

TM 9-1425-525-12-1

TECHNICAL MANUAL

**OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL:
EMPLACEMENT OF IMPROVED HAWK
AIR-DEFENSE GUIDED-MISSILE SYSTEM
(IMPROVED HAWK AIR DEFENSE GUIDED MISSILE SYSTEM)**

This copy is a reprint which includes current
pages from Changes 1 through 8.

HEADQUARTERS, DEPARTMENT OF THE ARMY

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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.

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.

WARNING

RADIATION HAZARD

Refer to TM 3-261, TM 38-250, and TB 750-237 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

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 0.01 watt per square centimeter. 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 0.01 watt per square centimeter 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 damage. In each instance, radiation intensity rapidly diminishes as the distance is increased.

ANTENNA

DISTANCE

Improved High-powered Illuminator Radar	366 feet (111.5 meters)
Improved Cw Acquisition Radar	60 feet (18.3 meters)
Improved Pulse Acquisition Radar	50 feet (15.2 meters)
Improved Range-only Radar	148 feet (45.1 meters)

No radiation hazard exists at radar ground level *within* the distance stated 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 in front of the antennas when radiating.

NOTE

Potentially hazardous power density levels do not exist in the radiation field of the improved pulse and cw acquisition radars 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.

For the improved pulse acquisition radar:**MECHANICAL HAZARD**

When performing maintenance procedures in the vicinity of the antenna, insure that the antenna SAFETY SWITCH, located on the receiver-transmitter group, is in the SAFE position.

For the IFF antenna:**MECHANICAL HAZARD**

When performing maintenance procedures in the vicinity of the antenna, insure that one of the two ANT SAFE SWITCHES (one located on the IFF antenna and the other on the whip antenna base) is set to SAFE. In addition, not more than three personnel should occupy the roof of the ICC/TM at any time.

For the improved cw acquisition radar:**MECHANICAL HAZARD**

When performing maintenance procedures in the vicinity of the antenna, insure that the antenna SAFETY SWITCH, located on the radar set group, is in the SAFE position.

For the improved range-only radar:**MECHANICAL HAZARD**

When performing maintenance procedures in the vicinity of the antenna, insure that the antenna SAFETY SWITCH, located on the base of the pedestal, is in the SAFE position.

For the improved high-powered illuminator radar:**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.

For the improved launcher:**MECHANICAL HAZARD**

When performing maintenance procedures in the vicinity of the ILCHR boom, insure that the correct LAUNCHERS OPERATE—SAFE switch for the ILCHR to be checked, located on the improved launching section control box, is set to the LAUNCHERS SAFE position.

WARNING**EXPLOSIVES**

Intercept-aerial guided missile MIM-23B-1 and MIM-23B-2 contains explosives. All applicable safety regulations will be strictly enforced. Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents.

Handling operations should not be performed during electrical storms.

WARNING

SAFETY MEASURES FOR HANDLING HIGH-PRESSURE AIR SYSTEMS

1. Personnel who handle high-pressure airhoses and components shall be thoroughly trained in the use and maintenance of the equipment, and in the application of safety measures to protect against existing hazards. Proper protective equipment shall be worn as required.
2. The system shall be used only for the purpose for which it was originally designed.
3. Inspect all systems using high-pressure air before, during, and after use for leaks, defective airhoses, improperly adjusted valves, malfunctioning regulators and relief valves, the presence of foreign materials in the system; and corrosion. Use only the lubricants that are specified for pneumatic components. Oils and greases can explode when compression heat is present.
4. Clear all airhoses and valves at regular intervals. Release pressure through bleeder valves before disconnecting any lines or hoses or making any repairs.
5. When pressurizing a system, personnel operating the valves shall stand clear of hose connections, and shall turn the valves slowly to prevent shock loading or pressure surges which may damage hoses or components. Close valves manually to prevent overtightening; never tighten with a wrench or tool.

NOTE

Large volume containers at low pressure have sufficient stored energy to cause death or serious injury.

6. Observe the following precautions pertaining to high-pressure airhoses:

- a. The minimum bending radius for flexible airhoses shall be: 4 inches for 1/4-inch ID hose; 6 inches for 3/8-inch ID hose; 7 inches for 1/2-inch ID hose; 9-1/4 inches for 3/4-inch ID hose.
- b. Never coat or paint an airhose, because this impairs the normal breathing tendency of the airhose.
- c. Depressurize and protect airhoses from the sun when not in use.
- d. Do not kink, twist, strike, walk on, run over, jerk, or otherwise abuse airhoses.
- e. Allow 2 feet of slack for each 100 feet of airhose to compensate for contraction during pressurization.
- f. Secure high-pressure airhose at 36-inch intervals. Use equipment straps, ground stakes, or sandbags as necessary.
- g. 1550 PSIG air pressure is used in the operation of this equipment.

NOTE

For inspection and test of air and other gas compressors, refer to TB 742-93-1.

TECHNICAL MANUAL }
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 DEPARTMENT OF THE ARMY
 WASHINGTON, D. C. 12 September 1972

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

EMPLACEMENT OF IMPROVED HAWK

AIR-DEFENSE GUIDED-MISSILE SYSTEM

TABLE OF CONTENTS

		Paragraphs	Pages
CHAPTER	1. INTRODUCTION	1-1-1-5	1-1
	2. SERVICE UPON RECEIPT OF IMPROVED HAWK AIR-DEFENSE GUIDED-MISSILE SYSTEM		
Section	I. General considerations	2-1, 2-2	2-1
	II. Service upon receipt of major items	2-3-2-13	2-2
CHAPTER	3. PREPARATION FOR TRAVEL		
Section	I. General	3-1-3-3	3-1
	II. Methods of transportation	3-4, 3-5	3-1
	III. Preparation for travel for improved cw acquisition radar AN/MPQ-48	3-6-3-10	3-5
	IV. Preparation for travel for improved high-powered illuminator radar AN/MPQ-46	3-11-3-13	3-22
	V. Preparation for travel for improved range-only radar set AN/MPQ-51	3-14-3-18	3-28
	VI. Preparation for travel for improved pulse acquisition radar set AN/MPQ-50	3-19-3-22	3-36
	VII. Preparation for travel for loader-transporter		3-55
	VIII. Preparation for travel for improved guided missile launcher XM192E1	3-23-3-26	3-55
	IX. Preparation for travel for improved battery control central AN/TSW-8	3-27-3-30	3-68
	X. Preparation for travel for improved ground equipment test shop AN/TSM-112	3-31-3-33	3-74
	XI. Preparation for travel for improved launching section control box AN/GSA-132	3-34, 3-35	3-78
	XII. Preparation for travel for guided missile loading and storage pallet XM1E1	3-36-3-39	3-79
	XIII. Preparation for travel for 45-kw and 60-kw engine-driven generators	3-40-3-42	3-89
	XIV. Preparation for travel for information and coordination central AN/MSQ-95	3-43-3-45	3-95
	XV. Preparation for travel for the improved platoon command post AN/MSW-11... ..	3-45.1-3-45.3	3-109
	XVI. Preparation for travel for electrical cable assembly set AN/GSA-130.....	3-46-3-49	3-114
CHAPTER	4. EMPLACEMENT PROCEDURES		
Section	I. General	4-1, 4-2	4-1
	II. Emplacement of improved cw acquisition radar AN/MPQ-48	4-3-4-8	4-1
	III. Emplacement of improved high-powered illuminator radar AN/MPQ-46	4-9-4-11.1	4-5
	IV. Emplacement of improved range-only radar AN/MPQ-51	4-12-4-16	4-8.1
	V. Emplacement of improved pulse acquisition radar AN/MPQ-50	4-17-4-20	4-10
	VI. Emplacement of improved guided missile launcher XM192E1	4-21-4-24	4-13
	VII. Emplacement of loader-transporter		
	VIII. Emplacement of improved battery control central AN/TSW-8	4-25-4-28	4-17
	IX. Emplacement of improved ground equipment test shop AN/TSM-112	4-29-4-31	4-18
	X. Emplacement of improved launching section control box AN/GSA-132	4-32, 4-33	4-19
	XI. Emplacement of guided missile loading and storage pallet XM1E1	4-34-4-37	4-19
	XII. Emplacement of 45-kw and 60-kw engine-driven generators	4-38-4-41	4-21

		Paragraphs	Pages
Section XIII.	Emplacement of information and coordination central AN/MSQ-95	4-42-4-45	4-23
XIV.	Emplacement of improved platoon command post AN/MSW-11.....	4-45.1-4-45.5	4-27
XV.	Emplacement of electrical cable assembly set AN/GSA-130	4-46-4-51	4-31
CHAPTER 5.	ELECTRICAL CABLE ASSEMBLY SET		
Section I.	General	5-1, 5-2	5-1
II.	Interunit cables	5-3-5-5	5-1
III.	Maintenance	5-6-5-9	5-6
CHAPTER 6.	ORIENTING AND ALINING	6-1-6-6	6-1
Section I.	IH battery	6-1-6-6	6-1
II.	IAFU	6-7-6-12	6-58
	7. LIGHTNING PROTECTION	7-1-7-7	7-1
APPENDIX A.	REFERENCES		A-1
B.	SERIAL NUMBER EFFECTIVITY CODE		B-1
INDEX.....			Index-1

CHAPTER 1

INTRODUCTION

1-1. Scope

a. This technical manual (TM) contains instructions for the information and guidance of personnel responsible for the emplacement, alignment, and preparation for travel of the improved HAWK air-defense guided-missile system. This manual also contains instructions for organizational maintenance of the electrical cable assembly set.

b. This TM is one of a series of manuals on operation, assembly and emplacement, organizational maintenance, direct and general support, and depot maintenance of the improved HAWK air-defense guided-missile system.

1-2. Reporting of Equipment Publications Improvements

Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes

to DA Publications) and forwarded direct to: Commander, U.S. Army Missile Command, ATTN: AMSMI-NPM, Redstone Arsenal, Alabama 35809.

1-3. Forms, Records, and Reports

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

1-4. Nomenclature and Reference Designations

For information pertaining to nomenclature and reference designations refer to the TM on the specific major item.

1-5. Differences Among Models

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

CHAPTER 2

SERVICE UPON RECEIPT OF IMPROVED HAWK AIR-DEFENSE GUIDED MISSILE SYSTEM

Section I. GENERAL CONSIDERATIONS

2-1. Scope

a. When a new or reconditioned major item of the improved HAWK system 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 major item. Service upon receipt depends upon the level of preshipment processing, which is explained in paragraph 2-3. For service upon receipt of the improved HAWK guided missile, refer to TM 9-1410-530-14; for the loader-transporter, refer to TM 9-1450-500-10.

2-2. General Service Procedures

a. TM 9-1425-525-L lists the applicable forms, records, and reports to be used for inspection. Examine the logbook for each major item of equipment 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. Check the serial number of each major item with the number recorded in the logbook.

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.

i. Remove the blocking or bracing used to prevent consoles, cabinets, and chairs from moving during shipping. Secured chairs can be released by removing the locking device and web strapping found over the chair seats and under the chair base. Remove the cushioning material used to prevent chafing of the chair by the metal shipping strap. Unpack the equipment or spare parts stowed in drawers. If the equipment or spare parts have been secured to prevent movement during transportation, remove the securing material. Remove the tape and web strapping from the rack storage designed equipment. Make certain the equipment is properly positioned.

Section II. SERVICE UPON RECEIPT OF MAJOR ITEMS

2-3. General

Service upon receipt of a major item 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.

CAUTION

Care should be exercised in performing service-upon-receipt procedures because many parts damage easily. Damage or exposure to bad weather may require a complete overhaul or cause the equipment to become inactive.

2-4. Service Upon Receipt of the Improved Cw Acquisition Radar (ICWAR), Improved High-Powered Illuminator Radar (IHIPIR), and Improved Range-Only Radar (IROR)

Refer to paragraphs 2-1 and 2-2 for general service-upon-receipt information. In addition, the procedures listed in subparagraphs *a* through *l* below must be followed upon receiving the ICWAR, IHIPIR, and IROR.

a. Trailer. Refer to TM 9-2330-235-14 for service upon receipt of the M514 and 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 con-

sole 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. Fender Wells. Remove the desiccants, humidity indicators, web strapping, taped-on-packaged items, tools, equipment, and chemically neutral paper. Check the contents. Replace the tools and equipment in the assigned fender wells.

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

k. Protective Covers. Remove the protective covers on the IHIPIR, ICWAR, and IROR antennas.

l. Check Procedures. Perform the periodic check procedures for the ICWAR (TM 9-1430-528-12-1), the IHIPIR (TM 9-1430-533-12-1), and the IROR (TM 9-1430-529-12-1).

2-5. Service Upon Receipt of the Improved Pulse Acquisition Radar (IPAR)

a. Refer to paragraphs 2-1 and 2-2 for information and procedures for service upon receipt of the IPAR. The basic procedures listed for the cw radars apply to the IPAR, except as indicated below. Difference of location and construction of items should be obvious. The antenna sections and the feedhorn are packaged in three containers. These should be checked to see that every part is present and in good condition. Make certain the waveguide cover plate and the waveguide support bracket are secured on the upper waveguide opening which connects to the feedhorn. Perform the periodic check procedures contained in TM 9-1430-534-12-1.

CAUTION

The waveguide cover plate (2, fig. 3-37) must be bolted on tightly and evenly. The feedhorn flange must be bolted tightly and evenly to the feedhorn flange plate on the bottom of the container in which the feedhorn is stowed. The slightest imperfection in the waveguide assemblies will greatly impair the efficiency of the radar. No moisture or foreign matter should be in any part of the waveguide assembly. The feedhorn must be properly stowed so that no stresses or strains are evident upon receipt.

b. Procedures for service upon receipt of the M390 trailer are described in TM 9-2330-235-14.

2-6. Service Upon Receipt of the Improved Battery Control Central (IBCC)

Refer to paragraphs 2-1 and 2-2 for information and procedures for service upon receipt of the IBCC. When shipped, the IBCC is protected from moisture with desiccants which may be attached to, or suspended from, structural members of the consoles or racks. Four cardboard containers holding the desiccant may be secured to the floor. Open the vent on the entrance door when first entering the IBCC and remove the desiccants. If the equipment or spare parts stored in the drawers have been secured to prevent movement during transportation, remove the securing material. The siren is located inside the entrance door bolted to the floor with three holding bolts. Remove the three holding bolts (2, fig. 3-67) and mount the siren on the corner of the roof over the entrance to the IBCC (fig. 3-66). Connect the IBCC power cable. Apply power to check the IBCC operating condition. Servicing of the air conditioner will be performed by the mobility equipment center. Perform the periodic check procedures contained in TM 9-1430-526-12-1.

CAUTION

If the M10 collective protection equipment is to be used, the Fairchild Stratos Model VEA4-3A (FSN 4120-926-4280) air conditioner must be installed on the IBCC.

2-7. Service Upon Receipt of the Improved Ground Equipment Test Shop (IGETS)

Refer to paragraphs 2-1 and 2-2 for information

and procedures for service upon receipt of the IGETS. Check to see that all the cases are firmly secured to the pallet to prevent movement of any kind. Remove the test sets and open the covers to see that there are no broken or missing parts. Release the panels and slide them out to check the chassis for broken, loose, or missing parts. Perform the preventive maintenance checks. For detailed procedures on the ground equipment test shop, refer to TM 9-4935-542-12. After checks, replace and secure the equipment in the proper locations on the pallet.

2-8. Service Upon Receipt of the Improved Launching Section Control Box (ILSCB)

Refer to paragraphs 2-1 and 2-2 for information and procedures for service upon receipt of the ILSCB. In addition, check the snap fasteners and switches to see that they are tight and work properly. Make sure that the connector receptacles are in good condition. See that the caps and wire tie ropes are secure and in place. Open the storage compartment cover and check to see that the safety and arming test aid and the headset are present and in good condition. Perform preventive maintenance checks. For detailed procedures on the ILSCB, refer to TM 9-1440-531-12-1.

2-9. Service Upon Receipt of the Guided Missile Loading and Storage Pallet

For general information for service upon receipt of the guided missile loading and storage pallet, refer to paragraph 2-1. Procedures for service upon receipt of the M390 trailer is described in TM 9-2330-235-14.

2-10. Service Upon Receipt of the 45- and 60-Kw Engine-Driven Generators

CAUTION

When adding oil to the crankcase, always use the oil specified in the lubrication order. If, in an emergency, it is necessary to add oil of a type not specified in the lubrication order, continue to operate the engine until a new supply of the proper oil can be obtained; then drain the crankcase and refill with the specified oil.

a. Unless shipped by helicopter, the generator is delivered mounted on a trailer. Before attempting to start the engine, check the lubricating oil level in the crankcase with the dipstick located on the righthand side of the engine between the fuel

filters. The oil level must be maintained between the high and low level markings.

b. Make sure the cooling system is full of water or a solution of water and permanent-type antifreeze according to the seasonal requirements. If the coolant is all water, it must contain a rust inhibitor. Be sure there is a sufficient supply of clean fuel. Paragraphs 2-2 and 2-3 provide further general information and procedures for service upon receipt of the 45- and 60-kw engine-driven generators.

c. For operation of the 60-kw generator with the improved HAWK, an ac output receptacle box assembly 8035560 must be installed. To install the assembly, proceed as follows:

(1) At the generator end, remove the six screws holding the left-hand, long, narrow panel above the tool storage compartment.

(2) Install the ac output assembly, using the screws removed in (1) above.

(3) Connect the wiring tap (WT) tiepoints as follows:

- (a) WT1, WT5, and WT9 to TB5-L1.
- (b) WT2, WT6, and WT10 to TB5-L2.
- (c) WT3, WT7, and WT11 to TB5-L3.
- (d) WT4 and WT8 to TB5-LO.

d. When the generator is removed from the battery for repair or replacement, the ac output assembly is to be removed and retained for installation on the replacement generator.

2-11. Service Upon Receipt of the Improved Launcher (ILCHR)

Refer to paragraphs 2-2 and 2-3 for information and procedures for service upon receipt of the ILCHR. Remove the front and rear compartment covers and visually inspect the interior to determine that all assemblies, on-vehicle equipment, and tools are present, in good condition, and properly stowed or mounted. If the equipment or tools are wrapped and taped, remove the wrapping and tape and stow the tools and equipment in the assigned locations. In the front compartment, check the level indicator on the base hydraulic system reservoir for proper level of the hydraulic fluid. If the base hydraulic system is filled with a preservative, it must be drained and replenished with the proper hydraulic fluid. On the left side of the boom support base, check the main hydraulic system reservoir level indicator for the proper hydraulic fluid level. If the main hydraulic system is filled with a preservative, it must be drained and replenished with the proper hydraulic fluid. For the specification on proper hydraulic fluid for ILCHR

hydraulic systems, refer to TM 9-1440-531-12-1. Check the ILCHR base air vent covers and remove any sealing tape, barrier material, and desiccant. Check the main hydraulic system heat exchanger intake and exhaust, and remove any sealing tape and barrier material. Raise the center compartment hatch cover, and remove the desiccant, sealing tape, and barrier material. Perform the periodic check procedures contained in TM 9-1440-531-12-1.

2-12. Service Upon Receipt of the Electrical Cable Assembly Set

Refer to paragraphs 2-2 and 2-3 for information and procedures for service upon receipt of the electrical cable assembly set. Check to see that all the cables are present, complete, and in good condition. There are 26 data cables and 14 power cables. Table 5-1 provides data on these cables. Cables should be secured to their respective reels by the retaining clamps on each reel. A visual check should be made of the connector contacts, caps, marker bands, insulation shielding, and general appearance.

2-13. Service Upon Receipt of the Information and Coordination Central (ICC)

a. *M390 and M390C Trailers.* Refer to TM 9-2330-235-14 for service upon receipt procedures.

b. *Equipment Shelter.* When entering the ICC shelter, open the vent on the entrance door and remove the desiccants attached to the console, rack structures, or the floor. Inspect the automatic data processor (ADP), the battery terminal equipment (BTE), and communications equipment for damage. The air conditioner is serviced by the mobility equipment center.

c. *Identification, Friend or Foe (IFF) Equipment.* The IFF antenna is packed in a shipping container secured to the floor of the ICC. Detailed instructions for service upon receipt procedures are given in TM 11-5895-532-12. Installation procedures for mounting the antenna on the roof of the ICC are provided in TM 9-1430-527-12-1.

d. *Battery Terminal Equipment (BTE).* Refer to TM 9-1430-580-14 supplied with the BTE for service upon receipt procedures.

e. *ICC Operation.* Perform the periodic check procedures to test the operation of the ICC. Refer

to TM 9-1430-527-12-1 for the check procedures.

WARNING

Avoid contact with the electrolyte; otherwise burns to skin or damage to clothing may result.

f. Batteries. The two 12-volt batteries are shipped without electrolyte. Fill the batteries with electrolyte as directed on the filler plugs.

2-14. Service Upon Receipt of the Improved Platoon Command Post (IPCP)

a. M390 and M390C Trailers. Refer to TM 9-2330-235-14 for service upon receipt procedures.

b. Equipment Shelter. When entering the IPCP, open the vent on the entrance door and remove the desiccants attached to the console, rack structures, or the floor. Inspect the automatic data processor (ADP), the tactical display and engagement control console (TDECC), the battery terminal equipment (BTE), and the communications equipment for damage. The air conditioner is serviced by the mobility equipment center.

c. Identification Friend or Foe (IFF) Equipment. The IFF antenna is packed in a shipping

container secured to the floor of the IPCP. Detailed instructions for service upon receipt procedures are given in TM 11-5895-532-12. Installation procedures for mounting the antenna on the roof of the IPCP are provided in DTM 9-1430-535-12-1.

d. Battery Terminal Equipment. Refer to TM 9-1430-580-14 supplied with the BTE for service upon receipt procedures.

e. IPCP Operation. Perform the periodic check procedures to test the operation of the IPCP. Refer to DTM 9-1430-535-12-1 for the check procedures.

WARNING

Avoid contact with the electrolyte; otherwise burns to the skin or damage to clothing may result.

f. Batteries. The two 12-volt batteries are shipped without electrolyte. Fill the batteries with electrolyte as directed on the filler plugs.

2-15. Service Upon Receipt of the Platoon Support Van

Remove all packing material and desiccant. Check each item for broken, loose, or missing parts. Store each item in the proper equipment rack or compartment.

CHAPTER 3

PREPARATION FOR TRAVEL

Section I. GENERAL

3-1. Scope

Preparation for travel of the improved HAWK system equipment is presented in this chapter. Paragraphs 3-4 and 3-5 contain general information on the transportation of the equipment by truck (prime mover), cargo aircraft, and helicopter. Paragraphs 3-6 through 3-47 contain the preparation for travel procedures.

3-2. Explanation of Procedures

The preparation for travel procedures describe the most efficient method of converting the improved HAWK system from a completely emplaced battery into a mobile unit. Before the battery can be disassembled and prepared for travel, it must be deenergized as described in the TM for each major item. Detailed instructions for preparing individual major items for travel are presented in separate sections in this chapter.

3-3. Trailers

There are four different trailers used to support the major items of the improved HAWK. Each trailer is discussed separately below.

a. *M514 Trailer.* The M514 trailer is used to support the ICWAR and the IROR.

b. *M390 Trailer.* The M390 trailer is used to support the ICC/TM, IPAR, and the IHIPIR.

c. *M390C Trailer.* The M390C trailer is used to support the guided missile loading and storage pallet, and the ICC/TM.

d. *M200A1 Trailer.* The M200A1 trailer is used to support the 45- and 60-kw engine-driven generators.

Section II. METHODS OF TRANSPORTATION

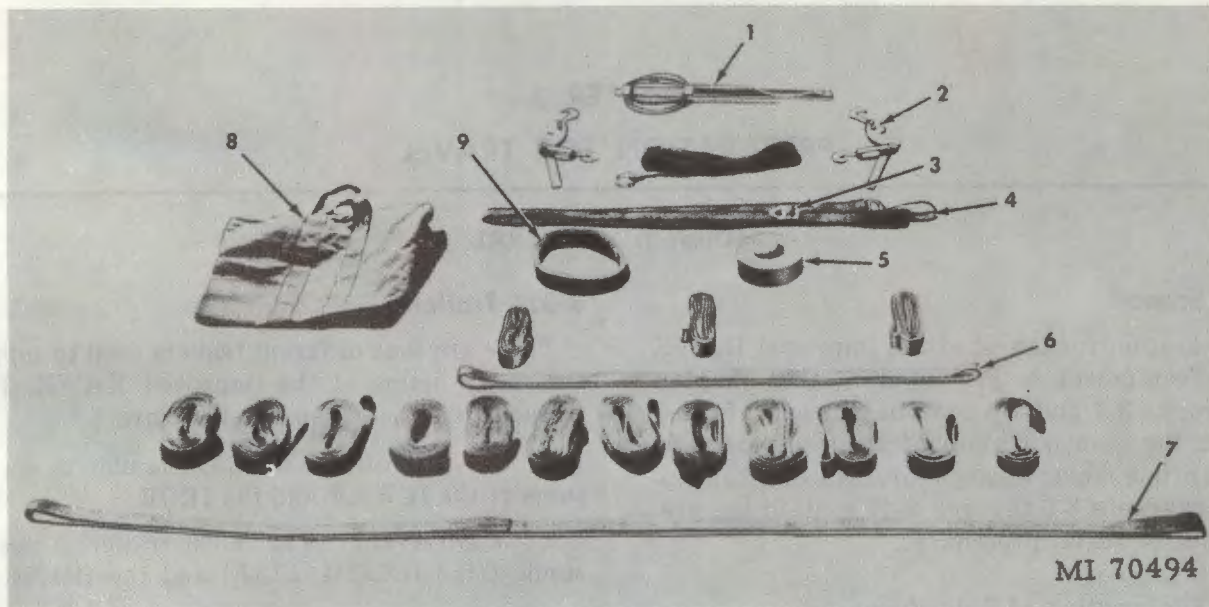
3-4. Transportation by Truck

Usually, the major items are transported by the M36 truck (prime mover) to their battery site. Most of the major items are towed by a prime mover, and their respective supporting equipment is transported in the prime mover's bed. TM 9-1425-525 contains a listing of major items with associated prime mover illustrating the prime mover's typical load and type of trailer towed.

3-5. Transportation by Air

a. *Helicopter.* The small items of the improved HAWK system, such as the ILSCB, power and data cables, and the RL-31 cable reelers are transported inside a helicopter. The major items are helicopter-lifted by means of a suspension sling assembly. This assembly is fabricated from the components shown in figure 3-1 and table 3-1. The storage bag (8, fig. 3-1) is used to stow the remaining components when not in use. The grounding device assembly (1, fig. 3-1) is used to ground

the helicopter lifting hook (A1, fig. 3-13) before hookup of the major item. The grounding device assembly must be fabricated locally. Refer to subparagraph b below for fabrication procedures for this device. Two 15-foot tiedown straps (4, fig. 3-1) and two load binders (2, fig. 3-1) are used to secure the IHIPIR antenna and the loader suspension arms. The 4-foot (6, fig. 3-1) and 8-foot (7, fig. 3-1) web loops are used to form individual suspension slings. An individual suspension sling consists of two or more web loops daisy-chained together to form the desired length required to lift the major item. Some of the slings vary in length because of the center of gravity or the construction of the item to be lifted. Instructions for sling construction for each major item are given in the Preparation for Travel sections of this manual. The web loops are in standard 4- and 8-foot lengths, and a specific combination is used to form the desired length of a suspension sling. When an 8-foot web loop is daisy-chained, the loop is half its original length, or 4 feet. A suspension sling assembly is formed when the individual suspension



MI 70494

- 1—Grounding device assembly
- 2—Load binder
- 3—Quick-fit tiedown fastener
- 4—15-foot tiedown strap
- 5—Tape

- 6—4-foot web loop
- 7—8-foot web loop
- 8—Storage bag
- 9—10-inch web ring

Figure 3-1. Helicopter lifting components

slings required to lift the major item are properly secured to the 10-inch web ring (9, fig. 3-1). An example for forming a 12-foot suspension sling and attaching the sling to the 10-inch web ring is shown in figures 3-2 and 3-3.

b. *Grounding Device Assembly.* The grounding device assembly (1, fig. 3-1) 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 3-4.

(1) Obtain a 2-foot section of 1-inch copper tubing (1) or other suitable material and fabricate as shown in A.

(2) Obtain a 1-inch strip of copper material (4) or other suitable material, 10 inches long and fabricate as shown in B.

(3) Attach the copper strip (4) to the copper tubing (1) with two self-threading screws.

(4) Obtain a piece of copper braid (2) or other suitable material, which has a minimum length of 26 feet and fabricate as shown in C.

(5) Attach one end of the copper braid (2) to the copper tubing (1) with a $\frac{1}{2}$ -inch bolt, lockwasher, and nut.

(6) Obtain a 12-inch copper rod (3) or other suitable material, and fabricate as shown in D.

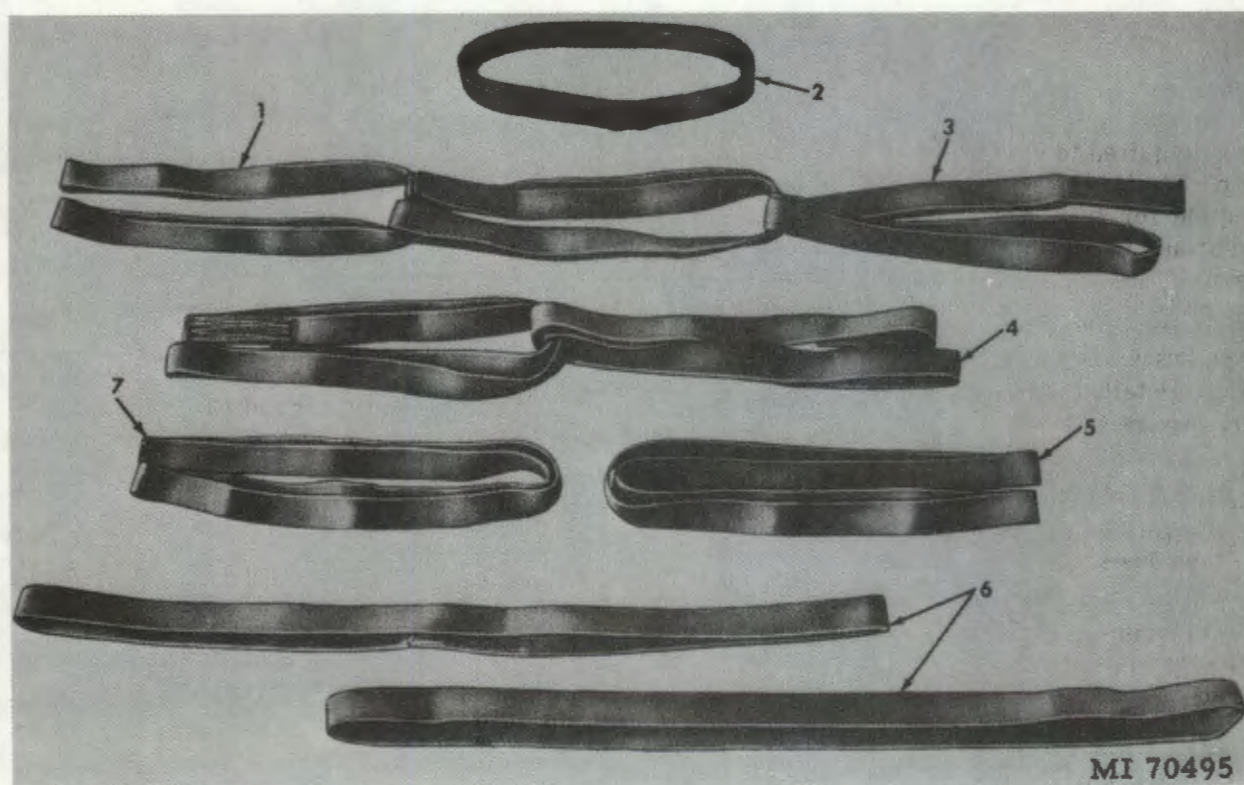
(7) Attach the remaining end of the copper braid (2) to the copper rod (3) with a $\frac{1}{2}$ -inch bolt, lockwasher, and nut.

(8) Insulate one-half of the copper tubing (1) with an insulating tape as shown in A.

c. *Cargo Aircraft.* When the improved HAWK system equipment is transported by cargo aircraft, the preparation for travel procedure is the same as for the prime mover. It may be necessary to lower the ICWAR, IHIPR, and IROR antennas, dependent upon the cargo compartment height limitations of the aircraft to be used. For detailed instructions on stowing the ICWAR, IHIPR, and IROR antennas, refer to paragraphs 3-10, 3-13, and 3-18, respectively. When the IPAR is transported by cargo aircraft, it may be necessary, as a height requirement, to disassemble the antenna reflector. Refer to paragraph 3-21a(8) through (11) for detailed instructions on disassembling the antenna reflector.

Table 3-1. Description of Helicopter Lifting Components

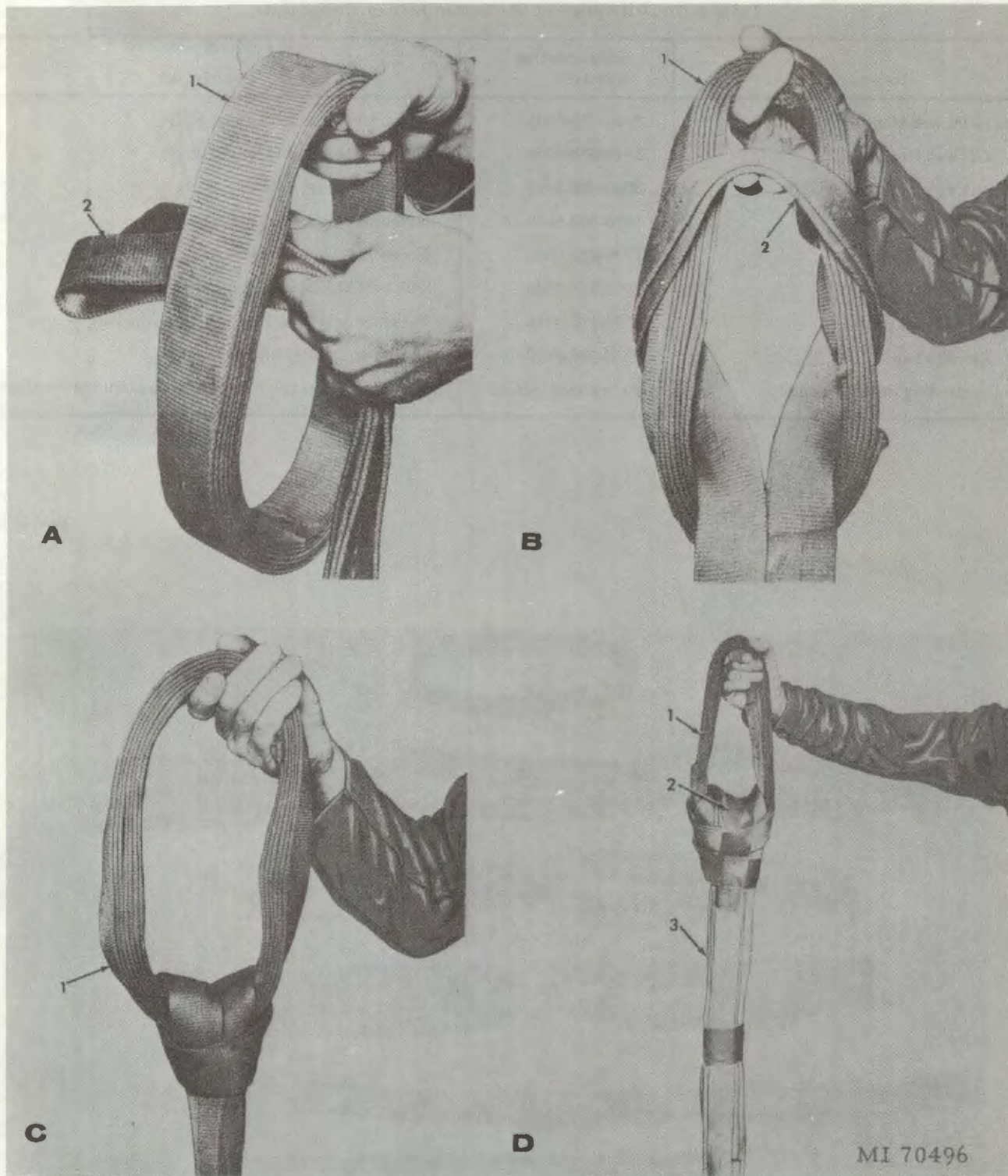
Item	Identification number	Description
10-in. web ring	3940-675-5001	Nylon webbing, 10 in. long, 5 ply
4-ft web loop (4)	3940-675-5002	Nylon webbing, 4 ft long, 1 ply
8-ft web loop (13)	3940-675-5003	Nylon webbing, 8 ft long, 1 ply
Web strap (2)	1670-360-0540	Nylon webbing, 15 ft long, 1 ply
Load binder (2)	3990-360-0248	Eccentric takeup, w/lever
Strap fastener (2)	1670-360-0340	Quick-fit buckle
Adhesive tape	8135-266-5016	Pressure sensitive, 2 in. wide, 60-yds, long
Storage bag	8460-245-6693	Cotton duck, OD, w/zipper
Grounding device assembly	Fabricated locally	Refer to paragraph 3-5b for fabrication instructions



1-8-Foot web loop
 2-10-Inch web ring
 3-12-Foot suspension sling
 4-Daisy chain

5-4-Foot loop
 6-8-Foot web loops
 7-4-Foot loop

Figure 3-2. Helicopter suspension sling—daisy chain—typical.



MI 70496

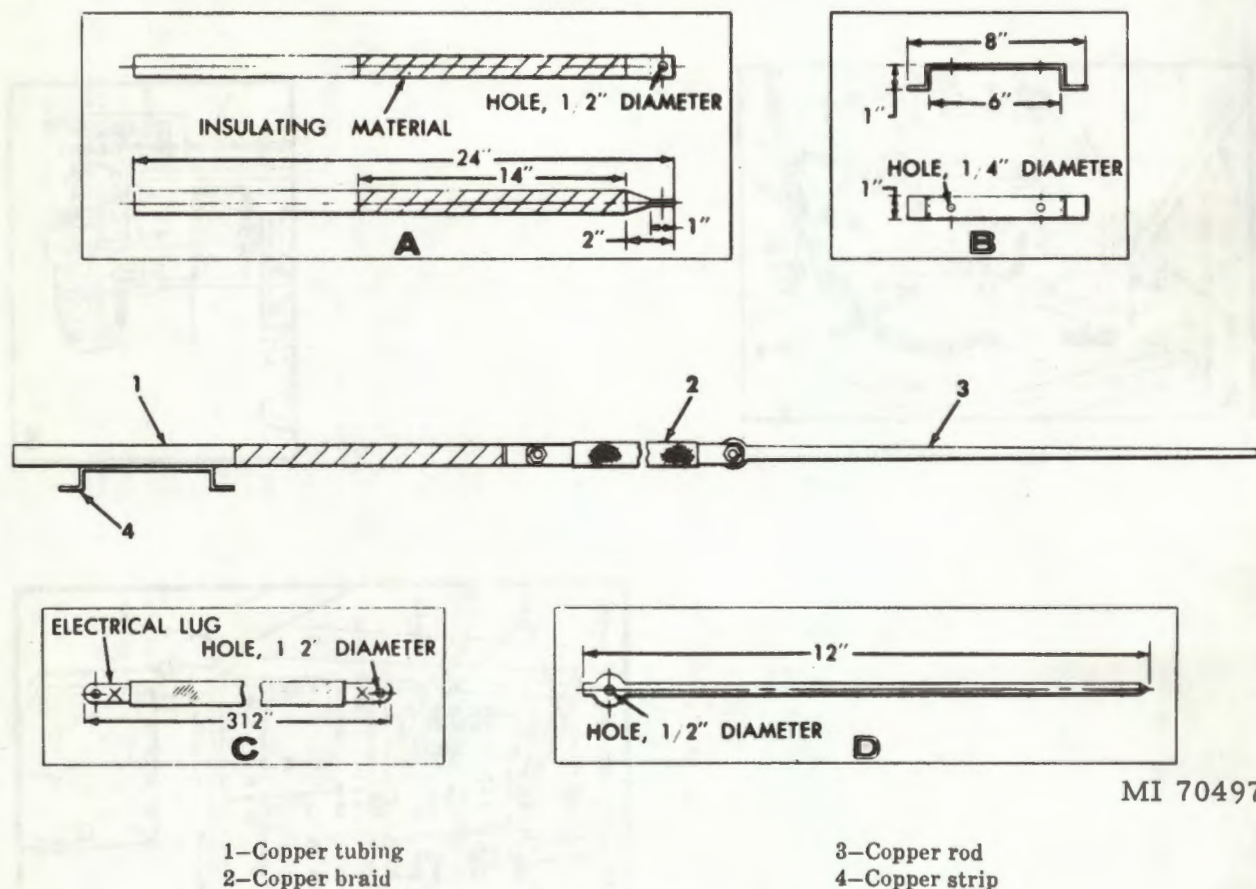
A
1-10-Inch web ring
2-Suspension sling

B
1-10-Inch web ring
2-Suspension sling

C
1-10-Inch web ring (bottom)

D
1-10-Inch web ring
2-Tape
3-Suspension slings

Figure 3-3. Attaching suspension slings to 10-inch web ring.



MI 70497

Figure 3-4. Grounding devices assembly.

Section III. PREPARATION FOR TRAVEL FOR IMPROVED CW ACQUISITION RADAR AN/MPQ-48

3-6. General

This section describes the preparation for travel procedures of the ICWAR and its M514 trailer by prime mover (par. 3-8). Paragraph 3-8.1 contains preparation for travel procedures for the ICWAR when cabled directly to the IBCC. Preparation for travel by helicopter is contained in par. 3-9.

3-7. Tools

The tools required to prepare the ICWAR for travel are listed in *a* through *d* below.

a. Common Screwdriver. The common screwdriver is stowed in the right-front fender well of the trailer.

b. Cross-Recessed Screwdriver. The cross-recessed screwdriver is stowed in the right front-fender well of the trailer.

c. Leveling Jack Cranks. The leveling jack cranks are stowed in the left fender well of the trailer.

d. 3/4-Inch Open-End Wrench. The 3/4-inch open-end wrench is stowed in the general mechanic's tool kit.

3-8. Preparation for Travel Procedures— Prime Mover

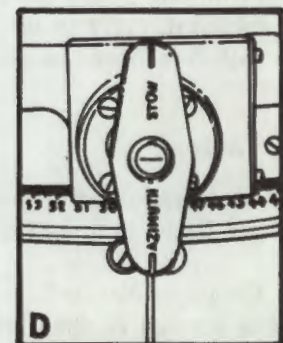
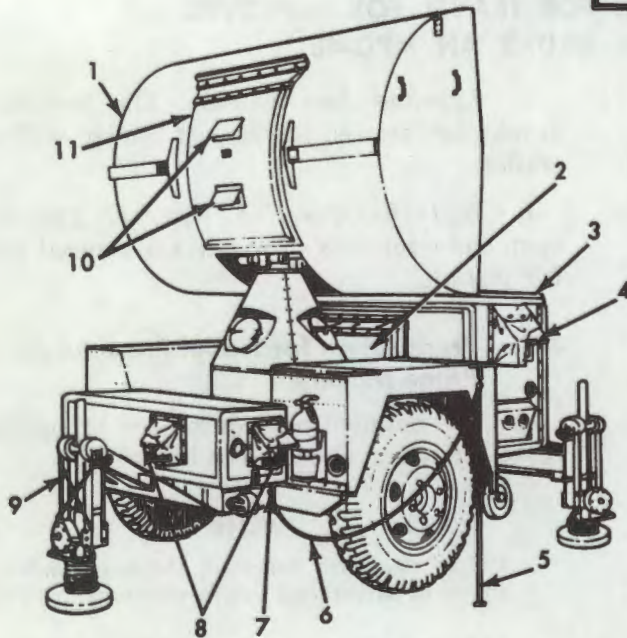
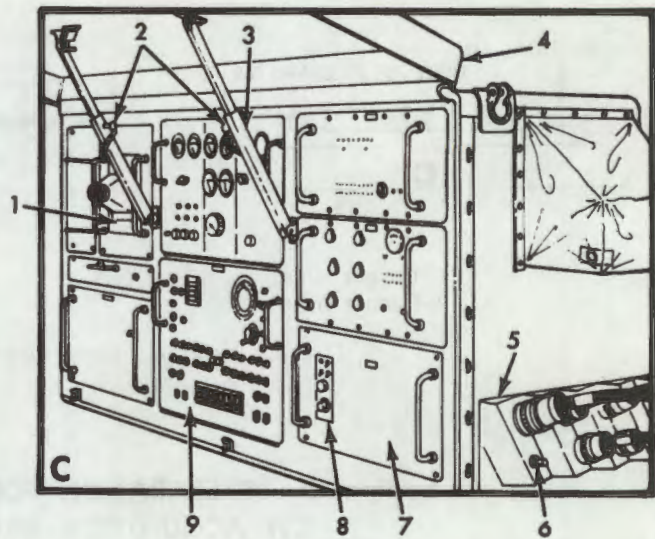
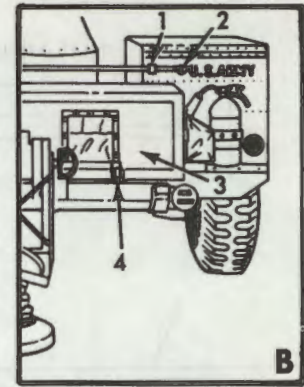
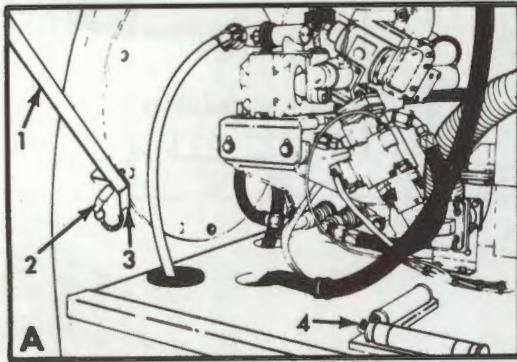
a. The detailed procedures for preparing the ICWAR for travel are given below.

NOTE

Unless otherwise indicated, the key numbers shown in parentheses below refer to figure 3-5.

(1) Set the antenna SAFETY SWITCH (C6) to the SAFE position.

(2) Deenergize the ICWAR (TM 9-1430-528-12-1).



MI 70498

Figure 3-5. ICWAR—preparation for travel and emplacement.

- 1—Antenna
- 2—Air vent cover
- 3—Radar set group cabinet
- 4—Air vent cover (2)
- 5—Ground rod
- 6—Ground rod cable
- 7—Ground rod cable attach point
- 8—Air vent cover (3)
- 9—Rear leveling jack
- 10—Air vent cover (2)
- 11—Receiver-transmitter cabinet cover

A

- 1—Receiver-transmitter cabinet cover support arm
- 2—Quick-disconnect pin
- 3—Support bracket
- 4—Spirit levels

B

- 1—Ground rod stow bracket
- 2—Ground rod
- 3—Motor generator
- 4—Fastener (4)

C

- 1—Azimuth speed indicator hood
- 2—Quick-disconnect pins
- 3—Radar set group cabinet cover support arms
- 4—Radar set group cabinet cover
- 5—Cable entry panel
- 6—Antenna SAFETY SWITCH
- 7—Communications panel
- 8—Communication station
- 9—Fuse and control panel

D

AZIMUTH STOW lock

Figure 3-5—Continued.

(3) Disconnect all power and data cables, and cap the connectors and receptacles with the protective caps provided.

(4) Secure the antenna protective cover on the antenna (9 and 2, fig. 3-6) with the cords (2, fig. 3-7).

(5) Manually rotate the antenna so that it faces the road side of the trailer.

(6) Engage the AZIMUTH STOW lock (D).

(7) Close and secure the air vent covers (2 and 4).

(8) Close and secure the air vent covers (8 and 10).

(9) Close and secure the air vent cover (B2, fig. 3-8).

(10) Fold the protective covers of the air vent covers (4 and 8) flat, and secure them.

(11) Disconnect the headset from the communication station (C8) and stow the headset behind the communications panel (C7).

(12) Remove the azimuth and speed indicator (ASI) hood (C1) from the ASI scope and stow it in the left fender well.

(13) Insure that all chassis drawers and panels in the radar set group are secure.

(14) Insure that the pedestal elevation angle shim (fig. 3-9) not being used is stored and secured in the radar set group cabinet cover.

(15) Close and secure the radar set group cabinet cover (C4).

(16) Disconnect the ground rod cable from the ground rod cable attach point and the ground rod. Stow the ground rod cable in the right-rear fender well.

NOTE

In batteries equipped with the stake puller kit (fig. 3-10) omit step (17) and perform steps (18) and (19) below.

(17) Pull the ground rod out of the ground and stow it in the designated ground rod stow brackets (B1).

(18) Remove the ground rod as described in (a) through (g) below.

NOTE

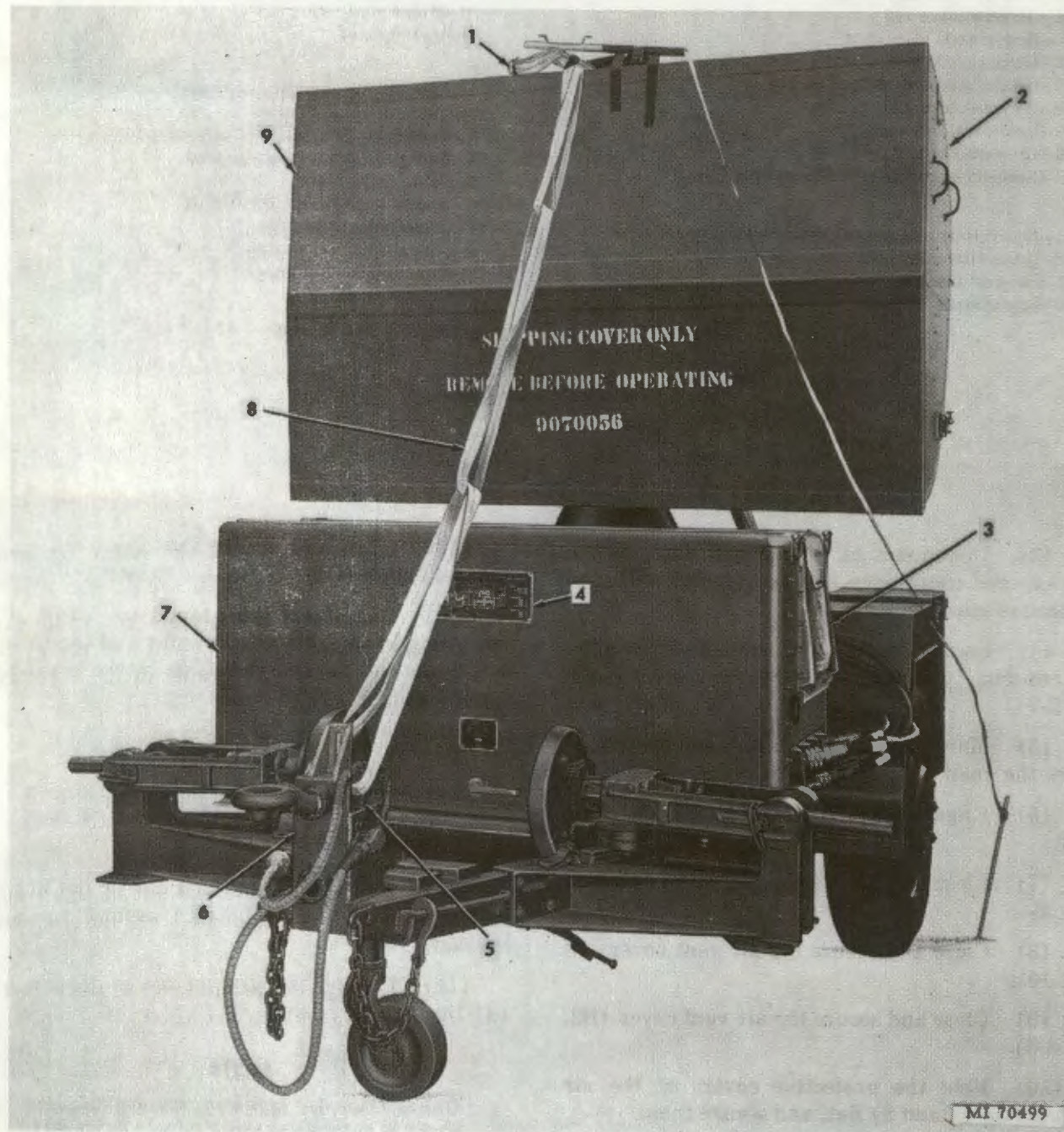
Unless otherwise indicated, the key numbers shown in parentheses below refer to figure 3-11.

(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.

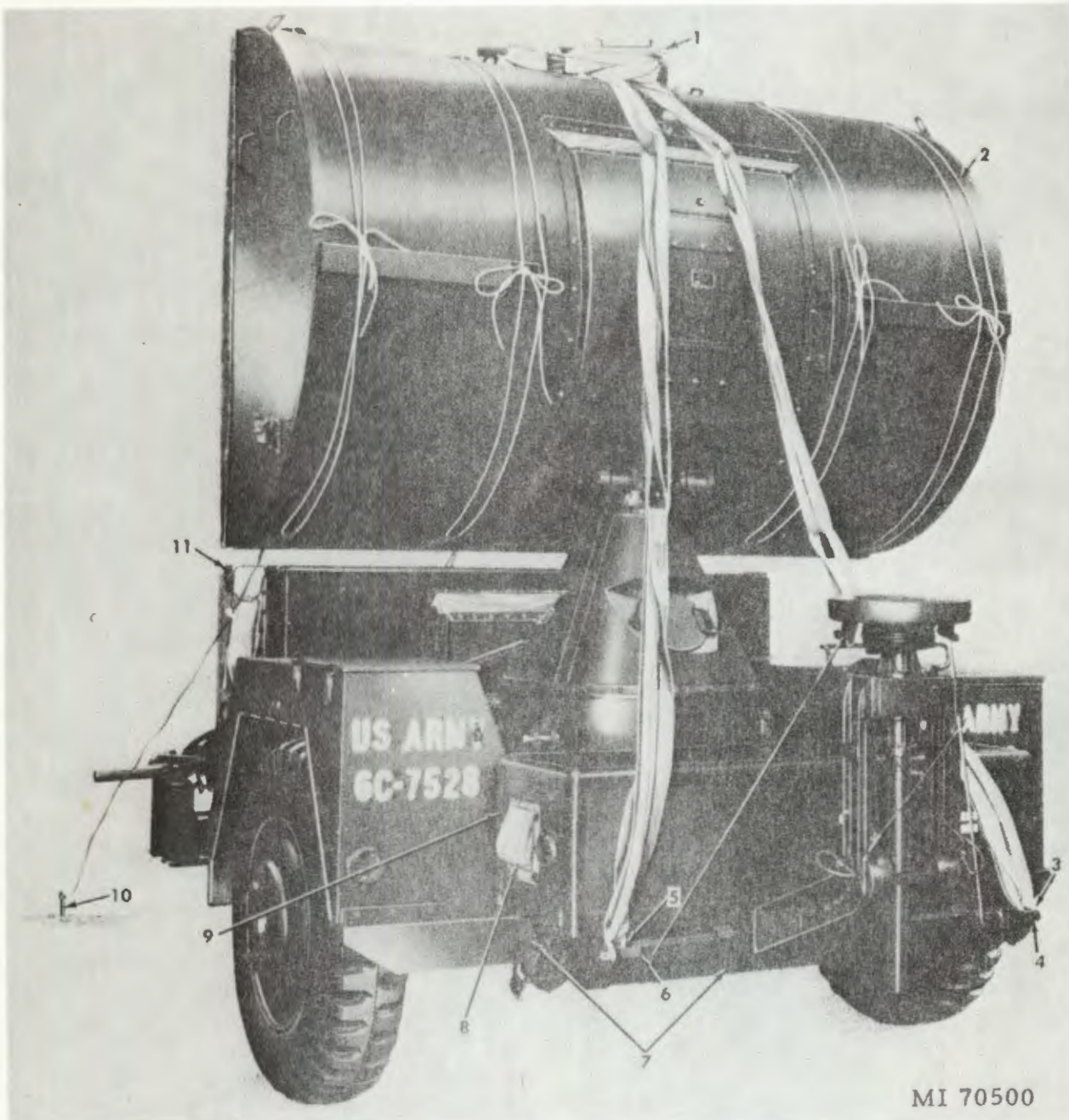
(c) Place the ground rod grip (3) on the ground rod (4) and secure the latch.

(d) Attach the cable yoke to the eye of the grip.



- 1—Suspension sling assembly
- 2—Antenna
- 3—Protective cover
- 4—Placard
- 5—Forward lift point
- 6—Lunette housing
- 7—Radar set group cabinet cover
- 8—18-Foot suspension sling
- 9—Antenna protective cover

Figure 3-6. ICWAR—suspension sling assembly secured for helicopter pickup—front view.



MI 70500

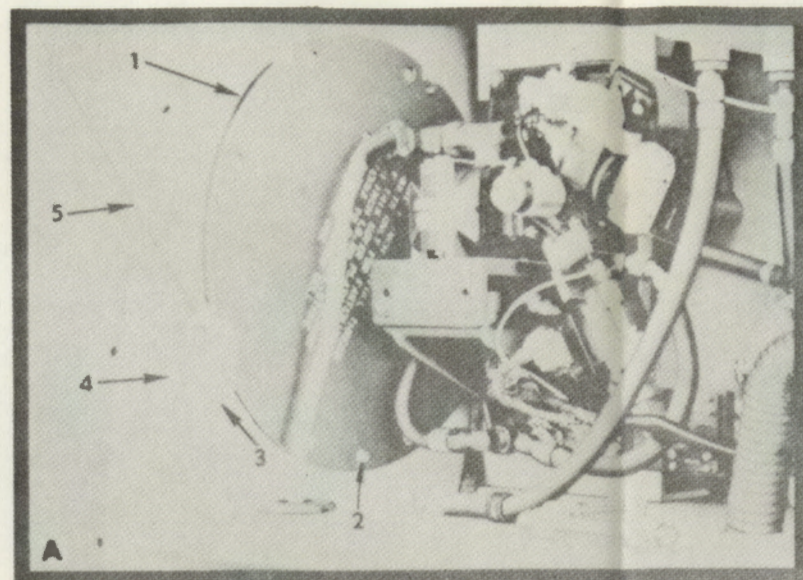
- 1—Grounding device
- 2—Antenna cover cords
- 3—Right-rear clevis
- 4—Right-rear lift point
- 5—Left-rear clevis
- 6—Left-rear lift point

- 7—Snap fastener
- 8—Protective cover
- 9—Motor-generator assembly
- 10—Ground rod
- 11—Radar set group cabinet

Figure 3-7. ICWAR—suspension sling assembly secured for helicopter pickup—rear view.

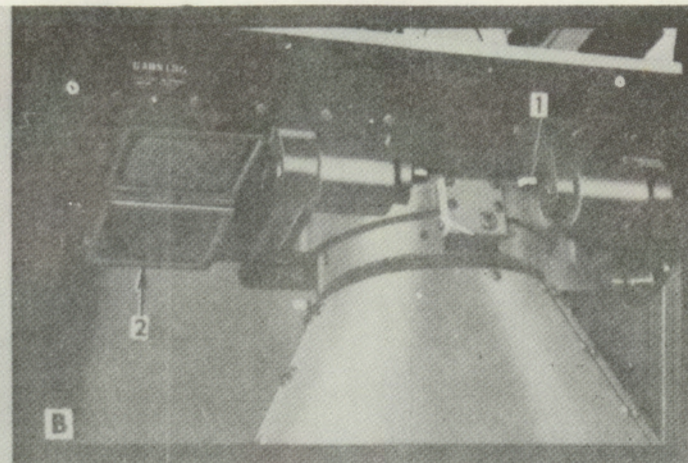
A

- 1—Antenna base cover plate
- 2—Hexagon-head capscrew (3)
- 3—Support bracket
- 4—Quick-disconnect pin
- 5—Receiver-transmitter cabinet cover support arm



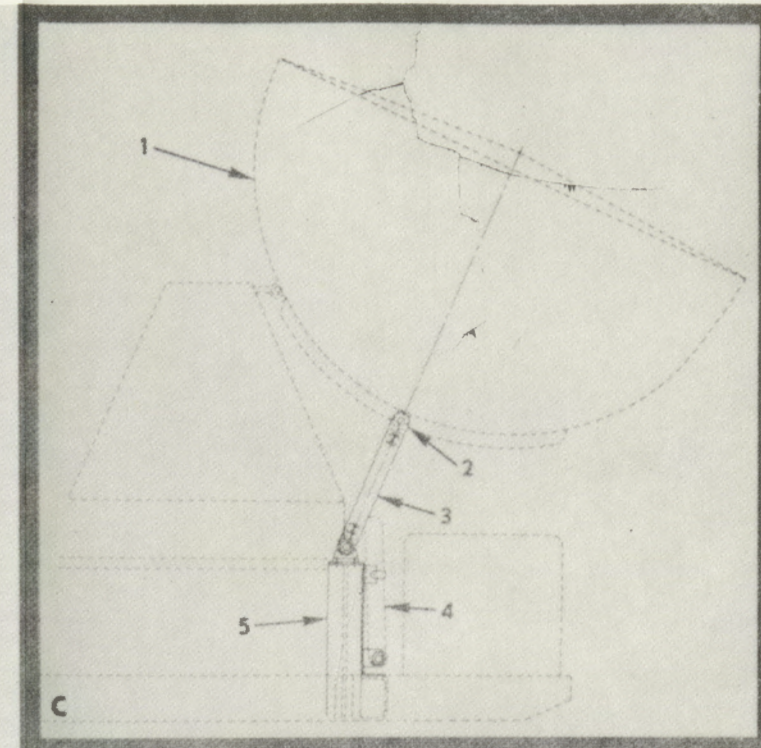
B

- 1—2-Inch hexagon-head capscrew (8)
- 2—Air vent cover



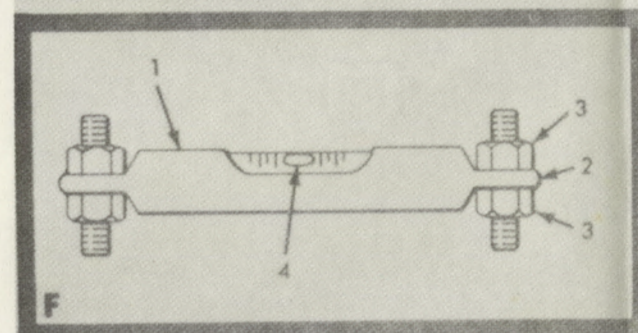
C

- 1—Antenna
- 2—Antenna stow lug
- 3—Antenna support arm (emplaced)
- 4—Antenna support arm (stowed)
- 5—Eye pad (support arm)



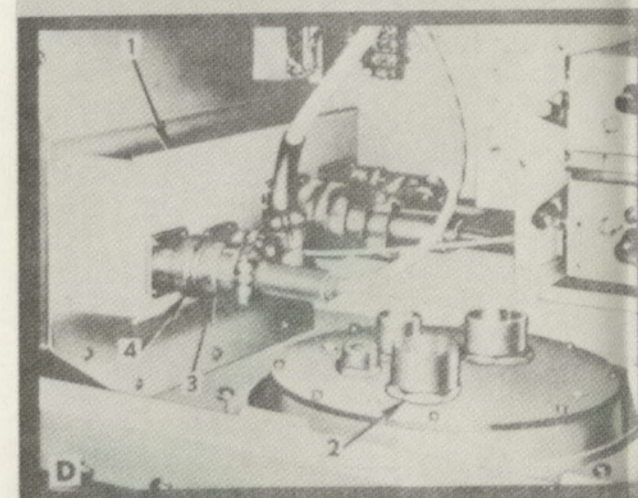
D

- 1—Dummy receptacle stow bracket
- 2—Pedestal electrical connector receptacle (4)
- 3—Pedestal electrical connector
- 4—Dummy receptacle



E

- 1—Antenna base cover plate
- 2—Cover plate
- 3—Pedestal



F

- 1—Level vial
- 2—Level stud
- 3—Locking nuts
- 4—Bubble

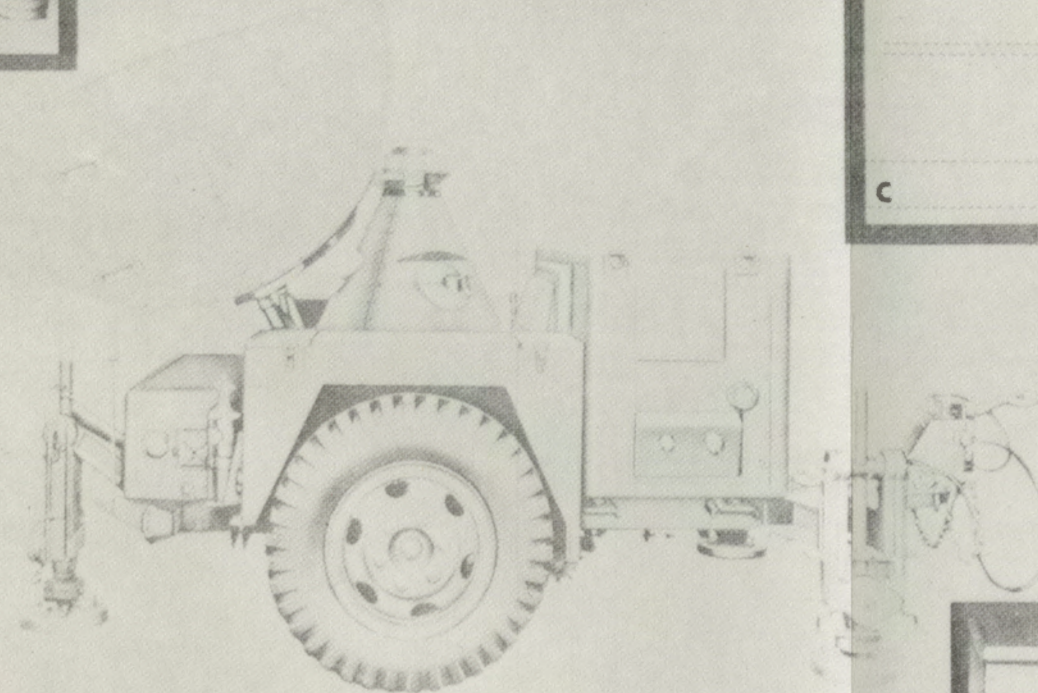
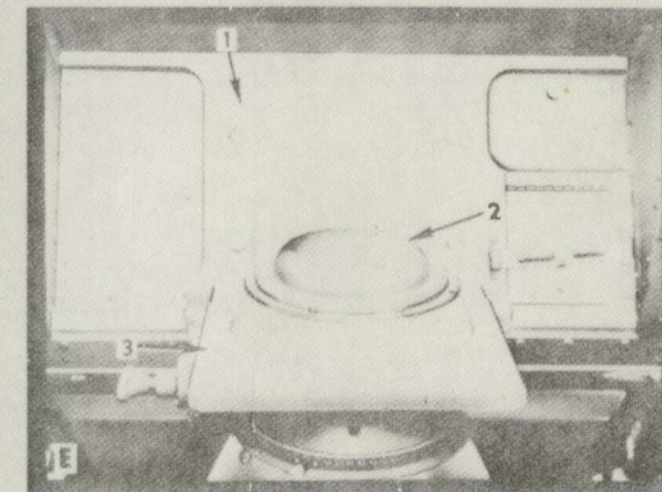


Figure 3-8. ICWAR—antenna stowing and raising.

MI 70501

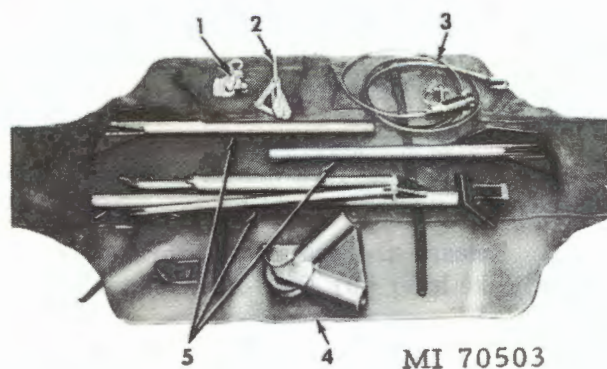


Figure 3-9. Storage location of the elevation angle shim for the ICWAR pedestal.

(e) Insure that other tripod pad is directly under 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, attach the grip of the ground rod, and back off the vehicle once more.



- 1-Ground rod grip
- 2-Straight-jawed grip
- 3-Retrieving cable
- 4-Pulley
- 5-Tripod (disassembled)

Figure 3-10. Stake puller kit.

(19) Stow the ground rod in the designated ground rod stow brackets (B1, fig. 3-5).

NOTE

If the ICWAR all-weather shelter is emplaced, refer to TM 10-8340-203-13 for the preparation for travel procedures.

b. The detailed procedures for preparing the M514 trailer, which supports the ICWAR and the IROR for travel, are as follows

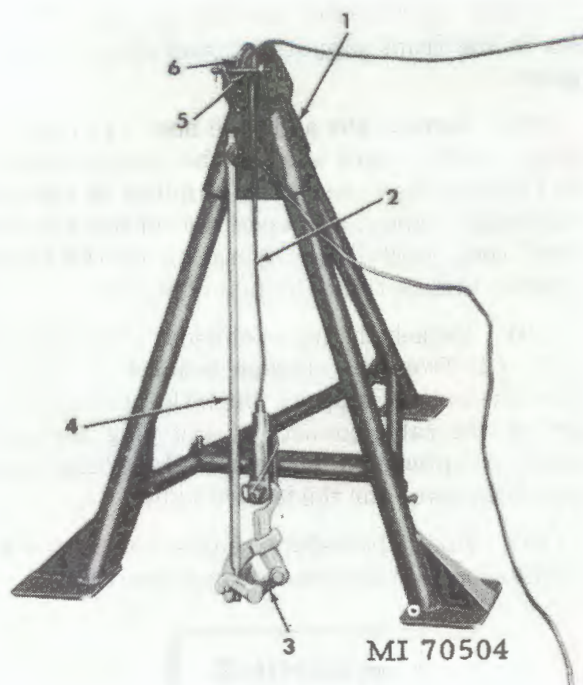
WARNING

Insure that the front support (6, fig. 3-12) is locked in the down position, and set the handbrakes.

NOTE

Unless otherwise indicated, the key numbers shown below in parentheses refer to figure 3-12.

(1) Obtain the three leveling jack cranks (D1) from the fender well and install them on the three leveling jack crankshafts (D3).



- 1-Tripod
- 2-Retrieving cable
- 3-Ground rod grip
- 4-Ground rod
- 5-Cable restraining pin
- 6-Pulley

Figure 3-11. Removal of ground rod.

(2) Retract the rear leveling jack (D2) until the weight of the trailer rests on the tires and the front leveling jacks, and the rear leveling jack is just clear of the ground.

(3) Open the pintle hook (E3) on the prime mover by removing the pintle hook locking pin (E1) and lifting the spring-loaded T-bar latch (E2).

(4) Position the prime mover so that the pintle hook is directly below the lunette (E4).

(5) Engage the lunette on the open pintle hook by retracting the front leveling jacks.

(6) Close the pintle hook and insert the pintle hook locking pin.

(7) Raise the trailer front support by performing the following steps.

(a) Remove the gravity pin (B3) from the frame support bracket (B1).

(b) Withdraw the spring-loaded locking pin (C1) in the upper section of the front support leg (B2).

(c) Lift the front support to the stow position, and allow the spring-loaded locking pin to spring back into the locking hole.

(d) Install the gravity pin through the holes in the front support leg and frame support bracket.

(8) Remove the airbrake hose (4) from the bracket on the right side of the lunette support (3). Connect the hose to the coupling at the rear of the prime mover, and open the service coupling shutoff cock, permitting operation of the trailer hydraulic brakes from the prime mover.

(9) Detach the intervehicular cable plug assembly (2) from the storage bracket on the left side of the lunette support. Open the spring-loaded cover on the cable connector, and plug the cable into the receptacle on the rear of the prime mover to provide power for the trailer lights.

(10) Hook the safety chains (5) to the appropriate loops at the rear of the prime mover.

WARNING

For the safety of personnel, use the leveling jack handgrip (12) when raising or lowering the leveling jacks.

(11) Retract the two front leveling jack as-

semblies (11) completely, using the leveling jack cranks. Remove the leveling jack cranks from the jack crankshafts (13) and stow them in the left fender well (1).

CAUTION

To prevent damage to the leveling jack, hold the spring-loaded retaining pins (10) out until the jack pad is all the way up. This procedure must be followed or the jack arm could break at the leveling jack pivot.

(12) Pull out the two spring-loaded retaining pins (10) for each of the two front leveling jacks. Rotate each jack upward by pulling on the leveling jack handgrip (12) and rest the leveling jacks on the pad and strap assembly (8). Secure each leveling jack with its strap.

(13) Pull out the spring-loaded retaining pins (A3) on the rear leveling jack; rotate the leveling jack upward to its vertical position and lock it by allowing the retaining pins to spring into the locking holes.

NOTE

When the ICWAR and IROR antennas are in the stowed position, the rear leveling jack (9, fig. 3-5) must be stowed in the alternate stow position (45 degrees from the vertical), completely retracted, as shown on the placard (4, fig. 3-6) on the radar set group cabinet cover. When the rear leveling jack is in the alternate stow position, step (14) below is not performed, and the stay bars (A2) are crossed over the jack support frame.

(14) Position the two stay bars (A2) to the rear leveling jack pad (A1), and turn the leveling jack crank clockwise to increase the tension on the stay bars.

(15) Remove the jack handle and stow it in the left fender well.

(16) Release the trailer handbrakes using the handbrake lever (9) (one on each side of the A-frame).

c. Prior to leaving the area, the following checks should be made:

(1) The antenna SAFETY SWITCH is in the SAFE position.

(2) All cables are disconnected and the connectors and receptacles properly capped.

(3) The protective cover is properly installed on the antenna.

- 1-Left fender well
- 2-Intervehicular cable plug assembly
- 3-Lunette support
- 4-Airbrake hose
- 5-Safety chain
- 6-Front support
- 7-Lifting handle
- 8-Pad and strap assembly
- 9-Handbrake lever
- 10-Spring-loaded retaining pin
- 11-Front leveling jack assembly
- 12-Jack crankshaft

- A**
- 1-Rear leveling jack pad
 - 2-Stay bar
 - 3-Spring-loaded retaining pin
 - 4-Leveling jack handgrip

- B**
- 1-Frame support bracket
 - 2-Front support leg
 - 3-Gravity pin

- C**
- 1-Spring-loaded locking pin

- D**
- 1-Leveling jack crank
 - 2-Rear leveling jack
 - 3-Leveling jack crankshaft

- E**
- 1-Pintle hook locking pin
 - 2-Spring-loaded T-bar latch
 - 3-Pintle hook
 - 4-Lunette

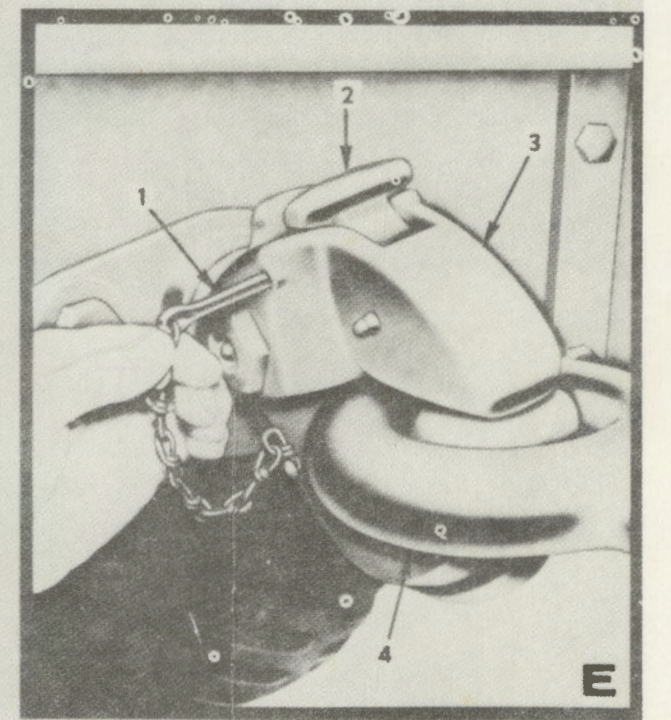
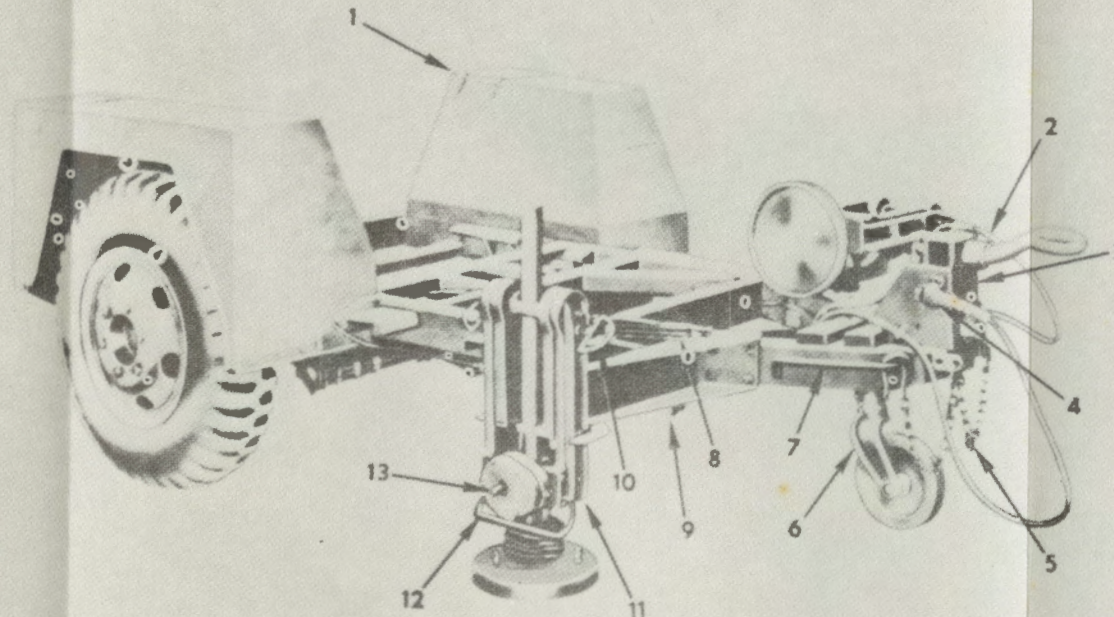
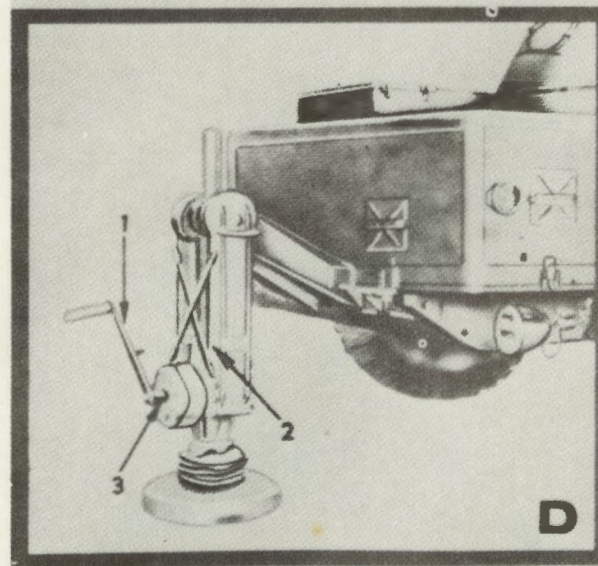
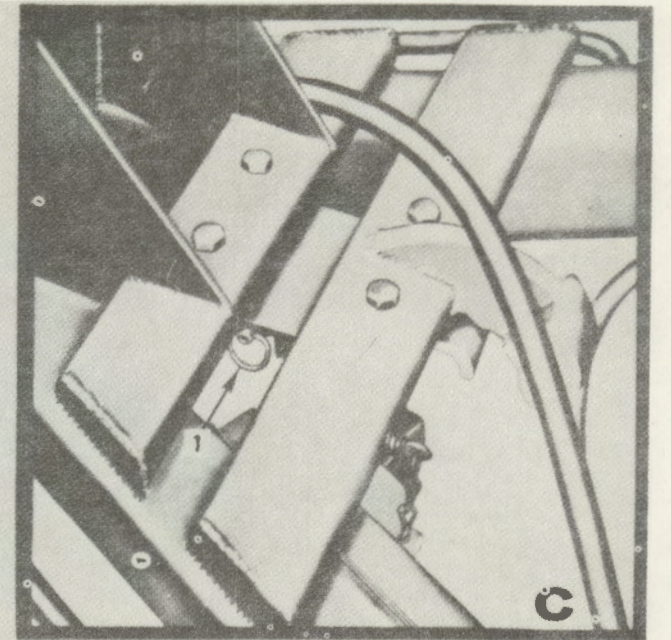
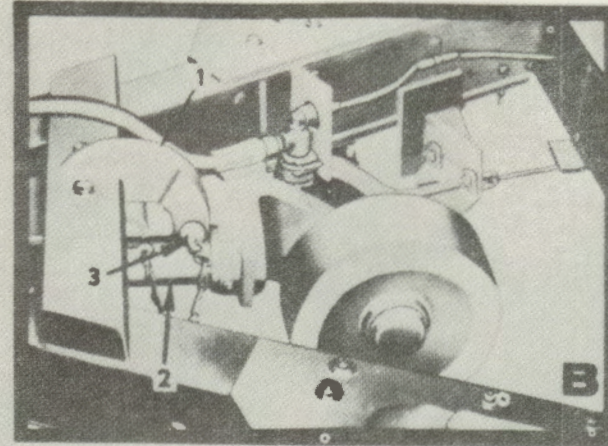
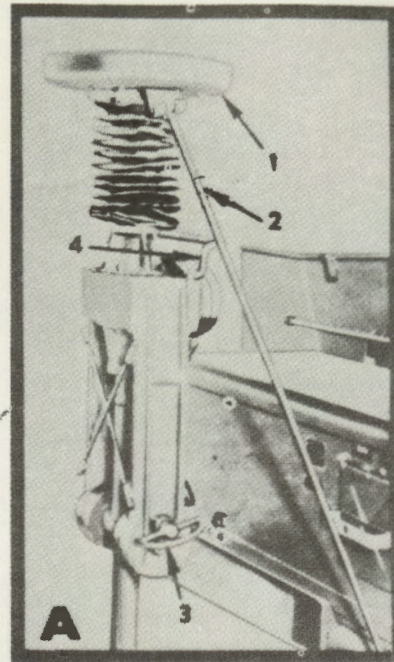


Figure 3-12. Trailer M514—preparation for travel and emplacement.

MI 70505

- (4) The AZIMUTH STOW lock is engaged.
- (5) All cabinet and vent covers are secured.
- (6) The protective covers are folded and secured.
- (7) All accessories are properly stowed in the fender wells.
- (8) The fender well covers are secured.
- (9) The ground rod is properly secured.
- (10) The front support jack is properly stowed.
- (11) The leveling jacks are properly stowed.
- (12) The trailer is connected properly to the prime mover.
- (13) The trailer lights are working properly.
- (14) The handbrakes are released.
- (15) The trailer brakes are working. (Move the prime mover a short distance and then stop.)

3-8.1. Preparation for Travel Procedure — ICWAR Cabled Directly to the IBCC

a. The detailed procedures for preparing the ICWAR for travel when cabled directly to the IBCC are as follows:

- (1) Perform the procedures of paragraph 3-8.
- (2) Reconnect the wire to 3A4A3A1-E1 previously disconnected (par. 4-7.1).
- (3) Reconnect the wire to 3A4A3A3TB2-11 previously disconnected (par. 4-7.1).
- (4) In the control indicator panel remove the jumper previously connected between 3A4A5S4-A2 and 3A4A5S4-A3.

b. Proceed to paragraph 3-48 for cable retrieving instructions.

3-9. Preparation for Travel Procedures — Helicopter

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the ICWAR by helicopter consists of twelve 8-foot web loops (7, fig. 3-1), three 4-foot web loops (6, fig. 3-1), and one 10-inch web ring (9, fig. 3-1). Four 8-foot web loops and one 4-foot web loop are daisy-chained (fig. 3-2) together to form an 18-

foot suspension sling for each of the three lift points (5, fig. 3-6; 4 and 6, fig. 3-7). For detailed procedures, refer to c below.

b. Prepare the ICWAR for helicopter lift by performing the steps described below.

(1) Lower the trailer front support as follows.

(a) Remove the gravity pin (B3, fig. 3-12) that secures the front support in the stow position.

(b) Pull the spring-loaded locking pin (C1, fig. 3-12) and lower the front support to an upright position.

(c) Release the spring-loaded locking pin to lock the front support in place.

(d) Replace the gravity pin in the frame support bracket.

(2) To prepare the ICWAR for travel, refer to paragraph 3-8a, b(1), (2) and (11) through (16), and c(1) through (8), (11), and (14).

(3) Locate the ICWAR so that the lunette is downwind, and chock the trailer wheels.

(4) Release the four snap fasteners (7, fig. 3-7) on the rear and ends of the motor-generator assembly (9, fig. 3-7).

(5) Tape all the sharp edges around the forward lift point (5, fig. 3-6).

c. Prepare the ICWAR suspension sling assembly as follows.

WARNING

Inspect web loops before use for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment from breaking of the loop.

(1) Attach an 8-foot web loop (7, fig. 3-1) through the forward lift point (5, fig. 3-6) on the lunette housing (6, fig. 3-6).

(2) Daisy-chain (fig. 3-2) three 8-foot and one 4-foot web loops to the free ends of the 8-foot web loop attached to the forward lift point forming the forward 18-foot suspension sling (8, fig. 3-6).

(3) Attach the free ends of the forward 18-foot suspension sling to the 10-inch web ring (fig. 3-3).

(4) Attach an 8-foot web loop to the right-rear clevis (3, fig. 3-7) on the right-rear lift point (4, fig. 3-7).

(5) Daisy-chain three 8-foot and one 4-foot web loops to the free ends of the 8-foot web loop attached to the right-rear clevis forming the right-rear 18-foot suspension sling.

(6) Attach the free ends of the right-rear 18-foot suspension sling to the 10-inch web ring.

(7) Attach an 8-foot web loop to the left-rear clevis (5, fig. 3-7) on the left-rear lift point (6, fig. 3-7).

(8) Daisy-chain three 8-foot and one 4-foot web loops to the free ends of the 8-foot web loop attached to the left-rear clevis, forming the left-rear 18-foot suspension sling.

(9) Attach the free ends of the left-rear 18-foot suspensions sling to the 10-inch web ring.

(10) Place tape through the 10-inch web ring, over the loops, and around the knot formed by the web loops (fig. 3-3).

(11) Pull the suspension sling assembly up taut to the top of the antenna, and place tape around all web loops every 12 inches (fig. 3-3) from the top of the antenna to the 10-inch web ring.

(12) Tape the suspension sling assembly (1, fig. 3-6) to the top of the antenna to prevent entangling.

(13) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the major item (10, fig. 3-7).

(14) Place the grounding device (1, fig. 3-7) with the taped suspension sling assembly on top of the antenna.

(15) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lift, the following checks should be made:

(1) The ICWAR is prepared for travel.

(2) The trailer lunette is downwind.

(3) The front support is locked in the down position.

(4) The handbrakes are released and wheels chocked.

(5) The antenna is locked in the forward position.

(6) All sharp edges are taped in areas where suspension slings could contact equipment.

(7) The suspension sling is properly attached.

(8) The suspension sling assembly is taped for helicopter pickup.

(9) The grounding device assembly is properly installed.

e. The using organization may be required to perform the following helicopter hookup procedures for each major item.

WARNING

The hookup crew must wear protective devices consisting of helmet liner, shell, and goggles for protection against flying sand, dirt, dust, and debris.

WARNING

The hovering helicopter develops high static voltage in excess of 20,000 volts on the helicopter lifting hook (A1, fig. 3-13). Steps (1) through (7) must be performed in the exact sequence given to insure maximum safety to the hookup personnel.

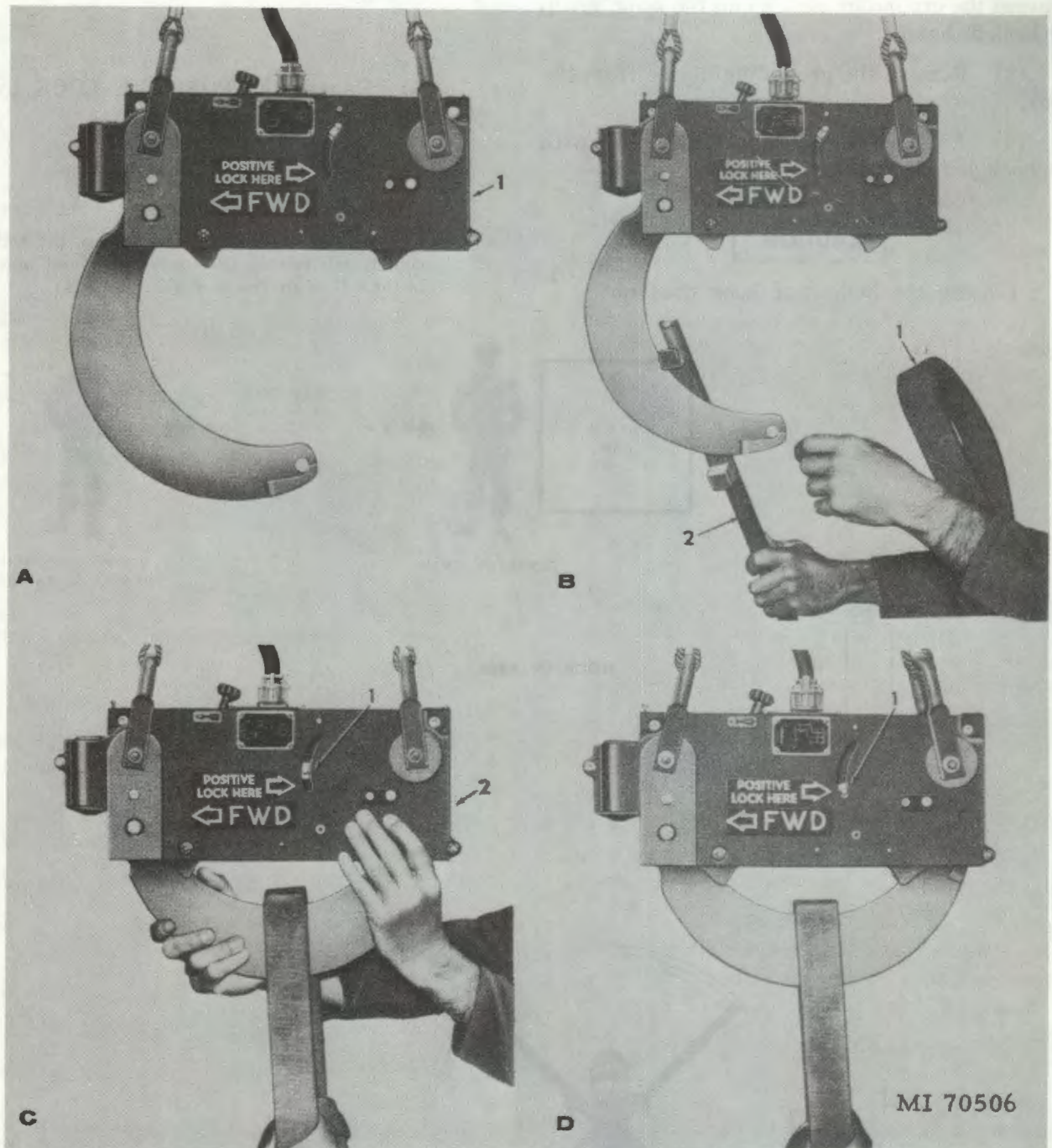
NOTE

Unless otherwise indicated, the key numbers shown below in parentheses refer to figure 3-12.

(1) The hookup crew takes a position on the major item so that the helicopter lifting hook (A1) can be grounded from the right and the 10-inch web ring of the suspension sling assembly (B1) put on the hook from the left (B).

WARNING

The helicopter lifting hook must be grounded, using the grounding device (B2), and the ground must be maintained until the hook is grasped by hand. If the hand grasp is released before hookup is completed, the hook must be grounded again before re-grasping the hook.



A
1-Helicopter lifting hook

B
1-10-Inch web ring
2-Grounding device

C
1-POSITIVE LOCK
2-Helicopter lifting hook-closed

D
1-POSITIVE LOCK-locked

Figure 3-13. Hookup of suspension sling assembly to helicopter lifting hook.

(2) Using the grounding device, ground the helicopter lifting hook. While maintaining contact between the grounding device and the hook, grasp the hook by hand.

(3) Remove the grounding device from the hook.

(4) Engage the 10-inch web ring (B1) with the hook and close the hook (C2).

CAUTION

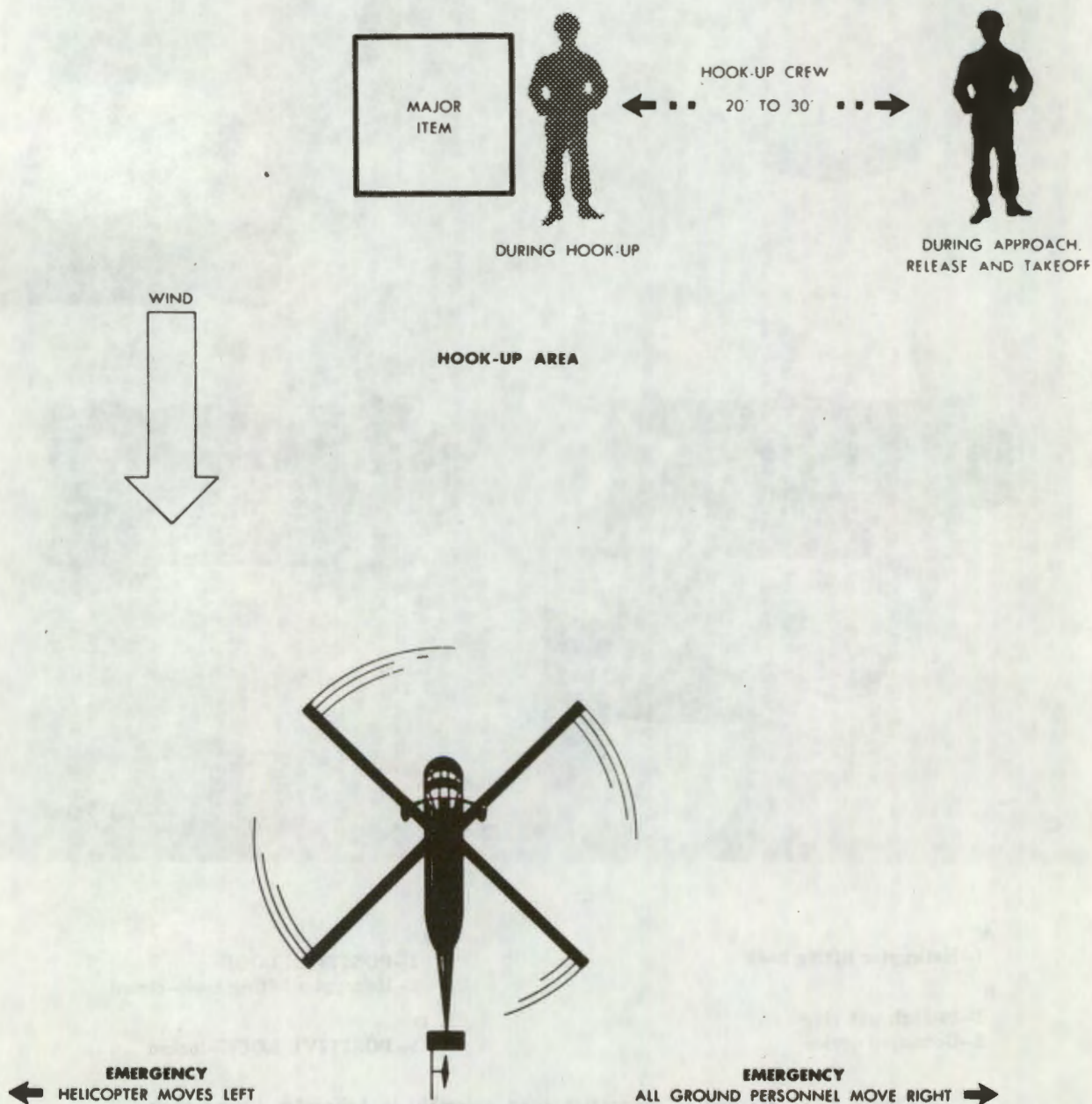
Closing the helicopter hook does not

lock it and care must be taken to insure that the POSITIVE LOCK (C1) is engaged.

(5) Engage the POSITIVE LOCK by depressing it fully downward (D1).

NOTE

In the event of aircraft malfunction, the helicopter will release the major item and move to the left of its line-of-flight (fig. 3-14).



MI 70507

Figure 3-14. Position diagram.

WARNING

To insure the safety of the hookup crew, step (6) below must always be performed at the completion of the hookup.

(6) The hookup crew must leave the major item to the right of the line-of-flight of the helicopter (fig. 3-14).

WARNING

The hookup crew must stay clear of the major item until it is airborne (fig. 3-14).

(7) Retrieve the grounding device assembly and return it to the storage bag.

3-10. Stowing the ICWAR Antenna

When the ICWAR is transported by cargo plane, it may be necessary, as a height requirement, to stow the antenna. The procedures for stowing the antenna are described below.

CAUTION

If the rear leveling jack (9, fig. 3-5) is in the stow position, it must be placed in the alternate stow position (45 degrees from the vertical), completely retracted, as shown on the placard (4, fig. 3-6) on the radar set group cabinet cover before performing step *a* below.

a. Close and secure the two air vent covers (10, fig. 3-5) on the back of the receiver-transmitter cabinet cover (11, fig. 3-5).

NOTE

Unless otherwise indicated, the figure references in parentheses in *b* through *m* below refer to figure 3-8.

b. Open the receiver-transmitter cabinet cover and attach the support arms (A5) to the support brackets (A3) with quick-disconnect pins (A4).

c. Disconnect the pedestal electrical connectors (D3) from the receptacles (D2) and connect them to the dummy receptacles (D4) on the dummy receptacle stow bracket (D1).

d. Remove the three hexagon-head capscrews (A2) and the antenna base cover plate (A1) from the inside of the receiver-transmitter group cabinet. Replace the three hexagon-head capscrews.

e. Close and secure the receiver-transmitter cabinet cover.

f. Engage the antenna AZIMUTH STOW lock (D, fig. 3-5).

g. Remove the antenna support arm from its stow position (C4).

h. Position the antenna support arm (C3) to the eye pad (C5) on top of the support arm. Secure with the same two hexagon-head bolts, washers, and nuts used for stowage of the antenna support arm.

i. Remove the two hexagon-head bolts, washers, and nuts from the top of the antenna support arm. Retain the hardware for use in step *k* below.

WARNING

Care must be taken to insure that the antenna will not tip over during step *j* below.

j. Remove the hexagon-head capscrews (eight 1 3/4-inch capscrews if uniform shim 10108032 is used or four 1-3/4 and four 2-inch capscrews if taper shim 9056233 is used) and flat washers (B1) which secure the antenna to the pedestal. Stow the capscrews in the right-rear fender well. Retain the flat washers for use in step *l* below.

k. Lower the antenna (C1) slowly. Engage the top of the antenna support arms (C3) to the antenna stow lugs (C2) on the antenna. Secure with the two hexagon-head bolts, washers, and nuts which were removed in step *i* above.

CAUTION

Insure that the antenna base cover plate is secured to the base of the antenna, using 1-inch hexagon-head capscrews and flat washers to prevent damage to the rf shield.

l. Obtain the 1-inch hexagon-head capscrews from the right-rear fender well and use them with the flat washers removed in step *j* above to secure the antenna base cover plate (A1) to the base of the antenna.

m. Remove the pedestal cover plate (E2) from the right-rear fender well, and position and secure

it to the pedestal (E3) with the four stud fasteners.

n. Secure the right-rear fender well cover.

o. Insure that the stay bars (A2, fig. 3-12) are crossed over the rear jack support frame.

Section IV. PREPARATION FOR TRAVEL FOR IMPROVED HIGH-POWERED ILLUMINATOR RADAR AN/MPQ-46

3-11. General

This section describes the preparation for travel procedures for the improved high-powered illuminator radar (IHIPIR) and its trailer by prime mover. Preparation for travel procedures by helicopter will be supplied later.

3-12. 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.

3-13. 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. 3-15) 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 (TM 9-1430-533-12-1).

(3) Disconnect all power and data cables, and cap the connectors and receptacles with the protective caps.

(4) Mount the protective covers (1, fig. 3-15) on the antenna, and secure them with the protective cover cords.

(5) Manually rotate the antenna so that it faces the desired stow position.

NOTE

Unless otherwise indicated, the key numbers shown below in parentheses refer to figure 3-16.

(6) Rotate the azimuth STOW lock (22) clockwise until the stow pin is fully engaged with the torque tube.

NOTE

Check for full pin engagement as follows:

(a) Using the stow wheel (rather than the stow wheel handle), rotate the wheel clockwise until a firm pin-to-torque tube engagement is assured. The antenna will move as the locking pin is seating if the stow pin is fully engaged.

(b) Manually check for full pin engagement, which prevents the antenna from moving in either direction.

(7) Lower the antenna to the lower mechanical limit. Engage the elevation STOW lock (12, fig. 3-15) by turning the handle clockwise. It may be necessary to move the antenna slightly in elevation to engage the lock.

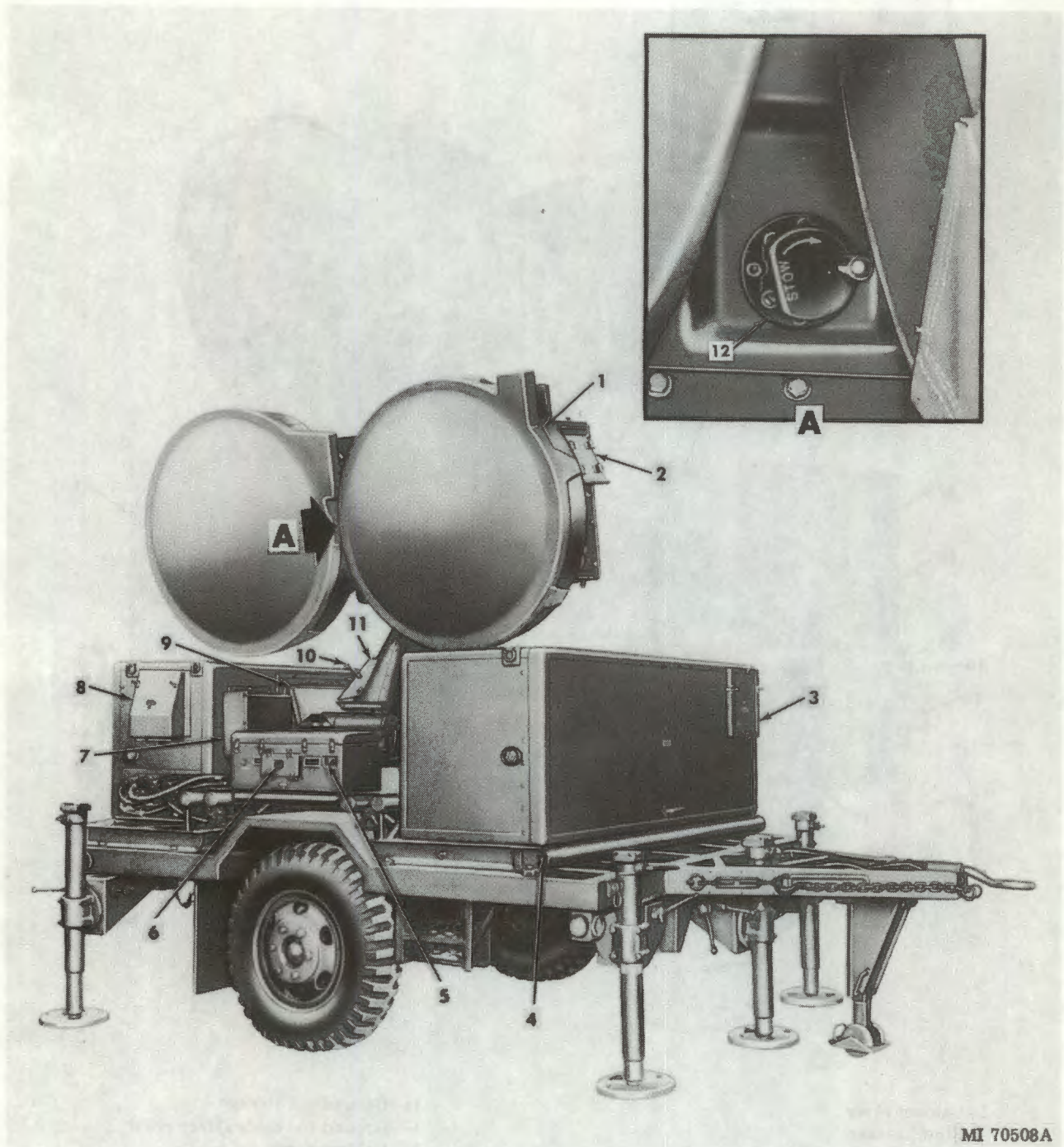
(8) Remove the exhaust air vent cover (2, fig. 3-15) from the stowed location on the exhaust air vent and secure it to the receiver compartment hood exhaust air vent.

(9) Disconnect the elevation motor exhaust cover (23) from the dummy receptacle (25) and connect it to the elevation motor exhaust (24).

(10) Close and secure the exhaust air vent cover on the rear of the liquid cooling cabinet (18).

(11) Close and secure the air intake cover (9, fig. 3-15) on the rear of the radar set group cabinet.

(12) Close and secure the pedestal intake cover (11, fig. 3-15).

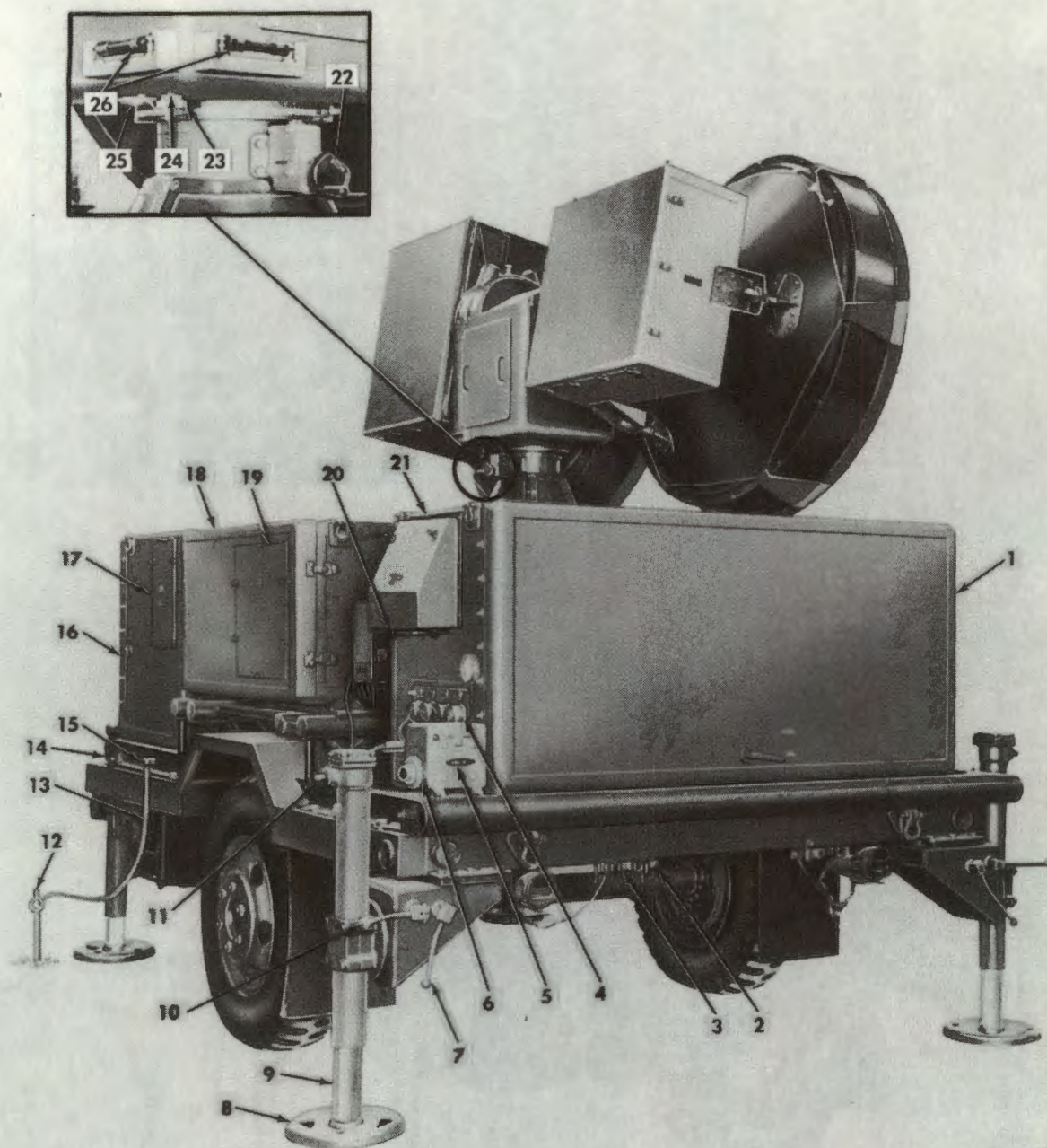


MI 70508A

- 1—Protective covers
- 2—Exhaust air vent cover
- 3—Transmitter door exhaust vent cover
- 4—Ground rod storage
- 5—PEDESTAL SAFETY SWITCH
- 6—Intake-exhaust vent cover

- 7—Headset storage box
- 8—Exhaust vent cover
- 9—Air intake cover
- 10—Lever
- 11—Pedestal intake cover
- 12—Elevation STOW lock

Figure 3-15. IHPIR preparation for travel and emplacement—right front view.



MI 70509A

- | | |
|--------------------------------------|----------------------------------|
| 1-Cabinet cover | 14-Ground rod storage |
| 2-Stow brackets | 15-Ground rod cable attach point |
| 3-Rear leveling jack crank | 16-Cabinet cover |
| 4-Cable entry panel | 17-Air intake vent cover |
| 5-Main power switch | 18-Liquid cooling cabinet |
| 6-Receptacle J1 | 19-Air intake vent cover |
| 7-Rear leveling jack horizontal lock | 20-Exhaust air vent cover |
| 8-Ground pad | 21-Radar set group cabinet |
| 9-Rear leveling jack | 22-Azimuth STOW lock |
| 10-Rear leveling jack vertical lock | 23-Elevation motor exhaust cover |
| 11-Crankshaft | 24-Dummy receptacle |
| 12-Ground rod | 25-Elevation motor exhaust |
| 13-Ground rod cable | 26-Spirit levels |

Figure 3-16. IHIPR preparation for travel and emplacement—left rear view.

(13) Remove and stow the intake-exhaust vent hood from the motor-generator assembly, and remove the intake-exhaust vent cover (6, fig. 3-15) from the stowed location and secure it to the motor-generator assembly.

(14) Remove and stow the transmitter cabinet intake vent hood, remove the intake cover (17, fig. 3-16) from the stowed location and secure it to the transmitter cabinet, and secure the exhaust cover to the transmitter door (3, fig. 3-15).

(15) Remove the exhaust vent cover from the stowed location and secure it to the hood on the rear of the transmitter set group cabinet.

(16) Remove the exhaust vent covers (8, fig. 3-15 and 20, fig. 3-16) from the stowed locations and secure them to the radar set group cabinet exhaust hoods.

(17) Remove the air intake vent cover from the stowed location on the rear of the antenna pedestal head, secure it to the liquid cooling cabinet air intake (19, fig. 3-16), and stow the hood.

(18) Disconnect the headset from the communication station located on the front panel of the 12.6-vdc power supply, and stow the headset in the headset storage box (7, fig. 3-15) on the rear of the radar set group cabinet.

(19) Secure all chassis drawers and panels in the radar set group and transmitter set group.

(20) Close and secure the cabinet covers (1 and 16).

(21) Remove the ground rod cable (14), from the ground rod cable attach point (15), and the ground rod (13).

NOTE

Refer to paragraph 3-8a(18) for the removal of the ground rod using the stake puller kit.

(22) Remove the ground rod.

(23) Stow the ground rod and the ground rod cable in the ground rod storage location (11).

b. The detailed procedures for preparing the M390 trailer, which supports the IHIPR, for travel, are as follows.

WARNING

Insure that the front support is locked

in the down position; that the hand-brake levers are set; and that the wheels are resting firmly on the ground.

(1) Remove the rear leveling jack cranks (3) from the stow brackets (2, fig. 3-16) and position them on the crankshafts (12) of the two rear leveling jacks.

(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 leveling jacks, and the front support jack.

NOTE

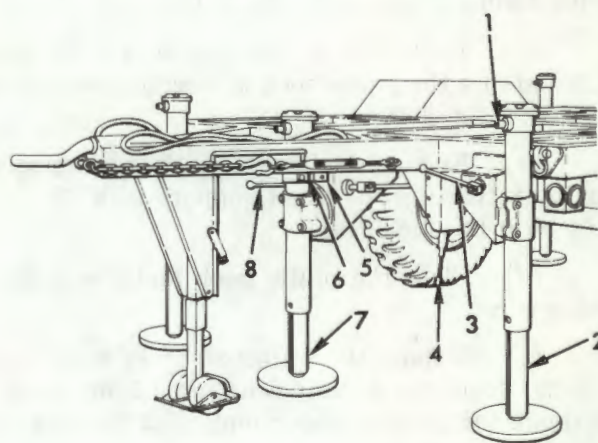
Unless otherwise indicated, the key numbers shown below in parentheses in steps (3) and (4) refer to figure 3-17.

(3) Stow each front leveling jack (2) as described in (a) through (e) below.

(a) Remove the leveling jack crank (6) from the stow bracket (5) on the A-frame and position it on the crankshaft (1).

(b) Turn the crank counterclockwise to retract the jack.

(c) Remove the jack crank.



MI 150668

- 1—Crankshaft
- 2—Front leveling jack
- 3—Front leveling jack vertical lock
- 4—Handbrake lever
- 5—Stow bracket
- 6—Leveling jack crank
- 7—Center leveling jack
- 8—Center leveling jack vertical lock

Figure 3-17. M390 trailer forward leveling jacks—preparation for travel and emplacement.

(d) Pull up and hold the front leveling jack vertical lock (3).

(e) Swing the jack upward until it is horizontal. Release the vertical lock.

(4) Position the jack crank on the center leveling jack crankshaft and turn it counterclockwise to retract the jack. Stow the center leveling jack (7) as described below.

(a) Remove the leveling jack crank (6) from the stow bracket (5) on the A-frame, and position it on the center leveling jack crankshaft. Turn the jack crank counterclockwise to retract the center leveling jack.

(b) Remove and stow the jack crank.

(c) Pull up and hold the center leveling jack vertical lock.

(d) Swing the jack sideways and upward to a horizontal position. Release the vertical lock.

(e) Pull up and hold the center leveling jack vertical lock (8).

(f) Swing the jack beneath the trailer. Release the horizontal lock.

(5) Connect the trailer to the prime mover as described below.

(a) Open the pintle hook on the prime mover by removing the locking pin and lifting the spring-loaded T-bar latch (fig. 3-18).

(b) Back the prime mover up to the trailer so that the pintle hook is directly under the lunette (4, fig. 3-18).

(c) Engage the lunette on the open pintle hook by retracting the front support jack (3, fig. 3-19) with the jack crank.

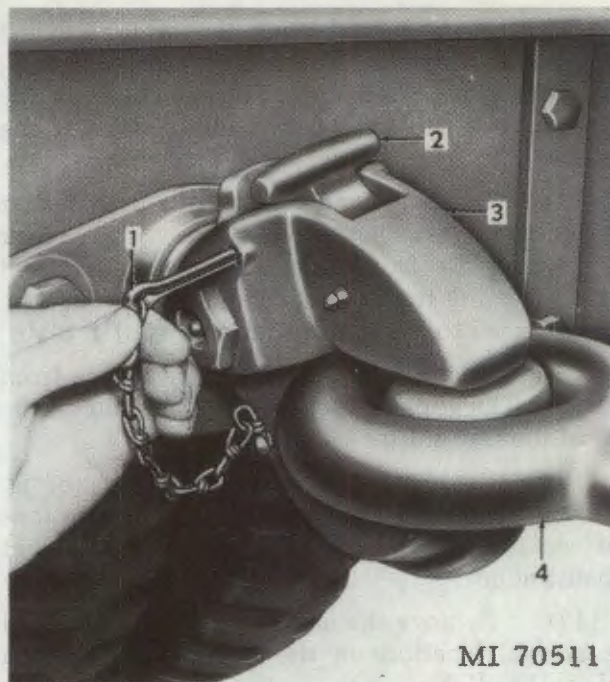
(d) Close the pintle hook and insert the locking pin.

(e) Remove the trailer airbrake hose (3), fig. 3-20) from the dummy coupling (2, fig. 3-20) 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.

(g) Remove the intervehicular cable (4, fig. 3-20) from the stowage clip (5, fig. 3-20) and plug it into the receptacle on the rear of the prime mover.

(h) Hook the safety chains (6, fig. 3-20) to the appropriate loops at the rear of the prime mover.



MI 70511

- 1-Pintle hook locking pin
- 2-Spring-loaded T-bar latch
- 3-Pintle hook
- 4-Lunette

Figure 3-18. Connecting trailer to prime mover.

(6) Stow the front support jack (3, fig. 3-19) as described below.

(a) Fully retract the jack with the jack crank.

(b) Place the jack crank in the stowage clip.

(c) Lock the front support jack in the stow position by pulling the spring-loaded frame handle (1, fig. 3-19), and using the jack handle (4, fig. 3-19) 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. 3-20).

NOTE

Unless otherwise indicated, the key numbers shown in parentheses below refer to figure 3-16.

(7) Stow each of the two rear leveling jacks as described below.

(a) Fully retract the jack with the jack crank.

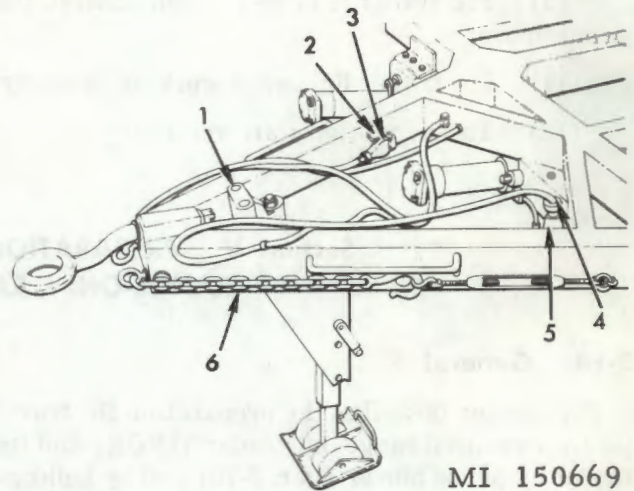
(b) Remove the jack crank and stow it in the stow bracket (2).

(c) Pull up and hold the vertical lock (10).

(d) Swing the ground pad (8) rearward and upward to the horizontal position. Release the vertical lock (10).

(e) Pull up and hold the horizontal lock (7).

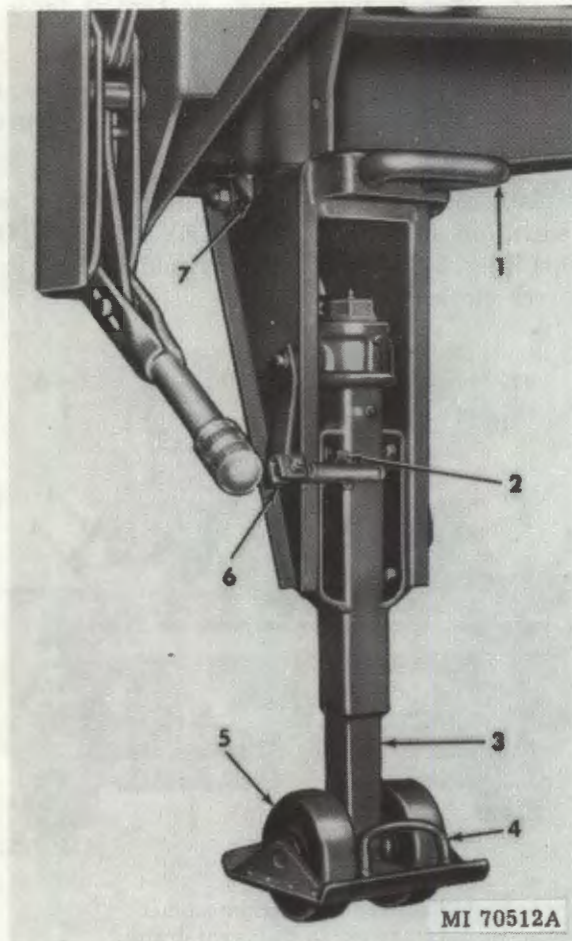
(f) Swing the jack horizontally until it is beneath the trailer. Release the horizontal lock.



MI 150669

- 1—Lunette mounting bracket
- 2—Dummy coupling
- 3—Airbrake hose
- 4—Intervehicular cable
- 5—Stowage clip
- 6—Safety chain
- 7—U-bolt

Figure 3-20. M390 trailer A-frame—preparation for travel and emplacement.



MI 70512A

- 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 3-19. M390 trailer front support jack—preparation for travel and emplacement.

(8) Release the handbrake levers (4, fig. 3-17) one 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.

(2) All cables are disconnected, and the connectors and receptacles properly capped.

(3) The antenna protective covers are properly installed.

(4) The antenna is facing to the desired side of the trailer.

(5) The azimuth and the elevation STOW locks are engaged.

(6) The IHIPR is properly secured to the trailer.

(7) All cabinet and vent covers are secured.

(8) The ground rod and ground rod cable are disconnected and properly stowed.

(9) The front support jacks, 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).

Section V. PREPARATION FOR TRAVEL FOR IMPROVED RANGE-ONLY RADAR SET AN/MPQ-51

3-14. General

This section describes the preparation for travel for the improved range-only radar (IROR) and its trailer by prime mover (par. 3-16) and by helicopter (par. 3-17).

3-15. Tools

The tools required to prepare the IROR for travel are a common screwdriver, a cross-recessed screwdriver, and a $\frac{3}{4}$ -inch open-end wrench.

3-16. Preparation for Travel Procedures — Prime Mover

a. The detailed procedures for preparing the IROR for travel are described below.

WARNING

To prevent injury to personnel working on or near the antenna, set the antenna SAFETY SWITCH (6, fig. 3-21) on the pedestal to SAFE.

- (1) Deenergize the IROR (TM 9-1430-529-12-1).
- (2) Disconnect all the power and data cables, and cap the connectors and receptacles with the protective caps.
- (3) Close and secure the two intake-exhaust air vent drawers (2 and 10, fig. 3-21), one on the receiver-transmitter cabinet (1, fig. 3-21) and one on the modulator power supply cabinet (11, fig. 3-21).
- (4) Manually rotate the antenna (1, fig. 3-22) to the maximum elevation angle.
- (5) Using care to avoid damage to the waveguide assembly (3, fig. 3-22), mount the antenna protective shipping cover (2, fig. 3-22) on the antenna.

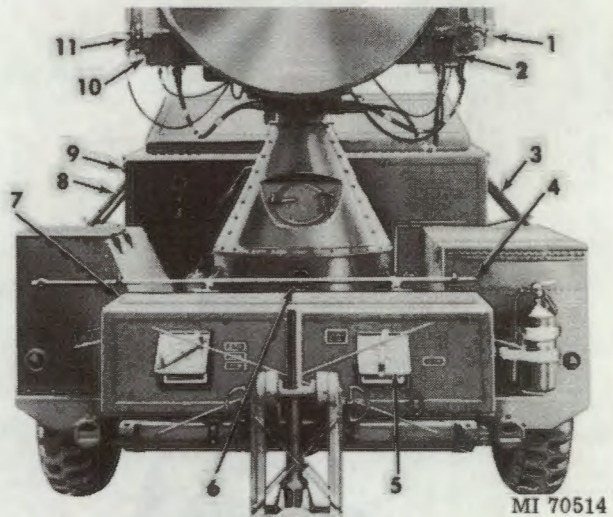
- (6) Secure the protective shipping cover by attaching the securing straps (5, fig. 3-22) to the inner ring on the back of the antenna.

- (7) Manually position the antenna to 0 degrees elevation.

- (8) Rotate the antenna so that it faces to the curb side of the trailer.

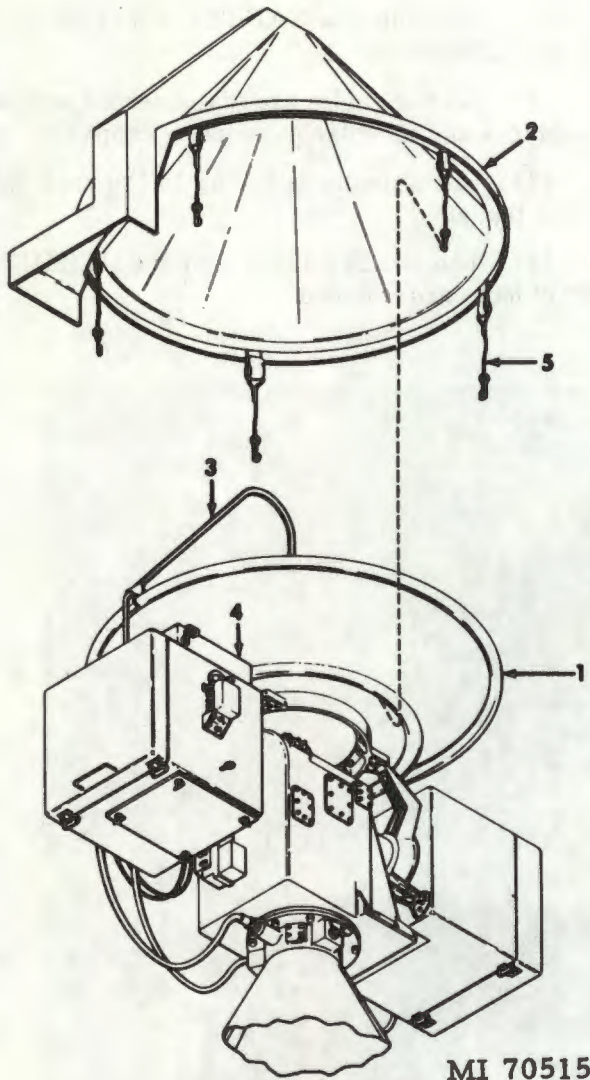
- (9) Engage the AZIMUTH STOW lock (3, fig. 3-23) by depressing and turning it 90 degrees clockwise.

- (10) Manually elevate the antenna to 0 mils in elevation and engage the ELEVATION STOW lock (1, fig. 3-23) by depressing and turning it 90 degrees clockwise.



- 1—Receiver-transmitter cabinet
- 2—Intake-exhaust air vent drawer
- 3—Air vent cover
- 4—Ground rod stow bracket
- 5—Air vent cover
- 6—Antenna SAFETY SWITCH
- 7—Motor-generator assembly
- 8—Air vent cover
- 9—Radar set group cabinet
- 10—Intake-exhaust air vent drawer
- 11—Modulator power supply cabinet

Figure 3-21. IROR air vent covers.



- 1-Antenna
- 2-Antenna protective shipping cover
- 3-Waveguide assembly
- 4-Air filter housing
- 5-Securing strap

Figure 3-22. Mounting the antenna protective shipping cover.

(11) Close and secure the air vent covers (3 and 8, fig. 3-21) on each side of the radar set group cabinet (9, fig. 3-21).

(12) Close and secure the four air vent covers (5, fig. 3-21) on the motor-generator assembly (7, fig. 3-21).

(13) Fold the protective covers (2 and 4, fig. 3-24) flat and secure with the turnlock fasteners on the radar set group cabinet and the motor-generator assembly.

(14) Insure that all chassis drawers and panels in the radar set group are secured.

(15) Remove the headset from the communication station (2, fig. 3-25) and stow the headset behind the communications stations panel (1, fig. 3-25).

(16) Close and secure the radar set group cabinet cover.

(17) Disconnect the ground rod cable (4) from the cable attach point (6) and the ground rod (3), and stow the cable in the left fender well (2), locating these items in fig. 3-26.

NOTE

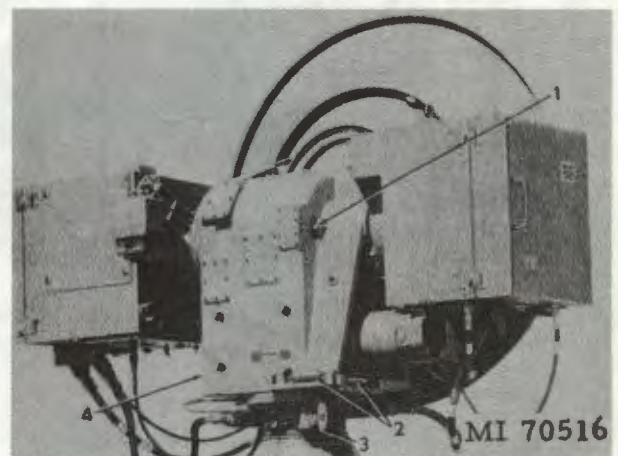
Refer to paragraph 3-8a(18) for removal of the ground rod using the stake puller kit.

(18) Pull the ground rod from the ground.

(19) Stow the ground rod in the ground rod stow brackets (4, fig. 3-21) on the rear of the trailer.

NOTE

If the IROR all-weather shelter is emplaced, refer to TM 10-8340-203-13 for the preparation for travel procedures.



- 1-ELEVATION STOW lock
- 2-Spirit levels
- 3-AZIMUTH STOW lock
- 4-Elevation head

Figure 3-23. IROR pedestal head.

NOTE

The IROR and ICWAR all-weather shelters are physically and functionally the same. The preparation for travel procedures are identical.

b. Refer to paragraph 3-8b for the preparation for travel procedures of the M514 trailer.

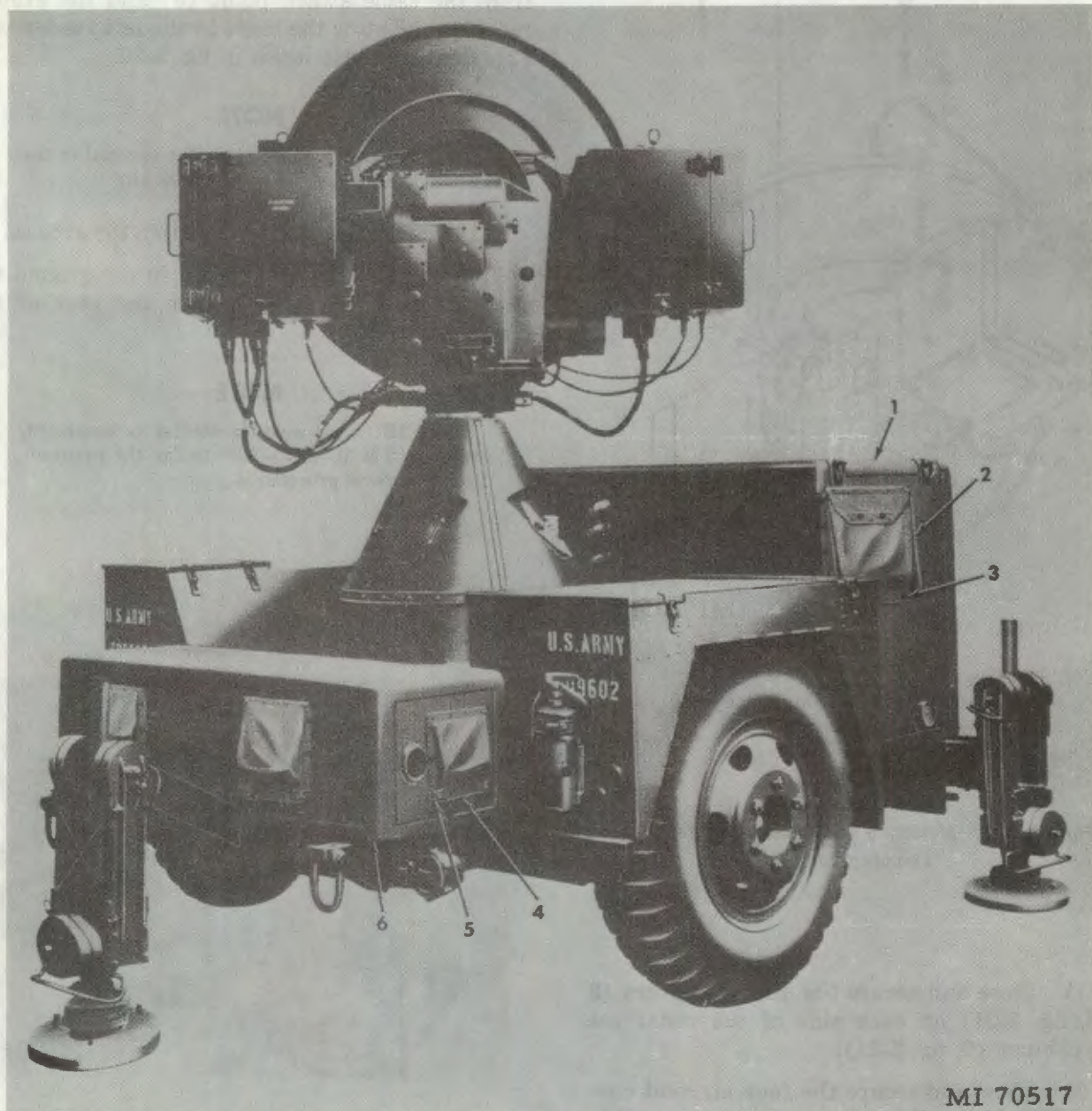
c. Prior to leaving the area, the following checks should be made:

(1) The antenna SAFETY SWITCH is in the SAFE position.

(2) All the cables are disconnected and the connectors and receptacles properly capped.

(3) The antenna is facing to the curb side of the trailer.

(4) The ELEVATION and the AZIMUTH STOW locks are engaged.



MI 70517

- 1-Radar set group cabinet
- 2-Protective cover (air vent)
- 3-Turnlock fastener

- 4-Protective cover (air vent)
- 5-Turnlock fastener
- 6-Motor-generator assembly

Figure 3-24. IROR protective covers folded.

- (5) All the cabinet and vent covers are secured.
- (6) The protective covers are folded and secured.
- (7) The accessories are properly stowed in fender wells.
- (8) The fender well covers are secured.
- (9) The ground rod is properly stowed.
- (10) The front support leg is properly stowed.
- (11) The leveling jacks are properly stowed.
- (12) The trailer is properly connected to the prime mover.
- (13) The trailer lights are working properly.
- (14) The handbrakes are released.
- (15) The trailer brakes are working (move the prime mover a short distance and then stop).

3-17. Preparation for Travel Procedures — Helicopter

- a. The helicopter lifting kit (fig. 3-1) is pro-

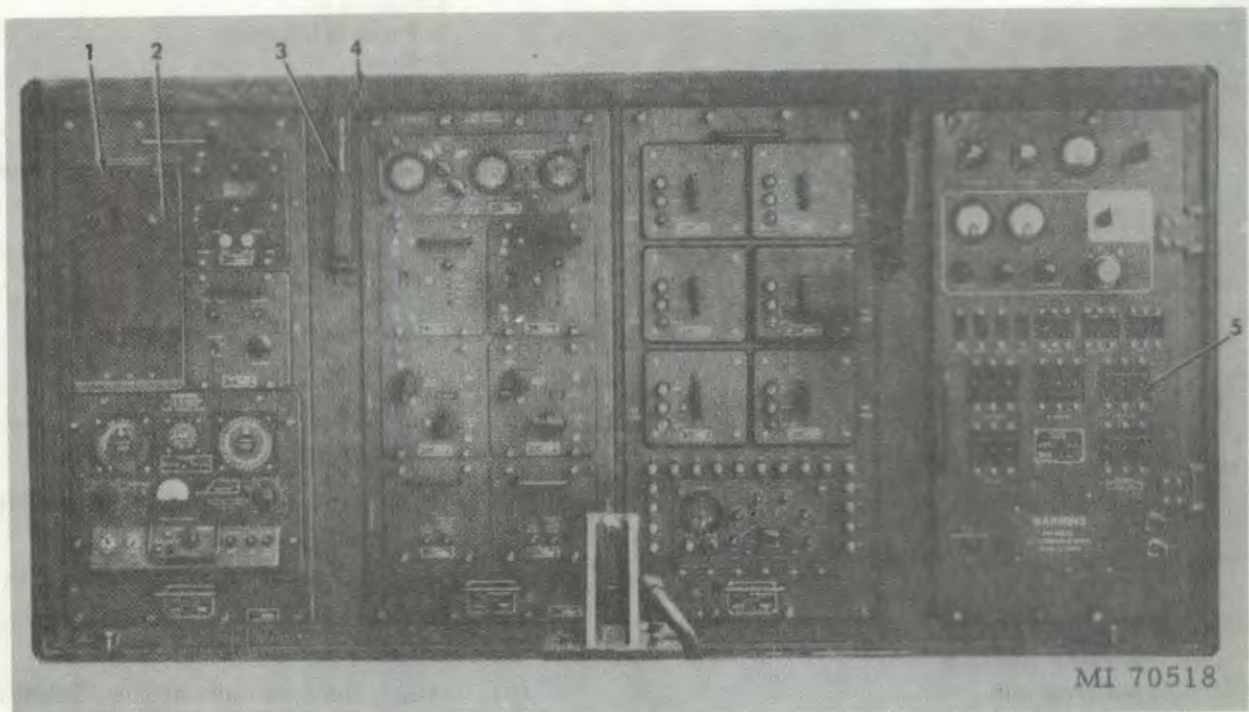
vided for each major item in the improved HAWK system. The kit contains the items required to form the suspension sling assembly for each major item. The suspension assembly, required to lift the IROR by helicopter, consists of nine 8-foot web loops (7), one 4-foot loop (6), and one 10-inch web ring (9) (see fig. 3-1). The forward suspension sling is made up of three 8-foot web loops and one doubled 4-foot web loop daisy-chained together (fig. 3-2) to form a 13-foot suspension sling. Each of the two rear suspension slings consists of three 8-foot web loops daisy-chained together to form a 12-foot suspension sling. For detailed suspension sling assembly, refer to c below.

- b. Prepare the IROR for helicopter lift as described below.

- (1) For preparation for travel of the IROR, refer to paragraphs 3-8b(1), (2), and (11) through (16), 3-9b(1), 3-16a(1) through (16), 3-16c(1) through (11), and (14).

- (2) Locate the IROR so that the lunette (6, fig. 3-27) is downwind and chock the trailer wheels.

- (3) Release the four snap fasteners (3, fig. 3-28) on the rear and ends of the motor-generator cabinet cover (4, fig. 3-28).



- 1—Communications station panel
- 2—Communications station
- 3—Cabinet cover support arms

- 4—Quick-disconnect pins
- 5—MAIN POWER circuit breaker

Figure 3-25. IROR radar set group—preparation for travel and emplacement.

c. Prepare the IROR suspension sling assembly as described below.

WARNING

Inspect the web loops before use for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

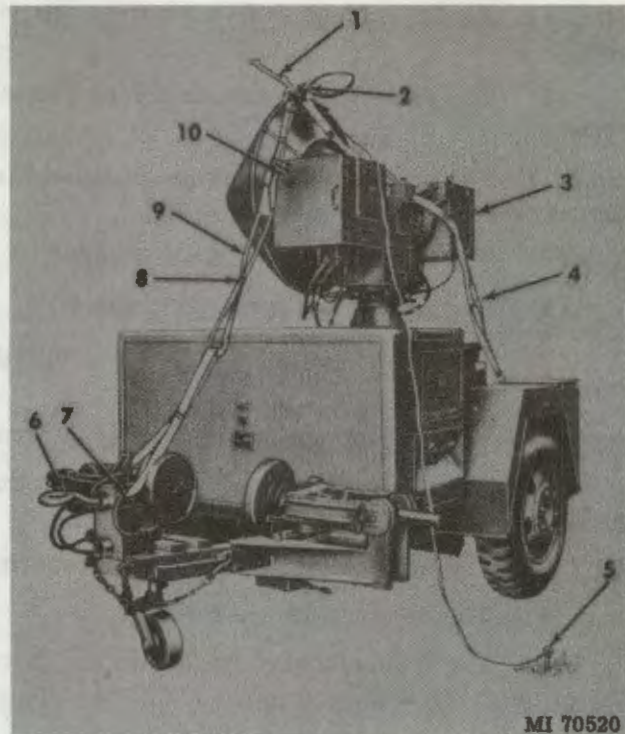
(1) Tape and pad all sharp edges around the forward lift point (7, fig. 3-27).

(2) Attach an 8-foot web loop (7, fig. 3-1) through the forward lift point.

(3) Daisy-chain (fig. 3-2) two 8-foot and one doubled 4-foot web loop to the free ends of the 8-foot web loop attached to the forward lift point, forming a 13-foot suspension sling.

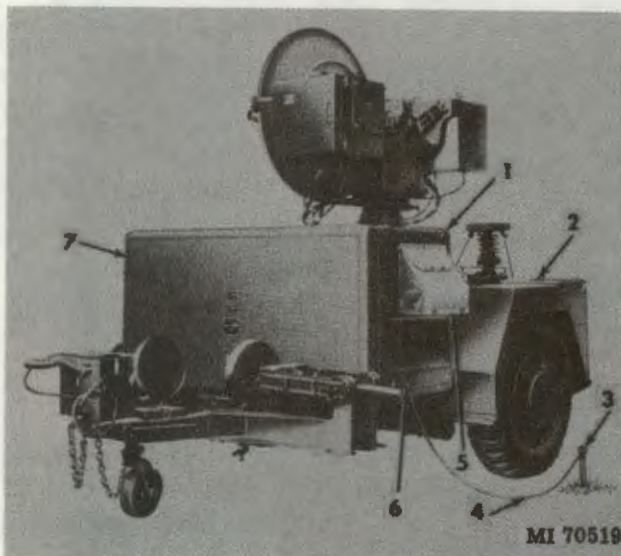
(4) Attach the free ends of the 13-foot suspension sling to the 10-inch web ring (fig. 3-3).

(5) Pull the suspension sling taut and place tape (8, fig. 3-27) around the sling every 12 inches.



- 1—Grounding device
- 2—Suspension sling assembly
- 3—Modulator power supply cabinet
- 4—Left-rear suspension sling
- 5—Ground rod
- 6—Lunette
- 7—Forward lift point
- 8—Rape
- 9—Forward suspension sling
- 10—Receiver-transmitter cabinet

Figure 3-27. IROR suspension sling assembly secured for helicopter pickup—front view (typical).



- 1—Radar set group cabinet
- 2—Left fender well
- 3—Ground rod
- 4—Ground rod cable
- 5—Air vent cover
- 6—Ground rod cable attach point
- 7—Radar set group cabinet cover

Figure 3-28. IROR ground rod—preparation for travel and emplacement.

(6) Tape and pad the top outer edge of the motor-generator cabinet cover (4, fig. 3-28).

(7) Attach an 8-foot web loop to the right-rear clevis (2, fig. 3-28).

(8) Daisy-chain two 8-foot web loops to the free ends of the 8-foot web loop attached to the clevis, forming a 12-foot suspension sling.

(9) Attach the free ends of the 12-foot suspension sling to the 10-inch web ring (fig. 3-3).

(10) Pull the suspension sling taut and place tape around the sling every 12 inches.

(11) Attach an 8-foot web loop to the left-rear clevis (5, fig. 3-28).

(12) Daisy-chain two 8-foot web loops to the free ends of the 8-foot web loop attached to the clevis, forming a 12-foot sling.

(13) Pull the suspension sling taut and place tape around the sling every 12 inches.

(14) Attach the free ends of the 12-foot suspension sling to the 10-inch web ring (fig. 3-3).

(15) Place tape through the 10-inch web ring, over the loops and around the knot formed by the web loops (fig. 3-3).

(16) Tape and pad all sharp edges around the modulator power supply cabinet (3, fig. 3-27).

(17) Pull the forward suspension sling (9, fig. 3-27) taut and tape it to the receiver-transmitter cabinet.

(18) Pull the left-rear suspension sling (4, fig. 3-27) taut and tape it to the side of the modulator power supply cabinet.

(19) Pull the right-rear suspension sling (1, fig. 3-28) taut and tape it to the edge of the antenna dish.

(20) Tape the suspension sling assembly (2, fig. 3-27) to the top of the IROR antenna to prevent entangling.

(21) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the IROR (5, fig. 3-27).

(22) Place the grounding device (1, fig. 3-27) with the taped suspension sling assembly on top of the IROR antenna.

(23) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lift, make the following checks:

(1) The IROR is prepared for travel.

(2) The front support is locked in the down position.

(3) The antenna is secured in the travel position.

(4) All sharp edges are taped and padded in areas where suspension slings may contact equipment.

(5) The suspension slings are properly attached.

(6) The suspension slings are taped for helicopter lift.

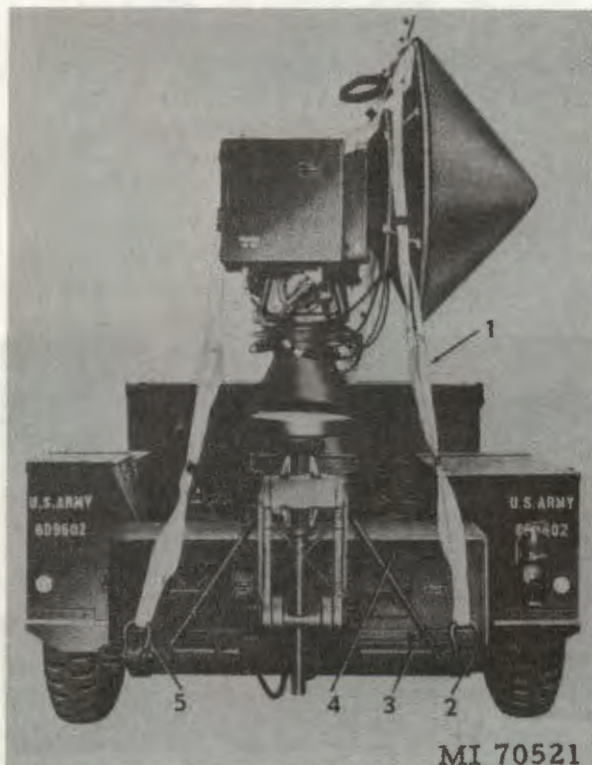
(7) The handbrakes are released and wheels chocked.

(8) The lunette is facing downwind.

(9) The grounding device assembly is properly installed.

(10) The elevation stow lock is engaged.

e. To attach the suspension sling assembly to the helicopter, refer to paragraph 3-9e.



- 1—Right-rear suspension sling
- 2—Right-rear clevis
- 3—Snap fasteners
- 4—Motor-generator cabinet cover
- 5—Left-rear clevis

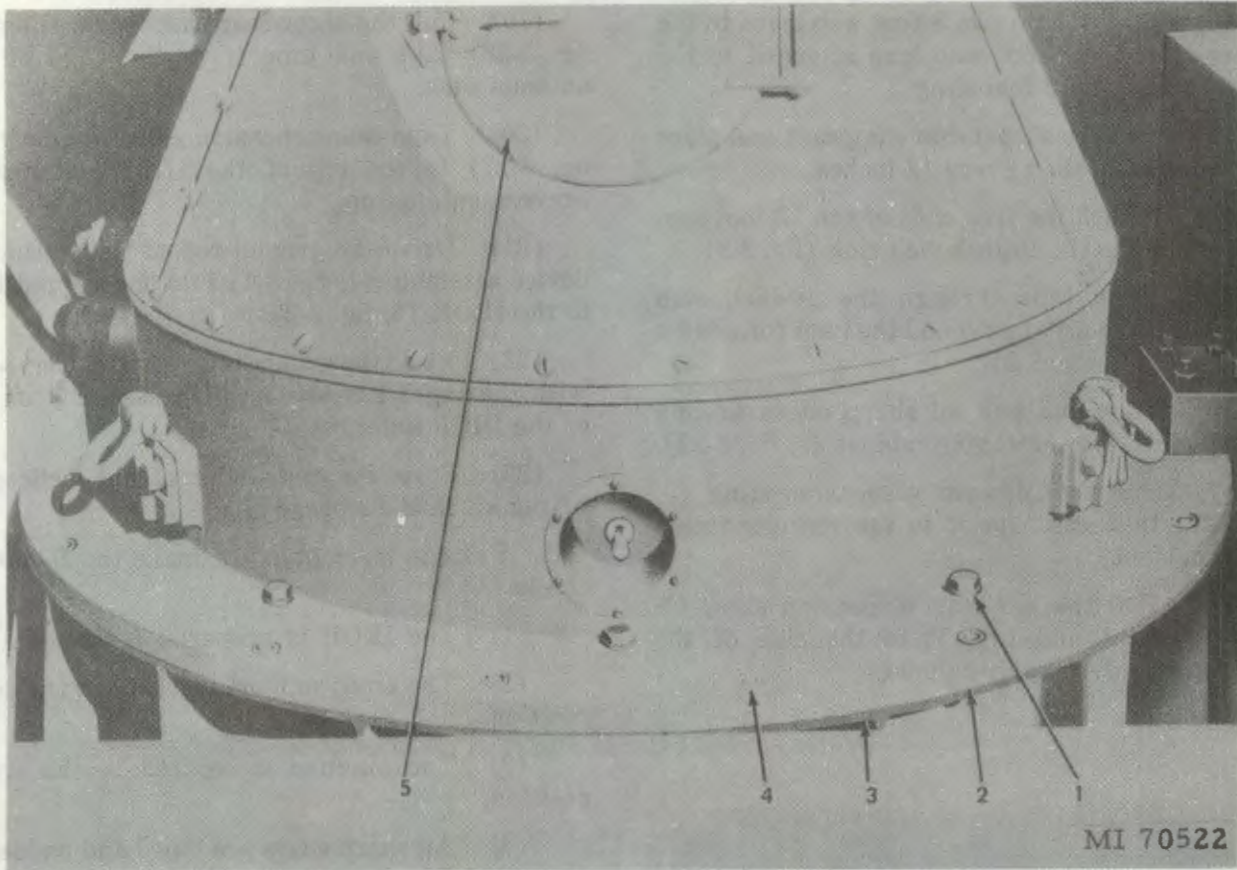
Figure 3-28. IROR suspension sling assembly secured for helicopter pickup—rear view (typical).

3-18. Stowing the IROR Antenna

When the IROR is transported by cargo aircraft, it may be necessary, as a height requirement, to stow the antenna. The procedures for stowing the antenna are described below.

a. Rotate the antenna so that it faces toward the rear of the trailer.

b. Engage the AZIMUTH STOW lock (3, fig. 3-23) by depressing and turning it 90 degrees clockwise.



- 1-Bolt (5)
- 2-Pedestal support plate
- 3-Pedestal support flange

- 4-Bolt (6)
- 5-Pedestal access door

Figure 3-29. IROR pedestal support plate.

c. Manually position the antenna to 0 mils in elevation and engage the ELEVATION STOW lock (1, fig. 3-23) by depressing and turning it 90 degrees clockwise.

d. Remove the five bolts (1, fig. 3-29) which secure the pedestal support plate (2, fig. 3-29) to the pedestal flange (3, fig. 3-20).

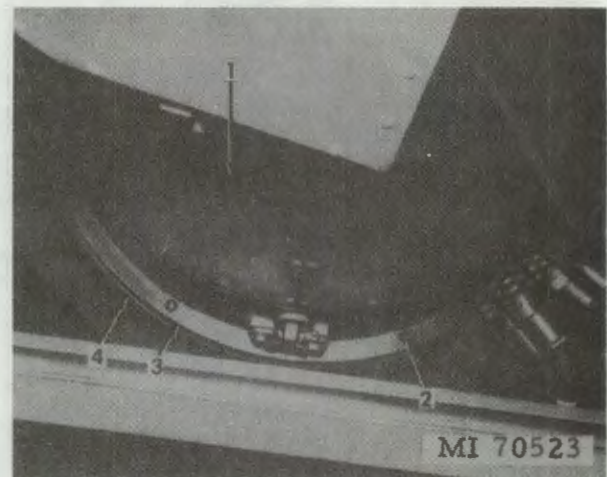
e. Remove the six bolts (4, fig. 3-29) that secure the pedestal support plate to the pedestal support flange, and remove the pedestal support plate.

f. Stow the pedestal support plate by taping it to the lunette.

g. Stow the 11 bolts in the right fender well.

h. Obtain a $\frac{5}{8}$ -inch rope at least 12 feet long.

i. Install the rope around the elevation head assembly as shown in figure 3-31.



- 1-Antenna pedestal
- 2-Bolt
- 3-Pedestal flange
- 4-Pedestal support flange

Figure 3-30. IROR pedestal flange.

CAUTION

Insure that the rope does not contact antenna cables while the antenna pedestal is being lowered.

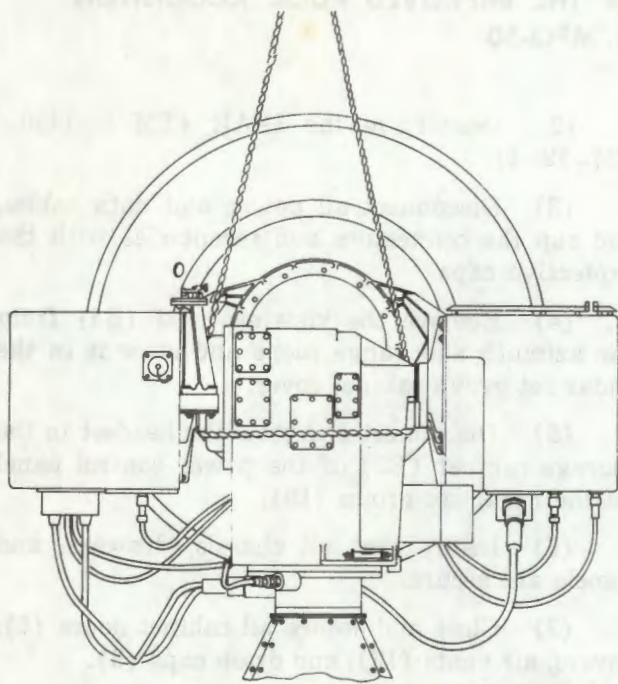
m. Allow a small amount of slack in the rope and manually tip the antenna pedestal toward the rear of the trailer until the weight of the antenna is supported by the crane.

n. Continue to lower the antenna pedestal with the crane until the pedestal base (4, fig. 3-32) contacts the tilt stop (2, fig. 3-32).

o. Secure the pedestal in the tilted position by inserting the spring-loaded tilt-lock pin (3, fig. 3-32) through the tilt stop and the two holes (1, fig. 3-32) in the pedestal.

p. Remove and stow the rope in the right-rear fender well.

q. Insure that the stay bars (A2, fig. 3-12) are crossed over the rear jack support frame.



MI 70524

Figure 3-31. IROR preparation for stowing antenna.

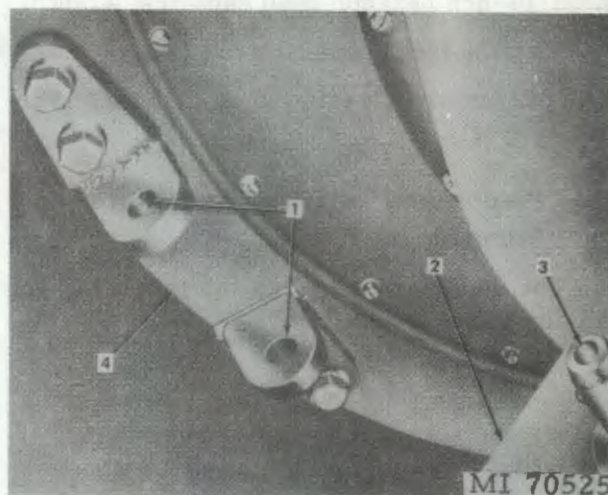
j. Position the crane at the lunette end of the trailer. Secure the $\frac{5}{8}$ -inch rope to the crane and take up the slack in the rope.

k. Remove the spring-loaded tilt-lock pin (3, fig. 3-32) from the tilt stop (2, fig. 3-32).

WARNING

To prevent injury to personnel or damage to the antenna by the antenna assembly falling backwards, do not remove the four bolts from the pedestal support flange until the crane is securely attached to the pedestal and the slack has been taken up.

l. Remove the four bolts (2, fig. 3-30) that secure the pedestal flange (3, fig. 3-30) to the pedestal support flange (4, fig. 3-30). Stow the four bolts in the right-rear fender well, and secure the fender well cover.



MI 70525

- 1-Hole
- 2-Tilt stop
- 3-Spring-loaded tilt-lock pin
- 4-Pedestal base

Figure 3-32. IROR tilt-lock pin and tilt stop.

Section VI. PREPARATION FOR TRAVEL FOR THE IMPROVED PULSE ACQUISITION RADAR SET AN/MPQ-50

3-19. General

This section describes the preparation for travel for the improved pulse acquisition radar (IPAR) by prime mover (par. 3-21) and by helicopter (par. 3-22).

3-20. Tools

The tools required to prepare the IPAR for travel are listed below. All the wrenches, except the hexagon-head capscrew wrench (*a* below) and the spanner wrench (*i* below), are located in the general mechanics' tool kit.

- a. Hexagon-head capscrew wrench (stowed on the antenna reflector support).
- b. Two 9/16-inch open-end wrenches.
- c. Two 1/2-inch open-end wrenches.
- d. Two 3/4-inch open-end wrenches.
- e. 3/8-inch hexagon-head capscrew wrench.
- f. 1-inch open-end wrench.
- g. 3/16-inch hexagon-head capscrew wrench.
- h. Two 1 1/8-inch open-end wrenches.
- i. Spanner wrench (stowed on the antenna reflector support).

3-21. Preparation for Travel Procedures — Prime Mover

- a. The detailed procedures for preparing the IPAR for travel are as follows.

NOTE

The key numbers shown in parentheses below in steps (1) through (7) refer to figure 3-33.

- (1) Set the antenna SAFE-OPERATE switch (D1) on the right side of the receiver-transmitter group to the SAFE position.

CAUTION

If the IPAR is to be prepared for travel immediately after use, it is necessary to retain power from the generator to run the liquid cooler for five minutes to cool off the stabilotron. If this is not done, damage to the stabilotron may result.

- (2) Deenergize the IPAR (TM 9-1430-534-12-1).

- (3) Disconnect all power and data cables, and cap the connectors and receptacles with the protective caps.

- (4) Remove the viewing hood (B4) from the azimuth and range scope and stow it in the radar set group cabinet cover.

- (5) Disconnect and stow the headset in the storage cabinet (B3) of the power control panel on the radar set group (13).

- (6) Insure that all chassis, drawers, and panels are secure.

- (7) Close and secure all cabinet doors (5), covers, air vents (12), and drain caps (9).

NOTE

If the IPAR all-weather shelters are emplaced, refer to TM 10-8340-203-13 for the preparation for travel procedures. If not, proceed to step (8).

- (8) Disassemble the omnidirectional antenna assembly as directed below.

NOTE

The key numbers shown in parentheses refer to figure 3-34 unless otherwise indicated.

- (a) Remove the two clamps (9) that secure the omnidirectional antenna cable (5) to the main antenna center section support (7).

- (b) Separate the cable from the clamps, then stow the clamps by refastening them to the main antenna center section support.

- (c) Disconnect the omnidirectional antenna cable from the amplifier-cooler group receptacle (8) and connect it to the dummy receptacle (2, fig. 3-35).

- (d) Disconnect the omnidirectional antenna cable from the omnidirectional antenna connector adapter (J1) (2), pull the cable through the antenna and connect it to the other dummy receptacle (2, fig. 3-35).

- (e) Release the four captive screws (3) and remove the omnidirectional antenna (1) from the main antenna mount (4).

- 1—Outer section
- 2—Center section
- 3—Feedhorn
- 4—Outer section
- 5—Cabinet door
- 6—Receiver-transmitter cabinet
- 7—Inner section
- 8—Ground rod cable attach point
- 9—Drain cap (2)
- 10—Ground rod cable
- 11—Ground rod
- 12—Air vent cover (3)
- 13—Radar set group
- 14—Antenna reflector support
- 15—Joint nut
- 16—Inner section

A

- 1—Feedhorn
- 2—5/16-Hexagon-head nut (10)
- 3—Waveguide twist
- 4—Waveguide twist flange
- 5—Dummy receptacle
- 6—Feedhorn bracket
- 7— $\frac{3}{8}$ -Hexagon-head nut (4)
- 8—Antenna support
- 9—Feedhorn flange
- 10—Receptacle cover
- 11—Feedhorn receptacle

B

- 1—Cabinet door
- 2—Cabinet door
- 3—Storage cabinet
- 4—Viewing hood
- 5—Air vent cover
- 6—Cabinet cover

C

- 1—MAIN POWER switch DS1
- 2—Cable entry panel

D

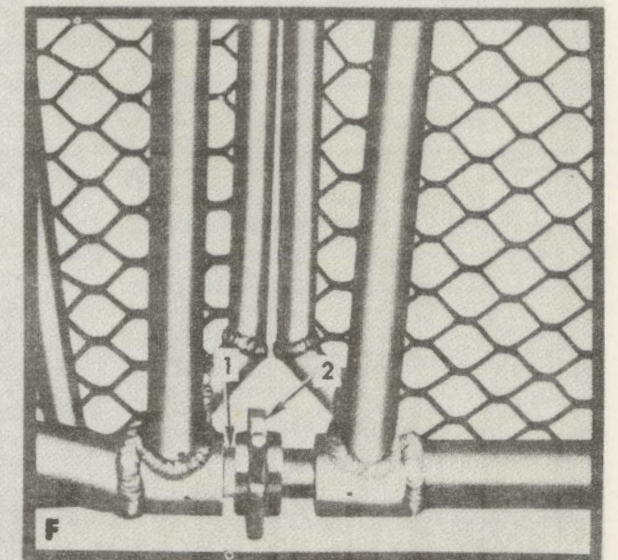
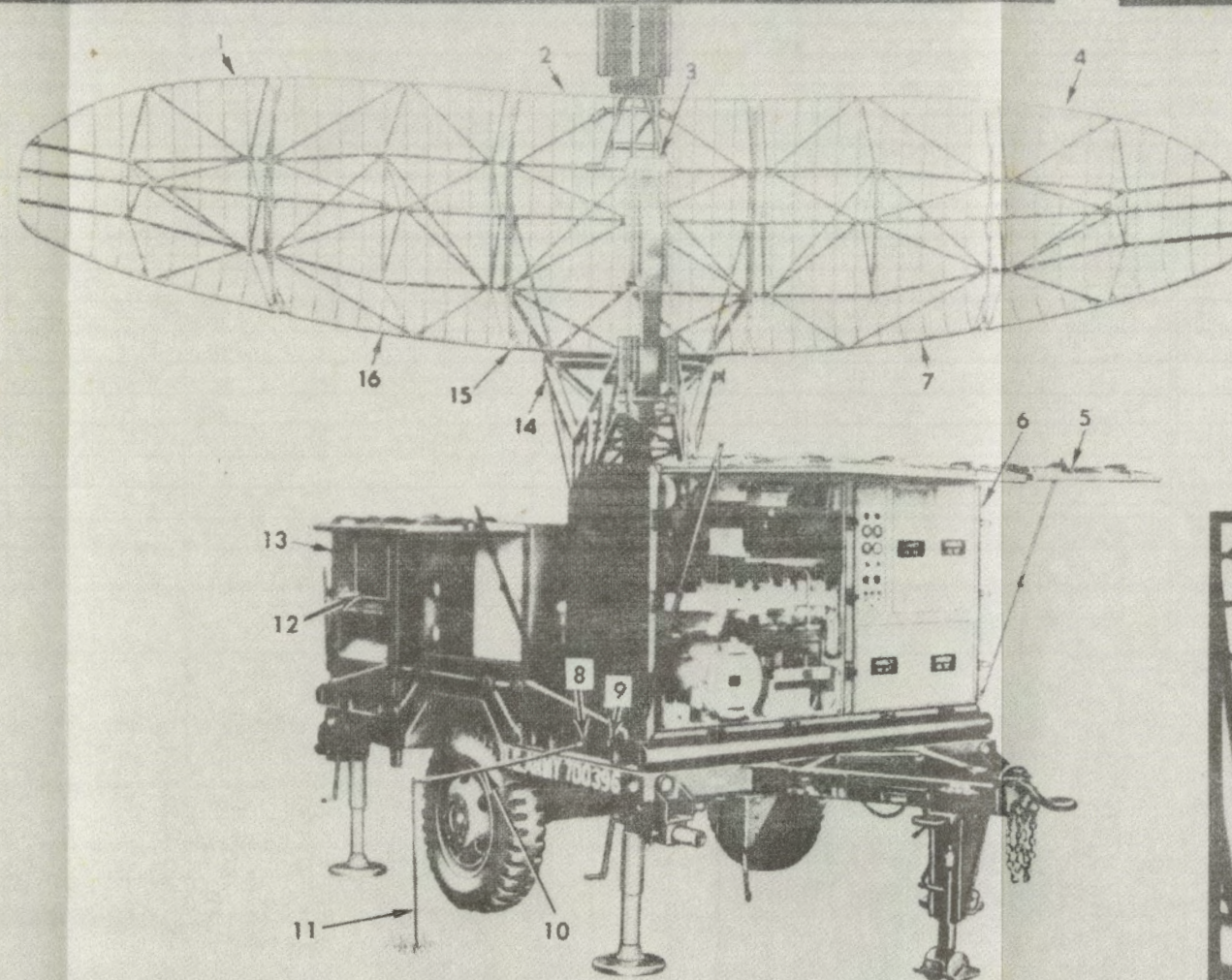
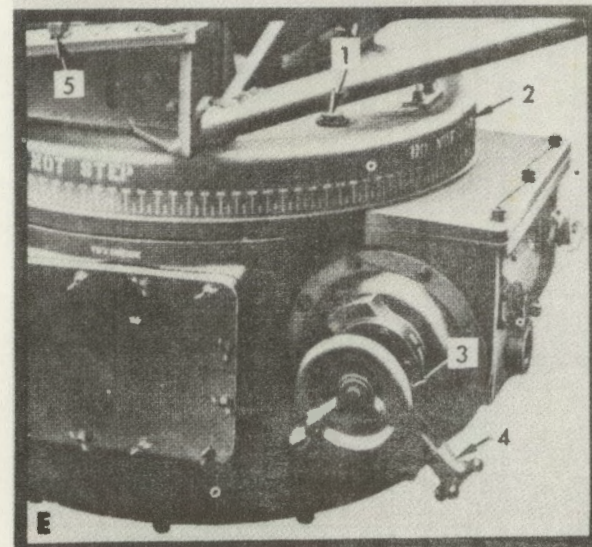
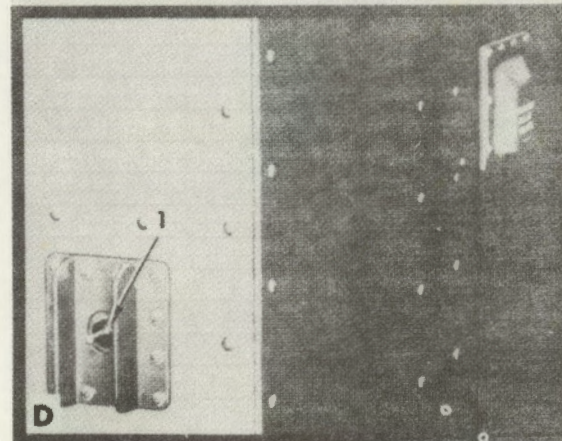
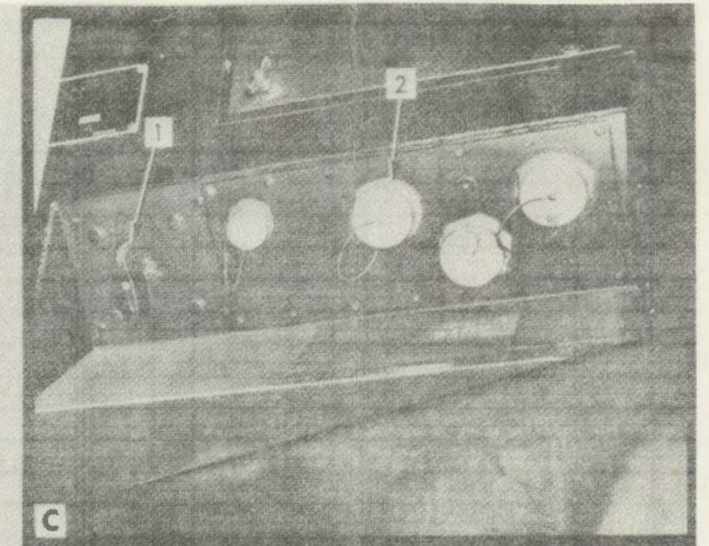
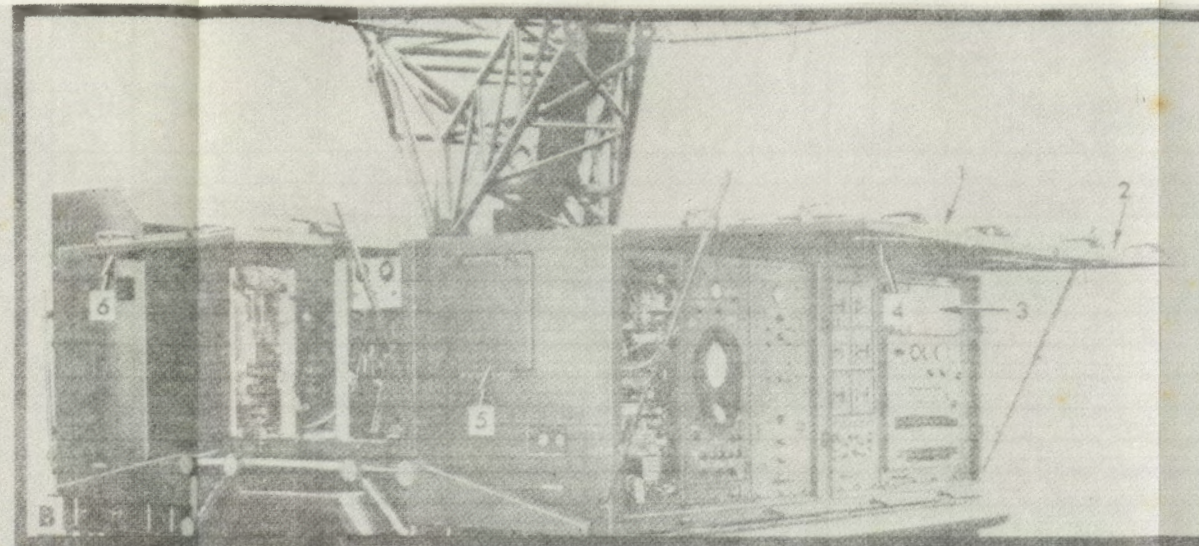
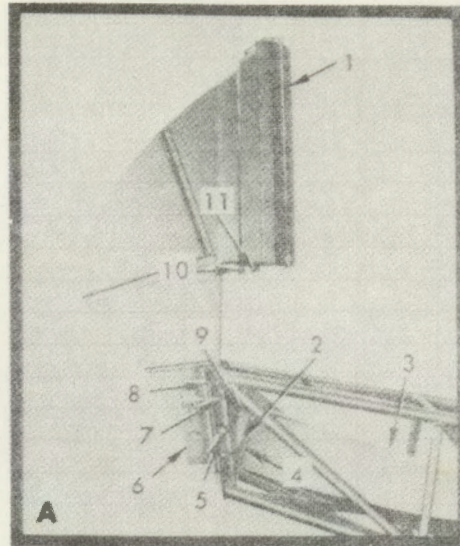
- 1—SAFE-OPERATE switch

E

- 1—Spirit level
- 2—Pedestal head
- 3—Antenna brake assembly handwheel
- 4—Azimuth stow lock
- 5—Hexagon-head capscrew wrench

F

- 1—Joint stud
- 2—Joint nut



MI 70526

Figure 3-33. IPAR preparation for travel and emplacement.

(9) Stow the omnidirectional antenna in reflector container 10672192 as described below.

NOTE

The key numbers shown in parentheses refer to figure 3-36.

(a) Loosen the two wingnuts (6) and slide the adjustable bracket (4) away from the stationary bracket (1).

(b) Loosen the wingnuts (7) and slide the small rubber-lined adjustable bar (3) upward.

(c) Loosen the three wingnuts (9) and slide the base adjustable bracket (8) downward.

(d) Place the base of the omnidirectional antenna (2) in the stationary bracket (1).

(e) Slide the adjustable bracket (4) toward the stationary bracket until the top of the omnidirectional antenna is resting on the lip of the adjustable bracket, and tighten the two wingnuts (6).

(f) Slide the small rubber-lined bar (3) downward until it presses snugly against the omnidirectional antenna, and secure it in this position by tightening the three wingnuts (7).

(10) Disassemble and stow the feedhorn (3, fig. 3-33) in antenna reflector container 9180247 as described below.

NOTE

Unless otherwise indicated the key numbers shown in parentheses in steps (a) through (d) below refer to figure 3-33.

(a) Remove the 10 hexagon nuts (A2), lockwashers, and flat washers and the 10 hexagon-head capscrews and flat washers that secure the feedhorn flange (A9) to the waveguide twist flange (A4) on the waveguide twist (A3). Retain the attaching hardware for use in step (h) below.

CAUTION

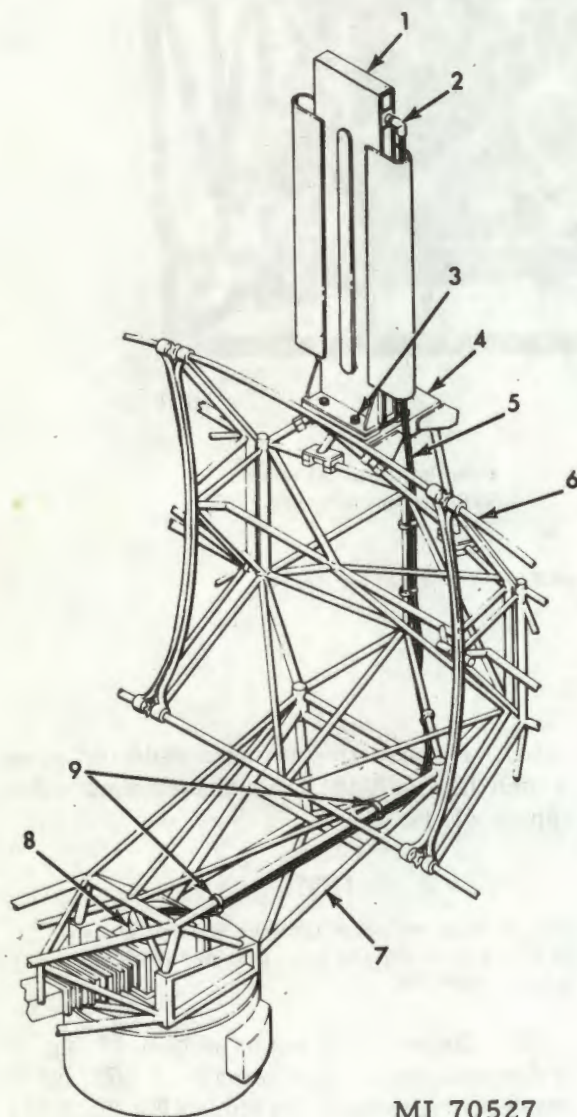
Support the uncoupled end of the waveguide twist to prevent undue stress on the flange weldment where the waveguide sections are joined.

(b) Remove the four hexagon nuts (A7) and lockwashers, eight flat washers, and four hexagon-head capscrews and flat washers that secure the feedhorn bracket (A6) to the antenna support (A8). Retain the attaching hardware for use in step (i) below.

(c) Remove the feedhorn (A1).

(d) Remove the waveguide cover plate (2, fig. 3-37) from its stowed position on the antenna reflector support (14).

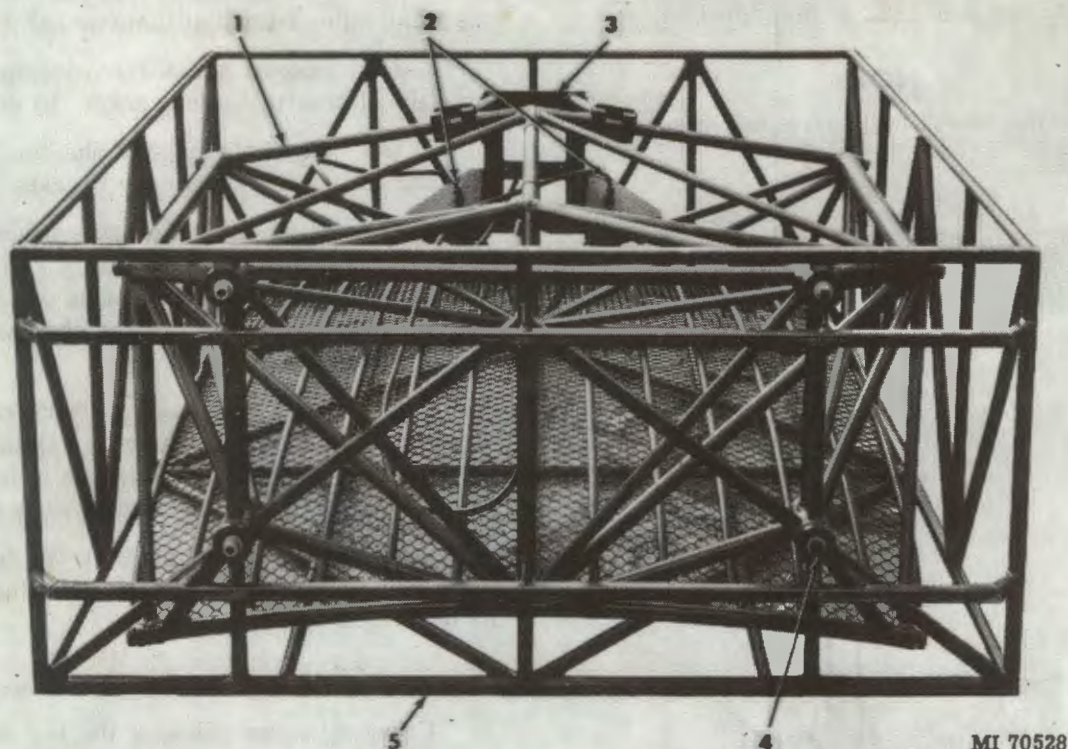
(e) Install the waveguide cover plate on the waveguide twist flange (4, fig. 3-37).



MI 70527

- 1—Omnidirectional antenna
- 2—Omnidirectional antenna connector adapter (J1)
- 3—Captive screws (4)
- 4—Antenna mount
- 5—Omnidirectional antenna cable
- 6—Main antenna center section
- 7—Main antenna center section support
- 8—Amplifier-cooler group receptacle
- 9—Cable clamps

Figure 3-34. Omnidirectional antenna—installed.



- 1—Center antenna reflector section
- 2—Dummy receptacles
- 3—Mounting base

- 4—Socket-head capscrews
- 5—Reflector container

MI 70528

Figure 3-35. Antenna reflector container 9192545—prepared for travel.

(f) Loosen the four wing-type screws (7, fig. 3-38).

(g) Position the feedhorn (2) as shown in the antenna reflector container (fig. 3-39) with the feedhorn flange (9) sitting on the feedhorn flange plate (8) and the top of the feedhorn sitting on the feedhorn support (4).

(h) Place the feedhorn flange on the feedhorn flange plate, position four clamps (2, fig. 3-38) on the feedhorn flange and secure them by tightening the four wingnuts (1, fig. 3-38).

(i) Position the adjustable clamps (3, fig. 3-39) to the top of the feedhorn, and tighten the four wing-type screws (7, fig. 3-38).

(11) Disassemble and stow the antenna reflector as described below.

NOTE

The antenna reflector containers can be used as stands when disassembling the antenna.

(a) Remove the antenna reflector spanner wrench (2, fig. 3-40) from the antenna reflector support (1, fig. 3-40).

NOTE

The antenna reflector spanner wrench is used to secure or loosen the joint nuts of the antenna reflector sections.

(b) Remove the outer section (1, fig. 3-33) by disengaging the five joint nuts (F2, fig. 3-33) that secure it to the joint studs (F1, fig. 3-33).

NOTE

The same joint nuts (7, fig. 3-39) that secure the antenna reflector sections when assembled are used to secure the antenna reflector sections to the containers.

(c) Position the five joint nuts (2, fig. 3-41) on the outer section (1, fig. 3-41) over the five joint studs (5, fig. 3-39), and secure the section to container 9180247.

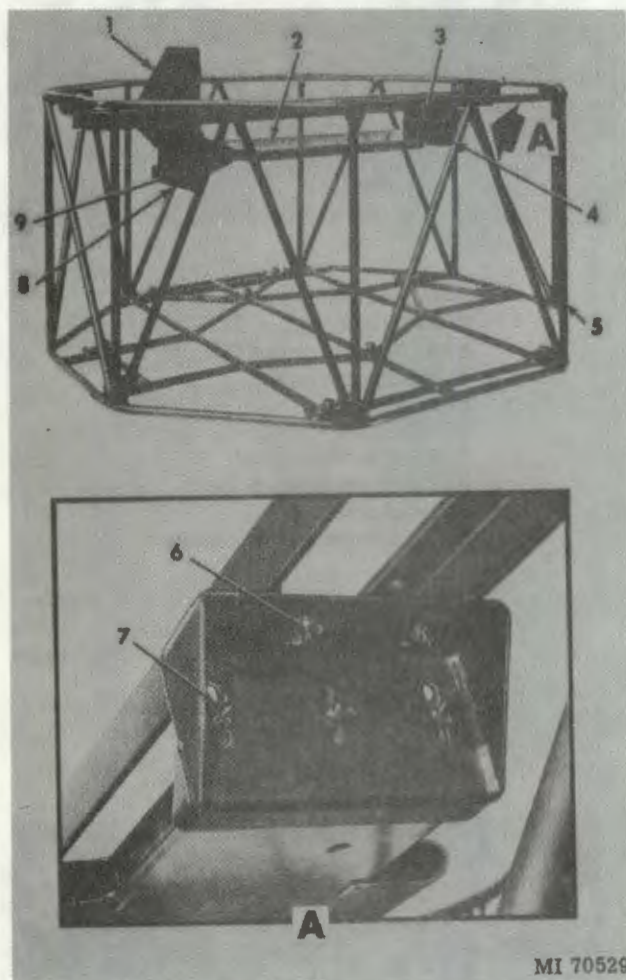
(d) Remove the inner section (16, fig. 3-33) in the same manner as in (b) above.

(e) Secure the inner section (1, fig. 3-39) to container 9180247 as described in (c) above.

(f) Position the container top (1, fig. 3-42) and secure it with four captive fasteners (2, fig. 3-42).

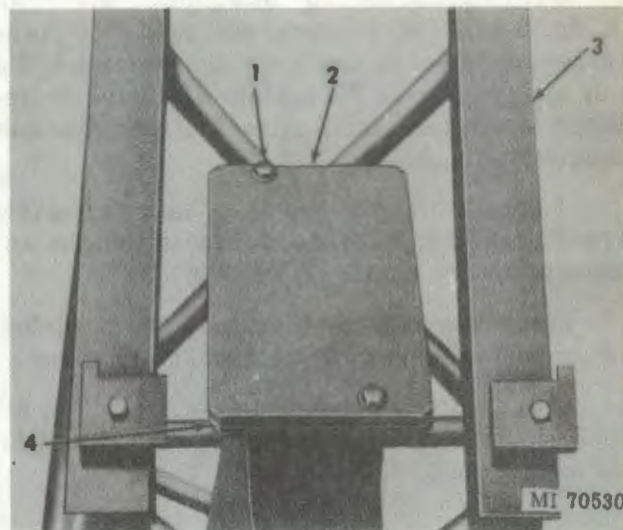
(g) Remove the outer section (4, fig. 3-33) in the same manner as in (b) above.

(h) Secure the outer section (1, fig. 3-43) to container 10672192 as described in (c) above.



- 1—Stationary bracket
- 2—Omnidirectional antenna
- 3—Rubber-lined adjustable bar
- 4—Adjustable bracket
- 5—Antenna reflector container (bottom)
- 6—Wingnuts (2)
- 7—Wingnuts (3)
- 8—Base adjustable bracket
- 9—Wingnuts (3)

Figure 3-36. Antenna reflector container 10672192—omnidirectional antenna secured.



- 1—Hexagon-head capscrew
- 2—Waveguide cover plate
- 3—Antenna reflector support
- 4—Waveguide twist flange

Figure 3-37. Waveguide cover plate installed.

(i) Remove the inner section (7, fig. 3-33) in the same manner as in (b) above.

(j) Secure the inner section (1, fig. 3-44) to container 10672192 as described in (c) above.

(k) Position the container top (1, fig. 3-45) and secure with the four captive fasteners (2, fig. 3-45).

(l) Stow the antenna reflector spanner wrench (2, fig. 3-40) on the antenna reflector support (1, fig. 3-40).

(m) Using the hexagon-head capscrew wrench (E5, fig. 3-33) stowed on the antenna reflector support, remove the center section (2, fig. 3-33) from the antenna reflector support (14, fig. 3-33). Retain the attaching hardware and capscrew wrench for use in step (p) below.

(n) Place the antenna reflector center section (1, fig. 3-46) into antenna reflector container 9192545 (5, fig. 3-46) with the reflector facing down and the top antenna reflector cross member (3, fig. 3-46) in the antenna reflector supports (2, fig. 3-46).

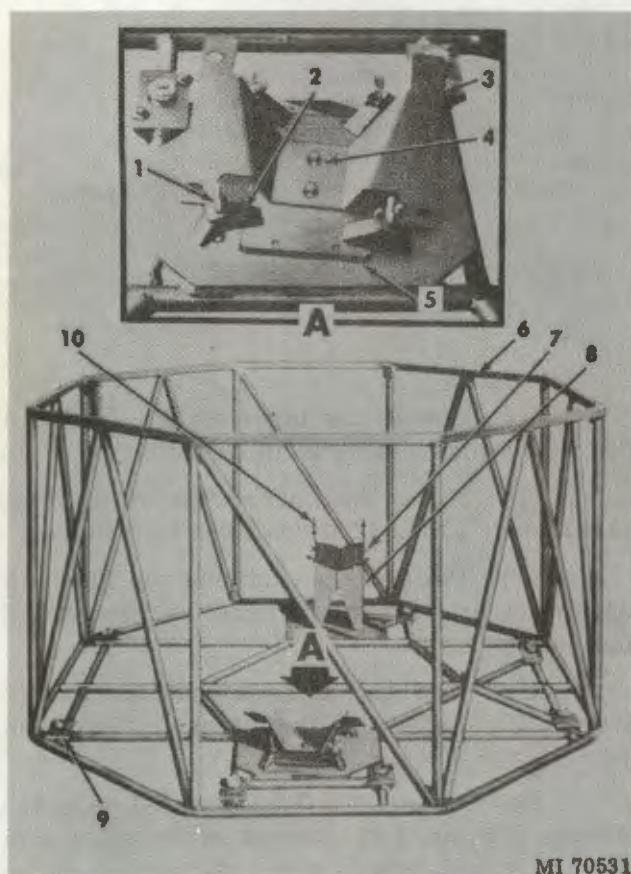
(o) Tighten the support bolts (4, fig. 3-46) that secure the center section to the supports.

(p) Place the four socket-head capscrews (4, fig. 3-35), flat washers, and split-type lock-washers, removed in step (m) above, through the four attach holes on the container. Secure the reflector to the container, using the hexagon-head capscrew wrench.

(q) Stow the hexagon-head capscrew wrench (E5, fig. 3-33) in its bracket on the antenna reflector support (1, fig. 3-40).

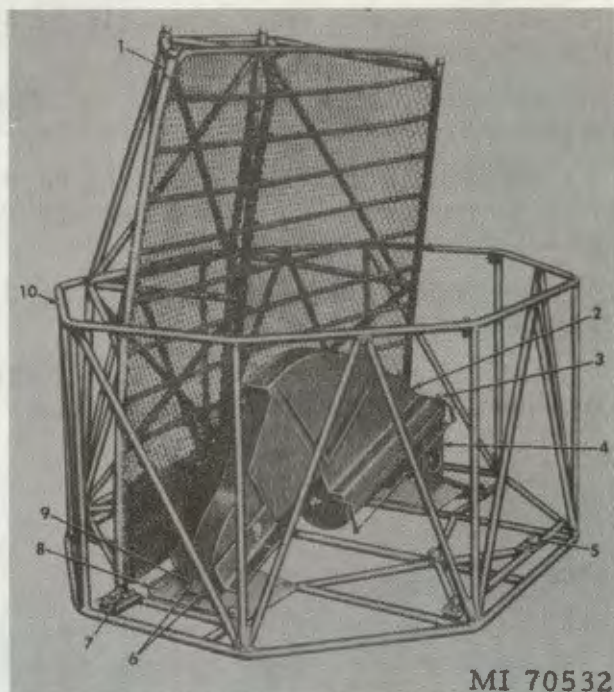
(12) Manually position the antenna reflector support over the receiver-modulator cabinet.

(13) Turn the azimuth stow lock (E4, fig. 3-33) clockwise to lock the antenna brake assembly handwheel (E3, fig. 3-33).



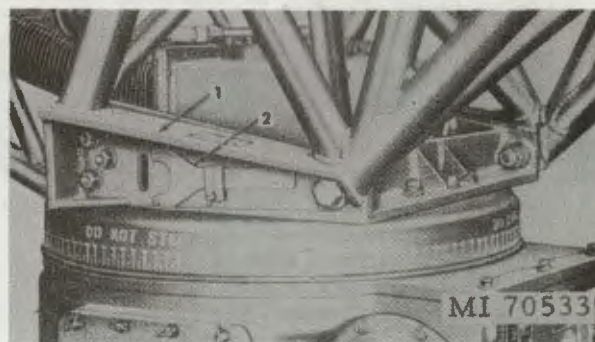
- 1—Wingnuts (4)
- 2—Clamps (4)
- 3—Waveguide support bracket
- 4—5/16 Hexagon-head bolt (4)
- 5—Waveguide cover plate
- 6—Antenna reflector container
- 7—Wing-type screw (4)
- 8—Feedhorn support
- 9—Joint stud (5)
- 10—Adjustable clamps

Figure 3-38. Antenna reflector container 9180247.



- 1—Inner section
- 2—Feedhorn
- 3—Adjustable clamp (2)
- 4—Feedhorn support
- 5—Joint stud (5)
- 6—Bolt (4)
- 7—Joint nut (5)
- 8—Feedhorn flange plate
- 9—Feedhorn flange
- 10—Antenna reflector container

Figure 3-39. Antenna reflector container 9180247—feedhorn and inner section secured.



- 1—Antenna reflector support
- 2—Antenna reflector spanner wrench

Figure 3-40. IPAR antenna reflector spanner wrench—stowed.

b. The detailed procedures for preparing the M390 trailer, which supports the IPAR for travel, are as follows.

WARNING

Insure that the front support jack (E3, fig. 3-48) is locked in the down position and that the wheels are resting firmly on the ground.

NOTE

Unless otherwise indicated, the key numbers shown in steps (1) through (8) below refer to figure 3-48.

(1) Remove the leveling jack cranks from their stow brackets (center rear of trailer) and position them on the crank shafts (F1, fig. 3-48) of the two rear leveling jacks (F5, fig. 3-48).

(2) Retract the rear leveling jacks with the cranks until they are clear of the ground.

(3) Stow each of the front corner leveling jacks (3, fig. 3-49) as described below.

(a) Remove the leveling jack crank (A6) from its stow bracket on A frame (A5), and position it on the jack crankshaft (2, fig. 3-49).

(14) Remove the ground rod cable (10, fig. 3-33) from the ground rod cable attach point (8, fig. 3-33) and the ground rod (11, fig. 3-33).

NOTE

Refer to paragraph 3-8a(18) for removal of the ground rod using the stake puller kit.

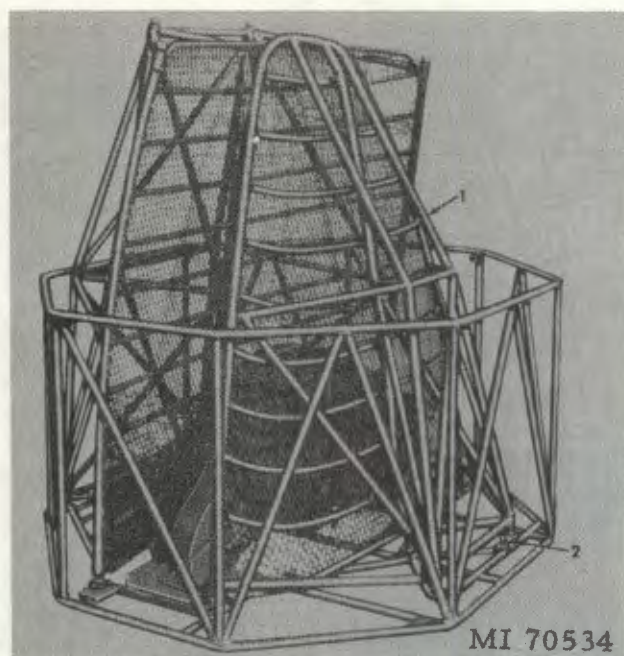
(15) Pull the ground rod from the ground.

(16) Stow the ground rod and cable on the platform behind the receiver-transmitter cabinet (6, fig. 3-33).

(17) Place the three antenna reflector containers on the prime mover and position as shown in figure 3-47.

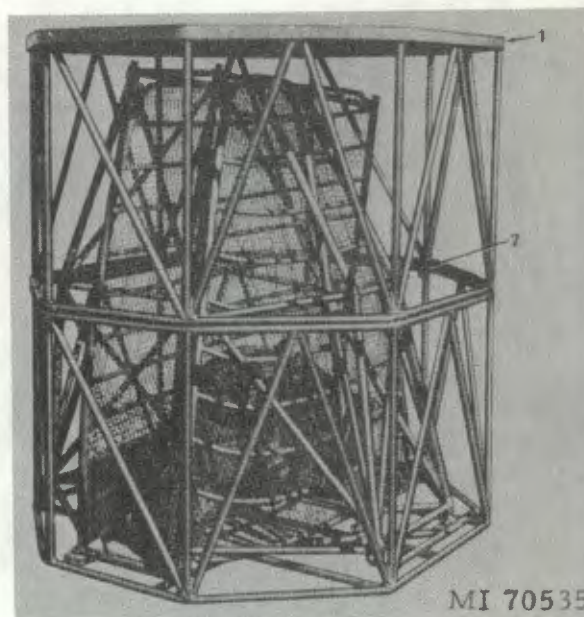
(18) Tie down the right and left side containers (2 and 3, fig. 3-47) with four web strap assemblies each (fig. 3-47).

(19) Tie down the center container (1, fig. 3-43) with four web strap assemblies (fig. 3-47).



1--Outer section
2--Joint nut (5)

Figure 3-41. Antenna reflector container 9180247—outer section secured.



1--Container top
2--Captive fastener (4)

Figure 3-42. Antenna reflector container 9180247—prepared for travel.

- (b) Retract the jack with the crank.
- (c) Remove and stow the jack crank.
- (d) Pull up and hold the jack vertical lock (4, fig. 3-49).

(e) Swing the jack upward until it is horizontal. Release the leveling jack vertical lock.

(4) Stow the center leveling jack (7, fig. 3-49) as described below.

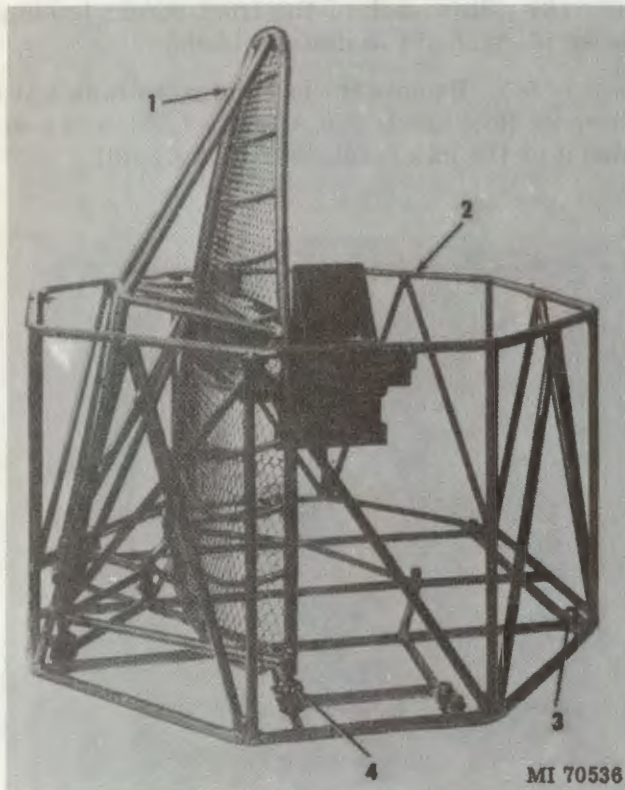
(a) Attach the jack crank to the crank-shaft and retract the jack.

(b) Remove and stow the jack crank.

(c) Pull up and hold the jack vertical lock.

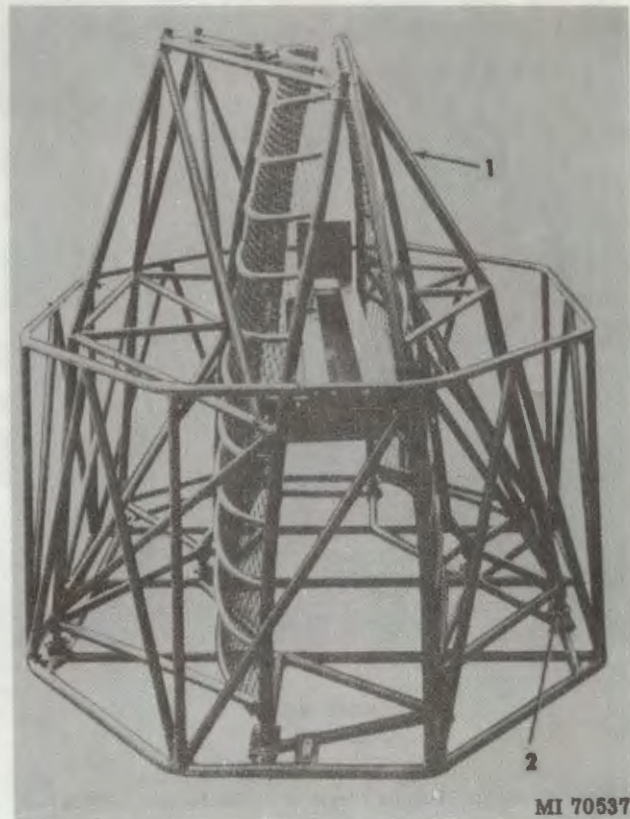
(d) Swing the jack sideways and upward to a horizontal position. Release the jack vertical lock.

(e) Pull up and hold the jack horizontal lock (6, fig. 3-49).



- 1—Outer section
- 2—Antenna reflector container
- 3—Joint stud
- 4—Joint nut

Figure 3-43. Antenna reflector container 10672192—outer section secured.



- 1—Inner section
- 2—Joint nut (5)

Figure 3-44. Antenna reflector container 10672192—outer and inner sections secured.

(f) Swing the jack beneath the trailer. Release the jack horizontal lock.

(5) Connect the trailer to the prime mover as described below.

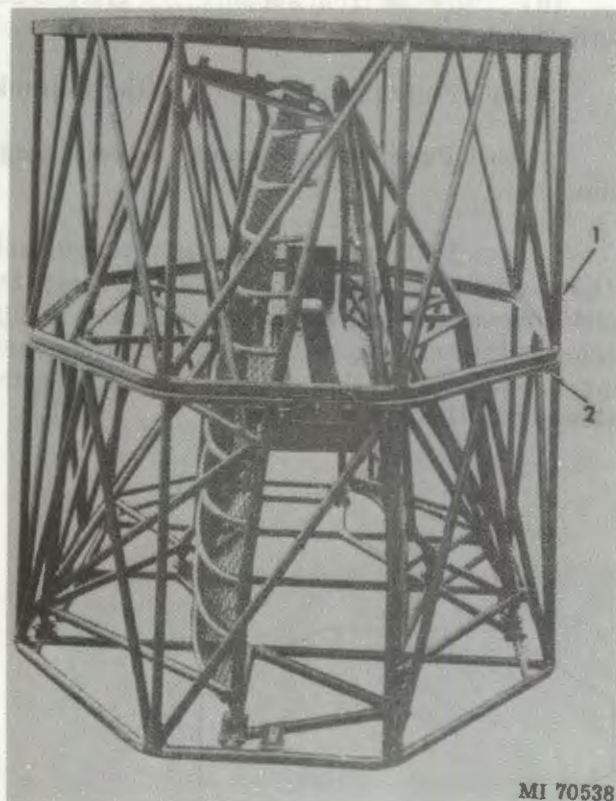
(a) Open the pintle hook (D3) on the prime mover by removing the locking pin (D1) and lifting the spring-loaded T-bar latch (D2).

(b) Back the prime mover up to the trailer so that the pintle hook is directly under the lunette (D4).

(c) Disengage the front support jack crank (E5) from its stowage clip.

(d) Engage the lunette on the open pintle hook by retracting the front support jack (E3).

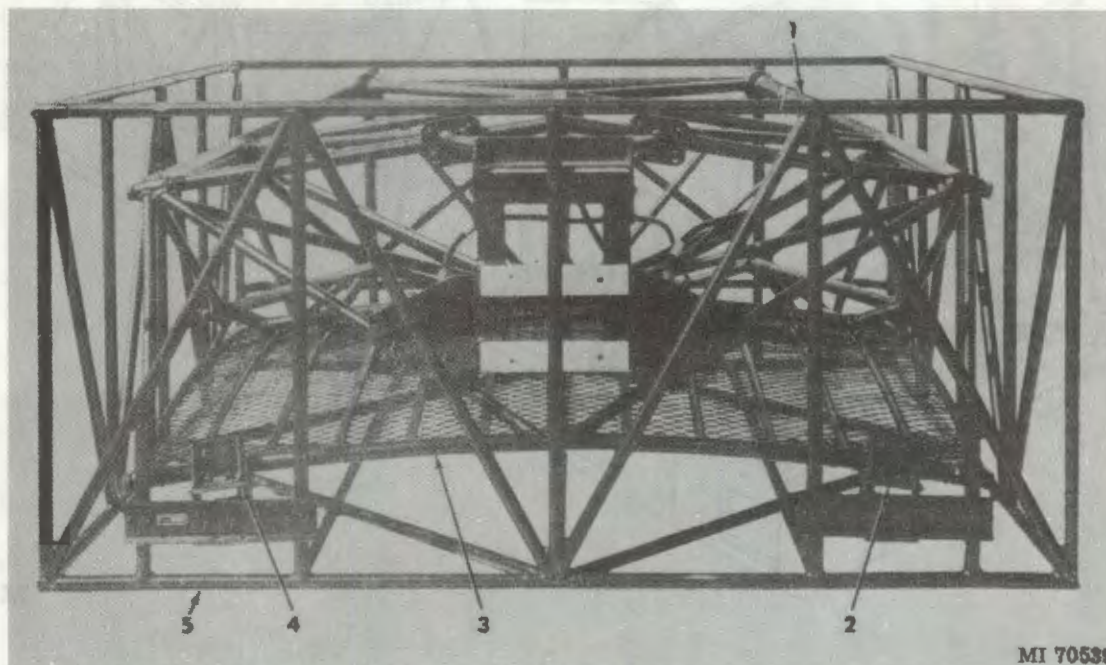
(e) Close the pintle hook and insert the locking pin.



MI 70538

- 1—Container top
- 2—Captive fasteners (4)

Figure 3-45. Antenna reflector container 10672192—prepared for travel.



MI 70539

- 1—Antenna reflector center section
- 2—Antenna reflector supports
- 3—Antenna reflector cross member
- 4—Support bolts
- 5—Antenna reflector container

Figure 3-46. Antenna reflector container 9192545—center section secured.

(f) Remove the trailer airbrake hose (A2) from the dummy coupling (A1). Connect the hose to the service coupling at the rear of the prime mover, and open the service coupling shut-off cock, permitting the operation of the trailer brakes from the prime mover.

(g) Remove the intervehicular cable (A3) from the stowage clip. Open the cover on the cable connector, and plug the cable into the receptacle on the rear of the prime mover to provide power for the trailer lights.

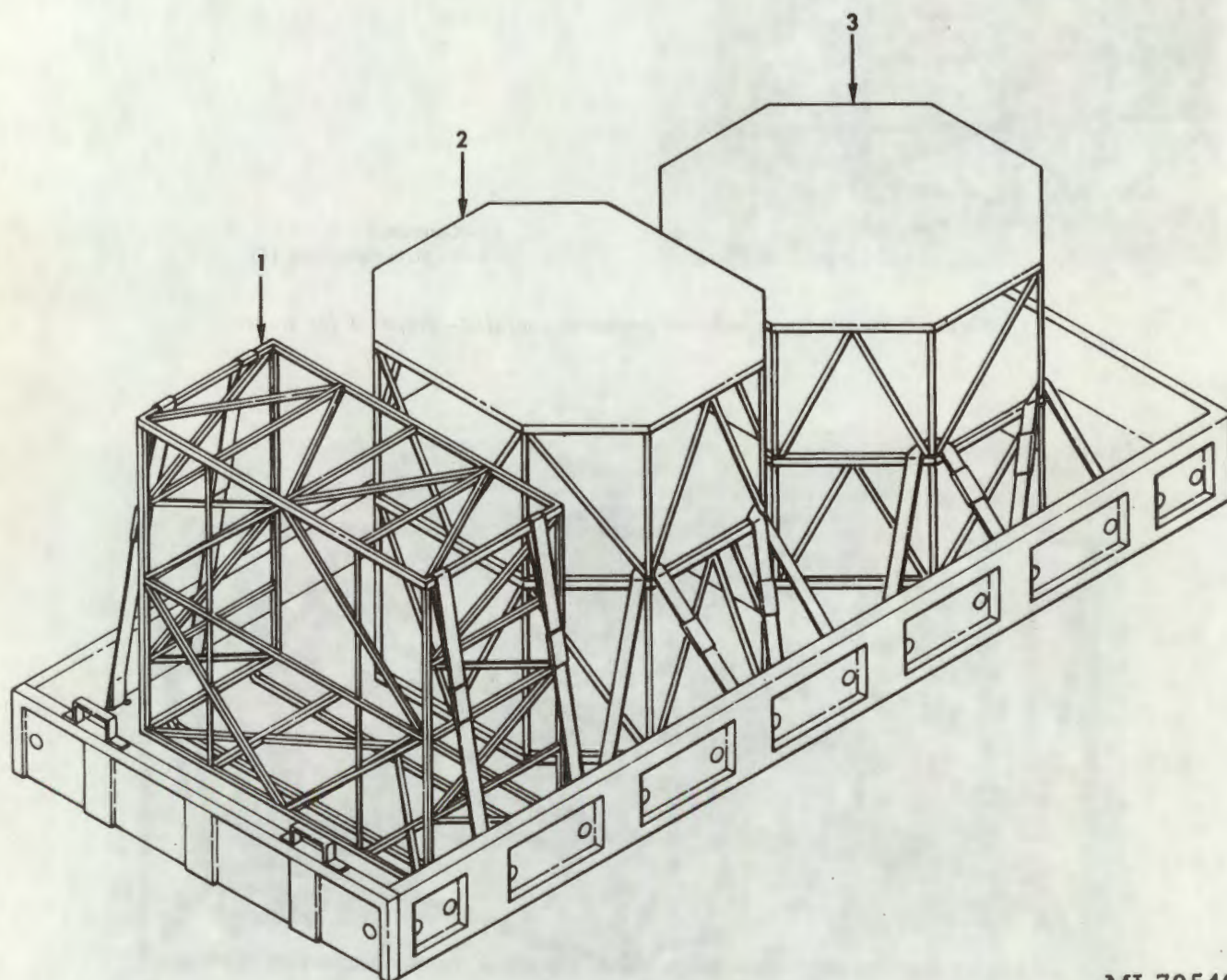
(h) Hook the safety chains (C2) to the appropriate loops at the rear of the prime mover.

(6) Stow the front support jack (E3) as described below.

(a) Fully retract the jack with the crank.

(b) Place the jack crank in the stowage clip.

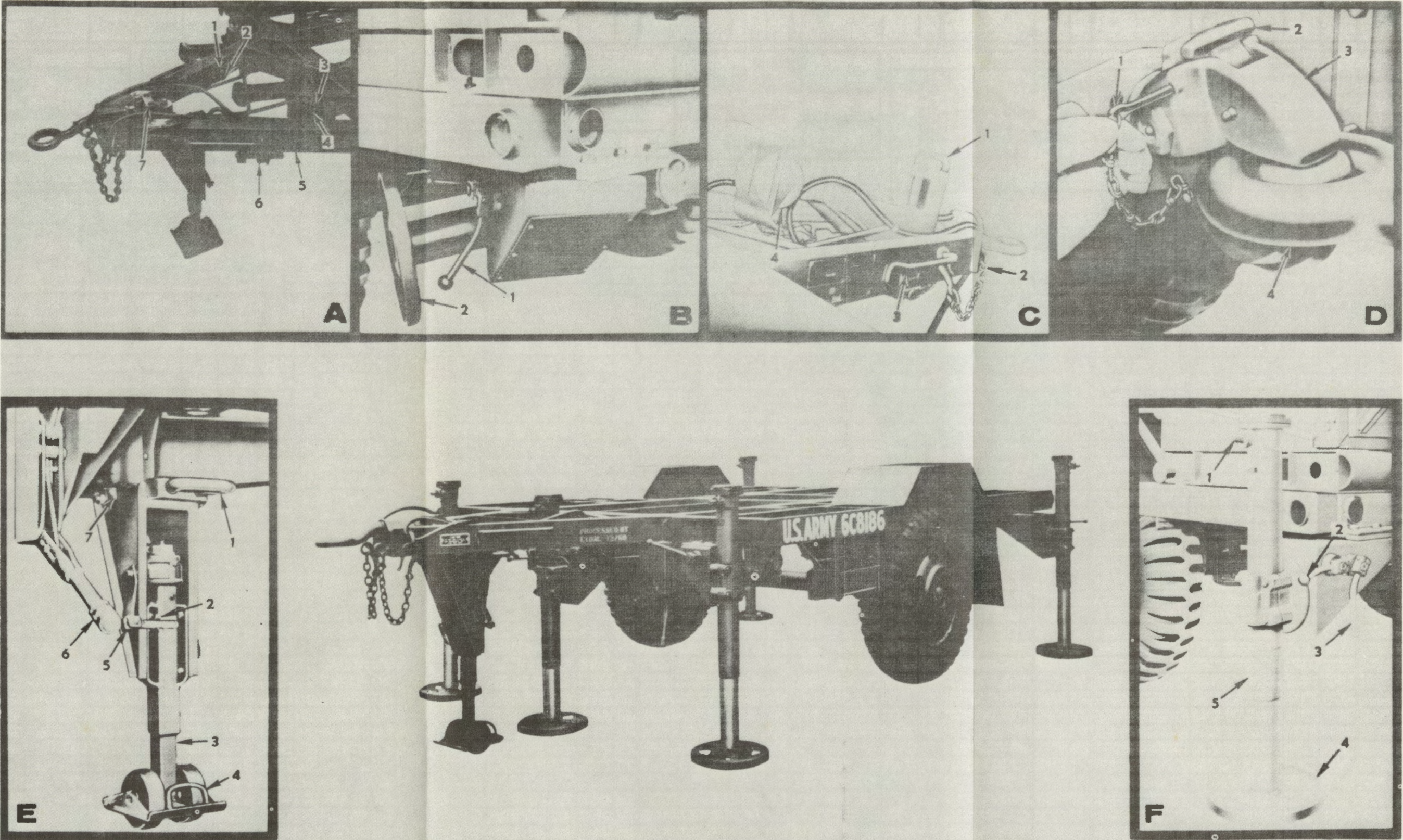
(c) Pull the spring-loaded frame handle (E1) and, using the jack handle (E4), rotate the jack rearward and upward until the frame handle engages the holes in the top of the lunette mounting bracket (A7), thus locking the jack in the stowed position.



- 1—Antenna reflector container—center
- 2—Antenna reflector container—right side
- 3—Antenna reflector container—left side

Figure 3-47. IPAR antenna reflector containers—tied down on prime mover.

MI 70540



MI 70541

Figure 3-48. IPAR M890 trailer—preparation for travel and emplacement.

(7) Stow each of the two rear leveling jacks (F5) as described below.

(a) Fully retract the jack with the crank.

(b) Remove and stow the jack crank.

(c) Pull up and hold the vertical lock (F2).

(d) Swing the ground pad (F4) rearward and upward until it is in a horizontal position. Release the vertical lock (F2).

(e) Pull up and hold the horizontal lock (F3).

(f) Swing the jack horizontally until it is beneath the trailer. Release the horizontal lock.

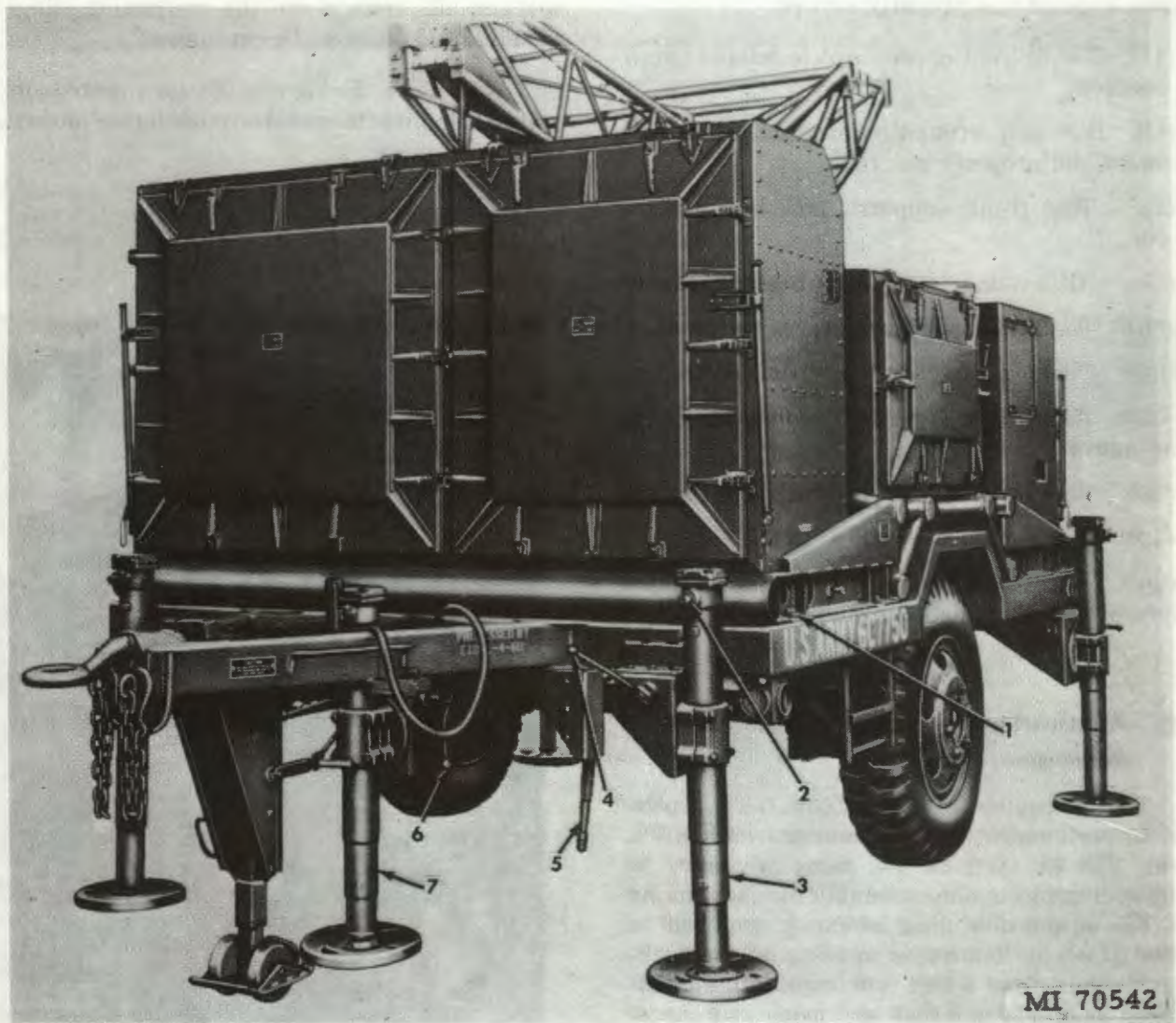
(8) Release the handbrake levers (5, fig. 3-49), one on each side of the A-frame.

c. Prior to leaving the area, the following checks should be made.

(1) The antenna SAFE-OPERATE switch is in the SAFE position.

(2) The antenna reflector support is in the stow position.

(3) The azimuth stow lock is engaged.



- 1-Bolt assemblies (8)
- 2-Jack crankshaft
- 3-Front corner leveling jack
- 4-Front leveling jack vertical lock

- 5-Handbrake lever
- 6-Center leveling jack horizontal lock
- 7-Center leveling jack

Figure 3-49. IPAR on M390 trailer.

(4) The IPAR is properly secured to the trailer.

(5) The antenna reflector sections are properly stowed in containers.

(6) The feedhorn is properly stowed in the container.

(7) The waveguide support bracket and waveguide cover plate are properly secured.

(8) The antenna reflector containers are properly tied down on the prime mover.

(9) MAIN POWER switch DS1 (C1, fig. 3-33) is set to the OFF position.

(10) The ground rod and ground rod cable are disconnected and properly stowed.

(11) The air vent covers are closed and properly secured.

(12) The compartment covers and drain caps are closed and properly secured.

(13) The front support jack is properly stowed.

(14) All leveling jacks are properly secured.

(15) The jack cranks are properly stowed.

(16) The pallet jacks are properly stowed.

(17) The trailer is properly connected to the prime mover.

(18) The trailer lights are working properly.

(19) The handbrakes are released.

(20) The trailer brakes are working (move prime mover a short distance and then stop).

3-22. Preparation for Travel Procedures — Helicopter

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the IPAR by helicopter consists of twelve 8-foot web loops, four 4-foot web loops, and one 10-inch web ring. Three 8-foot web loops and one 4-foot web loop are daisy-chained (fig. 3-2) together to form a 14-foot suspension sling for each of the four lift points. For detailed procedures, refer to c below. The suspension sling assembly required to lift the M390 trailer by helicopter consists of nine 8-foot web loops and one 10-inch web ring. Three

8-foot loops are daisy-chained (fig. 3-2) together to form a 12-foot suspension sling for each of the three lift points. For detailed procedures, refer to f below.

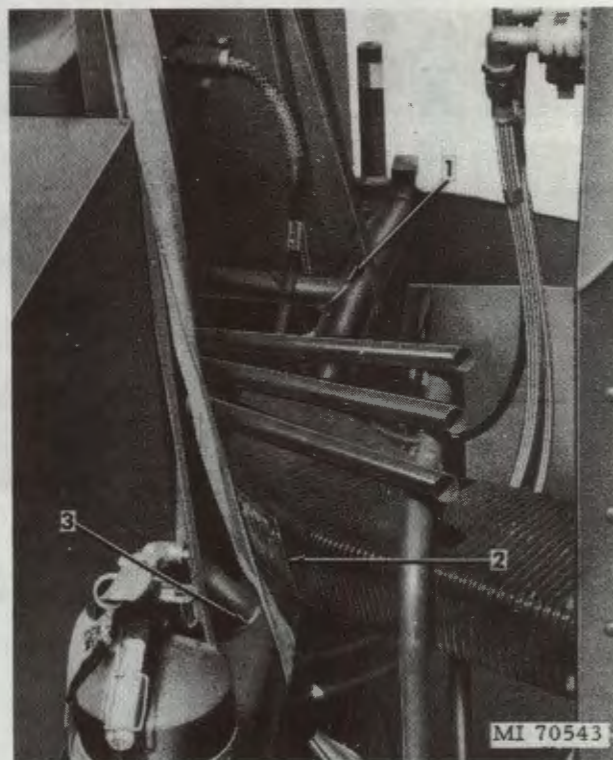
b. Prepare the IPAR for helicopter lift as described below.

(1) For preparation for travel procedures of the IPAR, refer to paragraph 3-21a. For preparation for travel procedures of the M390 trailer, refer to paragraph 3-21b(1) through (4), (7), and (8).

(2) Locate the IPAR so that the radar set group is downwind.

(3) Tape the flexible waveguide (2, fig. 3-50) and all areas where the suspension sling assembly could contact the equipment.

(4) Place the four pallet jack cranks on the catwalk behind the receiver-modulator cabinet and secure in place.



1—Left-front cross member junction
2—Flexible waveguide
3—Right-front cross member junction

Figure 3-50. IPAR forward helicopter lift points.

- (5) Remove the eight bolt assemblies (1, fig. 3-49) that secure the pallet to the trailer.

NOTE

After the IPAR has been helicopter-lifted from the trailer, replace the eight bolt assemblies in the trailer.

- (6) Rotate the antenna until the feedhorn (3, fig. 3-33) is positioned over the high-voltage power supply cabinet, and lock the antenna in place.

c. Prepare the IPAR suspension sling assembly as described below.

WARNING

Inspect web loops before use for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

- (1) Attach an 8-foot web loop (7, fig. 3-1) to the right-front cross member junction (3, fig. 3-50).

(2) Daisy-chain (fig. 3-2) two 8-foot web loops and one 4-foot web loop to the free ends of the attached 8-foot web loops, forming a 14-foot suspension sling.

(3) Attach the free ends of the 14-foot suspension sling to the 10-inch web ring (fig. 3-3). Pull the suspension sling taut and tape it to the reflector support (4, fig. 3-51).

(4) Attach an 8-foot web loop to the left-front cross member junction (1, fig. 3-50).

(5) Daisy-chain two 8-foot web loops and one 4-foot web loop to the free ends of the attached 8-foot web loop, forming a 14-foot suspension sling.

(6) Attach the free ends of the 14-foot suspension sling to the 10-inch web ring. Pull the suspension sling taut and tape it to the reflector support.

CAUTION

Insure that the suspension sling clears the wiring cables (2, fig. 3-52) behind the amplifier-cooler cabinet (1, fig. 3-52).

- (7) Attach an 8-foot web loop (4, fig. 3-52) to the right-rear cross member junction (3, fig. 3-52).

(8) Daisy-chain two 8-foot web loops and one 4-foot web loop to the free ends of the attached 8-foot web loop, forming a 14-foot suspension sling.

(9) Attach the free ends of the 14-foot suspension sling to the 10-inch web ring.

(10) Attach an 8-foot web loop to the left-rear cross member junction (1, fig. 3-53).

(11) Daisy-chain two 8-foot web loops and one 4-foot web loop to the free ends of the attached 8-foot web loop forming a 14-foot suspension sling.

(12) Attach the free ends of the 14-foot suspension sling to the 10-inch web ring. Pull the suspension sling taut and tape it to the reflector support (4, fig. 3-51).

(13) Place tape through the 10-inch web ring, over the loops, and around the knot formed by the web loops.

(14) Pull the suspension sling assembly up taut to the top of the major item and place tape around the suspension slings every 12 inches from the top of the antenna reflector support to the 10-inch web ring.

(15) Tape the suspension sling assembly (2, fig. 3-51) to the top of the antenna reflector to prevent entangling.

(16) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the major item.

(17) Place the grounding device (1, fig. 3-51) with the taped suspension sling assembly on top of the antenna reflector.

(18) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lifting of the IPAR, perform the following checks.

(1) The IPAR is prepared to travel.

(2) The flexible waveguide and other areas where suspension slings could contact equipment are taped.

(3) The pallet jacks are properly secured to the catwalk.

(4) The bolt assemblies are removed from the trailer and pallet.

(5) The feedhorn is positioned over the high-voltage power supply cabinet, and the azimuth stow lock is engaged.

(6) The suspension slings are properly attached.

(7) The suspension slings are taped for helicopter pickup.

(8) The radar set group is facing downwind.

(9) All the leveling jacks are stowed and secure.

(10) The handbrakes are released.

e. To attach the suspension sling assembly to the helicopter hook, refer to paragraph 3-9e.

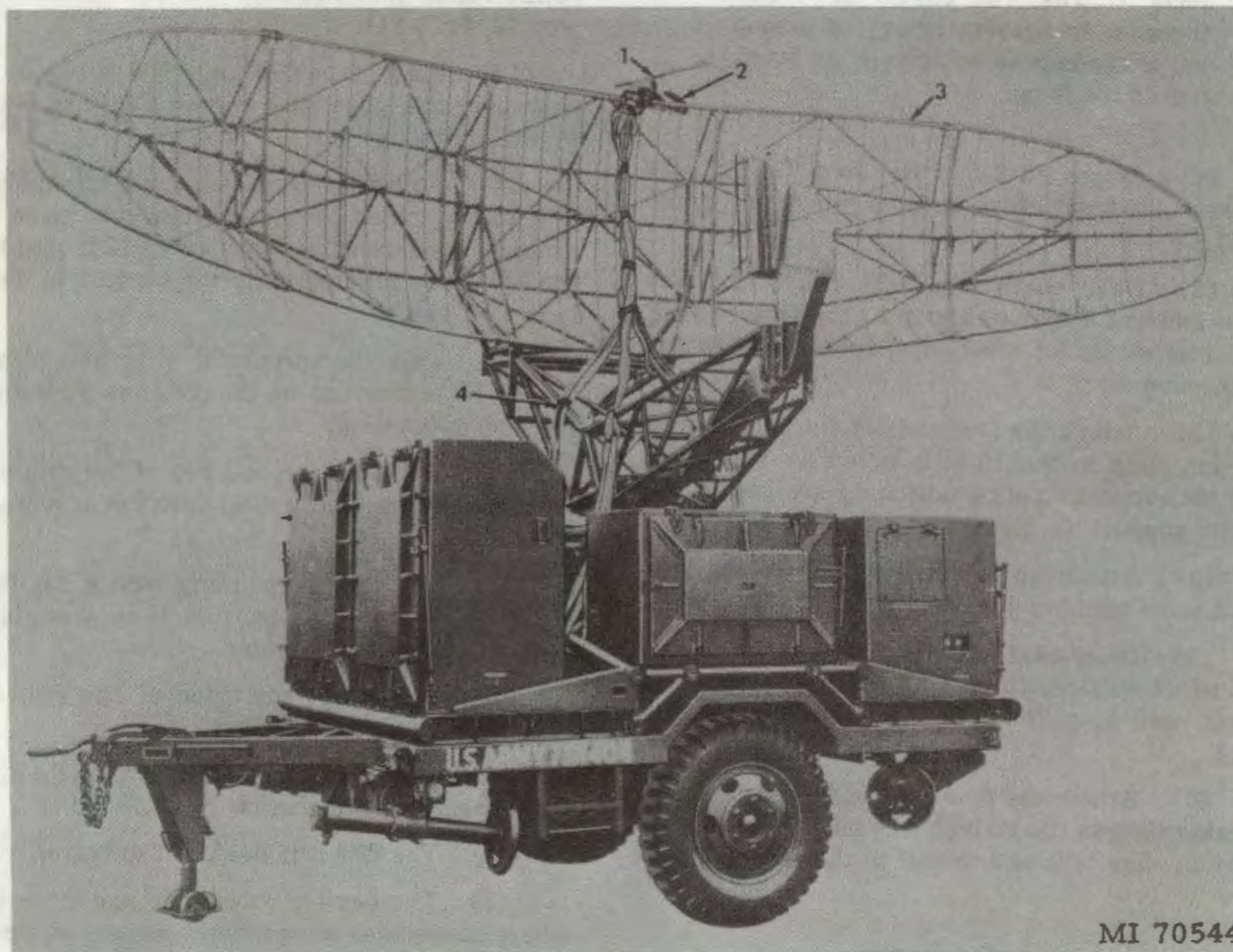
f. Prepare the M390 trailer for helicopter lift as described below.

CAUTION

The M390 trailer must not be helicopter lifted when an IPAR is installed on the trailer.

(1) For preparation for travel procedures of the M390 trailer, refer to paragraph 3-21b(1) through (4) and (6) through (8).

(2) Tape all sharp edges on the lunette (6, fig. 3-54) and the rear lifting points (fig. 3-55).



MI 70544

1—Grounding device
2—Suspension sling assembly

3—Antenna reflector
4—Reflector support

Figure 3-51. IPAR suspension sling assembly secured for helicopter pickup.

g. Prepare the M390 trailer suspension sling assembly as described below.

WARNING

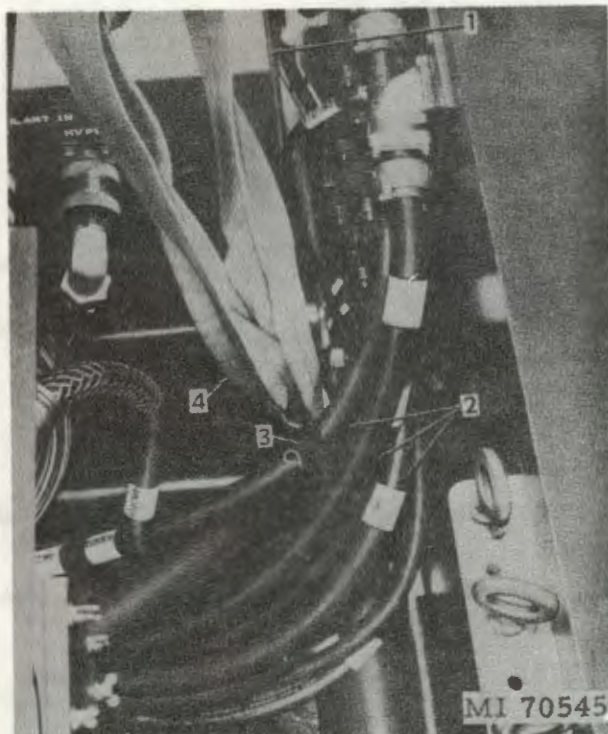
Inspect web loops, before use, for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

(1) Attach an 8-foot web loop (7, fig. 3-1) to the lunette (6, fig. 3-54) on the front of the trailer.

(2) Daisy-chain (fig. 3-2) two 8-foot web loops to the free end of the 8-foot web loop attached to the lunette forming the forward 12-foot suspension sling (4, fig. 3-54).

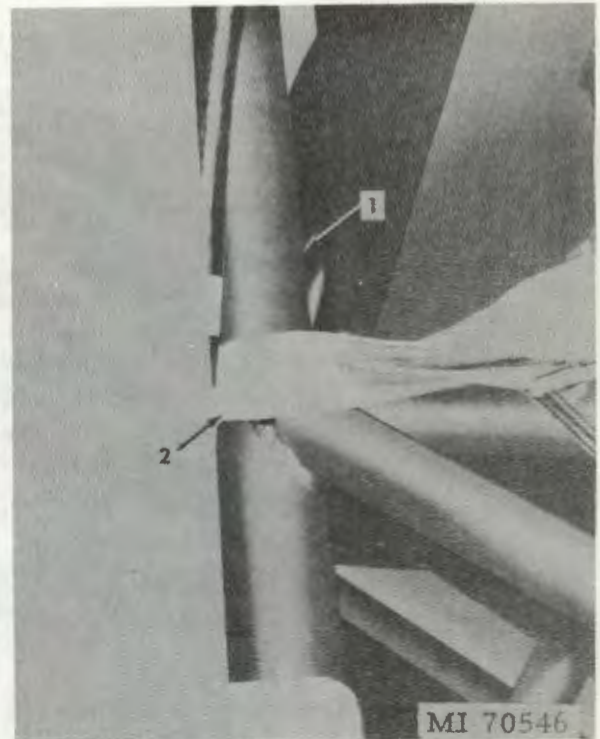
(3) Attach the free end of the 12-foot suspension sling to the 10-inch web ring (fig. 3-3).

(4) Attach an 8-foot web loop to the left end of the rear cross beam (2, fig. 3-55) on the outside of the taillight.



- 1-Amplifier-cooler cabinet
- 2-Wiring cables
- 3-Right-rear cross member junction
- 4-8-foot web loop

Figure 3-52. IPAR right-rear helicopter lift point.



- 1-Left-rear cross member junction
- 2-8-foot web loop

Figure 3-53. IPAR left-rear helicopter lift point.

(5) Daisy-chain two 8-foot web loops to the free ends of the 8-foot web loop, forming the left-rear 12-foot suspension sling.

(6) Attach the free ends of the 12-foot suspension sling to the 10-inch web ring.

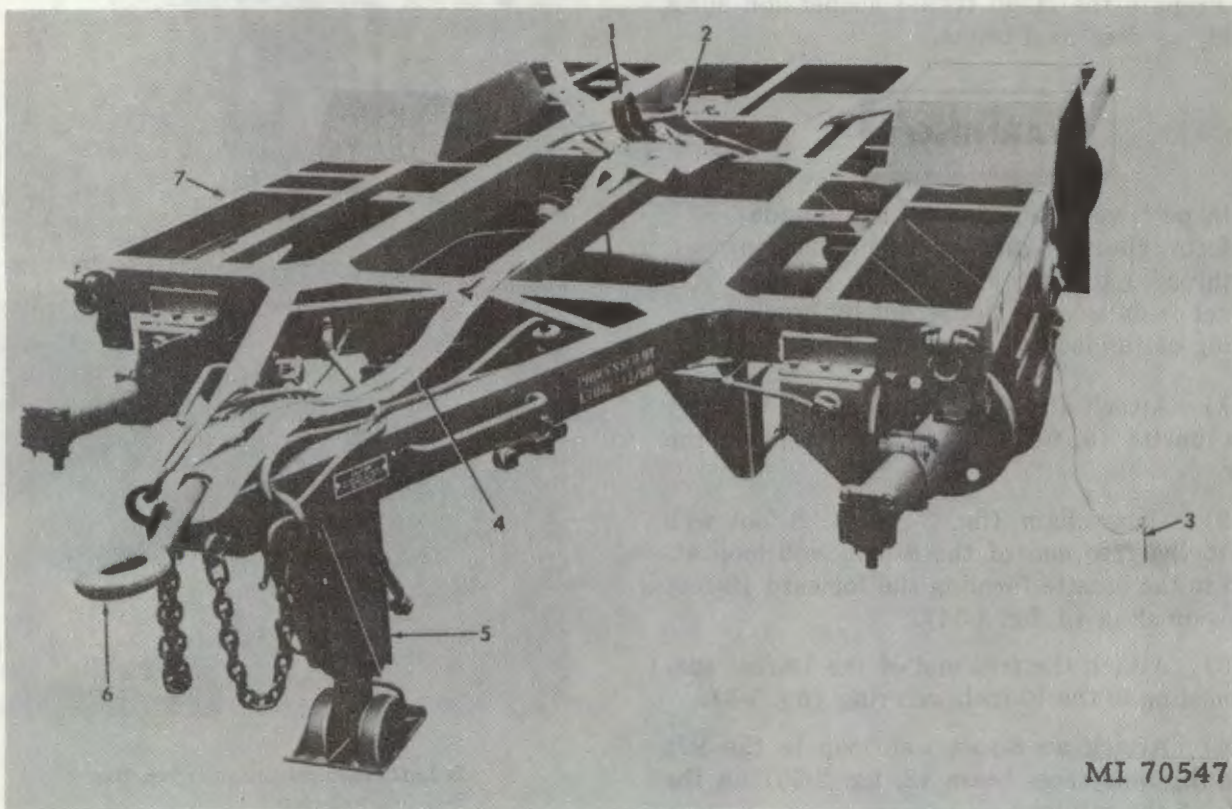
(7) Repeat steps (4) through (6) for the right end of the rear cross beam.

(8) Place tape through the 10-inch web ring, over the loops, and around the knot formed by the web loops (fig. 3-3).

(9) Pull the suspension sling assembly (1, fig. 3-54) up taut to the center of the trailer bed, and place tape around the suspension sling assembly every 12 inches from the top of the trailer to the 10-inch web ring.

(10) Tape all suspension slings to the trailer bed (7, fig. 3-54) to prevent entangling.

(11) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the major item.



- 1—Suspension sling assembly
- 2—Grounding device
- 3—Ground rod
- 4—12-foot suspension sling
- 5—Front support
- 6—Lunette
- 7—Trailer bed

Figure 3-54. M390 trailer—suspension sling assembly secured for helicopter pickup.

(12) Place the grounding device (2, fig. 3-54) with the tape suspension sling assembly on top of the major item.

(13) Stow the remainder of the lifting kit in the storage bag.

h. Prior to helicopter lift of the M390 trailer, check that:

- (1) The trailer is prepared for travel.
- (2) The front support is fully retracted.

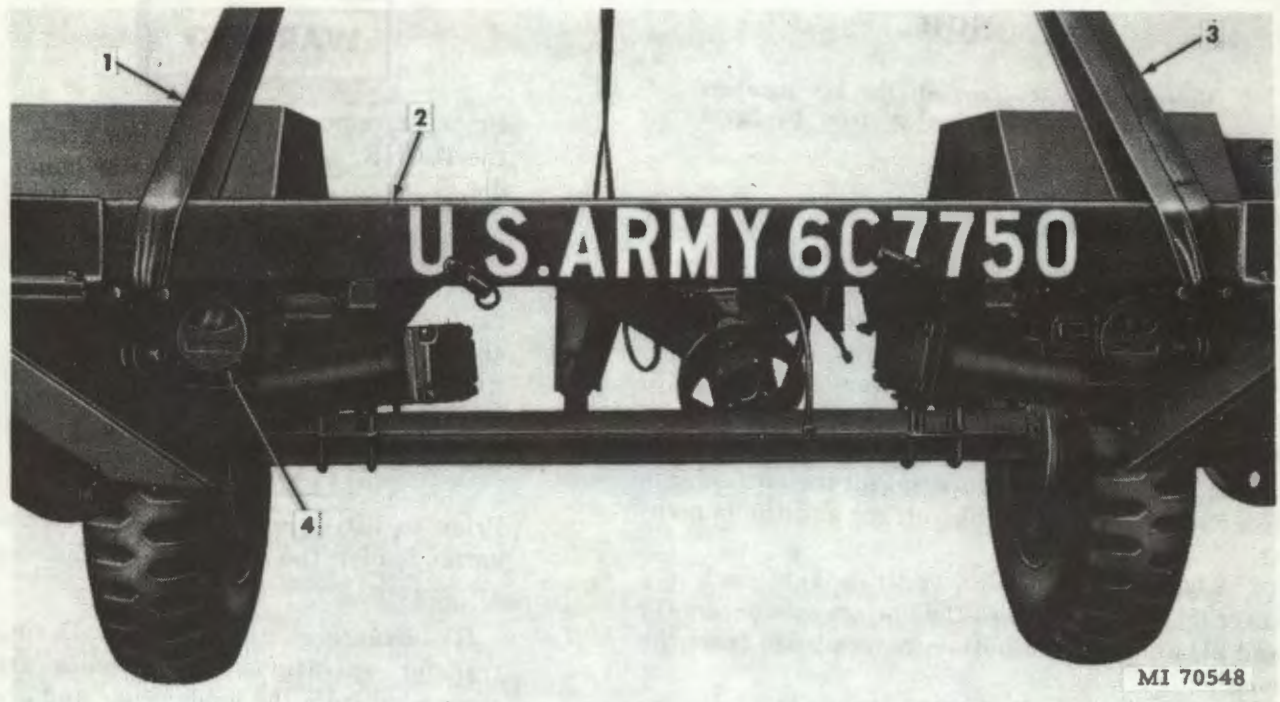
(3) All sharp edges are taped.

(4) The suspension slings are properly attached.

(5) The suspension sling assembly is taped for helicopter pickup.

(6) The trailer handbrakes are released.

i. To attach the suspension sling assembly to the helicopter hook, refer to paragraph 3-9e.



MI 70548

1—8-foot web loop
2—Rear cross beam

3—Right-rear suspension sling
4—Taillight

Figure 3-55. M890 trailer—rear lifting points.

Section VII. PREPARATION FOR TRAVEL FOR THE LOADER-TRANSPORTER

Refer to TM 9-1450-500-10 for detailed procedures to prepare the loader-transporter for travel by prime mover or helicopter.

Section VIII. PREPARATION FOR TRAVEL FOR THE IMPROVED GUIDED MISSILE LAUNCHER XM192E1

3-23. General

This section describes the preparation for travel procedures for the ILCHR by the prime mover (par. 3-25) and by helicopter (par. 3-26).

3-24. Tools

The only tool required to prepare the ILCHR for travel is a $\frac{3}{4}$ -inch open-end wrench. It is located in the general mechanics' tool kit.

3-25. Preparation for Travel Procedures — Prime Mover

a. The detailed procedures for preparing the ILCHR for travel by the prime mover are as follows.

(1) Dennergize the ILCHR (TM 9-1440-531-12-1).

NOTE

If the battery is operating in cold weather conditions, prior to removing the missiles from the ILCHR, deenergize the cold-weather kit heater covers (TM 9-1440-531-12-1) and remove the heater covers as stated in (1.1) below.

(1.1) Remove the cold-weather kit heater covers from the missiles, as follows:

NOTE

For the following removal procedures, two men and a 3-foot stand or stepladder are required.

NOTE

Unless otherwise specified, the key numbers shown in parentheses below refer to figure 3-55.1.

(a) Disconnect the cable assemblies (6) from the receptacles on the distribution box.

(b) Pull both ball-lock pins (18) of the center covers (17 and 19) from the holes in the sides of the fairing and center blast deflector.

(c) Release each side cover lower strap (8) from the buckle (20) of the bottom side cover. Release the tabs of the tailcone cover from the pile on the bottom and side covers. Pull the bottom side cover loose from the wing surface and the launcher.

(d) Release the lower strap (8) of each side cover (5) from the pile of the bottom side covers (15 and 21) and pull the bottom covers loose from the missile.

(e) Release the fastening tape (23) from the pile on the bottom of each outboard cover and release each bottom side cover (15 and 21) from the center cover.

(f) Unmate the center cover (17 or 19) from the supporting step (16) of each outboard cover and move the center cover forward until it releases from the launcher fairing.

(g) Release the lower strap (8) of each side cover from the buckle (20) of each outboard cover. Remove both bottom side covers (15 and 21) from between the lower wings of the missile.

(h) Remove the bottom center cover (17 or 19) from between the two lower wings of the missile.

(i) Release the top strap (7) of each side cover from the buckles (12) of the top cover.

(j) Release the tabs (13) from the pile on the rear edges of the top and side covers.

(k) Pull the tailcone cover (14) from against the rear edges of the top and side covers. Remove the cover from the tailcone of the missile.

(l) Disconnect the breakaway connection (3). Release the forward section of each cover by removing the two strap assemblies (2 and 27) from around each of the two strap grooves.

(m) Remove the bottom front cover (25) from the missile.

(n) Release the top heater cover from the side heater cover by releasing the side heater strap (4) from the pile (10) of the top heater cover. Remove one side heater cover (5).

(o) Remove the remaining side cover as described in step *n* above.

(p) Remove the top heater cover (11).

WARNING

Prior to removing the missiles from the ILCHR, set the SAFE/ARM handle (1, fig. 3-76) on each missile to the SAFE position and install shorting plugs on the missile umbilical connector (3, fig. 3-76). Utilize all safety precautions in removing the missiles from the ILCHR (TM 9-1440-531-12-1 and TM 9-1450-500-10).

CAUTION

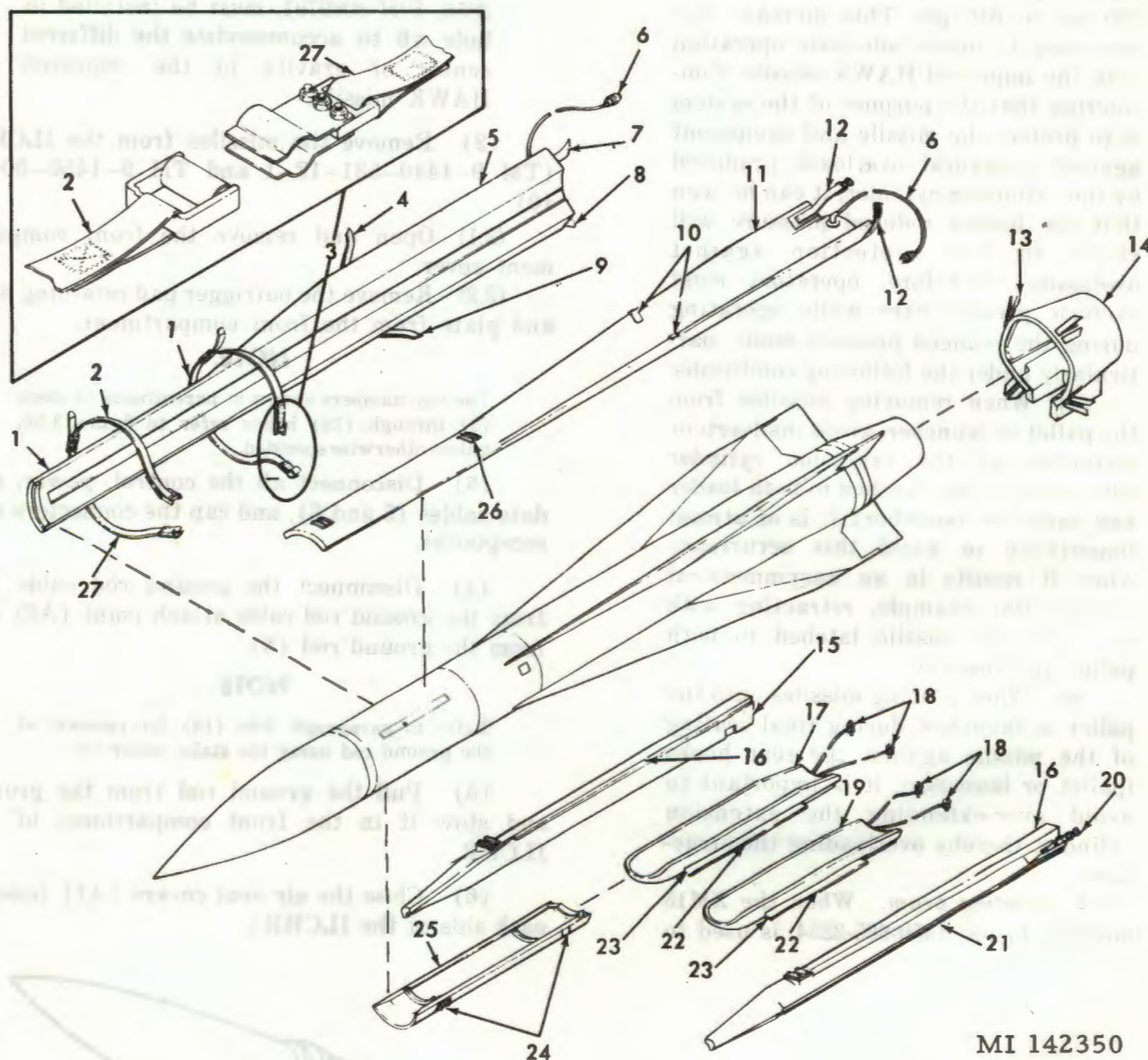
Prior to lifting missiles with the converted loader, the following precautions are mandatory.

(1) *Launcher interference.* During transfer operations, the missiles are suspended from the loader yoke and are free to swing about the yoke pivot. Missiles normally hang nose down from level. For transfer operations to and from the launcher, it is highly desirable to have the missiles hang at a 5-degree nose-down attitude. Because of the center of gravity location of the improved HAWK missile and the relationship to the yoke pivot, the missiles (3) hang 2 degrees nose down, or less than half the normal angle for standard missiles. If the missiles are allowed to maintain this shallow hang angle throughout the transfer operation, interferences of the missile boat tail and umbilical plug with the launcher rear hook occur. To avoid this condition, the following procedures are necessary:

(a) When transferring missiles to the launcher, as the missile boat tail approaches the launcher rear hook, exert and hold a light down force (by hand) on the missile radome (to prevent contact of the boat tail and umbilical plug with the launcher hook), until the missile(s) is in firm contact with the forward sector and the rear roller.

(b) When removing missiles from the launcher, exert and hold a light down force on the missile radome until the missile boat tail is safely clear of the launcher rear hook.

(2) *Reduced pressure.* Installation of this conversion changes the hydraulic



MI 142350

- 1 — Strap grooves
- 2 — Strap
- 3 — Breakaway connection
- 4 — Strap
- 5 — Side heater cover
- 6 — Cable assembly
- 7 — Top strap
- 8 — Lower strap
- 9 — Strap
- 10 — Pile
- 11 — Top heater cover
- 12 — Buckle
- 13 — Tab
- 14 — Tailcone insulating cover

- 15 — Bottom side insulating cover
- 16 — Supporting step
- 17 — Bottom center insulating cover
- 18 — Ball-lock pin
- 19 — Bottom center insulating cover
- 20 — Buckle
- 21 — Bottom side insulating cover
- 22 — Lower strap
- 23 — Fastening tape
- 24 — Strap grooves
- 25 — Bottom front insulating cover
- 26 — Strap grooves
- 27 — Strap

Figure 3-55.1. Removal of cold-weather kit heater covers.

system so that the pressure in the reduced pressure system increases from 320 psi to 615 psi. This increase was necessary to insure adequate operation with the improved HAWK missile. Considering that the purpose of the system is to protect the missile and equipment against structural overloads produced by the extension cylinder, it can be seen that the higher reduced pressure will result in less protection against overloads. Therefore, operators must exercise greater care while operating during the reduced pressure mode, particularly under the following conditions:

(a) When removing missiles from the pallet or launcher, avoid inadvertent retraction of the extension cylinder when missiles are latched to both loader and pallet (or launcher). It is of utmost importance to avoid this occurrence when it results in an unsymmetrical loading (for example, retracting with one outboard missile latched to both pallet and loader).

(b) When placing missiles onto the pallet or launcher, during final seating of the missile against the rear hooks (pallet or launcher), it is important to avoid over-extending the extension cylinder, thereby overloading the structures.

(3) *Hoisting beam.* When the XM15 hoisting beam, 1450-665-3234, is used to

lift single improved HAWK missiles, the component connecting link, 2590-690-2856, P/N 9089791, must be installed in hole #6 to accommodate the different center of gravity in the improved HAWK missile.

(2) Remove the missiles from the ILCHR (TM 9-1440-531-12-1 and TM 9-1450-500-10).

(2.1) Open and remove the front compartment cover.

(2.2) Remove the outrigger pad retaining bars and plate from the front compartment.

NOTE

The key numbers shown in parentheses in steps (3) through (12) below refer to figure 3-56, unless otherwise specified.

(3) Disconnect all the control, power, and data cables (5 and 6), and cap the connectors and receptacles.

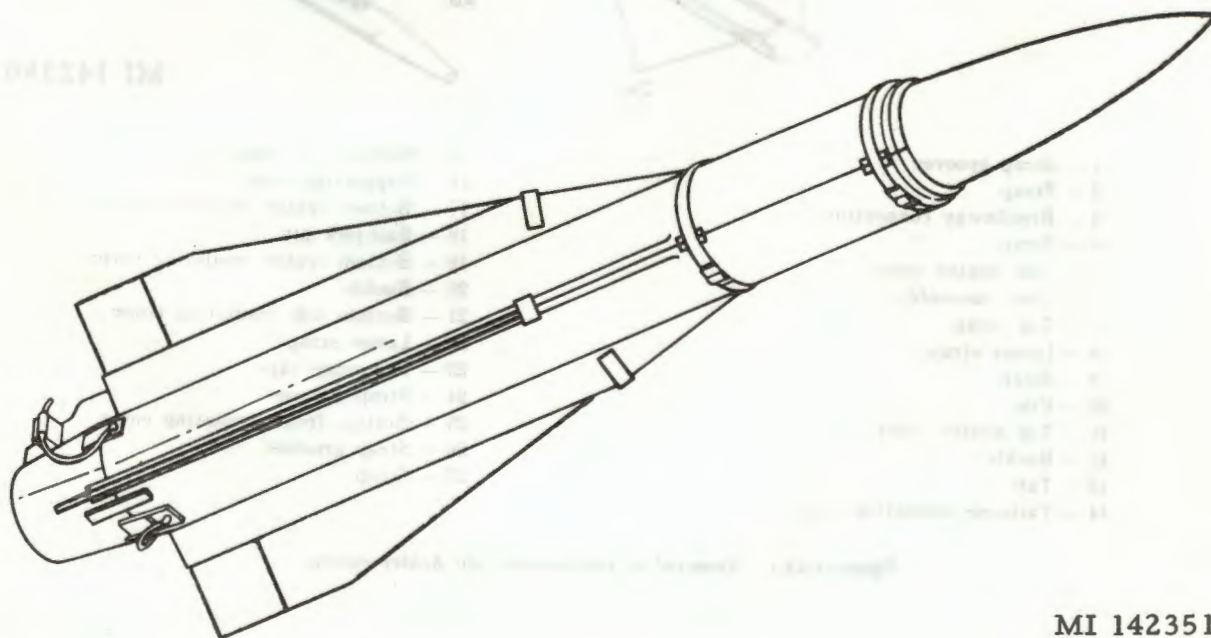
(4) Disconnect the ground rod cable (4) from the ground rod cable attach point (A2) and from the ground rod (3).

NOTE

Refer to paragraph 3-8a (18) for removal of the ground rod using the stake puller kit.

(5) Pull the ground rod from the ground and stow it in the front compartment of the ILCHR.

(6) Close the air vent covers (A1) (one on each side of the ILCHR).



MI 142351

Figure 3-55.2. Heater Covers on the missile.

nt covers
d rod cable attach point

l panel door
UAL AZIMUTH MOVEMENT VALVE
support hydraulic control panel

grip knob (2)
th stow lock
th mil ring

ner control
unications station and bracket assembly
unication cable

disconnect pin
support jack
ad
disconnect pin

ive cap
ye level
ump handle
ump
valve
raising valve
ont cylinder leveling valve
ront cylinder leveling valve
ylinder leveling valve

ger pad socket slide
spring
ger pad

pport arm
sion lockout handle (2)

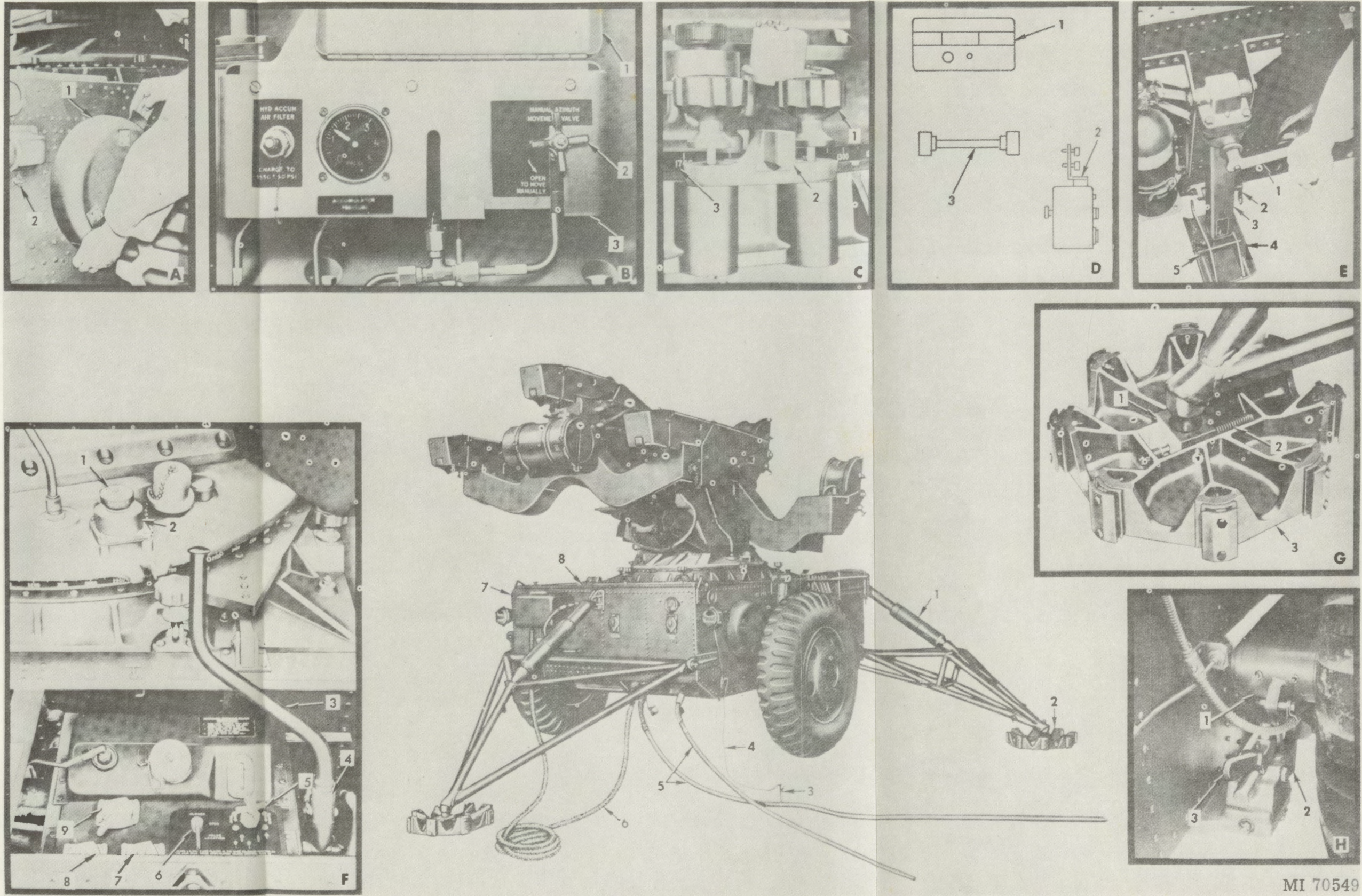


Figure 3-56. ILCHR—preparation for travel and emplacement.

MI 70549

(7) Engage the azimuth stow lock (C2) as described below.

(a) Open the control panel door, and open the MANUAL AZIMUTH MOVEMENT VALVE (B2) on the boom support hydraulic control panel (B3) by turning the valve handle counterclockwise. Manually move the boom support so that the red vernier points to 3200 on the azimuth mil ring (C3).

(b) Unscrew the finger grip knobs (C1) on the azimuth stow lock (C2). Lift and turn the azimuth stow lock 180 degrees. Engage the lug in the slot on the boom support and secure the finger grip knobs.

(c) Close the MANUAL AZIMUTH MOVEMENT VALVE by turning the valve handle clockwise, and close the control panel door.

(8) Remove the headset and extension cable from the launcher control (LC)(D1) and stow them in the ILCHR front compartment (8).

(9) Disconnect the communication cable (D3) and stow it in the LC cover.

(10) Remove the communication station and bracket assembly (D2) and stow it in the ILCHR front compartment.

(11) Remove the LC (7) from the front of the ILCHR.

WARNING

Check to insure that the front support jack (E3) is locked in the down position and that the jack pad (E4) is just clear of the ground.

(12) Emplace the ILCHR on its wheels and front support jack as outlined in (a) through (e) below.

(a) Deleted.

(b) At the base hydraulic panel, close the bleed valve (F5) and the hatch-raising valve (F6), and leave the left-front, right-front, and rear cylinder leveling valves (F7, F8, and F9) in the open position.

(c) Remove the handpump handle (F3) from the forward compartment and insert it into the handpump (F4). Move the handpump handle back and forth until all three locking sleeves (F1, fig. 3-57) loosen from their piston collar (F2, fig.

3-57). Unscrew the locking sleeves as far as possible.

(d) Slowly open the bleed valve to retract the leveling cylinders until the weight of the ILCHR rests on the wheels and the front support jack.

(e) Disengage each suspension lockout system by rotating the suspension lockout handle (H3) to the downward position.

NOTE

Unless otherwise specified, the key numbers shown in parentheses in steps (13) through (19) below refer to figure 3-57.

(13) Disengage the left-front outrigger as described below.

(a) Lift the outrigger (G4) so that the outrigger socket (F3) is forced against the piston collar (F2), forcing the retraction of the leveling cylinder (1, fig. 3-56). Close the left-front cylinder leveling valve (F7, fig. 3-56).

(b) While supporting the left leveling cylinder, lower the outrigger. Lower the leveling cylinder and allow it to rest against the ILCHR base.

(c) Disconnect the quick-disconnect pin (A1) that secures the outrigger sway brace (A2) to the locking bracket (A3).

(d) Stow the sway brace in the storage compartment.

(14) Attach the left-front towing brace as described in (a) through (c) below.

(a) Remove the towing brace (B5) from the front compartment. Screw the T-handle ball socket end into the socket on the right-front outrigger.

(b) Raise and swing the outrigger into the towing position.

(c) Attach and secure the clevis end of the towing brace to the towing brace bracket on the upper right-front corner of the ILCHR base with the quick disconnect pin.

(15) Disengage the right-front outrigger as described below.

(a) Lift the outrigger (B12) so that the outrigger socket is forced against the piston collar forcing retraction of the leveling cylinder. Close the cylinder leveling valve (F8, fig. 3-56).

(b) While supporting the leveling cylinder, lower the outrigger. Lower the leveling cylinder and allow it to rest against the ILCHR base.

(c) Disconnect the quick-disconnect pin that secures the outrigger sway brace to the locking bracket.

(d) Stow the sway brace in the storage compartment.

(16) Attach the right-front towing brace as described below.

(a) Remove the towing brace (B2) from the front compartment. Screw the T-handle ball socket end into the socket on the right-front outrigger.

(b) Raise and swing the outrigger into the towing position.

(c) Attach and secure the clevis end of the towing brace to the towing brace bracket on the upper right-front corner of the ILCHR base with the quick-disconnect pin.

(17) Remove the lunette from the front compartment. Position it so that the lugs on each side of the lunette fit into the slots on the inside of the front outriggers and that the lunette cross bars engage the ball projections on the top and bottom of the outriggers. Depress the detent (B10) and tighten the finger grip knob (B11).

(18) Raise the rear outrigger into the travel position as described below.

(a) Lift the outrigger (C3) so that the outrigger socket is forced against the piston collar, forcing retraction of the leveling cylinder (2).

(b) While supporting the leveling cylinder, lower the outrigger to the outrigger pad. Lower the leveling cylinder until it rests against the ILCHR base.

(c) Raise the outrigger and lay it against the ILCHR base. Raise the leveling cylinder, align the fitting on the leveling cylinder with the clevis fitting (C1) on the under side of the outrigger and secure with the quick-disconnect pin (C4).

NOTE

It may be necessary to adjust the leveling cylinder locking sleeve to align the leveling cylinder to the clevis fitting.

NOTE

In batteries equipped with the stake puller kit, omit step (19) and perform step (20).

(19) Remove the spades (G2) from the outrigger pad (G3) as described below.

CAUTION

To prevent damage to the index boom, insure that the protective covers are placed around the index boom.

(a) Place the two chains (E3) with the protective covers (E1) of the cable stay over the index boom (D2), and engage the two hooks on their respective chains (D3) as close to the index boom as possible.

(b) Insert the safety hook (D5) into the hole of the spade (D6).

(c) Raise the boom assembly on the loader-transporter and pull the spade from the outrigger pad (D4) and the ground.

(d) Repeat steps (b) and (c) above for the remaining spades, securing all three outrigger pads.

(20) To remove the ILCHR spades using the spade puller kit (fig. 3-10), perform the following steps.

(a) Position the tripod (2, fig. 3-58) so that the pulley (1, fig. 3-58) is directly over the spade to be removed.

(b) Place the cable yoke (3, fig. 3-58) on the spade and insert the pin through the yoke and ILCHR spade hole.

NOTE

All eight spades can be removed without changing the approach angle of the prime mover. The spades nearest the vehicle should be removed first to insure that the tripod will straddle and clear the pad when removing the spades on the far edge of the pad. If the spades on the sides of the pad are removed, either forward leg of the tripod can bear on the pad when positioning the pulley over the spade to be removed (fig. 3-59.)

(c) Drive the prime mover toward the tripod and hook the retrieving cable (4, fig. 3-58) to a towing point on the front of the vehicle.

NOTE

The cable must be hooked to the prime mover at a height less than 42 inches from the ground. If the cable is pulled upward from a higher point, the tripod assembly could rotate backward so that a tension load could not be applied to the cable.

- 1—Launcher control
- 2—Rear leveling cylinder
- 3—Rear outrigger
- 4—Outrigger and socket
- 5—Launcher control cover

- 1—Quick-disconnect pin
- 2—Left-front outrigger sway brace
- 3—Sway brace locking bracket
- 4—Quick-disconnect pin

- 1—Intervehicle electrical cable connector
- 2—Right-front towing brace
- 3—T-handle ball socket end
- 4—Brake hose fitting (2)
- 5—Left-front towing brace
- 6—Quick-disconnect pin
- 7—Towing brace bracket
- 8—Left-front outrigger
- 9—Lunette
- 10—Detent
- 11—Finger grip knob
- 12—Right-front outrigger

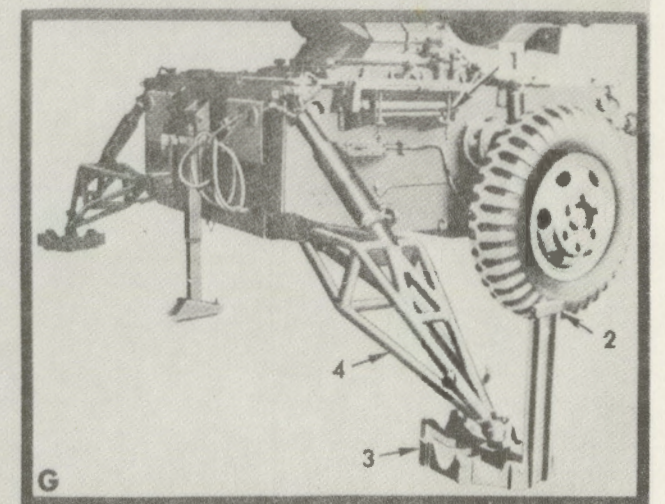
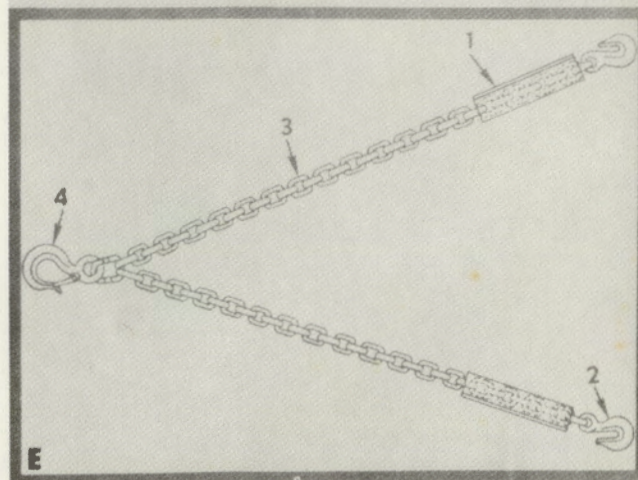
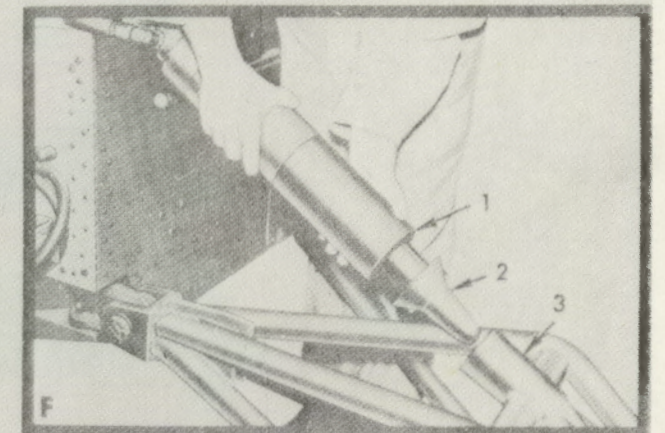
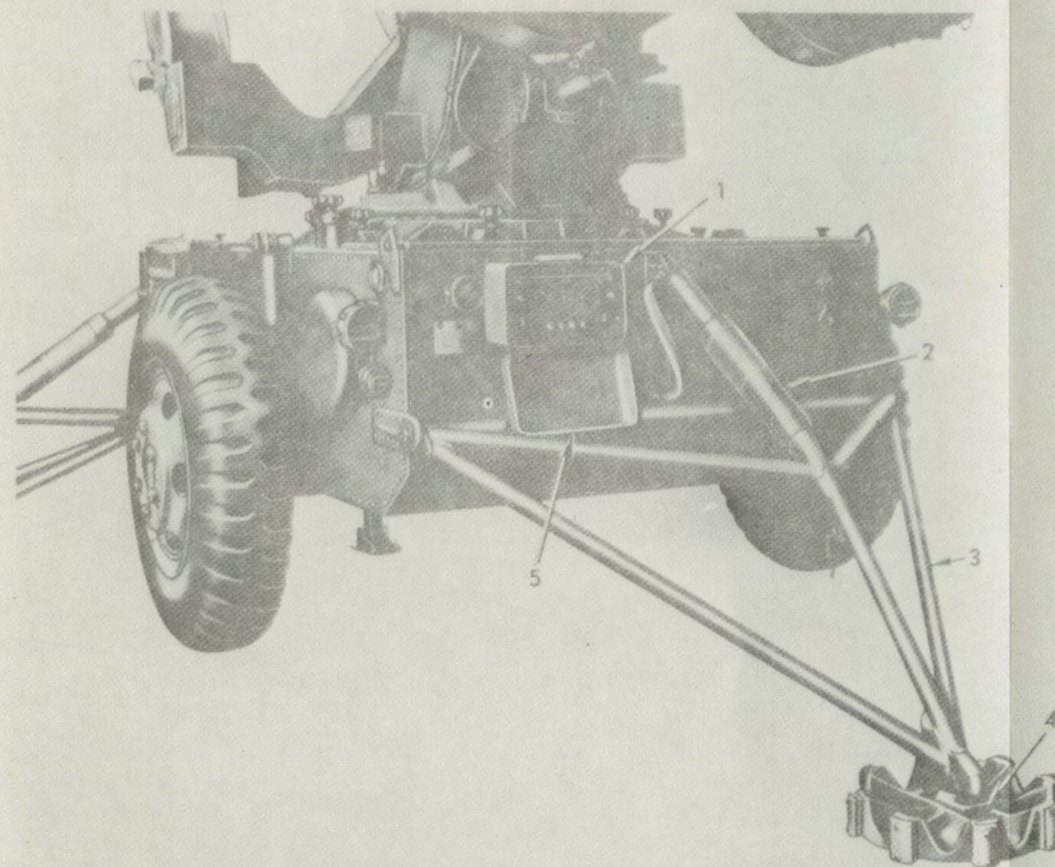
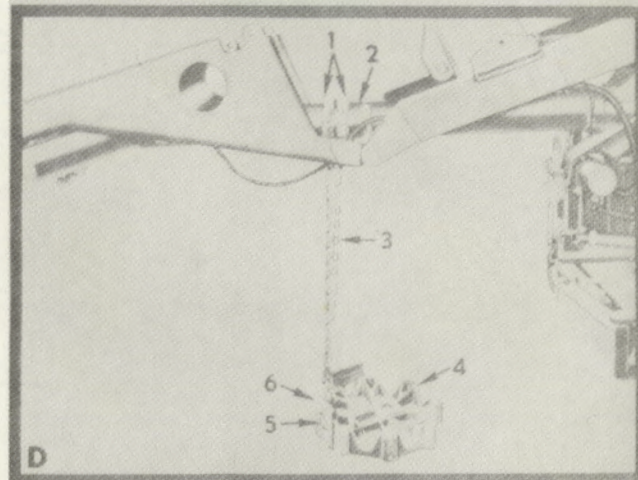
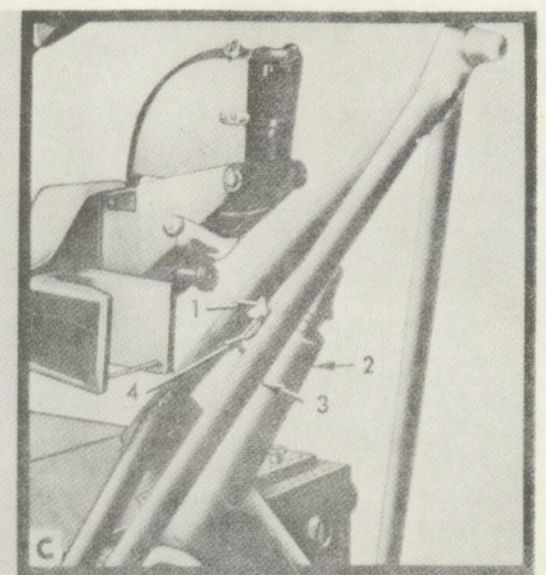
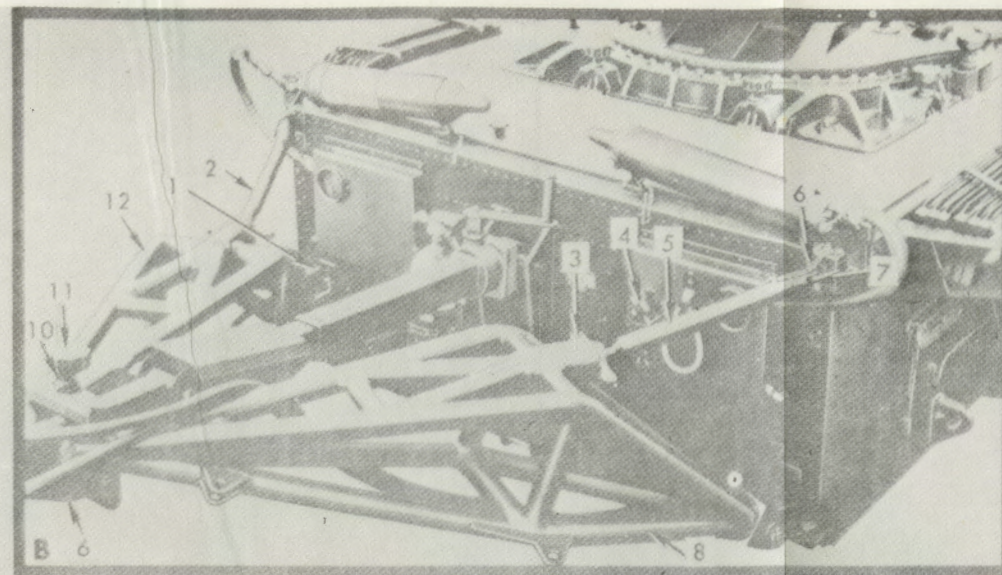
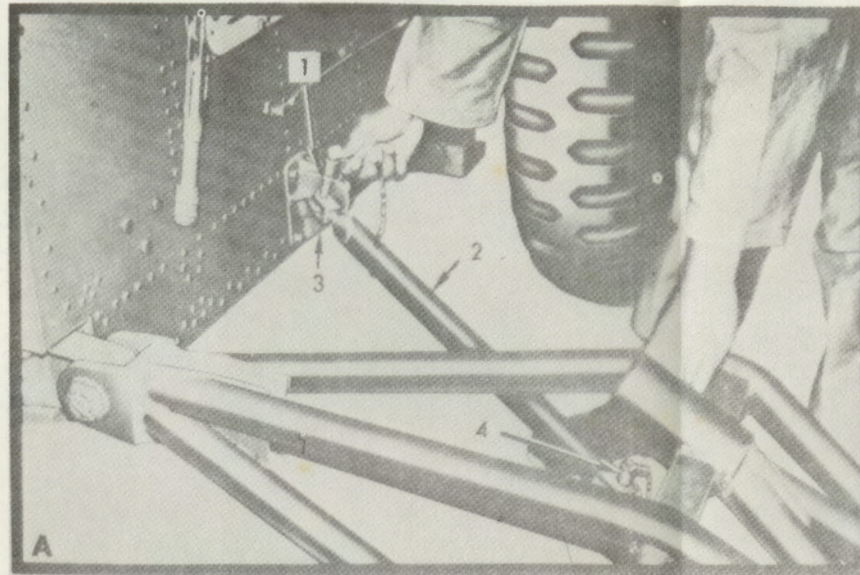
- 1—Clevis fitting
- 2—Rear leveling cylinder
- 3—Rear outrigger
- 4—Quick-disconnect pin

- 1—Protective cover (2)
- 2—Index boom
- 3—Chain
- 4—Outrigger pad
- 5—Safety hook
- 6—Spades

- 1—Protective cover (2)
- 2—Hook (2)
- 3—Chain (2)
- 4—Safety hook

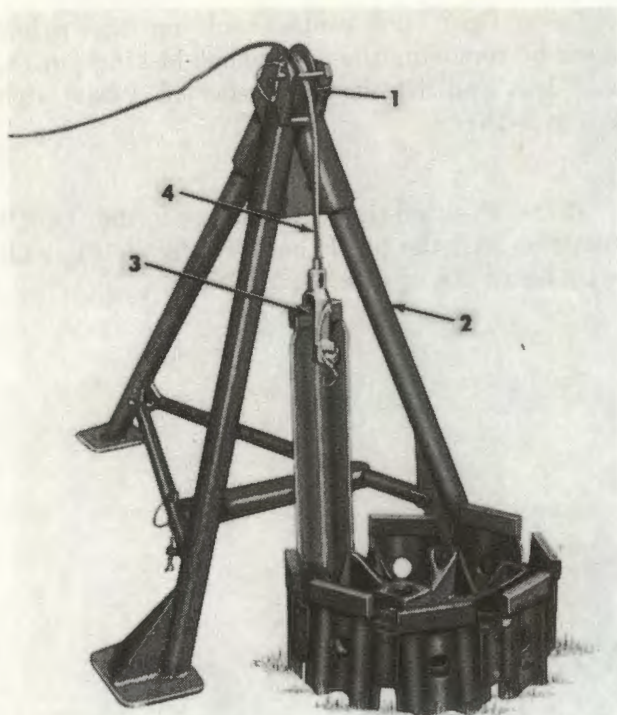
- 1—Locking sleeve (leveling cylinder)
- 2—Piston collar
- 3—Outrigger socket

- 1—Storage rack
- 2—Spades
- 3—Outrigger pad
- 4—Left-front outrigger



MI 70550

Figure 3-57. ILCHR ouptriggers—preparation for travel and emplacement.



MI 70551

- 1-Pulley
- 2-Tripod
- 3-Cable yoke
- 4-Retrieving cable

Figure 3-58. Removal of the ILCHR front and rear spades.

(d) Insure that the rear tripod pad is directly under the cable.

WARNING

Insure that personnel are standing forward and clear of the tripod before performing the following step.

(e) Back off the prime mover, stopping when the spade has been pulled free.

(f) Drive the prime mover forward approximately 3 feet to slacken the cable for the next operation.

(g) Position the tripod so that the pulley is directly above another spade and attach the cable yoke to the spade.

(h) Repeat steps (d) through (g) above until all eight spades have been removed.

(21) Stow the spades in the storage racks (4, fig. 3-60).

(22) Remove the intervehicular electrical cable from the front compartment and connect it to the receptacle (B1).

(23) Remove the handpump handle.

(24) Stow the following items in the front compartment.

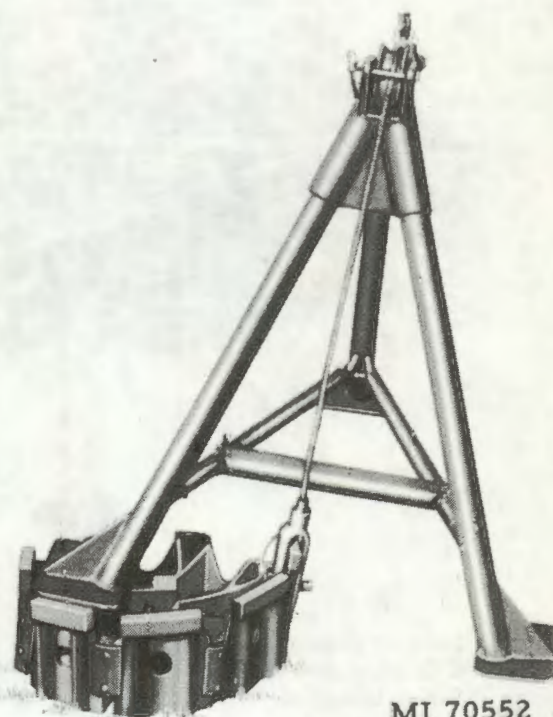
- (a) Ground rod.
- (b) Ground rod cable.
- (c) Tripod
- (d) LC
- (e) Launcher control cable.
- (f) Handpump handle.

(25) Visually inspect the front compartment to insure that all the accessory equipment is present and properly stowed.

(26) Close the ILCHR chassis drain valves.

(27) Install and secure the front compartment cover.

(28) Stow the outrigger pads (3, fig. 3-60) above the stowed spades.



MI 70552

Figure 3-59. Removal of the ILCHR spades (side).

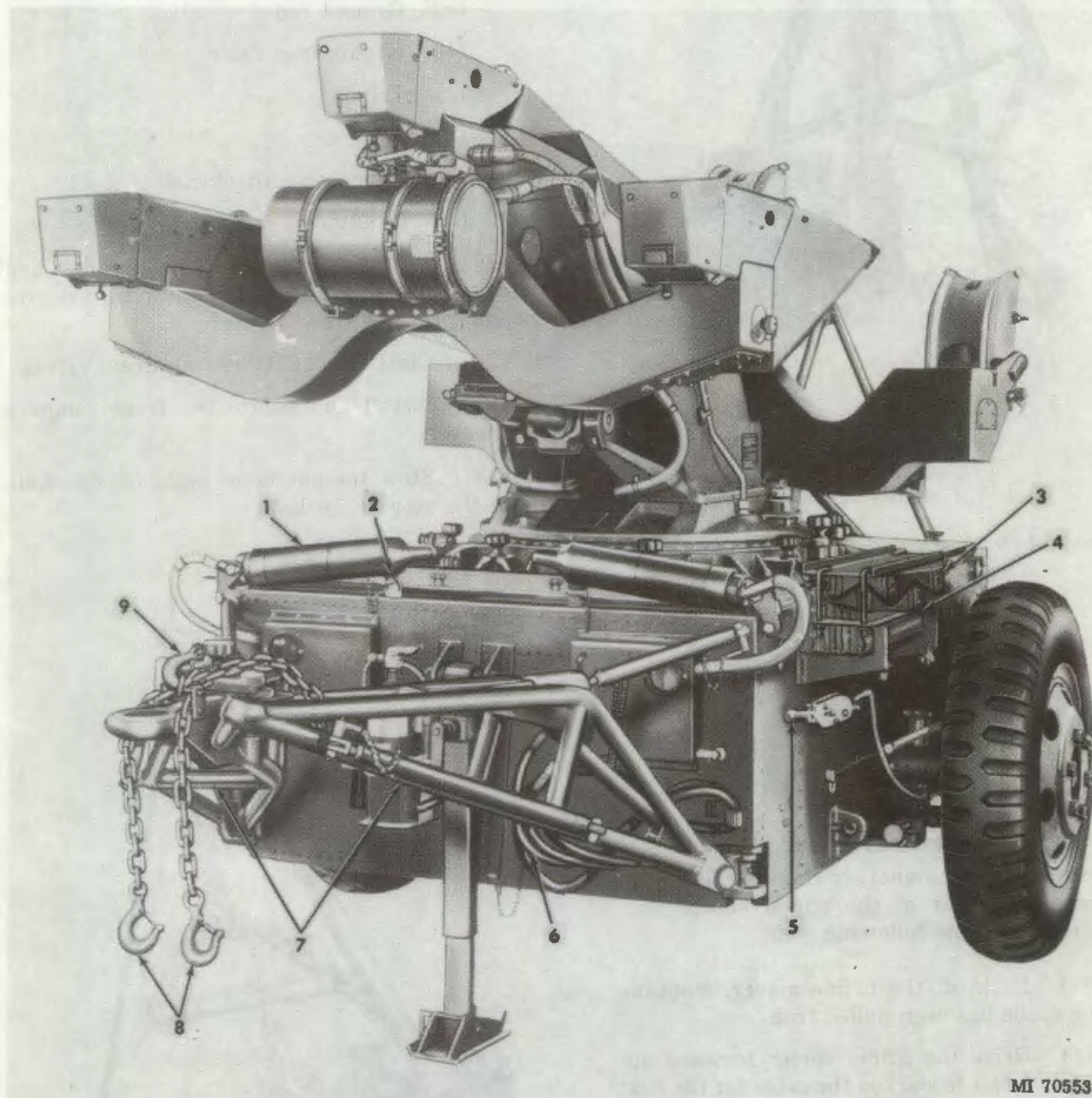
(29) Secure the two front leveling cylinders (1, fig. 3-60) in their stow brackets on top of the ILCHR base by inserting the quick-disconnect pins (2, fig. 3-60) through the brackets and the eyes on the leveling cylinder locking sleeves.

NOTE

It may be necessary to adjust the leveling cylinder locking sleeves to aline the eye and bracket.

(30) Open the pintle hook on the prime mover by removing the pintle hook locking pin (1, fig. 3-18), and lift the spring-loaded T-bar latch (2, fig. 3-18).

(31) Position the prime mover to the ILCHR lunette so that the pintle hook (3, fig. 3-18) is directly below the lunette (4, fig. 3-18).

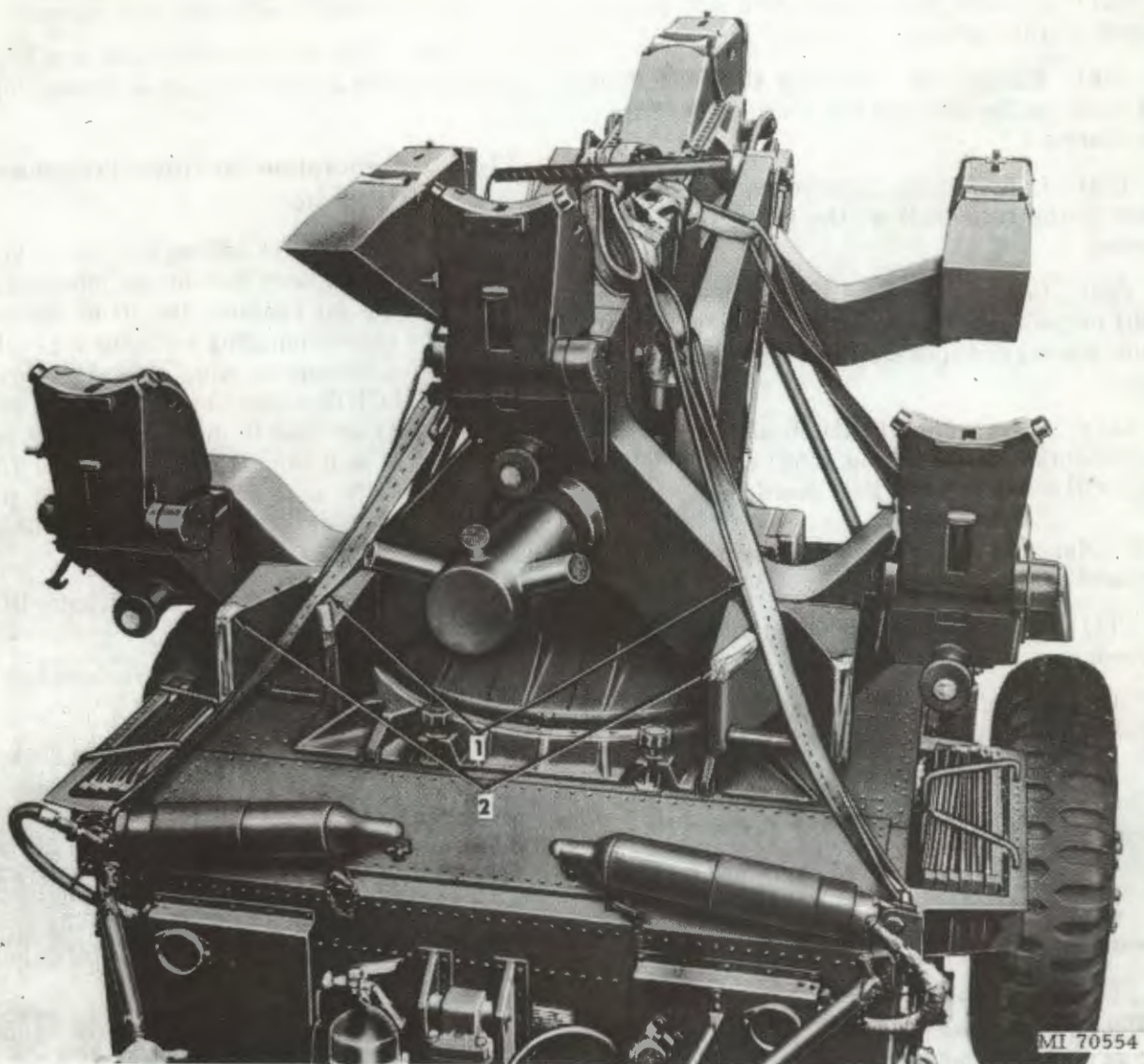


MI 70553A

- 1—Front leveling cylinder
- 2—Quick-disconnect pin
- 3—Outrigger pads
- 4—Spades
- 5—Handbrake lever

- 6—Airbrake hose
- 7—Forward outriggers
- 8—Safety chain
- 9—Outrigger safety chain

Figure 3-60. ILCHR—preparation for travel.



1—Suspension sling
2—Protective tape

Figure 3-61. ILCHR—index fittings taped.

(32) Engage the lunette onto the open pintle hook by retracting the front support jack (E3, fig. 3-56)

(33) Close the pintle hook and insert the locking pin.

(34) Connect the safety chains as described below.

(a) Hook the safety chains (8, fig. 3-60) to the appropriate loops at the rear of the prime mover.

(b) Insert the outrigger safety chain (9, fig. 3-60) through the left- and right-forward outriggers (7, fig. 3-60) and hook it to the loop provided on the lunette.

(35) Retract the front support jack (E3, fig. 3-56) with the crank (E1, fig. 3-56).

(36) Remove the quick-disconnect pins (E2 and E5, fig. 3-56) and swing the jack to a horizontal position with the jack pad on top (B, fig. 3-57).

(37) Replace the quick-disconnect pins removed in (36) above.

(38) Extend the jack with the crank until the hooks on the jack pad rest on the cross bars on the lunette.

(39) Connect the intervehicular electrical cable to the receptacle at the rear of the prime mover.

(40) Connect the two airbrake hoses (6, fig. 3-60) to the air hose connections at the rear of the prime mover, and open the service coupling shutoff cocks.

(41) Release the ILCHR brakes by moving the handbrake levers (5, fig. 3-60) on each side of the ILCHR base to a vertical position.

b. Make the following checks before leaving the area.

(1) All cable receptacle connectors are capped.

(2) The ground rod cable and ground rod are disconnected.

(3) The air vent covers are closed.

(4) The azimuth stow lock is engaged.

(5) The LC is removed and stowed.

(6) The suspension lockout mechanism is disengaged.

(7) The towing braces are properly secured to the front outriggers and to the ILCHR base.

(8) The lunette is properly secured to the front outriggers.

(9) The rear outrigger is properly secured.

(10) The alinement telescope and the fire cut-out assembly and support are properly stowed.

(11) The spades and the outrigger pads are properly stowed.

(12) The intervehicular electrical cable is properly secured and the lights are working.

(13) The front support jack is properly stowed.

(14) The front and rear compartment covers are properly secured.

(15) The front leveling cylinders are properly stowed.

(16) The ILCHR is properly connected to the prime mover.

(17) The handbrakes are released.

(18) The trailer brakes are working (move prime mover a short distance and then stop).

3-26. Preparation for Travel Procedures — Helicopter

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the ILCHR consists of eight 8-foot web loops (7, fig. 3-1) and one 10-inch web ring (9, fig. 3-1). Two 8-foot web loops are daisy-chained (fig. 3-2) together to form one 8-foot suspension sling for each of the four lift points. For detailed procedures, refer to *c* below.

b. Prepare the ILCHR for helicopter lift as described below.

(1) Perform the procedures outlined in paragraph 3-25a(1) through (6).

(2) Engage the azimuth stow lock as described in (a) through (c) below.

(a) Open the control panel door (B1, fig. 3-56) and open the MANUAL AZIMUTH MOVEMENT VALVE (B2, fig. 3-56) on the boom support hydraulic control panel. Manually move the boom support so that the white pointer points to 3200 on the azimuth mil ring.

(b) Unscrew the finger grip knobs (C1, fig. 3-56) on the azimuth stow lock (C2, fig. 3-56). Lift and turn the azimuth lock 180 degrees. Engage the lug in the slot on the boom support and secure the finger grip knobs.

(c) Close the MANUAL AZIMUTH MOVEMENT VALVE and close the control panel door.

(3) Perform the procedures outlined in paragraph 3-25a(8) through (21) and (23) through (29).

(4) Release the ILCHR brakes by moving the handbrake levers (5, fig. 3-60), on each side of the ILCHR base, to a vertical position.

(5) Position the ILCHR lunette downward.

(6) Retract the front support until the front of the ILCHR is lower than the rear.

(7) Perform the checks outlined in paragraph 3-25b(1) through (11), (14), (15), and (17).

(8) Tape 2, fig. 3-61) all sharp edges on the index fittings to prevent cutting the suspension slings (1, fig. 3-61).

c. Prepare the ILCHR suspension sling assembly as described below.

WARNING

Inspect web loops, before use, for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

(1) Attach one 8-foot web loop (7, fig. 3-1) to the left-front lift point (6, fig. 3-62).

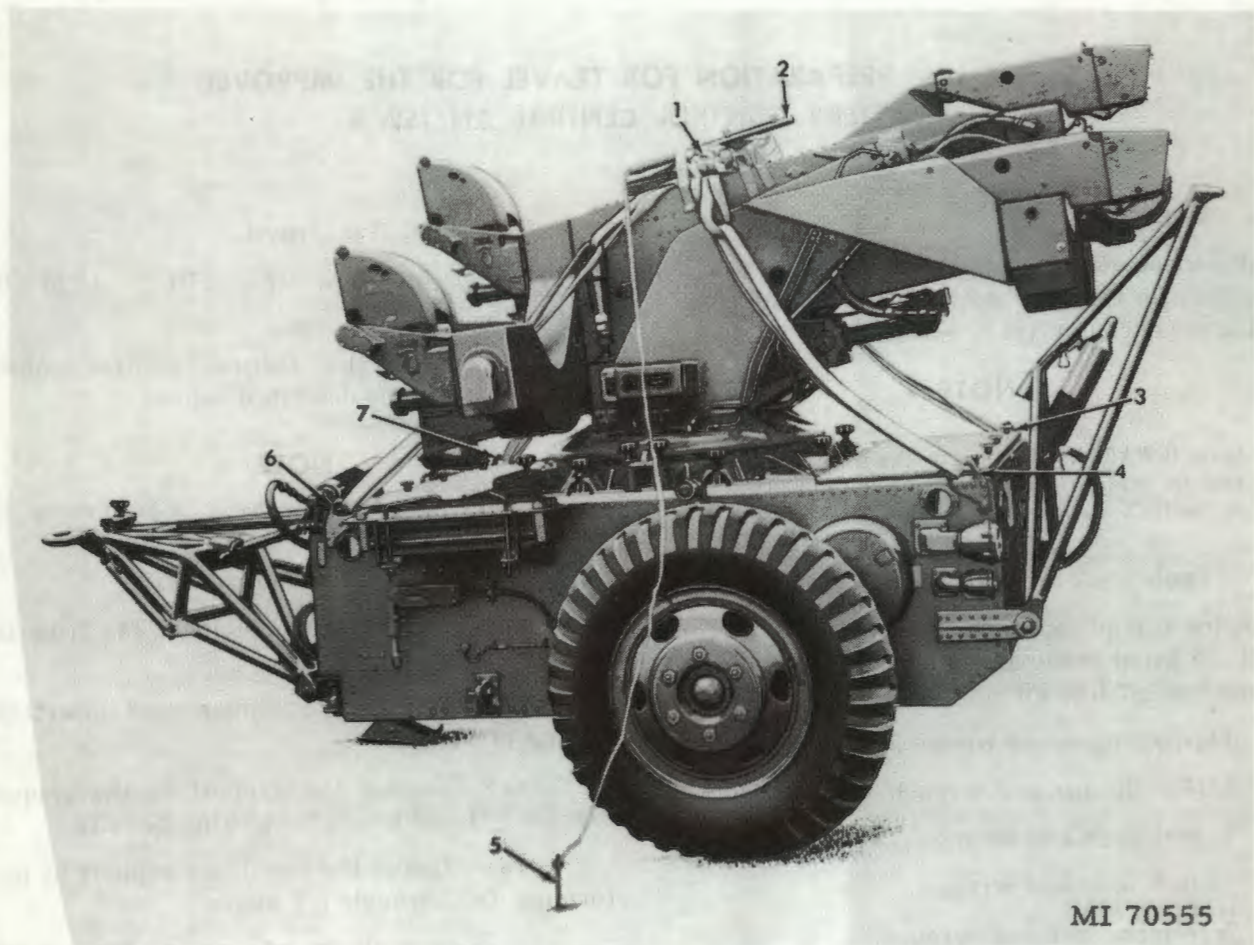
(2) Daisy-chain (fig. 3-2) one 8-foot web loop to the free ends of the 8-foot web loop attached to the left-front lift point, forming an 8-foot suspension sling.

(3) Attach the free ends of the 8-foot suspension sling to the 10-inch web ring (fig. 3-3).

(4) Repeat steps (1) through (3) above for the right-front, right-rear, and left-rear lift points.

(5) Place tape through the 10-inch web ring, over the loops and around the knot formed by the web loops (fig. 3-3).

(6) Pull the suspension sling assembly up taut to the top of the ILCHR center boom, and place tape around all web loops every 12 inches from the top of the center boom to the 10-inch web ring.



1—Suspension sling assembly
2—Ground device
3—Right-rear lift point
4—Left-rear lift point

5—Ground rod
6—Left-front lift point
7—Right-front lift point

Figure 3-62. ILCHR—suspension sling assembly secured for helicopter pickup.

(7) Tape the suspension sling assembly (1, fig. 3-62) to the top of the ILCHR center boom to prevent entangling.

(8) Drive the ground rod (5, fig. 3-62) of the ground device (2, fig. 3-63) into the ground next to the ILCHR.

(9) Place the ground device with the taped suspension sling on top of the ILCHR center boom.

(10) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lift of the ILCHR, perform the following checks.

(1) The ILCHR is prepared for travel.

(2) All sharp edges of the index fittings are taped.

(3) The turntable is rotated so that the white pointer points to 3200 mils on the azimuth mil ring indicator, and the azimuth stow lock is engaged.

(4) The front of the ILCHR base is lower than the rear.

(5) The lunette is facing downwind.

(6) The suspension sling assembly is properly attached.

(7) The suspension sling assembly is taped for helicopter pickup.

(8) The brakes are released.

e. To attach the suspension sling assembly to the helicopter, refer to paragraph 3-9e.

Section IX. PREPARATION FOR TRAVEL FOR THE IMPROVED BATTERY CONTROL CENTRAL AN/TSW-8

3-27. General

This section describes the preparation for travel procedures for the IBCC by the prime mover (par. 3-29) and helicopter (par. 3-30).

NOTE

If the ICWAR is cabled directly to the IBCC, connect the previously disconnected lead to 6TB28-7 in the IBCC cable entry enclosure.

3-28. Tools

The tools required to prepare the IBCC for travel are listed below and are located in the general mechanics' tool kit.

- a. 1 1/4-inch open-end wrench.
- b. 5/16-inch open-end wrench.
- c. 3/4-inch open-end wrench.
- d. 5/8-inch open-end wrench.
- e. 7/16-inch open-end wrench.
- f. Common screwdriver.

3-29. Preparation for Travel Procedures — Prime Mover

- a. Perform the following procedures to pre-

pare the IBCC for travel.

(1) Deenergize the IBCC (TM 9-1430-526-12-1).

(2) Install the tactical control console (TCC) supports as described below.

NOTE

The key numbers shown below in parentheses refer to figure 3-63.

(a) Disengage the support (4) from the storage clamp (6).

(b) Extend the support and insert the locking pin (5).

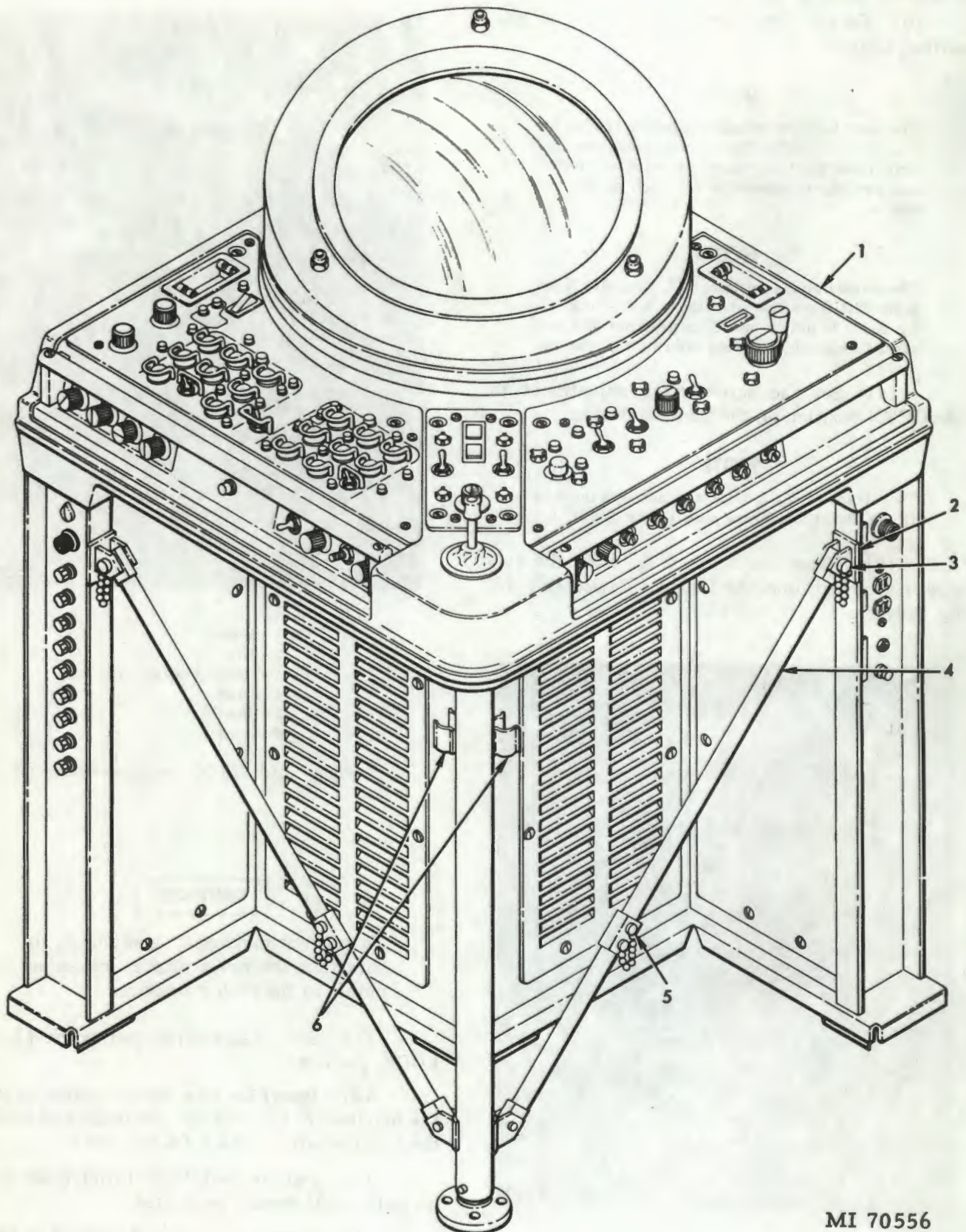
(c) Engage the support to the support bracket (2) and insert the locking pin (3).

(d) Install the remaining support by performing (a) through (c) above.

(3) Secure all console covers, drawers and chassis.

(4) Secure the telephone with the telephone tiedown strap.

(5) Secure the five headsets in the headset storage box.



MI 70556

1-TCC console
2-Support bracket
3-Locking pin

4-Support (2)
5-Locking pin
6-Storage clamp (2)

Figure 3-63. TCC console support brackets—installed.

(6) Secure the operators' chairs as described below.

NOTE

The chair tiedown procedure below is typical for one chair. Normally, the forward chair is secured first. There are two tiedown device attach points and two strap assemblies for each of the five chairs.

NOTE

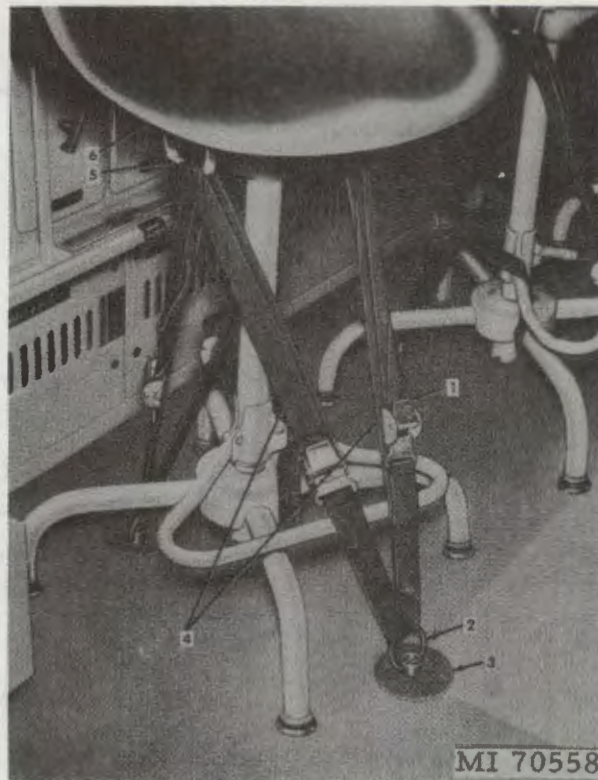
The screwdriver adjustment (2, fig. 3-64) is set to the PLUG position when the tiedown device (3, fig. 3-65) is not in use. This prevents dirt and other foreign objects from entering the opening.

(a) Set the screwdriver adjustment to the OPEN position on the tiedown device.

NOTE

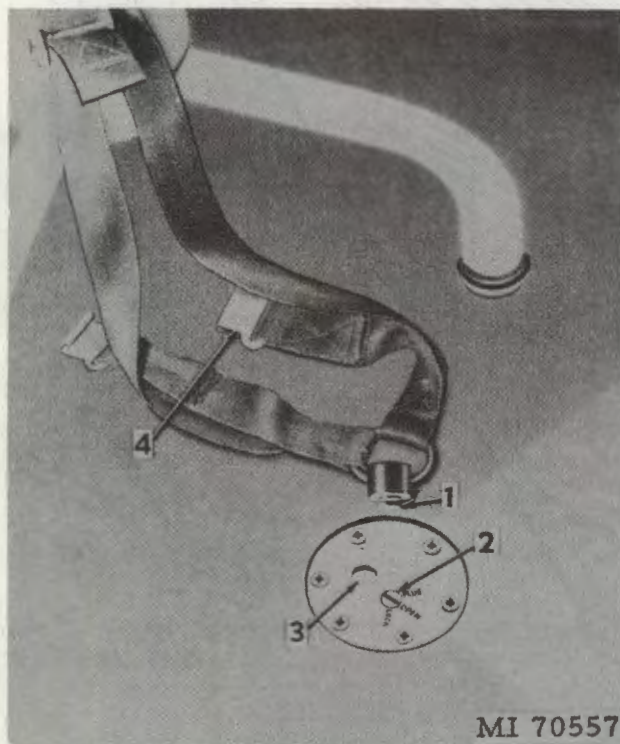
Two straps (4, fig. 3-65) are attached to the ring (2, fig. 3-65) and brass plug (1, fig. 3-64).

(b) Place the brass plug, with the two straps attached, into the tiedown device hole (3, fig. 3-64).



- 1-Buckle
- 2-Ring
- 3-Tiedown device (10)
- 4-Strap
- 5-Handle (2)
- 6-Chair

Figure 3-65. IBCC—chairs secured.



- 1-Brass plug (10)
- 2-Screwdriver adjustment
- 3-Tiedown device hole
- 4-Hook

Figure 3-64. IBCC—chair tiedown.

CAUTION

To prevent damage to equipment, insure that the brass plug is locked securely in the tiedown device.

(c) Set the screwdriver adjustment to the LOCK position.

(d) Insert the straps and buckles through the handles (5, fig. 3-65) of the chair, and engage the buckles with the hook (4, fig. 3-64).

(e) Pull the two straps through the buckles until equal tension is applied.

(f) Repeat steps (a) through (e) above to secure each of the remaining four chairs.

(7) Disconnect all power and data cables, and cap the connectors and receptacles with the provided protective caps.

(8) Disconnect the ground rod cables from the ground rod and from the cable attach point.

NOTE

Refer to paragraph 3-8a (18) for removal of the ground rod using the stake puller kit.

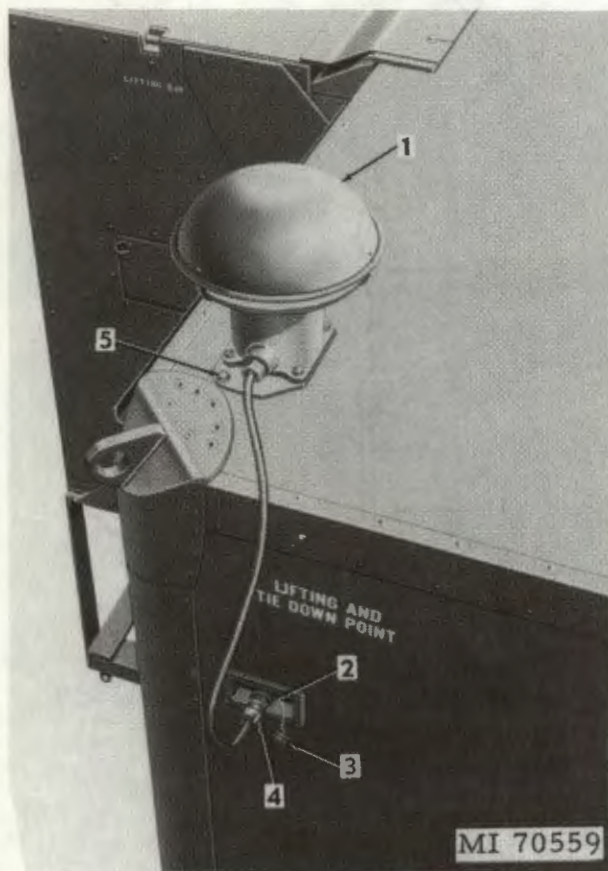
(9) Pull up the ground rod and stow it and the cable in the stow brackets beneath the continuous-wave target detection console (CWTDC).

NOTE

The key numbers shown in parentheses in steps (a) and (b) below refer to figure 3-66.

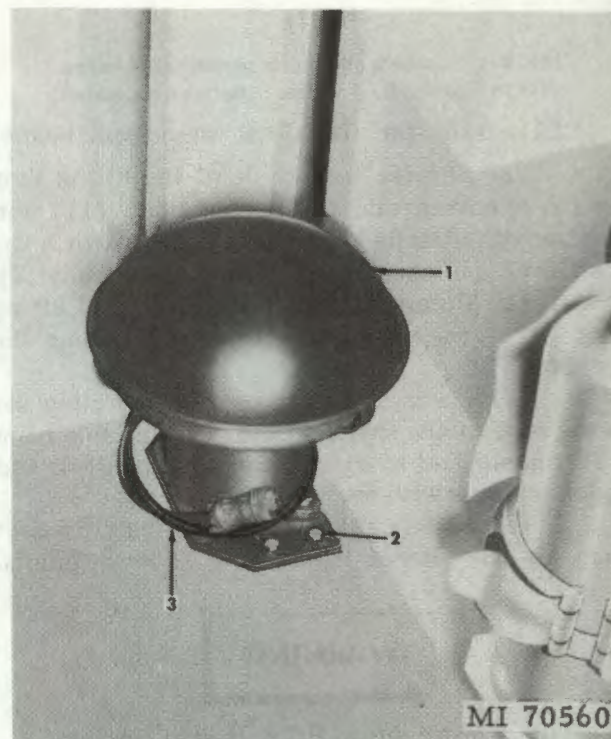
(10) Remove the siren (1), from the top of the IBCC and stow as described below.

(a) Disconnect the siren cable (4) from the side of the IBCC, and place the protective cap (3) over the receptacle (2).



- 1—Siren
- 2—Receptacle
- 3—Protective cap
- 4—Siren cable
- 5—Bolt (3)

Figure 3-66. IBCC—siren emplaced.



- 1—Siren
- 2—Bolt (3)
- 3—Siren cable

Figure 3-67. IBCC—siren stowed.

(b) Remove the three bolts (5) that secure the siren to the top of the IBCC and remove the siren.

(c) Place the three bolts, removed in (b) above, into the holes from which they were removed.

NOTE

The key numbers shown in parentheses in steps (d) thru (f) below refer to figure 3-67.

(d) Inside the IBCC, remove the three bolts (2) on the floor to the right of the door.

(e) Secure the siren (1) to the floor with the three bolts removed in (d) above.

(f) Wrap the siren cable (3) around the siren to prevent damage to the cable.

(11) Close and secure the shelter door vents.

(12) Remove the lifting sling set, tiedown kit, and common-point ring from the IBCC and secure the shelter door.

NOTE

The key numbers shown in parentheses below refer to figure 3-67.1 unless otherwise indicated.

(12.1) Lift the IBCC as described below:

(a) Shorten each cable of the lifting sling set by removing one turnbuckle body (11) and shackle with attached eye bolt (5), then attach the eyebolt (12) to the remaining turnbuckle body (7).

(b) Connect each cable of the lifting sling set to the commonpoint ring (3) using the eyehooks (2).

(c) Carry the assembled lifting sling set to the roof of the shelter. Connect one cable from the lifting sling set to each of the shelters lifting and tiedown points with eyehooks (9).

(d) Fasten guide ropes (at least 15 feet long) to the shelter lifting and tiedown points.

WARNING

The weight of a fully loaded shelter significantly exceeds the rated capacity of the wrecker when the wrecker boom is extended to the required maximum radius of 18 feet. The following precautions must be taken when lifting the electrical equipment shelter from or onto the M36 cargo truck with the 5-ton wrecker:

- (1) The site of lifting should be level.
- (2) The hookup crew should stand a minimum of 20 feet clear of the area after hookup is completed.
- (3) Personnel should never stand between the M36 cargo truck and the 5-ton wrecker during lifting operations.
- (4) Personnel using guide ropes should stand a minimum of 15 feet clear of the M36 cargo truck while guiding the shelter from or onto the truck bed.
- (5) Use caution while guiding the M36 cargo truck into position for loading or unloading to prevent bumping or catching of the shelter.
- (6) Insure that the truck brakes are set prior to loading or unloading of the shelters.

CAUTION

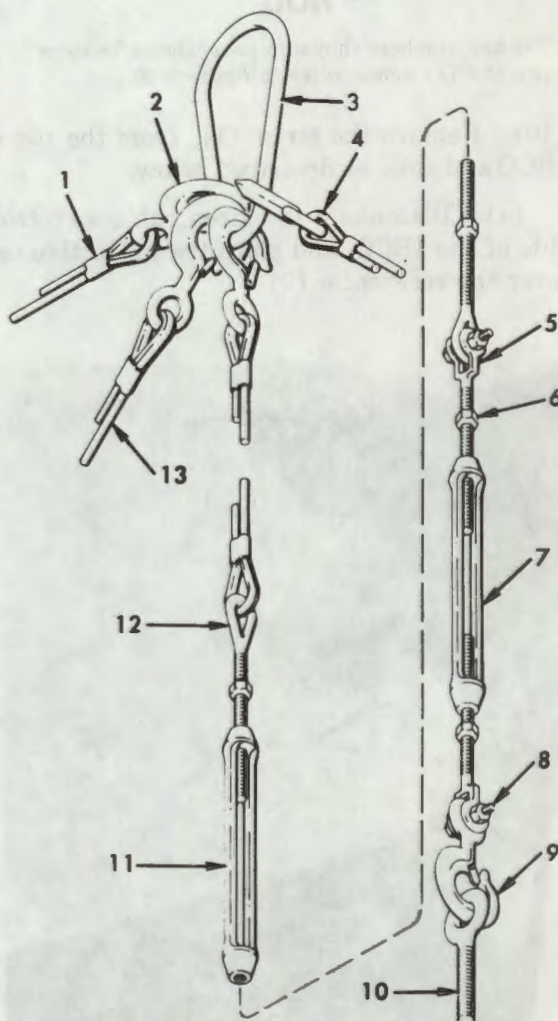
Use only the 5-ton wrecker and the wire rope lifting sling set (modified as in

12.1(a) above) to lift a fully loaded electrical equipment shelter onto or off the M36 cargo truck.

NOTE

The key numbers shown in parentheses below refer to figure 3-67.2 unless otherwise indicated.

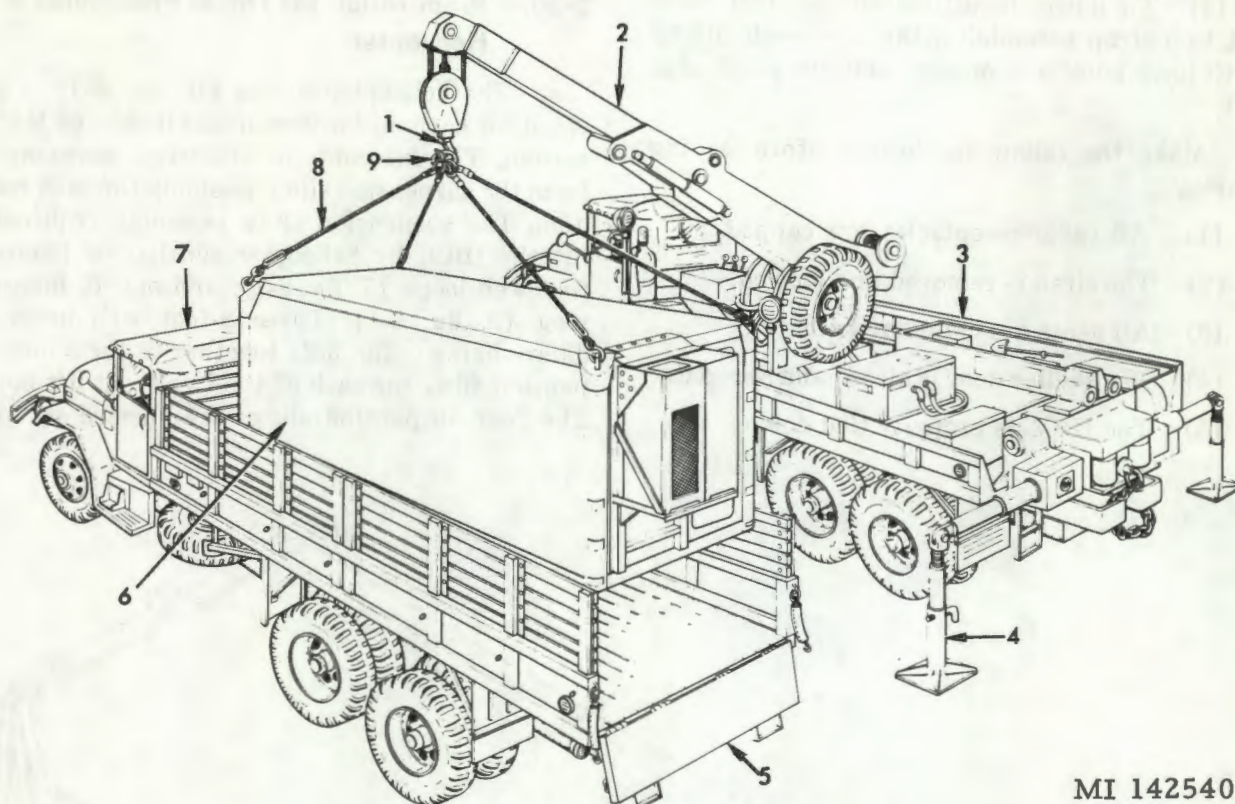
(e) Drive the 5-ton wrecker (3) to a position, parallel to and 6 feet from the shelter, which will allow the cable hook (1) to hang over the



MI 142539

- 1—Swaging sleeve
- 2—Eyehook
- 3—Common-point ring
- 4—Steel thimble
- 5—Shackle with attached eyebolt
- 6—Checknut
- 7—Turnbuckle body
- 8—Bolt and nut
- 9—Eyehook
- 10—Eyebolt
- 11—Turnbuckle body
- 12—Eyebolt
- 13—Steel cable

Figure 3-67.1. Lifting sling set.



MI 142540

- 1—Cable hook
- 2—Boom
- 3—5-ton wrecker
- 4—Outrigger
- 5—Tailgate

- 6—Shelter
- 7—M36 cargo truck
- 8—Lifting sling set
- 9—Common-point ring

Figure 3-67.2. Emplacement of shelter by 5-ton wrecker.

center of the shelter when the boom (2) swings 90 degrees from its travel position toward the shelter.

(f) Stabilize the 5-ton wrecker with the outriggers (4).

(g) Extend the 5-ton wrecker boom to 18 feet, and position it to cause the cable hook to hang over the center of the shelter.

(h) Lower the cable hook, attach it to the common-point ring (9), and lift the shelter as high as possible.

(i) Lower the M36 cargo truck tailgate (5), and back the truck (7) underneath the shelter (6) until the shelter is positioned squarely over the truck bed.

(j) Lower the shelter to the truck bed using the guide ropes as necessary.

(k) Remove the common-point ring from the cable hook, and the assembled sling set and guide ropes from the shelter.

(l) Replace the turnbuckle bodies and shackles with attached eyebolts on the lifting sling set. Stow the lifting sling set and common-point ring inside the shelter, and secure the shelter door.

(m) Raise the 5-ton wrecker cable hook, and retract the boom.

(n) Rotate the wrecker boom to the travel position, remove and stow the outriggers, and drive the 5-ton wrecker from the area.

NOTE

Steps (13) and (14) below apply to prime movers with TB 9-2300-280-30 applied.

(13) Tie down the forward end of the IBCC with six web strap assemblies, three on each lifting and tiedown point (fig. 3-68).

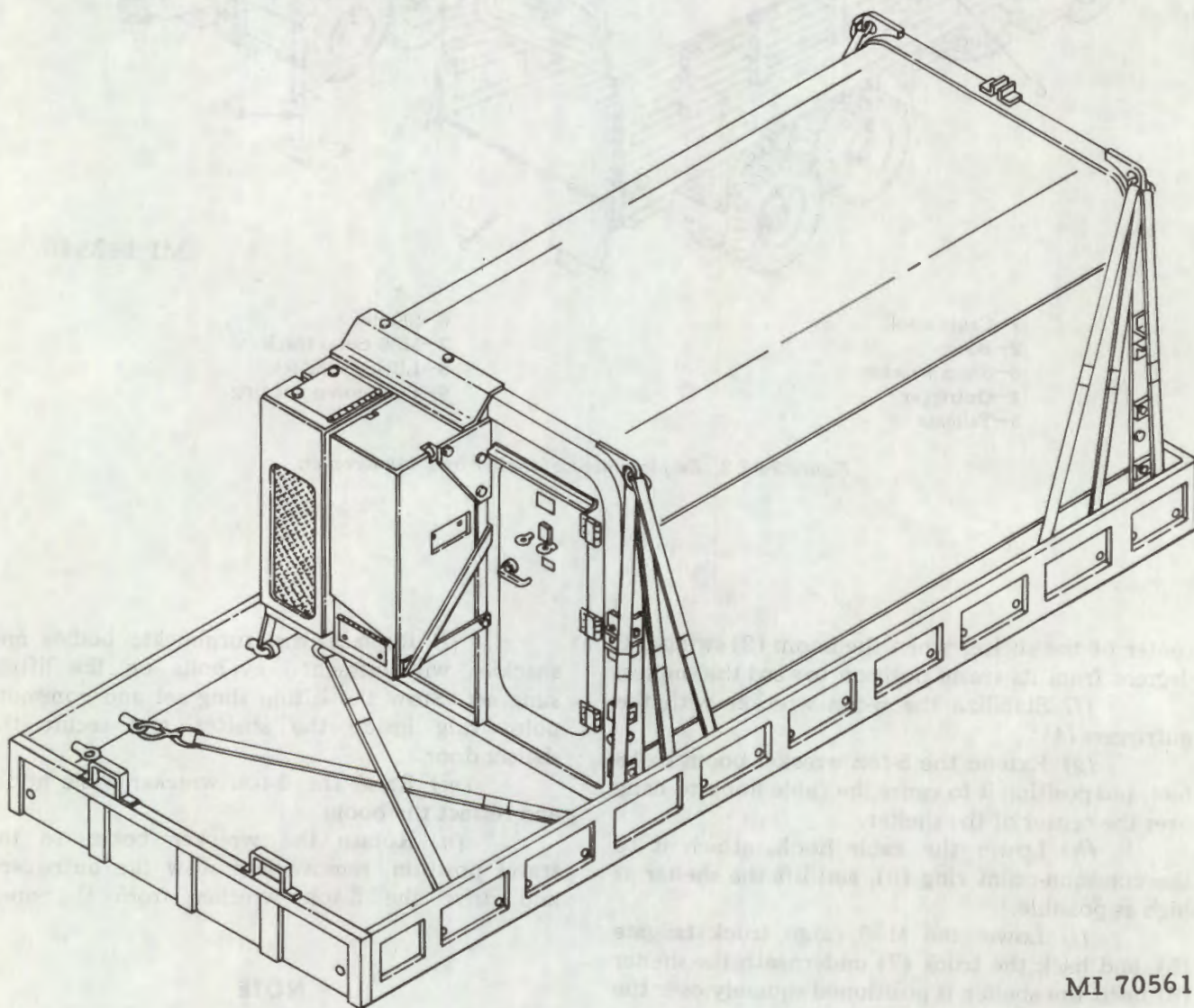
(14) Tie down the aft end of the IBCC with eight web strap assemblies, three on each lifting and tiedown point and one on each tow point (fig. 3-68).

b. Make the following checks before leaving the area.

- (1) All cable receptacles are capped.
- (2) The siren is removed and stowed.
- (3) All vents are closed and secured.
- (4) The shelter door is closed and secured.
- (5) The IBCC is properly tied down.

3-30. Preparation for Travel Procedures — Helicopter

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the IBCC by helicopter consists of twelve 8-foot web loops (7, fig. 3-1), and one 10-inch web ring (9, fig. 3-1). Three 8-foot web loops are daisy-chained (fig. 3-2) together to form one suspension sling for each of the two front lift points. The rear suspension slings are formed by using



MI 70561

Figure 3-68. IBCC—tied down on the prime mover.

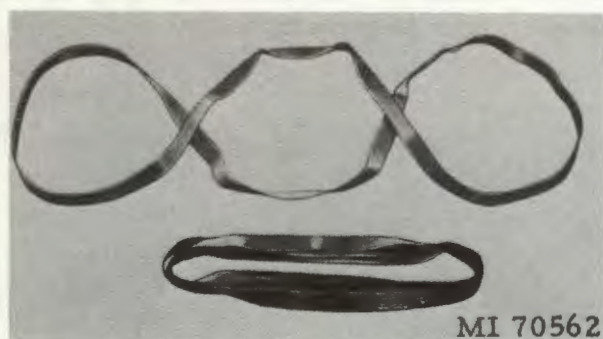


Figure 3-69. Triple web loop—typical.

three 8-foot web loops, with the first 8-foot web loop formed into a triple loop forming an 11-foot suspension sling for each of the two rear lift points. Because of the excess weight in the rear of the IBCC, the rear suspension slings are 1 foot shorter in length to permit the unit to travel in the horizontal or level position. For detailed procedures, refer to *c* below.

b. Prepare the IBCC for travel (par. 3-29a).

c. Prepare the IBCC suspension sling assembly as described below.

WARNING

Before use, inspect the web loops for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

(1) Place an 8-foot web loop through the left-front clevis.

(2) Daisy-chain two 8-foot web loops to the free ends of the 8-foot web loop attached to the left-front clevis, forming a 12-foot suspension sling.

(3) Attach the free ends of the 12-foot suspension sling to the 10-inch web ring (fig. 3-3).

(4) Repeat steps (1) through (3) above for the right-front clevis.

(5) Form a triple loop (fig. 3-69), using an 8-foot web loop.

(6) Remove the left-rear clevis (7, fig. 3-70). Place the triple loop through the clevis and reattach the clevis.

(7) Daisy-chain two 8-foot web loops to the free ends of the triple loop, forming an 11-foot suspension sling.

(8) Attach the free ends of the 11-foot suspension sling to the 10-inch web ring.

(9) Repeat steps (5) through (8) for the right-rear clevis.

(10) Place tape through the 10-inch web ring, over the loops and around the knot formed by the web loops (fig. 3-3).

(11) Pull the suspension sling assembly up taut and tape around all the web loops every 12 inches from the top of the IBCC to the 10-inch web ring.

(12) Tape the suspension sling assembly (6, fig. 3-70) to the top of the IBCC to prevent entangling, and insure that all clevises are turned to the top of the IBCC.

(13) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the IBCC.

(14) Place the grounding device (3, fig. 3-70) with the taped suspension sling assembly on top of the IBCC.

(15) Stow the remainder of the helicopter lifting kit in the storage bag.

d. If the IBCC is helicopter-lifted from the bed of the prime mover, steps (1) through (3) below must be performed.

(1) Place the prime mover so that it faces downwind.

(2) Engage the prime mover handbrake.

(3) Secure the prime mover tailgate in the horizontal position.

e. Prior to helicopter pickup, perform the following checks.

(1) The prime mover is facing downwind.

(2) The prime mover handbrakes are engaged.

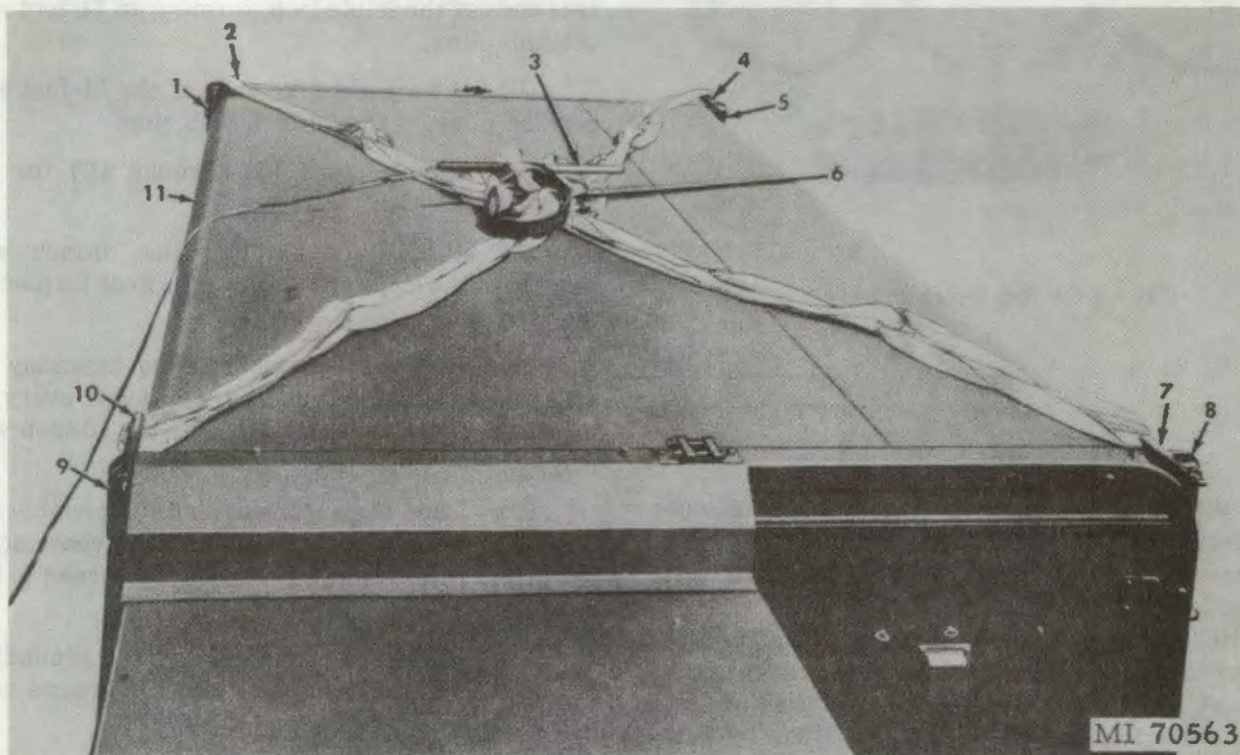
(3) The IBCC is prepared for travel.

(4) The suspension sling assembly is properly attached.

(5) The suspension sling assembly is taped for helicopter pickup.

(6) Each clevis is turned to the top of the IBCC.

f. To attach the suspension assembly to the helicopter, refer to paragraph 3-9e.



- 1—Right-front lift point
- 2—Right-front clevis
- 3—Grounding device
- 4—Left-front clevis
- 5—Left-front lift point
- 6—Suspension sling assembly

- 7—Left-rear clevis
- 8—Left-rear lift point
- 9—Right-rear lift point
- 10—Right-rear clevis
- 11—IBCC

Figure 3-70. IBCC—suspension sling assembly secured for helicopter pickup.

Section X. PREPARATION FOR TRAVEL FOR THE IMPROVED GROUND EQUIPMENT TEST SHOP AN/TSM-112

3-31. General

This section describes the preparation for travel procedures for the pallet-mounted ground equipment organizational maintenance test shop (improved ground equipment test shop) (IGETS) by the prime mover (par. 3-32) and by helicopter (par. 3-33).

3-32. Preparation for Travel Procedures — Prime Mover

a. Perform the following procedures for preparing the IGETS (fig. 3-71) for travel.

(1) Position and secure all the test sets in their combination cases.

(2) Position and secure each combination case in its proper location as marked on the storage rack.

(3) Strap the sling roll (5, fig. 3-72) to the storage rack (6, fig. 3-72).

(4) Attach the suspension sling as described in paragraph 3-33c.

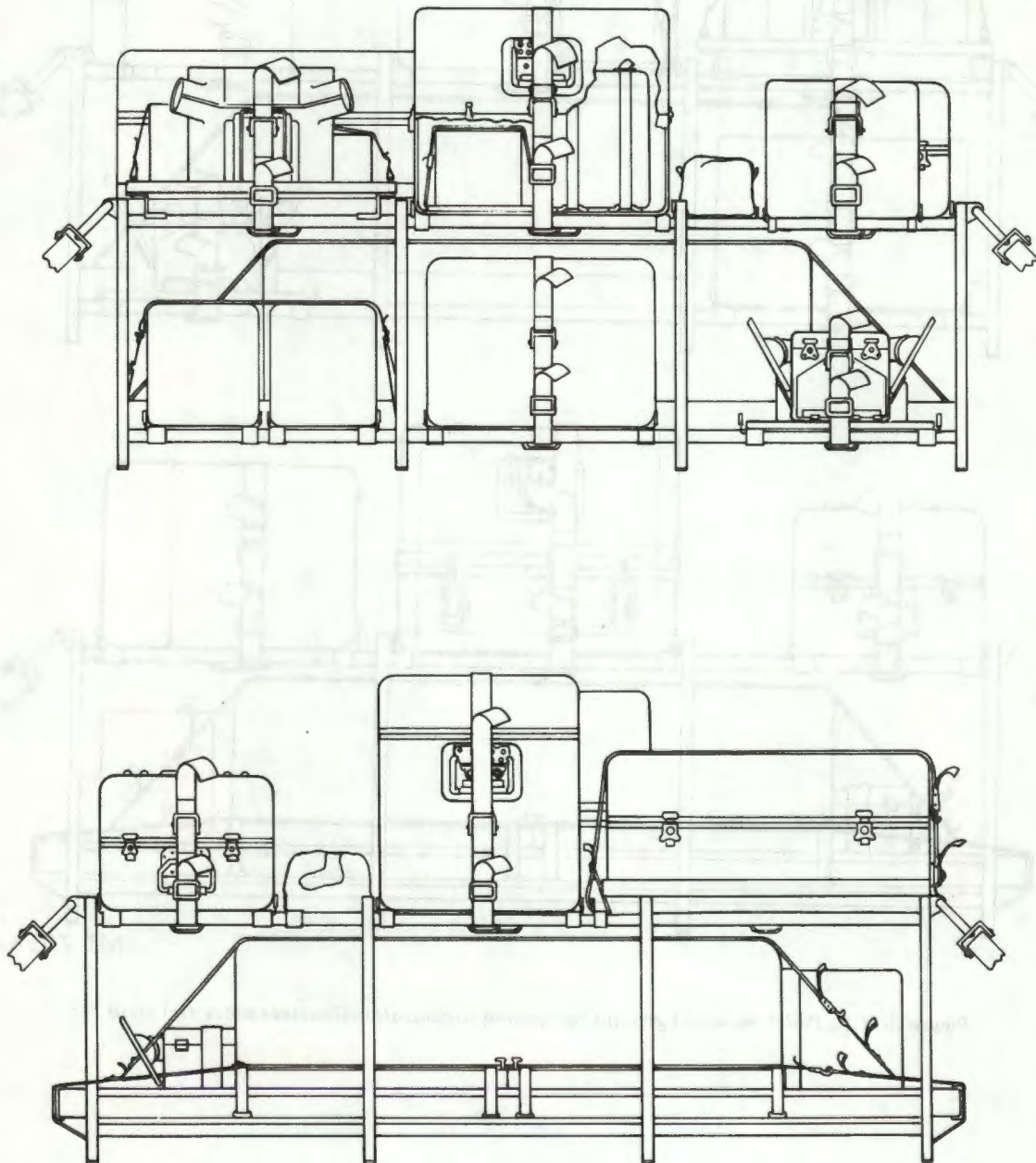
(5) Using a crane of suitable capacity and the suspension sling assembly, place the ground equipment test shop on the prime mover.

b. Prior to leaving the area, the following checks should be made.

- (1) All test sets are secured in their combination cases.
- (2) All combination cases are secured to the storage rack.
- (3) The sling roll is secured to the storage rack.

3-33. Preparation for Travel Procedures — Helicopter

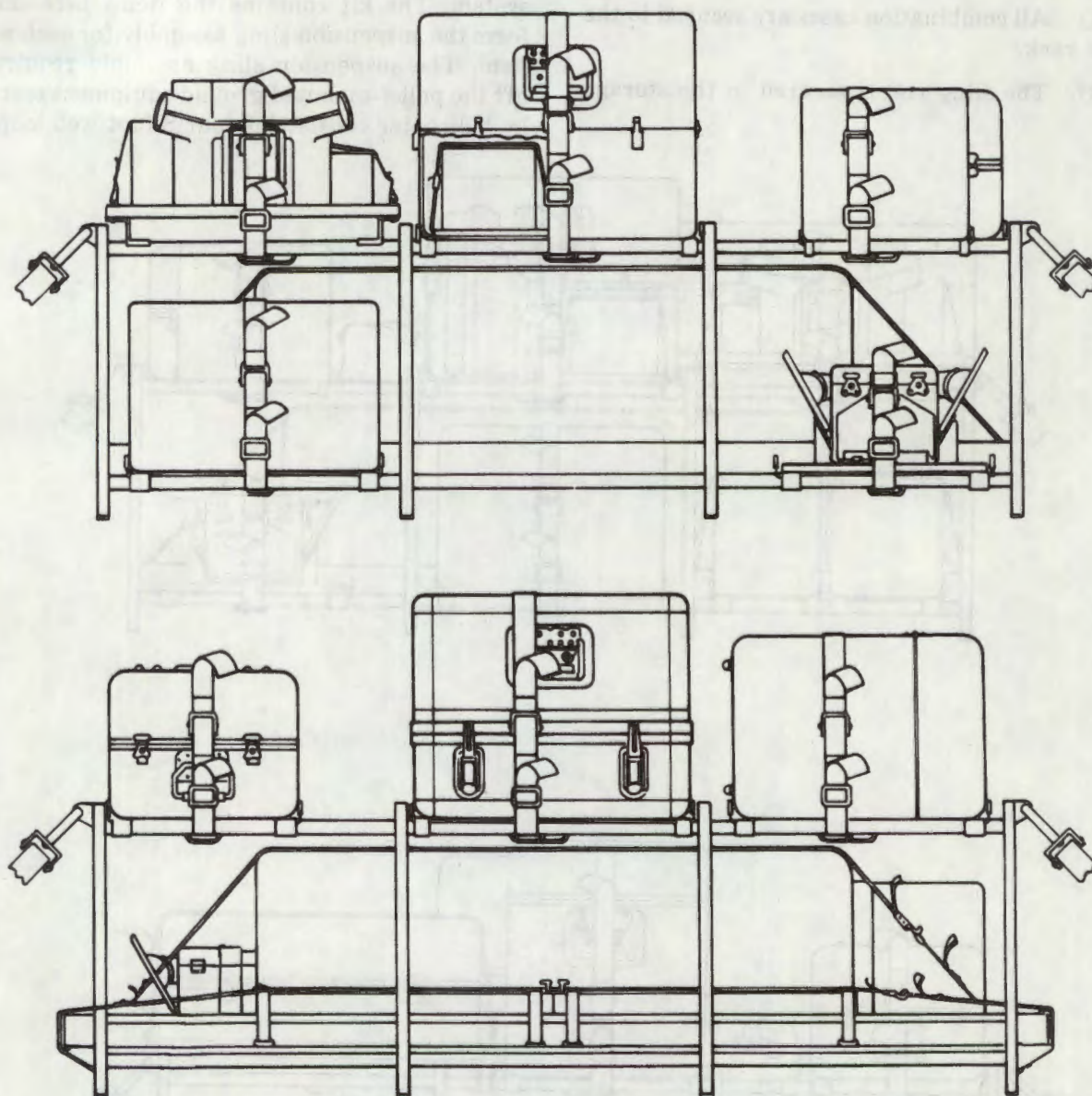
a. The helicopter lifting kit (par. 3-5a) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the pallet-mounted ground equipment test shop by helicopter consists of four 8-foot web loops (7,



MI 150667

Figure 3-71. Pallet-mounted ground equipment organizational-maintenance test shop *(L)¹.

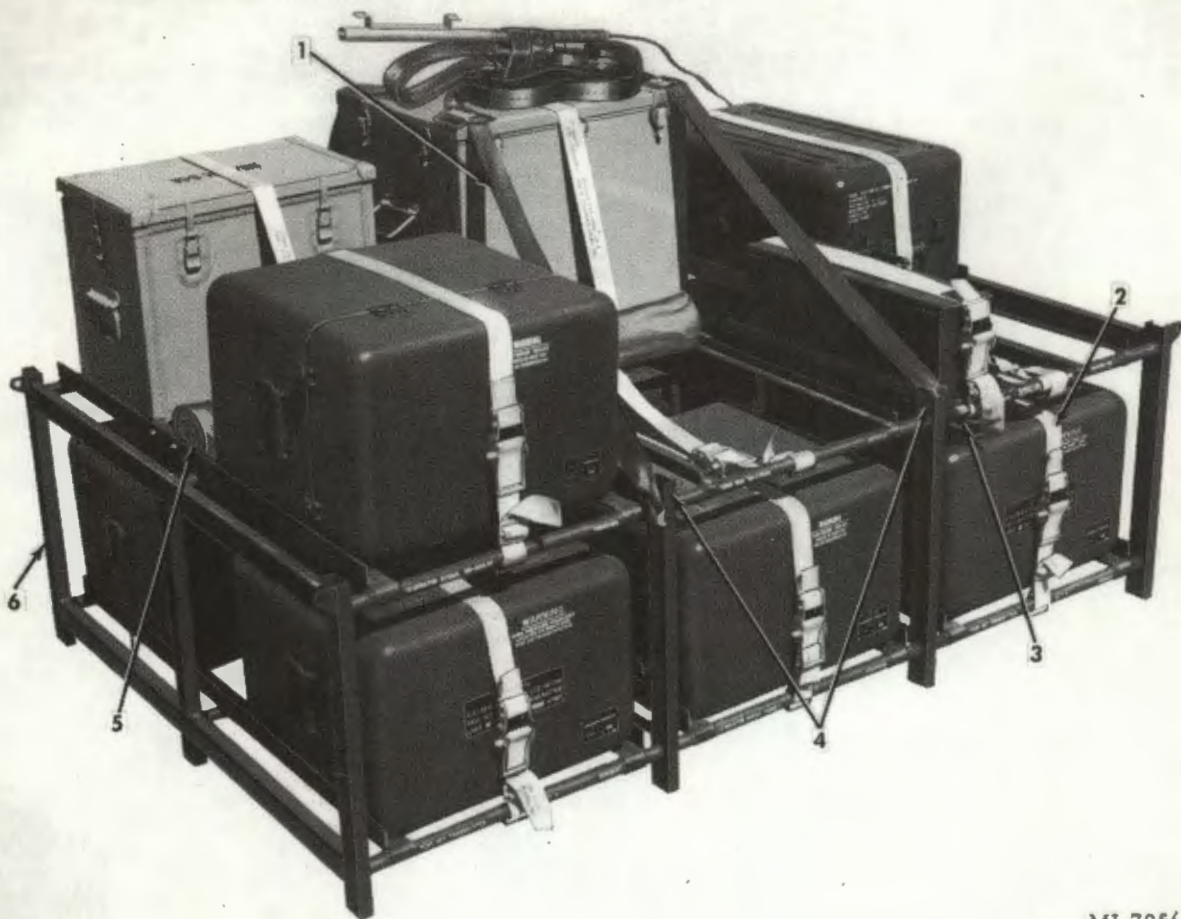
¹ Refer to appendix B for serial number effectivity.



MI 70564

Figure 3-71.1. Pallet-mounted ground equipment organizational-maintenance test shop *(K)¹.

¹ Refer to appendix B for serial number effectivity.



MI 70565

1—8-foot suspension sling
2—Tiedown strap
3—Top-right frame

4—Center vertical brace
5—Sling roll
6—Storage rack

Figure 3-72. Ground equipment test shop—suspension sling assembly secured for helicopter pickup—right side.

fig. 3-1) and one 10-inch web ring (9, fig. 3-1). One 8-foot web loop is used for each lift point, forming an 8-foot suspension sling (1, fig. 3-72).

b. Prepare the IGETS for helicopter lift as described below.

(1) For preparation for travel of the ground equipment test shop, refer to paragraph 3-22a(1) and (2).

(2) Tape all sharp edges at the top of the center vertical braces (6, fig. 3-73) to prevent cutting of the suspension slings.

c. Prepare the suspension sling assembly for the IGETS as described below.

WARNING

Before use, inspect the web loops for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

(1) Attach four 8-foot web loops to the top-left and top-right frames on the outside of the vertical braces (figs. 3-72 and 3-73).

(2) Attach the free end of the web loops to the 10-inch web ring (fig. 3-3).

(3) Place tape through the 10-inch web ring, over the loops and around the knot formed by the web loops.

(4) Pull the suspension sling assembly up taut to the top of the major item, and place tape around all web loops every 12 inches (D, fig. 3-3) from the top of the major item to the 10-inch web ring.

(5) Tape the suspension sling assembly to the top of the oscilloscope (1, fig. 3-73) to prevent entangling.

(6) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the major item.

(7) Place the grounding device (3, fig. 3-73) with the taped suspension sling assembly on top of the major item.

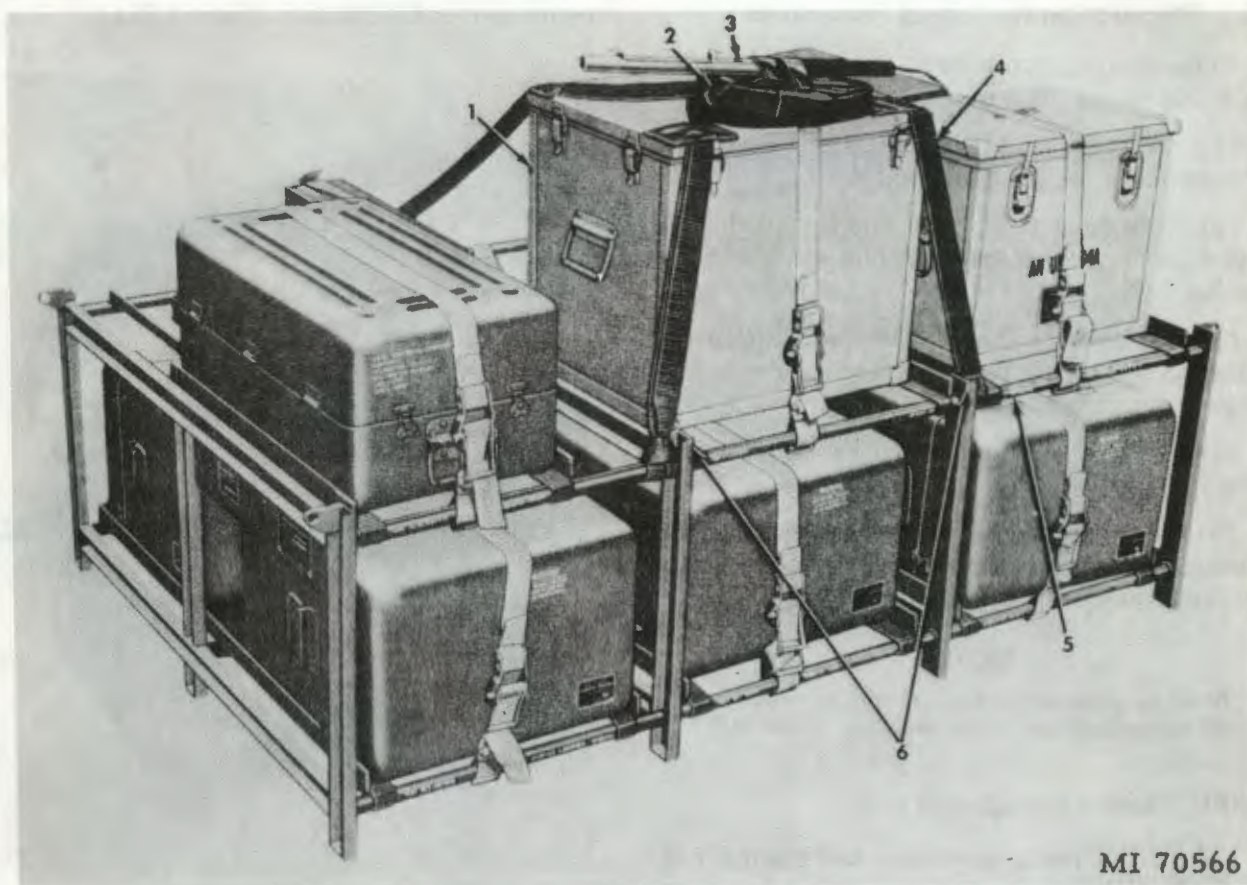
(8) Stow the remainder of the helicopter lifting kit in its storage bag.

d. If the ground equipment test shop is to be helicopter-lifted from the bed of the prime mover, steps (1) through (3) below must be performed.

(1) Locate the prime mover so that it faces downwind.

(2) Engage the prime mover handbrake.

(3) Secure the prime mover tailgate in the horizontal position.



MI 70566

1—Oscilloscope
2—Suspension sling assembly
3—Grounding device

4—8-foot web loop
5—Top-left frame
6—Center vertical brace (2)

Figure 3-73. Ground equipment test shop—suspension sling assembly secured for helicopter pickup—left side.

e. Prior to helicopter pickup, perform the following checks.

- (1) The ground equipment test shop is prepared for travel.
- (2) All sharp edges are taped.
- (3) The suspension slings are properly attached.
- (4) The suspension slings are taped for helicopter pickup.

- (5) The prime mover is facing downwind.
- (6) The prime mover handbrake is engaged.
- (7) The prime mover tailgate is secured in the horizontal position.

f. To attach the suspension sling assembly to the helicopter hook, refer to paragraph 3-9e.

Section XI. PREPARATION FOR TRAVEL FOR THE IMPROVED LAUNCHING SECTION CONTROL BOX AN/GSA-132

3-34. General

This section describes the preparation for travel procedures for the ILSCB by prime mover and helicopter.

3-35. Preparation for Travel Procedures

a. The detailed procedures for preparing the ILSCB (fig. 3-74) for travel are as follows.

- (1) Set the LAUNCHERS OPERATE/SAFE switches (4, fig. 3-74) to SAFE.
- (2) Disconnect all cables, and install all protective caps on their respective connectors and receptacles.
- (3) Disconnect the headset from the communication station (3, fig. 3-74) and stow it in the storage compartment (2, fig. 3-74).
- (4) Close and secure the cover (1, fig. 3-74) on the ILSCB.
- (5) Disconnect the ground rod cable from the ground rod cable attach point on the ILSCB and the ground rod.

NOTE

Refer to paragraph 3-8a (18) for the removal of the ground rod using the stake puller kit.

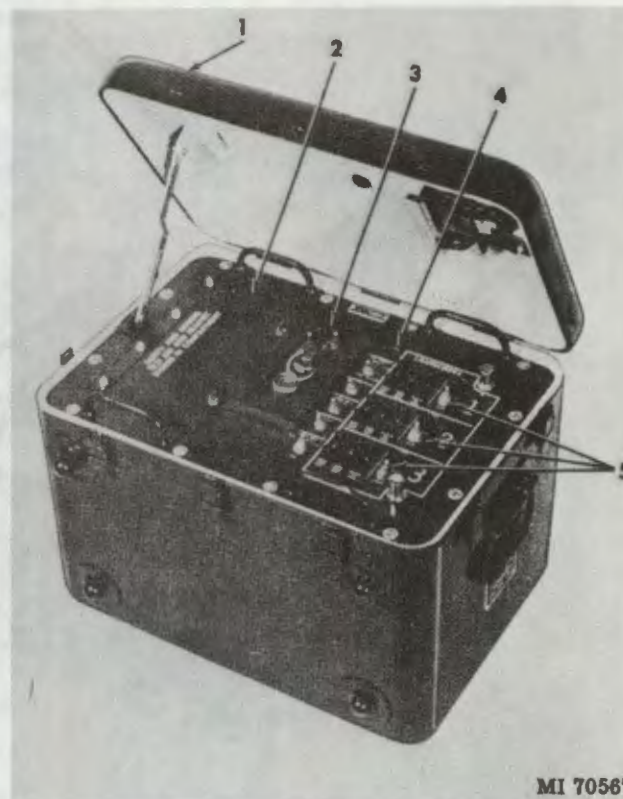
- (6) Remove the ground rod.
- (7) Stow the ground rod and ground rod cable on the IHPIR.
- (8) Place the ILSCB on the prime mover.
- (9) If more than one ILSCB is being transported, perform steps (a) and (b) below.

(a) Place a cushioning material (1, fig. 3-75) (1½-inch minimum thickness, 20 inches long,

and 16 inches wide) between each of the ILSCB's being transported.

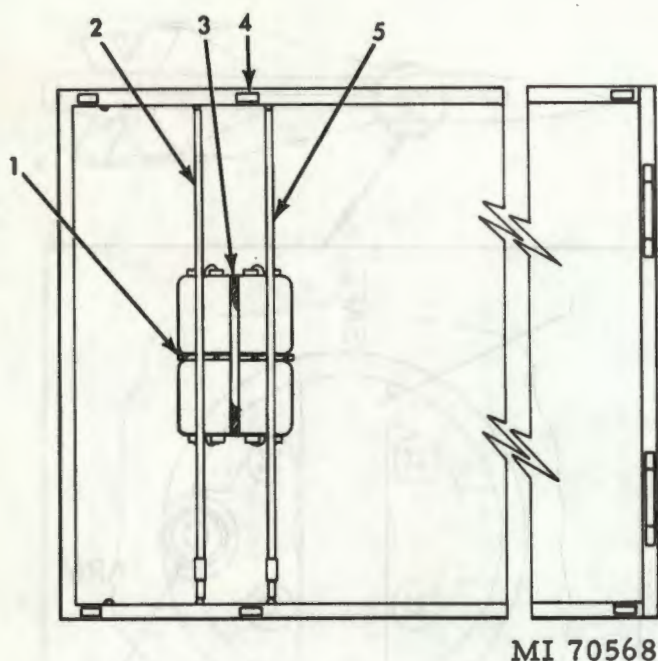
(b) Tie the ILSCB's together with a web strap assembly (3, fig. 3-75).

(10) Center the ILSCB laterally on the prime mover as shown in figure 3-75).



- 1-ILSCB cover
- 2-Storage compartment
- 3-Communications station
- 4-MSL COUNT DELAY switch
- 5-LAUNCHERS OPERATE-SAFE switch (3)

Figure 3-74. Improved launching section control box.



- 1-Cushioning material ($\frac{1}{2}$ inch minimum thickness, 20 inches long, and 16 inches wide)
 2-Web strap assembly
 3-Web strap assembly
 4-Stake pocket
 5-Web strap assembly

MI 70568

Figure 3-75. ILSCB—tied down on the prime mover.

(11) Tie down the ILSCB with two web strap assemblies (2 and 5, fig. 3-75).

b. Before leaving the area, make the following checks:

(1) Protective caps are installed on all connectors and receptacles.

(2) The ground rod and ground rod cable are disconnected and properly stowed on the IHIPR.

(3) The ILSCB is properly tied down.

Section XII. PREPARATION FOR TRAVEL FOR THE GUIDED MISSILE LOADING AND STORAGE PALLET XM1E1

3-36. General

This section describes the preparation for travel procedures for the guided missile loading and storage pallet (missile pallet) and its supporting trailer by the prime mover (par. 3-38) and by helicopter (par. 3-39). The missile pallet can be mounted on either the M390 or the M390C trailer (fig. 3-84) without modification. The difference between the M390 and M390C trailers is the fact that the M390 trailer has four leveling jacks and the M390C trailer has three. The M390C leveling jacks are physically and functionally the same as those of the M390. For the preparation for travel procedures of the M390 trailer, refer to paragraph 3-21b; for the M390C trailer, refer to paragraph 3-38e.

3-37. Tools

The only tools required to prepare the missile

pallet for travel are two $\frac{3}{4}$ -inch open-end wrenches and a 1-7/16 inch open-end wrench.

3-38. Preparation for Travel Procedures — Prime Mover

WARNING

When the improved HAWK missiles are to be transported by prime mover, the SAFE/ARM lever (1, fig. 3-76) must be set to the SAFE position for each missile.

a. For loading the missile pallet on the trailer, refer to TM 9-1450-500-10. Secure the missile pallet to the trailer with the attaching hardware (6, fig. 3-84).

b. Remove and retain the plug from the missile anchoring stud (fig. 3-77).

CAUTION

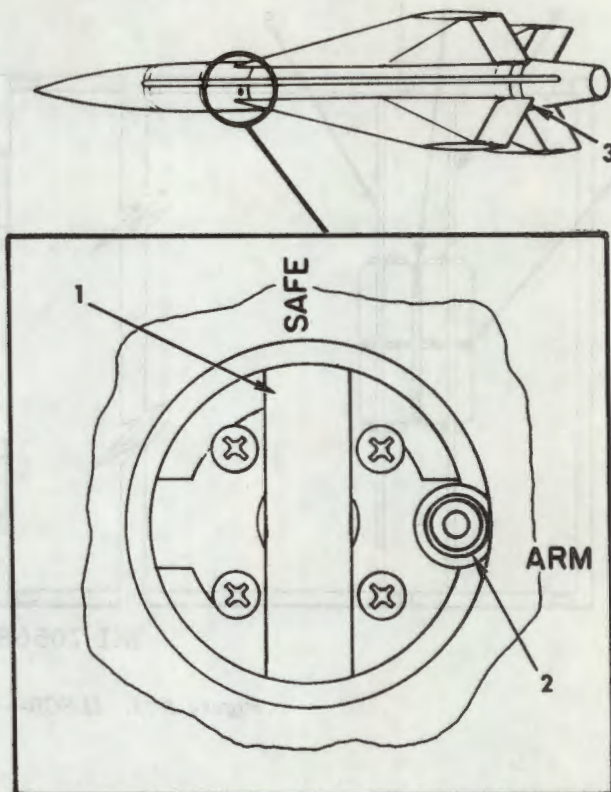
Prior to lifting missiles with the converted loader, the following precautions are mandatory.

(1) *Launcher interference.* During transfer operations, the missiles are suspended from the loader yoke and are free to swing about the yoke pivot. Missiles normally hang nose down from level. For transfer operations to and from the launcher, it is highly desirable to have the missiles hang at a 5-degree nose-down attitude. Because of the center of gravity location of the improved HAWK missile and the relationship to the yoke pivot, the missiles (3) hang 2 degrees nose down, or less than half the normal angle for standard missiles. If the missiles are allowed to maintain this shallow hang angle throughout the transfer operation, interferences of the missile boat tail and umbilical plug with the launcher rear hook occur. To avoid this condition, the following procedures are necessary:

(a) When transferring missiles to the launcher, as the missile boat tail approaches the launcher rear hook, exert and hold a light down force (by hand) on the missile radome (to prevent contact of the boat tail and umbilical plug with the launcher hook), until the missile(s) is in firm contact with the forward sector and the rear roller.

(b) When removing missiles from the launcher, exert and hold a light down force on the missile radome until the missile boat tail is safely clear of the launcher rear hook.

(2) *Reduced pressure.* Installation of this conversion changes the hydraulic system so that the pressure in the reduced pressure system increases from 320 psi to 615 psi. This increase was necessary to insure adequate operation with the improved HAWK missile. Considering that the purpose of the system is to protect the missile and equipment against structural overloads produced by the extension cylinder, it can be seen that the higher reduced pressure will result in less protection against



MI 70569

- 1-SAFE/ARM handle
- 2-MOTOR SAFE switch
- 3-Umbilical connector

Figure 3-76. Missile safety-and-arming controls.

overloads. Therefore, operators must exercise greater care while operating during the reduced pressure mode, particularly under the following conditions:

(a) When removing missiles from the pallet or launcher, avoid inadvertent retraction of the extension cylinder when missiles are latched to both loader and pallet (or launcher). It is of utmost importance to avoid this occurrence when it results in an unsymmetrical loading (for example, retracting with one outboard missile latched to both pallet and loader).

(b) When placing missiles onto the pallet or launcher, during final seating of the missile against the rear hooks (pallet or launcher), it is important to avoid over-extending the extension cylinder, thereby overloading the structures.

(3) *Hoisting beam.* When the XM15 hoisting beam, 1450-665-3234, is used to lift single improved HAWK missiles, the component connecting link, 2590-690-2856, P/N 9089791, must be installed in hole #6 to accommodate the different center of gravity in the improved HAWK missile.

c. For loading the missiles on the pallet, refer to TM 9-1450-500-10.

WARNING

If the missiles are to remain on the pallet during transport, each missile must be properly secured to the pallet to prevent injury to personnel or damage to the equipment. Make certain that the SAFE/ARM lever (1, fig. 3-76) is set to the SAFE position.

d. Secure the missile to the pallet as described below.

CAUTION

When installing the missile anchoring stud in step *d* below do not tighten the stud using a wrench on the recessed area of the stud. The recessed area is provided only to hold the stud when replacing the self-locking nut.

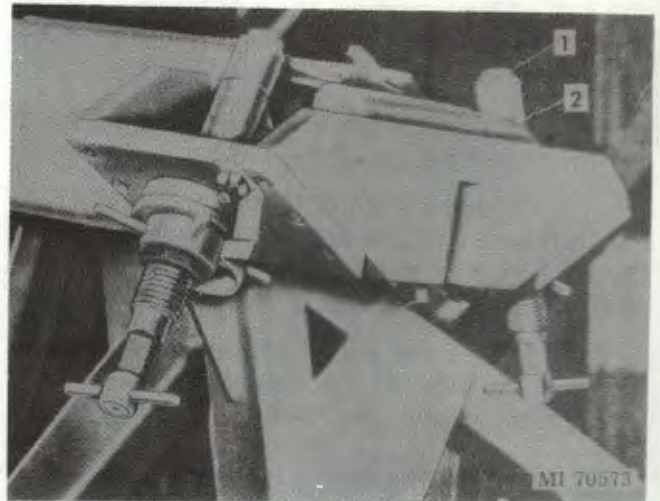
(1) Place the missile latch in the up position and secure with the quick-disconnect pin (2, fig. 3-78).

CAUTION

Failure to perform step (2) below may result in damage to the threaded wing nut or dropping of missile due to insufficient engagement of the missile anchoring stud in step (3).

(2) Fully retract both the self-locking nut (5, fig. 3-79) and the plain round nut (4, fig. 3-79) by turning them counterclockwise.

(3) Secure the missile anchoring stud (6, fig. 3-79) to the threaded wingnut (1, fig. 3-79) by turning the missile anchoring stud clockwise.



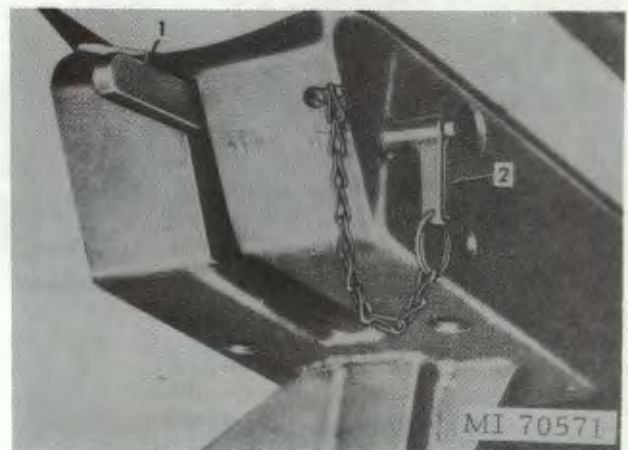
1—Plug
2—Missile anchoring stud

Figure 3-77. Missile anchoring stud—stowed.

CAUTION

Insure that the missile anchoring stud has been firmly handtightened to prevent stripping of the threaded wing-nut.

(4) Firmly handtighten the plain round nut until the self-adjusting washer (3, fig. 3-79) is tight against the missile anchoring plate (2, fig. 3-79).



1—Missile latch
2—Quick-disconnect pin

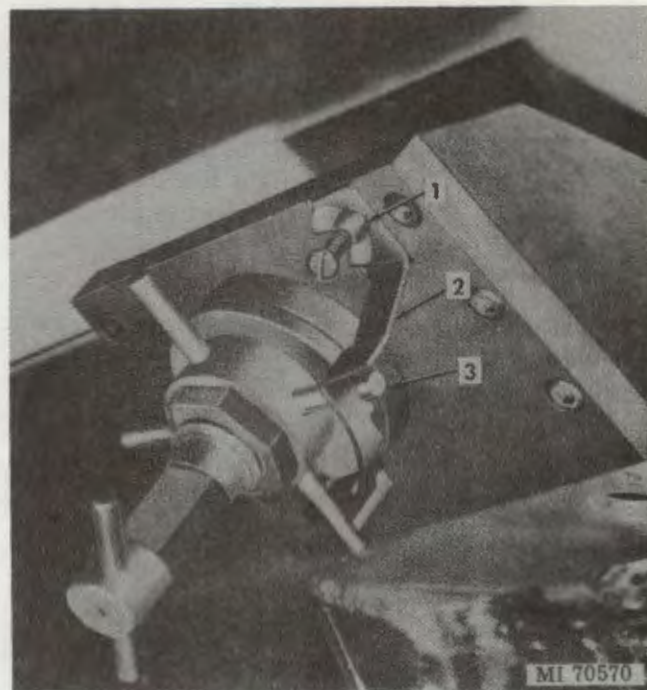
Figure 3-78. Missile latch.

(5) Firmly tighten the self-locking nut (5, fig. 3-79) until it is secured tightly against the plain round nut.

(6) Rotate the nut handle retainer (2, fig. 3-80) over the plain round nut pin.

(7) Using a wrench, tighten the self-locking nut to insure that the nut handle retainer claps the plain round nut pin up to the next serration to keep the missile anchoring stud secured tightly.

(8) Place the nut handle retainer into the detent on the missile anchoring plate and secure it with the wingnut (1, fig. 3-80).



1-Wingnut
2-Nut handle retainer
3-Plain round nut pin

Figure 3-80. Missile anchoring stud secured in missile.

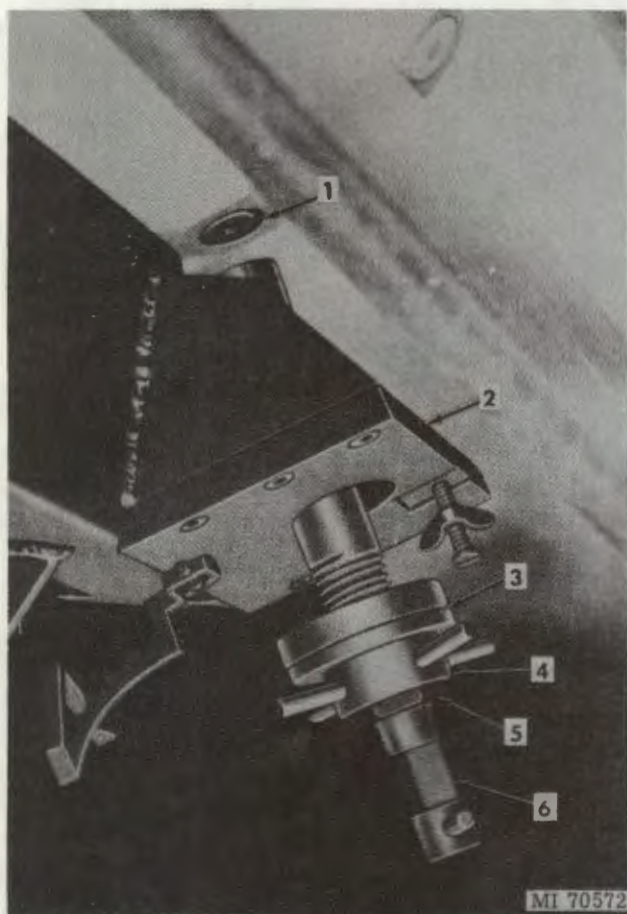
(9) Repeat steps (2) through (8) above for securing the five missile anchoring studs.

e. The missile pallet can be transported by prime mover on either the M390 or the M390C trailer. For preparation for travel of the trailers, refer to paragraph 3-21b. Disregard step (3) for the M390C, since this trailer does not have front corner leveling jacks.

f. The missile pallet can also be transported directly in the bed of the M35 or M36C prime movers. When these prime movers are used to transport missiles, tapered mounting skids (fig. 3-81) are installed on the truck bed and used to secure the pallet to the truck. The procedures for loading and mounting the pallet on the truck are described in steps below.

(1) Index the loader to the pallet and insert the pallet lift pins.

(2) Raise the pallet to maximum height and approach the rear of the truck, stopping when the rear end of the pallet is near the tailgate. If necessary, lift the pallet by hand so that the skids will clear the back edge of the truck.



1-Threaded wingnut
2-Missile anchoring plate
3-Self-adjusting washer
4-Plain round nut
5-Self-locking nut
6-Missile anchoring stud

Figure 3-79. Missile anchoring stud—plain round nut retracted.

NOTE

The missile pallet can be loaded on an M35 truck without interference problems, provided the truck is level. However, if the M36C truck is used, the back edge of the truck must be lowered for proper indexing and loading. This can be done by driving the truck up a slight rise as shown in figure 3-82, lowering the back end of the truck sufficiently for proper loading. Another possible method is to drive the front end of the loader up on a ramp approximately 6 inches in height (fig. 3-83). This ramp can be constructed using sandbags or other equipment available to the battery.

(3) Slide the pallet forward onto the tapered skids, lifting the pallet by hand slightly to clear the front edge of the skids.

(4) Lower the pallet onto the skids, remove the pallet lift pins, and store them on the pallet.

(5) Raise the boom and back off the loader.

(6) Slide the pallet by hand so that all four mounting holes are aligned.

(7) Install the mounting bolts and washers and tighten the bolts.

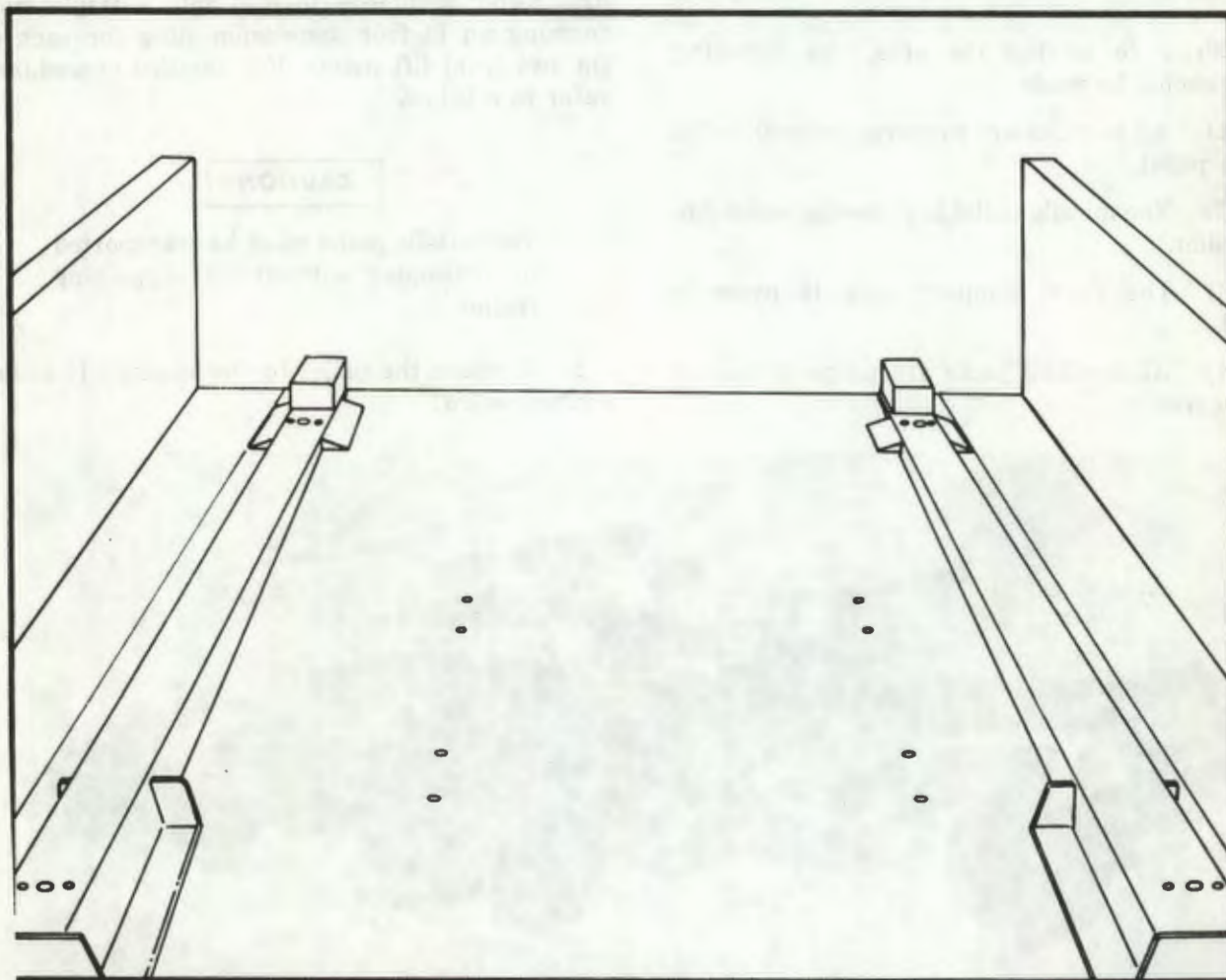
NOTE

Transfer of missiles to or from the pallet is accomplished using procedures contained in TM 9-1450-500-10. However, if the M36C truck is used as the prime mover, the back end of the truck must be lowered as described above for proper indexing.

g. Because of radome interference with some trailer loads when using M35 trucks as prime movers, the following towing limitations apply:

(1) Do not tow the IPAR, the IHIPR, or missiles on trailers.

(2) When missiles are carried on an M36C truck, there is sufficient radome clearance for all trailed loads. Adequate clearance exists when towing



MI 70574

Figure 3-81. Pallet mounting skids installed on M36C prime mover.

the following trailed loads with M35 trucks carrying missiles loads:

(2) Adequate clearance exists when towing the following trailed loads with M35 trucks carrying missile loads:

- (a) ILCHR's.
- (b) Generators.
- (c) ICWAR.
- (d) IROR (lock pedestal with radar dish facing aft).

CAUTION

It is possible to cause radome interference when making a sharp turn up a steep slope. This is especially true when towing an ILCHR or generator. Adequate caution should be taken by the truckdriver during extreme maneuvers of this type.

h. Prior to leaving the area, the following checks should be made:

- (1) All missiles are properly secured to the missile pallet.
- (2) The missile pallet is properly secured to the trailer.
- (3) The front support jack is properly stowed.
- (4) All leveling jacks are properly stowed and secured.

(5) The trailer is properly connected to the prime mover.

(6) The trailer lights are working properly.

(7) The handbrakes are released.

(8) The trailer brakes are working (move prime mover a short distance and then stop).

3-39. Preparation for Travel Procedures — Helicopter

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the missile pallet by helicopter consists of twelve 8-foot web loops (7, fig. 3-1). Three 8-foot web loops are daisy-chained (fig. 3-2) together to form a 12-foot suspension sling for each of the two rear lift points. The front suspension slings are formed by using three 8-foot web loops, with the first 8-foot web loop formed into a triple loop, forming an 11-foot suspension sling for each of the two front lift points. For detailed procedures, refer to c below.

CAUTION

The missile pallet must be transported by helicopter without its supporting trailer.

b. Prepare the pallet for helicopter lift as described below.

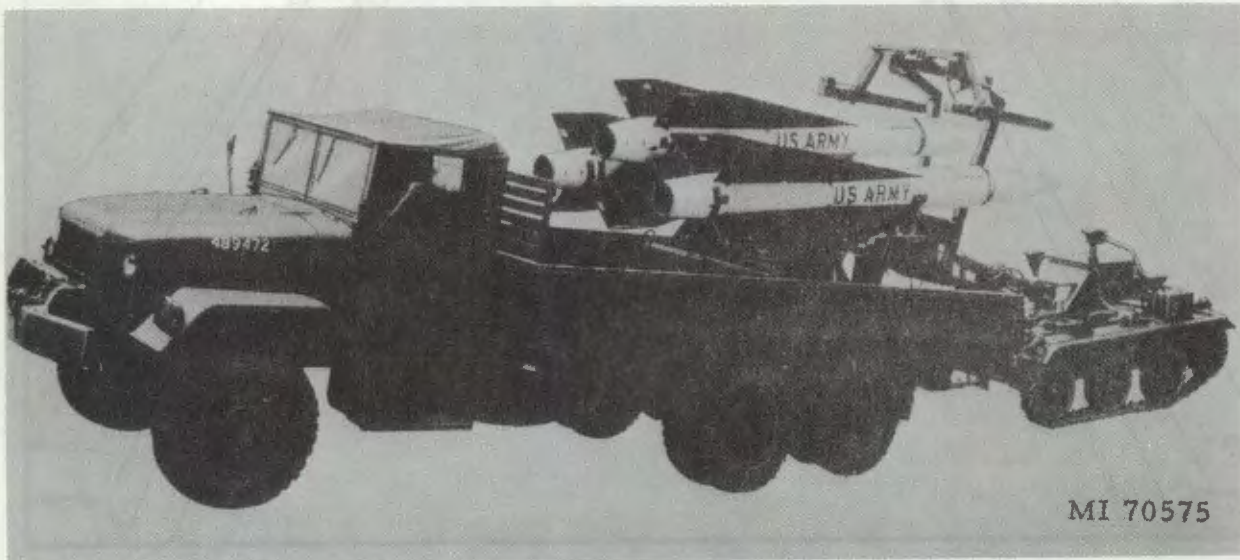


Figure 3-82. Indexing the loader to the prime mover—using terrain advantage.

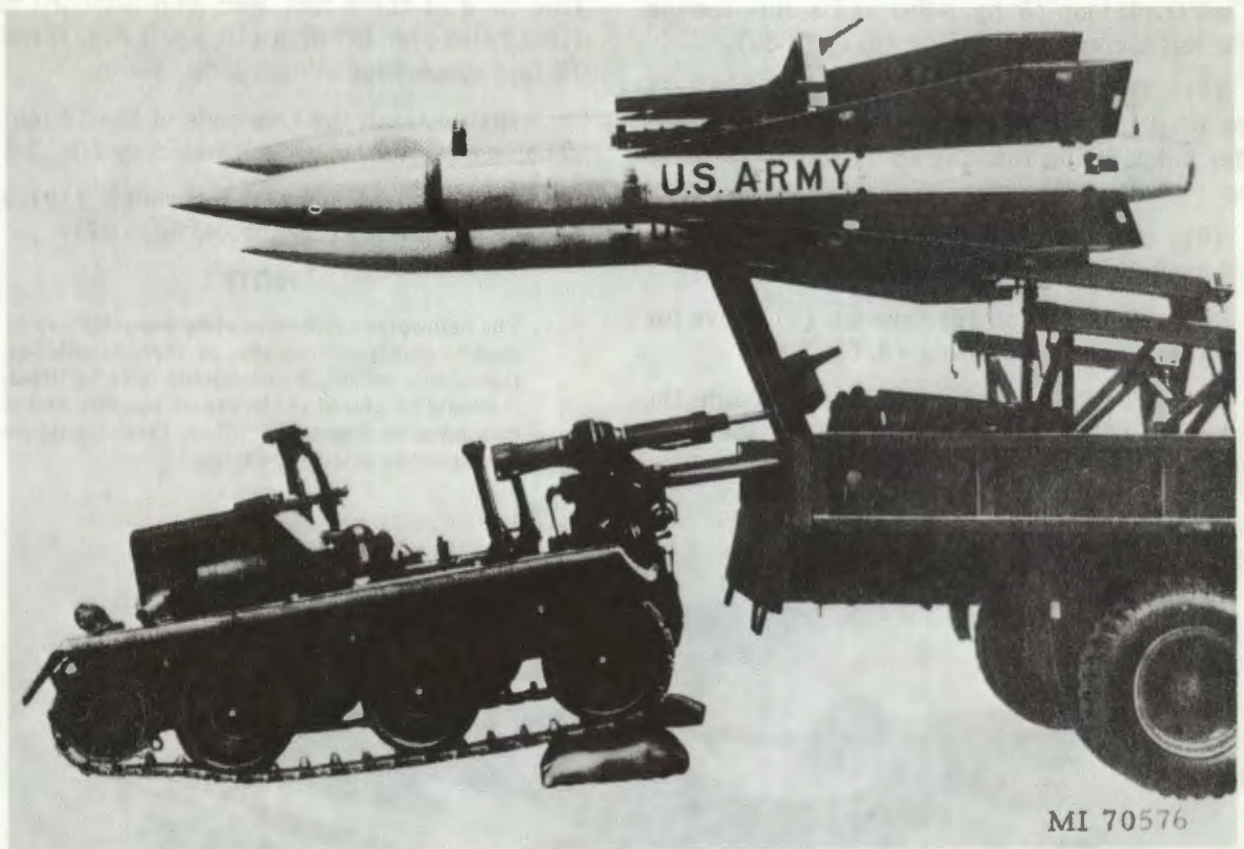


Figure 3-83. Indexing the loader to the prime mover—using the ramp.

(1) Prepare the M390C trailer for travel as described in paragraphs 3-31b(1), (2), (4), and (7), and 3-38e(6).

(2) Locate the trailer lunette downwind.

NOTE

Unless otherwise specified, the figure references in steps (3) through (5) below refer to figure 3-84.

(3) Remove the four quick-disconnect pins (3) that secure the helicopter lift arms (1 and 7) to the helicopter lift arm support tube (2).

(4) Place the right helicopter lift arm (7) into the support tube and secure it with the two quick-disconnect pins.

(5) Place the left helicopter lift arm (1) into the support tube and secure it with the two quick-disconnect pins.

c. Prepare the helicopter suspension sling assembly for the missile pallet as described below.

WARNING

Inspect web loops before use for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.

(1) Tape the top edges of the loader index fittings (1, fig. 3-85).

(2) Form a triple loop (fig. 3-69) with an 8-foot web loop (7, fig. 3-1).

(3) Remove the quick-disconnect pin (3, fig. 3-85) from the stow brackets on the left-rear pallet brace (4, fig. 3-85), and insert it into the outside of the left loader index fitting (1, fig. 3-85).

(4) Place the quick-disconnect pin through the left triple loop (5, fig. 3-86) and secure the pin to the left loader index fitting (4, fig. 3-86).

(5) Daisy-chain (fig. 3-2) two 8-foot web loops to the left triple loop attached to the left loader index fitting forming an 11-foot suspension sling.

(6) Attach the free ends of the 11-foot suspension sling to the 10-inch web ring (fig. 3-3).

(7) Repeat steps (2) through (6) above for the right loader index fitting (3, fig. 3-86).

(8) Pass an 8-foot web loop through the right front lift point (11, fig. 3-87) on the right helicopter lift arm (10, fig. 3-87).

(9) Daisy-chain two 8-foot web loops to the free ends of the 8-foot web loop attached to the right helicopter lift arm (10, fig. 3-87), forming a 12-foot suspension sling (3, fig. 3-87).

(10) Attach the free ends of the 12-foot suspension sling to the 10-inch web ring (fig. 3-3).

(11) Repeat steps (8) through (10) above for the left front lift point (4, fig. 3-87).

NOTE

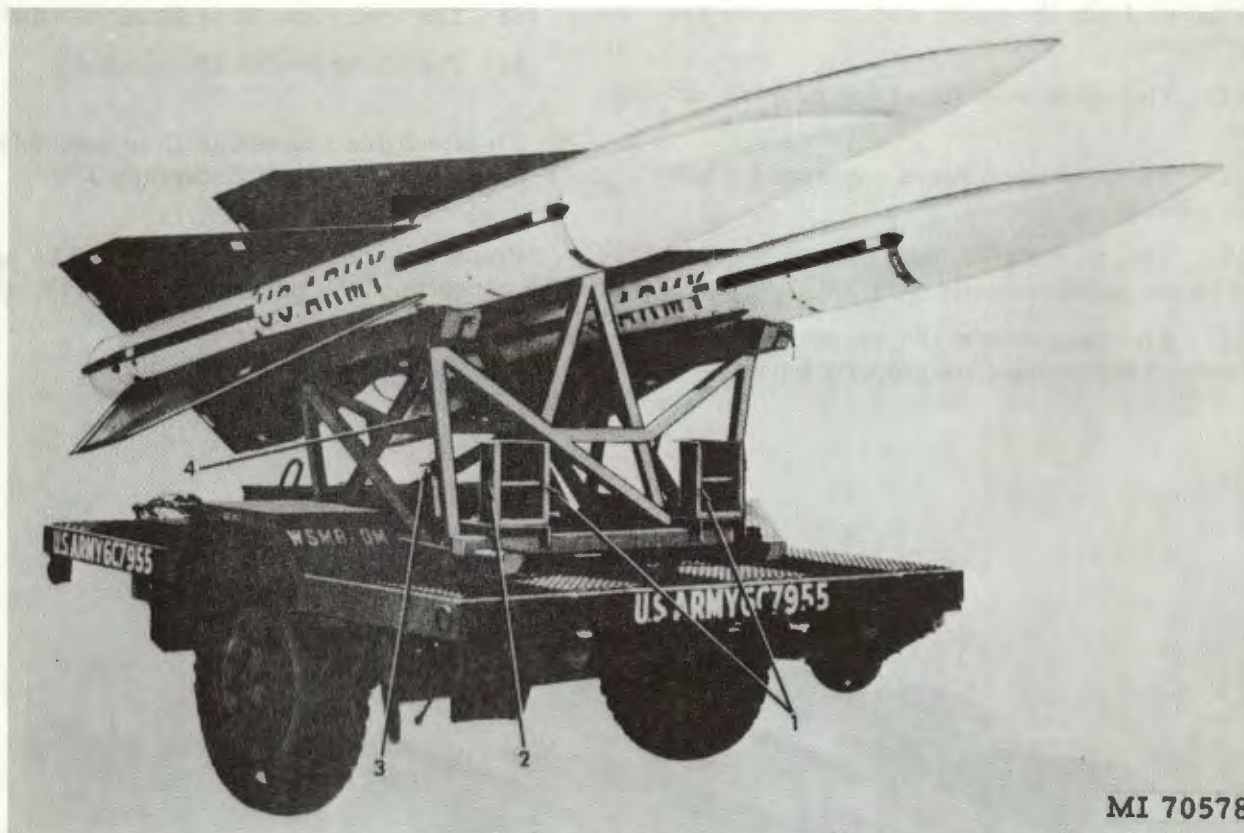
The helicopter suspension sling assembly can be used to transport one, two, or three missiles on the missile pallet. If one missile is to be lifted, it should be placed in the center position and if two missiles are to be lifted, they should be placed on the outside positions.



- 1—Left helicopter lift arm
- 2—Support tube
- 3—Quick-disconnect pin (4)
- 4—Brake handle (2)

- 5—M390C trailer
- 6—Attaching hardware
- 7—Right helicopter lift arm

Figure 3-84. Guided missile pallet—mounted on M390C Trailer—front view.



MI 70578

1—Loader index fitting (2)
2—Quick-disconnect pin hole

3—Quick-disconnect pin (2)
4—Left rear pallet brace

Figure 3-85. Guided missile pallet—mounted on M390C trailer—rear view.

(12) Place tape through the 10-inch web ring (D, fig. 3-3), over the loops and around the knot formed by the web loops.

(13) Pull the suspension sling assembly (2, fig. 3-87) up taut to the top of the center missile, and place tape around all the web loops every 12 inches from the top of the center missile to the 10-inch web ring.

(14) Tape the suspension sling assembly to the center missile to prevent the slings from entangling during helicopter pickup.

(15) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the major item.

(16) Place the grounding device (1, fig. 3-87) with the taped suspension sling assembly on top of the center missile.

NOTE

The missile pallet attaching hardware must remain with the trailer.

(17) Remove the attaching hardware (6, fig. 3-84) securing the missile pallet to the M390C trailer and stow it on the trailer.

(18) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lift, perform the following checks:

(1) The M390C trailer is prepared for travel.

(2) The helicopter lift arms are extended and secured in place.

(3) The four bolts, nuts, washers, and lock-washers securing the missile pallet to the trailer

are removed from the pallet and secured to the trailer frame.

(4) The suspension slings are properly attached.

(5) The suspension slings are taped for helicopter pickup.

(6) The missiles, if less than three, are placed on the pallet correctly.

(7) All areas where the suspension sling could contact sharp edges are properly taped.

(8) The trailer lunette is facing downwind.

(9) The trailer brakes are released.

e. To attach the suspension sling assembly to the helicopter hook, refer to paragraph 3-9e.

f. Prepare the M390 trailer for travel by helicopter as outlined in paragraphs 3-2b(1), (2), (4), (7), and (8), and 3-22f, g, and h.

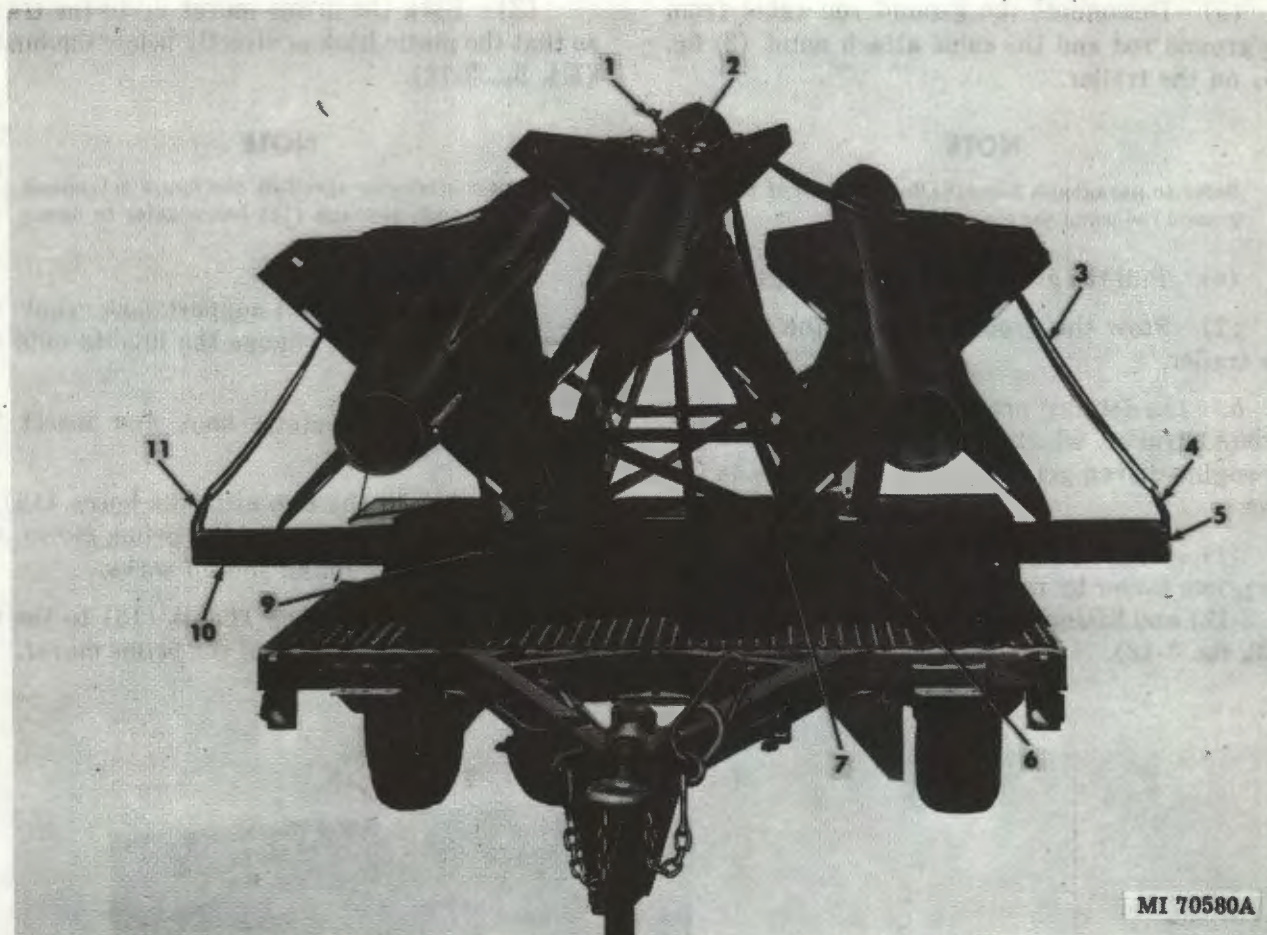


MI 70579

- 1—Right rear pallet brace
- 2—Right triple loop
- 3—Right loader index fitting

- 4—Left loader index fitting
- 5—Left triple loop

Figure 3-86. Guided missile pallet—suspension sling assembly secured for helicopter pickup—rear view.



MI 70580A

- 1—Grounding device
- 2—Suspension sling assembly
- 3—12-foot suspension sling
- 4—Left-front lift point
- 5—Left helicopter lift arm
- 6—Left quick-disconnect pin (2)

- 7—Support tube
- 8—Deleted
- 9—Right quick-disconnect pin (2)
- 10—Right helicopter lift arm
- 11—Right-front lift point

Figure 3-87. Guided missile pallet—suspension sling assembly secured for pickup—front view.

Section XIII. PREPARATION FOR TRAVEL FOR THE 45-KW AND 60-KW ENGINE-DRIVEN GENERATORS

3-40. General

This section describes the preparation for travel procedures for both the 45-kw and 60-kw engine-driven generators and trailer by prime mover (par. 3-41) and by helicopter (par. 3-42) (45-kw only).

3-41. Preparation for Travel Procedures — Prime Mover

a. The detailed procedures for preparing the 45-kw and 60-kw engine-driven generators for travel are as follows.

(1) Deenergize the generator in accordance with the instructions attached to the generator panel door.

(2) Disconnect all power cables, and cap the connectors and receptacles with the protective caps.

(3) Close the rear and side panels (1 and 2, fig. 4-5).

(4) Close the screen backing door (5, fig. 4-5) beside the cable entry panel (4, fig. 4-5).

(5) Disconnect the ground rod cable from the ground rod and the cable attach point (3, fig. 4-5) on the trailer.

NOTE

Refer to paragraph 3-8a(18) for removal of the ground rod using the stake kit.

(6) Pull the ground rod out of the ground.

(7) Stow the ground rod and the cable on the trailer.

b. The detailed procedures for preparing the M200A1 trailer, which supports the 45-kw or 60-kw engine-driven generator, for travel, are as follows.

(1) Open the pintle hook (E3, fig. 3-12) on the prime mover by removing the locking pin (E1, fig. 3-12) and lifting the spring-loaded T-bar latch (E2, fig. 3-12).

(2) Back the prime mover up to the trailer so that the pintle hook is directly below the lunette (E4, fig. 3-12).

NOTE

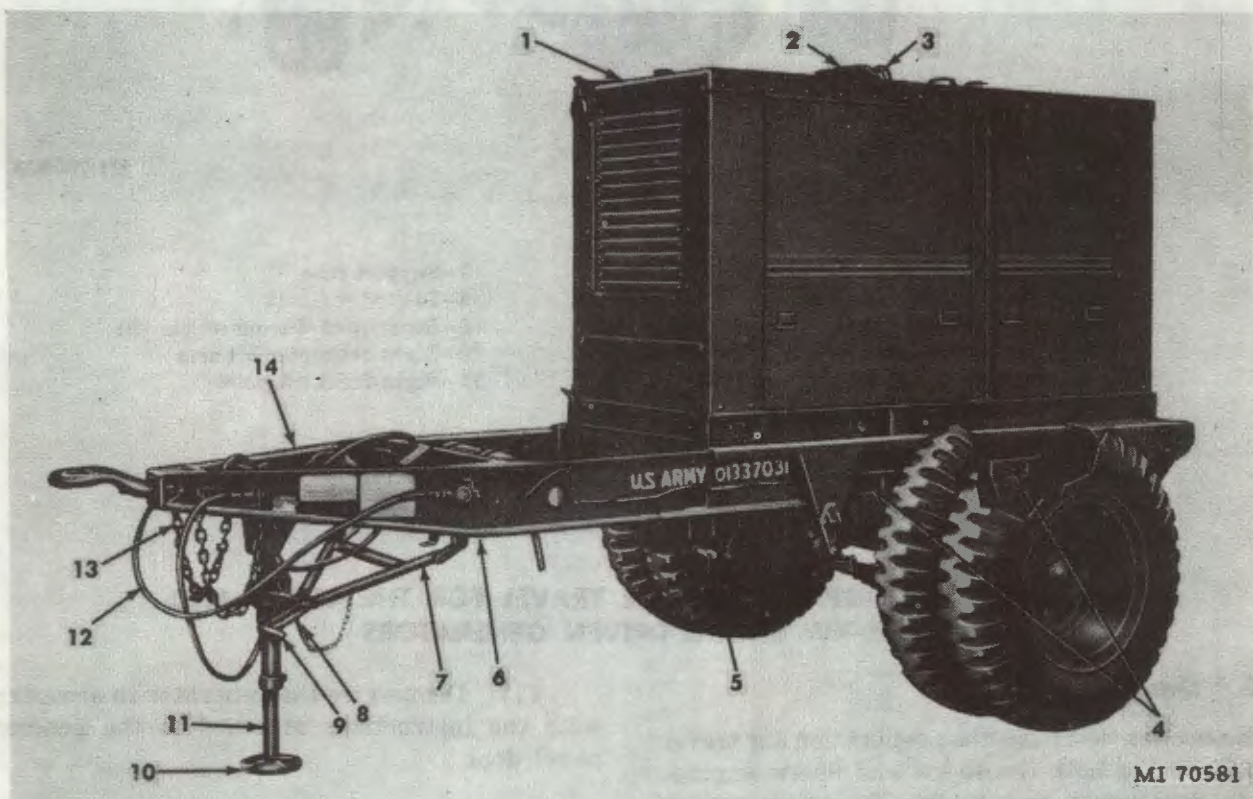
Unless otherwise specified, the figure references in steps (3) through (12) below refer to figure 3-88.

(3) Turn the front support jack crank (9) counterclockwise and engage the lunette onto the pintle hook.

(4) Close the pintle hook and insert the locking pin.

(5) Attach the two airbrake hoses (12) to the couplings on the rear of the prime mover and open the service coupling shutoff cocks.

(6) Hook the safety chains (13) to the appropriate loops at the rear of the prime mover.



MI 70581

- 1-45-Kw generator
- 2-Access cover
- 3-Lifting eye
- 4-Bolt (4)
- 5-Handbrake lever (2)
- 6-Handbrake lever (2)
- 7-Support frame

- 8-Support locking pin
- 9-Front support jack crank
- 10-Front support jack pad
- 11-Front support jack
- 12-Airbrake hose (2)
- 13-Safety chain (2)
- 14-M200A1 trailer

Figure 3-88. Engine-driven generator mounted on M200A1 trailer—typical.

(7) Remove the intervehicular cable assembly from the storage bracket on the A-frame. Open the spring-loaded cover on the cable plug connector, and plug the cable into the receptacle on the rear of the prime mover to provide power for the trailer lights.

(8) Fully retract the front support jack (11) with the jack crank (9).

(9) Remove the support locking pin (8) securing the support frame (7) to the front support jack and let the support frame swing down.

(10) Swing the front support jack toward the rear so that it can rest on the crosspiece of the support frame.

(11) Swing the support frame toward the front (with the front support jack resting on it) until the locking holes coincide with the locking holes on the front support jack. Secure with the support locking pin.

(12) Release the trailer handbrake, using the handbrake levers (5) (one on each side of the trailer).

c. Prior to leaving the area, the following checks should be made.

(1) All cable receptacles are capped.

(2) All covers are secured.

(3) The ground rod cable and ground rod are stowed properly.

(4) The generator is properly secured to the trailer.

(5) The front support jack is properly stowed.

(6) The trailer is properly connected to the prime mover.

(7) The trailer lights are working properly.

(8) The trailer handbrakes are released.

(9) The trailer brakes are working (move the prime mover a short distance and then stop).

3-42. Preparation for Travel Procedures — Helicopter (45-kw only)

a. The helicopter lifting kit (fig. 3-1) is provided for each major item in the improved HAWK system. The kit contains the items necessary to form the suspension sling assembly for each major item. The suspension sling assembly required to lift the 45-kw engine-driven generator by helicopter consists of ten 8-foot web loops (7, fig. 3-1),

two 4-foot web loops (6, fig. 3-1), and one 10-inch web ring (9, fig. 3-1). Five 8-foot web loops are daisy-chained (fig. 3-2) together to form a 20-foot suspension sling (2 and 5, fig. 3-89) for the rear and front lift points of the generator. These two 20-foot suspension slings are used for balance rather than to lift the generator. The prime lifting sling is the 3-foot suspension sling which consists of two 4-foot web loops. For detailed procedures, refer to c below.

b. Prepare the 45-kw engine-driven generator for helicopter lift as described in (1) through (7) below.

NOTE

The ground rod and ground rod cable must be transported with the generator.

(1) For preparation for travel of the 45-kw engine-driven generators, refer to paragraph 3-41a(1) through (4), and 3-41c(1) and (2).

(2) Disconnect the ground rod cable from the ground rod and the cable attach point (3, fig. 4-5) on the trailer.

NOTE

Refer to paragraph 3-8a(18) for removal of the ground rod using the stake puller kit.

(3) Pull the ground rod out of the ground.

(4) Tape the ground rod and the ground rod cable to the top of the generator.

CAUTION

To prevent damage to the brake diaphragm and air storage tank, the generator must be removed from the M200A1 trailer before helicopter lift.

(5) Remove the generator from the M200A1 trailer (14, fig. 3-88) as described below.

(a) Remove the four bolts (4, fig. 3-88) that secure the generator to the trailer.

NOTE

The four bolts must remain with the trailer.

(b) Open the access cover (2, fig. 3-88) and pull the lifting eye (3, fig. 3-88) up.

(c) Using the M108 crane, hook the crane cable to the lifting eye and slowly raise the generator from the trailer, placing it on the ground.

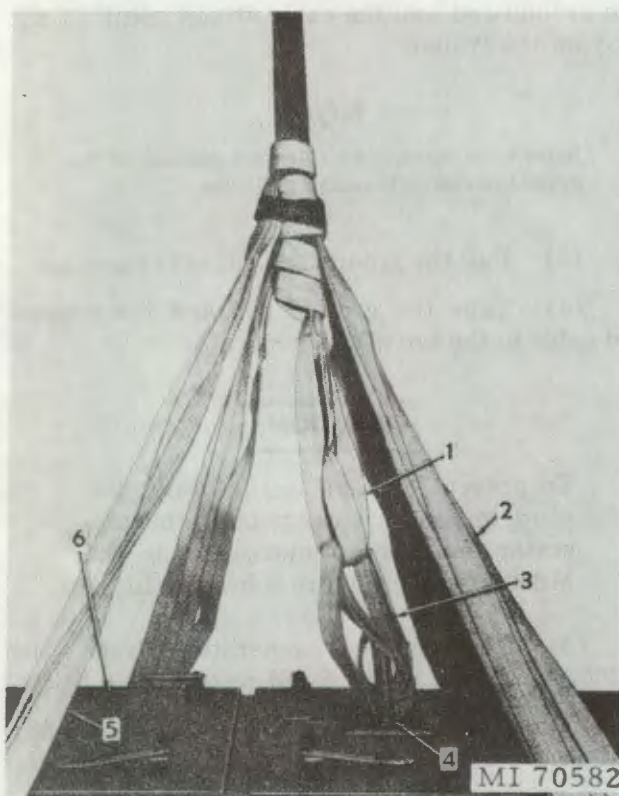
(6) Using a prime mover, remove the trailer from the helicopter lifting area. Procedures for connecting the trailer to the prime mover, are found in paragraph 3-41b.

(7) Tape all sharp edges on the front and rear lifting points (4 and 6, fig. 3-90) and the lifting eye (4, fig. 3-89) to prevent cutting of the suspension slings.

c. Prepare the generator suspension sling assembly as described below.

WARNING

Before use, inspect the web loops for defects (burns, cut edges, or broken threads) to prevent injury to personnel or damage to equipment by breaking of the loops.



- 1—4-Foot web loop
- 2—20-Foot suspension sling
- 3—Doubled 4-foot web loop
- 4—Lifting eye
- 5—20-Foot suspension sling
- 6—Generator

Figure 3-89. 45-Kw engine-driven generator—suspension sling attached.

(1) Double two 8-foot web loops and place through the front and rear lift points (4 and 6, fig. 3-90) as shown in figure 3-91.

(2) Daisy-chain (fig. 3-2) two 8-foot web loops to a free end of the double loop on the front lift point.

(3) Daisy-chain two 8-foot web loops to the other free end of the doubled loop, forming the front 20-foot suspension sling (3, fig. 3-90).

(4) Attach the two ends of the front 20-foot suspension sling to the 10-inch web ring (fig. 3-3).

(5) Double a 4-foot web loop (1, fig. 3-89) and attach it to the lifting eye (4, fig. 3-89) on the top of the generator (6, fig. 3-88).

(6) Daisy-chain one 4-foot web loop (1, fig. 3-89) to the free end of the doubled 4-foot web loop (3, fig. 3-89), forming a 3-foot suspension sling.

(7) Attach the free end of the 3-foot suspension sling to the 10-inch web ring (fig. 3-3).

(8) Repeat steps (2) through (4) above for the rear lift point.

(9) Place tape through the 10-inch web ring over the loops and around the knot formed by the web loops (fig. 3-92).

(10) Pull the suspension sling up taut to the top of the generator and place tape around all web loops every 12 inches from the top of the generator to the 10-inch web ring.

(11) Tape all suspension slings to the top of the generator to prevent entangling.

(12) Drive the ground rod of the grounding device assembly (1, fig. 3-1) into the ground next to the generator.

(13) Place the grounding device (1, fig. 3-90) with the taped suspension slings on top of the generator.

(14) Stow the remainder of the helicopter lifting kit in the storage bag.

d. Prior to helicopter lift, perform the following checks.

(1) The generator is prepared for travel.

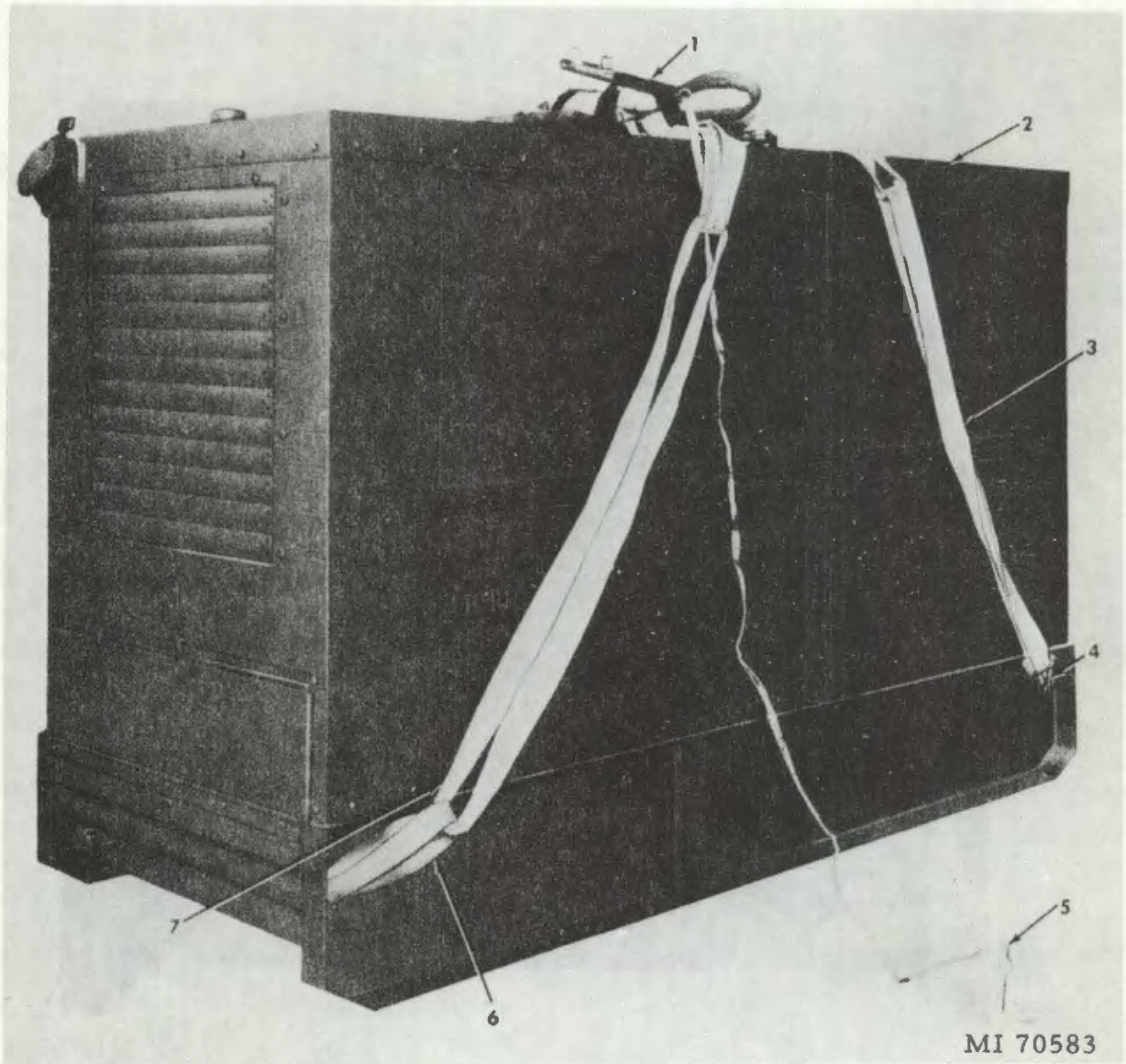
(2) The generator is removed from the M200A1 trailer.

(3) All sharp edges are taped in areas where the suspension slings may contact the equipment.

(4) The suspension slings are properly attached.

(5) The suspension slings are taped for helicopter pickup.

e. To attach the suspension sling assembly to the helicopter hook, refer to paragraph 3-9e.



MI 70583

- 1—Grounding device
- 2—Generator
- 3—Front 20-foot suspension sling
- 4—Front lifting point

- 5—Ground rod
- 6—Rear lifting point
- 7—Rear 20-foot suspension sling

Figure 3-90. 45-Kw engine-driven generator—suspension sling secured for helicopter pickup.

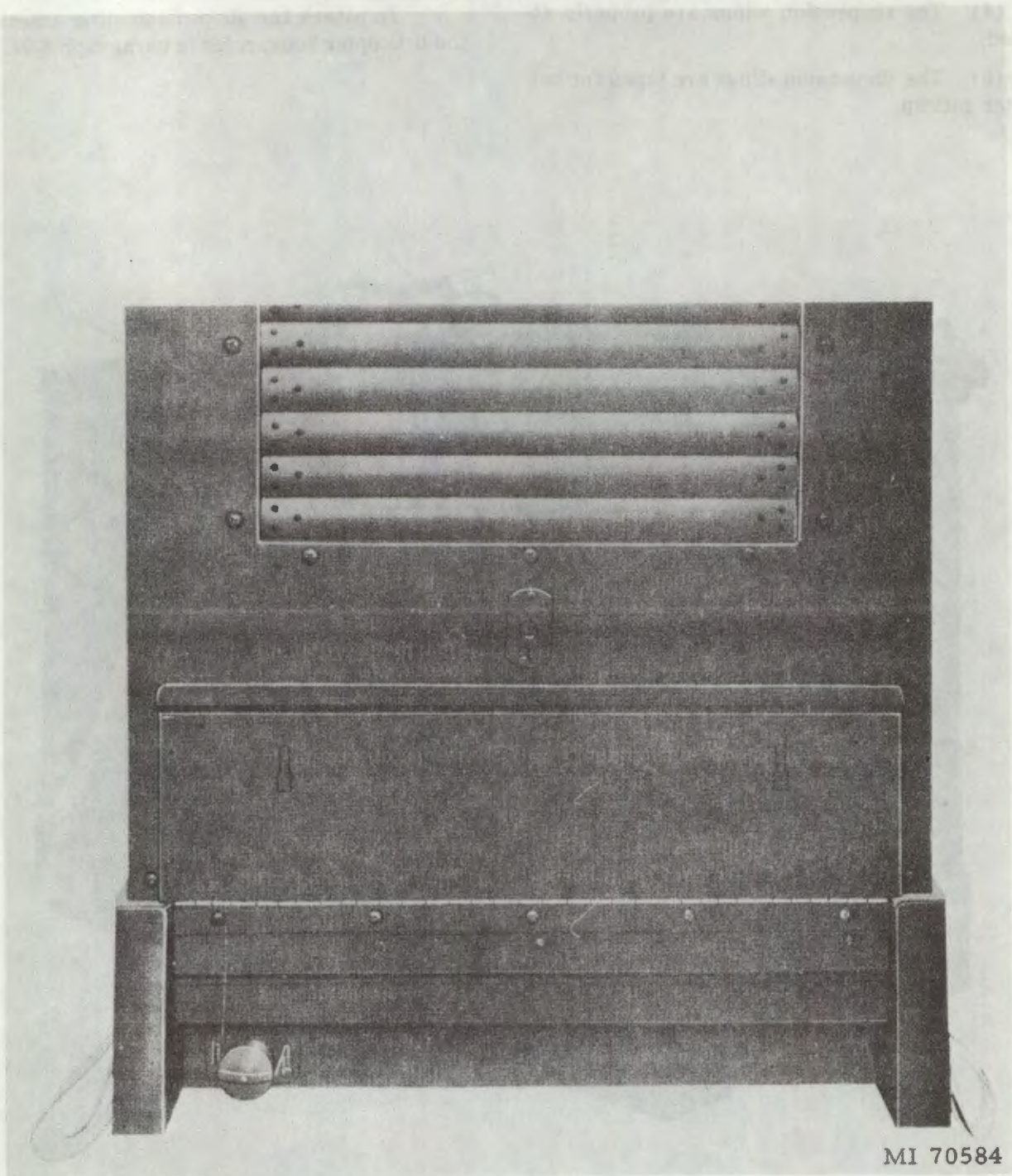


Figure 3-91. 45-Kw engine-driven generator—double 8-foot loop inserted through lift point—typical.

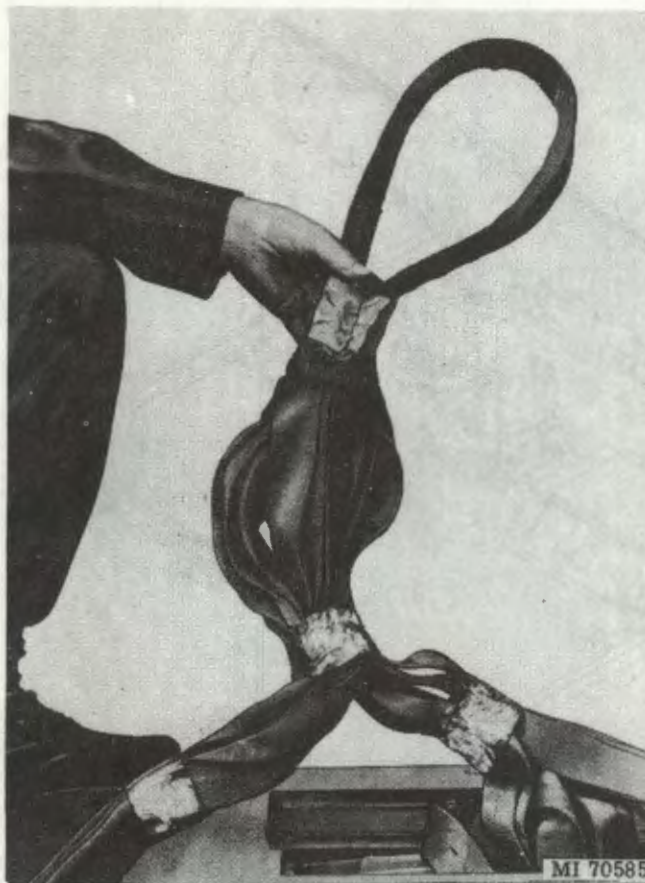


Figure 3-92. 45-Kw engine-driven generator—suspension sling assembly taped.

Section XIV. PREPARATION FOR TRAVEL FOR INFORMATION AND COORDINATION CENTRAL/TRAILER MOUNTED AN/MSQ-95

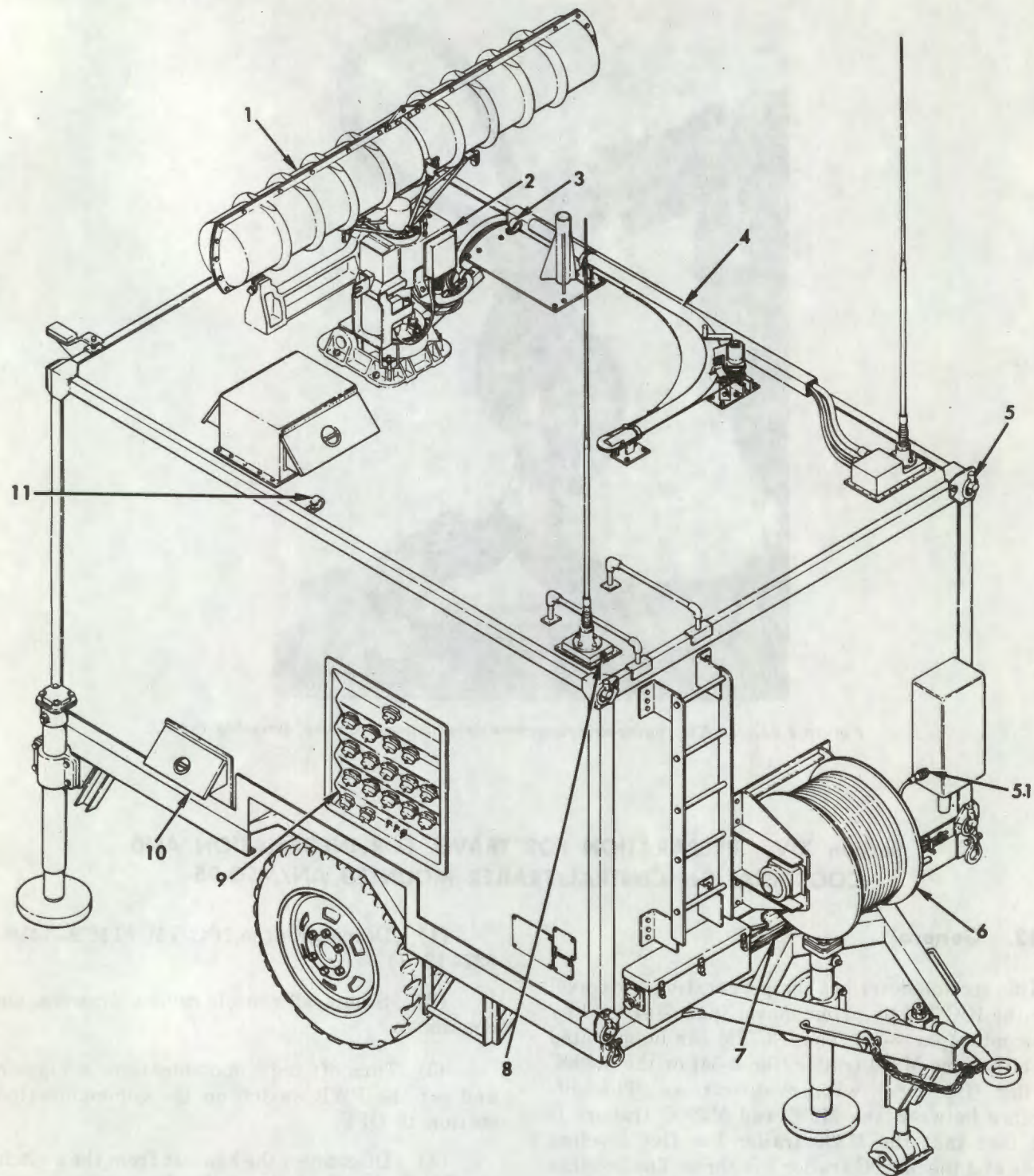
3-43. General

This section describes the preparation for travel for the ICC/TM by prime mover (par. 3-44) and by helicopter (par. 3-45). The ICC/TM can be mounted on either the M390 trailer (fig. 3-54) or the M390C trailer (fig. 3-84) with modifications. The difference between the M390 and M390C trailers is the fact that the M390 trailer has five leveling jacks and the M390C trailer has three. The leveling jacks for both trailers are physically and functionally the same. For the preparation for travel procedures of the M390 trailer, refer to paragraph 3-21b; for the M390C trailer, refer to paragraph 3-38e.

3-44. Preparation for Travel Procedures — Prime Mover

a. The detailed procedures for preparing the ICC/TM for travel are as follows.

- (1) Deenergize the ICC/TM (TM 9-1430-527-12-1).
- (2) Secure all console covers, drawers, and chassis.
- (3) Turn off the communications equipment and set the PWR switch on the communications station to OFF.
- (4) Disconnect the headset from the switchboard and stow it in the utility drawer.
- (5) Disconnect all power and data cables from the main cable entry panel (9, fig. 3-93 or 3-94) and cap the connectors and receptacles.
- (6) Disconnect ground strap 9166696-2 from the IBCC ground rod and stow the strap in the storage cabinet in the ICC/TM.
- (7) Disconnect the ground strap from the GRD attach point (1, fig. 3-95) or ground attach point E1 and the IBCC ground rod (1, fig. 3-96).



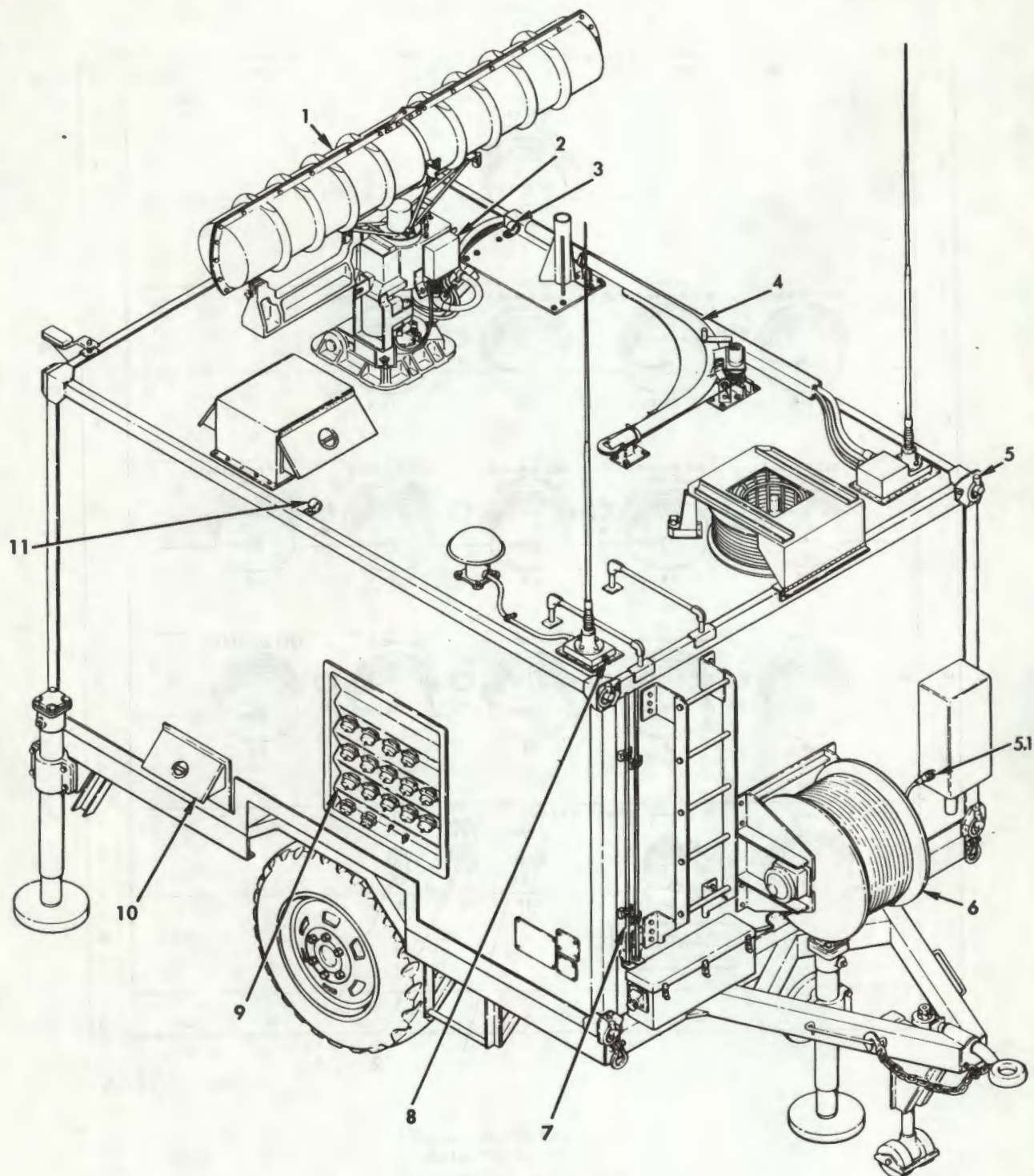
MI 70586A

- 1 — IFF antenna and pedestal assembly (roof mounted)
- 2 — Communication unit
- 3 — Radio antenna stowage clamp
- 4 — Antenna hoisting unit
- 5 — Shelter lifting and tiedown fittings (4)
- 5.1 — Communication termination unit J11

- 6 — Remote IFF cable and reel
- 7 — Ground rods (2)
- 8 — ANT SAFE/OPERATE switch
- 9 — Cable entry panel
- 10 — ADP air intake
- 11 — Radio antenna stowage clamp

Figure 3-93. ICC/TM *(E)¹—¾ front view.

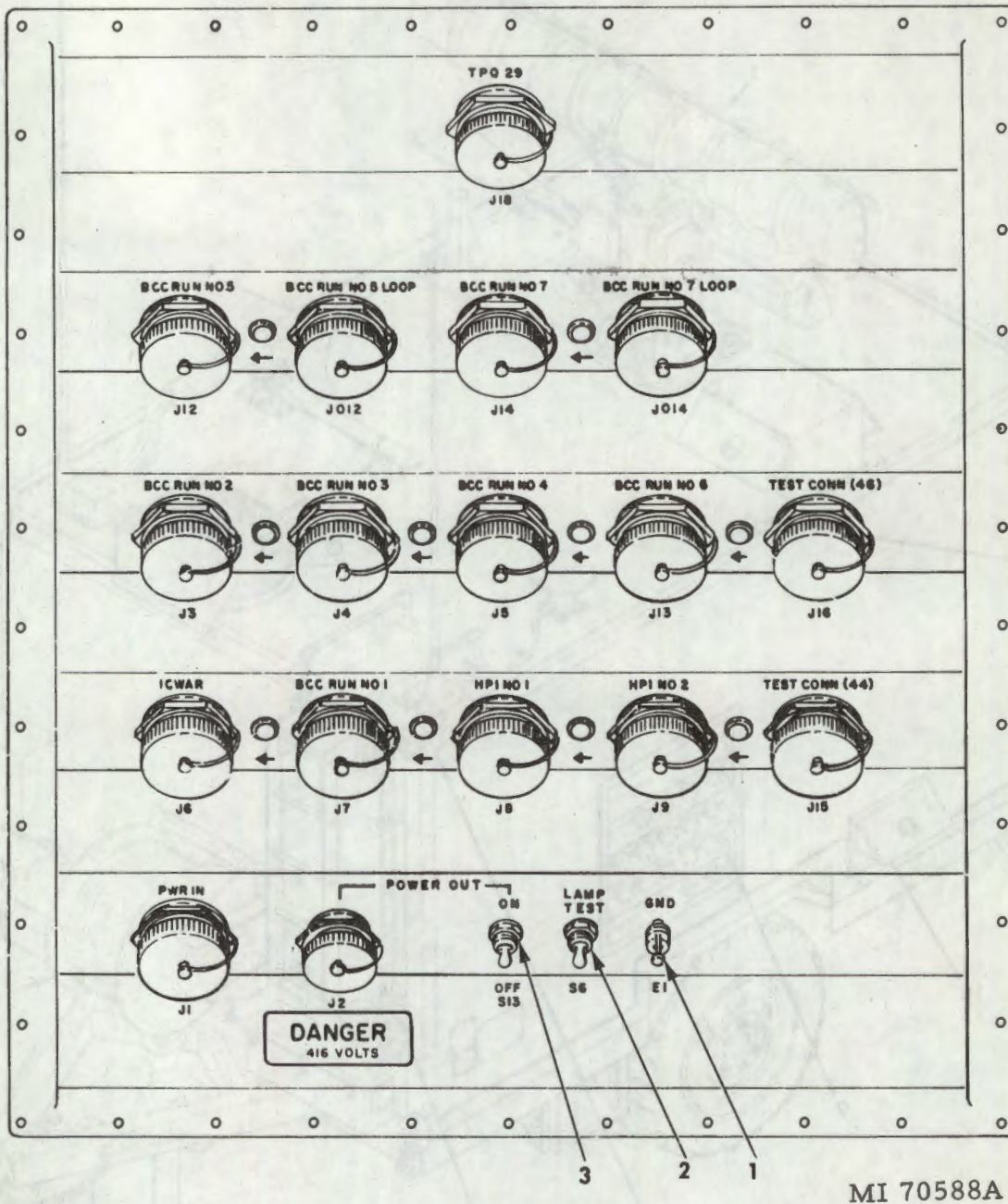
¹Refer to appendix B for serial number effectivity.



MI 70587A

- | | |
|--|--------------------------------|
| 1—IFF antenna and pedestal assembly (roof-mounted) | 6—Data cable and reel |
| 2—Communication unit | 7—Ground rods (2) |
| 3—Radio antenna stowage clamp | 8—ANT SAFE-OPERATE switch |
| 4—Antenna hoisting unit *(G) ¹ | 9—Main cable entry panel |
| 5—Shelter lifting and tiedown fittings (4) | 10—ADP air intake |
| 5.1—Communication termination unit J11 | 11—Radio antenna stowage clamp |

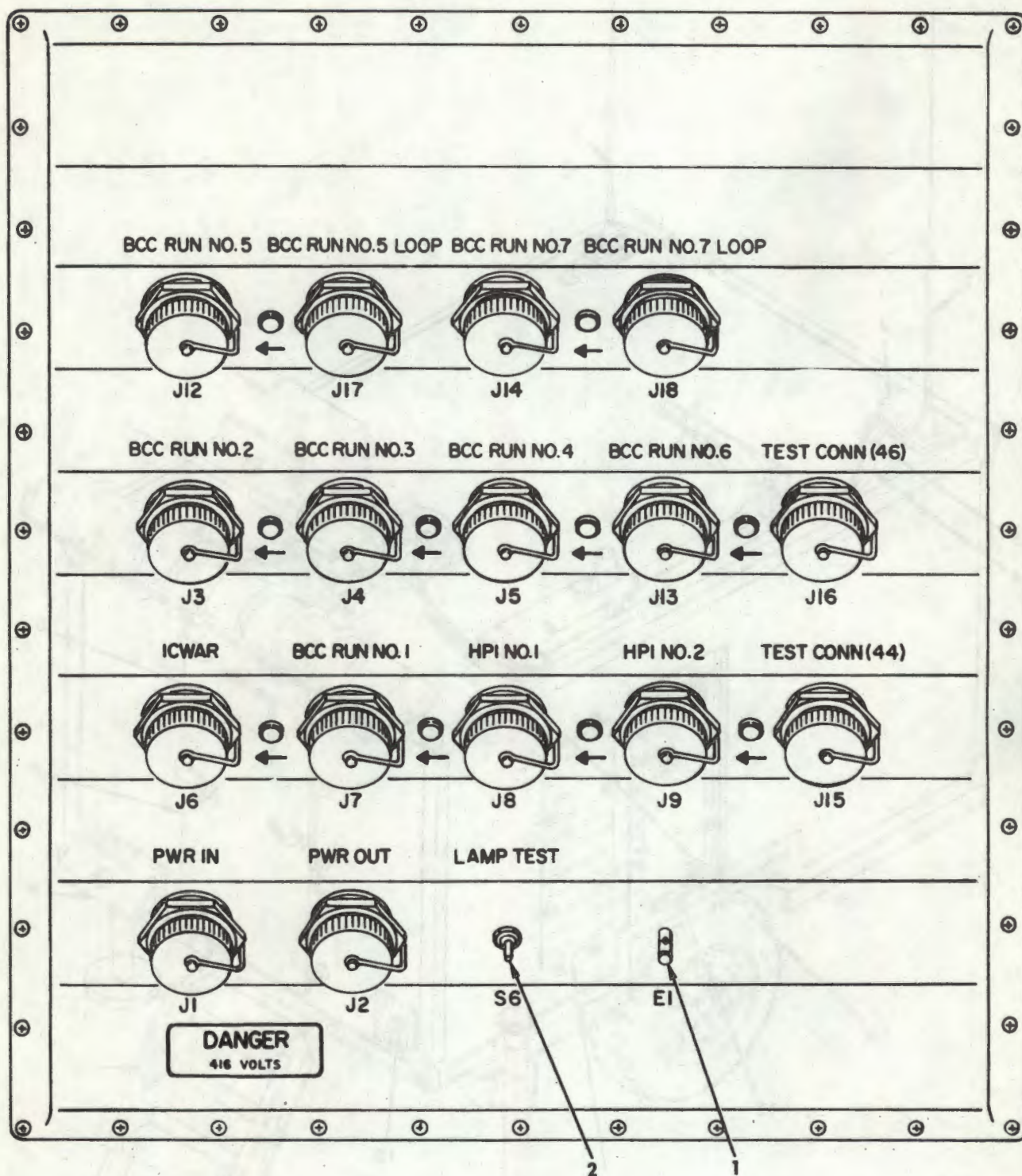
Figure 3-94. ICC *(D)¹ 3/4 front view.¹Refer to appendix B for serial number effectivity.



- 1—Ground attach point E1
- 2—LAMP TEST switch
- 3—POWER OUT switch

Figure 3-95. ICC *(E)¹ and IPCP cable entry panel.

¹Refer to appendix B for serial number effectivity.

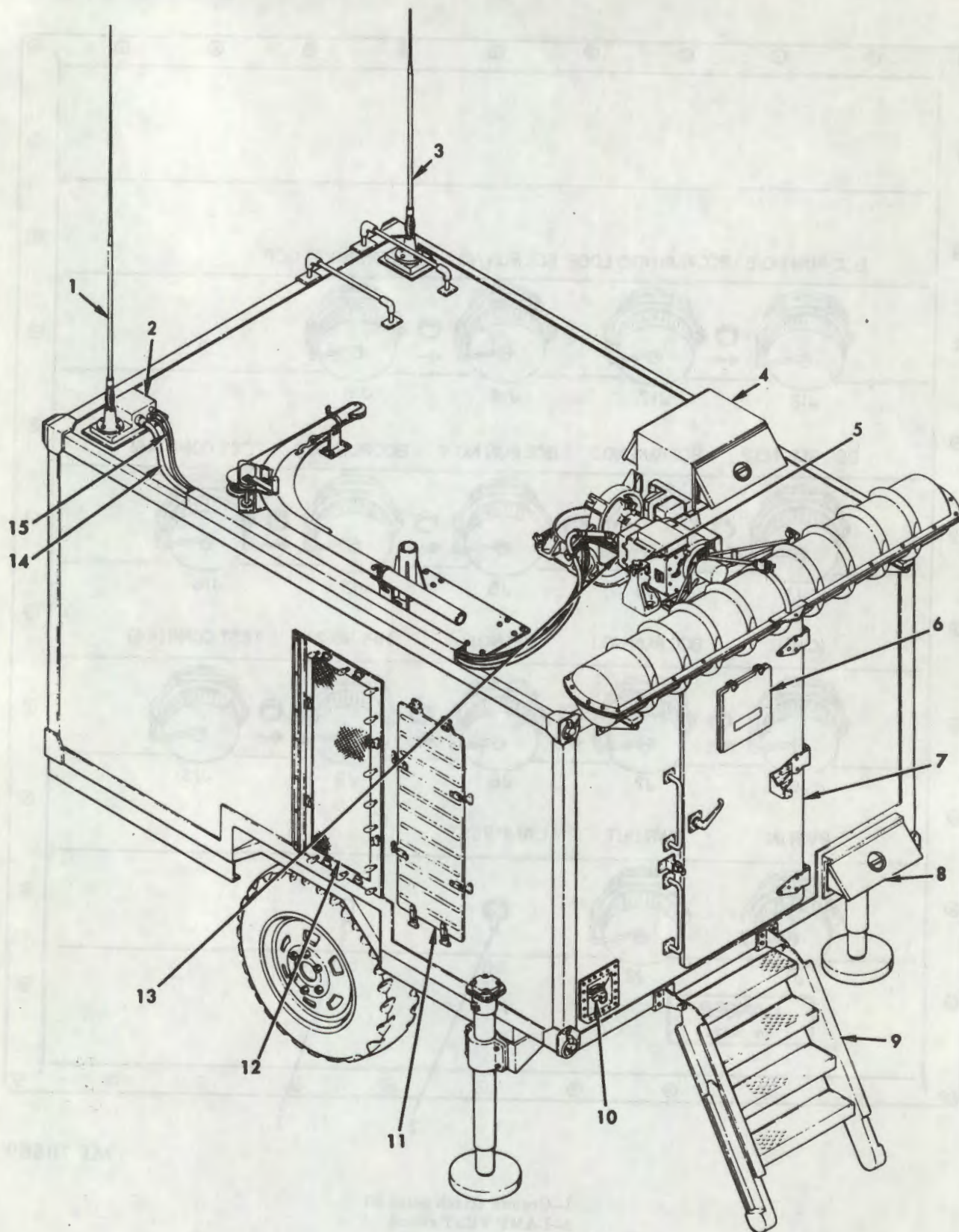


MI 70589

1—Ground attach point E1
2—LAMP TEST switch

Figure 3-96. ICC/TM (D)¹ cable entry panel.

¹Refer to appendix B for serial number effectivity.



MI 70590

Figure 3-97. ICC/TM *(E)¹—¾ rear view (IFF antenna stowed).

¹Refer to appendix B for serial number effectivity.

- 1-Intelligence and radar reporting net antenna
- 2-IFF antenna cable entry enclosure
- 3-Early warning net antenna
- 4-ADP air exhaust hood
- 5-Stow bracket for IFF antenna and pedestal assembly
- 6-Pressure air vent
- 7-Access door
- 8-ADP air intake

- 9-Stepladder
- 10-Remote IFF connector J25
- 11-Air conditioner cover
- 12-Air conditioner rf filter
- 13-AZIMUTH DRIVE SAFE switch
- 14-IFF antenna data cable (13.5 foot)
- 15-IFF antenna rf cables (13.5 foot) (2)

Figure 3-97—Continued.

NOTE

Insure that the 250 foot (76.2 meter) communication cable is disconnected from J11 on the communication termination unit (CTU), (5.1, fig. 3-93 or fig. 3-94) and from distribution box J2317 A/U.

(8) Stow the ground strap in the storage location provided in the ICC/TM.

(9) Remove the air conditioner cover (11, fig. 3-97 or 12, fig. 3-98) from the stowed position and install it on the air conditioner rf filter (12, fig. 3-97) or (13, fig. 3-98).

(10) Close the ADP air intake vents on the side (10, fig. 3-93 or 3-94) and rear (8, fig. 3-97) or (10, fig. 3-98) of the ICC/TM.

CAUTION

The maximum number of personnel allowed on the ICC/TM roof at any one time is three.

WARNING

Before climbing to the roof, insure that the ANT SAFE-OPERATE switch (8, fig. 3-93 or 3-94) is set to SAFE.

WARNING

Insure that all communications equipment has been deenergized before performing step (11) below.

(11) Lower the two radio whip antennas to the stowed position (fig. 3-99) by placing the antennas under the radio antenna stowage clamps (3 and 11, fig. 3-93 or 3-94).

(12) Close the ADP exhaust hood (4, fig. 3-97 or 6, fig. 3-98).

NOTE

Step (13) below is performed only if the IFF antenna is emplaced remotely.

(13) Disassemble and stow the remote IFF antenna as described below.

NOTE

The key numbers shown below in parentheses refer to figure 3-100 unless otherwise indicated.

(a) Disconnect and retrieve the 300-foot (91.4-meter) and the 75-foot (22.9 meter) remote IFF data cables (6) connected between IFF remote connector J25 (10, fig. 3-97) on the ICC/TM IFF cable entry panel and the 12-foot (3.7-meter) Y-data cable (5) at the remote site.

(b) Disconnect the 12-foot (3.7-meter) Y-data cable (5) connections at the IFF receiver-transmitter (4) and antenna pedestal (12).

(c) Disconnect the sum channel (3) and difference channel (7) rf cables connected between the IFF antenna pedestal and the IFF receiver-transmitter.

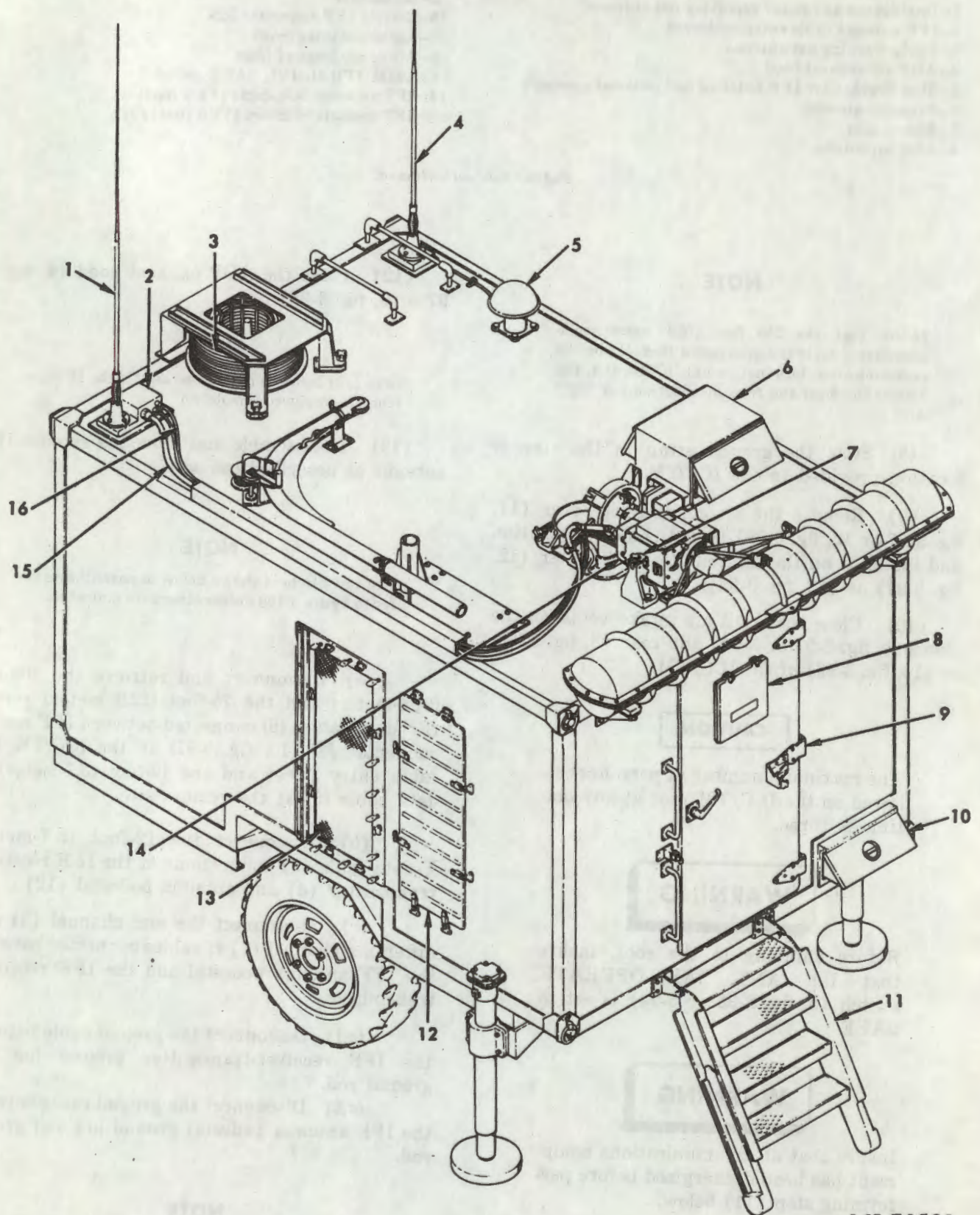
(c.1) Disconnect the ground cable between the IFF receiver-transmitter ground lug and ground rod.

(c.2) Disconnect the ground cable between the IFF antenna pedestal ground lug and ground rod.

NOTE

Refer to paragraph 3-8a (18) for removal of the ground rod using the stake puller kit.

(c.3) Pull up the ground rod.



MI 70591

Figure 3-98. ICC/TM (D)¹— $\frac{3}{4}$ rear view (IFF antenna stowed).

¹Refer to appendix B for serial number effectivity.

- 1—Intelligence and radar reporting net antenna
- 2—IFF antenna cable entry enclosure
- 3—IFF remote data cables
- 4—Early warning net antenna
- 5—Siren
- 6—ADP air exhaust hood
- 7—Stow bracket for IFF antenna and pedestal assembly
- 8—Pressure air vent

- 9—Access door
- 10—ADP air intake
- 11—Stepladder
- 12—Air conditioner cover
- 13—Air conditioner rf filter
- 14—AZIMUTH DRIVE SAFE switch
- 15—IFF antenna data cable (13.5 foot)
- 16—IFF antenna rf cables (13.5 foot) (2)

Figure 3-98—Continued.

(d) Disassemble the remote IFF antenna as described below.

1. Set the AZIMUTH DRIVE SAFE switch (13, fig. 3-97) on the antenna pedestal to OFF (safe).

WARNING

Removing the IFF antenna from its tripod presents a possible hazard to personnel and equipment. Use extreme caution when handling the IFF antenna to prevent accidental dropping which may result in injury to personnel.

2. Remove the IFF antenna (1) from the tripod (10).

3. Pull up the antenna tripod stakes securing the IFF antenna tripod.

4. Loosen the leg retainer handknob (9) and fold the tripod legs, lowering the legs, if necessary, by loosening the leg-length locking handknobs (8).

(e) Transport the IFF antenna, receiver-transmitter, stepstool, tripod, tripod spades, ground rod, ground cables and IFF remote cables to the ICC/TM area.

(f) Stow the tripod and tripod spades in their storage location in the ICC/TM and store the IFF remote cables.

NOTE

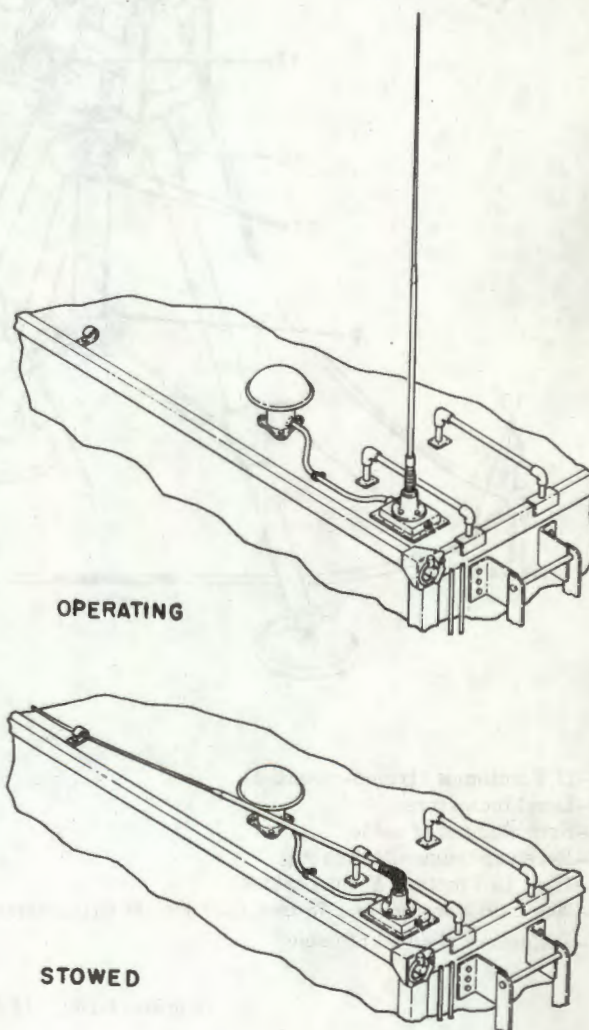
If the hoist is not installed on the roof of the ICC/TM, use a mobile crane.

(g) Using the hoist provided on the ICC/TM (4, fig. 3-101), lift the IFF antenna to the ICC/TM roof.

(h) Place the antenna in the antenna pedestal bracket (6, fig. 3-101). Engage the antenna with the bracket by tightening the pedestal bolt assembly handknobs (5, fig. 3-101).

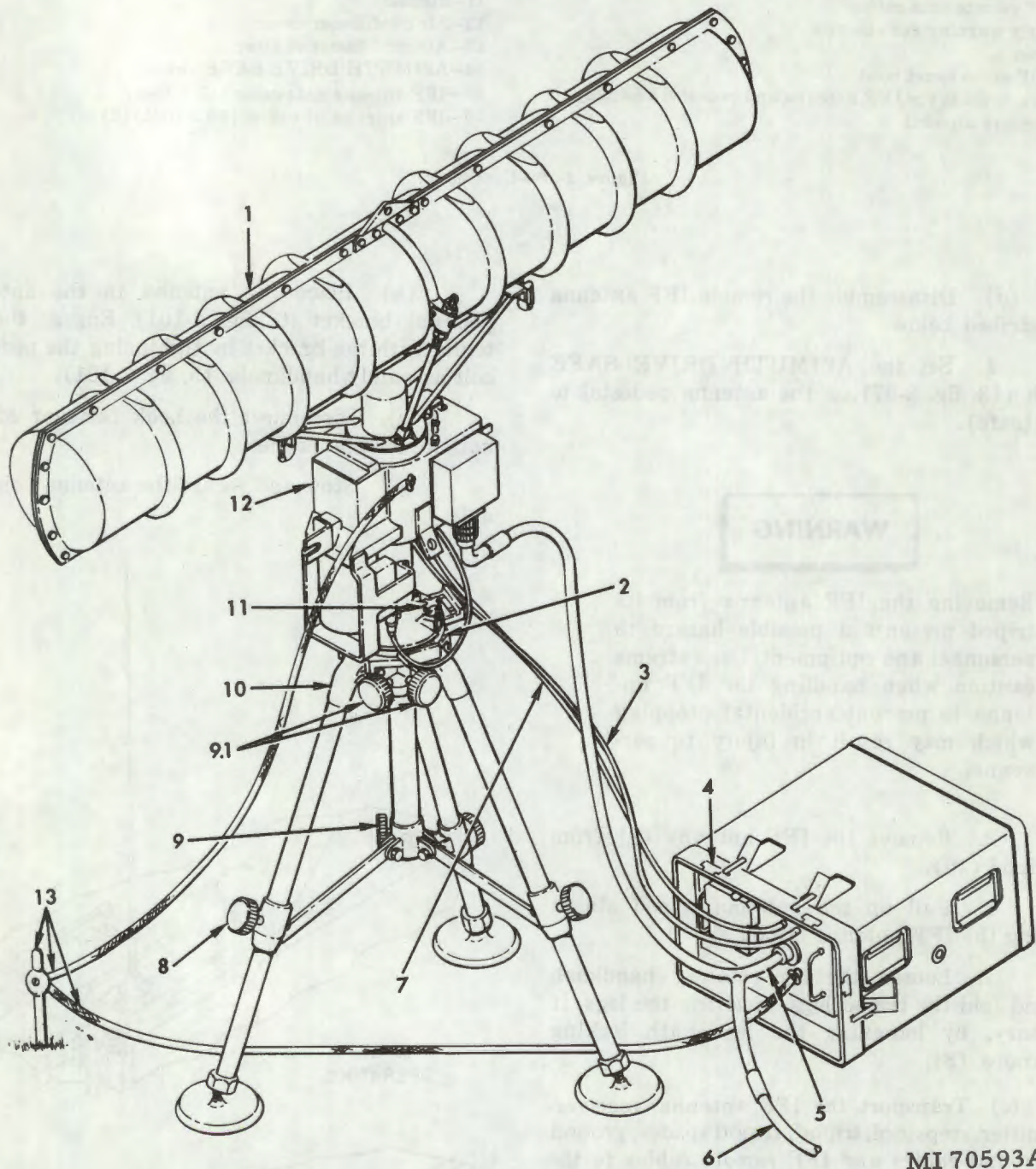
(i) Disconnect the hook fastener of the hoist or mobile crane.

(j) Stow and secure the antenna hoisting unit.



MI 70592

Figure 3-99. Radio whip antenna base.

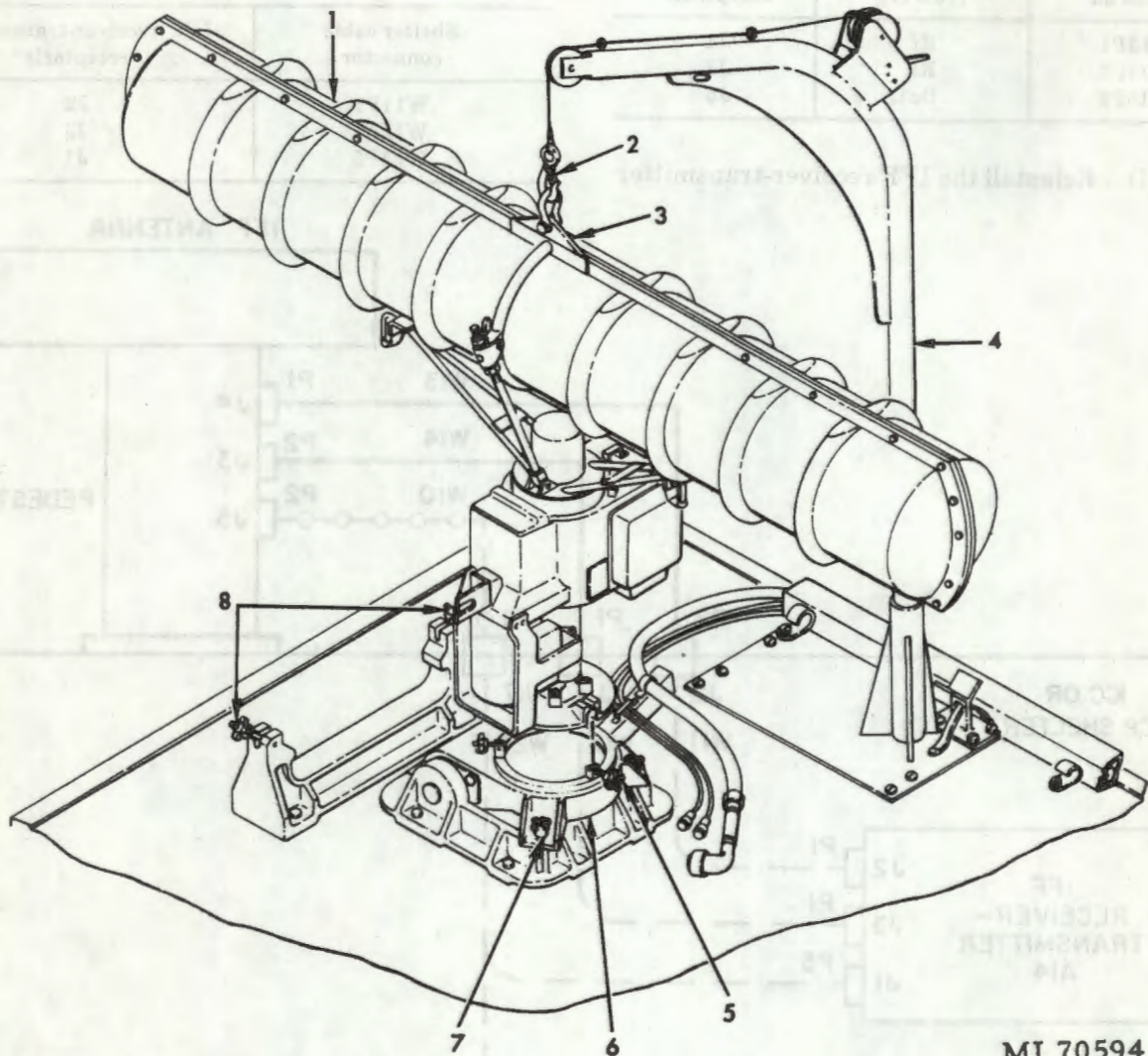


MI 70593A

- 1-IFF antenna (tripod-mounted)
- 2-Level indicators
- 3-Sum channel rf cable
- 4-Receiver-transmitter group
- 5-12-ft (3.7 meter) Y data cable
- 6-300-ft (91.4 meter) and 75-foot (22.9 meter) data cables
- 7-Difference channel rf cable

- 8-Leg length locking handknob
- 9-Leg retainer handknob
- 9.1-Leveling handknobs
- 10-Tripod
- 11-Pawl fastener
- 12-Pedestal assembly

Figure 3-100. IFF antenna (tripod-mounted).



MI 70594

- 1-IFF antenna and pedestal assembly
- 2-Hook fastener
- 3-Lifting bracket
- 4-Hoist with crank handle * (G)¹
- 5-Pedestal bolt assembly handknob (3)
- 6-Antenna pedestal bracket
- 7-Bolt assembly handknobs (2)
- 8-Stow bolt assembly handknobs (2)

Figure 8-101. IFF antenna—installation and removal.

¹Refer to appendix B for serial number effectivity.

(k) Connect the following local cables to the IFF antenna pedestal (refer to figure 3-102).

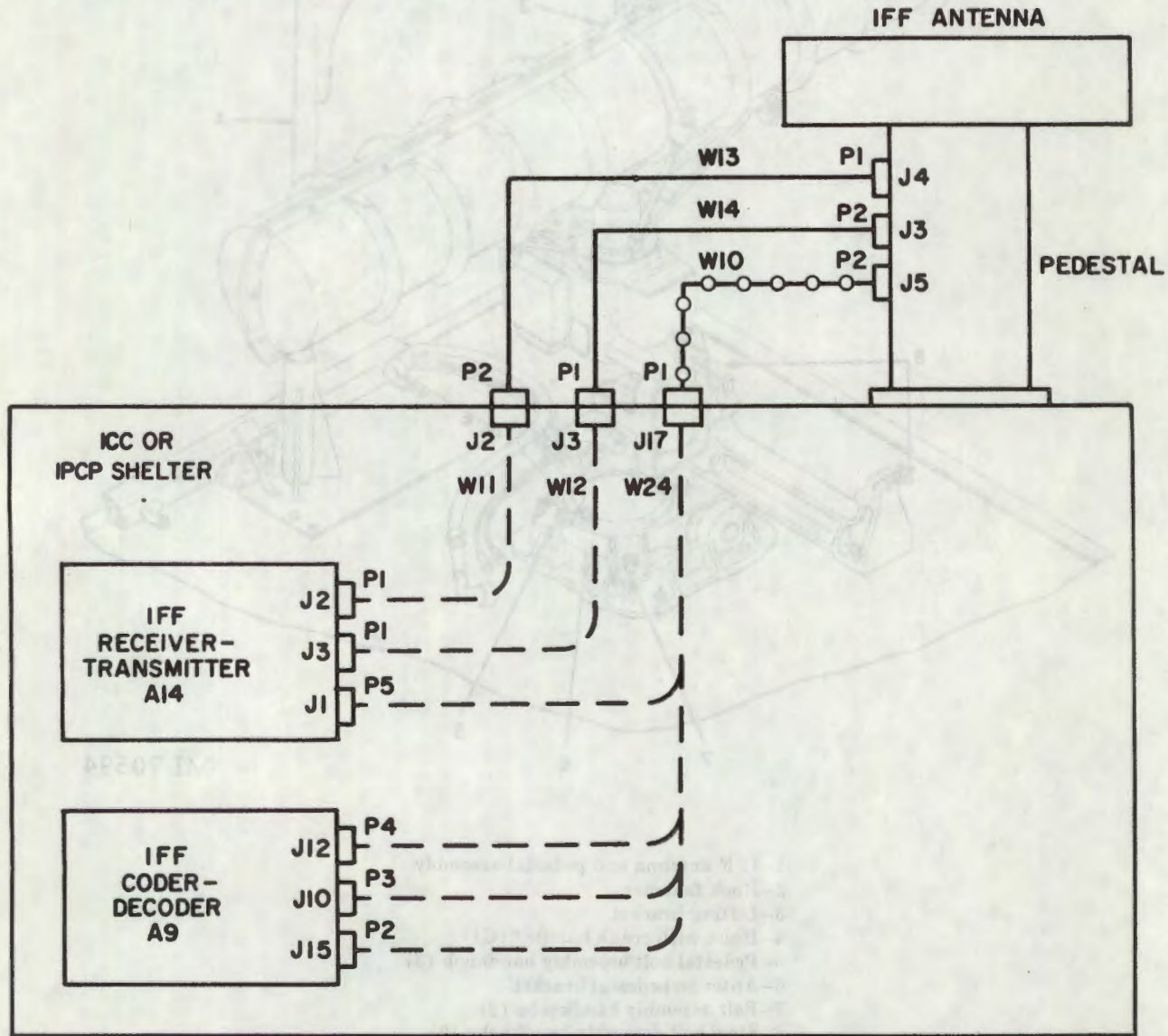
Local cable connector	Cable type (4.1 meters) (13.5 ft)	Antenna pedestal receptacle
W13P1	Rf	J4
W14P2	Rf	J3
W10P2	Data	J5

(l) Reinstall the IFF receiver-transmitter

in the ICC and secure it with the web straps provided.

(m) Connect the following shelter cables to the IFF receiver-transmitter (refer to figure 3-102).

Shelter cable connector	IFF receiver-transmitter receptacle
W11P1	J2
W12P1	J3
W24P5	J1



- 13.5-FT (4.1-METER) RF CABLE
- - - - - SHELTER CABLING
- 13.5-FT (4.1-METER) IFF DATA CABLE MI 70595A

Figure 3-102. IFF antenna interconnections—local installation.

(n) Within the ICC disconnect the following shelter cables from the IFF coder-decoder (refer to figure 3-103).

Shelter cable connector	IFF coder-decoder receptacle
W7P1	J10
W7P2	J12
W7P3	J15

(o) Connect the following shelter cables to the IFF coder-decoder (refer to figure 3-102).

Shelter cable connector	IFF interrogator receptacle
W24P2	J15
W24P3	J12
W24P4	J10

(13.1) Prepare the IFF antenna for stowing as described below.

(a) Unlock the quick disconnect pins (1, 2, and 6, fig. 6-13).

(b) Loosen the antenna upper stud nut (3, fig. 6-13).

(c) Observe the antenna tilt indicator (4, fig. 6-13) and adjust the nut (5, fig. 6-13) until the tilt indicator indicates zero (0) degrees.

(d) Tighten the upper stud nut.

NOTE

If a quick disconnect pin does not lock securely, adjust the tightness by small adjustments of the screw on the end of the pin. Try locking the pin after each adjustment and readjust as necessary until the quick disconnect pin locks securely.

(e) Lock the quick disconnect pins.

(14) Lower the IFF antenna to the stow position as described below.

(a) Release the two base bolt assembly handknobs (7, fig. 3-101), and lower the antenna to the stow position (fig. 3-97).

(b) Secure the antenna pedestal bracket in the stow position by tightening the two stow bolt assembly handknobs (8, fig. 3-101).

(15) Close and lock the pressure air vent (6, fig. 3-97) or (8, fig. 3-98) on the access door.

(16) Close and lock the access door (7, fig. 3-97) or (9, fig. 3-98).

(17) Raise and lock the stepladder (9, fig. 3-97) or (11, fig. 3-98).

WARNING

When stowing the front leveling jack in step (18) below, operate the jack crank in half-turn intervals to avoid contact with the front cable reel so as to prevent possible injury to the hands.

(18) Prepare the M390C trailer for travel as described in paragraph 3-21b. (Disregard step (3), since the M390C trailer does not have front corner leveling jacks.)

b. Prior to leaving the area, the following checks should be made.

(1) The ANT SAFE-OPERATE switch is in the SAFE position.

(2) The AZIMUTH DRIVE SAFE switch is in the OFF (SAFE) position.

(3) The IFF antenna is installed on the ICC roof in its stowed position.

(4) The antenna hoisting unit is stowed and secured.

(5) The ground rod and ground rod cable are disconnected and properly stowed.

(6) The ADP air intake vents are closed and properly secured.

(7) The air conditioner cover is installed and properly secured.

(8) The two radio whip antennas are properly stowed.

(9) Both headsets are stowed in the storage compartment.

(10) The pressure air vent on the door is closed and secured.

(11) The door is locked.

(12) The stairs are raised and properly stowed.

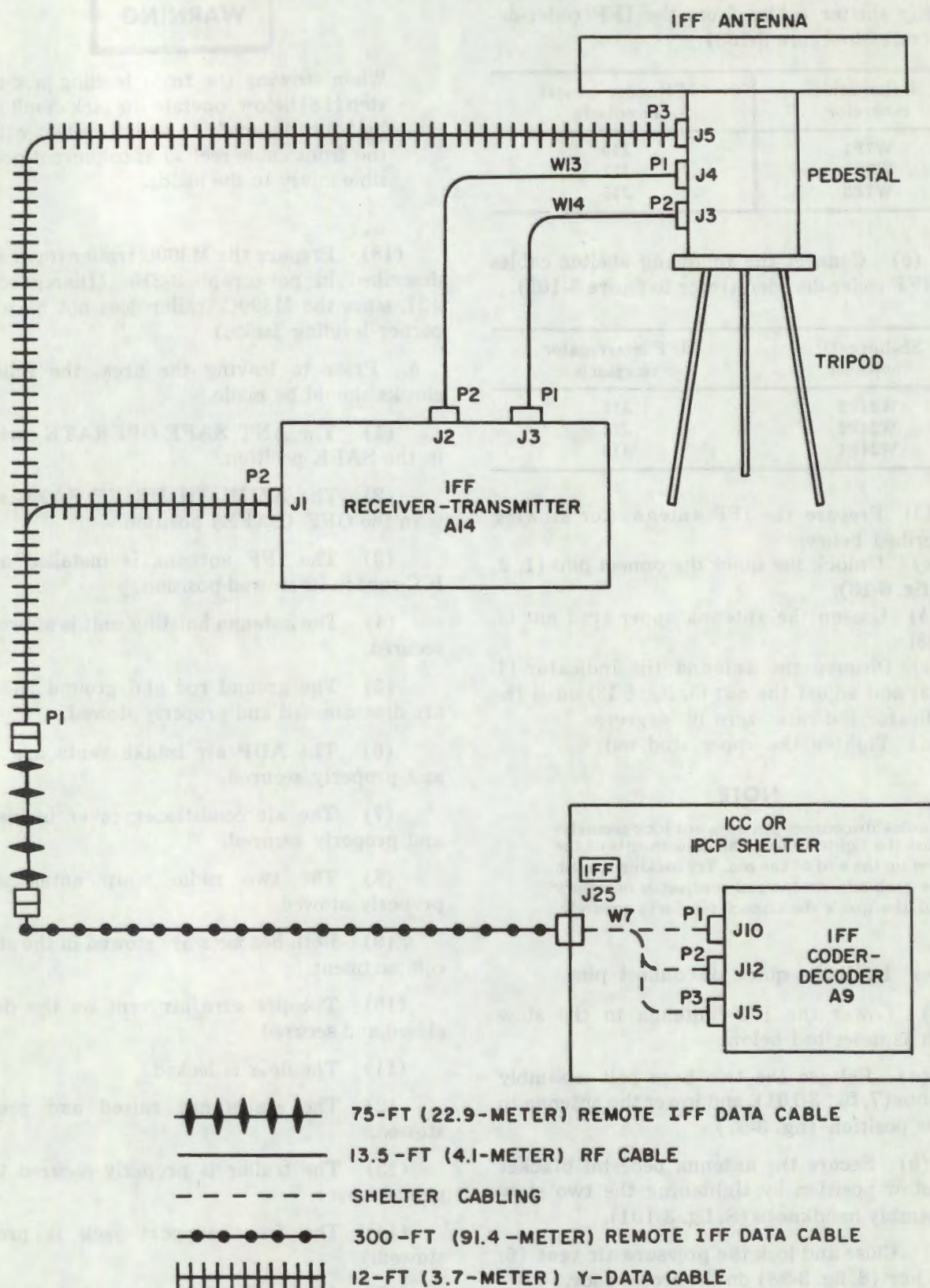
(13) The trailer is properly secured to the prime mover.

(14) The front support jack is properly stowed.

(15) All leveling jacks are properly stowed and secured.

(16) All jack cranks are properly stowed.

(17) The trailer lights are working properly.



MI 70596B

Figure 3-103. IFF antenna interconnections—remote installation.

(18) The handbrakes are released.

(19) The trailer brakes are working (move the prime mover a short distance and then stop).

3-45. Preparation for Travel Procedures — Helicopter

TO BE SUPPLIED LATER

Section XV. PREPARATION FOR TRAVEL FOR THE IMPROVED PLATOON COMMAND POST (IPCP) AN/MSW-11

3-45.1. General

This section describes the preparation for travel for the IPCP by prime mover (par. 3-45.2) and by helicopter (par. 3-45.3). The IPCP can be mounted on either the M390 trailer (fig. 3-54) or the M390C trailer (fig. 3-84) with modifications. For the preparation for travel procedures of the M390 trailer, refer to paragraph 3-21b; for the M390C trailer, refer to paragraph 3-38e.

3-45.2. Preparation for Travel Procedures—Prime Mover

NOTE

If the IPCP is emplaced as part of the IAFU, perform step *a* below. If the IPCP is emplaced in the IH battery as a substitute for the ICC, perform step *b* below.

a. Steps (1) through (18) below are the detailed procedures for preparing the IPCP for travel when it is emplaced as part of an IAFU.

(1) Deenergize the IPCP (DTM 9-1430-535-12-1).

(2) Secure all console covers, drawers, and chassis.

(3) Turn off the communications equipment, and set the PWR switch on the communications station to OFF.

(4) Disconnect the headsets from the switchboard and the tactical display and engagement control console (TDECC), and hang them on the headset hooks.

(5) Disconnect the power and data cables from the main cable entry panel (10, fig. 3-103.1), and cap the connectors and receptacles.

(6) Disconnect the 3-foot (0.9-meter) data cables connected between J12 and J012, and between J14 and J014 of the cable entry panel. Store the cables in the IPCP shelter.

(7) Disconnect the ground rod cable from GND attach point E1 (2, fig. 3-95).

NOTE

Refer to paragraph 3-8a(18) for removal of the ground rod using the stake puller kit.

(8) Pull up the ground rod and stow it and the cable in the storage location provided at the front end of the IPCP. (8, fig. 3-103.1).

(9) Remove the air conditioner cover (12, fig. 3-103.2) from the stowed position, and install it on the air conditioner rf filter (13, fig. 3-103.2).

(10) Close the ADP air intake vents on the side (11, fig. 3-103.1) and rear (9, fig. 3-103.2) of the IPCP.

CAUTION

Not more than three persons should occupy the IPCP roof at any one time.

WARNING

If the IFF antenna is installed on the IPCP roof, make certain that the antenna SAFE/OPERATE switch (9, fig. 3-103-1) is set to SAFE before climbing onto the roof.

WARNING

Insure that all communications equipment has been deenergized before performing step (11).

(11) Lower the two radio whip antennas to the stowed position (fig. 3-99) by placing the antennas under the radio antenna stowage clamps (3 and 12, fig. 3-103.1).

(12) Close the ADP exhaust hood (5, fig. 3-103.2).

NOTE

Step (13) below is performed only if the IFF antenna is emplaced remotely.

(13) Disassemble and stow the remote IFF antenna as described below.

WARNING

Before retrieving the remote IFF antenna, insure that the antenna SAFE/OPERATE switch (9, fig. 3-103.1) is set to SAFE and the AZ DRIVE switch (14, fig. 3-103.2) is set to OFF (SAFE).

NOTE

Refer to figure 3-103 for steps (a) through (c).

(a) Disconnect and retrieve both the 300-foot (91.4-meter) and 75-foot (22.9-meter) remote IFF data cables connected between IFF remote connector J25 on the rear of the IPCP and the 12-foot (3.7-meter) Y-data cable at the remote site.

(b) Disconnect the 12-foot (3.7-meter) Y-data cable connections at the IFF receiver-transmitter and antenna pedestal.

(c) Disconnect the two 13.5-foot (4.1-meter) rf cables connected between the IFF antenna pedestal and the IFF receiver-transmitter.

(d) Disconnect the ground cable between the IFF receiver-transmitter ground lug and the ground rod.

(e) Disconnect the ground cable between the IFF antenna pedestal ground lug and the ground rod.

NOTE

Refer to paragraph 3-8a (18) for removal of the ground rod using the stake puller kit.

(f) Pull up the ground rod.

(g) Disassemble the remote IFF antenna as described below.

1. Pull up the antenna tripod stakes securing the IFF antenna tripod.

WARNING

The handling of the IFF antenna/tripod assembly presents a possible hazard to personnel and equipment. Use extreme caution when handling the IFF antenna/tripod assembly to prevent accidental dropping which may result in injury to personnel.

2. Loosen the leg retainer handknob (9, fig. 3-100) and fold the tripod legs, lowering the legs, if necessary, by loosening the leg length locking handknobs (8, fig. 3-100).

3. Carry the IFF antenna/tripod assembly to the air conditioner side of the IPCP.

(h) Retrieve the 300-foot (91.4-meter) IFF remote data cable onto the cable reel (7, fig. 3-103.1). Secure the cable reel with the crank handle.

(i) Transport the receiver-transmitter group, tripod stakes, ground rod and straps, and IFF remote cables to the IPCP area.

(j) Stand the IFF antenna/tripod assembly on the tripod legs, with the legs unfolded and telescoped to the lowest level, next to the air conditioner side and directly below the antenna hoisting unit on the IPCP.

NOTE

Use guide ropes to guide the antenna assembly to prevent the assembly from bumping the IPCP.

(k) Using the antenna hoisting unit provided on the IPCP roof, connect the hook fastener (2, fig. 3-101) to the lifting bracket on the IFF antenna. Using the hoist with crank handle (4, fig. 3-101), carefully lift the IFF antenna to remove its weight from the tripod. Release the pawl fasteners (11, fig. 3-100) and remove the antenna from the tripod. Carefully lift the IFF antenna to the IPCP roof.

(l) Place the IFF antenna in the antenna pedestal bracket (6, fig. 3-101). Engage the IFF antenna with the bracket by securing the three bolt assembly handknobs (5, fig. 3-101).

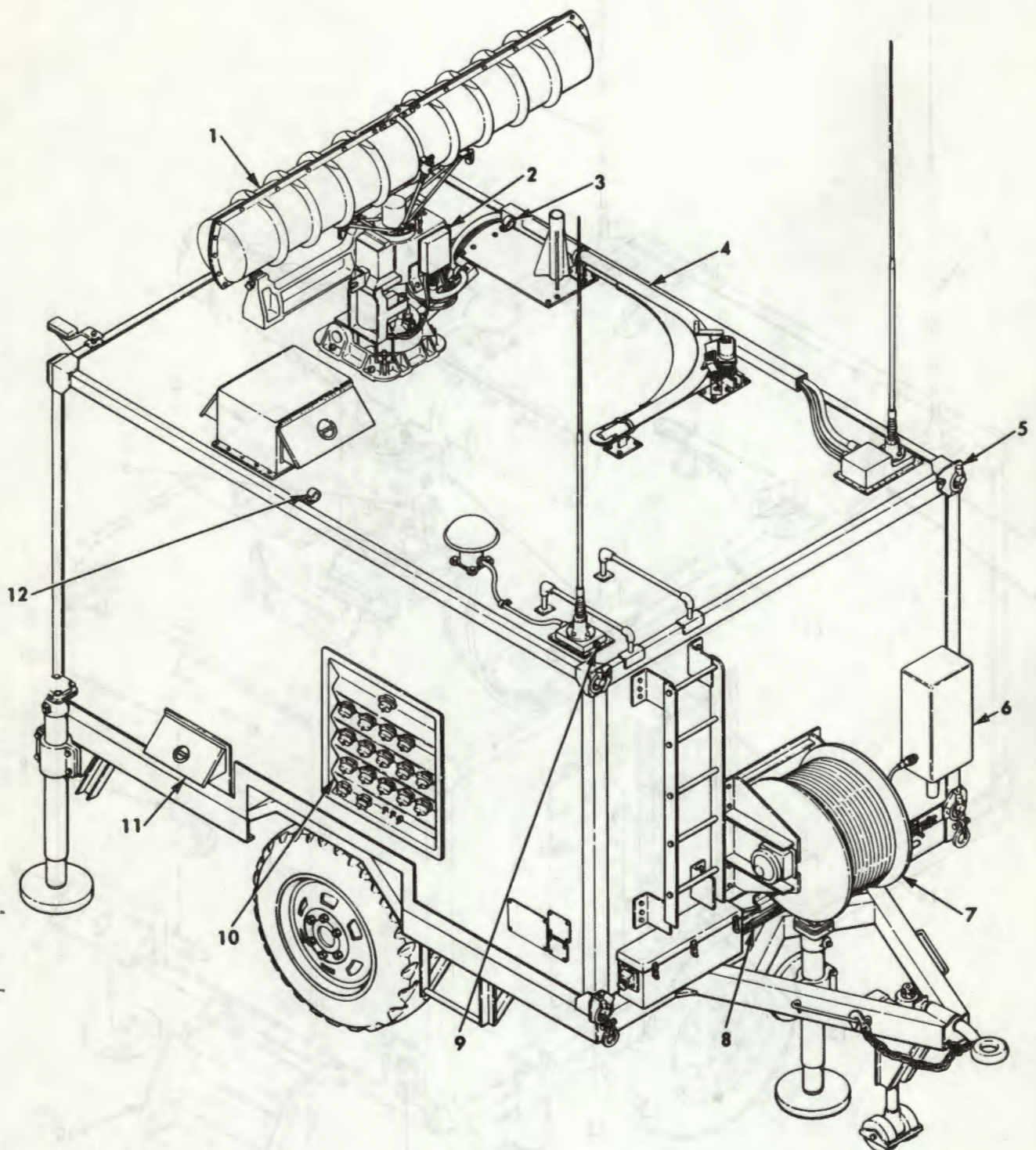
(m) Disconnect the hook fastener of the hoist.

(n) Stow and secure the antenna hoisting unit.

NOTE

Unless otherwise indicated, refer to figure 3-102 for steps (o) through (s).

(o) Stow the tripod and tripod spades in their storage location in the IPCP, and store the IFF remote cables.

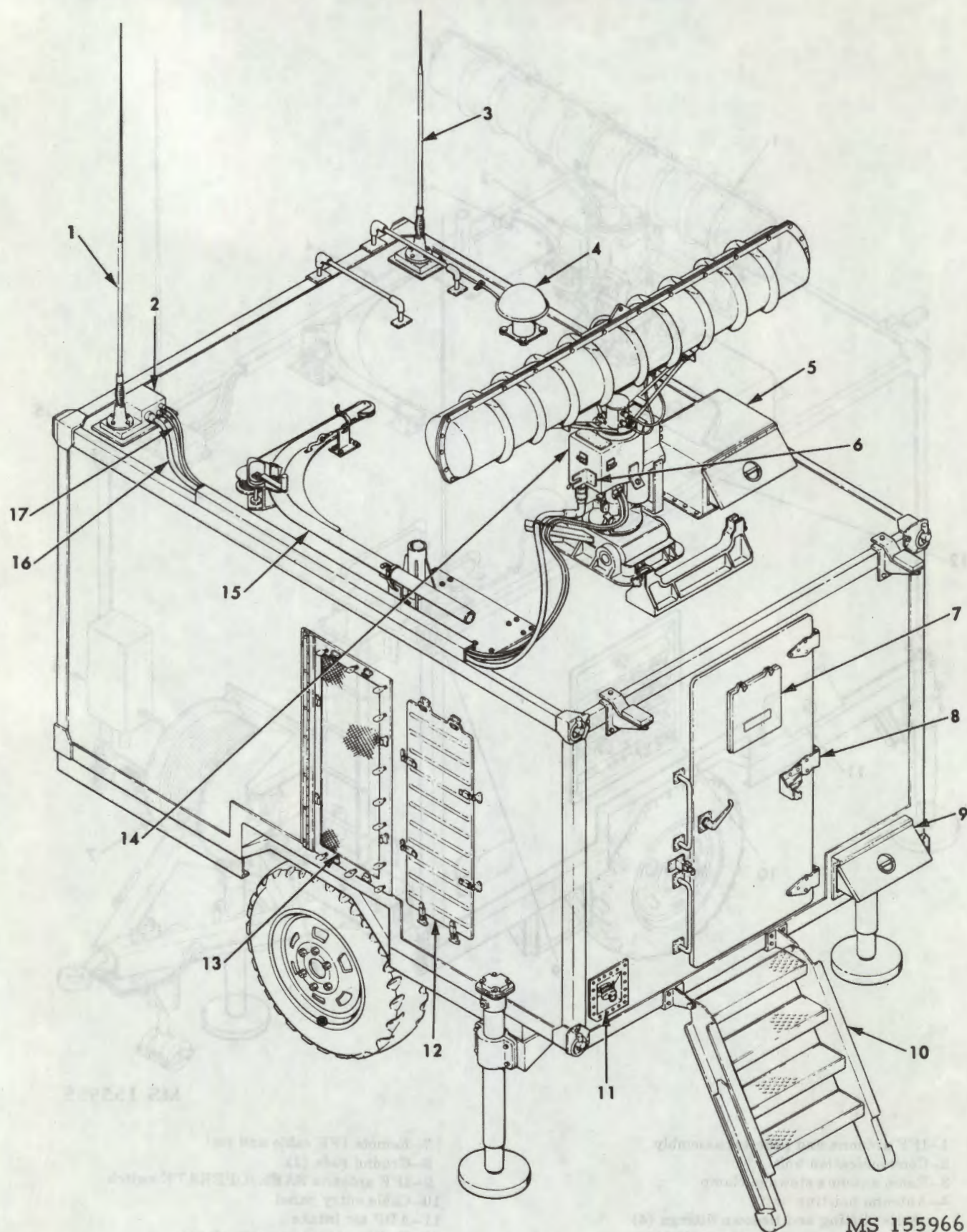


MS 155965

- 1-IFF antenna and pedestal assembly
- 2-Communication unit
- 3-Radio antenna stowage clamp
- 4-Antenna hoisting unit
- 5-Helper lifting and tiedown fittings
- 6-Communication termination unit J11

- 7-Remote IFF cable and reel
- 8-Ground rods (2)
- 9-IFF antenna SAFE/OPERATE switch
- 10-Cable entry panel
- 11-ADP air intake
- 12-Radio antenna stowage clamp

Figure 3-103.1 IPCP-3/4 front view.



MS 155966

Figure 3-103.2 IPCP-3/4 rear view.

- 1-Intelligence and radar reporting net antenna
- 2-IFF antenna cable entry inclosure
- 3-Battery maintenance and administration net antenna
- 4-Siren
- 5-ADP air exhaust hood
- 6-Stow bracket for IFF antenna and pedestal assembly
- 7-Pressure air vent
- 8-Access door
- 9-ADP air intake

- 10-Stepladder
- 11-IFF remote connector J25
- 12-Air conditioner cover (stowed)
- 13-Air conditioner rf filter
- 14-AZ DRIVE switch
- 15-Antenna hoisting unit
- 16-IFF antenna data cable (13.5 foot)
- 17-IFF antenna rf cables (13.5 foot) (2)

Figure 3-103.2-Continued.

(p) Connect the following local cables to the IFF antenna pedestal.

Local cable connector	Cable type (4.1 meters) (13.5 ft)	Antenna pedestal receptacle
W13P1	Rf	J4
W14P2	Rf	J3
W10P2	Data	J5

(q) Install the IFF receiver-transmitter in the IPCP, and secure it with the web straps provided.

(r) Connect the following shelter cables to the IFF receiver-transmitter.

Shelter cable connector	IFF receiver-transmitter receptacle
W11P1	J2
W12P1	J3
W24P5	J1

(s) Within the IPCP disconnect the following shelter cables from the IFF coder-decoder.

Shelter cable connector	IFF coder-decoder receptacle
W7P1	J10
W7P2	J12
W7P3	J15

(t) Connect the following shelter cables to the IFF coder-decoder.

Shelter cable connector	IFF coder-decoder receptacle
W24P2	J15
W24P3	J10
W24P4	J12

(14) Lower the IFF antenna to the stow position as described below.

(a) Release the two base bolt assembly handknobs (7, fig. 3-101), and lower the antenna to the stow position (fig. 3-97).

(b) Secure the antenna pedestal bracket in the stow position by tightening the two stow bolt assembly handknobs (8, fig. 3-101).

(15) Close and secure the pressure air vent (7, fig. 3-103.2) on the access door.

(16) Close and lock the access door (8, fig. 3-103.2).

(17) Raise and stow the stepladder (10, fig. 3-103.2).

WARNING

When stowing the front leveling jack in step (18) below, operate the jack crank in half-turn intervals to avoid contact with the cable reel in order to prevent possible injury to the hands.

(18) Prepare the M390 or M390C trailer for travel as described in paragraph 3-21b. (Disregard step (3), since the M390C trailer does not have front corner leveling jacks).

b. Steps (1) through (3) below are the detailed procedures for preparing the IPCP for travel when it is emplaced as part of an IH battery.

(1) Deenergize the IPCP (DTM 9-1430-535-12-1).

NOTE

Do not perform step (2) below if the IPCP is to be emplaced as an ICC when next emplaced.

(2) Connect the following shelter cables to the TDECC.

Shelter cable connector	TDECC receptacle
P18	J1
J33	P1
J34	P2
J35	P3
J36	P4
J37	P5
J38	P6
J39	P7

(3) Perform steps *a* (2) through (18) of paragraph 3-44.

c. Prior to leaving the area, the following checks should be made.

(1) The antenna SAFE/OPERATE switch is in the SAFE position.

(2) The AZ DRIVE switch is in the OFF (SAFE) position.

(3) The IFF antenna is installed on the IPCP roof in its stowed position.

(4) The antenna hoisting unit is properly stowed.

(5) The ground rod and ground rod cable are disconnected and properly stowed.

(6) The ADP air intake vents are closed and properly secured.

(7) The air conditioner cover is installed and properly secured.

(8) The two radio whip antennas are properly stowed.

(9) The headsets are stowed in the storage compartment.

(10) The pressure air vent on the door is closed and secured.

(11) The door is locked.

(12) The stepladder is raised and properly stowed.

(13) The trailer is properly secured to the prime mover.

(14) The front support jack is properly stowed.

(15) All leveling jacks are properly stowed and secured.

(16) All jack cranks are properly stowed.

(17) The trailer lights are working properly.

(18) The handbrakes are released.

(19) The trailer brakes are working (move the prime mover a short distance and then stop).

3-45.3. Preparation for Travel Procedures — Helicopter

TO BE SUPPLIED LATER

Section XVI PREPARATION FOR TRAVEL FOR THE ELECTRICAL CABLE ASSEMBLY SET AN/GSA-130

3-46. General

This section describes the procedures used to prepare the electrical cable assembly set for travel for the improved HAWK battery or IAFU. These typical procedures, when followed, provide for rapid stowage and preparation for travel of the electrical cable assembly set.

a. Types of Cables. The improved HAWK and IAFU air defense guided missile system uses two types of cables: power cables and data cables. All power cables are identical and are 375 feet (114.3 meters) long. They have a male connector on one end, and a female connector on the other end. The data cables are either 35 or 375 feet (10.67 or 114.3 meters) long and have female connectors on each end.

b. Cable Retrieving. Figure 3-104 illustrates typical cable retrieving procedures for the improved HAWK battery, while figure 3-107 illustrates the procedures for the IAFU. In each illustration where the cable retrieving operations

are identical, the order and directions of the cables to be retrieved are given only once. However, the number of cables to be retrieved is indicated.

c. RL-31 Cable Reeler. A typical procedure used by cable crews for retrieving cables with the RL-31 cable reeler (3, fig. 3-105) is described below.

(1) With the shaft of the RL-31 cable reeler inserted through the center hole of the cable reel, place the empty cable reel in the cable reeler.

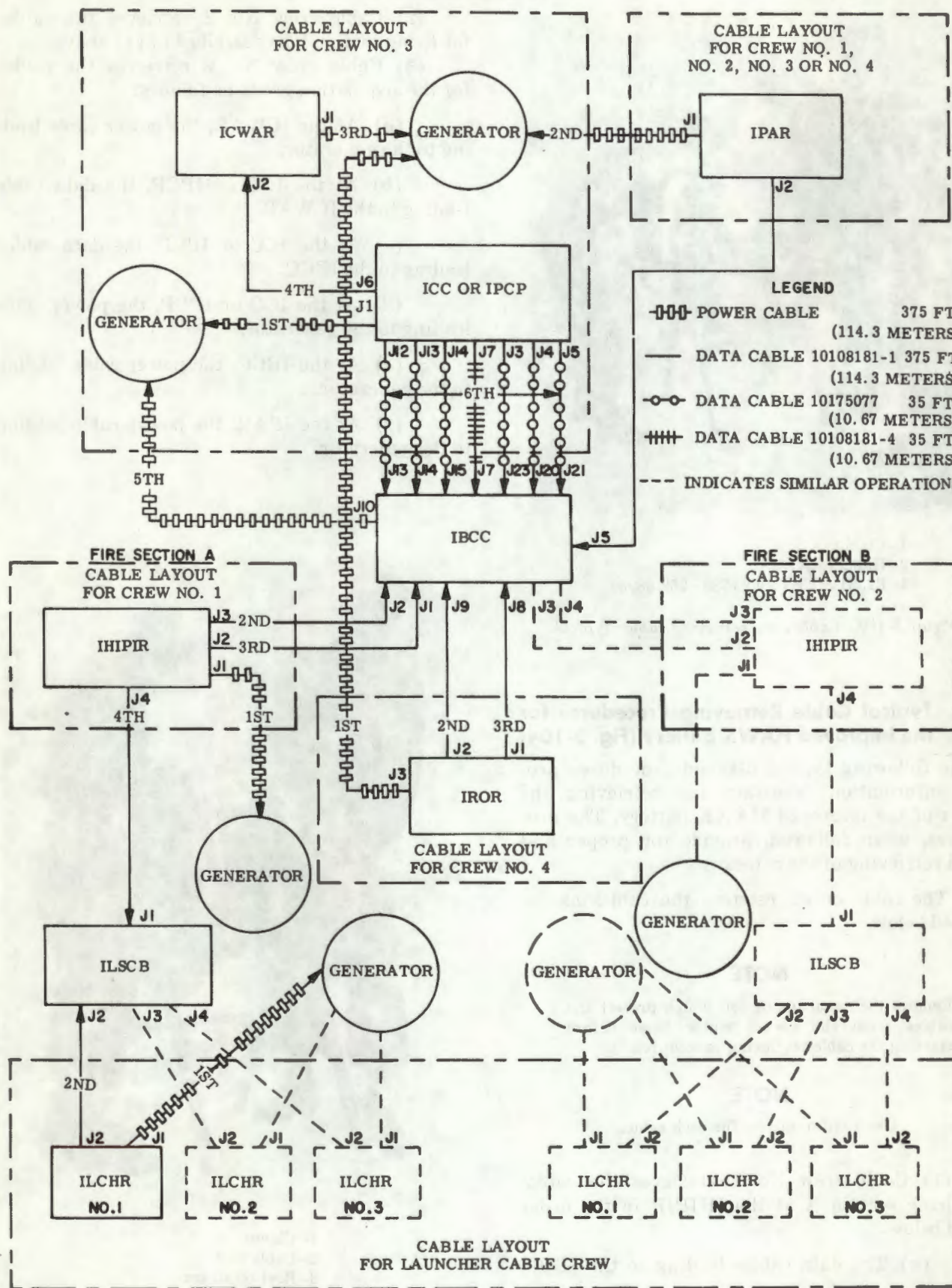
(2) Secure the reel in place with the two reel retainers (3, fig. 3-106).

(3) Connect the end of the cable to be retrieved to the empty reel with the clamp (1, fig. 3-105).

(4) Reel in the cable (fig. 3-105).

(5) Connect the end of the cable to the reel with the clamp (1, fig. 3-106).

d. Cable Connections. Disconnect all cables connected to the major items before starting the cable retrieving procedures.



MI 70599A

Figure 3-104. Improved HAWK battery electrical cable assembly set retrieving assignments—typical—block diagram.



- 1—Clamp
- 2—Handcrank
- 3—RL-31 cable reeler (3895-252-6896)

Figure 3-105. Cable crew retrieving cable—typical.

3-47. Typical Cable Retrieving Procedures for the Improved HAWK Battery (Fig. 3-104)

The following typical detailed procedures provide information necessary for retrieving the cables of the improved HAWK battery. The procedures, when followed, provide for proper and rapid retrieving of the cables.

a. The cable crews retrieve the cables as described below.

NOTE

Remove the sandbags or soil which protect the cables from the rocket motor blast before starting the cable retrieving procedures.

NOTE

Use a different reel for each cable.

(1) Cable crew No. 1 retrieves the cables for firing section A at the IHIPIR in the order listed below.

- (a) The data cables leading to the IBCC.
- (b) The data cables leading to the ILSCB.
- (c) The power cable leading to the generator.

(2) Cable crew No. 2 retrieves the cables for firing section B as described in (1) above.

(3) Cable crew No. 3 retrieves the cables for the acquisition group as follows:

(a) At the ICWAR, the power cable leading to the generator.

(b) At the ICC or IPCP, the data cable leading to the ICWAR.

(c) At the ICC or IPCP, the data cables leading to the IBCC.

(d) At the ICC or IPCP, the power cable leading to the generator.

(e) At the IBCC, the power cable leading to the generator.

(f) At the IPAR, the power cable leading to the generator.



- 1—Clamp
- 2—Cable reel
- 3—Reel retainers
- 4—RL-31 cable reeler

Figure 3-106. Placing cable reel in the RL-31 cable reeler—typical.

(4) Cable crew No. 4 retrieves the cables from the IROR as follows:

(a) The two data cables leading to the IBCC.

(b) The power cable leading to the generator.

(5) The first cable crew to finish its respective procedure, listed in (1) through (4) above, will retrieve the data cable between the IPAR and the IBCC from the IPAR end.

(6) The ILCHR cable crew retrieves the data and power cables at each ILCHR.

b. Table 3-2 indicates the number of cable reels and cable reelers to be loaded on the prime movers and at which major item the equipment is available.

3-48. Typical Cable Retrieving Procedures for the Improved HAWK Battery—Minus the ICC

The following typical detailed procedures provide information necessary for retrieving the cables of the improved HAWK battery when the ICC is not cabled into the battery. The procedures, when followed, provide for proper and rapid retrieving of the cables.

a. Perform the following steps of paragraph 3-47: a(1) through a(3)(a).

b. Cable crew No. 3 at the IBCC, retrieves the data cable leading to the ICWAR.

c. Perform the following steps of paragraph 3-47: a(3)(e), a(3)(f), a(4), a(5), a(6) to retrieve the remaining cables.

d. Table 3-2 indicates the number of data cable reels and cable reelers to be loaded on the prime

movers and at which major item the equipment is available. Disregard the entries in the table for the ICC.

3-49. Typical Cable Retrieving Procedures for the IAFU (Fig. 3-107)

The following typical procedures provide information necessary for retrieving the IAFU power and data cables. The procedures, when followed, provide for proper and rapid retrieving of the cables.

NOTE

Remove the sandbags or soil which protect the cables from the rocket motor blast before starting the cable retrieving procedures.

a. Cable crew No. 1 retrieves the cables at the IHIPR in the order listed below.

(1) The data cables leading to the IPCP.

(2) The data cable leading to the ILSCB.

(3) The power cable leading to the generator.

b. Cable crew No. 2 retrieves the following cables at the IPCP.

(1) The data cable leading to the ICWAR.

(2) The power cable leading to the ICWAR from the generator.

(3) The power cable leading to the generator.

c. The ILCHR cable crew retrieves the data and power cables at each ILCHR.

d. Table 3-3 indicates the number of cable reels and cable reelers to be loaded on the prime movers and at which major item the equipment is available.

Table 3-2. Cable Reel and RL-31 Cable Reeler Loading Chart—Improved HAWK Battery—Typical

Equipment to be loaded on indicated prime movers	LOAD ON THE PRIME MOVER FOR:													
	Each IHIPIR	IROR		ICWAR		IPAR		Each ILCHR	Generators		Generator			
	(3 data)	(5 data)		(1 power) (1 data)		(5 data)		(1 data)	(4) (2 power)		(2) (2 power)			
	(pick up at each IHIPIR	pick up at IROR	pick up at ICC or IPCP	pick up at ICWAR	pick up at ICC or IPCP	pick up at IPAR	pick up at ICC or IPCP	pick up at each ILCHR	pick up at each IHIPIR	pick up at each ILCHR	pick up at IPAR	pick up at IBCC	pick up at ICC or IPCP	pick up at IROR
Power cable				1					1	1	1	1	1	1
Data cable	3	2	3		1	1	4	1						
RL-31 cable reeler	1	1	1	1		1		1				1		

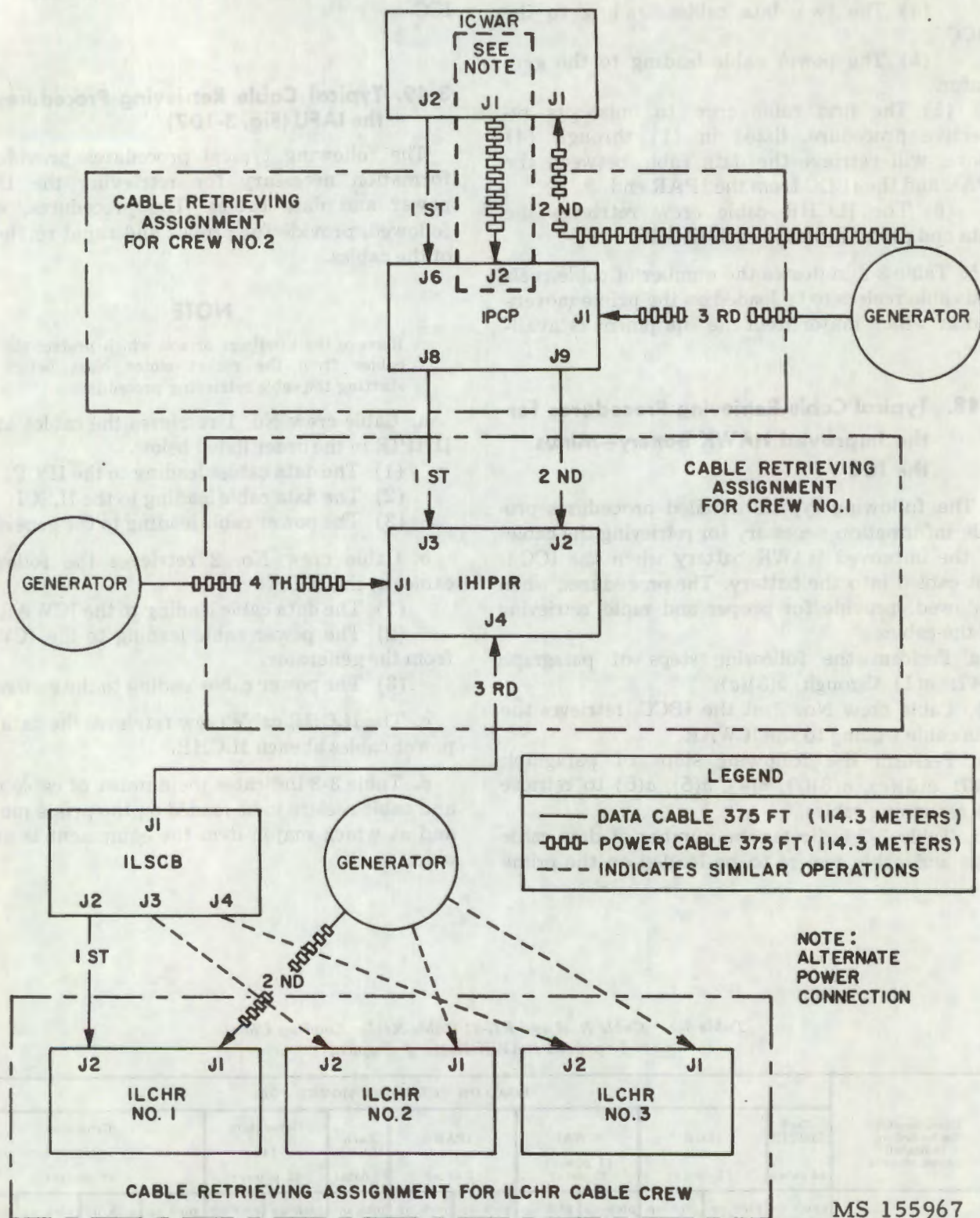


Figure 3-107. IAFU electrical cable assembly set retrieving assignments—typical—block diagram.

Table 3-3. Cable Reel and RL-31 Cable Reeler Loading Chart—IAFU—Typical

Equipment to be loaded on indicated prime movers	FOR THE PRIME MOVER FOR						
	IHIPR (3 data)	ICWAR (1 power) (1 data)		Each ILCHR (1 data)	Generators (3) (5 power)		
	pick up at IHIPR	pick up at ICWAR	pick up at IPCP	pick up at each ILCHR	pick up at IHIPR	pick up at IPCP	pick up at each ILCHR
Power cable		1			1	1	3
Data cable	3		1	1			
RL-31 cable reeler	1	1		1		1	

CHAPTER 4

EMPLACEMENT PROCEDURES

Section I. GENERAL

4-1. Scope

The detailed emplacement procedures for the improved HAWK system equipment are presented in this chapter. Each major item is covered in a separate section. Refer to TM 9-1425-525, Volume II for information concerning site selection and evaluation.

4-2. Explanation of Procedures

The procedures for emplacing the improved HAWK system equipment describe a typical method of setting up a completely emplaced battery site from a mobile unit. These procedures cover arrival by prime mover or helicopter. They continue in sequence until all the major items are ready for orientation and alinement. Procedures for orientation and alinement are described in chapter 6.

Section II. EMPLACEMENT OF IMPROVED CW ACQUISITION RADAR AN/MPQ-48

4-3. General

This section contains the detailed emplacement procedures for the improved cw acquisition radar (ICWAR). These procedures begin with the arrival of this major item at the battery site by either the prime mover (par. 4-5) or helicopter (par. 4-6). Procedures for raising the antenna from the stowed position to the operating position are contained in paragraph 4-7. Paragraph 4-7.1 contains procedures for emplacing the ICWAR cabled directly to the IBCC when the ICC/TM is not cabled into the system.

4-4. Tools

The tools required are: a common screwdriver, a cross-recessed screwdriver, a 3/4-inch open-end wrench, and a sledge hammer.

4-5. Emplacement Procedures — Prime Mover

a. The detailed procedures for emplacing the M514 trailer, which supports the ICWAR are as follows.

NOTE

The key numbers shown below in parentheses refer to figure 3-12.

(1) Set the trailer handbrakes by pulling the handbrake levers (9) toward the front of the trailer, allowing the pawls to engage the ratchets.

(2) Lower the rear leveling jack (D2) by performing steps (a) through (g) below.

(a) Remove a jack crank from the left-rear fender well. Engage it on the rear leveling jack crankshaft (D3).

(b) Retract the jack until the tension on the stay bars (A2) is decreased.

(c) Remove the stay bars from the jack pad (A1).

(d) Pull out on the spring-loaded retaining pins (A3) and rotate the jack downward, using the handgrip (A4).

(e) Release the retaining pins to secure the jack in the down position.

(f) Adjust the jack until the jack pad rests firmly on the ground.

(g) Cross the stay bars over the jack support frame.

(3) Lower the front support by performing steps (a) through (d) below.

(a) Remove the gravity pin (B3) that secures the front support leg (B2) to the frame support bracket (B1).

(b) While supporting the front support, pull the spring-loaded locking pin (C1). Slowly lower the front support to the down position.

(c) Release the locking pin to lock the front support in the down position.

(d) Replace the gravity pin in the frame support bracket.

(4) Lower the front leveling jacks by performing steps (a) through (e) below for each front leveling jack.

(a) Remove the strap which secures the jack assembly (11).

WARNING

For the safety of personnel, use the leveling jack handgrip (12) when raising or lowering the leveling jacks.

CAUTION

To prevent damage to the leveling jack, hold the spring-loaded retaining pins (10) out until the jack pad is all the way down. This procedure must be followed or the jack arm could break at the leveling jack pivot.

(b) Pull and hold the spring-loaded retaining pins (one on each side of the jack), and rotate the jack to the down position, using the handgrip.

(c) Release the retaining pins to secure the jack in the down position.

(d) Obtain a jack crank (D1) from the left fender well and engage it on the jack crankshaft.

(e) Adjust the jack until the jack pad rests firmly on the ground.

(5) Release the trailer from the prime mover as described in (a) through (i) below.

(a) Disconnect the safety chains (5) from the prime mover and stow the chains on the lifting handle (7) located on the A-frame.

(b) Close the service coupling shutoff cock on the rear of the prime mover.

(c) Disconnect the airbrake hose (4) from the rear of the prime mover, and stow it on the bracket on the right side of the lunette support (3).

(d) Disconnect the intervehicular cable plug assembly (2) from the receptacle on the rear of the prime mover, and stow it on the bracket on the left side of the lunette support.

(e) Remove the locking pin (E1) from the pintle hook (E3) on the prime mover.

(f) Release the spring-loaded T-bar latch (E2) and open the pintle hook.

(g) Adjust each front leveling jack until the lunette (E4) is free of the pintle hook.

(h) Move the prime mover forward, close the pintle hook, and install the locking pin.

(i) Stow the jack crank in the left fender well.

b. The detailed procedures for emplacing the ICWAR are as follows.

NOTE

If the antenna is in the stowed position, refer to paragraph 4-7 below for antenna raising procedures.

NOTE

If the tactical situation requires changing the elevation shim, proceed to paragraph 4-8 before emplacing the ICWAR.

NOTE

Unless otherwise specified, the figure references in parentheses below refer to figure 3-5.

(1) Set the antenna SAFETY SWITCH (C6) on the cable entry panel (C5) to the SAFE position.

WARNING

Make sure the antenna 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 and stow the antenna protective cover (9, fig. 3-6) in a protected area.

(3) Release the antenna AZIMUTH STOW lock (D) by depressing and turning it 90 degrees counterclockwise.

(4) Remove the ground rod (B2) from its stowed position on the ICWAR, and drive it into the ground.

(5) Remove the ground rod cable from the right fender well and connect it between the ground rod and the cable attach point (7).

NOTE

If the ICWAR all-weather shelter is to be emplaced, perform step (6) below.

(6) Emplace the all-weather shelter (TM 10-8340-203-13).

(7) Open the radar set group cabinet cover (C4) and secure it with the two quick-disconnect pins (C2) on the cover support arms (C3).

(8) Set the MAIN POWER circuit breaker on the front panel to OFF.

(9) Remove the headset from its stowed position behind the communications panel (C7) and connect it to jack J1 on the communications station (C8).

(10) Remove the hood (C1) from the right-front fender well and install it on the azimuth and speed indicator (ASI).

(11) Open the protective covers (3, fig. 3-6, and 8, fig. 3-7) on the radar set group cabinet (11, fig. 3-7) and the motor-generator assembly (9, fig. 3-7).

(12) Open all the air vent covers (2, 4, 8, and 10, and B2, fig. 3-8).

(13) Level the ICWAR as described below.

(a) Open the receiver-transmitter cabinet cover (11) to gain access to the two spirit levels.

(b) Adjust the radar leveling jacks until the trailer tires are at least 1 inch off the ground and the two spirit levels indicate level.

(c) Rotate the antenna 360 degrees, and observe that the bubbles in both leveling vials are within a tolerance of $\pm 1/3$ of a major division in all quadrants. Perform steps (d) through (k) below if these conditions are not met.

(d) Observe the spirit level on a line parallel to the trailer jacks which are under the radar set group. Center the bubble in the leveling vial by adjusting the applicable trailer jack.

(e) Rotate the antenna 180 degrees and observe that the spirit level indicates a constant level condition. Perform step (f) if this condition is not met.

(f) Loosen the locking nuts on the spirit level and adjust out one-half of the indicated error. Tighten the locking nuts.

(g) Reposition the trailer leveling jacks until the bubble in the spirit level is exactly centered.

(h) Rotate the antenna an additional 180 degrees, making certain that the bubble in the spirit level remains centered while the antenna is rotating.

(i) Repeat steps (d) through (h) above until the spirit level indicates a constant level condition in both 180-degree positions.

(j) Observe the other spirit level and rotate the antenna through 90-degree quadrants. Make certain that the bubble in the spirit level remains centered while the antenna is rotating through all quadrants.

(k) Repeat steps (d) through (j) above until the ICWAR remains level while the antenna is rotating through each quadrant within a tolerance of $1/3$ of a major division of both spirit levels.

c. Place the ICWAR all-weather shelter in the stow position (TM 10-8340-203-13).

NOTE

The ICWAR all-weather shelter is placed in the stow position when the radar is radiating, or when maintenance is not being performed.

d. Prior to energizing the ICWAR, perform the following checks:

(1) The leveling jacks are properly emplaced.

(2) The antenna protective cover has been removed.

(3) The ground rod and ground rod cable are properly emplaced.

(4) The radar set group cabinet cover is properly supported in the open position.

(5) The headset is properly connected.

(6) The protective covers on the radar set group cabinet and the motor-generator assembly are opened.

(7) The air vent covers are opened.

(8) The bubbles are centered in the spirit levels.

(9) The AZIMUTH STOW lock is released.

(10) The cables are properly connected.

4-6. Emplacement Procedures — Helicopter

a. Remove and disassemble the suspension sling assembly.

b. Stow the helicopter lifting kit in the storage bag and stow the storage bag.

c. Secure the cover on the motor-generator assembly (B3, fig. 3-5) in place with the four snap fasteners (B4, fig. 3-5).

d. Emplace the M514 trailer, which supports the ICWAR, as described in paragraph 4-5a(1), (2), and (4).

e. Emplace the ICWAR as described in paragraph 4-5b and c.

4-7. Raising the Antenna from the Stowed Position

The detailed procedures for raising the antenna from its stowed position are as follows.

NOTE

Unless otherwise indicated, the figure references in parentheses below refer to figure 3-8.

a. Release the four stud fasteners and remove the pedestal cover plate (E2) from the pedestal, and stow it in the right-rear fender well.

b. Remove the antenna base cover plate (E1) from the base of the antenna by removing the eight 1-inch hexagon-head capscrews and flat washers. Stow the capscrews in the right fender well, and retain the flat washers for use in step e below.

c. Remove the two hexagon-head nuts, flat washers, and bolts which secure the antenna (C1) to the antenna support arms (C3), and retain the hardware for use in step f below.

NOTE

Insure that the proper shim, as determined by the tactical situation, is mounted on the pedestal before raising the antenna.

d. Slowly raise the antenna and support it in the upright position until step e below is performed.

NOTE

The mounting hardware used in step e below is dependent upon which of two elevation angle shims is being mounted on the antenna pedestal head. The tapered elevation angle shim, 9056233, shown being removed in two steps in figure 4-1, is normally mounted on the antenna pedestal head. The alternate uniform thickness shim, 10108032, could be substituted. The shim that is not in use is stored on the underside of the cabinet cover (fig. 3-9) on the radar set group.

CAUTION

To prevent damage to the rf shield, use only the mounting hardware as directed in step e below

e. Secure the antenna to the pedestal with the hexagon-head capscrews obtained from the right-rear fender well, together with the flat washers removed in step b above (eight 1-3/4-inch capscrews if uniform shim 10108032 is used, or four 1-3/4-inch capscrews for the thin end and four 2-inch capscrews for the thick end if taper shim 9056233 is used).

f. Insert the two hexagon-head bolts removed in step c above into the antenna stow lug (C2) on the top of the antenna support arm and secure them with the flat washers and nuts.



STEP A



STEP B

MI 70602

Figure 4-1. Removal of the tapered elevation angle shim from the ICWAR pedestal.

g. Remove the antenna support arm (C3) from the eye pad (C5) on top of the support arm and secure the antenna support arm in its stow position (C4).

h. Open the receiver-transmitter cabinet cover (11, fig. 3-5) and attach the receiver-transmitter cabinet cover support arms (A5) to the support brackets (A3) with the quick-disconnect pins (A4).

i. Remove the pedestal electrical conductors from their dummy receptacles (D4) and connect them to their respective receptacles (D2) on top of the pedestal head.

j. Remove the three hexagon-head capscrews (A2) and use them to secure the antenna base cover plate (A1) in the stow position inside the receiver-transmitter group cabinet.

4-7.1. Emplacement Procedure—ICWAR Cabled Directly to the IBCC

a. The detailed procedures for emplacing the ICWAR when cabled directly to the IBCC are as follows:

(1) Perform the procedures contained in paragraph 4-5.

NOTE

Use an ohmmeter to identify the wires located within the radar set group identified below.

(2) Lift, tape and tie back the wire located on 3A4A3A1-E1 connected to 3A4A3A1J2-B.

(3) Lift, tape and tie back the wire located on 3A4A3A3TB2-11 connected to 3A4A3A1J2-J.

(4) In the control indicator panel connect a jumper between 3A4A5S4-A2 and 3A4A5S4-A3.

b. Proceed to paragraph 4-48 for cabling instructions.

4-8. Installation of the Elevation Shim

NOTE

Refer to TM 9-1425-525-2 to determine which elevation shim is required.

a. Stow the antenna (par. 3-10).

b. Remove the existing shim (fig. 4-1) and install the required shim.

c. Stow the remaining shim (fig. 3-9).

d. Raise the antenna from its stowed position (par. 4-7).

e. Level the radar (par. 4-5b(13)).

f. Open and secure the receiver-transmitter cabinet cover (11, fig. 3-5).

g. Position the antenna to face over the radar set group cabinet.

h. Loosen the level vial locking nuts (F3, fig. 3-8) and adjust the level studs (F2, fig. 3-8) until the bubbles are centered in both level vials.

i. Rotate the antenna 180 degrees and observe that the level vials indicate a constant level condition. Repeat step *h* if necessary.

j. Rotate the antenna an additional 180 degrees and observe that both bubbles remain centered.

k. Repeat steps *g* through *j* until both level vials indicate a constant level condition within a tolerance of $\pm 1/3$ of a major division.

l. Tighten the locking nuts and recheck the level condition for all positions by rotating the antenna while observing both level vials.

Section III. EMPLACEMENT OF IMPROVED HIGH-POWERED ILLUMINATOR RADAR AN/MPQ-46

4-9. General

This section describes the emplacement procedures for the improved high-powered illuminator radar (IHIPIR). These procedures begin with the arrival of the IHIPIR at the battery site by prime mover (par. 4-11) and describe the complete em-

placement procedures of the M390 trailer which supports the IHIPIR.

4-10. Tools

The tools required are: a common screwdriver, a cross-recessed screwdriver, a 7/16-inch wrench, Allen wrenches and a sledge hammer.

4-11. Emplacement Procedures — Prime Mover

NOTE

When emplacing the IHIPR, insure that the transmitter console is faced towards the IPAR.

a. The detailed procedures for emplacing the M390 trailer are as follows.

NOTE

Unless otherwise indicated, the key numbers in parentheses shown below refer to figure 3-16.

(1) Set the trailer handbrake with the handbrake levers (4, fig. 3-17), one on each side of the A-frame.

(2) Emplace each rear leveling jack (9) as described below.

(a) Pull up and hold the horizontal lock (7).

(b) Turn the jack horizontally until the ground pad (8) 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 (3) from the stow bracket (2) on the rear center of the trailer and place it on the crankshaft (12).

(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. 3-19) with the ground pad handle (4, fig. 3-19), pull upward on the spring-loaded frame handle (1, fig. 3-19).

(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. 3-19).

(c) Disengage the jack crank (6, fig. 3-19), and turn it clockwise until the support wheels (5, fig. 3-19) 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. 3-20) from the receptacle on the prime mover and place it in the stowage clip (5, fig. 3-20).

(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. 3-20).

(d) Remove the locking pin from the pintle hook on the prime mover (fig. 3-18).

(e) Release the spring-loaded T-bar latch (2, fig. 3-18) and open the pintle hook.

(f) Turn the front support jack crank clockwise until the lunette (4, fig. 3-18) is free of the pintle hook.

(g) Move the prime mover forward, close the pintle hook, and insert the locking pin.

(5) Lower the front center leveling jack (7, fig. 3-17) as described below.

(a) Pull up and hold the horizontal lock.

(b) Turn the jack until the ground pad is clear of the trailer. Release the horizontal lock.

(c) Pull up and hold the vertical lock (8, fig. 3-17).

(d) Rotate the jack to the vertical position with the ground pad down. Release the vertical lock.

(e) Remove the jack crank (6, fig. 3-17) from the stow bracket (5, fig. 3-17) on the A-frame, and place it on the jack crankshaft (1, fig. 3-17).

(f) Adjust the jack until the ground pad is just clear of the ground.

(6) Lower each of the front corner leveling jacks (2, fig. 3-17) as described below.

(a) Pull up and hold the vertical lock (3, fig. 3-17).

(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 leveling jack crankshaft.

(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.

- (1) Set the PEDESTAL SAFETY SWITCH (4, fig. 3-15) 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. 3-15) and stow them in a protected area.

- (3) Remove the ground rod and the ground cable from the front cross member of the IHIPIR radar platform.

- (4) Emplace the ground rod and attach the ground cable between the rod and the cable attach point (fig. 3-16).

- (5) Raise the radar set group cabinet cover (1, fig. 3-16) and secure it by inserting the quick-disconnect pins (1, fig. 4-2) into the cover support arms (2, fig. 4-2).

- (6) Open the transmitter set group cabinet cover (16, fig. 3-16) and secure it by inserting the quick-disconnect pins into the cover support arms.

- (7) Open the air intake and exhaust vent covers as described below.

- (a) Remove the air exhaust vent cover (2, fig. 3-15) and stow the cover on the receiver exhaust air vent.

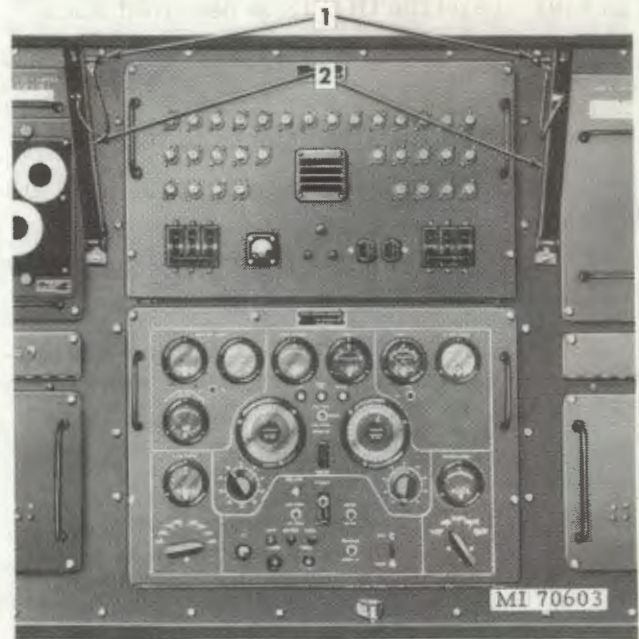
- (b) Disconnect the elevation motor exhaust cover (24, fig. 3-16) from the elevation motor exhaust (25, fig. 3-16) and connect it to the dummy receptacle (26, fig. 3-16).

- (c) Open the cooling console exhaust vent cover located on the rear of the liquid cooler (18, fig. 3-16).

- (d) Open the radar set group air intake cover on the rear of the radar set group cabinet.

- (e) Open the pedestal intake cover (10, fig. 3-15).

- (f) Remove the cover on the motor-generator intake-exhaust vent, (5, fig. 3-15) and stow the cover on the rear of the transmitter set group



1—Quick-disconnect pins
2—Cover support arms

Figure 4-2. Radar set group cabinet—emplacement.

cabinet, and secure the intake-exhaust hood to the motor-generator assembly.

- (g) Remove the cover on the transmitter set group cabinet air intake vent (17, fig. 3-16), and stow the cover on the rear of the transmitter set group cabinets, and secure the intake hood to the side of the transmitter set group cabinet.

- (h) Remove the cover on the transmitter set group door exhaust vent (3, fig. 3-15), stow the cover on the rear of the transmitter set group cabinet, and secure the exhaust hood to the transmitter set group door.

- (i) Remove the exhaust vent cover on the rear of the transmitter set group cabinet and stow the cover on the rear of the cabinet.

- (j) Remove the covers on the radar set group exhaust vents (7, fig. 3-15 and 20, fig. 3-16), and stow the covers on the exhaust vent hoods.

- (k) Remove the cover on the liquid cooler intake vent (19, fig. 3-16) and stow the cover on the rear of the transmitter head assembly and secure the hood to the liquid cooler cabinet.

- (8) Set the main power switch (5, fig. 3-16) on the main power distribution box to OFF.

- (9) Connect the main power cable from the generator to receptacle J1 (6, fig. 3-16) on the main power distribution box.

(10) Level the IHIPIR as described below.

(a) Energize the radar (TM 9-1430-533-12-1).

(b) Position the antenna to 1600 mils up.

(c) Deenergize the radar (TM 9-1430-533-12-1).

(d) Set the PEDESTAL SAFETY SWITCH (4, fig. 3-15) to SAFE.

(e) Adjust the front-center and rear leveling jacks until the trailer wheels are at least one inch off the ground.

NOTE

The IHIPIR is leveled with a three-point support. The two front corner leveling jacks are only used to provide additional stability in windy conditions.

(f) Uncover the two spirit levels (26, fig. 3-16) 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.

(g) Cover the two spirit levels with their protective covers.

(h) Adjust the front corner jacks until the ground pads are just resting on the ground.

(i) Remove and stow the cranks in their respective stow brackets.

(j) Adjust the front support jack until the support wheels are resting on the ground.

(k) Secure the crank in the stowage clip (2, fig. 3-19).

NOTE

Insure that the cable connection procedures for the IHIPIR (par. 4-47) have been followed to avoid putting the radar in STANDBY prior to performing step (11) below.

(11) Connect the IBCC data cables to receptacles J2 and J3 on the IHIPIR cable entry panel (4, fig. 3-16).

(12) Connect the ILSCB data cable to receptacle J4 on the IHIPIR cable entry panel.

(13) Position illuminator identification switch S1 on the cable entry panel to the appropriate position (ILL A or ILL B).

(14) Remove the headset from the storage box (6, fig. 3-15) on the rear of the radar set group cabinet and connect it to the communication

station located in the front panel of the 12.6-vdc power supply drawer.

(15) Release the elevation STOW lock (11, fig. 3-15) and the azimuth STOW lock (22, fig. 3-16) on the elevation head by turning the handles counterclockwise.

c. Prior to energizing the IHIPIR, the following checks should be made:

(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 covers 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 IHIPIR is level.

4-11.1 Emplacement Procedures — Pallet-Mounted.

NOTE

The pallet-mounted IHIPIR is not mobile and must be lowered to its exact operating position.

a. Steps (1) through (3) below contain the detailed procedures for emplacing the pallet-mounted IHIPIR.

(1) Remove and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

(2) Adjust all jacks until the pallet is at least 1 inch off the ground.

(3) Observe the spirit levels (26, fig. 3-16) and adjust the jacks as necessary until each level bubble is centered.

b. Emplace the IHIPIR as described in subparagraphs 4-11b(1) through (9) and (11) through (15).

c. Perform the checks outlined in subparagraphs 4-11c(1) through (10) prior to energizing the IHIPIR.

Section IV. EMPLACEMENT OF IMPROVED RANGE-ONLY RADAR AN/MPQ-51

4-12. General

This section contains detailed emplacement procedures for the improved range-only radar (IROR). The procedures begin with the arrival of the IROR at the battery site by either prime mover (par. 4-14) or helicopter (par. 4-15). The procedures for raising the IROR antenna from the stowed position to the operating position are detailed in paragraph 4-16.

4-13. Tools

The tools required are: a common screwdriver, a cross-recessed screwdriver, a $\frac{3}{4}$ -inch open-end wrench, and a sledge hammer.

4-14. Emplacement Procedures — Prime Mover

a. For emplacement procedures of the M514 trailer, which supports the IROR, refer to paragraph 4-5a.

b. The detailed procedures for emplacing the IROR are as follows. If the IROR antenna is in the stowed position, refer to paragraph 4-16 for antenna raising procedures.

WARNING

To prevent injury to personnel working on or near the antenna, set the SAFETY SWITCH (6, fig. 3-21) on the pedestal to the SAFE position.

(1) Release the ELEVATION stow lock (1, fig. 3-23) and manually rotate the antenna to the maximum elevation angle.

(2) Disconnect the securing straps (5, fig. 3-22) from the back of the antenna.

(3) Using care to avoid damage to the waveguide assembly (3, fig. 3-22), remove the antenna protective shipping cover (2, fig. 3-22) and stow it in a protected area.

(4) Manually rotate the antenna to 0 degrees elevation.

(5) Remove the ground rod from the stow bracket (4, fig. 3-21). Emplace the ground rod.

(6) Remove the ground rod cable (4, fig. 3-26) from the left fender well (2, fig. 3-26) and attach it between the rod and the cable attach point (6, fig. 3-26).

NOTE

If the IROR all-weather shelter is to be emplaced, perform step (7) below.

(7) Emplace the all-weather shelter (TM 10-8340-203-13).

(8) Raise the radar set group cabinet cover (7, fig. 3-26) and secure it by inserting the two quick-disconnect pins (4, fig. 3-25) into the support arms (3, fig. 3-25).

(9) Set the MAIN POWER circuit breaker (5, fig. 3-25) to the OFF position.

(10) Remove the headset from its storage location behind the communications station panel (1, fig. 3-25) and connect it to the communications station (2, fig. 3-25).

(11) Open the air vent covers (2 and 4, fig. 3-24) on the radar set group cabinet and the motor-generator assembly (6, fig. 3-24). Figure 3-21 shows a cover in the open position.

(12) Open the four air vent covers (4, fig. 3-24) on the motor-generator assembly.

(13) Open the two air vent covers (5, fig. 3-26) at each end of the radar set group cabinet.

(14) Open the two intake-exhaust air vent drawers (2 and 10, fig. 3-21), one beneath the receiver-transmitter cabinet (1, fig. 3-21) and one beneath the modulator power supply cabinet (11, fig. 3-21).

(15) Level the IROR as indicated below.

(a) Adjust the jacks until the tires are at least an inch off the ground.

(b) Uncover the two spirit levels (2, fig. 3-23) at the rear corner of the elevation head.

(c) Adjust the jacks until the bubbles are centered in the spirit levels.

(d) Cover the spirit levels with their protective covers.

(e) Remove and stow the jack cranks in the left fender well.

(16) Release the AZIMUTH stow lock (3, fig. 3-23) by depressing and turning it 90 degrees counterclockwise.

NOTE

If the IROR all-weather shelter is emplaced, perform step c below.

c. Place the all-weather shelter in the stow position (TM 10-8340-203-13).

NOTE

The all-weather shelter is placed in the stow position when the radar is radiating or when maintenance is not being performed.

d. Prior to energizing the IROR, the following checks should be made:

(1) The leveling jacks are properly emplaced.

(2) The antenna SAFETY SWITCH is in the SAFE position.

(3) The ground rod and ground rod cable are properly emplaced.

(4) The radar set group cabinet cover is locked in the open position.

(5) The protective covers are opened.

(6) All the vent covers are opened.

(7) The bubbles in the spirit levels are centered.

(8) The AZIMUTH stow and ELEVATION stow locks are disengaged.

(9) The cables are properly connected.

(10) The headset is connected to the communications station.

4-15. Emplacement Procedures — Helicopter

a. Remove and disassemble the suspension sling assembly.

b. Stow the helicopter lifting kit in the storage bag and stow the bag.

c. Secure the motor-generator cabinet cover (4, fig. 3-28) in place with the four snap fasteners (3, fig. 3-28).

d. Emplace the M514 trailer (par. 4-5a).

e. Emplace the IROR (par. 4-14b and c).

4-16. Raising the IROR Antenna from the Stowed Position

WARNING

Insure that the power cables are disconnected prior to starting assembly operations.

- a. Obtain a $\frac{5}{8}$ -inch rope at least 3.6 meters long.
- b. Install the rope around the elevation head assembly as shown in figure 3-31.
- c. Position the crane at the lunette end of the trailer. Secure the rope to the crane, and take up the slack in the rope.
- d. Remove the spring-loaded tilt-lock pin (3, fig. 3-32) from the tilt stop.

WARNING

After the antenna is raised, insure that the four bolts securing the pedestal support flange to the pedestal flange are secured before the crane is detached from the antenna pedestal.

e. Slowly raise the antenna with the crane, until the pedestal support flange (4, fig. 3-30) rests firmly against the pedestal flange (3, fig. 3-30). Maintain tension on the rope.

f. Remove the four bolts from the fender well and use them to secure the pedestal flange to the pedestal support flange.

g. Insert the spring-loaded tilt-lock pin into the tilt stop.

h. Obtain the pedestal support plate which is taped to the lunette.

i. Remove the 11 pedestal support plate bolts from the fender well and use them to secure the pedestal support plate (2, fig. 3-29) to the pedestal support flange (3, fig. 3-29) and the pedestal flange (3, fig. 3-30).

j. Remove the rope from the crane and the elevation head assembly.

k. Connect the power cables to the IROR.

Section V. EMPLACEMENT OF IMPROVED PULSE ACQUISITION RADAR AN/MPQ-50

4-17. General

This section describes the emplacement procedures for the improved pulse acquisition radar (IPAR). These procedures begin with the arrival of the IPAR at the battery site by either prime mover (par. 4-19) or helicopter (par. 4-20).

4-18. Tools

With the addition of a sledge hammer, the tools needed for emplacing the IPAR are the same as the tools needed for the preparation for travel procedures (par. 3-20).

4-19. Emplacement Procedures — Prime Mover

a. Steps (1) through (17) below contain detailed procedures for emplacing the IPAR.

- (1) Emplace the M390 trailer (par. 4-11a).
- (2) Level the IPAR as described below.

(a) Adjust the front center and rear leveling jacks until the trailer wheels are at least 1 inch off the ground.

NOTE

The IPAR is leveled using a three-point support. The two front corner leveling jacks are only used to provide additional stability in windy conditions.

(b) View the spirit level (E1, fig. 3-33) and adjust the jacks as necessary, until the level bubble is centered.

(c) Adjust the front corner leveling jacks until the ground pads are just clear of the ground.

(d) Remove and stow the jack cranks.

(e) Adjust the front support jack until the support wheels are resting on the ground.

(f) Stow the jack crank in its stowage clip.

(3) Set the antenna SAFE-OPERATE switch (D1, fig. 3-33) to SAFE.

(4) Set the MAIN POWER switch (C1, fig. 3-33) to OFF.

(5) Unpack and assemble the antenna reflector as described in (a) through (m) below.

NOTE

When the antenna sections have been removed from their containers, the containers may be used as stands.

(a) Obtain the hexagon-head capscrew wrench (E5, fig. 3-33) from the pedestal head and use it to remove the four socket-head capscrews (4, fig. 3-35), flat washers, and split-type lock-washers. Loosen the support bolts (4, fig. 3-46) and remove the antenna reflector center section from container 9192545. Retain the hardware for use in step (c) below.

(b) Aline the center section (2, fig. 3-33) with the mounting holes at the four corners of the antenna reflector support (14, fig. 3-33).

(c) Secure the center section to the antenna reflector support with the hardware removed in step (a) above. Stow the capscrew wrench in the stow clips on the pedestal head.

(d) Obtain the spanner wrench (2, fig. 3-40) from its stowed position on the antenna reflector support.

(e) Release the four captive fasteners (2, fig. 3-45) and remove the tops (1, fig. 3-45) of container 10672192 and container 9180247.

(f) Loosen the five joint nuts (2, fig. 3-44) and remove the inner section from container 10672192.

(g) Aline the inner section (7, fig. 3-33) on the center section and tighten the five joint nuts (F2, fig. 3-33) to the joint studs (F1, fig. 3-33), using the spanner wrench.

(h) Loosen the five joint nuts (4, fig. 3-43) and remove the outer section from container 10672192.

(i) Aline the outer section (4, fig. 3-33) on the inner section and tighten the five joint nuts to the joint studs, using the spanner wrench.

(j) Remove the inner section (1, fig. 3-39) from container 9180247.

(k) Aline the inner section (16, fig. 3-33) on the center section and tighten the five joint nuts to the joint studs, using the spanner wrench.

(l) Remove the outer section (1, fig. 3-41) from container 9180247.

(m) Aline the outer section on the inner section (fig. 3-33) and tighten the five joint nuts to the joint studs, using the spanner wrench. Stow the spanner wrench.

(6) Remove the omnidirectional antenna from antenna reflector container 10672192 as described below.

NOTE

The key numbers shown below in parentheses refer to figure 3-36.

(a) Loosen the three wingnuts (7) and slide the small rubberlined bar (3) upward.

(b) Loosen the three wingnuts (9) and slide the base adjustable bracket (8) downward.

(c) Remove the omnidirectional antenna by loosening the two wingnuts (6) and sliding the adjustable bracket (4) to the rear.

(7) Install the omnidirectional antenna assembly as directed below.

NOTE

The key numbers shown below in parentheses refer to figure 3-34, except where otherwise indicated.

(a) Aline the antenna (1) on the antenna mount (4) and secure it with the four captive screws (3).

(b) Disconnect both antenna connectors from the dummy receptacles (2, fig. 3-35).

NOTE

Visually inspect both connectors on the omnidirectional antenna cable to insure that the center conductor is not recessed, preventing proper contact with its mating connector.

(c) Pass the antenna cable through the antenna and connect it to connector adapter J1 (2).

(d) Connect the remaining connector on the antenna cable to the amplifier-cooler group receptacle (8).

(e) Remove the two cable clamps (9), insert the cable, and reinstall the clamps to the main antenna center section support.

(8) Remove the waveguide cover plate (2, fig. 3-37) from the waveguide twist flange and stow the waveguide cover plate on the main antenna center section support (14, fig. 3-33).

(9) Remove the feedhorn (2, fig. 3-39) from antenna container 9180247 as described below.

(a) Loosen the four wing-type screws (7, fig. 3-33) that secure the adjustable clamps (10, fig. 3-38) to the top of the feedhorn (2, fig. 3-39).

(b) Loosen the four wingnuts (1, fig. 3-38) and turn the clamps (2, fig. 3-38).

(c) Remove the feedhorn from the antenna reflector container.

(10) Secure the feedhorn to the antenna reflector support as described below.

NOTE

The find numbers shown below in parentheses refer to fig. 3-33.

(a) Secure the feedhorn bracket (A7) on the antenna support (A9), using four hexagon-head capscrews, eight flat washers, four lockwashers, and four hexagon nuts (A8). Do not completely tighten the nuts.

(b) Secure the feedhorn flange (A10) to the waveguide twist flange (A5) with 10 hexagon-head capscrews, 20 flat washers, 10 lockwashers, and 10 hexagon nuts (A3).

(c) Tighten the four hexagon nuts (A8) to secure the feedhorn bracket to the antenna reflector support.

(11) Remove the ground rod (11), and the ground rod cable from the platform behind the receiver-transmitter cabinet (6).

(12) Emplace the ground rod and connect the cable between the rod and the cable attach point (8).

(13) Open and secure all the cabinet doors (5, B1 and B2).

(14) Open and secure all the air vent covers (12 and B5).

(15) Open the drain caps on the cabinets.

(16) Remove the headset from the storage cabinet (B3), and connect it to the communications station.

(17) Remove the viewing hood (B4), from its stow position in the radar set group cabinet cover and install it on the azimuth and range scopes.

NOTE

If the IPAR all-weather shelters are to be emplaced, perform step b below.

b. Emplace the all-weather shelter (TM 10-8340-203-13).

NOTE

The IPAR all-weather shelters cannot be emplaced unless the IPAR is mounted on its trailer.

c. Prior to energizing the IPAR, the following checks should be made:

(1) The leveling jacks are properly emplaced.

(2) The antenna SAFE-OPERATE switch is set to SAFE.

(3) The MAIN POWER switch is set to OFF.

(4) The ground rod and ground rod cable are properly emplaced.

(5) The antenna reflector is properly assembled.

(6) The feedhorn is properly installed.

(7) The rf cable is connected.

(8) The compartment covers are secured in the open position.

(9) The air vent covers are secured in the open position.

(10) All the drain caps are open.

(11) The headset is properly connected.

(12) The power and data cables are properly connected.

(13) The IPAR is level.

4-20. Emplacement Procedures — Helicopter

NOTE

The pallet-mounted IPAR is not mobile and must be lowered to its exact operating position.

a. Steps (1) through (6) below contain the detailed procedures for emplacing the pallet.

(1) Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

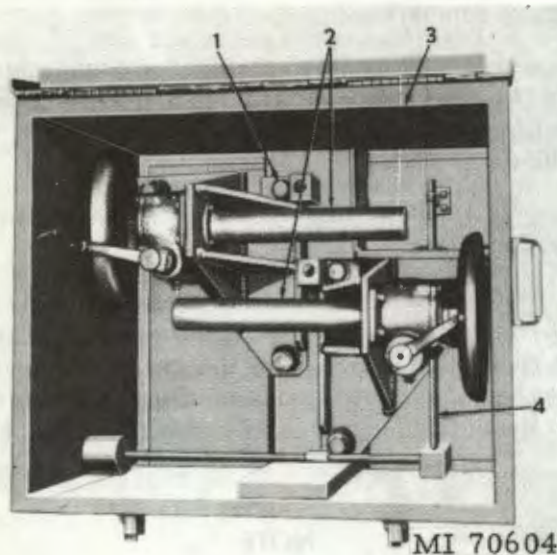
(2) Loosen the six captive screws (1, fig. 4-3) and remove the two pallet jacks (2, fig. 4-3) from the pallet jack container (3, fig. 4-3). Remove the two remaining pallet jacks from the other pallet jack container in the same manner.

(3) Aline a pallet jack to the threaded receptacles (4, fig. 4-4) on the pallet, and secure it in place with the three captive bolts (1, fig. 4-4).

(4) Install the three remaining pallet jacks.

(5) Adjust the four jacks until the pallet is at least 1 inch off the ground.

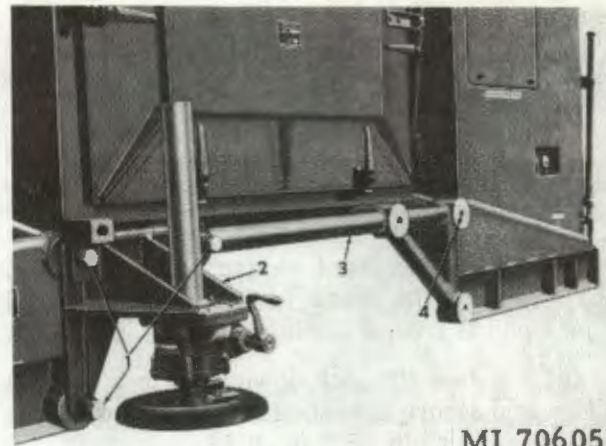
(6) View the spirit level (E1, fig. 3-33), and adjust the jacks as necessary, until the level bubble is centered.



1-Captive screws
2-Pallet jacks

3-Pallet jack container
4-Wrench

Figure 4-3. Pallet jacks stowed in container.



MI 70605

1-Captive bolts
2-Pallet jack
3-Pallet
4-Threaded receptacle

Figure 4-4. IPAR pallet jack secured.

b. Emplace the IPAR as described in paragraph 4-19a(3) through (17).

c. Perform the checks outlined in paragraph 4-19c(2) through (13) prior to energizing the IPAR.

d. Emplace the M390 trailer as outlined below.

(1) Remove, disassemble, and stow the suspension sling assembly.

(2) Set the trailer handbrakes, using the handbrake levers (E6, fig. 3-48), one on each side of the A-frame.

(3) Adjust the front support jack until the trailer appears level.

(4) Emplace the leveling jacks (par. 4-11a).

Section VI. EMPLACEMENT OF THE IMPROVED GUIDED MISSILE LAUNCHER XM192E1

4-21. General

This section describes the emplacement procedures for the ILCHR (fig. 4-21). The procedures begin with the arrival of this major item at the battery site by either prime mover (par. 4-23) or helicopter (par. 4-24).

4-22. Tools

The only tools required are a $\frac{3}{4}$ -inch open-end wrench and a sledge hammer.

4-23. Emplacement Procedures — Prime Mover

a. Steps (1) through (34) below contain the detailed procedures for emplacing the ILCHR by prime mover.

(1) Engage the ILCHR brakes by placing the handbrake levers (5, fig. 3-60) on each side of the ILCHR base to the horizontal position.

(2) Close the service coupling shutoff cocks, disconnect the two airbrake hoses (6, fig. 3-60)

from the rear of the prime mover, and stow them in the brake hose fittings (B4, fig. 3-57) on the front of the ILCHR base.

(3) Disconnect the intervehicular electrical cable from the receptacle at the rear of the prime mover.

(4) Hold the front support jack (E3, fig. 3-56) and turn the crank counterclockwise until the jack pad is free of the lunette cross bar.

(5) Rotate the jack downward to a vertical position and secure it to the ILCHR base with the quick-disconnect pin (E2, fig. 3-56).

(6) Remove the quick-disconnect pin (E5, fig. 3-56) and rotate the jack pad to a horizontal position.

(7) Secure the jack pad in the horizontal position with the quick-disconnect pin.

(8) Adjust the jack until the jack pad rests firmly on the ground.

(9) Disconnect the safety chains as described in (a) and (b) below.

(a) Disconnect the outrigger safety chain (9, fig. 3-60) and remove it from the forward outriggers (7, fig. 3-60).

(b) Disconnect the safety chains (8, fig. 3-60) from the rear of the prime mover.

(10) Remove the locking pin (E1, fig. 3-12) from the pintle hook (E3, fig. 3-12) on the prime mover.

(11) Release the spring-loaded T-bar latch (E2, fig. 3-12) and open the pintle hook.

(12) Adjust the front support jack until the lunette (E4, fig. 3-12) is free of the pintle hook. Move the prime mover forward, close the pintle hook, and insert the locking pin.

(13) Disconnect the intervehicular electrical cable from the receptacle (B1) on the ILCHR base.

(14) Remove the quick-disconnect pins (6, fig. 3-57) which secure the front leveling cylinders in their stow brackets. Lower the leveling cylinders clear of the front compartment cover. Replace the quick-disconnect pins in the stow brackets.

(15) Remove the front compartment cover.

NOTE

The figure numbers shown below in parentheses refer to figure 3-57, unless otherwise indicated.

(16) Depress the detent (B10) and turn the finger grip knob (B11) counterclockwise. Remove the lunette (B9) from the front outriggers (B8 and B12).

(17) Emplace the left front and right front outriggers as described below.

(a) Support the outer end of the outrigger (B8), withdraw the quick-disconnect pin (B6), and remove the towing brace (B5) from the bracket on the upper left (B7) corner of the ILCHR base.

(b) Remove the towing brace from the outrigger by unscrewing the T-handle ball socket end (B3) from the outrigger.

(c) Obtain the sway brace (A2) from the storage compartment.

(d) Swing the outrigger around, and secure the sway brace to the outrigger and the locking bracket (A3) on the ILCHR base with the quick-disconnect pins (A1 and A4).

(d.1) Remove the outrigger pad retaining bars and plate.

(e) Remove an outrigger pad (G3, fig. 3-56) from its stow position above the spade storage rack (G1), place it on the ground under the outer end of the outrigger, and insert the outer end into the outrigger pad socket slide (G1, fig. 3-56).

NOTE

Insure that the outrigger pad socket slide is perpendicular to the side of the ILCHR with the socket spring (G2, fig. 3-56) toward the trailer side.

(f) Remove the handpump handle (F3, fig. 3-56) from the front compartment, and connect it to the handpump (F4, fig. 3-56).

(g) Open the left front or right front cylinder leveling valve (F7 or F8, fig. 3-56) and close all other valves on the base hydraulic panel to allow manual operation of the appropriate leveling cylinder.

(h) Aline the leveling cylinder (F1) with the outrigger socket (F3).

(i) Actuate the handpump to extend the piston collar (F2) until it engages the outrigger socket.

(j) Close the leveling valve.

(18) Emplace the rear outrigger as described below.

(a) Support the rear leveling cylinder (C2), and remove the quick-disconnect pin (C4) that secures the cylinder to the clevis fitting (C1) on the underside of the outrigger.

(b) Support the outrigger, lower the leveling cylinder, and then lower the outrigger.

(c) Remove an outrigger pad from its stow position above the spade storage rack, place it under the outer end of the rear outrigger, and insert the outer end into the outrigger pad socket slide.

NOTE

Insure that the outrigger pad socket slide is perpendicular to the rear of the ILCHR with the socket spring toward the rear of the trailer.

(d) Open the rear cylinder leveling valve (F9, fig. 3-56).

(e) Aline the rear leveling cylinder (C2) with the rear outrigger socket.

(f) Actuate the handpump to extend the piston collar until it engages the rear outrigger socket.

(g) Close the leveling valve.

(19) Level the ILCHR as described below.

(a) Lock each wheel suspension system out by rotating the lockout assembly handles (H3, fig. 3-56) to an upright position, so that the spring-loaded detents are engaged.

(b) Open the front cylinder leveling valves (F7 and F8, fig. 3-56). Actuate the handpump until the ILCHR wheels are 1 inch off the ground. Close the cylinder valves.

(c) Open the rear cylinder leveling valve (F9, fig. 3-56). Actuate the handpump until the ILCHR base appears level.

(d) Remove the protective cap on the bulls-eye level (F2, fig. 3-56).

(e) View the bulls-eye level and determine if the ILCHR is level. If necessary to level the ILCHR, open the leveling valves one at a time, and actuate the handpump to extend the associated leveling cylinder.

NOTE

Close the opened leveling valve before opening the second one.

(f) If necessary, with the required leveling valve in the open position, open the bleed valve to retract the associated leveling cylinder.

(g) When the ILCHR is level, screw the locking sleeves on the three leveling cylinders down against the piston collars.

(h) Open all the leveling valves on the base hydraulic panel.

(i) Recheck the bulls-eye level to insure the ILCHR remains level.

(j) Remove and stow the handpump handle.

(k) Turn the front support jack crank clockwise until the jack pad is just clear of the ground.

(20) Open the ILCHR chassis drain valves.

(21) Remove the tripod and launcher control (LC) (7, fig. 3-56) from the front compartment and emplace the LC on the tripod.

(22) Open the LC cover, set the REMOTE-LOCAL switch to LOCAL, and place the remaining switches in the OFF or down position.

(23) Remove the communications station and bracket assembly (D2, fig. 3-56) from the ILCHR forward compartment and install it on the LC (D1, fig. 3-56).

(24) Remove the communications cable (D3, fig. 3-56) stowed in the LC cover and connect it between J2 on the LC and J1 on the communications station.

(25) Remove the headset and extension cable from the ILCHR forward compartment and connect them to the communications station.

(26) Remove the LC cable (6, fig. 3-56) from the front compartment. Connect it between the LOCAL CONTROL cable receptacle at the base of the ILCHR base and connector J1 on the LC.

(27) Remove the ground rod and ground rod cable from the front compartment.

(28) Emplace the ground rod and connect the cable between the rod and the cable attach point (A2, fig. 3-56).

(29) Stow the lunette, intervehicular electrical cable, outrigger pad retaining bars and plate, and towing braces in the front compartment.

(30) Close and secure the front compartment cover.

(31) Release the azimuth STOW lock (C2, fig. 3-56) by releasing the grip knobs (C1, fig. 3-56) and rotating the STOW lock 180 degrees. Secure the grip knobs.

(32) Pull open the air vent covers (A1, fig. 3-56) on each side of the ILCHR base.

(33) Remove the spades (G2) from the storage rack (G1) and emplace the outrigger pads (G3) by driving the spades through the slots provided on the pads.

CAUTION

Prior to lifting missiles with the converted loader, the following precautions are mandatory.

(1) *Launcher interference.* During transfer operations, the missiles are suspended from the loader yoke and are free to swing about the yoke pivot. Missiles normally hang nose down from level. For transfer operations to and from the launcher, it is highly desirable to have the missiles hang at a 5-degree nose-down attitude. Because of the center of gravity location of the improved HAWK missile and the relationship to the yoke pivot, the missiles (3) hang 2 degrees nose down, or less than half the normal angle for standard missiles. If the missiles are allowed to maintain this shallow hang angle throughout the transfer operation, interferences of the missile boat tail and umbilical plug with the launcher rear hook occur. To avoid this condition, the following procedures are necessary:

(a) When transferring missiles to the launcher, as the missile boat tail approaches the launcher rear hook, exert and hold a light down force (by hand) on the missile radome (to prevent contact of the boat tail and umbilical plug with the launcher hook), until the missile(s) is in firm contact with the forward sector and the rear roller.

(b) When removing missiles from the launcher, exert and hold a light down force on the missile radome until the missile boat tail is safely clear of the launcher rear hook.

(2) *Reduced pressure.* Installation of this conversion changes the hydraulic system so that the pressure in the

reduced pressure system increases from 320 psi to 615 psi. This increase was necessary to insure adequate operation with the improved HAWK missile. Considering that the purpose of the system is to protect the missile and equipment against structural overloads produced by the extension cylinder, it can be seen that the higher reduced pressure will result in less protection against overloads. Therefore, operators must exercise greater care while operating during the reduced pressure mode, particularly under the following conditions:

(a) When removing missiles from the pallet or launcher, avoid inadvertent retraction of the extension cylinder when missiles are latched to both loader and pallet (or launcher). It is of utmost importance to avoid this occurrence when it results in an unsymmetrical loading (for example, retracting with one outboard missile latched to both pallet and loader).

(b) When placing missiles onto the pallet or launcher, during final seating of the missile against the rear hooks (pallet or launcher), it is important to avoid over-extending the extension cylinder, thereby overloading the structures.

(3) *Hoisting beam.* When the XM15 hoisting beam, 1450-665-3234, is used to lift single improved HAWK missiles, the component connecting link, 2590-690-2856, P/N 9089791, must be installed in hole #6 to accommodate the different center of gravity in the improved HAWK missile.

(34) Load the missiles on the ILCHR (TM 9-1440-531-12-1 and TM 9-1450-500-10).

NOTE

If the battery is operating in cold-weather conditions, install the cold-weather kit heater covers as stated in (35) below and energize the cold-weather heater covers (TM 9-1440-531-12-1).

(35) Install the cold-weather kit heater covers on the missiles, as follows:

NOTE

For the following installation procedures, two men and a 3-foot stand or stepladder are required.

NOTE

Unless otherwise specified, the key numbers shown in parentheses below refer to figure 3-55.1.

(a) Install the top heater cover (11) with the strap grooves (26) forward on the missile as shown on figure 3-55.1. Aline the rear edge of the heater cover with the rear edge of the elevons.

(b) Install one side heater cover (5). Aline the strap grooves (1) with those of the top heater cover. Secure the top heater cover, with the side heater strap (4) to the pile (10) of the top heater cover.

(c) Install the remaining side heater cover as described in (b) above.

(d) Install the bottom front insulating cover (25) to the missile. Aline the strap grooves (24) with those of the side heater covers.

(e) Secure the forward section of each cover with the two strap assemblies (2 and 27) with the breakaway connection (3) at the top.

(f) Install the tailcone insulating cover (14), pushing it tight against the rear edges of the top and side covers.

(g) Fasten the tabs (13) to the pile on the rear edges of the top and side covers.

(h) Fasten the top straps (7) of each side cover to the buckles (12) of the top cover.

(i) Insert the bottom center insulating covers (17 or 19) between the lower wings.

NOTE

The cover (17) is used in the outboard positions of the launcher; the cover (19) is used in the center position.

(j) Insert bottom side insulating covers (15 and 21) between the wings of the missile, alining the rear edge of each cover with the rear edge of each elevon. Fasten the lower strap (8) of each side cover to the buckle (20) of each outboard cover.

(k) Move the center cover (17 or 19) aft until it seals with the launcher fairing, and mates with the supporting step (16) of each outboard cover.

(l) Squeeze bottom side covers (15 and 21) together with the center cover, and secure the fastening tape (23) to the pile on the bottom of each outboard cover.

NOTE

It is important that step / be accomplished properly so that the center insulating cover (17 or 19) will lie against the surface of the missile.

(m) Push the bottom cover assembly against the missile, and fasten the lower strap (8) of side covers (5) to the pile of bottom side covers (15 and 21).

CAUTION

Take up the slack of the missile blanket heater cables so that no part of the cable will strike when the boom is elevated. Secure the slack of the cables through the lower straps.

(n) Push each bottom side cover tightly against the wing surface and the launcher. Fasten the tabs of the tailcone cover to the pile on the bottom and side covers. Secure each side cover lower strap (8) to the buckle (20) of the bottom side cover.

(o) Insert ball-lock pins (18) of bottom center covers (17 and 19) into holes provided in the sides of the fairing and center blast deflector.

(p) Connect the cable assemblies (6) to the receptacles on the distribution box.

WARNING

Observe all missile handling precautions contained in TM 9-1410-530-14 prior to energizing the ILCHR.

b. Prior to energizing the ILCHR, the following checks should be made:

- (1) The handbrakes are engaged.
- (2) The airbrake hoses are properly stowed.
- (3) The lunette, outrigger retaining bars and plate and intervehicular electrical cable are properly stowed in the front compartment.
- (4) All three outriggers are properly emplaced.
- (5) The sway braces are properly emplaced.
- (6) The wheel suspension system is locked out.
- (7) The ILCHR is level.
- (8) The front support jack pad is just clear of the ground.
- (9) The azimuth STOW lock is unlocked and properly stowed.
- (10) The LC is properly emplaced.
- (11) The REMOTE-LOCAL switch on the LC is in the LOCAL position and all other switches are in the OFF or down position.

- (12) The headset is properly connected to the LC.
- (13) The launcher control cable is properly connected between the LC and the ILCHR base.
- (14) The air vent covers are opened.
- (15) The ground rod and ground rod cable are properly emplaced.
- (16) The power and data cables are properly connected.
- (17) The front and rear compartment covers are secured.

Section VII. EMPLACEMENT OF THE LOADER-TRANSPORTER

Refer to TM 9-1450-500-10 for the detailed procedures for emplacing the loader-transporter by prime mover or helicopter.

Section VIII. EMPLACEMENT OF THE IMPROVED BATTERY CONTROL CENTRAL AN/TSW-8

4-25. General

This section describes the emplacement procedures for the improved battery control central (IBCC) by prime mover (par. 4-27) and by helicopter (par. 4-28).

CAUTION

If the ICWAR is to be cabled directly to the IBCC, the following wiring change at the IBCC cable entry enclosure must be incorporated:

Lift, tape and tie back the wire connected to 6TB28-7.

4-26. Tools

With the addition of a sledge hammer, the tools needed for emplacing the IBCC are the same as the tools needed for the preparation for travel procedures (par. 3-28).

4-27. Emplacement Procedures — Prime Mover

a. Refer to TM 9-4935-502-14 for lifting procedures.

b. The procedures for emplacing the IBCC, whether the IBCC remains on the prime mover or is placed on the ground, are as follows.

- (1) Open the entrance door.
- (2) Open the air vents on the inside and outside of the entrance door.

- (18) All remaining equipment is stowed.

4-24. Emplacement Procedures — Helicopter

- a. Remove and disassemble the suspension slings.
- b. Stow the helicopter lifting kit in the storage bag and stow the bag.
- c. The ILCHR is emplaced as described in paragraphs 4-23a(1), (14) through (34), and 4-23b.

(3) Remove the ground rod from the bracket underneath the continuous wave target detection console (CWTDC). Emplace the ground rod a minimum of 0.6 meters (2 feet) into the ground. Connect the ground rod cable between the ground rod and the cable attach point on the side of the IBCC near the entrance door. Insure that the ICC/TM ground cable is connected to the IBCC ground rod.

(4) Raise the condenser air discharge door on the air conditioner.

(5) Remove the three bolts (2, fig. 3-67) that secure the siren to the floor and remove the siren. Replace the bolts.

(6) Install the siren on top of the IBCC (fig. 3-66) and attach the siren cable to the receptacle (2, fig. 3-66).

(7) Remove and stow the tactical control console (TCC) supports as described below.

NOTE

The key numbers shown below in parentheses refer to figure 3-63.

(a) Remove the locking pin (3) from the support bracket and disengage the support (4).

(b) Remove the locking pin (5) and reduce the length of the support.

(c) Stow the support in the storage clamp (6).

(d) Remove and stow the remaining TCC support.

(8) Place all switches and circuit breakers on the power distribution panel to the OFF position. Insure that the POWER circuit breaker on the power supply control is set to the OFF position.

(9) Steps (a) through (f) below describe the procedures for removing one chair. The other four chairs are removed in the same manner. There are two tiedown device attach points and two strap assemblies for each chair.

(a) Loosen the buckles (1, fig. 3-65) and disengage the hooks (4, fig. 3-64).

(b) Remove the straps (4, fig. 3-65) with attached buckles from the two handles (5, fig. 3-65).

(c) Set the screwdriver adjustment (2, fig. 3-64) to the OPEN position.

(d) Remove the brass plug (1, fig. 3-64) from the tiedown device hole (3, fig. 3-64).

(e) Set the screwdriver adjustment to the PLUG position.

(f) Stow the chair tiedown kit.

(10) Loosen the telephone tiedown strap.

CAUTION

To prevent damage to the headsets when not in use, place each headset on the hook provided on the shelter wall near the designated operator station.

(11) Remove the five headsets from the headset storage box and install two on the TCC and one each on FC A, FC B, and the CWTDC.

(12) Set the HEIGHT ABOVE SEA LEVEL dial on the height signal comparator to indicate the height above sea level of the site.

Section IX. EMPLACEMENT OF THE IMPROVED GROUND EQUIPMENT TEST SHOP AN/TSM-112

4-29. General

This section describes the emplacement procedures for the IGETS. The procedures begin with the arrival of the unit at the battery site by either prime mover (par. 4-30) or helicopter (par. 4-31).

4-30. Emplacement Procedures — Prime Mover

a. Attach the IGETS suspension sling assembly as described in paragraph 3-33c.

b. Attach the suspension sling assembly to a crane of suitable capacity, and remove the IGETS from the prime mover.

(13) Set the center angle adjust controls beneath the cover of firing consoles FC A and FC B to indicate the desired center angle of the IHIPIR elevation search limits.

c. Prior to energizing the IBCC, the following checks should be made:

(1) The door vents are open.

(2) The ground rod and ground rod cable are properly emplaced.

(3) The air conditioner condenser air discharge door is opened.

(4) The siren is properly mounted to the top of the IBCC.

(5) All switches and circuit breakers on the power distribution panel are in the OFF position.

(6) The POWER circuit breaker on the power supply control is in the OFF position.

(7) The power cable is properly connected.

(8) The chair tiedown straps are removed and stowed.

(9) The telephone tiedown strap is loosened.

(10) The five headsets are emplaced.

(11) The IHIPIR cable identification switches are properly positioned.

(12) The data cables are properly connected.

4-28. Emplacement Procedures — Helicopter

a. Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

b. Emplace the IBCC (par. 4-27).

c. Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit storage bag. Stow the bag.

d. Unfasten the tiedown straps (2, fig. 3-72) and remove the equipment as required.

e. Once the IHIPIR has been emplaced, remove the sling roll (5, fig. 3-72) from the storage rack (6, fig. 3-72) and store it on the radar prime mover.

4-31. Emplacement Procedures — Helicopter

Remove, disassemble, and stow the suspension slings in the lifting kit storage bag. Stow the bag.

Section X. EMPLACEMENT OF THE IMPROVED LAUNCHING

SECTION CONTROL BOX AN/GSA-132

4-32. General

This section describes the emplacement procedures for the improved launching section control box (ILSCB). The procedures begin with the arrival of the major item at the battery site by either prime mover or helicopter.

4-32.1. Tools

The only tool required is a sledge hammer.

4-33. Emplacement Procedures — Prime Mover or Helicopter

WARNING

The ILSCB must be emplaced at least 61 meters from the nearest ILCHR, and with a suitable barricade to protect it and operating personnel from the missile rocket motor blast.

NOTE

During inclement weather, or under blackout conditions, the ILSCB shall be emplaced and operated under a protective shelter.

- a. Remove the ILSCB from the prime mover or helicopter.
- b. Remove the ground rod and cable stowed on the IHIPIR and emplace the ground rod.
- c. Connect the ground rod cable between the ground rod and the ground rod cable attach point on the ILSCB.
- d. Place the LAUNCHERS OPERATE/SAFE switches (4, fig. 3-74) to SAFE.
- e. Set the MSL COUNT DELAY switch (4, fig. 3-74) as appropriate for the existing temperature.
- f. Remove the headset from the storage compartment (2, fig. 3-74) and connect it to the communications station (2, fig. 3-74).

Section XI. EMPLACEMENT OF THE GUIDED MISSILE

LOADING AND STORAGE PALLET XM1E1

4-34. General

This section describes the emplacement procedures for the guided missile loading and storage pallet (missile pallet) and its supporting trailer by prime mover (par. 4-36) and by helicopter (par. 4-37). The missile pallet can be mounted on either the M390 or the M390C trailer. The differences in emplacement of the M390 and M390C are the number of leveling jacks and the physical location of these jacks. The M390 has four leveling jacks, and the M390C has three. The M390C leveling jacks are functionally the same as those of the M390 trailer. Emplacement of the M390 and M390C trailers by prime mover is described in paragraph 4-36a (1) through (6) and e (1) through (6), respectively. Emplacement of the M390 and M390C trailers by helicopter is described in paragraphs 4-20d (1) through (4) and 4-37e (1) through (4), respectively.

4-35. Tools

The only tools required are two 3/4-inch open-end wrenches, a 1-7/16-inch open end wrench, and a small hammer.

4-36. Emplacement Procedures — Prime Mover

- a. The detailed procedures for emplacing the M390 trailer are as follows.
 - (1) Emplace the trailer (par. 4-11a).
 - (2) Adjust the jacks until the trailer wheels are at least 1 inch off the ground and the trailer appears level.
 - (3) Stow the jack cranks.
 - (4) Adjust the front support jack until the support wheels are resting firmly on the ground.
 - (5) Stow the jack crank in its storage clip.

b. Release the missiles from the pallet by performing steps (1) through (4) below.

(1) Release the wingnut (1, fig. 3-80) and remove the nut handle retainer (2, fig. 3-80) from the plain round nut pin (3, fig. 3-80).

(2) Using a wrench, if necessary, release the missile anchoring stud assembly from the threaded wingnut (1, fig. 3-79) by turning it counterclockwise.

(3) Loosen the plain round nut (4, fig. 3-79) by turning it clockwise. If necessary tap the plain round nut with a small hammer to break it loose from the self-adjusting washer (3, fig. 3-79).

(4) Release the quick-disconnect pin (2, fig. 3-78) and place the missile latch (1, fig. 3-78) in the down position.

CAUTION

Prior to lifting missiles with the converted loader, the following precautions are mandatory.

(1) *Launcher interference.* During transfer operations, the missiles are suspended from the loader yoke and are free to swing about the yoke pivot. Missiles normally hang nose down from level. For transfer operations to and from the launcher, it is highly desirable to have the missiles hang at a 5-degree nose-down attitude. Because of the center of gravity location of the improved HAWK missile and the relationship to the yoke pivot, the missiles (3) hang 2 degrees nose down, or less than half the normal angle for standard missiles. If the missiles are allowed to maintain this shallow hang angle throughout the transfer operation, interferences of the missile boat tail and umbilical plug with the launcher rear hook occur. To avoid this condition, the following procedures are necessary:

(a) When transferring missiles to the launcher, as the missile boat tail approaches the launcher rear hook, exert and hold a light down force (by hand) on the missile radome (to prevent contact of the boat tail and umbilical plug with the launcher hook), until the missile(s) is in firm contact with the forward sector and the rear roller.

(b) When removing missiles from the launcher, exert and hold a light down force on the missile radome until the missile boat tail is safely clear of the launcher rear hook.

(2) *Reduced pressure.* Installation of this conversion changes the hydraulic system so that the pressure in the reduced pressure system increases from 320 psi to 615 psi. This increase was necessary to insure adequate operation with the improved HAWK missile. Considering that the purpose of the system is to protect the missile and equipment against structural overloads produced by the extension cylinder, it can be seen that the higher reduced pressure will result in less protection against overloads. Therefore, operators must exercise greater care while operating during the reduced pressure mode, particularly under the following conditions:

(a) When removing missiles from the pallet or launcher, avoid inadvertent retraction of the extension cylinder when missiles are latched to both loader and pallet (or launcher). It is of utmost importance to avoid this occurrence when it results in an unsymmetrical loading (for example, retracting with one outboard missile latched to both pallet and loader).

(b) When placing missiles onto the pallet or launcher, during final seating of the missile against the rear hooks (pallet or launcher), it is important to avoid over-extending the extension cylinder, thereby overloading the structures.

(3) *Hoisting beam.* When the XM15 hoisting beam, 1450-665-3234, is used to lift single improved HAWK missiles, the component connecting link, 2590-690-2856, P/N 9089791, must be installed in hole #6 to accommodate the different center of gravity in the improved HAWK missile.

c. To remove the missiles from the pallet, refer to TM 9-1450-500-10.

d. To remove the missile pallet from the trailer, refer to TM 9-1450-500-10.

e. The detailed procedures for emplacing the M390C trailer are as follows.

(1) Perform the procedures outlined in paragraphs 4-11a(1) through (5).

(2) Adjust the jacks until the trailer wheels are at least 1 inch off the ground and the trailer appears level.

(3) Stow the jack cranks.

(4) Adjust the front support jack crank until the support wheels are resting firmly on the ground.

(5) Stow the jack crank in its storage clip.

f. Release the missile from the pallet as described in steps b(1) through (3) above.

NOTE

Observe the caution preceding step c above.

g. To remove the missiles from the pallet, refer to TM 9-1450-500-10.

h. To remove the missile pallet from the trailer, refer to TM 9-1450-500-10.

4-37. Emplacement Procedures — Helicopter

a. Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

b. For loading the missile pallet on the trailer, refer to TM 9-1450-500-10.

NOTE

Observe the caution preceding step c above.

c. For loading the missiles on the pallet, refer to TM 9-1450-500-10.

d. Emplace the M390 trailer as described in paragraph 4-20d.

e. Emplace the M390C trailer as described below.

(1) Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

(2) Set the trailer handbrakes, using the handbrake levers (E6, fig. 3-48) (one on each side of the A-frame).

(3) Adjust the front support jack until the trailer appears level.

(4) Emplace the rear and front center leveling jacks as described in paragraphs 4-11a(2) and (5).

Section XII. EMPLACEMENT OF THE 45-KW AND 60-KW ENGINE-DRIVEN GENERATORS

4-38. General

This section describes the emplacement procedures for the 45-kw and 60-kw engine-driven generators and the M200A1 trailer, which supports the generators. The procedures begin with the arrival of this item at the battery site by either prime mover (par. 4-40) or helicopter (par. 4-41) (45-kw only). If possible, emplace the generator so that the fan faces away from the IHIPIR. Otherwise the generator should be sandbagged on the IHIPIR side or dug in to prevent radar interference.

4-39. Tools

The only tool needed is a sledge hammer.

4-40. Emplacement Procedures — Prime Mover

a. The detailed procedures for emplacing the M200A1 trailer are as follows.

(1) Set the trailer brakes by operating the handbrake levers (5, fig. 3-88) (one on each side of the trailer frame).

(2) While supporting the front support jack (11, fig. 3-88), remove the support locking pin (8, fig. 3-88) and allow the support frame (7, fig. 3-88) to swing down.

(3) Lower the jack to a vertical position. Raise the support frame until the locking holes coincide with the locking holes on the jack and secure with the locking pin.

(4) Adjust the jack until the jack pad rests on the ground.

(5) Close the service coupling shutoff cock, disconnect the two airbrake hoses (12, fig. 3-88) from the prime mover, and attach the hoses to their respective receptacles on the sides of the A-frame.

(6) Disconnect the safety chains (13, fig. 3-88) from the prime mover and stow them on the A-frame.

(7) Disconnect the intervehicular cable assembly from the receptacle on the rear of the prime mover and attach it to the storage bracket on the A-frame.

(8) Open the pintle hook on the prime mover by removing the locking pin and lifting the spring-loaded T-bar latch (E2, fig. 3-12).

(9) Adjust the jack until the lunette is free of the pintle hook.

(10) Move the prime mover forward, close the pintle hook, and insert the locking pin.

b. The detailed procedures for emplacing the 45-kw and 60-kw engine-driven generators are as follows.

(1) Remove the ground rod and cable from the trailer and emplace the ground rod.

(2) Connect the cable between the ground rod and the cable attach point (3, fig. 4-5) on the generator.

(3) Open the screen backing door (5, fig. 4-5) beside the cable entry panel.



1-Rear panel
2-Side panels
3-Ground rod cable attach point

4-Cable entry panel
5-Screen backing door

Figure 4-5. Engine-driven generator—rear panel opened (typical).

c. Prior to energizing the generator, the following checks should be made:

- (1) The handbrakes are engaged.
- (2) The front support jack is properly emplaced.
- (3) The ground rod and ground cable are properly emplaced.

Section XIII. EMPLACEMENT OF INFORMATION AND COORDINATION CENTRAL/TRAILER MOUNTED AN/MSQ-95

4-42. General

This section describes the emplacement procedures for the information and coordination central/trailer mounted (ICC/TM). The procedures begin with the arrival of the major item at the battery site by prime mover (par. 4-44). In addition, the procedures for remote emplacement of the IFF antenna are contained in paragraph 4-45.

4-43. Tools

The tools required are a screwdriver and a sledge hammer.

4-44. Emplacement Procedures—Prime Mover

CAUTION

Insure that the ICC/TM is emplaced with the shelter access door faced away from all radars and the sector of interest whenever possible.

a. Emplace the M390 or M390C trailer (par. 4-11a(1) through (5)).

b. The detailed procedures for emplacing the ICC/TM are as follows.

- (1) Obtain ground strap 9166696-2 from the storage cabinet in the ICC/TM.
- (2) Deleted.
- (3) Connect the ground strap to the GRD terminal (1, fig. 3-95) or ground attach point E1 (1, fig. 3-96).
- (4) Connect ground strap 9166696-2 between the ICC/TM and IBCC ground rod.

4-41. Emplacement Procedures — Helicopter (45-kw only)

NOTE

The 45-kw engine-driven generator, when helicopter lifted, is emplaced without the M200A1 trailer.

a. Remove, disassemble, and stow the suspension sling assembly in the helicopter lifting kit bag. Stow the bag.

b. For emplacement of the generator, refer to paragraph 4-40b and c.

WARNING

When lowering the front leveling jack in step (5) below, operate the jack crank in half-turn intervals to avoid contact with the front cable reel so as to prevent possible injury to the hands.

(5) Lower the front and rear jacks until the trailer tires are at least 1 inch off the ground.

(6) Raise the IFF antenna from the stow position as described below:

WARNING

Before climbing to the ICC/TM roof, make certain that the ANT SAFE-OPERATE switch (8, fig. 3-93 or 3-94) is set to SAFE. Make certain the AZIMUTH DRIVE SAFE switch (13, fig. 3-97) or (14, fig. 3-98) is set to OFF (SAFE).

WARNING

Not more than three persons should occupy the roof at any one time.

WARNING

When in the stowed position, the IFF antenna and pedestal assembly are under spring tension.

(a) At the antenna pedestal, release the two stow bolt assembly handknobs (8, fig. 3-101)

securing the antenna in the stow position. Ease the antenna and pedestal assembly (under tension spring) to the operating position.

(b) Secure the antenna pedestal in the operating position by tightening the two base bolt assembly handknobs (7, fig. 3-101).

(7) Level the ICC/TM as described in steps (a) through (c) below.

(a) View the horizontal spirit level (1, fig. 4-6) and adjust the leveling jacks as necessary, until the level bubble is centered.

(b) Adjust the front support jack until the support wheels are resting on the ground.

(c) Stow the jack cranks in their stowage clips.

NOTE

If remote installation of the IFF antenna is desired, refer to paragraph 4-45 for detailed instructions.

(8) Connect a headset to jack J3 on the communications module (2, fig. 4-6).

(9) Open the ADP exhaust hood (4, fig. 3-97) or (6, fig. 3-98).

(10) Release the two radio whip antennas from the stowage clamps (3 and 11, fig. 3-93 or 3-94) and raise the antennas to the operating position.

(11) Insure that the power and data cables are connected (par. 4-51).

(12) Remove the cover (11, fig. 3-97) or (12, fig. 3-98) from the air conditioner and stow it as shown in figure 3-97 or 3-98.

(13) Open the ADP air intake vents on the side (10, fig. 3-93 or 3-94) and rear (8, fig. 3-97) or (10, fig. 3-98) of the ICC/TM.

(14) Release and lower the stepladder (9, fig. 3-97) or (11, fig. 3-98).

(15) Open the pressure air vent on the door (6, fig. 3-97) or (8, fig. 3-98).

(16) Unlock and open the access door (7, fig. 3-97) or (9, fig. 3-98).

CAUTION

To prevent damage to the headsets when not in use, place each headset on the hook provided on the shelter wall near the designated operator station.

(17) Connect a headset to the receptacle mounted on the wall above the auxiliary control unit.

NOTE

Insure that the 250 foot (76.2 meter) (26 pair) communication cable is connected between distribution box J2317A/U and connector J11 on the communication termination unit (CTU).

(18) Energize the radio and telephone communications equipment (TM 9-1430-527-12-1).

NOTE

Before the generator is connected to the ICC/TM and energized, the ICC/TM communications equipment receives operating power from its self-contained battery supply. When the generator is activated and the ICC/TM energized, the battery supply is automatically disconnected and the ICC/TM is switched to the generator supply lines.

4-45. Remote Installation of the IFF Antenna

WARNING

Make certain that the ANT SAFE-OPERATE switch (8, fig. 3-93 or 3-94) is set to SAFE and the AZIMUTH DRIVE SAFE switch (13, fig. 3-97) or (14, fig. 3-98) is set to OFF (SAFE). The maximum number of personnel allowed on the roof at any one time is three.

a. Remove the IFF antenna and pedestal assembly (1, fig. 3-93 or 3-94) from the antenna pedestal bracket (6, fig. 3-101) as described below.

NOTE

If the IFF antenna is in the stow position, raise it to the operating position (par. 4-44b(6)).

(1) Disconnect the antenna cables as follows:

Local cable connector	IFF antenna pedestal receptacle
W13P1	J4
W14P2	J3
W10P2	J5

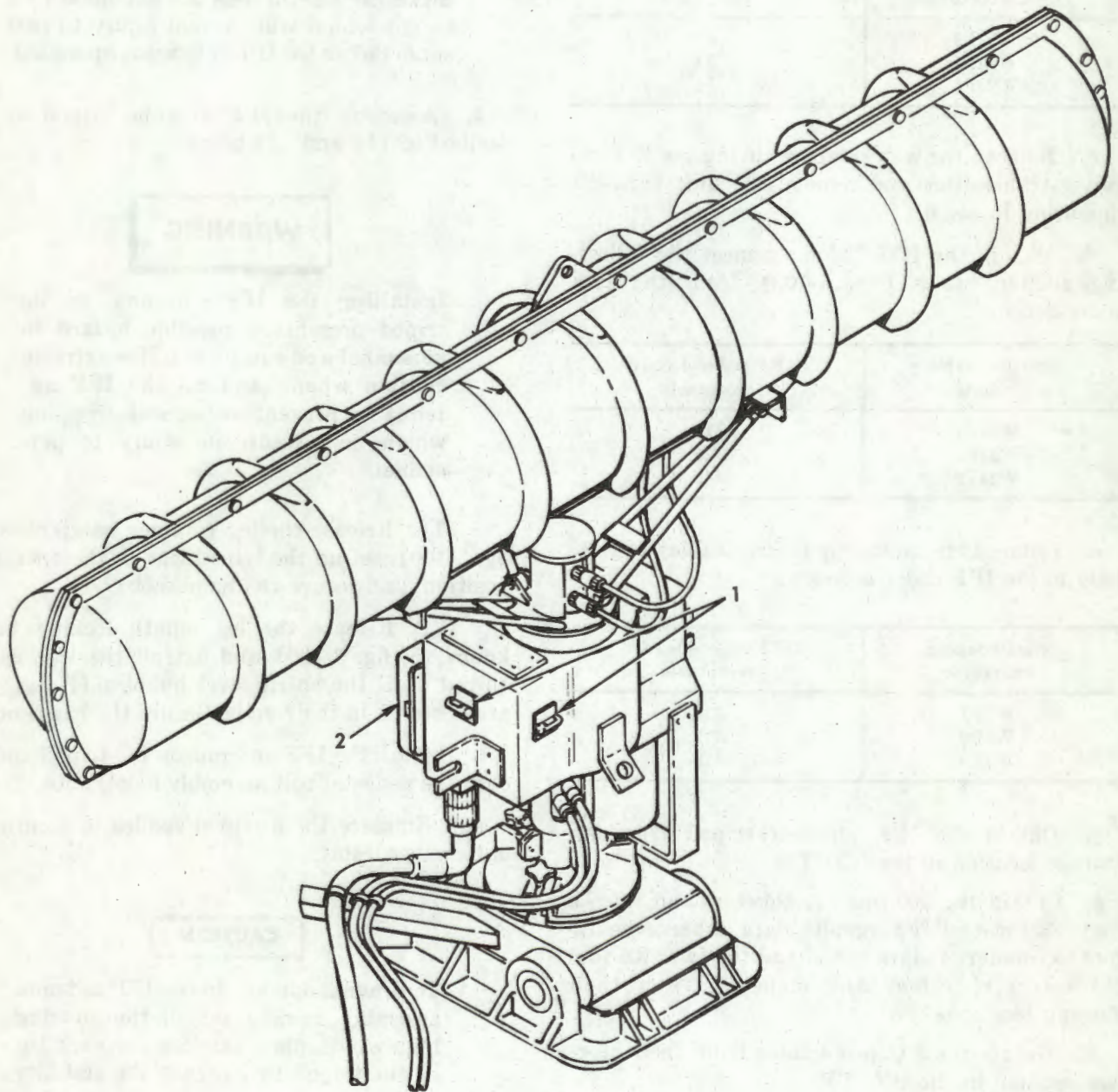
NOTE

If the antenna hoisting unit is not installed on the ICC/TM roof, use the mobile crane to remove the IFF antenna.

(2) Connect the hook fastener of the antenna hoisting unit to the lifting bracket on the IFF antenna.

WARNING

Never release the three pedestal bolt assembly handknobs unless the antenna hoisting unit is hooked onto the lifting bracket.



MI 70607

- 1—Antenna horizontal spirit level
- 2—Communications module

Figure 4-6. IFF antenna.

(3) Release the three pedestal bolt assembly handknobs (7, fig. 3-101).

(4) Using the hoist with crank handle (4, fig. 3-101), carefully lift the IFF antenna and pedestal assembly from the antenna pedestal bracket and lower it to the ground with the hoist.

b. Within the ICC/TM disconnect the following shelter cables (fig. 3-102) from the IFF receiver-transmitter:

Shelter cable connector	IFF receiver-transmitter receptacle
W11P1	J2
W12P1	J3
W24P5	J1

c. Remove the web straps securing the IFF receiver-transmitter and remove the unit from its mounting location.

d. Within the ICC/TM disconnect the following shelter cables (fig. 3-102) from the IFF coder-decoder:

Shelter cable connector	IFF coder-decoder receptacle
W24P4	J10
W24P3	J12
W24P2	J15

e. Connect the following shelter cables (fig. 3-103) to the IFF coder-decoder:

Shelter cable connector	IFF coder-decoder receptacle
W7P1	J10
W7P2	J12
W7P3	J15

f. Obtain the IFF antenna tripod from its storage location in the ICC/TM.

g. Obtain the 300-foot (91.4-meter) and the 75-foot (22.9-meter) IFF remote data cables, the 12-foot (3.7-meter) Y-data cable, and the two 13.5-foot (4.1-meter) rf cables and stepstool from their storage locations.

h. Obtain the 3 tripod spades from their storage location in the ICC/TM.

i. Obtain the ground rod and ground straps from their storage location on the ICC/TM.

j. Transport the IFF antenna, ground rod and ground straps, tripod, and tripod spades, IFF

receiver-transmitter, stepstool, and cables to the remote site.

NOTE

The remote site must be within 375 feet (114.3 meters) of the ICC/TM.

WARNING

When assembling the IFF antenna tripods make certain the legs are extended to a height which will prevent injury to personnel when the IFF antenna is operating.

k. Assemble the IFF antenna tripod as described in (1) and (2) below.

WARNING

Installing the IFF antenna on its tripod presents a possible hazard to personnel and equipment. Use extreme caution when handling the IFF antenna to prevent accidental dropping which may result in injury to personnel.

(1) Release the leg retainer handknobs (9, fig. 3-100), set up the tripod legs to the operating position, and secure the handknobs.

(2) Release the leg length locking handknobs (8, fig. 3-100) and extend the legs as required until the spirit level bubbles (1, fig. 4-6) are centered in their vials. Secure the handknobs.

l. Install the IFF antenna on the tripod and secure the pedestal bolt assembly handknobs.

m. Emplace the 3 tripod spades to secure the antenna pedestal.

CAUTION

To prevent damage to the IFF antenna assembly remote installation during high winds, place sandbags on each leg of the tripod to increase the stability of the tripod.

n. Check the tripod level indicators and releve if necessary by adjusting the four handknobs (9.1, fig. 3-100), as required.

o. Emplace the ground rod near the IFF antenna pedestal and connect the ground cable to the IFF antenna pedestal ground lug.

p. Position the IFF receiver-transmitter near the tripod and connect the ground cable to the IFF receiver-transmitter ground lug and ground rod.

q. Connect the two rf cables between the IFF antenna pedestal and receiver-transmitter as shown in figure 3-103.

r. Connect the Y-data cable to the IFF antenna pedestal and receiver-transmitter as shown in figure 3-103.

s. Lay the 300-foot (91.4-meter) and 75-foot (22.9-meter) IFF remote data cables from the remote site to the ICC. Connect one end of the cable to the Y-data cable and the other end to IFF remote connector J25 (10, fig. 3-97) on the ICC.

Section XIV. EMPLACEMENT OF IMPROVED PLATOON COMMAND POST AN/MSW 11

4-45.1. General

This section describes the emplacement procedures for the IPCP. The procedures begin with the arrival of the major item at the site by either prime mover (par. 4-45.3) or helicopter (par. 4-45.5). In addition, the procedures for remote emplacement of the IFF antenna are contained in paragraph 4-45.4.

4-45.2 Tools

The tools required are a screwdriver and a sledge hammer.

4-45.3 Emplacement Procedures — Prime Mover

CAUTION

Insure that the IPCP is emplaced with the shelter access door faced away from all pulse radars and the sector of interest whenever possible.

NOTE

If the IPCP is to be emplaced as part of an IAFU, perform steps *a* and *b* below. If the IPCP is to be emplaced as part of an IH battery perform steps *a* and *c* below.

a. Emplace the M390 trailer (par. 4-11a) or the M390C trailer (par. 4-11a (1) through (5)).

b. Steps (1) through (18) below are detailed procedures for emplacing the IPCP as part of an IAFU.

(1) Obtain the ground rod (8, fig. 3-103.1) and cable from its storage location at the front of the IPCP.

(2) Emplace the ground rod near the IPCP cable entry panel, and connect the cable between the rod and cable attach point E1 (2, fig. 3-95).

WARNING

When lowering the front leveling jack, operate the jack crank in half-turn intervals to avoid contact with the front cable reel in order to prevent possible injury to the hands.

(3) Lower the front and rear jacks until the trailer tires are at least one (1) inch off the ground.

(4) Raise the IFF antenna from the stow position as described below:

WARNING

Not more than three persons should occupy the IPCP roof at any one time.

WARNING

Before climbing to the IPCP roof, insure that the antenna SAFE/OPERATE switch (9, fig. 3-103.1) is set to SAFE.

WARNING

When in the stowed position, the IFF antenna and pedestal assembly are under spring tension.

(a) At the antenna pedestal, release the two stow bolt assembly handknobs (8, fig. 3-101) securing the antenna in the stow position. Ease the

antenna and pedestal assembly (under spring tension) into the operating position.

(b) Secure the antenna pedestal in the operating position by tightening the two base bolt assembly handknobs (7, fig. 3-101).

(5) Level the IPCP as described below.

(a) View the horizontal spirit levels (1, fig. 4-6), and adjust the leveling jacks, as necessary, until each level bubble is centered.

(b) Adjust the front support jack until the support wheels are resting on the ground.

(c) Stow the jack cranks in their stowage clips.

NOTE

If remote installation of the IFF antenna is desired, refer to paragraph 4-45.4 for detailed instructions.

(6) Open the ADP exhaust hood (5, fig. 3-103).

(7) Release the two radio whip antennas from the stowage clamps (3 and 12, fig. 3-103.1), and raise the antennas to the operating position (1 and 3, fig. 3-103.2).

(8) Insure that the power and data cables are connected.

(9) Remove the cover (12, fig. 3-103.2) from the air conditioner, and stow it as shown in figure 3-103.2.

(10) Open the ADP air intake vents on the side (11, fig. 3-103.1) and rear (9, fig. 3-103.2) of the IPCP.

(11) Release and lower the stepladder.

(12) Open the pressure air vent (7, fig. 3-103.2) on the door.

(13) Unlock and open the access door (8, fig. 3-103.2).

CAUTION

To prevent damage to the headsets when not in use, place each headset on the hook provided near the designated operator station.

(14) Connect a headset to the communications module mounted on the wall above the auxiliary control unit.

(15) Connect headsets to the receptacles located on the right and left side of the TDECC.

(16) Connect a headset to the IFF antenna communications module (2, fig. 4-6).

(17) Obtain the two 3-foot (0.9-meter) data cables from their storage location within the IPCP. At the IPCP cable entry panel, connect

one of the cables between receptacles J12 and J012, and the other cable between receptacles J14 and J014.

(18) In the main cable entry panel, TB1-10 and -14 must be jumpered together (IPCP operation). If TB1-10 and -16 are jumpered (ICC operation), transfer the lead from TB1-16 to TB1-14.

NOTE

Insure that all power and data cables are connected to the TDECC before performing step (19) below (par. 3-45.2b(2)).

NOTE

Before energizing the IPCP, make certain the two 3-foot (0.9-meter) data cables are connected to receptacles J12, J012 and J14, J014 as directed in step (17) above.

NOTE

Insure that the 250-foot (76.2-meter) (26 pair) communication cable is connected between the distribution box J2317 A/U and J11 (6, fig. 3-103.1) on the communication termination unit (CTU).

(19) Set the IPCP/ICC switch on ADP DTO DWR #2 to IPCP.

(20) Energize the IPCP (DTM 9-1430-535-12-1).

(21) Set the HPI ALTITUDE control on the TDECC RO control panel to the height above sea level of the site (DTM 9-1430-535-12-1, table 3-14).

(22) Set the IHIPIR elevation search limits center angle control in the TDECC (DTM 9-1430-535-12-1, table 3-18).

NOTE

Before the generator is connected to the IPCP and energized, the IPCP communications equipment receives operating power from its self-contained battery supply. When the generator is activated and the IPCP energized, the battery supply is automatically disconnected and the IPCP is switched to the generator supply lines.

c. Steps (1) through (6) are the detailed procedures for emplacing the IPCP as part of an IH battery.

(1) Perform steps b (1) through b (14) and (16) of paragraph 4-45.3.

(2) Set the IPCP/ICC switch on the ADP DTO DWR #2 to ICC.

(3) In the main cable entry panel, TB1-10 and -16 must be jumpered together (ICC operation). If TB1-10 and -14 are jumpered (IPCP

operation), transfer the lead from TB1-14 to TB1-16.

(4) If the IFF antenna is to be remotely installed, perform the procedures outlined in paragraph 4-45.

(5) Insure that the following shelter cables at the TDECC are disconnected.

Shelter cable connector	TDECC receptacle
P18	J1
J33	P1
J34	P2
J35	P3
J36	P4
J37	P5
J38	P6
J39	P7

NOTE

Before energizing the IPCP, make certain the two 3-foot (0.9-meter) data cables are disconnected from between receptacles J12, J012 and J14, J014 on the cable entry panel.

NOTE

Insure that the 250-foot (76.2-meter) (26 pair) communication cable is connected between the distribution box J2317A/U and J11 (6, fig. 3-103.1) on the CTU.

(6) Energize the IPCP (DTM 9-1430-535-12-1, but disregard the TDECC energizing procedures.

4-45.4. Remote Installation of the IFF Antenna

WARNING

Make certain that the antenna SAFE/OPERATE switch is set to SAFE and the AZ DRIVE switch is set to OFF (SAFE).

WARNING

Not more than three persons should occupy the IPCP roof at any one time.

a. Obtain the IFF antenna tripod from its storage area and set it up on the air conditioner side of the IPCP to its lowest configuration. Remove the IFF antenna and pedestal assembly (1, fig. 3-103.1) from the antenna pedestal bracket (6,

fig. 3-101) as described in steps (1) through (3) below.

NOTE

If the IFF antenna is in the stow position, raise it to the operating position (par. 4-45.3b(4)).

(1) Disconnect the local cables from the IFF antenna pedestal (fig. 3-102) as follows:

Local cable connector	IFF antenna pedestal receptacle
W13P1	J4
W14P2	J3
W10P2	J5

(2) Connect the hook fastener of the antenna hoisting unit to the lifting bracket on the IFF antenna.

WARNING

Never release the three pedestal bolt assembly handknobs unless the antenna hoisting unit is hooked onto the lifting bracket.

(3) Release the three pedestal bolt assembly handknobs (5, fig. 3-101).

NOTE

Use guide ropes to guide the antenna assembly to prevent the assembly from bumping the IPCP.

(4) Using the hoist with crank handle, carefully lift the IFF antenna and pedestal assembly from the antenna pedestal bracket, and lower it to the tripod assembly and secure the antenna pedestal to the tripod using all three (3) pawl fasteners (11, fig. 3-100).

b. Within the IPCP disconnect the following shelter cables (fig. 3-102) from the IFF receiver-transmitter:

Shelter cable connector	IFF receiver-transmitter receptacle
W11P1	J2
W12P1	J3
W24P5	J1

c. Remove the web straps securing the IFF receiver-transmitter, and remove the unit from its mounting location.

d. Within the IPCP disconnect the following shelter cables (fig. 3-102) from the IFF coder-decoder:

Shelter cable connector	IFF coder-decoder receptacle
W24P4	J12
W24P3	J10
W24P2	J15

e. Connect the following shelter cables to the IFF coder-decoder:

Shelter cable connector	IFF coder-decoder receptacle
W7P1	J10
W7P2	J12
W7P3	J15

f. Obtain the 75-foot (22.9-meter) IFF remote data cable, the 12-foot (3.7-meter) Y-data cable, the stepstool and the two 13.5-foot (4.1-meter) rf cables from their storage locations.

g. Obtain the three tripod spades from their stowage location in the IPCP.

h. Obtain the ground rod and two ground straps from their stowage location on the front of the IPCP.

i. Remove the end of the 300-foot (91.4-meter) IFF remote data cable from the cable reel (7, fig. 3-103.1). Release the cable reel and lay the cable to the remote site. At the IPCP, disconnect the connector from the empty reel. Secure the cable reel and handcrank.

j. Transport the IFF antenna, ground rod, ground strap, tripod, tripod spades, stepstool, IFF receiver-transmitter, and cables to the remote site.

NOTE

The remote site must be within 375 feet (114.3 meters) of the IPCP.

WARNING

When assembling the IFF antenna tripod, make certain the legs are extended to a height which will prevent injury to personnel when the IFF antenna is operating.

WARNING

The handling of the IFF antenna/tripod presents a possible hazard to personnel and equipment. Use extreme caution when handling the IFF antenna/tripod assembly to prevent accidental dropping which may result in injury to personnel.

k. Erect the IFF antenna/tripod assembly to its operating position as described in (1) and (2) below.

(1) While supporting the IFF antenna/tripod assembly, spread the tripod legs to their maximum limit and lock the legs using the leg retainer handknob (9, fig. 3-100).

(2) While supporting the IFF antenna/tripod assembly, allow the three (3) legs to contact the ground. Using the stepladder, erect the antenna to its operating position and secure the leg length locking handknobs (8, fig. 3-100).

(3) Center the spirit level bubbles (2, fig. 3-100) in their vials using the leveling handknobs (9.1, fig. 3-100).

NOTE

The length of each leg may have to be adjusted, using the leg length locking handknobs (8, fig. 3-100), if the ground is not level enough to allow the leveling of the antenna using the leveling handknobs (9.1, fig. 3-100).

l. Emplace the three tripod spades to secure the antenna pedestal.

CAUTION

To prevent damage to the IFF antenna assembly remote installation during high winds, place sandbags on each leg of the tripod to increase the stability of the tripod.

m. Check the tripod level indicators and re-level, if necessary, by adjusting the four handknobs (9.1, fig. 3-100) as required.

n. Position the IFF receiver-transmitter near the tripod, and emplace the ground rod between the tripod and the IFF receiver-transmitter.

o. Connect a ground cable between the IFF antenna pedestal ground lug and the ground rod.

p. Connect the second ground cable between the ground lug on the IFF receiver-transmitter and the ground rod.

q. Connect the two rf cables between the IFF antenna pedestal and receiver-transmitter as shown in figure 3-103.

r. Connect the Y-data cable to the IFF antenna pedestal and receiver-transmitter as shown in figure 3-103.

s. Connect one end of the cable to the Y-data cable, and the other end to the IFF remote connector J25 on the IPCP cable entry panel.

4-45.5. Emplacement Procedures — Helicopter TO BE SUPPLIED LATER

Section XV. EMPLACEMENT OF ELECTRICAL CABLE ASSEMBLY SET AN/GSA-130

4-46. General

This section describes the procedures for emplacement of the electrical cable assembly set in either the improved HAWK battery or IAFU. These typical procedures, when followed, provide for rapid emplacement of the electrical cable assembly set.

a. *Types of Cables.* The improved HAWK air defense guided missile system uses two types of cables: power cables and data cables. All power cables are identical, and are 375 feet (114.3 meters) long. They have a male connector on one end, and a female connector on the other end. The male connector is always connected to the generator, and the female connector to the major item. The data cables are either 35 or 375 feet (10.67 or 114.3 meters) long, and have identical connectors on each end.

b. *Test Connectors.* When two or more data cables are to be connected to any one major item, the cables may be connected incorrectly. Therefore, a test connector, located on the IBCC, ICC or IPCP, IHIPR, ILSCB, and IROR is used to identify cable runs. An indicator lamp, used in conjunction with the test connector, is located next to each data cable connector. With standby power applied to the major item, a data cable is first connected to the test connector. The data cable is then connected to the connector adjacent to the illuminated indicator lamp.

c. *Cable Layout.* Figures 4-7 and 4-8 illustrate typical cable-laying procedures for the improved HAWK battery and IAFU, respectively. In each illustration, where the procedures are identical, the order and direction of the cables to be laid are given only once. However, the number of cables to be laid is indicated.

d. *RL-31 Cable Reeler.* A typical procedure used by cable crews for laying cables with the RL-31 cable reeler is described below.

(1) With the shaft of the RL-31 cable reeler inserted through the cable reel, place the reel in the reeler (fig. 3-106).

(2) Secure the reel in place with the reel retainers.

(3) Remove the clamp holding the connector associated with the outer layer of the cable.

(4) Hold the cable reeler in place, and lay the cable.

(5) When the entire cable is laid, release the remaining connector from the reel and remove the empty reel.

4-47. Typical Cable-Laying Procedures for the Improved HAWK Battery (Fig. 4-7)

NOTE

All cable connections to the ILCHR's, generators, and radars are made before the cable is connected to the IBCC, ICC or IPCP, and ILSCB. This method allows the crew chief to determine ILCHR's 1, 2, and 3, and the battery commander to determine firing sections A and B by directing the appropriate cable connections.

NOTE

The cable-laying procedures listed below are so arranged that only the test connectors and indicator lamps at the IBCC, ICC or IPCP, and ILSCB are used. The following typical detailed procedures provide information necessary for laying the cables.

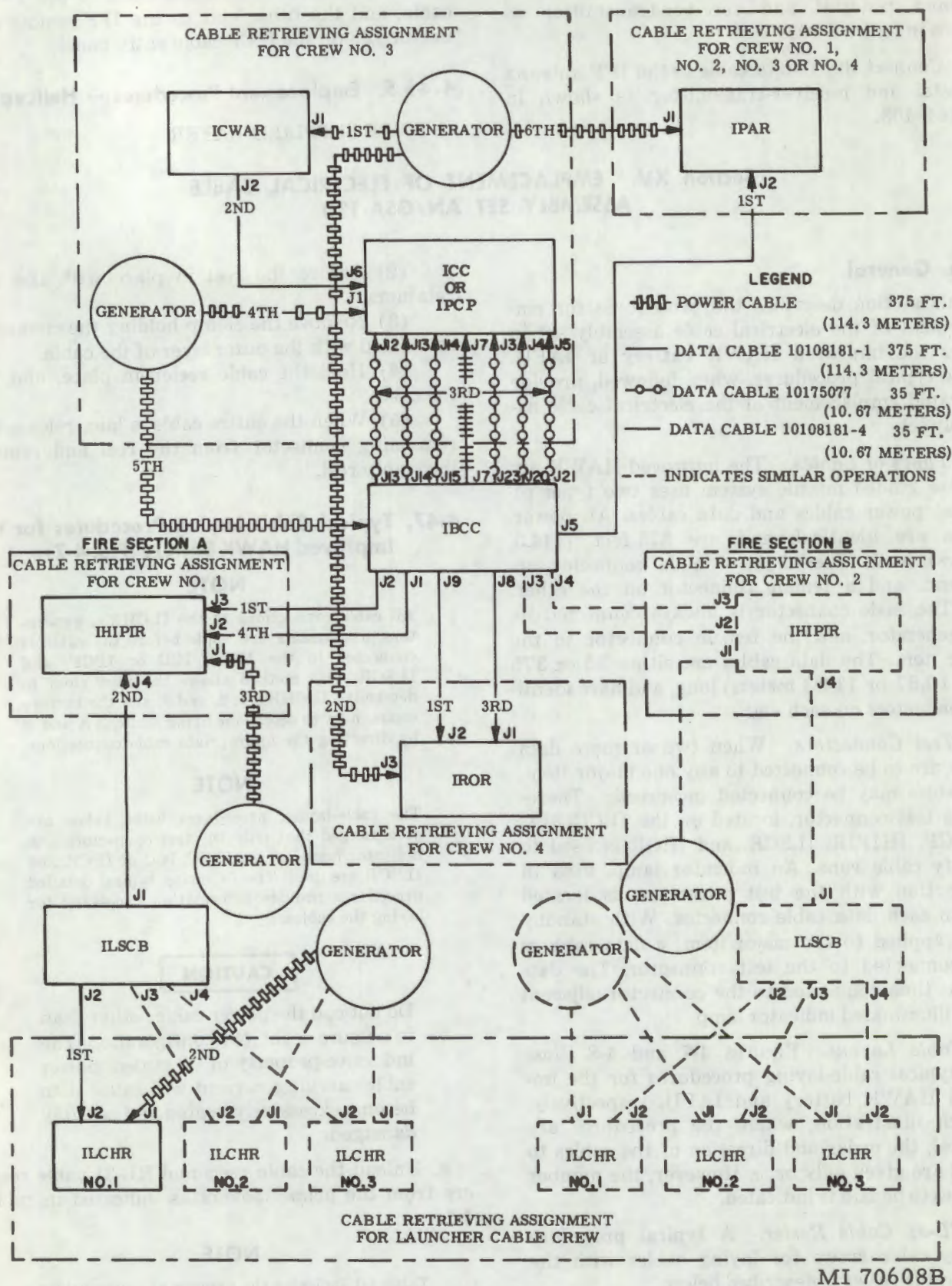
CAUTION

Do not coil the power cables other than in a figure eight (8) configuration. The inductive property of a coiled power cable carrying current will cause it to become excessively heated and possibly damaged.

a. Unload the cable reels and RL-31 cable reelers from the prime movers as indicated in table 4-1.

NOTE

Table 4-1 indicates the number of power cables, data cables, and cable reelers to be unloaded at each major item. Table 4-1 also indicates from which prime mover the equipment is to be unloaded.



MI 70608B

Figure 4-7. Improved HAWK battery electrical cable assembly set layout—typical—block diagram.

Table 4-1. Cable Reel and RL-31 Cable Reeler Placement Chart—
Improved HAWK Battery—Typical

Equipment to be unloaded from indicated prime movers	FOR THE PRIME MOVER FOR:													
	Each IHIPIR (3 data)	IROR (5 data)			ICWAR (1 power) (1 data)		IPAR (5 data)		Each ILCHR (1 data)	Generators (4) (2 power)		Generator (2) (2 power)		
	unload at each IHIPIR	unload at IROR	unload at ICC or IPCP	unload at ICC or IPCP	unload at ICWAR	unload at IPAR	unload at ICC or IPCP	unload at each ILCHR	unload at each IHIPIR	unload at each ILCHR	unload at IPAR	unload at IBCC	unload at ICC or IPCP	unload at IROR
Power cable					1					1	1	1	1	1
Data cable	3	2	3	1		1	4	1						
BL-31 cable reeler	1	1	1		1	1		1				1		

b. The cable crews lay the cables as follows:

(1) Cable crew No. 1 lays the cable for firing section A as described below.

(a) At the IHIPIR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the IHIPIR, connect the female connector to J1.

(b) At the IHIPIR, place a data cable reel in the cable reeler, and lay the cable to the IBCC. At the IHIPIR, connect the cable to J2.

(c) At the IHIPIR, place a data cable reel in the cable reeler, and lay the cable to the ILSCB. At the IHIPIR, connect the cable to J3.

(d) At the IHIPIR, place a data cable reel in the cable reeler, and lay the cable to the ILSCB. At the IHIPIR, connect the cable to J4.

(2) Cable crew No. 2 lays the cables for firing section B as described in (1) above.

(3) Cable crew No. 3 lays the cables for the acquisition group as described below.

(a) At the ICC or IPCP, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the ICC or IPCP, connect the female connector to J1.

(b) At the IPAR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the IPAR, connect the female connector to J1.

(c) At the IBCC, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the IBCC, connect the female connector to J10.

(d) At the ICWAR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the ICWAR, connect the female connector to J1.

(e) At the ICC or IPCP, place a 375-foot (114.3-meter) data cable reel in the cable reeler, and lay the cable to the ICWAR. At the ICC or IPCP, connect the cable to J2.

(f) At the ICC or IPCP, place a 35-foot (10.67-meter) data cable reel in the cable reeler, and lay the cable to the IBCC. At the ICC or IPCP, disconnect the connector from the empty cable reel and remove the reel from the reeler. Repeat this operation for the six remaining 35 feet (10.67-meter) data cables leading to the IBCC.

(4) Cable crew No. 4 lays the cables for the IROR as described below.

(a) At the IROR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the IROR, connect the female connector to J3.

(b) At the IROR, place a data cable reel in the cable reeler, and lay the cable to the IBCC. At the IROR, connect the cable to J2.

(c) At the IROR, place a data cable reel in the cable reeler, and lay the cable to the IBCC. At the IROR, connect the cable to J1.

(5) The first of the four cable crews to finish its respective procedure will lay the cable for the IPAR by performing the following operation. At the IPAR, place a data cable reel in the cable reeler, and lay the cable to the IBCC. At the IPAR, connect the cable to J2.

(6) The ILCHR cable crew lays the cables for each ILCHR as described below.

(a) At the ILCHR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four power connectors on the generator. At the ILCHR, connect the female connector to J1.

(b) At the ILCHR, place a data cable reel in the cable reeler, and lay the cable to the ILSCB. At the ILCHR, connect the cable to J2.

(7) Perform the procedures described below before performing the cable identification and connecting procedures in steps (8) through (10).

(a) Determine which IHIPIR and ILCHR combinations are to be designated firing section A and firing section B.

(b) Inform the personnel of each IHIPIR to set the cable identification switches to the positions which correspond to the firing sections determined in (a) above.

(8) Perform the procedures described below at the ILSCB.

(a) Request the IHIPIR personnel to energize the radars (TM 9-1430-533-12-1).

(b) Set the HPI CABLE IDENT/OFF switch to HPI CABLE IDENT. Connect each data cable, in turn, to connector J1 on the ILSCB until the panel lights on the ILSCB illuminate.

(c) Connect the data cable that causes the panel lamps to illuminate to connector J1 on the ILSCB. (This is the IHIPIR data cable).

(d) Determine which ILCHR's are to be designated 1, 2, and 3.

(e) Connect the data cables from ILCHR's 1, 2, and 3 to connectors J2, J3, and J4, respectively, on the ILSCB.

(f) Repeat steps (b) through (e) above for the other firing section.

(9) Perform the procedures described below at the IBCC.

(a) Request the IBCC personnel to energize the IBCC (TM 9-1430-526-12-1).

(b) At the cable entry panel, press the LAMP TEST switch and insure that the indicator lamp adjacent to each data cable connector illuminates.

(c) Connect a 375-foot (114.3-meter) data cable to the TEST connector, and observe which indicator lamp illuminates.

(d) Remove the data cable from the TEST connector and connect it adjacent to the lamp which illuminated in step (c) above.

(e) Repeat steps (c) and (d) above until the remaining 114.3-meter data cables are connected to the IBCC.

(f) Connect a 35-foot (10.67-meter) data cable (10108181) to connector J7.

(g) Connect six 35-foot (10.67-meter) data cables (10175077) to connectors J13, J14, J15, J20, J21, and J23 in any order.

(10) Perform the procedures below at the ICC or IPCP.

(a) At the main cable entry panel, press the LAMP TEST switch and insure that the indicator lamp adjacent to each data connector illuminates.

(b) Locate the two 10108181 data cables,

one 375 feet (114.3 meters) and one 35 feet (10.67 meters).

CAUTION

Do not insert 10108181 data cables into TEST CONN (46) connector J16, as this will cause an incorrect indicator lamp to illuminate and may also result in equipment damage.

(c) Connect one of the 10108181 data cables to TEST CONN (44) connector J15, and observe which indicator lamp illuminates.

(d) Remove the data cable from TEST CONN (44) connector J15, and connect it adjacent to the lamp which illuminated in step (c) above.

(e) Repeat steps (c) and (d) above for the remaining 10108181 data cable.

(f) Connect one of the 10.67-meter data cables (10175077) to TEST CONN (46) connector J16, and observe which indicator lamp illuminates.

(g) Remove the 35-foot (10.67-meter) data cable from TEST CONN (46) connector J16, and connect it adjacent to the indicator lamp which illuminated in step (f) above.

(h) Repeat steps (f) and (g) for the remaining 35-foot (10.67-meter) 10175077 data cables.

c. After all the cables are laid and connected, they must be protected from missile rocket motor blasts and vehicular traffic. This can be done by burying the cables or covering them with sandbags.

4-48. Cable Laying Procedure for the Improved HAWK Battery Minus the ICC

The following typical detailed procedures provide information necessary for laying the cables when the ICC is not being emplaced.

a. Perform the following steps of paragraph 4-47: a, b, c (1), c (2), c (3)(b), c (3)(c), c (3)(d), c (4) through c (8).

NOTE

The data cable from the ICWAR cannot be cable identified at the IBCC. Make position identification before connecting the cable to the IBCC.

b. Connect the 114.3 meter data cable from the ICWAR to the CWAR connector on the IBCC cable entry panel.

c. Connect a 114.3 meter data cable to the TEST connector, and observe which indicator lamp illuminates.

d. Remove the data cable from the TEST connector and connect it to the connector adjacent to the lamps which illuminated in step c above.

e. Repeat steps (c) and (d) above until the remaining 114.3 meter data cables are connected to the IBCC.

f. After all the cables are laid and connected, they must be protected from missile rocket motor blasts and vehicular traffic. This can be done by burying the cable or covering them with sandbags.

4-49. Emplacement Procedure—Helicopter

The electrical cable assembly set is transported by helicopter and will be emplaced at the discretion of the battery commander.

4-50. Typical Cable-Laying Procedures for the IAFU (Fig. 4-8)

The following typical procedures provide information necessary for laying the cables.

NOTE

All data cable connections to the ILCHR's are made before the cables are connected to the ILSCB. This method allows the crew chief to determine ILCHR's 1, 2, and 3 by directing the appropriate cable connections.

NOTE

The cable-laying procedures listed below are so arranged that only the test connectors (cable identification) and indicators at the ILSCB and IPCP are used.

CAUTION

Do not coil the power cables other than in a figure eight (8) configuration. The inductive property of a coiled power cable carrying current will cause it to become excessively heated and possibly damaged.

a. Unload the cable reels and RL-31 cable reelers from the prime movers as indicated in table 4-2.

b. Cable crew No. 1 lays the cables for the firing section as described below.

(1) At the IHIPIR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four connectors on the generator. At the IHIPIR, connect the female end to J1.

(2) At the IHIPIR, place a data cable reel in the cable reeler, and lay the cable to the IPCP. At the IHIPIR, connect the cable to J2.

(3) At the IHIPIR, place a data cable reel in the cable reeler, and lay the cable to the IPCP. At the IHIPIR connect the cable to J3.

(4) At the IHIPIR place a data cable reel in the cable reeler, and lay the cable to the ILSCB. At the IHIPIR, connect the cable to J4.

c. Cable crew No. 2 lays the cables for the IPCP and ICWAR as described below.

(1) At the IPCP, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four connectors on the generator. At the IPCP, connect the female connector to J1.

(2) At the ICWAR, place a power cable reel in the cable reeler, and lay the cable to the generator. At the generator, connect the male connector to one of the four connectors, and at the ICWAR connect the female connector to J1.

Table 4-2. Cable Reel and RL-31 Cable Reeler Placement Chart—IAFU—Typical

Equipment to be unloaded from indicated prime movers	FOR THE PRIME MOVER FOR						
	IHIPIR (3 data)	ICWAR (1 power) (1 data)		each ILCHR (1 data)	Generators (3) (6 power)		
	unload at IHIPIR	unload at ICWAR	unload at IPCP	unload at each ILCHR	unload at IHIPIR	unload at IPCP	unload at each ILCHR
Power cable		1			1	1	3
Data cable	3		1	1			
RL-31 cable reeler	1	1		1		1	

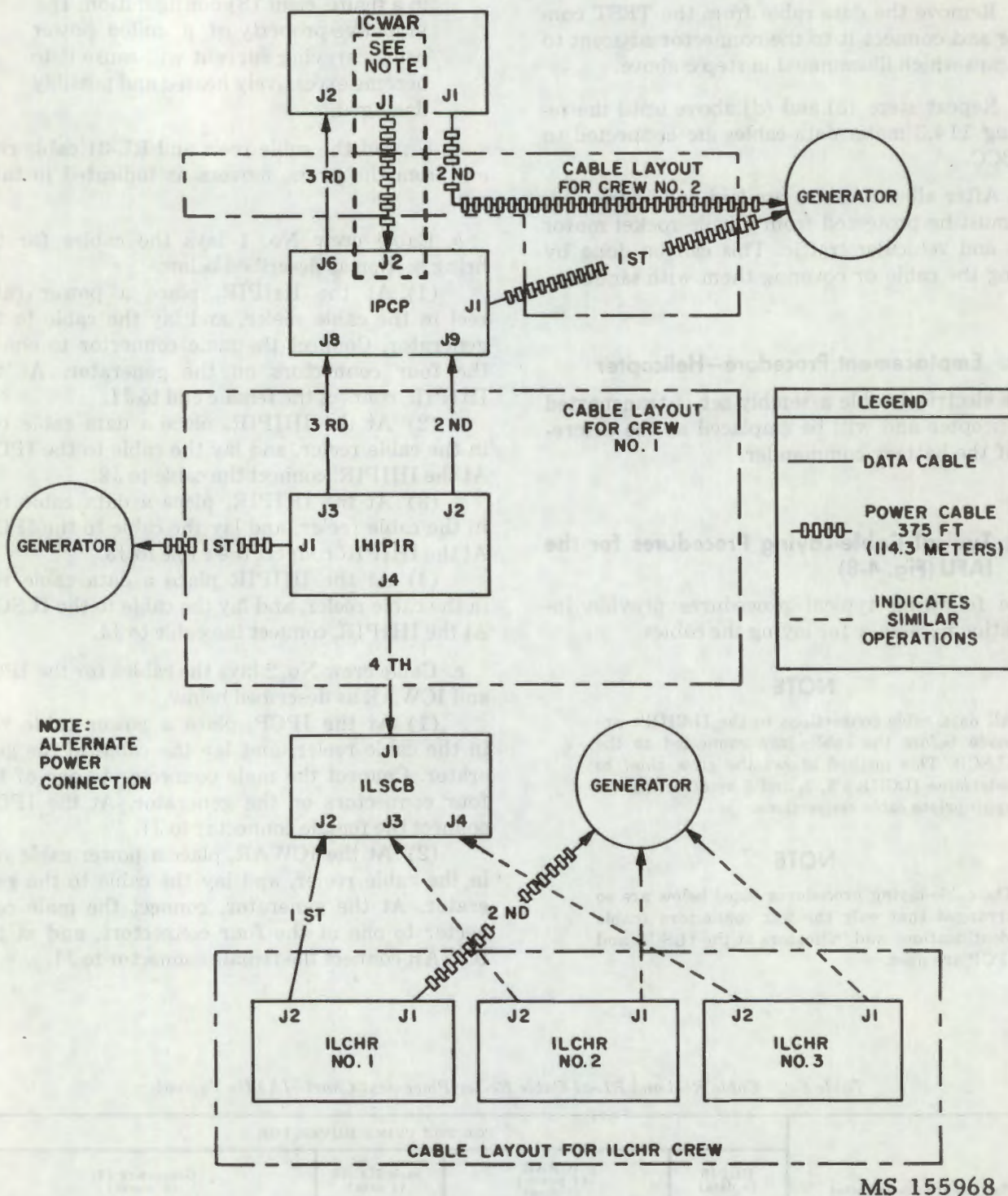


Figure 4-8. IAFU electrical cable assembly set layout—typical—block diagram.

(3) At the IPCP, place a data cable reel in the cable reeler, and lay the cable to the ICWAR. At the IPCP, connect the cable to J6.

d. The ILCHR cable crew lays the cables for each ILCHR as described below.

(1) At the ILCHR, place a power cable reel in the cable reeler, and lay the cable to the generator. Connect the male connector to one of the four connectors on the generator. At the ILCHR, connect the female connector to J1.

(2) At the ILCHR, place a data cable reel in the cable reeler, and lay the cable to the ILSCB. At the ILCHR, connect the cable to J2.

e. Perform the procedures described below at the ILSCB.

(1) Request the IHIPR personnel to energize the radar (TM 9-1430-533-12-1).

(2) Set the HPI CABLE IDENT/OFF switch to HPI CABLE IDENT. Connect each data cable, in turn, to connector J1 on the ILSCB, and observe which cable causes the cable identification (ID) lamp on the ILSCB front panel to illuminate. Connect this cable to connector J1 on the ILSCB.

(3) Determine which ILCHR's are to be designated 1, 2, and 3.

(4) Connect the data cables from ILCHR's 1, 2, and 3 to connectors J2, J3, and J4, respectively, on the ILSCB.

f. Perform the procedures described below at the IPCP.

(1) At the cable entry panel, press the LAMP TEST switch (1, fig. 3-103.2) and observe that

the indicator lamp adjacent to each data cable connector illuminates.

(2) Locate the three 10108181-1 375-foot (114.3 meter) data cables.

CAUTION

Do not insert 10108181-1 data cables into TEST CONN (46) connector J16, as this will cause an incorrect indicator lamp to illuminate and may also result in equipment damage.

(3) Connect one of the 10108181-1 data cables to TEST CONN (44) connector J15 on the IPCP cable entry panel, and observe which indicator lamp illuminates.

(4) Remove the data cable from TEST CONN (44) connector J15, and connect it to the connector adjacent to the lamp which illuminated in step (3) above.

(5) Repeat steps (3) and (4) above for the two remaining data cables.

g. After all the cables are laid and connected, they must be protected from missile rocket motor blasts and vehicular traffic. This can be done by burying the cables or covering them with sandbags.

4-51. Emplacement Procedure — Helicopter

The electrical cable assembly set is transported by helicopter and will be emplaced at the discretion of the unit commander.

CHAPTER 5

ELECTRICAL CABLE ASSEMBLY SET

Section I. GENERAL

5-1. Scope

This chapter contains descriptive and maintenance data for the improved HAWK electrical cable assembly set. The use of the cable identification test receptacle located on certain major items of the improved HAWK system is also discussed.

5-2. Explanation of Electrical Cable Assembly Set

The electrical cable assembly set is used to connect the various major items of the improved HAWK system into one complete battery (two firing sections), or into a battery minus (one firing section) and an IAFU. All power cables are identical; however, there are three types of data cables.

Section II. INTERUNIT CABLES

5-3. General

The electrical cable assembly set consists of 14 power cable assemblies and 26 data cable assemblies. These figures include one spare of each type of data cable assembly and one spare power cable assembly.

a. The power cable is made of four No. 8 AWG conductors. Two types of data cable consist of 42 conductors: forty No. 20 AWG and two 73-ohm coaxial conductors. The third type of data cable consists of 43 conductors: forty No. 20 AWG and three 73-ohm coaxial conductors.

b. The power cable assembly is 114.3 meters long, and has a four-prong male connector on the end which plugs into the generator. The other end

has a four-contact female connector which plugs into any of the major items.

c. The data cable assemblies are either 10.67 or 114.3 meters long, having female connectors on both ends. These connectors can be plugged into the data cable receptacle on any one of the major items having the correct number of connectors.

d. Paragraphs 5-6 through 5-9 of this chapter contain information for inspection and maintenance of the cable assemblies.

e. Table 5-1 contains a listing of the cable assemblies comprising the electrical cable assembly set. Detailed procedures for interconnecting the major items of an improved HAWK battery and an IAFU are described in Chapter 4, Section XV.

Table 5-1. Cable Assembly Data

CABLE TYPE	NUMBER REQUIRED	SPARES	PART NUMBER	CABLE WEIGHT	REEL PART NUMBER	REEL WEIGHT	CABLE-END DESIGNATION	TOTAL REELS W/CABLES	COMBINED WEIGHTS (REELS W/CABLES)
114.3-meter Power	13	1	9178555	175 lb	9179946	50 lb	"GEN" gen. end	14	3375 lb
10.67-meter Data	6	1	10175077	18 lb	9172110	53 lb	None	7	497 lb
10.67-meter Data	1	1	10108181-4	19 lb	9172110	53 lb	None	2	144 lb
114.3-meter Data	16	1	10108181-1	193 lb	9179947	50 lb	None	17	4131 lb

5-4. Conductor Functions

For improved HAWK conductor functions refer to TM 9-1425-525-12-2. For IAFU conductor functions refer to DTM 9-1425-525-12-5.

5-5. Test Receptacles

a. General. Each major item of equipment, except the ICWAR and ILCHR, is equipped with a test receptacle, located on the cable entry panel, which is used to identify data cable runs and origins. The data cable can be quickly and easily inserted into the test receptacle and withdrawn from it. A 28-vdc indicating lamp, located close to the data receptacle it identifies, is wired in series with certain contacts in the test receptacle and with a 28-vdc source coming from within the item of which the indicator is a part. When a data cable is inserted into the test receptacle, the indicating lamp that illuminates is dependent upon the wiring arrangement of the receptacle. Because of the different wiring arrangements (jumpers) of data cable receptacles, only the lamp indicating the true origin of the data cable inserted into the test receptacle will be illuminated. Stencilled markings near each receptacle identify the origin of the data cable that should be connected to it.

b. Items Connected by a Single Cable. All cable receptacles are marked to show the cable that should be connected to them. For this reason, the items connected by a single cable do not need an indicating test receptacle. Figure 5-1 shows the cable entry panel of an ILCHR, one of the major items using only one data cable.

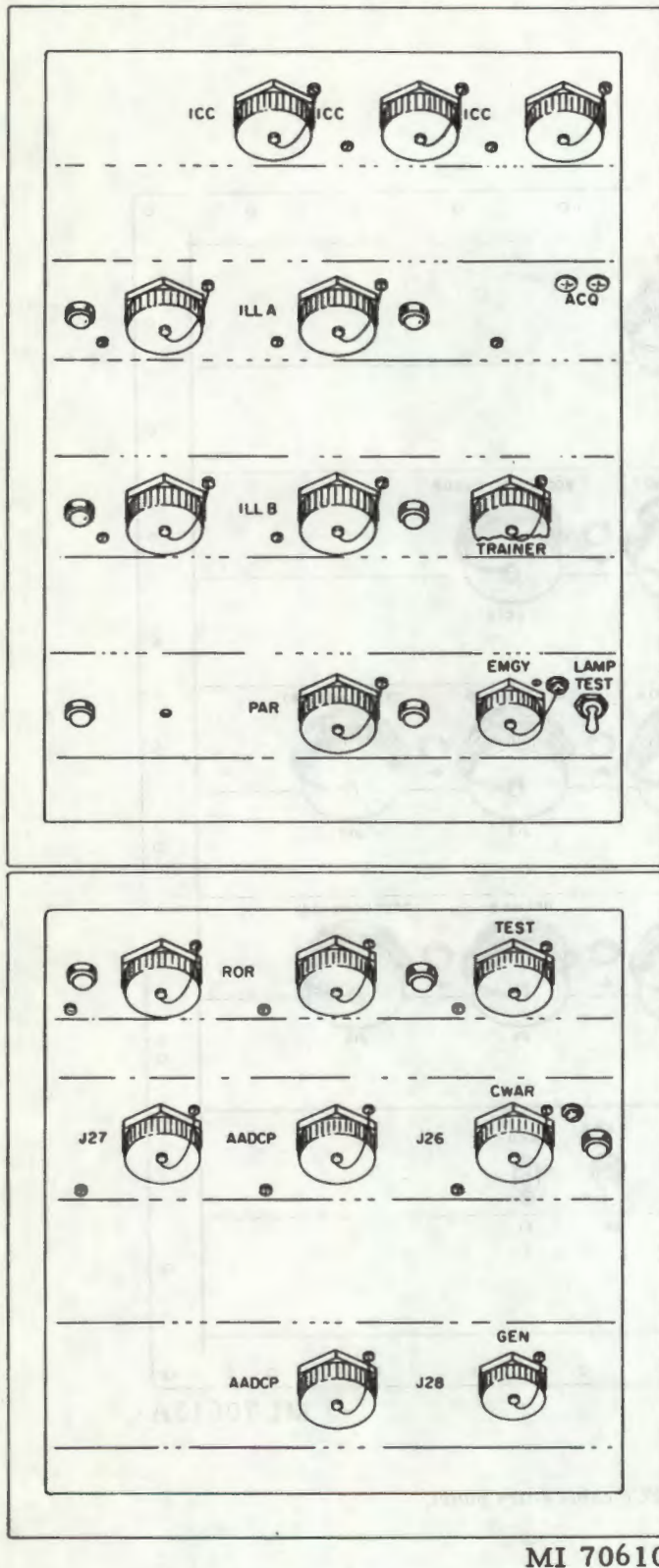
c. IH Battery Major Items Connected by Dual Cable Runs. The two IHIPIR's and the IROR are connected to the IBCC by dual cable runs.



Figure 5-1. ILCHR—cable entry panel.

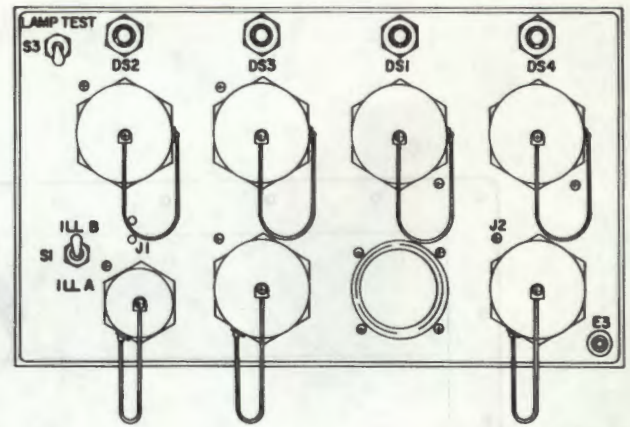
All six 375-foot (114.3-meter) data cables are interchangeable because of their identical construction. On each major item there are three similar receptacles for two data cables between the major item and the IBCC. One of the receptacles is a test receptacle, and the other two are the actual data cable receptacles. The IBCC has data cable receptacles (fig. 5-2) for each major item cable run and also a test receptacle. When data cable installation begins, the cables may be connected to either data cable receptacle on the major unit. At the IBCC, prior to connection, the cable connector is first plugged into the test receptacle. Because of the origin of the cable, an indicator lamp identifying the proper receptacle is energized. Illumination of the lamp indicates the receptacle to which the cable in the test receptacle should be connected. Figures 5-3 and 5-4 show the IHIPIR and IROR cable entry panels, respectively, that are connected by two or more cable runs. There are eight data cables connected to the ICC or IPCP; seven of which connect to the IBCC, the remaining one to the ICWAR. Of these eight data cables, six are identical 35-foot (10.67-meter) data cables (10175077), one is a 35-foot (10.67-meter) data cable (10108181-4), and one is a 375-foot (114.3-meter) data cable (10108181-1). The method of determining the correct cable connections is identical to that described above for cable connections between the IBCC and major items. The ICC and IPCP cable entry panels are shown in figure 5-5. Because an improved HAWK battery uses two IHIPIR's, an explanation of the IHIPIR data cable indicating circuitry is presented in subparagraph *d* below.

c.1. IAFU Major Items Connected by Dual Cable Runs. The IHIPIR is connected to the IPCP by two data cables. Both data cables are identical, therefore they are interchangeable. To insure that the same data cable is connected to the proper connector at the IHIPIR and IPCP, a test receptacle is provided on the IPCP cable entry panel (fig. 3-95) and IHIPIR cable entry panel (fig. 5-3). When data cable installation begins, one end of each data cable may be connected to either receptacle at the IHIPIR, or to the two corresponding connectors at the IPCP. Normally, one end of each data cable is connected to the receptacles located on the IHIPIR. At the IPCP, prior to connection, the opposite end of each cable is first connected to the test receptacle. Because of the origin of the cable, a cable identifier lamp on the IPCP cable entry panel illuminates indicating the proper receptacle to which the cable in the test receptacle should be connected.



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Figure 5-2. IBCC—cable entry panel.



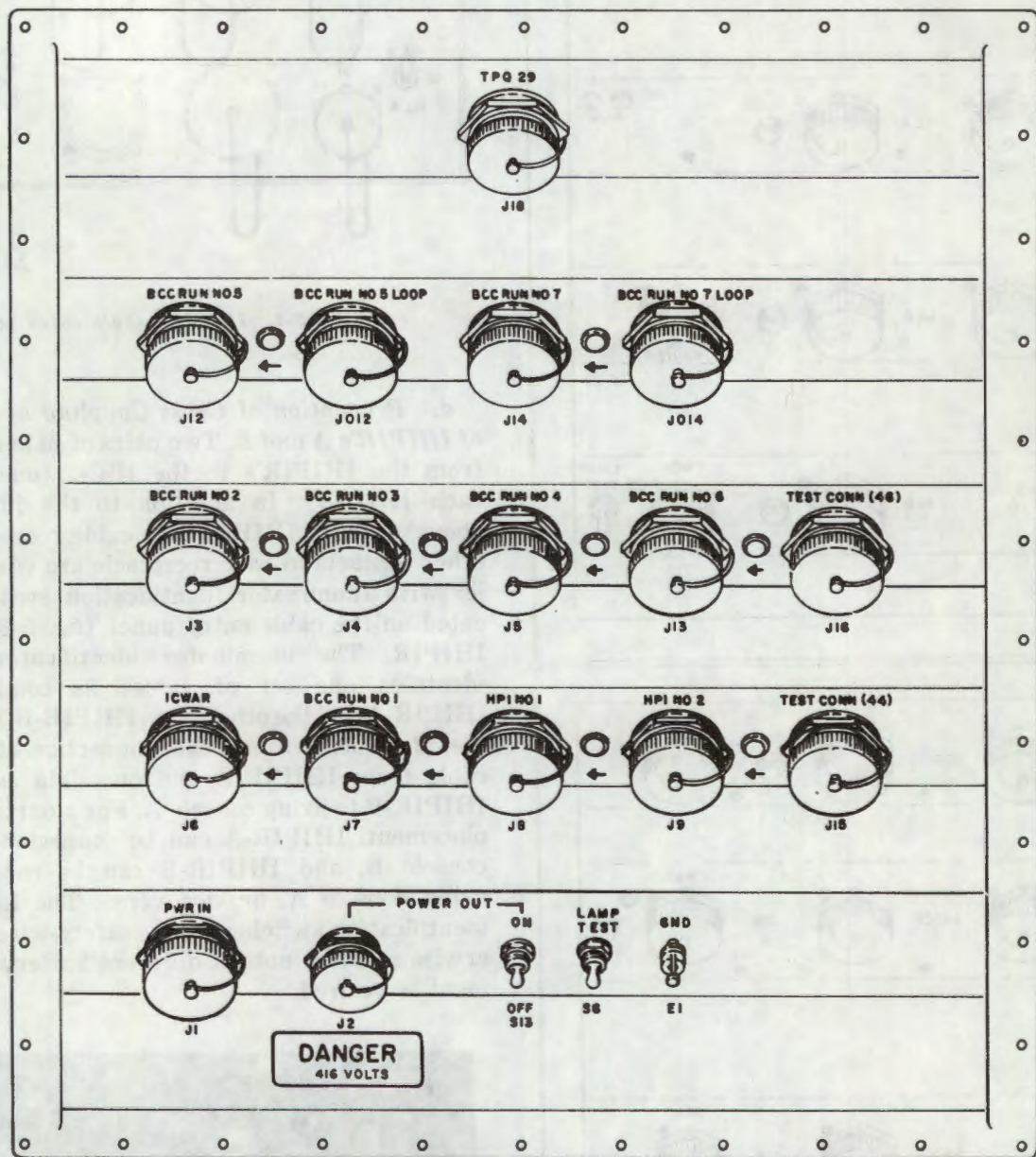
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Figure 5-3. IHIPIR—cable entry panel.

d. *Prevention of Cross Coupling at the IBCC of IHIPIR's A and B.* Two pairs of data cables run from the IHIPIR's to the IBCC (one pair for each—IHIPIR). In addition to the jumpers (a above) in each IHIPIR data cable receptacle, two other contacts in each receptacle are wired in series with illuminator identification switch S1 located on the cable entry panel (fig. 5-3) of each IHIPIR. The illuminator identification switch identifies one set of cables as coming from IHIPIR-A and the other from IHIPIR-B. For example, identification prevents connection of one data cable from IHIPIR-A and one data cable from IHIPIR-B to firing console A. For a particular emplacement, IHIPIR-A can be connected to firing console B, and IHIPIR-B can be connected to firing console A, or vice versa. The illuminator identification switches can be safety-wired, or otherwise secured, until a different battery arrangement is desired.

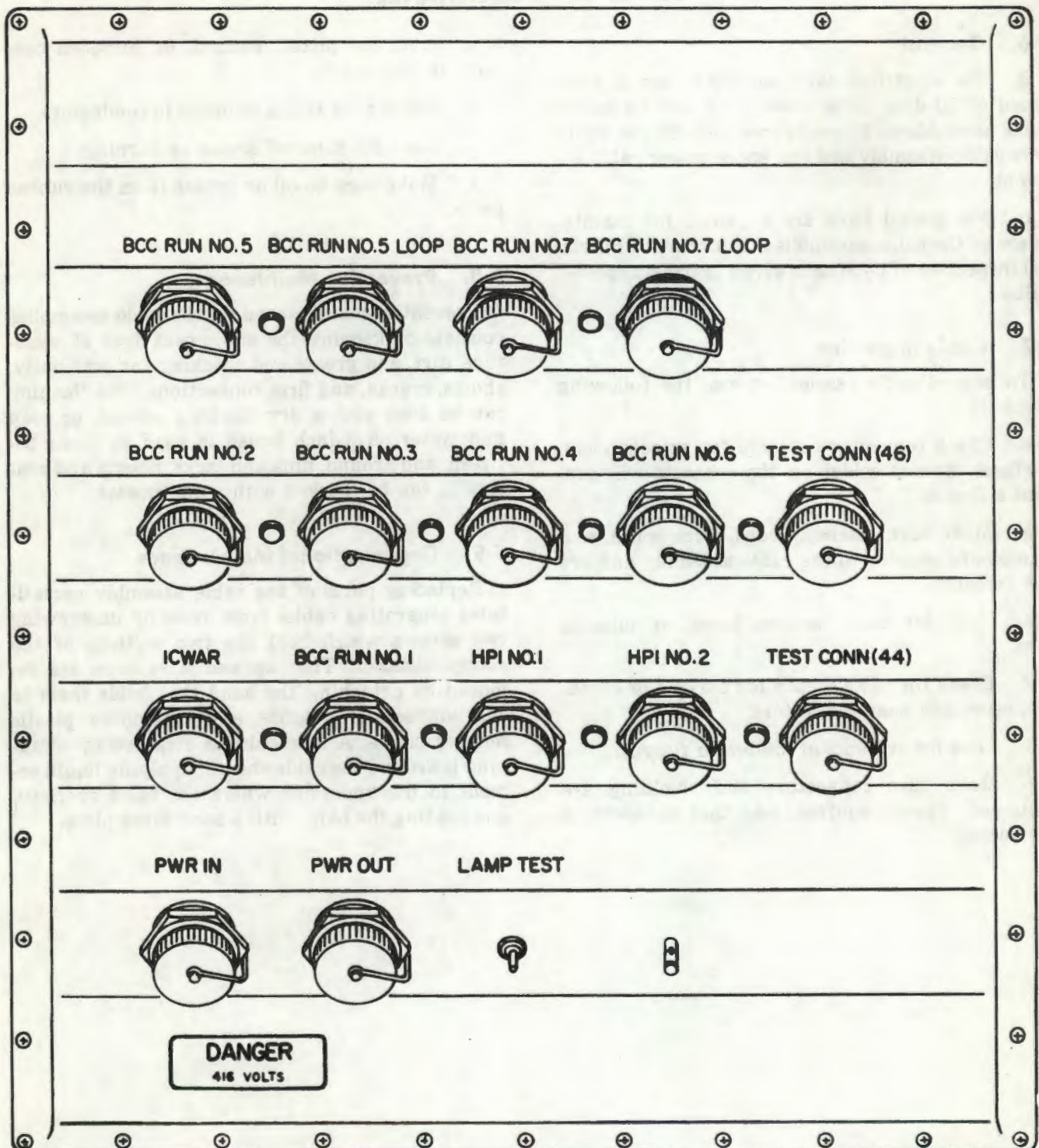


Figure 5-4. IROR—cable entry panel.



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Figure 5-5. ICC *(E)¹ and IPCP cable entry panel.¹Refer to appendix B for serial number effectivity.



MI 70614

Figure 5-6. ICC/TM—cable entry panel *(D)¹.

¹Refer to appendix B for serial number effectivity.

Section III. MAINTENANCE

5-6. General

a. The electrical cable assembly set is composed of 26 data cable assemblies and 14 power cable assemblies. These figures include one spare data cable assembly and one spare power cable assembly.

b. No special tools are required for maintenance of the cable assemblies. Information on visual inspection of cabling is given in paragraph 5-7 below.

5-7. Cable Inspection

To inspect cable assemblies, use the following checklist:

a. Check connector contacts for smooth clean surfaces. Excess solder on the contacts will prevent a firm fit.

b. Make sure assembly caps, wire ropes, and clamps are secured to the cable assembly and are not defective.

c. Look for bent, broken, loose, or missing pins.

d. Check the cable sheath for fraying or cracking, especially near connectors.

e. Look for evidence of mildew or fungus.

f. Make sure connectors and shielding are grounded, where required, and that connections are secure.

g. Look for pitted, burned, or corroded contacts in connectors.

h. Inspect for shorts or opens in conductors.

i. Look for signs of arcing or burning.

j. Make sure no oil or grease is on the rubber parts.

5-8. Preventive Maintenance

Preventive maintenance for the cable assemblies consists of keeping the equipment free of moisture, dirt, and grease and checking for continuity, shorts, cracks, and firm connections. The cleaning can be done with a dry cleaning solvent, or soap and water. A 1-inch brush is used to clean between, and around, pins and jacks. Shorts and continuity can be checked with a multimeter.

5-9. Organizational Maintenance

Replacing parts of the cable assembly necessitates separating cables from reels by unscrewing two screws which hold the two sections of the clamp together. The cap and wire rope are removed by detaching the band that holds them to the connector. A knife easily removes plastic marker bands. A new band is attached by wrapping it around the cable sheath, applying liquid cement to the underside where the band overlaps, and holding the band until a bond takes place.

CHAPTER 6

ORIENTING AND ALINING

Section I. IH BATTERY

6-1. Purpose

a. Accurate target firing data and successful target engagement largely depend on alinement of the improved HAWK battery. Alinement of the battery is accomplished after the IPAR has been oriented to a known azimuth reference. If the proper procedures are not carefully followed, misleading target information will be displayed on the major item scopes, and effective target engagement will be degraded.

b. Normally, the improved HAWK 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 ADCP, any available landmark may be used as a reference point for orienting the improved HAWK battery.

c. While there are several methods of orienting and alining the battery, only the optimum methods are discussed in this chapter. Paragraph 6-2 describes four methods of orienting and alining the mobile battery.

6-2. Methods of Orienting and Alining a Mobile Battery

There are four methods of orienting and alining a mobile battery, a primary and three alternates. Subparagraphs *a* through *d* below give a general description of the four methods.

a. *Primary Method.* When the battery is emplaced so that each major item has line of sight with the item to which it is alined, the primary method of orienting and alining is used. The IPAR is oriented and alined to a north azimuth reference or to any other known reference point to provide accurate target reference displays. The IFF (located atop the ICC, or remoted) is then alined to the IPAR. The IHIPIR's and ICWAR are then alined

h the IPAR. The IROR is then alined separately with each IHIPIR and the ILCHR's alined with their associated IHIPIR.

b. *First Alternate Method.* When the battery is emplaced so that one or more major items do not have line of sight with the item to which it is alined, the first alternate method of orienting and alining is used for that item. The cw radars and IFF antenna not having line of sight with the IPAR must be oriented to the same reference point used in orienting the IPAR. A different reference point may be used when the IROR is alined with each IHIPIR or when alining the ILCHR's with the IHIPIR's. However, use of the same reference point, when possible, will expedite alinement.

NOTE

The use of more than one reference point when alining the cw radars and the IFF antenna with the IPAR can seriously degrade the effectiveness of the battery. Tolerances inherent in surveying more than one reference point, and in calculating azimuths from more than one reference point with an M2 aiming circle, introduce errors of varying magnitudes depending upon which major items are alined to the same or to different reference points. Using only one common reference point insures that the major items of the battery will be alined with each other to a tolerance which is dependent upon the accuracy of the alinement telescopes and the mil ring indicators. The orientation of the entire battery to one known reference point (for example, north) is dependent upon the accuracy of the M2 aiming circle, and the known reference point being at least 305 meters from the radar being oriented.

c. *Second Alternate Method.* When the battery is emplaced, and an IPAR is not available, the ICWAR is oriented and alined to a north azimuth reference or to any known reference in place of the IPAR to provide accurate target reference displays. The IFF antenna and the IHIPIR's are alined with the ICWAR. The IROR is then alined separately with each IHIPIR and the ILCHR's alined with their associated IHIPIR.

d. *Third Alternate Method.* When the battery is emplaced, and both an IPAR and ICWAR are not available, the IFF antenna is oriented and alined to a north azimuth reference or to any known reference. The IHIPIR's are alined with the IFF antenna. The IROR is then alined separately with each IHIPIR and the ILCHR's alined with their associated IHIPIR.

6-3. Orientation and Alinement During Blackout Conditions

During blackout conditions, any of the four methods discussed in paragraph 6-2 above may be employed with the assistance of an M42 or M53 instrument light.

NOTE

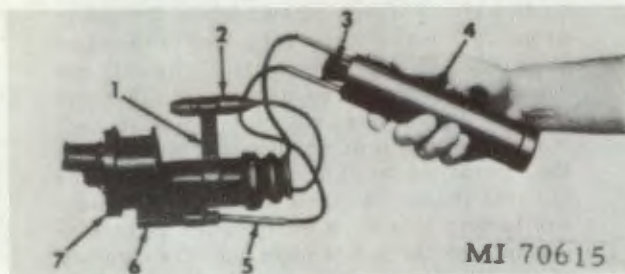
The key numbers shown below in parentheses refer to figure 6-1.

a. The M42 instrument light (4) is used in conjunction with the M90F alinement telescope on the IHIPIR, ICWAR, IPAR, and the IROR. 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 radars and the ILCHR's are sighted on the pen lights.

NOTE

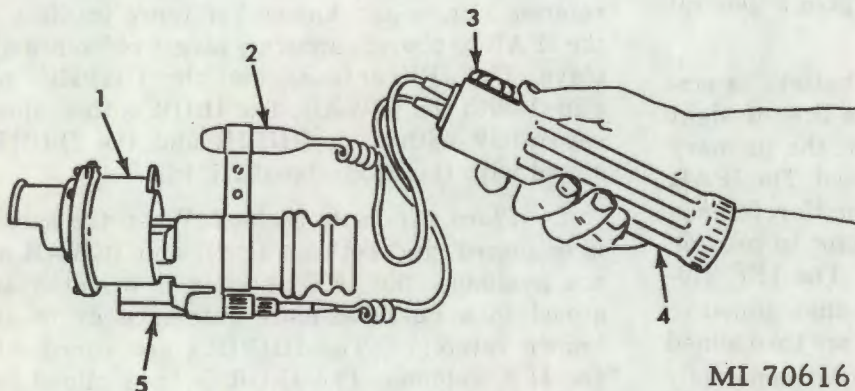
The key numbers shown below in parentheses refer to figure 6-2.

b. The M53 instrument light (4) is used with the M90F telescope on the ICC (IFF antenna)



- | | |
|------------------------|-----------------------|
| 1-Bracket | 5-Battery power lead |
| 2-Pen light | 6-Dovetail fitting |
| 3-Control switch | 7-Alinement telescope |
| 4-M42 instrument light | |

Figure 6-1. Mounting the M42 instrument light.



- | |
|------------------------|
| 1-Alinement telescope |
| 2-Pen light |
| 3-Control switch |
| 4-M53 instrument light |
| 5-Dovetail fitting |

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Figure 6-2. Mounting the M53 instrument light.

and the alinement telescope and fire cutout device on the ILCHR. It is similar to the M42 and also contains the pen light (2) for sighting. The control switch (3) is a different type and is mounted forward on the side of the instrument light. The M53 instrument light can be used in place of the M42 instrument light on the other major items.

6-4. Preliminary Procedures

Before orientation and alinement of the battery can be attempted, steps a through c below must be accomplished.

a. Emplace the improved HAWK mobile battery as described in paragraphs 4-1 through 4-49 (excluding pars. 4-45.1 through 4-45.4).

b. Energize the power generators in accordance with the instructions posted on the inside of the generator's panel, and set the output of the generators for 425 vac.

c. Establish interunit communications in accordance with detailed emplacement instructions for major units presented in paragraphs 4-1 through 4-49 (excluding pars. 4-45.1 through 4-45.4).

6-5. Synchro Control System

Detailed functional schematics of the synchro control system for the IH battery are contained in TM 9-1425-525-12-2, together with synchro alinement procedures for each major item.

6-6. System Orientation and Alinement Procedures

Perform the procedures in table 6-1 to orient and aline the mobile battery when the IPAR is available, the procedures in table 6-2 when the IPAR is not available, or the procedures in table 6-3 when both the IPAR and ICWAR are not available.

Table 6-1. System Orientation and Alinement Procedures with IPAR

Step	Operation	Normal indication	Corrective procedure
WARNING Insure that all major antenna safety switches are set to safe. NOTE Insure that all major items are energized in LOCAL STANDBY unless otherwise indicated. This procedure is directed from the IBCC.			
1.	Orient and Aline the IPAR.		
a.	Direct the IPAR personnel to:		
(1)	Set the SYSTEM CONTROL switch (3, fig. 6-8) to LOCAL.		
(2)	Set the antenna SAFE-OPERATE switch (2, fig. 6-3) to SAFE.		
(3)	Verify that the IPAR is level (refer to par. 4-19a(2)).		
(4)	Release the azimuth stow lock (1, fig. 6-3).		
(5)	Install the alinement telescope on the IPAR antenna (fig. 6-4).		
(6)	Rotate the antenna until the telescope is front sighted on the designated reference point.		
(7)	Secure the antenna in place with the azimuth stow lock.		
(8)	Loosen the wing locknuts (1, fig. 6-5) and the knurled locknuts (fig. 6-6).		
(9)	Rotate the azimuth mil ring indicator (3, fig. 6-5) until the vernier (2, fig. 6-5) indicates the azimuth bearing of the known reference point.		
(10)	Tighten the wing locknuts and the knurled locknuts.		
(11)	Release the azimuth stow lock and rotate the antenna until the vernier ring indicates 0 mils.		
(12)	Secure the antenna in place with the azimuth stow lock.		
b.	Set the test switch (2, fig. 6-7) to OPERATE.		
c.	Direct the IPAR personnel to:		
(1)	Set the SYSTEM CONTROL switch (3, fig. 6-8) to REMOTE.		
(2)	Press and hold the ANTENNA CT ZERO INDICATOR switch (2, fig. 6-9).		
(3)	Unlock and rotate the TRAILER POSITION COMPENSATOR ADJUSTMENT knob (4, fig. 6-9), clockwise until a fine null is obtained on the ANTENNA CT ZERO INDICATOR meter (3, fig. 6-9).		
(4)	Lock the TRAILER POSITION COMPENSATOR ADJUSTMENT knob without disturbing the meter null, and release the ANTENNA CT ZERO INDICATOR switch.		
d.	In the IBCC:		
	Set the SCAN MODE switch (1, fig. 6-10) to NORMAL.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
1e. Cont.		Rotate the SERVO GAIN control (1, fig. 6-7) clockwise until the TCC sweep (fig. 6-11) oscillates, and then counterclockwise just to the point at which sweep oscillation stops.	
f.		Adjust the correlation cursor handwheel, (2, fig. 6-14) until the correlation cursor is coincident with the sweep on the TCC indicator.	
NOTE To obtain an accurate mil indication from the CORRELATION CURSOR counter view the counter from a point directly above the counter window.			
g.		Observe the CORRELATION CURSOR counter (1, fig. 6-14).	
The CORRELATION CURSOR counter indicates 0 ± 6 mils. If the CORRELATION CURSOR counter indicates approximately 3200 mils, a false null was obtain in step c. Readjust the TRAILER POSITION COMPENSATOR ADJUSTMENT knob clockwise to the correct null by repeating step c.			
h.		Direct the IPAR personnel to:	
(1)		Press and hold the REMOTE SCOPE pushbutton (2, fig. 6-8).	
The PPI scope sweep (1, fig. 6-8) is positioned at 0 mils azimuth. Adjust the position of synchro B2 in the azimuth and range indicator (fig. 6-8).			
(2)		Release the REMOTE SCOPE pushbutton.	
2.		Aline the IFF Antenna.	
a.		Direct the IPAR personnel to reverse the alinement telescope on the IPAR antenna.	
b.		Direct the ICC personnel to:	
(1)		Energize the IFF in REMOTE (TM 9-1430-527-12-1).	
(2)		Set the ANT SYNC switch (3, fig. 6-12) to EXT.	
(3)		Set the ANT/SAFE OPERATE switch (8, fig. 3-94) to SAFE and the AZIMUTH DRIVE SAFE switch (13, fig. 3-97) to OFF (SAFE).	
(4)		If the IFF antenna is roof-mounted, insure that the ICC is level (refer to par. 4-44b(7)). If the IFF antenna is remotely installed, insure that the antenna is level (refer to par. 4-45n)).	
(5)		Slide the M-90F telescope and mounting bracket assembly into the telescope mount.	
c.		Direct the ICC and IPAR personnel to front sight the IFF antenna, and simultaneously backsight the IPAR antenna, until the vertical crosshair of the IFF telescope is vertically centered on the IPAR telescope and the IPAR telescope is vertically centered on the IFF telescope.	
d.		Direct the IPAR personnel to secure the IPAR antenna in place with the azimuth stow lock	

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
2e. Cont.	Direct the ICC personnel to:		
(1)	Loosen the three screws that secure the azimuth mil ring on the IFF antenna and set the mil ring to indicate the azimuth of the IPAR as indicated by the IPAR azimuth mil ring.		
(2)	Open the antenna control drawer and connect the ac voltmeter between A2J1-5 and chassis ground (5, fig. 6-44).		
(3)	Open the AZ ADJ access cover on the antenna control panel by loosening the captive retaining screw and loosen the AZ ADJ LOCK.		
(4)	Adjust the AZ ADJ control (1, fig. 6-12) clockwise until a null is obtained on the ac voltmeter.		
(5)	Tighten the AZ ADJUST LOCK. Close the AZ ADJ access cover and tighten securely.		
(6)	Remove the AC voltmeter leads and close the antenna control drawer.		
f.	Adjust the correlation cursor handwheel, (2, fig. 6-14) until the correlation cursor is coincident with the sweep on the TCC indicator.		
NOTE			
To obtain an accurate mil indication from the CORRELATION CURSOR counter view the counter from a point directly above the counter window.			
g.	Record the indication of the CORRELATION CURSOR counter (1, fig. 6-14).		
WARNING			
Insure that all personnel are clear of the IFF antenna.			
CAUTION			
Make certain that the antenna hoisting unit (4, fig. 3-93 or 3-94) is in the stowed position before performing the following steps.			
h.	Direct the ICC personnel to:		
(1)	Set the AZIMUTH DRIVE SAFE switch to ON.		
(2)	Set the ANT SAFE-OPERATE switch to OPERATE.		
The IFF antenna remains front sighted on the IPAR.			
If the IFF antenna rotates 3200 mils a false null was obtained in step 2e(4). Readjust the AZ ADJ control clockwise for the correct null on the ac voltmeter (the IFF antenna is front-sighted on the IPAR).			
(3)	Set the ANT SAFE-OPERATE switch to ANT SAFE.		
(4)	Set the AZIMUTH DRIVE SAFE switch to OFF.		
i.	Set the SCAN MODE switch to CW.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation Normal indication Corrective procedure
2j. Cont.	Direct the ICC personnel to:
(1)	Momentarily press the CASUALTY/CW ROTATE pushbutton (1, fig. 6-15) for a CASUALTY indication.
(2)	Set the ANT SYNC switch (3, fig. 6-12) to INT.
k.	Adjust the correlation cursor handwheel until the correlation cursor is coincident with the sweep on the TCC indicator. The CORRELATION CURSOR counter indicates within ± 10 mils of the indication recorded in step 2g. Adjust IFF azimuth synchro B3 located behind communication unit (2, fig. 3-93).
l.	Direct the ICC personnel to:
(1)	Momentarily press the CASUALTY/CW ROTATE pushbutton for a CW ROTATE indication.
(2)	Set the ANT SYNC switch to EXT.
m.	Set the SCAN MODE switch to NORMAL.
NOTE Once the antenna is installed, the angle of the antenna tilt must be adjusted.	
n.	Direct the ICC personnel to adjust the tilt of the IFF antenna as follows:
(1)	Unlock the three quick-disconnect pins (1, 2, 6, fig. 6-13).
(2)	Loosen the antenna upper stud nut (3, fig. 6-13).
(3)	Observe the antenna tilt indicator (4, fig. 6-13) and adjust the tilt adjust nut (5, fig. 6-13) to obtain maximum degree of tilt with respect to the horizon.
(4)	Tighten the upper stud nut, being careful not to change the adjustment.
(5)	Lock the three quick-disconnect pins.
NOTE Observe that the BCC R BUS lamp on the Fuse and Control panel is illuminated. Do not perform the alinement if the lamp is extinguished.	
3.	Aline the IHIPIR.
NOTE Observe that the BCC R BUS lamp on the Fuse and Control panel is illuminated. Do not perform the alinement if the lamp is extinguished.	
a.	Direct the ILCHR personnel to insure that all ILCHR's are in local control.
NOTE Perform steps b through s to aline IHIPIR A, and then repeat these steps to aline IHIPIR B. Use FCA controls when alining IHIPIR A, and FCB controls when alining IHIPIR B.	

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
3b. Cont.	Direct the IHIPIR personnel to:		
(1)	Insure that the PEDESTAL SAFETY switch (2, fig. 6-16) is set to SAFE		
(2)	Insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
(3)	Insure that the IHIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM circuit breaker (1, fig. 6-18) and the POWER AMPLIFIER BEAM circuit breaker (2, fig. 6-18) set to OFF.		
(4)	Install the alinement telescope on the IHIPIR antenna (fig. 6-19.)		
(5)	Insure that the IHIPIR is level (refer to par. 4-11b(10)).		
	NOTE		
	If line of sight exists between the IHIPIR and the IPAR, proceed directly to step <i>h</i> below; if not, perform steps <i>c</i> through <i>g</i> .		
	When the alternate method is being used to aline the IHIPIR with the IPAR, the reference point used must be located at least 305 meters from the IPAR and the IHIPIR. The M2 aiming circle must be located at this reference point and must be visible to both the IPAR and the IHIPIR. All azimuth bearings must be determined to the M2 aiming circle from the telescope of the IHIPIR being oriented.		
c.	Survey and emplace a stake, referenced to the IHIPIR center line, approximately 305 meters from the IHIPIR.		
	NOTE		
	Any known reference point may be used provided that it is the same reference direction to which the IPAR is alined.		
d.	Direct the IHIPIR personnel to front-sight the IHIPIR antenna on the reference stake.		
e.	Direct the IPAR personnel to front-sight the IPAR antenna on the reference stake.		
	NOTE		
	While the IHIPIR alines, the IPAR must remain oriented to the stake.		
f.	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-25) to the same azimuth as the IPAR as read from the IPAR azimuth mil ring.		
g.	Proceed to step <i>k</i> .		
h.	Direct the IPAR and IHIPIR personnel to front sight the IHIPIR antenna and simultaneously back sight the IPAR antenna until the vertical crosshair of the IHIPIR telescope is alined with the IPAR telescope and the IPAR telescope is vertically centered on the IHIPIR telescope. Secure the IPAR antenna in place with the azimuth stow lock.		
i.	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-25) to the same azimuth as the IPAR as read from the IPAR azimuth mil ring.		
j.	Set the SYSTEM ACCURACY TEST switch (1, fig. 6-20) to ON.		
k.	Set the test switch (2, fig. 6-7) to TEST ROTATE.		
	The azimuth repeatback mark on the FCC display (fig. 6-21) is coincident with the IHIPIR azimuth cursor.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
3l. Cont.	Set the SYSTEM ACCURACY TEST switch to OFF.		
m.	Set the test switch to OPERATE.		
n.	Position the cursor on top of the sweep on the FCC indicator, using the azimuth cursor handwheel (2, fig. 6-20).		
o.	Set the MANUAL ELEVATION control (1, fig. 6-22) to 0 mils.		
p.	Press the ELEVATION MANUAL pushbutton (3, fig. 6-20).		
q.	Set the test switch to TEST ROTATE.		
r.	Direct the IHIPIR personnel to:		
(1)	Set the LOCAL-REMOTE switch to REMOTE.		
(2)	Insure that the IHIPIR telescope is still alined with the IPAR telescope.		
(3)	At the IHIPIR pedestal, push the synchro adjust knob (2, fig. 6-23) down and slowly rotate it clockwise until a null is obtained on nulling meter M1 (4, fig. 6-23).		
(4)	Press fine null switch S1 (3, fig. 6-23), and simultaneously rotate the synchro adjust knob clockwise until a fine null is obtained. Release the fine null switch.		
(5)	Release the synchro adjust knob, and assure that the null indication remains on nulling meter M1.		
	The IHIPIR repeatback mark is positioned at the same azimuth as the cursor. If the IHIPIR repeatback mark is displaced 3200 mils from the cursor a false null was obtained in step 3r(3) above. Readjust the synchro adjust knob clockwise for the correct null and repeat steps 3r(3), (4), and (5).		
(6)	Set the MOTOR GENERATOR circuit breaker (2, fig. 6-24) to ON.		
	WARNING Insure that all personnel are clear of the IHIPIR antenna.		
(7)	Set the PEDESTAL SAFETY SWITCH to OPERATE.		
s.	Observe the position of the azimuth repeatback mark in the FCC indicator.		
	The azimuth repeatback mark is positioned at the same azimuth as the cursor.		
t.	Direct the IHIPIR personnel to set the PEDESTAL SAFETY switch to SAFE.		
4.	Aline the ICWAR.		
a.	Direct the ICWAR personnel to:		
(1)	Insure that the antenna SAFETY SWITCH (3, fig. 6-26) is set to SAFE.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
4a. Cont.			
(2)	Set the LOCAL-REMOTE switch (2, fig. 6-27) to LOCAL.		
(3)	Insure that the ICWAR is level (refer to par. 4-5b(13)).		
(4)	Place the ICWAR in the false radiate mode.		
(5)	Set the operating mode switch (1, fig. 6-27) to PULSE SLAVE.		
(6)	Install the alinement telescope on the ICWAR antenna (fig. 6-28).		
NOTE			
If line of sight exists between the ICWAR and the IPAR proceed directly to step <i>f</i> below; if not, perform steps <i>b</i> through <i>e</i> below.			
When the alternate method is being used to aline the ICWAR with the IPAR, the reference point used must be located at a distance of at least 305 meters from the IPAR and the ICWAR. The M2 aiming circle must be located at this reference point and must be visible to both the IPAR and the ICWAR. All azimuth bearings must be determined to the M2 aiming circle from the telescope of the ICWAR.			
<i>b.</i>	Survey and emplace a stake, referenced to the ICWAR center line, not less than 305 meters from the ICWAR.		
<i>c.</i>	Direct the ICWAR personnel to:		
(1)	Manually rotate the ICWAR antenna until the alinement telescope is sighted on the M2 aiming circle telescope.		
NOTE			
In high wind the antenna has to be held in place manually.			
If the M2 aiming circle telescope is not in the field of view of the ICWAR telescope, perform steps (a) and (b) below.			
(a)	Loosen the two elevation lock screws (4, fig. 6-28) to rotate the ICWAR telescope on its elevation axis.		
(b)	When the M2 aiming circle and ICWAR telescopes are alined with each other, secure the two elevation lock screws.		
(2)	Determine the azimuth bearing of the ICWAR telescope to the M2 aiming circle.		
<i>d.</i>	Direct the IPAR personnel to:		
(1)	Release the azimuth stow lock and rotate the IPAR antenna until the mil ring indicator (3, fig. 6-5) indicates the azimuth bearing of the M2 aiming circle from the ICWAR.		
(2)	Secure the IPAR antenna in place with the azimuth stow lock.		
(3)	Loosen the thumbscrews holding the azimuth scale (2, fig. 6-26).		
(4)	Position the azimuth scale to the azimuth of the M2 aiming circle.		
(5)	Tighten the thumbscrews.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
4. Cont.	NOTE		
	Inform the ICWAR personnel that the ICWAR antenna must be held in place manually and its telescope sighted continually on the M2 aiming circle, until the alinement procedures are completed.		
e.	Direct the ICWAR personnel to:		
(1)	Record the setting of the boresight compensator adjust knob (2, fig. 6-29).		
(2)	Turn the boresight shift compensator adjust knob to 0.		
(3)	Proceed to step <i>h</i> .		
f.	Direct the ICWAR personnel to:		
(1)	Record the setting of the boresight shift compensator adjust knob (2, fig. 6-29).		
(2)	Turn the boresight shift compensator adjust knob to 0.		
g.	Direct the IPAR and ICWAR personnel to front sight the ICWAR antenna and simultaneously back sight the IPAR antenna until the vertical crosshair of the ICWAR telescope is vertically centered on the IPAR telescope and the IPAR telescope is vertically centered on the ICWAR telescope. Secure the IPAR antenna in place with the azimuth stow lock.		
	NOTE		
	The ICWAR antenna must be manually held in place and its alinement telescope continually sighted on the IPAR telescope until the ICWAR alinement procedures are completed.		
	If the IPAR is not in the field of view of the ICWAR telescope, perform steps (1) and (2) below.		
(1)	Loosen the two elevation lock screws (4, fig. 6-28) to rotate the ICWAR telescope on its elevation axis.		
(2)	When the IPAR and ICWAR telescopes are alined with each other, secure the two elevation lock screws.		
h.	Direct the ICWAR personnel to:		
(1)	Loosen the thumbscrews holding the azimuth scale (2, Fig. 2-26).		
(2)	Position the azimuth scale to the azimuth bearing of the IPAR as indicated on the IPAR azimuth mil ring.		
(3)	Tighten the thumbscrews.		
i.	Set the test switch (2, fig. 6-7) to OPERATE.		
j.	Direct the ICWAR personnel to:		
(1)	Set the ICWAR LOCAL/REMOTE switch to REMOTE.		
(2)	Unlock the SYNCHRO CLUSTER ORIENT adjust knob (3, fig. 6-30), by releasing the adjust knob lock.		
(3)	Set servo BITE switch S1 (2, fig. 6-30) to position 6 (ALIGN COARSE).		
(4)	Push the SYNCHRO CLUSTER ORIENT adjust knob down and rotate it clockwise until a null indication is obtained on servo BITE meter M1 (1, fig. 6-30).		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
4j. Cont.	(5) Set the servo BITE switch to position 7 (ALIGN FINE), and rotate the SYNCHRO CLUSTER ORIENT adjust knob clockwise to obtain a fine null on servo BITE meter M1. (6) Release the SYNCHRO CLUSTER ORIENT adjust knob. (7) Lock the adjust knob lock and check that servo BITE meter M1 still indicates a null. (8) Set the servo BITE switch to OPR.		
	NOTE Make certain that the CASUALTY/CW ROTATE switch in the ICC is in the CW ROTATE position.		
k.	Observe the sweep on the CWTDC (fig. 6-31) and the TCC, set the SCAN MODE switch to CW, then return it to NORMAL. The sweep does not move more than ± 2 mils. If the sweep moves more than ± 2 mils and line of sight does not exist between the ICWAR and the IPAR, repeat steps <i>b</i> through <i>d</i> and <i>i</i> through <i>k</i>; if line of sight does exist, repeat steps <i>g</i> through <i>k</i>. If the sweep moves 3200 mils a false null was obtained in step <i>j</i>(4). Repeat steps <i>g</i> through <i>k</i>, if line of sight exists; if line of sight does not exist, repeat steps <i>b</i> through <i>d</i> and <i>i</i> through <i>k</i>. In either case, in steps <i>j</i>(4) readjust the SYNCHRO CLUSTER ORIENT adjust knob clockwise to the correct null. WARNING Insure that all personnel are clear of the ICWAR antenna.		
l.	Direct the ICWAR personnel to: (1) Set the ANTENNA SAFETY switch to OPERATE and insure that the AZIMUTH AMPLIDYNE circuit breaker is set to ON. The azimuth of the ICWAR antenna does not change. (2) Set the ANTENNA SAFETY switch to SAFE. (3) Remove and stow the ICWAR telescope.		
m.	Direct the IPAR personnel to remove and stow the IPAR telescope. WARNING Insure that all personnel are clear of the ICWAR and IPAR antennas.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
4 n. Cont.	Insure that the SYSTEM CONTROL switch (3, fig. 6-8) on the IPAR azimuth and range indicator is set to REMOTE.		
o.	Direct the ICWAR personnel to set the ICWAR antenna SAFETY switch to OPERATE.		
p.	Direct the IPAR personnel to set the SAFE-OPERATE switch to OPERATE.		
q.	Press the RADIATE pushbutton (1, fig. 6-32).		
	The ICWAR and IPAR antennas rotate.		
r.	Direct the ICWAR personnel to:		
(1)	Open the antenna control and power supply drawer (1, fig. 6-33), connect an ac voltmeter across R1 (3, fig. 6-33), and adjust R36 (2, fig. 6-33) for a null on the ac voltmeter.		
	The ac voltmeter indicates 500 mvrms maximum.		
	Adjust R21 (1.1, fig. 6-33) 1/4 turn clockwise, then readjust R36 for a null. Repeat this procedure until the normal indication is obtained.		
	The ICWAR and IPAR antennas rotate in synchronism.		
(2)	Remove the ac voltmeter and close the antenna control and power supply drawer.		
5.	Aline the IROR.		
	NOTE		
	IHIPIR A must be alined to the IROR before IHIPIR B during IROR alinement. If IHIPIR A is not available aline IHIPIR B using the procedure for IHIPIR A.		
	If line of sight does not exist between the IROR and the IHIPIR's, but line of sight does exist between the IROR and the reference point used in orienting the IPAR, this reference point should be used to expedite the alinement procedure. If line of sight does not exist between the IROR and the reference point used in orienting the IPAR, a new reference point must be established. This reference point must be located at least 305 meters from the IROR and the IHIPIR being alined, and may be different for each IHIPIR. The M2 aiming circle must be located at this reference point and be visible to the IROR and the IHIPIR. All azimuth measurements must be made from the M2 aiming circle to the IROR and the IHIPIR being alined.		
	WARNING		
	Insure that no personnel stand less than 4.6 meters in front of the radiating side of the IROR antenna, since the IROR may be radiating when the LOCAL-REMOTE switch is in the REMOTE position.		
a.	Direct the IHIPIR personnel to insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
b.	Set the power switch on the IROR electronic control amplifier to ON.		
c.	Direct the IROR personnel to:		
(1)	Insure that the LOCAL-REMOTE switch (9, fig. 6-34) is set to LOCAL.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
5c. Cont.			
(2)	Set the RADIATE-STANDBY switch (10, fig. 6-34) to STANDBY.		
(3)	Set the SAFETY switch (5, fig. 6-35) to SAFE.		
(4)	Insure that the IROR is level (refer to par. 4-14b(15)).		
			NOTE The steel tape is graduated in meters. If it is not possible to measure the distance from the IROR to IHIPIR A or IHIPIR B because of the terrain, the distance must be calculated or obtained by some other means.
(5)	Measure and record the distance between the IROR pedestal center and the IHIPIR A pedestal center.		
(6)	Measure and record the distance between the IROR pedestal center and the IHIPIR B pedestal center.		
(7)	Install the alinement telescope on the IROR telescope mount (fig. 6-36).		
			WARNING Insure that all personnel are clear of the IROR antenna.
(8)	Set the SAFETY switch to OPERATE.		
			NOTE If line of sight exists between the IHIPIR's and the IROR, perform steps <i>d</i> through <i>g</i> ; if not, proceed to step <i>h</i> below.
d.	Backsight the IROR antenna on the IHIPIR antenna by adjusting the IROR azimuth and elevation handwheels (8 and 11, fig. 6-34) until the IROR telescope is pointing at the IHIPIR telescope.		
e.	Direct the IHIPIR personnel to:		
(1)	Set the PEDESTAL SAFETY switch (2, fig. 6-16) to SAFE.		
(2)	Manually position the IHIPIR antenna to 0 mils elevation and engage the elevation STOW lock (1, fig. 6-16).		
			NOTE If the IROR telescope is not in the IHIPIR telescope field of view, loosen the two elevation lock screws and rotate the IHIPIR telescope on its axis to bring the IROR telescope into view. Then tighten the two lock screws.
(3)	Manually rotate the IHIPIR antenna to sight on the IROR telescope.		
			WARNING Insure that all personnel are clear of the IHIPIR antenna.

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation Normal indication Corrective procedure
5e. Cont.	
(4)	Set the LOCAL-REMOTE switch to REMOTE.
f.	Direct the IROR personnel to:
(1)	Set the SERVO FIL circuit breaker on the power distribution panel to OFF.
(2)	Set the SAFETY switch to SAFE, and wait 3 minutes before proceeding.
(3)	Manually position the IROR antenna until the IROR telescope is sighted on the IHIPIR telescope.
g.	Proceed to step <i>k</i> .
h.	Direct the IHIPIR personnel to:
(1)	Front sight the IHIPIR antenna on the M2 aiming circle telescope using the azimuth and elevation handwheels.
(2)	Place the antenna SAFETY switch to the SAFE position.
	NOTE Wait 3 minutes before proceeding.
(3)	Manually position the IHIPIR antenna to 0 mils elevation and engage the elevation STOW lock (1, fig. 6-16).
	NOTE If the M2 aiming circle telescope is not in the IHIPIR telescope field of view, loosen the two elevation lock screws and rotate the IHIPIR telescope on its axis to bring the M2 aiming circle telescope into view. Then tighten the two lock screws.
(4)	Manually rotate the IHIPIR antenna to sight on the M2 aiming circle telescope.
	WARNING Insure that all personnel are clear of the IROR antenna.
i.	Direct the IROR personnel to:
(1)	Place the SAFETY switch (5, fig. 6-35) to OPERATE.
(2)	Backsight the IROR antenna on the M2 aiming circle by adjusting the azimuth and elevation handwheels (8 and 11, fig. 6-34).
(3)	Set the SERVO FIL circuit breaker on the power distribution panel to OFF.
	NOTE Wait 3 minutes before proceeding.
(4)	Place the SAFETY switch to SAFE.
(5)	Manually position the antenna until the alinement telescope is pointing exactly at the M2 aiming circle telescope.

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
5 i. Cont.			
(6)	At the M2 aiming circle, determine and record the azimuth angle between the IHIPIR and the IROR. Note whether the IHIPIR is to the left or right of the IROR from the M2 aiming circle.		
j.	Direct the IHIPIR personnel to:		
(1)	If the IHIPIR is to the left of the IROR as noted in step i(6) above, rotate the azimuth handwheel clockwise 3200 mils plus the azimuth angle recorded in step i(6) above.		
(2)	If the IHIPIR is to the right of the IROR as noted in step i(6) above, rotate the azimuth handwheel clockwise 3200 mils minus the azimuth angle recorded in step i(6) above.		
k.	Direct the IROR personnel to:		
			NOTE The IROR antenna must be manually held in place and its telescope continually sighted on the IHIPIR or M2 aiming circle telescope, until the alinement procedures in steps (1) through (9) below are completed.
(1)	Rotate the appropriate DISTANCE TO ILLUM handwheels (5 and 7, fig. 6-34) for IHIPIR A or IHIPIR B until the adjacent METERS indicators (4 and 6, fig. 6-34) indicate zero.		
(2)	Set the LOCAL-REMOTE switch to REMOTE.		
(3)	Set the SERVO FIL circuit breaker on the power distribution panel to ON.		
(4)	Request the IBCC personnel to (Receive only) call the IROR from firing console A. When the IROR is being alined with IHIPIR B, request the IBCC personnel to call the IROR from firing console B.		
(5)	Rotate the appropriate CLUSTER ADJUST handwheel (1 or 3, fig. 6-34) clockwise for IHIPIR A or IHIPIR B until the azimuth parallax computer indicator (2, figure 6-34) indicates zero.		
(6)	When the IROR is being alined with IHIPIR A, raise the locking lever (6, fig. 6-35) and adjust the CLUSTER ORIENT ILLUMINATOR #1 control clockwise (4, fig. 6-35) until a null is obtained on the null meter (2, fig. 6-35). When the IROR is being alined with IHIPIR B, raise the locking lever (7, fig. 6-35) and adjust the CLUSTER ORIENT ILLUMINATOR #2 control (3, fig. 6-35) clockwise until a null is obtained on the null meter (2, fig. 6-35).		
			NOTE IHIPIR A must be alined to the IROR before IHIPIR B during IROR alinement.
(7)	Press and hold the null meter sensitivity switch (1, fig. 6-35) and adjust the appropriate CLUSTER ORIENT control clockwise for a null indication on the null meter.		
(8)	Turn the locking lever to lock the appropriate CLUSTER ORIENT control without disturbing the meter null.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation
5k. Cont.	
(9)	Release the CLUSTER ORIENT control and the null meter sensitivity switch.
	WARNING Insure that all personnel are clear of the IROR antenna.
(10)	Set the SAFETY switch to OPERATE.
	The azimuth of the IROR antenna does not change. If the IROR antenna rotates 3200 mils, a false null was obtained in step k(6). Repeat steps b through i, and in step k(6) readjust the CLUSTER ORIENT control clockwise to the correct null.
(11)	Set the SERVO FIL circuit breaker on the power distribution panel to OFF.
(12)	Set the SAFETY switch to SAFE.
	NOTE If alinement is being made to the M2 aiming circle telescope the normal indication below will be the M2 aiming circle telescope not the IHIPIR telescope.
(13)	Sight through the IROR telescope.
	The IROR telescope is pointing directly at the IHIPIR telescope. NOTE In the following step, set the azimuth mil ring on the IROR to the same azimuth mil indication as IHIPIR A only.
(14)	Set the azimuth mil ring on the IROR to the same azimuth mil indication of the IHIPIR.
(15)	Remove and stow the alinement telescope.
	WARNING Insure that all personnel are clear of the IROR antenna.
(16)	Set the SAFETY SWITCH to OPERATE.
(17)	Notify the IBCC personnel that the IROR alinement with the IHIPIR's has been completed.
l.	Press the ROR RELEASE pushbutton on the appropriate firing console.

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
6.	Check Alinement.		
	NOTE Insure that all major items are energized in REMOTE STANDBY and all antenna safe-operate switches are in SAFE unless otherwise directed.		
	NOTE To obtain accurate mil indication from the CORRELATION CURSOR counter always view the counter from a point directly above the counter window.		
a.	Direct the IPAR, ICWAR, IHIPIR-A, and IHIPIR-B personnel to position their antennas to 800 mils as read on their respective azimuth mil ring.		
b.	Direct the ICC personnel to:		
	NOTE The battery check portion of the operational tape will not load while performing step (1) below.		
(1)	Load the operational program in accordance with TM 9-1430-527-12-1.		
(2)	Set the READER POWER switch (4, fig. 2-7) to ON.		
(3)	Set the INSTRUCTION INPUT switches on the CPU panel to 06044042.		
(4)	Press the EXECUTE pushbutton 1 time.		
	The tape advances to the battery check routine portion of the tape and stops.		
(5)	Set the DATA INPUT switches on the CPU panel to 40000101.		
(6)	Set the LOCAL/REMOTE switch to REMOTE.		
(7)	Press the DTO MANUAL RESET pushbutton.		
(8)	Press the CPU RESET pushbutton.		
(9)	Press the DISPLAY ENABLE pushbutton.		
(10)	Press the START/STEP/PULSE pushbutton 2 times.		
	The battery check portion of the operational program is loaded and executed.		
	The printer readout indicates: ACQ 793 to 807 mils.		
	HPI A indicates 793 to 807 mils.		
	HPI B indicates 793 to 807 mils.		
c.	Set the SCAN MODE switch to CW.		
d.	Direct the ICC operator to insure that the CASUALTY/CW ROTATE switch on the auxiliary control unit is set to CW ROTATE.		
e.	Repeat steps b (7) through (10).		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation Normal indication Corrective procedure
6f. Cont.	Direct the ICWAR personnel to return the boresight shift compensator adjust knob to the setting recorded in step 4e(1).
7.	Aline the ILCHR. WARNING Perform the following procedures in the exact sequence given to prevent injury to personnel. a. Direct the IHIPIR personnel to: WARNING Insure that all personnel are clear of the IHIPIR antenna. (1) Set the LOCAL-REMOTE switch (4, fig. 6-17) to LOCAL. (2) Set the PEDESTAL SAFETY SWITCH (2, fig. 6-16) to SAFE. (3) Position the IHIPIR antenna to 0 mils elevation and engage the elevation STOW lock (1, fig 6-16). b. Direct the ILCHR personnel to: (1) Set the ILSCB SAFE-OPERATE switch (2, fig. 6-37) for the ILCHR being alined to SAFE. (2) On the LC, set the LOCAL-REMOTE switch (5, fig. 6-38) to LOCAL and the MAIN POWER switch (1, fig. 6-38) to OFF. (3) Install the LC on its tripod 3 meters or more from the ILCHR. (4) Insure that the ILCHR is level (refer to par. 4-23a(19)). (5) Obtain the telescope support bar (2, fig. 6-39) from its storage location. (6) Install the telescope support bar in the brackets (3, fig. 6-39) provided on the rear of the ILCHR chassis, on the side away from the IHIPIR. Secure the telescope support bar lock (4, fig. 6-39). (7) Remove the alinement telescope and fire cutout assembly (1, fig. 6-39) from the ILCHR forward compartment. (8) Install the alinement telescope and fire cutout assembly on the telescope support bar (fig. 6-39). Secure the alinement telescope and fire cutout assembly lock (6, fig. 6-40). Remove the cutout assembly cover and loosen the telescope locks. NOTE Ignore obstructions at ranges greater than 2 kilometers.

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
7b. Cont.			
(9)	Using the alinement telescope and fire cutout assembly telescope, scan the horizon and determine the elevation angle of the highest obstruction by reading the elevation indicator (7, fig. 6-40).		
(10)	Transfer the alinement telescope and fire cutout assembly and support bar to the opposite side of the ILCHR and repeat step (9) above.		
(11)	Set the azimuth override lever (2, fig. 6-41) to the detent which is between 100 and 150 mil above the highest obstruction noted in steps (9) and (10) above.		
(12)	Adjust the telescope to an elevation of 90 mils.		
(13)	Scan the horizon and determine the elevation angle of the highest obstruction occupying a sector greater than four switches wide (400 mils). Repeat from the other side of the ILCHR. (a) If the obstruction sector is not greater than four switches wide set the minimum elevation lever (1, fig. 6-41) and the elevation fire interrupter lever (1, fig. 6-42) to 150 mils. (b) If the obstruction sector exceeds four switches and the azimuth override lever (2, fig. 6-41) is set at or below 600 mils, set the minimum elevation lever (1, fig. 6-41) and the elevation fire interrupter lever (1, fig. 6-42) to 200 mils below the setting of the azimuth override lever (2, fig. 6-41) selected in step (11) above. (c) If the obstruction sector exceeds four switches and the azimuth override lever (2, fig. 6-41) is set above 600 mils, scan the horizon to determine the lowest elevation angle at which no obstruction is more than four switches then set the minimum elevation lever (1, fig. 6-41) and the elevation fire interrupter lever (1, fig. 6-42) to 60 mils above that angle.		
NOTE If the minimum elevation lever setting in step 13(c) exceeds 400 mils relocate the ILCHR or set the minimum elevation lever to 200 mils and accept high probability of misfire.			
(14)	Adjust the telescope to an elevation of 60 mils below the setting of the minimum elevation lever. Scan the horizon and set all azimuth cutouts by setting the appropriate fire cutout switches (4, fig. 6-40).		
WARNING The minimum elevation lever shall under no circumstances be set to greater than 400 mils. Do not set the minimum elevation control to less than 150 mils in step c.			

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
7c. Cont.	At the IHIPIR, set the minimum elevation control (2, fig. 6-43) of the stowed synchro (1, fig. 6-43) to 40 mils above the highest fire interrupter setting of any ILCHR of that firing section.		
	NOTE		
	If a line of sight exists between the ILCHR and IHIPIR, proceed directly to step <i>d</i> below; if a line of sight does not exist, perform steps <i>d</i> through <i>h</i> and <i>k</i> through <i>u</i> .		
	NOTE		
	When performing steps <i>d</i> through <i>h</i> below, the reference point should be located at least 305 meters from the ILCHR and IHIPIR. The M2 aiming circle must be located at this point and must be visible to both the ILCHR and the IHIPIR.		
<i>d.</i>	Locate a reference stake at least 305 meters from the ILCHR and IHIPIR.		
<i>e.</i>	Direct the IHIPIR personnel to front sight the IHIPIR antenna on the reference stake. Insure that the IHIPIR antenna does not move until step <i>p</i> is completed.		
<i>f.</i>	Direct the ILCHR personnel to sight the ILCHR alinement telescope on the reference stake.		
<i>g.</i>	Using the M2 aiming circle, determine and record the azimuth angle between the IHIPIR and the ILCHR being alined. Observe if the IHIPIR is to the left or right of the ILCHR being alined.		
<i>h.</i>	Direct the ILCHR personnel as follows:		
(1)	If the IHIPIR is to the left of the ILCHR being alined, rotate the ILCHR alinement telescope counterclockwise (ccw) for the azimuth angle recorded in step <i>g</i> above.		
(2)	If the IHIPIR is to the right of the ILCHR being alined, rotate the ILCHR alinement telescope clockwise (cw) for the azimuth angle recorded in step <i>g</i> above.		
(3)	Remove the alinement telescope and fire cutout assembly from the telescope support bar. Remove the support bar and install it in the ILCHR front compartment. Connect P9 to J2 and P10 to J1.		
(4)	Proceed to step <i>k</i> .		
<i>i.</i>	Direct the IHIPIR and ILCHR personnel to front sight the IHIPIR antenna and simultaneously back sight the ILCHR telescope until the vertical crosshair of the IHIPIR telescope is vertically centered on the ILCHR telescope and the ILCHR telescope is vertically centered on the IHIPIR telescope. Insure that the IHIPIR antenna does not move until step <i>q</i> is completed.		
<i>j.</i>	Direct the ILCHR personnel to:		
(1)	Adjust the telescope until the crosshairs are alined with the centerline of the IHIPIR telescope.		
(2)	Lock the telescope in the azimuth position by tightening the azimuth lock (5, fig. 6-39) when the crosshairs are alined with the centerline of the IHIPIR telescope assembly.		
(3)	Remove the alinement telescope and fire cutout assembly from the telescope support bar and install it in the ILCHR forward compartment. Connect P9 to J2, and P10 to J1.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation Normal indication Corrective procedure
7k. Cont. (1) NOTE If the ALIGN meter does not indicate in step 7k(2) below, insure that the cable connections made in step 7j(3) above have been made correctly. (2) (3) (4) (5) (6) (7) WARNING Clear all personnel from the area of the boom radius of rotation before performing the next operation. (8) (9) NOTE Perform steps 7l through 7p only if time is not critical or if a discrepancy is suspected in step 7k(9) above.	Direct the ILCHR personnel to: Set and hold the ALIGN/OPERATE switch (3, fig. 6-41) to ALIGN. Set and hold the ALIGN NULL/COARSE/FINE switch (6, fig. 6-41) to ALIGN NULL and rotate the differential generator COARSE ADJUST control (5, fig. 6-41) until a null (less than 6 volts) is indicated on the ALIGN meter (4, fig. 6-41). Release the ALIGN NULL/COARSE/FINE switch (COARSE) and rotate the differential generator COARSE ADJUST control clockwise only until another null is indicated on the ALIGN METER. Set and hold the ALIGN NULL/COARSE/FINE switch to FINE and carefully rotate the differential generator COARSE ADJUST control a small amount in either direction until a fine null is obtained. Release the ALIGN NULL/COARSE/FINE switch. Release the ALIGN/OPERATE switch. Stow the telescope support bar. Set the MAIN POWER switch (1, fig. 6-38) to MAIN POWER, and set the HYD PRESS switch (4, fig. 6-38) to HYD PRESS. Set the ALIGN switch (3, fig. 6-38) to ALIGN. The launcher boom slews to the azimuth and elevation position of the IHIPIR antenna. Direct the ILCHR personnel to: Set the ALIGN switch (3, fig. 6-38) to OFF. Set the HYD PRESS switch (4, fig. 6-38) to OFF. Set the MAIN POWER switch (1, fig. 6-38) to OFF. Mount the ILCHR boom boresight telescope support and the boresight telescope on the rear outrigger of the ILCHR.
l. (1) (2) (3) (4)	Direct the ILCHR personnel to: Set the ALIGN switch (3, fig. 6-38) to OFF. Set the HYD PRESS switch (4, fig. 6-38) to OFF. Set the MAIN POWER switch (1, fig. 6-38) to OFF. Mount the ILCHR boom boresight telescope support and the boresight telescope on the rear outrigger of the ILCHR.

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
7l. Cont.	NOTE If a line-of-sight exists between the ILCHR and IHIPIR, proceed directly to step <i>n</i> below; if a line-of-sight does not exist, perform step <i>m</i> below.		
<i>m.</i>	Direct the ILCHR personnel to:		
(1)	Front sight the boresight telescope on the reference stake and record the mil indication on the azimuth mil ring.		
(2)	If the IHIPIR is to the left of the ILCHR being alined (as observed in step 7c(4) above) subtract the angle recorded in step 7c(4) above from the recorded indication in step <i>m</i> (1) above.		
(3)	If the IHIPIR is to the right of the ILCHR being alined (as observed in step 7c(4) above) add the angle recorded in step 7c(4) above to the recorded indication in step <i>h</i> (1) above.		
	WARNING Clear all personnel from the area of the boom radius of rotation before performing the next operation.		
(4)	Set the MAIN POWER switch to MAIN POWER.		
(5)	Set the HYD PRESS switch to HYD PRESS.		
(6)	Set the ALIGN switch to ALIGN.		
	The launcher slews to the position indicated in step 7 <i>m</i> (2) or 7 <i>m</i> (3) as appropriate.		
<i>n.</i>	Direct the ILCHR personnel to:		
	WARNING Clear all personnel from the area of the boom radius of rotation before performing the next operation.		
(1)	Set the MAIN POWER switch to MAIN POWER and set the HYD PRESS switch to HYD PRESS.		
(2)	Set the ALIGN switch to ALIGN.		
<i>o.</i>	Direct the IHIPIR personnel to front sight the IHIPIR telescope on the ILCHR boresight telescope and maintain this sighting until the following step is completed.		
<i>p.</i>	Direct the ILCHR personnel to back sight through the ILCHR telescope.		
	The ILCHR boresight telescope vertical crosshair is aligned on the IHIPIR telescope within 10 mils.		

Table 6-1. System Orientation and Alinement Procedures with IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
7q. Cont.	At the IHIPIR, rotate the IHIPIR antenna to the center of the fire section sector, or to the desired stow azimuth of the ILCHR.		
r.	Direct the ILCHR personnel to:		
(1)	Note that the ILCHR slewed to the IHIPIR stowed azimuth and note the mil indication below the red indicator on the ILCHR azimuth mil ring.		
(2)	Rotate the azimuth handwheel (2, fig. 6-38) until it indicates the same azimuth as step <i>m</i> (1) above. This is the stow azimuth of the ILCHR.		
(3)	Set the ALIGN switch to OFF.		
s.	At the IHIPIR, manually rotate the antenna to 0 mils azimuth.		
WARNING			
The ILCHR will slew during steps (1) and (4) below.			
t.	Direct the ILCHR personnel to:		
(1)	Set the ALIGN switch on the LC to ALIGN.		
(2)	Record the mil indication below the red indicator on the azimuth mil ring. This value will be used in ILCHR alinement checks (TM 9-1430-526-12-1).		
(3)	Observe the elevation indicator located on the side of the elevation actuator trunnion.		
The elevation indicator indicates within 1/16 inch of 0.			
(4)	Set the ALIGN switch to OFF.		
The ILCHR slews to the stow azimuth of the ILCHR.			
(5)	Repeat steps <i>a</i> through <i>t</i> for the remaining ILCHR's.		
u.	Inform the IHIPIR personnel that the ILCHR alinement has been completed.		

Table 6-2. System Orientation and Alinement Procedures Without IPAR

Step	Operation	Normal indication	Corrective procedure
WARNING Insure that all major item antenna safety switches are set to safe. NOTE Insure that all major items are energized in LOCAL STANDBY unless otherwise indicated. This procedure is directed from the IBCC.			
1.	Orient and Aline the ICWAR.		
a.	Direct the ICWAR personnel to:		
(1)	Insure that the antenna SAFETY SWITCH (3, fig. 6-26) is set to SAFE.		
(2)	Set the LOCAL-REMOTE switch (2, fig. 6-27) to LOCAL.		
(3)	Insure that the ICWAR is level (refer to par. 4-5b(13)).		
(4)	Set the operating mode switch (1, fig. 6-27) to LOCAL SYNCHRO.		
(5)	Install the alinement telescope on the ICWAR antenna (fig. 6-28).		
(6)	Manually rotate the ICWAR antenna until the vertical crosshair of the alinement telescope is front sighted on the known reference point.		
NOTE In high winds the antenna must be held in place manually.			
(7)	Loosen the thumbscrews holding the azimuth scale (3, fig. 6-26) and set the azimuth of the known reference point and tighten the thumbscrews.		
(8)	Manually rotate the ICWAR antenna until the azimuth scale indicates 0 mils.		
(9)	Set the azimuth handwheel on the fuse and control panel to 0 mils.		
(10)	Record the setting of the boresight shift compensator adjust knob (2, fig. 6-29).		
(11)	Turn the boresight shift compensator knob to 0.		
(12)	Unlock the SYNCHRO CLUSTER ORIENT adjust knob (3, fig. 6-30) by releasing the adjust knob lock.		
(13)	Set the servo BITE switch (2, fig. 6-30) to position 6 (ALIGN COARSE).		
(14)	Push the SYNCHRO CLUSTER ORIENT adjust knob down and rotate it clockwise until a null indication is obtained on servo BITE meter M1 (1, fig. 6-30).		
(15)	Set the servo BITE switch to position 7 (ALIGN FINE), and rotate the SYNCHRO CLUSTER ORIENT adjust knob clockwise to obtain a fine null on servo BITE meter M1.		
(16)	Release the SYNCHRO CLUSTER ORIENT adjust knob, lock it, and check that servo BITE meter M1 still indicates a null.		
(17)	Set the servo BITE switch to OPR.		

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation Normal indication Corrective procedure
1 a. Cont. (18)	Set the ICWAR LOCAL/REMOTE switch to REMOTE. NOTE Make certain that the ICC CASUALTY/CW ROTATE switch is set to CW ROTATE. b. Set the SCAN MODE switch (1, fig. 6-10) to CW. c. Set the test switch (2, fig. 6-7) to OPERATE. d. Rotate the SERVO GAIN control (1, fig. 6-7) clockwise until the TCC sweep (6, fig. 6-11) oscillates, and then counterclockwise just to the point at which sweep oscillation stops. e. Adjust the correlation cursor handwheel (2, fig. 6-14) until the correlation cursor is coincident with the sweep on the TCC indicator. NOTE To obtain an accurate mil indication from the CORRELATION CURSOR counter view the counter from a point directly above the counter window. f. Observe the CORRELATION CURSOR counter (1, fig. 6-14). The CORRELATION CURSOR counter indicator 0 ± 6 mils.
2. a. b. (1) (2) (3) (4) (5) c. d. (1) (2)	Aline the IFF Antenna. Direct the ICWAR personnel to reverse the alinement telescope on the ICWAR antenna. Direct the ICC personnel to: (1) Energize the IFF in REMOTE (TM 9-1430-527-12-1). (2) Set the ANT SYNC switch (3, fig. 6-12) to EXT. (3) Set the ANT/SAFE OPERATE switch (8, fig. 3-94) to SAFE and the AZIMUTH DRIVE SAFE switch (13, fig. 3-97) to OFF (SAFE). (4) If the IFF antenna is roof-mounted, insure that the ICC is level (refer to par. 4-44b(7)). If the IFF antenna is remotely installed, insure that the antenna is level (refer to par. 4-45n)). (5) Slide the M-90F telescope and mounting bracket assembly into the telescope mount. c. Direct the ICC and ICWAR personnel to frontsight the IFF antenna, and simultaneously backsight the ICWAR antenna, until the vertical crosshair of the IFF telescope is vertically centered on the ICWAR telescope and the ICWAR telescope is vertically centered on the IFF telescope. d. Direct the ICC personnel to: (1) Loosen the three screws that secure the azimuth mil ring on the IFF antenna and set the mil ring to indicate the azimuth of the ICWAR as indicated by the ICWAR azimuth mil ring. (2) Connect the ac voltmeter and connect it between A2J1-5 and ground (1, fig. 6-44).

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation
	Normal indication Corrective procedure
2d. Cont.	
(3)	Open the AZ ADJ access cover on the antenna control panel by loosening the captive retaining screw and loosen the AZ ADJ LOCK.
(4)	Adjust the AZ ADJ control clockwise (1, fig. 6-12) until a null is obtained on the ac voltmeter.
(5)	Remove the AC voltmeter leads.
e.	Adjust the correlation cursor handwheel, (2, fig. 6-14) until the correlation cursor is coincident with the sweep on the TCC indicator.
	NOTE To obtain an accurate mil indication from the CORRELATION CURSOR counter view the counter from a point directly above the counter window.
f.	Record the indication of the CORRELATION CURSOR counter (1, fig. 6-14).
	WARNING Insure that all personnel are clear of the IFF antenna.
	CAUTION Make certain that the antenna hoisting unit (4, fig. 3-93 or 3-94) is in the stowed position before performing the following steps.
g.	Direct the ICC personnel to:
(1)	Set the AZIMUTH DRIVE SAFE switch to ON.
(2)	Set the ANT SAFE-OPERATE switch to OPERATE.
	The IFF antenna remains front-sighted on the ICWAR. If the IFF antenna rotates 3200 mils a false null was obtained in step 2d(4). Readjust the AZ ADJ control clockwise for the correct null on the ac voltmeter (the IFF antenna is front-sighted on the ICWAR).
(3)	Set the ANT SAFE-OPERATE switch to ANT SAFE.
(4)	Set the AZIMUTH DRIVE SAFE switch to OFF.
h.	Set the SCAN MODE switch to CW.
i.	Direct the ICC personnel to:
(1)	Momentarily press the CASUALTY/CW ROTATE pushbutton (1, fig. 6-15) for a CASUALTY indication.
(2)	Set the ANT SYNC switch (3, fig. 6-12) to INT.

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
2j. Cont.	Adjust the correlation cursor handwheel until the correlation cursor is coincident with the sweep on the TCC indicator.		
	The CORRELATION CURSOR counter indicates within ± 10 mils of the indication recorded in step 2f.		
	Adjust IFF azimuth synchro B3 [located behind communication unit (2, fig. 3-93)].		
k.	Direct the ICC personnel to:		
(1)	Momentarily press the CASUALTY/CW ROTATE pushbutton for a CW ROTATE indication.		
(2)	Set the ANT SYNC switch to EXT.		
l.	Set the SCAN MODE switch to NORMAL.		
3.	Aline the IHIPIR.		
	NOTE		
	Observe that the BCC R BUS lamp on the Fuse and Control panel is illuminated. Do not perform the alinement if the lamp is extinguished.		
a.	Direct the ILCHR personnel to insure that all ILCHR's are in local control.		
	NOTE		
	Perform steps b through n to aline IHIPIR A, and then repeat these steps to aline IHIPIR B. Use FCA controls when alining IHIPIR A and FCB controls when alining IHIPIR B.		
b.	Direct the IHIPIR personnel to:		
(1)	Insure that the PEDESTAL SAFETY switch (2, fig. 6-16) is set to SAFE.		
(2)	Insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
(3)	Insure that the IHIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM circuit breaker (1, fig. 6-18) and the POWER AMPLIFIER BEAM circuit breaker (2, fig. 6-18) set to OFF.		
(4)	Install the alinement telescope on the IHIPIR antenna (fig. 6-19).		
(5)	Insure that the IHIPIR is level (refer to par. 4-11b(10)).		
c.	Direct the ICWAR and IHIPIR personnel to front sight the IHIPIR antenna and simultaneously back sight the ICWAR antenna until the vertical crosshair of the IHIPIR antenna is centered on the ICWAR antenna and the vertical crosshair of the ICWAR antenna is centered on the IHIPIR antenna.		
d.	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-25) to the same azimuth as the ICWAR as read from the ICWAR azimuth mil ring.		
e.	Set the SYSTEM ACCURACY TEST switch (1, fig. 6-20) to ON.		

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
3f. Cont.	Set the test switch (2, fig. 6-7) to TEST ROTATE.		
		The azimuth repeatback mark on the FCC display (fig. 6-21) is coincident with the cursor.	
g.	Set the SYSTEM ACCURACY TEST switch to OFF.		
h.	Set the test switch to OPERATE, and the SCAN MODE switch to CW.		
NOTE			
Insure that the CASUALTY/CW ROTATE switch (1, fig. 6-15) is in CW ROTATE.			
i.	Position the cursor on top of the sweep on the FCC indicator, using the azimuth cursor handwheel (2, fig. 6-20).		
j.	Set the MANUAL ELEVATION control (1, fig. 6-22) to 0 mils.		
k.	Press the ELEVATION MANUAL pushbutton (3, fig. 6-20).		
l.	Set the test switch to TEST ROTATE.		
m.	Direct the IHIPIR personnel to:		
(1)	Set the LOCAL-REMOTE switch to REMOTE.		
(2)	Insure that the IHIPIR telescope is still alined with the ICWAR telescope.		
(3)	At the IHIPIR pedestal, push the synchro adjust knob (2, fig. 6-23) down and rotate it clockwise until a null is obtained on nulling meter M1 (4, fig. 6-23).		
(4)	Press fine null switch S1 (3, fig. 6-23), and simultaneously rotate the synchro adjust knob clockwise until a fine null is obtained. Release the fine null switch.		
(5)	Release the synchro adjust knob, and assure that the null indication remains on nulling meter M1.		
		The IHIPIR repeatback mark is positioned at the same azimuth as the cursor.	
		If the IHIPIR repeatback mark is displaced 3200 mils from the cursor a false null was obtained in step 4m(3) above. Readjust the synchro adjust knob clockwise for the correct null and repeat steps 4m(3), (4), and (5).	
(6)	Set the MOTOR GENERATOR circuit breaker (2, fig. 6-24) to ON.		
WARNING			
		Insure that all personnel are clear of the IHIPIR antenna.	
(7)	Set the PEDESTAL SAFETY switch to OPERATE.		
n.	Observe the position of the azimuth tracking symbol on the FCC indicator.		
		The azimuth tracking symbol is positioned at the same azimuth as the cursor.	

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
4.	Aline the IROR.		
	Perform the procedures contained in table 6-1, step 5.		
5.	Check Alinement.		
	NOTE		
	Insure that all major items are energized in REMOTE STANDBY and all antenna safe-operate switches are in SAFE unless otherwise directed.		
	NOTE		
	To obtain accurate mil indication from the CORRELATION CURSOR counter always view the counter from a point directly above the counter window.		
a.	Direct the ICWAR, IHIPIR-A, and IHIPIR-B personnel to position their antennas to 800 mils as read on their respective azimuth mil ring.		
b.	Direct the ICC personnel to:		
	NOTE		
	The battery check portion of the operational tape will not load while performing step (1) below.		
(1)	Load the operational program in accordance with TM 9-1430-527-12-1.		
(2)	Set the READER POWER switch (4, fig. 2-7) to ON.		
(3)	Set the INSTRUCTION INPUT switches on the CPU panel to 06044042.		
(4)	Press the EXECUTE pushbutton 1 time.		
	The tape advances to the battery check routine portion of the tape and stops.		
(5)	Set the DATA INPUT switches on the CPU panel to 40000101.		
(6)	Set the LOCAL/REMOTE switch to REMOTE.		
(7)	Press the DTO MANUAL RESET pushbutton.		
(8)	Press the CPU RESET pushbutton.		
(9)	Press the DISPLAY ENABLE pushbutton.		
(10)	Press the START/STEP/PULSE pushbutton 2 times.		
	The battery check portion of the operational program is loaded and executed.		
	The printer readout indicates: ACQ 793 to 807 mils.		
	HPI A indicates 793 to 807 mils.		
	HPI B indicates 793 to 807 mils.		
c.	Set the SCAN MODE switch to CW.		
d.	Direct the ICC operator to insure that the CASUALTY/CW ROTATE switch on the auxiliary control unit is set to CW ROTATE.		

Table 6-2. System Orientation and Alinement Procedures Without IPAR—Continued

Step	Operation	Normal indication	Corrective procedure
5e. Cont.	Repeat steps b (7) through (10).		
f.	Direct the ICWAR personnel to return the boresight shift compensator adjust knob to the setting in step 1a(10).		
6.	Aline the ILCHR. Perform the procedures contained in table 6-1, step 7.		

Table 6-3. System Orientation and Alinement Procedures Without IPAR and ICWAR

Step	Operation	Normal indication	Corrective procedure
		WARNING Insure that all major item antenna safety switches are set to safe. NOTE Insure that all major items are energized in LOCAL STANDBY unless otherwise indicated. This procedure is directed from the IBCC.	
1.	Orient and Aline the IFF Antenna.		
a.	Direct the ICC personnel to:		
(1)	Set the ANT SAFE/OPERATE switch (8, fig. 3-94) to SAFE and the AZIMUTH DRIVE SAFE switch (13, fig. 3-97 to OFF (SAFE)).		
(2)	Energize the IFF in REMOTE (TM 9-1430-527-12-1).		
(3)	Set the ANT SYNC switch (3, fig. 6-12) to INT.		
(4)	Set the INT ANT SYNC control (2, fig. 6-12) to 20 RPM CW.		
(5)	Momentarily press the CASUALTY/ CW ROTATE pushbutton (1, fig. 6-15) for a CASUALTY indication.		
(6)	If the IFF antenna is roof-mounted, insure that the ICC is level (refer to par. 4-44b(7). If the IFF antenna is remotely installed, insure that the antenna is level (refer to par. 4-45n)).		
(7)	Slide the M-90F telescope and mounting bracket assembly into the telescope mount.		
(8)	Rotate the IFF antenna until the telescope is alined with the designated azimuth reference point.		
(9)	Loosen the hardware (7, fig. 6-13) securing the IFF antenna azimuth mil ring.		
		NOTE In high winds, the antenna must be held in place manually until the alinement procedures are completed.	

Table 6-8. System Orientation and Alinement Procedures Without IPAR and ICWAR—Continued

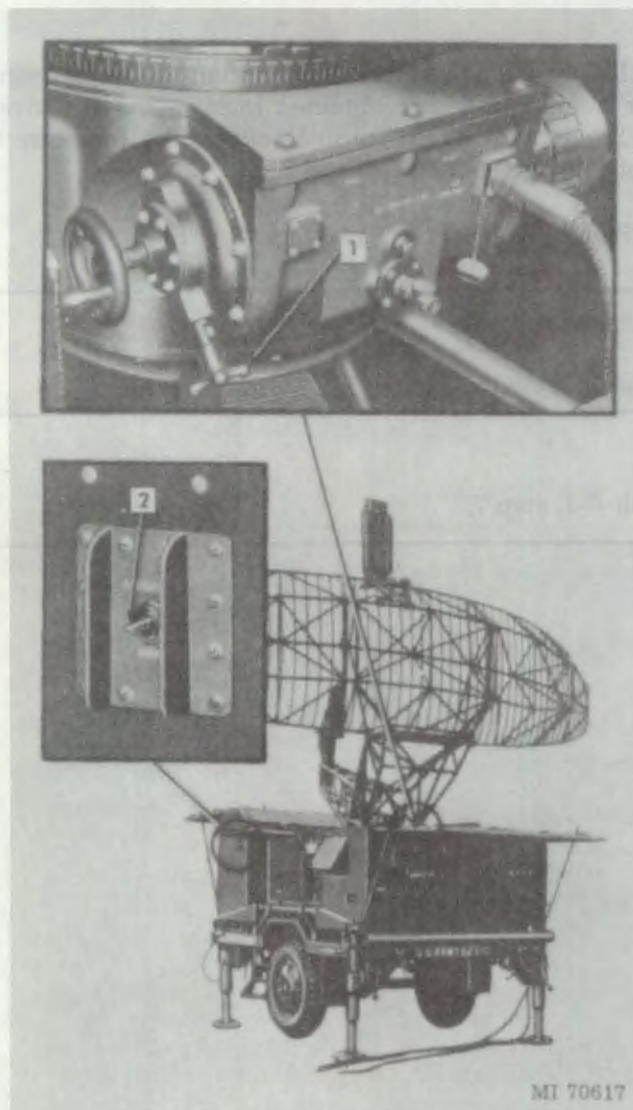
Step	Operation	Normal indication	Corrective procedure
1c. Cont.			
(10)	Rotate the IFF antenna until the telescope is front sighted on the designated azimuth reference point.		
(11)	Secure the azimuth mil ring by tightening the hardware loosened in step (9) above.		
(12)	Rotate the IFF antenna until the vernier indicates 0 mils.		
b.	Set the SCAN MODE switch (1, fig. 6-10) to CW.		
c.	Direct the ICC operator to:		
(1)	Open the AZ ADJ access cover by loosening the captive retaining screw and loosening the AZ ADJ LOCK.		
(2)	Adjust the AZ ADJ control (1, fig. 6-12) until the TCC indicator sweep is positioned at 0 mils.		
d.	Direct the ICC personnel to:		
(1)	Tighten the AZ ADJ LOCK and close and secure the AZ ADJ LOCK cover.		
			NOTE Once the IFF antenna is installed the angle of antenna tilt must be adjusted.
(2)	Adjust the tilt of the IFF antenna as described in steps 2n (1) through (5) of table 6-1.		
2.	Aline the IHIPIR.		
			NOTE Observe that the BCC R BUS lamp on the Fuse and Control panel is illuminated. Do not perform the alinement if the lamp is extinguished.
a.	Direct the ILCHR personnel to insure that all ILCHR's are in local control.		
			NOTE Perform steps b through n to aline IHIPIR A, and then repeat these steps to aline IHIPIR B. Use FCA controls when alining IHIPIR A, and FCB controls when alining IHIPIR B.
b.	Direct the IHIPIR personnel to:		
(1)	Insure that the PEDESTAL SAFETY switch (2, fig. 6-16) is set to SAFE.		
(2)	Insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
(3)	Insure that the IHIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM circuit breaker (1, fig. 6-18) and the POWER AMPLIFIER BEAM circuit breaker (2, fig. 6-18) set to OFF.		
(4)	Install the alinement telescope on the IHIPIR antenna (fig. 6-19).		
(5)	Insure that the IHIPIR is level (refer to par. 4-11b(10)).		

Table 6-3. System Orientation and Alinement Procedures Without IPAR and ICWAR—Continued

Step	Operation Normal indication Corrective procedure
2c. Cont.	Direct the ICC and IHIPIR personnel to front sight the IHIPIR antenna and simultaneously back sight the IFF antenna until the vertical crosshair of the IHIPIR telescope is vertically centered on the ICC telescope and the IFF telescope is vertically centered on the IHIPIR telescope.
d.	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-23) to the same azimuth as the IFF as read from the IFF azimuth mil ring.
e.	Set the SYSTEM ACCURACY TEST switch (1, fig. 6-20) to ON.
f.	Set the test switch (2, fig. 6-7) to TEST ROTATE. The azimuth repeatback mark on the FCC display (fig. 6-21) is coincident with the IHIPIR azimuth cursor.
g.	Set the SYSTEM ACCURACY TEST switch to OFF.
h.	Set the test switch to OPERATE.
i.	Position the cursor on top of the sweep on the FCC indicator, using the azimuth cursor handwheel (2, fig. 6-20).
j.	Set the MANUAL ELEVATION control (1, fig. 6-22) to 0 mils.
k.	Press the ELEVATION MANUAL pushbutton (3, fig. 6-20).
l.	Set the test switch to TEST ROTATE.
m.	Direct the IHIPIR personnel to:
(1)	Set the LOCAL-REMOTE switch to REMOTE.
(2)	Insure that the IHIPIR telescope is still alined with the IFF telescope.
(3)	At the IHIPIR pedestal, push the synchro adjust knob (2, fig. 6-23) down and rotate it until a null is obtained on nulling meter M1 (4, fig. 6-23).
(4)	Press fine null switch S1 (3, fig. 6-23), and simultaneously rotate the synchro adjust knob until a fine null is obtained. Release the fine null switch.
(5)	Release fine null switch S1 and the synchro adjust knob, and assure that the null indication remains on nulling meter M1. The IHIPIR repeatback mark is positioned at the same azimuth as the cursor.
(6)	Set the MOTOR GENERATOR circuit breaker (2, fig. 6-24) to ON.
	WARNING
	Insure that all personnel are clear of the IHIPIR antenna.
(7)	Set the PEDESTAL SAFETY switch to OPERATE.

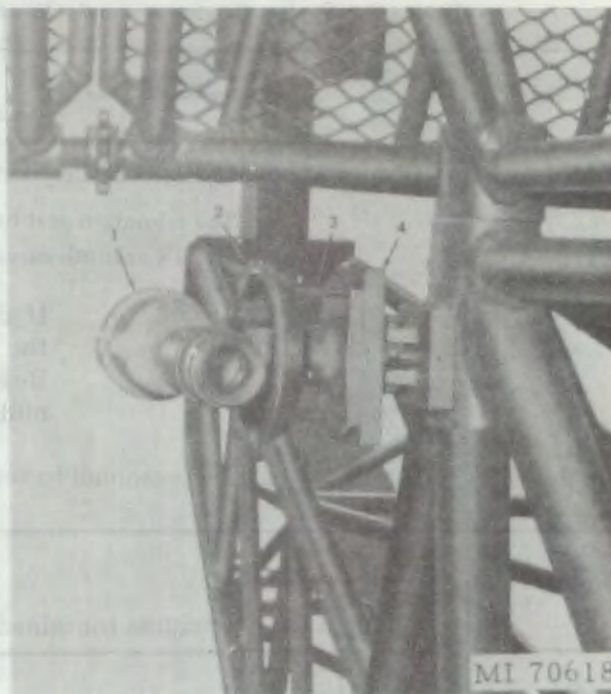
Table 6-3. System Orientation and Alinement Procedures Without IPAR and ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
2n. Cont.	Observe the position of the azimuth repeatback mark on the FCC indicator.	The azimuth repeat back mark is positioned at the same azimuth as the IHIPIR azimuth cursor. If the IHIPIR repeatback mark is displaced 3200 mils from the cursor a false null was obtained in step 2m(3) above. Readjust the synchro adjust knob clockwise for the correct null and repeat steps 2m(3), (4), and (5).	
o.	Direct the IHIPIR personnel to set the PEDESTAL SAFETY switch to SAFE.		
3.	Aline the IROR.		
	Perform the procedures contained in table 6-1, step 5.		
4.	Aline the ILCHR.		
	Perform the procedures contained in table 6-1, step 7.		



- 1—Azimuth stow lock
- 2—SAFE-OPERATE switch

Figure 6-3. IPAR external controls.



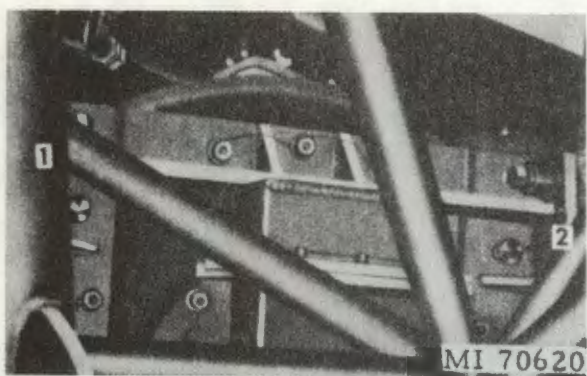
- 1—Alinement telescope
- 2—Telescope mount assembly
- 3—Mounting screws
- 4—Mounting bracket

Figure 6-4. IPAR alinement telescope—mounted.



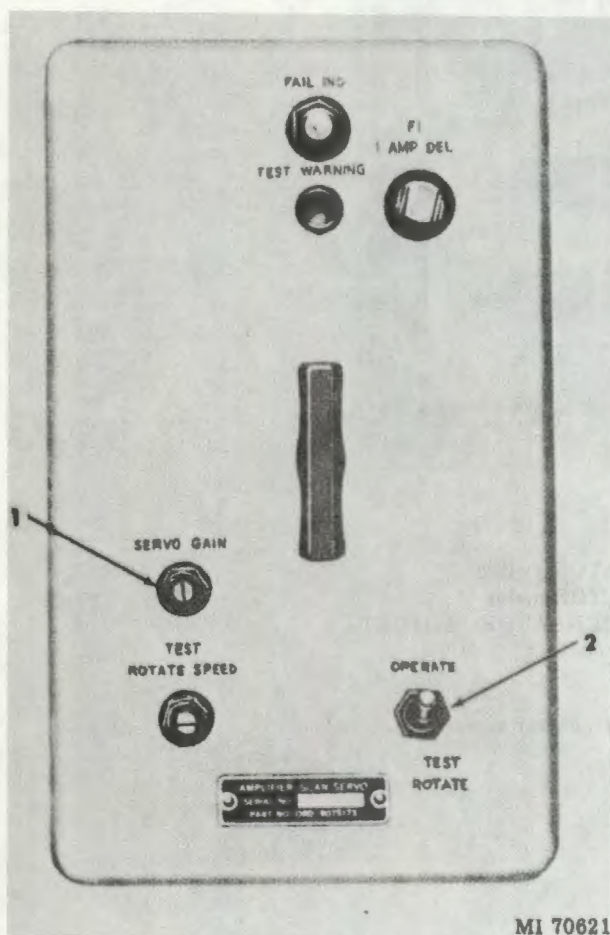
- 1—Wing locknuts
- 2—Vernier
- 3—Mil ring indicator

Figure 6-5. IPAR mil ring.



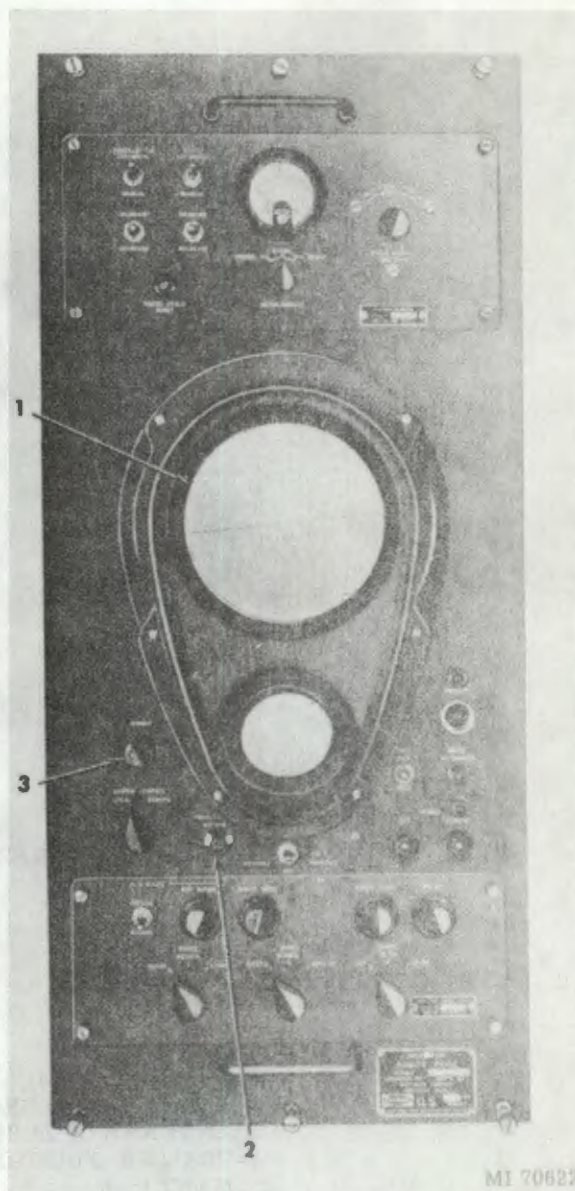
- 1-Knurled locknut (mil ring)
- 2-Knurled locknut (mil ring)

Figure 6-6. IPAR mil ring locknuts.



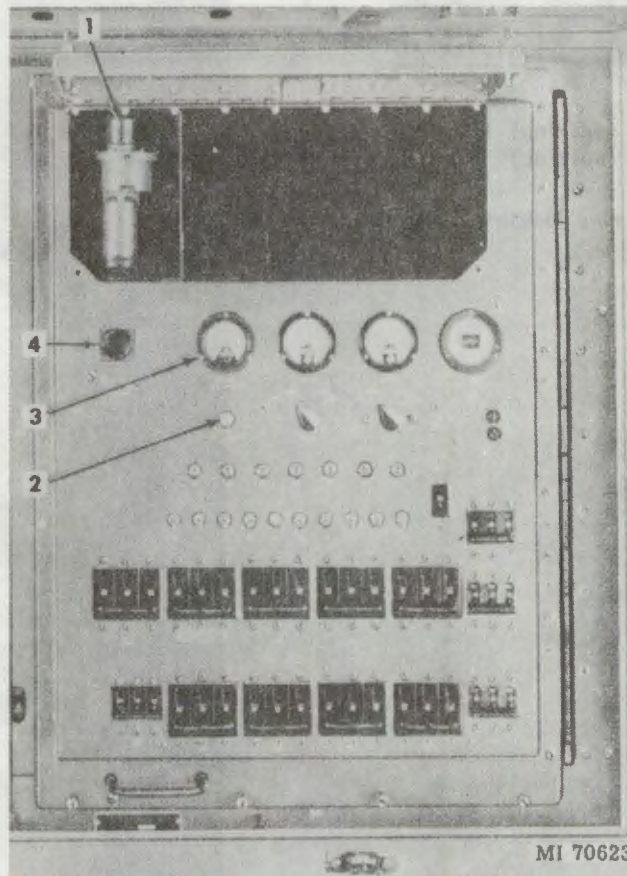
- 1-SERVO GAIN control
- 2-Test switch

Figure 6-7. IBCC scan servo amplifier controls.



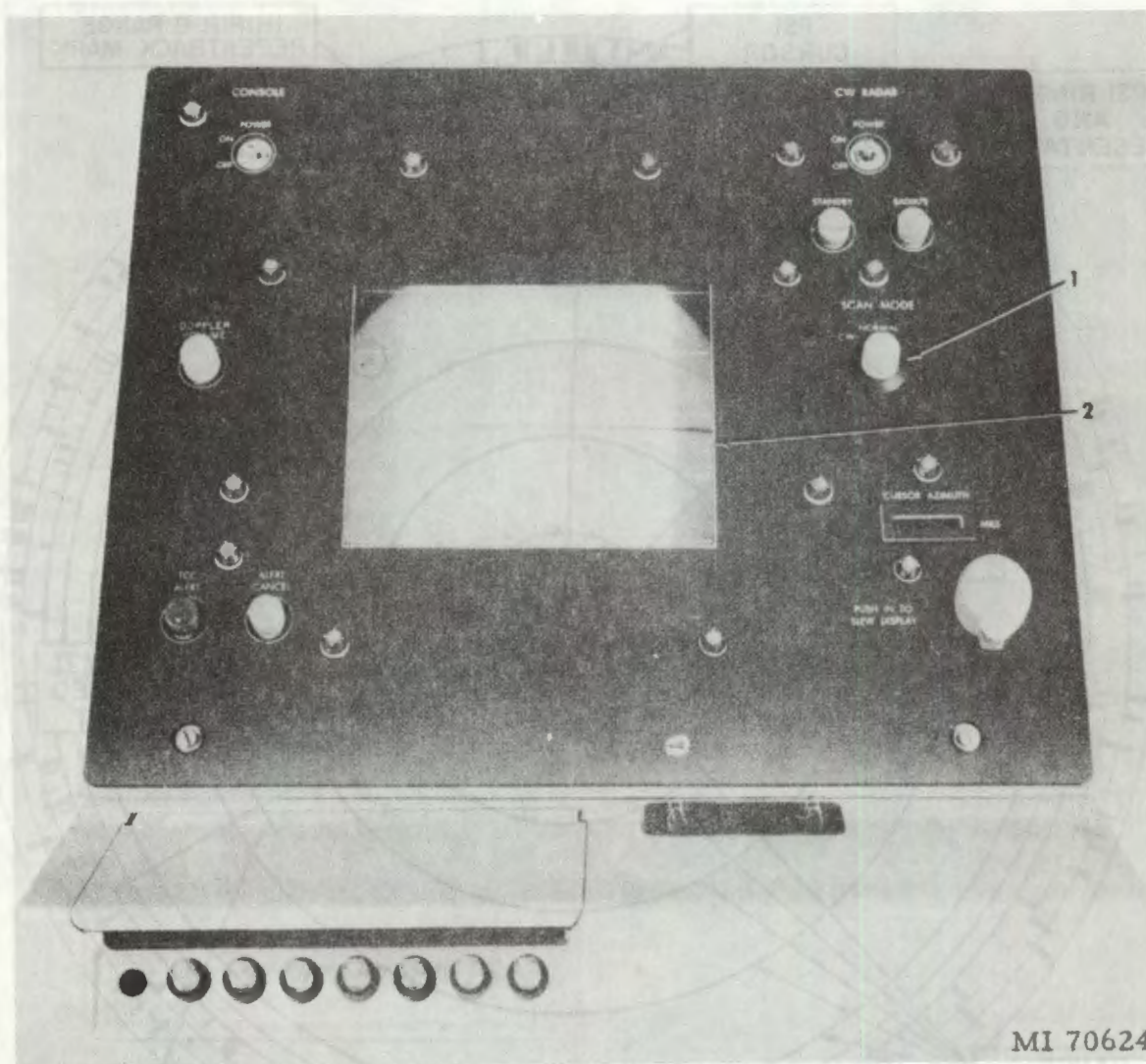
- 1-PPI scope
- 2-REMOTE SCOPE pushbutton
- 3-SYSTEM CONTROL switch

Figure 6-8. IPAR azimuth and range indicator.



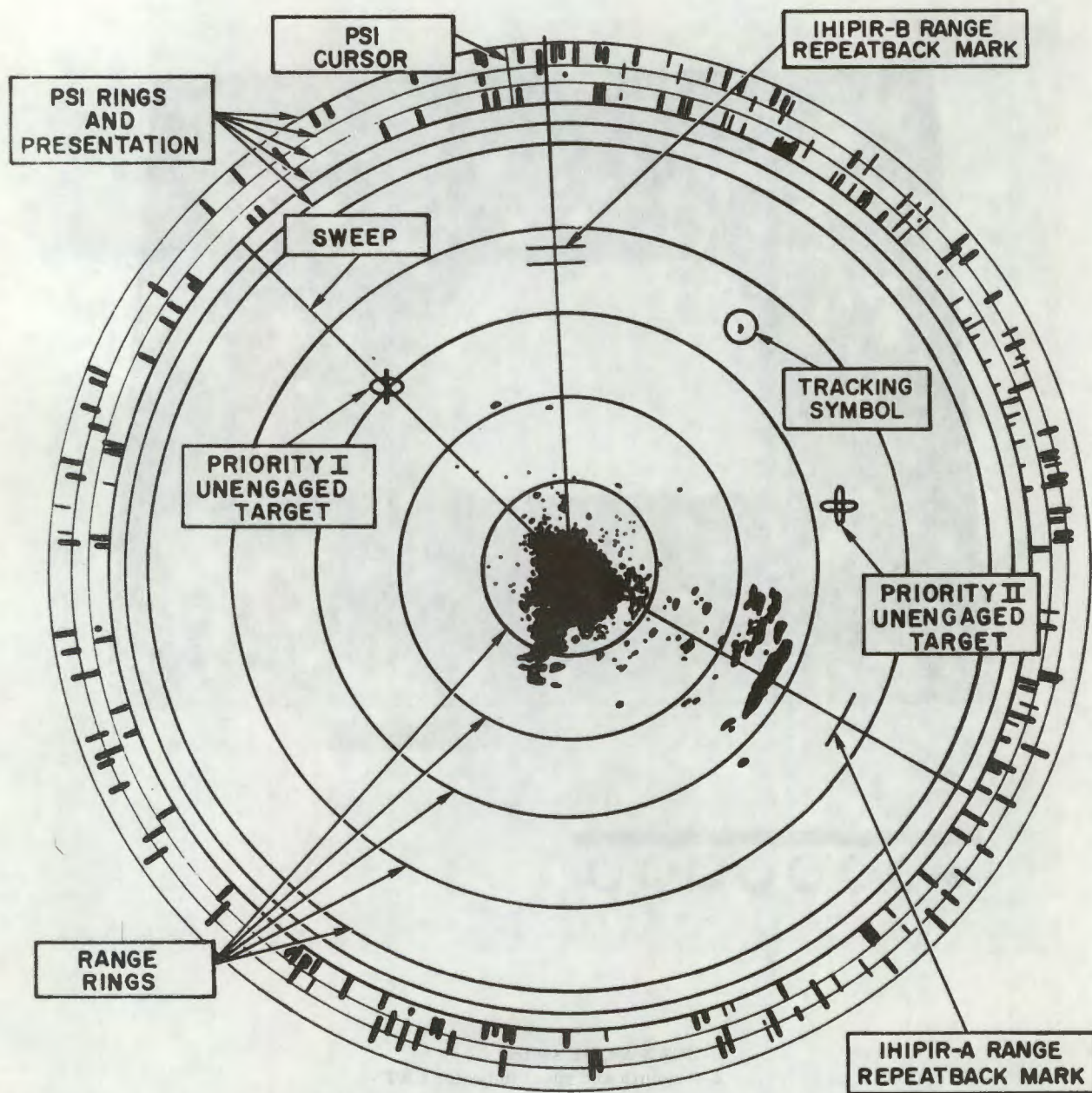
- 1-Telescope (stowed)
- 2-ANTENNA CT ZERO INDICATOR switch
- 3-ANTENNA CT ZERO INDICATOR meter
- 4-TRAILER POSITION COMPENSATOR ADJUST-
MENT knob

Figure 6-9. IPAR fuse and control panel.



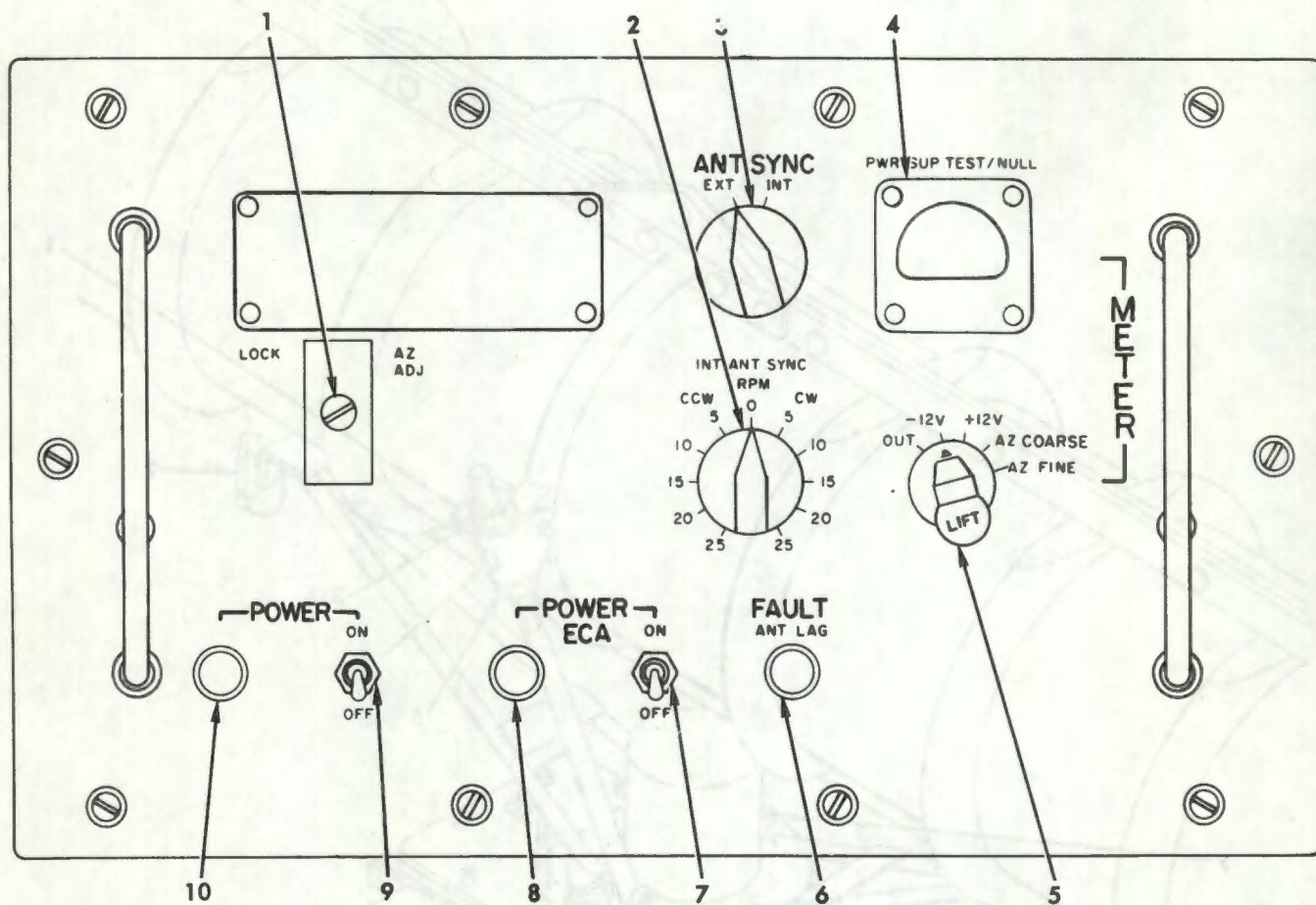
- 1-SCAN MODE switch
2-Azimuth and speed indicator CRT

Figure 6-10. IBCC azimuth and speed indicator controls.



MI 70625

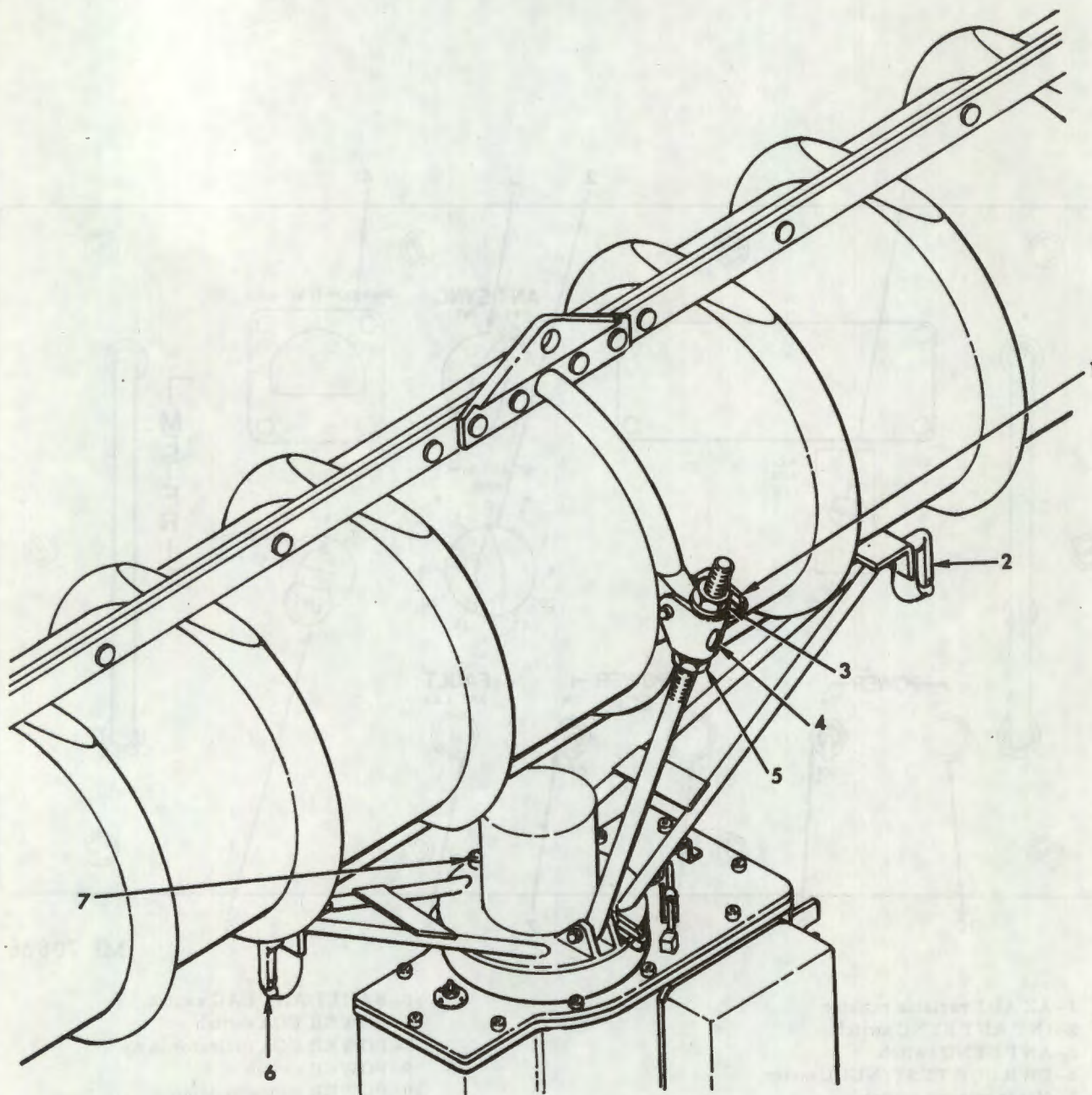
Figure 6-11. IBCB tactical control console (TCC) presentations.



- 1-AZ ADJ variable resistor
- 2-INT ANT SYNC switch
- 3-ANT SYNC switch
- 4-PWR SUP TEST/NULL meter
- 5-Meter selector switch

- 6-FAULT ANT LAG switch
- 7-POWER ECA switch
- 8-POWER ECA indicator-lamp
- 9-POWER switch
- 10-POWER indicator-lamp

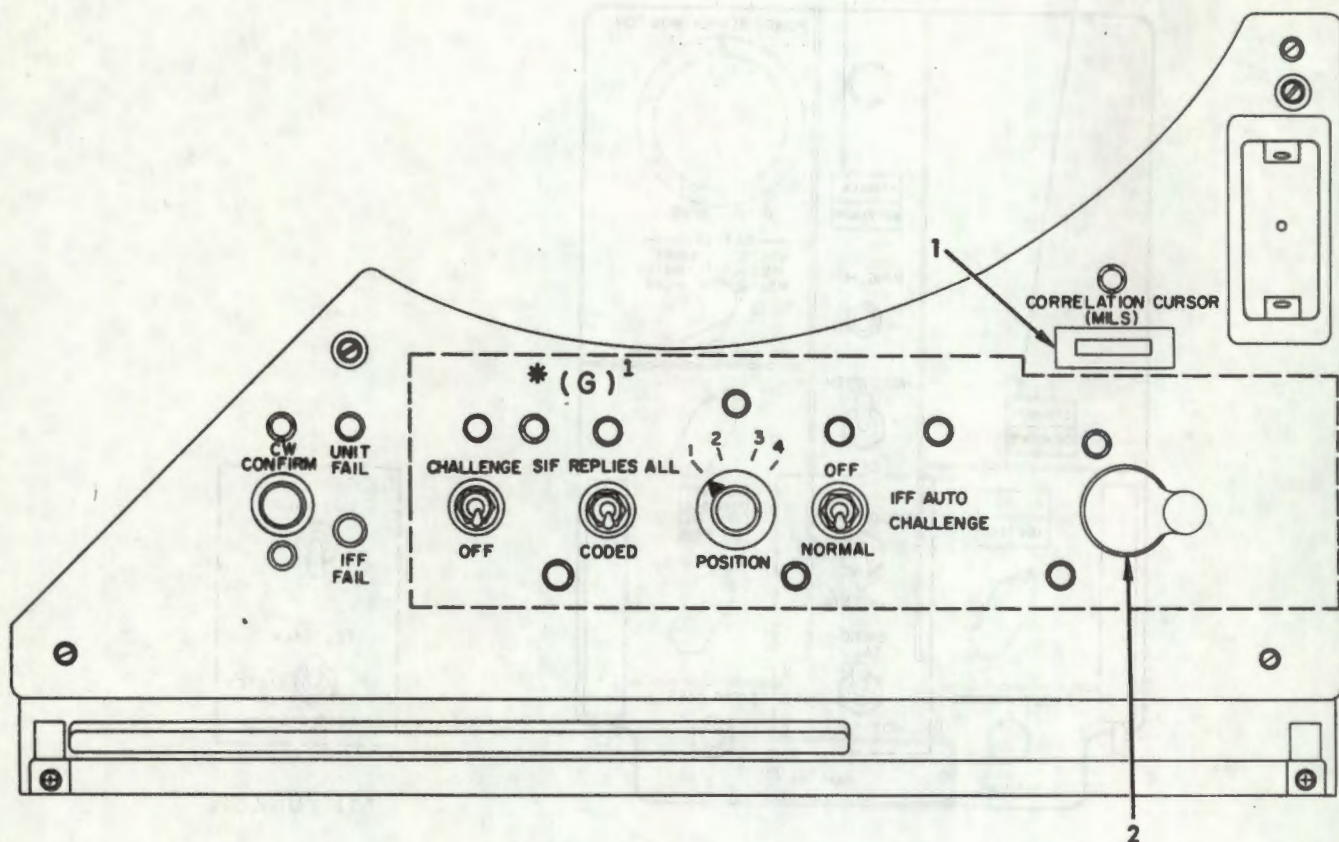
Figure 6-12. Coder-decoder group antenna control panel—controls.



MI 70627

- 1—Quick-disconnect pin
- 2—Quick-disconnect pin
- 3—Upper stud nut
- 4—Tilt indicator
- 5—Tilt adjust nut
- 6—Quick-disconnect pin
- 7—Mil ring lock screws (3)

Figure 6-13. IFF antenna alignment adjustments.



MI 70711

- 1-CORRELATION CURSOR (MILS) counter
- 2-Correlation cursor handwheel

Figure 6-14. Tactical control assistant (TCA) panel assembly controls.

¹Refer to appendix B for serial number effectivity.

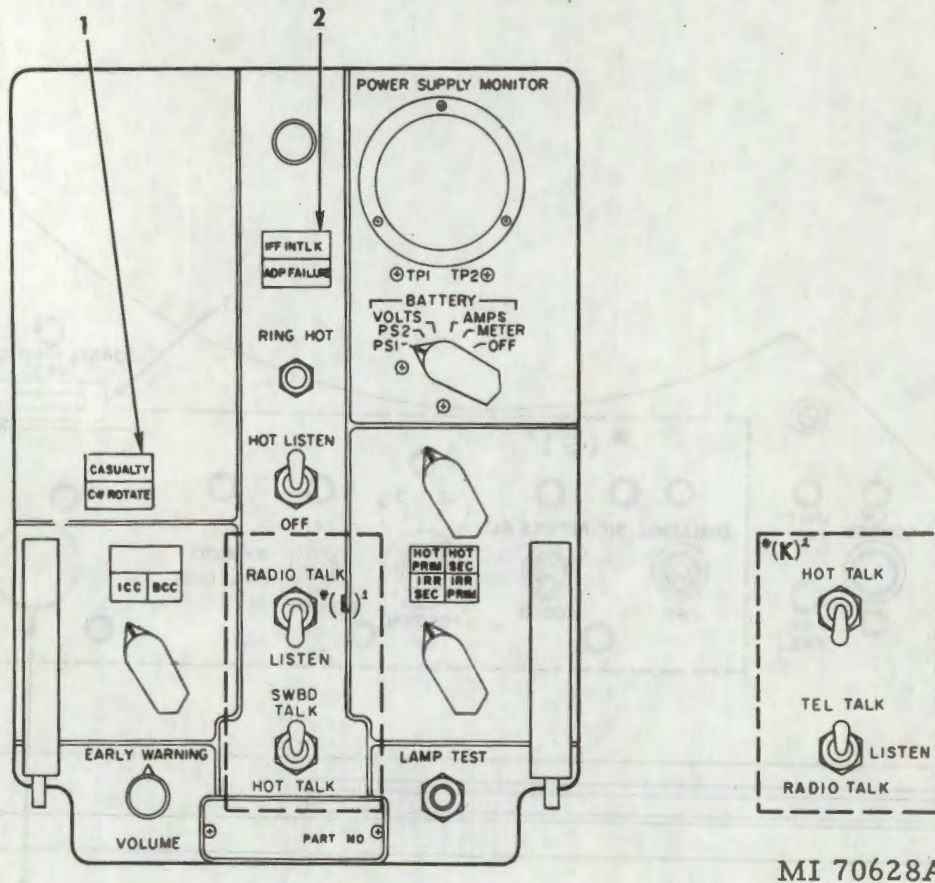
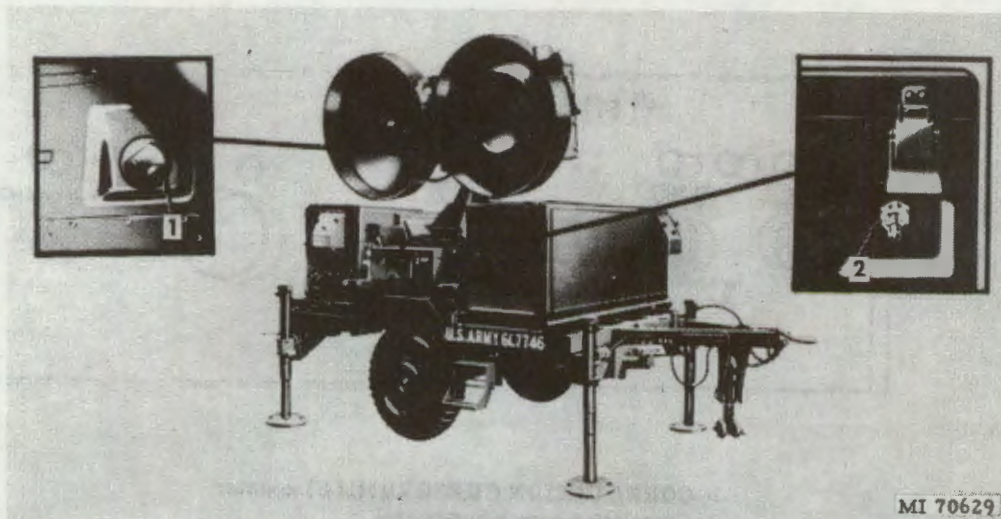


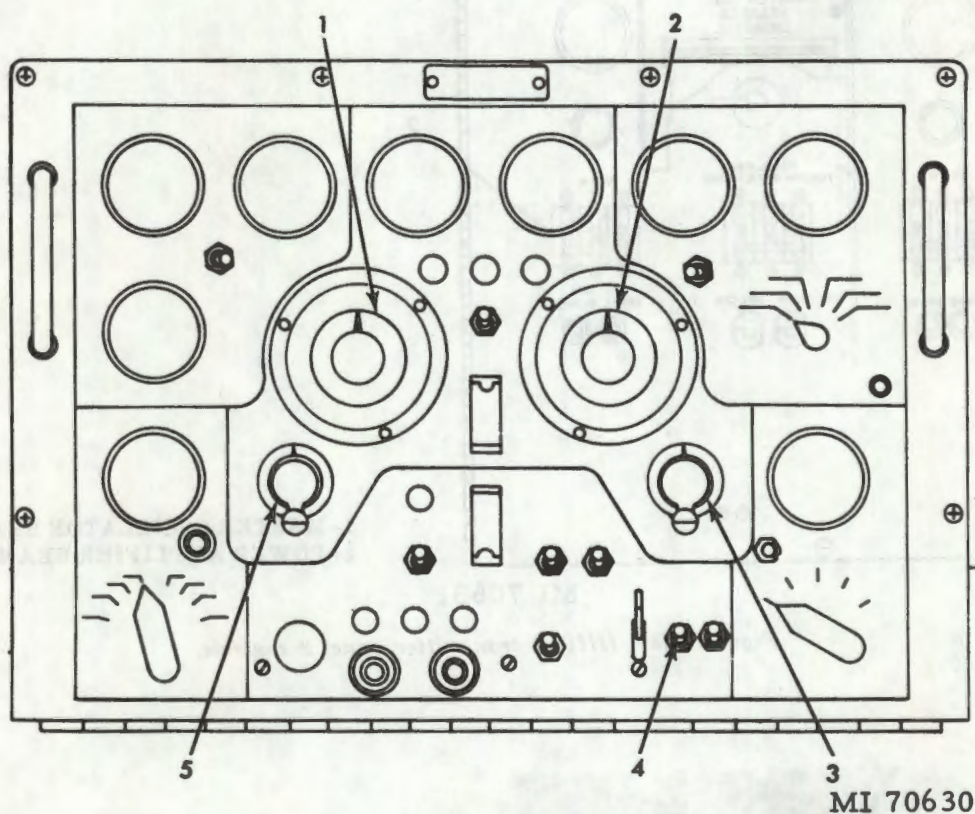
Figure 6-15. ICC/TM auxiliary box controls.



1-Elevation STOW lock
2-PEDESTAL SAFETY switch

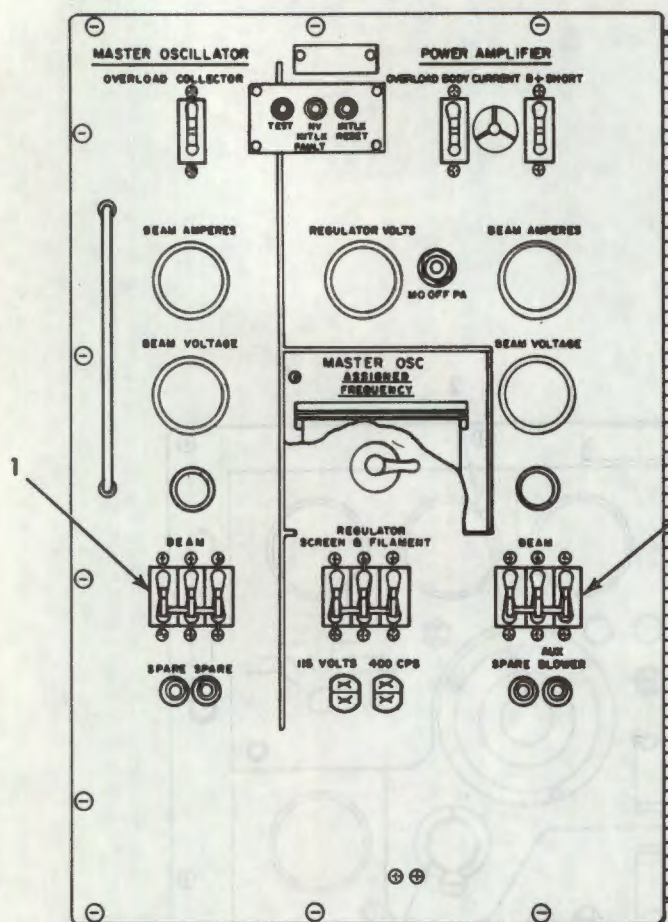
Figure 6-16. IHIPR external controls.

¹Refer to appendix B for serial number effectivity.



- 1-ELEVATION dial
- 2-AZIMUTH dial
- 3-Azimuth handwheel
- 4-LOCAL-REMOTE switch
- 5-Elevation handwheel

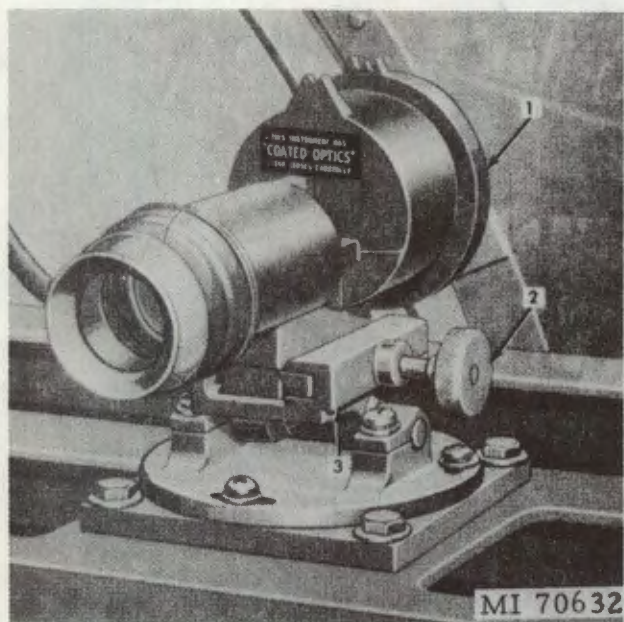
Figure 6-17. IHIPR control-indicator panel controls.



- 1—MASTER OSCILLATOR BEAM circuit breaker
2—POWER AMPLIFIER BEAM circuit breaker

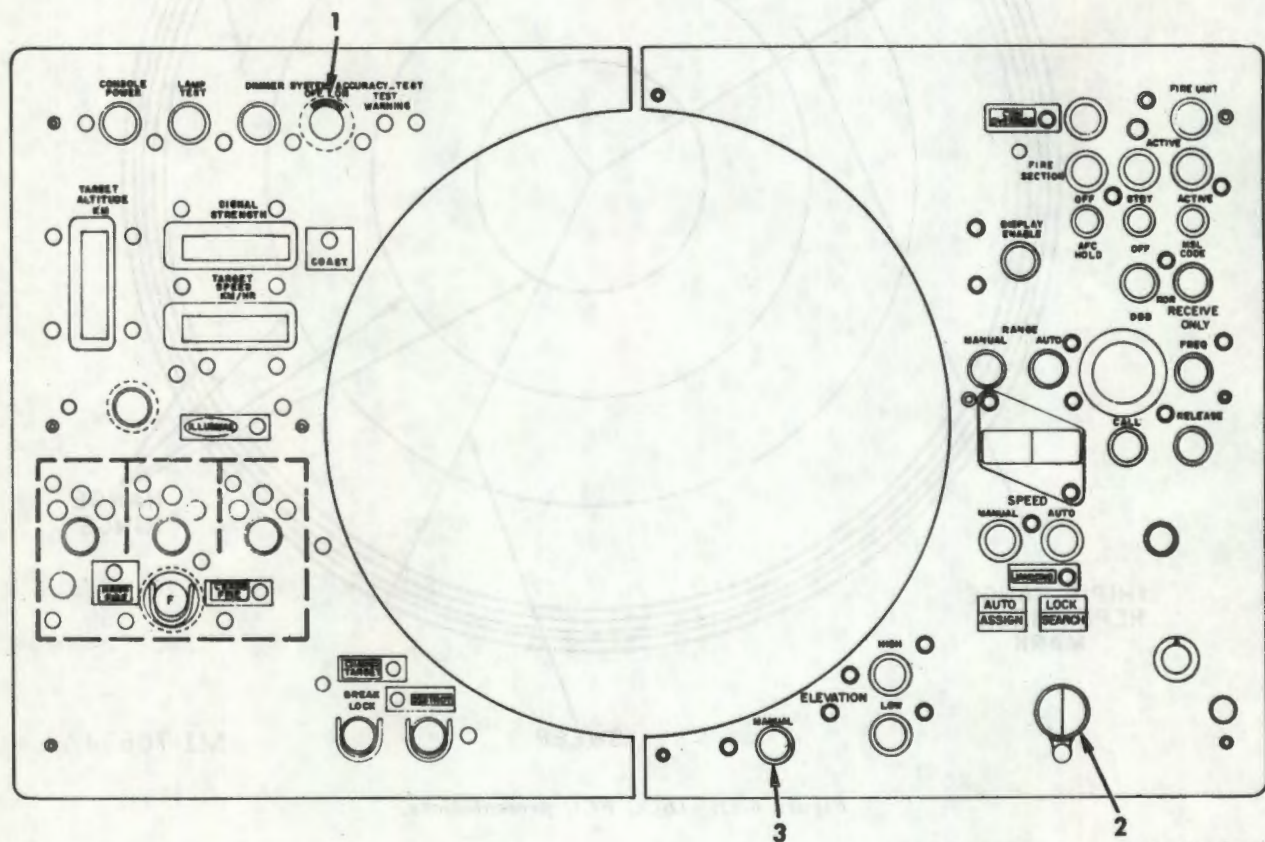
MI 70631

Figure 6-18. IHIPIR transmitter panel 2 controls.



- 1—Alinement telescope
2—Finger grip lock knob
3—Dovetail mounting bracket

Figure 6-19. IHIPIR alinement telescope—mounted.



MI 70633

- 1-SYSTEM ACCURACY TEST switch
- 2-Azimuth cursor handwheel
- 3-ELEVATION MANUAL pushbutton

Figure 6-20. IBCC FC cover assembly controls.

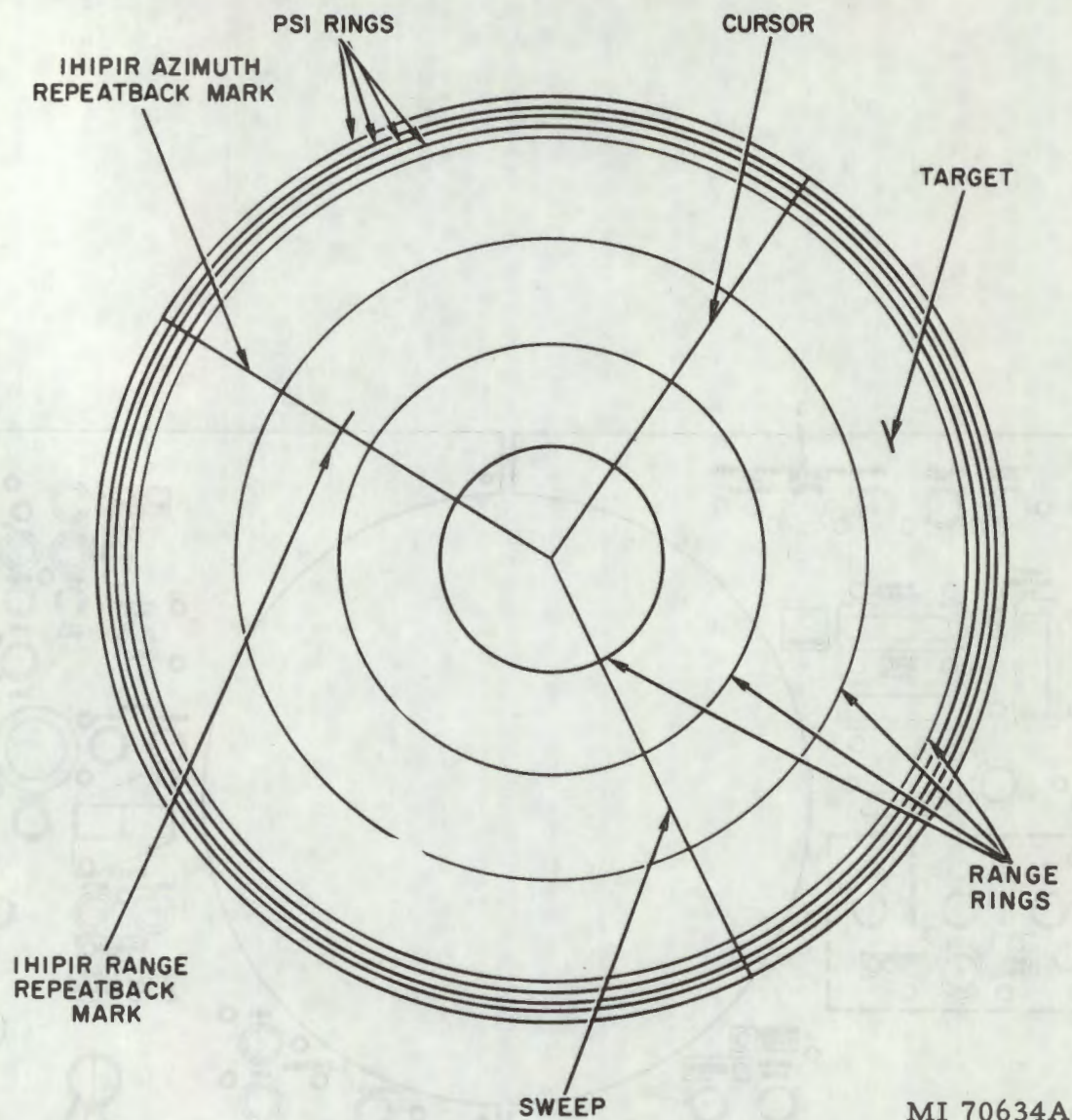
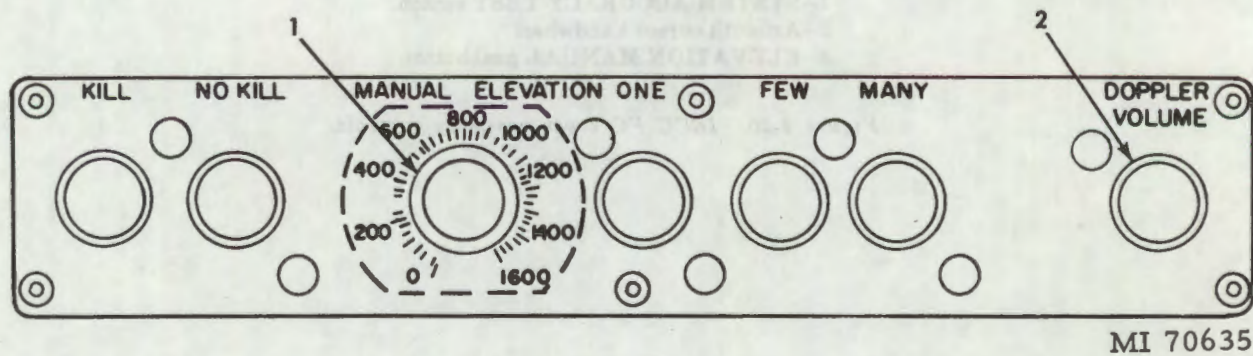
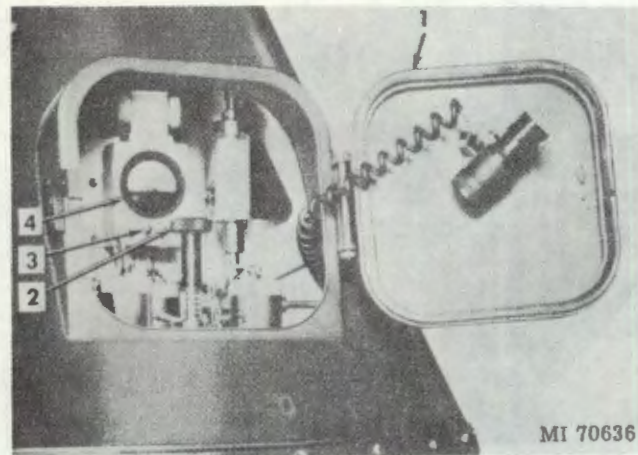


Figure 6-21. IBCC FCC presentations.



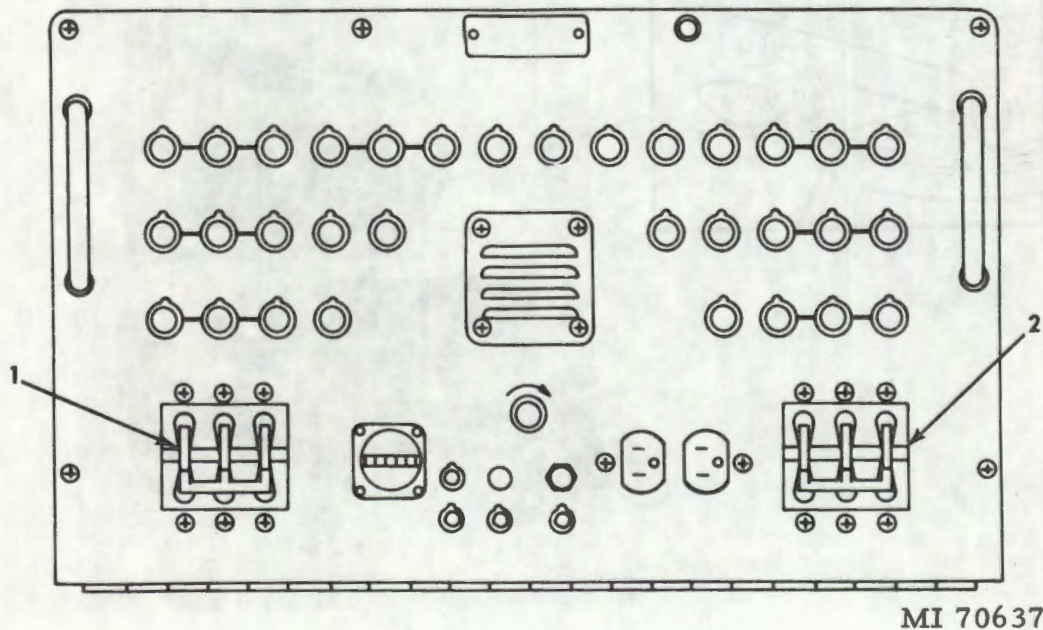
- 1-MANUAL ELEVATION control
- 2-DOPPLER VOLUME control

Figure 6-22. IBCC FCC panel controls.



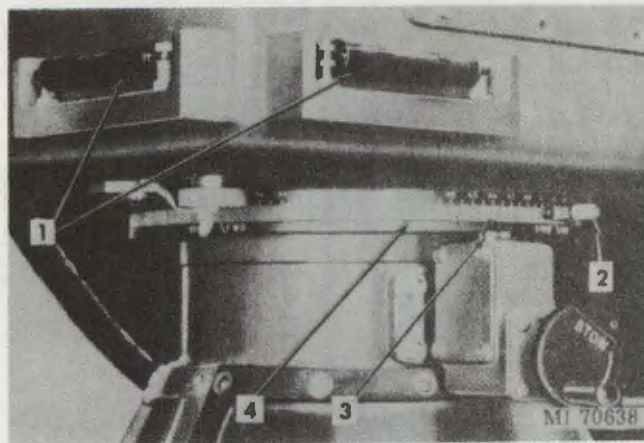
- 1-Synchro access cover
- 2-Synchro adjust knob
- 3-Fine null switch S1
- 4-Nulling meter M1

Figure 6-23. IHIPR alignment controls—pedestal.



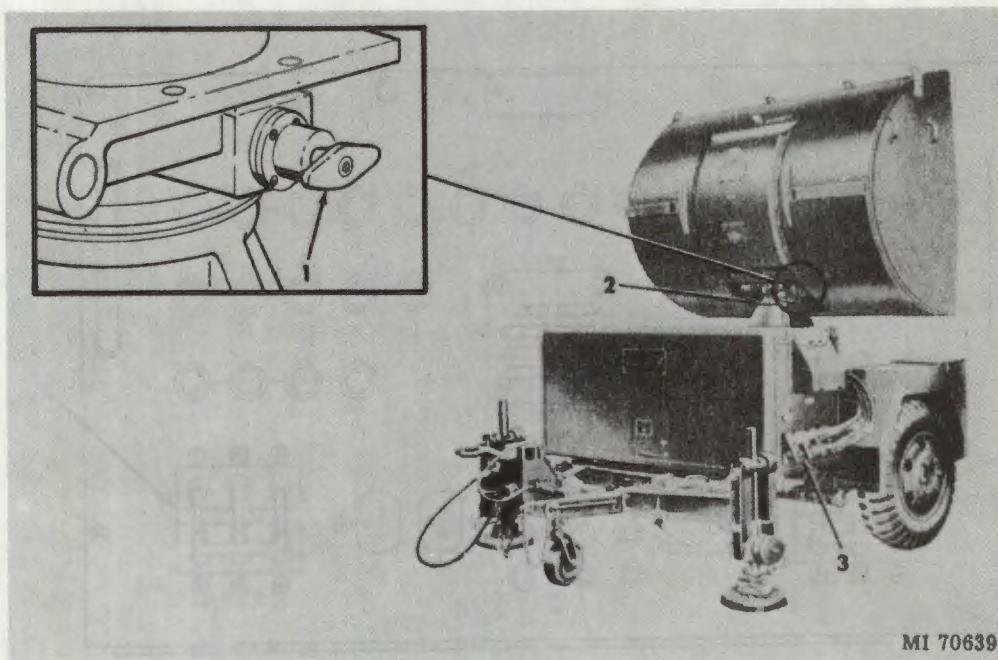
- 1-MAIN POWER circuit breaker
- 2-MOTOR GENERATOR circuit breaker

Figure 6-24. IHIPR main fuse panel controls.



- 1-Spirit levels
- 2-Thumbscrew
- 3-Pointer
- 4-Mil ring

Figure 6-25. IHPIR spirit levels and mil ring.

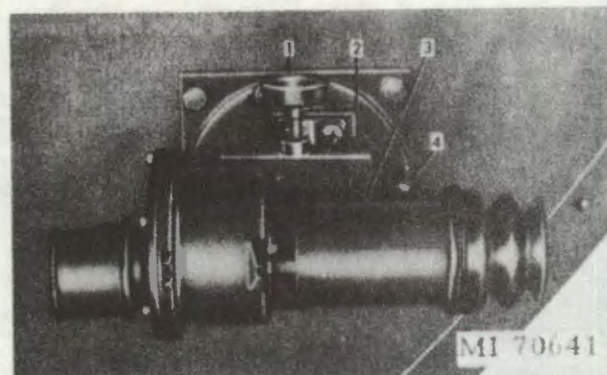


- 1-Stow lock
- 2-Azimuth scale
- 3-SAFETY SWITCH

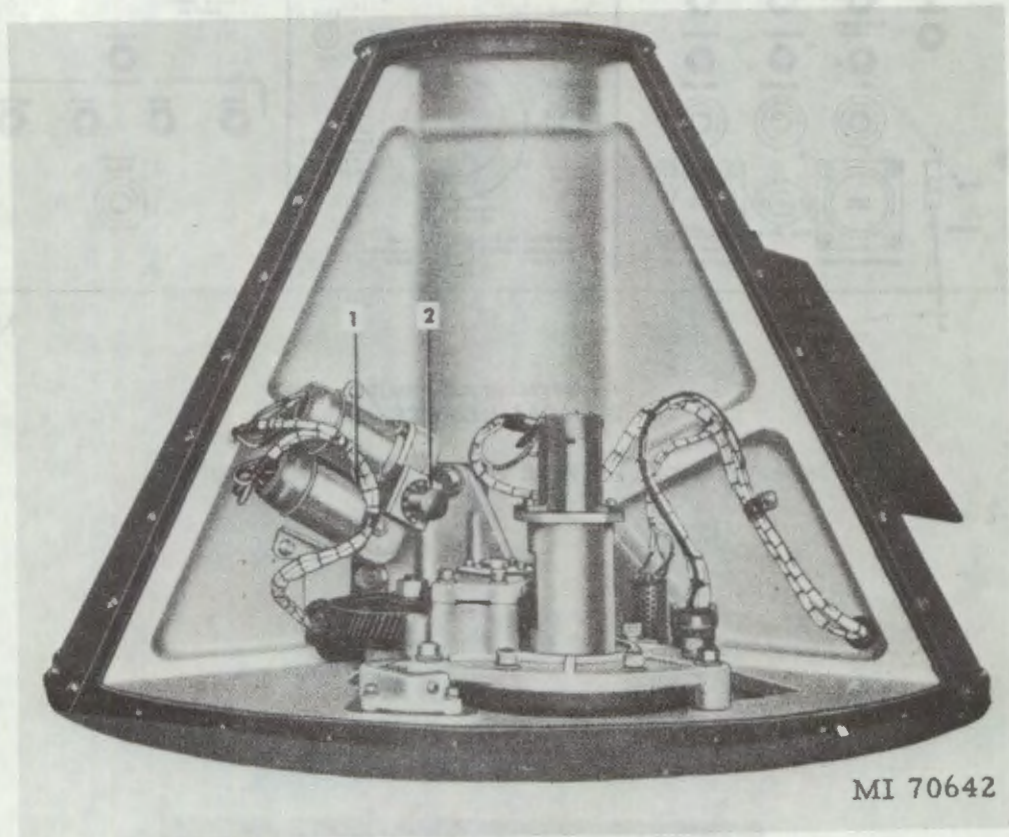
Figure 6-26. ICWAR external controls.

1-Operating mode switch
2-LOCAL-REMOTE switch

Figure 6-27. ICWAR control-indicator panel controls.

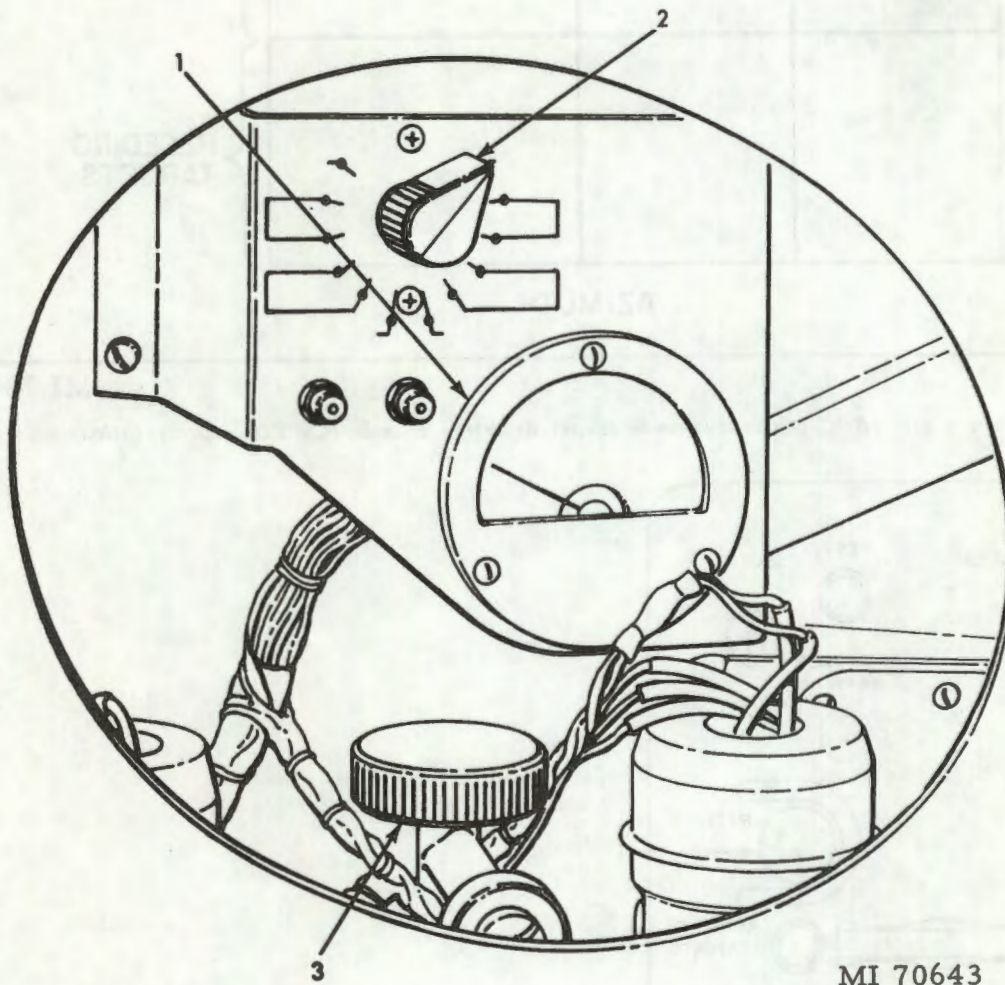


- 1—Finger grip lock knob
2—Dovetail mounting bracket
3—Alinement telescope
4—Elevation lock screw (2)



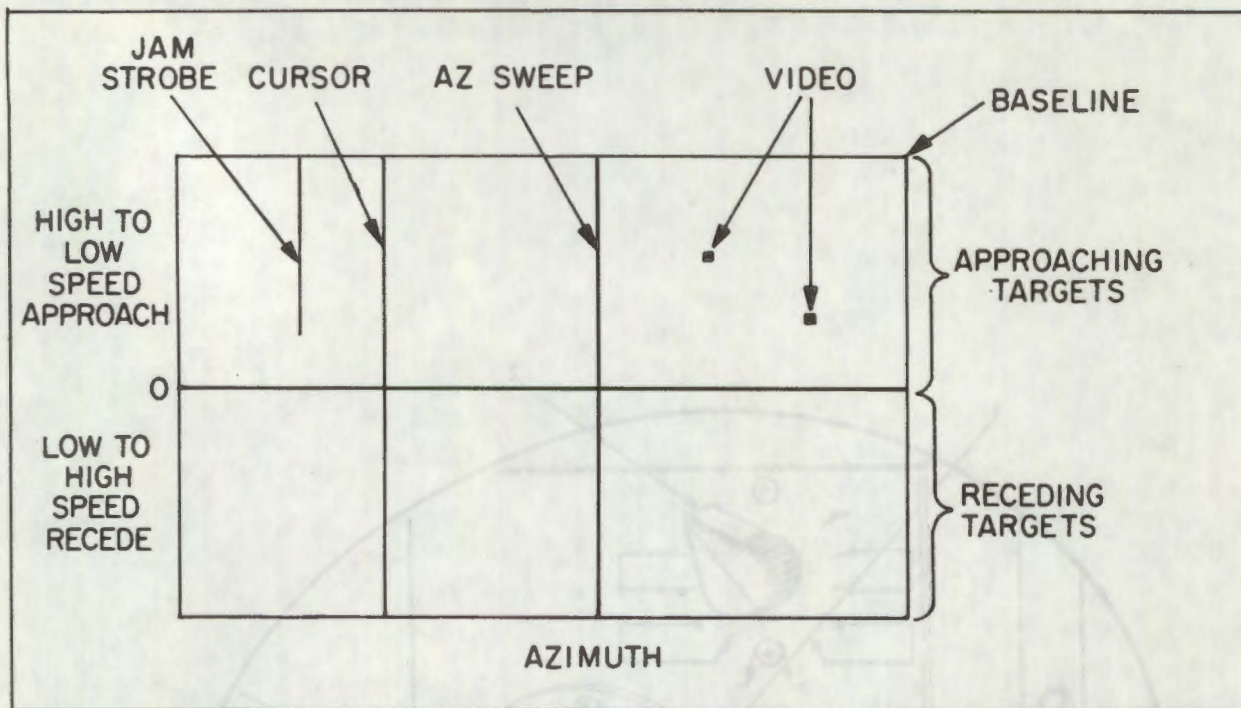
- 1-Differential generator assembly
- 2-Boresight shift compensator adjust knob

Figure 6-29. ICWAR boresight alinement control.



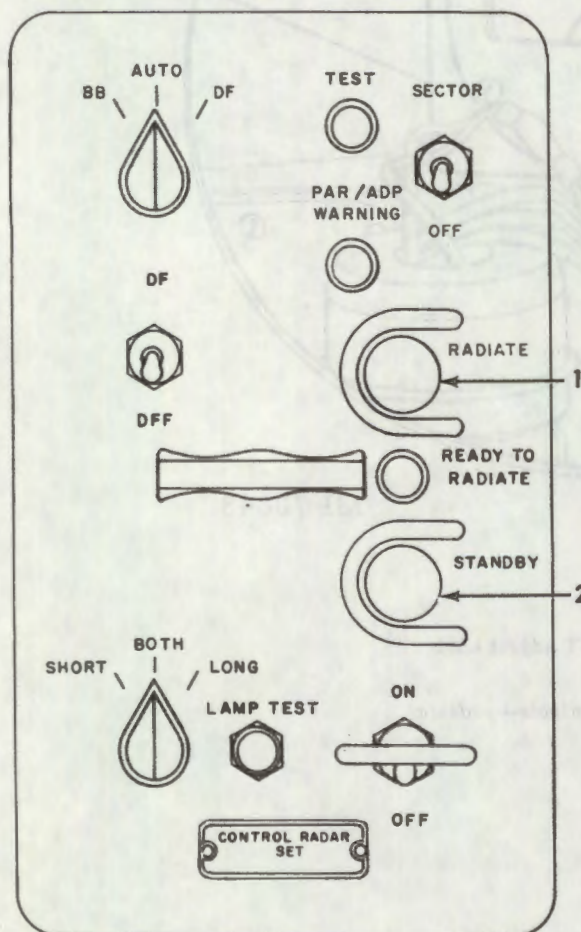
- 1-Servo BITE meter M1
- 2-Servo BITE switch S1
- 3-SYNCHRO CLUSTER ORIENT adjust knob

Figure 6-30. ICWAR alinement controls—pedestal.



MI 70644A

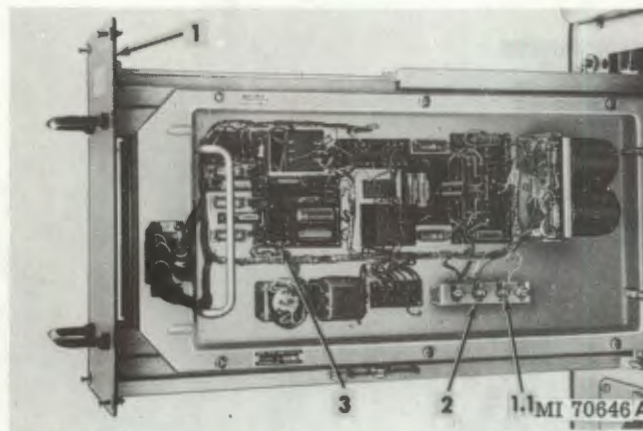
Figure 6-31. IBCB continuous-wave target detection console (CWTDC) presentations.



MI 70645A

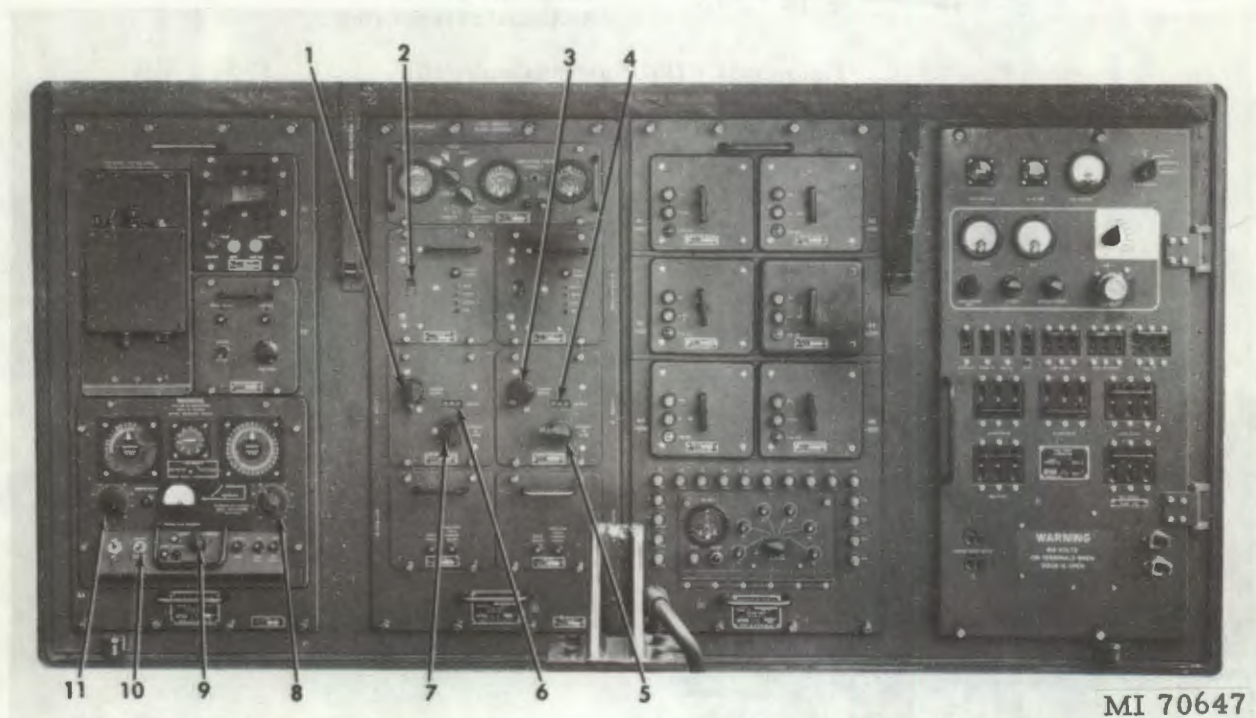
1-RADIATE pushbutton
2-STANDBY pushbutton

Figure 6-32. IBCB IPAR control.



- 1—Antenna control and power supply drawer
- 1.1—R21
- 2—R36
- 3—R1

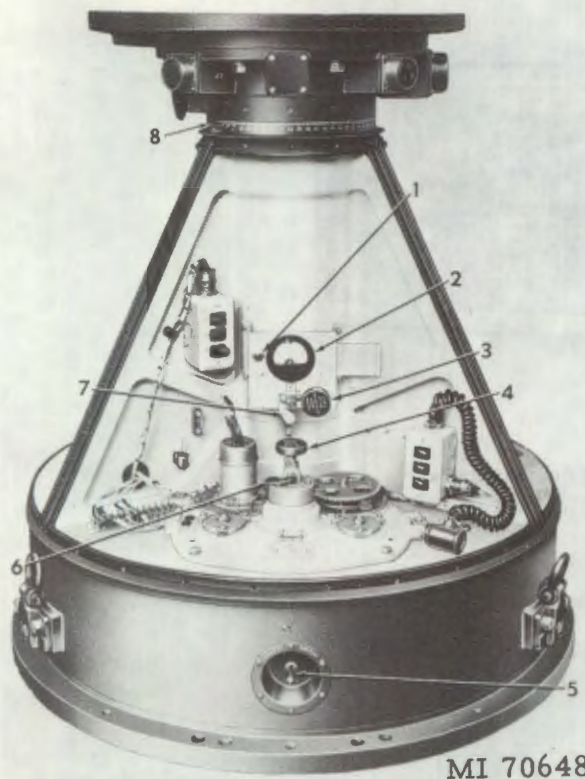
Figure 6-33. ICWAR azimuth control amplifier.



- 1—CLUSTER ADJUST handwheel
- 2—Azimuth parallax computer indicator
- 3—CLUSTER ADJUST handwheel
- 4—METERS indicator
- 5—DISTANCE TO ILLUM handwheel
- 6—METERS indicator

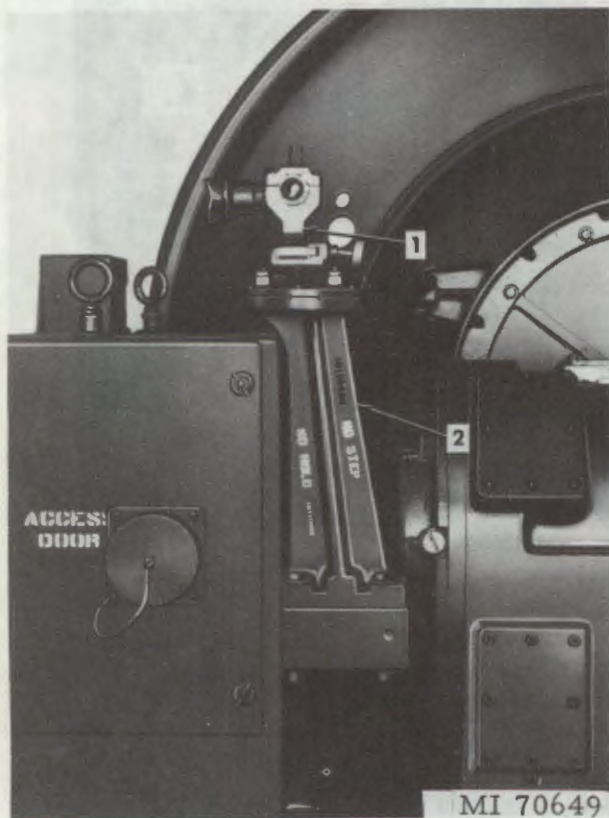
- 7—DISTANCE TO ILLUM handwheel
- 8—Azimuth handwheel
- 9—LOCAL-REMOTE switch
- 10—RADIATE-STANDBY switch
- 11—Elevation handwheel

Figure 6-34. IROR radar set group—front panels.



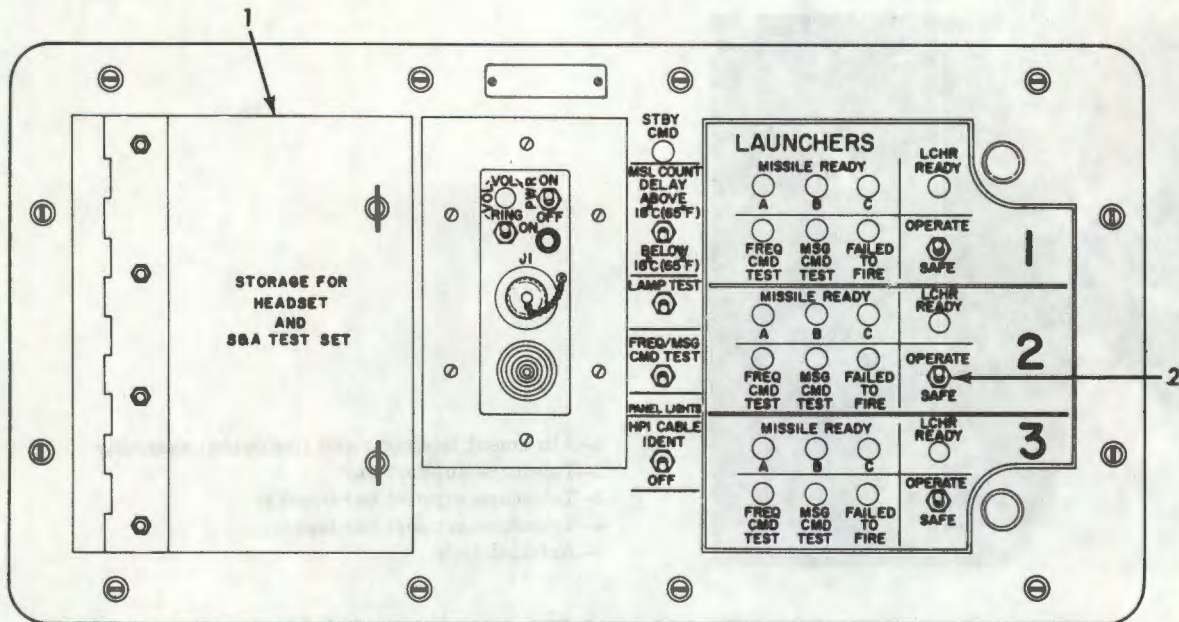
- 1-Null meter sensitivity switch
- 2-Null meter
- 3-CLUSTER ORIENT ILLUMINATOR #2 control
- 4-CLUSTER ORIENT ILLUMINATOR #1 control
- 5-SAFETY switch
- 6-Locking lever
- 7-Locking lever
- 8-Azimuth vernier ring

Figure 6-35. IROR antenna pedestal.



- 1-Alinement telescope
- 2-Telescope mount assembly

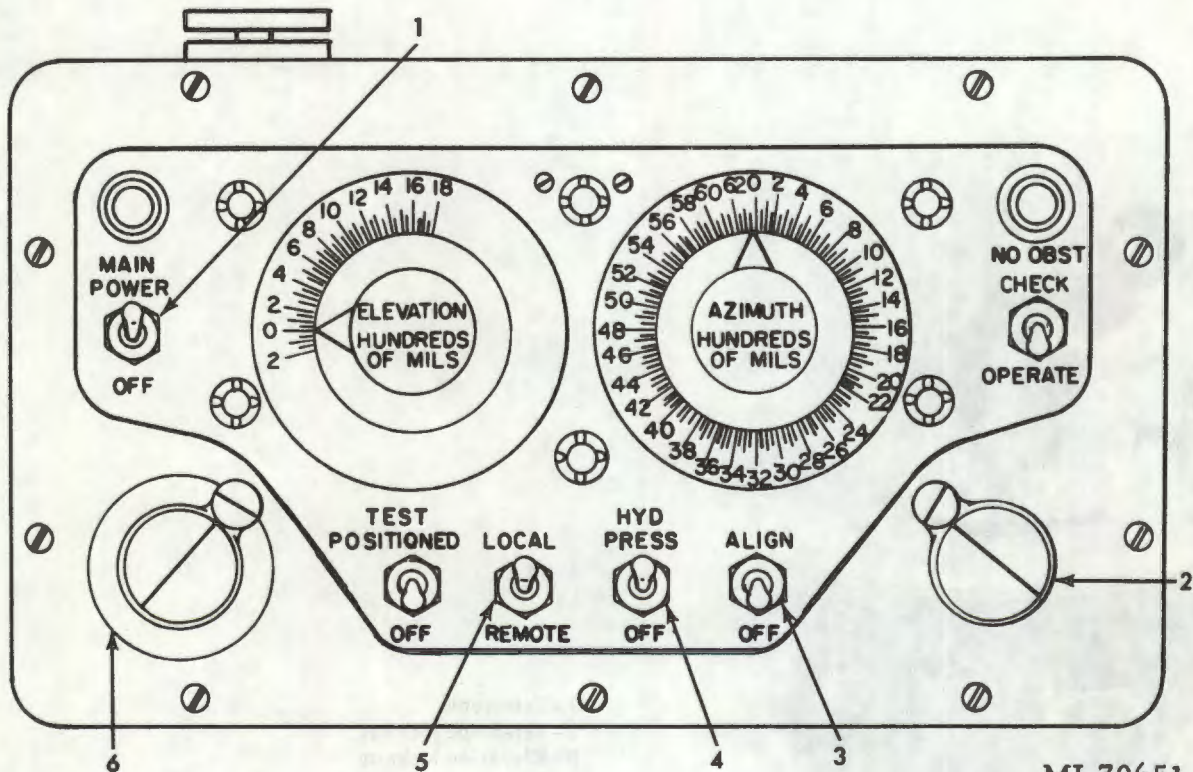
Figure 6-36. IROR alinement telescope—mounted.



MI 70650

- 1-Storage area
2-SAFE-OPERATE switch

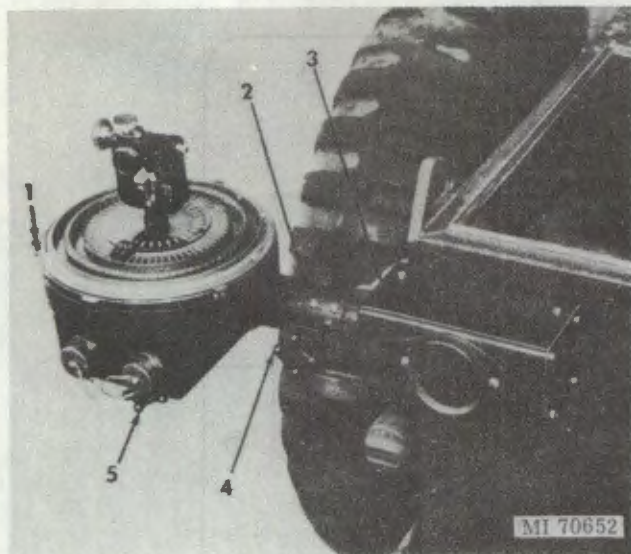
Figure 6-37. Improved launching section control box.



MI 70651

- 1-MAIN POWER switch
2-Azimuth handwheel
3-ALIGN switch
4-HYD PRESS switch
5-LOCAL-REMOTE switch
6-Elevation handwheel

Figure 6-38. Launcher control (LC).



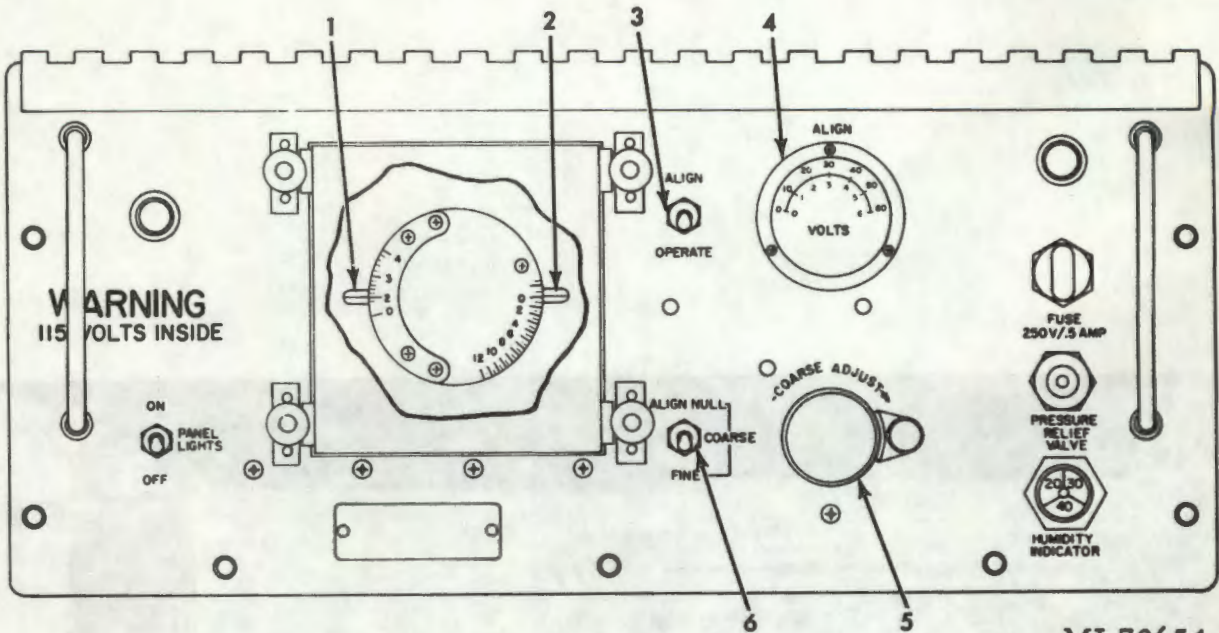
- 1—Alinement telescope and fire cutout assembly
- 2—Telescope support bar
- 3—Telescope support bar bracket
- 4—Telescope support bar lock
- 5—Azimuth lock

Figure 6-39. Alinement telescope and fire cutout assembly—mounted.



- 1—Telescope
- 2—Telescope locknut
- 3—Elevation locknut
- 4—Fire cutout switches
- 5—Azimuth lock
- 6—Assembly lock
- 7—Elevation indicator

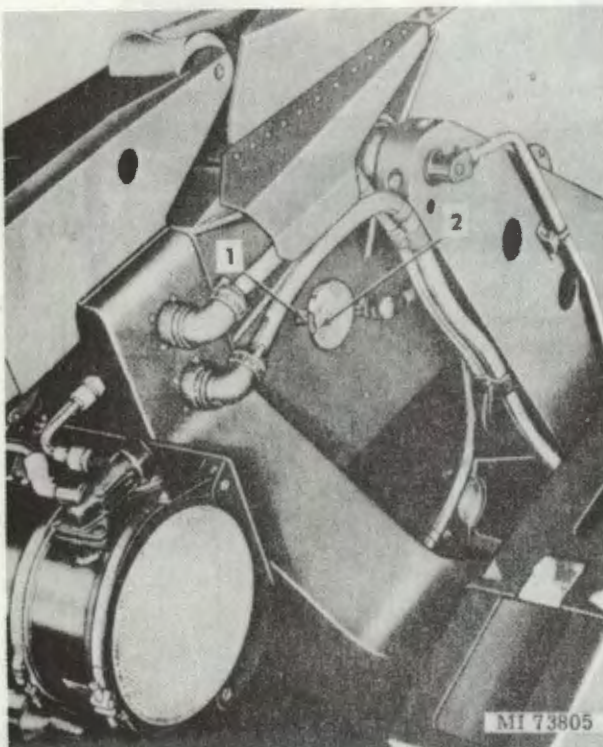
Figure 6-40. Alinement telescope and fire cutout assembly.



MI 70654

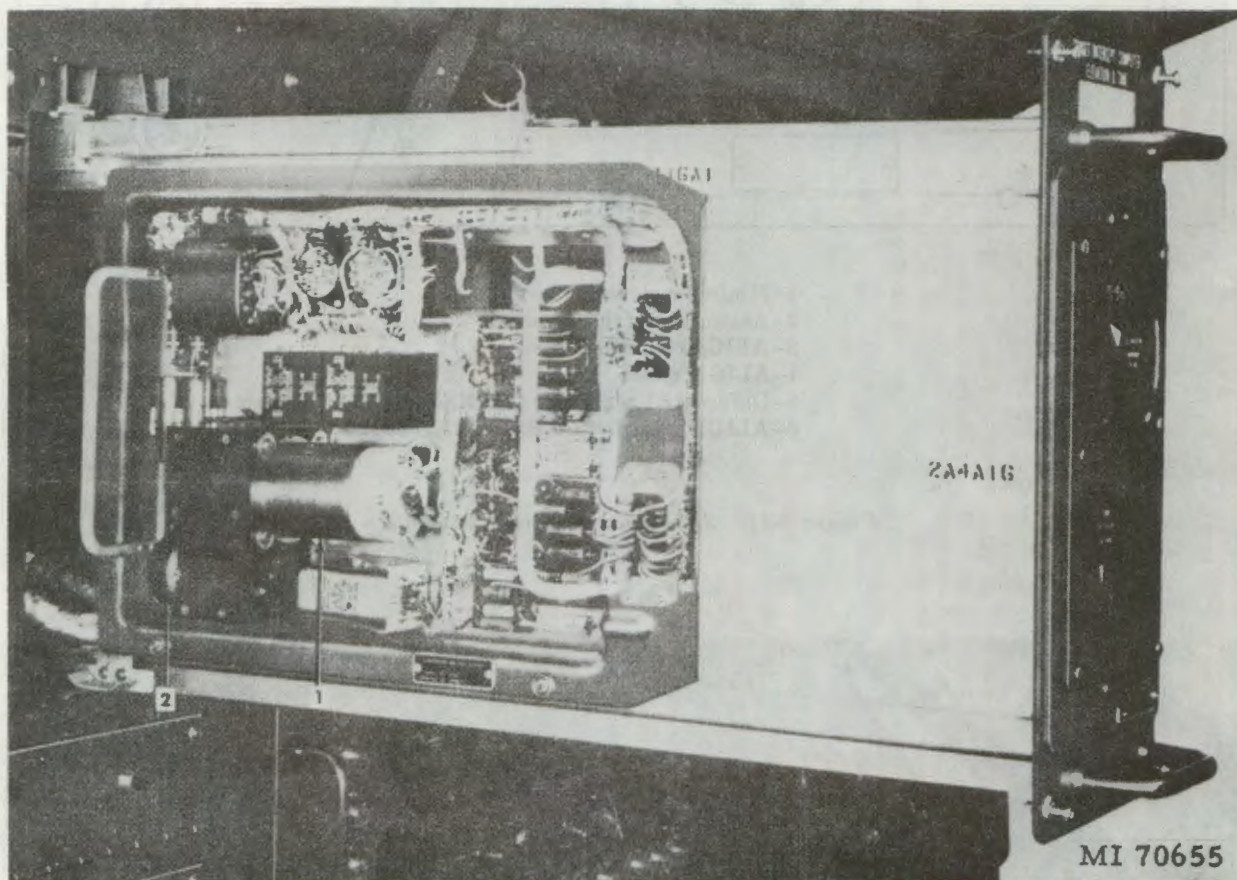
- 1-Minimum elevation lever
- 2-Azimuth override lever
- 3-ALIGN/OPERATE switch
- 4-ALIGN meter
- 5-Differential generator COARSE ADJUST control
- 6-ALIGN NULL/COARSE/FINE switch

Figure 6-41. Shoot-around console controls.



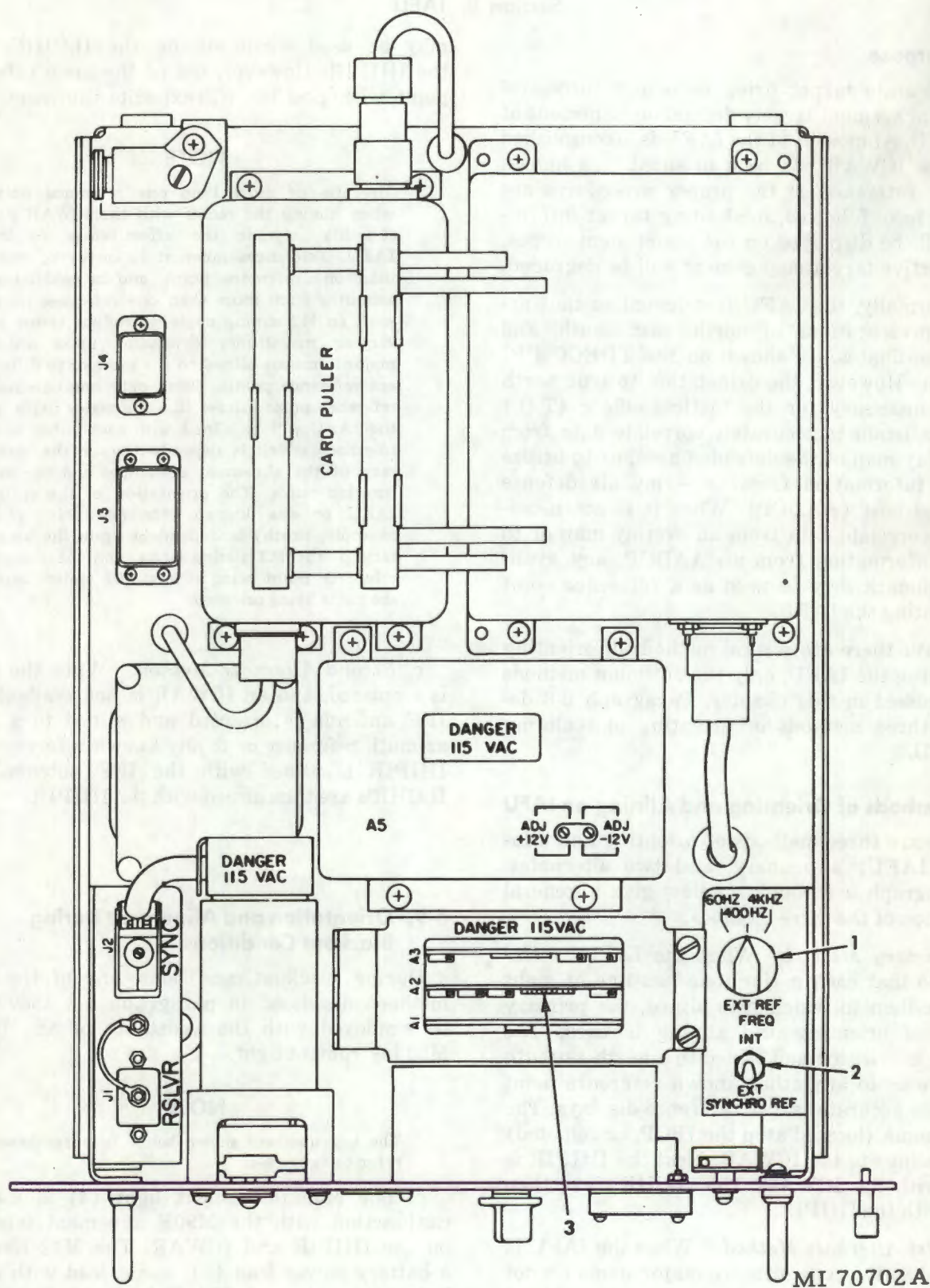
- 1-Elevation fire interrupter lever
- 2-Elevation fire interrupter scale

Figure 6-42. ILCHR boom.



- 1—Minimum elevation stowed synchro
- 2—Minimum elevation control

Figure 6-43. IHPIR minimum elevation stowed synchro.



- 1-EXT REF FREQ switch
- 2-SYNCHRO REF switch
- 3-A2J1-5

Figure 6-44. IFF coder-decoder group antenna control panel.

Section II. IAFU

6-7. Purpose

a. Accurate target firing data and successful target engagement largely depend on alinement of the IAFU. Alinement of the IAFU is accomplished after the ICWAR has been oriented to a known azimuth reference. If the proper procedures are not carefully followed, misleading target information will be displayed on the major item scopes, and effective target engagement will be degraded.

b. Normally, the IAFU is oriented so that accurate presentations of north, east, south, and west coordinates are shown on the TDECC PPI indicator. 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 IAFU.

c. While there are several methods of orienting and alining the IAFU, only the optimum methods are discussed in this chapter. Paragraph 6-8 describes three methods of orienting and alining the IAFU.

6-8. Methods of Orienting and Alining an IAFU

There are three methods of orienting and alining an IAFU: a primary, and two alternates. Subparagraph a through c below give a general description of the three methods.

a. *Primary Method.* When the IAFU is emplaced so that each major item has line of sight with the item to which it is alined, the primary method of orienting and alining is used. The ICWAR is oriented and alined to a north azimuth reference or to any other known reference point to provide accurate target reference displays. The IFF antenna (located atop the IPCP, or remoted) is then alined to the ICWAR. Next the IHIPIR is alined with the ICWAR. The ILCHR's are then alined with the IHIPIR.

b. *First Alternate Method.* When the IAFU is emplaced so that one or more major items do not have line of sight with the item to which it is alined, the first alternate method of orienting and alining is used for that item. The radars not having line of sight with the ICWAR must be oriented to the same reference point used in orienting the ICWAR. A different reference point

may be used when alining the ILCHR's with the IHIPIR. However, use of the same reference point, when possible, will expedite alinement.

NOTE

The use of more than one reference point when alining the radars with the ICWAR can seriously degrade the effectiveness of the IAFU. Tolerances inherent in surveying more than one reference point, and in calculating azimuths from more than one reference point with an M2 aiming circle, introduce errors of varying magnitudes depending upon which major items are alined to the same or to different reference points. Using only one common reference point insures that the major items of the IAFU will be alined with each other to a tolerance which is dependent upon the accuracy of the alinement telescopes and the mil ring indicators. The orientation of the entire IAFU to one known reference point (for example, north) is dependent upon the accuracy of the M2 aiming circle, and the known reference point being at least 305 meters from the radar being oriented.

c. *Second Alternate Method.* When the IAFU is emplaced, and an ICWAR is not available, the IFF antenna is oriented and alined to a north azimuth reference or to any known reference. The IHIPIR is alined with the IFF antenna. The ILCHR's are then alined with the IHIPIR.

6-9. Orientation and Alinement During Blackout Conditions

During blackout conditions, any of the three methods discussed in paragraph 6-8 above may be employed with the assistance of an M42 or M53 instrument light.

NOTE

The key numbers shown below in parentheses refer to figure 6-1.

a. The M42 instrument light (4) is used in conjunction with the M90F alinement telescope on the IHIPIR and ICWAR. The M42 contains a battery power lead (5), 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 a control switch (3). During alinement at night, the telescopes on the radars and the ILCHR's are sighted on the pen lights.

NOTE

The key numbers shown below in parentheses refer to figure 6-2.

b. The M53 instrument light (4) is used with the M90F telescope on the IPCP (IFF antenna) and the alinement telescope and fire cutout device on the ILCHR. It is similar to the M42 and also contains the pen light (2) for sighting. The control switch (3) is a different type and is mounted forward on the side of the instrument light. The M53 instrument light can be used in place of the M42 instrument light on the other major items.

6-10. Preliminary Procedures

Before orientation and alinement of the IAFU can be attempted, steps *a* through *c* below must be accomplished.

- a. Emplace the IAFU major items as described in chapter 4.
- 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 communications in accordance with detailed emplacement instructions for the IAFU major items presented in chapter 4.

6-11. Synchro Control System

Detailed functional schematics of the synchro control system for the IAFU are contained in DTM 9-1425-525-12-5. Synchro alinement procedures for each major item are also contained therein.

6-12. IAFU Orientation and Alinement Procedures

Perform the procedures in table 6-4 to orient and aline the IAFU when the ICWAR is available or the procedures in table 6-5 when the ICWAR is not available.

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR

Step	Operation	Normal indication	Corrective procedure
	WARNING Insure that all major item antenna safety switches are set to safe. NOTE Insure that all major items are energized in LOCAL STANDBY, unless otherwise indicated. This procedure is directed from the IPCP.		
1.	Orient and Aline the ICWAR.		
a.	Direct the ICWAR personnel to:		
(1)	Insure that the antenna SAFETY SWITCH (3, fig. 6-26) is set to SAFE.		
(2)	Set the LOCAL-REMOTE switch (2, fig. 6-27) to LOCAL.		
(3)	Insure that the ICWAR is level (refer to par. 4-5b)(13).		
(4)	Set the operating mode switch (1, fig. 6-27) to LOCAL SYNCHRO.		
(5)	Install the alinement telescope (3, fig. 6-28) on the ICWAR antenna.		
(6)	Manually rotate the ICWAR antenna until the vertical crosshair of the alinement telescope is sighted on the known reference point.		
	NOTE In high winds the antenna must be held in place manually.		
(7)	Loosen the thumbscrews holding the azimuth scale (2, fig. 6-26), set the azimuth of the known reference point, then tighten the thumbscrews.		

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation Normal indication Corrective procedure
1 a. Cont.	(8) Manually rotate the ICWAR antenna until the azimuth scale indicates 0 mils. (9) Set the azimuth handwheel on the fuse and control panel to 0 mils. (10) Record the setting of the boresight shift compensator adjust knob (2, fig. 6-29). (11) Turn the boresight shift compensator knob to 0. (12) Unlock the SYNCHRO CLUSTER ORIENT adjust knob (3, fig. 6-30) by releasing the adjust knob lock. (13) Set servo BITE switch S1 (2, fig. 6-30) to position 6 (ALIGN COARSE). (14) Push the SYNCHRO CLUSTER ORIENT adjust knob down, and rotate it clockwise until a null indication is obtained on servo BITE meter M1 (1, fig. 6-30). (15) Set servo BITE switch to position 7 (ALIGN FINE), and rotate the SYNCHRO CLUSTER ORIENT adjust knob clockwise to obtain a fine null on servo BITE meter M1. (16) Release the SYNCHRO CLUSTER ORIENT adjust knob, lock it, and check that servo BITE meter M1 still indicates a null. (17) Set the servo BITE switch to OPR. (18) Set the ICWAR LOCAL-REMOTE switch to REMOTE. b. Rotate the AZIMUTH handwheel (2, fig. 6-45) until the AZIMUTH cursor is coincident with the sweep on the PPI CRT indicator. The azimuth cursor counter indicates 0 ± 6 mils. If the azimuth cursor counter indicates approximately 3200 mils, a false null was obtained in step a(14). Repeat steps a(2) and a(12) through (18) above for the correct null.
2.	Aline the IFF Antenna.
a.	Direct the ICWAR personnel to reverse the alinement telescope on the ICWAR antenna.
b.	Set the ANT SYNC switch (3, fig. 6-12) to EXT.
c.	Set the IFF antenna SAFE/OPERATE switch (9, fig. 3-103.1) to SAFE and the AZ DRIVE switch (14, fig. 3-103.2) to OFF (SAFE).
d.	Energize the IFF equipment (DTM 9-1430-535-12-1).
e.	If the IFF antenna is roof-mounted, insure that the IPCP is level (refer to par. 4-45.3b). If the IFF antenna is remotely installed, insure that the IFF antenna is level (refer to par. 4-45.4k).
f.	Slide the M90F telescope and mounting bracket assembly into the telescope mount.

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
2f. Cont.	NOTE If a line of sight exists between the ICWAR and the IFF, proceed directly to step <i>l</i> below; if not, perform steps <i>g</i> through <i>k</i>. When the alternate method is being used to align the ICWAR with the IFF, the reference point used must be located at least 305 meters from the ICWAR and the IFF. The M2 aiming circle must be located at this reference point and must be visible to both the ICWAR and the IFF. All azimuth bearings must be determined to the M2 aiming circle from the telescope of the ICWAR being oriented.		
<i>g.</i>	Survey and emplace a stake, referenced to the ICWAR center line, not less than 305 meters from the ICWAR.		
<i>h.</i>	Direct the ICWAR personnel to:		
(1)	Manually rotate the ICWAR antenna until the alinement telescope is sighted on the M2 aiming circle telescope.		
(a)	NOTE In high winds the antenna has to be held in place manually. If the M2 aiming circle telescope is not in the field of view of the ICWAR telescope, perform steps (a) and (b) below.		
(b)	Loosen the two elevation lock screws (4, fig. 6-28) to rotate the ICWAR telescope on its elevation axis.		
(2)	When the M2 aiming circle and ICWAR telescopes are aligned with each other, tighten the two lock screws.		
<i>i.</i>	Determine the azimuth bearing of the ICWAR telescope to the M2 aiming circle.		
<i>j.</i>	Rotate the IFF antenna until the mil ring indicator indicates the azimuth bearing of the M2 aiming circle from the ICWAR.		
<i>k.</i>	NOTE Inform the ICWAR personnel that the ICWAR antenna must be held in place manually and its telescope sighted continually on the M2 aiming circle, until the alinement procedures are completed.		
<i>l.</i>	Loosen the three screws that secure the azimuth mil ring on the IFF antenna, and set the mil ring to indicate the azimuth of the M2 aiming circle. Tighten the three screws.		
<i>m.</i>	Proceed to step <i>n</i> .		
<i>n.</i>	Direct the ICWAR and IFF personnel to front sight the IFF antenna, and simultaneously backsight the ICWAR antenna until the vertical crosshair of the IFF telescope is centered on the ICWAR telescope, and the ICWAR telescope is vertically centered on the IFF telescope.		
<i>o.</i>	Loosen the three screws that secure the azimuth mil ring on the IFF antenna, and set the mil ring to indicate the azimuth of the ICWAR as indicated by the ICWAR azimuth mil ring.		
<i>p.</i>	Open the antenna control drawer and connect the ac voltmeter between A2J1-5 (3, fig. 6-44) and chassis ground.		
<i>q.</i>	Open the AZ ADJ access cover on the antenna control panel by loosening the captive retaining screw, and loosen the AZ ADJ LOCK.		

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
2p.	Adjust the AZ ADJ control (1, fig. 6-12) clockwise until a minimum indication is obtained on the ac voltmeter.		
q.	Tighten the AZ ADJUST LOCK. Close the AZ ADJ access cover and tighten it securely.		
r.	Remove the ac voltmeter leads and close the antenna control drawer.		
s.	Adjust the AZIMUTH handwheel (2, fig. 6-45) until the azimuth cursor is coincident with the ICWAR portion of the sweep (80 km and beyond) on the TDECC indicator, and record the reading of the AZIMUTH mils counter (1, fig. 6-45).		
WARNING Insure that all personnel are clear of the IFF antenna. CAUTION Make certain that the antenna hoisting unit (4, fig. 103.1) is in the stowed position before performing the following steps.			
t.	Set the AZ DRIVE switch to ON and the IFF antenna SAFE/OPERATE switch to OPERATE.		
The IFF antenna remains front sighted on the ICWAR antenna. If the antenna rotates 3200 mils, a false null was obtained in step p. Set the IFF antenna SAFE/OPERATE switch to SAFE. If a line of sight exists, repeat steps l through t above for the correct null. If a line of sight does not exist, perform steps g through j and n through t.			
u.	Set the IFF antenna SAFE/OPERATE switch to SAFE.		
v.	Momentarily press the CASUALTY/CW ROTATE pushbutton (1, fig. 6-15) for a CASUALTY indication.		
w.	Set the ANT SYNC switch (3, fig. 6-12) to INT.		
x.	Adjust the AZIMUTH handwheel until the azimuth cursor is coincident with the sweep on the PPI indicator.		
The AZIMUTH counter indicates within ± 10 mils of the indication recorded in step n above. Adjust IFF azimuth synchro B3 located behind the communication unit (2, fig. 3-101.1).			
y.	Momentarily press the CASUALTY/CW ROTATE pushbutton for a CW ROTATE indication.		
z.	Set the ANT SYNC switch to EXT.		
NOTE Insure the antenna is set to the maximum tilt angle by observing the tilt indicator (4, fig. 6-13). If an adjustment is required, perform step aa below. If not required, proceed to step ab.			

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
2aa.	To adjust the tilt of the IFF antenna, proceed as follows:		
(1)	Unlock the quick-disconnect pins (1, 2, and 6, fig. 6-13).		
(2)	Loosen the antenna upper stud nut (3, fig. 6-13).		
(3)	Observe the antenna tilt indicator (4, fig. 6-13), and adjust the nut (5, fig. 6-13) to obtain the maximum degree of tilt with respect to the horizon.		
(4)	Tighten the upper stud nut, being careful not to change the adjustment.		
	NOTE		
	If a quick-disconnect pin does not lock securely, adjust the tightness with small adjustments of the screw on the end of the pin. Try locking the pin after each adjustment and readjust as necessary until the quick-disconnect pin locks securely.		
(5)	Lock the quick-disconnect pins.		
ab.	Remove the M90F telescope and mounting bracket.		
ac.	Disconnect and remove the headset.		
ad.	Set the PWR switch on the IFF communication module to OFF.		
ae.	Secure the IFF communication module door.		
3.	Aline the IHIPIR.		
	NOTE		
	Observe that the BCC R BUS lamp on the fuse and control panel is illuminated. Do not perform the alinement if the lamp is extinguished.		
a.	Set the mode switch (1, fig. 6-47) on the status panel to HPI.		
b.	Direct the ILCHR personnel to insure that all ILCHR's are in local control.		
c.	Direct the IHIPIR personnel to:		
(1)	Insure that the PEDESTAL SAFETY switch (2, fig. 6-16) is set to SAFE.		
(2)	Insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
(3)	Insure that the IHIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM and POWER AMPLIFIER BEAM circuit breakers (1 and 2, fig. 6-18) set to OFF.		
(4)	Install the alinement telescope (1, fig. 6-19) on the IHIPIR antenna.		
(5)	Insure that the IHIPIR is level (refer to par. 4-11b(10)).		
	NOTE		
	If a line of sight exists between the IHIPIR and the ICWAR, proceed directly to step <i>i</i> below; if not, perform steps <i>d</i> through <i>h</i> .		
	When the alternate procedure is being used to aline the IHIPIR with the ICWAR, the reference point must be located at least 305 meters from the IHIPIR and the ICWAR. The M2 aiming circle must be located at this reference point and must be visible to both the IHIPIR and the ICWAR. All azimuth bearings must be determined to the M2 aiming circle from the telescope of the IHIPIR.		

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation
	Normal indication Corrective procedure
3d.	Survey and emplace a stake, referenced to the IHIPIR center line, not less than 305 meters from the IHIPIR.
	NOTE
	Any known reference point may be used provided that it is the same reference direction to which the ICWAR is alined.
e.	Direct the IHIPIR personnel to front sight the IHIPIR antenna on the M2 aiming circle telescope.
f.	Direct the ICWAR personnel to front sight the IHIPIR antenna on the M2 aiming circle telescope.
	NOTE
	While the IHIPIR alines, the ICWAR must remain oriented to the M2 aiming circle.
g.	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-25) to the same azimuth as the ICWAR as read from the ICWAR azimuth mil ring.
h.	Proceed to step <i>k</i> .
i.	Direct the ICWAR and IHIPIR personnel to front sight the IHIPIR antenna and simultaneously back sight the ICWAR antenna until the vertical crosshair of the IHIPIR telescope is alined with the ICWAR telescope, and the vertical crosshair of the ICWAR telescope is alined with the IHIPIR telescope.
j.	Direct the IHIPIR personnel to loosen the two screws that secure the azimuth mil ring on the IHIPIR antenna pedestal, and set the mil ring to indicate the azimuth of the ICWAR antenna. Tighten the two screws.
k.	Position the azimuth cursor over the radial sweep on the TDECC PPI indicator, using the AZIMUTH handwheel.
l.	Set the ELEVATION thumbwheel (2, fig. 6-46) to 0 mils.
m.	Direct the IHIPIR personnel to:
	(1) Set the LOCAL-REMOTE switch to REMOTE.
	(2) Insure that the IHIPIR telescope is still alined with the ICWAR telescope.
	(3) At the IHIPIR pedestal, push the synchro adjust knob (2, fig. 6-23) down, and rotate it clockwise until a null is obtained on nulling meter M1 (4, fig. 6-23).
	(4) Press fine null switch S1 (3, fig. 6-23), and simultaneously rotate the synchro adjust knob clockwise until a fine null is obtained. Release the fine null switch.
	(5) Release the synchro adjust knob, and insure that the null indication remains on nulling meter M1.
	The IHIPIR track symbol (□) is positioned at the same azimuth as the cursor.
	If the IHIPIR track symbol is displaced 3200 mils from the cursor, a false null was obtained in step <i>m</i> (3) above. If a line of sight exists, repeat steps <i>c</i> (1) and <i>i</i> through <i>m</i> . If a line of sight does not exist, repeat steps <i>c</i> (1), <i>d</i> through <i>g</i> , and <i>k</i> through <i>m</i> . In either case in step <i>m</i> (3) readjust the synchro adjust knob clockwise to the correct null.

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
3n.	Direct the IHIPIR personnel to:		
(1)	Set the MOTOR GENERATOR circuit breaker (2, fig. 6-24) to ON.		
	WARNING		
	Insure that all personnel are clear of the IHIPIR antenna.		
(2)	Set the PEDESTAL SAFETY switch to OPERATE.		
o.	Observe the position of the IHIPIR track symbol on the TDECC PPI display.		
	The IHIPIR track symbol is positioned at the same azimuth as the cursor.		
p.	Direct the IHIPIR personnel to set the PEDESTAL SAFETY switch to SAFE.		
4.	Check Alinement.		
	NOTE		
	Insure that all major items are energized in REMOTE STANDBY and all antenna SAFE-OPERATE switches are in SAFE unless otherwise directed.		
	NOTE		
	To obtain an accurate mil indication from the CORRELATION CURSOR counter, always view the counter from a point directly above the counter window.		
a.	Direct the ICWAR, and IHIPIR personnel to position their antennas to 800 mils as read on their respective azimuth mil rings.		
	NOTE		
	The battery check portion of the operational tape will not load while performing step (b) below.		
b.	Load the operational program in accordance with TM 9-1430-535-12-1.		
c.	Set the READER POWER switch on the printer-reader to ON.		
d.	Set the INSTRUCTION INPUT switches on the CPU panel to 06044042.		
e.	Press the EXECUTE pushbutton 1 time.		
	The tape advances to the battery check routine portion of the tape and stops.		
f.	Set the DATA INPUT switches on the CPU panel to 40000101.		
g.	Set the LOCAL-REMOTE switch to REMOTE.		
h.	Press the DTO MANUAL RESET pushbutton.		
i.	Press the CPU RESET pushbutton.		
j.	Press the DISPLAY ENABLE pushbutton.		
k.	Press the START/STEP/PULSE pushbutton 2 times.		
	The battery check portion of the operational program is loaded and executed.		
	The printer readout indicates: ACQ 793 to 807 mils.		
	HPI indicates 793 to 807 mils.		

Table 6-4. IAFU Orientation and Alinement Procedures with ICWAR—Continued

Step	Operation	Normal indication	Corrective procedure
4l.	Insure that the CASUALTY/CW ROTATE switch on the auxiliary control unit is set to CW ROTATE.		
m.	Repeat steps h through k.		
n.	Direct the ICWAR personnel to return the boresight shift compensator adjust knob to the setting recorded in step 1a(10).		
5.	Aline the ILCHR. Perform the procedures contained in table 6-1, step 7.		

Table 6-5. IAFU Orientation and Alinement Procedures without ICWAR

Step	Operation	Normal indication	Corrective procedure
		WARNING Insure that all major item antenna safety switches are set to safe. NOTE Insure that all major items are energized in LOCAL STANDBY, unless otherwise indicated. This procedure is directed from the IPCP.	
1.	Orient and Aline the IFF Antenna.		
a.	Set the IFF antenna SAFE/OPERATE switch (9, fig. 3-103.1) to SAFE and the AZ DRIVE switch (14, fig. 3-103.2) to OFF (SAFE).		
b.	Energize the IFF in accordance with DTM 9-1430-535-12-1.		
c.	Set the ANT SYNC switch (3, fig. 6-12) to INT.		
d.	Set the INT ANT SYNC control (2, fig. 6-12) to 0 RPM CW.		
e.	Momentarily press the CASUALTY/CW ROTATE pushbutton (1, fig. 6-15) for a CASUALTY indication.		
f.	If the IFF antenna is roof-mounted, insure that the IPCP is level (refer to par. 4-45.3b). If the IFF antenna is remotely installed, insure that the IFF antenna is level (refer to par. 4-45.4k).		
g.	Slide the M90F telescope and mounting bracket assembly into the telescope mount.		
h.	Rotate the IFF antenna until the telescope is alined with the designated azimuth reference point.		

Table 6-5. IAFU Orientation and Alinement Procedures without ICWAR—Continued

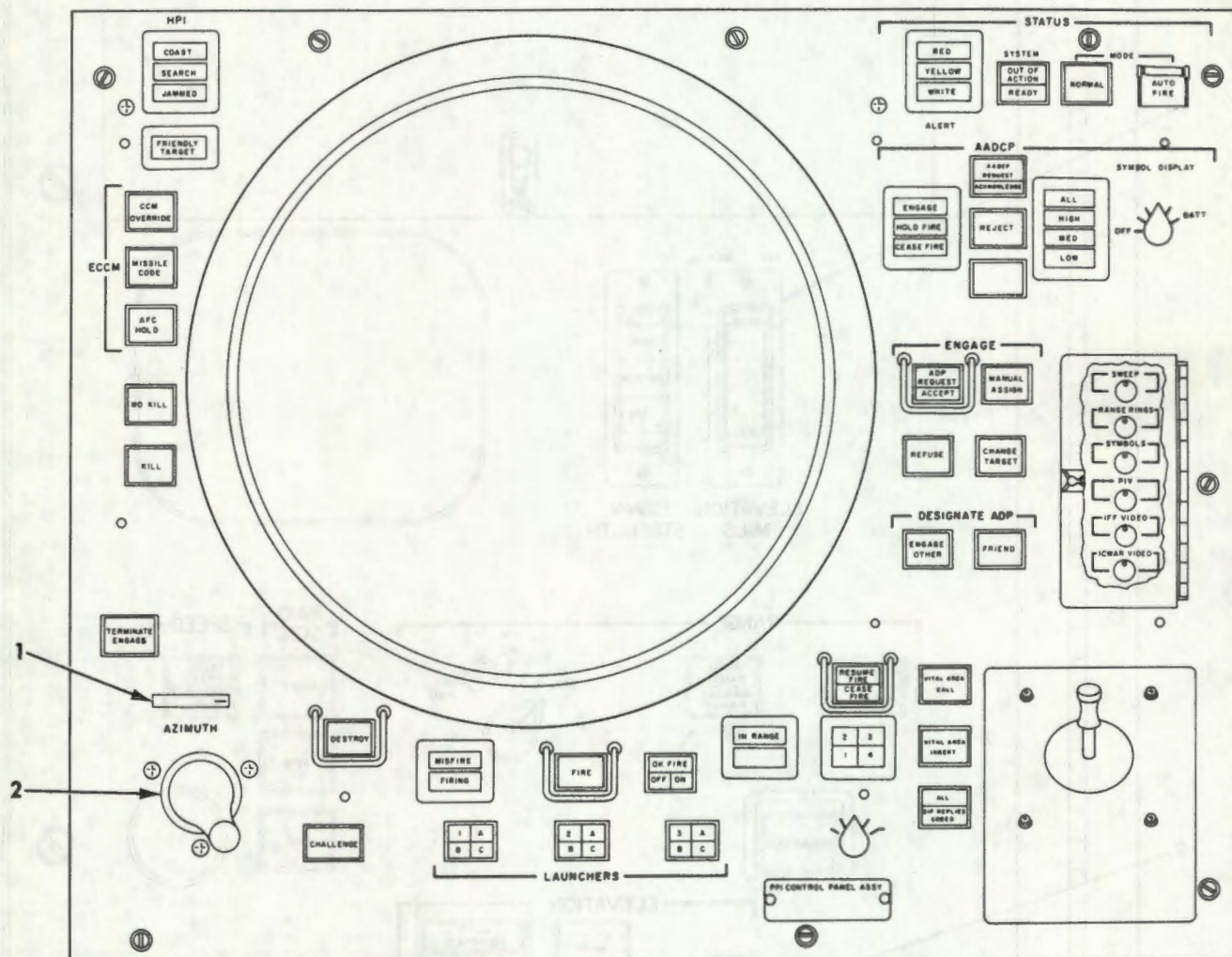
Step	Operation	Normal indication	Corrective procedure
1i.	Loosen the lock screws (7, fig. 6-13) securing the IFF antenna azimuth mil ring.		
	NOTE		
	In high winds, the antenna must be held in place manually until the alinement procedures are completed.		
j.	Rotate the azimuth mil ring until the vernier indicates the azimuth bearing of the known reference point.		
k.	Secure the azimuth mil ring by tightening the lock screws loosened in step <i>i</i> above.		
l.	Rotate the IFF antenna until the vernier indicates 0 mils.		
m.	Open the AZ ADJ access cover by loosening the captive retaining screw, and loosen the AZ ADJ LOCK.		
n.	Adjust the AZ ADJ control (1, fig. 6-12) until the TDECC indicator sweep is positioned at 0 mils.		
o.	Tighten the AZ ADJ LOCK, then close and secure the AZ ADJ LOCK cover.		
	NOTE		
	Insure the antenna is set to the maximum tilt angle by observing the tilt indicator (4, fig. 6-13). If an adjustment is required, perform step <i>p</i> ; if not required, proceed to step 2.		
p.	Adjust the tilt of the IFF antenna as described in step <i>aa</i> of table 6-4.		
2.	Aline the IHIPIR.		
	NOTE		
	Observe that the BCC R BUS lamp on the fuse and control panel is illuminated. Do not perform the alinement if the lamp is extinguished.		
a.	Set the mode switch (1, fig. 6-47) on the status panel to HPI.		
b.	Direct the ILCHR personnel to insure that all ILCHR's are in local control.		
c.	Direct the IHIPIR personnel to:		
(1)	Insure that the PEDESTAL SAFETY switch (2, fig. 6-16) is set to SAFE.		
(2)	Insure that the LOCAL-REMOTE switch (4, fig. 6-17) is set to LOCAL.		
(3)	Insure that the IHIPIR is in a false radiate condition, with the MASTER OSCILLATOR BEAM and POWER AMPLIFIER BEAM circuit breakers (1 and 2, fig. 6-18) to OFF.		
(4)	Install the alinement telescope (1, fig. 6-19) on the IHIPIR antenna.		
(5)	Insure that the IHIPIR is level (refer to par. 4-11b(10)).		

Table 6-5. IAFU Orientation and Alinement Procedures without ICWAR—Continued

Step	Operation
	Normal indication Corrective procedure
2c. Cont.	NOTE If a line of sight exists between the IHIPIR and the IFF, proceed directly to step <i>i</i> below; if not, perform steps <i>d</i> through <i>h</i>. When the alternate method is being used to align the IHIPIR with the IFF, the reference point used must be located at least 305 meters from the IFF and the IHIPIR. The M2 aiming circle must be located at this reference point and must be visible to both the IFF and the IHIPIR. All azimuth bearings must be determined to the M2 aiming circle from the telescope of the IHIPIR.
<i>d.</i>	Survey and emplace a stake, referenced to the IHIPIR center line, approximately 305 meters from the IHIPIR.
	NOTE Any known reference point may be used provided that it is the same reference direction to which the IFF is alined.
<i>e.</i>	Direct the IHIPIR personnel to front sight the IHIPIR antenna on the M2 aiming circle telescope.
<i>f.</i>	Direct the IFF personnel to front sight the IPAR antenna on the M2 aiming circle telescope.
	NOTE While the IHIPIR alines, the IFF must remain oriented to the stake.
<i>g.</i>	Direct the IHIPIR personnel to set the azimuth mil ring (4, fig. 6-25) to the same azimuth as the IFF as read from the IFF azimuth mil ring.
<i>h.</i>	Proceed to step <i>k</i>.
<i>i.</i>	Direct the IFF and IHIPIR personnel to front sight the IHIPIR antenna and simultaneously backsight the IFF antenna until the vertical crosshair of the IHIPIR telescope is alined with the IFF telescope, and the vertical crosshair of the IFF telescope is alined with the IHIPIR telescope.
<i>j.</i>	Direct the IHIPIR personnel to loosen the two screws that secure the azimuth mil ring on the IHIPIR antenna pedestal, and set the mil ring to indicate the azimuth of the IFF antenna. Secure the two screws.
<i>k.</i>	Position the azimuth cursor over the radial sweep on the TDECC indicator, using the AZIMUTH handwheel (2, fig. 6-45).
<i>l.</i>	Set the ELEVATION thumbwheel (2, fig. 6-46) to 0 mils.
<i>m.</i>	Direct the IHIPIR personnel to:
(1)	Set the LOCAL-REMOTE switch to REMOTE.
(2)	Insure that the IHIPIR telescope is still alined with the IFF telescope.
(3)	At the IHIPIR pedestal, push the synchro adjust knob (2, fig. 6-23) down and rotate it clockwise until a null is obtained on nulling meter M1 (4, fig. 6-23).
(4)	Press fine null switch S1 (3, fig. 6-23) and simultaneously rotate the synchro adjust knob clockwise until a fine null is obtained. Release the fine null switch.

Table 6-5. IAFU Orientation and Alinement Procedures without ICWAR—Continued

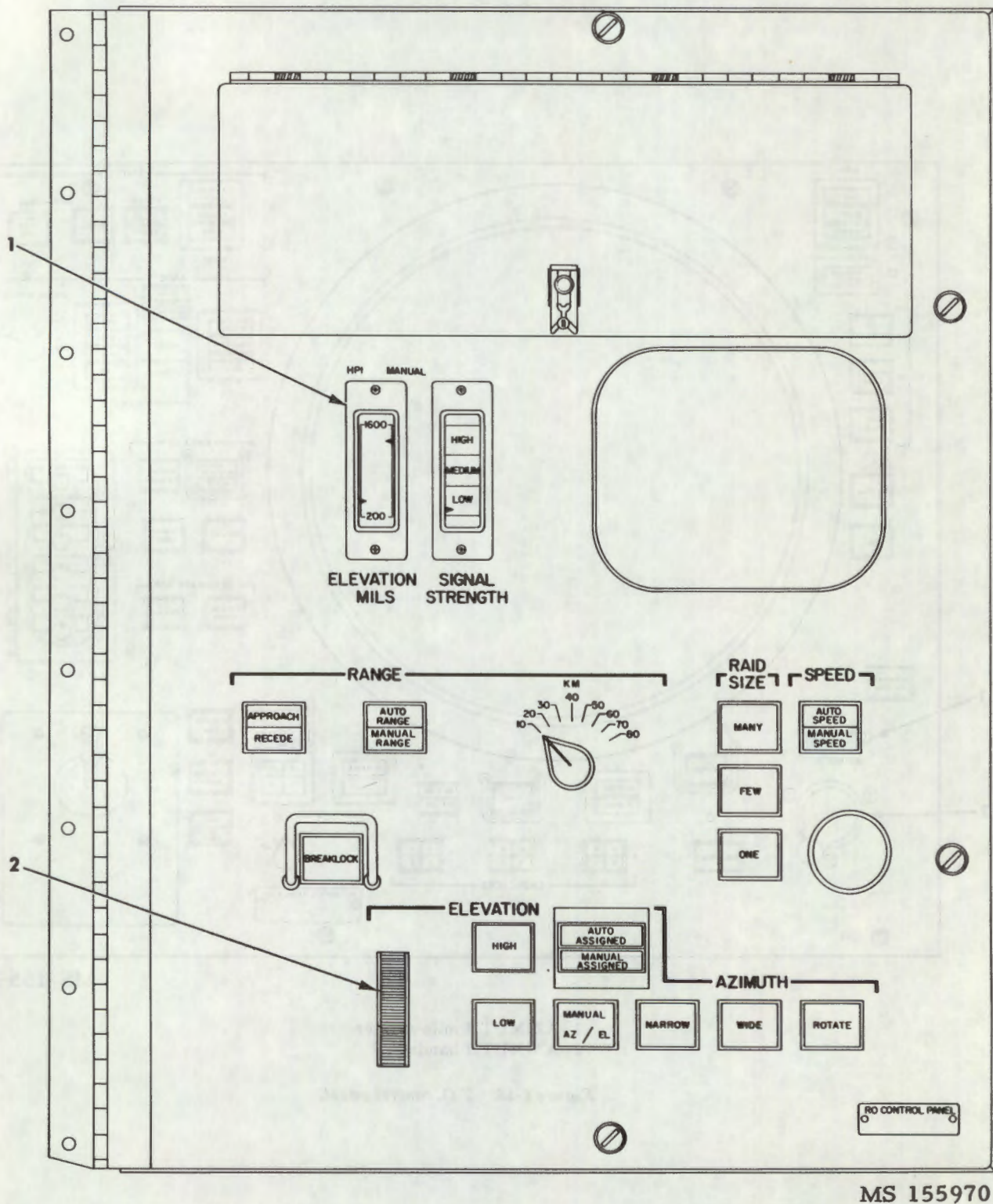
Step	Operation	Normal indication	Corrective procedure
2m. Cont.			
(5)	Release the synchro adjust knob, and assure that the null indication remains on nulling meter M1. The IHIPIR track symbol (□) is positioned at the same azimuth as the cursor. If the IHIPIR track symbol is displaced 3200 mils from the cursor, a false null was obtained in step m(4) above. If a line of sight to the IFF antenna exists, set the LOCAL-REMOTE switch to LOCAL and repeat steps i through m. If a line of sight does not exist, set the LOCAL-REMOTE switch to LOCAL and repeat steps e through g and i through m. In either case in step m(3) readjust the synchro adjust knob clockwise to the correct null.		
n.	Direct the IHIPIR personnel to:		
(1)	Set the MOTOR GENERATOR circuit breaker (2, fig. 6-24) to ON.		
	WARNING		
	Insure that all personnel are clear of the IHIPIR antenna.		
(2)	Set the PEDESTAL switch to OPERATE.		
o.	Observe the position of the IHIPIR track symbol on the TDECC PPI display.		
	The IHIPIR track symbol is positioned at the same azimuth as the cursor.		
p.	Direct the IHIPIR personnel to:		
(1)	Set the PEDESTAL switch to SAFE.		
(2)	Set the LOCAL-REMOTE switch to LOCAL.		
q.	Direct the IFF personnel to:		
(1)	Remove the M90F telescope and mounting bracket.		
(2)	Disconnect and remove the headset.		
(3)	Set the PWR switch on the IFF communication module to OFF.		
(4)	Secure the IFF communication module door.		
3.	Aline the ILCHR. Perform the procedures contained in table 6-1, step 7.		



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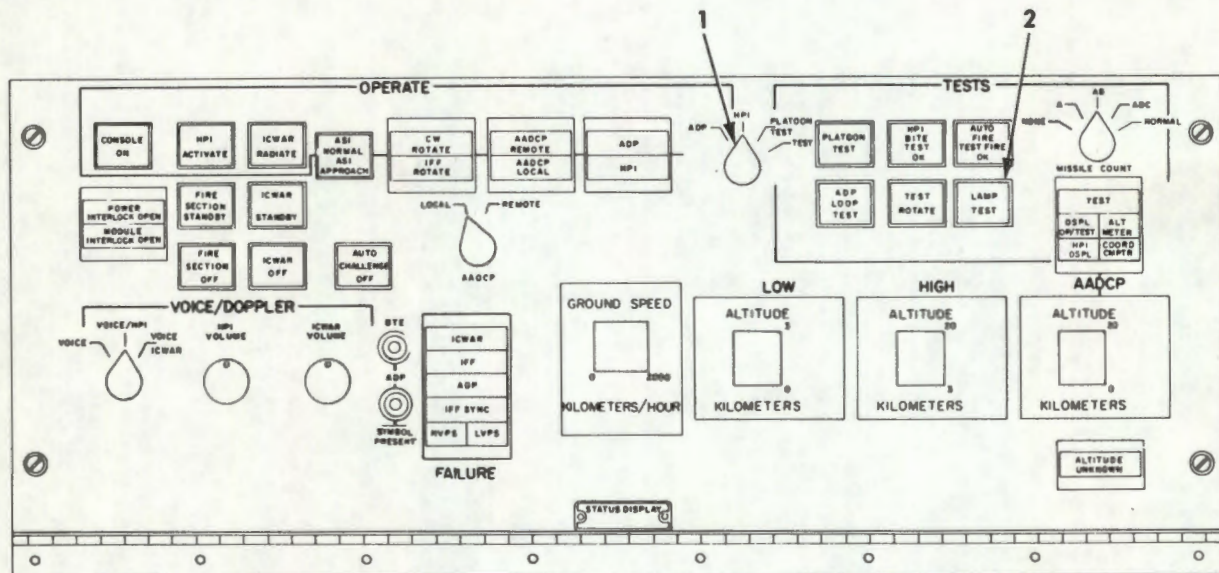
- 1—AZIMUTH mils counter
2—AZIMUTH handwheel

Figure 6-45. T.O. control panel.



1—ELEVATION MILS counter
2—ELEVATION thumbwheel

Figure 6-46. RO control panel.



MS 155971

1—OPERATE/TEST switch
2—LAMP TEST pushbutton

Figure 6-47. Status panel.

CHAPTER 7

LIGHTNING PROTECTION

7-1. Scope

a. This chapter contains instructions for protecting the improved HAWK battery from direct lightning and lightning-induced surges of high current. Although the standard battery emplacement procedures require grounding of equipment, additional protection is needed in areas where the battery site is higher than the surrounding terrain and in areas where severe electrical storms are experienced.

b. The "cone of protection" concept is employed in the following procedures to protect the major items of the battery. Theoretically, a cone of protection originates at the uppermost point of a vertical shielding conductor, and extends conically downward. The formula for determining the radius of the circular base of the cone, and thus the protected ground area is as follows: the radius of the cone is twice the height of the vertical-shielding conductor (fig. 7-1). In general, the shielding conductor will protect all items or structures completely enclosed by the cone, but will not significantly influence lightning seeking a point outside the cone.

c. 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.

7-2. General Lightning Protection Emplacement Instructions

The following general instructions apply in the emplacement of all vertical shielding conductors.

a. The shielding conductor mast with vertical-shielding conductor must be emplaced a minimum of 1.8 meters (6 feet) from the equipment being protected.

b. If the distance from the equipment to the shielding conductor mast exceeds 1.8 meters, the height of the mast must be increased by one-half the added distance to remain within the cone of protection.

NOTE

If the equipment to be protected is located on a mound or tower, the height of the shielding conductor must be increased an amount equal to the height of the mound or tower.

NOTE: THE RADIUS OF THE CONE IS EQUAL TO TWICE ITS HEIGHT.

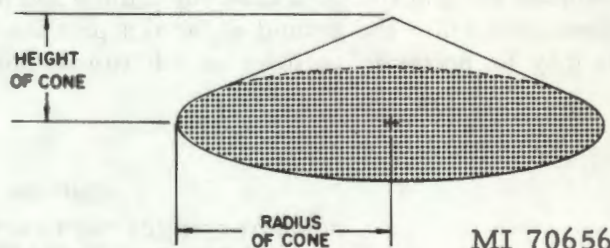


Figure 7-1. Cone of protection concept.

c. The shielding conductor must extend 30 cm above the top of the shielding conductor mast to provide an air terminal to intercept the electrical discharge at a safe distance above vulnerable and flammable parts or structures.

d. Use a 1.8-meter length of wooden molding to protect the shielding conductor from mechanical damage at ground level.

e. Emplace a shielding conductor ground rod at least 1.8 meters beyond the shielding conductor mast (3.6 meters minimum from the equipment to be protected). The distance between the equipment ground rod and the shielding conductor ground rod should be extended to the maximum practical distance. Drive the shielding conductor ground rod 1.8 meters into the ground.

NOTE

If bedrock prevents driving the shielding conductor ground rod 1.8 meters deep, dig a radial trench (3.6 meters long by 0.91 meters deep (12 by 3 feet)) from the base of the shielding conductor mast and away from the equipment being protected. Connect No. 6 copper wire to the vertical shielding conductor and bury the wire in the trench.

CAUTION

Do not connect the equipment ground rod to the shielding conductor ground rod.

f. Connect a bonding conductor of No. 6 copper wire between the base of the shielding conductor and the ground rod and bury the bonding conductor at least 15 cm underground.

g. Measured resistance between the shielding conductor ground rod and equipment ground rod should not be more than 0.5 ohm per foot (30.48 cm) distance or less than 1 ohm total between the two ground rods. In the event any of the resistance measurements are higher than allowed, corrective action should be taken to decrease the resistance. The first step to be taken to decrease ground resistance is to assure that the ground rods are driven into the ground to a sufficient depth. If resistance readings are still too high after the ground rod has been driven into the ground as far as is practicable it may be necessary to drive an additional rod(s)

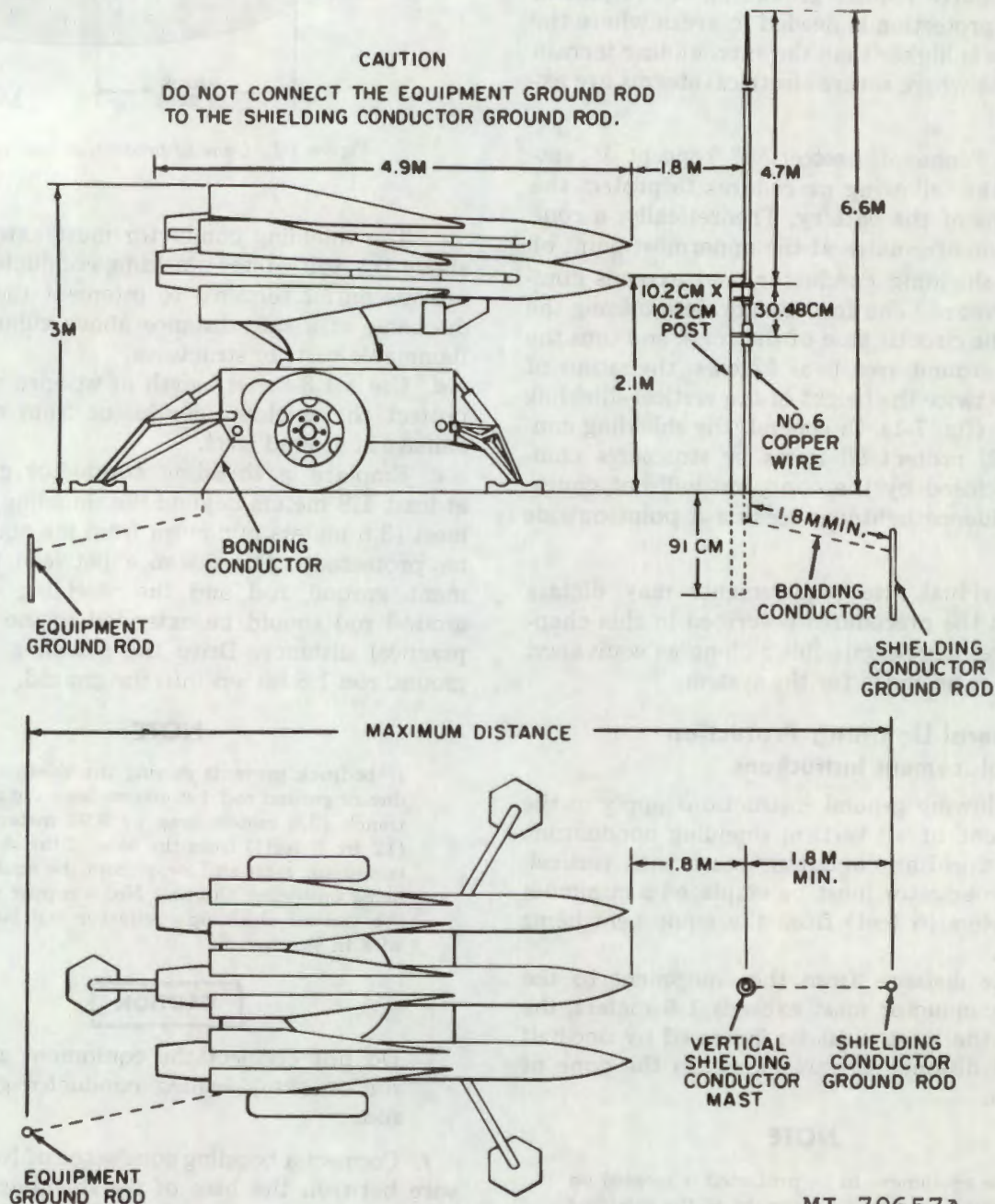
connected in parallel with the original rod or relocate the original ground rod.

7-3. Lightning Protection Fabrication for ILCHR's

Fabricate a lightning protection assembly for each ILCHR in accordance with paragraph 7-2 above, and figures 7-2 and 7-3. Refer to table 7-1 for a list of materials required.

NOTE

Secure the clamp and bracket on the wooden post so that the mast may be lowered away from the ILCHR if desired.



MI 70657A

Figure 7-2. ILCHR lightning protection layout.

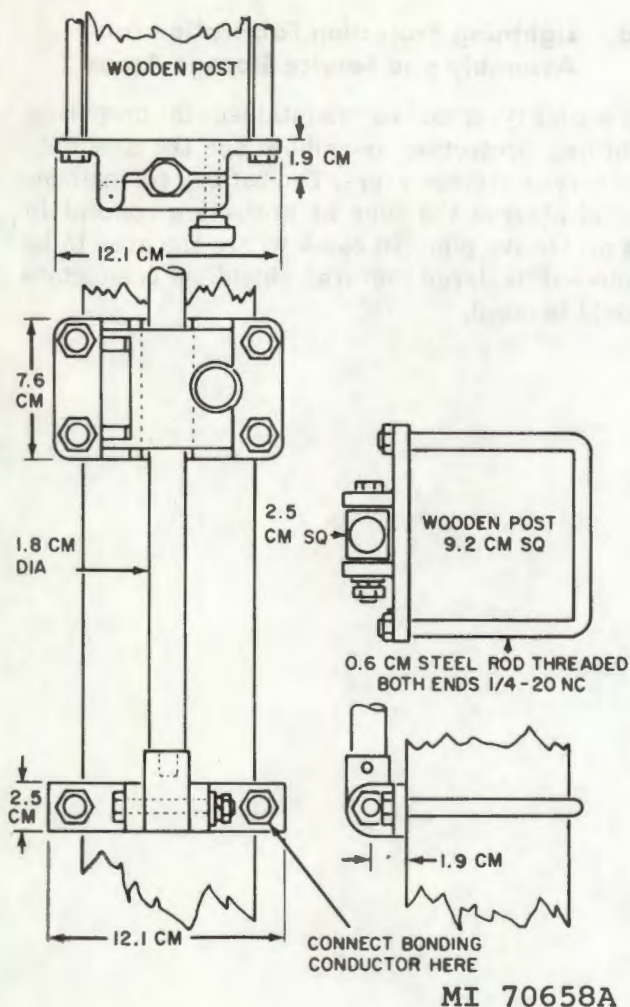


Figure 7-3. Bracket assembly for attaching the mast to the post.

7-4. Lightning Protection Fabrication for Radars

Fabricate a lightning protection assembly for each radar in accordance with paragraph 7-2 and figure 7-4. Refer to table 7-2 for a list of materials required.

7-5. Lightning Protection Fabrication for the Improved Battery Control Central and Information and Coordination Central

Fabricate a lightning protection assembly for the IBCC and ICC shelters in accordance with paragraph 7-2 and figure 7-5. Refer to table 7-2 for a list of materials required. If lightning protection for an individual shelter is required, fabricate the lightning protection assembly as directed for radars (par. 7-4).

Table 7-1. Materials Required for Each ILCHR

Description	Part No.	Federal stock No.
POST, wooden, 10.2 cm x 10.2 cm x 3.05 m	9175247	5975-296-0762 6145-284-1402 5315-161-9862
ROD, ground, 1.83 m x 15.88 cm		
WIRE, copper, No. 6		
STAPLES, 2.54 cm x 0.95 cm		
MAST SECTIONS		
length/m diameter/cm		
0.977 1.11	MS49(SIG)	5820-199-8842
0.996 1.27	MS50(SIG)	5820-155-8131
0.998 1.43	MS51(SIG)	5820-155-8130
1.003 1.59	MS52(SIG)	5820-155-8129
1.006 1.75	MS53(SIG)	5820-156-1055
CLAMP and BRACKET as in figure 7-3, 1 set		
MOLDING, Ranier wood ground wire, No.		
RGM-2, 1.83 m		
STAPLES, 7.62 cm x 2.81 cm		

Table 7-2. Materials Required for Each Radar, Each Pair of Shelters, and Remote IFF Antenna Installation

Description	Part No.	Federal stock no.
Pole, utility, 10.65 m (1 each)	9175247	5975-296-0762 6145-284-1402 5315-161-9862
ROD, ground, 1.83 m x 15.88 cm (1 each)		
WIRE, copper, No. 6, 26.56 m		
STAPLES, 2.54 cm long, 0.95 cm dia		
MOLDING, Ranier wood ground wire, No. RGM-2, 1.83 m		
STAPLES, 7.62 cm long, 2.81 cm in. dia		

7-6. Lightning Protection Fabrication for the Improved Platoon Command Post

Fabricate a lightning protection assembly for the IPCP in accordance with paragraph 7-2 and figure 7-6. Refer to table 7-3 for a list of materials required.

7-7. Lightning Protection Fabrication for Remotely Located AN/TPX-46 Interrogator/Receiver Set and Antenna

Fabricate a lightning protection assembly for the AN/TPX-46 interrogator/receiver set and antenna in accordance with paragraph 7-2 and figure 7-7. Refer to table 7-2 for a list of materials required.

Table 7-3. Materials Required for Each IPCP, and Remote IFF Antenna Installation

Description	Part No.	Federal stock no.
Pole, utility, 10.65 m (1 each)	9145247	
Wire, copper, No. 6, 26.56 m		6145-284-1402
Rod, ground, 1.83 m x 15.88 cm		5975-296-0762
Staples, 2.54 cm x 0.95 cm dia		5315-161-9862
Staples, 7.62 cm x 2.81 cm dia		
Molding, Rainer wood		
Ground wire, No. RGM-2, 1.83 m		

7-8. Lightning Protection Fabrication for Assembly and Service Storage Areas

Flexibility must be maintained in preparing lightning protection assemblies for the assembly and service storage areas. The battery commander should observe the cone of protection concept in his protective plan. In cases where the area to be protected is large, several shielding conductors should be used.

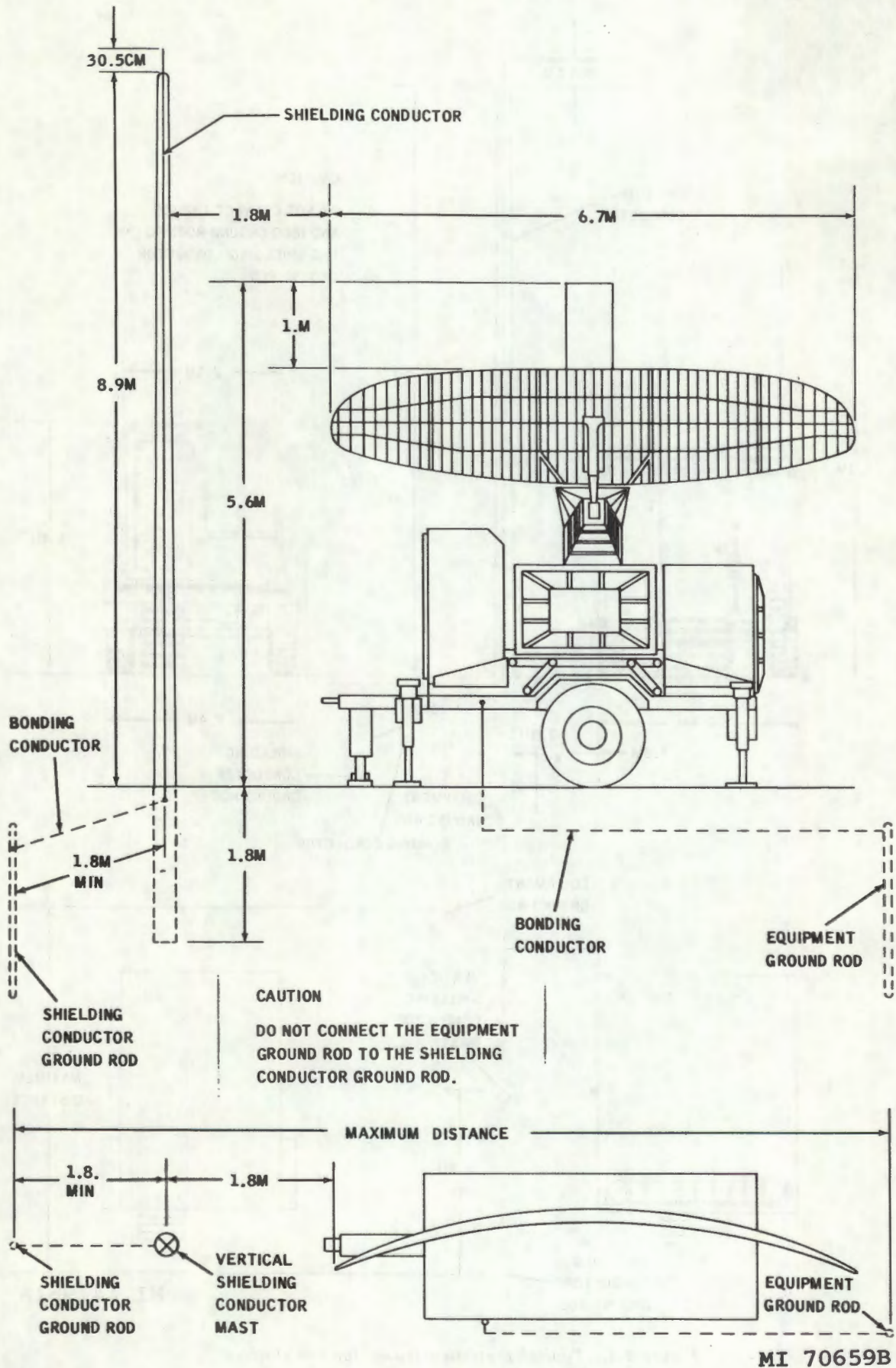


Figure 7-4. Typical radar lightning protection layout.

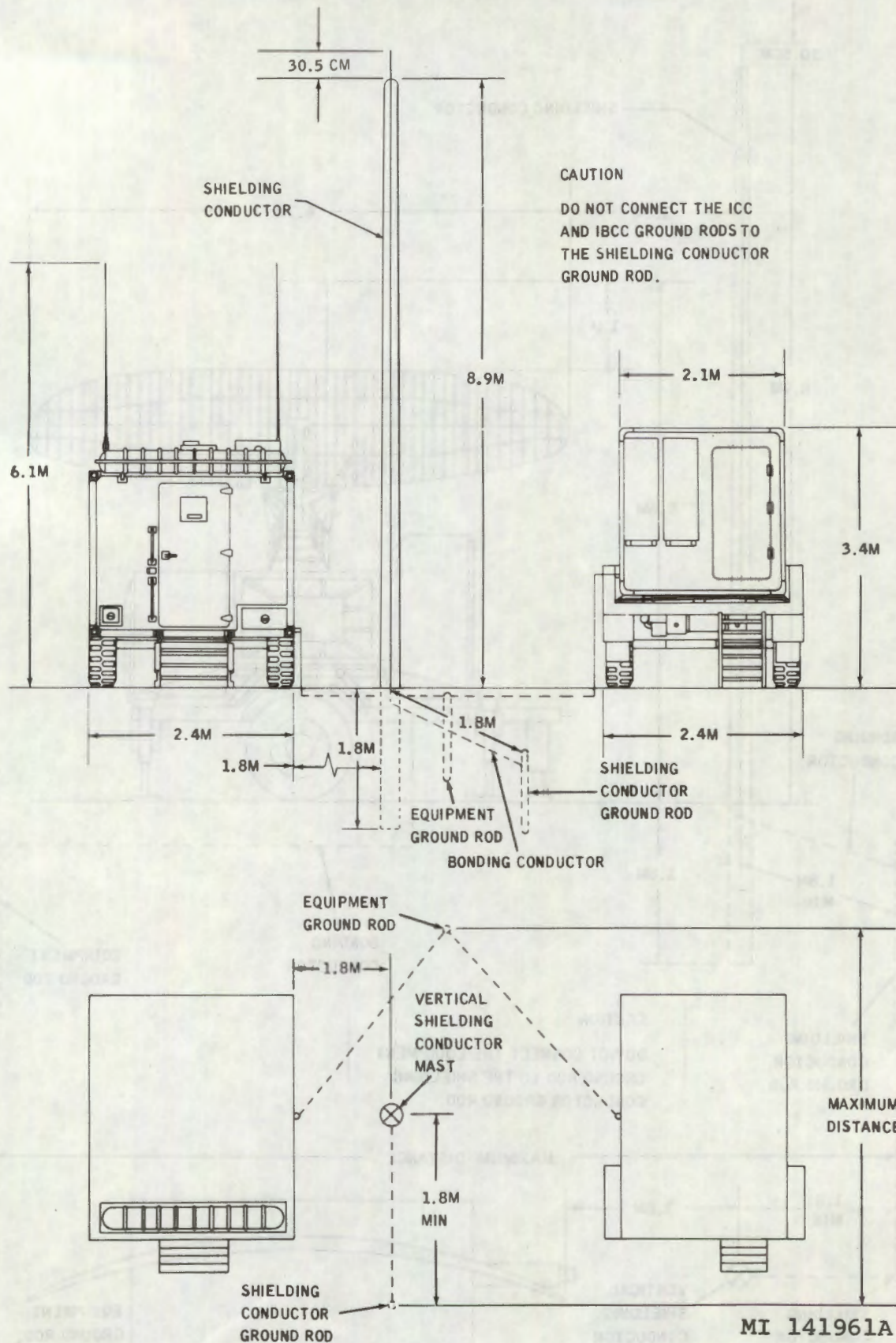


Figure 7-5. Typical protection layout for the shelters

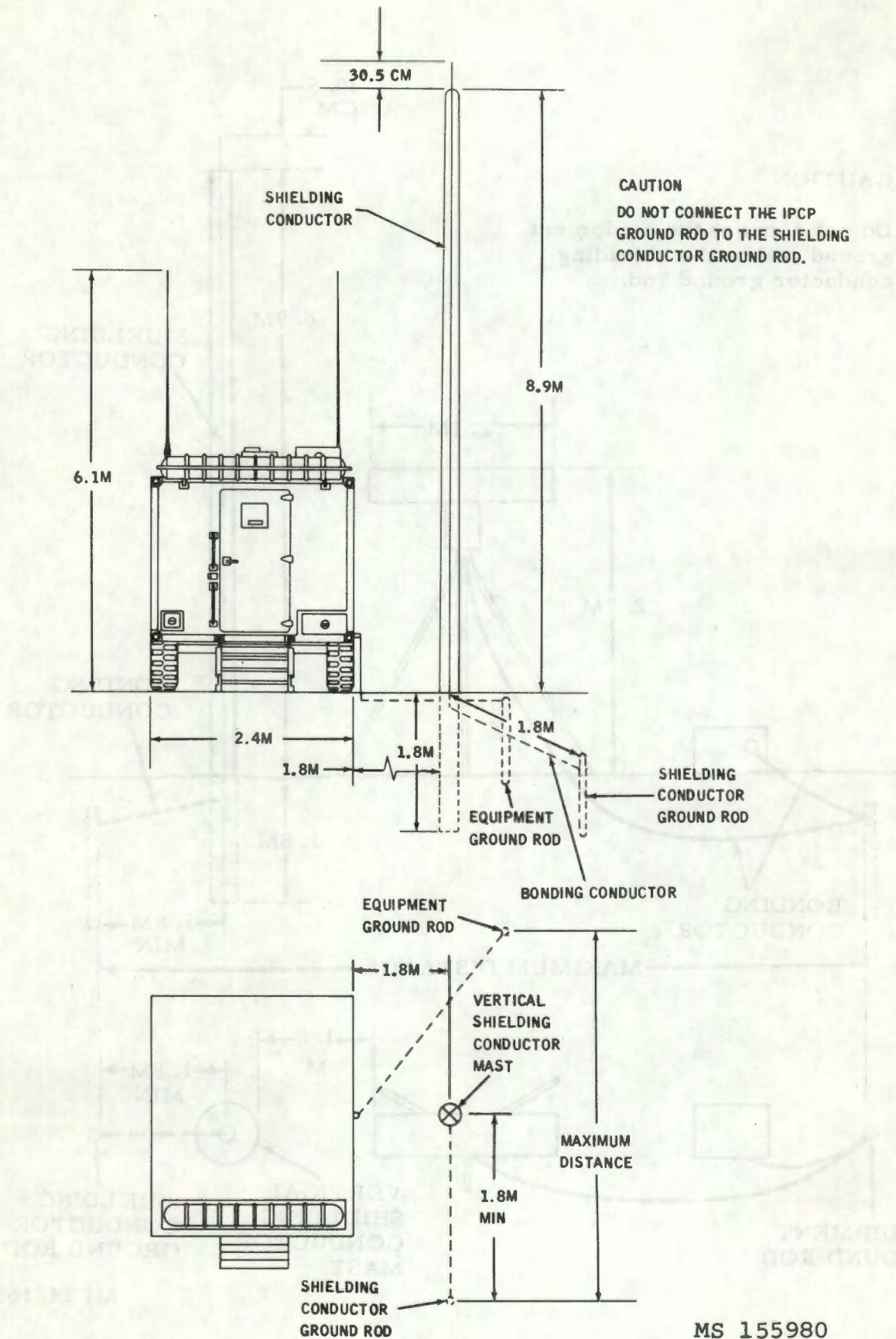
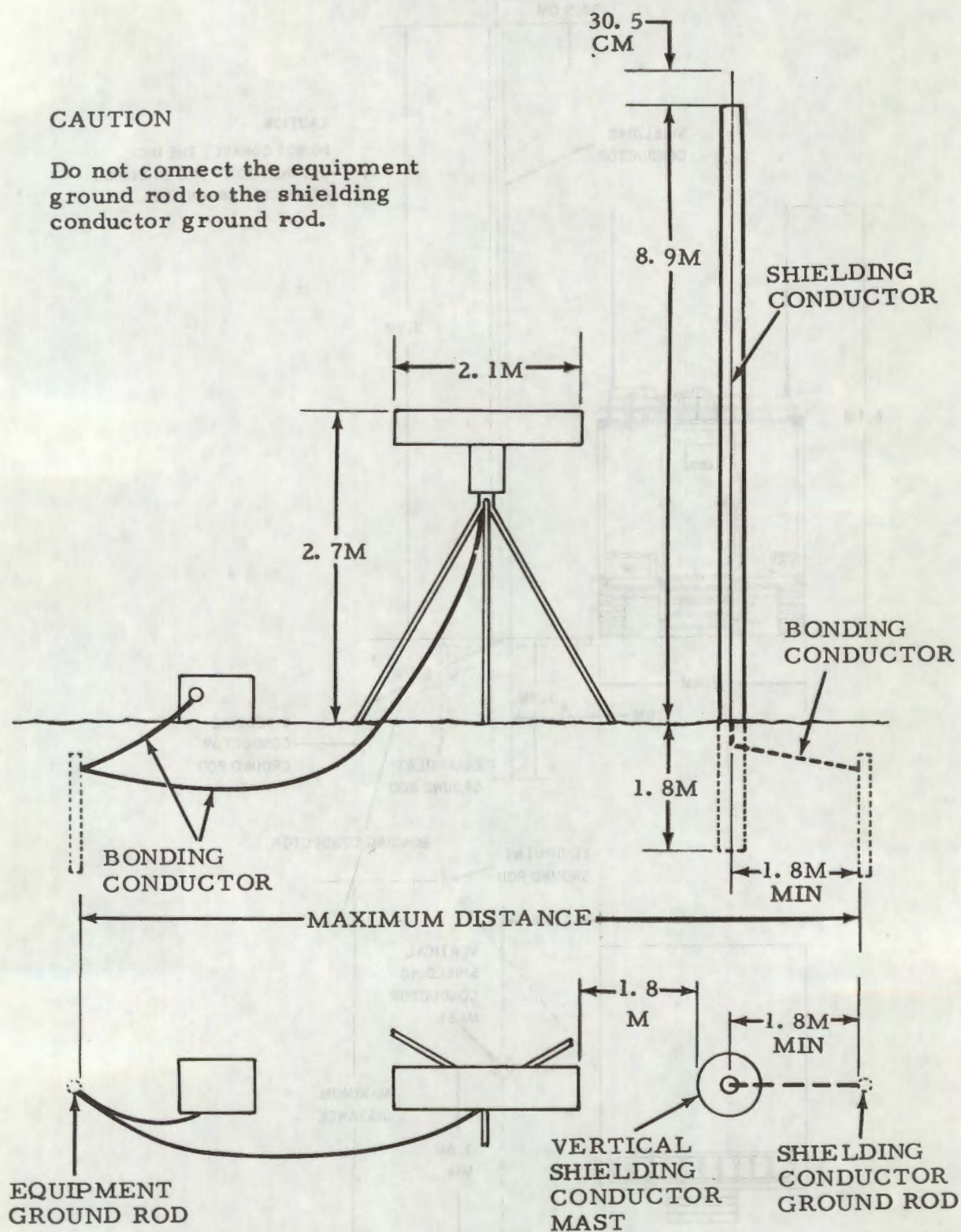


Figure 7-6. Typical protection layout for the IPCP.

CAUTION

Do not connect the equipment ground rod to the shielding conductor ground rod.



MI 142165

Figure 7-7. AN/TPX-46 interrogator/receiver and antenna lightning protection layout.

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

SERIAL NUMBER EFFECTIVITY CODE

B-1. General

The serial number effectivity code is an alphabetical code used to indicate differences among models.

B-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.

B-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.

B-4. Serial Number Effectivity Code

The following is a list of the code symbols used in this manual.

- *(D) 275001 through 300000.
- *(E) 300001 and up.
- *(F) 275001 through 300000 provided MWO 9-1430-527-30-1 has not been applied.
- *(G) 275001 through 300000 provided MWO 9-1430-527-30-1 has been applied, and 300001 and up.
- *(H) 275001 through 380000 provided MWO 9-1430-527-50-14 has not been applied.
- *(J) 275001 through 380000 provided MWO 9-1430-527-50-14 has been applied, and 380001 and up.
- *(K) 275001 through 275008, 300001 through 300015 and 345009 through 345033 provided MWO 9-1430-542-50-1 has not been applied.
- *(L) 275001 through 275008, 300001 through 300015 and 345009 through 345033 provided MWO 9-4935-542-50-1 has been applied, and 380001 and up.

INDEX

	Paragraph
A	
Air transportation:	
Cargo aircraft (<i>See</i> Preparation for travel, cargo aircraft)	
Helicopter (<i>See specific item</i>)	
Alinement (<i>See</i> Orienting and alining)	
Antenna, omnidirectional (<i>See</i> Pulse acquisition radar, improved)	
Antenna raising, improved cw acquisition radar	4-7
Antenna raising, improved range-only radar	4-16
Antenna reflector, disassembly of IPAR	3-21a
Antenna stowing, improved cw acquisition radar	3-10
Antenna stowing, improved range-only radar	3-18
Authorized forms (<i>See</i> Forms, records, and reports)	
B	
Battery control central, improved	
Emplacement:	
Helicopter	4-28
Prime mover	4-27
Preparation for travel:	
Helicopter	3-30
Prime mover	3-29
Service upon receipt:	
Detailed	2-6
General	2-2
Tools:	
Emplacement	4-26
Preparation for travel	3-28
C	
Cable, inspection (<i>See</i> Interunit cables)	
Cable laying:	
Improved HAWK	4-48
Improved assault firing unit (IAFU)	5-1
Cable retrieving:	
Improved HAWK	3-47
Improved HAWK - minus the ICC	3-48
IAFU	3-49
Cables, conductor functions of	5-4
Cables, data (<i>See</i> Interunit cables)	
Cables, interunit (<i>See</i> Interunit cables)	
Cables, power (<i>See</i> Interunit cables)	
Cables, preventive maintenance (<i>See</i> Interunit cables)	
Cw acquisition radar, improved:	
Antenna raising (<i>See</i> Antenna raising, improved cw acquisition radar)	
Antenna stowing (<i>See</i> Antenna stowing, improved cw acquisition radar)	
Elevation shim, installation of	4-8
Emplacement:	
Helicopter	4-6
Prime mover	4-5
Preparation for travel:	
Helicopter	3-9
Prime mover	3-8

Paragraph

C—Continued

Service upon receipt:

Detailed	2-4
General	2-1—2-3

Tools:

Emplacement	4-4
Preparation for travel	3-7

D

Daisy chain, forming of	3-5
Data cables (<i>See</i> Interunit cables)	

E

Electrical cable assembly set:

Emplacement	4-47—4-51
Function	5-1—5-4
Maintenance	5-6—5-9
Preparation for travel	3-46—3-49
Service upon receipt:	
Detailed	2-12
General	2-1—2-3
Emplacement (<i>See specific items</i>)	

F

Feedhorn, disassembly of IPAR	3-21a
Forms, records, and reports	1-3

G

Generators, 45-kw, 60-kw:

Emplacement:	
Helicopter (45 kw)	4-41
Prime mover	4-40
Preparation for travel:	
Helicopter (45 kw)	3-42
Prime mover	3-41
Service upon receipt:	
Detailed	2-10
General	2-1—2-3
Tools, emplacement	4-39
Grounding device assembly, fabrication of	3-5b
Guided missile loader (<i>See</i> Loader-transporter)	
Guided-missile zero-length launcher, (improved XM192E1) (<i>See</i> Launcher)	

H

HAWK guided missile, improved (<i>See</i> Missile, guided)	
HAWK mobile battery cable laying (<i>See</i> Cable laying, HAWK mobile battery)	
Helicopter lifting kit	3-5a
High-powered illuminator radar, improved:	
Emplacement, prime mover	4-11
Preparation for travel, prime mover	3-13
Service upon receipt:	
Detailed	2-4
General	2-1—2-3
Tools:	
Emplacement	4-10
Preparation for travel	3-12

Paragraph

I

Information and coordination central:

Emplacement, prime mover	4-44
Preparation for travel, prime mover	3-44
Remote installation of IFF antenna	4-45
Service upon receipt:	
Detailed	2-13
General	2-1—2-3
Tools	4-43
Interunit cables, improved HAWK:	
Data (<i>See also</i> Tables)	5-3c
Inspection	5-7
Organizational maintenance	5-9
Power	5-3b
Preventive maintenance	5-8

K

Kit, helicopter lifting (*See* Helicopter lifting kit)

L

Launcher, mobile HAWK, improved:

Emplacement:	
Helicopter	4-24
Prime mover	4-23
Orienting and alining (<i>See</i> Tables)	
Preparation for travel:	
Helicopter	3-26
Prime mover	3-25
Service upon receipt:	
Detailed	2-11
General	2-1—2-3
Tools:	
Emplacement	4-22
Preparation for travel	3-24
Launching section control box, improved:	
Emplacement:	
Prime mover	4-33
Preparation for travel:	
Prime mover	3-35
Service upon receipt:	
Detailed	2-8
General	2-1—2-3
Lightning protection:	
Cone of protection concept	7-1b
Fabrication:	
Assembly and service storage areas	7-8
Battery control central	7-5
Improved platoon command post (IPCP)	7-6
Launchers	7-3
Radars	7-4
Remotely located AN/TPX-46 interrogator/receiver set and antenna	7-7
Lightning rod emplacement instructions, general	7-2
Scope	7-1
Loader-transporter:	
Emplacement	Chapter 4, Section VII
Preparation for travel	Chapter 3, Section VII

Paragraph

M

M514 trailer:

Emplacement:

Helicopter	4-5b
Prime mover	4-5a

Preparation for travel:

Helicopter	3-9a
Prime mover	3-8b

Service upon receipt	2-4a
----------------------------	------

M390 trailer:

Emplacement:

Helicopter	4-20d
Prime mover	4-19a

Preparation for travel:

Helicopter	3-22f, g, h, i
Prime mover	3-21b

Service upon receipt	2-4a
----------------------------	------

M390C trailer:

Emplacement:

Helicopter	4-37e
Prime mover	4-36e

Preparation for travel:

Helicopter	3-21b
Prime mover	3-38e

M200A1 trailer:

Emplacement	4-40a
-------------------	-------

Preparation for travel:

Helicopter	3-42b
Prime mover	3-41b

Methods of transportation (*See* Transportation, methods of)

Missile, guided, service upon receipt	2-1b
---	------

N

Nomenclature and reference designations	1-4
---	-----

O

Orientation (*See* Orienting and alining)

Orienting and alining:

IH battery:

During blackout conditions	6-3
Methods of	6-2
Preliminary procedures	6-4
Purpose	6-1
System (<i>See</i> also Tables)	6-6

IAFU:

During blackout conditions	6-9
Methods of	6-8
Orientation and alinement procedures	6-12
Preliminary procedures	6-10
Purpose	6-7

P

Pallet, trailer-mounted guided missile loading and storage:

Emplacement:

Helicopter	4-37
Prime mover	4-36

Preparation for travel:

Helicopter	3-39
Prime mover	3-38

Service upon receipt:

Detailed	2-9
General	2-1—2-3

Paragraph

P-Continued

Tools:	
Emplacement	4-35
Preparation for travel	3-37
Platoon command post, improved	
Emplacement:	
Helicopter	4-45.5
Prime mover	4-45.3
Remote emplacement of the IFF antenna.....	4-45.4
Tools	4-45.2
Preparation for travel:	
Helicopter	3-45.3
Prime mover	3-45.2
Service upon receipt :	2-14
Power cable (<i>See</i> Interunit cables)	
Preparation for travel (<i>See specific item</i>)	
Preparation for travel, cargo aircraft	3-5c
Preparation for travel, helicopter (<i>See specific item</i>)	
Prime mover transportation (<i>See specific item</i>)	
Pulse acquisition radar, improved:	
Antenna, omnidirectional, preparation for travel	3-21a
Emplacement:	
Helicopter	4-20
Prime mover	4-19
Preparation for travel:	
Helicopter	3-22
Prime mover	3-21
Service upon receipt:	
Detailed	2-5
General	2-1-2-3
Tools:	
Emplacement	4-18
Preparation for travel	3-20

R

Range-only radar, improved:	
Emplacement:	
Helicopter	4-15
Prime mover	4-14
Preparation for travel:	
Helicopter	3-17
Prime mover	3-16
Service upon receipt:	
Detailed	2-4
General	2-1-2-3
Tools:	
Emplacement	4-13
Preparation for travel	3-15
Range-only radar, improved, antenna raising (<i>See</i> Antenna raising, improved range-only radar)	
Range-only radar antenna, improved, stowing of (<i>See</i> Antenna stowing, improved range-only radar)	
Receptacles, test	5-5
Reference designation (<i>See</i> Nomenclature and reference designation)	
Reporting equipment publication improvements	1-2

S

Service upon receipt (<i>See specific item</i>)	
Synchro control system:	
Improved assault firing unit (IAFU)	6-11
Improved HAWK	6-5

Paragraph

T

Tables:

Cable assembly data (table 5-1)	5-3
Cable reel and RL-31 cable reeler loading chart—improved HAWK battery—typical (table 3-2)	3-47b
Cable reel and RL-31 cable reeler loading chart—IAFU—typical (table 3-3)	3-49d
Cable and RL-31 cable reeler placement chart—improved HAWK battery—typical (table 4-1)	4-48
Cable reel and RL-31 cable reeler placement chart—IAFU—typical	4-50a
Description of helicopter lifting components (table 3-1)	3-5
IAFU orientation and alinement procedures with ICWAR (table 6-4)	6-12
IAFU orientation and alinement procedures without ICWAR (table 6-5)	6-12
Lightning protection:	
Materials required for each launcher (table 7-1)	7-3
Materials required for each pair IPCP and remote IFF antenna installation (table 7-3)	7-6
Materials required for each radar, each pair of shelters, and remote IFF antenna installation (table 7-2)	7-4
System orientation and alinement:	
With IPAR (table 6-1)	6-6
Without IPAR (table 6-2)	6-6
Without IPAR and ICWAR (table 6-3)	6-6
Test receptacles (<i>See</i> Receptacles, test)	
Tools (<i>See specific item</i>)	
Trailer, M200A1 (<i>See</i> M200A1 trailer)	
Trailer, M390 (<i>See</i> M390 trailer)	
Trailer, M390C (<i>See</i> M390C trailer)	
Trailer, M514 (<i>See</i> M514 trailer)	
Trailer-mounted guided missile loading and storage pallet (<i>See</i> Pallet, trailer-mounted guided missile loading and storage)	
Transportation, methods of (mobile HAWK)	3-4, 3-5
Transportation by prime mover (<i>See specific item</i>)	

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