DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL AND DIRECT SUPPORT
MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
FOR

GUN LAYING AND POSITIONING SYSTEM (GLPS):
M67 (NSN 6675-01-430-1965) (EIC: CJ2)

PROVIDED UNDER CONTRACT NUMBER:
DAAE20-98-D-0003

Manufactured By:

Leica Technologies, Inc.
107 N. King Street
Leesburg, VA 20176
CAGE Code: 7Z946

31 OCTOBER 2000

SAFETY PRECAUTIONS

WARNING

DO NOT LOOK THROUGH THE TELESCOPE DIRECTLY AT THE SUN. SERIOUS EYE DAMAGE CAN RESULT.

WARNING

THE RANGEFINDER MRF2000-2 IS EYESAFE WHEN OPERATED ACCORDING TO THE OPERATOR MANUAL. ESTABLISHED EYESAFE LASER EXPOSURE LEVELS MAY BE EXCEEDED THROUGH UNAUTHORIZED HANDLING, E.G. OPENING THE COVER OR USING OTHER POWER SUPPLY MEANS THAN THOSE DESCRIBED IN THIS OPERATOR MANUAL. UNDER THESE CIRCUMSTANCES, EYE INJURY TO OPERATOR AND BYSTANDERS CAUSED BY RADIANT EXPOSURE IS POSSIBLE, INCLUDING DAMAGE TO THE CORNEA AND/OR RETINA.

WARNING

USE METHYL ETHYL KETONE IN A WELL VENTILATED AREA. ABSORPTION THROUGH THE SKIN OR INHALATION IN CONCENTRATION IS HARMFUL AND INGESTION MAY BE FATAL.

WARNING

TAKE CARE WHEN FOLDING THE TRIPOD LEGS TO PREVENT PINCHING HANDS OR FINGERS

CAUTION

DO NOT ATTACH THE POWER ADAPTER TO THE BATTERY CHARGER. THE POWER ADAPTER COULD BE DAMAGED.

CAUTION

BEFORE MOUNTING THE GYROSCOPE AND THEODOLITE, ENSURE THE TRIPOD LEGS ARE SEATED FIRMLY IN THE GROUND. THIS IS CRITICAL FOR PROPER ORIENTATION. THE GYROSCOPE REQUIRES A STABLE PLATFORM TO ACHIEVE AN ACCURATE DIRECTION.

CAUTION

ENSURE THE GYROSCOPE CLAMPING SCREW IS IN THE OPEN POSITION BEFORE INSERTING GYROSCOPE.

CAUTION

TO PREVENT DAMAGE, DO NOT LIFT THEODOLITE BY KNOBS OR EYEPIECE

CAUTION

DO NOT TURN ON THE TARGET ROD AND WALK AWAY. THE TARGET ROD IS CONNECTED DIRECTLY TO THE BATTERY AND WILL DISCHARGE THE SEB42-1 DOWN TO AN IRREVERSIBLE LEVEL. THE BATTERY IS THEN DESTROYED.

SAFETY PRECAUTIONS

CAUTION

MANUAL LEVELING IS NOT SUFFICIENT FOR OPERATION OF GYROSCOPE. PRECISION LEVELING IS REQUIRED TO ACHIEVE TIMELY DIRECTIONAL ORIENTATION.

CAUTION

DO NOT DISTURB THE SYSTEM WHILE THE GYROSCOPE IS MEASURING. VIBRATION IN THE IMMEDIATE VICINITY OF THE GYROSCOPE WILL UNNECESSARILY INCREASE SPIN-UP TIME.

CAUTION

DO NOT REMOVE THE BATTERY OR POWER ADAPTER BEFORE TURNING THE GLPS OFF. DATA WILL BE LOST IF THE BATTERY IS REMOVED WHILE THE GLPS IS STILL TURNED ON.

CAUTION

VERTICAL AND HORIZONTAL CONTROL KNOBS MUST BE LOOSE WHEN THE THEODOLITE IS PACKED. IF LOCKED, EXCESSIVE PRESSURE COULD BE APPLIED AND THE CONTROL KNOBS COULD BE STRIPPED. DO NOT LIFT THEODOLITE BY KNOBS OR EYEPIECE.

CAUTION

DO NOT IMMERSE ELECTRICAL/ELECTRONIC COMPONENTS IN WATER. IMMERSION WILL CAUSE DAMAGE TO ELECTRICAL/ELECTRONIC COMPONENTS.

CAUTION

DO NOT USE CHEMICALS FOR CLEANING, EXCEPT WHERE SPECIFIED BY TECHNICAL PUBLICATION. SOLVENTS CAN DETERIORATE PAINT, COATINGS OR LENS CEMENT.

CAUTION

TO PREVENT ETCHING OF GLASS SURFACES, DO NOT USE DIRTY OR ROUGH-TEXTURED RAGS TO CLEAN. DO NOT TOUCH OPTICS WITH FINGERS.

CAUTION

DO NOT ATTEMPT ANY REPAIRS OR ADJUSTMENTS BEYOND THOSE DESCRIBED IN THIS MANUAL. TURN THE EQUIPMENT IN TO THE APPROPRIATE MAINTENANCE ORGANIZATION.

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1-1 SCOPE

Figure 1-1 Gun Laying and Positioning System (GLPS)

a. Type of Manual: Operation and Maintenance Manual

b. Model Number and Equipment Name: M67 Gun Laying and Positioning System

c. Purpose of Equipment: To provide accurate directional control and position data to howitzers.

1-2 LIST OF ABBREVIATIONS/ACRONYMS

The following abbreviations apply throughout the manual unless otherwise stated within the text.

A	ampere
AC	alternating current
Ah	ampere-hour
ASIOE	associated support items of equipment
Az	azimuth
AzOfFir	azimuth of fire
Batt	battery
BITE	built-in test equipment
C	Celsius
cm	centimeter
Coord	coordinates
DC	direct current
Deflct	deflection
E	easting
F	Fahrenheit
Fig.	figure
g	gram
GLPS	gun laying and positioning system
GPS	global positioning system
H	height
h	hour
Hz	Hertz (cycles per second)
in	inch
kg	kilogram
lb	pound
LCD	liquid crystal display
LED	light emitting diode
mA	milliampere
max	maximum
min	minimum
mm	millimeter
ms	millisecond
MTBF	mean-time between failure
MTTR	mean-time to repair
N	northing
NiCd	nickel-cadmium
No	number
OS	orienting station
Pantel	panoramic telescope
PE	probable error
PLGR	precision light-weight Global Positioning System receiver
RefPnt	reference point
RetIllu	reticle illumination
RFRD DEFLCT	referred deflection
S	south
SCP	survey control point
SystNo	system number
V	volt
VertAng	vertical angle
WayPnt	way point
°	degree
%	percent
σ	sigma (standard deviation)

Section II. EQUIPMENT DESCRIPTION

1-3 INSPECTION UPON RECEIPT OF EQUIPMENT

1-3.a Initiation of batteries.

1-3.a.1 New Batteries.

New batteries are not charged when delivered from factory. Prior to use the first time, they must be charged with the SLG6-1 BATTERY CHARGER. Due to physical reasons, a battery will not reach its full capacity with the first charging cycle. This means that the user can probably not run 20 missions with this initially charged battery.

1-3.a.2 Stored Batteries.

When a batter is stored for an extended period, it will be completely discharged. This is normal for NiCd batteries. Such a battery will have the same behavior as a new battery. That means it will not reach its full capacity with the first recharging cycle.

1-3.a.3 Charging/Discharging.

Use the SLG6-1 battery charger to charge the SEB42-1 (see Para 2-7.1.a of the manual). As with every NiCd battery, the SEB42-1 should be used until completely discharged and then recharged to its full capacity. This procedure will reduce the memory effect of the NiCd cells to its minimum and therefore extend the life cycle of a battery.

1-3.a.4 Charging.

If a new battery is charged for the first time, leave it on the SLG6-1 battery charger for approximately 12 hours after the green light has turned on to charge it completely. Charge the batteries at room temperatures if possible. Hot or cold temperatures will not allow batteries to completely charge. The voltage of a fully charged battery can rise up to more than 26 Volts, depending on the temperature. When using the battery, the voltage will drop down to a medium level quite fast and will remain there for a longer time before dropping down faster again at the end of its capacity.

CAUTION

DO NOT TURN ON THE TARGET ROD AND WALK AWAY. THE TARGET ROD IS CONNECTED DIRECTLY TO THE BATTERY AND WILL DISCHARGE THE SEB42-1 DOWN TO AN IRREVERSIBLE LEVEL. THE BATTERY IS THEN DESTROYED.

1-3.a.5 Discharging.

Discharge the battery down to 22 Volts before recharging. Use the GLPS system in normal operation until the display says “Battery empty”. If you want to force a battery to discharge with the GLPS, turn on the keyboard and display illumination and perform several positioning procedures while running the gyro until the T502S display shows “Battery empty” If the battery can not be discharged to its empty level due to tactical reasons for several cycles, perform conditioning procedure as described below after about 20 to 30 recharging cycles. This will decrease the memory effect of the NiCd cells and therefor increase the battery life cycle.

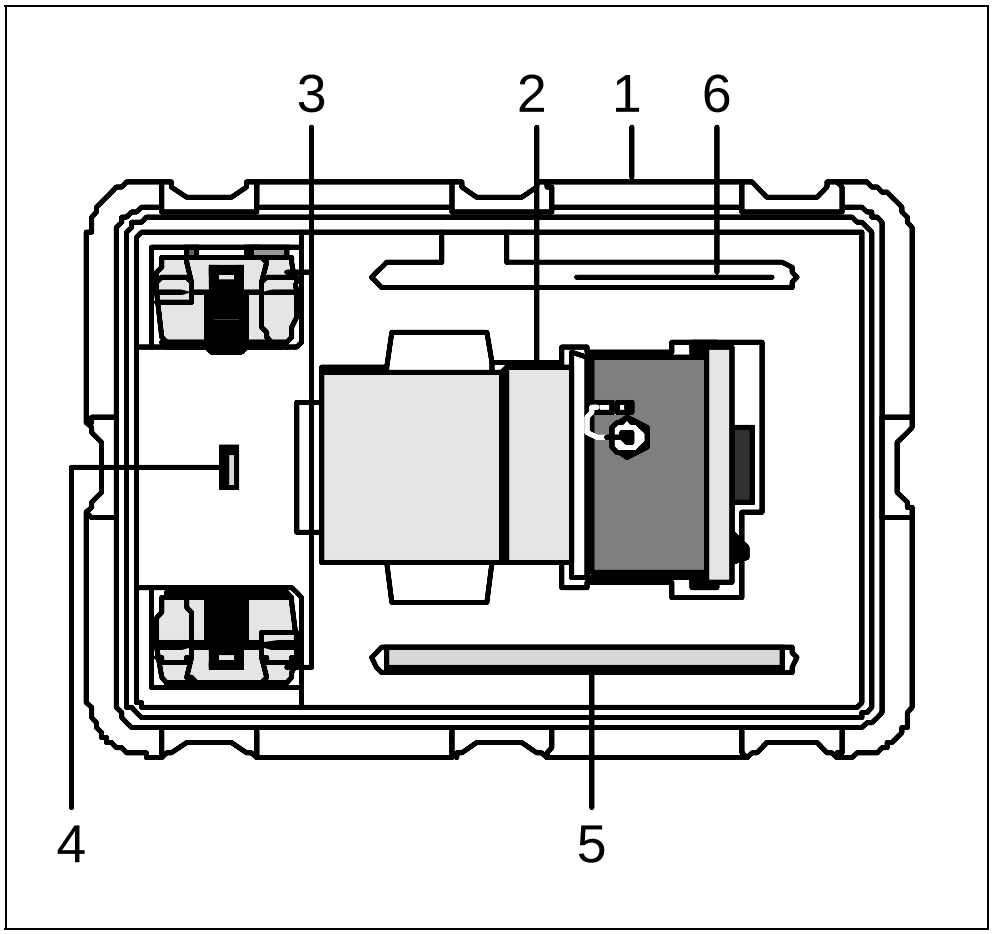
1-3.a.6 Conditioning.

New batteries (or batteries which have been stored for a long period) have to be conditioned to get their full capacity. Perform such a conditioning procedure at room temperature if possible. Charge the battery on the SLG6-1 until the green light turns on. Leave it for an additional 6 to 12 hours to charge it completely. Use the battery in normal use until the GLPS system says “Battery empty”. Be aware that probably less then 20 missions can be performed. Recharge the empty battery again as described above. After about 4 to 5 such charging/discharging cycles, the battery will reach its full capacity.

1-3.b.Inspection of Equipment.

Inspect upon receipt to ensure the items shown in Figure 1-2 are present.

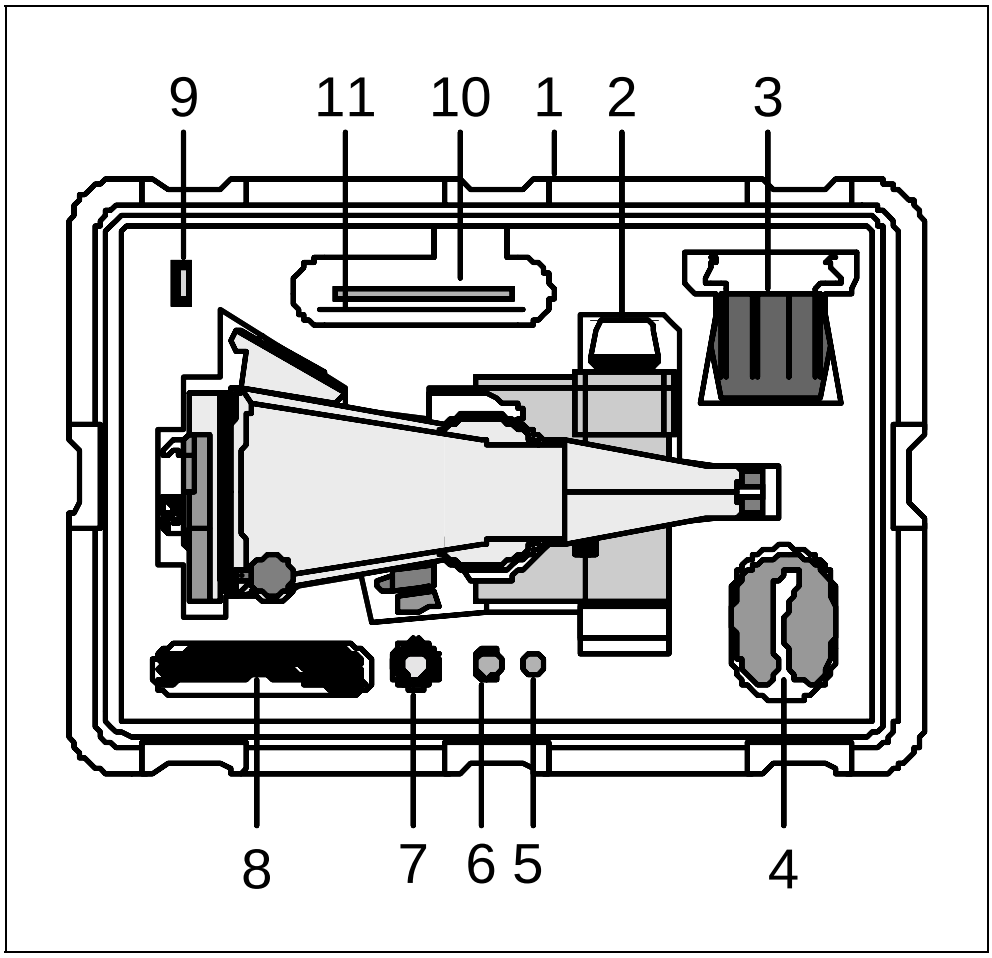
SVP262-1 — Container 1 of 4
Gyro Compass, SKK3-08



Item	Nomenclature	Part No.
1	SVP262-1 Container	667 075
2	SKK3-08 Gyro Compass	636 892
3	SEB42-1 Batteries (2 pcs)	522 894
4	Set of Spare Fuses, 2A, Slow Blow (10 pcs)	703 053
5	Operator Manual	665 260
6	Packing List	711 819

Figure 1-2a. GLPS System Components — Gyroscope

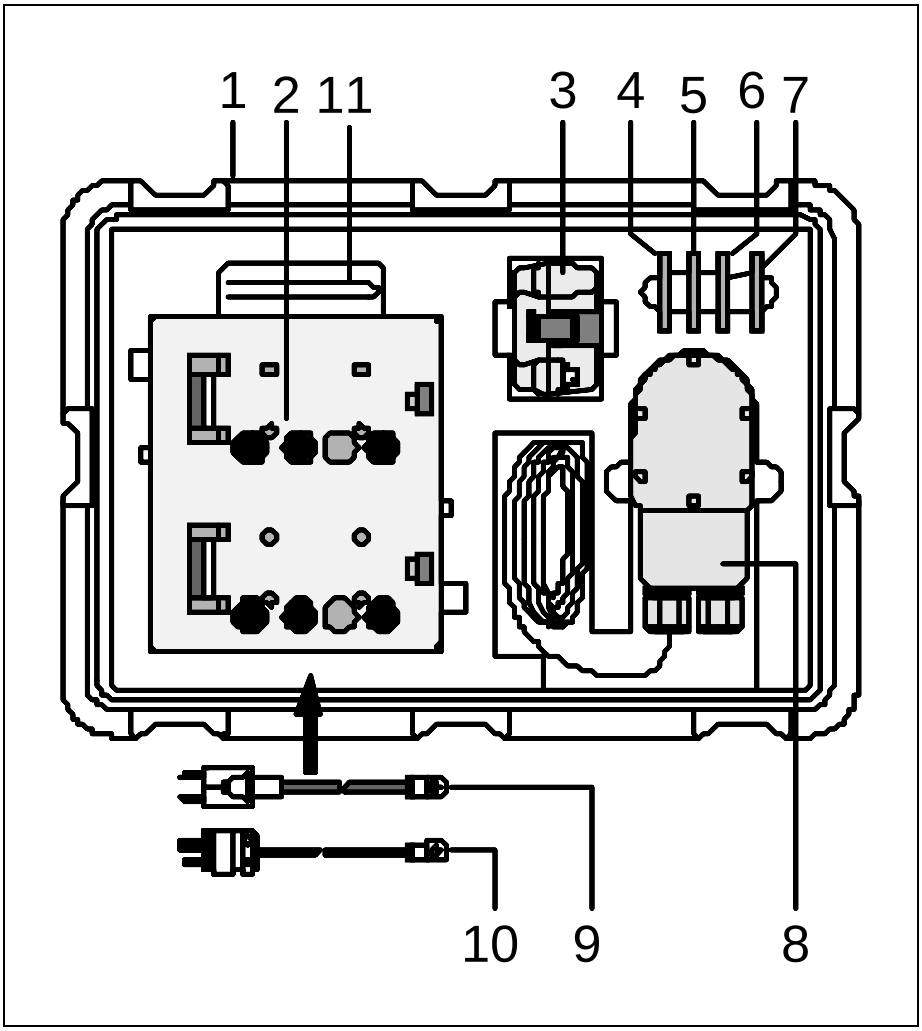
SVP263-1 — Container 2 of 4
Theodolite, T502S



Item	Nomenclature	Part No.
1	SVP263-1 Container	667 074
2	T502S Theodolite	667 047
3	SHT9 PLGR Mounting Bracket	636 919
4	SVP244 Rain and Dust Cover	636 918
5	Set of Spare Bulbs, 28V (3 pcs)	703 051
6	Lens Brush, with Case	701 042
7	SZ19 Target Rod	667 046
8	SV44 Interface Cable	636 920
9	Set of Spare Fuses, 0.1A, Slow Blow (10 pcs)	703 052
10	Set of Tissues for Cleaning	703 545
11	Packing List	711 818

Figure 1-2b. GLPS System Components — Theodolite

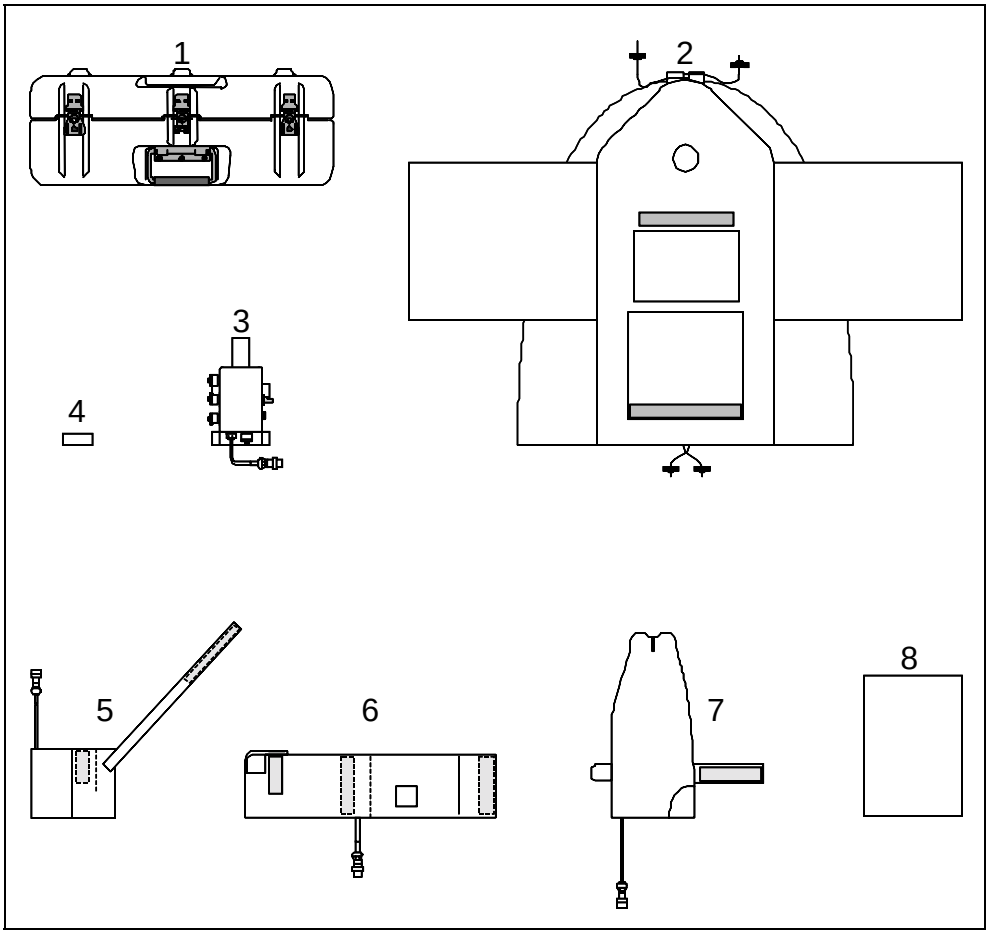
SVP203-3 — Container 3 of 4
Battery Charger, SLG6-1



Item	Nomenclature	Part No.
1	SVP203-3 Container	667 076
2	SLG6-1 Battery Charger	439 150
3	SEV22-1 Power Adapter	431 632
4	Set of Spare Fuses, 2A, Slow Blow (10 pcs)	703 053
5	Set of Spare Fuses, 1.6A, Slow Blow (10 pcs)	703 054
6	Set of Spare Fuses, 4A, Slow Blow (10 pcs)	703 055
7	Set of Spare Fuses, 10A, Slow Blow (10 pcs)	703 056
8	SEV23-2 Power Cable (10m) with NATO plug (dc)	667 099
9	SEV34-7 Power Cable (3m) with EU plug (ac)	711 212
10	SEV34-8 Power Cable (3m) with US plug (ac)	711 213
11	Packing List	711 820

Figure 1-2c. GLPS System Components — Charger

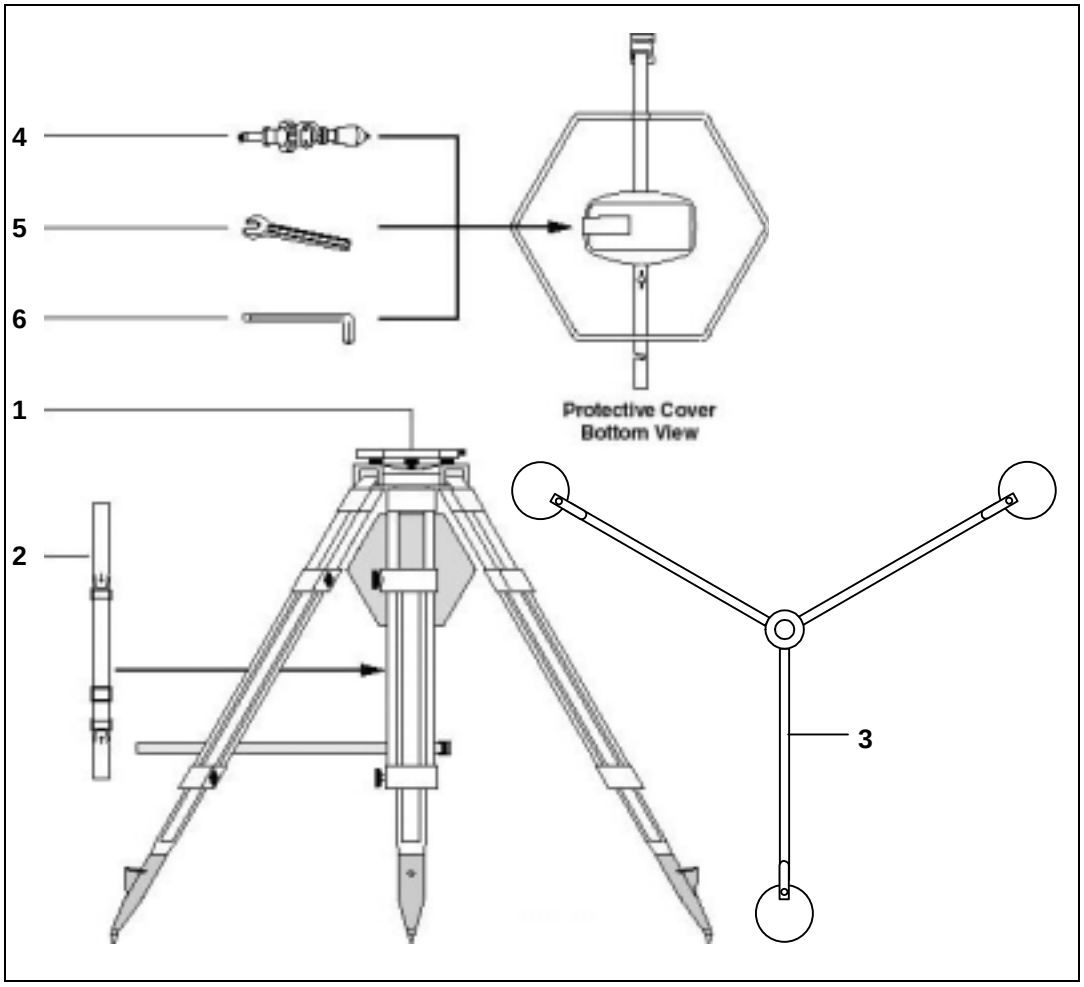
SVP250-1 — Container 4 of 4
Winterization Kit, SVP250



Item	Nomenclature	Part No.
1	SVP250-1 Container	667 077
2	Insulation Cover for GLPS	708 750
3	Distribution Box	708 581
4	Set of Spare Fuses, 10A, Slow Blow (10 pcs)	703 056
5	Heating Cap for SKK3-08	708 747
6	Heating Band for SKK3-08	708 748
7	Heating Cover for T502S	708 749
8	Packing List	711 821

Figure 1-2d. GLPS System Components — Winterization Kit

— Loose Items
Tripod, SST90-1



Item	Nomenclature	Part No.
1	SST90-1 Gyroscope Tripod	667 229
2	GDZ4 Tripod Carrying Strap	315 010
3	GST4 Tripod Base	332 200
4	Plumb Bob Assembly	358 866
5	Open-End Wrench, 13mm	710 001
6	Allen Key	166 494

Figure 1-2e. GLPS System Components — Tripod

1-4 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

Purpose of the GLPS: Provide accurate directional control and position data to howitzers.

Component capabilities and features (Figure 1-3.)

a. MRF2000-2 Eyesafe Laser Rangefinder (1). The eyesafe laser rangefinder measures distance to forward stations while providing optics for the system.

(1) Class I Eyesafe Laser Rangefinder.
(2) Optical interface for GLPS operator.
(3) Controlled through the theodolite keypad.
(4) Fully integrated with theodolite.

b. T502S Theodolite (2). The theodolite is a digital electronic angle measuring device used to measure horizontal and vertical angles. The theodolite includes a liquid crystal display for operator interface and houses the CPU. Data is input using the seven-key keypad.

(1) Digital electronic angle measuring instrument used to measure angles.
(2) Provides operator interface with digital LCD Display.
(3) Houses the systems central processing unit (CPU).
(4) Fully integrated with MRF2000-2 Laser Rangefinder.
(5) Interfaces with SKK3-08 Gyroscope.

c. SKK3-08 Gyroscope (3). The gyroscope measures the direction to grid north and provides this information to the CPU. The gyroscope provides data interface with the PLGR.

(1) Provides accurate measurement to grid north.
(2) Provides interface with AN/PSN-11 Precision Lightweight GPS Receiver (PLGR).

d. SST 90-1 Tripod (4). The tripod is the operational platform for the system, providing a stable base for GLPS operation.

e. Target Rod (5). The target rod provides an aim point for instrument operators to sight on when aligning sight systems on the GLPS. The target rod is equipped with a light for night operations.

f. The AN/PSN-11 PLGR (6). The PLGR is a separate item mounted with and connected to GLPS that provides GPS data to the system.

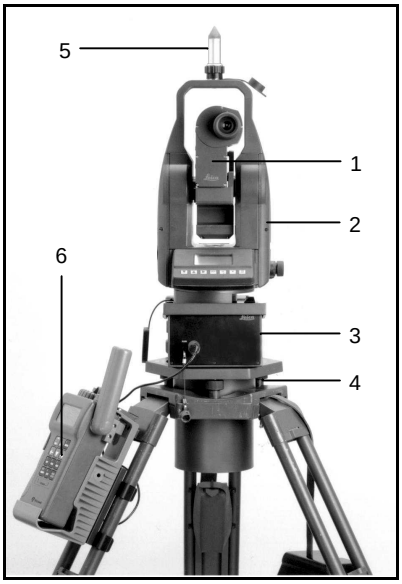


Figure 1-3. GLPS Components

1-5 EQUIPMENT DATA

a. MRF2000-2 Monocular Rangefinder

Telescope	coaxial, erect image
Magnification (standard)	10x
Field of view at 1000 ft / m	80 ft / 80 m
Objective aperture	50 mm
Focusing	fixed
Shortest focused distance	30 m
Laser	
Type	860 nm laser diode
Minimum range	30 m
Maximum range	2500 m

b. T502S Electronic Theodolite

Display	Liquid Crystal
Keyboard	Seven key push button
Software	Menu-guided operation
Data Interface:	
Serial input/output	RS232C
Power Supply Requirements and Source:	
Input voltage, DC	22 V to 28 V (24 V nominal)
Rechargeable NiCd battery	SEB42-1 battery
Vehicle power supply	Input via SEV22-1 power adapter
Operating temperature	–28°F to +131°F / –32°C to +55°C
With winterization kit	–28°F to –51°F / –32°C to –46°C
Storage temperature	–51°F to +160°F / –46°C to +71°C
Wind (on tripod)	25 mph / 40 km/h
Angle measurement	continuous (absolute encoder)
Circle graduation	6400 mils
Unit of display	To the nearest 0.1 mil
Leveling	
Automatic index	pendulum compensator
Resolution	5 sec (±0.025 mil)
Physical Data with Laser Rangefinder	
Dimensions	8.5 x 8.5 x 16.2 in / 217 x 215 x 411 mm
Weight	16.2 lb / 7.33 kg

c. SKK3-08 GYROSCOPE

Azimuth Determination	
Pre-alignment and warm-up	not required
Azimuth reference	grid north
Measurement time	approximately 210 s
Accuracy of orientation	±0.2 mil PE for latitudes 0° to 70° N or S ±0.3 mil PE for latitudes above 70° to 75° N or S
Operation	
BITE (built-in test equipment)	diagnostics for service engineers
Physical Data	
Dimensions	6.9 x 8.5 x 11.5 in / 176 x 216 x 293 mm
Weight	15.5 lb / 7.05 kg

d. SEB42-1 BATTERY

Type	nickel-cadmium (NiCd)
Voltage output	24 VDC
Capacity	1.2 Ah (20 missions at 20°C / 68°F)
Fuse	2 A slow blow
Operating temperature	+14°F to +122°F / –10°C to +50°C
Storage temperature	–22°F to +140°F / –30°C to +60°C
Recharging temperature range	+14°F to +122°F / –10°C to +50°C
Battery Charger	SLG6 Battery Charger
Dimensions	6.5 x 4.1 x 2.7 in / 167 x104 x 70 mm
Weight	3.4 lb / 1.54 kg

e. SLG6 BATTERY CHARGER

Alternating Current (AC)	115 V or 230 V, +10% / –20% 50 Hz to 60 Hz
AC fuse	1.6 A slow blow
Direct Current (DC)	10 V to 33 V
DC fuse	4 A slow blow
Charging Current	0.4 A maximum, at 24 VDC
Time to recharge a fully discharged battery:	
+41°F to +122°F / +5°C to +50°C	7 h
+14°F to +40°F / –10°C to +5°C	14 h
Dimensions	9.7 x 8.3 x 3.1 in / 247 x 210 x 80 mm
Weight	8.8 lb / 4.0 kg

f. SEV22-1 POWER ADAPTER

Input voltage	10 VDC to 33 VDC
Fuse	10 A slow blow
Output voltage	24 VDC
Output current	0.4 A continuous, peaks up to 2 A
Dimensions	6.5 x 4.1 x 2.7 in / 167 x 104 x 70 mm
Weight	2.6 lb / 1.2 kg

g. SVP262-1 CONTAINER FOR GYROSCOPE

Dimensions	22.8 x 16.1 x 14.1 in / 580 x 410 x 360 mm
Weight, empty	18.7 lb / 8.5 kg
Weight, complete	43.6 lb / 19.8 kg

h. SVP203-2 CONTAINER FOR BATTERY CHARGER

Dimensions	22.8 x 16.1 x 8.7 in / 580 x 410 x 220 mm
Weight, empty	15.7 lb / 7.1 kg
Weight, complete	24.1 lb / 11.1 kg

i. SVP263-1 CONTAINER FOR THEODOLITE

Dimensions	22.8 x 16.1 x 14.1 in / 580 x 410 x 360 mm
Weight, empty	18.7 lb / 8.5 kg
Weight, complete	37.0 lb / 16.8 kg

j. SVP250-1 CONTAINER FOR WINTERIZATION KIT

Dimensions	22.8 x 16.1 x 8.7 in / 580 x 410 x 220 mm
Weight, empty	15.7 lb / 7.1 kg
Weight, complete	16.9 lb / 7.7 kg

k. SZI9 TARGET ROD

Max. diameter x height	1.34 x 4.61 in / 34 x 117 mm
Weight	0.2 lb / 95 g

l. SVP250 WINTERIZATION KIT

Ambient temperature range	–28°F to –51°F / –32°C to –46°C
Weight (incl. container)	16.9 lb / 7.7 kg

m. SHT9 PLGR MOUNTING BRACKET

Dimensions	9.1 x 5.5 x 4.3 in / 230 x 140 x 110 mm
Weight	0.9 lb / 0.4 kg

n. GST90-1 GYRO TRIPOD

Diameter	13.4 in / 34 cm
Length	38.6 in / 98 cm
Weight	21.9 lb / 9.9 kg

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-6 EQUIPMENT DESCRIPTION

a. SKK3-08 Gyroscope. The SKK3-08 gyroscope finds the direction of grid north and displays the azimuth of the three-point bearing which supports, centers and aligns the base of the T502S electronic theodolite internally. The gyroscope makes two coarse measurements, and one (or two) fine measurement(s) near north to determine the azimuth unambiguously and accurately. Since the gyroscope does not require any manual (external) pre-alignment, its initial orientation is an arbitrary value.

The gyroscope is a single box unit, designed to fit into the gyro tripod.

(1) Power supply mounting hinge.
(2) Power supply locking bracket.
(3) Theodolite interface port provides data and voltage interface with the theodolite.
(4) Theodolite interface port protective cover.
(5) Carrying handle stop.
(6) Gyroscope carrying handle.
(7) PLGR data port with protective cover.
(8) Theodolite locking lever.

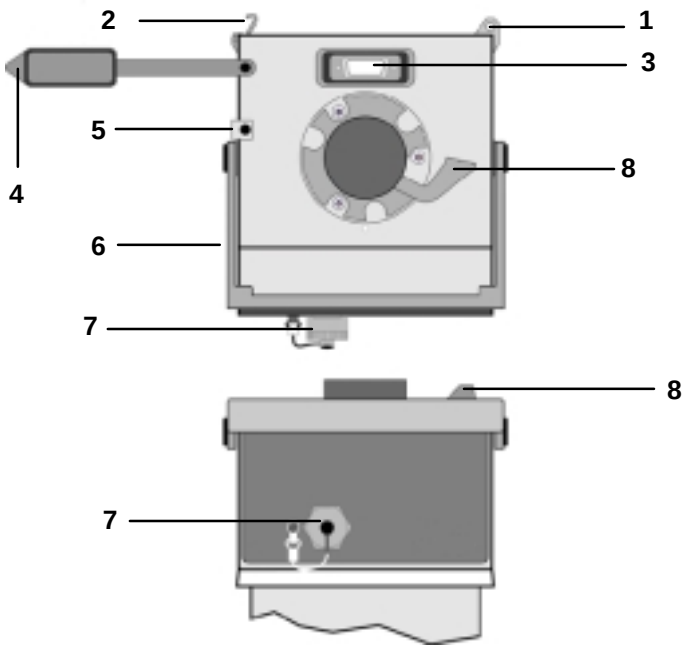


Figure 1-4 SKK3-08 Gyroscope

b. T502S Theodolite with MRF 2000 Rangefinder . The T502S theodolite is designed for use with the SKK3-08 gyroscope. The MRF2000-2 monocular rangefinder is an integral part of the theodolite. A clear menu-guided operational process and direct function keys are provided for ease of operation.

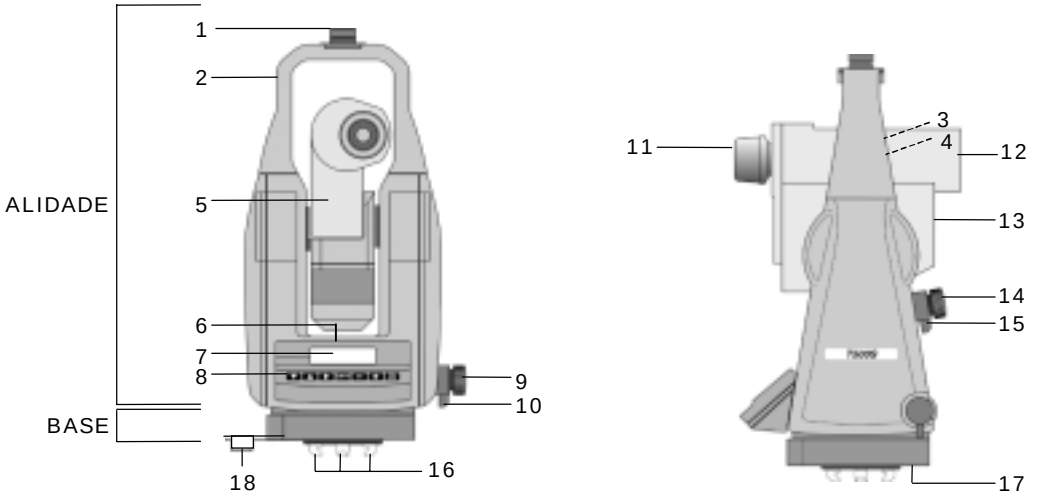


Figure 1-5 T502S Theodolite with MRF 2000 Rangefinder

1. Alidade. The alidade is the upper part of the theodolite which rotates on the standing axis. The alidade comprises:

- Target rod connector (1).
- Theodolite carrying handle (2).
- Target rod fuse (3).
- Target rod illumination rheostat (4)
- MRF 2000-2 Laser Rangefinder (5).
- Circular leveling vial (6).
- Data Display (7)
- Operator keyboard (8).
- Horizontal motion fine adjustment knob (9).
- Horizontal motion locking lever (10).
- Telescope eyepiece (11).
- Telescope objective (12).
- Laser exit window (13).
- Vertical motion fine adjustment knob (14).
- Vertical motion locking lever (15).

When not clamped, the alidade rotates freely around the horizontal axis while the MRF 2000-2 laser rangefinder tilts freely along the vertical axis. Movement along both axes provides horizontal and vertical measurement for the instrument. An embedded tilt sensor acts as electronic level and compensates for any residual leveling error.

2. Base. The base is the lower part of the theodolite and is mounted on the gyroscope. The base is comprised of:

- Flange with forced centering studs (16) provides horizontal motion and a means of securing the theodolite to the gyroscope.
- Gyroscope interface port (17) for electrical and data connection to the gyroscope with protective cover (18).

Three bearings align the theodolite and the three-point bearing of the gyroscope while three studs lock it in position. The theodolite power is supplied via the gyroscope through the interface port in the base. The direction data from the gyroscope and electrical power are delivered to the theodolite through the interface port.

WARNING

THE LASER RANGEFINDER IS EYESAFE WHEN OPERATED ACCORDING TO THE OPERATOR MANUAL. ESTABLISHED EYESAFE LASER EXPOSURE LEVELS MAY BE EXCEEDED THROUGH UNAUTHORIZED HANDLING SUCH AS OPENING THE COVER OR USING A POWER SUPPLY OTHER THAN THOSE ISSUED WITH THE SYSTEM. UNDER THESE CIRCUMSTANCES, EYE INJURY TO OPERATOR AND BYSTANDERS CAUSED BY RADIANT EXPOSURE IS POSSIBLE. CORNEA/RETINA DAMAGE COULD OCCUR.

3. **MRF2000-2 Monocular Rangefinder.** The MRF2000-2 monocular rangefinder is shown in figure 1-5. The rangefinder (5) is an eyesafe laser rangefinder equipped with a ten power telescope. It is mounted centrally on the theodolite. The vertical motion fine adjustment knob, vertical motion locking lever, horizontal motion fine adjustment knob and horizontal motion locking lever are used for aiming and pointing the telescope. It consists of:

   - Eyepiece (11).
   - Objective for the laser receiver and sighting (12).
   - Laser exit window (13).

   A vertical angle inclinometer located on the right side of the theodolite when facing the eyepiece is mounted to the tilting axle of the rangefinder. The vertical axis rotates with the rangefinder and is measured along this tilting axis.

   The rotation angle is ±30° (approx. ±500 mil).

   A fixed focus telescope is used.

   The shortest measuring distance for the laser rangefinder is 30 m. The eyepiece can be rotated to focus the cross-hairs of the reticle to the user's eyesight.

   The laser rangefinder is controlled with the theodolite keypad. When activated by pressing the ENTER key on the keypad, a laser beam is emitted through the laser exit window. The beam is reflected off the target and received through the sighting objective of the telescope.

c. SEB42-1 Battery. The SEB42-1 battery (Figure 1-6) is a 24V battery that contains 20 rechargeable NiCd-cells. The battery clamps to the rear of the gyroscope with a hinge (1) and a latch (2). The latch is equipped with a safety catch (3) which must be pressed to release the latch. The battery is protected against discharging or short circuiting by a fuse (4).

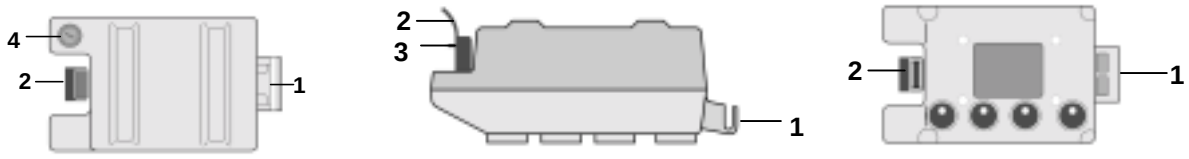


Figure 1-6. SEB42-1 Battery

For recharging, the battery is attached to the SLG6 battery charger. At temperatures between +41°F to +122°F / +5°C to +50°C it takes less than 7 hours to charge an empty battery. At temperatures below +5°C (+41°F) it may take up to 14 hours to fully recharge the battery.

NOTE

DISPOSE OF BATTERIES IN ACCORDANCE WITH ESTABLISHED MILITARY, FEDERAL, AND LOCAL PROCEDURES TO PRECLUDE DAMAGE TO THE ENVIRONMENT.

d. SLG6 Battery Charger. The SLG6 battery charger is used to recharge SEB42-1 batteries. The charger is equipped with two mounting hinge brackets (1) for the two batteries provided with GLPS. The charger automatically provides the appropriate current depending on cell voltage and temperature. The charger is activated by means of a toggle switch (2) with a centered off position and separate on positions for DC and AC operation. When switched on, a yellow power light (3) is illuminated. Red charge lights (4) and green ready lights (5) indicate the status of batteries mounted on either the left or right bracket. The SLG6 is powered from any military vehicle or DC power source of 10v to 33v through the DC socket (6), or any AC power source from 115v to 230v through the AC socket (7). The system is protected from power fluctuation by a 4 amp DC fuse (8) and a 1.6 amp AC fuse (9).

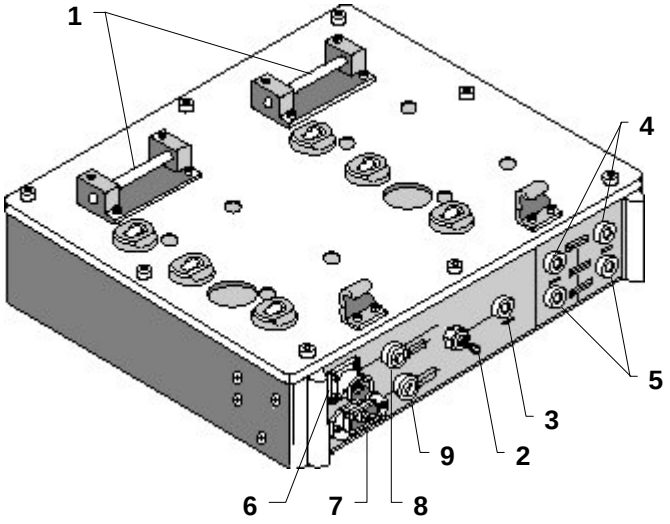


Figure 1-7. SLG6 Battery Charger

e. SEV22-1 Power Adapter. The SEV22-1 power adapter is used with an external 10 to 33 V DC power source (e.g., vehicle power supply). Power is supplied through a power cable (3). The housing of the adapter is identical to the SEB42-1 battery with the exception of the DC power connector (4). The power adapter is mounted using the hinge bracket (1) and latch (2) following the same procedure as for the SEB42-1 battery. A power indicator (5) will illuminate when power is supplied to the adapter. The adapter is protected against electrical damage by a fuse (6).

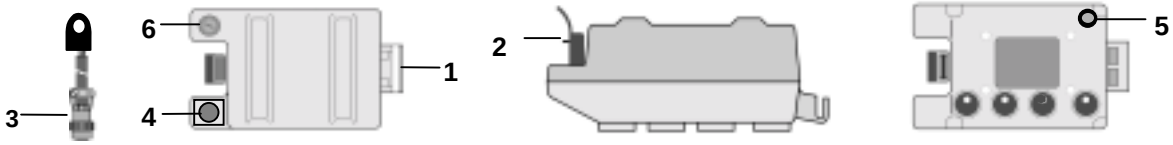


Figure 1-8. SEV22-1 Power Adapter

CAUTION

DO NOT ATTACH THE POWER ADAPTER TO THE BATTERY CHARGER. THE POWER ADAPTER COULD BE DAMAGED.

Containers. The GLPS is stored and transported in watertight containers (Figure 1-9) made of rugged, synthetic material. Plastic foam inserts protect the equipment during transport. Two sizes of containers are provided with the system. The battery charger and winterization kit containers (1) and the gyroscope and theodolite container (2) are constructed of the same materials and equipped with a pressure relief valve and carrying handles.

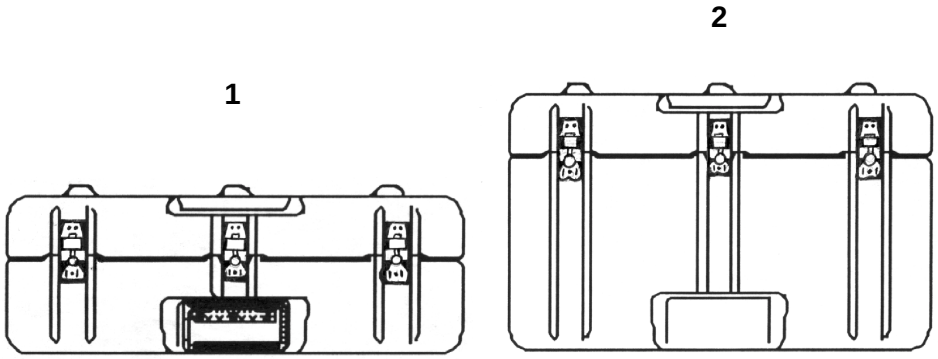


Figure 1-9. Containers

g. SZI9 Target Rod. The SZI9 target rod (Figure 1-10) serves as an aim point for instruments sighting on the GLPS. The target rod is pushed onto the connector on the theodolite carrying handle by means of a rubber attachment. Power is provided directly through the socket. The light is switched on by turning the target rod clockwise or counter clockwise until the electrical contacts between the target rod and connector make contact. A light bulb in the tip provides light controlled by a rheostat and protected by a fuse, both located on the carrying handle of the theodolite.

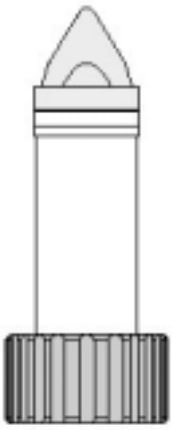


Figure 1-10. SZI9 Target Rod

h. GST90-1 Tripod. The GST90-1 gyroscope tripod provides a stable operating base for the system. The tripod is equipped with a tilting dish (2) and three leveling screws (4) for mounting and leveling the gyroscope. A circular leveling vial (1) is provided to level the tripod. The gyroscope clamping screw (3) secures the gyroscope in the tilting dish. A protective cover (5) for the tilting dish and an adjustable carrying strap (7) are provided for transport. The tripod has 3 telescoping legs equipped with two clamping screws (6,9) and a tripod boot (10) on each leg for seating the leg in the ground. A tripod leg strap (8) is used to secure the legs in the stowed position for transport. Accessories provided for the operation of the tripod are a plumb bob, used for centering the instrument over known points, and an open end and hex wrench, used to tighten the legs of the tripod. The accessories are located in a pouch inside the protective cover.

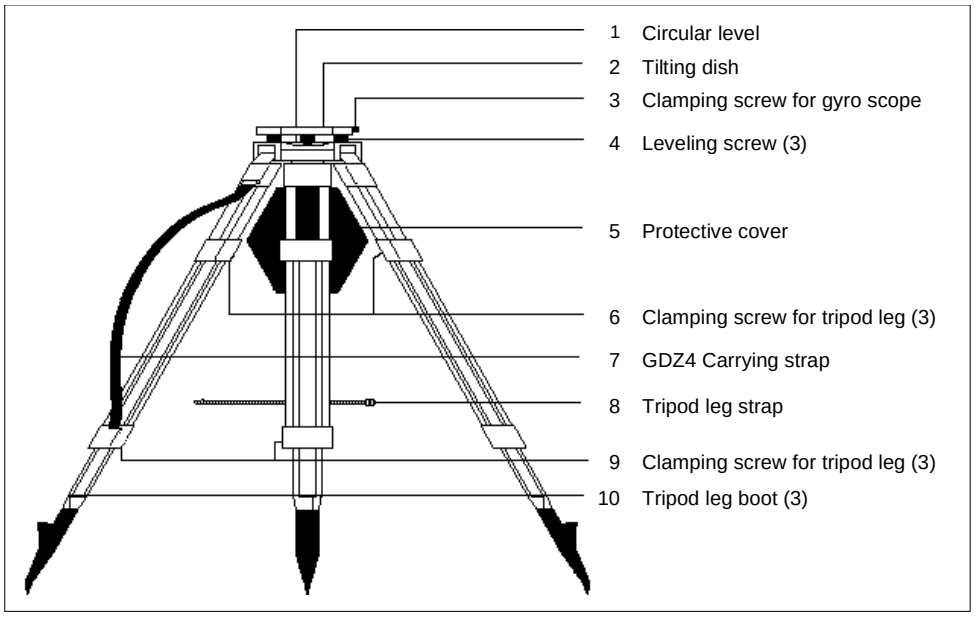


Figure 1-11. GST90-1 Gyro Tripod

i. SHT9 PLGR Mounting Bracket. The SHT9 PLGR Mounting Bracket is used to attach the PLGR to the GST90-1 tripod for ease of operation. The bracket is attached to the tripod by means of a hook (1) and clamps (2). The PLGR is secured to the bracket by means of a latch (3).

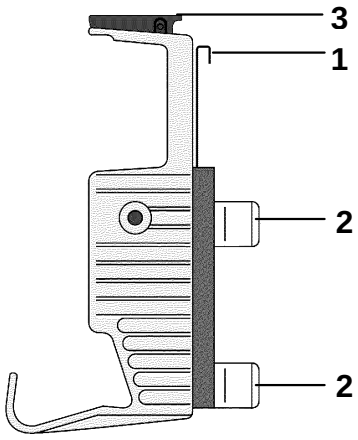


Figure 1-12. SHT9 PLGR Mounting Bracket

j. SVP244 Rain and Dust Cover. The SVP244 rain and dust cover is used to protect the instrument against the elements. Cover GLPS with the rain and dust cover anytime the system is set up but not in immediate use.

k. SVP250 Winterization Kit. The SVP250 winterization kit is for use at ambient temperatures from –28°F to -51°F / –32°C to -46°C.

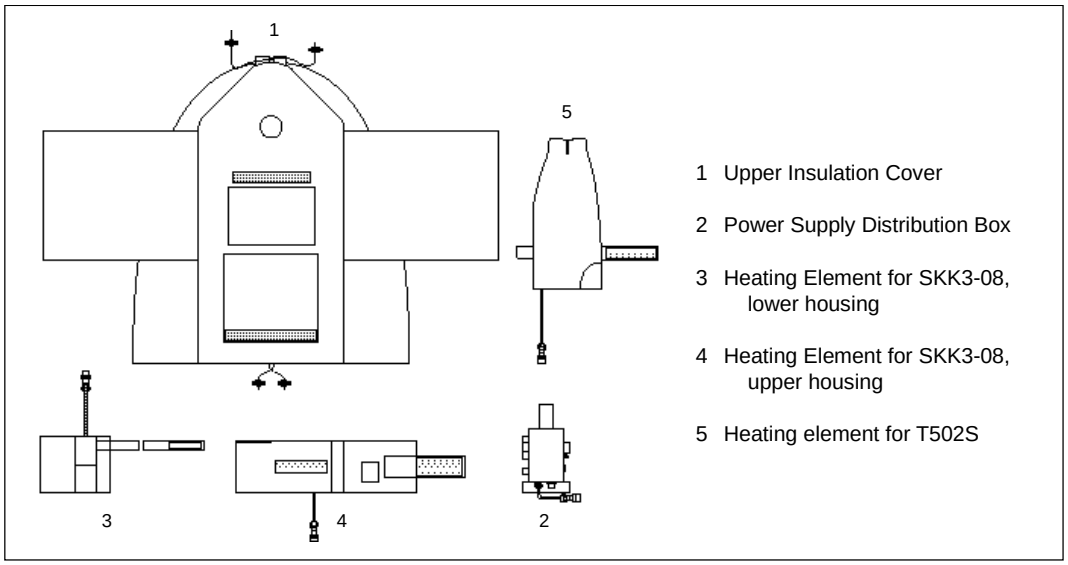


Figure 1-13. SVP250 Winterization Kit

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1 GENERAL.

Using accurate azimuth provided by the gyroscope, distance measurement provided by the laser rangefinder and position information provided by the Battalion survey or PLGR, the electronic theodolite calculates the easting, northing, altitude and deflection or azimuth to the forward station. The theodolite is a highly accurate angle measurement device that contains the GLPS software package and serves as the system's central processing unit (CPU).

GLPS is primarily used by soldiers that supervise cannon units in tactical environments, specifically those soldiers who supervise firing position occupation and are responsible for orienting a firing platoon or battery for direction. These include the Gunnery Sergeant (GSG), Platoon Sergeant, and the Platoon Leader.

2-2 SET UP AND MANUALLY LEVEL THE GLPS.

NOTE

PLGR SHOULD BE INITIALIZED AND OPERATING
PRIOR TO MOUNTING ON TRIPOD.

HIGHER FIGURE ORDER OF MERIT (LOWER FOM #)
WILL PROVIDE MOST ACCURATE POSITIONING.
FOM 1 WILL MEET THE POSITIONAL ACCURACY REQUIREMENTS OF GLPS.

a. Select Location. Select a location for placement of GLPS, to serve as the orienting station (OS). The OS will provide line of sight from GLPS to each of the howitzers.

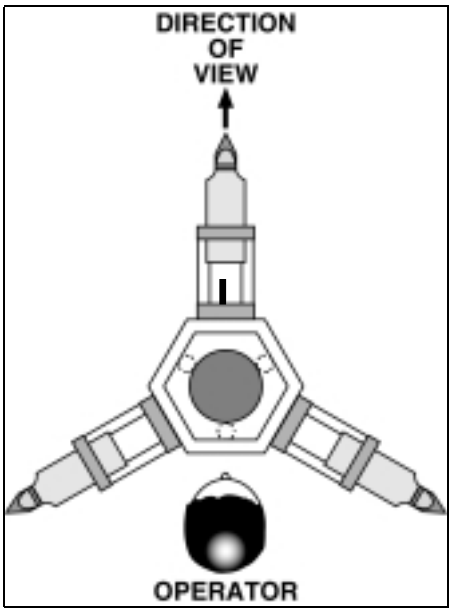


Figure 2-1. Positioning the Tripod

b. Set Up and Level the Tripod.

> **CAUTION**
>
> **BEFORE MOUNTING THE GYROSCOPE AND THEODOLITE, ENSURE THE TRIPOD LEGS ARE SEATED FIRMLY IN THE GROUND. THIS IS CRITICAL FOR PROPER ORIENTATION. THE GYROSCOPE REQUIRES A STABLE PLATFORM TO ACHIEVE AN ACCURATE DIRECTION.**

- Invert tripod, with protective cover facing the ground.
- Loosen tripod leg clamping screws.
- Extend tripod legs until tripod boots are chest height.
- Tighten tripod leg clamping screws.
- Place tripod in upright position, spreading legs until the tilting dish is about waist-level to the operator.

> **NOTE**
>
> ARRANGE TRIPOD LEGS TO ENSURE THAT THE TRIPOD LEG WITH PROTECTIVE COVER FOR THE TILTING DISH IS POINTING IN THE GENERAL DIRECTION OF THE HOWITZER(S). THIS WILL ENSURE OPTIMUM SPACE IS AVAILABLE FOR THE OPERATOR WHEN OPERATING THIS INSTRUMENT.

- Seat each tripod boot by firmly stepping on the boot and pushing downward.
- Uncover tripod tilting dish.
- Remove tripod cover assembly in windy conditions.
- Ensure that leveling screws are in the center position with grooves visible.
- Level the tripod base using the circular leveling vial by adjusting tripod leg height until the bubble is centered. At a minimum, half of the bubble should be within the circle upon completion.

c. Mount SKK3-08 North Seeking Gyroscope. The gyroscope requires approximately three and a half minutes to "spin-up" and download the reference azimuth directly to the electronic theodolite.

> **CAUTION**
>
> **ENSURE THE GYROSCOPE CLAMPING SCREW (5) IS IN THE OPEN POSITION BEFORE INSERTING GYROSCOPE.**

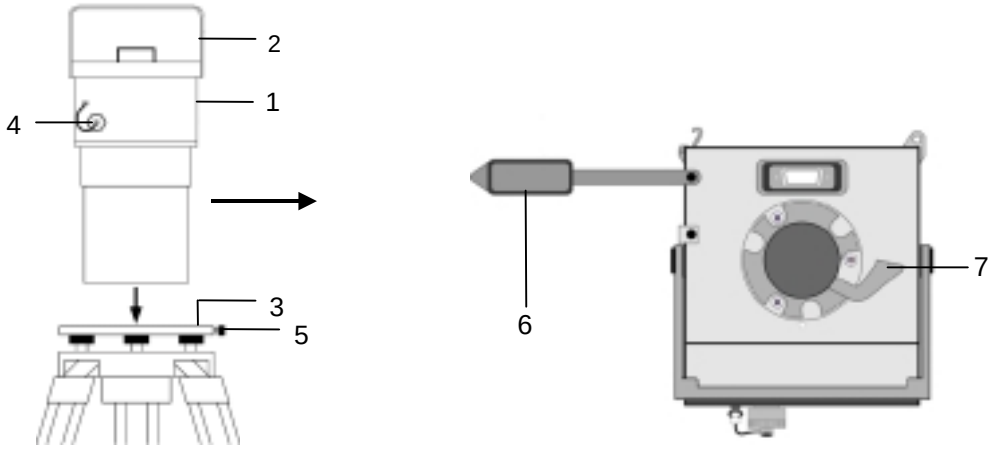


Figure 2-2. Mounting the Gyroscope

- Remove gyroscope (1) from container using the lifting handle (2).
- Insert the gyroscope (1) in the tripod tilting dish (3) with the RS232 PLGR data port (4) facing the operator.

- Move gyroscope back and forth, while in tripod tilting dish, to ensure it is sitting flush in the dish.
  - Fold lifting handle (2) toward the operator.
  - Secure the gyroscope with clamping screw (5) on the tilting dish.
  - Remove protective cover (6) from theodolite data port located on the gyroscope.
- Place theodolite locking lever (7) on the gyroscope in the forward (open) position to receive the theodolite.

d. Mount Digital Electronic Theodolite T502S with MRF 2000 Laser Rangefinder. The digital electronic theodolite is an angle-measuring instrument with an integrated laser rangefinder used to determine horizontal and vertical angular measurements in mils and range in meters to forward stations. The laser rangefinder measures distances from a minimum range of 30 meters to a maximum range of 2500 meters with an accuracy of ± 1 meter.

CAUTION

TO PREVENT DAMAGE, DO NOT LIFT THEODOLITE BY KNOBS OR EYEPIECE

ENSURE APPROXIMATELY ONE-HALF OF THE WHITE CENTERING RING ON BOTH THE VERTICAL AND HORIZONTAL FINE ADJUSTMENT DRIVES ARE VISIBLE.

DO NOT TURN FINE ADJUSTMENT KNOBS PAST THEIR MECHANICAL STOPS

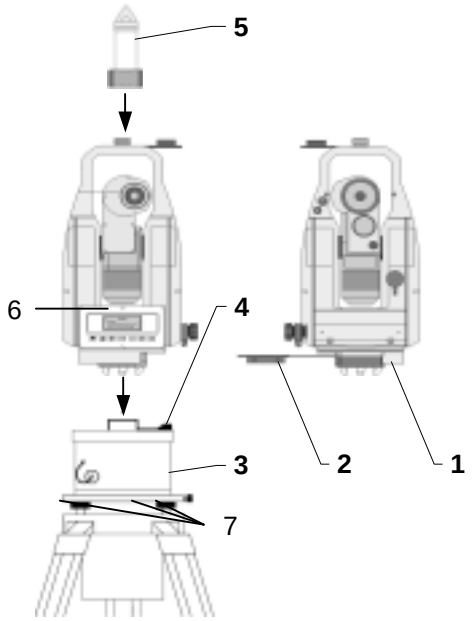


Figure 2-3. Mounting the Digital Electronic Theodolite

- Remove theodolite (1) from container, remove the gyroscope interface protective cover (2) and mount the theodolite on the gyroscope (3).
- Ensure that the gyroscope interface port on the gyroscope aligns with the gyroscope interface port on the theodolite.
- Secure theodolite by moving the theodolite locking lever (4) to the rear (closed) position. Ensure theodolite is secured by attempting to move it back and forth.
- Remove the target rod (5) from the container.
- Mount the target rod (5) on the target rod connector on the theodolite carrying handle.

e. Mount the Battery.

- Remove one battery from container.

NOTE
BATTERIES SHOULD BE FULLY CHARGED PRIOR TO BEGINNING EXTENDED OPERATIONS. PROPER STORAGE AND THE USE OF PROPER RECHARGING PRACTICES WILL MAINTAIN MAXIMUM BATTERY CAPACITY.

Batteries stored at extremely high or extremely low temperatures will discharge at an accelerated rate. Storage at temperatures that are comfortable to the human body is desirable.

The service life of NiCd batteries is maximized when batteries are used until they are totally discharged, prior to being recharged. System will prompt operator with “BATTERY LOW” warning then a “BATTERY EMPTY” warning. Batteries that are only partially discharged, prior to recharging, will not recharge to their maximum capacity. The batteries tend to establish a "memory" or upper threshold for recharge that is less than full capacity. When a battery is thought to be fully charged but quickly runs out of power, the battery should be completely discharged and recharged three (3) times to restore full capacity.

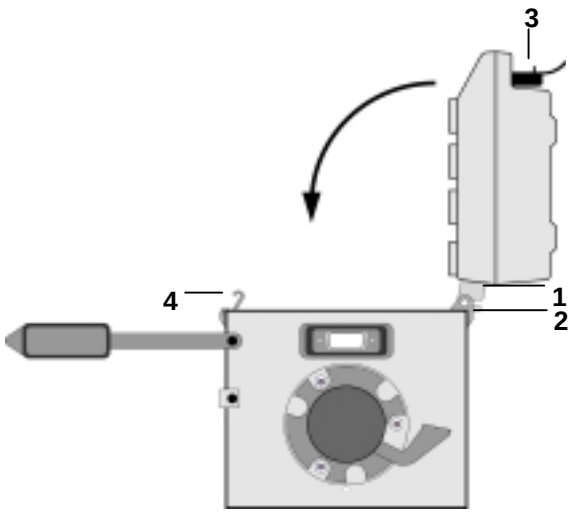


Figure 2-4. Mounting the Battery

NOTE
PROPER SEQUENCE OF MOUNTING BATTERIES IS WITH THEODOLITE MOUNTED TO GYROSCOPE WHICH IS INSTALLED ON TRIPOD

- Attach battery hinge (1) to the hinged mounting bracket (2) located on the gyroscope.
- Rotate battery until it is flush with the gyroscope
- Secure battery latch (3) to the locking bracket (4) on the left rear of the gyroscope.

f. Mount PLGR.

- Remove SHT9 PLGR mounting bracket from the theodolite container.
- Attach PLGR mounting bracket to the tripod leg using hook (1) and clamps (2).
- Remove protective covers from the RS-232 data ports located on the PLGR and gyroscope.
- Remove the PLGR RS232 interface cable from the theodolite container
- Connect RS-232 cable to the PLGR and the RS232 data port on the gyroscope; being careful not to bend the pins.
- Install PLGR in PLGR mounting bracket located on tripod leg and secure with latch (3).

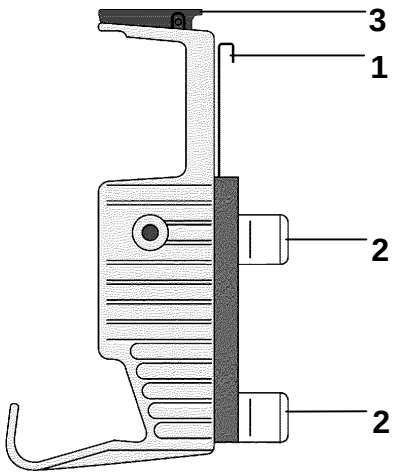


Figure 2-5. SHT9 PLGR Mounting Bracket

g. Level System Manually.

- Using the “LEFT THUMB RULE FOR LEVELING”, CENTER BUBBLE in circular leveling vial (6) on the theodolite using leveling screws (7) on the tripod (Figure 2-3).

2-3 OPERATE THE GLPS

This portion of the manual will explain the features, functions, and use of the GLPS.

a. Explanation of GLPS Display and Keypad. GLPS provides a keypad to select fields and input data and an electronic LCD display. The keypad and display are used to operate the system.

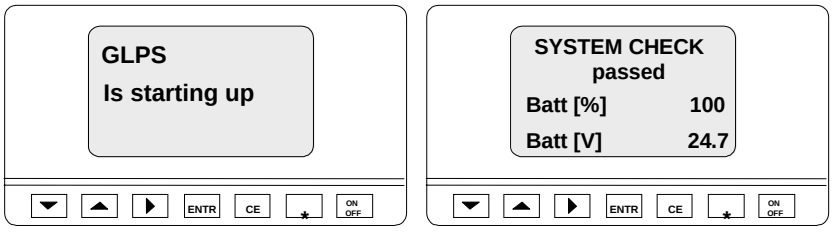
Symbol/Key	Name	Function
→	**Program Indicator**	Located on left side of display: Indicates highlighted program. Located on right side of display: Indicates additional program steps are required.
^ ^ v v	**Up/Down Indicator**	Located in the upper left corner of the display. Indicates programs are located above, below or both above and below the program indicator.
/	**Busy Indicator**	Located in the upper right corner of the display. Indicates the gyroscope or system software is busy by rotating clockwise.
ON/OFF	**On/Off Key**	Used to turn GLPS on and off.
*	**Illumination Key**	Activates illumination of display, keypad and reticle.
CE	**Clear Entry Key**	Returns operator to previous step in the program sequence.
ENTR	**Enter Key**	Selects program indicated by indicator. Enters input data. Continues to next step in the program. Used to clear error messages.
▶	**RIGHT cursor key**	Moves cursor to the right.
▲	**UP cursor key**	Moves program indicator up. Increases the value of a highlighted digit.
▼	**DOWN cursor key**	Moves the program indicator down. Decreases the value of a highlighted digit.

b. Operate GLPS.

- Press ON/OFF power key located on the keypad.

  A momentary "GLPS is starting up" display appears on the screen.

  The next screen indicates a SYSTEM CHECK has been conducted. Battery information indicating the percentage of charge remaining and the current output voltage is displayed. The system will also inform the operator if either of these parameters fall below the operational battery output voltage range of 22 to 25 volts DC for GLPS.

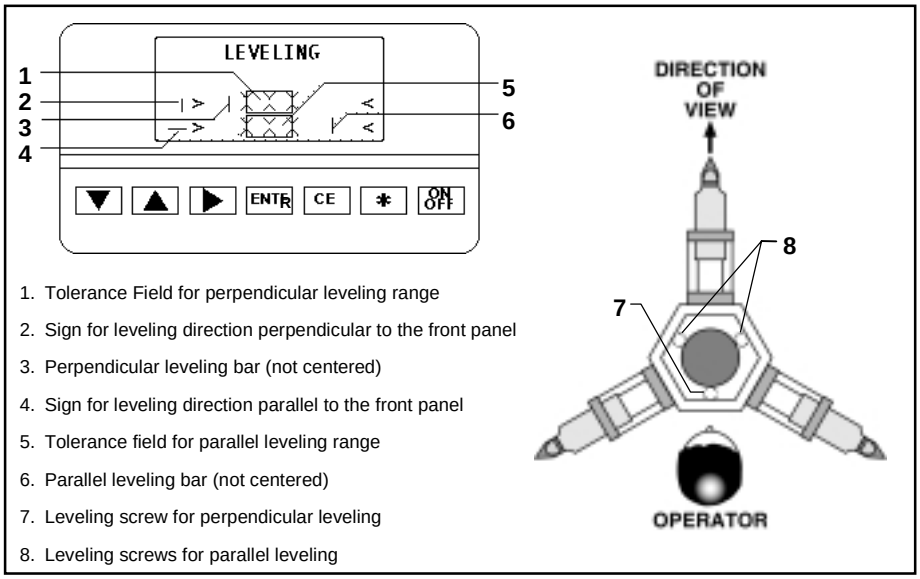


NOTE

GLPS AUTOMATICALLY SHUTS DOWN AFTER 15 MINUTES OF INACTIVITY TO CONSERVE POWER. AUTOMATIC SHUTDOWN DOES NOT CAUSE LOSS OF DATA.

- Press ENTR to continue.

The next screen provides the means for precision leveling of the system.



1. Tolerance Field for perpendicular leveling range
2. Sign for leveling direction perpendicular to the front panel
3. Perpendicular leveling bar (not centered)
4. Sign for leveling direction parallel to the front panel
5. Tolerance field for parallel leveling range
6. Parallel leveling bar (not centered)
7. Leveling screw for perpendicular leveling
8. Leveling screws for parallel leveling

Figure 2-6. Precision Leveling

c. Precision Leveling the System.

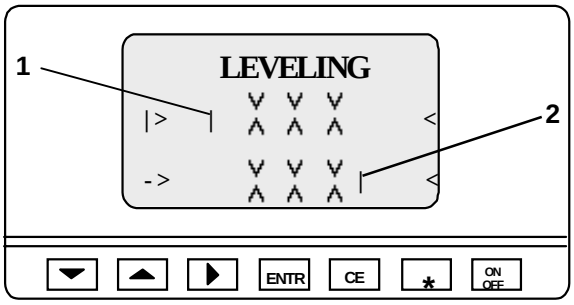
CAUTION

MANUAL LEVELING IS NOT SUFFICIENT FOR OPERATION OF GYROSCOPE. PRECISION LEVELING IS REQUIRED TO ACHIEVE TIMELY DIRECTIONAL ORIENTATION.

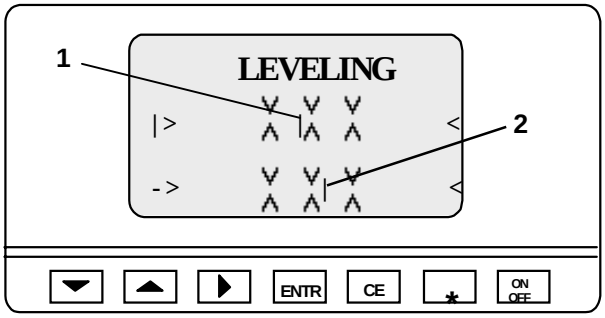
This menu screen provides the operator with the precision leveling options for the system. Select "yes" if the system has not previously been leveled in the current position. Select "no" if the system has previously been leveled. If "no" is selected, the main menu will be displayed.

- Press right cursor key or ENTR to select yes. The next screen provides the means for precision leveling of the system. In the event manual leveling has not been performed, the display will indicate this by displaying the word “TILT”.

- Two fields, defined by the left and right arrows pointing inward, represent the tolerance field for leveling. The vertical leveling bars depict the level status of the represented planes in relationship to the front panel. The upper field and vertical leveling bar (1) show the leveling condition in the horizontal plane perpendicular to the front panel. The lower field and vertical leveling bar (2) show the leveling condition in the horizontal plane.



- Using the leveling screws located beneath the tilting dish of the tripod, level the system. Turn the leveling screw for lower parallel leveling (Figure 2-6, item 8) until the lower leveling field (1) is within the tolerance field shown in Figure 2-6. Continue the process for the upper perpendicular leveling field (2) using the leveling screws for perpendictular leveling (Figure 2-6, item 7).

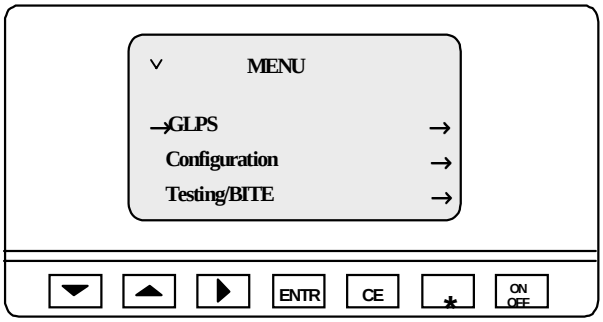


- Press ENTR to continue.

  GLPS is now set up and ready for operation.

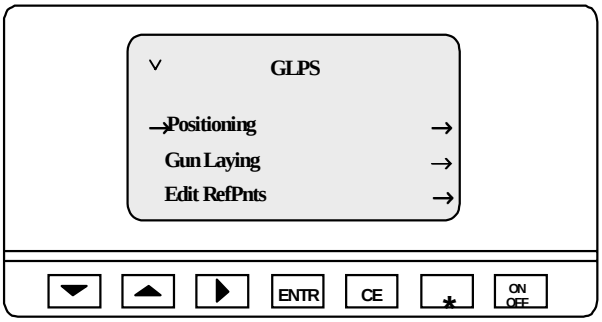
2-4 GLPS MAIN MENU

The main menu of GLPS displays three utilization options for the GLPS. These options are GLPS, Configuration and Testing/BITE. The GLPS selection provides the primary functions for positioning and orienting artillery systems. Configuration provides the operator with the ability to select or change operational configuration of the system. Testing/BITE is for performing a self-test of the system. This menu is displayed automatically upon completion of precision leveling.



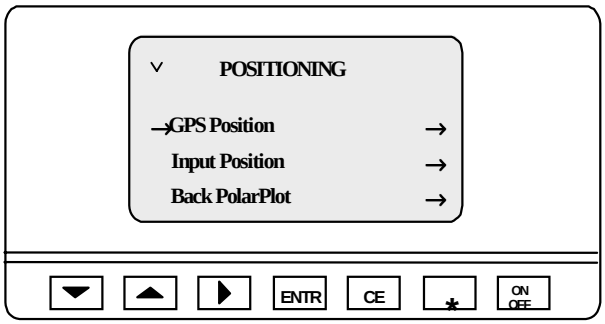
- Select GLPS by pressing the right cursor key or ENTR.

2-4.1 GLPS Function. This screen provides the operator with choices for GLPS operation. These are positioning, gun laying and editing reference points. Positioning allows the operator to determine or input the coordinates for the current position. Gun Laying provides the operator the selections for orienting weapons. Edit RefPnts provides the operator with the ability to store location data and retrieve that data for future use.



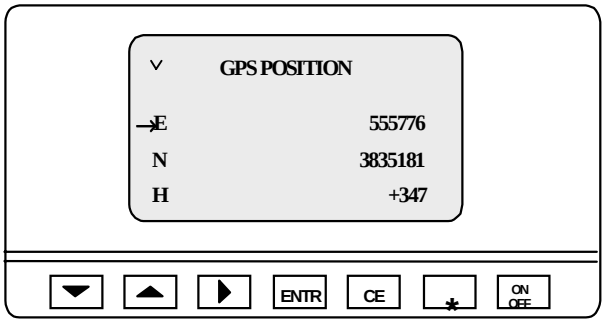
- Select Positioning by pressing the right cursor key or ENTR.

2-4.1.a. Positioning and Orientation. This menu selection provides three options for determining GLPS position data. These are GPS Position, Input Position or Back Polar Plot. Using GPS data from the PLGR is the primary method used, when survey data is not available, for determining the position of the GLPS. Input Position and Back Polar Plot are methods used when position data from a survey source is available. Input Position uses known location data obtained from a survey source for positioning. Back Polar Plot transfers known location data that is within 2500 meters of the GLPS position to determine its location.



- Select GPS Position by pressing the right cursor key.

2-4.1.a.1 GPS Position. GPS data from the PLGR is the primary method for determining the position of the GLPS when survey data is not available. This screen shows GPS position established by the PLGR. Verify the position data on the PLGR with the data displayed on the GLPS.



- Press ENTR to continue. The ORIENTATION menu will be displayed.

2-4.1.a.1.a GLPS Orientation for Direction. The operator will orient GLPS for direction following any method of positioning. Orientation is performed prior to laying howitzers or measuring angles. This function will start immediately upon GLPS receiving position data either from PLGR or survey source. Two methods are provided for orienting the system. GLPS provides the option of manually inputting a known azimuth. Orienting by gyroscope is the primary method of orientation.

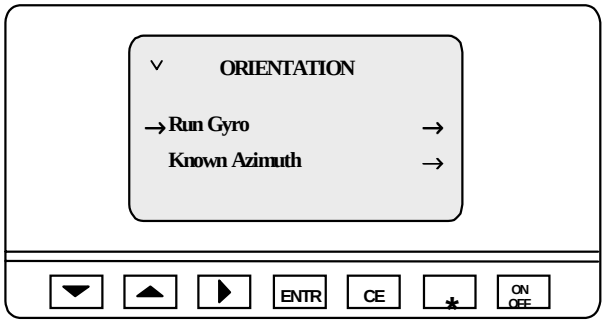
2-4.1.a.1.a.1 Gyro Orientation Method. The gyroscope measures the direction of grid north and displays the direction in grid azimuth on the theodolite display.

CAUTION

DO NOT DISTURB THE SYSTEM WHILE THE GYROSCOPE IS MEASURING. VIBRATION IN THE IMMEDIATE VICINITY OF THE GYROSCOPE WILL UNNECESSARILY INCREASE SPIN-UP TIME.

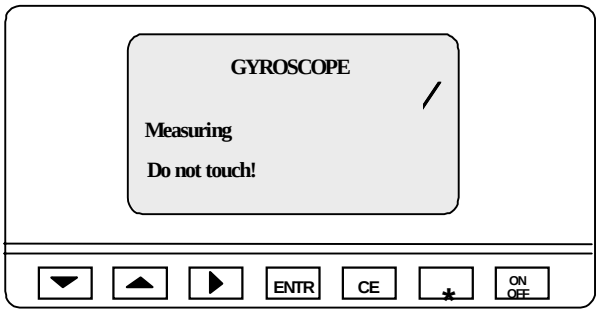
NOTE

IN WINDY CONDITIONS, THE OPERATOR SHOULD POSITION HIMSELF BETWEEN THE INSTRUMENT AND THE WIND TO BLOCK THE WIND. THIS WILL ELIMINATE SOME OF THE VIBRATION TO THE SYSTEM FROM THE WIND AND DECREASE GYROSCOPE SPIN UP TIME**.**



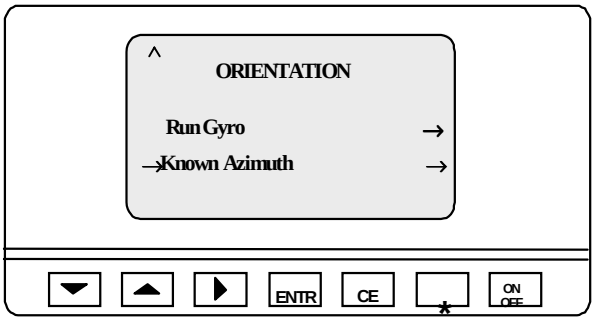
- Select Run Gyro by pressing the right cursor or ENTR key. This action will engage the gyroscope.

  This screen will remain visible until the gyro has completed measuring. The gyro requires approximately three and a half minutes to complete orientation.



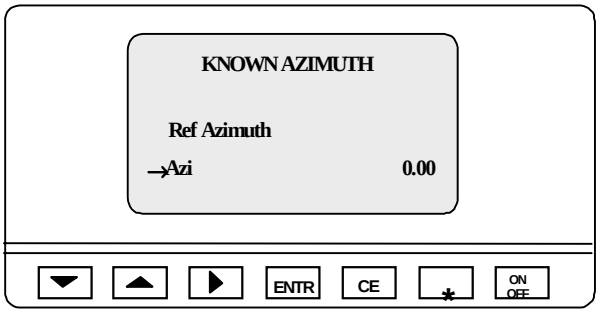
- After GLPS is oriented, the gun laying menu, paragraph 2-4.1b, will be displayed.

2-4.1.a.1.a.2 Orienting by Known Azimuth. The method of orienting for direction is by manual input of a known azimuth. The azimuth normally will be provided by a Battalion survey source. This method requires the operator to sight on a reference point that has directional control and input the known direction.



- Select Known Azimuth by pressing the right cursor or ENTR key.

- Sight on the reference point for the known azimuth.
- Press ENTR to continue.

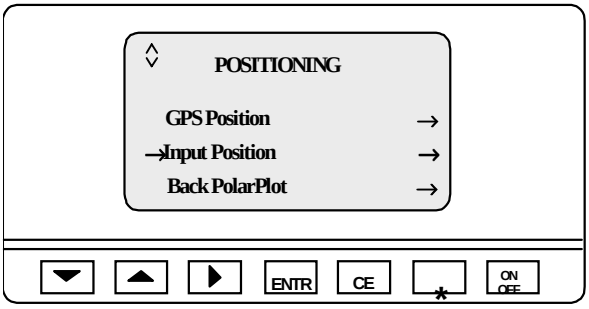


- Input the Known Azimuth to the reference point by pressing the right cursor key. This will underline, or highlight, one digit within the selected line of data.
- Press up or down cursor key to change the number until the desired digit is displayed.
- Press the right cursor key to move to the next digit. Continue this process until all digits in the line are correct; then press the ENTR key to enter the data. The cursor will disappear.
- Press ENTR to continue.

  GLPS is now oriented. The gun laying menu, paragraph 2-4.1b, will be displayed.

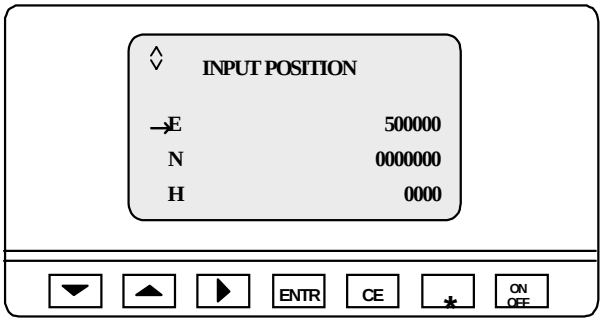
2-4.1.a.1.b Input Position. Input Position is normally used when operating at a OS, SCP survey location.

- Select Input Position using the down cursor key, then press the right cursor key or ENTR.

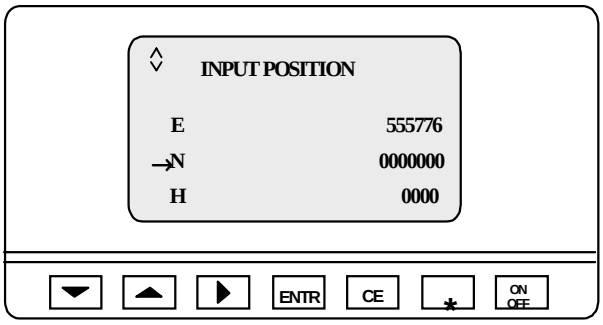


This screen provides the capability to manually input known location data.

- Input or change position data by pressing the right cursor key. This will underline, or highlight, one digit within the selected line of data, as seen below.
- Press up or down cursor key to change the number until the desired digit is displayed.

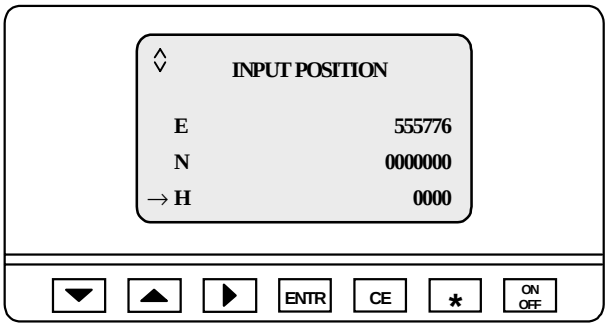


- Press the right cursor key to move to the next digit. Continue this process until all digits in the line are correct; then press the ENTR key to enter the data. The cursor will disappear.
- Press the down cursor key to move the cursor to the next line of data.



- Select northing (N) by pressing the right cursor key and repeat process to input known northing data. Press ENTR to continue.

- Press the down cursor key to move the cursor to the next line of data.

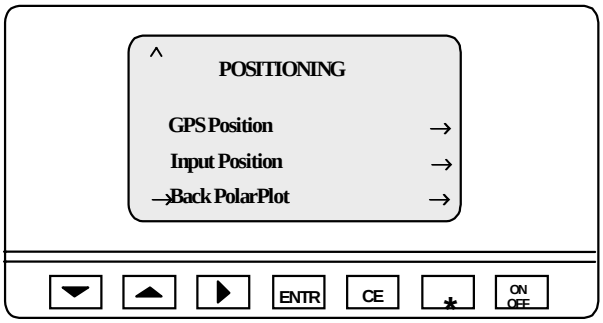


- Select height (H) and repeat process to input known altitude data. Press ENTR to enter the data. Press ENTR again to continue.

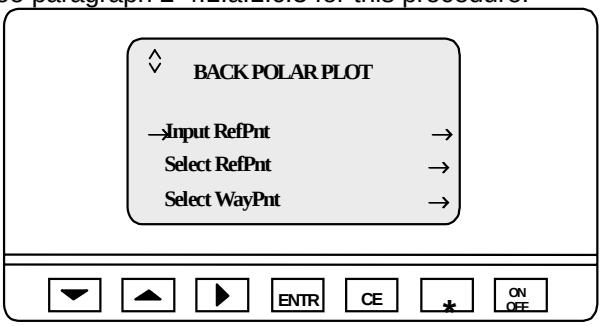
The system is now ready to be oriented and will automatically display the gyroscope menu. Paragraph 2-4.1.a.1.a provides detailed instructions on orienting for direction.

2-4.1.a.1.c Back Polar Plot. Back Polar Plot is used when GLPS location data is not known, but distant known location data is available. The GLPS will measure the direction and distance from the current position to a known reference point in order to calculate the current position data. The reference point must be within 2500 meters and have line of sight with the orienting location.

- Select Back Polar Plot using the down cursor key; then press the right cursor or ENTR key.

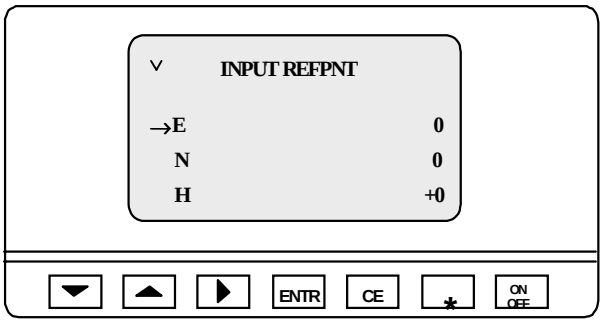


This screen provides three methods of inputting reference point data. Input RefPnt allows the operator to manually input reference point data. See paragraph 2-4.1.a.1.c.1 for this procedure. Select RefPnt allows the operator to select and automatically transfer reference point data that has already been stored in the GLPS memory. See paragraph 2-4.1.a.1.c.2 for this procedure. Select WayPnt allows the operator to select and automatically transfer reference point data stored in the PLGR memory. See paragraph 2-4.1.a.1.c.3 for this procedure.

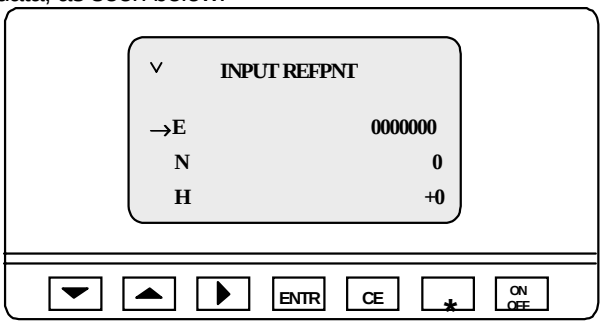


2-4.1.a.1.a.3 Input Reference Point. Input reference point (Input RefPnt) allows the operator to manually input reference point data. The data is input using the keypad by moving the cursor up or down to the selected line of data.

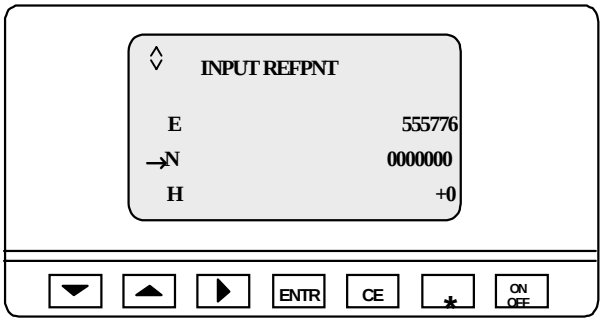
- Select INPUT REFPNT by pressing the right cursor or ENTR key. This will take you to the INPUT REFPNT screen.



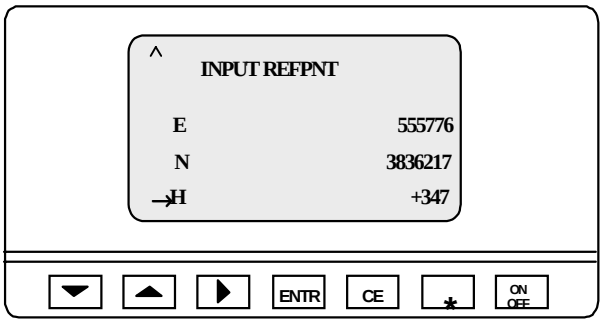
- Input or change reference point data by pressing the right cursor key. This will highlight one digit within the selected line of data, as seen below.



- Press up or down cursor key to change the number until the desired digit is displayed.
- Press the right cursor key to move to the next digit. Continue this process until all digits in the line are correct; then press ENTR. The cursor will disappear.
- Press the down cursor key to move the cursor down to the next line of data, as shown in the screen below. Continue this process until easting, northing and altitude have been completed.

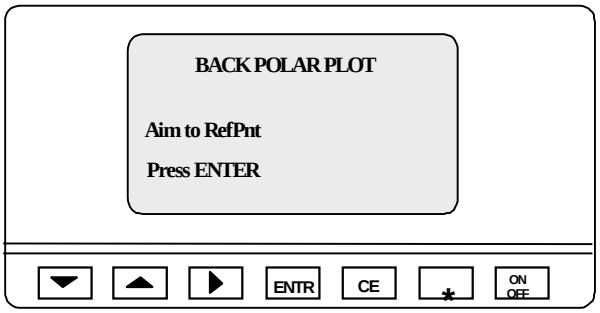


When all three lines of data have been input, the screen appears as seen below.



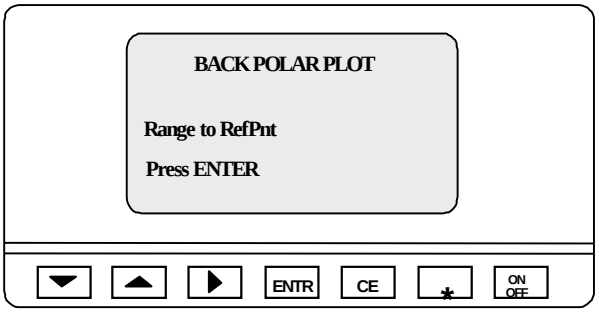
- Press ENTR when complete.

  The next screen will instruct the operator to sight on the reference point, allowing the system to measure and store both vertical and horizontal angles for calculating location.



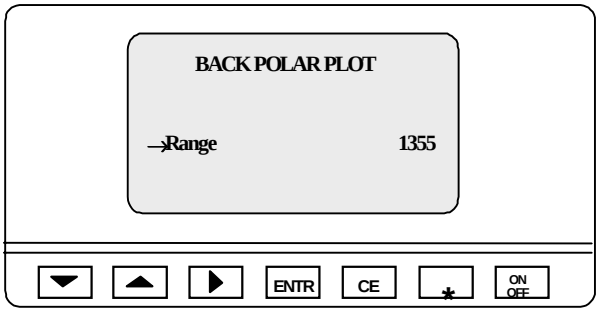
- Align the optics on the reference point and press ENTR.

  The next screen will allow the operator to determine the range to the reference point and stores the range for calculating location.



- Ensure optics are properly aligned on the reference point and press ENTR.

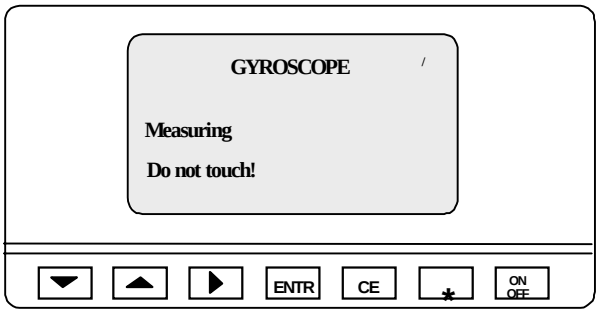
  The system displays the measured range to the reference point in meters.



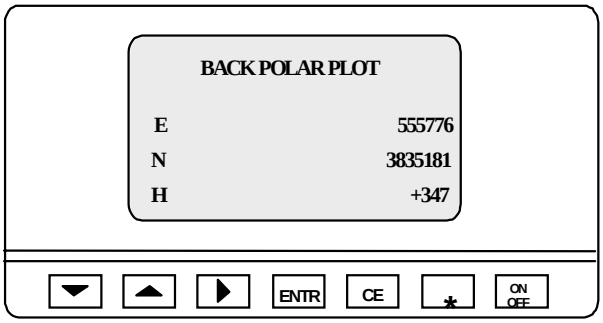
CAUTION

DO NOT DISTURB THE SYSTEM WHILE THE GYRO IS MEASURING.

- Press ENTR to engage the gyro. The gyroscope will require about three and a half minutes to complete orientation.



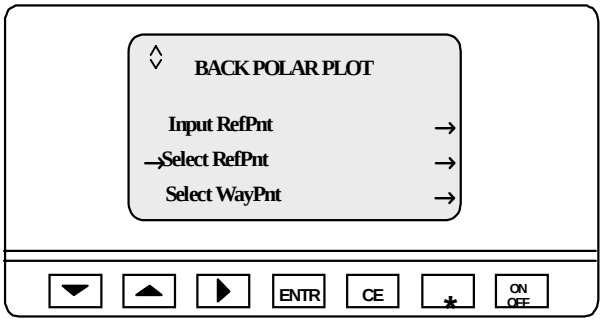
The system will automatically calculate and display the GLPS current position data.



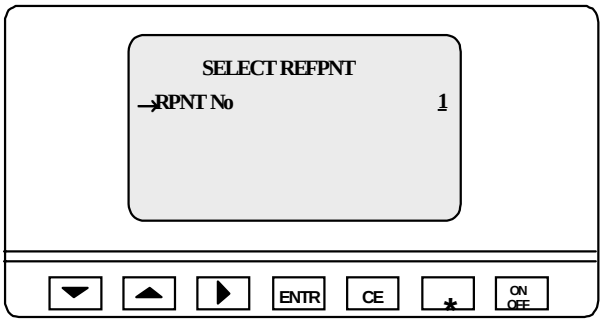
GLPS is oriented and ready to perform gun laying.

- Press ENTR to continue. The Gun Laying menu, paragraph 2-4.1b, will be displayed.

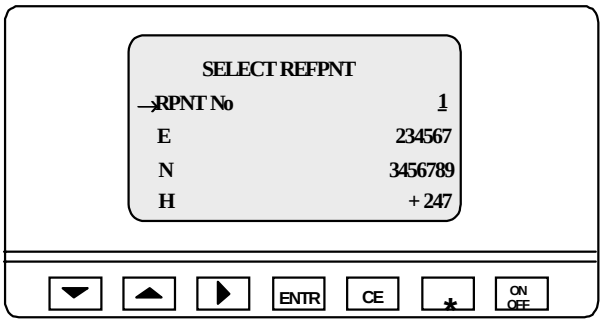
2-4.1.a.1.a.4 Select Reference Point. Select RefPnt, the second option on the Back Polar Plot menu, allows the operator to select and automatically transfer reference point data stored in the GLPS memory. This method is faster than manual input and eliminates the probability of operator error during the manual Input RefPnt method. Use Select RefPnt when reference point coordinates have been stored in the GLPS.



- Select 'Select RefPnt' using the down cursor key, then press the right cursor or ENTR key. The Select RefPnt screen will be displayed.

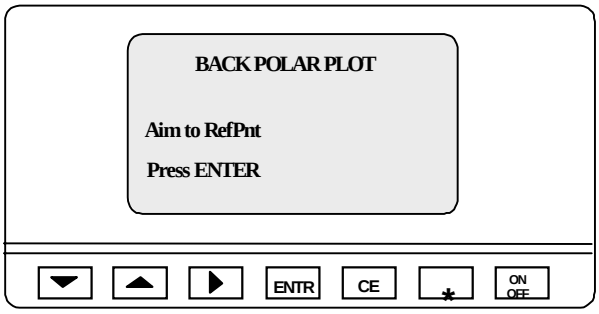


- Press ENTR or the right cursor key to highlight the reference point number.
- Change the reference point number using the up or down cursor keys until the desired reference point is indicated, then press ENTR. The grid coordinates for the selected reference point will be displayed.



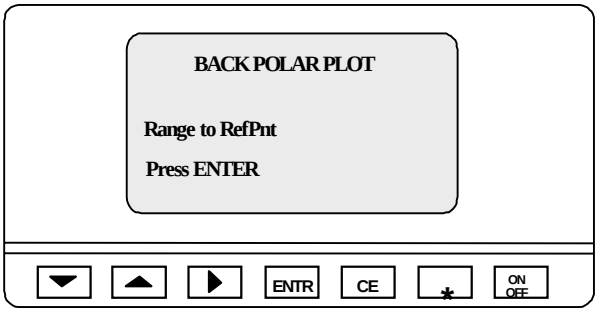
- Press ENTR to continue.

The next screen will instruct the operator to sight on the reference point, allowing the system to measure and store both vertical and horizontal angles for calculating location.

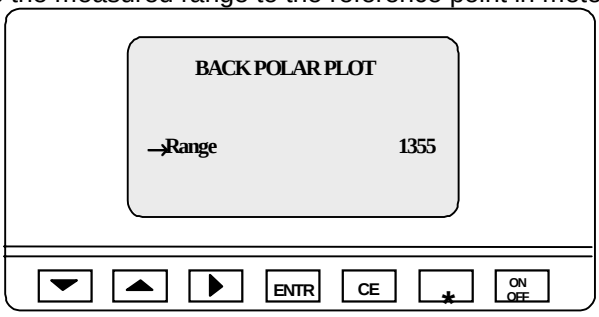


- Align the optics on the reference point and press ENTR.

The next screen will allow the operator to determine the range to the reference point and stores the range for calculating location.

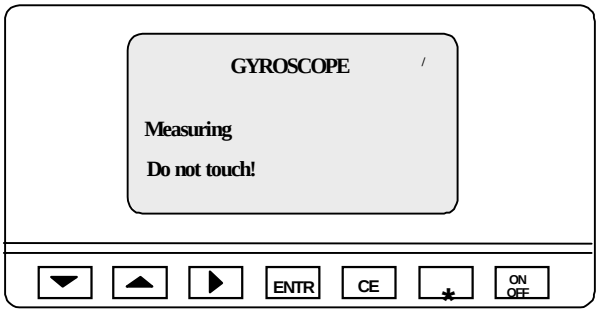


- Ensure optics are properly aligned on the reference point and press ENTR.
  The system displays the measured range to the reference point in meters.

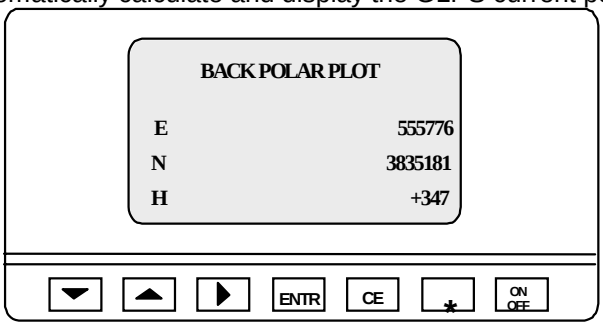


CAUTION
DO NOT DISTURB THE SYSTEM WHILE THE GYRO IS MEASURING.

- Press ENTR to engage the gyro. The gyroscope will take about three and a half minutes to complete orientation.



The system will automatically calculate and display the GLPS current position data.



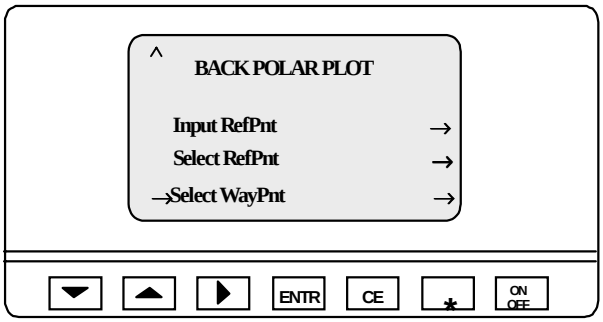
- Press ENTR to continue. The Gun Laying menu, paragraph 2-4.1b, will be displayed.

2-4.1.a.1.c.3 Select Way Point. Select WayPnt, the third option on the Back Polar Plot menu, follows the same process as previously described in Select RefPnt with the exception that Select WayPnt allows the operator to select and automatically transfer reference point data stored in the PLGR memory.

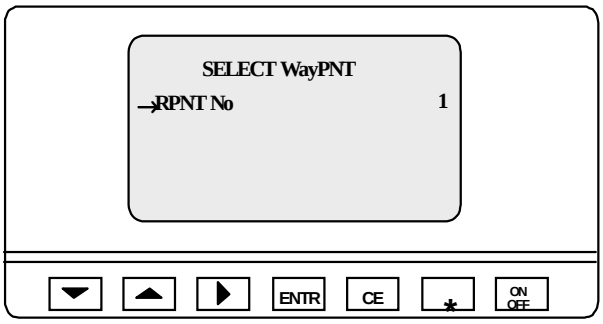
NOTE

When the GLPS is receiving location data from the PLGR, the PLGR Hemisphere will override the GLPS configuration. Care must be exercised when storing Waypoints in the PLGR, making sure that the PROPER 100,000 meter grid square identifier is entered, and NOT one from the WRONG Hemisphere. The wrong setting will prompt an ERROR Message (Error, Check Settings) when the Gyro is orienting

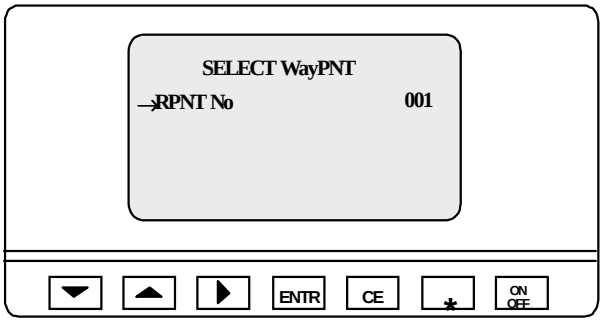
- Select 'Select WayPnt' using the down cursor key, then press the right cursor or ENTR key.



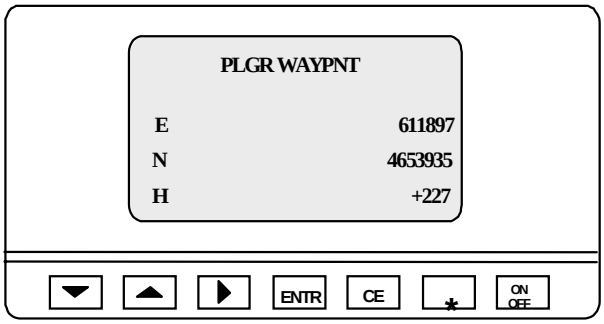
The Select WayPnt screen will be displayed.



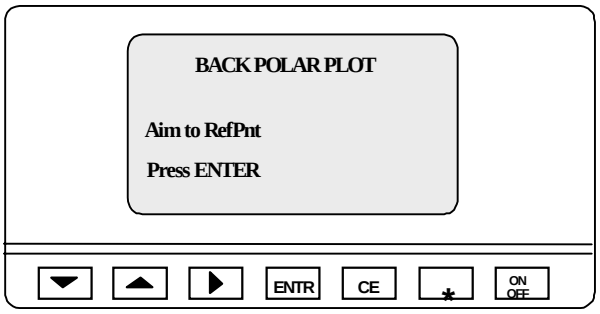
- Press ENTR or the right cursor key to highlight the reference point number. The reference point coordinates are displayed.



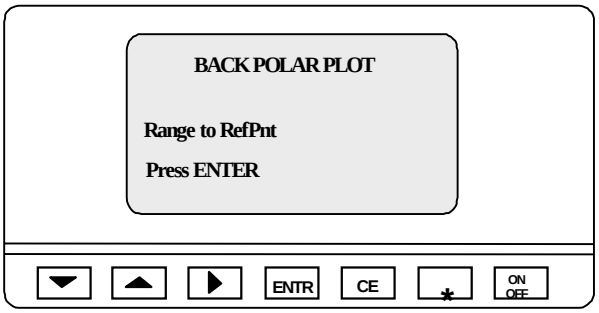
- Change the reference point number using the up or down cursor keys until the desired reference point is indicated, then press ENTR.
- Press ENTR again and the waypoint grid corrdinates will be displayed.



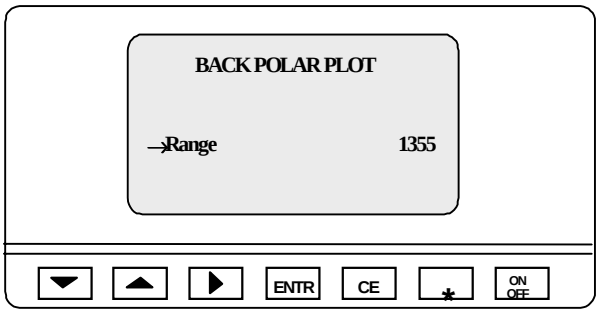
After verifying the GRID coordinate press ENTR to proceed.
The next screen will instruct the operator to sight on the reference point, allowing the system to measure and store both vertical and horizontal angles for calculating location.



- Align the optics on the reference point and press ENTR.
  The next screen will allow the operator to determine the range to the reference point and stores the range for calculating location.



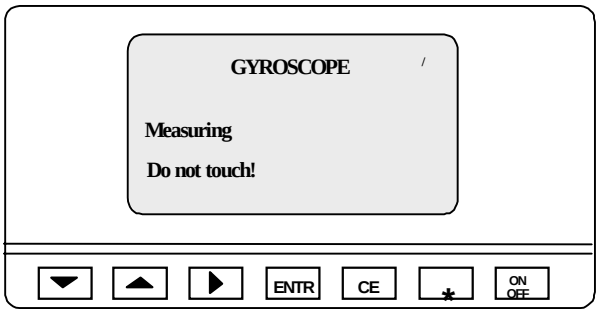
- Ensure optics are properly aligned on the reference point and press ENTR.
  The system displays the measured range to the reference point in meters.



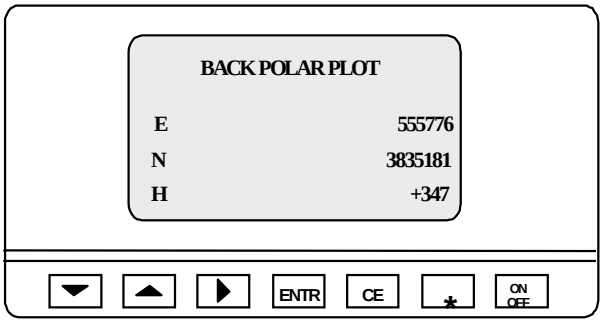
CAUTION

DO NOT DISTURB THE SYSTEM WHILE THE GYRO IS MEASURING.

- Press ENTR to engage the gyro. The gyroscope will take about three and a half minutes to complete orientation.



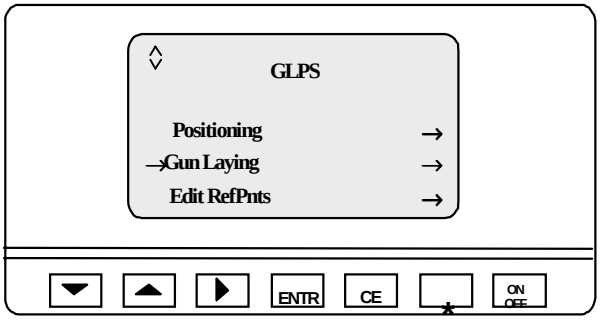
The system will automatically calculate and display the current GLPS position data.



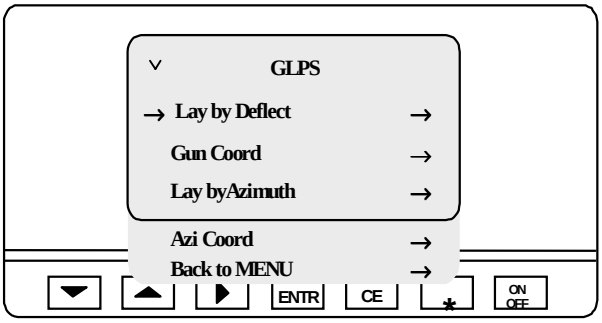
- Press ENTR to continue. The Gun Laying menu will be displayed.

2-4.1.b Gun Laying. The Gun Laying menu option is used to orient howitzers for direction, to determine howitzer location and to store that data for future use. Gun laying is performed after GLPS has been set up and positioning/orienting is completed.

- Select Gun Laying using the up or down cursor keys and press the right cursor key or ENTR.



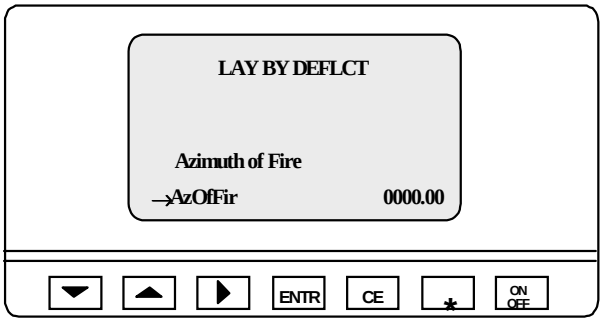
The Gun Laying menu provides the operator with five menu options.



The Lay by Deflct option is used to orient or lay the howitzers for direction and determine howitzer coordinates, deflection, vertical angle and range.
The Gun Coord option is used to store and recall howitzer data for up to eight howitzers.
The Lay by Azimuth option is used to determine coordinates, grid azimuth, vertical angle and range to various reference points or objects.
The Azi Coord option is used to store and recall system data for up to eight systems determined under the Lay by Azimuth option.
The Back to MENU selection returns the display to the main menu.

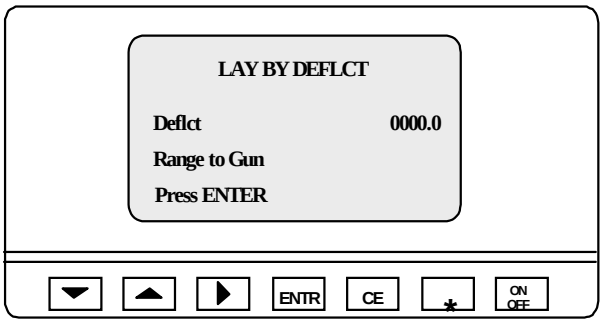
- Select Lay by Deflct using the right cursor key or pressing ENTR.

2-4.1.b.1 Lay by Deflection. The Lay by Deflct option is used to orient or lay the howitzers for direction and determine howitzer coordinates, deflection, vertical angle and range.



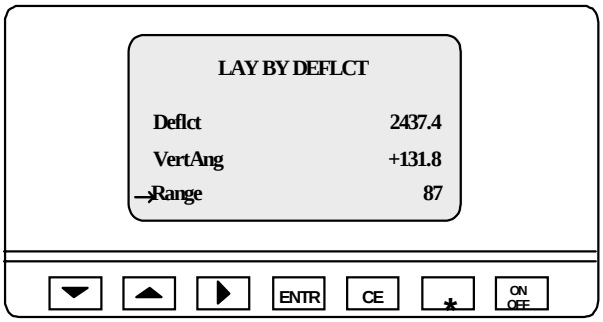
- Select AzOfFir by pressing the right cursor key or ENTR key.
- Press the right cursor key to highlight the first digit of the azimuth of fire.
- Press the up or down cursor key to change the number until the desired digit is displayed.
- Press the right cursor key to move to the next digit.
- Continue this process until the desired azimuth of fire is displayed, then press the ENTR key to enter the data.
- Press ENTR to continue.

The following screen will be displayed.



- Sight on selected howitzer. When sighting on the howitzer, place the vertical hairline of the theodolite across the center of the head of the pantel. Place the horizontal hairline at a point just below the window. This sight picture will provide greater reflectability when lasing the howitzer for range with the laser rangefinder.
- Press ENTR after the proper sight picture has been established.

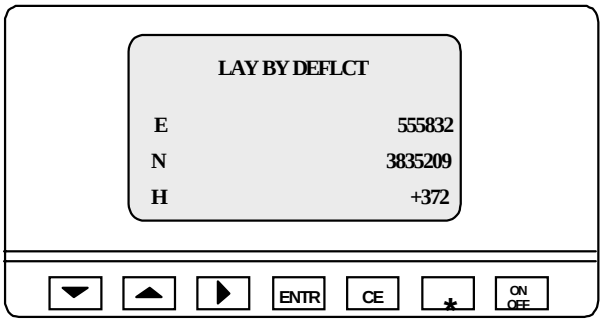
This will prompt the rangefinder to lase the system for range and display the deflection, vertical angle and range, as seen in the next screen.



NOTE

Functioning of the GLPS hardware locks up the deflection counter. (Turn off reticle illumination during night operations) After ENTR is pressed during actual occupation of the gun line, ENTR should NOT be pressed again, as it forces the operator to go through the Gun Coordinate Storage process and will slow down the "Occupation Ready To Fire" time. This process will work during the advance party preparation of the position.

- Press ENTR to compute and display howitzer location data.



- The lay data are stored in non-volatile memory. Enter the Gun Coord menu to access the data. Data can be stored for up to eight howitzers.
- Press ENTR to proceed to the STORE COORD menu.

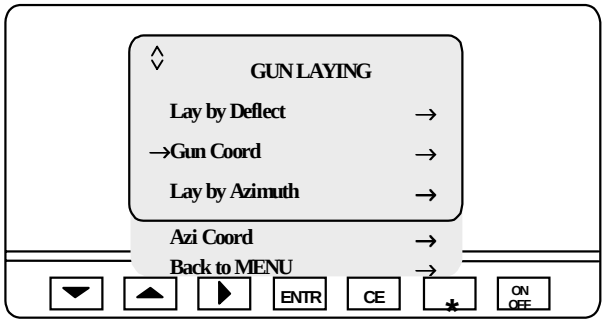
- Press ENTR or the right cursor key to place cursor under the gun number digit.

NOTE

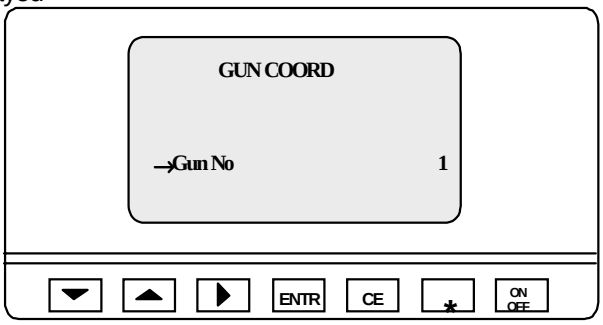
Up to eight howitzers can be stored.

- Change the gun number by pressing the up or down cursor keys until the correct howitzer number is displayed.
- Press the ENTR key to enter the data.
- Press ENTR again to continue.
- Repeat the process described in this paragraph for each howitzer until all howitzers' data is stored.
- To return to Gun Laying screen, press CE.

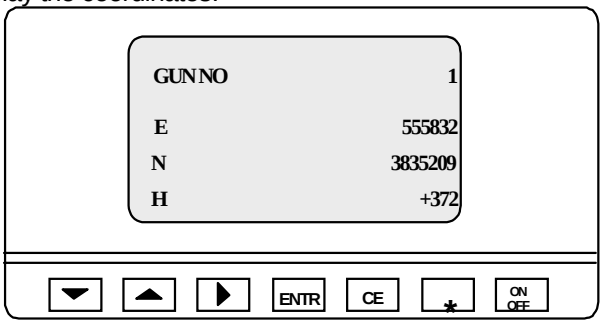
2-4.1.b.2 Gun Coordinates. The gun coordinates (Gun Coord) option is used to recall howitzer data determined in the Lay by Deflection option for up to eight howitzers.



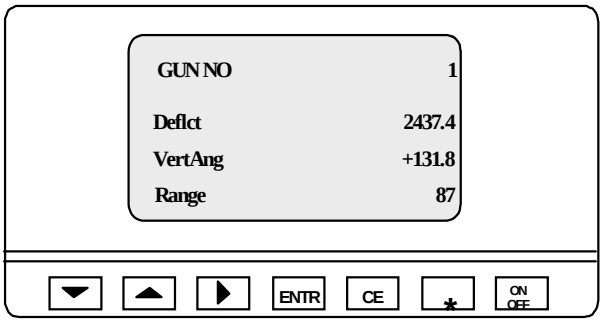
- Select Gun Coord using the down cursor key, then press the right cursor key or ENTR. The following screen will be displayed



- This screen allows for gun selection. Press the right cursor key or ENTR to highlight the gun number.
- Press the up or down cursor key to change the digit until the desired gun number is displayed.
- Press ENTR to select the gun number.
- Press ENTR to display the coordinates.

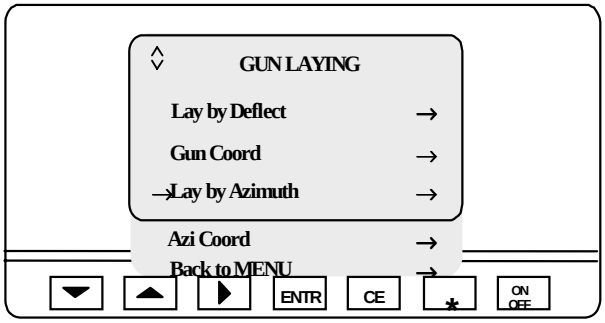


- Press ENTR to display deflection, vertical angle and range to the howitzer.



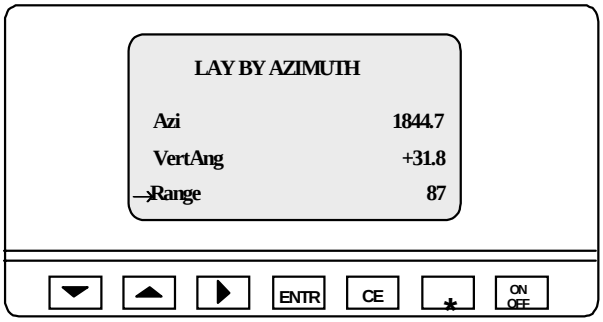
- Press ENTR to repeat process for each howitzer.
- Press CE to return to the Gun Laying menu.

2-4.1.b.3 Lay By Azimuth. The Lay by Azimuth option is used to determine direction and location of forward stations. Forward stations may then be used as orienting stations or reference points for future use.



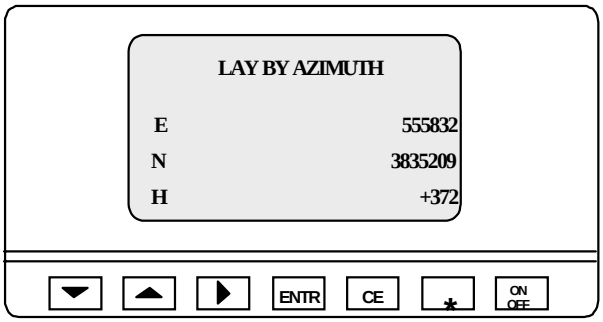
- Select Lay by Azimuth using the down cursor key, then press the right cursor key or ENTR.

- Sight on the forward station.
- Press ENTR to measure direction, vertical angle and range.



Azimuth, vertical angle and range are measured and displayed.

- Press ENTR to display coordinates.



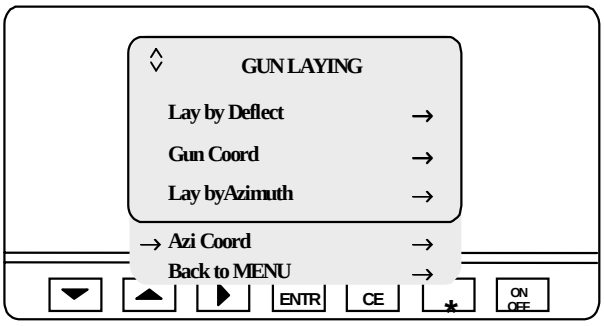
Coordinates are calculated and displayed.

- Press ENTR to store coordinates.

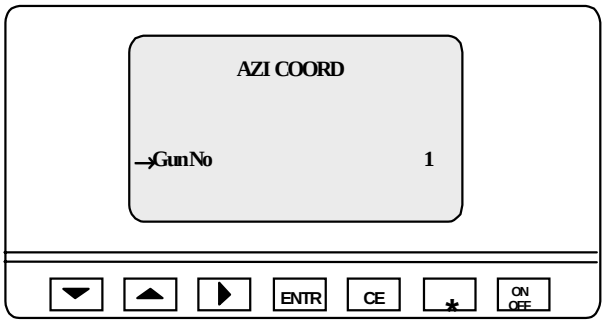
NOTE
Up to eight coordinates can be stored.

- Press the right cursor key or ENTR to select the gun number.
- Change the number by pressing the up or down cursor key until the correct number is displayed.
- Press ENTR to enter the data.
- Press ENTR to continue.
- Press CE to return to the Gun Laying menu.

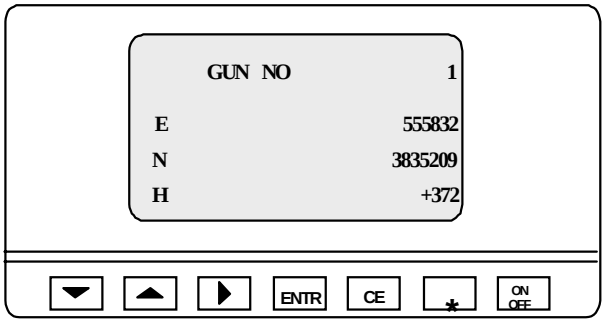
2-4.1.b.4 Azimuth Coordinates. The Azi Coord option is used to recall data determined in the Lay by Azimuth option for up to eight forward stations. Forward stations may then be used as orienting stations or reference points for future use.



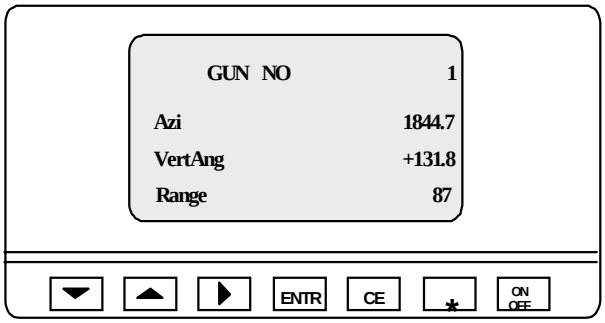
- Select Azi Coord using the down cursor; then press the right cursor key or ENTR.



- This screen allows for forward station selection. Press the right cursor key or ENTR to highlight the forward station number.
- Press the up or down cursor key to change the digit until the desired digit is displayed.
- Press ENTR to select the number.
- Press ENTR again to display the coordinates.

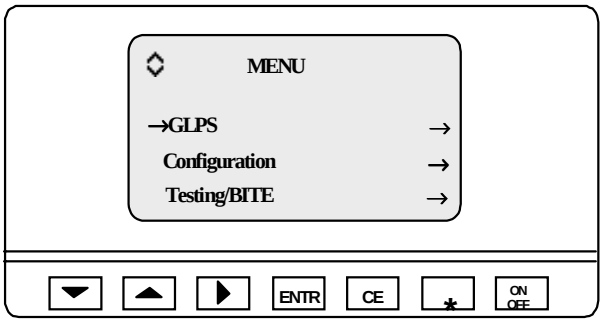


- Press ENTR to display the measured azimuth, vertical angle and range.

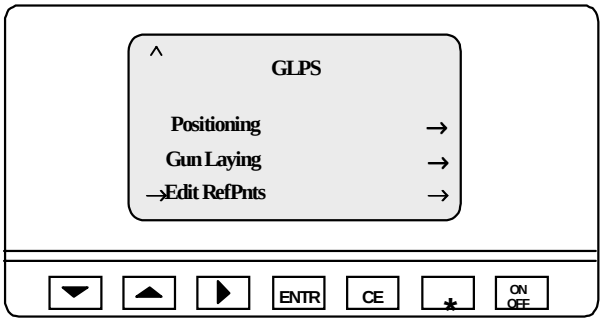


- Press ENTR to repeat the process.
- Press CE to return to the Gun Laying menu

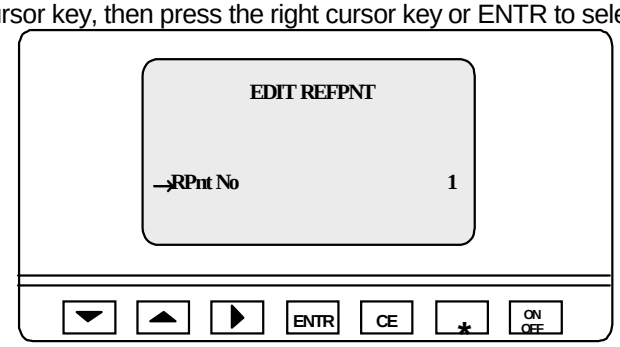
2-4.1.a.2 2-4.1.c Edit Reference Points. Reference points are locations with known coordinates. GLPS can store up to nine reference points. These reference points can then be used during Back Polar Plot to determine station coordinates.



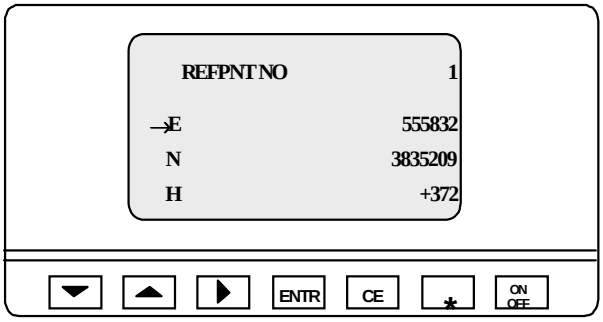
- Select GLPS from the main menu by pressing the right cursor key or ENTR.



- Press the down cursor key, then press the right cursor key or ENTR to select Edit RefPnt.

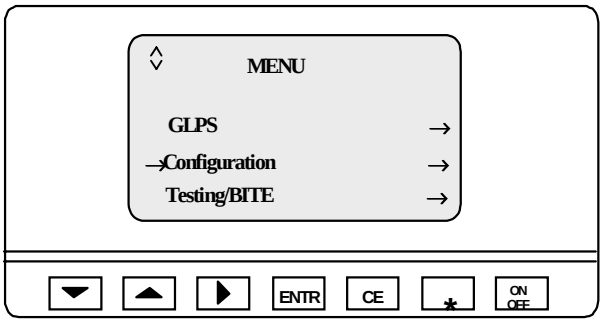


- This screen allows for reference point selection. Press the right cursor key or ENTR to highlight the reference point number.
- Press the up or down cursor key to change the digit until the desired digit is displayed.
- Press ENTR to select reference point.
- Press ENTR again to display the coordinates.



- Press CE to return to the GLPS menu. Press CE again to return to the main menu.

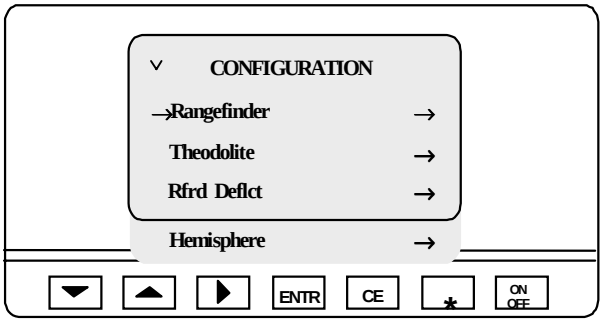
2-4.2 Configuration. The configuration option allows the operator to set or change user settings. Select Configuration when the change of a default setting is required.



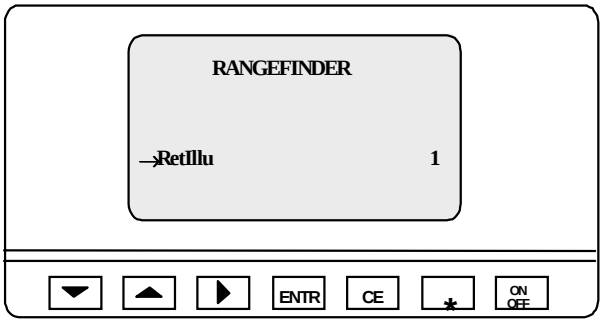
- From main menu, select Configuration using the down cursor key, then press the right cursor key or ENTR.

Each configuration menu option provides the operator the ability to change a setting.

2-4.2.a Rangefinder Configuration. The rangefinder option allows the operator to increase or decrease the reticle illumination for night or limited-visibility operation. The setting options are between 1 and 15. Increasing the value will cause the reticle illumination to increase while decreasing the value will cause it to diminish. (Setting options are: OFF, FAINT, MEDIUM, and BRIGHT.)

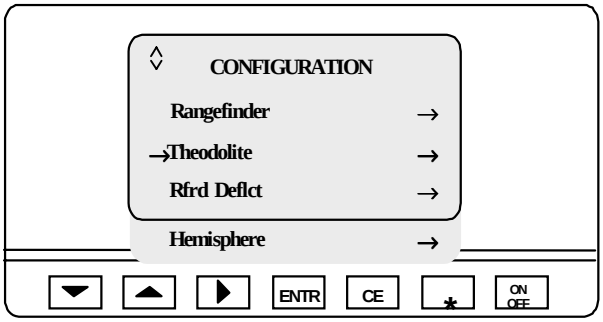


- Select Rangefinder using the down cursor; then press the right cursor key or ENTR.
- Highlight the RetIllu digit by pressing the right cursor key. Change setting by pressing the right cursor key until the desired level of reticle illumination is achieved.

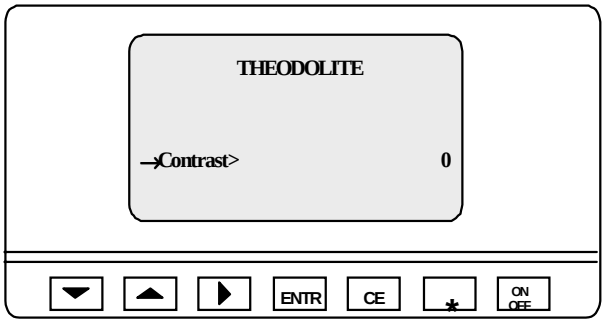


- Press ENTR to select the setting.
- Press ENTR to return to the configuration menu.

2-4.2-b. Theodolite Configuration. Theodolite display contrast is set by means of this menu. There are four possible contrast settings ranging from 0, the darkest setting, to 3, the brightest setting.

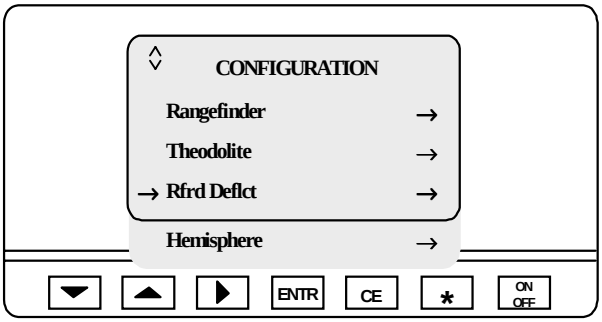


- Select Theodolite using the down cursor; then press the right cursor key or ENTR.

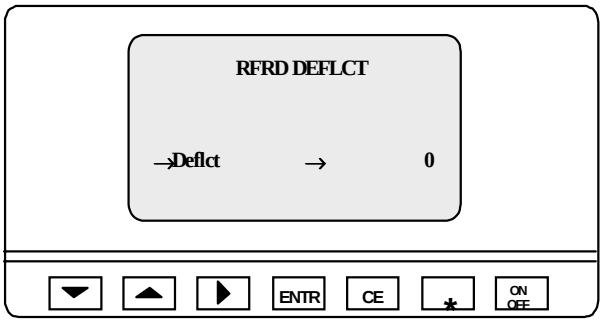


- Change the Contrast digit by pressing the right cursor key.
- Press ENTR to input the digit and return to the configuration menu.

2-4.2.c. Referred Deflection. The referred deflection (Rfrd Deflct) option allows the operator to select deflection reading for howitzers using M100 and M12-series panoramic telescopes. There are two possible settings: 0 or 3200. The default setting of "0" is for M100-series panoramic telescopes. The "3200" setting is used for M12-series panoramic telescopes.

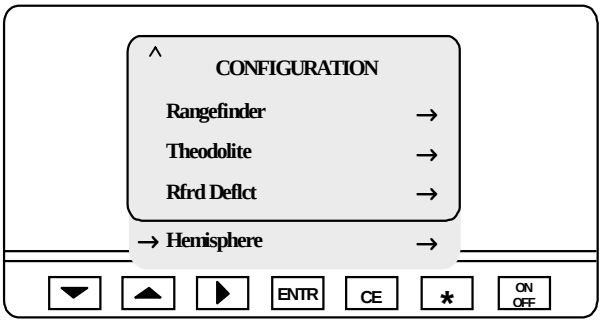


- Select Rfrd Deflct using the down cursor, then press the right cursor key or ENTR.

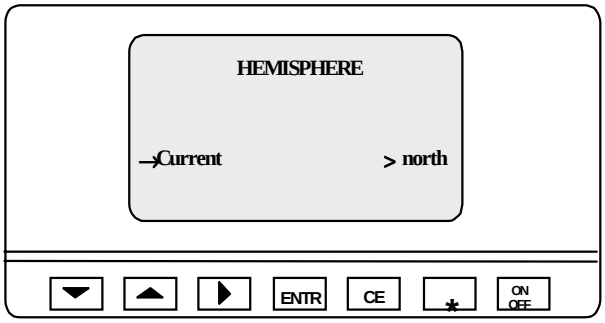


- Press the right cursor key to change the setting to 3200 for M12-series panoramic telescopes or 0 for M100-series. The default setting is 0.
- Press the ENTR key to enter the data and return to the configuration menu.

2-4.2.d. Hemisphere Configuration. The hemisphere option allows the operator the ability to select hemisphere options. The Northern Hemisphere is the default setting. When operating the GLPS in the Southern Hemisphere the setting must be changed.



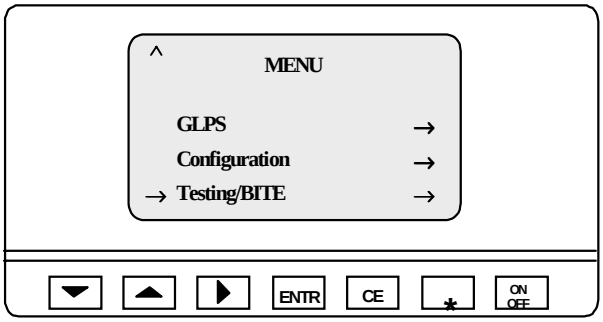
- Select Hemisphere using the down cursor; then press the right cursor key or ENTR.



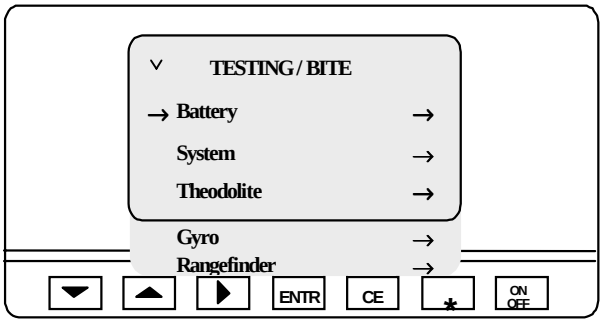
- Press the right cursor key to change the setting between north and south. The default setting is north.
- Press the ENTR key to enter the data and return to the configuration menu.
- Press CE to return to MENU.

2-4.3 Testing/BITE. Self-testing is conducted automatically when the system is powered up. The Testing/BITE function is provided for manual testing of the system.

- Select Testing/BITE using the down cursor, then press the right cursor key or ENTR.

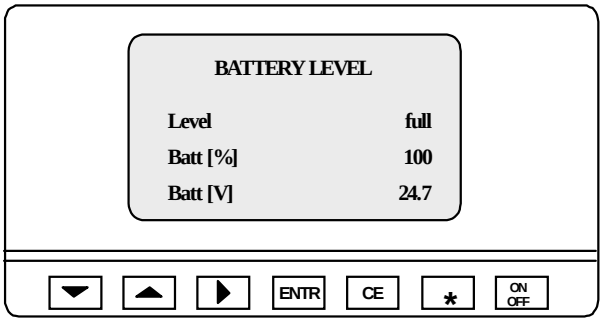


2-4.3-a. Battery Test. This test will determine if the battery is providing sufficient power to conduct missions.



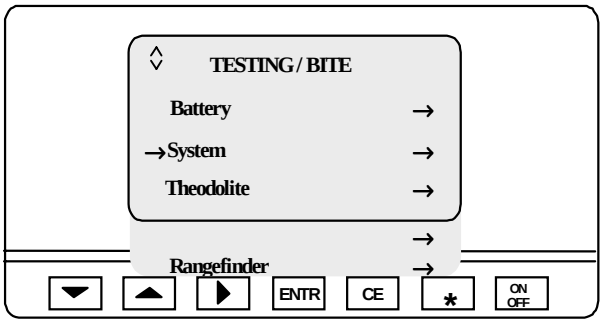
- Select Battery using the right cursor key or ENTR.

The display will provide the operator with battery charge level (full, low or empty), percentage of power remaining and voltage output. If power level is insufficient, replace the battery with a charged battery.

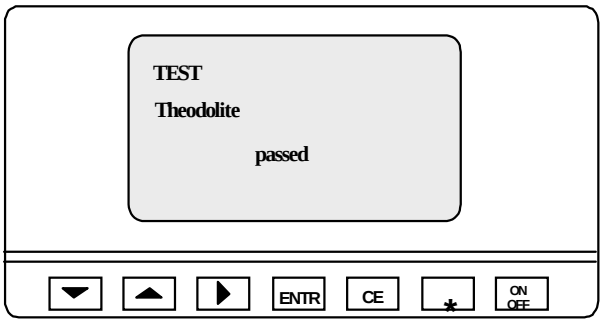


- Press ENTR to return to Testing/BITE menu.

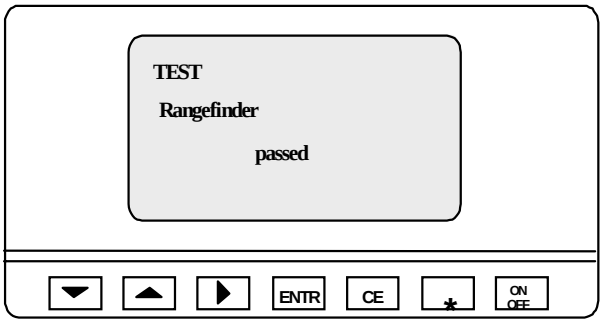
2-4.3.b. System Test. The system test performs tests on the theodolite, rangefinder and gyro. These tests may also be performed individually by selecting the appropriate menu option. In the event of a failure in any of the tests, the display will indicate the failure. Proceed to the troubleshooting procedures in paragraph 3-1 of this manual to rectify the problem.



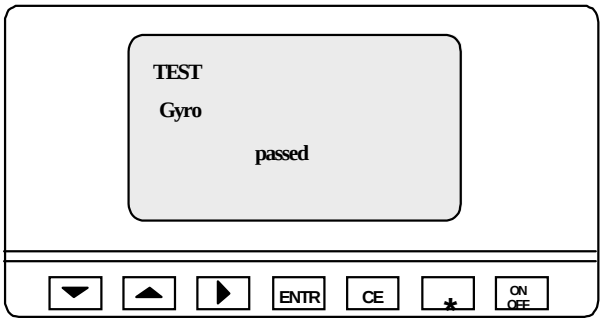
- Select System using the down cursor; then press the right cursor key or ENTR. The first test conducted is on the theodolite. The following screen will be displayed upon completion of the self-test.



- Press ENTR to perform rangefinder test.



- Press ENTR to gyro test. The system requires approximately ten minutes to perform the test. The next screen will be presented upon completion of the Gyro test, indicating pass or failure.



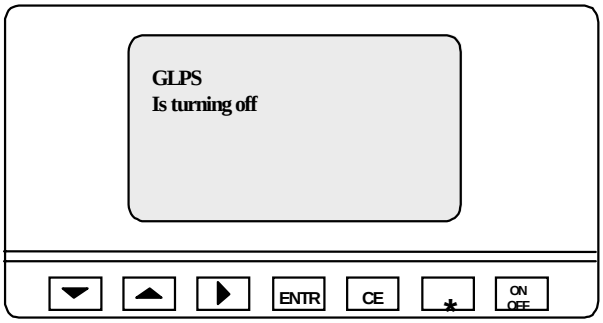
- Press CE to return to MENU.

2-4.3.c. Individual Component Tests. The battery, theodolite, rangefinder and gyro also can be tested individually. To perform the tests individually, select the item desired from the Testing/BITE

menu. Perform the test as outlined in paragraph 2-4.3 above by skipping the system test and selecting the specific component to be tested.

2-5 MARCH ORDER GLPS

- Turn the GLPS off by pressing the ON/OFF key on the key pad. GLPS includes an automatic shutoff feature that activates when the system is idle for 15 minutes. The following screen will momentarily displayed prior to the screen going blank.



CAUTION

DO NOT REMOVE THE BATTERY OR POWER ADAPTER BEFORE TURNING THE GLPS OFF. DATA WILL BE LOST IF THE BATTERY IS REMOVED WHILE THE GLPS IS STILL TURNED ON.

- Remove the target rod from theodolite and return it to its container. Replace the target rod connector protective cover.
- Remove SEB42-1 Battery or SEV22-1 Power Adapter from the hinged mounting bracket located on the back of the gyroscope. Return the battery or power adapter latch to its locked position and replace the unit in its respective container.
- Remove PLGR from bracket. Disconnect RS 232 cable from the PLGR and gyroscope. Replace the RS232 receptacle covers on the PLGR and gyroscope. Place PLGR and cable in respective containers. Remove PLGR bracket from tripod leg and return to its container.

CAUTION

VERTICAL AND HORIZONTAL CONTROL KNOBS MUST BE LOOSE WHEN THE THEODOLITE IS PACKED. IF LOCKED, EXCESSIVE PRESSURE COULD BE APPLIED AND THE CONTROL KNOBS COULD BE STRIPPED. DO NOT LIFT THEODOLITE BY KNOBS OR EYEPIECE. VERTICAL AND HORIZONTAL CONTROL KNOBS HAVE A WHITE CENTERING RING. THESE CENTERING RINGS MUST BE RETURNED TO THE CENTER POSITION, WHERE APPROXIMATELY HALF OF THE LINE IS VISIBLE WHEN LOOKING AT THE LOCKING LEVER. THE RING MUST BE RETURNED TO THIS POSITION PRIOR TO REMOVAL FROM THE GYROSCOPE.

-
- Move the theodolite locking lever to the forward (open) position. Remove the theodolite from gyroscope (ensure the vertical and horizontal fine adjustment knobs are re-centered), replace interface connector protective cover and place the theodolite in the container.
- Secure latches on container.
- Loosen the gyroscope clamping screw. Using the lifting handle, remove gyroscope from tripod. Replace the theodolite data transfer connector protective cover located on the gyroscope and return gyroscope to its container.
- Secure latches on container.

WARNING

TAKE CARE WHEN FOLDING THE TRIPOD LEGS TO PREVENT PINCHING HANDS OR FINGERS

- Replace tripod tilting dish protective cover and secure with strap. Loosen clamping screws on tripod legs. Retract tripod legs and tighten clamping screws. Fold legs together and secure with strap.

2-6 STORAGE

GLPS should be stored in its containers provided. Some precautions should be taken prior to storing.

- Never store wet equipment in containers. If packed wet, remove at the earliest opportunity and wipe dry. Allow container inserts to dry before packing.
- For equipment stored for extended periods, operate the equipment at least annually. Run the gyro for at least 20 minutes. This can be done by running the gyro test two times. This will increase the readiness of the equipment for operation.

2-7 OPERATION OF AUXILIARY EQUIPMENT

Operating the Battery Charger.

WARNING

THE FUSES FOR THE DC AND AC POWER SUPPLIES HAVE DIFFERENT RATINGS. THE DC IS 4A SLOW BLOW. THE AC IS 1.6A SLOW BLOW. THE DC AND AC FUSES ARE NOT INTERCHANGEABLE. USE THE PROPER FUSE IN THE PROPER APPLICATION. NEVER INTERCHANGE THESE FUSES OR USE FUSES OTHER THAN THOSE SPECIFIED IN THIS MANUAL. FAILURE TO USE PROPER FUSES MAY DAMAGE THE BATTERY CHARGER OR MAY CAUSE PERSONAL INJURY.

WARNING

ALWAYS DISCONNECT THE DC OR AC POWER CABLE BEFORE REPLACING A FUSE.

2-7.1.a.1 Charging SEB42-1 Batteries from 10 to 33 VDC

- Make sure the POWER switch (1) is in the centered OFF position. Connect the SEV23-2 (NATO) DC power cable (2) to the battery charger using the upper DC socket (3). Connect the power cable NATO plug to the vehicle power source. The electrical circuit is protected by a 4 amp fuse.
- Mount and secure one or two SEB42-1 batteries in the mounting hinge brackets (4).
- Set the toggle switch (1) to the upper ON-DC position. The yellow POWER light (5) confirms that the charger is on.
- Check the status of the red CHARGE light (6) and the green READY light (7). The red CHARGE light means the battery is being charged. The green READY light means the battery is fully charged.
- Switch the toggle switch to the OFF position before removing or exchanging batteries.

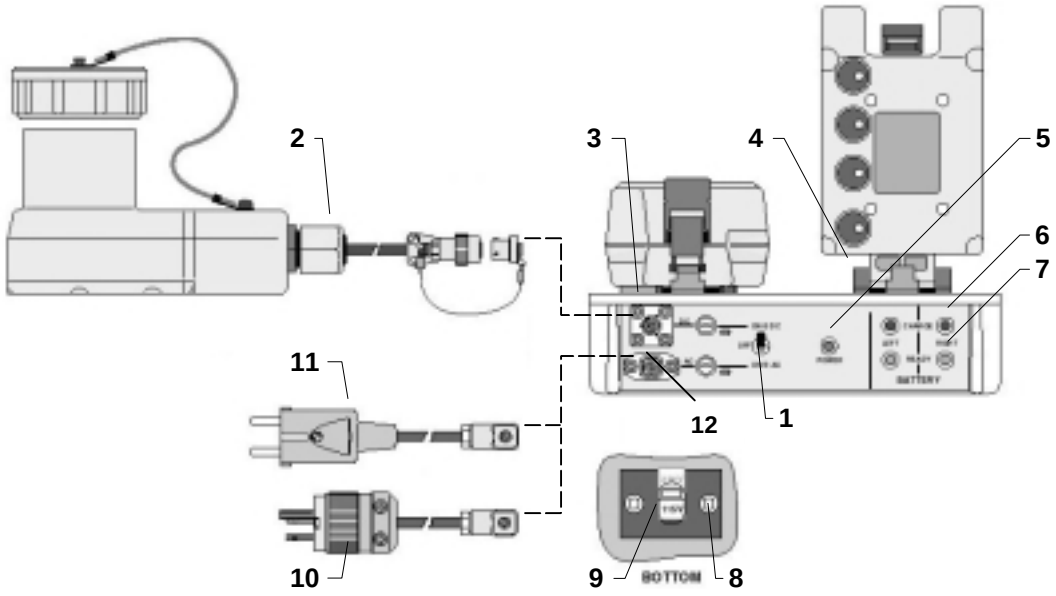


Fig 2-7 SLG6 Battery Charger with Power Cables and Voltage Selector Switch

2-7.1.a.2 Charging SEB42-1 Batteries from 110 to 230 VAC

- Make sure the POWER switch (1) is in the centered OFF position.

CAUTION

THE VOLTAGE SELECTOR ON THE BOTTOM OF THE BATTERY CHARGER MUST BE SET TO 115V OR 230V TO CONFORM TO LOCAL POWER. FAILURE TO MATCH VOLTAGES WILL DAMAGE THE FUSE.

- To change the voltage setting, use a cross tip screw driver to unscrew two screws (8). Remove the cover glass and slide the voltage selector switch (9) to the desired position. Reattach the cover glass with the two screws.
- Select either the SEV34-8 (US) AC power cable (10) or the SEV34-7 (EU) AC power cable (11), based on AC outlet configuration. Connect the AC power cable to the battery charger using the lower AC socket (12) and secure it with the screw. Plug the cable into an AC outlet. The electrical circuit is protected by a 1.6 amp fuse.
- Mount and secure one or two SEB42-1 batteries in the mounting hinge brackets (4).
- Set the toggle switch (1) to the lower ON-AC position. The yellow POWER light (5) confirms that the charger is on.
- Check the status of the red CHARGE light (6) and the green READY light (7). The red CHARGE light means a battery is being charged. The green READY light means a battery is fully charged.
- Switch the toggle switch to the OFF position before removing or exchanging batteries.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

2-8 GENERAL

Preventive maintenance checks and services (PMCS) means systematic caring, inspecting and servicing of equipment to keep it in good condition. The following paragraphs explain the operator's role in PMCS.

a. Be sure to perform PMCS each time you operate GLPS. Always do PMCS in the same order so it becomes habit.

b. Perform BEFORE (b) PMCS before you operate. Always keep in mind CAUTIONS and WARNINGS.

c. Perform DURING (d) PMCS while you operate. Always keep in mind CAUTIONS and WARNINGS.

d. Perform AFTER (a) PMCS after you operate.

e. Perform ANNUAL (A) PMCS each year.

f. If the equipment fails to operate properly, troubleshoot following procedures outlined in Chapter 3 of this manual. Report any deficiencies using proper forms as outlined in DA Pam 738-750.

2-9 PMCS PROCEDURES.

a. Table 2-1 lists inspections and care required to keep GLPS in good operating condition.

b. The "INTERVAL" column of Table 2-1 indicates when to perform each check or service.

c. The "ITEM TO BE INSPECTED" column of Table 2-1 indicates what item is to be inspected.

d. The "PROCEDURE" column of Table 2-1 indicates what procedure to follow when performing the inspection or service.

e. If equipment does not perform as required, refer to troubleshooting procedures in Chapter 3 of this manual. Report any malfunctions or failures on DA Form 2404 or refer to DA Pam 738-750.

CAUTION

DO NOT IMMERSE ELECTRICAL/ELECTRONIC COMPONENTS IN WATER. IMMERSION WILL CAUSE DAMAGE TO ELECTRICAL/ELECTRONIC COMPONENTS.

f. When performing PMCS you will require dry, clean cloth. The following checks are common for the entire system.

1. KEEP IT CLEAN. Dirt and debris may get in the way and cause or cover up serious problems. Clean as you work or as needed. Use a damp cloth to clean metal surfaces and lens tissue and the soft lens brush issued with the system to clean the lenses. Dry thoroughly after cleaning and before repacking the system.

2. RUST AND CORROSION. Check GLPS for rust and corrosion. If rust or corrosion exists, remove it. If painting or protective coating is required, notify unit maintenance.

3. BOLTS, NUTS AND SCREWS. Check for loose, missing, bent or broken nuts, bolts or screws. Pay particular attention to the tripod. If loose screws are found, tighten them using the open end and hex wrench provided with the system. Screws securing protective covers to the system should be tightened using a regular flat screwdriver.

4. CABLES AND CONNECTORS. Check power and data cables for cracks, breaks or dry rot. Unit maintenance will order replacement cables if these conditions exist. Check connectors for dirt and debris. Clean and remove as necessary.

5. Check illumination of data display, key pad and reticle at night or in a dark room.

CAUTION

DO NOT USE CHEMICALS FOR CLEANING, EXCEPT WHERE SPECIFIED BY TECHNICAL PUBLICATION. SOLVENTS CAN DETERIORATE PAINT, COATINGS OR LENS CEMENT.

CAUTION

TO PREVENT ETCHING OF GLASS SURFACES, DO NOT USE DIRTY OR ROUGH-TEXTURED RAGS TO CLEAN. DO NOT TOUCH OPTICS WITH FINGERS.

Table 2.1. Operator Preventive Maintenance Checks and Services

Item No.	Interval b	d	a	A	Item to be Inspected	Procedure	Equipment Not Mission Capable (NMC) if:
1	•		•	•	**GLPS**	Check completeness.	Theodolite/LRF, gyroscope or tripod missing.
2			•	•	Mechanical Parts	Inspect for cleanliness and serviceability. Check connectors for serviceability.	Mechanical parts are broken or missing.
3				•	Electrical Parts and Cables	Check cables for cracks, cuts, dry rot, fraying or breaks in insulation.	Power cannot be applied to operate GLPS.
					Theodolite & Laser Rangefinder		
4		•		•	Circular Level Vial	Check to determine if vial is cracked or broken.	Level vial broken.
5		•		•	Locking levers and fine adjustment knobs	Check function and for smooth motion.	Motion is rough or parts are missing or broken.
6		•	•	•	Optics	Inspect for chips, cracks, clarity and cleanliness.	Cannot lay howitzers or position GLPS due to fault in optics.
7		•		•	Standing axis	Check that rotation is smooth.	Rotation is rough.
8		•		•	Telescope eyepiece	Adjust diopter.	Reticle will not focus.
9		•		•	Telescope	View target at >30 meters.	Target will not come into focus.
10				•	**SKK3-08 Gyroscope**	Verify calibration of system as outlined on page 3-3 of this TM.	Gyroscope fails system test.
11			•	•	Contacts	Check for damage and cleanliness. If dirty, clean.	Contacts damaged or completely corroded.

Table 2.1. Operator Preventive Maintenance Checks and Services (Continued)

Item No.	Interval b	d	a	A	Item to be Inspected	Procedure	Equipment Not Mission Capable (NMC) if:
12	•	•			**Battery Charger and Batteries**	Check function during charging.	Battery Charger, Batteries and Power Adapter are all missing or inoperative.
12a	•				Batteries	Install on charger and check for green light.	No green light.
13			•	•	Contacts	Check for damage and cleanliness. If dirty, clean	Contacts damaged or completely corroded.
14	•			•	**Power Adapter**	Attach power adapter to gyroscope. Connect to 10 – 33 VDC. Power ON. Press ENTR to check display elements and input voltage on the theodolite display. Check display and keyboard illumination.	Battery Charger, Batteries and Power Adapter are all missing or inoperative. Display is illegible.
15			•	•	Contacts	Check for damage and cleanliness. If dirty, clean	Contacts damaged or completely corroded.
					Tripod		
16		•		•	Legs, hinges	Check for any loose parts.	Not capable of setting up and leveling the system.
17		•		•	Leveling screws	Check that motion is smooth.	
18		•		•	Clamping screws	Check function.	
19				•	**Winterization Kit**	Check for missing components.	
20				•		Connect elements to power distribution box. Connect to power supply. Check LED. If LED is illuminated, system is operational.	LED is not illuminated.
					Containers		
21	•			•	Closures, handles	Check function.	
22			•	•	Inserts, foam	Leave open until fully dry.	

Section III. OPERATION UNDER USUAL CONDITIONS

2-10 GENERAL

This section contains special instructions for operating and servicing GLPS under unusual conditions. Special care must be taken when extremes in temperature, humidity and terrain are present or anticipated. Proper handling will not only ensure proper operation, but will also guard against excessive wear of working parts and damage to the system.

2-11 WINTERIZATION KIT INSTALLATION

The SVP250 winterization kit is an externally mounted device used during periods of extreme cold weather. Use the winterization kit at ambient temperatures from –28°F to –51°F / –32°C to –46°C. The winterization kit heats the GLPS above the minimum operating temperature of –28°F / –32°C.

Warm-up time is dependent upon the actual temperature of the SKK3-08 Gyroscope and the T502S Electronic Theodolite. The warmer these components, the shorter the warm-up time. When the containers with these components are stored at temperatures of –51°F (-46°C), the warm-up time is approximately 75 minutes. If the container with the theodolite can be kept at temperatures above –22°F (-30°C), the warm-up time can be reduced to approximately 35 minutes. It is more critical to keep the T502S Electronic Theodolite warm because this instrument contains the liquid crystal display readout of GLPS data.

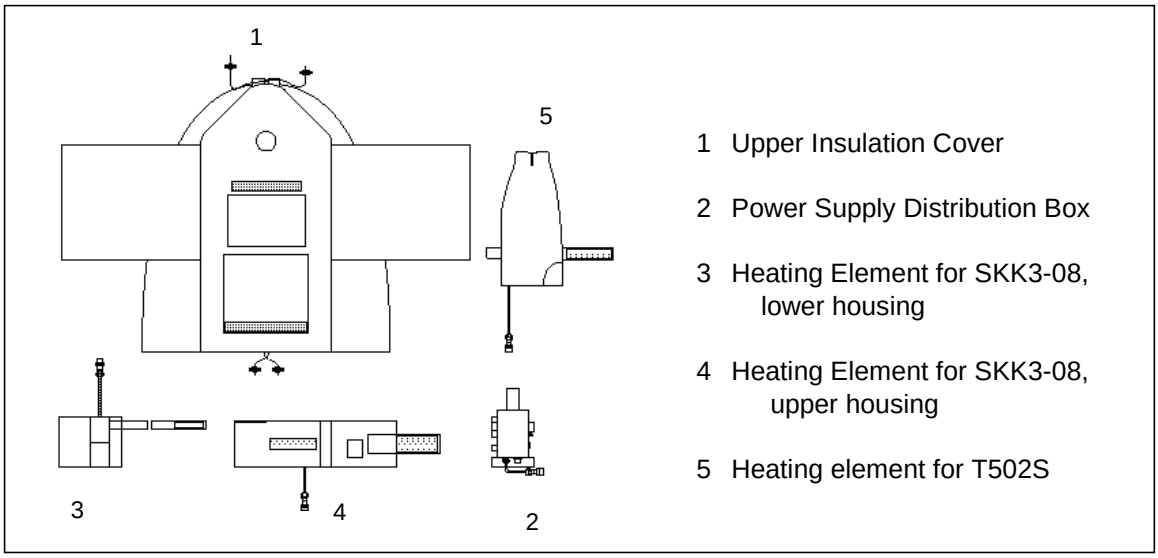


Figure 2-8. SVP250 Winterization Kit Components

a. Attach SEV22-1 power adapter to the back of the gyroscope to power the system. Do not use the SEB42-1 battery if the external temperature is below the minimum operating range for the battery. Mount the power supply distribution box (1) on a tripod leg.

b. Mount the heating element for SKK3-08 gyroscope lower housing (Figure 2-8 item 3) over the lower housing (2) as shown in figure 2-9. Fasten the velcro tab on the mounting band to secure the heating element in place.

c. Mount the heating element for the SKK3-08 gyroscope upper housing (Figure 2-8 item 4) by placing the rear mounting band over the power adapter and cable (3) and securing with the velcro closure. Wrap the heating element around both sides of the gyroscope with the opening over the PLGR data port on the face of the gyroscope (4) as shown in Figure 2-9. Secure the in place with the velcro closure.

d. Mount the heating element for the T502S theodolite (Figure 2-8 item 5) by first placing the target rod and connector located on the operating handle of the theodolite through the hole provided in the center of the heating element. The connecting band on the back side of the element should be positioned on the back side of the theodolite (5) as shown in Figure 2-9. Secure the mounting band (6) with velcro closure.

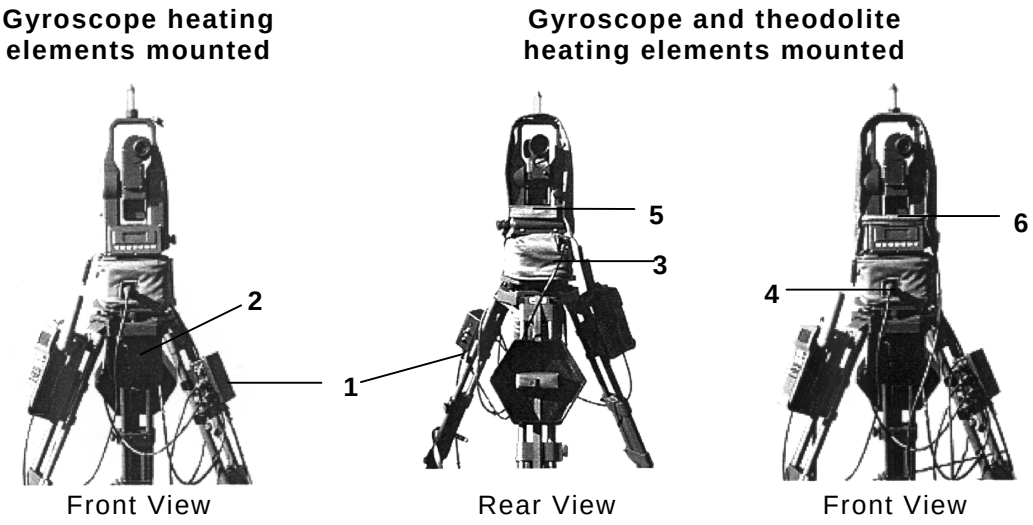


Figure 2-9. Power Supply Mounting

e. Connect the SKK3-08 gyroscope upper and lower housing heating element cables and the theodolite heating element cable to the connectors (8) on the power supply distribution box (Figure 2-10). Connect cable (2) from the Power Supply Distribution Box to the SEV22-1 Power Adapter Mounted on the gyroscope.

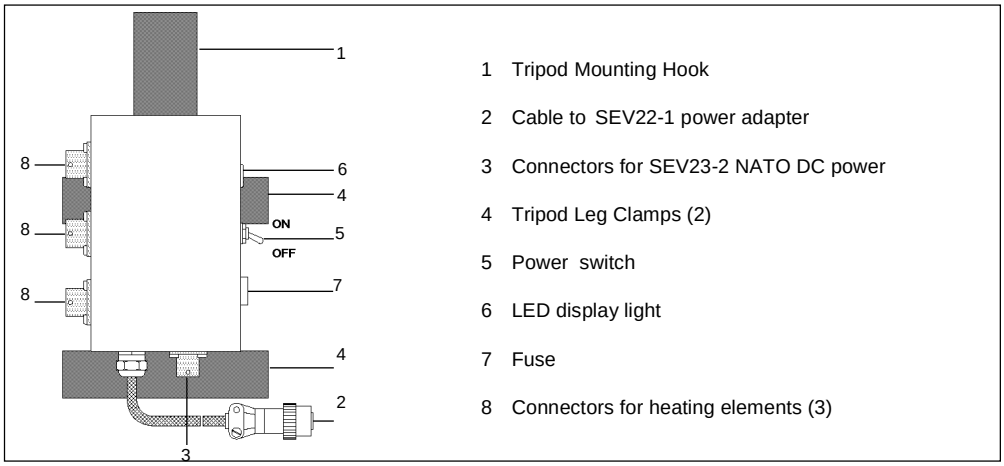


Figure 2-10. Power Supply Distribution Box

f. Mount the upper insulation cover over the theodolite (Figure 2-11). Pull the cover over the theodolite, inserting the target rod through the opening at the top of the cover (11). Align the window (13) to provide an unhindered view of the display and keyboard. Align the opening for the telescope eyepiece (12) over the telescope eyepiece. Secure the openings for the telescope objective and laser exit window on the back side of the instrument over the telescope objective. Secure the upper insulation blanket in place with the pull cord.

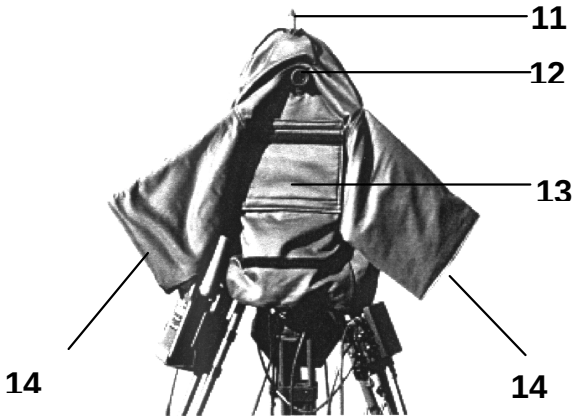


Figure 2-11. Winterization Kit Mounted

g. Connect the SEV23-2 NATO DC power cable to the connector (3) located on the power supply distribution box as shown in Figure 2-10. Connect the NATO slave adapter on the power cable to the NATO connector on the vehicle. Move the power switch (5) on the power supply distribution box to the ON position. Verify the LED display light (6) is illuminated. This will indicate the system is operating properly. Operate the GLPS as in normal operations through the two sleeves (14) as shown in Figure 2-11.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. TROUBLESHOOTING, VERIFICATION, AND MAINTENANCE

3-1 TROUBLESHOOTING

The troubleshooting table lists common malfunctions that may be encountered during operation or maintenance of GLPS. Tests and inspections should be performed in the order listed in the table. If malfunctions are encountered which are not listed or corrected by procedures in this manual, notify direct support maintenance.

a. If equipment does not function properly, make sure you are operating it correctly. Consult the troubleshooting table to find out what to do in case of a problem. Pay particular attention to:

- Leveling and adjustment of the circular level.
- Jolts or vibration when the gyroscope is measuring.
- Power supply.
- Power conservation: The system shuts off automatically when idle after fifteen minutes but retains all data.
- During operation, Built-in Test Equipment (BITE) monitors various vital functions of the system, to include gyroscope, theodolite and rangefinder.

- When an ERROR message is displayed proceed as follows:
  1. Press ENTR to clear the ERROR message.
  2. Repeat the operation being performed at time the ERROR was displayed and perform gyro spin.
  3. If the ERROR message is repeated (1st repeat), turn GLPS off and check the gyroscope seating:
     a) Remove the theodolite and place in transport case.
     b) Remove the gyroscope from tripod and place in transport case.
     c) Ensure tripod leveling is correct.
     d) Reseat gyroscope in tripod and tighten clamping screw on tilting dish.
     e) Reattach theodolite to gyroscope and ensure precision leveling is correct.
  4. Turn GLPS on and use TEST/BITE screen to verify system readiness.
  5. Repeat the operation being performed when the ERROR message was displayed.
  6. If the ERROR message is repeated (2nd repeat), proceed to Table 3-1 (page 3-2 of this manual).
  7. Note the complete error message displayed and the operation being performed at time of error (e.g. BackPolar Plot/Aim to RefPt).
  8. Record this information on the DA Form 2404.

c. Shipping Instructions for items not repairable at field level:

1. Fill out DA 2404 to describe defects with item and where the items need to be returned to. If serialized, include serial number of unit.

2. Address for Shipping:

   Borish Manufacturing Corp.
   4511 East Paris SE
   Grand Rapids, MI 49512
   DODAC: CMANJX
   RIC: CTN

3. Send one copy of DA Form 2404 to the above address and one copy to the following address:

   TACOM-RI
   AMSTA-LC-CFSF
   ATTN: Ms. Margaret Emmert
   Rock Island Arsenal, IL 61299-7630

Table 3-1. Troubleshooting.

GLPS Troubleshooting Procedures		
Malfunction	**Test or Inspection reveals:**	**Corrective Action**
SLG6-1 Battery Charger Power Control not lit.	No AC or DC power.	Check voltage selector. Check power cable. Replace fuse (AC or DC). Power Switch On-AC or On-DC.
Charge or Ready not lit.	Battery not being charged.	Clean contacts. Replace fuse.
BATTERY CHARGED not displayed after maximum of 14 hours charging.	Battery Charger or Battery defective.	Try a different battery on same side of charger. If same problem occurs, charger is defective. If second battery works, first battery is defective.
WARNING Battery is Low is displayed.	Low power from SEB42-1 Battery.	Press ENTR to return to program. Complete current task. Turn GLPS off. Change battery and continue mission.
	No power from SEV22-1 Power Adapter.	Check external DC power. Check power cable. Replace fuse. Clean contacts.
	Note to Operator.	When **WARNING Battery is Low** is displayed, the operator should turn the system "off" before removing and replacing the battery. Once power is restored, the data collected prior to shutdown is retained. If the battery is removed without proper shutdown procedures, data will be lost.
BATTERY EMPTY warning is displayed.	No power.	Replace battery.
WARNING – Gyro Disturbed (Check settings) is displayed.	Gyroscope has detected a fault in the settings.	Press ENTR to return to program. Check that hemisphere setting in **CONFIGURATION** is correct. Check that **GLPS position coordinates** are correct. Continue the mission**.**
WARNING – Gyro Disturbed (Vibration) is displayed.	Gyroscope has detected vibration that affects accuracy of measurement.	Press ENTR to return to program. Determine cause of vibration (vehicle passing, wind, etc.) and correct. **If wind is detected, block wind with body or vehicle and remove cover from tripod leg.** Continue the mission.
ERROR message displayed: – SYSTEM + message – THEODOLITE + message – GYRO + message – MRF + message – PLGR + message	 Defect is above operator level. Theodolite defect. Gyroscope defect. Laser rangefinder defect. PLGR error.	 Turn in GLPS. Turn in GLPS. Turn in GLPS. Turn in GLPS. Check PLGR settings and change as required. If error repeated, proceed to PLGR operator manual.
SZI9 Target Rod doesn't work	No power or bulb defect.	Clean contacts. Replace bulb. Replace fuse.

3-2 FIELD VERIFICATION

CAUTION

DO NOT ATTEMPT ANY REPAIRS OR ADJUSTMENTS BEYOND THOSE DESCRIBED IN THIS MANUAL. TURN THE EQUIPMENT IN TO THE APPROPRIATE MAINTENANCE ORGANIZATION.

CAUTION

PRECISION IS ESSENTIAL TO ACCURATE VERIFICATION. ATTENTION TO DETAIL AND STRICT COMPLIANCE WITH SETUP AND MEASUREMENT PROCEDURES OUTLINED IN THIS MANUAL ARE REQUIRED.

FIELD VERIFICATION PROCEDURES REQUIRE THE GLPS TO BE PLUMBED OVER THE SCP.

TO THE EXTENT POSSIBLE, ELIMINATE ALL DISTURBING ENVIRONMENTAL INFLUENCES AND FACTORS TO THE INSTRUMENT (e.g. WIND, VIBRATION, SOFT GROUND, AND HEAT WAVES)

3-2.1. Introduction. Field verification is performed to ensure calibration settings established and set by the manufacturer are within tolerance. Verification is required:

- Upon receipt of equipment.
- Annually.
- When gyroscope or theodolite have been subjected to rough handling when not packaged in transport containers.

For best accuracy, verification is performed over a survey control point (SCP) with a known baseline that has been established with third order, or higher, level of survey accuracy. In the event that an established SCP with known baseline and acceptable accuracy is not available, paragraph 3-2.4 provides an alternative method of establishing a baseline with which to verify calibration, using two (2) GLPS.

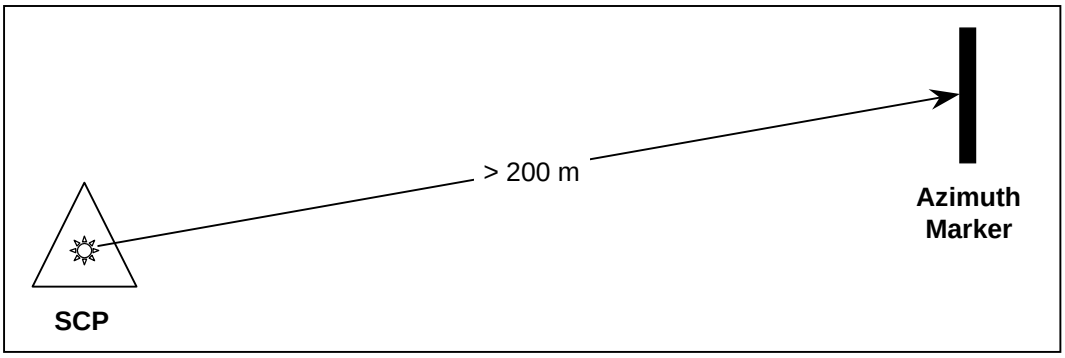


Figure 3-1. Setup for Verification Using SCP

3-2.2. Setup for Verification Using Survey Control Point (SCP with Baseline Method). Set up and center the GLPS over the SCP as shown in Figure 3-1, following the procedures outlined in paragraph 2-2 of this manual. Range to the Azimuth Marker for the baseline must be at least 200 meters from the SCP.

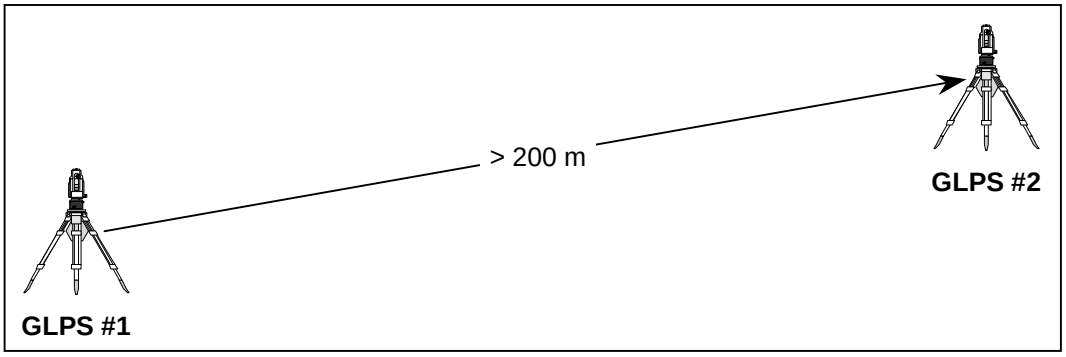


Figure 3-2. Setup for Verification Without SCP

3-2.3. Setup For Verification Using Field Expedient Method (SCP with Baseline Is Not Available).

(1) Set up (2) GLPS as shown in Figure 3-2, following the procedures in paragraph 2-2 of this manual, making sure that the distance between the systems is greater than 200 meters. Using the plumb bob assembly, mark the center of the OS, at each GLPS.

(2) Position GLPS using PLGR or Back Polar Plot, following the procedures in paragraph 2-4.1.a of this manual.

(3) Enter the Lay by Azimuth menu, sight on the target rod of the distant instrument, range it, and record the coordinates of the distant instrument (i.e. easting, northing, and elevation).

(4) Use each instrument to verify the position information of the other. Readings should be within ± 10 meters in northing, easting, and altitude. If not, repeat the process.

3-2.4. Field Expedient Verification Procedure (SCP with Baseline Not Available).

(1) Position and orient each system as described in paragraph 3-2.3, above.

(2) Throughout the following procedure, ensure that the GLPS is plumbed over the center of the OS marked in 3-2.3 (1), above.

(3) Enter the Lay by Azimuth menu and sight on the target rod of the distant instrument. Determine the azimuth to the instrument and record, Az_M (measured azimuth).

NOTE

WAIT TWO TO THREE MINUTES BETWEEN GYRO MEASUREMENTS.

(4) Reorient the gyroscope at the Run Gyro prompt, and repeat step 3-2.4(2). Record the measured azimuth.

(5) Repeat steps 3-2.4(2) through 3-2.4(3) three times, for a total of four (4) measurements at each location.

NOTE

LEVELING SCREWS ARE APPROXIMATELY 120 DEGREES APART AND MAY BE USED AS A REFERENCE.

(6) Rotate the gyroscope in the tilting dish, approximately 120º.

(7) Ensure that the system is centered over the SCP and is within precision leveling tolerance.

(8) Repeat steps 3-2.4.(2) through 3-2.4.(6) three times for a total of twelve (12) azimuth measurements for each system.

(9) Calculate (Az_1 and Az_2) the mean of the 12 azimuth readings determined at each station.

(10) Add 3200 to the lesser of these azimuths (Az_1 or Az_2).

(11) If [(Az_1 + 3200mil) - Az_2] = 0 within ± 0.8 mil, the systems are within tolerance.

(12) If [(Az_1 + 3200mil) - Az_2] exceeds 0 ± 0.8 mil, replace one or both systems and repeat this process.

Upon successful completion of the field expedient verification procedure, permanently mark the center of each OS used; recording their coordinates and the azimuth between them. If these benchmarks are maintained, the coordinates and measured azimuth can be used for future verification procedures (see paragraph 3-2.5), thereby saving time.

3-2.5. Verification procedure. From setup and orientation of the GLPS over a known baseline, conduct the following.

(1) Select the Input Position option from the menu. Verify that the data is correct and press ENTR.

(2) Execute Run Gyro.

(3) Enter the Lay by Azimuth menu, and sight on the azimuth marker.

(4) Measure and record the azimuth to the marker as Az_M.

NOTE

WAIT TWO TO THREE MINUTES BETWEEN GYRO MEASUREMENTS

(5) Reorient the gyroscope at the Run Gyro prompt.

(6) Repeat steps 3-2.5.(2) through 3-2.5.(5) two times, for a total of three (3) measurements at each location.

NOTE

LEVELING SCREWS ARE APPROXIMATELY 120 DEGREES APART AND MAY BE USED AS A REFERENCE.

(7) Rotate the gyroscope in the tilting dish, approximately 120º.

(8) Repeat steps 3-2.5.(2) through 3-2.5.(7) two times, for a total of nine (9) azimuth measurements.

(9) Calculate the mean of the nine (9) azimuth measurements.

(10) Calculate the difference, $\Delta Az = Az_K - Az_M$, between the known (Az_K) and the measured (Az_M) azimuths. Determine the maximum tolerance in the table below. Turn the instrument in to Direct Support Maintenance for calibration if the difference (ΔAz) exceeds the permissible tolerance. Following the procedures in paragraph 3-2.5. above, independently verify that the difference (ΔAz) exceeds the maximum tolerance before returning the system to Depot for maintenance.

	SCP with Baseline Method	Field Expedient Established Baseline Method
Maximum Tolerance of ΔAz	± 0.4 mil	± 0.8 mil

3-3 MAINTENANCE PROCEDURES

3-3.1 SKK3-08 Gyro Compass

(1) Replacement of cover (Fig. A-2, Item 1).
- Unscrew screw (Fig. A-2, Item 2) and remove with washer (Fig. A-2, Item 3).
- Remove cover, and replace.

(2) Replacement of cover (Fig. A-2, Item 4)
- Unscrew screw (Fig. A-2, Item 5)
- Remove cover with keeper, and replace.

3-3.2 T502S Theodolite with MRF2000 Rangefinder

(1) Replacement of gyro compass interface protective cover (Fig. A-3, Item 1).
- Unscrew screw (Fig. A-3, Item 2) and remove with washer (Fig. A-3, Item 3).
- Remove cover, and replace.

(2) Replacement of target rod interface protective cover (Fig. A-3, Item 7).
- Remove cover, and replace.
  - Cover not screwed.

(3) Replacement of fuse (Fig. A-3, Item 4) or fuse holder (Fig. A-3, Item 5).
- Unscrew fuse holder.
- Replace fuse and/or fuse holder.

(4) Replacement of eyepiece cover (Fig. A-3, Item 6).
- Remove cover, and replace.
  - Cover not screwed.

3-3.3 SZ19 Target Rod

(1) Replacement of target rod parts.
- Unscrew target tip (Fig. A-4, Item 1).
- Unscrew lamp holder (Fig. A-4, Item 2).
- Remove bulb (Fig. A-4, Item 3) from lamp holder (Fig. A-4, Item 2).
- Replace whatever is necessary (Fig. A-4, Item 1, 2, 3, or 4)

3-3.4 SEB42-1 Battery

(1) Replacement of fuse (Fig. A-5, Item 1) or fuse holder (Fig. A-5, Item 2).
- Unscrew fuse holder
- Replace fuse and/or fuse holder.

(2) Replacement of locking latch (Fig. A-5, Item 3)
- Unscrew two screws (Fig. A-5, Item 4).
- Replace locking latch.

3-3.5 SEV22-1 Power Adapter

(1) Replacement of fuse (Fig. A-6, Item 1) or fuse holder (Fig. A-6, Item 2).
- Unscrew fuse holder
- Replace fuse and/or fuse holder.

(2) Replacement of locking latch (Fig. A-6, Item 3)
- Unscrew two screws (Fig. A-6, Item 4).
- Replace locking latch.

3-3.6 SLG6-1 Battery Charger

- Replacement of fuse (Fig. A-7, Item 1 or 3) or fuse holder (Fig. A-7, Item 2).
    - Unscrew fuse holder
    - Replace fuse and/or fuse holder.

(2) Replacement of voltage selector seal (Fig. A-7, Item 4) or cover glass (Fig. A-7, Item 5).

- Unscrew two screws (Fig. A-7, Item 7) and remove with washers (Fig. A-7, Item 6).
- Replace seal and/or cover glass.

(3) Replacement of SEV23-2 cable cover (Fig. A-7, Item 9)

- Unscrew attaching screw from plug.
- Remove cover with keeper, and replace.

(4) Replacement of cable connector seal (Fig. A-7, Item 8).

- Strip away old seal (from cable assembly SEV34-7 or SEV34-8) and remove.
- Replace seal.

3-3.7 SST90-1 Tripod

- Replacement of Protective Cover Assembly components (Fig. A-8, Item 1).
    - Unbuckle the protective cover assembly (Fig. A-8, Item 1) with strap (Fig. A-8, Item 4).
    - Lift strap from ball screw (Fig. A-8, Item 3) and pull strap from protective cover assembly.
    - Open pouch (Fig. A-8, Item 5) and remove plumb bob assembly (Fig. A-8, Item 11), open end wrench (Fig. A-8, Item 12), and Allen key (Fig. A-8, Item 13).
    - Using a cross-recessed screwdriver and the wrench, remove four nuts (Fig. A-8, Item 8), four washers (Fig. A-8, Item 7), two distance plates (Fig. A-8, Item 6), and pouch.
    - Using a cross-recessed screwdriver, remove screw (Fig. A-8, Item 9) from ball screw.
    - Replace items as necessary.
    - Reassemble in reverse order, applying thread sealant to all screws.

(2) Replacement of Carrying Straps (Fig. A-8, Item 16 and 17).

NOTE

CARRYING STRAP CAN ONLY BE PLACED ON ONE LEG OF THE TRIPOD.

- Disengage shackles at the ends of carrying straps from the retainer knobs and remove the carrying strap (Fig. A-8, Item 16).
- Remove tripod leg strap (Fig. A-17, Item 17), using a cross-recessed screwdriver to remove two screws (Fig. A-8, Item 18).
- Replace as necessary.

(3) Replacement of Tripod Head components (Fig. A-9).

- Using a small screwdriver, remove Circlip (Fig. A-9, Item 2), slide (Fig. A-9, Item 3), and clamping screw (Fig. A-9, Item 4), from tilting dish (Fig. A-9, Item 1).
- Loosen two screws (Fig. A-9, Item 13) prior to removal of clamping jaw screws (Fig. A-10, Item 3), to remove each leg assembly (Fig. A-8, Item 14).
- Use a wrench to loosen the bottom portion of the leveling screws (Fig. A-9, Item 12), to remove.
- Using an Allen key, remove six screws (Fig. A-9, Item 10), twelve spring washers (Fig. A-9, Item 9), tripod plate (Fig. A-9, Item 14), three sliding supports (Fig. A-9, Item 5), and three ceramic balls (Fig. A-9, Item 6).
- Remove six screws (Fig. A-9, Item 10), twelve spring washers (Fig. A-9, Item 9), and tilting dish (Fig. A-9, Item 1).

- Unscrew three leveling screws (Fig. A-9, Item 12) from the axial bearings (Fig. A-9, Item 7).
- Screw out three axial bearings (Fig. A-9, Item 7) and remove ring (Fig. A-9, Item 8).
- Using open end wrench, unscrew circular level vial (Fig. A-9, Item 11).
- Using a small wrench, unscrew six screws (Fig. A-9, Item 13) that lock six screws (Fig. A-9, Item 10) in place.
- Replace items as necessary.
- Reassemble in reverse order.
- Secure three axial bearings (Fig. A-9, Item 7) with thread sealant.
- Screw in six screws (Fig. A-9, Item 10) until pressure from the twelve spring washers (Fig. A-9, Item 9) is felt. Tighten one-half turn more and secure with thread sealant.
- Lightly grease clamping screw (Fig. A-9, Item 4), three sliding supports (Fig. A-9, Item 5), and ceramic balls (Fig. A-9, Item 6).
- Screw leveling screws (Fig. A-9, Item 12) into tripod plate and tighten with pliers. Secure with thread sealant.
- Screw six screws (Fig. A-9, Item 13) one half revolution into tripod plate.

(4) Replacement of Tripod Legs (Fig. A-8, Item 14 or 15).

- Using open end wrench (Fig. A-8, Item 12), loosen two screws (Fig. A-9, Item 13) in tripod plate (Fig. A-9, Item 14) above the corresponding tripod leg.
- Using an Allen key, remove two screws (Fig. A-10, Item 3), two clamping jaws (Fig. A-10, Item 2), two bearings (Fig. A-10, Item 1), and the tripod leg.
- Using an Allen key, remove two screws (Fig. A-10, Item 4) and pull out the foot assembly (Fig. A-10, Item 10). Set the fastening plate (Fig. A-10, Item 5) aside. Using a small screwdriver, loosen the screw (Fig. A-10, Item 7) and remove the clamping screw (Fig. A-10, Item 6).

NOTE

CLAMPING SCREW (Fig. A-10, Item 9) CONSISTS OF TWO THREADS.

- Remove clamping screw (Fig. A-10, Item 9) by turning it clockwise to the stop, bending the wooden bar inward and releasing the left-handed thread.
- Visually check that the left-handed thread is completely free of its brass retainer fitting.
- Hold the wooden bar firmly in place and turn the thumbscrew counterclockwise to remove it.
- Remove washer (Fig. A-10, Item 8).
- To reassemble, slide the lower clamping profile (Fig. A-10, Item 11) over the two wooden bars. Turn the clamping screw (Fig. A-10, Item 9) completely in to the profile.
- Fit washer (Fig. A-10, Item 8) over clamping screw. Press the wooden bar with the brass retainer fitting firmly against the clamping screw. Turn the clamping screw counterclockwise and check to ensure proper threading in the brass retainer fitting. Turn the clamping screw counterclockwise until it stops.
- Slide the foot assembly (Fig. A-10, Item 10) into the tripod leg assembly and reassemble in reverse order.
- Apply thread sealant to screws (Fig. A-10, Items 4 and 7).

3-3.8 GLPS Transport Containers

(1) Replacement of Upper Inserts (Fig. A-12, Item 2, 5, and 8).

- Rip the damaged insert from its container lid.
- Remove all adhesive residue with a scraper.

WARNING

USE METHYL ETHYL KETONE IN A WELL-VENTILATED AREA. ABSORPTION THROUGH THE SKIN OR INHALATION IN CONCENTRATION IS HARMFUL AND INGESTION MAY BE FATAL.

- Remove all traces of adhesive with Methyl Ethyl Ketone until the surface of the lid is clean.

NOTE

THE SURFACES TO BE JOINED MUST BE CLEAN, DRY, AND FREE OF DUST, OIL, AND KETONE.

- Smear rubber adhesive on the top contact surface of the replacement insert. Avoid getting adhesive on the insert sides.
- Let stand five (5) minutes and again smear rubber adhesive on the top contact surface of the insert, avoiding getting adhesive on the insert sides.
- Apply adhesive in the same manner to the inside surface of the lid which makes contact with the insert. Avoid getting adhesive on the sides of the lid.
- Let the adhesive evaporate for ten (10) minutes.
- Align the insert with the lid and press firmly into place.
- Do not close the container for at least 12 hours.

(2) Replacement of Lower Inserts (Fig. A-12, Item 3, 6, and 9).

NOTE

LOWER INSERTS ARE NOT GLUED IN THE SAME MANNER, BUT ARE PARTIALLY FORM LOCKED.

- Remove the damaged insert from the container.
- Remove and clean adhesive residue from inside of cases in the manner described above
- Place the new insert in the container.
- Apply adhesive only along the top rim at the corners of the case. Temporarily insert wooden wedges near the corners to compress the insert enough to apply adhesive.
- Observe drying times between adhesive application and before placing equipment in or closing cases.

APPENDIX A
REPAIR PARTS AND SPECIAL TOOLS LIST

A-1 Scope. This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of operator and direct support maintenance on the GLPS. It authorizes the requisition, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

A-2 General. In addition to Section I, Introduction, this Repair Parts and Special Tools list is divided into the following sections:

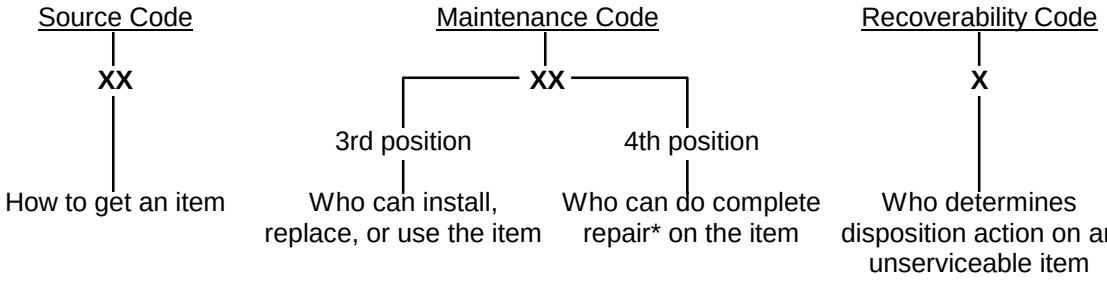
a. Section II - Repair Parts List. A list of spares and repair parts authorized by this RPSTL, for use in the performance of maintenance. The list also includes parts that must be removed for replacement of the authorized parts.

b. Section III - Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE (UOC) column) for the performance of maintenance.

A-3 Explanation of Columns (Sections II and III).

a. ITEM NO. (Column (1))**.** Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column (2))**.** The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria and disposition instruction, as shown in the following breakout:



*Complete repair: Maintenance capacity, capability and authority to perform all corrective maintenance tasks of the “Repair” function in a use/user environment in order to restore serviceability to a failed item.

1. Source Code. The source code tells you how to get an item needed for maintenance, repair or overhaul of an end item/equipment. Explanations of source codes follow:

Code		Explanation
PA PB PC** PD PE PF PG		Stocked items; use applicable NSN or request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. **Items coded PC are subject to deterioration.
KD KF KB		Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.
MO	(Made at unit/AVUM Level)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION and USABLE ON CODE (UOC) column and listed in the bulk material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
MF	(Made at DS/AVUM Level)	
MH	(Made at GS Level)	
ML	(Made at Specialized Repair Activity (SRA))	
MD	(Made at Depot)	
AO	(Assembled by unit/AVUM Level)	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned, or fabricated and assembled, at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
AF	(Assembled by DS/AVIM Level)	
AH	(Assembled by GS Category)	
AL	(Assembled by SRA)	
AD	(Assembled by Depot)	

NOTE

WHEN AUTHORIZED, CANNIBALIZATION OR CONTEOLLED EXCHANGE MAY BE USED AS A SOURCE OF SU0PPLY FOR ITEMS WITH THE SOURCE CODES LISTED BELOW, EXCEPT FOR THOSE SOURCE-CODED “XA” OR THOSE AIRCRAFT SUPPORT ITEMS RESTRICTED BY THE REQUIREMENTS OF AR 700-42.

XA- Do not requisition an “XA”-coded item. Order its next higher assembly.
XB- If an “XB” item is not available from salvage, order it using the CAGEC and part number given.
XC- Installation drawing, diagram, instruction sheet, field service drawing that is identified by manufacturer’s part number.
XD- Item is not stocked. Order an “XD”-coded item through normal supply channels using the CAGEC and part number given, if no NSN is available.

2. Maintenance Code. Maintenance codes indicates the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the 3rd and 4th positions of the SMR code as follows:

a) The maintenance code entered in the 3rd position tells you the lowest maintenance level authorized to remove, replace and use an item. The maintenance code entered in the 3rd position will indicate authorization to one of the following levels of maintenance.

Code	Application/Explanation
C	- Crew or operator maintenance done within unit or aviation maintenance.
O	- Unit or aviation unit category can remove, replace, and use the item.
F	- Direct support or aviation intermediate level can remove, replace, and use the item.
H	- General support level can remove, replace, and use the item.
L	- Specialized repair activity can remove, replace, and use the item.
D	- Depot level can remove, replace, and use the item.

b) The maintenance code entered in the 4th position indicates whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). Some limited repair may be done on the item at a lower level of maintenance if authorized by the maintenance allocation chart (MAC) and SMR codes. This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	- Unit or aviation unit is the lowest level that can do complete repair of the item.
F	- Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	- General support is the lowest level that can do complete repair of the item.
L	- Specialized repair activity is the lowest level that can do complete repair of the item.
D	- Depot is the lowest level that can do complete repair of the item.
Z	- Non-reparable. No repair is authorized.
B	- No repair is authorized. (No parts or special tools are authorized for the maintenance of the “B”-coded item.) However, the item may be reconditioned by adjusting, lubricating, etc. at the user level.

3. Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability codes entered in the 5th position of the SMR code follow:

Recoverability Codes	Application/Explanation
Z	- Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR code.
O	- Reparable item. When uneconomically reparable, condemn and dispose of the item at unit or aviation unit level.
F	- Reparable item. When uneconomically reparable, condemn and dispose of the item at direct support or aviation intermediate level.
H	- Reparable item. When uneconomically reparable, condemn and dispose of the item at general support level.
D	- Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	- Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A	- Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. CAGEC (Column (3))**.** The Contractor and Government Entity Code (CAGEC) is a 5-digit alphanumeric code that is used to identify the manufacturer, distributor, Government agency, etc. that supplies the item.

d. Part Number (Column (4))**.** Indicates the primary number used by the manufacturer (individual, company, firm, corporation or Government activity) that controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements, to identify an item or range of items.

NOTE

WHEN YOU USE AN NSN TO REQUISITION AN ITEM, THE ITEM YOU RECEIVE MAY HAVE A DIFFERENT PART NUMBER FROM THE PART ORDERED.

e. Description And Usable On Code (UOC) (COLUMN (5))**.** This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) Items that are included in kits and sets are listed below the name of the kit or set.

(3) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

(4) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

(5) The usable on code, when applicable.

(6) In the special tools list section, basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE and other special support equipment. When density of equipment supported exceeds density spread indicated in the BOI, the total authorization is increased proportionately.

(7) The statement “END OF FIGURE” appears just below the last item description in column (5) for a given figure in both Section II and Section III.

f. QTY (Column (6))**.** The QTY (quantity per figure) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, sub-functional group, or an assembly. A “V” appearing in this column in lieu of a quantity indicates that the quantity is a variable and the quantity may vary from application to application.

A-4 Special Information.

a. Usable on Code. The usable on code appears in the lower left corner of the Description column heading. Usable on codes are shown as “UOC:…” in the Description Column on the first line of an applicable item description/nomenclature. Items not coded are applicable to all models.

b. Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the description column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source-coded to be manufactured or fabricated are found elsewhere.

c. Assembly Instructions. Detailed assembly instructions for items source-coded to be assembled from component spare/repair parts are found in separate TM’s. Items that make up the assembly are listed immediately following the assembly item entry or reference is made to an applicable figure.

d. Kits. Line item entries for repair parts kits appear in their applicable figure in item number sequence. The statement “Part of Kit P/N” with the applicable part number will follow the item name.

e. Index Numbers. Items that have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number index and the bulk material list in Section II.

Section II. REPAIR PARTS LISTS

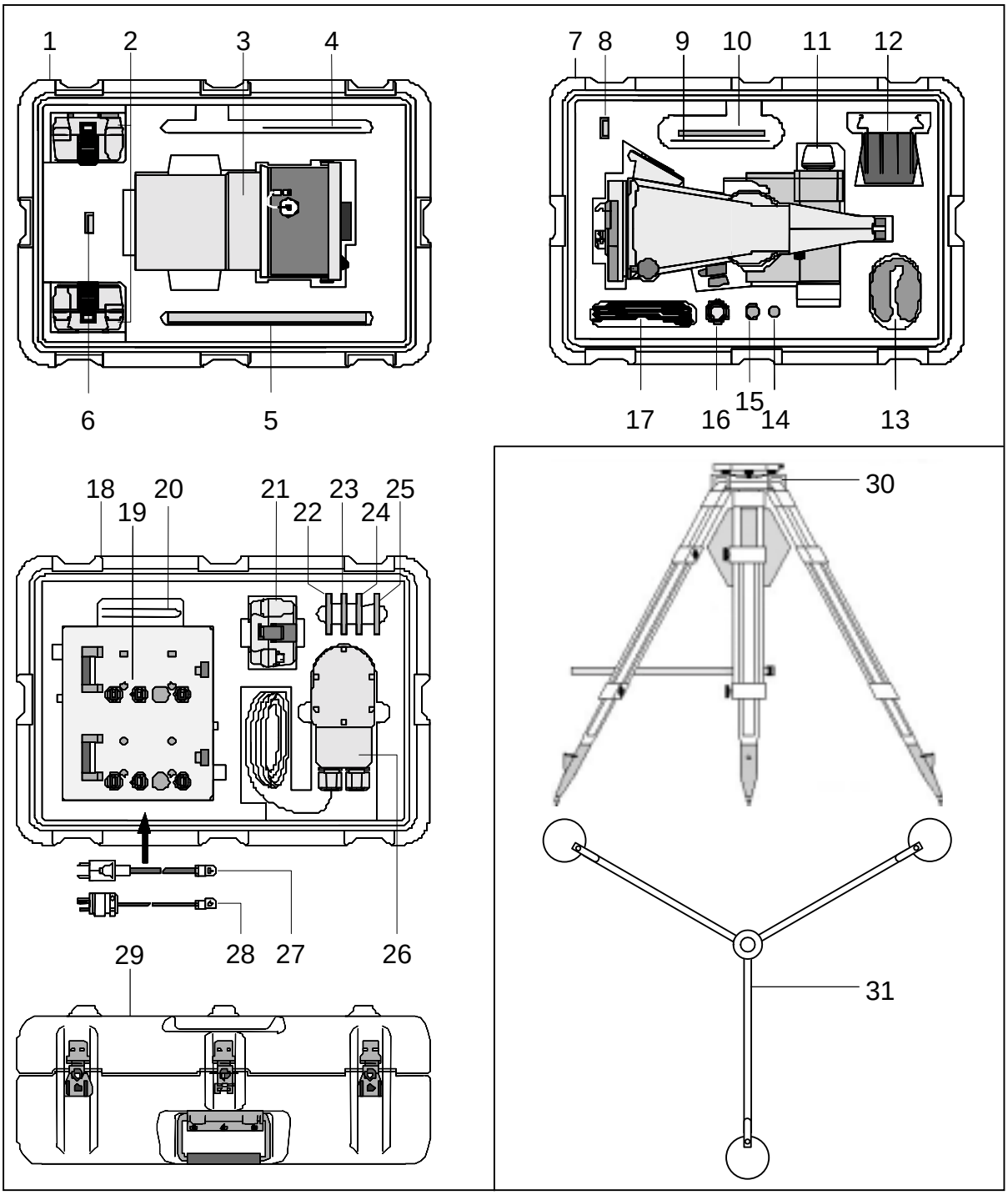


Figure A-1. Gun Laying and Positioning System, PN: 711716

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 00 FIG. A-1	
					GUN LAYING AND POSITIONING SYSTEM (MIL-PRF-53136)	
1	PAOZZ		7Z946	667075	CASE,SURVEYING EQUI.....	1
2	PAOOO	6140013233487	7Z946	522894	BATTERY,STORAGE.....	2
3	PAODD	6615014688249	7Z946	636892	GYROSCOPE,DISPLACEM.....	1
4	PAOZZ	9905014685182	7Z946	711819	LIST,PACKING,GYROSC.....	1
5	XDOZZ		19200	TM9-6675-347-13	TECHNICAL MANUAL.....	1
6	PAOZZ	5920014699021	7Z946	703053	FUSE.....	10
7	PAOZZ	6675014700742	7Z946	667074	CASE,SURVEYING EQUI.....	1
8	PAOZZ	5920014699002	7Z946	703052	FUSE.....	10
9	PAOZZ	9905014685181	7Z946	711818	LIST,PACKING,THEODI.....	1
10	PAOZZ	1290014688243	7Z946	703545	TISSUES,CLEANING,LE.....	1
11	PAODD	6675014686526	7Z946	667047	THEODOLITE,SURVEYIN.....	1
12	PAOZZ	5340014706142	7Z946	636919	BRACKET,MOUNTING.....	1
13	PAOZZ	5340014706153	7Z946	636918	COVER.....	1
14	PAOZZ	6240014700912	7Z946	703051	LAMP.....	3
15	PAOZZ	6240014700912	7Z946	701042	LAMP.....	1
16	PAOOO	1290014686061	7Z946	667046	ROD ASSEMBLY,TARGET.....	1
17	PAOZZ	4920014703582	7Z946	636920	CABLE ASSEMBLY,INTE.....	1
18	PAOZZ	6160014779887	7Z946	711208	CASE,BATTERY POWER.....	1
19	PAOOO	6130014685176	7Z946	439150	CHARGER,BATTERY.....	1
20	PAOZZ	9905014685183	7Z946	711820	LIST,PACKING,BATTER.....	1
21	PAOOZ	6130014704237	7Z946	431632	ADAPTER,POWER SUPPL.....	1
22	PAOZZ	5920014699021	7Z946	703053	FUSE.....	10
23	PAOZZ	5920014699004	7Z946	703054	FUSE.....	10
24	PAOZZ	5920014759814	7Z946	703055	FUSE,CARTRIDGE.....	10
25	PAOZZ	5920014699014	7Z946	703056	FUSE.....	10
26	PAOZA	6150014716164	S3890	667099	CABLE ASSEMBLY,POWE.....	1
27	PAOZA	6150014716169	S3890	711212	CABLE ASSEMBLY,POWE.....	1
28	PAOZA	6150014716172	S3890	711213	CABLE ASSEMBLY,POWE.....	1
29	PAOOO	1290014685180	7Z946	636960	WINTERIZATION KIT,F.....	1
30	PAODD	1290014686531	7Z946	667299	TRIPOD,FIRE CONTROL.....	1
31	PAOZZ	1290014686062	7Z946	332200	BASE,TRIPOD,FIRE CO.....	1

END OF FIGURE

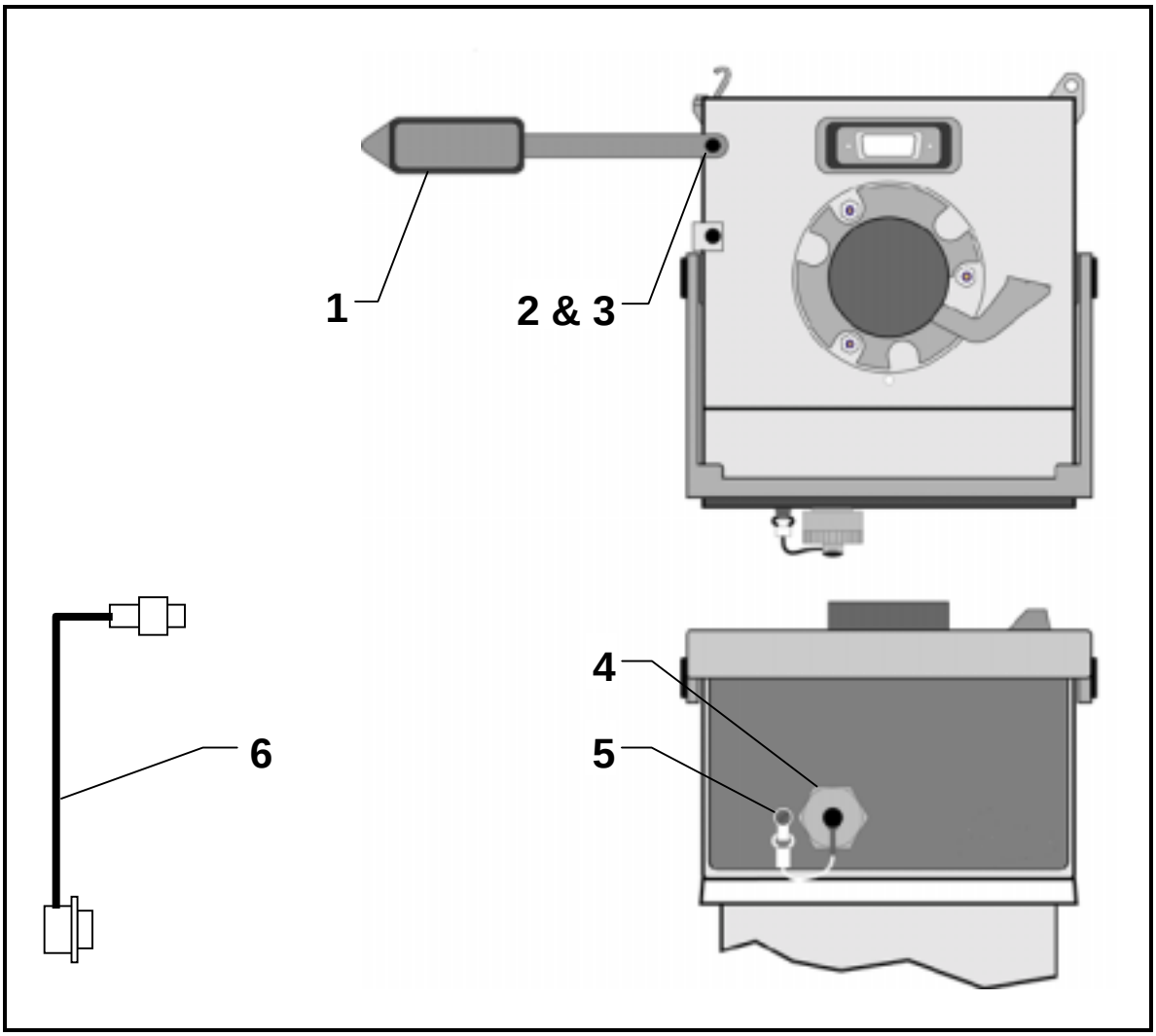


Figure A-2. Gyro Compass, PN: 636892

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 01 FIG. A-2	
					GYROSCOPE (636892)	
1	PAOZZ	5340014703899	7Z946	701095	COVER	1
2	PAOZZ	5305013265101	7Z946	186725	SCREW,MACHINE	1
3	PAOZZ	5325014702030	7Z946	355386	RING,RETAINING	1
4	PAOZZ	5340014703889	7Z946	159900	COVER	1
5	PAOZZ	5305123243909	7Z946	440938	SCREW	1
6	PAOZZ	4920014703582	7Z946	636920	CABLE ASSEMBLY,INTE	1

END OF FIGURE

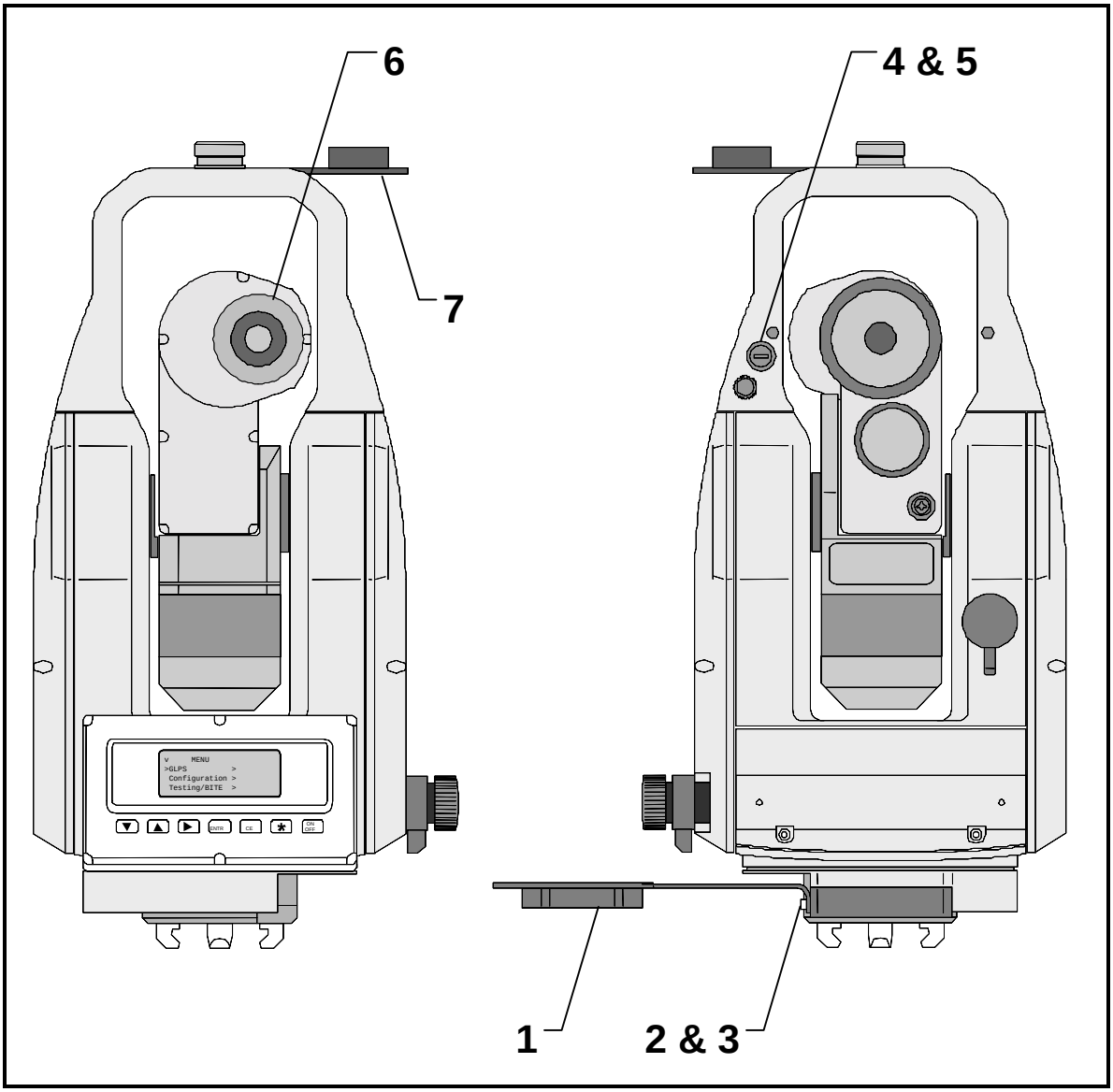


Figure A-3. Theodolite with Rangefinder, PN: 667047

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 02 FIG. A-3	
					THEODOLITE WITH RANGEFINDER (667047)	
1	PAOZZ	5340014703887	7Z946	708522	COVER	1
2	PAOZZ	5305014247892	7Z946	236418	SCREW,CAP,HEXAGON H	1
3	PAOZZ	5325014702030	7Z946	355386	RING,RETAINING	1
4	PAOZZ	5920014698977	7Z946	249304	FUSE	1
5	PAOZZ	5920014699219	7Z946	420938	FUSEHOLDER	1
6	PAOZZ	5340014703902	7Z946	563988	COVER	1
7	PAOZZ	5935014705049	7Z946	711309	COVER,ELECTRICAL CO	1

END OF FIGURE

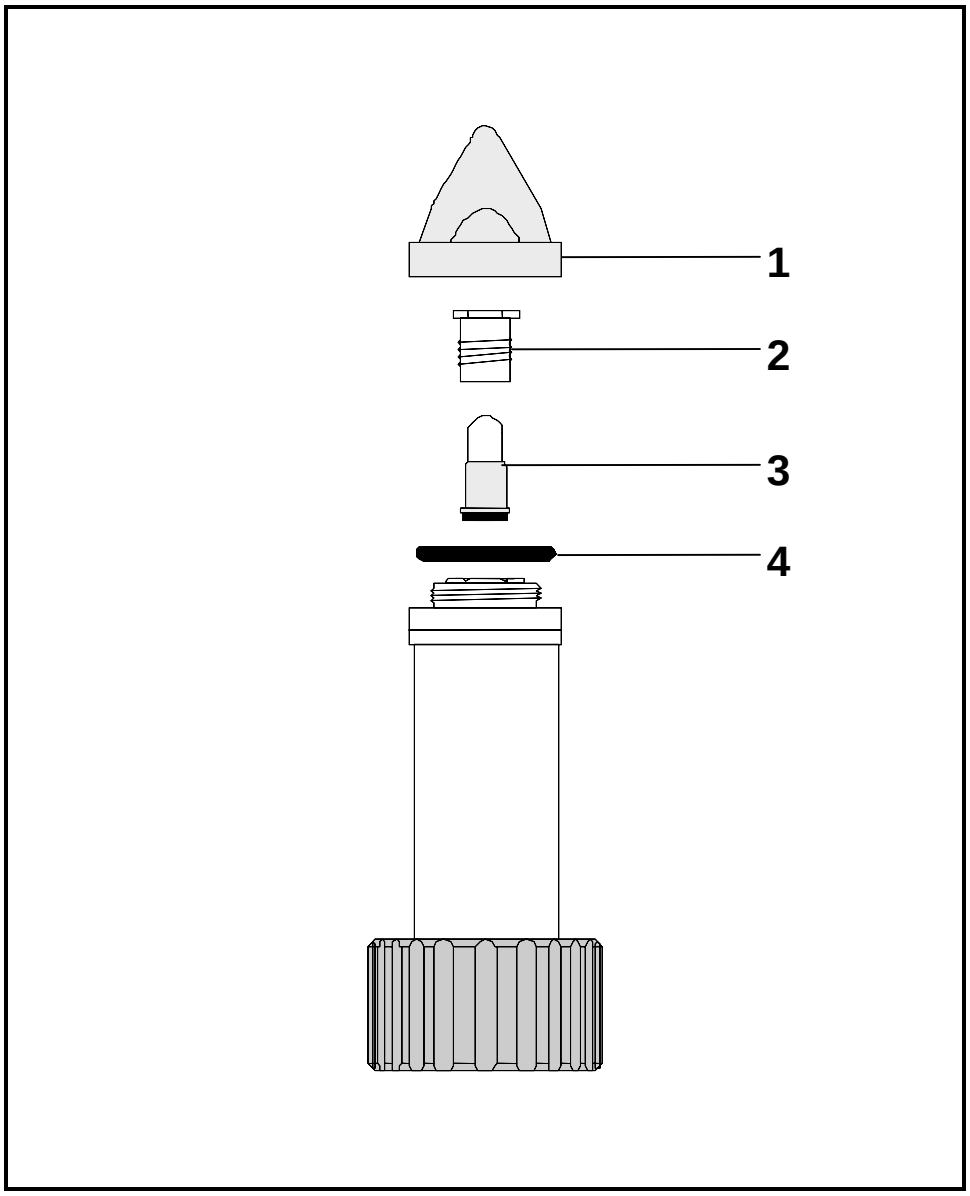


Figure A-4. Target Rod Assembly, PN: 667046

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 03 FIG. A-4	
					ROD ASSEMBLY, TARGET (667046)	
1	PAOZZ	1290014686064	7Z946	707932	TIP,TARGET.....	1
2	PAOZZ	6220014242478	7Z946	198677	LENS,LIGHT.....	1
3	PAOZZ	6240014754293	7Z946	198676	LAMP.....	100
4	PAOZZ	5331014703986	7Z946	433955	SEAL.....	1

END OF FIGURE

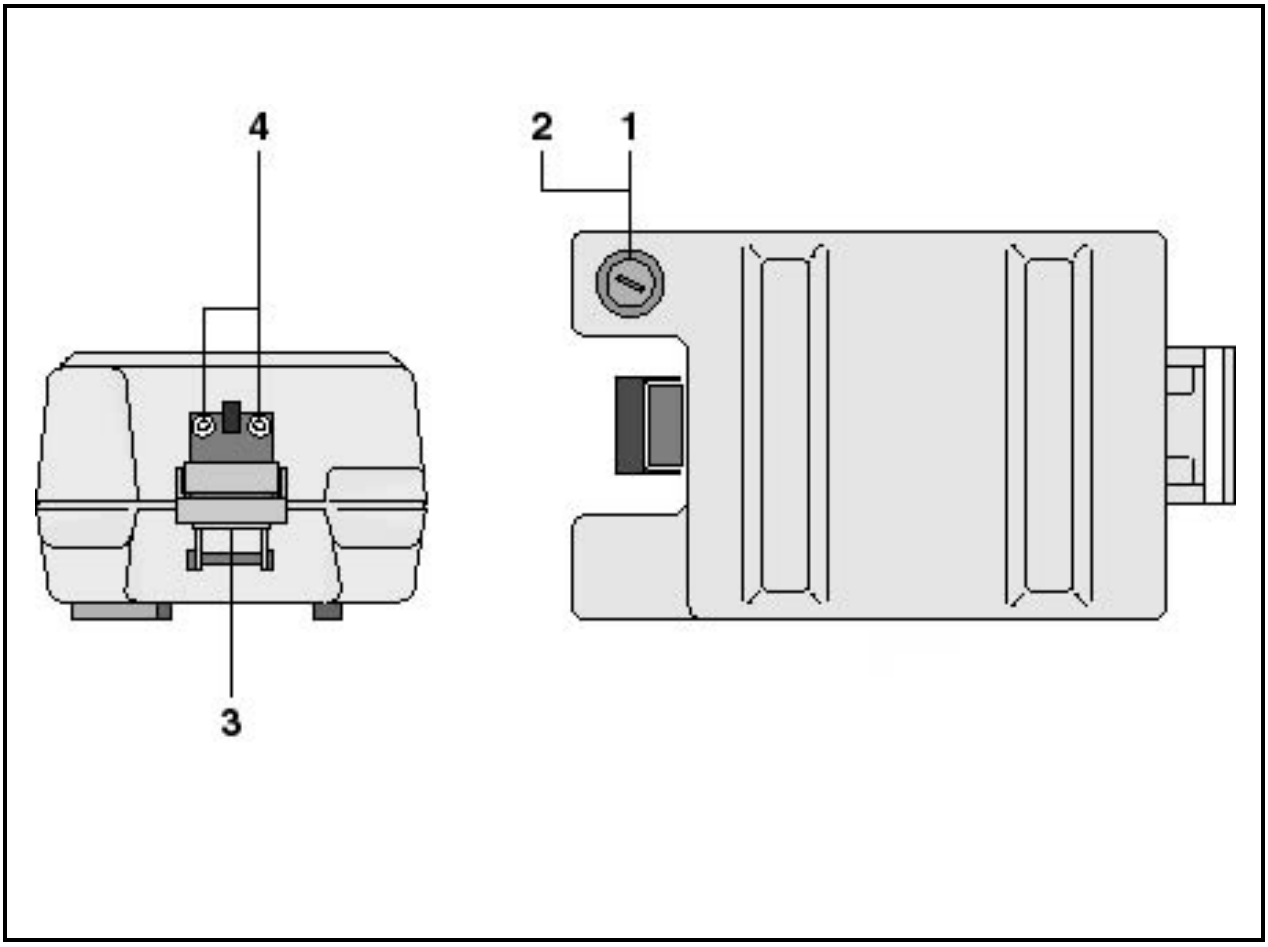


Figure A-5. Battery, PN: 522894

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 04 FIG. A-5	
					BATTERY, STORAGE (522894)	
1	PAOZZ	5920013393083	7Z946	317193	FUSE,CARTRIDGE.....	1
2	PAOZZ	5920014699219	7Z946	420938	FUSEHOLDER.....	1
3	PAOZZ	5340014686536	7Z946	433998	LATCH,LOCKING.....	1
4	PAOZZ	5305123244485	7Z946	259956	SCREW.....	2

END OF FIGURE

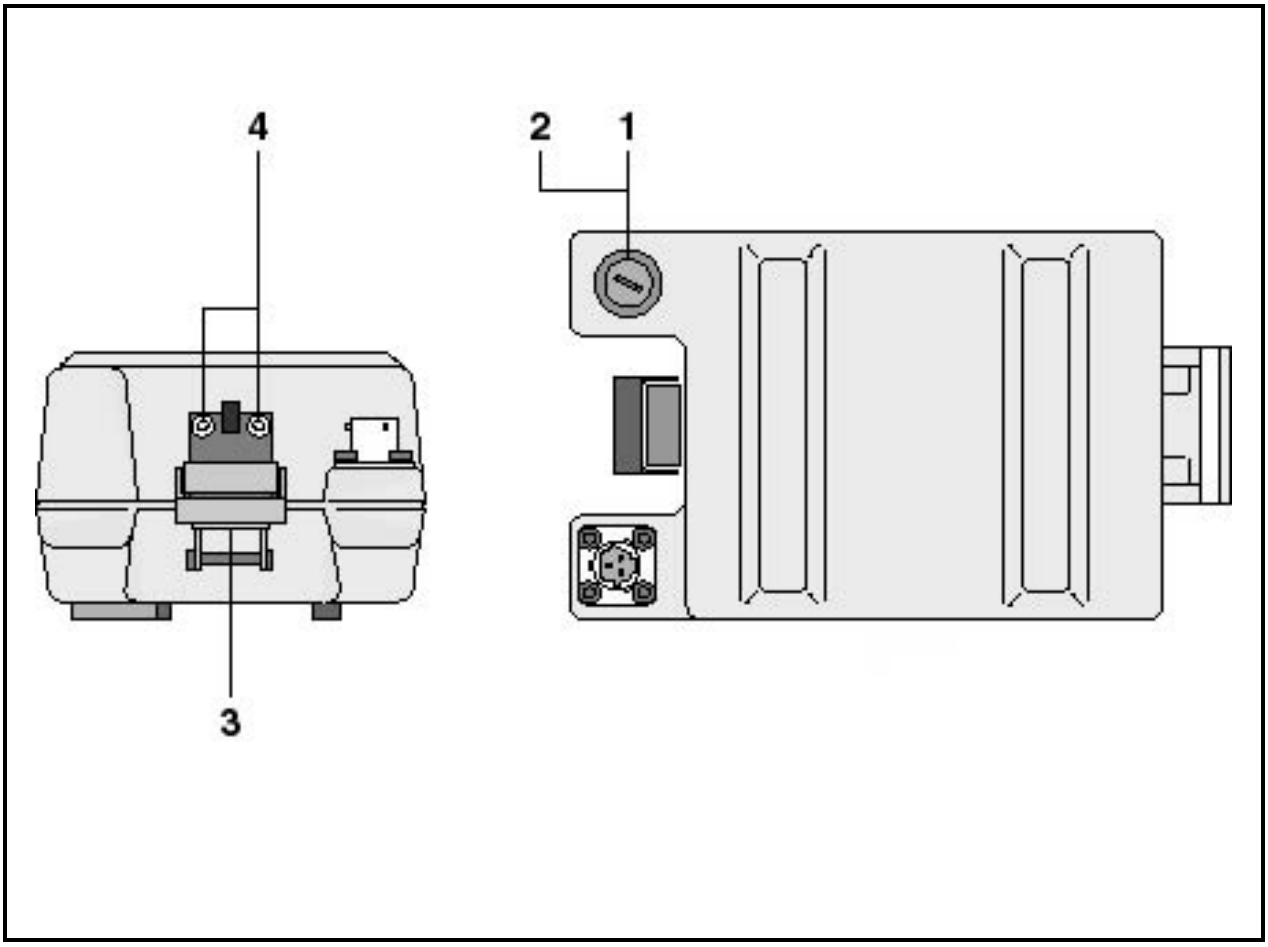


Figure A-6. Power Adapter, PN: 431632

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 05 FIG. A-6	
					POWER ADAPTER (431632)	
1	PAOZZ	5920014698986	7Z946	317279	FUSE	1
2	PAOZZ	5920014699219	7Z946	420938	FUSEHOLDER	1
3	PAOZZ	5340014686536	7Z946	433998	LATCH,LOCKING	1
4	PAOZZ	5305123244485	7Z946	259956	SCREW	2

END OF FIGURE

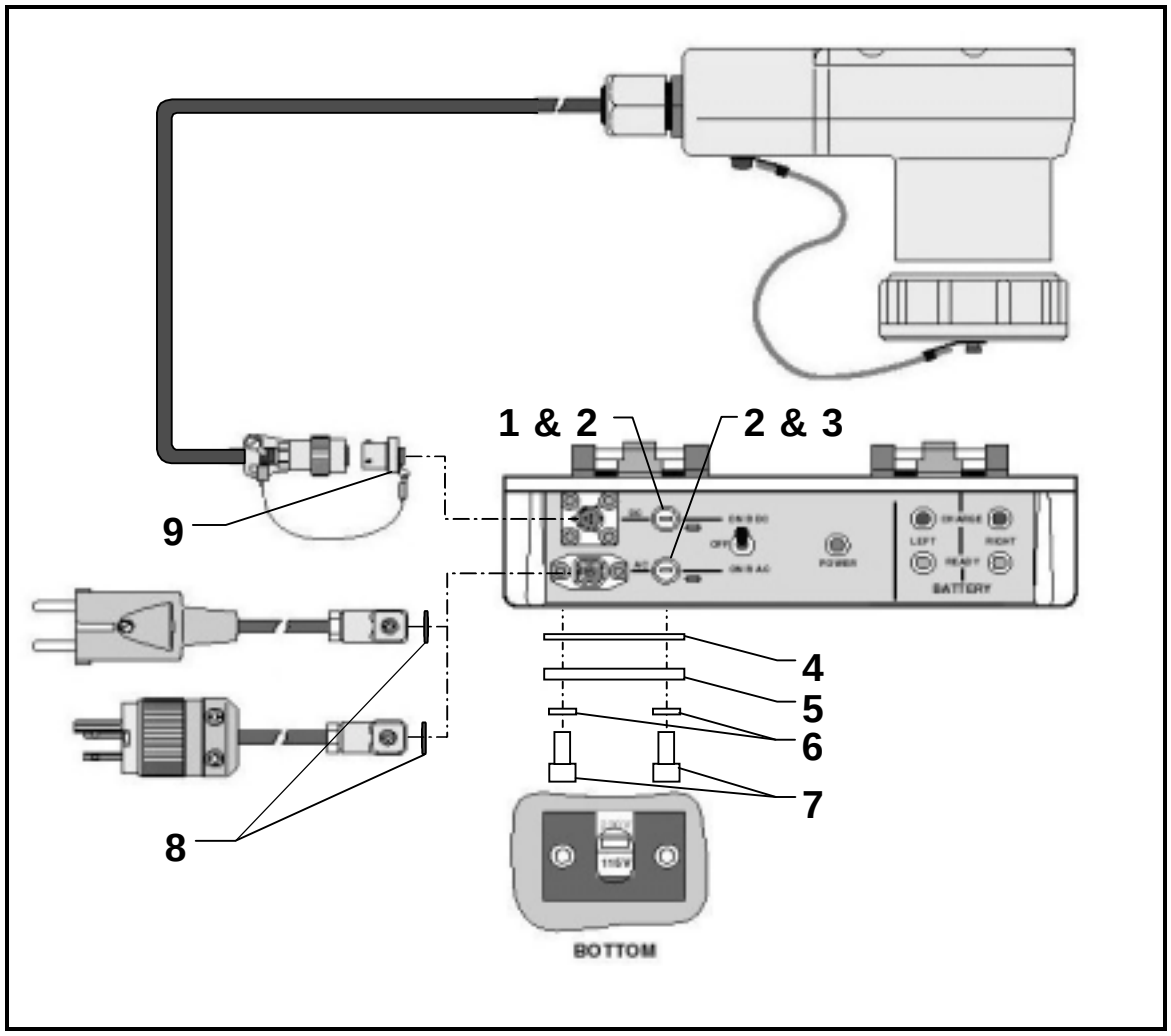


Figure A-7. Battery Charger, PN: 439150

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 06 FIG. A-7	
					BATTERY CHARGER (439150)	
1	PAOZZ	5920014698994	7Z946	167654	FUSE	1
2	PAOZZ	5920014249968	7Z946	700076	FUSEHOLDER,EXTRACTO	2
3	PAOZZ	5920014698991	7Z946	393606	FUSE	1
4	PCOZZ	5330014703989	7Z946	712688	GASKET	1
5	PAOZZ	5340014706180	7Z946	712305	COVER,PROTECTIVE	1
6	PAOZZ	5310123402509	7Z946	422940	WASHER,FLAT	2
7	PAOZZ	5305170441498	7Z946	316304	SCREW	2
8	PCOZZ	5330014754297	7Z946	712560	GASKET	2
9	PAOZZ	5935014754294	7Z946	429562	COVER,ELECTRICAL CO	1

END OF FIGURE

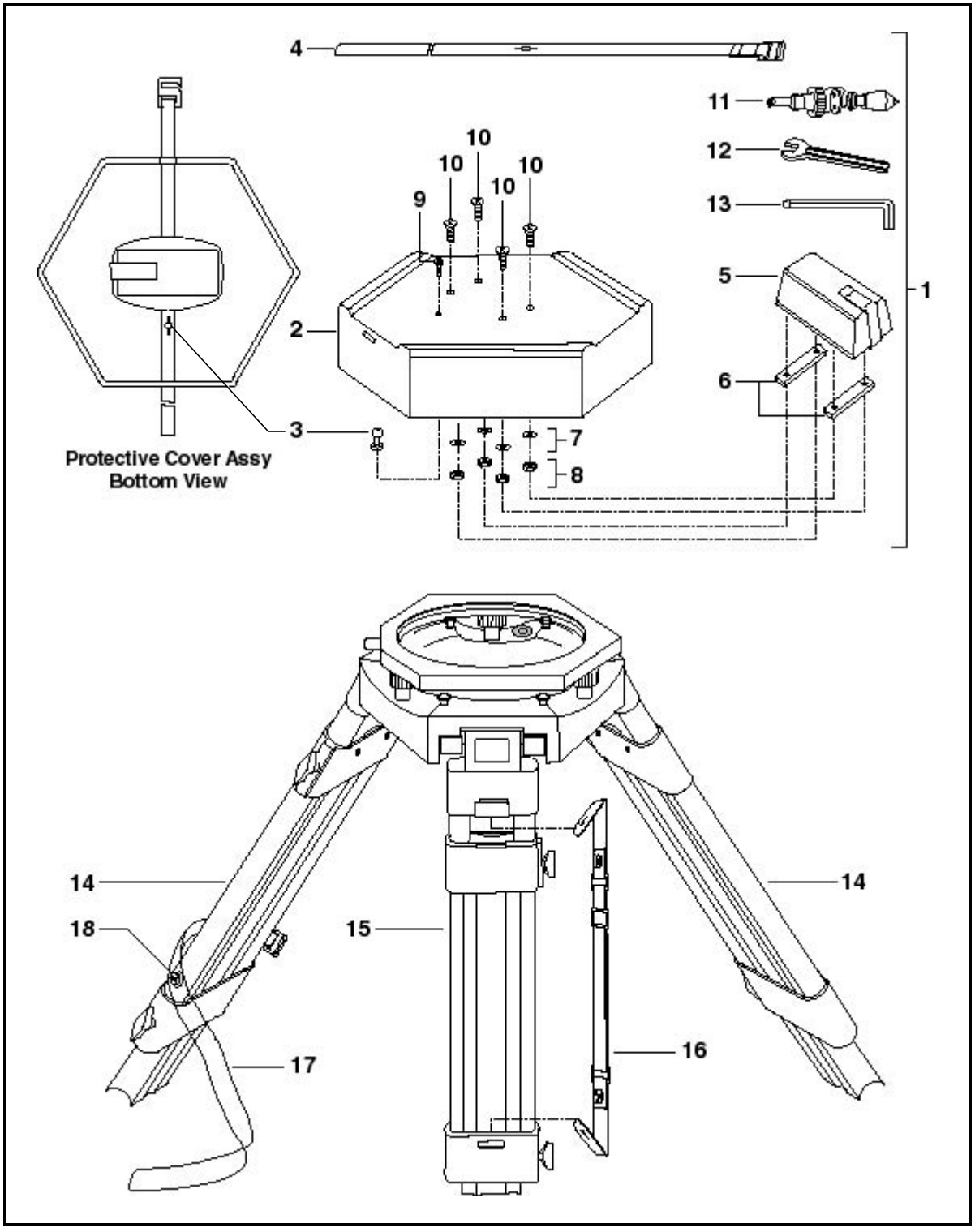


Figure A-8. Tripod Assembly, PN: 667299

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 07 FIG. A-8	
					TRIPOD ASSEMBLY (667299)	
1	PAOZZ	5340014705885	7Z946	710288	COVER	1
2	XDFZZ		7Z946	710554	COVER,TRIPOD	1
3	PAOZZ	5307014707076	7Z946	710071	STUD,BALL	1
4	PAOZZ		7Z946	710073	STRAP,WEBBING	1
5	PAOZZ	5140014703005	7Z946	708689	BAG,TOOL	1
6	PAOZZ	5365014699709	7Z946	708980	SPACER,PLATE	2
7	PAOZZ	5310251223942	S3890	246078	WASHER,FLAT	4
8	PAOZZ	5310014699912	7Z946	375922	NUT	4
9	PAOZZ		7Z946	385866	SCREW,MACHINE	1
10	PAOZZ	5305014707069	7Z946	308329	SCREW,MACHINE	4
11	PAOZZ	5210014754298	7Z946	358866	PLUMB BOB	1
12	PAOZZ	5120014701162	7Z946	710001	WRENCH,OPEN END	1
13	PAOZZ	5120014701163	7Z946	166494	KEY,SOCKET HEAD SCR	1
14	PAFZZ	1290014705048	7Z946	708782	LEG ASSEMBLY,TRIPOD	2
15	PAFFZ	5975014761484	7Z946	708783	LEG,ELECTRICAL EQUI	1
16	PAOZZ		7Z946	315010	SLING,BAG AND CASE	1
17	PAFZZ	5340014706162	7Z946	710072	STRAP,RETAINING	1
18	PAOZZ	5305219101184	7Z946	346286	SCREW	2

END OF FIGURE

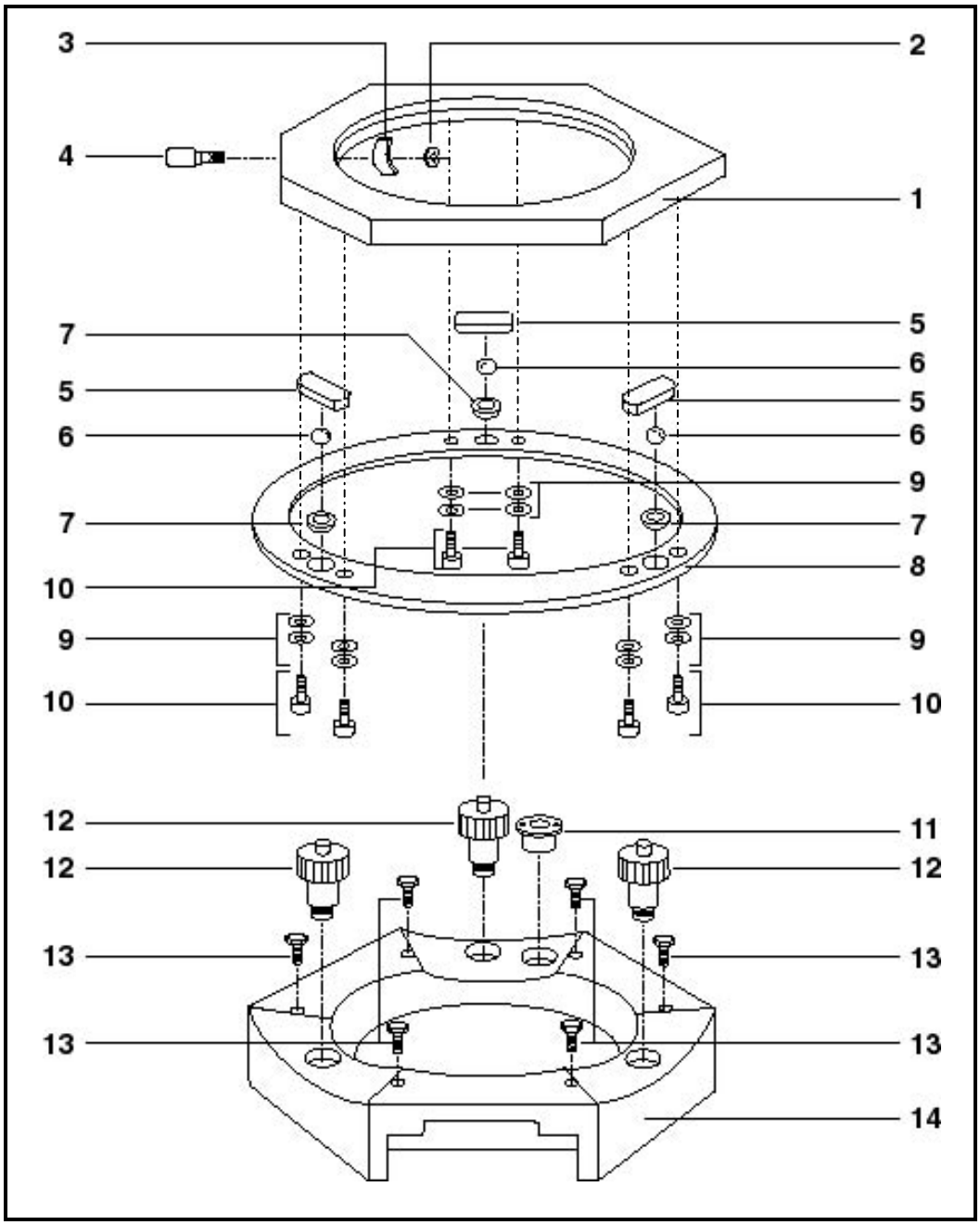


Figure A-9. Tripod Head Assembly, PN: 712406

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 08 FIG. A-9	
					TRIPOD ASSEMBLY (667299)	
1	PAFZZ	5340014706186	7Z946	712313	PLATE,MOUNTING.....	1
2	PAFZZ	5325014702031	7Z946	161318	RING,RETAINING.....	1
3	PAFZZ	5340014686065	7Z946	344282	SLIDE,RETAINING.....	1
4	PAFZZ	5305013267577	7Z946	344277	SETSCREW.....	1
5	PAFZZ	5340014686069	7Z946	353183	SUPPORT,SLIDE,RETAI.....	3
6	PAFZZ	3895013257623	7Z946	166954	BALL,TRIPOD.....	3
7	PAFZZ	3110013267400	7Z946	360541	BEARING,BALL,ANNULA.....	3
8	XAFZZ		7Z946	344279	PLATE, RING.....	1
9	PAFZZ	5310123241332	7Z946	236246	WASHER,SPRING TENSI.....	12
10	PAFZZ	5305219101185	7Z946	348901	SCREW,MACHINE.....	6
11	PAFZZ	6680014761483	7Z946	712311	INDICATOR,SIGHT,LIQ.....	1
12	PAFZZ	5305014686063	7Z946	307769	SCREW,LEVELING.....	3
13	PAFZZ	5306218550247	7Z946	405968	SCREW,MACHINE.....	6
14	XAFZZ		7Z946	344278	PLATE, TRIPOD.....	1

END OF FIGURE

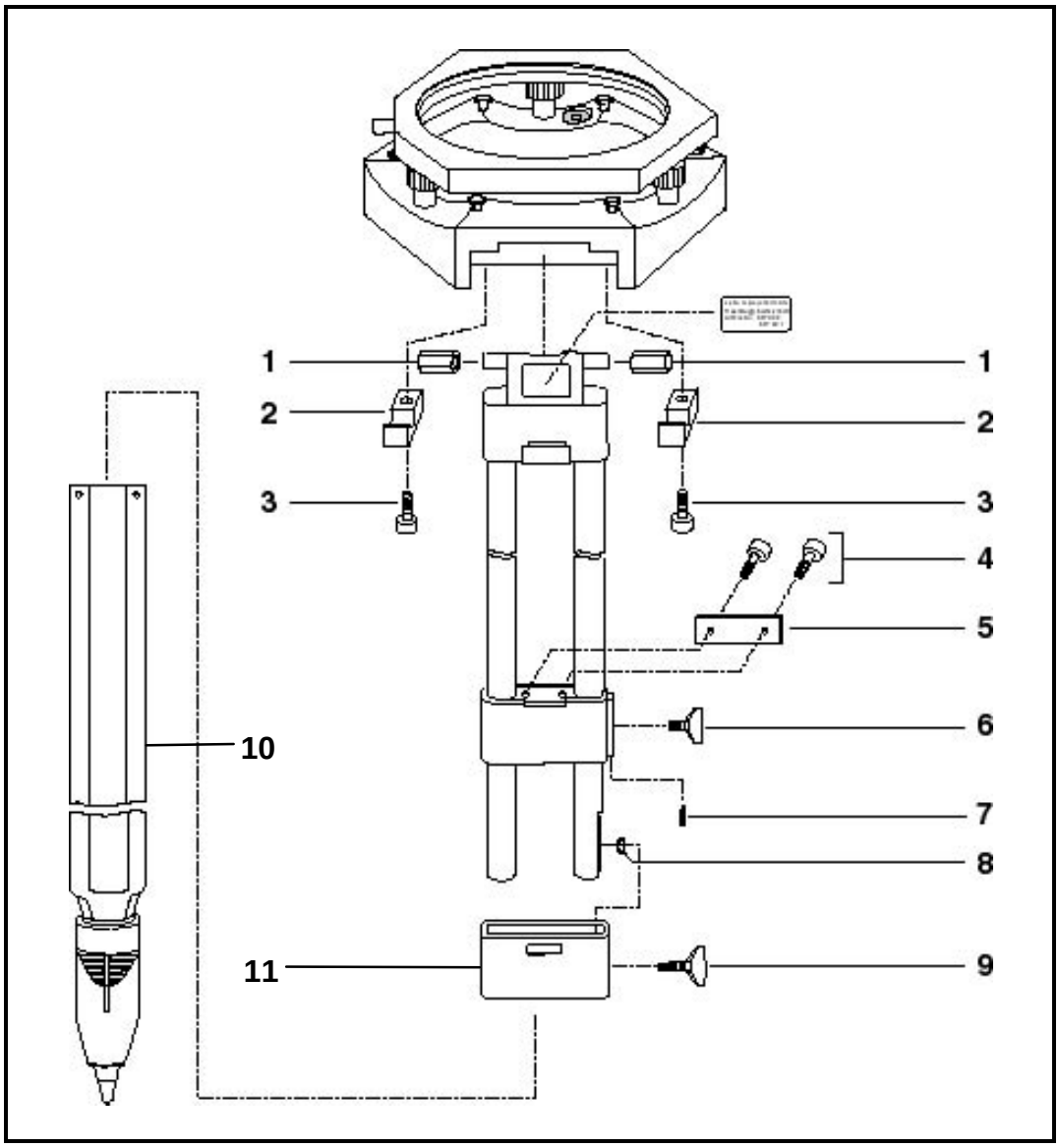


Figure A-10. Tripod Leg Assembly, PN: 708782 or 708783

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 09 FIG. A-10	
1	PAFZZ	3110013257099	7Z946	271990	BEARING,BALL,ANNULA.....	6
2	PAFZZ	5340014686068	7Z946	344280	CLAMP,RETAINING.....	6
3	PAFZZ	5305013264918	7Z946	507123	SCREW,CAP,SOCKET HE.....	6
4	PAFZZ	5305014707066	7Z946	311152	SCREW.....	6
5	PAFZZ	5340014703891	7Z946	708712	PLATE,MOUNTING.....	3
6	PAFZZ	5305014707073	7Z946	708649	SCREW.....	3
7	PAFZZ	5305251147683	7Z946	338282	SCREW.....	3
8	PAFZZ	5310014699909	7Z946	180236	WASHER.....	3
9	PAFZZ	5305123244485	7Z946	335620	SCREW,CAP,SOCKET HE.....	3
10	PAFZZ	1290014686067	7Z946	708781	FOOT ASSEMBLY,TRIPO.....	3
11	PAFZZ	6620013276747	7Z946	335621	BAND,CLAMPING.....	3

END OF FIGURE

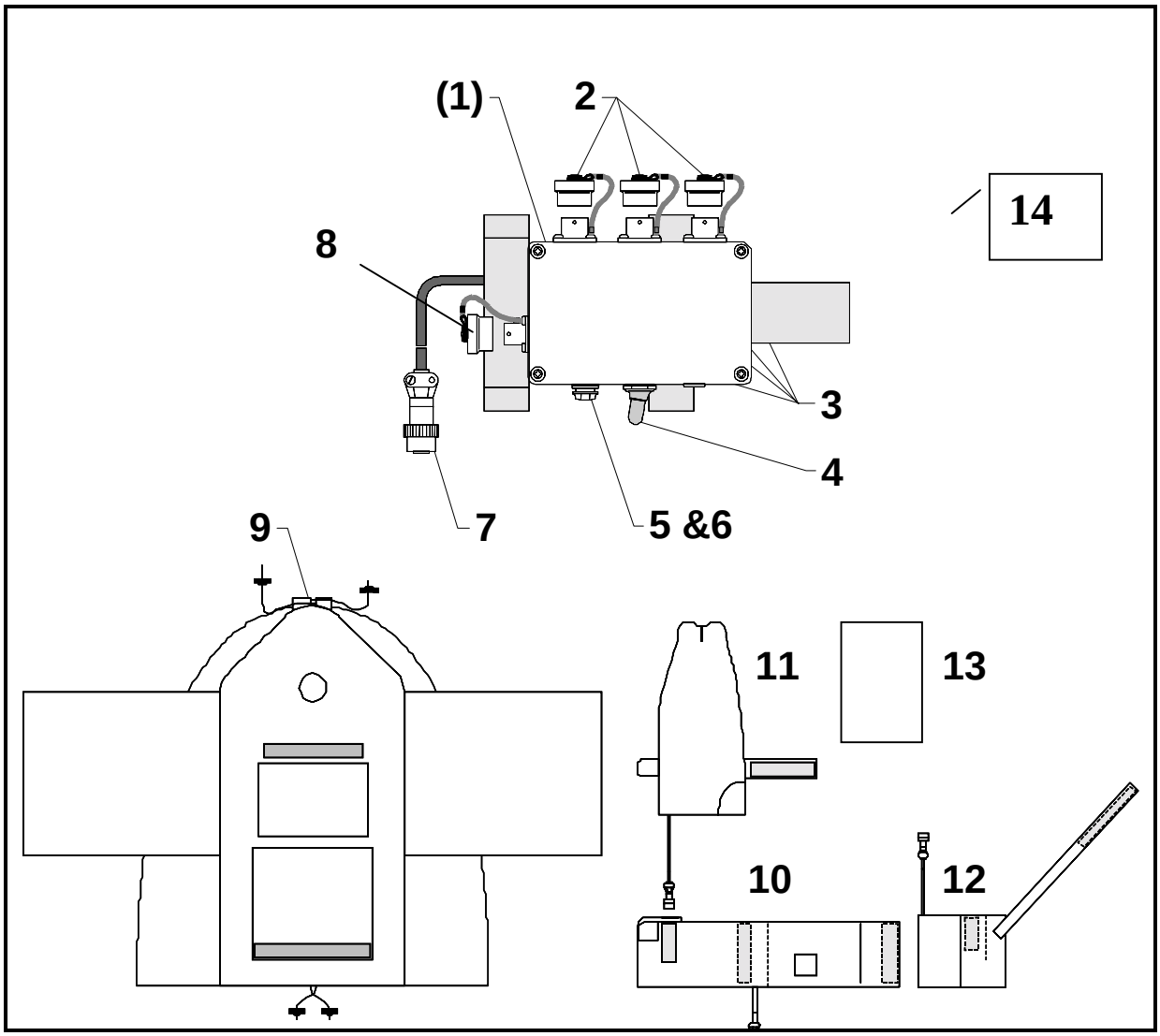
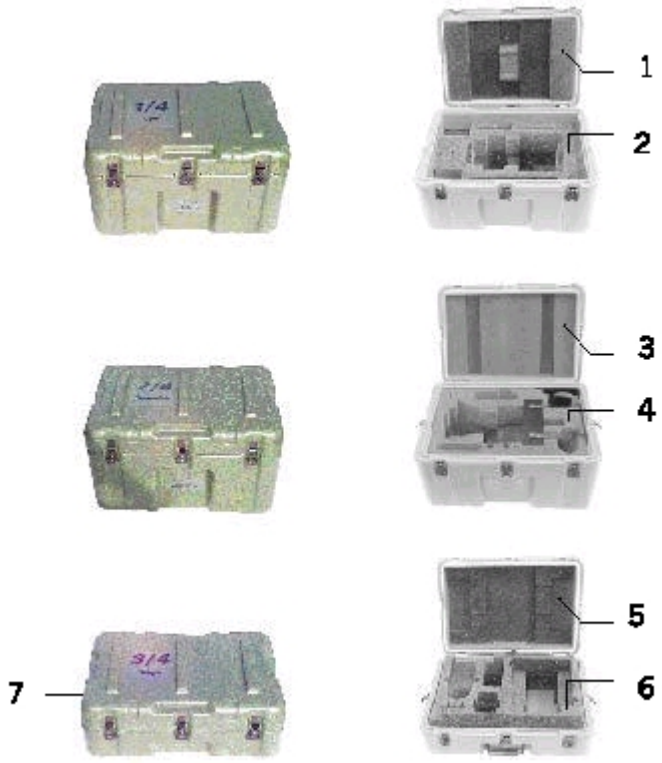


Figure A-11. Winterization Kit, PN: 636960

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 10 FIG. A-11	
					KIT, WINTERIZATION (636960)	
1	PAOZZ	5935170525290	7Z946	159895	COVER,ELECTRICAL CO.....	1
2	PAOZZ	5935014754292	7Z946	426029	COVER,ELECTRICAL CO.....	3
3	PAOZZ	5305014707072	7Z946	276157	SCREW.....	4
4	PAOZZ	5930014707030	7Z946	708733	COVER,SWITCH TERMIN.....	1
5	PAOZZ	5920014698986	7Z946	317279	FUSE.....	1
6	PAOZZ	5920014699221	7Z946	712437	FUSEHOLDER.....	1
7	PAOZZ	5935014705052	7Z946	420562	COVER,ELECTRICAL CO.....	1
8	PAOZZ	5640014736001	7Z946	708750	INSULATION BLANKET,.....	1
9	PAOZZ	4540014736942	7Z946	708748	INSULATION BLANKET,.....	1
10	PAOZZ	4540014736946	7Z946	708749	INSULATION BLANKET,.....	1
11	PAOZZ	4540014736939	7Z946	708747	INSULATION BLANKET,.....	1
12	PAOZZ	9905014686537	7Z946	711821	LIST,PACKING,WINTER.....	1
13	PAOZZ	6110014700680	7Z946	708581	DISTRIBUTION BOX.....	1
14	PAOZZ	5920014699014	7Z946	703056	FUSE,CARTRIDGE.....	10

END OF FIGURE



8---Adhesive for securing rubber inserts not shown.

Figure A-12. Containers P/N 667075, 667074, and 667076

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 11 FIG. A-12	
					CONTAINERS, P/N 667075, 667074, AND 667076	
1	PAOZZ	8135014723346	7Z946	712402	LINER,CASE.....	1
2	PAOZZ	8135014725163	7Z946	710084	INSERT.....	1
3	PAOZZ	8135014724108	7Z946	712403	INSERT.....	1
4	PAOZZ	8135014725165	7Z946	710085	INSERT.....	1
5	PAOZZ	8135014725164	7Z946	712404	INSERT.....	1
6	PAOZZ	8135014725861	7Z946	711869	INSERT.....	1
7	PAOZZ	6160014779887	7Z946	711208	CASE,BATTERY POWER.....	1
7	PAOZZ	6675014700870	7Z946	667077	CASE,WINTERIZATION.....	1
8	PCOZZ	8040008326173	1A9T3	EC-1357-5OZ	ADHESIVE.....	1

END OF FIGURE

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
8040-00-832-6173	A-12	8	5310-01-469-9912	A-8	8
6140-01-323-3487	A-1	2	6110-01-470-0680	A-11	13
3110-01-325-7099	A-10	1	6675-01-470-0742	A-1	7
3895-01-325-7623	A-9	6	6675-01-470-0870	A-12	7
5305-01-326-4918	A-10	3	6240-01-470-0912	A-1	14
5305-01-326-5101	A-2	2	5120-01-470-1162	A-8	12
3110-01-326-7400	A-9	7	5120-01-470-1163	A-8	13
5305-01-326-7577	A-9	4	5325-01-470-2030	A-2	3
6620-01-327-6747	A-10	11		A-3	3
5920-01-339-3083	A-5	1	5325-01-470-2031	A-9	2
6220-01-424-2478	A-4	2	5140-01-470-3005	A-8	5
5305-01-424-7892	A-3	2	4920-01-470-3582	A-1	17
5920-01-424-9968	A-7	2		A-2	6
6130-01-468-5176	A-1	19	5340-01-470-3887	A-3	1
1290-01-468-5180	A-1	29	5340-01-470-3889	A-2	4
9905-01-468-5181	A-1	9	5340-01-470-3891	A-10	5
9905-01-468-5182	A-1	4	5340-01-470-3899	A-2	1
9905-01-468-5183	A-1	20	5340-01-470-3902	A-3	6
1290-01-468-6061	A-1	16	5331-01-470-3986	A-4	4
1290-01-468-6062	A-1	31	5330-01-470-3989	A-7	4
5305-01-468-6063	A-9	12	6130-01-470-4237	A-1	21
1290-01-468-6064	A-4	1	1290-01-470-5048	A-8	14
5340-01-468-6065	A-9	3	5935-01-470-5049	A-3	7
1290-01-468-6067	A-10	10	5935-01-470-5052	A-11	7
5340-01-468-6068	A-10	2	5340-01-470-5885	A-8	1
5340-01-468-6069	A-9	5	5340-01-470-6142	A-1	12
6675-01-468-6526	A-1	11	5340-01-470-6153	A-1	13
1290-01-468-6531	A-1	30	5340-01-470-6162	A-8	17
5340-01-468-6536	A-5	3	5340-01-470-6180	A-7	5
	A-6	3	5340-01-470-6186	A-9	1
9905-01-468-6537	A-11	12	5930-01-470-7030	A-11	4
1290-01-468-8243	A-1	10	5305-01-470-7066	A-10	4
6615-01-468-8249	A-1	3	5305-01-470-7069	A-8	10
5920-01-469-8977	A-3	4	5305-01-470-7072	A-11	3
5920-01-469-8986	A-6	1	5305-01-470-7073	A-10	6
	A-11	5	5307-01-470-7076	A-8	3
5920-01-469-8991	A-7	3	6150-01-471-6164	A-1	26
5920-01-469-8994	A-7	1	6150-01-471-6169	A-1	27
5920-01-469-9002	A-1	8	6150-01-471-6172	A-1	28
5920-01-469-9004	A-1	23	8135-01-472-3346	A-12	1
5920-01-469-9014	A-1	25	8135-01-472-4108	A-12	3
	A-11	14	8135-01-472-5163	A-12	2
5920-01-469-9021	A-1	6	8135-01-472-5164	A-12	5
	A-1	22	8135-01-472-5165	A-12	4
5920-01-469-9219	A-3	5	8135-01-472-5861	A-12	6
	A-5	2	5640-01-473-6001	A-11	8
	A-6	2	4540-01-473-6939	A-11	11
5920-01-469-9221	A-11	6	4540-01-473-6942	A-11	9
5365-01-469-9709	A-8	6	4540-01-473-6946	A-11	10
5310-01-469-9909	A-10	8	5935-01-475-4292	A-11	2

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
6240-01-475-4293	A-4	3			
5935-01-475-4294	A-7	9			
5330-01-475-4297	A-7	8			
5210-01-475-4298	A-8	11			
5920-01-475-9814	A-1	24			
6680-01-476-1483	A-9	11			
5975-01-476-1484	A-8	15			
6160-01-477-9887	A-1	18			
	A-12	7			
5340-01-477-9890	A-8	16			
5310-12-324-1332	A-9	9			
5305-12-324-3909	A-2	5			
5305-12-324-4485	A-5	4			
	A-6	4			
	A-10	9			
5310-12-340-2509	A-7	6			
5305-17-044-1498	A-7	7			
5935-17-052-5290	A-11	1			
5306-21-855-0247	A-9	13			
5305-21-910-1184	A-8	18			
5305-21-910-1185	A-9	10			
5305-25-114-7683	A-10	7			
5310-25-122-3942	A-8	7			

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
1A9T3	EC-1357-5OZ	8040-00-832-6173	A-12	8
19200	TM9-6675-347-13		A-1	5
7Z946	159895	5935-17-052-5290	A-11	1
7Z946	159900	5340-01-470-3889	A-2	4
7Z946	161318	5325-01-470-2031	A-9	2
7Z946	166494	5120-01-470-1163	A-8	13
7Z946	166954	3895-01-325-7623	A-9	6
7Z946	167654	5920-01-469-8994	A-7	1
7Z946	180236	5310-01-469-9909	A-10	8
7Z946	186725	5305-01-326-5101	A-2	2
7Z946	198676	6240-01-475-4293	A-4	3
7Z946	198677	6220-01-424-2478	A-4	2
7Z946	236246	5310-12-324-1332	A-9	9
7Z946	236418	5305-01-424-7892	A-3	2
S3890	246078	5310-25-122-3942	A-8	7
7Z946	249304	5920-01-469-8977	A-3	4
7Z946	259956	5305-12-324-4485	A-5	4
			A-6	4
7Z946	271990	3110-01-325-7099	A-10	1
7Z946	276157	5305-01-470-7072	A-11	3
7Z946	307769	5305-01-468-6063	A-9	12
7Z946	308329	5305-01-470-7069	A-8	10
7Z946	311152	5305-01-470-7066	A-10	4
7Z946	315010	5340-01-477-9890	A-8	16
7Z946	316304	5305-17-044-1498	A-7	7
7Z946	317193	5920-01-339-3083	A-5	1
7Z946	317279	5920-01-469-8986	A-6	1
			A-11	5
7Z946	332200	1290-01-468-6062	A-1	31
7Z946	335620	5305-12-324-4485	A-10	9
7Z946	335621	6620-01-327-6747	A-10	11
7Z946	338282	5305-25-114-7683	A-10	7
7Z946	344277	5305-01-326-7577	A-9	4
7Z946	344278		A-9	14
7Z946	344279		A-9	8
7Z946	344280	5340-01-468-6068	A-10	2
7Z946	344282	5340-01-468-6065	A-9	3
7Z946	346286	5305-21-910-1184	A-8	18
7Z946	348901	5305-21-910-1185	A-9	10
7Z946	353183	5340-01-468-6069	A-9	5
7Z946	355386	5325-01-470-2030	A-2	3
			A-3	3
7Z946	358866	5210-01-475-4298	A-8	11
7Z946	360541	3110-01-326-7400	A-9	7
7Z946	375922	5310-01-469-9912	A-8	8
7Z946	385866		A-8	9
7Z946	393606	5920-01-469-8991	A-7	3
7Z946	405968	5306-21-855-0247	A-9	13
7Z946	420562	5935-01-470-5052	A-11	7
7Z946	420938	5920-01-469-9219	A-3	5
			A-5	2

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
7Z946	420938	5920-01-469-9219	A-6	2
7Z946	422940	5310-12-340-2509	A-7	6
7Z946	426029	5935-01-475-4292	A-11	2
7Z946	429562	5935-01-475-4294	A-7	9
7Z946	431632	6130-01-470-4237	A-1	21
7Z946	433955	5331-01-470-3986	A-4	4
7Z946	433998	5340-01-468-6536	A-5	3
			A-6	3
7Z946	439150	6130-01-468-5176	A-1	19
7Z946	440938	5305-12-324-3909	A-2	5
7Z946	507123	5305-01-326-4918	A-10	3
7Z946	522894	6140-01-323-3487	A-1	2
7Z946	563988	5340-01-470-3902	A-3	6
7Z946	636892	6615-01-468-8249	A-1	3
7Z946	636918	5340-01-470-6153	A-1	13
7Z946	636919	5340-01-470-6142	A-1	12
7Z946	636920	4920-01-470-3582	A-1	17
			A-2	6
7Z946	636960	1290-01-468-5180	A-1	29
7Z946	667046	1290-01-468-6061	A-1	16
7Z946	667047	6675-01-468-6526	A-1	11
7Z946	667074	6675-01-470-0742	A-1	7
7Z946	667075		A-1	1
7Z946	667077	6675-01-470-0870	A-12	7
S3890	667099	6150-01-471-6164	A-1	26
7Z946	667299	1290-01-468-6531	A-1	30
7Z946	700076	5920-01-424-9968	A-7	2
7Z946	701042		A-1	15
7Z946	701095	5340-01-470-3899	A-2	1
7Z946	703051	6240-01-470-0912	A-1	14
7Z946	703052	5920-01-469-9002	A-1	8
7Z946	703053	5920-01-469-9021	A-1	6
			A-1	22
7Z946	703054	5920-01-469-9004	A-1	23
7Z946	703055	5920-01-475-9814	A-1	24
7Z946	703056	5920-01-469-9014	A-1	25
			A-11	14
7Z946	703545	1290-01-468-8243	A-1	10
7Z946	707932	1290-01-468-6064	A-4	1
7Z946	708522	5340-01-470-3887	A-3	1
7Z946	708581	6110-01-470-0680	A-11	13
7Z946	708649	5305-01-470-7073	A-10	6
7Z946	708689	5140-01-470-3005	A-8	5
7Z946	708712	5340-01-470-3891	A-10	5
7Z946	708733	5930-01-470-7030	A-11	4
7Z946	708747	4540-01-473-6939	A-11	11
7Z946	708748	4540-01-473-6942	A-11	9
7Z946	708749	4540-01-473-6946	A-11	10
7Z946	708750	5640-01-473-6001	A-11	8
7Z946	708781	1290-01-468-6067	A-10	10
7Z946	708782	1290-01-470-5048	A-8	14

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
7Z946	708783	5975-01-476-1484	A-8	15
7Z946	708980	5365-01-469-9709	A-8	6
7Z946	710001	5120-01-470-1162	A-8	12
7Z946	710071	5307-01-470-7076	A-8	3
7Z946	710072	5340-01-470-6162	A-8	17
7Z946	710073		A-8	4
7Z946	710084	8135-01-472-5163	A-12	2
7Z946	710085	8135-01-472-5165	A-12	4
7Z946	710288	5340-01-470-5885	A-8	1
7Z946	710554		A-8	2
7Z946	711208	6160-01-477-9887	A-1	18
			A-12	7
S3890	711212	6150-01-471-6169	A-1	27
S3890	711213	6150-01-471-6172	A-1	28
7Z946	711309	5935-01-470-5049	A-3	7
7Z946	711818	9905-01-468-5181	A-1	9
7Z946	711819	9905-01-468-5182	A-1	4
7Z946	711820	9905-01-468-5183	A-1	20
7Z946	711821	9905-01-468-6537	A-11	12
7Z946	711869	8135-01-472-5861	A-12	6
7Z946	712305	5340-01-470-6180	A-7	5
7Z946	712311	6680-01-476-1483	A-9	11
7Z946	712313	5340-01-470-6186	A-9	1
7Z946	712402	8135-01-472-3346	A-12	1
7Z946	712403	8135-01-472-4108	A-12	3
7Z946	712404	8135-01-472-5164	A-12	5
7Z946	712437	5920-01-469-9221	A-11	6
7Z946	712560	5330-01-475-4297	A-7	8
7Z946	712688	5330-01-470-3989	A-7	4

APPENDIX B
FORMS

The Following forms may be reproduced locally.

GLPS Field Verification Using Survey Control Point

GLPS Serial Number:_____ **Date**: _____

SCP Location: _____	Marker Location: _____
Survey Order: _____	Survey Order: _____
Easting: _____	Easting: _____
Northing: _____	Northing: _____
Elevation: _____	Elevation: _____
Azimuth to Marker: _____	
Distance to Marker: _____	

Measurement	**Az_M**
1	
2	
3	
4	
5	
6	
7	
8	
9	
Average Az_M	
Δ Az = Az_K – Avg Az_m	

Results/Remarks:_____

_____

_____

_____

_____

GLPS Field Verification (Field Expedient Method)

GLPS Serial Number:_____ **Date**: _____

GLPS	Distant Instrument's Position
Easting: _____	Easting: _____
Northing: _____	Northing: _____
Elevation: _____	Elevation: _____
Range to Distant Instrument: _____	

Measurement	**Az_M**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Average Az_M	

Results/Remarks:_____

_____

_____

_____

_____

_____

_____

HOW TO USE DA 2404 FORM

REFERENCE: Website http://www.usapa.army.mil/forms/forms3.html

1. Use Form Flow to fill out form.
2. Print filled out form.
3. Send copy with item to be repaired.
4. Send copy to address in paragraph 3.1.9c.

EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET

For use of this form, see DA PAM 738-750 and 738-751; the proponent agency is DCSLOG

1. ORGANIZATION		2. NOMENCLATURE AND MODEL					
3. REGISTRATION/SERIAL/NSN	4a. MILES	b. HOURS	c. ROUNDS FIRED	d. HOT STARTS	5. DATE	6. TYPE INSPECTION	

7. APPLICABLE REFERENCE			
TM NUMBER	TM DATE	TM NUMBER	TM DATE

COLUMN a – Enter TM item number.

COLUMN b – Enter the applicable condition status symbol

COLUMN c – Enter deficiencies and shortcomings.

COLUMN d – Show corrective action for deficiency or shortcoming listed in Column c.

COLUMN e – Individual ascertaining completed corrective action initial in this column.

STATUS SYMBOLS

"X" – Indicates a deficiency in the equipment that places it in an inoperable status.

CIRCLED "X" – Indicates a deficiency, however, the equipment may be operated under specific limitations as directed by higher authority or as prescribed locally, until corrective action can be accomplished.

HORIZONTAL DASH "(-)" – Indicates that a required inspection, component replacement, maintenance operation check, or test flight is due but has not been accomplished, or an overdue MWO has not been accomplished.

DIAGONAL "(/)" – Indicates a material defect other than a deficiency which must be corrected to increase efficiency or to make the item completely serviceable.

LAST NAME INITIAL IN BLACK, BLUE-BLACK INK, OR PENCIL - Indicates that a completely satisfactory condition exists.

FOR AIRCRAFT - Status symbols will be recorded in red.

ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSTIC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.

8a. SIGNATURE *(Person(s) performing inspection)*	8b. TIME	9a. SIGNATURE *(Maintenance Supervisor)*	9b. TIME	10. MANHOURS REQUIRED

TM ITEM NO. *a*	STATUS *b*	DEFICIENCIES AND SHORTCOMINGS *c*	CORRECTIVE ACTION *d*	INITIAL WHEN CORRECTED *e*

DA FORM 2404, APR 79 Replaces edition of 1 Jan 64, which will be used USAPPC V1.00

TM ITEM NO. *a*	STATUS *b*	DEFICIENCIES AND SHORTCOMINGS *c*	CORRECTIVE ACTION *d*	INITIAL WHEN CORRECTED *e*

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0011008

DISTRIBUTION: To be distributed in accordance with the initial distribution requirements for IDN: 401176, TM 9-6675-347-13&P.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

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.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

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

THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

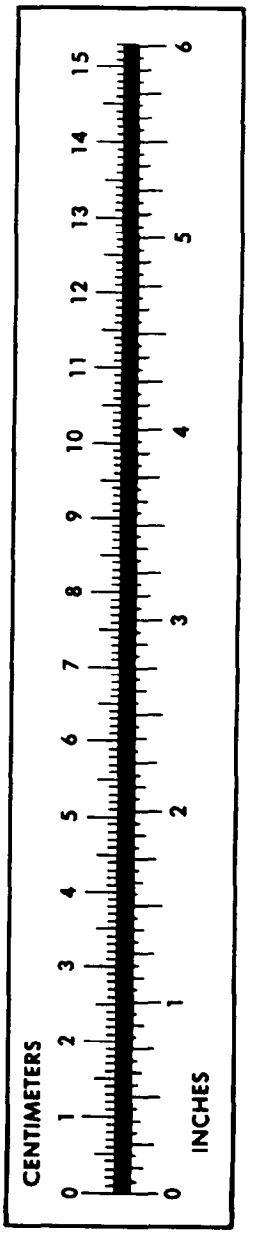
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



PIN: 077973-000