TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, FIELD AND DEPOT MAINTENANCE TRAINER RADAR AN/ULT-T2

Posted 24 Feb 68 JS

TM 11-6940-205-15
CHANGES NO. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *2 February 1961*

TM 11-6940-205-15, 19 April 1960, is changed as indicated below to incorporate installation, operation, and maintenance information on Antenna AS-1057/ULT-T2 (antenna training device). Antenna AS-1057/ULT-T2 is used in conjunction with Radar Trainer AN/ULT-T2.

Page 129. Add the following appendixes:

APPENDIX I

INSTALLATION, OPERATION, AND MAINTENANCE OF ANTENNA AS-1057/ULT-T2

Section I. INTRODUCTION

1. Scope

This appendix describes Antenna AS-1057/ULT-T2 (fig. 1) and covers its installation, operation, and maintenance. Assignment of the antenna training device maintenance functions is covered in the maintenance allocation chart (app. II).

2. General Description

(fig. 1)

a. The antenna training device is composed of a parabolic reflector (Polarad model CA-R), directional antenna (Polarad model CA-X), and Cable Assembly CG-545/U. It is supplied for use with Radar Trainer AN/ULT-T2 (Radar Signal Interference Trainer (X-Band) Device 15X12).

b. The directional antenna (horn antenna) is a highly directional horn antenna operating in the 7.36- to 10.0-kmc frequency range. The horn antenna is fed by a section of waveguide with inside dimensions that are slightly smaller than the standard X-band waveguide. The waveguide is terminated at one end with a waveguide-to-coaxial adapter which contains a female type N connector. A dielectric cover prevents dirt and dust from accumulating in the horn antenna.

c. The parabolic reflector provides an increase of directivity and gain over that of the horn antenna. Holes in the parabolic reflector decrease its wind resistance. The diameter of these holes and their relative location have been designed to minimize any back radiation. The parabolic reflector contains a bracket for mounting the antenna to a tripod, mast, or other suitable support. Three dielectric supporting rods attached to the parabolic reflector support the horn antenna.

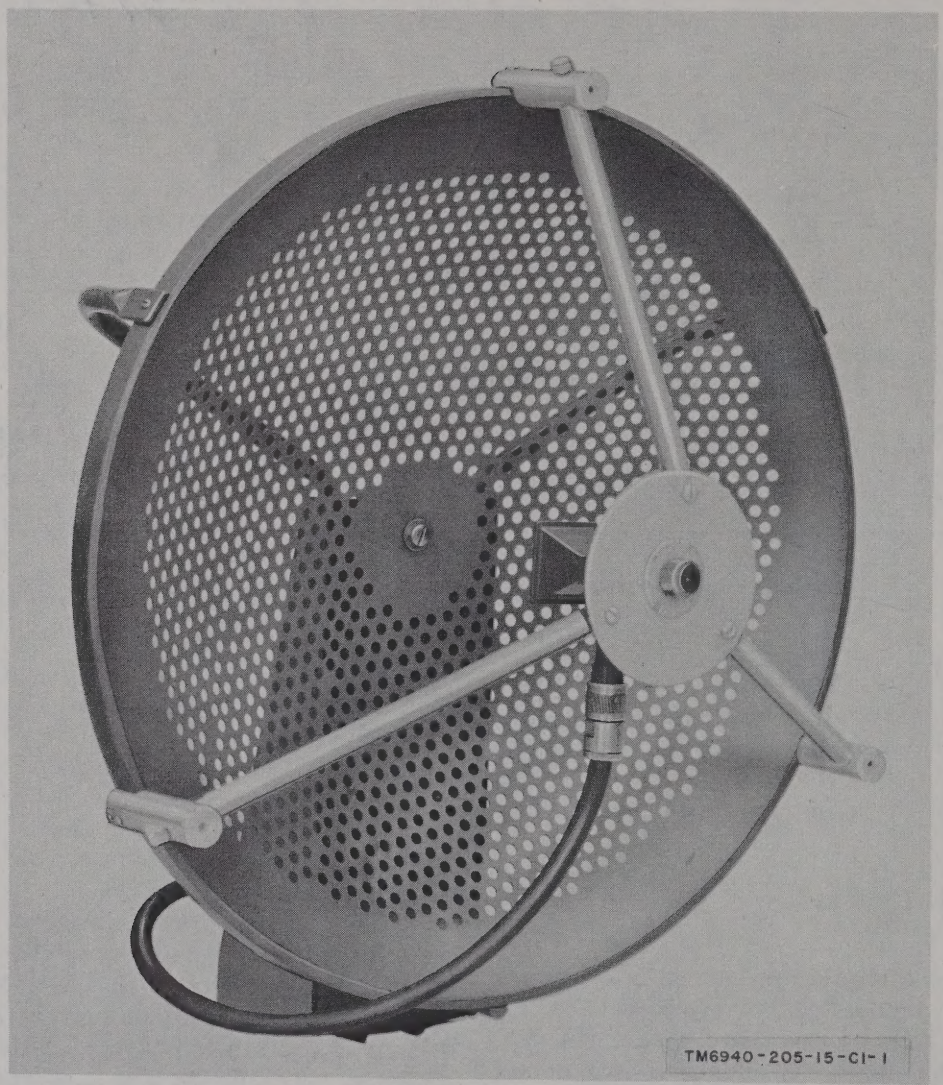


Figure 1. Antenna AS-1057/ULT-T2

3. Technical Characteristics

Frequency range	7.36 to 10.0 kmc.
Nominal input impedance	50 ohms.
Gain	28 db at 9 kmc.
Power input to antenna	Limited by rf coaxial cable assembly employed.
Beam width	5° E-plane - 4° H-plane at 7.36 kmc. 4° E-plane - 3° H-plane at 8 kmc. 4° E-plane - 3° H-plane at 9 mc. 4° E-plane - 3° H-plane at 10 kmc.
Back lobe attenuation	Better than 20 db.
Side lobe attenuation	Better than 20 db.

4. Components of Antenna AS-1057/ULT-2T

Quantity	Item	Height (in.)	Width (in.)	Depth (in.)	Unit weight (lb)
1	Parabolic reflector	20-13/16	19-15/16	13-7/16	2
1	Horn antenna	2-½	1-½	3-⅜	0.5
1	Cable Assembly (26 in.) CG-545/U.				1

Section II. INSTALLATION AND OPERATION

5. Packaging Data

When packed for shipment, Antenna AS–1057/ULT–T2 is placed in a water-resistant, fiberboard sealed container which is wrapped in water-resistant paper and then packed in a heavyduty fiberboard carton and sealed. A typical shipping box and its contents are shown in figure 2. The box is 14⅝ inches by 21⅛ inches by 22 inches, and 3.9 cubic feet. The total weight is 5 pounds.

6. Unpacking

a. Open the fiberboard box and then the moisture vaporproof barrier that covers the carton inside the box. Remove the carton.

b. Open the inner carton and remove the contents. Be careful when removing equipment from the carton, so as not to drop or damage any pieces that might have jarred loose during shipment.

c. Preserve the original cartons so that they may be reused for repacking the equipment, if required.

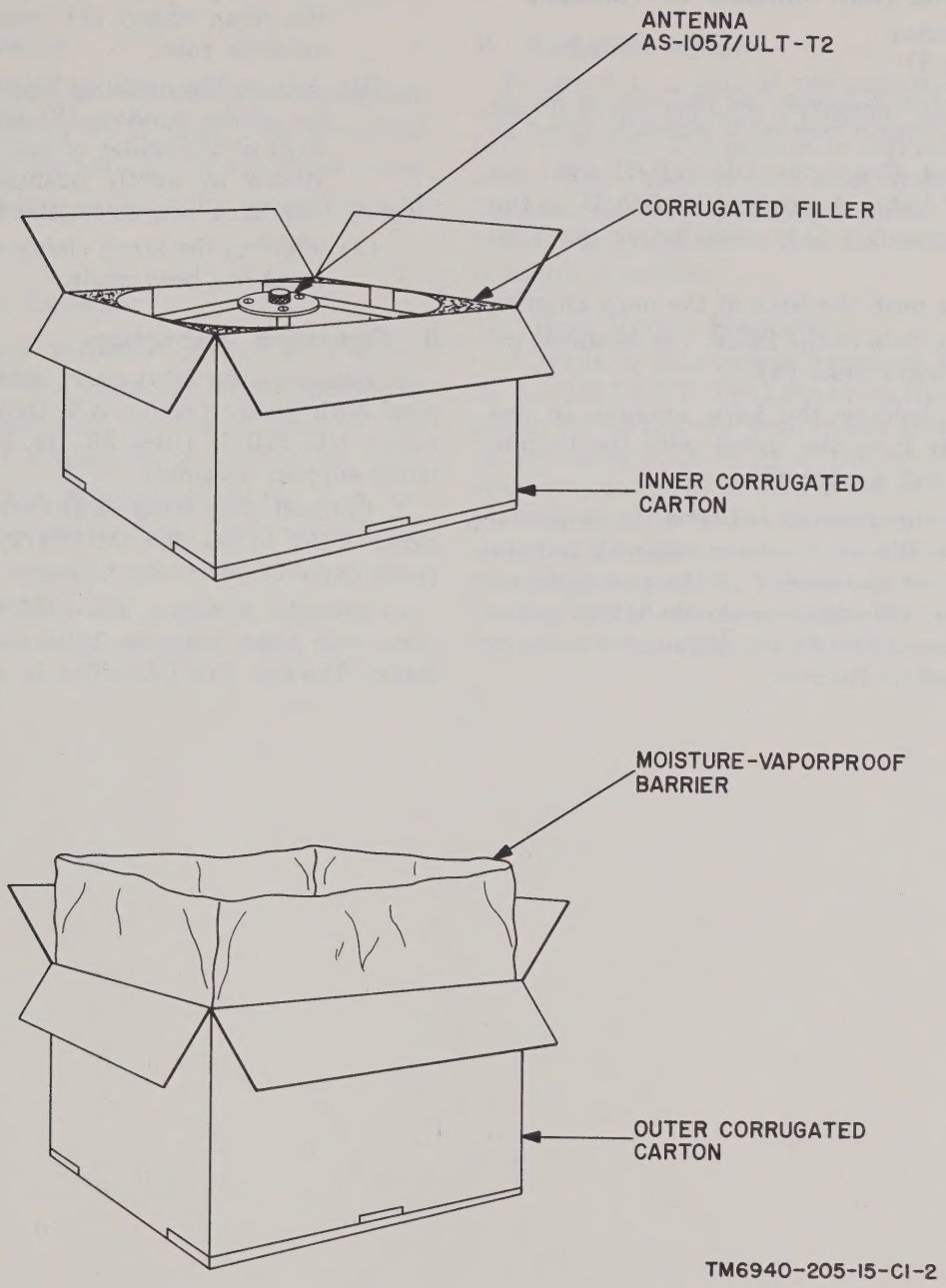


Figure 2. Typical packaging illustration.

7. Mounting Horn Antenna on Parabolic Reflector (fig. 5)

Note. Complete disassembly and reassembly of the antenna training device is explained in paragraphs 15 and 16.

a. Connect Connector UG–21D/U (15) on one end of Cable Assembly CG–545/U to the connector assembly (14) mounted on the horn antenna.

b. Gently push the back of the horn antenna (7) into the hole in the insert (3) mounted inside the antenna yoke (4).

c. While holding the horn antenna in one hand, secure it to the insert with the thumbscrew (1) and washer (2).

d. Check the distance between the center of the window (8) on the horn antenna and the screw (18) at the center of the parabolic reflector (20). This distance should be 5¾ inches plus or minus 1/16. If the distance is not correct, proceed as follows:

(1) Use a screwdriver and gently loosen the strap clamp (6) mounted on the antenna yoke.

(2) Adjust the distance between the center of the window (8) and the screw (18) at the center of the parabolic reflector by gently pushing the insert (3) in or out, as required.

(3) Tighten the strap clamp after adjustment has been made.

8. Operating Instructions

a. Connect plug P501 on rf cable W601 supplied with Radar Trainer AN/ULT–T2 to Connector UG–22B/U (item 35, fig. 5) on the antenna support assembly.

b. Connect plug P309 on the other end of rf cable W601 to the RF OUTPUT jack on the front panel of the radar trainer.

c. Operate Antenna AS–1057/ULT–T2 the same way horn antenna A801 (supplied with Radar Trainer AN/ULT–T2) is operated.

Section III. THEORY OF OPERATION

9. Horn Antenna

The horn antenna consists of a waveguide feed horn flared in the E-plane. The pyramidal construction of the horn allows a gradual transition of impedance between the waveguide and free space.

10. Parabolic Reflector

The parabolic reflector is used as a directional device. The geometry of the parabolic reflector is such that the focus point of the parabola is at a distance of 5¾ inches from the center of the parabola. With the horn antenna mounted at the focus point of the parabola, the rf energy radiated by the horn antenna is reflected by the parabolic reflector and concentrated into a directional beam.

11. Radiation Pattern

Figure 3 is a plot of the radiation pattern when the horn antenna is mounted on the parabolic reflector. The pattern is defined in terms of the field intensity at a fixed distance about the antenna, for a given input power to the antenna. The graph shows that the radiated beam is highly directive.

12. Gain Versus Frequency

A graph of gain versus frequency for Antenna AS–1057/ULT–T2 is shown in figure 4. The graph shows that the gain of the system steadily increases from 27 db at the low end of the frequency range to 29.6 db at the high end. The gain at any particular frequency within the range of the antenna can be read directly from the graph by locating the desired frequency on the horizontal axis and reading the corresponding gain in db on the vertical axis.

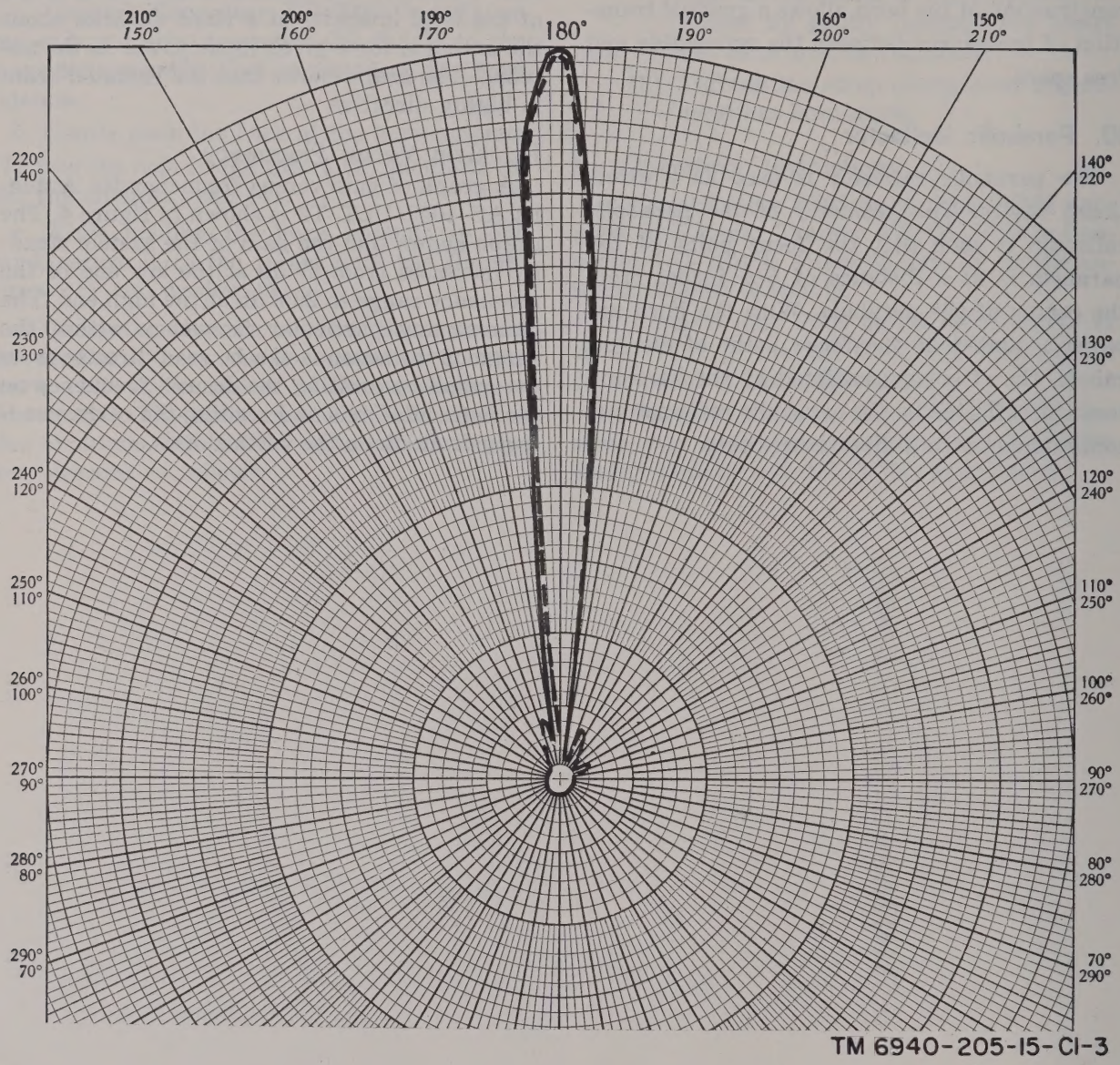


Figure 3. Field intensity pattern of antenna training device.

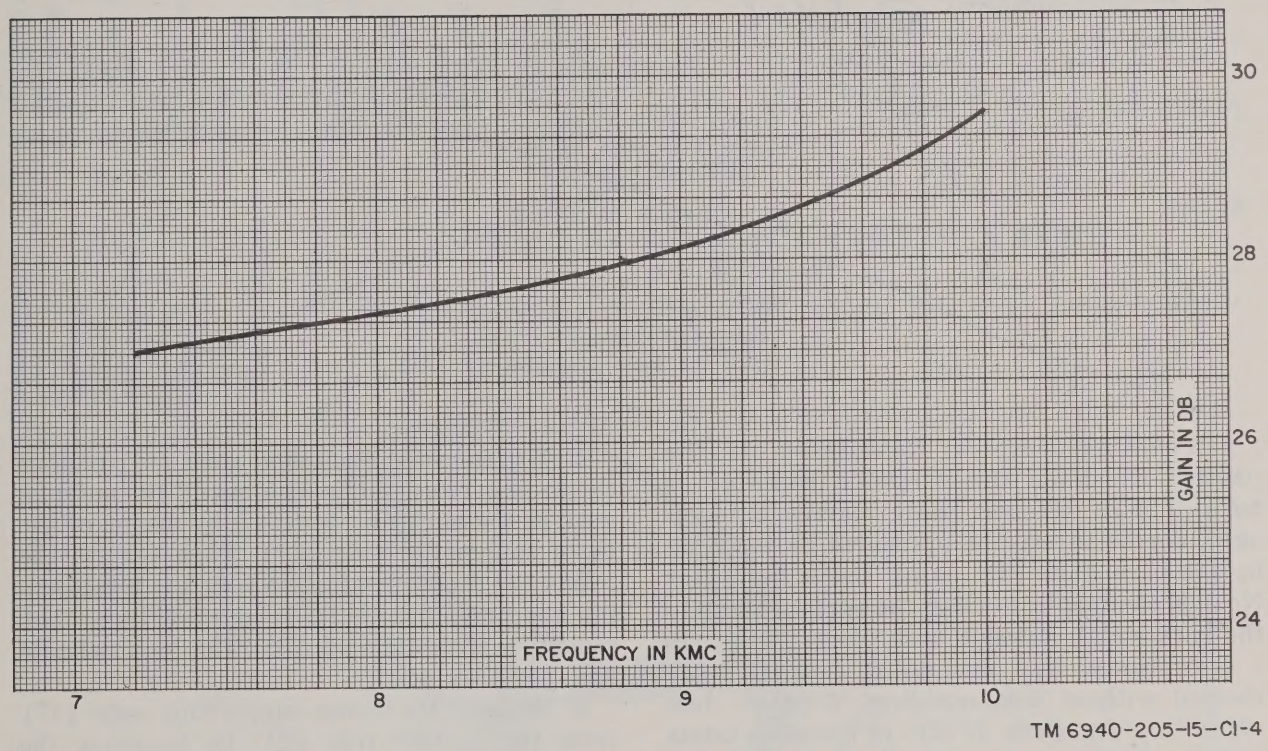


Figure 4. Gain versus frequency curve for antenna training device.

Section IV. MAINTENANCE

13. General

To insure continuous trouble-free operation, the preventive maintenance procedures outlined in paragraph 14 must be adhered to. In addition, an accurate log in which all failures, modifications, and observations concerning the antenna training device are entered should be kept. This log will serve as a valuable source of operational and maintenance information. When it is necessary to replace worn or damaged parts, refer to disassembly and reassembly procedures contained in paragraphs 15 and 16.

14. Preventive Maintenance

a. Periodic checks.

What to check	Possible defect	Remedy
Parabolic reflector	Visually inspect antenna support assembly for loose supporting brackets.	Tighten all loose supports.
Rf cable	Visually check for frayed or loose ends and signs of deterioration	Replace defective cable.
Antenna mounting	Visually check for loose strap clamp and thumgscrew. Also check for loose supporting rods.	Tighten all connections.

b. Touching Up and Refinishing. If the painted finish on the parabolic reflector or horn antenna becomes badly scarred or damaged, corrosion may be prevented by touching up the bare spots with paint. Use a No. 00 or No. 000 sandpaper to clean the surface down to the bare metal. Retouch with paint.

c. Cleaning. The equipment can easily be cleaned without disassembling. Wipe all dust off with a dry cloth. If dirt or corosion exists which cannot be removed with a dry cloth, use a clean cloth slightly moistened with cleaning compound to clean the equipment. Then wipe thoroughly dry.

15. Disassembly of Antenna AS-1057/ULT-T2 (fig. 5)

a. Disconnect the connector (15) from the horn antenna and remove the thumbscrew (1) and washer (2). Remove the antenna horn by gently pulling it toward the center of the reflector.

b. To remove the protective window (8) from the mouth of the horn antenna (7), remove the eight screws (9) that hold it in place. Remove the connector assembly (14) by loosening the locking nut (13) and unscrewing the connector assembly.

c. To remove the antenna yoke (4), remove the three screws (16) which mount the antenna yoke to the parabolic reflector by means of the three supporting rods (17). Then remove the insert (3) from the antenna yoke (4) by loosening and removing the strap clamp (6) and then removing the guide pin (5). The insert should now push out easily.

d. Remove the three supporting rods (17) from the upright rods (24) by loosening the setscrews (27). Then remove the upright rods by removing the screws (23), washers (25), and nuts (26) that mount them to the reflector assembly.

e. Remove Cable Assembly CG–545/U from the antenna support assembly (30) by removing the four screws (34), washers (36), and nuts (37) which mount it. Remove the support bracket (31) by removing the screw (28) and washer (29) that secure it to the antenna support and the screws (32) that secure it to parabolic reflector. Remove righthand bracket (39) by removing the screws (38), washers (40), nuts (41), and screw (42). Remove lefthand bracket (44) by removing the screws (43), washers (45), nuts (46), and screw (42). Remove the parabolic reflector (20) from the antenna support assembly (30) by removing the screw (18), washers (19 and 21), and nut (22).

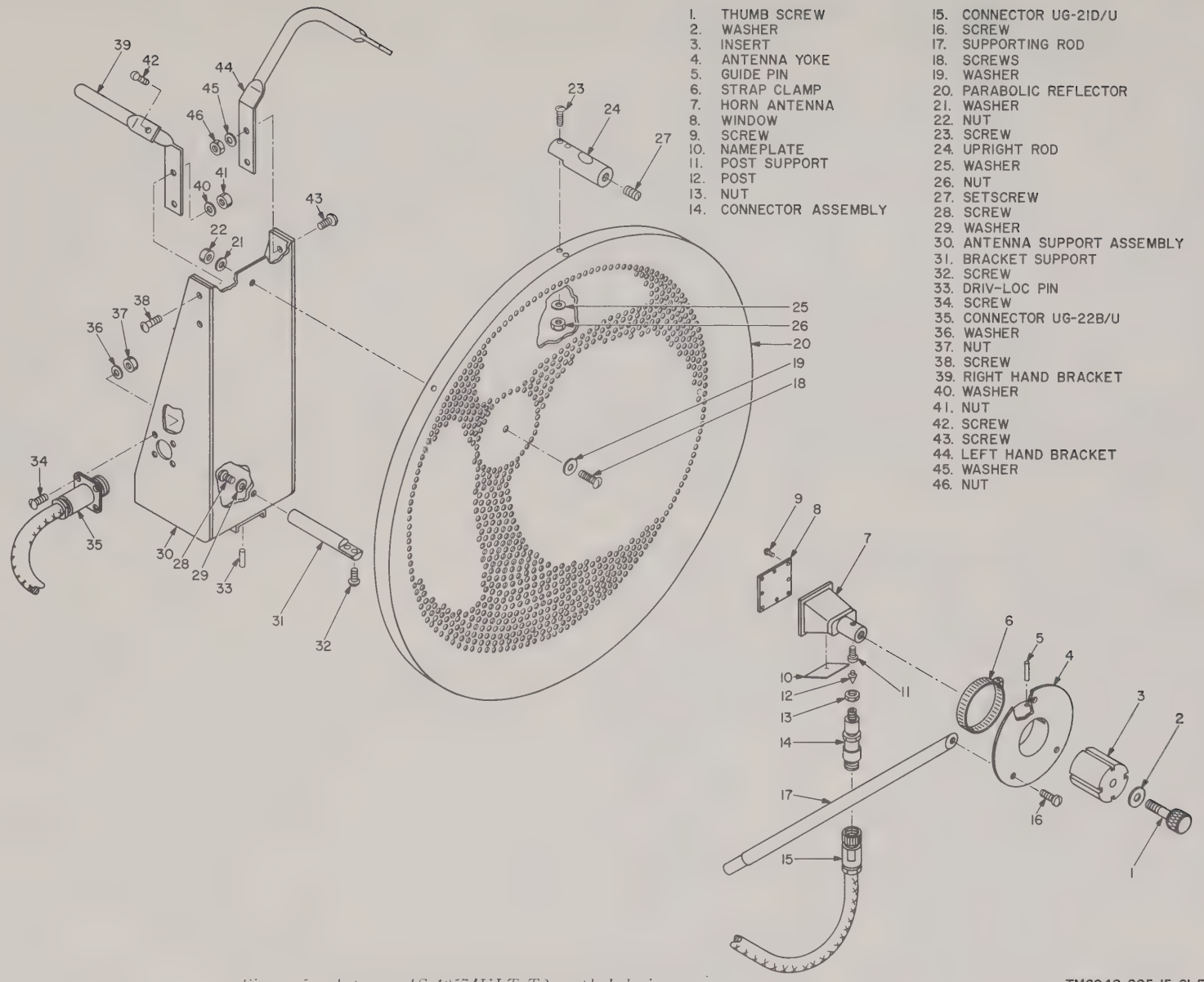


Figure 5. Antenna AS-1057/ULT-T2, exploded view.

TM6940-205-15-CI-5

16. Reassembly of Antenna AS-1057/ULT-T2

(fig. 5)

a. Secure the parabolic reflector (20) to the antenna support assembly (30) with the screw (18), washers (19 and 21), and nut (22). Secure one end of each supporting bracket (39 and 44) to the antenna support assembly with the screws (38 and 43), washers (40 and 45), and nuts (41 and 46). Secure the other end of each supporting bracket (39 and 44) to the parabolic reflector with a screw (42). Secure the support bracket (31) to the antenna support assembly with the screw (28) and washer (29). Secure the other end of the support bracket (31) to the parabolic reflector with the two screws (32). Attach Cable Assembly CG–545/U to the antenna support assembly with the four screws (34), washers (36), and nuts (37).

b. Secure the three upright rods (24) to the parabolic reflector with the screws (23), washers (25), and nuts (26). Insert the three supporting rods (17) into the openings in the upright rods and secure with the setscrews (27).

c. Secure the antenna yoke (4) to the three supporting rods with the three screws (16). Insert the guide pin (5) into the opening in the top of the antenna yoke, and gently slide the insert (3) into the antenna yoke. Loosely hold the insert in place with the strap clamp (6).

d. Secure the protective window (8) to the mouth of the horn antenna (7) with eight screws (9), and secure the connector assembly (14) to the bottom of the horn antenna by carefully screwing it into the horn antenna and tightening the locking nut (13). Then gently slide the horn antenna into the opening in the insert, and secure with the thumbscrew (1) and washer (2).

e. Connect Connector UG–21D/U (15) on Cable Assembly CG–545/U to the connector assembly mounted on the bottom of the antenna horn.

f. Adjust the position of the horn antenna for a distance of 5¾ inches between the center of the window (8) and screw (18) at the center of the parabolic reflector by gently pushing the insert (3) in or out, as required.

g. Tighten the strap clamp (6).

APPENDIX II

MAINTENANCE ALLOCATION CHART, ANTENNA AS-1057/ULT-T2

Section I. MAINTENANCE ALLOCATION

1. General

a. This section assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns are as follow:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical order with their components listed alphabetically immediately below the assembly listing.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operation.

(a) Service. To clean, preserve and replenish fuel and lubricants.

(b) Adjust. To regulate periodically to prevent malfunction.

(c) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(f) Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

(g) Aline. To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(j) Overhaul. To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responble for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates

codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicate the tool, test, and maintenance equipment required to perform the maintenance function.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communication zones, to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Mounting Hardware

The basic entries of this maintenance allocation chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

4. Comments and Suggestions

Any comments concerning omissions and discrepancies in this change will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS–LM, Fort Monmouth, N. J.

SECTION II MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
ANTENNA, AS-1057/ULT-T2								
	service		X				3	
	adjust		X				3	
				X			4	
	inspect	X						
	test		X				1	
				X			2	
					X		2	
						X	2	
	replace		X				3	
	repair				X		4	
	rebuild					X	4	
	overhaul				X		4	
ANTENNA MOUNT ASSEMBLY	repair				X			
	rebuild					X		
CLAMP	replace		X					
INSERT, ANTENNA MOUNT	replace		X					
PIN, GROOVED, HEADLESS	replace		X					
SUPPORT, ANTENNA	replace		X					
	rebuild					X		
CABLE	replace			X				
CONNECTORS	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AS-1057/ULT-T2 (continued)								
NUT	repair				X			Available in std maint kits
SCREW	replace		X					(Nylon)
SCREWS	repair				X			Available in std maint kits
WASHERS	repair				X			Available in std maint kits
YOKE, ANTENNA MOUNT	replace		X					
HORN, WAVEGUIDE ASSEMBLY	repair				X			
	rebuild					X		
CONNECTOR	replace		X					
WASHER	replace				X			Available in std maint kits
HORN, WAVEGUIDE	replace		X					
REFLECTOR ASSEMBLY	repair				X			
	rebuild					X		
REFLECTOR, ANTENNA	replace		X					
	rebuild					X		
SUPPORT ASSEMBLY	repair				X			
	rebuild					X		
BRACKETS	rebuild					X		Fabricate
NUT	replace		X					Available in std maintenance kits
SCREW	replace				X			Available in std maintenance kits
SUPPORT	rebuild					X		Fabricate
WASHER	replace				X			Available in std Maintenance kits
THUMB SCREW	replace		X					(Loose item)

SECTION III ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH.	(3) 2ND ECH.	(4) 3RD ECH.	(5) 4TH ECH.	(6) 5TH ECH.	(7) TOOL CODE	(8) REMARKS
AS-1057/ULT-T2 (continued)							
MULTIMETER AN/URM-105		†				1	
MULTIMETER TS-352/U			†	†	†	2	
TOOL EQUIPMENT TE-41		†				3	
TOOL KIT TK-87/U			†	†	†	4	

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NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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