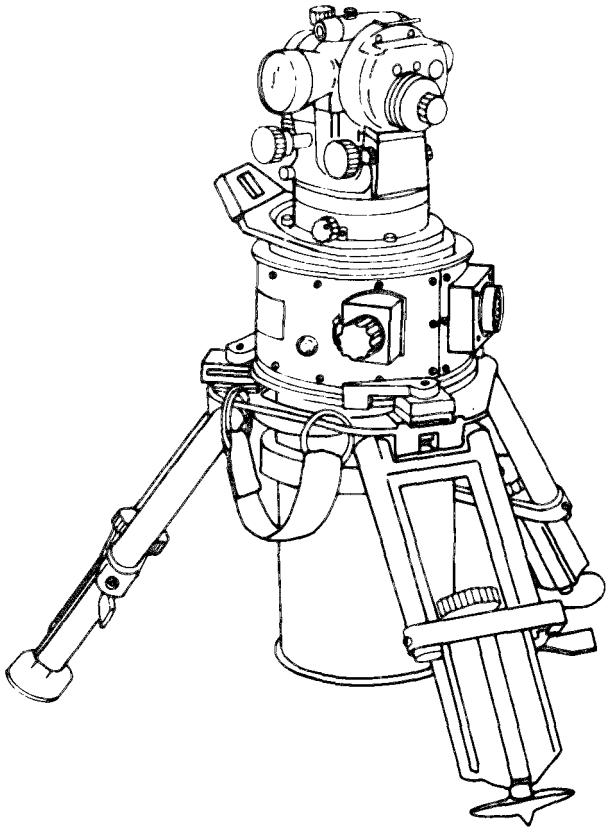
ORGANIZATIONAL MAINTENANCE MANUAL



EQUIPMENT DESCRIPTION

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

APPENDIXES

SURVEY INSTRUMENT: AZIMUTH GYRO, LIGHTWEIGHT MODEL AG-8, TYPE1 (6675-00-062-8579)

This manual together w/TM 5-6675-250-10 supds TM 5-6675-250-12 16 June 1975, including all Chgs

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

22 APRIL 1987 1987

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 16 September 1987

Organizational Maintenance Manual

SURVEY INSTRUMENT: AZIMUTH GYRO, LIGHTWEIGHT
MODEL AG-8, TYPE 1 (6675-00-062-8579)

TM 5-6675-250-20, 22 April 1987, is changed as follows:

Supersession notice was inadvertently omitted from cover. Add: "This manual together with TM 5-6675-250-10, supersedes TM 5-6675-250-12, 16 June 1975, including all changes."

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Unit Maintenance Requirements for Survey Instrument, Azimuth, Gyro, Lightweight (AG-8, Type 1).

☆ U.S. GOVERNMENT PRINTING OFFICE: 1987—754-030/60482

WARNING

Make sure power is OFF before performing maintenance.

Corrosive Battery Electrolyte (Potassium Hydroxide). Wear rubber gloves, apron, and face shield when handling leaking batteries. If potassium hydroxide is spilled on clothing, or other material wash immediately with clean water. If spilled on personnel, immediately start flushing the affected area with clean water. Continue washing until medical assistance arrives.

When operating in the dark, light from the cage-uncage indicator is visible at 45 meters. The indicator should be shielded to avoid detection when security is required.

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

Wear safety goggles when using grinding wheel.

TECHNICAL MANUAL

NO. 5-6675-250-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 22 April 1987

ORGANIZATIONAL MAINTENANCE MANUAL

SURVEY INSTRUMENT: AZIMUTH GYRO, LIGHTWEIGHT MODEL AG-8, TYPE1-NSN 6675-00-062-8579

REPORT ERRORS AND RECOMMENDED IMPROVEMENTS

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

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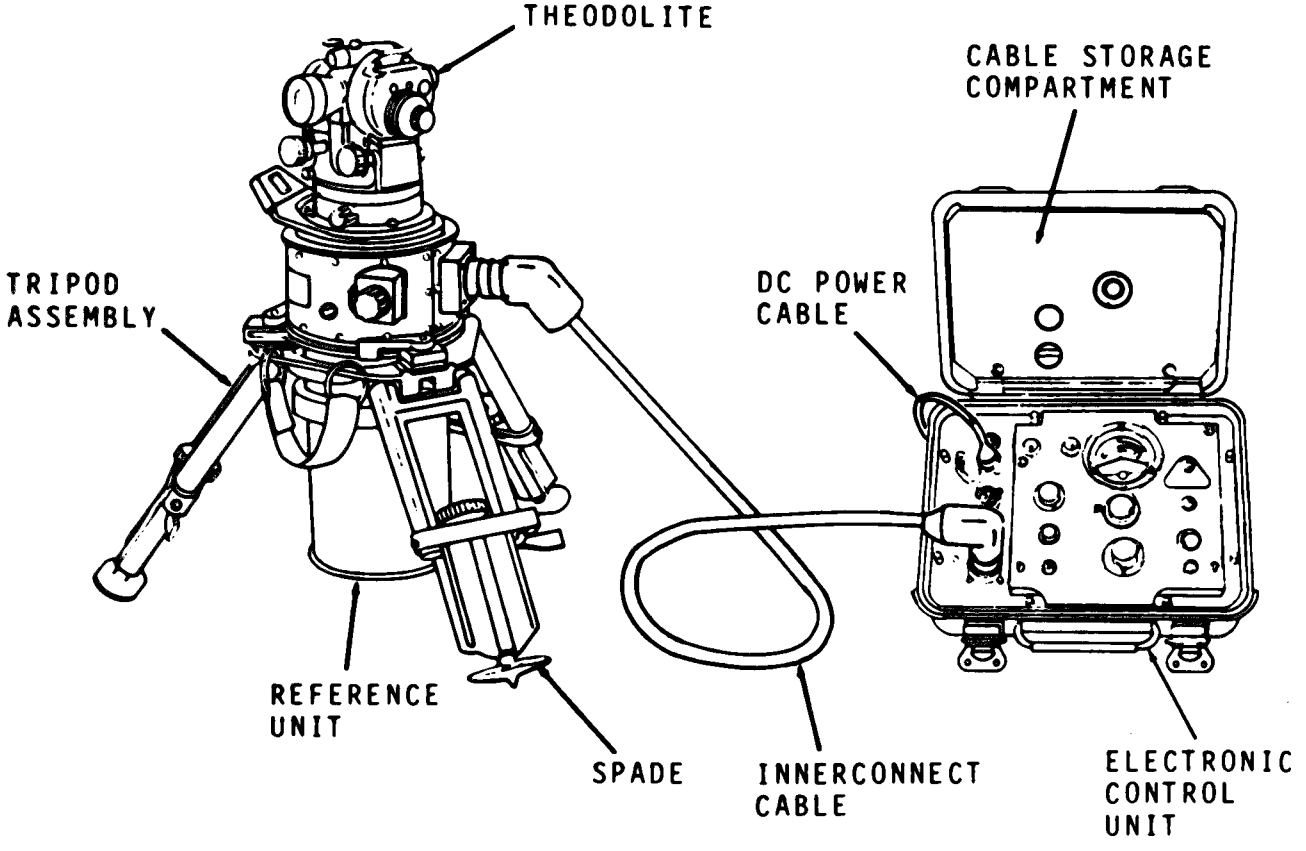
CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION



1-1. SCOPE

a.	Type of Manual	Organizational Maintenance Manual
b.	Model Number and Equipment Name	Survey Instrument: Azimuth, Gyro, Lightweight Lear Siegler, Inc. Model AG-8, Type 1-NSN 6675-00-062-8579
c.	Purpose of Equipment	North-seeking Gyroscope Capable of Determining True Forth With High Accuracy Without the Assistance of Celestial or Landmark Sightings

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS

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).

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

Destruction of Army materiel to prevent enemy use shall be accomplished upon order of the Unit Commander I.A.W. TM 750-244-3.

1-4. PREPARATION FOR STORAGE OR SHIPMENT

Procedures necessary for storage or shipment and receipt of equipment are contained in Chapter 2, Organizational Maintenance Instructions.

1-5. HAND RECEIPT MANUALS

This manual has a companion document with a TM number followed by “-HR” (which stands for Hand Receipt). The TM 5-6675-250-10-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As aid to property accountability, additional “-HR” manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR310-2: Commander U.S. Army AG Publications Center, ATTN: AGLD-OD, 2800 Eastern Boulevard, Baltimore, MD 21220

1-6. REPORTING OF EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your instrument needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don’t like about your equipment. Let us know why you don’t like the design or performance. Put it on an SF368 (Quality Deficiency Report). EIRs should be mailed directly to Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

1-7. LIST OF ABBREVIATIONS

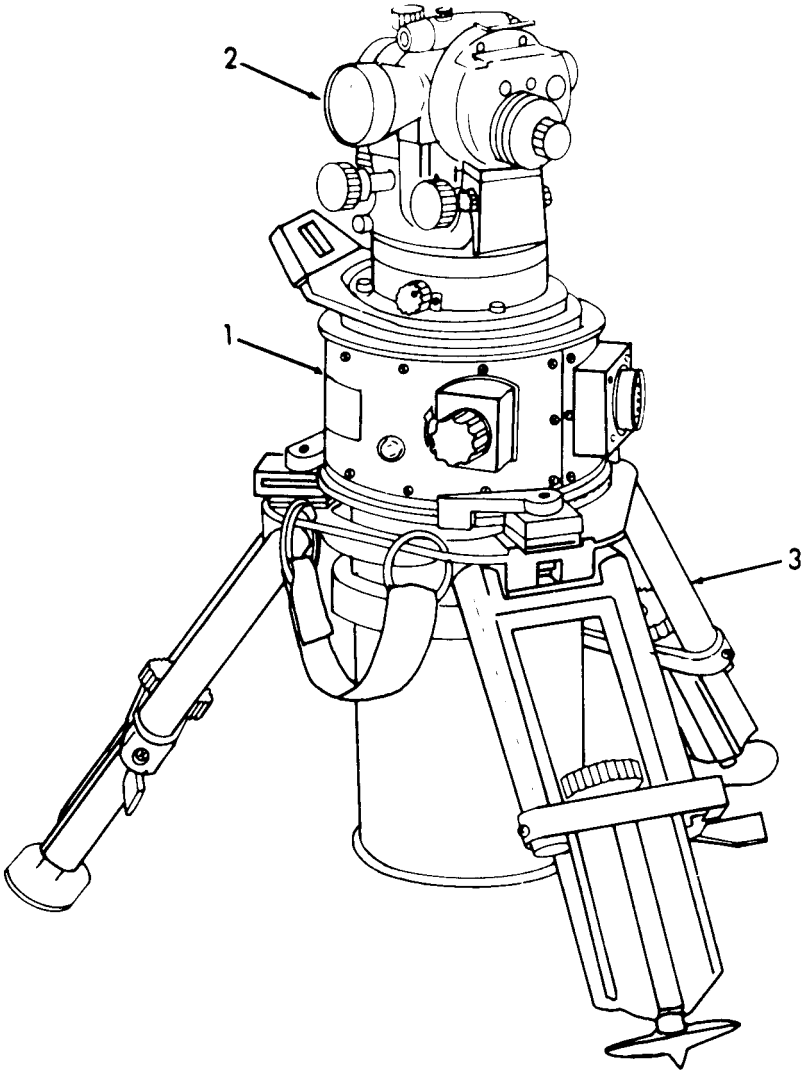
AC . . . . . alternating current
amp . . . . . ampere
BRT . . . . . BRIGHT
C . . . . . Celsius
CCW . . . . . counterclockwise
cm . . . . . Centimeters
CW . . . . . clockwise
DC . . . . . direc t current
ECU . . . . . Electronic Control Unit
F . . . . . Fahrenheit
GC . . . . . Gyro Compass
GRU . . . . . Gyroscopic Reference Unit
hex . . . . . hexagon
hvywt . . . . . heavyweight
Hz . . . . . Hertz
ILEUM . . . . . Illuminate
in . . . . . inch(es)
Kg . . . . . Kilogram
kHz . . . . . Kilohertz
kmph . . . . . Kilometer per hour
MHz . . . . . Megahertz
mil . . . . . thousandths of an inch
mph . . . . . milesperhour
PWR . . . . . Power
SIAGL . . . . . Survey Instrument: Azimuth, Gyro, Lightweight
SYNC . . . . . Synchronous
THEO . . . . . Theodolite
V . . . . . Vertical, Volt
Vac . . . . . Volt(s) alternating current
Vdc . . . . . Volt(s) direct current
V/M . . . . . Volt/Meter

Section II. EQUIPMENT DESCRIPTION

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

- Man portable
- Highly accurate
- All weather operational
- Built-in-self-test circuits
- Capable of determining and indicating true north within 15 minutes after power is applied.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

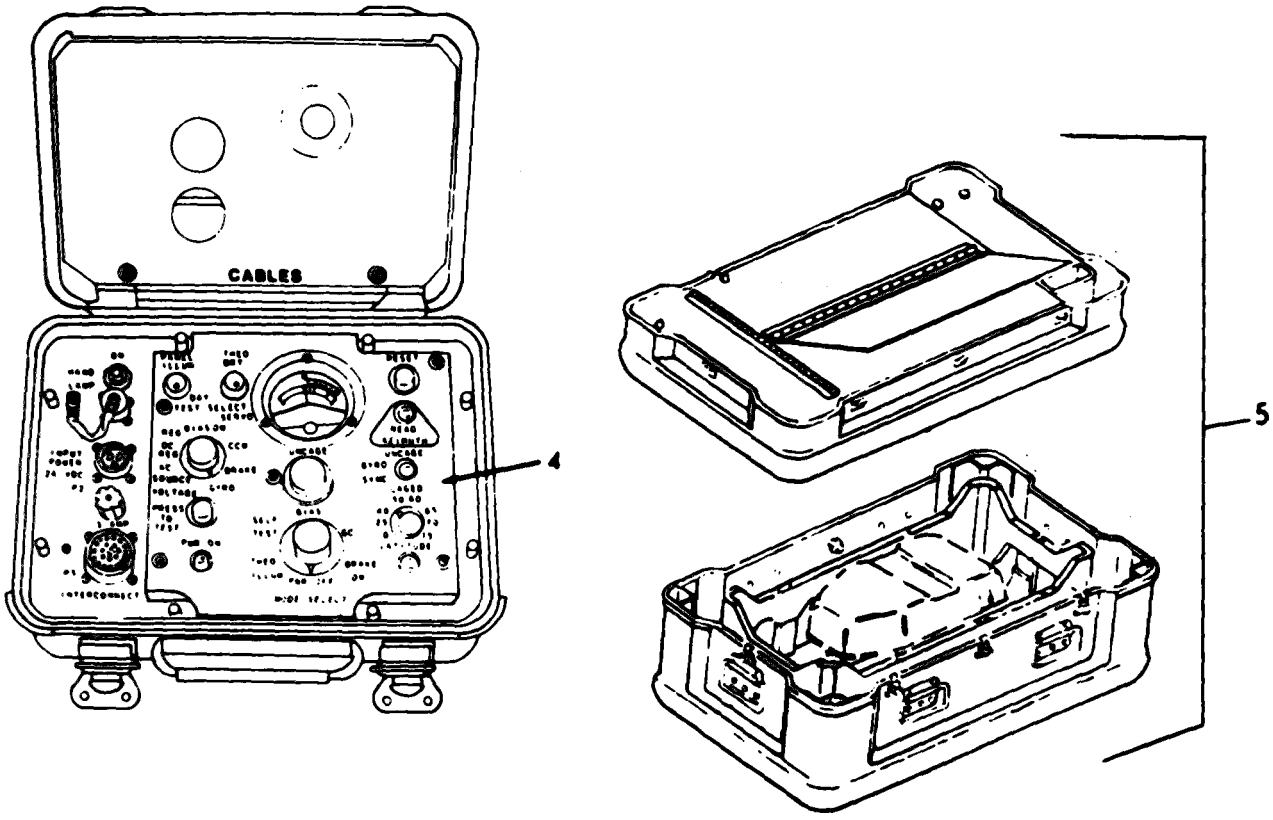


GYROSCOPIC REFERENCE UNIT(GRU)(1) . . . . . Pendulous north seeking gyro, which automatically references the readout theodolite to true north.

THEODOLITE (2) . . . . . Surveying instrument used to measure vertical and horizontal angles.

TRIPOD ASSEMBLY (3) . . . . . Supports and provides leveling for the GRU.

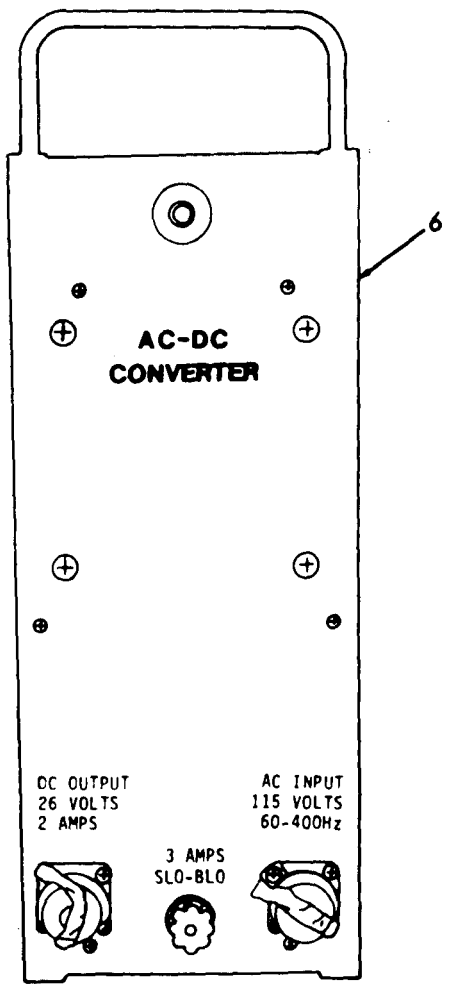
1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

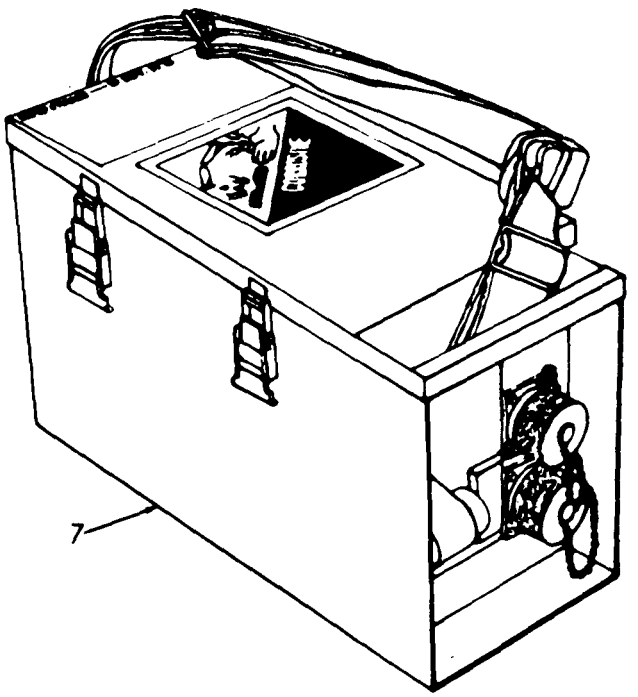


ELECTRONICS CONTROL UNIT (ECU) (4) . . . . . Contains operating controls, indicators and control electronics.

TRANSPORT CASE (5) . . . . . Provides means for shipping, storage of the Survey Instrument, Azimuth, Gyro, Lightweight (SIAGL) and spare parts.

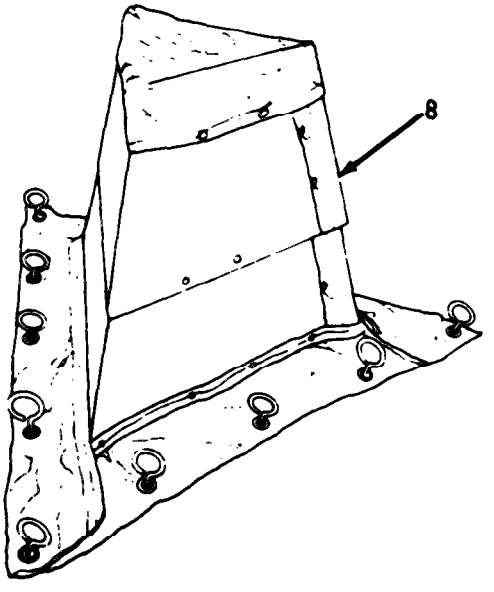
1.9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

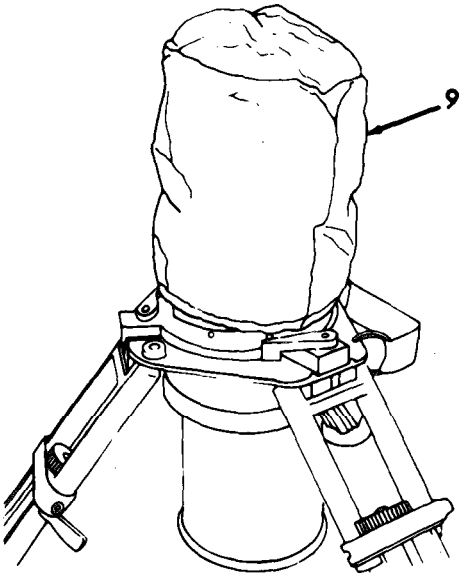




AC-DC CONVERTER (6)	Used to convert 115 ± 10 Vat, 60 or 400 Hz power to the 24 Vdc power required to operate the equipment.
BATTERY (7)	Used as source of power for the SIAGL.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

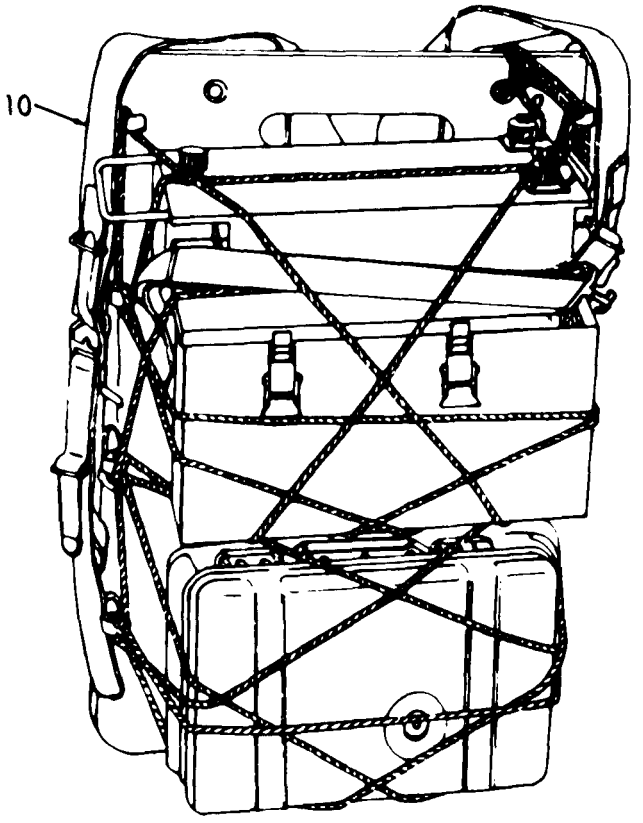


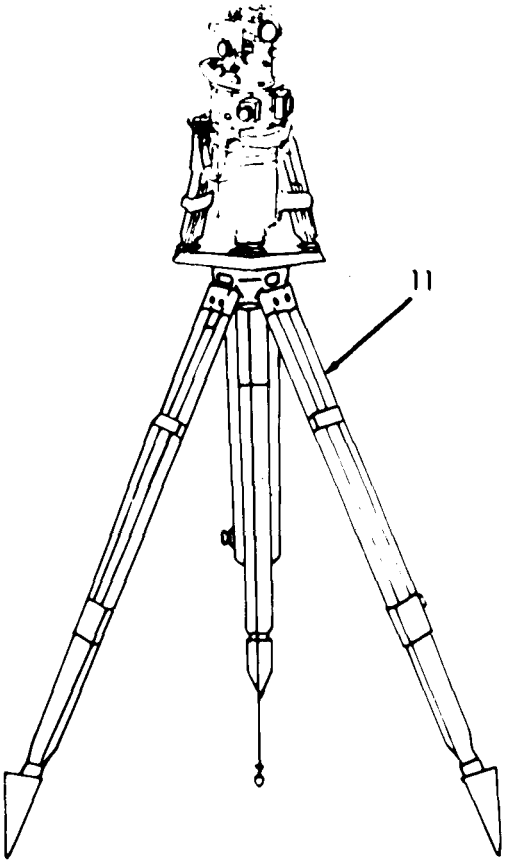


WIND SHELTER (8) . . . . . Used to protect the equipment and maintain performance during operations in winds exceeding 20 mph (32 kmph).

RAIN AND DUST COVER (9) . . . . . Provides protection for the theodolite when operating in adverse weather conditions.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)





BACKBOARD (10)	Provides means for backpacking the ECU, converter, and other associated components of the SIAGL set.
AUXILIARY TRIPOD ASSEMBLY (11)	Used to elevate the instrument when operations from a standing position are desired.

1-10. EQUIPMENT DATA

Dimensions and Weights:

TRANSPORT CASE (packed)

Length	36.9 inches	(93.7 cm)
Width	21.8 inches	(55.4 cm)
Height	18.4 inches	(46.7 cm)
Weight	125 pounds	(56.7 Kg)

TRANSIT CASE (packed-weight, including Transport case)

Length	19.7 inches	(50.0 cm)
Width	11.5 inches	(29.2 cm)
Height	9.5 inches	(24.1 cm)
Weight	28.5 pounds	(12.9 Kg)

ELECTRONIC CONTROL UNIT WITH COVER (packed-weight, including transport case)

Length	12.1 inches	(30.7 cm)
Width	10.3 inches	(26.2 cm)
Height	6.1 inches	(15.5 cm)
Weight	13.5 pounds	(6.1 Kg)

WINDSHELTER (packed)

Length	29 inches	(73.7 cm)
Width	5 inches	(12.7 cm)
Height	15.5 inches	(39.4 cm)
Weight	18 pounds	(8.1 Kg)

AUXILIARY TRIPOD (packed)

Length	38 inches	(96.5 cm)
Weight	15 pounds	(6.8 Kg)

BATTERY, storage, BB-442/U

Length	12.5 inches	(31.8 cm)
Width	5.8 inches	(14.7 cm)
Height	7.4 inches	(18.8 cm)
Weight	30.0 pounds	(13.6 Kg)

PACKBOARD

Width	15 inches	(38.1 cm)
Height	24 inches	(61.0 cm)
Weight	6 pounds	(2.70 Kg)

Section III. TECHNICAL PRINCIPALS OF OPERATION

1-11. TECHNICAL PRINCIPLES OF OPERATION

a. Gyroscopic Reference Unit (GRU)

(1) Uncaged indicator(1). Illuminates during operations when the pendulum is uncaged.

(2) Caging knob (2). Used to uncage the pendulum in the bias mode and after the gyro motor attains synchronous speed in the gyro compass (GC) mode. Also used for caging the pendulum after bias and after GC has been completed. Illumination of the GYRO SYNC indicator on the ECU is necessary prior to activating the CAGE-UNCAGE knob when in GC mode.

(3) Vertical lock (3). Permits operator to lock telescope at any desired vertical position. When vertical lock is released (turned counterclockwise), the telescope is free to be moved to any vertical position.

(4) Elevation control (4). Permits operator to control vertical positioning of the telescope. The control is used to center target image vertically in the reticle pattern of the telescope.

(5) Horizontal lock (5). Permits operator to lock theodolite at any desired horizontal position. The lock is released when it is necessary to rotate the theodolite; light finger torque is applied to lock the theodolite at the desired position.

(6) Azimuth control (6). Permits the operator to adjust the horizontal position of the theodolite. The control is used to center the target image horizontally in the reticle pattern of the telescope.

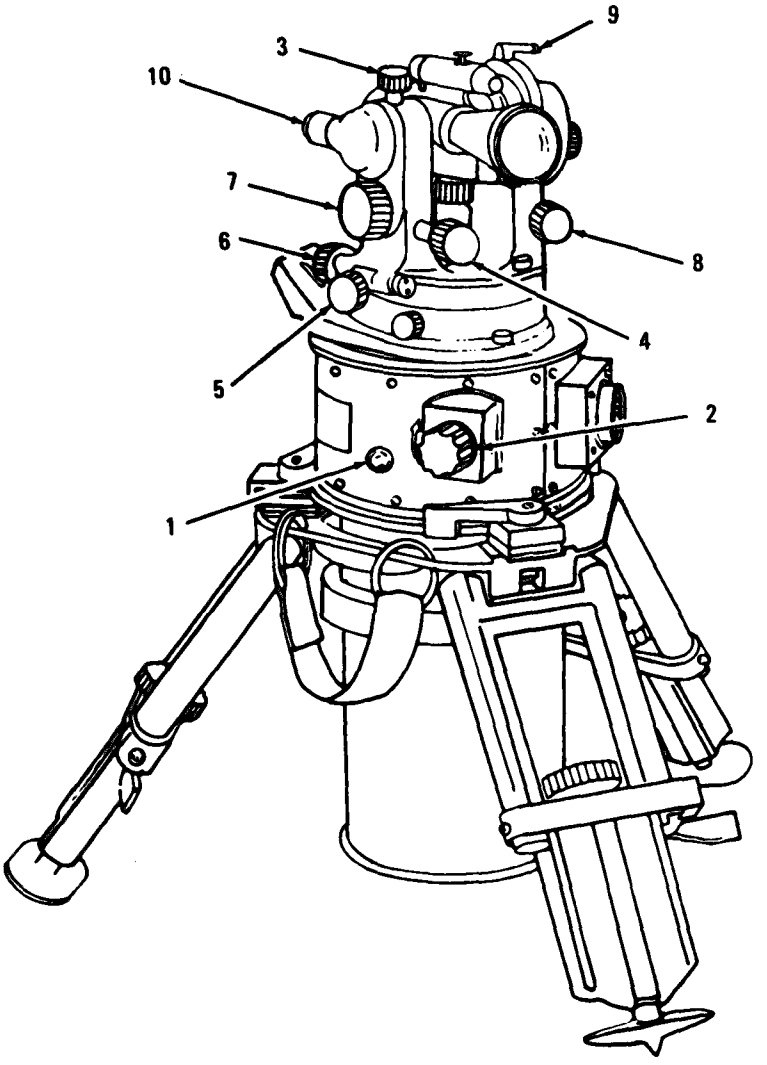
(7) Micrometer control (7). Permits the operator to adjust the full range of the vernier scale to obtain an accurate horizontal and vertical scale reading.

(8) Altitude level control (8). Adjusts the position of the altitude level and V circle (vertical) optical scale.

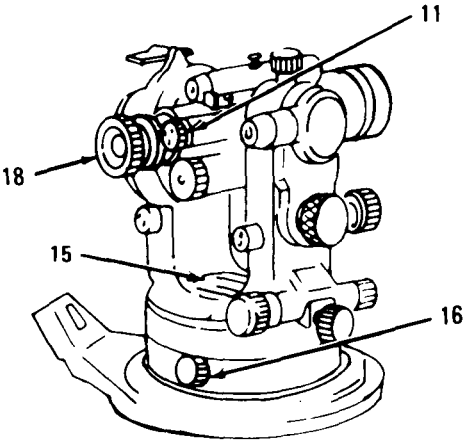
(9) Altitude level mirror (9). Manually adjustable to permit the operator to see the altitude level without changing from a telescope and azimuth scale reading position.

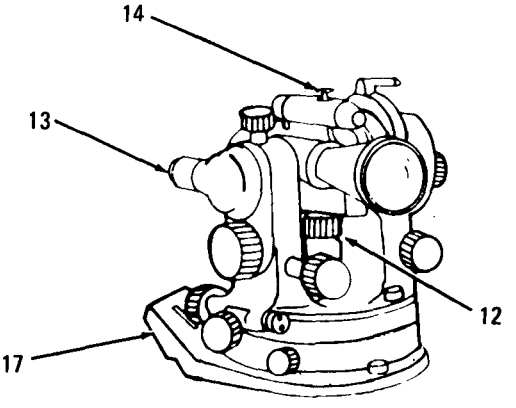
(10) Theodolite scale lamp eyepiece (10). Used to view the optical scales. The eyepiece can be swiveled to allow the optical scales to be viewed from any position.

1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)



1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)





1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)

(11) Telescope focus control (11). Permits the operator to adjust the focal length of the telescope to see a target.

(12) Reticle illumination control (12). Adjusts the intensity of the lighting of the reticle pattern during night operations.

(13) Microscope focus (13). Permits the operator to adjust the focus of the microscope to present a clear, sharp image of the optical scales.

(14) Magnetic compass plunger (14). Locks the compass needle in a fixed position to protect it from vibration and shock when not in use. Pressing the plunger releases the locking mechanism and permits the spring-mounted needle to move freely.

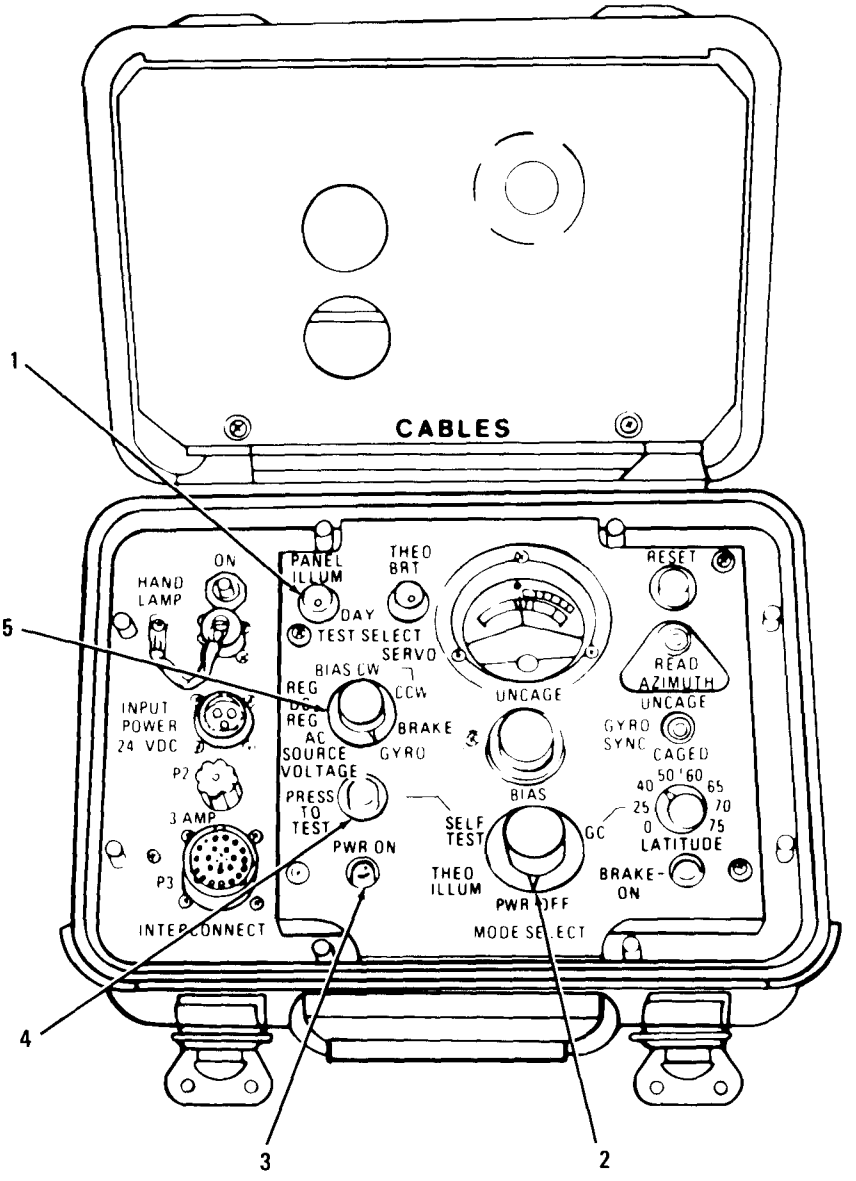
(15) Plate level (15). Indicates the level of the theodolite and the GRU.

(16) Horizontal circle setting control (16). Used to set the horizontal circle during theodolite calibration.

(17) Mounting plate and reference mirror (17). Used for aligning the theodolite horizontal circle with the follow-up by providing a fixed reference point.

(18) Reticle focus control (18). Permits the operator to adjust the reticle pattern to a sharp focus. The reticle focus control is used in conjunction with the reticle lamp illumination control during night use.

1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)



1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)

b. Electronic Control Unit (ECU)

(1) Panel illumination control (1). Enables the operator to illuminate the panel during night use. During day operations the control is rotated fully counterclockwise. To illuminate the panel for night operations, the control is rotated clockwise.

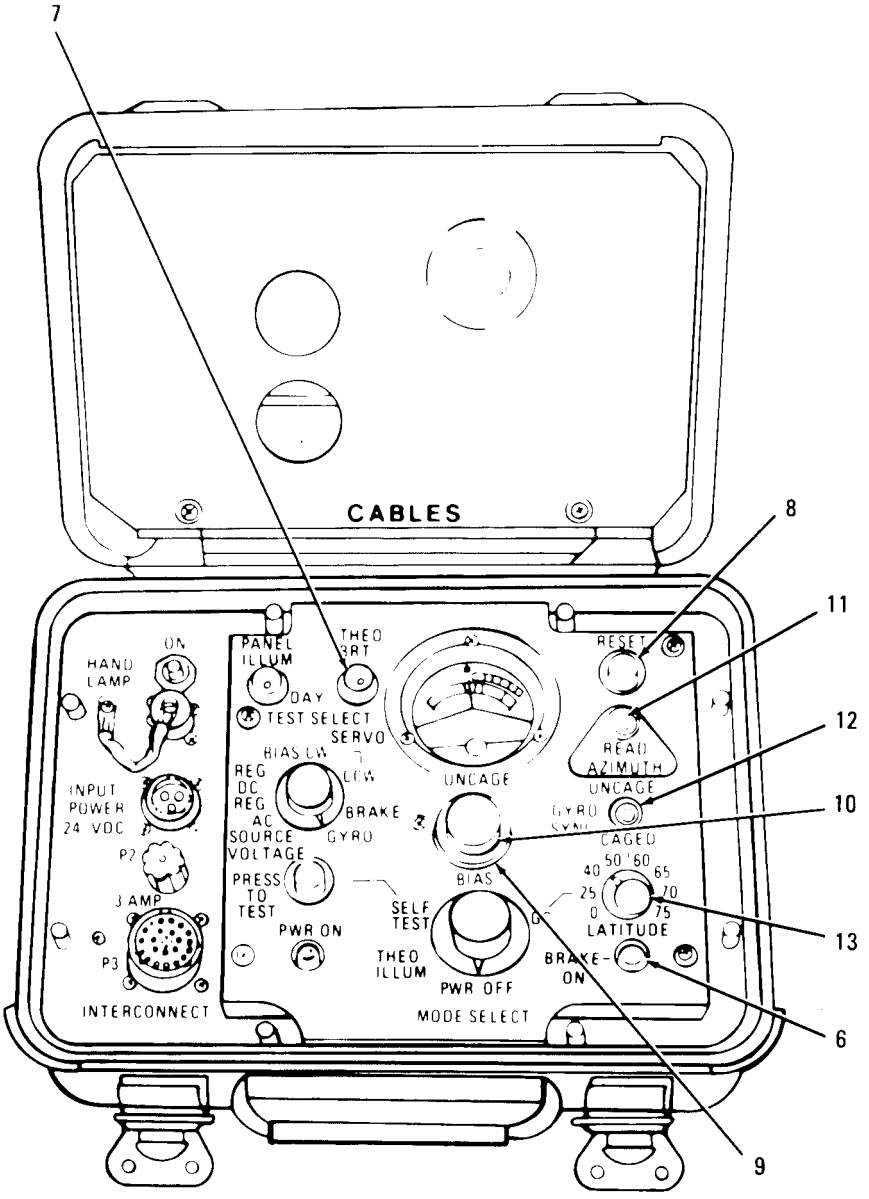
(2) Mode select switch (2). The MODE SELECT switch is maintained in the PWR OFF position when the equipment is not in operation. Placing the switch in THEO ILLUM position lights the telescope reticle, the scales and the autocollimation eyepiece. Placing the switch in the SELF TEST position enables the operator to perform assurance tests of the equipment before and during operation. The determination and setting of bias conditions is accomplished with the use of the MODE SELECT switch in the BIAS position. Placing the switch in GC (gyro compassing) applies power to the gyro motor and indicates the alignment operation of the instrument. Through the BRAKE ON position, the gyro motor is stopped when it is desired to repeat alignments or shut down the instrument. With the MODE SELECT switch in the THEO ILLUM position, all system power is off except to the theodolite. In this mode the theodolite may be used for determining azimuths from the original north determination, but the azimuth should be verified by rereading to the target after caging and braking of the gyro wheel. In this mode the theodolite can also be used for any normal theodolite procedure.

(3) Power on indicator (3). The application of power to the system is indicated by the illumination of the PWR ON indicator. Failure of the indicator to light when the ECU is connected to the power source, and when the MODE SELECT switch is moved from the PWR OFF or THEO ILLUM positions, indicates a malfunction in the system.

(4) Press to test switch (4). Press to obtain a TEST METER indication for each test position setting of this TEST SELECT switch. Operation of the PRESS TO TEST switch is needed only during the self-test procedure to obtain an indication on the TEST METER.

(5) Test select switch (5). Used in conjunction with the TEST METER to check subsystems of the equipment and stages of operation. During self-test operations, the selector switch is placed to each of its positions; at each position the PRESS TO TEST switch is pressed and operability of the associated circuit is indicated on the TEST METER (pointer in green area for all but SOURCE VOLTAGE, which is displayed on the upper meter scale and GYRO, which should center in yellow area).

1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)



1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)

(6) Brake on indicator (6). Illuminates when the MODE SELECT switch is placed to BRAKE ON, indicating the braking sequence. At the completion of the sequence, a 90-second dynamic braking of the gyro motor, the BRAKE ON indicator light will be extinguished.

(7) Theodolite brightness control (7). Rotating the control clockwise increases the intensity of the light.

(8) Reset switch (8). Enables the operator to reinitiate the gyrocompass interval. Pressing the RESET switch extinguishes the READ AZIMUTH indicator and reinitiates gyrocompass action for a minimum of 45 seconds.

(9) Bias control (9). Following self-test operations, the instrument is adjusted for bias through the BIAS control. Rotating the BIAS control clockwise will move the pointer to the right, and counterclockwise rotation will move the pointer to the left. Careful attention should be given to positioning the pointer in the center of the scale to ensure the highest degree of accuracy.

(10) Bias lock (10). Mechanically holds the BIAS CONTROL in the set position to prevent an accidental movement.

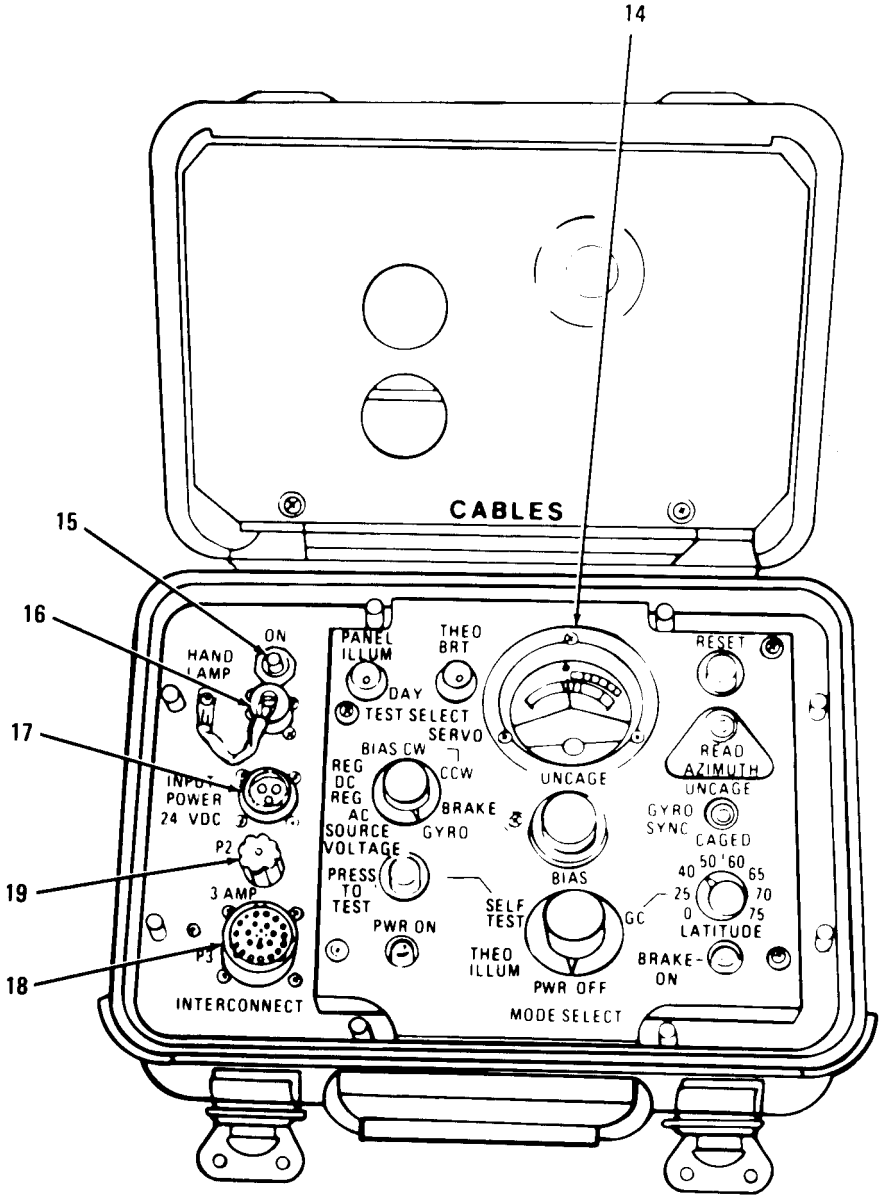
(11) Read azimuth indicator (11). Illuminates when true north has been obtained; light is applied automatically to the theodolite scale for azimuth reading.

(12) Gyro sync indicator (12). Illumination indicates that the gyro motor has attained synchronous speed. When the GYRO SYNC indicator illuminates the CAGE-UNCAGE knob the GRU is to be rotated to UNCAGE (clockwise rotation).

(13) Latitude select switch (13). Provided to maintain instrument operating time at different latitudes of operation. The switch is adjustable with a screwdriver and contains eight positions. The switch positions and corresponding latitudes of operation areas follows:

Switch Position	Latitude of Operation
0	0-15 degrees
25	15-30 degrees
40	30-45 degrees
50	45-55 degrees
60	55-63 degrees
65	63-67 degrees
70	67-73 degrees
75	73-75 degrees

1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)



1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)

(14) Test meter (14). Provides a visual indication of operational status of the instrument in both testing and operating modes. Satisfactory operation of the circuits associated with TEST SELECT switch position is indicated by the meter pointer. The meter and the TEST SELECT switch are used in conjunction with the PRESS TO TEST switch, which must be actuated to obtain meter indications during self-test operation. When the TEST SELECT switch is in the SOURCE VOLTAGE position, the input voltage may be read on the voltage scale on the right side of the meter scale. When the TEST SELECT switch is in the GYRO position, the meter pointer should center in the yellow area. When the TEST SELECT switch is in any other position, the meter pointer should be in the green area.

(15) Hand-lamp switch (15). Provided to turn the hand-lamp on or off.

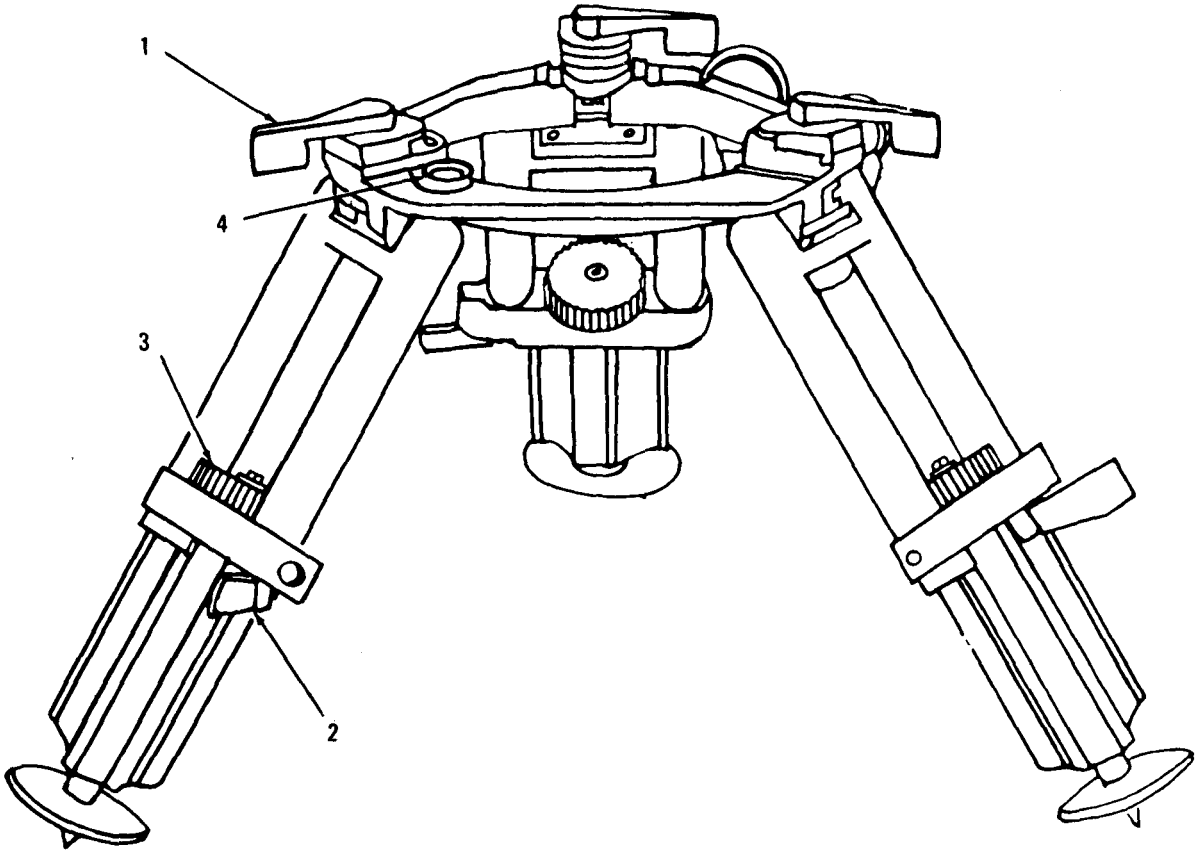
(16) Hand-lamp connector (A2J1) (16). The connector for connecting the hand-lamp to the ECU.

(17) Input power connector (A2J2) (17). The connector by which the ECU is connected to the electrical power source.

(18) Interconnect connector (A2J3) (18). The connector by which the GRU is connected to the electronic control unit.

(19) Fuse holder (19). A receptacle for the 24 Vdc, 3 amp fuse which is used to protect the electric parts from damage in the event of a power overload.

1-11. TECHNICAL PRINCIPLES OF OPERATION (Continued)



c. Tripod.

(1) Hold-down clamp (1). The three hold-down clamps on the tripod assembly are provided to secure the GRU to the tripod assembly. A lever on each clamp is provided to release the GRU when it is necessary to rotate or laterally move the GRU for preorientation or plumbing.

(2) Tripod leg clamps (2). Leg clamps are provided on each leg of the tripod for controlling the elevation of the assembly. Loosening the leg clamps permits the center section of the legs to be extended or retracted for coarse adjustment.

(3) Fine-level adjustment knob (3). Provisions for leveling the tripod assembly are provided by fine-level adjustment knobs on each leg.

(4) Tripod circular level (4). A level vial is provided on the base plate of the tripod to indicate the coarse level of the assembly.

CHAPTER 2

MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains maintenance and servicing instructions that are the responsibility of Organizational Maintenance. Operator maintenance tasks given in TM 5-6675-250-10.

SECTION I. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND TEST EQUIPMENT

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

There are no special tools or support equipment required at the organizational level of maintenance.

2-3. SPARES AND REPAIR PARTS

Spares and repair parts are listed and illustrated in the repair parts and special tools list covering organizational maintenance for this equipment in TM 5-6675-250-20P.

SECTION II. SERVICE UPON RECEIPT

2-4. SERVICE UPON RECEIPT

The surveying instrument will be inspected and operationally tested before it is placed in everyday use.

2-5. SERVICE UPON RECEIPT CHECKLIST

NOTE

Exercise care when unloading the transport case from vehicles. Do not stand or walk on the case and do not stack more than three cases high. Use handles provided for safety and ease of handling.

LOCATION/ITEM	ACTION	REMARKS
1. Transport case components	a. Inspect equipment for dents, defective latches, paint damage, loose or missing parts.	Refer to table 2-1 for a list of parts contained in transport case.
	b. Reject case if damage prevents it from functioning properly.	
2. Transit case components	a. Inspect equipment for dents, defective latches, paint damage, loose or missing parts.	Refer to table 2-1 for a list of parts contained in transit case.
	b. Reject case if damage prevents it from functioning properly.	
3. Electronic control unit cover	a. Inspect equipment for dents, defective latches, paint damage, loose or missing parts.	Refer to table 2-1 for a list of parts contained in cover.
	b. Reject cover if damage prevents it from functioning properly.	

2-5. SERVICE UPON RECEIPT CHECKLIST (Continued)

Table 2-1. Parts Listing

ITEM
1. Transport Case
a. AC Power cable
b. Battery adapter cable
c. DC Power extension cable
d. DC Power adapter cable
e. Jumper cable
f. Winterization kit
g. Shoulder and waist harries.
h. Tripod adapter assembly
i. Spare fuses
j. Spare lamps
k. Spare knobs
1. Tools
m. Operator and organizational maintenance manual
n. AC-DC Converter
2. Transit Case
a. Dusting brush
b. Plumb bob assembly
c. Eyepiece prism (right angle)
d. Eyepiece sun filter
e. Spare lamps
f. Horizontal circle setting tool
g. Fuse
h. Rain and dust cover
3. Electronic Control Unit Cover
a. Interconnect cable
b. Power cable
c. Hand lamp assembly

2-6. 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, Packaging Improvement Report.

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

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

2-7. LUBRICATION INSTRUCTIONS

a. Lubrication requirements at the organizational level of maintenance consists of lubricating the tripod assembly.

b. Lubrication is to be performed, as a minimum, when assembling the tripod leg assemblies following replacement of parts. Clean lubrication areas with trichlorethane, Federal Specification 0-T-620, or an equivalent chlorinated solvent.

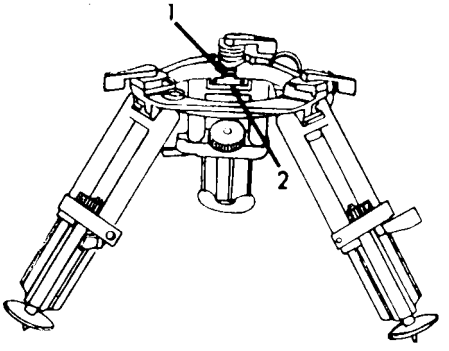
c. When operating in windy and dusty environments, inspect the tripod fine-leveling and pivot assemblies periodically; lubricate as necessary.

d. Lubricate the fine-leveling assembly when indications of binding occur during leveling operations.

e. Tripod pivot assembly lubrication.

(1) Lubricate pin (1) in the pivot assembly (2) by applying a film of silicone grease MIL-S-8660.

(2) Wipe off excess grease with a clean lint free cloth.

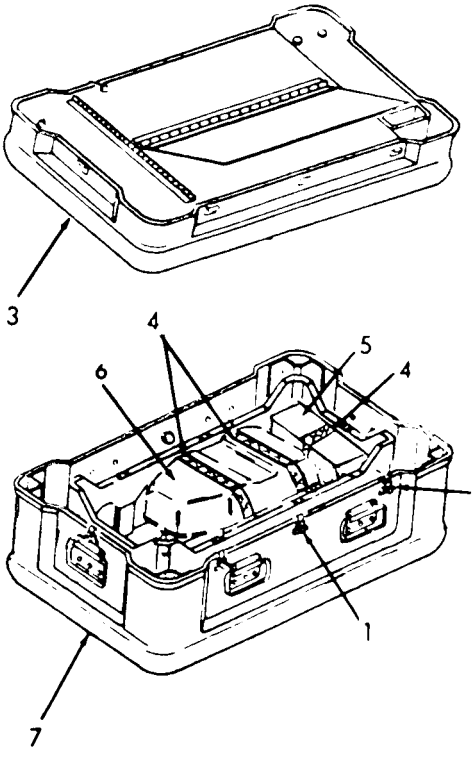


2-8. ASSEMBLY AND PREPARATION FOR USE

UNPACKING TRANSPORT CASE

CAUTION

Avoid exposure of the equipment to dust, soil or other abrasive materials.



Press pressure relief valve (1) on lower section (7).

b. Unfasten latches (2) securing upper section (3). Remove upper section (3).

c. Unfasten strap latches (4).

d. Remove ECU (5) and transit case (6) from lower section (7).

2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

UNPACKING TRANSPORT CASE (Continued)

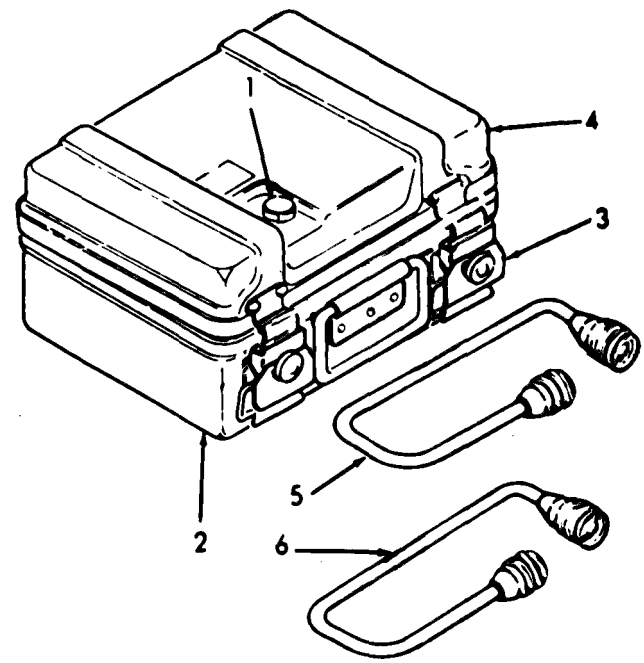
e. Refer to Table 2-1 and remove items stored in transport case.

f. Press pressure relief valve (1) on ECU case (2).

g. Release latches (3) on case (2) and remove cover (4).

h. Remove cables (5 and 6) from case cover (4).

i. Remove auxiliary equipment required for operation from transport case storage compartments.



UNPACKING TRANSIT CASE

CAUTION

Avoid exposure of the equipment to dust, soil or other abrasive materials.

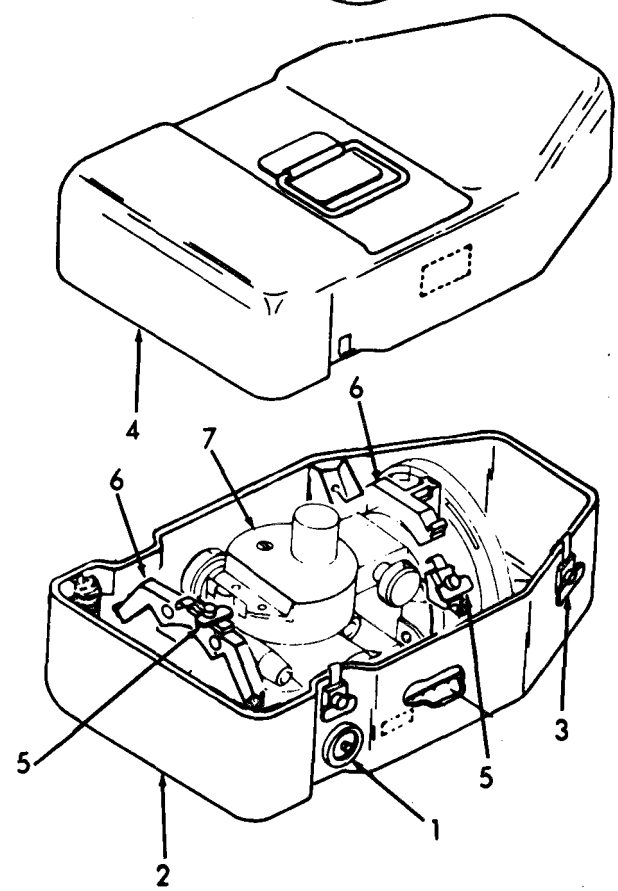
a. Press pressure relief valve (1) on lower section (2).

b. Unfasten latches (3) securing upper and lower sections and remove upper section (4).

c. Unfasten latches (5) and open clamps (6) securing GRU (7) in lower section (2).

d. Remove GRU (7) from lower section.

e. Refer to table 2-1 and remove items stored in transit case.



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

SETTING-UP GYROSCOPIC REFERENCE UNIT AND TRIPOD

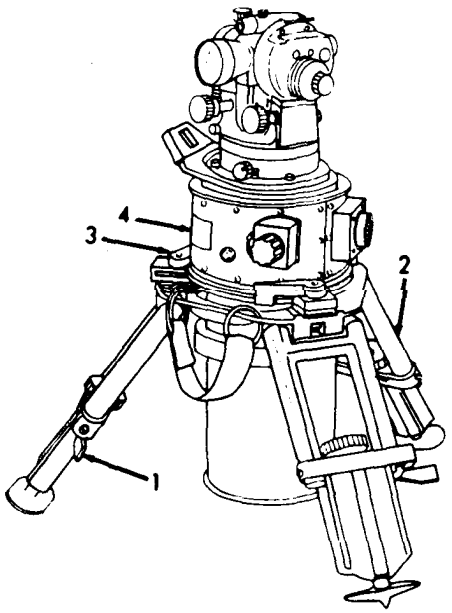
a. Loosen leg clamp (1) on each leg of tripod (2).

b. Extend each leg about one-quarter inch from full extension.

c. Tighten clamps (1) to secure the adjustable legs.

d. Release three hold-down clamps (3).

e. Install GRU (4) in tripod and tighten three hold-down clamps (3).



CAUTION

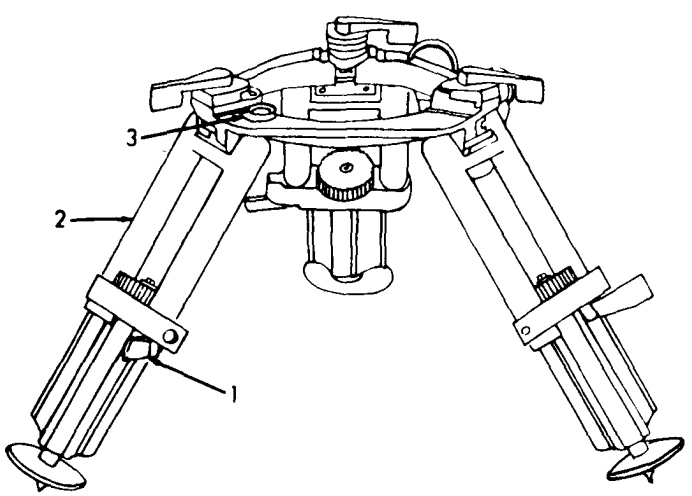
The legs of the tripod assembly are hinge-mounted and can swing beyond a normal standing position. Exercise care to avoid spreading the legs excessively and knocking the GRU against the ground.

f. Spread tripod legs outward to obtain a level condition while standing the unit in a vertical position over a selected location.

COARSE LEVELING

a. Release one of the tripod leg clamps (1).

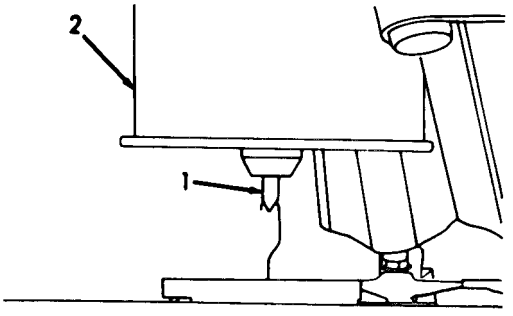
b. Adjust leg (2) to obtain a level indication on tripod circular level (3). Repeat procedure for each of the other two tripod legs.



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

COARSE LEVELiNG (Continued)

c. If the unit is to be centered over a fixed reference point, extend plumb pointer (1) located on the bottom of the GRU housing (2).

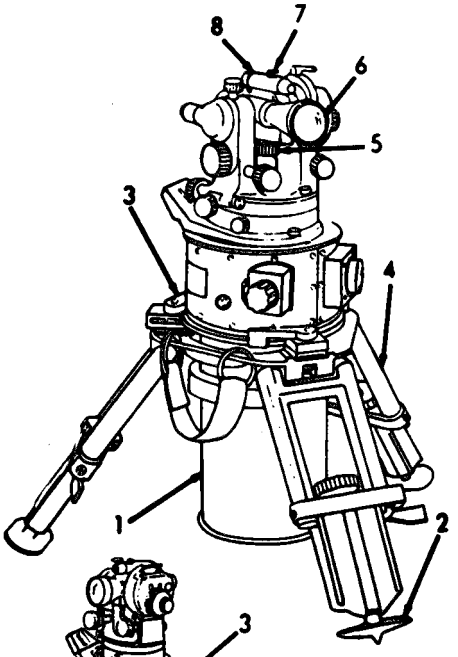


d. Place the GRU (1) on the ground so that the pointer is close to the fixed point and press the leg spades (2) into the ground.

e. Release holddown clamps (3) on the tripod (4) and shift GRU (1) in the tripod (4) to position pointer over the fixed reference point.

f. Rotate the theodolite alidade (5) to position the objective end of the telescope (6) over the NORTH mark on the GRU (1) and tighten horizontal lock.

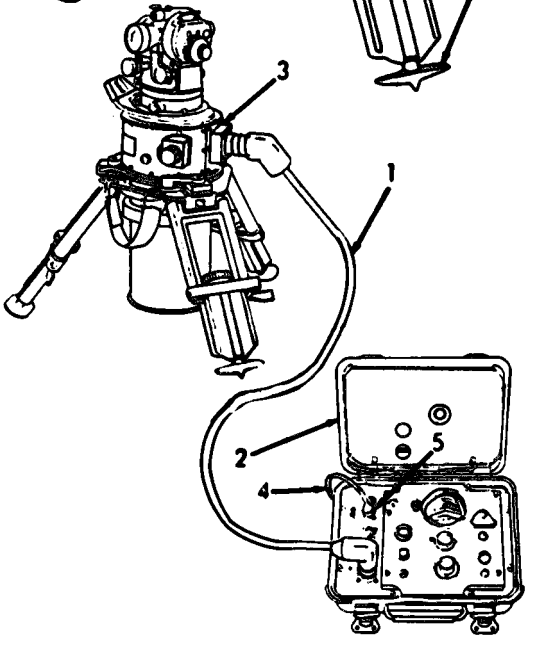
g. Preorient the GRU (1) to north by releasing the tripod holddown clamps (3) and rotate the GRU (1) in the tripod (4) until the two magnetic compass needle images are in coincidence. With the telescope (6) level, depress the plunger (7) on the magnetic compass (8).



h. Check to ensure that plumbing pointer is still over the fixed reference point. Tighten each of the three holddown clamps (3) on the tripod (4).

i. Connect the interconnect cable (1) between the ECU (2) and GRU (3).

Connect power cable (4) between the POWER receptacle (5) on the ECU (2) and a 22-33 Vdc power source.



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

AC-DC CONVERTER ASSEMBLY

NOTE

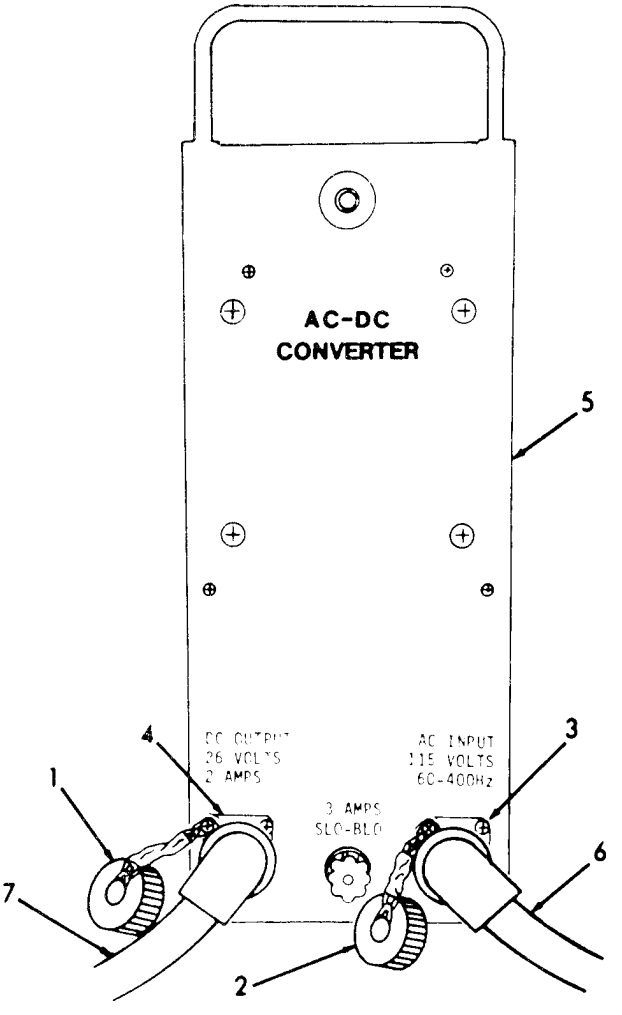
The AC-DC converter assembly is provided to permit the surveying instrument to be powered from a 115 Vac, 60 or 400 Hz power source. When connetted to the AC power source, the converter supplies the DC voltage necessary to operate the instrument. The converter and interconnecting electrical cables are stored in the transport case. Cap assemblies are provided on the converter to protect the electrical receptacles when the equipment is not in use.

a. Remove converter and associated cables from the transport case when it is needed for use.

b. Remove protective caps (1 and 2) from receptacles (3 and 4) on converter (5).

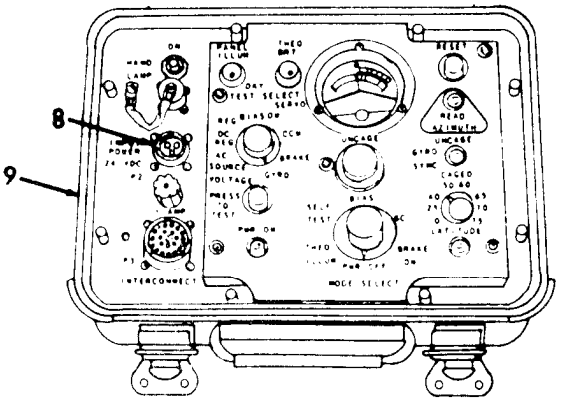
c. Connect the 115 Vac cable (6) between the AC power source and input receptacle (3) on converter (5).

d. Connect power cable (7) between output receptacle (4) on converter (5) and power receptacle (8) on ECU (9).



FINE-LEVELING

a. Rotate theodolite alidade (1) so that the long axis of the plate level (2) is in the same plane as one of the tripod legs (3).



2-6. ASSEMBLY AND PREPARATION FOR USE (Continued)

FINE-LEVELING (Continued)

b. Adjust fine-level control (4) to place the bubble in the center of the level vial.

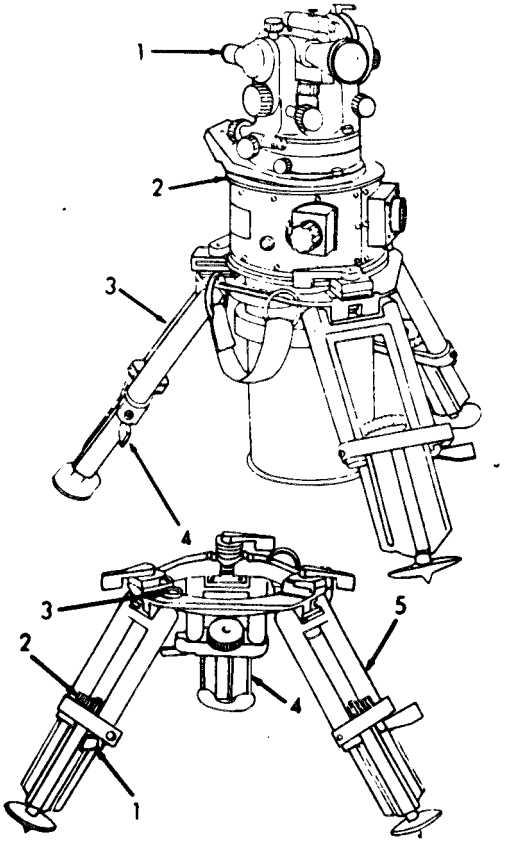
NOTE

If adjustment cannot be made, proceed to next step.

c. Release one of the tripod leg clamps (1).

d. Adjust leg (2) to obtain a level indication on tripod circular level (3). Repeat procedure for each of the other two tripod legs.

e. Rotate the alidade 90 degrees and adjust both the remaining legs (4 and 5). Continue the process until the alidade can be rotated 360 degrees with no more than ± 1/2 division displacement of the bubble.

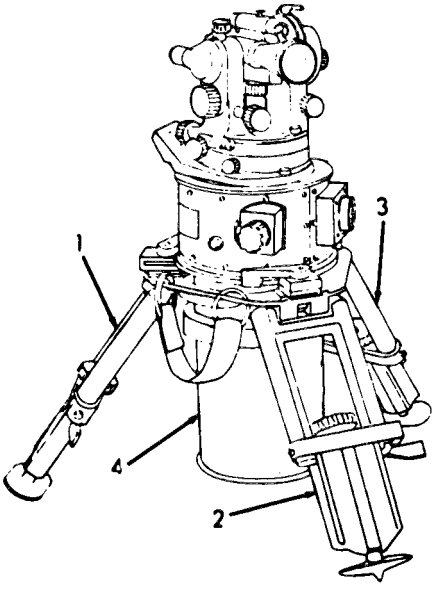


SETUP PROCEDURE WITH AUXILIARY TRIPOD

CAUTION

Ensure that the auxiliary tripod is level. ed when setting up the equipment. Binding of the SIAGL tripod legs may occur during adjustment if the auxiliary tripod is not leveled.

a. Spread auxiliary tripod legs (1, 2 and 3) outward to obtain a level condition while standing the tripod assembly (4) in a vertical position over a selected location.



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

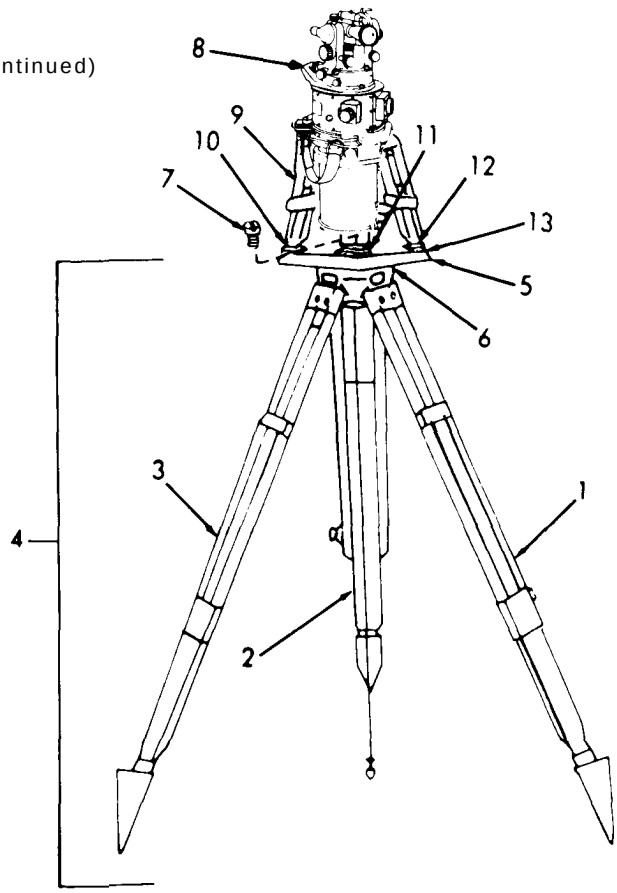
SETUP PROCEDURE WITH AUXILIARY TRIPOD (Continued)

b. Remove tripod adapter assembly (5) from transport case storage compartment and place on top of auxiliary tripod (4).

c. Center and position each tripod adapter leg (1, 2 and 3) at the apex of the auxiliary tripod plate (6) and secure with bridge screw (7) attached to plate.

d. Place GRU (8) and tripod (9) on tripod adapter assembly (5).

e. Place tripod leg spades (10, 11 and 12) in receptacles provided in each leg of the adapter assembly (5) and secure tripod (9) to the adapter (5) with spade latches (13).

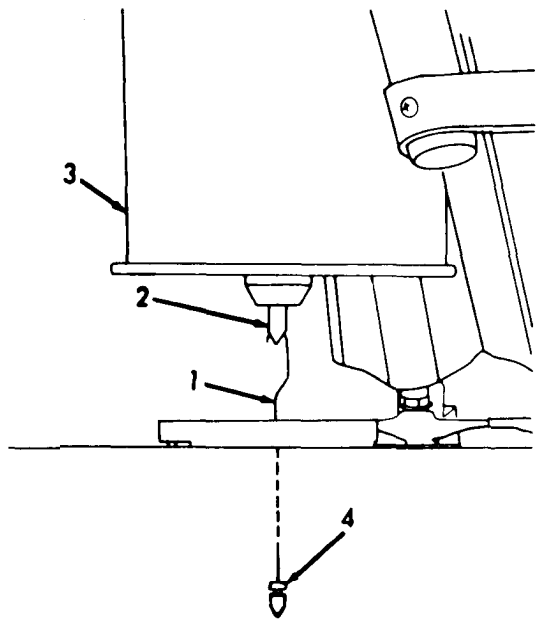


NOTE

If a plumb bob is to be used for centering the instrument over a fixed reference point, use plumb bob assembly stored in the transit case.

f. Insert extension hook (1) through bridge screw and attach to pointer (2) on the underside of GRU housing (3).

g. Attach plumb bob assembly (4) to plumb pointer (2) and adjust cord length to position plumb bob approximately over fixed referenced point.



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

SETUP PROCEDURE WITH AUXILIARY TRIPOD (Continued)

CAUTION

Make sure adapter is firmly attached.

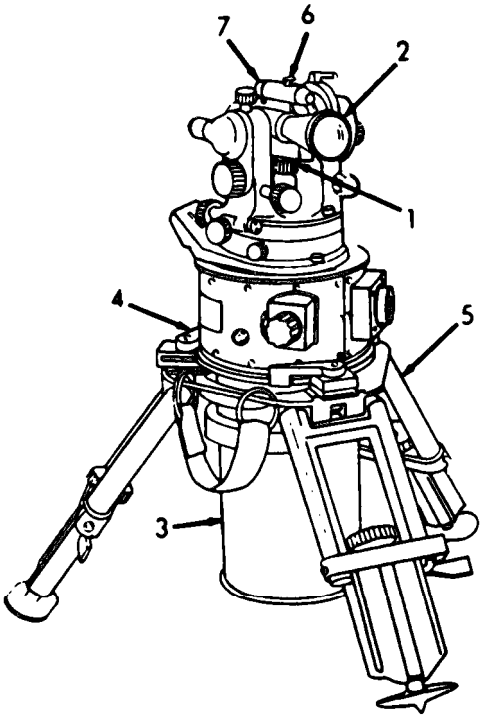
NOTE

Maneuver the auxiliary tripod to position the point of the plumb bob over the fixed reference point. Verify that the plumb bob extension hook does not touch the sides of the bridge screw. if necessary, adjust the telescoping legs of the tripod to obtain level condition.

h. Rotate the theodolite alidade (1) to position the objective end of the telescope (2) over the NORTH mark on the GRU (3) and tighten horizontal lock.

i. Preorient the GRU (3) to north by releasing the tripod hold-down clamps (4) and rotate the GRU (3) in the tripod (5) until the two magnetic compass needle images are in coincidence. With the telescope (2) level, depress the plunger (6) on the magnetic compass (7).

j. Check to ensure that plumbing pointer is still over the fixed reference point. Tighten each of the three holddown clamps (4) on the tripod (5).



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

SETUP PROCEDURE WITH AUXILIARY TRIPOD (Continued)

k. Connect the interconnect cable (1) between the ECU (2) and GRU (3).

l. Connect power cable (4) between the POWER receptacle (5) on the ECU (2) and a 22-33 Vdc power source.

AC-DC CONVERTER ASSEMBLY

NOTE

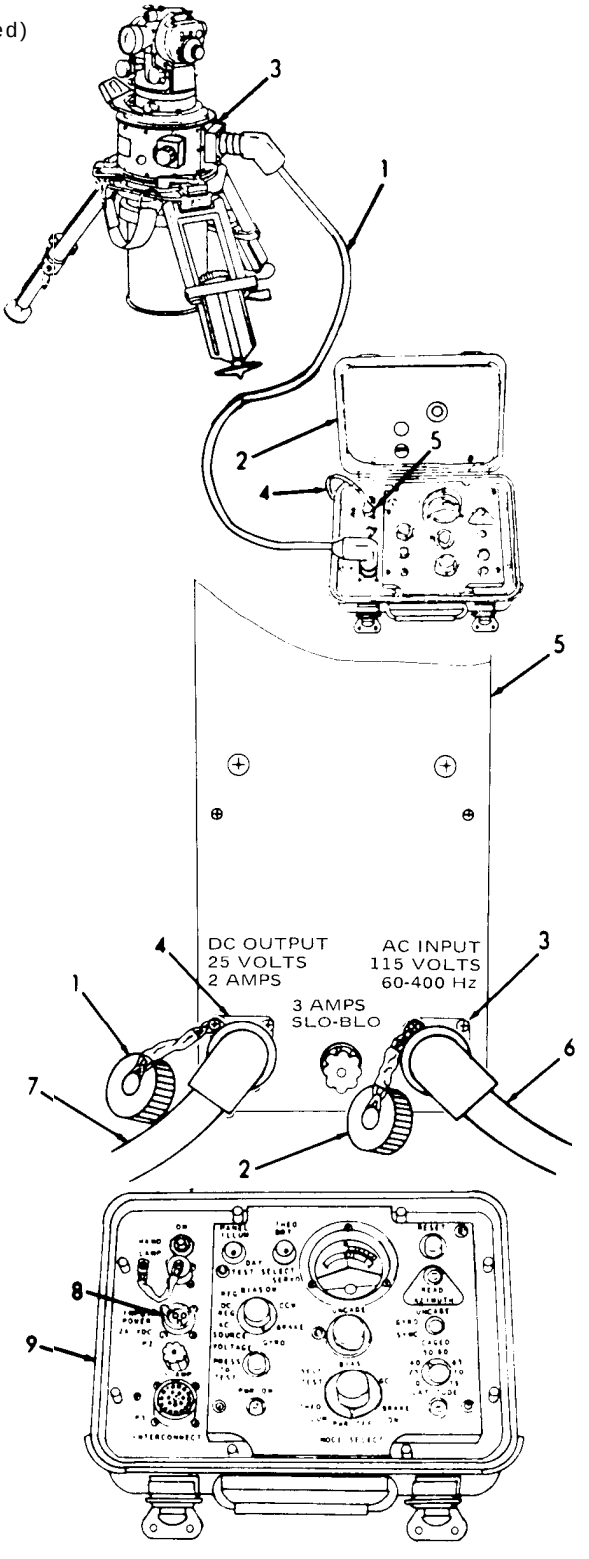
The AC-DC converter assembly is provialed to permit the surveying instrument to be powered from a 115 Vat, 60 or 400 Hz power source. When connected to the AC power source, the converter supplies the DC voltage necessary to operate the instrument. The converter and interconnecting electrical cables are stored in the transport case. Cap assemblies are provided on the converter to protect the electrical receptacles when the equipment is not in use.

a. Remove converter and associated cables from the transport case when it is needed for use.

b. Remove protective caps (1 and 2) from receptacles (3 and 4) on converter (5).

c. Connect the 115 Vac cable (6) between the AC power source and input receptacle (3) on converter (5).

d. Connect power cable (7) between output receptacle (4) on converter (5) and power receptacle (8) on ECU (9).



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

FINE-LEVELING

a. Rotate theodolite alidade (1) so that the long axis of the plate level (2) is in the same plane as one of the tripod legs (3).

b. Adjust fine-level control (4) to place the bubble in the center of the level vial.

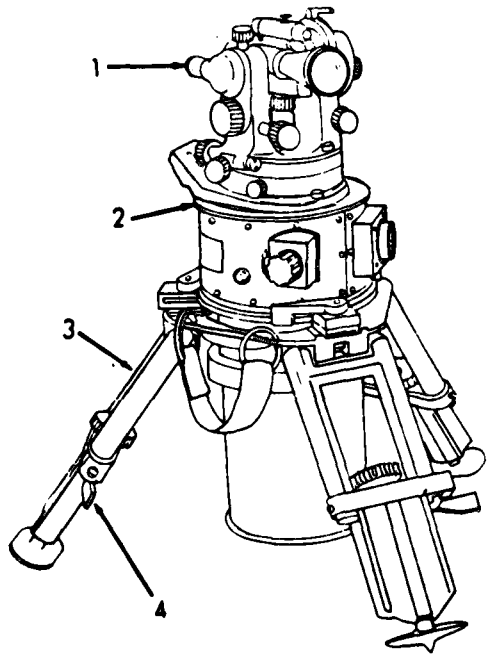
NOTE

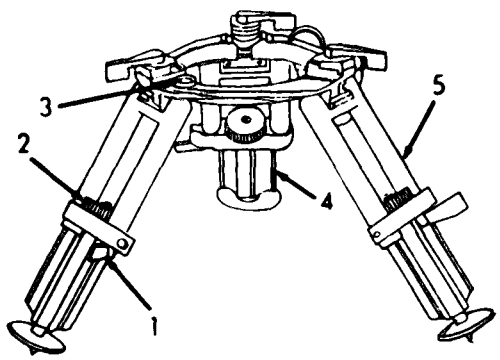
If adjustment cannot be made, proceed to next step.

c. Release one of the tripod leg clamps (1).

d. Adjust leg (2) to obtain a level indication on tripod circular level (3). Repeat procedure for each of the other two tripod legs.

e. Rotate the alidade 90 degrees and adjust both the remaining legs (4 and 5). Continue the process until the alidade can be rotated 360 degrees with no more than ± 1/2 division displacement of the bubble.



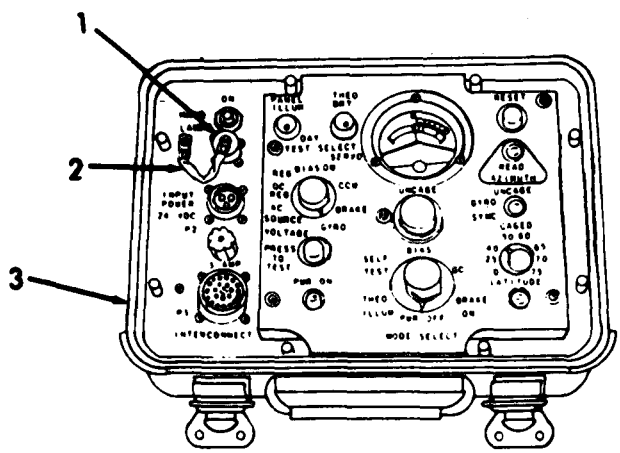


NIGHT OPERATION

NOTE

A hand-lamp assembly may be used during night operations. A hand-lamp switch and receptacle are provided on ECU to accommodate the assembly.

a. Remove cap and chain (1) from hand lamp connector (2) on ECU case (3).



2-8. ASSEMBLY AND PREPARATION FOR USE (Continued)

NIGHT OPERATION (Continued)

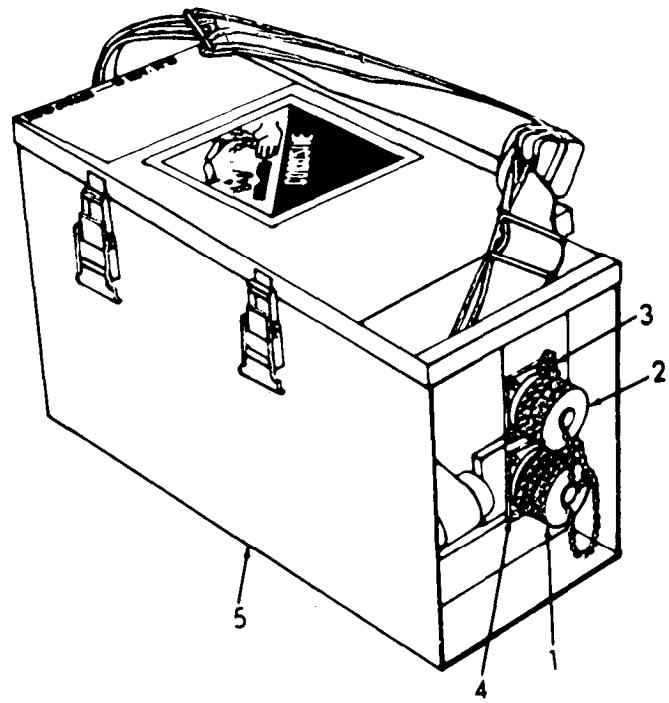
b. Remove hand lamp assembly from ECU lid.

c. Install hand lamp assembly on connector (2)

BATTERY INSTALLATION

WARNING

Corrosive Battery Electrolyte (Potassium Hydroxide). Wear rubber gloves, apron, and face shield when handling leaking batteries. If potassium hydroxide is spilled on clothing, or other material wash immediately with clean water. If spilled on personnel, immediately start flushing the affected area with clean water. Continue washing until medical assistance arrives.



a. Remove cap and chain assemblies (1 and 2) from electrical connectors (3 and 4) on battery (5).

b. Connect battery adapter cable to the battery and power cable.

c. Connect power cable to the ECU.

SECTION III. PREVENTIVE MAINTENANCE

CHECKS AND SERVICES (PMCS)

2-9. PMCS

a. Preventive Maintenance Checks and Services (PMCS), Table 2-2, are to be done to be sure the surveying instrument is ready to use at all times. These checks and services help you find and fix defects before the surveying instrument is damaged or fails.

b. Item numbers in the first column of Table 2-2 are the order in which things are to be done. Column two “Interval” lists when to do them.

c. If minor defects are found when the surveying instrument is operating, take notes on what they are. Fix them, or have them fixed after you have stopped operating the surveying instrument.

NOTE

While the surveying instrument is operating, if any defect develops that you think will damage the surveying instrument, stop operation at once.

d. Record all defects and steps taken to fix them on DA Form 2404 (Equipment Inspection and Maintenance Work Sheet) as soon as possible.

NOTE

Always keep in mind the WARNINGS and CAUTIONS located on the inside front cover.

2-9. PMCS (Continued)

Table 2-2. Organizational Preventive Maintenance Checks and Services

LEGEND

B - Before Operation

A - After Operation

Item No.	Interval B	Interval A	Item to be Inspected	Procedure	Equipment Is Not Ready/Available If:
1	•	•	Transport case	Inspect for inoperable handles, latches or mounting. Inspect case interior for condition of isolators, bumpers, seals, latch supports and structure. Inspect for inoperable relief valve. Replace an inoperable relief valve.	Handles or latches are inoperable. Relief valve is defective or interior components are damaged or missing or case is damaged.
2	•	•	Accessories	Replace damaged or missing accessories with serviceable equipment.	Components are damaged or missing.
3	•	•	Cable accessories	Inspect for severed cable, cracked or otherwise damaged connectors, and bent or broken pins. Ensure that protective caps are installed on electrical connectors. Report damaged cable assemblies to Direct Support Maintenance.	Cables or connectors are damaged or defective. Caps are damaged or missing.
4	•	•	AC-DC converter	Inspect electrical connectors for loose mounting and check to see if protective caps are installed. Check to see that cover is securely installed. Report any damage to Direct Support Maintenance.	Electrical connectors are damaged or protective caps are missing or damaged. Converter is otherwise damaged in any way.

2-9. PMCS (Continued)

2-2. Organizational Preventive Maintenance Checks and Services (Continued)

Item No.	Interval B	Interval A	Item to be Inspected	Procedure	Equipment is Not Ready/Available If:
5	•	•	Transit case	Inspect for inoperable handles, latches or loose mounting. Check to see that GRU and tripod are properly positioned and secured in case. Inspect case interior for condition of isolators, bumpers, seals, latch supports, and structure. Inspect for inoperable relief valve. Replace an inoperable relief valve.	Handles or latches are inoperable. Relief valve is defective or interior components are damaged or missing or case is damaged.
6	•	•	Gyroscopic reference unit	Inspect tripod for proper operation of clamps and level adjustment. Check that leg assemblies extend and retract properly and do not bind. Inspect electrical receptacle, switch and indicator for secure mounting and damage. Replace damaged or missing knobs or leg assemblies. Report other damage or malfunctions to Direct Support Maintenance.	Tripod does not operate properly, electrical receptacle switch or indicator is damaged or defective.
7	•	•	Theodolite	Inspect for damaged or burned out lamps. Replace as necessary. Report any additional damage to Direct support Maintenance.	Any damage other than lamp replacement is noted.

2-9. PMCS (Continued)

Table 2-2. Organizational Preventive Maintenance Checks and Services (Continued)

Item No.	Interval B	Interval A	Item to be Inspected	Procedure	Equipment Is Not Ready/Available If:
8	•	•	Electrical control unit	Inspect control panel for secure mounting. Tighten or replace securing parts as necessary. Inspect for defective indicator lamps. Replace as necessary. Inspect case for damage. Report any other damage to Direct Support Maintenance.	Malfunction cannot be corrected by replacement of lamps.
9	•	•	Identification plates and markings	Inspect for legibility and secure mounting. Replace missing or damaged identification plates. Restore illegible markings to duplicate original equipment marking.	
10	•	•	Wind shelter	Inspect for wear, bent or flat pins, or loose rivets.	

SECTION IV. TROUBLESHOOTING

2-10. TROUBLESHOOTING

Table 2-3 contains troubleshooting information useful to you in diagnosing and correcting malfunctions or unsatisfactory operation of the surveying instrument.

a. The troubleshooting table lists the common malfunctions and unsatisfactory conditions you are most likely to encounter.

b. You should first find the malfunction in the table which most closely describes the problem; then perform the tests, inspections and corrective actions in the order in which they are listed.

2-10. TROUBLESHOOTING (Continued)

c. This manual cannot list all possible symptoms which may occur. If a condition exists which cannot be solved by you, notify your supervisor.

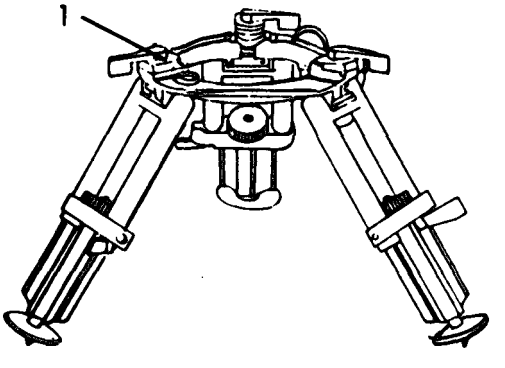
d. You should verify the fault before performing Troubleshooting.

NOTE

Malfunctions which cannot be remedied through the procedures in this section are to be reported to Direct Support Maintenance.

Table 2-3. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU)
1. BINDING OF TRIPOD LEG ASSEMBLIES.
Step 1. Lubricate tripod pivot assembly. a. Apply a film of silicone grease, MIL-S-8660, item 7, Appendix C, at the pivot pin (1). b. Wipe excess grease from the assembly using a clean cloth.

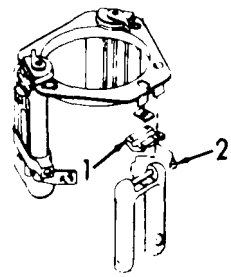


2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check for excessive clamping in tripod pivot (1).
Loosen screws (2) slightly to relieve tension.



Step 3. Check for structural damage to the leg assemblies.

a. Spread and retract leg assembly (1). If pivot action is not smooth replace the leg assembly.

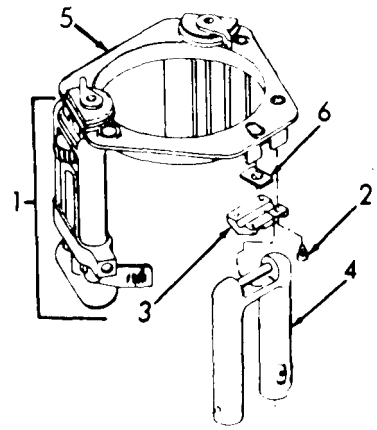
b. Remove four screws (2) and pivot cap (3).

c. Remove tripod leg assembly (4).

d. Apply a film of silicone grease, MIL-S-8660, item 7, Appendix C, to pivot pin of new leg (4).

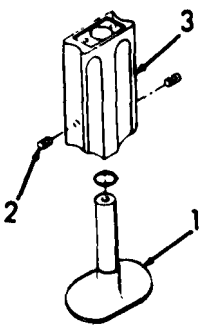
e. Wipe excess grease from the leg assembly using a clean cloth.

f. Position leg assembly (4) by base (5) and install rectangular nut (6) and pivot cap (3) under pivot pin located on upper portion of leg assembly using four screws (2).



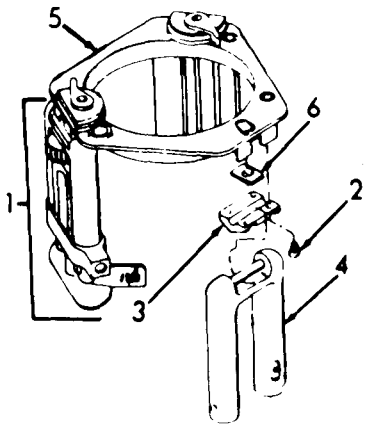
2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
2. BINDING OF FINE-LEVELING ASSEMBLY.
Step 1. Check fine-leveling for lack of lubrication. a. Apply a film of silicone lubricant, MIL-S-8660, item 7, Appendix C, to shaft surface of spade (1). b. Retract and extend spade several times to spread lubricant. c. Wipe excess lubricant from assembly using a clean cloth. d. Remove setscrew (2) from extension leg (3). e. Insert molydisulfide lubricant, MIL-G-21164, item 4, Appendix C, into setscrew hole. f. Extend and retract spade several times to spread lubricant. g. Install setscrew (2). 

2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
Step 2. Inspect for structural damage to tripod leg assembly. a. Extend and retract spade (1). b. If action is not smooth, with no evidence of binding, replace leg assembly. c. Remove four screws (2), pivot cap (3), and leg assembly (4). d. Apply a film of silicone grease, MIL-S-8660, item 7, Appendix C, to pivot pin of a new leg assembly (4). e. Wipe excess grease from the leg assembly using a clean cloth. f. Position leg assembly (4) by base (5) and install rectangular nut (6) and pivot cap (3) under pivot pin located on upper portion of leg assembly using four screws (2). 

2-10. TROUBLESHOOTING - (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

GYROSCOPIC REFERENCE UNIT (GRU) (Continued)

3. GRU INSECURE IN TRIPOD ASSEMBLY.

Step 1. Check to see if hold-down clamp(s) are loose.

Tighten.

Step 2. Check for defective hold-down clamp(s).

a. Visually inspect hold-down clamp(s) (1, 2, and 3) for wear or other defects.

b. Remove screw (4) attaching GRU (5) to lower clamps (6).

CAUTION

Place suitable material under base of GRU to support weight of the GRU unit. Damage can result to GRU if dropped.

c. Rotate locking arm (7) counterclockwise and slide clamp outward from GRU (5).

d. Remove GRU (5) from tripod (8).

e. Rotate locking arm (7) counterclockwise and disengage from rectangular nut (9).

f. Raise locking arm (7) with bolt (10) attached from the base (11).

g. Remove washer (12), upper clamp (13), lower clamp (6), and rectangular nut (9) from the base (11).

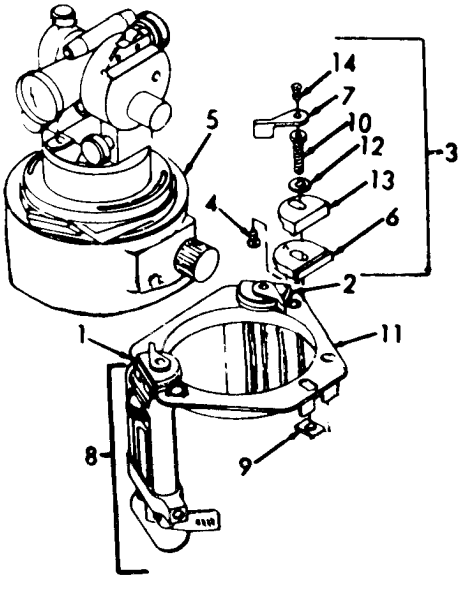
h. Remove screw (14) and separate bolt (10) from locking arm (7).

i. Apply MIL-G-21164 molydisulfide lubricant, item 4, Appendix C, to threads of bolt (10).

j. Engage tang on upper clamp (13) in slot in lower clamp (6).

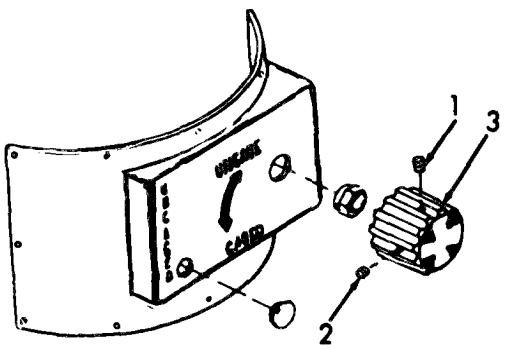
2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
k. Install washer (12) on bolt (10) and insert bolt (10) thru clamps (13 and 6) and base (11) into rectangular nut (9). **NOTE** **Final adjustment of bolt (10) is performed at installation of GRU into tripod.** l. Install GRU (5) into tripod base (11). m. Secure each lower clamp (6) to GRU with screw (4). n. Slide GRU to approximate center of base (11) and rotate bolt (10) to tighten clamps. o. Install locking arms (7) so that arm is approximately tangent to GRU housing, when clamps are tight. p. Apply MIL-S-22473 Grade N, Form R primer, item 5, Appendix C, to threads of screws (14), and allow to dry 5 seconds. Apply MIL-S-46163, Grade N, Type II, locking sealant, item 2, Appendix C , to the first few threads of screws. Install screws (14).   

2.10. TROUBLESHOOTING (Continued)

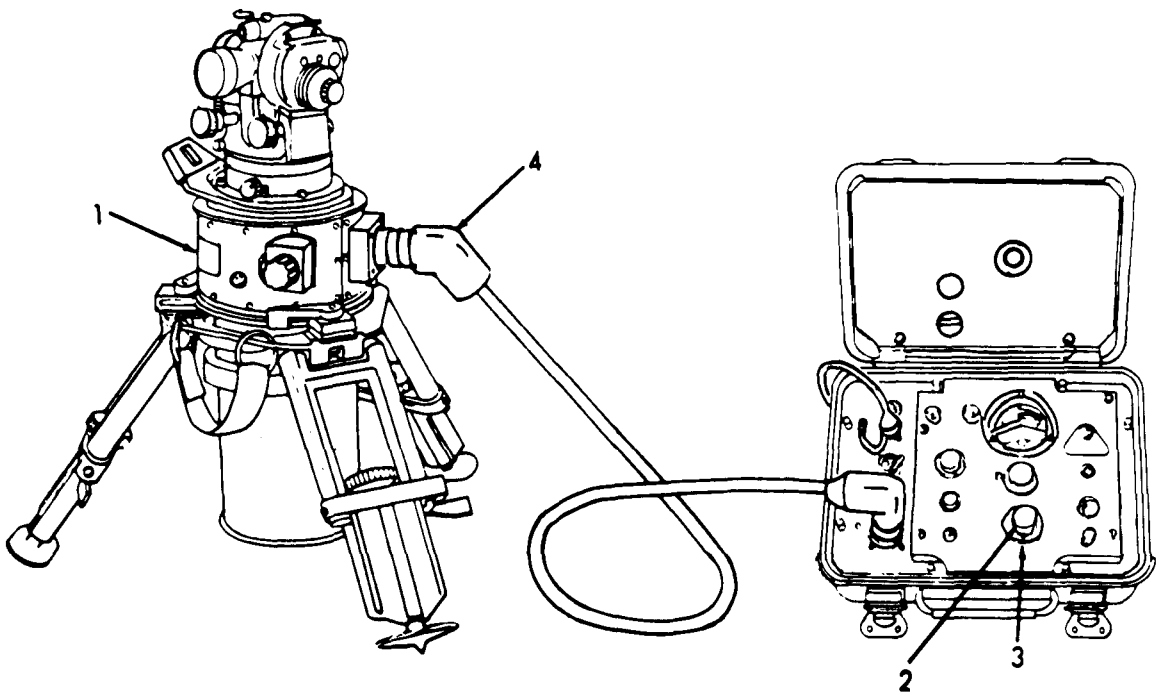
Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
4. CAGE-UNCAGE CONTROL INOPERATIVE.
Step 1. Check for loose knob. Tighten set screws (1 and 2) in knob (3).

Step 2. Check for defective control.
a. Replace existing GRU with one that is operable. If the system operates correctly with new GRU, this indicates original GRU was defective.

2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
b. Replace a defective GRU (1) with a new one, by placing Mode Select Switch (2) in PWR OFF position (3) and disconnecting and connecting power cable (4) to GRU (1). c. Report defective GRU to Direct Support Maintenance.



2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)	
5. THEODOLITE INOPERATIVE.	
Step 1. Check for defective lamps.	
	a. Place MODE SELECT SWITCH (1) in PWR OFF position (2).
	b. Turn protective cap (3) counterclockwise and remove.
	c. Remove lamp (4) from socket.
	d. Inspect lamp for burned out filament.
	e. Replace defective lamp with a good one.
	f. Install lamp (4) in socket.
	g. Install protective cap (3) finger tight.

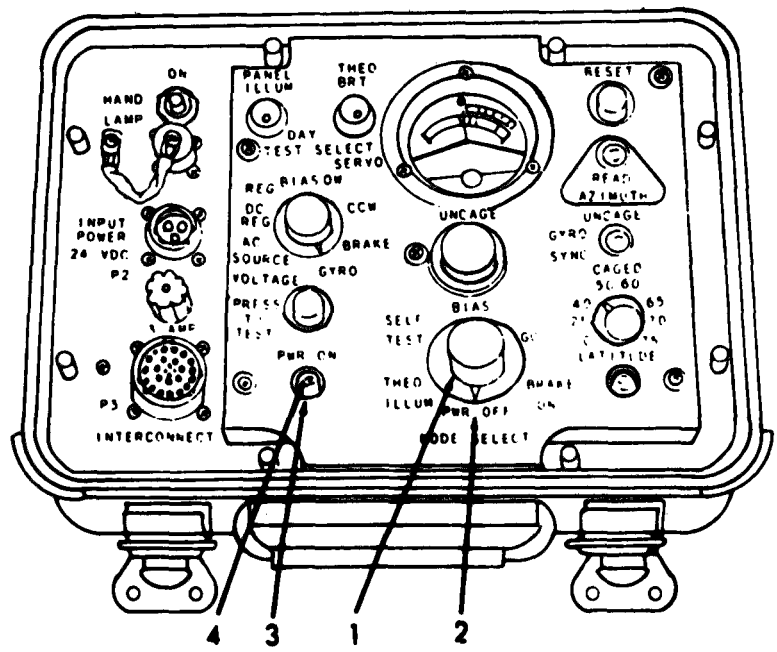
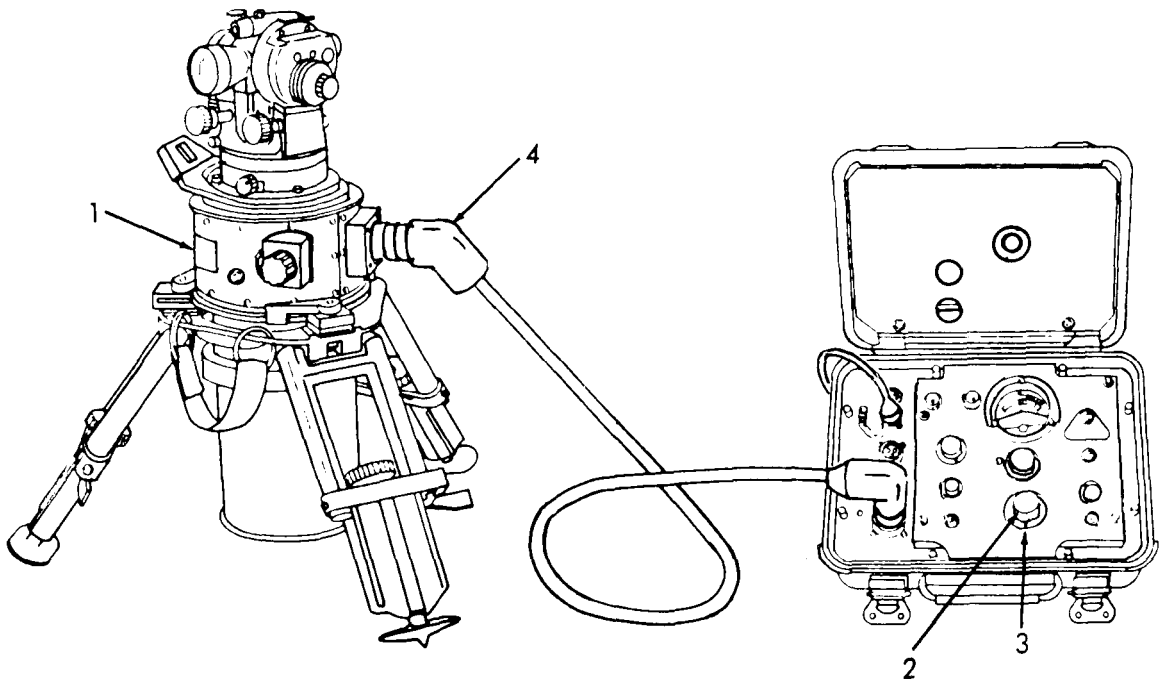


Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)
Step 2. Check for defective control. a. Replace existing GRU with one that is operable. If the system operates correctly with new GRU, this indicates original GRU was defective. b. Replace a defective GRU (1) with a new one, by placing Mode Select Switch (2) in PWR OFF position (3) and disconnecting and connecting power cable (4) to GRU (1). c. Report defective GRU to Direct Support Maintenance.



2-10. TROUBLESHOOTING (Continued)

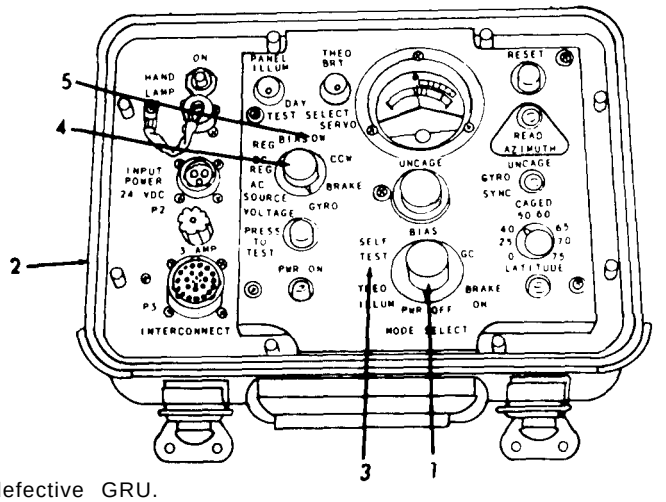
Table 2-3. Troubleshooting (Continued)

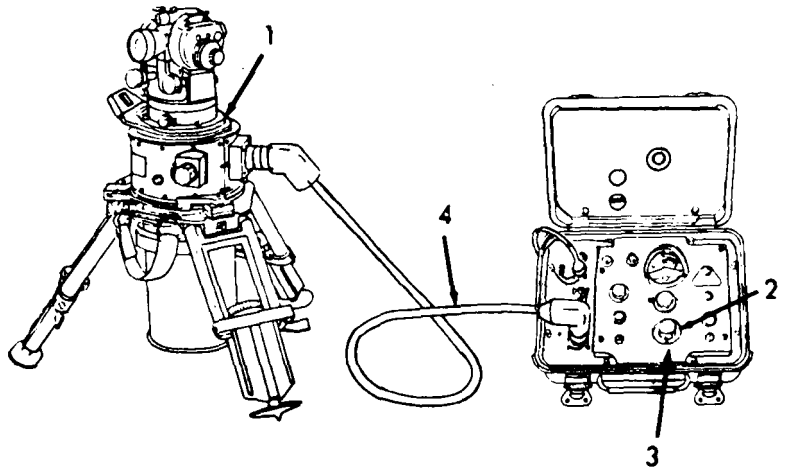
MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)	
6. INACCURATE THEODOLITE READING INDICATIONS.	
Step 1. Check reference mirror for improper alignment.	a. Set-up the SIAGL with the GRU over a base line of a known azimuth. b. Perform one azimuth determination. c. Set the theodolite horizontal circle to the azimuth of the known line, with the theodolite on target. d. Place the MODE SELECT switch (1) on the ECU (2) to SELF TEST (3) and the TEST SELECT switch (4) to CW (5), and turn the GRU output shaft 5 to 10 degrees clockwise from the position of the previous azimuth determination. Switch the SELF TEST switch (3) out of the SERVO position (6) to stop the turning action. e. Perform an additional azimuth determination. f. Read and record the azimuth to the target and the reference mirror angle, using both direct and reverse readings. g. Repeat step f for the counterclockwise turn direction. h. Repeat steps f and g for a total of ten azimuth determinations. i. Calculate the arithmetic mean of the determined azimuths and subtract from the known value. j. Calculate the arithmetic mean of the measured reference mirror angle and algebraically add to the resultant of step (i). The result of this calculation is the new reference mirror azimuth value.

2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
GYROSCOPIC REFERENCE UNIT (GRU) (Continued)	
	k. Align the theodolite horizontal circle to the reference mirror.
Step 2. Check for defective GRU.	a. Replace existing GRU with one that is operable. If the system operates correctly with new GRU, this indicates original GRU was defective. b. Replace a defective GRU (1) with a new one, by placing Mode Select Switch (2) in PWR OFF position (3) and disconnecting and connecting power cable (4) to the GRU (1). c. Report defective GRU to Direct Support Maintenance.

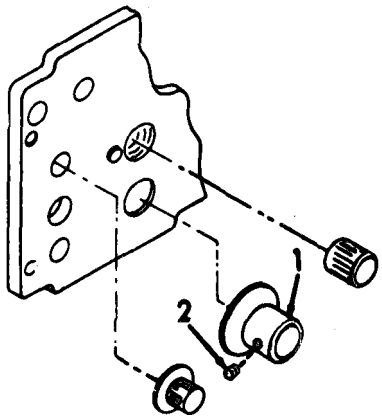




2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
ELECTRONIC CONTROL UNIT	
1. ECU SWITCHES INOPERATIVE.	
Step 1. Check for loose knobs.	a. Rotate knob (1). b. If knob turns without operating switch, tighten setscrews (2).
Step 2. Check for defective switches.	a. Disconnect power cables (1, 2 and 3) from ECU (4). b. Replace existing ECU with one that is operable. If system operates correctly with new ECU, this indicates original was defective. c. Reconnect power cables (1, 2 and 3) to ECU (4). d. Report defective ECU to Direct Support Maintenance.



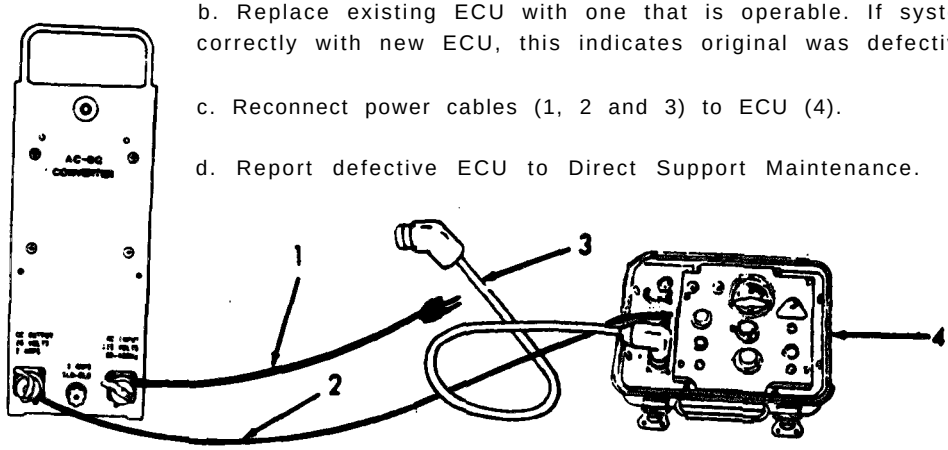


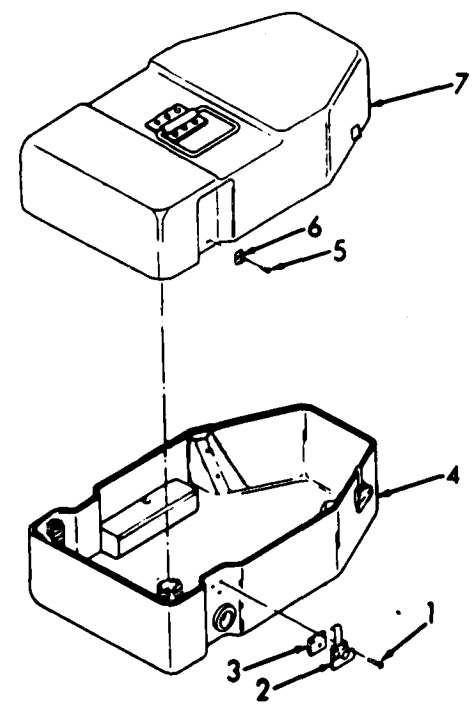
Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ELECTRONIC CONTROL UNIT (Continued)
2. ECU PANEL LOOSE IN CASE. Check for damaged panel, loose or missing captive screws. a. Visually check for missing captive screws. b. Turn captive screw clockwise. If no tension is felt, captive screw is defective. c. If captive screws are defective, report defective ECU to Direct Support Maintenance.
CASES
1. IMPROPER SEALING OF TRANSPORT, TRANSIT OR ECU CASES. Step 1. inspect for loose fasteners. Tighten screws. Step 2. Inspect for defective fasteners. a. Operate latch (2) and check for binding or other mechanical defects. b. If defective, remove screws (1) attaching latch (2) and spacer (3) to lower section of case (4). c. Remove latch (2) and spacer (3) from lower section of case (4). d. Remove screws (5) and latch (6) from upper section of case (7). e. Apply a coating of sealant primer, Military Specification, MIL-S-22473, Grade N, Form R, item 5, Appendix C, to the threads of attaching screws. Allow to air dry for 5 seconds. Apply MIL-S-46163, Grade N, type II locking sealant, item 2, Appendix C, to the first few threads of the screws.

2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

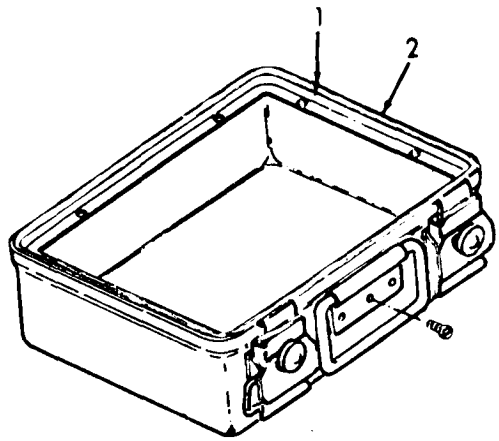
MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
CASES (Continued)	
	f. Install latch (6) to upper section of case (7) with screws (5). g. Install spacer (3) and latch (2) to lower section of case (4) with screws (1).



2-10. TROUBLESHOOTING (Continued)

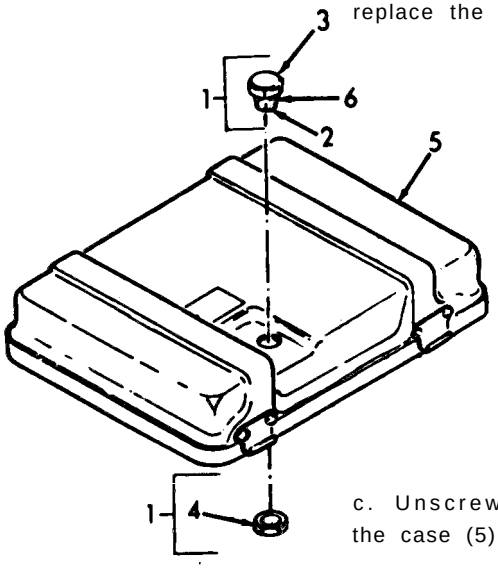
Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CASES (Continued)
Step 3. Inspect for defective seal.
a. Using a blunt instrument, remove the seal (1) from the recess in the case (2).
b. Scrape all seal and adhesive residue from the seal cavity.
c. Cut a length of seal material equal to the length of the seal cavity in the lower case (2).
d. Apply a continuous bead of RTV sealant, Military Specification, MIL-A-46106 RTV103BLA, item 6, Appendix C, into the seal cavity.
e. Press the seal (1) into the cavity.
f. Wipe excess sealant from the case (2).



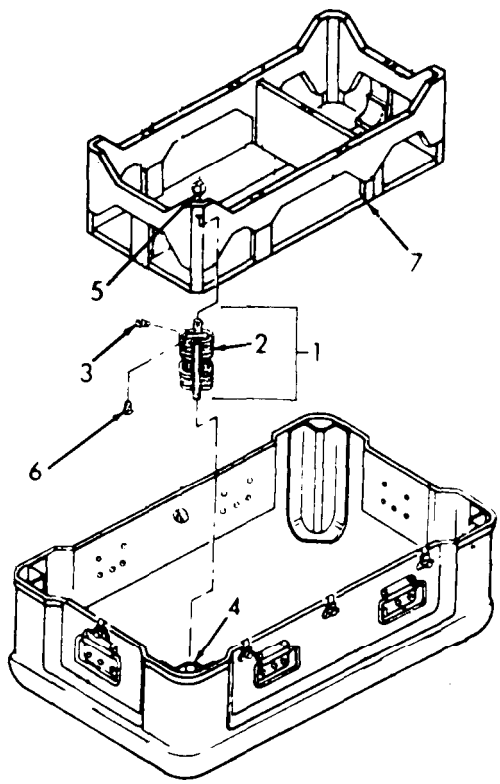
2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CASES (Continued)
2. INOPERATIVE PRESSURE RELIEF VALVE.
Step 1. Check for defective pressure relief valve (1). a. Apply air pressure to the inside end (2) of the pressure relief valve (1). If the air pressure is not completely stopped, replace the pressure relief valve. b. With air pressure applied to the inside end of the pressure relief valve, press on the outside end (3). If the air pressure is not relieved, replace the pressure relief valve (1).      c. Unscrew the pressure relief valve retaining nut (4) from the interior of the case (5), and remove the valve (1). d. Install the pressure relief valve (1) with retainer nut (4). Tighten the nut so that the seal in the valve is compressed and the valve body (6) is in contact with the lid.
Step 2. Check for structural damage to case. a. Visually examine the case for dents or other structural damage. b. Report condition to Direct Support Maintenance.

2-10. TROUBLESHOOTING (Continued)

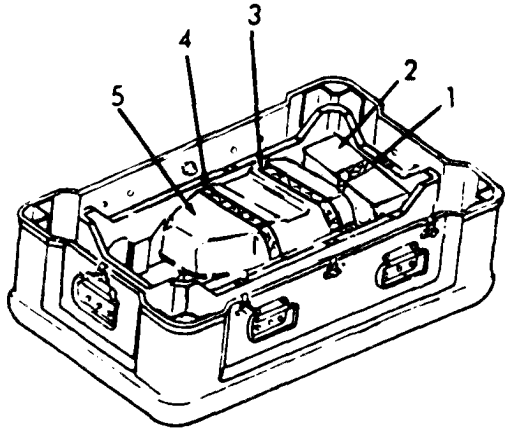
Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CASES (Continued)
3. ELECTRONIC CONTROL UNIT AND TRANSIT CASE MOVE IN TRANSPORT CASE.
Step 1. Inspect for defective isolators (1). a. Visually inspect isolators (1) for broken spring (2). b. Remove screws (3) securing isolator (1) to case bracket (4). c. Hold attaching nut (5) with a hex wrench, remove screws (6) and isolator (1) from mounting rack (7). d. Positon new isolator (1) against case bracket (4) and secure with screws (3). e. Secure isolator to mounting rack (7) with screws (6) and nuts (5). 

2-10. TROUBLESHOOTING (Continued)

Table 2-3. Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
CASES (Continued)	
Step 2. Inspect for defective retaining clamps.	a. With retaining clamp (1) on ECU case (2) in locked position, pull on ECU. b. If retaining clamp releases under pressure, report condition to Direct Support Maintenance. c. With retaining clamps (3 and 4) on transit case (5) in locked position, pull on transit case. d. If retaining clamp(s) release under pressure, report condition to Direct Support Maintenance.



SECTION V. MAINTENANCE PROCEDURES

2-11. CAGING KNOB

This task covers:
a. Removal b. Repair/Replace c. Installation

INITIAL SETUP

Tools

Key set, hexagon head
NSN 5120-01-017-9535

Material/parts

MIL-S-22473, Grade N, Form R
Primer, Item 5, Appendix C
Locking Sealant MIL-S-46163,
Grade N, Type II, Item 2,
Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Caging Knob	a. Remove two setscrews (1) from caging knob.	
	b. Remove caging knob (2) from caging shaft (3).	
REPAIR/REPLACE		
	Replace defective caging knob with a serviceable like item.	

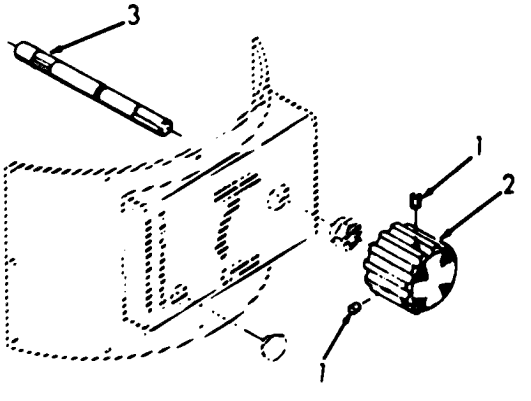
2-11. CAGING KNOB (Continued).

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION		
2. Caging Knob	a. Install two setscrews (1) partially into caging knob (2).	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C to the two setscrews and allow to air dry for 5 seconds. Apply locking sealant, MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of two set screws.
	b. Place caging knob (2) onto caging shaft (3).	

NOTE

Allow sufficient space between caging knob and GRU housing to prevent binding.

c. Tighten two setscrews.



2-12. TIME TOTALIZING METER

This task covers:

Inspection

INITIAL SETUP

Material/parts

Stopwatch

Personnel Required

MOS 82E Surveying
Instrument Mechanic

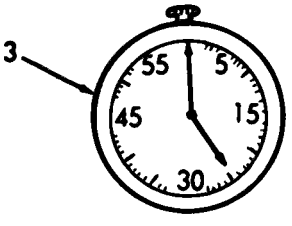
LOCATION/ITEM	ACTION	REMARKS

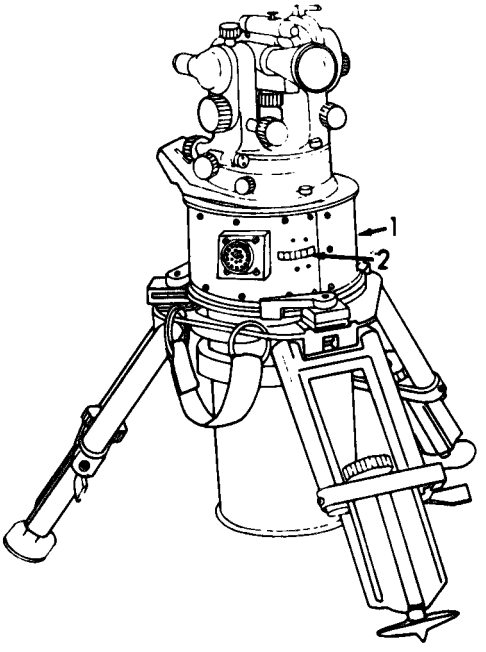
INSPECTION

a. Apply power to GRU (1).

b. Observe time totalizing meter (2) and compare elapsed time with stopwatch (3).

c. If elapsed time differs, report condition to Direct Support Maintenance.





2-13. TRIPOD ASSEMBLY

This task covers:

a.	Removal	b.	Disassembly	c.	Inspection
d.	Repair	e.	Reassembly	f.	Installation

INITIAL SETUP

Tools

Screwdriver, cross tip
NSN 5120-00-965-0626
Screwdriver, flat tip
NSN 5120-00-236-2127
Key set, hexagon
NSN 5120-01-017-9535

Material/parts

MIL-S-8660 Silicone grease,
Item 7, Appendix C
MIL-S-22473 Grade N, Form R
Primer, Item 5, Appendix C
MIL-G-21164 Molydisulfide,
Lubricant, Item 4, Appendix C
MIL-S-46163 Grade N, Type II,
Locking sealant, Item 2,
Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. GRU	a. Remove screws (1) attaching GRU (2) to lower clamp (3).	

CAUTION

Place suitable material under base of GRU to support weight of the GRU unit. Damage can result to GRU if dropped.

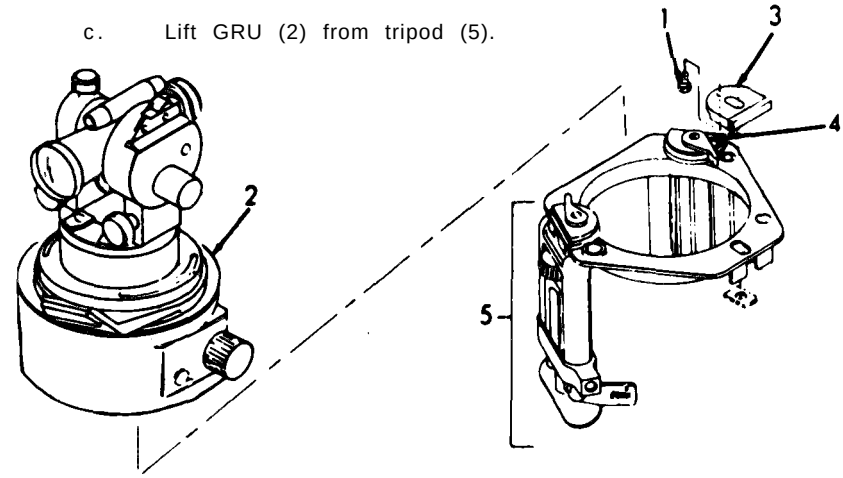
b. Rotate locking-arm (4) counter-clockwise and slide clamps (3) outward from GRU (2).

2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REMOVAL (Continued)

c. Lift GRU (2) from tripod (5).



DISASSEMBLY

2. Tripod

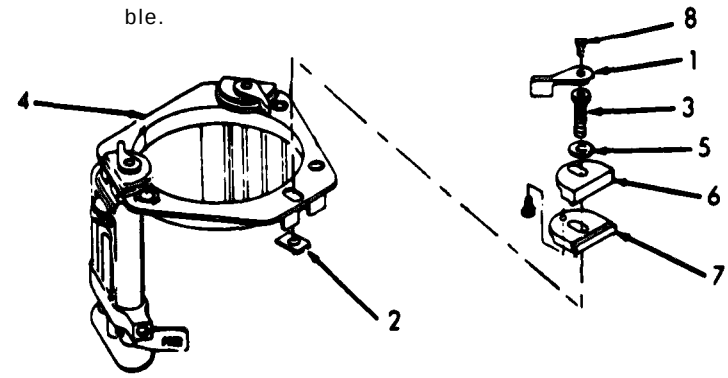
a. Rotate locking arm (1) counter-clockwise and disengage from rectangular nut (2).

b. Raise locking arm with bolt (3) attached from base (4).

c. Remove washer (5), upper clamp (6), lower clamp (7) and rectangular nut (2) from base (4).

d. Remove screw (8) and separate bolt (3) from locking arm (1).

e. Invert tripod and spread legs as far as possible.



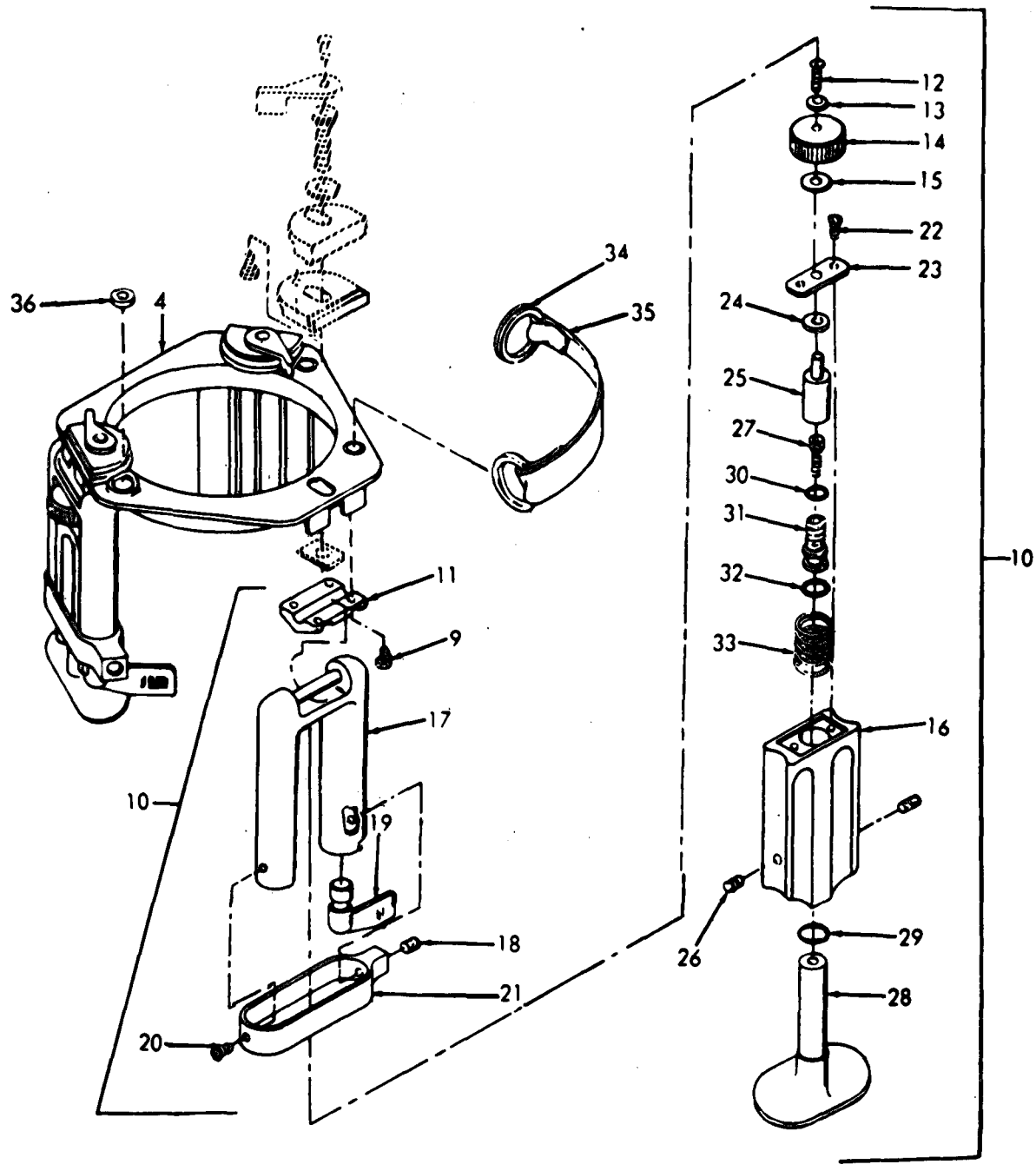
2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY (Continued)		
f.	Remove screws (9) and remove leg assembly (10) and pivot cap (11) from base.	
g.	Remove screw (12), washer (13), knob (14), and thrust washer (15).	
h.	Remove extension leg (16) with attached parts, from leg assembly (17).	
i.	Remove setscrew (18) and pull cam lock (19) from leg assembly (17).	
j.	Remove screw (20) and pull clamping band (21) from ends of leg.	
k.	Remove two screws (22), plate (23) and washer (24) from leg assembly (16).	
l.	Turn fine leveling nut (25) clockwise and remove from bushing (31).	
m.	Remove screw (26).	
n.	Remove screw (27) and pull spade (28) from extension leg (16).	
o.	Remove O-ring (29) from extension leg.	Discard O-ring.
p.	Remove O-ring (30), bushing (31), O-ring (32), and spring (33) from extension leg (16).	Discard O-rings.
q.	Spread rings (34) and disengage from base (4). Remove handle (35) from rings.	
r.	Remove level (36) from base (4).	

2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY (Continued)



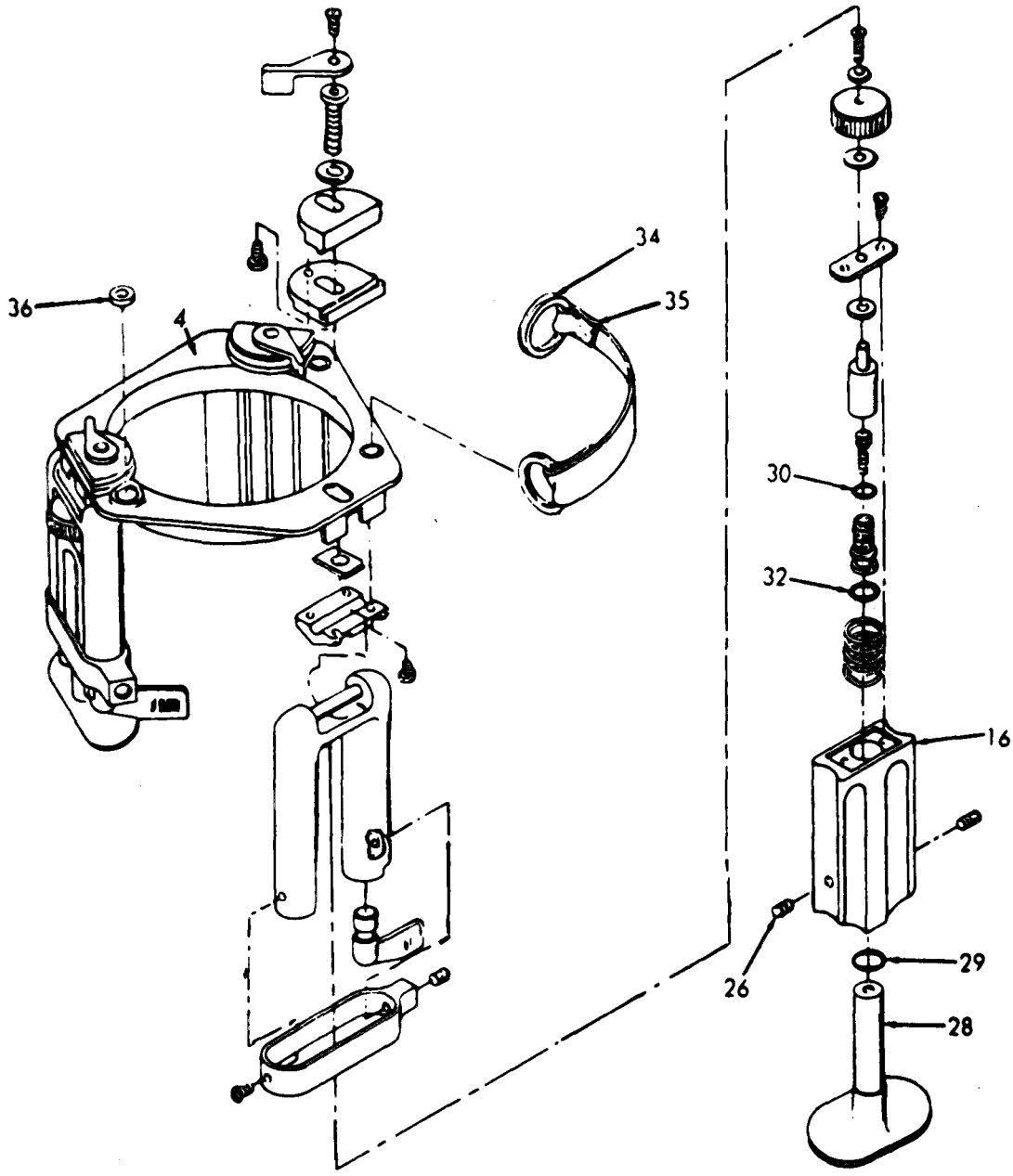
2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
	a. Inspect threaded parts for crossed or stripped threads.	
	b. Inspect spring for loss of tension or cracked or broken coils.	
	c. Inspect all other parts for evidence of wear or damage.	
REPAIR		
	Replace O-rings and defective parts with a serviceable like item.	
REASSEMBLY		
3. Tripod	a. Install level (36) in base (4).	
	b. Spread rings (34) and thread through loops in handle (35) and holes in the base (4).	
	c. Apply a film of MIL-S-8660 silicone grease, item 7, Appendix C, to shaft surface of spade (28) and O-rings (29, 30 and 32).	
	d. Install O-rings (29, 30 and 32) into respective grooves and slide spade (28) into extension leg (16).	
	e. Install setscrew (26) into leg extension (16) so that spade (28) is restrained from rotating but slides freely in and out of extension (16).	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the threads of setscrew (26), and allow to air dry. Then apply MIL-S-46163, Grade N, Type 11, locking sealant, item 2, Appendix C, to the first few threads of the setscrew.

2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



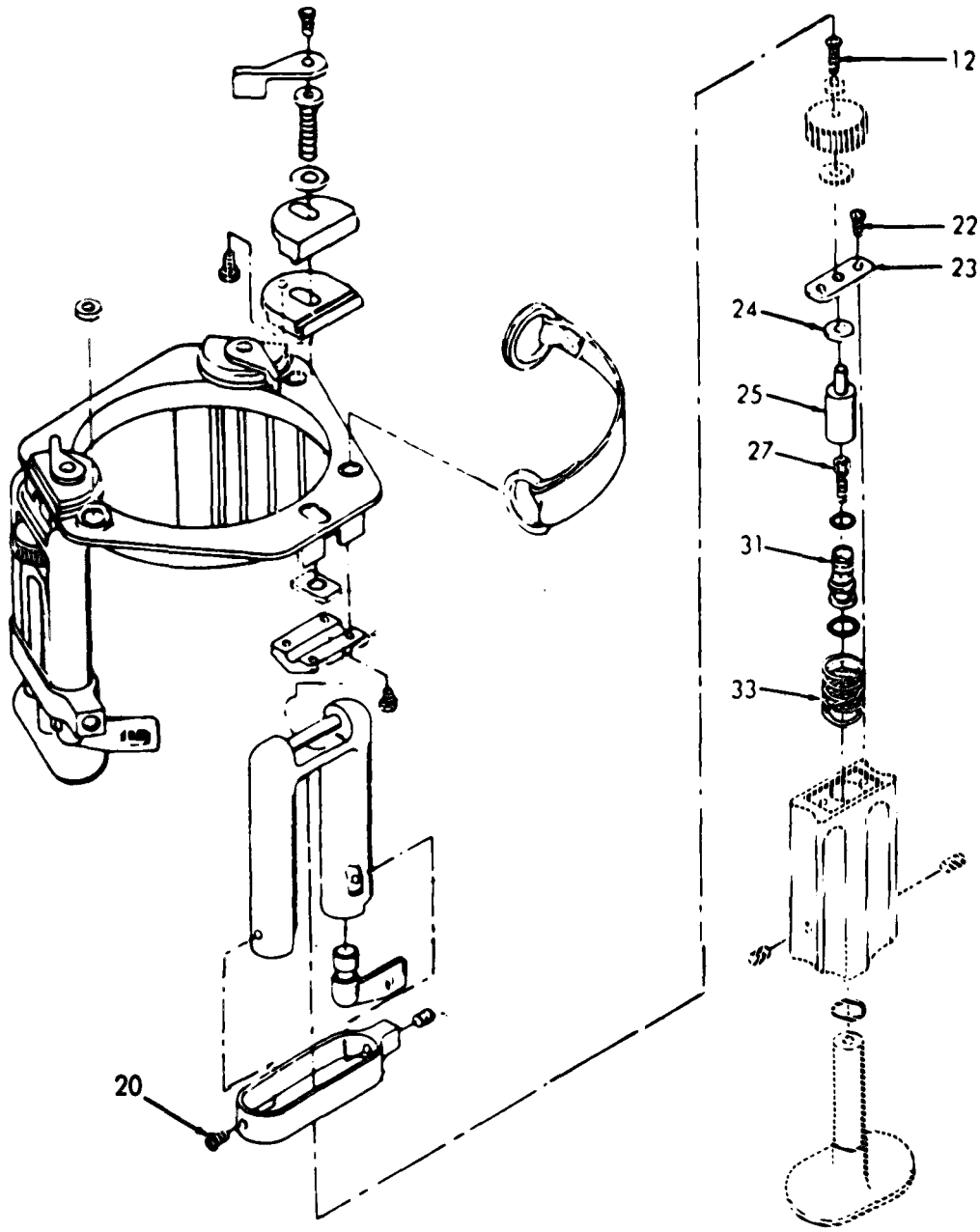
2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS
REASSEMBLY (Continued)		
f.	Drop spring (33) into the extension leg cavity, over the spade shaft.	
g.	Apply MIL-G-21164 molydisulfide lubricant, item 4, Appendix C, to the threads of bushing (31), and install into the extension leg cavity.	
h.	Depress bushing (31) and spring (33), and install screw (27).	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the threads on screw (27), and allow to air dry for 5 seconds. Apply MIL-S-46163, Grade N, Type II locking sealant, item 2, Appendix C, to the first few threads of the screw.
i.	Screw fine-level nut (25) onto bushing (31).	
j.	Place washer (24) and plate (23) on the shaft of fine level nut (25).	
k.	Install screws (22) to secure plate (23).	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the threads of screws (12), (22) and (20), and allow to air dry for 5 seconds. Apply MIL-S-46163, Grade N, Type II locking sealant, item 2, Appendix C, to the first few threads of the screw.

2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



2-13. TRIPOD ASSEMBLY (Continued)

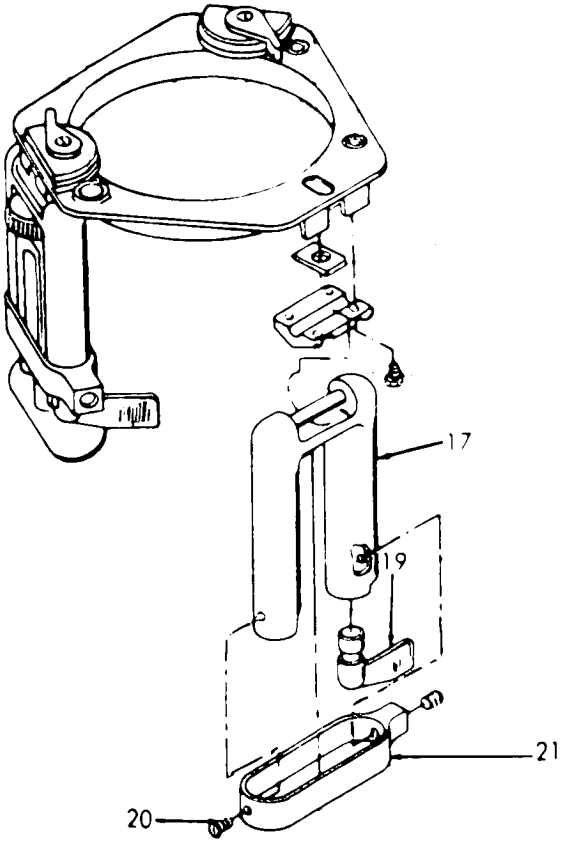
LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

l. Install clamping band (21) over the leg, with the screw hole aligned, and install screw (20) through the clamping band into leg (17).

m. Insert locking cam (19) into the end cavity of leg (17).

Apply MIL-G-21164, molydisulfide lubricant, item 4, Appendix C, to the bearing surfaces of locking cam (19).



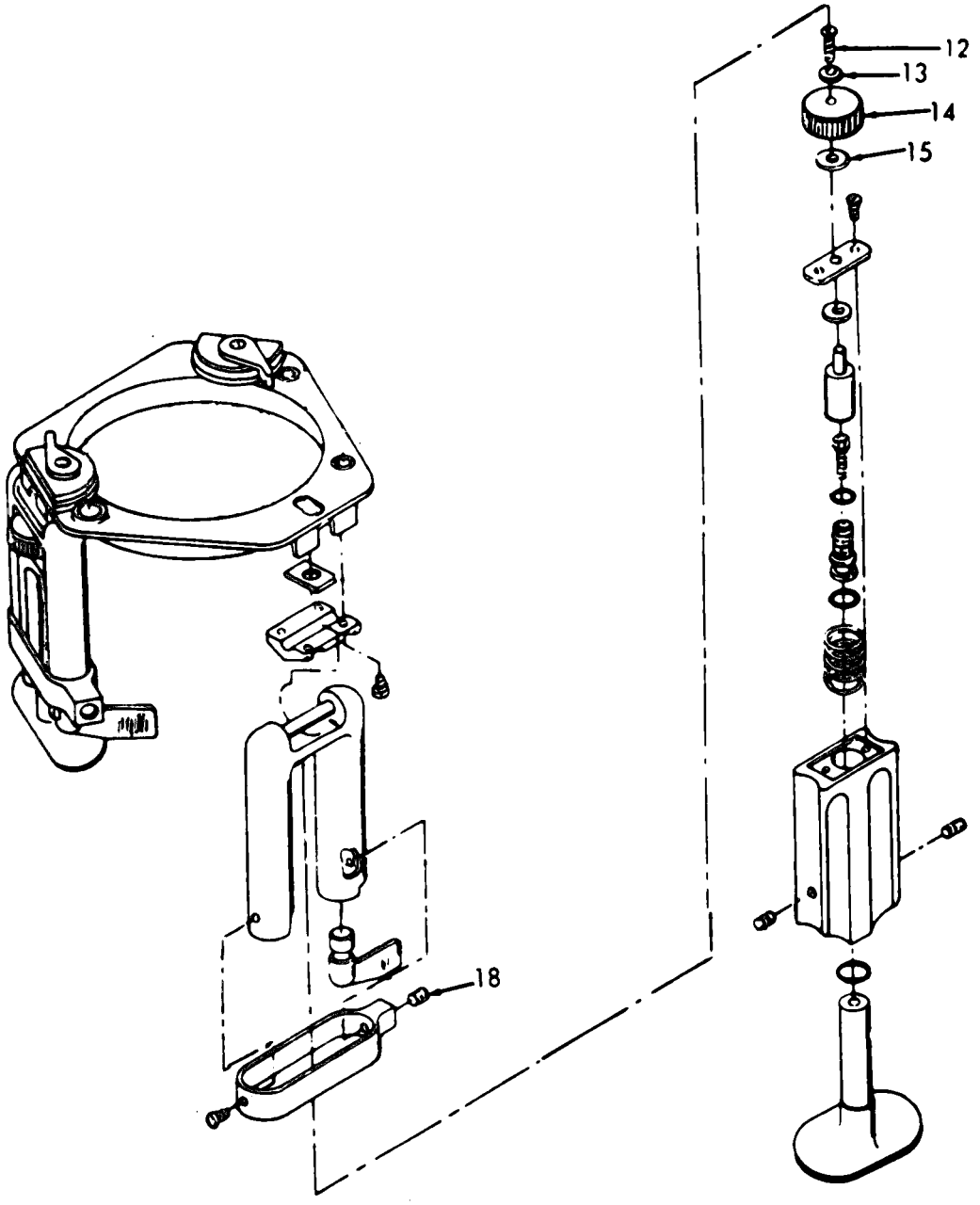
2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

n. Install setscrew (18) into the clampling band, and slide the extension leg assembly into the leg.

o. Install thrust washer (15), knob (14), and washer (13) with screw (12).

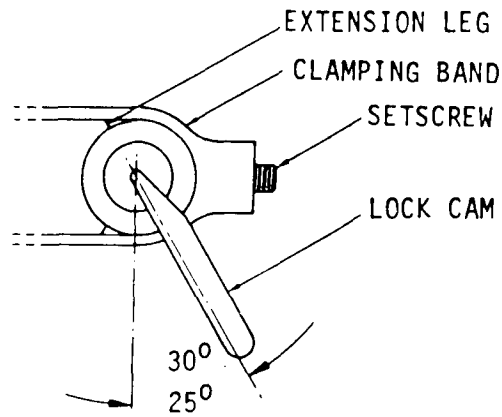


2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

p. Adjust the setscrew into the clamping band until the extension leg is securely locked within the leg as shown.



q. Position the leg assembly (10) parallel with base (4).

Apply a thin film of MIL-S-8660 silicone grease, item 7, Appendix C, to the pivot rod of leg (17).

r. Place pivot cap (11) over pivot rod, against the base, and secure with screws (9).

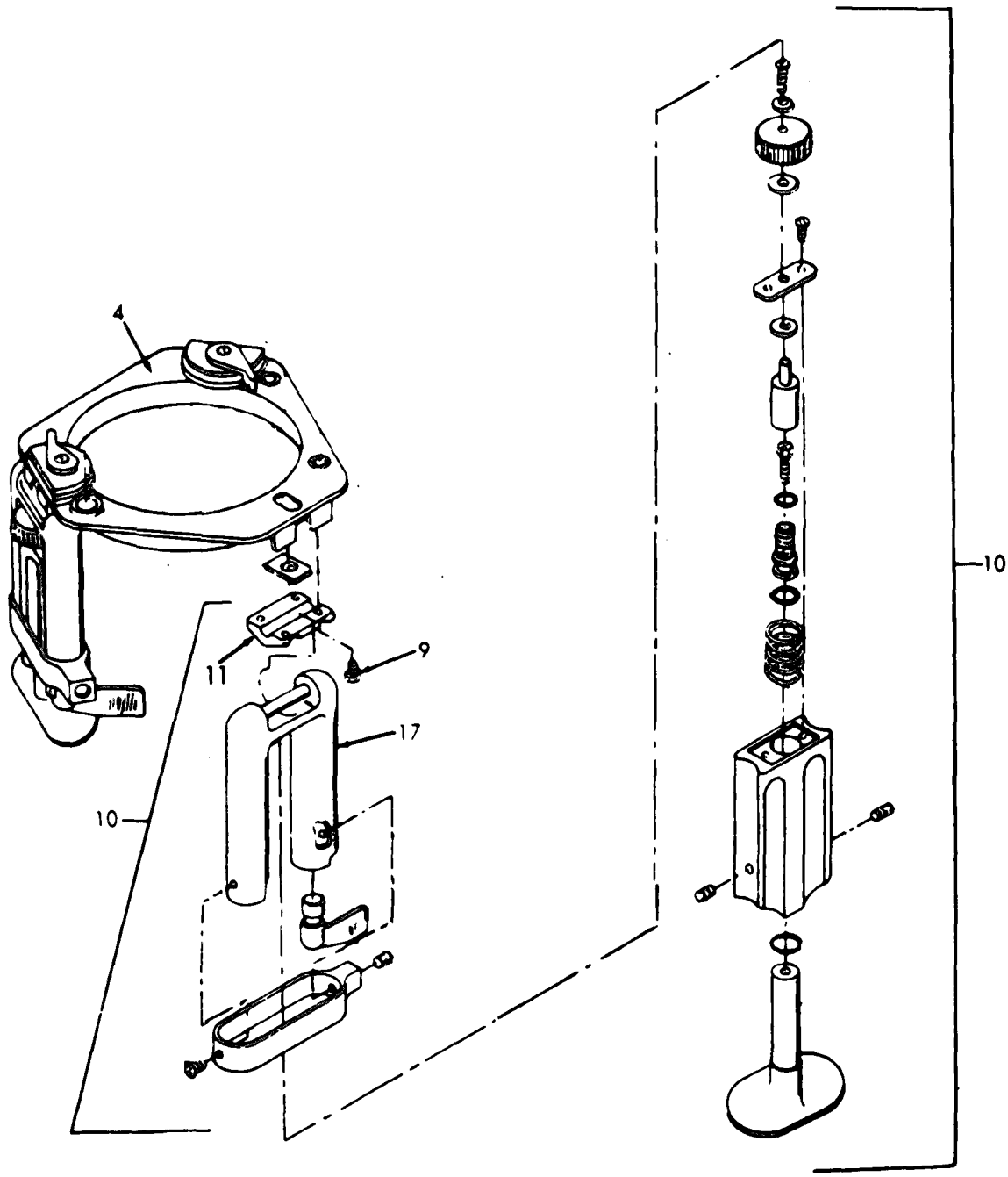
Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the threads of screws (9), and allow to air dry for 5 seconds. Apply MIL-S-46163, Grade N, Type II locking sealant, item 2, Appendix C, to the first few threads of the screws.

2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

s. Adjust screws (9) so that the tripod legs are self supporting when horizontal and at right angles to the tripod base.



2-13. TRIPOD ASSEMBLY (Continued)

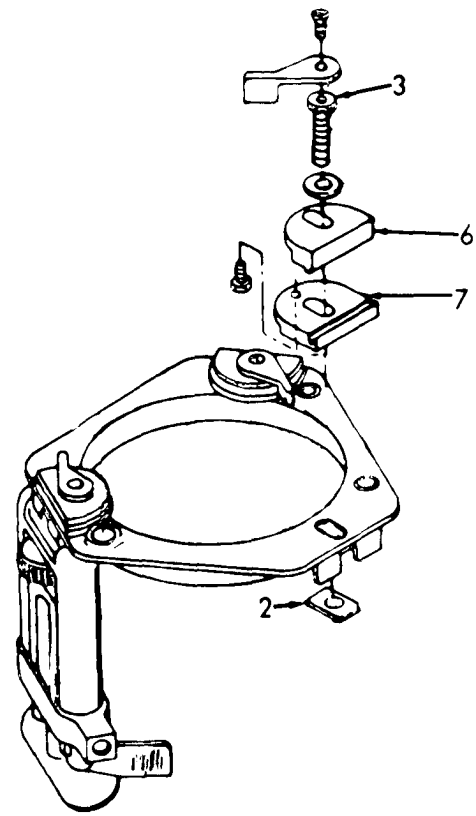
LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

t.	Engage the tange on the upper clamp (6) in the slot in lower clamp (7). Insert bolt (3) through the clamps and base, into the rectangular nut (2).	Apply MIL-G-21164 molydisulfide lubricant, item 7, Appendix C, to the threads of bolt (3).

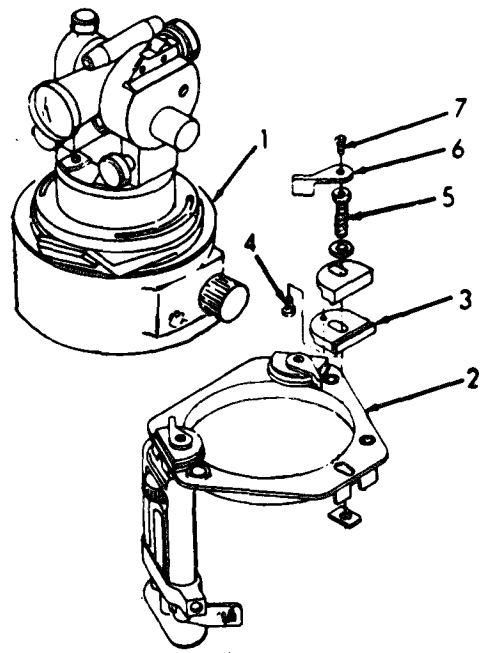
NOTE

Final adjustment of bolt (3) and installation is performed at installation of the GRU into the tripod.



2-13. TRIPOD ASSEMBLY (Continued)

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION		
4. GRU	a. Place the GRU (1) into the tripod base (2).	
	b. Secure each lower clamp (3) to the reference unit with screw (4).	
	c. Slide the GRU to the approximate center of the case and rotate bolt (5) to tighten the clamps.	
	d. Install locking arms (6) so that the arm is approximately tangent to the GRU housing, when the clamps are tight.	
	e. Install screws (7) to secure locking arm.	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the threads of screws (7), and allow to air dry 5 seconds. Apply MIL-S-46163, Grade N, Type II, locking sealant, item 2, Appendix C, to the first few threads of the screws.



2-14. THEODOLITE LAMPS.

This task covers:

a. Removal b. Installation

INITIAL SETUP

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

REMOVAL

WARNING

Make sure power is OFF before performing maintenance.

NOTE

Maintenance is to be performed with theodolite installed on the GRU.

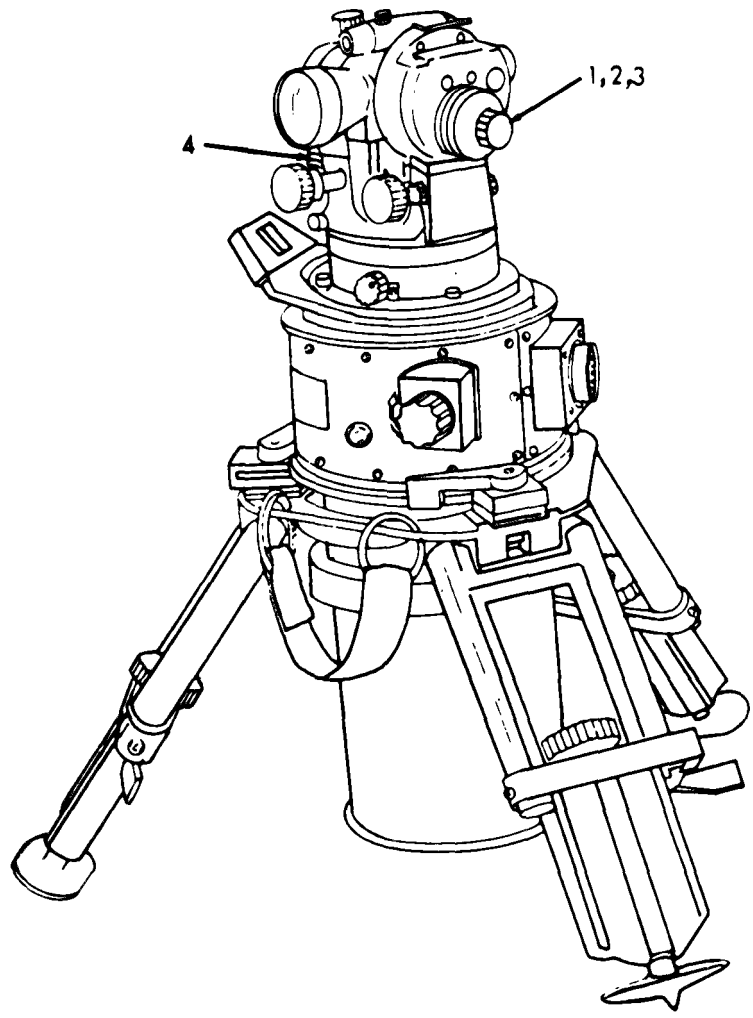
1.	Optical scale lamp	a.	Rotate protective cap (1) counterclockwise and remove.
		b.	Remove lamp (2) from socket (3).
2.	Autocollimation lamp		Remove reticle and autocollimation lamp (4) in the same manner.

INSTALLATION

3.	Optical scale lamp	a.	Place new lamp (2) in socket (3).
		b.	Position protective cap (1) over socket and turn clockwise until finger-tight.
4.	Autocollimation lamp		Install reticle and autocollimation lamp (4) in the same manner.

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION (Continued)



2-15. THEODOLITE LENS

This task covers:

Service

INITIAL SETUP

Material/Parts

Lens tissue
(NSN 6640-00-597-6745)

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

SERVICE

WARNING

Make sure power is OFF before performing maintenance.

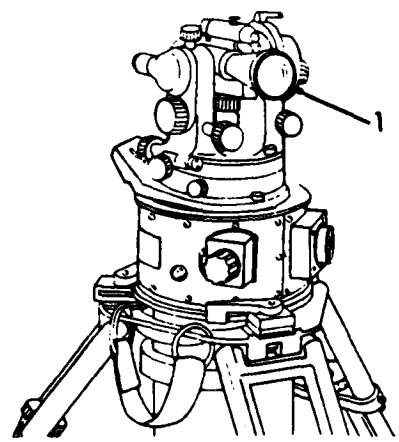
NOTE

Maintenance is to be performed with theodolite installed on the GRU.

Lens

a. Clean lenses (1) with lens cleaning tissue.

b. Report excessively dirty or damaged lenses to Direct Support Maintenance.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR.

This task covers:

Service

INITIAL SETUP

Material/Parts

Methelethelkeyton (MEK)
Federal Specification
TT-M-261, Item 3, Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

SERVICE

NOTE

At 100-hour intervals (approximate) the reference mirror shall be checked and a new azimuth reference determined if needed. Determination of the azimuth value for the reference mirror shall also be performed upon reassembly of the GRU after major repairs and maintenance. The azimuth reference shall also be verified if the instrument sustains a severe shock or other disturbance greater than encountered in normal handling.

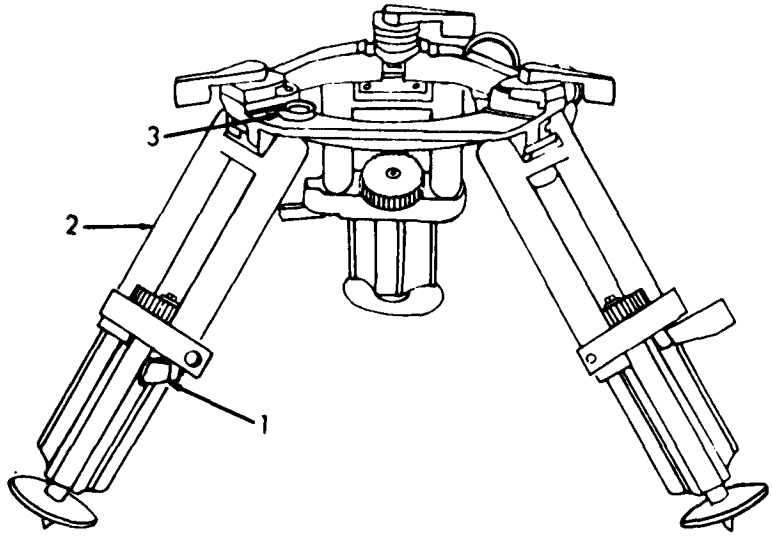
Set up the instrument with GRU over a base line of known azimuth.

1.	Coarse leveling of unit	a.	Coarse level the instrument by releasing one of the tripod leg clamps (1).
		b.	Adjust the leg (2) to obtain a level indication on the tripod circular level (3). Repeat procedure for each of the other two legs.

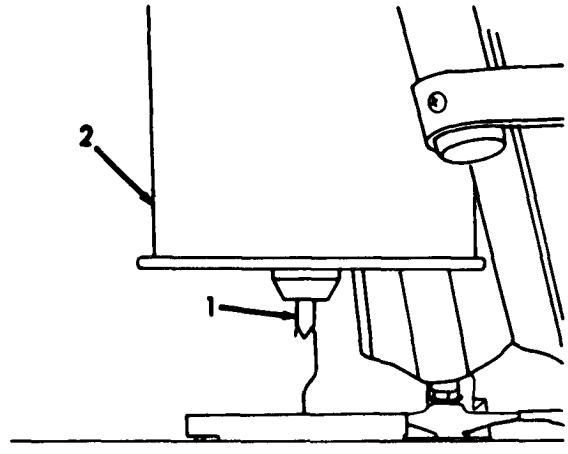
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)



c. If the unit is to be centered over a fixed reference point, extend the plumb pointer (1) located on the bottom of the GRU housing (2).



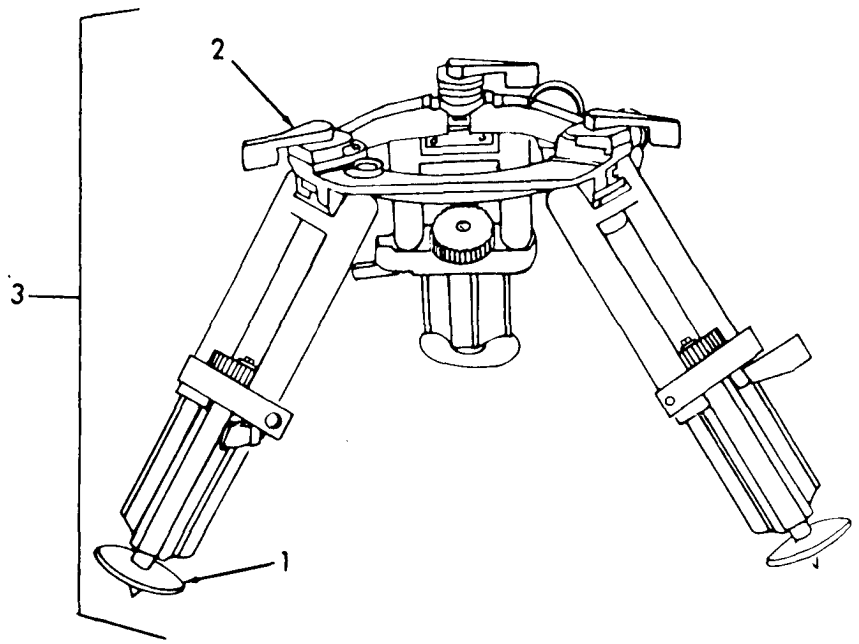
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

d. Place the GRU on the ground so that the pointer is close to the fixed point and press leg spades (1) into the ground.

e. Release hold-down clamps (2) on tripod (3) and shift GRU in the tripod to position the pointer over the fixed reference point.



f. Rotate theodolite alidade (1) to position objective end of telescope over the NORTH mark on GRU. Tighten horizontal lock (2).

g. Preorient GRU (3) to north by releasing tripod hold-down clamps (4) and rotate GRU in the tripod until the two magnetic compass images are in coincidence.

h. With telescope level, depress plunger (5) on magnetic compass (6).

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

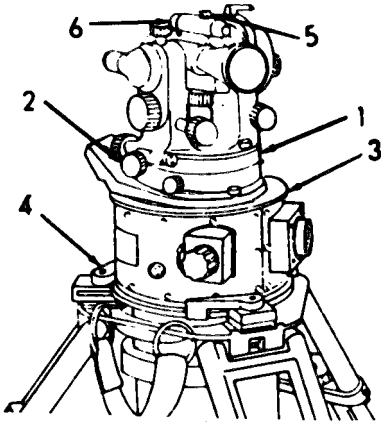
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

NOTE

Check to ensure that the plumbing position is still over the fixed reference point.

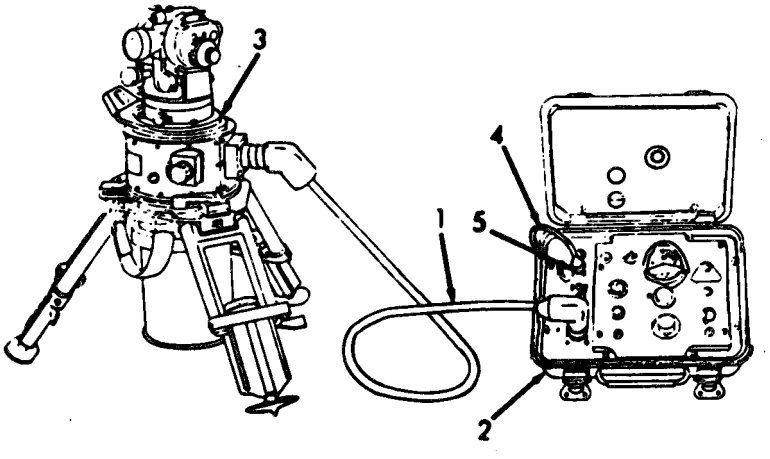
i. Tighten each of the three hold-down clamps (4) on the tripod.



2. Power cable installation

a. Connect interconnect cable (1) to the ECU (2) and GRU (3).

b. Connect DC Power cable (4) to the POWER receptacle (5) on ECU (2) and a 22-33 Vdc power source.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

NOTE

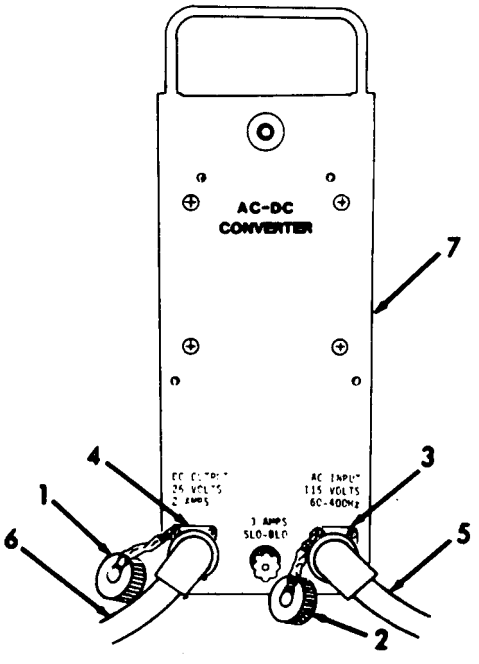
Auxiliary cables and an AC-DC converter are stored in the transport case for use as needed.

c. Remove AC-DC converter and associated cables from transport case.

d. Remove protective caps (1 and 2) from receptacles (3 and 4).

e. Connect the 115 Vac cable (5) between AC power source and input receptacle (3).

f. Connect power cable (6) between output receptacle (4) on the converter (7) and the power receptacle on the ECU.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

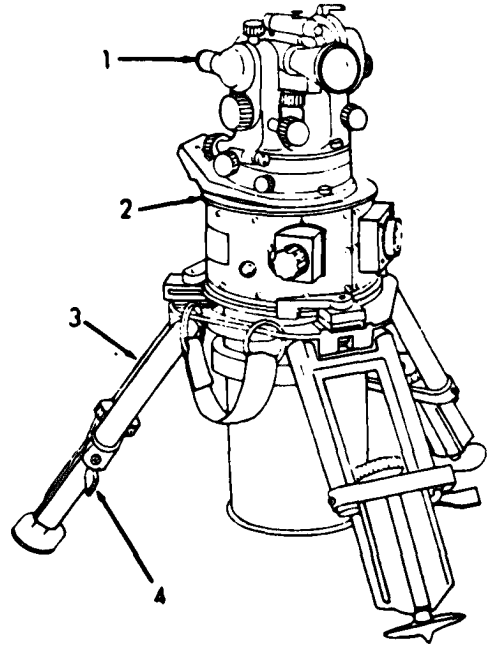
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

3. Fine-leveling of unit	a. Rotate theodolite alidade (1) so that the long axis of the plate level (2) is in the same plane as one of the tripod legs (3).	
	b. Adjust fine-level control (4) to place the bubble in the center of the level vial.	

NOTE

If adjustment can not be made proceed to steps c. and d.



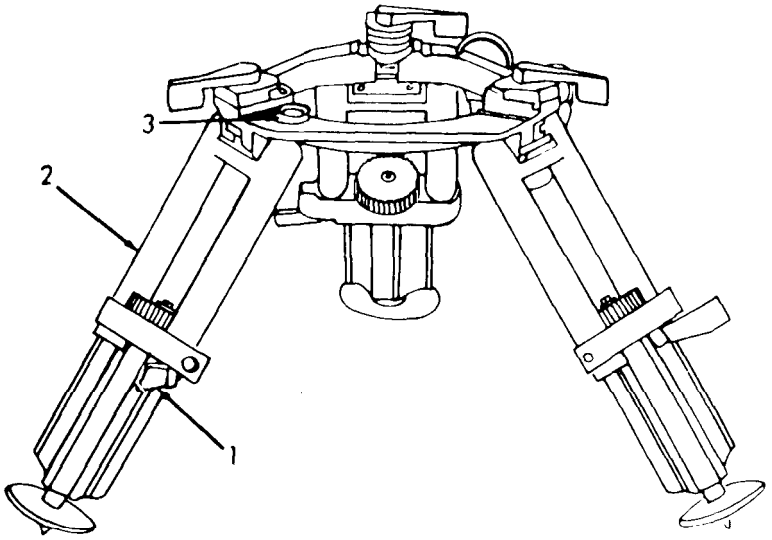
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

c. Coarse level the instrument by releasing one of the tripod leg clamps (1).

d. Adjust the leg (2) to obtain a level indication on the tripod circular level (3). Repeat procedure for each of the other two legs.



e. Rotate the alidade 90 degrees and adjust both the remaining legs.

f. Continue the process until the alidade can be rotated 360 degrees with no more than ± 1/2 division displacement of the bubble.

NOTE

Prior to starting an azimuth determination, the alignment of the horizontal circle shall be checked and adjusted if necessary. Instructions for performing the alignment procedure are provided in the following paragraph.

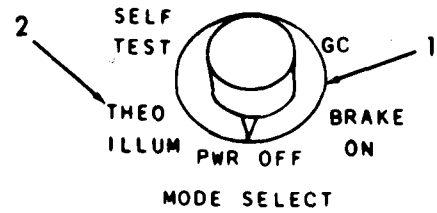
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

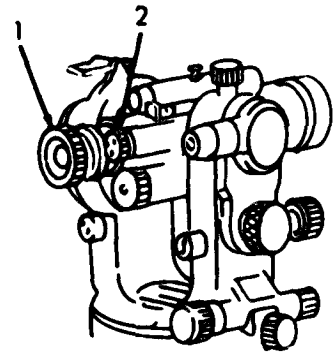
SERVICE (Continued)

4. Alignment of theodolite horizontal circle to reference mirror

a. Place the MODE SELECT switch (1) to THEO ILLUM (2).



b. Adjust reticle focus (1) to obtain a sharp, clear focus of the reticle seen through the telescope eyepiece (2).



c. Release horizontal (1) and vertical locks (2) on the theodolite (3).

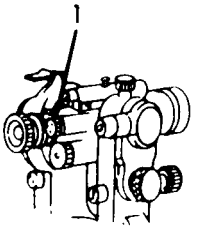
d. Align telescope (4) to the mirror and tighten horizontal (1) and vertical locks (2).

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR [Continued)

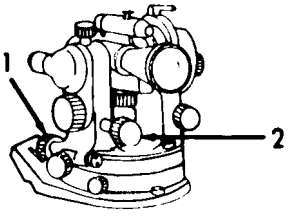
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

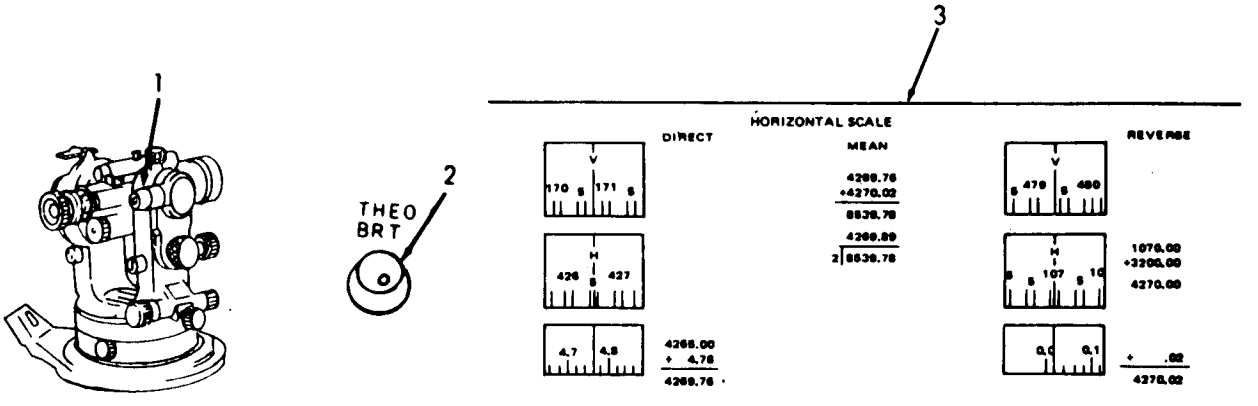
e. Adjust telescope focus (1) until autocollimated image (a bright green cross) appears in clear focus.



f. Adjust azimuth (1) and elevation (2) controls to center image accurately in reticle pattern.



g. Adjust microscope focus control (1) and THEO BRT control (2) until the horizontal scale image (3) appears in clear focus.

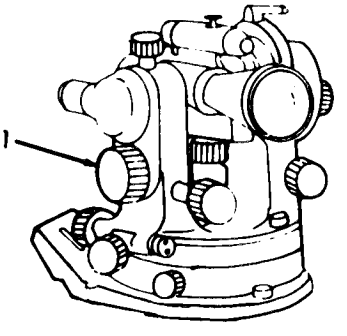


2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS
SERVICE (Continued)		

h. Adjust the micrometer control (1) to position the fixed index mark of the horizontal scale to the center of the nearest double line.

i. If the vernier scale does not appear under the fixed index, adjust the micrometer control to position the fixed index mark of the horizontal scale to the center of the second nearest double line.



j. Record the horizontal scale reading as follows:

(1) If the fixed index is over a three-digit number, record the number as it appears and add a zero as the fourth digit.

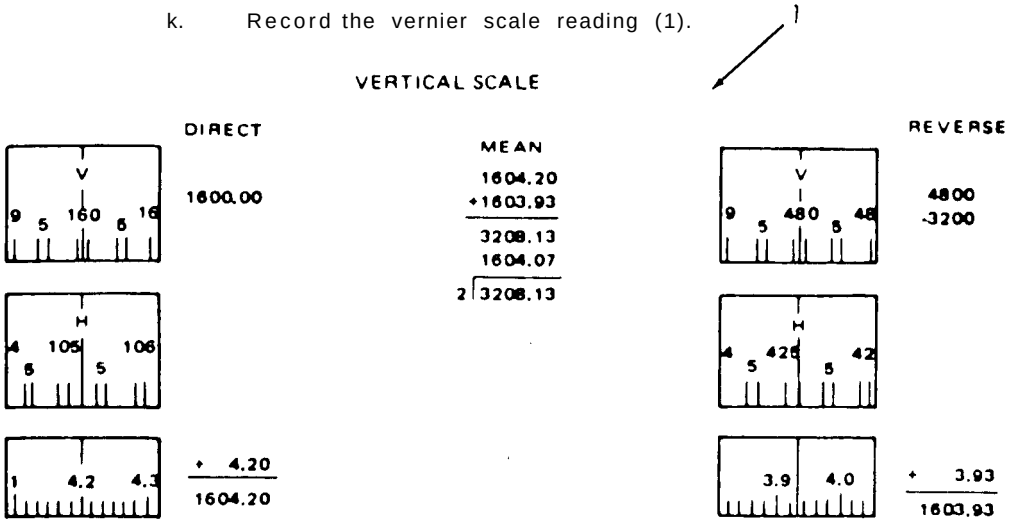
(2) If the fixed index is over a number 5, record the preceding three-digit number and add a 5 as the fourth digit.

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

k. Record the vernier scale reading (1).

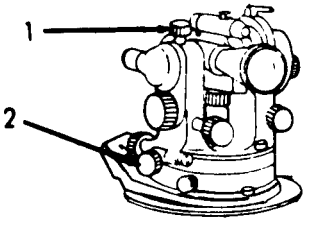


l. Obtain the direct horizontal reading by adding the recorded readings of the horizontal and vernier scales.

m. Obtain reverse readings by doing the following:

(1) Release the vertical lock (1) and rapidly rotate telescope 180 degrees about the horizontal axis; tighten the vertical lock.

(2) Release the horizontal lock (2) and rotate the theodolite alidade 180 degrees (clockwise); tighten the horizontal lock.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

(3) Record the reverse horizontal and vernier scale readings in the same manner as used for direct readings.

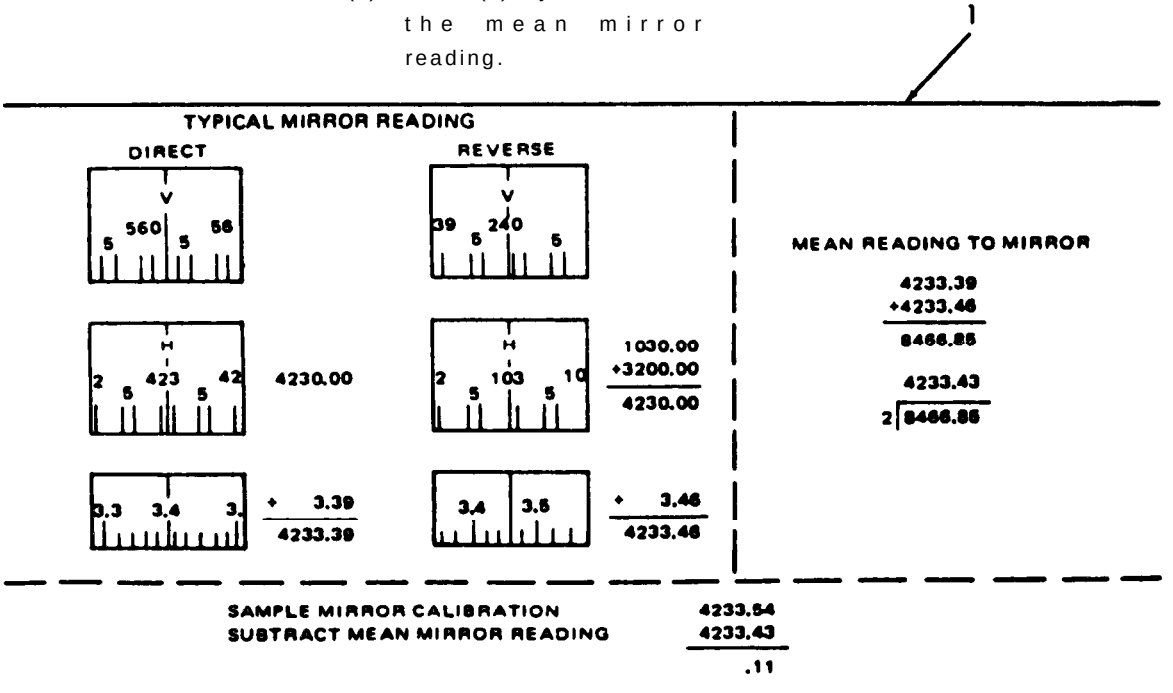
(4) Add horizontal and vernier scale readings to obtain reverse horizontal reading.

n. Obtain the mirror reading (1) by doing the following:

(1) Add 3200.00 to the reverse reading.

(2) Add the direct and reverse readings.

(3) Divide (2) by 2 to obtain the mean mirror reading.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

o. If the mirror reading determined in step n. is within 0.04 mil of the value displayed on the mirror azimuth plate just below the reference mirror window, then no adjustment is necessary. If the error is greater than 0.04 mil, the following adjustment procedures are to be followed.

(1) Subtract the last four digits of the reverse reading from the last four digits of the direct reading (disregard the first two digits).

(2) Divide this value by two to determine the collimation error.

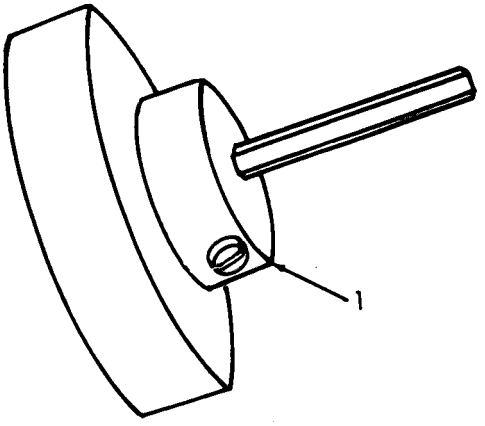
(3) Algebraically add the collimation error to the value on the mirror azimuth plate.

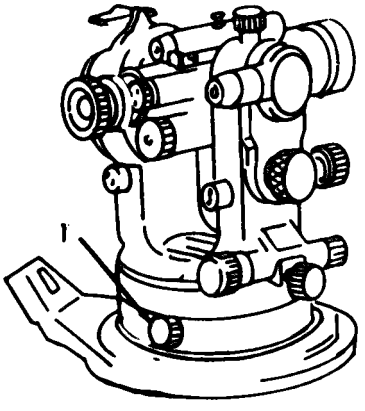
(4) With the telescope in the direct position, center the image accurately in the reticle pattern. Adjust azimuth and elevation controls as necessary to center image. Using the horizontal circle adjusting tool (1), adjust the micrometer and horizontal circle (1) to the value calculated in step 3.

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)



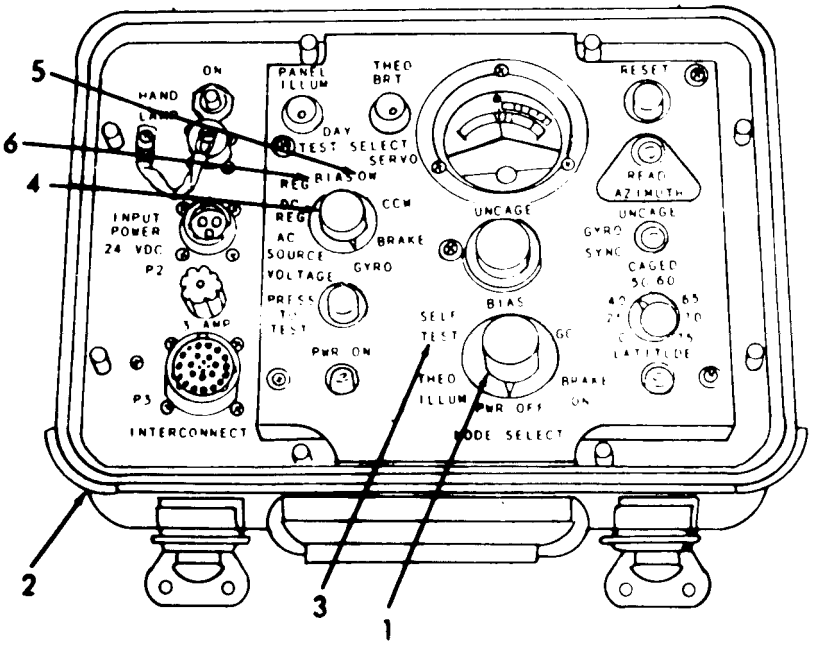


2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

p. Place the MODE SELECT switch (1) on the ECU (2) to SELF TEST (3) and the TEST SELECT switch (4) to CW (5), and turn the GRU output shaft 5 to 10 degrees clockwise from the position of the previous azimuth determination. Switch the SELF TEST switch out of the SERVO position to stop the turning action.



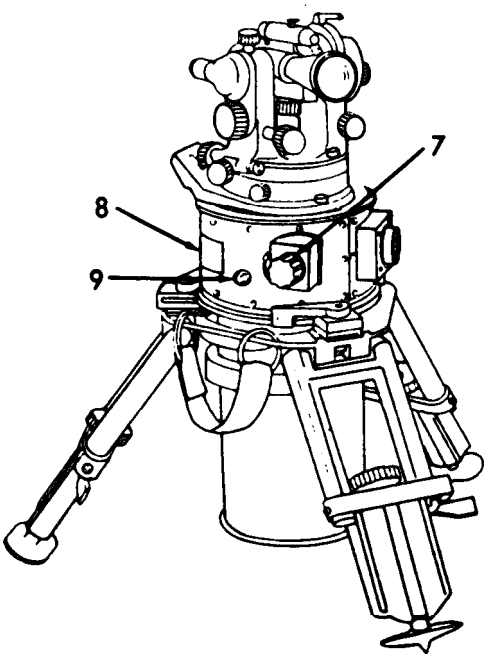
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

q. Place the MODE SELECT switch (1) to BIAS (6) (audible click).

r. Rotate the CAGE-UNCAGE knob (7) on the reference unit (8) clock-wise until the UN-CAGED indicator (9) lights.

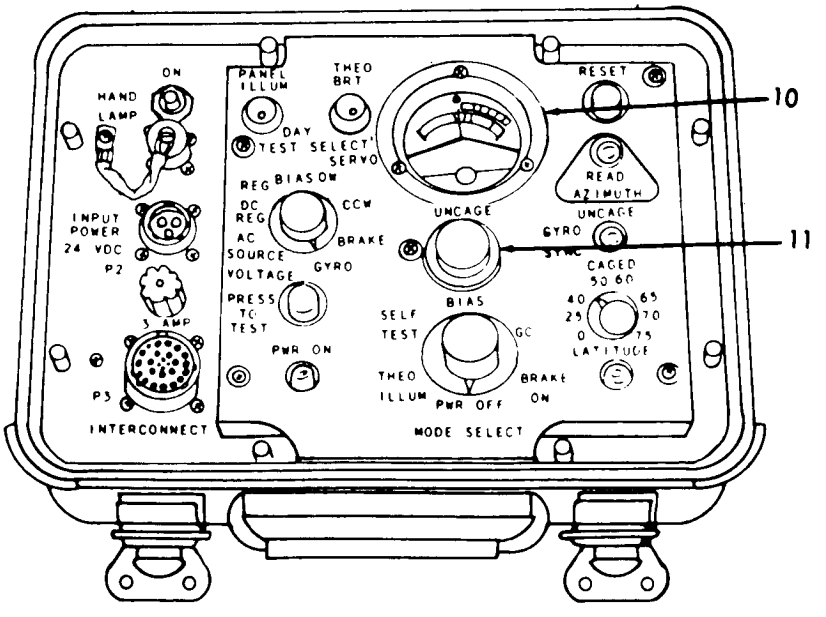


WARNING

When operating in the dark, light from the cage-uncage indicator is visible at 45 meters. The indicator should be shielded to avoid detection when security is required.

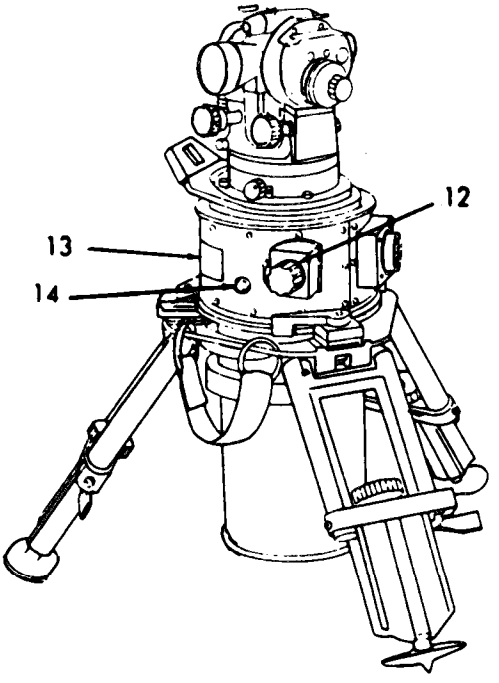
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS
SERVICE (Continued)	s. Observe TEST METER pointer (10) swing left and right from zero, at a rate of about one reversal every five seconds. When the pointer comes to a stop, verify that it is positioned at zero; if necessary use the Bias control (11) to obtain the required position. This is done by rotating the outer ring counterclockwise to unlock the inner knob, rotating the inner knob to center the pointer and rotating the outer ring clockwise to relock the inner knob.	



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS
SERVICE (Continued)		
	t. Rotate the CAGE-UNCAGE knob (12) on the GRU (13) counterclockwise until the UNCAGE indicator (14) is out (audible click).	

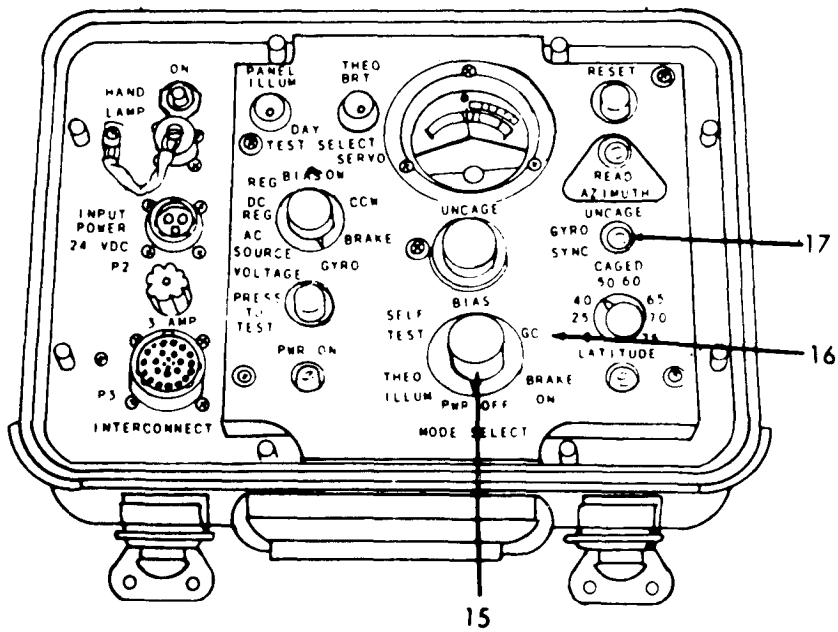


2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

u. Place the MODE SELECT switch (15) to GC (gyro compass) (16); verify that the GYRO SYNC indicator (17) illuminates within two minutes, at normal ambient temperature (above ± 15°F).



CAUTION

During the first azimuth determination on a new site the operator should insure the follow up index mask does not remain at either end of the servo operating range. Continuous operation of the instrument in this condition could cause excessive wear of the servo geartrain slip clutch. This situation can exist in areas of excessive magnetic anomalies which cause the GRU to be preoriented in excess of 40 degrees of true north.

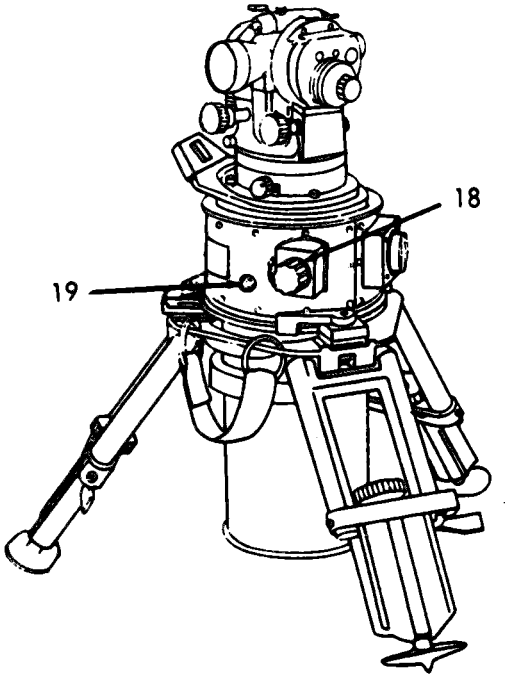
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

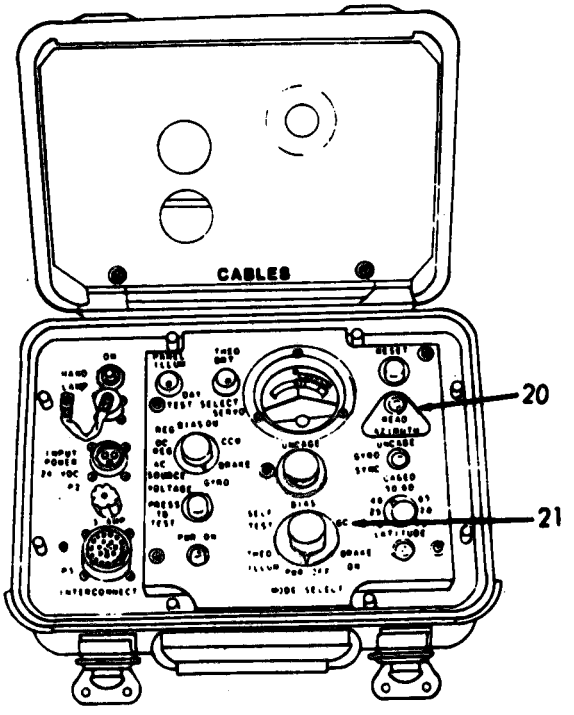
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

v. Rotate the CAGE-UNCAGE knob (18) clockwise until the UNCAGED indicator (19) illuminates.

w. Verify that the READ AZIMUTH indicator (20) illuminates 15 minutes after uncaging the gyro (21).





2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

NOTE

Actuation of the RESET switch reinstates the servo mechanism so that it may continue to track and damp the pendulum for a minimum of 45 seconds. Under normal operating conditions, it is not required to use the reset, for it would only delay the azimuth determination with little improvement in azimuth determination accuracy. Three possible examples of when to use the reset are: (1) an abnormally short alignment time, (2) when the GRU or tripod has been disturbed after the READ AZIMUTH indicator illuminates, or (3) after an immediate full scale deflection in either direction on the TEST METER FOLLOWING ILLUMINATION OF the READ AZIMUTH indicator. Considering time available to establish azimuth and accuracy required, the operator must exercise judgment prior to performing the reset operation. In order to avoid error accumulation, it is recommended that the RESET not be used later than 20 minutes after biasing.

x. Read and record the azimuth to the target and the reference mirror angle, using both direct and reverse readings.

y. Repeat step (x) for the counter-clockwise turn direction.

z. Repeat steps (x) and (y) for a total of ten azimuth determinations.

aa. Calculate the arithmetic mean of the determined azimuths and subtract from the known value.

ab. Calculate the arithmetic mean of the measured reference mirror angle and algebraically add to the resultant of step (aa). The result of this calculation is the new reference mirror azimuth value.

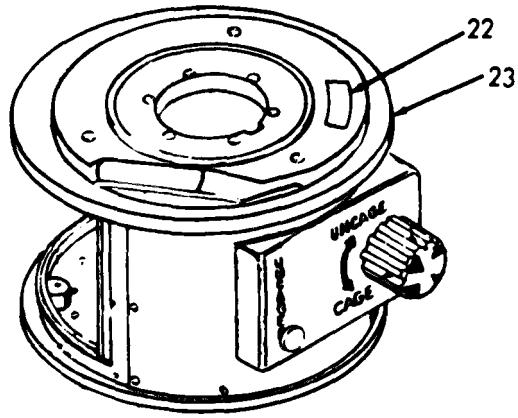
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

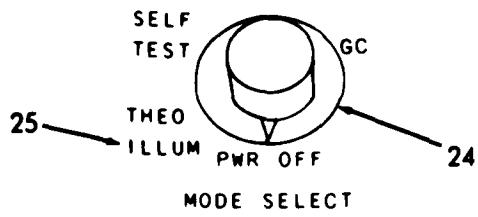
SERVICE (Continued)

ac. Inscribe the mirror azimuth, determined in step (ab), onto a new reference mirror decal, using a typewriter or ball point pen.

ad. Secure this decal (22) to the mirror mounting plate (23), by moistening the back with methelethelkeyton (MEK), Federal Specification TT-M-261. Apply the decal to the plate where the previous decal was located.



ae. Place the mode select switch (24) to THEO ILLUM (25).

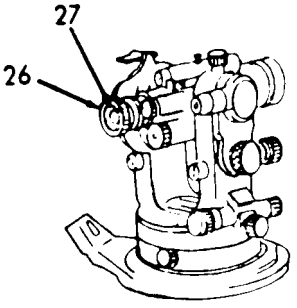


2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

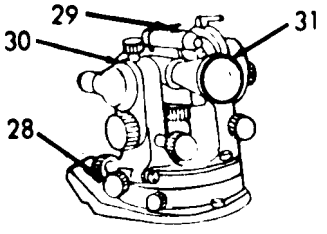
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

af. Adjust reticle focus (26) to obtain a sharp, clear focus of the reticle seen through the telescope eyepiece (27).

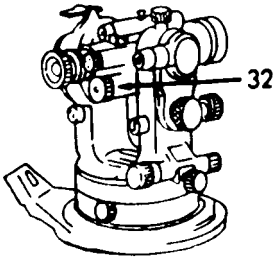


ag. Release horizontal (28) and vertical locks (29) on the theodolite (30).



ah. Align telescope (31) to the mirror and tighten horizontal (28) and vertical locks (29).

ai. Adjust telescope focus (32) until autocollimated image (a bright green cross) appears in clear focus.

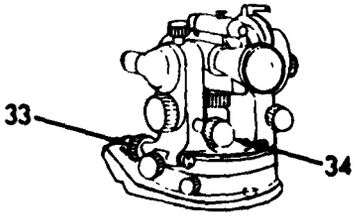


2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

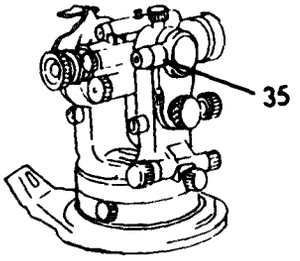
LOCATION/ITEM	ACTION	REMARKS

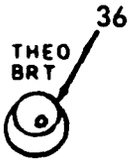
SERVICE (Continued)

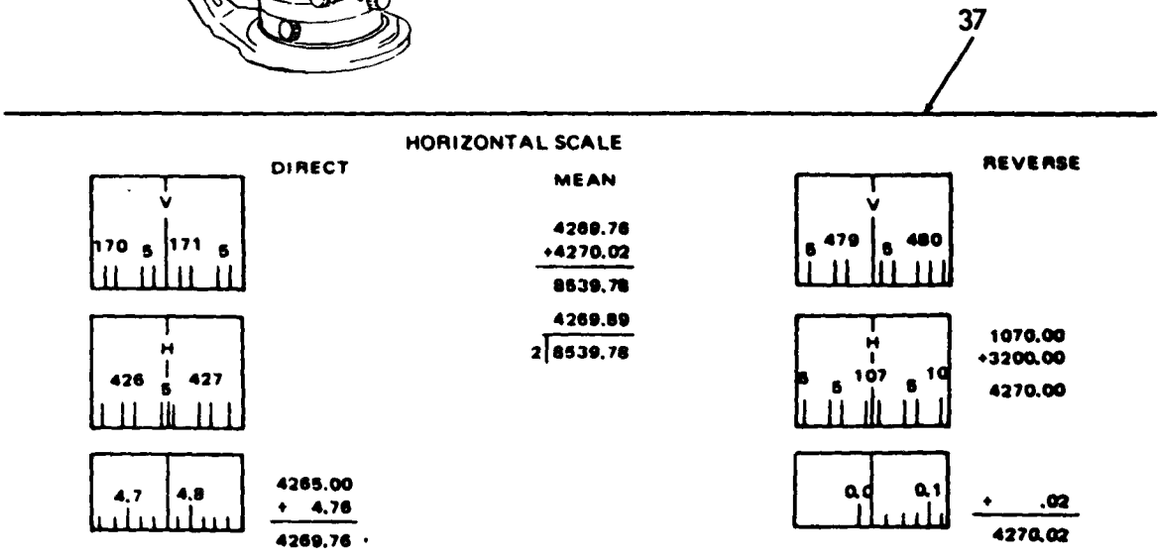
aj. Adjust azimuth (33) and elevation (34) controls to center image accurately in reticle pattern.



ak. Adjust microscope focus control (35) and THEO BRT control (36) until the horizontal scale image (37) appears in clear focus.







2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

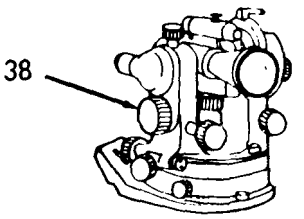
al. Adjust the micrometer control (38) to position the fixed index mark of the horizontal scale to the center of the nearest double line.

am. If the vernier scale does not appear under the fixed index, adjust the micrometer control to position the fixed index mark of the horizontal scale to the center of the second nearest double line.

an. Record the horizontal scale reading as follows:

(1) if the fixed index is over a three-digit number, record the number as it appears and add a zero as the fourth digit.

(2) If the fixed index is over a number 5, record the preceding three-digit number and add a 5 as the fourth digit.



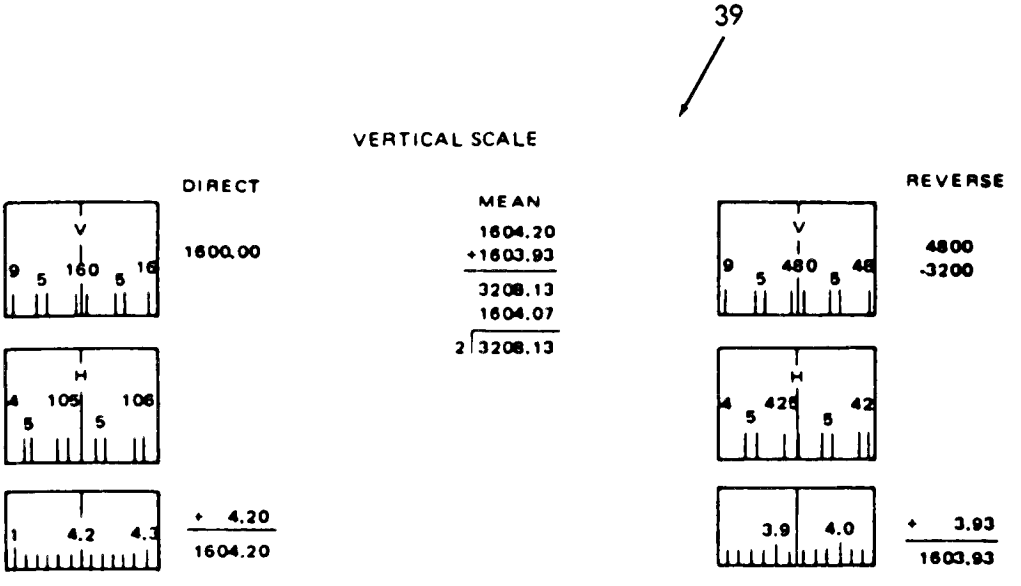
2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

ao. Record the vernier scale reading (39).

ap. Obtain the direct horizontal reading by adding the recorded readings of the horizontal and vernier scales.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

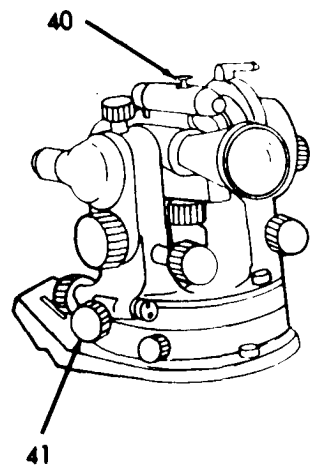
LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

aq. Obtain reverse readings by doing the following:

(1) Release the vertical lock (40) and rapidly rotate telescope 180 degrees about the horizontal axis; tighten the vertical lock.

(2) Release the horizontal lock (41) and rotate the theodolite alidade 180 degrees (clockwise); tighten the horizontal lock.



(3) Record the reverse horizontal and vernier scale readings in the same manner as used for direct readings.

(4) Add horizontal and vernier scale readings to obtain reverse horizontal reading.

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

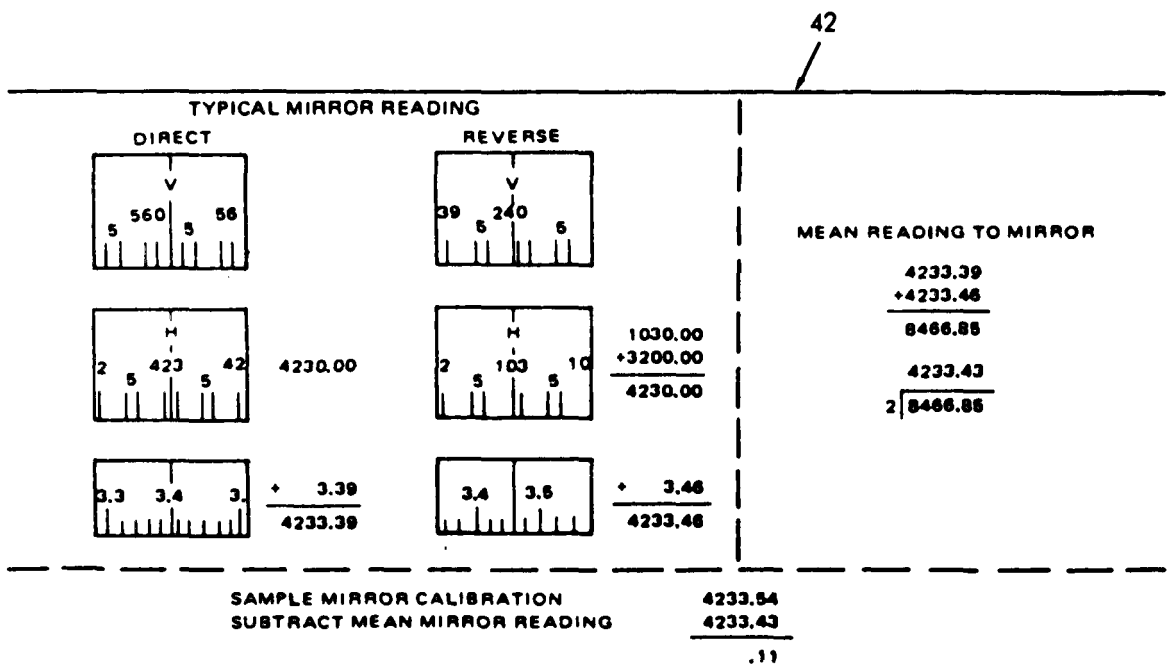
SERVICE (Continued)

ar. Obtain the mirror reading (42) by doing the following:

(1) Add 3200.00 to the reverse reading.

(2) Add the direct and reverse readings.

(3) Divide the results of step (2) by 2 to obtain the mean mirror reading.



2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)

as. If the mirror reading determined in step ar. is within 0.04 mil of the value displayed on the mirror azimuth plate just below the reference mirror window, then no adjustment is necessary. If the error is greater than 0.04 mil, the following adjustment procedures are to be followed.

(1) Subtract the last four digits of the reverse reading from the last four digits of the direct reading (disregard the first two digits).

(2) Divide this value by two to determine the collimation error.

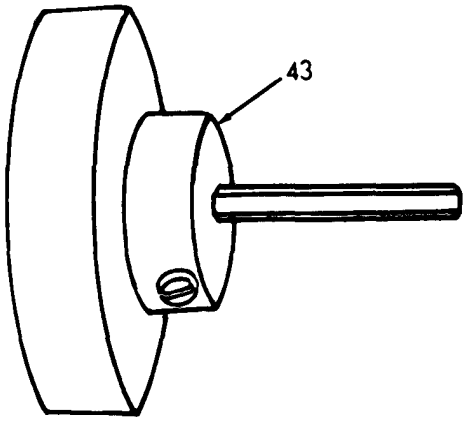
(3) Algebraically add the collimation error to the value on the mirror azimuth plate.

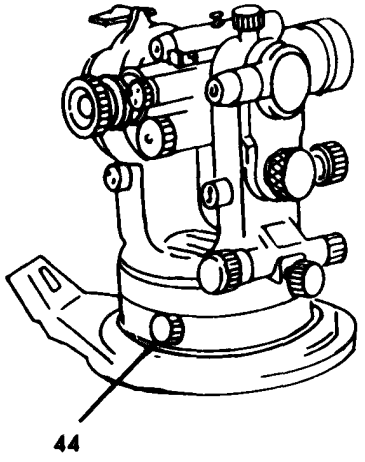
(4) With the telescope in the direct position, center the image accurately in reticle pattern. Adjust azimuth and elevation controls as necessary to center image. Using the horizontal circle adjusting tool (43), adjust the micrometer and horizontal circle (44) to the value calculated in step (3).

2-16. DETERMINATION OF AZIMUTH VALUE FOR REFERENCE MIRROR (Continued)

LOCATION/ITEM	ACTION	REMARKS

SERVICE (Continued)





2-17. CAP AND CHAIN ASSEMBLY, ECU PANEL

This task covers:
a. Removal b. Repair/Replace c. Installation

INITIAL SETUP

Tools

Screwdriver, cross tip
NSN 5120-00-965-0626

Material/parts

MIL-S-22473, Grade N, Form R
Primer, item 5, Appendix C
Locking Sealant MIL-S-46163,
Grade N, Type II, Item 2,
Appendix C

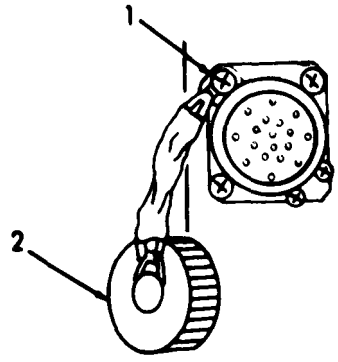
Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM		ACTION	REMARKS
REMOVAL			
1.	Cap and chain	a. Remove screw (1) securing cap and chain assembly to ECU panel.	
		b. Remove cap and chain assembly (2).	
REPAIR/REPLACE			
		Replace defective cap and chain assembly with a serviceable like item.	
INSTALLATION			
2.	Cap and chain	a. Position cap and chain assembly (2) in place on ECU panel.	

2-17. CAP AND CHAIN ASSEMBLY, ECU PANEL (Continued)

LOCATION/ITEM	ACTION	REMARKS
	b. Install screw (1) and tighten.	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the screw and allow to air dry for 5 seconds. Apply locking sealant, MILG46163, Grade N, Type II, item 2, Appendix C, to the first few threads of screw.



2-18. CONTROL KNOBS, ECU PANEL.

This task covers:
a. Removal b. Repair/Replace c. Installation

INITIALSETUP

Tools

Keyset, hexhead
NSN 5120-01-017-9535
Hex wrench, Size 0.050 inch

Material/parts

MIL-S-22473, Grade N, Form R
Primer, Item 5, Appendix C
Locking sealant MIL-S-46163,
Grade N, Type II, Item 2,
Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

NOTE

Maintenance instructions given in the following procedures apply to all control knobs on the ECU.

REMOVAL

1. Control knob

a. Remove two setscrews (1) recessed into control knob.

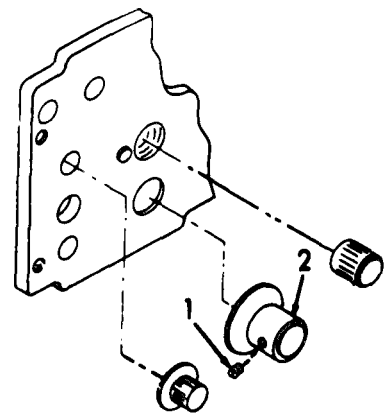
b. Remove control knob (2) from control shaft.

REPAIR/REPLACE

Replace defective control knob or setscrew(s) with a serviceable like item.

2-18. CONTROL KNOBS, ECU PANEL (Continued)

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION		
2. Control knob	a. Install control knob (2) on control shaft.	
	NOTE **Allow sufficient space between control knob and ECU panel to prevent binding.**	
	b. Tighten setscrews (1).	Apply MIL-S-22473, Grade N, Form R primer, item 5, Appendix C, to the two set-screws and allow to air dry for 5 seconds. Apply locking sealant MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of two setscrews. Install the setscrews partially into the control knob.



2-19. ELECTRONIC CONTROL UNIT CASE

This task covers:

a. Disassembly b. Cleaning c. Inspection
d. Repair e. Reassembly

INITIAL SETUP

Tools

Knife
Screwdriver, cross-tip
NSN 5120-00-965-0626
Screwdriver, flat-tip
NSN 5120-00-236-2127

Material/parts

Detergent
Water
Pail
Clean cloths
Trichloroethane
Fed. Spec. 0-T-620 or
equivalent, Item 8,
Appendix C
MIL-A-46106 RTV103BLA
Sealant, Item 6, Appendix C
MIL-S-22473, Grade N, Form R
Primer, Item 5, Appendix C
MIL-S-46163, Grade N, Type II,
Locking sealant, Item 2,
Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY

1. Upper case (3)	a. Press pressure relief valve (1) on case cover (3) to relieve internal pressure.	
	b. Release latches (2) and separate case cover (3) from lower section (23).	

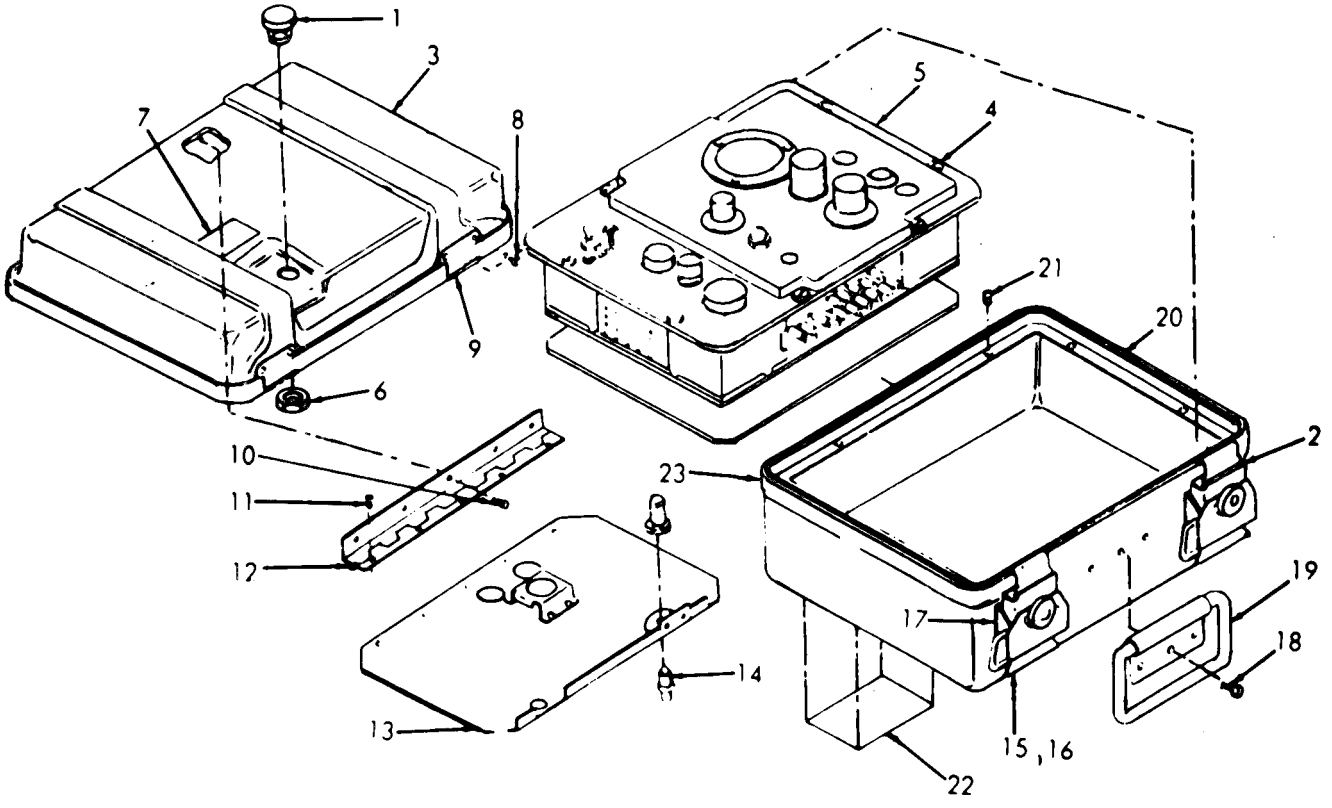
2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY (Continued)		
	c. Loosen eight captive screws (4) and remove ECU (5) from case.	
	d. Remove retainer nut (6) from pressure relief valve (1).	
	e. Remove pressure relief valve (1).	
	f. Remove pressure relief valve decal (7).	Remove only if illegible or defaced.
	g. Remove eight screws (8) and catches (9).	
	h. Remove rivets (10) securing hinge (12) to case cover (3).	
	i. Remove rivets (11) securing hinge to lid (13) and remove hinge (12) and lid (13).	
	j. Remove pushbutton fasteners (14) from lid (13).	
2. Lower section (23)	k. Remove eight screws (15) from twist lock fasteners (16) and remove twist lock fasteners (16) and spacers (17).	
	l. Remove three screws (18) from handle and remove handle (19).	
	m. Remove silicone tubing (20).	Use blunt instrument to remove tubing.

2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY (Continued)



n.	Remove insert (21).	
o.	Remove identification plate (22) from bottom of lower section (23).	Remove only if illegible or defaced.

CLEANING

Scrape all tubing and adhesive residue from lower section. Clean case sections with clean cloths dampened in detergent and water solution. Clean latches, hinges and handle with trichloroethane Fed. Spec. 0-T-620 or equivalent. Dry thoroughly.

2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
	Inspect case sections for cracks, breaks, dents or other visible damage. Inspect threaded parts for crossed or stripped threads. Operate latches to check for binding or other mechanical malfunctions.	
	Replace defective parts with a serviceable like item.	
REASSEMBLY		
5. Lower section (23)	a. Install identification plate (22) if removed.	
	b. Install inserts (21).	
	c. Cut a length of tubing equal to length of tubing cavity in the lower case.	
	d. Apply continuous bead of RTV sealant, MIL. SPEC. MIL-A-46106 RTV103BLA, item 6, Appendix C, to tubing cavity.	
	e. Press tubing (20) into cavity.	Wipe excess sealant from case.

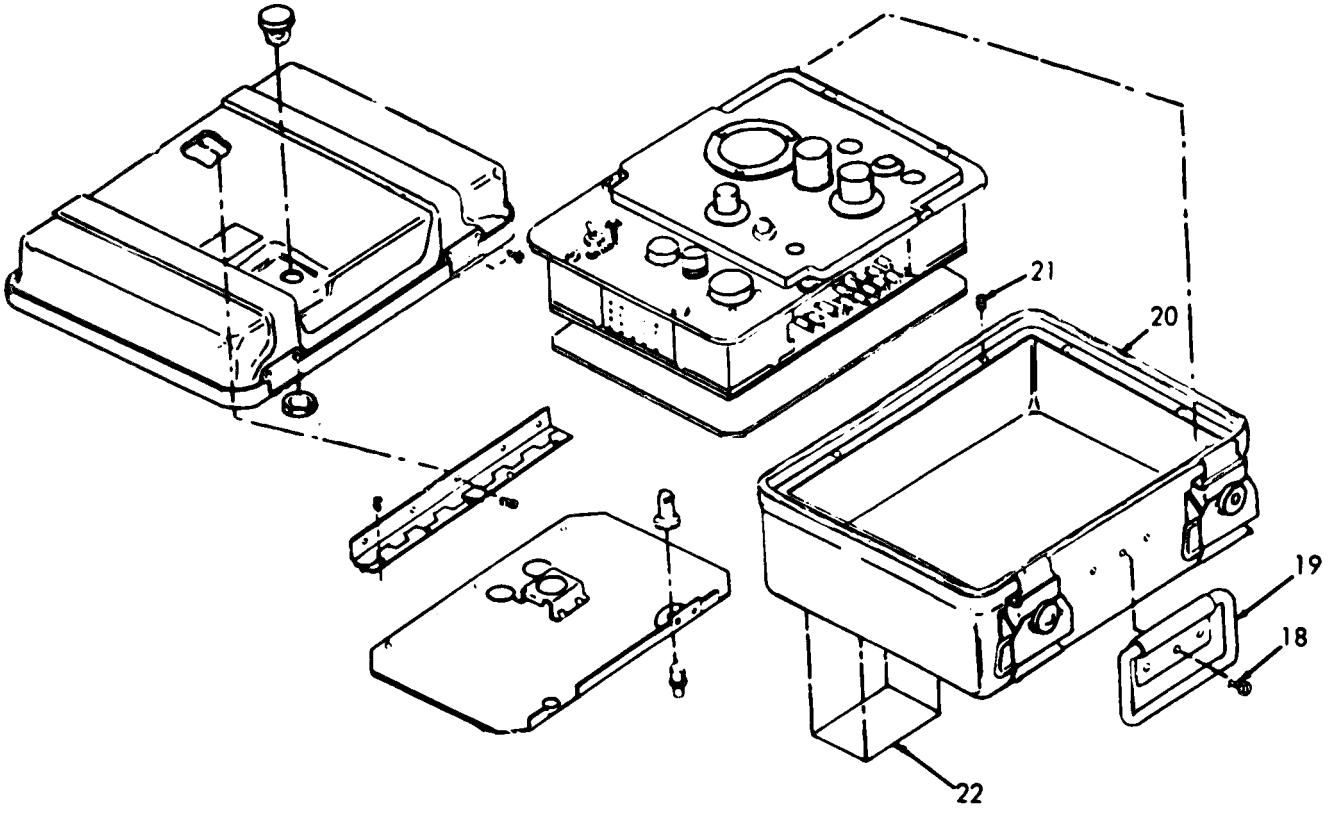
NOTE

Apply a coating of sealant primer, Military Specification MIL-S-22473, Grade N, Form R, item 5, Appendix C, to threads of all attaching screws. Air dry for five (5) seconds.

2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



f.	Install handle (19) with screws (18) and tighten.	Apply a small amount of thread sealant, MIL. SPEC. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of handle attaching screws.

2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM		ACTION	REMARKS
REASSEMBLY (Continued)			
	g.	Install spacers (17) and fasteners (16) with screws (15). Loosely attach latch.	Apply a small amount of thread sealant, MIL. SPEC. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of twist lock fastener screws.
4. Upper section (3)	h.	Install pushbutton fasteners (14) in lid (13).	
	i.	Install hinge (12) to lid (13) with rivets (11).	
	j.	Secure hinge (12) to case cover (3) with rivets (10).	
	k.	Install catches (9) using screws (8).	Apply a small amount of thread sealant, MIL. SPEC. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of catch attaching screws.
	l.	Install pressure relief valve decal (7) if removed.	
	m.	Install pressure relief valve (1) with retainer nut (6).	Tighten retainer nut so that seal in the valve is compressed and valve body is in contact with the lid.

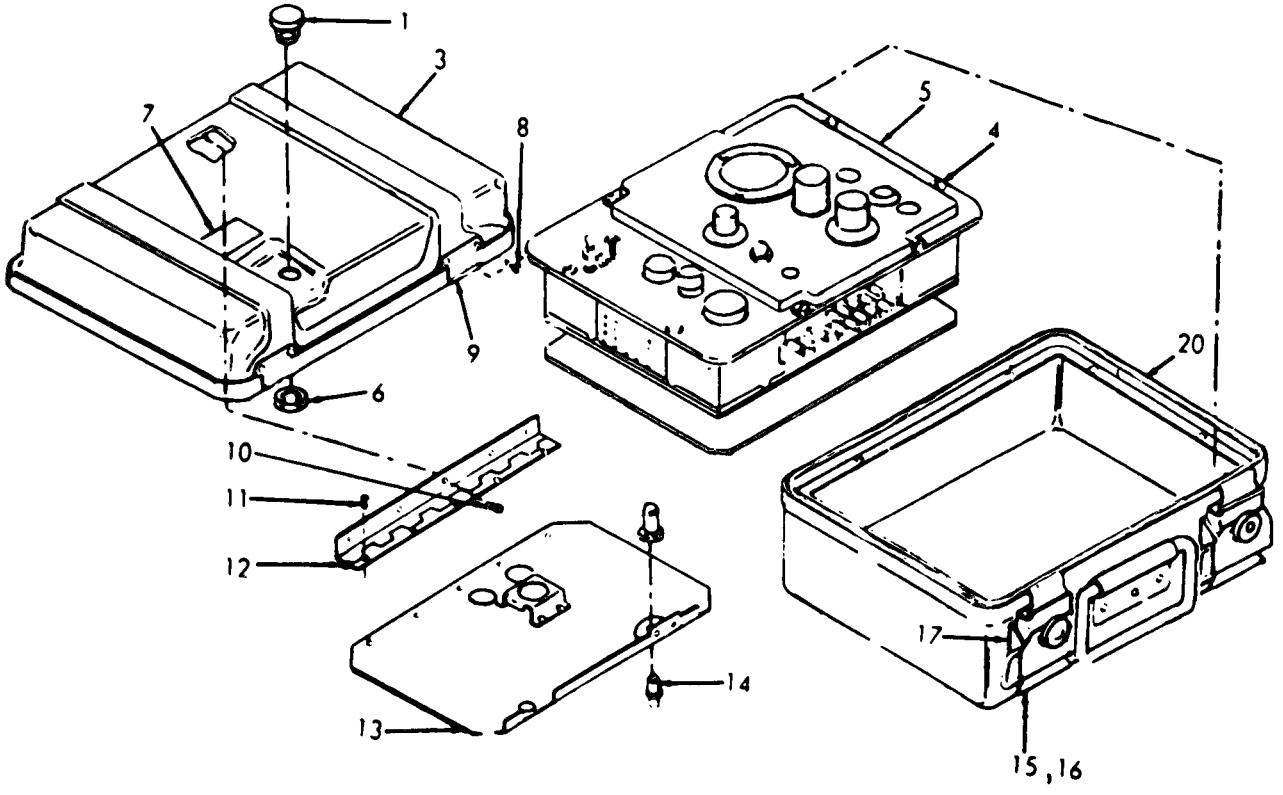
2-19. ELECTRONIC CONTROL UNIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

n. Position ECU (5) in place in lower case and secure with captive screws (4).

o. Adjust fasteners (16) so that cover (3) compresses the tubing (20) when closed, then tighten screws (15).



2-20. TRANSPORT CASE

This task covers:

a. Disassembly b. Cleaning c. Inspection
d. Repair e. Reassembly

INITIAL SETUP

Tools

Knife
Screwdriver, cross-tip
NSN 5120-00-965-0626
Screwdriver, flat-tip
NSN 5120-00-236-2127
Combination wrench 7/16”
NSN 5120-00-228-9505
Key set hexagon
NSN 5120-01-017-9535

Material/parts

Detergent
Pail
Clean cloths
Trichloroethane
Fed. Spec. 0-T-620 or
equivalent, Item 8,
Appendix C
MIL-A-46106 RTV103BLA
Sealant, Item 6, Appendix C
MIL-S-22473;, Grade N, Form R
Primer, Item 5, Appendix C
MIL-S-46163, Grade N, Type II,
Locking sealant, Item 2,
Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATiON/ITEM	ACTION	REMARKS
DISASSEMBLY		
1. Top cover (4)	a. Press pressure relief valve (1) on bottom case (2) to relieve internal pressure.	
	b. Release latches (3) and separate top cover (4) from bottom case (2).	

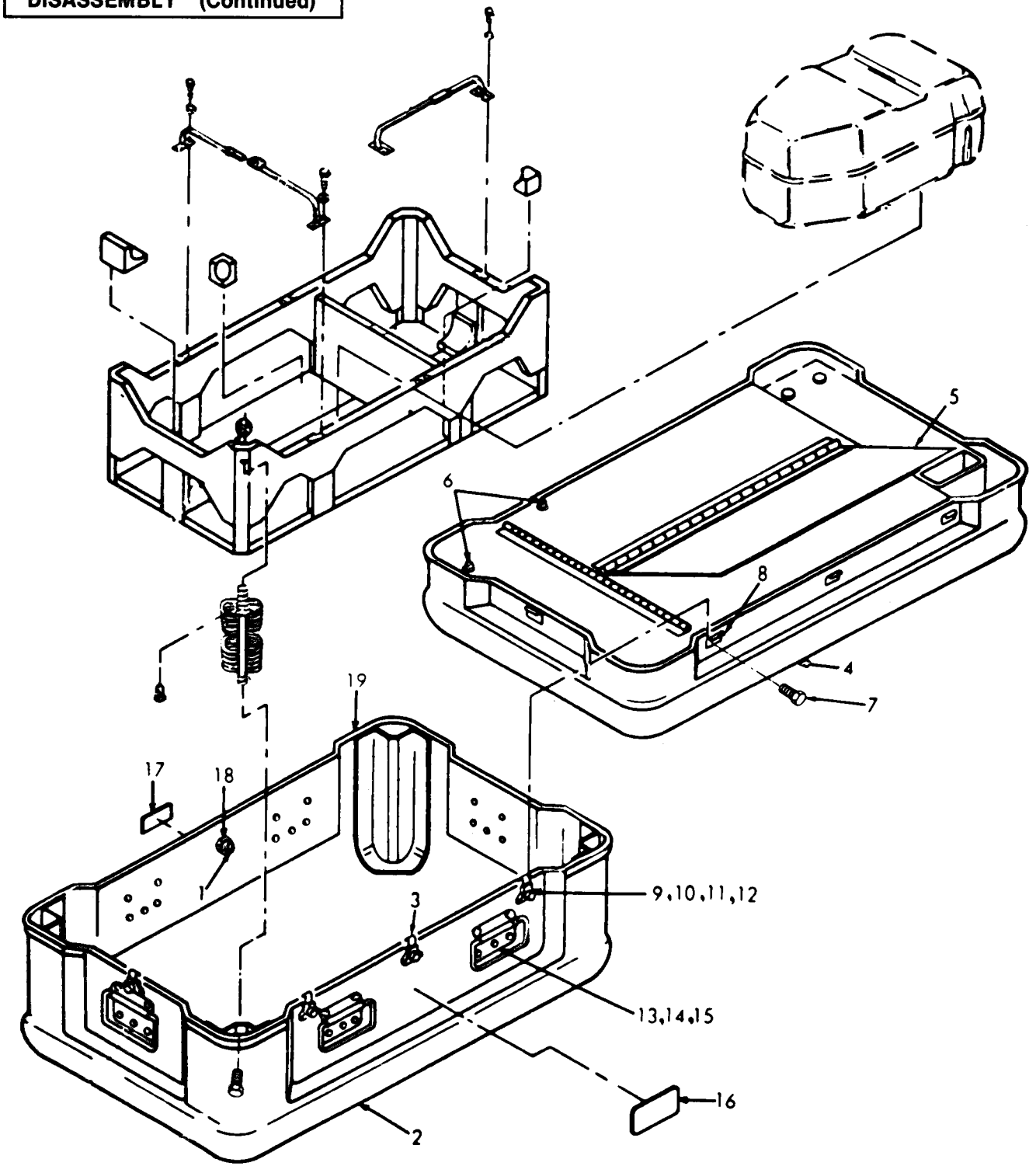
2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM		ACTION	REMARKS
DISASSEMBLY (Continued)			
	c.	Open compartments in lid (5) and remove cable assemblies, carrying harnesses, and tripod adapter assembly.	
	d.	Remove push button fasteners (6) and lid (5).	
	e.	Remove screws (7) and catches (8).	
2. Bottom case (2)	f.	Remove screws (9), catches (10), and standoff's (11 and 12).	
	g.	Remove rivets (13), handles (14) and backup plates (15).	
	h.	Remove identification plate (16).	Remove only if illegible or defaced.
	i.	Remove pressure relief valve decal (17).	Remove only if illegible or defaced.
	j.	Remove retaining nut (18) from interior of case.	
	k.	Remove pressure relief valve (1).	
	l.	Remove silicone tubing (19) from recess in bottom of case.	Use blunt instrument to remove tubing.

2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY (Continued)

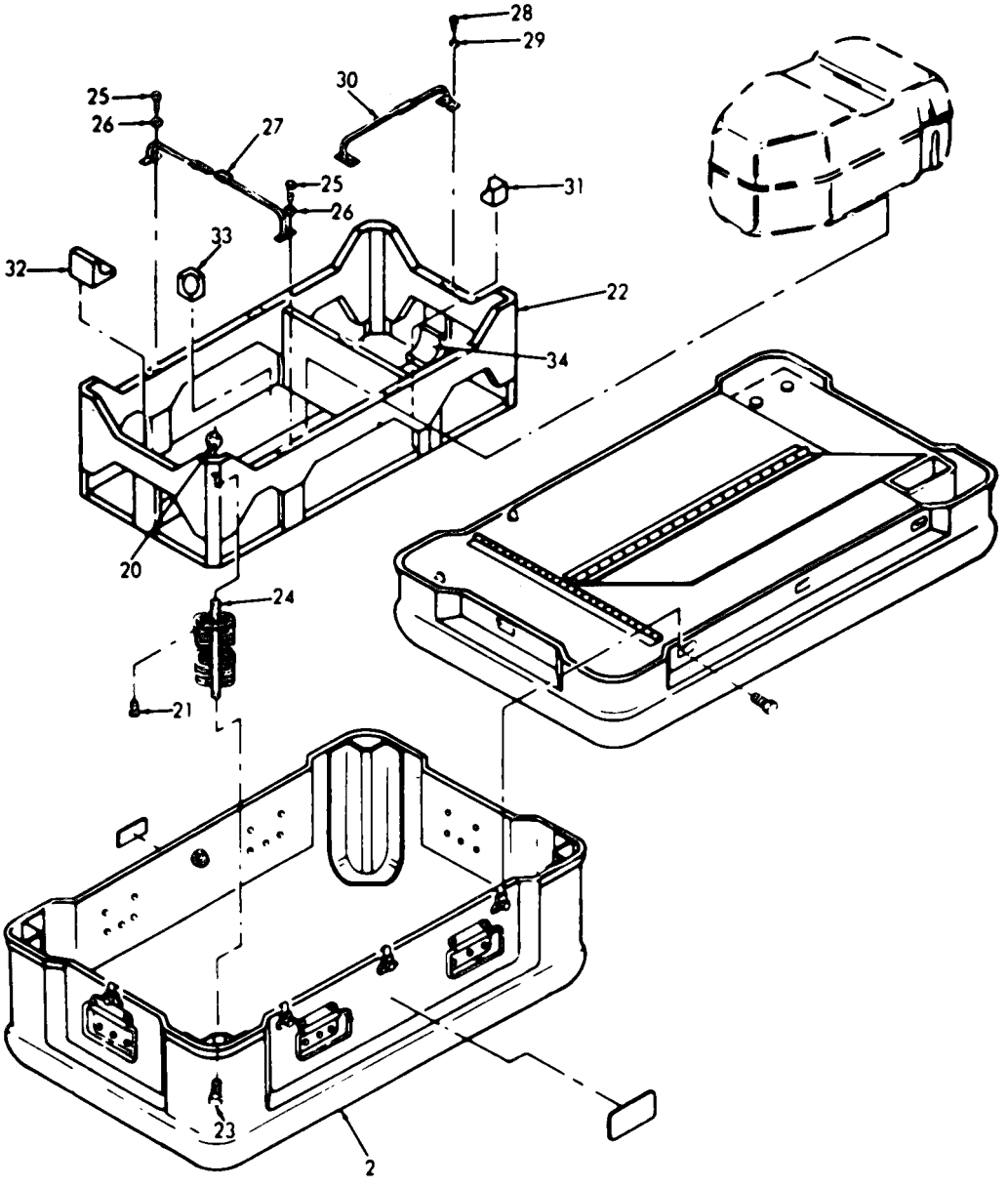


2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM		ACTION	REMARKS
DISASSEMBLY (Continued)			
3. Case mounting rack (22)	m.	Hold self-locking nut (20) to prevent turning and remove recessed screws (21) and nuts (20).	Use 7/16" combination wrench to hold self-locking nut and allen wrench to remove screws.
	n.	Remove case mounting rack (22) from bottom case (2).	
	o.	Remove recessed screws (23) securing isolators (24) to bottom case and remove isolators (24).	Use allen wrench to remove screws.
	p.	Remove four support screws (25) and washers (26) from support (27). Remove support (27).	
	q.	Remove four support screws (28) and washers (29) from support (30). Remove support (30).	
	r.	Remove edge cushions (31 and 32).	
	s.	Remove corner cushions (33 and 34).	
CLEANING			
		Scrape all tubing and adhesive residue from bottom case. Clean case sections using clean cloths dampened with detergent and water solution. Clean latches and handles with trichloroethane Fed. Spec. 0-T-620, item 8, Appendix C or equivalent.	Dry thoroughly.
INSPECTION			
		Inspect case sections for cracks, breaks, dents, or other visable damage. Inspect threaded parts for crossed or stripped threads.	

2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
INSPECTION (Continued)		
	Operate latches to check for binding or other mechanical malfunctions. Inspect carrying harness for frayed material and damaged fasteners. Inspect cable assemblies for bent, burned, or otherwise damaged pins and worn insulation.	



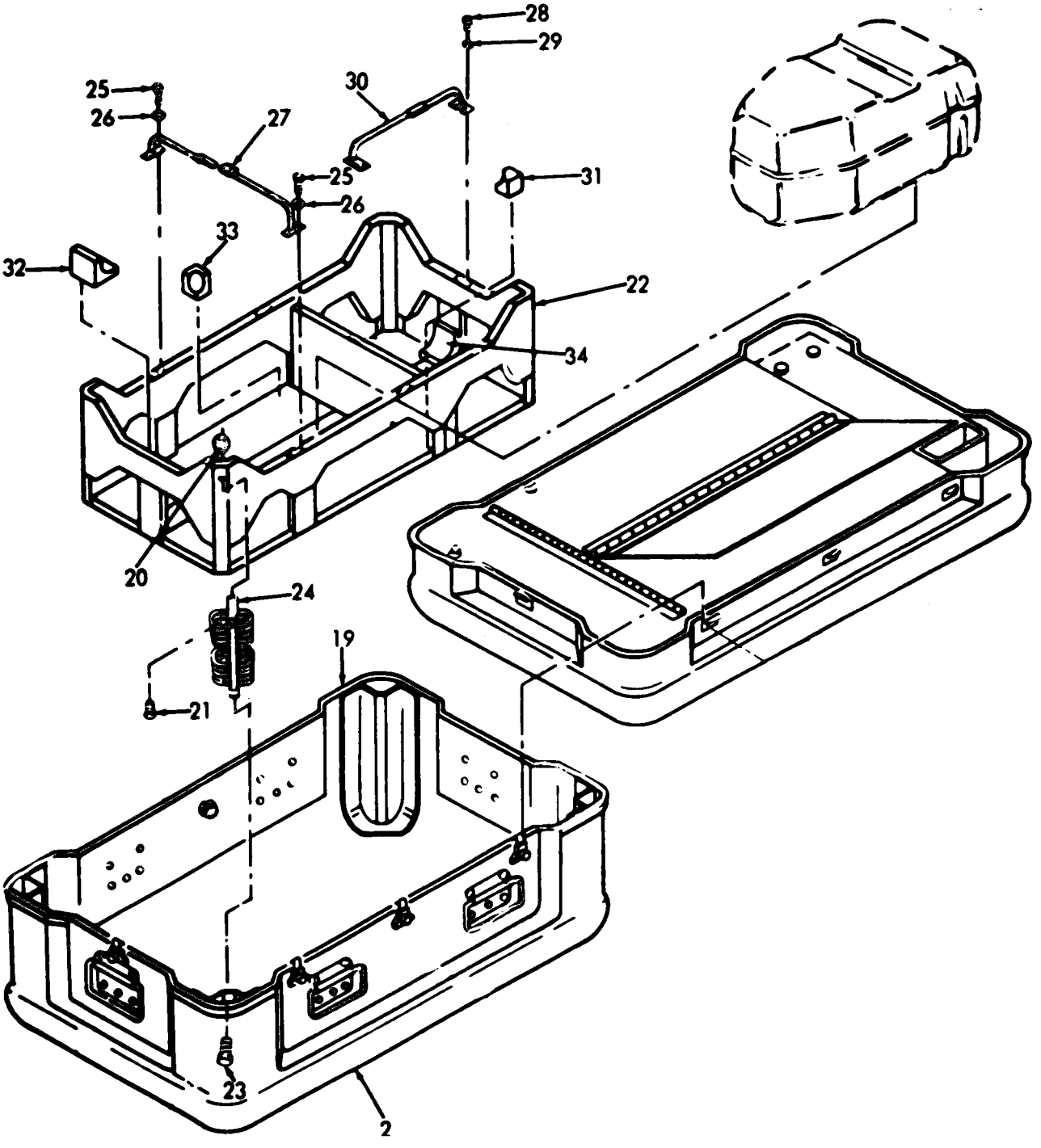
2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
REPAIR		
	Replace damaged or defective parts with a serviceable like item.	
REASSEMBLY		
4. Case mounting rack	a. Install corner cushions (34 and 33) and edge cushions (32 and 31) in case mounting rack (22).	
	b. Install support (30) using four washers (29) and screws (28) and tighten screws.	
	c. Install support (27) using four washers (26) and screws (25) and tighten.	
	d. Install isolators (24) in bottom case (2) with screws (23).	
	e. Place case mounting rack (22) in bottom case (2) and secure isolators (24) to case mounting rack (22) with screws (21) and self-locking nuts (20).	
5. Bottom case	f. Cut a length of tubing (19) equal to length of tubing cavity in bottom of case (2).	
	g. Apply continuous bead of RTV sealant, MIL. SPEC. MIL-A-46106 RTV103BLA, item 6, Appendix C, to tubing cavity.	
	h. Press tubing (19) into cavity.	Wipe excess sealant from case.

2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



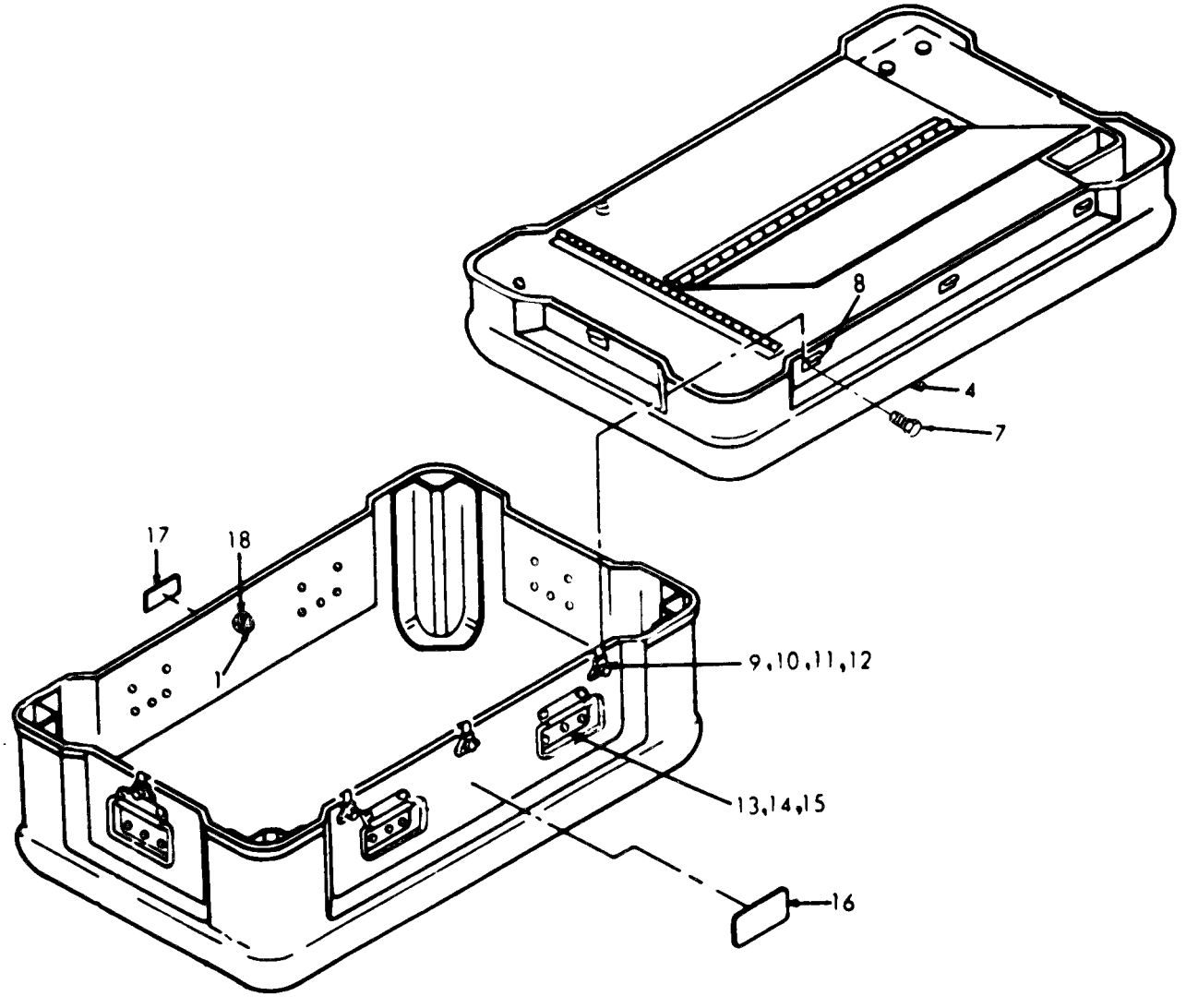
2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
REASSEMBLY (Continued)		
	i. Install pressure relief valve (1) with retainer nut (18).	Tighten retainer nut so that seal in valve is compressed and valve body is in contact with case.
	j. Install pressure relief valve decal (17) and identification plate (16) if removed.	
	k. Position backup plates (15) in place and install handles (14) using rivets (13).	
	NOTE **Apply a coating of sealant primer, Military Specification MIL-S-22473, Grade N, Form R, item 5, Appendix C, to threads of all attaching screws. Air dry for five (5) seconds.**	
	l. Install standoff's (12 and 11), catches (10) with screws (9) and tighten.	Apply a small amount of locking sealant, Mil. Spec. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of catch attaching screws.
6. Top cover	m. Install catches (8) to top cover (4) with screws (7) and tighten.	Apply a small amount of locking sealant, Mil. Spec. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of catch attaching screws.

2-20. TRANSPORT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



2-20. TRANSPORT CASE (Continued)

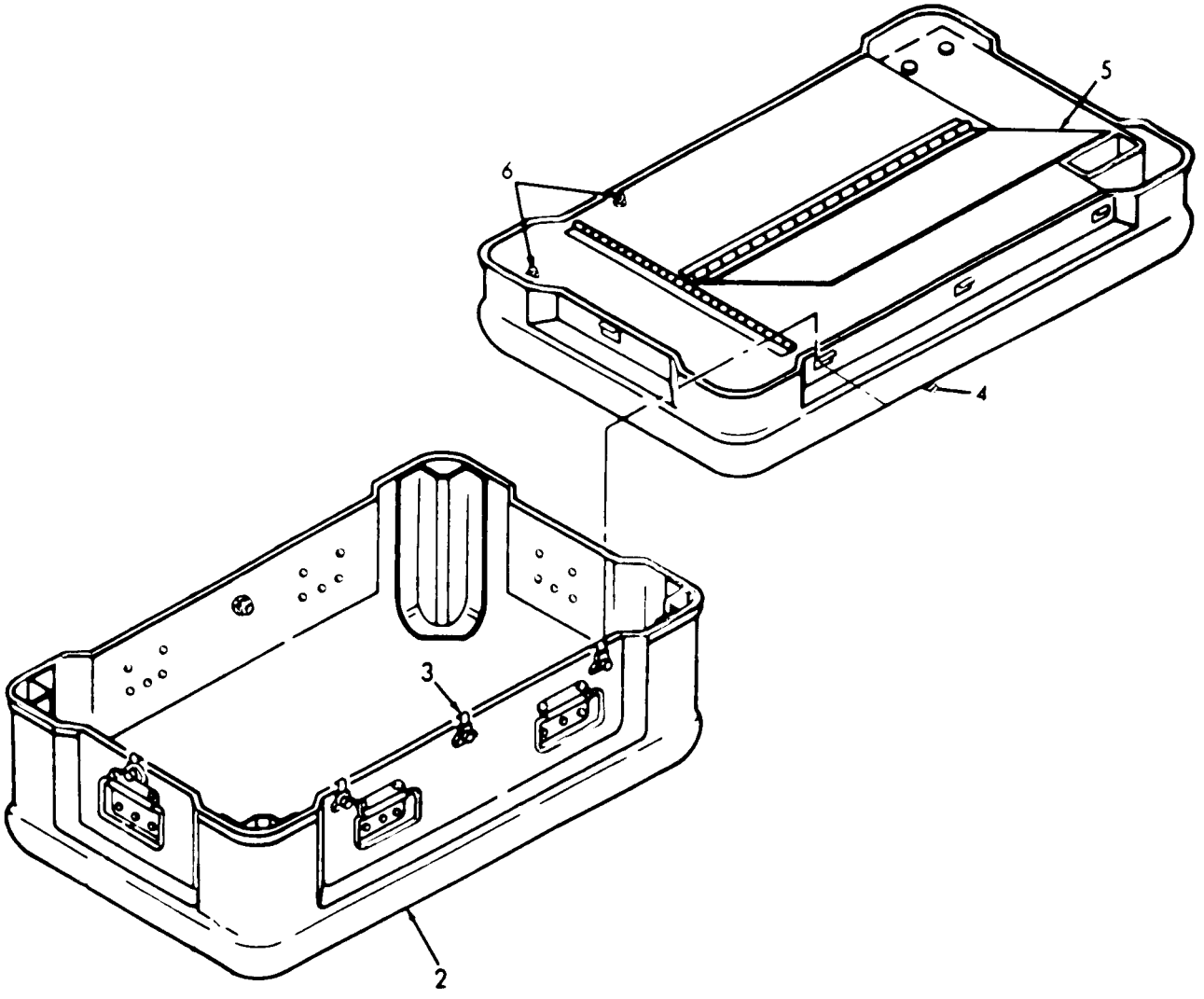
LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

n. Install pushbutton fasteners (6) in lid (5).

o. Place cable assemblies, carrying harnesses, and tripod adapter assembly in their applicable compartment in lid (5).

p. Place top cover (4) in place on bottom case (2) and secure with latches (3).



2-21. TRANSIT CASE

This task covers:

a. Disassembly b. Cleaning c. inspection
d. Repair e. Reassembly

INITIAL SETUP

Tools

Knife
Screwdriver, cross-tip
NSN 5120-00-965-0626
Screwdriver, fiat-tip
NSN 5120-00-236-2127

Material/parts

Detergent
Water
Pail
Clean cloths
Trichioroethane
Fed. Spec. 0-T-620 or
equivalent, item 8,
Appendix C
Sealant, MIL-A-46106 RTV103BLA
item 6, Appendix C
Primer,
MIL-S-22473, Grade N, Form R
item 5, Appendix C
Thread sealant,
MIL-S-46163, Grade N, Type II,
Item 2, Appendix C

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		
1. Lid (1)	a. Press pressure relief valve (14) to release pressure on transit case.	
	b. Unfasten latches (17) and remove lid (1) from bottom section (2).	
	c. Remove identification plate (3) from lid.	Remove only if illegible or defaced.

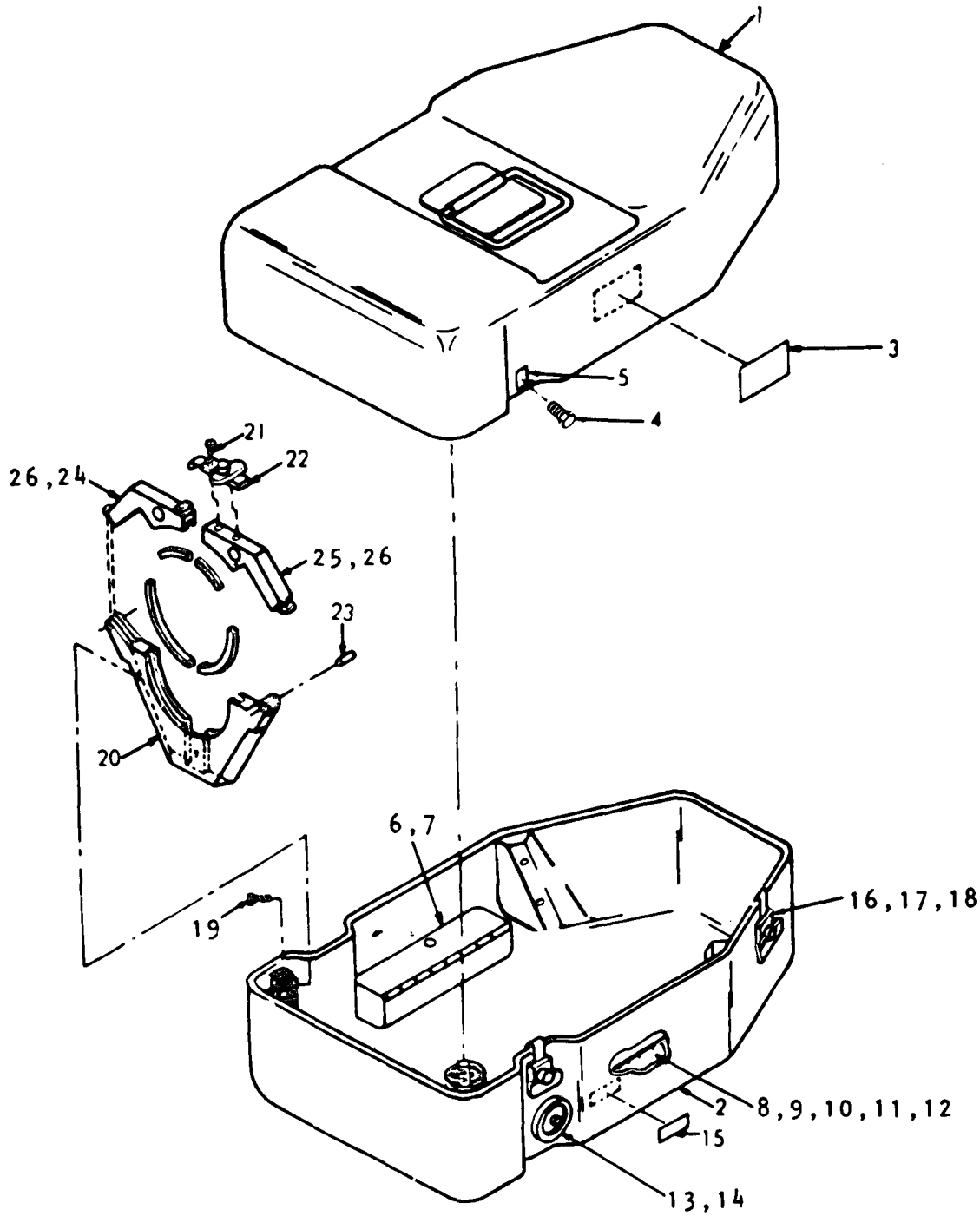
4-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY (Continued)		
	d. Remove screws (4) and latches (5).	
2. Bottom section (2)	e. Remove rain and dust cover (6), lens brush (7), theodolite prism eyepiece (8), theodolite eyepiece filter (9), plumb bob assembly (10), lamp (11), and fuses (12) from storage compartments.	
	f. Unscrew retaining nut (13) and remove relief valve (14).	
	g. Remove pressure relief valve decal (15).	Remove only if defaced or illegible.
	h. Remove screws (16), latches (17), and spacers (18) from bottom section (2).	
	i. Remove screws (19) securing lower support (20) and remove support.	
	j. Remove screws (21) and catch (22) from lower left clamp.	
	k. Remove pins (23) from right and left clamps (24 and 25) and remove clamps (24 and 25) and retainer pads (26).	

2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY (Continued)

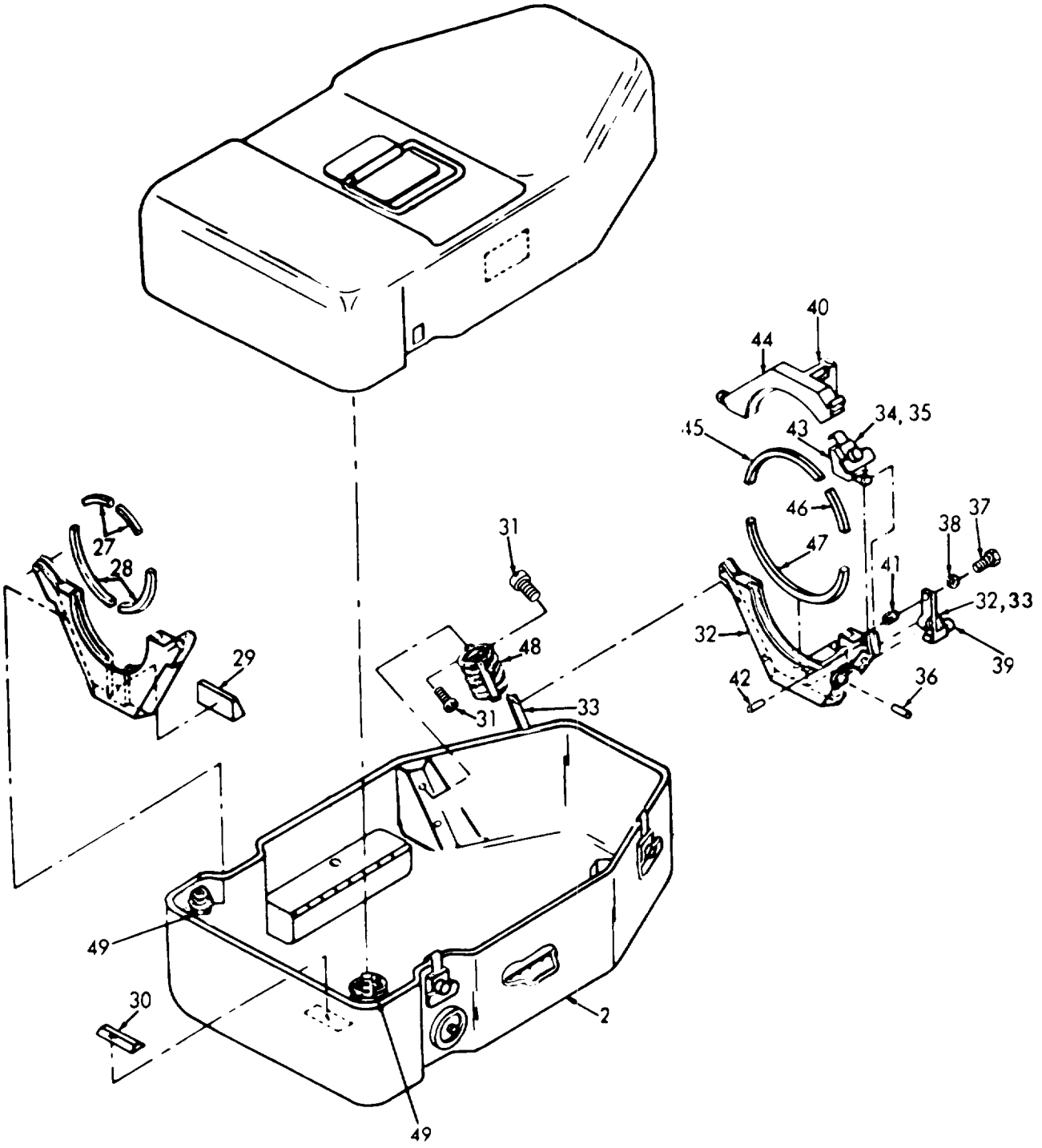


2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY (Continued)		
	l. Remove liners (27and 28) and retainer pad (29).	
	m. Remove snubbing bumper (30) from bottom section (2).	
	n. Remove screws (31) securing upper support and remove upper support (32) and spacers (33).	
	o. Remove screws (34) and catch (35) from upper left clamp.	
	p. Remove straight headless pins (36) from pivot arms.	
	q. Remove screws (37), washers (38), pivot arms (39 and 40) and springs (41) from upper support (32).	
	r. Remove straight headless pin (42) and upper clamp (43) from upper support (32).	
	s. Remove straight headless pin (42) and upper right clamp (44).	
	t. Remove liners (45, 46 and 47).	
	u. Remove eight screws (31) and two each isolators (48 and 49) from bottom section.	
CLEANING		
	Clean lid and bottom section with clean cloths dampened with detergent and water solution. Clean metal parts with trichloroethane, Fed. Spec. 0-T-620, item 8, Appendix C, or equivalent.	Dry thoroughly.

2.21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS
CLEANING (Continued)		



2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

INSPECTION

Inspect threaded parts for crossed or stripped threads. Inspect springs for loss of tension or broken coils. Inspect lid and bottom section for dents, cracks, breaks or other visible damage. inspect latches for binding or other mechanical malfunction.

REPAIR

Replace damaged or defective parts with a serviceable like item.

REASSEMBLY

3. Bottom section

a. Install isolators (49 and 48) in bottom section (2) with screws (31). Tighten screws.

b. Install liners (47, 46 and 45).

c. Position upper right clamp (44) on upper support (32) and install pin (42).

d. Position upper clamp (43) on upper support (32) and install pin (42).

e. Install springs (41), pivot arms (40 and 39), washers (38) and screws (37) in upper support (32).

f. Install pins (36).

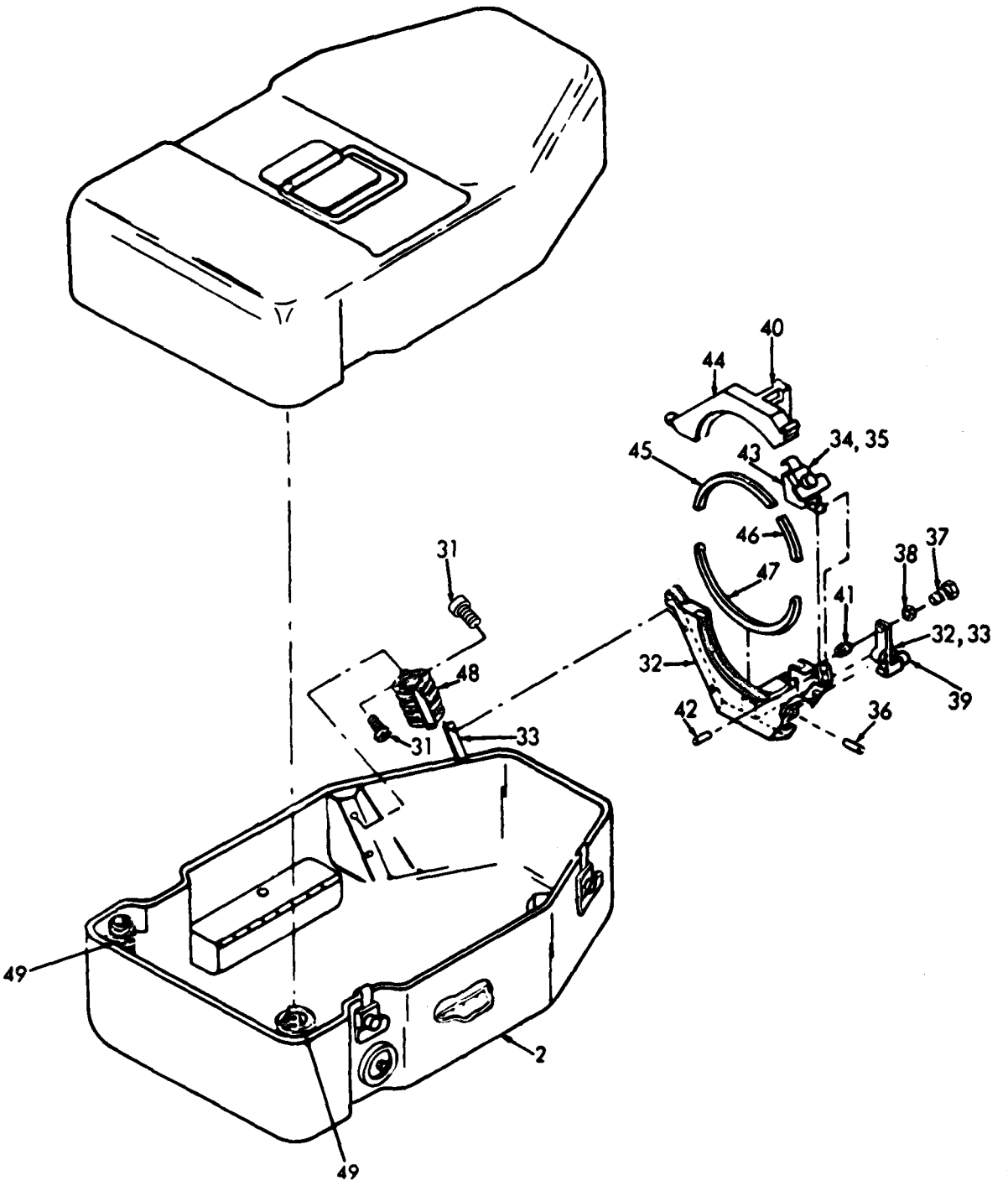
g. Install catch (35) with screws (34) and tighten.

h. Install spacers (33) and upper support (32) with screws (31) and tighten.

2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



2-21. TRANSIT CASE (Continued)

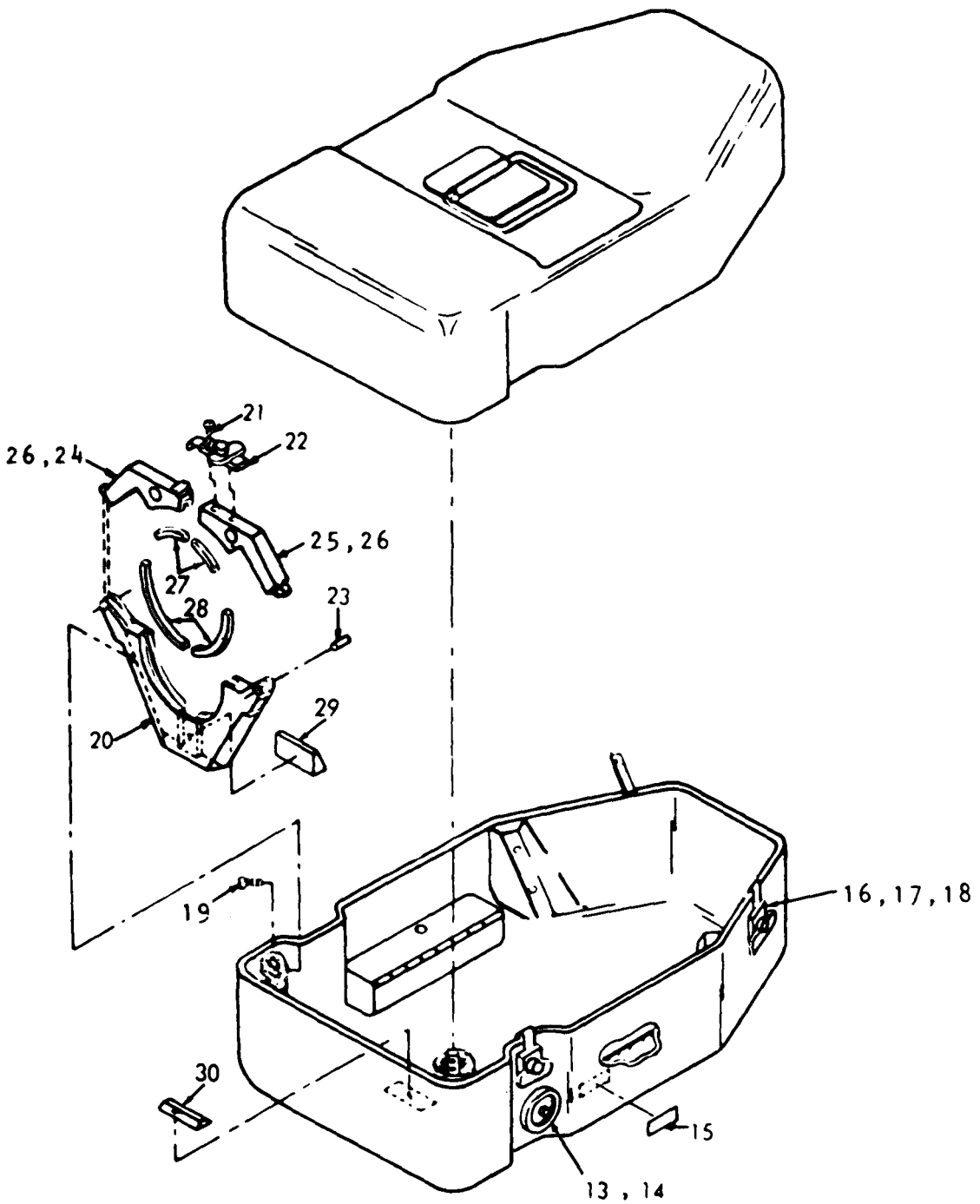
LOCATION/ITEM	ACTION	REMARKS
REASSEMBLY (Continued)		
i.	Install snubbing bumper (30).	
j.	Install retainer pad (29) and liners (28 and 27).	
k.	Install retainer pads (26) in right and left clamps (25 and 24).	
l.	Install right and left clamps (25 and 24) using pins (23).	
m.	Install catch (22) onto left clamp (25) with screws (21) and tighten.	
n.	Install lower support (20) with screws (19) and tighten.	
o.	Position spacers (18) and latches (17) in place and install screws (16).	Apply primer, MIL. SPEC. MIL-S-22473, Grade N, Form R, item 5, Appendix C, to the threads of screws prior to installation. Allow to air dry for five (5) seconds. Apply thread sealant, MIL. SPEC. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of latch attaching screws.
p.	Install pressure relief valve decal (15) if removed.	

2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)

q. Install relief valve (14) using retainer nut (13) and tighten.



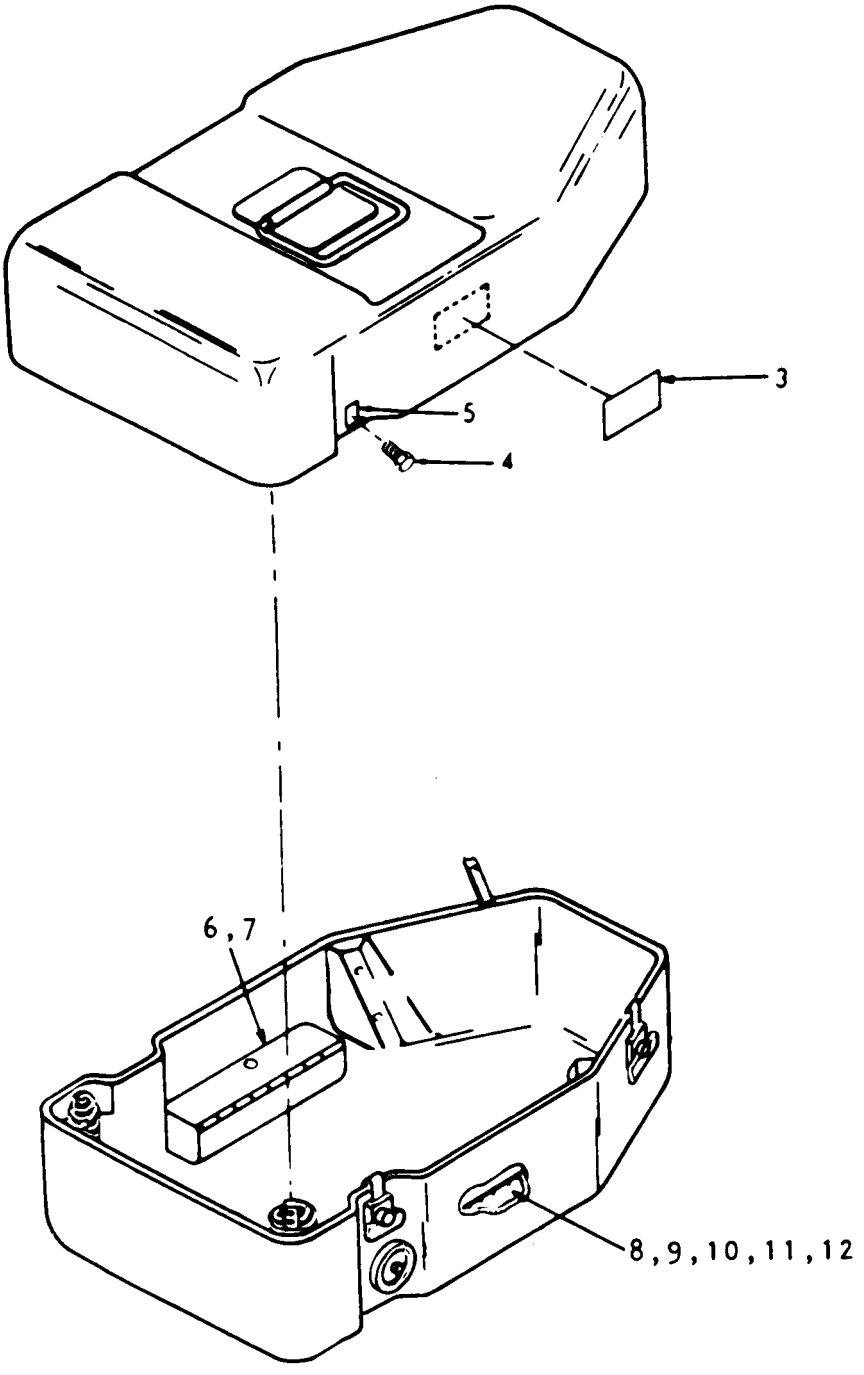
2-21. TRANSIT CASE (Continued)

LOCATION/ITEM		ACTION	REMARKS
REASSEMBLY (Continued)			
	r.	Place fuses (12), lamps (11) plumb bob assembly (10), theodolite eyepiece filter (9), theodolite prism eyepiece (8), lens brush (7) and rain and dust cover (6) in their proper compartment.	
4. Lid	s.	Position latches (5) in place on lid and install using screws (4) and tighten.	Apply primer, MIL. SPEC. MIL-S-22473, Grade N, Form R, item 5, Appendix C, to the threads of screws prior to installation. Allow to air dry for five (5) seconds. Apply thread sealant, MIL. SPEC. MIL-S-46163, Grade N, Type II, item 2, Appendix C, to the first few threads of latch attaching screws.
	t.	Install identification plate (3), if removed.	

2-21. TRANSIT CASE (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



2-22. TRIPOD ADAPTER

This task covers:

a. Disassembly b. Cleaning c. Inspection
d. Repair/Replace e. Reassembly

INITIAL SETUP

Tools

Hammer
Drift
Pliers
Key set, hexagon
NSN 5120-01-017-9535

Material/parts

Dry cleaning solvent P-D-680
Item 1, Appendix C
Clean cloths

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM		ACTION	REMARKS
DISASSEMBLY			
1. Support arm	a.	Remove four spring pins (1).	Use hammer and drift to remove pins.
	b.	Remove spring pin (2) releasing spade latch (3).	Use hammer and drift to remove pin.
	c.	Remove spring pin (4) releasing extension spring (5).	Use hammer and drift to remove pin.
2. Pivot hub	d.	Remove setscrew (6).	
	e.	Remove retaining rings (7) from pivot pin.	

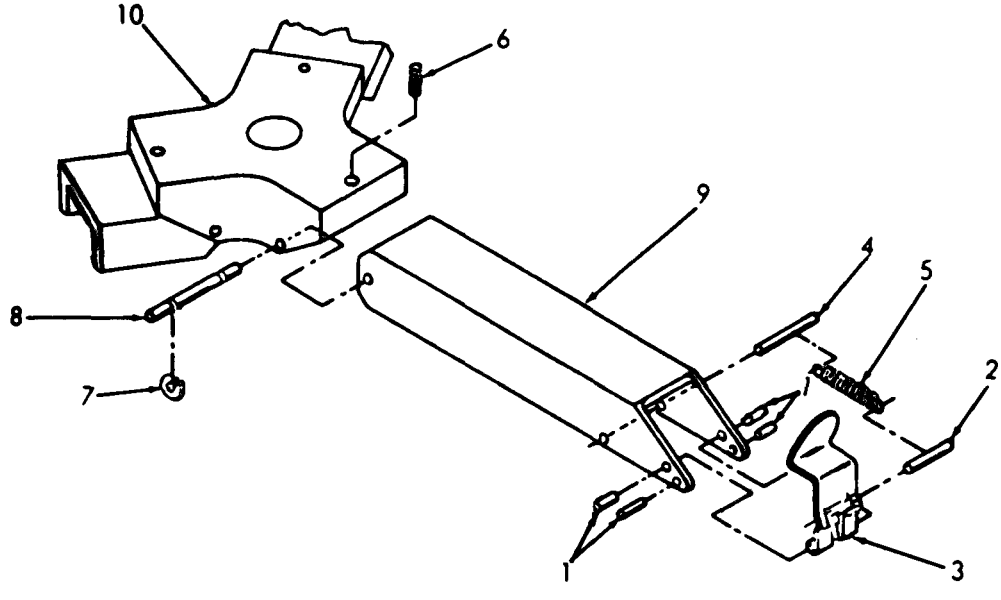
2-22. TRIPOD ADAPTER (Continued)

LOCATION/ITEM	ACTION	REMARKS

DISASSEMBLY (Continued)

f.	Remove pivot pin (8) releasing support arm (9) from pivot hub (10).	Use hammer and drift to remove pivot pin.
g.	Disassemble other two support arms in same manner.	

CLEANING



WARNING

SOLVENT

Dry cleaning solvent, P-D-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated or prolonged skin contact. Do not use near open frame or excessive heat. Flash point of solvent is 100° -136°F (38° - 59°C).

Clean all metal parts using dry-cleaning solvent P-D-680, item 1, Appendix C, and dry thoroughly.

2-22. TRIPOD ADAPTER (Continued)

LOCATION/ITEM	ACTION	REMARKS

INSPECTION

Inspect pins for burrs. Inspect springs for loss of tension or broken coils. Inspect support arms and pivot hub for nicks, breaks, burrs or distortion. Inspect setscrews for crossed or stripped threads.

REPAIR

Replace damaged or defective parts with a serviceable like item.

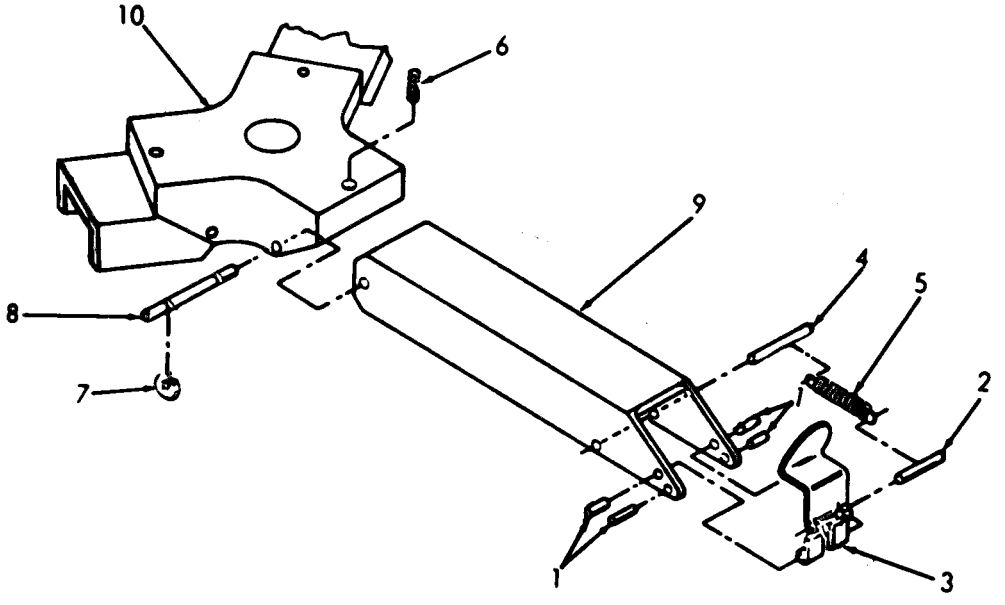
REASSEMBLY

3.	Pivot hub (10)	a.	Position support arm (9) in place on pivot hub (10) and secure with pivot pin (8).
		b.	Install retaining rings (7) onto pivot pin (8).
		c.	Install setscrew (6).
4.	Support arm (9)	d.	Insert spring pin (4) partially into support arm (9) and place one end of extension spring (5) over spring pin.
		e.	Install spring pin (4).
		f.	Position spade latch (3) in place in support arm.
		g.	Insert spring pin (2) partially into spade latch (3) and place other end of extension spring (5) over spring pin (2).
		h.	Install spring pin (2).
		i.	Install four spring pins (1).
		j.	Reassemble other two support arms in same manner.

2-22. TRIPOD ADAPTER (Continued)

LOCATION/ITEM	ACTION	REMARKS

REASSEMBLY (Continued)



2-23. AUXILIARY CABLE ASSEMBLIES

This task covers:

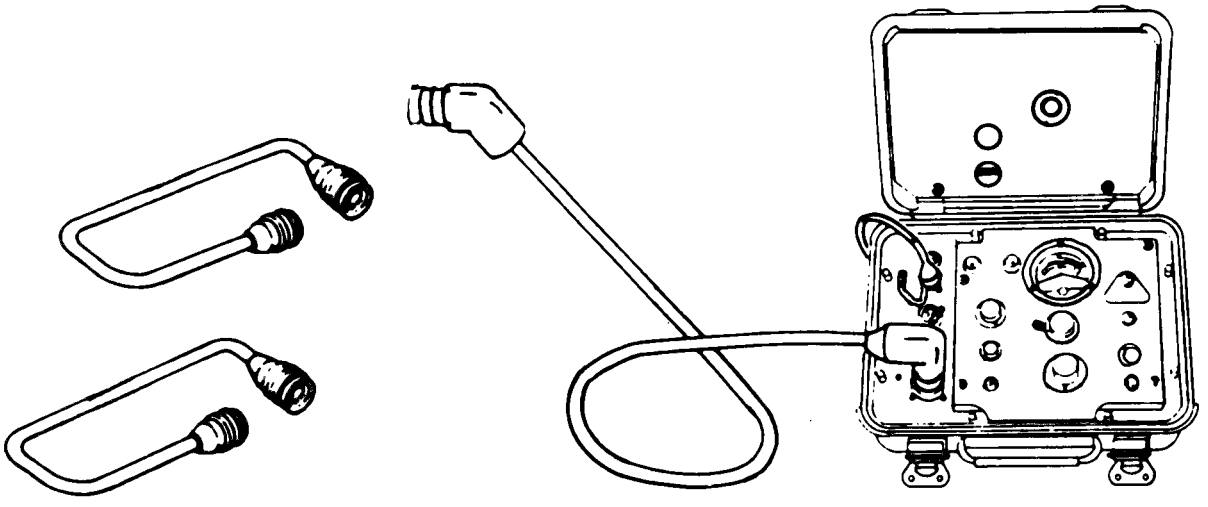
a. Inspection b. Replacement

INITIAL SETUP

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
	Inspect cable assemblies for deterioration, bent or broken pins, damaged connectors or cracked or severed insulation.	
REPLACEMENT		
	Replace damaged or defective cables with a serviceable like item.	



2-24. WIND SHELTER

This task covers:

a. Inspection b. Repair/Replace

INITIAL SETUP

Tools

Center punch
Small hammer
Metal file
Grinding stone
Goggles

Material/parts

Weather resistant nylon thread
Large needle

Personnel Required

MOS 82E Surveying Instrument Mechanic

General Safety Instructions

Wear safety goggles when using grinding wheel.

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
	Inspect cotton duct components (1, 2, and 3) for ripped seams, torn or frayed edges, rips, tears, holes, loose or missing rivets. Inspect pins (4) for distortion or flattened points.	
REPAIR		
1. Cotton Duct components	a. Patch holes using large needle and weather resistant nylon thread.	
	b. Restitch torn or frayed edges, seams and rips using a large needle and weather resistant nylon thread.	

2-24. WIND SHELTER (Continued)

LOCATION/ITEM	ACTION	REMARKS

REPAIR (Continued)

c. If damage is beyond repair, replace defective component.

2. Loose rivets

d. Tighten loose rivets using a center punch and small hammer.

WARNING

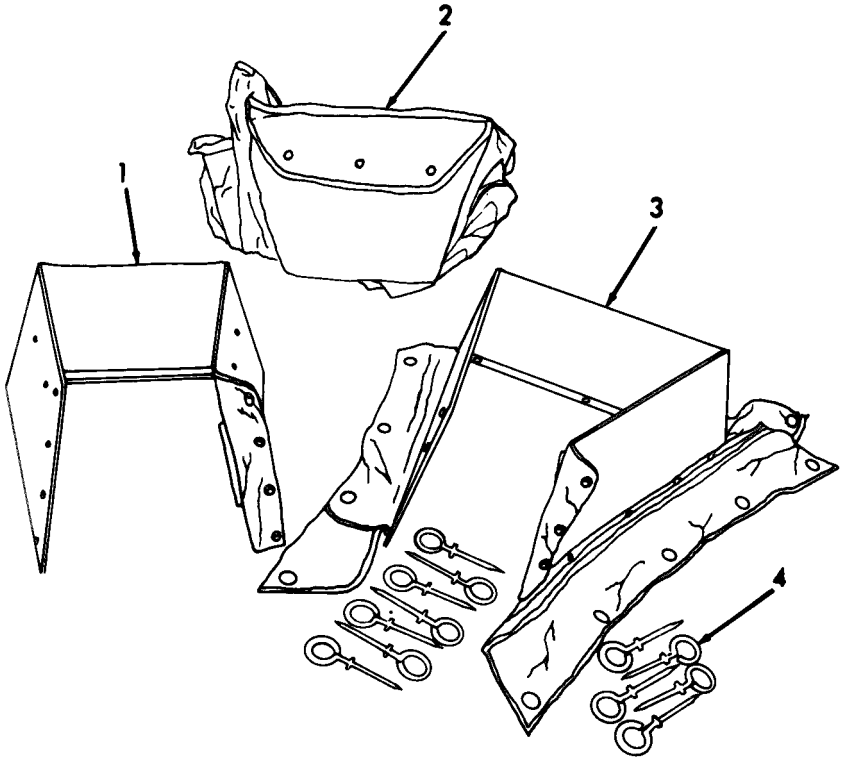
Wear safety goggles when using grinding wheel.

3. Pins

e. Round flattened points on pins using a metal file or grinding wheel.

f. Straighten bent pin shaft using a hammer while shaft is laying on a flat, hard surface.

g. Replace all pins damaged beyond repair.



2-25. RAIN AND DUST COVER

This task covers:

a. Inspection b. Repair/Replace

INITIAL SETUP

Material/parts

Weather resistant nylon thread
Large needle

Personnel Required

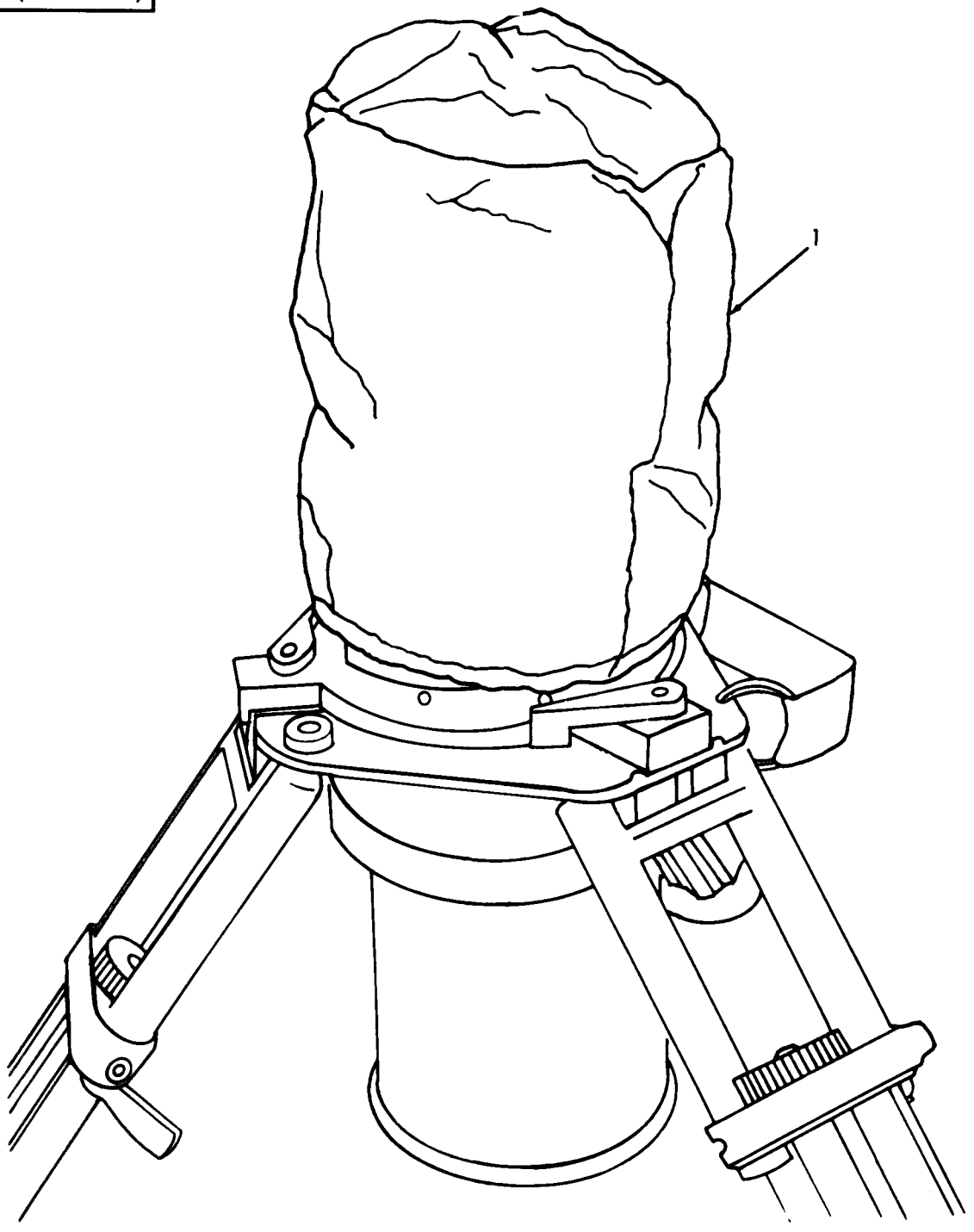
MOS 82E Surveying Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
	Inspect for frayed stitching, rips, holes, tears and deterioration.	
REPAIR		
1. Rain and dust cover (1)	a. Patch holes using large needle and weather resistant nylon thread.	
	b. Restitch torn or frayed edges, seams or rips using a large needle and weather resistant nylon thread.	
	c. If damage is beyond repair, replace rain and dust cover.	

2-25. RAIN AND DUST COVER (Continued)

LOCATION/ITEM	ACTION	REMARKS

REPAIR (Continued)



2-26. CAP AND CHAIN ASSEMBLY, AC-DC CONVERTER

This task covers:
a. Removal b. Replacement c. Installation

INITIAL SETUP

Tools

Screwdriver, cross-tip
NSN 5120-00-965-0626

Personnel Required

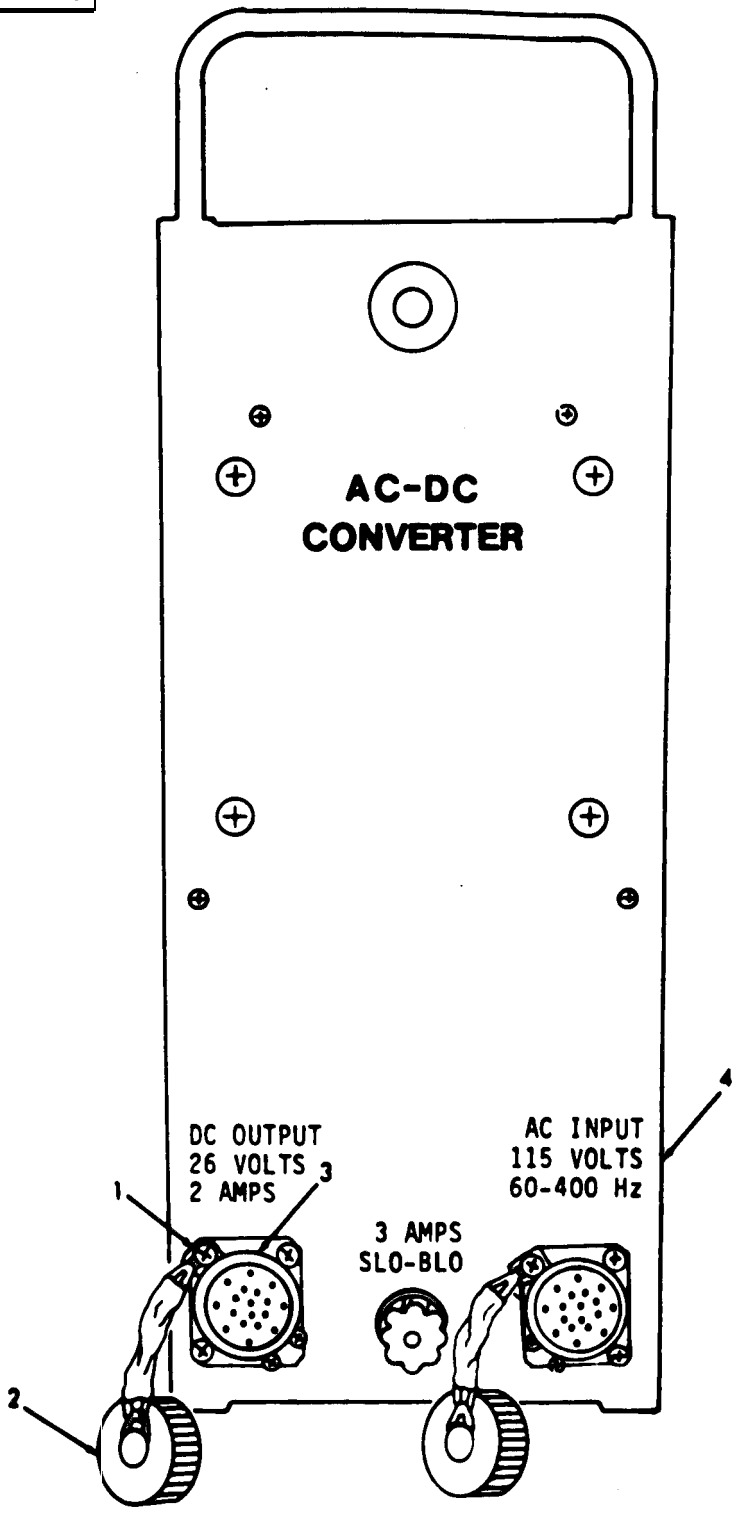
MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Cap and chain assembly (2)	a. Remove phillips head screw (1) securing cap and chain assembly (2) to converter (4).	
	b. Unscrew cap and chain assembly from connector (3) if attached.	
	c. Remove cap and chain assembly (2).	
REPLACEMENT		
	Replace defective cap and chain assembly with a serviceable like item.	
INSTALLATION		
2. Cap and chain assembly	a. Screw cap and chain assembly (2) onto connector (3).	
	b. Secure cap and chain assembly to converter (4) with screw (1) and tighten.	

2-26. CAP AND CHAIN ASSEMBLY, AC-DC CONVERTER (Continued)

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION (Continued)



2-27. WAIST STRAP HARNESS

This task covers:

a. Removal
b. Inspection
c. Repair/Replace
d. Installation

INITIAL SETUP

Personnel Required

MOS 82E Surveying
Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS

REMOVAL

1. Waist strap

a. Remove waist strap (1) from right bottom side strap anchor (2) on back pack.

b. Remove other end of waist strap (1) from left bottom side strap anchor (2) on backpack.

INSPECTION

Inspect waist strap harness for frayed stitching, tears, deterioration or other visible damage.

REPAIR

Replace defective waist strap harness with a serviceable like item.

INSTALLATION

2. Waist strap

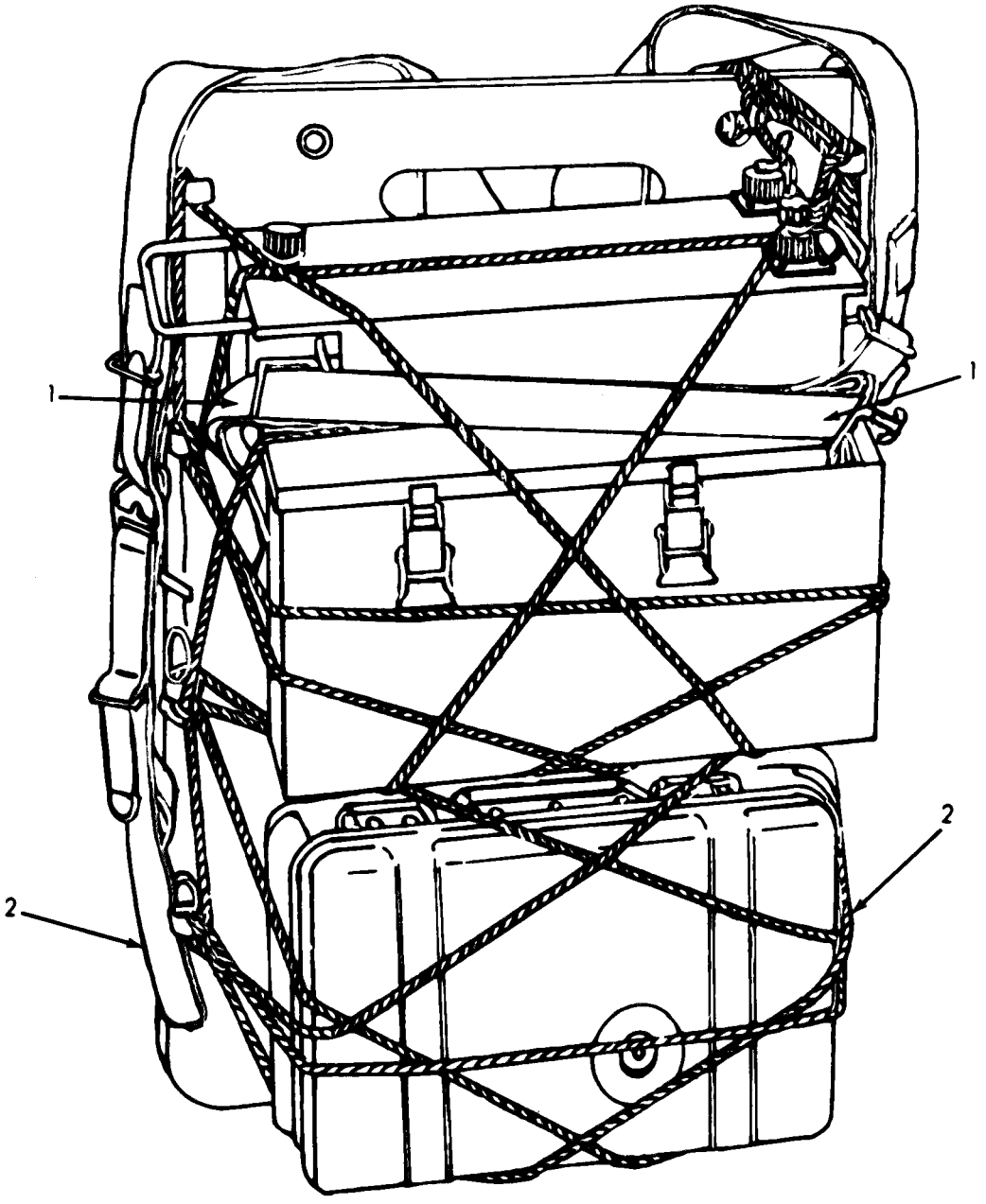
a. Install waist strap (1) onto left bottom side anchor (2) on backpack.

b. Install other end of waist strap onto right bottom side anchor on backpack.

2-27. WAIST STRAP HARNESS (Continued)

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION (Continued)



2-28. SHOULDER HARNESS

This task covers:

a. Removal
b. Inspection
c. Repair/Replace
d. Installation

INITIAL SETUP

Personnel Required

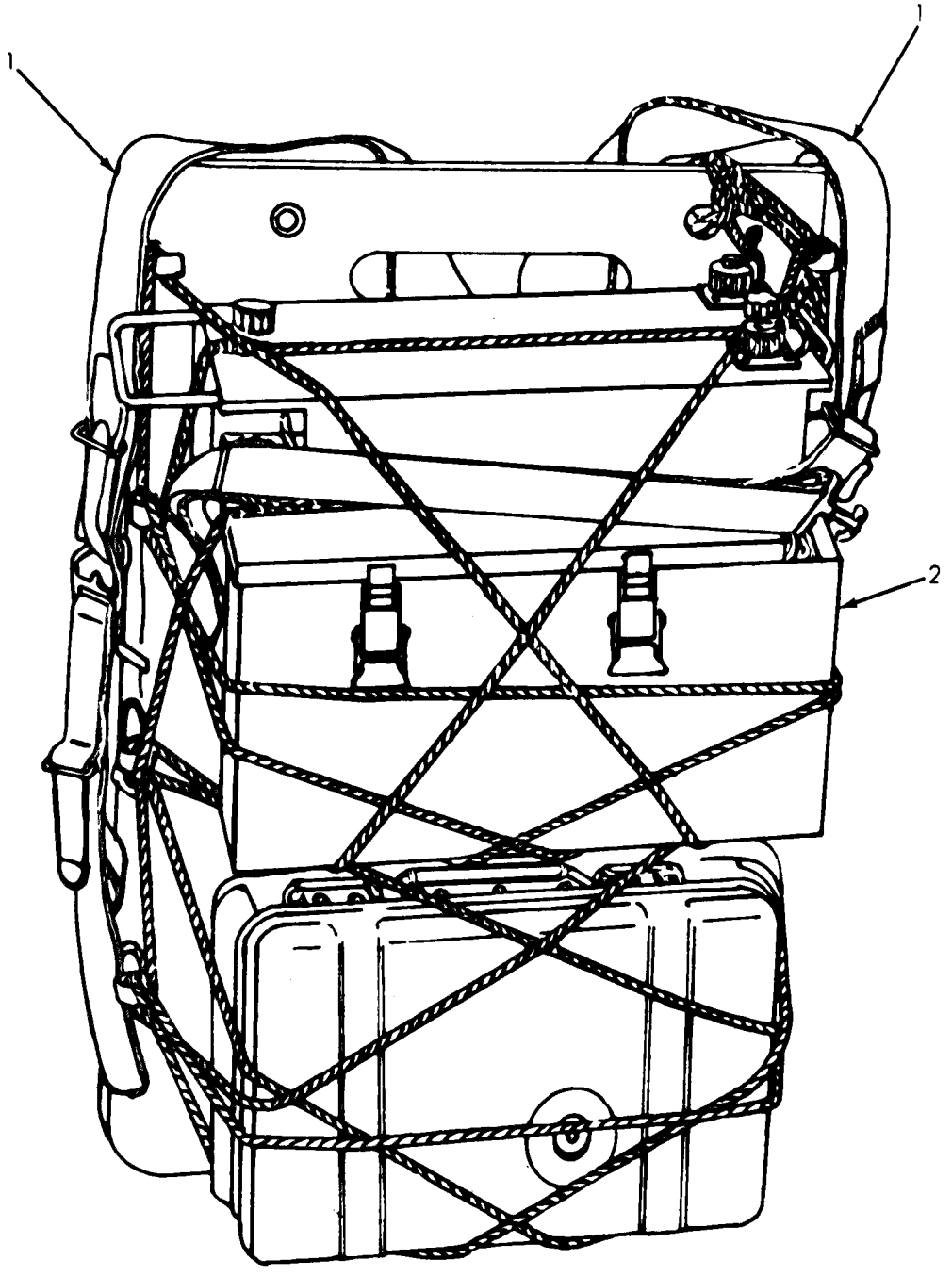
MOS 82E Surveying Instrument Mechanic

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Shoulder straps (1)	a. Remove short strap end from the top center anchor on transit case (2).	
	b. Remove long strap end from the bottom side anchor on transit case (2).	
INSPECTION		
	Inspect shoulder harness for frayed stitching, tears, deterioration or other visible damage.	
REPAIR		
	Replace defective shoulder harness with a serviceable like item.	
INSTALLATION		
2. Shoulder straps (1)	a. Secure short strap end to top center anchor on transit case (2).	
	b. Secure long strap end to bottom side anchor on transit case (2).	

2-28. SHOULDER HARNESS (Continued)

LOCATION/ITEM	ACTION	REMARKS

INSTALLATION (Continued)



APPENDIX A

REFERENCES

A-1. SHIPMENT AND STORAGE

TM 740-90-1	Administrative Storage of Equipment.

A-2. DESTRUCTION TO PREVENT ENEMY USE

TM 750-244-3	Procedures for Destruction of Equipment. to Prevent Enemy Use.

A-3. TECHNICAL MANUALS

DA PAM 738-750	The Army Maintenance Management System
TM 11-6140-203-15-3	Operator, Organizational, Direct Support and General Support and Depot Maintenance Manual Including Repair Parts and Special Tool List. Nonaircraft Nickel-Cadmium Batteries.
TM 5-6675-250-10	Operator's Manual, Survey Instrument: Azimuth, GYRO, Lightweight, Model AG-8, Type I (6675-00-062-8579).
TM 5-6675-250-20P	Organizational Maintenance Repair Parts and Special Tools List Survey Instrument: Azimuth, Gyro, Lightweight (Model AG-8) NSN 6675-00-062-8579
TM 5-6675-250-34	Direct Support and General Support Maintenance Manual Survey instrument: Azimuth, Gyro, Lightweight (Model AG-8) NSN 6675-00-062-8579
TM 5-6675-250-34P	Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) Survey Instrument: Azimuth, Gyro, Lightweight (Model AG-8) NSN 6675-00-062-8579

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section Ill contains supplemental instructions or explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of the equipment.

B-2. MAINTENANCE FUNCTIONS (Continued)

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc), considered in classifying Army equipment/components.

B-3. COLUMN ENTRIES USED IN THE MAC

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

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

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

B-3. COLUMN ENTRIES USED IN THE MAC (Continued)

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work/time figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work/time figures represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/ quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. The symbol designations for the various maintenance levels are as follows:

C	Operator or Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

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

f. Column 6, Remarks. This column shall contain a letter code in alphabetical order which shall be keyed to the remarks contained in Section III.

B-4. COLUMN ENTRIES USED IN TOOL AND TEST EQUIPMENT REQUIREMENTS

a. Column 1, Reference Code. This code scheme recorded in column 5, Section II.

b. Column 2, Maintenance Category. This column shows the lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. This column lists the name or identification of the tool or test equip ment.

d. Column 4, National/NATO Stock Number. This column lists the National/NATO Stock Number of the tool or test equipment.

e. Column 5, Tool Number. This column lists the manufacturer's code or part number of the tool or test equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
01	GYROSCOPIC REFERENCE UNIT								
0101	Theodolite	Inspect		0.1				4,5,6,10	
		Service		0.2					
		Adjust		0.2					
		Align		0.2					
		Replace			0.3				
		Repair					4.0		
		Rebuild					5.0		
	Lamps	Inspect		0.1					
		Replace		0.1					
0102	Upper Housing Assembly	Inspect		0.1					
		Service			0.1				
		Replace					8.0		
		Overhaul					8.0		
	Control Knob, Cage-Uncage	Replace		0.1					
	Servo Motor-Tach	Replace					2.0	1,8	
	Gear Box Assembly	Inspect			0.5				
		Test			1.0				
		Adjust			0.3				
		Replace			1.0				
		Repair			1.0				
	Caging Mechanism	Inspect			1.0				
		Adjust			0.5				
		Repair					2.0		
	Upper Band Clamp Assembly	Inspect			0.2			10	
		Adjust			0.4				
		Replace					8.0		

Section II. MAINTENANCE ALLOCATION (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
01	GYROSCOPIC REFERENCE UNIT (Cont)								
0102	Upper Housing Assembly (Cont)								
	Preamplifier Assembly	Test					1.0		
		Replace					10.0		
	Tilt Switch Assembly	Inspect			0.1			4,6	
		Replace			1.0				
	Time Totalizing Meter	Inspect		0.1					
		Replace			1.0				
	Relay, K1	Test			0.3			3	
		Replace					1.5		
	Caging Link	Inspect			0.2				
		Adjust			0.4				
		Replace			0.5				
	Caging Solenoid	inspect			0.2			7	
		Test			0.2				
		Adjust			0.8				
		Replace					2.0		
	Uncaged Indicator Light	Inspect		0.1				4,6	
		Test			0.3				
		Replace			0.5				
	Caging Mechanism Control Switches	Inspect			0.2				
		Adjust			0.5				
		Replace			1.0				

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
01	GYROSCOPIC REFERENCE UNIT (Cont)								
0102	Upper Housing Assembly (Cont)								
	Upper Housing Seals	Inspect			0.2				
		Replace			2.0				
0103	Pendulum and Followup Assembly	Inspect					0.2	4,6	
		Replace					4.0		
	Pendulum Suspension Band	Inspect					0.2		
		Replace					8.0	4,6	
	Outer Shield	Inspect	0.1	0.1					
		Replace			0.3				
	Pendulum Shield	Inspect					0.2		
		Replace					0.4		
	Gyro Wheel Assembly	Test					0.2	4,6	
		Replace					1.0		
0104	Tripod Assembly	Inspect		0.1					
		Service		0.3					
		Replace		0.2					
		Repair		0.3					
02	ELECTRONIC CONTROL UNIT	Inspect		0.2				4,6	
		Test			0.3				
		Service		0.5					
		Replace		0.3					
		Repair			0.8				
		Overhaul				2.0			

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
02	ELECTRONIC CONTROL UNIT (Cont)								
0201	Case	Inspect		0.2					
		Service		0.2					
		Replace		0.2					
		Repair		0.5					
	Cable Assemblies	Inspect	0.1	0.1					
		Test			0.2				
		Replace		0.1					
	Hand Lamp Assembly	Inspect	0.1	0.1					
		Test			0.2				
		Replace		0.1					
0202	Printed Circuit Board Assembly	Inspect			0.3			8	
		Replace			0.5				
		Repair				1.0			
0203	Panel Assembly	Inspect	0.2	0.2				7,8	
		Test			0.5				
		Replace			0.5				
		Repair			1.0				
	Meter	Inspect			0.2				
		Replace			0.5				
	Control Switches	Inspect			0.2				
		Replace			1.0				
	Rotary Switches	Inspect			0.2				
		Replace			0.5				
	Potentiometers	Inspect			0.2				
		Replace			0.5				
	Fuse	Replace	0.1						

Section II. MAINTENANCE ALLOCATION CHART (Continued

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
02	ELECTRONIC CONTROL UNIT (Cont)								
0203	Panel Assembly (Cont)								
	Lamps	Replace	0.1						
	Control Knobs	Replace		0.1					
	Cap and Chain Assembly	Replace		0.1					
	Edge-lighted Panel	Inspect	0.3	0.3					
		Replace			0.5				
		Repair					1.0		
03	TRANSPORT CASE	Inspect		0.2					
		Replace		0.1					
		Repair		0.5					
	Cable Assemblies	Inspect		0.1					
		Test			0.2				
		Replace		0.1					
	Pressure Relief Valve	Inspect		0.3					
		Replace		0.3					
	Latches	Inspect		0.2					
		Replace		0.3					
	Seal	Inspect		0.1					
		Replace		0.5					
	Harness, Waist Strap	Inspect		0.1					
		Replace		0.1					

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level C	O	F	H	D	(5) Tools and equipment	(6) Remarks
03	TRANSPORT CASE (Cont)								
	Harness, Shoulder	Inspect		0.1					
		Replace		0.1					
	Tripod Adapter Assembly	Inspect	0.1						
		Replace		0.1					
		Repair		0.3					
04	AC-DC CONVERTER ASSEMBLY	Inspect	0.2	0.2				1,7,8	
		Test			0.5				
		Replace		0.5					
		Repair			1.0				
	Fuse	Replace	0.1						
	Cap and Chain Assembly	Replace		0.1					
	Transformer, T1	Test			0.3				
		Replace			0.5				
	Diodes	Test			0.3				
		Replace			0.4				
	Capacitor, C1	Test			0.2				
		Replace			0.4				
	Resistor, R1	Test			0.2				
		Replace			0.4				
	Filter, FL1	Test			0.2				
		Replace			0.5				
05	TRANSIT CASE	Inspect		0.2					
		Service		0.2					
		Replace							
		Repair		0.5					

Section III. SPECIAL TOOLS AND TEST EQUIPMENT REQUIREMENTS

Reference Code	Maintenance Category	Nomenclature	National/ NATO Stock Number	Tool Number
1	F	AC Voltmeter		
2	F	Anti-backlash Setting Tool		
3	F	DC Current Meter Dynamics Co.		503
4	F	Extender Cables (2) Printed Circuit Board		
5	O	Horizontal Circle Adjusting Tool		
6	F	Interconnect Breakout Box		T5-352U
7	O	Multimeter		T5-325U
8	F	Oscilloscope, Tektronics		502
9	F	Torque Wrench, 60 in. lb.		
10	F	Upper Band Clamp Adjusting Tool		

APPENDIX C

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists expendable supplies and materials you will need to maintain the surveying instrument. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-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, App-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 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 a two character alphabetical abbreviation (e.g., ea. in,. pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O		Dry Cleaning Solvent, P-D-680	
2	O		Locking Sealant, MIL-S-46163 Grade N, Type II	
3	O		Methelethelkeyton (MEK) Fed. Spec. TT-M-261	
4	O		Molydisulfide Lubricant MIL-G-21164	
5	O		Primer, MIL-S-22473 Grade N, Form R	
6	O		RTV Sealant, MIL-SPEC. MIL-A-46106 RTV103BLA	
7	O		Silicone Grease, MIL-S-8660	
8	O	6810-00-664-0387	Trichlorethane Fed. Spec. 0-T-620	

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JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEAVENWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-6675-250-20	22 Apr 87	SURVEY INSTRUMENT: AZIMUTH

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.
B1		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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TM 5-6675-250-20	22 Apr 87	SURVEY INSTRUMENT: AZIMUTH

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

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

PRINTED NAME. GRADE OR TITLE. AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 2, 1 Nov 80.

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

REVERSE OF DA FORM 2028-2 Reverse of DRSTS-M Overprint 2, 1 Nov 80

TEAR ALONG PERFORATED LINE

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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 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .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