TM 9-1430-1533-12-1

TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR HIGH-POWERED ILLUMINATOR RADAR SET AN/MPQ-57 NSN 1430-01-078-9643

HAWK AIR DEFENSE GUIDED MISSILE SYSTEM

This copy is a reprint which includes current pages from Changes 1 and 2

DEPARTMENT OF THE ARMY JUNE 1983

WARNING

RADIATION HAZARD

This equipment contains the following radioactive items:

Nomenclature	*NSN*	*Isotope*	*Amount (Microcuries)*
Electron tube TG-67	5960-00-882-9042	*	1.0—2.0

*Isotope and level of activity varies among manufacturers. Refer to TB 43-0116.

Refer to TM 3—261, TM 38—250, and TB 43—0116 for information relative to shipping, storage, handling, and disposal of radioactive material.

FIRST AID FOR RADIOACTIVE CONTACT

The following first aid procedure for wounds caused by anything coated with a radioactive particle material represent the only reasonable first aid treatment which would possibly be available:

a. Stimulation of mild bleeding by normal pressure about the wound and by use of suction cups.

WARNING

Do not suck the wound by mouth. The wound must be washed with soap and flushed with plenty of clear water.

b. If the wound is of the puncture type, or the opening is quite small, an incision should be made to promote free bleeding and to facilitate cleaning and flushing of the wound.

c. Evacuate patient to a medical facility where monitoring of the wound can be accomplished. All such wounds should be examined by a medical officer.

d. For wounds involving the extremities, pending medical attention, place a lightly constricting band (tourniquet) 2 to 4 inches closer to the heart than the site of the wound. The band should be tight enough to halt the flow of blood in superficial blood vessels but not tight enough to stop the pulse (arterial flow).

CLEANING SURFACES ON WHICH TUBES HAVE BEEN BROKEN

Wet Method. Put on rubber or plastic gloves. Pick up large fragments with forceps then, using a wet cloth, wipe across the area. Make one wipe at a time and fold cloth in half, using the clean side for wiping each time. When cloth becomes too small, discard and start again with a clean piece of cloth. Care must be taken not to rub the radioactive particles into the surface being cleaned by using a back and forth motion. All debris and cloths used for cleaning should be sealed in a container such as a plastic bag, heavy waxed paper, ice cream carton, or glass jar for disposal.

WARNING FOR RADIO-FREQUENCY RADIATION HAZARD (FOR HAWK SYSTEMS WITH CWAR AN/MPQ-55)

Radio-frequency (rf) radiation from radar antennas and associated equipment is a potential hazard to personnel. Rf radiation is not cumulative but it can be hazardous. It heats the body tissues, and, if the radiation intensity is sufficiently high, will permanently damage the tissue. This damage is not immediately apparent.

Precautions should be taken to insure that personnel are not exposed to rf radiations of hazardous intensity levels. Personnel who must be within the hazardous distances for the below listed radars should be instructed not to place themselves on the radiating side of the antenna, and to never look into a transmitting horn or open waveguide which is connected to an energized transmitter.

Personnel are prohibited from entering areas where they may be exposed to levels of rf radiation above 10 milliwatts per square centimeter (10 mw/cm^2). This level, though not considered hazardous, is stipulated by AR 40-583 as the maximum permissible exposure level for personnel.

A power intensity of at least 10 mw/cm^2 is present along the axis of each radar's transmitted beam, for the distances listed below. These distances are based on calculations and actual measurements and may be used as a guide to prevent radio-frequency radiation injury. In each instance, radiation intensity rapidly diminishes as the distance is increased.

ANTENNA	DISTANCE
High-powered Illuminator Radar	111.5 m (366 ft)
Cw Acquisition Radar non-scanning	74 m (243 ft)
scanning	36 m (118 ft)
Pulse Acquisition Radar	15.2 m (50 ft)
Range-only Radar	45.1 m (148 ft)

The 36m distance for the scanning CWAR antenna does not mean the system constitutes a hazard to personnel while the antenna is scanning. When the antenna stops scanning and is stationary, those systems capable of producing power densities greater than 50 mw/cm^2 must be controlled so that under no circumstances will personnel be exposed to intensities equal to or greater than 50 mw/cm^2. When the radar is energized to full radiate, personnel must not be within 74 meters (243 feet) of the antenna along the designated azimuth.

No radiation hazard exists at radar ground level if the radars are not depressed below zero degrees elevation. When at all possible during maintenance, however, place the antenna at a high elevation. Personnel are restricted from the area atop the radars or other elevated locations in front of the antennas when radiating.

Personnel may move in and around the CWAR to zero range at ground level provided they are below the horizontal center line of the antennas. There is no height restriction to either side or rear of the antennas.

Potentially hazardous power density levels do not exist in the radiation field of the pulse acquisition radar when scanning.

The above information is applicable to typical Hawk sites. The services of the U.S. Army Environmental Hygiene Agency are available, in accordance with the provisions of AR 40-583 for the evaluation of potential radio-frequency hazards at sites where unusual operating or site conditions may exist.

WARNING

DANGEROUS 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.

Use extreme caution when operating equipment protected by interlocks. Insure that interlocks (doors, panels, and drawers) are functioning properly. (TM 9—1425—525—12—4)

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 the vital organs of the body.

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.

EXTREMELY DANGEROUS POTENTIALS
greater than 500 volts exist in the following units:

High-voltage regulator
Master oscillator filament power supply
Master oscillator power supply
Power amplifier filament power supply
Power amplifier power supply
Transmitter high-voltage power supply test set
Transmitter panel 2

MECHANICAL HAZARD

When performing maintenance procedures in the vicinity of the antenna, insure that the antenna PEDESTAL SAFETY SWITCH, located on the motor-generator assembly, is in the SAFE position.

WARNING

X-RAY HAZARD

X-rays exist within the IHIPIR when radiating.

The X-rays are emitted from PA klystron tube VA868(V2). Do not operate the IHIPIR with the protective tube shield removed from V2.

Failure to heed the warning may result in unnecessary exposure to low-level radiation. The severity of this exposure damage is dependent on the proximity of the source (tube) and the length of exposure.

WARNING

HIGH NOISE LEVEL WHEN RADAR IS OPERATING

When operating, the liquid cooler produces dangerously loud noises. Without protection, long exposure to this noise can cause a hearing loss. Ear protectors must be worn within ten feet of the cooler. See AR 40—5 for additional information.

WARNING

When the HIPIR is connected to the BCC/PCP, synchro reference is applied to the HIPIR by the BCC/PCP. Therefore, regardless of the HIPIR's condition, synchro reference will be present within the HIPIR's circuitry whenever the BCC/PCP is energized. Before performing maintenance on the HIPIR, disconnect all data cables from the off-trailer connector panel.

WARNING

DANGEROUS CHEMICALS

are used in the operation
of this equipment

DEATH

may result if personnel fail
to observe safety precautions

The following is a list of chemicals used in the operation or maintenance of the equipment in this manual, including proper care and handling procedures and corrective actions (fire and first aid procedures).

Item (NSN/APN)	Care and Handling Procedures	Corrective Actions
Coolant (6850-00-078-4459/ 5959151)	Flammable; avoid open flames and sparks.	CO_2 or dry chemical extinguisher.
	Avoid contact with skin (use rubber gloves).	Wash with water.
	Avoid contact with eyes (use safety goggles).	Flush thoroughly with water.
	Swallowing can cause damage to the central nervous system and severe kidney damage.	Seek medical attention immediately.
Dielectric coolant fluid OS59 type 3 (9160-00-943-4691) MIL-C-47220)	Avoid water contamination as mixture can become flammable.	Use CO_2 or dry chemical extinguisher.
	Excessive high temperature may produce irritating vapors.	Remove victim to fresh air.
	Avoid prolonged and repeated skin contact.	Wash thoroughly.
	Avoid contact with eyes.	Flush thoroughly with water. Get medical attention.
Isopropyl alcohol, technical TT 1735 grade 3 (6810-00-286-5435)	Flammable; keep away from open flames.	Use CO_2 or dry chemical extinguisher.
	Vapors are toxic and can produce symptoms of intoxication and irritation of eyes, nose, and throat.	Remove to fresh air and give oxygen if short of breath. Get medical attention.
	Avoid contact with skin. Not toxic but may add to the effect of inhalation.	Promptly remove soaked clothing and wash skin thoroughly with water.
	Swallowing causes severe nausea, vomiting, abdominal pain, bleeding and central nervous system damage.	Induce vomiting if victim is conscious and alert. If victim is not alert, black coffee and activated charcoal may be given. Never give anything by mouth to a person who is unconscious. Get medical attention.

WARNING

DANGEROUS CHEMICALS

Continued

Item (NSN/APN)	Care and Handling Procedures	Corrective Actions
Methanol OM 232 grade A (6810-00-292-9676)	Flammable; keep away from heat or open flames.	Use CO_2 or dry chemical extinguisher.
	Use in well-ventilated area. Inhalation can cause headache, dizziness, weakness, or disturbance of the stomach, intestines or eyes.	Remove victim to fresh air. If not breathing, use artificial respiration. Get medical attention. Keep warm and cover eyes to exclude light.
	Avoid prolonged contact with skin.	Wash with water.
	Avoid contact with eyes.	Wash thoroughly with water. Get medical attention.
	Swallowing causes intoxication, drowsiness, visual disturbances (dilated, unreactive pupils), possible blindness.	Immediately induce vomiting and seek medical attention. Do not induce vomiting in an unconscious victim.
Mineral spirits (8010-00-242-2089)	Flammable. Avoid heat, sparks and open flames. When heated, may yield carbon monoxide. Excessive inhalation causes headache, dizziness, and nausea. Use with adequate ventilation.	Use CO_2 or dry chemical extinguisher.
		Remove victim to fresh air and get medical attention. Apply artificial respiration if necessary.
	Avoid prolonged or repeated contact with skin.	Wash with mild soap and water and apply skin cream.
	Avoid contact with eyes. Do not wear contact lenses when working with this material.	Flush thoroughly with water. Get medical attention.
Naphtha TTN 97 TTY1GRA (6810-00-223-9073)	Flammable. Avoid open flames or sparks.	Use CO_2 or dry chemical extinguisher.
	Use in well-ventilated area.	Remove victim to fresh air. If breathing has stopped, perform artificial respiration. Get medical attention.
	Avoid contact with skin. Wear protective clothing (rubber gloves, apron, and safety goggles).	Wash skin with soap or mild detergent and water. If irritation persists after washing, get medical attention.
	Avoid contact with eyes. Do not wear contact lenses; use safety goggles.	Wash thoroughly with water. Get medical attention.
	Avoid swallowing.	Do not induce vomiting. Get medical attention immediately.

WARNING

DANGEROUS CHEMICALS

Continued

Item (NSN/APN)	Care and Handling Procedures	Corrective Actions
Polychlorinated biphenyls (PCB) (contained in General Electric and Electrical Utilities capacitors located in the liquid cooler) (5910-00-675-4503/9175280)	When heated, vapors are highly toxic. Do not allow capacitors to become overheated. Replace any capacitors that show signs of excessive swelling or leaking.	Remove to fresh air and give oxygen if short of breath. If breathing has stopped, perform artificial respiration. Keep the victim warm. Get medical attention.
	Avoid contact with eyes. Do not wear contact lenses when working with this material.	Wash thoroughly with water. Get medical attention.
	Avoid contact with skin.	Wash with soap or mild detergent and water. Remove contaminated clothing. Get medical attention.
	Excessive inhalation or swallowing can cause nausea, vomiting, loss of weight, liver damage and abdominal pain. When liver damage is severe, it can be fatal.	Get medical attention immediately. If swallowed, induce vomiting. Do not induce vomiting in an unconscious victim.
	If material leaks or vaporizes, persons in the area should wear protective clothing (paper suits, gloves, disposable booties, organic respirators) when disposing of contaminants.	Remove all ignition sources. Ventilate the area. If solid material is present, sweep onto paper or other suitable material and burn in a safe place. If in a liquid form, absorb on paper towels. Evaporate in a safe place, then burn. PCB material can also be disposed of in an approved hazardous waste location.
Toluene OC265 (6810-00-257-2487)	Flammable; keep away from open flames.	Use CO_2 or dry chemical extinguisher.
	Vapors harmful. Use in well-ventilated area.	Remove to fresh air.
	Avoid prolonged contact with skin.	Wash thoroughly with water.
	Avoid contact with eyes.	Flush with water for at least 15 minutes. Get medical attention.
	Avoid swallowing.	Get medical attention immediately. If swallowed, induce vomiting. Do not induce vomiting in an unconscious victim.

Insert the latest changed pages in accordance with the instructions on the transmittal sheet.

LIST OF EFFECTIVE PAGES

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line in the outer margin of the page. Changes to illustrations are indicated by a letter suffix adjacent to the identification number. Added or completely revised chapters, sections, paragraphs, tables, etc., are indicated by a vertical line by the title.

Dates of issue for original and changed pages are:

Original 28 Jun 1983
Change 1 3 Oct 1983
Change 2 6 May 1984

THE EFFECTIVITY OF THE PAGES IN THIS PUBLICATION IS LISTED BELOW.

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e	2	2-4	0	3-6	2
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TECHNICAL MANUAL
No. 9—1430—1533—12—1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *28 June 1983*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL
FOR
HIGH-POWERED ILLUMINATOR
RADAR SET AN/MPQ-57
NSN 1430-01-078-9643
HAWK AIR DEFENSE GUIDED MISSILE SYSTEM

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 Missile Command, ATTN: DRSMI-SNPM, Redstone Arsenal, Alabama 35898. A reply will be furnished to you.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

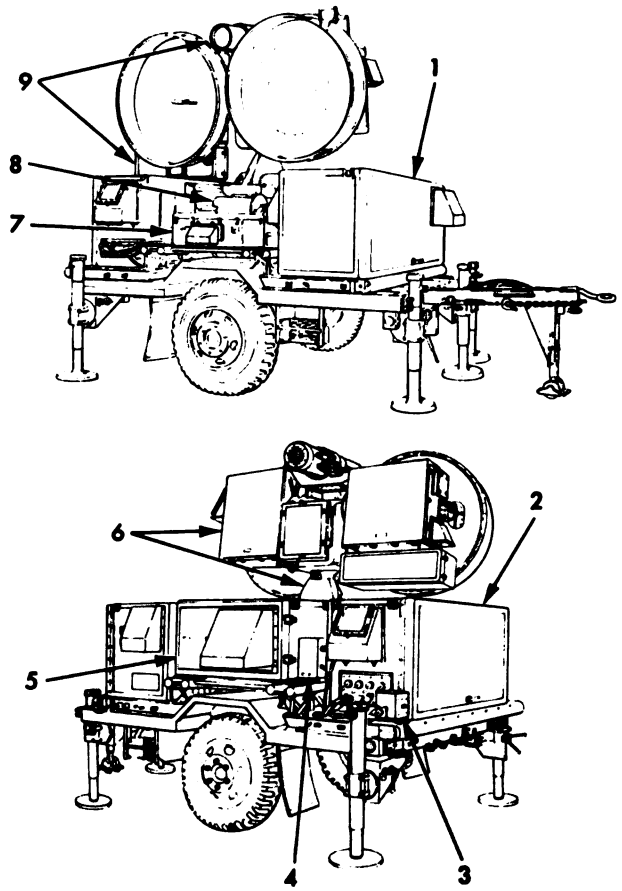
1-1. Scope

a. This technical manual (TM) contains instructions for operator and organizational maintenance of the high-powered illuminator radar AN/MPQ-57 (HIPIR) (fig. 1-1).

b. This TM also contains information relative to the operation and/or maintenance of the radar video tracking group (tracking adjunct system (TAS)). However, only those units which have been specifically designated to receive TAS and have obtained appropriate table of organization and equipment (TOE) authorization may order, receive, or mount TAS battery replaceable units (BRU's).

c. This TM is one of a series of TM's on operation, assembly and emplacement, organizational maintenance, direct and general support, and depot maintenance of the HAWK air defense guided missile system.

d. The requirement for nomenclature distinction between "Basic and Improved" HAWK Systems and major items is no longer applicable. Action to delete this distinctive terminology will be taken as the respective pages of the manual are changed for other reasons.



1 — Transmitter group (30A1A1)
2 — Radar set group (30A1A4)
3 — Main power distribution box (30A1A6)
4 — Input voltage adjust assembly (30A1A8)
5 — Liquid cooler (30A1A2)
6 — Antenna receiver group (30A1A3)
7 — Motor-generator assembly (30A1A5)
8 — Dummy load (30A1A7)
9 — Tracking adjunct system (TAS) (optional)

Figure 1-1. Radar set AN/MPQ-57 — major groups and assemblies.

1-2. Destruction of Materiel to Prevent Enemy Use

Destruction of materiel to prevent enemy use will be undertaken by the user upon order of the unit commander. His decision will be based upon orders and policies established by the Army Commander. Procedures for destruction of the HIPIR and related materiel are contained in TM 43—0002—24.

1-3. Travel, Preparation, Emplacement, Alinement, and Lightning Protection

Complete instructions for preparation for travel, emplacement, orientation and alinement, and lightning protection of the IHIPIR are contained in chapters 6 through 9.

1-4. Forms, Records, and Reports

For the forms, records, and reports required of units maintaining this equipment, refer to TM 38—750.

1-5. Hand Receipts

Hand receipts for Components of End Items (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) items are published in Hand Receipt Manuals, TM 9—1425—525—10—HR and TM 9—1425—1525—10—HR. These manuals are published to aid in property accountability and are available through: Commander, U.S. Army Adjutant General Publications Center, ATTN: AGDL-OD, 1655 Woodson Road, St. Louis, MO 63114.

1-6. Reporting Equipment Improvement Recommendations (EIR's)

If your IHAWK equipment 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). Instructions for preparing EIR's are provided in TM 38—750, The Army Maintenance Management System (TAMMS). EIR's should be mailed directly to Commander, US Army Missile Command, ATTN: DRSMI-SNEM, Redstone Arsenal, Alabama 35898. A reply will be sent directly to you.

Section II. DESCRIPTION AND DATA

1-7. Physical Description

NOTE

The key numbers shown below in parentheses refer to figure 1-1.

a. General. The IHIPIR consists of eight major groups and assemblies: transmitter group (1), radar set group (2), main power distribution box (3), input voltage adjust assembly (4), liquid cooler (5), antenna receiver group (6), motor-generator assembly (7), and dummy load (8). The IHIPIR may also contain the tracking adjunct system (9).

NOTE

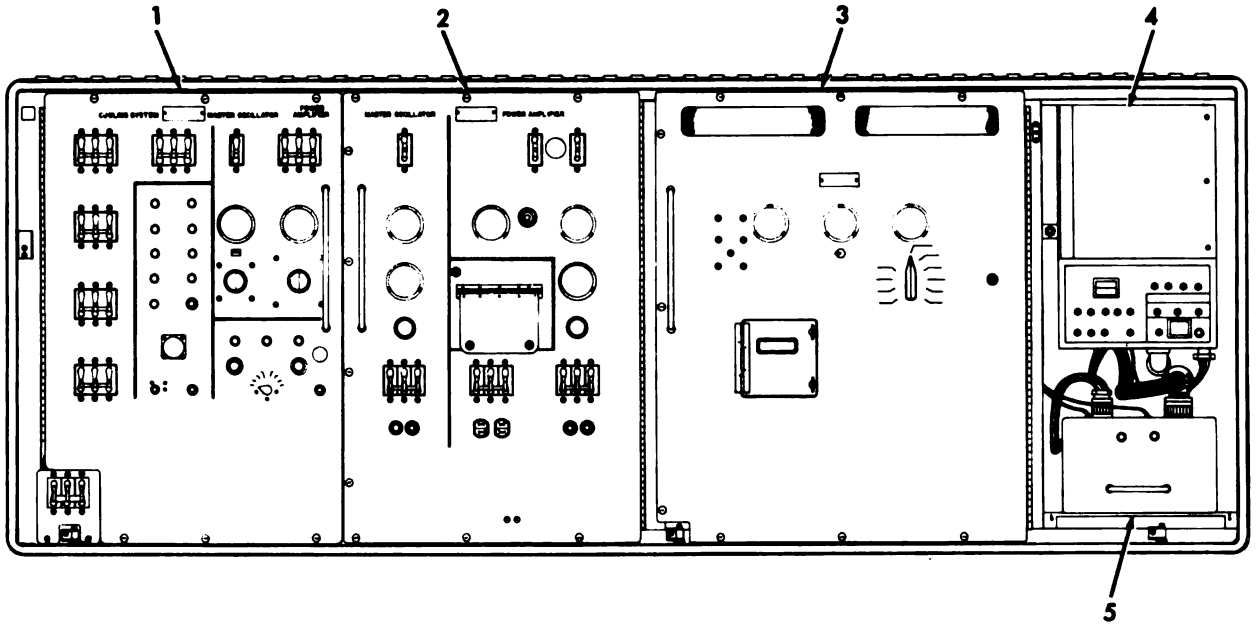
The key numbers shown below in parentheses refer to figure 1-2.

b. Transmitter Group. The transmitter group contains a number of racks and panels consisting of one or more units or components. A watertight door, covering the front of the cabinet, provides access to the operating controls and electronic units. The door opens upward and can be locked to provide protection from the weather during local operation or maintenance.

(1) *Transmitter panel 1.* Transmitter panel 1 (1) is a hinged panel containing power circuit breakers, switches, indicator lamps, meters, and controls used in monitoring and controlling the operation of the transmitter, liquid cooler, and the transmitter interlock circuits. The panel opens to the left and provides access to the high-voltage power supply, transmitter contactor relay assembly, line voltage regulator, and the high-voltage power supply test set. A blower, behind transmitter panel 1, provides cooling air for units behind the transmitter panels.

(2) *Transmitter panel 2.* Transmitter panel 2 (2) is a hinged panel containing meters, switches, and controls for controlling and monitoring the operation of the transmitter. This panel also contains two 115-volt convenience outlets. They are used to power external test equipment and lights. The panel opens to the right and provides access to the high-voltage power supply, high-voltage regulator, and the ripple sensing unit.

(3) *Transmitter panel 3.* Transmitter panel 3 (3) is a hinged panel containing meters, switches, and test jacks for monitoring the operation of the transmitter. Access through this panel is provided to allow transmitter power amplifier tuning. The panel opens to the right to provide access to the rf transmitter assembly and the cooling system interlock.



1 — Transmitter panel 1
2 — Transmitter panel 2
3 — Transmitter panel 3
4 — Transmitter control unit
5 — Degeneration preamplifier/±15-vdc power supply drawer

Figure 1-2. Transmitter group — cover removed.

(4) *Transmitter control unit.* The transmitter control unit (4) is located in the upper right-hand corner of the transmitter set group cabinet. It contains six plug-in assemblies which control the operation of the transmitter. Transmitter test and function status is controlled and displayed with front panel switches and indicator lamps. Behind the transmitter control unit is a forced-air cooling system which provides cooling air to the plug-in assemblies.

(5) *Degeneration preamplifier/±15-vdc power supply assembly.* This pull-out assembly (5) contains a 15-volt and a −15-volt power supply and the degeneration preamplifier. The power supplies provide power to the transmitter control unit. The degeneration preamplifier supports the degeneration block's noise cancellation function. It is provided with two front panel adjustments.

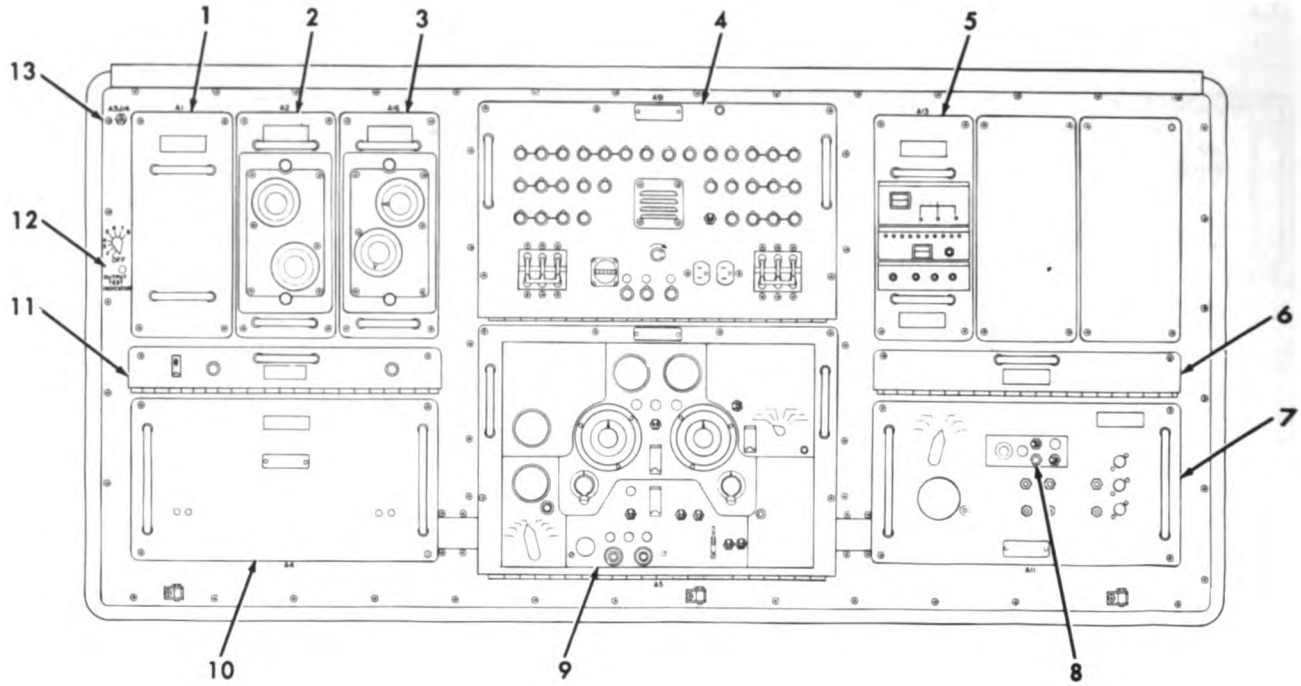
NOTE

The key numbers shown below in parentheses refer to figure 1-3.

c. Radar Set Group. The radar set group contains a number of drawers, racks, and panels, each of which contains one or more components or plug-in units. A watertight door, covering the entire front of the cabinet, provides access to the operating controls and electronic units. The door opens upward and can be locked open. This provides protection from the weather during local operation or maintenance. When the door is closed, the equipment is automatically placed in the remote mode of operation.

(1) *Power supply drawer.* The 300-, 90-, 28-vdc power supply (1) is a pull-out drawer. When opened it provides access to the 300-, 90-, and 28-vdc power supply assembly. This power supply develops and distributes controlling and energizing voltages for the IHIPIR.

(2) *Target intercept computer.* The target intercept computer (TIC) is divided into two drawers: the range and azimuth drawer (2), and the elevation and time-of-flight drawer (3). The range and azimuth drawer contains the range and azimuth control amplifier, the range and azimuth computer,



1 — 300-Vdc power supply drawer
2 — Target intercept computer — range and azimuth drawer
3 — Target intercept computer — elevation and time-of-flight drawer
4 — Main fuse panel
5 — Servo control unit
6 — Right-hand subordinate distribution box
7 — 100-, ±50-Vdc power supply
8 — Communications station
9 — Control-indicator panel
10 — −100-, 150-, 250-Vdc power supply
11 — Left-hand subordinate distribution box
12 — Output test indicator lamp and switch
13 — 28-Vdc connector for cover mounted blackout light

Figure 1-3. Radar set group — door removed.

and the range interlock computer. The elevation and time-of-flight drawer contains the comparator and minimum elevation cutout, the elevation and time-of-flight computer, and the elevation and time-of-flight control amplifier. The TIC generates lead angle commands that are fed to the improved launcher (ILCHR) just prior to missile launch to aim the missiles on the ILCHR boom for the shortest possible trajectory. The TIC also determines when the target is in range and indicates this to the improved battery control central (IBCC) and the improved platoon command post (IPCP).

(3) *Main fuse panel.* The main fuse panel (4) is a hinged panel containing indicator fuses, power circuit breakers, a doppler speaker, a speaker volume control, a remote synchro reference indicator, an equipment time meter, and 115-volt convenience outlets. During maintenance, the panel may be lowered to provide access to the contactor rack and the radar set group contactor relay assembly.

(4) *Servo control unit.* The servo control unit (SCU) (5) contains 10 plug-in circuit cards which control the positioning of the antenna and one BITE circuit card. The unit receives position and search commands from the IBCC/IPCP and positions the antenna accordingly. When target lock occurs, the SCU automatically responds to radar error information received from the signal processor to track the target. Three groups of switches and indicators are on the front panel. One group controls and displays the radar system test status. The servo control test is also controlled and displayed on this panel. The last group provides local search control. The drawer can be pulled out to provide access to the circuit cards for maintenance purposes.

(5) *Right-hand subordinate distribution box.* This panel (6) hinges down to provide access to the A12 wiring harness and test jacks J16 and J18.

(6) *100-, ±50-Vdc power supply drawer.* This drawer (7) contains the 100-, ±50-vdc power supplies and the communications station (8). The power supplies provide low voltages for the solid state circuitry in the radar set group and the antenna receiver group. The communications station provides communications between major items within the battery.

(7) *Control-indicator panel.* The control-indicator panel (9) is a hinged panel containing switches, controls, indicators, and meters for controlling and monitoring the operation of the IHIPIR and its antenna system. The panel may be lowered on its hinges during maintenance to provide access to the 5.4-vdc power supply and the forced air cooling system for the radar set group.

(8) *5.4-Vdc power supply.* The rack located behind the control-indicator panel contains the 5.4-vdc power supply. This power supply provides 5.4 vdc for both the radar set group and radar receiver. The rack may be rolled part way out for access during maintenance. The power supply can be disconnected for complete removal.

(9) *Forced air cooling system.* The forced air cooling system for the radar set group consists of a blower motor, an air-intake filter, a series of air ducts, and two exhaust filters located at each end of the radar set group. The purpose of the system is to cool the components and plug-in units in the radar set group to prevent damage from overheating.

(10) *—100-, 150-, 250-Vdc power supply.* This power supply (10) generates and distributes low voltages to the radar set group and the antenna receiver group. Front panel test jacks are provided for voltage measurement.

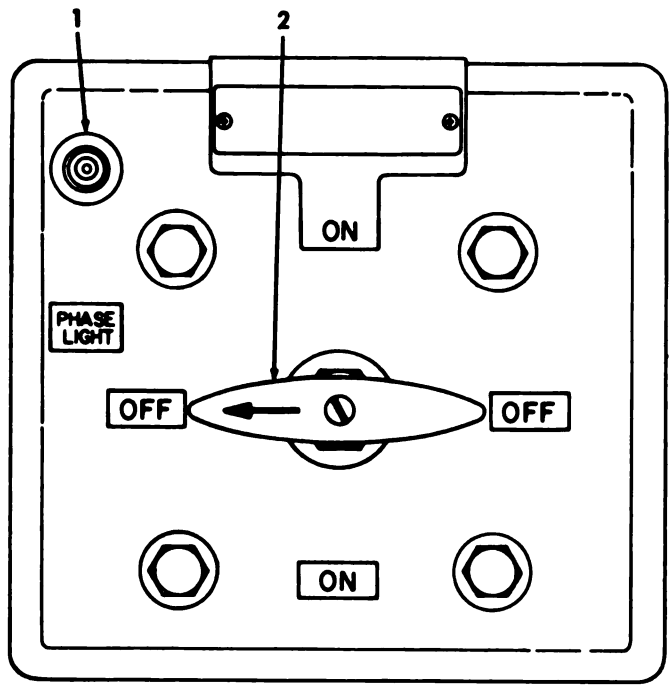
(11) *Left-hand subordinate distribution box.* Interlock bypass switches and indicator are mounted on this panel (11). It hinges down to provide access to 28-vdc connections.

(12) *Output test indicator and switch.* This indicator and switch (12) are mounted on the edge of the radar set group. Together, they indicate the presence of IHIPIR to launcher (ILCHR) signals.

NOTE

The key numbers shown below in parentheses refer to figure 1-4.

d. Main Power Distribution Box. The main power distribution box monitors the phasing and controls the main power input from the power generator. It contains a PHASE LIGHT lamp (1) and a main power switch (2).



1 — PHASE LIGHT lamp
2 — Main power switch

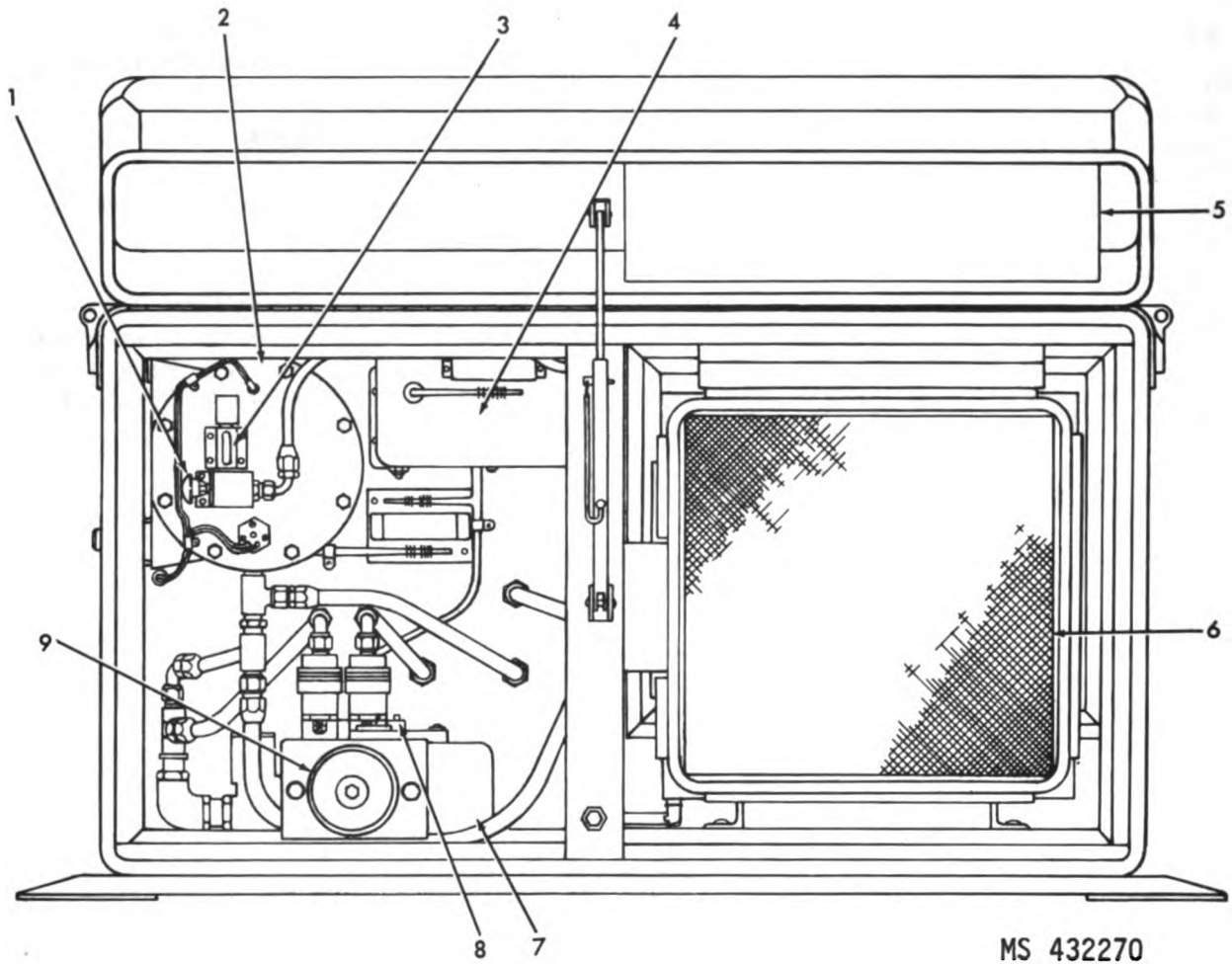
Figure 1-4. Main power distribution box.

e. Input Voltage Adjust Assembly (4, Fig. 1-1). This unit is mounted on the road side of the radar, between the liquid cooler and the radar set group. A screw-on cover protects the input voltage screwdriver adjustment.

NOTE

The key numbers shown below in parentheses refer to figure 1-5.

f. Liquid Cooler. The liquid cooler provides cooling fluid to the high-voltage power supply, rf transmitter assembly, and the dummy load. A watertight door, covering the entire front of the cabinet, opens upward and locks to provide access to the components (1 through 9) for maintenance. During operation, the cover over the air intake filter (5) must be kept open. An air exhaust door on the rear of the cabinet provides access to the exhaust-air filter. The rear exhaust door also must be kept open during operation.



1 — Indicator valve knob
2 — Reservoir
3 — Sight gate
4 — Capacitor assembly
5 — Air-intake filter
6 — Heat exchanger
7 — Rotary pump
8 — Bypass indicator
9 — Liquid filter

Figure 1-5. Liquid cooler — door opened.

NOTE

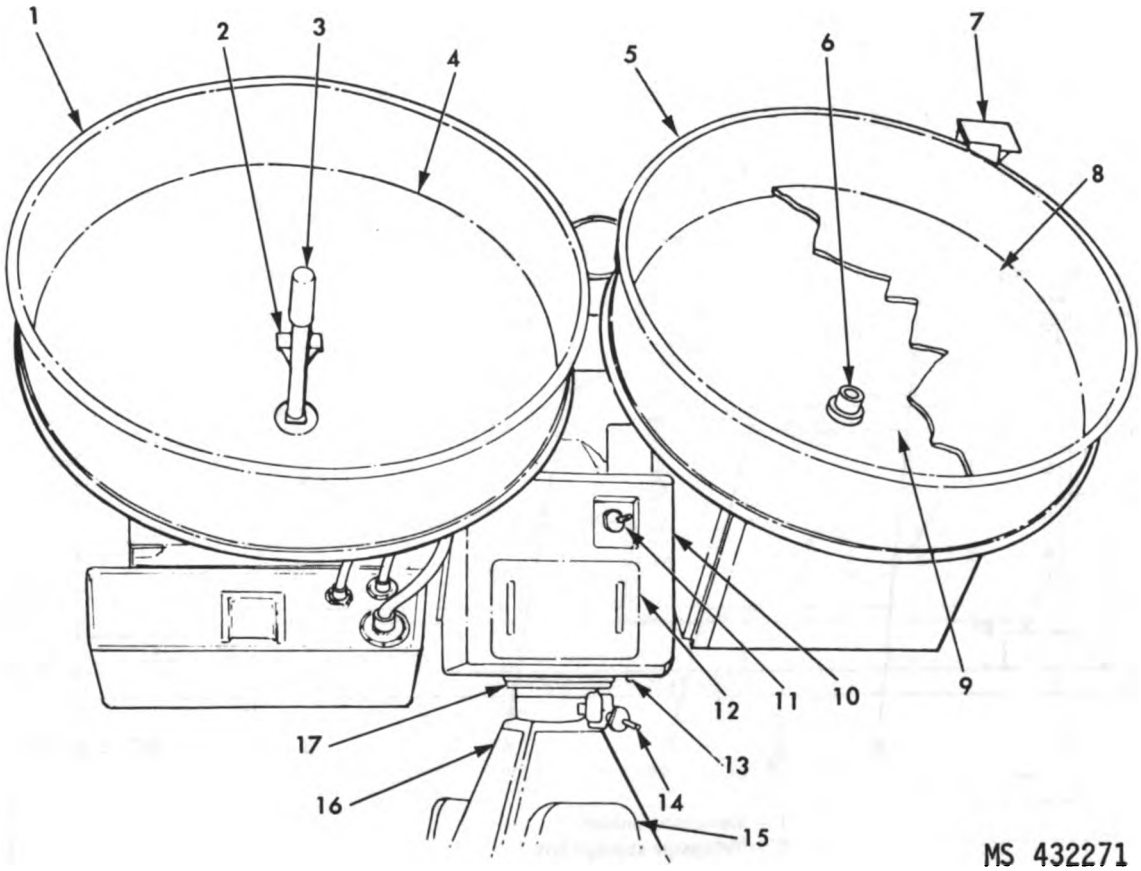
The key numbers shown below in parentheses refer to figure 1-6, unless otherwise indicated.

g. Antenna Receiver Group. The antenna receiver group consists of the antenna pedestal (16), radar transmitter antenna (1), and radar receiving antenna (5) mounted to the center of the radar platform.

(1) *Antenna pedestal.* The pedestal (16) houses the azimuth drive and gear assemblies, synchro assemblies, torque tube and slipring assemblies, and the blower assembly. Access covers and plates on the pedestal are removable for maintenance. The pedestal also serves as an inclosure through which rf energy and electronic data are delivered to and received from the radar set group and radar transmitting antenna to the receiver and transmitter. The elevation head (10) sits on top of the antenna pedestal. Two spirit levels (13) mounted on the elevation head are used in leveling the IHIPIR. Access covers (12) provide access to the motor, gear assemblies, and synchro assemblies used to elevate or lower the antenna. Stow locks (11 and 14) are provided to lock the antenna in elevation and azimuth.

(2) *Transmitting antenna.* The radar transmitter antenna (1) is a parabolic reflector-type antenna with a transmitting feed system consisting of two radiating elements: a transmitting waveguide (2) and a transmitter feed horn (3).

(3) *Receiving antenna.* The receiving antenna (5) is made up of two sections. One is the main receiver antenna made up of a parabolic reflector (9), a nutating receiver horn (6), and a cassegrain grid (8). The other section is the side lobe feed horn (7).



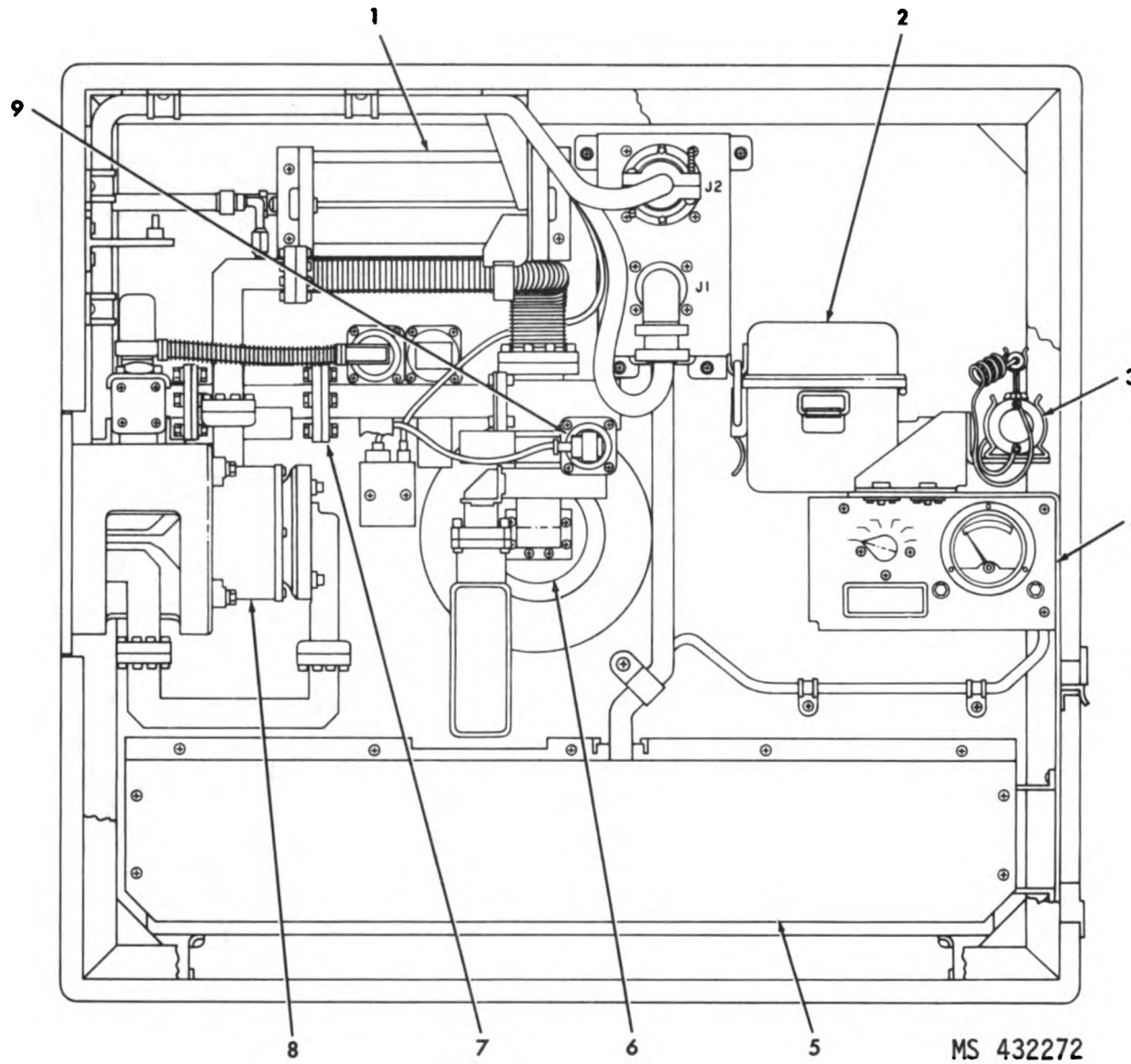
1 — Radar transmitter antenna
2 — Transmitting waveguide
3 — Transmitter feed horn
4 — Transmitting reflector
5 — Radar receiving antenna
6 — Nutating receiver feed horn
7 — Side lobe feed horn
8 — Cassegrain grid
9 — Receiver reflector
10 — Elevation head
11 — Elevation STOW lock
12 — Access cover (2)
13 — Spirit level
14 — Azimuth STOW lock
15 — Access cover
16 — Antenna pedestal
17 — Azimuth indicator scale

Figure 1-6. Antenna receiver group.

NOTE

The key numbers shown below in parentheses refer to figure 1-7.

(4) *Transmitter housing.* The transmitter housing contains the transmitter waveguide assembly (7), a portion of the transmitter feed (6), the telescope storage box (2), the 5.4-, ±12.6-, ±50-vdc power supply assembly (5), the power supply monitor (4), and the M42 instrument light (3).



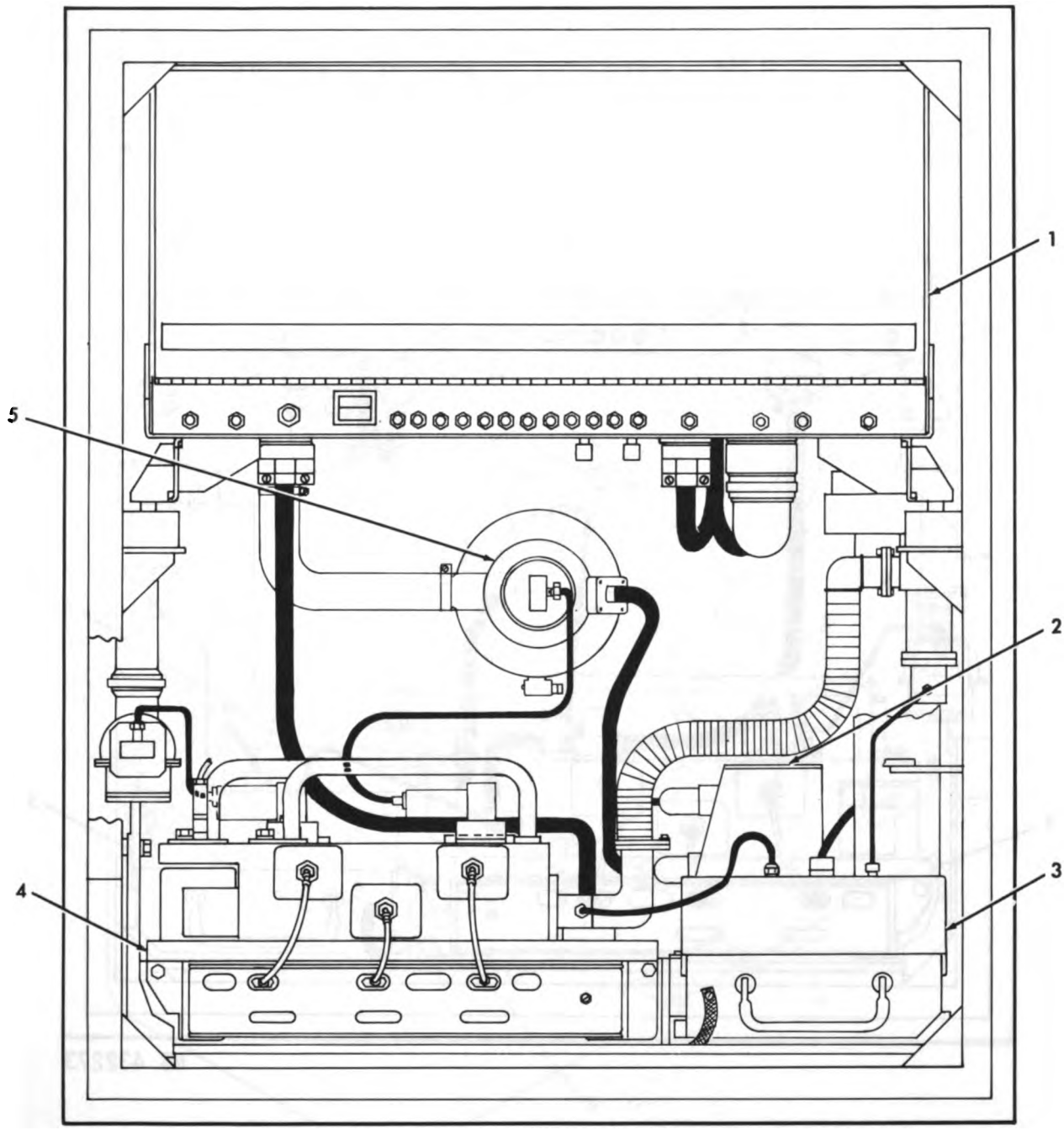
1 — Desiccant holder
2 — Telescope storage box
3 — M42 instrument light
4 — Power supply monitor
5 — 5.4-, ±12.6-, ±50-Vdc power supply assembly
6 — Transmitter feed
7 — Waveguide assembly
8 — Transmitter rotary coupler
9 — Antenna arc detector crystal

Figure 1-7. Transmitter housing — cover removed.

NOTE

The key numbers shown below in parentheses refer to figures 1-8 and 1-8.1.

(5) *Receiver housing.* The receiver housing contains the signal processor (1), nutating scanner drive (2), receiver local oscillator (3), receiver assembly (4), and the nutating scanner assembly (5).

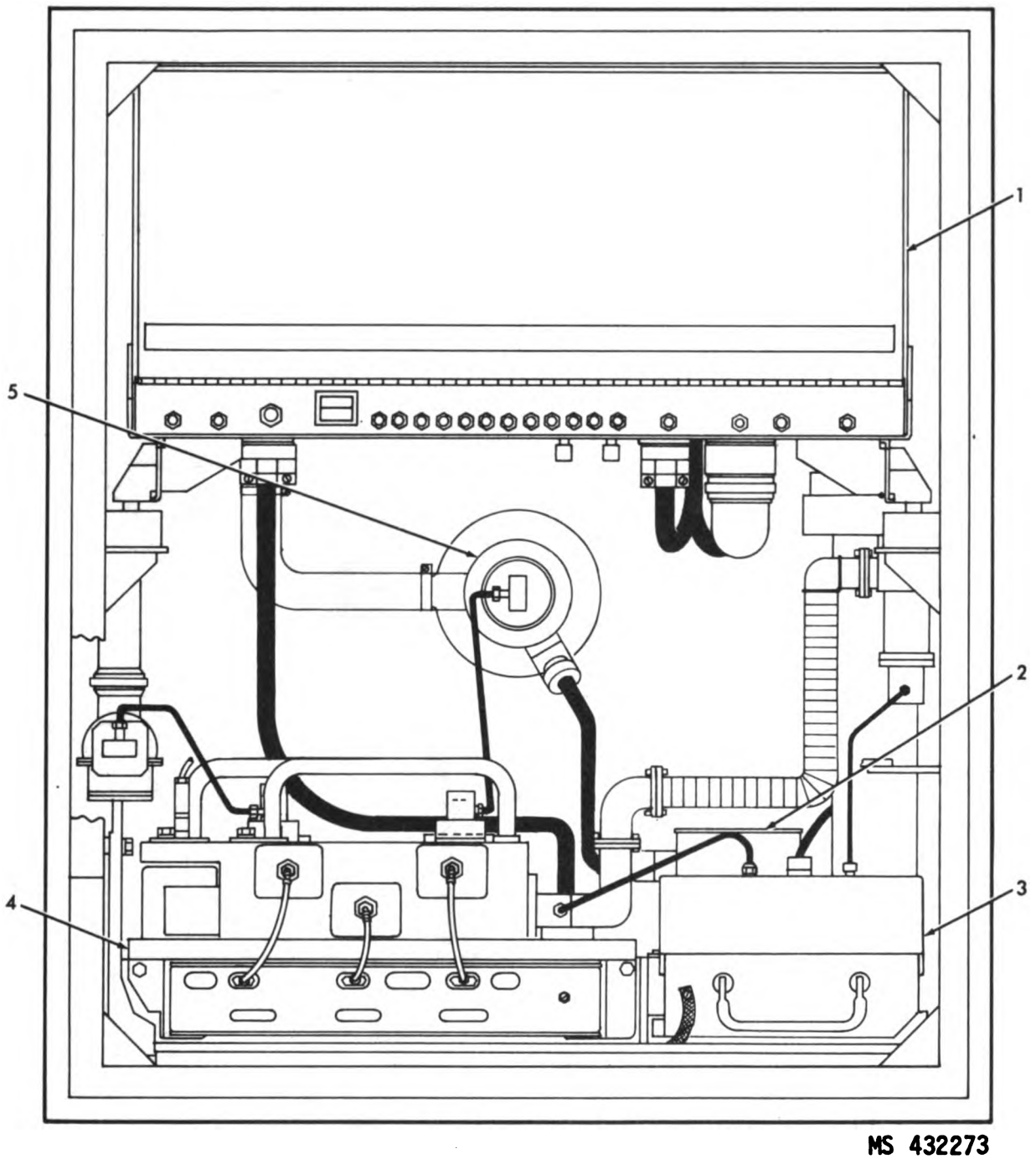


1 — Signal processor
2 — Nutating scanner drive
3 — Receiver local oscillator
4 — Receiver assembly
5 — Nutating scanner assembly

*Figure 1-8. Receiver housing *(G)[1] — cover removed.*

MS 433345

[1]Refer to appendix D for serial number effectivity.



1 — Signal processor
2 — Nutating scanner drive
3 — Receiver local oscillator
4 — Receiver assembly
5 — Nutating scanner assembly

*Figure 1-8.1. Receiver housing *(F)[1] — cover removed.*

[1]Refer to appendix D for serial number effectivity.

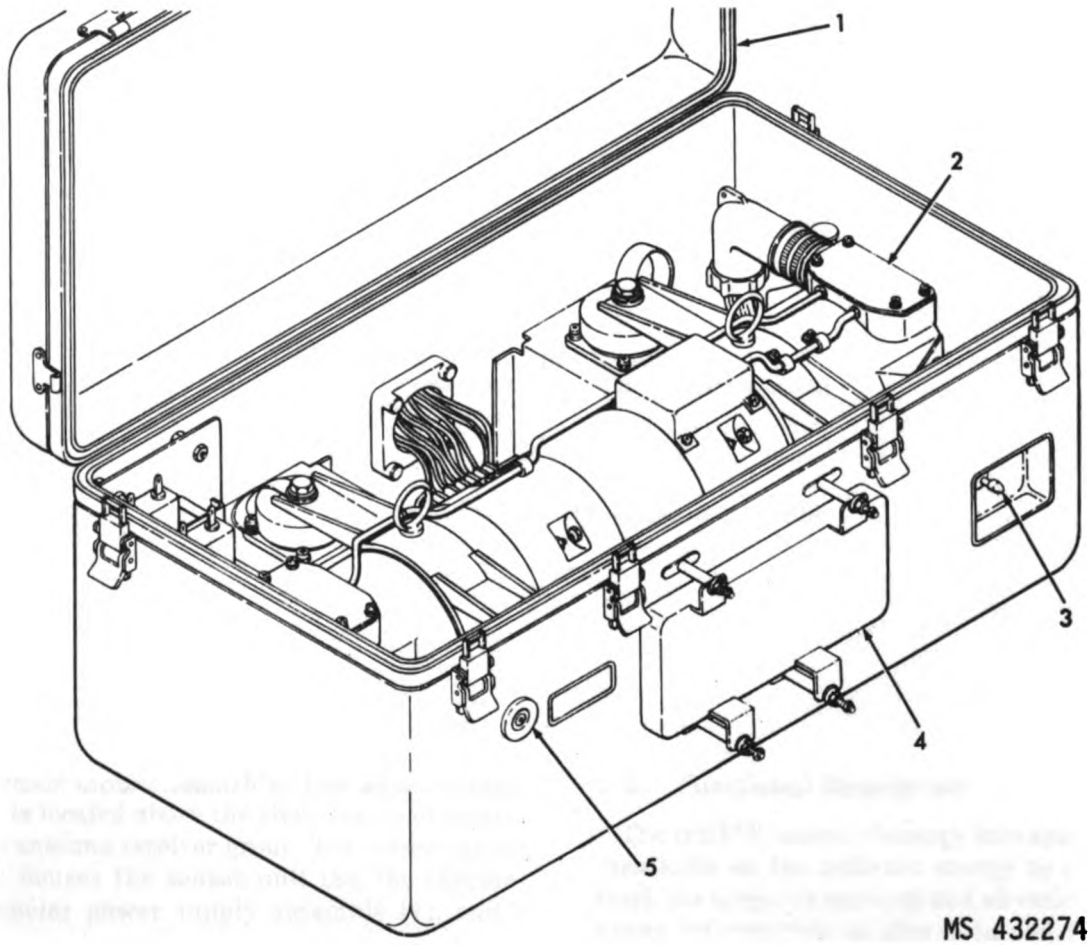
h. Motor-generator Assembly (Fig. 1-9). The motor-generator (2) provides armature voltages for the azimuth and elevation drive motors. The case has an air inlet-outlet door (4) to provide ventilation, a pressure equalizer valve (5), and the PEDESTAL SAFETY SWITCH (3). A hinged cover provides access to the motor-generator for maintenance.

i. Dummy Load (8, Fig. 1-1). The dummy load is mounted between the antenna pedestal and the motor generator assembly. When troubleshooting the high voltage power supply circuits, the dummy load is used to simulate the load provided by the transmitter M.O. and P.A. tubes.

NOTE

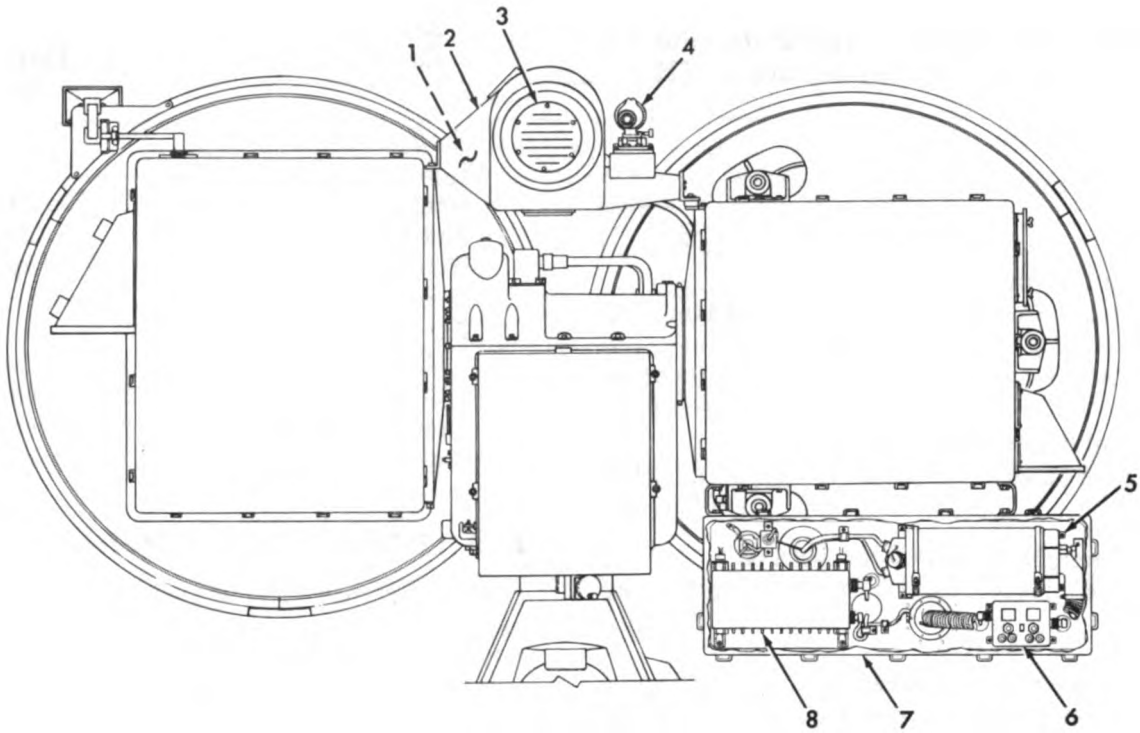
The key numbers shown below in parentheses refer to figure 1-10, unless otherwise indicated.

j. Tracking Adjunct System. The tracking adjunct system (TAS) is optional equipment for the HIPIR and is mounted on the antenna receiver group. It consists of seven units mounted in two housings: the sensor mount assembly (2) and the processor-power supply group (7).



1 — Motor-generator case
2 — Motor-generator
3 — PEDESTAL SAFETY SWITCH
4 — Air inlet-outlet door
5 — Pressure equalizer valve

Figure 1-9. Motor-generator assembly — door opened.



MS 432987

1 — Thermo-electric cooler power supply assembly
2 — Sensor mount assembly
3 — Sensor unit
4 — Alinement telescope
5 — Processor unit
6 — Relay and fail indicator assembly
7 — Processor-power supply group (cover removed)
8 — Power supply

Figure 1-10. Tracking adjunct system — IHIPIR.

(1) *Sensor mount assembly.* The sensor mount assembly is located above the elevation head assembly of the antenna receiver group. The sensor mount assembly houses the sensor unit (3), the thermo-electric cooler power supply assembly (1), and a blower to provide cooling air to the sensor unit.

(2) *Processor-power supply group.* The processor-power supply is located below the transmitter housing. It contains the power supply (8), processor unit (5), relay and fail indicator assembly (6), and a blower to provide cooling air to the processor unit.

1-8. Functional Description

The IHIPIR beams rf energy into space. The radar then locks on the reflected energy to automatically track the target in azimuth and elevation. Speed and range information is also obtained from the reflected signal. The IHIPIR provides the necessary information to aim the ILCHR so that the missile can home on the energy reflected by the target (illumination) and intercept it. For additional functional description, refer to TM 9—1430—1533—12—2.

1-9. Data

This paragraph contains physical data for the HIPIR. Operating data is provided in TM 9—1425—1525.

a. Radar.

Overall length (travel condition) ..... 4.75m (15 ft 7 in.)

Overall width (travel condition) ..... 2.44m (8 ft)

Overall height (travel condition, without TAS installed) ..... 3.28m (10 ft 9 in.)

Overall height (travel condition, with TAS installed) ..... 3.33m (10 ft 11 in.)

Total weight of HIPIR mounted on M390 trailer ..... 4244.33 kg (9357 lb)

Maximum slope emplacement ..... 10 degrees

Diameter of circle of emplacement ..... 4.93m (16 ft 2 in.)

b. Antenna.

Reflector-type ..... Parabolic with fixed feed

Reflector diameter ..... 1.22m (48 in.)

Mechanical limits:

Azimuth ..... None

Elevation ..... 1600 ±25 mils
−178 ±25 mils

Electrical limits:

Azimuth ..... None

Elevation ..... 1564 ±20 mils
−124 ±20 mils

c. Trailer.

Type M390

Length ..... 4.75m (15 ft 7 in.)

Width ..... 2.44m (8 ft)

Weight ..... 1710 kg (3770 lb)

Tire size ..... 900 × 20

Tire Pressure

Highway ..... 4.22 kg/cm² (60 psi)

Cross country ..... 3.16 kg/cm² (45 psi)

Mud, sand, snow ..... 2.11 kg/cm² (30 psi)

Brakes ..... Air-over hydraulic

1-10. Differences Among Models

Any differences among models that exist in this equipment are indicated in the text and on diagrams by the use of the serial number effectivity code. This code is given in appendix D.

1-11. Modification Work Orders

Table 1-1 lists all modification work orders (MWO's) affecting the HIPIR. The table includes the MWO number, description, and effectivity.

NOTE

MWO's are listed in this manual for information only. This manual is not an authority for requisitioning kits. The published MWO, or change thereto, is the only authority for requisitioning MWO kits.

Table 1-1. Modification Work Orders

MWO	Description	Effectivity
9—1430—1533—50—3	Changes coolant hoses from rubber to teflon. Changes part number of the cooling system interlock from 10109706 to 13039098 and the rf modulator-oscillator from 11569734 to 13039097. Provides mechanical strength, abrasion resistance, and prevents degradation of hose material due to coolant.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 through 620800.
9—1430—1533—50—4	Adds 30 suppression diodes to miscellaneous relays to eliminate transients. Changes the following part numbers: radar set group from 11568089 to 11566363; transmitter group from 11568213 to 13219168; high-voltage regulator from 11568217 to 11566363; console heaters from 10108731 to 11569609; cooling system interlock from 13039098 to 11569610; and pedestal heater from 10182788 to 11566378.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 to 630451.

Table 1-1. Modification Work Orders — Continued

MWO	Description	Effectivity
9—1430—1533—50—5	Installs two new radio frequency isolators J5 and J6; changes the part number of the receiver assembly from 11569744 to 13039028, and installs a new nutating scanner drive 13038851. These modifications allow the radar to properly track targets under all operating conditions.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 to 630451.
9—1430—1533—50—6	Adds a relay to the control-indicator panel in the radar set group which enables delay lock in response to TPQ-29 simulated TOJ command. Changes the part number of the control-indicator panel from 13038885 to 13219166; the A3 wiring harness from 13039023 to 13219167; the antenna pedestal from 11568237 to 11566370; and the pedestal head assembly from 11568265 to 11570004.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 to 630451.
9—1430—1533—50—7	Adds heat sink alinement pieces to nutating scanner assembly to prevent overheating and premature failure. Changes part number from 11568358 to 11566367.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 to 630451.
9—1430—1533—50—8	Semiconductor added to transmitter control unit to provide the lamp test function to the radiate interlock reset indicator. Changes transmitter group part number from 11568213 to 13219168, and the transmitter control unit from 11571363 to 13219169.	Radar set AN/MPQ-57 11568205 with serial numbers 570641 to 630451.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INDICATORS

2-1. General

This section provides information concerning the controls and indicators of the IHIPIR.

2-2. Controls and indicators

The controls and indicators are listed in tabular form in tables 2-1 through 2-14, and are shown in figures 2-1 through 2-14. Placarded items are indicated by upper case letters.

Section II. OPERATION UNDER USUAL CONDITIONS

2-3. General

This section references procedures for normal operation of the IHIPIR. Prior to operation, the IHIPIR must be emplaced in accordance with the procedures in chapter 7.

2-4. Normal Operation

Under normal conditions, the IHIPIR is unattended during operation. All operating functions are controlled remotely from the IBCC/IPCP. To operate the IHIPIR remotely, all controls must be set to the positions listed in table 3-3 except for the following:

Control	*Setting*
Main power switch	ON
PEDESTAL SAFETY SWITCH	OPERATE
LOCAL-REMOTE switch	REMOTE
MOTOR GENERATOR circuit breaker	ON
MASTER OSCILLATOR BEAM circuit breaker	ON
POWER AMPLIFIER BEAM circuit breaker	ON

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-5. General

This section contains information pertaining to operation of the IHIPIR under extreme weather conditions.

2-6. Wind

The IHIPIR can be operated in gusts of wind up to 80 km (50 miles) per hour and steady winds up to 64 km (40 miles) per hour. At winds in excess of this,

deenergize the radar following the procedures in chapter 3 and perform the following steps, or evacuate the radar to a protected area.

a. Stow all loose equipment.

b. Close all vent and access doors.

c. Secure the protective shipping covers on the antenna.

d. Engage the elevation STOW lock.

e. Disengage the azimuth STOW lock.

f. Lower the leveling jacks until the weight of the radar is equally distributed between the jacks and the wheels.

g. Place sandbags or other weights across the jack pads. Use a minimum of 272 kg (600 lbs) per jack or tie the trailer securely to four 1.52m (5 ft) ground anchors.

2-7. Extreme Cold and Hot Weather Operation

a. The IHIPIR can be operated satisfactorily at temperatures as low as −32°C (−25°F) with no solar radiation for a period of at least three days. To insure proper radar operation in cold weather, set pedestal heater control switch S1 (1, fig. 2-12) to ON and pedestal blower circuit breaker CB1 (4, fig. 2-12) to ON.

b. The IHIPIR can be operated satisfactorily for a minimum of four hours when subjected to the following conditions:

Temperature	41°C (105°F)
Solar radiation	360 BTU/sq ft/hr (105 watts/square foot)

2-8. Barometric Pressure

The IHIPIR can be operated satisfactorily at atmospheric pressures encountered from sea level up to 3.05 km (10,000 feet) above sea level, and is capable of withstanding the pressure encountered at 7.62 km (25,000 feet) above sea level for a period of no more than 12 hours.

2-9. Humidity

This IHIPIR can be operated satisfactorily at a relative humidity of 100 percent provided the temperature does not exceed 32°C (90°F).

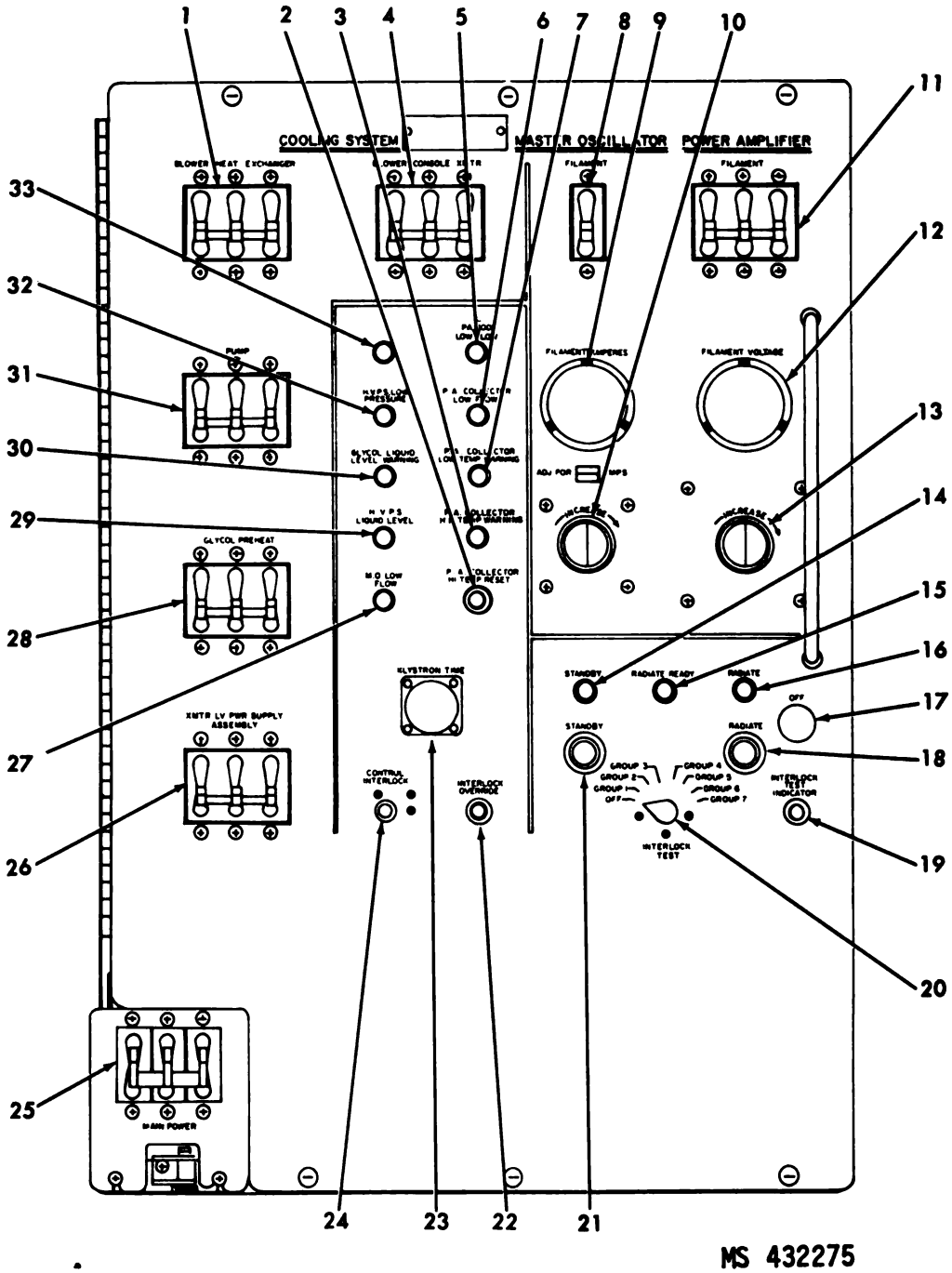


Figure 2-1. Transmitter panel 1 — controls and indicators.

Table 2-1. Transmitter Panel 1 — Controls and Indicators (Fig. 2-1)

Key	Control or indicator	Function
1	BLOWER HEAT EXCHANGER circuit breaker	Applies or removes operating power from heat exchanger blower in transmitter console; opens circuit automatically when overload is present.
2	P.A. COLLECTOR HI TEMP RESET pushbutton	Resets interlocks when P.A. COLLECTOR HI TEMP WARNING lamp lights.
3	P.A. COLLECTOR HI TEMP WARNING lamp	When lit, indicates a high temperature in power amplifier collector, and that the radiate interlocks are open.
4	BLOWER CONSOLE XMTR circuit breaker	Applies or removes operating power from air cooler blower in transmitter console, opens circuit automatically when overload is present.
5	P.A. BODY LOW FLOW lamp	When lit, indicates a low coolant flow through the power amplifier body; and indicates the radiate interlocks are open.
6	P.A. COLLECTOR LOW FLOW lamp	When lit, indicates a low coolant flow through the power amplifier collector, and indicates the radiate interlocks are open.
7	P.A. COLLECTOR LOW TEMP WARNING lamp	When lit, indicates a low temperature in the power amplifier collector.
8	MASTER OSCILLATOR FILAMENT circuit breaker	Applies or removes 240 vac to filament power supply of master oscillator; opens circuit automatically when overload is present.
9	MASTER OSCILLATOR FILAMENT AMPERES meter	Monitors filament current of master oscillator in amperes.
10	MASTER OSCILLATOR filament control	Controls master oscillator filament current as monitored on ammeter.
11	POWER AMPLIFIER FILAMENT circuit breaker	Applies or removes 416 vac to filament power supply of power amplifier; opens circuits automatically when overload is present.
12	POWER AMPLIFIER FILAMENT VOLTAGE meter	Monitors filament voltage of power amplifier.
13	POWER AMPLIFIER filament control	Controls the power amplifier filament current monitored on the ammeter.
14	STANDBY lamp	When lit, indicates equipment is in standby.
15	RADIATE READY lamp	When lit, indicates that radiate condition can be achieved.
16	RADIATE lamp	When lit, indicates equipment is in radiate.
17	OFF pushbutton	Deenergizes the radar.
18	RADIATE pushbutton	Places equipment in radiate condition.
19	INTERLOCK TEST INDICATOR lamp	When lit, indicates closed interlocks for the INTERLOCK TEST switch position.
20	INTERLOCK TEST switch	*Position* — *Function* OFF — INTERLOCK TEST OFF GROUP 1 — CONTROL INTERLOCK switch, STANDBY pushbutton, and OFF pushbutton GROUP 2 — PA FILAMENT, MO FILAMENT, and REGULATOR SCREEN & FILAMENT circuit breakers GROUP 3 — Heat exchanger intake and exhaust GROUP 4 — Intake vent and console exhaust GROUP 5 — Lvps GROUP 6 — Panels 1, 2, and 3 GROUP 7 — Radiate continuity
21	STANDBY pushbutton	Places equipment in standby condition.
22	INTERLOCK OVERRIDE pushbutton	While pressed, overrides all standby interlocks in transmitter console.
23	KLYSTRON TIME meter	Registers total time radar is in radiate.

Table 2-1. Transmitter Panel 1 — Controls and Indicators (Fig. 2-1)—Continued

Key	Control or indicator	Function
24	CONTROL INTERLOCK pushbutton	Permits remote control of standby and radiate functions from radar set group or IBCC/IPCP if transmitter group cover is closed.
25	MAIN POWER circuit breaker	Applies or removes line power to the transmitter group, automatically opens circuit when overload is present.
26	XMTR LV PWR SUPPLY ASSEMBLY circuit breaker	Applies or removes operating power to the transmitter LV power supply; opens circuit automatically when overload is present.
27	M.O. LOW FLOW lamp	When lit, indicates liquid coolant flow rate to master oscillator is low.
28	GLYCOL PREHEAT circuit breaker	Applies or removes 416 vac to heater element in cooling system reservoir; opens circuit automatically when overload is present.
29	H.V.P.S. LIQUID LEVEL lamp	When lit, indicates high-voltage power supply liquid level is low and the radiate interlocks are open.
30	GLYCOL LIQUID LEVEL WARNING lamp	When lit, indicates glycol liquid level in reservoir is low.
31	PUMP circuit breaker	Applies or removes operating power to liquid cooling system pump; opens circuit automatically when overload is present.
32	H.V.P.S. LOW PRESSURE lamp	Not used at the present time.
33	Spare indicator lamp	Provided for possible future need.

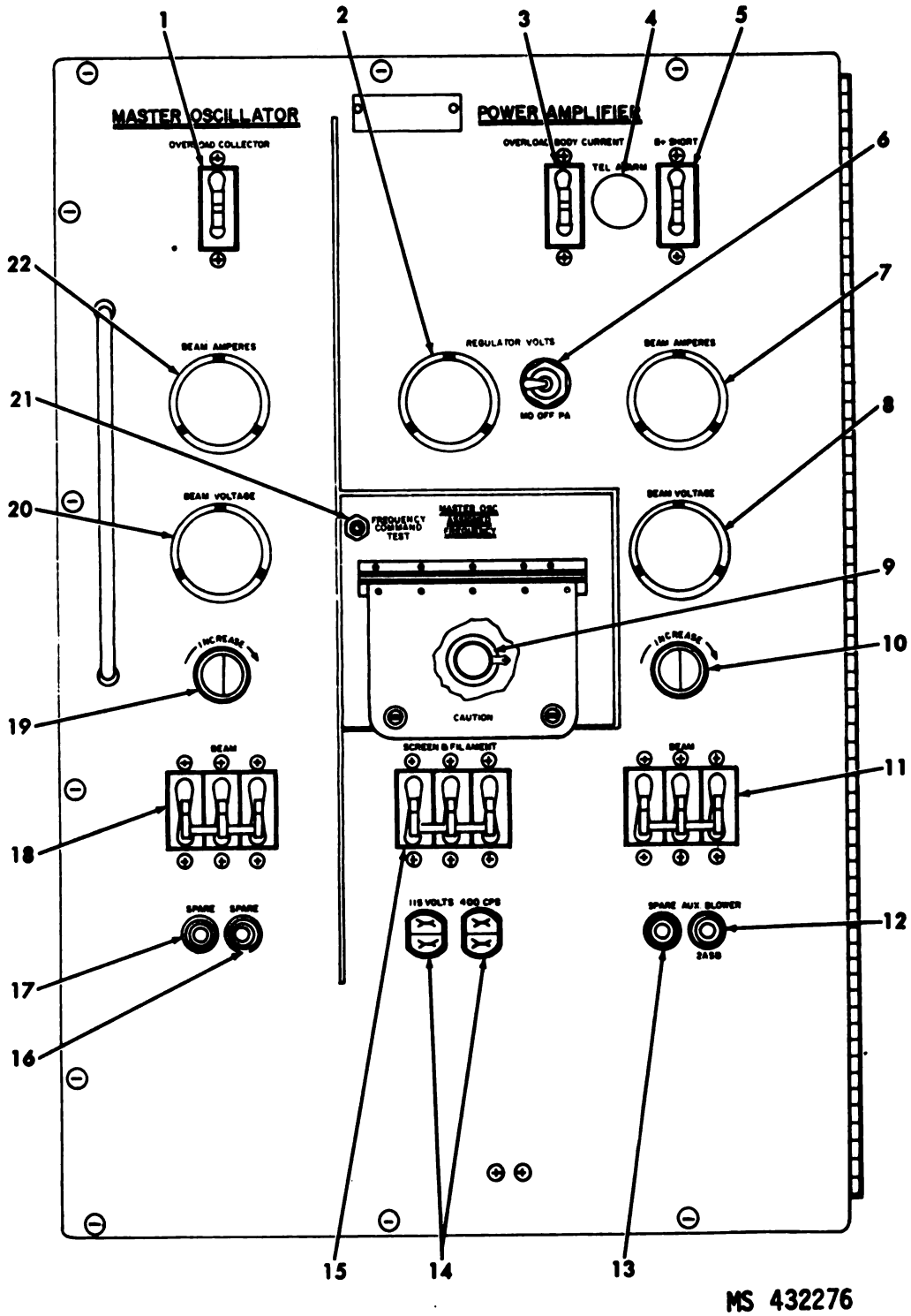


Figure 2-2. Transmitter panel 2 — controls and indicators.

Table 2-2. Transmitter Panel 2 — Controls and Indicators (Fig. 2-2)

Key	Control or indicator	Function
1	MASTER OSCILLATOR OVERLOAD COLLECTOR circuit breaker	Prctects master oscillator circuit; opens automatically under overload condition, and opens radiate interlocks.
2	REGULATOR VOLTS meter	Indicates voltage of master oscillator or power amplifier regulator tube.
3	POWER AMPLIFIER OVERLOAD BODY CURRENT circuit breaker	Protects power amplifier circuit; automatically opens under overload condition, and opens radiate interlocks.
4	Sonalert TEL ALARM	Activates when IHIPIR is being called by another unit in battery.
5	POWER AMPLIFIER B+ SHORT circuit breaker	Protects power amplifier circuit; opens automatically under overload condition, and opens radiate interlocks.
6	MO/OFF/PA switch	Selects either master oscillator or power amplifier series tube voltage to be presented on REGULATOR VOLTS meter.
7	POWER AMPLIFIER BEAM AMPERES meter	Monitors operating current of power amplifier.
8	POWER AMPLIFIER BEAM VOLTAGE meter	Monitors operating voltage of power amplifier.
9	MASTER OSC ASSIGNED FREQUENCY switch	Establishes a binary code representing IHIPIR assigned frequency.
10	POWER AMPLIFIER beam control	Controls beam amperes and beam voltage as monitored on ammeter and voltmeter.
11	POWER AMPLIFIER BEAM circuit breaker	Applies or removes 416 vac to high-voltage power supply for high voltage to power amplifier; opens automatically under overload condition.
12	AUX. BLOWER fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
13	SPARE fuse	Provided for possible future need.
14	115 VOLTS 400 CPS convenience outlets	Provide access to 115-vac, 400-Hz power at front panel.
15	REGULATOR SCREEN & FILAMENT circuit breaker	Applies or removes 240 vac to regulator set MO and PA power supply; circuit opens automatically when overload is present, and opens radiate interlocks.
16	SPARE fuse	Provided for possible future need.
17	SPARE fuse	Provided for possible future need.
18	MASTER OSCILLATOR BEAM circuit breaker	Applies or removes 416 vac to high-voltage power supply for high voltage to master oscillator; opens automatically under overload condition.
19	MASTER OSCILLATOR beam control	Controls beam amperes and beam voltage as monitored on ammeter and voltmeter.
20	MASTER OSCILLATOR BEAM VOLTAGE meter	Monitors the operating voltage of master oscillator.
21	FREQUENCY COMMAND TEST pushbutton	Enables testing of transmitter frequency command circuitry to ILCHR.
22	MASTER OSCILLATOR BEAM AMPERES meter	Monitors operating current of master oscillator.

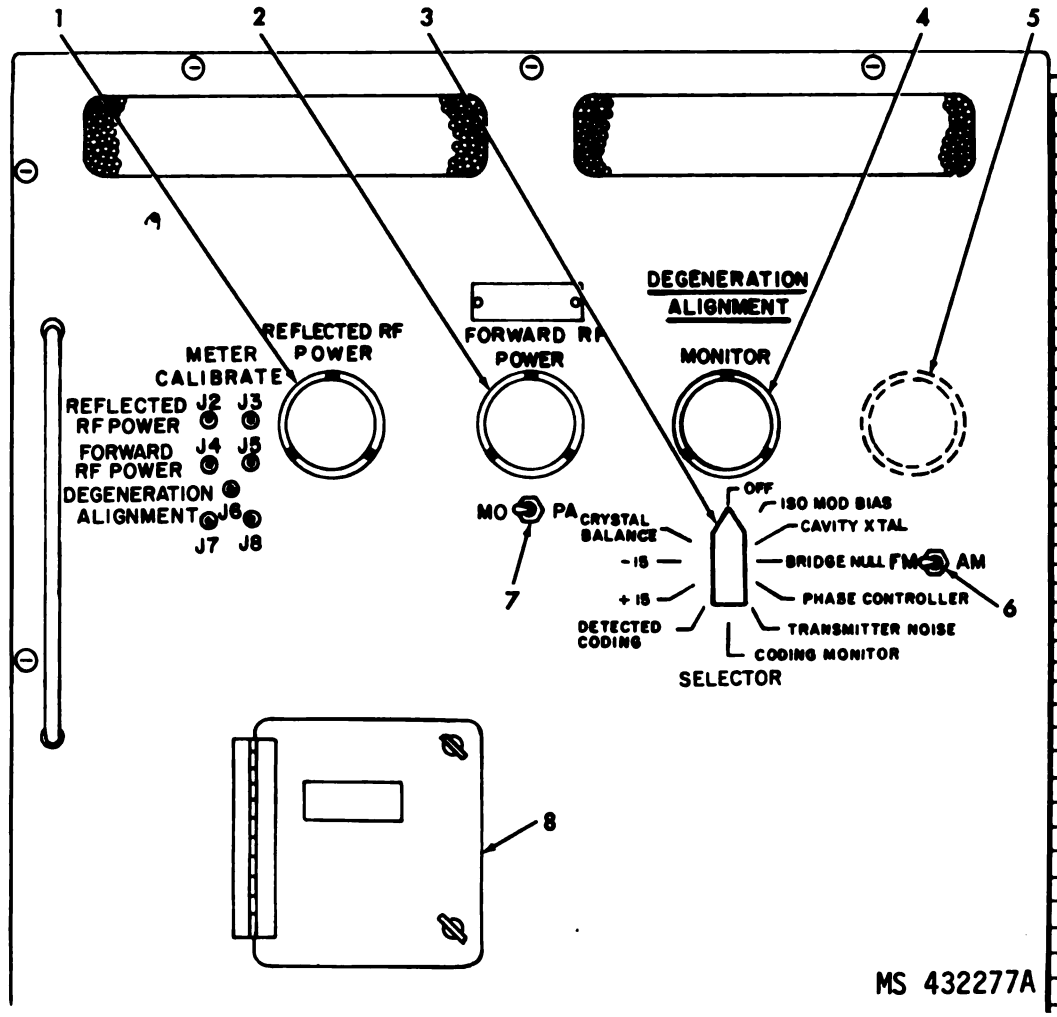


Figure 2-3. Transmitter panel 3 — controls and indicators.

Table 2-3. Transmitter Panel 3 — Controls and Indicators (Fig. 2-3)

Key	Control or indicator	Function
1	REFLECTED RF POWER meter	Monitors reflected rf power from input cavity of klystron power amplifier.
2	FORWARD RF POWER meter	Monitors master oscillator or power amplifier forward rf power output as selected by forward rf power switch.
3	DEGENERATION ALIGNMENT SELECTOR switch	Selects the following transmitter functions for display on DEGENERATION MONITOR meters: CRYSTAL BALANCE, −15V, +15V, DETECTED CODING, OFF, ISO-MOD BIAS, CAVITY XTAL, BRIDGE NULL, PHASE CONTROLLER, TRANSMITTER NOISE, and CODING MONITOR.
4	DEGENERATION ALIGNMENT MONITOR meter	Monitors positions of the DEGENERATION ALIGNMENT SELECTOR switch.
5	DEGENERATION MONITOR meter (located behind panel)	Monitors positions of the DEGENERATION ALIGNMENT SELECTOR switch.
6	FM/AM switch	Selects am or fm noise to be displayed on the DEGENERATION MONITOR meters with the DEGENERATION ALIGNMENT SELECTOR switch in the TRANSMITTER NOISE position.
7	MO/PA switch	Selects MO or PA rf power for display on the FORWARD RF POWER meter.
8	PA adjust access door	Permits access to the power amplifier tube adjustments.

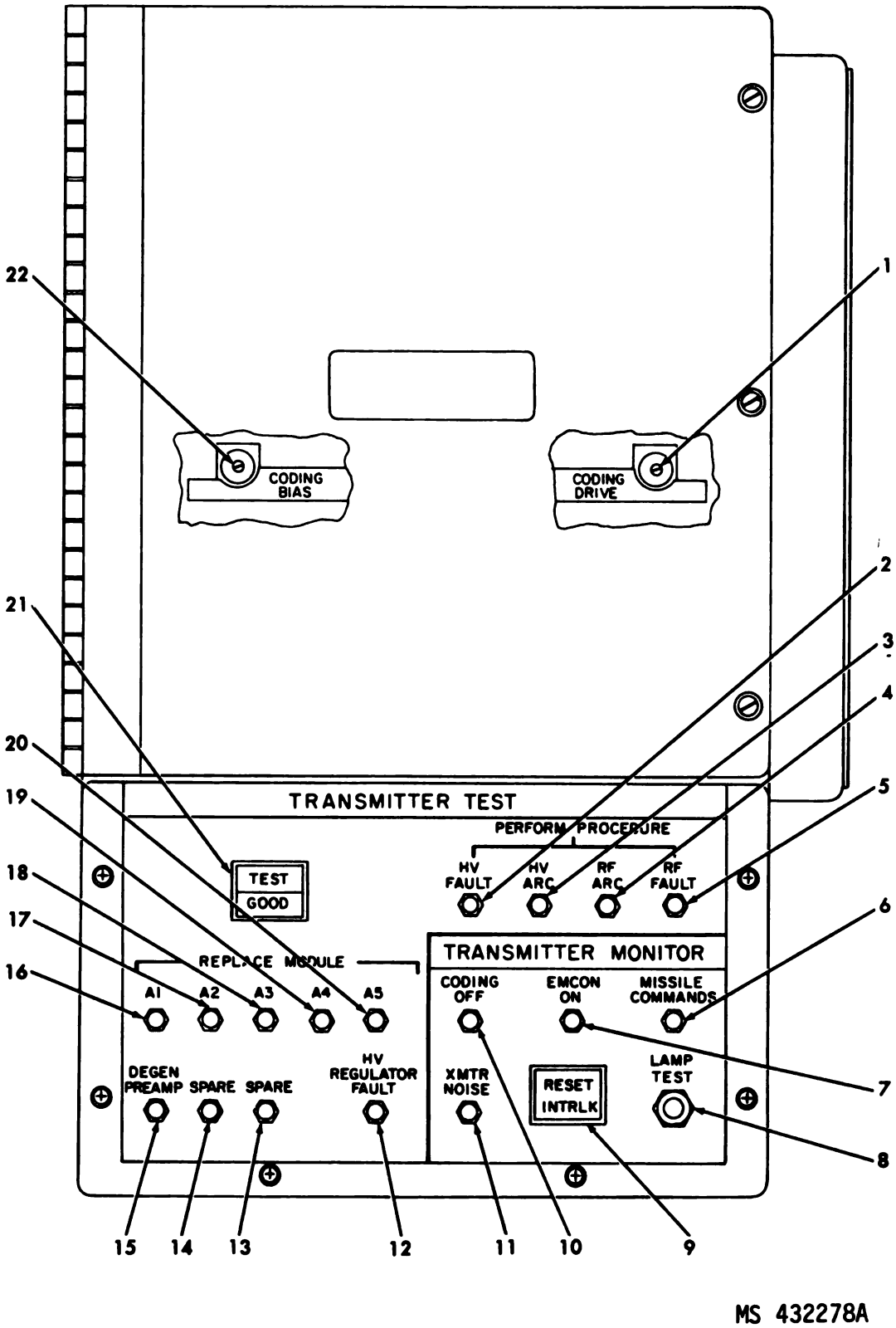


Figure 2-4. Transmitter control unit — controls and indicators.

Table 2-4. Transmitter Control Unit — Controls and Indicators (Fig. 2-4)

Key	Control or indicator	Function
1	CODING DRIVE adjust	Adjust amplitude of modulation.
2	PERFORM PROCEDURE HV FAULT lamp	Lights when, after an otherwise GOOD automatic BITE sequence, a loss of MO or PA high voltage occurs while in radiate. EMCON disables this indicator.
3	PERFORM PROCEDURE HV ARC lamp	Lights when an MO or PA high voltage arc occurs.
4	PERFORM PROCEDURE RF ARC lamp	Lights when, after an otherwise GOOD automatic BITE sequence, ionization is detected. When lit after the radar has returned itself to standby, indicates that this condition occurred due to an extended rf arc.
5	PERFORM PROCEDURE RF FAULT lamp	Lights when, after an otherwise GOOD automatic BITE sequence, a fault has been detected that is not covered by an automatic BITE lamp.
6	TRANSMITTER MONITOR MISSILE COMMANDS lamp	Lights when one or two missile commands are detected on the coding signal.
7	TRANSMITTER MONITOR EMCON ON lamp	Lights when the radar is in the EMCON mode of operation.
8	LAMP TEST pushbutton	When pressed, lights all lamps on the TRANSMITTER TEST panel.
9	RESET INTRLK indicator pushbutton	Lights when the radiate interlock circuit is broken, switching the radar to radiate ready. Press to reset before returning the radar to radiate.
10	TRANSMITTER MONITOR CODING OFF lamp	Lights when in the radiate mode and no coding is detected on the rf output.
11	TRANSMITTER MONITOR XMTR NOISE lamp	Lights when excessive transmitter FM noise is detected.
12	REPLACE MODULE HV REGULATOR FAULT lamp	Lights when transmitter BITE detects a fault in the high-voltage regulator.
13	REPLACE MODULE SPARE lamp	Not used.
14	REPLACE MODULE SPARE lamp	Not used.
15	REPLACE MODULE DEGEN PREAMP lamp	Lights when transmitter BITE detects a fault in the degeneration preamplifier.
16	REPLACE MODULE A1 lamp	Lights when transmitter BITE detects a fault in transmitter control unit module A1.
17	REPLACE MODULE A2 lamp	Lights when transmitter BITE detects a fault in transmitter control unit module A2.
18	REPLACE MODULE A3 lamp	Lights when transmitter BITE detects a fault in transmitter control unit module A3.
19	REPLACE MODULE A4 lamp	Lights when transmitter BITE detects a fault in transmitter control unit module A4.
20	REPLACE MODULE A5 lamp	Lights when transmitter BITE detects a fault in transmitter control unit module A5.
21	TEST/GOOD indicator switch	When pressed, the TEST portion of the switch starts the automatic transmitter test. GOOD lights to indicate the successful end of a transmitter control unit test sequence. Pressing the switch a second time will shut off any TRANSMITTER TEST lamp that is lit and disable automatic BITE inputs to tactical circuits.
22	CODING BIAS adjust	Adjusts bias of modulation signal.

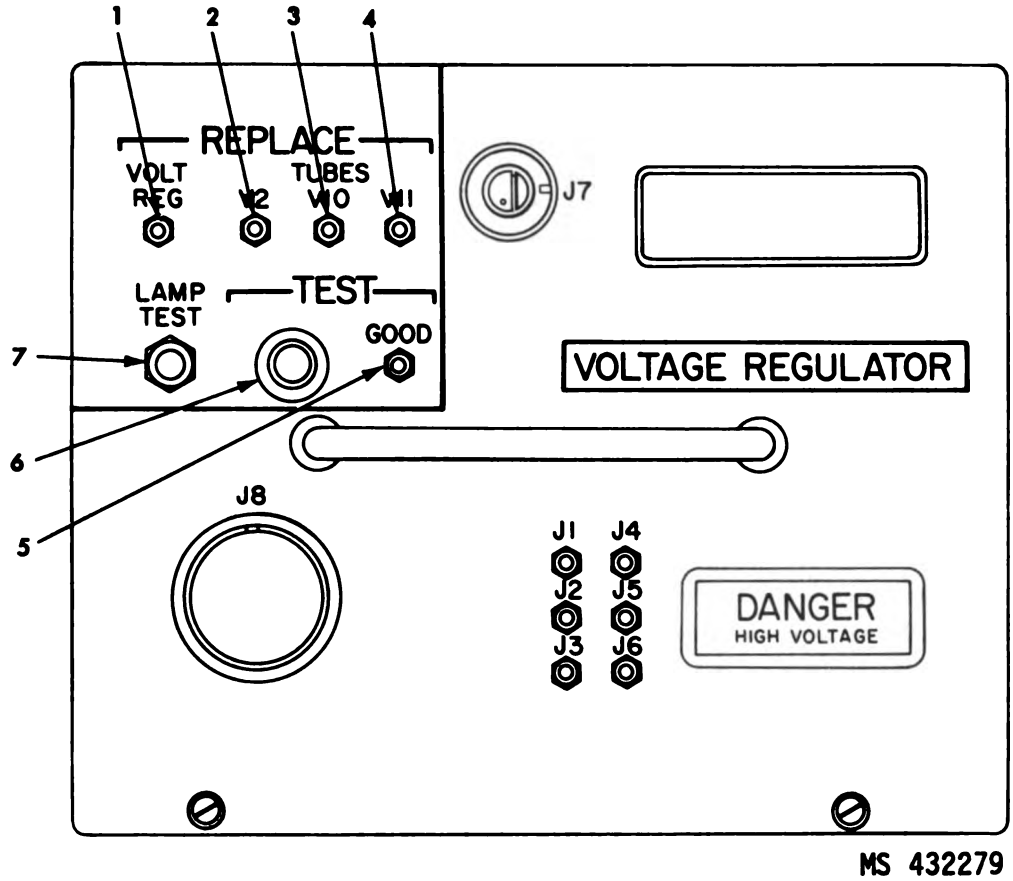


Figure 2-5. High-voltage regulator — controls and indicators.

Table 2-5. High-Voltage Regulator — Controls and Indicators (Fig. 2-5)

Key	Control or indicator	Function
1	REPLACE VOLT REG lamp	When lit, indicates that high-voltage regulator BITE detected a fault in the voltage regulator amplifier/BITE module.
2	REPLACE TUBES V2 lamp	When lit, indicates that high-voltage regulator BITE detected that V2 is defective.
3	REPLACE TUBES V10 lamp	When lit, indicates that high-voltage regulator BITE detected that V10 is defective.
4	REPLACE TUBES V11 lamp	When lit, indicates that high-voltage regulator BITE detected that V11 is defective.
5	TEST GOOD lamp	Lights at conclusion of test if test is good.
6	TEST pushbutton	When pressed and held, initiates test. After conclusion of test, the TEST pushbutton has to be pressed again to restore high-voltage regulator to tactical status.
7	LAMP TEST pushbutton	When pressed, applies dc voltage to all front lamps for test purposes.

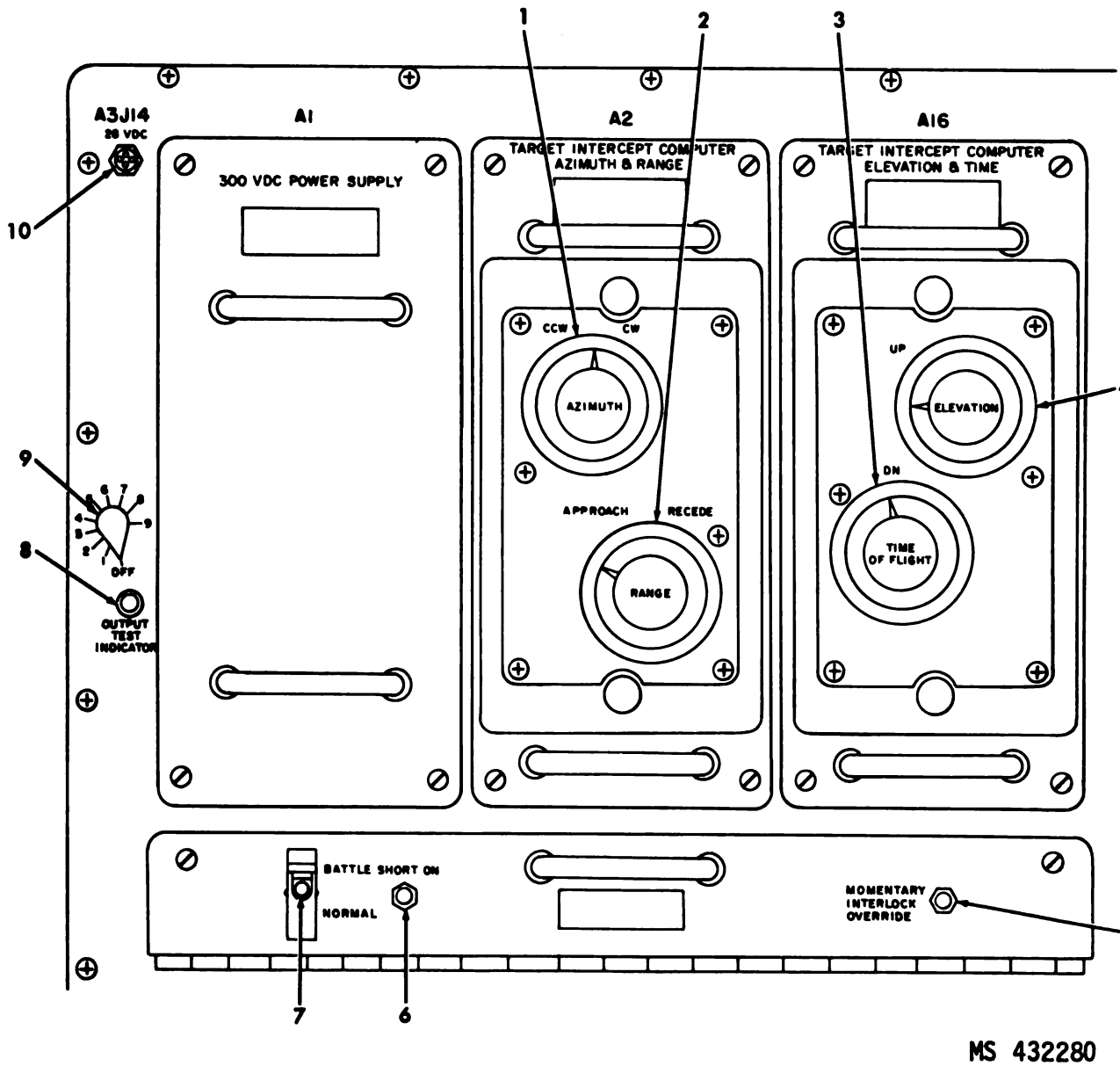


Figure 2-6. Radar set group road side — controls and indicators.

Table 2-6. Radar Set Group Road Side — Controls and Indicators (Fig. 2-6)

Key	Control or indicator	Function
1	AZIMUTH indicator dial	Automatically indicates, in hundreds of mils, computed azimuth lead angle.
2	RANGE indicator dial	Automatically indicates, in kilometers, the approach or recede range of target.
3	TIME OF FLIGHT indicator dial	Automatically indicates time of flight of missile to target.
4	ELEVATION indicator dial	Automatically indicates, in hundreds of mils, the computed elevation lead angle.
5	MOMENTARY INTERLOCK OVERRIDE pushbutton	Overrides radar set group standby interlocks while it is pressed.
6	BATTLE SHORT ON lamp	When lit, indicates the BATTLE SHORT switch is in the ON position.
7	BATTLE SHORT switch	When ON, overrides radar set group and transmitter console interlocks, and disables the arc counter circuits.
8	OUTPUT TEST INDICATOR lamp	Monitors output test indicator switch.
9	Output test indicator switch	1-4 — Monitors transmitter frequency command. 5 — Monitors autopilot command from IBCC/IPCP to ILCHR's. 6-8 — Monitors missile messages from IBCC/IPCP to ILCHR's. 9 — Monitors fast time constant (FTC) command.
10	Blackout light jack	Provides 28 vdc for cover mounted blackout light.

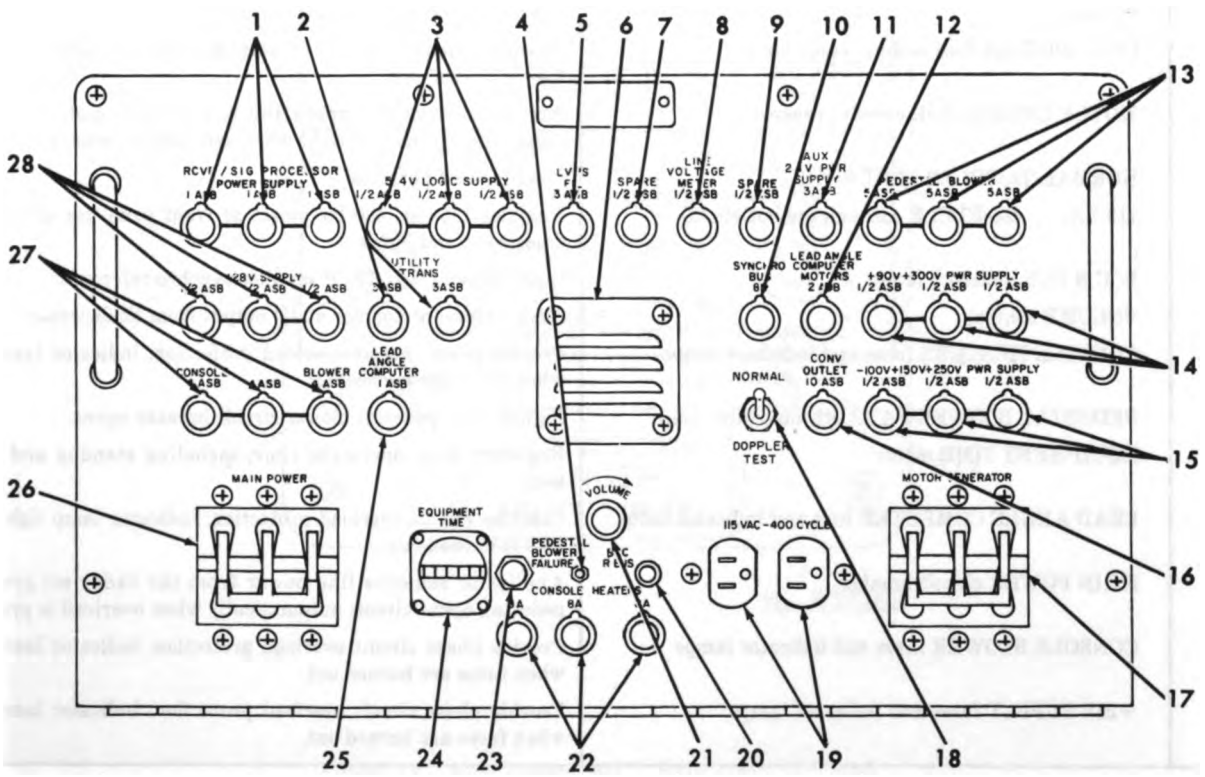


Figure 2-7. Main fuse panel — controls and indicators.

Table 2-7. Main Fuse Panel — Controls and Indicators (Fig. 2-7)

Key	Control or indicator	Function
1	RCVR/SIG PROCESSOR POWER SUPPLY fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
2	UTILITY TRANS fuses and indicator lamps	Provide circuit overload protection; indicator lamps light when fuses are burned out.
3	5.4V LOGIC SUPPLY fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
4	TP1 test point	Monitors the output of the remote synchro control.
5	LVPS FIL fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
6	Loudspeaker	Provides audible doppler indication.
7	SPARE fuse and indicator lamp	Provided for possible future need.
8	LINE VOLTAGE METER fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
9	SPARE fuse and indicator lamp	Provided for possible future need.
10	SYNCHRO BUS fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
11	AUX 28V PWR SUPPLY fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
12	LEAD ANGLE COMPUTER MOTORS fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
13	PEDESTAL BLOWER fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
14	+90V +300V PWR SUPPLY fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
15	−100V +150V +250V PWR SUPPLY fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
16	CONV OUTLET fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
17	MOTOR GENERATOR circuit breaker	Applies or removes operating power from motor-generator; automatically opens circuit when overload is present.
18	NORMAL/DOPPLER TEST switch	Used for test purposes.
19	115 VAC — 400 CYCLE convenience outlets (2)	Provides 115-vac, 400-Hz power at front panel for external test equipment and lights.
20	BCC R BUS indicator lamp	Lights when IBCC/IPCP supplies synchro reference.
21	VOLUME control	Adjusts level of doppler audio output from loudspeaker.
22	CONSOLE HEATERS fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
23	PEDESTAL BLOWER FAILURE indicator lamp	Lights when pedestal blower circuit breaker opens.
24	EQUIPMENT TIME meter	Registers total operating time, including standby and radiate time.
25	LEAD ANGLE COMPUTER fuse and indicator lamp	Provides circuit overload protection; indicator lamp lights when fuse is burned out.
26	MAIN POWER circuit breaker	Applies or removes line power from the radar set group and pedestal; opens circuit automatically when overload is present.
27	CONSOLE BLOWER fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.
28	+28V SUPPLY fuses and indicator lamps	Provide phase circuit overload protection; indicator lamps light when fuses are burned out.

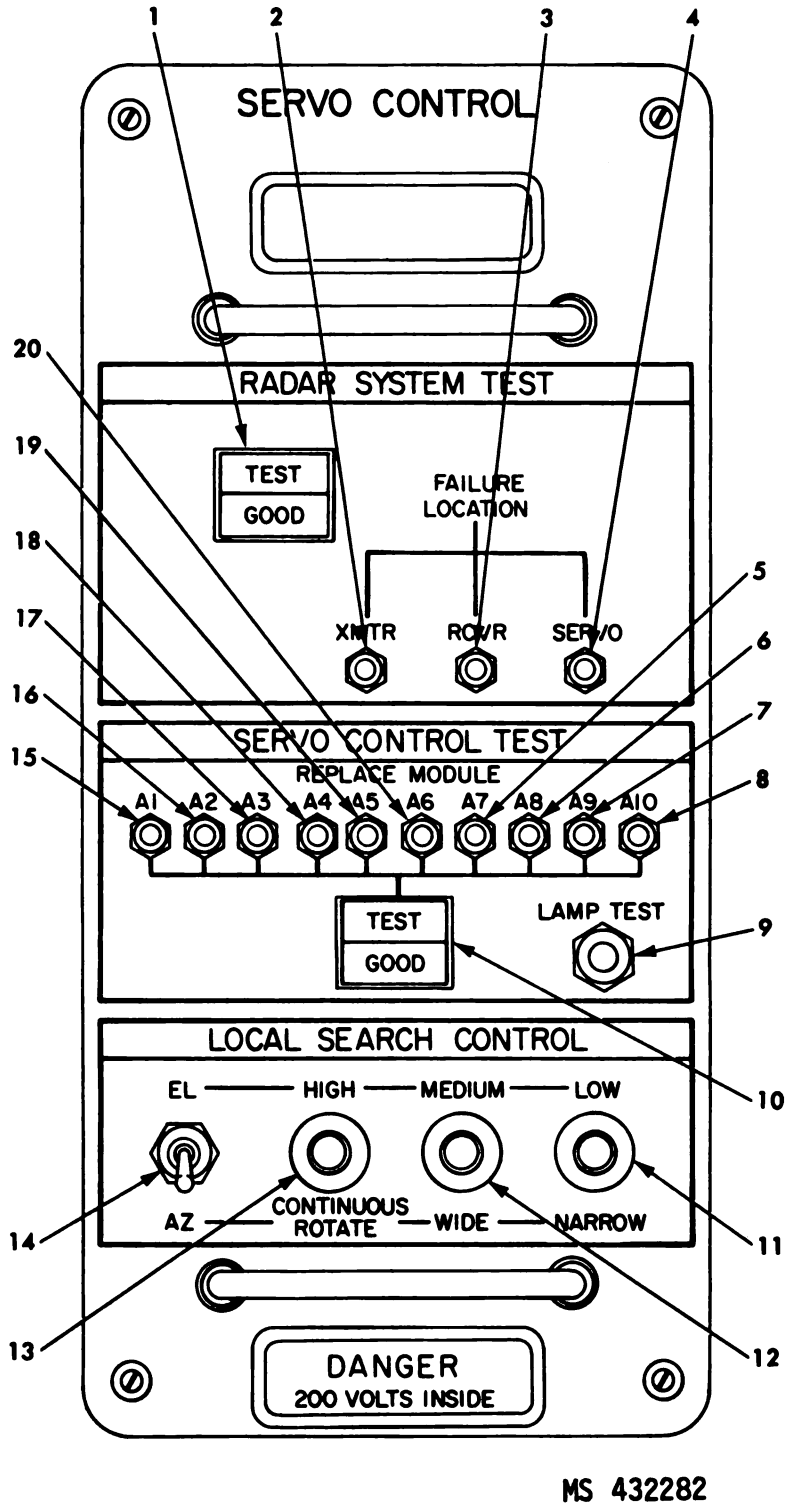


Figure 2-8. Servo control unit — controls and indicators.

Table 2-8. Servo Control Unit — Controls and Indicators (Fig. 2-8)

Key	Control or indicator	Function
	NOTE	
	Key numbers 1 through 4 below are part of the RADAR SYSTEM TEST confidence test system.	
1	TEST/GOOD indicator-switch	When pressed, the TEST portion of the switch starts the local radar system confidence test. GOOD lights to indicate the successful end of a test sequence. Pressing the switch a second time will shut off any RADAR SYSTEM TEST lamp that is lit and disable automatic BITE inputs to tactical circuits.
2	FAILURE LOCATION XMTR lamp	When lit during a local system test, indicates a transmitter failure.
3	FAILURE LOCATION RCVR lamp	When lit during a local system test, indicates a receiver failure.
4	FAILURE LOCATION SERVO lamp	When lit during a local system test, indicates a servo failure.
	NOTE	
	Key numbers 5 through 10 and 15 through 20 below are part of the SERVO CONTROL TEST system.	
5	REPLACE MODULE A7 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A7.
6	REPLACE MODULE A8 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A8.
7	REPLACE MODULE A9 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A9.
8	REPLACE MODULE A10 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A10.
9	LAMP TEST pushbutton	When pressed, lights all front panel lamps.
10	TEST/GOQD indicator-switch	When pressed, the TEST portion of the switch starts the servo BITE automatic test. GOOD lights to indicate the successful end of a test sequence. Pressing the switch a second time will shut off any REPLACE MODULE lamp that is lit and disable automatic BITE inputs to tactical circuits.
	NOTE	
	Key numbers 11 through 14 below are part of the LOCAL SEARCH CONTROL circuits.	
11	LOW/NARROW pushbutton	When pressed, causes a low altitude antenna search with the EL/AZ switch set to EL and a narrow azimuth antenna search with the EL/AZ switch set to AZ.
12	MEDIUM/WIDE pushbutton	When pressed, causes a medium altitude antenna search with the EL/AZ switch set to EL and a wide azimuth antenna search with the EL/AZ switch set to AZ.
13	HIGH/CONTINUOUS ROTATE pushbutton	When pressed, causes a high altitude antenna search with the EL/AZ switch set to EL and continuous rotation of the antenna when the EL/AZ switch is set to AZ.

Table 2-8. Servo Control Unit — Controls and Indicators (Fig. 2-8)—Continued

Key	Control or indicator	Function
14	EL/AZ switch	EL — Enables an antenna search in elevation. AZ — Enables an antenna search in azimuth.
15	REPLACE MODULE A1 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A1.
16	REPLACE MODULE A2 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A2.
17	REPLACE MODULE A3 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A3.
18	REPLACE MODULE A4 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A4.
19	REPLACE MODULE A5 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A5.
20	REPLACE MODULE A6 lamp	When lit, indicates servo BITE detects a fault in servo control unit module A6.

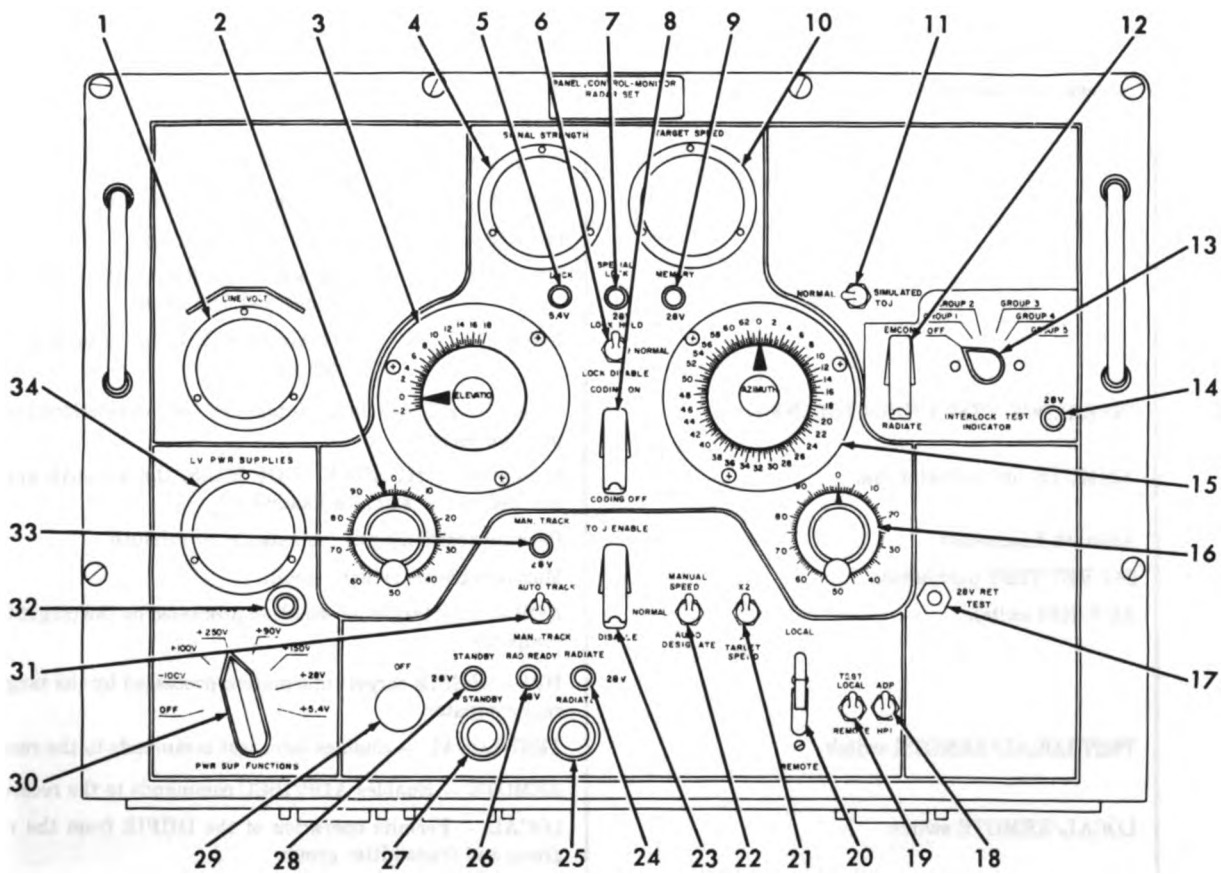


Figure 2-9. Control-indicator panel — controls and indicators.

Table 2-9. Control-Indicator Panel — Controls and Indicators (Fig. 2-9)

Key	Control or indicator	Function
1	LINE VOLT meter	Indicates setting of the input voltage adjust assembly.
2	Elevation handwheel	Permits positioning of the antenna in elevation.
3	ELEVATION mil indicator dial	Indicates, in HUNDREDS OF MILS, the elevation angle commanded by the elevation handwheel.
4	SIGNAL STRENGTH meter	Measures the strength of the return signal from target.
5	LOCK 5.4V lamp	When lit, indicates lock on target or synthetic lock.
6	LOCK HOLD/NORMAL/LOCK DISABLE	LOCK HOLD — Forces receiver system lock for test purposes. NORMAL — Permits normal operation in acquiring and locking on target. LOCK DISABLE — Prohibits receiver system lock on any signal. For test purposes only.
7	SPECIAL LOCK 28V lamp	When lit, indicates special lock circuitry is enabled.
8	CODING ON/CODING OFF switch	Applies coding to, or removes coding from, the transmitted signal.
9	MEMORY 28V lamp	When lit, indicates lock is lost and the IHIPIR is in the memory mode of operation.
10	TARGET SPEED meter	Indicates radial speed of target.
11	NORMAL/SIMULATED TOJ switch	NORMAL — Permits normal operation of TOJ circuits. SIMULATED TOJ — Simulates TOJ for testing.
12	EMCON/RADIATE switch	EMCON — Enables the EMCON mode of the transmitter. RADIATE — Enables the rf radiate mode of the transmitter.
13	Interlock test switch	*Position* — *Function* OFF — Off GROUP 1 — Auxiliary 28v GROUP 2 — Lh subordinate junction box GROUP 3 — 300v and console lvps GROUP 4 — Pedestal lvps, RSG control-indicator panel, and fuse panel GROUP 5 — Lh air exhaust, rh air exhaust and console heaters
14	INTERLOCK TEST INDICATOR 28V lamp	When lit, indicates closed interlocks for the interlock test switch position selected.
15	AZIMUTH mil indicator dial	Indicates, in HUNDREDS OF MILS, the azimuth angle commanded by the azimuth handwheel.
16	Azimuth handwheel	Permits positioning of the antenna in azimuth.
17	28V RET TEST pushbutton	Monitors 28-vdc return circuit.
18	ADP/HPI switch	ADP — ADP target information processed by the target intercept computer. HPI — IHIPIR target information processed by the target intercept computer.
19	TEST LOCAL/REMOTE switch	TEST LOCAL — Enables local test commands to the receiver. REMOTE — Enables ADP/IBCC commands to the receiver.
20	LOCAL/REMOTE switch	LOCAL — Permits operation of the IHIPIR from the radar set group and transmitter group. REMOTE — Permits operation of the IHIPIR from the IBCC/IPCP.
21	TARGET SPEED switch	X2 — Spring loaded to this position. X1 — Increases the sensitivity of the TARGET SPEED meter.

Table 2-9. Control-Indicator Panel — Controls and Indicators (Fig. 2-9)—Continued

Key	Control or indicator	Function
22	Speed-designate switch	MANUAL SPEED — Enables manual speed commands to receiver in local test. NORMAL — Normal operating position. AUTO DESIGNATE — Enables auto speed commands to receiver in local test.
23	TOJ ENABLE/DISABLE switch	Enables and disables track-on-jam mode of operation.
24	RADIATE 28V lamp	When lit, indicates equipment is in radiate condition.
25	RADIATE pushbutton	Places equipment in radiate condition.
26	RAD READY 28V lamp	When lit, indicates that radiate conditions can be achieved.
27	STANDBY pushbutton	Places equipment in standby condition.
28	STANDBY 28V lamp	When lit, indicates equipment is in standby.
29	OFF pushbutton	Removes standby and radiate power.
30	PWR SUP FUNCTIONS switch	Selects output of −100V, +100V, +250V, +90V, +150V, +28V or +5.4V power supplies for indication on the LV PWR SUPPLIES meter.
31	AUTO. TRACK/MAN. TRACK switch	MAN. TRACK — Disables a portion of the tracking circuits to prevent automatic tracking when lock occurs. AUTO. TRACK — Enables the tracking circuits to automatically track a target when lock occurs.
32	RIPPLE TEST pushbutton	Allows the ripple sensing of each power supply to be monitored by the LV PWR SUPPLIES meter.
33	MAN. TRACK 28V lamp	When lit, indicates that auto-manual switch is in MAN. TRACK position.
34	LV PWR SUPPLIES meter	Monitors voltage of function selected by PWR SUP FUNCTIONS switch and displays RIPPLE TEST function.

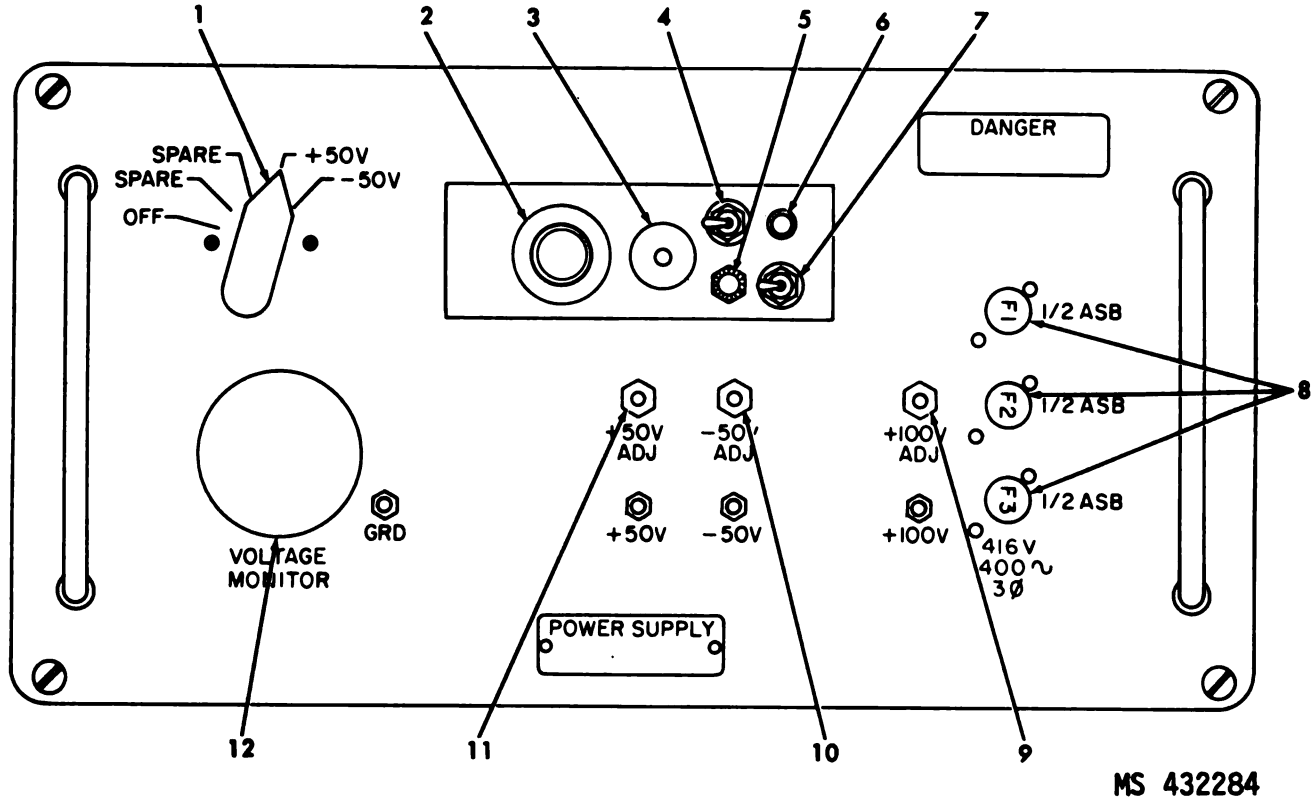


Figure 2-10. 100-, ±50-Vdc power supply — controls and indicators.

Table 2-10. 100, ±50-Vdc Power Supply — Controls and Indicators (Fig. 2-10)

Key	Control or indicator	Function
1	Voltage selector switch	Selects output of 50-vdc or −50-vdc power supply for monitoring on the VOLTAGE MONITOR meter.
2	Sonalert speaker	Sounds audible alert when IHIPIR is being called by another major item in battery.
3	Jack J1	Connects headset to communications module.
4	RING switch	Enables IHIPIR to call another major item in battery.
5	1A125V fuse (E)[1] 1A28V fuse (D)[1]	Provides circuit overload protection.
6	VOL control	Adjusts the volume level in the headset.
7	POWER switch (E)[1]	ON — Applies radar power to the communications module.
		OFF — Removes all power from the communications module.
		EMERGENCY — Applies battery power to the communications module.
	PWR switch (D)[1]	ON — Applies radar power to the communications module.
		OFF — Removes power from the communications module.
8	416V 400 ~ 3ϕ fuses and indicator lamps	Provide power supply circuit overload protection, indicator lamps light when fuses are burned out.
9	+100V ADJ variable resistor	Adjusts output of 100-vdc power supply.
10	−50V ADJ variable resistor	Adjusts output of −50-vdc power supply.
11	+50V ADJ variable resistor	Adjusts output of 50-vdc power supply.
12	VOLTAGE MONITOR meter	Monitors positions of voltage selector switch.

[1]Refer to appendix D for serial number effectivity.

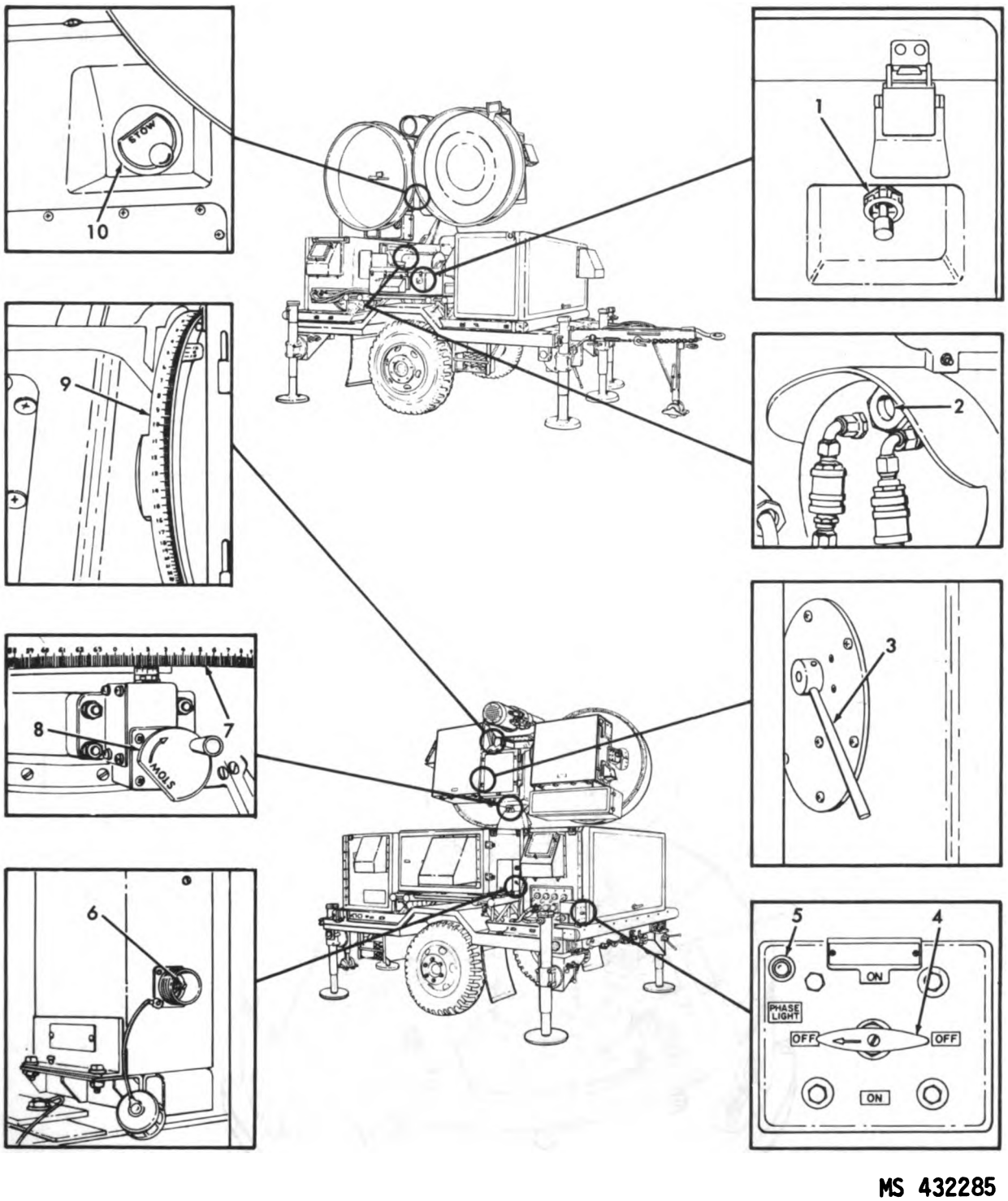


Figure 2-11. IHIPIR — miscellaneous controls and indicators.

Table 2-11. IHIPIR — Miscellaneous Controls and Indicators (Fig. 2-11)

Key	Control or indicator	Function
1	PEDESTAL SAFETY SWITCH	OPERATE — Permits normal positioning of antenna.
		SAFE — Disables antenna-positioning system to allow maintenance of antenna.
2	Coolant level indicator	Indicates coolant level in the dummy load.
3	Elevation brake	Holds the antenna at elevation angles not controlled by the elevation STOW lock and disconnects drive to the antenna.
4	Main power switch	ON — Applies power through the main power distribution box.
		OFF — Removes power from the main power distribution box.
5	PHASE LIGHT lamp	When lit, indicates correct phase input to the main power distribution box.
6	Input voltage adjust variable transformer	Adjusts the input line voltage to the IHIPIR.
7	Azimuth indicator scale	Indicates the azimuth angle of antenna in mils.
8	Azimuth STOW lock handwheel	Locks the antenna facing road side, curb side, front, or rear and disconnects drive to the antenna.
9	Elevation indicator scale	Indicates the elevation angle of antenna in mils.
10	Elevation STOW lock handwheel	Locks the antenna at 0 mils elevation and disconnects drive to the antenna.

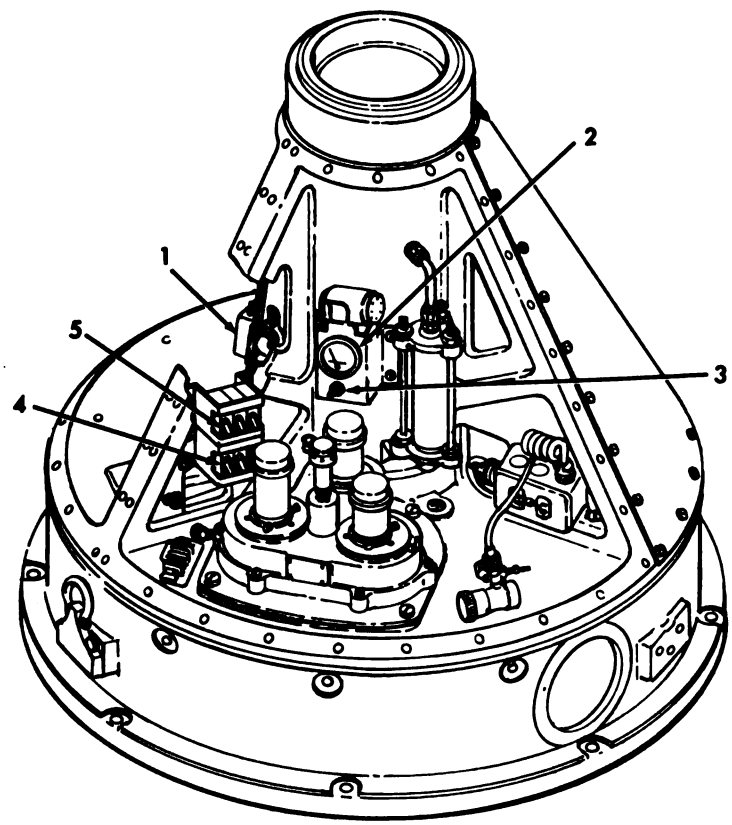


Figure 2-12. Antenna pedestal — controls and indicators.

Table 2-12. Antenna Pedestal — Controls and Indicators (Fig. 2-12)

Key	Control or indicator	Function
1	Heater control switch	Applies or removes 416 vac to pedestal heater assembly.
2	Null meter	Monitors azimuth synchro error for battery alinement procedures.
3	Null switch	Increases sensitivity of null meter for fine adjustment of azimuth synchro.
4	Pedestal blower circuit breaker	Applies or removes 416 vac to pedestal blower; opens circuit automatically under overload condition.
5	TAS circuit breaker	Applies or removes 416 vac to TAS; automatically opens under overload condition.

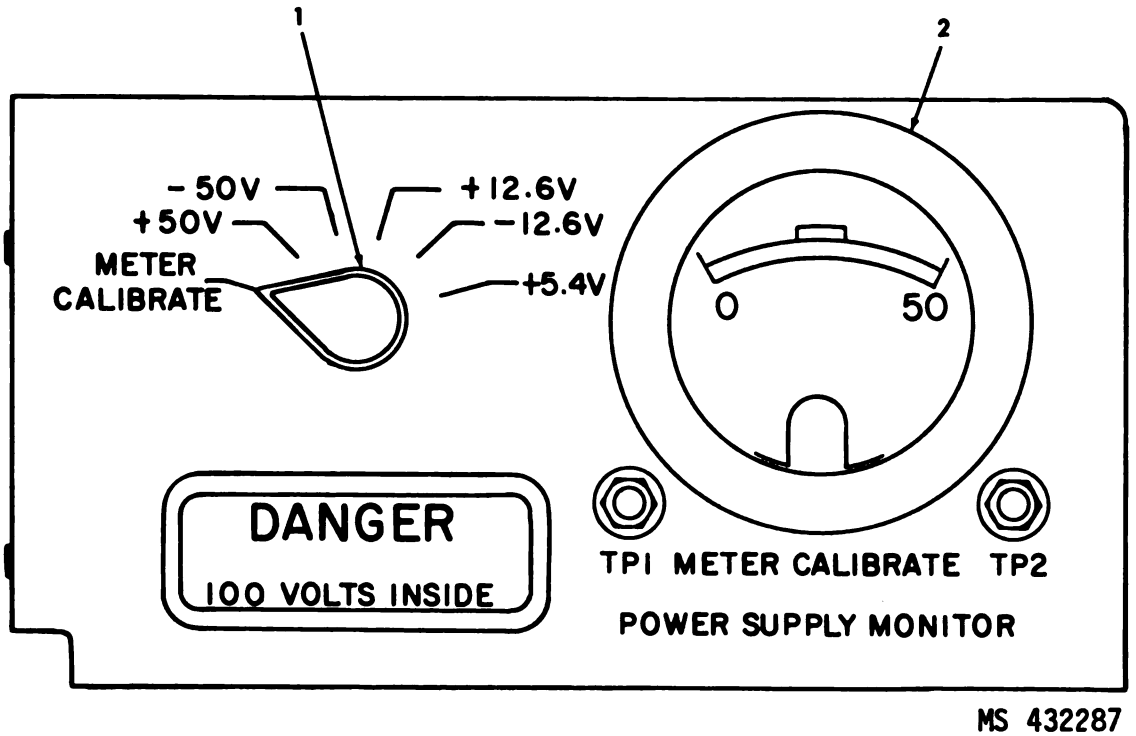


Figure 2-13. Power supply monitor — controls and indicators.

Table 2-13. Power Supply Monitor — Controls and Indicators (Fig. 2-13)

Key	Control or indicator	Function
1	POWER SUPPLY MONITOR switch	Allows selection of individual signal processor power supply outputs for display on the POWER SUPPLY MONITOR meter.
2	POWER SUPPLY MONITOR meter	Displays the power supply outputs used by the signal processor.

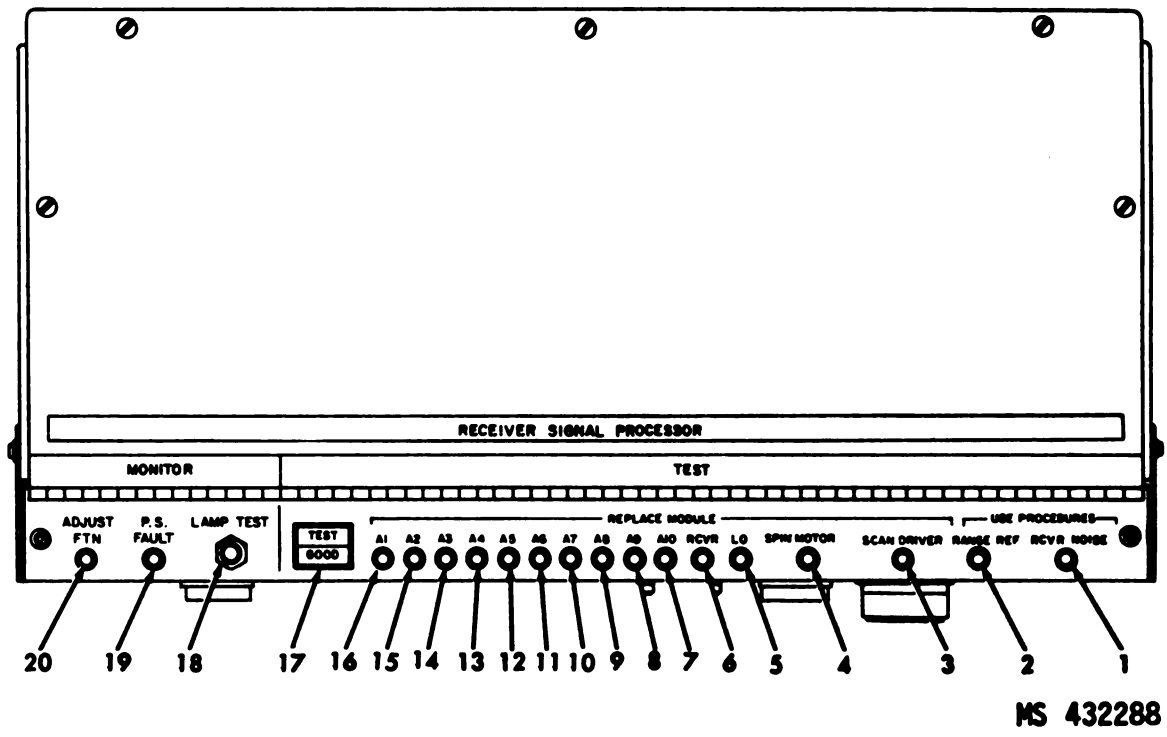


Figure 2-14. Signal processor — controls and indicators.

Table 2-14. Signal Processor — Controls and Indicators (Fig. 2-14)

Key	Control or indicator	Function
1	USE PROCEDURES RCVR NOISE lamp	Lights when receiver noise is unacceptably high.
2	USE PROCEDURES RANGE REF lamp	Lights when a fault has been detected in the RANGE reference.
3	REPLACE MODULE SCAN DRIVER lamp	Lights when signal processor BITE detects a fault in the scan driver.
4	REPLACE MODULE SPIN MOTOR lamp	Lights when signal processor BITE detects a fault in the spin motor.
5	REPLACE MODULE LO lamp	Lights when signal processor BITE detects a local oscillator fault.
6	REPLACE MODULE RCVR lamp	Lights when signal processor BITE detects a receiver fault.
7	REPLACE MODULE A10 lamp	Lights when signal processor BITE detects a fault in signal processor module A10.
8	REPLACE MODULE A9 lamp	Lights when signal processor BITE detects a fault in signal processor module A9.
9	REPLACE MODULE A8 lamp	Lights when signal processor BITE detects a fault in signal processor module A8.
10	REPLACE MODULE A7 lamp	Lights when signal processor BITE detects a fault in signal processor module A7.
11	REPLACE MODULE A6 lamp	Lights when signal processor BITE detects a fault in signal processor module A6.
12	REPLACE MODULE A5 lamp	Lights when signal processor BITE detects a fault in signal processor module A5.
13	REPLACE MODULE A4 lamp	Lights when signal processor BITE detects a fault in signal processor module A4.
14	REPLACE MODULE A3 lamp	Lights when signal processor BITE detects a fault in signal processor module A3.
15	REPLACE MODULE A2 lamp	Lights when signal processor BITE detects a fault in signal processor module A2.
16	REPLACE MODULE A1 lamp	Lights when signal processor BITE detects a fault in signal processor module A1.
17	TEST/GOOD indicator-switch	When pressed to light the TEST portion of the switch, starts the automatic signal processor test. GOOD lights to indicate the successful end of a signal processor test sequence. Pressing the switch a second time will shut off any signal processor TEST lamp that is lit and disable automatic BITE inputs to tactical circuits.
18	LAMP TEST pushbutton	When pressed, lights all lamps on the signal processor MONITOR/TEST panel.
19	P.S. FAULT lamp	Lights when signal processor power supplies do not meet the signal processor needs.
20	ADJUST FTN lamp	Lights when BITE detects a need to adjust feedthrough nulling.

CHAPTER 3

PERIODIC CHECKS AND ADJUSTMENTS

Section I. PREVENTIVE MAINTENANCE SERVICES

3-1. General

The purpose of preventive maintenance is to detect the first signs of electrical and mechanical failures, and to insure that appropriate corrective action is taken before expensive and time-consuming repairs or replacements are required. This system is based on frequent inspections and services accomplished by operators or maintenance personnel under active supervision by all commanders and supervisors.

3-2. Responsibility

Operators and crew chiefs are personally responsible for assigned materiel. Section and platoon leaders are charged with supervisory responsibility for materiel pertaining to their commands. Unit and organization commanders are required to insure that materiel issued or assigned to their commands is properly maintained.

3-3. Intervals

The principal criteria for determining the frequency of preventive maintenance services are operating hours and road movement. Since these cannot be accurately predicted, prescribed intervals will be used. Operation under adverse conditions such as extreme temperature or inclement weather may require that preventive maintenance services be performed more frequently. Reduce the intervals when environmental conditions indicate the need. Do not exceed the intervals unless authorized to do so.

3-4. General Procedures for All Services and Inspections

Refer to TM 9—1425—525—12—4 for information on general procedures for all services and inspections.

3-5. Preventive Maintenance Checks and Services (Table 3-1)

a. These checks and services are to be performed by the organizational maintenance mechanic and the operator. Only those procedures beyond the responsibilities of the operator will be performed by the mechanic. The battery maintenance supervisor will determine the specific areas of responsibility.

b. The daily preventive maintenance checks are a systematic inspection of IHIPIR each day and after each time it is emplaced so that defects may be discovered and corrected before they result in serious damage or failure.

c. Daily checks are to be performed before the weekly checks. Daily checks and then weekly checks are to be performed before doing the monthly checks, etc.

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

e. Report any deficiencies using the proper forms (see TM 38—750). Any defects noted that are beyond the scope of the organizational maintenance mechanic will be reported immediately to the maintenance supervisor.

f. The specific checks and services for the IHIPIR are listed in table 3-1. The personnel responsible for performing the checks and services at the various intervals are as follows:

Interval	*Responsible Personnel*
Hourly	Organizational
Days	Operator, organizational
Weekly	Operator, organizational
Monthly	Operator, organizational
Semiannually	Operator, organizational
Annually	Operator, organizational

Table 3-1. HIPIR Preventive Maintenance Checks and Services

S-Semiannually W-Weekly A-Annually M-Monthly H-Hours DY-Days

Item No.	Interval H	DY	W	M	S	A	Item to be inspected	Procedures Check for and have repaired or adjusted as necessary	For readiness reporting, equipment is not ready/available if:
							General inspection	During normal operation, inspect exterior surfaces for dirt, rust, and corrosion. Check equipment for loose or missing hardware, broken meter faces, chipped paint, loose connections, defective insulation, and improper type fuse holders.	
1.			•				Transmitter group and liquid cooler absorption rolls	Check for excessive discoloration and for glycol saturation. Replace if necessary. Refer to par. 4-12.	
2.			•				Antenna pedestal desiccator	Check for blue color. Replace desiccator if desiccant is white or pink. Refer to par. 4-11.	
3.			•				Transmitter housing desiccator	Check for blue color. Replace desiccator if desiccant is white or pink. Refer to par. 4-11.	
4.	•						Cooling system	Insure reservoir is full every 200 hours of operation. Drain and replace coolant every 3000 hours of operation or when visual inspection reveals contamination. Refer to par. 4-14. Purge the cooling system when inspection indicates contamination or the use of unauthorized coolant. Refer to par. 4-16.	
5.	•						Cooling system filters	Clean or replace after every 150 hours of operation or monthly, whichever comes first. Refer to par. 4-15.	
6.				•			Coolant hoses	Check hoses for cracking, leaks, or deterioration. Replace if necessary. Refer to par. 4-13.	
7.			•				Rotary pump	Inspect for leakage. If greater than five (5) drops per minute, replace pump. Refer to par. 5-19.	
8.				•			Coolant level	Check coolant level in high voltage dummy load. Fill with OS-59 as necessary. Refer to par. 4-19.	
9.	•				•		Shock absorber	Inspect after every 1000 hours of operation or semiannually, whichever comes first. Lower antenna fully until lower limit piston portion of shock is depressed, then slowly elevate antenna while someone observes piston. If piston returns immediately to original position, shock is in good condition. If piston remains in depressed position, shock is either defective or low on fluid. Fill shock to top of piston with hydraulic fluid, MIL-H-5606, 9150-00-252-6383. Replace shock if it does not perform properly after fluid is added. Inspect shock for hydraulic fluid leakage.	
10.	•				•		Antenna pedestal sliprings and brushes	Clean sliprings 50 to 70 hours after installation of new brushes and semiannually thereafter or when sliprings are suspected of malfunction. Inspect brushes for wear each time sliprings are cleaned.	
11.		•					Panel meters/BITE	Have DS maintenance personnel perform periodic maintenance every 120 days (TM 9—4935—1548—14).	
12.				•			Radar set	Lubricate the radar in accordance LO 9-1430-1533-12.	
13.			•				Radar set	Perform weekly check procedures. Refer to table 3-11 through 3-13.	Weekly check procedures cannot be performed.
14.					•		Air filters	Remove and clean the air filters. Refer to TM 9—1425—525—12—4.	

Table 3-1. HIPIR Preventive Maintenance Checks and Services—Continued

S-Semiannually W-Weekly A-Annually M-Monthly H-Hours DY-Days

Item No.	Interval H	DY	W	M	S	A	Item to be inspected	Procedures Check for and have repaired or adjusted as necessary	For readiness reporting, equipment is not ready/available if:
15.		•					Waveguide and rf components	Check for radio-frequency (rf) leakage when excessive transmitter or receiver noise is not correctable by other means, when any rf component has been replaced or repaired, or every 90 days (par. 4-23).	Personnel hazard exists.
16.	•						Motor-generator brushes	Inspect at the end of the first 1000 hours of operation and every 500 operating hours thereafter (par. 4-17).	
17.	•						Liquid cooler unit fan assembly	Inspect every 200 hours for evidence of contamination or corrosion (par. 4-18).	
18.							Optional TAS (if installed)	Refer to TM 9—1430—1536—13.	

Section II. OPERATIONAL CHECKS

3-6. General

This section contains procedures for energizing and deenergizing the HIPIR, the daily and weekly check procedures, and all information necessary to prepare the HIPIR for the performance of the check procedures.

3-7. Special Tools and Test Equipment

The following special tools and test equipment are required for the performance of the weekly check procedures: wavemeter test set 10106210, insulated adjustment tool 5120-00-974-5359, and jumper leads.

3-8. Sample Table

The following sample table explains the use and layout of the check procedure tables. Notice that the operations, normal indications, and corrective procedures are alined with their respective headings, as indicated in the sample by the vertical arrowed lines.

Sample Table

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Check (Step Name) Sequence and step name of the specific check.**	Figure and key number references to locate listed control or indicator.	
a.	(OPERATION) Sequential operations required to obtain the normal indication. **(NORMAL INDICATION) Normal system or circuit responses.** (CORRECTIVE PROCEDURE) Adjustment listing if applicable. Fault isolation procedures.		

3-9. Procedures Prior to Application of Power

WARNING

Make certain that the IHIPIR is correctly emplaced in accordance with the instructions in chapter 7.

Before applying power to the IHIPIR, perform the procedures listed in table 3-2 to insure that the air intake and exhaust vents are opened, the vent covers are stowed, the vent hoods are installed, and the IHIPIR is properly grounded.

3-10. Position of Controls Prior to Application of Power

Before applying power to the IHIPIR, set the controls to the positions listed in table 3-3. Controls not listed may be set to any position as they do not directly affect the energizing procedure. Make certain that the controls are correctly set before the energizing procedures are performed.

NOTE

If the IHIPIR is in the remote operating mode, perform the deenergizing procedures in table 3-6 before performing the procedures in table 3-3.

Table 3-2. Procedures Prior to Application of Power

Step	Operation / Normal indication / Corrective procedure		Illustration	
			Figure	Key
1.	Radar set group door	opened and locked.	1-1	2
2.	Radar set group exhaust vent covers	removed and stowed.	3-1 3-2	5 2
3.	Radar set group intake vent	opened.	3-1	6
4.	Motor-generator assembly intake and exhaust vent cover	removed and stowed.		4
5.	Motor-generator assembly vent hood	installed.		
6.	Transmitter group exhaust vent cover	removed and stowed.		3
7.	Transmitter group door exhaust vent cover	removed and stowed.		2
8.	Transmitter group door exhaust vent hood	installed.		
9.	Transmitter group door	opened and locked.	1-1	1
10.	Transmitter group intake vent cover	removed and stowed.	3-2	4
11.	Transmitter group intake vent hood	installed.		
12.	Liquid cooler intake vent cover	removed and stowed.		3
13.	Liquid cooler intake vent hood	installed.		
14.	Liquid cooler exhaust vent cover (rear of cooler)	opened.	1-1	5
	NOTE Insure that the safety wire securing clip (right side of vent cover) is installed.			

Table 3-2. Procedures Prior to Application of Power —Continued

Step	Operation		Illustration	
			Figure	Key
15.	Pedestal intake vent	opened.	3-1	7
16.	Elevation drivemotor air vent plug	removed and stowed.	3-2	5
17.	Receiver housing exhaust vent cover	removed and stowed.	3-1	1
18.	Transmitter housing exhaust vent cover	removed and stowed.	3-2	1
19.	Elevation STOW lock handwheel	disengaged (fully ccw).	2-11	10
20.	Azimuth STOW lock handwheel	disengaged (fully ccw).		8
21.	Elevation brake	released position (up).		3
22.	Radar spirit levels	bubbles centered ±1 division.	6-7	28
23.	Ground rod and strap	insure properly secured to radar and grounded.		12, 13
24.	All coolant lines	no leaks evident.		
25.	Power and data cables	connected and secure.		
26.	All drawers and panels	closed and secured.		
27.	All radar set group cabinet and liquid cooler lifting shackles	stowed (down) and tightened.	6-7 4-4	31 9
28.	Liquid cooler door	closed and secured.		10
29.	Antenna pedestal access covers	closed and secured.	1-6, 4-2	15, 4

Table 3-3. Position of Controls Prior to Application of Power

Step	Operation		Illustration	
			Figure	Key
1.	Main power switch	OFF.	2-11	4
2.	PEDESTAL SAFETY SWITCH	SAFE.		1
3.	LOCAL/REMOTE switch	LOCAL.	2-9	20
4.	AUTO. TRACK/MAN. TRACK switch	MAN. TRACK.		31
5.	CODING ON/CODING OFF switch	CODING ON.		8
6.	LOCK HOLD/NORMAL/LOCK DISABLE	NORMAL.		6
7.	Speed-designate switch	NORMAL.		22
8.	TEST LOCAL/REMOTE switch	TEST LOCAL.		19
9.	TOJ ENABLE/DISABLE switch	TOJ ENABLE.		23
10.	ADP/HPI switch	HPI.		18
11.	EMCON/RADIATE switch	EMCON.		12
12.	Elevation handwheel	1500 mils.		2
13.	Main fuse panel MAIN POWER circuit breaker	ON.	2-7	26

Table 3-3. Position of Controls Prior to Application of Power—Continued

Step	Operation		Illustration	
			Figure	Key
14.	MOTOR GENERATOR circuit breaker	OFF.		17
15.	BATTLESHORT switch	NORMAL.	2-6	7
16.	Transmitter panel 1 MAIN POWER circuit breaker	ON.	2-1	25
17.	XMTR LV PWR SUPPLY ASSEMBLY circuit breaker	ON.		26
18.	GLYCOL PREHEAT circuit breaker	ON.		28
	CAUTION **The GLYCOL PREHEAT circuit breaker must be set to OFF when the P.A. COLLECTOR LOW TEMP WARNING lamp (7, fig. 2-1) goes off.**			
19.	PUMP circuit breaker	ON.	2-1	31
20.	BLOWER HEAT EXCHANGER circuit breaker	ON.		1
21.	BLOWER CONSOLE XMTR circuit breaker	ON.		4
22.	MASTER OSCILLATOR FILAMENT circuit breaker	ON.		8
23.	POWER AMPLIFIER FILAMENT circuit breaker	ON.		11
24.	MASTER OSCILLATOR OVERLOAD COLLECTOR circuit breaker	ON.	2-2	1
25.	MASTER OSCILLATOR BEAM circuit breaker	OFF.		18
26.	POWER AMPLIFIER OVERLOAD BODY CURRENT circuit breaker	ON.		3
27.	POWER AMPLIFIER B+ SHORT circuit breaker	ON.		5
28.	POWER AMPLIFIER BEAM circuit breaker ..	OFF.		11
29.	MO/OFF/PA switch	OFF.		6
30.	REGULATOR SCREEN & FILAMENT circuit breaker	ON.		15
31.	Heater control switch	ON.	2-12	1
32.	Pedestal blower circuit breaker	ON.		4
33.	TAS circuit breaker (if optional TAS is installed)	ON.		5
34.	FIL TEST switch	OFF.	3-10	2
35.	HI VOLT TEST switch	OFF.		3

Table 3-3. Position of Controls Prior to Application of Power—Continued

Step	Operation		Illustration	
			Figure	Key
36.	PWR SUP FUNCTIONS switch	OFF.	2-9	30
37.	Voltage selector switch	OFF.	2-10	1
38.	DEGENERATION ALIGNMENT SELECTOR switch	OFF.	2-3	3
39.	POWER SUPPLY MONITOR switch	METER CALIBRATE.	2-13	1
40.	Output test indicator switch	OFF.	2-6	9
41.	Interlock test switch	OFF.	2-9	13
42.	INTERLOCK TEST switch	OFF.	2-1	20
43.	POWER (E)[1] or PWR (D)[1] switch	ON.	2-10	7

[1]Refer to appendix D for serial number effectivity.

3-11. Energizing Procedures

The IHIPIR is energized in two stages, shutdown to standby and standby to radiate. These procedures are listed in tables 3-4 and 3-5. When performing the daily or weekly check procedures, the procedures in table 3-5 need not be performed as they are included as an integral part of the checks.

NOTE

All references to colored areas on meters are for colors seen during daylight conditions. Figure 3-15 illustrates all IHIPIR meters and their colored areas.

Table 3-4. Energizing Procedures — Shutdown to Standby

Step	Operation Normal indication Corrective procedure		Illustration	
			Figure	Key
1.	PHASE LIGHT lamp	observe.	2-11	5
	PHASE LIGHT lamp	**lit.**		
2.	Main power switch	ON.		4
	LINE VOLT meter	**upper green area.**	2-9	1
	Adjust input voltage adjust variable transformer.		2-11	6
	Perform table 13-3, TM 9—1430—1533—12—2—2.			

Table 3-4. Energizing Procedures — Shutdown to Standby—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
3.	Transmitter STANDBY pushbutton	press and release.	2-1	21
	STANDBY lamp	**lights.**		14
	Perform table 13-4-1, TM 9—1430—1533—12—2—2.			
	RADIATE READY lamp	**lights in 3 to 7 minutes..**		15
	Perform table 13-4-2, TM 9—1430—1533—12—2—2.			
	Radar set group blower	**operates.**	3-17	3
	Cooling console blower	**operates.**		4
	Pedestal blower	**operates.**		2
	Transmitter group blower	**operates.**		5
	Transmitter group auxiliary blower	**operates.**		1
	Perform table 13-7-2, TM 9—1430—1533—12—2—2.			

Table 3-5. Energizing Procedures — Standby to Radiate

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
	Place the radar in full radiate as follows:			
1.	Elevation brake	released position (up).	2-11	3
2.	MOTOR GENERATOR circuit breaker	ON.	2-7	17
3.	PEDESTAL SAFETY SWITCH	OPERATE.	2-11	1
4.	EMCON/RADIATE switch	RADIATE.	2-9	12
5.	MASTER OSCILLATOR BEAM circuit breaker	ON.	2-2	18
6.	POWER AMPLIFIER BEAM circuit breaker ..	ON.		11

WARNING

The IHIPIR transmits a very powerful beam, exposure to which is harmful to body tissue. Make certain that all personnel remain clear of the transmitter beam.

Table 3-5. Energizing Procedures — Standby to Radiate—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
	WARNING Make certain all personnel and equipment are clear of the antenna area, as the antenna will elevate to 1500 mils when the RADIATE pushbutton is pressed. **CAUTION** Do not point the antenna of a radiating IHIPIR within 90 degrees of another illuminator unless absolutely necessary. If this becomes necessary, refer to TM 9—1425—1525 for operating considerations. **CAUTION** If necessary to radiate in the direction of missiles, make certain that the missiles are facing away from the IHIPIR.		
7.	RADIATE pushbutton ..... press and release.	2-1	18
	RADIATE READY lamp ..... **goes off.**		15
	RADIATE lamp ..... **lights.**		16
	Perform table 13-4-3, TM 9—1430—1533—12—2—2.		

3-12. Deenergizing Procedures

The deenergizing procedures for the IHIPIR are contained in table 3-6. Under emergency conditions, the IHIPIR may be deenergized directly from radiate to shutdown by pressing the OFF pushbutton on either the control-indicator panel (29, fig. 2-9) or transmitter panel (17, fig. 2-1).

Table 3-6. Deenergizing Procedures

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Radiate to Standby.**		
	STANDBY pushbutton ..... press and release.	2-1 (or 2-9)	21(27)
	RADIATE lamp ..... **goes off.**		16(24)
	RADIATE READY lamp ..... **lights.**		15(26)
	Perform table 13-4-3, TM 9—1430—1533—12—2—2.		

Table 3-6. Deenergizing Procedures—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
2.	**Standby to Shutdown.**		
a.	OFF pushbutton ..... press and release.	2-1 (or 2-9)	17(29)
	RADIATE READY lamp ..... goes off.		15(26)
	Perform table 13-4-1, TM 9—1430—1533—12—2—2.		
	All five equipment blowers ..... stop operating.		
	Perform table 13-7-2, TM 9—1430—1533—12—2—2.		
b.	Main power switch ..... OFF.	2-11	4
c.	Radar set group and transmitter group doors ..... close and secure.		

3-13. Low Voltage Power Supply Checks

The low voltage power supply checks for the HIPIR are contained in table 3-7. These procedures are not to be performed on a daily basis. They are performed as a corrective procedure in conjunction with the weekly check procedures. Prior to performing any fault isolation procedures in these checks, deenergize the HIPIR according to table 3-6, then energize it according to tables 3-4 and 3-5.

Table 3-7. Low Voltage Power Supply Checks

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Check Radar Set Group ±100V, +250V, +90V, +150V, +28V, +5.4V Power Supplies.**		
a.	PWR SUP FUNCTIONS switch ..... −100V.	2-9	30
	LV PWR SUPPLIES meter ..... yellow area.		34
	Adjust R57 (−100V) for red line.	3-8	3
	Perform table 13-5-7, TM 9—1430—1533—12—2—2.		
b.	PWR SUP FUNCTIONS switch ..... +100V.		
	LV PWR SUPPLIES meter ..... yellow area.		
	Adjust +100 ADJ for red line.	2-10	9
	Perform table 13-5-6, TM 9—1430—1533—12—2—2.		

Table 3-7. Low Voltage Power Supply Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1c.	PWR SUP FUNCTIONS switch ..... +250V.		
	LV PWR SUPPLIES meter ..... green area.		
	Adjust R24 (+250V) for red line.	3-8	2
	Perform table 13-5-7, TM 9—1430—1533—12—2—2.		
d.	PWR SUP FUNCTIONS switch ..... +90V.		
	LV PWR SUPPLIES meter ..... green area.		
	Perform table 13-5-4, TM 9—1430—1533—12—2—2.		
e.	PWR SUP FUNCTIONS switch ..... +150V.		
	LV PWR SUPPLIES meter ..... green area.		
	Adjust R36 (+150V) for red line.		
	Perform table 13-5-7, TM 9—1430—1533—12—2—2.		1
f.	PWR SUP FUNCTIONS switch ..... +28V.		
	LV PWR SUPPLIES meter ..... green area.		
	Perform table 13-5-3, TM 9—1430—1533—12—2—2.		
g.	Disconnect all data cables.		
h.	28V RET TEST pushbutton ..... press and hold.	2-9	17
	LV PWR SUPPLIES meter ..... deflects to the left from center scale.		
	Perform table 13-5-3, TM 9—1430—1533—12—2—2.		
i.	28V RET TEST pushbutton ..... release.		
j.	Reconnect all data cables.		
k.	PWR SUP FUNCTIONS switch ..... +5.4V.	2-9	30
	LV PWR SUPPLIES meter ..... green area.		34
	Perform table 13-5-5, TM 9—1430—1533—12—2—2.		
l.	PWR SUP FUNCTIONS switch ..... OFF.		

Table 3-7. Low Voltage Power Supply Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
2.	**Check Radar Set Group ±50V Power Supply.**		
a.	Voltage selector switch ..... +50V.	2-10	1
	VOLTAGE MONITOR meter ..... red area.		12
	Adjust +50V ADJ for 25 ua.		11
	Perform table 13-5-6, TM 9—1430—1533—12—2—2.		
b.	Voltage selector switch ..... −50V.		
	VOLTAGE MONITOR meter ..... red area.		
	Adjust −50V ADJ for 25 ua.		
	Perform table 13-5-6, TM 9—1430—1533—12—2—2.		
c.	Voltage selector switch ..... OFF.		
3.	**Check Receiver/Signal Processor Power Supplies.**		
a.	Transmitter STANDBY pushbutton ..... press and release.	2-1	21
a.1.	Open antenna transmitter housing cover.		
b.	Power supply monitor switch ..... +50V.	2-13	1
	POWER SUPPLY MONITOR meter ..... red area.		2
	Perform table 13-5-1, TM 9—1430—1533—12—2—2.		
c.	Power supply monitor switch ..... −50V.		
	POWER SUPPLY MONITOR meter ..... red area.		
	Perform table 13-5-1, TM 9—1430—1533—12—2—2.		
d.	Power supply monitor switch ..... +12.6V.		
	POWER SUPPLY MONITOR meter ..... red area.		
	Perform table 13-5-1, TM 9—1430—1533—12—2—2.		
e.	Power supply monitor switch ..... −12.6V.		
	POWER SUPPLY MONITOR meter ..... red area.		
	Perform table 13-5-1, TM 9—1430—1533—12—2—2.		

Table 3-7. Low Voltage Power Supply Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
3*f*.	Power supply monitor switch ..... +5.4V.		
	POWER SUPPLY MONITOR meter ..... red area.		
	Perform table 13-5-1, TM 9—1430—1533—12—2—2.		
g.	Power supply monitor switch ..... OFF.		
h.	Close and secure antenna transmitter housing cover.		
4.	**Check Transmitter Power Supplies.**		
a.	DEGENERATION ALIGNMENT SELECTOR switch ..... +15V.	2-3	3
	DEGENERATION ALIGNMENT MONITOR meter ..... 22 to 28.		4
	Perform table 13-5-2, TM 9—1430—1533—12—2—2.		
b.	DEGENERATION ALIGNMENT SELECTOR switch ..... −15V.		
	DEGENERATION ALIGNMENT MONITOR meter ..... 22 to 28.		
	Perform table 13-5-2, TM 9—1430—1533—12—2—2.		
c.	DEGENERATION ALIGNMENT SELECTOR switch ..... OFF.		

3-14. Daily Check Procedures

a. The daily check procedures are contained in tables 3-8 through 3-10. The purpose of these procedures is to check the operational readiness of the HIPIR on a daily basis and after emplacement of the radar.

b. The daily check procedures are to be performed by an operator with assistance from organizational maintenance personnel. At least two people are required for safety and convenience when performing these checks.

c. The check procedure steps must be performed in the sequence given. If a normal indication is not obtained when performing the steps as listed, make certain that the correct procedures have been used before troubleshooting for defective units.

d. Although adjustments are considered a normal part of the check procedures, it is not necessary to adjust for optimum operation (peaking) unless a normal indication can not be obtained. The HIPIR will operate satisfactorily as long as the indications obtained are within the range specified in the normal indication.

e. Refer to paragraph 3-8 for a sample table explaining the layout and use of the check procedure tables.

f. During periods of continuous operation, selected checks may be performed more frequently to assure that the equipment is operating satisfactorily.

g. Close all HIPIR drawers, compartment doors, and housing covers during normal radar operation to eliminate potential rf interference from the PAR, CWAR, or other sources. If the antenna housing cover is opened, elevate the HIPIR to 400 mils and point it towards the PAR to eliminate potential damage to the receiver diodes. When it becomes necessary to open other drawers, compartment doors and housing covers, and an abnormal indication is observed, request that the PAR and/or CWAR be placed in standby to determine if it is causing the abnormal indication (except in tactical situations). If the PAR and CWAR are not the source of interference, perform the rf leakage detection test in par. 4-23.

*g.*1. Periodic flashing of the transmitter control unit lamps can occur due to PAR radiation. Before performing the transmitter automatic BITE checks, request that the PAR be placed in standby.

h. Normal operation of the HIPIR is accomplished with the BATTLE SHORT switch (7, fig. 2-6) in the NORMAL position. Operating personnel must make certain that all interlocked drawers and panels are closed to assure positive action of the interlock system. When any of the interlocked drawers or panels are opened, the radar will automatically deenergize to the off condition. Care must be observed and the check procedures followed to make certain that the radar does not shut down during the performance of the check procedures. None of the interlocked drawers or panels provide high-voltage protection when they are opened, so care must be exercised during the performance of the check procedures.

i. If a fault is observed while performing any daily check procedure, perform the associated weekly check procedure.

Table 3-8. Radar Set Group Daily Checks

Step	Operation Normal indication Corrective procedure	Illustration	
		Figure	Key
1.	**Perform Automatic SERVO CONTROL TEST.**		
	CAUTION		
	Only one automatic test should be performed at a time.		
	NOTE		
	The HIPIR must be energized to the standby condition before performing the check procedures. If the condition of the HIPIR is:		
	(1) Off, perform tables 3-2 through 3-4 and 3-8 through 3-10.		
	(2) Standby or radiate ready, perform table 3-3, except step 1, and tables 3-8 through 3-10.		
	(3) False radiate or full radiate, press and release the STANDBY pushbutton and perform table 3-3, except step 1, and tables 3-8 through 3-10.	2-1	21
	(4) Manually elevate the antenna to 200 mils and set elevation brake (down).	2-11	3
	NOTE		
	The FAILURE LOCATION XMTR lamp is normally lit during standby, radiate ready, or false radiate conditions.		
a.	LAMP TEST pushbutton ..... press and hold.	2-8	9
	All RADAR SYSTEM TEST and SERVO CONTROL TEST lamps ..... light.		1 thru 10, 15 thru 20
	Replace failed lamp.		

Table 3-8. Radar Set Group Daily Checks — Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1*b.*	LAMP TEST pushbutton ..... release.		
c.	TEST/GOOD indicator-switch ..... press and release.	2-8	10
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off.		
	NOTE If the normal indication is not obtained, press and release TEST/GOOD indicator-switch and repeat step 1*c* once more before troubleshooting.		
d.	TEST/GOOD indicator-switch ..... press and release.		
	GOOD label ..... goes off.		
2.	**Check Target Intercept Computer (Approach).**		
a.	Open target intercept computer range and azimuth drawer.	1-3	2
b.	APPROACH/RECEDE switch ..... set and hold to APPROACH.	3-5	3
	TIME OF FLIGHT indicator dial ..... 44 to 50 seconds.	2-6	3
	Adjust −100V, +150V, +250V for red line on LV PWR SUPPLIES meter.	3-8	1, 2, 3
	RANGE indicator dial ..... 24 to 26 KM APPROACH.	2-6	2
	AZIMUTH indicator dial ..... 225 to 275 mils CW.		1
	ELEVATION indicator dial ..... 5 mils DN to 75 mils UP.		4
	IN RANGE lamp ..... lights.	3-5	1
	OUT OF RANGE lamp ..... off.		2
c.	APPROACH/RECEDE switch ..... release.		
d.	Close and secure target intercept computer range and azimuth drawer.		

Table 3-9. Transmitter Daily Checks

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Check Master Oscillator and Power Amplifier Filaments.**		
	NOTE Insure that blower heat exchanger is operating.		
	Observe filament meters.		
	MASTER OSCILLATOR **FILAMENT AMPERES meter ... within 0.1 amps of value on decal located beneath meter.**	2-1	9
	Adjust MASTER OSCILLATOR filament control.		10
	POWER AMPLIFIER **FILAMENT VOLTAGE meter ... red line.**		12
	Adjust POWER AMPLIFIER filament control.		13
	WARNING The IHIPIR transmits a very powerful beam, exposure to which is harmful to body tissue. Make certain all personnel remain clear of the transmitter beam.		
	WARNING Make certain all personnel and equipment are clear of the antenna area. The antenna will elevate to 1500 mils when RADIATE pushbutton is pressed.		
	CAUTION Do not point the antenna of a radiating IHIPIR within 90 degrees of another IHIPIR unless absolutely required. Refer to TM 9—1425—1525 if this operation becomes necessary.		
	CAUTION If necessary to radiate in the direction of missiles, make certain the missiles are facing away from the IHIPIR.		

Table 3-9. Transmitter Daily Checks — Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
2.	**Check High Voltage and Rf Power.**			
a.	Elevation brake	released position (up).	2-11	3
b.	PEDESTAL SAFETY SWITCH	OPERATE.		1
c.	MOTOR GENERATOR circuit breaker	ON.	2-7	17
d.	Elevation handwheel	1500 mils.	2-9	2
e.	EMCON/RADIATE switch	RADIATE.		12
f.	MASTER OSCILLATOR BEAM circuit breaker	ON.	2-2	18
g.	POWER AMPLIFIER BEAM circuit breaker	ON.		11
h.	MO/OFF/PA switch	MO.		6
i.	RADIATE pushbutton	press and release.	2-1	18
	RADIATE lamp	lights.		16
	REGULATOR VOLTS meter	1.4 to 1.6K volts.	2-2	2
	Adjust MASTER OSCILLATOR BEAM control.			19
	MASTER OSCILLATOR BEAM VOLTAGE meter	green area.		20
j.	MO/PA switch	MO.	2-3	7
	FORWARD RF POWER meter	green area.	2-3	2
k.	MO/OFF/PA switch	PA.		
	REGULATOR VOLTS meter	0.9 to 1.1K volts.		
	Adjust POWER AMPLIFIER beam voltage control.		2-2	10
	POWER AMPLIFIER BEAM VOLTAGE meter	green area.		8
l.	MO/PA switch	PA.	2-3	7
	FORWARD RF POWER meter	green area.	2-3	2
3.	**Check Degeneration Alinement.**			
	NOTE Allow 2 minutes for the transmitter cavity to lock.			

Table 3-9. Transmitter Daily Checks — Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
3.	Set DEGENERATION ALIGNMENT SELECTOR switch as follows and observe the DEGENERATION ALIGNMENT MONITOR meter indication: *DEGENERATION ALIGNMENT SELECTOR switch position* — DEGENERATION ALIGNMENT MONITOR meter indication CAVITY XTAL ..... **12 μa minimum and stable.** BRIDGE NULL ..... **green area.** TRANSMITTER NOISE ..... **6 maximum.** **NOTE** The above indication may deflect momentarily at a decreasing rate until the radar has achieved its normal operating coolant temperature.	2-3	3,4
4.	**Check Transmitter Frequency Command.** MASTER OSC ASSIGNED FREQUENCY switch ..... set to assigned frequency.	2-2	9
5.	**Perform Automatic TRANSMITTER TEST.**		
a.	LAMP TEST pushbutton ..... press and hold.	2-4	8
	All TRANSMITTER TEST and TRANSMITTER MONITOR lamps light.		2 thru 7, 9 thru 12, and 15 thru 21
	Replace defective lamp.		
b.	LAMP TEST pushbutton ..... release.		
c.	TEST/GOOD indicator-switch ..... press and release.	2-4	21
	NOTE Radar will revert to radiate ready status before end of test sequence.		
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off.		
	NOTE If normal indication is not obtained, press and release TEST/GOOD indicator-switch and RADIATE pushbutton, and repeat step 5*c* once more before troubleshooting.		
d.	TEST/GOOD indicator-switch ..... press and release. **GOOD label ..... goes off.**		

Table 3-9. Transmitter Daily Checks — Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
5e.	RADIATE pushbutton ..... press and release.	2-1	18
	RADIATE lamp ..... **lights.**		16
	NOTE Allow 2 minutes for transmitter cavity to lock.		

Table 3-10. Receiver and Target Processing Daily Checks

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Perform Automatic SIGNAL PROCESSOR TEST.**		
a.	Elevation handwheel ..... rotate until ELEVATION mil indicator dial indicates 400 mils.	2-9	2, 3
b.	Elevation brake ..... set (down).	2-11	3
	CAUTION If the PAR is radiating, elevate the HIPIR antenna to 400 mils and point it towards the PAR before opening the antenna receiver housing cover.		
c.	PEDESTAL SAFETY SWITCH ..... SAFE.		1
d.	Open antenna receiver housing cover.		
e.	LAMP TEST pushbutton ..... press and hold.	2-14	18
	All MONITOR and TEST lamps light. Replace defective lamp.		1 thru 17, 19, 20
f.	LAMP TEST pushbutton ..... release.		
g.	TEST/GOOD indicator-switch ..... press and release.		17
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off. **NOTE** If normal indication is not obtained, press and release TEST/GOOD indicator-switch and repeat step 1*g* once more before troubleshooting.		
h.	TEST/GOOD indicator-switch ..... press and release.		
	GOOD label ..... **goes off.**		

Table 3-10. Receiver and Target Processing Daily Checks—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
1i.	Close and secure antenna housing cover.			
j.	Elevation brake	release (up).		
k.	PEDESTAL SAFETY SWITCH	OPERATE.		
2.	**Perform Automatic RADAR SYSTEM TEST.**			
a.	Observe FAILURE LOCATION lamps.			
	FAILURE LOCATION XMTR, RCVR and SERVO lamps	**off.**	2-8	2, 3, 4
b.	Verify LOCK HOLD/NORMAL/LOCK DISABLE	NORMAL.	2-9	6
c.	AUTO. TRACK/MAN. TRACK switch	AUTO. TRACK.		31
d.	TEST/GOOD indicator-switch	press and release.		1
	TEST label lights immediately. GOOD label lights within 60 seconds and TEST label remains lit.			
	NOTE			
	If normal indication is not obtained, press and release TEST/GOOD indicator-switch and repeat step 2c once more before troubleshooting.			
e.	TEST/GOOD indicator switch	press and release.		
	TEST and GOOD labels	**go off.**		
f.	AUTO. TRACK/MAN. TRACK	MAN. TRACK.		
3.	**Check Radar Status.**			
	EMCON/RADIATE switch	EMCON.	2-9	12
	FAILURE LOCATION XMTR lamp	**lights.**	2-8	2

3-15. Weekly Check Procedures

a. The weekly check procedures are contained in tables 3-11 through 3-13. The purpose of these procedures is to insure that the IHIPIR is operating at its optimum level of performance.

b. The weekly check procedures are to be performed by organizational maintenance personnel with assistance from an operator. At least two people are required for safety and convenience when performing these checks.

c. The check procedure steps must be performed in the sequence given. If a normal indication is not obtained when performing the steps as listed, make certain that the correct procedures have been used before troubleshooting for defective units.

d. Although adjustments are considered a normal part of the check procedures, it is not necessary to adjust for optimum operation (peaking) unless a normal indication can not be obtained. The IHIPIR will operate satisfactorily as long as the indications obtained are within the range specified in the normal indication.

e. Refer to paragraph 3-8 for a sample table explaining the layout and use of the check procedure tables.

f. During periods of continuous operation, selected checks may be performed more frequently to assure that the equipment is operating satisfactorily.

g. Close all HIPIR drawers, compartment doors, and housing covers during normal radar operation to eliminate potential rf interference from the PAR, CWAR, or other sources. If the antenna housing cover is opened, elevate the HIPIR to 400 mils and point it towards the PAR to eliminate potential damage to the receiver diodes. When it becomes necessary to open other drawers, compartment doors and housing covers, and an abnormal indication is observed, request that the PAR and/or CWAR be placed in standby to determine if it is causing the abnormal indication (except in tactical situations). If the PAR and CWAR are not the source of interference, perform the rf leakage detection test in par. 4-23.

*g.*1. Periodic flashing of the transmitter control unit lamps can occur due to PAR radiation. Before performing the transmitter automatic BITE checks, request that the PAR be placed in standby.

h. Normal operation of the HIPIR is accomplished with the BATTLE SHORT switch (7, fig. 2-6) in the NORMAL position. Operating personnel must make certain that all interlocked drawers and panels are closed to assure positive action of the interlock system. When any of the interlocked drawers or panels are opened, the radar will automatically deenergize to the off condition. Care must be observed and the check procedures followed to make certain that the radar does not shut down during the performance of the check procedures. None of the interlocked drawers or panels provide high-voltage protection when they are opened, so care must be observed during the performance of the check procedures.

i. If a radar system test fault persists, but a specific indication of a fault is not observed during the performance of the indicated automatic test, perform the other automatic tests to gain additional information.

Table 3-11. Radar Set Group Weekly Checks

Step	Operation Normal indication Corrective procedure	Illustration	
		Figure	Key
	CAUTION Only one automatic test should be performed at a time.		
	NOTE If any fault is detected while performing a weekly check, perform table 3-7, low voltage power supply checks, prior to performing corrective procedures.		
	NOTE The HIPIR must be energized to the standby condition before performing the check procedures. If the condition of the HIPIR is:		
	(1) Off, perform tables 3-2 through 3-4.		
	(2) Standby or radiate ready, perform table 3-3, except step 1.		
	(3) False radiate or full radiate, press and release the STANDBY pushbutton and perform table 3-3, except step 1.	2-1	21
	NOTE The FAILURE LOCATION XMTR lamp is normally lit during standby, radiate ready, or false radiate conditions.	2-8	2

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	 Key
1.	**Perform Automatic SERVO CONTROL TEST.**		
a.	LAMP TEST pushbutton ..... press and hold.		
	All FAILURE LOCATION and REPLACE MODULE lamps light.		1 thru 8, 10 15 thru 20
	Replace failed lamp.		
b.	LAMP TEST pushbutton ..... release.		
c.	TEST/GOOD indicator-switch ..... press and release.	2-8	10
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off.		
	NOTE If normal indication is not obtained, press and release TEST/GOOD indicator-switch and repeat step 1c once more before troubleshooting.		
	Perform low voltage supply checks in table 3-7.		
	Replace indicated module.		
	Replace servo BITE module A11.		
	Perform table 13-10-1, TM 9—1430—1533—12—2—2.		
d.	TEST/GOOD indicator-switch ..... press and release.		
	GOOD label ..... goes off.		
	Perform table 13-10-1, TM 9—1430—1533—12—2—2.		
2.	**Check Servo Positioning System.**		
	WARNING Failure to perform step 2*a* below could result in injury to personnel or damage to equipment.		
a.	Insure that pedestal area is secured and free of personnel and equipment.		
b.	MASTER OSCILLATOR BEAM circuit breaker ..... OFF.	2-2	18
c.	POWER AMPLIFIER BEAM breaker ..... OFF.		11
d.	Elevation brake ..... released position (up).	2-7	3
e.	MOTOR GENERATOR circuit breaker ..... ON.	2-7	17

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	 Key
2*f*.	PEDESTAL SAFETY SWITCH ..... OPERATE.	2-11	1
g.	Elevation handwheel ..... rotate to 0 mil.	2-9	2
h.	RADIATE pushbutton ..... press and release.	2-1	18
	RADIATE lamp ..... lights.		16
	Perform table 13-4-3, TM 9—1430—1533—12—2—2.		
i.	Elevation handwheel ..... rotate to 800 mils, then to 400 mils.		
	Antenna follows smoothly in correct direction.		
	Perform table 13-10-3, TM 9—1430—1533—12—2—2.		
j.	Azimuth handwheel ..... rotate in both directions.	2-9	16
	Antenna follows smoothly in correct direction.		
	Perform table 13-10-4, TM 9—1430—1533—12—2—2.		
3.	**Check Low Box Search.**		
a.	Elevation handwheel ..... rotate until ELEVATION mil indicator dial indicates 50 mils.	2-9	2 3
b.	EL/AZ switch ..... EL.	2-8	14
c.	LOW/NARROW pushbutton ..... press and hold.	2-8	11
	Antenna moves up and down in elevation.		
	Antenna sidesteps in azimuth.		
	Perform table 13-10-9, TM 9—1430—1533—12—2—2.		
d.	LOW/NARROW pushbutton ..... release.		
4.	**Check High Box Search.**		
a.	Elevation handwheel ..... rotate until ELEVATION mil indicator dial indicates 400 mils.	2-9	2 3
b.	HIGH/CONTINUOUS ROTATE pushbutton ..... press and hold.	2-8	13
	Antenna moves up and down in elevation approximately eight times the distance as in step 3c above.		
	Antenna sidesteps in azimuth.		
	Perform table 13-10-6, TM 9—1430—1533—12—2—2.		

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation Normal indication Corrective procedure		Illustration Figure	 Key
4c.	HIGH/CONTINUOUS ROTATE pushbutton	release.		
5.	**Check Secant Amplifier Search Sector Width.**			
a.	Elevation handwheel	rotate until ELEVATION mil indicator dial indicates 1066 mils.	2-9	2 3
b.	LOW/NARROW pushbutton	press and hold.	2-8	11
	Antenna moves up and down in elevation. **Antenna sidesteps in azimuth.** Perform table 13-10-9, TM 9—1430—1533—12—2—2.			
c.	ADP/HPI switch	ADP.	2-9	18
	Antenna moves up and down in elevation. **Antenna sidesteps in azimuth approximately twice the distance as in step *b* above.** Perform table 13-10-9, TM 9—1430—1533—12—2—2.			
d.	LOW/NARROW pushbutton	release.		
e.	ADP/HPI switch	HPI.		
6.	**Check Azimuth 60-Degree Search.**			
a.	Elevation handwheel	rotate until ELEVATION mil indicator dial indicates 400 mils.	2-9	2 3
b.	EL/AZ switch	AZ.	2-8	14
c.	LOW/NARROW pushbutton	press and hold.		11
	Antenna steps up and down in elevation. **Antenna moves in azimuth to the right and the left.** Perform table 13-10-6, TM 9—1430—1533 12—2—2.			
d.	LOW/NARROW pushbutton	release.		
7.	**Check Azimuth 120-Degree Search.**			
a.	MEDIUM/WIDE pushbutton	press and hold.	2-8	12
	Antenna steps up and down in elevation. **Antenna moves in azimuth to the right and the left approximately twice the distance as in step 6c above.** Perform table 13-10-6, TM 9—1430—1533—12—2—2.			

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
7*b*.	MEDIUM/WIDE pushbutton ..... release.		
8.	**Check Lock Disable/Lock Hold.**		
a.	LOCK HOLD/NORMAL/ LOCK DISABLE switch ..... LOCK DISABLE.	2-9	6
	LOCK lamp ..... does not light.		5
	Perform table 13-9-1, TM 9—1430—1533—12—2—2.		
b.	LOCK HOLD/NORMAL/LOCK DISABLE switch ..... LOCK HOLD.	2-9	6
	LOCK lamp ..... lights.		5
	TARGET SPEED meter ..... stops sweeping.		10
	Perform table 13-9-1, TM 9—1430—1533—12—2—2.		
c.	LOCK HOLD/NORMAL/LOCK DISABLE ..... NORMAL.		
9.	**Check Recede Command.**		
a.	Open the target intercept computer range and azimuth drawer.	1-3	2
b.	APPROACH/RECEDE switch ..... set and hold to RECEDE.	3-5	3
c.	Set the output test indicator switch to the following positions and observe the OUTPUT TEST INDICATOR lamp.	2-6	8,9
	Output test indicator switch position — **OUTPUT TEST INDICATOR lamp** 6 — **off.** 7 — **lit.** 8 — **lit.**		
	Perform table 13-10-10, TM 9—1430—1533—12—2—2.		
d.	APPROACH/RECEDE switch ..... release.		
e.	Output test indicator switch ..... OFF.		
10.	**Check Elevation Lead Angle Cutout.**		
a.	APPROACH/RECEDE switch ..... set and hold to RECEDE.	3-5	3

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
10*b.*	Elevation handwheel	slowly rotate ccw until computer ELEVATION indicator dial deflects upward.	2-9 2-6	2 4
	Antenna elevation indicator scale	**48 to 58 mils.**	2-11	9
	Perform table 13-6-7, TM 9—1430—1533—12—2—2.			
c.	APPROACH/RECEDE switch	release.		
11.	**Check Azimuth Lead Angle Designation.**			
a.	ADP/HPI switch	ADP.	2-9	18
b.	Range and azimuth control amplifier switch S1	CW, then CCW and record indications on computer AZIMUTH indicator dial for each position.	3-4 2-6	4 1
	The recorded indications should be equal but in opposite directions.			
	Adjust R49.		3-4	7
	Perform table 13-6-1, TM 9—1430—1533—12—2—2.			
c.	Range and azimuth control amplifier switch S1	set and hold to CW (away from chassis).		
	Computer AZIMUTH indicator dial	**300 mils CW.**		
	Adjust R52.			6
	Perform table 13-6-1, TM 9—1430—1533—12—2—2.			
d.	Range and azimuth control amplifier switch S1	release.		
12.	**Check Elevation and Time-of-Flight Lead Angle Calibration.**			
a.	Elevation handwheel	0 mil on ELEVATION dial.	2-9	2,3
b.	ADP/HPI switch	ADP.		18
c.	PEDESTAL SAFETY SWITCH	SAFE.	2-11	1
d.	LOCK HOLD/NORMAL/LOCK DISABLE	LOCK HOLD.	2-9	6

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
12*e.*	AUTO. TRACK/MAN. TRACK switch	AUTO. TRACK.		31
	TIME OF FLIGHT indicator dial	**5 to 9 seconds.**	2-6	3
	Perform table 13-6-10, TM 9—1430—1533—12—2—2.			
f.	Open target intercept computer elevation and time-of-flight drawer.		1-3	3
g.	Elevation and time-of-flight control amplifier switch S1	set and hold to ZERO (toward chassis).	3-7	8
	Computer ELEVATION indicator dial	**0 mil.**	2-6	4
	Adjust R49.		3-7	4
	Perform table 13-6-5, TM 9—1430—1533—12—2—2.			
h.	Elevation and time-of-flight control amplifier switch S1	set and hold to GAIN (away from chassis).		
	Computer ELEVATION indicator dial	**500 mils UP.**		
	Adjust R52.			3
	Perform table 13-6-5, TM 9—1430—1533—12—2—2.			
i.	Elevation and time-of-flight control amplifier switch S1	release.		
j.	LOCK HOLD/NORMAL/LOCK DISABLE	NORMAL.		
k.	AUTO. TRACK/MAN. TRACK switch	MAN. TRACK.	2-9	31
13.	**Check Approaching Target.**			
a.	ADP/HPI switch	HPI.	2-9	18
b.	AUTO. TRACK/MAN. TRACK switch	MAN. TRACK.		31
c.	PEDESTAL SAFETY SWITCH	OPERATE.	2-11	1
d.	Elevation handwheel	rotate until ELEVATION mil indicator dial indicates 200 mils.	2-9	2,3
e.	APPROACH/RECEDE switch	set and hold to APPROACH.	3-5	3
	RANGE indicator dial	**24 to 26 km APPROACH**	2-6	2
	Perform range amplifier balance, table 3-18.			
	Perform table 13-6-9, TM 9—1430—1533—12—2—2.			

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
13*e.* Cont	**Computer AZIMUTH indicator dial ..... 225 to 275 mils CW.**		1
	Perform azimuth amplifier balance, table 3-19.		
	Perform table 13-6-1, TM 9—1430—1533—12—2—2.		
	TIME OF FLIGHT indicator dial ..... 44 to 50 seconds.	2-6	3
	Adjust −100V, +150V, +250V for red line on LV PWR SUPPLIES meter.	3-8	1, 2, 3
	Perform time-of-flight amplifier balance, table 3-20.		
	Perform table 13-6-10, TM 9—1430—1533—12—2—2.		
	IN RANGE lamp ..... lights.	3-5	1
	OUT OF RANGE lamp ..... off.		2
	Computer ELEVATION indicator dial ..... 5 mils DN to 75 mils UP.	2-6	4
	Perform elevation amplifier balance, table 3-21.		
	Perform table 13-6-4, TM 9—1430—1533—12—2—2.		
f.	APPROACH/RECEDE switch ..... release.		
14.	**Check Receding Target.**		
a.	APPROACH/RECEDE switch ..... set and hold to RECEDE.	3-5	3
	RANGE indicator dial ..... 24 to 26 km RECEDE.	2-6	2
	Perform range amplifier balance, table 3-18.		
	Perform table 13-6-9, TM 9—1430—1533—12—2—2.		
	Computer AZIMUTH indicator dial ..... 225 to 275 mils CW.		1
	Perform azimuth amplifier balance, table 3-19		
	Perform table 13-6-1, TM 9—1430—1533—12—2—2.		
	TIME OF FLIGHT indicator dial ..... 60 to 68 seconds.	2-6	3
	Adjust −100V, + 150V, + 250V for red line on LV PWR SUPPLIES meter.	3-8	1, 2, 3
	Perform elevation and time-of-flight amplifier balance, table 3-20.		
	Perform table 13-6-10, TM 9—1430—1533—12—2—2.		

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
14*a.* Cont.	**OUT OF RANGE lamp ..... off.**	3-5	2
	IN RANGE lamp ..... lights.		1
	Computer ELEVATION indicator dial ..... 120 to 200 mils UP.	2-6	4
	Perform elevation amplifier balance, table 3-21.		
	Perform table 13-6-4, TM 9—1430—1533—12—2—2.		
b.	APPROACH/RECEDE switch ..... release.		
15.	**Check Minimum Launch Angle.**		
a.	Observe that indication on stowed synchro in comparator and minimum elevation cutout is set to prescribed battery minimum launch angle.	3-6	4
b.	APPROACH/RECEDE switch ..... set and hold to APPROACH until computer ELEVATION indicator dial stops, then release.	3-5 2-6	3 4
	WARNING Make certain that all personnel and equipment are clear of antenna area.		
c.	Rotate elevation handwheel clockwise 100 mils above stowed synchro indication, then slowly counterclockwise until DS1 illuminates.	2-9 3-6	2 4,1
	Antenna elevation indicator scale reading, added to the computer ELEVATION indicator dial reading, equals the stowed synchro indication plus 25 mils.	2-11 2-6 3-6	9 4 4
	Perform table 13-6-8, TM 9—1430—1533—12—2—2.		
d.	STANDBY pushbutton ..... press and release.	2-1	21
	RADIATE READY lamp ..... lights.		15
	Perform table 13-4-2, TM 9—1430—1533—12—2—2.		
e.	Close target intercept computer range and azimuth drawer.	1-3	2
f.	Close target intercept computer elevation and time-of-flight drawer.		3

Table 3-11. Radar Set Group Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
16.	**Check Audio Amplifier.**		
a.	NORMAL/DOPPLER TEST switch ..... hold to DOPPLER TEST.	2-7	18
	Audible simulated doppler is heard over loudspeaker.		6
	Perform table 13-11-1, TM 9—1430—1533—12—2—2.		
b.	NORMAL/DOPPLER TEST switch ..... release.		

Table 3-12. Transmitter Weekly Checks

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
I.	**Check Transmitter Panel 1 Indicator Lamps.**		
a.	Press the following lamps and observe that each lamp lights when pressed.		
	H.V.P.S. LOW PRESSURE lamp.	2-1	32
	GLYCOL LIQUID LEVEL WARNING lamp.		30
	H.V.P.S. LIQUID LEVEL lamp.		29
	M.O. LOW FLOW lamp.		27
	P.A. BODY LOW FLOW lamp.		5
	P.A. COLLECTOR LOW FLOW lamp.		6
	P.A. COLLECTOR LOW TEMP WARNING lamp.		7
	P.A. COLLECTOR HI TEMP WARNING lamp.		3
	Replace defective lamp.		
b.	Observe that the following lamps are off.		
	H.V.P.S. LOW PRESSURE lamp.		
	GLYCOL LIQUID LEVEL WARNING lamp.		
	M.O. LOW FLOW lamp.		
	H.V.P.S. LIQUID LEVEL lamp.		
	P.A. BODY LOW FLOW lamp.		
	P.A. COLLECTOR LOW FLOW lamp.		
	NOTE P.A. COLLECTOR LOW TEMP WARNING lamp may be lit until coolant reaches operating temperature.		
	P.A. COLLECTOR LOW TEMP WARNING lamp.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1*b.* Cont.	**P.A. COLLECTOR HI TEMP WARNING lamp.** Perform table 13-7-1, TM 9—1430—1533—12—2—2.	2-1	3
2.	**Check Master Oscillator and Power Amplifier Filament.**		
	CAUTION Master oscillator and power amplifier filaments are adjusted only while radar is in standby or radiate ready condition. Do not readjust filaments in full radiate. Insure blower heat exchanger is operating.		
	Observe filament meters.		
	MASTER OSCILLATOR FILAMENT AMPERES meter .... within 0.1 amp of value on the decal located beneath the meter.	2-1	9
	Adjust MASTER OSCILLATOR filament control.		10
	Perform table 13-8-2, TM 9—1430—1533—12—2—2.		
	POWER AMPLIFIER FILAMENT VOLTAGE meter .... red line.		12
	Adjust POWER AMPLIFIER filament control.		13
	Perform table 13-8-3, TM 9—1430—1533—12—2—2.		
3.	**Check Master Oscillator and Power Amplifier.**		
a.	MO/OFF/PA switch ..... MO.	2-2	6
b.	Elevation handwheel ..... 1500 mils on ELEVATION mil indicator dial.	2-9	2, 3
c.	EMCON/RADIATE switch ..... RADIATE.	2-9	12
	WARNING The IHIPIR transmits a very powerful beam, exposure to which is harmful to body tissue. Make certain all personnel remain clear of transmitter beam.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	 Key
	WARNING Make certain all personnel and equipment are clear of antenna area. The antenna will elevate to 1500 mils when RADIATE pushbutton is pressed. **CAUTION** Do not point the antenna of a radiating IHIPIR within 90 degrees of another IHIPIR unless absolutely required. Refer to TM 9—1425—1525 if this operation becomes necessary. **CAUTION** If necessary to radiate in the direction of missiles, make certain that the missiles are facing away from the IHIPIR. **CAUTION** Do not operate radar in radiate with ion probes removed.		
d.	MASTER OSCILLATOR BEAM circuit breaker ..... ON.	2-2	18
e.	POWER AMPLIFIER BEAM circuit breaker .. ON.	2-1	11
f.	RADIATE pushbutton ..... press and release.	2-1	18
	RADIATE lamp ..... **lights.**		16
	Perform table 13-4-3, TM 9—1430—1533—12—2—2.		
	REGULATOR VOLTS meter ..... **1.4 to 1.6 K volts.**	2-2	2
	Adjust MASTER OSCILLATOR beam control.		19
	Perform table 13-8-5, TM 9—1430—1533—12—2—2.		
	MASTER OSCILLATOR BEAM VOLTAGE meter ..... **green area.**	2-2	20
	See note in step 3*g* below before troubleshooting.		
	Perform table 13-8-5, TM 9—1430—1533—12—2—2.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
3*g*.	MO/OFF/PA switch ..... PA.		6
	REGULATOR VOLTS meter ..... 0.9 to 1.1 K volts.		2
	Adjust POWER AMPLIFIER beam control.		10
	Perform table 13-8-6, TM 9—1430—1533—12—2—2.		
	POWER AMPLIFIER BEAM VOLTAGE meter ..... green area.		8
	See note below before troubleshooting.		
	Perform table 13-8-6, TM 9—1430—1533—12—2—2.		
	NOTE		
	If MASTER OSCILLATOR or POWER AMPLIFIER BEAM VOLTAGE indication is not in green area, increase or decrease input voltage adjust variable transformer as required, in one division increments (but remaining within green area) on LINE VOLT meter. Adjust the MASTER OSCILLATOR beam control and POWER AMPLIFIER beam control for normal MO REGULATOR VOLTS and PA REGULATOR VOLTS for indications before observing MO BEAM VOLTAGE and PA BEAM VOLTAGE indications are in green area.	2-11 2-9 2-2	6 1 19 10
4.	**Check Forward Rf Power.**		
	MO/PA switch ..... PA.	2-3	7
	FORWARD RF POWER meter ..... green area.		2
	Perform PA alinement, arc detector crystal attenuator adjustment, table 3-17.		
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.		
	REFLECTED RF POWER meter ..... green area.		1
	Perform PA alinement, table 3-17.		
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
	NOTE If frequency change is desired or master oscillator is replaced, perform power amplifier, degeneration, coding, and feedthrough nulling alinement procedures in sequence after frequency change before proceeding.		
5.	**Check Master Oscillator Frequency.**		
	NOTE Allow 2 minutes for the transmitter cavity to lock.		
a.	Wavemeter test set METER SENSITIVITY control ..... fully counterclockwise.	3-13	5
b.	Connect coaxial cable (RG-8) between rf transmitter assembly DC2-J1 and wavemeter test set RF INPUT connector.	3-11 3-13	1 4
c.	Wavemeter test set METER SENSITIVITY control ..... rotate clockwise until sensitivity meter indicates 3/4 of full scale.		1
d.	Wavemeter test set FREQUENCY MC control ..... rotate until sensitivity meter indicates a sharp null.	3-13	3
e.	Refer to master oscillator frequency correlation chart:	3-14	
	Master oscillator is tuned to the assigned frequency ±2 scale indications on wavemeter test set.		
	Adjust wavemeter test set FREQUENCY-MC control for correct MO frequency setting on dial.	3-13	3 2
	Tune master oscillator tuning control until wavemeter test set sensitivity meter indicates a sharp null. Rotate FREQUENCY-MC control fully ccw, then repeat 5*c*, *d*, and *e*.	3-11 3-13	12 1
	Verify frequency setting using frequency correlation chart, fig. 3-14.		
	MASTER OSC ASSIGNED FREQUENCY switch is set to the position that corresponds to assigned frequency.	2-2	9
	Set MASTER OSC ASSIGNED FREQUENCY switch to the correct position and perform steps 8*e* and 8*f*.	2-2	9
f.	Wavemeter test set ..... disconnect and secure.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
6.	**Check Degeneration Alinement.**		
a.	Set DEGENERATION ALIGNMENT SELECTOR switch to following positions and observe the following indications on the DEGENERATION ALIGNMENT MONITOR meter.	2-3	3 4
	DEGENERATION ALIGNMENT SELECTOR switch position — **DEGENERATION ALIGNMENT MONITOR meter indication**		
	CAVITY XTAL ..... **12 μa minimum and stable.**		
	Perform degeneration alinement, table 3-14.		
	BRIDGE NULL ..... **null green area.**		
	Perform degeneration alinement, table 3-14.		
	PHASE CONTROLLER ..... **10-40 μa.**		
	NOTE The above indication may vary slightly when transmitter panel 3 door is opened or closed.		
	Perform degeneration alinement, table 3-14.		
	CODING OFF lamp ..... **off.**	2-4	10
	CODING MONITOR ..... **20-40 μa.**		
	Perform coding alinement, table 3-15.		
b.	DEGENERATION ALIGNMENT SELECTOR switch ..... TRANSMITTER NOISE.		
c.	FM/AM switch ..... hold to AM.	2-3	6
	DEGENERATION ALIGNMENT MONITOR meter ..... 5 maximum.		
	NOTE The above indication may deflect momentarily at a decreasing rate until the radar has achieved its normal operating coolant temperature.		
	Adjust CROSS COUPLING ADJ.	3-9	1

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	Illustration Key
6d.	FM/AM switch. ..... release.		
	DEGENERATION ALIGNMENT MONITOR meter ..... 6 maximum.		
	NOTE The above indication may deflect momentarily at a decreasing rate until the radar has achieved its normal operating coolant temperature.		
	Perform degeneration alinement, table 3-14. Perform table 13-8-7, TM 9—1430—1533—12—2—2.		
e.	DEGENERATION ALIGNMENT SELECTOR switch ..... OFF.		
7.	**Perform Automatic TRANSMITTER TEST.**		
	NOTE If any TRANSMITTER TEST or TRANSMITTER MONITOR on-line monitor lamps are lit before or after performing the automatic transmitter test (accompanied by a GOOD label), refer to table 13-2-2, TM 9—1430—1533—12—2—2.		
a.	LAMP TEST pushbutton ..... press and hold.	2-4	8
	All panel lamps light.		2 thru 7, 9 thru 12, and 15 thru 21
	Replace failed lamp.		
b.	LAMP TEST pushbutton ..... release.		
	All panel lamps ..... go off.		
c.	TEST/GOOD indicator-switch ..... press and release.		21
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off. Radar returns to RADIATE READY during test.		
	NOTE If normal indication is not obtained, press and release TEST/GOOD indicator-switch and repeat step 7c once more before troubleshooting.		
	Perform low voltage power supply checks in table 3-7. Replace indicated module.		

Table 3-12. Transmitter Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
7c. Cont.	Replace transmitter BITE module A6.		
	Perform table 13-8-1, TM 9—1430—1533—12—2—2.		
d.	TEST/GOOD indicator-switch ..... press and release.		
	GOOD label ..... goes off.		
	Perform table 13-8-1, TM 9—1430—1533—12—2—2.		
e.	RADIATE pushbutton ..... press and release.	2-1	18
8.	**Check Transmitter Frequency Command.**		
a.	FREQUENCY COMMAND TEST pushbutton ..... press and hold.	2-2	21
b.	Output test indicator switch ..... positions 1 through 4.	2-6	9
	OUTPUT TEST INDICATOR lamp ..... lights in each position.		8
	Perform table 13-8-16, TM 9—1430—1533—12—2—2.		
c.	FREQUENCY COMMAND TEST pushbutton ..... release.		
d.	MASTER OSC ASSIGNED FREQUENCY switch ..... assigned setting.	2-2	9
e.	Output test indicator switch ..... positions 1 through 4.	2-6	9
	In positions 1 through 4, OUTPUT TEST INDICATOR lamp lights or goes off in accordance with master-oscillator frequency correlation chart for setting of MASTER OSC ASSIGNED FREQUENCY switch.	3-14	
	Perform table 13-8-16, TM 9—1430—1533—12—2—2.		
f.	Output test indicator switch ..... OFF.		

Table 3-13. Receiver and Target Processing Weekly Checks

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	**Check Feedthrough Nulling.**		
a.	Elevation handwheel ..... 400 mils.	2-9	2
b.	Elevation brake ..... set (down).	2-11	3

Table 3-13. Receiver and Target Processing Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
	CAUTION If the PAR is radiating, elevate the HIPIR antenna to 400 mils and point it towards the PAR before opening the antenna receiver housing cover.		
c.	PEDESTAL SAFETY SWITCH ..... SAFE.		1
d.	Open antenna receiver housing cover.		
e.	LAMP TEST pushbutton ..... press and hold.	2-14	18
	All TEST and MONITOR lamps ..... light.		1 thru 17, 19, 20
	Replace failed lamp.		
f.	LAMP TEST pushbutton ..... release.		
	All TEST and MONITOR lamps ..... go off.		
	Perform table 13-9-1, TM 9—1430—1533—12—2—2.		
g.	Observe ADJUST FTN lamp.	2-14	20
	ADJUST FTN lamp ..... off.		
	Perform FTN alinement, table 3-16.		
	Perform table 13-9-3, TM 9—1430—1533—12—2—2.		
2.	**Perform Automatic SIGNAL PROCESSOR TEST.**		
a.	TEST/GOOD indicator-switch ..... press and release.	2-14	17
	TEST label lights immediately. GOOD label lights within 4 minutes and TEST label goes off.		
	NOTE If normal indication is not obtained, press and release TEST/GOOD indicator-switch. Observe any failure indications and repeat step 2*a* once more before troubleshooting. If different failure indications are obtained on alternate test sequences, fault isolate receiver failures first (all indications except A1—A10).		
	Perform low voltage power supply checks in table 3-7.		
	Fault isolate indicated receiver failures.		
	Replace indicated module (A1—A10).		
	Replace BITE module A11.		
	Perform table 13-9-1, TM 9—1430—1533—12—2—2.		

Table 3-13. Receiver and Target Processing Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
2*b.*	TEST/GOOD indicator-switch	press and release.		
	GOOD label	**goes off.**		
		Perform low voltage power supply checks in table 3-7.		
		Replace indicated module (A1-A10).		
		Replace BITE module A11.		
		Perform table 13-9-1, TM 9—1430—1533—12—2—2.		
c.	Close and secure antenna receiver housing cover.			
d.	Release elevation brake.		2-11	3
e.	PEDESTAL SAFETY SWITCH	OPERATE.		1
3.	**Check TOJ/FTC.**			
a.	TEST LOCAL/REMOTE switch	TEST LOCAL.	2-9	19
b.	DEGENERATION ALIGNMENT SELECTOR switch	CODING MONITOR.	2-3	3
c.	Observe and record the DEGENERATION ALIGNMENT MONITOR meter indication.			4
d.	Observe the TRANSMITTER MONITOR MISSILE COMMANDS lamp.		2-4	6
	TRANSMITTER MONITOR MISSILE COMMANDS lamp	**off.**		
		Perform table 13-8-14, TM 9—1430—1533—12—2—2.		
e.	NORMAL/SIMULATED TOJ switch	hold to SIMULATED TOJ.	2-9	11
	TRANSMITTER MONITOR MISSILE COMMANDS lamp	**lit.**		
		Perform table 13-8-14, TM 9—1430—1533—12—2—2.		
	DEGENERATION ALIGNMENT MONITOR meter	**CODING MONITOR level drops to less than half the recorded indications.**		
		Perform table 13-8-13, TM 9—1430—1533—12—2—2.		
f.	NORMAL/SIMULATED TOJ switch	release.	2-9	19
4.	**Check Pause Lock Rate.**			
a.	LOCK HOLD/NORMAL/LOCK DISABLE switch	NORMAL.	2-9	6
b.	AUTO. TRACK/MAN. TRACK switch	MAN. TRACK.		31

Table 3-13. Receiver and Target Processing Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
4c.	Elevation handwheel	1500 mils on ELEVATION mil indicator dial.		2, 3
	LOCK lamp	**flashes 1 to 15 times per minute over a one-minute period.**		5
	NOTE **If the above indication is not obtained over a one-minute period, repeat the step, averaging the indication over a 5-minute period. If the normal indication is still not obtained, proceed with the corrective action.**			
	Remove the LEAD ANGLE COMPUTER MOTORS fuse and indicator lamp. Wait three minutes, then repeat step 4. If the indication still exceeds 15 flashes per minute, attempt to find a quiet area by moving the antenna to another azimuth and elevation until a normal indication can be obtained. If a quiet area cannot be found, bypass step 4. If a quiet area is obtained, reinstall the fuse and repeat step 4. If the normal indication is not obtained, proceed with the following corrective action.		2-7	12
	Perform table 13-9-5, TM 9—1430—1533—12—2—2.			
d.	Elevation handwheel	400 mils on ELEVATION mil indicator on dial.		
5.	**Perform Automatic RADAR SYSTEM TEST.**			
a.	EL/AZ switch	EL.	2-8	14
b.	AUTO. TRACK/MAN. TRACK switch	AUTO. TRACK.	2-9	31
c.	HIGH/CONTINUOUS ROTATE pushbutton	press and hold.	2-8	13
d.	TEST/GOOD indicator-switch	press and release.		1
	TEST label	**lights.**		
	Antenna box searches to approximately 400 mils elevation and stops.			
	Antenna moves left in azimuth and down in elevation approximately 3 degrees.			
	NOTE **Slight overshoot and slow correction is a normal indication.**			
	FAILURE LOCATION RCVR and SERVO lamps light for less than 3 seconds.		2-8	4
	GOOD label lights within 60 seconds and TEST label remains lit.			

Table 3-13. Receiver and Target Processing Weekly Checks — Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
5 *d.* Cont.	**NOTE** If normal indication is not obtained, press and release TEST/ GOOD indicator-switch and repeat step 5*d* once more before troubleshooting. Perform BITE test indicated by lit FAILURE LOCATION lamp. Perform table 13-10-2, TM 9—1430—1533—12—2—2.		
e.	HIGH/CONTINUOUS ROTATE pushbutton ..... release.	2-8	13
f.	Observe RANGE indicator dial. **RANGE indicator dial ..... 28 to 32 km APPROACH.** Perform table 13-6-9, TM 9—1430—1533—12—2—2.	2-6	2

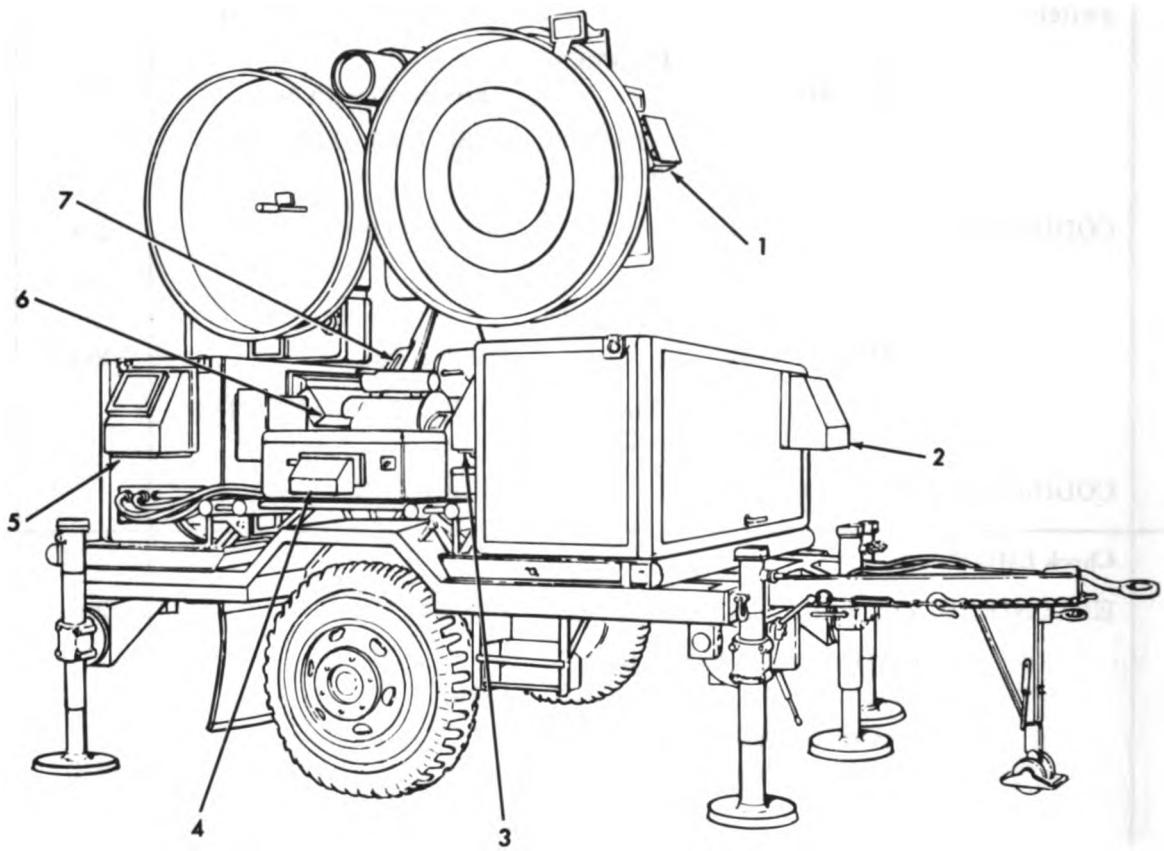
Table 3-13. Receiver and Target Processing Weekly Checks—Continued

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
5 *g.*	TEST/GOOD indicator-switch ..... press and release.		1
	GOOD label ..... **goes off.**		
	Perform table 13-10-2, TM 9—1430—1533—12—2—2.		
h.	AUTO. TRACK/MAN. TRACK switch ..... MAN. TRACK.	2-9	31
6.	**Check Destruct Command.**		
a.	DEGENERATION ALIGNMENT SELECTOR switch ..... DETECTED CODING.	2-3	3
	DEGENERATION ALIGNMENT MONITOR meter ..... **greater than 15 μa.**	2-3	4
	Perform table 13-8-21, TM 9—1430—1533—12—2—2.		
b.	CODING ON/CODING OFF switch ..... CODING OFF.	2-9	8
	CODING OFF lamp ..... **lit.**	2-4	10
	DEGENERATION ALIGNMENT MONITOR meter ..... **less than 2μa.**	2-3	4
	Perform table 13-8-21, TM 9—1430—1533—12—2—2.		
c.	CODING ON/CODING OFF switch ..... CODING ON.		
7.	**Check EMCON.**		
a.	EMCON/RADIATE switch ..... EMCON.	2-9	12
	FAILURE LOCATION XMTR lamp ..... **lights.**	2-8	2
	TRANSMITTER MONITOR EMCON ON lamp ..... **lights.**	2-4	7
	Perform table 13-8-20, TM 9—1430—1533—12—2—2.		
b.	MO/PA switch ..... PA.	2-3	7
	FORWARD RF POWER meter ..... **blue area.**		2
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.		

Section III. ILLUSTRATIONS

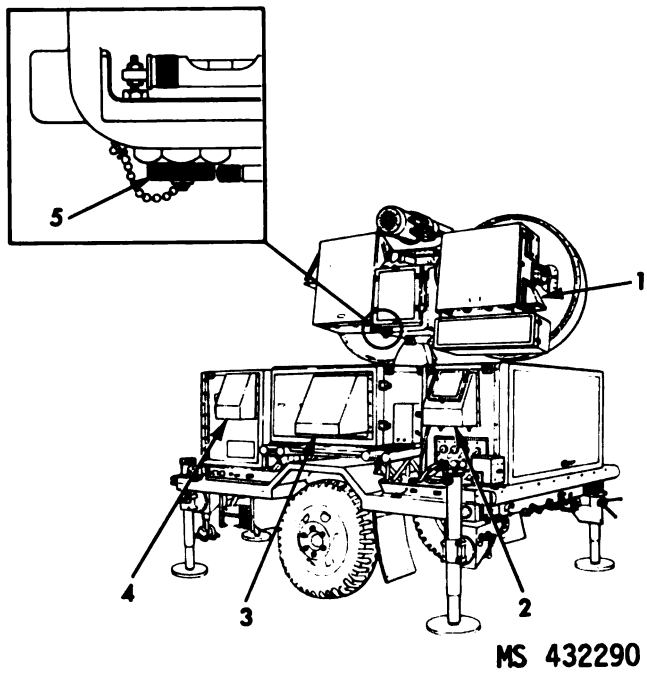
3-16. General

This section contains the illustrations necessary for operator and organizational maintenance of the IHIPIR. The illustrations are presented in a logical order for easy reference to the controls, indicators, test points, and adjustments.



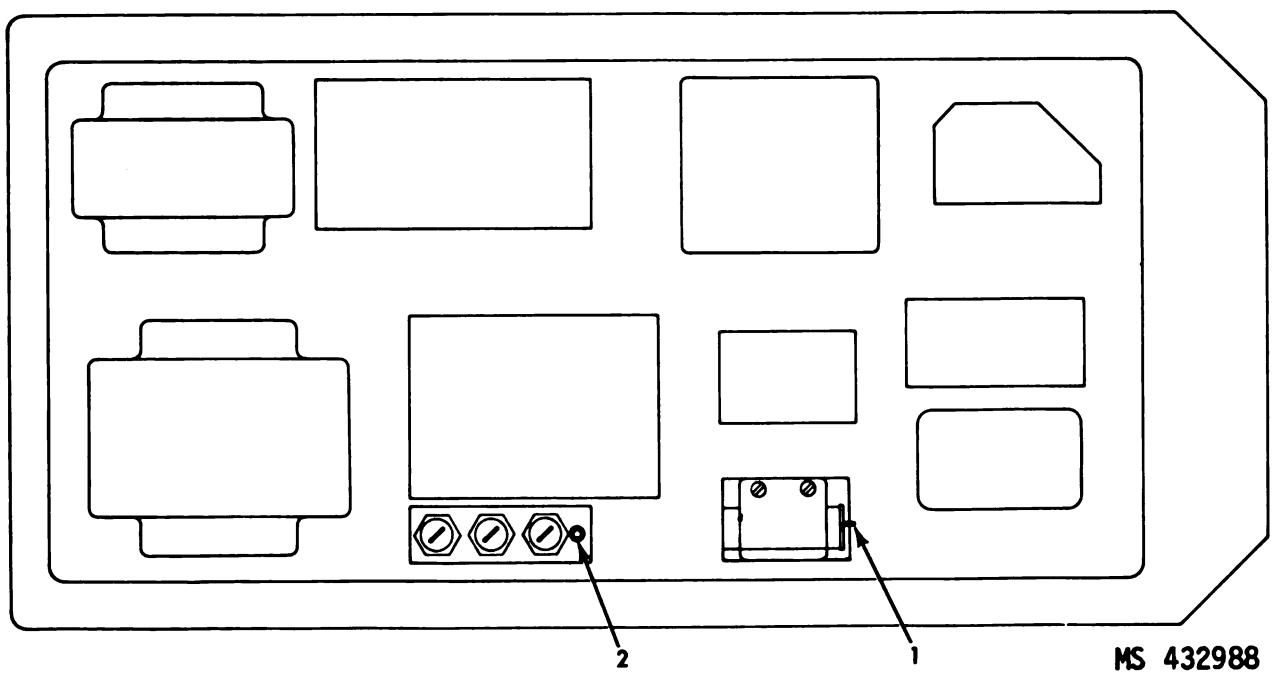
1 — Receiver exhaust vent
2 — Transmitter group door exhaust vent
3 — Transmitter group exhaust vent
4 — Motor-generator intake and exhaust vent
5 — Radar set group exhaust vent
6 — Radar set group intake vent
7 — Pedestal intake vent

Figure 3-1. IHIPIR air intake and exhaust vents — curb side.



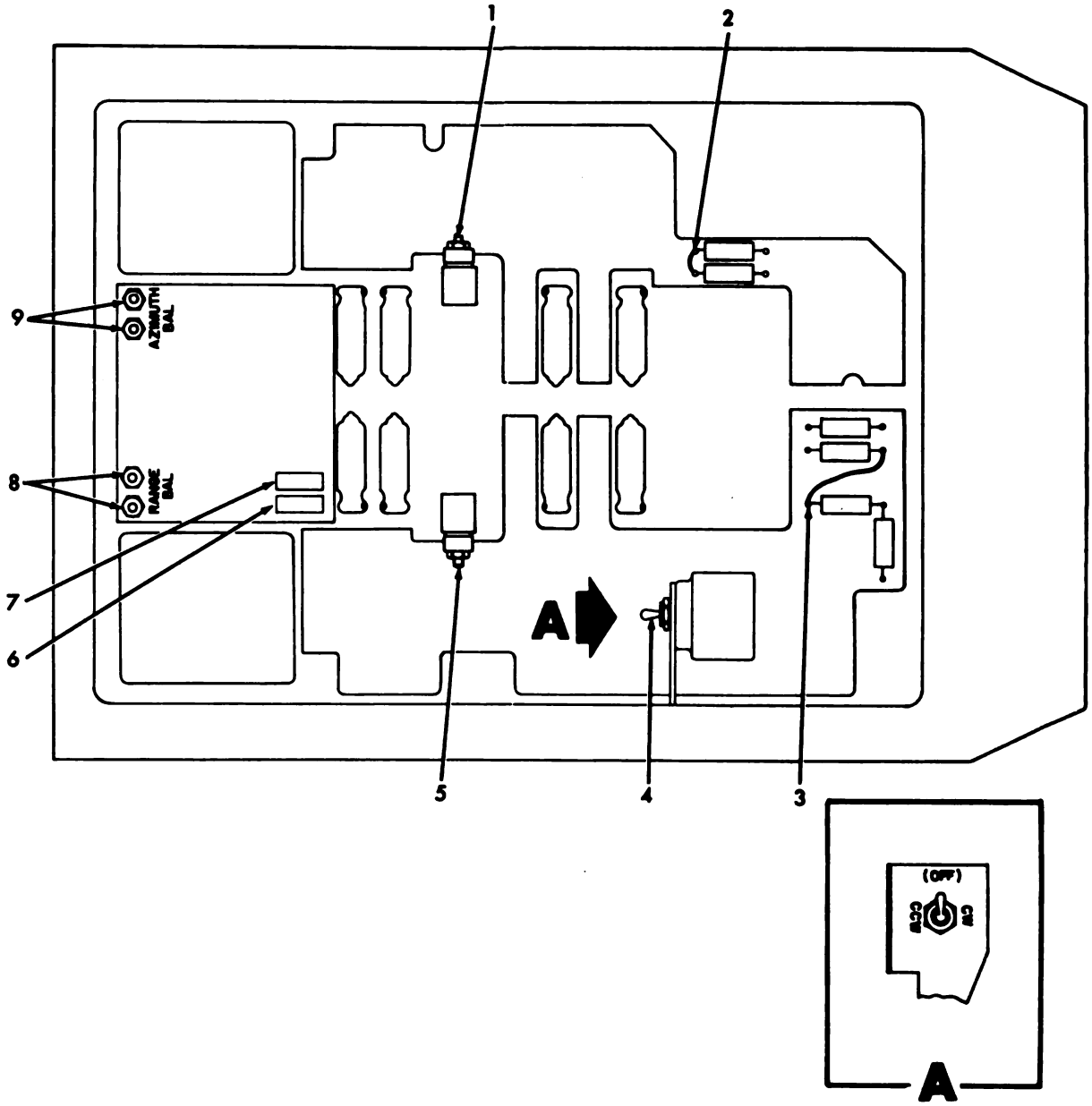
1 — Transmitter antenna housing air vent
2 — Radar set group exhaust vent
3 — Liquid cooler intake vent
4 — Transmitter group intake vent
5 — Elevation drivemotor air vent plug

Figure 3-2. IHIPIR air intake and exhaust vents — road side.



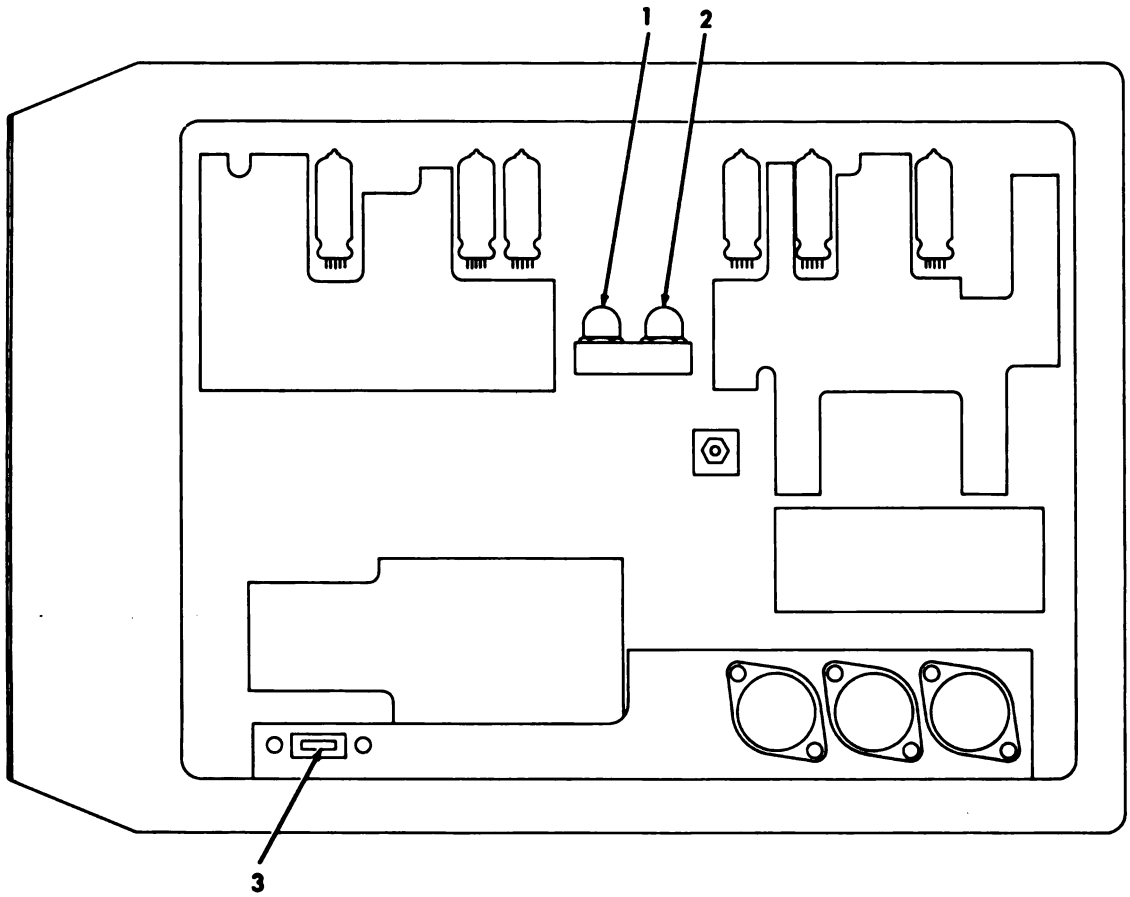
1 — Negative terminal (case terminal) of C4
2 — Test point 1

Figure 3-3. 300-, 90-, 28-Vdc power supply test points.



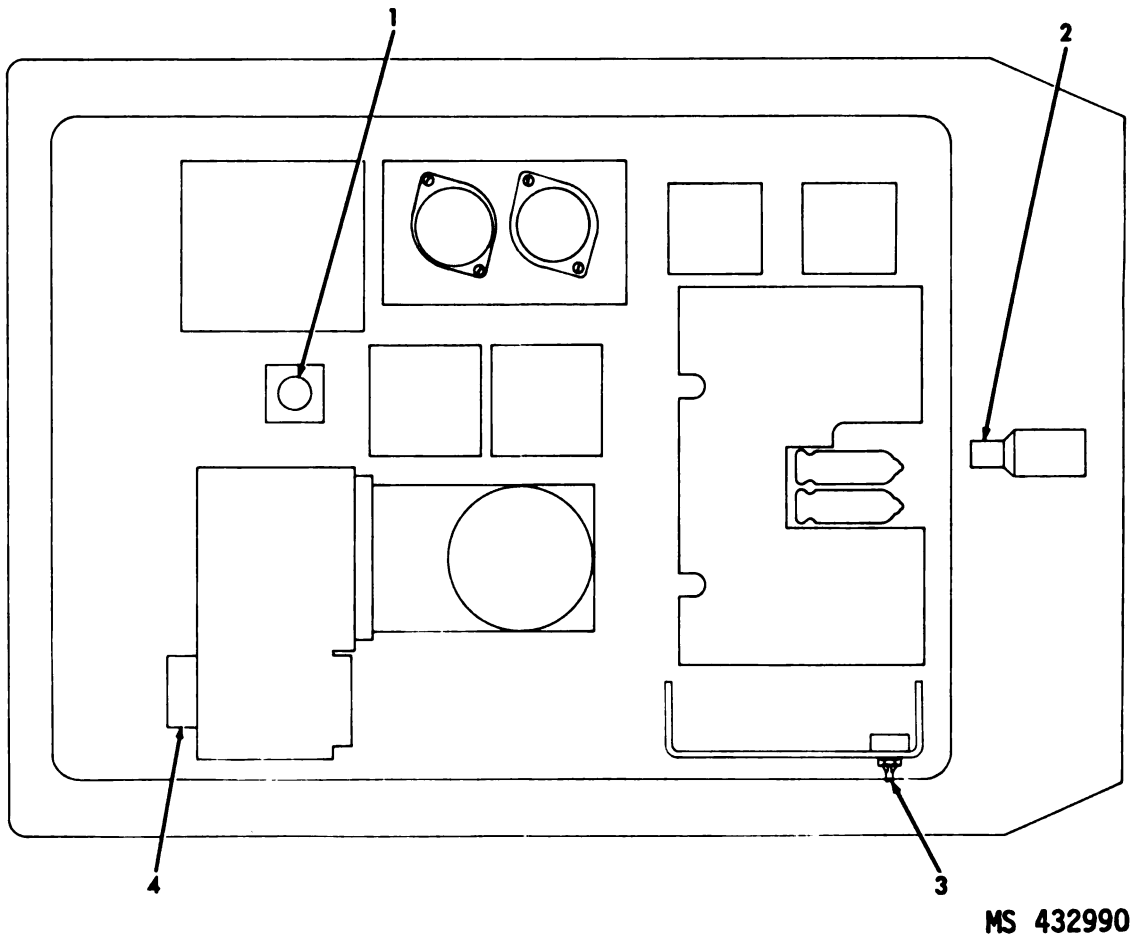
1 — R37
2 — Junction of R22 and R24
3 — Junction of R3 and R4
4 — Switch S1
5 — R16
6 — R52
7 — R49
8 — RANGE BAL jacks
9 — AZIMUTH BAL jacks

Figure 3-4. Range and azimuth control amplifier — test points and adjustments.



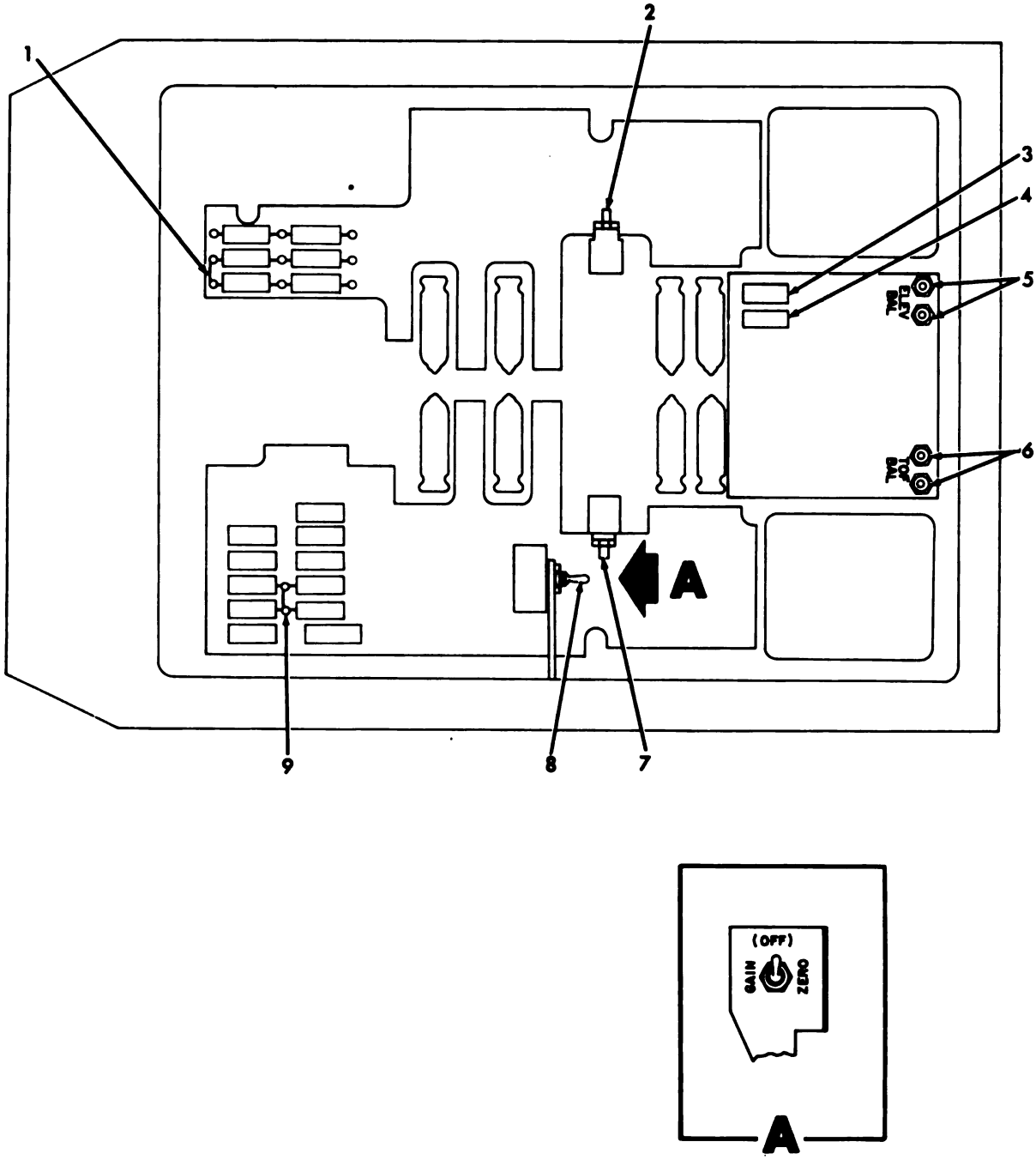
1 — IN RANGE lamp
2 — OUT OF RANGE lamp
3 — APPROACH/RECEDE switch

Figure 3-5. Range interlock computer — controls and indicators.



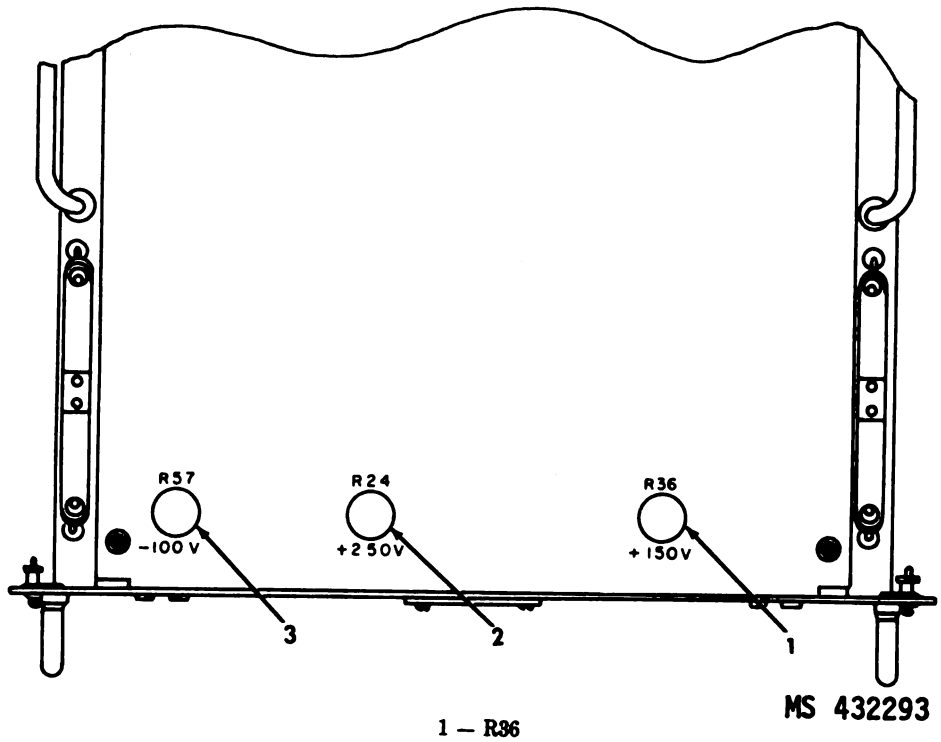
1 — DS1
2 — TEST pushbutton
3 — ZERO ADJ control
4 — Stowed synchro dial

Figure 3-6. Comparator and minimum elevation cutout — controls and indicators.



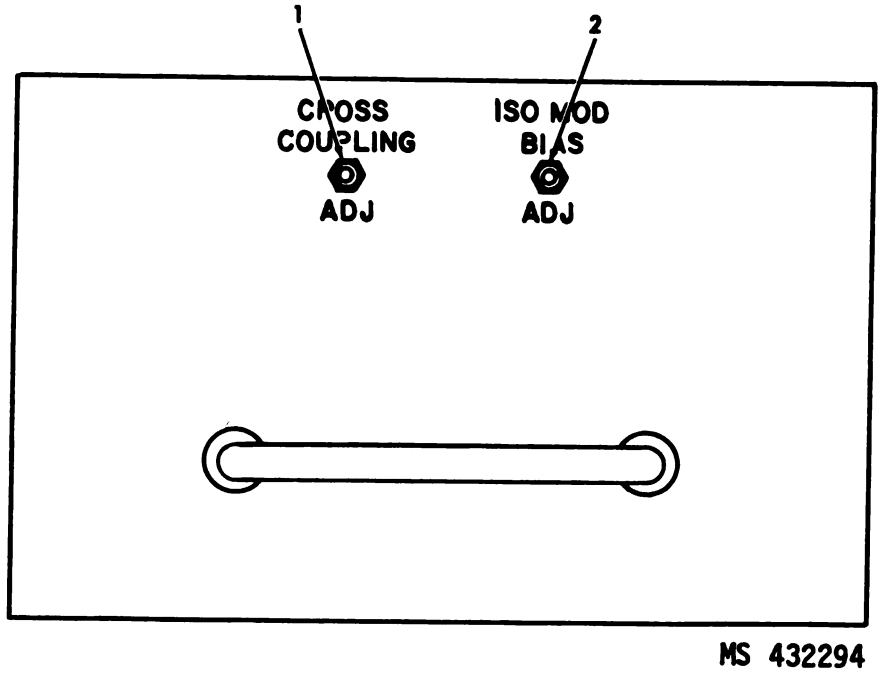
1 — Junction of R12 and R13
2 — R27
3 — R52
4 — R49
5 — ELEV BAL jacks
6 — TOF BAL jacks
7 — R39
8 — Switch S1
9 — Junction of R4 and R5

Figure 3-7. Elevation and time-of-flight control amplifier — test points and adjustments.



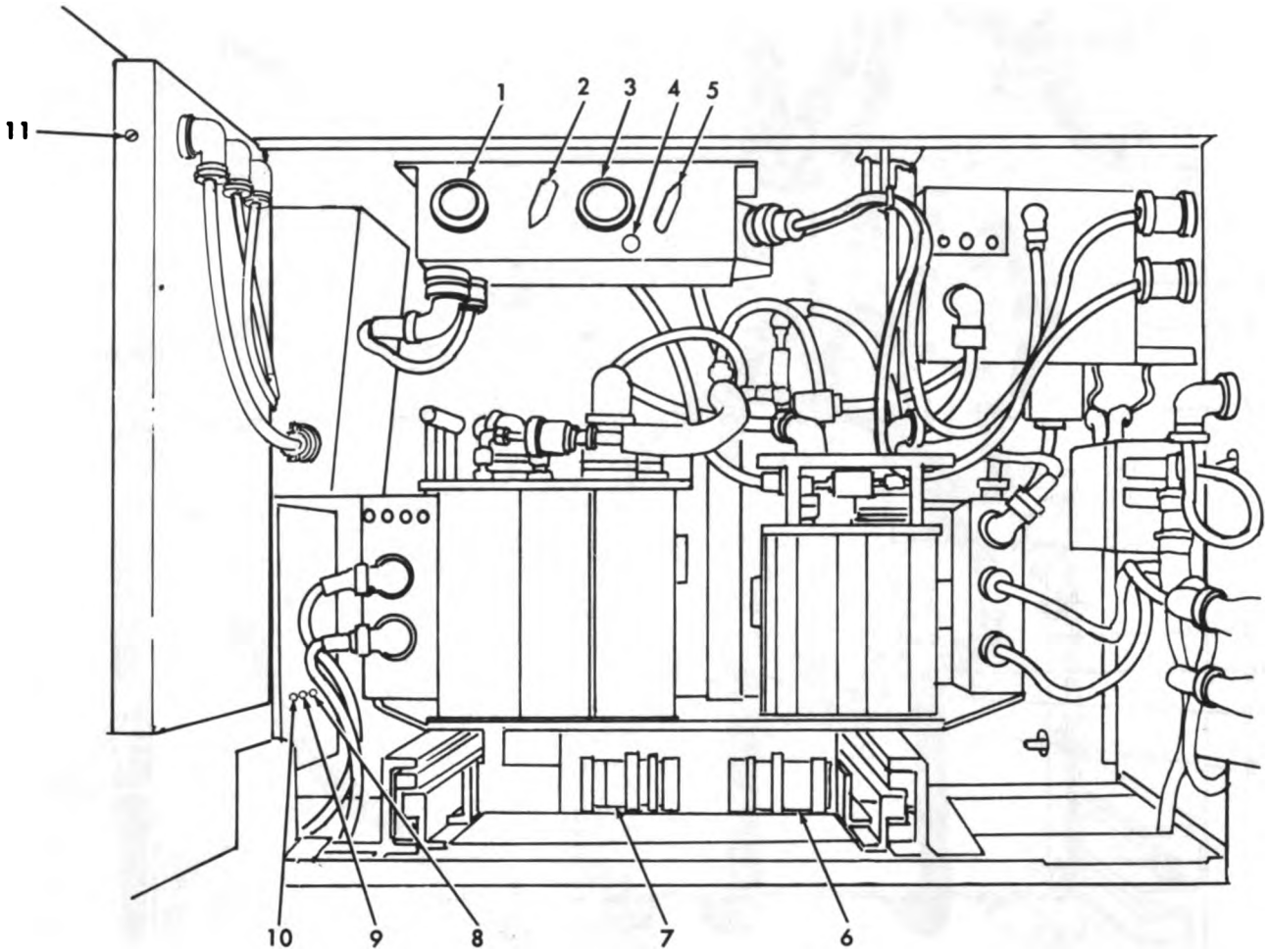
1 — R36
2 — R24
3 — R57

Figure 3-8. —100-, 150-, 250-Vdc power supply — adjustments.



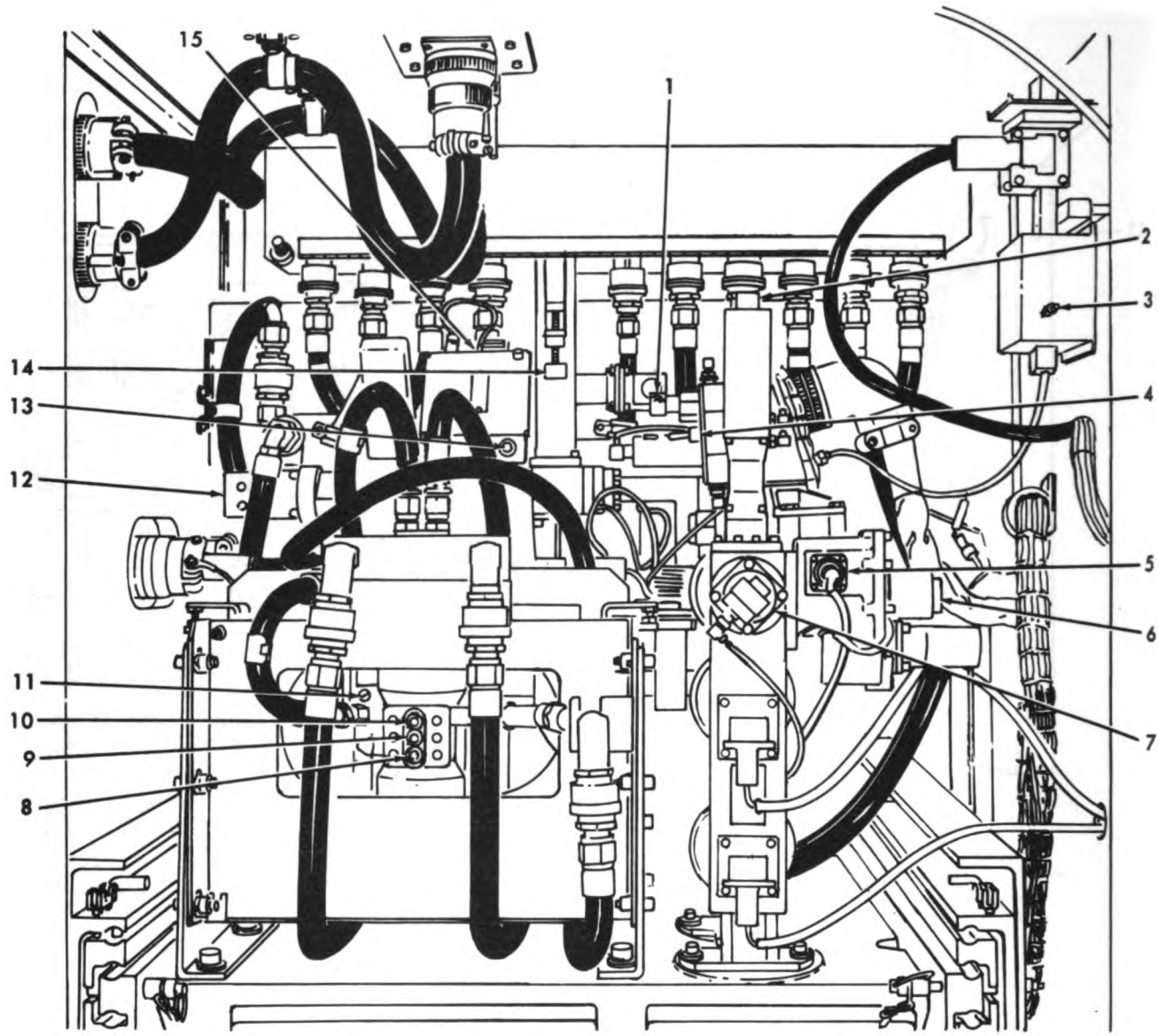
1 — CROSS COUPLING ADJ
2 — ISO MOD BIAS ADJ

Figure 3-9. Degeneration preamplifier — adjustments.



1 — FIL TEST meter
2 — FIL TEST switch
3 — HI VOLT TEST meter
4 — PA FIL/MO FIL switch
5 — HI VOLT TEST switch
6 — PA test adapter
7 — MO test adapter
8 — R2
9 — R6
10 — R10
11 — FILAMENT METER CAL control

Figure 3-10. High-voltage power supply area — controls, indicators and adjustments.



1—DC2J1
2—Phase shifter
3—CODING ADJUST
4—ION PROBE TEST switch
5—Cavity plug A7J1
6—Cavity tuning shaft
7—Cavity crystal
8—Input cavity
9—Idler cavity
10—Output cavity
11—Arc detector crystal attenuator
12—Master oscillator tuning control
13—High frequency loop switch
14—Isomodulator short adjust
15—Af-rf amplifier

Figure 3-11. Rf transmitter assembly — controls and adjustments.

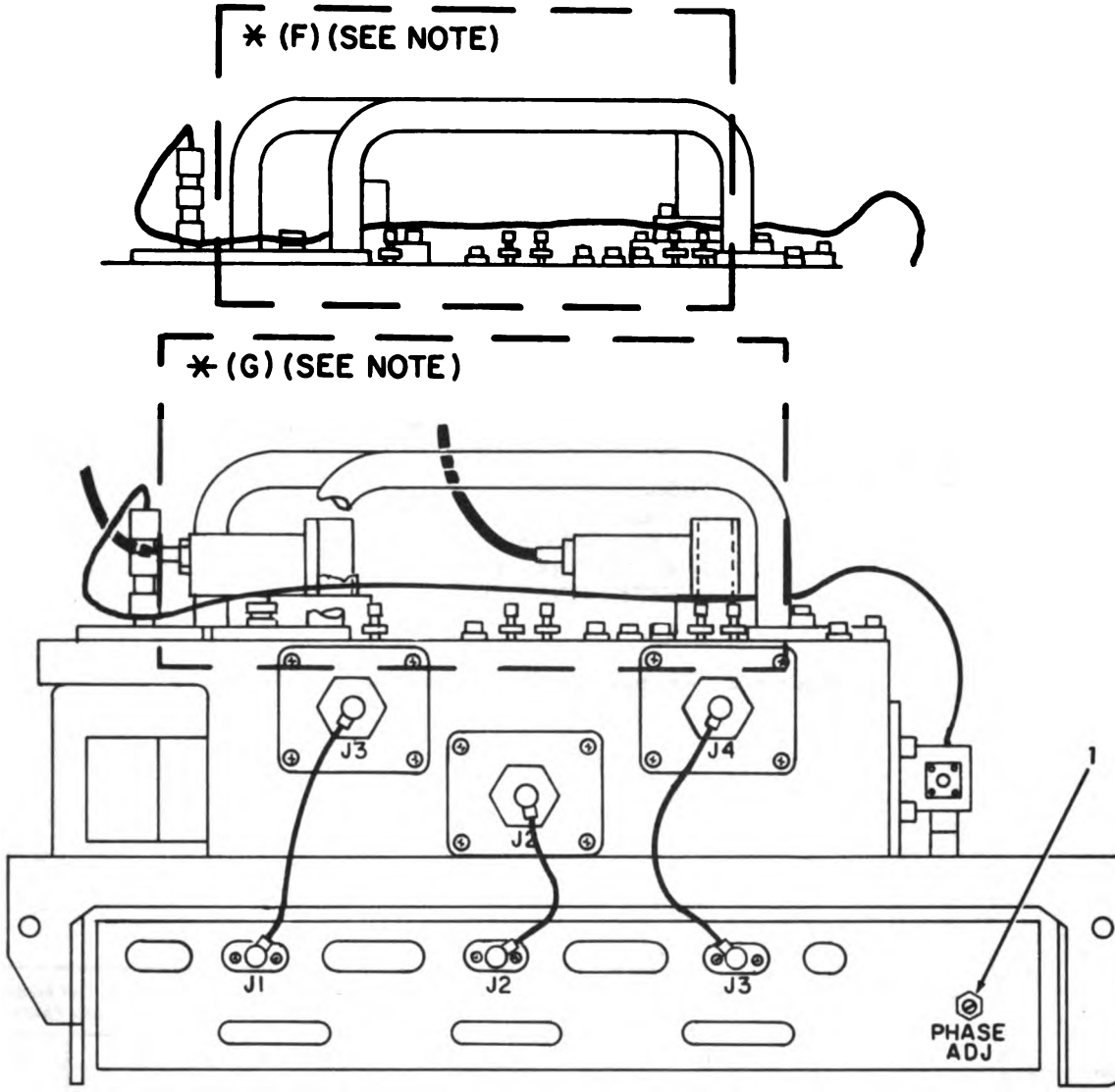
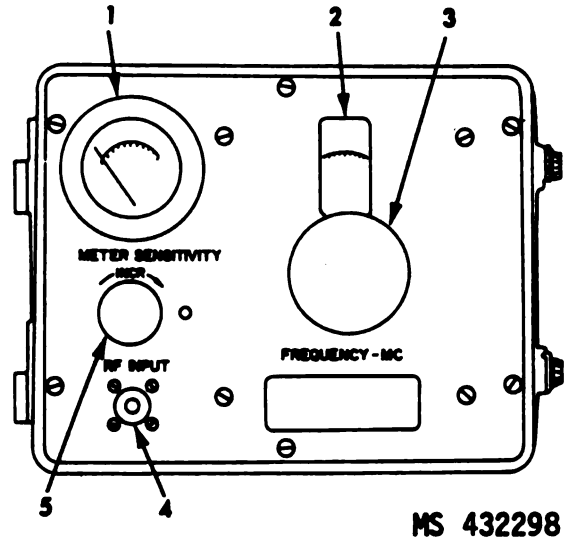
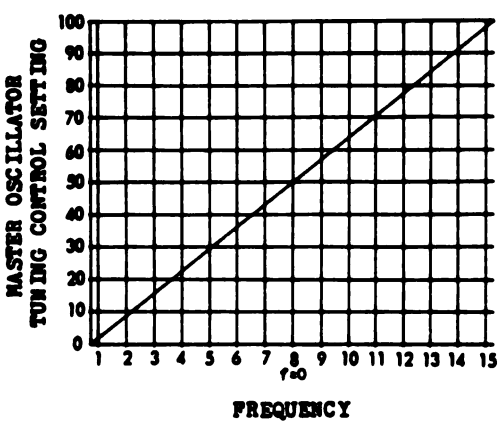


Figure 3-12. Receiver assembly — controls and adjustments.



1—Sensitivity meter
2—Frequency indicator
3—FREQUENCY-MC control
4—RF INPUT connector
5—METER SENSITIVITY control

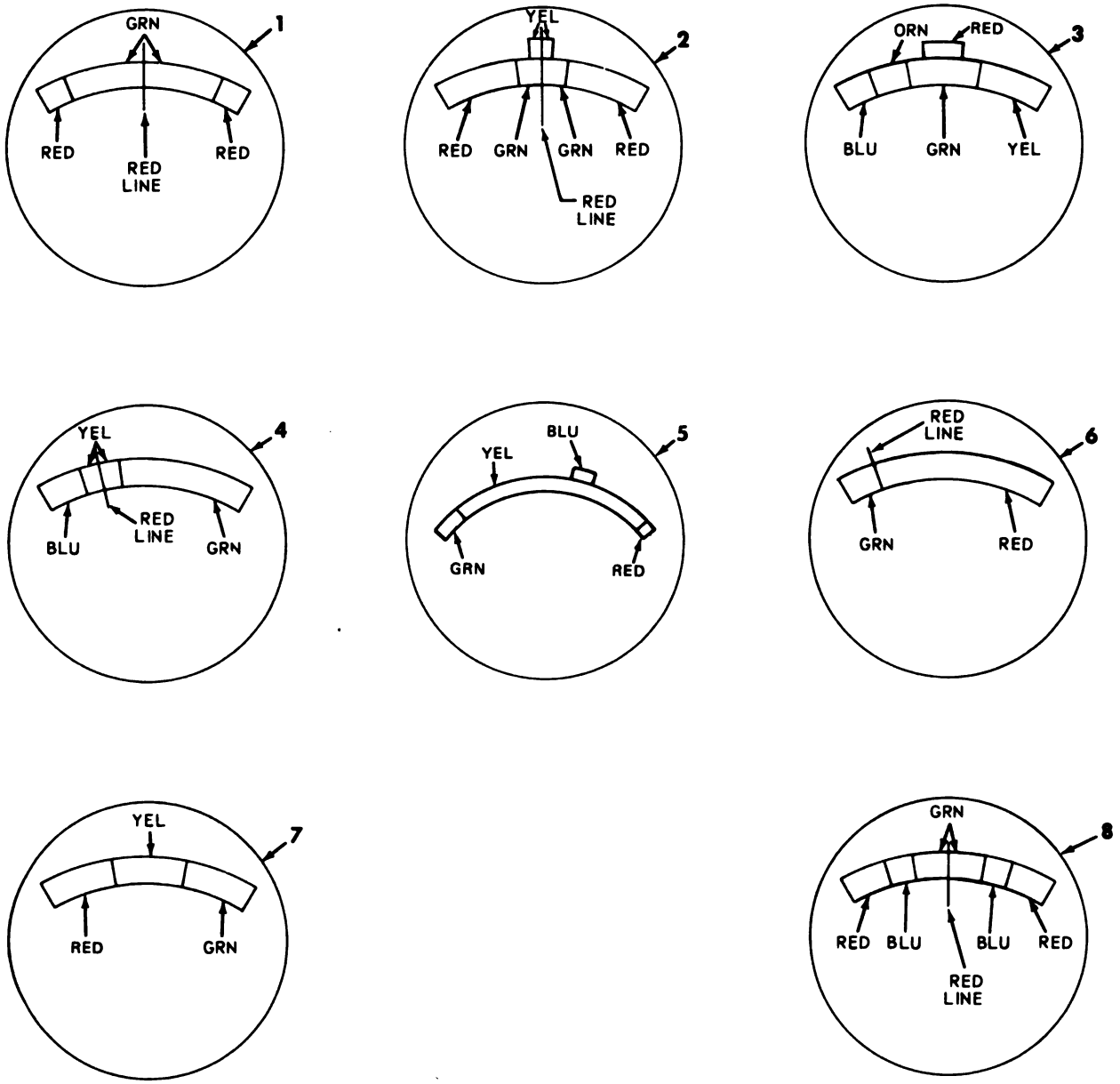
Figure 3-13. Wavemeter test set — controls and indicators.



Assigned Frequency	M.O. Frequency	Output Test Indicator Switch Position			
		1	2	3	4
1.	f = −122.5	On	On	On	On
2.	f = −105.0	Off	On	On	On
3.	f = −87.5	On	Off	On	On
4.	f = −70.0	Off	Off	On	On
5.	f = −52.0	On	On	Off	On
6.	f = −35.0	Off	On	Off	On
7.	f = −17.5	On	Off	Off	On
8.	f = 0	Off	Off	Off	On
9.	f = +17.5	On	On	On	Off
10.	f = +35.0	Off	On	On	Off
11.	f = +52.5	On	Off	On	Off
12.	f = +70.0	Off	Off	On	Off
13.	f = +87.5	On	On	Off	Off
14.	f = +105.0	Off	On	Off	Off
15.	f = +122.5	On	Off	Off	Off

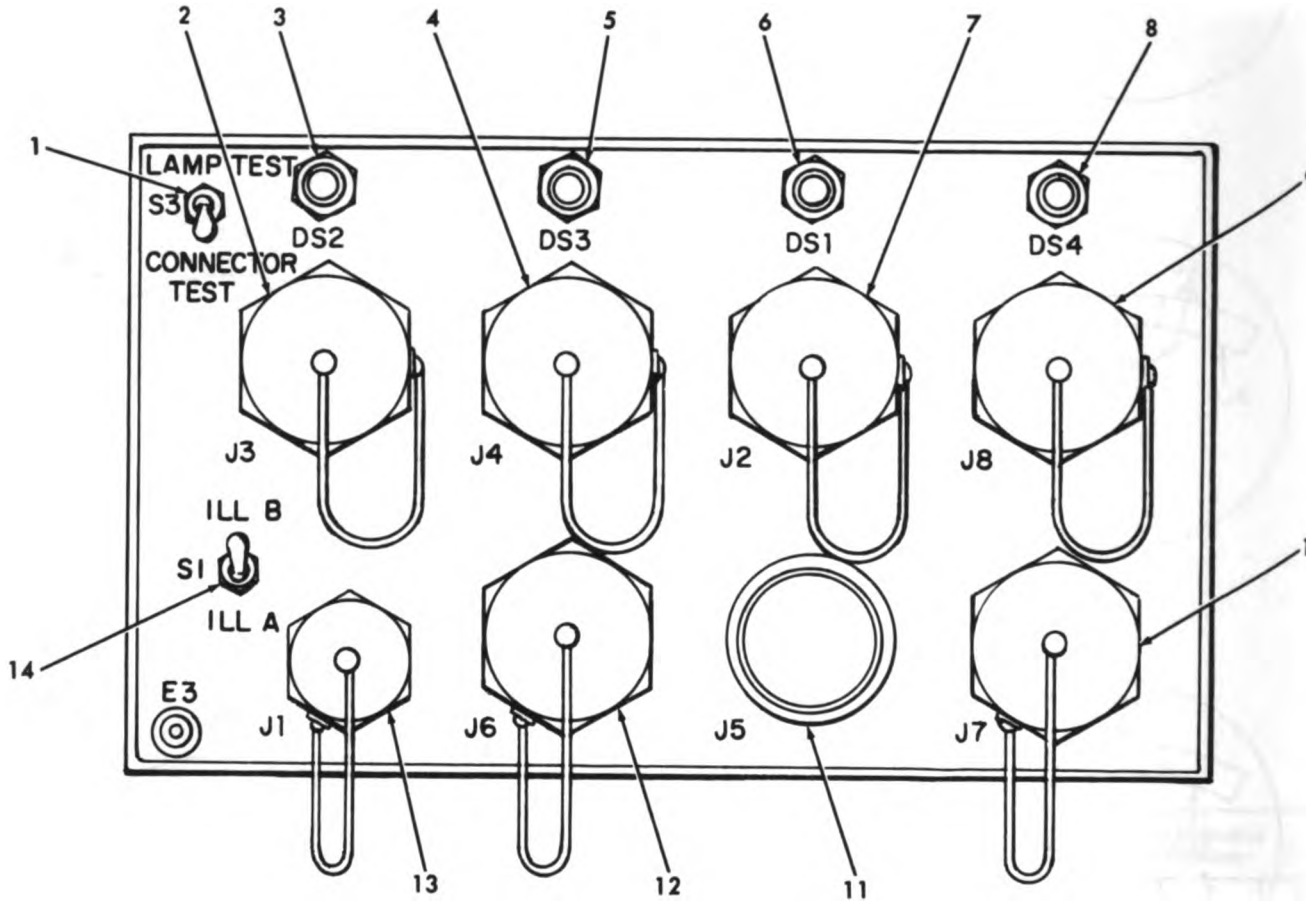
MS 432991

Figure 3-14. Master oscillator frequency correlation chart.



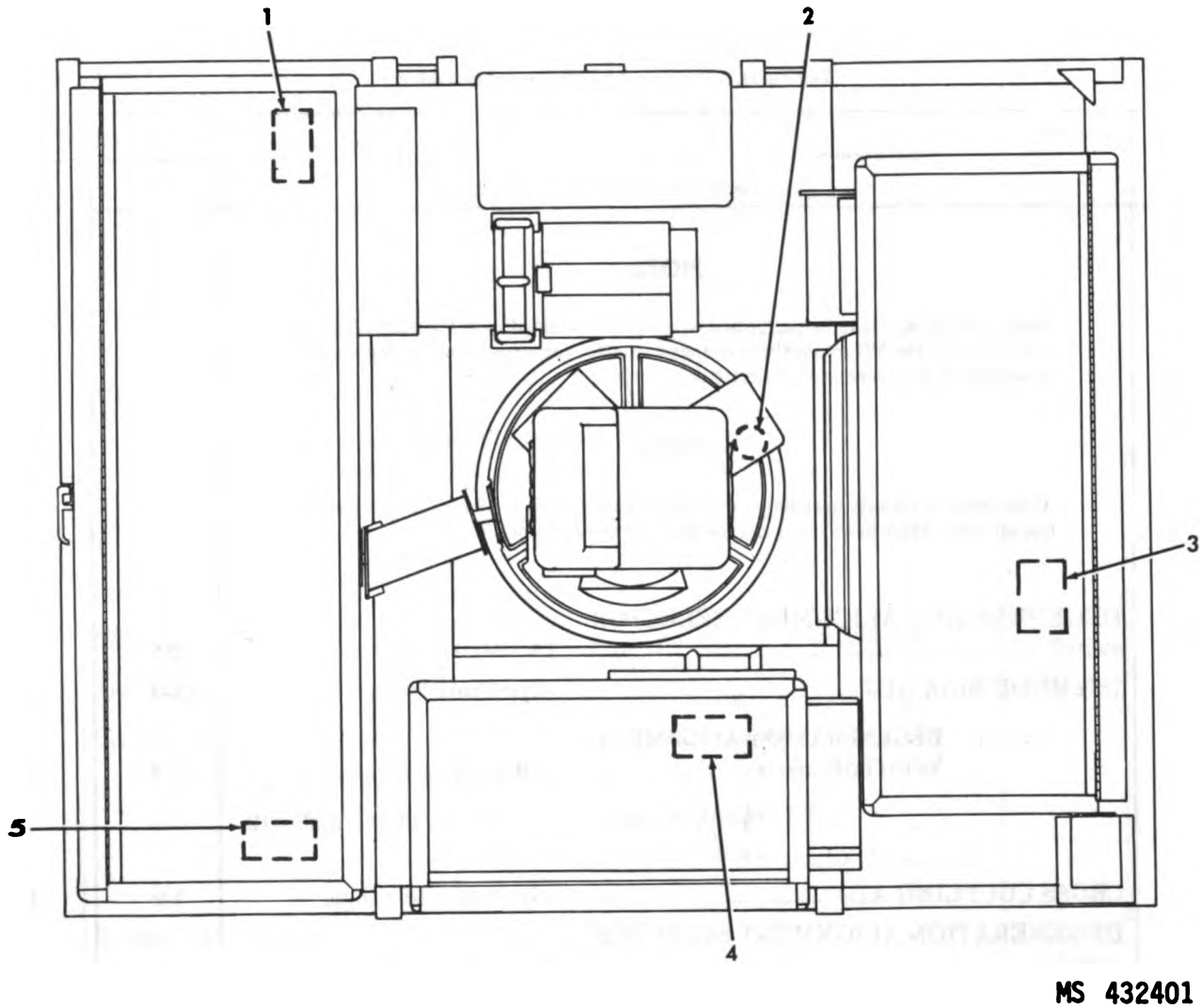
1—LINE VOLT, MASTER OSCILLATOR BEAM VOLTAGE, POWER AMPLIFIER BEAM VOLTAGE, POWER AMPLIFIER FILAMENT VOLTAGE, and high-voltage power supply test set HI VOLT TEST meters
2—LV PWR SUPPLIES meter
3—100-, ±50-Vdc power supply VOLTAGE MONITOR meter and POWER SUPPLY MONITOR meter
4—FORWARD RF POWER meter
5—DEGENERATION ALIGNMENT MONITOR meter and DEGENERATION MONITOR meter
6—REFLECTED RF POWER meter
7—SIGNAL STRENGTH meter
8—High-voltage power supply test set FIL TEST meter

Figure 3-15. Meter colored areas.



1—LAMP TEST switch S3
2—J3
3—Indicator lamp DS2
4—J4
5—Indicator lamp DS3
6—Indicator lamp DS1
7—J2
8—Indicator lamp DS4
9—J8
10—J7
11—J5
12—Test receptacle J6
13—J1
14—Illuminator identification switch S1

Figure 3-16. IHIPIR cable entry panel.



1—Transmitter group auxiliary blower
2—Pedestal blower
3—Radar set group blower
4—Cooling console blower
5—Transmitter group blower

Figure 3-17. Locations of IHIPIR air blowers.

Section IV. ALINEMENT PROCEDURES

3-17. General

This section contains special alinement procedures which are performed only when so instructed in the weekly check procedures.

Table 3-14. Degeneration Alinement Procedures

Step	Operation Normal indication Corrective procedure	Illustration Figure	Illustration Key
	NOTE **These procedures are to be performed only when instructed by the weekly check procedures, when the MO frequency is changed, or after replacement of the degeneration preamplifier, PA tubes or rf transmitter assembly.**		
	NOTE **Allow radar to operate in radiate until thermal stability is achieved, but not less than five minutes before performing degeneration alinement procedure.**		
1.	DEGENERATION ALIGNMENT SELECTOR switch ..... ISO-MOD BIAS.	2-3	3
2.	ISO MODE BIAS ADJ ..... adjust until:	3-9	2
	DEGENERATION ALIGNMENT MONITOR meter ..... null in green area.	2-3	4
	Perform table 13-8-7, TM 9—1430—1533—12—2—2.		
3.	CROSS COUPLING ADJ ..... adjust to mid-range.	3-9	1
4.	DEGENERATION ALIGNMENT SELECTOR switch ..... CAVITY XTAL.		
5.	Allow cavity to tune to a peak and disconnect W1P21. Manually adjust cavity tuning shaft to establish a peak indication.		
	DEGENERATION ALIGNMENT MONITOR meter ..... peak in yellow area.		4
	Perform table 13-8-9, TM 9—1430—1533—12—2—2.		
6.	DEGENERATION ALIGNMENT SELECTOR switch ..... PHASE CONTROLLER.		
7.	Phase shifter ..... adjust for the following indication.	3-11	2
	DEGENERATION MONITOR meter varies smoothly left and right of 25 μa. Adjust for 25 μa. If the meter indication oscillates, readjust CROSS COUPLING ADJ to eliminate this condition.	2-3	4,5

Table 3-14. Degeneration Alinement Procedures—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	 Key
8.	DEGENERATION ALIGNMENT SELECTOR switch ..... BRIDGE NULL.		
9.	Press and hold high frequency loop switch and adjust CROSS COUPLING ADJ until: **DEGENERATION ALIGNMENT MONITOR METER ..... indicates a null.** Perform table 13-8-7, TM 9—1430—1533—12—2—2.	3-11 3-9 2-3	13 1 4
10.	Release high frequency loop switch.		
11.	DEGENERATION ALIGNMENT SELECTOR switch ..... TRANSMITTER NOISE.		
12.	Adjust the isomodulator short adjust (A4DC1) for a null. **DEGENERATION ALIGNMENT MONITOR METER ..... 6 μa maximum.** Perform table 13-8-7, TM 9—1430—1533—12—2—2.	3-11	14
13.	Reconnect W1P21.		
14.	FM/AM switch ..... set and hold to AM.	2-3	6
15.	Press and hold high frequency loop switch.		
16.	CROSS COUPLING ADJ ..... adjust until: **DEGENERATION ALIGNMENT MONITOR meter ..... indicates a null.** Perform table 13-8-7, TM 9—1430—1533—12—2—2.		
17.	Release high frequency loop switch. **DEGENERATION ALIGNMENT MONITOR meter ..... 5 μa maximum.** Perform table 13-8-7, TM 9—1430—1533—12—2—2.		
18.	FM/AM switch ..... release. **DEGENERATION MONITOR meter indicates ..... 6 μa maximum.** Perform table 13-8-7, TM 9—1430—1533—12—2—2.		

Table 3-15. Coding Alinement Procedures

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
	NOTE These procedures are to be performed only when instructed by the weekly check procedures or after replacement of the range and coding oscillator, rf pallet, or transmitter BITE circuit card assembly.		
	NOTE Insure that transmitter panel 3 door is closed when performing this procedure.		
1.	DEGENERATION ALIGNMENT SELECTOR switch ..... CODING MONITOR.	2-3	3
2.	CODING BIAS ..... adjust for maximum on DEGENERATION ALIGNMENT MONITOR meter.	2-4 2-3	22 4
3.	CODING ADJUST ..... adjust for maximum on DEGENERATION ALIGNMENT MONITOR meter.	3-11	3
4.	CODING DRIVE ..... adjust until:	2-4	1
	TRANSMITTER MONITOR CODING OFF lamp ..... lights and just goes off.		10
	DEGENERATION ALIGNMENT MONITOR meter ..... 20 to 40 μa. (Record the microamp indication and adjust CODING DRIVE for recorded reading plus two additional microamps.)		
	Perform table 13-8-13, TM 9—1430—1533—12—2—2.		
5.	NORMAL/SIMULATED TOJ switch ..... hold to SIMULATED TOJ.	2-9	11
	TRANSMITTER MONITOR MISSILE COMMANDS lamp ..... lights.	2-4	6
	TRANSMITTER MONITOR CODING OFF lamp ..... off.		
	DEGENERATION ALIGNMENT MONITOR meter ..... one-half the microamp indication recorded in step 4, ± 1 μa.		
	Adjust CODING BIAS until the normal indications in step 5 are observed.		
	Repeat steps 4 and 5.		
6.	NORMAL/SIMULATED TOJ switch ..... release.		

Table 3-16. Feedthrough Nulling Alinement Procedures

Step	Operation Normal indication Corrective procedure	Illustration Figure	Illustration Key
	NOTES **These procedures are to be performed only when instructed by the weekly check procedures.** **Read the entire procedure before starting.**		
	WARNING The IHIPIR transmits a very powerful beam, exposure to which is harmful to body tissue. Make certain all personnel remain clear of the transmitter beam.		
1.	RADIATE pushbutton ..... press and release.	2-1	18
	NOTE **Allow two minutes for transmitter cavity to lock.**		
2.	Signal processor TEST/GOOD indicator-switch ..... press and release.	2-14	17
	TEST label lights immediately.		
3.	Within 2.5 seconds press and release LAMP TEST pushbutton.		18
	GOOD label lights and the TEST label goes off. After 1 second the TEST label lights again and the GOOD label goes off.		
4.	Repeat above step three times.		
	2.5 Seconds after the final sequence is completed, the RCVR lamp lights. After approximately 8 seconds, the RCVR lamp goes off.		6
5.	Adjust PHASE ADJ. to obtain a maximum number of REPLACE MODULE lamps lit.	3-12	1
	A minimum of A1 through A4 lamps are lit, the GOOD label is lit, and the ADJUST FTN lamp is off.	2-14 3-12	7 thru 16
	Perform table 13-9-3, TM 9—1430—1533—12—2—2.		
6.	TEST/GOOD indicator-switch ..... press and release.		
	TEST/GOOD label goes off.		

Table 3-17. Power Amplifier Alinement Procedures

Step	Operation / Normal indication / Corrective procedure		Illustration: Figure	Illustration: Key
	NOTE These procedures are to be performed only when instructed by the weekly check procedures, when the MO frequency is changed or after replacement of the degeneration preamplifier, PA tube, or rf transmitter assembly.			
1.	MO/PA switch	PA.	2-3	7
2.	Output cavity (upper adjust screw)	adjust fully cw.	3-11	10
3.	Input cavity (lower adjust screw)	adjust fully ccw.		7
4.	Idler cavity (middle adjust screw)	adjust fully ccw.		8
5.	DEGENERATION ALIGNMENT SELECTOR switch	CRYSTAL BALANCE.	2-3	3
6.	Input cavity (lower adjust screw)	adjust until:		
	REFLECTED RF POWER meter	**null in green area.**		1
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.			
7.	Output cavity (upper adjust screw)	adjust until:		
	FORWARD RF POWER meter	**upper blue area.**		2
	NOTE If the indication in step 7 is not obtained, adjust idler cavity (middle adjust screw) until indication is obtained.			
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.			
8.	Arc detector crystal attenuator	adjust until:	3-11	11
	DEGENERATION ALIGNMENT MONITOR meter	**25 μa.**		
	Perform table 13-8-11, TM 9—1430—1533—12—2—2.			
9.	Output cavity (upper adjust screw)	adjust until:		10
	FORWARD RF POWER meter	**indicates a peak.**		
	Perform table 13-8-8, TM 9—1430—1533—12—2—2.			

Table 3-17. Power Amplifier Alinement Procedures—Continued

Step	Operation Normal indication Corrective procedure	Illustration Figure	Illustration Key
10.	Idler cavity (middle adjust screw) ..... adjust until: **NOTE** The idler cavity (middle adjust screw) can be adjusted for two peak indications on the FORWARD RF POWER meter. Select the highest peak (normally the first peak obtained in green area if adjusting cw from null ccw position). **FORWARD RF POWER meter** ..... **peak in green area.** Perform table 13-8-8, TM 9—1430—1533—12—2—2.	3-11	9
11.	Arc detector crystal attenuator ..... adjust until: **DEGENERATION ALIGNMENT MONITOR meter** ..... **25 μa.** **NOTE** Adjust output and idler cavities alternately for a peak indication on FORWARD RF POWER meter. Perform table 13-8-11, TM 9—1430—1533—12—2—2.		
12.	Perform degeneration alinement procedures in table 3-14.		

Table 3-18. Range Amplifier Balance

Step	Operation Normal indication Corrective procedure	Illustration	
		Figure	Key
1.	Place radar in standby mode of operation.		
2.	Place antenna at 200 mils in elevation.		
3.	Set elevation brake (down).	2-11	3
4.	Open target intercept computer range and azimuth drawer.	1-3	2
5.	Connect jumper lead from junction of R3 and R4 in range and azimuth control amplifier to chassis ground.	3-4	3
6.	Set DMM to measure vac and connect DMM test leads across RANGE BAL jacks.		8
	DMM indicates ..... less than 1 vac.		
	Adjust R16.		5
	Perform table 13-6-9, TM 9—1430—1533—12—2—2.		
7.	Remove DMM test leads from RANGE BAL jacks.		
8.	Remove jumper lead from junction of R3 and R4, and chassis ground.		

Table 3-19. Azimuth Amplifier Balance

Step	Operation Normal indication Corrective procedure	Illustration	
		Figure	Key
1.	Place radar in standby mode of operation.		
2.	Place antenna at 200 mils in elevation.		
3.	Set elevation brake (down).	2-11	3
4.	Open target intercept computer range and azimuth drawer.	1-3	2
5.	Connect jumper lead from junction of R22 and R24 in range and azimuth control amplifier to chassis ground.	3-4	2
6.	Set DMM to measure vac and connect DMM test leads across AZIMUTH BAL jacks.		9
	DMM indicates ..... less than 1 vac.		
	Adjust R37.		1
	Perform table 13-6-1, TM 9—1430—1533—12—2—2.		
7.	Remove DMM test leads from AZIMUTH BAL jacks.		
8.	Remove jumper lead from junction of R22 and R24, and chassis ground.		

Table 3-20. Time-of-Flight Amplifier Balance

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	Place radar in standby mode of operation.		
2.	Place antenna at 200 mils in elevation.		
3.	Set elevation brake (down).	2-11	3
4.	Open target intercept computer elevation and time-of-flight drawer.	1-3	3
5.	Connect jumper lead from junction of R4 and R5 in elevation and time-of-flight control amplifier to chassis ground.	3-7	9
6.	Set DMM to measure vac and connect DMM test leads across TOF BAL jacks.		6
	DMM indicates ..... less than 1 vac.		
	Adjust R39.		7
	Perform table 13-6-10, TM 9—1430—1533—12—2—2.		
7.	Remove DMM test leads from TOF BAL jacks.		
8.	Remove jumper lead from junction of R4 and R5, and chassis ground.		

Table 3-21. Elevation Amplifier Balance

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Key
1.	Place radar in standby mode of operation.		
2.	Place antenna at 200 mils in elevation.		
3.	Set elevation brake (down).	2-11	3
4.	Open target intercept computer elevation and time-of-flight drawer.	1-3	3
5.	Connect jumper lead from junction of R12 and R13 in elevation and time-of-flight control amplifier, and chassis ground.	3-7	1
6.	Set DMM to measure vac and connect DMM test leads across ELEV BAL jacks.		5
	DMM indicates ..... less than 1 vac.		
	Adjust R27.		2
	Perform table 13-6-4, TM 9—1430—1533—12—2—2.		
7.	Remove DMM test leads from ELEV BAL jacks.		
8.	Remove jumper lead from junction of R12 and R13, and chassis ground.		

Section V. SILENT MODE SYSTEM REDEPLOYMENT CHECKS

3—18. General

This section contains information pertaining to the silent mode system redeployment checks. These checks are performed by the BCC/PCP personnel to establish integrated system confidence following emplacement without placing system radars in the radiate mode.

3—19. Preparation

When directed to prepare the HIPIR for the silent mode redeployment checks by the BCC or PCP personnel, perform table 3-22.

Table 3-22. Silent Mode Redeployment Check Preparation

Step	Operation / Normal indication / Corrective procedure	Illustration: Figure	Illustration: Zone
	WARNING Make certain all personnel and equipment are clear of the antenna area, as the antenna will elevate to 1500 mils when the RADIATE pushbutton is pressed.		
1.	HIPIR ..... energize to the false radiate condition. **NOTE** The false radiate condition is obtained by energizing the radar to radiate, table 3-5, except both the MASTER OSCILLATOR and POWER AMPLIFIER BEAM circuit breakers are turned off.	2-2	18, 11
2.	LOCAL/REMOTE switch ..... LOCAL.	2-9	20
3.	Azimuth handwheel ..... set to the primary threat line (PTL) azimuth.		16
4.	MASTER OSC ASSIGNED FREQUENCY switch ..... record current setting and set to assigned frequency 1.	2-2	9
5.	PEDESTAL SAFETY SWITCH. ..... SAFE.	2-11	1
6.	Azimuth indicator scale ..... verify setting to the PTL azimuth and report to BCC/PCP personnel. (Hold the antenna to maintain the PTL azimuth.)		7

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-1. General

Repair parts, special tools, and equipment are issued to the using organization for operating and maintaining the IHIPIR.

4-2. Repair Parts

Repair parts are supplied to the using organization for replacement of those parts that become worn, damaged, or otherwise unserviceable, providing replacement of these parts is within their scope. TM 9—1430—1533—24P is the authority for requisitioning replacement parts for the IHIPIR.

4-3. Special Tools and Test Equipment

The special tools and test equipment required for organizational maintenance of the IHIPIR are listed in chapter 3, par. 3-7.

Section II. SERVICE UPON RECEIPT - GENERAL

4-4. Scope

a. When a new or reconditioned IHIPIR is first received by the using organization, it is the responsibility of the officer-in-charge to determine whether the materiel has been properly prepared for service, and to insure that it is in condition to perform its assigned mission when placed in service. For this purpose, a visual inspection will be made of all major components, assemblies, subassemblies, and accessories to make sure that they are present, properly assembled, secured, and clean. Equipment records will be checked to determine that the major item has been correctly adjusted and lubricated.

b. This chapter presents general and detailed services to be performed upon receipt of each IHIPIR. Service upon receipt depends upon the level of preshipment processing, which is explained in paragraph 4-6.

4-5. General Service Procedures

a. TM 38—750 lists the applicable forms, records, and reports to be used for inspection. Check the serial number of the IHIPIR with the number recorded in the logbook. Examine the logbook for IHIPIR to determine the general maintenance background of the materiel.

b. Check all tags attached to the materiel for information pertaining to lubrication required before the adjustment of parts. Check the tags, or other indicators of used or reconditioned equipment, for any changes. Immediately transfer to the system logbook and appropriate manuals all the information found on such tags or indicators.

c. Make certain that all hardware is secure, cabling not frayed, and cable conductors not exposed.

d. Make sure that all major component parts are present. Check to insure that leveling jacks are present and in good condition. Look for missing or loose bolts, screws, and rivets. Check the shielding and ground connections. Make sure the nameplates are present and secured in their proper places.

e. Check all items of equipment to determine whether they are in good operating condition. Check to determine that all exterior surfaces are intact and properly assembled, noting excessive grease, oil, or foreign matter that might interfere with proper operation.

f. Visual checks of the equipment give an indication of its condition. Steps (1) through (23) below list these checks. Any deficiencies noted should be corrected before operation of the equipment.

(1) Check the materiel against the accompanying lubrication orders for proper lubrication.

(2) Make sure that sealing is complete on all sealed parts of the equipment.

(3) Check all indexes, scales, division and nameplates, warning, danger, and caution plates to see that they are clear and easy to read.

(4) Look for bare spots or damaged finish to see if any unprotected metal surfaces are exposed to corrosion or rust. Determine whether a touchup or complete refinishing job should be accomplished.

(5) Inspect movable metal parts such as bearings, hinges, sliding surfaces, and latches to determine whether they are clean, properly lubricated, and free from rust and foreign matter.

(6) Look for moisture or rust producing conditions.

(7) Check the service tags of fire extinguishers for current servicing.

(8) Make sure flammable liquids are in authorized containers only.

(9) Look for excessive or uneven wear, play, or backlash in geartrains, bearing surfaces, dials, and knobs.

(10) Check the contacts of connectors for looseness, corrosion, or dirt.

(11) Look for solder filings, stray bits of solder, and cold-solder joints.

(12) See that the solder connections are not bulky with excess solder but are neat, smooth and shiny, and coated with anti-fungus varnish.

(13) Inspect all the insulation for signs of discoloration, carbonization, mildew, or fungus growth.

(14) See that there is no chafing, or possibility of chafing, of the insulation.

(15) Look for bent, broken, loose, or missing contacts on plug-in components. Make sure that the contacts are clean.

(16) Remove all the dry batteries from equipment not in use.

(17) Check the capacitors for evidence of heating (discoloration, swelling, cracked, or melted wax).

(18) Check the resistors for discoloration, cracks, breaks, and signs of overheating.

(19) Look for indications of burned, pitted, or corroded contacts on switches, relays, and circuit breakers. Check the contacts for cleanliness. Make sure the switch detents have a positive mechanical action.

(20) Ceramic parts should be clean and without cracks or breaks.

(21) Check the wiring and cabling for proper support where required. Runs should be short and have only enough slack to relieve stress on leads.

(22) Examine the wires near terminals for frayed or loose strands that can cause shorts.

(23) Visually inspect the lenses, prisms, reticles, and windows to make sure that they are free of scratches, pits, dirt, and chips which would interfere with the optical performance of the equipment. Any breakdown or excessive discoloration of cement between elements of the compound lenses which affects optical performance in the field is cause for rejection of the instrument. Do not base rejection on the lack of reflection-reducing coating for the optical elements of instruments already in the field. There must be no parallax, abnormal, or double vision. If errors cannot be brought into specified tolerances as determined by the system alinement requirements, the optical instrument is considered unserviceable.

g. Remove the tape from all glass surfaces, such as meter windows, reflectors, instrument dials, lights, and windows over cathode-ray tubes.

h. Remove the sealing tape from vents, doors, covers, and other tape-sealed areas.

Section III. SERVICE UPON RECEIPT OF THE IHIPIR

4-6. General

Service upon receipt of the IHIPIR depends upon whether it has been processed for overseas, extended storage, or use within 30 days by the using organization. The level at which an item is shipped is clearly marked on it. The main levels of processing for shipment are presented in subparagraphs *a* through *c* below.

a. Level A military package provides preservation and packaging for adequate protection against corrosion, deterioration, and physical damage during shipment, handling, indeterminate storage, and world-wide redistribution.

b. Level B limited military package furnishes preservation and packaging for adequate protection against corrosion, deterioration, and physical damage during multiple domestic shipments, handling, and covered storage.

c. Level C minimum military package prepares for preservation and packaging for adequate protection against corrosion, deterioration, and physical damage during shipment from the supply source to the first receiving activity for immediate use. The supplier's commercial practice will be accepted when such practice meets the requirements of level C.

4-7. Service Upon Receipt of the IHIPIR

Refer to paragraphs 4-4 and 4-5 for general service-upon-receipt information. In addition, the procedures listed in subparagraphs *a* through *l* below must be performed upon receiving the IHIPIR.

a. Trailer. Refer to TM 9—2330—235—14 for service upon receipt of the M390 trailer.

b. Motor-Generator Assembly. Remove the protective tape, if any, from the cover. Remove the cover by releasing the snap fasteners along the bottom edges. Remove the desiccant units and securing tape. Any barrier material used with the units for shipping purposes should be removed. Remove the humidity indicator on or near the motor. If the motors are shockmounted but have been secured for shipment, remove the securing devices and place the motors in the shockmounted position. Replace the cover and secure it in the locked position with the snap fasteners.

c. Radar Set Group. All chassis within the console should be locked in their respective positions with the turnlock studs on the individual panels. Check the cover locking device for proper operation. Remove the protective tape from the dials and knobs. Remove the desiccant units and associated packaging material located near the motor area. Remove the humidity indicator on or adjacent to the inside area of the console unit cover.

d. Radar Set Group Exterior. If the electrical connections are taped, remove the tape from the exposed ends of the cables, harnesses, plugs, cable openings, sockets, receptacles, terminals, junction boxes, and electrical openings. Remove the securing wire from the ground rod attached to the console exterior. Do not confuse securing wire with the heavy ground wire attached to the rod. If the metal surfaces are preserved with oil or grease, remove excessive amounts.

e. Pedestal. Remove the barrier material and desiccant in the conical section of the pedestal blower area. Remove the humidity indicator fixed to the lower inside rim of the blower access port frame. The humidity indicator might be located in some other position within the blower area, but is always as far away as possible from the desiccant.

f. Azimuth Mil Ring Indicator. Remove any tape or cotton covering the mil ring indicator.

g. Elevation Mil Indicator. Remove any tape or cotton covering the mil indicator. Remove any padding between the mil indicator and the elevation head assembly.

h. Telescope Mount. Remove any padding or tape covering the telescope mount.

i. Fire Extinguisher. Remove the fire extinguisher from the packaging container. Remove all tape and padding material.

j. Protective Covers. Remove the protective covers on the IHIPIR antennas.

k. Check Procedures. Perform the check produres for the IHIPIR (chapter 3).

Section IV. LUBRICATION

4-8. General Lubrication Instructions

Lubrication intervals are based on normal 8-hour day operation. These intervals may be reduced to compensate for abnormal operation, severe conditions, or the discovery of contaminated lubricants. During inactive periods the intervals may be extended, commensurate with adequate preservation. After washing or fording, the IHIPIR must be lubricated. Parts should be cleaned with volatile mineral spirits, paint thinner (TPM), or dry cleaning solvent (PD-680, type 1). All lubrication points should be dried before applying the lubricant.

4-9. Lubrication Chart

Lubrication chart LC 9-1430-1533-12 (fig. 4-1) prescribes lubricating instructions as to location, intervals, and proper materials for the IHIPIR. It also contains the specific procedures to be performed.

NOTE

Refer to TM 9—2330—235—14 for preventive maintenance checks and services and lubrication instructions for trailer M390.

LUBRICATION CHART **LC 9-1430-1533-12**

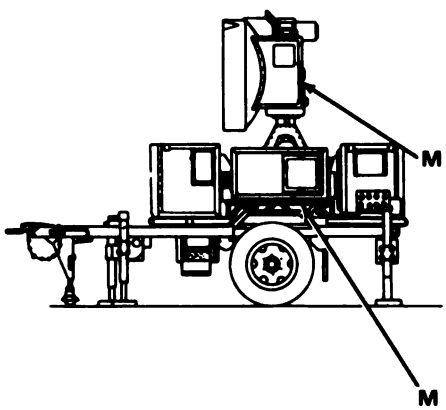
RADAR SET AN/MPQ-57 IHIPIR (IMPROVED HAWK AIR DEFENSE GUIDED MISSILE SYSTEM)

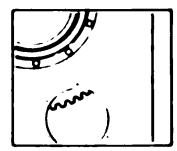
Intervals are based on normal operations. Reduce to compensate for abnormal operation, severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Relubricate after washing and fording.

Warning: The dry-cleaning solvent referred to below is flammable. Keep away from heat and open flame.

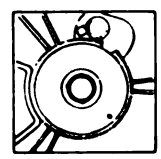
Clean parts with dry-cleaning solvent (PD-680, Type 1). Dry before lubricating.

INTERVAL — LUBRICANT





M GMD ELEVATION DRIVE GEAR (See note 1)



M GMD AZIMUTH DRIVE GEAR (See note 2)

KEY

LUBRICANTS — ALL TEMPERATURES		INTERVAL
OAI — OIL, LUBR., Aircraft instrument (MIL-L-6085)	For arctic operation refer to FM 9—207	M — Monthly
GMD — GREASE, Molybdenum disulfide (MIL-G-21164)		

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Figure 4-1. Lubrication chart (sheet 1 of 2).

- NOTES -

1. ELEVATION DRIVE GEAR — To reach elevation drive gear assembly, remove access plate from side of elevation head. Apply a thin coat of lubricant GMD to the teeth of the gear. Do not mix graphite with lubricant.

2. AZIMUTH DRIVE GEAR — To reach azimuth drive gear, remove pedestal bottom cover. Apply thin coat of lubricant GMD to teeth of gear. Do not mix graphite with lubricant.

3. OIL CAN POINTS — Monthly, lubricate all cabinet latches and hinges with OAI.

4. DATA GEARS — Do not lubricate.

5. MOTOR-GENERATOR (DIEHL CONFIGURATION ONLY) — Lubricate after every 1000 hours of operation. Use lubricant GMD. Remove the four threaded inserts from grease drain holes at the bottom of the motor generator. Retain the inserts. Remove the four grease cups and fill with grease. Reinstall the cups and screw them down till grease oozes from the drain holes. Reinstall the threaded inserts.

6. TRAILER LUBRICATION — Refer to TM 9—2330—235—14.

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Figure 4-1. Lubrication chart (sheet 2 of 2).

Section V. MAINTENANCE SERVICES

4-10. General

This section contains the instructions for the maintenance of the HIPIR. For instructions not contained in this manual, refer to TM 9—1425—525—12—4.

4-11. Desiccator Replacement

Remove and install the pedestal and the transmitter housing desiccators as shown in figures 4-2 and 4-3.

4-12. Absorption Paper Roll Replacement

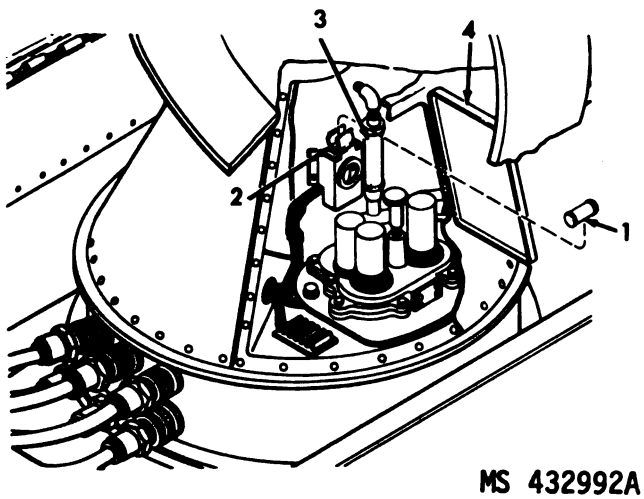
Remove the absorption paper rolls from the locations shown in figures 4-4 and 5-10, and replace.

4-13. Coolant Hose Replacement

a. Purge the cooling system as described in paragraph 4-16, steps *a* through *p*, but do not install the lock wire in step *p*. If purging cannot be accomplished, disassemble and clean the filters.

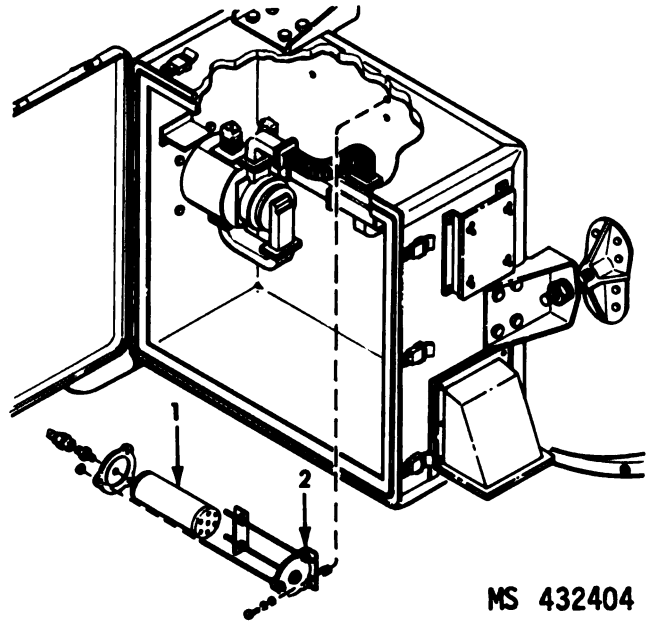
b. Drain the cooling system as described in paragraph 4-14*b* and clean all components.

c. After the hoses have been replaced, purge the cooling system as described in paragraph 4-16, steps *k* through *q*.



1—Desiccator (spare)
2—Clip
3—Desiccator
4—Access cover

Figure 4-2. Replacement of the desiccator in the antenna pedestal.



1—Desiccator
2—Holder

Figure 4-3. Replacement of the desiccator in the transmitter housing.

4-14. Filling and Draining the Cooling System

NOTE

Coolant 5959151, 6850-00-078-4459 (Union Carbide PM-3961), is the only authorized replacement for the HIPIR cooling system.

NOTE

The key numbers shown below in parentheses refer to figure 4-4, unless otherwise indicated.

a. Filling Cooling System.

(1) Deenergize the HIPIR (par. 3-12).

(2) Set the PEDESTAL SAFETY SWITCH to SAFE.

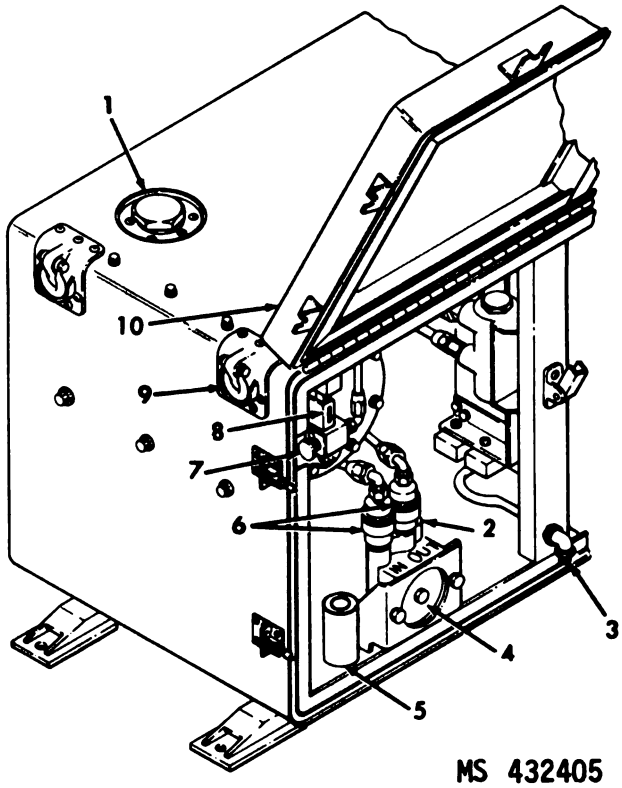
(3) Position the antenna over the motor-generator assembly.

(4) Make certain that all coolant lines are connected and tightened.

(5) Fill the reservoir with clean coolant.

(6) Clean all spilled coolant immediately with a dry cloth.

(7) Energize the HIPIR to standby condition (pars. 3-9 thru 3-11), and operate the pump for 15 seconds.



1—Filler cap
2—Bypass indicator
3—Draincock
4—Filter assembly
5—Absorption paper
6—Quick-disconnects
7—Indicator valve knob
8—Sight tube
9—Lifting shackle
10—Door

Figure 4-4. Cooling system filler cap and indicator valve.

(8) Repeat steps (5), (6), and (7) above until the reservoir remains full while the pump is operating.

(9) With the pump operating, press and hold the indicator valve knob (7) until the coolant passing through the sight tube (8) is free of air bubbles. Release the knob.

(10) Make certain that the GLYCOL LIQUID LEVEL WARNING lamp (30, fig. 2-1) is off.

b. Draining Cooling System.

(1) Loosen the filler cap (1) to vent the system.

NOTE

Use locally available material to divert the coolant flow from the equipment to the draining receptacles.

(2) Open the draincock (3) and allow the system to drain. Periodically press and hold the indicator valve knob (7) to allow the heat exchanger to drain completely.

4-15. Cleaning the Filter Elements in the Liquid Cooler Filter Assembly

NOTE

The key numbers shown below in parentheses refer to figure 4-4.

a. Remove the quick-disconnects (6) from the filter assembly (4).

CAUTION

Replace the filter assembly with stainless steel type filters (10105739) and elements (SP1314) only.

NOTE

The filter elements must be inspected for damage. If damaged, they must be replaced. Spare elements are contained in filter assembly repair kit 5959133.

NOTE

The filter assembly (4) need not be removed from its mount in order to clean the filter elements.

b. Refer to figure 4-5 for the cleaning operation.

c. Connect the quick-disconnects (6).

d. Fill the cooling system as described in paragraph 4-14*a*.

CAUTION

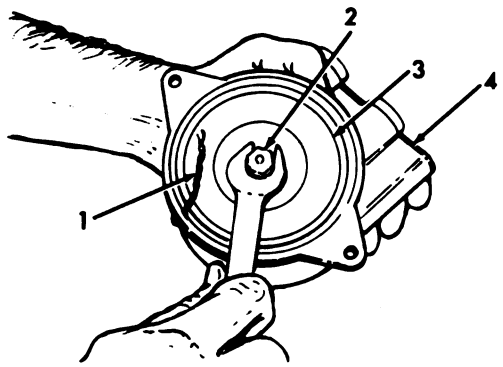
To check for proper coolant flow through the filters while the cooling system is operating, press and release the bypass indicator (2) and note that it does not move more than 1/8 inch upward.

4-16. Purging the Cooling System

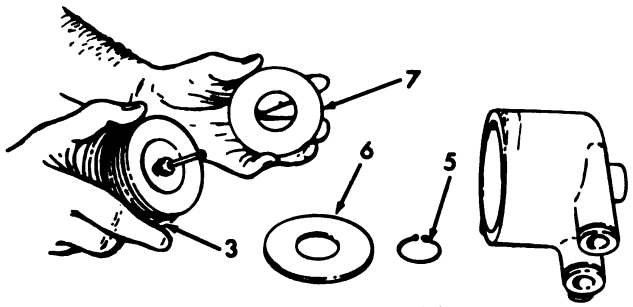
The following procedure is for purging the cooling system.

CAUTION

In performing the following purging procedure, the pump must be operated without the required lubrication provided by the coolant; as a result, the life of the pump is affected. Therefore, it is imperative that operation of the pump not exceed the time noted in the following procedure.

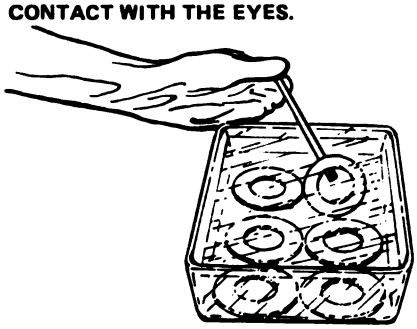


1. CUT THE LOCKWIRE (1), UNSCREW THE BOLT (2), AND REMOVE THE COVER ASSEMBLY (3), FROM THE HOUSING (4).

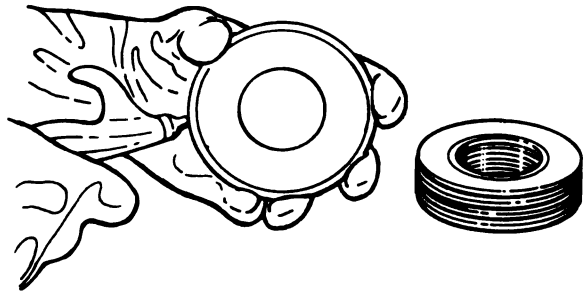


2. REMOVE THE RETAINING RING (5), AND THE END PLATE (6), AND LIFT THE EIGHT FILTER ELEMENTS (7) FROM THE COVER ASSEMBLY (3).

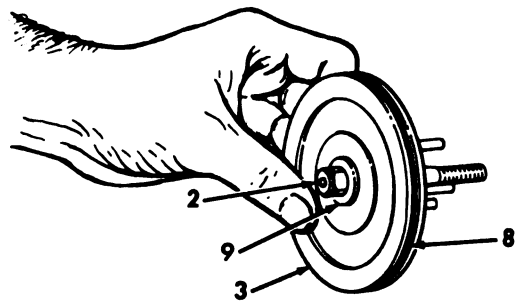
WARNING: PROTECTIVE GLOVES SHOULD BE WORN TO PREVENT SKIN IRRITATION WHEN USING THE CLEANING SOLUTION. AVOID CONTACT WITH THE EYES.



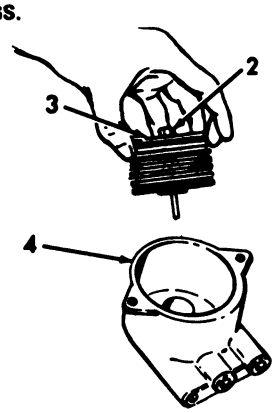
3. PLACE THE FILTER ELEMENTS IN A BATH OF DRY CLEANING SOLVENT AND SOAK THEM FOR ABOUT 10 MINUTES. THEN REMOVE THE ELEMENTS AND PLACE THEM IN A FRESH BATH, AGITATING THEM UNTIL CLEAN.



4. REMOVE THE FILTER ELEMENTS FROM THE BATH AND BLOW OFF THE EXCESS SOLUTION WITH AN AIR HOSE.



5. REMOVE THE PREFORMED PACKING (8) FROM THE COVER ASSEMBLY (3) AND THE PREFORMED PACKING (9) FROM BOLT (2). REPLACE THEM WITH NEW PREFORMED PACKINGS.



6. WIPE THE INSIDE OF THE HOUSING (4) WITH A CLEAN CLOTH. REPLACE THE FILTER ELEMENTS, THE END PLATE AND THE RETAINING RING ON THE COVER ASSEMBLY (3) AND INSTALL THE ASSEMBLY IN THE HOUSING (4). TIGHTEN THE BOLT (2) (50-75 INCH POUNDS) AND LOCKWIRE THE BOLT TO THE HOUSING.

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Figure 4-5. Cleaning the filter elements in the liquid cooler filter assembly.

a. Drain the cooling system as described in paragraph 4-14*b*.

b. Clean the filter assembly but do not lockwire the bolt to the housing.

c. Make certain that all coolant lines are connected and tightened.

d. Fill the reservoir with methanol (6810-00-275-6010).

CAUTION

Do not energize the heaters with methanol in the system. Insure that the GLYCOL PREHEAT circuit breaker (28, fig. 2-1) is set to OFF before proceeding.

e. Energize the IHIPIR (pars. 3-9 thru 3-11), and operate the pump for 15 seconds.

f. Repeat steps *d* and *e* above until the reservoir remains full while the pump is operating.

g. Periodically press and hold the indicator valve knob (7, fig. 4-4) while the pump is operating.

h. Operate the cooling system for three minutes.

i. Drain the cooling system as described in paragraph 4-14*b*.

j. Remove the filter assembly and inspect for contamination; if contamination exists, repeat the cleaning procedure shown in figure 4-5, but do not lockwire the bolt to the housing.

k. Fill the reservoir with distilled water (OB41).

l. Turn the heaters on. Set the GLYCOL PREHEAT circuit breaker to on.

m. Allow the water to heat until the P.A. COLLECTOR LOW TEMP WARNING lamp (7, fig. 2-1) goes off.

n. Operate the cooling system for four to five minutes.

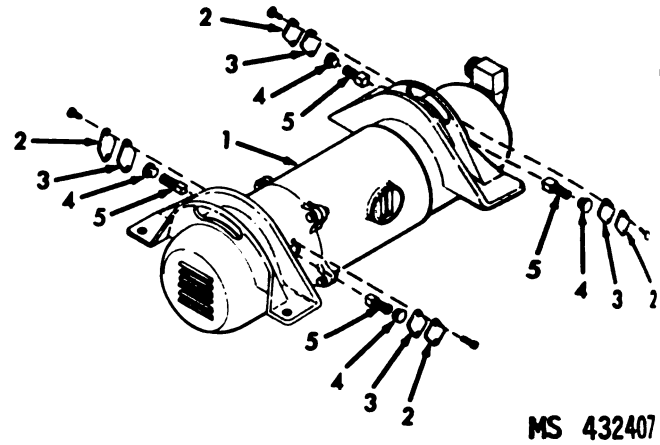
o. Drain the cooling system as described in paragraph 4-14*b*.

p. Repeat steps *k* through *o* until there is no visible evidence of contamination (oil film) on the filter, then lockwire the bolt to the housing.

q. Fill the cooling system as described in paragraph 4-14*a*.

4-17. Inspection of the Motor-Generator Brushes

a. Use figure 4-6 (configuration A) for the General Electric motor-generator inspection.



1—Motor-generator
2—Plate (4)
3—Gasket (4)
4—Cap (4)
5—Brush assembly (4)

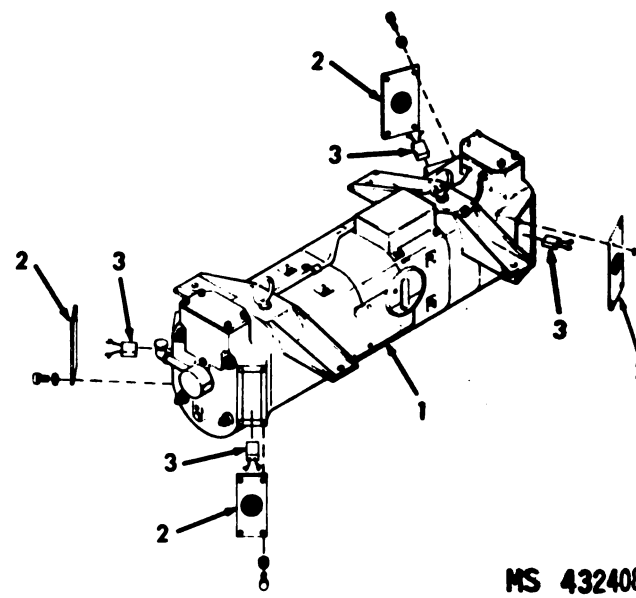
Figure 4-6. Inspection of the motor-generator brushes (configuration A).

(1) Insure that the MOTOR GENERATOR circuit breaker (17, fig. 2-7) on the main fuse panel is set to OFF.

(2) Remove and inspect each of the four brushes as shown in figure 4-6.

(3) If the brushes are less than 5/16 inch long, replace them.

b. Use figure 4-7 (configuration B) for the Diehl motor-generator inspection.



1—Motor-generator
2—Intake port (4)
3—Brush assembly (4)

Figure 4-7. Inspection of the motor-generator brushes (configuration B).

NOTE

The key numbers shown below in parentheses refer to figure 4-7.

(1) Insure that the MOTOR GENERATOR circuit breaker on the main fuse panel is set to OFF.

(2) Remove the four intake ports (2) and inspect each of the four brushes (3).

(3) If the brushes are less than ½-inch long, replace them.

(4) Replace the intake ports.

Figure 4-8. Deleted.

4-18. Inspection of the Liquid Cooler Unit Fan Assembly

NOTE

The key numbers shown below in parentheses refer to figure 4-9.

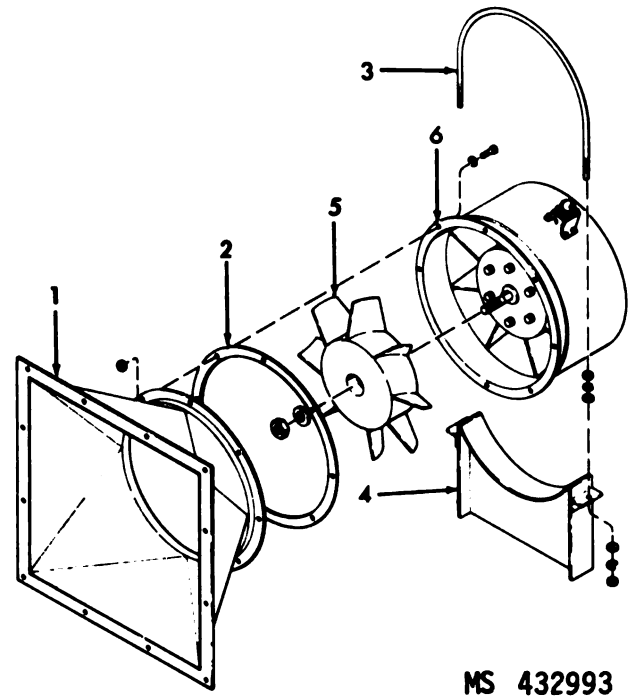
a. The cooler unit should be inspected after every 200 hours of operation for evidence of contamination or corrosion. This may be accomplished by using a mirror to observe the fan assembly and motor housing.

b. Close inspection is required, particularly at the tip of the impeller blade and the housing, for evidence of buildup of material that would reduce the tip clearance of the impeller (5). Any buildup of material that would cause interference between the impeller and the housing (6) could result in motor burnout.

CAUTION

If the PUMP circuit breaker (31, fig. 2-1) trips, it should not be held in the ON position. The unit should be inspected as above to insure that the impeller is free to rotate. Binding of the impeller on the housing can result in motor burnout particularly if the circuit breaker is held ON.

c. If contamination or corrosion is present, replace the fan assembly.



1—Shroud
2—Gasket
3—Clamp
4—Support
5—Impeller
6—Housing

Figure 4-9. Inspection of the fan assembly and motor housing.

4-19. Filling the Dummy Load

NOTE

Coolant fluid dielectric OS59 (MIL-C-47220 type 3) is the only authorized replacement for the HIPIR dummy load.

WARNING

Should the MIL-C-47220, type 3 coolant become sufficiently contaminated by water so as to appear milky, it becomes a flammable mixture and must be handled as such.

WARNING

Do not allow the coolant to come in contact with open cuts or sores.

CAUTION

Avoid getting excessive amounts of the coolant on any part of the equipment.

CAUTION

The coolant has a silicate ester base and is sensitive to water. Even small quantities of water can react to produce a precipitate or sludge. Large quantities of water may produce a system-clogging gel. Avoid water contamination of the coolant at all times.

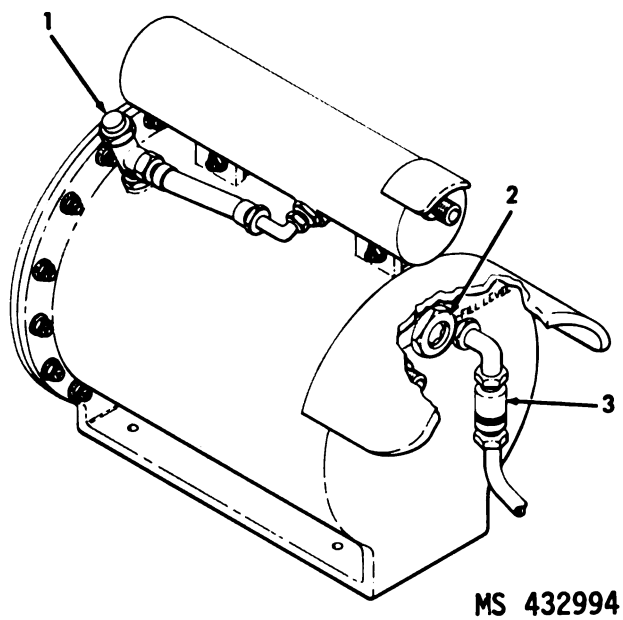
NOTE

The key numbers shown below in parentheses refer to figure 4-10.

a. Make certain that all coolant lines and the quick-disconnects (3) are connected and tightened.

b. Remove the filler cap (1) and fill with clean coolant to the fill-level indicator (2).

c. Clean all residue from spilled coolant immediately with a dry cloth.



1—Filler cap
2—Fill-level indicator
3—Quick-disconnect

Figure 4-10. Dummy load filler cap and fill-level indicator.

4-20. Cleaning and Alining the Antenna Pedestal Sliprings

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11).

NOTE

The key numbers shown below in parentheses refer to figure 4-11.

a. Removal.

(1) Remove the pedestal cover assembly (1), heater control assembly (5), cover plate (4), and its related gasket.

(2) Disconnect connectors from the electrical contact brush housing (3).

(3) Remove the electrical contact brush housing (3).

(4) Inspect each brush (6 and 8) for damage and for less than 1/16-inch thickness at either end. Replace if necessary.

b. Cleaning.

(1) Brush off any residue that might have settled on the barriers. Rotate the antenna assembly through several revolutions to clean the barriers.

(2) Sprinkle naphtha, TTN 97 TTY1GRA (6810-00-223-9073), over a clean lint-free cloth.

(3) Wring out excess naphtha so that the cloth is slightly dampened.

(4) Starting with the top slipring (2), hold the cloth firmly against the contact surface of the slipring barrier and rotate the antenna assembly at least two revolutions.

(5) Perform step (4) above for all remaining slip-rings. Insure that a clean area of the cloth is used and that the antenna assembly is rotated at least two revolutions for each slipring surface.

NOTE

If the sliprings are malfunctioning, request that DS and GS personnel perform the slipring resistivity check (TM 9—1430—533—34—2).

c. *Installation and Alinement.*

CAUTION

Insure that all the brushes (6 and 8) are in contact with their respective sliprings prior to seating the electrical contact brush housing to the antenna pedestal.

(1) Install the electrical contact brush housing (3).

(2) Rotate the antenna assembly to insure that there is no binding and that the brushes ride freely in the grooves of the slipring assembly (2).

(3) Check the contact brushes (6 and 8): if they are misalined or riding on the slipring barrier, move the brushes off or away from the slipring barrier toward center of slipring contact groove.

(4) Rotate the antenna in azimuth 6400 mils and recheck brushes (6 and 8) for alinement. If no brushes are misalined, proceed to step (9). If brushes are misalined, proceed to step (5).

CAUTION

Loosen the contact brush screws just enough to move the contact brush. Loosening the screws too much could cause the retainer to drop into the pedestal base.

(5) Loosen two retainer screws on the electrical contact brush holder assembly (7) of the brush to be alined.

(6) Move the contact brush to the center of the contact groove.

(7) Tighten both retainer screws.

(8) Repeat steps (4) through (8) for the remaining misalined contact brushes in the electrical contact brush holder assembly.

(9) Install the electrical contact brush holder assembly (7).

(10) Connect the connectors to the electrical contact brush holder assembly.

(11) Reinstall the pedestal cover assembly (1), the heater control assembly (5), the cover plate (4), and its related gasket.

4-20.1. Electrical Contact Brush Holder Assembly Alinement Procedure

WARNING

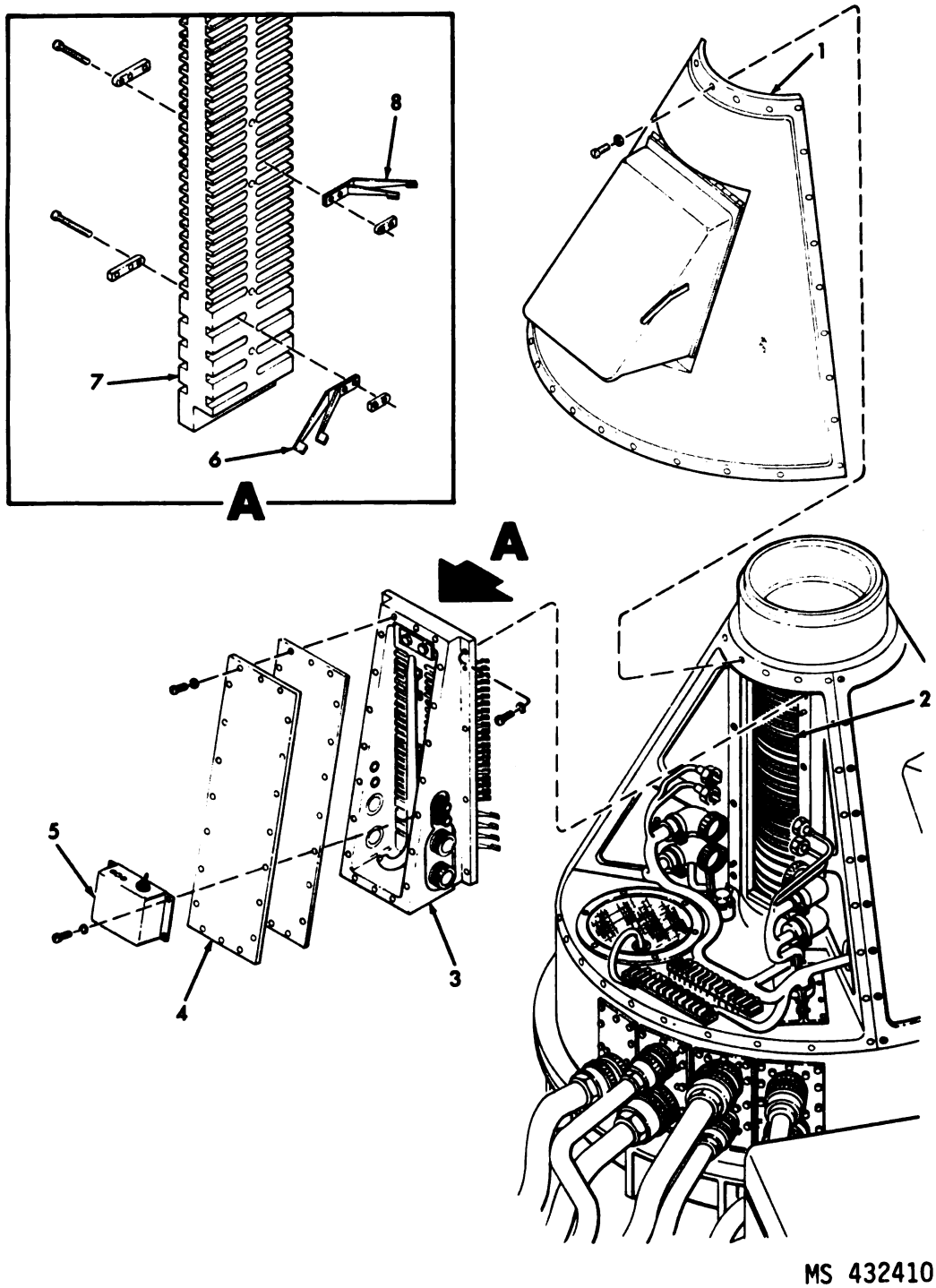
Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11).

NOTE

The key numbers shown below refer to figure 4-11.1.

a. *Removal.*

(1) Remove the cover assembly (3), the heater control assembly (5, fig. 4-11), the cover plate (6), and its related gasket (7).



1—Pedestal cover assembly
2—Slipring assembly
3—Electrical contact brush housing
4—Cover plate
5—Heater control assembly
6—Brush SR68 — SR75 10068230
7—Electrical contact brush holder assembly
8—Brush SR1 — SR67 10068231

Figure 4-11. Replacement of the electrical contact brushes.

(2) Remove the electrical contact brush housing (22) from the pedestal base (23).

(3) Remove the branched wiring harness (12) from the electrical contact brush holder assembly (16).

(4) Remove the electrical contact brush holder assembly from electrical contact brush housing (22) by removing hardware (8, 9, 13, 14 and 15).

b. Installation and Alinement.

(1) Install the electrical contact brush housing to the pedestal base (23).

(2) Rotate the antenna until no. 10 (190)-32 NF drilled and tapped hole can be located through the collar of the lowest part of the slipring assembly.

(3) Insert the threaded end of alinement tool (11568625) into tapped hole and hand tighten. Center inside the electrical contact brush housing (22) by moving the antenna.

(4) Carefully install and aline the electrical contact brush holder assembly (16) to the electrical contact brush housing (22) by passing the alinement tool installed in step *b*(3) through the center hole at the bottom of the electrical contact brush holder assembly.

(5) Reinstall and tighten retaining hardware (8, 9, 13, 14 and 15).

(6) Remove the alinement tool.

(7) Safety wire the screws (8 and 13) at the top and bottom of the electrical contact brush holder assembly (16) using the safety wire technique outlined in TM 9—1425—525—12—4.

(8) Reinstall the branched wiring harness.

(9) Reinstall the electrical contact brush housing.

(10) Reinstall the cover plate (6) and its related gasket (7), the heater control assembly and the cover assembly (3).

(11) Check brush alinement (par. 4-20*c*, steps (2) through (8)).

4-21. HVPS Connector Treatment Procedures

NOTE

Use the connector repair kit (package stock number 5421100) for these procedures.

a. Remove all foreign matter from the silicon rubber inserts, using cleaning solvent MIL-C-81302, 6850-00-984-5853, and allow them to dry.

b. Using one of the talcum bottles from the kit, dust the silicon inserts with talcum.

c. Squeeze the empty talcum bottle, blowing air over the inserts to remove excess talcum powder.

d. Immediately connect the mating connectors to prevent entrapment of moisture in the talcum powder.

4-22. Repair of the Radar Set Group and Transmitter Group Weatherstrips

NOTE

The key numbers shown below in parentheses refer to figure 4-12.

a. Remove the screws (1) and the metal strip (2) securing the canvas protective strip (3) to the equipment cabinet door (4).

b. Inspect the weatherstrip at the junction of the equipment cabinet and the front panel (5) for gaps which would allow water to enter the cabinet.

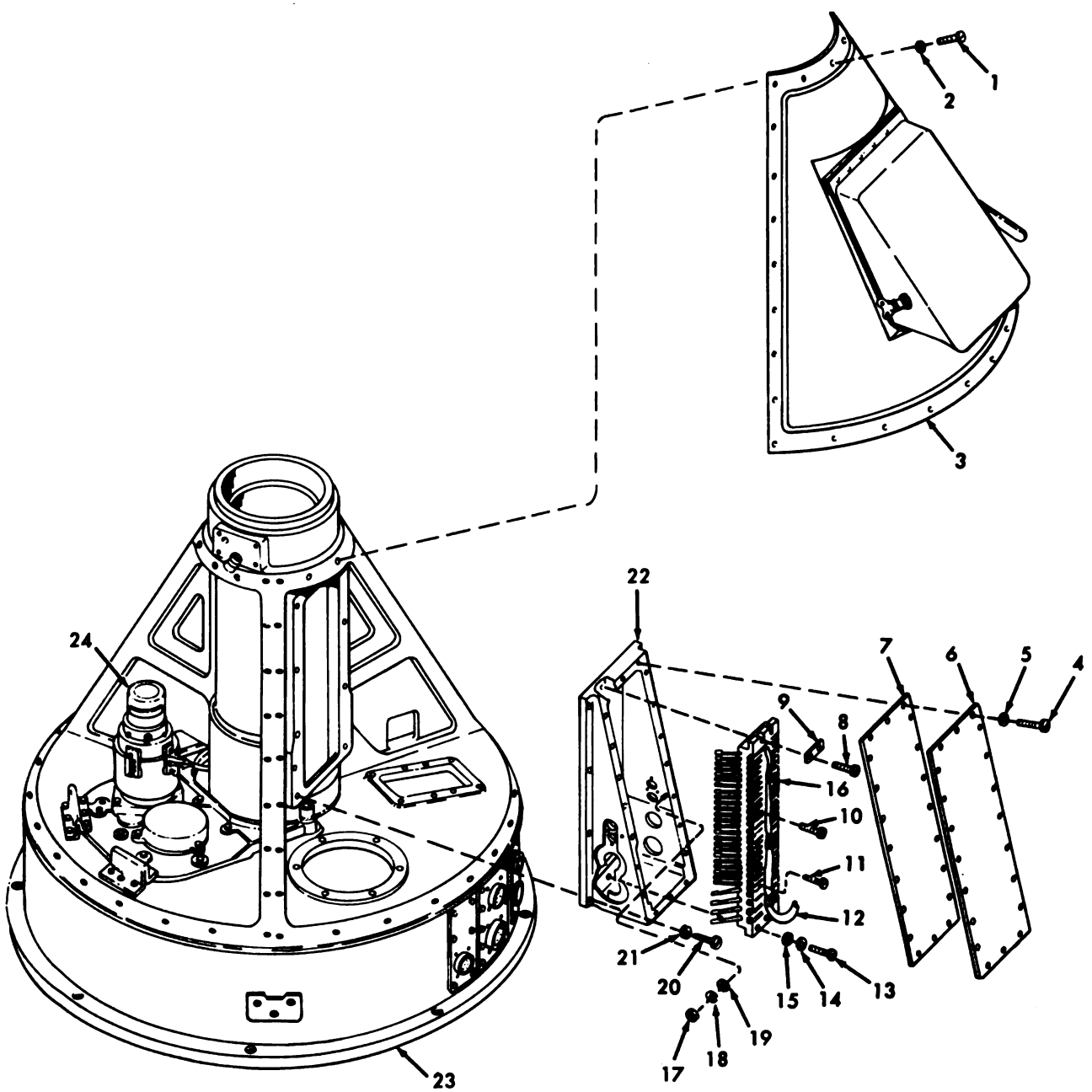
c. If necessary, apply a fine bead of R.T.V. 102 (8040-00-225-4548) to seal the gaps.

d. After the R.T.V. 102 has dried, secure the canvas protective strip to the equipment cabinet door using the screws and metal strip removed in step *a* above.

4-23. Radio-Frequency Leakage Detection Test

WARNING

Prolonged exposure to radio-frequency (rf) radiation of 10 mw/cm^2 or greater, as per AR 40-583, is a potential health hazard. This test is used to determine if a hazard to health or equipment exists in the HIPIR. If an indication of rf leakage greater than 1 mw/cm^2 is detected, the radar should be turned off immediately and repairs made.



1—Screw
2—Washer
3—Cover assembly
4—Screw
5—Washer
6—Cover plate
7—Gasket
8—Screw
9—Shim
10—Screw
11—Screw
12—Wiring harness
13—Screw
14—Washer
15—Washer
16—Electrical contact brush holder assembly
17—Nut
18—Washer
19—Washer
20—Screw
21—Washer
22—Electrical contact brush housing
23—Pedestal base
24—Azimuth drive motor

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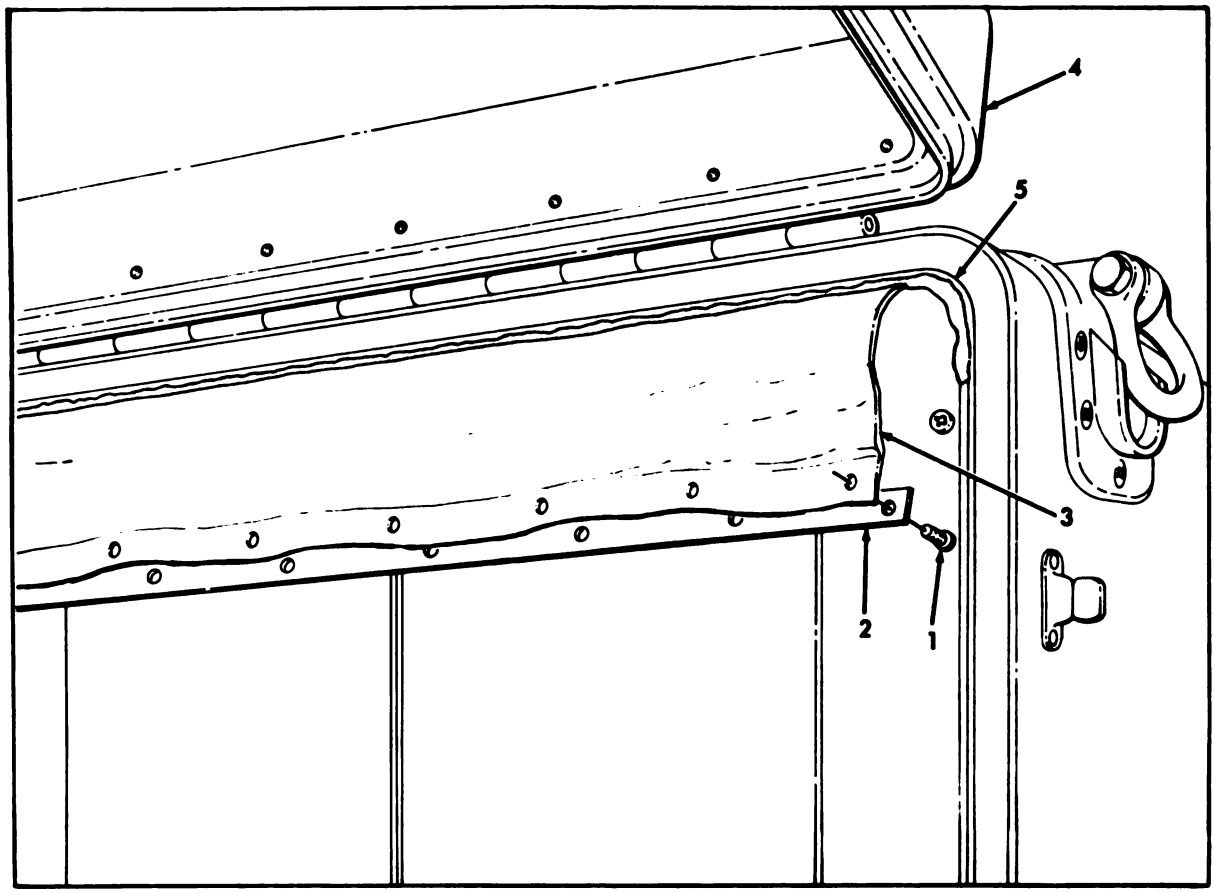
Figure 4-11.1. Removal of the electrical contact brush holder assembly and housing.



MS 432411

1—Screw
2—Metal strip
3—Canvas protective strip
4—Door
5—Junction of equipment cabinet and front panel

Figure 4-12. Repair of the radar set group and transmitter group weatherstrips.

WARNING

Physical sensation of heat on any portion of the body in the proximity of waveguide components may indicate an rf radiation leak of hazardous intensity.

NOTE

An rf leakage level of less than 1 mw/cm² is used as the acceptance level rather than the permissible 10 mw/cm² for the following reasons: It is difficult to perfectly aline the detector waveguide flange in a position very close to the potential leak; the accuracy of the measurement may vary by a factor of 0.5 to 2; leakage levels that exceed 1 mw/cm² may degrade radar performance.

a. Preparation for Test.

(1) Insure that the LOCAL/REMOTE switch (20, fig. 2-9) is set to LOCAL.

(2) Deenergize the IHIPIR in accordance with table 3-6.

(3) Set the BATTLE SHORT switch (7, fig. 2-6) to ON, the PEDESTAL SAFETY SWITCH (1, fig. 2-11) to SAFE, and the MOTOR GENERATOR circuit breaker (17, fig. 2-7) to OFF.

(4) Remove the access cover and seal (2 and 3, fig. 5-14) from the back of the pedestal head assembly.

(5) Open and remove the doors from the antenna receiver and transmitter compartments.

(6) Remove the round bottom cover from beneath the pedestal base.

(7) Remove protective cover from the waveguide assembly between the transmitter console and the pedestal.

WARNING

The IHIPIR transmits a powerful beam, exposure to which is harmful to body tissue. Make certain all personnel remain clear of the transmitter beam when radiating. Failure to perform steps (8) and (9) below may pose a hazard to personnel.

(8) Manually position the antenna to 800 mils elevation and set the elevation brake (down).

(9) Manually position the antenna to the specified safe azimuth.

(10) Energize the radar to full radiate. Make certain that the MOTOR GENERATOR circuit breaker is set to OFF and the elevation brake is set (down).

(11) If an oscilloscope (AN/USM-281A or equivalent) is available, use test method 1 in subparagraph *b*. If a multimeter (TS-505D/U) is available, use test method 2 in subparagraph *c*.

b. Test Method 1.

(1) Obtain the following:

(*a*) Oscilloscope AN/USM-281A, 6625-00-228-22-1 or equivalent.

(*b*) Rf detector, part no. 9082599, 4935-00-006-0197.

(*c*) Rf cable assembly, part no. 9195578, 4935-00-848-7584 or equivalent cable of sufficient length consisting of RG-58C/U coaxial cable with properly attached male BNC connectors on both ends.

(2) Connect the rf cable assembly between the rf detector and the oscilloscope INPUT A.

(3) Connect the oscilloscope power plug to a 115 VOLTS 400 CPS outlet (14, fig. 2-2) on transmitter panel 2.

(4) Set the oscilloscope switches and controls to measure a signal level of approximately 1.2 vdc. Refer to TM 9—4935—542—12. Make certain the polarity switch is set for a positive deflection.

(5) Hold the rf detector flange against a flat metal surface to block any rf input. Adjust the oscilloscope position control to place the sweep on the bottom graticule line.

(6) Remove the protective cover from A1A1J1 located on the right side of transmitter panel 3 (3, fig. 1-2).

(7) Place the opening of the rf detector as close as possible to the opening of J1 without touching. The oscilloscope sweep should deflect at least 0.6 vdc. If the deflection is less than 0.6 vdc, check the position of the rf detector to connector J1 and, while observing the oscilloscope, move the detector from side to side. If the sweep still does not deflect at least 0.6 vdc, replace the diode 1N23ER (9063252) located under the knurled screwcap of the rf detector and repeat step (7).

(8) Replace the protective cover on A1A1J1.

(9) Proceed to paragraph *d*.

c. Test Method 2.

(1) Obtain the following:

(*a*) Multimeter TS-505D/U, 6625-00-243-0562 or equivalent.

(*b*) Rf detector, part no. 9082599, 4935-00-006-0197.

(*c*) Adapter UG-1035/U, 5935-00-807-3895 or equivalent dual banana-to-BNC.

(2) Connect the adapter to the rf detector.

(3) Connect the multimeter power plug to a 115 VOLTS 400 CPS utility outlet (14, fig. 2-2) on transmitter panel 2.

(4) Set the multimeter FUNCTION switch to +DC and the RANGE switch to 2.5V/RX1.

(5) Connect the multimeter DC and COMMON probes together and adjust the ZERO ADJ control for a 0.0-vdc indication.

(6) Connect the multimeter test leads to the appropriately colored terminals on adapter UG-1035/U.

(7) Remove the protective cover from A1A1J1 located on the right side of panel 3 (3, fig. 1-2).

(8) Place the opening of the rf detector as close as possible to the opening of J1 without touching. The multimeter should indicate at least 0.6 vdc. If the meter indicates less than 0.6 vdc, check the position of the rf detector to connector J1 and while observing the meter, move the detector from side to side. If the indication is still less than 0.6 vdc, replace diode 1N23ER (9063252) located under the knurled screwcap of the rf detector and repeat step (8).

(9) Replace the protective cover on A1A1J1.

(10) Proceed to paragraph *d*.

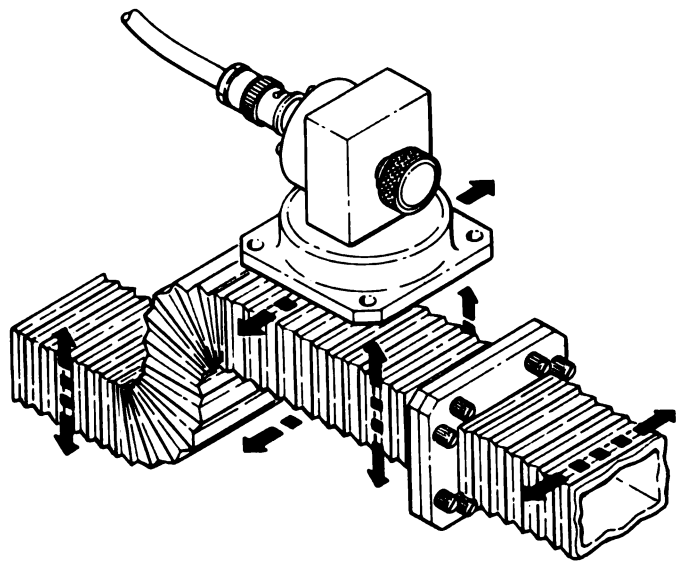
d. Rf Leakage Testing Procedure.

WARNING

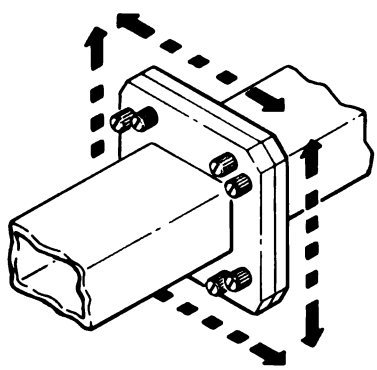
An indication of 1.2 vdc or more on the multimeter or on the oscilloscope indicates rf leakage in excess of 1mw/cm². This leakage poses a potential hazard to personnel and a possible detriment to equipment operation. The radar should be deenergized and repairs made.

WARNING

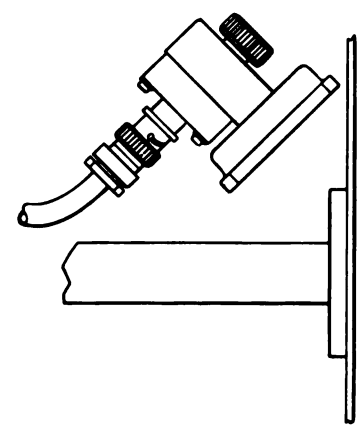
The antenna must be positioned at the specified safe azimuth. Personnel must be prevented from passing within 111.5 m (366 ft) of the front of the antenna. Position WARNING signs to show the entire affected area.



VIEW A



VIEW B



VIEW C

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Figure 4-13. Typical orientations for rf leakage testing.

NOTE

The open end of the rf detector is used to detect radiation. Rf energy leaking from waveguides or waveguide connections is directional and polarized. The detector must be positioned as indicated below.

(1) Open transmitter panel 3 (3, fig. 1-2).

(2) Test all waveguide flanges and rf components on the rf pallet for leakage. Move the rf detector from side to side around the waveguide flange being tested, while observing the indication on the oscilloscope or multimeter. Refer to figure 4-13 for the correct orientation of the rf detector to the waveguide. Flexible waveguide (flexguide) must be tested over its entire length (view A, fig. 4-13) and rf joints must be tested on all sides (view B, fig. 4-13).

(3) Test the rotary joint and waveguide in the pedestal base. Test rotary joints around their entire circumference.

(4) Test the waveguided between the transmitter cabinet and the antenna pedestal. Test waveguide to bulkhead connections by holding the rf detector as shown in view C of fig. 4-13.

(5) Test the flexguide and waveguide connections in the pedestal head assembly.

(6) Test the rotary joint, flexguide, and waveguide connections located in the antenna transmitter compartment.

(7) Test the waveguide and directional coupler connections in the antenna receiver compartment.

(8) Re-tighten any connection which indicates excessive rf leakage.

(9) Deenergize the radar.

(10) Disconnect all test equipment.

(11) Install and secure the gasket and cover on the pedestal head assembly, the antenna receiver and transmitter compartment doors, the protective cover for the waveguide between the transmitter console and the pedestal, and the round bottom cover from beneath the pedestal base.

(12) Close and secure transmitter panel 3.

(13) Set the BATTLE SHORT switch to OFF.

4-24. Replacement of the Counterbalance Assembly

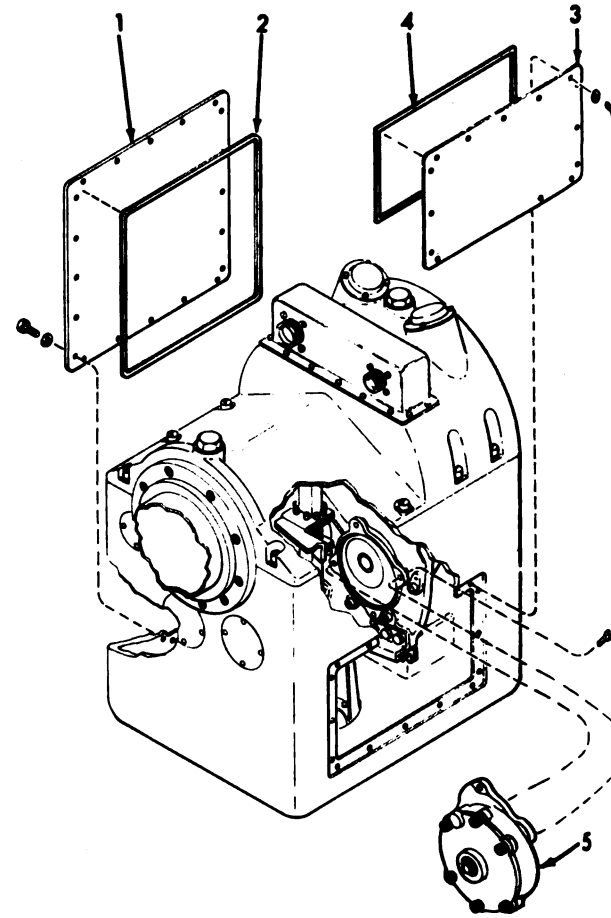
WARNING

Deenergize the IHIPIR and disconnect the power cable.

a. Removal.

(1) Elevate the antenna to 1600 mils and set the elevation brake (down).

(2) Remove the elevation head assembly covers (1 and 3, fig. 4-14).



1—Elevation head assembly cover
2—Seal
3—Elevation head assembly cover
4—Gasket
5—Counterbalance assembly

Figure 4-14. Removal of the counterbalance assembly.

(3) Stuff rags into the tube housing to prevent hardware from falling into the lower pedestal housing.

NOTE

The key numbers shown below in parentheses refer to figure 4-15 unless otherwise indicated.

(4) Loosen the clamp on the motor-tachometer generator exhaust hose (2). Disconnect the hose from the generator and position it to gain access to the counterbalance assembly (5, fig. 4-14).

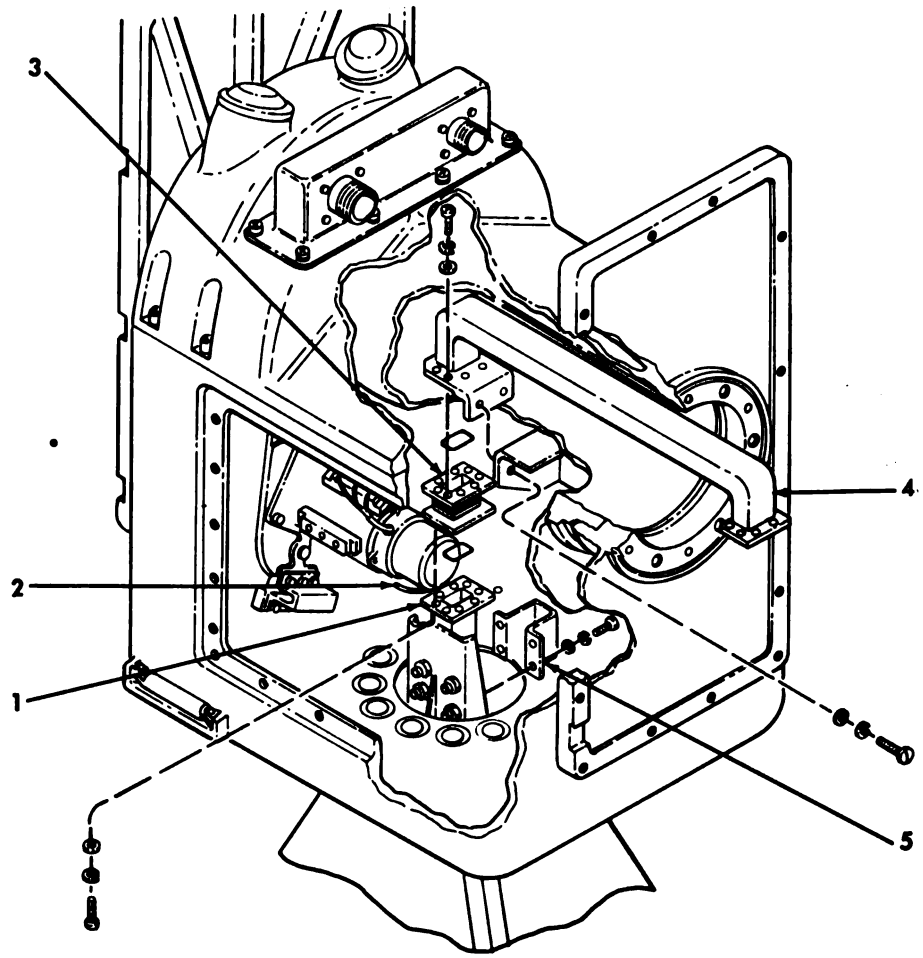
(5) Move the wiring harness for greater access to the assembly.

NOTE

It is not necessary to remove the cable clamp secured to the waveguide assembly (4).

(6) Remove the four screws securing waveguide support bracket (5) and remove the bracket.

(7) Remove the eight screws securing the waveguide (1) to the flexguide (3). Move the waveguide away from the counter-balance assembly.



1—Waveguide
2—Generator exhaust hose
3—Flexguide
4—Waveguide assembly
5—Waveguide support bracket

Figure 4-15. Elevation head assembly.

WARNING

The counterbalance spring may be caught in a tensed or loaded position and is hazardous to personnel if broken. Use extreme caution while performing the following steps.

CAUTION

The waveguide will only move approximately 1/4 inch. Do not force it further.

(8) Remove the four self-locking bolts securing the counterbalance assembly.

(9) Pull the counterbalance assembly straight out as far as possible to disengage the splined end of the gearshaft. Rotate the counterbalance assembly downward to clear the waveguide assembly, and remove the counterbalance assembly.

b. Installation.

(1) Coat the protruding gear teeth of the gearshaft with grease MIL-G-21164C (9150-00-223-4004).

(2) Install the counterbalance assembly (5, fig. 4-14) in the elevation head. Rotate the assembly to aline the housing mounting holes with the elevation head mounting holes. Push the assembly in to engage the gearshaft.

(3) Install the four bolts which secure the counterbalance assembly.

(4) Aline the waveguide (1) with the flexguide (3) and install the eight screws which secure them.

(5) Install the waveguide support bracket (5) and secure it with the four screws.

(6) Reposition the wiring harness.

(7) Connect the exhaust hose (2) to the motor-tachometer generator and secure the hose with its clamp.

(8) Remove the rags from the tube housing and install the covers (1 and 3, fig. 4-14).

c. Test After Installation. Manually position the antenna to check for excessive tension.

CHAPTER 5

CORRECTIVE MAINTENANCE

5-1. General

This section provides maintenance instructions for authorized maintenance personnel of the IHIPIR.

WARNING

Hazardous rf radiation levels can leak from improperly joined waveguide flanges. This hazard can also be caused by damage such as dents and scratches on waveguide flange faces. The radar may be damaged by the introduction of foreign particles (dirt, dust, metal filings, etc.) into waveguide openings. Cap open waveguide fittings with dust covers as soon as possible after disconnection. To prevent a potential personnel hazard or degradation of radar performance, all waveguide, flexguide, and rf component flanges must be connected and disconnected exactly as specified in the procedures contained in this chapter.

5-2. Waveguide Connections

a. Installation.

WARNING

Failure to perform step (1) below could pose a hazard to personnel or equipment.

(1) Inspect waveguide flanges for scratches or dents which extend from the waveguide opening to any screw hole or to the flange edge. Check for torn or damaged window material and for missing, cracked, or damaged "O" rings.

(2) Before installing any screws, insure that no undue force is required to mate the flanges.

(3) Start all screws by hand, avoiding cross threading, before any screws are tightened.

(4) In sequence (fig. 5-1) snug each screw until the flanges are touching.

(5) In sequence, torque each screw to 26 to 30 inch-pounds.

b. Test After Installation. Perform the rf leakage test (par. 4-23) immediately upon completion of any procedure requiring the connection of any waveguide flanges. Carefully test all waveguide connections made during repair and all disturbed flexible waveguides.

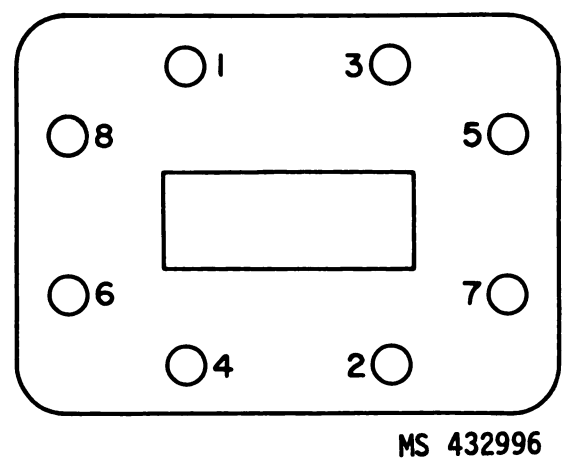


Figure 5-1. Torque sequence for waveguide connections.

5-3. Replacement of the Receiver Assembly

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11).

CAUTION

Cap the waveguide fittings with dust covers as soon as possible after disconnection.

NOTE

The key numbers shown below in parentheses refer to figure 5-2.

a. Removal.

(1) Disconnect the grounding strap (1) from the local oscillator grounding lug (2).

(2) Disconnect the electrical connectors from local oscillator J1 and J2 (3 and 4).

(3) Disconnect W1P12 from local oscillator J3 (5).

(4) Disconnect W8P1 from frequency converter J8 (6).

(5) Remove the local oscillator (8) by removing two panhead screws (7).

(6) Disconnect the waveguide assembly (10) from the receiver IF assembly by removing four socket-head screws (9).

(7) Disconnect the electrical connectors from nutating scanner drive J1 and J2 (11 and 12).

(8) Disconnect the electrical connectors from receiver IF J4 and J5 (13 and 14).

(9) Disconnect the electrical connectors from frequency converter J5 and J6 (15 and 16).

(10) Remove the receiver assembly (18) by removing two hex-head screws (17).

b. Installation.

(1) Install the receiver assembly (18) using two hex-head screws (17).

(2) Connect the electrical connectors to frequency converter J5 and J6 (15 and 16).

(3) Connect the electrical connectors to receiver IF J4 and J5 (13 and 14).

(4) Connect the electrical connectors to nutating scanner drive J1 and J2 (11 and 12).

(5) Connect waveguide assembly (10) to the receiver IF assembly using four socket-head screws (9).

(6) Install the local oscillator (8) using two panhead screws (7).

(7) Connect W8P1 to frequency converter J8 (6).

(8) Connect W1P12 to local oscillator J3 (5).

(9) Connect the electrical connectors to local oscillator J1 and J2 (3 and 4).

(10) Connect the grounding strap (1) to local oscillator grounding lug (2).

(11) Perform rf leakage detection test (par. 4-23).

c. Test After Installation. Refer to table 3-13 for check procedures.

5-4. Replacement of the Frequency Converter Crystal Rectifier Diodes

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11).

NOTE

The key numbers shown below in parentheses refer to figure 5-3.

a. Removal.

CAUTION

Failure to perform steps (1) and (2) below may result in damage to diodes.

(1) Insure that all radar antennas are facing away from the HIPIR.

(2) Insure that all rf power in all radars has been shut off.

(3) Disconnect the electrical connector (1) from its jack.

(4) Loosen the nut (2) on the jack about two turns.

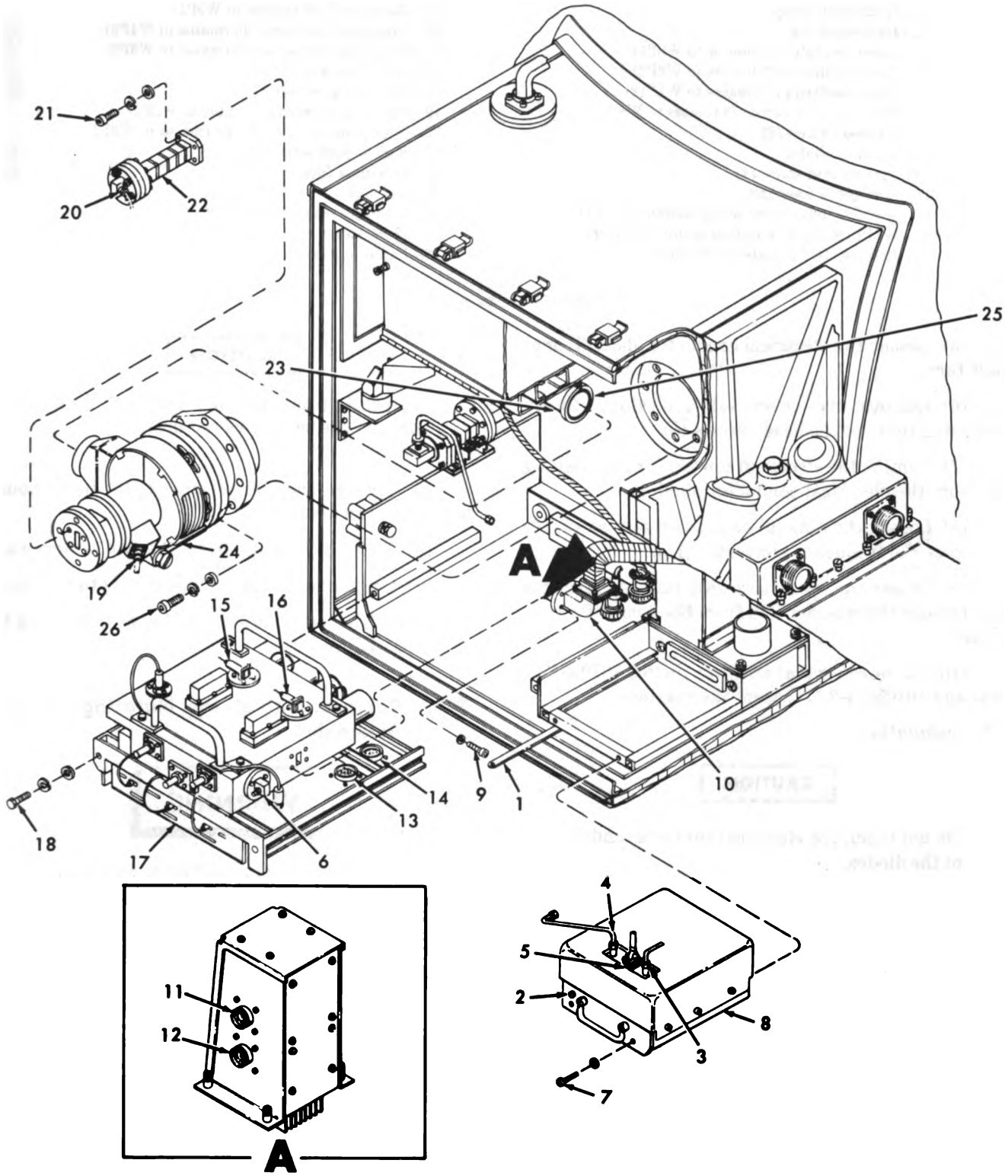


*Figure 5-2. Replacement of the receiver assembly and nutating scanner assembly *(G)[1].*

[1]Refer to appendix D for serial number effectivity.

1—Grounding strap
2—Grounding lug
3—Local oscillator J1 (mates to W6P1)
4—Local oscillator J2 (mates to W8P2)
5—Local oscillator J3 (mates to W1P12)
6—Frequency converter J8 (mates to W8P1)
7—Panhead screw (2)
8—Local oscillator
9—Socket-head screw (4)
10—Waveguide assembly
11—W1P13 (mates to nutating scanner drive J1)
12—W2P1 (mates to nutating scanner drive J2)
13—Receiver IF J4 (mates to W1P14)
14—Receiver IF J5 (mates to W9P1)
15—Frequency converter J5 (mates to W4P2)
16—Frequency converter J6 (mates to W3P2)
17—Hex-head screw (2)
18—Receiver assembly
19—Nutating scanner J1 (mates to W2P2)
20—Waveguide adapter A3W5 (mates to W3P1)
21—Socket-head screw (4)
22—Bandpass filter
23—Air hose
24—Nutating scanner assembly
25—Hose clamp
26—Panhead screw

Figure 5-2 —Continued.

(5) Loosen the electrical conductor shell (3) one-half turn.

(6) Remove the cover (4) and shim (5) by removing four socket-head screws (6).

(7) Remove the electrical contact (7) and bushing (8) from the electrical conductor shell.

(8) Loosen the nuts (9) on the two setscrews (10) on top of the frequency converter (11).

(9) Loosen the two setscrews to release the diodes and remove the retainer (12) from the frequency converter.

(10) Remove crystal rectifier diodes 10105811-1 (13) and 10105811-2 (14) from the retainer.

b. Installation.

CAUTION

Do not touch the electrical contacts (ends) of the diodes.

(1) Install new crystal rectifier diodes 10105811-1 (13) and 10105811-2 (14) to the retainer (12).

(2) Install the retainer to the frequency converter (11).

(3) Install the bushing (8) and electrical contact (7) to the electrical conductor shell (3).

(4) Install the cover (4) and shim (5) using four socket-head screws (6).

(5) Tighten the electrical conductor shell until the electrical contact contacts the diodes.

(6) Tighten the nut (2) on the electrical connector (1).

CAUTION

To prevent damage to the diodes, do not tighten the setscrews too much.

(7) Tighten the two setscrews (10) just enough to contact the diodes.

(8) Tighten the nuts (9) on the two setscrews.

(9) Connect electrical connector (1) to its jack.

c. Test After Installation. Refer to table 3-13 for check procedures.

5-5. Replacement of the Nutating Scanner Assembly

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11).

CAUTION

Cap the waveguide fittings with dust covers as soon as possible after disconnection.

NOTE

The key numbers shown below in parentheses refer to figures 5-2 and 5-2.1.

a. Removal.

(1) Disconnect electrical connectors J1 and A3W5 (19 and 20).

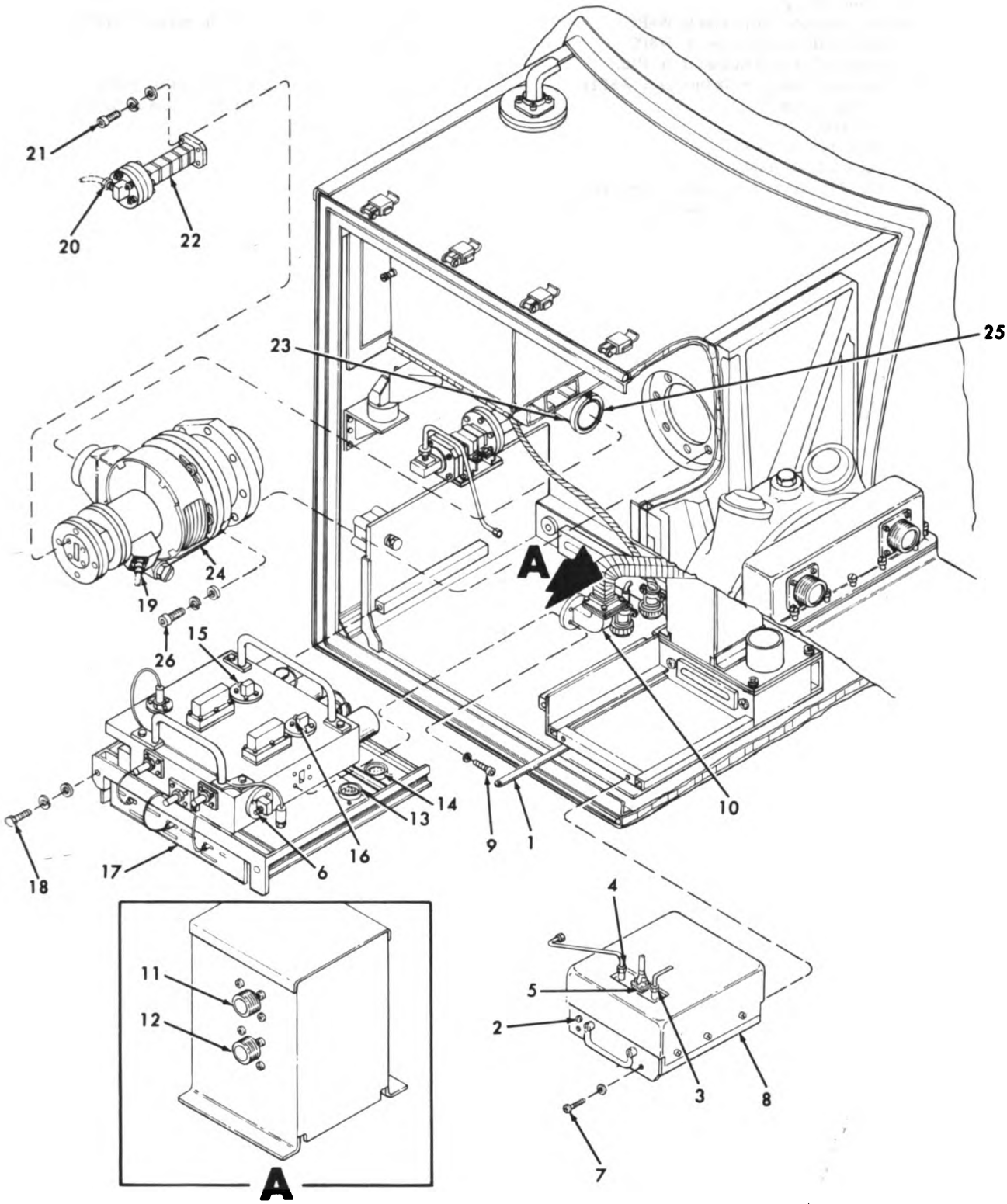
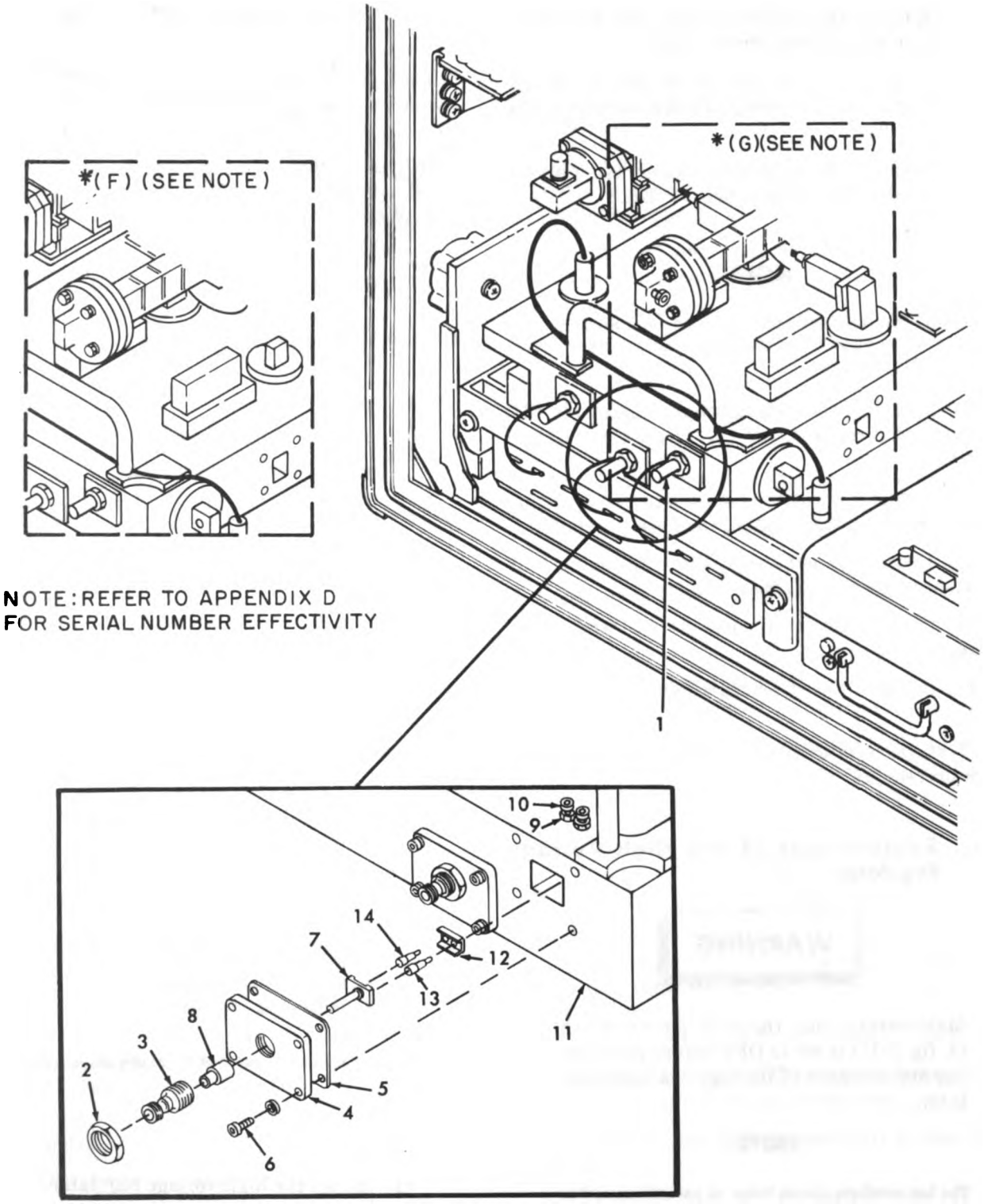


*Figure 5-2.1. Replacement of the receiver assembly and nutating scanner assembly *(F)[1].*

[1]Refer to appendix D for serial number effectivity.

1—Grounding strap
2—Grounding lug
3—Local oscillator J1 (mates to W6P1)
4—Local oscillator J2 (mates to W8P2)
5—Local oscillator J3 (mates to W1P12)
6—Frequency converter J8 (mates to W8P1)
7—Panhead screw (2)
8—Local oscillator
9—Socket-head screw (4)
10—Waveguide assembly
11—W1P13 (mates to nutating scanner drive J1)
12—W2P1 (mates to nutating scanner drive J2)
13—Receiver IF J4 (mates to W1P14)
14—Receiver IF J5 (mates to W9P1)
15—Frequency converter J5 (mates to W4P2)
16—Frequency converter J6 (mates to W3P2)
17—Hex-head screw (2)
18—Receiver assembly
19—Nutating scanner J1 (mates to W2P2)
20—Waveguide adapter A3W5 (mates to W3P1)
21—Socket-head screw (4)
22—Bandpass filter
23—Air hose
24—Nutating scanner assembly
25—Hose clamp
26—Panhead screw

Figure 5-2.1. — Continued.



1—Electrical connector
2—Nut
3—Electrical connector shell
4—Cover
5—Shim
6—Socket-head screw (4)
7—Electrical contact
8—Bushing
9—Nut (2)
10—Setscrew (2)
11—Frequency converter
12—Retainer
13—Diode 10105811-1
14—Diode 10105811-2

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Figure 5-3. Replacement of the frequency converter crystal rectifier diodes.

(2) Remove the bandpass filter (22) by removing the four socket-head screws (21).

(3) Disconnect the air hose (23) from the nutating scanner assembly (24) by loosening the hose clamp (25).

(4) Remove the nutating scanner assembly by removing the eight panhead screws (26).

b. Installation.

NOTE

Insure that the slots on the motor-generator housing and on the support bracket of the nutating scanner assembly are alined.

(1) Install the nutating scanner assembly (24) with electrical connector J1 (19) in the three o'clock position.

(2) Connect the air hose (23) to the nutating scanner assembly and tighten the hose clamp (25).

(3) Install the bandpass filter (22) using four socket-head screws (21) (par. 5-2).

(4) Connect electrical connectors J1 and A3W5 (19 and 20).

(5) Perform the rf leakage detection test (par. 4-23).

c. Test After Installation. Refer to table 3-13 for check procedures.

5-6. Replacement of the High-Voltage Regulator

WARNING

Make certain that the main power switch (4, fig. 2-11) is set to OFF before performing maintenance of the high-voltage regulator.

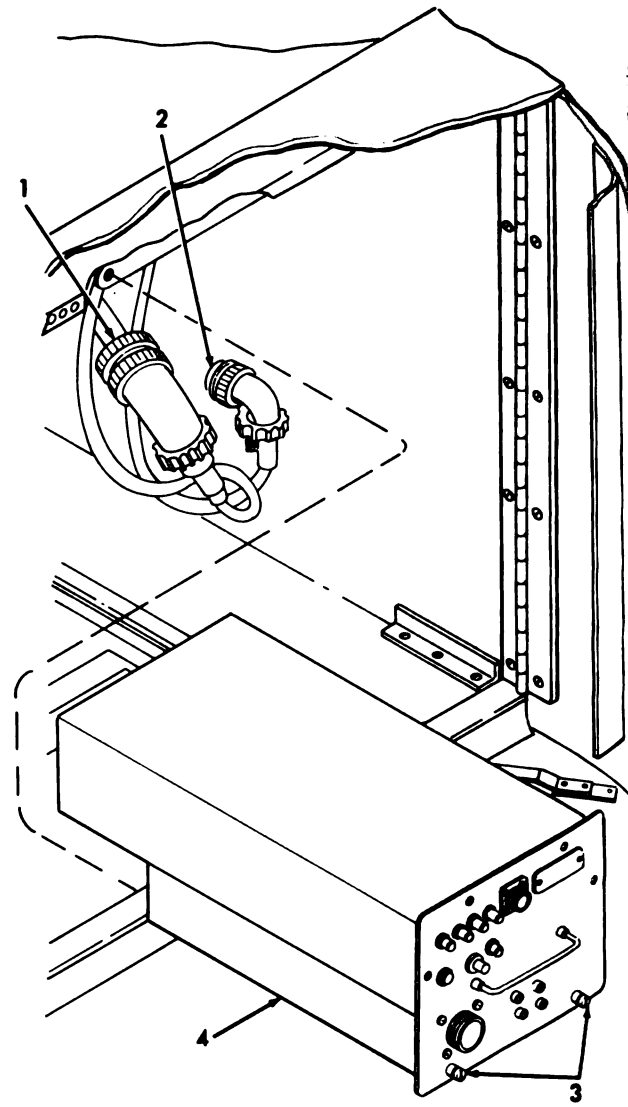
NOTE

The key numbers shown below in parentheses refer to figure 5-4.

a. Removal.

(1) Disconnect the two electrical connectors (1 and 2).

(2) Remove the high-voltage regulator (4) by loosening two screws (3).



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1—Electrical connector W1P2 (mates with A6J8)
2—Electrical connector W1P3 (mates with A6J7)
3—Externally relieved body screw (2)
4—High-voltage regulator

Figure 5-4. Replacement of the high-voltage regulator.

b. Installation.

(1) Install the high-voltage regulator.

(2) Connect the two electrical connectors.

c. Test After Installation.

(1) Perform the high-voltage regulator automatic test as follows.

(a) Energize the HIPIR to standby (tables 3-2 through 3-4).

(b) Set the BATTLE SHORT switch (7, fig. 2-6) to ON.

(c) Press and release the high-voltage regulator LAMP TEST pushbutton (7, fig. 2-5) to insure that all lamps light.

(d) Press and hold the high-voltage regulator TEST pushbutton (6, fig. 2-5). Insure that the TEST GOOD lamp (5, fig. 2-5) is lit and that no other lamps are lit.

(2) Refer to table 3-12 for check procedures.

5-7. Replacement of the Master Oscillator Power Supply

WARNING

High voltage is present in the high voltage power supply assembly. Set the main power switch (4, fig. 2-11) to OFF.

CAUTION

Do not add coolant to the HVPS modules. Coolant refill or replacement is authorized only at the DS and GS maintenance level.

CAUTION

Catch any coolant that drains out of the coolant lines. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

NOTE

The key numbers shown below in parentheses refer to figure 5-5.

a. Removal.

(1) Disconnect the electrical connectors (1 and 2) from the control indicator panel (3) and the electrical connectors (4 through 6) from the distribution box (7).

(2) Disconnect the coolant hoses (8 and 9) from the bracket (10).

(3) Pull the slide support (11) forward to its fully extended position.

(4) Close the shutoff valve by turning the shutoff valve cap (12) clockwise.

(5) Disconnect electrical connector P1 (13) of the control-indicator panel and P1 of electrical cable W2 (14).

(6) Cover connectors J1 and J2 of the power supply, using the protective covers stored on the sides of the power supply.

(7) Disconnect the coolant hoses from the quick-disconnect coupling halves (15 and 16).

(8) Remove the master oscillator power supply (17).

b. Installation.

(1) Install the master oscillator power supply (17).

(2) Perform a continuity check to verify that a good connection exists between the module, the HVPS assembly, and system ground.

(3) Connect the coolant hoses to their respective fittings, using the quick-disconnect coupling halves (15 and 16).

(4) Remove the protective covers from connectors J1 and J2 and secure them to their respective storage areas on the sides of the power supply.

(5) Connect electrical connectors P1 (13) to the INPUT connector and P1 of electrical cable W2 (14) to the OUTPUT connector as shown in view A.

CAUTION

The shutoff valve must be opened before resuming operation of the radar to prevent a pressure buildup within the power supply assembly.

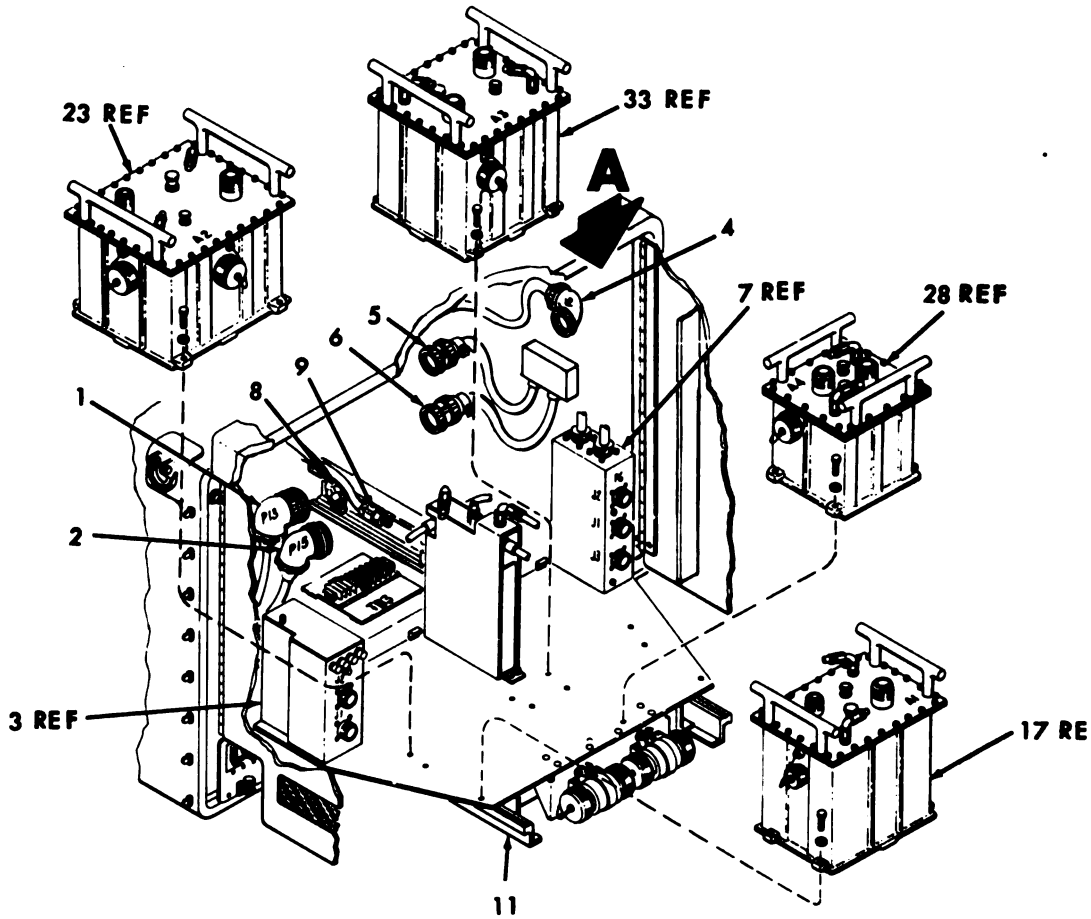
(6) Open the shutoff valve by turning the shutoff valve cap (12) counterclockwise.

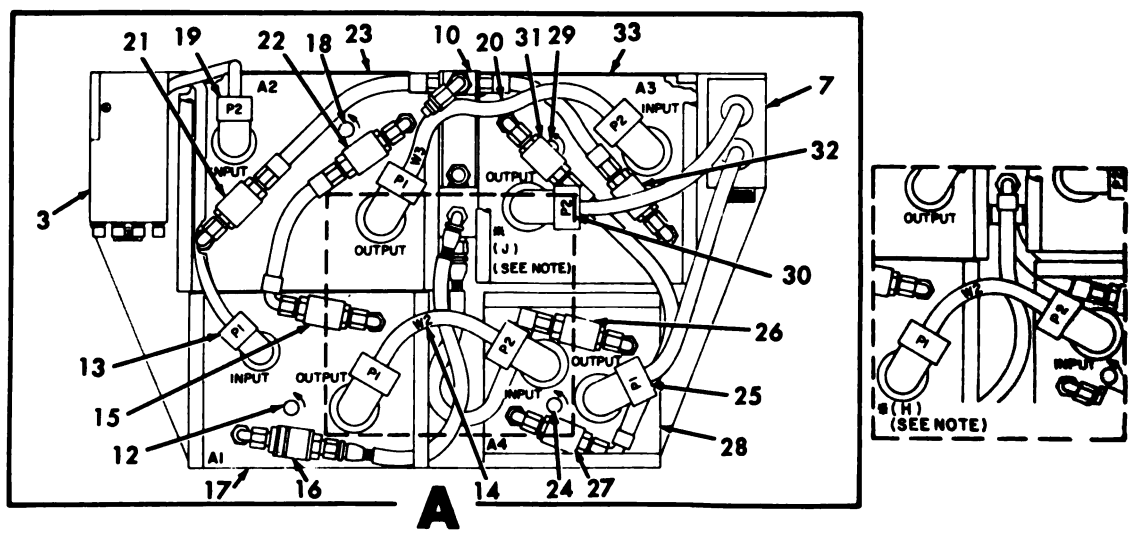
(7) Retract the slide support (11) to the closed position.

(8) Connect the quick-disconnects of the coolant hoses (8 and 9) to their respective fittings on the bracket (10).

(9) Connect the electrical connectors (4 through 6).

c. Test After Installation. Refer to table 3-12 for check procedures.





NOTE: REFER TO APPENDIX D
FOR SERIAL NUMBER EFFECTIVITY

Figure 5-5. Replacement of the high-voltage power supply assemblies.

MS 432997A

1—Electrical connector P13
2—Electrical connector P15
3—Control-indicator panel
4—Electrical connector P6
5—Electrical connector P2
6—Electrical connector P1
7—Distribution box
8—Coolant hose
9—Coolant hose
10—Bracket
11—Slide support
12—Shutoff valve cap
13—Electrical connector P1
14—Electrical cable W2
15—Quick-disconnect coupling half
16—Quick-disconnect coupling half
17—Master oscillator power supply
18—Shutoff valve cap
19—Electrical connector P2
20—Electrical cable W3
21—Quick-disconnect coupling half
22—Quick-disconnect coupling half
23—Power amplifier power supply
24—Shutoff valve cap
25—Electrical connector P1
26—Quick-disconnect coupling half
27—Quick-disconnect coupling half
28—Master oscillator filament power supply
29—Shutoff valve cap
30—Electrical connector P2
31—Quick-disconnect coupling half
32—Quick-disconnect coupling half
33—Power amplifier filament power supply

Figure 5-5—Continued.

5-8. Replacement of the Power Amplifier Power Supply

WARNING

High voltage is present in the high-voltage power supply assembly. Set the main power switch (4, fig. 2-11) to OFF.

CAUTION

Do not add coolant to the HVPS modules. Coolant refill or replacement is authorized only at the DS and GS maintenance level.

CAUTION

Catch any coolant that drains out of the coolant lines. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

NOTE

The key numbers shown below in parentheses refer to figure 5-5.

NOTE

The master oscillator power supply must be removed before the power amplifier can be replaced.

a. Removal.

(1) Perform the procedures described in subparagraph 5-7*a* for the removal of the master oscillator power supply.

(2) Close the shutoff valve by turning the shutoff valve cap (18) clockwise.

(3) Disconnect electrical connectors P2 (19) of the control indicator panel and P1 of electrical cable W3 (20).

(4) Cover connectors J2 and J1 of the power supply.

(5) Disconnect the coolant hose from the quick-disconnect coupling halves (21 and 22).

(6) Remove the power amplifier power supply (23).

b. Installation.

(1) Install the power amplifier power supply (23).

(2) Perform a continuity check to verify that a good connection exists between the module, the HVPS assembly, and system ground.

(3) Connect the coolant hoses to their respective fittings as shown in view A, using the quick-disconnect coupling halves (21 and 22).

(4) Remove the protective covers from connectors J1 and J2 and secure them to their respective storage areas on the sides of the power supply.

(5) Connect electrical connector P1 of electrical cable W3 (20) to the output connector and P2 (19) to the input connector.

CAUTION

The shutoff valve must be opened before resuming operation of the radar to prevent a pressure buildup within the power supply assembly.

(6) Open the shutoff valve by turning the shutoff valve cap (18) counterclockwise.

(7) Perform the procedures described in subparagraph 5-7*b* for the installation of the master oscillator power supply.

c. Test After Installation. Refer to table 3-12 for check procedures.

5-9. Replacement of the Master Oscillator Filament Power Supply

WARNING

High voltage is present in the high-voltage power supply assembly. Set the main power switch (4, fig. 2-11) to OFF.

CAUTION

Do not add coolant to the HVPS modules. Coolant refill or replacement is authorized only at the DS and GS maintenance level.

CAUTION

Catch any coolant that drains out of the coolant lines. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

NOTE

The key numbers shown below in parentheses refer to figure 5-5.

a. Removal.

(1) Disconnect the electrical connectors (1 and 2) from the control-indicator panel (3) and the electrical connectors (4 through 6) from the distribution box (7).

(2) Disconnect the coolant hoses (8 and 9) from the bracket (10).

(3) Pull the slide support (11) forward to its fully extended position.

(4) Close the shutoff valve by turning the shutoff valve cap (24) clockwise.

(5) Disconnect electrical connectors P2 of electrical cable W2 (14) and P1 (25) of the distribution box.

(6) Cover connectors J1 and J2 of the power supply, using the protective covers stored on the sides of the power supply.

(7) Disconnect the coolant hoses from the quick-disconnect coupling halves (26 and 27).

(8) Remove the master oscillator filament power supply (28).

b. Installation.

(1) Install the master oscillator filament power supply (28).

(2) Perform a continuity check to verify that a good connection exists between the module, the HVPS assembly, and system ground.

(3) Connect the coolant hoses to their respective fittings, using the quick disconnect coupling halves (26 and 27).

(4) Remove the protective covers from connectors J1 and J2 and secure them to their respective storage areas on the sides of the power supply.

(5) Connect electrical connector P2 of electrical cable W2(14) to the input connector and P1(25) to the output connector as shown in view A.

CAUTION

The shutoff valve must be opened before resuming operation of the radar to prevent a pressure buildup within the power supply assembly.

(6) Open the shutoff valve by turning the shutoff valve cap (24) counterclockwise.

(7) Retract the slide support (11) to the closed position.

(8) Connect the quick-disconnects of coolant hoses (8 and 9) to their respective fittings on the bracket (10).

(9) Connect the electrical connectors (4 through 6).

c. Test After Installation. Refer to table 3-12 for check procedures.

5-10. Replacement of the Power Amplifier Filament Power Supply

WARNING

High voltage is present in the high-voltage power supply assembly. Set the main power switch (4, fig. 2-11) to OFF.

CAUTION

Do not add coolant to the HVPS modules. Coolant refill or replacement is authorized only at the DS and GS maintenance level.

CAUTION

Catch any coolant that drains out of the coolant lines. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

NOTE

The key numbers shown below in parentheses refer to figure 5-5.

NOTE

The master oscillator filament power supply must be removed before the power amplifier filament power supply can be replaced.

a. Removal.

(1) Perform the procedures described in subparagraph 5-9*a* for the removal of the master oscillator filament power supply.

(2) Close the shutoff valve by turning the shutoff valve cap (29) clockwise.

(3) Disconnect electrical connectors P2 of electrical cable W3 (20) and P2 (30) of the distribution box.

(4) Cover connectors J2 and J1 of the power supply, using the protective covers stored on the sides of the power supply.

(5) Disconnect the coolant hose from the quick disconnect coupling halves (31 and 32).

(6) Remove the power amplifier filament power supply (33).

b. Installation.

(1) Install the power amplifier filament power supply (33).

(2) Perform a continuity check to verify that a good connection exists between the module, the HVPS assembly, and system ground.

(3) Connect the coolant hoses to their respective fittings as shown in view A, using the quick-disconnect coupling halves (31 and 32).

(4) Remove the protective covers from connectors J1 and J2, and secure them to their respective storage areas on the sides of the power supply.

(5) Connect electrical connector P2 of electrical cable W3 (20) to the input connector and P2 (30) to the output connector.

CAUTION

The shutoff valve must be opened before resuming operation of the radar to prevent a pressure buildup within the power supply assembly.

(6) Open the shutoff valve by turning the shutoff valve cap (29) counterclockwise.

(7) Perform the procedures described in subparagraph 5-9*b* for the installation of the master oscillator filament power supply.

c. Test After Installation. Refer to table 3-12 for check procedures.

5-11. Replacement of the Power Amplifier Tube

WARNING

Set the main power switch (4, fig. 2-11) to OFF and ground all points of high potential before proceeding.

CAUTION

Use only nonmagnetic tools when performing the following maintenance.

CAUTION

Cap the coolant line fittings as soon as possible after disconnections. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

CAUTION

Cap the waveguide flanges with dust covers as soon as possible after the disconnections have been made.

NOTE

The key numbers shown below in parentheses refer to figure 5-6.

a. Removal.

NOTE

It is not necessary to pull the rf transmitter assembly out on slides to perform the following steps.

(1) Disconnect the hose and tube assemblies (6 and 15).

(2) Remove the power amplifier tube (7 and 16).

b. Installation.

(1) Install the power amplifier tube (7 and 16).

(2) Connect the hose and tube assemblies (6 and 15).

c. Test After Installation.

(1) Disconnect the cable connector from the HVPS A6J3.

(2) Connect cable connector A20P4 to HVPS connector A6J3.

(3) Set the main power switch (4, fig. 2-11) to ON.

(4) Insure that the LINE VOLT meter (1, fig. 2-9) indicates the red line.

(5) Press the STANDBY pushbutton (21, fig. 2-1).

(6) Set the HVPS test set FIL TEST switch (2, fig. 3-10) in the PAϕ1, PAϕ2, PAϕ3 positions (positions 2, 3, and 4). The HVPS test set FIL TEST meter (1, fig. 3-10) should indicate red line in each switch position. If not, adjust the corresponding control R2, R6, and R10 (8, 9, and 10, fig. 3-10) accordingly.

(7) Set the HVPS test set FIL TEST switch (2, fig. 3-10) in the PA FIL position (position 6). The HVPS test set FIL TEST meter (1, fig. 3-10) should indicate red line. If not, adjust the POWER AMPLIFIER filament control (13, fig. 2-1) on transmitter panel 1 accordingly.

(8) The FILAMENT VOLTAGE meter on transmitter panel 1 (12, fig. 2-1) should indicate red line. If not, calibrate the FILAMENT VOLTAGE meter to the red line by adjusting the FILAMENT METER CAL control (11, fig. 3-10) on the right side of transmitter panel 1.

(9) Disconnect cable connector A20P4 from HVPS connector A6J3.

(10) Connect cable connector A7P2 to HVPS connector A6J3.

(11) Refer to table 3-12 for the check of the power amplifier cavities.

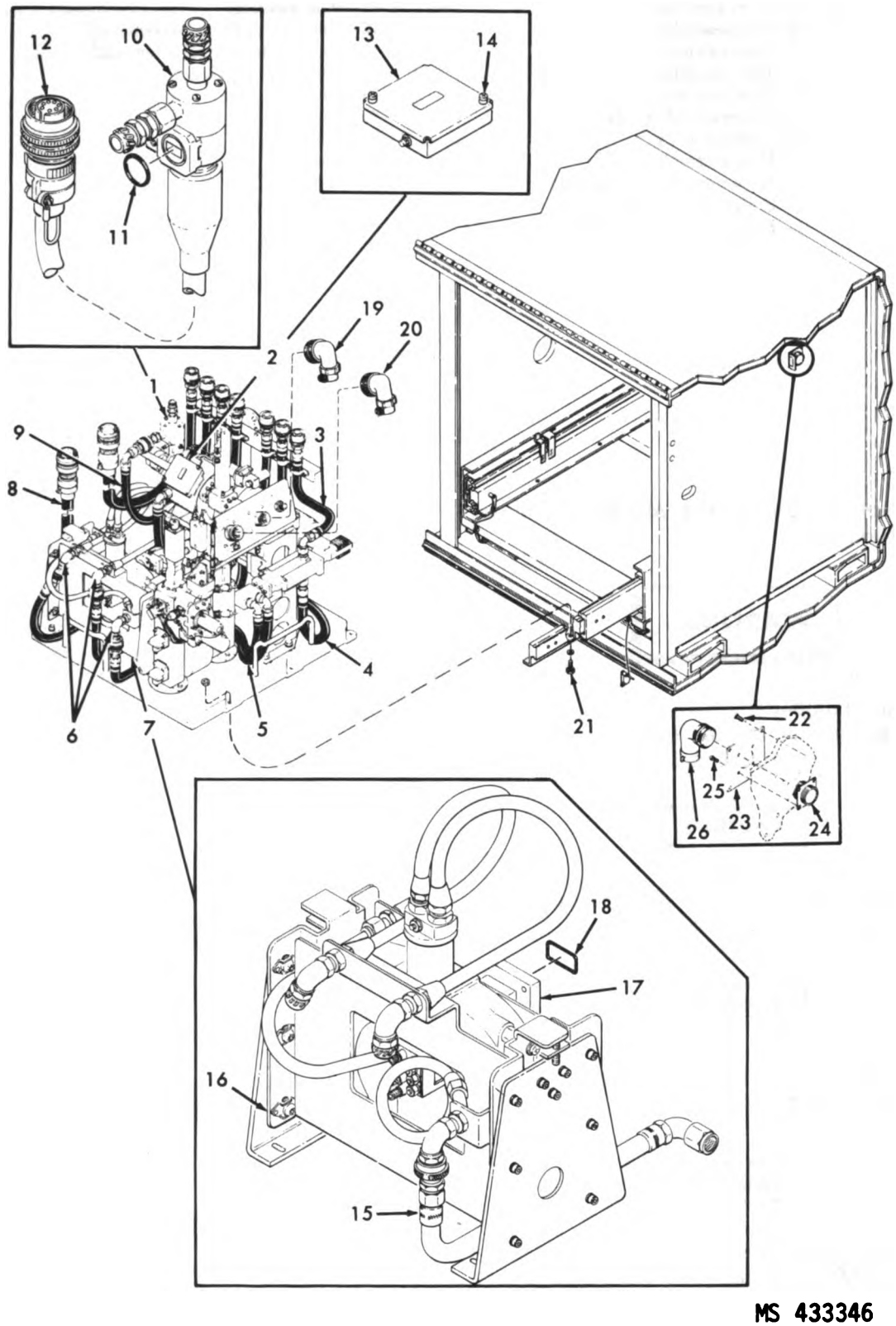


*Figure 5-6. Replacement of the power amplifier tube, master oscillator, and af-rf amplifier *(J)[1].*

[1]Refer to appendix D for serial number effectivity.

1—Master oscillator (tunable)
2—Af-rf amplifier
3—Hose assembly
4—Hose assembly
5—Hose assembly
6—Tube assembly
7—Power amplifier tube
8—Hose assembly
9—Hose assembly
10—Master oscillator (removed)
11—Preformed packing
12—Electrical connector A4P2
13—Af-rf amplifier (removed)
14—Captive screw
15—Hose assembly
16—Power amplifier tube (removed)
17—Arc detector crystal attenuator
18—Preformed packing
19—Connector P18
20—Connector P39
21—Screw
22—Screw
23—Plate
24—Connector J1
25—Screw
26—Connector P26

Figure 5-6 — Continued.

5-12. Replacement of the Master Oscillator (Tunable)

WARNING

Set the main power switch (4, fig. 2-11) to OFF and ground all points of high potential before performing maintenance.

CAUTION

Use only nonmagnetic tools when performing the following maintenance.

CAUTION

Cap the waveguide fittings as soon as possible after disconnection.

CAUTION

Cap the coolant line fittings as soon as possible after disconnection. Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

NOTE

The key numbers shown below in parentheses refer to figures 5-6 and 5-6.1.

a. Removal. Remove the master oscillator (tunable) (1 and 10).

b. Installation.

(1) Install the master oscillator (tunable) (1 and 10).

NOTE

Make certain that the specification information from the master oscillator (tunable) has been transferred to the decals located on transmitter panel 1.

(2) To obtain the approximate frequency setting of the tunable master oscillator tube, note the decal reading posted on transmitter panel 1.

(3) Refer to the master oscillator frequency correlation chart (fig. 3-14) to obtain the master oscillator tuning control setting.

(4) Set the master oscillator tuning control dial to the appropriate setting. The exact frequency setting will be obtained when the test after installation is performed.

c. Test After Installation. Perform the main power, power supplies, transmitter, and receiver weekly checks in chapter 3.

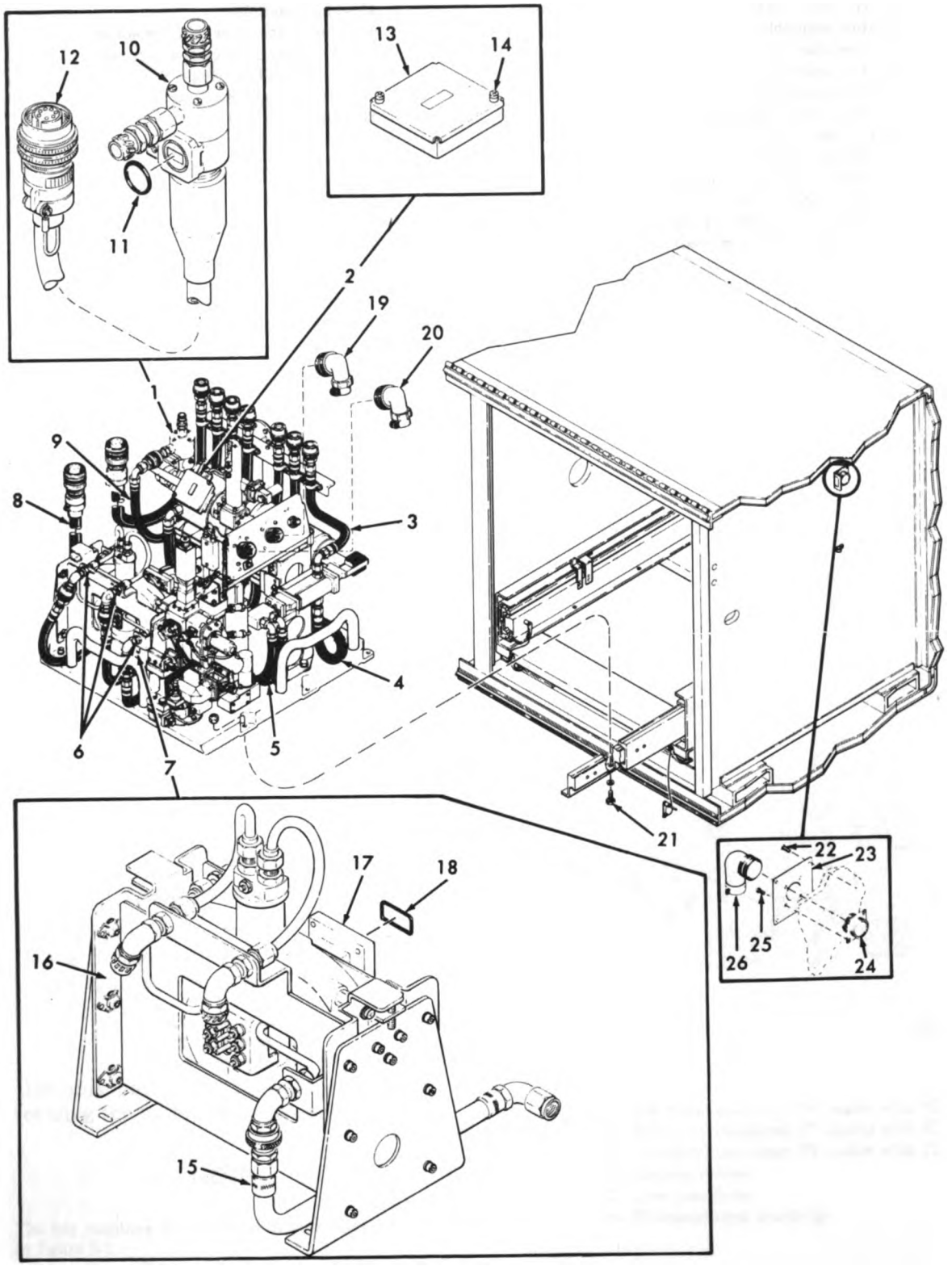


*Figure 5-6.1. Replacement of the power amplifier tube, master oscillator, and af-rf amplifier *(H)*[1]

[1]Refer to appendix D for serial number effectivity.

1—Master oscillator (tunable)
2—Af-rf amplifier
3—Hose assembly
4—Hose assembly
5—Hose assembly
6—Tube assembly
7—Power amplifier tube
8—Hose assembly
9—Hose assembly
10—Master oscillator (removed)
11—Preformed packing
12—Electrical connector A4P2
13—Af-rf amplifier (removed)
14—Captive screw
15—Hose assembly
16—Power amplifier tube (removed)
17—Arc detector crystal attenuator
18—Preformed packing
19—Connector P18
20—Connector P39
21—Screw
22—Screw
23—Plate
24—Connector J1
25—Screw
26—Connector P26

Figure 5-6.1 — Continued.

5-13. Replacement of the Af-Rf Amplifier

WARNING

Set the main power switch (4, fig. 2-11) to OFF and ground all points of high potential before proceeding.

CAUTION

Use only nonmagnetic tools when performing the following maintenance.

NOTE

The key numbers shown below in parentheses refer to figure 5-6.

a. Removal. Remove the af-rf amplifier (2 and 13).

b. Installation. Install the af-rf amplifier (2 and 13).

c. Test After Installation. Refer to table 3-12 for check procedures.

5-14. Replacement of the Low-Pass Filter

WARNING

Set the main power switch (4, fig. 2-11) to OFF and ground all points of high potential before performing maintenance.

CAUTION

Use only nonmagnetic tools when performing the following maintenance.

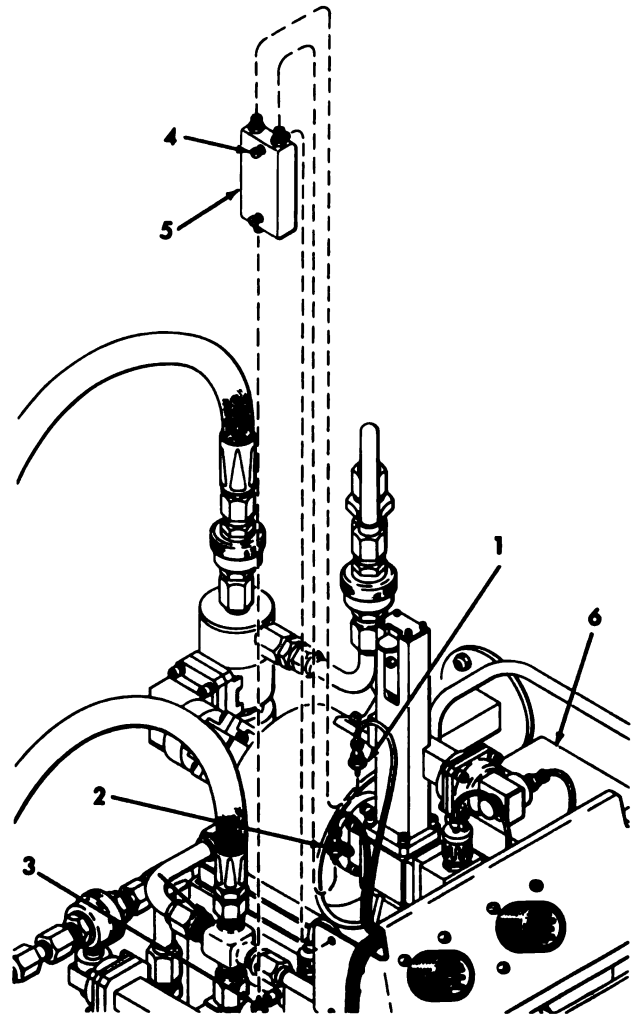
NOTE

The key numbers shown below in parentheses refer to figure 5-7.

a. Removal. Remove the low-pass filter (5).

b. Installation. Install the low-pass filter (5).

c. Test After Installation. Refer to table 3-12 for check procedures.



MS 432998

1—Electrical connector P8 (mates with FL1J3)
2—Electrical connector P7 (mates with FL1J2)
3—Electrical connector P9 (mates with FL1J1)
4—Captive screws
5—Low-pass filter
6—Rf transmitter assembly

Figure 5-7. Replacement of the low-pass filter.

5-15. Replacement of the Degeneration Block

WARNING

Set the main power switch (4, fig. 2-11) to OFF and ground all points of high potential before performing maintenance.

CAUTION

Use only nonmagnetic tools when performing the following maintenance.

CAUTION

Cap the waveguide fittings with dust covers as soon as possible after disconnection.

NOTE

The key numbers shown below in parentheses refer to figure 5-8.

a. Removal.

(1) Disconnect the electrical connectors (1 through 5).

(2) Disconnect the waveguide flange at upper rear of the degeneration block (6). Retain all hardware.

(3) Remove and retain four base mounting screws and hardware.

(4) Remove the degeneration block (6), being careful to retain the preformed packing (7) for use with the new assembly.

b. Installation.

WARNING

To prevent a potential hazard to personnel or equipment, make all waveguide connections as described in par. 5-2.

(1) Inspect preformed packing (7) as described for "O" rings in par. 5-2.

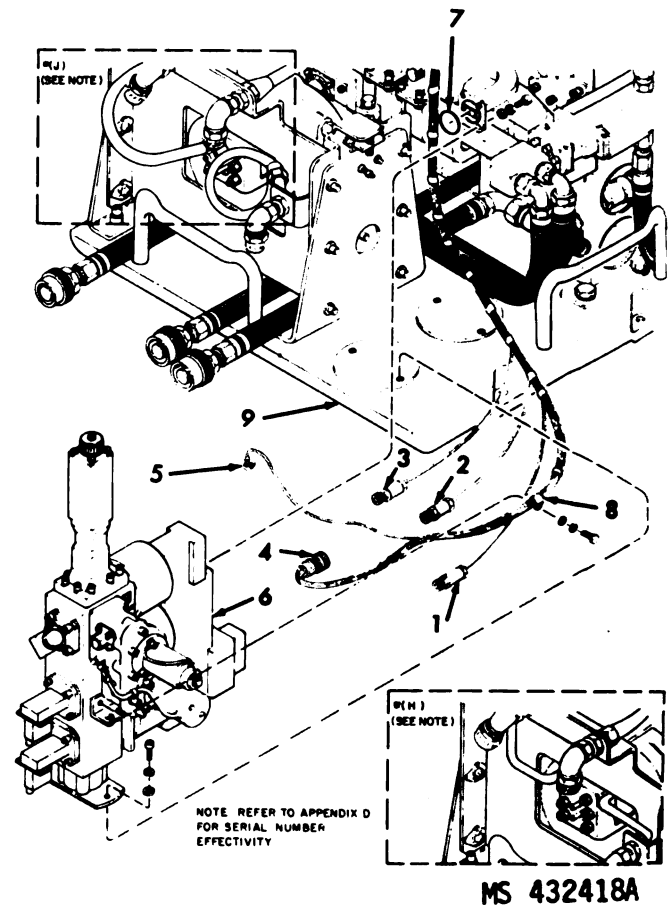
(2) Position the degeneration block (6) for installation and start, but do not tighten, the four base mounting screws and hardware.

(3) Connect the waveguide flange at upper rear of the degeneration block using retained hardware.

(4) Tighten the four base mounting screws.

(5) Connect the electrical connectors (1) through (5).

c. Test After Installation. Refer to table 3-12 for test procedures.



1—Electrical connector P19 (mates with A4J1)
2—Electrical connector P17 (mates with A3J1)
3—Electrical connector P16 (mates with A2J1)
4—Electrical connector P21 (mates with A7J1)
5—Electrical connector P10 (mates with A8J1)
6—Degeneration block
7—Preformed packing
8—Loop clamp
9—Rf pallet

Figure 5-8. Replacement of the degeneration block.

5-16. Replacement of the Rf Transmitter Assembly

WARNING

High voltage is used in the operation of the rf transmitter assembly. Set the main power switch (4, fig. 2-11) to OFF before performing maintenance.

CAUTION

When removing or installing the rf transmitter assembly, use only the pallet base for handholds. Do not use any of the components for a handhold, as this could cause serious damage to the unit.

a. Removal.

NOTE

The key numbers shown below in parentheses refer to figure 5-9.

(1) Remove the power amplifier tube (par. 5-11*a*).

(2) Remove the waveguide cover (1) from the trailer pallet.

(3) Remove the flexible waveguide flange (3) by removing eight socket-head screws (2).

CAUTION

Cover the waveguide flange with a dust cover as soon as possible after the disconnection has been made.

(4) Remove the inner bellows retainer (5) by removing six panhead screws (4).

(5) Remove the preformed packing (6) from the rf transmitter assembly directional coupler (7).

NOTE

The key numbers shown below in parentheses refer to figure 5-10.

CAUTION

To prevent glycol from damaging the electrical connectors (1 and 2), cover them with a protective cloth.

(6) Disconnect the hose assemblies (3 through 9).

CAUTION

Catch any coolant that drains out of the coolant lines and cap all lines and fittings as soon as possible. Dispose of the coolant per local safety regulations. Make certain that all spilled coolant is thoroughly removed immediately with a dry cloth before removing any electrical cables or applying power to the radar.

(7) Disconnect the electrical connectors (10 through 15).

(8) Remove the two quick-release pins (16) and pull the rf transmitter assembly (19) until the drawer slides (17) are fully extended.

WARNING

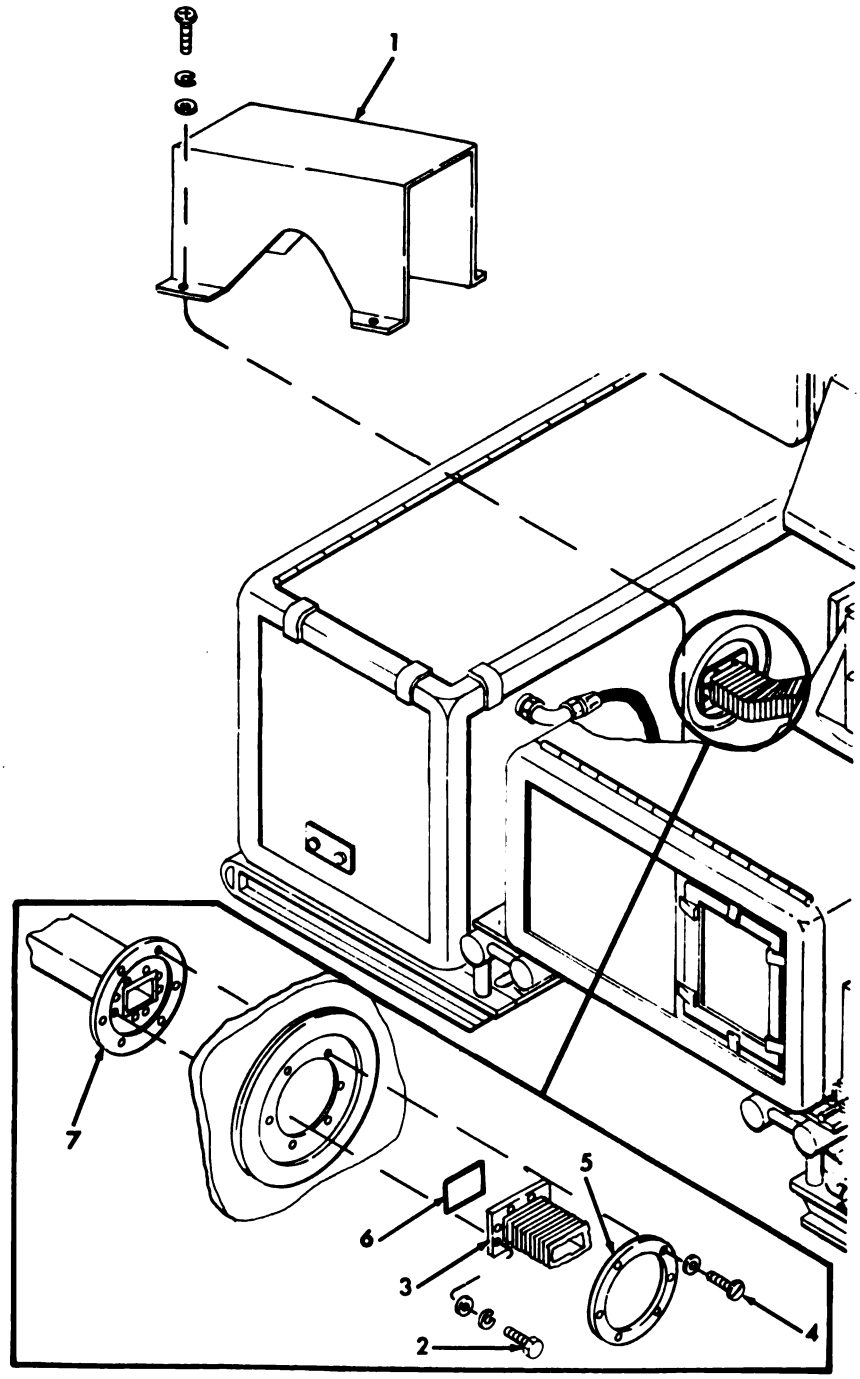
Use at least four people when removing the rf transmitter assembly to prevent injury to personnel.

(9) Remove the master oscillator (tunable) (par. 5-12*a*).

(10) Remove the rf transmitter assembly from the slides by removing six hex-head screws (18).

CAUTION

Cover the directional coupler flange with a dust cover as soon as possible after the disconnection has been made.



MS 432419

1—Waveguide cover
2—Socket-head screw (8)
3—Flexible waveguide flange
4—Panhead screw (6)
5—Inner bellows retainer
6—Preformed packing
7—Rf transmitter assembly directional coupler

Figure 5-9. Removal of the rf transmitter assembly waveguide.

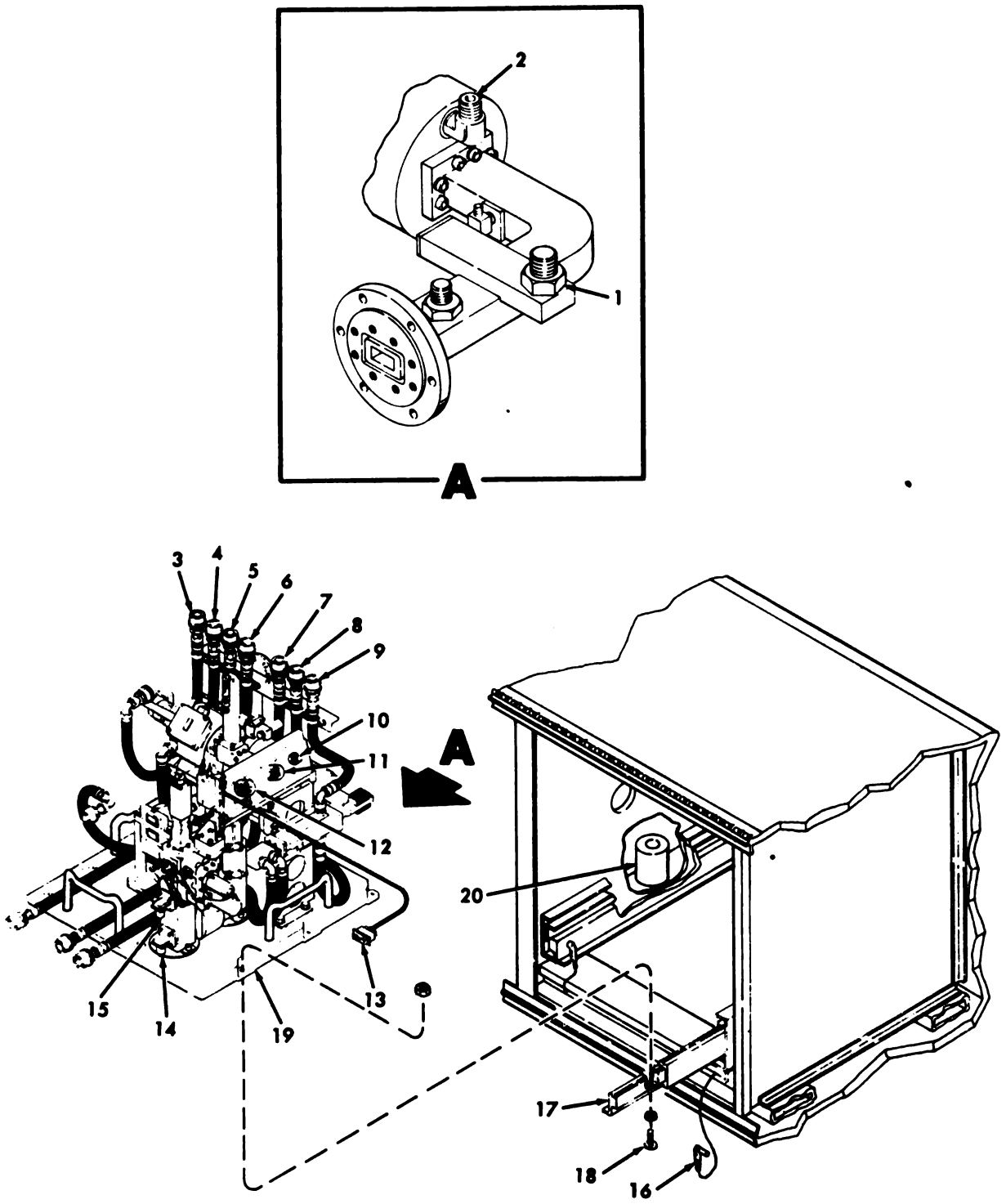


Figure 5-10. Replacement of the rf transmitter assembly.

1—J1DC5
2—W1-15
3—Hose assembly (marker band "B")
4—Hose assembly (marker band "C")
5—Hose assembly (marker band "D")
6—Hose assembly (marker band "E")
7—Hose assembly (marker band "F")
8—Hose assembly (marker band "G")
9—Hose assembly (marker band "H")
10—Electrical connector W12J1 (mates with W9P1)
11—Electrical connector J1 (mates with A17P18)
12—Electrical connector J2 (mates with A17P39)
13—Electrical connector W1P18 (mates with A21J2)
14—Electrical connector A13J4 (mates with W5P1)
15—Electrical connector A13J3 (mates with W4P1)
16—Quick-release pin (2)
17—Slide (2)
18—Hex-head screw (6)
19—Rf transmitter assembly
20—Absorption paper

Figure 5-10 —Continued.

b. Installation.

WARNING

Use at least four people when installing the rf transmitter assembly to prevent injury to personnel.

(1) Install the rf transmitter assembly on the slides.

(2) Install the power amplifier tube (par. 5-11*b*).

(3) Install the master oscillator (tunable) (par. 5-12*b*).

(4) Slide the rf transmitter assembly into the radar transmitter console and secure it using the two quick-release pins.

(5) Connect electrical connectors (10 through 15).

(6) Connect hose assemblies (3 through 9).

(7) Install the preformed packing on the rf transmitter assembly directional coupler.

(8) Install the inner bellows retainer using six panhead screws.

(9) Install the flexible waveguide flange on the directional coupler using eight socket-head screws (par. 5-2).

(10) Perform rf detection test (par. 4-23).

(11) Install the waveguide cover.

c. Test After Installation. Refer to table 3-12 for check procedures.

5-17. Replacement of the High-Voltage Power Supply Test Set

CAUTION

Make certain that all spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

a. Removal and Installation. Remove and install the high-voltage power supply test set (fig. 5-11).

b. Test After Installation. Refer to table 3-12 for check procedures.

5-18. Replacement of the Liquid Cooler Unit

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11) before performing maintenance.

NOTE

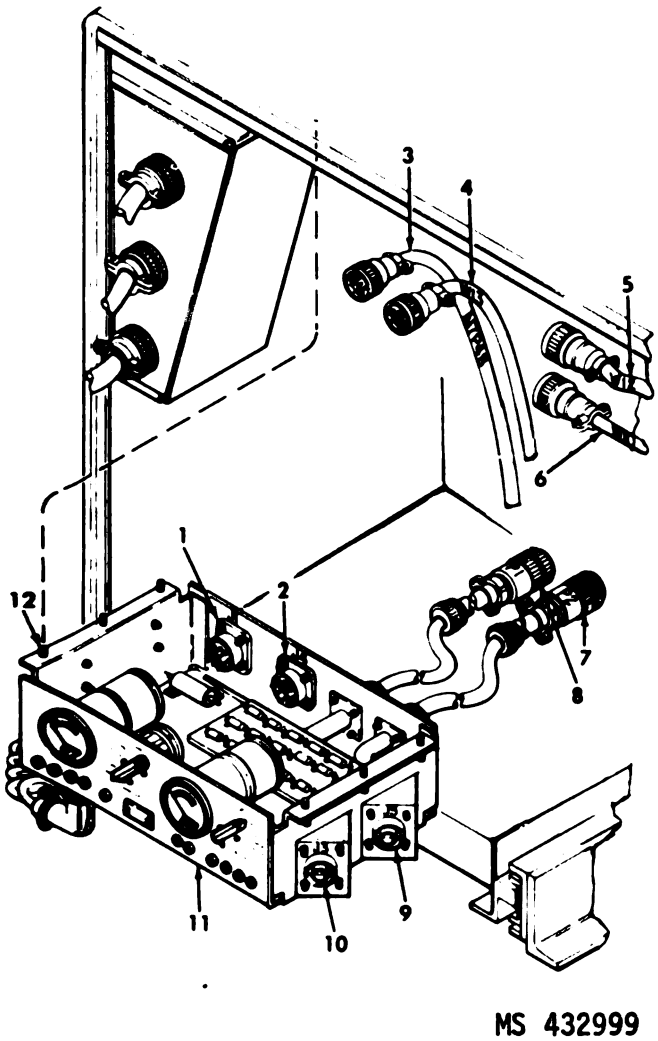
The key numbers shown below in parentheses refer to figure 5-12.

a. Removal.

(1) Open the liquid cooler door.

(2) Drain the cooling systems as described in paragraph 4-14*b* and clean all components.

(3) Disconnect the electrical connector (1).



1—Electrical connector J1 (mates with wiring harness A17P48)
2—Electrical connector J4 (mates with cable assembly W13)
3—Wiring harness A17P48
4—Cable assembly W13
5—Cable assembly W12
6—Cable assembly W10
7—Cable P2 (mates with J2 dummy load)
8—Cable P1 (mates with J1 dummy load)
9—Electrical connector J5 (mates with cable assembly W12)
10—Electrical connector J3 (mates with cable assembly W10)
11—High-voltage power supply test set
12—Turnlock fastener

Figure 5-11. Replacement of the high-voltage power supply test set.

(4) Disconnect the rubber hose assemblies (2 through 5) and catch the coolant fluid overflow in a container.

CAUTION

Make certain that all spilled coolant is thoroughly removed immediately with a dry cloth before applying power to the radar.

(5) Remove the eight machine screws and lockwashers (6 and 7).

(6) Remove the liquid cooler unit (8).

b. Installation.

(1) Install the liquid cooler unit (8).

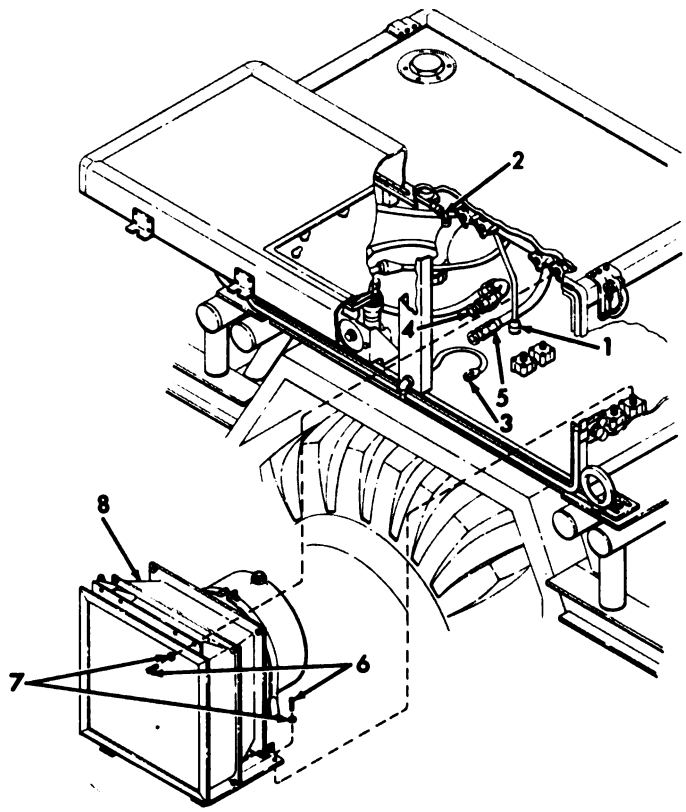
(2) Install the eight machine screws and lockwashers (6 and 7).

(3) Connect the rubber hose assemblies (2 through 5).

(4) Connect the electrical connector (1).

(5) Fill the unit and check the coolant fluid level (par. 4-14*a*).

(6) Close and secure the liquid cooler door.



1—Electrical connector
2—Rubber hose assembly
3—Rubber hose assembly
4—Rubber hose assembly
5—Rubber hose assembly
6—Machine screw (8)
7—Lockwasher (8)
8—Liquid cooler unit

Figure 5-12. Replacement of the liquid cooler unit.

5-19. Replacement of the Rotary Pump

NOTE

The key numbers shown below in parentheses refer to figure 5-13, unless otherwise indicated.

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11) before performing maintenance.

a. Removal.

(1) Open the liquid cooler door.

(2) Remove the filler cap (1).

(3) Open the draincock (7).

(4) Disconnect the rubber hose assembly (4, fig. 5-12) from the liquid cooler unit and catch the coolant overflow in a container.

CAUTION

Make certain that all residue from spilled coolant is thoroughly removed immediately with a dry cloth. Check before applying power to the radar.

NOTE

When the hose clamp (4) is removed, the entire contents of the coolant tank drain. Provide a container of adequate size to catch the fluid.

(5) Disconnect the hose assembly (5) and the preformed hose (2).

(6) Disconnect the electrical connector (3).

(7) Remove the rotary pump (8).

b. Installation.

NOTE

Remove the shipping plugs from the rotary pump at the time of installation.

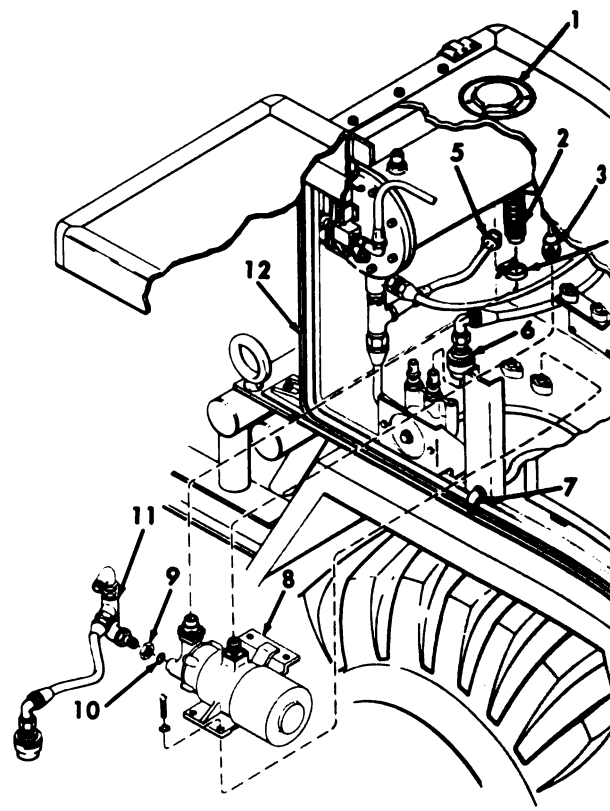
(1) Install the rotary pump (8).

(2) Reconnect the hose assemblies and electrical connector.

(3) Fill the cooling system (par. 4-14*a*).

(4) Close the liquid cooler door.

c. Test After Installation. Refer to table 3-12 for check procedures.



1—Filler cap
2—Preformed hose
3—Electrical connector
4—Hose clamp
5—Hose assembly
6—Quick-disconnect fitting
7—Draincock
8—Rotary pump
9—Nut
10—Preformed packing
11—Hose and fitting assembly
12—Liquid cooler

Figure 5-13. Replacement of the rotary pump.

5-20. Replacement of the 100- and ±50-Vdc Power Supply Assemblies

a. Removal and Installation. The removal and installation of the 100- and ±50-vdc power supply (fig. 5-14) and its assemblies is obvious by illustration. Insure that the IHIPIR is properly deenergized before attempting removal or installation.

CAUTION

Adjustment of the 100- and ±50-vdc power supply outputs must be made at a slow rate and only up to the specified voltage value. Do not allow voltage outputs to exceed the specified value from either maladjustment or rapid adjustment. Failure to observe these precautions will result in damage to circuits.

b. Test After Installation.

NOTE

The following power supply adjustments must be made prior to application of power.

(1) Set the +100V ADJ (9, fig. 2-10) fully counterclockwise.

(2) Set the −50V ADJ (10, fig. 2-10) fully counterclockwise.

(3) Set the +50V ADJ (11, fig. 2-10) fully counterclockwise.

(4) Refer to table 3-10 for the check procedures to be performed.

5-21. Replacement of the Elevation Motor-Tachometer Generator

a. Removal.

WARNING

Failure to perform step (1) could cause injury to personnel or damage to the equipment.

(1) Set the PEDESTAL SAFETY SWITCH (1, fig. 2-11) to the SAFE position, and the main power switch (4, fig. 2-11) to the OFF position.

NOTE

The key numbers shown below in parentheses refer to figure 5-15.

(2) If necessary, remove the liquid cooler air intake cover (1) from its storage position on the elevation head.

(3) Remove the pedestal head access cover (2) and the seal (3) from the elevation head (6).

(4) Remove the ventilating hose (4) from the air intake port of the motor-tachometer generator (5).

(5) Identify, tag, and remove the electrical leads from the two terminal boards on the motor-tachometer generator.

(6) Remove the four self-locking bolts and flat washers that secure the motor-tachometer generator.

(7) Remove the motor-tachometer generator by pulling straight out to allow spur gear on end of shaft to disengage from mating gear.

b. Installation.

CAUTION

Failure to perform steps (1) and (2) could cause damage to the equipment.

(1) Remove dust cap from the air intake port of the replacement motor-tachometer generator.

(2) Coat the gear teeth of the replacement motor-tachometer generator with grease 9150-00-223-4004.

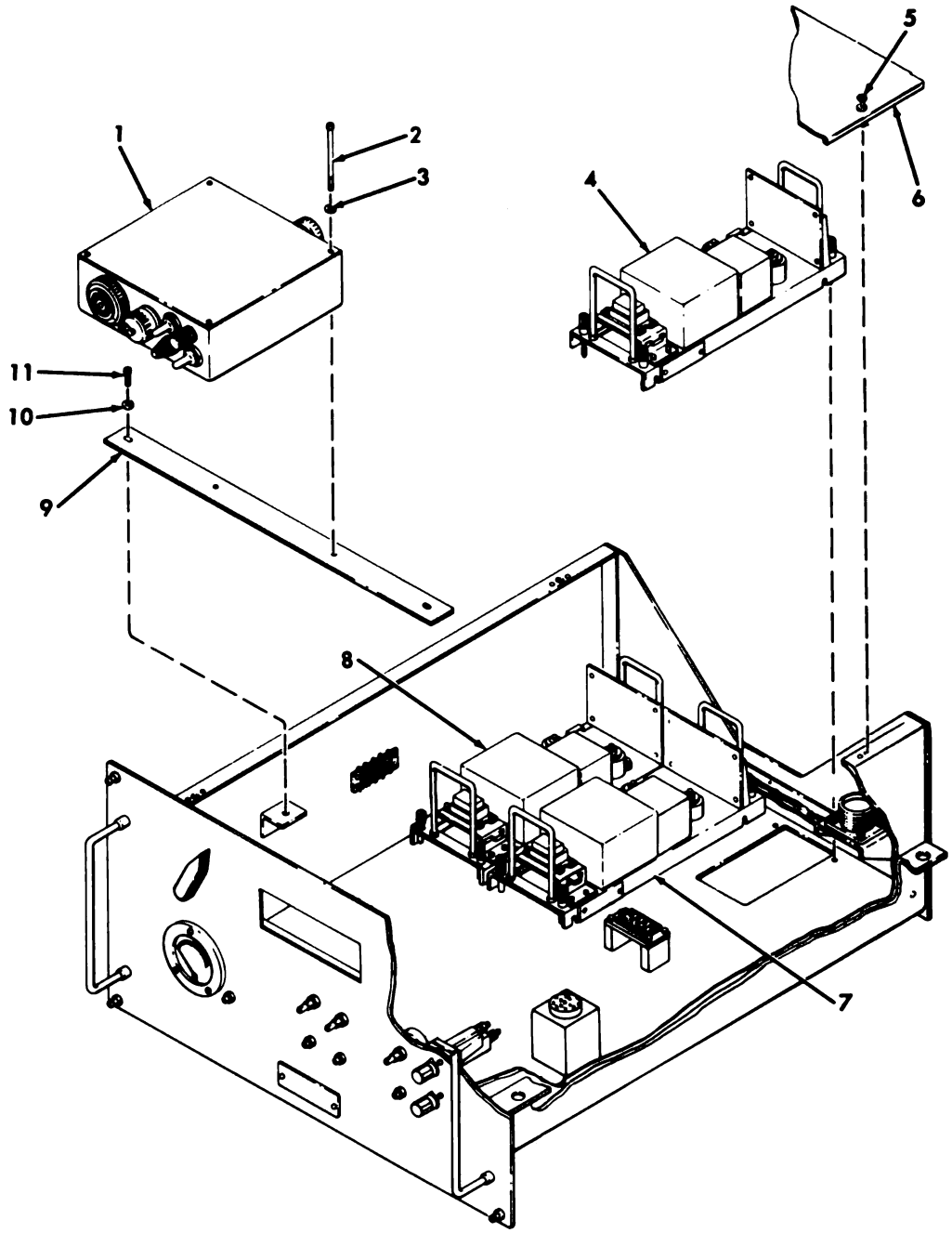
(3) Install the replacement motor-tachometer being careful to mesh the gears and secure with the four self-locking bolts and flat washers.

(4) Connect the electrical leads to the two terminal boards of the motor-tachometer generator.

(5) Connect the ventilating hose (4) to the air intake port of the motor-tachometer generator.

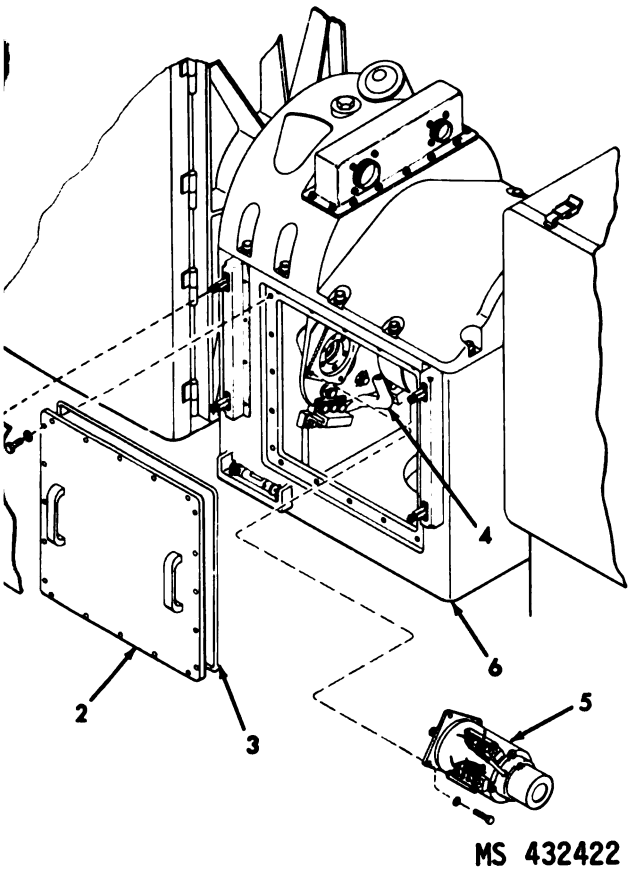
(6) Install the pedestal head access cover (2) and seal (3) to the elevation head (6).

c. Test After Installation. Refer to the antenna positioning checks in table 3-11 for check procedures.



1—Communications station (A8)
2—Screw
3—Washer
4—50-Vdc power supply (A1)
5—Turnlock fastener (4)
6—Top cover
7—50-Vdc power supply (A2)
8—100-Vdc power supply (A5)
9—Plate
10—Washer
11—Screw

Figure 5-14. Replacement of the communications station, 100- and ±50-vdc power supply assemblies.



1—Liquid cooler air intake cover (storage position)
2—Pedestal head access cover
3—Seal
4—Ventilating hose
5—Elevation motor-tachometer generator
6—Elevation head

Figure 5-15. Replacement of the elevation motor-tachometer generator.

5-22. Replacement of the Azimuth Motor-Tachometer Generator

a. Removal.

CAUTION

Failure to perform step (1) could cause injury to personnel or damage to equipment.

(1) Set the PEDESTAL SAFETY SWITCH (1, fig. 2-11) to the SAFE position, and the main power switch (4, fig. 2-11) to the OFF position.

NOTE

The key numbers shown below in parentheses refer to figure 5-16.

(2) Remove the cover (1) from the pedestal base (4).

(3) Identify, tag, and remove the electrical leads from the two terminal boards on the motor tachometer generator (3).

(4) Remove the bolts and flat washers that secure the motor-tachometer generator.

(5) Remove the motor-tachometer generator by pulling straight out to allow spur gear on end of shaft to disengage from mating gear.

b. Installation.

CAUTION

Failure to perform steps (1) and (2) could cause damage to the equipment.

(1) Remove dust cap from air intake port (2) of the replacement motor-tachometer generator.

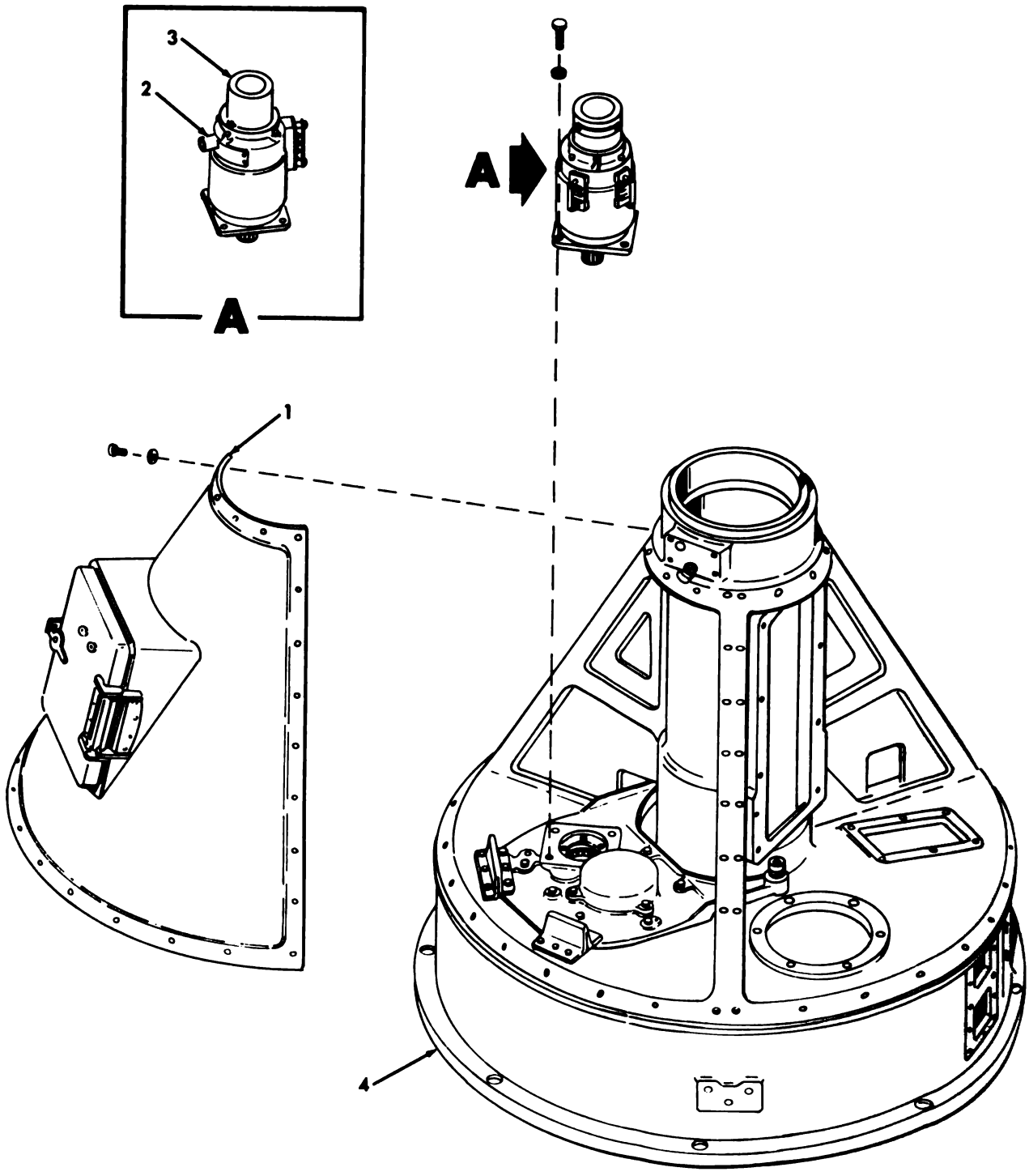
(2) Coat the gear teeth of the replacement motor-tachometer generator with grease 9150-00-223-4004.

(3) Install the replacement motor-tachometer generator being careful to mesh the gears and secure with the bolts and flat washers.

(4) Connect the electrical leads to the two terminal boards of the motor-tachometer generator.

(5) Install the cover (1) to the pedestal base (4).

c. Test After Installation. Refer to the antenna positioning checks in table 3-11 for check procedures.



1—Access door and cover
2—Air intake port
3—Motor-tachometer generator
4—Pedestal

Figure 5-16. Replacement of the azimuth motor-tachometer generator.

5-23. Replacement of the Degeneration Preamplifier

a. Removal.

NOTE

The key numbers shown below in parentheses refer to figure 5-17.

(1) Disconnect the electrical connectors (2 through 5).

(2) Pull the degeneration preamplifier chassis (1) out of the transmitter group until its slides are fully extended.

(3) Remove the degeneration preamplifier (6) by loosening four captive screws (7).

b. Installation.

(1) Install the degeneration preamplifier by tightening four captive screws.

(2) Slide the degeneration preamplifier chassis into the transmitter group.

(3) Connect electrical connectors.

c. Test After Installation. Refer to table 3-12 for check procedures.

5-24. Replacement of the ±15-Vdc Power Supply Assemblies

a. Removal and Installation. The removal and installation of the ±15-vdc power supply assemblies (fig. 5-17) is obvious by illustration. Insure that the IHIPIR is properly deenergized before attempting removal or installation.

b. Test After Installation. Refer to table 3-7 for check procedures.

5-25. Replacement of the Signal Processor Parent Board

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11) before performing maintenance.

NOTE

The key numbers shown below in parentheses refer to figure 5-18.

a. Removal.

(1) Disconnect the two air hoses (3 and 4) by loosening clamps (1 and 2) for each hose.

(2) Disconnect the electrical connectors from J1 through J7 (5 through 11).

(3) Open the signal processor cover (12).

(4) Remove circuit cards A1 through A11 (13 through 23).

(5) Remove the rf shield (24) between A1 and A2.

(6) Remove the rear stainless steel slides (25) between A1 and A2.

(7) Remove the top mounting screws (26).

(8) Remove the bottom mounting screws (27).

WARNING

Two people are required to safely remove the signal processor.

(9) Remove the signal processor (28).

NOTE

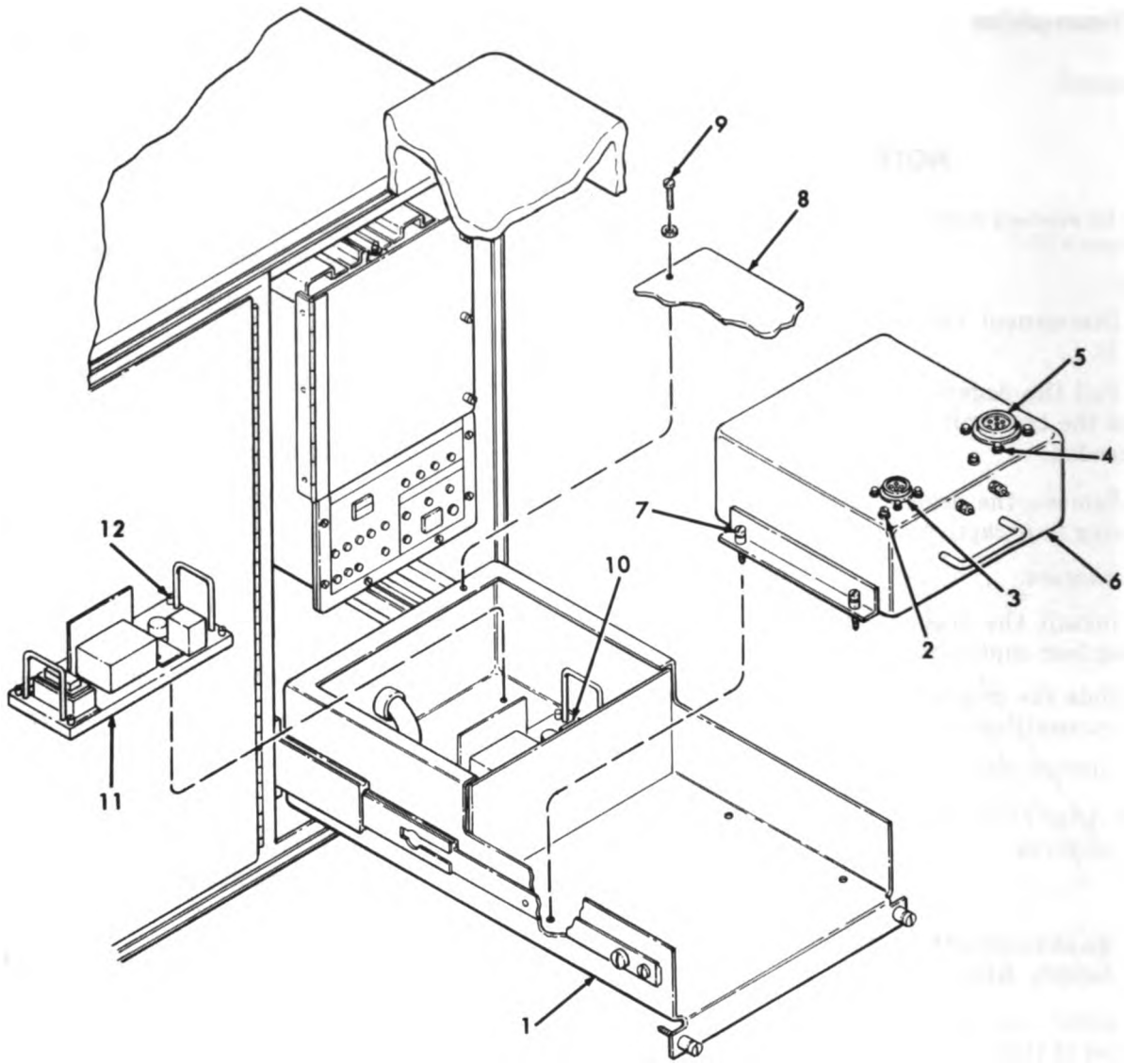
The key numbers shown below in parentheses refer to figure 5-19.

(10) Remove the signal processor rear cover (2) by removing 20 screws (1).

(11) Remove the signal processor bottom cover (4) by removing 27 screws (3).

(12) Remove 18 screws (5) from the signal processor parent board (6) and pull the parent board gently outward to provide access to connectors A12J1 through A12J3 (7 through 9).

(13) Disconnect the grounding strap (10) from the parent board.



1—Chassis
2—J1 (mates with W4P2)
3—J4 (mates with A17P47)
4—J2 (mates with W5P2)
5—J3 (mates with A17P44)
6—Degeneration preamplifier
7—Captive screw (4)
8—Cover
9—Screw (4)
10—15-vdc power supply assembly
11— —15-vdc power supply assembly
12—Captive screw (4)

Figure 5-17. Replacement of the degeneration preamplifier and ±15-vdc power supply assemblies.

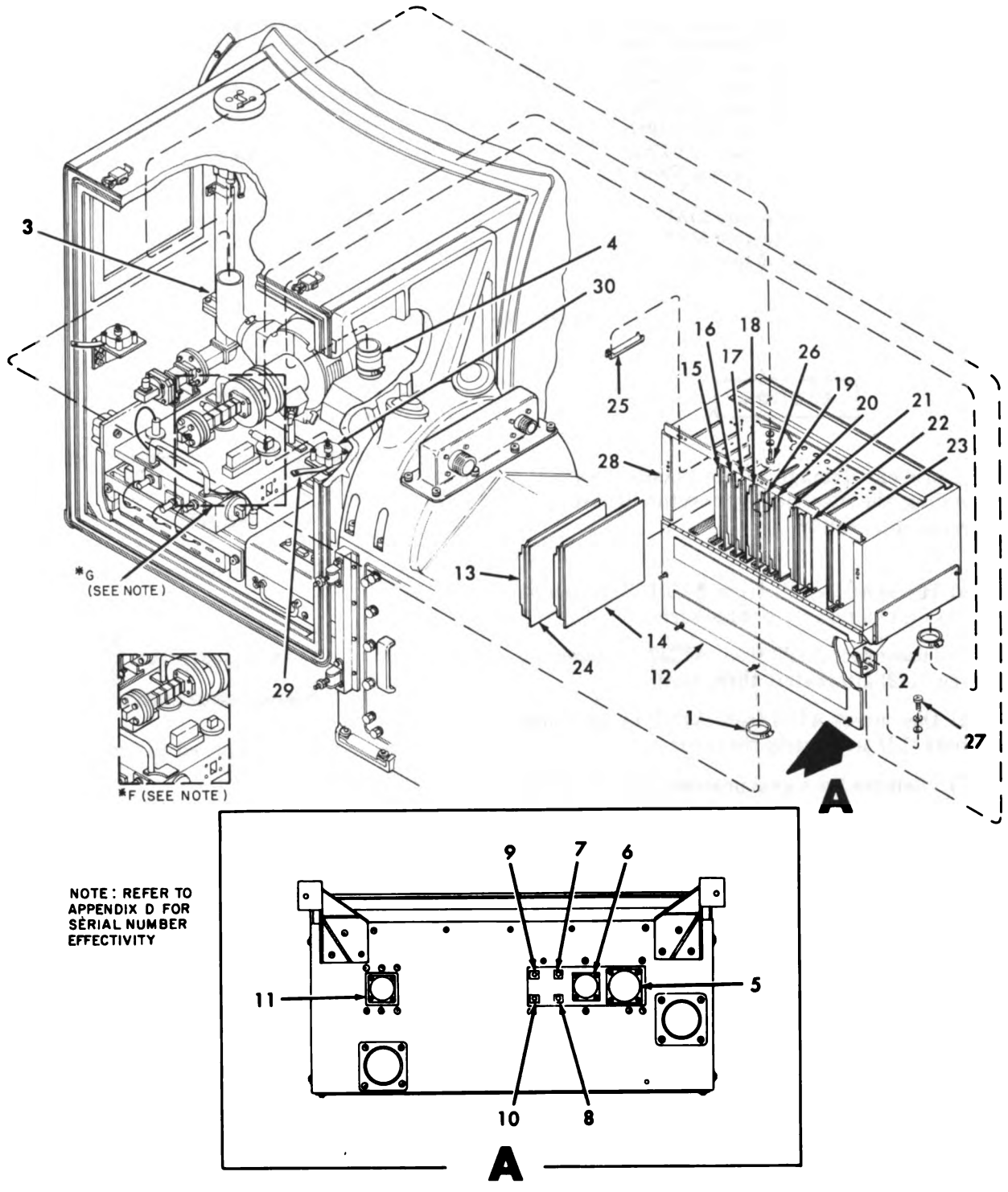


Figure 5-18. Removal of the signal processor.

1—Clamp
2—Clamp
3—Nutating scanner cooling air hose
4—Signal processor air intake hose
5—A1J1 (mates to W1P20)
6—A1J2 (mates to W1P19)
7—A1J3 (mates to W1P18)
8—A1J4 (mates to W1P16)
9—A1J5 (mates to W1P17)
10—A1J6 (mates to W1P15)
11—A1J7 (mates to W9P2)
12—Cover
13—Circuit card A1A1
14—Circuit card A1A2
15—Circuit card A1A3
16—Circuit card A1A4
17—Circuit card A1A5
18—Circuit card A1A6
19—Circuit card A1A7
20—Circuit card A1A8
21—Circuit Card A1A9
22—Circuit Card A1A10
23—Circuit card A1A11
24—Rf shield
25—Stainless steel slide (2)
26—Mounting screw (2)
27—Mounting screw (2)
28—Receiver signal processor
29—Ground strap (4)
30—Shock mount (4)

Figure 5-18—Continued.

CAUTION

To prevent damage to the plastic hood holding the electrical connector, loosen screws alternately.

(14) Disconnect A1P1 from A12J1 by loosening two screws (11) alternately three turns.

(15) Disconnect A1P2 from A12J2 by loosening two screws (12) alternately three turns.

(16) Disconnect A1P3 from A12J3 by loosening two screws (13) alternately three turns.

(17) Remove the signal processor parent board.

b. Installation.

CAUTION

To prevent damage to the plastic hood holding the electrical connector, tighten screws alternately.

(1) Connect A1P1 to A12J1 (7) by tightening two screws (11) alternately three turns.

(2) Connect A1P2 to A12J2 (8) by tightening two screws (12) alternately three turns.

(3) Connect A1P3 to A12J3 (9) by tightening two screws (13) alternately three turns.

(4) Install the signal processor parent board (6) using 18 screws (5).

(5) Connect the grounding strap (10) to the parent board.

(6) Install the signal processor bottom cover (4) using 27 screws (3).

(7) Install the signal processor rear cover (2) using 20 screws (1).

NOTE

The key numbers shown below in parentheses refer to figure 5-18.

WARNING

Two people are required to safely install the signal processor.

(8) Aline the ground straps (29) on the shock mounts (30) with mounting holes.

(9) Install the signal processor (28).

(10) Install the top mounting screws (26) loosely.

(11) Install the signal processor air intake hose (4) and tighten its clamp (2).

(12) Tighten the top mounting screws.

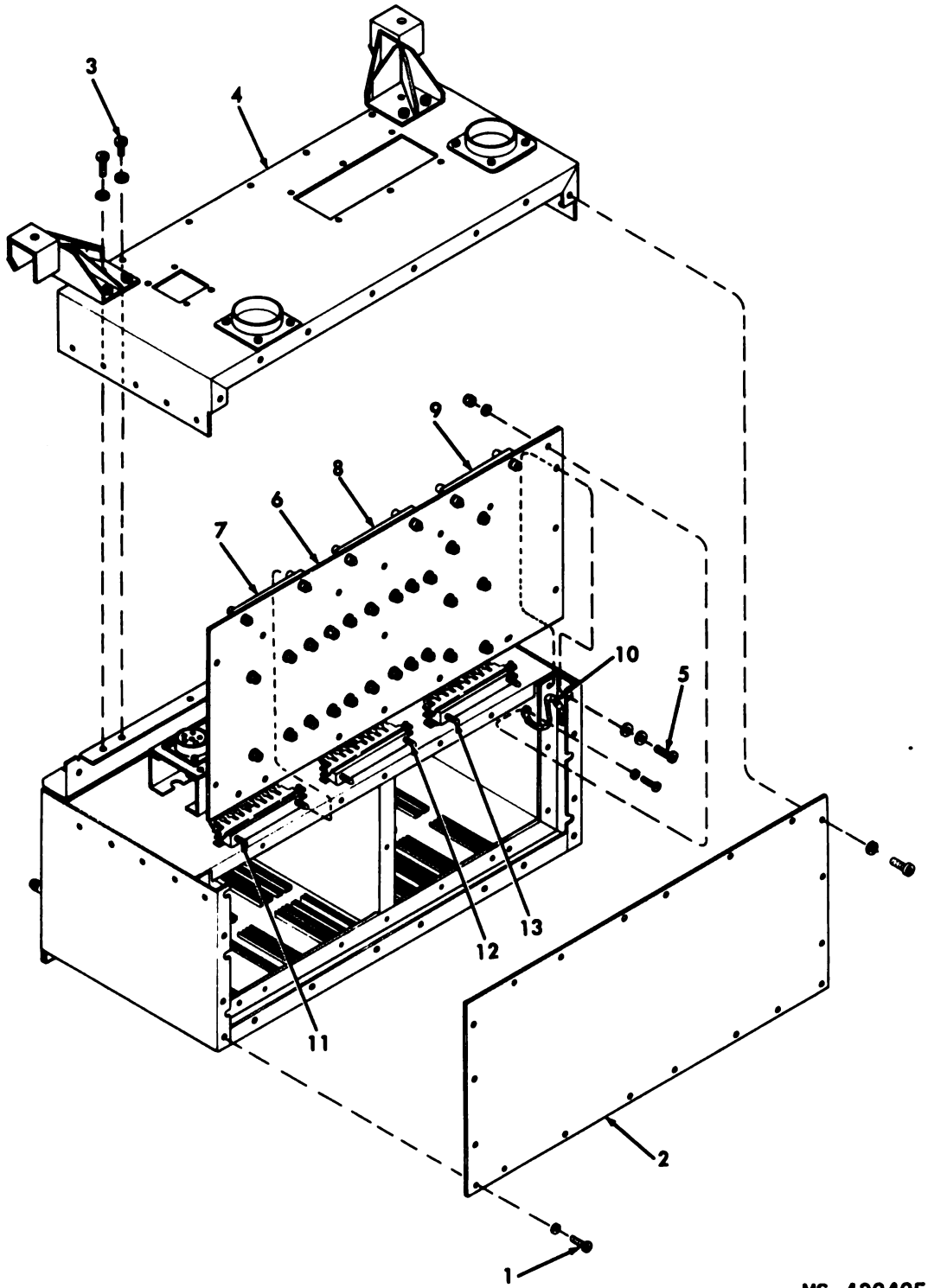
(13) Install the bottom mounting screws (27).

(14) Install the rear stainless steel slides (25) between A1 and A2.

(15) Install the rf shield (24) between A1 and A2.

(16) Install circuit cards A1 through A11 (13 through 23).

(17) Close the signal processor cover (12).



1—Screw (20)
2—Signal processor rear cover
3—Screw (27)
4—Signal processor bottom cover
5—Screw (18)
6—Signal processor parent board
7—A12J1 (mates to A1P1)
8—A12J2 (mates to A1P2)
9—A12J3 (mates to A1P3)
10—Grounding strap
11—Screw (2)
12—Screw (2)
13—Screw (2)

Figure 5-19. Replacement of the signal processor parent board.

(18) Connect the electrical connectors to J1 through J7 (5 through 11).

(19) Connect the nutating scanner cooling air hose (3) to the signal processor and tighten its clamp (1).

c. Test After Installation. Refer to table 3-13 for check procedures.

5-26. Replacement of the ±50-, ±12.6-, and 5.4-Vdc Power Supply Assemblies

WARNING

Set the PEDESTAL SAFETY SWITCH to SAFE and the main power switch to OFF (1 and 4, fig. 2-11) before performing maintenance.

a. Removal and Installation. The removal and installation of the ±50-, ±12.6-, and 5.4-vdc power supply assemblies (fig. 5-20) is obvious by illustration. Insure that the IHIPIR is properly deenergized before attempting removal or installation.

b. Test After Installation. Refer to table 3-7 for check procedures.

5-27. Replacement of the Transmitter Control Unit Parent Board

WARNING

Set the transmitter MAIN POWER circuit breaker to OFF (25, fig. 2-1) before performing maintenance.

NOTE

The key numbers shown below in parentheses refer to figure 5-21.

a. Removal.

(1) Remove the degeneration preamplifier (par. 5-23*a*).

(2) Slide the degeneration preamplifier chassis (1) into the transmitter group.

(3) Disconnect the electrical connectors (2 through 4).

(4) Open the transmitter control unit door (5).

(5) Disconnect the electrical connector from transmitter local oscillator J1 (6).

(6) Remove the transmitter local oscillator (7) from the transmitter control unit (9) by loosening two captive screws (8).

(7) Remove the circuit cards (10 through 14) from the transmitter control unit.

(8) Remove the bottom mounting screws (15).

(9) Remove the top mounting screws (16).

(10) Remove the transmitter control unit.

(11) Remove the transmitter control unit rear cover (18) by removing 14 screws (17).

(12) Disconnect W1P1 from A7J3 (19).

(13) Disconnect A19P4 from A7J4 (20).

(14) Disconnect the grounding strap (21) from the ground screw (22) on the transmitter control unit.

CAUTION

To prevent damage to plastic hood holding the electrical connector, loosen screws alternately.

(15) Disconnect A19P1 from A7J1 (24) by loosening two screws (23) alternately three turns.

(16) Disconnect A19P2 from A7J2 (26) by loosening two screws (25) alternately three turns.

(17) Remove the transmitter control unit parent board (28) by removing six screws (27).

(18) Remove the grounding strap from the parent board.

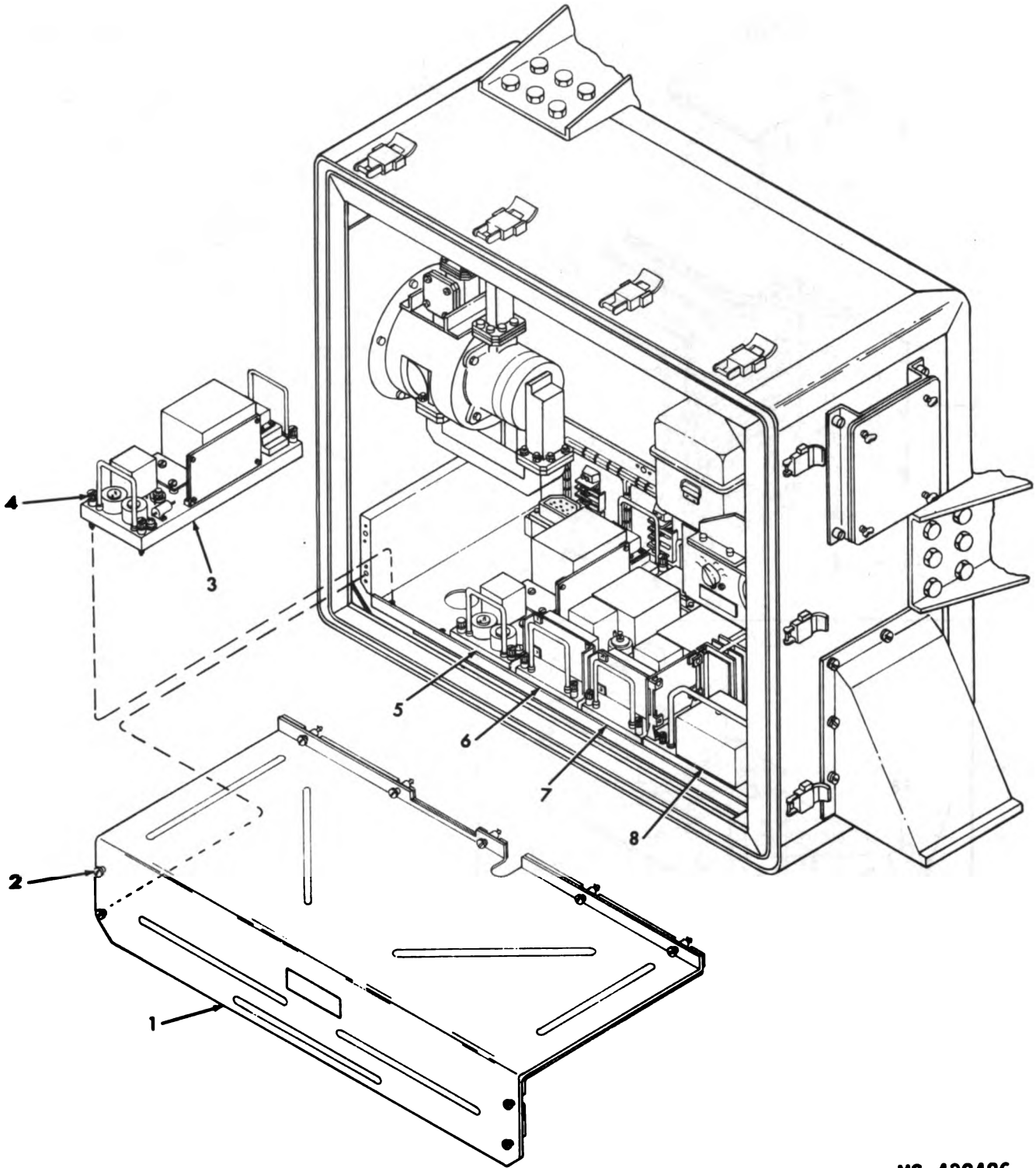
b. Installation.

(1) Connect the grounding strap (21) to the transmitter control unit parent board (28).

(2) Install the transmitter control unit parent board using six screws (27).

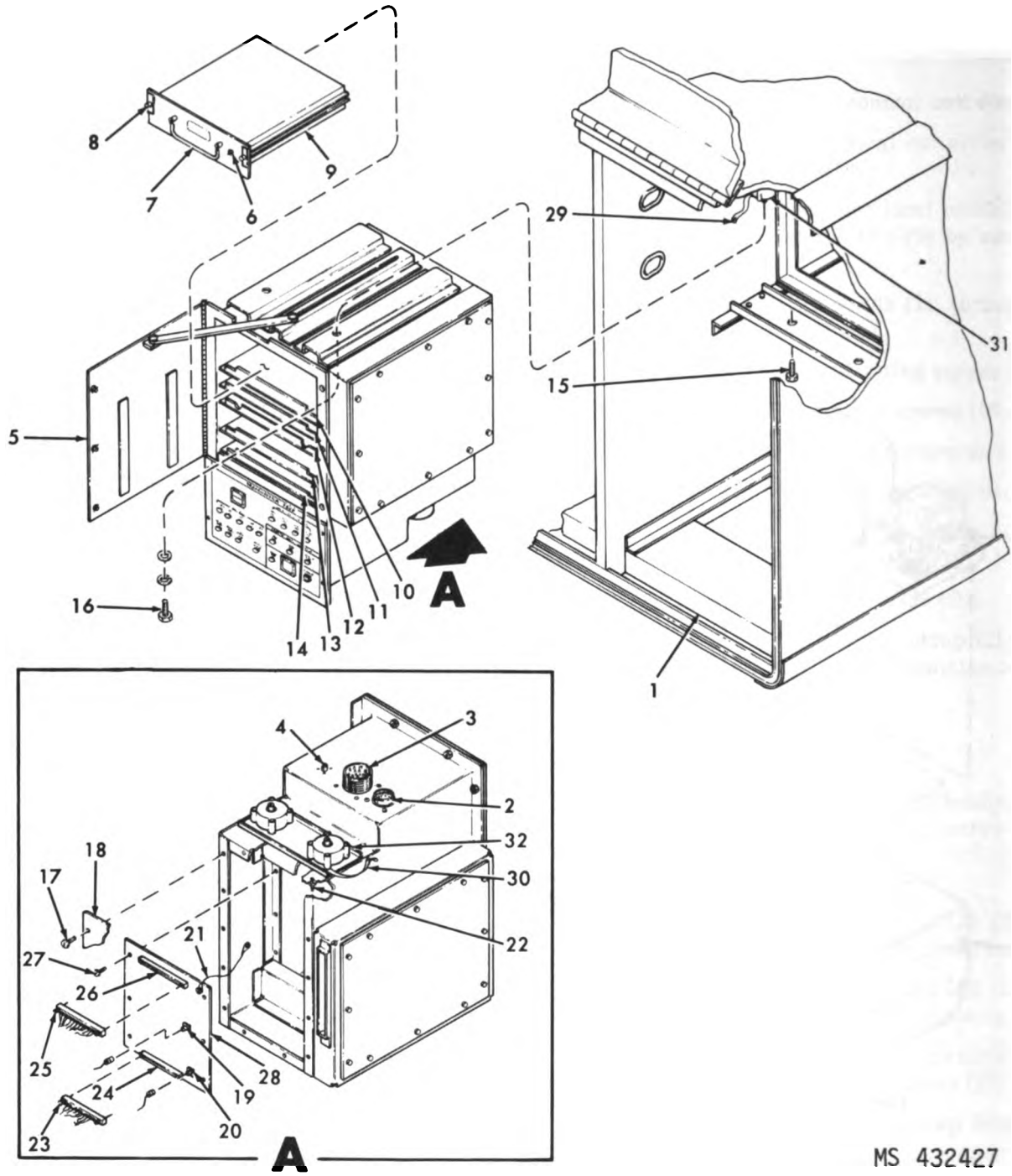
CAUTION

To prevent damage to the plastic hood holding the electrical connector, tighten screws alternately.



1—Cover
2—Screw (9)
3—12.6-Vdc power supply
4—Screw (4)
5— —12.6-Vdc power supply
6—50-Vdc power supply
7— —50-Vdc power supply
8—5.4-Vdc power supply

Figure 5-20. Replacement of the ±50-, ±12.6-, 5.4-vdc power supply assemblies.



1—Degeneration preamplifier chassis
2—J1 (mates to A17P37)
3—J2 (mates to A17P38)
4—J3 (mates to W8P1)
5—Door
6—Transmitter local oscillator J1
7—Transmitter local oscillator A19A1
8—Captive screw (2)
9—Transmitter control unit
10—Circuit card A19A2
11—Circuit card A19A3
12—Circuit card A19A4
13—Circuit card A19A5
14—Circuit card A19A6
15—Mounting screw (2)
16—Mounting screw (2)
17—Screw (14)
18—Transmitter control unit rear cover
19—A7J3 (mates to W1P1)
20—A7J4 (mates to A19P4)
21—Grounding strap
22—Ground screw
23—Screw (2)
24—A7J1 (mates to A19P1)
25—Screw (2)
26—A7J2 (mates to A19P2)
27—Screw (6)
28—Parent board
29—Ground strap (2)
30—Ground strap (2)
31—Shock mount (2)
32—Shock mount (2)

Figure 5-21. Replacement of the transmitter control unit parent board.

(3) Connect A19P1 to A7J1 (24) by tightening two screws (23) alternately three turns.

(4) Connect A19P2 to A7J2 (26) by tightening two screws (25) alternately three turns.

(5) Connect the grounding strap (21) to the ground screw (22) on the transmitter control unit.

(6) Connect W1P1 to A7J3 (19).

(7) Connect A19P4 to A7J4 (20).

(8) Install the transmitter control unit rear cover (18) using 14 screws (17).

(9) Aline the ground straps (29 and 30) on the shock mounts (31 and 32) with the mounting holes.

(10) Install the transmitter control unit (9).

(11) Install the top mounting screws (16).

(12) Install the bottom mounting screws (15).

(13) Install the circuit cards (10 through 14).

(14) Install the transmitter local oscillator (7) by tightening two captive screws (8).

(15) Connect the electrical connector to transmitter local oscillator J1 (6).

(16) Close the transmitter control unit door (5).

(17) Connect the electrical connectors (2 through 4).

(18) Pull the degeneration preamplifier chassis (1) out of the transmitter group until its slides are fully extended.

(19) Install the degeneration preamplifier (par. 5-23*b*).

c. Test After Installation. Refer to table 3-12 for check procedures.

5-28. Replacement of Servo Control Unit Parent Boards A and B

WARNING

Set the main fuse panel MAIN POWER circuit breaker to OFF (27, figure 2-7).

NOTE

The key numbers shown below refer to figure 5-22.

a. Removal.

(1) Loosen the four captive screws (1) and pull the servo control unit (2) out of the radar set group cabinet until the drawer slides are fully extended.

(2) Open the servo control unit cover (3).

NOTE

To remove the servo control unit parent board A only, proceed to step (6).

(3) Remove circuit cards A13A1 through A13A8 (4 through 11).

(4) Disconnect A13P7 from A14J1 (13) by loosening two screws (12) alternately three turns.

(5) Disconnect A13P8 from A14J2 (15) by loosening two screws (14) alternately three turns.

NOTE

To remove servo control unit parent board B only, proceed to step (9).

(6) Remove circuit cards A13A9 through A13A11 (16 through 18).

CAUTION

To prevent damage to the plastic hood holding the electrical connector, loosen screws alternately.

(7) Disconnect A13P9 from A15J1 (20) by loosening two screws (19) alternately three turns.

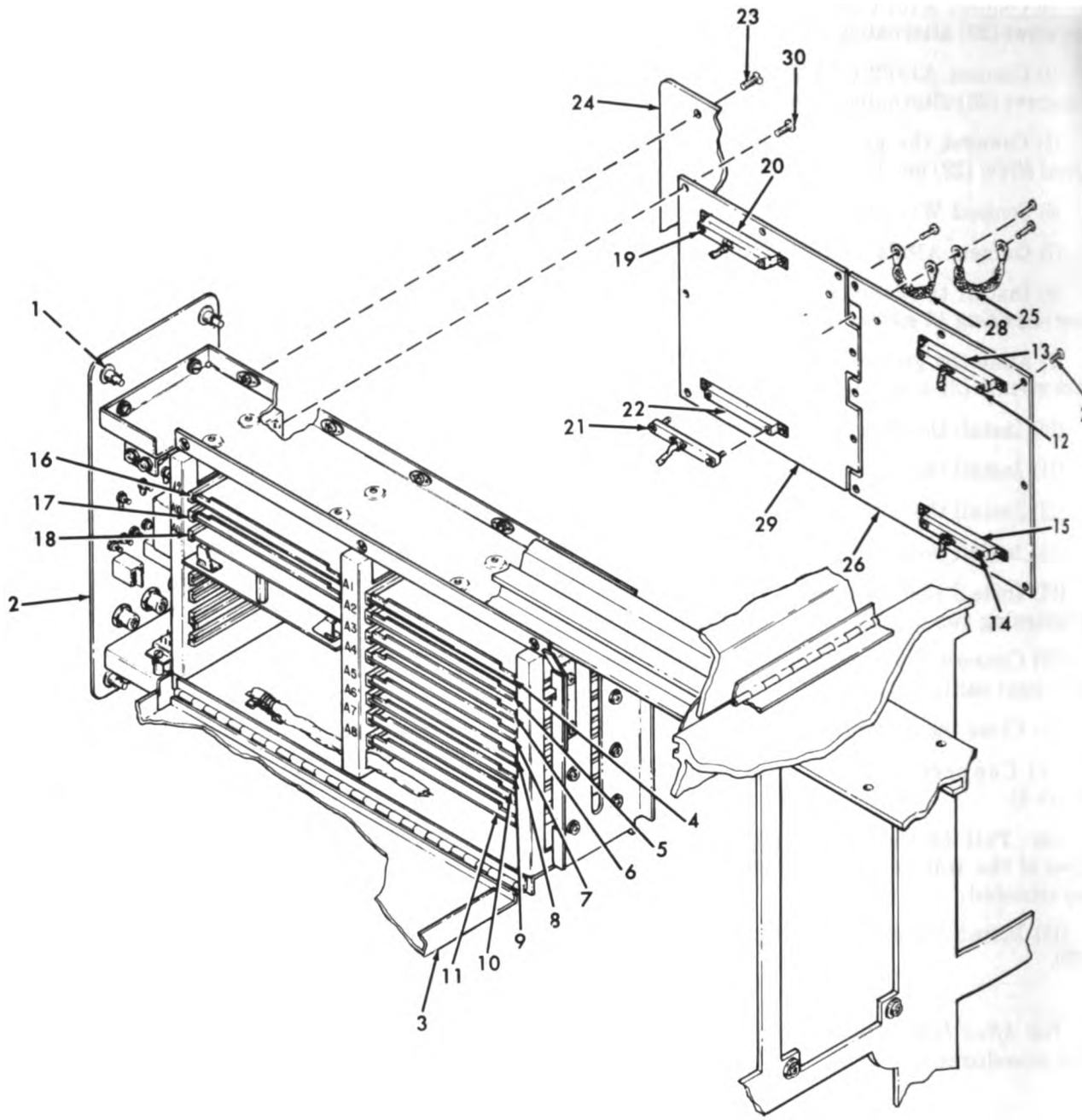
(8) Disconnect A13P10 from A15J2 (22) by loosening two screws (21) alternately three turns.

(9) Remove the servo control unit rear cover (24) by removing 10 screws (23).

NOTE

To remove servo control unit parent board A only, proceed to step (12).

(10) Disconnect the grounding strap (25) from parent board B (26).



1—Captive screw (4)
2—Servo control unit
3—Cover
4—Circuit card A13A1
5—Circuit card A13A2
6—Circuit card A13A3
7—Circuit card A13A4
8—Circuit card A13A5
9—Circuit card A13A6
10—Circuit card A13A7
11—Circuit card A13A8
12—Screw (2)
13—A14J1 (mates to A13P7)
14—Screw (2)
15—A14J2 (mates to A13P8)
16—Circuit card A13A9
17—Circuit card A13A10
18—Circuit card A13A11
19—Screw (2)
20—A15J1 (mates to A13P9)
21—Screw (2)
22—A15J2 (mates to A13P10)
23—Screw (10)
24—Rear cover
25—Grounding strap
26—Parent board B
27—Screw (8)
28—Grounding strap
29—Parent board A
30—Screw (9)

Figure 5-22. Replacement of the servo control unit parent boards A and B.

(11) Remove parent board B by removing eight screws (27).

NOTE

Perform steps (12) and (13) only if removing servo control unit parent board A.

(12) Disconnect the grounding strap (28) from parent board A (29).

(13) Remove parent board A by removing nine screws (30).

b. Installation.

NOTE

To remove servo control unit parent board B only, proceed to step (3).

(1) Install parent board A (29) using nine screws (30).

(2) Connect the grounding strap (28) to parent board A.

NOTE

To install servo control unit parent board A only, proceed to step (5).

(3) Install parent board B (26) using eight screws.

(4) Connect the grounding strap (25) to parent board B.

(5) Install the servo control unit rear cover (24) using 10 screws (23).

NOTE

To install servo control unit parent board B only, proceed to step (9).

CAUTION

To prevent damage to the plastic hood holding the electrical connector, tighten screws alternately.

(6) Connect A13P9 to A15J1 (20) by tightening two screws (19) alternately three turns.

(7) Connect A13P10 to A15J2 (22) by tightening two screws (21) alternately three turns.

(8) Install circuit cards A13A9 through A13A11 (16 through 18).

NOTE

To install servo control unit parent board A only, proceed to step (12).

CAUTION

To prevent damage to the plastic hood holding the electrical connector, tighten screws alternately.

(9) Connect A13P7 to A14J1 (13) by tightening two screws (12) alternately three turns.

(10) Connect A13P8 to A14J2 (15) by tightening two screws (14) alternately three turns.

(11) Install circuit cards A13A1 through A13A8 (4 through 11).

(12) Close the servo control unit cover (3).

(13) Push the servo control unit (2) into the radar set group cabinet and tighten, using four captive screws (1).

c. Test After Installation. Refer to table 3-11 for check procedures.

5-28.1. Replacement of the CONTROL INTERLOCK Pushbutton Switch on Transmitter Panel 1

NOTE

This procedure applies only to AN/MPQ-46 radars modified to AN/MPQ-57 configuration.

a. Removal.

WARNING

Failure to perform step (1) could cause injury to personnel.

(1) Set the transmitter MAIN POWER circuit breaker (25, fig. 2-1) to OFF.

(2) Open transmitter panels 1 and 2 (1 and 2, fig. 1-2).

NOTE

The key numbers shown below in parentheses refer to figure 5-23.

(3) Disconnect A17P7 from J2 (1).

(4) Disconnect A17P8 from J3 (2).

(5) Disconnect A17P6 from J4 (3).

(6) Remove the transmitter panel 1 cover (4).

(7) If the existing switch is P/N 9176165 (5), remove three screws from the switch.

(8) If the existing switch is P/N M8805/23-003 (6), remove the nut and lockwasher from the switch.

(9) Tag and remove all wires from the switch.

b. Installation.

(1) If the old switch was P/N 9176165 (5), fill the three unused screw mounting holes on transmitter panel 1 with epoxy (IC white) and spray paint the filled holes.

(2) Reverse the anti-rotate tab ring on the new CONTROL INTERLOCK pushbutton switch (P/N M8805/23-003) so that the tab faces away from the mounting panel.

(3) Connect the tagged wires to the pushbutton switch.

(4) Install threaded portion of the switch through the existing switch mounting hole and secure it with the supplied lockwasher and nut.

(5) Replace the transmitter panel 1 cover.

(6) Connect A17P7 to J2.

(7) Connect A17P8 to J3.

(8) Connect A17P6 to J4.

(9) Close transmitter panels 1 and 2.

NOTE

The CONTROL INTERLOCK pushbutton switch is activated by a plunger on the transmitter console door when the door is closed.

(10) Adjust the door plunger so that it does not apply excessive force on the plastic pushbutton when the door is closed.

5-29. Replacement of TAS Units

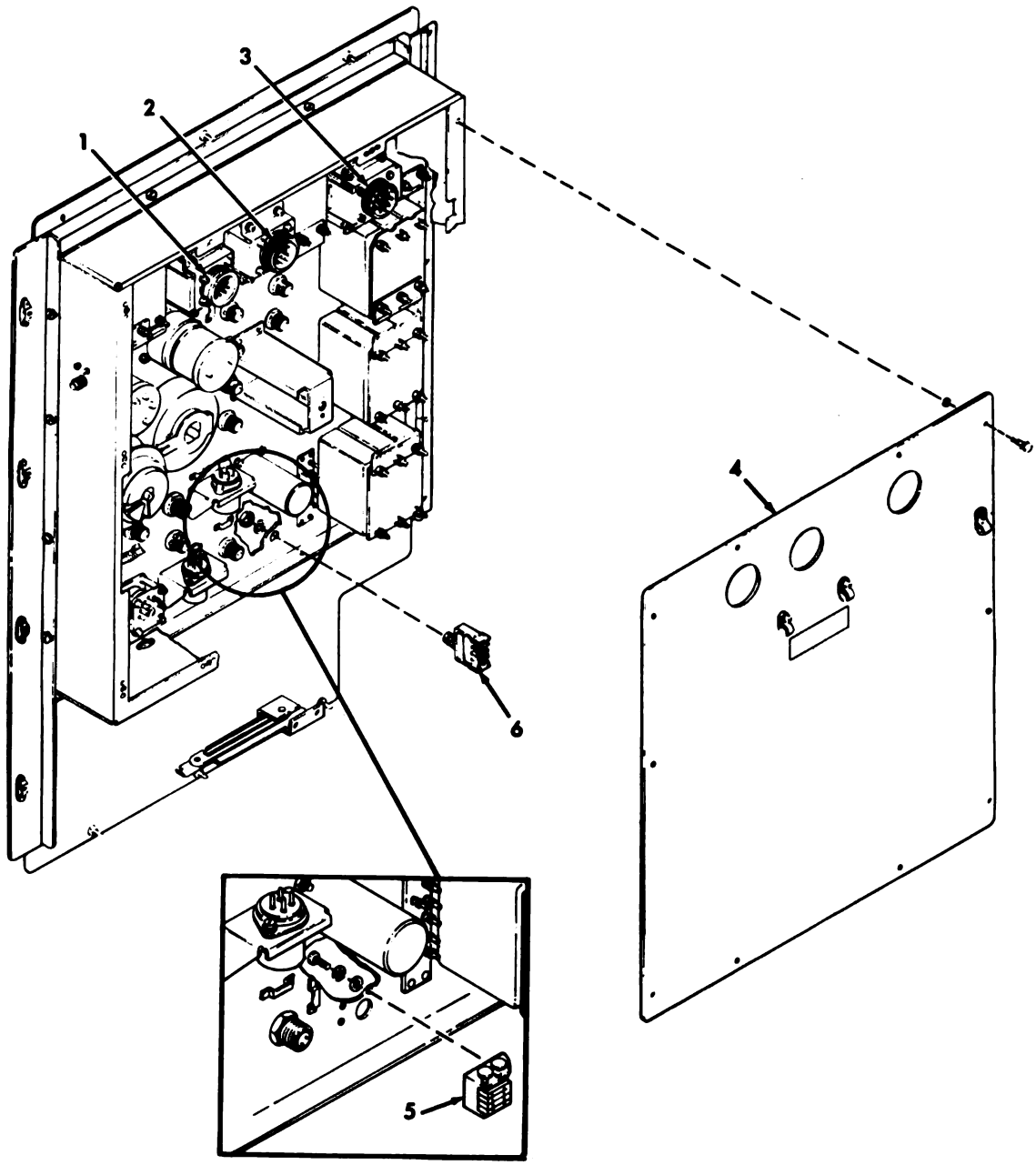
For the removal or replacement of units of the tracking adjunct system, refer to TM 9—1430—1536—13.

5-30. Replacement of Additional Units

The removal or replacement of the units listed in table 5-1 is obvious. Make certain that the radar is deenergized before performing maintenance. For the appropriate test after installation, refer to the table listed for each unit.

5-31. Replacement of Circuit Card Assemblies

The replacement of circuit card assemblies within the servo control unit, signal processor, and transmitter control unit is discussed typically in TM 9—1425—525—12—4. Circuit card extractor 13038393 must be used to remove the circuit card assemblies. After replacement of any of the circuit card assemblies, perform the automatic BITE sequence for the affected unit.



1—J2
2—J3
3—J4
4—Transmitter panel 1 cover
5—CONTROL INTERLOCK pushbutton switch (P/N 9176165)
6—CONTROL INTERLOCK pushbutton switch (P/N M8805/23-003)

Figure 5-23. Replacement of the CONTROL INTERLOCK pushbutton switch on transmitter panel 1.

Table 5-1. Replacement of Additional Units

Unit removed or replaced	Part No.	Check procedure table
Coding filter	11568866	3-12
Comparator and minimum elevation cutout	10672158	3-11
Cooling system interlock	11569610 *(L)[1] 13039098 *(J)[1]*(K)[1] 10109706 *(H)[1]	3-12
Elevation and time-of-flight computer	10177520	3-11
Elevation and time-of-flight control amplifier	10181868	3-11
High pass filter and coding trap	10182963	3-12
Isomodulator assembly	10109005	3-12
Line voltage regulator	10065984	3-4
Local oscillator assembly (receiver)	11566669	3-13
Main power distribution box	10045640	3-4
Motor generator assembly	11569721	3-11
Nutating scanner drive	13038851 *(G)[1] 11570751 *(F)[1]	3-13
Power Supply (5.4 vdc)	10182795	3-7
Power supply (±100-, 150-, 250-vdc)	10045529	3-7
Power supply (300-, 90-, 28-vdc)	10292737	3-7
Range and azimuth computer	9067129	3-11
Range and azimuth control amplifier	10181821	3-11
Range interlock computer	11568226	3-11
Ripple sensing unit	10067285	3-12
Transmitter contactor relay assembly	11570742	3-12

[1]Refer to appendix D for serial number effectivity.

CHAPTER 6

PREPARATION FOR TRAVEL

Section I. GENERAL

6-1. Scope

Preparation for travel of the IHIPIR is presented in this chapter. Paragraphs 6-4 and 6-5 contain general information on the transportation of the equipment by truck (prime mover), cargo aircraft, and helicopter. Paragraphs 6-8 and 6-9 contain the preparation for travel procedures.

6-2. Explanation of Procedures

The preparation for travel procedures describe the most efficient method of converting the IHIPIR from a completely emplaced radar into a mobile unit.

6-3. Trailer

The M390 trailer is used to support the IHIPIR. For detailed information pertaining to the M390 trailer, refer to TM 9—2330—235—14.

Section II. METHODS OF TRANSPORTATION

6-4. Transpertation by Truck

The M35 truck (prime mover) is usually used to tow the IHIPIR to the battery site. Supporting equipment for the radar is transported in the bed of the prime mover.

6-5. Transpertation by Air

a. Helicopter. The IHIPIR is helicopter lifted by means of a suspension sling assembly. This assembly and other associated helicopter lifting components are shown in figure 6-1 and table 6-1. The storage bag (7, fig. 6-1) is used to stow the components when not in use. The grounding device assembly (1, fig. 6-1) is used to ground the helicopter lifting hook (2, fig. 6-18) before hookup of the IHIPIR. This device is fabricated locally as described in subparagraph (2) below. Two spreader bar assemblies (fig. 6-5) are used to prevent the suspension sling assembly legs from bearing against sharp edges and fragile or lightly constructed parts of the equipment being lifted. These assemblies are fabricated locally as described in subparagraph (3) below.

(1) *Suspension sling assembly.* The suspension sling assembly (fig. 6-2) required to lift the IHIPIR consists of four nylon web and chain legs connected to a 30.5 cm (1 ft) diameter nylon web ring. Each leg is 7.01 m (23 ft) long and consists of a 4.57 m (15 ft) nylon web leg with a 2.44 m (8 ft) chain assembly bolted to the end of the nylon web leg. The sling legs can be adjusted in length to compensate for the center of gravity or construction of the item to be lifted. Figure 6-3 shows a typical chain leg hookup of the suspension sling assembly. Instructions for sling preparation for the IHIPIR are given in section III.

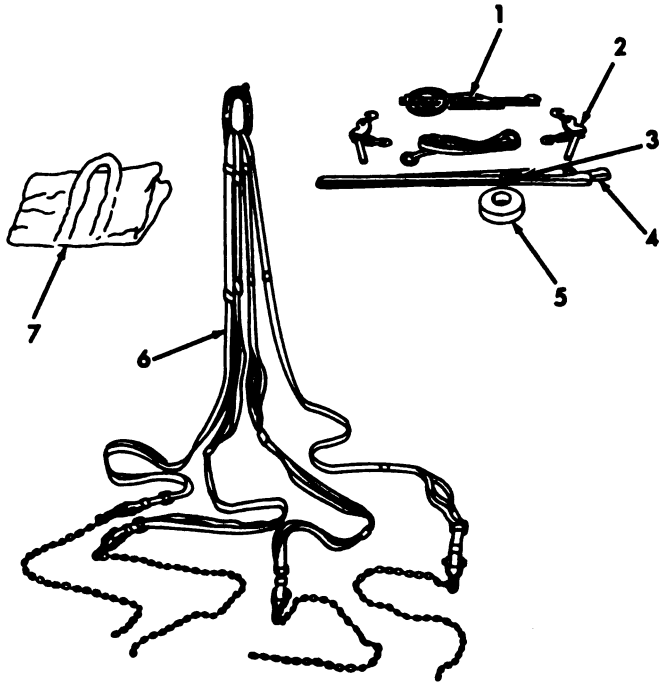
(2) *Grounding device assembly.* The grounding device assembly (1, fig. 6-1) must be fabricated locally. Detailed procedures for fabricating this device are as follows:

NOTE

The letters and key numbers shown below in parentheses refer to figure 6-4.

(*a*) Obtain a 61 cm (2 ft) section of 25.4 mm (1 in.) copper tubing (1) or other suitable material and fabricate as shown in view A. (Do not apply insulating material at this time).

(*b*) Obtain a 25.4 mm (1 in.) strip of copper material (4) or other suitable material, 25.4 cm (10 in.) long and fabricate as shown in view B.



1—Grounding device assembly
2—Load binder
3—Quick-fit tiedown fastener
4—4.57m (15 ft) tiedown strap
5—Tape
6—Suspension sling assembly
7—Storage bag

Figure 6-1. Helicopter lifting components.

(*c*) Attach the copper strip to the copper tubing with two self-threading screws.

(*d*) Obtain a piece of copper braid (2) or other suitable material, which has a minimum length of 7.93 m (26 ft), and fabricate as shown in view C.

(*e*) Attach one end of the copper braid to the copper tubing with a 1/2-inch bolt, lockwasher, and nut.

(*f*) Obtain a 30.5 cm (12 in.) copper rod (3) or other suitable material and fabricate as shown in view D.

(*g*) Attach the remaining end of the copper braid to the copper rod with a 1/2-inch bolt, lockwasher, and nut.

(*h*) Insulate one-half of the copper tubing with an insulating tape as shown in view A.

(3) *Spreader bar assembly.* The two spreader bar assemblies are fabricated locally. Detailed procedures for fabricating each assembly (fig. 6-5) are as follows:

(*a*) Obtain the required number of lengths of 2 × 4-inch lumber or other suitable material.

(*b*) Obtain the required nails for construction of the spreader bar assembly (table 6-1).

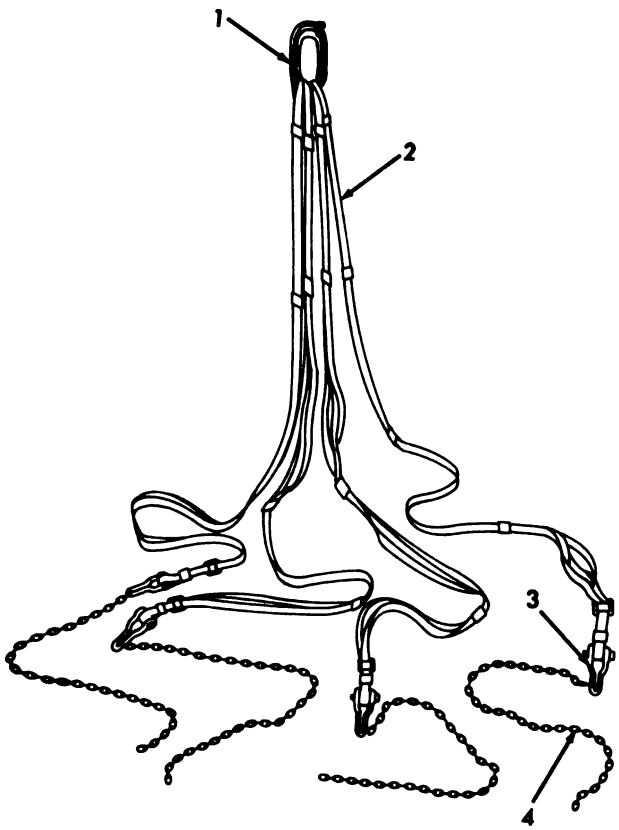
(*c*) Cut three pieces of lumber as shown in view A, figure 6-5.

(*d*) Nail the pieces of lumber together as shown in view B, figure 6-5.

b. Cargo Aircraft. When the IHIPIR is transported by cargo aircraft, the preparation for travel procedure is the same as for the prime mover.

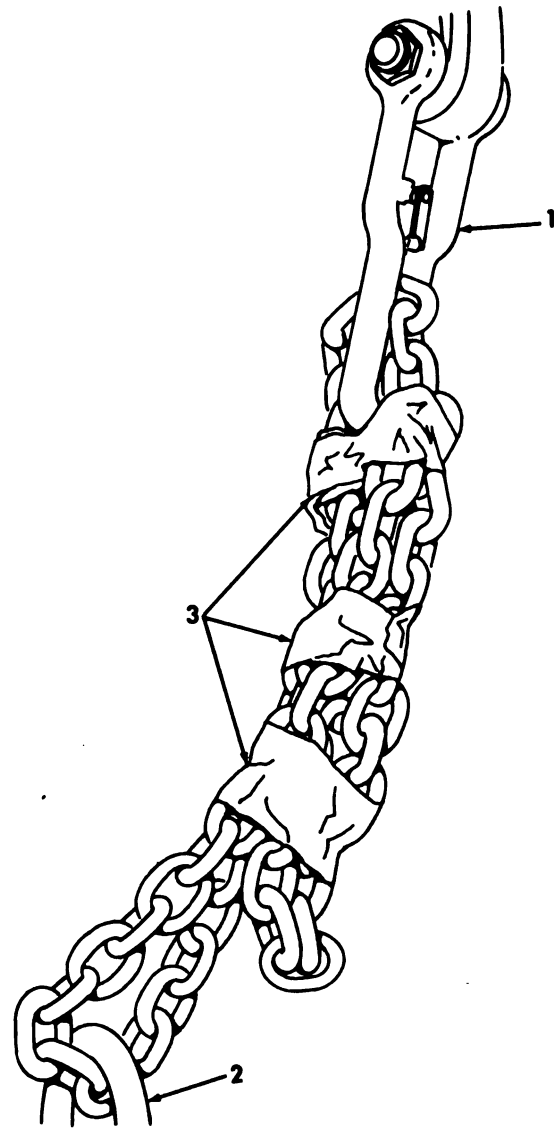
Table 6-1. Description of Helicopter Lifting Components

Item	Identification number	Description
Suspension sling assembly (2)	1670-00-902-3080	Nylon and chain leg cargo sling, 7.01 m (23 ft) long; 15,000 lbs capacity
Nylon cord	MIL-C-5040, Type I or III	Nylon cord, 3.18 mm (1/8-in) diameter
Protective padding	8135-00-559-1531	Cellulose wadding, cushioning material
Webstrap (2)	1670-00-360-0540	Nylon webbing 4.57 m (15 ft) long, 1 ply
Load binder (2)	3900-00-360-0248	Eccentric takeup, w/lever
Strap fastener (2)	1670-00-360-0340	Quick-fit buckle
Adhesive tape	8135-00-266-5016	Pressure sensitive, 5 cm (2 in.) wide 54.9 m (60 yds) long
Storage bag	8460-00-245-6693	Cotton duck, OD, w/zipper
Grounding device assembly	Fabricated locally	Refer to paragraph 6-5*a* for fabrication instructions
Spreader bar assembly (2)	Fabricated locally	Refer to paragraph 6-5*a* for fabrication instructions
Nails	10d or 16d	10d, 7.62 cm (3 in.) or 16d, 8.89 cm (3-1/2 in.)



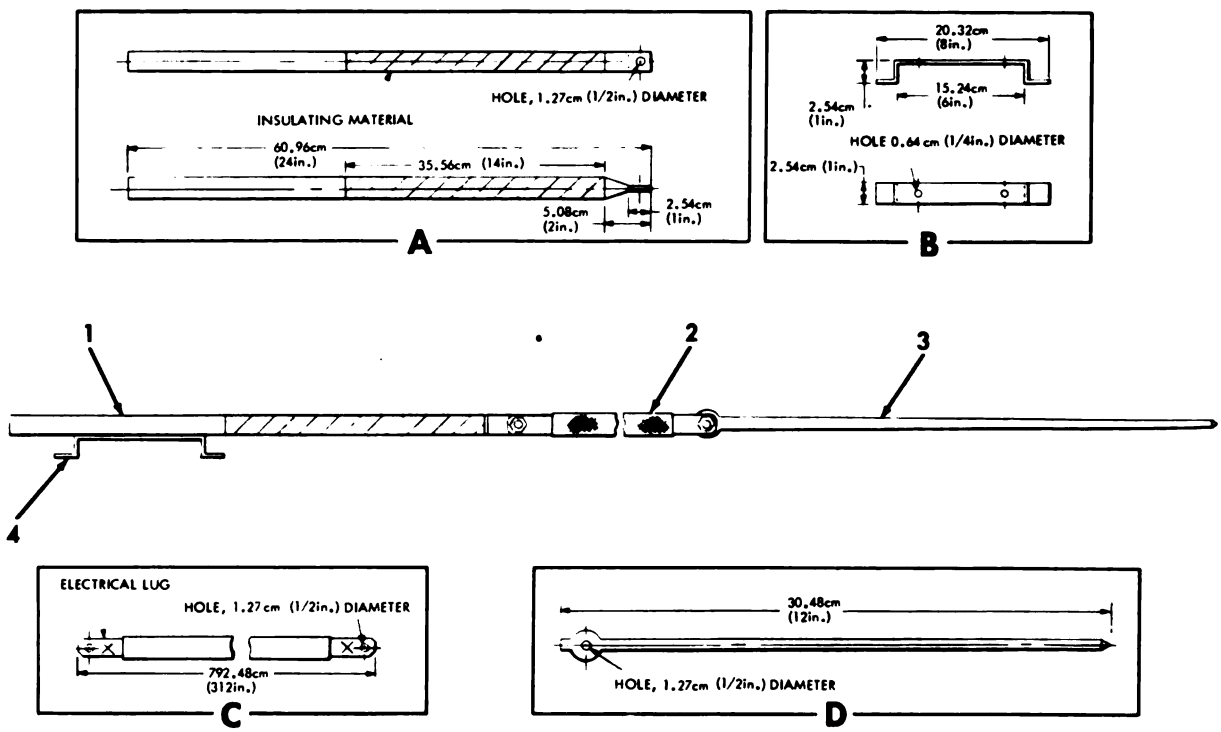
1—30.5 cm (1 ft) web ring
2—4.57 m (15 ft) nylon web leg
3—Grab link
4—2.44 m (8 ft) chain leg

Figure 6-2. Helicopter suspension sling—typical.



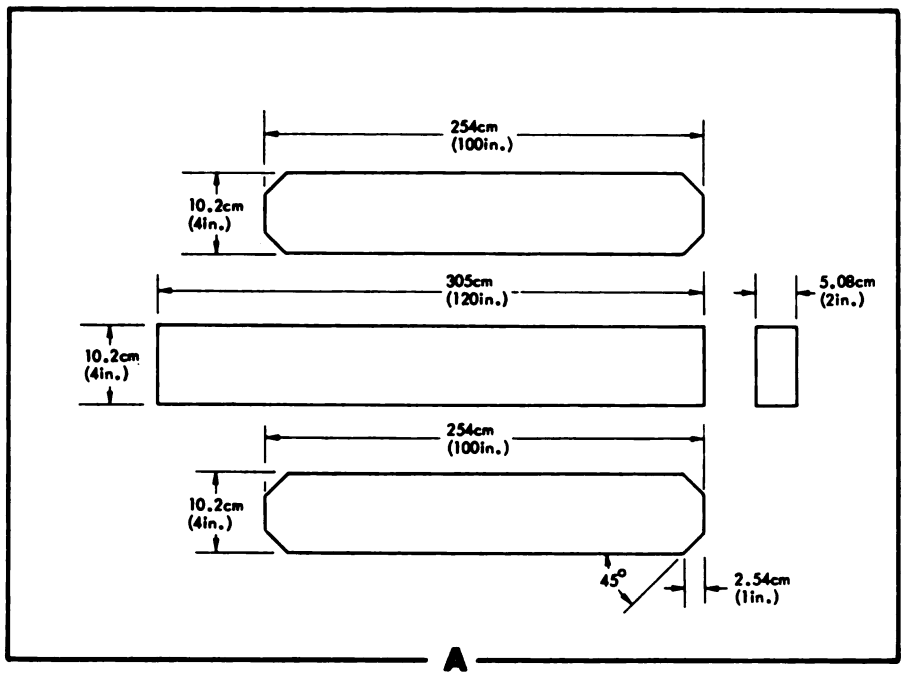
1—Grab link
2—Tie point
3—Taped excess chain

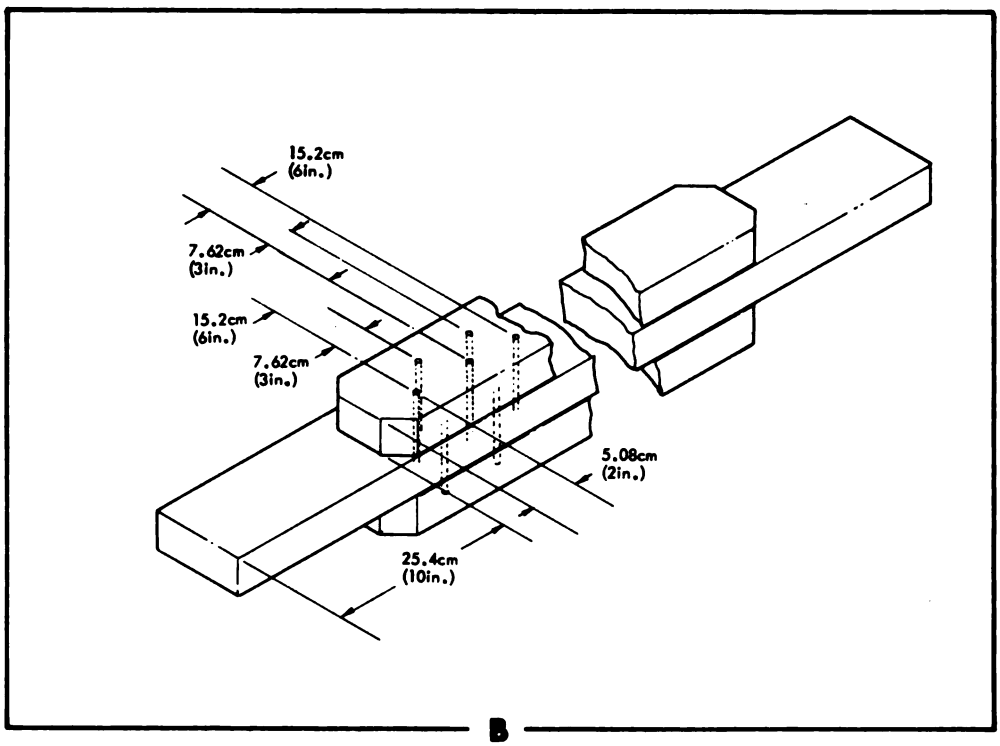
Figure 6-3. Suspension sling assembly—typical chain leg hookup.



1—Copper tubing
2—Copper braid
3—Copper rod
4—Copper strip

Figure 6-4. Grounding device assembly.





MS 433007

Figure 6-5. Spreader bar assembly.

Section III. PREPARATION FOR TRAVEL

6-6. General

This section describes the preparation for travel for the IHIPIR by prime mover (par. 6-8) and by helicopter (par. 6-9).

6-7. Tools

The tools required to prepare the IHIPIR for travel are a common screwdriver, a cross-recessed screwdriver, 7/16-inch wrench, and Allen wrenches. These are stowed in the general mechanics tool kit.

6-8. Preparation for Travel Procedures — Prime Mover

a. The detailed procedures for preparing the IHIPIR for travel are as follows:

(1) Set the PEDESTAL SAFETY SWITCH (5, fig. 6-6) to the SAFE position.

WARNING

Insure that the PEDESTAL SAFETY SWITCH remains in the SAFE position to prevent the antenna from rotating should electrical power be applied while personnel are working on or near the antenna.

(2) Deenergize the IHIPIR (table 3-6).

WARNING

Prior to handling a system power cable insure that the generator main power circuit breaker is set to off.

(3) Disconnect all power and data cables and cap the connectors and receptacles with the protective caps.

(4) Mount the protective covers (1, fig. 6-6) on the antenna, and secure them with the protective cover cords.

(5) If the TAS sensor unit is installed on the IHIPIR, install the sensor unit dust cover (12, fig. 6-6) on the TAS sensor unit.

(6) If the TAS sensor unit or the sensor unit replacement weight is not installed in the sensor mount assembly (30, fig. 6-7), cover the sensor mount assembly with the sensor mount dust cover.

(7) Manually rotate the antenna so that it faces the stow position shown in figure 6-6.

NOTE

The key numbers shown below in parentheses refer to figure 6-7 unless otherwise indicated.

(8) Rotate the azimuth STOW lock (24) clockwise until the stow pin is fully engaged with the torque tube and the antenna cannot be moved in either direction.

(9) Lower the antenna to the lower mechanical limit. Engage the elevation STOW lock (13, fig. 6-6) by turning the handle clockwise. It may be necessary to move the antenna slightly in elevation to engage the lock.

(10) Remove the exhaust air vent cover (2, fig. 6-6) from the stowed location on the exhaust air vent and secure it to the receiver compartment hood exhaust air vent.

(11) Disconnect the elevation motor exhaust cover (25) from the dummy receptacle (26) and connect it to the elevation motor exhaust (27).

(12) Close and secure the exhaust air vent cover on the rear of the liquid cooling cabinet (20).

(13) Close and secure the air intake cover (9, fig. 6-6) on the rear of the radar set group cabinet.

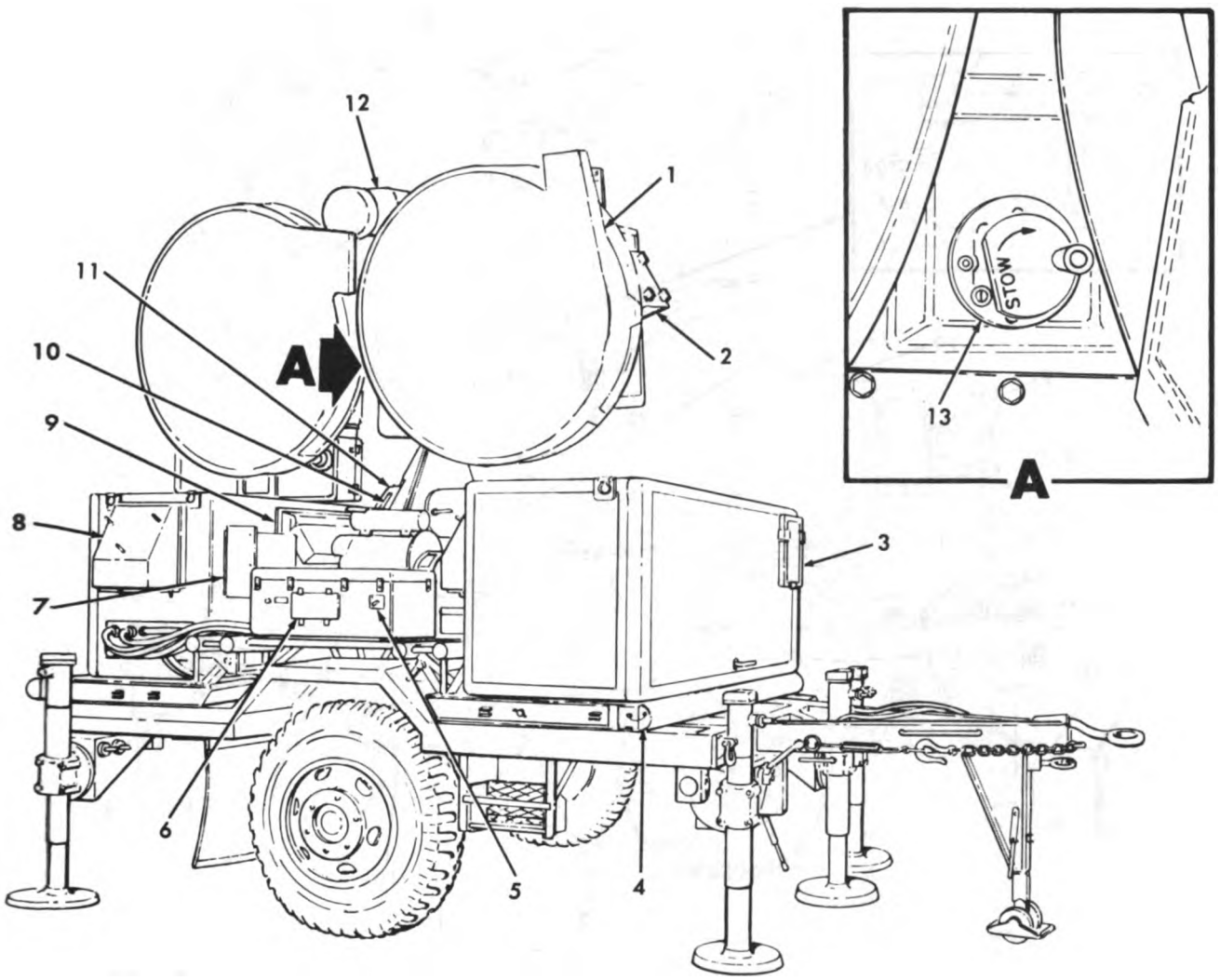
(14) Close and secure the pedestal intake cover (11, fig. 6-6).

(15) Remove and stow the intake-exhaust vent hood from the motor-generator assembly and remove the intake-exhaust vent cover (6, fig. 6-6) from the stowed location and secure it to the motor-generator assembly.

(16) Remove and stow the transmitter group cabinet intake vent hood, remove the intake cover (19) from the stowed location and secure it to the transmitter group cabinet, and secure the exhaust cover to the transmitter group door (3, fig. 6-6).

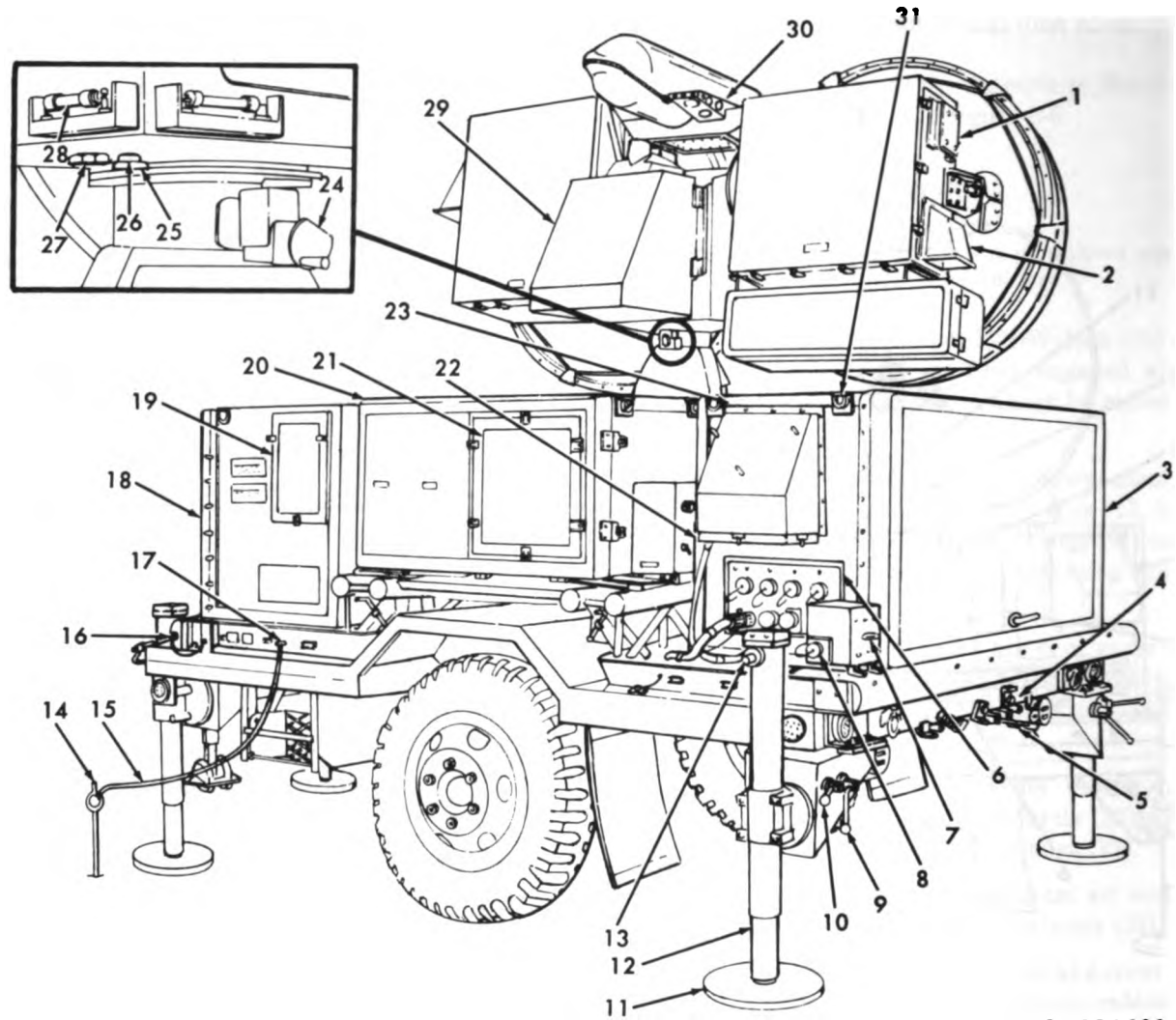
(17) Remove the exhaust vent cover from the stowed location and secure it to the hood on the rear of the transmitter group cabinet.

(18) Remove the radar set group exhaust vent covers (8, fig. 6-6 and 22, fig. 6-7) from the stowed locations and secure them to the radar set group cabinet exhaust hoods.



1—Protective covers
2—Receiver exhaust air vent cover
3—Transmitter group door exhaust vent cover
4—Ground rod storage
5—PEDESTAL SAFETY SWITCH
6—Motor-generator intake-exhaust vent cover
7—Headset storage box
8—Radar set group exhaust vent cover
9—Radar set group air intake cover
10—Lever
11—Pedestal intake cover
12—Sensor unit dust cover
13—Elevation STOW lock

Figure 6-6. IHIPIR preparation for travel and emplacement — right front view.



1—Transmitter housing exhaust vent cover
2—Transmitter housing exhaust vent
3—Radar set group cabinet door
4—Jack crank stow brackets
5—Rear leveling jack crank
6—Cable entry panel
7—Main power switch
8—Receptacle J1
9—Rear leveling jack horizontal lock
10—Rear leveling jack vertical lock
11—Ground pad
12—Rear leveling jack
13—Crankshaft
14—Ground rod
15—Ground rod cable
16—Ground rod storage
17—Ground rod cable attach point
18—Transmitter group cabinet door
19—Transmitter group air intake vent cover
20—Liquid cooling cabinet
21—Liquid cooler air intake vent cover
22—Radar set group exhaust air vent cover
23—Radar set group cabinet
24—Azimuth STOW lock
25—Elevation motor exhaust cover
26—Dummy receptacle
27—Elevation motor exhaust
28—Spirit levels
29—Liquid cooler air intake vent hood
30—Sensor mount
31—Lifting shackle

Figure 6-7. IHIPIR preparation for travel and emplacement — left rear view.

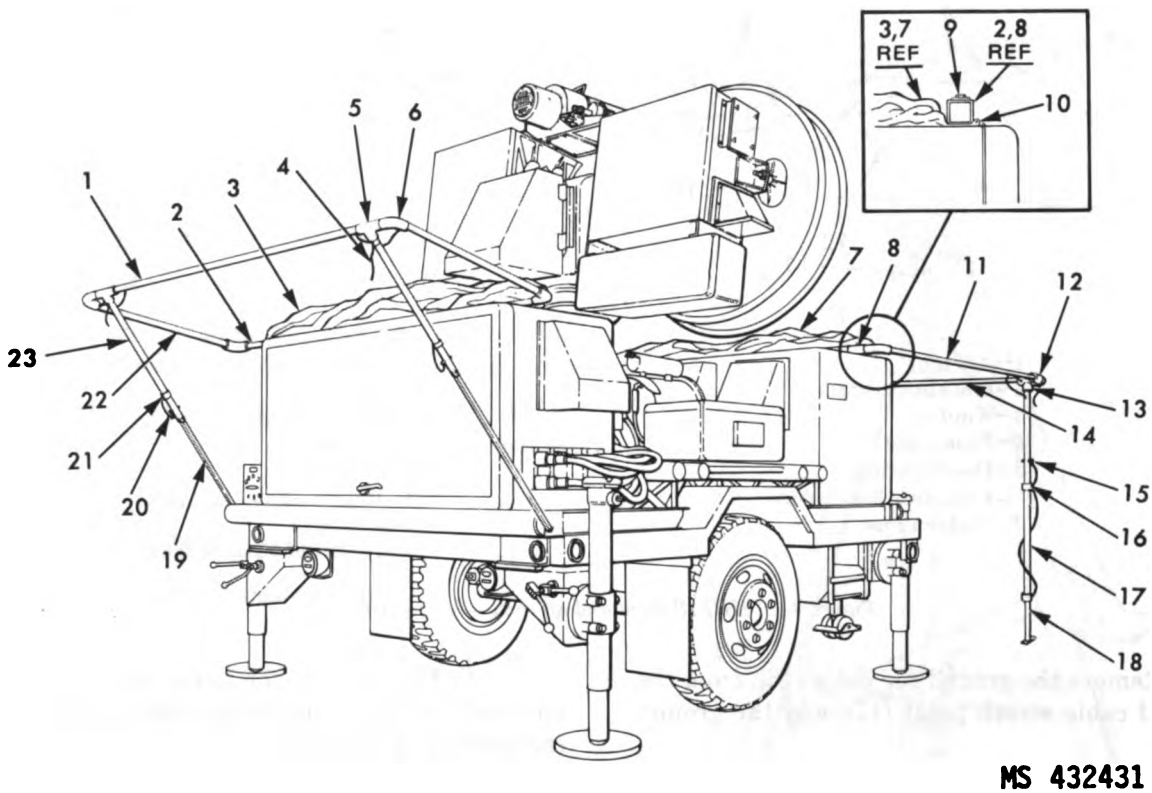
(19) Remove the air intake vent cover from its stowed location on the rear of the antenna pedestal head, secure it to the liquid cooling cabinet air intake (21), and stow the hood (29) on the rear of the antenna pedestal head.

(20) Disconnect the headset from the communication station located on the front panel of the 100-, ±50-vdc power supply, and stow the headset in the headset storage box (7, fig. 6-6) on the rear of the radar set group cabinet.

(21) Secure all chassis drawers and panels in the radar set group and transmitter group.

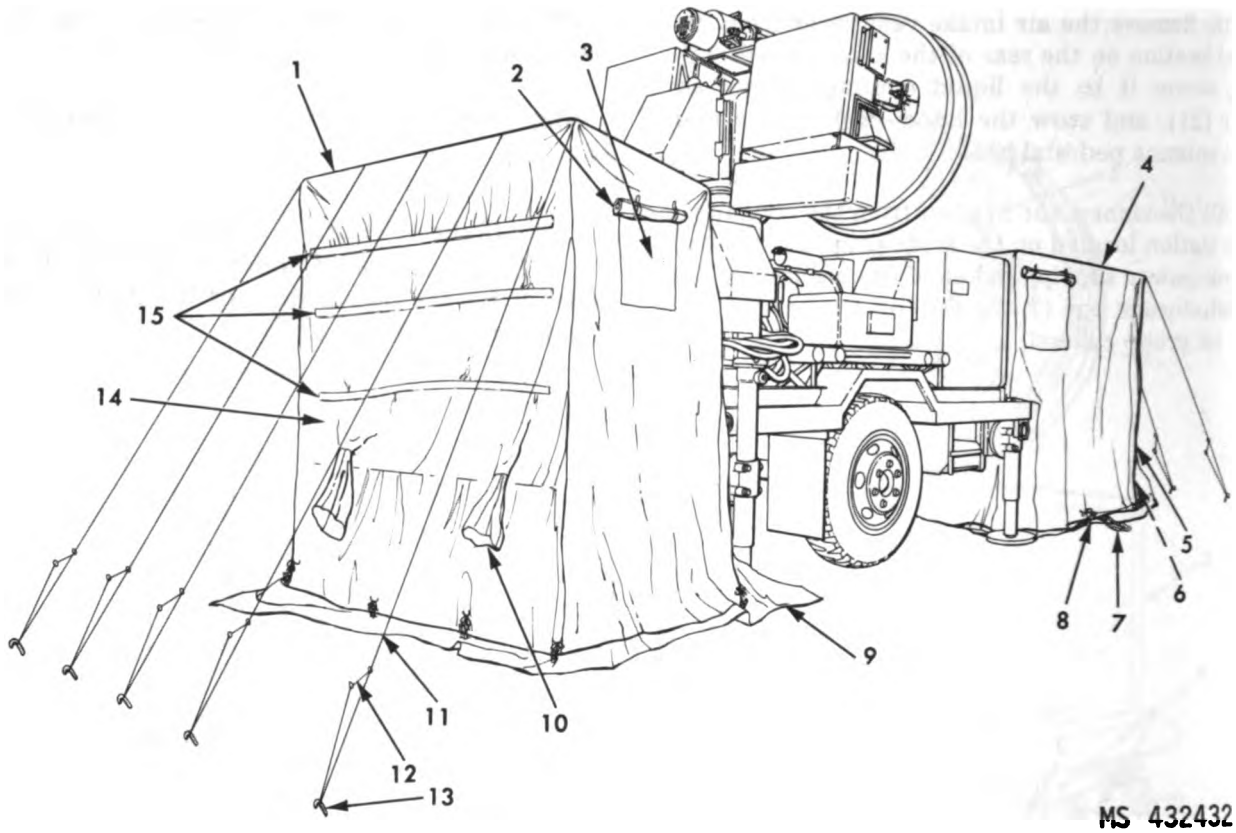
(22) Close and secure the cabinet doors (3 and 18).

(23) If the IHIPIR all-weather shelters (figs. 6-8, 6-9) are emplaced, refer to TM 10—8340—203—13 for the preparation for travel procedures. If not, proceed to step (24).



1—Aft tent outer top support
2—Aft tent inner top support
3—Aft tent
4—Polyester cord
5—Tee
6—Elbow
7—Front tent
8—Front tent inner top support
9—Machine screw
10—Test rope hem
11—Front tent side top support
12—Elbow
13—Tee
14—Front tent outer top support
15—Bar pin
16—Collar
17—Front tent support pole
18—Front tent support pole adapter
19—Aft tent support pole adapter
20—Bar pin
21—Collar
22—Aft tent side top support
23—Aft tent support pole

Figure 6-8. IHIPIR front and aft tents — frame assembly.



1—Aft tent
2—Blackout curtain
3—Window
4—Front tent
5—Door opening
6—Front tent heater duct
7—Tiedown rope
8—30.5 cm (12 in.) tent pin
9—Sod cloth
10—Aft tent heater duct
11—Guy line
12—Tent slip
13—40.5 cm (16 in.) tent pin
14—Back wall
15—Touch-and-close fasteners

Figure 6-9. IHIPIR front and aft tents — emplaced.

(24) Remove the ground rod cable (15), from the ground rod cable attach point (17), and the ground rod (14).

(25) Remove the ground rod (see note below).

NOTE

In batteries equipped with the stake puller kit (fig. 6-10), remove the ground rod as described in (*a*) through (*g*) below.

NOTE

The key numbers shown in parentheses below refer to figure 6-11 unless otherwise indicated.

(*a*) Position the tripod (1) so that the pulley (6) is directly over the ground rod.

(*b*) Drive the prime mover toward the tripod and hook the retrieving cable (2) to a towing point on the front of the vehicle.

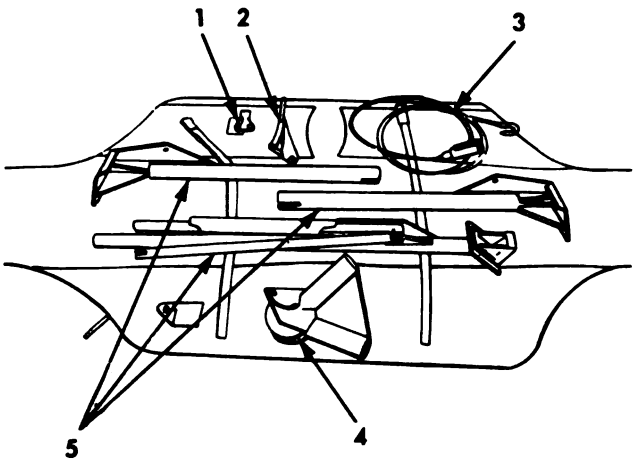
(*c*) Attach the ground rod grip (3) to the base of ground rod (4) and secure the latch.

(*d*) Attach the cable yoke to the eye of the grip.

(*e*) Insure that the tripod leg that is opposite the pulley is in line with the retrieving cable.

(*f*) Back off the prime mover, stopping when the cable yoke has run to the cable restraining pin (5).

(*g*) If the ground rod has not pulled free, and cannot be removed by hand, unlatch the grip, drive the truck forward, reattach the grip to the base of the ground rod, and back off the vehicle once more.



MS 432433

1—Ground rod grip
2—Straight-jawed grip
3—Retrieving cable
4—Pulley
5—Tripod (disassembled)

Figure 6-10. Stake puller kit.

(26) Stow the ground rod and the ground rod cable in the ground rod storage location (16, fig. 6-7).

b. The detailed procedures for preparing the M390 trailer, which supports the IHIPIR, for travel are as follows:

WARNING

Insure that the front support is locked in the down position; that the handbrake levers are set; and that the wheels are resting firmly on the ground.

NOTE

The key numbers shown below in parentheses refer to figure 6-7 unless otherwise indicated.

(1) Remove the rear leveling jack cranks (5) from the stow brackets (4) and position them on the crankshafts (13) of the two rear leveling jacks (12).

(2) Turn the cranks counterclockwise and retract the rear leveling jacks until they are clear of the ground and the weight of the trailer is on the wheels, the front corner support jacks, and the front support jack.

NOTE

The key numbers shown below in parentheses refer to figure 6-12 unless otherwise indicated.

(3) Stow each front corner support jack (3) as follows:

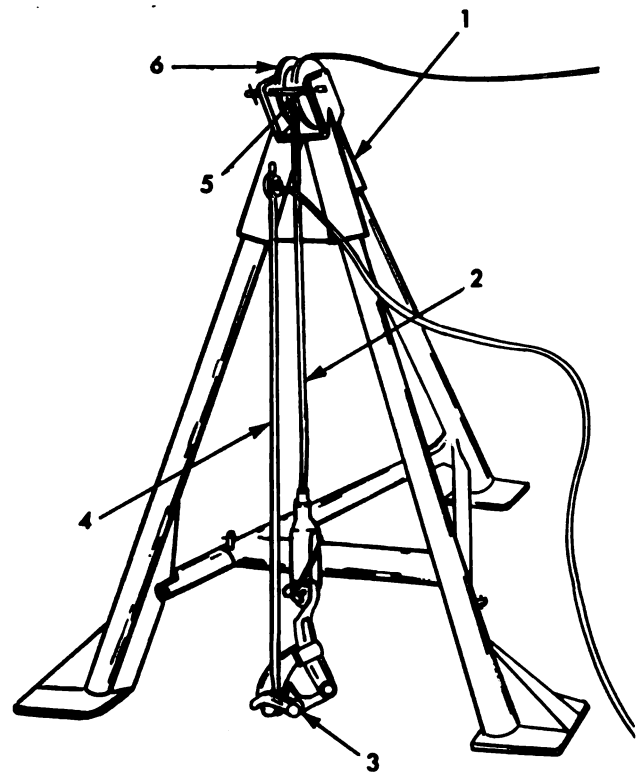
(*a*) Remove the jack crank (8) from the stow bracket (7) on the A-frame and position it on the crankshaft (2).

(*b*) Turn the crank counterclockwise to retract the jack.

(*c*) Remove the jack crank.

(*d*) Pull up and hold the front corner support jack vertical lock (4).

(*e*) Swing the jack upward until it is horizontal. Release the vertical lock.



MS 432434

1—Tripod
2—Retrieving cable
3—Ground rod grip
4—Ground rod
5—Cable restraining pin
6—Pulley

Figure 6-11. Removal of ground rod.

(4) Position the jack crank on the center leveling jack crankshaft (1) and turn it counterclockwise to retract the jack.

(5) Remove and stow the jack crank.

(6) Stow the center leveling jack as follows:

CAUTION

Be careful not to damage the trailer airbrake line (6, fig. 6-15) when stowing the center leveling jack.

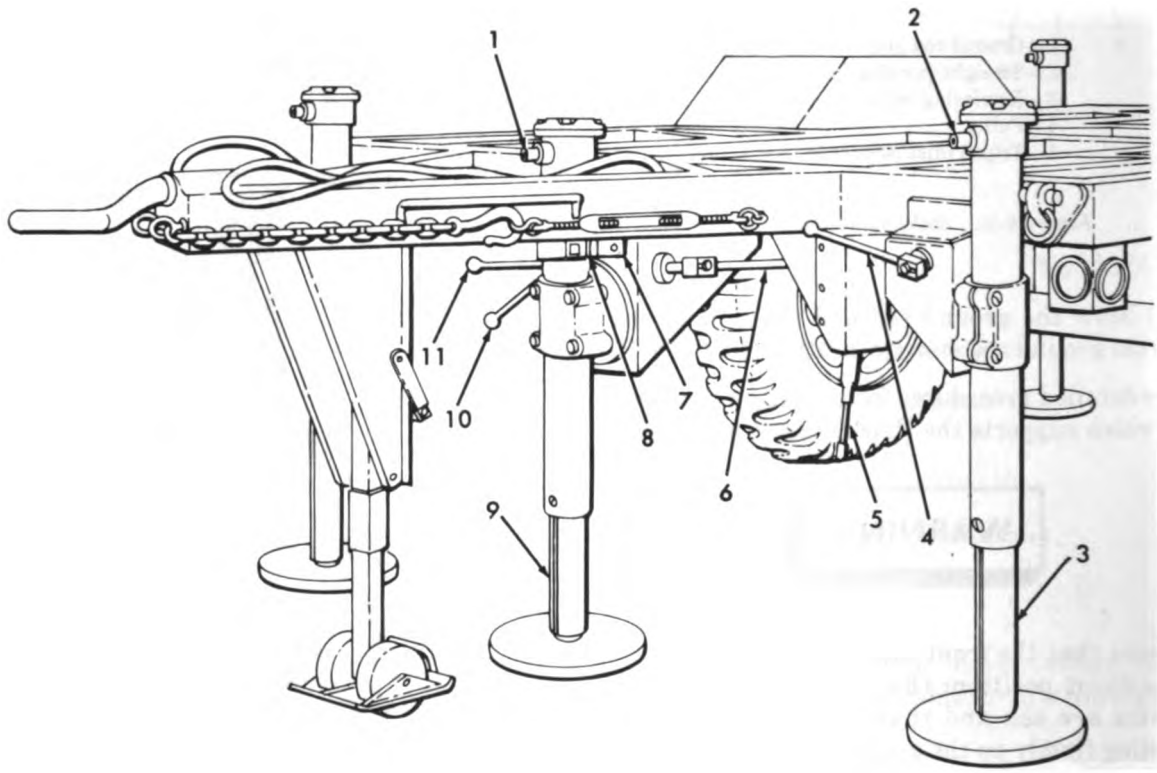
(*a*) Pull up and hold the jack vertical lock (11).

(*b*) Tilt the jack sideways approximately 30 degrees and release the lock.

(*c*) Push down on the jack horizontal lock (10), swing the jack enough to clear the horizontal lock detent, and release the lock.

(*d*) Carefully swing the jack beneath the trailer while continuing to tilt the jack sideways so as to clear the trailer yoke. Be careful not to bump the airbrake line with the jack.

(*e*) After the trailer yoke is cleared, swing the jack upward until it locks in the horizontal position.



MS 433008

1—Center leveling jack crankshaft
2—Front corner support jack crankshaft
3—Front corner support jack
4—Front corner support jack vertical lock
5—Handbrake lever
6—Center leveling jack horizontal lock
7—Stow bracket
8—Jack crank
9—Center leveling jack
10—Center leveling jack horizontal lock
11—Center leveling jack vertical lock

Figure 6-12. M390 trailer forward leveling jacks — preparation for travel and emplacement.

(*f*) Swing the jack beneath the trailer until it locks in position.

(7) Connect the trailer to the prime mover as described below:

(*a*) Open the pintle hook (3, fig. 6-13) on the prime mover by removing the locking pin and lifting the spring-loaded T-bar latch (1 and 2, fig. 6-13).

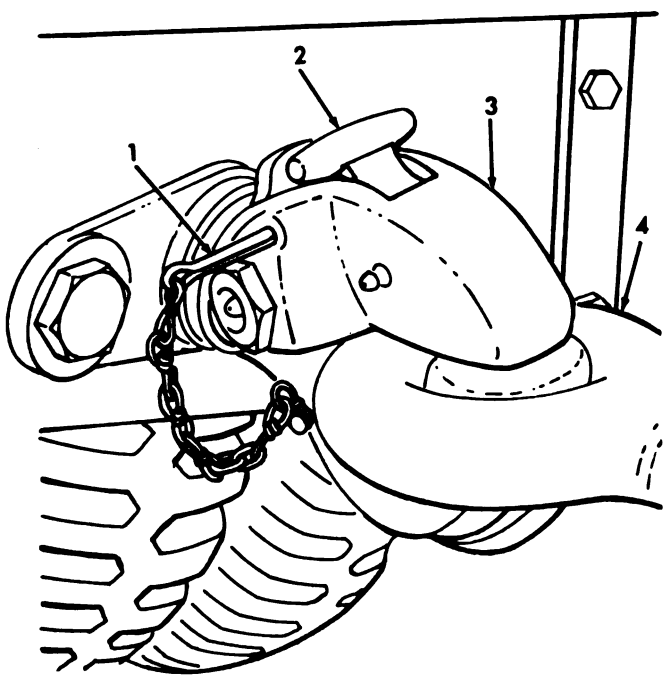
(*b*) Back the prime mover up to the trailer so that the pintle hook is directly under the lunette (4, fig. 6-13).

(*c*) Engage the lunette on the open pintle hook by retracting the front support jack (3, fig. 6-14) with the jack crank (6, fig. 6-14).

(*d*) Close the pintle hook and insert the locking pin.

(*e*) Remove the trailer airbrake hose (3, fig. 6-15) from the dummy coupling (2, fig. 6-15) and connect it to the service coupling at the rear of the prime mover.

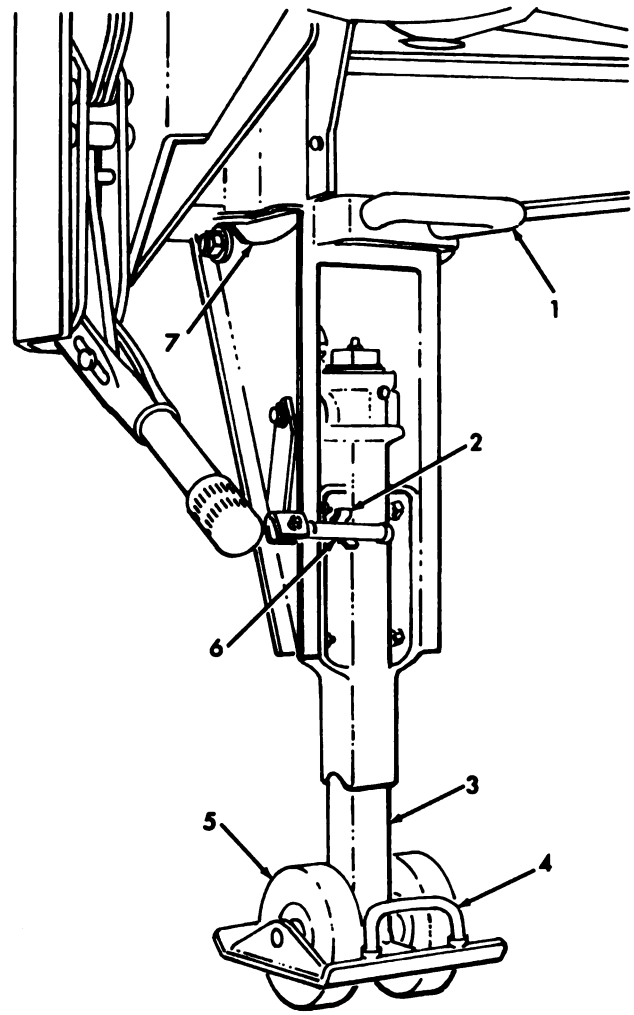
(*f*) Open the service coupling shutoff cock on the prime mover.



MS 432435

1—Pintle hook locking pin
2—Spring-loaded T-bar latch
3—Pintle hook
4—Lunette

Figure 6-13. Connecting trailer to prime mover.



MS 432436

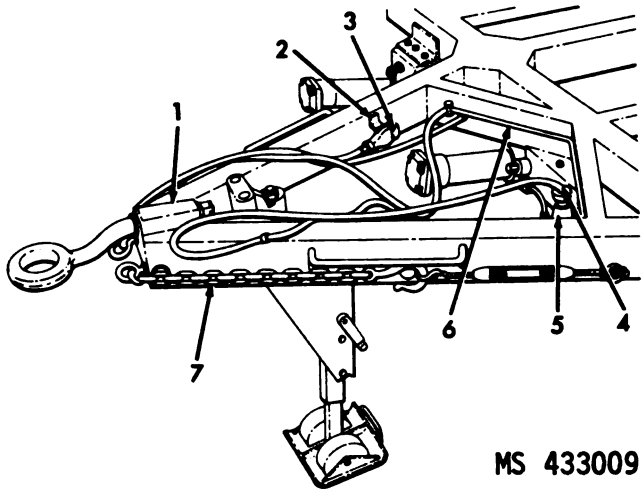
1—Spring-loaded frame handle
2—Stowage clip
3—Front support jack
4—Ground pad handle
5—Support wheels
6—Front support jack crank
7—Bracket and spindle assembly

Figure 6-14. M390 trailer front support jack — preparation for travel and emplacement.

(*g*) Remove the intervehicular cable (4, fig. 6-15) from the stowage clip (5, fig. 6-15) and plug it into the receptacle on the rear of the prime mover.

(*h*) Hook the safety chains (7, fig. 6-15) to the appropriate loops at the rear of the prime mover.

(8) Fully retract the front support jack with the jack crank and then insert the crank in the stowage clip.



1—Lunette mounting bracket
2—Dummy coupling
3—Airbrake hose
4—Intervehicular cable
5—Stowage clip
6—Airbrake line
7—Safety chain

Figure 6-15. M390 trailer A-frame — preparation for travel and emplacement.

(9) Lock the front support jack in the stow position by pulling the spring-loaded frame handle (1, fig. 6-14), and using the ground pad handle (4, fig. 6-14) to rotate the jack rearward and upward until the spring-loaded frame handle engages the holes in the top of the lunette mounting bracket (1, fig. 6-15).

NOTE

Unless otherwise indicated, the key numbers shown in parentheses below refer to figure 6-7.

(10) Stow each of the two rear leveling jacks (12) as described below:

(*a*) Fully retract the jack using the jack crank (5).

(*b*) Remove the jack crank and stow it in the stow bracket (4).

(*c*) Pull up and hold the vertical lock (10).

(*d*) Swing the ground pad (11) rearward and upward to the horizontal position. Release the vertical lock.

(*e*) Pull up and hold the horizontal lock (9).

(*f*) Swing the jack horizontally until it is beneath the trailer. Release the horizontal lock.

(11) Release the handbrake levers (5, fig. 6-12) on each side of the A-frame.

c. Prior to leaving the area, the following checks should be made:

(1) The PEDESTAL SAFETY SWITCH is in the SAFE position (5, fig. 6-6).

(2) All cables are disconnected, and the connectors and receptacles properly capped.

(3) The antenna protective covers (1, fig. 6-6) are properly installed.

(4) The antenna is facing the desired side of the trailer.

(5) The azimuth (24, fig. 6-7) and the elevation STOW locks (13, fig. 6-6) are engaged.

(6) The IHIPIR is properly secured to the trailer.

(7) All cabinet doors and vent covers are secured (1, 3, 18, 19, 21, 22, and 25).

(8) The ground rod (14) and ground rod cable (15) are disconnected and properly stowed.

(9) The front support jack, leveling jacks, and jack cranks are properly stowed.

(10) The trailer is properly connected to the prime mover.

(11) The trailer lights are working properly.

(12) The handbrakes are released.

(13) The trailer brakes are working (move the prime mover a short distance and apply brakes).

6-9. Preparation for Travel Procedures — Helicopter

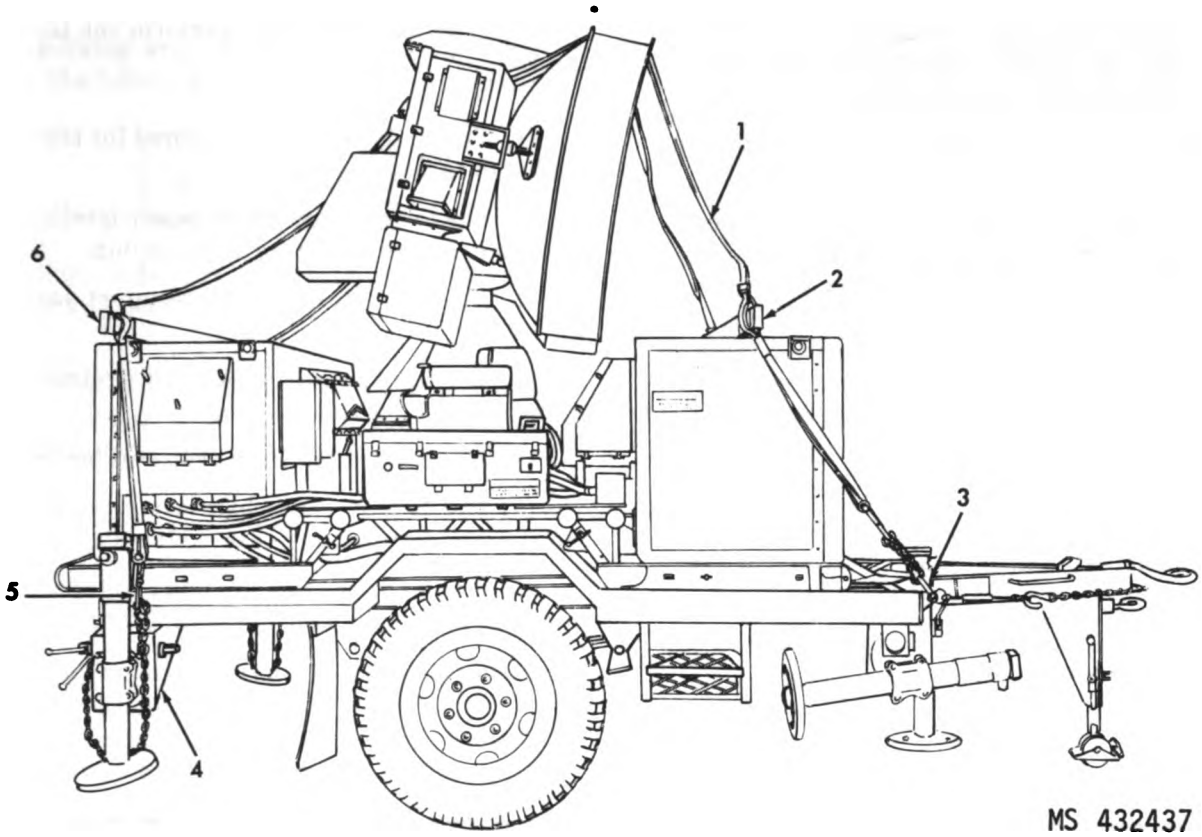
a. The helicopter lifting kit (fig. 6-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary, except for the two spreader bars, to lift the IHIPIR and the M390 trailer by helicopter.

b. Prepare the IHIPIR for helicopter lift as described below:

(1) For preparation for travel procedures for the IHIPIR, refer to paragraph 6-8*a*. In 6-8*a*(7)stow the antenna facing the trailer lunette (fig. 6-16).

(2) For preparation for travel procedures for the M390 trailer, refer to paragraph 6-8*b* (1) through (5), and (8).

c. Prepare two spreader bars as described in paragraph 6-5*a*(3).



1—Suspension sling assembly
2—Spreader bar
3—Right front lifting eye
4—Right rear leveling jack bracket
5—Grab link
6—Spreader bar

Figure 6-16. IHIPIR — suspension sling assembly hookup.

d. Prepare the suspension sling (fig. 6-2) as described below:

WARNING

Failure to perform step (1) below could cause injury to personnel or damage to equipment.

(1) Inspect each nylon web leg (2, fig. 6-2) of the suspension sling for any defects (burns, cut edges, or broken threads) that would make the sling unusable.

(2) Select two adjacent legs of the suspension sling assembly, and lay full length on the ground at the rear of the radar. Insert a spreader bar (fig. 6-5) between the two legs 86.4 cm (34 in.) above the grab link bolts of each leg. Tie with nylon cord and tape.

(3) Lay the spreader bar (6, fig. 6-16) with sling legs attached on top of the radar set the group cabinet with the chain legs hanging over the side of the cabinet and adjacent to the rear leveling jack.

NOTE

Due to the uneven distribution of weight in the IHIPIR, an unequal number of chain links are used to attach the chain legs to the front and rear lifting points. In the following steps, the correct chain link is determined by counting from the end link of the chain leg.

(4) Wrap a chain leg around each rear leveling jack bracket as shown in figure 6-16. Insure that the grab link is forward of the jack, and fasten link 13 of each chain in its grab link.

(5) Place the center loop of the lifting sling assembly on top of the antennas, and lay the unattached sling legs down over the transmitter cabinet so that the chain legs fall adjacent to the front lifting eyes.

(6) Attach each of the two sling legs to the front lifting eyes by passing one chain leg through each eye as shown in figure 6-16, and fasten link 52 of each chain in its grab link.

(7) Place the second spreader bar (2, fig. 6-16) on top of the transmitter cabinet.

(8) Insert the spreader bar between the two sling legs 86.4 cm (34 in.) above the grab link bolts of each leg. Tie with nylon cord and tape.

(9) Fasten loose chain ends with tape to prevent fouling (fig. 6-3).

(10) To prevent fouling of the sling assembly before hookup, coil all four sling legs together on top of the radar antennas. Tape the legs as shown in figure 6-17 so that they will break away during lift. Insure that the sling legs are positioned and taped so that they will not hang up during lift. In particular, insure that the sling legs are taped clear of the antenna side receiver horn. Tape the spreader bars to the top of the cabinets on which they are resting.

(11) Drive the ground rod of the grounding device assembly into the ground next to the trailer.

(12) Place the grounding device (2, fig. 6-17) with the taped suspension slings on top of the antenna.

e. Prior to helicopter lift, perform the following checks:

(1) The trailer has been prepared for travel, and the handbrakes have been set.

(2) The two rear and front center leveling jacks are retracted and in the vertical position.

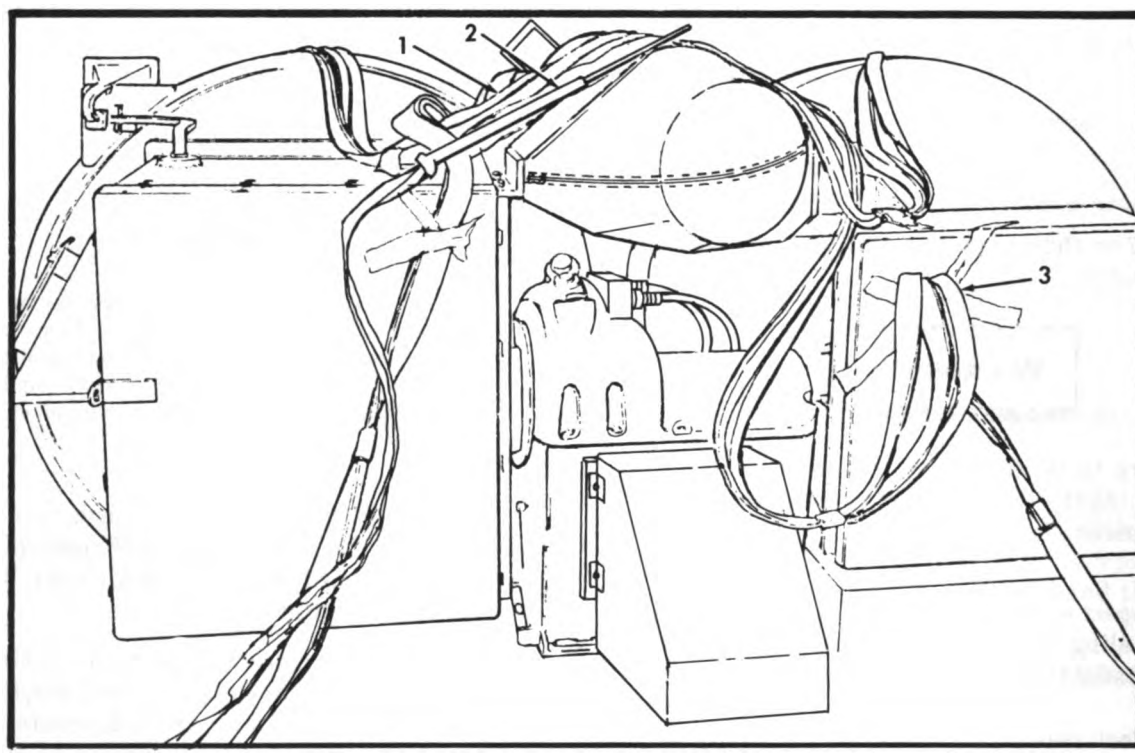
(3) The two front corner support jacks are stowed.

(4) The front support jack is fully retracted and in the vertical position.

(5) The IHIPIR has been prepared for travel.

(6) The two spreader bars are resting on and taped to the forward and rear cabinets.

(7) The four sling legs are laid and taped so that they will not hang up during helicopter lift.



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1—Suspension sling assembly
2—Grounding device
3—Suspension sling leg taped

Figure 6-17. IHIPIR — suspension sling assembly secured for helicopter pickup.

f. The using organization may be required to perform the following helicopter hookup procedures.

WARNING

Failure to perform step (1) may result in injury to personnel.

(1) The hookup crew must wear protective devices consisting of helmet liners, shell, and goggles for protection against flying sand, dirt, dust, and debris.

WARNING

The hovering helicopter develops high static voltages in excess of 20,000 volts on the helicopter lifting hook (2, fig. 6-18). Failure to perform steps (2) through (8) below in the exact sequence given may result in injury to personnel.

(2) The hookup crew takes a position on the major item so that the opening of the helicopter lifting hook is to their left. This permits the hook to be grounded from its right side and the nylon assembly to be placed on the hook from the left side.

WARNING

Failure to perform step (3) may result in injury to personnel.

(3) Ground the helicopter lifting hook using the grounding device assembly (1, fig. 6-1). Maintain the contact between the grounding device and the lifting hook throughout the hookup procedure. If the ground is disconnected before the hookup is completed, the hook must be grounded again before attempting to hook up the sling assembly.

(4) Grasp the hook by hand and slip the nylon web ring of the suspension sling onto the hook.

(5) Make certain that the helicopter lifting hook latch (3, fig. 6-18) has locked the ring into place.

(6) Make certain that all hands are clear of the helicopter lifting hook and then remove the grounding device from the hook.

WARNING

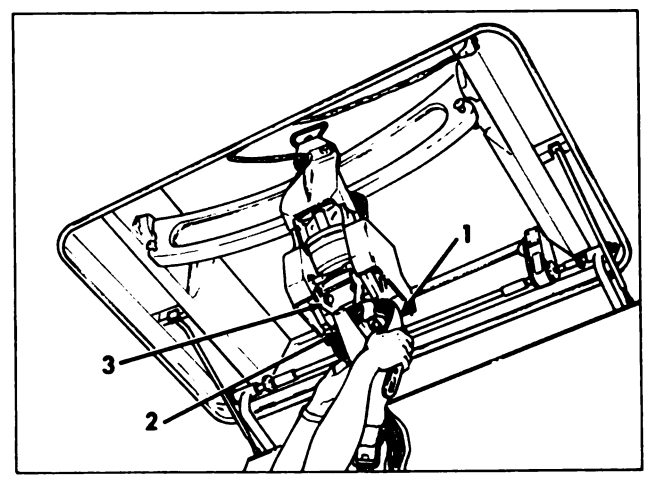
Failure to perform step (7) may result in injury to personnel.

(7) The hookup crew must leave the major item to the right of the line-of-flight of the helicopter (fig. 6-19) after completion of the hookup.

WARNING

The hookup crew must stay clear of the major item until it is airborne (fig. 6-19).

(8) Retrieve the grounding device assembly and return it to the storage bag.



MS 433010

1—30.5 cm (1 ft) nylon web ring
2—Helicopter lifting hook
3—Helicopter lifting hook latch

Figure 6-18. Hookup of suspension sling assembly to helicopter lifting hook.

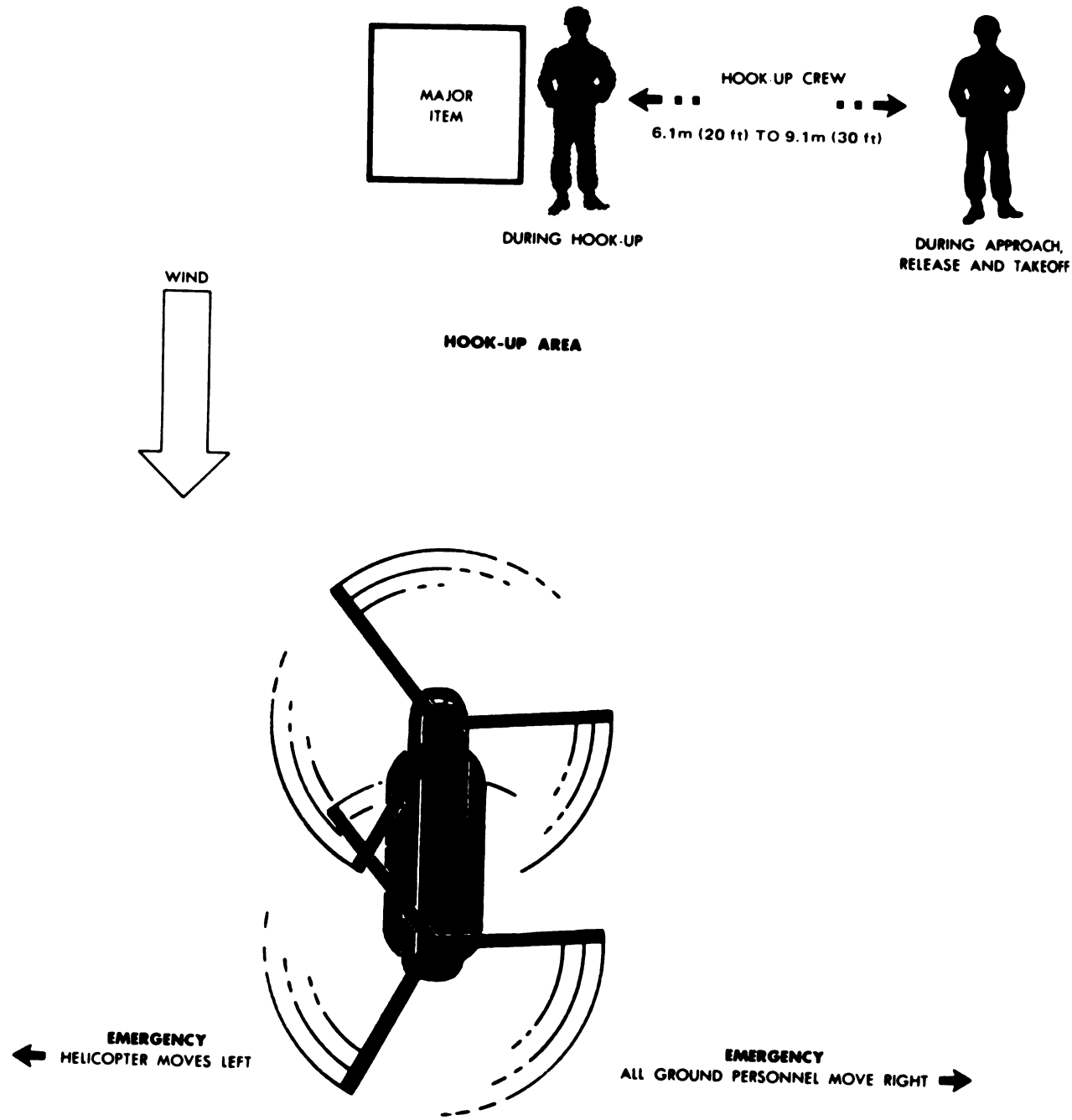


Figure 6-19. Helicopter hookup crew — position diagram.

CHAPTER 7

EMPLACEMENT PROCEDURES

Section I. GENERAL

7-1. Scope

The detailed emplacement procedures for the IHIPIR are presented in this chapter. Refer to TM 9—1425—1525 for information concerning site selection and evaluation.

7-2. Explanation of Procedures

The procedures for emplacing the IHIPIR describe a typical method of setting up a completely emplaced radar from a mobile unit. These procedures cover arrival by prime mover or helicopter. They continue in sequence until the radar is ready for orientation and alinement. Procedures for orientation and alinement are described in chapter 8.

Section II. EMPLACEMENT OF THE IHIPIR

7-3. General

This section describes the emplacement procedures for the IHIPIR. These procedures begin with the arrival of the IHIPIR at the battery site by either prime mover (par. 7-5) or helicopter (par. 7-7) and describe the complete emplacement procedures of the M390 trailer which supports the IHIPIR.

7-4. Tools

The tools required are a common screwdriver, a cross-recessed screwdriver, a 7/16-inch wrench, Allen wrenches and a sledge hammer.

7-5. Emplacement Procedures—Prime Mover

NOTE

When emplacing the IHIPIR, insure that the transmitter console is faced towards the IPAR.

a. The detailed procedures for emplacing the M390 trailer are as follows:

NOTE

The key numbers shown below in parentheses refer to figure 6-7 unless otherwise indicated.

(1) Set the trailer handbrakes with the handbrake levers (5, fig. 6-12), one on each side of the A-frame.

(2) Emplace each of the two rear leveling jacks (12) as described below:

(*a*) Pull up and hold the horizontal lock (9).

(*b*) Turn the jack horizontally until the ground pad (11) is at the rear of the trailer. Release the horizontal lock.

(*c*) Pull up and hold the vertical lock (10).

(*d*) Rotate the jack to the vertical position with the ground pad down. Release the vertical lock.

(*e*) Remove a crank (5) from a stow bracket (4) on the rear center of the trailer and place it on the crankshaft (13).

(*f*) Adjust the jack until the ground pad is just clear of the ground.

(3) Lower the front support jack as described below:

(*a*) While supporting the jack (3, fig. 6-14) with the ground pad handle (4, fig. 6-14), pull upward on the spring-loaded frame handle (1, fig. 6-14).

(*b*) Lower the jack to the down position. Insure that the ends of the spring-loaded frame handle engage the holes in the bracket and spindle assembly (7, fig. 6-14).

(*c*) Disengage the jack crank (6, fig. 6-14), and turn it clockwise until the support wheels (5, fig. 6-14) rest firmly on the ground.

(4) Release the trailer from the prime mover as described below:

(*a*) Disconnect the safety chains and secure them with the turnbuckles.

(*b*) Remove the intervehicular cable assembly (4, fig. 6-15) from the receptacle on the prime mover and place it in the stowage clip (5, fig. 6-15).

(*c*) Close the service coupling shutoff cock at the rear of the prime mover. Disconnect the trailer airbrake hose from the service coupling and place it on the dummy coupling (2, fig. 6-15).

CAUTION

Make certain that the rear leveling jacks are in the vertical position and that the ground pads are lowered almost to the ground before releasing the trailer from the prime mover.

(*d*) Remove the locking pin (1, fig. 6-13) from the pintle hook (3, fig. 6-13) on the prime mover.

(*e*) Release the spring-loaded T-bar latch (2, fig. 6-13) and open the pintle hook.

(*f*) Turn the front support jack crank clockwise until the lunette (4, fig. 6-13) is free of the pintle hook.

(*g*) Move the prime mover forward, close the pintle hook, and insert the locking pin.

CAUTION

Be careful not to damage the trailer airbrake line when lowering the front center leveling jack.

(5) Lower the front center leveling jack (9, fig. 6-12) as follows:

(*a*) Pull up and hold the horizontal lock (6, fig. 6-12).

(*b*) Swing the jack out from under the trailer until the vertical lock (11, fig. 6-12) is accessible. Release the horizontal lock.

(*c*) Pull up and hold the vertical lock.

(*d*) Being careful not to bump the airbrake line (6, fig. 6-15), tilt the jack sideways as required to clear the trailer yoke.

(*e*) Release the vertical lock.

(*f*) Continue to tilt the jack sideways while swinging it out from under the trailer, until the jack is locked in both the horizontal and vertical positions.

(*g*) Remove the jack crank (8, fig. 6-12) from the stow bracket (7, fig. 6-12) on the A-frame, and place it on the jack crankshaft (1, fig. 6-12).

(*h*) Adjust the jack until the ground pad is just clear of the ground.

(6) Lower each of the front corner support jacks (3, fig. 6-12) as described below:

(*a*) Pull up and hold the vertical lock (4, fig. 6-12).

(*b*) Rotate the jack to the vertical position with the ground pad down. Release the vertical lock.

(*c*) Obtain a crank and engage it on the front corner support jack crankshaft (2, fig. 6-12).

(*d*) Adjust the jack until the ground pad is just clear of the ground.

b. The detailed procedures for emplacing the IHIPIR are as follows:

NOTE

The key numbers shown below in parentheses refer to figure 6-7 unless otherwise indicated.

(1) Set the PEDESTAL SAFETY SWITCH (5, fig. 6-6) to the SAFE position.

WARNING

Insure that the PEDESTAL SAFETY SWITCH remains in the SAFE position to prevent the antenna from rotating should electrical power be applied while personnel are working on or near the antenna.

(2) Remove the antenna protective covers (1, fig. 6-6) and stow them in a protected area.

(3) If the IHIPIR is equipped with TAS, remove the sensor unit dust cover (12, fig. 6-6).

(4) Remove the ground rod (14) and the ground cable (15) from the ground rod storage location (16).

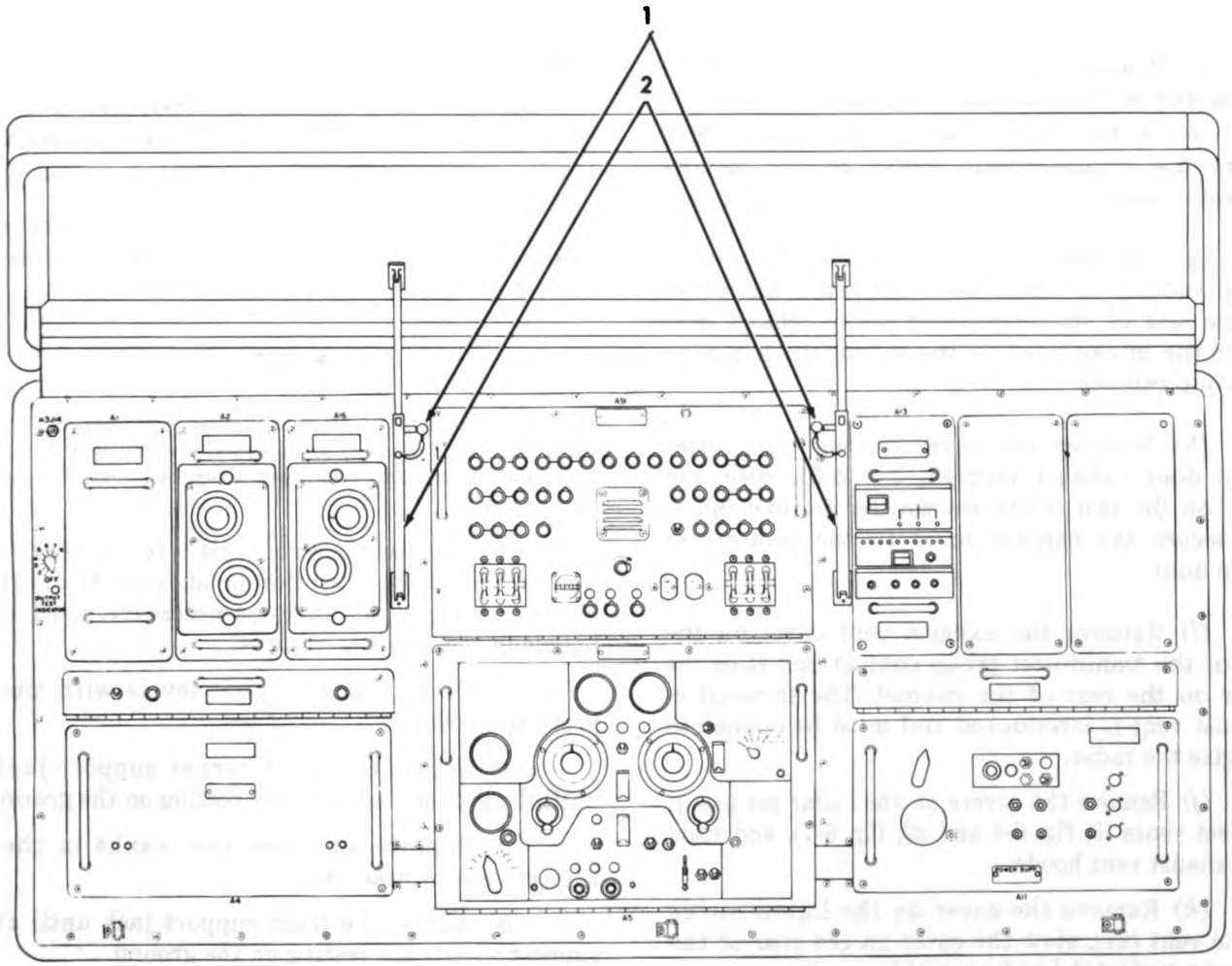
(5) Emplace the ground rod and attach the ground cable between the rod and the cable attach point (17).

(6) Connect a No. 6 insulated copper wire or equivalent between the IHIPIR ground rod and the ground rod at the power source.

(7) If the IHIPIR all-weather shelters (figs. 6-8, 6-9) are to be emplaced, refer to TM 10—8340—203—13 for the installation procedures. Otherwise, proceed to step (8).

(8) Raise the radar set group cabinet door (3) and secure it by inserting the quick-disconnect pins (1, fig. 7-1) into the cover support arms (2, fig. 7-1).

(9) Open the transmitter group cabinet door (18) and secure it by inserting the quick-disconnect pins into the cover support arms.



MS 432439

1—Quick-disconnect pins
2—Cover support arms

Figure 7-1. Radar set group cabinet — emplacement.

(10) Open the air intake and exhaust vent covers as described below:

(*a*) Remove the air exhaust vent cover (2, fig. 6-6) and stow the cover on the receiver exhaust air vent.

(*b*) Disconnect the elevation motor exhaust cover (25) from the elevation motor exhaust (27) and connect it to the dummy receptacle (26).

(*c*) Open the cooling console exhaust vent cover located on the rear of the liquid cooler (20).

(*d*) Open the radar set group air intake cover (9, fig. 6-6) on the rear of the radar set group cabinet.

(*e*) Open the pedestal intake cover (11, fig. 6-6).

(*f*) Remove the cover on the motor-generator intake-exhaust vent (6, fig. 6-6), stow the cover on the rear of the transmitter group cabinet, and secure the intake-exhaust hood to the motor-generator assembly.

(*g*) Remove the cover on the transmitter group cabinet air intake vent (19), stow the cover on the rear of the transmitter group cabinet, and secure the intake hood to the side of the transmitter group cabinet.

(*h*) Remove the cover on the transmitter group door exhaust vent (3, fig. 6-6), stow the cover on the rear of the transmitter group cabinet, and secure the exhaust hood to the transmitter group door.

(*i*) Remove the exhaust vent cover on the rear of the transmitter group cabinet and stow the cover on the rear of the cabinet. The transmitter exhaust vent is interlocked and must be opened to energize the radar.

(*j*) Remove the covers on the radar set group exhaust vents (8, fig. 6-6 and 22, fig. 6-7), and stow the exhaust vent hoods.

(*k*) Remove the cover on the liquid cooler intake vent (21), stow the cover on the rear of the antenna pedestal head assembly, and secure the hood to the liquid cooler cabinet.

(11) Set the main power switch (7) on the main power distribution box to OFF.

WARNING

Prior to handling a system power cable, insure that the generator main power circuit breaker is set to off. Prior to handling an on-trailer cable of a major item, set the major item main power circuit breaker to off.

(12) Connect the main power cable from the generator to receptacle J1 (8) on the main power distribution box.

(13) Level the IHIPIR as described below:

(*a*) Set the PEDESTAL SAFETY SWITCH to SAFE.

(*b*) Release the elevation STOW lock (13, fig. 6-6) and the azimuth STOW lock (24) by turning the handles counterclockwise.

(*c*) Adjust the front-center and rear leveling jacks until the trailer wheels are at least 25.4 mm (1 in.) off the ground.

NOTE

The IHIPIR is leveled with a three-point support. The two front corner support jacks are only used to provide additional stability in windy conditions.

(*d*) Uncover the two spirit levels (28) at the rear corner of the elevation head. View the spirit levels and adjust the jacks as necessary, until the bubble in each level is centered.

(*e*) Cover the two spirit levels with their protective covers.

(*f*) Adjust the front corner support jacks until the ground pads are just resting on the ground.

(*g*) Remove and stow the cranks in their respective stow brackets.

(*h*) Adjust the front support jack until the support wheels are resting on the ground.

(*i*) Secure the crank in the stowage clip (2, fig. 6-14).

(14) Connect the data cables to the IHIPIR (cable laying crew).

(15) Position illuminator identification switch S1 on the cable entry panel to the appropriate position (ILL A or ILL B).

(16) Remove the headset from the storage box (7, fig. 6-6) on the rear of the radar set group cabinet and connect it to the communication station jack J1 (3, fig. 2-10).

(17) Release the elevation STOW lock (13, fig. 6-6) and the azimuth STOW lock (24) on the elevation head by turning the handles counterclockwise.

c. Prior to energizing the HIPIR, make the following checks.

(1) The leveling jacks are properly emplaced.

(2) The PEDESTAL SAFETY SWITCH is in the SAFE position.

(3) The protective covers are removed and stowed.

(4) The ground rod and ground cable are properly emplaced.

(5) The main power switch is in the OFF position.

(6) The cabinet doors are secured in the open position.

(7) The headset is properly connected.

(8) All the vent covers are open.

(9) The azimuth STOW and elevation STOW locks have been released.

(10) The HIPIR is level.

7-6. Emplacement Procedure—Helicopter

a. Remove and stow the suspension sling assembly in the helicopter lifting kit storage bag and stow the bag.

b. Emplace the M390 trailer, which supports the HIPIR, as described in subparagraphs 7-5*a*(1) through (6).

c. Emplace the HIPIR as described in paragraph 7-5*b*.

d. Perform the checks outlined in paragraph 7-5*c* before energizing the HIPIR.

CHAPTER 8

ORIENTING AND ALINING

Section I. HAWK BATTERY (BCC AN/TSW-11)

8-1. Purpose

a. Accurate target firing data and successful target engagement depends on the orientation and alinement of the major items in the HAWK battery. The HIPIR has a critical role in this process because it serves as the primary system alinement reference or basepiece. Once emplaced, HIPIR A is established as the basepiece by orienting it to a known reference point (KRP). If the proper procedures are not carefully followed, misleading target information will be processed by the battery, and effective target engagement will be degraded.

b. Normally, the battery is oriented so that accurate presentations of north, east, south, and west coordinates are shown on its cathode-ray tubes (CRT's). However, the orientation to true north is only necessary for the tactical control officer or his assistant to accurately correlate data from an overlay map of the defended area, or to utilize tactical information from an Army air defense command post (AADCP). When it is not necessary to correlate data from an overlay map or to utilize information from an AADCP, any available landmark may be used as a reference point for orienting the battery.

8-2. Methods of Orienting and Alining the HIPIR's

a. HIPIR A. Since HIPIR A is the primary system basepiece, only one alinement method is required, i.e., antenna alinement with the KRP, using the M90F alinement telescope. The antenna azimuth mil ring is subsequently set to the azimuth of the KRP (as determined by the M2 aiming circle when the site is initially surveyed) to provide a true north orientation, or to 0 mils to provide orientation directly to the KRP. Once oriented, HIPIR A is directed by the BCC personnel to aline one radar in the acquisition section. Selection of the radar to be alined is dependent on system configuration as determined and directed by the BCC personnel. Procedures for all situations are contained in table 8-1. Alternate non-line-of-sight procedures are also included with each step. Extreme care must be exercised during this alinement procedure to minimize cumulative alinement errors since this acquisition radar will become the basepiece for the remainder of the system. This allows HIPIR A to proceed with LCHR and ROR alinement, thereby minimizing the time required to establish an operational fire section.

b. HIPIR B. The HIPIR B alinement method is dependent upon system configuration. Generally, the CWAR provides HIPIR B with alinement reference. This is accomplished by telescopically alining the HIPIR B and CWAR antennas, and by setting the HIPIR B azimuth mil ring to coincide with the CWAR azimuth mil ring. In the absence of the CWAR, the PAR provides alinement reference. If both the CWAR and PAR are unavailable, HIPIR B is alined with the IFF antenna. Alinement procedures for all situations are contained in table 8-1. The BCC personnel determine the appropriate alinement procedure and direct the HIPIR B personnel accordingly. Alternate non-line-of-sight procedures are also included with each step. When oriented, HIPIR B proceeds to aline its associated LCHR's and the ROR.

8-3. Sequence of HAWK Battery Alinement Operations

The orientation and alinement of the HIPIR's in the battery is controlled from the BCC. The BCC personnel initiate, monitor, and coordinate the alinement operations of all major items in the battery. Figure 8-1 illustrates the sequence in which the alinement operations of a typical battery are performed. The unshaded areas indicate the operations performed at the HIPIR as it is alined in the battery and the shaded areas indicate the ongoing alinement operations being performed at the other major items of the battery.

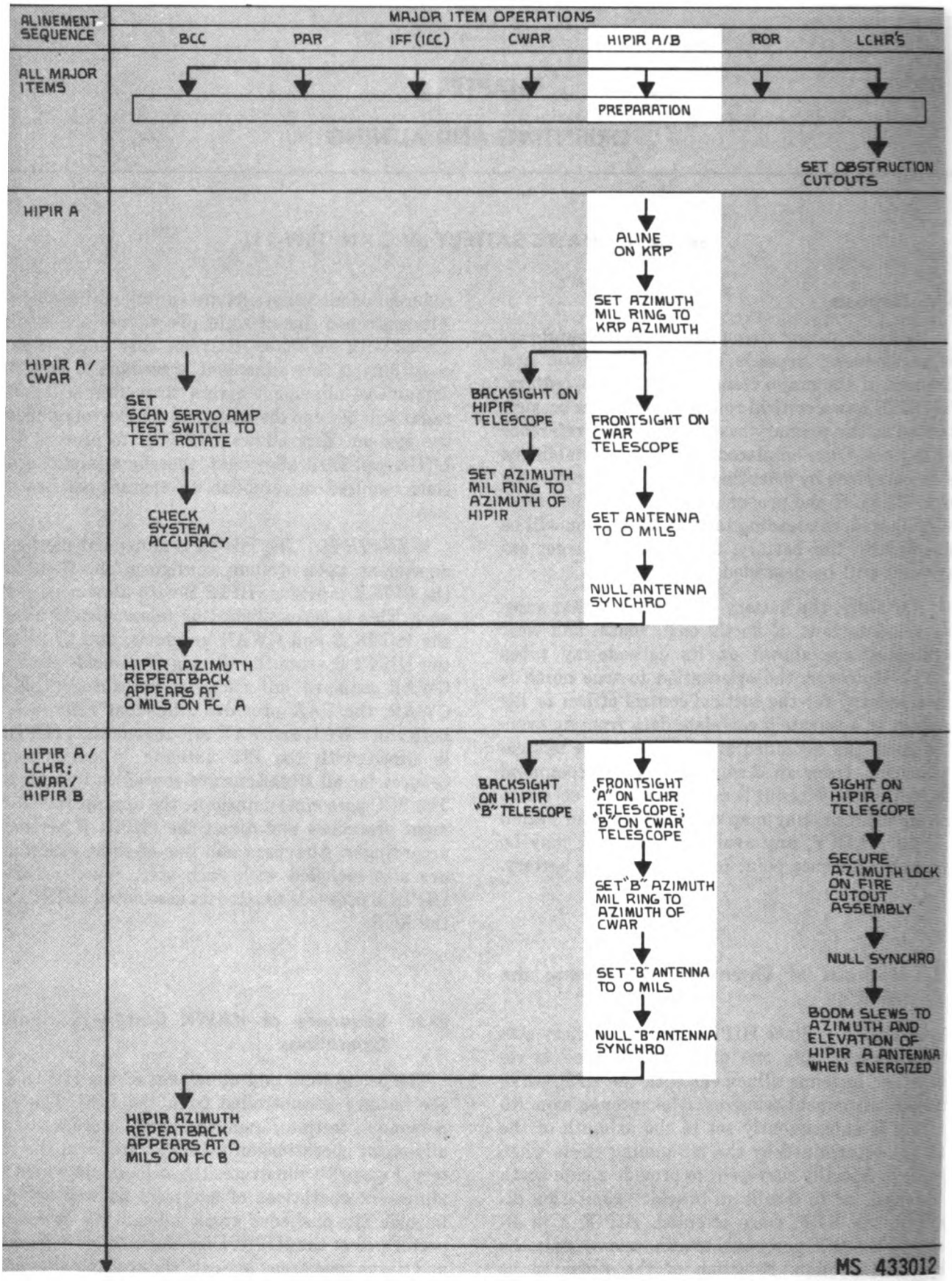


Figure 8-1. Sequence of HAWK battery alinement operations - typical (sheet 1 of 3).

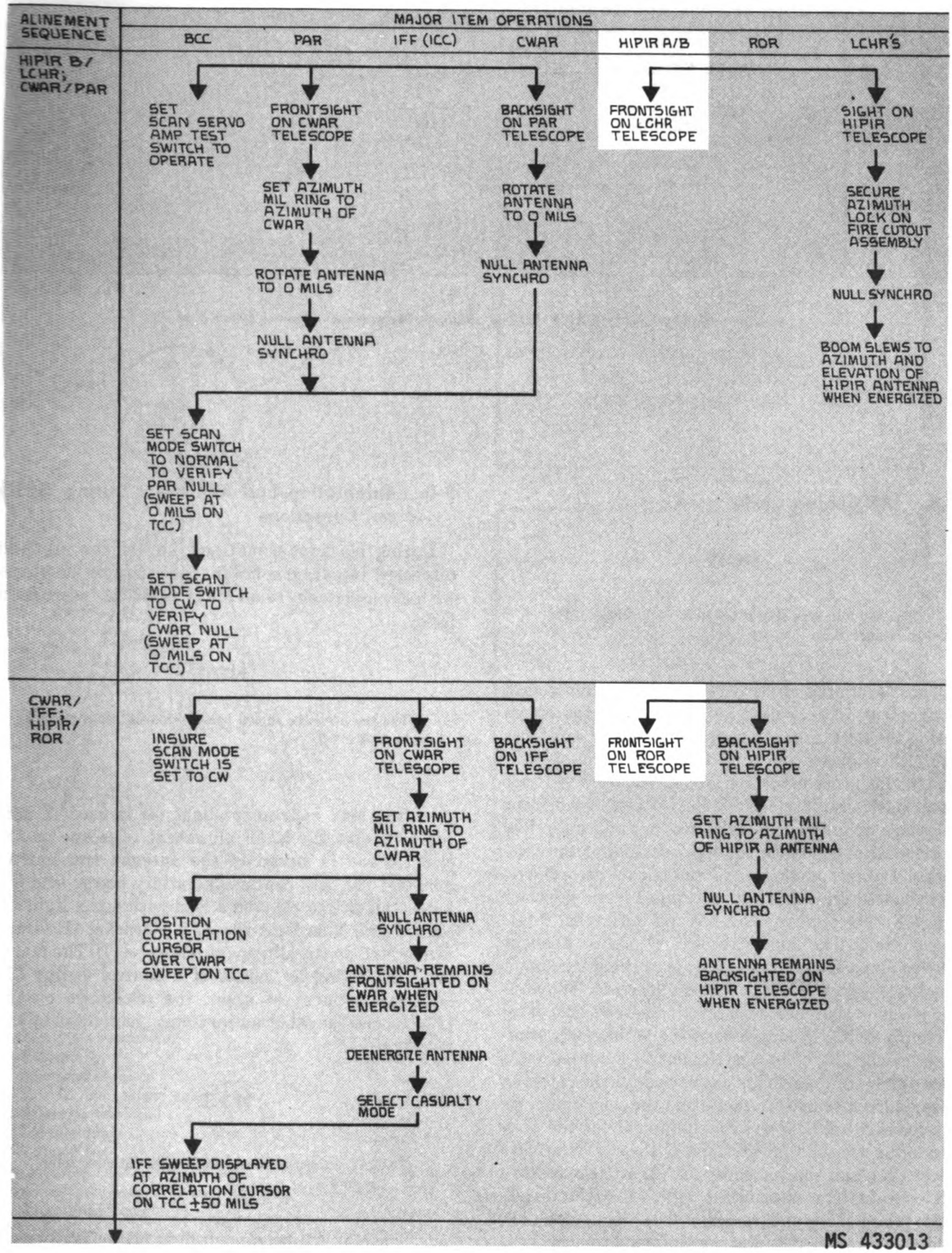


Figure 8-1. Sequence of HAWK battery alinement operations - typical (sheet 2 of 3).

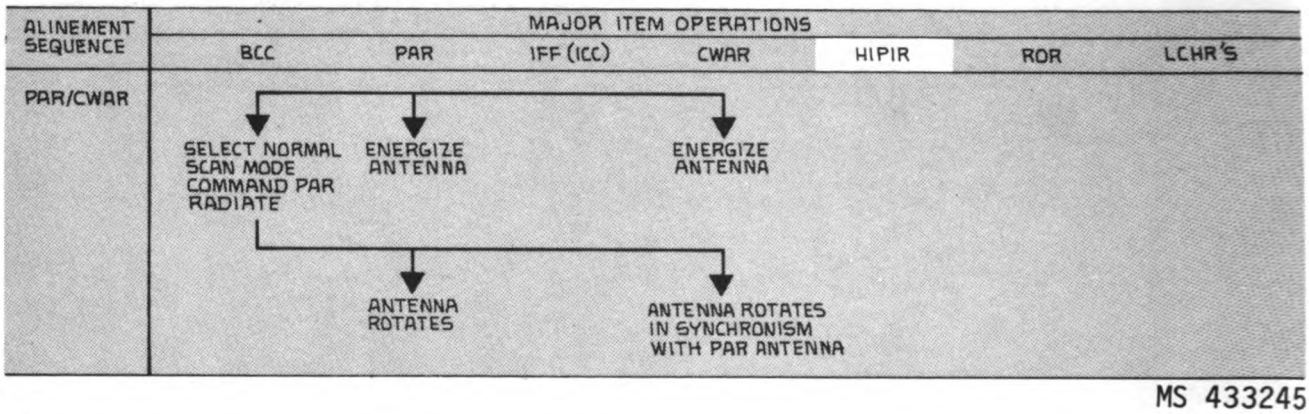


Figure 8-1. Sequence of HAWK battery alinement operations - typical (sheet 3 of 3).

8-4. M2 Aiming Circle

NOTE

The key numbers shown below in parentheses refer to figure 8-2.

The M2 aiming circle (31) is a small, lightweight instrument that is used in the battery for calculating the KRP azimuth bearing and other reference azimuth angles when any of the non-line-of-sight alinement procedures contained in table 8-1 are used. Basically, it consists of a 4-power, fixed-focus telescope mounted on a body that permits unlimited horizontal and limited vertical rotation of the telescope. Azimuth angle measurements are recorded on a graduated-scale azimuth mil ring (11) and micrometer (18). The aiming circle has two horizontal rotating motions. The upper (recording) motion changes the readings of the azimuth scale of the instrument; the lower (nonrecording) motion does not. The aiming circle is equipped with leveling screws (12), level vials (6), and a locking lever for the magnetic compass needle (21). The instrument is mounted on a baseplate (13) that serves as the base of the carrying case and is also used in mounting the instrument on a tripod (30). The accessory equipment for the aiming circle consists of the tripod, the carrying case cover (24), and the accessory kit (27). The accessory kit contains the instrument light (23), plumb bob (25), lampholder and remover (29), backplate (26), and canvas cover (28). Further information concerning the emplacement operation and maintenance of the M2 aiming circle is provided in FM 6—2.

8-5. Orientation and Alinement During Blackout Conditions

During blackout conditions, any of the methods discussed in paragraph 8-2 above may be employed with the assistance of an M42 or M53-E1 instrument light.

NOTE

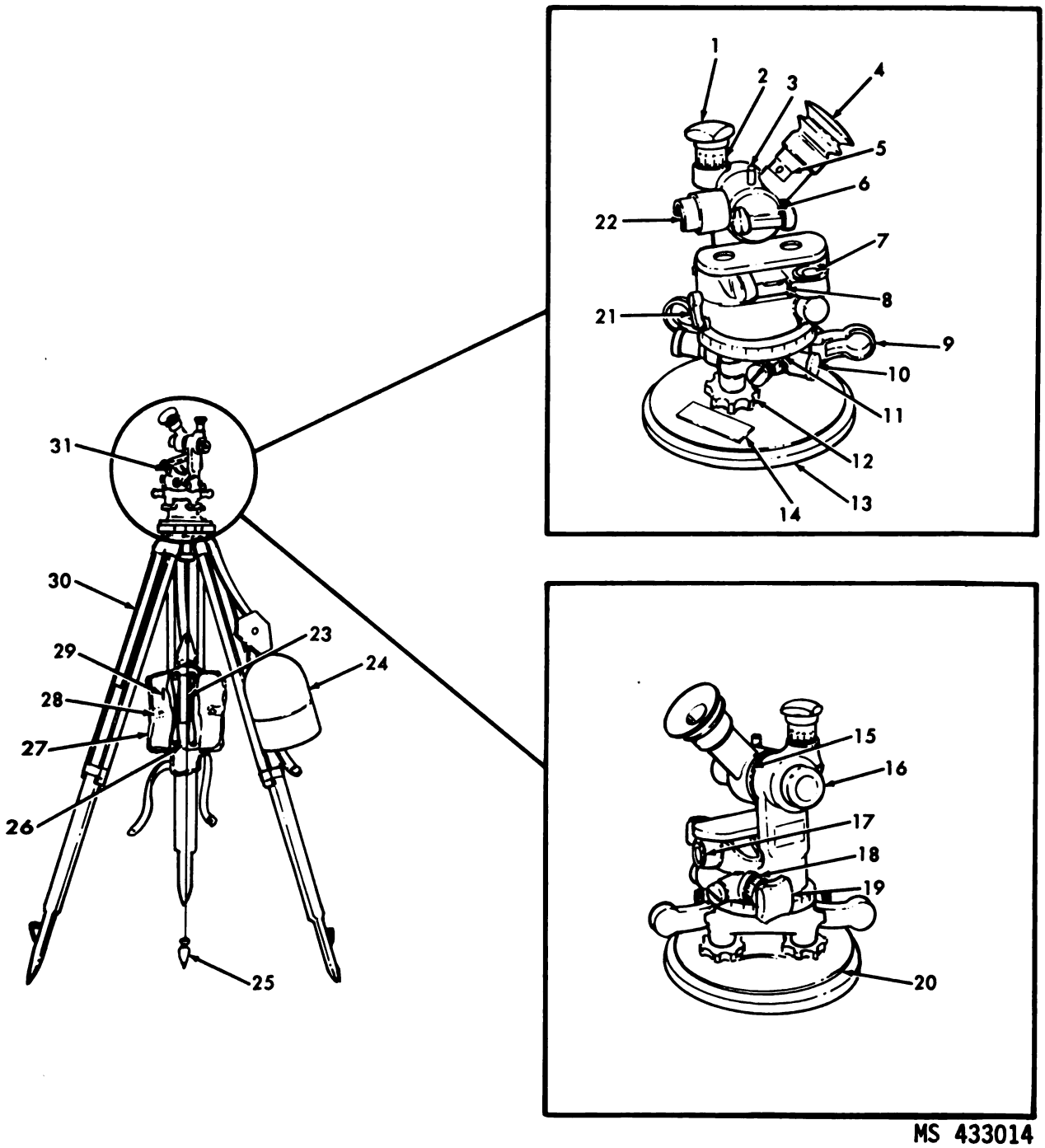
The key numbers shown below in parentheses refer to figure 8-3.

a. The M42 instrument light (4) is used in conjunction with the M90F alinement telescope on the IHIPIR and is stored in the antenna transmitter housing. The M42 contains a battery power lead (5), a dovetail fitting (6), and a lead with a pen light (2) on the end. This light fits into a bracket (1) which is mounted on the alinement telescope (7). The lamps are illuminated by means of a control switch (3). During alinement at night, the telescopes on the IHIPIR and the other major items are sighted on the pen lights.

NOTE

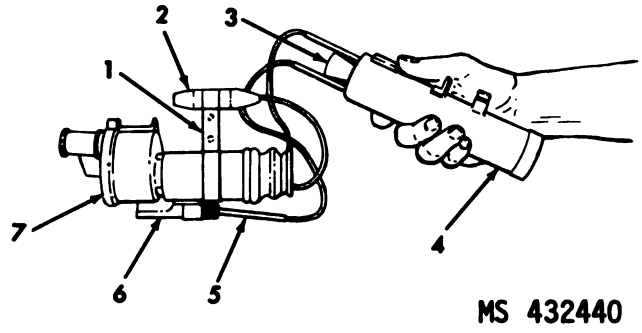
The key numbers shown below in parentheses refer to figure 8-4.

b. The M53-E1 instrument light (4) is usually used with the M90F telescope on the ICC (IFF antenna) and the M109 alinement telescope and fire cutout



1—Elevation knob
2—Elevation micrometer
3—Reflector
4—Telescope eyepiece
5—Slot for instrument light
6—Telescope level vial
7—Circular level
8—Tubular level
9—Orienting knob cover
10—Azimuth nonrecording orienting knob
11—Azimuth mil ring
12—Leveling screw
13—Baseplate
14—Notation pad
15—Elevation scale
16—Neutral filter (stored position)
17—Magnifier
18—Azimuth micrometer
19—Azimuth recording knob
20—Spring plate
21—Locking lever for compass needle
22—Objective
23—Instrument light
24—Cover for aiming circle
25—Plumb bob
26—Backplate
27—Accessory kit
28—Canvas cover
29—Lamp holder and remover
30—Tripod
31—M2 aiming circle

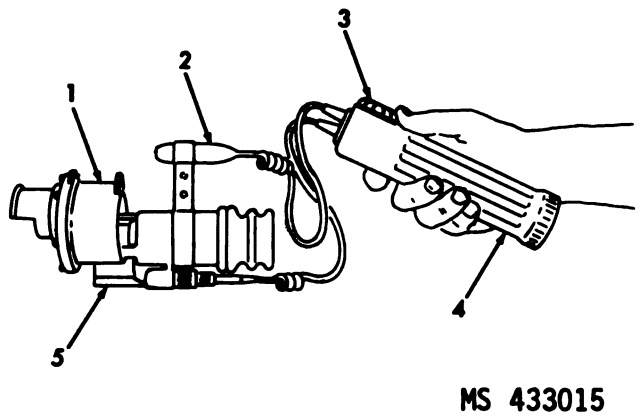
Figure 8-2. M2 aiming circle with accessory equipment.



1—Bracket
2—Pen light
3—Control switch
4—M42 instrument light
5—Battery power lead
6—Dovetail fitting
7—Alinement telescope

Figure 8-3. Mounting the M42 instrument light.

device on the ILCHR. However, it can also be used in place of the M42 instrument light on the IHIPIR. The M53-E1 is similar to the M42 except that the control switch (3) is a different type and it is mounted forward on the side of the instrument light. The M53-E1 is stored in the cabinet set drawer in the ICC and in the forward compartment of the ILCHR.



1—Alinement telescope
2—Pen light
3—Control switch
4—M53-E1 instrument light
5—Dovetail fitting

Figure 8-4. Mounting the M53-E1 instrument light.

8-6. Preliminary Procedures

Before orientation and alinement of the HIPIR can be attempted, steps *a* through *c* below must be accomplished.

a. Emplace the HIPIR as described in chapter 7.

b. Energize the power generators in accordance with the instructions posted on the inside of the generator panel, and set the output of the generators for 425 vac.

c. Establish interunit communications with the BCC.

8-7. Synchro Control System

Detailed functional schematics of the synchro control system for the HAWK battery are contained in TM 9—1425—1525—12—2, together with synchro alinement procedures for each major item.

8-8. HIPIR – LCHR Azimuth Alinement Verification

a. The azimuth alinement verification procedure is performed, under the direction of the LCHR personnel, after the HIPIR and LCHR have been alined to insure that the LCHR arms are parallel to the HIPIR line-of-sight. This parallel condition is necessary for the missile to lock on target. Paragraphs *b* through *d* below contain a brief description of these procedures.

b. If line-of-sight exists between the HIPIR and the LCHR and there are no missiles on the LCHR, azimuth alinement is verified by sighting the LCHR front and rear reference points on the HIPIR alinement telescope vertical crosshair. This line-of-sight verification is made on the LCHR arm closest to the LCHR alinement telescope. If both reference points cannot be alined on the vertical crosshair of the HIPIR telescope, a sighting target and support are used as described in paragraph *d* below.

c. The sighting target and support are used to verify the LCHR and HIPIR alinement under the following conditions.

(1) Alinement cannot be verified using the procedure described in paragraph *b* above.

(2) Line-of-sight exists between the HIPIR and LCHR and there are missiles on the LCHR.

(3) Line-of-sight between the HIPIR and the LCHR does not exist (refer to paragraph *e* below).

d. The sighting target support is placed on the LCHR front reference point and the sighting target is moved along the support until it is alined with the vertical crosshair of the HIPIR alinement telescope. The distance between the front reference point and the HIPIR alinement telescope line-of-sight is measured and recorded. The same measurement is taken of the distance at the rear reference point. The difference between these two measurements should be 3.8 cm (1.5 inches) or less. If the difference in measurement exceeds 3.8 cm (1.5 inches), it indicates improper alinement or boresighting, incorrect adjustment of the servo balance, or broken or bent connector pins in the compensation group cabinet of the LCHR.

e. If the line-of-sight between the HIPIR and LCHR does not exist, aline the sighting target with the vertical crosshair of the M2 aiming circle telescope exactly as done with the HIPIR alinement telescope in paragraph *d* above.

8-9. System Orientation and Alinement Procedures

Perform the procedures in table 8-1, as directed by the BCC personnel, to orient and aline the HIPIR's and the other system radars. Due to system configuration variations some steps do not apply in all situations.

NOTE

For detailed information concerning the setting and the reading of the HIPIR azimuth mil ring, refer to section III.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)

Step	Operation Normal indication Corrective procedure
	NOTE The following procedures are coordinated from the BCC. Perform only those steps you are directed to perform.
1.	**Preparation.**
a.	Observe that the BCC R BUS lamp (20, fig. 2-7) on the main fuse panel is illuminated. Do not perform the alinement if the lamp is extinguished.
b.	Insure that the LOCAL-REMOTE switch (20, fig. 2-9) is set to LOCAL.
c.	Insure that the HIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM circuit breaker (18, fig. 2-2) and the POWER AMPLIFIER BEAM circuit breaker (11, fig. 2-2) set to OFF.
d.	Insure that the PEDESTAL SAFETY SWITCH (1, fig. 2-11) is set to SAFE.
e.	Set the MOTOR GENERATOR circuit breaker (17, fig. 2-7) to OFF.
f.	Remove the M90F alinement telescope from the storage box (2, fig. 1-7) and install it on the HIPIR antenna (fig. 8-5).
g.	Insure that the HIPIR is level (refer to par. 7-5*b* (13)).
2.	**Orient the HIPIR A Antenna.**
a.	Manually rotate the antenna until the vertical crosshair of the alinement telescope (1, fig. 8-5) is centered on the known reference point (KRP).
b.	Secure the antenna in place with the azimuth STOW lock (8, fig. 2-11).
	NOTE Engaging the azimuth STOW lock while one of the antenna locking holes is positioned near the stow lock pin (i.e., while the antenna is pointing curbside or over the radar set group) may cause the stow lock pin to engage the lock hole and rotate the antenna slightly. If this situation is encountered, hold the antenna in place manually rather than securing it with the azimuth STOW lock.
c.	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6).
d.	Rotate the azimuth mil ring until the vernier (3, fig. 8-6) indicates the azimuth bearing of the KRP.
	NOTE For detailed information concerning the setting and the reading of the HIPIR azimuth mil ring, refer to section III.
e.	Tighten the two screws that secure the azimuth mil ring.
f.	Disengage the azimuth STOW lock.
g.	Report completion of HIPIR A antenna orientation to the BCC personnel and proceed as directed.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
3.	**Aline the CWAR Antenna with HIPIR A.**
a.	If line of sight exists between the HIPIR and the CWAR, proceed directly to step *l* below; if not, perform steps *b* through *k* below. Also, refer to the note below.
	NOTE When the alternate method is being used to aline the CWAR with the HIPIR, the reference point used must be located at a distance of at least 305 m (1000 ft) from the HIPIR and the CWAR. The M2 aiming circle must be visible to both the HIPIR and the CWAR.
b.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2)
c.	Adjust the azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
d.	Manually frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
e.	Secure the HIPIR antenna from moving in azimuth with the azimuth STOW lock (8, fig. 2-11).
f.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
g.	Unlock (fast motion) the azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as recorded in step *f* above. Lock (slow motion) the azimuth recording knob.
h.	Rotate the azimuth recording knob until the azimuth mil ring upper scale and azimuth micrometer indicate the azimuth as recorded in step *f* above.
i.	Unlock (fast motion) the azimuth non-recording orientation knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting knob and then adjust the knob for a fine frontsight.
j.	Direct the CWAR personnel to frontsight the CWAR alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the CWAR antenna, using both the fast and slow motion of the azimuth recording knob.
k.	Observe and record the M2 aiming circle azimuth indication and proceed to step *n*.
l.	Direct the CWAR personnel to backsight the CWAR antenna, and then simultaneously frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the CWAR alinement telescope. Secure the HIPIR antenna in place with the azimuth STOW lock (8, fig. 2-11).
m.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
n.	Direct the CWAR personnel to adjust the CWAR azimuth mil ring to indicate this azimuth while insuring that the CWAR antenna does not move.
o.	Inform the BCC that the CWAR antenna is oriented.
p.	Disengage the azimuth STOW lock.
q.	Proceed to step 9.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
4.	**Aline the PAR Antenna with HIPIR A.**
a.	If line of sight exists between the HIPIR and the PAR, proceed directly to step *l* below; if not, perform steps *b* through *k* below. Also, refer to the note below.
	NOTE When the alternate method is being used to aline the PAR with the HIPIR, the reference point used must be located at a distance of at least 305 m (1000 ft) from the HIPIR and the PAR. The M2 aiming circle must be visible to both the HIPIR and the PAR.
b.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2).
c.	Adjust the azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
d.	Manually frontsight the HIPIR antenna until the vertical crosshair of the alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
e.	Secure the HIPIR antenna from moving in azimuth with the azimuth STOW lock (8, fig. 2-11).
f.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
g.	Unlock (fast motion) and azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as recorded in step *f* above. Lock (slow motion) the azimuth recording knob.
h.	Rotate the azimuth recording knob until the azimuth mil ring upper scale and azimuth micrometer indicate the azimuth as recorded in step *f* above.
i.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orientating knob and then adjust the knob for a fine frontsight.
j.	Direct the PAR personnel to frontsight the PAR alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the PAR antenna, using both the fast and slow motion of the azimuth recording knob.
k.	Observe and record the M2 aiming circle azimuth indication and proceed to step *n*.
l.	Direct the PAR personnel to backsight the PAR antenna, and then simultaneously frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the PAR alinement telescope. Secure the HIPIR antenna in place with the azimuth STOW lock (8, fig. 2-11).
m.	Observe and record the HIPIR azimuth mil ring 4, fig. 8-6) indication.
n.	Direct the PAR personnel to adjust the PAR azimuth mil ring to indicate this azimuth while insuring that the PAR antenna does not move.
o.	Inform the BCC personnel that the PAR antenna is oriented.
p.	Disengage the azimuth STOW lock.
q.	Proceed to step 9.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)-Continued

Step	Operation Normal indication Corrective procedure
5.	**Aline the IFF Antenna with HIPIR A.**
a.	If line of sight exists between the HIPIR and the IFF, proceed directly to step *l* below; if not, perform steps *b* through *k* below. Also, refer to the note below.
	NOTE When the alternate method is being used to aline the IFF with the HIPIR, the reference point used must be located at a distance of at least 305 m (1000 ft) from the HIPIR and the IFF. The M2 aiming circle must be visible to both the HIPIR and the IFF.
b.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2).
c.	Adjust the azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
d.	Manually frontsight the HIPIR antenna until the vertical crosshair of the alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
e.	Secure the HIPIR antenna from moving in azimuth with the azimuth STOW lock (8, fig. 2-11).
f.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
g.	Unlock (fast motion) the azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as recorded in step *f* above. Lock (slow motion) the azimuth recording knob.
h.	Rotate the azimuth recording knob until the azimuth mil ring upper scale and azimuth micrometer indicate the azimuth as recorded in step *f* above.
i.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting and then adjust the knob for a fine frontsight.
j.	Direct the ICC personnel to frontsight the IFF alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the IFF antenna alinement telescope, using both the fast and slow motion of the azimuth recording knob.
k.	Observe and record the M2 aiming circle azimuth indication and proceed to step *n*.
l.	Direct the ICC personnel to backsight the IFF antenna, and then simultaneously frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the IFF alinement telescope. Secure the HIPIR antenna in place with the azimuth STOW lock (8, fig. 2-11).
m.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
n.	Direct the ICC personnel to adjust the IFF azimuth mil ring to indicate this azimuth while insuring that the IFF antenna does not move.
o.	Inform the BCC personnel that IFF antenna orientation is complete.
p.	Disengage the azimuth STOW lock.
q.	Proceed to step 9.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
6.	**Aline HIPIR B with the CWAR Antenna**
a.	If line of sight exists between the HIPIR and CWAR, proceed directly to step *d* below. If line of sight does not exist, proceed to step *b* for alternate alinement procedures using the M2 aiming circle (fig. 8-2). Also refer to note below.
	NOTE When the alternate method is being used to aline the HIPIR with the CWAR, the reference point used must be located at least 305 m (1000 ft) from the CWAR and the HIPIR. The M2 aiming circle must be located at this reference point and must be visible to both the CWAR and the HIPIR.
	NOTE In high wind, the antenna has to be held in place manually.
b.	When directed by the M2 aiming circle personnel:
(1)	Frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, Fig. 8-5) is centered on the M2 aiming circle telescope. Set the elevation brake (3, fig. 2-11) as required.
(2)	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6) and set the azimuth mil ring to the azimuth determined at the M2 aiming circle. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the M2 aiming circle telescope.
(3)	Tighten the two screws that secure the azimuth mil ring.
c.	Proceed to step *g*.
d.	When directed by the CWAR personnel, frontsight the HIPIR antenna on the backsighted CWAR antenna until the vertical crosshair of the HIPIR telescope (1, fig. 8-5) is centered on the CWAR telescope. Set the elevation brake (3, fig. 2-11) as required.
e.	Loosen the screws that secure the azimuth mil ring (4, fig. 8-6) and set the azimuth mil ring to the same azimuth as the CWAR. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the CWAR alinement telescope.
f.	Tighten the two screws that secure the azimuth mil ring.
g.	Inform the BCC personnel that HIPIR B orientation is complete.
h.	Proceed to step 9.
7.	**Aline HIPIR B with the PAR Antenna.**
a.	If line of sight exists between the HIPIR and PAR, proceed to step *d* below. If line of sight does not exist, proceed to step *b* for alternate alinement procedures using the M2 aiming circle (fig. 8-2). Also refer to note below.
	NOTE When the alternate method is being used to aline the HIPIR with the PAR, the reference point used must be located at least 305 m (1000 ft) from the PAR and the HIPIR. The M2 aiming circle must be located at this reference point and must be visible to both the PAR and the HIPIR.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
7. Cont.	**NOTE** In high wind, the antenna has to be held in place manually.
b.	When directed by the M2 aiming circle personnel:
(1)	Frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope. Set the elevation brake (3, fig. 2-11) as required.
(2)	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6) and set the azimuth mil ring to the azimuth determined at the M2 aiming circle. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the M2 aiming circle telescope.
(3)	Tighten the two screws that secure the azimuth mil ring.
c.	Proceed to step *g*.
d.	When directed by the PAR personnel, frontsight the HIPIR antenna on the backsighted PAR antenna until the vertical crosshair of the HIPIR telescope (1, fig. 8-5) is centered on the PAR telescope. Set the elevation brake (3, fig. 2-11) as required.
e.	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6) and set the mil ring to the same azimuth as the PAR. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the PAR alinement telescope.
f.	Tighten the two screws that secure the azimuth mil ring.
g.	Inform the BCC personnel that HIPIR B orientation is complete.
h.	Proceed to step 9.
8.	**Aline HIPIR B with the IFF Antenna.**
a.	If line of sight exists between the HIPIR and IFF, proceed directly to step *d* below. If line of sight does not exist, proceed to step *b* for alternate alinement procedures using the M2 aiming circle (fig. 8-2). Also refer to note below. **NOTE** When the alternate method is being used to aline the HIPIR with the IFF, the reference point used must be located at least 305 m (1000 ft) from the IFF and the HIPIR. The M2 aiming circle must be located at this reference point and must be visible to both the IFF and the HIPIR. **NOTE** In high wind, the antenna has to be held in place manually.
b.	When directed by the M2 aiming circle personnel:
(1)	Frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope. Set the elevation break (3, fig. 2-11) as required.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
8*b*. (2)	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6) and set the azimuth mil ring to the azimuth determined at the M2 aiming circle. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the M2 aiming circle telescope.
(3)	Tighten the two screws that secure the azimuth mil ring.
c.	Proceed to step *g*.
d.	When directed by the IFF personnel, frontsight the HIPIR antenna on the backsighted IFF antenna until the vertical crosshair of the HIPIR telescope (1, fig. 8-5) is centered on the IFF telescope. Set the elevation brake (3, fig. 2-11) as required.
e.	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6) and set the azimuth mil ring to the same azimuth as the IFF. Insure that the vertical crosshair of the HIPIR alinement telescope remains centered on the IFF alinement telescope.
f.	Tighten the two screws that secure the azimuth mil ring.
g.	Inform the BCC personnel that HIPIR B orientation is complete and proceed.
9.	**Null the HIPIR Antenna Synchro.**
a.	Manually rotate the HIPIR antenna until the azimuth mil ring (4, fig. 8-6) indicates 0 mils, and engage the azimuth STOW lock (8, fig. 2-11).
b.	Set the azimuth handwheel (16, fig. 2-9) on the control-indicator panel to 0 mils.
c.	At the HIPIR pedestal, push the synchro adjust knob (2, fig. 8-7) down and slowly rotate it clockwise or counterclockwise until a null is obtained on nulling meter M1 (4, fig. 8-7).
d.	Press the fine null switch S1 (3, fig. 8-7), and simultaneously rotate the synchro adjust knob clockwise or counterclockwise until a fine null is obtained. Release the fine null switch.
e.	Release the synchro adjust knob, and assure that the null indication remains on nulling meter M1.
f.	Inform the BCC personnel that antenna synchro nulling has been completed.
g.	If a false null is reported from the BCC, repeat steps *c* through *f*. If not, proceed.
h.	Disengage the azimuth STOW lock, and proceed to step 10.
10.	**Alinement with the LCHR.**
a.	Position the HIPIR antenna to 0 mils elevation and engage the elevation STOW lock handwheel (10, fig. 2-11). **WARNING** Do not set the minimum elevation control to less than 190 mils in step *b* below.
b.	Set the minimum elevation control (2, fig. 8-8) of the minimum elevation stowed synchro (1, fig. 8-8) to 40 mils above the highest fire interrupter setting of any LCHR of that firing section.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
10c.	If a line-of-sight exists between the HIPIR and LCHR, proceed directly to step *q* below. If a line-of-sight does not exist, proceed to step *d* for alternate alinement procedures using the M2 aiming circle (fig. 8-2). Also refer to the note below.
	NOTE When performing the alternate alinement procedures, the reference point should be located at least 305 m (1000 ft) from the HIPIR and LCHR. The M2 aiming circle must be located at this point and must be visible to both the HIPIR and the LCHR.
d.	*If line-of-sight does not exist*, emplace the M2 aiming circle (fig. 8-2) and level it using the circular and tubular levels (7 and 8, fig. 8-2).
e.	When the M2 aiming circle is emplaced, frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
f.	Direct the LCHR personnel to sight the LCHR alinement telescope until the vertical crosshair of the telescope is centered on the M2 aiming circle telescope.
g.	Prevent the HIPIR antenna from moving in azimuth.
h.	Record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
i.	Adjust the M2 aiming circle azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
j.	Unlock (fast motion) the azimuth recording knob and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates approximately 3200 mils. Lock (slow motion) the azimuth recording knob.
k.	Rotate the azimuth recording knob until the azimuth mil ring upper scale indicates 3200 mils.
l.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting knob and then adjust the knob for a fine frontsight.
m.	Sight the M2 aiming circle on the LCHR alinement telescope using both the fast and slow motion of the azimuth recording knob. Direct the LCHR personnel to simultaneously sight the LCHR alinement telescope on the M2 aiming circle telescope and then record the azimuth angle determined at the M2 aiming circle, and the angle indicated at the LCHR alinement telescope.
n.	Calculate and adjust for proper azimuth angle by subtracting the M2 aiming circle azimuth from the LCHR alinement telescope azimuth. However, if the LCHR alinement telescope azimuth is less than the M2 aiming circle azimuth, add 6400 mils and then subtract the M2 aiming circle azimuth.
o.	Direct the LCHR personnel to rotate the LCHR alinement telescope to the azimuth value calculated above, and then lock it in position.
p.	Proceed to step *r*.
q.	*If line-of-sight exists*, proceed as follows:
(1)	Frontsight the HIPIR until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the LCHR alinement telescope.
(2)	Direct the LCHR personnel to sight the LCHR alinement telescope on the HIPIR until the vertical crosshair is centered on the HIPIR alinement telescope.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

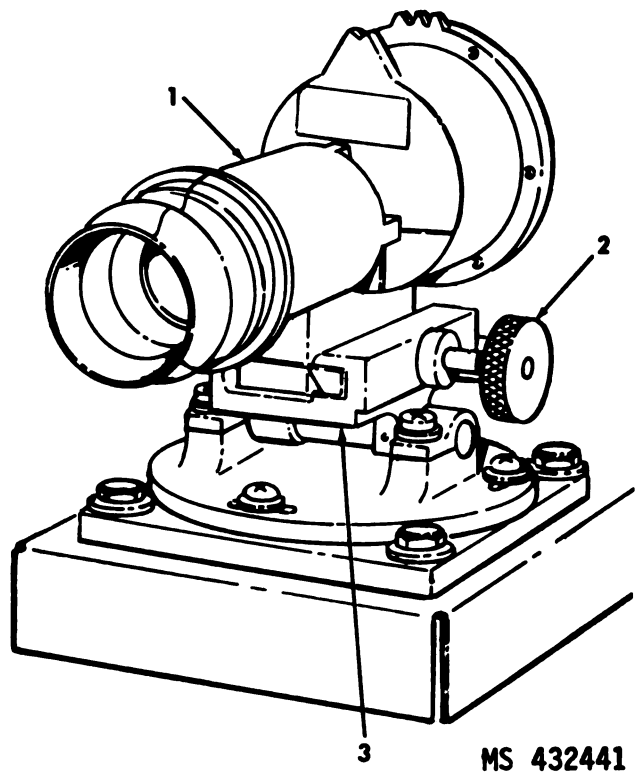
Step	Operation Normal indiration Corrective procedure
10*q*.(3)	Lock the LCHR alinement telescope in position by tightening the azimuth lock.
(4)	Record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
r.	Direct the LCHR personnel to perform the following alinement procedures and await instructions from them concerning related procedures to be performed at the HIPIR.
(1)	LCHR adjustments.
(2)	LCHR servo check.
(3)	Alinement verification.
(4)	Launcher orientation.
s.	Repeat steps *c* through *r* for the remaining LCHR's.
t.	Inform the BCC personnel that the LCHR alinement procedures have been completed.
u.	Set the LOCAL-REMOTE switch (20, fig. 2-9) to LOCAL, and proceed to step 11.
11.	**Alinement with the ROR Antenna.**
	NOTE HIPIR A must be alined to the ROR before HIPIR B during ROR alinement. If HIPIR A is not available, aline HIPIR B using the procedure for HIPIR A.
a.	Make certain that the PEDESTAL SAFETY SWITCH (1, fig. 2-11) is set to SAFE and that the LOCAL-REMOTE switch (20, fig. 2-9) is set to LOCAL.
b.	Manually position the HIPIR antenna to 0 mils elevation and set the elevation brake (3, fig. 2-11).
c.	If line of sight exists between the HIPIR's and ROR, proceed to step *m* below. If line of sight does not exist, proceed to step *d*. Also refer to the note below.
	NOTE If line of sight does not exist between the HIPIR's and the ROR, a new reference point must be established. This reference point must be located at least 305 m (1000 ft) from the ROR and the HIPIR being alined, and may be different for each HIPIR. The M2 aiming circle must be located at this reference point and be visible to the ROR and the HIPIR.
d.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2).
e.	When the M2 aiming circle is emplaced, frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle. Set the elevation brake as required.
f.	Obtain the azimuth reading from the HIPIR azimuth mil ring (4, fig. 8-6) and if it is less than 3200 mils, add 3200 mils. If the HIPIR azimuth is more than 3200 mils, subtract 3200 mils.
g.	Unlock (fast motion) the azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as determined in step *f* above. Lock (slow motion) the azimuth recording knob.

Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)—Continued

Step	Operation Normal indication Corrective procedure
11*h*.	Rotate the azimuth recording knob until the azimuth mil ring upper scale and the azimuth micrometer (18, fig. 8-2) indicate the azimuth determined in step *f* above.
i.	Unlock (fast motion) the azimuth nonrecording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth nonrecording orienting knob and then adjust the knob for a fine frontsight.
j.	Direct the ROR personnel to backsight the ROR alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the ROR antenna using both the fast and slow motion of the azimuth recording knob.
k.	If the ROR is being alined with HIPIR A, direct the ROR personnel to:
(1)	Loosen the screws that secure the ROR azimuth mil ring and set the ROR azimuth mil ring to indicate the upper scale azimuth of the M2 aiming circle.
(2)	Tighten the screws that secure the ROR azimuth mil ring.
l.	Proceed to step *o*.
m.	Direct the ROR personnel to backsight the ROR telescope on the HIPIR antenna, and then simultaneously frontsight the HIPIR telescope (1, fig. 8-5) on the ROR antenna until the vertical crosshair of the HIPIR alinement telescope is centered on the ROR alinement telescope. **NOTE** If the ROR alinement telescope is not in the HIPIR alinement telescope field of view, release the elevation brake and rotate the HIPIR antenna to bring the ROR alinement telescope into view. Then set the elevation brake.
n.	If the ROR is being alined with HIPIR A, direct the ROR personnel to:
(1)	Loosen the screws that secure the ROR azimuth mil ring and set the ROR azimuth mil ring to indicate the same azimuth as the HIPIR antenna azimuth mil ring (4, fig. 8-6).
(2)	Tighten the screws that secure the ROR azimuth mil ring.
o.	Make certain that the HIPIR antenna remains sighted on the M2 aiming circle or on the ROR antenna while the ROR personnel continue with the alinement procedures.
p.	Inform the BCC personnel when the alinement procedures have been completed.
12.	**Determining the Tactical Antenna Elevation Angle.**
a.	When the BCC personnel request the *tactical elevation angle:*
(1)	Look through the HIPIR alinement telescope (1, fig. 8-5) and manually scan the entire sector of interest azimuth.
(2)	Set the elevation brake (3, fig. 2-11) as required so the horizontal crosshair of the alinement telescope coincides with the lowest point of the horizon within sector.
(3)	Report this elevation (in mils) to the BCC personnel as the *tactical elevation angle.*
(4)	Release the elevation brake.

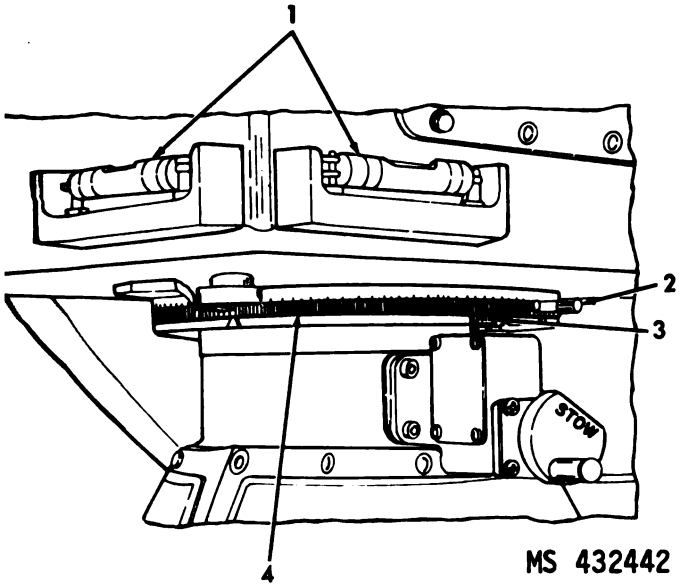
Table 8-1. HAWK Battery Orientation and Alinement Procedure (BCC AN/TSW-11)-Continued

Step	Operation Normal indication Corrective procedure
12*b*.	When directed to energize the antenna:
(1)	Clear the antenna area.
(2)	Set the PEDESTAL SAFETY SWITCH (1, fig. 2-11) to OPERATE.
(3)	Set the MOTOR GENERATOR circuit breaker (17, fig. 2-7) to ON.
c.	When directed to deenergize the antenna:
(1)	Set the MOTOR GENERATOR circuit breaker to OFF.
(2)	Set the PEDESTAL SAFETY SWITCH to SAFE.
d.	Remove and stow the M90F alinement telescope.



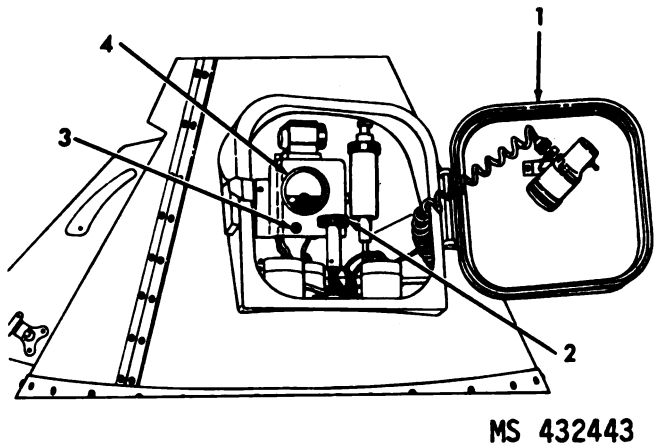
1—Alinement telescope
2—Finger grip lock knob
3—Dovetail mounting bracket

Figure 8-5. HIPIR alinement telescope—mounted.



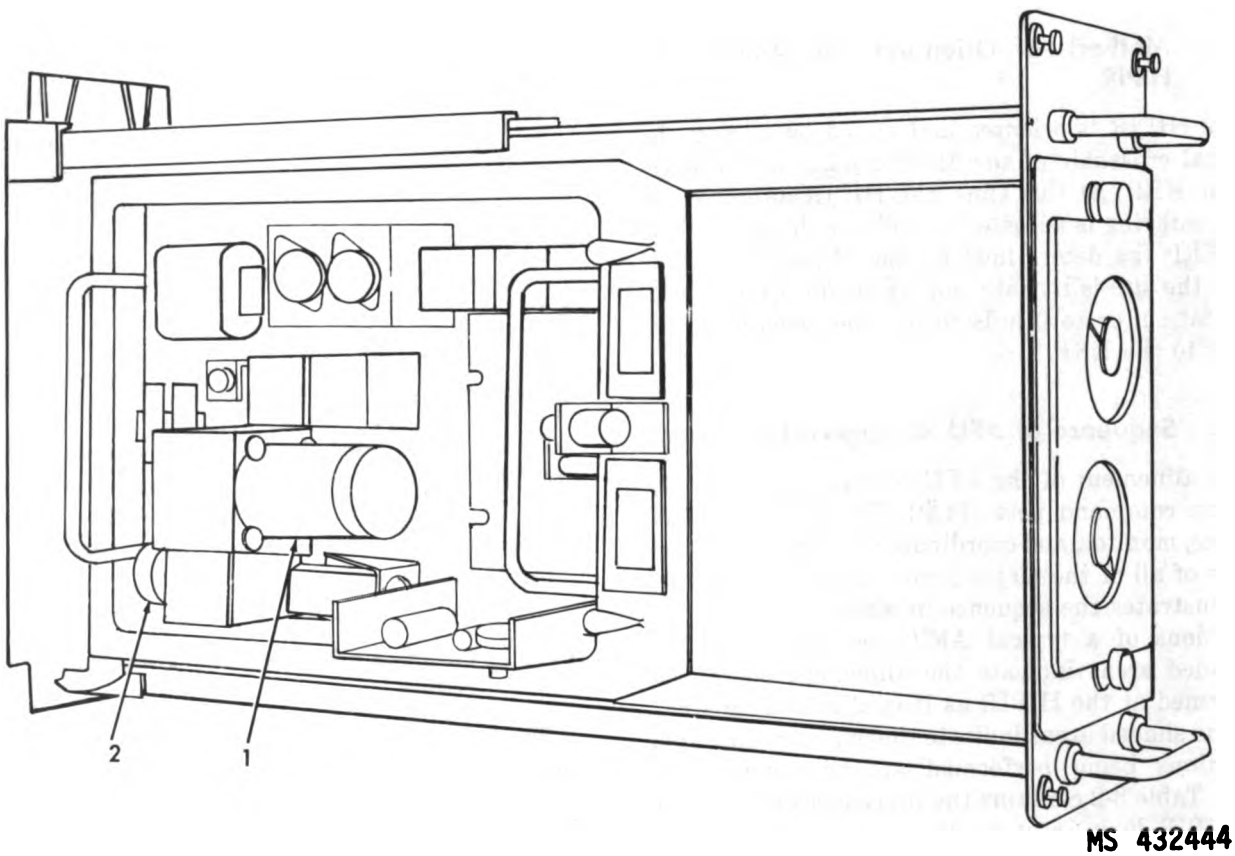
1—Spirit levels
2—Thumbscrew
3—Vernier scale
4—Mil ring

Figure 8-6. HIPIR spirit levels and mil ring.



1—Synchro access cover
2—Synchro adjust knob
3—Fine null switch S1
4—Nulling meter M1

Figure 8-7. HIPIR alinement controls—pedestal.



1—Minimum elevation stowed synchro
2—Minimum elevation control

Figure 8-8. HIPIR minimum elevation stowed synchro.

Section II. AFU (PCP AN/MSW-13, -14)

8-10. Purpose

a. Accurate target firing data and successful target engagement depend on the orientation and alinement of the major items in the assault firing unit (AFU). Alinement of the HIPIR in the AFU is accomplished by orienting it to the known reference point (KRP). If the proper procedures are not carefully followed, misleading target information will be processed by the AFU, and effective target engagement will be degraded.

b. Normally, the AFU is oriented so that accurate presentations of north, east, south and west coordinates are shown on its CRT's. However, the orientation to true north is only necessary for the tactical officer (T.O.) or his assistant to accurately correlate data from an overlay map of the defended area, or to utilize tactical information from an Army air defense command post (AADCP). When it is not necessary to correlate data from an overlay map or to utilize information from an AADCP, any available landmark may be used as a reference point for orienting the AFU.

8-11. Metheds of Orienting and Alining the HIPIR

The HIPIR is oriented and alined by alining the vertical crosshair of the M90F alinement telescope on the KRP. At this time, the HIPIR antenna azimuth mil ring is adjusted to indicate the azimuth of the KRP (as determined by the M2 aiming circle when the site is initially surveyed) for a true north orientation, or to 0 mils to provide orientation directly to the KRP.

8-12. Sequence of AFU Alinement Oporations

The alinement of the AFU is controlled from the platoon command post (PCP). The PCP personnel initiate, monitor, and coordinate the alinement operations of all of the major items in the AFU. Figure 8-9 illustrates the sequence in which the alinement operations of a typical AFU are performed. The unshaded areas indicate the alinement operations performed at the HIPIR as it is alined in an AFU, and the shaded areas indicate the ongoing alinement operations being performed at the other major items. Table 8-2 contains the procedures required of the HIPIR during system alinement, including alternate procedures when line of sight to the other major items does not exist. Due to configuration variations, some steps do not apply in all situations.

8-13. M2 Aiming Circle

The M2 aiming circle (fig. 8-2) is a small lightweight instrument that is used in the AFU for calculating the KRP azimuth bearing and other reference azimuth angles when any of the alternate non-line-of-sight alinement procedures contained in table 8-2 are used. Refer to paragraph 8-4 for a complete description of the M2 aiming circle.

8-14. Orientation and Alinement During Blackout Conditions

During blackout conditions, any of the alinement methods contained in table 8-2 may be employed with the assistance of an M42 (fig. 8-3) or M53-E1 (fig. 8-4) instrument light as described in paragraph 8-5.

8-15. Preliminary Procedures

Before orientation and alinement of the HIPIR can be attempted, steps *a* through *c* below must be accomplished.

a. Emplace the HIPIR as described in chapter 7.

b. Energize the power generators in accordance with the instructions posted on the inside of each generator panel, and set the output of the generators for 425 vac.

c. Establish interunit communications with the PCP.

8-16. Synchro Control System

Detailed functional schematics of the synchro control system for the AFU are contained in TM 9—1425—1525—12—5. Synchro alinement procedures for each major item are also contained therein.

8-17. HIPIR-LCHR Azimuth Alinement Verification

The azimuth alinement verification procedure is performed, under the direction of LCHR personnel, after the HIPIR and LCHR have been alined to insure that the LCHR arms are parallel to the HIPIR line of sight. This parallel condition is necessary for the missile to lock on target. Refer to paragraph 8-8 for a brief description of this procedure.

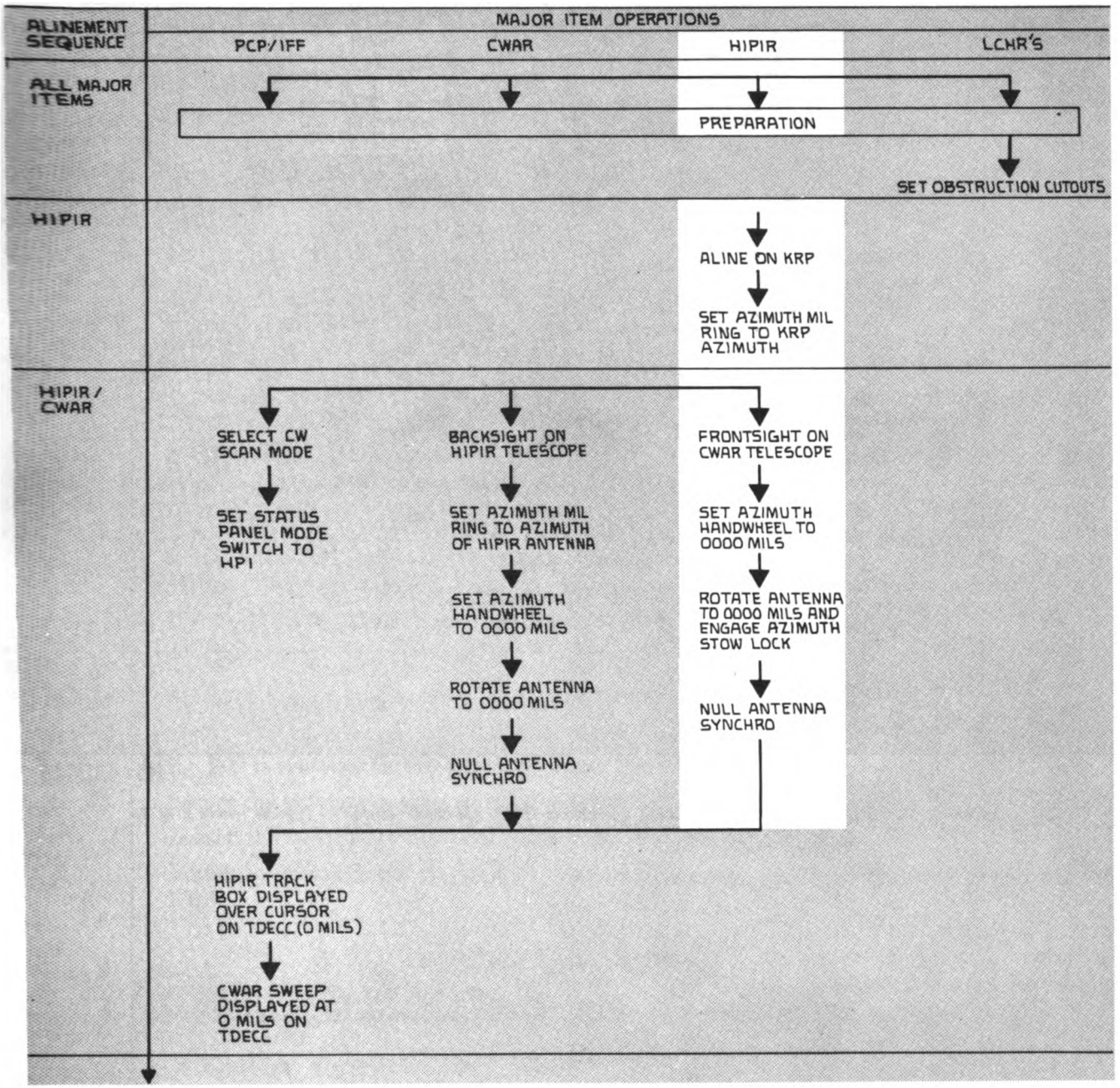


Figure 8-9. Sequence of AFU alinement operations (PCP AN/MSW-13, -14) — typical (sheet 1 of 2).

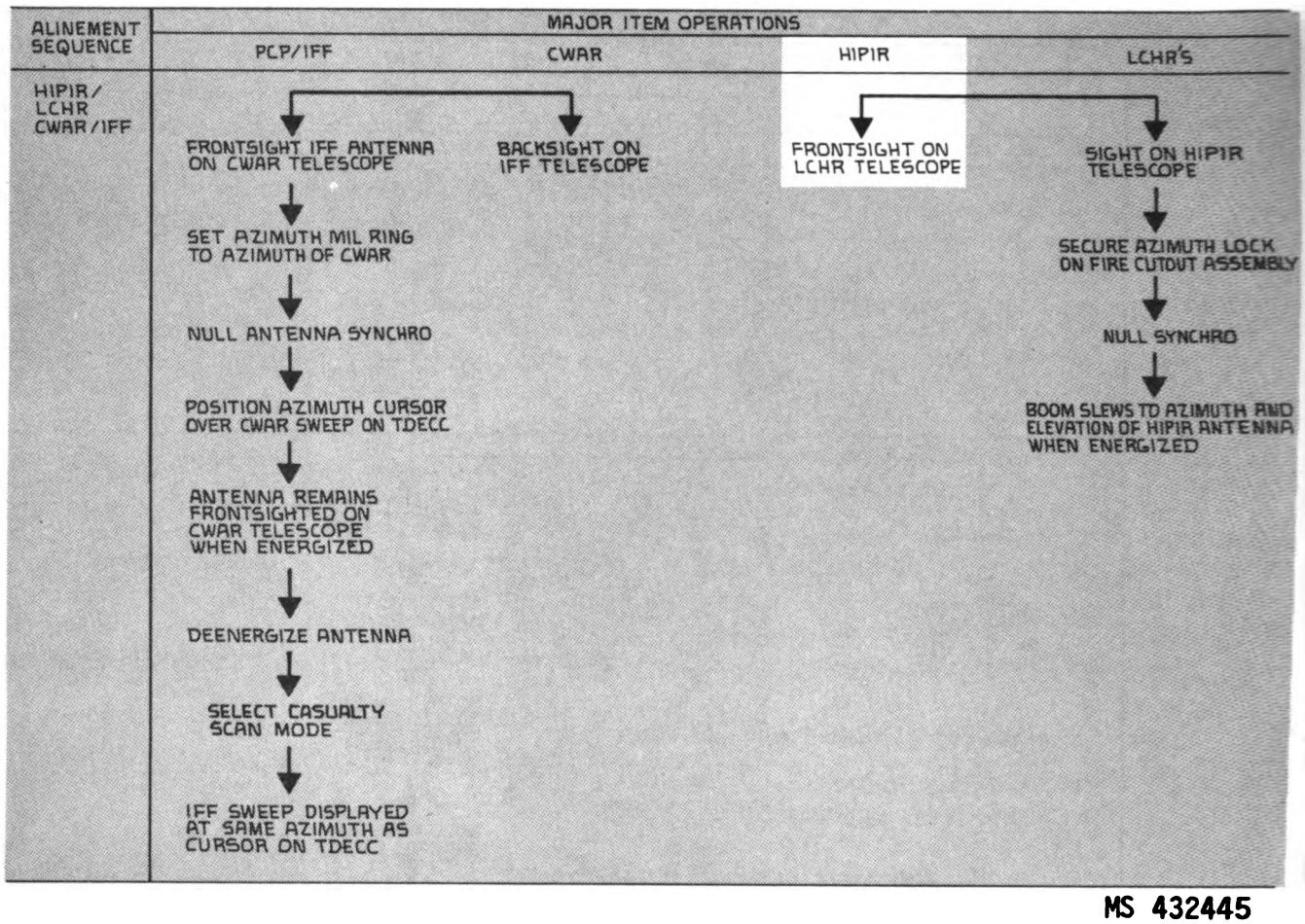


Figure 8-9. Sequence of AFU alinement operations (PCP AN/MSW-13,-14) — typical (sheet 2 of 2).

8-18. AFU Orientation and Alinement Procedures

Perform the procedures in table 8-2 to aline the HIPIR to the KRP and to aline the CWAR or IFF antenna with the HIPIR as directed by the PCP personnel. Table 8-2 contains procedures to be performed at the HIPIR and references to procedures to be performed at the other major items. These procedures are contained in the appropriate major item 12-1 manual.

NOTE

For detailed information concerning the setting and the reading of the HIPIR azimuth mil ring, refer to section III.

Table 8-2. AFU Orientation and Alinement Procedure (PCP AN/MSW-13, -14)

Step	Operation Normal indication Corrective procedure
	NOTE The following procedures are coordinated from the PCP. Perform only those steps you are directed to perform.
1.	**Preparation.**
a.	Observe that the BCC R BUS lamp (20, fig. 2-7) on the main fuse panel is lit. Do not perform the alinement if the lamp is off.
b.	Insure that the LOCAL-REMOTE switch (20, fig. 2-9) is set to LOCAL.
c.	Insure that the HIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM circuit breaker (18, fig. 2-2) and the POWER AMPLIFIER BEAM circuit breaker (11, fig. 2-2) set to OFF.
d.	Insure that the PEDESTAL SAFETY SWITCH (1, fig. 2-11) is set to SAFE.
e.	Set the MOTOR GENERATOR circuit breaker (17, fig. 2-7) to OFF.
f.	Remove the M90F alinement telescope from the storage box (2, fig. 1-7) and install it on the HIPIR antenna (fig. 8-5).
a g.	Insure that the HIPIR is level (refer to par. 7-5*b* (13)).
2.	**Orient and Aline the HIPIR Antenna.**
a.	Manually rotate the antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the known reference point (KRP).
b.	Secure the antenna in place with the azimuth STOW lock (8, fig. 2-11).
c.	Loosen the two screws that secure the azimuth mil ring (4, fig. 8-6).
d.	Rotate the azimuth mil ring until the vernier (3, fig. 8-6) indicates the azimuth bearing of the KRP.
	NOTE For detailed information concerning the setting and the reading of the HIPIR azimuth mil ring, refer to section III.
e.	Tighten the two screws that secure the azimuth mil ring.
f.	Disengage the azimuth STOW lock.
g.	Report completion of HIPIR antenna orientation to the PCP personnel and proceed as directed.
3.	**Aline the CWAR Antenna.**
a.	If line of sight exists between the HIPIR and the CWAR, proceed directly to step *l* below; if not, perform steps *b* through *k* below. Also, refer to the note below.
	NOTE When the alternate method is being used to aline the CWAR with the HIPIR, the reference point used must be located at a distance of at least 305 m (1000 ft) from the HIPIR and the CWAR. The M2 aiming circle must be visible to both the HIPIR and the CWAR.

Table 8-2. AFU Orientation and Alinement Procedure (PCP AN/MSW-13, -14)—Continued

Step	Operation Normal indication Corrective procedure
3*b*.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2).
c.	Adjust the azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
d.	Manually frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
e.	Secure the HIPIR antenna from moving in azimuth with the azimuth STOW lock (8, fig. 2-11).
f.	Observe and record the HIPIR azimuth mil ring indication (4, fig. 8-6).
g.	Unlock (fast motion) the azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as recorded in step *f* above. Lock (slow motion) the azimuth recording knob.
h.	Rotate the azimuth recording knob until the azimuth mil ring upper scale and azimuth micrometer indicate the azimuth as recorded in step *f* above.
i.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting knob and then adjust the knob for a fine frontsight.
j.	Direct the CWAR personnel to frontsight the CWAR alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the CWAR antenna, using both the fast and slow motion of the azimuth recording knob.
k.	Observe and record the M2 aiming circle azimuth indication and proceed to step *n*.
l.	Direct the CWAR personnel to backsight the CWAR antenna, and then simultaneously frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is vertically centered on the CWAR alinement telescope. Secure the HIPIR antenna in place with the azimuth STOW lock (8, fig. 2-11).
m.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
n.	Direct the CWAR personnel to adjust the CWAR azimuth mil ring to indicate this azimuth while insuring that the CWAR antenna does not move.
o.	Inform the PCP personnel that the CWAR antenna orientation is complete.
p.	Disengage the azimuth STOW lock.
q.	Proceed to step 5.
4.	**Aline the IFF Antenna.**
a.	If line of sight exists between the HIPIR and the IFF, proceed directly to step *l* below; if not, perform steps *b* through *k* below. Also refer to the note below. **NOTE** When the alternate method is being used to aline the IFF with the HIPIR, the reference point used must be located at a distance of at least 305 m (1000 ft) from the HIPIR and the IFF. The M2 aiming circle must be visible to both the HIPIR and the IFF.
b.	Emplace the M2 aiming circle (fig. 8-2) and level using the circular and tubular levels (7 and 8, fig. 8-2).

Table 8-2. AFU Orientation and Alinement Procedure (PCP AN/MSW-13, -14)—Continued

Step	Operation Normal indication Corrective procedure
4c.	Adjust the azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
d.	Manually frontsight the HIPIR antenna until the vertical crosshair of the alinement telescope is centered on the M2 aiming circle telescope.
e.	Secure the HIPIR antenna from moving in azimuth with the azimuth STOW lock (8, fig. 2-11).
f.	Observe and record the HIPIR azimuth mil ring indication (4, fig. 8-6).
g.	Unlock (fast motion) the azimuth recording knob (19, fig. 8-2) and rotate the M2 aiming circle until the azimuth mil ring upper scale (11, fig. 8-2) indicates the approximate azimuth as recorded in step *f* above. Lock (slow motion) the azimuth recording knob.
h.	Rotate the azimuth knob until the azimuth mil ring upper scale and azimuth micrometer indicate the azimuth as recorded in step *f* above.
i.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting knob and then adjust the knob for a fine frontsight.
j.	Direct the PCP personnel to frontsight the IFF alinement telescope on the M2 aiming circle, and simultaneously sight the M2 aiming circle on the IFF antenna, using both the fast and slow motion of the azimuth recording knob.
k.	Observe and record the M2 aiming circle azimuth indication and proceed to step *n*.
l.	Direct the PCP personnel to backsight the IFF antenna, and then simultaneously frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is vertically centered on the IFF alinement telescope. Secure the HIPIR antenna in place with the azimuth STOW lock (8, fig. 2-11).
m.	Observe and record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
n.	Direct the PCP personnel to adjust the IFF azimuth mil ring to indicate this azimuth while insuring that the IFF antenna does not move.
o.	Inform the PCP personnel that IFF antenna orientation is complete.
p.	Disengage the azimuth STOW lock, and proceed to step 5.
5.	**Null the HIPIR Antenna Synchro.**
a.	Manually rotate the HIPIR antenna until the azimuth mil ring indicates 0 mils, and engage the azimuth STOW lock (8, fig. 2-11).
b.	Set the azimuth handwheel (16, fig. 2-9) on the control-indicator panel to 0 mils.
c.	At the HIPIR pedestal, push the synchro adjust knob (2, fig. 8-7) down and slowly rotate it clockwise or counterclockwise until a null is obtained on nulling meter M1 (4, fig. 8-7).
d.	Press the fine null switch S1 (3, fig. 8-7) and simultaneously rotate the synchro adjust knob clockwise or counterclockwise until a fine null is obtained. Release the fine null switch.
e.	Release the synchro adjust knob, and assure that the null indication remains on nulling meter M1.
f.	Inform the PCP personnel that antenna synchro nulling has been completed.
g.	If a false null is reported from the PCP, repeat steps *c* through *f*. If not, proceed.
h.	Disengage the azimuth STOW lock, and proceed to step 6.

Table 8-2. AFU Orientation and Alinement Procedure (PCP AN/MSW-13, -14)—Continued

Step	Operation / Normal indication / Corrective procedure
6.	**Alinement with the LCHR.**
a.	Position the HIPIR antenna to 0 mils elevation and engage the elevation **STOW** lock handwheel (10, fig. 2-11).
	WARNING Do not set the minimum elevation control to less than 190 mils in step *b* below.
b.	Set the minimum elevation control (2, fig. 8-8) of the minimum elevation stowed synchro (1, fig. 8-8) to 40 mils above the highest fire interrupter setting of any LCHR of that firing section.
c.	If a line-of-sight exists between the HIPIR and LCHR, proceed directly to step *q* below. If a line-of-sight does not exist, proceed to step *d* for alternate alinement procedures using the M2 aiming circle (fig. 8-2). Also refer to the note below.
	NOTE When performing the alternate alinement procedures, the reference point should be located at least 305m (1000 ft) from the HIPIR and LCHR. The M2 aiming circle must be located at this point and must be visible to both the HIPIR and the LCHR.
d.	*If line-of-sight does not exist,* emplace the M2 aiming circle and level it using the circular and tubular levels (7 and 8, fig. 8-2).
e.	When the M2 aiming circle is emplaced, frontsight the HIPIR antenna until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the M2 aiming circle telescope.
f.	Direct the LCHR personnel to sight the LCHR alinement telescope until the vertical crosshair of the telescope is centered on the M2 aiming circle telescope.
g.	Prevent the HIPIR antenna from moving in azimuth.
h.	Record the HIPIR azimuth mil ring indication (4, fig. 8-6).
i.	Adjust the M2 aiming circle azimuth recording knob (19, fig. 8-2) until the azimuth micrometer (18, fig. 8-2) indicates 0 mils.
j.	Unlock (fast motion) the azimuth recording knob and rotate the M2 aiming circle until the azimuth mil ring upper scale indicates approximately 3200 mils. Lock (slow motion) the azimuth recording knob.
k.	Rotate the azimuth recording knob until the azimuth mil ring upper scale indicates 3200 mils.
l.	Unlock (fast motion) the azimuth non-recording orienting knob (10, fig. 8-2) and frontsight the M2 aiming circle on the HIPIR telescope. Lock (slow motion) the azimuth non-recording orienting knob and then adjust the knob for a fine frontsight.
m.	Sight the M2 aiming circle on the LCHR alinement telescope using both the fast and slow motion of the azimuth recording knob. Direct the LCHR personnel to simultaneously sight the LCHR alinement telescope on the M2 aiming circle telescope and then record the azimuth angle determined at the M2 aiming circle, and the angle indicated at the LCHR alinement telescope.

Table 8-2. AFU Orientation and Alinement Procedure (PCP AN/MSW-13, -14)—Continued

Step	Operation / Normal indication / Corrective procedure
6*n.*	Calculate and adjust for proper azimuth angle by subtracting the M2 aiming circle azimuth from the LCHR alinement telescope azimuth. However, if the LCHR alinement telescope azimuth is less than the M2 aiming circle azimuth, add 6400 mils and then subtract the M2 aiming circle azimuth.
o.	Direct the LCHR personnel to rotate the LCHR alinement telescope to the azimuth value calculated above, and then lock it in position.
p.	Proceed to step *r.*
q.	*If line-of-sight exists,* proceed as follows:
(1)	Frontsight the HIPIR until the vertical crosshair of the HIPIR alinement telescope (1, fig. 8-5) is centered on the LCHR alinement telescope.
(2)	Direct the LCHR personnel to sight the LCHR alinement telescope on the HIPIR until the vertical crosshair is centered on the HIPIR alinement telescope.
(3)	Lock the LCHR alinement telescope in position by tightening the azimuth lock.
(4)	Record the HIPIR azimuth mil ring (4, fig. 8-6) indication.
r.	Direct the LCHR personnel to perform the following alinement procedures and await instruction from them concerning related procedures to be performed at the HIPIR.
(1)	LCHR adjustments.
(2)	LCHR servo check.
(3)	Alinement verification.
(4)	Launcher orientation.
s.	Repeat steps *c* through *r* for the remaining LCHR's.
t.	Inform the PCP personnel that the LCHR alinement procedures have been completed.
u.	Set the LOCAL-REMOTE switch (20, fig. 2-9) to LOCAL, and proceed to step 7.
7.	**Determining the Tactical Antenna Elevation Angle.**
a.	When the PCP personnel request the *tactical elevation angle:*
(1)	Look through the HIPIR alinement telescope (1, fig. 8-5) and manually scan the entire sector of interest azimuth.
(2)	Set the elevation brake (3, fig. 2-11) as required so the horizontal crosshair of the alinement telescope coincides with the lowest point of the horizon within sector.
(3)	Report this elevation (in mils) to the PCP personnel as the *tactical elevation angle.*
(4)	Release the elevation brake.
b.	When directed to energize the antenna:
(1)	Clear the antenna area.
(2)	Set the PEDESTAL SAFETY SWITCH (1, fig. 2-11) to OPERATE.
(3)	Set the MOTOR GENERATOR circuit breaker (17, fig. 2-7) to ON.
c.	When directed to deenergize the antenna:
(1)	Set the MOTOR GENERATOR circuit breaker to OFF.
(2)	Set the PEDESTAL SAFETY SWITCH to SAFE.
d.	Remove and stow the M90F alinement telescope.

Section III. AZIMUTH MIL RING

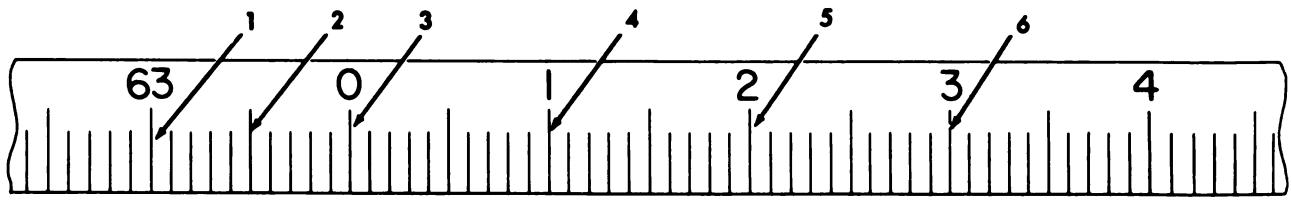
8-19. Introduction

This section explains how to read and adjust the azimuth mil ring and the vernier scale. Part A of figure 8-10 illustrates the azimuth mil ring, while part B illustrates the vernier scale. These two items provide antenna position data. The azimuth mil ring is read to provide data accurate to within 10 mils, while the vernier scale is used to provide data accurate to within one mil. The azimuth mil ring data, together with the vernier scale data, provides the antenna azimuth mil ring reading.

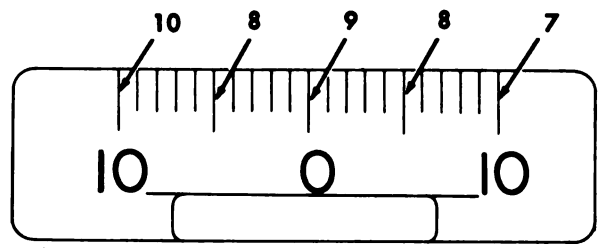
8-20. Description of the Azimuth Mil Ring and Vernier Scale

a. Azimuth Mil Ring. When the antenna is oriented and alined, the azimuth mil ring lined up with the zero (0) mark on the vernier scale can be read to obtain the HIPIR antenna azimuth position in mils. The azimuth mil ring contains 640 equally-spaced marks which divide the ring into 10-mil sections equalling 6400 mils. These marks are in two lengths, long and short. Every other long mark has a number, beginning with zero (0) (3, fig. 8-10). The zero mark has a value of zero mils or 6400 mils. These numbers continue with 1 (4, fig. 8-10), which has a value of 100 mils, and 2 (5, fig. 8-10), which has a value of 200 mils. This is followed by 3 (6, fig. 8-10), which has a value of 300 mils, and so on, through 63 (1, fig. 8-10), which has a value of 6300 mils, and finally to zero with a value of 6400 mils. Long unnumbered marks (2, fig. 8-10) located between two numbered marks divide the area inside the numbered marks into two 50-mil sections. Each 50-mil section contains four equally-spaced unnumbered short marks which form five 10-mil sections. The mil ring is secured by two thumbscrews which are loosened for adjustment of the azimuth mil ring.

b. Vernier Scale. The vernier scale is so mounted that it can be used to aid in reading the azimuth mil ring. The value of the mil ring is always read at a point exactly opposite the zero (0) mark (9, fig. 8-10) on the vernier scale. There are 21 long and short marks that divide the vernier scale into 20 equal



PART A - AZIMUTH MIL RING



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PART B - VERNIER SCALE

1—63 (6300 mils—long mark)
2—6350 mils (long mark)
3—0 (zero mils—long mark)
4—1 (100 mils—long mark)
5—2 (200 mils—long mark)
6—3 (300 mils—long mark)
7—10 (long mark)
8—5 (long mark)
9—0 (long mark)
10—10 (long mark)

Figure 8-10. Azimuth mil ring and vernier scale.

sections. The first, middle, and last marks are numbered 10, zero (0), and 10, respectively, (7, 9, and 10, fig. 8-10). The long marks between 10 and zero (0), and zero (0) and 10 (8, fig. 8-10) are not numbered, but have a value of five. None of the short marks are numbered, but each has a value of one. Each of the twenty sections of the scale has a value of one. The vernier scale is divided into two groups. These are zero (0) to 10 going in a cw direction, and zero (0) to 10 going in a ccw direction. The cw group is used to read or adjust the azimuth mil ring setting between 6400 mils and 3200 mils. The position of the vernier scale is fixed and cannot be adjusted.

8-21. How to Read the Azimuth Mil Ring Using the Vernier Scale (Fig. 8-11)

The azimuth mil ring reading when used with the vernier scale indicates the antenna azimuth position in mils. The azimuth mil ring reading is always taken opposite the zero (0) mark on the vernier scale. Part A of figure 8-11 shows the vernier scale zero mark lined up with the 100-mil mark on the azimuth mil ring. In this example, the mil ring simply reads 100 mils. Part B of figure 8-11 shows the vernier scale zero (0) mark lined up with the 6300-mil mark on the azimuth mil ring. But a simple mil ring reading is not always possible. Often, the azimuth mil ring must be read, using the vernier as shown in part C of figure 8-11. In this situation, notice that the vernier scale zero mark is not lined up with an azimuth mil ring mark. Instead, the zero mark is somewhere between 100 mils and 110 mils and in a cw direction. This means that the reading is at least 100 mils, but less than 110 mils. The vernier scale now must be used to indicate the number of mils between 100 and 110. This number is more than zero, but less than 10. When located, this number is added to 100 to complete the azimuth mil ring reading. This is how the vernier scale is read. Observe each mark (C, fig. 8-11) from 0 to 10 on the vernier scale in the

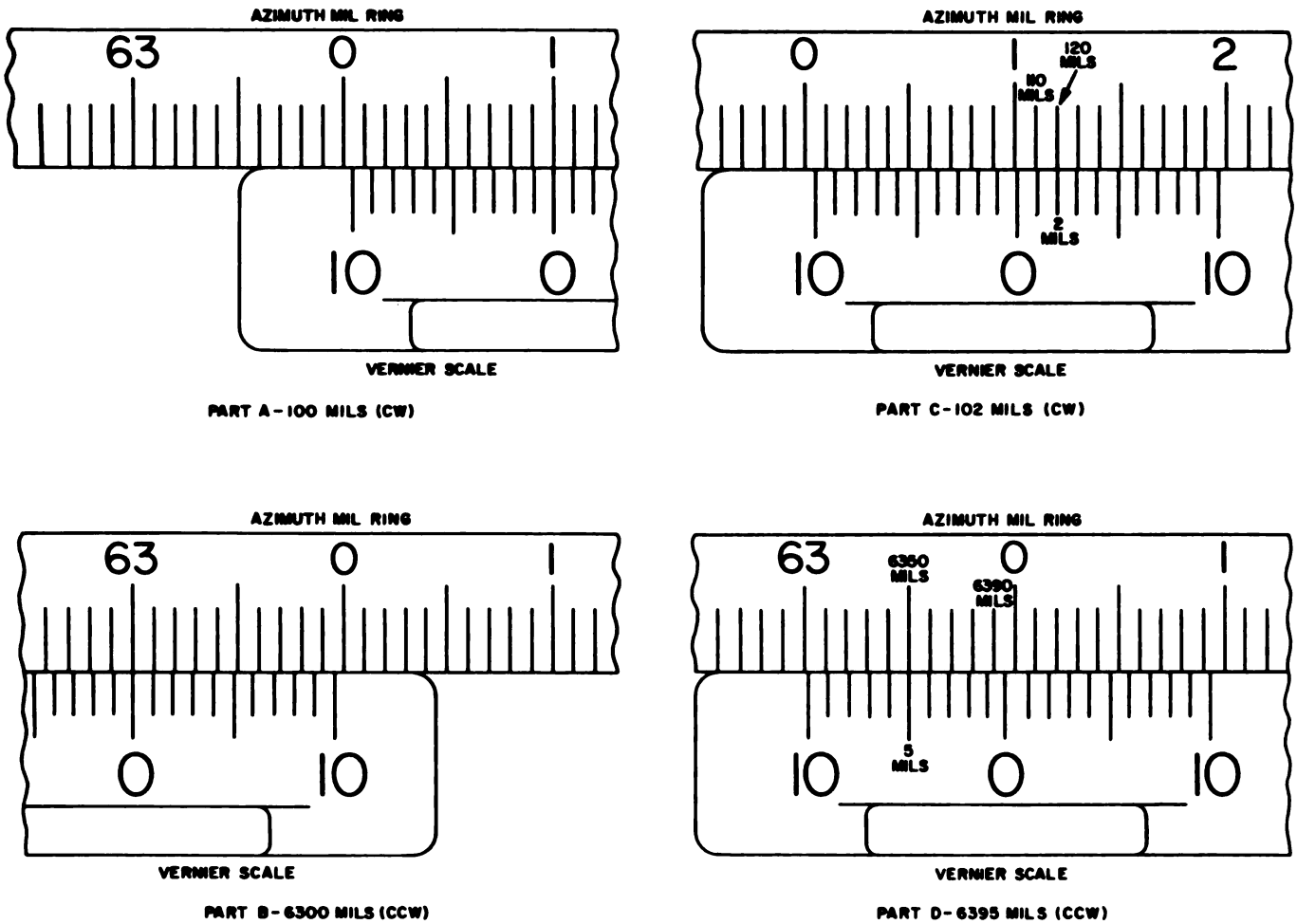


Figure 8-11. How to read the azimuth mil ring and vernier scale.

cw-positive direction. By design, only one of these marks lines up with a mark on the azimuth mil ring. In this example, the second mark past zero (0) lines up perfectly with a mark (120 mils) on the mil ring. The value of this mark on the vernier scale is 2. This number, when added to 100, gives a total of 102 mils. The azimuth mil ring reading then is 100 mils read on the azimuth mil ring, plus two mils read on the vernier scale. This means a total reading of 102 mils. Part D of figure 8-11 shows an azimuth mil ring reading of 6395 mils. Here the vernier scale zero (0) mark lies between 6390 and 6400 mils. In this example, the five-mil mark (ccw direction) on the vernier scale lines up with the 6350-mil mark on the azimuth mil ring. The azimuth mil ring is also read in a ccw direction. That is, reading starts at 6400 mils. The azimuth mil ring reading then is 6390 mils read on the azimuth mil ring plus five mils read on the vernier scale. This means a total reading of 6395 mils.

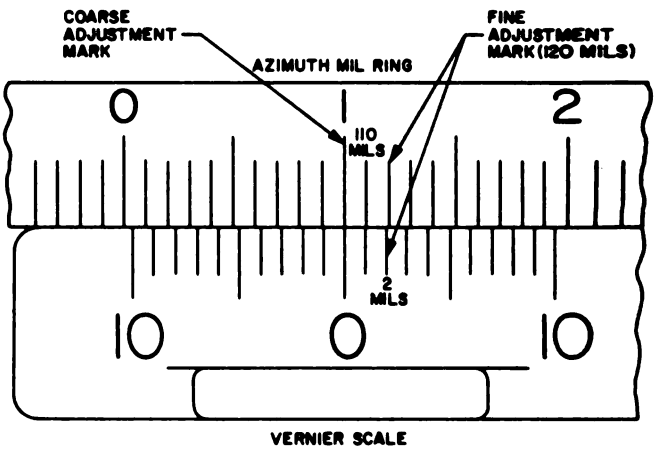
8-22. How to Set the Azimuth Mil Ring

a. Introduction. There are two methods used to adjust the azimuth mil ring setting. The method selected depends on the value of the azimuth mil ring setting. One method is used for those azimuth mil ring settings which can be read directly on an azimuth mil ring mark. This azimuth mil ring setting is divisible by 10 and requires a single adjustment. A second method is used for those azimuth mil ring settings that lie between two marks on the azimuth mil ring. This azimuth mil ring setting is not divisible by 10 and therefore requires two adjustments.

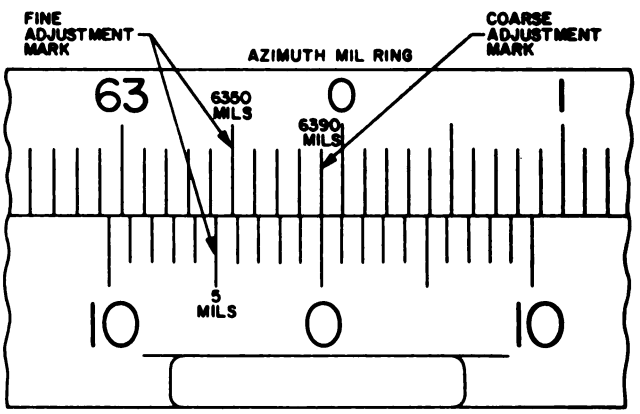
b. Azimuth Mil Ring Setting For Values Divisible By 10. A single fine adjustment is made when the value of the azimuth mil ring is divisible by 10. Assume the value of the required setting is 100 mils (A, fig. 8-11). This value is divisible by 10. One setting of the azimuth mil ring is all that is required. First, loosen the azimuth mil ring thumbscrews. Next, rotate the azimuth mil ring cw until the zero (0) mark on the vernier scale is exactly opposite the 100-mil mark. Tighten the thumbscrews. Now the azimuth mil ring is set to 100 mils. Assume the azimuth mil ring setting is 6300 mils (B, fig. 8-11). The value is divisible by 10. Loosen the azimuth mil ring thumbscrews. Next, rotate the azimuth mil ring ccw until the vernier scale zero (0) mark is exactly opposite the azimuth mil ring 6300-mil mark. Tighten the thumbscrews.

c. Azimuth Mil Ring Setting For Values Not Divisible by 10. Two adjustments to the azimuth mil ring are made when the azimuth mil ring setting is not divisible by 10. The first is a coarse adjustment. This is followed by a fine adjustment. Both adjustments are made to the azimuth mil ring.

(1) *Azimuth mil ring 102-mil cw coarse adjustment.* The coarse adjustment adjusts the azimuth mil ring to within 10 mils of the azimuth mil ring setting. Assume the value of the desired azimuth mil ring setting is 102 mils (A, fig. 8-12). This value is not divisible by 10. Notice that 102 mils on the azimuth mil ring is located cw somewhere between the 100-mil and 110-mil marks. The lower value mark (100 mils) is called the coarse adjustment mark. Before any adjustments can be made, loosen the azimuth mil ring thumbscrews. Next, line up the



PART A. 102 MIL CW COARSE ADJUSTMENT



PART B. 6395 MILS CCW COARSE ADJUSTMENT

MS 433239

Figure 8-12. Azimuth mil ring coarse adjustment.

100-mil coarse adjustment mark exactly opposite the vernier scale zero (0) mark. This completes the coarse adjustment. This setting also provides data needed to make the fine adjustment to the azimuth mil ring.

(2) *Azimuth mil ring 102-mil cw fine adjustment.* The fine adjustment to the azimuth mil ring is made by lining up the *fine adjustment* mark on the azimuth mil ring exactly opposite the *fine adjustment* mark on the vernier scale. These fine adjustment marks must be located and identified.

(a) Vernier scale fine adjustment mark. The vernier scale fine adjustment mark is found by subtracting the value of the coarse adjustment mark from the value of the azimuth mil ring setting. Assume an azimuth mil ring setting of 102 mils results in: 102 − 100 = 2. The vernier scale fine adjustment mark equals 2 mils and is located cw at the vernier scale second short mark past zero (0) (A, fig. 8-12).

(b) Azimuth mil ring fine adjustment mark. The azimuth mil ring fine adjustment mark of 120 mils (A, fig. 8-12) is located directly above and slightly to the right of the vernier scale fine adjustment mark. Note and identify this mark which is 120 mils on the azimuth mil ring. The fine adjustment is now made by lining up the azimuth mil ring fine adjustment mark exactly opposite the vernier scale fine adjustment mark (A, fig. 8-13). When this adjustment has been completed, tighten the azimuth mil ring thumbscrews. This completes the azimuth mil ring setting of 102 mils.

(3) *Azimuth mil ring 6395-mil ccw coarse adjustment.* The coarse adjustment adjusts the azimuth mil ring to within 10 mils of the azimuth mil ring setting. Assume the value of the desired azimuth mil ring setting is 6395 mils. This value is not divisible by 10. Notice that 6395 mils on the azimuth mil ring is located ccw somewhere between the 6390 and 6400-mil marks (B, Fig. 8-12). The lower value mark (6390 mils) is called the coarse adjustment mark. Before any adjustments can be made, loosen the azimuth mil ring thumbscrews. Next line up the 6390-mil coarse adjustment mark exactly opposite the vernier scale zero (0) mark. This completes the coarse adjustment. This setting also provides data needed to make the fine adjustment to the azimuth mil ring.

(4) *Azimuth mil ring 6395-mil ccw fine adjustment.* The fine adjustment to the azimuth mil ring is made by lining up the *fine adjustment* mark on the azimuth mil ring exactly opposite the *fine adjustment* mark on the vernier scale. These fine adjustments must be located and identified.

(a) Vernier scale fine adjustment mark. The vernier scale fine adjustment mark is found by subtracting the value of the coarse adjustment mark from the value of the desired azimuth mil ring setting. Assume an azimuth mil ring setting of 6395 mils results in: 6395 − 6390 = 5. The vernier scale fine adjustment mark equals 5 mils and is located ccw at the vernier scale 5-mil mark (B, fig. 8-12).

(b) Azimuth mil ring 6395-mil ccw fine adjustment mark. The azimuth mil ring fine adjustment mark of 6350 mils (B, fig. 8-12) is located directly above and slightly to the right of the vernier scale fine adjustment mark. Note and identify this mark on the azimuth mil ring. The fine adjustment is now made by lining up the azimuth mil ring fine adjustment mark exactly opposite the vernier scale fine adjustment mark (B, fig. 8-13). When this adjustment has been completed, tighten the azimuth mil ring thumbscrews. This completes the azimuth mil ring setting of 6395 mils.

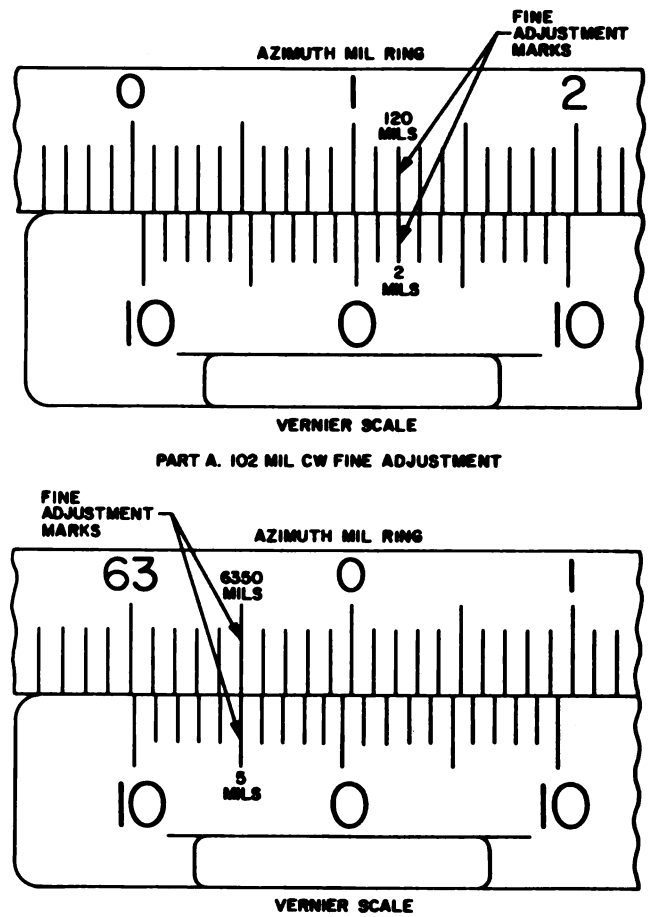


Figure 8-13. Azimuth mil ring fine adjustment.

CHAPTER 9

LIGHTNING PROTECTION

9-1. Scope

a. This chapter contains instructions for protecting the IHIPIR from direct and indirect lightning strikes. Standard battery and platoon emplacement procedures require equipment grounding. However, lightning protection is also required in areas where the battery site is higher than the surrounding terrain and in areas where severe electrical storms are experienced.

b. Individual site requirements may dictate changes in the procedures described in this chapter. Changes are permissible as long as equivalent protection is provided for the system.

9-2. Lightning Rod Design and Construction

a. General. The procedures contained in this paragraph are used to design, construct, and emplace a lightning rod for the IHIPIR. Once emplaced, each lightning rod is connected to the IHIPIR lightning protection ground system. The presence of a well-grounded lightning rod protects the IHIPIR from direct lightning strikes and lightning-induced current surges.

b. Cone of Protection. The "cone of protection" concept is used in the following procedures to protect the IHIPIR. A cone of protection starts at the highest point of a vertical shielding conductor, and extends conically downward. The shielding conductor provides lightning protection for all items or structures completely enclosed by the cone. The radius of the circular base of the cone defines the ground area protected by the vertical shielding conductor. This radius is equal to twice the height of the vertical shielding conductor (fig. 9-1).

c. Design and Construction. Fabricate a lightning protection assembly for the IHIPIR in accordance with figure 9-2. Refer to table 9-1 for a list of materials required.

9-3. Lightning Rod Emplacement Procedures

The following are the detailed procedures for emplacing the vertical shielding conductor and mast assemblies fabricated according to paragraph 9-2*c*.

CAUTION

Do not connect the equipment ground system to the lightning protection ground system. To do so will result in serious damage to electronic equipment in the event of a lightning strike.

a. Emplace the shielding conductor mast with vertical shielding conductor 1.83 m (6 ft) from the equipment being protected.

b. If the shielding conductor mast must be emplaced more than 1.83 m (6 ft) from the equipment, increase the height of the mast by one-half the added distance. This keeps the equipment within the cone of protection.

NOTE

If the equipment is located on a mound or tower, increase the height of the shielding conductor mast by an amount equal to the height of the mound or tower.

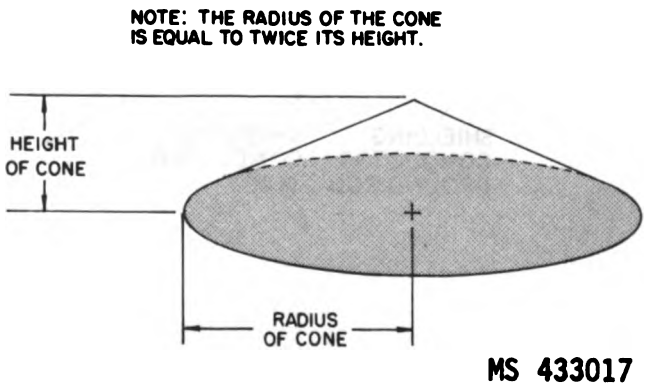


Figure 9-1. Cone of protection concept.

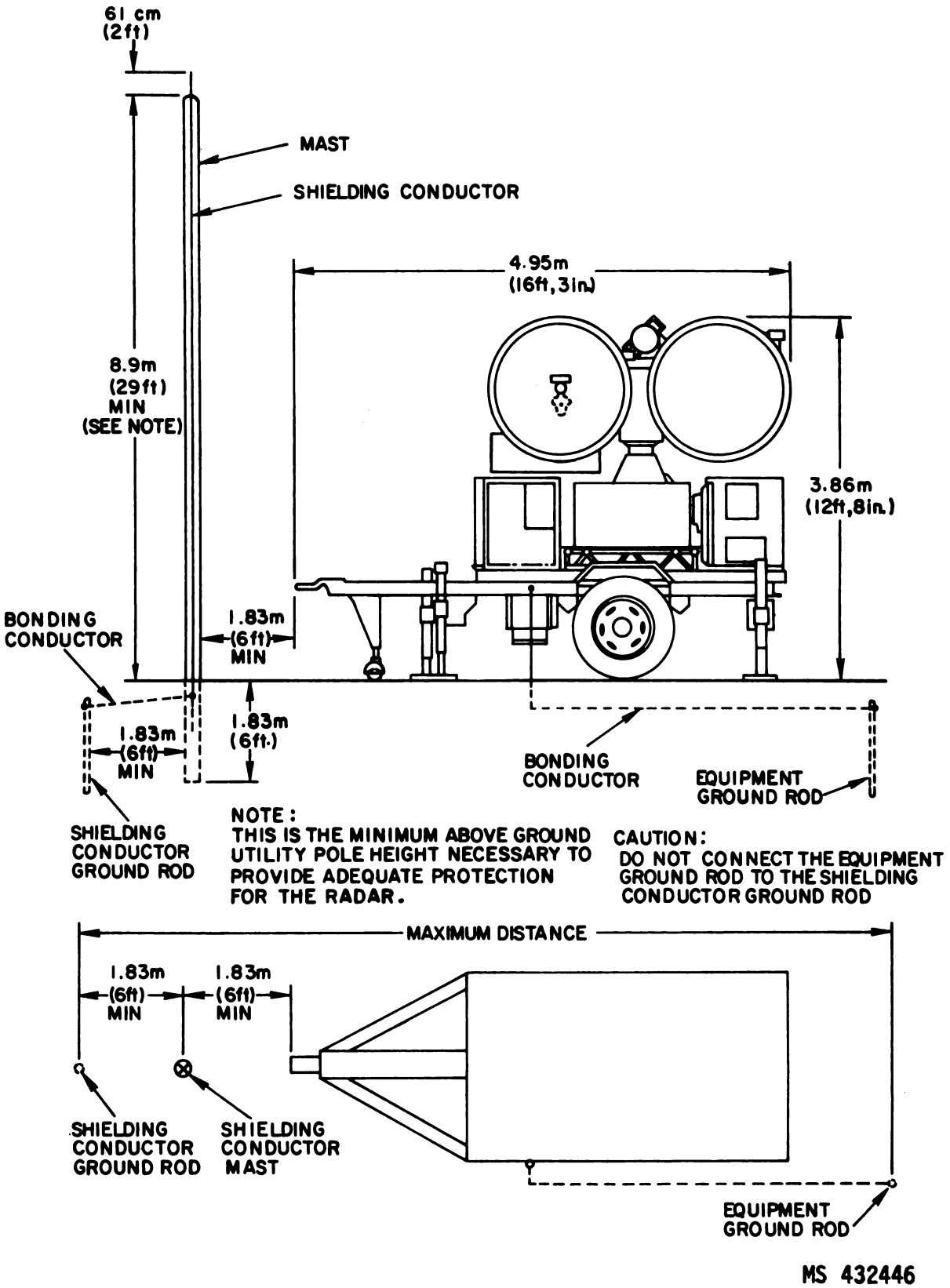


Figure 9-2. IHIPIR lightning protection layout — typical.

c. Extend the shielding conductor 61 cm (2 ft) above the top of the mast. This provides an air terminal to intercept the electrical discharge at a safe distance above vulnerable and flammable parts or structures.

d. Use a 1.83 m (6 ft) length of hollowed wood molding to protect the shielding conductor from mechanical damage at ground level.

e. Emplace a 1.83 m (6 ft) shielding conductor ground rod at least 1.83 m (6 ft) beyond the mast and at least 3.6 m (12 ft) from the equipment being protected. The distance between the shielding conductor ground rod and the equipment ground rod should be as large as possible.

NOTE

If bedrock prevents driving the shielding conductor ground rod 1.83 m (6 ft) deep, dig a radial trench 3.66 m long by 0.914 m deep (12 ft by 3 ft) from the base of the mast and away from the equipment being protected. Connect No. 2 copper wire to the vertical shielding conductor, and bury the wire in the trench.

f. Drive the shielding conductor ground rod at least flush with the ground. If possible, drive the ground rod 30 cm (1 ft) below the soil surface.

g. Refer to TM 9—1425—525—1, appendix I, for detailed instructions for measuring the resistance of the major item lightning protection ground rod or buried wire. If the measured resistance is more than 10 ohms, use the procedures contained in TM 9—1425—525—1, appendix I, to reduce the resistance to 10 ohms or less.

h. Connect a bonding conductor of No. 2 AWG copper wire between the base of the shielding conductor and the ground rod using silver epoxy material. Bury the bonding conductor at least 61 cm (2 ft) underground. The soil above the buried wire should be compressed to increase soil contact.

Table 9-1. Materials Required

Description	Part No.	NATO/National Stock No.
Pole, utility, 10.7 m (35 ft) (1 each)		
Rod, ground, 1.83 m × 1.59 cm (6 ft × 5/8 in.) (1 each)	9175247	5975-00-296-0762
Wire, copper, No. 2, 27 m (88.6 ft)		
Staples, 2.54 cm × 0.953 cm (1 in. × 3/8 in.)		5315-00-161-9862
Molding, Ranier wood ground wire No. RGM-2, 1.83 m (6 ft)		
Staples, 7.62 cm × 3.81 cm (3 in. × 1 1/2 in.)		

APPENDIX A
REFERENCES

Refer to TM 9—1425—525—L for a list of other publications pertinent to this material and associated equipment.

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. General

This appendix provides a summary of the maintenance operations covered in the equipment manuals. It authorizes categories of maintenance for specific maintenance 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. Explanation of Columns in the Maintenance Allocation Chart (MAC)

a. Group Number. The numbers in this column identify components, assemblies, and modules within the next higher assembly.

b. Component/Assembly. This column lists the names of components, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column lists the maintenance functions to be performed on the items listed in the component/assembly column. Maintenance functions will be limited to and defined as follows:

(1) *Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

(2) *Test.* To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

(3) *Service.* To clean, preserve, charge, or add fuel, lubricants, cooling agents, and air.

(4) *Adjust.* To rectify to the extent necessary to bring into proper operating range.

(5) *Aline.* To adjust specified variable elements of an item to bring to optimum performance.

(6) *Periodic test.* To determine the corrections to be made in the readings of instruments of test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

(7) *Install.* To set up for use in an operational environment such as an emplacement site or vehicle.

(8) *Replace.* To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

(9) *Repair.* To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

(10) *Overhaul.* To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

(11) *Rebuild.* To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Maintenance Category. This column specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest category of maintenance authorized to perform each maintenance function listed. This figure represents the active time required to perform the 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 manhours 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 mainte-

nance allocation chart. The symbol designations for the various maintenance categories are as follows:

Code	*Maintenance category*
C	Operator or crew
O	Organization maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

e. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in the tool and test equipment requirements table.

B-3. Explanation of Columns in the Tool and Test Equipment Requirements Table

a. Tool or Test Equipment Reference Code. The numbers in this column correspond to the numbers used in the tool required column of the MAC. The numbers indicate the applicable tool required to perform the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists the names of the tools, test, and maintenance equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National stock numbers of the tools and equipment.

e. Tool Number. This column lists the manufacturer's part number.

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
0100	Radar Set AN/MPQ-57	Inspect	5	5	5	5		
		Test	.3	.5	.5	.5		3, 4, 5
		Service	.5	.5	.5	.5		1, 2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test			4	4		12
		Align	1		2	2		6
		Repair		1	2	2		7,8,9,10,11
		Overhaul				80		
		Rebuild					240	
1000	Radar Set AN/TPQ-30	Inspect	3	3	3	3		
		Test	.3	.5	.5	.5		3, 4, 5
		Service	.1	.1	.1	.1		1, 2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test			2	2		12
		Repair		1	2	2		7,8,9,10,11
		Overhaul				60		
		Rebuild					180	
3500	Distribution box	Inspect	.1	.1				
		Test		.1	.1			3, 4
		Service	.1	.1				1, 2
		Replace		.2	.2			7,8,9,10,11
		Repair		1	1			7,8,9,10,11
		Overhaul				4		
		Rebuild					15	
3700	Dummy Load	Inspect	.1	.1	.1	.1		
		Test		1	1	1		3, 4
		Service	.1	.5	.5	.5		1, 2
		Replace		.5	.5	.5		7,8,9,10,11
		Repair		1	1	1		7,9,10,11
		Overhaul				5		
		Rebuild					20	

* C - operator/crew O - organizational F - direct support H - general support D - depot

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
3900	Transformer Assy	Inspect	.1	.1	.1	.1		
		Test		1	1	1		3, 4
		Service	.1	.1	.1	.1		1, 2
		Adjust	.1	.1	.1	.1		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair			1	1		7,9,10,11
		Overhaul				5		
		Rebuild					20	
4100	Cooler, Liquid, Electronic Equipment	Inspect	1	1	1	1		
		Test		2	2	2		3, 4
		Service	.2	1	1	1		1, 2
		Replace		3	3	3		7,8,9,10,11
		Repair			4	6		7,9,10,11
		Overhaul				20		
		Rebuild					40	
4110	Cooler, Unit Liquid	Inspect	.3	.3	.3	.3		
		Test		.5	.5	.5		3, 4
		Service	.1	.1	.1	.1		1, 2
		Replace		1	1	1		7,8,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					30	
4130	Wiring Harness Branched	Inspect		.1	.1	.1		
		Test		1	1	1		3, 4
		Replace			1	1		7,9,10,11
		Repair		.5	1	1		7,9,10,11
		Overhaul				3		
		Rebuild					5	
4155	Capacitor Assy	Inspect		1	1	1		
		Test		1	1	1		3, 4
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	1		7,9,10,11
		Overhaul				2		
		Rebuild					6	

* C - operator/crew O - organizational F - direct support H - general support D - depot

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MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
4170	Tank,Coolant fluid electronic equipment	Inspect	.1	.1	.1	.1		
		Test		.3	.3	.3		
		Service	.1	.3	.3	.3		
		Replace		2	2	2		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	
4180	Housing Liquid Cooler	Inspect	.3	.3	.3	.3		
		Service	.1	.3	.3	.3		
		Adjust		.2	.2			7,8,9,10,11
		Replace			3	3		7,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	
4500	Motor-generator	Inspect	.1	.1	.1	.1		
		Test		1	1	1		3, 4
		Service		.5	.5	.5		1, 2
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				10		
		Rebuild					20	
5100	Radar Set Group RCVR-XMTR	Inspect	.3	1	1	1		
		Test		1	1	1		3, 4, 5
		Service		.3	.3	.3		1, 2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test		1	1	1		12
		Replace		1	3	3		7,9,10,11
		Repair		5	10	10		7,8,9,10,11
		Overhaul				50		
		Rebuild					120	
5230	Reflector Antenna	Inspect	.1	.1	.1	.1		
		Test			2	2		3, 4
		Service		.1	.1	.1		1, 2
		Adjust			1	1		7,9,10,11
		Replace			3	3		7,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					20	

* C - operator/crew O - organizational F - direct support H - general support D - depot

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
5245	Power Supply	Inspect		.1	.1	.1		
		Test		.2	2	2		3,4,5
		Service	.1	.1	.1	.1		1,2
		Adjust		.1	.1	.1		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10		
		Rebuild					20	
5255	Power Supply	Inspect		.1	.1	.1		
		Test		.2	2	2		3,4,5
		Service	.1	.1	.1	.1		1,2
		Adjust		.1	.1	.1		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10		
		Rebuild					20	
5620	Reflector Antenna	Inspect		.1	.1	.1		
		Service	.1	.1	.1	.1		1,2
		Replace			3	3		7,9,10,11
		Repair		1	1	1		7,9,10,11
		Overhaul				5		
		Rebuild					20	
5625	Receiver Assembly	Inspect	.1	.1	.1	.1		
		Test		.5	.5	.5		3,4
		Service	.1	.1	.1	.1		1,2
		Adjust		.2	.2	.2		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair		.5	.5	.5		
		Overhaul				5		
		Rebuild					20	

* C - operator/crew O - organizational F - direct support H - general support D - depot

SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
5650	Heater, electrical	Inspect	.1	.1	.1	.1		
		Test		.2	.2	.2		4
		Service	.1	.1	.1	.1		1,2
		Replace			2	2		7,8,9,10,11
		Repair			1	1		7,8,9,10,11
		Overhaul				3		
		Rebuild					10	
5655	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			2	2		7,9,10,11
		Repair		.5	1	1		7,9,10,11
		Overhaul						
		Rebuild						
5660	Pedestal, Antenna	Inspect	.3	.3	.3	.3		
		Test		1	1	1		3,4
		Service	.1	.1	.1	.1		1,2
		Replace			6	6		7,9,10,11
		Repair		1	3	3		7,8,9,10,11
		Overhaul				20		
		Rebuild					80	
5665	Wiring Harness	Inspect		.1	.1	.1		
		Test		.5	.5	.5		3,4
		Replace			3	3		7,9,10,11
		Repair			1	1		7,9,10,11
		Overhaul				2		
		Rebuild					5	
5675	Head Assembly Antenna, Pedestal	Inspect		.5	.5	.5		
		Test		1	1	1		3,4
		Service	.1	.1	.1	.1		1,2
		Adjust		.5	.5	.5		7,8,9,10,11
		Replace			3	3		7,9,10,11
		Repair		2	3	3		7,8,9,10,11
		Overhaul				5		
		Rebuild					30	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY*					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
5680	Drive Box Elevation	Inspect		.2	.2	.2		
		Test		.5	.5	.5		3,4
		Service		.2	.2	.2		1,2
		Adjust		.5	.5	.5		7,8,9,10,11
		Replace			2	2		7,8,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				10		
		Rebuild					30	
5684	Motor-tachometer Generator	Inspect		.1	.1	.1		
		Test		2	2	2		3,4
		Service		.3	.3	.3		1,2
		Replace		1	1	1		7,8,9,10,11
		Repair		.2	.2	.2		7,9,10,11
		Overhaul						
		Rebuild					10	
5690	Counter balance	Inspect		.1	.1	.1		
		Service		.1	.1	.1		1,2
		Replace			2	2		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	
5765	Shock Absorber	Inspect		.1	.1	.1		
		Test		.3	1	1		
		Service		.1	.1	.1		1,2
		Adjust		.2	.2	.2		7,8,9,10,11
		Replace		1	1	1		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	
5775	Base Assembly Pedestal	Inspect		1	1	1		
		Test		1	1	1		3,4
		Service		.5	.5	.5		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace		2	2	2		7,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				20		
		Rebuild					60	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
5780	Cover Access, Pedestal Base	Inspect		.1	.1	.1		
		Service	.5	.5	.5	.5		1,2
		Replace		2	2	2		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				1		
		Rebuild					5	
5785	Ring assembly and Shaft	Inspect		.1	.1	.1		
		Test		.5	.5	.5		3,4
		Service		3	3	3		1,2
		Replace			7	7		7,9,10,11
		Repair			3	3		7,9,10,11
		Overhaul				20		
		Rebuild					60	
5790	Drive Box Azimuth	Inspect		.1	.1	.1		
		Test		.5	1	1		3,4
		Service		1	1	1		1,2
		Adjust			2	2		7,9,10,11
		Replace			2	2		7,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10		
		Rebuild					30	
5820	Drive and Synchro Assembly	Inspect		.1	.1	.1		
		Test		.5	.5	.5		3,4
		Service		.1	.1	.1		1,2
		Adjust		2	2	2		
		Replace		2	2	2		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10	30	
		Rebuild						
5840	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			2	2		7,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul						
		Rebuild					10	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
5860	Wiring harness	Inspect		.2	.2	.2		
		Test		1	1	1		3,4
		Replace			3	3		7,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	
5888	Holder Assembly, Electrical Contact Brush	Inspect		.5	.5	.5		
		Test		.5	.5	.5		3,4
		Service		3	3	3		
		Replace		1	4	4		7,8,9,10,11
		Repair		3	3	3		7,8,9,10,11
		Overhaul				10		
		Rebuild					30	
5889	Cover and Door Access Pedestal Base	Inspect		.1	.1	.1		
		Replace		2	2	2		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				5		
		Rebuild					10	
6100	Transmitter, Radar	Inspect	2	2	2	2		
		Test		2	2	2		3,4
		Service	.1	.5	.5	.5		1,2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test			2	2		12
		Replace		2	6	6		7,9,10,11
		Repair		4	4	4		7,9,10,11
		Overhaul				40		
		Rebuild					100	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
6101	Fan, Centrifugal	Inspect		.1	.1	.1		
		Test		.2	.2	.2		3,4
		Replace		1	1	1		7,8,9,10,11
		Repair		.5	1	1		7,9,10,11
		Overhaul				5		
		Rebuild					20	
6120	Panel, Power Distribution	Inspect	.2	1	1	1		
		Test		1	1	1		3,4
		Service	.5	.5	.5	.5		1,2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test			2	2		12
		Replace			1	1		7,8,9,10,11
		Repair		2	2	2		7,8,9,10,11
		Overhaul				20		
		Rebuild					50	
6140	Panel, Control-monitor	Inspect	.1	.1	.1	.1		
		Test		1	1	1		3,4
		Service	.5	.5	.5	.5		1,2
		Periodic test			2	2		12
		Replace			1	1		7,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				20		
		Rebuild					50	
6150	Regulator set voltage	Inspect		.2	.2	.2		
		Test		.2	.2	.2		3,4
		Service		.1	.1	.1		1,2
		Replace		.3	.3	.3		7,8,9,10,11
		Repair		1	4	6		7,9,10,11
		Overhaul				20		
		Rebuild					50	

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MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
6160	Panel, indicator-monitor-power	Inspect		.5	.5	.5		
		Test		1	1	1		3,4
		Service		.5	.5	.5		1,2
		Adjust		.3	.3	.3		7,8,9,10,11
		Periodic test			2	2		12
		Replace			1	1		7,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				20		
		Rebuild					50	
6175	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			3	3		7,9,10,11
		Repair			1	1		7,9,10,11
		Overhaul				5		
		Rebuild					10	
6200	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			2	2		7,9,10,11
		Repair			1			7,9,10,11
		Overhaul				5		
		Rebuild					10	
6210	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			2	2		7,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					10	

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MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY*					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
6230	Power Supply	Inspect		.1	.1	.1		
		Test		.2	3	3		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.1	.1	.1		7,8,9,10,11
		Replace		1	1	1		7,8,9,10,11
		Repair		.	2	2		7,9,10,11
		Overhaul				10		
		Rebuild					50	
6310	Relay Assembly	Inspect		.5	.5	.5		
		Test		1	1	1		3,4
		Service		.5	.5	.5		1,2
		Replace		1	1	1		7,8,9,10,11
		Repair		2	3	3		7,9,10,11
		Overhaul				10		
		Rebuild					30	
6410	Regulator Voltage	Inspect		.1	.1	.1		
		Test		1	1	1		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.2	.2	.2		7,8,9,10,11
		Replace		1	1	1		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10		
		Rebuild					30	
6450	Power Supply Assy	Inspect		.5	.5	.5		
		Test		2	6	6		3,4
		Replace		3	3	3		7,8,9,10,11
		Repair		2	4	4		7,9,10,11
		Overhaul				20		
		Rebuild					60	
6485	Control-Indicator	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				10		
		Rebuild					30	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1)	(2)	(3)	(4)					(5)
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY*					TOOLS AND EQUIPMENT
			C	O	F	H	D	
6505	Power Supply	Inspect		.1	.1	.1		
		Test		1	1	6		3,4,5
		Service		.5	.5	.5		7,8,9,10,11 13,14
		Adjust				1		13,14
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	4		13,14
		Overhaul				10		
		Rebuild					30	
6525	Power Supply	Inspect		.1	.1	.1		
		Test		1	1	6		3,4,5
		Service		.5	.5	.5		7,8,9,10,11 13,14
		Adjust				1		13,14
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	4		13,14
		Overhaul				10		
		Rebuild					30	
6535	Power Supply	Inspect		.1	.1	.1		
		Test		1	1	6		3,4,5
		Service		.5	.5	.5		1,2
		Adjust				1		13,14
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	4		13,14
		Overhaul				10		
		Rebuild					30	
6545	Power Supply	Inspect		.1	.1	.1		
		Test		1	1	6		3,4,5
		Service		.5	.5	.5		1,2
		Adjust				1		13,14
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	4		13,14
		Overhaul				10		
		Rebuild					30	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY*					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
6560	Amplifier-Modulator Oscillator Group	Inspect		.5	.5	.5		
		Test		2	4	4		3,4
		Service		1	1	1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace		3	3	3		7,8,9,10,11
		Repair		2	4	4		7,8,9,10,11
		Overhaul				20		
		Rebuild					40	
6585	Electron Tube	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Service		.1	.1	.1		1,2
		Replace		1	1	1		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				5		
		Rebuild					20	
6595	Amplifier Modulator Oscillator Group	Inspect		1	1	1		
		Test		2	4	4		3,4,5
		Service		.5	.5	.5		1,2
		Replace		2	2	3		7,8,9,10,11
		Repair		3	4	4		7,9,10,11
		Overhaul				5		
		Rebuild					20	
6610	Wiring harness	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Replace			3	3		7,9,10,11
		Repair		2	3	3		7,9,10,11
		Overhaul				5		
		Rebuild					10	
6665	Control Bridge, Noise Microwave	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Service		.1	.1	.1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace		2	2	2		7,8,9,10,11
		Repair		1	1	1		7,8,9,10,11
		Overhaul				10		
		Rebuild					30	

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
6670	Tuner Cavity	Inspect		.1	.1	.1		
		Test		1	1	1		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.5	.5	.5		7,8,9,10,11
		Replace		2	2	2		7,8,9,10,11
		Repair		1	3	3		7,9,10,11
		Overhaul				10		
		Rebuild					30	
6680	Amplifier Auto Frequency	Inspect		.1	.1	.1		
		Test		1	1	1		3,4,5
		Service		.1	.1	.1		1,2
		Replace		.5	.5	.5		7,8,9,10,11
		Repair			2	2		7,9,10,11
		Overhaul				10		
		Rebuild					40	
6720	Detector Flow Rate	Inspect		.5	.5	.5		
		Test		1	1	1		3,4
		Service		.5	.5	.5		1,2
		Replace		1	1	1		7,8,9,10,11
		Repair			4	4		
		Overhaul				5		
		Rebuild					20	
6750	Test Set Power Supply	Inspect		.1	.1	.1		
		Test		1	3	3		3,4
		Service		.5	.5	.5		1,2
		Periodic test			2	2		12
		Replace		1	1	1		7,8,9,10,11
		Repair		1	3	3		7,8,9,10,11
		Overhaul				15		
		Rebuild					45	
6790	Cabinet Electrical Equipment	Inspect		1	1	1		
		Service		1	1	1		1,2
		Replace			4	4		7,9,10,11
		Repair		2	3	3		7,8,9,10,11
		Overhaul				20		
		Rebuild					60	

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
7100	Radar Set Group Console	Inspect	.5	2	2	2		
		Test		2	3	3		3,4
		Service		1	1	1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Periodic test			3	3		12
		Replace			4	4		7,9,10,11
		Repair		2	4	4		7,8,9,10,11
		Overhaul				20		
		Rebuild					65	
7120	Power Supply	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				20		
		Rebuild					50	
7170	Drawer electrical equipment cabinet	Inspect		.1	.1	.1		
		Test		.2	.2	.2		3,4
		Service		.1	.1	.1		1,2
		Replace			2	2		7,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				15		
		Rebuild					35	
7210	Computer, Range and Azimuth	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust			2	2		7,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		.5	2	2		7,9,10,11
		Overhaul				10		
		Rebuild					40	

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
7230	Electronic Components Assembly	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.5	1	1		7,8,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				10		
		Rebuild					50	
7270	Electronic Components Assembly	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.5	1	1		7,8,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	2	2		7,8,9,10,11
		Overhaul				10		
		Rebuild					40	
7290	Drawer Electrical Equipment Cabinet	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Service		.1	.1	.1		1,2
		Replace			2	2		7,8,9,10,11
		Repair		1	1	1		7,9,10,11
		Overhaul				5		
		Rebuild					20	
7340	Computer	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		1	1	1		7,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	4	4		7,9,10,11
		Overhaul				10		
		Rebuild					35	

* C - operator/crew O - organizational F - direct support H - general support D - depot

SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
7410	Electronic Components Assembly	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	4	4		7,9,10,11
		Overhaul				10		
		Rebuild					35	
7425	Control, Minimum Elevation Angle	Inspect		.1	.1	.1		
		Test		1	2	2		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace			1	1		7,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					20	
7450	Electronic Components Assembly	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.5	1	1		7,8,9,10,11
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				10		
		Rebuild					35	
7480	Drawer Electrical Equipment Cabinet	Inspect		.1	.1	.1		
		Test		1	1	1		3,4
		Service		.1	.1	.1		1,2
		Replace			2	2		7,8,9,10,11
		Repair		1	2	2		7,9,10,11
		Overhaul				5		
		Rebuild					20	

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MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
7530	Power Supply	Inspect		.1	.1	.1		
		Test		1	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.5	1	1		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair		1	3	3		7,9,10,11
		Overhaul				15		
		Rebuild					50	
7770	Panel, fuse-power Distribution Loudspeaker	Inspect		.5	.5	.5		
		Test		1	2	2		3,4
		Service		.5	.5	.5		1,2
		Adjust		.1	.1	.1		7,8,9,10,11
		Replace		1	1	1		7,8,9,10,11
		Repair		1	3	3		7,8,9,10,11
		Overhaul				15		
		Rebuild					60	
7790	Power Supply	Inspect		.1	.1	.1		
		Test		.5	4	4		3,4,5
		Service		.5	.5	.5		1,2
		Adjust		.5	.5	.5		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair		1	4	4		7,9,10,11
		Overhaul				15		
		Rebuild					60	
7791	Intercommunication	Inspect	.1	.1	.1	.1		
		Test		.5	3	3		3,4,5
		Service	.1	.1	.1	.1		1,2
		Adjust		.1	.2	.2		7,8,9,10,11
		Replace		.5	.5	.5		7,8,9,10,11
		Repair		.2	2	2		7,8,9,10,11
		Overhaul				10		
		Rebuild					40	

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MAINTENANCE ALLOCATION CHART for
RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
7795	Power Supply	Inspect		.1	.1	.1		
		Test		.5	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.2	1	1		
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		.5	.2	.2		7,9,10,11
		Overhaul				15		
		Rebuild					50	
7835	Power Supply	Inspect		.1	.1	.1		
		Test		.5	4	4		3,4,5
		Service		.1	.1	.1		1,2
		Adjust		.2	1	1		
		Replace		.2	.2	.2		7,8,9,10,11
		Repair		.5	2	2		7,9,10,11
		Overhaul				15		
		Rebuild					50	
7910	Panel, Control-Monitor Radar Set	Inspect		.5	.5	.5		
		Test		1	3	3		3,4
		Service		.5	.5	.5		1,2
		Adjust		2	2	2		7,8,9,10,11
		Periodic test			2	2		12
		Replace			2	2		7,9,10,11
		Repair		2	4	4		7,8,9,10,11
		Overhaul				15		
		Rebuild					50	
7925	Gearease Synchro	Inspect		.1	.1	.1		
		Test		.2	1	1		3,4
		Service		.1	.1	.1		1,2
		Adjust		1	1	1		7,8,9,10,11
		Replace			1	1		7,9,10,11
		Repair			2	2		7,8,9,10,11
		Overhaul				5		
		Rebuild					20	

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MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY*					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
7935	Gearcase Synchro	Inspect		.1	.1	.1		3,4
		Test		.2	1	1		1,2
		Service		.1	.1	.1		7,8,9,10,11
		Adjust		1	1	1		7,9,10,11
		Replace			1	1		7,8,9,10,11
		Repair		.2	2	2		
		Overhaul				5		
		Rebuild					20	
7990	Electronic Components Assembly	Inspect		.1	.1	.1		3,4,5
		Test		1	1	1		1,2
		Service		.1	.1	.1		7,8,9,10,11
		Replace		1	1	1		7,9,10,11
		Repair		1	2	2		
		Overhaul				10		
		Rebuild					40	
8110	Heater Panel	Inspect		.1	.1	.1		3,4
		Test		1	1	1		1,2
		Service		.1	.1	.1		7,8,9,10,11
		Replace		4	4	4		7,9,10,11
		Repair		2	2	2		
		Overhaul				10		
		Rebuild					40	
8140	Wiring Harness	Inspect		.1	.1	.1		3,4
		Test		2	3	3		7,9,10,11
		Replace			8	8		7,9,10,11
		Repair		1	4	4		
		Overhaul				1		
		Rebuild					5	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

MAINTENANCE ALLOCATION CHART for

RADAR SET AN/MPQ-57

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY* C	O	F	H	D	(5) TOOLS AND EQUIPMENT
8160	Wiring harness	Inspect		.1	.1	.1		
		Test		2	3	3		3,4
		Replace			8	8		7,9,10,11
		Repair		1	4	4		7,9,10,11
		Overhaul				1		
		Rebuild					5	
8170	Wiring harness	Inspect		.1	.1	.1		
		Test		2	3	3		3,4
		Replace			8	8		7,9,10,11
		Repair		1	4	4		7,9,10,11
		Overhaul				1		
		Rebuild					5	
8210	Cabinet, electrical equipment	Inspect		1	1	1		
		Test		2	3	3		3,4
		Service		1	1	1		1,2
		Replace			4	4		7,8,9,10,11
		Repair		3	4	4		7,8,9,10,11
		Overhaul				10		
		Rebuild					35	
8235	Cabinet, electrical equipment	Inspect		1	1	1		
		Replace			4	4		7,9,10,11
		Repair		3	4	4		7,8,9,10,11
		Overhaul				10		
		Rebuild					35	

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SMI FORM 1134, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

END ITEM: HIPIR, Radar Set AN/MPQ-57

TOOL AND TEST EQUIPMENT REQUIREMENTS

Tool or Test Equipment Reference Code	Maintenance Category	Nomenclature	National/NATO Stock Number	Tool Number
1	C, O, F	Vacuum Cleaner Hand	7910-00-530-6260	
2	C, O, F	Rag Wiping	7920-00-245-1711	
3	O, F	Oscilloscope AN/USM-281A	6625-00-228-2201	
4	O, F	Multimeter Digital	1430-00-366-8753	10177187
5	F, H	High-Frequency Console	4935-00-157-0690	10182561
6	F	Boresight Kit		11569304
7	O, F	Tool Kit G. M. Maintenance	5180-00-231-7689	Z85648
8	O	Tool Kit G. M. Maintenance	5180-00-231-7690	Z85647
9	F	Tool Kit Electronic Repair	4935-00-532-9112	W37936
10	F	Tool Kit G. M. FM Electronic (HAWK)	5180-00-724-9099	W40402
11	F	Tool Kit G. M. FM Electro-Mech (HAWK)	5180-00-724-9093	W40265
12	F	Calibration Standard Maintenance	4935-00-089-4362	10178692
13	H	Tool Kit G. M. Maintenance	4935-00-724-9093	W40265
14	H	Tool Kit G. M. Maintenance	4935-00-724-9099	W40202

SMI FORM 1134-1, 1 FEB 75 PREVIOUS EDITION IS OBSOLETE

APPENDIX C

NOMENCLATURE AND REFERENCE DESIGNATIONS

Reference designation	TM nomenclature	Official nomenclature	Part no.
30	High-powered illuminator radar (HIPIR) (RAM)	Radar Set AN/MPQ-57	11568205
30A1	Platform-mounted improved high-powered illuminator radar (RAM)	Radar Set	11568204
30A1A1	Transmitter group	Transmitter, Radar	13219168 *(T)[1] 11568213 *(R)[1]
30A1A1A3	Degeneration preamplifier	Degen/Pre-Amp Assembly	11570484
30A1A1A3A1	Rf/video converter	Circuit card Assy. (Rf/Video Conv. Assy.)	11568862
30A1A1A3A2	Video	Circuit Card Assy. (Video)	11568835
30A1A1A3A3	BITE module	Circuit Card Assy. (BITE)	11568846
30A1A1A3A4	High pass filter and coding trap	Coding-Trap Filter (High Pass)	10182963
30A1A1A4	Rf transmitter assembly	Amplifier-Modulator-Oscillator Group	11569733
30A1A1A4A1	Isomodulator assembly	Isomodulator	10109005
30A1A1A4A3	Af-rf amplifier	Amplifier, Audio Frequency-Radio Frequency	11569728
30A1A1A4A12	Phase modulator	Phase Modulator	10067497-2
30A1A1A4A13	Degeneration block	Control Bridge, Noise, Microwave	11570076
30A1A1A5	High-voltage power supply	Power Supply Assembly	10178240
30A1A1A5A1	Master oscillator power supply	Power Supply (MO)	10178090
30A1A1A5A2	Power amplifier power supply	Power Supply (Pwr Ampl)	10178092
30A1A1A5A3	Power amplifier filament power supply	Power Supply (Filter and Pwr Ampl Heater)	10178200
30A1A1A5A4	Master oscillator filament power supply	Power Supply (MO Heater)	10178204
30A1A1A5A5	Control indicator panel	Control-Indicator Cable Assembly-Interconnecting box	10678027
30A1A1A5A6	Distribution box	Cable Assembly-Interconnecting Box	10180884
30A1A1A6	High-voltage regulator	Regulator Set, Voltage	11566366 *(L)[1] 11568217 *(K)[1]
30A1A1A6A1	MO and PA regulator amplifier and BITE	Circuit Card Assy, AMPL/BITE	11568088
30A1A1A7	Ripple sensing unit	Network, Ripple Sensing	10067285
30A1A1A8	15-Vdc power supply	Power Supply (±15 Vdc)	10678454
30A1A1A9	−15-Vdc power supply	Power Supply (±15 Vdc)	10678454
30A1A1A10	Transmitter panel 1	Panel, Indicator-Monitor-Power (Xmtr No. 1)	11568359
30A1A1A11	Transmitter panel 2	Panel, Power Distribution (Xmtr No. 2)	11568216
30A1A1A12	Transmitter panel 3	Panel, Control Monitor No. 3	11566688
30A1A1A14	Transmitter contactor relay assembly	Relay Assembly	11570742
30A1A1A15	Line voltage regulator	Regulator, Voltage	10065984
30A1A1A16	Radar transmitter fan	Fan, Centrifugal	9177316
30A1A1A17	Wiring harness	Wiring Harness, Branched	11570097
30A1A1A18	Cooling system interlock	Detector, Flow Rate, Temperature Fluid	11569610 *(L)[1] 13039098 *(J)[1] *(K)[1] 10109706 *(H)[1]

See footnotes at end of table.

Reference designation	TM nomenclature	Official nomenclature	Part no.
30A1A1A19	**Transmitter control unit**	**Rack, Electrical Equip (XMTR Control)**	13219169 *(T)[1] 11571363 *(R)[1]
30A1A1A19A1	Transmitter local oscillator	XMTR, Local Osc	11570430
30A1A1A19A1A1	Voltage controlled oscillator	Oscillator, VCO	11570269
30A1A1A19A1A2	Transmitter LO	Circuit Card Assy (Transmitter LO)	11570332
30A1A1A19A2	Ranging standard	Circuit Card Assy (Ranging Std)	11570429
30A1A1A19A3	Range and coding detector	Circuit Card Assy (Range & Coding Det.)	11570486
30A1A1A19A4	Range and coding oscillator	Circuit Card Assy (Range & Code Osc.)	11570487
30A1A1A19A5	Cavity tuner and arc detector	Circuit Card Assy (Cav. Tuner & Arc Det.)	11570485
30A1A1A19A6	Transmitter BITE	Circuit Card Assy (Xmtr BITE)	11566647
30A1A1A19A7	Parent board	Circuit Card Assy (Parent Board)	11566657
30A1A1A20	High-voltage power supply test set	**Test Set, Power Supply**	10176219
30A1A1A21	Coding filter	Coding Filter	11568866
30A1A1A23	Coupler	Coupler Assy	11570436
30A1A2	Liquid cooler	Cooler, Liquid Electronic Equipment	10045774
30A1A2A2	Rotary pump	Pump, Rotary, Power Driven	10668616
30A1A2A3	Blower assembly	Cooler Unit, Liquid	9177314
30A1A2A4	Capacitor assembly	Capacitor Assembly	10107293
30A1A3	**Antenna-receiver group**	**Radar set Group**	13038872 *(N)[1] 11566365 *(G)[1] *(M)[1] 11566359 *(F)[1]
30A1A3A1	**Antenna pedestal**	**Pedestal, Antenna**	11566370 *(Q)[1] 11568237 *(P)[1]
30A1A3A1	Pedestal wiring harness	Wiring Harness, Pedestal	11568365
30A1A3A1A1	**Pedestal head assembly**	**Head Assembly, Antenna Pedestal**	11570004 *(Q)[1] 11568265 *(P)[1]
30A1A3A1A2	Azimuth base cable assembly	Cable Assembly, Azimuth Base	11568266
30A1A3A1A2	**Heater**	**Heater, Duct Type, Electrical**	11566378 *(L)[1] 10182788 *(K)[1]
30A1A3A1A2A1	Heater control	Heater Control	10182777
30A1A3A1A3	Elevation head cable assembly	Cable Assembly, Elevation Head	11568264
30A1A3A1A4	Upper slipring assembly	Ring Assembly and Shaft	11568262
30A1A3A1A5	Pedestal base rotary coupler	Coupler, Rotary, RF	10045638
30A1A3A1A5	**Azimuth base cable assembly**	**Cable Assembly, Azimuth Base**	**11569138**
30A1A3A1A6	Triple waveguide assembly	Triple Waveguide Assembly (W6)	10111899
30A1A3A1A8	Lower slipring assembly	Slipring Assembly	11569095
30A1A3A2	Transmitter assembly	Reflector, Antenna (XMTR)	11570091
30A1A3A2A1	Transmitter rotary coupler	Coupler, Rotary RF	10045638
30A1A3A2A2	Arc detector crystal	Holder, Semiconductor Device	9176064
30A1A3A2A3	Power supply monitor	Panel, Power Supply Monitor	11570432
30A1A3A2A5	5.4-, ±12.6-, ±50-Vdc power supply assembly	Power Supply Assy (5.4, ±12.6, ±50V)	11570457
30A1A3A2A5A1	12.6-Vdc power supply	Power Supply (±12.6V)	10672535
30A1A3A2A5A1A1	Control amplifier	Amplifier Regulator Control (±12.6V)	10672537
30A1A3A2A5A2	−12.6-Vdc power supply	Power Supply (±12.6V)	10672535
30A1A3A2A5A2A1	Control amplifier	Amplifier Regulator Control (±12.6V)	10672537
30A1A3A2A5A3	50-Vdc power supply	Power Supply (±50V)	10674650

See footnotes at end of table.

Reference designation	TM nomenclature	Official nomenclature	Part no.
30A1A3A2A5A3A1	Control amplifier	Amplifier Regulator Control (±50V)	10674726
30A1A3A2A5A4	−50-Vdc power supply	Power Supply (±50V)	10674650
30A1A3A2A5A4A1	Control amplifier	Amplifier Regulator Control (±50V)	10674726
30A1A3A2A5A5	5.4-Vdc power supply	Power Supply (5.4V)	10182795
30A1A3A2A5A5A1	5.4-Vdc regulator	Regulator Voltage 5.4V	10182804
30A1A3A2FL1	Arc detector low pass filter	Arc Detector, Low Pass Filter	10103669
30A1A3A3	Radar receiver	Reflector, Antenna (RCVR)	11568257
30A1A3A3A1	**Signal processor**	**Signal Processor Assembly**	11566372 *(G)[1] 11566361 *(F)[1]
30A1A3A3A1A1	Video/up-converter	Circuit Card Assy (Video/Up Converter)	11570490
30A1A3A3A1A2	Missile image	Circuit Card Assy (Missile Image)	11568405
30A1A3A3A1A3	Filter amplifier	Circuit Card Assy (Filter Ampl)	11568402
30A1A3A3A1A4	Log amplifier	Circuit Card Assy (Log Ampl)	11568400
30A1A3A3A1A5	Dual AGC amplifier	Circuit Card Assy (Dual AGC Ampl)	11570489
30A1A3A3A1A6	Amplifier-detector	Circuit Card Assy (Ampl-Detector)	11570488
30A1A3A3A1A7	Range module	Circuit Card Assy (Range Module)	11566597
30A1A3A3A1A8	Speedgate sweep generator	Circuit Card Assy (Speedgate Sweep Gen)	11566587
30A1A3A3A1A9	Spectrum analyzer	Circuit Card Assy (Spectrum Analyzer)	11566578
30A1A3A3A1A10	**Wide band logic**	**Circuit Card Assy (Wide Band Logic)**	13219394 *(G)[1] 11566360 *(F)[1]
30A1A3A3A1A11	**BITE module**	**Circuit Card Assy (BITE)**	11566373 *(G)[1] 11566362 *(F)[1]
30A1A3A3A1A12	Parent board	Circuit Card Assy (Parent Board)	11568085
30A1A3A3A2	**Nutating scanner assembly**	**Scanner, Nutating Drive**	11566367 *(N)[1] 11568358 *(M)[1]
30A1A3A3A3	**Receiver assembly**	**Receiver Assy**	13039028 *(G)[1] 11569744 *(F)[1]
30A1A3A3A3A1	Receiver IF	Receiver IF Assembly	11568396
30A1A3A3A3A1A1	1st IF/Video logic	Circuit Card Assy (1st IF/VIDEO)	11568401
30A1A3A3A3A1A2	FMDU/BITE logic	Circuit Card Assy FMDU/BITE)	11568407
30A1A3A3A3A2	Frequency converter	Waveguide Block	10177003
30A1A3A3A4	Receiver L.O.	Receiver L.O. Assy	11566669
30A1A3A4A1	**UHF oscillator/BITE assembly**	**Circuit Card Assy (Saw Oscillator)**	11571379
30A1A3A3A5	**Nutating scanner drive**	**Scan Driver Assembly**	13038851 *(G)[1] 11570751 *(F)[1]
30A1A3A3A5A1	Scan driver circuit card assembly	Circuit Card Assy (Scan Driver)	11570756
30A1A3A4	Sensor mount	Sensor Mount Assembly	11570669
30A1A3A5	Processor/power supply group	Processor/Power Supply Group	11568680
30A1A4	**Radar set group**	**Radar Set Group**	11566363 *(L)[1] 11568089 *(K)[1]
30A1A4A1	300-Vdc power supply drawer	Drawer, Electrical Equipment Cabinet	11568197
30A1A4A1A1	300-, 90-, 28-Vdc power supply	Power Supply	10292737
30A1A4A2	Range and azimuth computer drawer	Drawer, Electrical Equipment Cabinet	9066294
30A1A4A2A1	Range and azimuth control amplifier	Ampl, Electronic, Cont (Range-Azimuth)	10181821
30A1A4A2A2	Range and azimuth computer	Computer, Range-Azimuth	9067129
30A1A4A2A3	Range interlock computer	Computer, Range Interlock	11568226

See footnotes at end of table.

Reference designation	TM nomenclature	Official nomenclature	Part no.
30A1A4A3	Wiring harness	Wiring Harness Branched (L H RSG)	13219167 *(Q)[1] 13039023 *(P)[1]
30A1A4A4	−100-, 150-, 250-Vdc power supply	Power Supply	10045529
30A1A4A5	Control-indicator panel	Panel, Control-Monitor Radar Set	13219166 *(Q)[1] 13038885 *(P)[1]
30A1A4A5A1	Meter network	Network, Meter Sensitivity	10110343
30A1A4A5A2	Amplifier detector	Amplifier Detector	10112391
30A1A4A6	Radar set group contactor relay assembly	Chassis, Electrical Equipment	11570294
30A1A4A8	5.4-Vdc power supply	Power Supply (5.4V)	10182795
30A1A4A8A1	5.4-Vdc regulator	Regulator Voltage 5.4V	10182804
30A1A4A9	Main fuse panel	Panel, Fuse-Power Distribution-Loudspeaker	13039017
30A1A4A9A1	Synchro detector	Detector, Relay Driver	10672687
30A1A4A9A2	Doppler amplifier	Audio Amplifier	11568810
30A1A4A10	Utility transformer and blower	Utility Transformer and Blower	9167050, 9172174
30A1A4A11	100-, ±50-Vdc power supply	Power Supply Assembly, RH (±50 Vdc, +100 Vdc)	11570451
30A1A4A11A1	50-Vdc power supply	Power Supply (±50-Vdc)	10674650
30A1A4A11A1A1	Control amplifier	Amplifier Regulator Control (±50V)	10674726
30A1A4A11A2	−50-Vdc power supply	Power Supply (±50-Vdc)	10674650
30A1A4A11A2A1	Control amplifier	Amplifier Regulator Control (±50V)	10674726
30A1A4A11A5	100-Vdc power supply	Power Supply (+100V)	10674651
30A1A4A11A5A1	Control amplifier	Circuit Card Assembly (+100V)	10675292
30A1A4A11A6	Expanded scale network	Multiplier, Electrical Instrument	10177125
30A1A4A11A8	Communications station	Intercommunication Station AN/GTC-25 (XO-3)	10288848*(E)[1] 10291990*(D)[1]
30A1A4A11A8A1	Headset amplifier	Amplifier, Audio Frequency (Headset)	10288745[2], 10675622[3]
30A1A4A11A8A3	Audio amplifier and squelch control	AGC Squelch Amplifier	10292557[2], 10288742[2], 10676770[3]
30A1A4A11A8A4	Power supply	Power Supply-Interconnecting Board	10288847[2], 10288424[3]
30A1A4A12	Wiring harness	Wiring Harness Branched (R.H. RSG)	13039021
30A1A4A13	Servo control unit	Servo Control Unit Assy	11570475
30A1A4A13A1/A10	Logic interface	Circuit Card Assy (Logic Interface)	11566572
30A1A4A13A2	Radar set control	Circuit Card Assy (Radar Set Control)	11566583
30A1A4A13A3	Elevation servo control	Circuit Card Assy (AZ/EL Servo Contr)	11570481
30A1A4A13A4	Azimuth/elevation tracking filter	Circuit Card Assy (AZ/EL Tracking Filter)	11570483
30A1A4A13A5	Azimuth servo control	Circuit Card Assy (AZ/EL Servo Contr)	11570481
30A1A4A13A6	Secant amplifier and ground speed computer	Circuit Card Assy (Secant Ampl/GSC)	11566566
30A1A4A13A7	Search pattern generator	Circuit Card Assy (Search Patrn Gen)	11566568
30A1A4A13A8	ROR/ADP buffer	Circuit Card Assy (ROR/ADP Buffer)	11566574
30A1A4A13A9	System BITE	Circuit Card Assy (System BITE)	11570482

See footnotes at end of table.

Reference designation	TM nomenclature	Official nomenclature	Part no.
30A1A4A13A11	Servo BITE	Circuit Card Assy (Servo BITE)	11566581
3A1A4A13A14	Board B	Circuit Card Assy (Board B)	11569787
30A1A4A13A15	Board A	Circuit Card Assy (Board A)	11569788
30A1A4A16	Elevation and time-of-flight computer drawer	Drawer, Electrical Equipment Cabinet	9066295
30A1A4A16A1	Comparator and minimum elevation cutout	Comparator-Minimum Elevation Cutout	10672158
30A1A4A16A2	Elevation and time-of flight computer	Computer, Elevation-Time-of-Flight	10177520
30A1A4A16A3	Elevation and time-of-flight control amplifier	Amplifier, Electronic Control (Elevation-Time-of-Flight)	10181868
30A1A4A17	Console heaters	Heater	11569609 *(L)[1] 10108731 *(K)[1]
30A1A4A18	Relay assembly	Relay Assy	9189085
30A1A4A19	Relay assembly	Relay Assembly	11570293
30A1A5	Motor-generator assembly	Generator, Motor	11569721
30A1A6	Main power distribution box	Distribution Box	10045640
30A1A7	Dummy load	Dummy Load, Electrical (HV)	10109460
30A1A8	Input voltage adjust assembly	Line Regulator	10180542

[1]Refer to appendix D for serial number effectivity.
[2]Use with communications station 10288848 only.
[3]Use with communications station 10291990 only.

APPENDIX D

SERIAL NUMBER EFFECTIVITY CODE

D-1. General

The serial number effectivity code is an alphabetical code used to indicate differences among models.

D-2. Symbols Used

Alphabetical symbols are used in the code. The symbol represents the serialization of the major assembly. An asterisk preceding the symbol indicates that the serialization is not of the major assembly, but instead is of the major item in which the assembly is normally located.

D-3. Symbols Not Used

To avoid possible confusion with classification markings, numerals, and certain units of equipment, the symbols (A), (B), (C), (I), (O), (S), and (U) are not used.

D-4. Serial Number Effectivity Code

The following is a list of the code symbols used in this manual.

*(D) 570641 through 630451 with part number 10291990.

*(E) 570641 through 630451 (by attrition) and 630452 and up with part number 10288848.

*(F) 570641 through 630451 provided MWO 9-1430-1533-50-5 has not been applied.

*(G) 570641 through 630451 provided MWO 9-1430-1533-50-5 has been applied and 630452 and up.

*(H) 570641 through 620300 provided MWO 9-1430-1533-50-3 has not been applied.

*(J) 570641 through 620300 provided MWO 9-1430-1533-50-3 has been applied and 620301 and up.

*(K) 570641 through 650451 provided MWO 9-1430-1533-50-4 has not been applied.

*(L) 570641 through 650451 provided MWO 9-1430-1533-50-4 has been applied and 650452 and up.

*(M) 570641 through 630451 provided MWO 9-1430-1533-50-7 has not been applied.

*(N) 570641 through 630451 provided MWO 9-1430-1533-50-7 has been applied and 630452 and up.

*(P) 570641 through 630451 provided MWO 9-1430-1533-50-6 has not been applied.

*(Q) 570641 through 630451 provided MWO 9-1430-1533-50-6 has been applied and 630452 and up.

*(R) 570641 through 630451 provided MWO 9-1430-1533-50-8 has not been applied.

*(T) 570641 through 630451 provided MWO 9-1430-1533-50-8 has been applied and 630452 and up.

APPENDIX E

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

E-1. Scope

This appendix lists basic issue items and items troop-installed or authorized required by the crew/operator for operation of radar set AN/MPQ-57 (IHIPIR).

E-2. General

This appendix is divided into the following sections:

a. Items Troop-Installed or Authorized List — Section II. A list, in alphabetical sequence, of items which, at the discretion of the unit commander, may accompany the end item, but are not subject to be turned in with the end item.

b. Basic Issue Items List — Section III. A list of items which are furnished with, and which must be turned in with, the end item.

c. Illustration — Section IV. Not applicable.

d. Indexes — Section V. Not applicable.

e. Abbreviations. Not applicable.

E-3. Special Information

For inventory of those loose components and parts which are included in radar set AN/MPQ-57 (IHIPIR) refer to TM 740—525, appendix C.

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Reference Number & Mfg Code — Usable On Code	(4) UNIT OF MEASURE	(5) QTY AUTH
		Section II. ITEMS TROOP INSTALLED OR AUTHORIZED LIST		
	8340—00—985—7432	Tent, IHIPIR, front	ea	1
	8340—00—985—7431	Tent, IHIPIR, aft	ea	1
	8540—00—530—3770	(CONUS) Paper roll, absorption	ea	1
	8540—00—530—3769	(OVERSEAS) Paper roll, absorption	ea	1
		Section III. BASIC ISSUE ITEMS		
PDCZZ	4210—00—555—8837	Fire extinguisher, with bracket	ea	1

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F

Figures:

F — Continued

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14 January 1979

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-1430-550-34-1	7 Sep 72	Unit of Radar Set AN/MPQ-50 Tested at the HFC

BE EXACT. . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
9-19		9-5	
21-2	step 1C		21-2

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

"B" Ready Relay K11 is shown with two #9 contacts. That contact which is wired to pin 8 of relay K16 should be changed to contact #10.

Reads: Multimeter B indicates 600 K ohms to 9000 K ohms.

Change to read: Multimeter B indicates 600 K ohms minimum.

Reason: Circuit being checked could measure infinity. Multimeter can read above 9000 K ohms and still be correct.

NOTE TO THE READER:

Your comments will go directly to the writer responsible for this manual, and he will prepare the reply that is returned to you. To help him in his evaluation of your recommendations, please explain the reason for each of your recommendations, unless the reason is obvious.

All comments will be appreciated, and will be given immediate attention. Handwritten comments are acceptable.

For your convenience, blank "tear out" forms, preprinted, addressed, and ready to mail, are included in this manual.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE
SP4 John Doe, Autovon 222-222	

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