TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

INCLUDING REPAIR PARTS

AND SPECIAL TOOLS LISTS

TEST SET,

INTERMEDIATE FREQUENCY

AN/GRM-63

This copy is a reprint which includes current pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY

23 OCTOBER 1967

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt ac line connections and the + 108, X + 150, + 250, and + 360 power supply circuits. Serious injury or death may result from contact with these points.

DON'T TAKE CHANCES!

CAUTION

Make certain that louvers located in the top and bottom of cabinet are kept clear of all obstructions. Proper cooling of the equipment requires free air passage through these louvers.

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *12 September 1977*

Operator's and Organizational Maintenance Manual
TEST SET, INTERMEDIATE FREQUENCY AN/GRM-63
(NSN 6625-00-089-4653)

TM 11-6625-657-12, 23 October 1967, is changed as follows:
1. The title is changed as shown above.
2. New or changed material is indicated by a vertical bar.
3. Remove and insert pages as indicated below.

Remove	*Insert*
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
C-1 through C-3	C-1 through C-5
D-1 through D-8	D-1

4. File this change sheet in front of the publication for reference.

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

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The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-51, Direct and General Support maintenance requirements for AN/GRC-50 and AN/GRM-63.

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DEPARTMENT OF THE ARMY
No. 11-6625-657-12 } WASHINGTON, D C, *23. October 1967*

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

TEST SET, INTERMEDIATE FREQUENCY AN/GRM-63
(NSN 6625-00-089-4653)

TABLE OF CONTENTS - Continued

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. Throughout this manual describes Test Set, Intermediate Frequency AN/GRM-63 (fig. 1-1) and covers the installation, limited operation, and operator and organizational maintenance. It includes instructions for operation under usual conditions, cleaning, and inspection of the equipment, and replacement of parts available to the operator and organizational repairman.

b. Operation of the AN/GRM-63, in conjunction with other test equipment (para 1-10) to test components of Radio Set AN/GRC-50(*) (V) (para 1-5*a*), is covered in the maintenance manual for Radio Set AN/GRC-50(*) (V), TM 11-5820-461-35.

c. Official nomenclature followed by (*) is used to indicate all models of the equipment items covered in this manual.

(1) Radio set AN/GRC-50(*) (V) represents Radio Sets AN/GRC-50(V)1, 2, 3, 4, 5, and Radio Sets AN/GRC-50A(V)1, 2, 3, 4, 5, 6, and 7.

(2) Amplifier-Converter AM-1955(*)/GRC represents Amplifier-Converters AM-1955/GRC and AM-1955A/GRC (assemblies 3A1).

(3) Amplifier-Converter AM-1956(*)/GRC represents Amplifier-Converters AM-1956/GRC and AM-1956A/GRC (assemblies 3A2).

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6-(Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71- 13/MCO P4030.29A, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/ AFR 75-18/MCO P4610.19B and DSAR 4500.15.

1-4. Reporting of Errors

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703. A reply will be furnished direct to you.

1-4.1. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407 (Maintenance Request). Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703. A reply will be furnished direct to you.

1-4.2. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

1-4.3. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

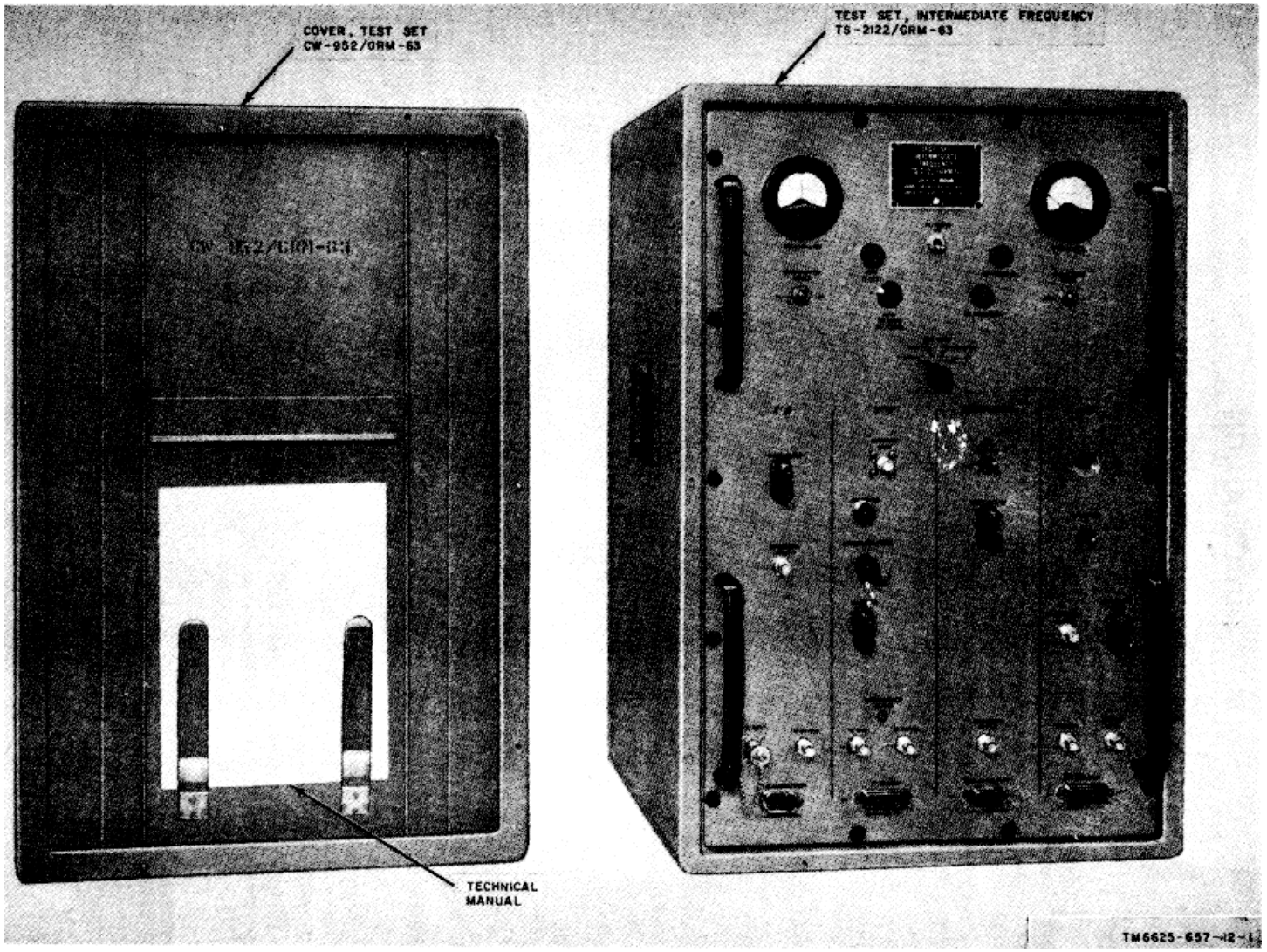

Figure 1-1. Test set, Intermediate Frequency AN/GRM-63, less running spares and minor assemblies.

Section II. DESCRIPTION AND DATA

1-5. Purpose and Use

NOTE
Throughout this manual, the AN/GRC50(*) (V) *assembly under test* is referred to as AUT.

a. Test Set, Intermediate Frequency AN/GRM-63 (hereafter referred to as IF test set), when used in conjunction with additional equipment (para 1-10), comprises a test set which enables the operator to check and perform alignment, check operation, and troubleshoot the following assemblies of Radio Set AN/GRC-50(*) (V) (TM 11-5820-461-35).

Assembly	*Used on*
Modulator assembly 2A5.	Transmitter, Radio T-893(P)/GRC.
Afc assembly 2A4/3A4.	T-893(P)/GRC and Receiver, Radio R-1148(P)/GRC.
First if. assembly 3A1A1/3A2A1.	AN-1955(*)/GRC (3A1) and AM-1956(*)/GRC(3A2).
Second IF assembly 3A5.	Receivers, Radio R-1148 (P)/GRC and R-1331(P)/GRC.

b. The IF test set consists of a metal cabinet that houses an automatic frequency control (afc) simulator assembly, two mixer simulator assemblies, a first IF assembly, a second IF simulator assembly, a modulator detector assembly, an afc error indicator, and a power supply. Also included are signal cables and adapters attached to the inside of the rear cover.

c. The IF test set provides a means of interfacing Radio Set AN/GRC-50(*) (V) assemblies with the IF test set facilities and additional test equipment. A self-contained, solid-state power supply provides regulated direct-current (dc) out-puts of + 108, + 150, and + 250 volts, as well as an unregulated dc voltage of + 360, and both balanced and unbalanced filament voltages of 6.3 volts alternating current (ac). The power supply is controlled by a relay that prevents the application of B+ voltages to an assembly plugged into the wrong panel connector. The relay is controlled by interlock circuits that permit it to energize only when TEST SELECT switch is at 1st IF. Other settings of the TEST SELECT switch require connecting the proper AUT to the appropriate connector (J6, J15, or J17) to complete the interlock circuit.

d. When used with an external oscilloscope and radiofrequency (rf) sweep generator, it will provide a pictorial representation of the frequency response characteristics of IF amplifiers. Continuously variable-frequency markers are supplied from an external rf signal generator and used in conjunction with a frequency meter to indicate the frequency of the marker.

e. Operation of afc assembly 2A4/3A4 is checked with a motor attached to an indicator dial for indicating afc error. An external rf signal generator provides the rf signal required to check afc assembly 2A4/3A4, and its output is checked with an external meter.

1-6. Technical Characteristics

a. 1st IF/2d IF Interface. Overall bandwidth (mixer simulator A4, first IF amplifier A5, and second IF simulator A3 in cascade.

Input stimulus:
- Center frequency ..... 60 MHz.
- Sweep width ..... 55-65 MHz.

Detected output response characteristics:
- Center frequency ..... 60 MHz ± 0.5.
- Bandwidth ..... 5.0 MHz ± 0.5 (3-db points).

b. Afc Simulator.

Input stimulus:
- Input stimulus ..... 20.5 MHz ± 10 kHz.
- Input level. ..... 300 millivolts rms.
- Output frequency ..... 20.5 MHz ± 10 kHz.
- Output level ..... 3 millivolts minimum across 50-ohm load.

Load simulator section:
- Input impedance (measured at 90 MHz with Boonton, Model 250 RX meter):
  - Resistive component 33 ohms ± 5.
  - Capacitance component ..... 8 pf ±5.

c. Modulator Interface. Overall bandwidth (AUT modulator assembly 3A5 through modulator detector A6):

Input stimulus required:
- Center frequency ..... 50 MHz.
- Sweep width ..... 45 to 55 MHz.

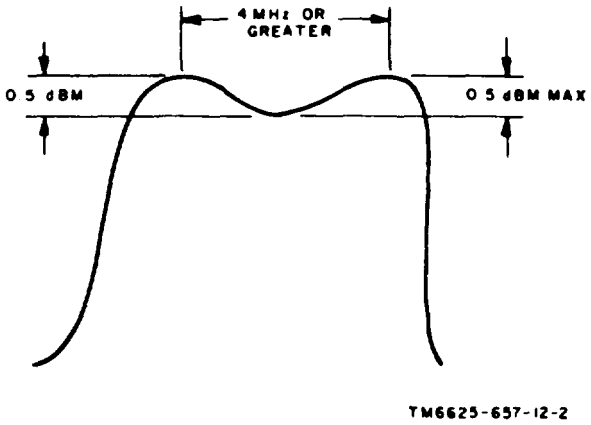

Figure 1-2. Modulator overall response.

Detected output response characteristics (fig. 1-2) of modulator detector.
Center frequency..... 50 MHz ± 0.5.
Bandwidth..... 4 MHz + 0, -1 MHz (between peaks).

d. Output Voltages.

First IF, connector J8 + 150 volts dc ± 1.6.3 volts ac ± 10 percent.

Second IF, connector
J15 ..... + 150 volts dc ± 1.
6.3 *volts ac ± 10 percent.

Operating squelch control Fully clockwise + 15 volts dc max; fully counterclockwise + 1 volt dc max.

Modulator, connector
J17 ..... 115 volts ac ±5.
6.3 volts ac ± 15 percent.
+ 108 volts de ±1.
+ 360 volts de ± 15, under load (+ 360, -20, and + 50 volts dc, without load).
+ 250 volts dc ± 1.

Afc, connector J6 .....6.3 volts ac ± 15 percent.
+ 150 volts de ± 1.
+ 250 volts de ± 1.

e. Power Requirements.

Input voltage.....115 volts ac± 5 percent.
Frequency .....50 to 60 Hz.
Power consumption.....100 watts.

f. Miscellaneous.

Equipment operating temperature range.....10°C. (50°F) to 37.8 °C. (100°F)

Equipment non-operating temperature range .....-62 °C (-80 °F.) to 71 °C. (160 F).
Weight .....75 pounds (34.1 kg).

1-6.1. Items Comprising an Operable Test Set, Intermediate Frequency AN/GRM-63 (FSN 6625-089-4653)

FSN	*Qty*	*Nomenclature, pat No. and mfr code*	*Figure No.*
		NOTE	
		The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer. distributor, or Government agency, etc.	
6625-0894653	1	Test Set, Intermediate Frequency AN/GRM-63 consisting of:	
	3	Adapter: 24655; GR274QBJ	1-3
5935-149-3534	3	Adapter UG-273/U	1-3
	1	Cable Assembly, Radio Frequency CG-3435/U: (1’1")	1-3
6625-935-2609	1	Cable Assembly, Radio Frequency CG-3435/U: (1’10")	1-3
6625-935-2593	1	Cable Assembly, Radio Frequency CG-3435/U: (7")	1-3
6625-935-2594	1	Cable Assembly, Radio Frequency CG-3435/U: (1’3.5")	1-3
6625-935-4194	1	Cable Assembly, Radio Frequency CG-3436/U: (3’5")	1-3
6625-935-1484	1	Cable Assembly, Radio Frequency CG-3437/U: (4’5")	1-3
6625-935-4193	1	Cable Assembly, Radio Frequency CG-3439/U: (3’5")	1-3
	1	Socket Assembly: 05276; TVS-9	1-3
6625-089-3962		Test Set, Intermediate Frequency TS-2122/GRM-63:	1-1
		NOTE	
		The following items and their quantities are mounted in or on equipment listed, for storage purposes. Adapter: 3	
5935-149-3534		Adapter UG-273/U: 3	
6625-935-2594	1	Cable Assembly, Radio Frequency CG-3435/U: (1’3.5"):	
6625-935-2593	1	Cable Assembly, Radio Frequency CG-3435/U: (7"):	
6625-935-2609	1	Cable Assembly, Radio Frequency CG-3435/U: (1’10"):	
	1	Cable Assembly, Radio Frequency CG-3435/U: (1’1"):	
6625-935-4194	1	Cable Assembly, Radio Frequency CG-3436/U: (3’5"):	
6625-935-1484	1	Cable Assembly, Radio Frequency CG-3437/U: (4’5"):	
6625-935-4193	1	Cable Assembly, Radio Frequency CG-3439/U: (3’5"):	
		Socket Assembly: 1	

Add paragraph 1-6.2 after paragraph 1-6.1.

1-6.2. Running Spares

FSN	*Qty*	*Item*
5960-262-1357	1	Electron tube: 81349; 5654/6AK5W
5960-247-8748	1	Electron tube: 81349; 5842
5960-237-6917	1	Electron tube: 5725/6AS6W
5920-043-2641	5	Fuse, cartridge: 81349; F02A250V0.25A
5920-010-6652	5	Fuse, cartridge: 81349; F02A250V3.0A
	1	Lamp, incandescent: 49671; 849546-18
6240-682-3411	1	Lamp, neon: 24455; NE-51H

1-7. Components of Test Set, Intermediate Frequency AN/GRM-63

NOTE

This listing is based on original shipment of Order No. FR-36-039-H-6-32182 (E). Minor assemblies are illustrated in figure 1-3. For cable details, refer to paragraph 1-11.

a. Components.

Quantity	*Item*	*Dimensions (in.)* *Height*	*Width*	*Depth*	*Unit weight (lb)*	*Figure No.*
1	Test Set, Intermediate Frequency TS-2122/GRM-63	27 (68.6 cm)	18 1/2 (47 cm)	17 1/2 (444 cm)	75 (34 kg)	1-1
1	Cable Assembly, Radio Frequency CG-3435/U (1 ft 1 in.).					1-3
1	Cable Assembly, Radio Frequency CG-3435/U (1 ft 10 in.).					1-3
1	Cable Assembly, Radio Frequency CG-3435/U (7 in.).					1-3
1	Cable Assembly, Radio Frequency CG-3435/ U (1 ft 3.5 in.).					1-3

Quantity	Item	Dimensions (in.) Height	Width	Depth	Unit weight (lb)	Figure No.
1	Cable Assembly, Radio Frequency CG-3436/U (3 ft 5 in.).					1-3
1	Cable Assembly, Radio Frequency CG-3430/U (3 ft 5 in.).					1-3
1	Cable Assembly, Radio Frequency CG-3437/U (4 ft 5 in.).					1-3
1	Cover, Test Set CW-952/GRM-63.	26 (66 cm)	1 1/2 (3.8 cm)	17 ½ (44.4 cm)	5 (2.27 kg)	1-1
3	Adapter, Connector UG-273/U.					1-3
3	Adapter, Connector, General Radio Company type 874-QBJ.					1-3
1	Tube adapter, test socket, Pomona Electronics Company, Inc. type TVS-9 (modified).					1-3
2	TM 116 57-12 1-1					
1 set	Running spares (b below).					

b. Running Spares.

Quantity	Item
5	Fuse F02AZ50V3.0A
5	Fuse F02A250V0.25A
1	Lamp, incandescent, Type 47
1	Lamp, Neon, NE51H
1	Tube electron 5054/6AU5W
1	Tube electron 5842
1	Tube electron 6725/6AS6W

c. Miscellaneous. Minor assemblies and the ac power cable are fastened to the inside of the rear cover. Adjustment controls of the dc power supply are accessible with rear door opened (fig. 1-4).

1-8. Description of Test Set, intermediate Frequency AN/GRM-63

fig. 1-1)

Test Set, Intermediate Frequency AN/GRM- 63 consist of Test Set, Intermediate Frequency TS-2122/GRM-63 and minor assemblies. The TS-2122/GRM-63 is housed in a rectangular metal cabinet, the front cover CW-952/GRM-63) of which is secured with 10 captive screws. The cabinet itself can be placed on a suitable workbench or any flat surface that permits free passage of air through louvers in the top and bottom. A hinged rear (lift-off) door secured with seven quarter-turn fasteners provides access to the cabinet interior.

1-9. Description of Minor Assemblies

The minor assemblies of Test Set, Intermediate Frequency AN/GRM-63 are illustrated in figure 13.

a. The cabinet assembly is of metal construction and contains all the assemblies of the IF test set. Minor assemblies are stored inside the cabinet.

b. Cables CG-3435/U (1 ft 1 in.), CG-3435/U (1 ft 10 in.), CG-3435/U (7 in.), and CG-3435/U (1, ft 3.5 in.) are fitted with Plug UG-88/U on both ends. *Because the length of these cables is critical, no other length cables should be used.*

c. Cable CG-3436/U (3 ft 5 in.) is fitted with Plug UG-88/U on one end and an assembly, consisting of a terminating resistor,

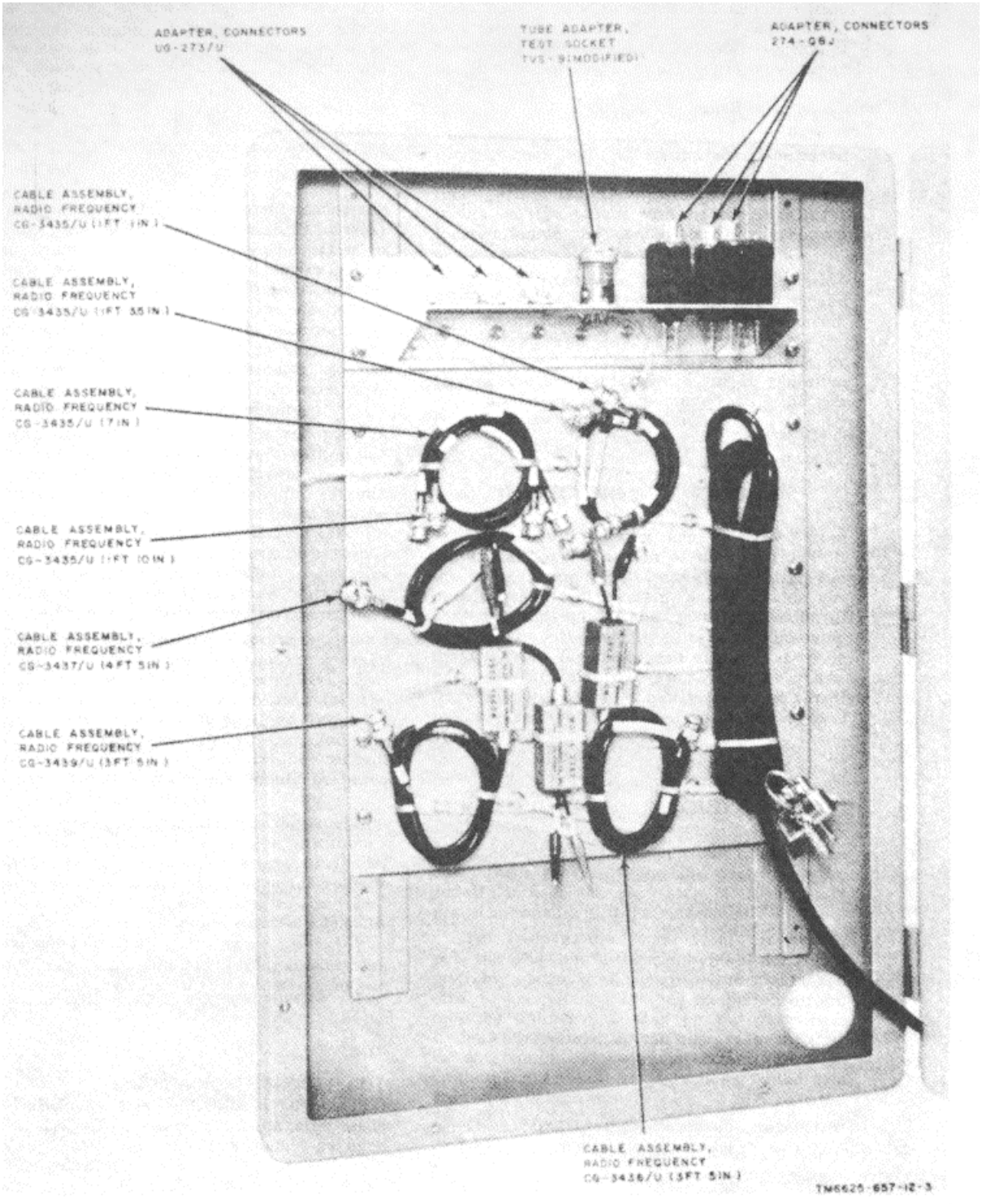

Figure 1-3. Minor assemblies stowed or rear door of TS-2122/GRM-63.

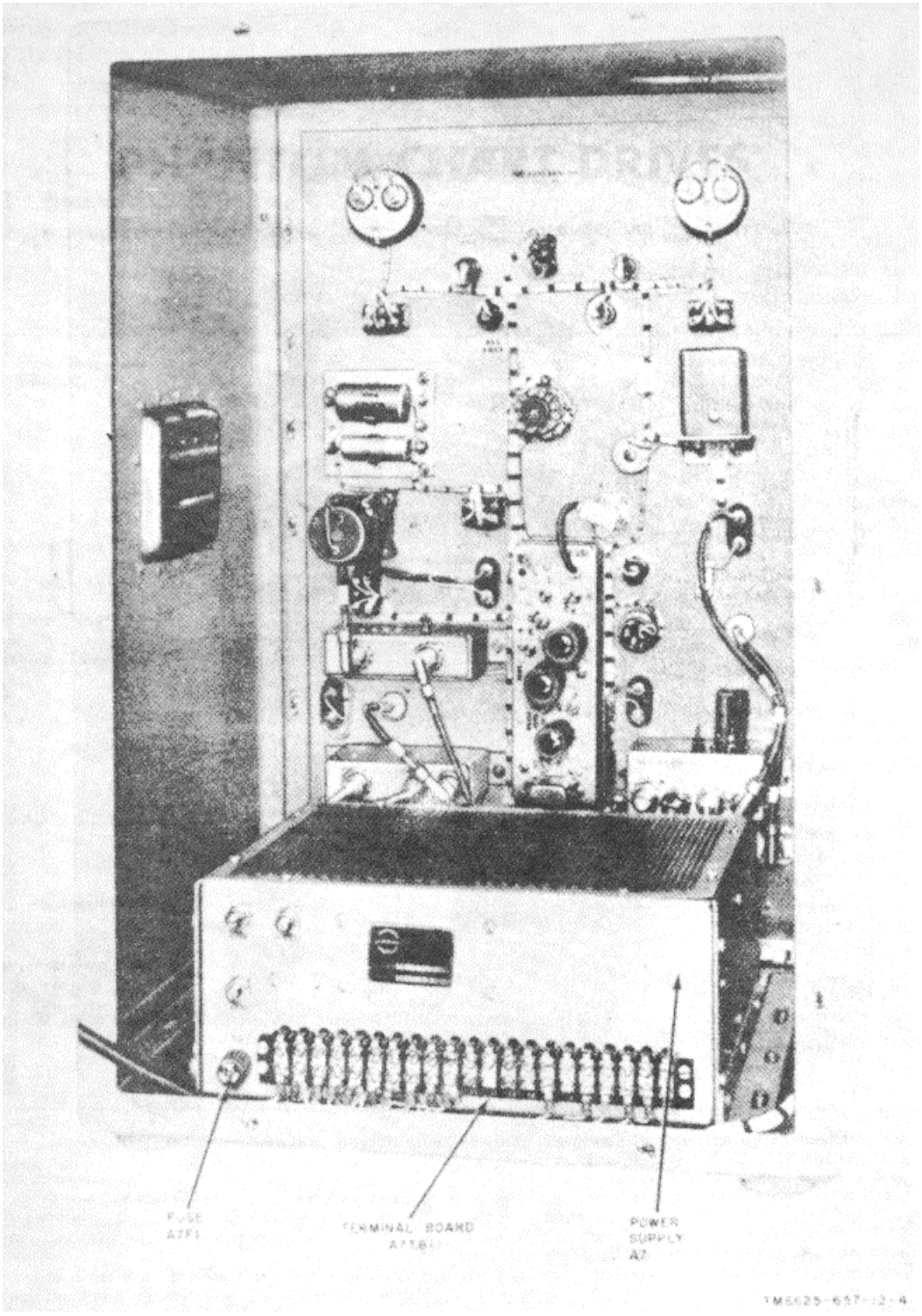

Figure 1-4. Interior of TS-2122/GRM-63.

blocking capacitor, and test leads terminated in insulated minigator clips, on the other end.

d. Cable CG-3439/U (3 ft 5 in.) is fitted with Plug UG-88/U on one end and an assembly, consisting of a series resistor and test leads terminated in insulated minigator clips, on the other end.

e. Cable CG-3437/U (4 ft 5 in.) is fitted with Plug UG-88/U on one end and an assembly, consisting of a series capacitor and test leads terminated in insulated minigator clips, on the other end.

f. Tube adapter, test socket; Pomono Electronics Company, Inc., type TVS-9 is modified with a .01-microfarad (uf) capacitor connected between pins 1 to 4.

g. Connector, adapter; General Radio Company, type 274-QBJ is a shielded BNC to dual-banana-pins adapter.

1-10. Additional Equipment Required

The following equipment is not supplied as part of the IF test set but is needed for use with it.

a. Test Equipment.

Nomenclature	Federal stock No.	Technical manual	Assembly under test: 3A1A1 3A2A1	2A4/3A4	3A5	2A5
Oscilloscope AN/USM-&1	6625-701-4038	TM 11-6625-219-12	X	X	X	X
Generator, Signal AN/USM-44(*)a.	6625-669-4031	TM 11-6625-508-10	X	X	X	X
Counter, Electronic, Digital Readout AN/USM-207.	6625-911-6368	TM 11-6625-700-10	X	X	X	X
Generator, Signal AN/URM-48.	6625-555-2264	TM 11-1257		X	X	
Meter, Modulation ME-7/U	6625-647-3737	TM 11-6625-400-12		X	X	
Voltmeter, Electronic ME-30(*)/U[b].	6625-643-1670	TM 11-6625-320-12		X	X	
Generator, Signal SG-71 (*)/FCC[c].	6625-669-0255	TM 11-5088		X	X	
Multimeter ME-26(*)/Ud	6625-646-9409	TM 11-6625-200-12	X		X	X
Generator, Signal Sweep Boonton, Type 240-A.			X		X	X
Voltmeter, Electronic AN/URM-145.	5820-973-3986	TM 11-625-524-15-1				X
Detector, Radio Frequency DT-149/U[e].	6625-245-9619	TM 11-6625-283-12	X		X	X
Analyzer, Spectrum AN/U PM-110.	6625-720-2495	TM 11-6625-326-12		X		

a AN/USM-44(*) represent Generator. Signal AN/USM-44 and AN/USM-4LA.
b ME-30(*)/U represents Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U ME-30C/U, and ME-30E/U.
c SG-71(*)/U represents Generator, Signal SG-71/FCC, SG-71A/FCC, and SG-71C/FCC.
d ME-26(*)/U represents Multimeter ME-26/U, ME-26A/U, ME-26B/U. ME-2SC/U, and ME-28D/U.
e DT-149/U is part of Generator, Signal TS-452D/U.

b. Cables and Adapters. For test cable information, refer to paragraph 1-11.

Description	Federal stock No.	Assembly under test: 3A1A1/3A2A1	2A4/3A4	3A5	2A5
		Quantity required			
Test Cable A: Cable Assembly, Rf CG409/U (3 ea)	5995-503-3518, 5995-503-0470, 5995-542-6221, or 5995-900-5021	1	1	1	1
Test cable B (2 ea)	6625-900-8688			1	
Test cable C (2 ea)				1	

Description	Federal stock No.	Assembly under test: 3A1A1/3A2A1	2A4/3A4	3A5	2A5
		Quantity required			
Test cable D: Cable Assembly, Rf CG3434/U (4 ft 2 in.) (part of AN/GRM62).	5995-935-4195	1	1	1	1
Test cable E	6625-900-8687			1	1
Minigator clips:					
Black nipple	5975-628-7714				
Red nipple	5975-839-4633				
Clip (2 ea)	5940-577-0994				
Adapter, Connector UG-201/U (N female-to- BNC male)	5935-201-3090		1	1	
Test Facilities Kit MK-715/GRC-50(V)a; from which the following items are required:	6625-868-8335				
Extender, Module MX-6989/GRC-50(V)				1	1
Extender, Module MX-6990/GRC-50(V)		1			1
Adapter, Connector UG-274/U		1		1	2

[a] See TM 11-5820-461-26P and TM 11-6820-461-35.

1-11. Test Cables Details

Note. This listing includes all additional test cables required but not provided. For test cable diagrams, refer to figure 1-5.

Cable nomenclature		Connectors					Cable diagram
Type	Symbol	P1	P2	P3	Wire or cable	Length (in.)	(fig. 1-5)
CG-409/U	A	UG-88/U	UG-88/U		RG58C/U	48 ± 1 (121.9 cm)	A
Test cable	B	UG-88/U	Notes [1]	Note [1],[2]	RG-58C/U	48 ± 1 (121.9 cm)	B
Test cable	C	Note [5]	Note 5		Test lead	18 ± 1 (465.7 cm)	C
Test cable	D	UG-88/U	Note 5	Note [4]	RG-58C/U	48 ± 1 (121.9 cm)	D
Test cable	E	UG-88/U	Notes [1], [3]	Note [4]	RG-58C/U	48 ± 1 (121.9 cm)	E

Note :
[1] Clip, minigator.
[2] Insulator, minigator clip, red.
[3] Insulator, minigator clip, black.
[4] Connector, pin tip, red (similar to E.F. Johnson type 105-772).
[5] Connector, pin tip, black (similar to E.F. Johnson type 105-773).

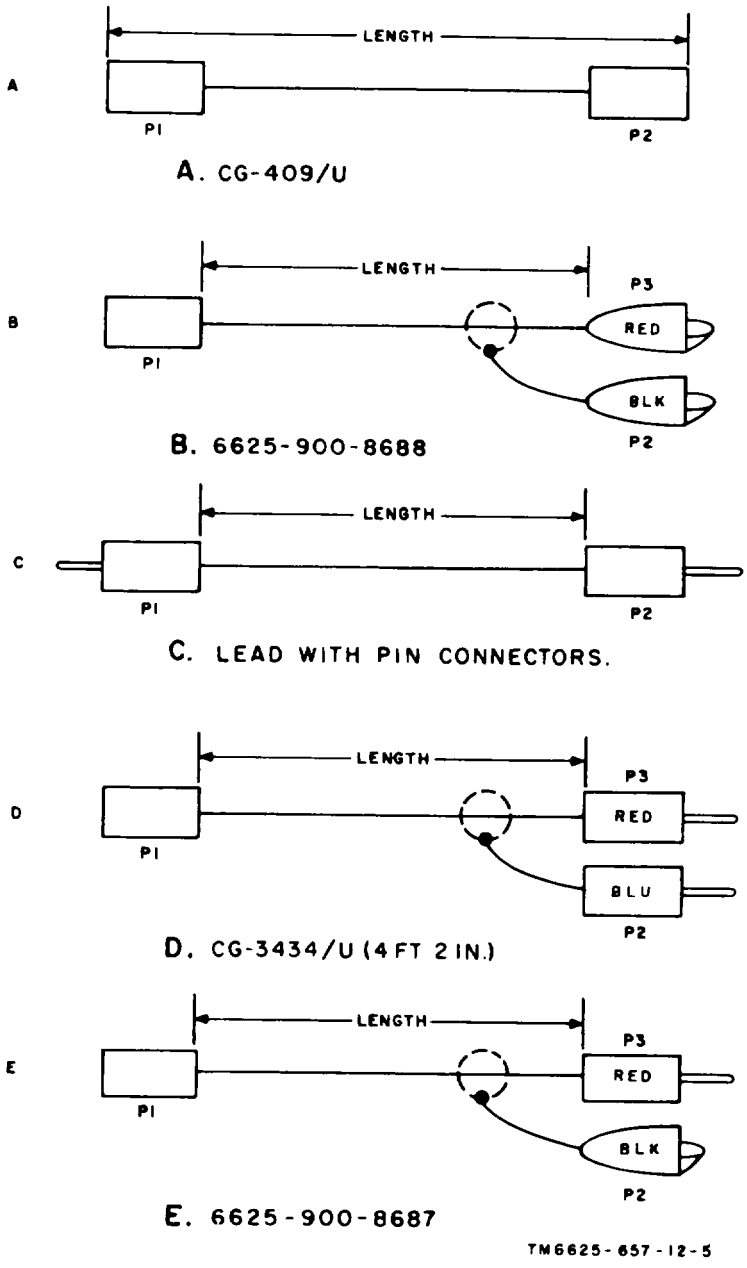

Figure 1-5. Test cables diagrams.

CHAPTER 2
INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

a. Packing Data. When packed for shipment, the methods applied may vary as to the shipping containers used, depending on the supply source. A typical shipping box and its contents are shown in figure 2-1.

b. Dimensions. When packed for shipment, the outside dimensions of the IF test set are 24 by 23 1/4 by 34 3/4 inches (61 x 59.1 x 88.3 centimeters (cm)); the volume is 11.4 cubic feet (0.323 cubic meters);' the packed weight is 110 pounds (49.94 kilograms (kg)).

c. Removing Contents.

(1) Cut and fold back the metal straps.

CAUTION

Do not attempt to pry off the top and sides; equipment damage may result.

(2) Remove the nails from the top and one side of the box with a nailpuller. Remove the top and side.

(3) Remove the outer carton.

(4) Open the outer carton and remove the inner carton that is wrapped in a moisture-vapor-proof barrier.

(5) Open the moisture-vapor-proof barrier and open the inner carton.

(6) Remove the equipment.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 3).

b. See that the equipment is complete as listed on the packing slip. Report all discrepancies in accordance with AR 735-11-2. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. If modified, see that any operational instruction changes resulting from the modification have been entered in the equipment manual.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

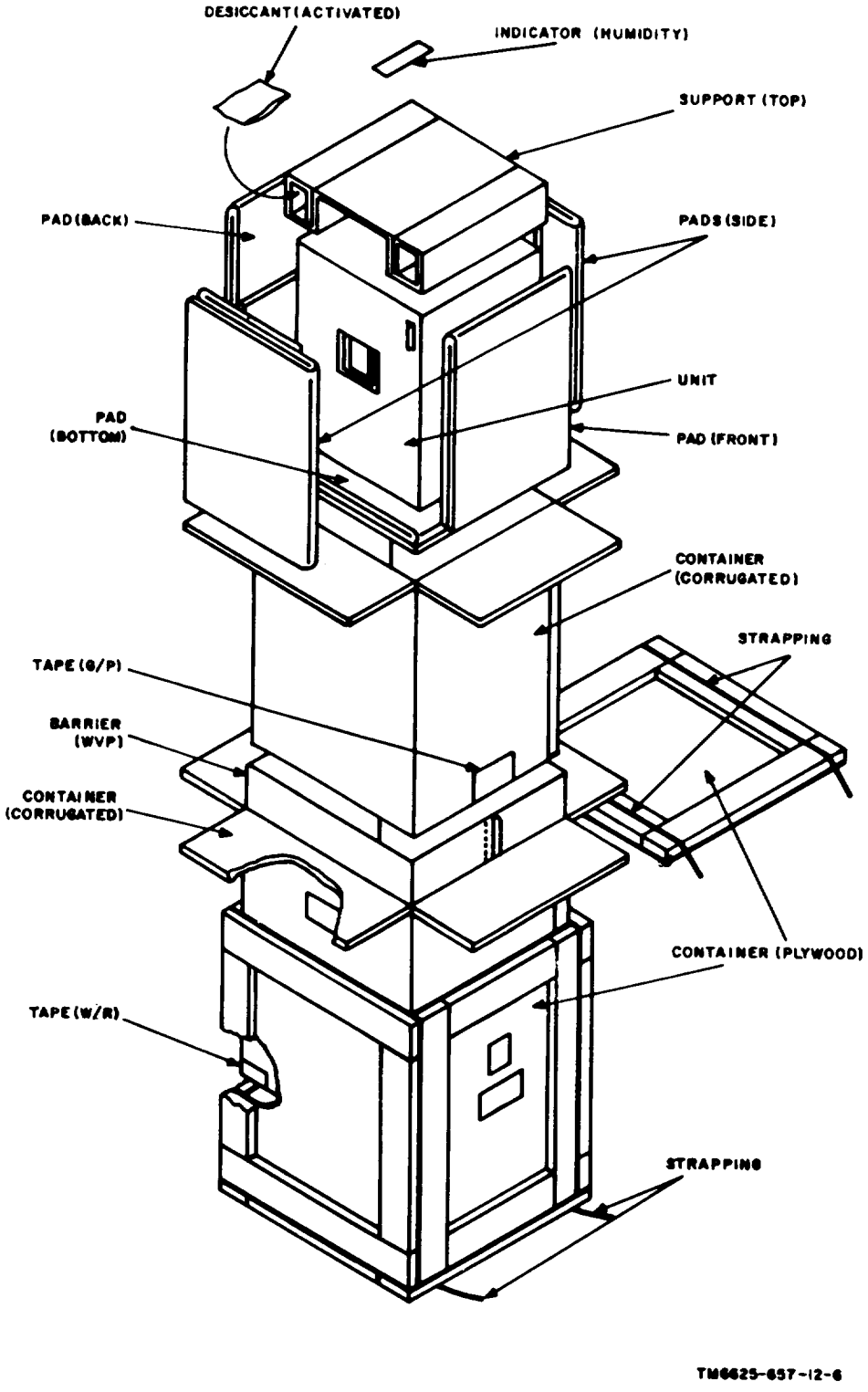

Figure 2-1. Typical packaging diagram.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS AND INDICATORS

Note. This section covers only items used by the operator; items used by maintenance personnel are covered in instructions for the appropriate maintenance category.

3-1. Placement of Equipment

The following precaution should be taken before operating IF test set. The IF test set must be mounted on a suitable workbench or any solid flat surface. The top and bottom louvers must be free of all obstructions which would impede or block the flow of air. Proper cooling of the IF test set requires the circulation of air through the cabinet.

3-2. Test Set, Intermediate Frequency TS-2122/GRM-63, Operating Controls and Indicators, General

(fig. 3-1)

Refer to paragraphs 3-3 through 3-7 for operating controls, indicators, fuses, and connectors and their functions. Throughout the manual, the Radio Set AN/GRC-50(*)(V) *assembly under test* (para 1-5*a*) will be referred to as the AUT. 3-3. Power and Switching Controls and Indicators (fig. 3-1)

3-3. Power and Switching Controls and Indicators

(fig. 3-1)

Control, indicator, or fuse	Function
AC POWER switch	--In ON position, 115 volts ac is applied to the IF test set which turns on all filament voltages, and applies 115 volts ac (afc motor primary power) to MODULATOR connector J17.
AC POWER ON pilot lamp	--Lights when 1 15 volts ac is applied to the IF test set by operation of AC POWER switch to ON.
FUSE 3 AMP	--Powerline fuse. Protects the equipment from damage caused by 115-volt ac line surges, application of wrong voltage, or internal short circuit due to part malfunction.
PUSH TO RESET DC POWER switch	--In depressed position, energizes a relay that turns on the dc power supply provided an AUT is connected to connector J6, J15, or J17 and selected by the TEST SELECT switch. It is not necessary for an assembly to be connected to J8 when TEST SELECT switch is set to 1S T IF.
DC POWER ON lamp	--Lights when de power is turned on by depressing the PUSH TO RESET DC POWER switch provided an AUT is connected to connector J6, J15, or J17 and selected by the TEST SELECT switch. It is not necessary for an assembly to be connected to J8 when TEST SELECT switch is set to 1st IF.
DISCRIMINATOR meter	--Indicates discriminator output voltage of the AUT selected by the DISCRIMINATOR SELECT switch.

Control, indicator, or fuse	Function
DISCRIMINATOR SELECT switch	Switches DISCRIMINATOR meter to the AUT.
	Switch position: 2nd IF — Selects 2d IF assembly 3A5 discriminator output voltage.
	Switch position: AFC — Selects afc assembly 2A4/3A4 discriminator output voltage.
SIGNAL LEVEL meter	Indicates IF signal level of the AUT selected by the SIGNAL LEVEL SELECT switch.
SIGNAL LEVEL SELECT switch	Switches -SIGNAL LEVEL meter to the AUT.
	Switch position: 2ND IF — Selects IF signal level of 2d IF assembly 3A5.
	Switch position: AFC — Selects IF signal level of afc assembly 2A4/3A4.
TEST SELECT switch	Selects the proper dc voltages to be applied to the AUT and arms the PUSH TO RESET DC POWER switch circuit provided an AUT is connected to connector J6, J15, or J17 and selected by the TEST SELECT switch. It is not necessary for an assembly to be connected to J8 when TEST SELECT switch is set to 1st IF. (Voltages are not applied to connectors J6, J8, J15, or J17 until the PUSH TO RESET DC POWER switch is depressed.)

Switch position	Voltages selected	Applies to connector
1st IF	+ 150 volts dc	J8
2nd IF	+150 volts dc	J15
MODUL.ATOR	+108, +250, +360 volts dc.	J17
AFC	+150, +250 volts dc.	J6

3-4. 1st IF Section, Connectors
(fig. 3-1)

Control, indicator, or fuse	Function
SCOPE OUTPUT connector J10	-The red binding post provides a means of connecting the detected rf output of the 1st IF section to an oscilloscope. The black binding post provides a ground connection.
GENERATOR INPUT connector J2	-Provides a means of applying rf signals from a signal generator to the 1ST IF section of the IF test set.
IF INPUT connector J7. (Connector J7 is part of mixer simulator assembly A2 and must have the dust cap replaced when not in use.)	-Provides a means of connecting the rf signals from a signal generator to the input of AUT.
IF OUTPUT connector J9	-Provides a means of connecting the rf output of AUT to the IF test set
1ST IF (3A1A/3A2A1) connector J8, MX4990/GRC-50(v a.	Provides a means of connecting the operating potentials from the IF test set to the AUT through the MX-6990/GRC-50(V).

a The marking indicates the proper cable from Test Facilities Kit MK-716/GRC-60(V) required to connect the AUT to the IF test (para 3-10).

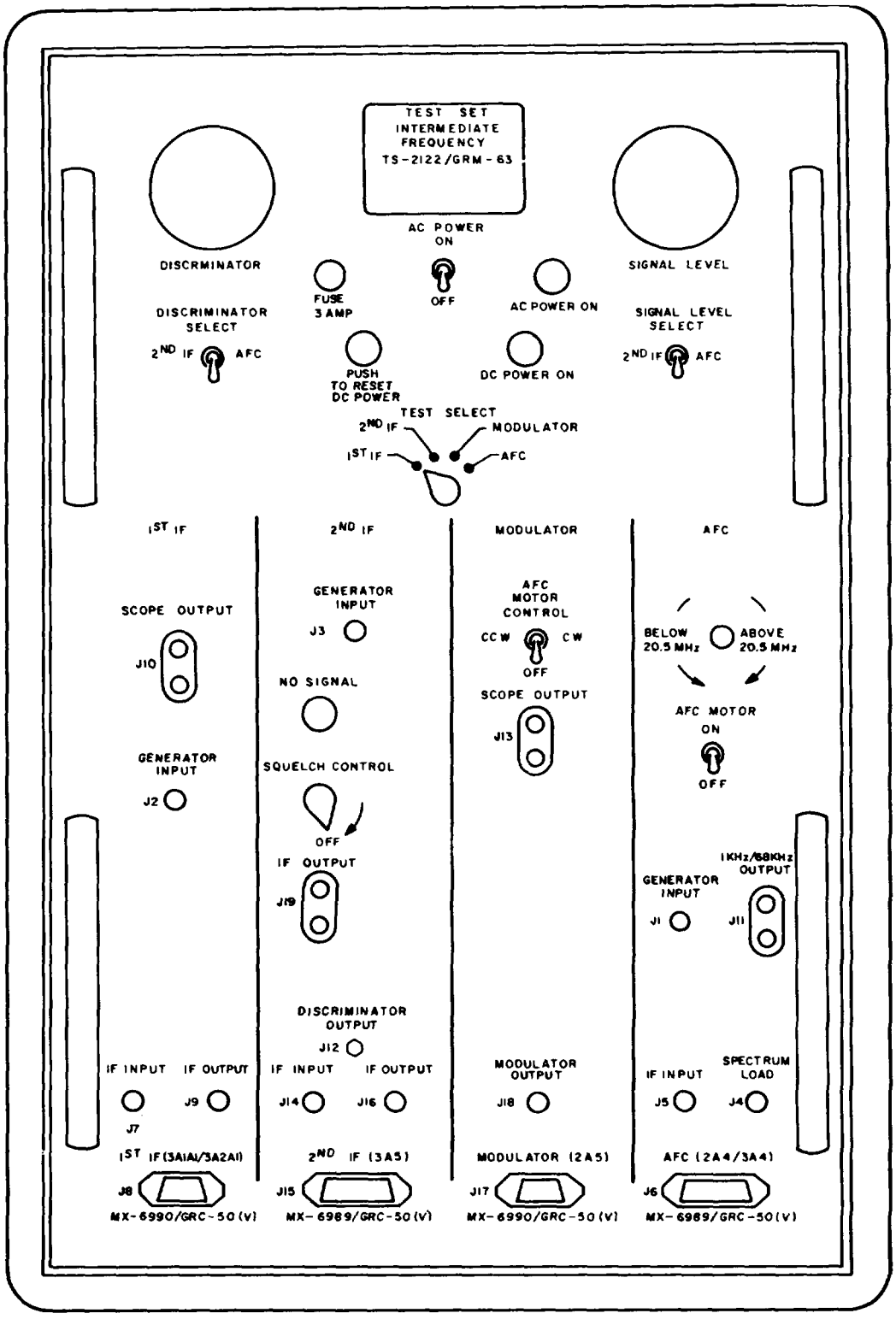

Figure 3-1. Test Set, Intermediate Frequency TS-2122/GRM-63, /front panel controls and indicators.

3-5. 2nd IF Section, Operating Controls, Indicators, and Connectors

(fig. 3-1)

Control, indicator, or fuse	Function
GENERATOR INPUT connector J3. (mixer simulator assembly A4).	Provides a means of applying rf signals to the 2nd IF section of the test set.
SQUELCH CONTROL	In the on position, supplies a fixed + 1.50 volts dc to the squelch relay and a variable dc voltage to the squelch amplifier input of the AUT.
IF OUTPUT connector J19	The red binding post provides a means of connecting the rf output of the AUT to an oscilloscope. The black binding post provides a ground connection.
DISCRIMINATOR OUTPUT connector J12	Provides a means of applying the discriminator voltage from the AUT through DISCRIMINATOR SELECT switch to DISCRIMINATOR meter.
IF INPUT connector J14	Provides a means of applying rf signals to the input of AUT.
IF OUTPUT connector J16	Provides a means of connecting the detected output of the AUT to the IF test set.
2nd IF (3A5) connector J15, MX-6989/GRC-50(V)[a].	Provides a means of connecting B + and filament voltages, signal level meter, squelch control, no-signal lamp, and the power relay return circuit to the AUT through MX-6989,/GRC-50(V).
NO SIGNAL pilot lamp	Lights when squelch relay in the AUT energizes, closing the normally open lamp contacts and providing 6.3 volts ac to the NO SIGNAL lamp.

[a] The marking indicates the proper cable from Test Facilities Kit MK -15/GRC 50(VI required to connect the AUT to the IF test set (para 3-10).

3-6. MODULATOR Section, Operating Control and Connectors

(fig. 3-1)

Control, indicator, or fuse	Function
AFC MOTOR CONTROL Switch	Provides a means of applying and reversing the phase of the 115-volt ac power to the control winding of the afc motor in the AUT. Reversing the phase will change the motor direction as indicated by CW (clockwise) or CCW (counterclockwise) switch marking.
SCOPE OUTPUT connector J13	The red binding post provides a means of connecting the detected output of AUT to an oscilloscope. The black binding post provides a ground connection.
MODULATOR OUTPUT connector J18	Provides a means of applying the rf output signal from the AUT to the IF test set.
MODULATOR (2A5) connector J17, MX-6990/GRC-50(V)a.	Provides a means of connecting B+ and filament voltages, afc motor voltages, and the power relay return circuit to the AUT through MX-6990/GRC-150(V).

[a] The marking indicates the proper cable from Test Facilities Kit MK-715/CR560(V) required to connect the AUT to the IF test set (para 3-10).

3-7. AFC Section, Operating Control, Indicator, and Connectors

(fig. 3-1)

Control, indicator, or fuse	Function
BELOW 20.5 MHz and ABOVE 20.5 MHz indicator motor.	Indicates if the afc error voltage of the AUT is above or below the 20.5 MHz reference. (Counter-clockwise rotation indicates the error voltage is below 20.5 MHz, clockwise rotation indicates error voltage is above 20.5 MHz.)
AFC MOTOR switch	In the ON position (up), applies 115-volt ac primary power and completes the control winding circuit from the AUT to the BELOW O2.5 MHz-ABOVE 20.5 MHz indicator.
GENERATOR INPUT connector J1	Provides a means of applying rf signals from a signal generator to the AFC section of the IF test set.
1KHZ/68KHZ OUTPUT connector J11	Provides a means of metering the modulation level of assembly 2A4/3A4.
IF INPUT connector J5	Provides a means of applying rf signals to the input of AUT.
SPECTRUM LOAD connector J4	Provides a means of applying the proper load to the spectrum generator when it is connected to J4.
AFC (2A4/3A4) connector J6, MX-6989/GRC-5(V)[a].	Provides a means of connecting B+ and filament voltages, discriminator and signal level meters, rotation direction indicator, and the power relay return circuit to assembly 2A4/3A4 through MX-6989/GRC-50(V).

[a] The marking indicates the proper cable from Test Facilities Kit MK 715/GRC-50(V) required to connect the AUT to the IF test set (para 3-10).

Section II. OPERATION UNDER USUAL CONDITIONS

3-8. General

a. Test Set, Intermediate Frequency AN/GRM-63, When used in conjunction with additional equipment (para 1-10), comprises an IF test set which enables the operator to check and perform alignment, check operation, and troubleshooting the following assemblies of Radio Set AN/GRC-50(*)(V).

Assemblies	Used in
Modulator assembly 2A5	-Transmitter, Radio T-893(P)/GRC.
Afc assembly 2A4/3A4	-T93(P)/GRC and Receiver, Radio R-1148(P)/GRC.
First IF assembly 3A1A1/3A2A1	-Amplifier-Converters
	AM-1955(*)/GRC (3A1), and
	AM-1956(*)/GRC (3A2).
Second IF assembly 3A5	-Receivers, Radio R-1148(P)/GRC and
	R-1331 (*)/GRC.

b. For any type of operation, perform the following procedures:

(1) Preliminary starting procedure (para 3-9).
(2) Starting procedure (para 3-10).
(3) Operating procedures (para 3-11 through 3-14).
(4) Stopping procedure (para 3-15).

3-9. Preliminary Starting Procedures

a. See that louvers in the top, bottom, and rear door of the cabinet are free of all obstructions.
b. Remove the front cover by unscrewing 10 captive screws.
c. Set the AC POWER switch to OFF.

d. Set the AFC MOTOR switch to OFF.

e. Set the AFC MOTOR CONTROL switch to OFF.

f. Set the SQUELCH CONTROL to OFF.

g. Release the seven quarter-turn fasteners on the rear hinged cover and swing open. Push the power cable through the hole in the cover.

h. Remove minor assemblies as required from the inside of the rear cover; refasten the cover.

3-10. Starting Procedure

a. Insert the proper-cable from Test Facilities Kit MK-715/GRC-50(V) (fig. 3-2) into J6, J8, J15, or J17 as required for the test being performed.

b. Connect the ac power cable to a 115-volt ac power source.

c. Set the AC POWER switch to ON (up) and allow a 10-minute warmup. The AC POWER ON pilot lamp (red) will light when the AC POWER switch is turned on.

***Notes*. 1. The MODULATOR, AFC, and 2nd IF (not 1st IF) sections have an interlock circuit to prevent damage to an AN/GRC-50(V)(*) assembly, if it is accidentally plugged into the wrong connector, by preventing the application of dc power.**

2. To check operation of the interlock circuit of the MODULATOR, AFC, and 2nd IF sections (when not testing an AN/GRC-50(*)(V) assembly), a jumper cable must be plugged into the proper pins on the terminal box of the MK-715/GRC-50(V) cable being used .

3-11. Testing First If Assembly 3A1A1/3A2A1

Start the equipment as outlined in paragraph 3-10.

a. Connect J14 of Extender, Module MX-6990//GRC-50(V) to J8 on the IF test set panel.

b. Unscrew the dust cap from IF INPUT connector J7.

c. Set the TEST SELECT switch to 1st IF.

d. Connect first IF assembly 3A1A1/3A2A1 to P1 on the MK-6990/GRC-50(V).

e. Push the PUSH TO RESET DC POWER switch. The DC POWER ON pilot lamp (red) will light.

f. Refer to TM 11-5820-461-35 for procedure to check first IF assembly 3A1A1/ 3A2A1 with the IF test set.

3-12. Testing Second If Assembly 3A5

Start the equipment as outlined in paragraph 3-10.

a. Connect P1 of Extender, Module MX-6989/GRC-50(V) to J15 on the IF test s, panel.

b. Set the TEST SELECT switch to 2nd IF

c. Connect second IF assembly 3A5 to J21 on the MX-6989 /GRC-50 (V).

d. Push the PUSH TO RESET DC POWER switch. The DC POWER ON pilot lamp (green) will light.

e. Refer to TM 11-5820-461-35 for procedures to check second IF assembly 3A5 with the IF test set.

3-13. Testing Modulator Assembly 2A5

Start the equipment as outlined in paragraph 3-10.

a. Connect P1 of Extender, Module MK-6990/GRC-50(V) to J17 on the IF test set panel.

b. Set the TEST SELECT switch to MODULATOR.

c. Connect modulator assembly 2A5 to J1/ on the MX-6990/GRC-50(V).

Caution: The output of modulator assembly 2A5 must be terminated before applying power, as damage may result to the output tube (e below).

d. Push the PUSH TO RESET DC POWER switch. The DC POWER ON pilot lamp (green) will light.

e. Refer to TM 11-5820-461-35 for procedures to check modulator assembly 2A5 with the IF test set.

3-14. Testing Afc Assembly 2A4/3A4

Start the equipment as outlined in paragraph 3-10.

a. Connect P1 of Extender, Module MX-6989/GRC-50(V) to J3 on the IF test set panel.

b. Set the TEST SELECT switch to AFC.

c. Connect the afc assembly to J21 on the MX-6989/GRC-50 (V).

d. Push the PUSH TO RESET DC POWER switch. The DC POWER ON pilot lamp (green) will light.

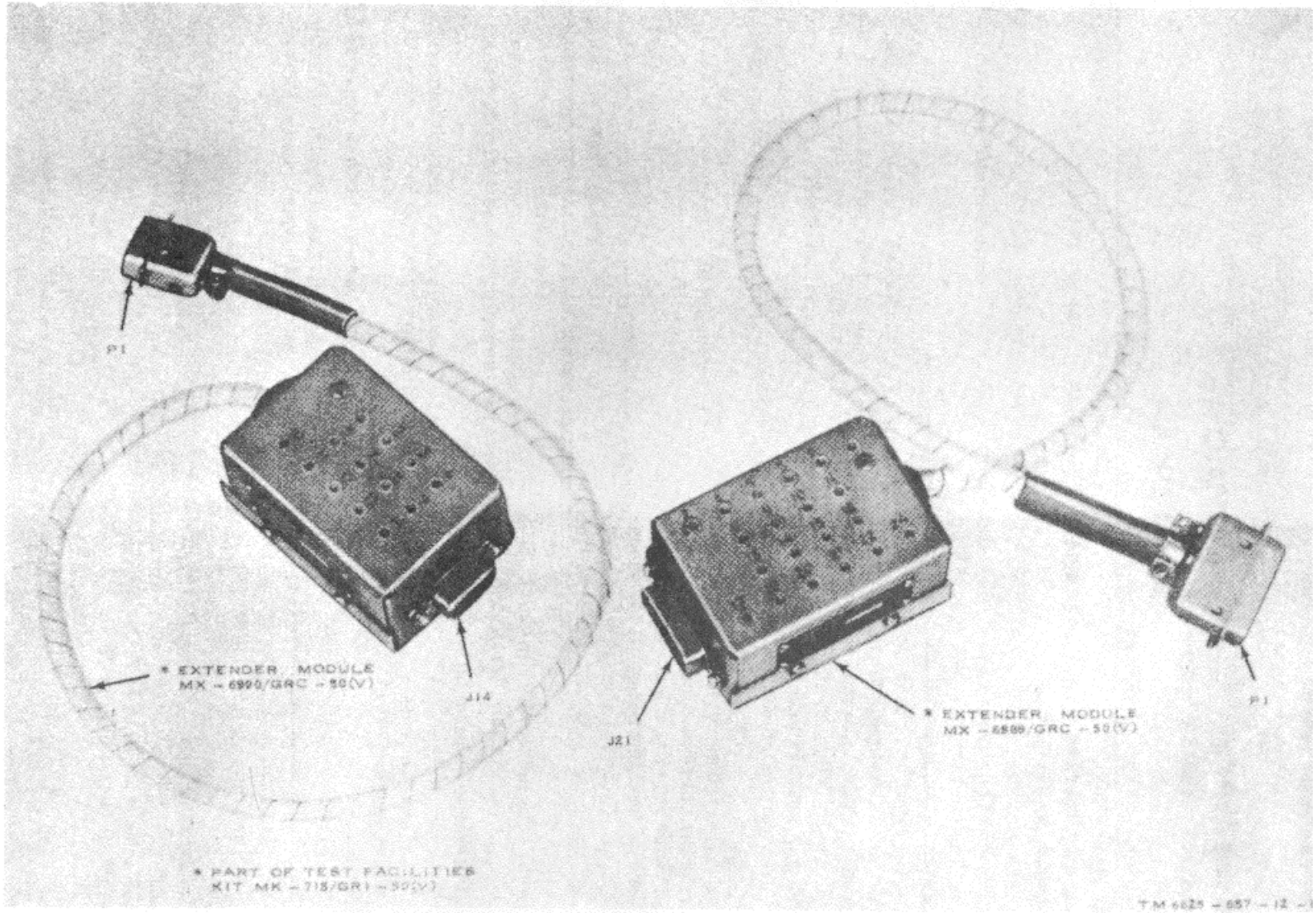

Figure 3-2. Extenders, Module MX-6989/GRC-50(V) and MX-6990/GRC-50(V) (part of Test Facilities Kit MK-715/GRC-50(V)).

e. Refer to TM 11-5820-461-35 for procedures to check the afc assembly with the IF test set.

3-15. Stopping Procedure

a. Set the AC POWER switch to OFF (down).

b. Set the SQUELCH CONTROL to OFF (completely clockwise).

c. Set the AFC MOTOR CONTROL switch to OFF (center position).

d. Set the AFC MOTOR switch to OF (down).

e. Set all switches on additional test equipment to off.

f. Remove all jumper cables from modu extenders.

g. Remove all cables from the from panel connectors.

h. Screw the dust cap on IF INPUT connector J7.

i. Remove the ac power cable from the ac power source.

CHAPTER 4

MAINTENANCE

Section I. GENERAL

Note. Do not apply torque to check bolts, screws, or nuts for tightness.

4-1. Scope of Maintenance

The maintenance duties assigned to the operator and organizational maintenance man of Test Set, Intermediate Frequency AN/GRM63 are listed below together with a reference to the paragraphs covering the specific maintenance function. These duties do not require special tools or test equipment.

a. Daily preventive maintenance checks and services chart (para 4-4).

b. Weekly preventive maintenance checks and services chart (para 4-5).

c. Cleaning (para 4-6).

d. Monthly preventive maintenance checks and services chart (para 4-7).

e. Quarterly preventive maintenance checks and services chart (para 4-8).

f. Touchup painting instructions (para 4-9).

g. General troubleshooting information (para 4-10).

h. Troubleshooting chart (para 4-11).

i. Repairs and adjustments (para 4-13).

4-2. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedure given in paragraphs 4-3 through 4-8 cover routine stematic care and cleaning essential to proper keep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance and ervices chart (para 4-4, 4-5, 4-7, and 4-8) tlines functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and the normal conditions; the *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective action indicated, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

4-3. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the AN/GRM-63 are required daily and weekly for the operator, and monthly and quarterly for the organizational maintenance man.

a. Paragraph 4-4 specifies checks and services that must be accomplished daily or under the special conditions listed below:

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in standby condition.

b. Paragraphs 4-5, 4-7, and 4-8 specify *additional* checks and services that must be performed weekly, monthly, and quarterly.

Section II. OPERATOR MAINTENANCE

4-4. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	Completeness	See that the equipment is complete	App. B.
2	Cleanliness	See that the equipment is clean	Para 4-6.
3	Connectors	Check tightness of all connectors	Para 4-13*b*.
4	Meter glasses and indicator lenses.	Check all meter glasses and indicator lenses for cracks.	Para 4-12*b*.
5	Controls and indicators	While making the operating checks (sequence numbers 6 through 14 below), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding and no excessive looseness is apparent.	
6	Preliminary	Set the controls as follows: *a.* Set AC POWER switch to OFF. *b.* Set AFC MOTOR CONTROL switch to OFF. *c.* Set AFC MOTOR switch to OFF. *d.* Set SQUELCH CONTROL to OFF. *e.* Connect ac power cable to 115-volt ac power source.	
7	AC POWER switch	Set AC POWER switch to ON (up). The AC POWER ON (red) lamp should light.	
8	PUSH TO RESET DC POWER switch.	The PUSH TO RESET DC POWER switch works in conjunction with TEST SELECT switch.	
	TEST SELECT switch	Set to 1st IF. *a.* Depress PUSH TO RESET DC POWER switch. DC POWER ON lamp (green) should light. *b.* Set TEST SELECT switch to 2nd IF DC POWER ON lamp should go out. *c.* Set TEST SELECT switch to 1st IF. *d.* Depress PUSH TO RESET DC POWER switch. DC POWER ON lamp (green) should light.	
9	TEST SELECT switch	Set to 2nd IF. *a.* Connect P1 of MX-6989/GRC50 (V) to J15 on IF test set. Connect test cable C (para 1-11) between pins 13 to 14 on MX-6989/GRC-50(V) terminal box. *b.* Depress the PUSH TO RESET DC POWER switch. The DC POWER ON lamp (green) should light.	Para 1-11.

Sequence No.	Item to be inspected	Procedure	Reference
		c. Remove test cable C. The DC POWER ON lamp should go out.	
	NO SIGNAL lamp	*d.* Connect test cable C between pins 3 to 11 on MX-6989/GRC-5O(V) terminal box. The NO SIGNAL lamp should light.	Para 1-11.
		e. Remove test cable from terminal box. The NO SIGNAL lamp should go out. Remove MX-6989/GRC-50(V).	
10	TEST SELECT switch	Set to MODULATOR	Para 1-11.
		a. Connect P1 of MX-6990/GRC-50(V) to J17 on IF test set. Connect test cable C between pins 3 to 11 on MX -690/GRC-50(V) terminal box.	
		b. Depress the PUSH TO RESET DC POWER switch. The DC POWER ON lamp (green) should light.	
		c. Remove test cable from terminal box. The DC POWER ON lamp should go out.	
		With MX6990/GRC-50(V) connected to J17:	
		a. Connect P1 of MX-6989/GRC-50(V) to J6 on IF test set.	
		b. Connect two type C test cables as follows:	Para 1-11.
		(1) Between MX-99(/GRC-5O(V) terminal box pin 9 to MX-6989/GRC-O(V) terminal box pin 11.	
		(2) Between MX-6990,/GRC-50(V) terminal box pin 2 to MX-6989/GRC-50(V) terminal box pin 9.	
	AFC MOTOR switch	*c.* Set the AFC MOTOR switch to ON.	
	AFC MOTOR CONTROL switch.	*d.* Set the AFC MOTOR CONTROL switch to CCW.	
	BELOW 20.5 MHz and ABOVE 20.5 MHz indicator.	The AFC BELOW 20.5 MHz - ABOVE 20.5 MHz indicator should indicate counterclockwise (CCW) rotation.	
		e. Set the AFC MOTOR CONTROL switch to CW. The indicator should indicate clockwise (CW) rotation.	
		f. Set the AFC MOTOR CONTROL and AFC MOTOR switches to OFF.	
		g. Remove both test cables connected between MX-4989/GRC 50 (V) and MX-6990/GRC-50(V).	

Sequence No.	Item to be inspected	Procedure	Reference
		h. Remove MX-6990/GRC-50(V) from J17.	
		i. Indicator should stop rotating.	
12		*a.* With MX-6989/GRC-50(V) connected to J6; connect test cable C between pins 19 to 24 of the terminal box of MX-6969/GRC-50(V).	Para 1-11.
	TEST SELECT switch	*b.* Set to AFC.	
		c. Depress the PUSH TO RESET DC POWER switch. The DC POWER ON lamp (green) should Light.	
		d. Remove test cable from the terrinal box of MX-6989/GRC-50(V). The DC POWER ON lamp goes out.	
		e. Remove MX-6989/GRC-50(V).	
13	DISCRIMINATOR SELECT switch.	Check mechanical action by operating switch.	Sequence No. 5 above.
14	SIGNAL LEVEL SELECT switch.	Check mechanical action by operating switch.	Sequence No. 5 above.

4-5. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	Cables.....	Inspect external cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	App B; fig. 4-2, and para 1-11.
2	Handles and latches.....	Inspect handles, latches, and hinges for looseness. Replace or tighten as necessary.	
3	Fuses.....	Check for proper fuses. The fuses should be the indicated value.	Para 4-13*c*.

4-6. Cleaning

Inspect the exterior surfaces of the IF test set. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

***Warning*: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. DO NOT use near a flame.**

b. Remove grease, fungus, and ground-in dust from the cases; use of cloth dampened (not wet) with Cleaning Compound (FSN 7930- 395-9542).

c. Remove dust or dirt from plugs and jacks with a brush.

***Caution*: Do not push on the meter face (glass) when cleaning; the meter may be damaged**.

d. Clean the front panels, meters, and control knobs; use a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; use mild soap if necessary.

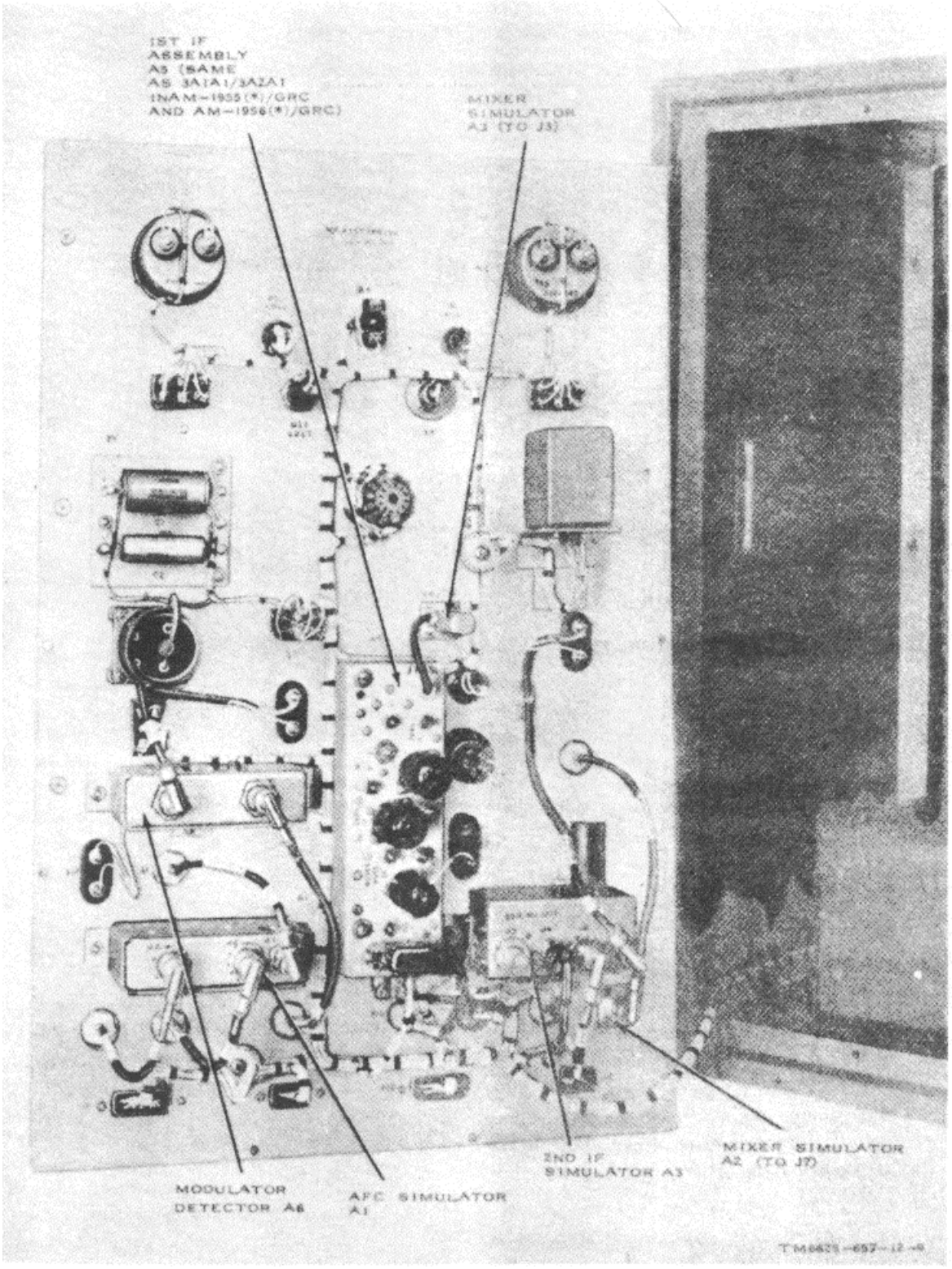

Figure 4-1. TS-2122/GRM-63, front panel, rear view, removed from cabinet.

Section III. ORGANIZATIONAL MAINTENANCE

4-7. Monthly Preventive Maintenance Checks and Services Chart

Perform the following on the exterior and interior of the equipment.

Sequence No.	Item to be inspected	Procedure	Reference
1	Pluckout items	Inspect clamps, connectors, adapters, tube shields, and lamps for proper seating. Check for wrong, bent, or broken parts.	Para 4-12*e*. Para 4-13*a*.
2	Hardware	See that all bolts, nuts, and washers are present and properly tightened.	
3	Exterior surfaces	Inspect exposed metal surfaces for rust corrosion, and bare metal areas. Clean and touch up paint as required.	Para 4-9.
4	Connectors	Check to be sure that jacks, connectors, and adapters fit snugly and make good contact.	Para 4-13*b*.
5	Terminal blocks	Inspect terminal blocks for loose connections and cracked or broken insulation.	Para 4-12*c*.
6	Records	If equipment records and logbooks are maintained on the equipment, inspect them to see that they are properly filled out and are up to date.	TM 38-750.

4-8. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	Reference
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	Modifications	Check DA Pam 310-7 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38-750 and DA PAM 310-7.
3	Spare parts	Check all spare parts for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions	App. B.

4-9. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to applicable cleaning and refinishing practices specified in TM 9-213.

4-10. General Troubleshooting Information

Troubleshooting this equipment is based upon the operational check contained in the daily preventive maintenance checks and services chart. To troubleshoot the equipment, perform all functions starting with sequence number 6 in the daily preventive maintenance checks and services chart (para 4-4) and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, turn to the troubleshooting chart (para 4-11). Perform the checks and corrective actions indicated in the troubleshooting chart. If the corrective

measures indicated do not result in correction of the trouble, higher category maintenance is required. Paragraphs 4-12*c* and 4-13*a* and *c* (referenced in the chart) contain additional information and step-by-step instructions for performing equipment tests and adjustments to be used during the troubleshooting procedures.

4-11. Troubleshooting Chart

The troubleshooting chart lists abnormal conditions based upon the daily preventive maintenance checks and services chart If corrective measures indicated do not result in correction of trouble, higher category maintenance is required.

Item No.	Trouble symptom	Possible trouble	Corrective measures
1	AC POWER ON pilot lamp does not light	AC POWER ON pilot lamp, FUSE 3 AMP, or ac power cable defective.	Check AC POWER ON pilot lamp (para 4-13*a*). Check FUSE 3 AMP (para 4-13*c*). Check connections on ac power cable.
2	DC POWER ON pilot lamp does not light	DC POWER ON pilot lamp. TEST SELECT switch not at 1ST IF.	Check DC POWER ON pilot lamp (para 4-13a).
3	*a.* DC POWER ON pilot lamp does not light.	*a.* DC POWER ON pilot lamp, TEST SELECT switch not at 2ND IF, defective MX-6989/GRC-50(V), test cable connected incorrectly.	*a.* Check DC POWER ON pilot lamp (para 4-13a). Inspect connectors for damage.
	b. NO SIGNAL lamp does not light.	*b.* NO SIGNAL pilot lamp, test cable connected incorrectly.	*b.* Check NO SIGNAL pilot amp (para 4-13a). Inspect connectors for damage.
4	DC POWER ON pilot lamp does not light.	DC POWER ON pilot lamp, TEST SELECT switch not at MODULATOR, defective MX-6990/GRC-50(V), test cable connected incorrectly.	Check DC POWER ON pilot lamp (para 4-13a). Inspect connectors for damage.
5	BELOW 20.5 MHz and ABOVE 20.5MHz indicator does not rotate.	Test cables connected incorrectly.	Higher category maintenance is required.
6	DC POWER ON pilot lamp does not light.	DC POWER ON pilot lamp. TEST SELECT switch not at AFC, test cable connected incorrectly.	Check DC POWER ON pilot lamp (para 4-13a). Inspect connectors for damage.
7	Inoperative in modulator test.	Missing +360 volts dc at connector J17 terminal 14.	Check fuse at rear of power supply (para 4-12c, 4-13c).

4-12. Supplementary Troubleshooting Information

a. Replacement of Tubes. DO NOT attempt to replace tubes. The alignment of the IF amplifiers may be disturbed.

b. Abnormal Operation of Meter Circuits. DO NOT attempt to troubleshoot the discriminator or signal level meter circuits. The meters are very sensitive and subject to damage.

Note. If troubles are indicated in a or b above, higher category maintenance is required.

c. Removal of Rear Door. Perform the procedures listed in (1), (2), and (3) below.

(1) Remove the ac power cable from the ac power source before opening the rear door.

(2) Release the seven quarter-turn fasteners on the rear door with a screwdriver, and swing open.

(3) If required, the rear door can be lifted off the hinges. (Pull the ac power cable through the opening in the door before lifting.)

4-13. Repairs and Adjustments

a. Replacement of Pilot Lamps.

(1) Turn the lens that covers the defective pilot lamp counterclockwise, and remove it from the lamp socket.

(2) Push in on the defective lamp and turn it counterclockwise to unlock it from the lamp socket.

(3) Insert the new lamp into the lamp socket. Push in on the lamp and turn it clockwise to lock it in place.

Note. **Be sure that the pilot lamp is of the proper rating. (For AC POWER ON, use type NE-1H; for DC POWER ON and NO SIGNAL, use type 47.)**

(4) Replace the lens on the lamp socket and turn it clockwise to tighten it.

b. Cable Repair. As a temporary measure, use electrical insulation tape to repair all breaks, cuts, kings, deterioration, strain, and fraying in the ac power cable and rf cables. To repair or replace rf connectos, follow the procedures shown in figure 4-2.

c. Fuse Replacement.

(1) Turn the fuseholder cap counterclockwise and remove it from the fuseholder.

(2) Remove the defective fuse from the fuseholder cap.

(3) Insert the new fuse in the fuseholder cap.

Note. **Check to be sure that the fuse is of the proper rating.**

(4) Fuse location and ratings are listed below:

Reference symbol	Fuse Rating		Location		
	Amp	Volts	Unit	Circuit	Figure No.
F1	3	250	TS-2122/GRM-63, front panel.	Ac input	3-1.
A7F1	0.25	250	Power supply A7, chassis, rear.	+360-volt dc supply	1-4.

(5) Replace the fuseholder cap in the fuseholder and turn it clockwise to tighten it.

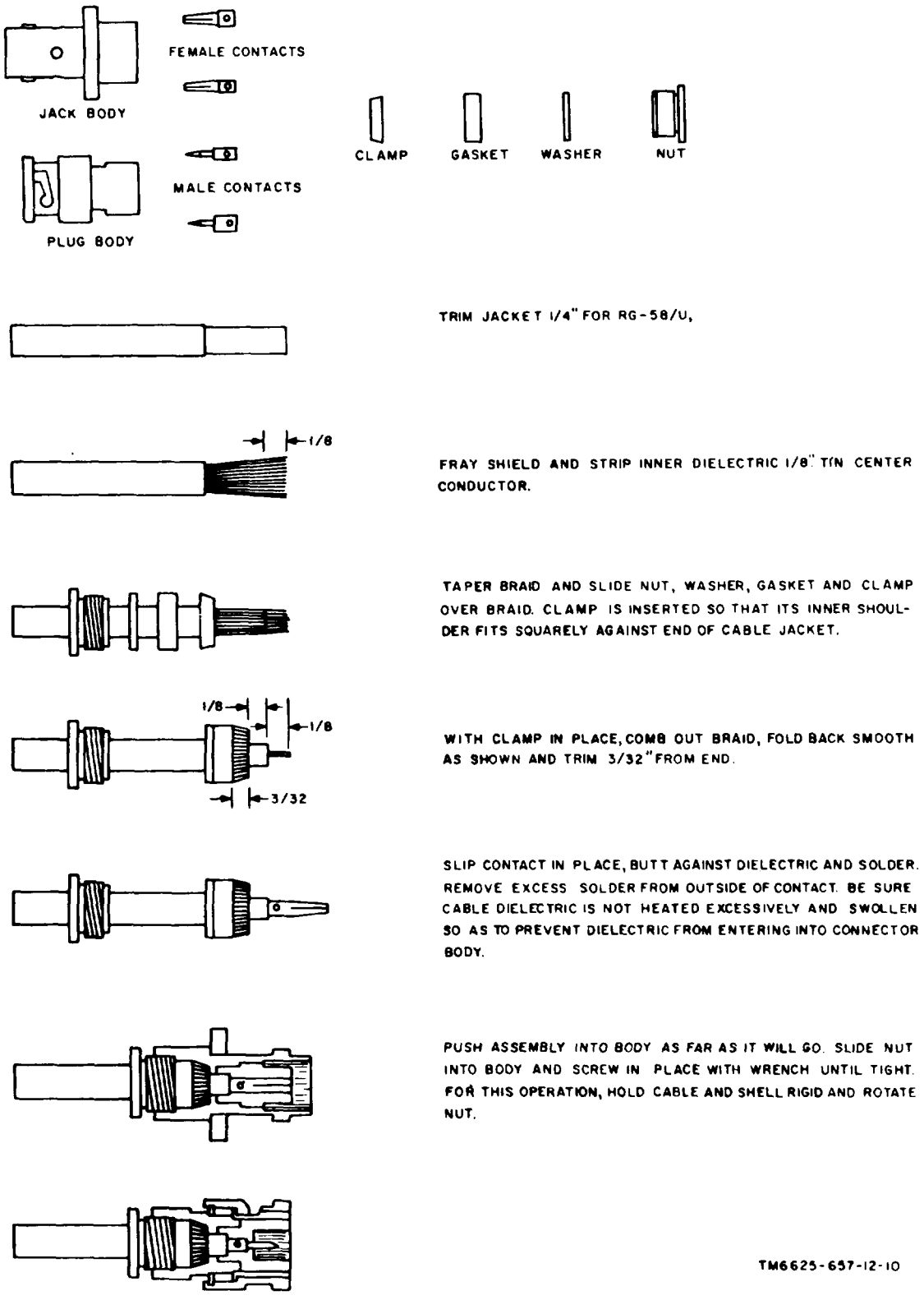

Figure 4-2. Assembly of rf cable and connectors.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. Disassembly of Equipment

Disassemble Test Set, Intermediate Frequency AN/GRM-63 as follows:

a. Perform the stopping procedure (para 3-15).

b. Release the seven quarter-turn fasteners on the rear door with a screwdriver and swing open, pull the ac power cable through the door hole.

c. Store the ac power cable and all minor assemblies in the rear door; refasten door with the seven quarter-turn fasteners.

d. Place technical manuals in the space provided inside the front cover.

e. Replace the front cover on the cabinet and secure with the 10 captive screws.

f. Store all components of Test Facilities kit case.

5-2. Repacking for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedures outlined below whenever circumstances permit. The information concerning the original packaging (para 2-1) will also be helpful.

a. Material Requirements. The following materials are required for packaging the test set. For stock numbers of materials, consult SB 38-100.

Material	Quantity
Waterproofing wrapping paper	12 sq ft (1.1 sq meters)
Paperboard wrapping	14 sq ft (1.3 sq cushioning. meters)
Waterproof pressure-sensitive adhesive tape (2 in. wide).	16 ft (4.9 meters)
Gummed paper tape (2 in. wide).	15 ft (4.6 meters)

b. Packaging. Package the items of the IF test set as outlined below.

(1) *Running spares*. Wrap each item with paperboard wrapping cushioning. Secure the cushioning with gummed paper tape.

(2) *Test Set, Intermediate Frequency AN/GRM-63.* Place the items packaged in (1) above within the space provided in the metal cabinet. Close and secure the lid. Cushion the cabinet by wrapping it with paperboard wrap ping cushioning. Secure the cushioning with gummed paper tape. Overwrap the cushioned case with waterproof wrapping paper. Secure the waterproof wrapping paper with waterproof pressure sensitive tape.

c. Packing

(1) Place the IF test set in a wooden box.
(2) Nail down the lid of the wooden box.
(3) Strap the nailed wooden box only when it is to be shipped overseas.
(4) Mark the box as prescribed in MIL-STD-129B.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

5-3. Authority for Demolition

The demolition procedures given in paragraph 5-4 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

5-4. Methods of Destruction

The tactical situation and time available will determine the method to be used when destruction of equipment is ordered. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially destroy all the equipment units.

a. Smash. Use sledges, axes, hammers, crowbars, any other heavy tools available to smash the interior units of the set.

(1) Use the heaviest tools on hand to smash the connectors, meters, knobs, dials, and power supply.

"NOTE"
MISSING FROM TEXT

(2) Remove the panel from the cabinet. With a heavy hammer or bar, smash as many of the exposed parts of the various chassis as possible.

b. Cut. Use axes, handaxes, machetes, and similar tools to cut cabling, cording, and wiring. Use a heavy axe or machete to cut the power cable. Cut all cords and cables in a number of places.

Warning: Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

c. Burn. Burn the technical manuals first. Burn as much of the equipment as is flammable; use gasoline, oil, flamerthrowers, and similar materials. Pour gasoline on the cut cables and internal wiring and ignite it. Use a flamethrower to burn spare parts, or pour gasoline on the spares and ignite them. Use incendiary grenades to complete destruction of the unit

d. Explode. Use explosives to complete demolition or to cause maximum damage, before burning, when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Incendiary grenades usually are most effective if destruction of small parts and wiring is desired.

(1) Use a fragmentation grenade to destroy the interior of the test set. Open the rear door of the cabinet and drop the grenade into the interior.

(2) For quick destruction of the IF test set, place an incendiary grenade on top of the unit. Get away from the unit after the grenade is placed.

e. Dispose. Bury or scatter destroyed parts or throw them in nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

APPENDIX A
REFERENCES

Following is a list of references available to the operator and organizational repairman of Test Set, Intermediate Frequency AN/GRM-63:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Order.
AR 700-58	Report of Packaging and Handling Deficiencies.
MIL-STD-129B	Marking for Shipment and Storage.
SB 38-100	Preservation, Packaging and Packing Materials, Supplies, and Equipment used by the Army.
TM 9-213	Painting Instructions for Field Use.
TM 11-5088	Generators, Signal SG-71/FCC, SG-71A/FCC, and SG-71B/FCC.
TM 11-5820-461-12	Organizational Maintenance Manual: Radio Sets AN/GRC-50(V)1, 2, 3, 4, and 5; Radio Sets AN/GRC-50A(V)1, 2, 3, 4, and 5.
TM 11-5820-461-25P	Organizational, DS, GS, and Depot Maintenance Repair Parts and Special Tool Lists: Radio Sets AN/GRC50(V)1, 2, 3, 4, and 5, and AN/GRC-50(V)1, 2, 3, 4, and 5.
TM 11-5820-461-35	Direct, General Support, and Depot Maintenance Manual: Radio Sets AN/GRC-50(V)1, 2, 3, 4, and 5; Radio Sets AN/GRC-50(V)1, 2, 3, 4, 5, 6, and 7; Test Facilities Kit MK-715/GRC-50(V).
TM 11-6625-200-12	Organizational Maintenance Manual: Multimeters ME-26A/U, ME-26B/ U, ME-26C/U, and ME-26D/U.
TM 11-6625-219-12	Organizational Maintenance Manual: Oscilloscope AN/USM-81.
TM 11-6625-475-15	Operator Organizational, Field, and Depot Maintenance Manual: Signal Generator TS-452D/U.
TM 11-6625-320-12	Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.
TM 11-6625-326-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Analyzer, Spectrum AN/UPM-110.
TM 11-6625-400-12	Operator and Organizational Maintenance Manual: Meter, Modulation ME-57/U.
TM 11-6625-508-10	Operator's Manual: Signal Generators AN/USM-44 and AN/USM-44A.
TM 11-6625-524-15-1	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Electronic Voltmeter AN/URM-145.
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207.
TM 38-750	Army Equipment Record Procedures.

APPENDIX C
MAINTENANCE ALLOCATIONS

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for AN/GRM-63. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

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

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

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), ro preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

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

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

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

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

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

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

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

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

C-3. Column Entries

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

b. Column 2, Component/Assembly. Column 2

contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

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

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

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

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

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

C-4. Tool and Test Equipment Requirements (Sect. III)

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

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

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

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

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

C-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is C-3)

SECTION II MAINTENANCE ALLOCATION CHART
FOR
TEST SET, INTERMEDIATE FREQUENCY AN/GRM-63

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
00	TEST SET, INTERMEDIATE FREQUENCY AN/GRM-63	Inspect	0.1						
		Service	0.1						
		Test	0.2						A
		Adjust	0.1						B
		Repair	0.2						C
		Test				0.45		1-7,10-12,16	
		Adjust				0.4		8,9	
		Calibrate				0.7			
		Repair				1.5		8,9	
		Overhaul				8.0		1 thru 16	D
		Rebuild					12.0	1 thru 16	D
01	Test Set, Intermediate Frequency TS-2122/GRM-63	Inspect				0.2			
		Test				0.4		1-7,10-12,16	
		Repair				1.0		8,9	
		Repair	0.2						C
0101	Simulator, Automatic Frequency Control (2A1)	Test				0.5		3-6,8,9	
		Replace				0.1		8,9	
		Repair				1.0		8,9	
		Overhaul				6.0		1 thru 16	D
		Rebuild					8.0	1 thru 16	D
02	Dummy Mixer (2A2)	Test				0.1		3,6	
		Replace				0.1			
		Repair				0.6		8,9	
03	Simulator, Second Intermediate (2A3)	Test				0.2		3-6,8,9	
		Replace				0.1		8,9	
		Repair				1.0		8,9	
		Overhaul				6.0		1 thru 16	D
		Rebuild					8.0	1 thru 16	D
04	Dummy Mixer (2A4)	Test				0.1		3,6	
		Replace				0.1			
		Repair				0.6		8,9	
05	Receiver, First Intermediate (2A5)	Inspect				0.2			
		Test				0.2			
		Align				0.5			
		Repair				1.0			
06	Detector, Modulator Output (2A6)	Test				0.2		3-6,8,9	
		Replace				0.1		8,9	
		Repair				1.0		8,9	
		Overhaul				6.0		1 thru 16	D
		Rebuild					8.0	1 thru 16	D
07	Power Supply (2A7)	Test				0.5		3-6,8,9	
		Replace				0.1		8,9	
		Repair				1.0		8,9	
		Overhaul				6.0		1 thru 16	D
		Rebuild					8.0	1 thru 16	D

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TEST SET, INTERMEDIATE FREQUENCY AN/GM-63

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	H, D	GENERATOR, SIGNAL TS-452D/U	6625-00-828-6410	
2	H. D	GENERATOR, SIGNAL TS-510/U	6625-00-519-1645	
3	H, D	VOLTMETER, ELECTRONIC ME-202/U	6625-00-709-0288	
4	H, D	RESISTOR, DECADE ZM-16/U	6625-00-669-0266	
5	H, D	MULTMETR ME-26/U	6625-00-360-2493	
6	H, D	VOLTWETER, ELECTRONIC AN/URM-145	6625-00-973-3986	
7	H, D	TEST FACILITIES KIT MK-715/GRC-50(V)	6625-00-868-8335	
B	H, D	TOOL KIT TK-100/G	5180-00-605-0079	
9	H, D	TOOL KIT TK-105/G	5180-00-610-8177	
10	H, D	TEST CABLE #1 (FABRICATE PER TM)		
11	H, D	TEST CABLE #2 (FABRICATE PER TM)		
12	H, D	(2) TEST LEADS #3 (FABRICATE PER TM)		
13	H, D	OSCILLCOPE AN/USM-140	6625-00-987-6603	
14	H, D	TRANSFORMER, VARIABLE POWER TF-518 /GRM-67	6120-00-089-2729	
15	H, D	POWER SUPPLY PP-3135/U	6625-00-635-7991	
16	H, D	TEST SET, ELECTRON TUBE TV-7/U	6625-00-376-4939	

SECTION IV. REMARKS
TEST SET, INTERMEDIATE FREQUENCY AN/GRM-63

REFERENCE CODE	REMARKS
A	Operational test only.
B	Front panel adjustments only.
C	By replacement of lamps, fuses, knobs, cable assemblies and dial only.
D	Plus shop support.

APPENDIX D
ORGANIZATIONAL REPAIR PARTS

DELETED

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