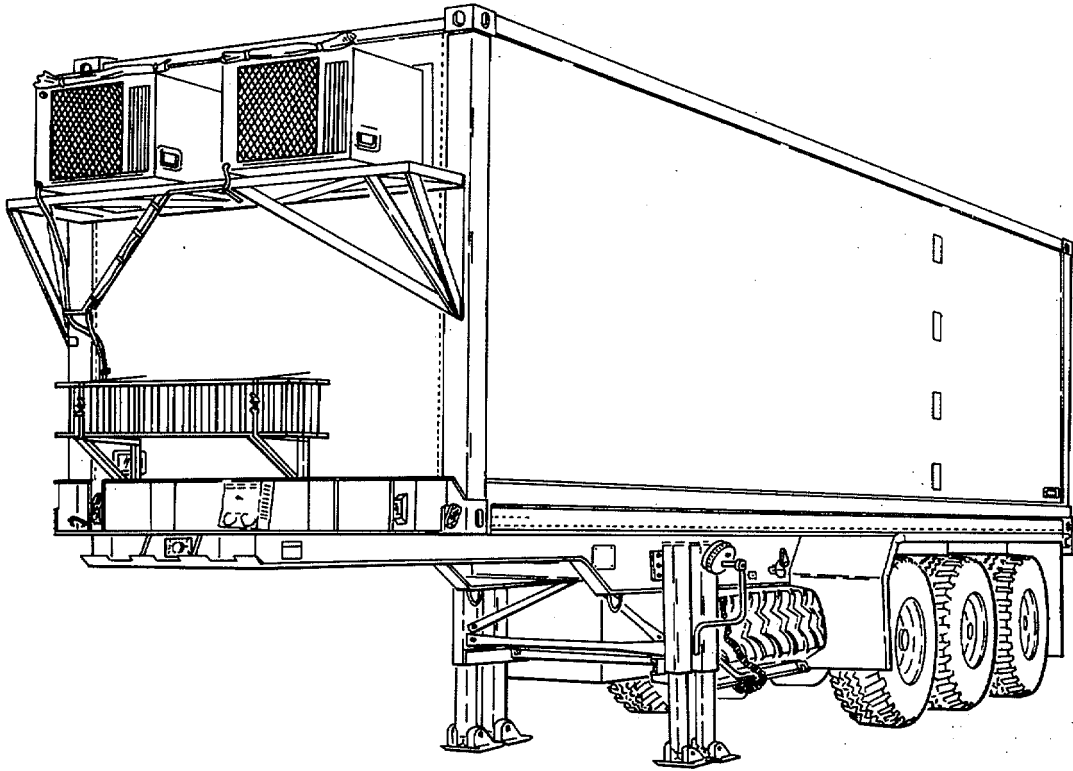
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		<u>Page</u>
CHAPTER 1.	MAINTENANCE SECTION	1-1
Section I	Introduction.....	1-1
Section II	Operating Instructions.....	1-11
Section III	Operator Maintenance	1-44
Section IV	Organizational Maintenance.....	1-53
Section V	Direct/General Support Maintenance	1-88
CHAPTER 2.	SHORT-RANGE OPTICAL CALIBRATOR	2-1
Section I	Introduction.....	2-1
Section II	Operating Instructions.....	2-11
Section III	Operator Maintenance	2-57
Section IV	Organizational Maintenance.....	2-63
Section V	Direct/General Support Maintenance	2-64
CHAPTER 3.	DRILL PRESS	3-1
Section I	Introduction.....	3-1
Section II	Operating Instructions.....	3-3
Section III	Operator Maintenance	3-10
Section IV	Organizational Maintenance.....	3-11
Section V	Direct/General Support Maintenance	3-21

CHAPTER 4.	GRINDER AND DUST CONTROL ASSEMBLY	4-1
Section I	Introduction.....	4-1
Section II	Operating Instructions.....	4-3
Section III	Operator Maintenance	4-12
Section IV	Organizational Maintenance.....	4-15
Section V	Direct/General Support Maintenance	4-20
CHAPTER 5.	INSTRUMENT LATHE	5-1
Section I	Introduction	5-1
Section II	Operating Instructions	5-6
Section III	Operator Maintenance	5-17
Section IV	Organizational Maintenance.....	5-19
Section V	Direct/General Support Maintenance	5-38
CHAPTER 6.	OPTICAL BENCH	6-1
Section I	Introduction.....	6-1
Section II	Operating Instructions.....	6-2
Section III	Operator Maintenance	6-11
Section IV	Organizational Maintenance	6-11
Section V	Direct/General Support Maintenance	6-11
CHAPTER 7.	BATTERY CHARGER	7-1
Section I	Introduction	7-1
Section II	Operating Instructions.....	7-4
Section III	Operator Maintenance	7-11
Section IV	Organizational Maintenance.....	7-12
Section V	Direct/General Support Maintenance	7-16
CHAPTER 8.	THEODOLITE	8-1
Section I	Introduction.....	8-1
CHAPTER 9.	FURNITURE AND CABINETS.....	9-1
Section I	Introduction.....	9-1
Section II	Operating Instructions.....	9-4
Section III	Operator Maintenance	9-6
Section IV	Organizational Maintenance.....	9-6
Section V	Direct/General Support Maintenance	9-24
CHAPTER 10.	SUPPORT ITEMS	10-1
Section I	Introduction.....	10-1
Section II	Operating Instructions.....	10-3
Section III	Operator Maintenance	10-23
Section IV	Organizational Maintenance.....	10-32
Section V	Direct/General Support Maintenance	10-32

APPENDIX A	REFERENCES	A-1
APPENDIX B	MAINTENANCE ALLOCATION CHART	B-1
APPENDIX C	COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS	C-1
APPENDIX D	ADDITIONAL AUTHORIZATION LIST	D-1
APPENDIX E	EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.....	E-1
GLOSSARY	GLOSSARY-1
INDEX	INDEX-1



CHAPTER 1

MAINTENANCE SECTION

SECTION I INTRODUCTION

1-1. GENERAL INFORMATION

1-1.1 Scope. This manual contains operating and maintenance instructions for the Maintenance Section, Topographic Support System (TSS). The purpose of the Maintenance Section is to repair Survey, Cartographic, and Reproduction equipment assigned to the Topographic Support System. The trailer chassis is covered in TM 5-2330-305-14, Operator, Organizational, Direct Support and General Support Maintenance Manual, Topographic Support System, Chassis, Semitrailer, ISO Container Transporter. Repair parts and special tools are listed in TM 5-6675-328-24P, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List, Maintenance Section, Topographic Support System. Lubrication instructions are contained in LO 5-6675-328-12, Lubrication Order, Maintenance Section, Topographic Support System. All authorized components 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 repair of Survey, Cartographic, and Reproduction equipment assigned to the Topographic Support System.

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 Maintenance 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 63120-1798. We will send you a reply.

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

1-1.6 Preparation for Storage or Shipment.

- a. Perform your preparation for movement procedures.
- b. For administrative storage of equipment, refer to TM 740-90-1.
- c. The chapters of this manual describe special shipping instructions for major components located in this section.

- d. In the event individual items of equipment must be removed from the section for repair or replacement, contact your battalion for packing and shipping instructions.

1-2. EQUIPMENT DESCRIPTION

1-2.1 Equipment Characteristics, Capabilities, and Features.

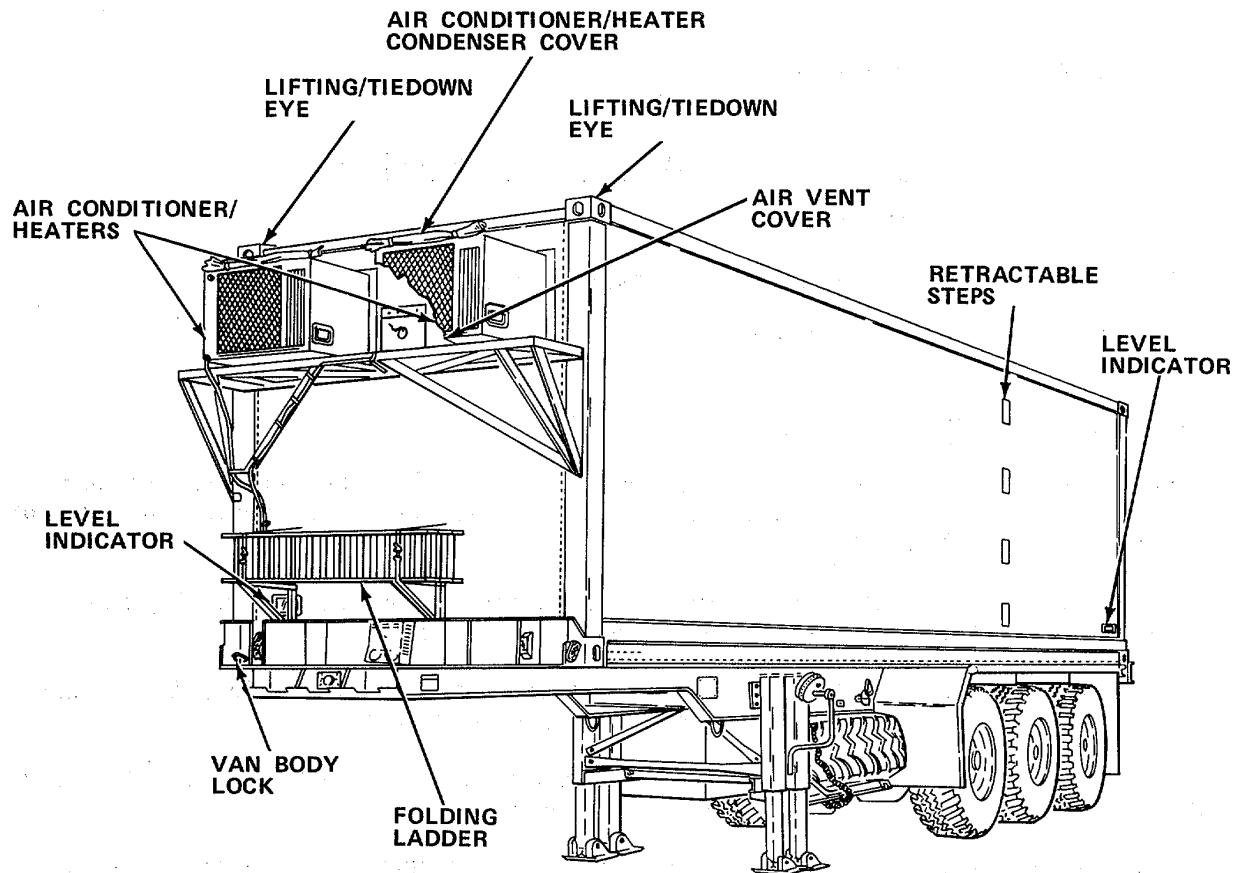
- a. Air and sea transportable.
- b. Transportable cross-country capability when mounted on chassis.
- c. Controlled internal environment.

1-2.2 Special Considerations.

- a. Site must permit section to be leveled within $\pm 2^\circ$, be well drained, and provide adequate overhead concealment. Wooded areas and other obstacles must not impede movement of transporters.
- b. Dispersal of topographic sections is limited to the length of electric power transmission cable available for unit generators.
- c. During site selection, avoid overhead power transmission lines to prevent danger from electric shock or electromagnetic interference.
- d. Power is normally supplied by 60 kW generators. Commercial electric power should be used if it is compatible and available.
- e. Cross-country capability of sections and transporters is limited. Relocation should be accomplished over hard-surfaced, all-weather roads whenever possible.

1-2.3 Location and Description of Major Components.

a. Roadside Exterior.



VAN BODY LOCK. Locks van body to trailer chassis.

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

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

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

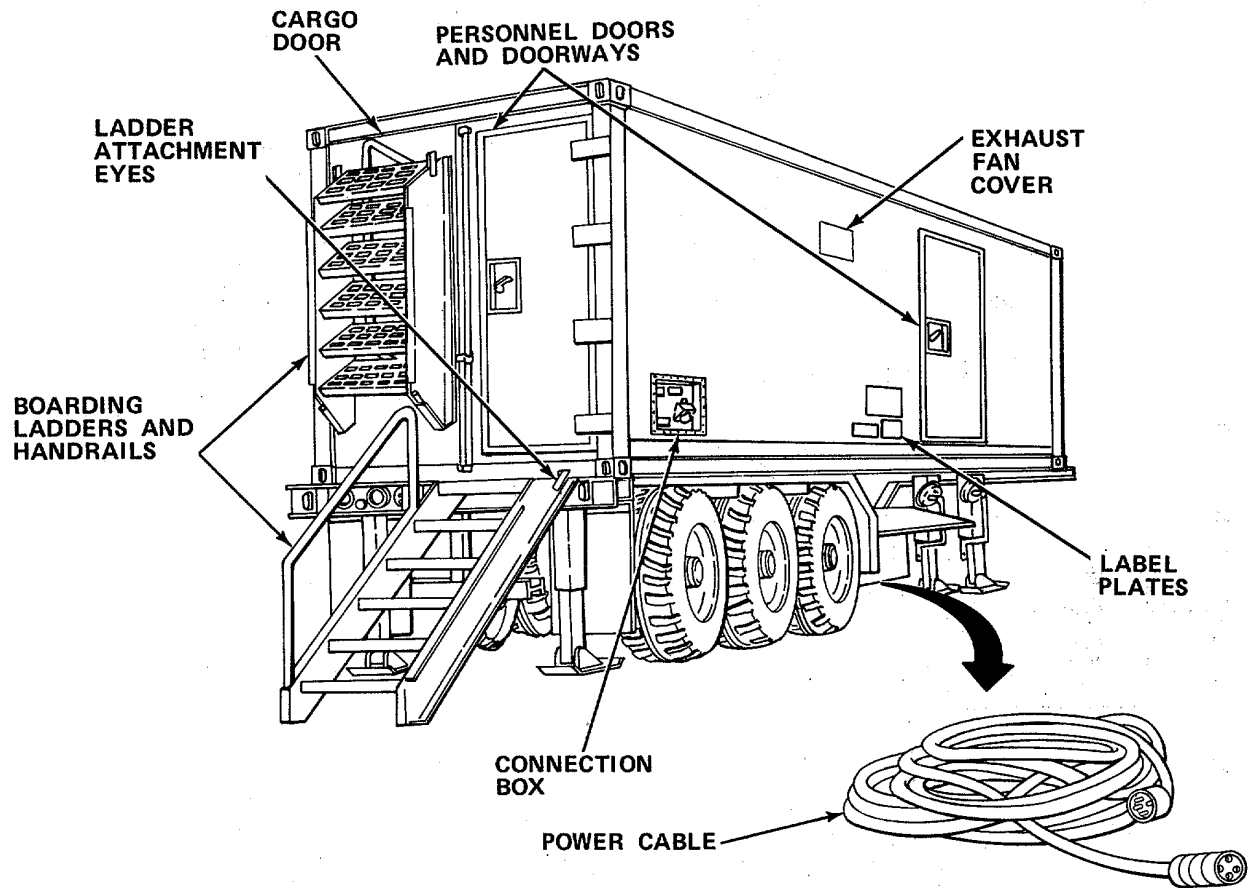
AIR VENT COVER. Covers air vent opening.

RETRACTABLE STEPS. Provide access to roof.

LEVEL INDICATORS. Indicate van body inclination.

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

b. Curbside Exterior.



CARGO DOOR. Access for equipment removal/installation.

PERSONNEL DOORS. Doors are 35.75 in. (90.8 cm) wide by 86.0 in. (218.4 cm) high.

PERSONNEL DOORWAYS. Doorways are 30.75 in. (78.1 cm) wide by 78.5 in. (199.4 cm) high.

BOARDING LADDERS AND HANDRAILS. Provide access to van body.

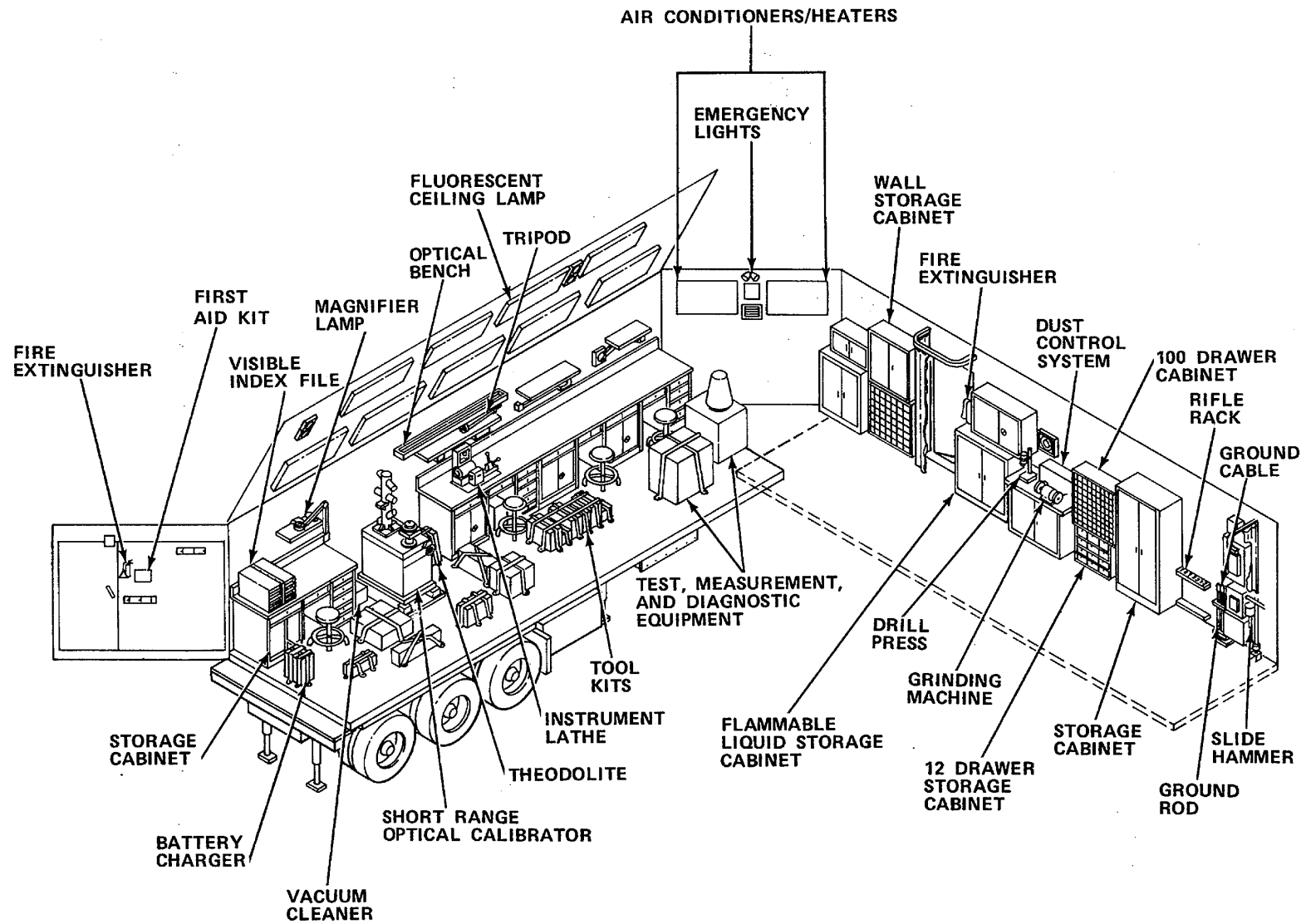
EXHAUST FAN COVER. Covers exhaust fan opening.

LADDER ATTACHMENT EYES. Attachment points for boarding ladder.

LABEL PLATES. Provides weight, dimensions, and center of gravity 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.



FIRE EXTINGUISHER. Dry-chemical fire extinguisher.

FIRST AID KIT. Limited first aid supplies.

VISIBLE INDEX FILE. Rapid access index file.

MAGNIFIER LAMP. Provides illumination and magnification for light table work station.

OPTICAL BENCH. Distance measuring equipment alignment device.

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

TRIPOD. Surveyor's.

AIR CONDITIONERS/HEATERS. Internal environmental control.

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

WALL STORAGE CABINET. Storage.

DUST CONTROL SYSTEM. Used with grinder.

100-DRAWER CABINET. Storage for small parts.

RIFLE RACK. Weapon storage.

SLIDE HAMMER. Installation and removal of grounding rod.

GROUND ROD. Electrical ground for van body.

GROUND CABLE. Used with ground rod.

STORAGE CABINET. Storage.

12-DRAWER STORAGE CABINET. Parts storage.

GRINDING MACHINE. Grinding/Polishing, motor-driven tool.

DRILL PRESS. Power-driven drill press.

FLAMMABLE LIQUID STORAGE CABINET. Storage of flammable liquids.

TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT.

TOOL KITS.

INSTRUMENT LATHE. Precision lathe for equipment repair.

THEODOLITE. Optical standard.

SHORT-RANGE OPTICAL CALIBRATOR. Calibration/Collimation device for optical surveying equipment.

VACUUM CLEANER. Cleaning equipment.

BATTERY CHARGER. Charging storage batteries.

STORAGE CABINET. Storage.

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

Dimensions

Length 33.66 ft (10.26 m)

Width 8 ft (2.44 m)

Height 8 ft (2.44 m)

Cubage 2154 cu ft (61.0 cu m)

Connections

Telephones One telephone (three-post) connection

Power 16.8 KW. One 120/208 V, three-phase, four-wire connection, and one 12 V dc tractor to container connector.

Ground Ground lug

Air Conditioner/Heater (Two Units)

Cooling 18,000 Btu/hr (5274W) each

Heating 14,300 Btu/hr (4190W) (Max) each

Power Requirements 208 V, 60 Hz, three-phase

Exhaust Fan 289 ft³/min (8.18 m³/min)

Air Vent 289 ft³/min (8.18 m³/min)

Weight

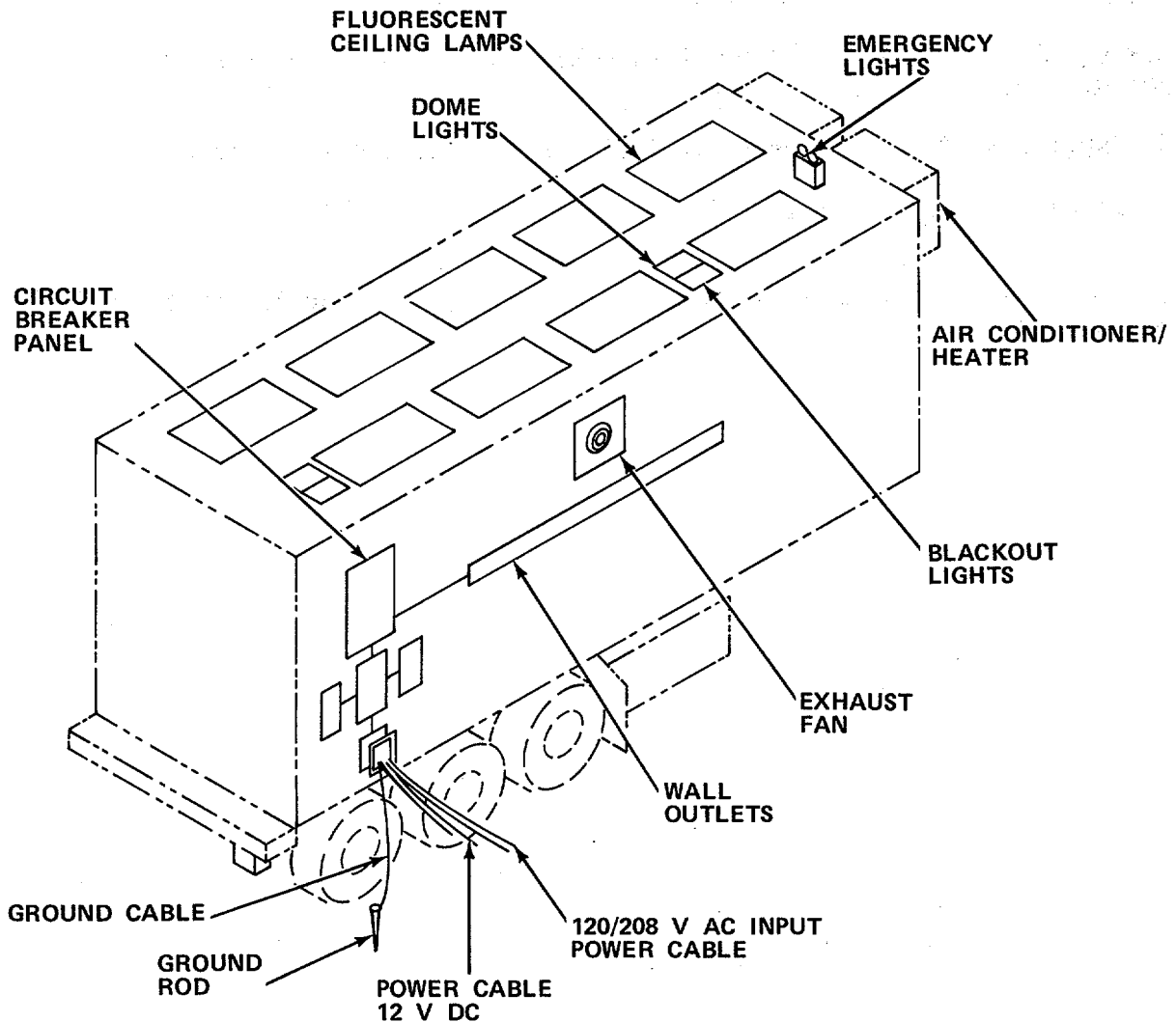
Gross (Container and Chassis) 26,635 lb (12,081.69 kg)

Tare (Container Only) 15,195 lb (6892.5 kg)

1-3. TECHNICAL PRINCIPLES OF OPERATION.

1-3.1 General. The operation of individual equipment is explained in the appropriate chapter for that equipment.

1-3.2 Electrical System.



GROUND ROD. Used to ground section.

GROUND CABLE. Used with ground rod.

CIRCUIT BREAKER PANEL. Contains voltage indicator, phase monitor, and 17 circuit breakers.

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

EXHAUST FAN. Plug-in fan. Separately fused.

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

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

EMERGENCY LIGHTS. Battery-powered. Activated by power loss.

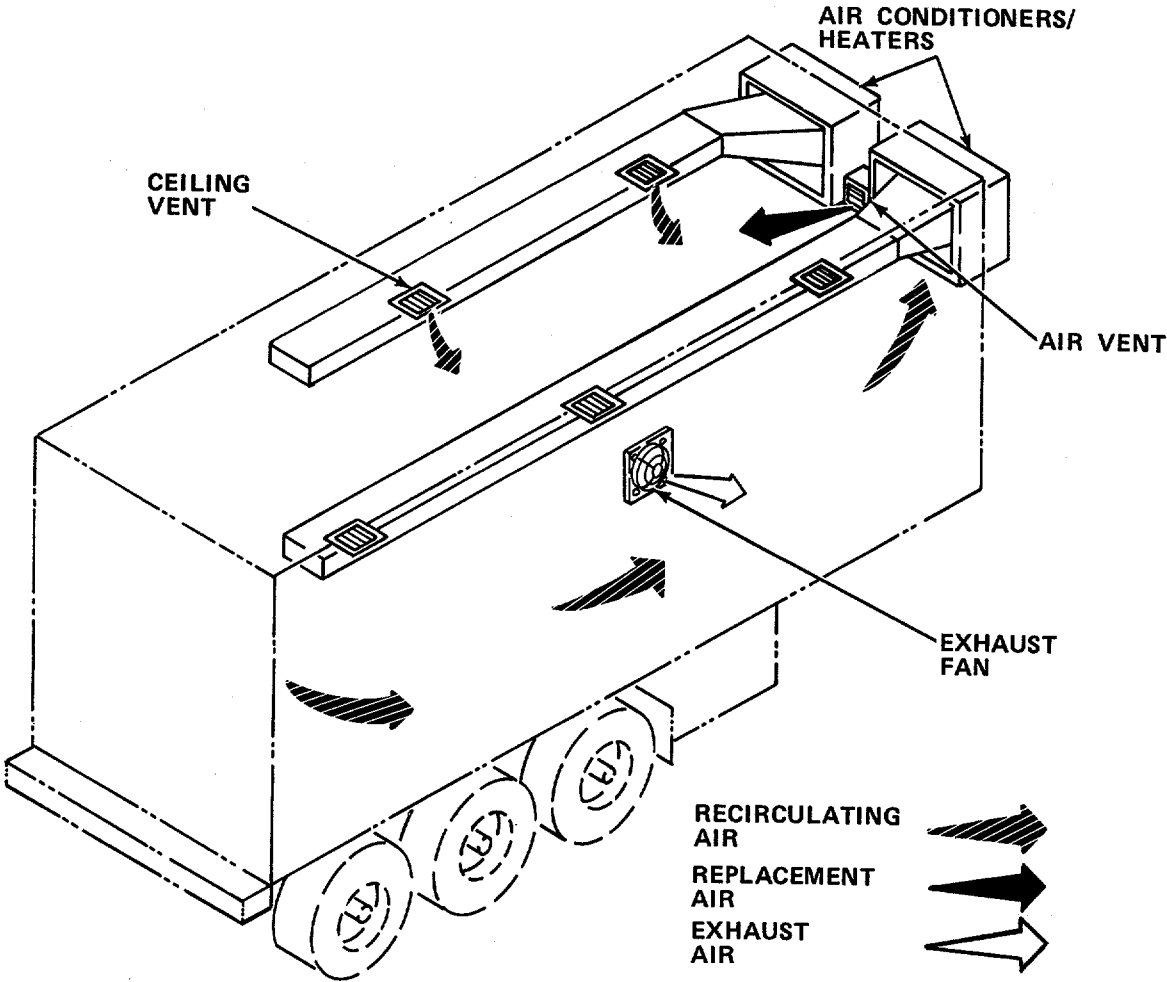
AIR CONDITIONER/HEATER. Air conditioner/heater powered by three-phase, 208 V, 30 amp current.

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

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

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

1-3.4 Ventilation System.



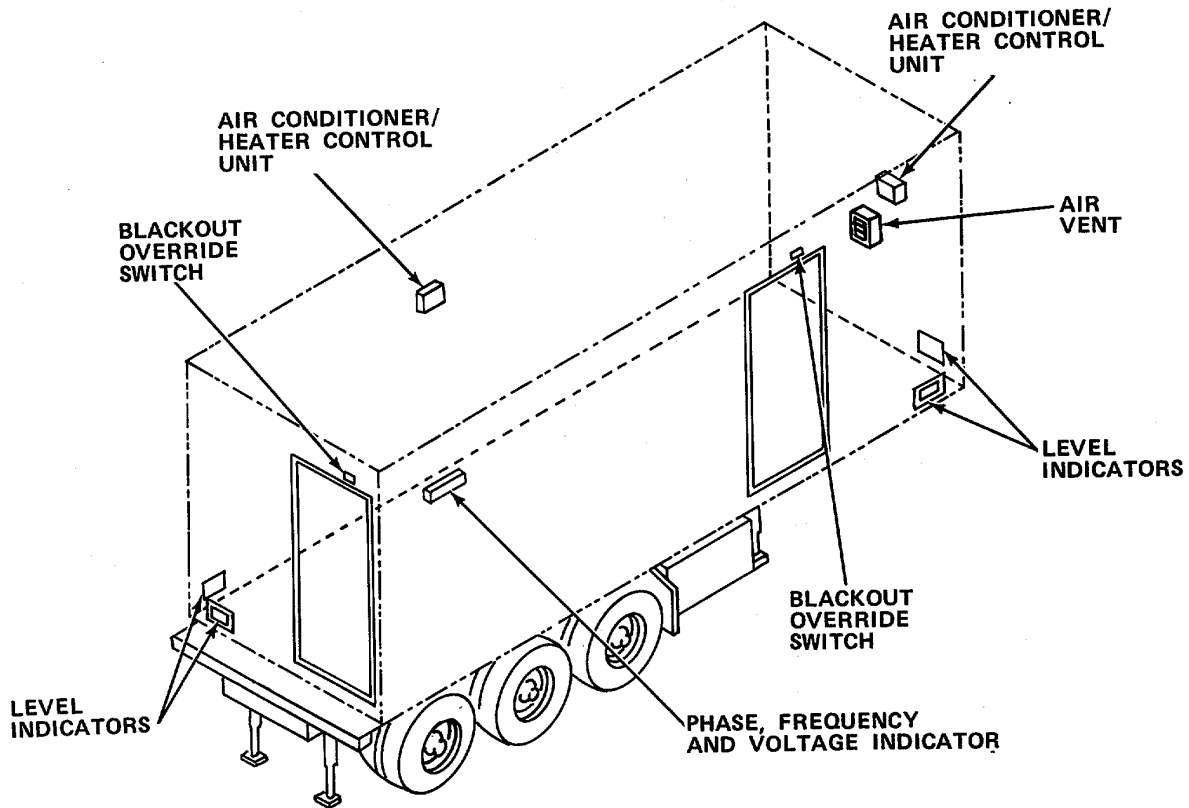
Exhaust fan exhausts air. Replacement air flows into the section through the air vent. Recirculating air is filtered as it enters the air conditioners/heaters. From the air conditioners/heaters, it flows through the ceiling vents and into the section.

NOTE

Detailed description of air conditioner/heater operation is contained in TM 5-4120-367-14, Operator's, Organizational, Direct Support, and General Support Maintenance Manual, Air Conditioner, Horizontal, Compact 18,000 Btu/hr (5274W) 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
Air Vent	Permits make-up air to enter as required.
Air Conditioner/Heater Control Units	Permits selection of air conditioner or heater mode of operation and temperature.
Blackout Override Switches	Turns off illumination when doors are opened.
Phase, Frequency, and Voltage Indicator	Monitors electrical 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 operations if you are the assigned operator and have not operated the item since the last weekly.
- 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
6 in. Adjustable Wrench	1
Flat Tip Screwdriver	1
Vacuum Cleaner	1
Cheesecloth (Item 4, Appendix E)	ar
Bucket	1
General Purpose Detergent (Item 6, Appendix E)	ar
Paint (Items 13, 13A and 13B, Appendix E)	ar
Paint Brushes	ar

Table 1-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

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

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

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

**AN - Annually
S - Semiannually
BI - Biennially**

(Number) - Hundreds of Hours

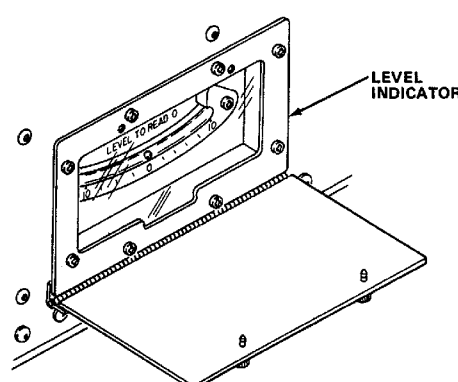
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B/W	<p><u>VAN BODY</u> <u>Inspect Exterior.</u></p> <p>1. Inspect surfaces for punctures, cracks, or open seams that could permit moisture to enter wall.</p>  <p>2. Inspect four level indicators for damage and to be sure section has remained level.</p>	<p>Punctures, cracks, or open seams are present.</p> <p>Indicators are broken.</p>

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
 A - After Q - Quarterly BI - Biennially

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Exterior - Cont</u></p> <p style="text-align: center;">WARNING</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> <div style="text-align: center;"> </div>	Connector damaged.
	B/W	<p>4. Inspect power entry panel for accumulated dirt, water, or corrosion.</p> <p style="text-align: center;">Clean power entry panel.</p>	

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

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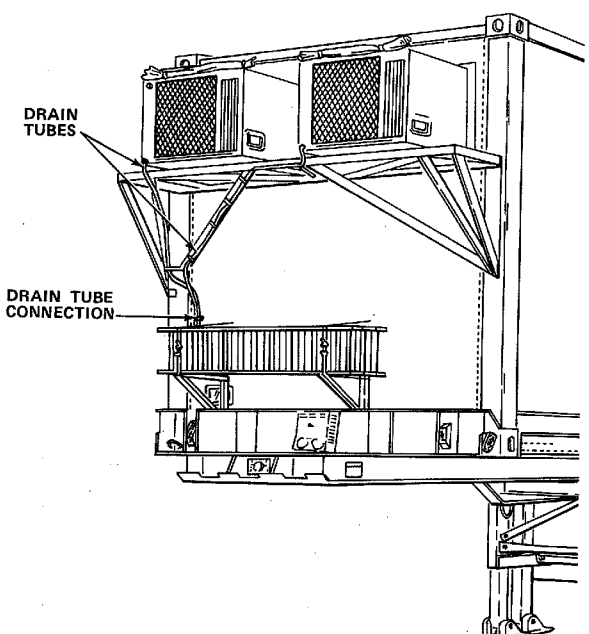
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B/W	<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Exterior - Cont</u></p> <p>5. Inspect power entry panel to be sure any unused receptacles are covered.</p> 	Missing covers.
	B/W	<p>6. Inspect air conditioner/heater drain tube to be sure tube is positioned as shown. Check for breaks and crimps in hose and check connection for damage or leakage.</p>	

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

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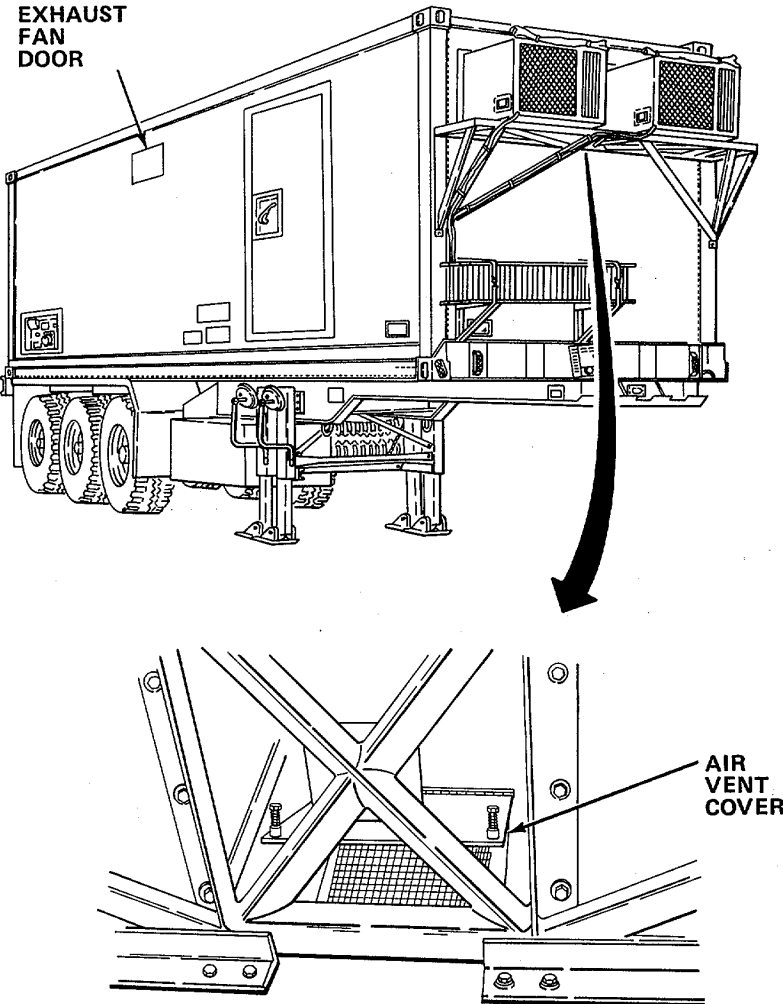
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1		<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Exterior - Cont</u></p>  <p>7. Inspect exhaust fan door and air vent covers to be sure they are not blocked or clogged. Clean as required. Clean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

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

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ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1		<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Exterior - Cont</u></p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">When mounted on chassis, perform following step.</p> <p>10. Inspect front and rear van body locks to be sure locks are fully engaged.</p> <p>11. Inspect gaskets on personnel doors for leaks or damage.</p> <p>11.1 Inspect hinges for proper placement of hinge pins.</p> <p>12. Clean and paint blistered, pitted, or flaking areas and bare metal spots in accordance with instructions contained in TM 43-0139, Painting Instructions for Field Use.</p>	<p>Lock disengaged.</p> <p>Missing hinge Pins.</p>
2		<p><u>Inspect Interior.</u></p> <p>1. Test emergency lights by placing switch in ready position and pressing test button.</p> <p>2. Inspect power cords and cables to be sure wires are not kinked, cut, or cracked.</p> <p>3. Inspect plug connectors to be sure all plug connectors are tight and firmly seated. Tighten if necessary.</p> <p>4. Check bulbs and fluorescent lamps. Replace if necessary.</p> <p>5. Inspect walls, ceilings, and floor for holes, open seams, or signs of seepage or leaks.</p> <p>6. Check storage cabinets for broken hinges, latches, and locks.</p>	<p>Emergency lights do not light. Wires or cables are cracked or cut.</p> <p>Leaks are present. Hinge, latch, or lock is broken.</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:
<p><u>VAN BODY - Cont</u></p>			
1		<p><u>Inspect Exterior - Cont</u></p>	
2		<p>Inspect Interior - Cont</p>	
	B/M A	<p>7. Inspect fire extinguishers. Check that security seals are not broken.</p>	<p>Fire extinguisher is missing or seals are broken.</p>
	Q	<p>8. Inspect circuit breaker panel.</p>	<p>Defective. circuit breaker.</p>
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Inspection is to be conducted on a not-to-interfere basis with work. Individual equipment will be inspected as directed by the appropriate chapter of this manual.</p> <div style="text-align: center;"> </div>			
<p>*U.S. GOVERNMENT PRINTING OFFICE: 1988 - 554-030/80164</p>			

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2	Q	<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Interior - Cont</u></p> <p>a. Set main circuit breaker to ON.</p> <p>b. Set each circuit breaker to OFF, then ON.</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. Place light switches on; 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;">WARNING</p> <p style="text-align: center;">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;">CAUTION</p> <p style="text-align: center;">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>Clean every four hours under desert conditions.</p>	<p>Light leaks are present.</p> <p>Blackout system is inoperable.</p>
*	B/D		
*			

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	S	<p><u>VAN BODY - Cont</u></p> <p>Inspect Interior - Cont</p> <p>b. Dry vertical and horizontal painted surfaces with clean cloth.</p> <p>c. Vacuum interior of section to remove dirt and waste. Pay particular attention to work stations.</p> <p>11. Inspect first aid kit.</p> <div data-bbox="630 951 792 1213" style="text-align: center;"> </div> <div data-bbox="500 1245 938 1501" style="text-align: center;"> <table border="1"> <thead> <tr> <th colspan="2">FIRST AID KIT, GENERAL PURPOSE</th> </tr> <tr> <th>LIST OF CONTENTS</th> <th>INSTRUCTIONS FOR USE</th> </tr> </thead> <tbody> <tr> <td>3 ROLLS ADHESIVE TAPE, SURGICAL, 1/2X1/2 YARDS</td> <td>USE FOR MINOR CUTS AND COLLARING REPAIR</td> </tr> <tr> <td>12 EACH BANDAGE, ADHESIVE, 1/2X2 1/2"</td> <td>MINOR CUTS, AS REQUIRED</td> </tr> <tr> <td>2 EACH BANDAGE, KNIT, COMPRESSION, CAMOUFLAGED, 5/8" YARDS</td> <td>USE AS DIRECTED AS REQUIRED FOR BANDAGE MARKER</td> </tr> <tr> <td>1 EACH BANDAGE, MESH, COMPRESSION, CAMOUFLAGED, 12X12 INCH</td> <td>USE FOR SLING</td> </tr> <tr> <td>1 P/B BLEED BANDAGE, PREPARATION PAD, STRAIGHT, 8X10 INCH, 1/2"</td> <td>SHAVING HAIR AND OPENING WOUNDS AS REQUIRED</td> </tr> <tr> <td>1 P/B COMPRESSION AND BANDAGE, CAMOUFLAGED, 1/2X2 1/2"</td> <td>FOR HOORS</td> </tr> <tr> <td>2 EACH DRESSING, FIRST AID, TIE, 6X4 INCHES</td> <td>FOR LARGE WOUNDS, EXCESSIVE BLEEDING</td> </tr> <tr> <td>1 EACH FIRST AID KIT, EYE DRESSING</td> <td>FOR EYE WOUNDS, SEE INSTRUCTIONS</td> </tr> <tr> <td>1 P/B GAUZE, PETROLATUM, 7/8X3", 3"</td> <td>FOR BURNS, APLTY AND OTHER BURNS</td> </tr> <tr> <td>1 BTL POWDER, WOUND SOLUTION, 1/2 OUNCE</td> <td>USE IDENTIFY AND CLASSIFY OF CUTS AND WOUNDS, APPLY BEFORE BANDING</td> </tr> <tr> <td>1 EACH ANEMONA INHALANTS</td> <td>DO NOT REMOVE BETWEEN JOINTS. HOLD IN 1/2" FROM MOUTH AND BREATHE THROUGH IT. DO NOT REMOVE BETWEEN JOINTS. HOLD IN 1/2" FROM MOUTH AND BREATHE THROUGH IT.</td> </tr> <tr> <td>1 EACH INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS</td> <td></td> </tr> </tbody> </table> </div> <p>a. Remove first aid kit from bracket.</p> <p>b. Remove contents.</p> <p>c. Inspect container for damage.</p>	FIRST AID KIT, GENERAL PURPOSE		LIST OF CONTENTS	INSTRUCTIONS FOR USE	3 ROLLS ADHESIVE TAPE, SURGICAL, 1/2X1/2 YARDS	USE FOR MINOR CUTS AND COLLARING REPAIR	12 EACH BANDAGE, ADHESIVE, 1/2X2 1/2"	MINOR CUTS, AS REQUIRED	2 EACH BANDAGE, KNIT, COMPRESSION, CAMOUFLAGED, 5/8" YARDS	USE AS DIRECTED AS REQUIRED FOR BANDAGE MARKER	1 EACH BANDAGE, MESH, COMPRESSION, CAMOUFLAGED, 12X12 INCH	USE FOR SLING	1 P/B BLEED BANDAGE, PREPARATION PAD, STRAIGHT, 8X10 INCH, 1/2"	SHAVING HAIR AND OPENING WOUNDS AS REQUIRED	1 P/B COMPRESSION AND BANDAGE, CAMOUFLAGED, 1/2X2 1/2"	FOR HOORS	2 EACH DRESSING, FIRST AID, TIE, 6X4 INCHES	FOR LARGE WOUNDS, EXCESSIVE BLEEDING	1 EACH FIRST AID KIT, EYE DRESSING	FOR EYE WOUNDS, SEE INSTRUCTIONS	1 P/B GAUZE, PETROLATUM, 7/8X3", 3"	FOR BURNS, APLTY AND OTHER BURNS	1 BTL POWDER, WOUND SOLUTION, 1/2 OUNCE	USE IDENTIFY AND CLASSIFY OF CUTS AND WOUNDS, APPLY BEFORE BANDING	1 EACH ANEMONA INHALANTS	DO NOT REMOVE BETWEEN JOINTS. HOLD IN 1/2" FROM MOUTH AND BREATHE THROUGH IT. DO NOT REMOVE BETWEEN JOINTS. HOLD IN 1/2" FROM MOUTH AND BREATHE THROUGH IT.	1 EACH INSTRUCTION BOOKLET AND FIRST AID EXPLANATIONS		
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2	B/W	<p><u>VAN BODY - Cont</u></p> <p><u>Inspect Interior - Cont</u></p> <p>d. Inspect contents for damage. Then use checklist to inventory contents.</p> <p>e. Replace damaged or missing items.</p> <p>f. Repack kit.</p> <p>g. Reinstall kit.</p> <p>12. Inspect blackout curtains.</p> <p>a. Inspect blackout curtains and valances for tears, missing hooks, or broken eyelets.</p> <p>b. Inspect nylon hook tape on curtain and wall for security of attachment.</p>	Curtains damaged.
3	B	<p><u>Insect 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. Power must be deenergized before servicing cable. Death or serious injury can result from failure to observe this safety precaution.</p> <p>a. Turn off safety switch.</p> <p>b. Disconnect cable from power entry panel.</p> <p>c. Wrap any cuts or abrasions in cable with electrical insulation tape.</p> <p>d. Reconnect power cable to entry panel.</p>	

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

1-6.1 Assembly and Preparation for Use.

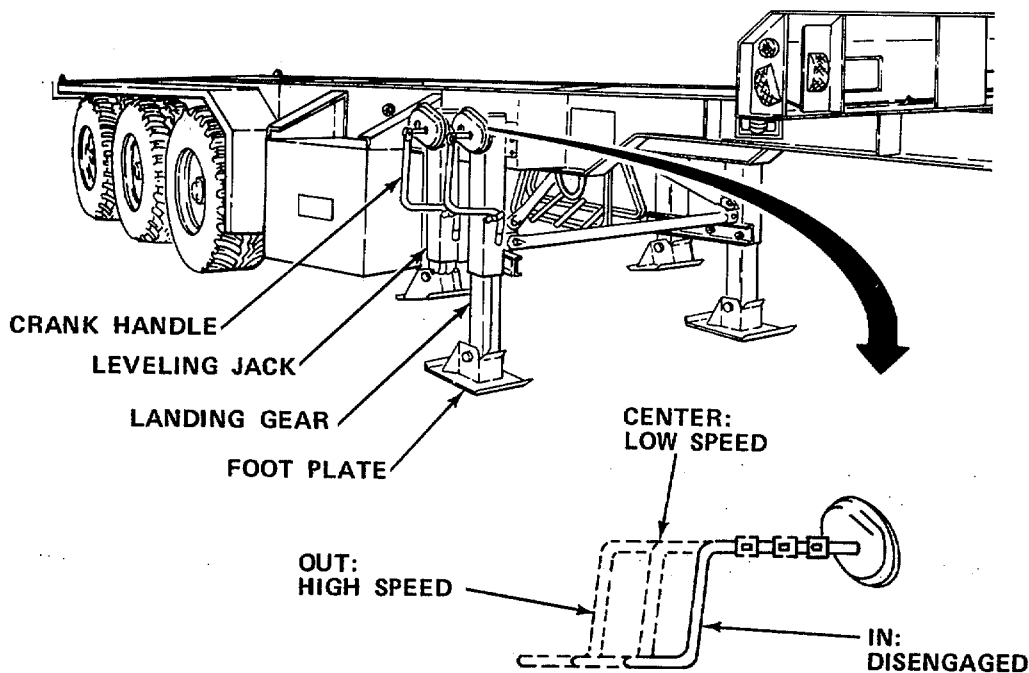
- a. Procedures for leveling.

CAUTION

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

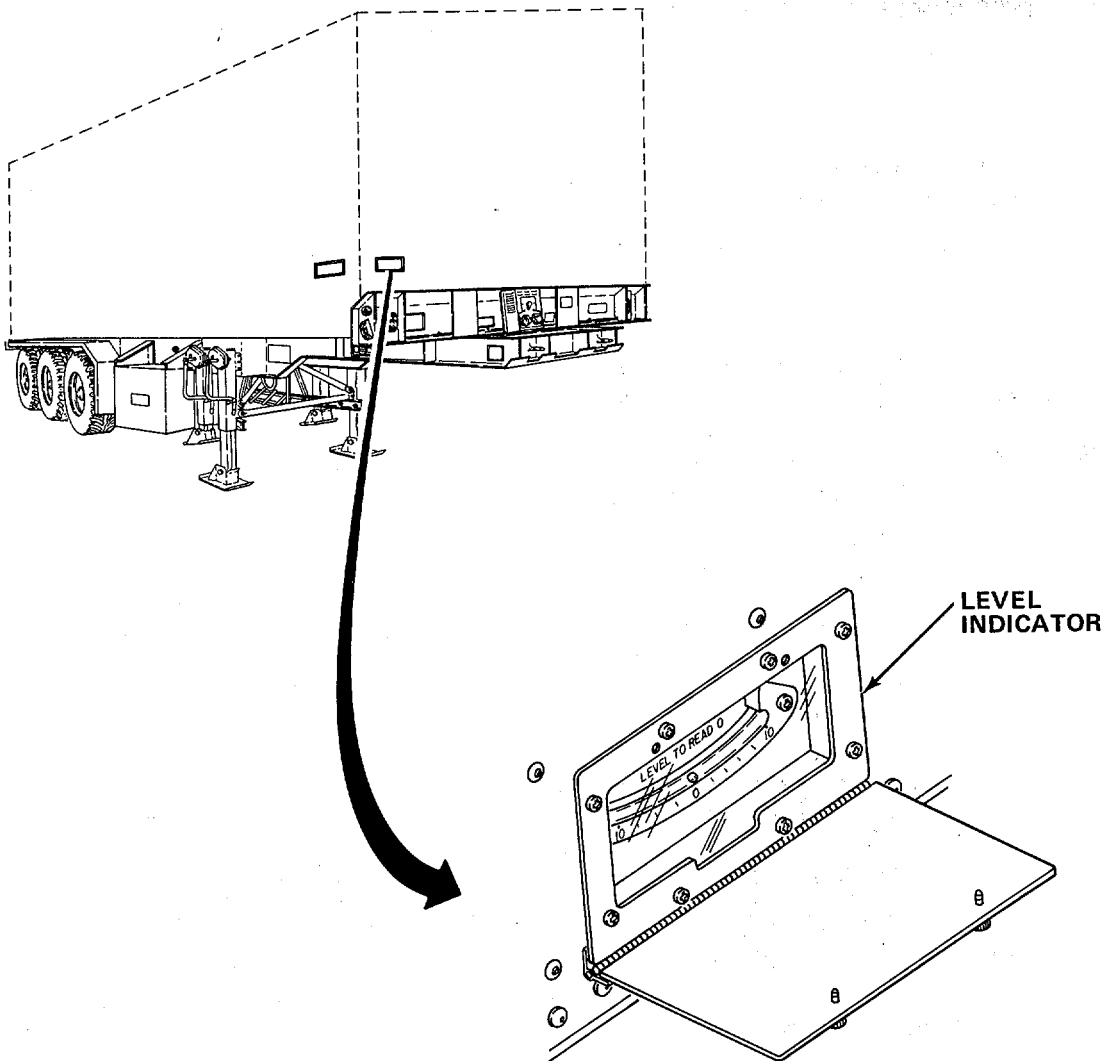
NOTE

- Snow or ice should be removed from under leveling foot plate before attempting to level section.
 - Sand, soft ground, or mud requires that shoring or scrap material be placed under leveling foot plate to increase surface area and prevent sinking into surface.
- (1) Deflate air suspension in accordance with TM 5-2330-305-14.



- (2) Approximately level chassis by raising or lowering landing gear.
- (3) Move crank handle from secured location and swing out.

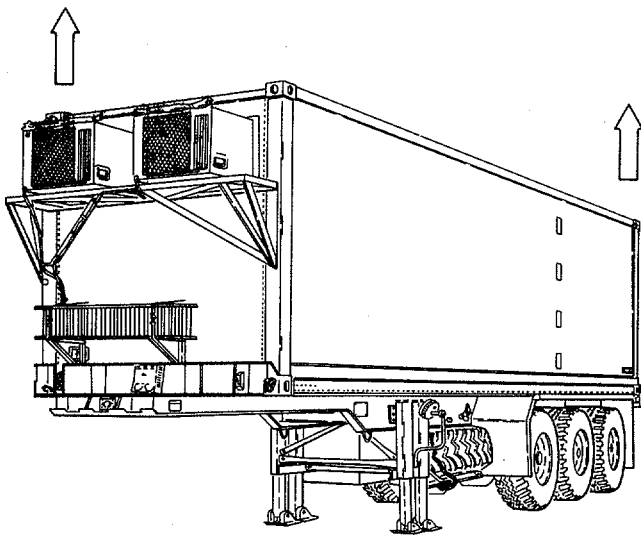
- (4) Pull crank handle on each leveling jack all the way out and engage. There are two positions when handle is engaged. Fully out is high speed. Partially out is low speed.
- (5) Lower each leveling jack by turning crank to right at high speed until foot plate just contacts ground.



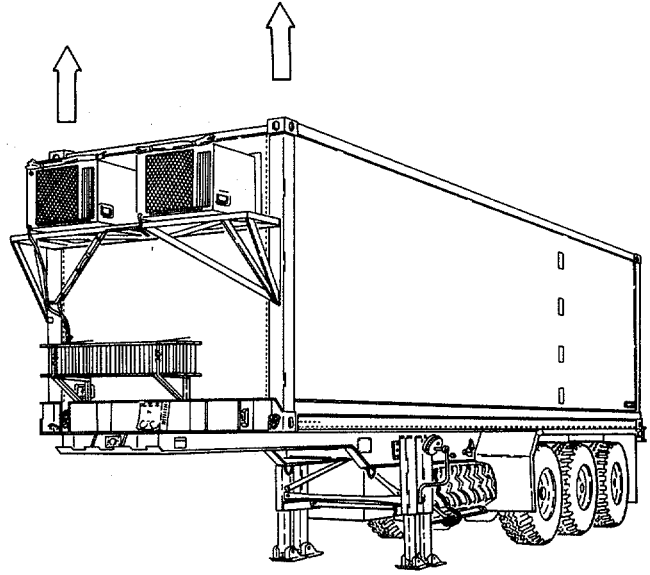
- (6) Station personnel to have a clear view of level indicators at both front and rear of section.
- (7) Observe level indicators to determine which end and side must be raised.

CAUTION

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

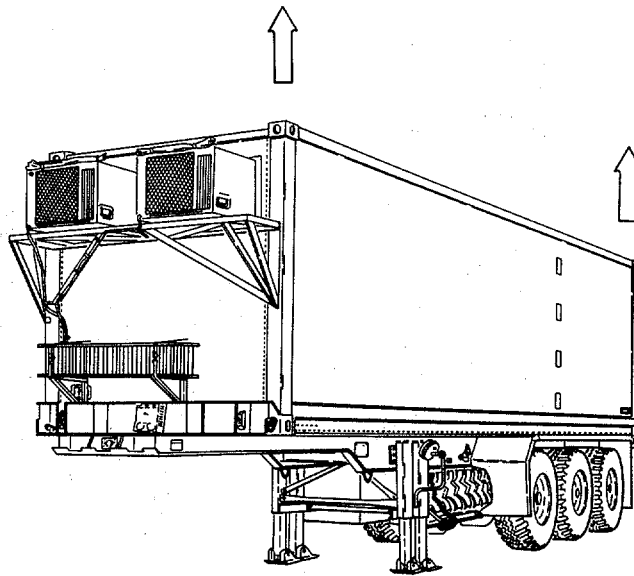


NO

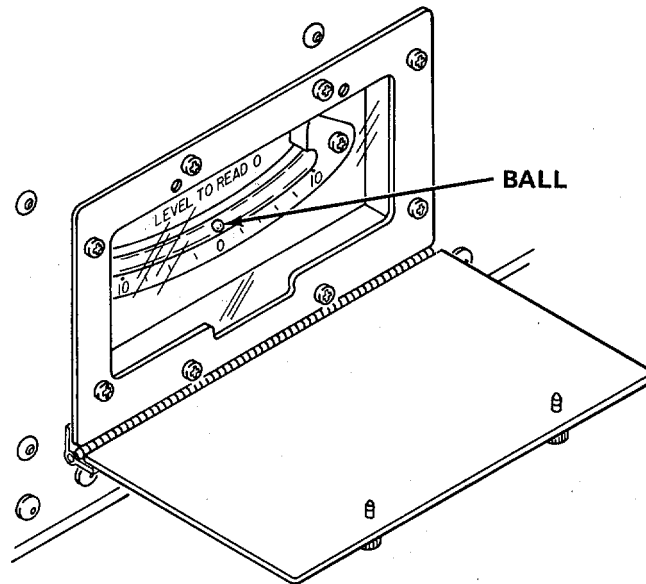


YES

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



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

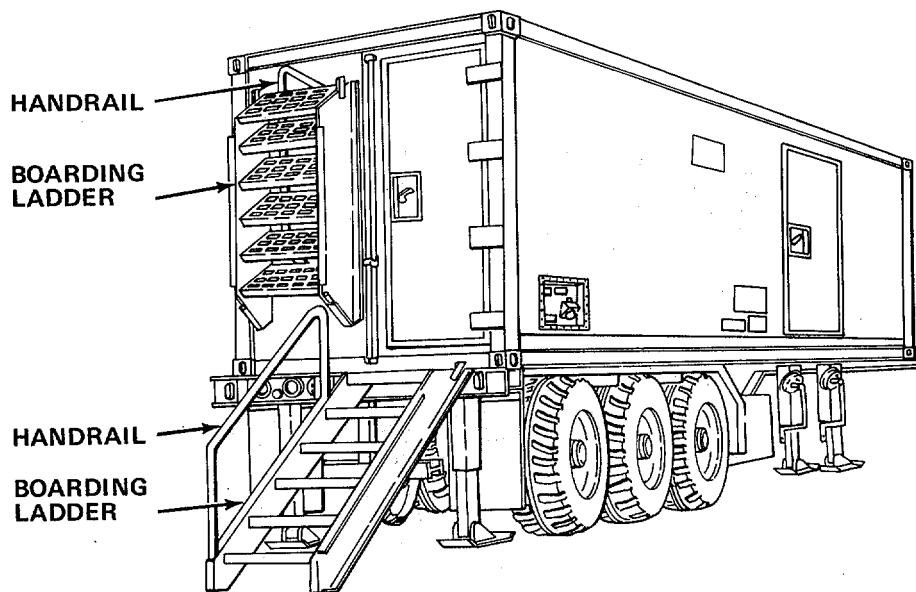


NOTE

Be sure ball is centered on all four level indicators 2° .

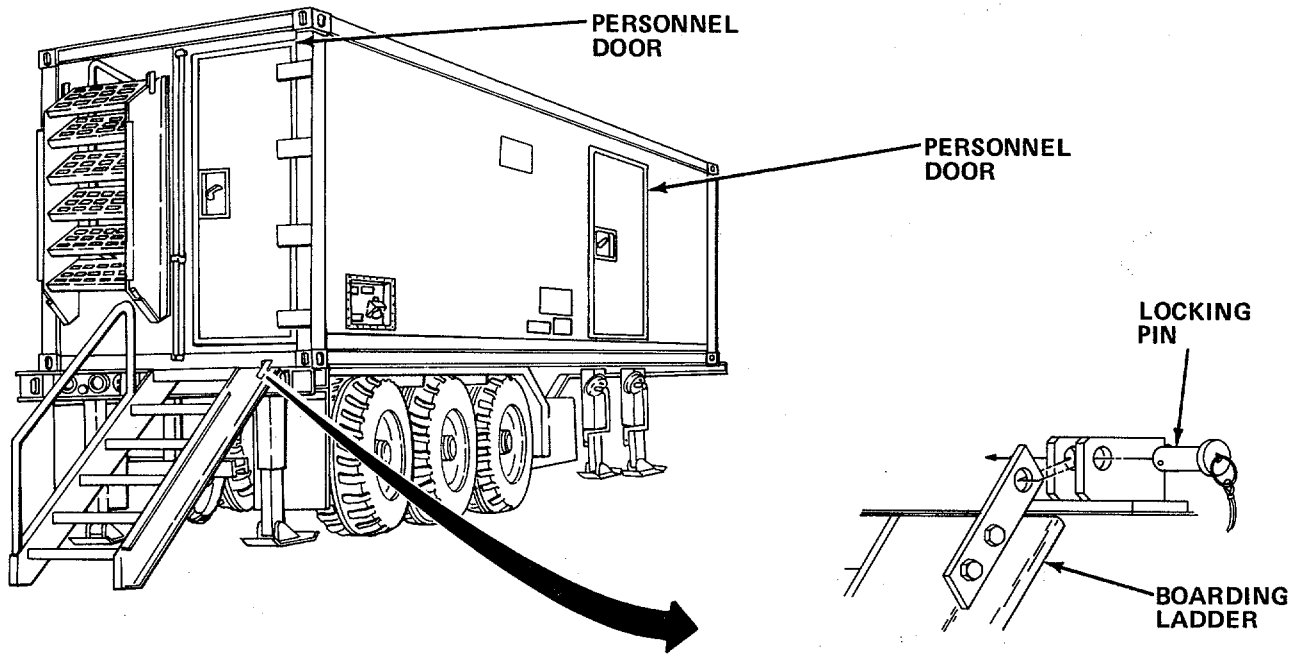
(10) Pull leveling crank handles away from chassis and lower crank handle to stowed position.

b. Procedures to activate section.

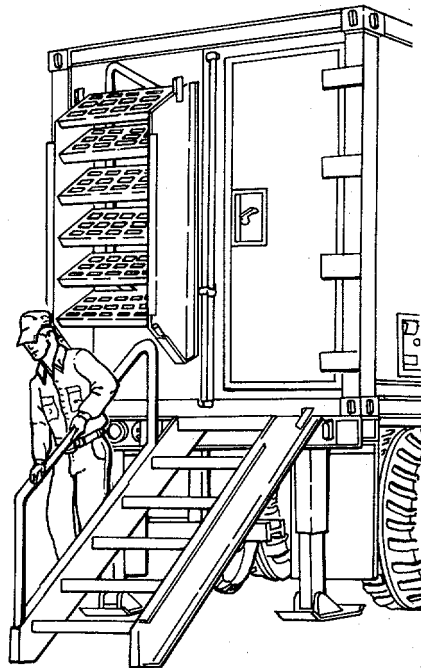


(1) Remove boarding ladders and handrails from rear of section.

(2) Remove handrails from ladders.



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

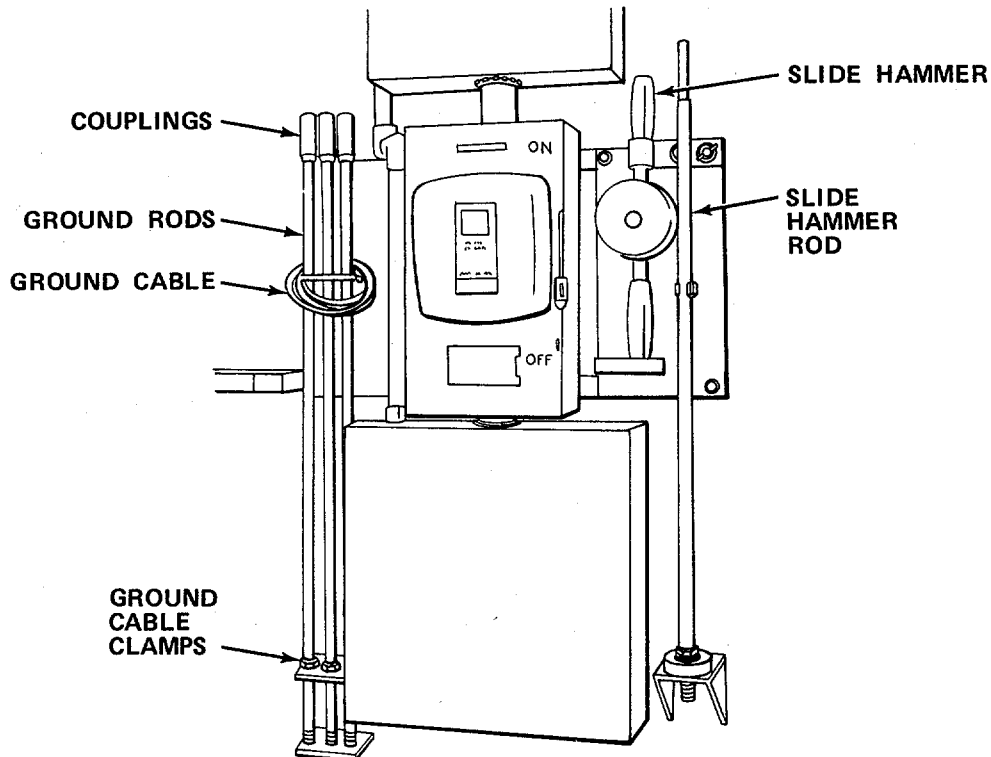


- (4) Mount one handrail on each ladder.

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

WARNING

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



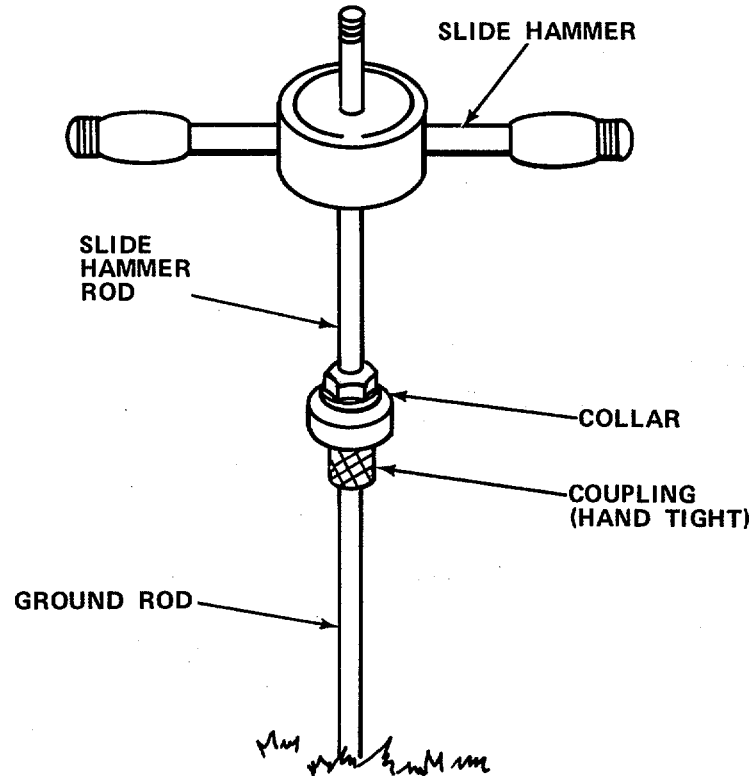
- (6) Remove ground rod, slide hammer, and ground cable from section.

NOTE

Apply a thin film of grease to threaded ends of rods before driving into ground. This will permit easy disassembly upon removal from ground.

Bottom ground rod must be 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 as possible to install ground rod. Then assemble the first ground rod and coupling to the slide hammer rod.

CAUTION

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

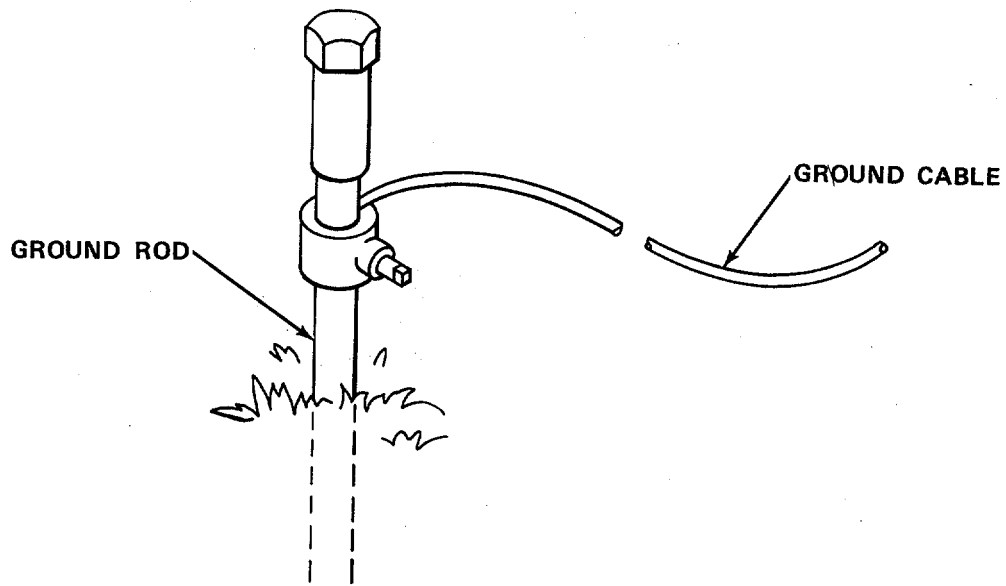
NOTE

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

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

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

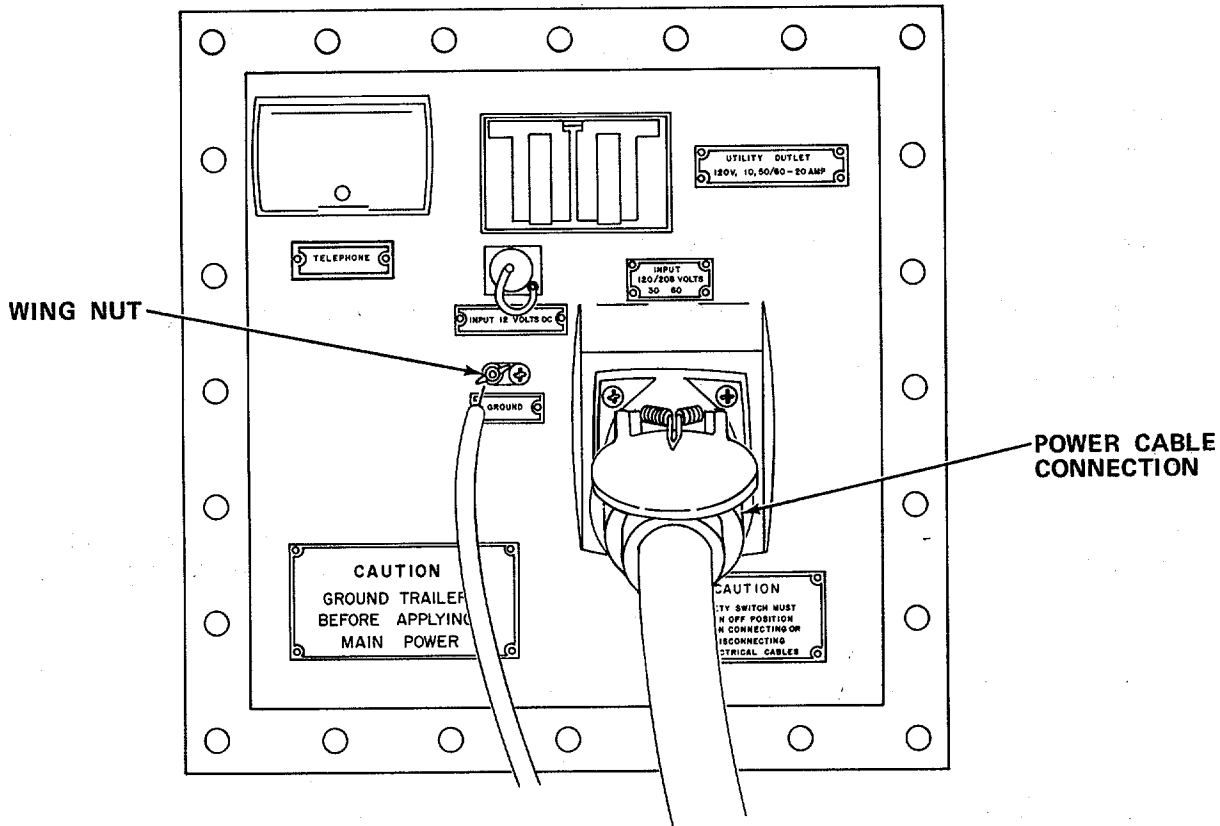
(10) Secure ground cable clamp and ground cable to ground rod.

**WARNING**

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

NOTE

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

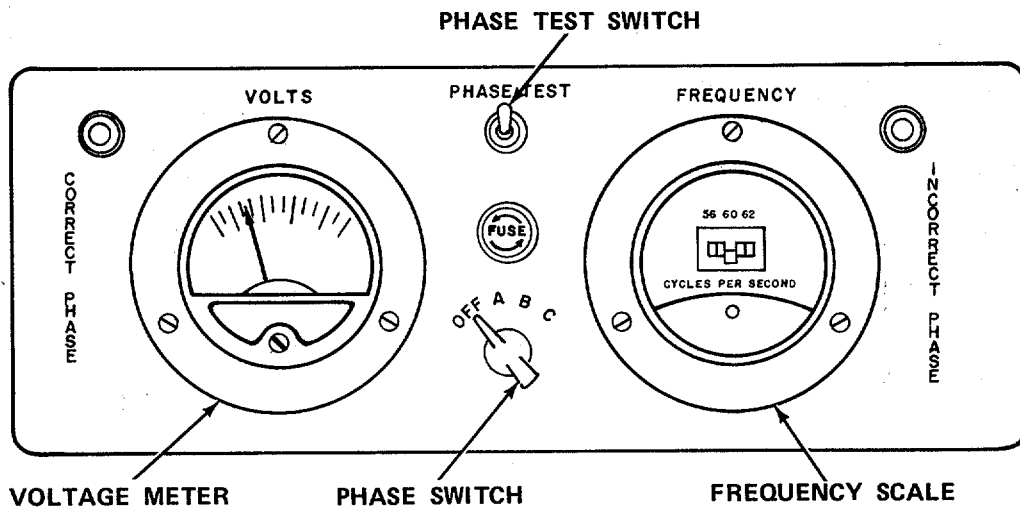


(11) Connect ground cable to ground lug with wing nut.

CAUTION

To avoid equipment damage, make sure safety switch and main circuit breaker are off before connecting power cable.

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



(13) Turn safety switch on.

CAUTION

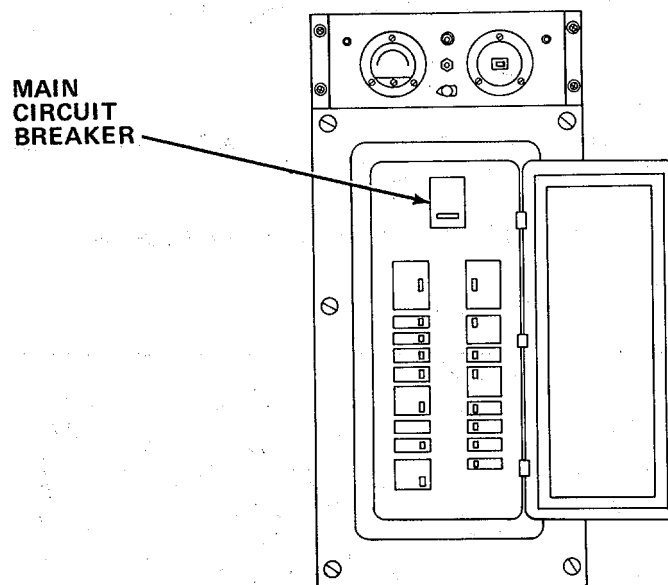
Do not turn on main circuit breaker if incorrect phase lamp lights. Damage to equipment may result.

- (14) Check voltage and frequency as follows:
- (a) Push phase test switch. Observe correct phase lamp lights.
 - (b) Turn phase switch to A.

CAUTION

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

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

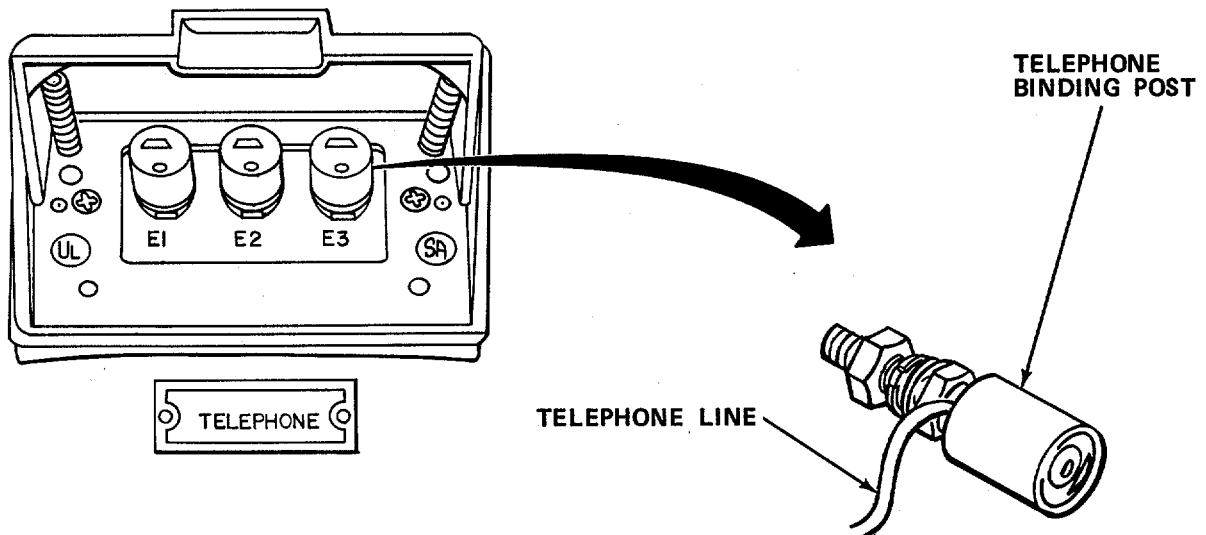


- (15) Set main circuit breaker ON.

NOTE

This step must be accomplished if section is placed into 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.



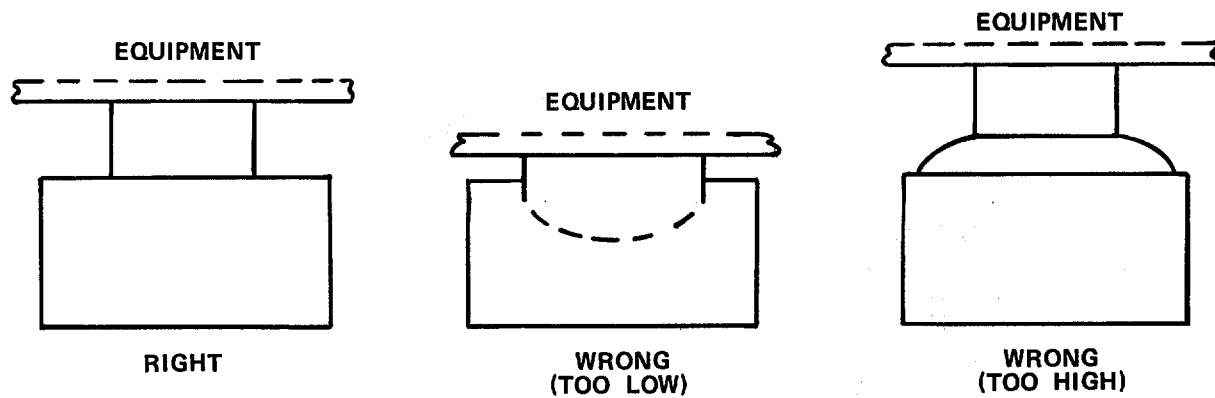
- (18) Connect telephone lines to interior corresponding binding posts.
- (19) Check blackout switches.
- (20) Plug in emergency lighting and turn switch to READY.
- (21) Fully deflate air shocks until short-range optical calibrator rests on top of air shock.

1-6.2 Preparation for Movement.

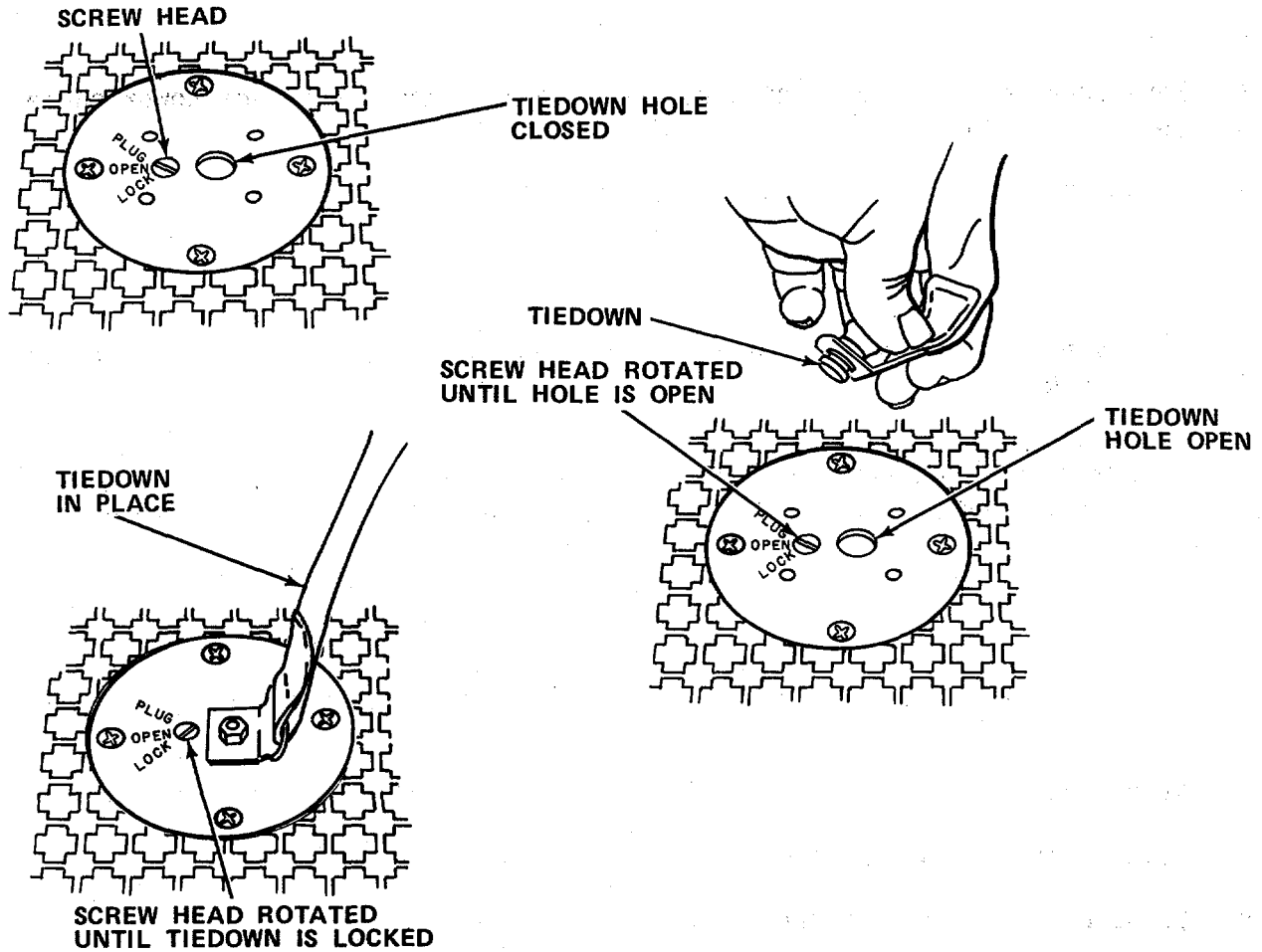
- a. Inventory equipment and supplies.
- b. Inflate shock absorbers.
 - (1) Remove all valve caps.
 - (2) Connect air hose to valve.

CAUTION

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



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



- c. Install tiedowns in tiedown sockets.
- d. Secure authorized equipment in proper containers or as specified by appropriate chapters.
- e. Secure straps and remove slack from tiedowns.

WARNING

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

- f. Turn emergency light switch OFF.
- g. Turn curbside and roadside circuit breakers OFF.
- h. Turn curbside and roadside air conditioner circuit breakers OFF.

- i. Turn main circuit breaker OFF.
- j. Turn individual lighting circuit breakers OFF.
- k. Turn safety switch OFF.

l. Have power cable disconnected at supply end. Then disconnect power cable from power entry panel. Put cable in storage box on chassis.

- m. Disconnect telephone cables from power entry panel.

CAUTION

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

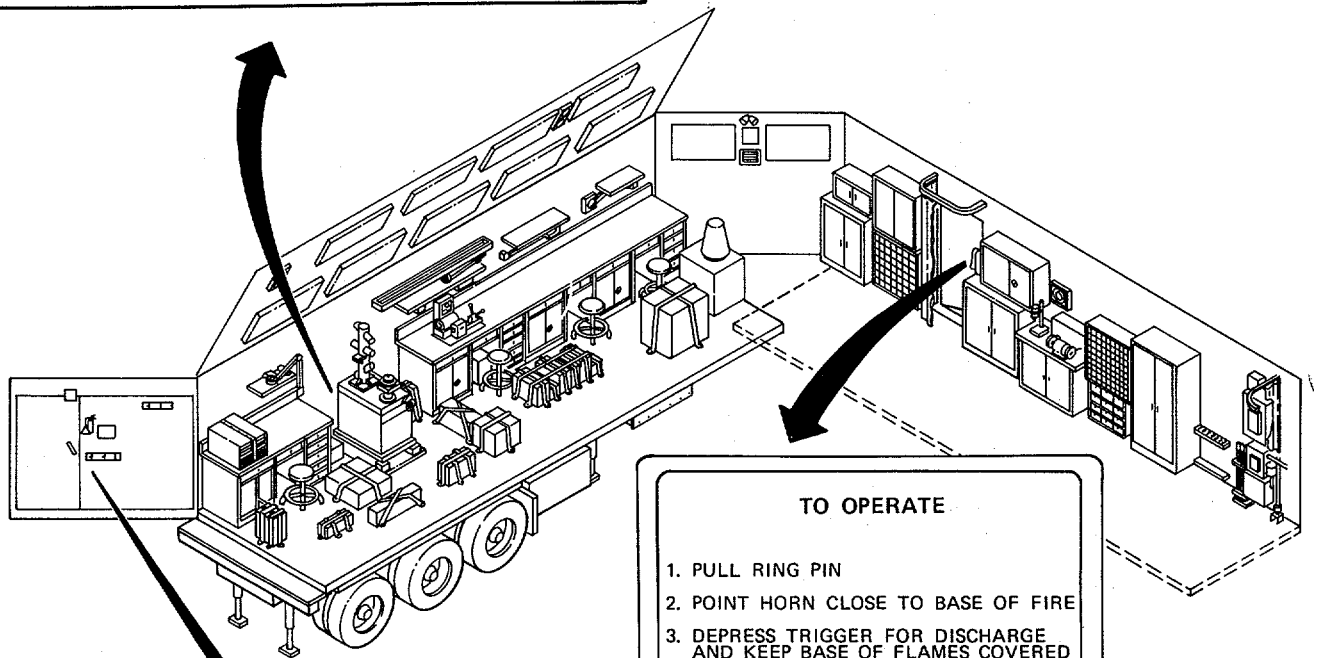
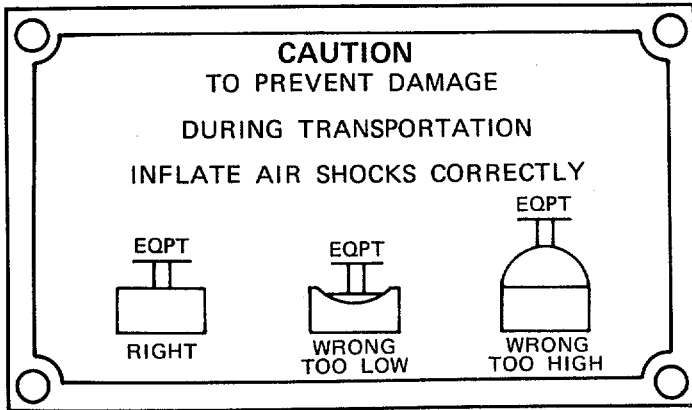
n. Remove ground rod with slide hammer, and put ground rods, couplings, and slide hammer inside section. Clean threads on each ground rod before storing.

NOTE

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

- o. Reinspect section interior for loose equipment and close all vent doors.
- p. Close section. Secure and lock all personnel doors and cargo door.
- q. Be sure air conditioner/heater covers are down and secured.
- r. Remove handrails from boarding ladders.
- s. Remove boarding ladders and insert handrails into back of ladders.
- t. Secure ladders to back of section.
- u. Fully extend landing gear.
- v. Retract leveling jacks.
- w. Visually inspect section exterior to be sure all equipment and covers are secured.

1-6.3 Operating Instructions on Decals and Instruction Plates.

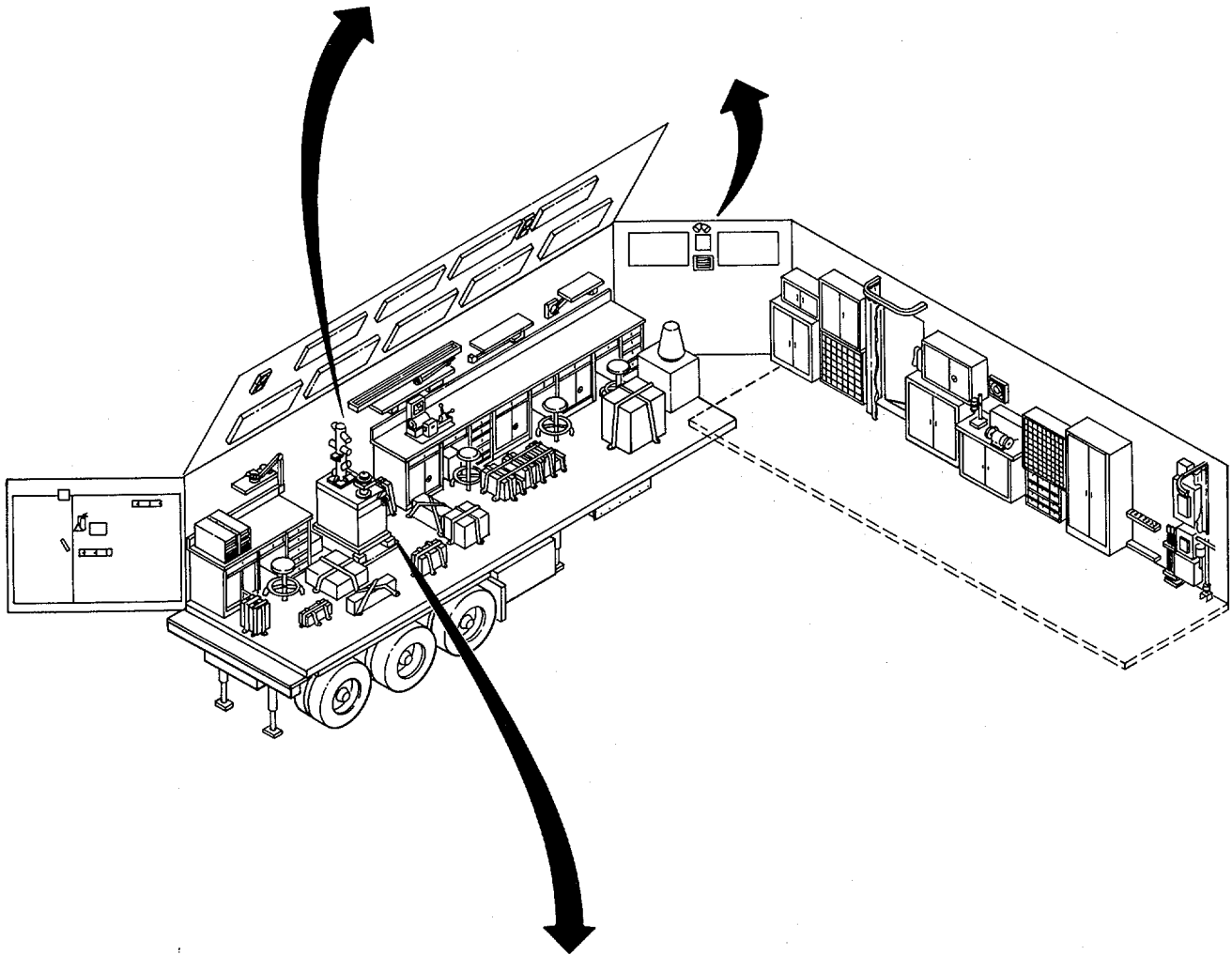


TO OPERATE

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, CF₃BR, 2 3/4 LB

CAUTION
OPEN OUTSIDE FLAPS
PRIOR
TO OPERATING AIR COND



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

BARRY STABL-LEVEL SLM-12
LOAD RATING: 300 to 1200 LBS.
MAX. INFLATION 90 P.S.I.

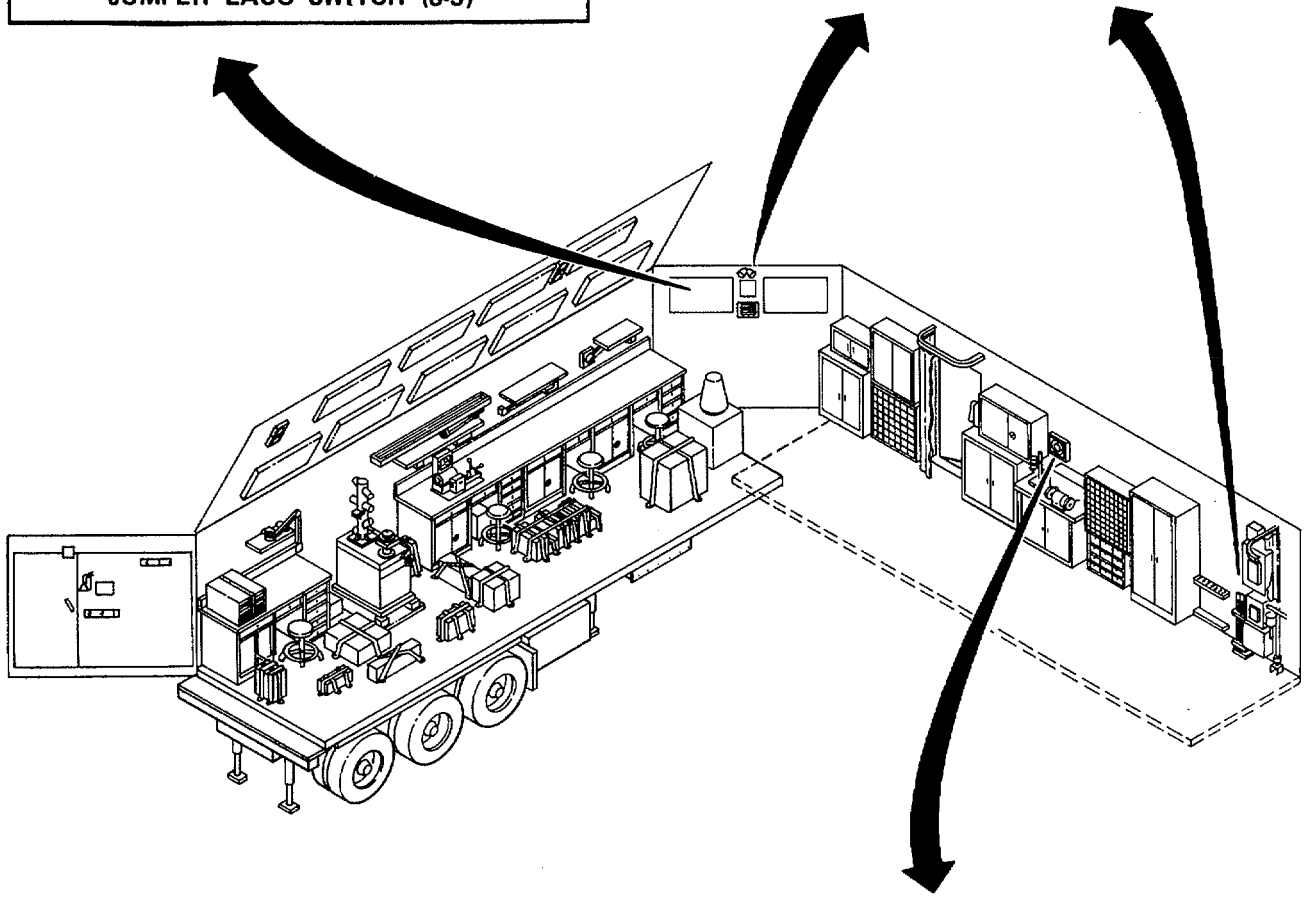
EQUIPMENT LOAD ON MOUNT MUST BE WITHIN LOAD RATING.
EQUIPMENT MOUNTING SURFACE MUST BE, OR ADAPTED TO BE FLAT
AND OF SIZE TO COVER ENTIRE OUTSIDE DIAMETER OF MOUNT.

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

CAUTION
EMERGENCY LIGHT SWITCH
MUST BE IN THE OFF POSITION
WHEN ELECTRICAL POWER
IS INTENTIONALLY DISCONNECTED

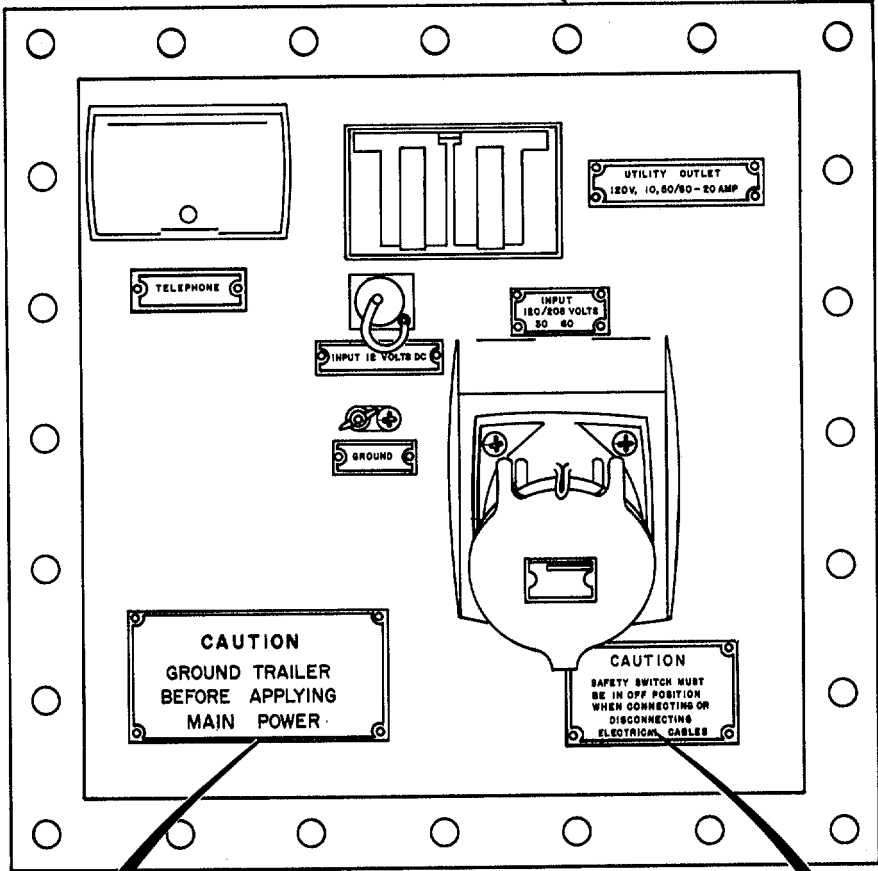
SWITCH MUST BE IN THE READY
POSITION FOR NORMAL EMERGENCY
LIGHT OPERATION

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



CAUTION
OPEN OUTSIDE VENT BEFORE
OPERATING FAN

POWER ENTRY PANEL



CAUTION
GROUND TRAILER
BEFORE APPLYING
MAIN POWER

CAUTION
SAFETY SWITCH MUST
BE IN OFF POSITION
WHEN CONNECTING OR
DISCONNECTING
ELECTRICAL CABLES

CAUTION
GROUND TRAILER
BEFORE APPLYING
MAIN POWER

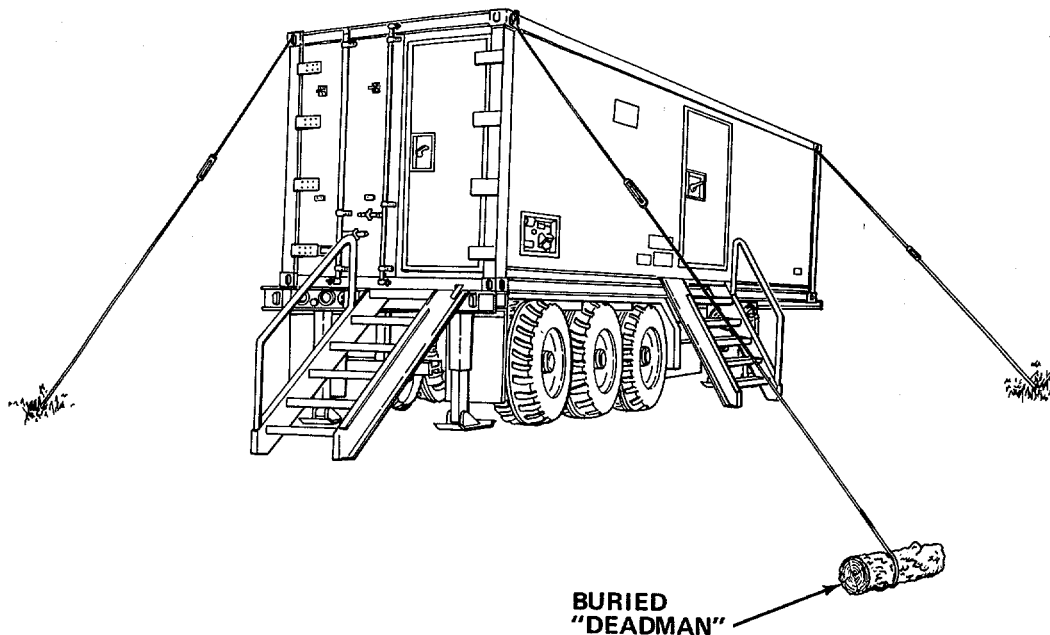
CAUTION
SAFETY SWITCH MUST
BE IN OFF POSITION
WHEN CONNECTING OR
DISCONNECTING
ELECTRICAL CABLES

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 ground cable, will become hard, brittle, and difficult to handle. Be careful when handling the cables when connecting or disconnecting them so that kinks and unnecessary loops will not result in permanent damage.

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

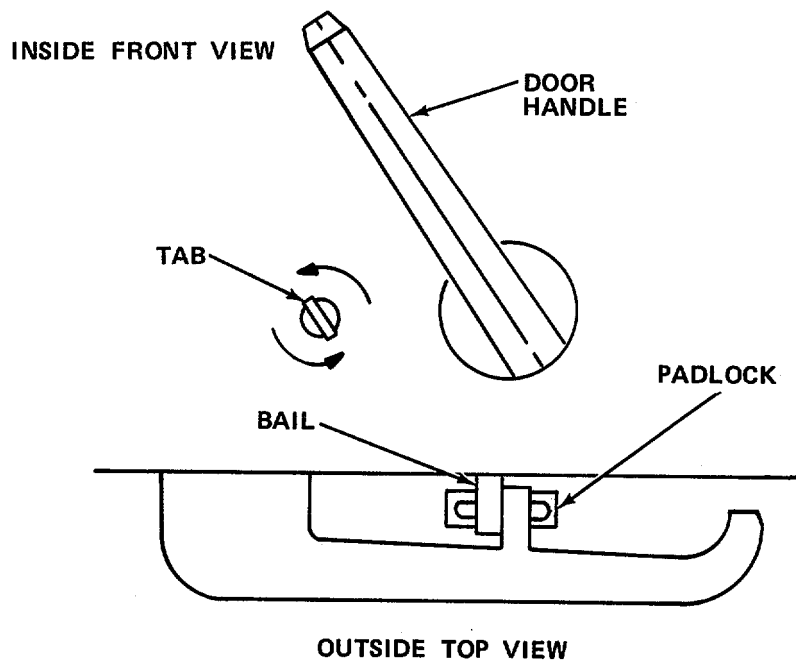
c. When section heaters are not operating or when the van body is being transported, liquid consumable supplies may freeze, break their containers, then melt, and ruin equipment or documents. Store these items in areas to prevent equipment or document damage.

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 contaminate cleaning supplies, and ruin optical and electrical equipment and documents. Restrict access to the section and close vents to prevent dust, grit, and sand from entering into the section. Cleaning of section interior must be conducted every four hours.

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 QL door handle is now free to turn.

SECTION III OPERATOR MAINTENANCE

1-8. LUBRICATION INSTRUCTIONS.

a. Lubrication instructions for the Maintenance Section are contained in LO 5-6675-328-12, Lubrication Order, Maintenance Section, Topographic Support System. The intervals and man-hours specified in the Lubrication Order are based on normal operations. During inactive periods, lubrication periods may be extended with adequate preservation.

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

c. Be sure that you refer to the appropriate chapter before any equipment is stored after use. Make sure 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 the operation or maintenance of the Maintenance Section 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 test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 1-2. TROUBLESHOOTING

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

1. NO ELECTRICAL POWER TO SECTION.

WARNING

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

Step 1. Observe voltage and frequency for phases A, B, and C. Read 115 + 5 V, 60 + 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 button 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.

Table 1-2. TROUBLESHOOTING - Cont

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

1. NO ELECTRICAL POWER TO SECTION - Cont

Step 3. Check safety switch position.

- (a) If safety switch is ON, proceed to step 4.
- (b) If safety switch is OFF, turn ON safety switch.

Step 4. Check main circuit breaker position.

- (a) If circuit breaker is ON, notify power supply supervisor.
- (b) If circuit breaker is OFF, turn ON.
- (c) If power fails to come on or circuit breaker trips repeatedly, notify power supply supervisor.

2. NO ELECTRICAL 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.

Step 2. Check voltage meter for 120 V ac.

- (a) If input voltage is correct, proceed to step 3.
- (b) If input voltage is not correct, refer to direct/general support maintenance for repair or replacement of defective wiring.

Table 1-2. TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

2. NO ELECTRICAL POWER TO EQUIPMENT - Cont

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, replace circuit breaker (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, repair or replace defective wiring.

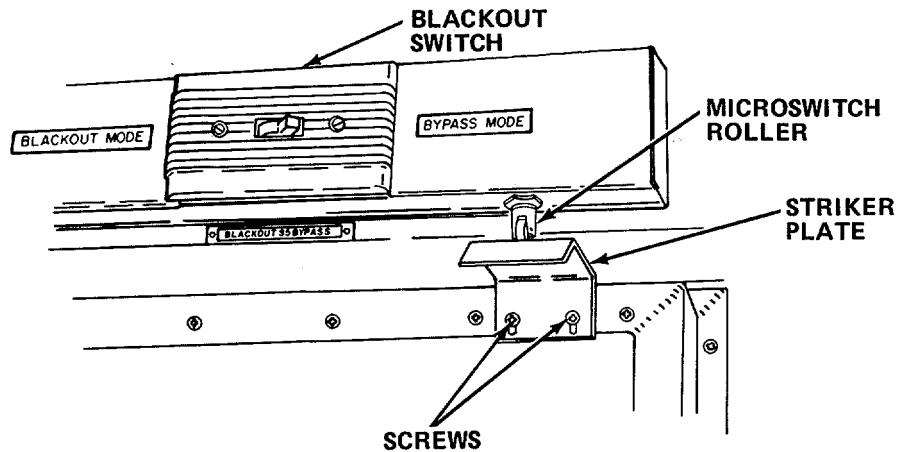
Table 1-2. TROUBLESHOOTING - Cont

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

3. BLACKOUT LIGHT DOES NOT OPERATE WITH LIGHT TOGGLE SWITCH IN ON POSITION.



Step 1. Check blackout S5 bypass switch position.

- (a) If switch is in blackout mode (off position), proceed to step 2.
- (b) If switch is in bypass mode (on position) reset switch to BLACKOUT mode.

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

- (a) If striker plate contacts roller, proceed to step 3.
- (b) If striker plate does not contact roller, loosen screws and move plate up until striker plate contacts roller.

1-10. MAINTENANCE PROCEDURES.

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

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

INDEX

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

1-10.1 Replace Fluorescent Lamp.

MOS: 35E, Special Electronic Devices Repairer
 or
 41B, Topographic Instrument Repair Specialist

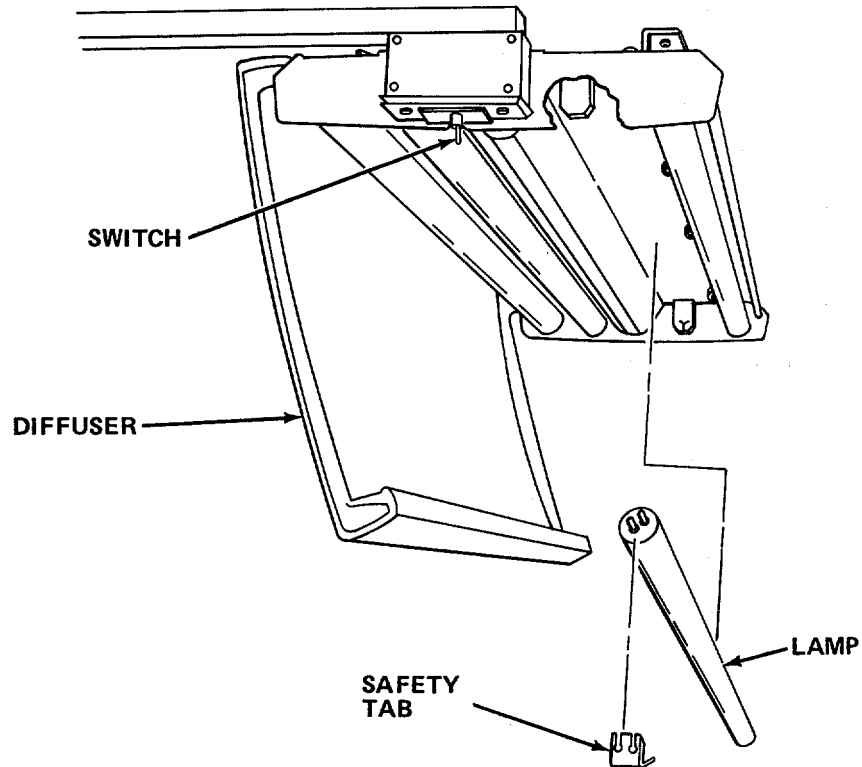
TOOLS: None

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 lamp prongs are free from slot and remove lamp.

e. Insert new lamp prongs into slot and rotate lamp 90 degrees.

f. Reinstall safety tab into lamp socket.

g. Reinstall diffuser.

h. Turn on power.

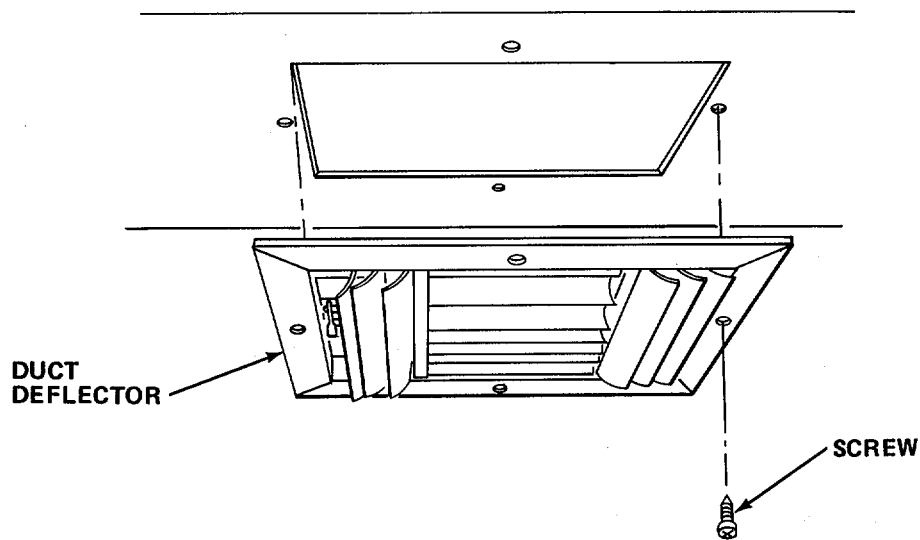
1-10.2 Service Ventilation Ducts.

MOS: 35E, Special Electronic Devices Repairer
 or
 41B, Topographic Instrument Repair Specialist

TOOLS: Vacuum Cleaner
 Cross 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 equipment covers.

1-10.3 Replace Blackout/Dome Light.

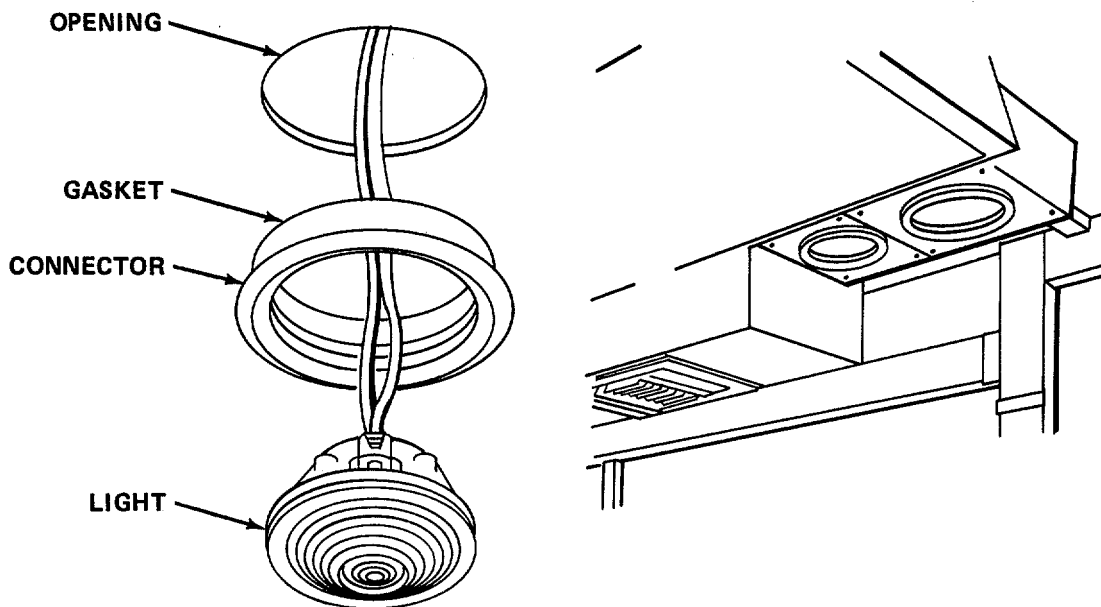
MOS: 35E, Special Electronic Devices Repairer
 or
 41B, Topographic Instrument Repair Specialist

TOOLS: None

SUPPLIES: Lamp (12V)
 Silicone Spray (Item 22, 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 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 the organizational level of maintenance.

1-12. REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; 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, IMDE, 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 are listed and illustrated in the Repair Parts and special Fools List, TM 5-6675-328-24P covering organizational maintenance for this equipment.

1-13. SERVICE UPON RECEIPT.

NOTE

The section may be received mounted on a chassis, or as a section for mounting on an available trailer/transporter, or on site. Inspection of the chassis is covered in TM 5-2230-305-14. 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, toolboxes, 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 AR735-11 and AR73511-2.

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

(1) Inventory section contents 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 van body.

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.

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

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

e. 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
8 in. Adjustable Wrench	1
Cross Tip Screwdriver	1
Flat Tip Screwdriver	1
Spring Scale	1
Padlock	1
Flashlight	1

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

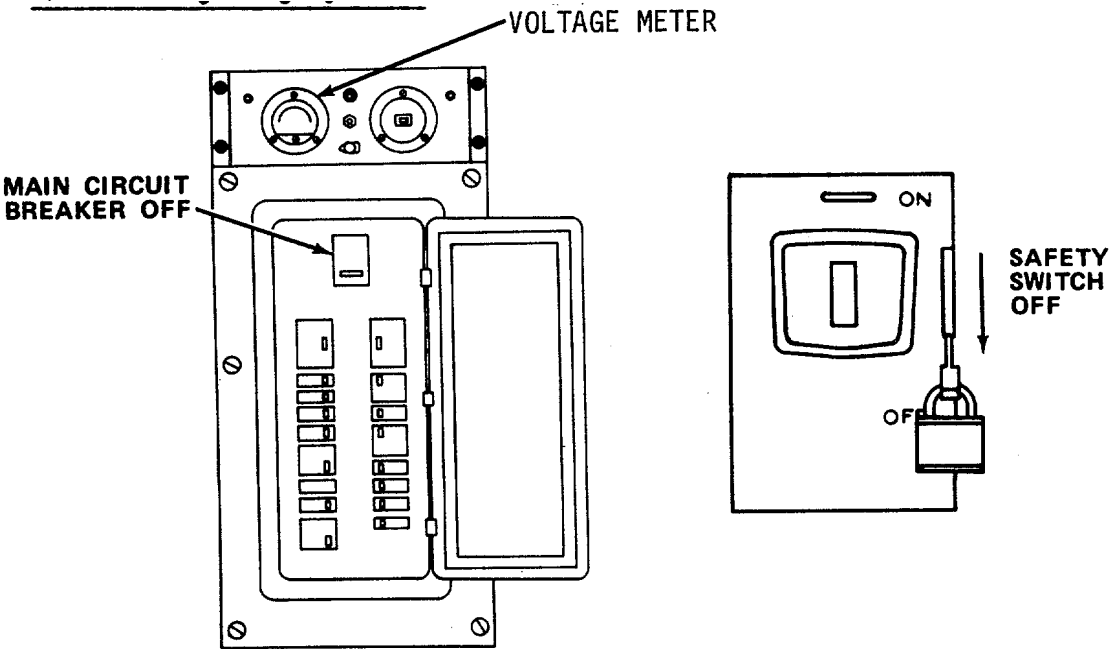
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE
1	M	<p><u>VAN BODY</u></p> <p><u>Service Air Conditioner/Heater.</u> Refer to TM 5-4120-367-14 for preventive maintenance checks and services.</p>
2	M	<p><u>Service Lighting System.</u></p> <div style="text-align: center;">  <p>VOLTAGE METER</p> <p>MAIN CIRCUIT BREAKER OFF</p> <p>SAFETY SWITCH OFF</p> </div> <p style="text-align: center;">WARNING</p> <p>Do not open or service electrical connections, cables, or switches until main power is OFF, circuit is tagged, and voltage meter confirms circuit is not energized. Death may result from failure to observe these safety precautions.</p> <p>1. Turn main circuit breaker OFF. Turn safety switch OFF.</p>

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

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

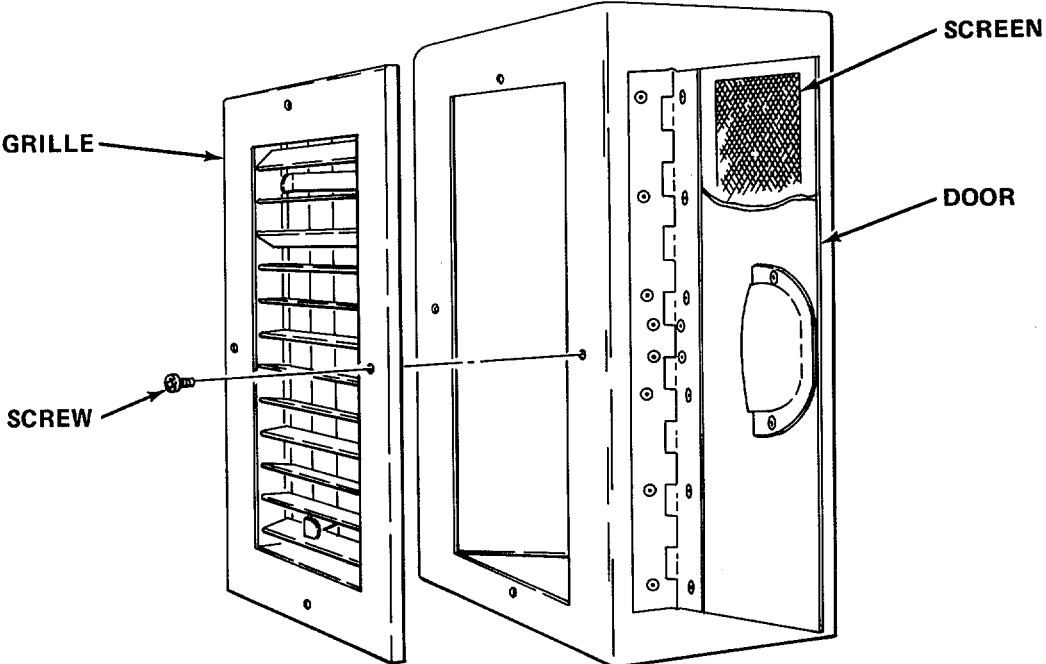
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE
2	M	<p><u>VAN BODY - Cont</u></p> <p>Service Lighting System - Cont</p> <ol style="list-style-type: none"> 2. Padlock safety switch. 3. Tighten all loose screws, bolts, and clamps. 4. Check which switches, switch plate outlets, receptacles, and posts require repair. 5. Check for loose screws and nuts on ceiling, console lights, circuit breaker panels, and conduits. 6. Remove padlock from safety switch. 7. Turn ON main circuit breaker and safety switch.
3	M	<p><u>Service Air Vent.</u></p>  <ol style="list-style-type: none"> 1. Remove screws from front of grille.

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
3	M	<p><u>VAN BODY - Cont</u></p> <p><u>Service Air Vent - Cont</u></p> <ol style="list-style-type: none"> 2. Remove front grille. 3. Using vacuum cleaner, clean two screens on side doors. Vacuum inside of air vent. 4. Reinstall grille and secure with screws.
4	M	<p><u>Inspect Fire Extinguisher.</u></p> <div style="text-align: center;"> </div> <ol style="list-style-type: none"> 1. Remove from mounting bracket. Check free movement of bracket. 2. Inspect nozzle and adapter assembly for damage. 3. Inspect seal. Check that it is not broken. <p>S</p> <ol style="list-style-type: none"> 4. Weigh cylinder. Replace if gross weight has decreased by 6 oz (170 g) or more.

1-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.

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

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

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

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).

Step 2. Check for continuity of lamp ballast.

- (a) If continuity exists, proceed to step 3.
- (b) If continuity does not exist, replace ballast (paragraph 1-16.1).

Table 1-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. FLUORESCENT CEILING LAMP IS INOPERATIVE Cont	Step 3. Check RF filter for shorts.	(a) If shorted, replace RF filter (paragraph 1-16.2). (b) If not shorted, repair or replace lamp wiring.
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).

1-16. MAINTENANCE PROCEDURES

a. This section contains instructions covering organizational maintenance functions for the Maintenance 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 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
Replace Ventilation Fan Cover	1-16.10
Replace Emergency Light Assembly	1-16.11
Repair Blackout Curtain	1-16.12
Repair Van Body Skin (Temporary).....	1-16.13
Replace Tiedown Socket	1-16.14
Replace Level Indicator	1-16.15
Replace Air Vent Screen	1-16.16
Replace Air Vent Cover.....	1-16.17
Repair Personnel Ladder	1-16.18

1-16.1 Replace Fluorescent Lamp Ballast.

MOS: 35E, Special Electronic Devices Repairer

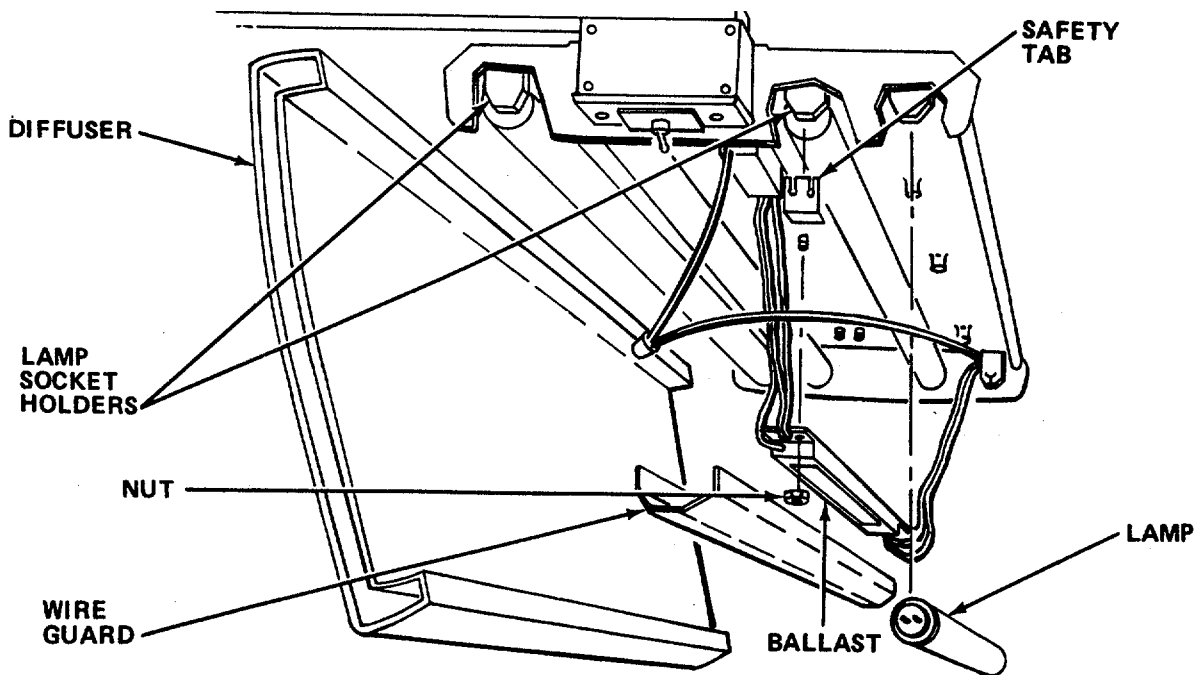
TOOLS: Flat Tip Screwdriver
 1/4 in. Wrench
 1/4 in. Drive Socket Set
 Scribe

SUPPLIES: Lamp Ballast
 Wire Ties

WARNING

Death or serious injury may result unless overhead lamp switch is turned off before working on light fixture.

- a. Turn off overhead light circuit breaker and main circuit breaker.
- b. Remove diffuser from light fixture.
- c. Remove safety tabs and lamps. Place in diffuser.
- d. Squeeze lamp wiring guard and remove.
- e. Remove wire ties as required.



f. Tag wires from ballast for reference.

- f. Tag wires from ballast for reference.

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

NOTE

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

- n. Reinstall wire guard.
- o. Reinstall lamps and safety tabs.
- p. Reinstall diffuser.
- q. Turn on overhead light circuit breaker and main circuit breaker.

1-16.2 Replace Radio Frequency (RF) Filter.

MOS: 35E, Special Electronic Devices Repairer

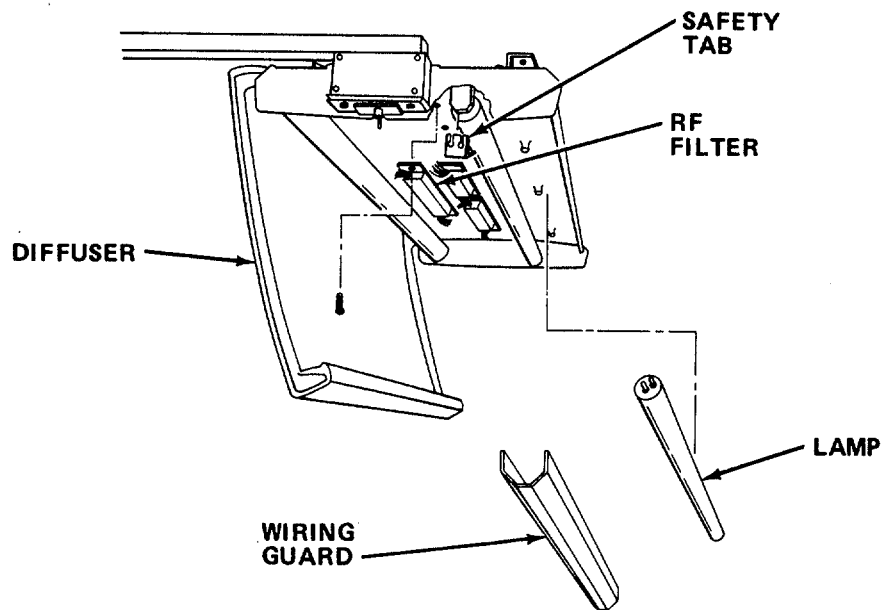
TOOLS: Flat Tip Screwdriver
1/4 in. Wrench
1/4 in. Drive Socket Set

SUPPLIES: RF Filter
Wire Ties

WARNING

Death or serious injury may result unless overhead lamp 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 lamp 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.

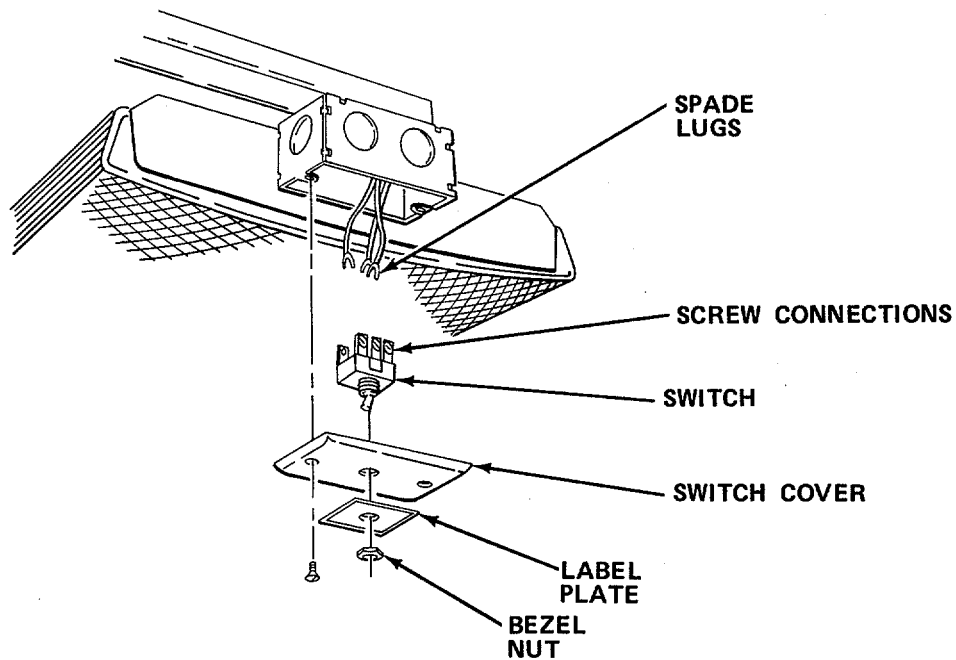
- m. Reinstall wire guard.
- n. Reinstall lamps and safety tabs.
- o. Reinstall diffuser.
- p. Turn on light switch.

1-16.3 Replace Fluorescent Lamp Switch.

MOS: 35E, Special Electronic Devices 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. Aline cover plate with holes and secure with screws.
- j. Turn on circuit breaker.

1-16.4 Replace On/Off Switch.

MOS: 35E, Special Electronic Devices Repairer

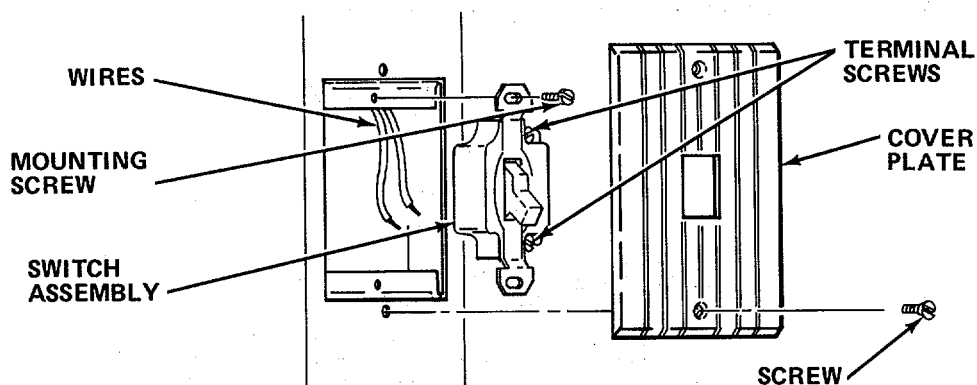
TOOLS: Flat Tip Screwdriver

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. Tag and disconnect wires.
- g. Install new switch.
- h. Reconnect wires.
- i. Guide switch into wire guide, alining holes.

NOTE

Be sure wires are not kinked or strained.

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

1-16.5 Replace Microswitch.

MOS: 35E, Special Electronic Devices Repairer

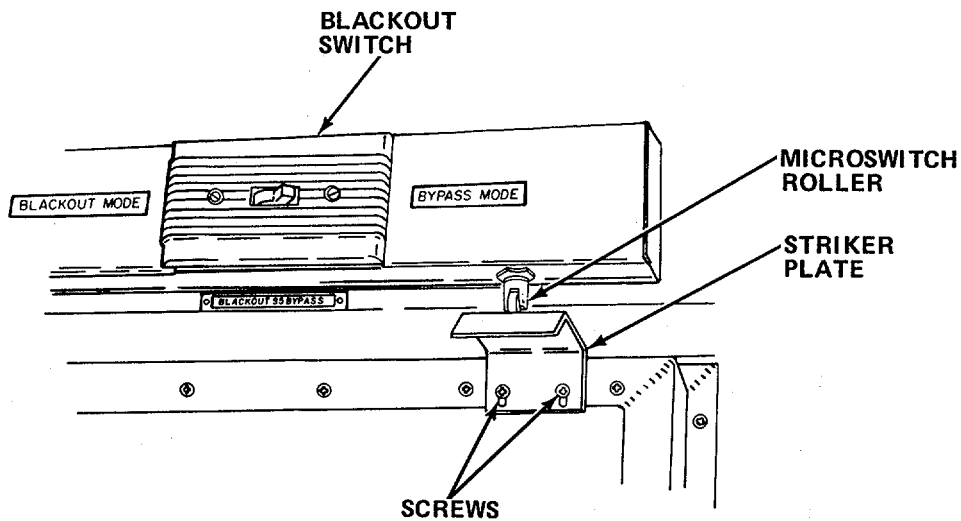
TOOLS: Flat Tip Screwdriver
6 in. Adjustable Wrench

SUPPLIES: Microswitch

WARNING

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

- a. Turn off blackout circuit breaker.



- b. Remove conduit cover.
c. Remove nut and pull out switch to allow access to wiring.
d. Tag and remove wires from switch.
e. Install wires on new switch.
f. Install switch and secure with nut.
g. Adjust striker plate until plate contacts roller.
h. Replace conduit cover.
i. Turn on circuit breaker.

1-16.6 Replace Receptacle.

MOS: 35E, Special Electronic Devices Repairer

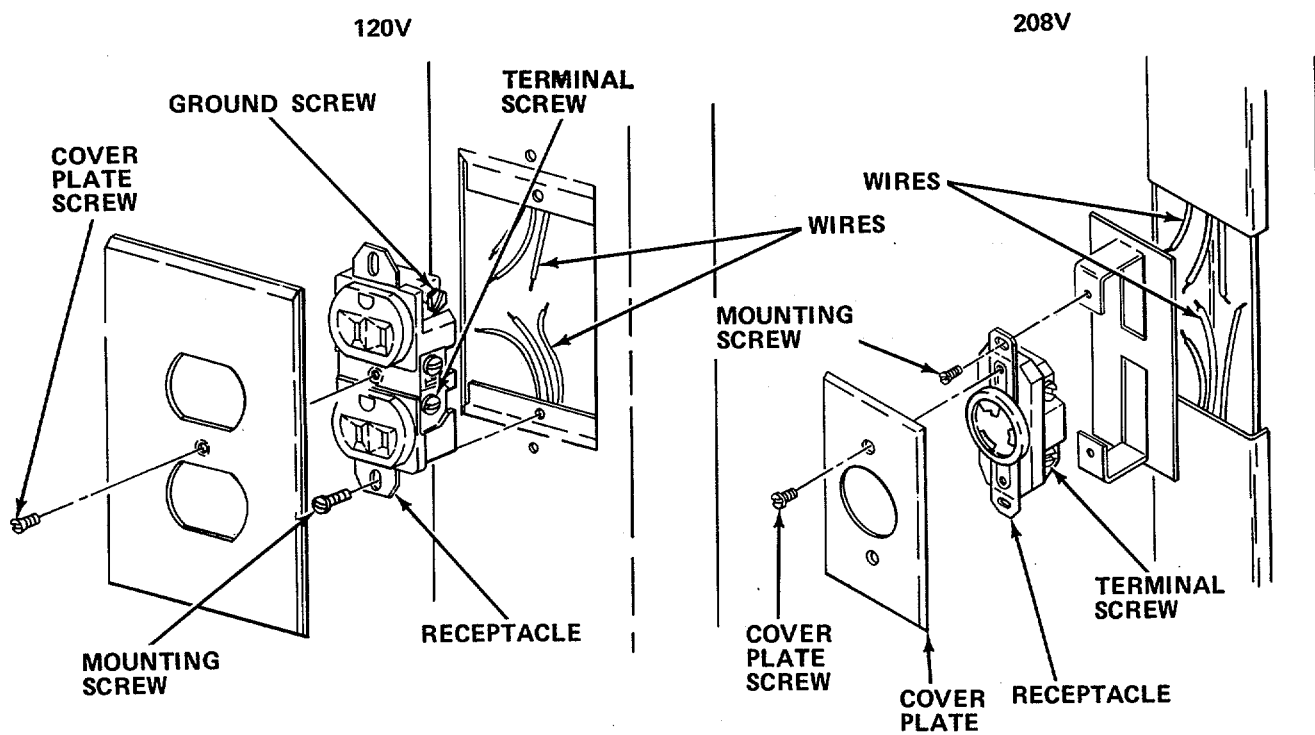
TOOLS: Flat Tip Screwdriver

SUPPLIES: Receptacle

WARNING

Death or serious injury may result 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. Tag and 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.

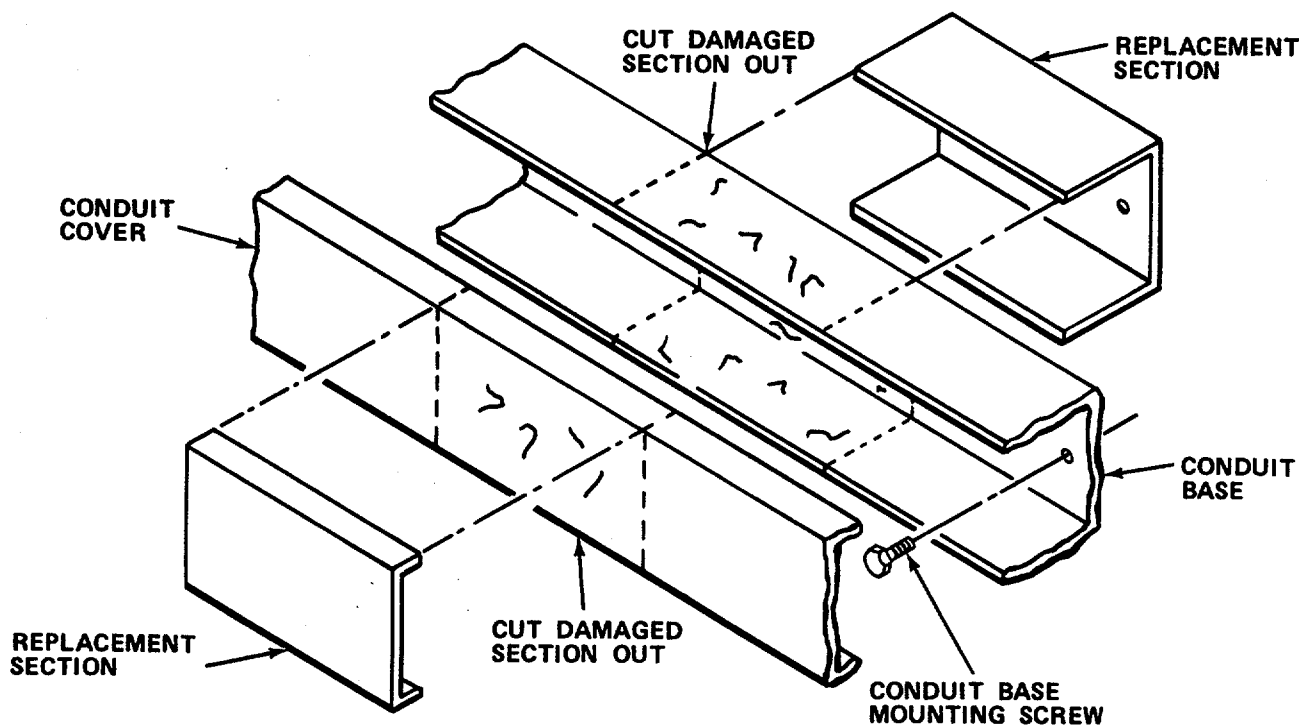
- j. Secure receptacle with screws.
- k. Reinstall cover plate. Secure with screws.
- l. Turn on receptacle circuit breaker.

1-16.7 Replace Wire Molding.

MOS: 35E, Special Electronic Devices Repairer

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

SUPPLIES: Paint (Item 14, Appendix E)
 Cheesecloth (Item 4, Appendix E)
 Conduit Base
 Conduit Cover
 Padlock



WARNING

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

NOTE

Alternate lighting is required to perform this task.

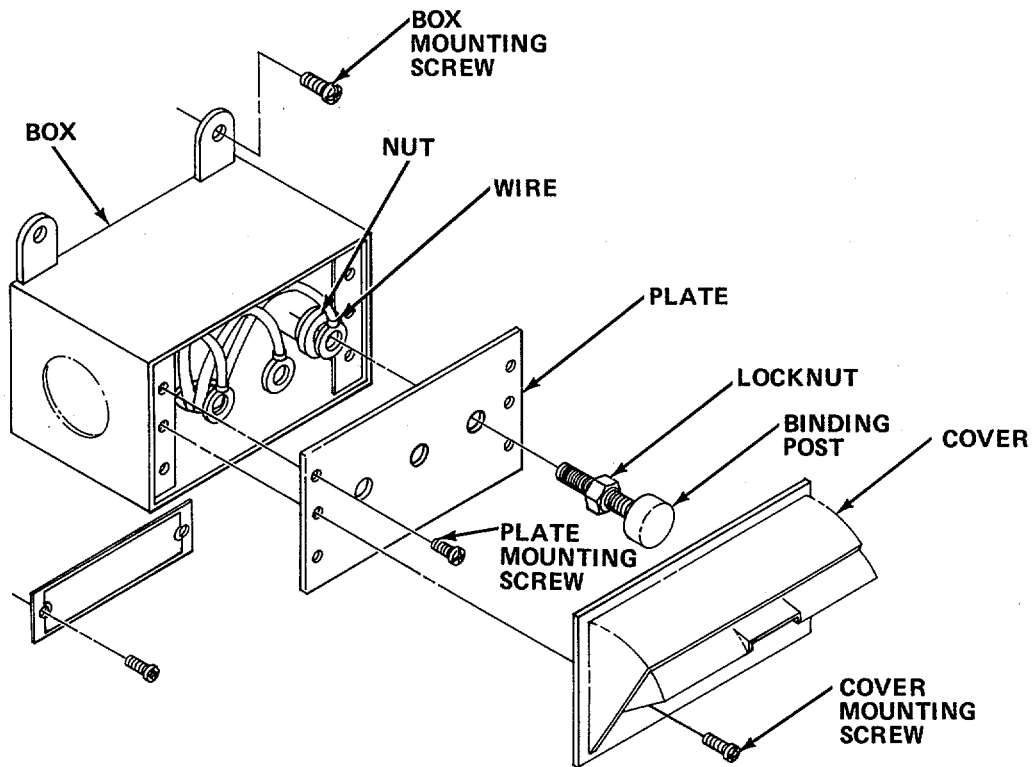
- a. Turn off and padlock safety switch.
- b. Remove conduit cover.
- c. Inspect wires for damage. Repair damaged wiring.
- d. Loosen wiring and carefully pull it from the entire base section.
- e. Remove screws and conduit base from wall.
- f. Mark and measure damaged area on molding. Record measurement.
- 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: 35E, Special Electronic Devices Repairer

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

SUPPLIES: Binding Post Box
Binding Posts



- a. Remove cover mounting. 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: 35E, Special Electronic Devices Repairer

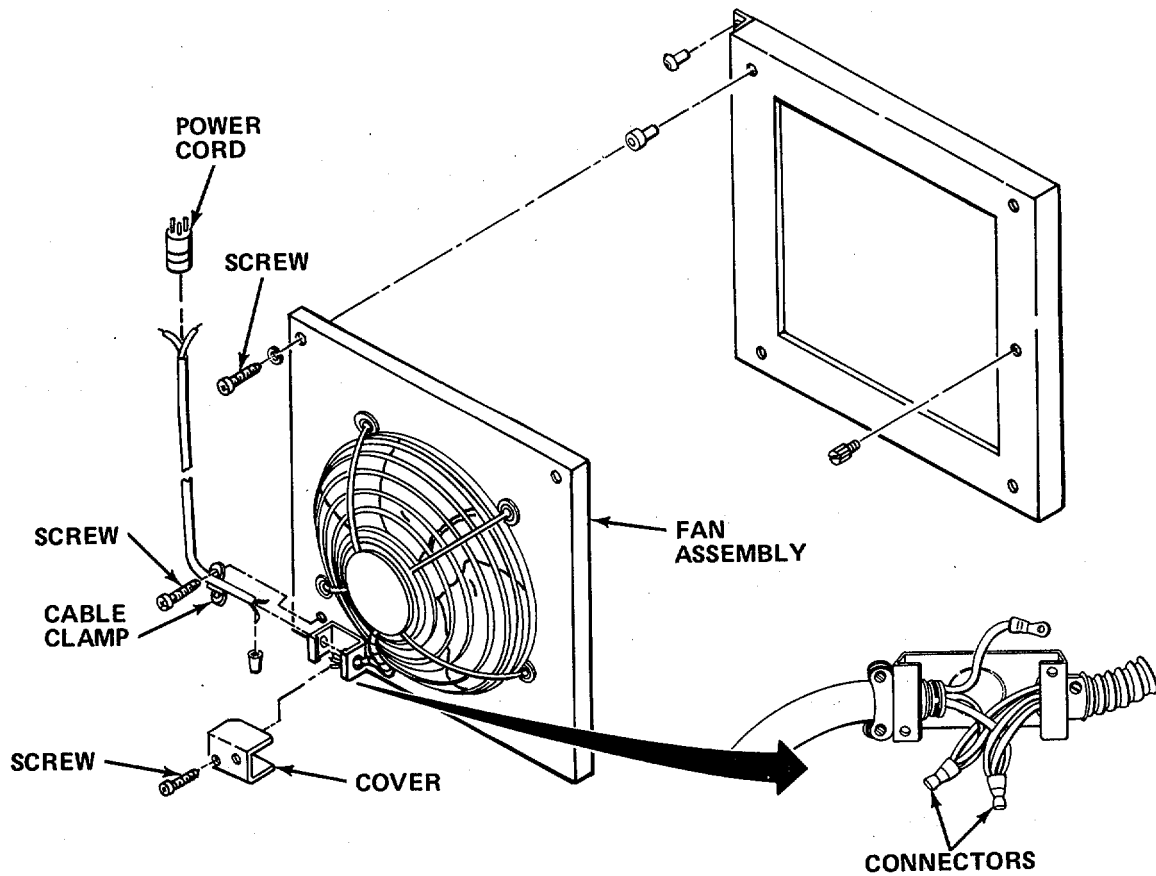
TOOLS: Flat Tip Screwdriver
Cross Tip Screwdriver
Wire Cutters

SUPPLIES: Fan Assembly
Wire Nuts
Power Cord

WARNING

Death or serious injury could result if power is left on. Turn fan switch off and disconnect 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.

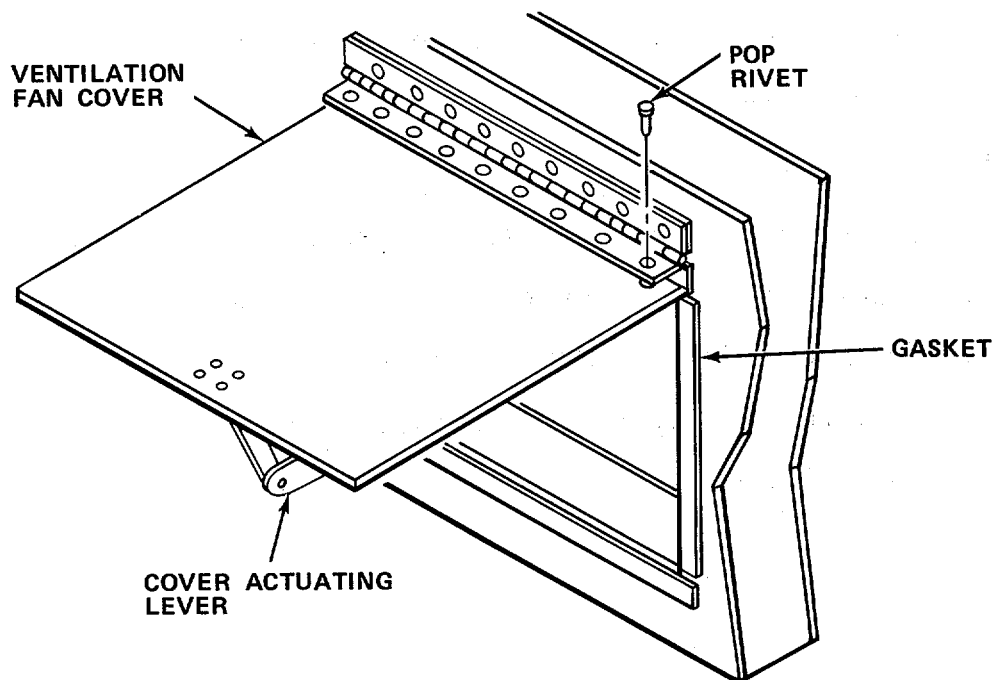
- d. Remove screws and cover.
- e. Tag wires and cut connectors from wires.
- f. Remove power cord from defective fan assembly.
- g. Install new fan.
- h. Install new power cord.
- i. Connect wires with connectors and remove tags.
- j. Tighten cable clamp screws.
- k. Reinstall cover. Secure with screws.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

1-16.10 Replace Ventilation Fan Cover.

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

TOOLS: Drill and Bits
Pop Rivet Gun
Scraper

SUPPLIES: Pop Rivets
Ventilation Fan Cover
Gasket
Solvent P-D-680 (Item 21, Appendix E)
Adhesive (Item 1, Appendix E)
Cheesecloth (Item 4, Appendix E)
Impermeable Gloves
Goggles



- a. Drill pop rivets from hinged cover to remove vent cover.
- b. 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).
- Fumes and chemicals used may result in death or blindness if personnel do not use proper ventilation.

- c. Scrape gasket off van body and clean area with solvent.
- d. Secure new gasket to section with adhesive.
- e. Aline ventilation fan vent cover and pop rivet to hinge.
- f. Check cover for tightness of closure.

1-16.11 Replace Emergency Light Assembly.

MOS: 35E, Special Electronic Devices 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.

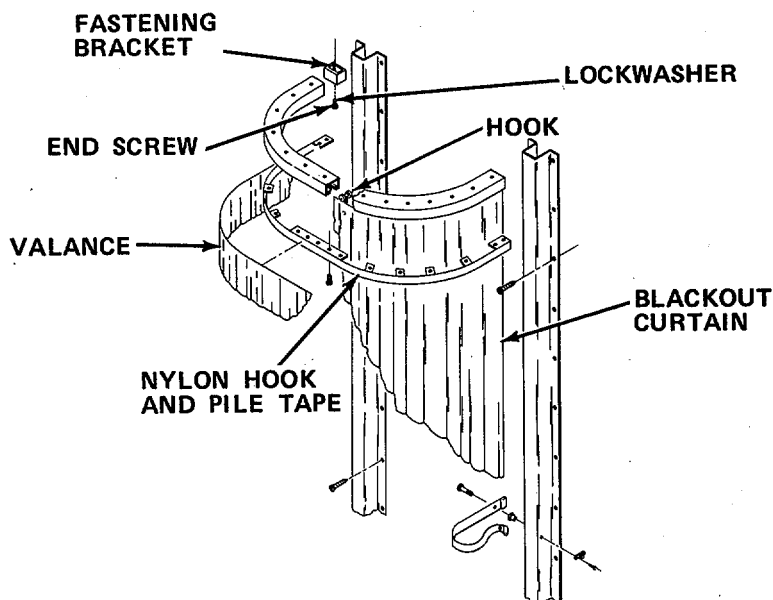
- a. Unplug power cord.
- b. Remove cover screws. Move cover out of way.
- c. Remove mounting screws.
- d. Remove emergency light assembly.
- e. Install new emergency light assembly. Secure with screws.
- f. Secure cover with screws.
- g. Plug in power cord.

1-16.12 Repair Blackout Curtain.

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

TOOLS: Cross Tip Screwdriver

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



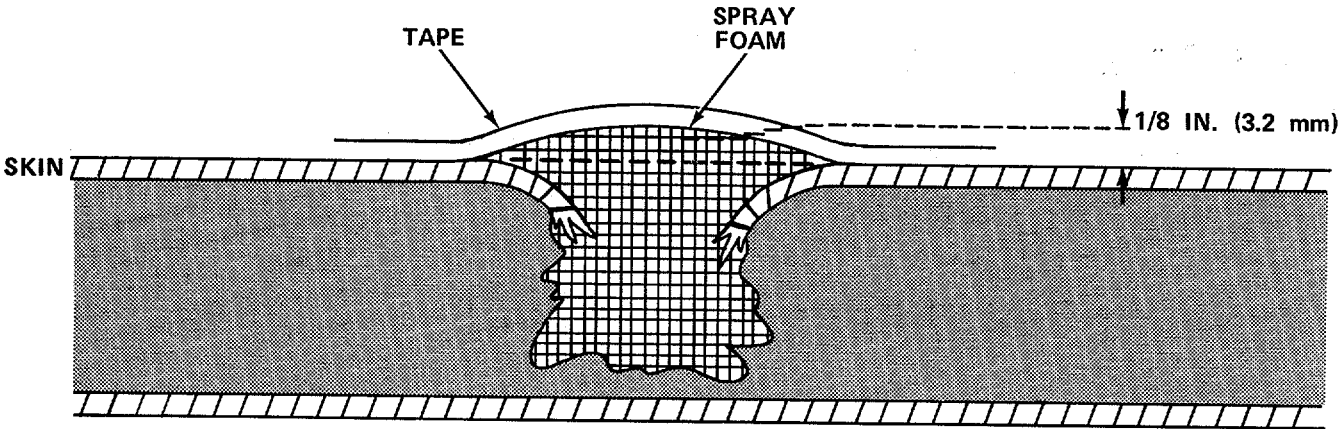
- a. Remove curtain from hooks.
- b. Pull curtain and valance from nylon hook and pile tape.
- c. Remove end screw, lockwasher, and fastening bracket from ceiling.
- d. Replace damaged hooks.
- e. Reinstall fastening bracket with hooks. Fasten with end screw and lockwasher.
- f. Glue nylon hook and pile 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 24, Appendix E)
Silicone Sealant (Item 19, Appendix E)
Sprayfoam (Item 23, Appendix E)



- a. Bend broken edges of punctured skin inward into puncture hole. Do not attempt to remove fragments of skin by bending or pulling outward. Bend skin inward only enough to put broken edges below surface of unbroken skin.
- b. Remove any loose fragments of foam which are not now held in place by bent broken skin. Removing small pieces of foam or dust is more important than removing chunks.
- c. Using cloth slightly dampened with water, wipe area around puncture to remove any dirt or mud and wipe dry.
- d. Inject sprayfoam into puncture. Mound sprayfoam to about 1/8 in. (3.2 mm) above surface of unbroken skin. Apply bead of sealant about 1/4 in. (6.4 mm) wide over all cuts in skin leading out from puncture. Do not smooth out sealant.
- e. Plan how puncture is to be covered with tape before applying any tape. Length and width of tape, number of tape strips, overlapping, and how tape is applied will affect sealing capability of repair. Each piece of tape should extend about 1-1/2 in. (38.1 mm) beyond sealant it will cover. If this will require more than one strip of tape, tape should overlap about 1/2 in. (12.7 mm). If three or more strips of tape are required, center strip should be applied first.

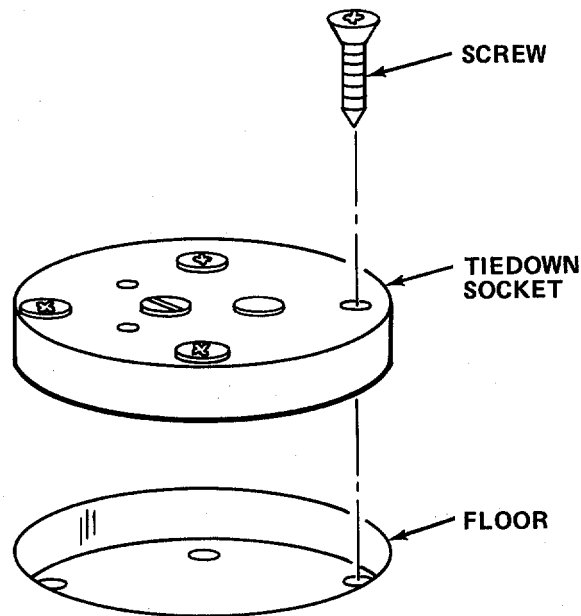
- f. Holding it taut, apply tape perpendicular to panel skin. Do not apply with rolling motion either end-to-end or center-to-ends. Do not rub each strip in place individually. Apply all strips lightly with proper overlap and rub into place.
- g. If necessary, damaged tape can be replaced; however, it should be removed with careful peeling motion to avoid damage to sealant. If sealant also peels back, new sealant should be applied. Complete removal of old sealant is not necessary. Permanent repair by direct support, or higher level of maintenance, should be made as soon as possible.

1-16.14 Replace Tiedown Socket.

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

TOOLS: Cross Tip Screwdriver
Flat Tip Screwdriver

SUPPLIES: Tiedown Socket



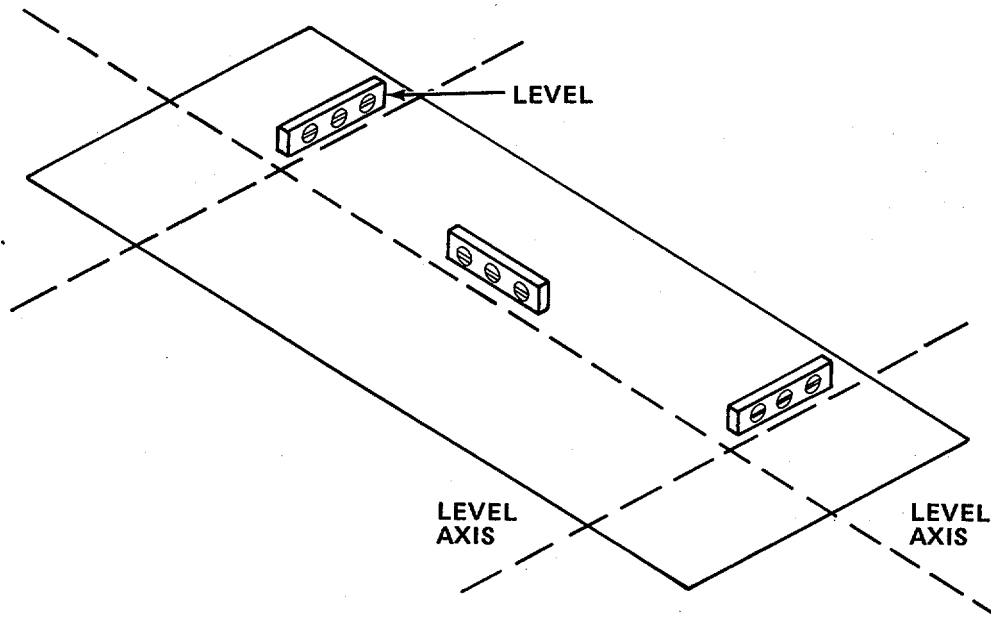
- a. Remove screws from tiedown socket.
- b. Pry defective socket from floor.
- c. Install new tiedown socket. Rotate new tiedown socket enough to avoid installing screws in old screw holes.
- d. Reinstall screws.

1-16.15 Replace Level Indicator.

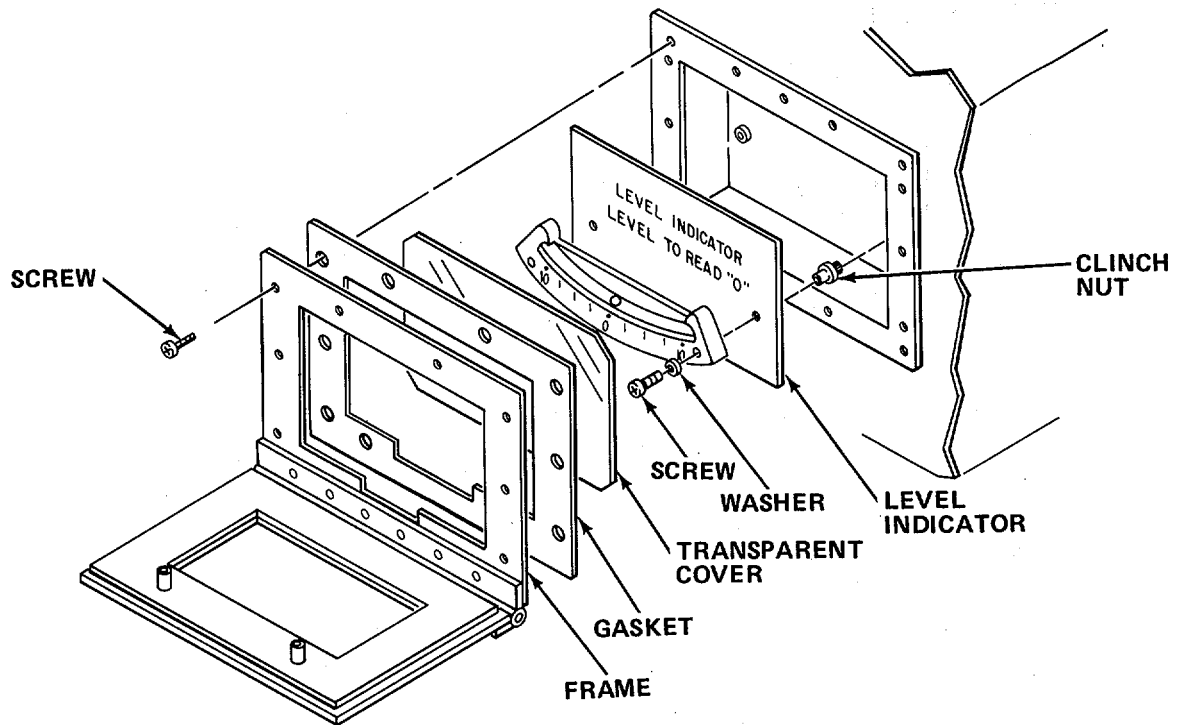
MOS: 41B, Topographic Instrument Repair Specialist
 or
 83FJ6, Reproduction Equipment Repairer

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 shown by carpenter's level at front-rear and left-right at each end.



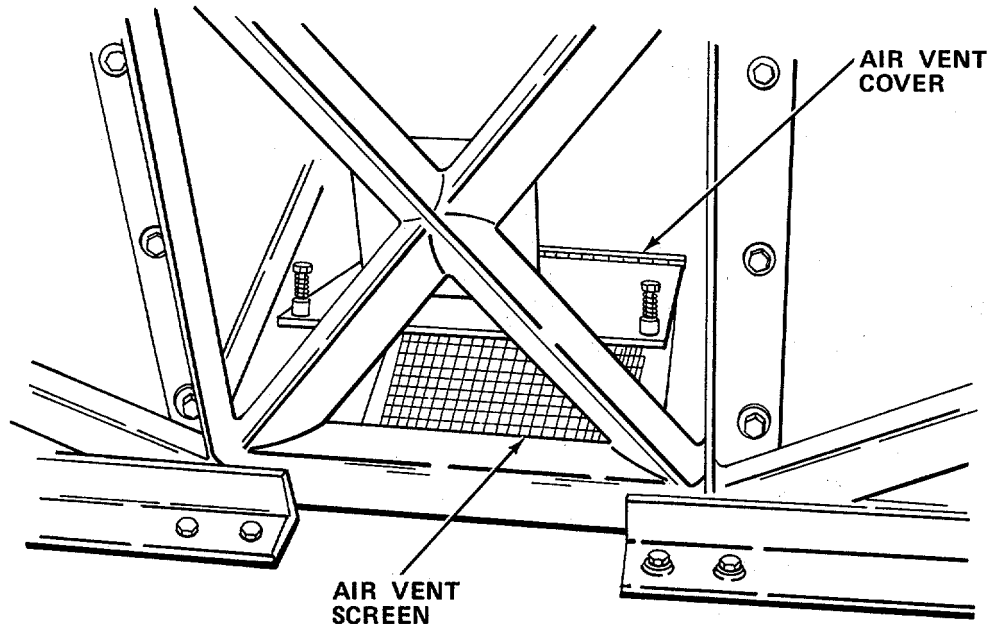
- c. Remove screws and washers to release frame and gasket.
- d. Remove transparent cover.
- e. Remove screws and washers to remove level indicator.
- f. Replace level indicator and secure with screws and washers.
- g. Reinstall transparent cover.
- h. Install new gasket.
- i. Reinstall frame and secure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

1-16.16 Replace Air Vent Screen.

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

TOOLS: Cross Tip Screwdriver
Scissors

SUPPLIES: Rubber Adhesive (Item 1, Appendix E)
Screen, Nylon (Item 18, Appendix E)



- a. Raise access cover and remove screws holding screen frame on 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 van and secure with screws. Lower cover.

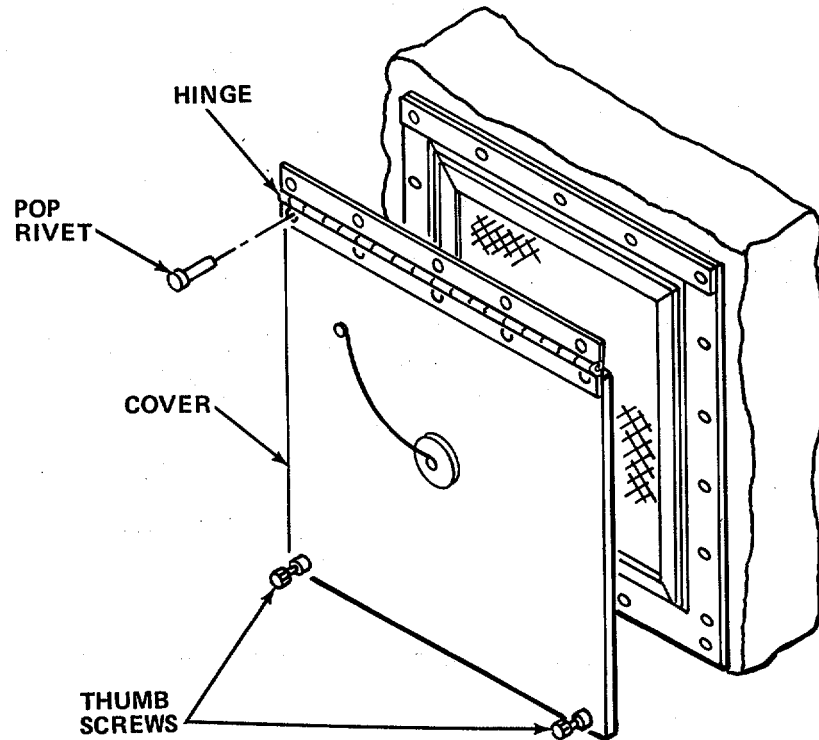
1-16.17 Replace Air Vent Cover.

MOS: 41B, Topographic Instrument Repair Specialist
or

83FJ6, Reproduction Equipment Repairer

TOOLS: Drill and Bits
Pop Rivet Gun

SUPPLIES: Vent Cover
Pop Rivets



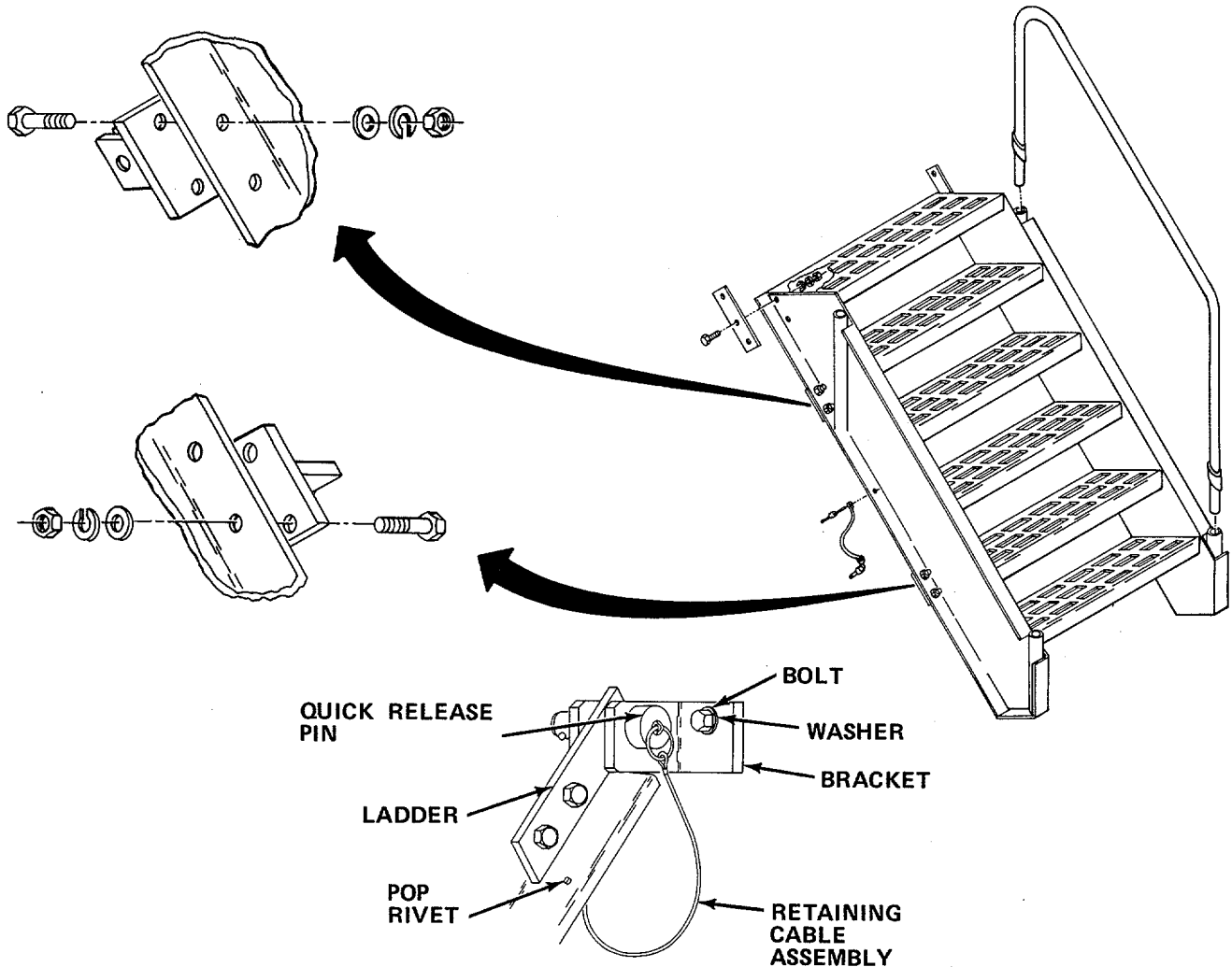
- a. Loosen thumbscrews.
- b. Drill pop rivets from hinge. Remove air vent cover.
- c. Aline holes and pop rivet new cover to section.
- d. Tighten thumbscrews.

1-16.18 Repair Personnel Ladder.

MOS: 63W, Wheeled Vehicle 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 rivet out.

- d. Reinstall or install new mounting brackets. Secure with bolts, washers, and nuts.
- e. Rivet new cable assembly with quick release pin to ladder.
- f. Check that ladder mounting brackets fit section on rear door and under personnel doors.

1-17. PREPARATION FOR STORAGE OR SHIPMENT.

- a. Section may be stored or shipped either mounted on chassis or unmounted. Preparation of chassis is covered in TM 5-2330-305-14 and should be referred to when mounted section is prepared for storage and shipment. TM 5-4120-367-14 must be reviewed for instructions covering air conditioner/heater.
- b. Remove consumable supplies that have limited shelf life or broken seals. Replace missing items and be sure that all remaining consumable supplies are at authorized levels. Be sure all major components are operational.
- c. Remove all unauthorized or personal equipment from section.
- d. Remove all classified material or sensitive data and place in 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; 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, IMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

1-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-328-24P 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 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 is not corrected by a listed corrective action, notify your supervisor.

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

Table 1-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. PERSONNEL/CARGO DOORS DO NOT CLOSE COMPLETELY.

Step 1. Check that latch rollers rotate freely.

Replace latches (paragraph 1-20.2).

Step 2. Check to see if latch rods are bent.

Replace latch rods (paragraph 1-20.2).

Step 3. Check to see if door gasket is torn or broken.

Replace door gasket (paragraph 1-20.3).

2. PERSONNEL/CARGO DOORS DO NOT LATCH PROPERLY.

Check door latch for missing or damaged components.

Replace door latch (paragraph 1-20.2).

3. AIR OR WATER ENTERS SECTION AROUND DOOR.

Check to see if door gasket is torn or broken.

Replace door gasket (paragraph 1-20.3).

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

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

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

WARNING

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

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

Connect power cable.

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

Notify your supervisor for service of power supply at source.

5. CIRCUIT BREAKERS TRIP CONTINUALLY.

WARNING

Turn off 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 receptacles are overloaded.

Reconnect equipment to different receptacles.

Step 2. Check to see if receptacles are damaged.

Replace receptacles (paragraph 1-16.6).

1-20. MAINTENANCE PROCEDURES.

- a. This section contains instructions covering direct/general support maintenance functions for the Maintenance 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

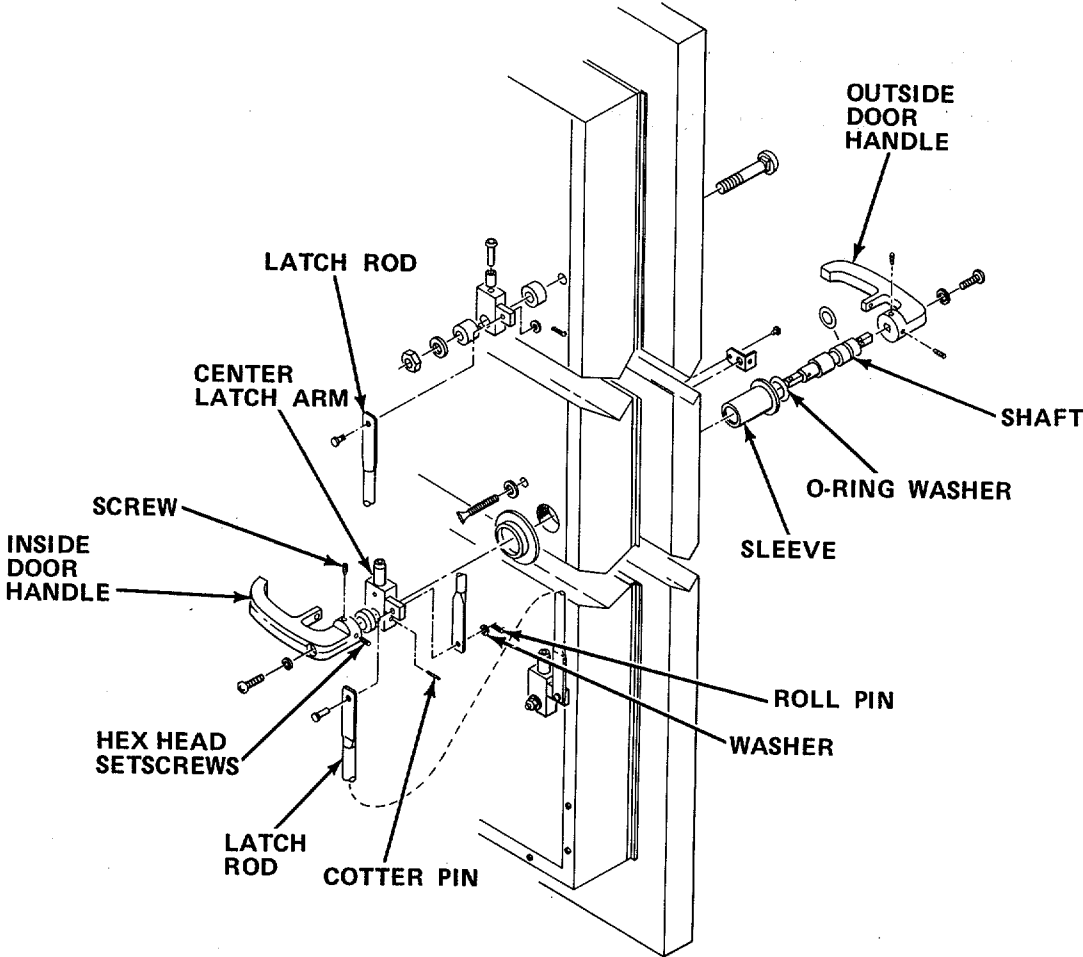
PROCEDURE	PARAGRAPH
Repair Personnel Door Handle.....	1-20.1
Replace Cargo Door Latch Assembly	1-20.2
Replace Personnel/Cargo Door Gasket	1-20.3
Replace Personnel/Cargo Door.....	1-20.4
Replace Circuit Breaker	1-20.5
Repair Floor Covering.....	1-20.6
Repair Van Body Skin (Permanent).....	1-20.7
Replace 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, Wheeled Vehicle Repairer
 TOOLS: Cross Tip Screwdriver
 Needle Nose Pliers
 15/16 in. Combination Wrench
 Hammer
 Center Punch
 1/8 in. Hex Head Key Wrench

- SUPPLIES: O-Ring Washer
 Sleeve
 Roll Pin
 Personnel Door Handle
 Cheesecloth (Item 4, Appendix E)
 Oil, Lubricating, General Purpose (Item 10, Appendix E)
 Hand Oiler
 Cotter Pin



a. Loosen screw and two hex head setscrews. Remove defective inside door handle.

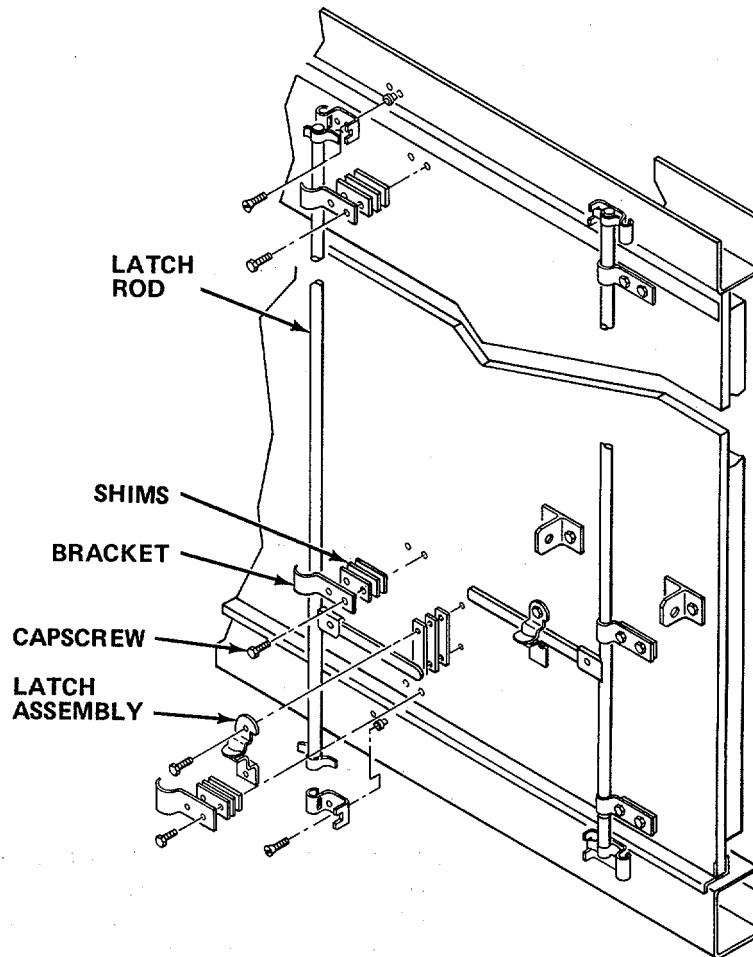
- b. Remove cotter pin and pins from center latch arm assembly.
- c. Move latch rods out of way.
- d. Punch roll pin from center latch arm assembly and pull latch arm assembly from shaft.
- e. Withdraw latch and defective door handle.
- f. Inspect components for wear.
- g. Replace worn O-ring washer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

1-20.2 Replace Cargo Door Latch Assembly.

MOS: 63W, Wheeled Vehicle Repairer

TOOLS: 9/16 in. Combination Wrench

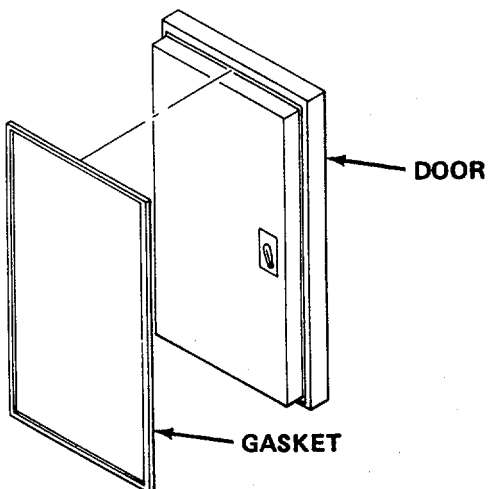
SUPPLIES: Cargo Door Latch Assembly



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

1-20.3 Replace Personnel/Cargo Door Gasket

MOS: 63W, Wheeled Vehicle Repairer
TOOLS: Knife
SUPPLIES: Vinyl Gasket
Adhesive (Item 1, Appendix E)
Solvent P-D-680 (Item 21, 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. Flashpoint of solvent is 1000 F to 1380 F (38° c to 590 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, Wheeled Vehicle Repairer

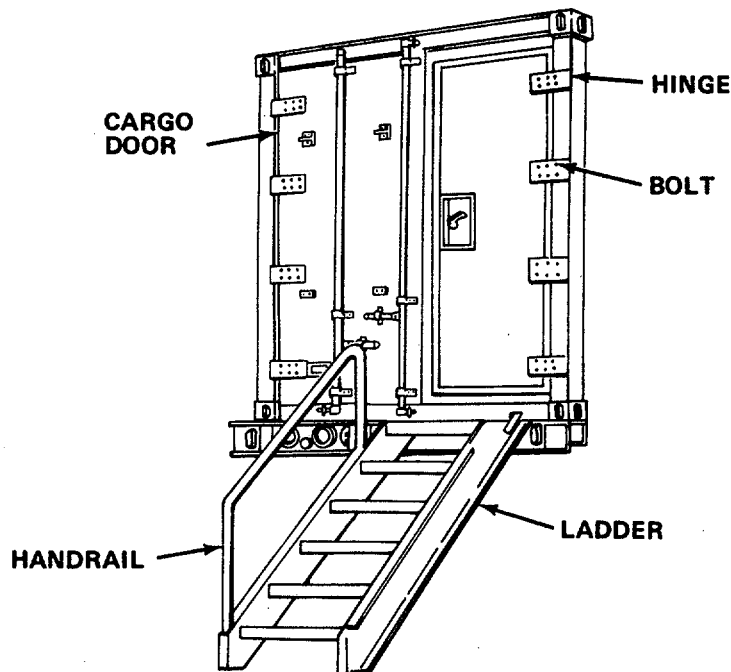
PERSONNEL: Two persons are required to perform this procedure.

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

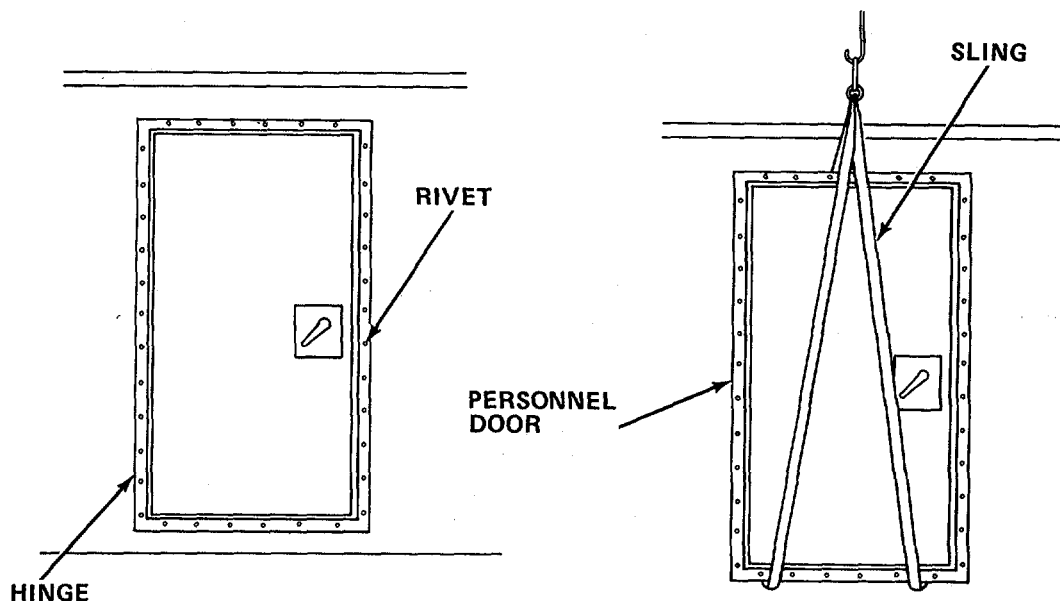
SUPPLIES: Personnel/Cargo Door
 Pop Rivets
 Vinyl Gasket
 Paint (Items 13, 13A and 13B, Appendix E)
 Paint (Item 14, Appendix E)
 Adhesive (Item 1, Appendix E)
 Cheesecloth (Item 4, Appendix E)

WARNING

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



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



- c. Place sling around door and put a slight strain on hoist to remove weight from hinges.
- d. Remove bolts from hinges on rear personnel door. On side personnel door, drill out pop rivets from hinges. 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 gasket on door after it is mounted (paragraph 1-20.3).
- j. Repaint door as needed.
- k. Close and lock door.

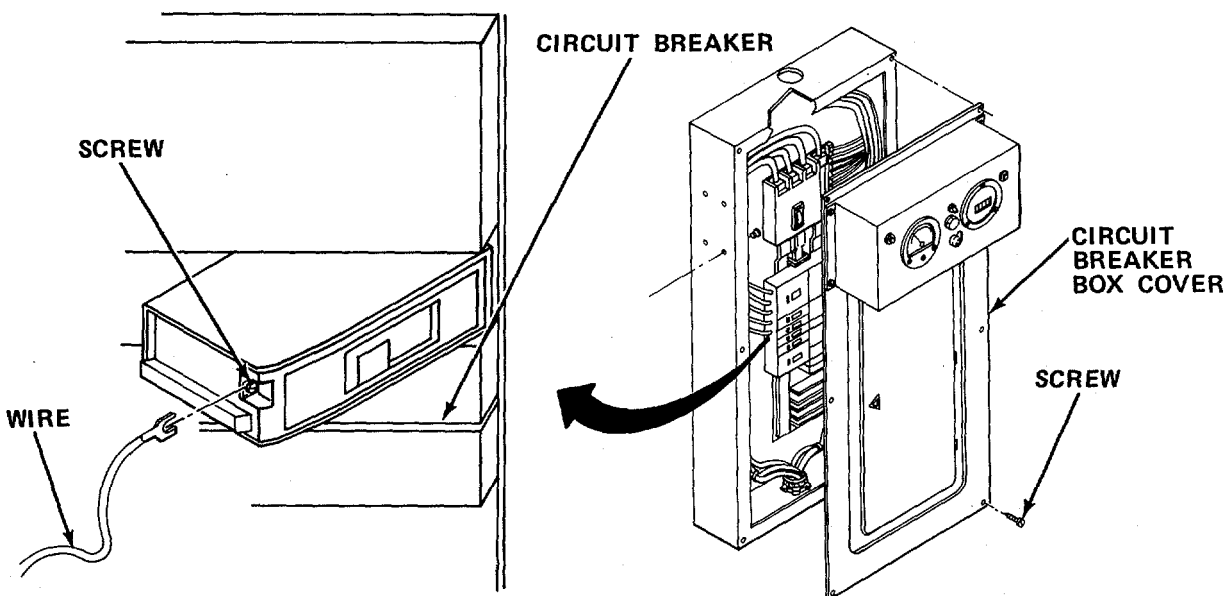
1-20.5 Replace Circuit Breaker.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver

Multimeter

SUPPLIES: Circuit Breaker

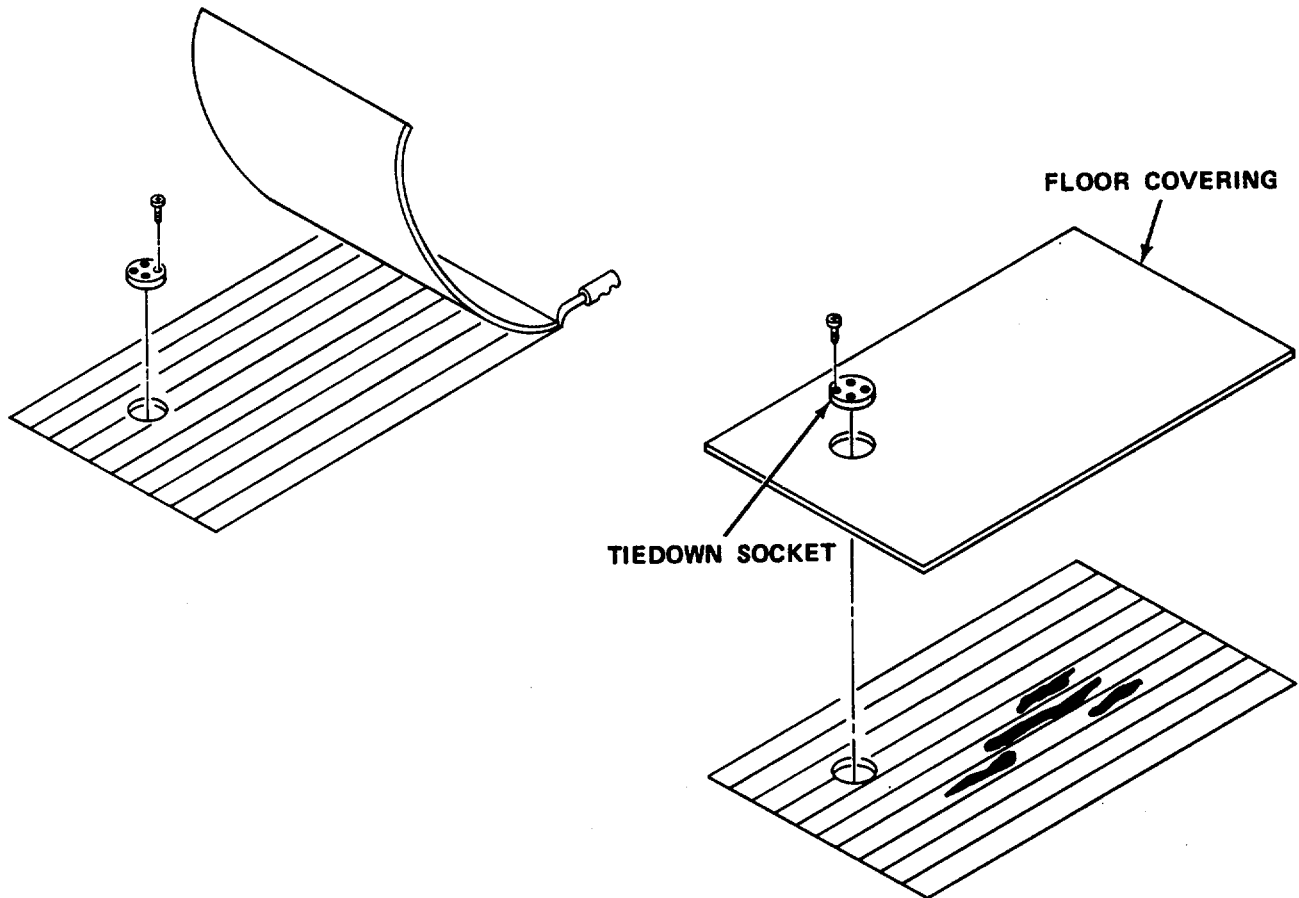
**WARNING**

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

- a. Turn off and padlock safety switch. Turn off individual circuit breakers.
- b. Remove circuit breaker box cover.
- c. Use multimeter to make sure voltage is completely off.
- d. Remove defective circuit breaker by pushing and snapping out of place.
- e. Tag and disconnect wires from defective circuit breaker.
- f. Reconnect wires to new circuit breaker. Secure wires with screw.
- g. Install new circuit breaker by pushing and snapping into place.
- h. Reinstall circuit breaker box cover.
- i. Remove padlock and turn on safety switch and individual circuit breakers.

1-20.6 Repair Floor. Covering.

MOS: 52C, Utilities Equipment Repairer

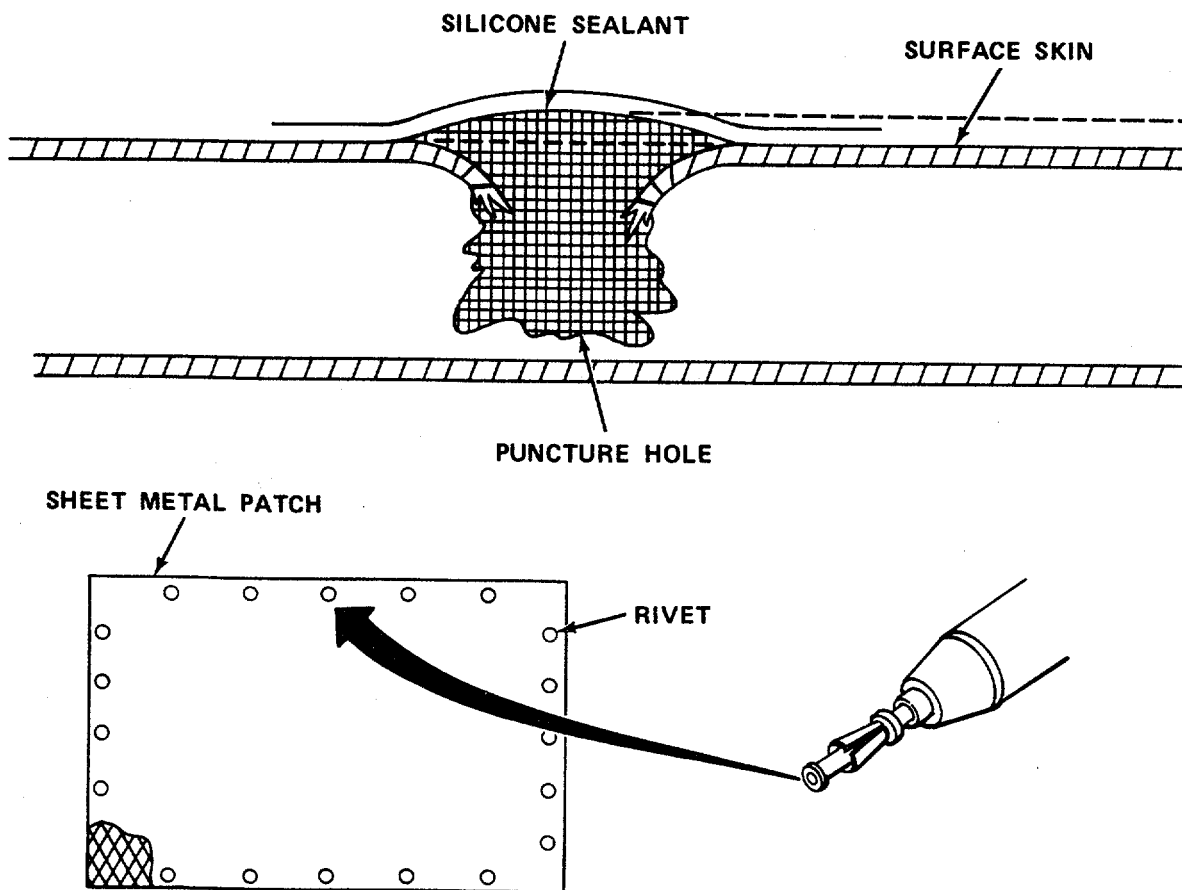
TOOLS: Utility Knife
Cross Tip Screwdriver
Scraper
StraightedgeSUPPLIES: Vinyl Floor Covering
Epoxy Resin (Item 17, Appendix E)
Floor Covering Patch (Item 7, Appendix E)
Cheesecloth (Item 4, Appendix E)

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

1-20.7 Repair Van Body Skin (Permanent).

- MOS: 63W, Wheeled Vehicle Repairer
 TOOLS: Pop Rivet Gun
 Electric Drill and Bits
 Paint Brush
 SUPPLIES: Pop Rivets
 Sprayfoam (Item 23, Appendix E)
 Silicone Sealant (Item 19, Appendix E)
 Sheet Metal
 Paint (Items 13, 13A and 13B, Appendix E)

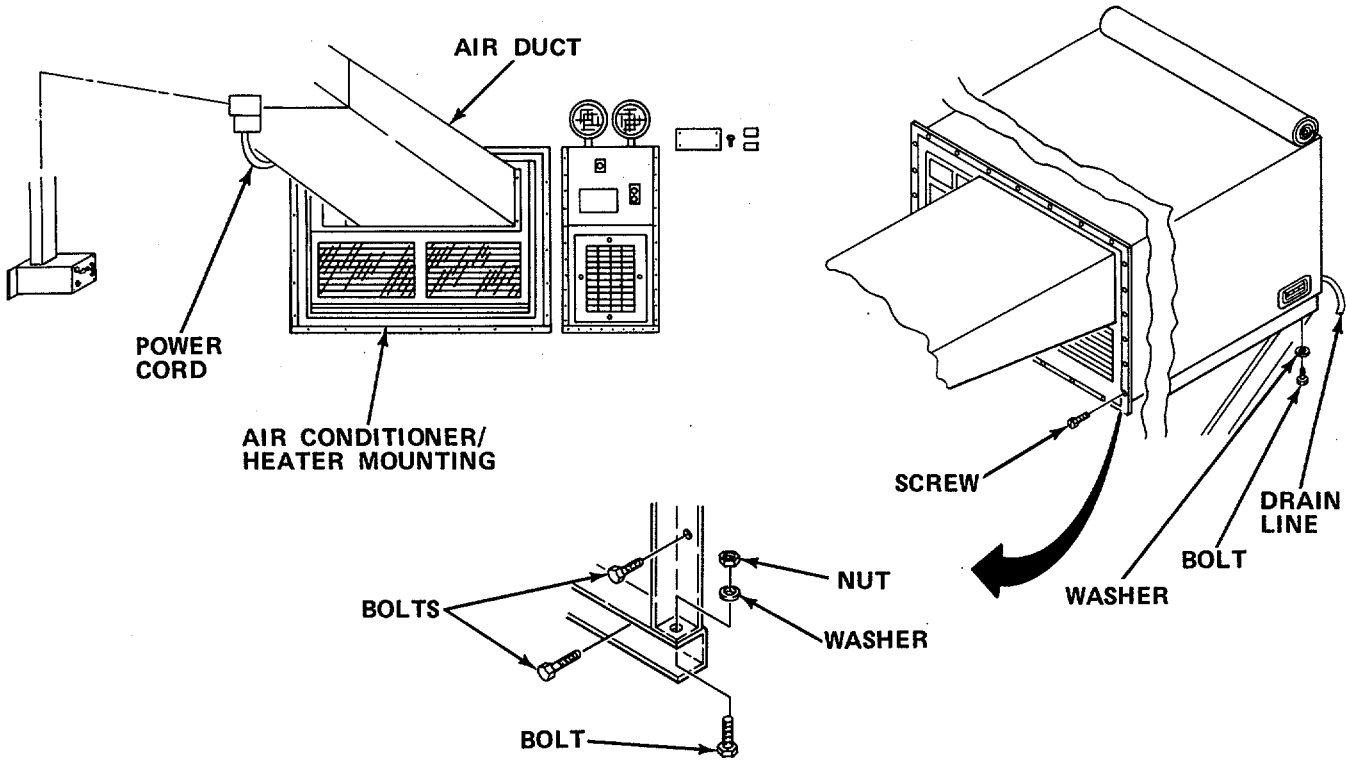
- a. Bend broken edges of skin inward into puncture hole. Do not attempt to remove fragments of skin by bending or pulling out.
- b. Remove any loose fragments of foam.
- c. Use cloth dampened with water to clean area around puncture. Wipe dry.
- d. Inject sprayfoam into puncture. Fill to 1/8 in. (3.2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



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

1-20.8 Replace Air Conditioner/Heater.

- MOS: 63W, Wheeled Vehicle Repairer
- PERSONNEL: Two persons are required to perform this procedure.
- TOOLS: Cross Tip Screwdriver
Lifting Equipment
8 in. Adjustable Wrench
7/16 in. Combination Wrench
- SUPPLIES: Air Conditioner/Heater
Solvent P-D-680 (Item 21, Appendix E)
Gasket
Sealant (Item 19, 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 van 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/heater 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 $\frac{1}{2}$ -'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 1000 F to 1380 F (380 C to 590 C).

- j. Clean sealant from opening using dry cleaning solvent P-D-680..
- k. Remove damaged gasket and replace with new gasket.
- i. Raise new 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 van 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.

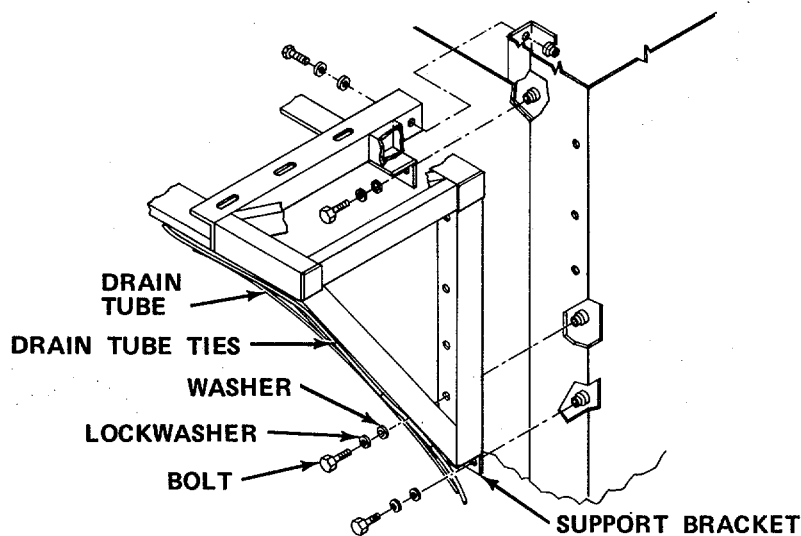
1-20.9 Replace Air Conditioner Support Bracket.

MOS: 63W, Wheeled Vehicle Repairer

PERSONNEL: Two persons are required to perform this procedure.

TOOLS: 9/16 in. Combination Wrench
Lifting Equipment

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).

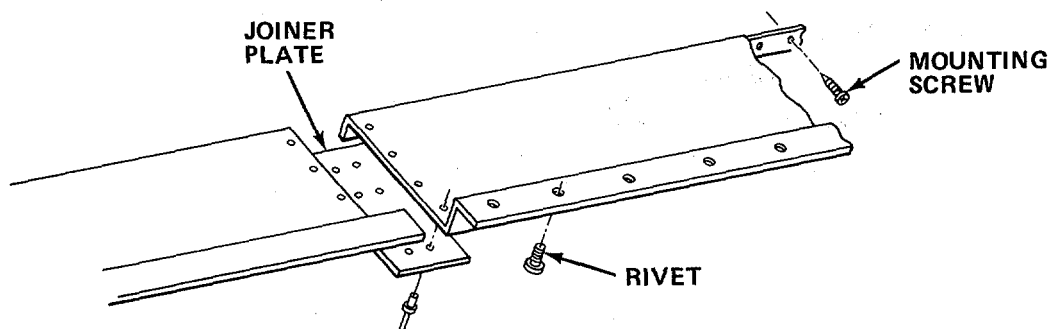
1-20.10 Replace Ventilation Duct.

MOS: 52C, Utilities Equipment Repairer

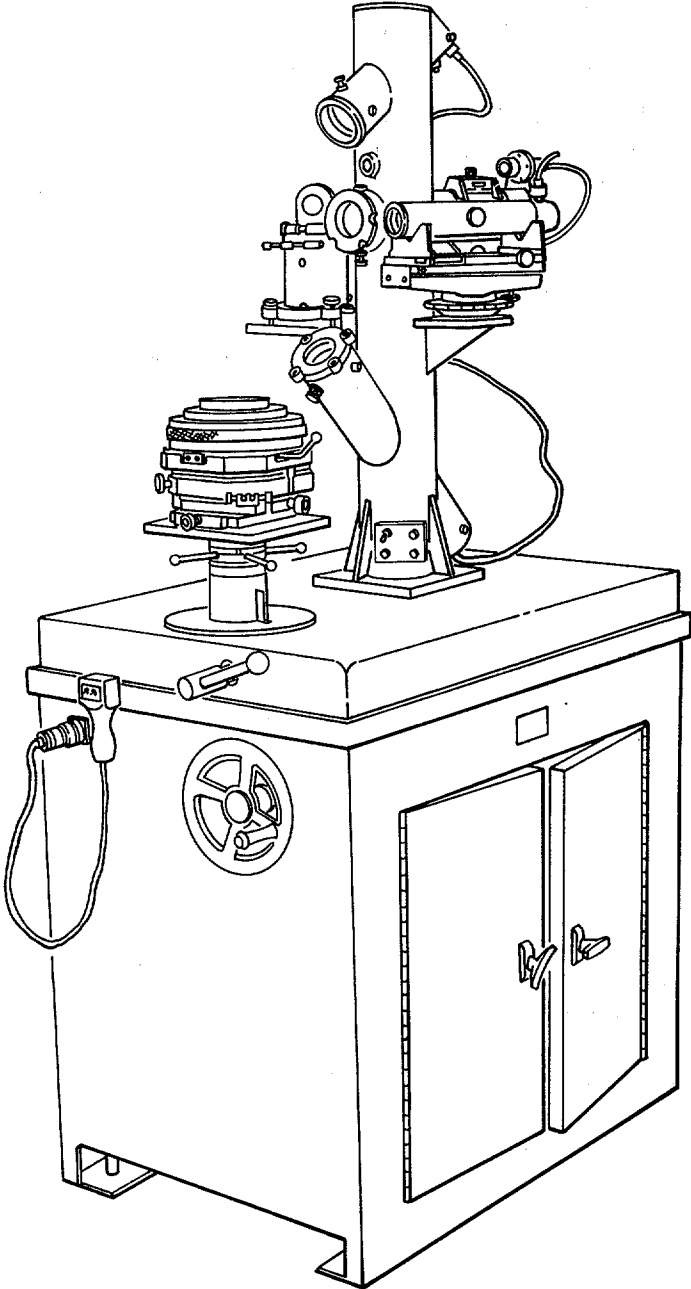
TOOLS: Hacksaw
Electric Drill and Bits
Ball Peen Hammer
Pop Rivet Gun
Cross Tip Screwdriver
Paint Brush

SUPPLIES: Sealant (Item 19, Appendix E)
Wood Block
Pop Rivets
Paint (Item 14, Appendix E)
Cheesecloth (Item 4, Appendix E)
Salvaged Ventilation Duct

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



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



CHAPTER 2
SHORT-RANGE OPTICAL CALIBRATOR

Section I INTRODUCTION

2-1. GENERAL INFORMATION.

2-1.1 Scope.

- a. Model Number and Equipment Name. Model 270 BN Universal Short-Range Optical Calibrator.
- b. Purpose of Equipment. To provide a means to calibrate, test, and/or adjust optical surveying equipment.

2-1.2 Reference Information.

Theodolite	Operator, Organizational, Direct Support, and General Support Maintenance Manual for Theodolite, Wild-Heerbrugg Model T-2, TM 5-6675306-14.
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2-1.3 Glossary.

Aim	To regulate direction of a sighting device.
Alidade.....	That part of an optical device that turns in azimuth with the telescope.
Autocollimation.	When an alinement scope is focused on a reflecting surface so that the reflecting image of the reticle is in register with its reticle pattern.
Autoreflexion.....	When an alinement scope is focused to reveal the image of the autoreflexion target and this is made to register with the reticle pattern.

Azimuth	Direction in horizontal plane.
Buck In	To place an instrument so that the line-of-sight is alined at both a far and near target. It is usually accomplished by trial and error.
Collimation	To place an instrument so that the line-of-sight is alined at both a far and near target.
Bull's-Eye Level	Concentric level attached to an instrument.
Elevation Axis	The rotation of a telescope in a vertical plane.
Eyepiece Lens.....	Lens closest to the eye.
Focus	To move optical parts so that a sharp image is seen.
Horizontal	Parallel to or in the plane of the horizon.
Objective Lens.....	Lens closest to the object being viewed.
Plunge	To rotate an optical sighting telescope 1800 in vertical plane.
Reference Line	The line of sight from which measurements are made.
Tangent Screw	A hand-operated screw which changes the direction of the line-of-sight in either azimuth or elevation.

Telescope.....	An optical system that consists of an objective lens, eyepiece lens, and focusing device that forms an image on a cross-line reticle. When viewed through the eyepiece the image is magnified and superimposed on the reticle.
Vertical	At right angles to the horizon.

2-2. EQUIPMENT DESCRIPTION.

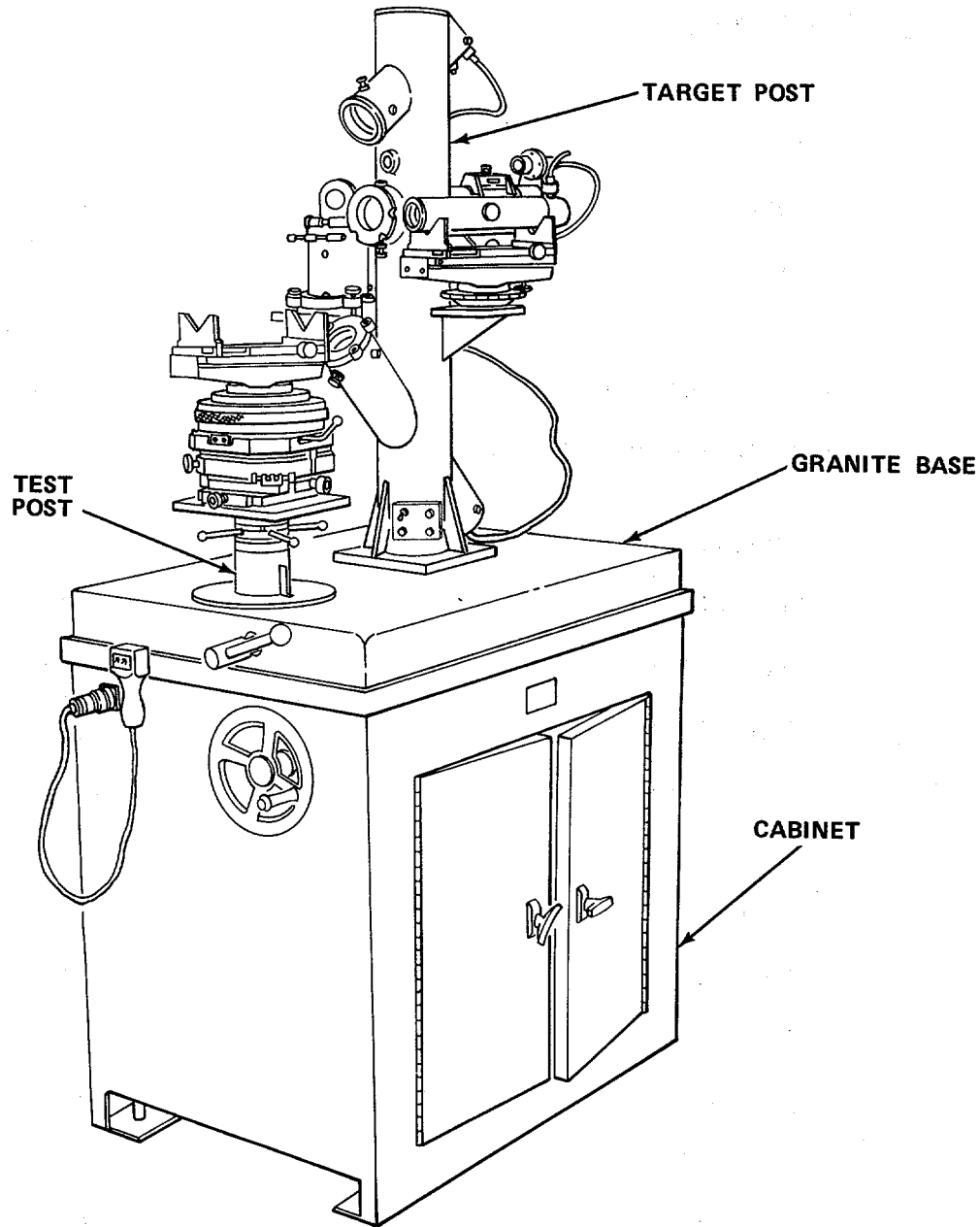
2-2.1 Equipment Characteristics, Capabilities, and Features.

a. Characteristics. A calibrator designed and built to occupy the smallest possible floor space while retaining the accuracy of larger calibrators.

b. Capabilities and Features.

- (1) Horizontal circle calibration of transits and theodolites.
- (2) Checks line of sight and short focus collimation.
- (3) Field calibration and/or adjustment of optical tooling instruments.
- (4) Standard calibration and adjustment.
- (5) Telescope level correction.
- (6) Optical plummet correction.

2-2.2 Location and Description of Major Components.



TARGET POST. Supports collimators, alinement telescopes, electrical controls for illumination, and mirror mountings for autocollimation, and autoreflexion.

GRANITE BASE. Provides rigid mounting to maintain alinement of target and test posts and dampens vibration.

CABINET. Provides storage space for accessories and houses portion of test post.

TEST POST. Consists of upper and lower portions. Upper portion contains mounting plate for Ultradex, and the lower portion contains lift mechanism and optical plummet collimator.

2-2.3 Equipment Data.

Dimensions

Weight	1100 lb (499 kg)
Length	3.5 ft (1.05 m)
Width	2.5 ft (0.76 m)
Height	6 ft (1.83 m)
Power Requirements	120 V, 60 Hz

Test Instruments Accommodated (This list is not all-inclusive).

<u>Instrument</u>	<u>Model</u>
Theodolite	Microptic 2
Theodolite	Microptic 3
Theodolite	KE-2e (73-0010)
Theodolite	KE-1e (73-0030)
Theodolite	KE-6e (73-0050)
Theodolite	T2
Theodolite	T16
Theodolite	T3
Theodolite	KI-A
Theodolite	DKM-1
Theodolite	DKM-2
Theodolite	DK-RV
Theodolite	901
Jig Transit	71
Jig Transit	71-1010
Jig Transit	71-1001

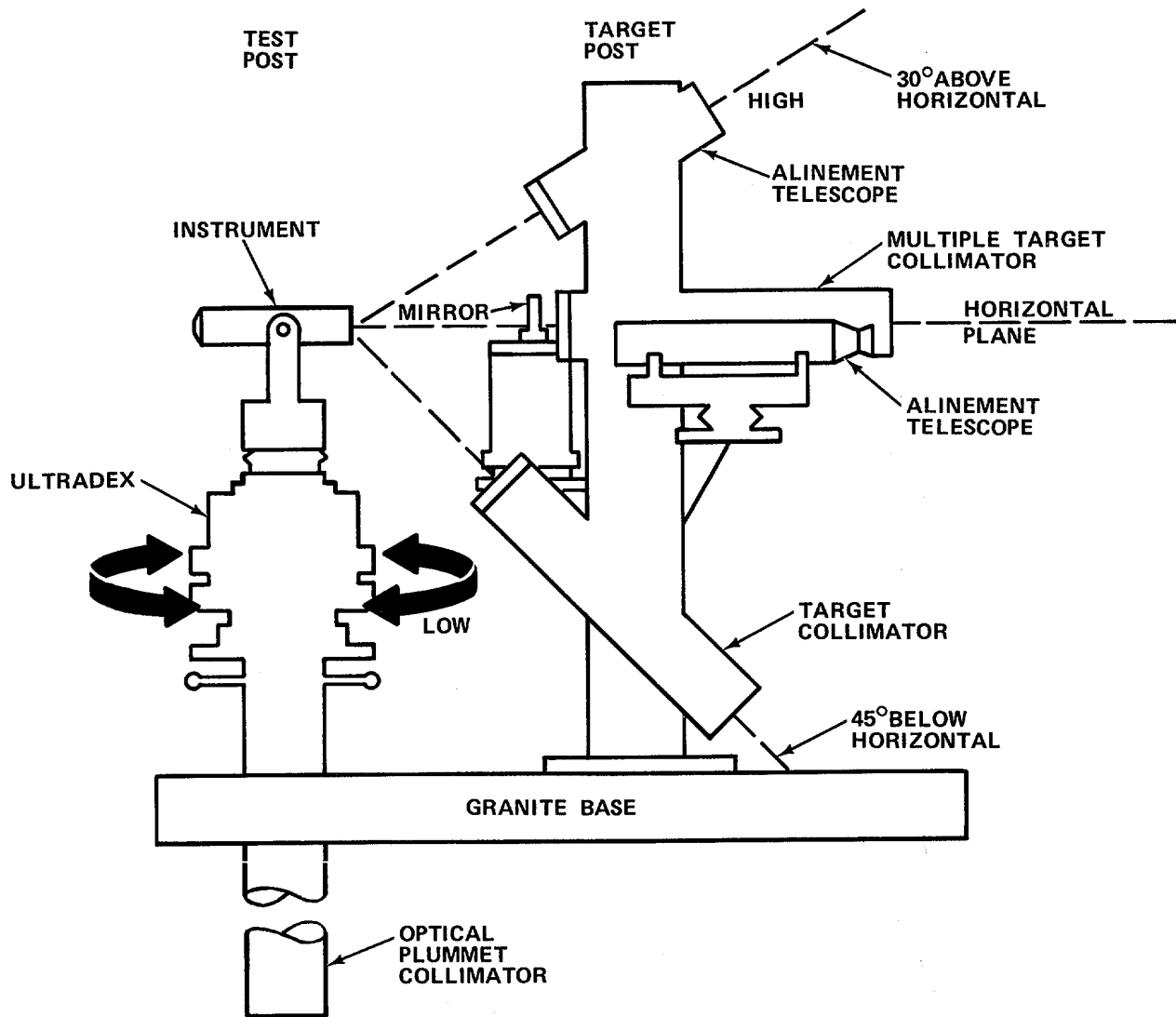
Transit	50
Optical Transit	75
Optical Transit	375
Optical Transit	76
Optical Transit	376
Optical Transit	74-0110
Optical Transit	74-0070
Optical Transit	6066-20
Transit Square	79
Transit Square	379
Wye Level	55
Wye Level	6019
Dumpy Level	45
Dumpy Level	05-700
Dumpy Level	6018
Dumpy Level	75-0030
Precision Level	545 (Sight Level)
Precision Level	75-0000 (Sight Level)
Precision Level	71-3010 (Sight Level)
Precision Level	N2
Precision Level	N3
Engineer's Level	GK-O
Engineer's Level	GK-1
Engineer's Level	GK-23
Alinement Telescope	81
Alinement Telescope	82

Alignment Telescope	83
Alignment Telescope	85
Alignment Telescope	381
Alignment Telescope	71-2020
Alignment Telescope	71-2051
Alignment Telescope	112/536
Alignment Telescope	95360
Target Collimator	271
Target Collimator	272
Target Collimator	71-4030
Target Collimator	71-4010
Target Collimator	71-2050
Target Collimator	112/782
Alidade	76-0000
Alidade	76-0020
Alidade	76-0030
Alidade	RK
Optical Plummet	458
Optical Plummet	48
Optical Plummet	48A
Mounting Adapter Stud Sizes	235-5 5/8 - 11
	235-14 3/4 - 16
	235-7 18.8 mm X 1.5 mm

Rotary Index Table	
Range	360°
Increments	1°
Accuracy	±0.25 arc seconds

Alignment Telescopes	
Magnification	30X at infinity
Reticle	Filar-Bifilar cross
Focusing Range	2 in. to infinity
Resolution	6 arc seconds
Multiple Target Collimator	
Focal Distances	4, 6, 16, 25, 50, and 75 ft and infinity
Pattern	Filar-Bifilar pattern except 6 ft distance target is 4 quadrant with 0.005 in. square
Target Collimator	
Reticle	Bi-filar cross-pattern
Resolution	4.5 arc seconds
Stride/Box Level	
Accuracy	2 arc seconds
Type	Coincidence bubble
Mirrors	
Mounting	Magnetic
Parallelism	2 arc seconds
Flatness	1/2 fringe with sodium light

2-3. TECHNICAL PRINCIPLES OF OPERATION.

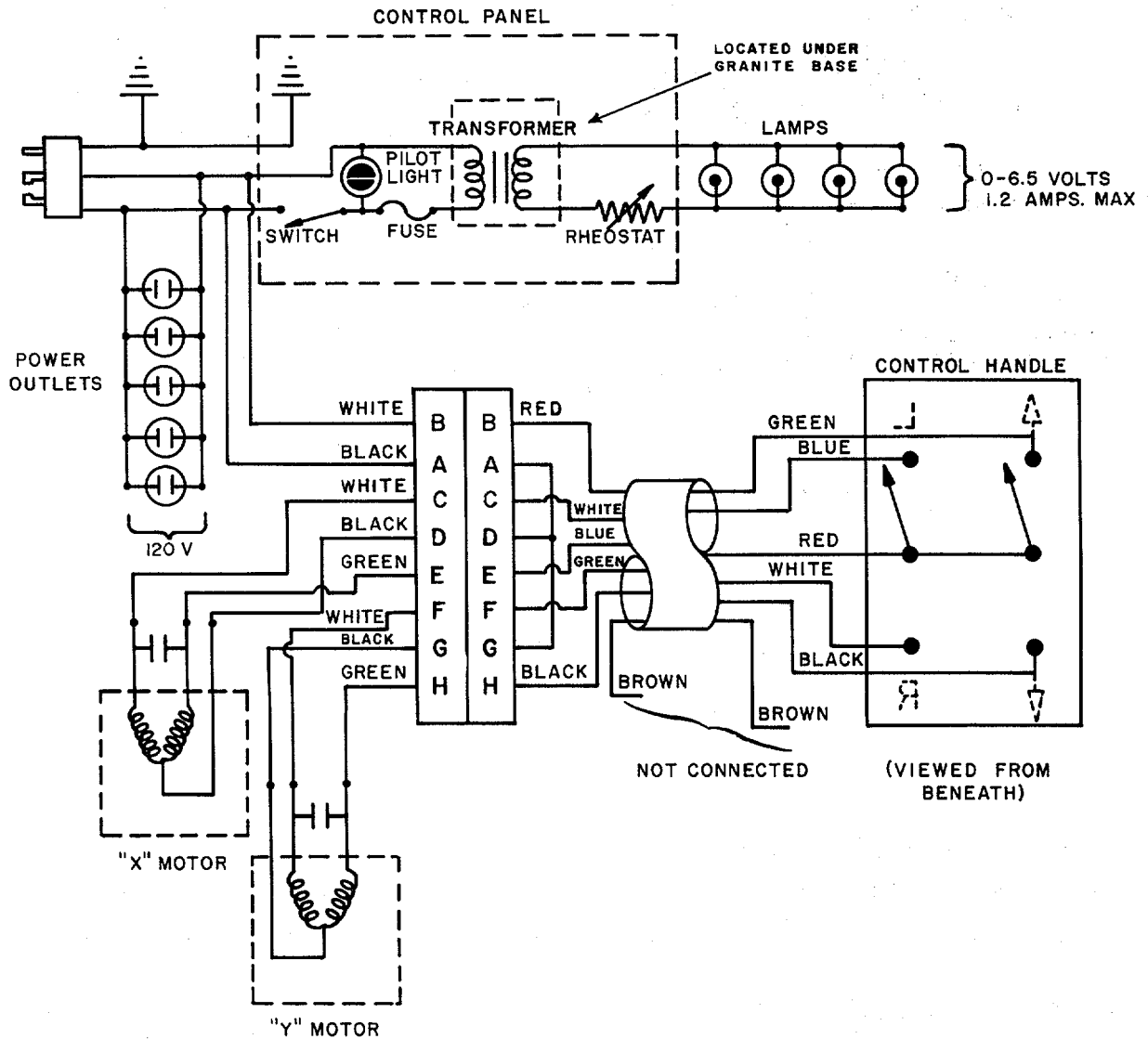


2-3.1 General. The short-range optical calibrator, hereafter referred to as the calibrator, must be correctly aligned before any instrument may be tested. Once aligned, no further calibrator adjustments are necessary and all adjustments will be made on the test instrument (TI). The following guidelines will aid in testing all types of instruments.

- a. The Ultradex, which is mounted on the test post, accepts various adapters for mounting test instruments.
- b. After the TI is mounted on test post, plug in the lighting unit if necessary.

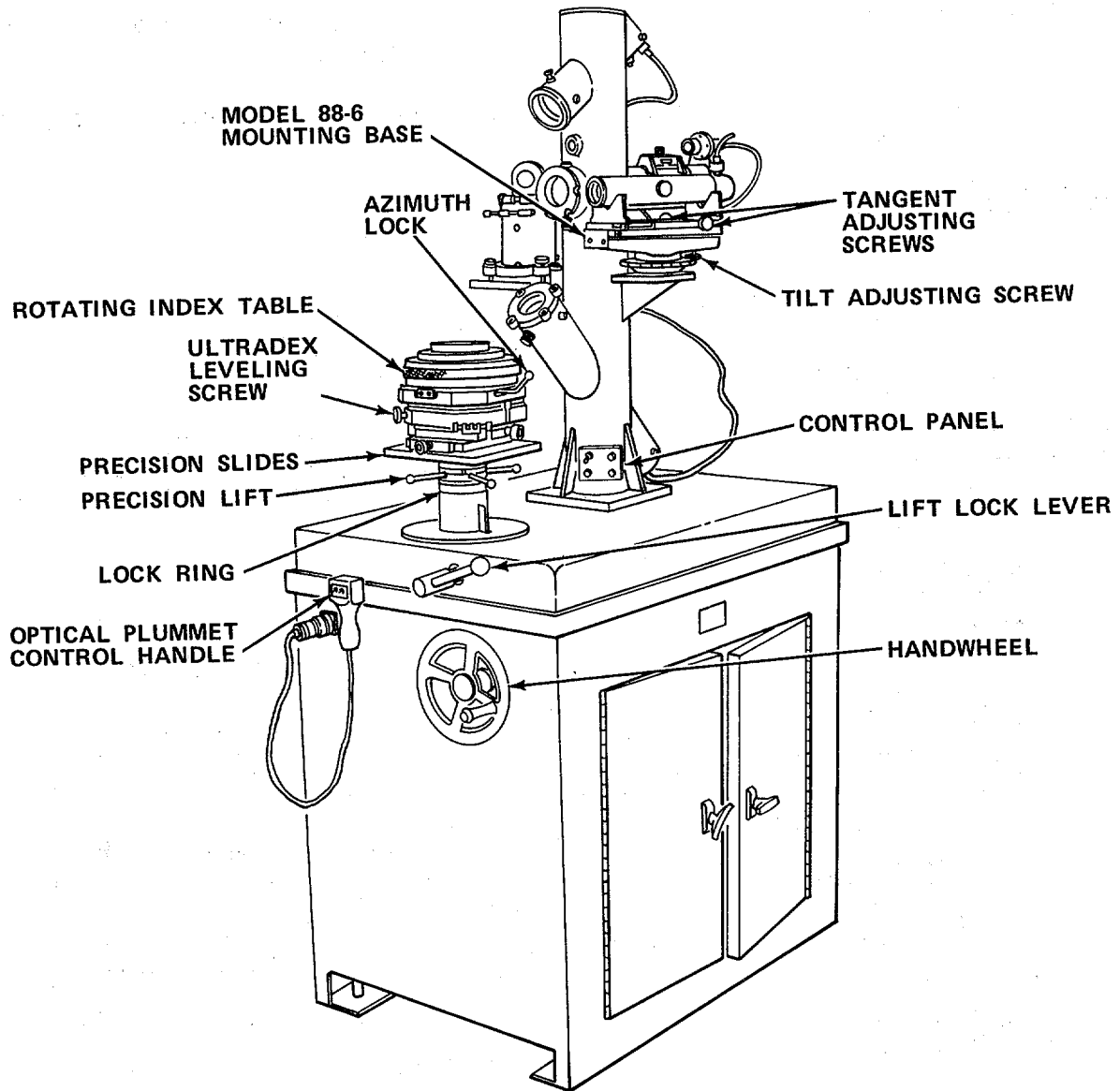
- c. Course and fine height adjustments are provided for alignment of the TI to the target post collimators.
- d. When transit or theodolite circles are to be checked, the Ultradex must be leveled to within 30 arc seconds of true horizontal.
- e. Autoreflexion and/or autocollimation checks can be accomplished by the use of the Model 185 stellite mirrors when mounted on the target post.
- f. Vertical axes can be checked with the optical plummet collimator mounted in the bottom of the test post.

2-3.2 Electrical Schematic.



SECTION II OPERATING INSTRUCTIONS

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



Control or Indicator	Function
Optical Plummet Control Handle	Controls axis movement of the optical plummet collimator.
Lock Ring	Locks precision lift.

Control or Indicator	Function
Precision Lift	Provides for fine vertical adjustment of the test post.
Precision Slides	Precisely moves the test instrument in the horizontal plane.
Ultradex Leveling Screws	Provides for leveling the Ultradex.
Rotating Index Table	Indicates in degrees the amount of indexing of the Ultradex.
Azimuth Lock	Locks horizontal rotation of the Ultradex.
Model 88-6 Mounting Base	Consists of V blocks for mounting alignment scopes and collimators and tilt and tangent adjustments for precise alignment of scope and collimators.
Control Panel	Controls illumination of target post instruments and optical plummet.
Handwheel	Provides coarse vertical lift adjustment of test post.
Lift Lock Lever	Locks test post in position.

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 the 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 operations if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval column. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected 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
Lens Tissue (Item 26, Appendix E)	ar
Lens Cleaner (Item 3, Appendix E)	ar
Cheesecloth (Item 4, Appendix E)	ar
Enamel Paint (Item 12, Appendix E)	ar
Hex Head Key Wrench Set	1

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 safely be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before Hours
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of

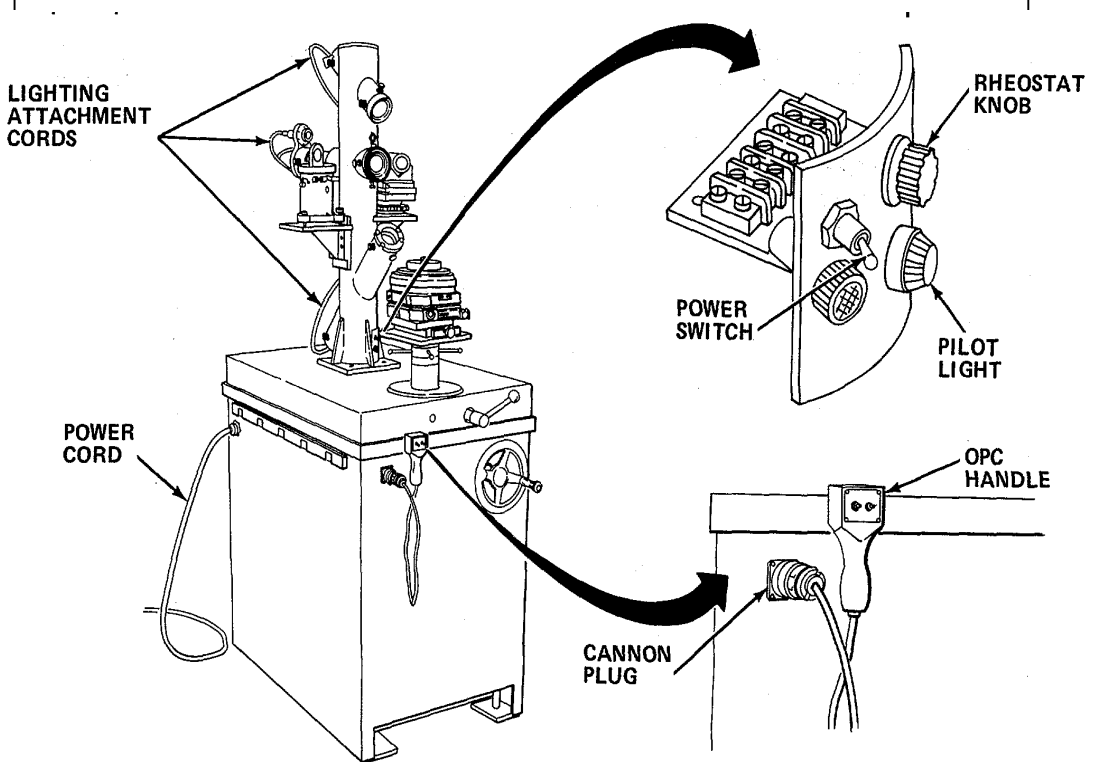
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>SHORT-RANGE OPTICAL CALIBRATOR</u></p> <p><u>Inspect.</u></p>  <p>1. Inspect calibrator for defective power cord and lighting attachment cords.</p>	Defective, burned, or broken power cord.

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

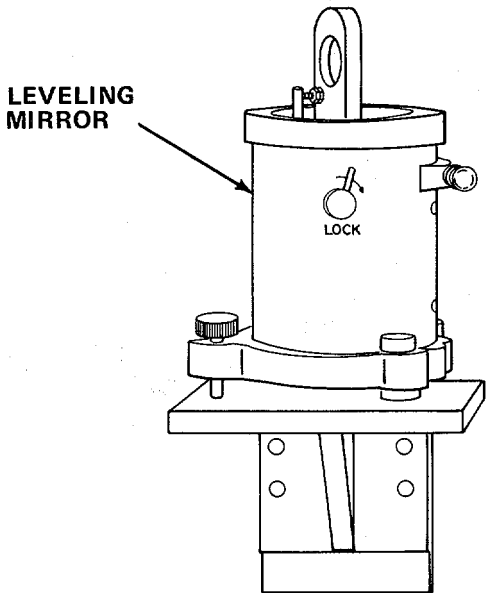
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Inspect - Cont</u></p> <ol style="list-style-type: none"> 2. Turn power on. Check that pilot light is illuminated. 3. Turn rheostat knob to right. Check that illuminators brighten. 4. Check that cannon plug is firmly seated in socket. 5. Check optical plummet (OPC) control handle for proper operation. 6. Inspect collimators in upper, middle, and lower tubes for security of mounting. visible looseness or wobble. necessary. <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 7. Inspect leveling mirror for cracks, scratches, and oil leaks. Check lock for proper operation. 	<p>OPC is broken.</p> <p>No Repair as</p>

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

B - Before
D - During
A - After

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(Number) - Hundreds of Hours

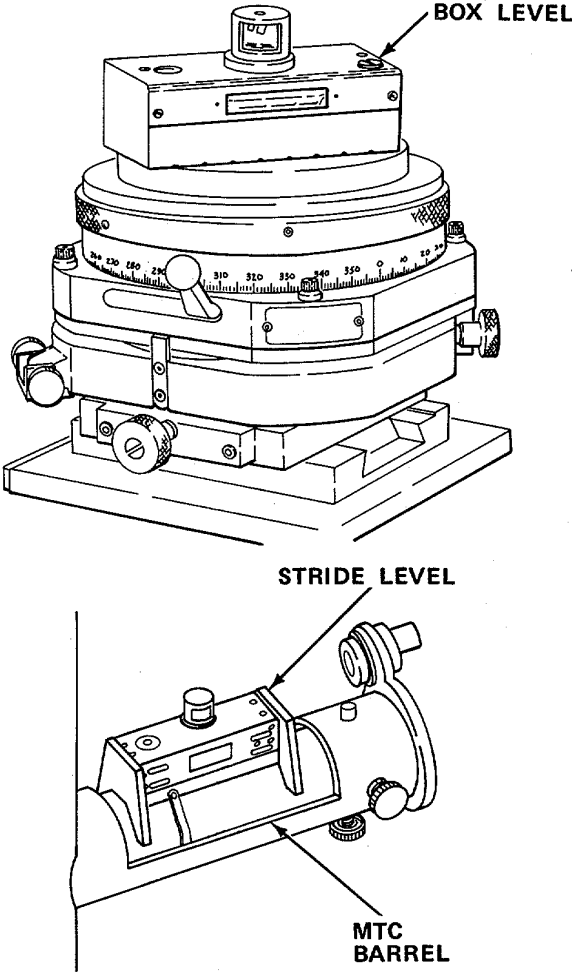
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p>Inspect - Cont</p>  <p>8. Inspect stride level and box level for loose or missing screws and scratched or broken bubble indicators.</p>	Broken bubble indicator.

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

B - Before
D - During
A - After

W - Weekly
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(Number) - Hundreds of Hours

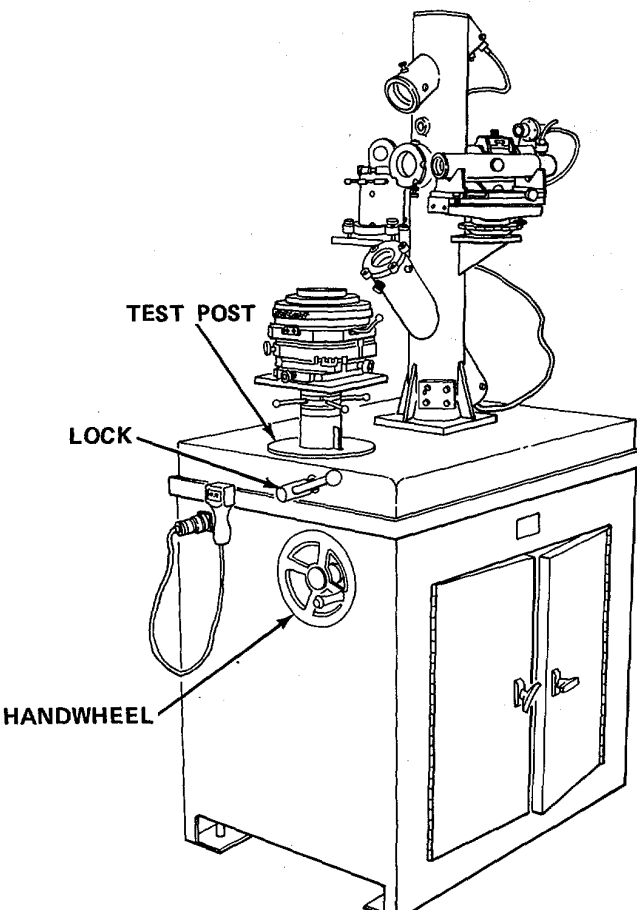
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Inspect - Cont</u></p> <p>9. Inspect stride level for secure attachment to multiple target collimator barrel.</p>  <p>10. Loosen lock, rotate handwheel, and check for free movement of test post.</p>	<p>Test post is jammed.</p>

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

B - Before
D - During
A - After

W - Weekly
M - Monthly
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AN - Annually
S - Semiannually
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(Number) - Hundreds of Hours

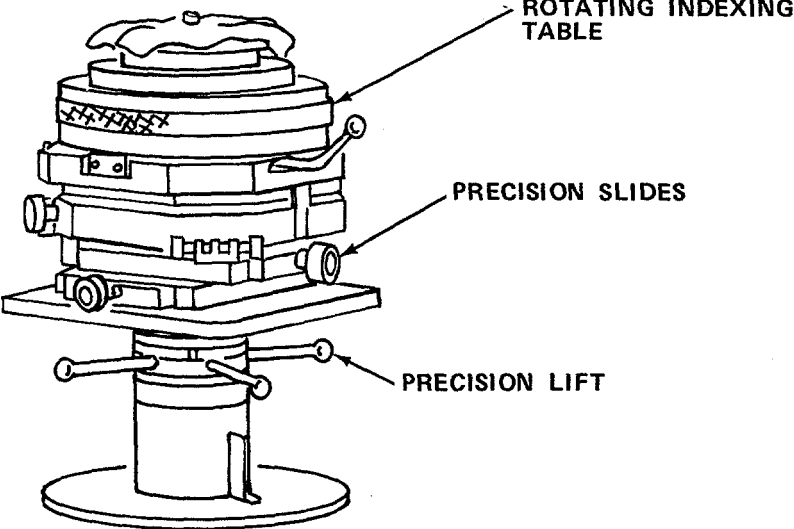
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p>SHORT-RANGE OPTICAL CALIBRATOR - Cont</p> <p><u>Inspect - Cont</u></p>  <p>11. Rotate precision lift and check for free movement.</p> <p>12. Check that rotating indexing table moves freely in azimuth.</p> <p>13. Check precision slides for binding.</p>	<p>Precision lift binds.</p> <p>Indexing table is damaged or jammed.</p> <p>Precision slide(s) binds.</p>

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

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

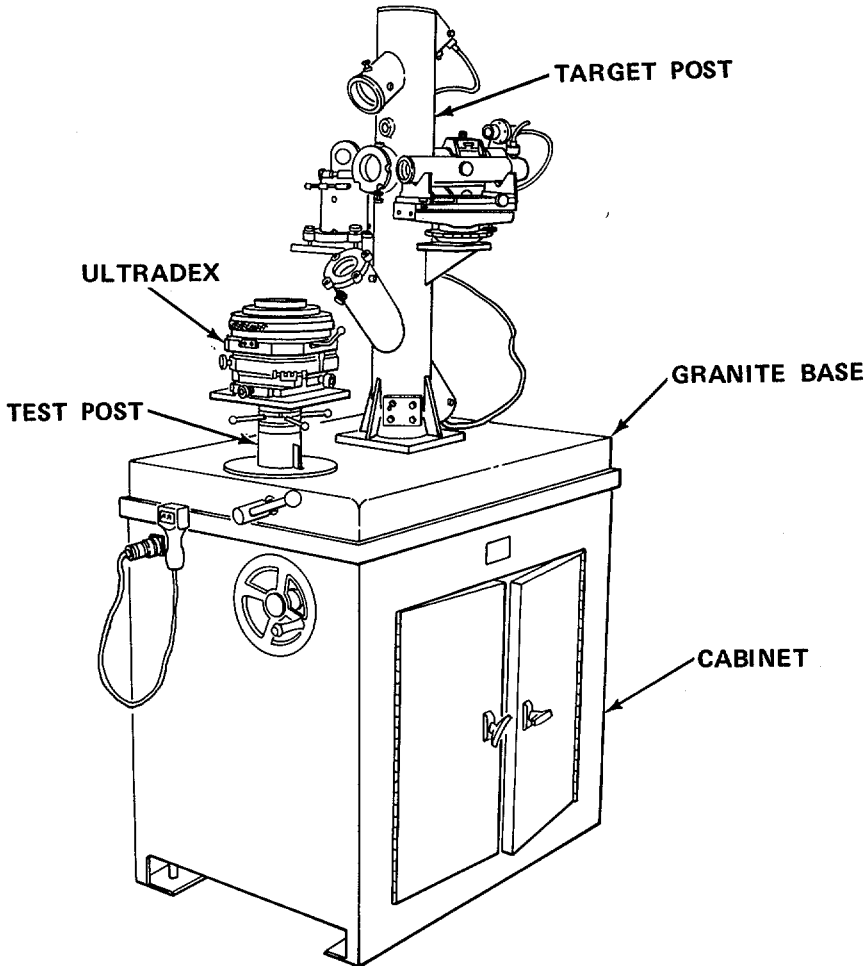
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B.	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Clean.</u></p>  <p>The diagram shows a complex optical instrument mounted on a cabinet. Labels with arrows point to the following parts: ULTRADEX (the main lens assembly), TEST POST (a vertical post on the left), TARGET POST (a vertical post on the right), GRANITE BASE (the top surface of the cabinet), and CABINET (the main body of the instrument).</p> <ol style="list-style-type: none"> 1. Wipe all exposed painted surfaces on target post. 2. Wipe top of granite base to remove any dust or dirt. 	

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

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

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Clean - Cont</u></p> <ol style="list-style-type: none"> 3. Wipe test post and Ultradex to remove dust. 4. Carefully inspect all visible optical glass surfaces on target post instrument and mirrors for dust, smudges, or fingerprints. 5. Remove dust from optical glass surfaces with watchmaker's blower. 6. Moisten lens tissue with optical cleaning solution, and wipe one optical glass surface starting from center and working toward edge. 7. Dispose of tissue. 8. Use clean, dry tissue and dry optical glass surface using circular motion. 9. Dispose of tissue. 10. Repeat cleaning on each remaining optical glass surface. Use a fresh moist tissue and fresh dry tissue on each glass surface. Do not reuse lens tissue. 	
	W	<ol style="list-style-type: none"> 11. Clean interior and exterior of cabinet. 	

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

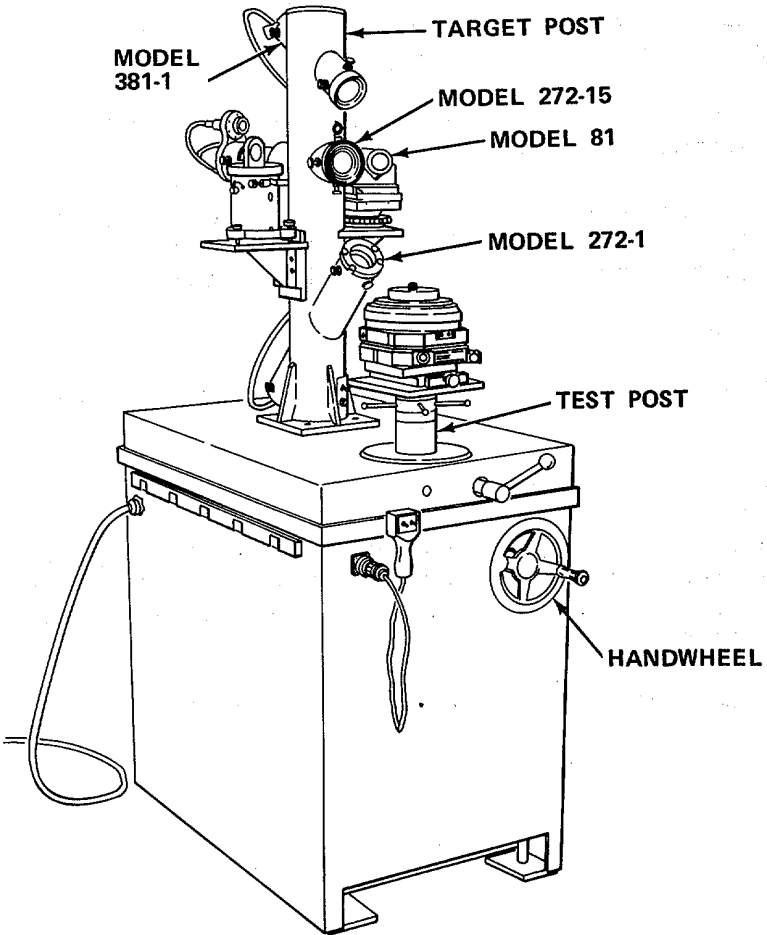
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
3	Q	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Service.</u></p> <ol style="list-style-type: none"> Remove Model 81, 381-1, 272-1, and 272-15 collimators from target post and place on work surface.  <ol style="list-style-type: none"> Wipe barrels. Wipe inside of collimator tubes. 	

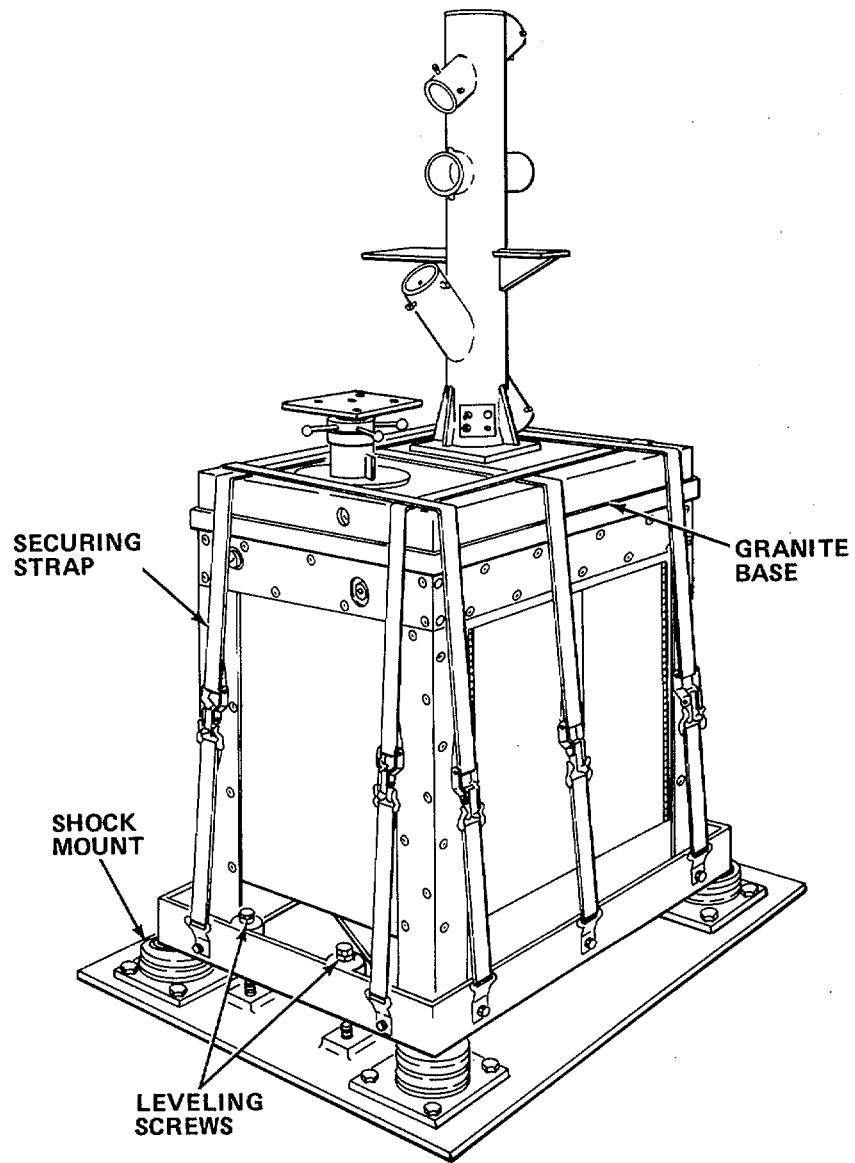
Table 2-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
3	Q	<p><u>SHORT-RANGE OPTICAL CALIBRATOR - Cont</u></p> <p><u>Service - Cont</u></p> <ol style="list-style-type: none"> 4. Touch up painted surfaces of target post as necessary. 5. Reinstall Model 81, 381-1, 272-1, and 272-15 collimators in target post. 6. Unlock and raise test post to maximum height with handwheel. <p style="text-align: center;">NOTE Brownish discoloration of test post is normal and is caused by brass powder picked up when test post is raised or lowered.</p> <ol style="list-style-type: none"> 7. Wipe test post shaft. 8. Lower test post to operating height and lock. 9. Realign collimators (paragraph 2-6.2). 	

2-6. OPERATION UNDER USUAL CONDITIONS.

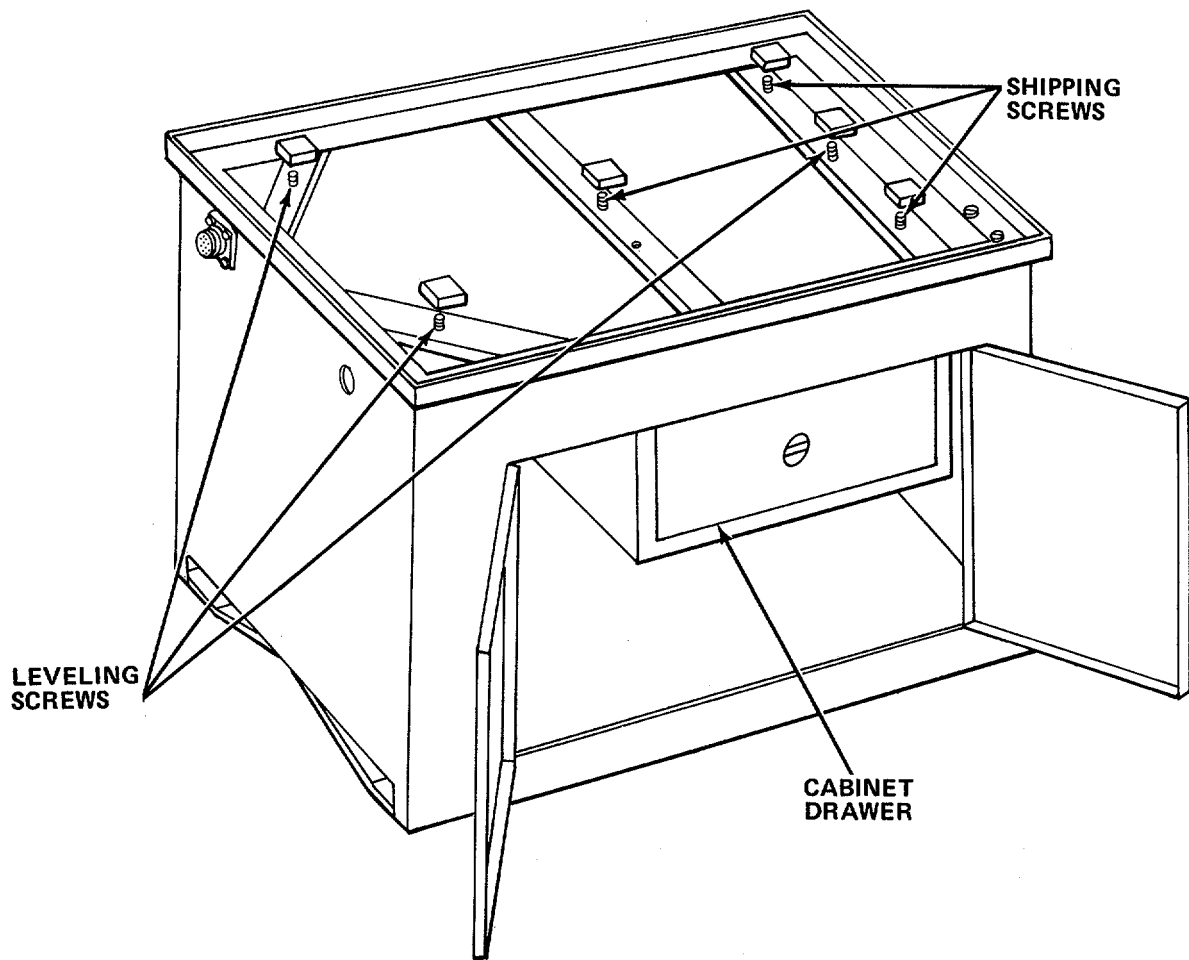
2-6.1 Assembly and Preparation for Use.



NOTE

Be sure that chassis is level before proceeding.

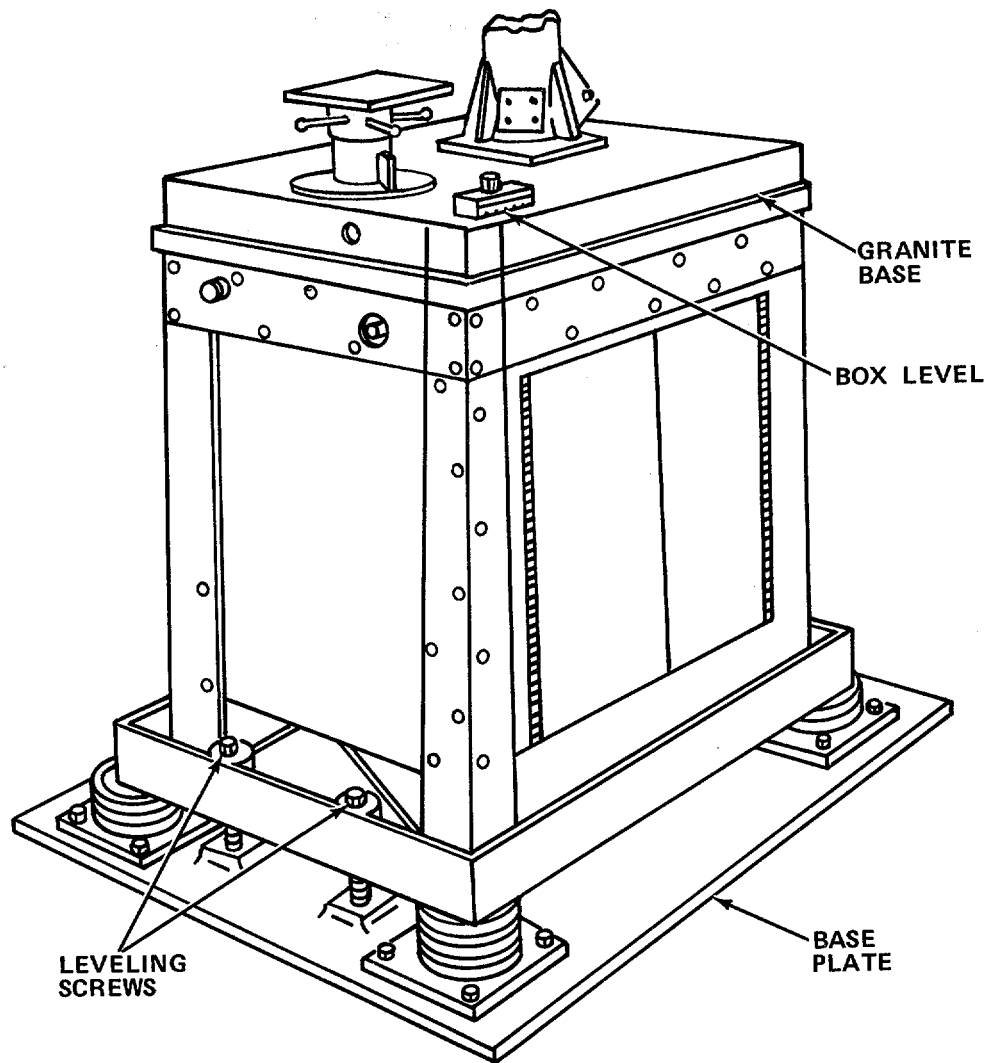
- a. Deflate shock mounting.
- b. Remove securing straps.



NOTE

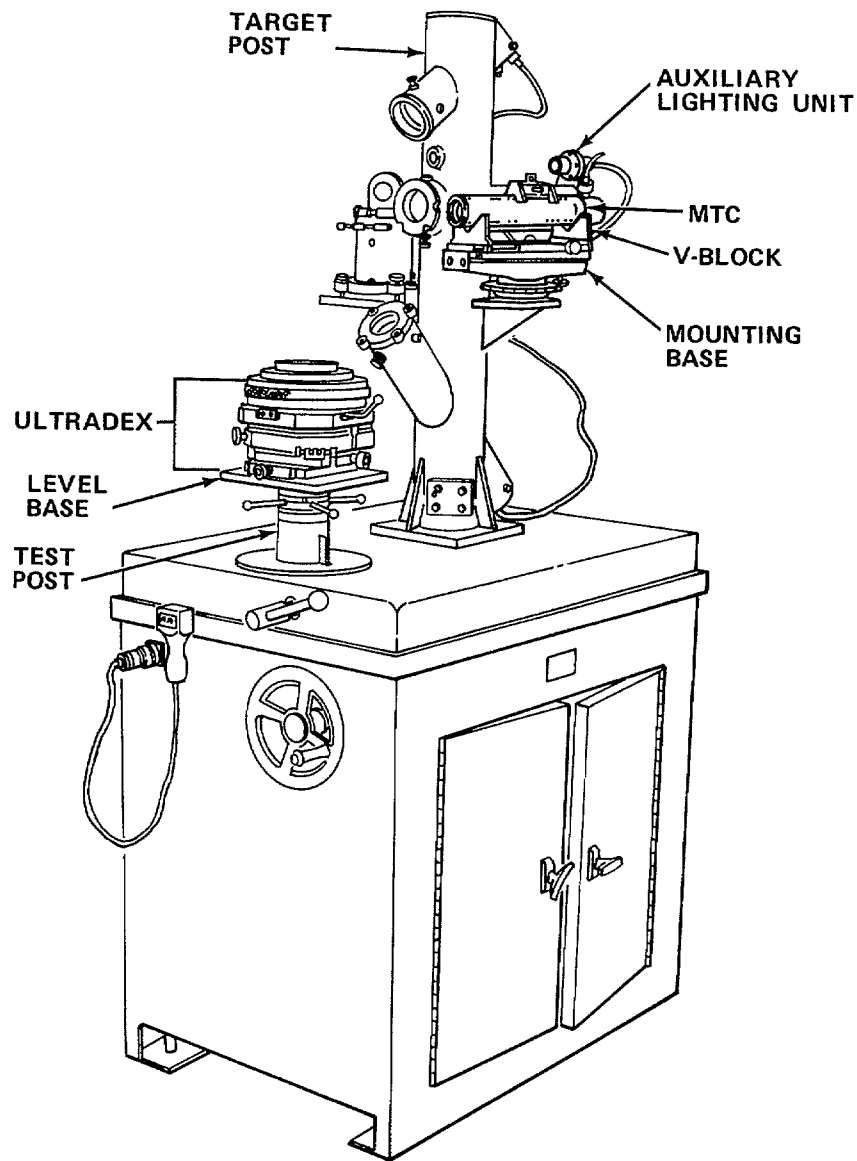
Drawer latches are located on the outside rear corners of drawer between drawer and drawer frame.

c. Remove cabinet drawer and loosen shipping screws inside cabinet under granite base.

**NOTE**

During the leveling procedure, be sure that all four leveling screws maintain contact with the base plate and support the cabinet. If finer leveling of the granite base is necessary, use the three leveling screws located inside cabinet under granite base.

- d. Place box level on the granite base and level the assembly using the four cabinet leveling screws.
- e. Reinstall cabinet drawer.



f. Install Ultradex. Remove Ultradex and socket head cap screws from container. With Ultradex handle positioned to the right of the operator, mount Ultradex on level base and secure with cap screws.

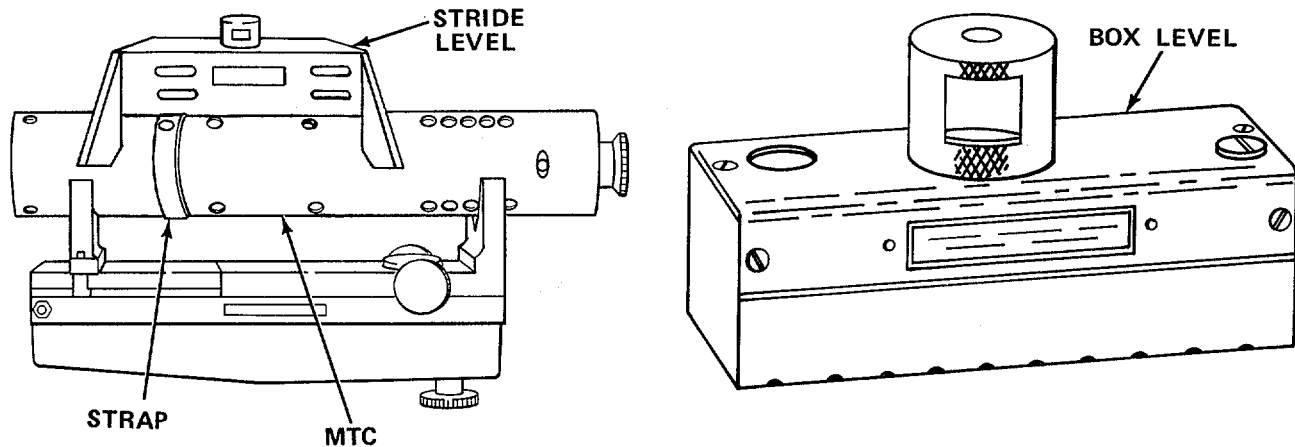
g. Preparation/Installation of stride level, box level, Model 272-15 Multiple Target Collimator, Model 272-1 Target Collimator, and Optical Plummet Collimator.

- (1) Remove two Model 88-6 mounting bases from their case and install on target post and test post.
- (2) Remove the Model 272-15 Multiple Target Collimator (MTC) from its case and place in the target post V-blocks.

NOTE

Use only GE number 50 bulbs or equivalent.

- (3) Plug in power cord and attach auxiliary lighting unit to MTC.

**NOTE**

The stride level and box level are similar in construction. To check the adjustment of the box level, place the box level on the Ultradex and follow the general procedures for the stride level given in steps 4-12 below.

- (4) Remove the stride level from its case, place on barrel of MTC and secure with strap. Use pencil or piece of tape to mark its longitudinal position so that level may be returned to same position in subsequent steps.
- (5) Use tilt adjustment provided on mounting base to bring split bubble into coincidence.
- (6) With bubble in coincidence, roll stride level away from you around barrel until bullseye bubble on top is tangent to outside of circle. See if split bubble is still in coincidence. If not, roll adjustment must be made.
- (7) Roll adjustment is made by turning opposed setscrews bearing against right-hand vial adjustment screw. Access to rear setscrew is obtained by removing socket-head setscrew in main housing, directly opposite vial adjustment screw. Access to front screw is gained through hole between right hand adjusting nuts. Upper adjusting nut on right-hand adjustment screw must be loosened slightly prior to making any adjustment, access to this nut is through slot. Adjust as follows:
 - (a) If right side of split bubble went up when level was rolled away from you, loosen front setscrew and tighten rear setscrew.
 - (b) If left side of split bubble went up, loosen rear setscrew and tighten front setscrew.

NOTE

These are opposed setscrews and both should be snug, not jammed, against post at completion of adjusting process.

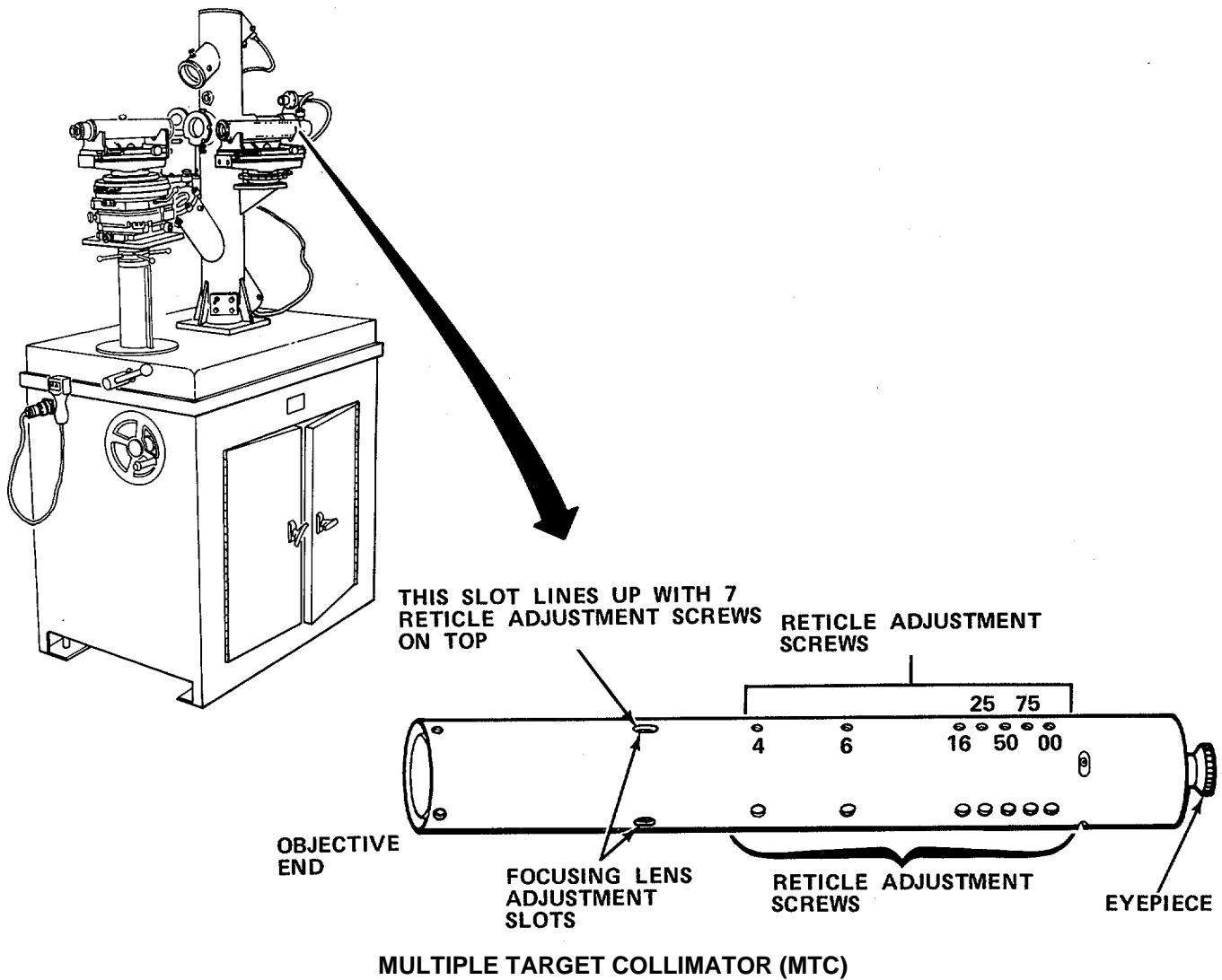
- (c) Resnug upper adjustment nut on right-hand adjustment screw.
 - (d) Recheck roll to see that roll adjustment is now correct.
- (8) Check that split bubble is in coincidence when bullseye bubble is centered in vial. If it is not, adjust mount as necessary to bring bubble into coincidence. Reverse stride level on collimator barrel. Aline mark made when stride level was placed on collimator barrel. Allow split bubble to stabilize (5-10 sec). Any error detected is double the actual error.
- (9) Use tilt adjustment of mounting base to take out half the error.
- (10) Remove remaining error as follows:
- (a) Loosen both top adjusting nuts slightly using adjusting pin provided. (This pin is found in box that contained stride level.)
 - (b) Use only lower left-hand adjusting nut to bring bubble completely into coincidence. Access is through slot.
 - (c) Resnug upper adjusting nuts, making sure bubble does not go out of coincidence.
- (11) Reverse stride level and allow bubble to stabilize. If error is still observed, repeat tilt adjustment. Continue this process until bubble remains in coincidence.
- (12) Recheck roll adjustment. If stride level adjustments are correct, remove stride level from MTC and return to its case.

CAUTION

Do not touch optical surfaces with fingers or wipe optical surfaces with cloth. Touching optical glass with fingers will smudge or etch optical coatings. Wiping with cloth may scratch optical coating.

NOTE

- Be sure adjustment slots, on MTC, will not ride over V-blocks when collimator is rotated.
- Only one of the focusing lens adjustment screw slots is in alignment with the seven reticle adjustment screws.



- (13) Rotate MTC until the focusing lens adjustment screw slot that is in line with the reticle adjustment screw slots is on top.
- (14) Place AS-1 in V-blocks of mounting base on test post, and mount so that AS-1 is looking into MTC.
- (15) Attach separate auxiliary lighting unit to AS-1 and power supply, and turn on light.
- (16) Adjust eyepiece of AS-1 telescope until reticle becomes sharp.
- (17) Use a stellite mirror to focus the AS-1 to infinity by placing the mirror against objective end and autocollimating off mirror. If reflected image is not in clear focus, adjust focusing knob until image becomes sharp.
- (18) Disconnect auxiliary lighting unit from AS-1, connect to MTC.

(19) If necessary, adjust focusing lens of MTC:

NOTE

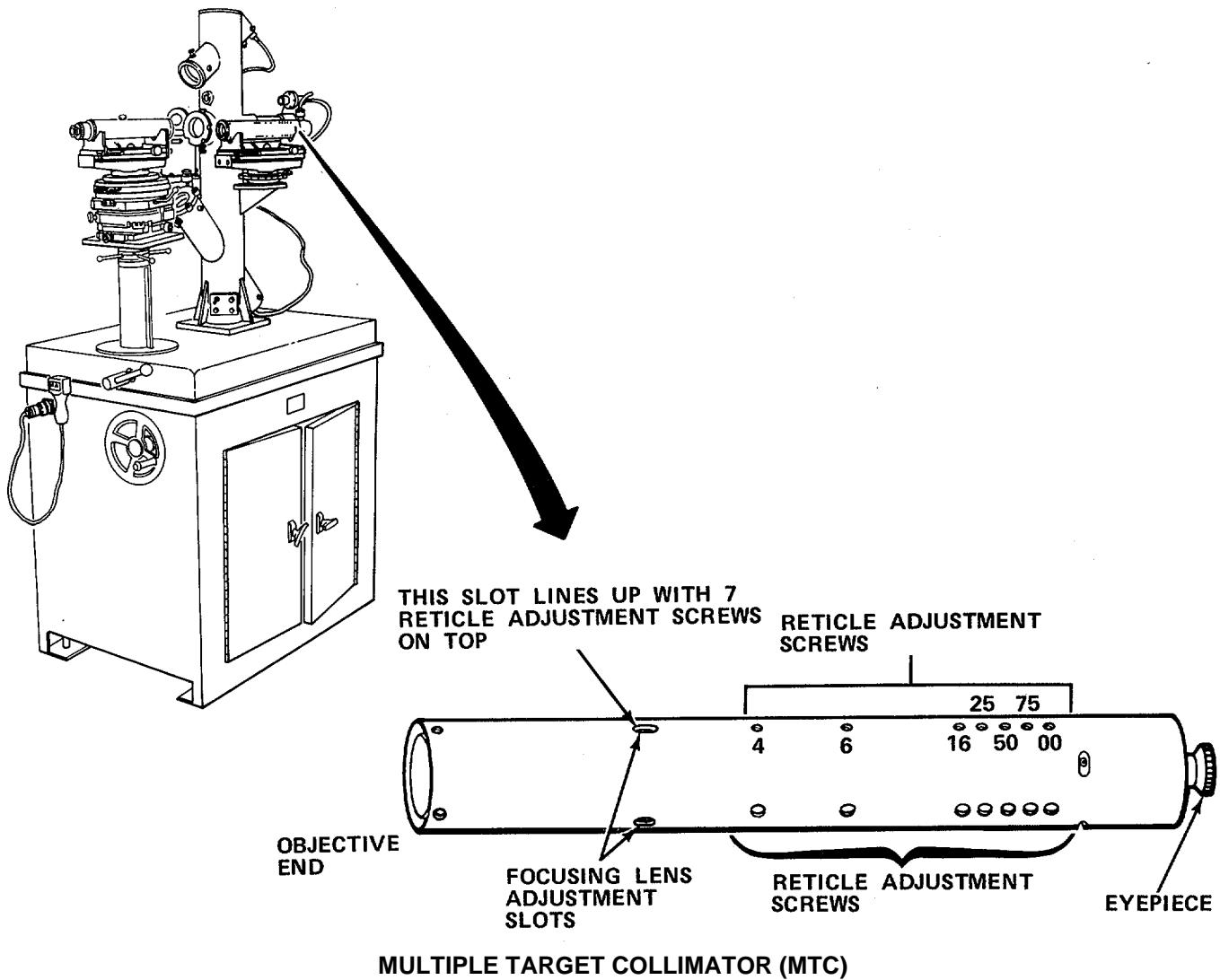
If infinity reticle image of MTC is sharp, do not adjust focusing lens.

- (a) Loosen three focusing lens adjustment screws.
- (b) Carefully slide focusing lens back and forth until infinity reticle image of MTC comes into sharp focus.
- (c) Snug the three adjustment screws and verify that infinity reticle image is still in sharp focus. Do not overtighten screws.

(20) Position collimators using mounting base adjustment screws until infinity reticle image of MTC is in vertical and horizontal register with reticle image of AS-1.

NOTE

- Centerline of collimators must be within 0.1 inches (2.5 mm) of each other.
 - Use only the filar portion of a filar bi-filar pattern; the bi-filar portion may not be exactly centered with respect to the filar position.
- (21) Rotate MTC 1800 in its mount. Check for out-of-register condition of vertical wire images only. If out-of-register condition is present, remove one-half of the error using the opposing reticle adjustment screws. Remove remaining error with tangent screws of AS-1 mounting base.
- (22) Rotate MTC 1800 in its mount and repeat steps (20) and (21) until vertical wires remain in register.
- (23) Rotate MTC 900 and repeat steps (20) through (22).
- (24) Adjust each of the remaining reticles in accordance with steps (20) thru (22) by focusing the AS-1 to receive the image of each remaining reticle in turn.
- (25) Install the MTC in center tube of target post:
- (a) Remove mirror mounting assembly from front of center tube.
 - (b) Remove two lower adjustment screws and spring plungers from horizontal tube and back out adjustment screw at both ends of the tube.
 - (c) Remove auxiliary lighting unit from MTC. Clean barrel and lens (table 2-1)



- (d) Observe three slots for focusing lens adjustment spaced 120° apart. One of these focusing slots is in alignment with seven of the reticle adjustment screws. Rotate barrel until focusing lens adjustment slot that is in line with seven reticle adjustment screws is on top.
- (e) Slide collimator into MTC tube from the front until objective end is flush with front of tube.
- (f) Reinstall lower adjustment screw in eyepiece end and tighten spring plunger screws. Use two adjustment screws at eyepiece end of horizontal tube to center MTC in tube by eye.
- (g) Reinstall lower adjustment screw in objective end and tighten spring plunger screws. Use adjustment screws to center MTC in tube by eye.
- (h) Reinstall mirror mounting assembly. Turn in retaining screws until screw heads are slightly below flush on mirror mounting base.

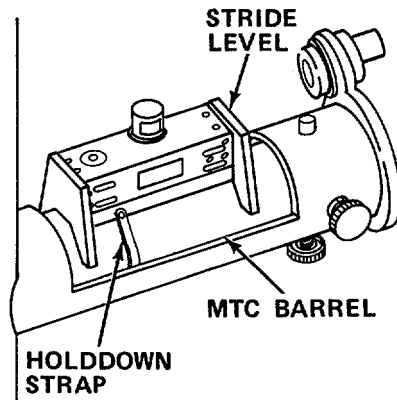
NOTE

Lighting attachment for MTC has two lamps.

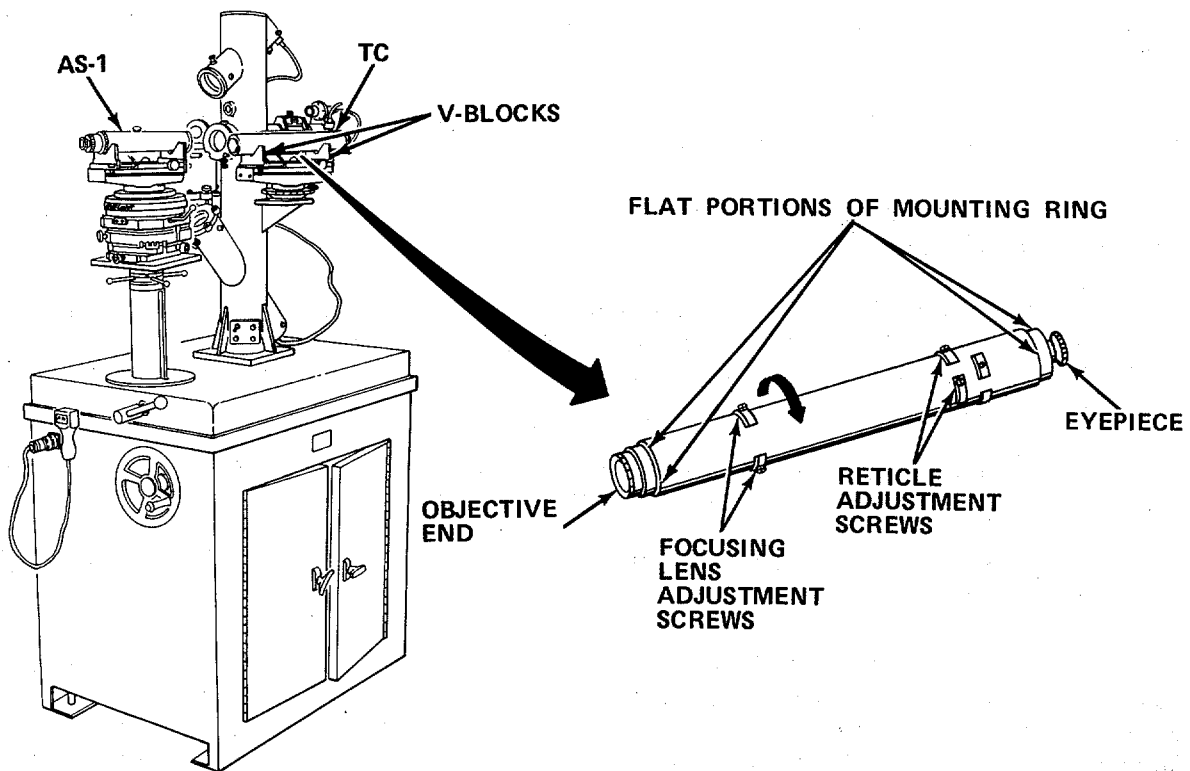
- (i) Install male plug of lighting attachment into center socket on rear of target post and one lamp on eyepiece of MTC. Install other lamp on micrometer check target.

(26) Mount Model 187 stride level:

- (a) Remove stride level from its case.



- (b) Place stride level on MTC barrel and secure with holddown strap.



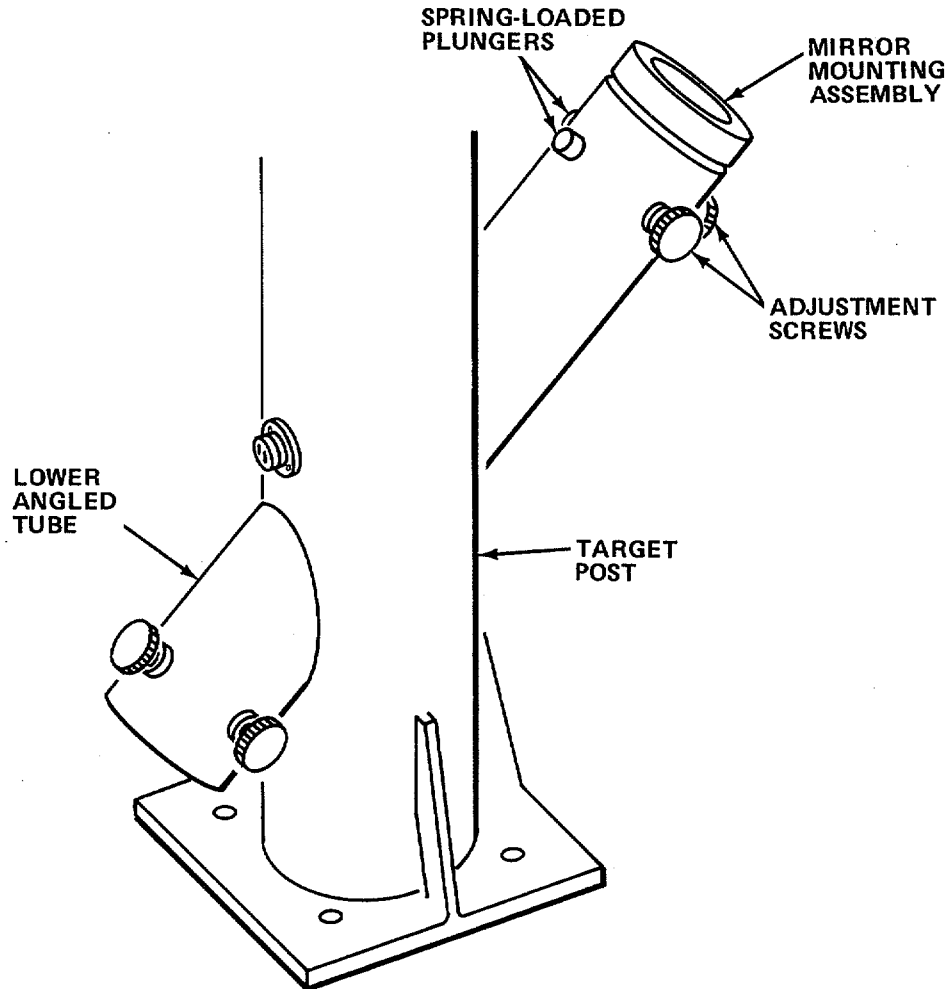
- (27) Remove Model 272-1 target collimator (TC) from case and place in Vblocks.

NOTE

Provided there are no lumps or gouges in the paint, rotating the TC in the V-blocks will cause no significant errors.

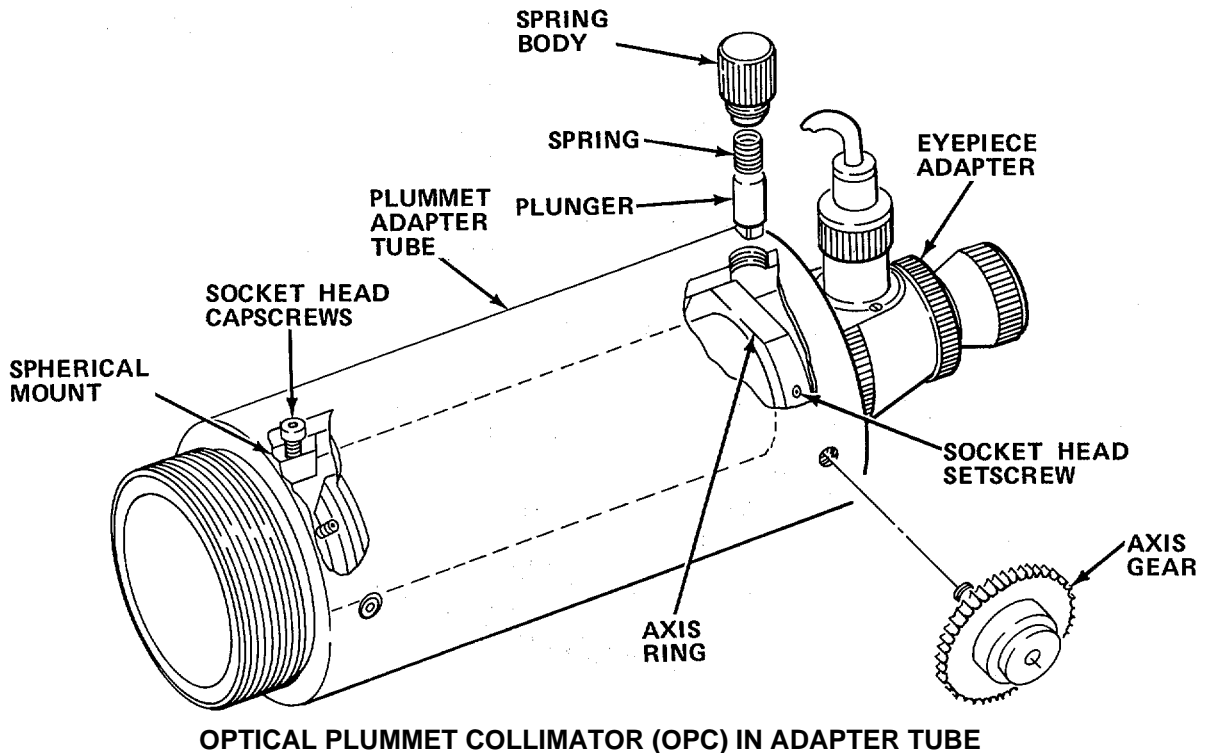
- (28) Rotate TC until the focusing lens adjustment screw that is in line with reticle adjustment screw is on top.
- (29) Attach lighting unit.
- (30) Turn on light.
- (31) Position AS-1 so that it is looking into TC.
- (32) Turn on light.
- (33) Use one of stellite mirrors and focus AS-1 for infinity by autocollimating off mirror. If reflected image is not in clear focus, adjust focusing knob until image becomes sharp.
- (34) Turn off light.
- (35) If infinity reticle image of TC is not sharp, adjust as follows:
- (a) Loosen three focusing lens adjustment screws.
 - (b) Carefully slide focusing lens back and forth until infinity reticle image of TC comes into sharp focus.
 - (c) Snug three adjustment screws and verify that infinity reticle image is still in register with AS-1 reticle. Do not overtighten screws.
- (36) Position collimators until infinity reticle image of TC is in vertical and horizontal register with reticle image of AS-1.
- (37) Rotate TC 180° in its mount. Check for out-of-register condition of vertical wire images only. If out-of-register condition is present, remove one-half of the error using reticle adjustment screws. Remove remaining error by using tangent screws of mount supporting AS-1.
- (38) Rotate TC 180° in its mount and verify adjustment. Continue rotating 180° and adjusting until vertical wires remain in register.
- (39) Rotate TC 90° and repeat steps (36) thru (38) until vertical wire image remains in register.
- (40) Bring both vertical and horizontal patterns into register using test post mounting base adjustments, and again rotate TC 180°. If adjustment is complete, wires should remain in exact register both vertically and horizontally. If they do not, rotate TC 90° and repeat steps (36) thru (39) until they remain in register.

(41) Install TC in lower tube of target post:



- (a) Remove mirror mounting assembly from front end of tube.
- (b) Loosen two adjustment screws opposite spring-loaded plungers in each end of lower angled tube. Back out screws until rounded tips are nearly flush with inside wall of tube.
- (c) Remove TC from V-blocks on target post. Note four flat portions of two mounting rings on ends of collimator barrel. These flat portions will be horizontal and vertical when installation is complete. Clean collimator barrel and lenses (table 2-1).
- (d) To prevent reticle adjusting capstan screws from contacting adjustment screws or plunger tips, rotate barrel of collimator 450 from final position, and insert TC into front end of target post tube eyepiece end first.

- (e) When TC is in approximate position, rotate it 450 and bring ring at eyepiece end of TC into contact with spring-loaded plungers at rear end of tube. TC may be supported by eyepiece during this operation. Screw in the adjustment screws and center eyepiece end of TC in tube by eye.
- (f) Hold objective end of TC in contact with spring-loaded plungers at front end of tube, screw in adjustment screws, and center objective end of TC in tube by eye.
- (g) Install male connector of lighting unit on bottom receptacle on target post and snap other end onto eyepiece.
- (h) Reinstall mirror mounting assembly.



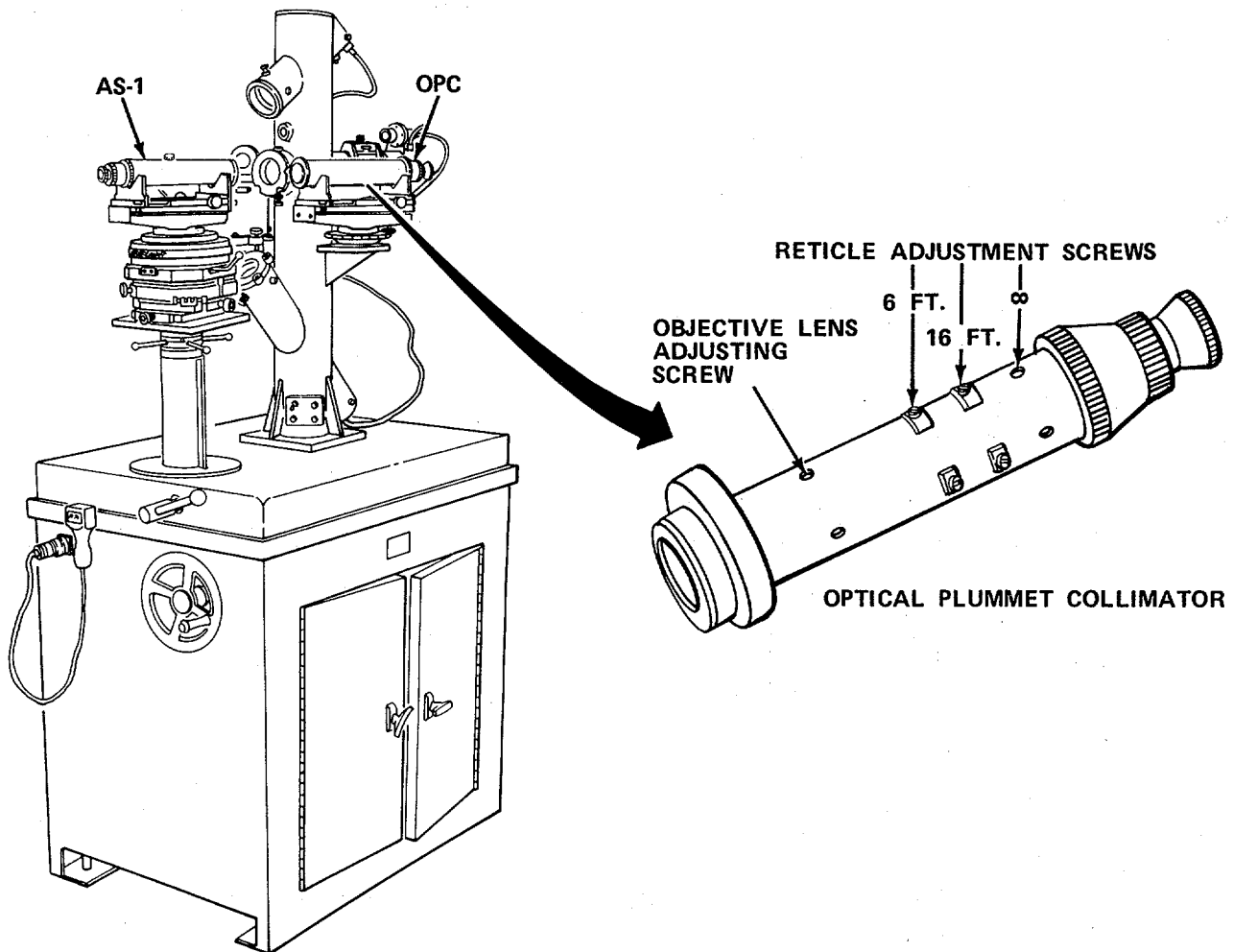
- (42) Prepare and aline Optical Plummet Collimator (OPC) as follows:
- (a) Remove OPC in accordance with paragraph 2-20.4.
 - (b) Place plummet adapter tube on a bench, threaded end down.
 - (c) Mark exact location of the OPC with respect to the plummet adapter tube.
 - (d) Unscrew axis gears, and remove spring bodies, springs, and plungers from the plummet adapter tube.
 - (e) Remove the four socket head capscrews that secure the spherical mount near the threaded end of the plummet adapter tube.

- (f) Carefully lift the OPC from the adapter tube.
- (g) Unscrew the eyepiece adapter from the OPC. (h) Matchmark the position and orientation of the axis ring and loosen four socket head setscrews that secure the axis ring to the OPC and remove axis ring.
- (i) Screw the eyepiece adapter back on the OPC.
- (j) Unscrew the objective cap ring from the end of the OPC and remove the spacer tube.

NOTE

Do not remove spherical mount from OPC.

- (k) Place the OPC in V-blocks on target post and attach lighting unit.
- (l) Position AS-1 so that it is looking into the OPC.



WARNING

To avoid electrical shock and short circuits, disconnect the optical plummet control handle before plugging in power cord.

(m) If installed, disconnect OPC control handle, plug in power cord, and turn on light to AS-1.

(n) Use stellite mirror to verify that the AS-1 is focused for infinity by autocollimating off the mirror. If the reflected image is not in clear focus, adjust the focusing knob until the image becomes sharp. Turn off light.

(o) Turn on light to OPC and adjust collimators until the infinity reticle image of the OPC is in vertical and horizontal register with reticle image of AS-1.

NOTE

If the infinity reticle image of the OPC is not sharp, damage to either the objective lens or the infinity reticle has occurred. Refer to higher level maintenance.

(p) Rotate the OPC 180° in its mount. Check for out-of-register condition of vertical wire images only. If out-of-register condition is present, remove one half of the error using the horizontal setscrews located toward eyepiece end of OPC. Remove remaining error by using tangent screws of the mount supporting the AS-1.

(q) Rotate the OPC 180° and verify the adjustment. Continue rotating and adjusting until vertical wires remain in register.

(r) Rotate the OPC 90° and repeat steps (o) thru (q) until vertical wire images remain in register.

(s) With both vertical and horizontal wires in register, rotate the OPC 180°. If the wires remain in register, adjustment is complete. If they do not, repeat steps (o) thru (r) until they remain in register.

(t) Use the adjusting screws to adjust the two remaining reticles (16 ft and 6 ft); focus the AS-1 to receive the image of each of the remaining reticles in turn and use the procedures in steps (o) thru (s) above.

(u) Focus the AS-1 on the autoreflexion target of the OPC.

(v) Bring the AS-1 reticle into exact register with horizontal and vertical lines of the OPC target.

(w) Rotate the OPC 180° in its mount. If an out-of-register condition is observed, remove one half of the error using the setscrews located nearest the objective end of the OPC.

(x) Repeat steps (y) and (w) until no out-of-register condition is observed.

(43) When alinement is completed, turn off lights, remove power cord and light from OPC, and reassemble OPC as follows:

- (a) Install spacer tube on end of OPC and secure with objective cap ring.
- (b) Remove eyepiece adapter from OPC.
- (c) Aline match marks and install the axis ring and secure with four socket head setscrews.
- (d) Screw eyepiece adapter back on OPC.
- (e) Carefully lower the OPC into the adapter tube.
- (f) Install four socket head capscrews that secure spherical mount and tighten capscrews.
- (g) Aline match marks and install axis gear, spring plungers, springs, and spring bodies in the adapter tube.
- (h) Center eyepiece end in adapter tube using axis gears.
- (i) Install OPC in accordance with paragraph 2-20.4.

h. Preparation/Installation of Model 81 Alinement Telescope (AS-1) and Model 381-1 Alinement Telescope (AS-2).

(1) Turn on light to AS-1.

NOTE

Position AS-1 so that adjustment screw holes will not contact V-blocks and interfere with rotation.

- (2) Place AS-1 so that objective end is pointed toward MTC. Adjust eyepiece of AS-1 until reticle becomes sharp.
- (3) Place stellite mirror on adjustable mirror mount in front of MTC.

NOTE

Adjust mirror base as necessary to obtain reflected image.

(4) Focus AS-1 to infinity by autocollimating off mirror. Adjust focusing knob until reflected image of reticle comes into sharp focus.

- (5) Turn off light and remove stellite mirror from target post.
- (6) Turn on light to MTC.

NOTE

If infinity reticle image of MTC is not sharp and distinct, then MTC is not properly adjusted and must be recalibrated.

(7) Aline AS-1 so that infinity reticle image of MTC is in vertical and horizontal register with reticle image of AS-1 to achieve alinement adjustments provided on test post and mount supporting AS-1.

NOTE

Mark AS-1 to maintain same position on V-blocks during rotation.

(8) Rotate AS-1 180° in its mount. Check for out-of-register condition of vertical wire images only.

NOTE

If necessary, remove paint from adjustment screw holes.

(9) If out-of-register condition exists, use two horizontal reticle adjustment screws of AS-1 to remove one-half of the error. Remove remaining error by using tangent screws of mount supporting AS-1.

(10) Rotate AS-1 180° in its mount and verify adjustment. Continue rotating 180° and adjusting until vertical wires remain in register.

(11) Rotate AS-1 90° and, using only adjustment screws of AS-1 reticle, adjust until vertical wires are in register.

(12) Bring both vertical and horizontal patterns into register and rotate AS-1 180°. If adjustment is complete, wires should remain in exact register both vertically and horizontally. If they do not, rotate AS-1 90° and repeat steps (7) thru (11) until they remain in register.

NOTE

If it is not possible to roll in reticle, position of focusing lens relative to optical-mechanical axis of telescope has been disturbed due to mishandling. Refer to higher level maintenance.

(13) Adjust focusing knob of AS-1 until image of 16 ft reticle of MTC becomes sharp.

(14) Adjust AS-1 mount until two reticle images are in vertical and horizontal register.

- (15) Rotate AS-1 180° in its mount. Check for out-of-register condition of vertical wire images only.

NOTE

If out-of-register condition exists with either the 16 ft or 4 ft reticle, there may be error in focusing lens and/or objective lens positioning. Adjustment of such error is complex and should be referred to higher level maintenance for adjustment.

- (16) Adjust focusing knob of AS-1 until 4 ft reticle of MTC is sharp, and repeat steps (14) and (15).

NOTE

Reticles must be in adjustment before attempting to adjust autoreflection target.

- (17) Place stellite mirror on adjustable mirror mount in front of MTC.

- (18) Turn on light to AS-1.

- (19) Turn focusing knob slowly until autoreflection target comes into sharp focus.

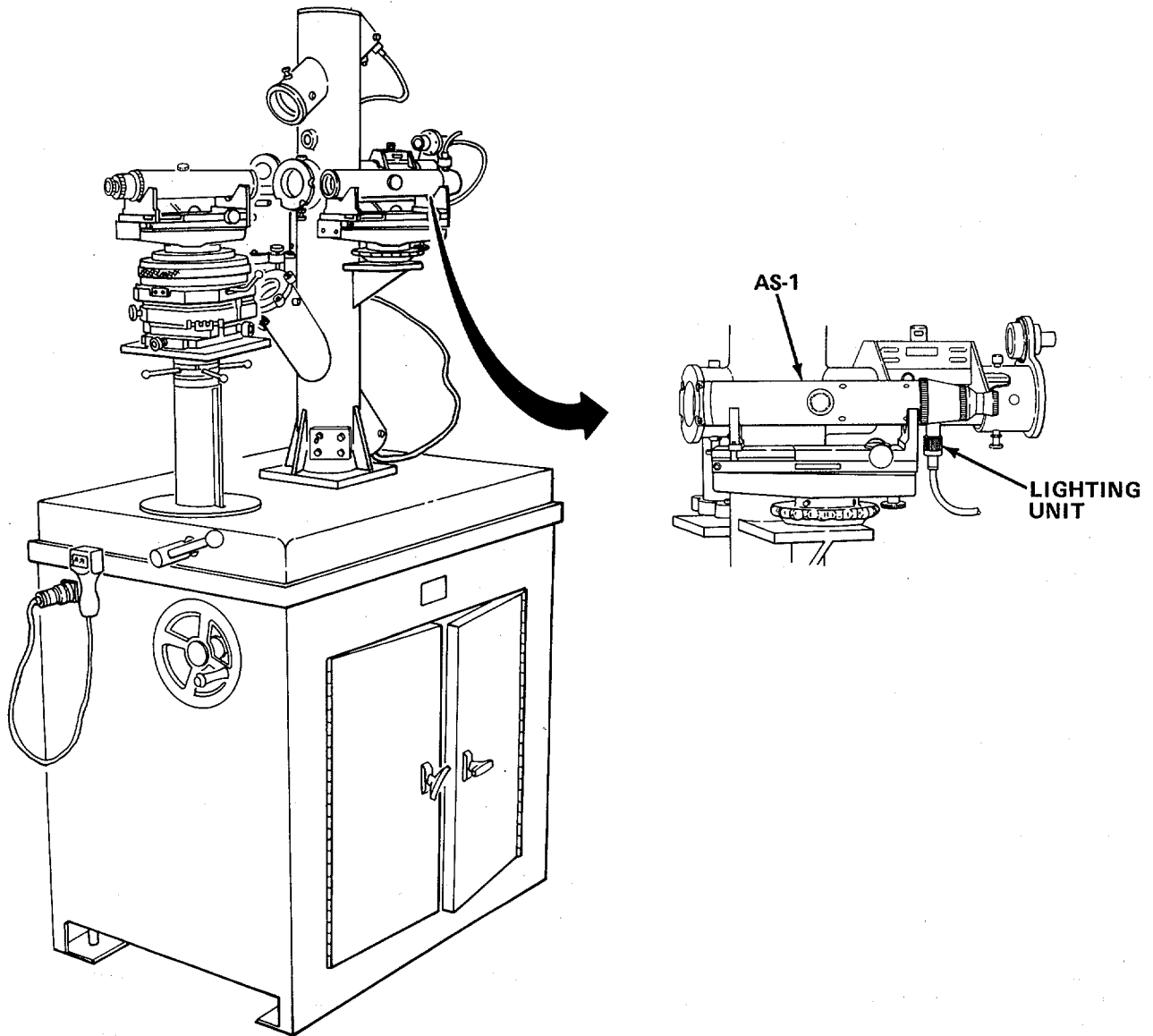
- (20) Adjust either mirror or AS-1 base until reticle image is centered on cross of autoreflection target pattern.

(21) Rotate AS-1 180° in its mount, and check for out-of-register condition of vertical pattern only. If out-of-register condition is present, remove one-half the error using horizontal autoreflection target adjustment screws. Remove remaining error using tangent screws of mount supporting AS-1.

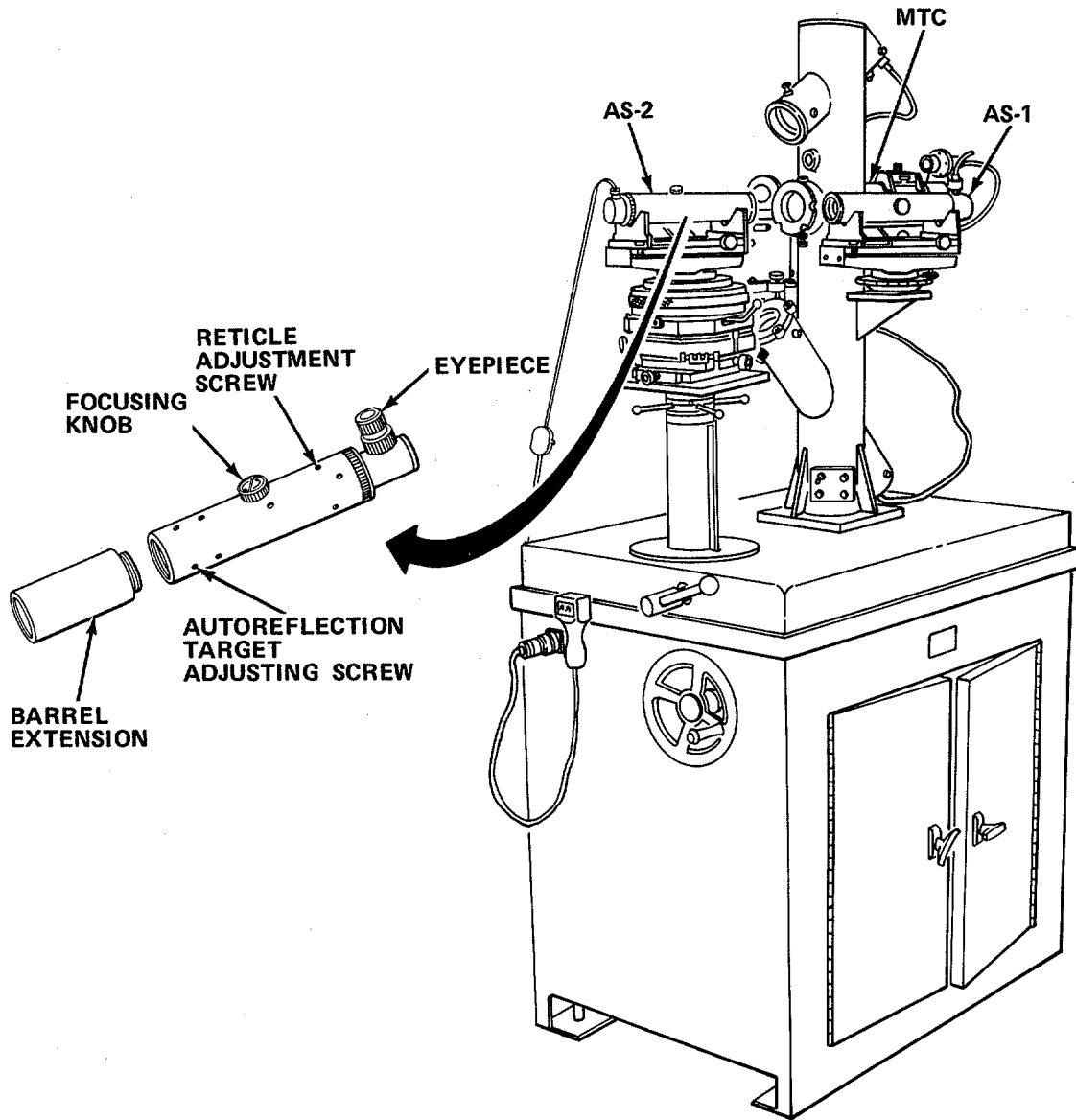
(22) Rotate AS-1 180° in its mount and verify adjustment. Continue rotating 180° and adjusting until vertical patterns remain in register.

- (23) Rotate AS-1 90° . Repeat steps (21) and (22) until vertical pattern is in register.

(24) Bring both vertical and horizontal patterns into register, and again rotate AS-1 180° . If adjustment is complete, patterns should remain in exact register both vertically and horizontally. If they do not, rotate AS-1 90° , and repeat steps (20) through (23) until they remain in register.



- (25) Remove lighting attachment from AS-1, and transfer AS-1 to V-blocks of mounting base on target post.
- (26) Attach a lighting unit to AS-1 and target post.
- (27) Remove AS-2 from its case.



NOTE

Do not install barrel extension. Barrel extension must be off for the following procedures.

- (28) Install AS-2 in V-blocks of mounting base on test post with objective end facing MTC.
- (29) Attach separate auxiliary lighting unit to AS-2 and plug other end into external power outlet on side of cabinet. Turn on light.
- (30) Adjust eyepiece of AS-2 until reticle becomes sharp.
- (31) If not previously installed, place stellite mirror on adjustable mirror mount on front of MTC.
- (32) Focus AS-2 to infinity by autocollimating off mirror. Adjust focusing knob until reflected image of reticle is in sharp focus.
- (33) Turn off light.
- (34) Remove stellite mirror.
- (35) Turn on light to MTC.
- (36) Use adjustments provided on test post and mount to align AS-2 so that infinity reticle image of MTC is in vertical and horizontal register with reticle image of AS-2.

NOTE

If infinity reticle image of MTC is not sharp, MTC is not properly adjusted and must be corrected before proceeding.

- (37) Rotate AS-2 180° in its mount. Check for out-of-register condition of vertical wire images only. If out-of-register condition exists, reticle must be adjusted.
- (38) Use two horizontal reticle adjustment screws to remove one-half of the error. Remove remaining error by using tangent screws of mount.
- (39) Rotate AS-2 180° in its mount and verify adjustment. Continue rotating 180° and adjusting until vertical wires remain in register.
- (40) Rotate AS-2 90° and repeat steps (38) and (39) until vertical wires are in register.
- (41) Bring both vertical and horizontal patterns into register, and again rotate AS-2 180° . If adjustment is complete, wires should remain in exact register both vertically and horizontally. If they do not, rotate AS-2 90° and repeat steps (36) thru (40) until they remain in register.

NOTE

If it is not possible to roll in reticle, position of focusing lens relative to optical-mechanical axis of AS-2 has been disturbed due to mishandling. Refer to higher level maintenance.

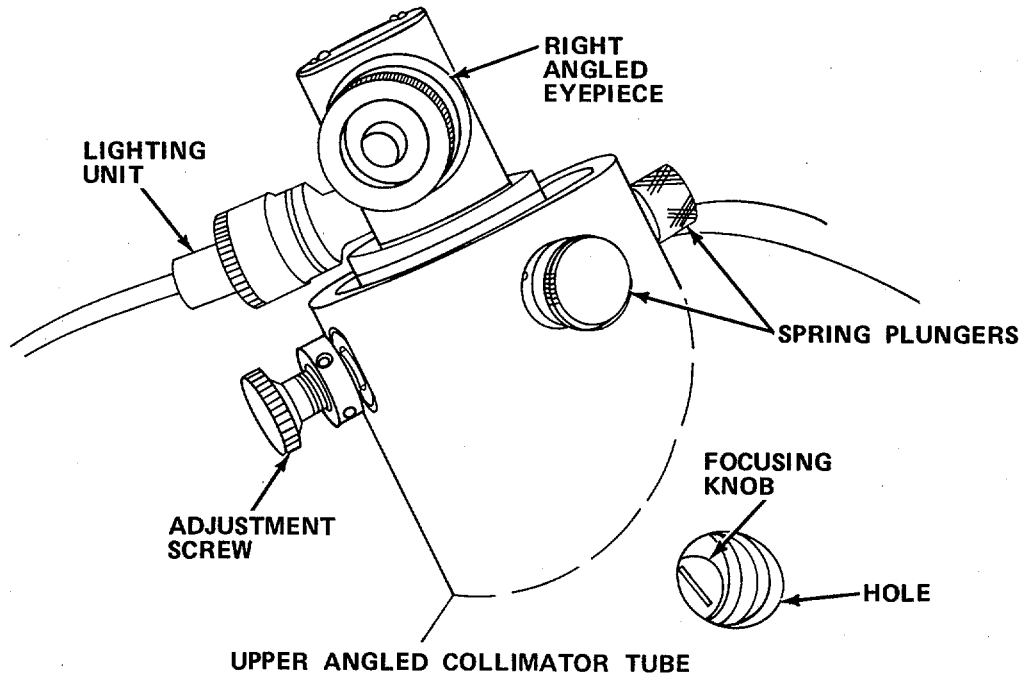
- (42) Adjust focusing knob of AS-2 until image of 16 ft reticle of MTC becomes sharp.
- (43) Adjust AS-2 until two reticle images are in vertical and horizontal register.
- (44) Rotate AS-2 180° in its mount. Check for out-of-register condition in vertical wire only.
- (45) Adjust focusing knob of AS-2 until 4 ft reticle of MTC is sharp and repeat steps (43) and (44).

NOTE

Reticles must be in adjustment before attempting to adjust autoreflection target.

- (46) Place stellite mirror on adjustable mirror mount in front of MTC.
- (47) Turn on light to AS-2.
- (48) Turn focusing knob slowly until autoreflection target comes into sharp focus. This will occur when AS-2 is focused to a distance equal to twice the distance of autoreflection target to mirror.
- (49) Adjust either mirror or AS-2 until reticle image is centered on cross of autoreflection target pattern.
- (50) Rotate AS-2 180° in its mount and check for out-of-register condition of vertical pattern only. If out-of-register condition is present remove one-half error using horizontal autoreflection target adjustment screws. Remove remaining error using tangent screws of mount supporting AS-2.
- (51) Rotate AS-2 180° in its mount and verify adjustment. Continue rotating 180° and adjusting until vertical patterns remain in register.
- (52) Rotate AS-2 90° and repeat steps (49) thru (51) until vertical pattern is in register.
- (53) Bring both vertical and horizontal patterns into register and again rotate AS-2 180°. If adjustment is complete, patterns should remain in exact register both vertically and horizontally. If they do not, rotate AS-2 90° and repeat steps (48) thru (52) until they remain in register.

- (54) Remove stellite mirror from MTC mounting post and return to storage.
- (55) Disconnect auxiliary light from AS-2 and power outlet and return to storage. Turn off target post light.
- (56) Install AS-2 in the upper angled collimator tube of target post as follows:



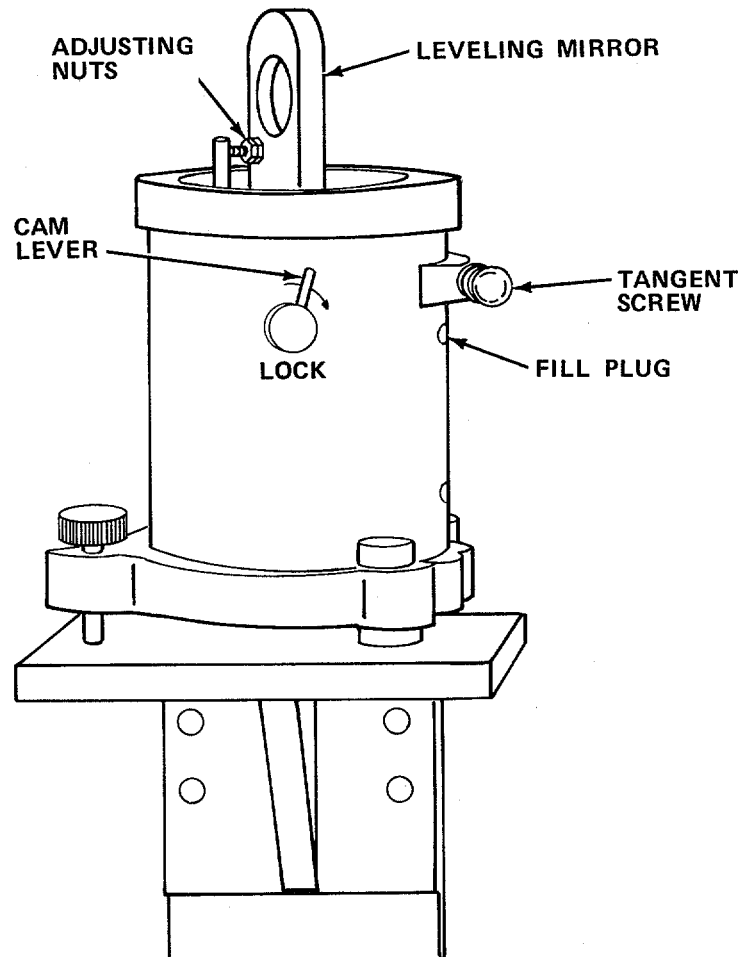
- (a) Remove mirror mounting assembly from collimator tube.
- (b) Loosen adjustment screws, and remove springs and plungers in upper end of collimator tube.
- (c) Loosen adjustment screws in lower end of collimator tube.
- (d) Clean AS-2 barrel, barrel extension, and lenses, (table 2-1).
- (e) Reinstall barrel extension on AS-2.
- (f) Slide adapter end of AS-2 into collimator tube from rear so that focusing knob faces hole in target post.
- (g) Reinstall springs and plungers in upper end of angled collimator tube.
- (h) Center the focusing knob in hole on post.
- (i) Tighten adjustment screws until collimator is just secured at front and rear.
- (j) Center AS-2 in tube by eye using adjustment screws. Check that focusing knob remains centered in hole. Reposition AS-2 if not centered.

(k) Reinstall mirror mounting assembly.

(l) Connect male plug of lighting unit to socket on target post. Connect other end to right angled eyepiece.

(57) Remove mounting base from test post and store.

i. Install Model 287-1 Leveling Mirror.



(1) Remove leveling mirror, reservoir, and base from case.

(2) Unscrew upper fill plug from leveling mirror reservoir and with leveling mirror upright, fill reservoir to bottom of fill plug with mineral oil. Then reinstall fill plug.

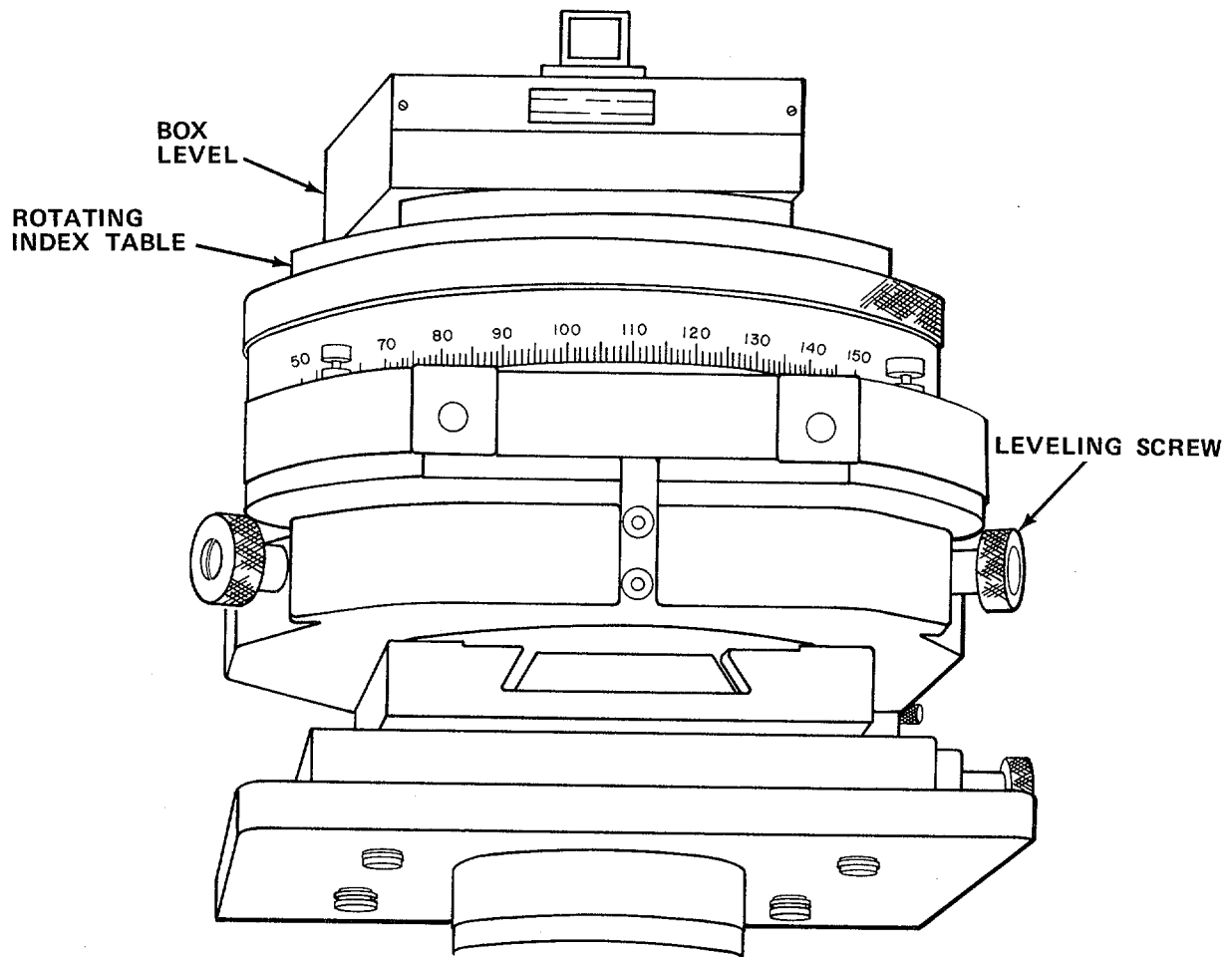
(3) Place leveling mirror in its base and place assembled leveling mirror on adjustable platform.

(4) Level assembly using bullseye bubble as reference.

j. Install optical plummet control handle.

2-6.2 Initial Adjustments and Daily Checks.

a. Level Ultradex. Ultradex table must be leveled to within 30 arc seconds of true horizontal. Use leveling screws and Zeiss method to level Ultradex as follows:



- (1) Place Model 187 box level on rotating index table.
- (2) Turn leveling screws at two active points to level Ultradex.

b. Mount test instrument (TI) on Ultradex.

NOTE

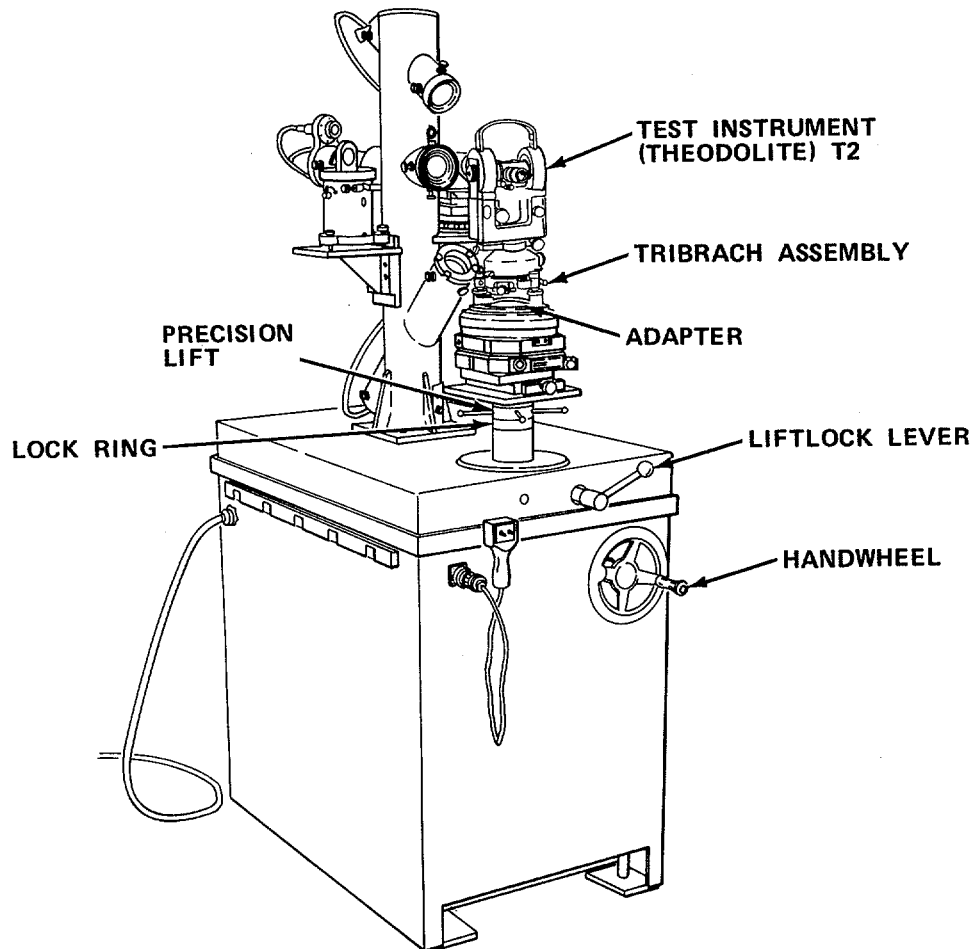
During the following procedures, the test instrument referred to is the Wild-Heerbrugg Model T-2 Theodolite.

- (1) Determine adapter required to mount TI.

- (a) Use adapter 235-5 for instruments having 5/8-11 internal threaded sockets.
 - (b) Use adapter 235-14 for instruments having 3/4-16 internal threaded sockets.
 - (c) Use Kern theodolite adapter 235-7 for instruments with internal threads accepting 18.8 mm x 1.5 mm.
- (2) Mount adapter on Ultradex.

NOTE

If an alidade plate is required, remove the three screws securing the standard 3-1/2-8 threaded mount from Ultradex and remove the mount. The alidade plate is attached with the three screws.



- (3) Mount test instrument on adapter.
- (a) Mount tribrach assembly.

- (b) Mount TI in tribrach assembly.
- (c) Plug power cord into 120 V ac outlet and turn lighting switch on.

NOTE

To avoid false readings during test procedures, remove all tools and equipment from granite base. Do not lean on or allow anyone else to lean against base or cabinet.

- c. Adjust height.

WARNING

Keep test post locked except when making adjustments; test post may drop if left unlocked. To avoid personal injury, keep hands from under post when making adjustments.

- (1) Release test post lift lock lever by rotating to left.
- (2) Adjust handwheel by turning to right or left until test instrument's optical system is at approximate height of MTC.

NOTE

Test post must be locked for accurate measurements.

- (3) Tighten the test post lift lock lever by rotating to right.
- (4) Loosen lock ring, align TI with MTC using precision lift, then tighten lock ring.

NOTE

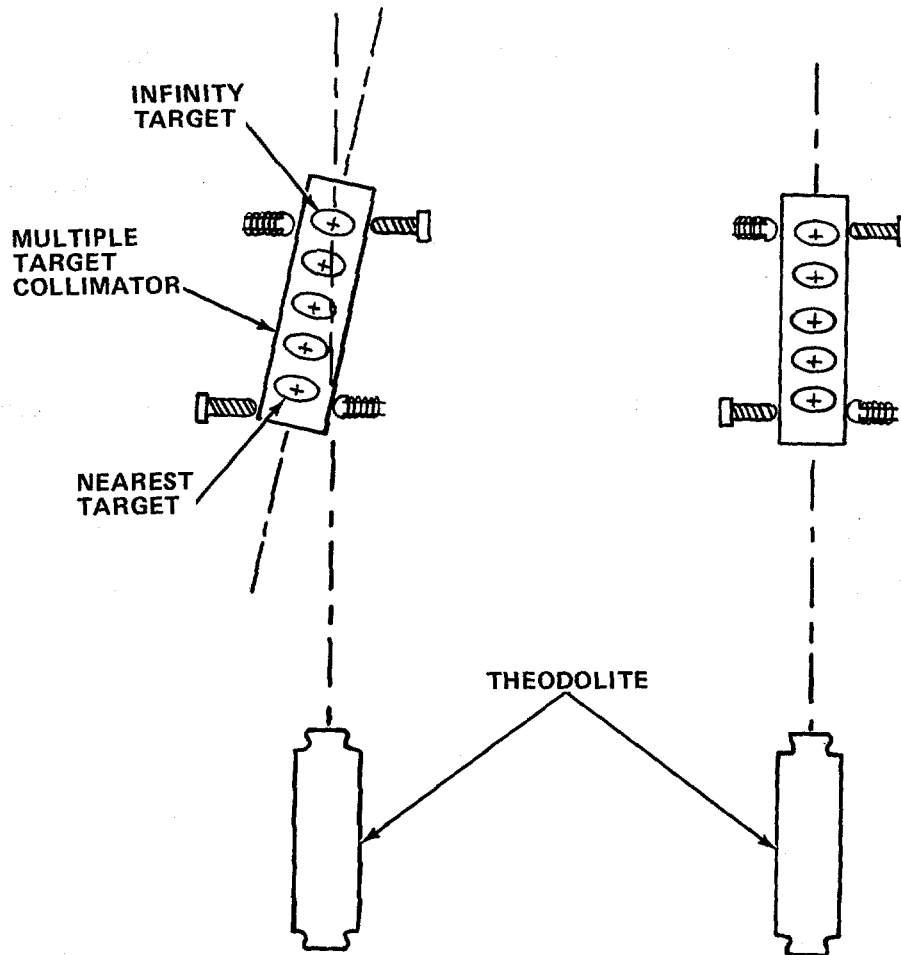
During the following steps, leveling of TI must be checked constantly and releveled as necessary.

- (5) Level TI.
- (6) Recheck to be sure TI is aligned with MTC.

- d. Align collimators.

- (1) Focus TI to infinity target of MTC.
- (2) Rotate MTC until collimator infinity reticle and TI reticle image are parallel .

- (3) Level MTC using stride level.
- (4) Bring reticle images into register using azimuth (horizontal) tangent screw and zenith (vertical) tangent screw of TI.



NOTE

When bucking in, use tangent screws to adjust for infinity target, and precision lift and slides to adjust for nearest target.

- (5) Adjust tangent screws, precision lift, and precision slides to buck in infinity target and nearest target image that can be brought into focus.
- (6) Tilt TI to view infinity reticle of TC in lower tube.
- (7) Rotate TC barrel to bring reticle image parallel to TI reticle image.
- (8) Bring TC reticle into register using collimator mounting adjustment screws.

- (9) Tilt TI to view reticle of AS-2 in upper tube.
- (10) Focus AS-2 on infinity by inserting screwdriver through left-hand hole of angled tube and rotating focusing screw fully to left. Rotate focusing screw to right until filar-bifilar reticle image is observed to be sharp when viewed through TI.
- (11) Rotate AS-2 to make reticle image parallel to TI reticle image.
- (12) Bring AS-2 reticle into register using AS-2 mounting adjustment screws.
- (13) Reverse theodolite 180° on its mount and plunge to reverse vertical axis of TI telescope.
- (14) Aline TI reticle to TC reticle in lower tube.
- (15) Tilt to AS-2 in upper tube.
- (16) Correct one quarter of the error by adjusting upper tube mounting screws.
- (17) Tilt to MTC in center tube.
- (18) Bring reticles into register with horizontal tangent screw of TI.
- (19) Repeat steps (13) thru (18) until all error is removed.
- (20) Turn rotating index table 180 to right.

NOTE

If necessary, focus AS-1 on infinity using stellite mirror.

(21) Bring reticle images of TI and AS-1 into register by using mounting base tangent screws. If range of tangent screws is not adequate for adjustment, proceed as follows:

- (a) Adjust tangent screws to midrange of thread travel.
- (b) Loosen two setscrews holding upper section of 88-6 mounting base to mounting plate.

(c) Rotate upper section until reticle images of TI and AS-1 are in approximate alinement and tighten setscrews.

(d) Use tangent screws to bring reticle images of TI and AS-1 into register.

e. Aline TI with OPC.

NOTE

Perform the following operation only if the optical plummet collimator is to be used for calibration. After using the optical plummet collimator for calibration, realine the collimators in accordance with step d, above.

- (1) Check that OPC eyepiece is centered in the adapter tube by eye.
- (2) Observe OPC through TI optical plummet.
- (3) Focus plummet eyepiece on OPC target.
- (4) Position TI with precision slides to register reticle and target pattern.
- (5) Rotate TI 180° using Ultradex.

NOTE

Do not use the OPC control handle to position the OPC in the test post. The OPC control handle is used only with a TI capable of focusing on the infinity reticle.

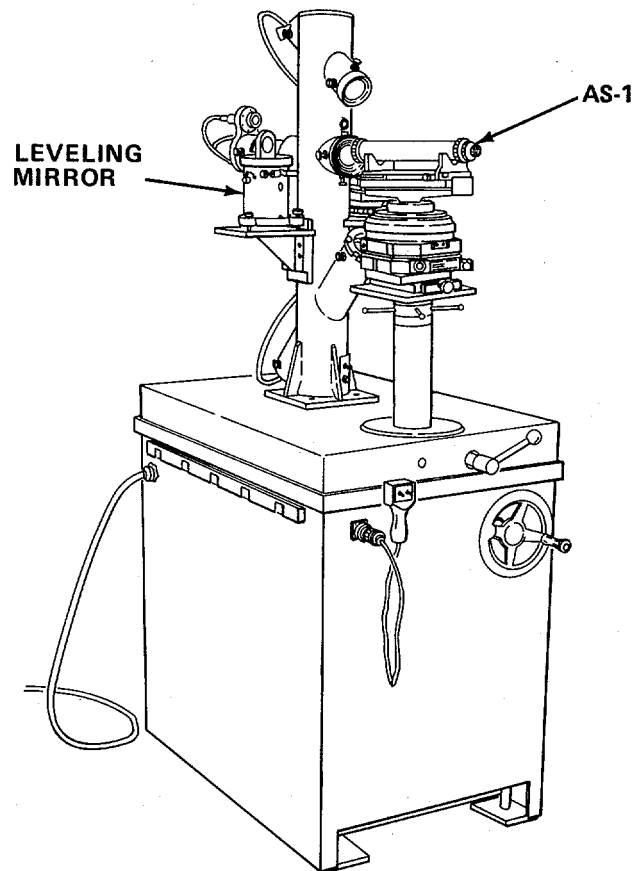
- (6) Use precision slides on Ultradex to remove one-half of reticle error.
- (7) Rotate TI 180° using Ultradex.
- (8) If register error exists, use TI optical plummet to remove one-half of error.
- (9) Rotate TI 180° using Ultradex. If reticles are out of register, repeat steps (4) thru (8) until all error is removed.
- (10) Calibrator is now alined to permit calibration of instruments.

f. Aline leveling mirror. After alinement, the leveling mirror may be used to level instruments that do not have a level vial.

CAUTION

Whenever leveling mirror is moved or adjustments are made, mirror assembly must be in up and locked position to prevent damage to delicate knife edges. Only exception to this rule is when tangent screw is being used to obtain small amounts of azimuth (rotational) correction.

- (1) Move AS-1 and mounting base to test post; mount so that it is aimed at mirror and adjust for vertical displacement.
- (2) Level AS-1 using stride level.
- (3) Attach auxiliary lighting unit to AS-1 and turn it on.



- (4) Carefully lower leveling mirror into operating position using cam lever.
- (5) Using focusing knob, focus the AS-1 to pick up the reflected reticle image from the mirror.

- (6) Adjust AS-1 to bring reflected reticle image into exact vertical and horizontal register with reticle image.
- (7) Raise leveling mirror out of operating position using cam lever and rotate mirror assembly 180°

NOTE

Do not move AS-1 vertically or horizontally.

- (8) Carefully lower leveling mirror into operating position using cam lever and use tangent screw of leveling mirror to realine vertical wires.

NOTE

Difference between position of reflected image and reticle image represents twice the actual error between true vertical and mirror surface.

- (9) If reflected image moved up, move adjusting nuts away from viewing instrument until one-half of error is removed. If reflected image moved down, move adjusting nuts toward viewing instrument until one half of error is removed.

- (10) Repeat steps (7) thru (9) until error is removed.

- (11) Reinstall mounting base and AS-1 on target post.

2-6.3 Operating Procedures. This manual is not intended to cover all available instruments. Although the following guidelines should be helpful in testing all types of instruments.

Keep in mind that the calibrator must be correctly alined before any instrument can be correctly tested. Choose the proper adapter to mount the instrument to be tested on the Ultradex. To test an alinement scope for example, a Model 88-6 mounting base must be installed on the test post. Both a coarse and fine vertical height adjustment is provided for the test post. When transit or theodolite circles are to be checked make sure the Ultradex is leveled to within 30 arc seconds of true horizontal.

Autocollimation and autoreflexion checks can be made using Model 185 stellite mirrors when mounted on adjustable mirror mounts on the target post.

When an optical plummet of a tribrach is to be checked, use the precision slides to position the tribrach over the OPC.

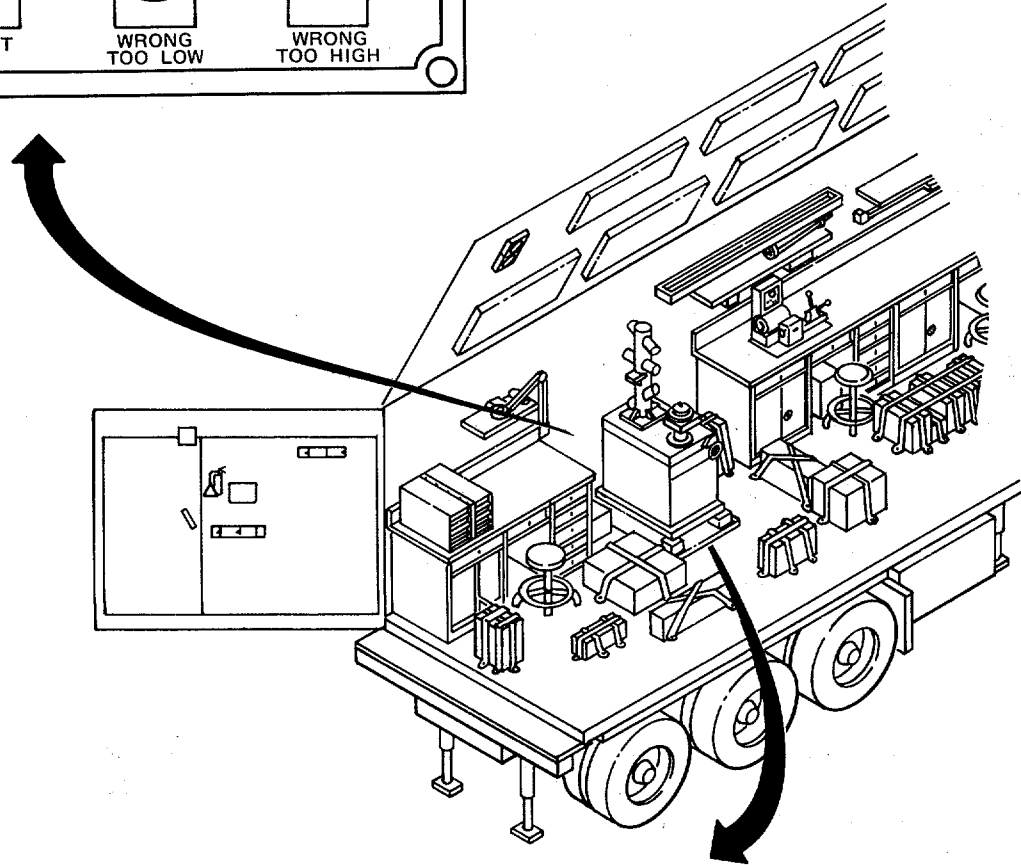
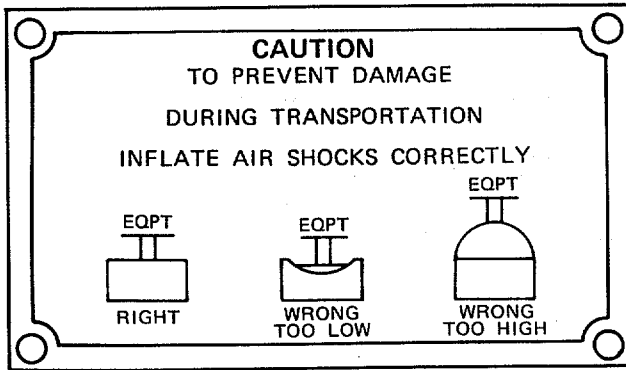
The Model 390 optical wedge may be used to determine the amount of off-center error of a reticle or target in an alignment scope or collimator. After attaching the wedge on an adjustable mirror mount, set the wedge dial to zero. Mount the scope to be tested on the test post, align the reticle images, and rotate the scope 180°. The amount of error is determined by rotating the wedge dial until the reticles are again in alignment; reading the amount of error on the wedge scale. Each graduation represents one arc second.

The micrometer check target is permanently mounted on the MTC tube and provides a means for checking optical micrometers.

2-6.4 Preparation for Movement.

- a. Remove four lighting units from test post and alignment telescopes and store in case.
- b. Remove stellite mirrors and store in case.
- c. Remove stride level and store in case.
- d. Remove leveling mirror and base. Drain reservoir and store in case.
- e. Remove Model 81 Alignment Telescope and store in case.
- f. Remove Model 88-6 Mounting Base and store in case.
- g. Remove Model 381-1 Alignment Telescope and store in case.
- h. Remove target collimator and store in case.
- i. Disconnect power cord.
- j. Remove MTC and store in case.
- k. Fully lower test post.
- l. Tighten shipping screws located under granite base.
- m. Place box level in storage case.
- n. Complete preparation for movement in accordance with paragraph 1-6.2.

2-6.5 Operating Instructions on Decals and Instruction Plates.



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

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

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

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. This equipment does not require lubrication.

2-9. TROUBLESHOOTING PROCEDURES.

a. The table lists the common malfunctions which you may find during operation or maintenance of the short-range optical calibrator, 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. NO ILLUMINATION AT TARGET POST.

Step 1. Remove fuse (paragraph 2-10.1) and check for continuity.

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

(b) If continuity does not exist, replace defective fuse (paragraph 2-10.1).

WARNING

Electrical shock hazard. You must stand on rubber matting as a protective measure before performing these procedures. Death or serious injury could result.

Step 2. Check power outlet for 120 V ac.

(a) If power is present, proceed to step 7.

(b) If power is not present, proceed to step 3.

Step 3. Check power panel indicators for correct voltage, frequency, and phase.

(a) If correct, proceed to step 4.

(b) If incorrect, notify power supply supervisor.

Table 2-2. TROUBLESHOOTING-Cont

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

1. NO ILLUMINATION AT TARGET POST-Cont

Step 4. Check circuit breaker ON/OFF position.

- (a) If circuit breaker is ON, proceed to step 5.
- (b) If circuit breaker is OFF, turn ON.
- (c) If circuit breaker trips repeatedly, notify your power supply supervisor.

Step 5. Check circuit breaker output for 120 V ac.

- (a) If voltage is present, proceed to step 6.
- (b) If voltage is not present, replace circuit breaker (paragraph 1-20.5).

Step 6. Remove receptacle and check for 120 V ac input.

- (a) If present, replace outlet (paragraph 1-16.5).
- (b) If not present, refer to direct/general support maintenance for repair of defective wiring.

Step 7. Using multimeter, check for continuity of power cord.

- (a) If continuity exists, proceed to step 9.
- (b) If continuity does not exist, replace power cord.

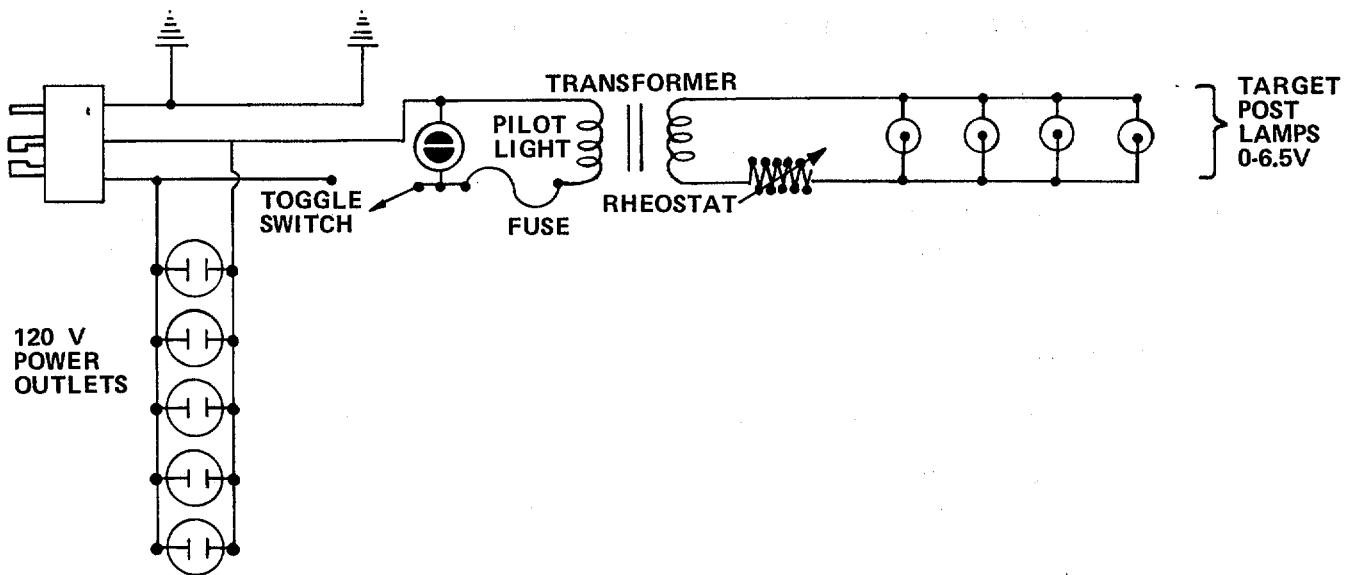
Step 8. Remove four hex head screws, pull out cover plate, and check toggle switch for continuity.

- (a) If continuity exists, proceed to step 9.
- (b) If continuity does not exist, replace toggle switch (paragraph 2-20.1).

Table 2-2. TROUBLESHOOTING-Cont

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

1. NO ILLUMINATION AT TARGET POST-Cont



Step 9. Check for 120 V ac input to transformer.

- (a) If 120 V ac is present, proceed to step 10.
- (b) If 120 V ac is not present, repair or replace wiring from switch to transformer.

Step 10. Check for 6.5 V ac output from transformer.

- (a) If 6.5 V ac is present, proceed to step 11.
- (b) If 6.5 V ac is not present, replace transformer (paragraph 2-20.2).

Step 11. Check for 0 to 6.5 V ac at rheostat.

- (a) If correct voltage is present, repair or replace wiring or connectors.
- (b) If correct voltage is not present, replace rheostat (paragraph 2-20.1).

Table 2-2. TROUBLESHOOTING-Cont.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION
<p>2. OPTICAL PLUMMET CROSS HAIRS DO NOT MOVE.</p> <p>Step 1. Check for input power to the optical calibrator.</p> <p style="padding-left: 40px;">(a) Perform steps 1 thru 7 of MALFUNCTION 1.</p> <p style="padding-left: 40px;">(b) If movement is not restored, proceed to step 2.</p> <p>Step 2. Check for proper OPC control cable connection.</p> <p style="padding-left: 40px;">(a) If disconnected or loose, connect or tighten connections.</p> <p style="padding-left: 40px;">(b) If properly connected, proceed to step 3.</p> <p>Step 3. Check for continuity of control handle cable and switches.</p> <p style="padding-left: 40px;">(a) If continuity does not exist, replace control handle (paragraph 2-10.2).</p> <p style="padding-left: 40px;">(b) If continuity exists, refer to direct/general support maintenance.</p>

2-10. MAINTENANCE PROCEDURES.

a. This section contains instructions covering operator maintenance functions for the short-range optical calibrator. 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
Replace Optical Plummet Control Handle.	2-10.2

2-10.1 Replace Fuse.

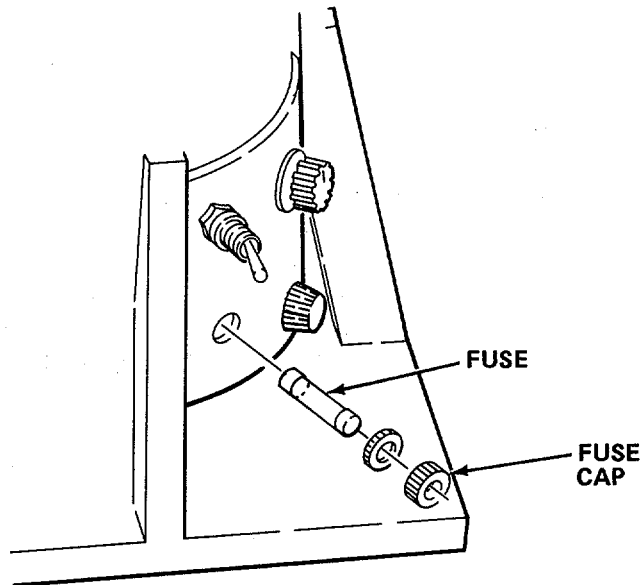
MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Fuse (1/4 amp)

WARNING

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

- a. Unplug power cord.



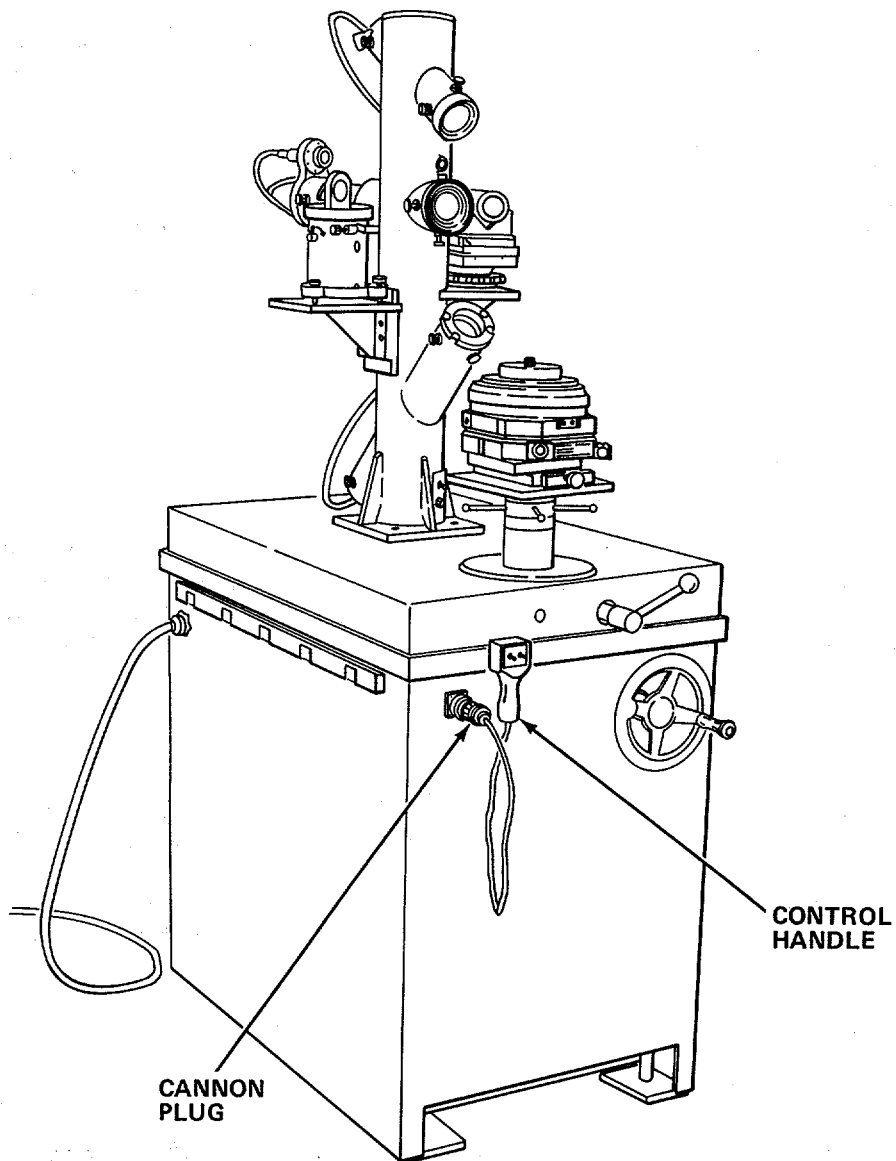
- b. Push in fuse cap and twist to left to release fuse.
- c. Install new fuse.
- d. Push in fuse cap and twist to right until cap locks.
- e. Plug in power cord.

2-10.2 Replace Optical Plummet Control Handle.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Optical Plummet Control Handle

- a. Unplug power cord.



- b. Unscrew defective control handle at cannon plug.
- c. Install new control handle.
- d. Plug in power cord.

SECTION IV ORGANIZATIONAL MAINTENANCE

2-11. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication.

2-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; 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, IMDE, 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 5-6675-328-24P covering organizational maintenance for this equipment.

2-13. SERVICE UPON RECEIPT.

2-13.1 The using organization is responsible for being sure that all components are in proper condition when this equipment is received. The only adjustments authorized are those specified for operator, or direct support maintenance. Disassembly of optical or mechanical components is not authorized at this level of maintenance.

2-13.2 Checking Unpacked Equipment.

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

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

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

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

2-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES. There are no organizational troubleshooting procedures assigned for this equipment.

2-16. MAINTENANCE PROCEDURES. There are no organizational maintenance procedures assigned for this equipment.

2-17. PREPARATION FOR STORAGE OR SHIPMENT.

a. Before removal of equipment for storage, the following components are to be removed and stored in their shipping containers:

- (1) Ultradex
- (2) Four alinement telescopes
- (3) Stellite mirrors
- (4) Optical leveling mirror
- (5) Stride level
- (6) Adjustable mounting base
- (7) Optical plummet control handle
- (8) Box level

b. Check that test post is in lowered position.

c. Check that all power cords and lighting unit cords are stored.

SECTION V DIRECT/GENERAL SUPPORT MAINTENANCE

2-18. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT.

2-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special tools, TMDE and Support Equipment is listed in the applicable repair parts and special tools list in Appendix B of this manual.

2-18.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-6675-328-24P covering direct/general support maintenance for this equipment.

2-19. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES.

a. Direct/general support troubleshooting procedures cover the most common malfunctions that may be repaired at the direct/general support level. Repair or adjustment requiring specialized equipment is not authorized unless such equipment is available. Troubleshooting procedures used 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 following schematic or the foldout at the end of this manual for further fault analysis.

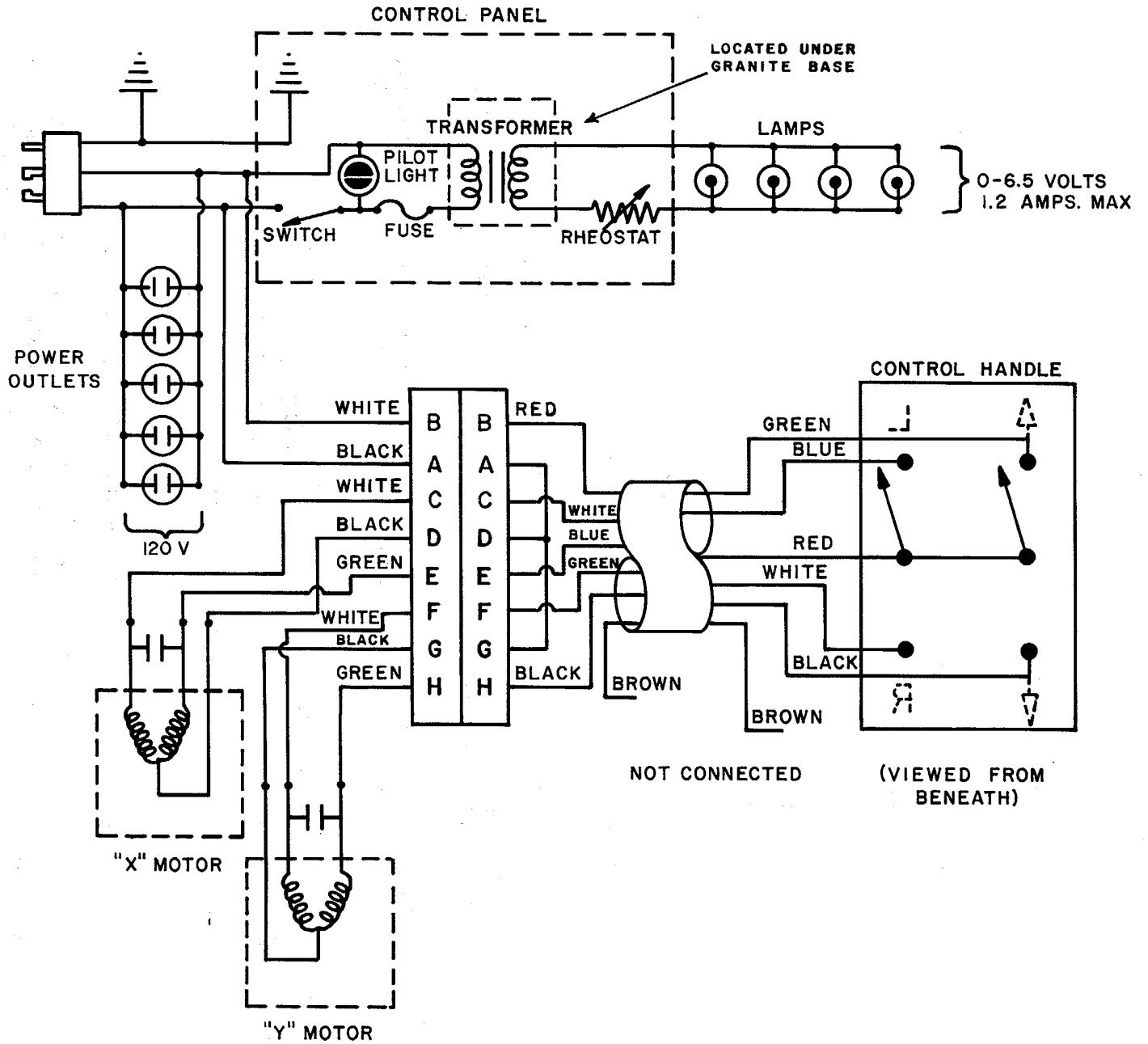


Table 2-3. DIRECT/GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

OPTICAL PLUMMET MOTORS DO NOT OPERATE.

WARNING

Electrical shock hazard. You must stand on rubber matting as a protective measure while performing these procedures. Death or serious injury could result.

Step 1. Check for 120 V ac at motor connections by operating the switches on OPC handle.

- (a) If voltage is not present, proceed to Step 2.
- (b) If voltage is present, replace motor (paragraph 2-20.3).

Step 2. Disconnect control handle at cannon plug and use an ohmmeter to check for continuity between terminals by operating the switches on OPC handle.

- (a) If continuity exists, proceed to step 3.
- (b) If open circuit exists, replace control handle (paragraph 2-10.2).

Step 3. Check for 120 V ac at terminals B and A of cannon plug.

- (a) If no voltage present, repair or replace wiring and connections from power plug.
- (b) If voltage is present, replace defective cannon plug or wiring to motor.

2-20. MAINTENANCE PROCEDURES.

a. This section contains instructions covering direct/general support maintenance functions for the short-range optical calibrator. 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 Toggle Switch or Rheostat	2-20.1
Replace Transformer	2-20.2
Replace Motor(s).....	2-20.3
Remove/Install Optical Plummet Collimator	2-20.4
Remove/Install Short-Range Optical Calibrator	2-20.5

2-20.1 Replace Toggle Switch or Rheostat.

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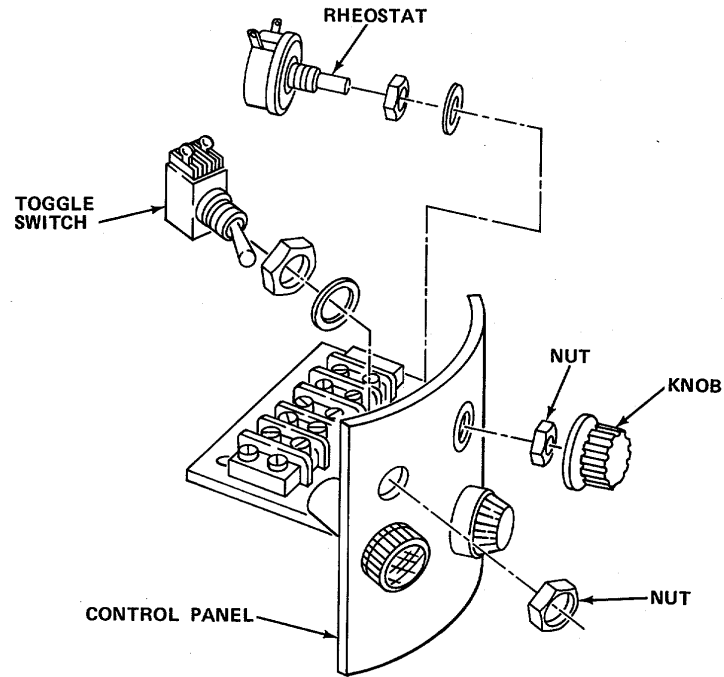
TOOLS: Hex Head Key Wrench Set
 Soldering Iron
 Flat Tip Screwdriver
 5/16 in. Combination Wrench
 9/16 in. Combination Wrench

SUPPLIES: Toggle Switch
 Rheostat
 Rosin Core Solder (Item 20, Appendix E)

WARNING

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

- a. Unplug power cord.



- b. Remove control panel.
- c. Gently pull control panel out to allow access to wiring. If replacing rheostat, remove knob.
- d. Remove nut from switch or rheostat shaft as applicable.
- e. Pull switch or rheostat from control panel.
- f. Tag and disconnect wires.
- g. Reconnect two terminal wires.
- h. Push switch or rheostat through hole and install nut.
- i. Reinstall control panel. If replacing rheostat, reinstall knob.
- j. Plug in power cord.

2-20.2 Replace Transformer.

MOS: 41B, Topographic Instrument Repair Specialist

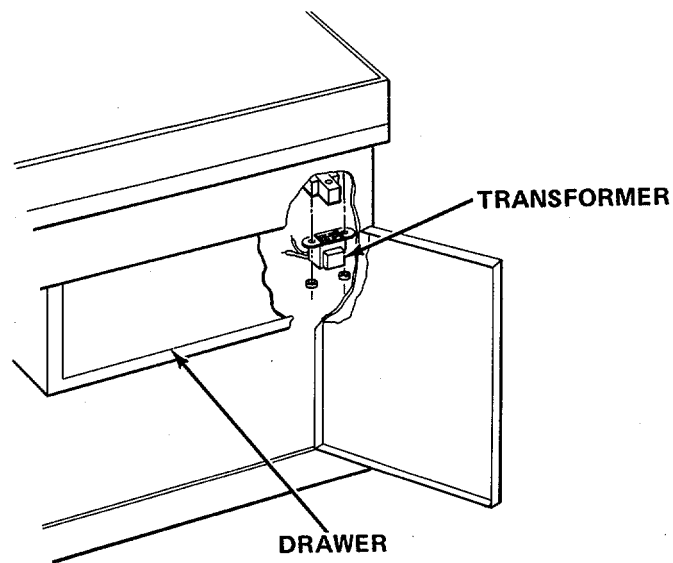
TOOLS: Flat Tip Screwdriver
5/16 in. Nut Driver

SUPPLIES: Transformer

WARNING

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

- a. Unplug power cord.



- b. Open cabinet doors and remove drawer.
- c. Disconnect transformer wires from terminal strip and tag the terminals.
- d. Remove two nuts holding transformer and remove transformer.
- e. Install new transformer and secure with nuts.
- f. Connect wires to terminal strip.
- g. Replace drawer and close cabinet doors.
- h. Plug in power cord.

2-20.3 Replace X or Y Axis Motor.

MOS: 41B, Topographic Instrument Repair Specialist

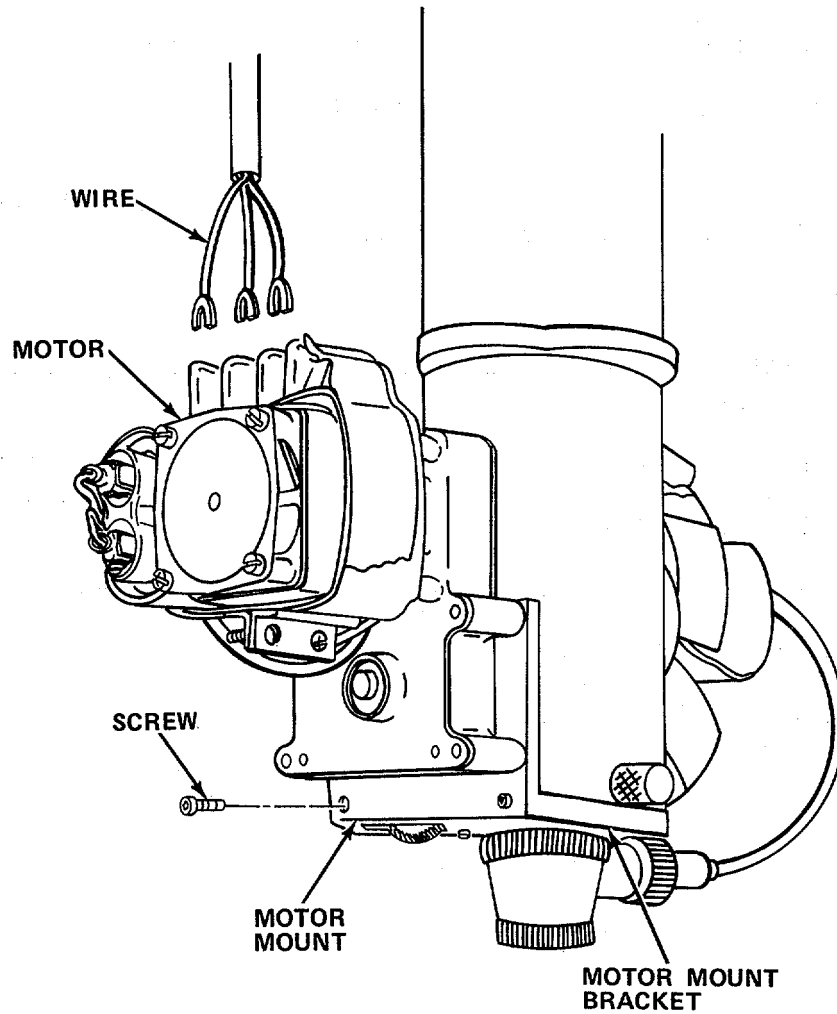
TOOLS: Hex Head Key Wrench Set
Flat Tip Screwdriver

SUPPLIES: AC Motor

WARNING

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

- a. Unplug power cord.
- b. Open cabinet doors.



- c. Tag and remove three wires from motor.
- d. Remove screws holding motor mount to motor mount bracket.
- e. Remove motor and its mount and place on workbench.

NOTE

The right axis motor shaft has a worm gear; the left axis motor shaft has a miter gear.

- f. Loosen two setscrews holding gear on motor shaft. Remove gear and retain.
- g. Remove screws holding motor mount to motor and remove mount.
- h. Install motor mount on new motor.
- i. Install gear on new motor shaft but do not tighten setscrews.
- j. Attach motor mount to motor mount bracket and secure with screws.
- k. Adjust mesh of worm gear (right axis motor) or miter gear (left axis motor) as follows:
 - (1) Worm gear. Position worm gear on motor shaft so that worm gear is centered on spur gear and tighten setscrews.
 - (2) Miter gear.
 - (a) Remove all slack from motor shaft by pushing shaft toward the motor.
 - (b) Mesh the two miter gears and position the miter gear on the motor shaft to give 0.003 to 0.005 in. (0.76 to 0.127 mm) backlash between the two gears.
 - (c) Tighten the setscrews and recheck the backlash.
- l. Attach three wires to motor.
- m. Plug in power cord.

2-20.4 Remove/Install Optical Plummet Collimator Assembly.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Hex Head Key Wrench Set
Spanner Wrench

SUPPLIES: Optical Plummet Collimator

WARNING

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

- a. Unplug power cord.
- b. Remove the OPC Assembly as follows.

WARNING

Keep test post locked. Test post may drop if left unlocked. To avoid personal injury, keep hands and body from under test post.

- (1) Remove motors in accordance with paragraph 2-20.3.
 - (2) Unscrew lighting unit from OPC.
 - (3) Mark the exact orientation of the plummet adapter tube with relation to the bottom of the test post.
 - (4) Loosen lock ring securing the plummet adapter tube to the test post and unscrew the plummet adapter tube completely.
 - (5) Remove eight hex head screws holding motor mounting bracket to the bottom of the plummet tube and remove motor mounting bracket.
- c. Install the OPC Assembly as follows.
 - (1) Install the motor mounting bracket and secure with eight hex head screws.
 - (2) Screw the plummet adapter tube into the test post.
 - (3) Match up the marks that were made during removal and tighten the locking ring.
 - (4) Install the motors in accordance with paragraph 2-20.3.
 - (5) Screw the lighting unit into the OPC.
 - (6) Close the cabinet door.
 - (7) Plug in power cord.

2-20.5 Remove/Install Short-Range Optical Calibrator.

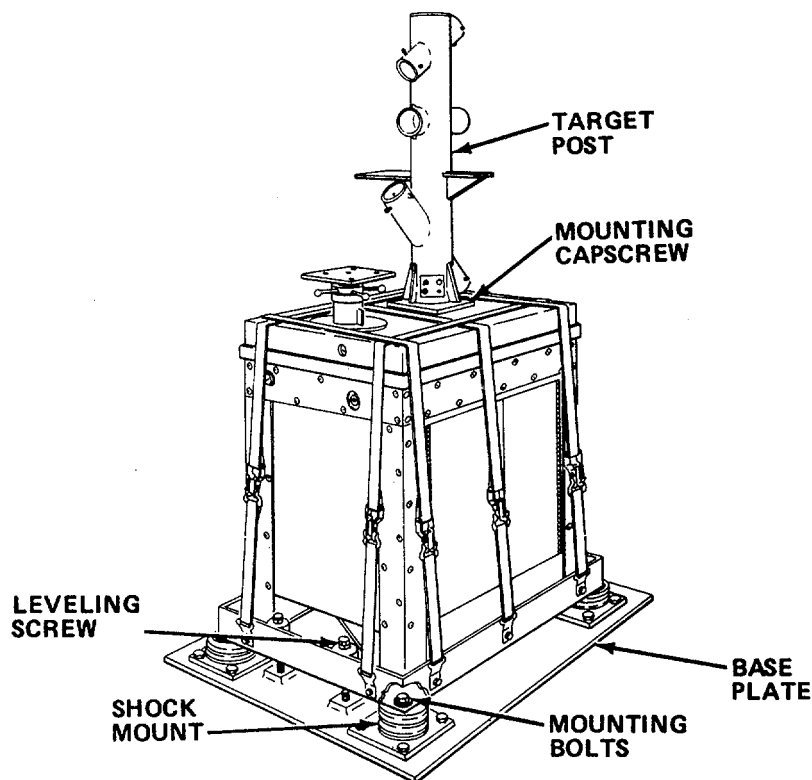
MOS: 41B, Topographic Instrument Repair Specialist

PERSONNEL: Three (3) persons required

TOOLS: 7/16 in. Combination Wrench (2)
 9/16 in. Combination Wrench
 18 mm Hex Head Key Wrench
 1/2 in. Drive Ratchet
 1-3/8 in. Socket, 1/2 in. Drive
 3/4 in. Socket, 1/2 in. Drive
 1/2 in. Socket Extension, 36 in. Long

SUPPLIES: Short-Range Optical Calibrator

- a. Remove supervisor's work bench (paragraph 9-6.7).
- b. Remove vacuum cleaner and attachments; remove four lag bolts and vacuum cleaner storage box.
- c. Remove optical collimators and Ultradex; be sure all equipment is properly secured in transportation cases (paragraph 2-6.4).
- d. Tighten shipping screws under granite base.



Change 1 2-73

- e. Remove cover plate; tag and disconnect terminal board wiring.
- f. Remove cable clamps above drawer.
- g. Tag and remove wires from terminal board located next to transformer assembly.
- h. Remove power control panel with attached five-wire cables.
- i. Remove target post mounting capscrews, washers, and self-locking nuts.
- j. Remove target post.
- k. Remove mounting bolts and lockwashers from each shock mount.
- l. Raise calibrator using leveling screws.

WARNING

Severe personnel injury may occur if calibrator is moved in the section without using adequate lifting equipment. Use care and use only approved lifting equipment.

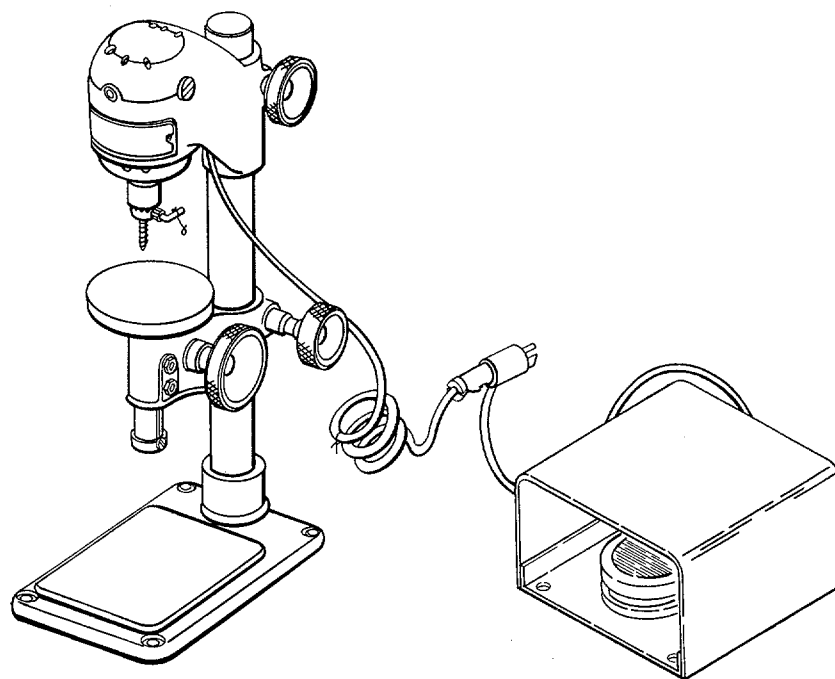
- m. Position pallet jack under calibrator and raise off of base plate. Remove leveling screws.
- n. Move calibrator to rear door and remove from section using forklift.

NOTE

Reinstall target post on calibrator after removal of calibrator from section. Remove target post from replacement calibrator before installing in section.

- o. Install calibrator in section using forklift and pallet jack.
- p. Position replacement calibrator over base plate and line up shock mounts.
- q. Reinstall leveling screws, remove pallet jack, and lower calibrator on shock mounts.
- r. Reinstall bolts and lockwashers to secure calibrator to shock mounts.

- s. Reinstall target post and secure with mounting capscrews, washers, and self locking nuts.
- t. Thread five-wire cable through granite base and reconnect wires on terminal board near transformer.
- u. Install cable clamps above drawers.
- v. Reconnect wires to control panel terminal board.
- w. Reinstall power control panel cover plate.
- x. Reinstall vacuum cleaner storage box; secure with four lag bolts and store vacuum cleaner and attachments.
- y. Reinstall supervisors work bench (paragraph 9-6.7).
- z. Prepare calibrator for use in accordance with paragraphs 2-6.1 and 2-6.2.



CHAPTER 3

DRILL PRESS

SECTION I INTRODUCTION

3-1. GENERAL INFORMATION.

3-1.1 Scope.

- a. Model Number and Equipment Name. Model Series 16 Drill Press.
- b. Purpose of Equipment. To precision-drill small parts.

3-2. EQUIPMENT DESCRIPTION.

3-2.1 Equipment Characteristics, Capabilities, and Features.

- a. High speed universal motor.
- b. Tray feed.
- c. Sealed ball bearings.
- d. Adjustable tray.
- e. Adjustable motor housing.
- f. Variable speed foot controller.

3-2.2 Equipment Data.

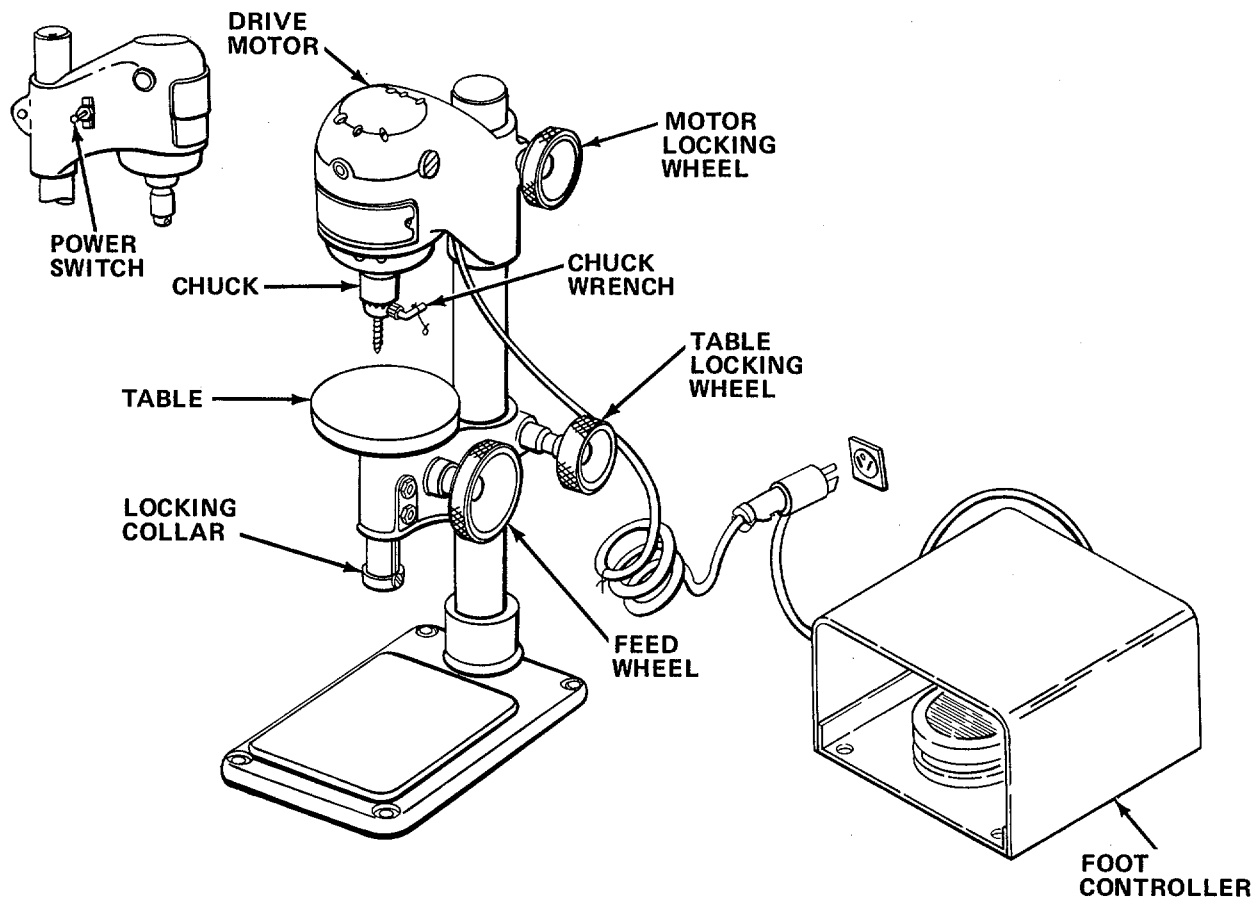
Motor	Universal-Type
Power Requirements	120 V, 50/60 Hz, 1.0 amp
Horsepower	1/16 hp (47W)
Motor Speed Using Foot Controller	0 to 17,000 rpm

Chuck Capacity	0-5/32 in. (0-3.97 mm)
Chuck-to-Table Dimension	4 in. (10.2 cm)
Table Feed Stroke	1 5/8 in. (4.1 cm)
Table Diameter	3 1/2 in. (8.9 cm)
Base Dimensions	5 in. X 8 in. (12.7 cm X 20.3 cm)
Overall Height	17 in. (43.2 cm)

3-3. TECHNICAL PRINCIPLES OF OPERATION. Technical principles of operation are combined with Description and Use of Operator's Controls and Indicators.

SECTION II OPERATING INSTRUCTIONS

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



Control or Indicator

Function

Power Switch

Controls electrical power to motor.

Drive Motor

High speed, universal motor provides rotary power to spindle.

Foot Controller

Allows variable motor speed.

Motor Locking Wheel

Provides for adjustment of motor housing on support column.

Control or Indicator	Function
Feed Wheel	ADJUST: Rotate wheel to left and move housing to desired position. Rotate it wheel to right to tighten. Raises and lowers feed table by means of rack and pinion. RAISE: Rotate to right. LOWER: Rotate to left.
Table Locking Wheel	Provides for adjustment of feed table on support column. ADJUST: Rotate wheel to left and move table to desired position. Rotate wheel to right to tighten.
Locking Collar	Limits travel of feed tray. ADJUST: Loosen setscrew, slide collar to desired position and tighten setscrew.
Table	Flat platform where item to be drilled is positioned. Table is raised and lowered by rotating feed wheel in desired direction.
Chuck	Locks and holds drill bits and rotates with drive motor. OPEN: Insert chuck wrench and rotate to left. CLOSE: Insert chuck wrench and rotate to right.

3-5. 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 the proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

3-5. 1 PMCS Procedures.

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operations if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval column. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected 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 4, Appendix E)	ar

Table 3-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can 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

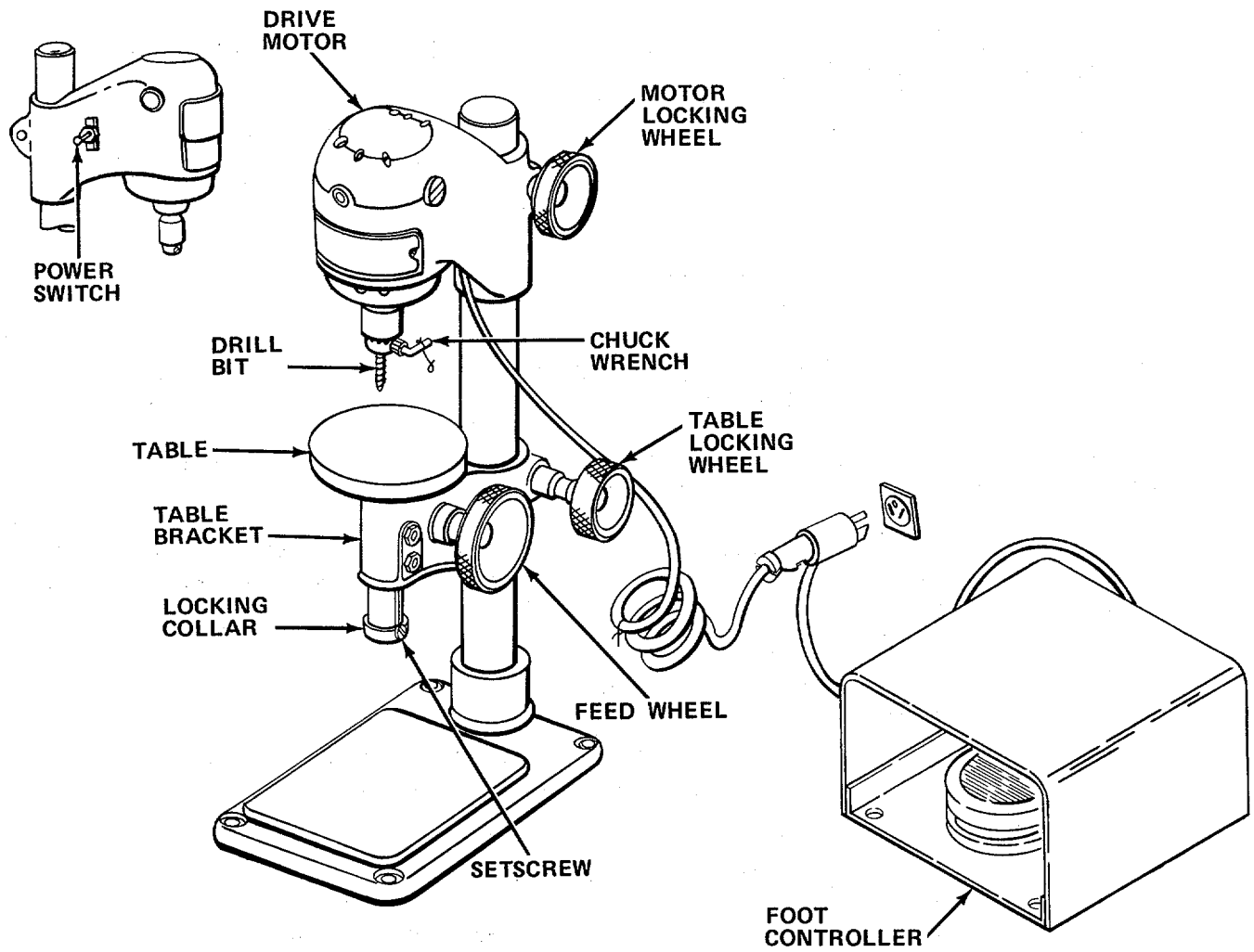
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p>DRILL PRESS</p> <p><u>Inspect Drill Press.</u></p>	
<p>1. Check locking collar for loose setscrew. Tighten if necessary.</p>			

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

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

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>DRILL PRESS - Cont</u></p> <p><u>Inspect Drill Press - Cont</u></p> <ol style="list-style-type: none"> 2. Check for loose knobs, bolts, and screws. 3. Attach foot controller and plug in power cord. <p style="text-align: center;">WARNING</p> <ul style="list-style-type: none"> • Grinding and drilling operations may result in blindness if eye protection is not worn. • Rotating and spinning equipment may snag loose clothing, hair, or jewelry resulting in severe personal injury. <ol style="list-style-type: none"> 4. Turn power on and verify proper motor operation. 5. Turn power off. 	
2	A	<p><u>Service Drill Press.</u></p> <ol style="list-style-type: none"> 1. Unplug power cord. 2. Wipe surfaces clean with cheesecloth. 	

3-6. OPERATION UNDER USUAL CONDITIONS.



WARNING

Wear eye protection when operating equipment. Keep hands, loose clothing, and jewelry away from rotating equipment.

- a. Insert proper size drill bit into chuck jaws.

- b. Insert chuck wrench into chuck and rotate to the right to tighten chuck jaws around drill bit. Remove chuck wrench.
- c. Measure height of material to be drilled, plus approximately 1/8 in. (3 mm). This is the working distance.
- d. With table in its lowest position, loosen table locking wheel.

CAUTION

Fasten equipment to feed tray to prevent rotation.

- e. Move table assembly until working distance from table to drill bit is achieved and drill bit is centered on table.
- f. If larger distance between table and drill bit is needed, loosen motor locking wheel and move motor while keeping drill bit centered on table.
- g. To adjust drilling depth, rotate feed wheel until desired drilling depth is achieved; loosen setscrew on locking collar, move collar up shaft to table bracket, and tighten set screw.

NOTE

If desired, drill press may be operated without the foot controller. Plug motor power cord in outlet and operate with power switch.

- h. Attach foot controller and plug in power cord.
- i. Turn power switch on and operate drill with foot controller.
- j. Rotate feed wheel to the right to drill hole.

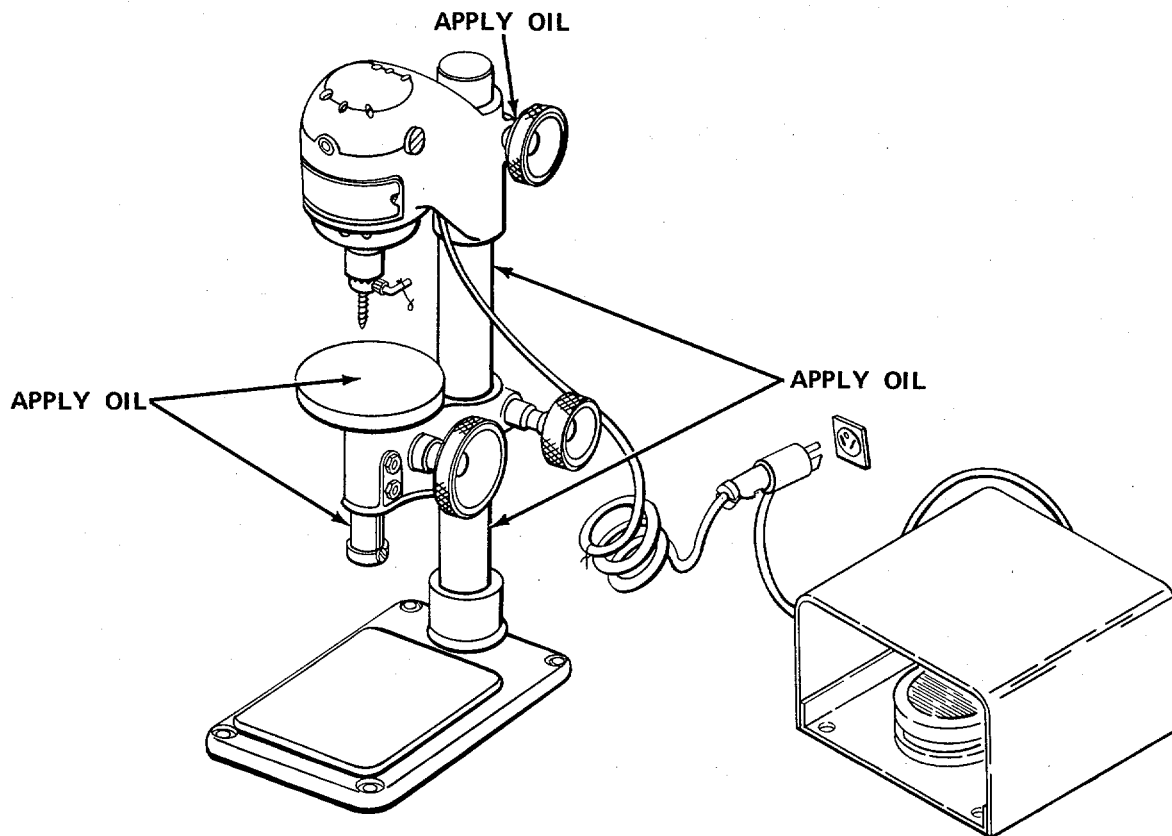
3-7. OPERATION UNDER UNUSUAL CONDITIONS. This equipment is designed for operation only in a controlled environment.

SECTION III OPERATOR MAINTENANCE

3-8. LUBRICATION INSTRUCTIONS. Use lubricating oil (Item 10, Appendix E) and lubricate the drill press after each use as follows:

NOTE

The following lubrication instructions are mandatory.



- a. Lubricate the column and table. Wipe off excess oil with clean cloth.
- b. Raise table to maximum height and lubricate the rack, feed wheel shaft, and pinion gear of the feed assembly.
- c. Lubricate the threads and shaft of motor locking wheel.

3-9. TROUBLESHOOTING PROCEDURES. There are no operator troubleshooting procedures assigned for this equipment.

3-10. MAINTENANCE PROCEDURES. There are no operator maintenance procedures assigned for this equipment.

SECTION IV ORGANIZATIONAL MAINTENANCE

3-11. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication at this level of maintenance.

3-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT.

3-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

3-12.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, TMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

3-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special tools List, TM 5-6675-328-24P, covering organizational maintenance for this equipment.

3-13. SERVICE UPON RECEIPT.

3-13.1 Checking Unpacked Equipment.

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

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

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

3-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no organizational PMCS procedures assigned for this equipment.

3-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.

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

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

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

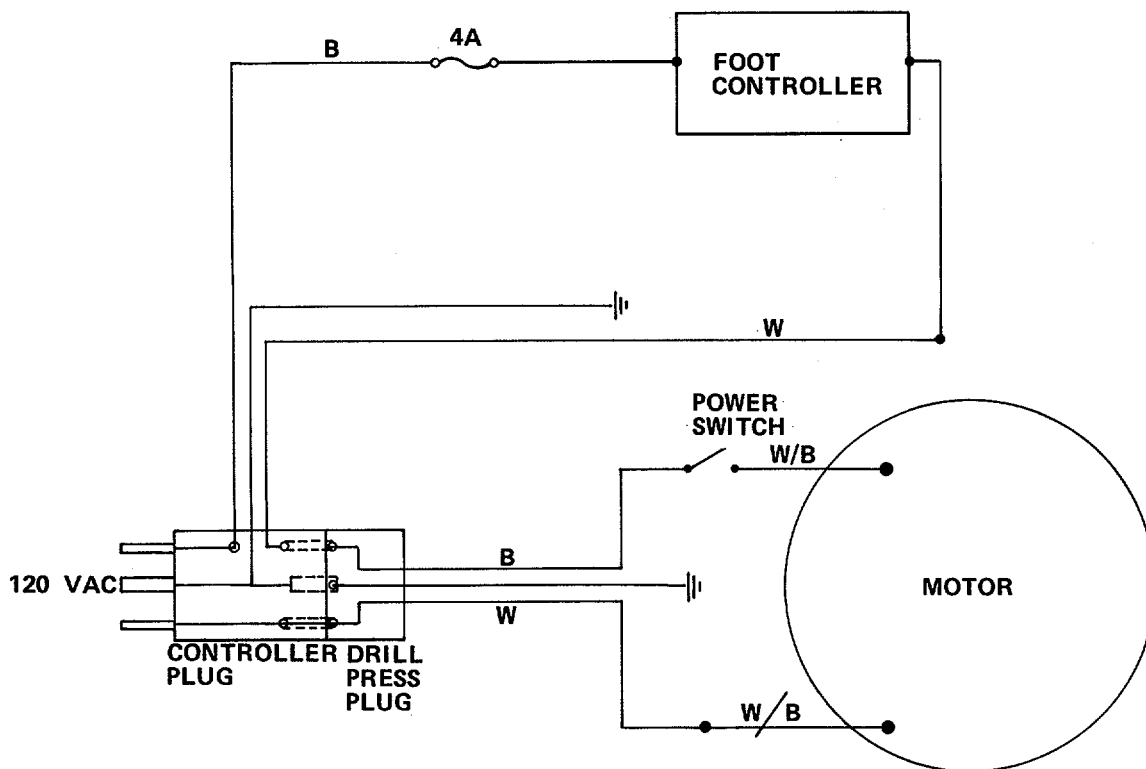


Table 3-2. ORGANIZATIONAL TROUBLESHOOTING

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

MOTOR DOES NOT OPERATE.

Step 1. Remove drill press motor power cord from foot controller power cord and plug into outlet.

- (a) If motor operates, replace foot controller (paragraph 3-16. 6).
- (b) If motor does not operate, proceed to step 2.

Step 2. Check power outlet for 120 V ac using a multimeter.

- (a) If power is present, proceed to step 7.
- (b) If power is not present, proceed to step 3.

Step 3. Check power panel indicators for correct voltage, frequency, and phase.

- (a) If correct, proceed to step 4.
- (b) If incorrect, notify power supply supervisor.

Step 4. Check circuit breaker ON/OFF position.

- (a) If circuit breaker is ON, proceed to step 5.
- (b) If circuit breaker is OFF, turn ON.
- (c) If circuit breaker trips repeatedly, notify power supply supervisor.

Step 5. Check circuit breaker output for 120 V ac.

- (a) If voltage present, proceed to step 6.
- (b) If voltage not present, replace circuit breaker (paragraph 1-20. 5).

Table 3-2. ORGANIZATIONAL TROUBLESHOOTING - Cont

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

MOTOR DOES NOT OPERATE Cont

Step 6. Remove receptacle and check for 120 V ac input.

- (a) If present, replace receptacle (paragraph 1-16.5).
- (b) If not present, refer to direct/general support maintenance for repair of defective wiring.

Step 7. Remove and inspect motor brushes (paragraph 3-16.3).

- (a) If brush length is worn to less than 11/64 in. (4.4 mm), replace brushes (paragraph 3-16.3).
- (b) If brushes are good, proceed to step 8.

Step 8. Using multimeter, check for continuity of power cord.

NOTE

To perform continuity checks, it may be necessary to remove insulation from wire splices.

- (a) If continuity exists, proceed to step 9.
- (b) If continuity does not exist, replace power cord (paragraph 3-16.2).

Step 9. Using multimeter, check for continuity of power switch.

- (a) If continuity exists, replace motor assembly (paragraph 3-16.4).
- (b) If continuity does not exist, replace power switch (paragraph 3-16.1).

3-16. MAINTENANCE PROCEDURES.

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

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

INDEX

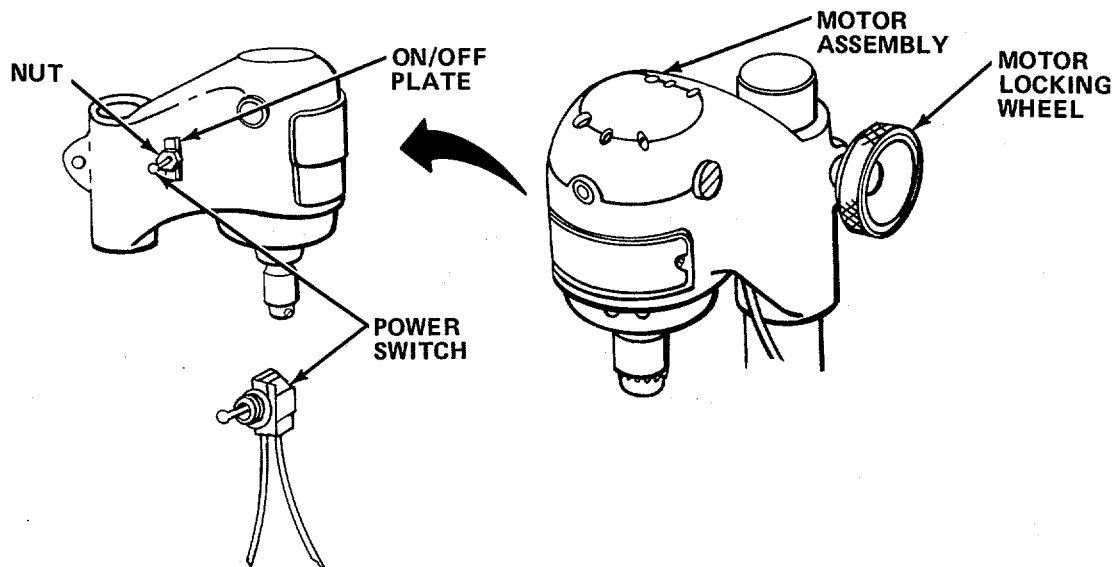
PROCEDURES	PARAGRAPH
Replace Power Switch	3-16.1
Replace Power Cord or Motor Assembly	3-16.2
Replace Motor Brushes.....	3-16.3
Replace Drill Press.....	3-16.4
Replace Foot Controller.	3-16.5

3-16.1 Replace Power Switch.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: 9/16 in. Combination Wrench
Soldering Iron
Diagonal Pliers

SUPPLIES: Power Switch
Heat Gun
Heat Shrink Tubing
Solder (Item 20, Appendix E)

**WARNING**

Death or serious injury may occur from electrical shock if the power cord is not unplugged before servicing.

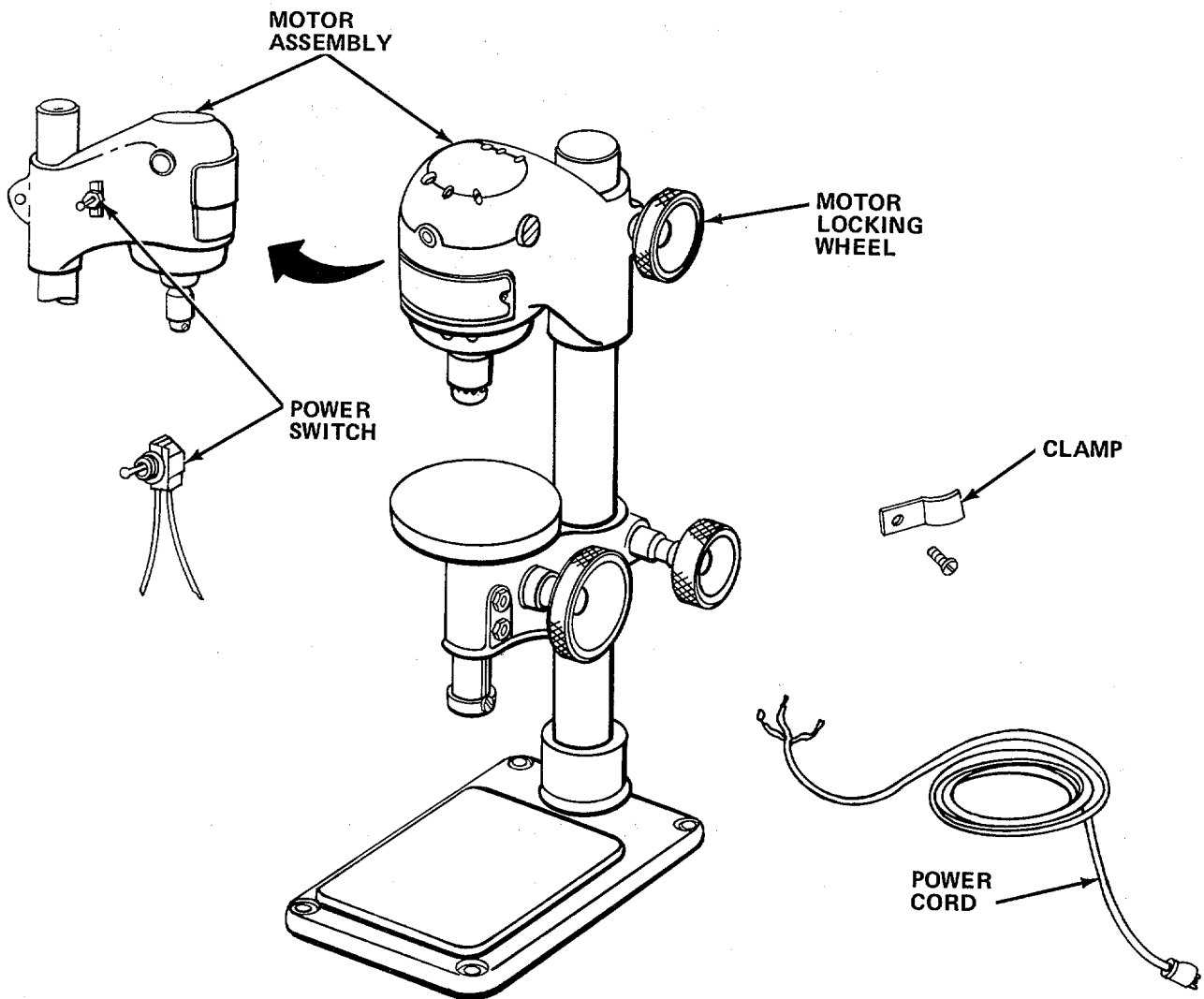
- a. Unplug power cord.
- b. Loosen motor locking wheel and remove motor assembly from column.
- c. Remove nut, ON/OFF plate, and pull switch out of housing.
- d. Tag and disconnect wires; remove switch from housing.
- e. Connect wires to new switch.
- f. Install switch in housing and secure with ON/OFF plate and nut.
- g. Reinstall motor assembly on column and tighten locking wheel.
- h. Plug in power cord.

3-16.2 Replace Power Cord or Motor Assembly.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver
 Offset Flat Tip Screwdriver
 Soldering Iron

SUPPLIES: Solder (Item 20, Appendix E)
 Heat Shrink Tubing
 Heat Gun
 Power Cord



WARNING

Death or serious injury may occur from electrical shock if the power cord is not unplugged before servicing.

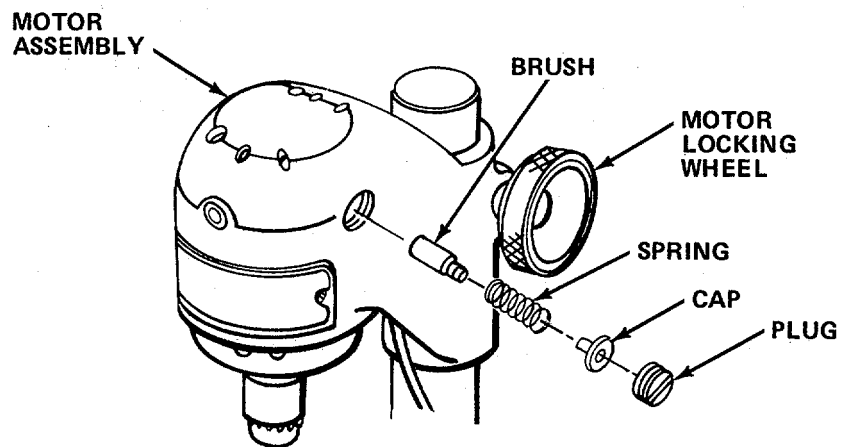
- a. Unplug power cord.
- b. Loosen motor locking wheel and remove motor assembly from column.
- c. Remove power switch to allow access to wires and screws holding power cord.
- d. Loosen clamp screw and free power cord.
- e. Tag and disconnect wires; remove power cord.
- f. Connect power cord wires.
- g. Position power cord under clamp and tighten clamp.
- h. Reinstall power switch.
- i. Reinstall motor assembly on column and tighten locking wheel.
- j. Plug in power cord.

3-16.3 Replace Motor Brushes.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: Flat Tip Screwdriver

SUPPLIES: Brushes
Springs



WARNING

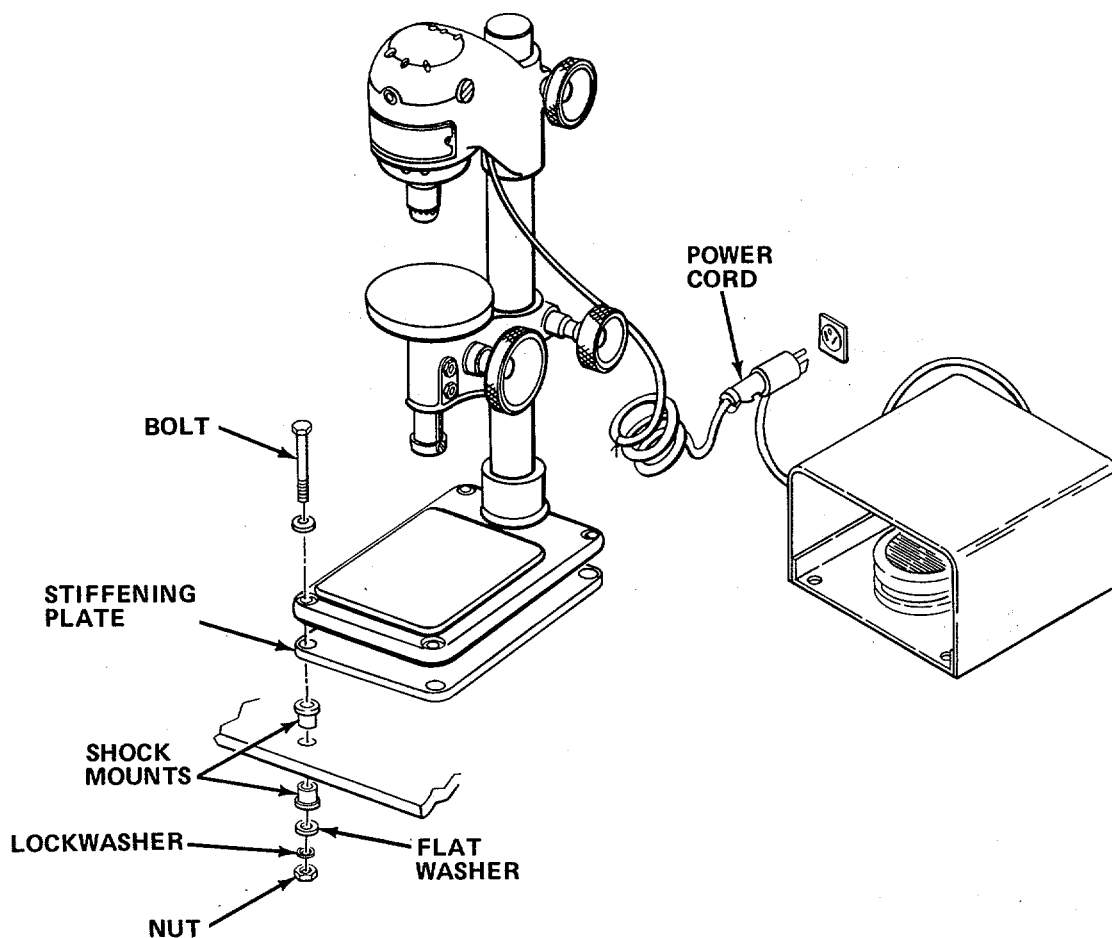
Death or serious injury may occur from electrical shock if the power cord is not unplugged before servicing.

- a. Unplug power cord.
- b. Loosen motor locking wheel and remove motor assembly.
- c. Remove brush plugs, caps, springs, and old brushes from both sides of motor.
- d. Discard brushes and springs.
- e. Install new brushes, springs, caps, and brush plugs.
- f. Reinstall motor assembly on column and tighten locking wheel.
- g. Plug in power cord.

3-16.4 Replace Drill Press.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: 1/4 in. Drive Socket Set
7/16 in. Combination Wrench

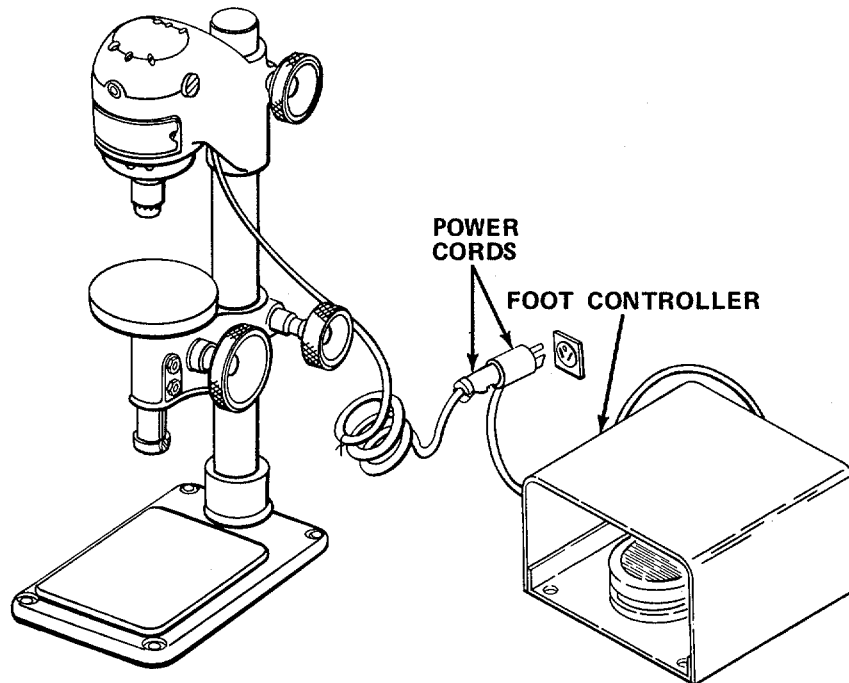


- a. Unplug power cord.
- b. Remove nuts, washers, bolts, and lower shock mounts retaining drill press to cabinet top. Open cabinet to remove two rear bolts.
- c. Remove drill press, stiffening plate, and upper shock mounts.
- d. Install upper shock mounts and stiffening plate.
- e. Install new drill press to cabinet top stiffening plate; secure with shock mounts, retaining bolts, nuts, and washers.
- f. Plug in power cord and check for operation.

3-16.5 Replace Foot Controller.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Foot Controller

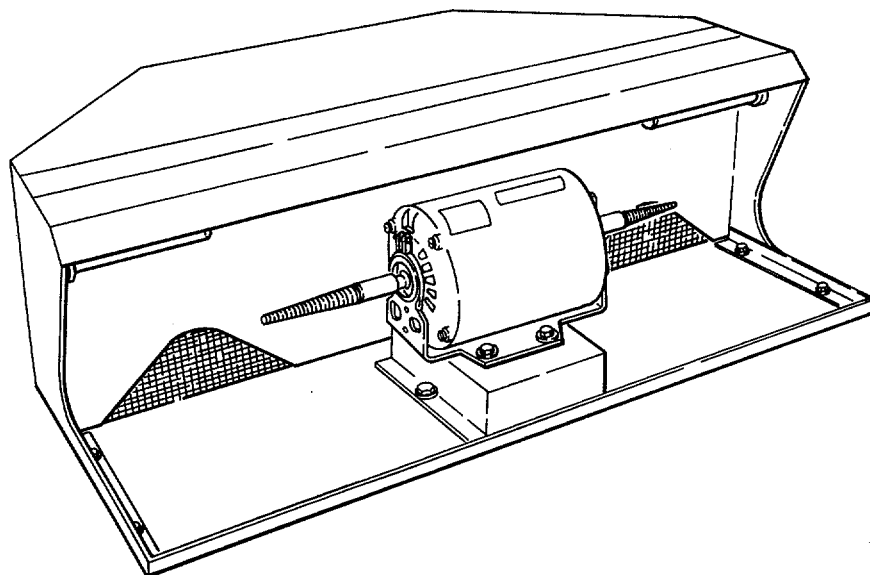


- a. Unplug power cord.
- b. Discard old foot controller.
- c. Install new foot controller.
- d. Plug in power cord.

3-17. 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 4

GRINDER AND DUST CONTROL ASSEMBLY

SECTION I INTRODUCTION

4-1. GENERAL INFORMATION.4-1.1 Scope.

- a. Model Number and Equipment Name.
 - (1) Model 765 Grinder.
 - (2) Model 31-760A Dust Control Assembly.
- b. Purpose of Equipment.
 - (1) To grind and polish various metal items.
 - (2) To collect grinding dust from grinder.

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

- a. Accepts various attachments.
- b. High speed.
- c. Sleeve bearings.
- d. Replaceable air filter.
- e. Centrifugal fans.
- f. Removable top.
- g. Light over each arbor.
- h. Constructed of 16-gage steel.
- i. Switch-controlled service outlet.

4-2.2 Equipment Data.4-2.2.1 Grinder.

Shaft Diameter	0.500 in. (12.70 mm)
Mounting Base Holes	2-3/4 in. x 4-1/4 in. (7.0 cm x 10.8 cm)
Power Requirements	120 V, 60 Hz, Single-Phase
Motor Horsepower Rating	1/3 Hp (250 W)
Motor Speed	3450 rpm

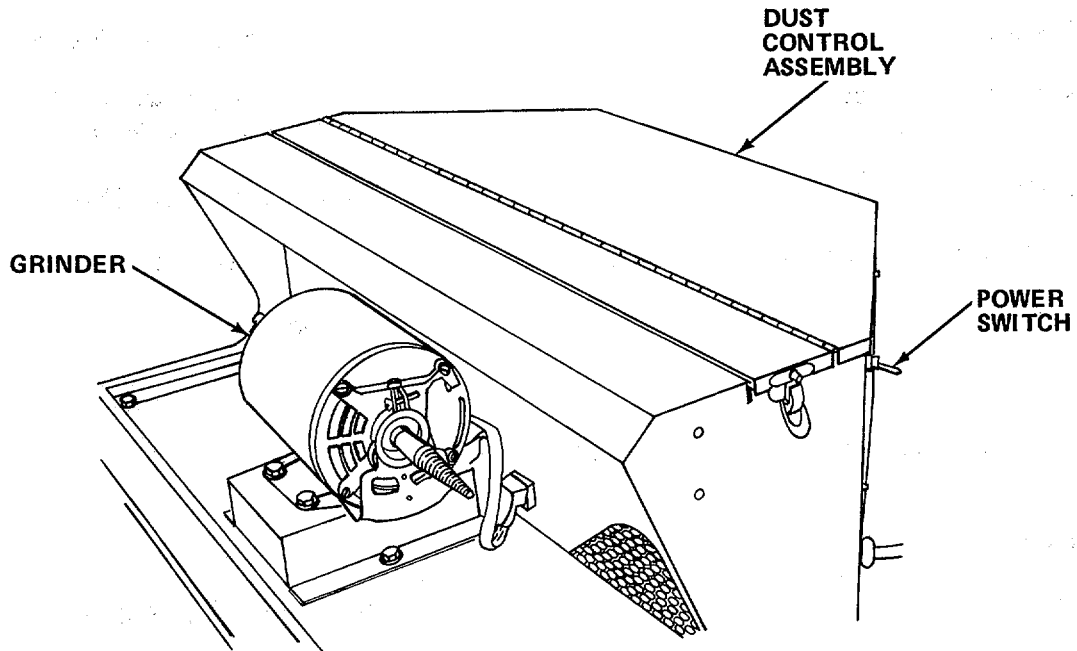
4-2.2.2 Dust Control.

Dimensions	
Width	32.25 in. (81.9 cm)
Depth	25.50 in. (64.8 cm)
Height	12.50 in. (31.8 cm)
Weight	79 lbs (35.87 kg)
Motor Speed	1320 rpm
Power Requirements	120 V, 60 Hz
Motor Horsepower Rating	1/4 hp (18.7 W)

4-3. TECHNICAL PRINCIPLES OF OPERATION. Technical principles of operation are combined with Description and Use of Operator's Controls and Indicators.

SECTION II OPERATING INSTRUCTIONS

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



NOTE

The grinder is controlled by the power switch that operates the dust control system to ensure both components function as one unit.

Control or Indicator	Function
Power Switch	Activates fan, lights, power outlet, and grinder.

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 the 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 operations if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval column. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected 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 4, Appendix E)	ar
Flat Tip Screwdriver	1
Cross Tip Screwdriver	1
Adjustable Wrench	1
Vacuum Cleaner	1
1/4 in. Nut Driver	1

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

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can safely be checked and serviced without distributing 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

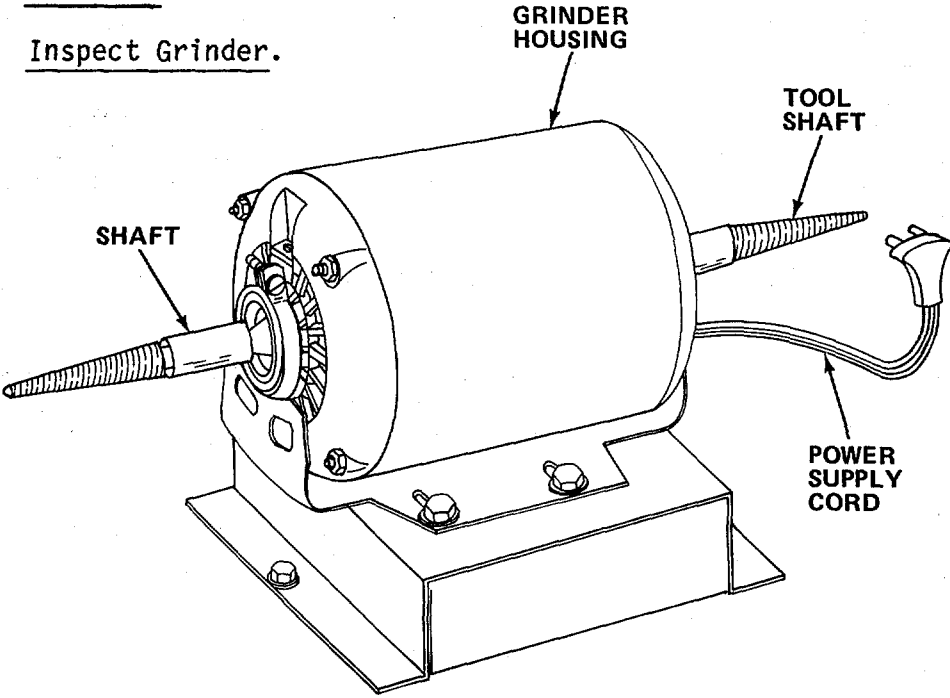
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting Equipment Is Not Ready/ Available If:
1	B	<p><u>GRINDER</u></p> <p><u>Inspect Grinder.</u></p>  <p>1. Unplug power supply cord from dust control system.</p> <p>2. Check power supply cord for cracked or broken wires and connectors.</p> <p>3. Check grinder housing for loose or missing nuts, bolts, and screws.</p> <p>4. Check tool shafts for loose mounting setscrews.</p> <p>5. Check attachments for proper installation.</p>	<p>Power supply cord is 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
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(Number) - Hundreds of Hours

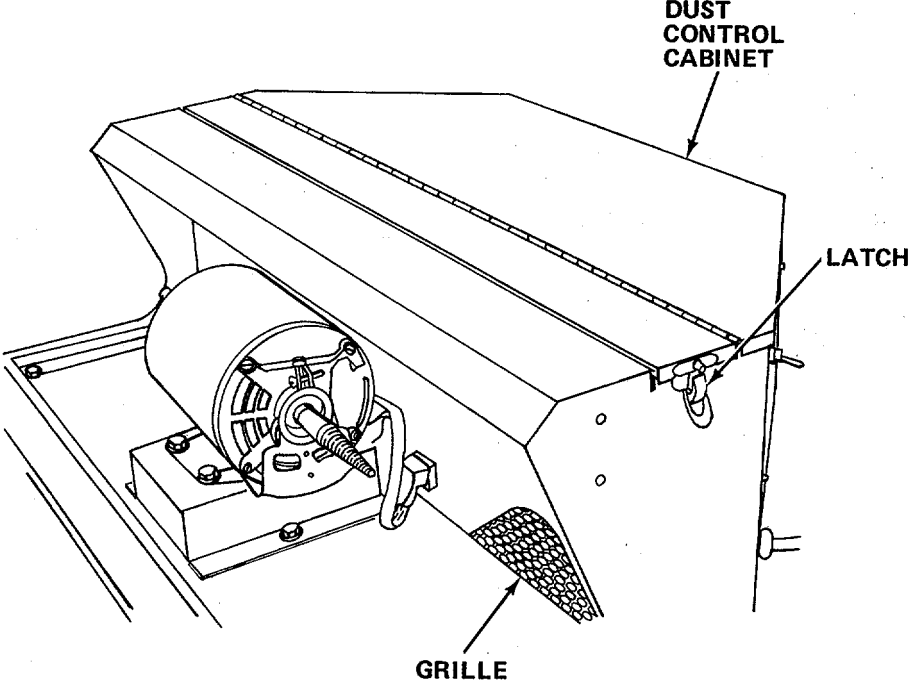
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting Equipment Is Not Ready/ Available If:
2	A	<p><u>GRINDER</u></p> <p><u>Service Grinder.</u></p>	
	A	<p>Clean surface of grinder with cheesecloth.</p>	
1	W	<p><u>DUST CONTROL ASSEMBLY</u></p> <p><u>Inspect Dust Control Assembly.</u></p>	
	B	 <p>1. Check cabinet for loose screws, nuts and latches. Tighten or replace, if necessary.</p> <p>2. Check filter and clean grille as necessary.</p>	

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

B - Before
 D - During
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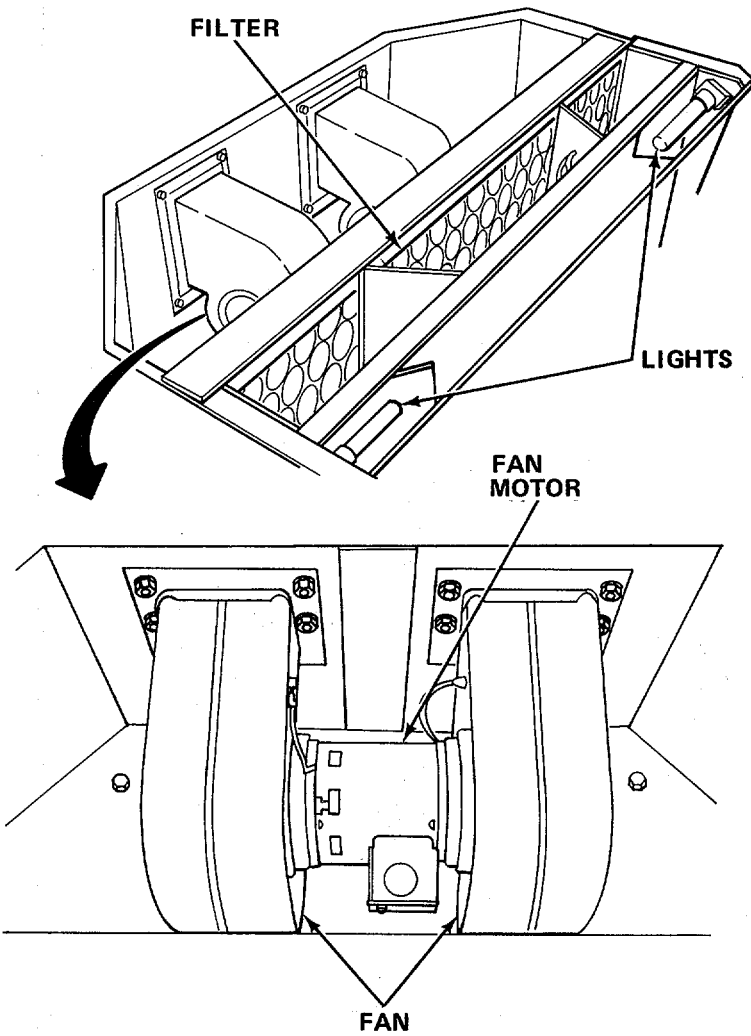
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting Equipment Is Not Ready/ Available If:
1	W	<p><u>DUST CONTROL ASSEMBLY</u></p> <p><u>Inspect Dust Control Assembly - Cont</u></p>  <p>The diagram consists of two parts. The upper part is a perspective view of a rectangular dust control assembly. A curved arrow points to the front panel, which is shown partially open. Labels include 'FILTER' pointing to the mesh inside, 'LIGHTS' pointing to two small rectangular components on the right side, and 'FAN MOTOR' pointing to a component at the bottom. The lower part is a top-down view of the assembly, showing two large cylindrical components (filters) on either side of a central fan motor. A label 'FAN' points to the central motor.</p>	
	M	3. Remove top cover and check fan for proper operation. Reinstall top cover.	
	B	4. Check that both lights operate properly.	

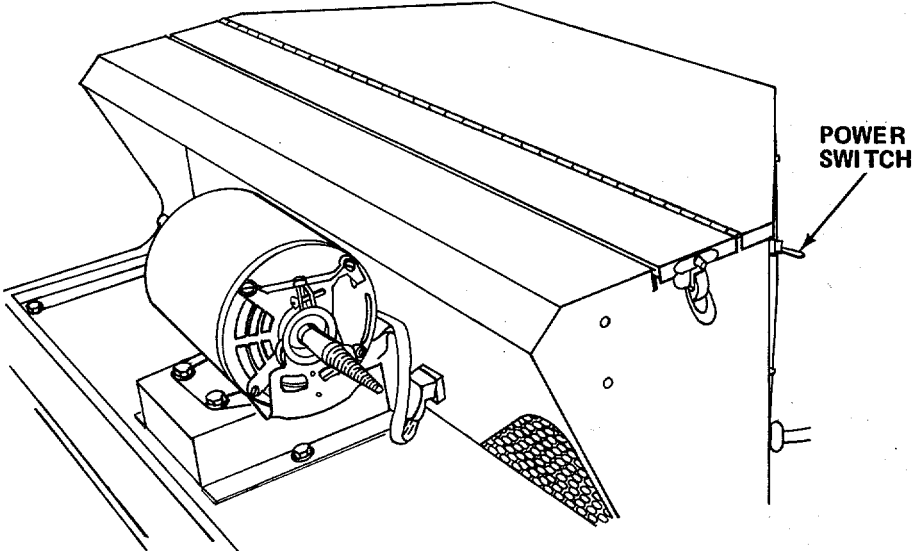
Table 4-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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	For Readiness Reporting Equipment Is Not Ready/ Available If:
1	W	<p><u>DUST CONTROL ASSEMBLY</u></p> <p><u>Inspect Dust Control Assembly - Cont</u></p> 	
B	5.	Inspect power switch for loose wiring or retaining nut.	

4-6. OPERATION UNDER USUAL CONDITIONS.

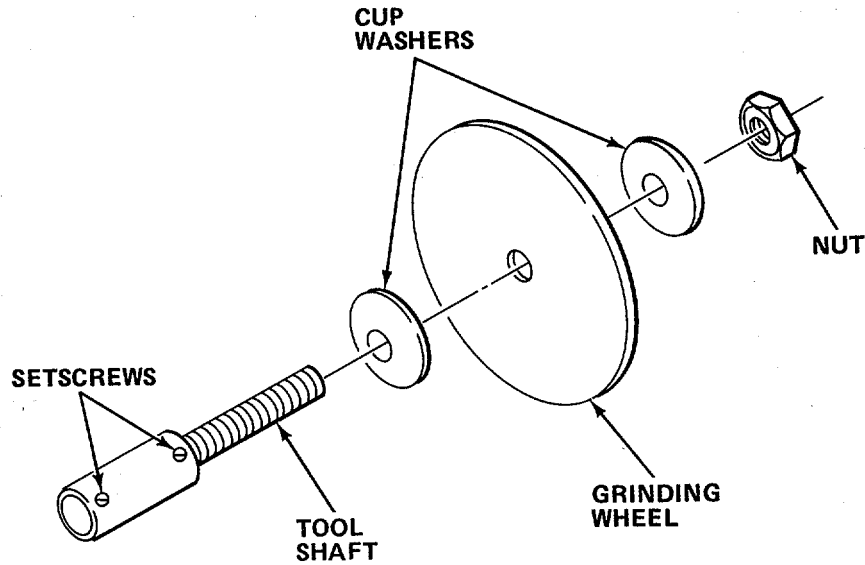
4-6.1 Assembly and Preparation for Use. Install desired attachment to grinder shaft and tighten setscrews securely using the following procedures.

WARNING

If buffing or grinding wheels are installed incorrectly, they will become detached from machine during use and may cause injury to personnel. Ensure that left hand thread tool shaft stamped "L", is attached to left hand motor shaft, and right hand thread tool shaft stamped "R", is attached to right hand motor shaft.

a. Installing buffing wheel(s).

- (1) Install left/right hand thread tapered tool shaft(s) on motor shaft.
- (2) Aline setscrews with flat side of motor shaft and tighten setscrews.
- (3) Install buffing wheel onto shaft and tighten with light, hand tight pressure.



b. Install grinding wheel(s). Select grinding wheels in accordance with USAF To 32-1-151 and install as follows:

- (1) Install left/right hand thread grinding wheel tool shaft(s) on motor shaft(s).
- (2) Aline setscrews with flat of motor shaft and tighten setscrews.

WARNING

To avoid grinding wheel disintegration and injury to personnel, do not use grinding wheels rated lower than 3500 rpm.

Do not operate damaged, unbalanced, or out-of-round grinding wheels or attachments.

- (3) Install one cup washer, grinding wheel, a second cup washer, and secure with nut.

4-6.2 Operating Procedures.

- a. Check that grinder motor electrical connector is plugged into dust control system.
- b. Plug in power cord.

WARNING

Grinding or buffing causes air-borne particles that may enter the eyes. Eye protection is mandatory when operating this equipment.

- c. Turn on dust control assembly.
- d. Perform grinding and/or polishing operation.
- e. Turn off dust control assembly.

CAUTION

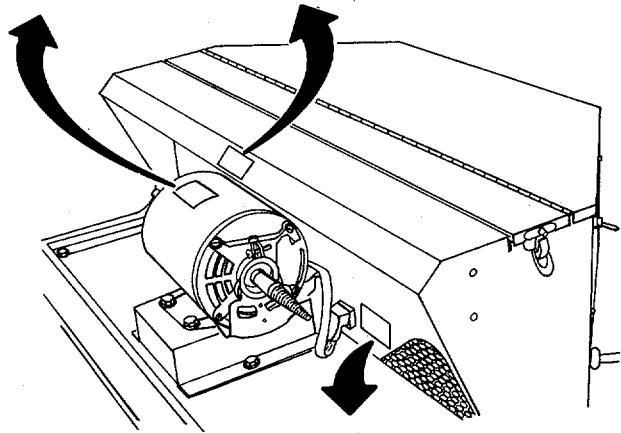
Store attachments separately to prevent damage.

- f. Unplug power cord.
- g. Remove wheel(s) from shaft(s) and store.

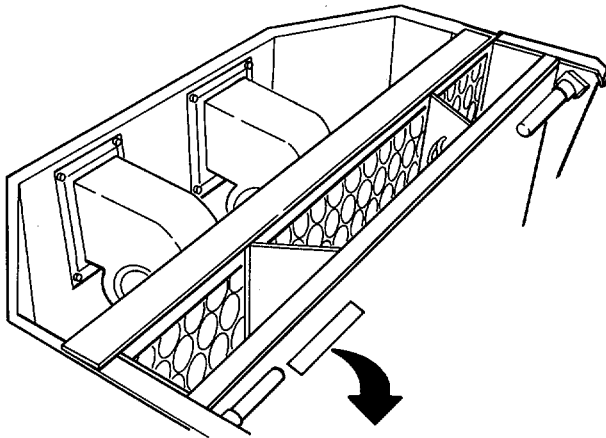
4-6.3 Operating Instructions on Decals and Instruction Plates.

WARNING!

- FOLLOW SET-UP AND OPERATING INSTRUCTIONS.
- WEAR SAFETY GOGGLES.
- CONTAIN LONG HAIR, LOOSE CLOTHING, NECKTIES AND JEWELRY TO AVOID CATCHING IN MOVING PARTS.



- DO NOT USE MOTOR WHICH EXCEEDS 8 AMPS.
- MAXIMUM RATING OF THIS UNIT IS 10 AMPS.



- DO NOT USE LAMPS LARGER THAN 60 WATTS.

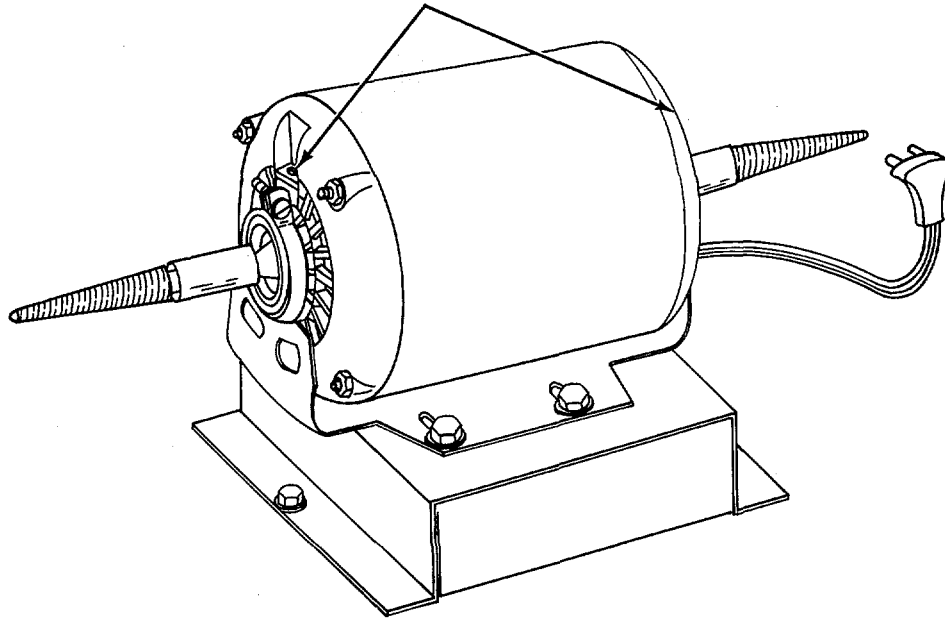
4-7. OPERATION UNDER UNUSUAL CONDITIONS. This equipment is designed for operation only in a controlled environment.

SECTION III OPERATOR MAINTENANCE

4-8. LUBRICATION INSTRUCTIONS. Lubricate sleeve bearings monthly with 30 to 35 drops of SAE 20 lubricating oil (Item 11, Appendix E).

NOTE

These lubrication instructions are mandatory.

LUBRICATION POINTS**4-9. TROUBLESHOOTING PROCEDURES.**

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

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

Table 4-2. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. DUST CONTROL DOES NOT MOVE AIR.	Step 1. Check for unplugged power supply cord.	(a) If plugged in, proceed to step 2.
	(b) If unplugged, plug in power supply cord.	
	Step 2. Check power switch position.	(a) If on, proceed to step 3.
		(b) If off, turn on power switch.
	Step 3. Check for clogged filter.	(a) If clean, proceed to step 4.
		(b) If dirty, replace filter (paragraph 4-10.1).
	Step 4. Remove top cover and check fan for operation.	
	If fan does not operate, refer to higher level of maintenance.	
2. LIGHTS DO NOT LIGHT, FAN MOTOR OPERATES.	Check for defective bulbs.	
	Replace bulb.	

4-10. MAINTENANCE PROCEDURES.

a. This section contains instructions covering operator maintenance functions for the grinder and dust control assembly. Personnel required are listed only if the task requires more than one.

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

INDEX

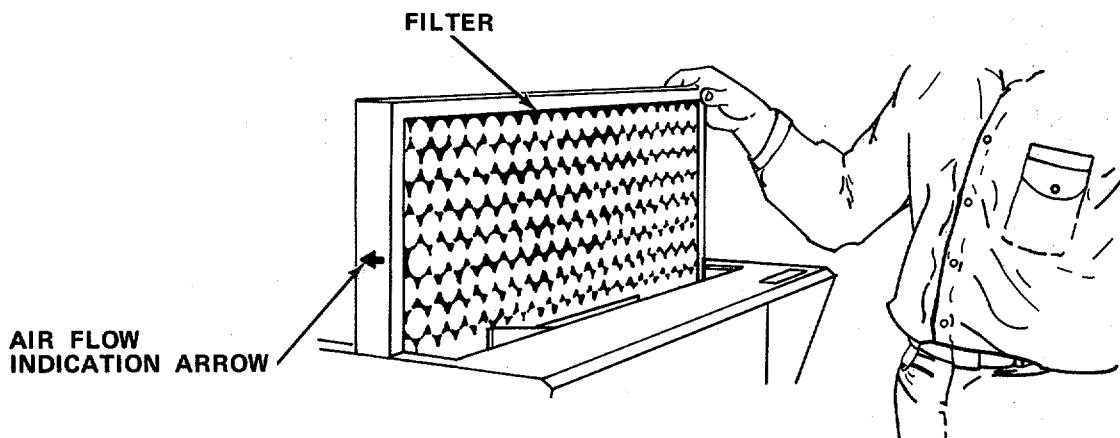
PROCEDURES	PARAGRAPH
Replace Filter.....	4-10.1

4-10.1 Replace Filter.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Filter

- a. Loosen latches and raise top cover.



- b. Lift filter up and out of cabinet.
- c. Install new filter; be sure arrow on filter points to rear of collector.
- d. Lower top cover and close latches.

SECTION IV ORGANIZATIONAL MAINTENANCE

4-11. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication at this level of maintenance.

4-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; 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 5-6675-328-24P 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 equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

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

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

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

4-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES.

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

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

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

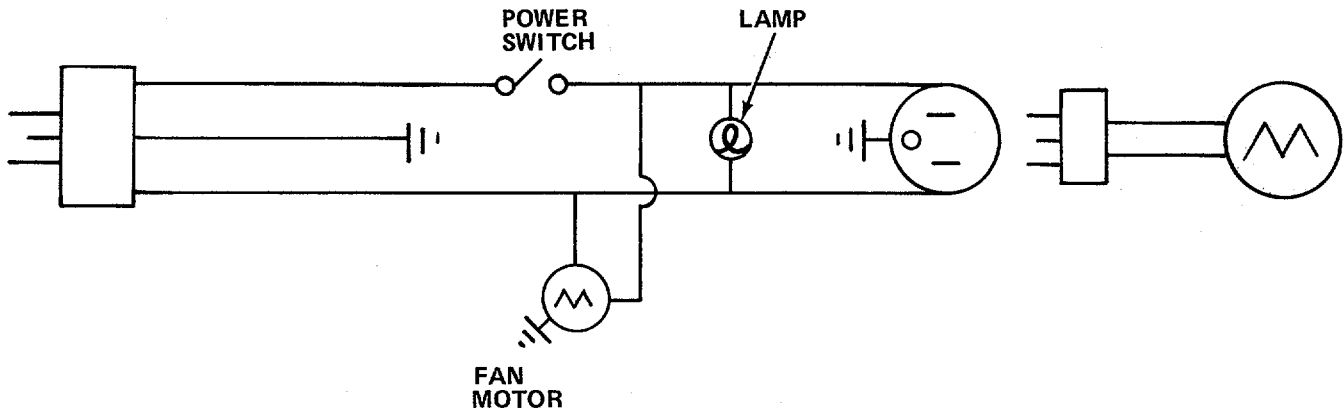


Table 4-3. ORGANIZATIONAL TROUBLESHOOTING

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

WARNING

Electrical shock hazard. You must stand on rubber matting as a protective measure before performing these procedures. Death or serious injury could occur.

1. FAN MOTOR DOES NOT OPERATE.

Step 1. Check power outlet for 120 V ac using a multimeter.

(a) If power is not present, proceed to step 2.

(b) If power is present, replace dust control assembly (paragraph 4-16.2).

TABLE 4-3. ORGANIZATIONAL TROUBLESHOOTING - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. FAN MOTOR DOES NOT OPERATE - Cont	Step 2. Check power panel indicators for correct voltage, frequency, and phase.	<ul style="list-style-type: none"> (a) If correct, proceed to step 3. (b) If incorrect, notify power supply supervisor.
	Step 3. Check circuit breaker ON/OFF position.	<ul style="list-style-type: none"> (a) If circuit breaker is ON, proceed to step 4. (b) If circuit breaker is OFF, turn ON. (c) If circuit breaker trips repeatedly, notify power supply supervisor.
	Step 4. Check circuit breaker output for 120 V ac.	<ul style="list-style-type: none"> (a) If voltage is present, proceed to step 5. (b) If voltage is not present, replace circuit breaker (paragraph 1-20.5).
	Step 5. Remove receptacle and check for 120 V ac input.	<ul style="list-style-type: none"> (a) If present, replace receptacle (paragraph 1-16.5). (b) If not present, repair or replace defective wiring.
2. GRINDER MOTOR DOES NOT OPERATE.	Remove grinder motor power cord from dust control and plug into a receptacle with power available.	<ul style="list-style-type: none"> (a) If motor operates, troubleshoot power supply in accordance with malfunction 1, steps 1 thru 5, and repair as necessary. (b) If motor fails to operate, replace grinder motor (paragraph 4-16.1).

4-16. MAINTENANCE PROCEDURES.

a. This section contains instructions covering organizational maintenance functions for the grinder and dust control assembly. Personnel required are listed only if the task requires more than one.

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

INDEX

PROCEDURES	PARAGRAPH
Replace Grinder.....	4-16.1
Replace Dust Control Assembly.....	4-16.2

4-16.1 Replace Grinder.

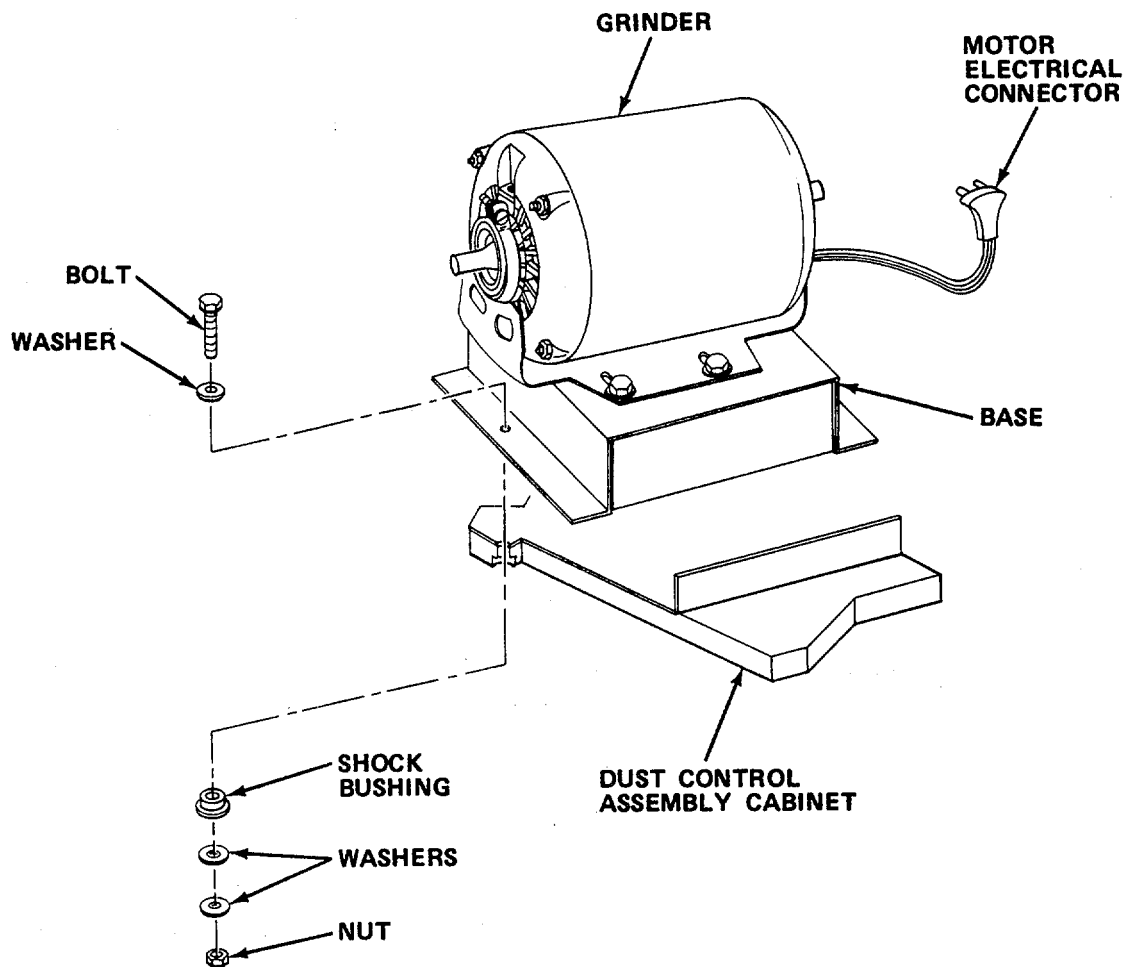
MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: 1/2 in. Combination Wrench
 7/16 in. Combination Wrench

SUPPLIES: Grinder

WARNING

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



- a. Unplug motor electrical connector.
- b. Remove grinding or polishing attachments and tool shafts from motor shaft (paragraph 4-6.1).
- c. Remove nuts, washers, bolts, and lower shock bushings retaining grinder to dust control assembly cabinet. Remove grinder.
- d. Remove grinder from base.
- e. Install new grinder on base.
- f. Install new grinder to cabinet, being sure that upper shock bushings are in position.
- g. Reinstall lower shock bushings, bolts, washers, and nuts, and tighten.
- h. Reinstall attachments to shaft.
- i. Plug motor electrical connector into dust control system.

4-16.2 Replace Dust Control Assembly.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: 7/16 in. Combination Wrench
7/16 in. Socket, 3/8 in. Drive
1/2 in. Socket, 3/8 in. Drive
1/4 in. Socket, 1/4 in. Drive
3/8 in. Drive Ratchet
1/4 in. Drive Ratchet

SUPPLIES: Dust Control System

WARNING

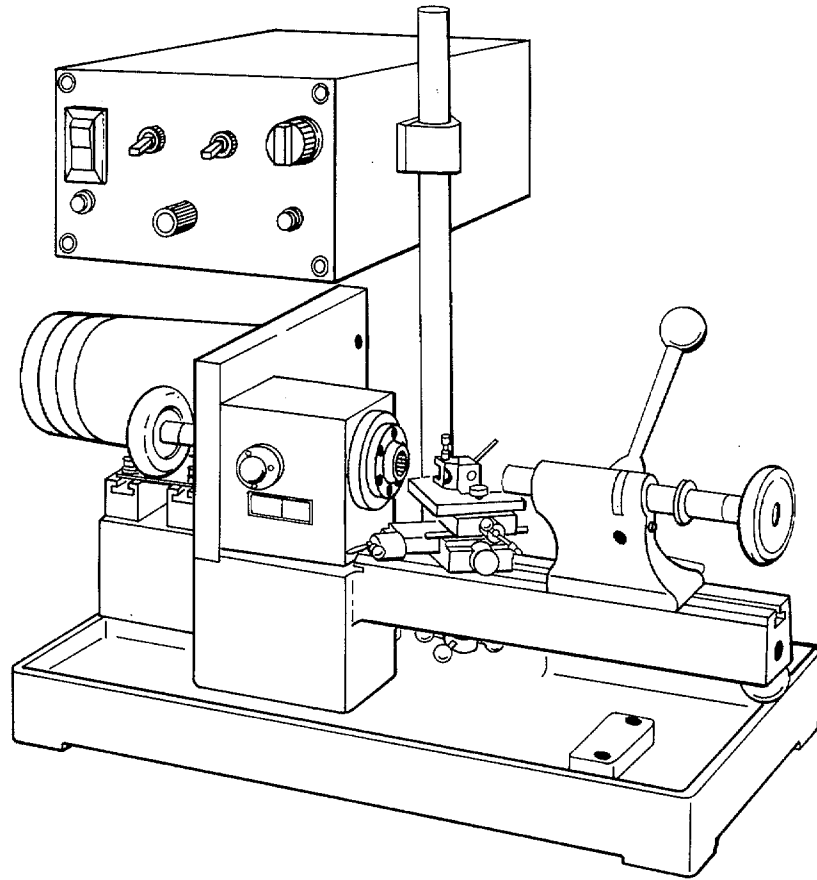
Death or serious injury may occur due to electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove nuts, bolts, washers, and shock mounts. Remove grinder and base.
- c. Remove sheet metal screws and top cover.
- d. Remove nuts, bolts, washers, and shock mounts retaining dust control assembly to table. Remove dust control assembly.
- e. Install new dust control assembly. Retain with nuts, bolts, washers, and shock mounts.
- f. Reinstall top cover and retain with sheet metal screws.
- g. Reinstall grinder and base, and retain with bolts, nuts, washers, and shock mounts.
- h. Plug in power cord.

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

SECTION V DIRECT/GENERAL SUPPORT MAINTENANCE

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



CHAPTER 5
INSTRUMENT LATHE
SECTION I INTRODUCTION

5-1. GENERAL INFORMATION.

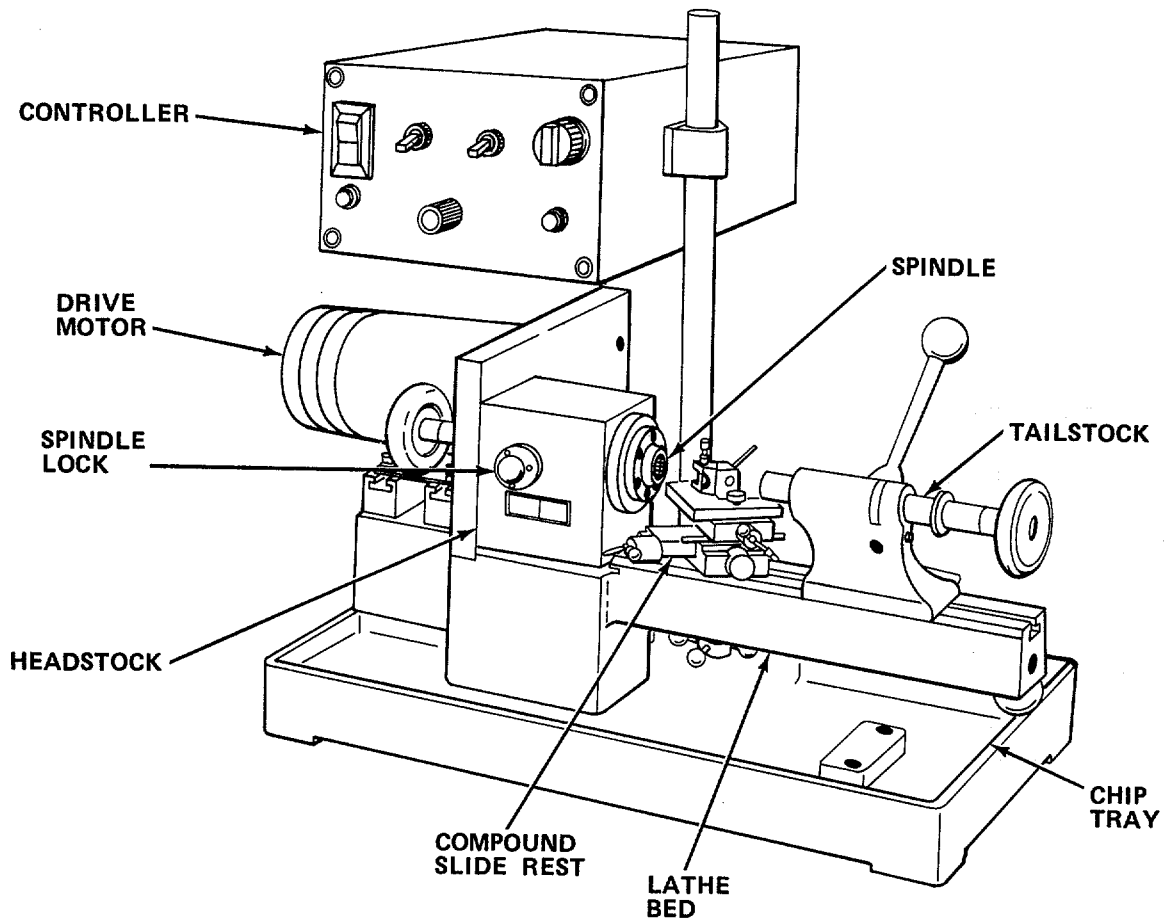
5-1.1 Scope.

- a. Model Number and Equipment Name. Model 1212-02 Instrument Lathe
- b. Purpose of Equipment. To perform various lathe operations on a wide variety of small, precision parts.

5-2. EQUIPMENT DESCRIPTION.

5-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Highly accurate.
- b. Fully enclosed headstock.
- c. High torque, permanent-magnet motor.
- d. Adjustable speed control.
- e. Dynamic motor braking.
- f. Cast-iron lathe bed.

5-2.2 Location and Description of Major Components.

CONTROLLER. Provides speed and directional control of drive motor. Controls coolant pump operation (where applicable) and either manual or foot control mode. A circuit breaker in the power switch protects the system.

DRIVE MOTOR. Provides rotary motion to headstock.

HEADSTOCK. Accepts various work holding accessories and is the work carrier.

TAILSTOCK. Used as either a support for long work or as a tool carrier.

LATHE BED. A precision, machined surface that supports the headstock and tailstock.

CHIP TRAY. Catches machining chips and (where applicable) cooling lubricant.

SPINDLE LOCK. Prevents spindle rotation while changing accessories.

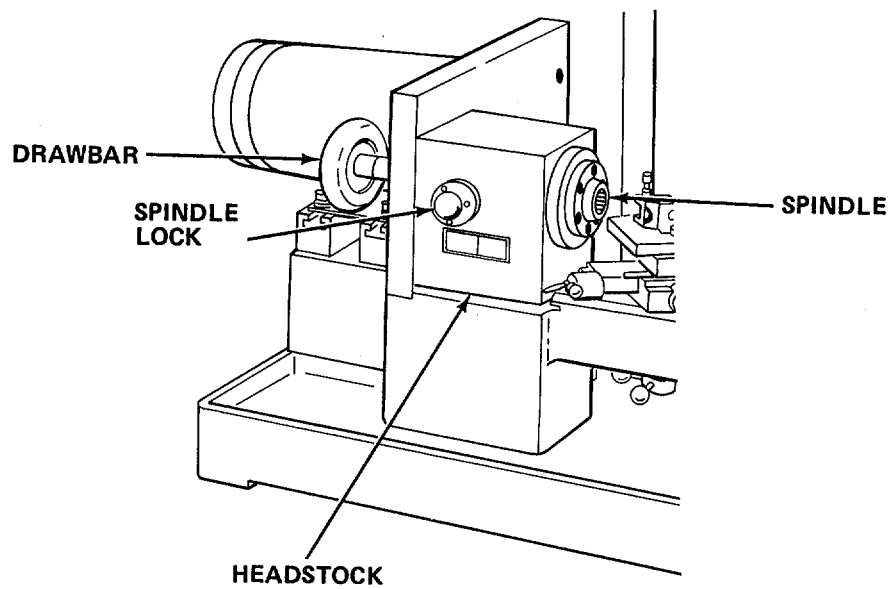
COMPOUND SLIDE REST. Holds tools for turning operations.

5-2.3 Equipment Data.

Maximum Collet Diameter	0.3150 in. (8.0 mm)
Bed Length	13 in. (33 cm)
Distance Between Centers	3-1/2 in. (8.9 cm) Max
Tailstock Spindle Travel	1-1/2 in. (3.1 cm)
Operating Speed Range	0-4000 rpm
Horsepower Rating	1/8 hp (93 W)
Power Requirements	120 V, 60 Hz, 1 amp,
Single-Phase	

5-3. TECHNICAL PRINCIPLES OF OPERATION. The function of the instrument lathe is to perform various precision machine shop operations. The lathe consists of:

5-3.1 Headstock. Mounts work-holding accessories and acts as the work carrier of the lathe. It consists of:

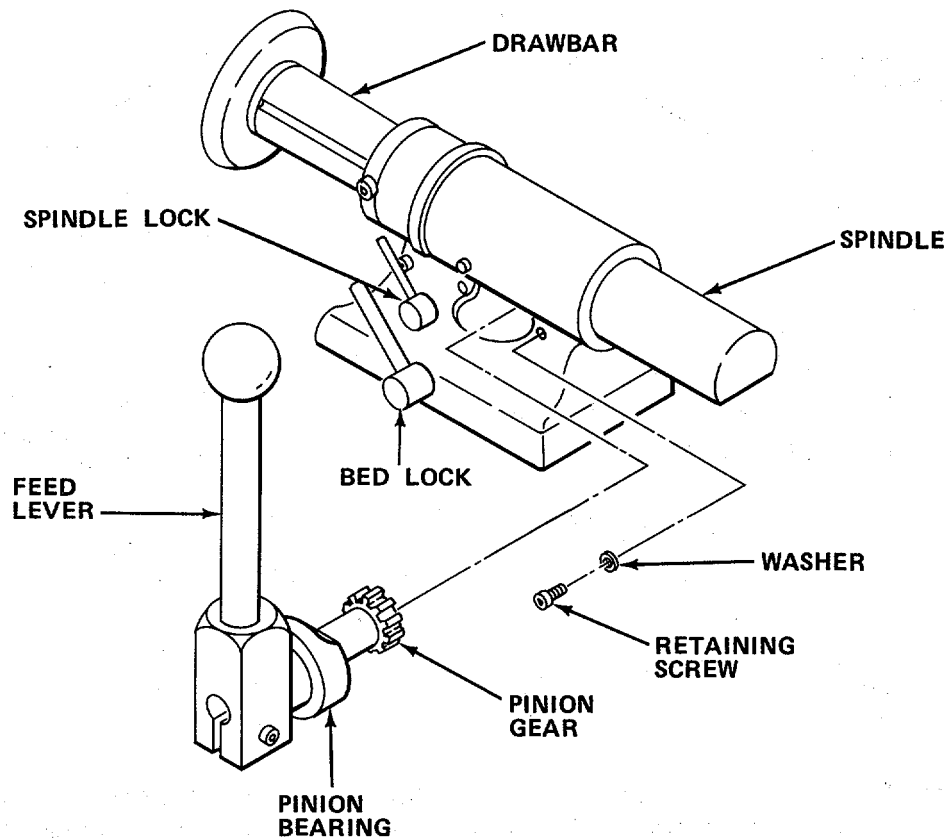


SPINDLE. A hollow, bearing-mounted shaft that supports the work-holding accessories.

DRAWBAR. Engages the threaded end of the work-holding device. When rotated to the right, the work-holding device is drawn tight into the spindle.

SPINDLE LOCK. A plunger that engages the locking collar on the spindle to prevent the spindle from rotating while removing or installing accessories.

5-3.2 Tailstock. Used as a support for long work or as a tool carrier. It consists of:



BED LOCK. Prevents the tailstock from sliding on the bed by applying pressure on the binding bolt.

DRAWBAR. Engages threads of work-holding or tooling accessories and pulls them tight in spindle. It contains an adjustable locking collar to limit horizontal travel of spindle and drawbar.

SPINDLE LOCK. Prevents spindle travel by applying pressure on the spindle.

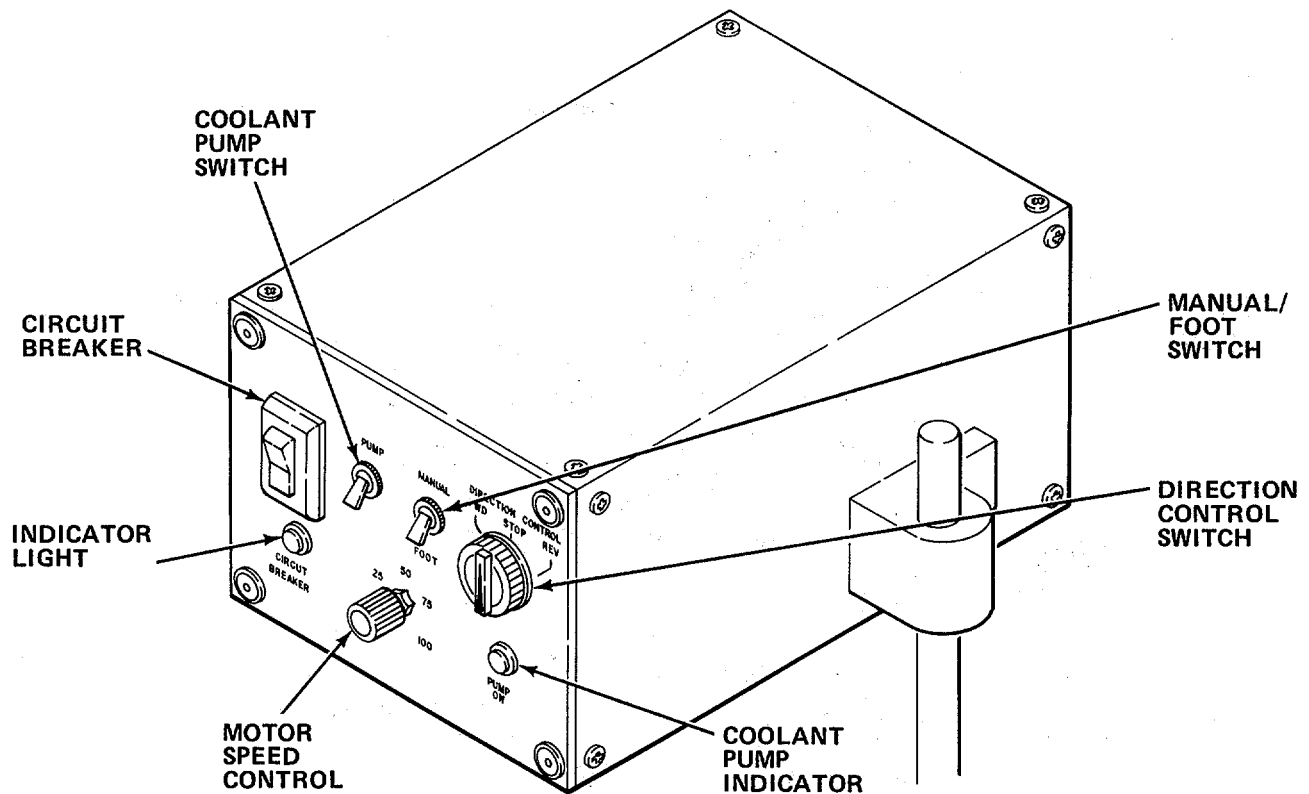
FEED LEVER. Horizontally advances and retracts the spindle through a rack-and-pinion arrangement.

SPINDLE. A hollow shaft used to mount the work-holding or tooling accessories.

5-3.3 Lathe Bed. Provides a mounting surface for the headstock, tailstock, and compound slide rest. It is accurately machined to maintain the alignment of all accessories clamped to it.

5-3.4 Chip Tray. A cast-iron bed to which the lathe and accessories are bolted. It catches machining chips.

5-3.5 Controller. An electronic control unit which controls operation of the lathe and accessories. It consists of:



DIRECTION CONTROL SWITCH. A three position switch allowing forward, stop, and reverse control. When switched to STOP, dynamic braking stops the motor.

COOLANT PUMP INDICATOR. Indicates coolant pump operation (where applicable).

MANUAL/FOOT SWITCH. Allows motor to be controlled manually or remotely through a foot switch.

MOTOR SPEED CONTROL. Rheostat which controls drive motor speed.

INDICATOR LIGHT. Indicates that CIRCUIT BREAKER is on.

CIRCUIT BREAKER. Protects the electrical system from short circuits or power over-loads. Resets manually.

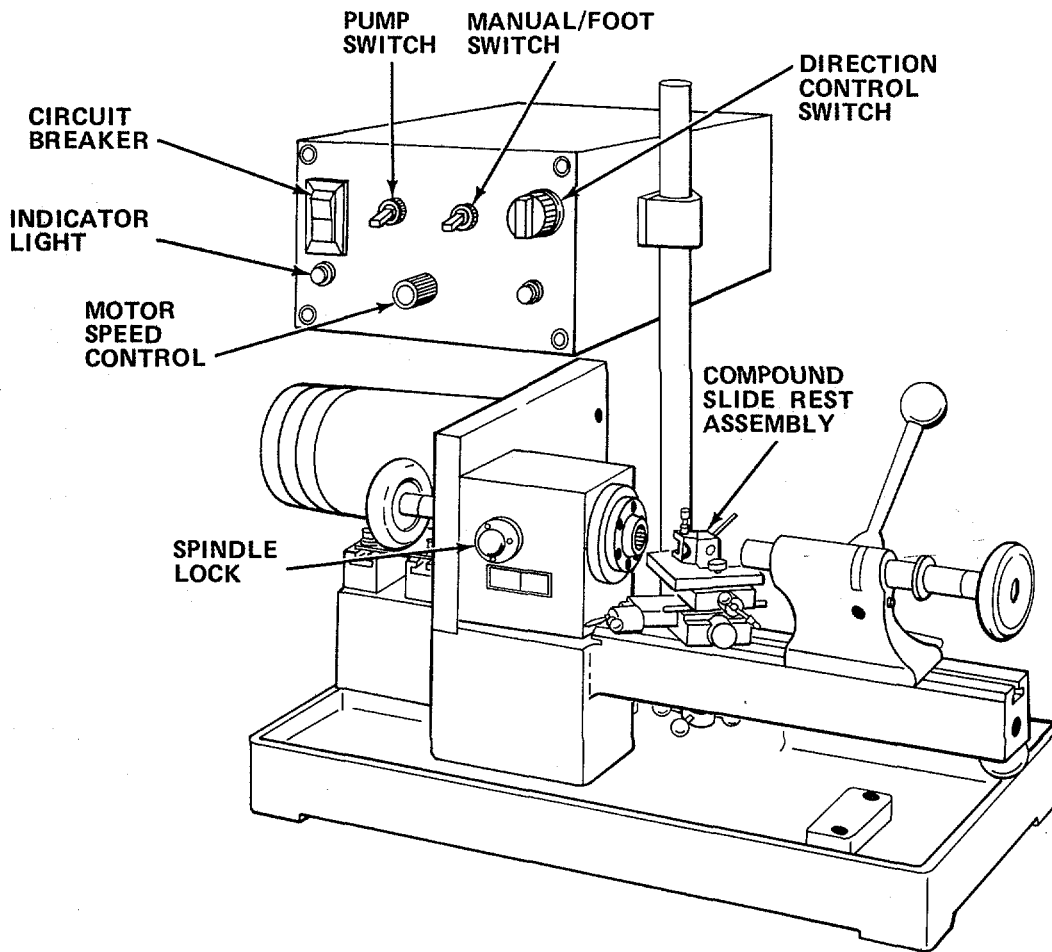
PUMP SWITCH. Controls operation of coolant pump (where applicable).

5-3.6 Drive Motor. A 130 V dc permanent magnet, variable-speed, reversible motor with dynamic braking. It provides rotary power to drive the headstock spindle through a pulley-and-belt arrangement.

5-3.7 Compound Slide Rest. Holds various tools for turning operations. Micrometer adjustments allow precise positioning of cutter tools in both the longitudinal and cross-feed directions.

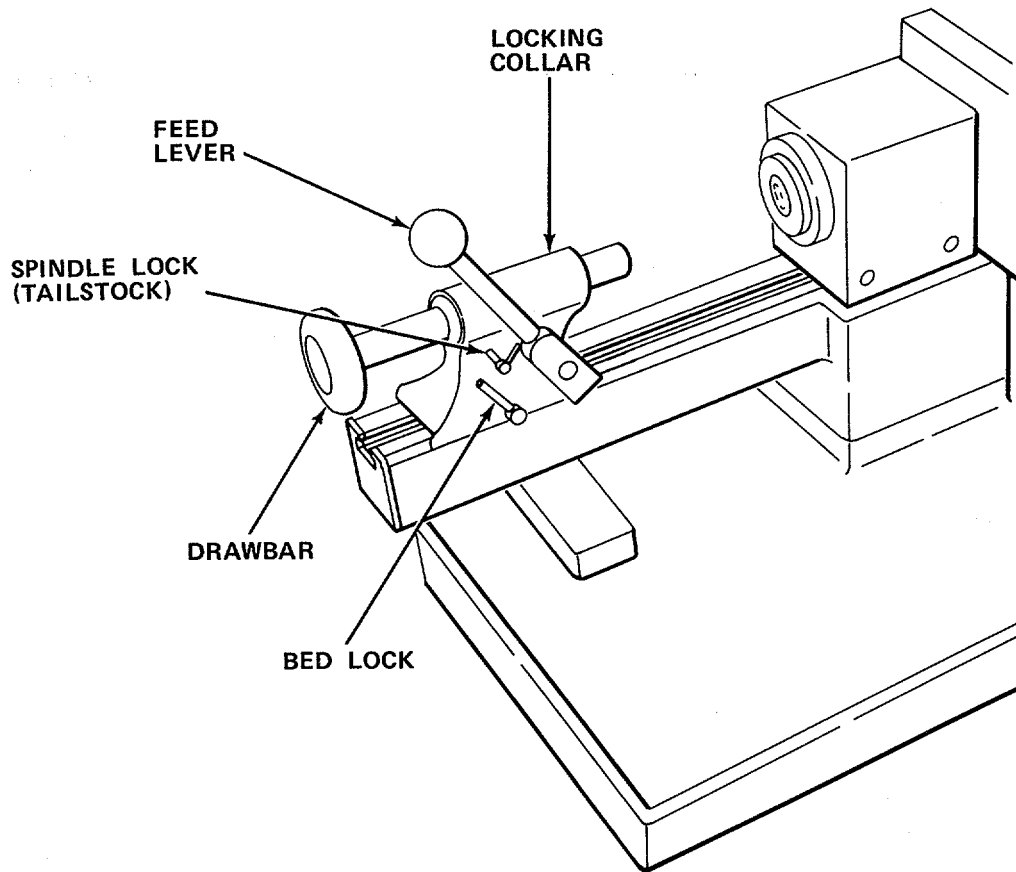
SECTION II OPERATING INSTRUCTIONS

5-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



Control or Indicator	Function
Motor Speed Control	<p>Controls rotary speed of drive motor.</p> <p>TURN TO RIGHT: Increases speed.</p> <p>TURN TO LEFT: Decreases speed.</p>
Indicator Light	<p>Indicates that circuit breaker is on.</p>

Control or Indicator	Function
CIRCUIT BREAKER	Protects electrical circuitry against power surges or shorts.
PUMP Switch	Controls operation of coolant pump, where applicable.
MANUAL/FOOT Switch	Selects manual or foot-operated control.
DIRECTION CONTROL Switch	A three position switch allowing forward, stop, and reverse control of drive motor.
Compound Slide Rest Assembly	Holds tools for turning or cutting operations.
Spindle Lock	Locks spindle to prevent rotation. To lock: Press in button. Rotate spindle until plunger engages locking collar. To release: Pull button out.



Control or Indicator	Function
Feed Lever	Advances and retracts tailstock spindle.
Bed Lock	Locks tailstock into position on lathe bed.
Drawbar	To retain and tighten collets and chucks.
Spindle Lock (Tailstock)	Locks spindle in lateral position.
Locking Collar	Adjusts to limit spindle travel. To adjust: Loosen setscrew, move collar to desired position, and tighten setscrew.

5-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

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

5-5.1. PMCS Procedures.

- a. PMCS are designed to keep the equipment in good working condition by performing periodic service tasks.
- b. Service intervals provide you, the operator, with time schedules that determine when to perform specified service tasks.
- c. The "Equipment is Not Ready/Available If" column is used for identification of conditions that make the equipment not ready/available for readiness reporting purposes or denies use of the equipment until corrective maintenance is performed.
- d. If your equipment fails to operate after PMCS is performed, immediately report this condition to your supervisor.
- e. Perform weekly as well as before operation if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval 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 4, 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 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**

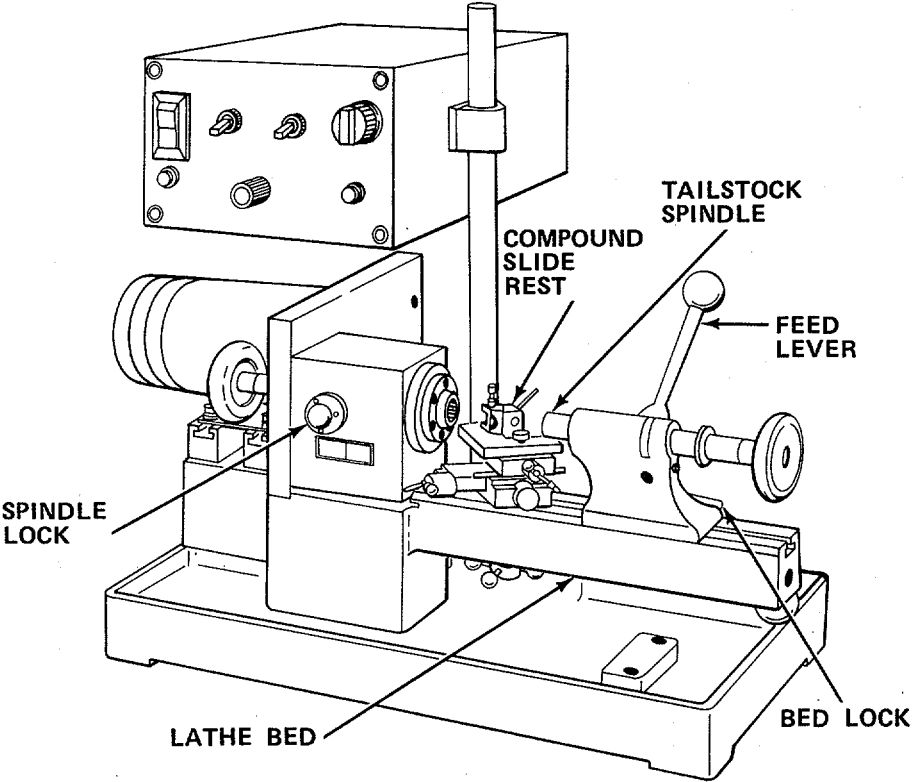
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>INSTRUMENT LATHE</u></p> <p><u>Inspect Lathe.</u></p>  <ol style="list-style-type: none"> 1. Check compound slide rest for smooth operation. Adjust gibs as necessary to remove excess play. 2. Check lathe bed for nicks, scratches, rust, or other damage. 	

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

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	A	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Inspect Lathe - Cont</u></p> <p>3. Inspect bearing surfaces for cleanliness. All surfaces must be free of dust, dirt, or other residue and properly lubricated with lubricating oil before any part of machine is operated (paragraph 6-8).</p> <p>4. Inspect headstock spindle lock for proper operation. Refer malfunctioning spindle lock to organizational maintenance.</p> <p>5. Inspect chip screen for residue and clean with cheesecloth.</p> <p>6. Check tailstock spindle, feed lever, and bed lock for proper operation.</p>	
2	B/A	<p><u>Service Lathe.</u></p> <div data-bbox="402 1073 1279 1648" data-label="Image"> </div> <p>1. Clean chips from lathe bed surface.</p> <p>2. Clean chips from compound slide rest with cheesecloth.</p>	

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

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

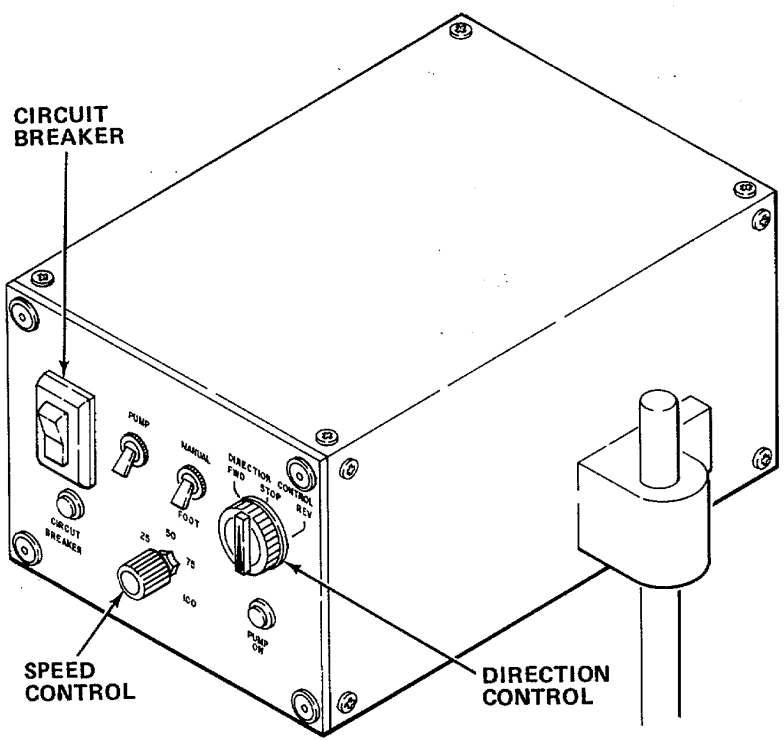
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	A	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Service Lathe - Cont</u></p> <p>3. Check spindles for damage. Clean chips from surfaces and collet recesses.</p> <p>4. Check chip tray for accumulated chips. Clean chips from tray with cheesecloth.</p> <p>5. Inspect headstock spindle lock for proper operation.</p> <p>6. Inspect chip screen for residue and clean with cheesecloth.</p>	
3	M	<p><u>Inspect and Test Controller.</u></p>  <p>The diagram shows a perspective view of a rectangular metal control box. On the front panel, there are several controls: a circuit breaker switch at the top left, a pump button, a manual stop button, a speed control knob with markings for 25, 50, 75, and 100, and a direction control knob with markings for FWD, STOP, and REV. A cable with a connector is plugged into the right side of the box. Labels with arrows point to the circuit breaker, speed control, and direction control.</p>	

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

B - Before Hours W - Weekly AN - Annually (Number) - Hundreds of
 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:
3	M	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Inspect and Test Controller - Cont</u></p> <ol style="list-style-type: none"> 1. Turn speed control to 0 and plug power cord into 120 V ac outlet. 2. Turn CIRCUIT BREAKER on and inspect indicator lamp for operation. 3. Turn DIRECTION CONTROL switch to FWD. 4. Check speed control for proper operation. 5. Leave speed control at high speed and turn direction control to STOP. Spindle should stop in dynamic breaking mode. 6. Turn speed control to 0 and check operation in reverse direction. 7. Turn speed control to 0, turn circuit breaker off, and unplug power cord. 8. Inspect controller for loose or missing knobs or screws, and tighten. 	<p>Speed cannot be controlled.</p> <p>Spindle coasts to a stop.</p>

5-6. OPERATION UNDER USUAL CONDITIONS.5-6.1. Operating Procedures.**CAUTION**

To avoid damage to collets or threads, do not overtighten drawbar when attaching collets. To avoid collet damage, do not tighten drawbar if collet does not contain workstock.

NOTE

- Keep all exposed surfaces of spindle and collets free of rust and foreign matter.
 - Remove dummy collets from headstock and tailstock before operating lathe.
- a. Attaching collets. Select collets in accordance with work diameter and Table 5-2.

Table 5-2. COLLET SIZES WITH DECIMAL EQUIVALENTS

Collet Number	Size		Collet Number	Size	
	Millimeters	Inches		Millimeters	Inches
1	0.1	0.0039	41	4.1	0.1614
2	0.2	0.0079	42	4.2	0.1654
3	0.3	0.0118	43	4.3	0.1693
4	0.4	0.0157	44	4.4	0.1732
5	0.5	0.0197	45	4.5	0.1772
6	0.6	0.0236	46	4.6	0.1811
7	0.7	0.0276	47	4.7	0.1850
8	0.8	0.0315	48	4.8	0.1890
9	0.9	0.0354	49	4.9	0.1929
10	1.0	0.0394	50	5.0	0.1969
11	1.1	0.0433	51	5.1	0.2008
12	1.2	0.0472	52	5.2	0.2047
13	1.3	0.0512	53	5.3	0.2087
14	1.4	0.0551	54	5.4	0.2126
15	1.5	0.0591	55	5.5	0.2165
16	1.6	0.0630	56	5.6	0.2205
17	1.7	0.0669	57	5.7	0.2244
18	1.8	0.0709	58	5.8	0.2283
19	1.9	0.0748	59	5.9	0.2323
20	2.0	0.0787	60	6.0	0.2362
21	2.1	0.0827	61	6.1	0.2402
22	2.2	0.0866	62	6.2	0.2441
23	2.3	0.0906	63	6.3	0.2480
24	2.4	0.0945	64	6.4	0.2520
25	2.5	0.0984	65	6.5	0.2559
26	2.6	0.1024	66	6.6	0.2598
27	2.7	0.1063	67	6.7	0.2638
28	2.8	0.1102	68	6.8	0.2677
29	2.9	0.1142	69	6.9	0.2717
30	3.0	0.1181	70	7.0	0.2756
31	3.1	0.1220	71	7.1	0.2795
32	3.2	0.1260	72	7.2	0.2835
33	3.3	0.1299	73	7.3	0.2874
34	3.4	0.1339	74	7.4	0.2913
35	3.5	0.1378	75	7.5	0.2953
36	3.6	0.1417	76	7.6	0.2992
37	3.7	0.1457	77	7.7	0.3031
38	3.8	0.1496	78	7.8	0.3071
39	3.9	0.1535	79	7.9	0.3110
40	4.0	0.1575	80	8.0	0.3150

CAUTION

To avoid damage to tapers and machining inaccuracy due to runout, clean the tapers in the headstock spindle, tailstock spindle, and tapers on the collets or chucks before installing.

- (1) Insert collet into headstock (or tailstock) by engaging keyway of collet shank with internal key in spindle.
- (2) Engage spindle lock and screw drawbar onto collet, but do not tighten.
- (3) Insert work into collet and tighten drawbar.
- (4) Disengage spindle lock and rotate spindle through 360 degrees to be sure there is no interference from other tooling.

NOTE

Install drill chuck in tailstock or universal three-jaw chuck in headstock in accordance with collet instructions above.

- b. Install compound slide rest on lathe bed and tighten binding bolt.
- c. Operation.
 - (1) Turn speed control knob to 0 position.
 - (2) Insert power cord into 120 V ac outlet.

WARNING

- Keep hands, clothing, hair, jewelry, or other loose apparel away from rotating machinery. Severe personal injury may occur.
- Eye protection must be used when operating lathe.
 - (3) Set MANUAL/FOOT switch to MANUAL position.
 - (4) Turn CIRCUIT BREAKER to ON position.
 - (5) Set DIRECTION CONTROL switch to FWD or REV as desired.
 - (6) Turn speed control knob to desired speed.
- d. Shutdown.
 - (1) Set DIRECTION CONTROL switch to STOP.
 - (2) Turn CIRCUIT BREAKER to the OFF position.
 - (3) Remove tooling from headstock and tailstock collets.
 - (4) Remove collets and install dummy collets.

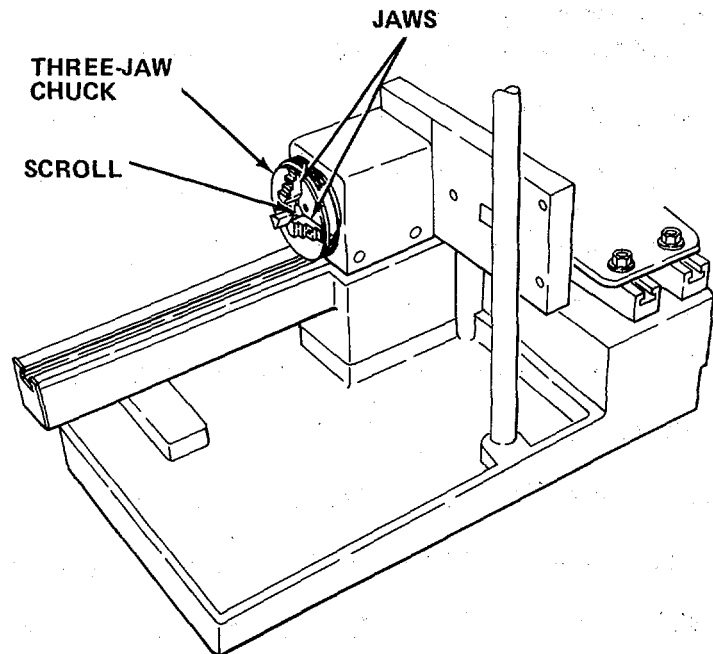
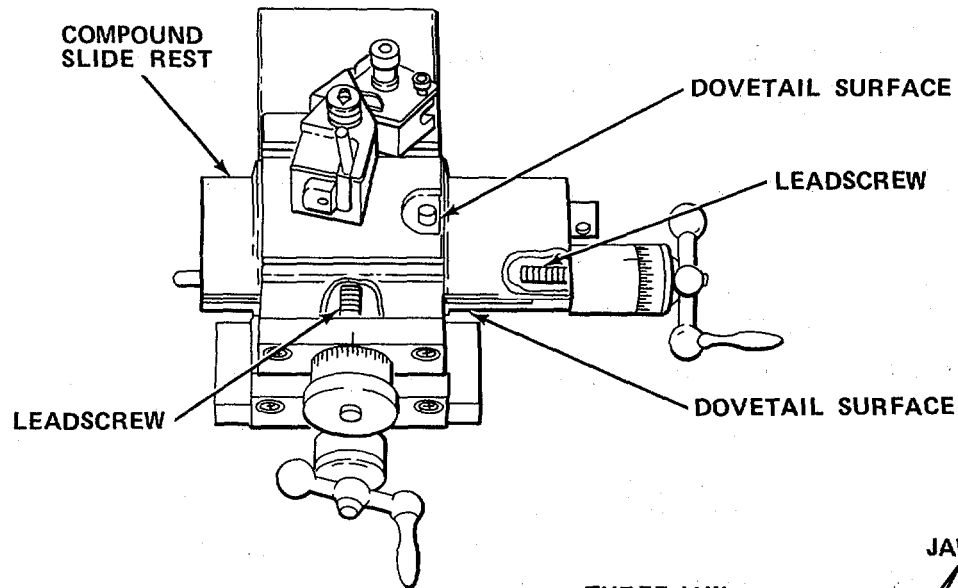
5-7. OPERATION UNDER UNUSUAL CONDITIONS. This equipment is designed for operation only in a control led environment.

SECTION III OPERATOR MAINTENANCE

5-8. LUBRICATION INSTRUCTIONS. After each use, lubricate lathe at the points indicated below using lubricating oil (Item 10, Appendix E).

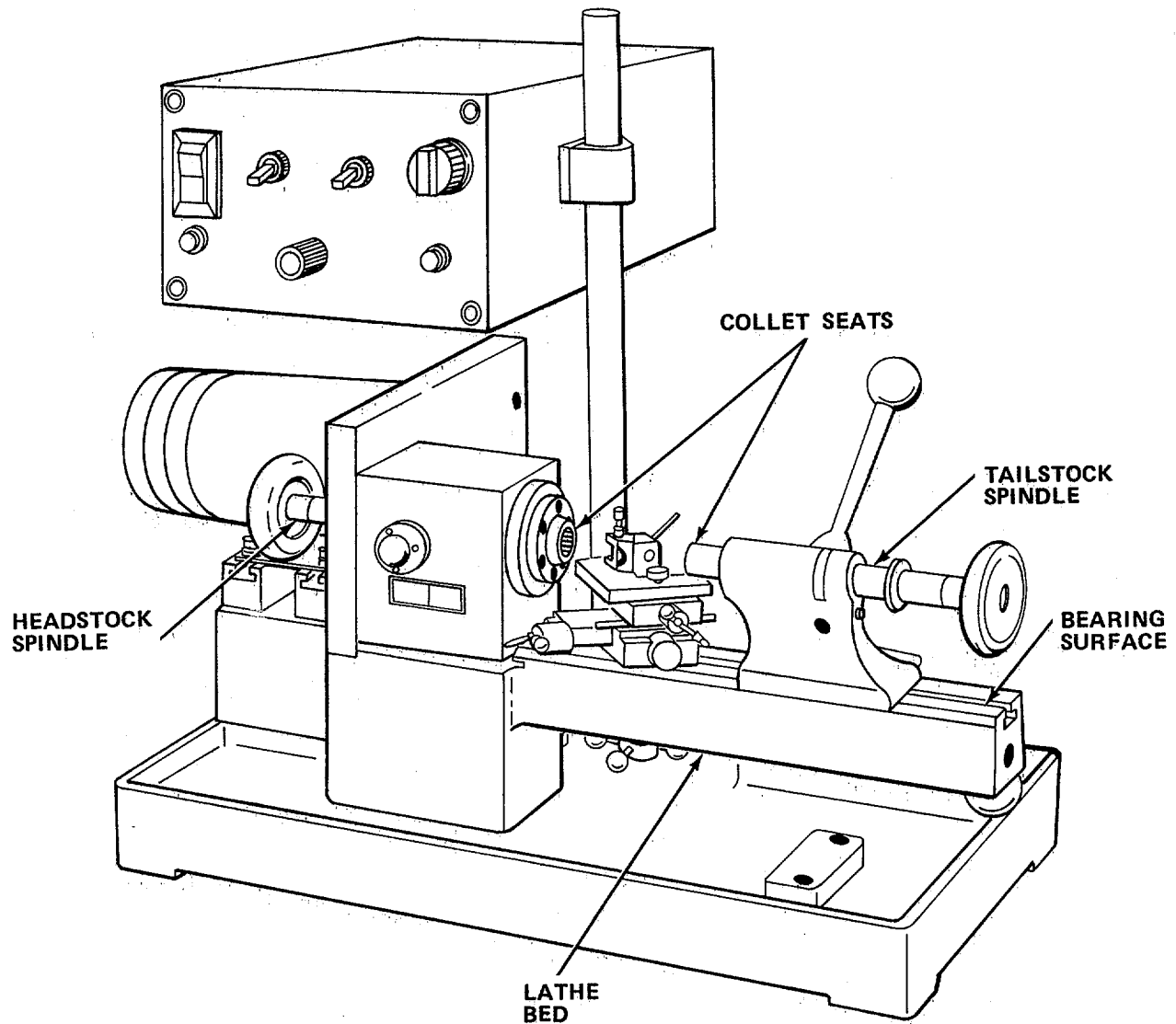
NOTE

These lubrication instructions are mandatory.



5-8.1. Three-Jaw Chuck. Lubricate scroll and under jaws on face plate.

5-8.2. Compound Slide Rest. Lubricate at all dovetail surfaces, leadscrews, and leadscrew bearings.



5-8.3. Exposed Bearing Surfaces. Lubricate all exposed bearing surfaces of the bed.

5-8.4. Headstock Spindle. Lubricate the collet seat and the exposed rear end of the spindle.

5-8.5 Tailstock Spindle. Lubricate the outside diameter and the collet seat.

5-9. TROUBLESHOOTING PROCEDURES. There are no operator troubleshooting procedures assigned for this equipment.

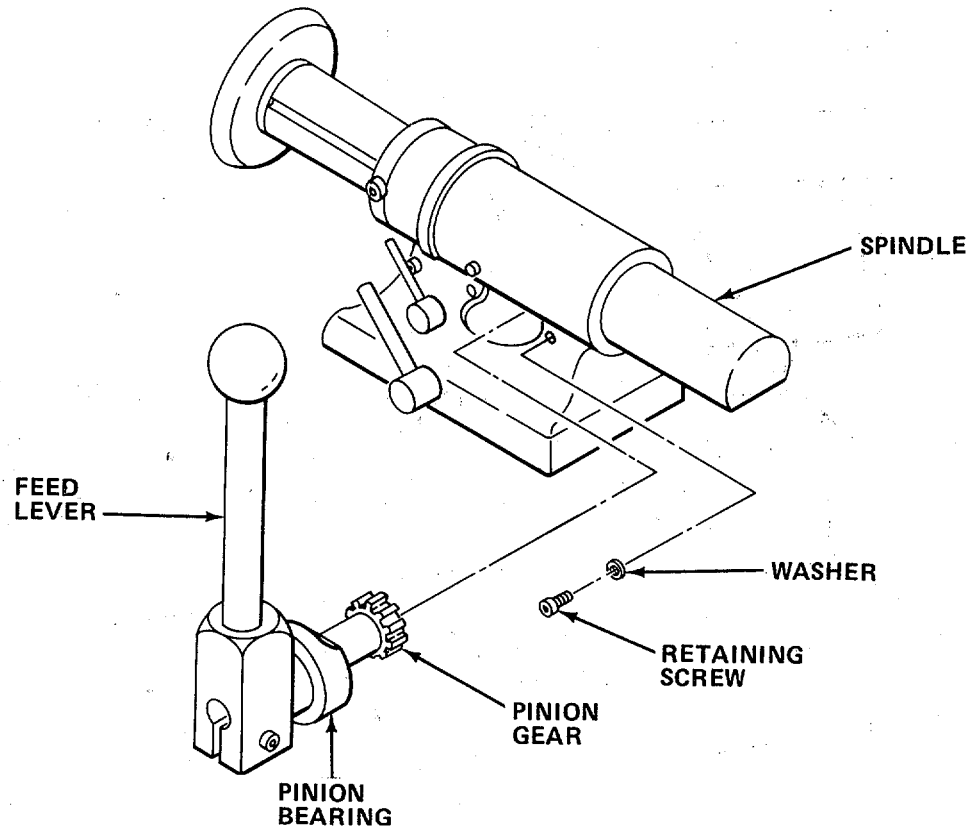
5-10. MAINTENANCE PROCEDURES. There are no operator maintenance procedures assigned for this equipment.

SECTION IV ORGANIZATIONAL MAINTENANCE

5-11. LUBRICATION INSTRUCTIONS.

NOTE

These lubrication instructions are mandatory.



5-11.1. Tailstock Spindle. After removing the retaining screws, washers, and feed lever, apply a thin film of grease (Item 8, Appendix E) on the pinion and spindle. Apply a light coat of oil (Item 10, Appendix E) on the pinion bearing. Wipe off any excess with clean cloth and reinstall feed lever. This should be done on a monthly basis.

5-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT.

5-12.1. Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified label of Organization and Equipment (MTOE) applicable to your unit.

5-12.2. Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. No special tools; test, measurement, and diagnostic equipment; or support equipment are required for the repair of this equipment at the organizational level of maintenance.

5-12.3. Repair Parts. Repair parts are listed and illustrated in the Repair Parts And Special Tools List, TM 5-6675-328-24P, covering organizational maintenance for this equipment.

5-13. SERVICE UPON RECEIPT.

5-13.1. Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.
- c. Check to see whether the equipment has been modified.

5-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- a. PMCS are designed to keep the equipment in good working condition by performing certain tests, inspections, and services. The intervals provide you, the organizational technician, with time schedules that determine when to perform specified tasks.
- b. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording the results of PMCS.
- c. Interval columns. This column determines the time period designated to perform your PMCS.
- d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.
- e. List of tools and materials required for PMCS is as follows:

<u>Item</u>	<u>Quantity</u>
Cross Tip Screwdriver	1
Hex Head Key Wrench Set	1
Cheesecloth (Item 4, Appendix E)	ar

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE
1	B	<p><u>INSTRUMENT LATHE</u></p> <p><u>Inspect Lathe.</u></p> <div data-bbox="487 714 1169 1386" data-label="Image"> </div> <p>1. Remove cover with hex head key wrench, and inspect drive belt for visible damage or wear and proper adjustment.</p>

Table 5-3. 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

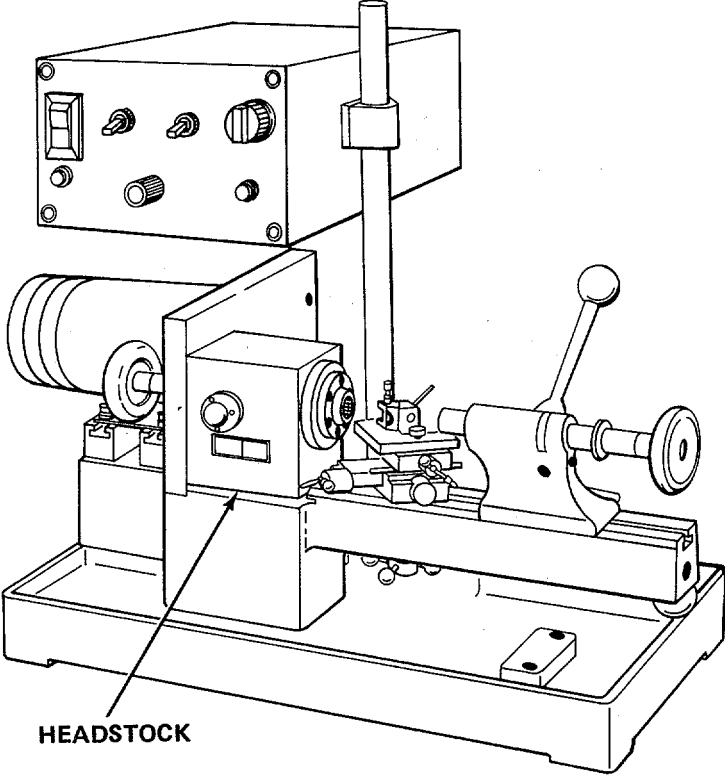
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE
2	M	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Inspect Headstock.</u></p>  <p>HEADSTOCK</p> <ol style="list-style-type: none"> 1. Check spindle for excessive play, vibration, or noise. If a defect is suspected, replace headstock as an assembly.

Table 5-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

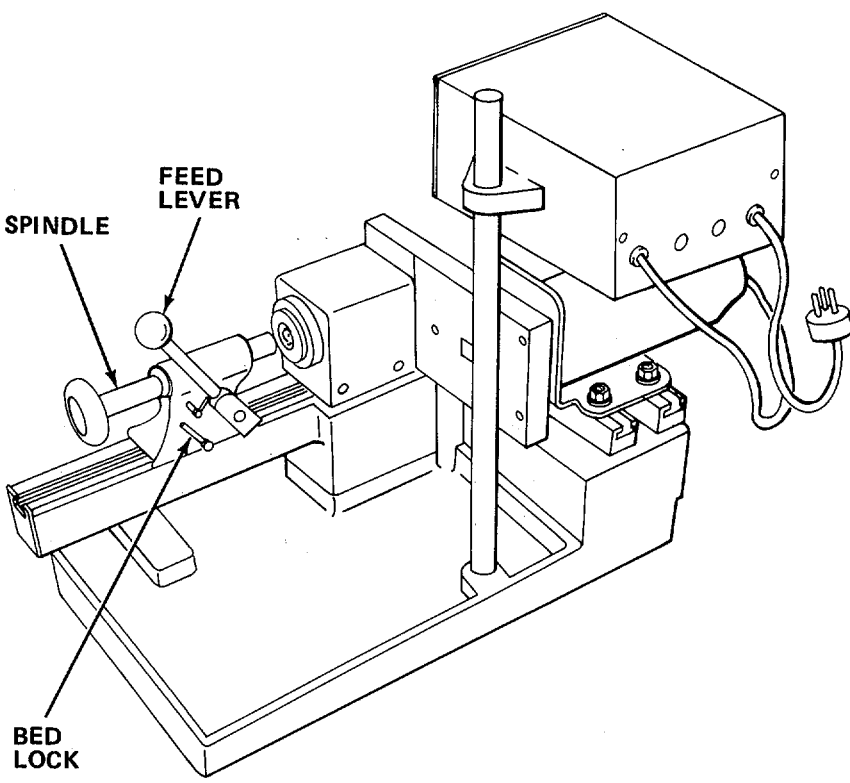
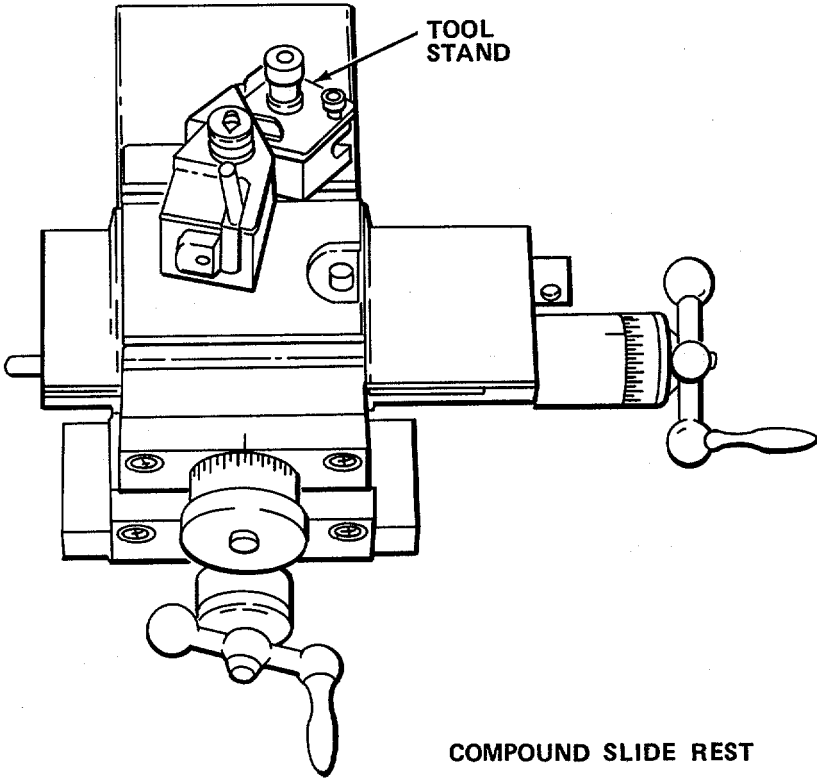
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE
3	M	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Inspect and Service Tailstock Assembly.</u></p>  <ol style="list-style-type: none"> 1. Check spindle, feed lever, and bed lock for proper operation. 2. Check spindle for excessive radial play. Replace tailstock if excessive wear or damage is suspected.

Table 5-3. 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
4	M	<p><u>INSTRUMENT LATHE - Cont</u></p> <p><u>Inspect Compound Slide Rest.</u></p>  <p style="text-align: center;">COMPOUND SLIDE REST</p> <ol style="list-style-type: none"> 1. Inspect compound slide rest for loose screws or mountings. Tighten screws or mountings. 2. Clean compound slide rest with cheesecloth. 3. Inspect tool stand for tightness.

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 at lower levels should be conducted in addition to the organizational troubleshooting procedures.
- b. This manual cannot list all the possible malfunctions or every possible test/ inspection and corrective action. If a malfunction is not listed or corrected by a listed corrective action, notify your supervisor.
- c. For unidentified malfunctions, use the following schematic or the foldout located at the end of this manual for further fault analysis.

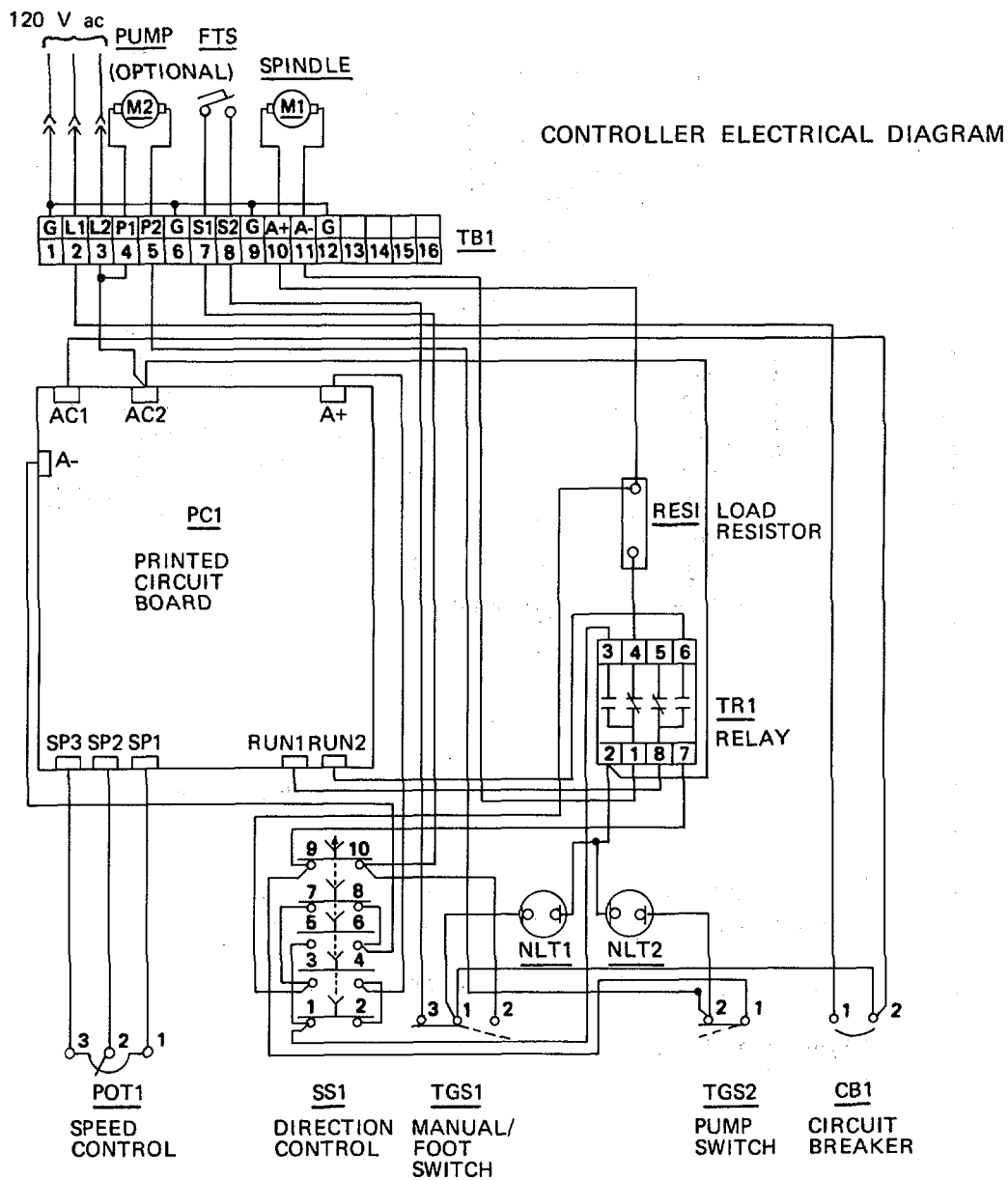


Table 5-4. ORGANIZATIONAL TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. DRIVE MOTOR DOES NOT OPERATE.

Step 1. Check power outlet for 120 V ac using a multimeter.

- (a) If power is present, proceed to step 6.
- (b) If power is not present, proceed to step 2.

Step 2. Check power panel indicators for correct voltage, frequency, and phase.

- (a) If correct, proceed to step 3.
- (b) If incorrect, notify power supply supervisor.

Step 3. Check circuit breaker ON/OFF position.

- (a) If circuit breaker is on, proceed to step 4.
- (b) If circuit breaker is off, turn on.
- (c) If circuit breaker trips repeatedly, notify power supply supervisor.

Step 4. Check circuit breaker output for 120 V ac.

- (a) If voltage present, proceed to step 5.
- (b) If voltage not present, replace circuit breaker (paragraph 1-20.5).

Table 5-4. ORGANIZATIONAL TROUBLESHOOTING - Cont

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

1. DRIVE MOTOR DOES NOT OPERATE - Cont

Step 5. Remove receptacle and check for 120 V ac input.

(a) If present, replace receptacle (paragraph 1-16.5).

(b) If not present, repair or replace defective wiring.

Step 6. Using multimeter, check for continuity of power cord from controller to motor.

(a) If continuity exists, replace drive motor (paragraph 5-16.1).

(b) If continuity does not exist, replace controller (paragraph 5-16.6).

2. DRIVE MOTOR OPERATES BUT HEADSTOCK SPINDLE DOES NOT ROTATE.

Step 1. Check headstock spindle lock for engagement.

Disengage headstock spindle lock.

Step 2. Check drive belt for breakage, slippage, or improper adjustment.

Replace broken or damaged drive belt and adjust (paragraph 5-16.2).

Step 3. Check for frozen headstock bearings.

Replace damaged headstock (paragraph 5-16.3).

5-16. MAINTENANCE PROCEDURES.

a. This section contains instructions covering organizational maintenance functions for the instrument lathe. 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

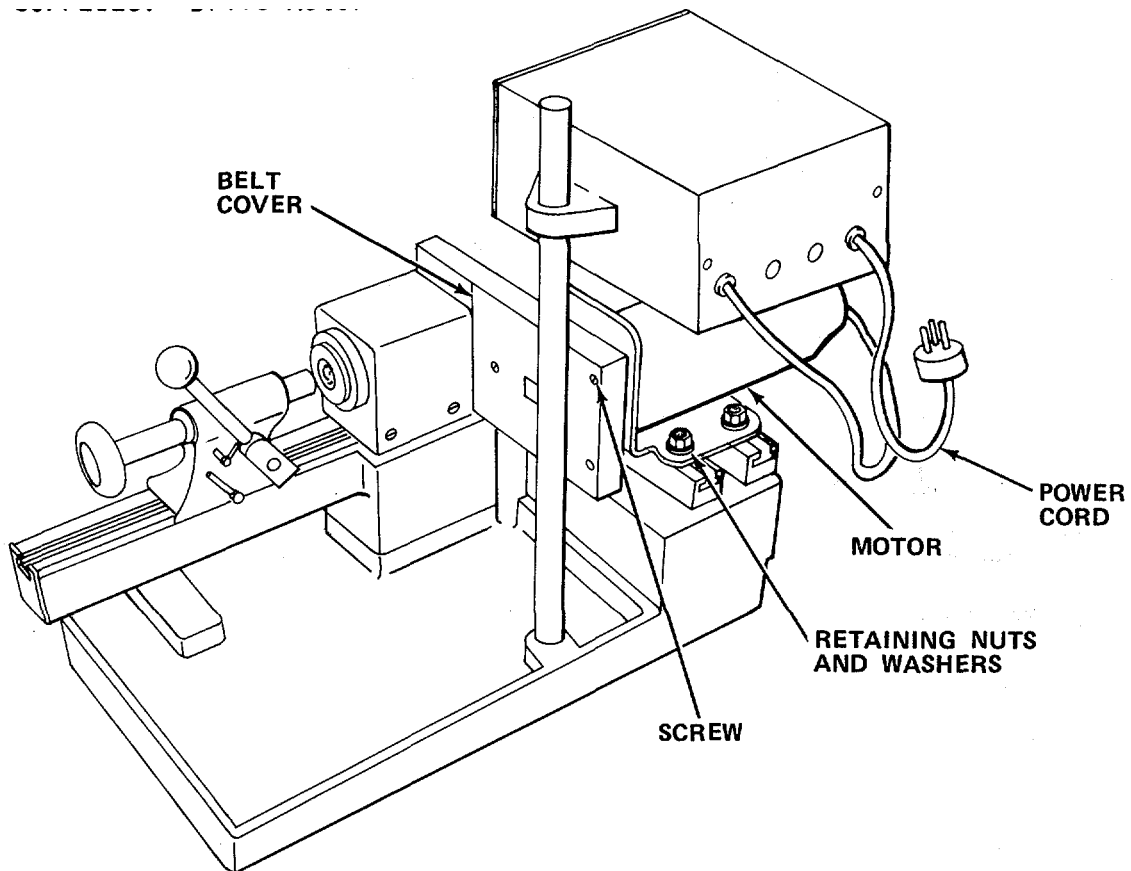
PROCEDURE	PARAGRAPH
Replace Drive Motor	5-16.1
Replace/Adjust Drive Belt	5-16.2
Replace Headstock Assembly.....	5-16.3
Replace Tailstock Assembly.....	5-16.4
Replace Compound Slide Rest.....	5-16.5
Replace Controller	5-16.6

5-16.1. Replace Drive Motor.

MOS: 41B, Topographic Instrument Repair Specialist

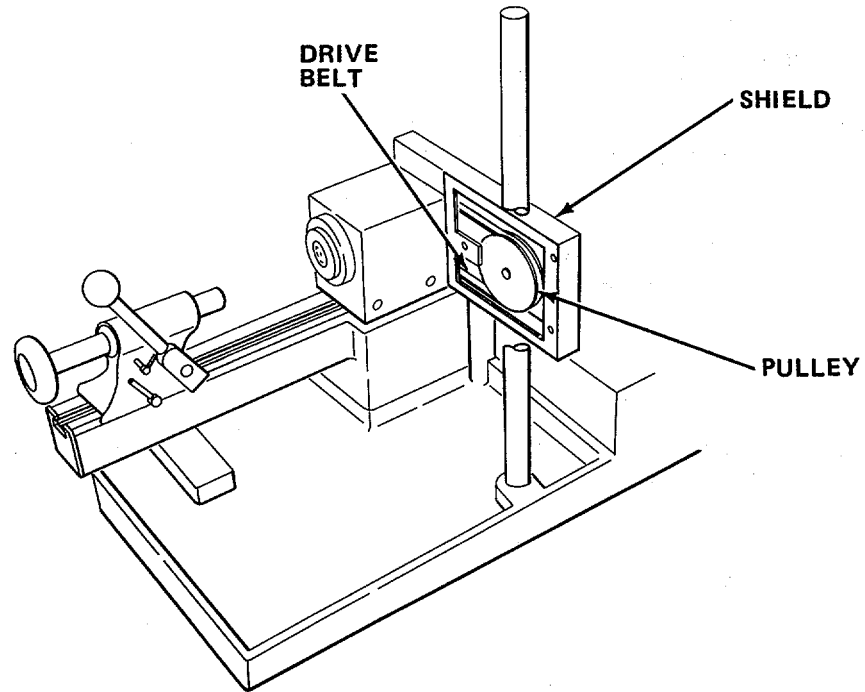
TOOLS: Hex Head Key Wrench Set
 Flat Tip Screwdriver
 1/4 in. Drive Socket Set
 1/4 in. Drive Socket Extension, 2 in. Long

SUPPLIES: Drive Motor

**WARNING**

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

- a. Unplug power cord.
- b. Tag wires and disconnect controller cord from motor.
- c. Remove three socket head screws retaining cover to shield and remove cover.
- d. Remove four nuts, lock washers, and flat washers retaining motor to motor base.



- e. Slide motor forward and remove drive belt.
- f. Remove socket head setscrew from pulley and remove pulley from motor.
- g. Remove motor and bracket from base.
- h. Remove screws and bracket from motor and retain.
- i. Reinstall bracket on new motor.
- j. Reinstall motor on motor base and install retaining nuts and washers finger tight.
- k. Reinstall pulley on motor shaft, align with flat surface on shaft, and tighten setscrew.
- l. Reinstall drive belt.
- m. Slide motor to rear until all belt slack is removed, position so that pulley clears shield, and tighten motor mounting nuts.
- n. Rotate pulley to be sure pulley does not rub on shield. Reposition motor or pulley as necessary.
- o. Reinstall cover and three retaining screws.
- p. Reinstall controller cord to motor.
- q. Plug in power cord.

5-16.2. Replace/Adjust Drive Belt.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Hex Head Key Wrench Set

1/4 in. Drive Socket Set

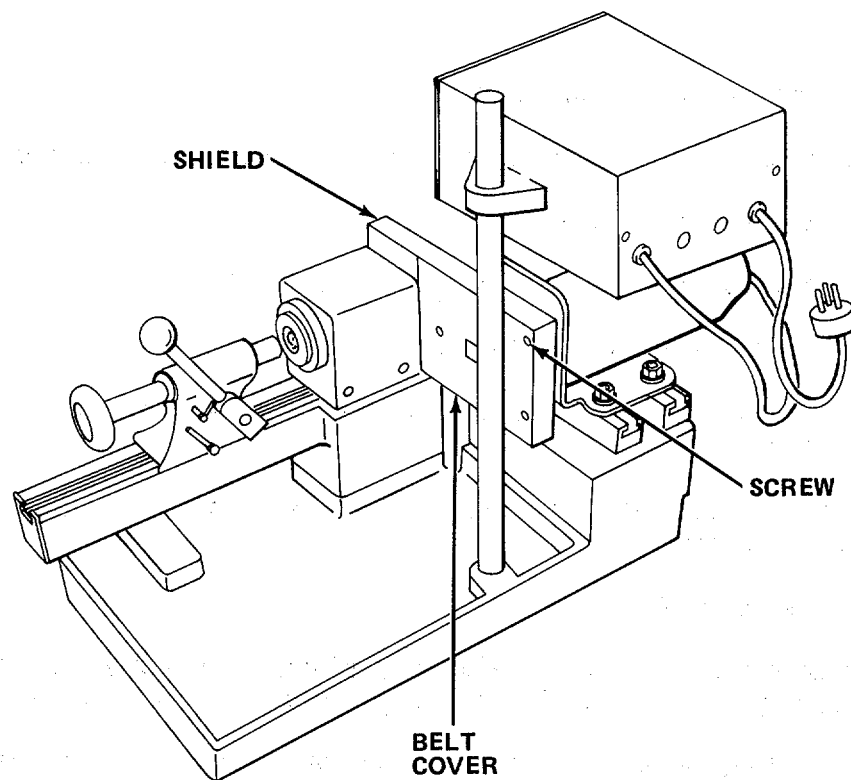
1/4 in. Drive Socket Extension, 2 in. Long

SUPPLIES: Drive Belt

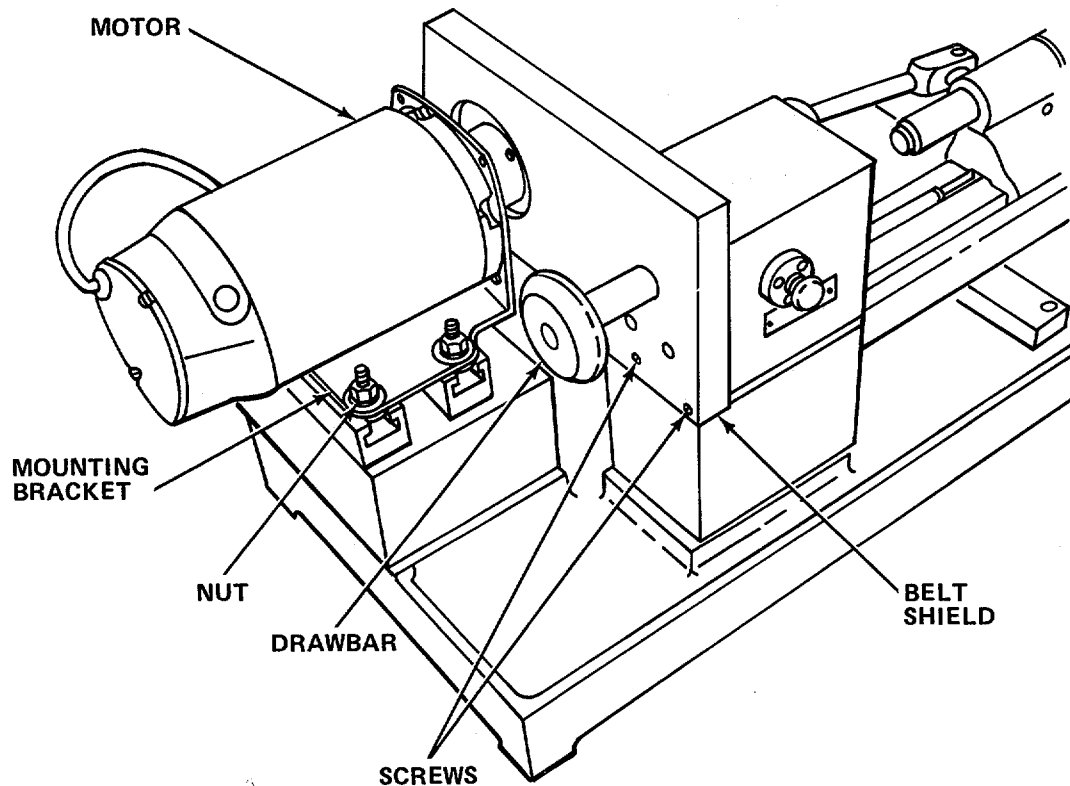
WARNING

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

- a. Unplug power cord.



- b. Remove socket head screws retaining cover to shield and remove cover.



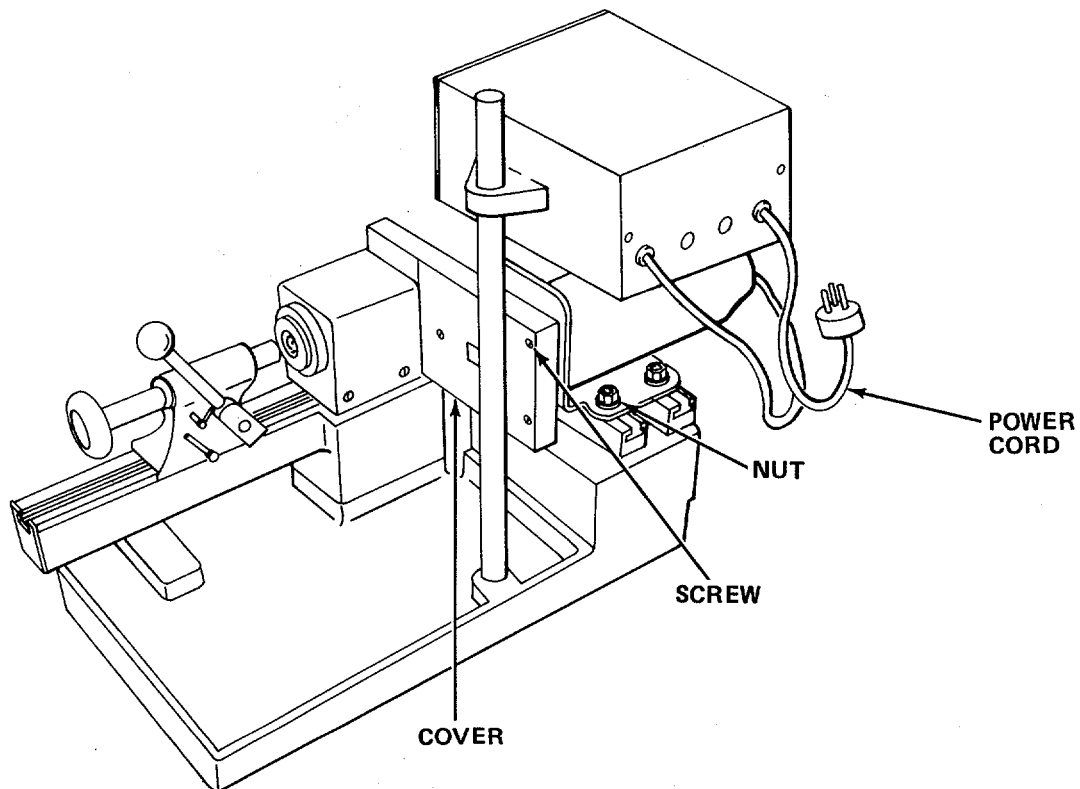
- c. Remove headstock drawbar.
- d. Remove socket head screws and move belt shield to allow belt clearance.
- e. Loosen nuts retaining drive motor to mounting bracket.
- f. Slide motor forward and remove drive belt.
- g. Install new drive belt.
- h. Reinstall shield and retaining screws.
- i. Reinstall drawbar.
- j. Adjust belt tension by sliding motor toward rear until all belt slack is removed.
- k. Tighten mounting bracket retaining nuts.
- l. Reinstall cover and retaining screws.
- m. Plug in power cord.

5-16.3. Replace Headstock Assembly.

MOS: 41B, Topographic Instrument Repair Specialist

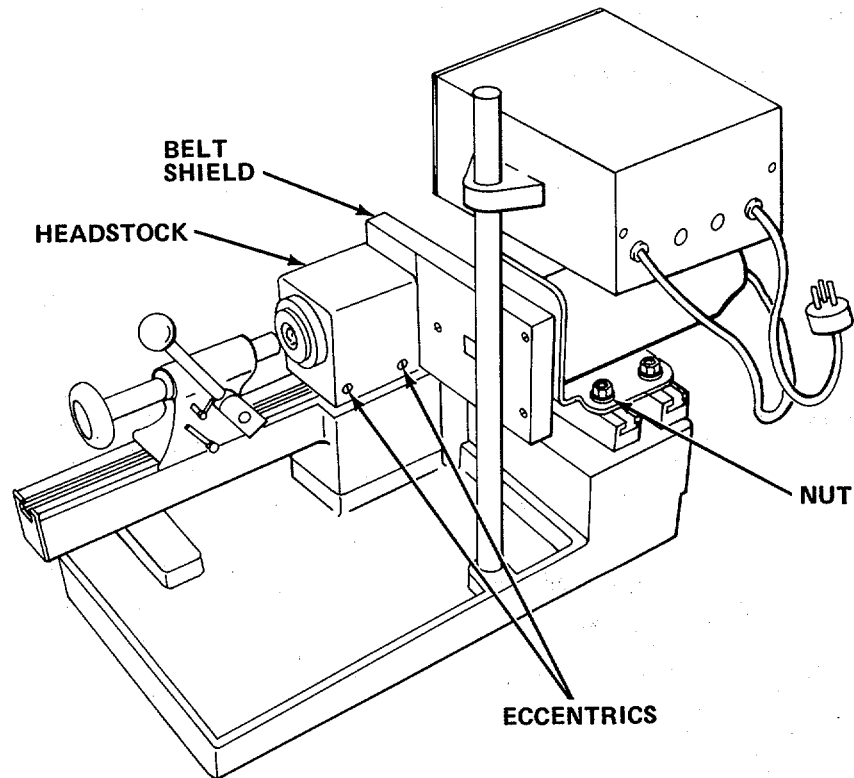
TOOLS: Hex Head Key Wrench Set
 1/4 in. Drive Socket Set
 1/4 in. Drive Socket Extension, 2 in. Long

SUPPLIES: Headstock Assembly

**WARNING**

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

- a. Unplug power cord.
- b. Remove socket head screws retaining cover to shield and remove cover.
- c. Loosen nuts retaining drive motor base.
- d. Slide motor and bracket forward, and remove drive belt from motor pulley.

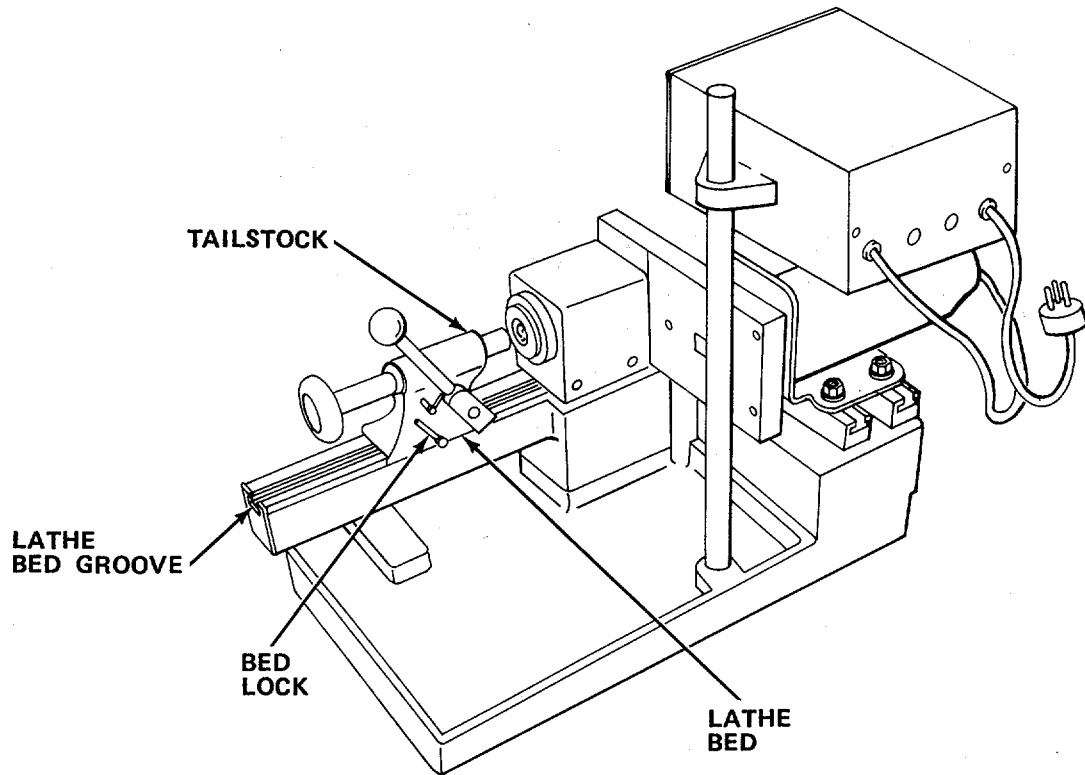


- e. Remove drawbar from headstock.
- f. Remove screws retaining belt shield to headstock and move shield to allow clearance.
- g. Slide motor and shield to the rear..
- h. Loosen eccentrics and slide headstock off lathe bed.
- i. Install new headstock on lathe bed.
- j. Reinstall belt, aline pulley, and tighten headstock eccentrics.
- k. Reinstall belt shield and secure with retaining screws.
- l. Reinstall drawbar in headstock.
- m. Slide motor to the rear. Adjust belt to remove all slack, and tighten retaining nuts.
- n. Reinstall cover on shield and secure with retaining screws.
- o. Plug in power cord.

5-16.4. Replace Tailstock Assembly.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Tailstock Assembly

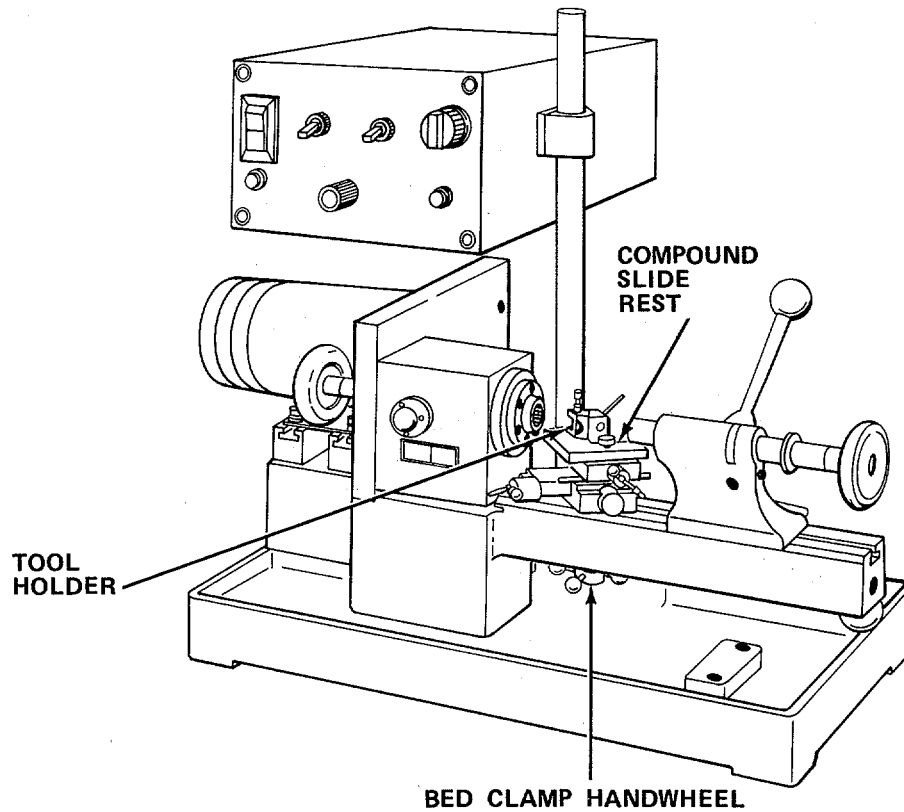


- a. Loosen bed lock.
- b. Slide tailstock off lathe bed.
- c. Install new tailstock on bed with binding bolt in bed groove.
- d. Tighten bed lock.

5-16.5. Replace Compound Slide Rest.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Compound Slide Rest



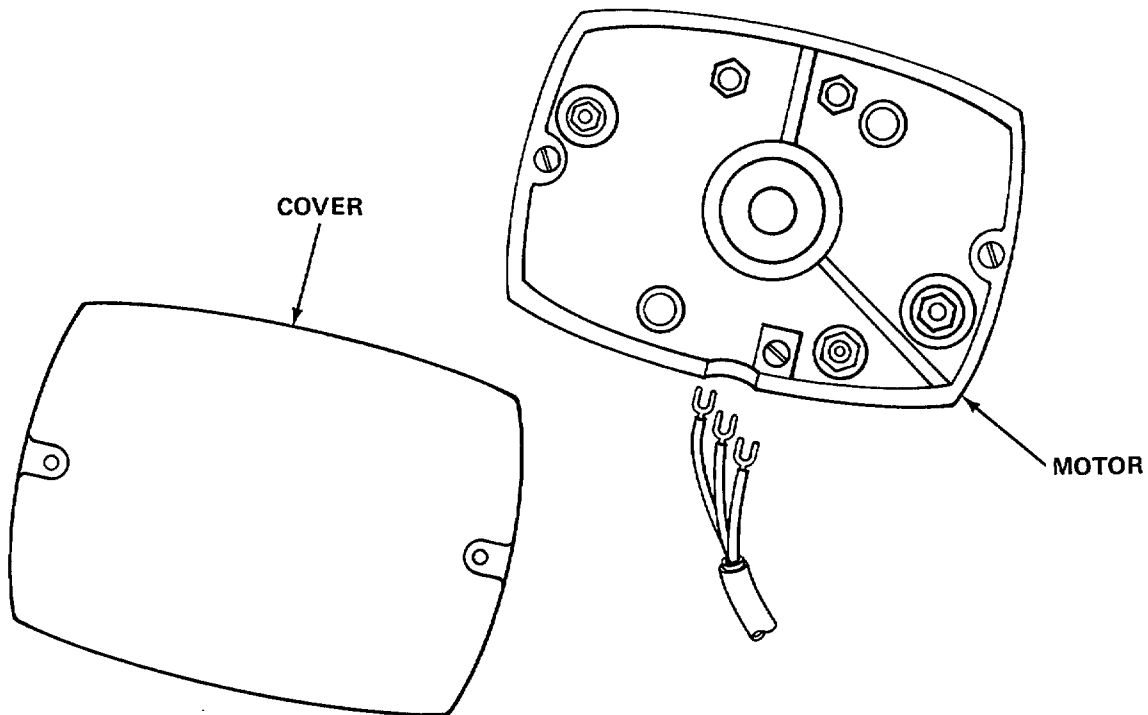
- a. Remove tooling from tool holder.
- b. Loosen bed clamp handwheel.
- c. Slide compound slide rest off of clamping bolt.
- d. Install new compound slide rest onto clamping bolt.
- e. Position compound slide rest and tighten clamp handwheel.
- f. Reinstall tooling in tool holder.

5-16.6. Replace Controller.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Flat Tip Screwdriver
Hex Head Key Wrench Set
3/8 in. Combination Wrench

SUPPLIES: Controller

**WARNING**

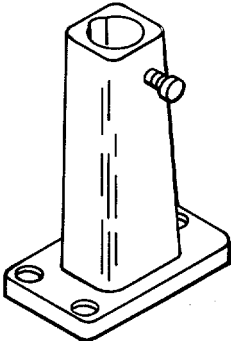
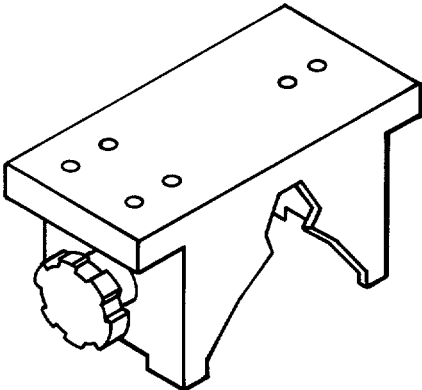
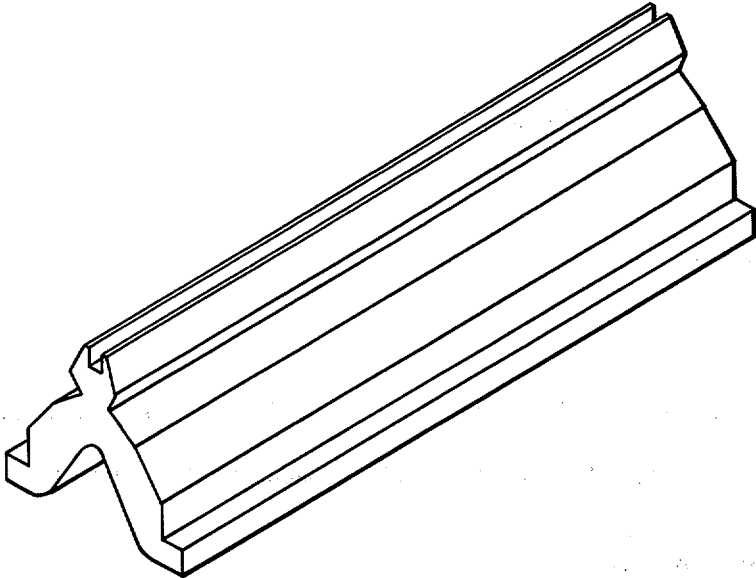
Death or serious injury may occur from electrical shock unless power cord is unplugged before servicing.

- a. Unplug power cord.
- b. Remove cover, tag motor connections, and disconnect motor power cord.
- c. Loosen setscrew on controller mounting bracket and remove controller.
- d. Install new controller and tighten setscrew.
- e. Connect new controller wires to motor connections, remove tags, and reinstall cover.

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

OPTICAL BENCH

SECTION I INTRODUCTION

6-1. GENERAL INFORMATION.

6-1.1 Scope.

- a. Model Number and Equipment Name. Model 22-4055 Triangular Optical Bench.
- b. Purpose of Equipment. To check distance measuring equipment.

6-2. EQUIPMENT DESCRIPTION.

6-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Lightweight.
- b. Portable.
- c. Nonmagnetic.

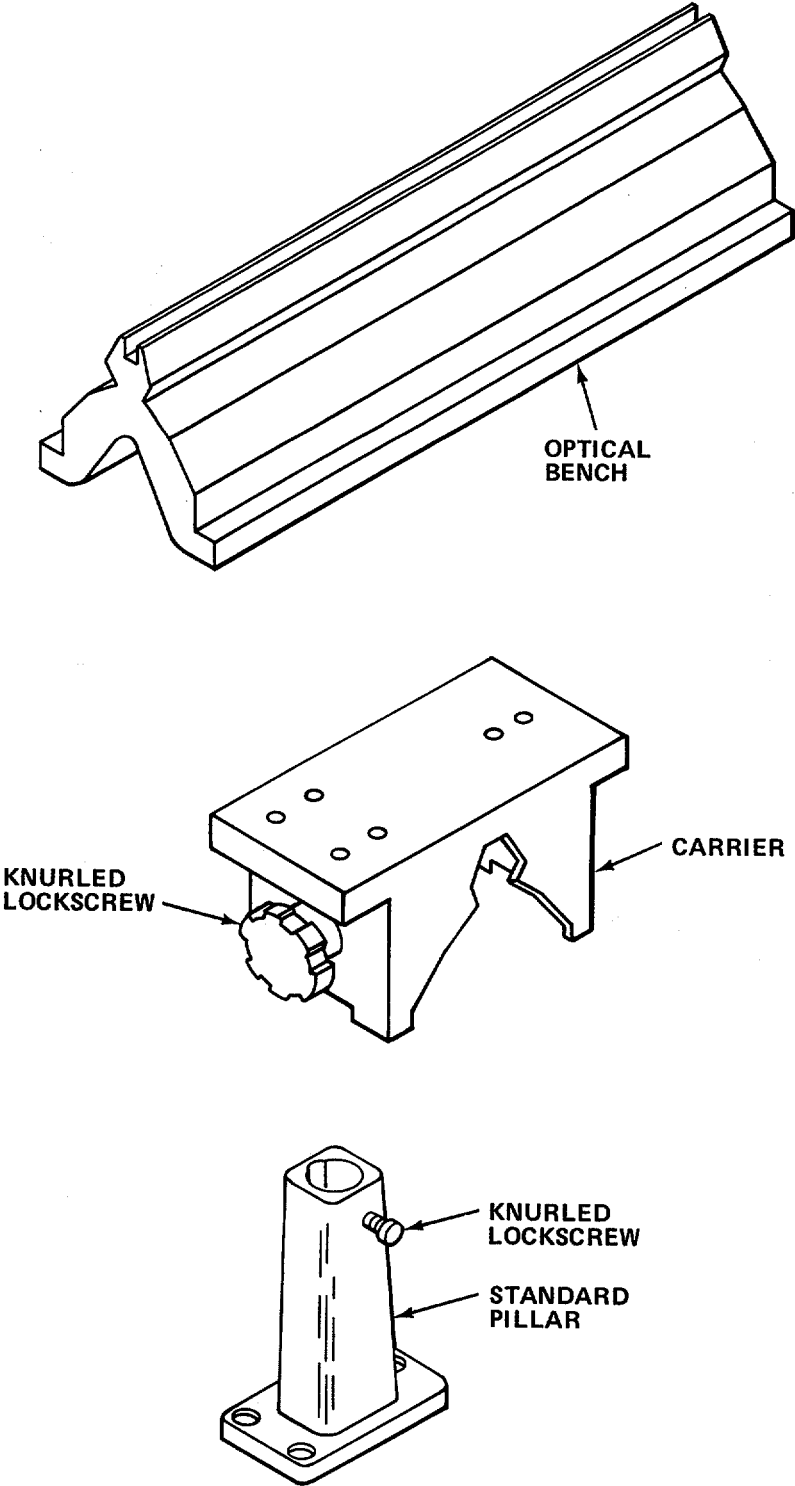
6-2.2 Equipment Data.

Bench	
Width	2.24 in. (5.69 cm)
Length	6.58 ft (2.01 m)
Carrier	
Width	2.36 in. (6.0 cm)
Pillar	
Height	3.15 in. (8.0 cm)
Stem Range	0.39-0.54 in. (9.9-13.7 mm)

6-3. TECHNICAL PRINCIPLES OF OPERATION. Technical Principles of Operation are combined with Description and Use of Operator's Controls and Indicators.

SECTION II OPERATING INSTRUCTIONS

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



Control or Indicator	Function
Optical Bench	Provides mounting surface for carrier.
Standard Pillar	Mounts on carrier. Supports instrument post.
Knurled Lock Screw (Pillar)	Locks instrument post in pillar.
Carrier	Keyed to fit on optical bench. Moves along bench to desired distance.
Knurled Lock Screw (Carrier)	Locks position of carrier on optical bench.

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 your during (D) PMCS.
- c. After You Operate. Be sure to perform your after (A) PMCS.
- d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

6-5.1 PMCS Procedures.

- 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 operations if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.
- f. Item number column. Item numbers are assigned in chronological ascending sequence regardless of interval designation. These numbers are used for your "TM number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet in recording results of PMCS.
- g. Interval column. This column determines the time period designated to perform your PMCS.
- h. Item to be inspected 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 materials required for PMCS is as follows:

<u>Item</u>	<u>Quantity</u>
Cheesecloth (Item 4, Appendix E)	ar
General Purpose Oil (Item 10, Appendix E)	ar

Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

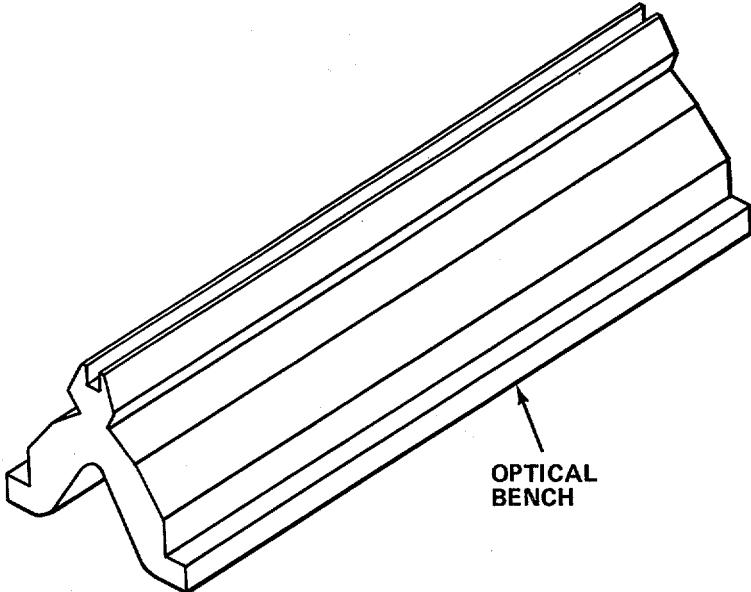
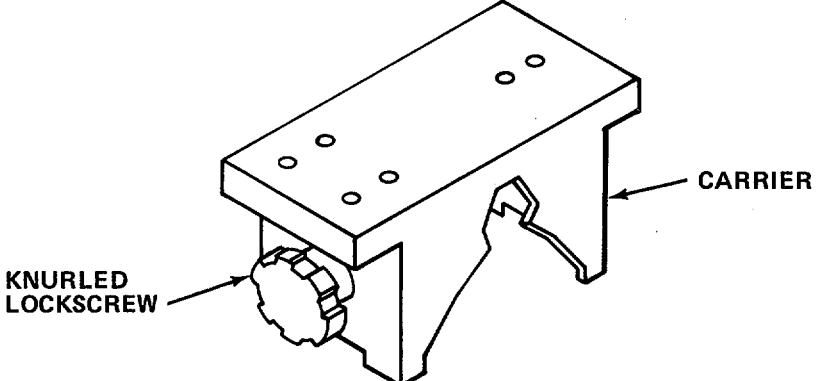
ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>OPTICAL BENCH</u></p> <p><u>Inspect.</u></p>  <p>1. Inspect optical bench for flat spots and burrs.</p>  <p>2. Inspect carrier for jammed knurled lock screw.</p>	

Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
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(Number) - Hundreds of Hours

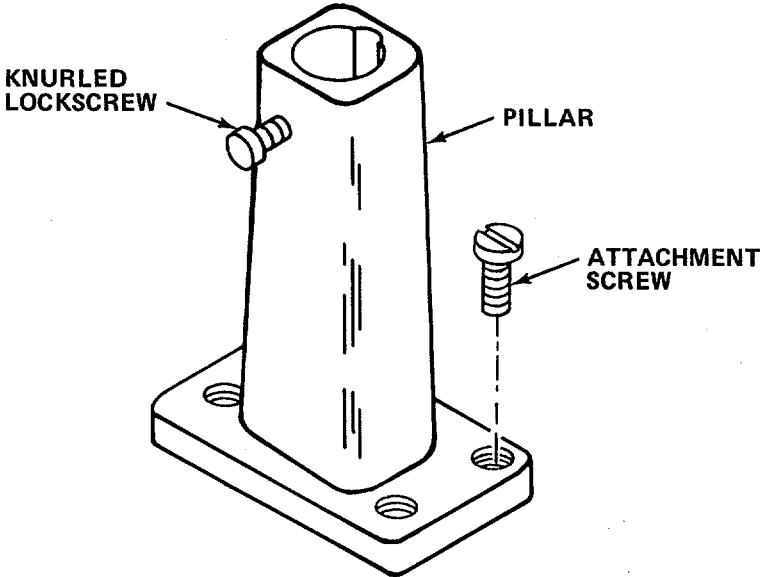
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	B	<p><u>OPTICAL BENCH - Cont</u></p> <p><u>Inspect - Cont</u></p>  <ol style="list-style-type: none"> 3. Inspect pillar for jammed knurled lockscrew. 4. Inspect for missing attachment screws. 5. Inspect for dirt, corrosion, or rust on screws. 	

Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
D - During
A - After

W - Weekly
M - Monthly
Q - Quarterly

AN - Annually
S - Semiannually
BI - Biennially

(Number) - Hundreds of Hours

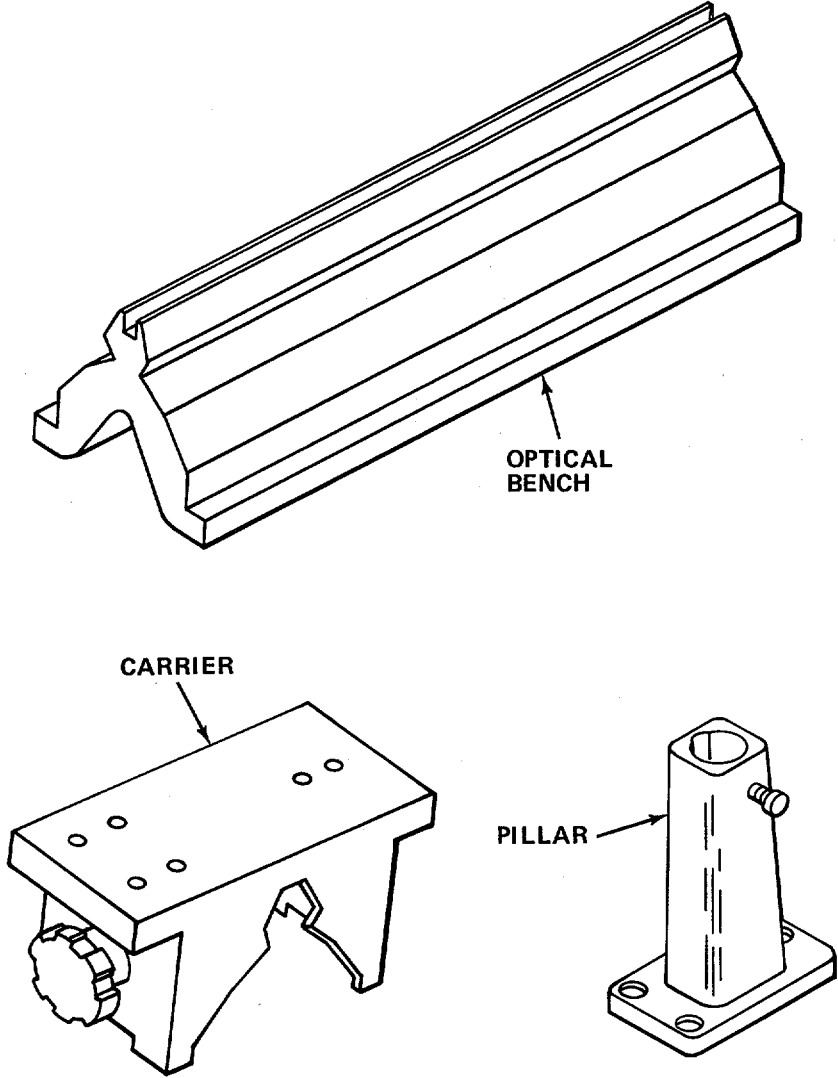
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B	<p><u>OPTICAL BENCH - Cont</u> <u>Clean.</u></p>  <p>1. Moisten clean cheesecloth with fresh general purpose oil.</p>	

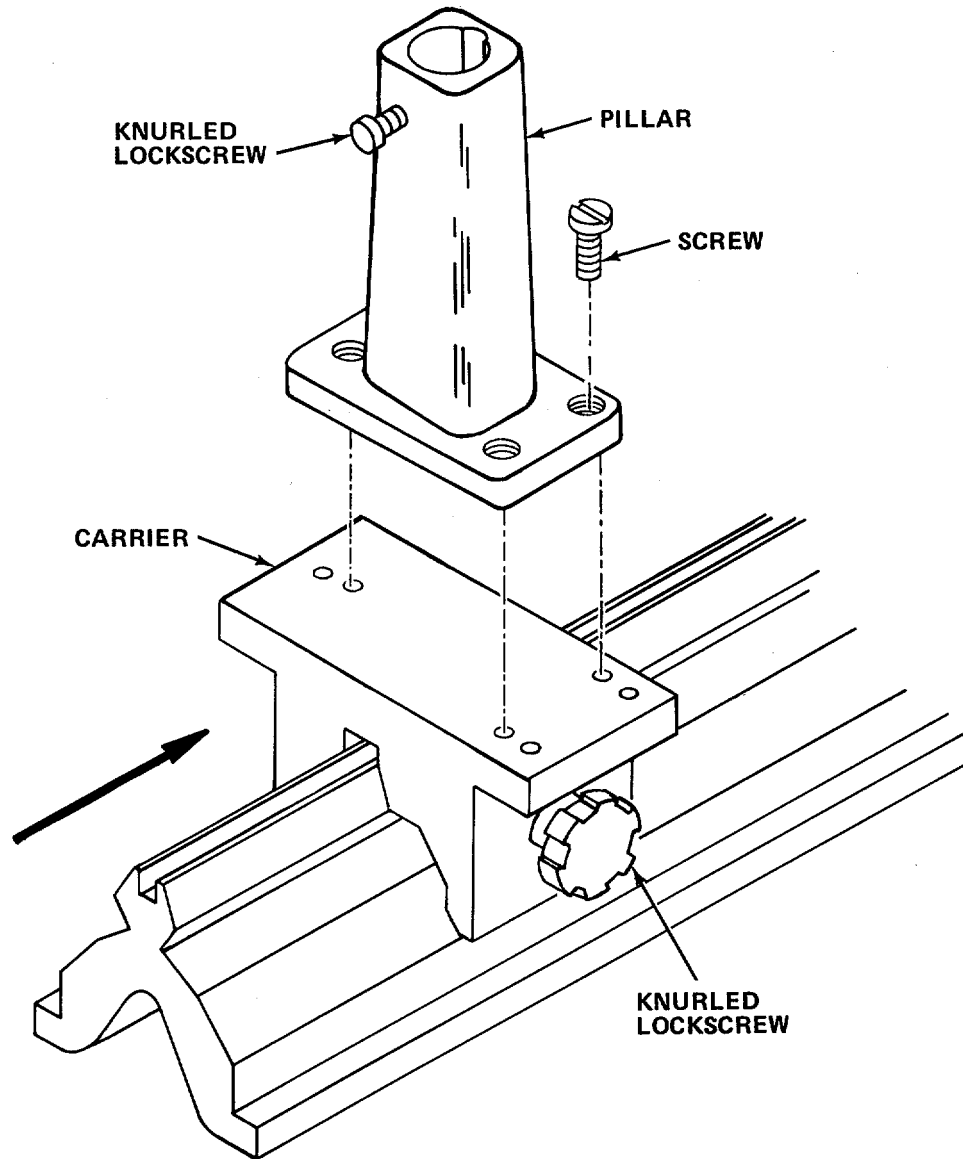
Table 6-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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 PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
2	B	<p><u>OPTICAL BENCH - Cont</u> <u>Clean - Cont</u></p> <p>2. Wipe all surfaces of optical bench, pillar, and carrier with oiled cheesecloth to remove dust, dirt, or corrosion.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>To prevent unnecessary wear to components, do not clean optical bench with abrasive compounds or metal polish.</p> <p>3. Wipe oil from surfaces of optical bench, pillar, and carrier to avoid contaminating optical equipment.</p>	

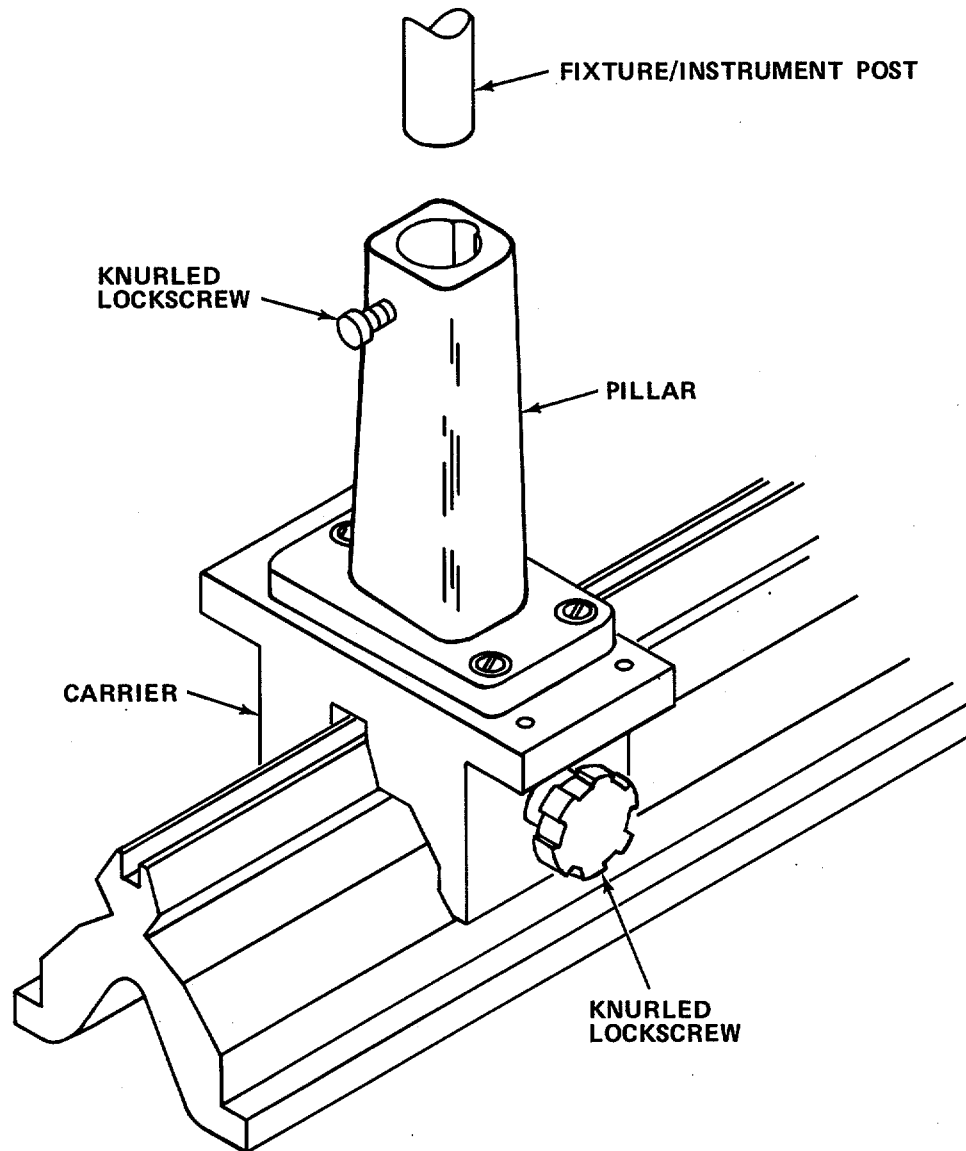
6-6. OPERATION UNDER USUAL CONDITIONS.**6-6.1 Operating Procedures.**

- a. Remove optical bench from storage and place on work surface with narrow slot facing upward.
- b. Place carrier and pillar on work surface. Then turn knurled lockscrews to left until lock screw ends are free. Do not remove lockscrews.
- c. Slide carrier on optical bench.



- d. Tighten knurled lock screw finger tight to hold carrier on optical bench.

- e. Line up mounting holes in pillar with holes in carrier and secure with attachment screws.



- f. Insert fixture or instrument post into pillar.
- g. Tighten knurled lockscrew on pillar finger tight to hold post.
- h. Loosen knurled lockscrew on carrier and slide carrier to desired position. Then tighten knurled lockscrew finger tight.

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 at this level of maintenance.
- 6-9. TROUBLESHOOTING PROCEDURES.** There are no operator troubleshooting procedures assigned for this equipment.
- 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.

6-11/(6-12 blank)

Model 100 P.C. 60 Cycles .13 Amps Output: 100/60/45/35 Amps at 6/12/18/24 VDC MODEL 100-000 MADE BY CENTURY MFG. CO., Mpls., MN.

TIMER (MINUTES)

CHARGING RATE

DO NOT SET TO BATTERY IN EXCESS OF BATTERY VOLTAGE.

***EXCLUSIVE VOLTMETER AND AMMETER TEST FOR:**

- * Sulfated Batteries
- * Shorted Batteries
- * Poor Connections
- * Frozen Batteries
- * Proper Polarity
- * Open Circuits
- * Proper Charge

VOLTMETER

AMMETER

LISTED 100/60/45/35 AMPS AT 6/12/18/24 VOLTS

UL 2421 E34852 E621947

INSTRUCTIONS FOR CHARGING BATTERIES

1. Check battery state of charge with hydrometer or specific gravity test meter.
2. Read charging time to minutes under the correct battery voltage column and opposite the specific gravity or per cent of charge measured. Charge should be "OFF".
3. With Charger "OFF" connect clamps to battery (see instruction manual).
4. Set Charger for indicated chart time. Set charging rate control to low or high corresponding to chart before use.
5. After unit shut off, open charger time has elapsed.

NOTE: Most maintenance Free Batteries have no vent caps and water cannot be replaced. Be careful not to heat the battery. Heat will reduce charging. Do not charge at over 90 degrees for extended periods.

WARNING: Risk of Ignition Gas Emission

CHARTING TIME (MINUTES)					
BATTERY SPECIFIC GRAVITY (TEMPERATURE)	PER CENT OF CHARGE	6 VOLT		12 VOLT	
		CHARGING TIME (MIN)	CHARGING RATE (AMP)	CHARGING TIME (MIN)	CHARGING RATE (AMP)
1.275	100%	100	10	100	10
1.270	75%	120	10	120	10
1.265	50%	140	10	140	10
1.260	25%	160	10	160	10
1.255	0%	180	10	180	10

Any battery at 24V charge or higher may require 15 minutes and should be charged at 100%.

BATTERY VOLTAGE TESTING

BEFORE CHARGING: The voltage meter should read the battery voltage at 15% no reading, check to see that clamps are tight and not reversed on battery.

DURING CHARGING: Battery voltage should read as follows:

- 6 VOLT BATTERY: 6.3 to 6.5 volts
- 12 VOLT BATTERY: 12.0 to 12.5 volts
- 24 VOLT BATTERY: 23.0 to 23.5 volts

100% TO 75% CHARGE: 13.0 to 13.5 volts

75% TO 50% CHARGE: 13.5 to 14.0 volts

50% TO 25% CHARGE: 14.0 to 14.5 volts

25% TO 0% CHARGE: 14.5 to 15.0 volts

100% TO 75% CHARGE: 13.0 to 13.5 volts

75% TO 50% CHARGE: 13.5 to 14.0 volts

50% TO 25% CHARGE: 14.0 to 14.5 volts

25% TO 0% CHARGE: 14.5 to 15.0 volts

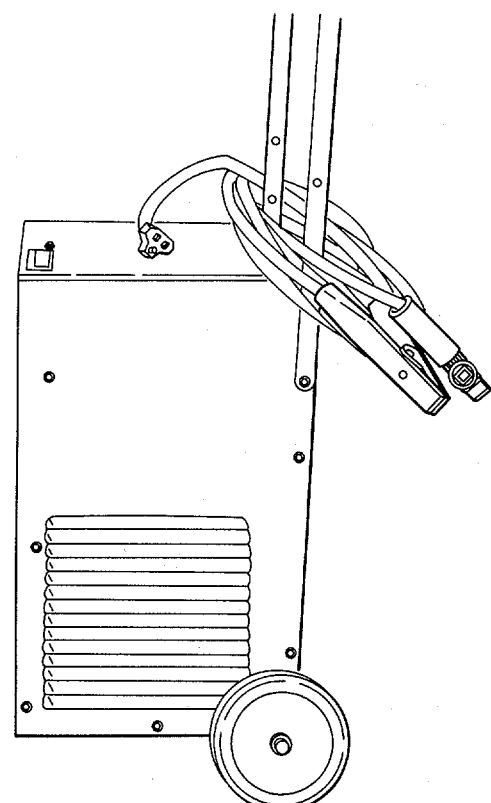
CAUTION: Do not expose to rain, replace defective caps or wires immediately.

CAUTION: Do not expose to rain, replace defective caps or wires immediately.

WARNING: Connect or disconnect the battery plug only when the hood is closed to prevent arcing and burning any results.

FLEET CHARGER/BOOSTER

Delivers Maximum Boost Power for Starting



CHAPTER 7**BATTERY CHARGER****SECTION I INTRODUCTION****7-1. GENERAL INFORMATION.**7-1.1 Scope.

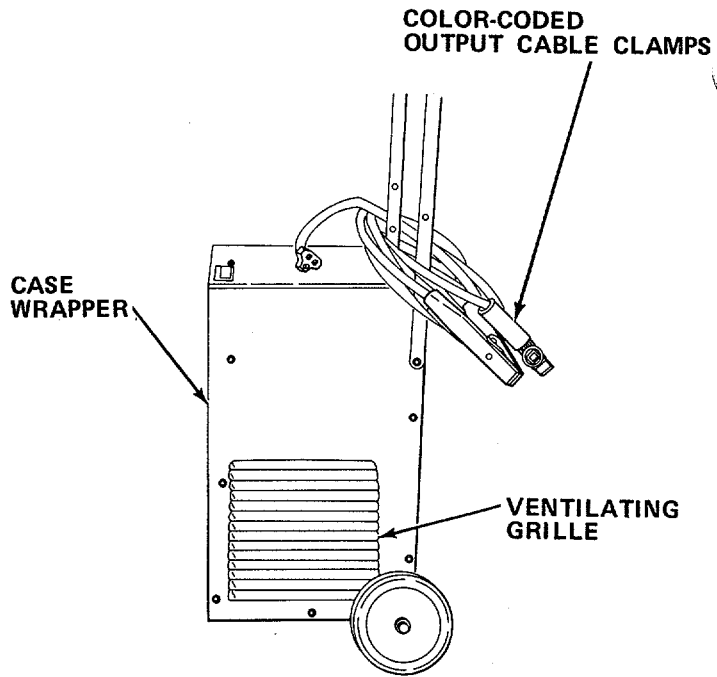
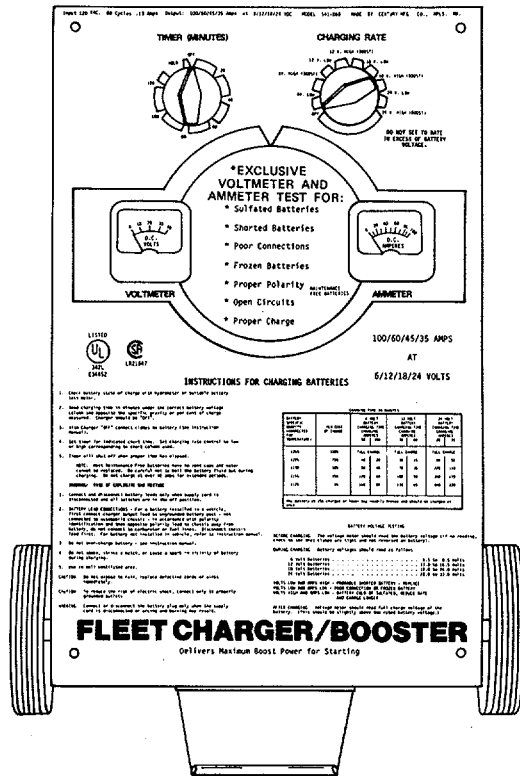
- a. Model Number and Equipment Name. Model 141-060 Battery Charger.
- b. Purpose of Equipment. To convert 120 V ac to 6, 12, 18 or 24 V dc for charging lead-acid storage batteries.

7-1.2 Reference. Refer to TM 9-6140-200-15, Operator and Organizational Field and Depot Maintenance: Storage Batteries, Lead-Acid Type.

7-2. EQUIPMENT DESCRIPTION.7-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Provides constant voltage of 6, 12, 18, or 24 V dc for charging lead-acid storage batteries.
- b. Charges one or more batteries of the same voltage simultaneously.
- c. Fast and slow charging capabilities.

7-2.2 Location and Description of Major Components.



FRONT PANEL. Contains operating controls, meters, and operating instructions for battery charger.

VENTILATING GRILLE, RIGHT AND LEFT SIDE. Interior of battery charger is cooled by a motor-driven fan which receives and exhausts air through grilles in case wrapper.

COLOR-CODED OUTPUT CABLE CLAMPS. Black is negative. Red is positive. Connects charger to battery.

7-2.3 Equipment Data.

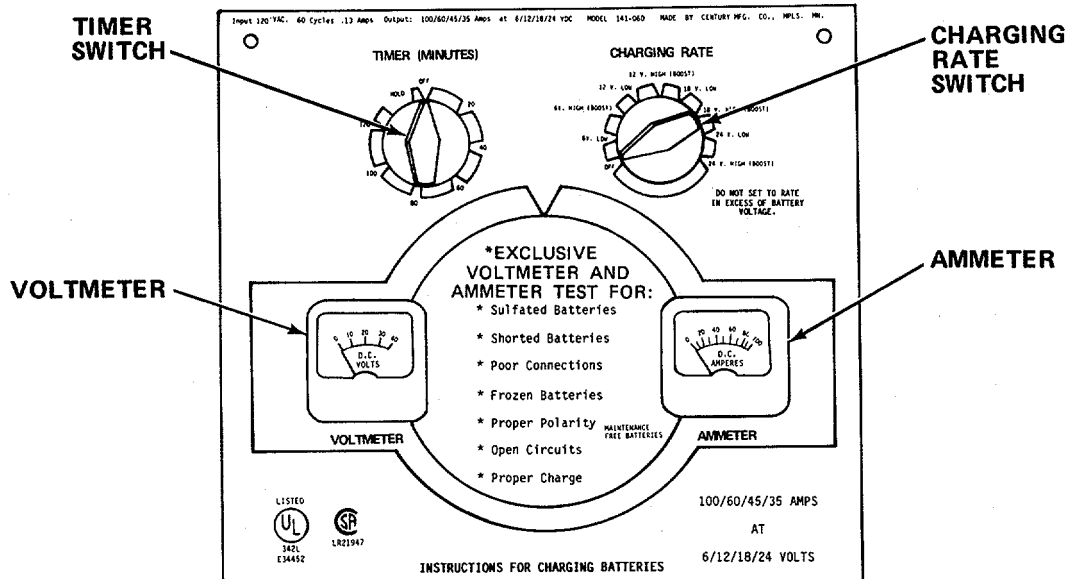
Power Requirements	120 V, 60 Hz, Single-Phase
Dimensions	
Width	15 in. (38.1 cm)
Depth	13 in. (33 cm)
Height	30-5/8 in. (77.8 cm)
Weight	55.5 lb (25.2 kg)
DC Output Voltage	6.5 to 8.5, 13 to 16.5, 19 to 24, or 25 to 33 V with charging rate switch in the 6, 12, 18, or 24 V positions.
Fast Charging Rate	100, 60, 45, or 35 amps maximum at 6, 12, 18, and 24 V respectively.
Slow Charging Rate	50, 30, 25, or 20 amps maximum at 6, 12, 18, and 24 V respectively.

7-3. TECHNICAL PRINCIPLES OF OPERATION.

The charging voltage and current range from the secondary side of the transformer is selected by the CHARGING RATE switch. During the charging cycle, the amperage will vary in accordance with the battery state-of-charge; as the specific gravity of the battery increases, the amperage will decrease. The TIMER controls the length of charging time and will automatically turn the charger off. If the TIMER is placed in the hold position, the CHARGING RATE switch must be turned to OFF at the end of the charging cycle to avoid overcharging. The output of the transformer secondary is rectified by two diodes for the dc output. A circuit breaker in the output line provides overload protection.

SECTION II OPERATING INSTRUCTIONS

7-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.



Control or Indicator	Function
AMMETER	Indicates charging rate output current.
VOLTMETER	Indicates output voltage of battery charger.
CHARGING RATE SWITCH	Nine position switch. Selects charging voltage for 6, 12, 18, and 24 V batteries. Also selects charging rate (current range) with a high or low position for each voltage. OFF position for turning charger off.
TIMER SWITCH	Controls duration of charge. Settings are available from 0 to 120 minutes. Also has a hold position for setting an indefinite charging period.

7-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

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

7-5.1 PMCS Procedures.

- 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.

Table 7-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

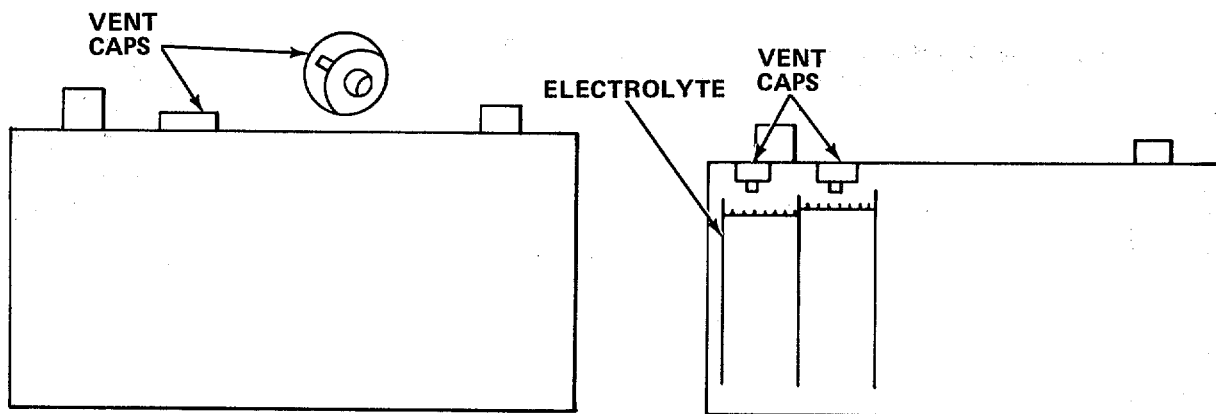
If the equipment must be kept in continuous operation, check and service only those items that can safely be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

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:
1	B	<p><u>BATTERY CHARGER.</u></p> <p><u>Inspect.</u></p> <ol style="list-style-type: none"> 1. Unplug power cord. 2. Inspect power cord and battery cables for cuts, kinks, breaks, frayed wires, and cracked connectors. 3. Inspect switches and knobs for secure fit and that they are in correct operating position. 4. Inspect meter windows for cracks. 5. Check CHARGING RATE switch and TIMER for smooth operation. 	<p>Defective power cord.</p> <p>Defective DC output cable.</p> <p>Loose or missing knobs.</p> <p>Cracked meter window.</p> <p>TIMER or CHARGING RATE switches do not operate properly.</p>

7-6. OPERATION UNDER USUAL CONDITIONS.**7-6.1 Battery Pre-Charging Checks and Test****WARNING**

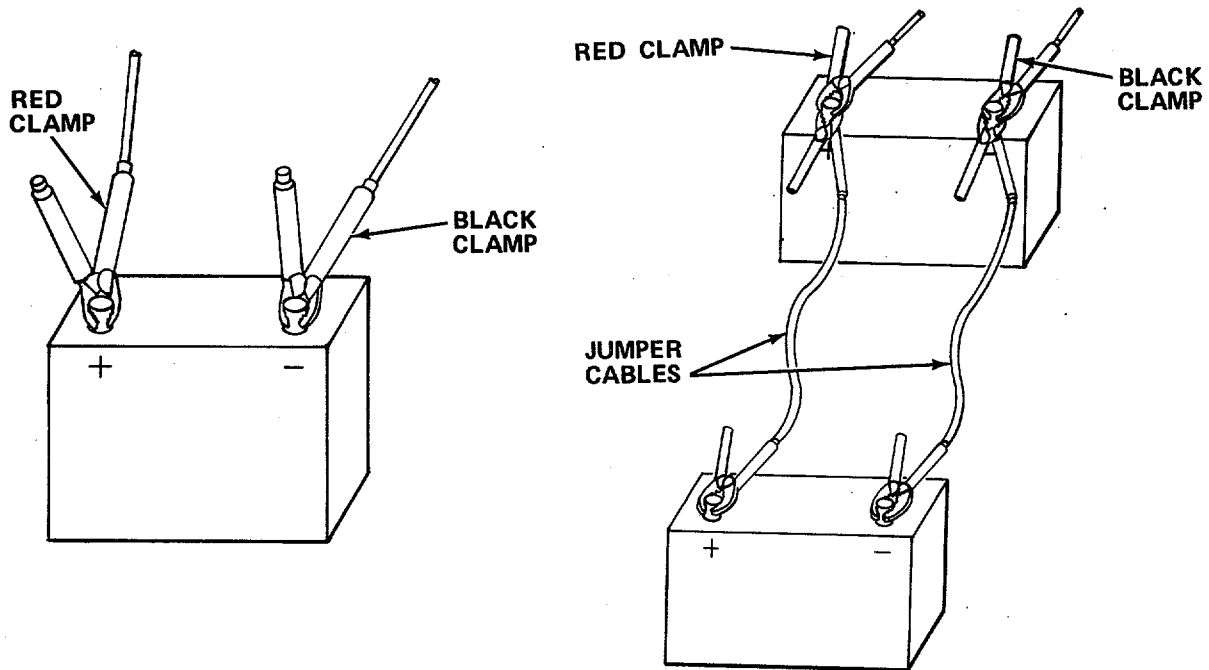
- Charging batteries generate explosive mixtures. Do not charge batteries where flames or other ignition sources may occur. Use in a well ventilated area. Be extra cautious to reduce the risk of dropping a metal tool onto the battery. A metal tool could short-circuit the battery terminals and cause an explosion. Death or injury can result.
 - Remove personal metal items such as rings, bracelets, and watches when working with a lead-acid battery. These items can cause a short-circuit that will result in a severe burn.
 - Caustic Chemicals in Batteries: Use rubber gloves, apron, and face shield to avoid burns. If chemicals get on skin, clothes, or equipment, wash immediately with water. If chemicals get in your eyes, flush thoroughly with water and get medical help immediately.
 - Use charger for charging a lead-acid type battery only. It is not intended to supply power to a low voltage electrical system other than in an automotive application. Do not use for charging dry-cell batteries as they may burst and cause injury to personnel.
- a. Check for the leakage of electrolyte around battery case.
 - b. Inspect battery case for cracks.
 - c. Inspect battery terminals for damage.
 - d. Clean battery terminals.



- e. Remove vent caps.
- f. Determine the state-of-charge of the battery or batteries. Refer to TM 9-6140200-15 for lead-acid batteries.

- g. Check electrolyte level and add water if necessary. Reinstall vent caps loosely
- h. Place wet cloth over battery vent caps.
- i. When more than one battery is to be charged, connect batteries in parallel. Use short jumper cables and connect securely.

7-6.2 Operating Procedures.



WARNING

Connect or disconnect the battery clamps only when the power cord is disconnected, or arcing and burning may result in an explosion and cause injury to personnel.

CAUTION

The HOLD position of the TIMER should be used only for prolonged low rate charging. If turned to HOLD the charger will charge indefinitely and cause battery damage through overcharging.

NOTE

If multiple batteries are to be charged, the charging time will increase in direct proportion to the number of batteries being charged, and the charging rate will decrease. Two batteries will take twice as long to charge as one.

a. Charging

- (1) Test and prepare battery for charging in accordance with paragraph 7-6.1.
- (2) Turn CHARGING RATE switch to OFF.
- (3) Connect dc output cables to battery. Red clamp to positive (+) terminal, black clamp to negative (-) terminal.
- (4) Plug in power cord.
- (5) To obtain desired charging time, refer to table 7-2 using the specific gravity obtained in paragraph 7-6.1, step f.

TABLE 7-2. BATTERY CHARGING TIME

CHARGING TIME IN MINUTES

BATTERY SPECIFIC GRAVITY (CORRECTED FOR TEMPERATURE)	PER CENT OF CHANGE	6 VOLT BATTERY CHARGING TIME CHARGING AMPERES		12 VOLT BATTERY CHARGING TIME CHARGING AMPERES		24 VOLT BATTERY CHARGING TIME CHARGING AMPERES	
		50	100	30	60	20	35
		FULL CHARGE		FULL CHARGE		FULL CHARGE	
1265	100%	FULL CHARGE		FULL CHARGE		FULL CHARGE	
1225	75%	40	20	30	15	96	55
1190	50%	80	40	70	35	220	110
1155	25%	120	60	100	50	340	170
1120	0%	160	80	130	65	440	220

CAUTION

Any battery at 1150 specific gravity or lower may readily freeze and should be charged at once.

- (6) Set TIMER to value selected from chart for the state-of-charge of the battery.
- (7) Turn CHARGING RATE switch to the LOW (slow charge) or HIGH (fast charge) position for the voltage of the battery being charged.
- (8) Be sure that ammeter indicates that charging current is flowing. Ammeter will indicate charging current in accordance with the battery state-of-charge.
- (9) Refer to table 7-3 and ensure that the voltmeter indicates within prescribed limits.

Table 7-3. BATTERY CHARGER OUTPUT VOLTAGE

Battery V	Output V
6	6.5 - 8.5
12	13 - 16.5
18	19 - 24
24	25 - 33

WARNING

Battery may explode and cause injury if charging rate is not reduced immediately when violent gassing occurs or battery becomes uncomfortably hot to the touch.

NOTE

Steady gassing and warm battery indicates battery is approaching full charge.

(10) TIMER will turn charger off when charging is completed. If TIMER is in HOLD position, charging is complete when charging current approaches zero and battery is gassing freely.

(11) When charging is completed, turn TIMER and CHARGING RATE switches to OFF.

(12) Unplug ac power cord.

(13) Disconnect charging cables.

(14) Remove wet cloth from battery vent caps and tighten caps.

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.

a. The table lists the common malfunctions you may find during the operation or maintenance of the battery charger 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 test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 7-4. TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. BATTERY CHARGER DOES NOT CHARGE, NO METER READINGS.

Step 1. Check power cord.

(a) If plugged in, proceed to step 2.

(b) If unplugged, plug in.

Step 2. Check connections at battery.

(a) If meter still has no reading, proceed to step 3.

(b) Clean battery terminals and reposition clamps.

Step 3. Check for sulfated or open circuit battery.

(a) Replace defective battery.

(b) If meters still have no reading, refer to direct/general support maintenance.

Table 7-4. TROUBLESHOOTING - Cont.

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

2. HIGH METER READING WHILE CHARGING.

Step 1. Check for reversed cable connections.

- (a) If correct, proceed to step 2.
- (b) If reversed, reconnect to proper terminals.

Step 2. Check for shorted or dead battery cell.

- (a) Replace battery.
- (b) If battery still fails to charge, refer to direct/general support maintenance.

7-10. MAINTENANCE PROCEDURES. There are no operator maintenance procedures assigned for this equipment.

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; 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 5-6675-328-24P covering organizational maintenance of this equipment.

7-13. SERVICE UPON RECEIPT.

7-13.1 Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.
- c. Check to see whether the equipment has been modified.

7-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

- 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 are used for your "TM number" column on DA Form 2404.
- c. Interval column. This column determines the time period designated to perform your PMCS.
- d. Item to be inspected and procedures column. This column lists functional groups and their respective assemblies and subassemblies as shown in the Maintenance Allocation Chart (Appendix B). The appropriate check or service procedure follows the specific item to be inspected.
- e. List of tools and materials required for PMCS is as follows:

<u>Items</u>	<u>Quantity</u>
Cheesecloth (Item 4, Appendix E)	ar
Cleaning Concentrate (Item 5, Appendix E)	ar
Electrical Insulation Tape (Item 25, Appendix E)	ar

Table 7-4. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

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

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

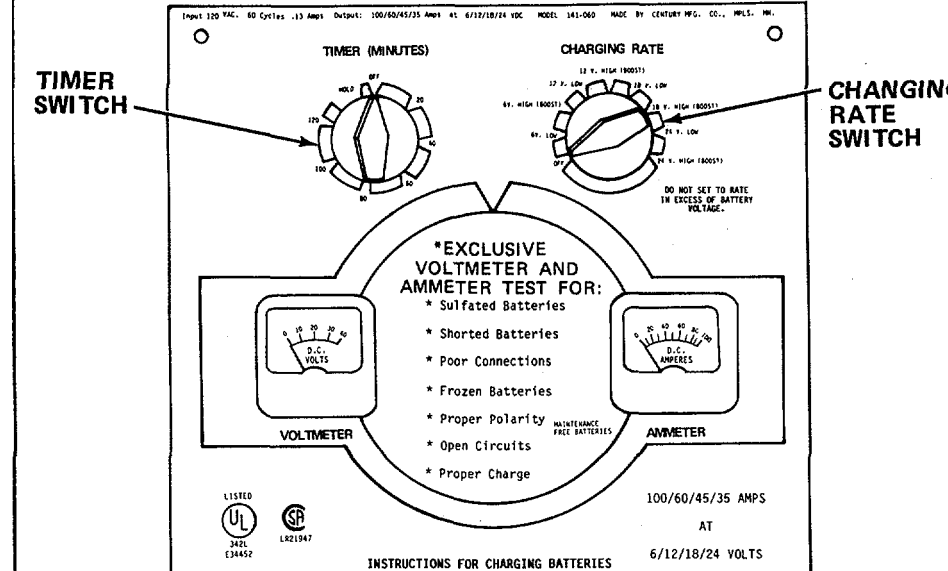
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
1	M	<p>BATTERY CHARGER</p> <p><u>Service.</u></p>  <p>1. Set CHARGING RATE switch to OFF.</p> <p>2. Unplug power cord.</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Do not use an excessive amount of liquid. Damage to the equipment may occur.</p>	

Table 7-4. 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:
1	M	<p><u>BATTERY CHARGER</u></p> <p><u>Service - Cont</u></p> <p>3. Use clean cloth moistened with water and cleaning concentrate to remove dirt and moisture from exterior surfaces.</p> <p>4. Operate CHARGING RATE switch and TIMER switch through their entire ranges. Check for free operation without binding and positive action in each position.</p> <p>5. Repair any cuts or cracks in the insulation of the ac power cord by covering damaged area with insulation tape.</p> <p>6. Replace loose or missing screws on cover, handle, and foot assembly.</p>	

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

7-16. MAINTENANCE PROCEDURES. There are no organizational maintenance procedures assigned for this equipment.

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

SECTION V DIRECT/GENERAL SUPPORT MAINTENANCE

7-18. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT.

7-18.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of organization and Equipment (MTOE) applicable to your unit.

7-18.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special Tools, IMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

7-18.3 Repair Parts. Repair parts are listed and illustrated in Repair Parts and Special Tools List, TM 5-6675-328-24P, covering direct/general support maintenance for this equipment.

7-19. 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 following schematic or the foldout located at the end of this manual for further fault analysis.

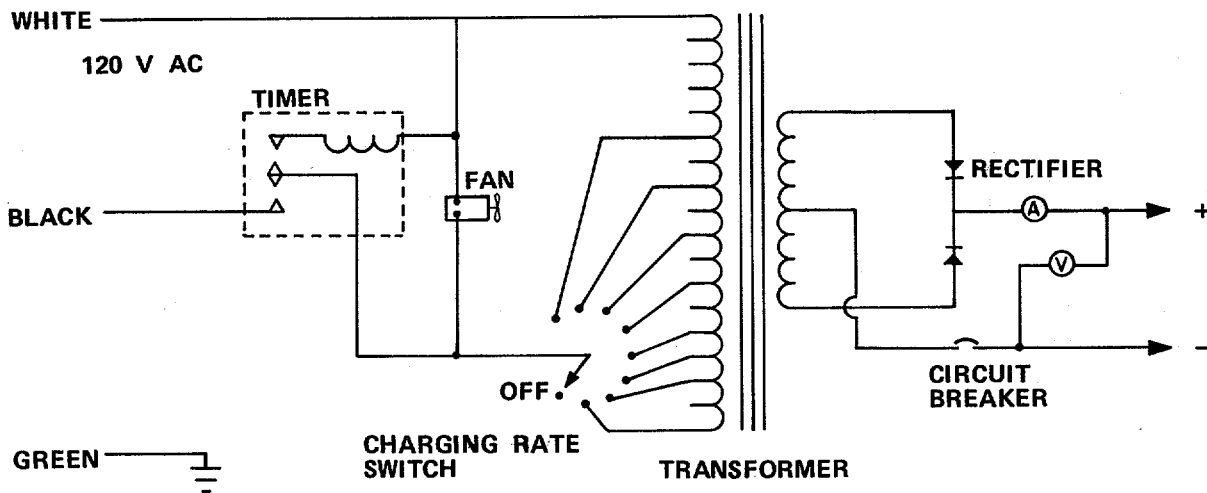
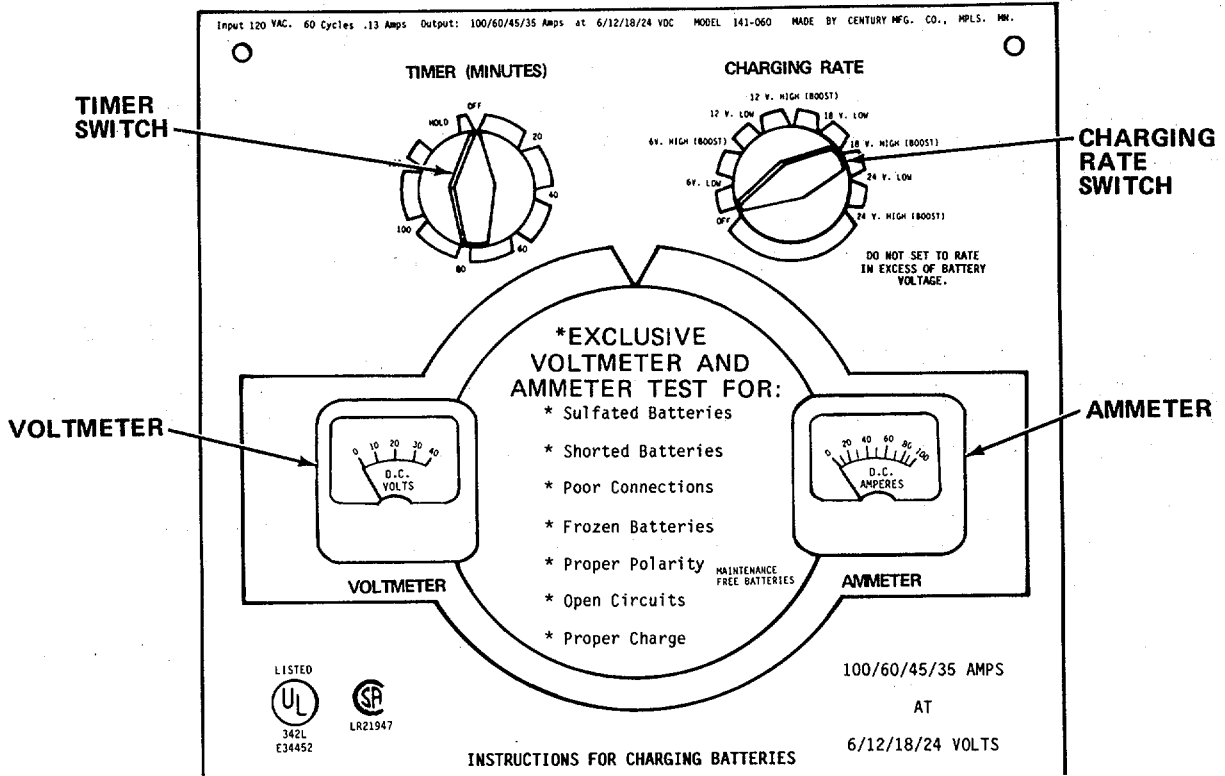


Table 7-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES

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



WARNING

Be extremely careful when making voltage checks. Use insulated test probes only. Do not touch any internal components of the battery charger while it is being tested. Death or serious injury may result.

1. NO DC OUTPUT WHEN ANY OF THE VOLTAGES ARE SELECTED ON THE CHARGING RATE SWITCH AND THE TIMER IS TURNED ON.

Step 1. Check for continuity of internal circuit breaker.

- (a) If continuity exists, proceed to step 2.
- (b) If no continuity exists, replace circuit breaker (paragraph 7-20.4).

Table 7-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES - Cont.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. NO DC OUTPUT WHEN ANY OF THE VOLTAGES ARE SELECTED ON THE CHARGING RATE SWITCH AND THE TIMER IS TURNED ON - Cont	Step 2. Check for continuity of TIMER.	<ul style="list-style-type: none"> (a) If continuity exists, proceed to step 3. (b) If no continuity exists, replace TIMER (paragraph 7-20.3).
	Step 3. Check for continuity of CHARGING RATE switch.	<ul style="list-style-type: none"> (a) If continuity exists, proceed to step 4. (b) If no continuity exists, replace CHARGING RATE switch (paragraph 7-20.2).
	Step 4. Check for continuity of AMMETER.	<ul style="list-style-type: none"> (a) If continuity exists, proceed to step 5. (b) If no continuity exists, replace AMMETER (paragraph 7-20.1).
	Step 5. Check resistance of diode.	<ul style="list-style-type: none"> (a) If back-to-front reading is significantly greater than front-to-back reading, proceed to step 6. (b) If incorrect resistance reading exists, replace diode (paragraph 7-20.5).
	Step 6. Check for defective transformer.	Replace battery charger.
2. BATTERY CHARGER OPERATES BUT VOLTMETER DOES NOT INDICATE.	Check for defective VOLTMETER.	Replace VOLTMETER (paragraph 7-20.1).

Table 7-5. DIRECT/GENERAL SUPPORT TROUBLESHOOTING PROCEDURES - Cont

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. BATTERY CHARGER OPERATES BUT TIMER WILL NOT MOVE FROM SELECTED POSITION. Check for defective TIMER.		Replace TIMER (paragraph 7-20.3).
4. BATTERY..CHARGER WILL NOT OPERATE IN ONE OR MORE POSITIONS OF THE CHARGING RATE SWITCH.		Step 1. Check for defective CHARGING RATE switch. (a) Replace CHARGING RATE switch (paragraph 7-20.2). (b) If battery charger still does not operate, replace battery charger.

7-20. MAINTENANCE PROCEDURES.

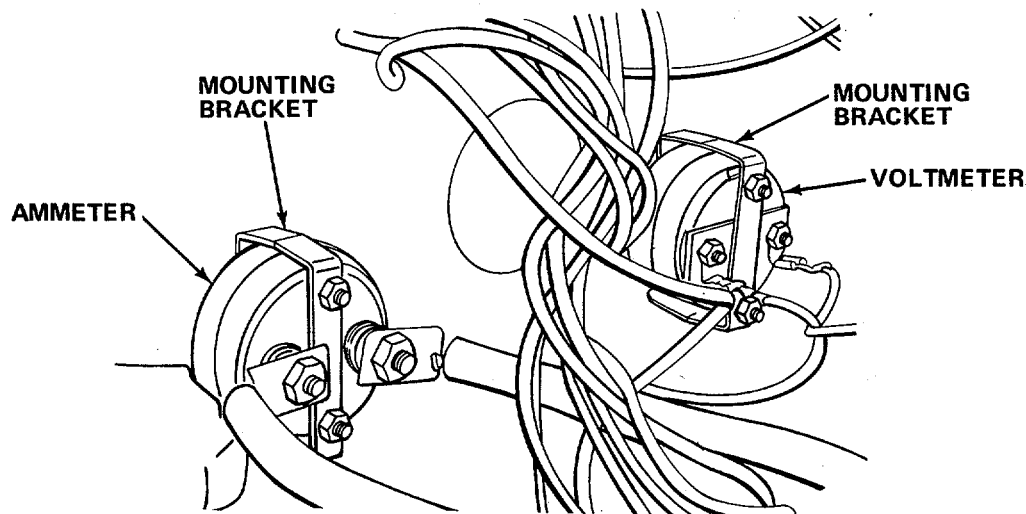
- a. This section contains instructions covering direct/general support maintenance functions for the battery charger. Personnel are listed only if the task requires more than one.
- b. After completing each maintenance procedure, perform operational check to be sure that equipment is properly functioning.

INDEX

PROCEDURE	PARAGRAPH
Replace AMMETER OR VOLTMETER	7-20.1
Replace CHARGING RATE Switch	7-20.2
Replace TIMER	7-20.3
Replace Circuit Breaker	7-20.4
Replace Diode	7-20.5

7-20.1 Replace AMMETER or VOLTMETER.

MOS: 35E, Special Electronic Devices Repairer
 TOOLS: 1/4 in. Nutdriver
 5/16 in. Nutdriver
 7/16 in. Combination Wrench
 SUPPLIES: AMMETER
 VOLTMETER

**WARNING**

Electric shock hazard. Power cord must be disconnected prior to removing case wrapper. Death or serious injury may result.

- a. Turn CHARGING RATE switch to OFF.
- b. Unplug power cord.
- c. Remove screws, handle, and case wrapper.
- d. Tag and disconnect wires.
- e. Remove nuts from mounting bracket.
- f. Remove mounting bracket and AMMETER or VOLTMETER.
- g. Install new AMMETER or VOLTMETER and retain with mounting bracket and nuts.
- h. Reconnect wires.
- i. Reinstall case wrapper, handle, and screws.

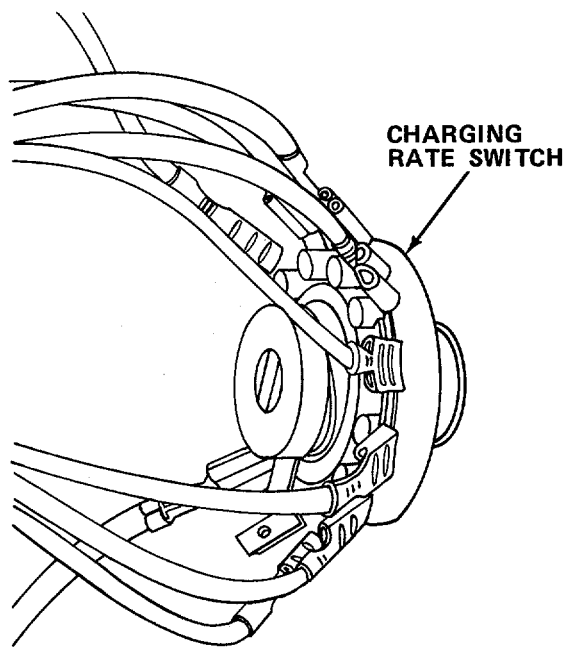
7-20.2 Replace CHARGING RATE Switch.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: 1/4 in. Nutdriver

9/16 in. Combination Wrench

SUPPLIES: CHARGING RATE Switch

**WARNING**

Electric shock hazard. Power cord must be disconnected prior to removing case wrapper. Death or serious injury may result.

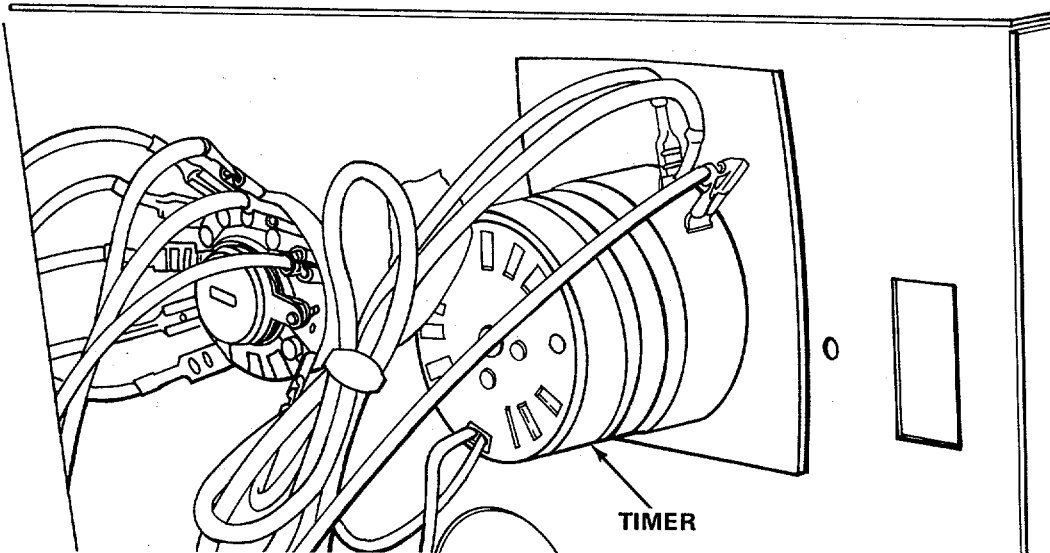
- a. Turn CHARGING RATE switch to OFF.
- b. Unplug power cord.
- c. Remove screws, handle, and case wrapper.
- d. Pull off control knob, remove nut, and pull out CHARGING RATE switch.
- e. Tag and disconnect wires and remove CHARGING RATE switch.
- f. Connect wires to replacement CHARGING RATE switch.
- g. Install CHARGING RATE switch, secure with nut, and reinstall control knob.
- h. Reinstall case wrapper, handle, and screws.

7-20.3 Replace TIMER.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: 1/4 in. Nutdriver
3/16 in. Nutdriver

SUPPLIES: TIMER



WARNING

Electric shock hazard. Power cord must be disconnected prior to removing case wrapper. Death or serious injury may result.

- a. Turn CHARGING RATE switch to OFF.
- b. Unplug power cord.
- c. Remove screws, handle, and case wrapper.
- d. Pull off control knob. Remove two screws and pull out TIMER.
- e. Tag and disconnect wires and remove TIMER.
- f. Connect wires to new TIMER.

NOTE

Be sure to keep screws centered in panel when tightening.

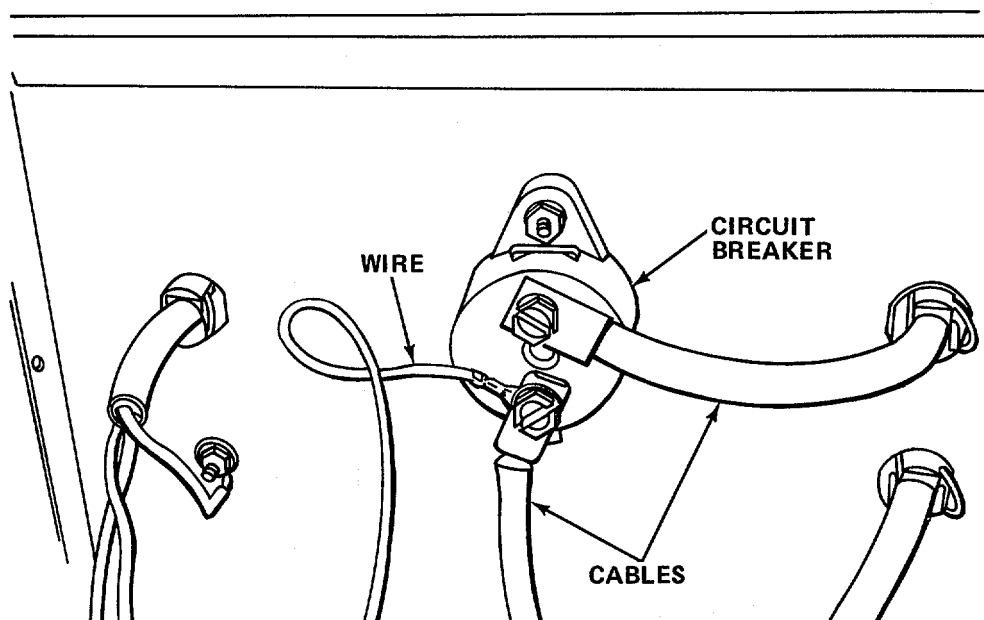
- g. Reinstall TIMER, screws, and control knob.
- h. Reinstall case wrapper, handle, and screws.

7-20.4 Replace Circuit Breaker.

MOS: 35E, Special Electronic Devices Repairer

TOOLS: 1/4 in. Nutdriver
 3/8 in. Nutdriver
 7/16 in. Nutdriver
 Cross Tip Screwdriver

SUPPLIES: Circuit Breaker

**WARNING**

Electric shock hazard. Power cord must be disconnected prior to removing ease wrapper. Death or serious injury may result.

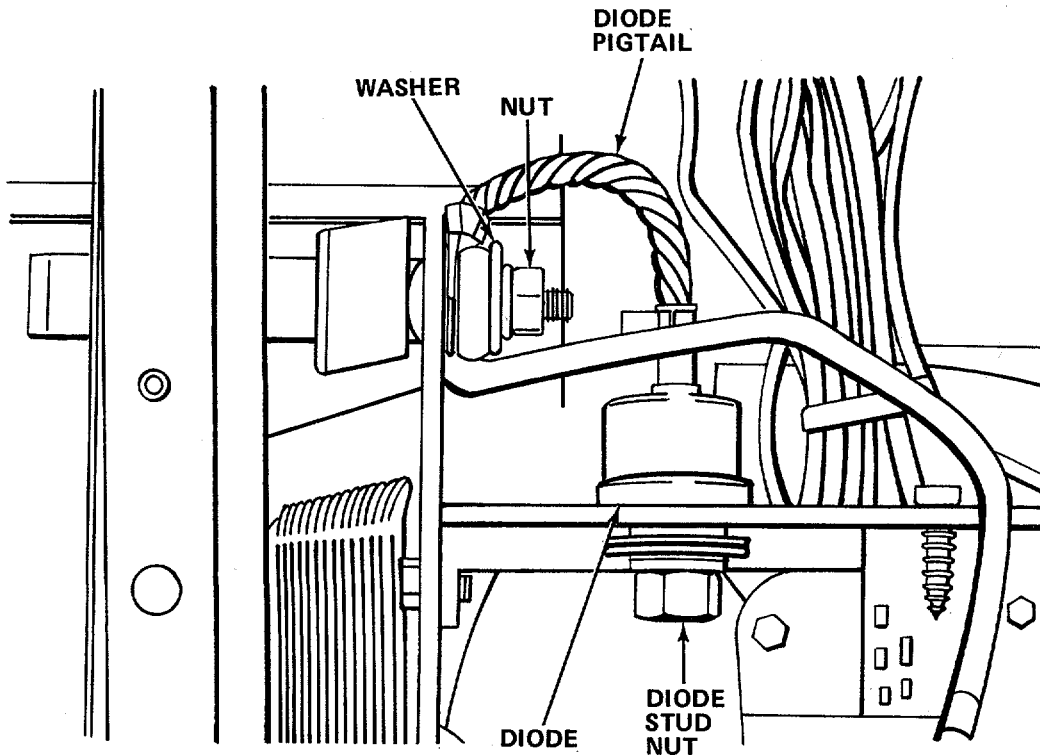
- a. Turn CHARGING RATE switch to OFF.
- b. Unplug power cord.
- c. Remove screws, handle, and case wrapper.
- d. Tag and disconnect two cables and one wire.
- e. Remove screws, nuts, washers, and circuit breaker.
- f. Install new circuit breaker and secure with screws, nuts, and washers.
- g. Reconnect cables and wire.
- h. Reinstall case wrapper, handle, and screws.

7-20.5 Replace Diode.

MOS: 35E, Special Electronic Devices Repairer

TOOLS:
 1/4 in. Nutdriver
 9/16 in. Socket, 3/8 in. Drive
 1/2 in. Combination Wrench
 12 in. Adjustable Wrench
 0 to 250 lb in. (0-28 N.m) Torque Wrench
 3/8 in. Drive Ratchet

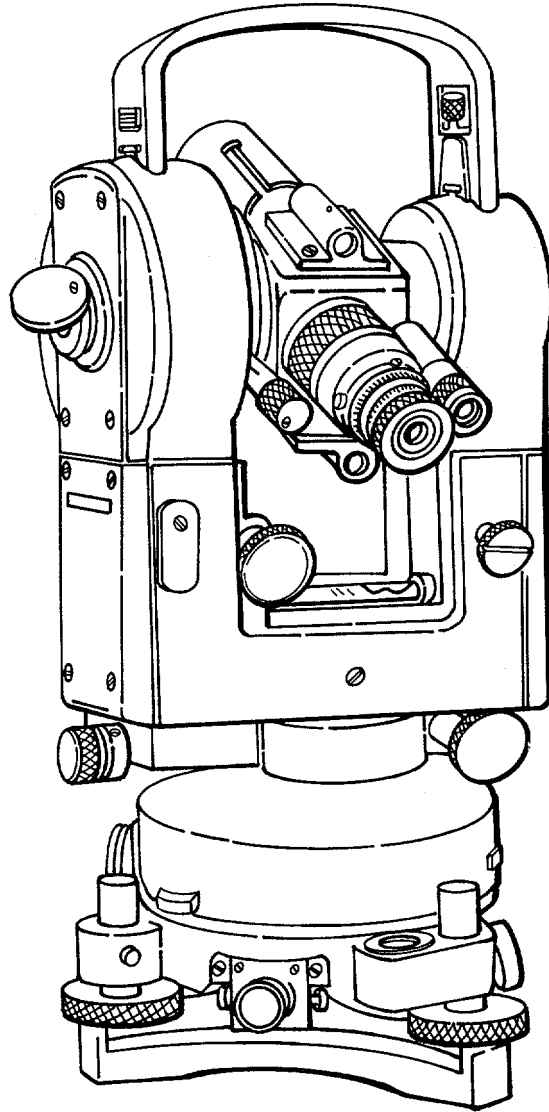
SUPPLIES:
 Diode
 Dielectric Heat Sink Compound, GE 623 (Item 9, Appendix E)



WARNING

Electric shock hazard. Power cord must be disconnected prior to removing case wrapper. Death or serious injury may result.

- a. Turn CHARGING RATE switch to OFF.
- b. Unplug power cord.
- c. Remove screws, handle, and case wrapper.
- d. Remove nut and washer and disconnect diode pigtail.
- e. Remove nut from diode stud and remove diode.
- f. Coat new diode and heat sink mounting areas with heat sink compound.
- g. Install new diode, reinstall nut, and torque to 90 to 110 lb in. (10 to 12.4 N.m)
- h. Connect diode pigtail.
- i. Reinstall case wrapper, handle, and screws.



CHAPTER 8

THEODOLITE

SECTION I INTRODUCTION

8-1. GENERAL INFORMATION.

8-1.1. Scope.

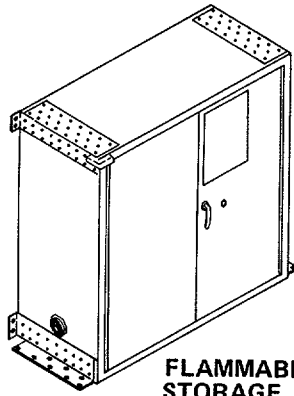
- a. Model Number and Equipment Name. Model T2-74DEG Theodolite, Directional; 1- Second Graduation, 5.9 in. Long Telescope: Detachable tribrach with accessories and tripod.
- b. Purpose of Equipment. Shop standard theodolite used to calibrate the short-range optical calibrator.

8-1.2. Reference Information.

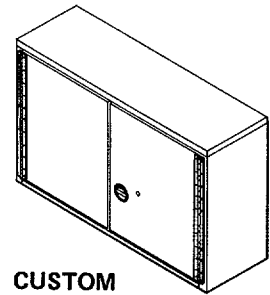
Operator, Organizational, Direct Support, and General Support Maintenance Manual for Theodolite, Wild-Heerbrugg Model T-2	TM 5-6675-306-14
Organizational, Direct Support and General Support Maintenance Repair Parts, and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Theodolite, Wild-Heerbrugg Model T-2.....	TM 5-6675-306-24P



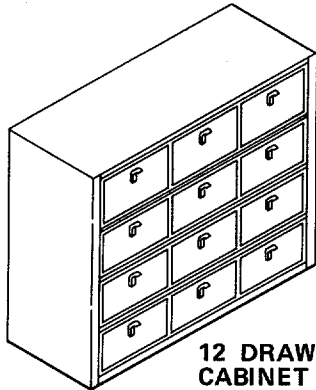
**BENCH TOP
STORAGE
CABINET**



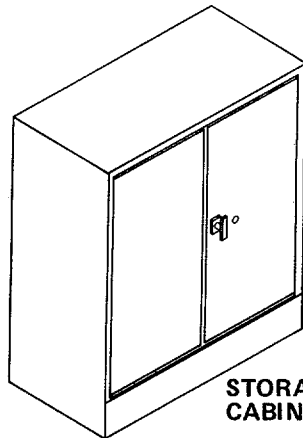
**FLAMMABLE LIQUID
STORAGE CABINET**



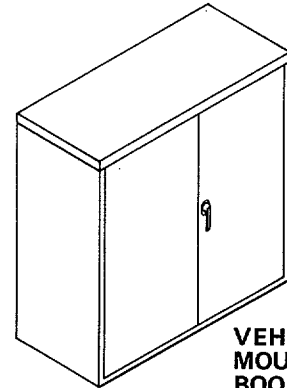
**CUSTOM
BOOKCASE**



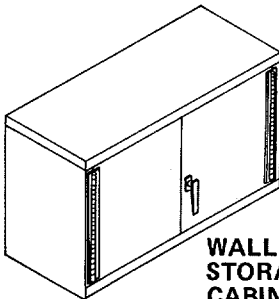
**12 DRAWER
CABINET**



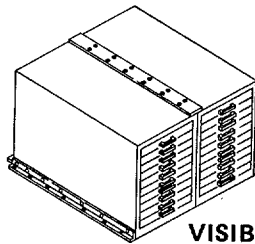
**STORAGE
CABINET**



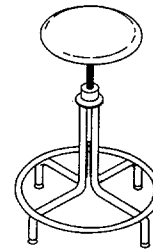
**VEHICULAR
MOUNTED
BOOKCASE**



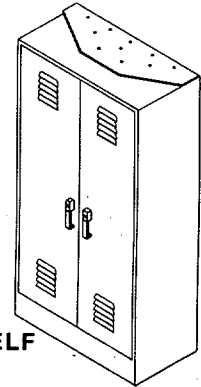
**WALL
STORAGE
CABINET**



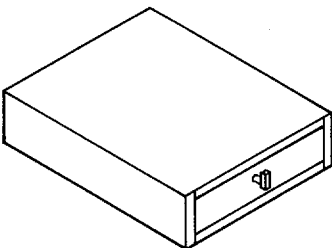
**VISIBLE
INDEX FILE**



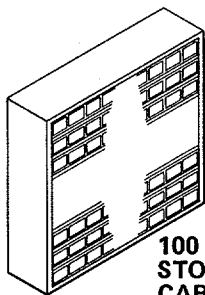
**REVOLVING
STOOL**



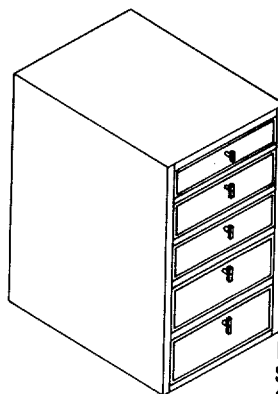
**FOUR-SHELF
STORAGE
CABINET**



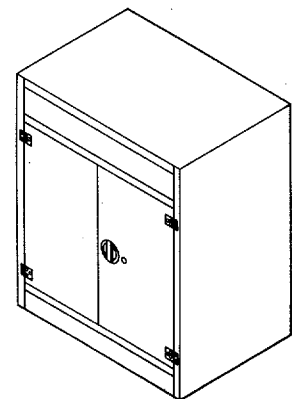
**WORKBENCH
DRAWER**



**100 DRAWER
STORAGE
CABINET**



**FIVE-DRAWER
STORAGE
CABINET**



**TWO-DOOR
STORAGE
CABINET**

CHAPTER 9**FURNITURE AND CABINETS****SECTION I INTRODUCTION****9-1. GENERAL INFORMATION.**

9-1.1. Scope. This chapter contains the description of all furniture and cabinets contained in this section.

9-2. EQUIPMENT DESCRIPTION.

- a. Vehicular-Mounted Bookcase. Contains three shelves for the storage of books and manuals. Two doors enclose the front of the bookcase. The doors are secured by a recessed latch built into the right-hand door. Dimensions:

Width 36 in. (92 cm)

Depth 13 in. (33 cm)

Height 36 in. (92 cm)

- b. Custom Bookcase. Contains one shelf for the storage of books and manuals. An integral, recessed latch and lock secure the double doors. Dimensions:

Width 42 in. (107 cm)

Depth 13 in. (33 cm)

Height 27 in. (69 cm)

- c. Two-Door Storage Cabinet. Provides storage for miscellaneous items. This double-door, two-shelf cabinet is secured by a door latch and lock. There is an individually latching drawer atop the cabinet. The sliding shelves are equipped with tiedown straps secured with locking pins. Dimensions:

Width 30 in. (76 cm)

Depth 29 in. (74 cm)

Height 36 in. (92 cm)

- d. Five-Drawer storage Cabinet. The cabinet has five individual latching drawers for storage of miscellaneous items. Dimensions:

Width 21 in. (53 cm)

Depth 29 in. (74 cm)

Height 36 in. (92 cm)

- e. Workbench Drawer. Provides storage for miscellaneous items and has a built-in latch. Dimensions:

Width 22 in. (56 cm)

Depth 27 in. (69 cm)

Height 6.5 in. (17 cm)

- f. Bench Top Storage Cabinet. Provides for mounting of drill press and grinder, and storage for miscellaneous items. The cabinet has double doors with a recessed latch and key lock. The two sliding shelves are equipped with tiedown straps secured with locking pins. Dimensions:

Width 46 in. (117 cm)

Depth 26.5 in. (67 cm)

Height 34 in. (87 cm)

- g. Wall Storage Cabinet. Provides storage for miscellaneous items. The cabinet has double doors with a built-in latch and full-length piano hinges. Dimensions:

Width 30 in. (76 cm)

Depth 12 in. (30 cm)

Height 18 in. (46 cm)

- h. Four-Shelf Storage Cabinet. Provides storage for miscellaneous items. The cabinet has two louvered doors with a built-in latch and four internal shelves. Dimensions:

Width 36 in. (92 cm)

Depth 18 in. (46 cm)

Height 72 in. (183 cm)

- i. Storage Cabinet. Contains three shelves for storage for miscellaneous items. The cabinet has double doors with an integral latch and lock. Dimensions:

Width 36 in. (92 cm)

Depth 18 in. (46 cm)

Height 42 in. (107 cm)

- j. Twelve-Drawer Cabinet. Provides storage for miscellaneous small items. The cabinet has 12 individual sliding drawers. Dimensions:

Width 30 in. (76 cm)

Depth 11.5 in. (29 cm)

Height 25 in. (64 cm)

- k. Flammable Liquid Storage Cabinet. Provides storage for flammable liquids. The cabinet has double doors with a built-in latch and lock, a screened flame arrester vent, double-wall construction, and one adjustable shelf. Dimensions:

Width 43 in. (109 cm)

Depth 18 in. (46 cm)

Height 43.6 in. (111 cm)

1. One Hundred Drawer Cabinet. Provides storage for miscellaneous small items. The cabinet has 100 individual sliding drawers with retaining straps. Dimensions:

Width 36 in. (92 cm)

Depth 9 in. (23 cm)

Height 34.5 in. (88 cm)

- m. Visible Index File. Provides quick reference storage for 8 X 5 in. (20 X13 cm) index cards. Each of the 20 sliding drawers contain 63 card pockets. Dimensions:

Width 10.6 in. (27 cm)

Depth 24 in. (61 cm)

Height 25 in. (64 cm)

- n. Revolving Stool. Provides seating at workbench. Height is adjustable. Dimensions:

Height 28 in. (71 cm), Max

22 in. (58 cm), Min

9-3. TECHNICAL PRINCIPLES OF OPERATION. There are no specific principles of operation for this equipment.

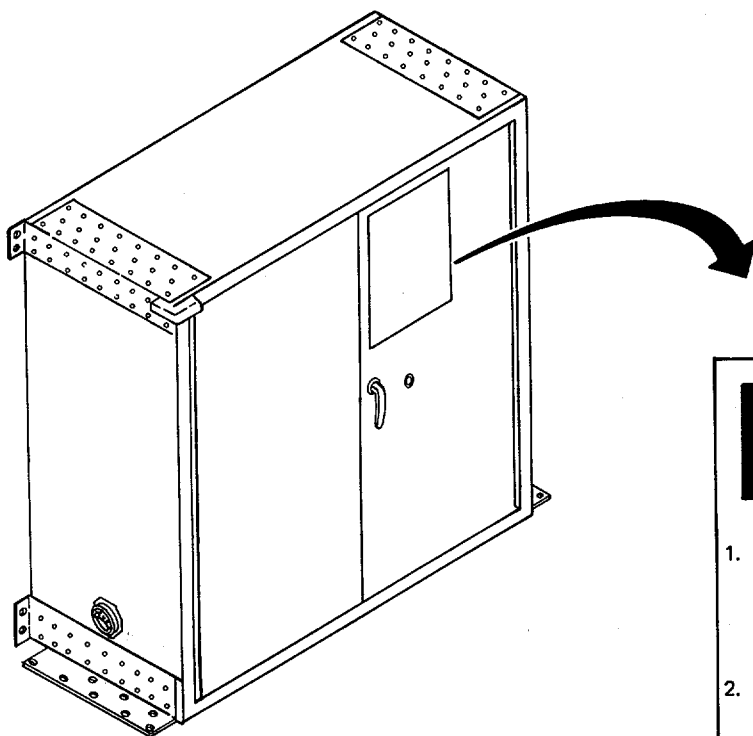
SECTION II. OPERATING INSTRUCTIONS

9-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS. This equipment has no operator's controls or indicators.

9-5. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no operator PMCS procedures assigned for this equipment.

9-6. OPERATION UNDER USUAL CONDITIONS. No specific operating procedures are required.

9-6.1. Operating Instructions on Decals and Instruction Plates.



⚠ WARNING

1. TO INSURE PROPER OPERATION OF DOORS, ACCURATELY LEVEL THE CABINET BY ADJUSTING THE FOUR LEVELING FEET WITH WEIGHT IN THE CABINET.
2. ATTACH ACCEPTABLE "GROUND" WIRE TO "GROUNDING-SCREW" AT BOTTOM REAR OF CABINET.
3. VENT PLUGS ARE PROVIDED FOR ISOLATION OF CABINET CONTENTS BUT MAY BE REMOVED IF LOCAL FIRE ORDINANCES REQUIRE CONNECTION TO VENTILATING SYSTEM.

THE MANUFACTURER SPECIFICALLY DISCLAIMS ANY RESPONSIBILITY FOR IMPROPER FUNCTION OF THIS PRODUCT IF THE ABOVE CONDITIONS ARE NOT MET.

9-7. OPERATION UNDER UNUSUAL CONDITIONS. This equipment is designed for operation only in a control led environment.

SECTION III. OPERATOR MAINTENANCE

9-8. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication.

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

9-10. MAINTENANCE PROCEDURES.

- a. This section contains instructions covering operator maintenance functions for the cabinets and furniture. 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.

9-10.1 Inspect Cabinets and Furniture. Inspect cabinets and furniture for structural damage, rust, and proper operation of all latches, hinges, drawer slides, and adjustment mechanisms.

SECTION IV. ORGANIZATIONAL MAINTENANCE

9-11. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication.

9-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT.

9-12.1 Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and and Equipment (MTOE) applicable to your unit.

9-12.2 Special Tools; Test, Measurement, and Diagnostic Equipment; and Support Equipment. Special tools, IMDE, and Support Equipment is listed in the applicable repair parts and special tools list and in Appendix B of this manual.

9-12.3 Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special 1ools List, TM 5-6675-328-24P covering organizational maintenance for this equipment.

9-13. SERVICE UPON RECEIPT.

9-13.1 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.

9-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no organizational PMCS procedures assigned for this equipment.

9-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES. There are no organizational troubleshooting procedures assigned for this equipment.

9-16. MAINTENANCE PROCEDURES.

- a. This section contains instructions covering organizational maintenance functions for the cabinets and furniture. 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

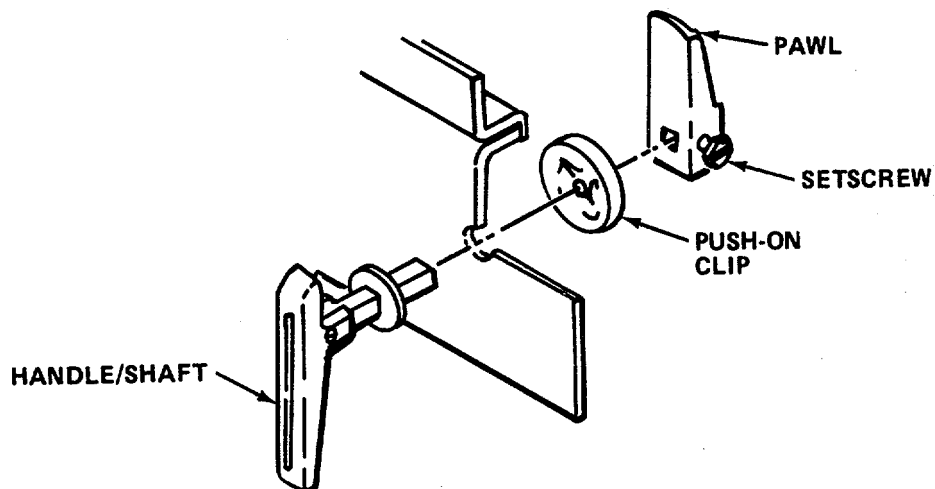
PROCEDURE	PARAGRAPH
Replace Drawer Latch.....	9-16.1
Replace Door Latch (Flush-Type)	9-16.2
Replace Door Latch (Wall Storage Cabinet).....	9-16.3
Replace Latch (Four-Shelf Storage Cabinet)	9-16.4
Replace Hinge	9-16.5
Replace Hinge (Piano Hinge)	9-16.6
Remove/Install Work Station Storage Cabinet Assemblies	9-16.7
Remove/Install Wall Storage Cabinet	9-16.8
Remove/Install Vehicular Mounted Bookcase	9-16.9
Remove/Install 100-Drawer Storage Cabinet	9-16.10
Remove/Install Custom Bookcase	9-16.11
Remove/Install Four-Shelf Storage Cabinet	9-16.12
Remove/Install Bench Top Storage Cabinet	9-16.13
Remove/Install Storage Cabinet	9-16.14
Remove/Install 12-Drawer Storage Cabinet	9-16.15
Remove/Install Flammable Liquid Storage Cabinet	9-16.16
Remove/Install Visible Index File	9-16.17

9-16.1. Replace Drawer Latch.

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

TOOLS: 1/4 in. Drive Socket Set

SUPPLIES: Latch



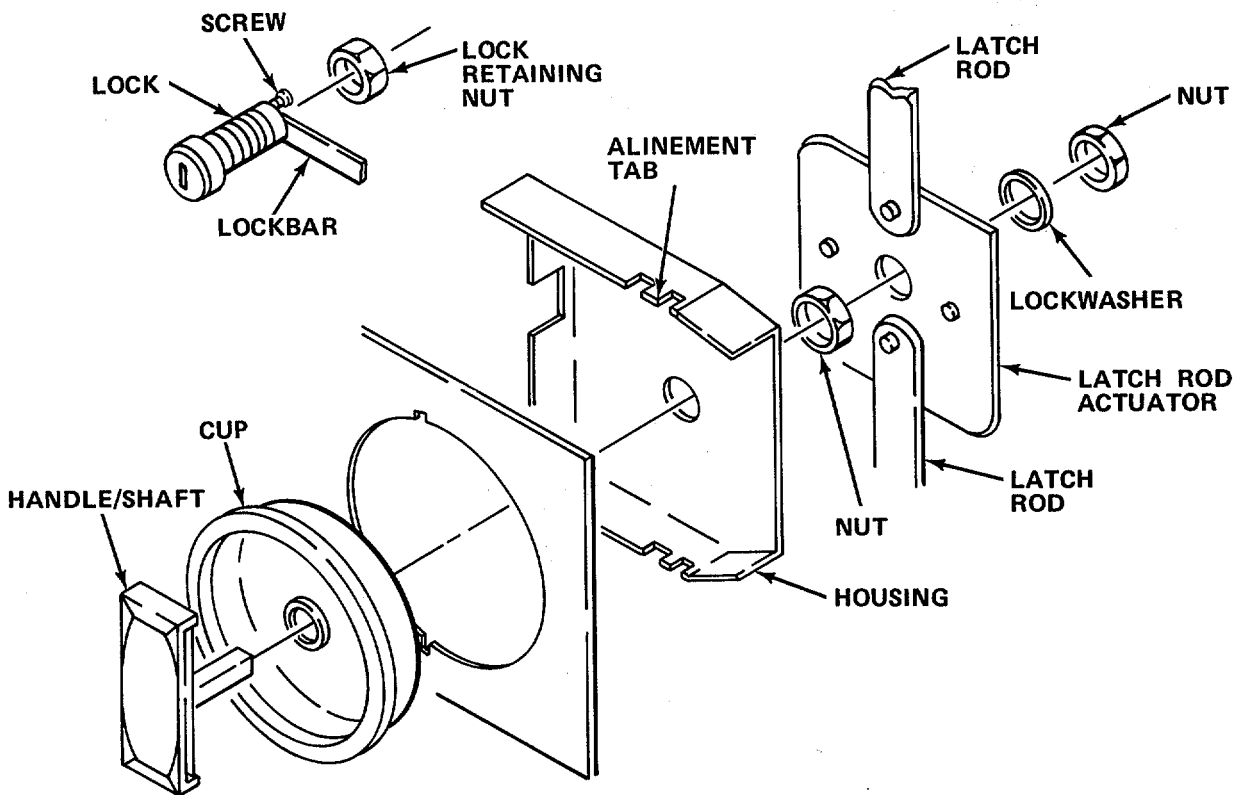
- a. Loosen setscrew securing pawl to shaft-and remove pawl.
- b. Remove push-on clip and handle/shaft.
- c. Install new handle/shaft and secure with new push-on clip.
- d. Position pawl on shaft at a point where latch operates freely and drawer will be held securely shut. Tighten setscrew which secures pawl to shaft.

9-16.2. Replace Door Latch (Flush-Type).

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

TOOLS: 7/8 in. Combination Wrench
 9/16 in. Combination Wrench
 1/4 in. Drive Socket Set

SUPPLIES: Flush-Type Latch



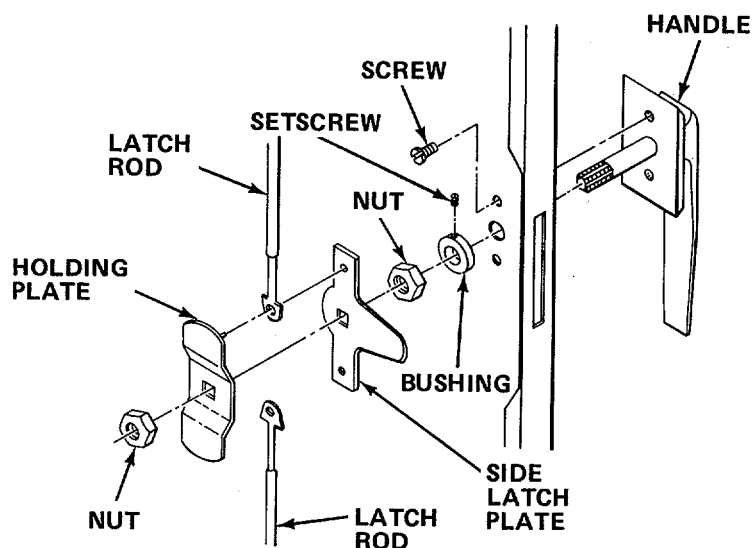
- a. Remove nut and lockwasher from shaft.
- b. Remove latch rod actuator and two latch rods.
- c. Remove screw and lockbar.
- d. Remove nut and housing.
- e. Remove handle/shaft and cup.
- f. Remove lock retaining nut and lock.
- g. Install new lock and attach to door with lock retaining nut.
- h. Install new cup and handle/shaft with handle in closed position.
- i. Check that alignment tabs on housing are inserted in notches cut in door and attach housing finger tight with nut.
- j. Install lockbar and secure with screw.
- k. Insert latch rods into guides located at top and bottom of door.
- l. Install latch rod actuator on shaft with pins facing front of door and guide latch rod ends on upper and lower actuator pins.
- m. Secure latch rod actuator against housing with lockwasher and nut.

9-16.3. 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 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.

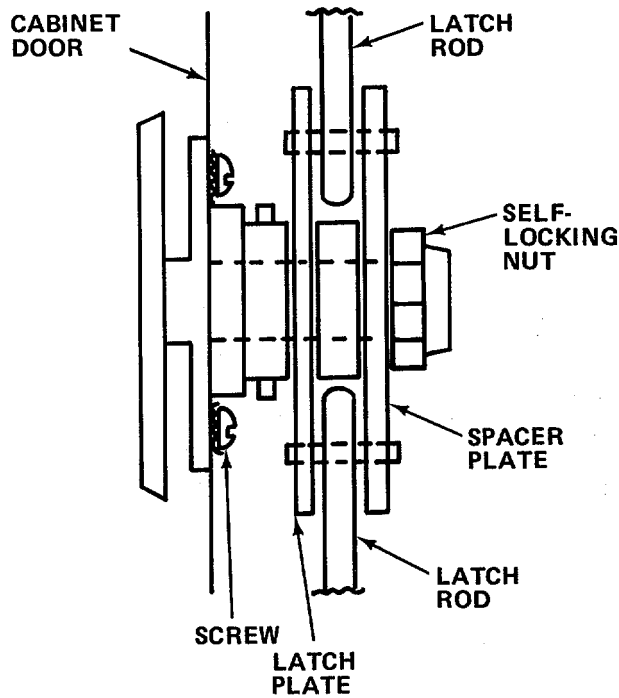
9-16.4 Replace Latch (Four-Shelf Storage Cabinet).

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

TOOLS: 9/16 in. Combination Wrench

Flat Tip Screwdriver

SUPPLIES: Latch



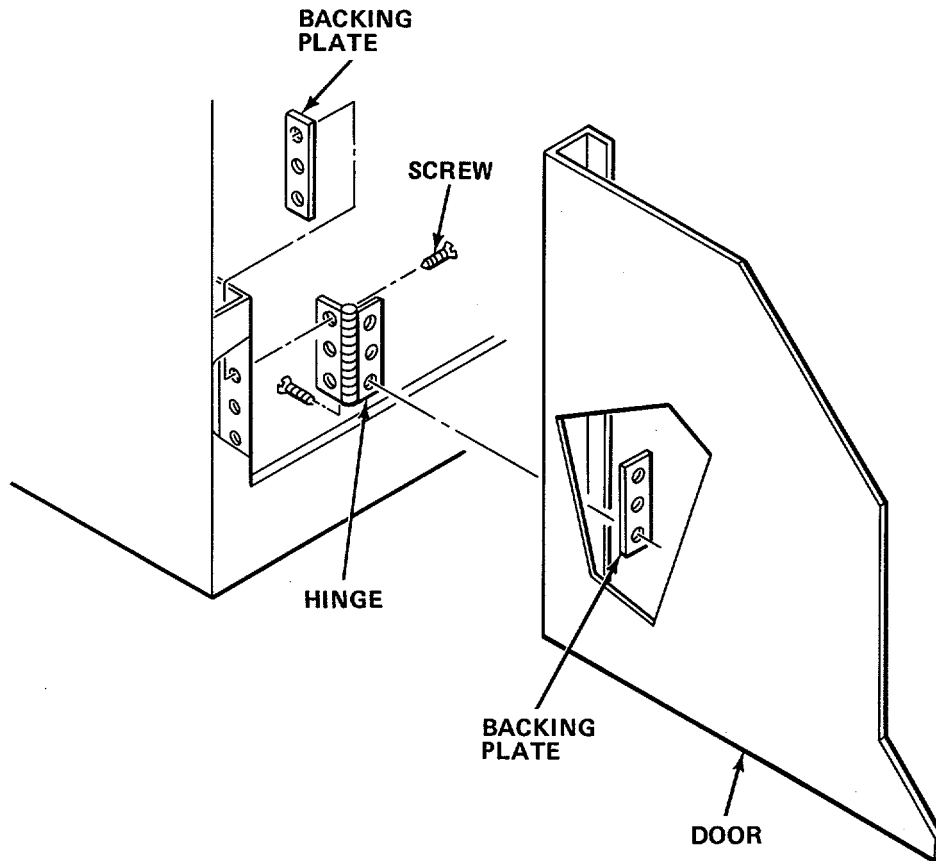
- a. Remove self-locking nut and spacer plate.
- b. Remove latch rods and latch plate.
- c. Remove screws securing handle to door and remove handle.
- d. Install new handle and secure to door with screws.
- e. Install latch plate.
- f. Install latch rods and spacer plate.
- g. Install self-locking nut and tighten securely.

9-16.5. Replace Hinge.

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

TOOLS: Cross Tip Screwdriver

SUPPLIES: Hinge



- a. Remove screws and backing plates which attach hinge to frame and door, and retain.
- b. Remove defective hinge.
- c. Set new hinge into place and attach with screws and backing plates to frame and door.

9-16.6. 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 12 pop rivets.
- d. Remove temporarily installed screws and nuts and install remaining pop rivets.

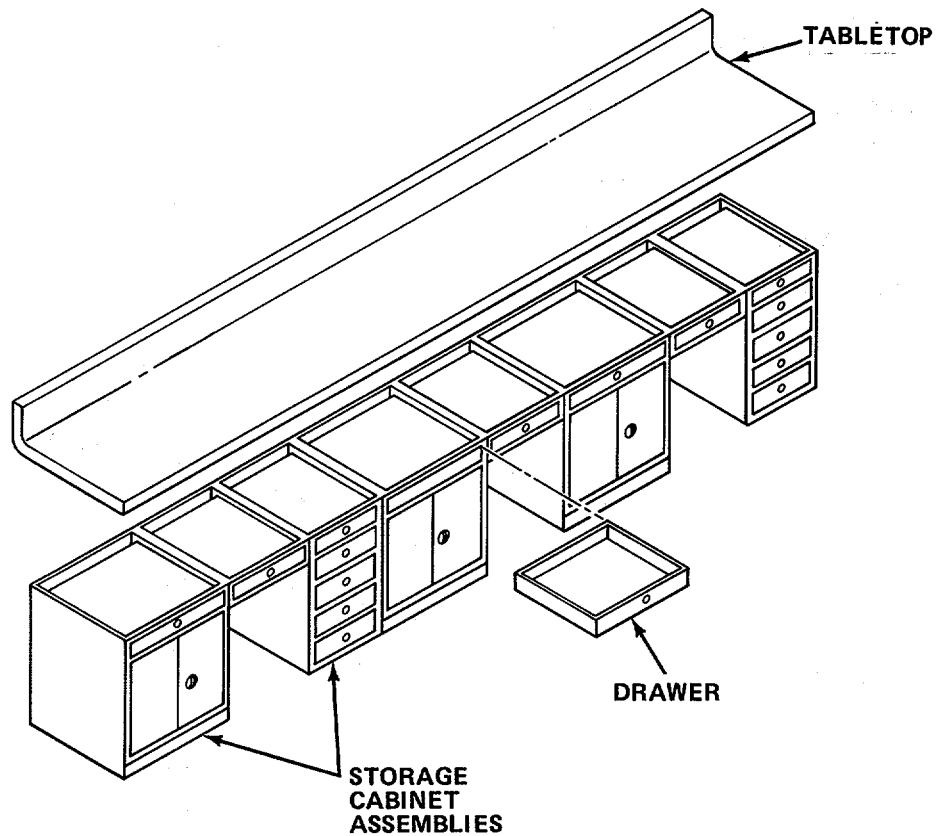
9-16.7 Remove/Install Work Station Storage Cabinet Assemblies

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

TOOLS: Cross Tip Screwdriver
7/16 in. Combination Wrench
1/4 in. Drive Socket Set

SUPPLIES: Tabletop
Frame
Storage Cabinet Assemblies
Panel

- a. Remove equipment from tabletop as necessary.
- b. Remove drawers/shelves.
- c. Remove bolts, washers, and nuts holding cabinet/drawer assemblies together.



- d. Remove bolts and washers holding cabinet to wall.
- e. Remove tabletop screws.
- f. Support tabletop and separate cabinet/drawer assemblies.
- g. Replace defective components.

NOTE

To ensure alinement, install all bolts and screws finger tight before tightening with wrench.

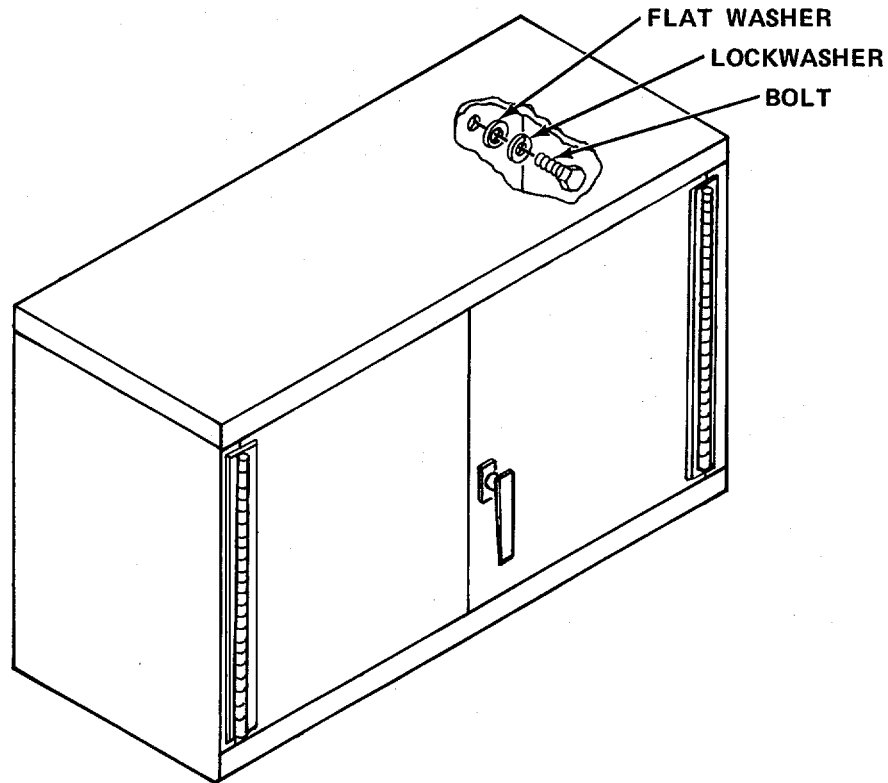
- h. Bolt cabinet/drawer assemblies together and secure with washers and nuts.
- i. Install tabletop screws.
- j. Bolt cabinet to wall with bolts and washers.
- k. Install drawers/shelves.

9-16.8. Remove/Install Wall Storage Cabinet.

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

TOOLS: 1/4 in. Drive Socket Set

SUPPLIES: Wall Storage Cabinet



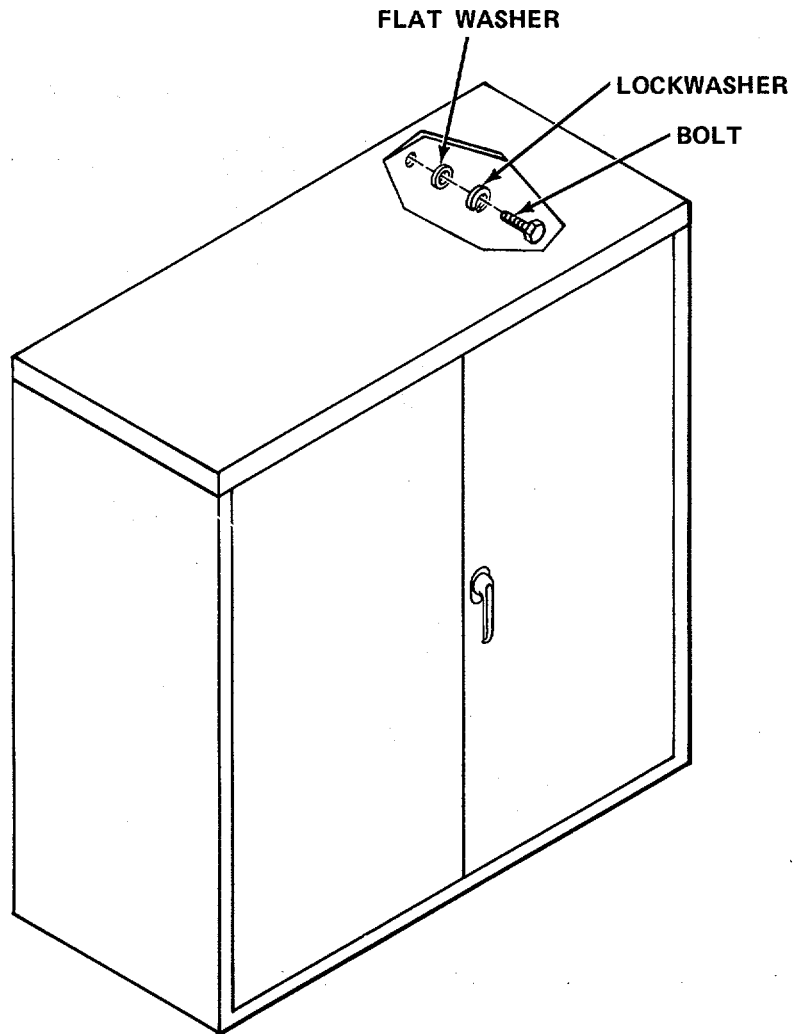
- a. Remove bolts, lockwashers, and flat washers holding cabinet to wall.
- b. Remove cabinet.
- c. Install new cabinet and secure to wall with bolts, lockwashers, and flat washers.

9-16.9. Remove/Install Vehicular Mounted Bookcase.

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

TOOLS: 1/4 in. Drive Socket Set

SUPPLIES: Vehicular Mounted Bookcase



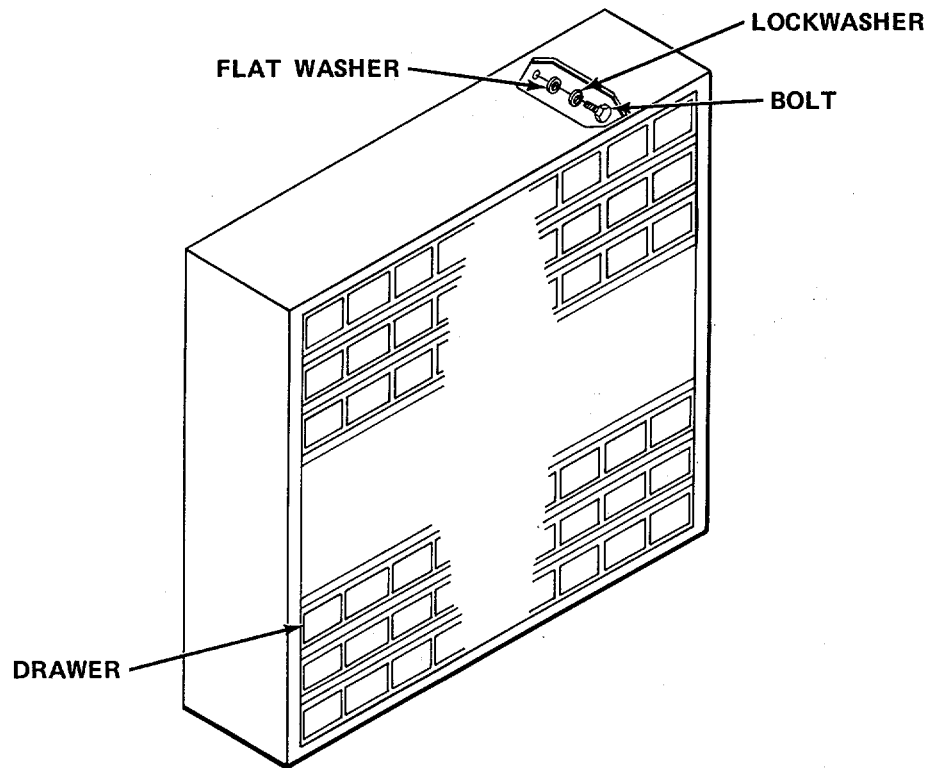
- a. Remove bolts, lockwashers, and flat washers holding bookcase to wall and remove bookcase.
- b. Place new bookcase in position and secure to wall with bolts, lock-washers, and flat washers.

9-16.10. Remove/Install 100 Drawer Storage Cabinet.

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

TOOLS: 1/2 in. Socket, 1/2 in. Drive 1/2 in. Drive Ratchet

SUPPLIES: 100 Drawer Storage Cabinet



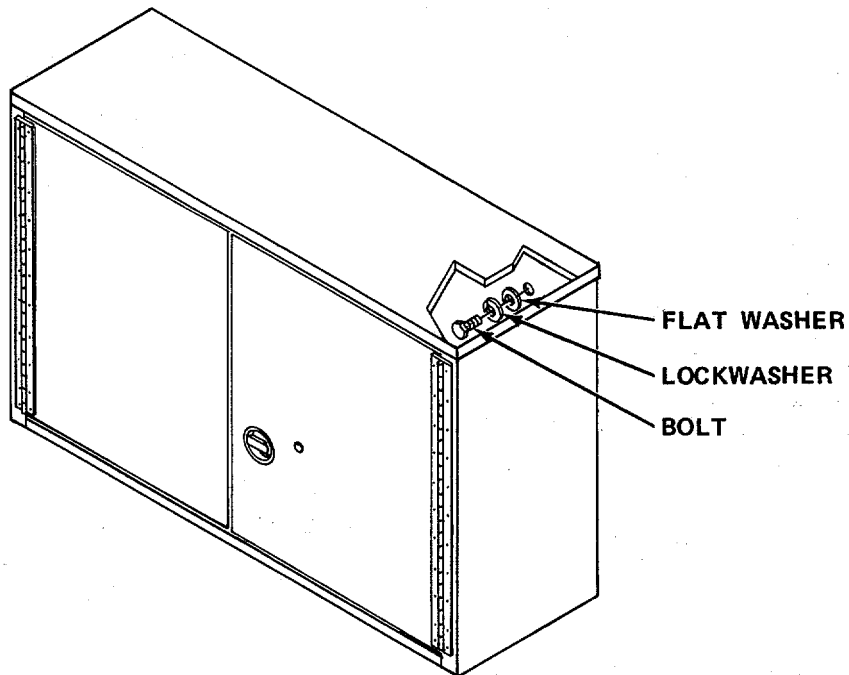
- a. Remove drawers to gain access to mounting bolts.
- b. Remove bolts, lockwashers, and flat washers holding cabinet to wall.
- c. Remove cabinet and reinstall drawers.
- d. Remove drawers; place new cabinet in position and secure to wall with bolts, lockwashers, and flat washers.
- e. Install drawers.

9-16.11. Remove/Install Custom Bookcase.

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

TOOLS: 1/2 in. Socket, 1/2 in. Drive
1/2 in. Drive Ratchet

SUPPLIES: Custom Bookcase



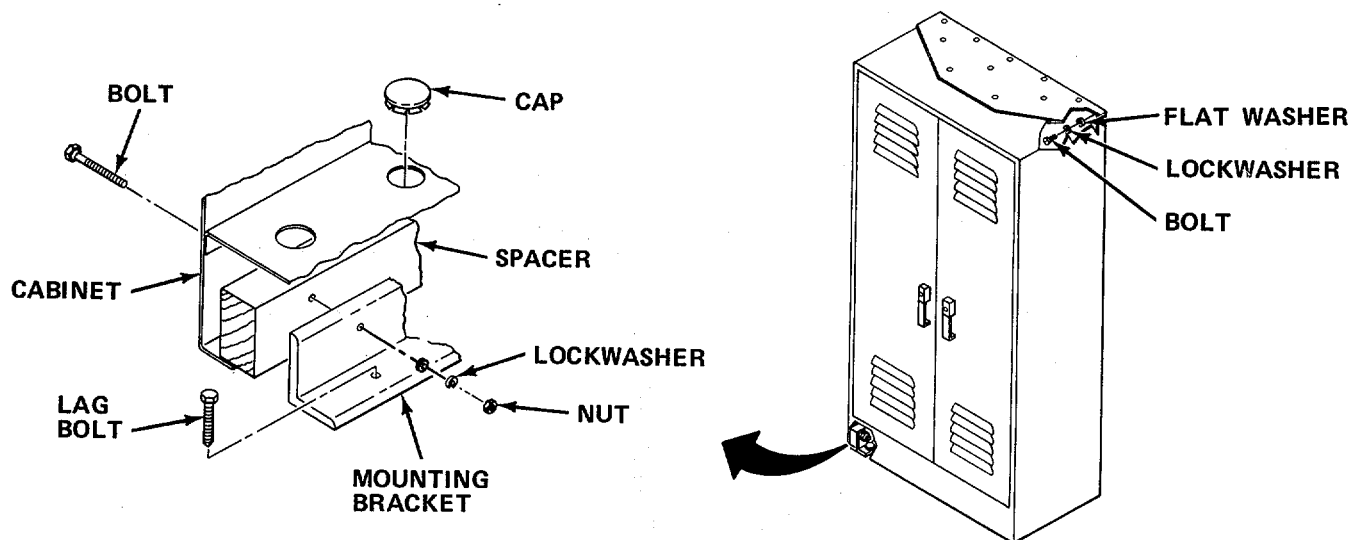
- a. Remove bolts, lockwashers, and flat washers holding bookcase to wall and remove bookcase.
- b. Place new bookcase in position and secure to wall with bolts, lockwashers, and flat washers.

9-16.12. Remove/Install Four-Shelf Storage Cabinet.

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

TOOLS: 1/4 in. Drive Socket Set
 1/4 in. Drive Socket Extension, 6 in. Long
 11/32 in. Combination Wrench
 Flat Tip Screwdriver
 Cross Tip Screwdriver
 Mechanical Fingers

SUPPLIES: Four-Shelf Storage Cabinet



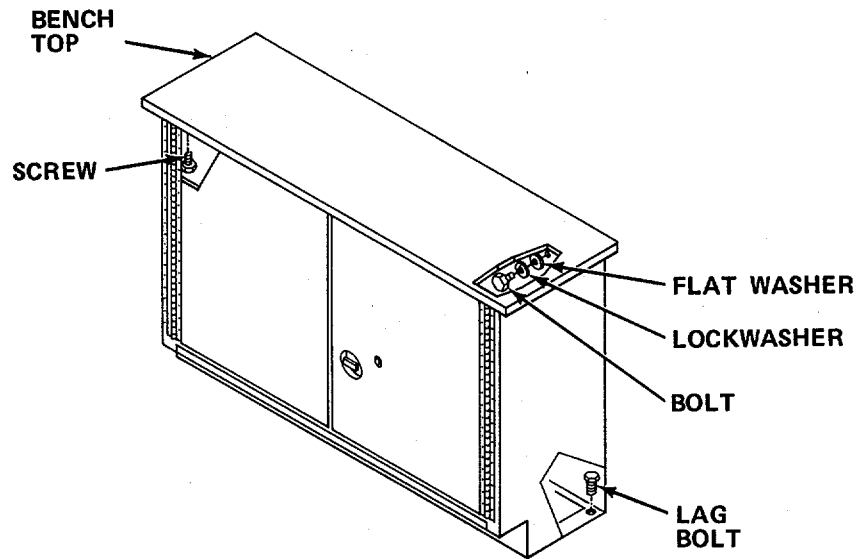
- a. Remove bolts, lockwashers, and flat washers holding cabinet to wall.
- b. Remove caps; remove lag bolts holding mounting brackets to floor and remove cabinet.
- c. Remove bolts, nuts, and lockwashers; remove mounting brackets and spacers from cabinet. Retain mounting brackets and spacers for use on new cabinet.
- d. Position spacers and mounting brackets on new cabinet and 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 bolts, lockwashers, and flat washers.
- g. Tighten the mounting bracket and spacer retaining bolts and nuts.
- h. Tighten the lag bolts holding the mounting bracket to the floor and install the caps.

9-16.13. Remove/Install Bench Top Storage Cabinet.

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

TOOLS: 1/2 in. Socket, 1/2 in. Drive
1/2 in. Drive Ratchet
Cross Tip Screwdriver

SUPPLIES: Storage Cabinet



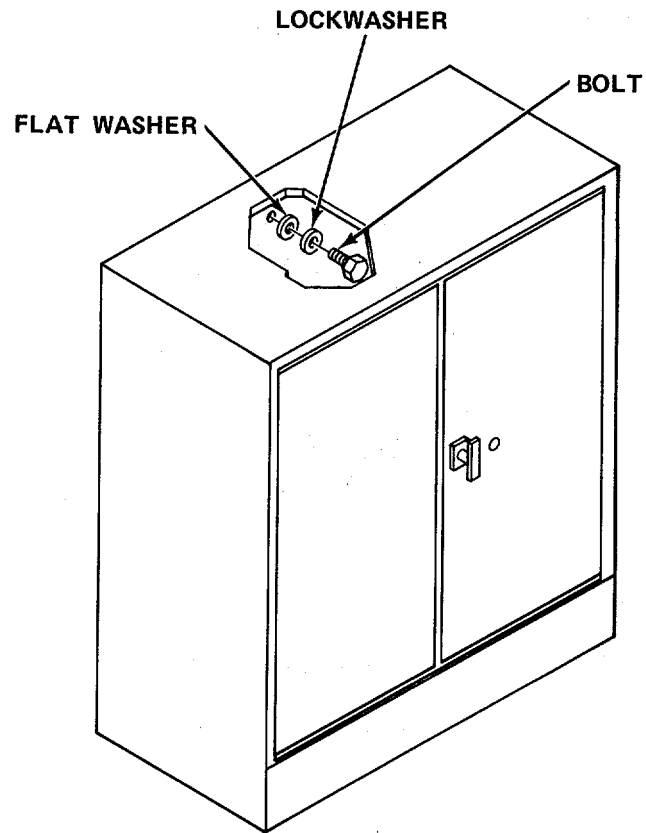
- a. Remove drill press (paragraph 3-16.5).
- b. Remove grinder/dust control assembly (paragraph 4-16.1 and 4-16.2).
- c. Remove screws securing bench top and remove bench top. Retain bench top for use on new cabinet.
- d. Remove bolts, flat washers, and lockwashers holding cabinet to wall.
- e. Remove lag bolts holding cabinet to floor and remove cabinet.
- f. Place new cabinet in position and install but do not tighten lag bolts.
- g. Install bench top and secure with screws.
- h. Secure cabinet to wall with bolts, flat washers, and lockwashers.
- i. Tighten lag bolts securing cabinet to floor.
- j. Install grinder/dust control assembly (paragraph 4-16.1 and 4-16.2).
- k. Install drill press (paragraph 3-16.5).

9-16.14 Remove/Install Storage Cabinet.

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

TOOLS: 1/4 in. Socket, 1/4 in. Drive
1/4 in. Drive Ratchet

SUPPLIES: Storage Cabinet



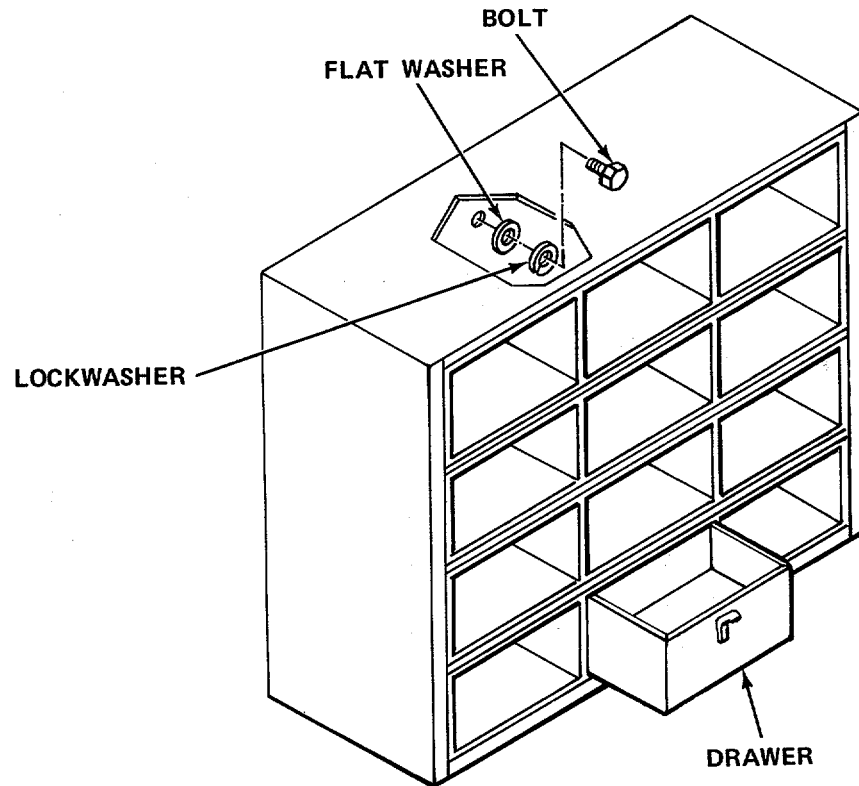
- a. Remove bolts, flat washers, and lockwashers holding cabinet to wall.
- b. Remove cabinet.
- c. Place new cabinet in position and secure to wall with bolts, flat washers, and lockwashers.

9-16.15 Remove/Install 12-Drawer Storage Cabinet.

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

TOOLS: 1/2 in. Socket, 1/2 in. Drive
 1/2 in. Drive Ratchet

SUPPLIES: 12-Drawer Storage Cabinet



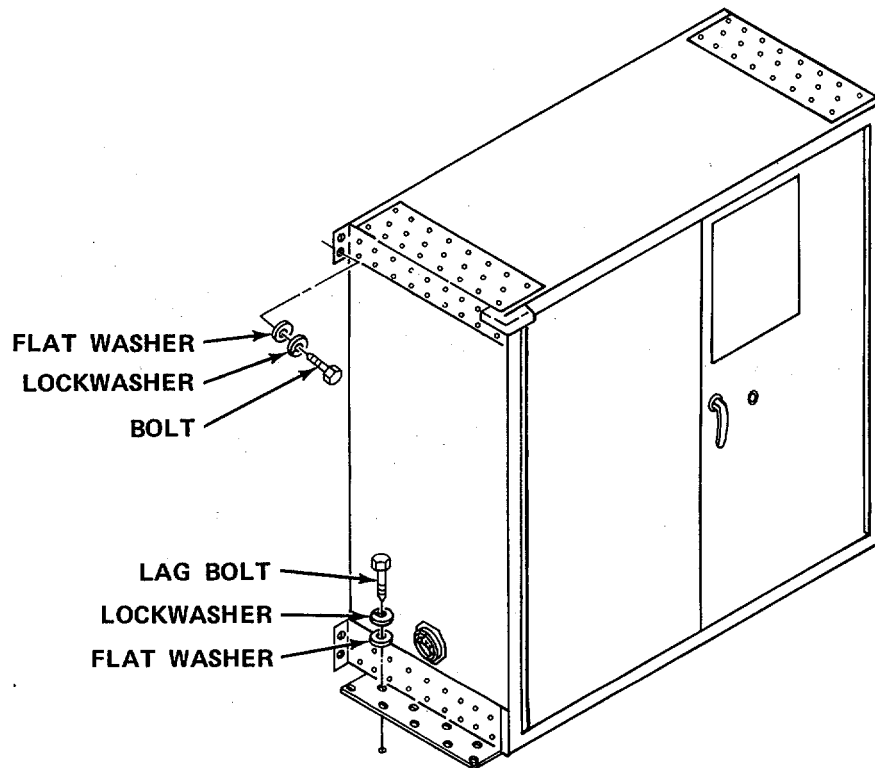
- a. Remove drawers to gain access to mounting bolts.
- b. Remove bolts, flat washers, and lockwashers holding cabinet to wall. Remove cabinet and reinstall drawers.
- c. Remove drawers; place new cabinet in position and secure to wall with bolts, flat washers, and lockwashers.
- d. Install drawers.

9-16.16 Remove/Install Flammable Liquid Storage Cabinet.

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

TOOLS: 1/2 in. Socket, 1/2 in. Drive
 1/2 in. Drive Ratchet

SUPPLIES: Flammable Liquid Storage Cabinet



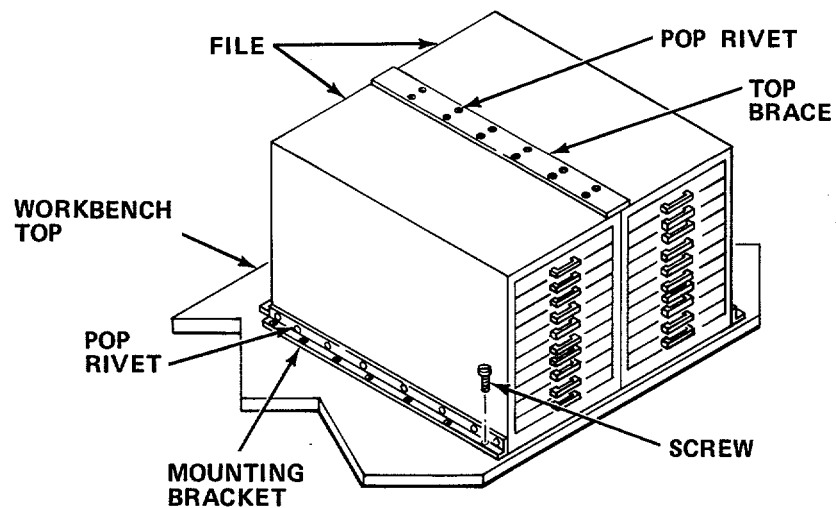
- a. Remove bolts, lockwashers, and flat washers holding cabinet to wall.
- b. Remove lag bolts, lockwashers, and flat washers which secure cabinet to floor.
- c. Remove cabinet.
- d. Place new cabinet in position and install lag bolts, lockwashers, and flat washers. Do not tighten lag bolts.
- e. Secure cabinet to wall with bolts, lockwashers, and flat washers.
- f. Tighten lag bolts securing cabinet to floor.

9-16.17 Remove/Install Visible Index File.

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

TOOLS: Cross Tip Screwdriver
Electric Drill
3/16 in. Drill Bit
Pop Rivet Gun

SUPPLIES: Visible Index File(s)
3/16 in. Pop Rivets

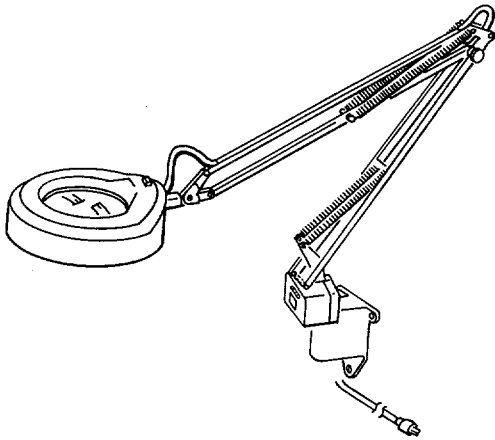


- a. Remove screws from mounting brackets.
- b. Drill out pop rivets from bottom of file(s).
- c. Drill out pop rivets from top brace.
- d. Remove file(s).
- e. Pop rivet top brace and mounting brackets to new file(s).
- f. Reinstall screws securing mounting bracket to workbench top.

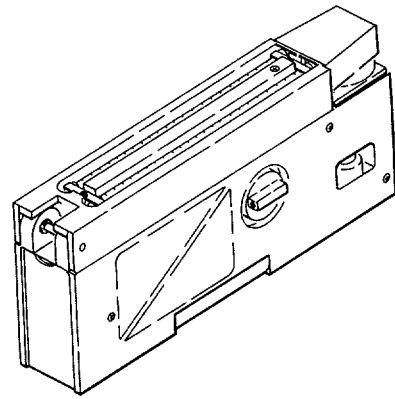
9-17. PREPARATION FOR STORAGE OR SHIPMENT. Contact your battalion for packing and shipping instructions.

SECTION V DIRECT/GENERAL SUPPORT MAINTENANCE

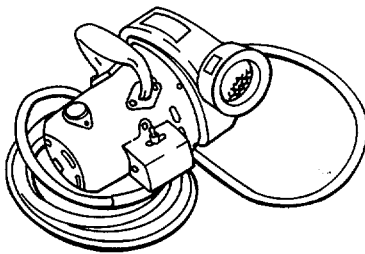
There are no direct/general support maintenance procedures assigned for this equipment.



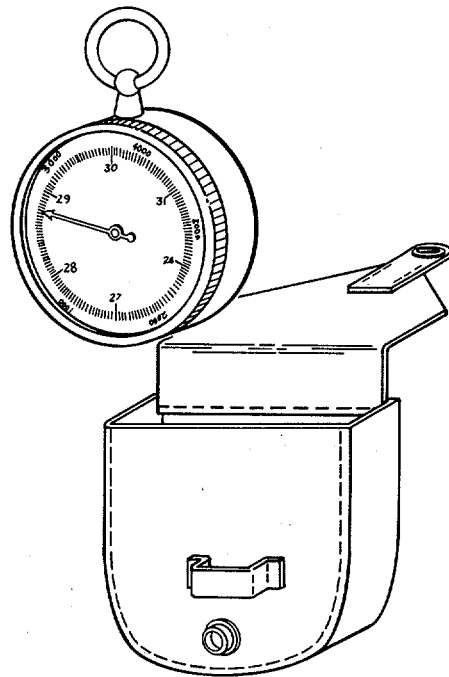
MAGNIFIER LAMP



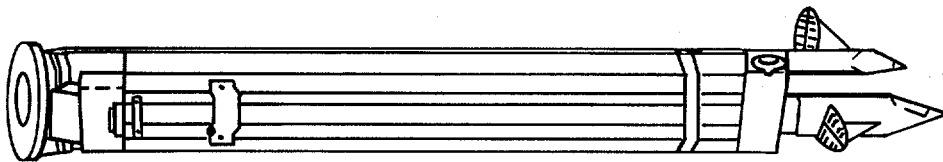
HAND PSYCHROMETER



VACUUM CLEANER



ALTIMETER/BAROMETER



TRIPOD

CHAPTER 10
SUPPORT ITEMS
SECTION I INTRODUCTION

10-1. GENERAL INFORMATION.

10-1.1 Scope. This chapter covers the support items contained in this section. The support items consist of the following equipment:

- a. Magnifier Lamps.
 - (1) Model IM-8-5-B.
 - (2) Model LFM1BX5.
- b. Model 566-3 Hand Psychrometer.
- c. Model 2075F Altimeter/Barometer.
- d. Model 3400 Vacuum Cleaner.
- e. MIL-T-14091 Tripod.

10-2. EQUIPMENT DESCRIPTION.

10-2.1 Equipment Characteristics, Capabilities, and Features.

- a. Magnifier Lamps Adjustable for accurate positioning to provide illuminated magnification of precision work. Provision for both wall and bench mounting.
- b. Hand Psychrometer Uses battery powered fan to provide air flow across wet and dry bulb thermometers to determine relative humidity.
- c. Altimeter/Barometer Aneroid type used to determine both altitude and barometric pressure.
- d. Vacuum Cleaner Heavy duty motor used for general cleaning.
- e. Tripod Heavy duty, used for mounting various survey or test instruments.

10-2.2 Equipment Data.

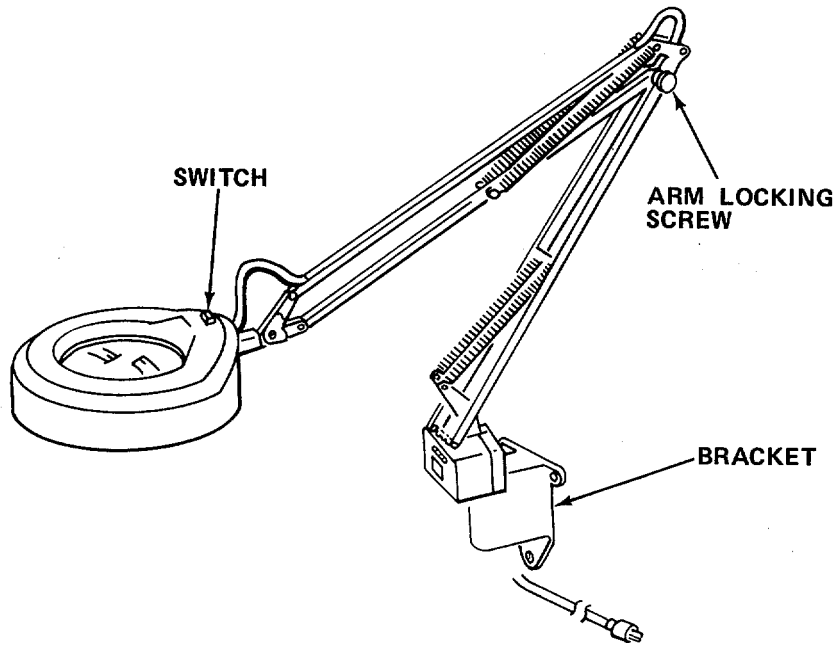
- a. Magnifier Lamp - Replaceable 120 V ac lamp and diffuser.
- b. Hand Psychrometer Packed in carrying case containing a 1 oz (30 ml) water bottle, psychrometric chart, instruction booklet, and slide rule.
- c. Altimeter/Barometer Aneroid type packed in leather carrying case.
- d. Vacuum Cleaner Packed in storage box containing hose, various vacuum and blowing attachments, liquid spray attachments, and motor repair kit containing motor bearings and brushes.
- e. Tripod Refer to TM 5-6675-306-14.

10-3. TECHNICAL PRINCIPLES OF OPERATION. Technical Principles of Operation are combined with Description and Use of Operator's Controls and Indicators.

SECTION II OPERATING INSTRUCTIONS

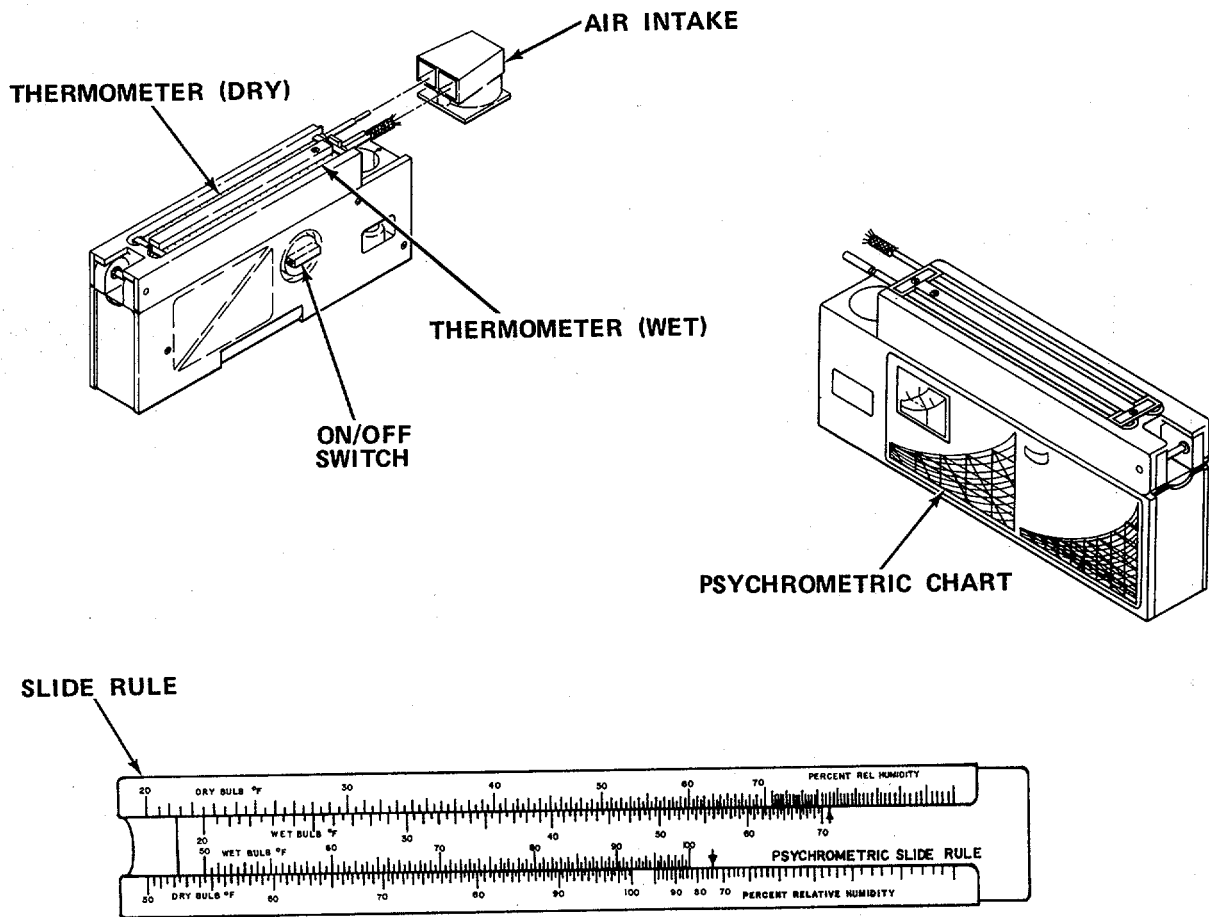
10-4. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.

10-4.1 Magnifier Lamp.



Control or Indicator	Function
Arm Locking Screw	Locks lamp arm in position.
Bracket	Attaches lamp to wall.
Base	Allows mounting lamp assembly on work bench.
Switch	Turns lamp on or off.

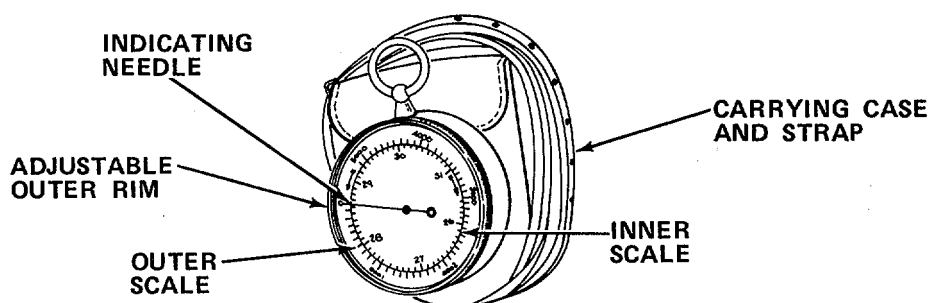
10-4.2 Hand Psychrometer.



Control or Indicator	Function
Air Intake	Directs air flow over wet and dry bulbs.
Thermometer (Dry)	Indicates dry bulb temperature in degrees Fahrenheit.
Thermometer (Wet)	Indicates wet bulb temperature in degrees Fahrenheit.

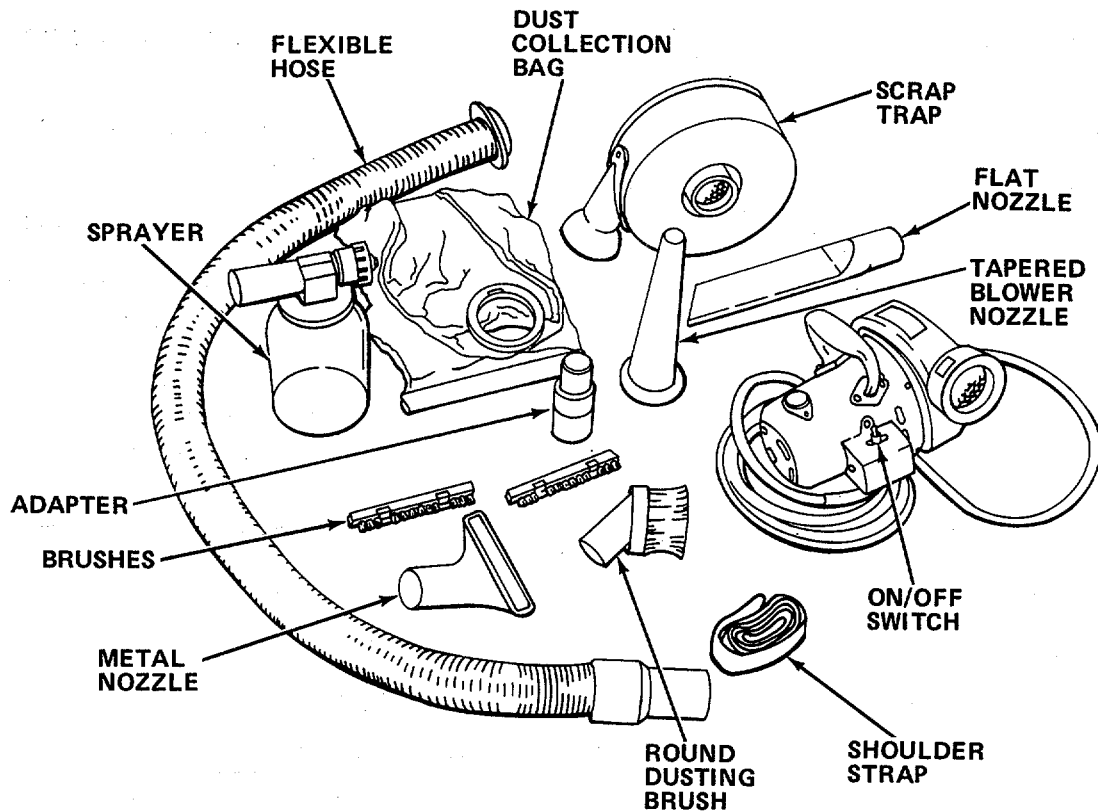
Control or Indicator	Function
ON/OFF Switch	Turns on fan motor and, when turned fully right, provides thermometer illumination.
Psychrometric Chart	Utilizes wet and dry bulb temperatures to determine relative humidity.
Slide Rule	Used to determine relative humidity. After taking thermometer readings, align wet and dry bulb readings.

10-4.3 Altimeter/Barometer.



Control or Indicator	Function
Indicating Needle	Indicates barometric pressure or altitude.
Carrying Case and Strap	Holds instrument.
Inner Scale	Graduated in inches of mercury for reading barometric pressure.
Outer Scale	Graduated in feet for determining altitude.
Adjustable Outer Rim	Used to adjust altitude scale.

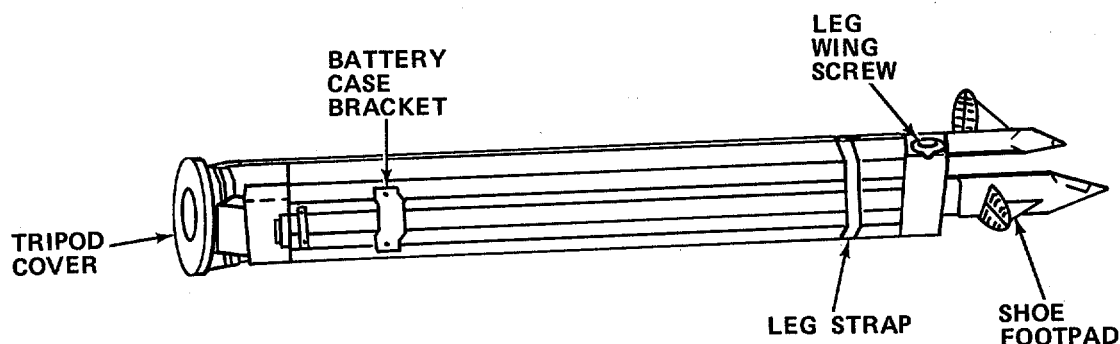
10-4.4 Vacuum Cleaner.



Control or Indicator	Function
Flexible Hose	Allows cleaning 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	Used to direct airflow.
ON/OFF Switch	Turns power on or off.
Shoulder Strap	Attaches to vacuum cleaner for easier carrying. V

Control or Indicator	Function
Round Dusting Brush	Used for light dust and dirt.
Metal Nozzle	Used for large, flat surfaces.
Brushes	Used on metal nozzle.
Adapter	Connects various attachments to hose.
Sprayer	Sprays liquid when attached to blower side of vacuum cleaner.

10-4.5 Tripod.



Control or Indicator	Function
Tripod Cover	Protects tripod plate.
Battery Case Bracket	Holds battery case when illumination system is fitted.
Leg Wing Screw	Clamps sliding leg assembly.
Shoe Footpad	Used to push tripod shoe into ground.
Leg Strap	Secures legs in stored Leg Strap position.

10-5. 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 the proper equipment. Report any deficiencies using the proper forms. See DA Pam 738-750.

10-5.1 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 your weekly as well as before operations if you are the assigned operator and have not operated the item since the last weekly or if you are operating the item for the first time.

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

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

h. Item to be inspected 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>Items</u>	<u>Quantity</u>
Liquid Lens Cleaner (Item 3, Appendix E)	ar
Cheesecloth (Item 4, Appendix E)	ar

Table 10-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

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

B - Before **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:
1	B	<p><u>SUPPORT ITEMS</u></p> <p><u>Inspect Magnifier Lamp.</u></p> <ol style="list-style-type: none"> Inspect lens for cracks, breaks, or dirt. Clean as required. Inspect arms and bracket for cracks or breaks. Replace as required. 	<p>Lens cracked or broken.</p> <p>Arms or bracket cracked or broken.</p>
2	B	<p><u>Service Magnifier Lamp.</u></p> <ol style="list-style-type: none"> Clean both sides of lens with liquid lens cleaner and wipe clean with cheesecloth. 	
3	B	<p><u>Inspect Hand Psychrometer.</u></p> <ol style="list-style-type: none"> Remove hand psychrometer from carrying case. Check for missing or dirty wick on wet bulb. Inspect thermometers. Be sure there are no cracks or illegible numerals. Check that air ducts and air intakes are clear of debris. Clean as necessary. 	<p>Wick is missing or dirty.</p> <p>Thermometer is cracked or numerals are illegible</p>

Table 10-1. 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:
4	B	<p><u>SUPPORT ITEMS - Cont</u></p> <p><u>Inspect Hand Psychrometer Lamp, Motor, and Bottle.</u></p> <ol style="list-style-type: none"> 1. Install batteries. 2. Turn switch fully to right and check light and motor operation. 3. Check water bottle for cracks or deterioration. Fill water bottle. 	<p>Motor does not operate.</p>
5	B	<p><u>Inspect Altimeter/Barometer.</u></p> <div data-bbox="414 1060 1193 1627" data-label="Image"> <p>The diagram shows a circular altimeter/barometer with a ring at the top. It is shown next to its leather carrying case, which has a flap that is partially open. Arrows point from the text labels to the corresponding parts of the instrument and case.</p> </div> <ol style="list-style-type: none"> 1. Inspect leather case for signs of cracking, torn leather, or broken stitching. 	

Table 10-1. 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.	IN-TER-VAL	ITEM TO BE INSPECTED	For Readiness Reporting, Equipment Is Not Ready/ Available If:
		PROCEDURE	
5	B	<u>SUPPORT ITEMS - Cont</u> <u>Inspect Altimeter/Barometer Cont</u>	Glass is glass or broken or cracked. Casing is dented. Outer rim will not move.
		2. Remove altimeter/barometer from case. 3. Inspect altimeter/barometer for broken or cracked dented casing. 4. Check adjustable outer rim for free motion.	
6	B	<u>Clean Exterior Surfaces of Altimeter/Barometer.</u>	
		1. Clean glass face and body using cheesecloth. 2. Replace altimeter/barometer in leather case.	
7	B	<u>Inspect Vacuum Cleaner.</u>	Cracked or broken. housing. Frayed, worn, or damaged power cord or plug. Noisy or improper motor operation.
		1. Inspect vacuum cleaner for damage to housing attachments, or frayed or worn power cord, and proper operation of motor.	

Table 10-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
 D - During
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W - Weekly
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AN - Annually
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(Number) - Hundreds of Hours

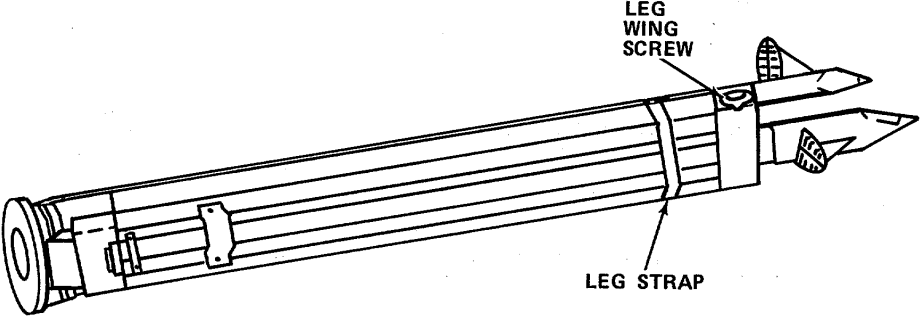
ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
8	B	<p><u>SUPPORT ITEMS - Cont</u></p> <p><u>Inspect Tripod.</u></p> <ol style="list-style-type: none"> 1. Remove tripod from storage by unfastening securing straps.  <ol style="list-style-type: none"> 2. Unbuckle leg strap. 3. Loosen leg wing screws. 4. Extend legs fully and tighten leg wing screws. 	

Table 10-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

B - Before
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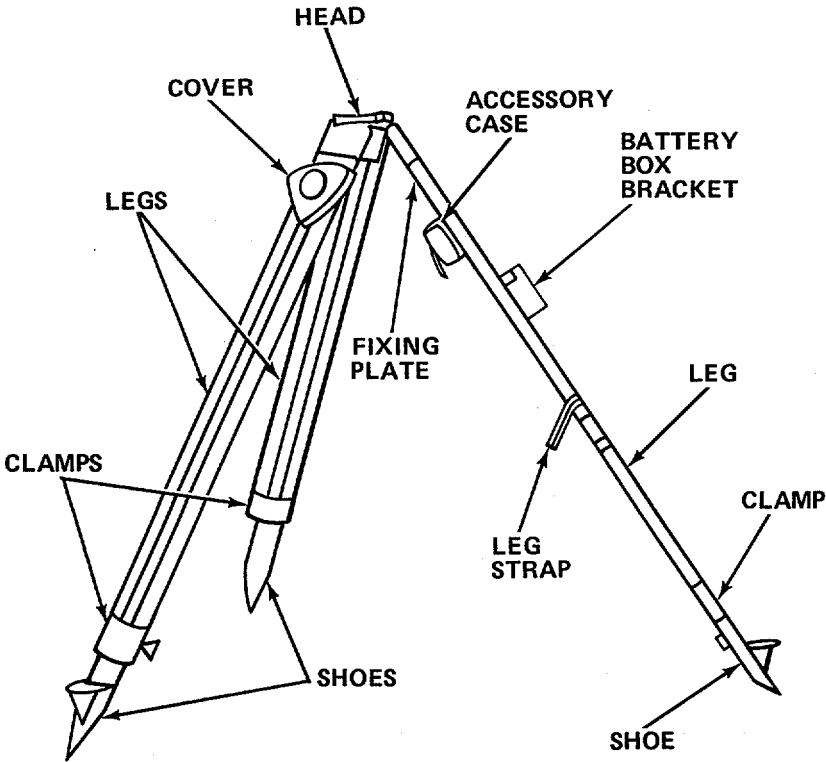
ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
8	B	<p><u>SUPPORT ITEMS - Cont</u></p> <p><u>Inspect Tripod - Cont</u></p>  <p>5. Set up tripod.</p> <p>6. Remove tripod cover and inspect for cracks, breaks, or damaged threads. Replace damaged cover.</p>	

Table 10-1. 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:
8	B	<p><u>SUPPORT ITEMS Cont</u></p> <p><u>Inspect Tripod Cont</u></p> <p>7. Inspect head for bends, burrs, wear, or damage. Inspect mounting bracket and screw for cracks and thread damage.</p> <p>8. Inspect clamps, shoes, fixing plates, and battery box brackets for cracks, breaks, or wear. Repair or replace damaged parts.</p> <p>9. Inspect leg strap and accessory case for cuts, wear, or damaged seams. Repair or replace damaged parts.</p> <p>10. Inspect wooden legs for cracks, splits, wear, or warping.</p> <p>11. Remove plumb bob from accessory case.</p> <div data-bbox="354 1155 1263 1402" style="text-align: center;"> <p>The diagrams show four items: a bayonet tube with a textured base, a plumb bob with a conical bottom, a small circular slide, and a coiled plumb line.</p> </div> <p>12. Inspect plumb bob, bayonet tube, and slide for signs of wear, cracks, breaks, and inspect for frayed plumb line. Repair or replace damaged parts</p>	<p>Head is bent.</p> <p>Wooden legs are cracked, split, worn, or warped.</p>

Table 10-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

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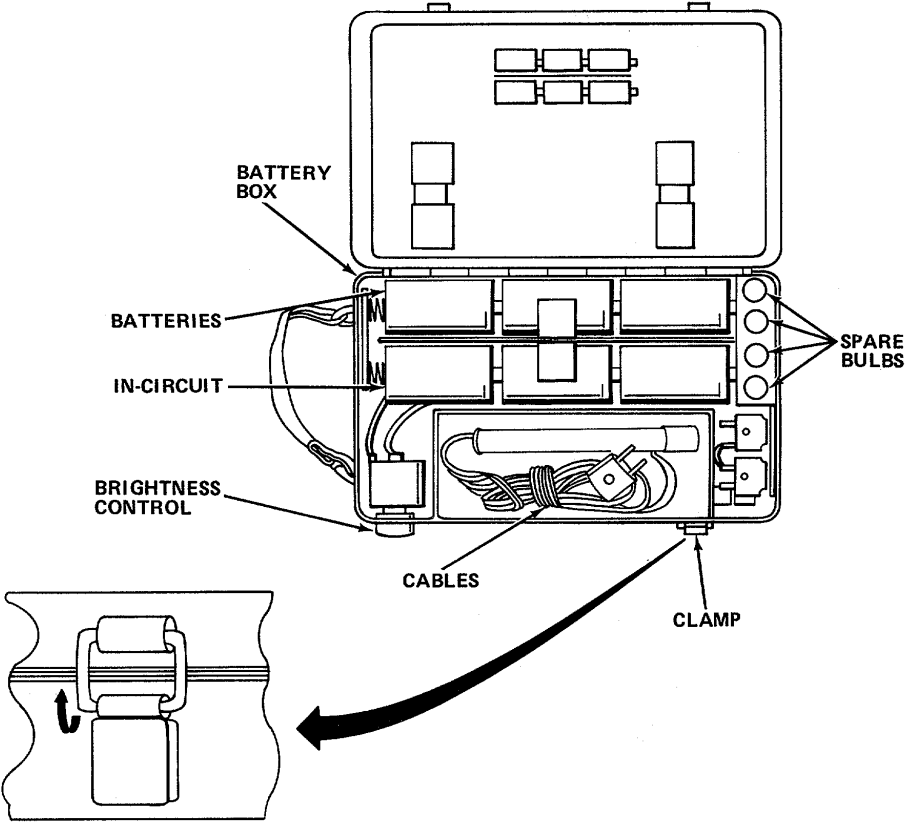
ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
9	B	<p><u>SUPPORT ITEMS - Cont</u></p> <p><u>Inspect Battery Box.</u></p>  <p>1. Inspect battery box for dents, corrosion, cracks, and other damage. Check that lid closes easily and clamps hold lid to box securely.</p>	

Table 10-1. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES - Cont

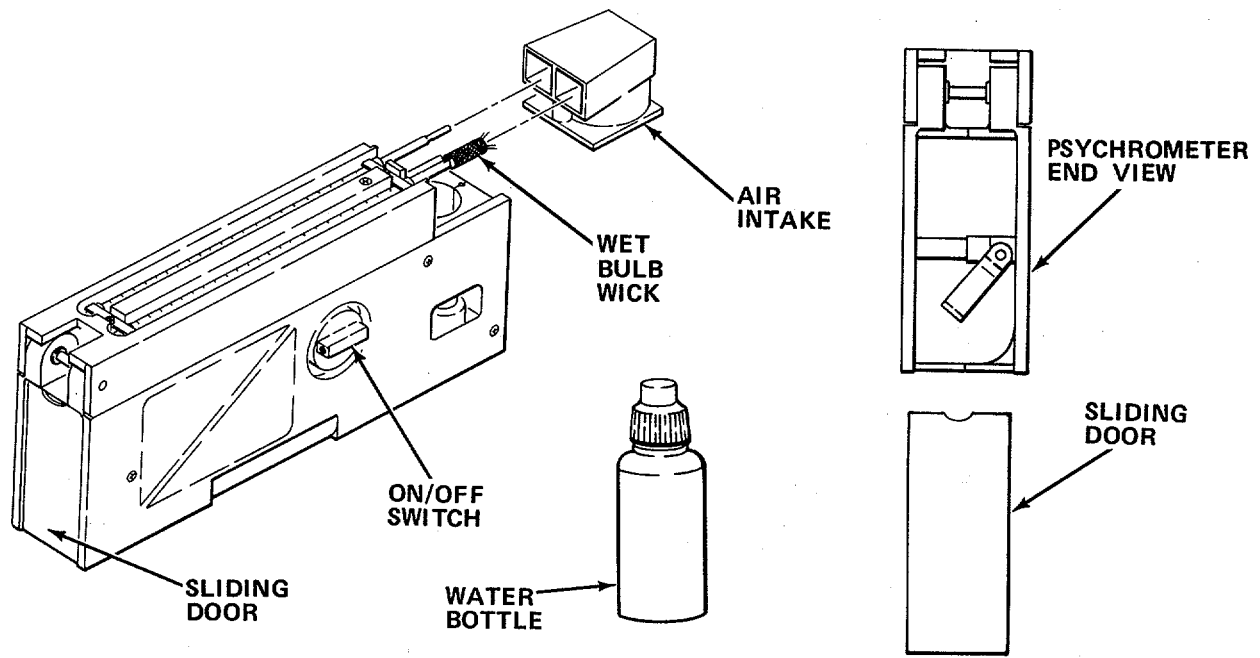
B - Before W - Weekly AN - Annually (Number) - Hundreds of Hours
 D - During M - Monthly S - Semiannually
 A - After Q - Quarterly BI - Biennially

ITEM NO.	IN-TER-VAL	ITEM TO BE INSPECTED PROCEDURE	For Readiness Reporting, Equipment Is Not Ready/ Available If:
9	B	<p><u>SUPPORT ITEMS Cont</u></p> <p><u>Inspect Battery Box Cont</u></p> <ol style="list-style-type: none"> 2. Check all connections. 3. Inspect in-circuit and batteries for loose or dirty contacts, damage, leakage, or corrosion. 4. Inspect for presence of spare bulbs. 5. Inspect cables for broken or frayed wires and loose or defective plugs. <div data-bbox="509 1031 1079 1444" style="text-align: center;"> <p>The diagram shows a cylindrical hand lamp. A switch is located on the left side of the lamp's body. A cable extends from the right end of the lamp, ending in a terminal plug with two prongs. Arrows point from the text labels to the corresponding parts of the lamp.</p> </div> <ol style="list-style-type: none"> 6. Inspect hand lamp for defective wiring, cracked or broken casing, and defective terminal plug or lamp. 7. Be sure hand lamp switch operates properly. 	<p>Damaged or corroded connections.</p> <p>Damaged or corroded contacts.</p> <p>Defective wiring or plugs.</p> <p>Defective wiring, plug, or broken casing.</p> <p>Defective switch.</p>

10-6. OPERATION UNDER USUAL CONDITIONS.

10-6.1 Magnifier Lamp. The magnifier lamp may be used mounted in the wall bracket or the optional lamp base. The lamp is pin mounted and is removed from either base or bracket by pulling straight up.

10-6.2 Hand Psychrometer.



- a. Open sliding door; remove water bottle and close sliding door.
- b. Saturate wet bulb wick as follows:
 - (1) Remove air intake, turn psychrometer so wet bulb faces down, and thoroughly saturate wet bulb wick.

NOTE

Be sure no water contacts the thermometer tubes or the dry bulb. Remove any water spilled on the tubes or dry bulb.

- (2) Replace sliding air intake and turn right side up.
- c. Open sliding door; replace water bottle and close sliding door.

NOTE

Whether placed on a bench or hand held, air intake and both exhaust ports must be entirely free of obstruction. The hand psychrometer samples air to which it is exposed. Care must be taken to use it far enough away from sources of heat, cold, or moisture. Be sure hand does not contact thermometers during use.

- d. Place hand psychrometer on flat surface or hold in hand with graduations of thermometer facing up and air intake pointing to left.

CAUTION

Be sure to turn motor off after each observation since unnecessary usage will greatly shorten life of batteries.

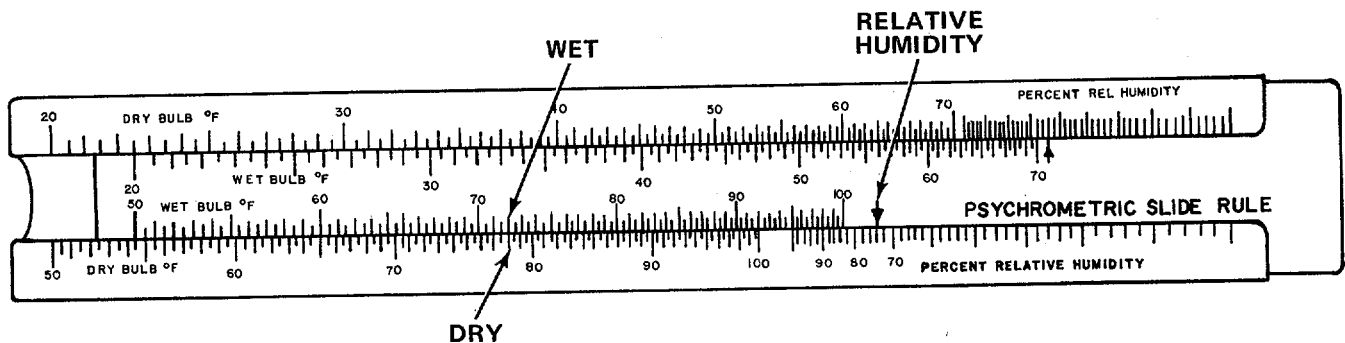
- e. Turn ON/OFF switch ON and allow wet bulb temperature to stabilize.
- f. If thermometer illumination is desired, turn knob fully right.

NOTE

If wet bulb temperature fails to stabilize within 2.5 minutes after being energized, fan motor is probably running too slow due to weak batteries.

- g. Turn ON/OFF switch OFF.
- h. Record wet and dry bulb temperatures.
- i. Read psychrometric slide rule as follows:

- (1) Aline wet bulb temperature and dry bulb temperature on slide rule.

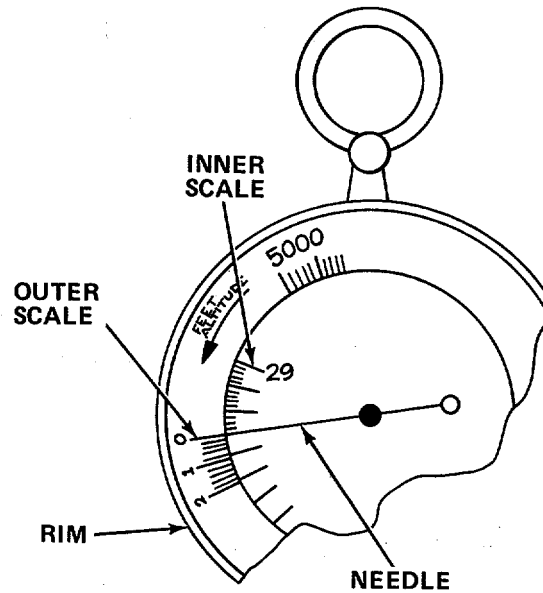


EXAMPLE: WET BULB TEMPERATURE 72°
 DRY BULB TEMPERATURE 78°
 % RELATIVE HUMIDITY 74%

- (2) Percentage value of relative humidity is indicated by arrow pointer on sliding center portion of the scale.

10-6.3 Altimeter/Barometer.

- a. Determine altitude.



- (1) Remove altimeter/barometer from case and hold in horizontal position. S_
 - (2) Set outer scale by turning rim until the known control altitude is set under needle and return to case.
 - (3) Proceed to station where altitude is to be measured, hold altimeter/ barometer horizontally, and record altitude opposite needle.
- b. Determine barometric pressure by reading inner scale underneath needle and applying temperature correction.
- (1) For every 10°F (6°C) above 50°F (10°C), add 2% to reading.
 - (2) For every 10°F (6°C) below 50°F (10°C), deduct 2% from reading.

10-6.4 Vacuum Cleaner.**WARNING**

Electric shock could occur if used on wet surfaces. Do not expose to rain; store indoors. Be sure electrical cable is in good condition and properly grounded.

- a. Using as vacuum.
 - (1) Attach dust collection bag to air discharge opening.
 - (2) Remove protective screen lock from air intake opening; attach scraptrap to that opening.
 - (3) Attach swivel end of hose to scrap-trap by turning lock to right until secure.
 - (4) Attach tool required 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.

NOTE

If desired, hose may be used with tapered rubber nozzle.

- (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.

NOTE

Pushing siphon tube too far into sprayer cap may block air flow.

- (1) Push siphon tube firmly into hole in bottom of sprayer cap. Screw cap onto jar and be sure that tube is at least 1/4 inch above bottom of jar. Trim tube if too long.

- (2) Prepare liquid to be sprayed according to instructions on container. Fill sprayer jar not more than 3/4 full.
- (3) Attach blower hose to exhaust end of blower and attach the adapter and sprayer to the other end of the hose.

NOTE

Thick liquids will take a few seconds to start spraying.

(4) Turn on blower and point sprayer to a waste area for testing. To spray, cover hole at top with finger; to stop spraying, remove finger from hole.

(5) For light liquids, turn sprayhead in direction reading "LESS". For heavier liquids, turn in direction reading "MORE".

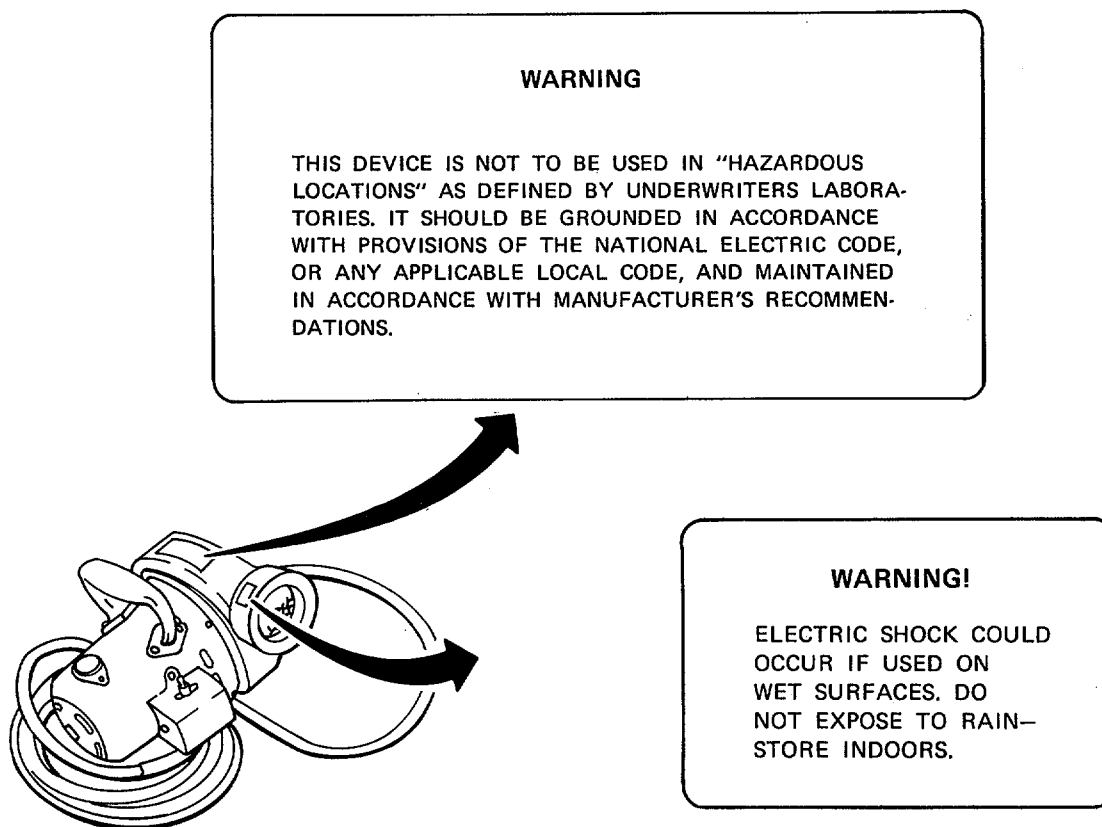
(6) Regulate spray pattern by turning the fan adjustment on the sprayhead.

(7) Immediately after using sprayer for painting, clean jar and spray gun thoroughly. To dismantle adjustable spray control nozzle, twist nozzle to left, pull off, and clean by running cleaner through all openings. Reinstall nozzle.

10-6.5 Tripod.

Set up and operate tripod in accordance with TM 5-6675-306-14.

10-6.6 Preparation for Movement. Check that all equipment is properly stored in their respective containers and/or securely held with tiedowns. Those items that are not secured by tiedowns will be stored in drawers or lockers.

10-6.7 Operating Instructions on Decals and Instruction Plates

10-7. OPERATION UNDER UNUSUAL CONDITIONS. Except for the vacuum cleaner and magnifier lamp, no special instructions are necessary for use under unusual conditions. Do not use the vacuum cleaner on wet surfaces or expose either the vacuum cleaner or the magnifier lamp to rain.

SECTION III OPERATOR MAINTENANCE

10-8. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication.

10-9. TROUBLESHOOTING PROCEDURES.

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

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

Table 10-2. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. MAGNIFIER LAMP WILL NOT WORK.		
	Check that magnifier lamp is plugged into outlet. Press switch off; then on.	
	(a) If light still does not come on, replace lamp (paragraph 10-10.1).	
	(b) If new lamp will not work, replace magnifier lamp assembly (paragraph 10-10.2).	
2. PSYCHROMETER LAMP WILL NOT LIGHT.		
	Check that switch is on.	
	(a) Replace lamp (paragraph 10-10.4).	
	(b) If lamp still does not light, replace batteries (paragraph 10-10.3).	
	(c) If lamp still does not light, replace psychrometer.	
3. FAN WILL NOT OPERATE IN PSYCHROMETER.		
	Check that switch is on.	
	(a) If fan does not work, replace batteries (paragraph 10-10.3).	
	(b) If fan still does not work, replace psychrometer.	
4. VACUUM CLEANER MOTOR DOES NOT OPERATE.		
	Check that vacuum cleaner is plugged into outlet. Turn switch ON.	
	If motor does not operate, replace vacuum cleaner.	

10-10. 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 Lamp in Magnifier Lamp Assembly	10-10.1
Replace Magnifier Lamp Assembly	10-10.2
Replace Batteries in Hand Psychrometer	10-10.3
Replace Lamp in Hand Psychrometer	10-10.4
Replace Wick in Hand Psychrometer	10-10.5
Replace Thermometers in Hand Psychrometer	10-10.6

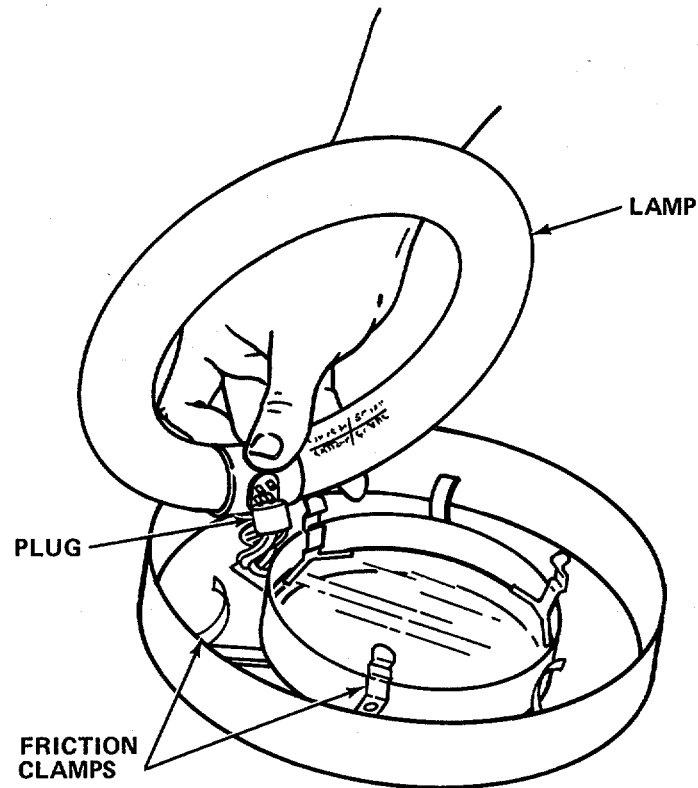
10-10.1 Replace Lamp In Magnifier Lamp Assembly.

MOS: 41B, Topographic Instrument Repair Specialist

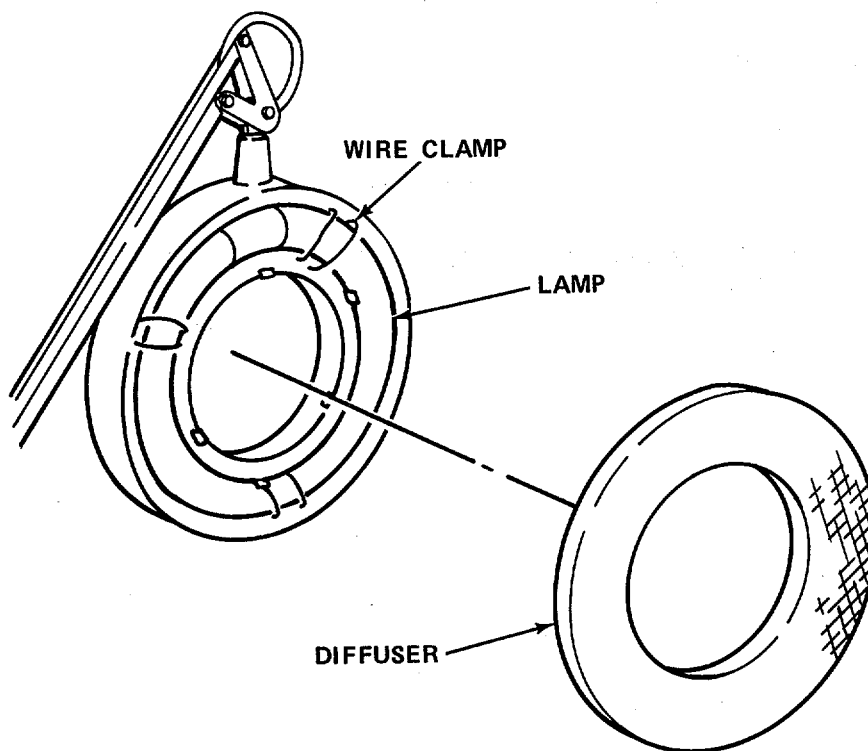
SUPPLIES: Fluorescent Lamp (22 W)

WARNING

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



- a. Unplug magnifier lamp assembly and remove diffuser.



NOTE

On some magnifier lamp assembly models, lamp is held in place with friction clamps.

- b. Release wire clamps, pull out lamp, and disconnect plug from lamp.
- c. Connect plug to new lamp and retain lamp with wire clamps.
- d. Reinstall diffuser.

10-10.2 Replace Magnifier Lamp Assembly.

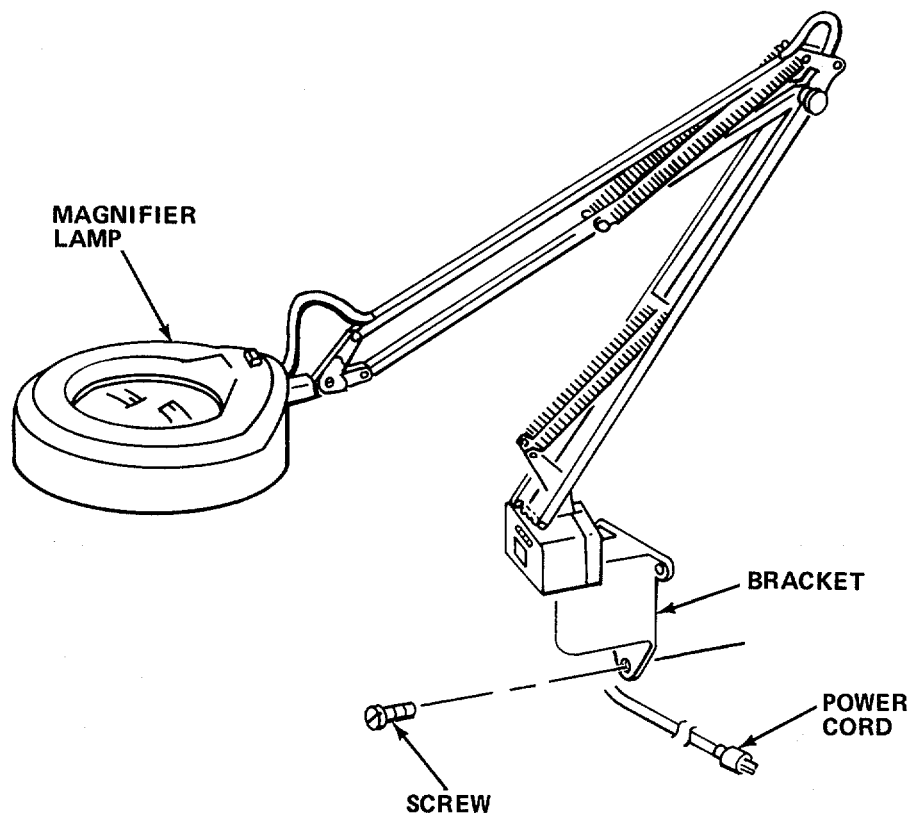
MOS: 41B, Topographic Instrument Repair Specialist

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.

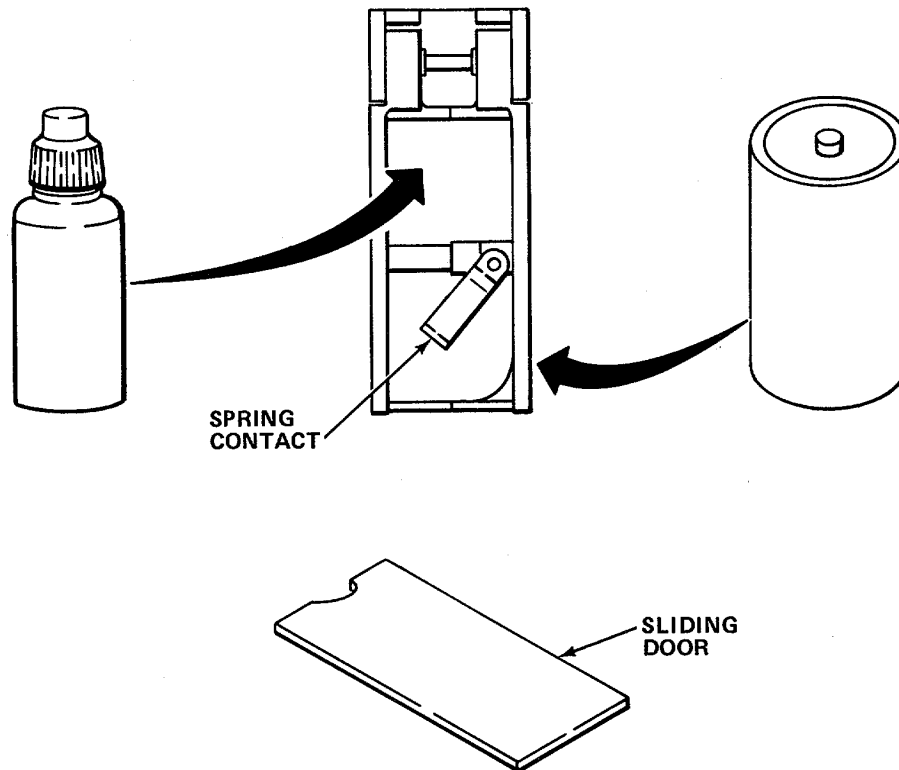


- a. Unplug power cord and remove lamp from bracket.
- b. Remove three screws to release bracket from wall.
- c. Install new magnifier lamp bracket and secure with screws.
- d. Install new magnifier lamp in bracket and plug in power cord.

10-10.3 Replace Batteries in Hand Psychrometer.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Three Batteries (D-size, 1.5 V)



- Remove sliding door from end of hand psychrometer.
- Rotate spring contact from battery compartment to bottle compartment and remove batteries.

CAUTION

Keep hand psychrometer as close to horizontal as possible to prevent distortion of battery contact at far end of battery compartment. Insert center contact post of battery first.

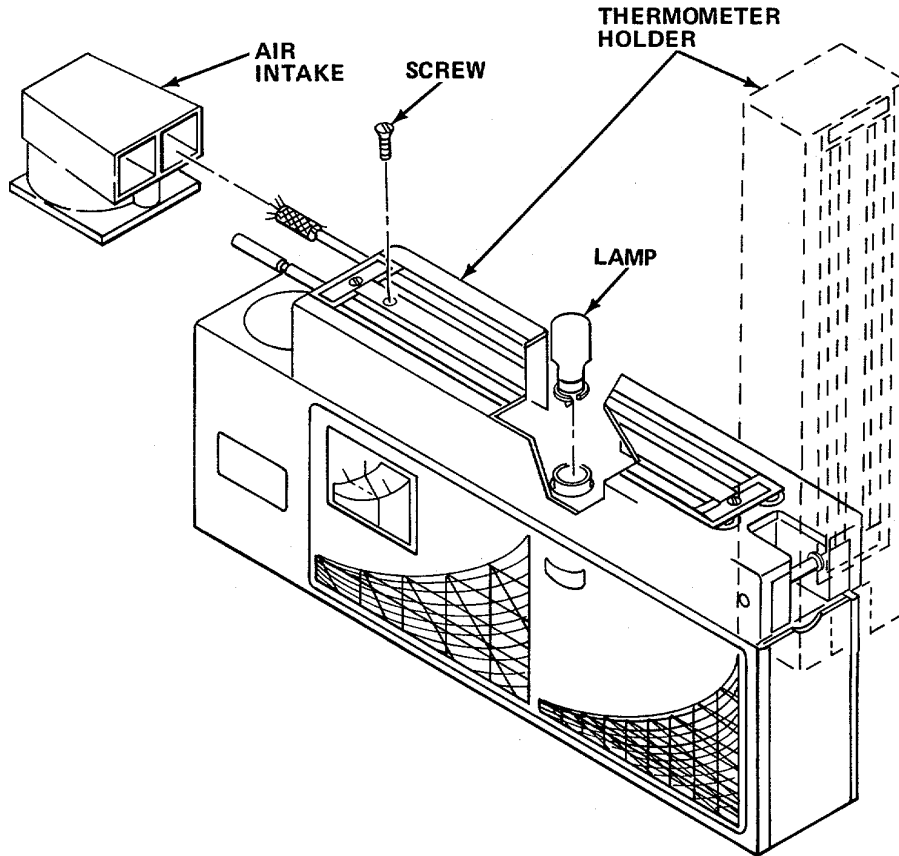
- Insert three D-size batteries into battery compartment.
- Rotate spring contact to its original position and replace sliding door.

10-10.4 Replace Lamp in Hand Psychrometer.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver

SUPPLIES: Lamp (GE-47)



- a. Remove air intake.
- b. Remove screw securing thermometer holder.
- c. Raise holder upward to gain access to lamp.
- d. Replace defective lamp.
- e. Lower holder.
- f. Secure holder in place with screw.
- g. Replace air intake.

10-10.5 Replace Wick in Hand Psychrometer.

MOS: 41B, Topographic Instrument Repair Specialist

SUPPLIES: Wick Thread

- a. Remove air intake and remove and discard old wick.
- b. Clean thermometer bulb.
- c. Install new wick and tie with thread at narrow section between bulb and thermometer stem.
- d. Stretch wick toward end of bulb. Tie wick at end of bulb with second thread, trim threads, and trim wick about 1/8 in. (3 mm) from end of bulb.
- e. Reinstall air intake.

10-10.6 Replace Thermometers in Hand Psychrometer.

MOS: 41B, Topographic Instrument Repair Specialist

TOOLS: Cross Tip Screwdriver

SUPPLIES: Thermometer Set

- a. Remove air intake and two retainer strips holding the thermometer in position.
- b. Lift out the thermometers and remove the rubber bushings.

NOTE

These thermometers are supplied as a matched set. Do not replace separately.

- c. Install rubber bushings on new thermometers, position thermometers on psychrometer, and secure with retainer strips and screws.
- d. Reinstall air intake.

SECTION IV ORGANIZATIONAL MAINTENANCE

10-11. LUBRICATION INSTRUCTIONS. This equipment does not require lubrication.

10-12. REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT; AND SUPPORT EQUIPMENT. These items are not required at the organizational level of maintenance.

10-13. SERVICE UPON RECEIPT.

10-13.1 Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- b. Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.
- c. Check to see whether the equipment has been modified.

10-14. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES. There are no organizational PMCS procedures assigned for this equipment.

10-15. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES. There are no organizational troubleshooting procedures assigned for this equipment.

10-16. MAINTENANCE PROCEDURES. There are no organizational maintenance procedures assigned for this equipment.

10-17. PREPARATION FOR STORAGE OR SHIPMENT. Contact your battalion for packing and shipping instructions.

SECTION V DIRECT/GENERAL SUPPORT MAINTENANCE

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

APPENDIX A

REFERENCES

A-1. SCOPE. This appendix lists all forms, technical manuals, and other publications referenced in this manual, as well as other pertinent information.

A-2. FORMS.

Recommended Changes to Publications and Blank Forms..... DA Form 2028

Recommended Changes to Equipment Technical Publications DA Form 2028-2

Equipment Inspection and Maintenance Worksheet DA Form 2404

Quality Deficiency Report SF 368

The Army Maintenance Management System (TAMMS)..... DA Pam 738-750

The Army Test, Measurement and Diagnostic
Equipment Register, Index and Instructions,
Parts I and II (two volumes) DA Pam 700-21

The Army Test, Measurement and Diagnostic
Equipment Register, Preferred List DA Pam 700-21-1

A-3. FIELD MANUALS.

Metal Body Repair and Related Operations FM 43-2

Northern Operations FM 31-71

Nuclear, Biological and Chemical (NBC)
Defense (Reprinted w/Basic Incl. C1) FM 21-40

Camouflage..... FM 5-20

A-4. TECHNICAL MANUALS.

The following Lubrication Order, Components List and Technical Manuals pertain to the Maintenance Section.

Operator, Organizational, Direct Support, and General Support Maintenance Manual: Air Conditioner, Horizontal, Compact, 208-Volt, 3-Phase, 18,000 BTUH Cooling, 12,000 BTUH Heating TM 5-4120-367-14

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

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 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 Maintenance Section..... TM 5-6675-328-24P

Hand Receipt, Covering Contents of Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) for Maintenance Section TM 5-6675-328-14HR

Operator, Organizational, Direct Support, and General Support Maintenance Manual for Theodolite, Wild-Heerbrugg Model T-2..... TM 5-6675-306-14

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Theodolite, Wild-Heerbrugg Model T-2 TM 5-6675-306-24P

Power Supply, Direct Current; Hewlett-Packard Model 6268B..... TM 9-6625-1906

Operator, Organizational, Direct Support, and General Support Maintenance Manual for Tripod, MIL-T-14091 TM 5-6675-306-14

A-4. TECHNICAL MANUALS - Cont

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Operations Section TM 5-6675-313-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Storage and
Retrieval Section TM 5-6675-314-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Distribution Section TM 5-6675-315-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Drafting Support
Section TM 5-6675-316-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Compilation Section..... TM 5-6675-317-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Survey Section TM 5-6675-318-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Rectifier I Section TM 5-66.75-319-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Rectifier II Section TM 5-6675-320-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Mosaicking/Drafting
Section..... TM 5-6675-321-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Collection Section TM 5-6675-322-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Analysis Section TM 5-6675-323-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Information Section TM 5-6675-324-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Synthesis Section TM 5-6675-325-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Paper Conditioning
Section TM 5-3610-252-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Finishing Section TM 5-3610-253-14

Operator, Organizational, Direct Support, and General
Support Maintenance Manual for Division Direct
Support Section..... TM 5-6675-326-14

Operator, Organizational, Direct Support, and General Support Maintenance Manual for Facsimile Transmitting and Receiving Device, Magnavox Model AN/GXC-7A TM 11-5895-1079-14

Operator, Organizational, Direct Support, and General Support Maintenance Manual for Copying Machine, Diazo Process, Model T335-8 TM 5-3610-256-14

Operator and Organizational Support Maintenance Manual (Including Repair Parts and Special Tools List) for Analytical Photogrammetric Positioning System, A450 APPS AN/UYK-48 TM 9-1260-12&P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Operations Section TM 5-6675-313-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Storage and Retrieval Section..... TM 5-6675-314-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Distribution Section TM 5-6675-315-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Drafting Support Section TM 5-6675-316-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Compilation Section. TM 5-6675-317-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Survey Section TM 5-6675-318-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Rectifier I Section..... TM 5-6675-319-24P

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Rectifier II Section TM 5-6675-320-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Mosaicking/Drafting Section..... TM 5-6675-321-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Collection Section TM 5-6675-322-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Analysis Section TM 5-6675-323-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Information Section. TM 5-6675-324-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Synthesis Section..... TM 5-6675-325-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Paper Conditioning Section TM 5-3610-252-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Finishing Section..... TM 5-3610-253-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Division Direct Support Section TM 5-6675-326-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Copying Machine, Diazo
Process, Model T335-8..... TM 5-3610-256-24P

Organizational, Direct Support, and General Support
Maintenance Repair Parts and Special Tools List
(Including Depot Maintenance Repair Parts and
Special Tools) for Facsimile Receiving Device TM 11-5895-1079-24P

Direct Support and General Support Maintenance
Manual (Including Repair Parts and Special Tools)
for Analytical Photogrammetric Positioning System
(APPS), A450 APPS AN/UYK-48 TM 9-1260-206-34&P

Organizational, Direct Support, and General Support
 Maintenance Manual for Calculator, Hewlett-Packard
 Model 9825A (Desk Top Computer, an APPS Component) TM 11-2660-263-24/1 &/2

Organizational, Direct Support, and General Support
 Maintenance Repair Parts and Special Tools List
 (Including Depot Maintenance Repair Parts and
 Special Tools) for Calculator, Hewlett-Packard
 Model 9825A (Desk Top Computer, an APPS Component) TM 11-2660-263-1079-24P

Spectrum Analyzer, Hewlett-Packard Model 8557A TM 5-6675-304-14

Impedence Bridge, Hewlett-Packard Model 4260A TM 11-6625-2639-14

Frequency Converter, Hewlett-Packard
 Model 5255A TM 11-6625-2485-15-1

AM/FM Signal Generator, Hewlett-Packard
 Model 8640B TM 9-4931-488-34P

Multimeter AN/URM-105C, Barnett Instrument
 Company Model B105 TM 11-6625-203-35

Multimeter, Phaostron Instrument Company
 Model TS-352B/U TM 11-6625-366-15
 TM 11-6625-366-24P

Multimeter, Hewlett-Packard Model 410C TM 11-6625-1614-15

Test Set Device, Semiconductor, Hickok
 Model TS-1836 C/U TM 11-6625-539-14-3

Impedence Bridge, Hewlett-Packard Model 4260A TM 11-6625-2639-14

Test Set Device, Transistor, Hickok Model
 TS-1836D/U (This unit is interchangeable
 with Hickok Model TS-1836 C/U, listed
 above.) TM 11-6625-539-14-3

Operator and Organizational Field and Depot Maintenance:
 Storage Batteries, Lead Acid Type TM 9-6140-200-15

Use and Care of Hand Tools and Measuring Tools..... TM 9-243

Administrative Storage of Equipment TM 740-90-1

Procedures for the Destruction of Equipment
 to Prevent Enemy Use TM 750-244-3

Painting Instructions for Field Use TM 43-0139

Chemical, Biological, and Radiological Decontamination TM 3-220

A-5. MISCELLANEOUS PUBLICATIONS.

Lubrication Order for Operations Section LO 5-6675-313-12

Lubrication Order for Storage and Retrieval
Section LO 5-6675-314-12

Lubrication Order for Distribution Section LO 5-6675-315-12

Lubrication Order for Drafting Support Section LO 5-6675-316-12

Lubrication Order for Compilation Section LO 5-6675-317-12

Lubrication Order for Survey Section LO 5-6675-318-12

Lubrication Order for Rectifier I Section LO 5-6675-319-12

Lubrication Order for Rectifier II Section LO 5-6675-320-12

Lubrication Order for Mosaicking/Drafting
Section LO 5-6675-321-12

Lubrication Order for Collection Section..... LO 5-6675-322-12

Lubrication Order for Analysis Section LO 5-6675-323-12

Lubrication Order for Information Section LO 5-6675-324-12

Lubrication Order for Synthesis Section..... LO 5-6675-325-12

Lubrication Order For Paper Conditioning Section LO 5-3610-252-12

Lubrication Order for Finishing Section LO 5-3610-253-12

Lubrication Order for Division Direct Support
Section LO 5-6675-326-12

Lubrication Order for Maintenance Section LO 6-6675-328-12

Calibration and Repair Requirements for the
Maintenance of Army Material TB 43-180

Vertical Amplifier, Dual Channel Plug-in
Unit, Hewlett-Packard Model 1801A TB 11-6625-1703-50

Impedence Bridge, Hewlett-Packard Model 4260A TB 11-6625-2558-35

Electronic Frequency Counter, Hewlett-Packard
Model 5345A..... TB 9-4935-272-50-3

Frequency Converter, Hewlett-Packard
Model 5255A TB 9-6625-1374-35
TB 9-6625-1374-50

Digital Marker/Counter Generator, Hewlett-Packard Model 8600A	TB 9-6625-2014-35
Multimeter, Hewlett-Packard Model 34702A	TB 11-6625-2809-35
Multimeter, AN/URM-105C, Barnett Instrument Company Model B105	TB 9-6625-990-35
Multimeter, Phaostron Instrument Model TS-352B/U	TB 11-6625-366-35
Multimeter, Hewlett-Packard Model 410C	TB 9-6675-046-35
Power Supply, Direct Current, Hewlett-Packard Model 6268B	TB 9-6625-1906
Time Base Delay, Plug-in Unit, Hewlett-Packard Model 5262A	TB 11-6625-229-7041
TB 11-6625-1703-50	
Time Interval Unit, Hewlett-Packard Model 5262A	TB 9-6625-781-35
Signal Generator, Hewlett-Packard Model 8640B	TB 9-4931-488-50
Vertical Amplifier, Dual Channel Plug-in, Hewlett-Packard Model 1801A.....	TO 33A1-2-113-11
Impedence Bridge, Hewlett-Packard Model 4260A	TO 33A1-12-916-1
Sweep Generator, Hewlett-Packard Model 8601A.....	TO 33D7-59-35-1
Digital Counter/Marker Generator, Hewlett-Packard Model 8600A	TO 33A1-8-713-1
Multimeter, Hewlett-Packard Model 34702A	TO 33A1-12-1019-1
Multimeter, Hewlett-Packard Model 410C	TO 33A1-12-704-1
Power Sensor, Hewlett-Packard Model 8481A	TO 33A1-7-270-11
Time Base Delay, Plug-in Unit, Hewlett-Packard Model 5262A	TO 33AI-8-479-1
Hand, Measuring, and Power Tools	TO 32-1-151
Main Frame Display, Hewlett-Packard Model 182T	
Down Converter, Hewlett-Packard Model 11710A	
Multimeter, Digital Voltmeter, Hewlett-Packard Model 3466A	

Digital Multimeter, Hewlett-Packard
Model 3435A

Oscilloscope, Hewlett-Packard Model 180C

Digital Photometer/Radiometer, Tektronix
Model J16

Irradiance Probe, Tektronix Model J6502

Power Meter, Hewlett-Packard Model 435B

APPENDIX B**MAINTENANCE ALLOCATION CHART (MAC)**

INTRODUCTION**The Army Maintenance System MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component levels, which are shown on the MAC in column (4) as:

Field – includes two columns, Unit maintenance and Direct Support maintenance. The Unit maintenance column is divided again into two more subcolumns, C for Operator or Crew and O for Unit maintenance.

Sustainment – includes two subcolumns, General Support (H) and Depot (D)

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
 - a. Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
 - b. Repack. To return item to packing box after service and other maintenance operations.
 - c. Clean. To rid the item of contamination.

- d. Touch up. To spot paint scratched or blistered surfaces.
- e. Mark. To restore obliterated identification.
- 4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
- 5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.
- 6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- 7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- 8. Paint. To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
- 9. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
- 10. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function: Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, and that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

- 11. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

12. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) Group Number. Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized. Column (3) Maintenance Function.

Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above). Column (4) Maintenance Level.

Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field: C Operator or Crew maintenance
 O Unit maintenance
 F Direct Support maintenance

Sustainment:

L Specialized Repair Activity
 H General Support maintenance
 D Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Table 1. MAC for Maintenance Section

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT- ENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE	
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT			DEPOT
			C	O	F	H			D
00	Maintenance Section	Overhaul					**		
01	Van Body (ISO Container)	Inspect Service Repair	0.8 0.9	0.5 1.0	1.5		2.0	8, 10, 11, 16 1, 3, 6, 7	
	Fluorescent Light Assy	Repair	0.1	0.7				1	
	Blackout/Dome Light Assy	Repair	0.2						
	Exhaust Fan Assy	Repair		0.5				1	
	Air Conditioner/Heater Assy	Replace					2.0	1	A
	Electrical Assy	Inspect Repair		0.5 0.9	1.0			1, 3	
	Telephone Binding Post Assy	Repair		0.7				1	
	Emergency Light Assy	Replace		0.3				1	
	Tiedown Socket Assy	Replace		0.3				6	
	Level Indicator Assy	Replace		0.6				2, 3	
	Blackout Curtain Assy	Repair		1.0				6	
	Personnel Ladder Assy	Repair		0.8				6, 7	
	Personnel/Cargo Door Assy	Replace Repair			1.5 2.0			6 6	
02	Short-Range Optical Calibrator	Inspect Service Repair Remove/ Install	0.6 0.8	0.1	1.5 3.0			13, 14 4 1, 3, 15	
** Depot Team will determine work times.									

**Table 1. MAC for
Maintenance Section
(Continued)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT- ENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
03	Transformer Assy	Replace			0.7			4	
	Motor Assy	Replace			1.2			4	
	Drill Press	Inspect Service Repair Remove/ Install	0.2 0.5 1.0 0.5					1 1	
04	Grinder and Dust Control Assy	Inspect Service	0.2 0.2					9, 10, 11, 12	
	Grinder	Replace		0.7				1	
05	Dust Control	Replace		0.5				1	
	Instrument Lathe	Inspect Service Repair	0.1 0.2 0.3	0.3				1 1	
	Motor Speed Control Assy	Replace		0.8				1	
06	Drive Motor Assy	Adjust Replace		0.4 0.5				1 1	
	Head Stock Assy	Replace		0.2				1	
	Tail Stock Assy	Replace		0.1					
07	Optical Bench	Inspect Service	0.2 0.1						
07	Fast Battery Charger	Inspect Service Repair	0.1 0.2 0.2		1.0			1, 4	

**Table 1. MAC for
Maintenance Section
(Continued)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT- ENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE	
			FIELD		SUSTAINMENT				
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT			DEPOT
			C	O	F	H			D
08	Theodolite						B		
09	Furniture and Cabinets	Inspect	0.5						
		Repair		0.8			1, 3, 7		
		Remove/ Install		0.6			1, 3, 5, 7		
10	Support Items	Inspect	0.5						
		Service	0.3				6		
		Repair	0.3	0.3			6		

**Table 2. Tool and Test Equipment
for Maintenance Section**

Tool or Test Equipment	Maintenance Level	Nomenclature	National Stock Number	Tool Number
1	O, F	Shop Equipment, Automotive Maint & Repair, Common #1 Plus Metric Option	4910-00-754-0654	
2	O	Tool Kit, Carpenter's Engineer Squad	5180-00-293-2895	
3	O, F	General Mechanic's Automotive Plus Metric Option	5180-00-177-7033	
4	O, F, D	Electronic Equipment	5180-00-605-0079	
5	F	Mechanical Fingers	5120-00-269-6258	
6	O, F, D	Light Machine Repair	5180-00-596-1540	
7	F	Rivet Gun	5120-00-017-2849	
8	C	Brush, Wire	7920-00-291-5815	
9	C	Screwdriver, Cross Tip No. 2	5120-00-234-8913	
10	C	Screwdriver, Flat Tip, 6 in.	5120-00-234-8910	
11	C	Wrench, Adjustable, 6 in.	5120-00-264-3795	
12	C	Wrench Set, Socket Single Socket Spinner	5120-00-089-3663	
13	C	Wrench Set, Socket Head Screw	5120-00-729-6392	
14	C	Blower, Watchmaker's	5120-00-254-4612	
15	O	Extension Bar, 1/2 in. Drive, 36 in. long	5120-00-278-6643	
16	O	Spring Scale	6670-00-238-9777	

**Table 3. Remarks for
Maintenance Section**

REFERENCE CODE	REMARKS
A	See TM 9-4120-367-14 for maintenance procedures.
B	See TM 5-6675-306-14 and TM 5-6675-306-24P for maintenance procedures.

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 Maintenance 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 II: Basic Issue Items. These are the minimum essential items required to place the Maintenance Section in operation, to operate it, and to perform emergency repairs. BII must be with the Maintenance 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 (Ilus. Number). This column indicates the number of the illustration in which the item is shown.

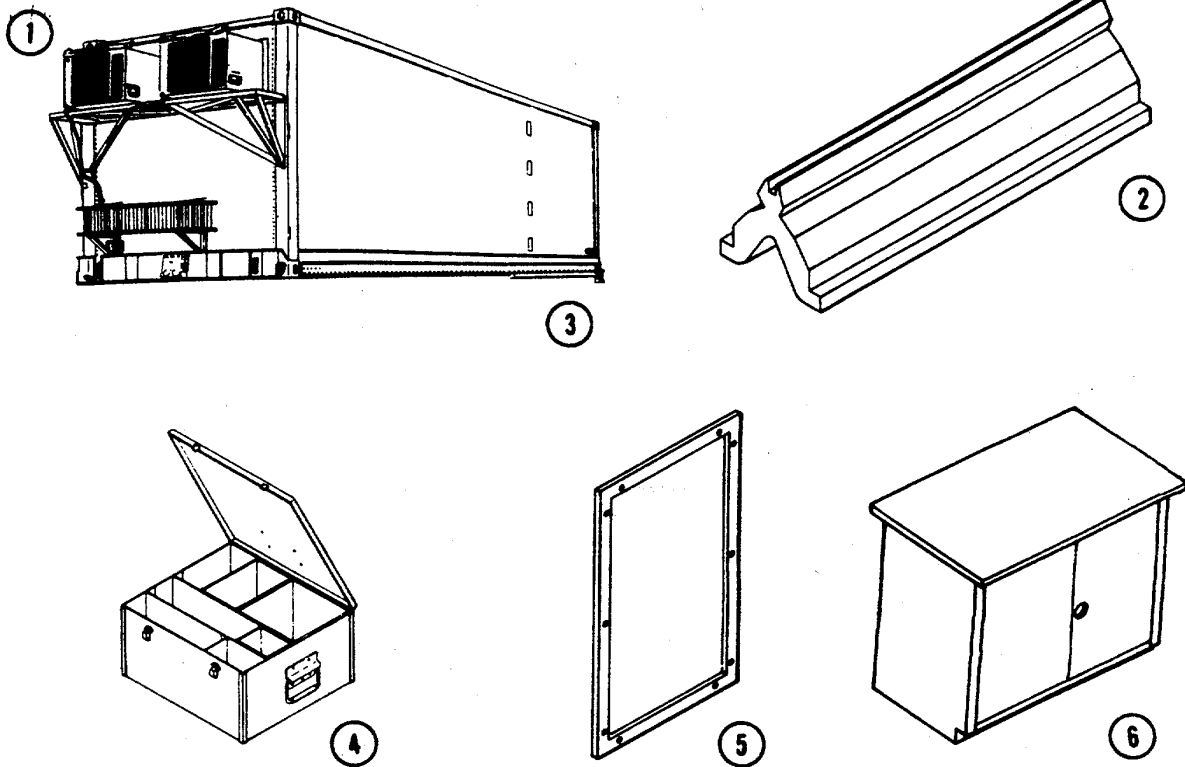
b. Column (2): National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

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).

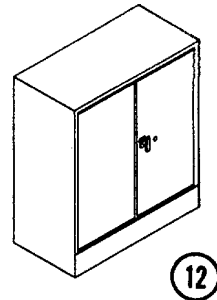
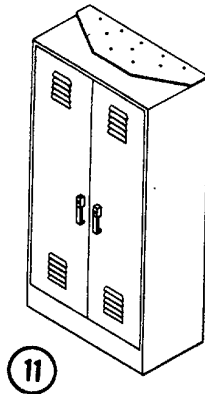
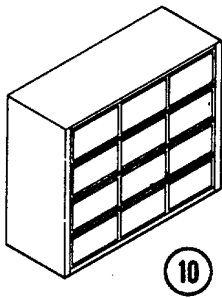
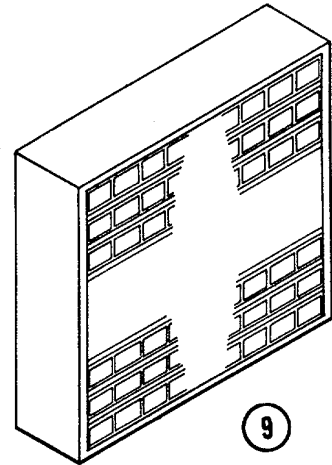
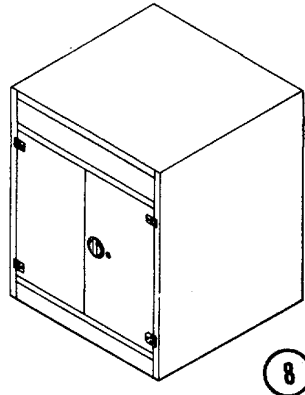
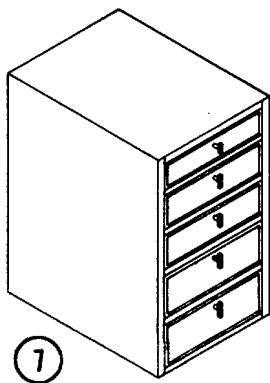
e. Column (5): Quantity Required (Qty Rqd). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II COMPONENTS OF END ITEM



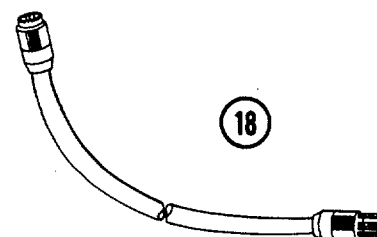
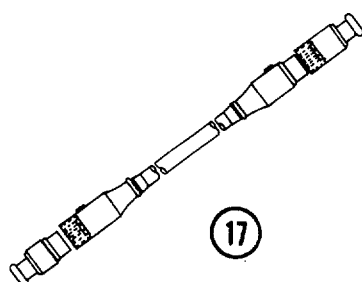
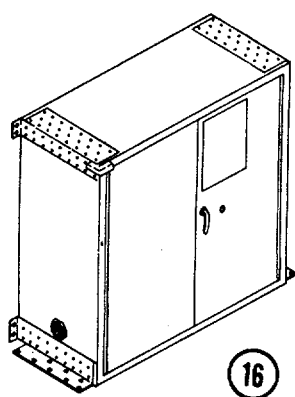
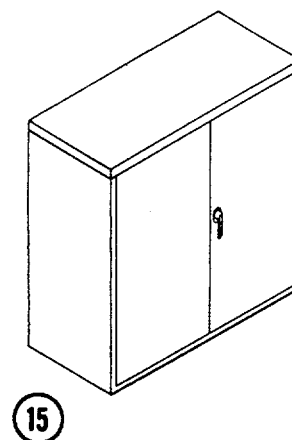
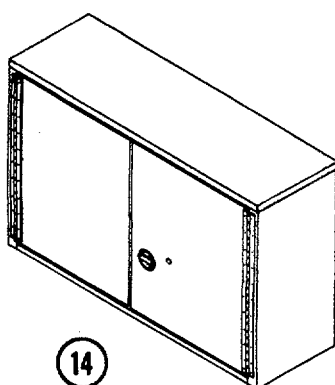
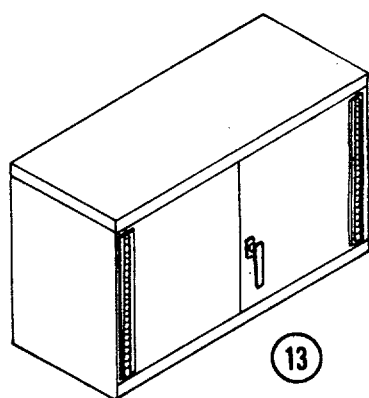
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) U/M	(5) QTY RQD
1	4120-00-974-7206	AIR CONDITIONER (81349) MIL-A-52767	ea	2
2		BENCH, OPTICAL (21175) 22-6928	ea	1
3	6675-01-215-4778	VAN ASSEMBLY; MODIFIED; (97403)13225E3032	ea	1
4		BOX, VEHICULAR ACCESSORIES: for vacuum cleaner (97403)13225E3490	ea	1
5	7195-00-105-7941	BULLETIN BOARD (79819) T5-2303	ea	1
6		CABINET, STORAGE, BENCH TOP (51745) 13225E3413	ea	1

SECTION II COMPONENTS OF END ITEM - Cont



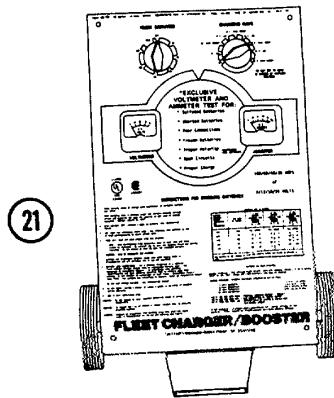
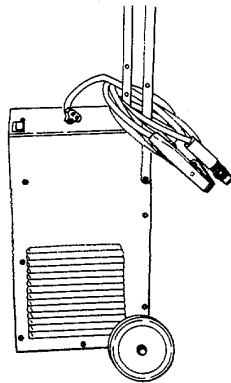
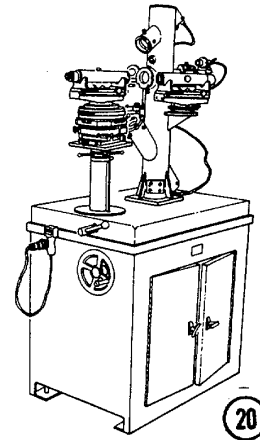
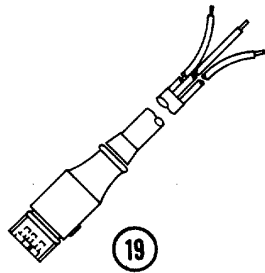
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) U/M	(5) QTY RQD
7		CABINET, STORAGE, 5 DRAWER (97403) 13225E3451	ea	3
8		CABINET, STORAGE, 2 DOOR (97403) 13225E3450	ea	4
9		CABINET, SMALL PARTS, STORAGE, 100 DRAWER (39428) 4620S11	ea	2
10		CABINET, SMALL PARTS, STORAGE, 12 DRAWER (28854) 512	ea	1
11		CABINET, STORAGE, SUPPLY (97403)13225E3792	ea	1
12		CABINET, STORAGE, 3 SHELF (97403) 13225E3895	ea	1

SECTION II COMPONENTS OF END ITEM - Cont



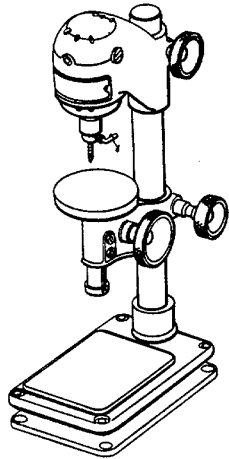
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) U/M	(5) QTY RQD
13		CABINET, STORAGE, TECH MANUALS (97403)13225E4648	ea	1
14		CABINET, STORAGE, WALL (97403)13225E3459	ea	1
15		CABINET, STORAGE, VEHICULAR MOUNTED BOOKCASE (97403)13225E4026	ea	1
16		CABINET, STORAGE (97403)13225E3629	ea	1
17	6150-00-134-0847	CABLE ASSEMBLY, POWER, ELECTRICAL (90129) RC 1736-5	ea	3
18	6150-00-866-2358	CABLE ASSEMBLY, POWER, ELECTRICAL (16428) MIL-C-3432	ea	1

SECTION II COMPONENTS OF END ITEM - Cont

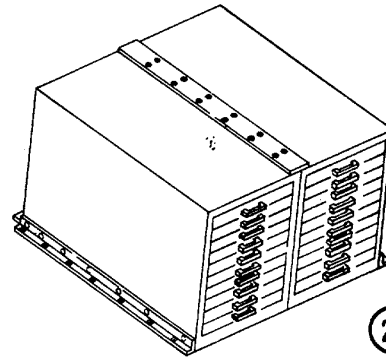


(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) U/M	(5) QTY RQD
19	2590-00-134-0848	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL (90129) X8728A	ea	1
20	6675-01-165-9444	CALIBRATOR, SHORT RANGE OPTICAL (09201) 270BN	ea	1
21		CHARGER, BATTERY (05884)1-600	ea	1
22	7910-00-205-3400	CLEANER, VACUUM, ELECTRIC (51745) MVV 3400	ea	1

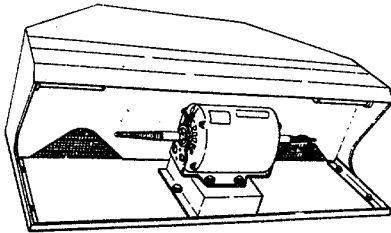
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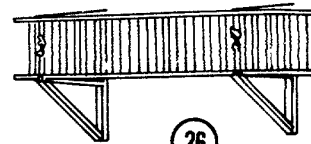
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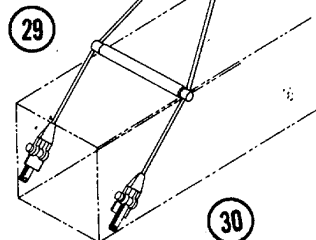
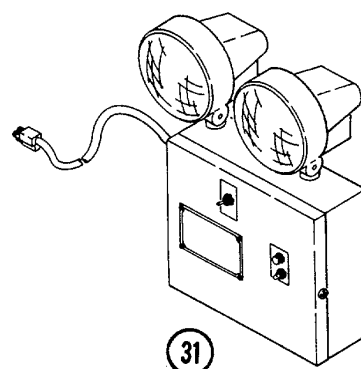
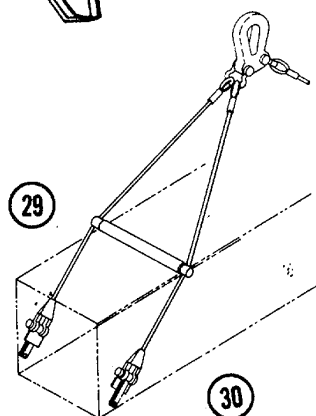
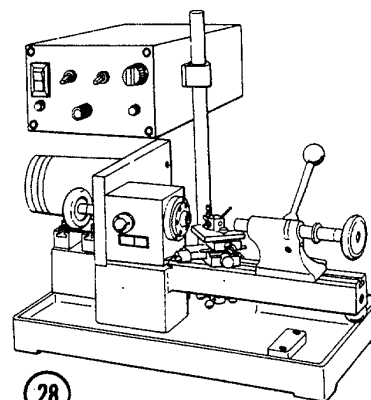
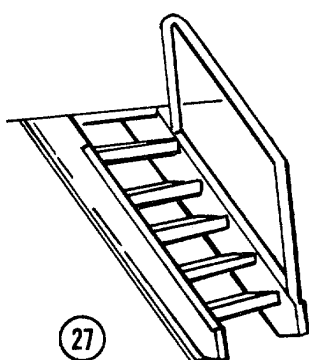
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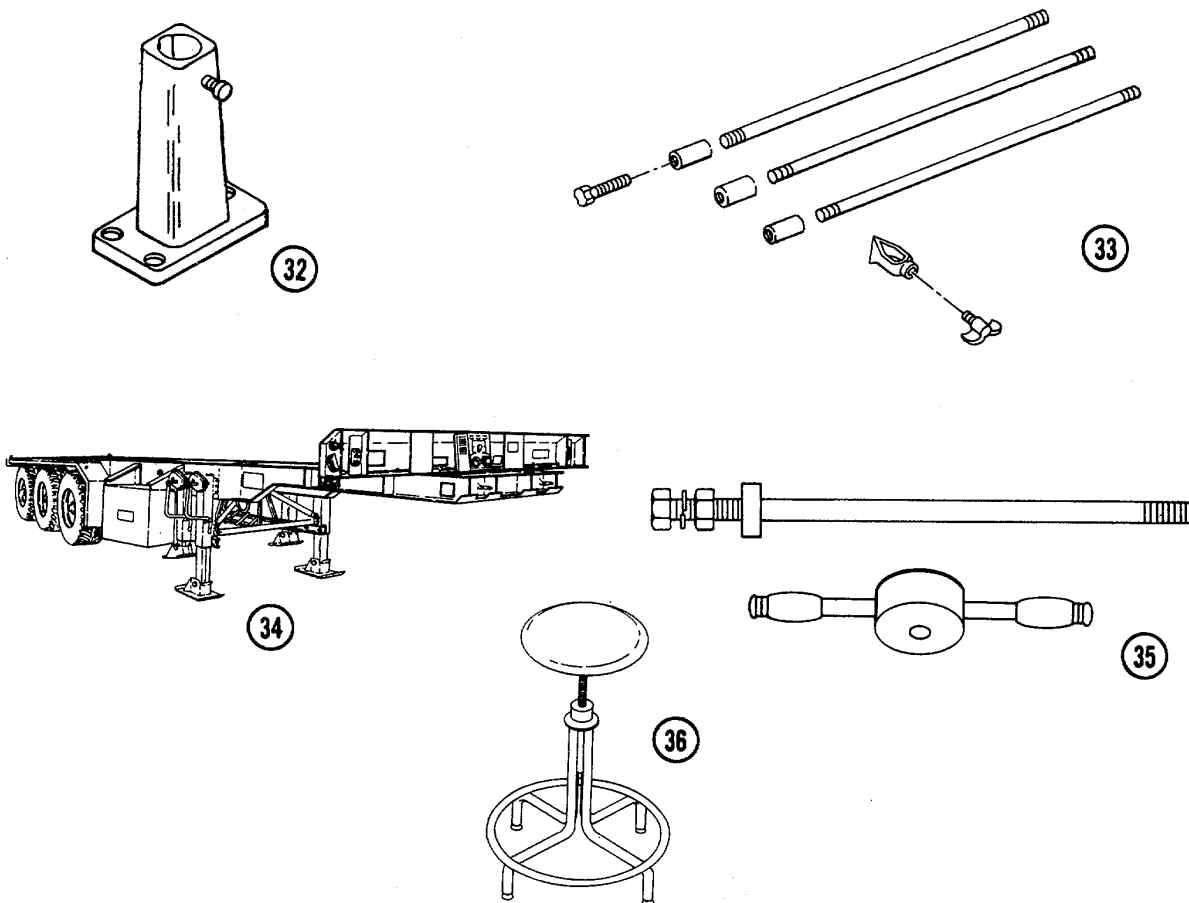
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) U/M	(5) QTY RQD
23	3413-01-198-5482	DRILL, MACHINE, UPRIGHT (18797) 8226	ea	1
24	7460-01-165-1052	FILE, VISIBLE INDEX, CABINET (39428) 4871T22	ea	2
25	3415-01-165-1043	GRINDING AND BUFFING MACHINE, UTILITY (18037) 765	ea	1
26	5440-01-152-7757	LADDER, EXTENSION - FOLDING (39428)8028T16	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	2540-01-133-9726	LADDER, VEHICLE BOARDING (97403) 13225E3074	ea	2
28	3416-01-180-7595	LATHE, JEWELER'S (35870) 1212-02	ea	1
29		LIFTING AND TIEDOWN DEVICE, TRANSPORTABLE SHELTER: left hand (52555) 1390-4	ea	2
30		LIFTING AND TIEDOWN DEVICE, TRANSPORTABLE SHELTER: right hand (52555) 1390-3	ea	2
31		LIGHT, EMERGENCY (97403) 13225E3396	ea	1

SECTION II COMPONENTS OF END ITEM - Cont



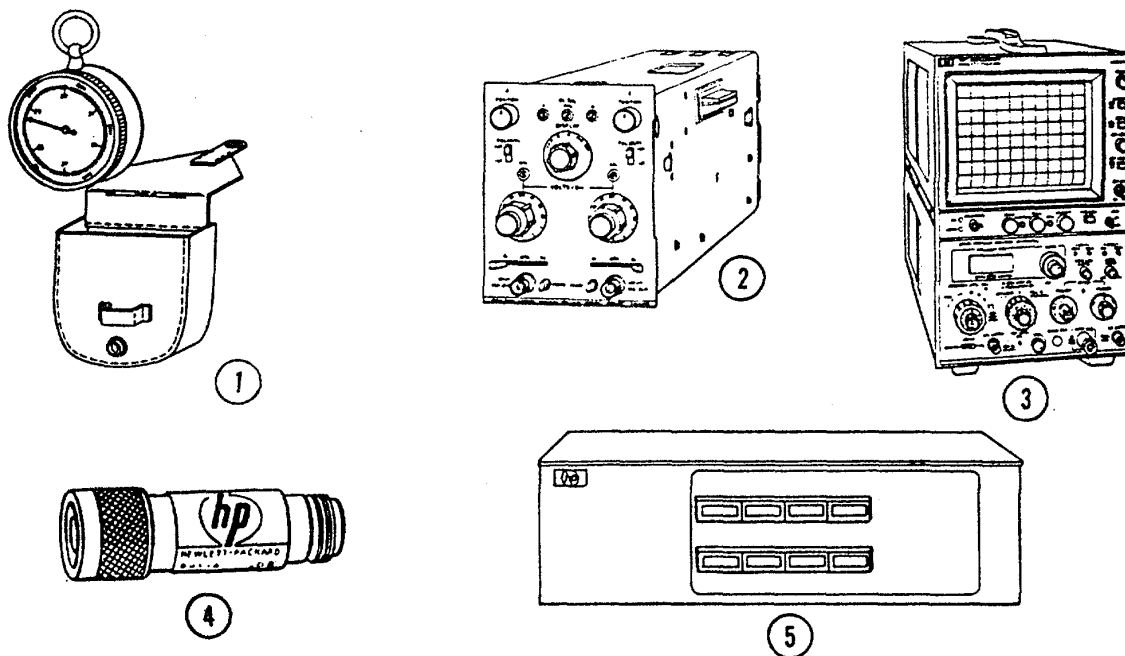
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
32	6650-00-575-7402	PILLAR STANDARD, OPTICAL (21175) 22-4055	ea	1
33	5975-00-878-3791	ROD, GROUND (81348) W-R-550	ea	1
34	2330-01-076-4797	SEMITRAILER, FLATBED (97403) TL/MIL-B-13207	ea	1
35	5120-01-013-1676	SLIDE HAMMER, GROUND ROD EMPLACEMENT (45225) P74-144	ea	1
36	7110-00-634-8596	STOOL, REVOLVING (09177) 60-100	ea	4

SECTION III BASIC ISSUE ITEMS

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	5935-00-280-1454	ADAPTER, CONNECTOR (96906) MS35184-914	ea	6
	5935-00-204-8392	ADAPTER, CONNECTOR (02660) 31-217	ea	4
	5935-00-701-3509	ADAPTER, CONNECTOR (02660) 2075	ea	4
	5935-00-149-3914	ADAPTER, CONNECTOR (54358) KC-91-01	ea	2
	5935-00-149-3534	ADAPTER, CONNECTOR (96906) MS90577-273	ea	2
	5935-00-681-5013	ADAPTER, CONNECTOR (96906) MS35176-491 B	ea	2
	5935-00-204-5098	ADAPTER, CONNECTOR (94923) 73-90914-1	ea	4
	5935-00-666-1649	ADAPTER, CONNECTOR (96906) MS35368-306B	ea	2
	5935-00-683-7892	ADAPTER, CONNECTOR (96906) MS35173-2740	ea	8
	5985-00-406-4631	ADAPTER, COUPLING (28480) X281 A	ea	1
	6675-01-062-2815	ADJUSTABLE PIN WRENCH (97403) 13222E5578	ea	2
	6675-00-035-3903	ADJUSTING TOOL, SPECIAL (97403)13218E3373	ea	1

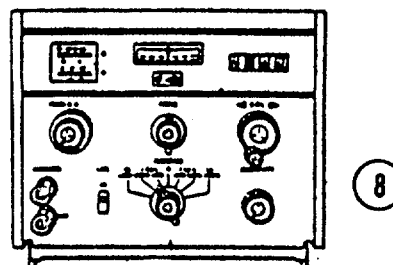
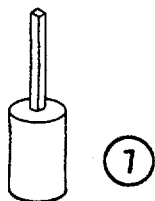
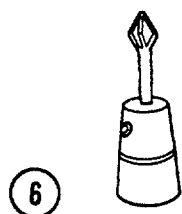
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SECTION III BASIC ISSUE ITEMS - Cont



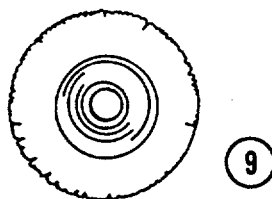
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
1	6660-00-078-6368	ALTIMETER-BAROMETER, ANEROID (59310) 2075F	ea	1
2	6625-01-096-3693	AMPLIFIER, 50 MHZ DUAL CHANNEL VERTICAL (28480) 1801A/OP5	ea	1
3	6625-01-096-3693	ANALYZER, SPECTRUM (28480) 8557A	ea	1
	8415-00-205-3895	APRON, CONSTRUCTION WORKER'S (53800) 51A11102	ea	1
		APRON, SHOP TYPE (39428) 5256T1	ea	8
		ARCH BOARD FILE (79819) 7-105712	ea	2
4	5985-00-167-0544	ATTENUATOR, FIXED (28480) 8491A10PT003	ea	1
5	6625-00-047-9555	ATTENUATOR, VARIABLE (28480) 3750A	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



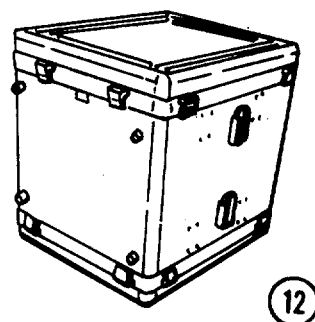
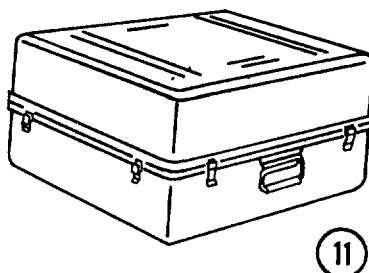
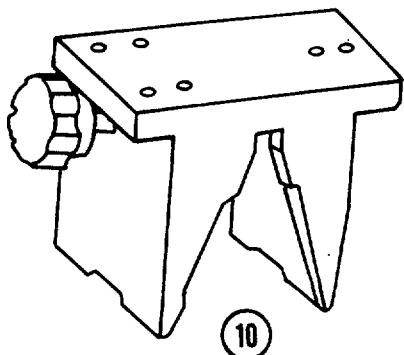
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	6760-00-161-2532	AUTOCOLLIMATOR, RICHARD (02145) 960303	ea	1
		BASE, WEIGHTED (15607) C	ea	3
	6140-00-635-3824	BATTERY FILLER, GRAVITY (72853) 74	ea	1
6	5120-00-180-0876	BIT, SCREWDRIVER (55719) TMP12A	ea	1
7	5120-00-044-1718	BIT, SCREWDRIVER (55719) TMA4-1/2	ea	1
	5120-00-254-4612	BLOWER, WATCHMAKERS (64959) R8950	ea	1
		BOOK: RCA transistor substitution handbook (77609) latest edition	ea	1
8	6625-00-236-1536	BRIDGE CAPACITANCE - INDUCTANCE RESISTANCE (28480) 4260A	ea	1
	8020-00-619-8929	BRUSH, ARTIST'S: metal ferrule round (06608)13308	ea	2
	8020-00-240-6361	BRUSH, ARTIST'S: ox ear hair (79819) 9397	ea	2
	7920-00-291-5812	BRUSH, DUSTING, DRAFTSMAN'S (79819) Q6-38NB-010	ea	1
	7920-00-205-1427	BRUSH, DUSTING, LENS AND PHOTOGRAPHIC NEGATIVE (81348) H-B-1654	ea	2

SECTION III BASIC ISSUE ITEMS - Cont



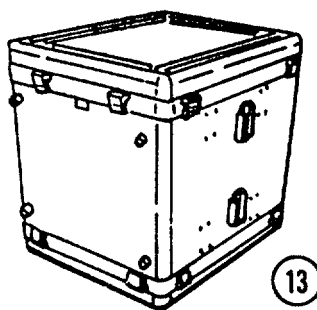
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	7920-00-224-7987	BRUSH, FILE CLEANER (81348) H-B-421	ea	1
	8020-00-297-6658	BRUSH, PAINT (39428) 7806T4	ea	2
	7510-00-550-8446	BRUSH, TYPEWRITER (79819) 03-52	ea	4
	8020-00-260-1306	BRUSH, VARNISH (39428) 7799T1	ea	2
	8020-00-260-1304	BRUSH, VARNISH (39428) 7799T3	ea	2
9	5130-00-596-0673	BRUSH, WIRE, ROTARY WHEEL (55719) AC618A	ea	1
	7920-00-291-5815	BRUSH, WIRE SCRATCH (39428) 7188T2	ea	1
	6675-00-035-3771	CABLE EXTENDER (97403)13218E3058	ea	2
	6145-00-542-6092	CABLE, RADIO FREQUENCY (92194) 9058C	ft	100
	5995-00-121-6334	CABLE ASSEMBLY, RADIO FREQUENCY (28480) 11501A	ea	2
	5995-00-070-8747	CABLE ASSEMBLY, RADIO FREQUENCY (28480) 10503A	ea	6
	5995-00-642-9560	CABLE ASSEMBLY, RADIO FREQUENCY (24655) 274 NP	ea	2
	6145-00-161-0887	CABLE ASSEMBLY, RADIO FREQUENCY (92194) 9008A	ft	5

SECTION III BASIC ISSUE ITEMS - Cont



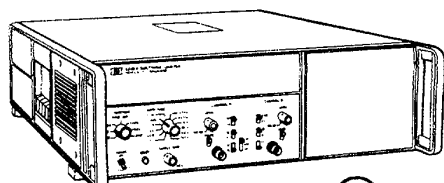
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	5995-00-753-1816	CABLE ASSEMBLY, RADIO FREQUENCY (52228) 11500A	ea	1
	5995-00-724-9599	CABLE ASSEMBLY, RADIO FREQUENCY (73408) 2248-60	ea	4
	6625-00-779-3865	CABLE ASSEMBLY, RADIO FREQUENCY, BRANCHED (24655) 274NO	ea	3
	5210-00-229-3051	CALIPER, INSIDE (39428) 2060A24	ea	1
	5210-00-229-3049	CALIPER, OUTSIDE (39428) 2060A16	ea	1
	5210-00-277-7549	CALIPER, VERNIER (57163) 122	ea	1
10		CARRIER, TRI-PACK (21175) 22-4162	ea	1
11		CASE, OSCILLOSCOPE (28480) 9211-1297	ea	1
12		CASE, OPERATING (51745) ID-00-376-1	ea	1

SECTION III BASIC ISSUE ITEMS - Cont

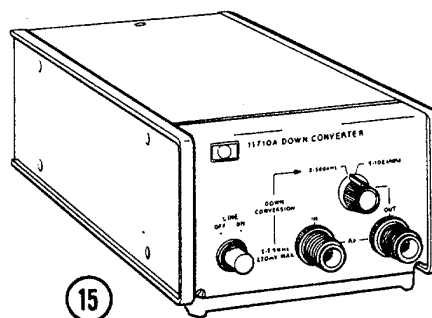


(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
13		CASE, OPERATING (51745) ID-00-376-2	ea	1
		CHUCK GRINDER (18037) CK956	ea	2
		CIRCUIT CARD EXTENDER, POLAR (D2789) 19219	ea	1
	3460-00-264-5535	CLAMP, PARALLEL, TOOLMAKER'S: (57163) 161B	ea	1
	5999-00-878-4311	CLIP, ELECTRICAL (76545) 70CS	ea	4
	5999-00-204-5206	CLIP, ELECTRICAL (76545) 60CS	ea	2
	5999-00-501-8365	CLIP, ELECTRICAL (83330) 361-103	ea	4
	5999-00-263-1051	CLIP, ELECTRICAL (83330) 316-102	ea	4
	5999-00-240-9775	CLIP, ELECTRICAL (76545) 45C	ea	20
	5999-00-204-8350	CLIP, ELECTRICAL (76545) 24C	pg	2
	5935-01-009-4501	CONNECTOR, PLUG, ELECTRICAL (81348) W-C-596/17-1	ea	6
	6625-01-111-1074	CONVERTER, FREQUENCY (28480) 5355A	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



14



15

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
14	6625-00-531-4752	COUNTER, ELECTRONIC, DIGITAL READOUT (28480) 5345A	ea	1
15	6625-01-063-8267	DOWN CONVERTER (28480) 11710 B	ea	1
	5210-00-263-0376	DIVIDERS, MECHANICS' (57163) 83-8	ea	1
	5120-00-223-9952	DRESSER, ABRASIVE WHEEL, HAND (39428) 4530A2	ea	1
	5110-00-293-3411	DRILL, HAND (39428) 2859A1	ea	1
	5110-00-241-4973	DRILL, PUSH (16892) 223	ea	1
	5133-01-052-3580	DRILL SET, TWIST (26232) 57725	se	3
	5133-01-101-9802	DRILL, TWIST (26232) 503-44367	ea	2
	5133-01-101-9799	DRILL, TWIST (26232) 503-44366	ea	2
	5133-01-101-9800	DRILL, TWIST (26232) 503-44365	ea	2
	5133-01-101-9801	DRILL, TWIST (26232) 503-44364	ea	2
	5133-01-101-9802	DRILL, TWIST (26232) 503-44363	ea	2

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
	5133-01-101-9803	DRILL, TWIST (26232) 503-44362	ea	2
	5133-01-101-9804	DRILL, TWIST (26232) 503-44360	ea	2
	5133-01-101-9805	DRILL, TWIST (26232) 503-44359	ea	2
	5133-01-101-9791	DRILL, TWIST (26232) 503-48356	ea	2
	5133-01-101-9806	DRILL, TWIST (26232) 503-44355	ea	2
	5133-01-101-9790	DRILL, TWIST (26232) 503-48364	ea	2
	5133-01-101-9789	DRILL, TWIST (26232) 503-48367	ea	2
	5133-01-101-9798	DRILL, TWIST (26232) 503-47210	ea	2
	5133-01-101-9797	DRILL, TWIST (26232) 503-47211	ea	2
	5133-01-101-9796	DRILL, TWIST (26232) 503-47215	ea	2
	5133-01-101-9795	DRILL, TWIST (26232) 503-47217	ea	2
	5133-01-101-9794	DRILL, TWIST (26232) 503-47219	ea	2
	5133-01-101-9793	DRILL, TWIST (26232) 503-47221	ea	2
	5133-01-101-9792	DRILL, TWIST (26232) 503-47225	ea	1
	5133-01-101-9788	DRILL, TWIST (26232) 503-47227	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
	5133-01-101-9787	DRILL, TWIST (26232) 503-47228	ea	2
	5133-01-101-9786	DRILL, TWIST (26232) 503-47229	ea	1
	5133-01-101-9785	DRILL, TWIST (26232) 503-47231	ea	1
	5133-01-101-9784	DRILL, TWIST (26232) 503-47235	ea	2
	5133-01-101-9783	DRILL, TWIST (26232) 503-47237	ea	1
	5133-01-101-9782	DRILL, TWIST (26232) 503-47239	ea	1
	5133-01-101-9781	DRILL, TWIST (26232) 503-47241	ea	1
	5133-01-101-9780	DRILL, TWIST (26232) 503-47245	ea	1
	5133-01-101-9779	DRILL, TWIST (26232) 503-47247	ea	1
	5133-01-101-9778	DRILL, TWIST (26232) 503-47249	ea	1
	5133-01-101-9777	DRILL, TWIST (26232) 503-47251	ea	1
	5133-01-101-9776	DRILL, TWIST (26232) 503-47254	ea	1
	5133-01-101-9775	DRILL, TWIST (26232) 503-47255	ea	1
	5133-01-101-9774	DRILL, TWIST (26232) 503-47257	ea	1
	5133-01-101-9773	DRILL, TWIST (26232) 503-47258	ea	1

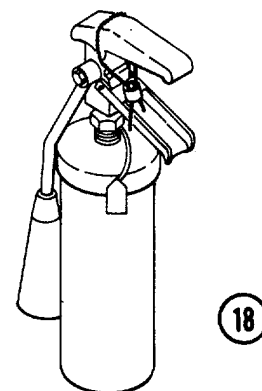
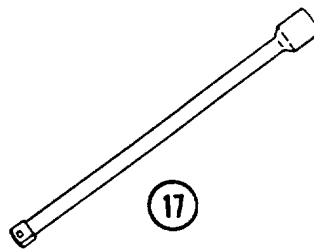
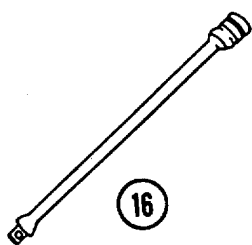
SECTION III BASIC ISSUE ITEMS - Cont

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	5133-01-101-9772	DRILL, TWIST (26232) 503-47260	ea	1
	5133-01-101-9771	DRILL, TWIST (26232) 503-47263	ea	1
	5133-01-101-9770	DRILL, TWIST (26232) 503-47264	ea	1
	5133-01-101-9769	DRILL, TWIST (26232) 503-47264	ea	1
	5133-01-101-9768	DRILL, TWIST (26232) 503-47266	ea	1
	5133-01-101-9767	DRILL, TWIST (26232) 503-47267	ea	1
	5133-01-101-9766	DRILL, TWIST (26232) 503-47269	ea	1
	5133-01-101-9765	DRILL, TWIST (26232) 503-47270	ea	1
	5133-01-101-9764	DRILL, TWIST (26232) 503-47272	ea	1
	5133-01-101-9763	DRILL, TWIST (26232) 503-47273	ea	1
	5133-01-101-9762	DRILL, TWIST (26232) 503-47275	ea	1
	5133-01-101-9761	DRILL, TWIST (26232) 503-47276	ea	1
	5133-01-101-9760	DRILL, TWIST (26232) 503-47278	ea	1
	5133-01-101-9759	DRILL, TWIST (26232) 503-47279	ea	1
	5133-01-101-9758	DRILL, TWIST (26232) 503-47281	ea	1

SECTION III BASIC ISSUE ITEMS - Cont

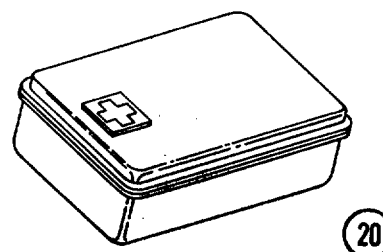
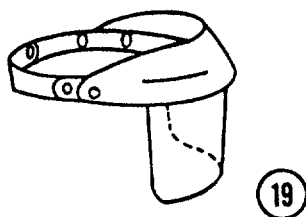
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	5133-01-101-9757	DRILL, TWIST (26232) 503-47282	ea	1
	5133-01-101-9756	DRILL, TWIST (26232) 503-47284	ea	1
	5133-01-101-9826	DRILL, TWIST (26232) 503-47285	ea	1
	5133-01-101-9825	DRILL, TWIST (26232) 503-47287	ea	1
	5133-01-101-9824	DRILL, TWIST (26232) 503-47288	ea	1
	5133-01-101-9823	DRILL, TWIST (26232) 503-47290	ea	1
	5133-01-101-9755	DRILL, TWIST (26232) 503-47291	ea	1
	5133-01-101-9822	DRILL, TWIST (26232) 503-47293	ea	1
	5133-01-101-9821	DRILL, TWIST (26232) 503-47294	ea	1
	5133-01-101-9820	DRILL, TWIST (26232) 503-47296	ea	1
	5133-01-101-9519	DRILL, TWIST (26232) 503-47297	ea	1
	5133-01-101-9818	DRILL, TWIST (26232) 503-47299	ea	1
	5133-01-101-9817	DRILL, TWIST (26232) 503-47300	ea	1
	5133-01-101-9816	DRILL, TWIST (26232) 503-47302	ea	1
	5133-01-101-9815	DRILL, TWIST (26232) 503-47303	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



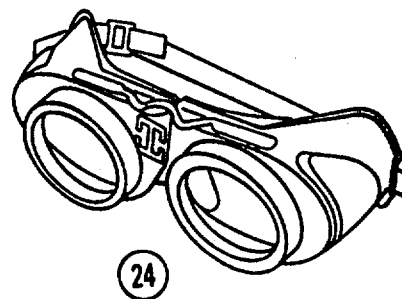
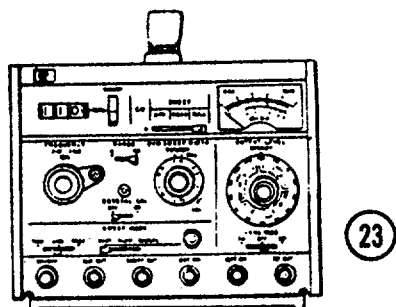
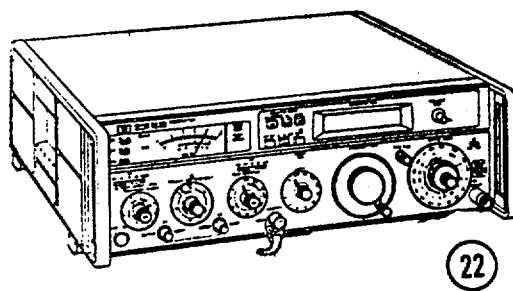
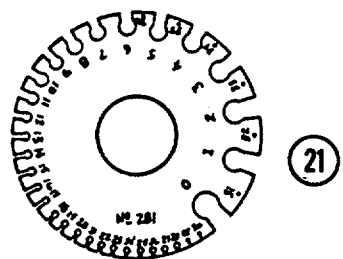
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	5133-01-101-9814	DRILL, TWIST (26232) 503-47305	ea	1
	5133-01-101-9813	DRILL, TWIST (26232) 503-47306	ea	1
	5133-01-101-9812	DRILL, TWIST (26232) 503-47308	ea	1
	5133-01-101-9811	DRILL, TWIST (26232) 503-47309	ea	1
	5133-01-101-9810	DRILL, TWIST (26232) 503-47311	ea	1
	5133-01-101-9809	DRILL, TWIST (26232) 503-47312	ea	1
	5133-01-101-9808	DRILL, TWIST (26232) 503-47314	ea	1
16	5120-00-227-8107	EXTENSION, SOCKET WRENCH (55719) FX6	ea	1
17	5120-00-243-7325	EXTENSION, SOCKET WRENCH (65814) M 115	ea	1
18	4210-00-555-8837	EXTINGUISHER, FIRE, MONOBROMOTRIFLUOROMETHANE (81349) MIL-E-52031	ea	2

SECTION III BASIC ISSUE ITEMS - Cont



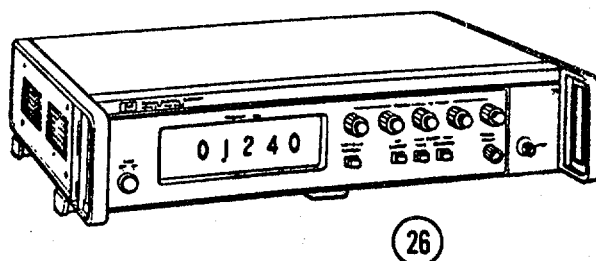
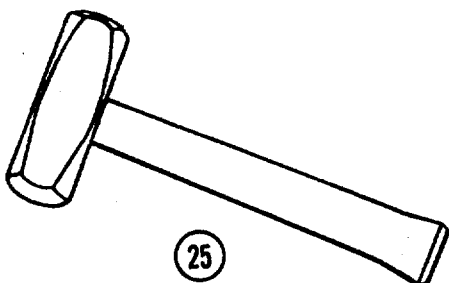
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
19	5120-00-596-1072	FACE, HAMMER, INSERTED (39428) 5877A61	ea	2
	5120-00-293-2999	FACE, HAMMER, INSERTED (39428) 5877D71	ea	2
	4240-00-439-3450	FACESHIELD, INDUSTRIAL (81348) L-F-36	ea	1
		FEELER GAGE SET, METRIC, 25 BLADE (93389) OOMM25	ea	1
	5110-00-242-5383	FILE, HAND (39428) 4236D21	ea	2
	5110-00-234-6550	FILE, HAND (39428) 4233A25	ea	2
20	5110-00-204-2685	FILE SET, HAND (18037) ZZSM2	se	1
	6545-00-922-1200	FIRST AID KIT, GENERAL PURPOSE (89875) SC C-6545-IL	ea	1
	6675-01-025-3292	FOCUS SCOPE (94987) 639-9006	ea	1
	5110-00-223-4972	FRAME, JEWELER'S SAW (18037) SF 19	ea	1
	5210-00-221-1993	GAGE, SCREW PITCH (57163) 158M	ea	1
	5210-00-221-1991	GAGE, SCREW PITCH (57163) 156	ea	1
		GAGE, SCREW PITCH (52346) L143B777	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



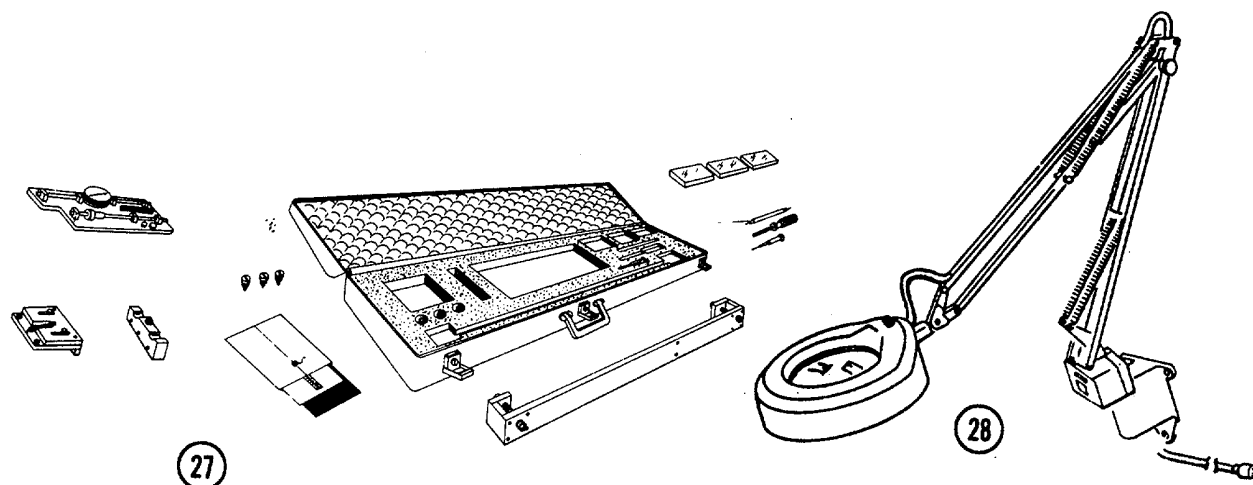
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	5210-00-221-1894	GAGE, TWIST DRILL AND TAP (57163) 185	ea	1
21	5210-00-238-3106	GAGE, WIRE (57163) 281	ea	1
	5120-00-490-4283	GEAR PULLER, 3 ARM, 5 in.	ea	1
22	6625-00-500-6525	GENERATOR, SIGNAL (28480) 8640B	ea	1
23	6625-00-135-9866	GENERATOR, SWEEP (28480) 8601A	ea	1
	8415-00-687-3956	GLOVES, CHEMICAL AND OIL PROTECTIVE (65662) 32917-140	pr	4
24	4240-00-269-7912	GOGGLES, INDUSTRIAL (73804) 5023A	pr	3
	4930-00-965-0288	GREASE GUN (77335) 30-171	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



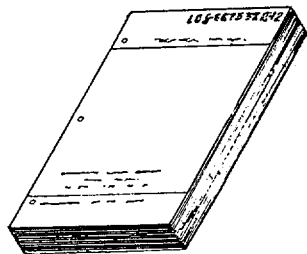
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
25	5120-00-251-4489	HAMMER, HAND (39428) 5884B15	ea	1
	5120-00-293-1155	HAMMER, HAND (58692) T51943	ea	1
	3439-00-631-6821	HANDLE, ELECTRIC SOLDERING IRON (78976) 776	ea	1
	5110-00-595-8325	HANDLE, FILE (73792) 890	ea	4
		HEAT GUN (59164) EP-7	ea	1
	3439-00-020-8596	HEATING UNIT, ELECTRIC SOLDERING IRON (78976) 4037-S	ea	1
		HEX BIT SET, METRIC, 9 PIECE, 4 mm to 17mm (93389) 4900M	se	1
	5120-00-903-8546	HOLDER, INSERTED HAMMER FACE (39428) 5877A12	ea	1
26	6625-00-414-6626	INDICATOR, DIGITAL DISPLAY (28480) 8600A	ea	1
	5120-00-915-4588	INSTALLING AND REMOVAL TOOL, CONNECTOR, ELECTRICAL CONTACT (81349) M81969/14-03	ea	1
	5970-00-266-2268	INSULATION, SLEEVING, ELECTRICAL (1 H351) 708-4514	ft	5
	5970-00-266-2263	INSULATION, SLEEVING, ELECTRICAL (96904) NATVAR	ft	5

SECTION III BASIC ISSUE ITEMS - Cont

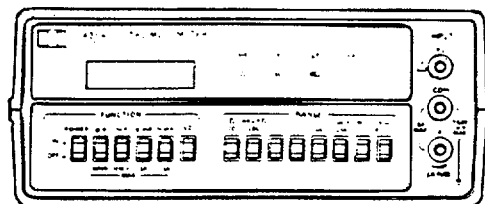


(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
27	5970-00-729-2996	INSULATION, SLEEVING, ELECTRICAL (94033) 596B31	ft	2
	6675-00-035-3774	INTERCONNECT BREAKOUT BOX (97403)13218E3055	ea	1
	5120-01-046-5079	KEY SET, METRIC, SOCKET HEAD SCREW, 14 KEYS, 2 mm to 19 mm (55719) AWM140CK	se	1
	5120-00-729-6392	KEY SET, SOCKET HEAD SCREW (81348) GGG-K-275 TY1 CL1	se	1
	1260-01-091-1926	KIT, ALINEMENT ASSEMBLY (52326)1441	kt	1
	6240-00-797-2650	LAMP, INCANDESCENT (33363) A51645	ea	1
	6625-00-079-1426	LEAD SET, TEST (28480) 11002A	ea	4
	6230-00-901-9755	LIGHT, EXTENSION (78011) 1510	ea	1
28	6650-00-252-6271	MAGNIFIER, MONOCULAR (06175) 81-41-92	ea	1
	6650-00-477-9613	MAGNIFIER, MONOCULAR (15607) KFM1B5D	ea	3

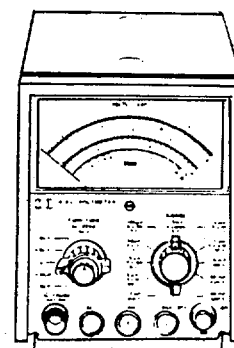
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29



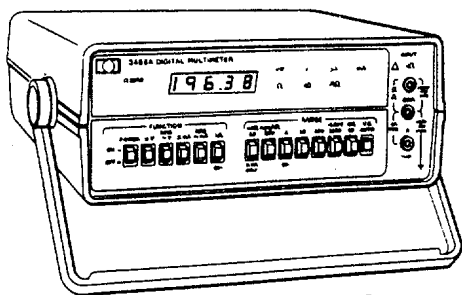
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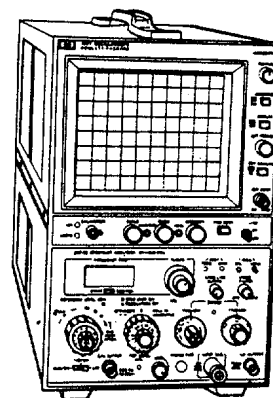
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(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
29	5120-00-448-2455	MANOMETER, 5 1/4 in. dia., 0-200 bar (D2789) 010929 MANUALS, TECHNICAL: LO 5-6675-328-12, Lubrication Order, TSS, Maintenance Section TM 5-6675-328-14, Operator's, Organizational, DS & GS Maintenance Manual, TSS Maintenance Section TM 5-6675-328-24P, Repair Parts and Special Tools List, TSS, Maintenance Section MIRROR ASSEMBLY, REARVIEW (29469) E69	ea	1
30	6625-01-128-8015	MIRROR, INSPECTION (00194) 554	ea	2
31	6625-00-969-4105	MULTIMETER, PORTABLE (28480) 3435A	ea	1
		MULTIMETER, PORTABLE (28480) 410C	ea	1

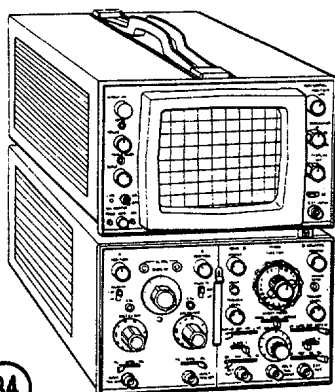
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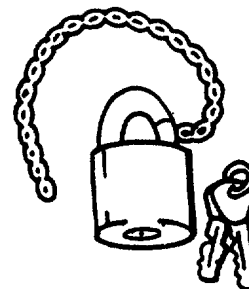
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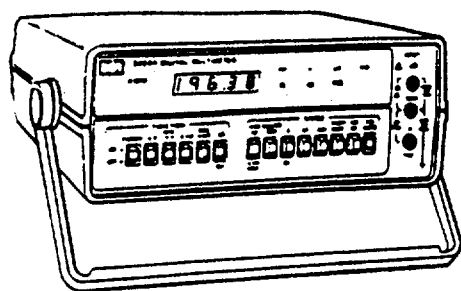
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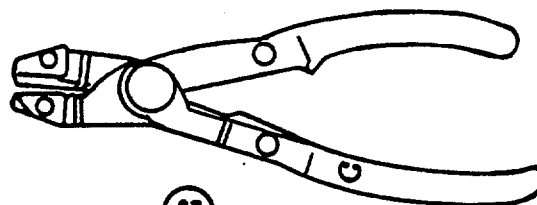
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(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
32	6625-01-118-9914	MULTIMETER, PORTABLE (28480) 3466A	ea	2
	4930-00-537-8977	OILER, HAND (34871) FACO1024	ea	1
33	6625-01-047-7468	OSCILLOSCOPE (28480) 182T	ea	1
34	6625-01-135-6977	OSCILLOSCOPE, SUBASSEMBLY (28480) 180C	ea	1
35	5340-00-682-1505	PADLOCK SET (77765) MS21313-52	se	1

SECTION III BASIC ISSUE ITEMS - Cont



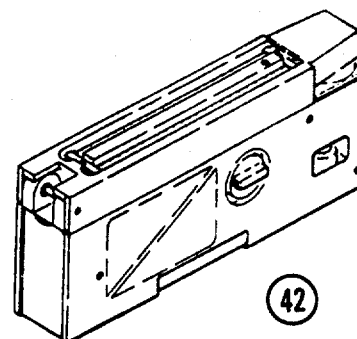
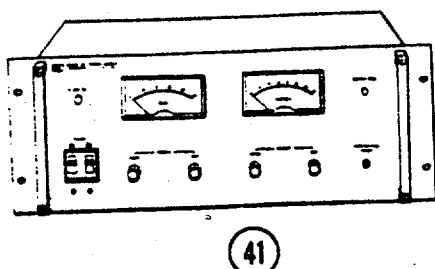
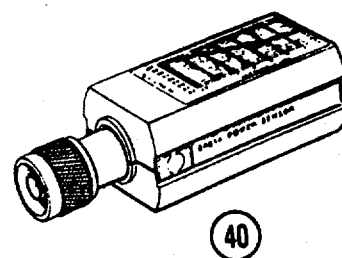
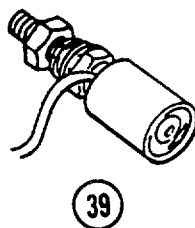
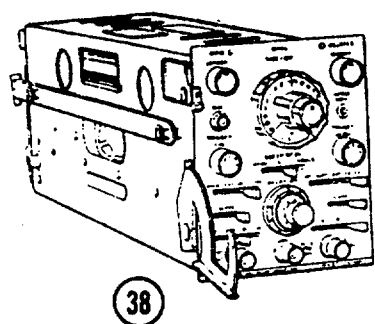
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37

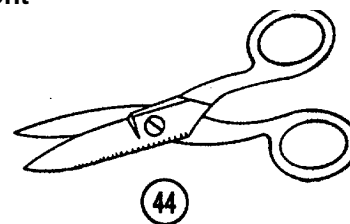
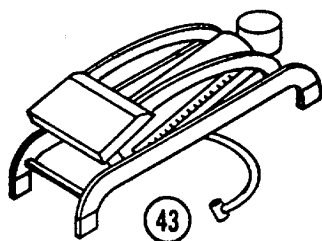
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
36	6695-00-548-8067	PHOTOMETER, DIGITAL, RADIOMETER (80009) J-16	ea	1
	6675-00-641-3525	PIN, ADJUSTING, SURVEYING INSTRUMENT (6R248) 3855	ea	20
	6675-00-353-4103	PIN, SURVEYING, CASE HARDENED (89905)0664	ea	2
	5120-00-227-7097	PLIERS (39428) 5642A14	ea	1
	5120-00-227-7093	PLIERS (39428) 5635A1	ea	1
	5120-00-268-3579	PLIERS (55719) 96	ea	1
	5120-00-239-8250	PLIERS (55719) 497CP	ea	1
	5120-00-222-2708	PLIERS, DIAGONAL CUTTING (79000) 39	ea	1
		PLIERS, NOTCH-NOSE (94987) 639-9007	ea	1
37	5120-01-038-1225	PLIERS SET, RETAINING RING (85688) 4440R	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
	5935-00-581-1385	PLUG, TIP (83330) 213-103	ea	10
38	6625-00-229-7041	PLUG-IN UNIT, ELECTRONIC TEST EQUIPMENT (28480)1821A	ea	1
39	5940-00-781-9240	POST, BINDING, ELECTRICAL (95692) 3590-2031-50B	ea	20
40	6625-00-354-9762	POWER SENSOR (28480) 8481A	ea	1
41		POWER SUPPLY (28480) 6268B	ea	1
	6625-01-070-2312	PROBE, HIGH VOLTAGE (28480) 34111A	ea	1
		PROBE, LUMINANCE (80009) J6503	ea	1
42		PSYCHROMETER, HAND, ELECTRICAL (23667) 524120-3	ea	2

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
43	6675-00-420-4751	PUMP, INFLATING, MANUAL (53800) 6 A 49454	ea	1
		PUNCH SET, DRIVE PIN AND CENTER (52346) 21 B270	se	1
		PYROMETER (39428) 4094K11	ea	1
		REFLECTOR ASSEMBLY (95036) 330F902	ea	1
		REFLECTOR, ASSEMBLY, TRIPRISM (73996) 7220-51	ea	1
	7240-00-244-7412	SAFETY CAN, FIXED SPOUT (39428) 4290T12	ea	1
44	5110-00-255-0420	SCISSORS, ELECTRICIAN'S (75347) 2100-5	ea	1
	5120-00-421-0498	SCREWDRIVER, CROSS TIP (55719) TMP01	ea	1
	5120-00-234-8913	SCREWDRIVER, CROSS TIP (81348) GGG-S-121	ea	1
	5120-00-234-8910	SCREWDRIVER, FLAT TIP (72368) 2143-6	ea	1
	5120-00-236-2137	SCREWDRIVER, FLAT TIP (75347) 601-3	ea	1
	5120-00-288-8739	SCREWDRIVER SET, JEWELER'S SWIVEL KNOB (33164) 250	ea	1
	5120-00-596-9591	SCREWDRIVER SET, OFFSET (55719) ST50	se	1

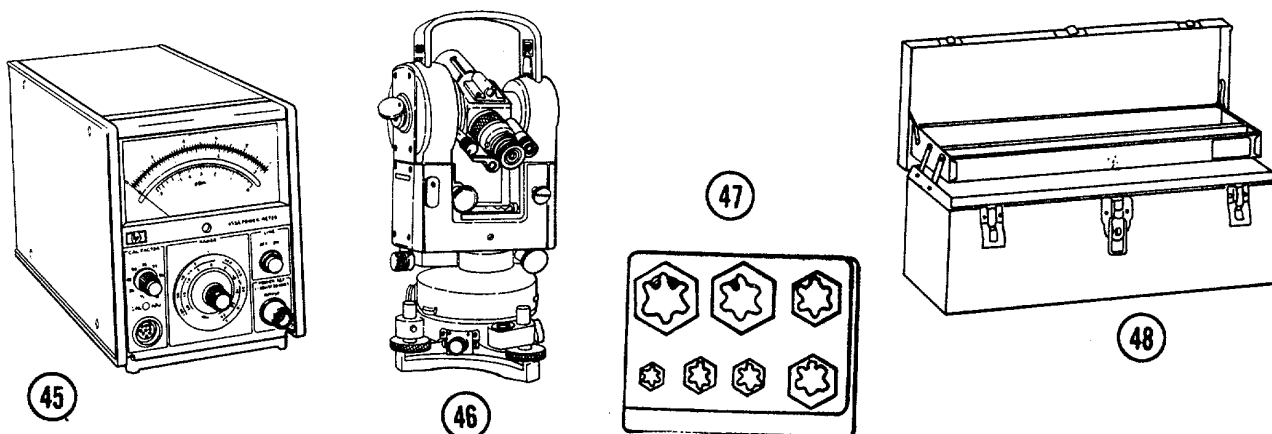
SECTION III BASIC ISSUE ITEMS - Cont

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
	5120-00-224-9728	SCRIBER, MACHINIST'S (39428) 2157A11	ea	1
	5120-01-117-3876	SOCKET SET, METRIC, 6 POINT, 3/8 in. drive, 21 sockets, 6 mm to 26 mm (55719) 221FSMY	se	1
	5120-01-115-1151	SOCKET SET, METRIC, 6 POINT, 1/4 in. drive, 12 sockets, 4 mm to 14 mm (55719) 112TMMY	se	1
	5120-00-935-4612	SOCKET WRENCH ATTACHMENT, SOCKET HEAD SCREW (97942) 579R153H03	ea	2
	3439-00-629-2697	SOLDERING AID TOOL (72653) 9086	ea	2
	3439-00-204-3859	SOLDERING IRON, ELECTRIC (39428) 7715D12	ea	1
		SOLDERING PENCIL, ELECTRIC (78976) 776-45	ea	1
	5210-00-078-8949	SQUARE, COMBINATION (57163) 435	ea	1
	5345-00-260-0758	STONE, SHARPENING (39428) 4506A3	ea	1
	5345-00-265-3126	STONE, SHARPENING (10670) 3501-3517	ea	1
		STRAP ASSEMBLY, BUCKLE-END: 6.0 in. (51745) 1844-104	ea	25
		STRAP ASSEMBLY, BUCKLE-END: 9.0 in. (82820) 1844-103	ea	1
		STRAP ASSEMBLY, BUCKLE-END: 7.0 in. (82820) 1844-102	ea	20
		STRAP ASSEMBLY, TIP-END: 23.0 in. (82820) 1845-103	ea	3

SECTION III BASIC ISSUE ITEMS - Cont

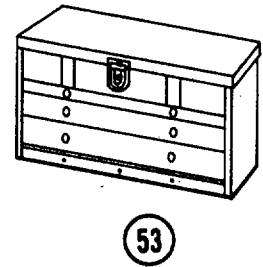
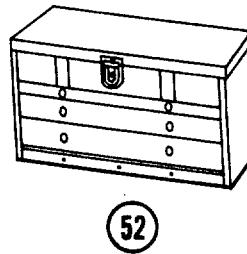
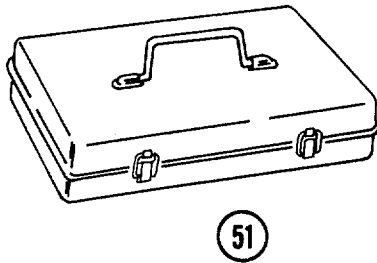
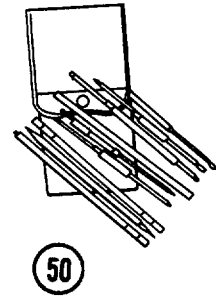
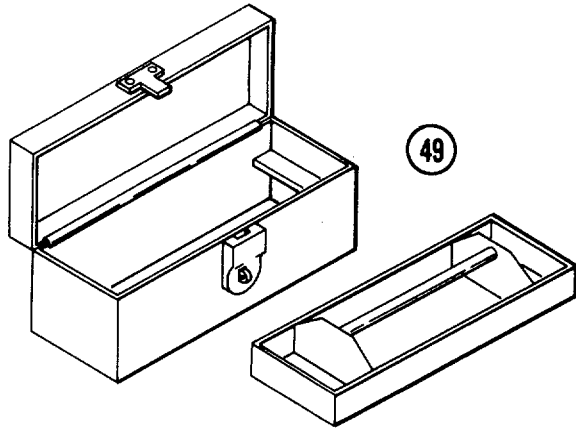
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
		STRAP ASSEMBLY, TIP-END: 36.0 in. (82820) 1845-106	ea	28
		STRAP ASSEMBLY, TIP-END: 40.0 in. (82820) 1845-101	ea	11
		STRAP ASSEMBLY, TIP-END: 58.0 in. (82820) 1845-105	ea	2
		STRAP ASSEMBLY, WEBBING: 30.0 in. (98313) 13225E3695-8	ea	6
		STRAP ASSEMBLY, WEBBING: 38.0 in. (98313) 13225E3695-7	ea	4
		STRAP ASSEMBLY, WEBBING: 55.0 in. (98313) 13225E3695-6	ea	6
		STRAP ASSEMBLY, WEBBING: 55.0 in. (98313) 13225E3695-4	ea	10
		STRAP ASSEMBLY, WEBBING: 94.0 in. (98313) 13225E3695-10	ea	7
		STRAP ASSEMBLY, WEBBING: 103.0 in. (98313) 13225E3695-9	ea	3
		STRAP ASSEMBLY, WEBBING: 120.0 in. (98313) 13225E3695-11	ea	2
		STRAP ASSEMBLY, WEBBING: 29.0 in. (98313) 13225E3695-13	ea	2
		TAP SET, THREAD CUTTING (26232) 5353-14720	se	1
		TAP SET, THREAD CUTTING (26232) 5353-1472B	se	1
		TARGET SET (89905) 373758	se	2
		TEST RESISTOR, 86.6 k OHM, 1%, 1/2 watt (76381) 78-9020-1358-9	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



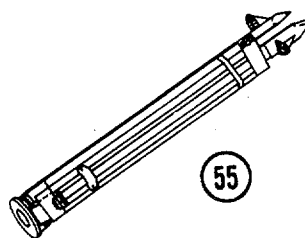
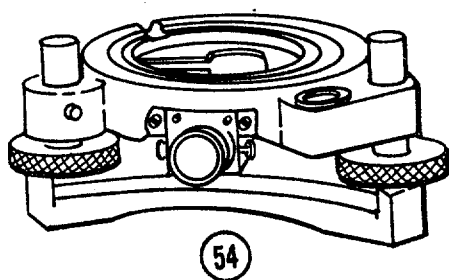
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
45	6625-00-449-9167	TEST SET, RADIO FREQUENCY POWER (28480) 435A	ea	1
	6630-00-171-5157	TESTER, BATTERY ELECTROLYTE SOLUTION (93489) 171 E	ea	1
46	6675-00-684-5171	THEODOLITE, SURVEYING (89905) T2-68MIL	ea	1
	5180-00-293-2896	THREADING SET, SCREW (26232) 00526	se	1
47		THREADING SET, SCREW (39428) 2621A2, W2578D1, and 2546A12	se	1
		THREADING SET, SCREW AND DRILLS (26232) 48D-00450	se	1
		THREADING SET, SCREW AND DRILLS (26232) 49D-00451	se	1
	3439-00-346-3538	TIP, ELECTRIC SOLDERING IRON (78976) 332	ea	6
	3439-00-294-5103	TIP, ELECTRIC SOLDERING IRON (89264) 454334	ea	6
	3439-00-801-0952	TIP, ELECTRIC SOLDERING IRON (78976) 333	ea	6
48	5140-00-319-5079	TOOL BOX, PORTABLE (75206) 520	ea	1

SECTION III BASIC ISSUE ITEMS - Cont



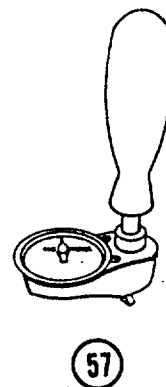
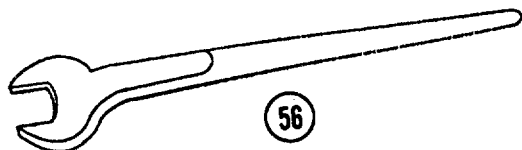
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
49	5140-00-315-2747	TOOL BOX, PORTABLE (75206) CS 16	ea	1
50	5180-00-451-4540	TOOL KIT, ALINEMENT (80112)9200	ea	1
51	5180-00-605-0079	TOOL KIT, ELECTRONIC EQUIPMENT (80063) SC 5180-91-CL-S21	se	3
52	5180-00-610-8177	TOOL KIT, ELECTRONIC EQUIPMENT (80063) SC 5180-91-CL-R07	se	2
53	5180-00-596-1538	TOOL KIT, PRECISION INSTRUMENT REPAIR (50980) SC 5180-90-CL-N53	se	1
	4940-00-528-9145	TRAY, SHOP MAINTENANCE (05668) 7235-10	ea	2

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
54	6675-01-092-4575	TRIBACH, SURVEYING INSTRUMENT (89905) 372689	ea	2
55	6675-00-641-3572	TRIPOD, SURVEYING (89905) GST21	ea	3
	5120-00-293-0149	TWEEZERS, CRAFTSMAN'S (91292) 60	ea	2
	5120-00-243-1350	VISE, HAND (24551) 7362	ea	1
	5120-00-288-9192	VISE, JEWELER'S (39428) 5299A12	ea	1
	5120-00-224-7271	VISE, PIN (18037) PVDA	ea	1
	3460-00-540-0925	WHEEL, ABRASIVE (18037) CX604C	ea	1
		WHEEL, ABRASIVE (18037) CX604F	ea	1
	5120-00-264-3795	WRENCH, ADJUSTABLE (80244) GGG-W-631 TY1 CL1	ea	1
		WRENCH, METRIC, COMBINATION BOX AND OPEN END, 46 mm (93889) 1246M	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
	5120-01-119-0010	WRENCH SET, METRIC, COMBINATION BOX AND OPEN END, 12 point, 19 wrenches, 10 mm to 32 mm (55719) OEXM719K	se	1
	5120-0.1-041-1585	WRENCH SET, METRIC, COMBINATION BOX AND OPEN END, 6 point, 6 wrenches, 5 mm to 9 mm (55719) OXIM706K	se	1
	5120-00-089-3663	WRENCH SET, SOCKET (96508) PS-120	ea	1
56	5120-01-029-8032	WRENCH, SPANNER (94987) 639-9005	ea	1
57	5120-00-890-7816	WRENCH, TORQUE (55719) TQS-6-FU	ea	1

Pages C-36 through C-45/C-46 is deleted.

Change 1 C-35/(C-36 blank)

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

SECTION I INTRODUCTION

D-1. SCOPE.

This appendix lists additional items you are authorized for the support of the Maintenance Section.

D-2. GENERAL.

This list identifies items that do not have to accompany the Maintenance Section and 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
6115-00-722-3760	Generator Set, DSL Eng TM: 15 kW	EA	1
5805-00-543-0012	Telephone, TA 312/PT	EA	1

Change 1 D-1/(D-2 blank)

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 Analysis Section. This listing is for information purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS

a. Column (1) Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 5, Appendix E.").

b. Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Organizational Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

c. Column (3) National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by two-character alphabetical abbreviations (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE / DURABLE SUPPLIES AND MATERIAL LIST - Cont

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
	C	6810-00-223-2739	Acetone, Technical: liquid form	PT
	C	8040-00-270-8150	Adhesive	TU
	C	8040-00-680-1080	Adhesive	TU
1	O	8040-00-174-2610	Adhesive, Rubber	CN
2	F	8040-00-152-0063	Adhesive, Waterproof	CN
	C	6810-00-201-0906	Alcohol, Denatured	PT
	C	7520-00-281-5911	Basket, Wastepaper	EA
	C	6135-00-120-1020	Battery, Dry	EA
	C	6135-00-120-1019	Battery, Dry	EA
	O	9160-00-253-1173	Beeswax, Technical	CK
	O	5110-00-241-2582	Blade, Jeweler's Saw	PG
	C	8530-00-162-5629	Blade, Safety Razor	BX
	C	7510-00-223-6706	Chalk, Marking	GR
	C	8330-00-965-1722	Chamois Leather, Sheepskin	EA
	C	9110-00-254-9001	Charcoal, Wood	BX
3	C	6850-00-592-3283	Cleaner, Lens	BK

SECTION II. EXPENDABLE / DURABLE SUPPLIES AND MATERIAL LIST - Cont

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
		6850-00-392-9751	Cleaning Compound, Optical Lens	BT
	O	6850-00-597-9765	Cleaning Compound, Solvent	GL
	C	6850-00-944-2306	Cleaning Solution, Ultrasonic	GL
4	C	8305-00-222-2423	Cloth, Cheesecloth	YD
5	C	6850-01-597-9765	Concentrate, Cleaning	GL
6	C	7930-00-530-8067	Detergent, General Purpose	GL
	C	8010-00-527-2053	Enamel: full gloss, black	EA
	O	8010-00-527-3199	Enamel: full gloss, red	EA
	O	8010-00-515-1596	Enamel: full gloss, white	EA
7	O	5610-00-618-0258	Floor Patch	GL
	F	3439-00-260-1264	Flux, Soldering	CN
	C	9150-00-985-7246	Grease, Aircraft and Instrument	CN
	O	9150-00-484-4009	Grease Cartridges, 14 oz.	PK
8	O	9150-00-985-7244	Grease, GIA	TU
9	F		Heat Sink Compound, Dielectric (01139) GE623	TU
	O	9150-01-119-7273	Lubricating Oil, Instrument	BT
10	C	9150-00-273-2389	Oil, Lubricating, General Purpose	CN
11	O	9150-00-052-9498	Oil, SAE 20 wt	QT

SECTION II. EXPENDABLE / DURABLE SUPPLIES AND MATERIAL LIST - Cont

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
12	O	8010-00-598-5052	Paint, Enamel, White	GL
13	O	8010-01-131-6254	Paint, Black	KT
13A	O	8010-01-160-6745	Paint, Brown	KT
13B	O	8010-01-162-5578	Paint, Green	KT
14	O	8010-00-298-3859	Paint, Light Green, INT.	GL
15	C	5350-00-619-9166	Paper, Abrasive	PK
	C	5610-00-161-2672	Plaster, Gypsum	BG
	O	8010-01-122-2135	Polyurethane Coating	QT
	O	8010-01-193-0520	Primer	KT
16	O	7920-00-205-1711	Rags	50/LB
17	F	8010-01-030-7254	Resin, Epoxy	KT
	C	6850-00-944-2306	Rinsing Solution, Ultrasonic (17656)	GL
	C	3439-00-255-4566	Rosin, Paste	CN
	O	5350-00-240-2213	Rouge, Abrasive	CK
18	O	FSCM 39428	Screen, Nylon (39428) 1017A31)	RO
19	O	8040-00-851-0211	Sealant, Silicone	TU
	C	6850-00-880-7616	Silicone Compound	TU
	C	7930-00-170-5467	Soap, Saddle	CN
	C	5970-00-542-7135	Sleeving, Textile, Electrical	EA

SECTION II. EXPENDABLE / DURABLE SUPPLIES AND MATERIAL LIST - Cont

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
20	O	3439-00-273-3722	Solder, Rosin Core	SL
	O	3439-00-289-8648	Solder, Tin Alloy	LB
21	O	6850-00-274-5421	Solvent, P-D-680	CN
	C	7920-00-240-2555	Sponge, Cellulose	EA
22	C	6850-00-880-1013	Spray, Silicone	CN
23	O		Sprayfoam Sealant (P/N 7627T1) (39428) 7627T1	CN
	C	9160-00-253-0877	Tallow, Inedible	CN
24	O	5640-00-103-2254	Tape, Cloth, Duct Sealing, 2 in.	RO
25	C	5970-00-926-7218	Tape, Insulating, Electrical	RO
	C		Tape, Insulation, Electrical (20999)17	RO
	C	8010-00-165-5540	Thinner, Dope and Lacquer	QT
26	C	6640-00-597-6745	Tissue, Lens Cleaning	BK
27	C	4020-00-231-5878	Twine, Fibrous	LB
28	O	8010-00-160-5851	Varnish, Oil	QT

* U.S. GOVERNMENT PRINTING OFFICE: 1986 652-126/20217

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GLOSSARY

ABBREVIATION/TERM	DEFINITION
Aim	To regulate direction of a sighting device.
Alidade.....	All upper parts of theodolite that turns in azimuth with sighting device.
Autocollimation	When an alinement scope is focused on a reflecting surface so that the reflecting image of the reticle is in register with its reticle pattern.
Autoreflexion.....	When an alinement scope is focused to reveal the image of the autoreflexion target and this is made to register with the reticle pattern.
Azimuth.....	Direction in horizontal plane.
Azimuth Axis	Vertical axis of bearing and spindle which confines rotation to horizontal plane.
Azimuth, To Turn in.....	To change direction in horizontal plane.
Buck In.....	To place an instrument so that line of sight satisfies two requirements (like aiming at two targets) simultaneously. It is usually accomplished by trial and error.
Circular Level (Bullseye)	Round level attached to instrument.
Collimation	To place an instrument so that the line-of-sight is alined at both a far and near target.
Elevation Axis	Axis of bearing and journal of telescope axle which confines rotation to vertical plane.
Elevation of Line of Sight	Direction of line of sight in vertical plane.
Focus.....	To move optical part so that sharp image is seen.
Horizontal.....	Perpendicular to direction of gravity.
Objective Lens	Lens at front end of telescope.

GLOSSARY - Cont

ABBREVIATION/TERM	DEFINITION
Plunge	Rotation of optical sighting telescope 1800in vertical plane.
Rectifier	Device for converting alternating current into direct current.
Reference Line.....	Line of sight from which measurements are made.
Tangent Screw.....	Hand-operated screw which changes direction of line of sight either in azimuth or in elevation.
Telescopic Sight.....	Optical system that consists of objective lens and focusing device that forms image on cross-line reticle which is viewed through eyepiece that magnifies image and cross-line together.
Vertical.....	In direction of gravity.

Glossary 2

INDEX

SUBJECT PARAGRAPH

BATTERY CHARGER

A

Ammeter, Replace 7-20.1

C

Characteristics, Capabilities, and Features 7-2.1
 CHARGING RATE Switch, Replace..... 7-20.2
 Circuit Breaker, Replace 7-20.4
 Components, Location and Description of Major..... 7-2.2
 Conditions, Operation Under Unusual..... 7-7
 Conditions, Operation Under Usual 7-6

D

Data, Equipment..... 7-2.3
 Description and Use of Operator's Controls
 and Indicators..... 7-4
 Diode, Replace 7-20.5
 Direct/General Support Troubleshooting 7-19

E

Equipment Data..... 7-2.3
 Equipment Description..... 7-2
 Equipment, Repair Parts, Special Tools;
 Test, Measurement, and Diagnostic
 Equipment; and Support..... 7-12, 7-18

G

General Information..... 7-1

INDEX - Cont

SUBJECT PARAGRAPH

BATTERY CHARGER - Cont

I

Indicators, Description and Use of Operator's
 Controls and 7-4
 Information, General 7-1
 Information, Reference 7-1.2
 Instructions, Lubrication 7-8, 7-11

L

Location and Description of Major Components 7-2.2
 Lubrication Instructions 7-8, 7-11

M

Maintenance Procedures 7-10, 7-16, 7-20
 Major Components, Location and Description of 7-2.2

O

Operation, Technical Principles of 7-3
 Operation Under Unusual Conditions 7-7
 Operation Under Usual Conditions 7-6
 Operator's Controls and Indicators, Description and Use of 7-4
 Operator Preventive Maintenance Checks and Services 7-5
 Organizational Preventive Maintenance Checks and Services 7-14
 Organizational Troubleshooting 7-15

P

Preparation for Storage or Shipment 7-17
 Preventive Maintenance Checks and
 Services 7-5, 7-14
 Procedures, Maintenance 7-10, 7-16, 7-20

INDEX - Cont

SUBJECT PARAGRAPH

BATTERY CHARGER - Cont

R

Receipt, Service Upon 7-13

Reference Information 7-1.2

Repair Parts, Special Tools; Test,
Measurement, and Diagnostic Equipment;
and Support Equipment..... 7-12, 7-18

Replace:

 Ammeter 7-20.1

 Charging Rate Switch..... 7-20.2

 CB1, Circuit Breaker..... 7-20.4

 Diode 7-20.5

 Timer 7-20.3

 Voltmeter 7-20.1

S

Scope 7-1.1

Services, Preventive Maintenance

 Checks and 7-5, 7-14

Service Upon Receipt 7-13

Shipment, Preparation for Storage or 7-17

T

Technical Principles of Operation 7-3

Timer, Replace 7-20.3

Troubleshooting Procedures 7-9, 7-15, 7-19

V

Voltmeter, Replace 7-20.1

INDEX - Cont

SUBJECT PARAGRAPH

CALIBRATOR

A

Aline Collimators 2-6.2
 Alinement Telescope (81):
 Calibrate..... 2-6.1
 Mounting 2-6.1
 Alinement Telescope (381-1):
 Calibrate..... 2-6.1
 Mounting 2-6.1
 Assembly and Preparation for Use 2-6.1

C

Characteristics, Capabilities and Features 2-2.1
 Collimators, Aline 2-6.2
 Control Handle, Replace..... 2-10.2
 Controls and Indicators, Description and Use of..... 2-4

D

Data, Equipment..... 2-2.3
 Description and Use of Operator's Controls and Indicators..... 2-4
 Direct/General Support Troubleshooting 2-19

E

Equipment Data..... 2-2.3
 Equipment Description..... 2-2

F

Fuse, Replace 2-10.1

G

General Information..... 2-1
 Glossary 2-1.3

INDEX - Cont

SUBJECT PARAGRAPH

CALIBRATOR - Cont

L

Leveling Mirror (287-1):
 Aline 2-6.2
 Mounting 2-6.1
 Location and Description of Major Components 2-2.2
 Lubrication Instructions 2-8, 2-11

M

Major Components, Location and Description of 2-2.2
 Maintenance Procedures 2-10, 2-16, 2-20
 Motor(s), Replace 2-20.3
 Movement, Preparation for 2-6.4
 Multiple Target Collimator:
 Calibrate 2-6.1
 Mounting 2-6.1

O

Operating Instructions on Decals and Instruction Plates 2-6.5
 Operating Procedures 2-6.3
 Operation Under Unusual Conditions 2-7
 Operation Under Usual Conditions 2-6
 Operator's Controls and Indicators, Description and Use of 2-4
 Operator Preventive Maintenance Checks and Services 2-5
 Optical Plummet Collimator, Remove/Install 2-20.4
 Organizational Preventive Maintenance Checks and Services 2-14
 Organizational Troubleshooting 2-15

P

Preparation for Storage or Shipment 2-17
 Preparation for Movement 2-6.4
 Preparation for Use, Assembly and 2-6.1
 Preventive Maintenance Checks and Services 2-5, 2-14
 Principles of Operation, Technical 2-3
 Procedures, Maintenance 2-10, 2-16, 2-20
 Procedures, Operating 2-6.3

INDEX - Cont

SUBJECT PARAGRAPH

CALIBRATOR - Cont

R

Receipt, Service Upon 2-13

Reference Information 2-1.2

Remove/Install:

 Optical Plummet Collimator 2-20.4

 Short-Range Optical Calibrator 2-20.5

Replace:

 Control Handle 2-10.2

 Fuse 2-10.1

 Motor(s) 2-20.3

 Rheostat 2-20.1

 Toggle Switch 2-20.1

 Transformer 2-20.2

Rheostat, Replace 2-20.1

Rotating Index Table:

 Adjustment 2-6.1

 Mounting 2-6.1

S

Scope 2-1.1

Stride Level:

 Calibrate 2-6.1

 Mounting 2-6.1

Storage and Shipment, Preparation for 2-17

T

Target Collimator (272-1 and 272-15):

 Calibrate 2-6.1

 Mounting 2-6.1

Technical Principles of Operation 2-3

Test Instruments:

 Accommodated 2-2.3

 Mounting 2-6.1, 2-6.2

Toggle Switch, Replace 2-20.1

Transformer, Replace 2-20.2

Troubleshooting 2-9, 2-15, 2-19

INDEX - Cont

SUBJECT

PARAGRAPH

DRILL PRESS

C

Characteristics, Capabilities, and Features 3-2.1
 Conditions, Operation Under Unusual..... 3-7
 Conditions, Operation Under Usual..... 3-6
 Controls and Indicators,
 Description and Use of Operator's..... 3-4

D

Data, Equipment..... 3-2.2
 Description and Use of Operator's Controls
 and Indicators..... 3-4
 Drill Press, Replace 3-16.4

E

Equipment Data..... 3-2.2
 Equipment Description..... 3-2
 Equipment Characteristics, Capabilities, and Features..... 3-2.1
 Equipment, Repair Parts, Special Tools; Test,
 Measurement, and Diagnostic Equipment; and
 Support 3-12

F

Foot Controller, Replace 3-16.5

G

General Information..... 3-1

I

Information, General 3-1
 Instructions, Lubrication..... 3-8, 3-11

INDEX - Cont

SUBJECT PARAGRAPH

DRILL PRESS - Cont

L

Lubrication Instructions..... 3-8, 3-11

M

Maintenance Procedures..... 3-10, 3-16
 Motor Assembly, Replace..... 3-16.2
 Motor Brushes, Replace..... 3-16.3

O

Operation, Technical Principles of 3-3
 Operation Under Unusual Conditions 3-7
 Operation Under Usual Conditions 3-6
 Operator's Controls and Indicators, Description
 and Use of..... 3-4
 Operator Preventive Maintenance Checks
 and Services..... 3-5
 Organizational Preventive Maintenance Checks and Services..... 3-14
 Organizational Troubleshooting 3-15

P

Power Cord, Replace..... 3-16.2
 Power Switch, Replace..... 3-16.1
 Preparation For Storage or Shipment 3-17
 Press, Drill, Replace 3-16.4
 Procedures, Maintenance..... 3-10, 3-16

R

Repair Parts, Special Tools; Test, Measurement,
 and Diagnostic Equipment; and Support
 Equipment..... 3-12
 Replace:
 Drill Press..... 3-16.4
 Foot Controller 3-16.5
 Motor Assembly..... 3-16.2

INDEX - Cont

SUBJECT PARAGRAPH

DRILL PRESS - Cont

R - Cont

Motor Brushes 3-16.3
 Power Cord..... 3-16.2
 Toggle Switch..... 3-16.1

S

Scope 3-1
 Service Upon Receipt 3-13
 Special Tools; Test, Measurement, and Diagnostic
 Equipment; and Support Equipment 3-12
 Storage or Shipment, Preparation for 3-17

T

Troubleshooting..... 3-9, 3-15

FURNITURE AND CABINETS

B

Bench Top Storage Cabinet, Remove/Install 9-16.13
 Bookcase, Custom 9-2
 Bookcase, Custom, Remove/Install 9-16.11
 Bookcase, Vehicular Mounted..... 9-2
 Bookcase, Vehicular Mounted, Remove/Install 9-16.9

C

Cabinet, Five Drawer Storage..... 9-2
 Cabinet, Flammable Liquid Storage..... 9-2
 Cabinet, Four-Shelf Storage 9-2
 Cabinet, 100 Drawer..... 9-2
 Cabinet, Storage..... 9-2
 Cabinet, 12 Drawer 9-2
 Cabinet, Two-Door Storage 9-2
 Cabinet, Wall Storage..... 9-2
 Custom Bookcase..... 9-2
 Custom Bookcase, Remove/Install 9-16.11

INDEX - Cont

SUBJECT FURNITURE AND CABINETS - Cont PARAGRAPH

D

Door Latch, Replace (Flush Type) 9-16.2
Door Latch, Replace (Wall Storage Cabinet) 9-16.3
Drawer Latch, Replace 9-16.1
Drawer, Workbench 9-2

E

Equipment Description 9-2

F

File, Visible Index 9-2
Five-Drawer Storage Cabinet 9-2
Flammable Liquid Storage Cabinet 9-2
Four-Shelf Storage Cabinet 9-2

G

General Information 9-1

H

Hinge, Replace 9-16.5
Hinge, Replace, (Piano Hinge) 9-16.6

I

Inspect Cabinets and Furniture 9-10.1
Instructions, Lubrication 9-8, 9-11

INDEX - Cont

SUBJECT

PARAGRAPH

FURNITURE AND CABINETS - Cont

L

Latch, (Storage Cabinet), Replace 9-16.4
 Latch, Door, (Flush-Type), Replace 9-16.2
 Latch, Door, (Wall Storage Cabinet), Replace 9-16.3
 Latch, Drawer, Replace 9-16.1
 Lubrication Instructions..... 9-8, 9-11

M

Maintenance Procedures 9-10, 9-16

O

Operation, Technical Principles of 9-3
 Operation Under Unusual Conditions 9-7
 Operation Under Usual Conditions 9-6
 Operator's Controls and Indicators, Description and Use of 9-4
 Operator Preventive Maintenance Checks and Services..... 9-5
 Organizational Preventive Maintenance Checks and Services..... 9-14
 Organizational Troubleshooting 9-15

P

Preparation for Storage and Shipment 9-17
 Preventive Maintenance Checks and Services 9-5, 9-14
 Procedures, Maintenance 9-10, 9-16

INDEX - Cont

SUBJECT PARAGRAPH

FURNITURE AND CABINETS - Cont

R

Receipt, Service Upon 9-13

Remove/Install:

- Custom Bookcase 9-16.11
- Flammable Liquid Storage Cabinet 9-16.16
- Storage Cabinet, Four-Shelf 9-16.12
- Storage Cabinet, Bench Top..... 9-16.13
- Storage Cabinet 9-16.14
- Wall Storage Cabinet 9-16.8
- Work Station Storage Cabinet Assemblies 9-16.7
- Vehicular Mounted Bookcase 9-16.9
- Visible Index File 9-16.17
- 12 Drawer Storage Cabinet 9-16.15
- 100 Drawer Storage Cabinet..... 9-16.10

Replace:

- Hinge. 9-16.5
- Hinge, (Piano Hinge) 9-16.6
- Latch, Door, (Flush Type).....-9-16.2
- Latch, Door, (Wall Storage Cabinet) 9-16.3
- Latch, Drawer..... 9-16.1
- Latch, (Four-Shelf Storage Cabinet) 9-16.4

Revolving Stool 9-2

S

Scope 9-1.1

Service Upon Receipt..... 9-13

Stool, Revolving. 9-2

T

Technical Principles of Operation. 9-3

Troubleshooting Procedures..... 9-9, 9-15

V

Vehicular Mounted Bookcase..... 9-2

Vehicular Mounted Bookcase, Remove/Install 9-16.9

Visible Index File 9-2

Visible Index File, Remove/Install 9-16.17

INDEX - Cont

SUBJECT PARAGRAPH

FURNITURE AND CABINETS - Cont

W

Wall Storage Cabinet 9-2
 Wall Storage Cabinet, Remove/Install 9-16.8
 Workbench Drawer..... 9-2

GRINDER AND DUST CONTROL ASSEMBLY

A

Assembly and Preparation for Use 4-6.1

C

Characteristics, Capabilities, and Features 4-2.1
 Conditions, Operation Under Unusual..... 4-7
 Conditions, Operation Under Usual..... 4-6
 Controls and Indicators, Description and
 Use of Operator's 4-4

D

Data, Equipment..... 4-2.2
 Description and Use of Operator's Controls
 and Indicators..... 4-4
 Dust Control Assembly, Replace 4-16.2

E

Equipment Data..... 4-2.2
 Equipment Description..... 4-2
 Equipment Characteristics, Capabilities, and Features..... 4-2.1
 Equipment, Repair Parts, Special Tools;
 Test, Measurement, and Diagnostic
 Equipment; and Support 4-12
 Equipment, Special Tools; Test, Measurement,
 and Diagnostic Equipment; and Support..... 4-12

INDEX - Cont

SUBJECT

PARAGRAPH

GRINDER AND DUST CONTROL ASSEMBLY - Cont

F

Filter, Replace 4-10.1

G

General Information 4-1

Grinder, Replace 4-16.1

I

Information, General 4-1

Instructions, Lubrication 4-8, 4-11

L

Lubrication Instructions 4-8, 4-11

M

Maintenance Procedures 4-10, 4-16

O

Operating Instructions on Decals and Instruction Plates 4-6.3

Operating Procedures 4-6.2

Operation, Technical Principles of 4-3

Operation Under Unusual Conditions 4-7

Operation Under Usual Conditions 4-6

Operator's Controls and Indicators, Description
and Use of 4-4

Operator Preventive Maintenance Checks and Services 4-5

Organizational Preventive Maintenance Checks and Services 4-14

Organizational Troubleshooting 4-15

INDEX - Cont

SUBJECT

PARAGRAPH

GRINDER AND DUST CONTROL ASSEMBLY - Cont

P

Preparation for Storage or Shipment..... 4-17
Preventive Maintenance Checks and
Services 4-5, 4-14
Procedures, Maintenance 4-10, 4-16
Procedures, Operating..... 4-6.2

R

Repair Parts, Special Tools; Test,
Measurement, and Diagnostic Equipment;
and Support Equipment..... 4-12
Replace:
Filter 4-10.1
Grinder..... 4-16.1
Dust Control Assembly..... 4-16.2

S

Scope..... 4-1
Services, Preventive Maintenance
Checks and 4-5, 4-14
Shipment, Preparation for Storage or 4-17
Special Tools; Test, Measurement, and Diagnostic
Equipment; and Support Equipment. 4-12

T

Technical Principles of Operation 4-3
Troubleshooting..... 4-9, 4-15

U

Use, Assembly and Preparation for 4-6.1

INDEX - Cont

SUBJECT PARAGRAPH

LATHE

A

Adjust Drive Belt..... 5-16.2
 Assembly, Headstock 5-2.2
 Assembly, Tailstock..... 5-3.2

B

Bed, Lathe..... 5-3.3

C

Characteristics, Capabilities and Features 5-2.1
 Chip Tray..... 5-3.4
 Components, Location and Description of Major..... 5-2.2
 Compound Slide Rest 5-3.7
 Conditions, Operation Under Unusual..... 5-7
 Conditions, Operation Under Usual 5-6
 Controls and Indicators, Description and Use of Operator's 5-4
 Controller 5-3.5
 Controller, Replace..... 5-16.6

D

Description and Use of Operator's Controls
 and Indicators 5-4
 Drive Belt, Replace/Adjust 5-16.2
 Drive Motor..... 5-3.6
 Drive Motor, Replace 5-16.1

E

Equipment Description..... 5-2
 Equipment Characteristics, Capabilities and Features..... 5-2.1
 Equipment, Repair Parts, Special Tools;
 Test, Measurement, and Diagnostic
 Equipment; and Support 5-12

INDEX - Cont

SUBJECT

PARAGRAPH

LATHE - Cont

G

General Information..... 5-1

H

Headstock Assembly 5-2.2
 Headstock Assembly, Replace..... 5-16.3

I

Information, General 5-1
 Instructions, Lubrication 5-8, 5-11

L

Lathe Bed 5-3.3
 Location and Description of Major Components..... 5-2.2
 Lubrication Instructions 5-8, 5-11

M

Motor, Drive, Replace 5-16.1

O

Operating Procedures..... 5-6.1
 Operation, Technical Principles of 5-3
 Operation Under Unusual Conditions 5-7
 Operation Under Usual Conditions 5-6
 Operator's Controls and Indicators, Description and Use of 5-4
 Operator Preventive Maintenance Checks and Services..... 5-5
 Organizational Preventive Maintenance Checks and Services..... 5-14
 Organizational Troubleshooting 5-15

INDEX - Cont

SUBJECT
LATHE - Cont

PARAGRAPH

P

Preparation for Storage or Shipment..... 5-17
Preventive Maintenance Checks and
Services 5-5, 5-14
Procedures, Operating..... 5-6.1

R

Receipt, Service Upon 5-13
Repair Parts, Special Tools; Test,
Measurement, and Diagnostic Equipment;
and Support Equipment..... 5-12
Replace:
Controller 5-16.6
Drive Belt 5-16.2
Drive Motor 5-16.1
Headstock Assembly 5-16.3
Slide Rest..... 5-16.5
Tailstock Assembly..... 5-16.4

S

Scope 6-1.1
Services, Preventive Maintenance
Checks and 5-5, 5-14
Shipment, Preparation for Storage or 5-17
Slide Rest, Replace 5-16.5

T

Tailstock Assembly 5-3.2
Tailstock Assembly, Replace 5-16.4
Technical Principles of Operation 5-3
Tray, Chip..... 5-3.4
Troubleshooting 5-9, 5-15

INDEX - Cont

SUBJECT

PARAGRAPH

MAINTENANCE SECTION

A

Air Conditioner/Heater, Replace 1-20.8
 Air Conditioner Support Bracket, Replace 1-20.9
 Air Vent Cover, Replace 1-16.16
 Air Vent Screen, Replace..... 1-16.15

B

Ballast, Fluorescent Lamp, Replace 1-16.1
 Blackout/Dome Light, Replace 1-10.3
 Blackout/Dome Light Microswitch, Replace 1-16.5
 Blackout Curtain, Repair 1-16.11
 Breaker, Circuit, Replace 1-20.5

C

Cargo Door Latch Assembly, Replace 1-20.2
 Characteristics, Capabilities; and Features 1-2.1
 Circuit Breaker, Replace 1-20.5
 Common Tools and Equipment..... 5-12, 5-18
 Components, Location and Description of Major..... 1-2.3
 Conditions, Operations Under Unusual 1-7
 Conditions, Operations Under Usual 1-6
 Cover, Air Vent, Replace 1-16.17
 Cover, Ventilation Fan, Replace 1-16.10
 Curtain, Blackout, Repair 1-16.12

D

Data, Equipment..... 1-2.4
 Description and Use of Operator's Controls
 and Indicators..... 1-4
 Destruction of Material to Prevent Enemy Use..... 1-1.5
 Door, Personnel/Cargo, Replace 1-20.4
 Door Gasket, Personnel/Cargo, Replace..... 1-20.3
 Door Handle, Personnel, Repair 1-20.1
 Door Latch Assembly, Cargo, Replace..... 1-20.2
 Duct, Ventilation, Replace 1-20.10
 Duct, Ventilation, Service 1-10.2

INDEX - Cont

SUBJECT

PARAGRAPH

MAINTENANCE SECTION - Cont

E

Emergency Light, Replace..... 1-16.11
 Equipment Data..... 1-2.4
 Equipment Description..... 1-2
 Equipment Characteristics, Capabilities, and Features..... 1-2.1

F

Fan, Ventilation, Replace..... 1-16.9
 Features, Equipment Characteristics, Capabilities, and 1-2.1
 Filter, Radio Frequency (RF), Replace..... 1-16.2
 Floor Covering, Repair 1-20.6
 Fluorescent Lamp, Replace..... 1-10.1
 Fluorescent Lamp Ballast, Replace..... 1-16.1
 Fluorescent Lamp Switch, Replace..... 1-16.3
 Forms and Records, Maintenance 1-1.3

G

General Information..... 1-1

H

Hand Receipt (-HR) Manual..... 1-1.7

I

Indicator, Level, Replace 1-16.15
 Indicators, Description and Use of Operator
 Controls and 1-4
 Instructions, Lubrication..... 1-8, 1-11

L

Ladder, Personnel, Repair..... 1-16.18
 Level Indicator, Replace 1-16.15
 Light, Blackout/Dome, Replace..... 1-10.3
 Light, Emergency, Replace..... 1-16.11
 Location and Description of Major Components 1-2.2
 Lubrication Instructions 1-8, 1-11

INDEX - Cont

SUBJECT

PARAGRAPH

MAINTENANCE SECTION - Cont

M

Maintenance Procedures 1-10, 1-16, 1-20
 Maintenance Forms and Records 1-1.3
 Manual, Hand Receipt (-HR) 1-1.7
 Molding, Wire, Replace 1-16.7

O

On/Off Switch, Replace 1-16.4
 Operation, Technical Principles of 1-3
 Operation Under Unusual Conditions..... 1-7
 Operation Under Usual Conditions 1-6
 Operator's Controls and Indicators, Description
 and Use of..... 1-4
 Operator Preventive Maintenance Checks and Services..... 1-5
 Organizational Preventive Maintenance Checks and Services..... 1-14
 Organizational Troubleshooting 1-15

P

Parts, Repair 1-12, 1-18
 Personnel Door Handle, Repair 1-20.1
 Personnel/Cargo Door, Replace..... 1-20.4
 Personnel/Cargo Door Gasket, Replace 1-20.3
 Personnel Ladder, Repair 1-16.18
 Preparation for Movement 1-6.2
 Preparation for Storage or Shipment..... 1-17
 Preventive Maintenance Checks and Services 1-5, 1-14
 Procedures, Maintenance 1-10, 1-16, 1-20

R

Radio Frequency (RF) Filter, Replace 1-16.2
 Receipt, Service Upon 1-13
 Receptacle, Replace..... 1-16.6
 Repair Parts 1-12, 1-18
 Repair:
 Blackout Curtain 1-16.12
 Personnel Door Handle 1-20.1
 Personnel Ladder 1-16.18
 Floor Covering 1-20.6
 Van Body Skin..... 1-16.13, 1-20.7

INDEX - Cont

SUBJECT

PARAGRAPH

MAINTENANCE SECTION - Cont

R - Cont

Replace:

Air Conditioner/Heater	1-20.8
Air Conditioner/Heater Support Bracket	1-20.9
Air Vent Cover	1-16.17
Air Vent Screen	1-16.16
Blackout/Dome Light	1-10.3
Blackout/Dome Light Microswitch	1-16.5
Cargo Door Latch Assembly	1-20.2
Circuit Breaker	1-20.5
Emergency Light	1-16.11
Fluorescent Lamp	1-10.1
Fluorescent Lamp Ballast	1-16.1
Fluorescent Lamp Switch	1-16.3
Level Indicator	1-16.15
On/Off Switch	1-16.4
Personnel/Cargo Door	1-20.4
Personnel/Cargo Door Gasket	1-20.3
Radio Frequency (RF) Filter	1-16.2
Receptacle	1-16.6
Telephone Binding Post Assembly	1-16.8
Tiedown Socket	1-16.14
Ventilation Duct	1-20.10
Ventilation Fan	1-16.9
Ventilation Fan Cover	1-16.10
Wire Molding	1-16.7

S

Scope	1-1
Service Upon Receipt	1-13
Service Ventilation Ducts	1-10.2
Services, Preventive Maintenance Checks and	1-5, 1-14
Shipment, Preparation for Storage or	1-17
Socket, Tiedown, Replace	1-16.14
Special Tools; Test, Measurement, Diagnostic and Support Equipment	1-12, 1-18
Switch, Fluorescent Lamp, Replace	1-16.3
Switch, On/Off, Replace	1-16.4

INDEX - Cont

SUBJECT

PARAGRAPH

MAINTENANCE SECTION - Cont

T

Technical Principles of Operation 1-3
 Telephone Binding Post Assembly, Replace..... 1-16.8
 Tiedown Socket, Replace 1-16.14
 Tools and Equipment, Special 1-12, 1-18
 Tools; Test, Measurement, Diagnostic, and
 Support Equipment, Special 1-12, 1-18
 Troubleshooting..... 1-9, 1-15, 1-19

V

Van Body Skin, Repair..... 1-16.13, 1-20.7
 Ventilation Duct, Replace 1-20.10
 Ventilation Ducts, Service 1-10.2
 Ventilation Fan, Replace 1-16.9
 Ventilation Fan Cover, Replace 1-16.10

W

Wire Molding, Replace 1-16.7

OPTICAL BENCH

C

Characteristics, Capabilities, and Features 6-2.1
 Controls and Indicators, Operator's..... 6-4

D

Data, Equipment..... 6-2.2
 Description Equipment..... 6-2

E

Equipment Data 6-2.2
 Equipment Description..... 6-2

INDEX - Cont

SUBJECT	PARAGRAPH
OPTICAL BENCH - Cont	
I	
Instructions, Lubrication	6-8, 6-11
L	
Lubrication Instructions	6-8, 6-11
O	
Operator's Controls and Indicators	6-4
Operation, Technical Principles of	6-3
Operation Under Unusual Conditions	6-7
Operation Under Usual Conditions.....	6-6
Operator Preventive Maintenance Checks and Services.....	6-5
Organizational Preventive Maintenance Checks and Services.....	6-14
Organizational Troubleshooting	6-15
P	
Preparation for Storage and Shipment	6-17
Preventive Maintenance Checks and Services	6-5, 6-14
R	
Receipt, Service Upon.....	6-13
S	
Scope.....	6-1
Service Upon Receipt.....	6-13
Services, Preventive Maintenance Checks and	6-5, 6-14
T	
Technical Principles of Operation	6-3
Troubleshooting Procedures.....	6-9, 6-15

INDEX - Cont

SUBJECT	PARAGRAPH
SUPPORT ITEMS	
A	
Altimeter/Barometer, Description and Use of Operator Controls and Indicators.....	10-4.3
Altimeter/Barometer, Operation Under Usual Conditions	10-6.3
B	
Batteries, Hand Psychrometer, Replace.....	10-10.3
C	
Characteristics, Capabilities, and Features.....	10-2.1
D	
Description and Use of Operator's Controls and Indicators:	
Altimeter/Barometer	10-4.3
Hand Psychrometer.....	10-4.2
Magnifier Lamp	10-4.1
Tripod	10-4.5
Vacuum Cleaner	10-4.4
G	
General Information.....	10-1
H	
Hand Psychrometer, Description and Use of Operator's Controls and Indicators	10-4.2
Hand Psychrometer, Operation Under Usual Conditions	10-6.2
Hand Psychrometer, Characteristics, Capabilities, and Features	10-2.1
I	
Information, General.....	10-1
Instructions, Lubrication.....	10-8, 10-11

INDEX- Cont

SUBJECT

PARAGRAPH

SUPPORT ITEMS - Cont

L

Lamp, Hand Psychrometer, Replace..... 10-10.4
 Lubrication Instructions 10-8, 10-11

M

Magnifier Lamp, Description and Use of Operator's
 Controls and Indicators..... 10-4.1
 Magnifier Lamp, Operation Under Usual Conditions 10-6.1
 Maintenance Procedures 10-10, 10-16

O

Operation Under Usual Conditions:
 Altimeter/Barometer 10-6.3
 Hand Psychrometer..... 10-6.2
 Magnifier Lamp 10-6.1
 Tripod 10-6.5
 Vacuum Cleaner..... 10-6.4

P

Preventive Maintenance Checks and Services 10-5, 10-14
 Procedures, Maintenance 10-10, 10-16

R

Replace:
 Batteries, Hand Psychrometer 10-10.3
 Lamp, Hand Psychrometer 10-10.4
 Lamp, Magnifier 10-10.1
 Magnifier Lamp Assembly 10-10.2
 Thermometers, Hand Psychrometer 10-10.6
 Wick, Hand Psychrometer. 10-10.5

S

Scope 10-1
 Services, Preventive Maintenance Checks and 10-5, 10-14

INDEX - Cont

SUBJECT

PARAGRAPH

SUPPORT ITEMS - Cont

T

Tripod, Description and Use of Operator's
Controls and Indicators..... 10-4.5
Tripod, Operation Under Usual Conditions..... 10-6.5
Troubleshooting..... 10-9, 10-15

V

Vacuum Cleaner, Description and Use of Operator's
Controls and Indicators..... 10-4.4
Vacuum Cleaner, Operation Under Usual Conditions..... 10-6.4

THEODOLITE

G

General Information..... 8-1

I

Information, General 8-1
Information, Reference 8-1.2

R

Reference Information 8-1.2

S

Scope 8-1

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff


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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigram = .035 ounce
 1 decagram = 10 grams = .35 ounce
 1 hectogram = 10 decagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

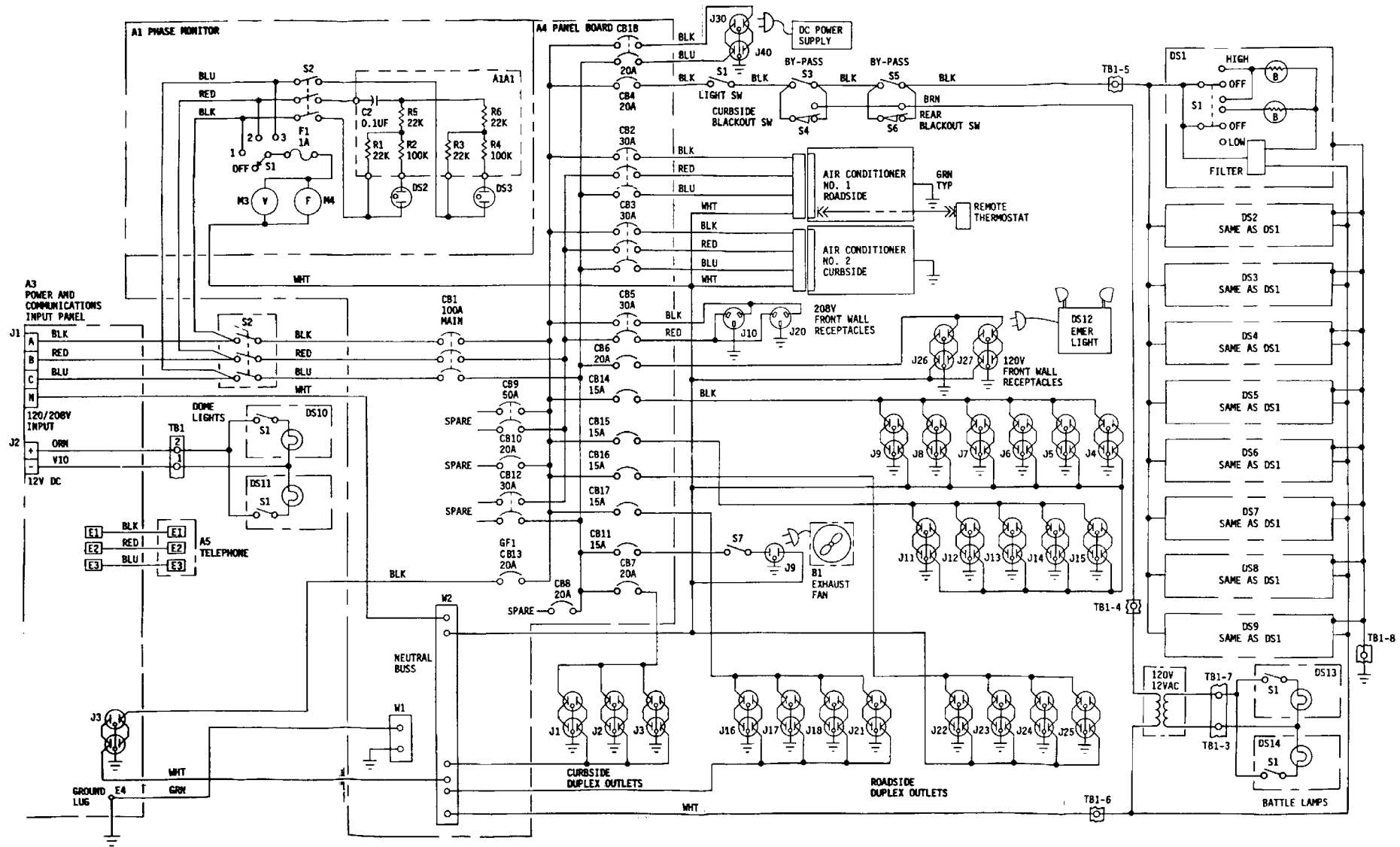
1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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FO-1. Maintenance Section Electrical Schematic

FP-1/(FP-2 blank)

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