TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

RMHS REFERENCE GYRO SET
NSN: 6605-01-206-4771

HEADQUARTERS, DEPARTMENT OF THE ARMY

9 JULY 1985

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

WARNING

Do not be misled by the term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

WARNING

Compressed air is dangerous and can cause serious bodily harm. To be useable for cleaning, a compressed air source must limit nozzle pressure to no more than 26 pounds per square inch gage (PSIG). Goggles must be worn at all times while using compressed air. Do not use compressed air to dry areas where cleaning compound has been used.

TECHNICAL MANUAL

NO. 55-6605-263-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 9 July 1985

Operator's, Organizational, Direct Support
and General Support Maintenance Manual
(Including Repair Parts and Special Tools List)

RMHS REFERENCE GYRO SET
NSN 6605-01-206-4771

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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HOW TO USE THIS MANUAL

This manual contains operator, organizational, direct and general support maintenance instructions for the portable RMHS Reference Gyro Set. This manual is divided into chapters, sections, and paragraphs. The chapters are numbered sequentially throughout the manual. The sections are divided into paragraphs which are numbered sequentially within the chapter.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. GENERAL. The RMHS Reference Gyro Set is a self-contained, portable system used as a calibration unit to realign and adjust magnetic compasses on US Army Watercraft. Included in the manual are general description and data; instructions for installation, operation, preventive and corrective maintenance, and technical principles of operation.

1-2. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750.

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. Procedures for the destruction of Army material are contained in TM 750-244-2.

1-4. ADMINISTRATIVE STORAGE. Refer to TM 740-90-1 for procedures, forms and records, and inspections required during administrative storage of this equipment.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATION (EIR). If your Reference Gyro Test Set needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.

1-6. NOMENCLATURE CROSS-REFERENCE LIST

COMMON NAME	OFFICIAL NOMENCLATURE
GYRO	Directional Gyro CN-998B/ASN-43
INVERTER	Static Power Inverter PS-299-1
INDICATOR	Angle Position Indicator Model 8300-02

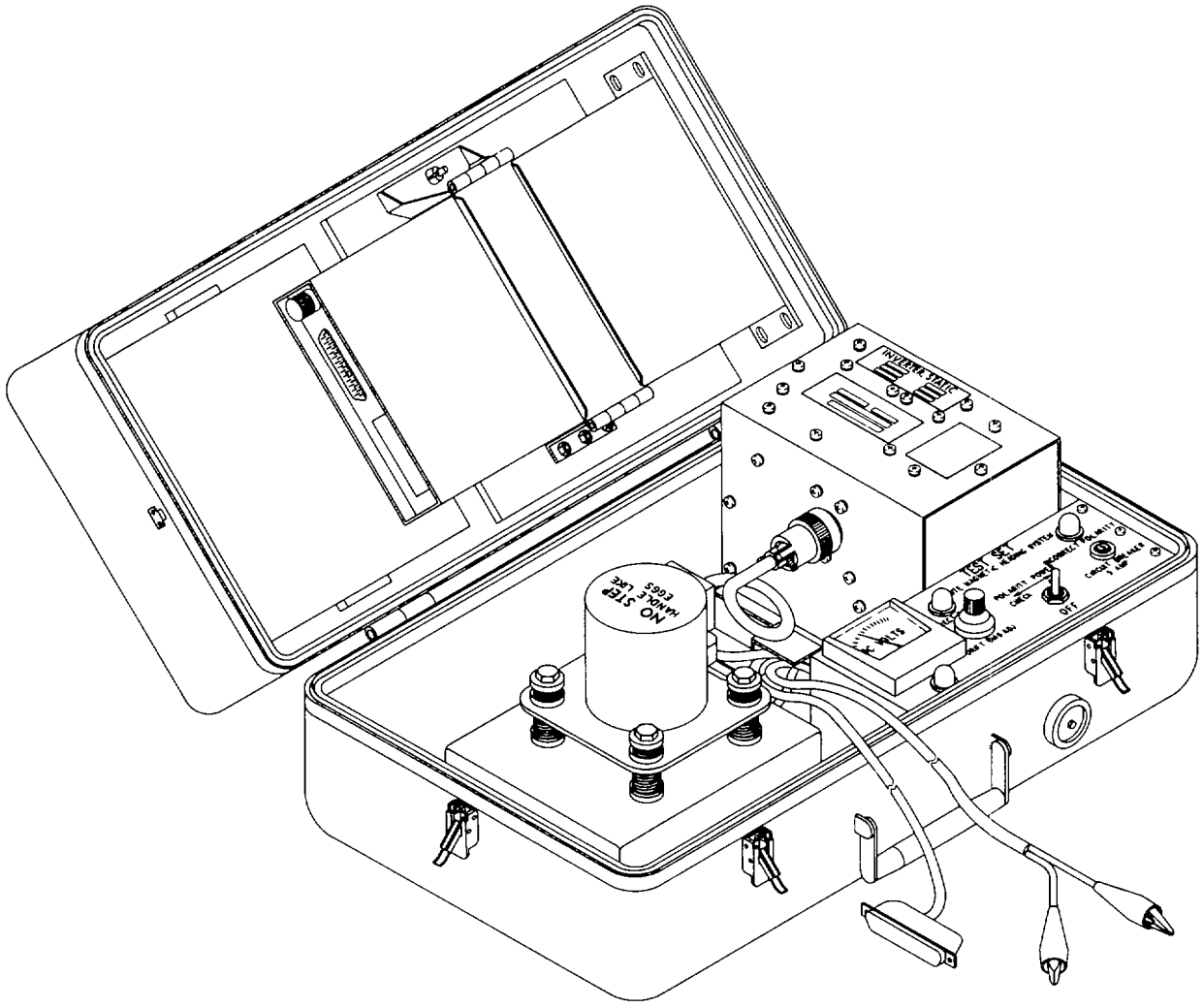

FIGURE 1-1. RMHS REFERENCE GYRO SET.

Section II. DESCRIPTION AND DATA

1-7. PURPOSE AND USE. The RMHS Reference Gyro Set is a self-contained, portable, free running Gyro (not northseeking) system to be used for reference headings only while adjusting/compensating remote magnetic heading systems located on US Army watercraft.

a. The RMHS Reference Gyro Set is housed in a single metal case and is specifically tailored to be portable and to satisfy the need to occasionally calibrate or realine the compass system (Gyro or Magnetic) used on board US Army watercraft.

b. The RMHS Reference Gyro Set consists of four modules and cables (see figure 1-1) as listed below:

Directional Gyro CN-998B/ASN-43

Power Inverter PS-299-1

Angle Position Indicator MDL-8300-02
Control Panel Assembly

Cable Assemblies:

Power Cable

Inverter Cable

Indicator Cable

Gyro Cable

1-8. DESCRIPTION OF MAJOR COMPONENTS.

a. Directional Gyro CN-998B/ASN-45.

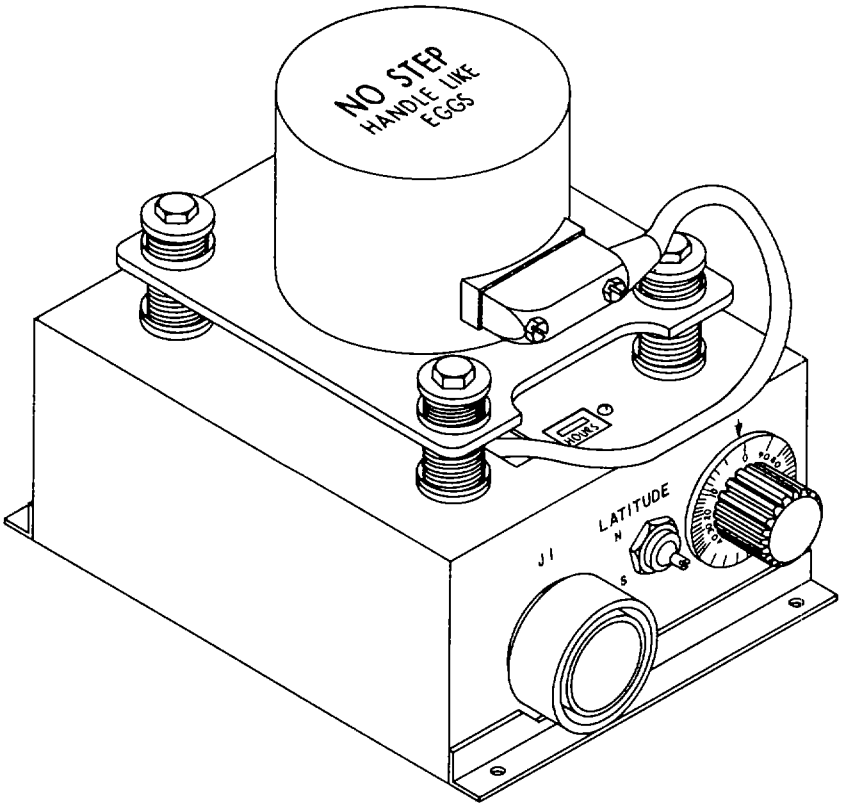

FIGURE 1-2. DIRECTIONAL GYRO.

(1) The Directional Gyro (Figure 1-2) is contained in a sealed unit and mounted on a base. The Gyro base contains the cable connector, hemisphere selector, and latitude adjustment potentiometer.

(2) The Gyro is a case-level gyro in which the Gyro assembly (inner gimbal) maintains a level, or upright position within the gimbal ring (outer gimbal). Changes in watercraft heading are reflected by corresponding changes in the position of the inner gimbal with respect to the outer gimbal. This heading change is fed to the angle position indicator and is reflected in degrees and minutes.

b. Power Inverter PS-299-1.

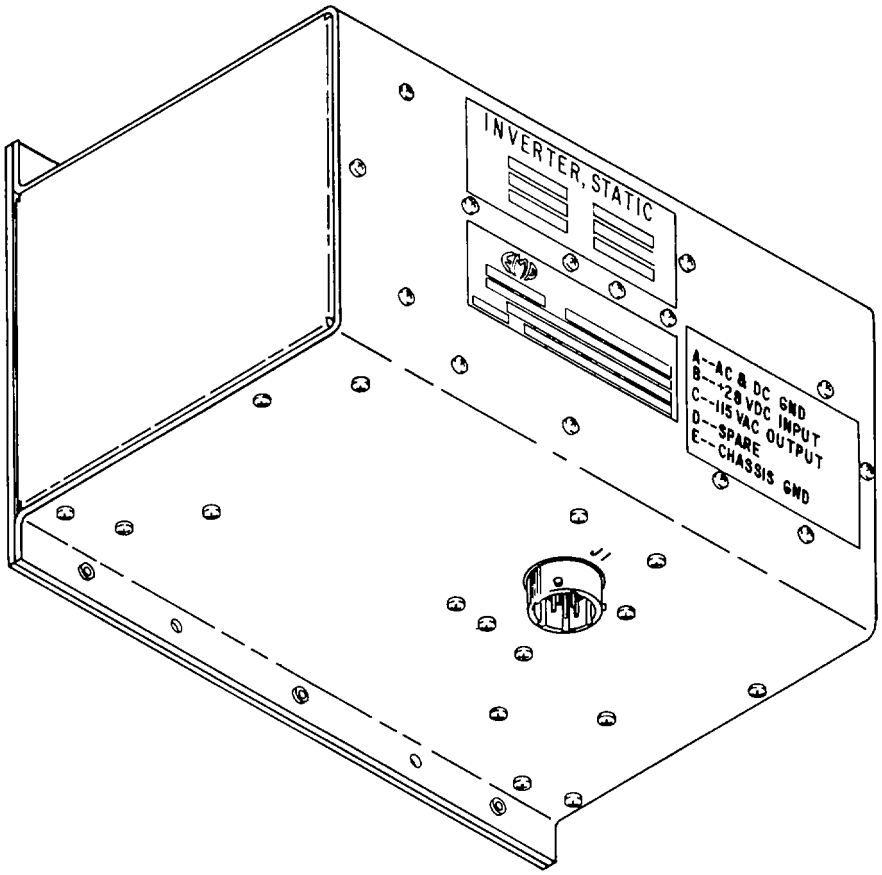

FIGURE 1-3. POWER INVERTER.

(1) The Power Inverter (figure 1-3) converts a nominal +27.5 Vdc input to a regulated 400 Hz single phase, 115 Vac out-put, and is generally intended for use with lightweight portable reference Gyro Systems.

(2) The inverter is a self-contained solid state electronic switching device that converts a direct current (dc) input to a single-phase alternating current (ac) output. The inverter consists of five major subassemblies that are mounted to the main chassis. The inverter is equipped with one external connector J1, that permits input dc and output ac to pass.

c. Angle Position Indicator MDL-8300-02.

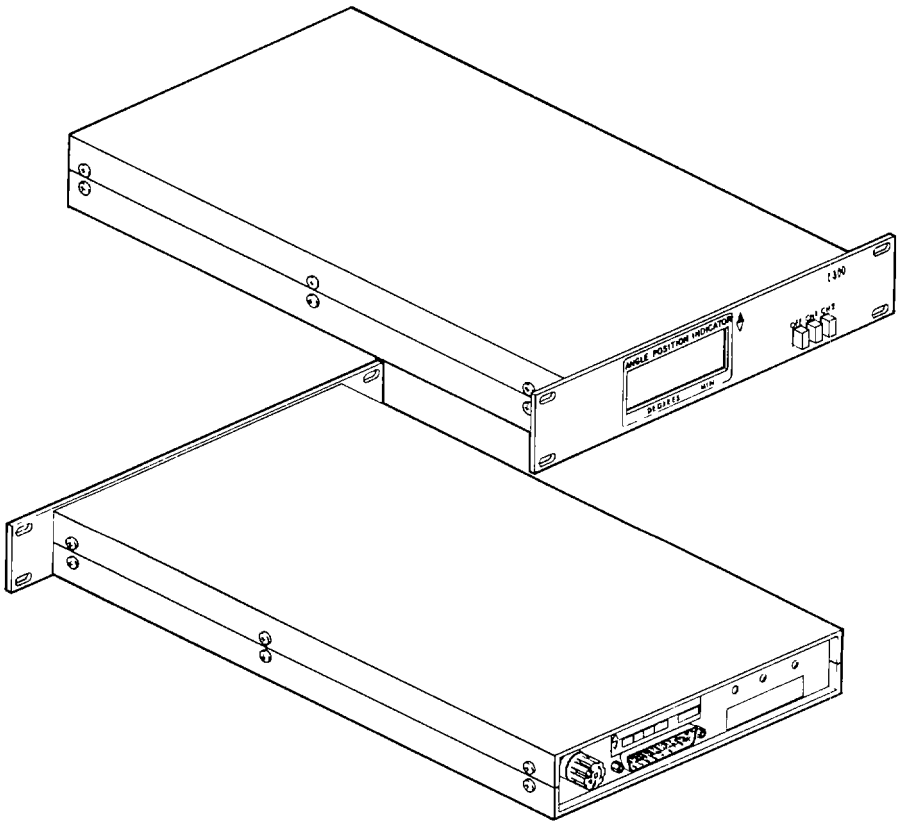

FIGURE 1-4. ANGLE POSITION INDICATOR.

(1) The angle position indicator (figure 1-4) is a solid state, portable unit with a five decade digital readout indicator. The unit has 2 channel inputs, however, only one channel is used in the RMHS Reference Gyro Set operation.

(2) The angle position indicator uses a type II Servo Loop Converter, that contains a Large Scale Intergrater (LSI) chip. Signals from the Directional Gyro CN-998B/ASN-43 are fed into channel 1 and through the LSI chip which converts the input signal into an AC error, and interpolation signal or reference signal. The reference signal is then converted to a dc voltage which is conditioned and fed to the digital readout indicator in degrees and minutes.

d. Control Panel Assembly.

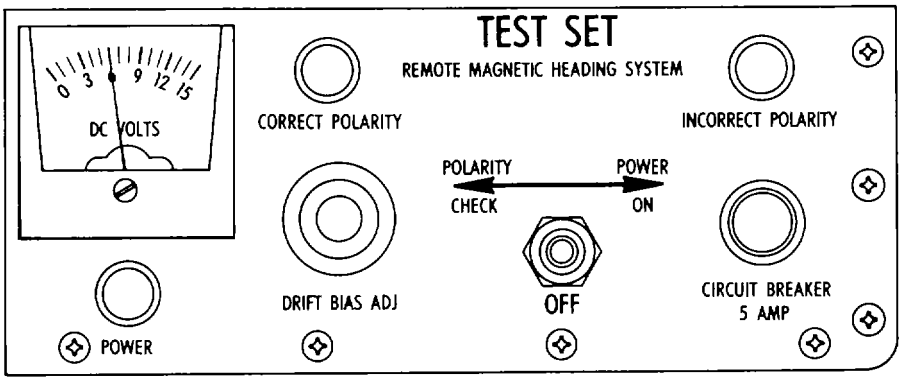

FIGURE 1-5. CONTROL PANEL.

(1) The Control Panel Assembly (figure 1-5) is a fabricated unit which is part of the RMHS Reference Gyro Set Case. It is permanently mounted in the lower right corner of the case and contains a DC VOLTMETER, POWER POLARITY INDICATORS, DRIFT BIAS ADJ, CIRCUIT BREAKER and POWER ON-OFF-POLARITY switch.

(2) The external dc power source is connected to the input circuit of the Control Panel Assembly. Input circuitry in the Control Panel Assembly checks for correct input dc voltage polarity and operates either the correct or incorrect polarity lamp. The Control Panel Assembly makes proper distribution of voltages and signal data to the Gyro, Inverter and Angle Position Indicator. The dc voltmeter is used in conjunction with the Gyro drift bias adjustment to assure that 6 Vdc +0.010 is applied to the Gyro Bias Circuit.

e. Cable Assemblies.

(1) The RMHS Reference Gyro Set has four cables connected to the Control Panel Assembly, as part of its signal distribution and interface circuit, which provides interconnections to the Gyro unit, Power Inverter, Angle Position Indicator, and External Power (which is polarized).

(2) The Gyro unit and Power Inverter cables are short cables terminating in the RMHS Reference Gyro Set Case to respective units. The dc power input cables and angle position indicator cables are longer to accommodate the distance to the external power source and ideal location of the angle position indicator.

1-9. PHYSICAL DATA

Directional Gyro CN-998B/ASN-43

height	5.94 inches
depth	7,56 inches
width	5.81 inches
weight	6.0 pounds

Power Inverter PS-299-1

height	5.5 inches
depth	4.8 inches
width.....	7.0 inches
weight	6.2 pounds

Angle Position Indicator Model 8300-02

height	1.75 inches
depth	12.0 inches
width	9.5 inches
weight	4.0 pounds

1-10. PERFORMANCE DATA

Directional Gyro CN-998B/ASN-43

- Magnetic heading has an accuracy of ±1 degree
- Slaving rate is 2.5 degrees ±1 degree per minute
- Power requirements are 115 Vac, 400 Hz; 30 VA starting and 20 VA running.

Power Inverter PS-299-1

- Input voltage +20.0 to +29.0 Vdc
- Operating temperatures -55 degrees C (-67 degrees F) to +55 degrees C (+131 degrees F)
- Output voltage 115 Vac, 400 Hz, single phase, @ 150 VA

Angle Position Indicator MDL 8300-02

- Accuracy to 0.03 degrees to 0.05 degrees
- Resolution is 0.01 degrees
- Input references from 47 Hz to 440 Hz
- Input power 115/230 V RMs to 125/250 V RMs, 47 to 440 Hz; 25 VA max

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-11. GENERAL.

a. The portable RMHS Reference Gyro Set is housed in a metal carrying case and consists of a Directional Gyro, Power Inverter, Position Indicator, control panel, and required cables and connectors (fig. 1-1).

b. The RMHS Reference Gyro Set provides accurate heading information referenced to magnetic/true north to calibrate existing on-board watercraft compass systems.

1-12. TECHNICAL PRINCIPLES OF MAJOR COMPONENTS.

a. Principles of Operation. The Directional Gyro is a case-level, free-running Gyro in which the Gyro assembly (inner gimbal) maintains a level, or upright position within the gimbalring (outer gimbal). Changes in watercraft heading are reflected by corresponding changes in the position of the inner gimbal with respect to the outer gimbal. These changes in relationship between the inner and the outer gimbals produce accurate and stabilized reference output signals which are fed to the angle position indicator. The Gyro input power requirements are 115 Vac, 400 Hz from the static power inverter.

b. The static power Inverter converts a nominal +27.5 Vdc external input to a regulated 115 Vac, 400 Hz ±20 Hz, single-phase output. A pulse width modulation technique is used and provides a sinusodial output waveform rated at 150 VA continuous. This regulated output voltage is fed to the Directional Gyro and Angle Position Indicator.

c. The Angle Position Indicator uses a type II servo lock-loop converter which receives the Gyro's reference signal and converts it into an analog signal. The analog signal is reflected on the Light Emitting Diodes (LED), lazy eight display panel Indicating heading in degrees and minutes.

1-13. FUNCTIONING OF EQUIPMENT SYSTEM. The following functional description of the RMHS Reference Gyro Set is shown in block diagram figure 1-6. When control panel ON-OFF-POLARITY switch is in the ON position, 28 Vdc is applied to the power inverter. The output of the power inverter, 115 Vac 400 Hz, is then fed to the Gyro and Angle Position Indicator units. When the Gyro's latitude switch is in the north or south hemisphere position, a latitude course correction is made to the Gyro. When the latitude knob (potentiometer) is positioned to actual latitude of the watercraft a very accurate correction is made to the Gyro. The resulting stabilized reference signal from the Gyro, indicating the actual

true heading of the compass and vessel, is sent to the Angle Position Indicator with a readout on the display panel in degrees and minutes. Adjustment of the drift bias adjustment potentiometer should be 6 Vdc initially. Once the drift rate of the Gyro has been corrected and stabilized within tolerance, the RMHS Reference Gyro Set functions as a latitude corrected free running Gyro providing accurate heading information during the adjustment/compensation of a watercraft compass while performing a compass swing.

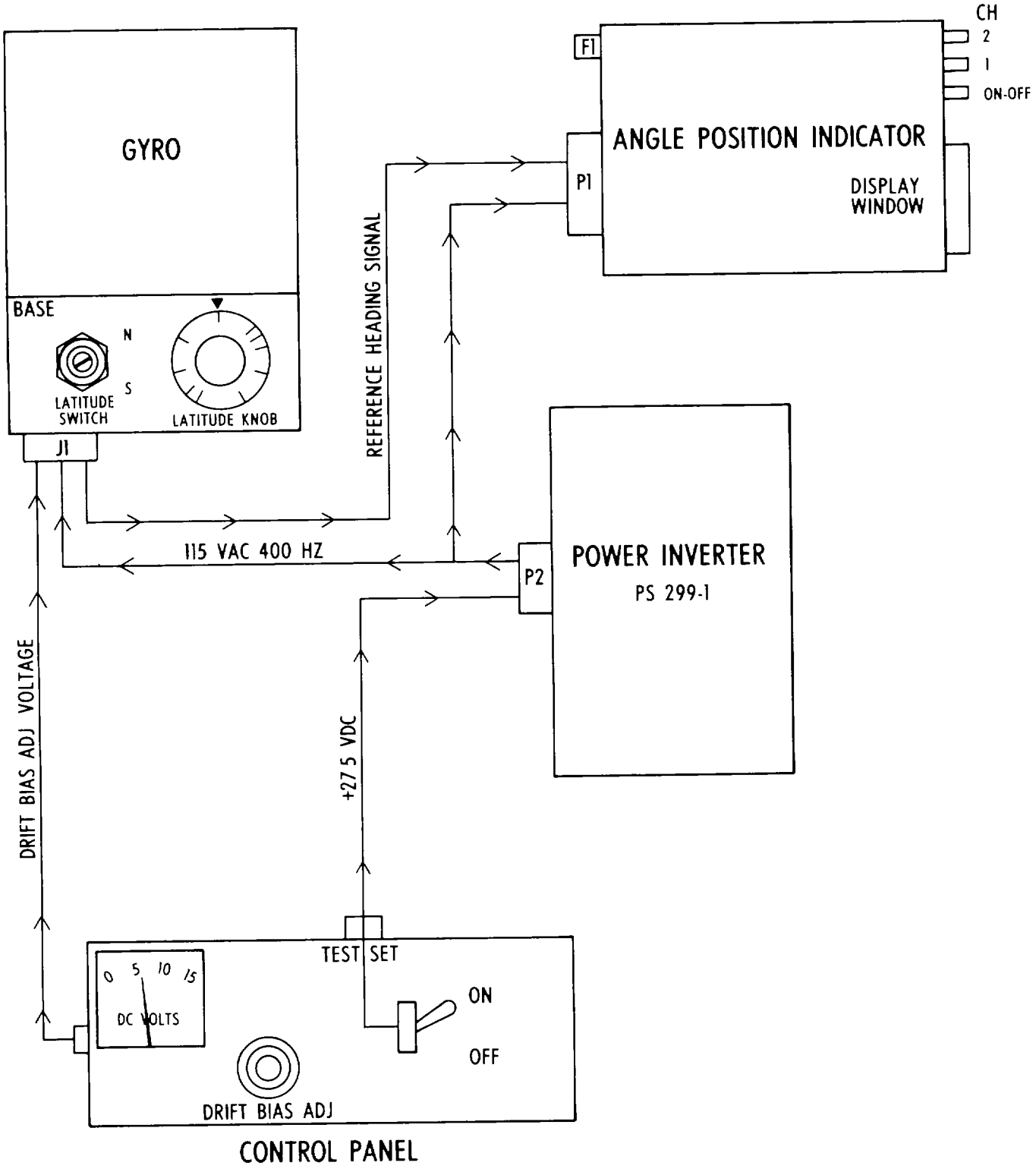

FIGURE 1-6. RMHS REFERENCE GYRO SET BLOCK DIAGRAM.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF CONTROLS AND INDICATORS

2-1. SCOPE. This chapter contains operator controls and indicators and operating procedures for the RMHS Reference Gyro Set. See figure 1-2, 1-4 and 2-1.

2-2. OPERATOR CONTROLS AND INDICATORS.

Table 2-1. Control Panel Assembly, Operator Controls and Indicators

Control or Indicator	Function
On-Off Polarity Switch	Checks Input Polarity; Turns Unit On-Off
Circuit Breaker	Overload Protection; Cuts Power Off
Drift Bias Adj. Potentiometer	Adj. dc Drift Bias in Gyro
Voltmeter	Indicates Applied Drift Bias Voltage
Correct Polarity Lamp	Indicates Proper dc (-)(+) Connection (Green Lamp)
Incorrect Polarity Lamp	Indicates Improper dc (-)(+) Connections (amber Lamp)
Power Lamp	Indicates 28 Vdc Applied to Unit (Red Lamp)

Table 2-2. Directional Gyro CN-998B/ASN-43, Operator Controls and Indicators

Control or Indicator	Function
Latitude Rotary Switch	Sets Gyro Northern/Southern Hemisphere
Latitude Potentiometer	Sets Local Latitude Correction in Gyro

Table 2-3. Angle Position Indicator, Operator Controls and Indicators

Control or Indicator	Function
Digital Display Indicator	Indicates Heading in Degrees and Minutes
On-Off Power Switch	Turns Unit On-Off (Red Lamp)

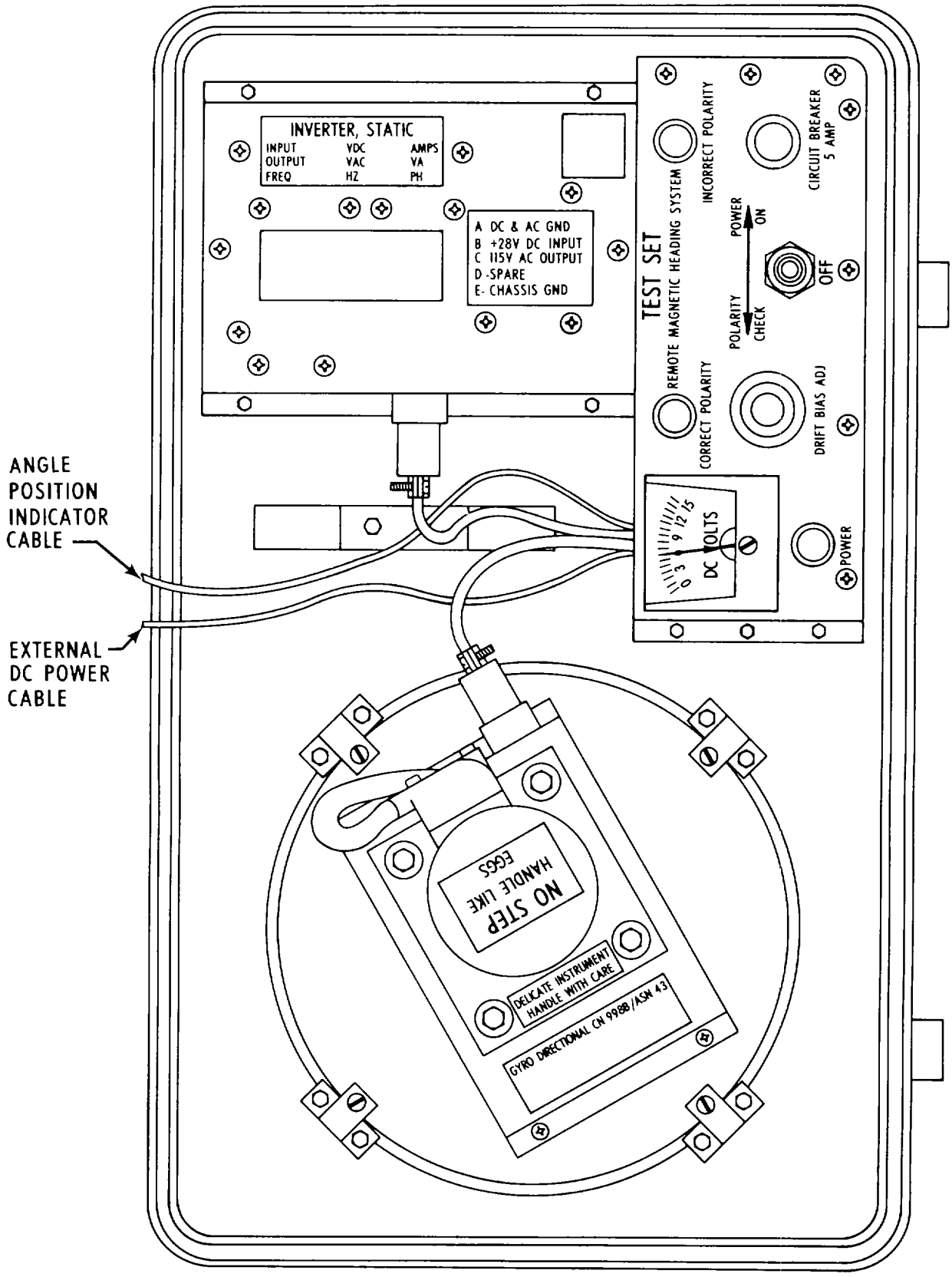

FIGURE 2-1. RMHS REFERENCE GYRO SET CONTROLS AND INDICATORS.

Table 2-3. Angle Position Indicator, Operator Controls and Indicators (cont)

Control or Indicator	Function
Channel 1 Input	Selects Channel 1 to Receive Signal Data
Channel 2 Input	Selects Channel 2 to Receive Signal Data

NOTE

Either channel can be used during operation.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. GENERAL.

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in a serviceable condition, prevent breakdowns and assure maximum operational capability. Preventive maintenance and services of the RMHS Reference Gyro Set are established at the general support maintenance level and are performed at daily, weekly, or monthly intervals, unless otherwise directed by the commanding officer or scheduled operations (Table 2-4).

b. Maintenance forms and records to be used and maintained with this equipment are specified in DA Pam 738-750.

2-4. DAILY AND WEEKLY PREVENTIVE MAINTENANCE. Perform all the daily and weekly preventive maintenance checks and services as outlined for the RMHS Reference Gyro Set. The step numbers in the PMCS outline indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit will be noted for future correction to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage equipment. Record all deficiencies together with the corrective action taken on the form specified in DA Pam 738-750.

2-5. MONTHLY PREVENTIVE MAINTENANCE. Perform all the preventive maintenance checks and services listed once each month in the sequence listed. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is not operated on a daily basis, adjustment can be made of the daily, weekly and monthly preventive maintenance checks and servicing requirements.

CAUTION

If you find a problem in the RMHS Reference Gyro Set which, if you continued to operate, would cause damage or failure, stop operations immediately. Record all problems on DA Form 2404 and notify the next higher level of maintenance as soon as possible.

Table 2-4. General Support Maintenance

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation **W-Weekly** **S-Semiannually**
D-Daily **M-Monthly**

ITEM NO.	INTERVAL B	D	W	M	S	Item To Be Inspected	Procedures	For readiness reporting equipment is not Ready/Available If:
						NOTE BE ALERT: If you find a fault which you can fix, fix it. Check out anything that seems wrong or unusual.		
1.	*		*			External case and internal contents. brackets, clamps, and mountings. Check for loose or missing hardware and replace and tighten as necessary	Inspect seating and stability of	Missing or loose hardware.
2.	*		*			Dials, knobs and switches.	Check each control for proper mechanical action. Observe that the mechanical action is positive and not binding or scraping.	Dial, knobs, or switches are missing or defective.

Table 2-4. General Support Maintenance (cont)

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation **W-Weekly** **S-Semiannually**
D-Daily **M-Monthly**

ITEM NO.	INTERVAL					Item To Be Inspected	Procedures	For readiness reporting equipment is not Ready/Available If:
	B	D	W	M	S			
3.	*		*			Case, modules, control panel and cables.	Check to see that all surfaces are free from dirt, grease, and moisture. Check general condition of each component. Inspect for scratched paint, missing screws, and bent or broken hardware.	Defects exist which prevent proper operation of equipment.
4.	*		*			Angle Position Indicator and control panel dc voltmeter.	Check to see that the indicators are in good condition and that their glass surfaces are clean and not cracked or damaged.	Connectors or plugs are damaged.
5.	*		*			Connectors and Plugs.	Check all connectors and plugs to all components and cables of the compass system and assure that they are clean, in tact, and not loose fitting.	Connectors or plugs. are damaged

Table 2-4. General Support Maintenance (cont)

PREVENTIVE MAINTENANCE CHECKS AND SERVICESI

B-Before Operation **W-Weekly** **S-Semiannually**
D-Daily **M-Monthly**

ITEM NO.	INTERVAL					Item To Be Inspected	Procedures	For readiness reporting equipment is not Readv/Available If:
	B	D	W	M	S			
6.	*		*			Cables and power cord.	Check all inter-cabling for cracks and breaks. Replace cables or power cord if they are broken, cracked or frayed.	Cables are missing, broken, cracked or frayed.
7.				*		Compass system operational check.	Check to see that the compass system operates in accordance with the operational check-out procedures in paragraph 2-7.	
8.					*	Gyro alinement and drift tolerance operates and that drift tolerances can be achieved as stated in paragraph 2-7.	Check to see that the Gyro adjustment circuit is defective. Check that drift bias voltage (6 V dc) is stable.	Gyro motor is defective or drift bias

Section III. OPERATION UNDER USUAL CONDITIONS

2-6. INSTALLATION INSTRUCTIONS.

a. Tools, Test Equipment and Materials Required for Installation. No tools, test equipment, or special material are required for installation of the Reference Gyro Test Set.

b. Place the RMHS Reference Gyro Set case in a location on board where it can be taped down and not disturbed during operation.

NOTE

Location of the RMHS Reference Gyro Set should not be greater than 10-14 feet from watercraft compass and operator due to length of angle position indicator cable.

c. Open case and remove the Angle Position Indicator. Make cable connection and place indicator near watercraft compass.

d. Secure the RMHS Reference Gyro Set case to the watercraft surface by tape or other means so that case cannot move.

e. Mark the outline of the case on surface with chalk or pencil. This will indicate if the RMHS Reference Gyro Set case has been moved during operation.

NOTE

Angle Position Indicator should be placed in a position where it can be viewed by both the vessel operator and the compass adjuster through-out the compass swing operation.

2-7. GENERAL. The following instructions pertain to the operational procedures of the RMHS Reference Gyro Set.

2-8. OPERATING PROCEDURES. (Fig. 1-6)

a. Ensure all switches are set to OFF.

b. Connect indicator cable to J1 of Angle Position Indicator.
c. Connect DC power cable to external +28 Vdc source.

d. Set ON-OFF-POLARITY switch to POLARITY CHECK position.

e. Correct polarity lamp (green) should illuminate. If incorrect polarity lamp (amber) illuminates, reverse DC power cable connections at external +28 Vdc source.

f. Set ON-OFF-POLARITY switch to OFF.

NOTE

Start watercraft engines to set-up normal hull vibrations and stabilize external 28 Vdc source. Leave watercraft engines running until compass adjustments are completed.

g. Set ON-OFF-POLARITY switch to ON. Power lamp (red) will illuminate.

h. Set power ON-OFF switch at Angle Position Indicator to ON.

i. Set Gyro latitude switch to either "N" or "S" depending on which hemisphere watercraft is located.

j. Set latitude dial on Gyro to indicate watercraft's local latitude.

k. Obtain the watercraft's heading via navigational charts, dock placement headings or other known accurate heading sources.

NOTE

Allow a Gyro warm-up period of 30 minutes to reach full speed and to stabilize.

l. Rotate the RMHS Reference Gyro Set in the case, by loosening the four clamp screws, until the Angle Position Indicator reading reflects watercraft heading.

m. Set the drift bias adjustment potentiometer until the control panel dc voltmeter indicates +6 Vdc.

n. Check Angle Position Indicator reading to determine direction of any drift (drift in excess of two degrees/four hours must be corrected).

NOTE

Establishing drift rate is preferred at a pier with known accurate heading, holding vessel tight against pier. Once drift is stabilized at pier, move vessel into channel and swing for 30 minutes. Come back to pier and check drift. Make drift corrections. Significant drift is only encountered while vessel is swinging. Each time vessel is returned to pier during RMHS calibration, drift rate should be checked.

o. Positive Gyro Drift Correction. If compass has positive drift rate indicated by increase in degrees/minutes, lower voltage by 0.5 volts on built-in voltmeter. Observe indication for six minutes. Multiply drift rate, minutes by 10, to ascertain drift rate per hour. Continued voltage adjustment will produce a desired drift rate.

p. Negative Gyro Drift Correction. If compass has negative drift rate indicated by a decrease in degrees/minutes, increase voltage by 0.5 volts.

NOTE

If bias adjust reaches full travel and more voltage compensation is required, return bias adjust to indicate 6 volts and turn latitude dial clockwise to correct negative drift and counterclockwise to correct positive drift. When drift is close to that desired, use bias adjust to finalize drift adjustment. The acceptable drift rate can be obtained in one hour.

q. Place Angle Position Indicator so that both the water-craft operator and compass adjuster can view the indicator headings.

r. Perform a 360 degrees compass swing while making adjustments to the watercraft compass under test.

s. After redocking, compare the present heading of the RMHS Reference Gyro Set to the original heading. See paragraph k. And determine drift.

NOTE

If Gyro drift rate is more than two degrees, recalibration of the Gyro drift voltage is required. Recheck watercraft compass adjustments.

2-9. RMHS REFERENCE GYRO SET SHUT-DOWN PROCEDURES.

a. Set control panel ON-OFF-POLARITY switch to OFF.

b. Set ON-OFF switch in Angle Position Indicator to OFF.

c. Remove dc power leads from external 28 volt source.

d. Remove indicator cable from Angle Position Indicator and secure cable and Angle Position Indicator in case.

CAUTION

Do not attempt to move the RMHS Reference Gyro Set for 30 minutes to assure that the Gyro rotor has completely stopped rotating.

Section IV. OPERATIONS UNDER UNUSUAL CONDITIONS

2-10. OPERATION IN HOT CLIMATE.

a. Keep sand, dirt and dust from connectors and outlets.

b. Do not drag or place an open connector on dirt or dust.

c. Keep cables, components and connectors covered when not in use.

2-11. OPERATION IN TROPICAL CLIMATE.

a. Keep moisture and fungi off the equipment by wiping with a lint-free cloth.

b. Do not operate equipment without covers for any long period of time.

c. Keep RMHS Refererence Gyro Set covered with tarpaulin or plastic sheet when in operation during wet weather.

2-12. OPERATION IN COLD OR WET CLIMATES. The RMHS Reference Gyro Set can be operated in all weather conditions with some caution.

a. Cold weather causes cables and wires to be:

* Hard,
* Brittle, and
* Difficult to handle

b. Always ensure that kinks and unnecessary loops will not result in permanent damage.

c. Keep water, ice and snow from:

* Receptacles,
* Connectors,
* Cables,
* Wires,
* Major Components, and
* Inside of case

d. Keep cables, components and connectors covered when in use during wet weather.

2-13. OPERATION IN SALT WATER ENVIRONMENT.

a. Do not expose the RMHS Reference Gyro Set to salt water spray.

b. Use tarpaulin or plastic sheet to protect cables, components, connectors and case from salt water spray.

c. Wipe all connectors (internal and external), components, cables and the inside and outside of Gyro case free of salt water.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE

3-1. GENERAL. Organizational maintenance is not applicable to the RMHS Reference Gyro Set.

CHAPTER 4

DIRECT SUPPORT MAINTENANCE

4-1. GENERAL. Direct support maintenance is not applicable to the RMHS Reference Gyro Set.

CHAPTER 5

GENERAL SUPPORT MAINTENANCE

Section I. INTRODUCTION

5-1. TOOLS AND EQUIPMENT. There are special tools required to maintain and repair the RMHS Reference Gyro Set, see Appendix B.

5-2. LUBRICATION. The RMHS Reference Gyro Set does not require lubrication.

5-3. INSPECTION.

a. Inspect all module plugs, cable connectors and cables for any bent pins or damages.

b. This Section outlines the general support maintenance requirements for visual inspection and preventative maintenance. Good care and alertness will help keep the portable RMHS Reference Gyro Set in top operating condition.

5-4. CLEANING. Refer to Appendix C for material identification and ordering information.

a. Cleaning and caring for the RMHS Reference Gyro Set is one of the most important maintenance functions that you can perform. It is often overlooked. Proper cleaning is necessary to keep the RMHS Reference Gyro Set in condition.

b. Inspect and clean the exterior of the RMHS Reference Gyro Set case. The exterior case surfaces should be free of moisture, dirt, grease, rust, fungus, and exposed metal surfaces (dents and scratches).

5-5. UNPACKING.

a. When packed for shipment, the RMHS Reference Gyro Set is secured firmly by tie-down brackets provided in the Gyro case.

b. While unpacking the angle position indicator, from the Gyro case, be careful to avoid damaging the unit. The circuitry is sensitive to low-shock environments.

NOTE

Avoid hitting or bumping the RMHS Reference Gyro Set during transportation as the gyro gimbals are uncaged and can be damaged easily.

5-6. CHECKING UNPACKED EQUIPMENT.

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (Report of Packing and Handling Deficiencies) as prescribed in AR 700-58.

b. Check the equipment against the component listing on the packing slip to see if the shipment is complete. Report all discrepancies in accordance with paragraph 1-2. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

Section II. TROUBLESHOOTING PROCEDURES

5-7. TROUBLESHOOTING PROCEDURES.

a. Troubleshooting and replacement of defective parts or components at the general support level are limited to those operations that can be performed while the RMHS Reference Gyro Set is in its case. This includes inspection of components, cable connections, and replacement of a faulty source.

b. The level of disassembly is defined by the Maintenance Allocation Chart (MAC) contained in Appendix B. Any replacement of parts or components must be performed when unit is not in operation.

c. This manual lists all malfunctions that may occur, including tests, inspections and corrective actions. If a malfunction is not listed or cannot be corrected by listed corrective actions, notify your supervisor.

d. When using the Troubleshooting Table 5-1, you will observe that the table contains three columns, plus the step indication as shown below.

MALFUNCTION This column lists the fault you observed when performing your operating procedures.

TEST OR INSPECTION This column directs you to the probable area causing. The malfunction.

CORRECTIVE ACTION This column tells you what to do to correct the problem.

5-8. TROUBLESHOOTING TABLE. If you observe an abnormal condition or result, refer to the troubleshooting table below. Perform the checks and corrective actions indicated.

Table 5-1. Troubleshooting Procedures

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. Power-on Indicator Lamp not illuminated.

   Step 1. Check external power cable connections for good contact. Be sure the external power source is on.

   Tighten connections and/or turn external power source on.

   Step 2. Check circuit breaker and power-on lamp.

   Replace defective part(s).

   Step 3. Check ON-OFF-POLARITY switch.

   Replace defective part.

2. Angle Position Indicator Power-on Lamp not illuminated.

   Step 1. Check cables and connections to Angle Position Indicator and static power inverter.

   Tighten connections.

   Step 2. Check for output voltage from static power inverter, (115 Vac 400 Hz).

   Replace defective component.

   Step 3. Check the ON-OFF switch.

   Replace defective component.

Table 5-1. Troubleshooting Procedures (cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

3. No 115 Vac 400 Hz Voltage.

Step 1. Check cable and connection to static power inverter.

Replace defective component.

Step 2. Check for +27.5 Vdc input from control panel to static power inverter.

Replace defective component.

4. No indication of degrees/minutes on Angle Position Indicator display window.

Step 1. Inspect cables and connections from Gyro to Angle Position Indicator and from Gyro to control panel. Ensure channel 1 or 2 selection switch is depressed.

Replace defective component.

5. Heading indication continuously changing.

Step 1. Check cables and connections from the control panel, power inverter, Gyro, and Angle Position Indicator.

Tighten connections.

Step 2. Check drift bias voltage (6.0 volts).

Make proper voltage adjustment. Replace defective component.

6. Unable to correct Gyro drift rate within tolerance.

Step 1. Check all cable connections.

Table 5-1. Troubleshooting Procedures (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 2. Check for stable and proper drift bias voltage.	Make proper voltage adjustment.
	Step 3. Check drift bias adj. for smooth operation.	Replace defective component.
7. Erroneous heading displayed by Angle Position Indicator.		
	Step 1. Check Gyro position in case.	Rotate Gyro to correct heading.
	Step 2. Check Gyro cable connection and drift bias voltage.	Replace defective component.
8. Angle Position Indicator does not track input data or is immobile at one angle.		
	Step 1. Check all cables and connections.	Replace defective component.
9. Angle Position Indicator continuously runs or displays large angular errors.		
	Step 1. Check all cables and connections.	Replace defective component.
10. One or more Angle Position Indicator numbers are always on or partially on.		Replace Angle Position Indicator.

Table 5-1. Troubleshooting Procedures (cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

11. The Gyro slaves at a continuous rate.

Step 1. Check cables and connections to Gyro and Angle Position Indicator.

Tighten Connections.

Step 2. Check drift bias voltage.

Make proper voltage adjustment.

Step 3. Check input power, (115 Vac 400 Hz), to Gyro.

Replace defective component.

12. Drift bias adjustment erratic or unstable.

Step 1. Ensure drift bias voltage is stable.

Step 2. Check Drift Bias Adj. for smooth mechanical operation.

Replace defective component(s).

13. “N" or "S" hemisphere adjustment erratic or inoperative.

Step 1. Check switch for mechanical smoothness.

Replace defective component.

14. Latitude position adjustment erratic or inoperative.

Step 1. Check latitude potentiometer for mechanical smoothness.

Replace defective component.

Section III. MAINTENANCE PROCEDURES

5-9. SCOPE OF GENERAL SUPPORT MAINTENANCE. General support maintenance of the RMHS Reference Gyro Set is limited to the procedures specified in the maintenance allocation chart (Appendix B). This will include normal housekeeping and cleaning of both the exterior and interior of the assemblage, and the performance of the preventive maintenance checks and services listed in table 2-4. Defects that cannot be corrected must be reported to personnel at a higher maintenance category. Records and reports of repair and preventive maintenance must be in accordance with procedures in DA Pam 738-750.

5-10. CLEANING.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with the skin should be avoided. When necessary, use gloves that the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

a. Use a dry, lint-free cloth or brush to remove dust or dirt. If necessary, moisten the cloth with cleaning compound, freon PCA, or TF. After cleaning, wipe dry with a dry cloth.

WARNING

Compressed air shall not be used for cleaning purposes except where reduced to less than 29 pounds per square inch (PSI) and then only with effective chip guarding and personnel protective equipment. Do not use compressed air to dry parts when TRICHLOROTRIFLUOROETHANE has been used. Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent chips or particles (of whatever size) from being blown into eyes or skin of the operator or other personnel.

b. Use a dust brush or fine paint brush to remove dust or dirt from the interior of the case and the exterior of the modules. If necessary, use dry compressed air, not exceeding 29 PSI, to loosen and remove dirt and dust from inaccessible spots in the case and around the modules.

APPENDIX A

REFERENCES

A-1. PUBLICATIONS INDEXES. The following index should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this manual.

Consolidated Index of Army Publications and Blank Forms ..... DA Pam 310-1

A-2. FORMS AND RECORDS. The following forms and records pertain to this material:

Quality Deficiency Report ..... SF 368

Recommended Changes to Publications ..... DA Form 2028

Report of Packaging and Handling Deficiencies ..... SF Form 6

A-3. OTHER PUBLICATIONS. The following publications contain information pertinent to this material and associated equipment:

Administrative Storage of Equipment ..... TM 740-90-1

First Aid for Soldiers ..... FM 21-11

Gyromagnetic Compass Sets ..... TM 11-6605-202-34

Operating and Maintenance Manual (Angle Position Indicator) NAI-TM-5015

Procedures for Destruction of Electronic Materiel to Prevent Enemy Use (Electronics Command) ..... TM 750-244-2

Static Power Inverter PP-6508/U ..... TM 11-6130-364-34

Static Power Inverter PP-6508/U ..... TM 11-6130-364-30

The Army Maintenance Management Systems (TAMMS) ..... DA PAM 738-750

Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools Lists For Gyromagnetic Compass Set AN/ASN-43 and AN/ASN-43A ..... TM 11-6605-202-24P

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. MAINTENANCE ALLOCATION CHART. This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the task levels of specific categories of maintenance in regard to functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. MAINTENANCE FUNCTION. Maintenance functions will be limited to and defined as follows:

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

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

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to dust, or to paint.

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

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

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

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

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

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

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

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

B-3. COLUMN ENTRIES.

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

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

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for the purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "Work Time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "Work Time" figures will be shown for each category. The number of task hours specified by the "Work Time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time

required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew
0 - Organizational
F - Direct Support
H - General Support
D - Depot

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

f. Column 6, Remarks. Applicable repair manuals.

B-4. TOOL AND TEST EQUIPMENT REQUIREMENTS, (SEC III).

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturers part number of the tool followed by the Federal Supply Code for manufacturers (5 digit) in parentheses.

SECTION II MAINTENANCE ALLOCATION CHART
FOR
RMHS REFERENCE GYRO SET

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	MAINTENANCE LEVEL					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	RMHS REFERENCE GYRO SET (16250) ES-C-34938	INSPECT	-	-	-	0,2	-	1	
		TEST	-	-	-	0.2	-	1.2	
		REPLACE	-	-	-	0.3	-	1	
		ADJUST	-	-	-	-	1.0		
		ALIGN	-	-	-	-	0.5		
		REPAIR	-	-	-	-	20.0		
		OVERHAUL	-	-	-	-	40.0		
01	DIRECTIONAL GYRO (80058) CN-998B/ASN-43	INSPECT	-	-	-	0.2	-	1	
		TEST	-	-	-	0.2	-	1.2	
		REPLACE	-	-	-	0.1	-	1	
		TEST	-	-	-	-	1.0		A
		ADJUST/ALIGN	-	-	-	-	0.8		
		REPAIR	-	-	-	-	24.0		
02	INVERTER, STATIC POWER (80058) PP-6508/U	INSPECT	-	-	-	0.2	-	1	
		TEST	-		-	0.2	-	1.2	
		REPLACE	-	-	-	0.2	-	1	
		TEST	-	-	-	-	0.5		B
		REPAIR		-	-	-	2.5		
03	ANGLE POSITION INDICATOR (07342) MODEL 830-02	INSPECT	-	-	-	0.2	-	1	
		TEST	-	-	-	0.2	-	1.2	
		REPLACE	-	-	-	0.1	-	1	
		TEST	-	-	-	-	1.0		C
		REPAIR	-	-	-	-	12.0		
04	CONTROL PANEL ASSEMBLY (16250) ES-34934	INSPECT	-	-	-	0.2	-		
		TEST	-	-	-	0.2	-		
		TEST	-	-	-	-	0.5		
		REPAIR	-	-	-	-	1.5		
0401	CABLE ASSEMBLY, GYRO (16250) ES-34971	INSPECT	-	-	-	0.1	-		
		TEST	-	-	-	0.2	-		
	REPAIR		-	-	-	-	1.0		

SECTION II MAINTENANCE ALLOCATION CHART
FOR
RMHS REFERENCE GYRO SET

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	MAINTENANCE LEVEL					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0402	CABLE ASSEMBLY, INDICATOR 6250) ES-34972	INSPECT TEST REPAIR	- - -	- - -	- - -	0.1 0.2 -	- - 1.0		
0403	CABLE ASSEMBLY, INVERTER (16250) ESC-34970	INSPECT TEST REPAIR	- - -	- - -	- - -	0.1 0.2 -	- - 1.0		
0401	CABLE ASSEMBLY, POWER (1250) ES34961	INSPECT TEST REPAIR	- - -	- - -	- - -	0.1 0.2 -	- - 1.0		
05	CASE ASSEMBLY (1650) ESC-34923	INSPECT TEST REPAIR	- - -	- - -	- - -	0.1 - -	- - 1.0		

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS FOR RMHS REFERENCE GYRO SET

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	H	TOOL KIT, TK-101/U	5180-00-064-5178	
2	H	MULTIMETER, AN/URM-105	6625-00-581-2036	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	SEE TM 11-6605-202-34 FOR DEPOT REPAIR
B	SEE TM 11-6130-364-30 AND TM 11-6130-364-34 FOR DEPOT REPAIR
C	SEE COMMERCIAL MANUAL NAI-TM-5015 FOR DEPOT REPAIR

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

C-1. This appendix lists the repair parts for the performance of general support and depot maintenance of the RMHS Reference Gyro Set.

C-2. Repair Parts List. Explanation of columns.

a. Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown.

(2) Item Number. The number used to identify the item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) Source Code. Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
MD	Item to be manufactured or fabricated at the depot maintenance level.
XB	Item is not procured or stocked. If not available through salvage, part must be requisitioned.

NOTE

Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(2) Maintenance Code. Maintenance codes are assigned to indicate the level of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	Application/Explanation
H	Support item is removed, replaced, used at the general support level.
D	Support item that is removed, replaced, used at depot, mobile depot, or specialized repair activity only.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	Application/Explanation
D	The lowest maintenance level capable of complete repair of the support item is the depot level.
Z	Nonreparable. No repair authorized.

(3) Recoverability Code. Recoverability codes assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Recoverability Codes	Definition
Z	Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.

c. National Stock Number. Indicates the National Stock Number assigned to the item and which will be used for requisitioning purposes.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

e. Part Number. The primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which 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 a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e.g., shims, spacers, etc).

C-3. National Stock Number and Part Number Index.

A list, in National Item Identification Number (NIIN) sequence, of all National Stock Numbers (NSN) appearing in the listing, followed by a list in alphanumeric sequence, of all part numbers appearing in the listing. National stock number and part numbers are cross-referenced to each illustration figure and item number appearance.

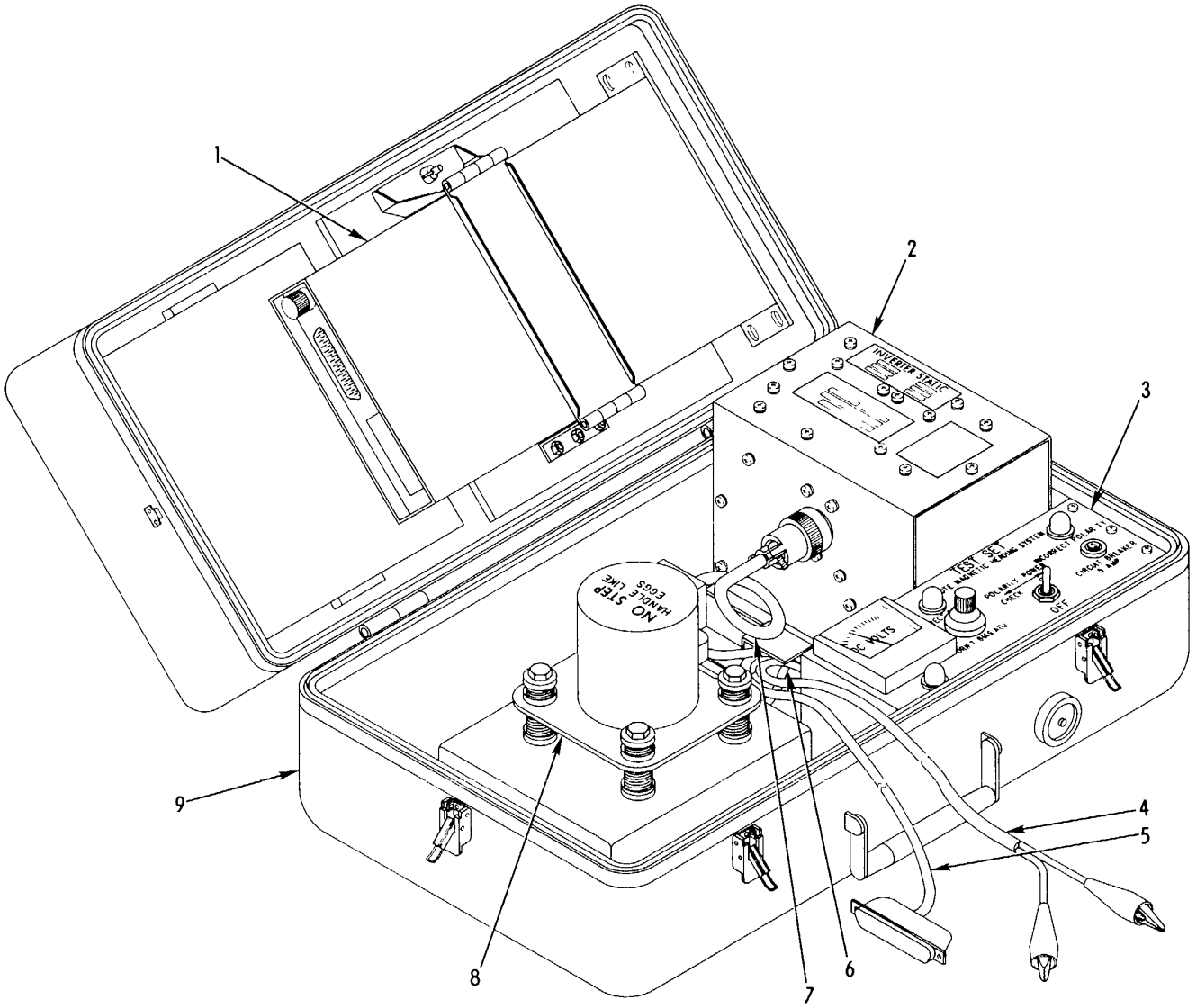

FIGURE C-1. RMHS REFERENCE GYRO SET

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION *USABLE ON CODE*	(7) U/M	(8) QTY INC IN UNIT
						GROUP 00: RMHS REFERENCE GYRO SET		
						(16250) ES-34938		
C-1	1	XBDDD		07342	8300-2	INDICATOR, ANGLE POSITION (See NAI-TM-5815 for parts)	EA	1
C-1	2	PADDD	6130-00-220-5212	80058	PP-6508/U	INVERTER, STATIC POWER (See TM 11-6130-364-30-1 for parts)	EA	1
C-1	3	MDDDD		16250	ES-34934	CONTROL PANEL	EA	1
C-1	4	MDDDD		16250	ES-34961	CABLE ASSEMBLY, POWER	EA	1
C-1	5	MDDDD		16250	ES-34972	CABLE ASSEMBLY, INDICATOR	EA	1
C-1	6	MDDDD		16250	ES-34971	CABLE ASSEMBLY, GYRO	EA	1
C-1	7	MDDDD		16250	ES-C-34970	CABLE ASSEMBLY, INVERTER	EA	1
C-1	8	PADDD	6615-00-167-9757	80058	CN998BASN43	GYRO DIRECTIONAL (See TM 11-6605-202-24P for parts)	EA	1
C-1	9	MDDDD		16250	ES-C-34923	CASE ASSEMBLY	EA	1

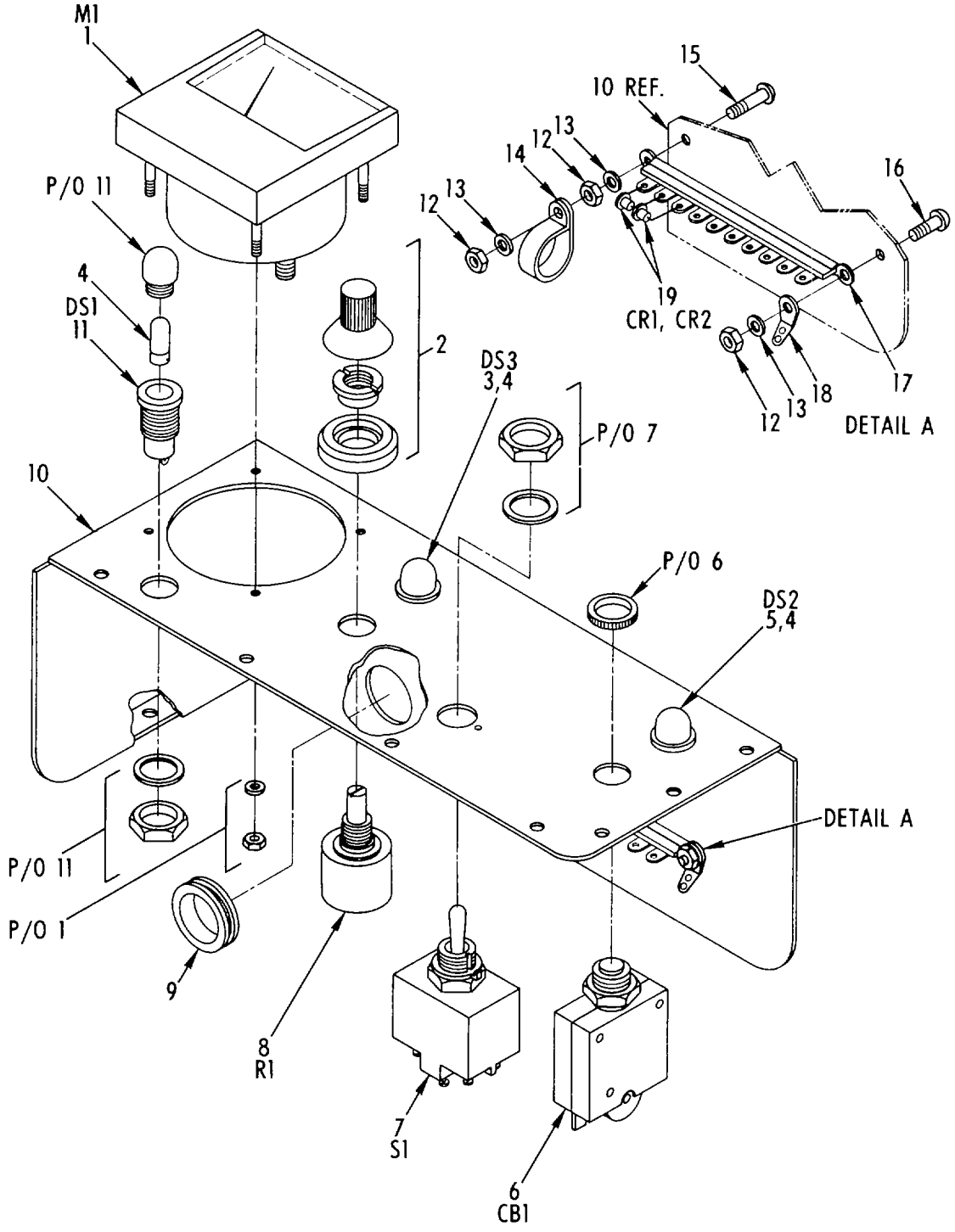

FIGURE C-2. CONTROL PANEL ASSEMBLY.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 04: CONTROL PANEL ASSEMBLY (16250) ES-34934		
C-2	1	PAHZZ		55026	1227-09570	VOLTMETER	EA	1
C-2	2	PAHZZ	5355-00-945-2560	88294	H462	DIAL, CONTROL	EA	1
C-2	3	PAHZZ	6210-00-806-9421	96906	MS25256-4	LIGHT, INDICATOR	EA	1
C-2	4	PAHZZ	6240-00-155-7836	96906	MS25237-327	LAMP, INCANDESCENT	EA	3
C-2	5	PAHZZ	5210-00-886-8845	96906	MS25256-2	LIGHT, INDICATOR	EA	1
C-2	6	PAHZZ	5920-00-283-6648	79485	375-205-101	CIRCUIT BREAKER	EA	1
C-2	7	PAHZZ	5930-80-581-8137	96906	MS24524-31	SWITCH TOGGLE	EA	1
C-2	8	PAHZZ	5905-01-897-4636	88294	3548S-1-103	RESISTOR, VARIABLE	EA	1
C-2	9	PAHZZ	5325-08-276-6160	96906	MS35489-14	GROMMET, NONMETAL	EA	1
C-2	10	MDHZZ		16250	ES-34934-1	PANEL, MARKED	EA	1
C-2	11	PAHZZ	6210-00-682-9833	96906	MS25256-6	LIGHT, INDICATOR	EA	1
C-2	12	PAHZZ	5310-00-982-6813	96906	MS21044C06	NUT, SELF-LOCKING	EA	3
C-2	13	PAHZZ	5319-0-8880-5976	96906	M515795-806	WASHER, FLAT	EA	3
C-2	14	PAHZZ	5340-00-570-8271	96906	MS25281-1	CLAMP, LOOP	EA	1
C-2	15	PAHZZ	5305-00-054-6655	96906	MS51957-31	SCREW, MACHINE	EA	1
C-2	16	PAHZZ	5395-00-854-6651	96906	MS51957-27	SCREW MACHINE	EA	1
C-2	17	PAHZZ	5940-00-178-0078	71785	2010	TERMINAL BOARD	EA	1
C-2	18	PAHZZ	5940-00-827-2653	96906	MS77068-2	TERMINAL LUG	EA	1
C-2	19	PAHZZ	5961-00-978-7660	81349	JAN1N540	SEMICONDUCTOR, DIODE	EA	2

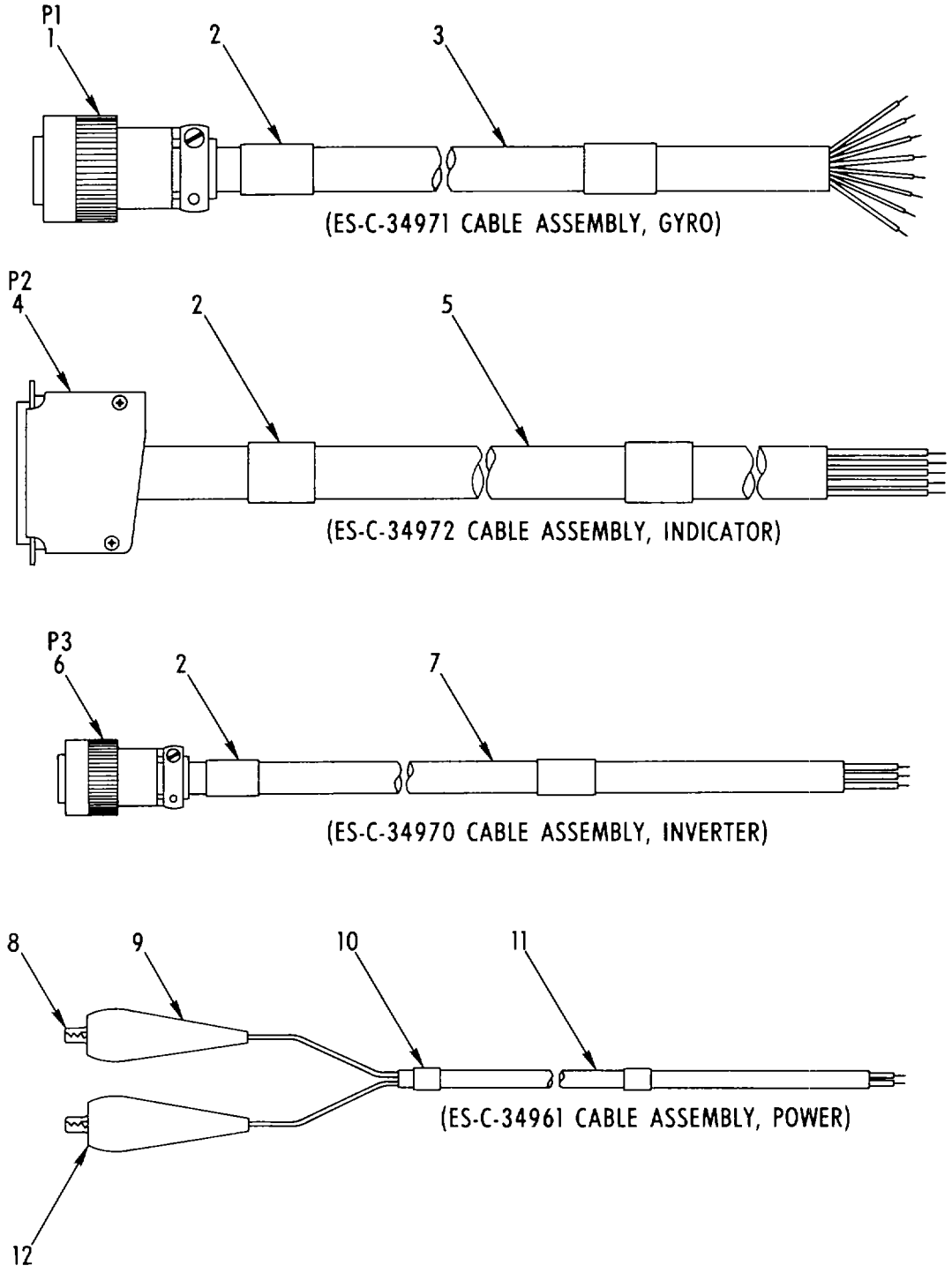

FIGURE C-3. CABLE ASSEMBLIES.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 0401: CABLE ASSEMBLY, GYRO		
						(16250) ES-34971		
						GROUP 0402: CABLE ASSEMBLY, INDICATOR		
						(16250) ES-34972		
						GROUP 0403: CABLE ASSEMBLY, INVERTER		
						(16250) ES-C-34970		
						GROUP 0404: CABLE ASSEMBLY, POWER		
						(16250) ES-349S1		
C-3	1	PAHZZ	5935-00-765-5988	96906	MS3126F16-26S	CONNECTOR, PLUG	EA	1
C-3	2	MDHZZ		80063	SC-C-681320-6	BAND IDENTIFICATION	FT	V
C-3	3	PAHZZ	6145-00-418-2706	92194	1178	CABLE, SPECIAL PURPOSE	FT	V
C-1	4	PAHZZ	5935-00-726-6691	71468	DCM37SC33	CONNECTOR, RECEPTACLE	EA	1
C-3	5	PAHZZ	6145-01-113-9994	92194	1175	CABLE, SPECIAL PURPOSE	FT	V
C-3	6	PAHZZ	5935-00-781-8765	96906	MS3116A14-5S	CONNECTOR, PLUG	EA	1
C-3	7	PAHZZ		92194	1171	CABLE, SPECIAL PURPOSE	FT	V
C-3	8	PAHZZ	5999-00-220-9767	81349	MILC15612	CLIP, ELECTRICAL	EA	2
C-3	9	PAHZZ	5975-00-281-0046	76545	49	CABLE NIPPLE, ELECTRICAL	EA	1
C-3	10	MDHZZ		80063	SCC-681320-5	BAND IDENTIFICATION	FT	V
C-3	11	PAHZZ	6145-00-941-5482	92194	1172	CABLE, SPECIAL PURPOSE	FT	V
C-3	12	PAHZZ	5975-00-383-1318	76545	49BLACK	CABLE NIPPLE, ELECTRICAL	EA	1

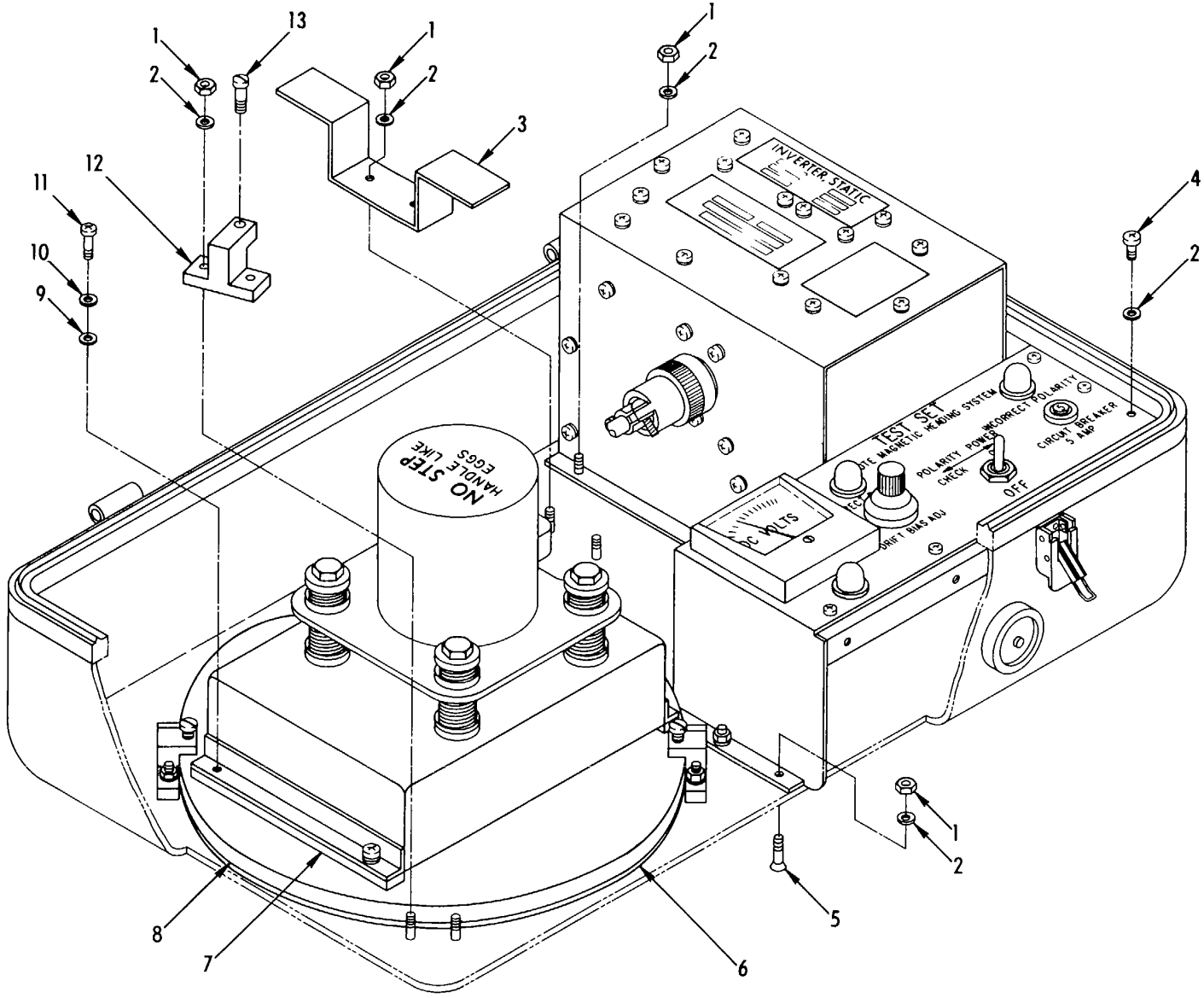

FIGURE C-4. CASE ASSEMBLY (SHEET 1 OF 2)

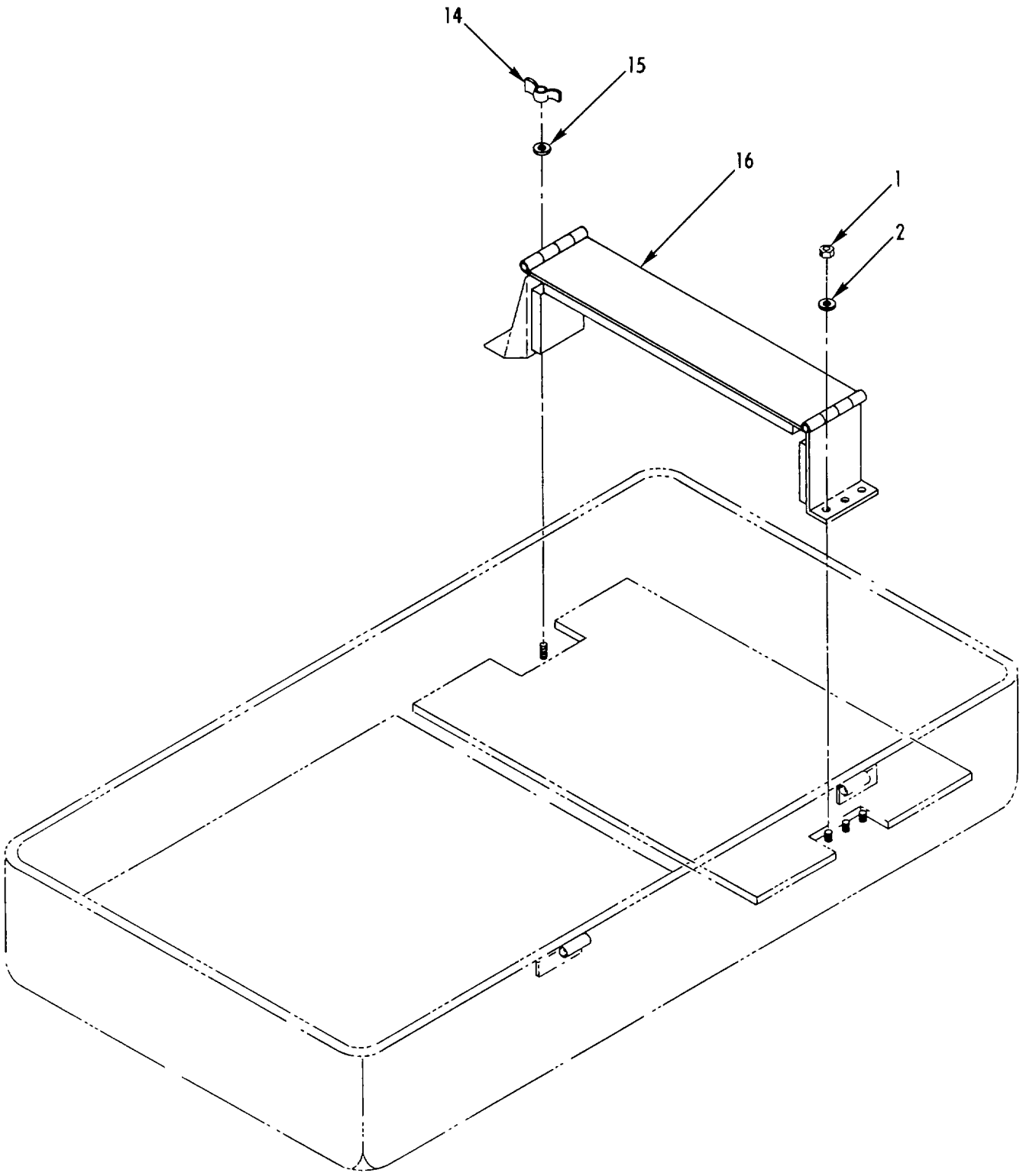

FIGURE C-4. CASE ASSEMBLY (SHEET 2 OF 2)

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 05: CASE ASSEMBLY (16250) ES-C-34923		
C-4	1	PAHZZ	5318-60-982-6813	96906	MS21044C06	NUT, SELF-LOCKING	EA	20
C-4	2	PAHZZ	5318-00-880-5976	96906	MS15795-806	WASHER, FLAT	EA	27
C-4	3	MDDZZ		16250	ES-34926	BRACKET, CABLE	EA	1
C-4	4	PAHZZ	5305-00 594-6651	96906	MS551957-27	SCREW, MACHINE	EA	7
C-4	5	PAHZZ	5305-00-859-4552	96906	MS35190-237	SCREW, MACHINE	EA	3
C-4	6	MDDZZ		16250	ES-34392	BEARING	EA	1
C-4	7	MDDZZ		16250	ES-36492	SPACER	EA	2
C-4	8	MDDZZ		16250	ES-14933	BASE, MOUNTING	EA	1
C-4	9	PAHZZ	5310-00-933-8119	96906	MS35338-137	WASHER, LOCK	EA	4
C-4	10	PAHZZ	5310-00-225-5328	96906	MS15795-841	WASHER, FLAT	EA	4
C-4	11	PAHZZ	5305-00-054-6671	96906	MS51957-46	SCREW, MACHINE	EA	4
C-4	12	MDDZZ		16250	ES-34931	BRACKET, HOLD DOWN	EA	4
C-4	13	PAHZZ	5305-96-659-3661	96906	MS51958-65	SCREW, MACHINE	EA	4
C-4	14	PAHZZ	5310-01-131-2247	96906	MS35426-26	NUT, PLAIN, WING	EA	1
C-4	15	PAHZZ	5310-00-883-9384	96906	MS15795-842	WASHER, FLAT	EA	1
C-4	16	MDDZZ		16250	ES-C-34945	BRACKET, MOUNTING	EA	1

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIG NO.	ITEM NO.
5305-00-054-6651	C-2	16
5305-00-054-6651	C-4	4
5305-00-054-6655	C-2	15
5305-00-054-6671	C-4	11
5305-00-059-3661	C-4	13
5305-00-059-4552	C-4	5
6240-00-155-7836	C-2	4
6615-00-167-9757	C-1	8
5940-00-178-0078	C-2	17
6130-00-220-5212	C-1	2
5999-00-220-9767	C-3	8
5310-00-225-5328	C-4	10
5325-00-276-6100	C-2	9
5975-00-281-0046	C-3	9
5920-00-283-6048	C-2	6
5975-00-383-1318	C-3	12
6145-00-418-2706	C-3	3
5340-00-570-8271	C-2	14
5930-00-581-8137	C-2	7

STOCK NUMBER	FIG. NO.	ITEM NO.
6210-00-682-9833	C-2	11
5935-00-726-6691	C-3	4
5935-00-765-5988	C-3	1
5935-00-781-8765	C-3	6
6210-00-806-8845	C-2	5
6210-00-806-9421	C-2	3
5940-00-827-2653	C-2	18
5310-00-880-5976	C-2	13
5310-00-880-5976	C-4	2
5310-00-883-9384	C-4	15
5310-00-933-8119	C-4	9
6145-00-943-5482	C-3	11
5310-00-982-6813	C-2	12
5310-00-982-6813	C-4	1
5355-00-945-2560	C-2	2
5961-00-978-7660	C-2	19
5905-01-097-4636	C-2	8
6145-01-113-9994	C-3	5
5310-01-131-2247	C-4	14

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

PART NUMBER	FSCM	FIG NO.	ITEM NO.
CN998BASN43	80058	C-1	8
DCM37SC33	71468	C-3	4
ES-C-34923	16250	C-1	9
ES-C-34945	16250	C-4	16
ES-C-34970	16250	C-1	7
ES-34926	16250	C-4	3
ES-34931	16250	C-4	12
ES-34932	16250	C-4	6
ES-34933	16250	C-4	8
ES-34934	16250	C-1	3
ES-34934-1	16250	C-2	10
ES-34961	16250	C-1	4
ES-34971	16250	C-1	6
ES-34972	16250	C-1	5
ES-36492	16250	C-4	7
H462	80294	C-2	2
JAN1N540	81349	C-2	19
MILC15612	81349	C-3	8
MS15795-806	96906	C-2	13
MS15795-806	96906	C-4	2
MS15795-841	96906	C-4	10
MS15795-842	96906	C-4	15
MS21044C06	96906	C-2	12
MS21044C06	96906	C-4	1
MS24524-31	96906	C-2	7
MS25237-327	96906	C-2	4
MS25256-2	96906	C-2	5
MS25256-4	96906	C-2	3
MS25281-6	96906	C-2	11
MS25281-8	96906	C-2	14
MS3116A14-5S	96906	C-3	6
MS3126F16-26S	96906	C-3	1
MS35190-237	96906	C-4	5
MS35338-137	96906	C-4	9
MS35426-26	96906	C-4	14
MS35489-14	96906	C-2	9
MS51957-27	96906	C-2	16
MS51957-27	96906	C-4	4
MS51957-31	96906	C-2	15
MS51957-46	96906	C-4	11
MS51958-65	96906	C-4	13
MS77068-2	96906	C-2	18
PP-6508/U	80058	C-1	2
SC-C-681320-5	80063	C-4	10
SC-C-681320-6	80063	C-4	2
1172	92194	C-3	11
1173	92194	C-3	7
1175	92194	C-3	5
1178	92194	C-3	3
1227-09570	55826	C-2	1
2010	71785	C-2	17
3540S-1-103	80294	C-2	8
375-205-101	79405	C-2	6
49	76545	C-3	9
49BLACK	76545	C-3	12
8300-2	07342	C-1	1

By Order of the Secretary of the Army:

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

Official:

DONALD J. DELANDRO
Brigadier General, United States Army
The Adjutant General

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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

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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