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D 101.11;  
11-5815-204-20

# TM 11-5815-204-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE  
SECOND ECHELON

## RADIO TELETYPEWRITER SETS AN/GRC-46 AND AN/VRC-29

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HEADQUARTERS, DEPARTMENT OF THE ARMY  
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**WARNING**

**DON'T TAKE CHANCES!  
EXTREMELY DANGEROUS VOLTAGES  
EXIST IN THE FOLLOWING UNITS  
OF RADIO TELETYPEWRITER SETS  
AN/GRC-46 AND AN/VRC-46  
Radio Transmitter T-195/GRC-19      1,000 volts**

**TECHNICAL MANUAL**  
**ORGANIZATIONAL MAINTENANCE MANUAL,**  
**RADIO TELETYPEWRITER SETS**  
**AN/GRC-46, AN/GRC-46A, AND AN/VRC-29**

TM 11-5815-204-20 }  
 CHANGES No. 1 }

HEADQUARTERS,  
 DEPARTMENT OF THE ARMY  
 WASHINGTON 25, D. C., 25 April 1960

TM 11-5815-204-20, 11 September 1959, is changed as indicated so that the manual also applies to Radio Teletypewriter Set AN/GRC-46A.

Change the title of the manual to: ORGANIZATIONAL MAINTENANCE MANUAL, RADIO TELETYPEWRITER SETS AN/GRC-46, AN/

GRC-46A, AND AN/VRC-29.

Page 2, chapter 1. Add the following Note below the title of chapter 1.

*Note.* Radio Teletypewriter Set AN/GRC-46A is similar to Radio Teletypewriter Set AN/GRC-46. Information in this manual applies to both sets unless otherwise specified Page 8, paragraph 11. Delete the chart and substitute:

Cable nomenclature	AN/GRC-46 cable length (in.)	AN/VRC-29 cable length (in.)	Connects	
			From	To
CX-4542/U.....	107		Junction box POWER INPUT (on top).	Vehicular electrical system.
CX-4849/U.....		75		
CX-4543/U.....	123	Not required	Junction box BLOWER receptacle (on top).	Blower.
CX-4545/U.....	77		Junction box LIGHTS receptacle (on top).	Lights and door switch on AN/GRC-46. Lights on AN/VRC-29.
CX-4850/U.....		77		
CX-4540/U.....	54		Junction box CV-278 receptacle (on top).	Frequency-shift converter 27.5 VOLTS DC receptacle.
CX-4847/U.....		22		
CX-4540/U.....	38		Junction box MD-203 receptacle (on top).	Modulator 27.5 VOLTS DC receptacle.
CX-4847/U.....		22		
CX-4544/U.....	152	Not required	Junction box HEATER receptacle (on top).	Heater.
CX-4539/U.....	57	62	Junction box T-195 receptacle (on top).	Transmitter 24 VOLTS DC receptacle.
CX-4549/U.....	53	39	Junction box BATTERY receptacle (left side).	Teletypewriter (RED plug to positive jack, BLACK plug to negative jack).
CG-409C/U.....	51	39	Junction box MD-203 receptacle (left side).	Modulator KEYING INPUT receptacle.
CX-4546/U.....	45	76	Junction box TRANS CONTROL receptacle (left side).	Receiver AUDIO receptacle.
CX-4547/U.....	66		Junction box CV-278 receptacle (left side).	Frequency-shift converter PRINTER receptacle.
CX-4848/U.....		42		
CX-4541/U.....	83	37	Junction box ROTARY CONVERTER POWER INPUT TTY receptacle (right side).	Teletypewriter rotary converter dc terminals.
CX-4541/U.....	83	37	Junction box ROTARY CONVERTER POWER INPUT CRYPT receptacle (right side).	Crypt rotary converter dc terminals.

Cable nomenclature	AN/GRC-46 cable length (in.)	AN/VRC-29 cable length (in.)	Connects	
			From	To
Cable and switch assembly. CX-4551/U.....	89	40	Junction box MARK HOLD SEND REC switch receptacle (left side). Junction box TTY SIGNAL LINE receptacle (looking directly at right side of junction box, use receptacle on the extreme left).	Remote mark-hold switch (part of assembly in AN/VRC-29). Teletypewriter (black lead to terminal 1, white lead to terminal 2).
CX-4551/U.....	111	76	Reperforator REC receptacle.....	Teletypewriter (black lead to terminal 3, white lead to terminal 4).
CG-530B/U.....	35	17	Transmitter MO OUT receptacle.....	Modulator MO INPUT receptacle.
CG-530B/U.....	35	17	Modulator FSK OUTPUT receptacle.	Transmitter FSK INPUT receptacle.
CG-1127/U.....	30	19	Receiver IF OUT receptacle.....	Frequency-shift converter INPUT receptacle.
Part of Teletypewriter Reperforator Transmitter TT-76(*)/GGC. CX-4855/U.....		109	Reperforator (red plug).....	Junction box TTY SIGNAL LINE KW9 INPUT receptacle.
Part of Teletypewriter Reperforator Transmitter TT-76(*)/GGC. CX-4854/U.....		109	Reperforator (gray plug).....	Junction box TTY SIGNAL LINE receptacle adjacent to the KW9 INPUT receptacle.
Part of Teletypewriter TT-98B/FG.			Teletypewriter.....	Teletypewriter rotary converter AC receptacle.
Part of Teletypewriter Reperforator Transmitter TT-77(*)/GGC CG-1127/U.....	12	12	Reperforator.....	Teletypewriter rotary converter AC receptacle.
Part of Radio Set AN/GRC-19 CX-1599/U.....	9	0	Transmitter RECEIVER ANTENNA receptacle.	Receiver ANT receptacle.
Part of Radio Set AN/GRC-19 CX-1573/U or CX-1852/U.....	72	72	Transmitter RECEIVER CONT receptacle.	Receiver POWER INPUT receptacle.
Part of Radio Set AN/GRC-19 CX-1334/U.....	39	39	Transmitter AUDIO receptacle.....	Microphone or telegraph key.
Part of Radio Set AN/GRC-19 Wire W-146.....			Receiver AUDIO receptacle.....	Headset or loudspeaker.
			Transmitter WHIP ANTENNA receptacle.	Antenna.

Facing page 10, figure 5. Make the following changes:

After "CX-1573/U" and "CX-1852/U," add: (72").

After "CG-1127/U" (between J616 of transmitter and J104 of receiver), change

"(10")" to: (12").

After "CX-4540/U" (from J6 of junction box), change "(54")" to: (38").

After "CX-4540/U" (from J7 of junction box), change "(38")" to: (54").

By Order of *Wilber M. Brucker*, Secretary of the Army:

**L. L. LEMNITZER,**  
*General, United States Army,*  
*Chief of Staff.*

**Official:**

**R. V. LEE,**  
*Major General, United States Army,*  
*The Adjutant General.*

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USASA (2)  
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Tech Stf, DA (1) except  
    CSigO (18)  
Tech Stf Bd (1)  
USA Arty Bd (1)  
USA Armor Bd (1)  
USA Inf Bd (1)  
USA AD Bd (1)  
USA Abn & Elet Bd (1)  
USA Avn Bd (1)  
USA ATB (?)  
USCONARC (5)  
US ARADCOM (2)  
US ARADCOM Rgn (2)  
OS Maj Comd (5)  
OS Base Comd (5)  
Log Comd (5)  
MDW (1)  
Armies (5) except  
    First US Army (7)  
Corps (2)  
Div (2)  
USATC (2)  
Svc Colleges (5)  
Br Svc Sch (5) except  
    USA Sig Sch (28)  
GENDEP (2) except  
    Atlanta GENDEP (none)  
Sig Sec, GENDEP (10)  
Sig Dep (17)  
Army Pictorial Cen (2)  
Engr Maint Cen (1)  
USA Ord Mal Comd (3)  
USASSA (15)  
USASSAMRO (1)  
USA Sig Pub Agcy (8)  
USA Sig Engr Agcy (1)  
USA Comm Agcy (3)  
USA Sig Eqp Spt Agcy (7)  
USA Sig Mal Spt Agcy (13)  
WRAMC (1)  
AFIP (1)  
AMS (1)  
Ports of Emb (OS) (2)  
Trans Terminal Comd (1)  
Army Terminals (1)  
OS Sup Agcy (1)  
Yuma Test Sta (2)  
USA Elet PG (1)

Sig Lab (5)  
Sig Fld Maint Shops (3)  
USA Corps (Res) (1)  
JBUSMC (2)  
Units org under fol TOE:  
1-7 (2)  
1-17 (2)  
1-26 (2)  
1-57 (2)  
5-15 (2)  
5-16 (2)  
5-215 (2)  
5-216 (2)  
5-464 (2)  
6-100 (2)  
6-101 (2)  
6-125 (2)  
6-126 (2)  
6-146 (2)  
6-148 (2)  
6-150 (2)  
6-200 (2)  
6-201 (2)  
6-300 (2)  
6-301 (2)  
6-315 (2)  
6-316 (2)  
6-325 (2)  
6-326 (2)  
6-328 (2)  
6-401 (2)  
6-415 (2)  
6-416 (2)  
6-500 (EB, HJ) (2)  
6-501 (2)  
6-525 (2)  
6-535 (2)  
6-536 (2)  
6-545 (2)  
6-585 (2)  
6-611 (2)  
6-631 (2)  
6-634 (2)  
6-635 (2)  
7-11 (2)  
7-12 (2)  
7-25 (2)  
7-26 (2)  
7-31 (2)  
7-32 (2)  
7-52 (2)

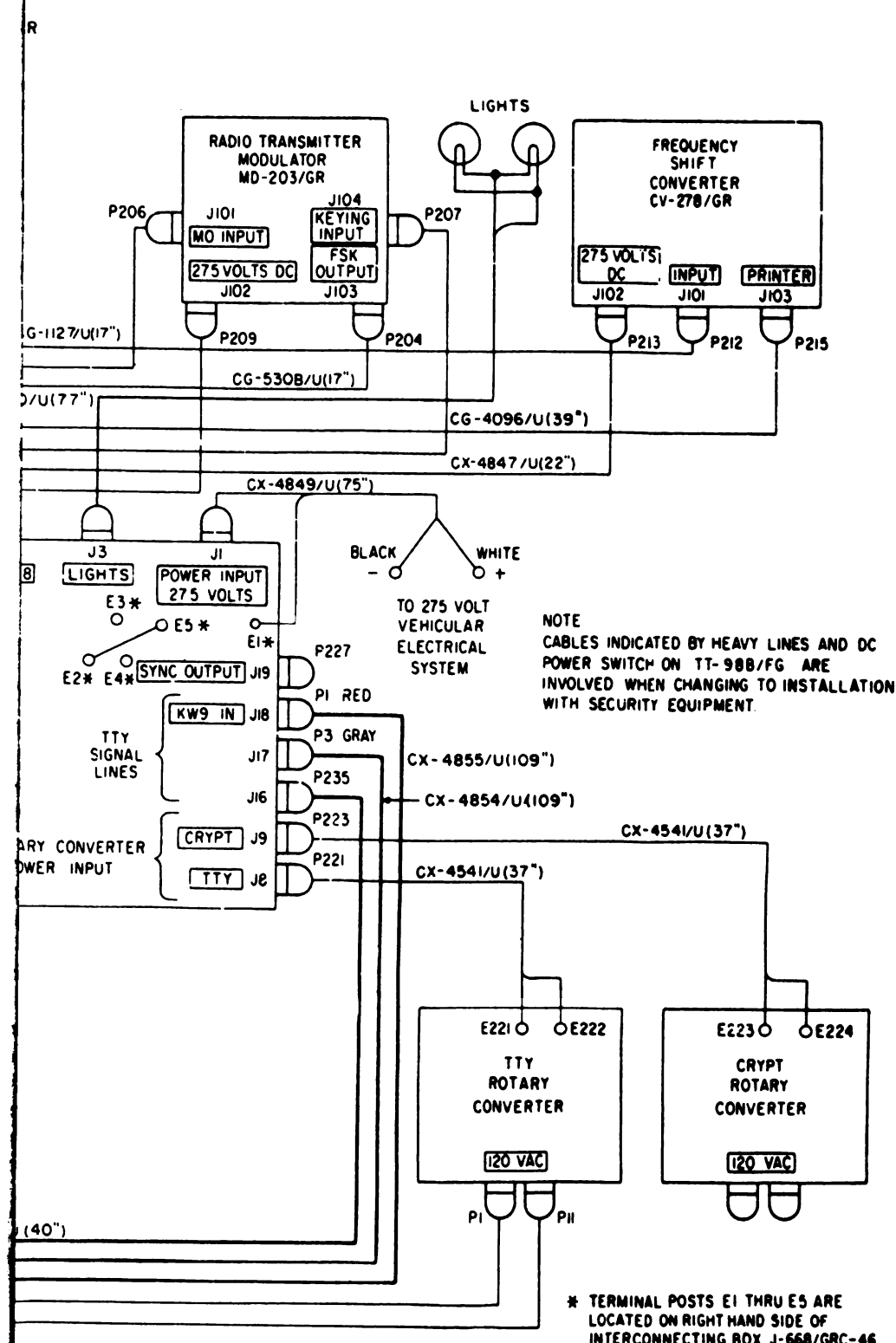
8-15 (2)  
8-16 (2)  
8-75 (2)  
8-76 (2)  
9-17 (2)  
9-25 (2)  
9-26 (2)  
9-47 (2)  
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9-66 (2)  
9-86 (2)  
9-87 (2)  
9-217 (2)  
9-377 (2)  
10-17 (2)  
10-22 (2)  
10-45 (2)  
10-46 (2)  
10-157 (2)  
10-347 (2)  
10-348 (2)  
10-536 (2)  
11-5 (2)  
11-6 (2)  
11-7 (2)  
11-16 (2)  
11-37 (2)  
11-38 (2)  
11-39 (2)  
11-55 (2)  
11-57 (2)  
11-97 (2)  
11-98 (2)  
11-117 (2)  
11-155 (2)  
11-500 (AA-AE) (2)  
11-555 (2)  
11-557 (2)  
11-587 (2)  
11-592 (2)  
11-597 (2)  
17-2 (2)  
17-22 (2)

17-25 (2)  
17-26 (2)  
17-45 (2)  
17-46 (2)  
17-65 (2)  
17-66 (2)  
17-77 (2)  
17-85 (2)  
17-86 (2)  
39-51 (2)  
39-61 (2)  
39-71 (2)  
39-72 (2)  
44-12 (2)  
44-15 (2)  
44-16 (2)  
44-35 (2)  
44-36 (2)  
44-85 (2)  
44-86 (2)  
44-115 (2)  
44-116 (2)  
44-435 (2)  
44-436 (2)  
44-437 (2)  
44-445 (2)  
44-447 (2)  
44-448 (2)  
44-500 (BA, BB) (2)  
44-535 (2)  
44-536 (2)  
44-537 (2)  
44-545 (2)  
44-547 (2)  
44-549 (2)  
55-16 (2)  
55-46 (2)  
55-75 (2)  
55-76 (2)  
55-116 (2)  
55-500 (AA-AE) (2)  
55-10 (2)  
57-5 (2)

**NG:** State AG (3); **units**—same as Active Army except allowance is one copy to each unit.

**USAR:** None.

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



NOTE  
 CABLES INDICATED BY HEAVY LINES AND DC  
 POWER SWITCH ON TT-988/FG ARE  
 INVOLVED WHEN CHANGING TO INSTALLATION  
 WITH SECURITY EQUIPMENT.

\* TERMINAL POSTS E1 THRU E5 ARE  
 LOCATED ON RIGHT HAND SIDE OF  
 INTERCONNECTING BOX J-668/GRC-46

Figure diagram for simplex connections

TM5815-204-20-C1-8





TECHNICAL MANUAL

Organizational Maintenance Manual

RADIO TELETYPEWRITER SETS AN/GRC-46, AN/GRC-46A, AN/GRC-46B, AND AN/VRC-29

TM 11-5815-204-20  
 CHANGES No. 2

HEADQUARTERS,  
 DEPARTMENT OF THE ARMY  
 WASHINGTON 25, D.C., 6 April 1961

TM 11-5815-204-20, 11 September 1959, is changed as indicated so that the manual also applies to Radio Teletypewriter Set AN/GRC-46B.

Change the title of the manual to read as above.

*Note.* The parenthetical reference to previous changes (example "page 1 of C 1") indicates that pertinent material was published in those changes.

*Page 2.* Delete the note below the title of Chapter 1 (page 1 of C1), and substitute:

*Note.* Radio Teletypewriter Sets AN/GRC-46A and AN/GRC-46B are similar to Radio Teletypewriter Set AN/GRC-46. Information in this manual applies to all sets unless otherwise specified.

Paragraph 1, line 6. Between "AN/GRC-46" and "and AN/VRC-29" add the following: AN/GRC-46A, AN/GRC-46B.

2. Comments

(Superseded)

*a. Parts List Form.* Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8 or 9) direct to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N.J., with comments on parts listings in appendix II.

*b. Comments on Manual.* Forward all other comments concerning this manual direct to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N.J.

Paragraph 4b, chart. After last item, add:

Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Weight (lb)	Contents
19%	7%	9%	0.9	7%	Interconnecting Box J-1195/GRC-46.

*Page 7, paragraph 8a, line 3.* Delete "Shelter S-89C" and substitute: the shelter.

Paragraph 9. Make the following changes: Delete subparagraph *a* and substitute:

*a.* Refer to the applicable manual for Radio Set AN/GRC-19 for installation of the antenna.

In subparagraph *b*(1), line 2, delete "(figure 10, TM 11-5815-204-10)."

*Page 8.* Delete paragraph 11 (page 1 of C 1) and substitute:

11. Cable Connections

For cable connections of Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, see TM 11-5815-204-10.

*Figure 5* (fold-out), facing page 10, caption. After "AN/GRC-46" add: and AN/GRC-46A.

*Page 13, paragraph 16.* Delete subparagraph *c*.

*Page 15, paragraph 18c, chart, "Action or condition" column.* In Step No. 8, delete the period after "WHIP."

*Page 17, paragraph 18c, chart, "Action or condition" column.* Make the following changes: Step No. 39, add: In the AN/GRC-46B, connected between the RED REC jack on the KWB-9/TSEC and terminals 3 and 4 of the teletypewriter. Step No. 46, line 4, change "pun" to: pin.

After Step No. 47, add:

Step No.	Unit	Action or condition	Normal indication	Corrective measures
	<i>Interconnecting Box J-1195/GRC-46 (AN/GRC-46B).</i>			
47.1	Cables.....	Refer to TM 11-5815-204-10.		
47.2	D OFF-P-E-D ON switch.....	Set to P-E-D ON.		
47.3	SIGNAL LINE CURRENT ADJUST.....	Turn maximum clockwise.		
47.4	OFF-LINE CURRENT ADJUST.....	Turn maximum counterclockwise.		
	<i>Security Equipment KWB-9/TSEC.</i>			
47.5	Refer to security equipment technical manual for preparatory settings of security equipment.			

After Step No. 51 add:

Step No.	Unit	Action or condition	Normal indication	Corrective measures
	<i>Interconnecting Box J-1195/GRC-46 (AN/GRC-46B).</i>			
51.1	D OFF-P-E-D ON switch.....	Set to D OFF.		
51.2	SIGNAL LINE CURRENT ADJUST.....	Not adjusted.		
51.3	OFF-LINE CURRENT ADJUST.....	Set for a 60 ma indication on the line current meter in the KWB-9/TSEC unit.		

Page 22, paragraph 18c. chart. After Step No. 105, add:

Step No.	Unit	Action or condition	Normal indication	Corrective measures
	<i>Modified Teletypewriter Repperator TT-78(*)/GGC in AN/GRC-46B.</i>			
105.1	TD ON switch.....	Press switch.....	Transmitter-distributor should start and send tape message.	Check switch.

Page 28, subparagraph 22g. Add the following:

g.1. Material Requirements for Packaging Interconnecting Box J-1194/GRC-46.

Material	Quantity
Slotted corrugated carton (7" x 5" x 5").....	1
Cellulose wadding (24" x 12").....	1
Neutral paper (28" x 18").....	1
Kraft tape (3" wide).....	58"

g.1. Material Requirements for Packaging Interconnecting Box J-1195/GRC-46.

Material	Quantity
Corrugated carton (19 1/4" x 8 1/4" x 7 1/2").....	1
Filler (43" x 6").....	1
Filler (43" x 2").....	1
Foil bag (18" x 31 1/2").....	1
Corrugated carton (19 1/4" x 9 1/4" x 7 1/2").....	1
Neutral paper (42" x 18").....	1
Kraft tape (3" wide).....	76"
Pressure-sensitive tape (2" wide).....	117"
Desiccant bag (16 oz).....	1
Desiccant bag (4 oz).....	1
Humidity indicator.....	1

## APPENDIX I (Superseded) REFERENCES

- Following is a list of applicable references that contain information applicable to the second echelon repairman of Radio Teletypewriter Sets AN/GRC-46, AN/GRC-46A, AN/GRC-46B, and AN/VRC-29
- SB 38-100 Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
- TM 11-806 Radio Transmitters T-195/GRC-19 and T-195A/GRC-19.
- TM 11-2225 Teletypewriter Sets AN/GGC-3 and AN/GGC-3A and Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC and TT-76B/GGC.
- TM 11-5410-201-12P Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Shelter, Electrical Equipment S-89C/G.
- TM 11-5805-210-10 Operator's Manual: Frequency Shift Converter CV-278/GR.
- TM 11-5805-210-20 Organizational Maintenance, Second Echelon: Frequency Shift Converter CV-278/GR.
- TM 11-5805-295-12P Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Mountings MT-791/U and MT-791A/U.
- TM 11-5815-200-10 Operator's Manual: Teletypewriter Sets AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-66, and AN/UGC-4 and Teleprinter TT-259/FG.
- TM 11-5815-200-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Teletypewriter Sets AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/UGC-4 and Teleprinter TT-259/FG.
- TM 11-5815-204-10 Operator's Manual: Radio Teletypewriter Sets AN/GRC-46, AN/GRC-46A, AN/GRC-46B, and AN/VRC-29.
- TM 11-5815-238-20P Organizational Maintenance Repair Parts and Special Tools List, Teletypewriter Set AN/GGC-3 and AN/GGC-3A; Reperforator Transmitters Teletypewriters TT-76/GGC, TT-76A/GGC and TT-76B/GGC.
- TM 11-5815-266-20P Organizational Maintenance Repair Parts and Special Tools List: Converter, Frequency Shift CV-278/GR.
- TM 11-5820-205-10 Operator's Manual: Radio Transmitter Modulator MD-203/GR.
- TM 11-5820-205-20 Organizational Maintenance, Second Echelon: Radio Transmitter Modulator MD-203/GR.
- TM 11-5820-205-20P Organizational Maintenance Repair Parts and Special Tools List: Radio Transmitter Modulator MD-203/GR.
- TM 11-5820-295-10 Operator's Manual: Radio Set AN/GRC-19.
- TM 11-5820-295-10P Operator's Maintenance Repair Parts and Special Tools List: Radio Set AN/GRC-19.
- TM 11-5820-295-20 Organizational Maintenance: Radio Set AN/GRC-19.
- TM 11-5820-295-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Radio Set AN/GRC-19.
- TM 11-5820-334-10 Operator's Manual, Radio Receiver R-392/URR.
- TM 11-5820-334-20 Organizational Maintenance Manual, Radio Receiver R 392/URR.
- TM 11-5820-334-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Receiver, Radio R-392/URR.
- TM 11-5820-335-10P Basic Issue Items List: Transmitter, Radio T-195/GRC-19.
- TM 11-5820-335-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Transmitter, Radio T-195/GRC.
- TM 11-5965-222-15P Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Dynamic Loudspeaker LS-166/U.
- TM 11-5815-204-20P Organizational Maintenance Repair Parts and Special Tools List, Radio Teletypewriter Set AN/GRC-46, AN/GRC-46A and AN/VRC-29.



# APPENDIX II (Superseded) MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### 1. General

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

b. Columns in the maintenance allocation chart are as follows:

- (1) *Part or component.* Only the nomenclature or standard item name is annotated in this column. 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 sequence 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 operations. These are defined as follows:
  - (a) *Service.* To clean, to preserve, and to 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, and other test devices.
  - (e) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.
  - (f) *Repair.* To restore to a serviceable condition by replacing unserviceable parts or by any other action required utilizing tools, equipment, and skills available, to include welding, grinding, riveting, straightening, adjusting, etc.

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

(h) *Rebuild.* To restore to a condition comparable to new by disassembling the item to determine the condition of its component parts and reassembling it using serviceable, rebuilt, or new assemblies, subassemblies, and parts.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible 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 indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are defined as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* A dagger (†) indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

## **2. Maintenance by Using Organizations**

When this equipment is used by Signal service organizations organic to theater headquarters or communications 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 the maintenance allocation chart do not include mounting hardware, such as screws, nuts, bolts, washers, brackets, clamps, etc.

## 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
RADIO TELETYPEWRITER SET AN/GRC-46; AN/GRC-16A; AN/VRC-29	replace		X			X	15	
	repair		X			X	14	
	rebuild		X			X	15	
	service		X			X	15	
	adjust	X					14	
	inspect		X				15	
	inspect		X				8, 13	
	test		X				1, 4, 5, 6, 10, 11, 13	
	test		X				1, 2, 3, 4, 6, 8, 13	
	test		X				9, 11, 16	
	test		X				1, 2, 3, 4, 7, 9, 9, 11, 16, 13	
	align		X				1, 4, 5, 10, 11, 15	
	align		X				1, 4, 6, 11, 15, 16	
align		X				1, 4, 7, 11, 15, 16		
ADAPTER, CONNECTOR	replace		X					
ANTENNA MOUNTING ASSEMBLY (AN/GRC-16A only)	replace		X					
BLOWER (AN/GRC-16A only)	repair			X				
	replace			X				
BURKET	replace					X		
CABLE ASSEMBLY	replace		X					
	repair			X				
ADAPTER, CABLE TO CONNECTOR	replace		X					
CABLE	replace		X					
CONNECTORS	replace		X					
CORD, ELECTRICAL	replace		X					
CLAMP, LOOP	replace		X					
CONVERTER, CV-378/GR	replace		X					
HEATER, INSTALLATION (AN/GRC-16A only)	replace		X					Separate BNC
	repair			X				
ADAPTER	replace					X		
BRACKET	replace					X		
CABLE SOLENOID ASSEMBLY	replace					X		

AN/GRC-46; AN/GRC-16A; AN/VRC-29

(6)	PART OR COMPONENT	MAINTENANCE FUNCTION	(7)	(8)	(9)	(10)	(11)	(12)	REMARKS
	AM/VBC-16; AM/VBC-16A; AM/VBC-85 (continued)								
	CAPACITOR	replace			X				
	CLAMP, HOSE	replace				X			
	COIL, SHUTOFF	replace			X				
	COIL	replace				X			
	CONNECTOR	replace			X				
	COUPLING	replace			X				
	DIAPHRAGM ASSEMBLY	replace				X			
	BLAIND AND BRACKET ASSEMBLY	replace					X		
	ELBOW, PIPE	replace					X		
	ELECTRONIC IGNITER	replace		X					
	FILTER, GASOLINE	replace				X			
	FLANGE, PIPE	replace			X				
	FUEL LINE	replace				X			
	FUEL PUMP	replace			X				
	FUSEHOLDER	replace		X					
	FUSE	replace				X			
	GASKET	replace					X		
	HEATER SUB-ASSEMBLY	replace			X				
	HOSE ASSEMBLY, METAL	replace		X					
	HOSE ASSEMBLY, RUBBER	replace				X			
	HOVER, DC	replace			X				
	MOUNT, HEADLIGHT	replace			X				
	NIFFLE, PIPE	replace			X				
	NUTS	replace			X				
	SOCKET	replace			X				
	SPRINGS	replace			X				
	SWITCH, OVERHEAT	replace			X				
	SWITCH, SENSITIVE	replace			X				
	SWITCH, THERMOSTATIC	replace			X				
	SWITCH, TOGGLE	replace			X				
	TANK, FUEL	replace			X				
	TUBING, COPPER	replace			X				
	VIBRATOR	replace			X				
	WIRE FABRIC	replace				X			
	EMULATOR	replace		X					



61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
PART OR COMPONENT		MAINTENANCE FUNCTION	1ST ECH	2ND ECH	3RD ECH	4TH ECH	5TH ECH	TOOLS REQUIRED	REMARKS					
JM/VBC-16; JM/VBC-16A; JM/VBC-16B (continued) INTERCONNECTING SEE J-664/VBC-46		replace		X	X			16						
		repair					X							
		rebuild		X				14						
		service	X					14 or 16						
		inspect		X				6		Visual only at lot				
		test												
ARMATURE		replace			X									
		repair					X							
		rebuild					X							
CAP. ELECTRICAL		replace		X										
CIRCUITRY		replace												
CIRCUIT BREAKER		replace												
CLIP, ELECTRICAL		replace												
CONE		replace												
CONNECTORS		replace												
COVER, FUSE		replace												
FUSES		replace												
FUSIBLES		replace	X											
JACKS		replace												
KNOBS		replace												
LEADS, BURNING AND RETAINER		replace												
RELAYS		replace	X											
RELAYS		replace												
RELAYS, RELAY		replace												
RELAYS, RELAY		replace												
SHUNT, JACK		replace												
SOCKET		replace												
SWITCHES		replace												
TERMINALS		replace												
WIRE, WIRE		replace												
		repair												
		rebuild												
LIGHTING SYSTEM (JM/VBC-16A only)		replace		X										
		replace		X										
		replace		X										
CABLE ASSEMBLY		replace												
		repair												

JM/VBC-16; JM/VBC-16A; JM/VBC-16B (continued)  
INTERCONNECTING SEE J-664/VBC-46

61)	PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH.	2ND ECH.	3RD ECH.	4TH ECH.	5TH ECH.	TOOLS REQUIRED	REMARKS
	AM/VBC-16; AM/VBC-44A; AM/VBC-89 (continued)								
	ADAPTER, CABLE TO CONNECTOR	replace			X				
	CABLE	replace			X				
	CONNECTOR	replace			X				
	CARD ELECTRICAL	replace			X				
	FLUORESCENT LIGHT	replace			X				
	LAMP, INCANDESCENT	replace	X						
	REFLECTOR, LIGHT	replace		X					
	SWITCH	replace			X				
	SWITCH, LOW	replace			X				
	TRANSFORMER LS-164/9	replace		X					Separate IMC
	REGULATOR RD-308/CS	replace		X					Separate IMC
	WATER CONNECTION	service		X				16	
		adjust			X			16	
		test			X			16	
		replace			X			0	
		repair			X				
		rebuild			X				
		replace			X				
	WORN, ELECTRICAL CONTACT	replace			X				
	CAPACITOR	replace			X				
	CASE, B.F.	replace			X				
	CONNECTOR	replace			X				

AM/VBC-44; AM/VBC-44A; AM/VBC-89

(b)	PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH.	2ND ECH.	3RD ECH.	4TH ECH.	5TH ECH.	TOOLS REQUIRED	REMARKS
	AN/GRC-46; AN/GRC-46A; AN/VRC-39 (continued)								
	MOUNTING BR-791/A, BR-791A/B	replace	X						Separate MAC
	BACK, ELECTRICAL EQUIPMENT (AN/GRC-46A only)	service		X				14	
		inspect	X					15	
		replace		X					
		repair			X				
		rebuild				X			
		replace					X		Separate MAC
	RADIO SET AN/GRC-19	replace	X						
	REEL RL-39 (AN/GRC-46A only)	replace		X					Separate MAC
	REPEATER-TRANSMITTER TELETYPEWRITER TT-76/GGC	replace	X						Separate MAC
	ROD, GROUND (AN/GRC-46A only)	replace	X						
	SEATS (AN/GRC-46A only)	replace					X		
		repair			X				
		replace					X		Separate MAC
	SHALTER 9-5PC/GA (AN/GRC-46 only)	replace					X		
	SHALTER (S-144 modified to house AN/GRC-46A)	replace					X		Separate MAC
		repair			X				
	FILTER, AIR	replace			X				
	HOUSING, CABLE	replace			X				
	SEAL (for Lever)	replace			X				
	TELETYPEWRITER SET AN UGC-4	replace			X				Separate MAC
	VENTILATOR KIT (AN/GRC-46A only)	replace	X						
	WIRE AN/GRC-46A only)	replace			X				

AN/GRC-46; AN/GRC-46A; AN/VRC-39

# ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	1ST ECH	2ND ECH	3RD ECH	4TH ECH	5TH ECH	TOOL CODE	REMARKS				
AN/GRC-16; AN/GRC-14A; AN/VRC-39 (continued)											
ACCESSORY KIT MC-389/UHM											
ANALYZER, SPECTRUM TS-722/U											
AUDIO OSCILLATOR TS-393/U											
ELECTRONIC MULTIMETER TS-605/U											
FREQUENCY METER AN/UHM-32											
FREQUENCY METER AN/UHM-79											
FREQUENCY METER AN/UHM-26											
MULTIMETER AN/UHM-106											
OSCILLOSCOPE OS-8/U											
POWER SUPPLY PP-1243/U											
R. F. SIGNAL GENERATOR AN/UHM-28											
TEST SET, ELECTRON TUBE TV-2/U											
TEST SET, ELECTRON TUBE TV-7/U											
TOOL EQUIPMENT TS-608											
TOOL EQUIPMENT TS-113											
VOLTMETER, METER ME-30/U											

AN/VRC-44; AN/VRC-44A; AN/VRC-89



BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,  
General, United States Army,  
Chief of Staff.

Official:

R. V. LEE,  
Major General, United States Army,  
The Adjutant General.

Distribution:

Active Army: To be distributed in accordance with DA Form 13-7 requirements for TM 11-series (unclass); plus the following formula:

USASA (3)	6-535	10-377
CNGB (1)	6-536	10-445
Tech Stf, DA (1) except CSigO (16)	6-545	10-448
DASA (5)	6-535	10-536
ARADCOM (3)	6-565	11-5
ARADCOM Rgn (3)	6-575	11-7
MDW (1)	6-576	11-16
Seventh US Army (3)	6-577	11-38
EUSA (3)	6-585	11-55
Units organized under following	6-630	11-57
TOE's (2 copies each except	6-634	11-96
as indicated):	7	11-97
1-7	7-11	11-98
1-17	7-12	11-117
1-87	7-17	11-155
1-67	7-25	11-165
5-5	7-26	11-166
5-6	7-31	11-167
5-15	7-32	11-237
5-16	7-52	11-500 (AA-AE, RA-RT (4))
5-214	8-15	11-555
6-100	8-16	11-557
6-101	8-75	11-557
6-115	8-76	11-592
6-116	8-137	11-597
6-125	9-17	17
6-126	9-25	17-2
6-135	9-26	17-22
6-136	9-47	17-25
6-137	9-65	17-26
6-138	9-65	17-45
6-200	9-86	17-46
6-201	9-87	17-51
6-300	9-217	17-52
6-301	9-227	17-55
6-315	9-377	17-56
6-316	9-500 (AA-AC)	17-65
6-325	10-17	17-66
6-326	10-22	17-77
6-328	10-45	17-85
6-330	10-45	17-86
6-401	10-105	17-115
6-415	10-106	17-116
6-416	10-107	29-56
6-425	10-157	33-105
6-426	10-202	33-106
6-500 (AA)	10-206	39-51
6-501	10-347	39-61
6-525	10-348	44-12

44-15  
44-16  
44-35  
44-35  
44-35  
44-235  
44-235  
44-435  
44-435  
44-437  
44-445  
44-446  
44-447

44-448  
44-500 (AA-AE)  
44-535  
44-536  
44-537  
44-544  
44-545  
44-546  
44-547  
44-548  
55-11  
55-12  
55-16

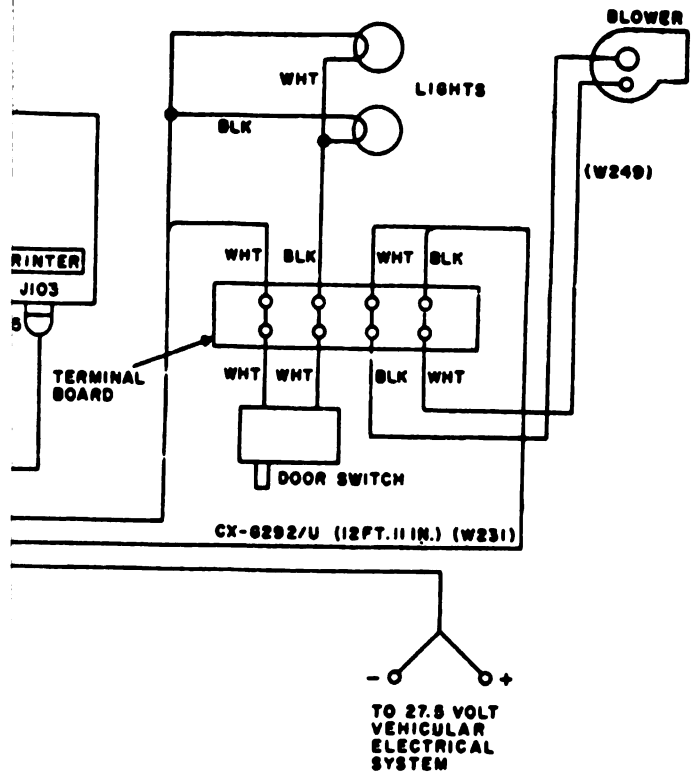
55-46  
55-57  
55-75  
55-76  
55-79  
55-116  
55-126  
55-456  
55-457  
55-500 (AA-AE)  
57  
57-5

**NG: State AG (3); Units—same as Active Army except allowance is one copy to each unit.**

**USAR: None.**

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





TMSB15-204-20-C1-1





**Organizational Maintenance Manual**  
**RADIO TELETYPEWRITER SETS AN/GRC-46, AN/GRC-46A,**  
**AN/GRC-46B, AND AN/VRC-29**

CHANGE }  
No. 6 }

**HEADQUARTERS**  
**DEPARTMENT OF THE ARMY**  
WASHINGTON, D. C., 21 October 1963

TM 11-5815-204-20, 11 September 1959, is changed as follows:

*Note.* The parenthetical reference to a previous change (example: "page 1 of C 5") indicates that pertinent material was published in that change.

*Page 2, paragraph 1 (page 1 of C 5).* Delete the note in paragraph 1.

Add paragraph 1.1 after paragraph 1.

**1.1. Index of Publications**

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. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (type 4, 6, 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders which are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

Paragraph 2 (page 1 of C 2, and page 1 of C 5). Delete paragraph 2 and substitute:

**2. Forms and Records**

*a. Reports of Maintenance and Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions in TM 38-750.

*b. Report of Damaged or Improper Shipment.* Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

*c. Reporting of Equipment Manual Improvements.* The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA technical manual parts lists or supply manual 7, 8 or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil pen, or typewriter. The original and one copy will be forwarded direct to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, New Jersey 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc.).

*Page 9.* Add paragraph 11.1 after paragraph 11.

**11.1. Internal Connections**  
(fig. 4.1)

*a.* The T-195(\*)/GRC-19 must be properly connected for fsk operation. When receiving a new or reconditioned T-195(\*)/GRC-19, make the following check to insure proper connection:

- (1) Set Multimeter AN/URM-105 at OHMS.
- (2) Place the multimeter test leads on the center conductors of the FSK IN and MO OUT connectors, located on the front panel.

(3) An indication of infinite resistance indicates proper connection for fax operation.

b. If the ohmmeter indicates 0 ohm, proceed as follows:

(1) Loosen the 16 Allen-head screws that hold the front panel to the cabinet, and slide the transmitter out of its case.

(2) Remove plug P601 from jack J620

(A, fig. 4.1). Remove plug P601 from jack J101.

(3) Insert plug P601 in jack J101 (B, fig. 4.1). Insert plug P601 in jack J620.

(4) Push the transmitter back into its case, and tighten the 16 front panel Allen-head screws.

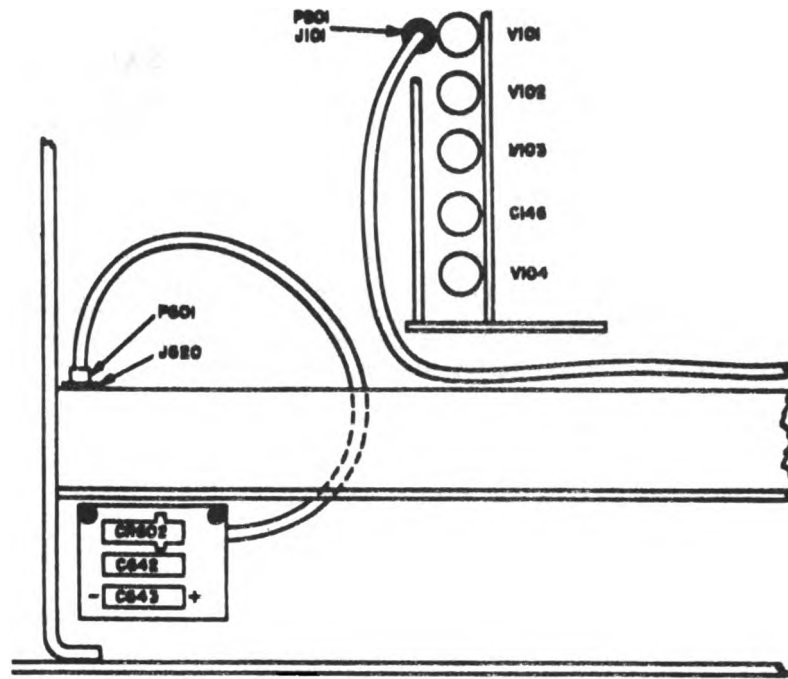
Add figure 4.1 after paragraph 11.1.

Page 31, appendix I (page 3 of C 2). Add the following references to appendix I:

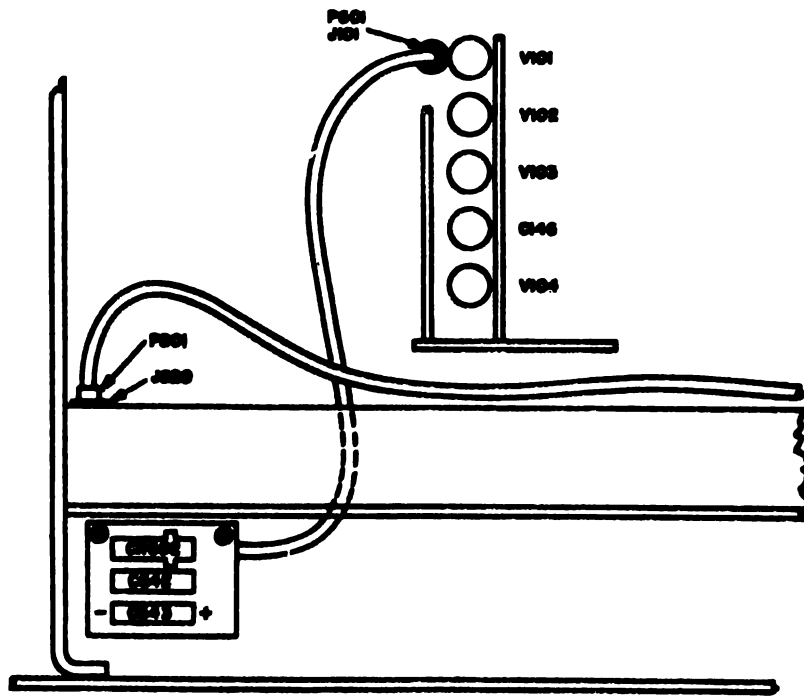
DA Pam 310-4 Index of Technical Manuals, Technical Bulletins, Supply Manuals (Type 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.

TM 9-213 Painting Instructions for Field Use.

TM 33-750 The Army Equipment Record System and Procedures.



A. VOICE OR CW OPERATION



B. FSK OPERATION

YH 8018-204-20-00-1

Figure 4-1. Transmitter, Radio T-105(\*)/ GEC-10, internal connections for voice and cw and fsk operation.

**By Order of the Secretary of the Army:**

**EARLE G. WHEELER,**  
*General, United States Army,*  
*Chief of Staff.*

**Official:**

**J. C. LAMBERT,**  
*Major General, United States Army,*  
*The Adjutant General.*

**Distribution:**

To be distributed in accordance with DA Form 12-32, Sec II (Unclass) requirements for Redstone and Honest John and Sergeant and Corporal and Lacrosse and Nike Hercules and Pershing and Nike Ajax and Hawk and Nike Hercules Improved and Target Missiles, TM, Radio.

Change }  
No. 7 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC, 8 October 1974

**Organizational Maintenance Manual  
RADIO TELETYPEWRITER SETS AN/GRC-46, AN/GRC-46A,  
AN/GRC-46B, AN/GRC-46C, AND AN/VRC-29**

TM 11-5815-204-20, 11 September 1959, is changed as follows:

This change indicates the manual is changed to apply to Radio Teletypewriter Set AN/GRC-46C also.

Change the title of the manual to read as shown above.

Page 2, paragraph 1.1. Delete paragraph 1.1 and substitute:

**1.1. Indexes of Publications**

a. *DA Pam 310-4.* Refer to 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 if there are modification work orders (MWO's) pertaining to the equipment.

Delete paragraph 2 and substitute:

**2. 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 Deficien-*

*cies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/MCO P4030.29, 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 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

**2.1. Reporting of Equipment Publication Improvements**

The 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 Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-CR, Fort Monmouth, NJ 07703.

Page 7, paragraph 8c, is superseded as follows:

c. *Main Power Cable.* Connect the vehicular and auxiliary power cables from source to the proper receptacle on the outside shelter wall.

*Facing page 10.* Add figure 5.2 after figure 5.1.

By Order of the Secretary of the Army:

Official:

**VERNE L. BOWERS**  
*Major General, United States Army*  
*The Adjutant General*

**FRED C. WEYAND**  
*General, United States Army*  
*Vice Chief of Staff*

**Distribution:**

To be distributed in accordance with DA Form 12-51, Organizational maintenance requirements for AN/GRC-46 and AN/VRC-29.

**Changes in force: C 1, C 2, C 5, C 6, C 7, and C 8**

**TM 11-5815-204-20  
C 8**

**CHANGE }  
No. 8 }**

**HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D. C. 7 April 1975**

**Organizational Maintenance Manual  
RADIO TELETYPEWRITER SETS AN/GRC-46, AN/GRC-46A,  
AN/GRC-46B, AND AN/VRC-29**

TM 11-5815-204-20, 1 September 1959, is changed as follows:

*Inside front cover.* Radiation warning is added after existing notices.



# WARNING RADIATION HAZARD



**RADIOACTIVE MATERIAL  
CONTROLLED DISPOSAL REQUIRED  
ACCOUNTABILITY NOT REQUIRED**

STD RW -2

Voltmeter	Ra 226	0.28uCi	6625-00-580-1901
Ammeter	Ra 226	0.28uCi	6625-00-580-9579
Ammeter	Ra 226	0.59uCi	6625-00-569-0243
Meter	Ra 226	0.69uCi	6625-00-669-0769
	Electron Tube	OA2WA	5960-00-503-4880
EEVC	U 238	0.1uCi	
CBS Hytron	Ni 63	0.5uCi	
Raytheon	Co 60	0.2uCi	

**Radiation Hazard Information:** The following radiation hazard information must be read and understood by all personnel before operating or repairing Radio Teletypewriter Sets AN/GRC-46, AN/GRC-46A, AN/GRC-46B, and AN/VRC-29. Hazardous radioactive materials are present in the above listed components of Frequency Shift Converter CV-278/GR and Transmitter Radio T-195A, and B/GRC-19.

The components are potentially hazardous when broken. See qualified medical personnel and the local Radiological Protection Officer (RPO) immediately, if you are exposed to or cut by broken components.

First aid instructions are contained in TB 43-0116, TB 43-0122, and AR 755-15.

**NEVER** place radioactive components in your pocket.

Use extreme care **NOT** to break radioactive components while handling them.

**NEVER** remove radioactive components from cartons until you are ready to use them.

If any of these components are broken, notify the local RPO immediately. The RPO will survey the immediate area for radiological contamination and will supervise the removal of broken components. The above listed radioactive components *will not* be repaired or disassembled. Disposal of broken, unserviceable, or unwanted radioactive components will be accomplished in accordance with the instructions in AR 755-15.

By Order of the Secretary of the Army:

Official:

**FRED C. WEYAND**  
*General, United States Army*  
*Chief of Staff*

**VERNE L. BOWERS**  
*Major General, United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-51, Organizational maintenance requirements for AN/GRC-46 and AN/VRC-29.



CHANGE }  
NO. 9 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 17 December 1976

**Organizational Maintenance Manual  
RADIO TELETYPEWRITER SETS AN/GRC-46, AN/GRC-46A, AN/GRC-46B,  
AN/GRC-46C, AND AN/VRC-29**

TM 11-5815-204-20, 11 September 1959, is changed as follows:

Page 2. Paragraph 2 is superseded as follows:

**2. Reporting of Errors**

The 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 Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. Paragraph 2.1 is added after paragraph 2.

**2.1 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 directly to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

*Figure 5.2.* Make the following changes:  
Delete "VEHICULAR SYSTEM" and substitute "AUXILIARY ELECTRICAL SYSTEM."  
Delete "AUXILIARY ELECTRICAL SYSTEM" and substitute "VEHICULAR SYSTEM."

By Order of the Secretary of the Army:

BERNARD W. ROGERS  
*General, United States Army  
Chief of Staff*

Official:

PAUL T. SMITH  
*Major General, United States Army  
The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-51, organizational maintenance requirements for AN/GRC-46 and AN/GRC-29.



Changes in force; C1, C2, C5 C6, C7, C8, and C9

TM 11-5815-204-20  
C 10

CHANGE }  
No. 10 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 2 June 1980

**Organizational Maintenance  
RADIO TELETYPEWRITER SETS  
AN/GRC-46 (NSN 5815-00-543-1760)  
AN/GRC-46A (NSN 5815-00-543-1760)  
AN/GRC-46B (NSN 5815-00-570-5488)  
AN/GRC-46C (NSN 5815-00-082-4205)  
AN/VRC-29 (NSN 5815-00-543-1758)**

TM 11-5815-204-20, 11 September 1959, is changed as follows:  
Title of manual is changed as shown above.  
*Inside front cover.* Add excessive weight warnings after existing warnings as follows:

**WARNING**

Transmitter, Radio T-195(\*)/GRC-19 weighs approximately 122 pounds. Two persons are required to lift it whenever it is moved. Be very careful when

handling the transmitter to prevent injury to personnel and damage to equipment.

**WARNING**

Receiver, Radio R-390(\*)/URR weighs approximately 52 pounds. Two persons are required to lift it whenever it is moved. Be very careful when handling the receiver to prevent injury to personnel and damage to equipment.

By Order of the Secretary of the Army:

Official:

J. C. PENNINGTON  
Major General, United States Army  
The Adjutant General

E. C. MEYER  
General, United States Army  
Chief of Staff

**DISTRIBUTION:**

To be distributed in accordance with DA Form 12-51, Operator Maintenance requirements for AN/GRC-46 and AN/VRC-29.



TECHNICAL MANUAL }  
 No. 11-5815-204-20 }

HEADQUARTERS,  
 DEPARTMENT OF THE ARMY  
 WASHINGTON 25, D. C., 11 September 1959

**RADIO TELETYPEWRITER SETS  
 AN/GRC-46 AND AN/VRC-29**

	Paragraph	Page
<b>CHAPTER 1. INTRODUCTION AND INSTALLATION</b>		
Section I. Introduction		
Scope.....	1	2
Comments.....	2	2
II. Installation		
General.....	3	2
Unpacking.....	4	2
Checking unpacked equipment.....	5	7
Siting.....	6	7
Tools and test equipment.....	7	7
Installation of Radio Teletypewriter Set AN/GRC-46 in cargo truck M-37.....	8	7
Additional installation instructions.....	9	7
Installation of Radio Teletypewriter Set AN/VRC-29.....	10	8
Cable connections.....	11	8
Initial adjustment of equipment.....	12	9
<b>CHAPTER 2. MAINTENANCE INSTRUCTIONS</b>		
Section I. General		
Scope.....	13	10
Tools, materials, and test equipment required.....	14	10
Preventive maintenance.....	15	10
Lubrication.....	16	13
II. Troubleshooting		
Visual inspection.....	17	13
Equipment performance checklist.....	18	13
Heater troubleshooting.....	19	26
Tube testing techniques.....	20	26
<b>CHAPTER 3. SHIPMENT AND LIMITED STORAGE</b>		
Disassembly of equipment.....	21	27
Repackaging for shipment or limited storage.....	22	27
Packaging Radio Teletypewriter Set AN/GRC-46.....	23	29
Packing Radio Teletypewriter Set AN/GRC-46.....	24	30
Packaging Radio Teletypewriter Set AN/VRC-29.....	25	30
Packing Radio Teletypewriter Set AN/VRC-29.....	26	30
<b>APPENDIX I. References</b> .....	--	31
<b>II. Maintenance allocation charts</b> .....	--	32



# CHAPTER 1

## INTRODUCTION AND INSTALLATION

### Section I. INTRODUCTION

#### 1. Scope

This manual covers the installation and second echelon maintenance of Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29. The operating instructions for this equipment are contained in TM 11-5815-204-10, Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, Operator's Manual.

*Note.* For applicable forms and records, see paragraph 2, TM 11-5815-204-10.

#### 2. Comments

Forward comments concerning this manual to the Commanding Officer, United States Army Signal Publications Agency, Fort Monmouth, N. J.

### Section II. INSTALLATION

#### 3. General

a. Radio Teletypewriter Set AN/GRC-46 is a complete system with all operating components and cables installed. The installation instructions are limited to those necessary to place a completely assembled radio teletypewriter set into operation. Instructions are limited to the installation of the following:

- (1) Whip antenna.
- (2) Fuel tank.
- (3) Ground strap.
- (4) Ground rod.

b. Radio Teletypewriter Set AN/VRC-29 is

shipped in crates and is installed in an armored vehicle at the depot.

#### 4. Unpacking

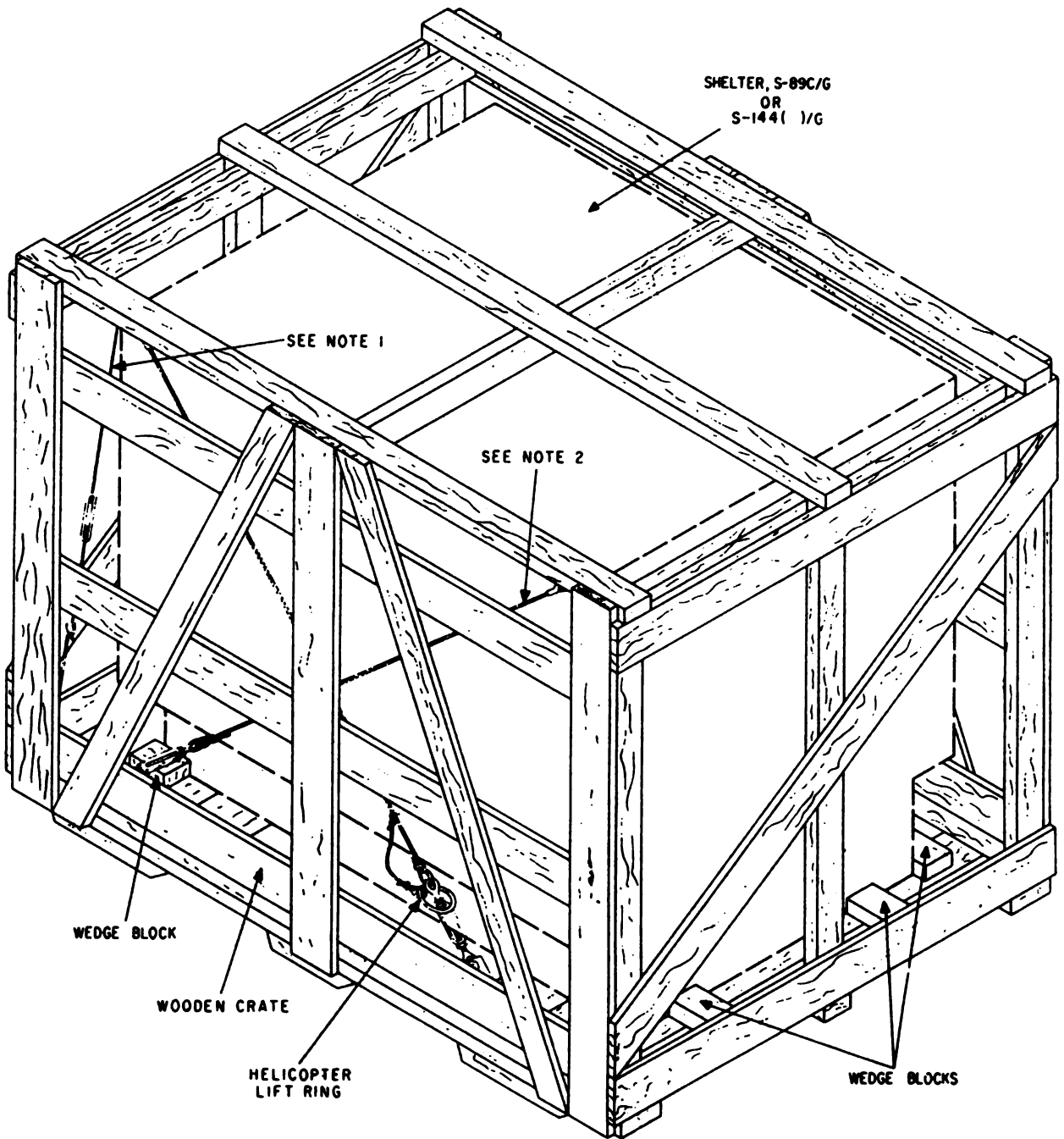
a. Radio Teletypewriter Set AN/GRC-46 is shipped as a complete system with all components installed in the shelter. The shelter is fastened to a skid and protected by a crate framework (fig. 1).

b. The components of Radio Teletypewriter Set AN/VRC-29 are packed in fiberboard cartons (figs. 2 and 3) which are packaged in a large wooden crate (fig. 4). The number, size, weight, and contents of each package are indicated in the following chart:

Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Weight (lb)	Contents
12½	10	15½	1.1	40	TTY rotary converter
12½	10	15½	1.1	40	Crypt rotary converter
5	10	13½	.4	15	Mounting MT-791/U (modulator)
5	10	13½	.4	15	Mounting MT-791/U (converter)
9½	10	20	1.1	23½	Radio Transmitter Modulator MD-203/GR
9½	10	20	1.1	19½	Frequency Shift Converter CV-278/GR
10	12	19	1.3	12¼	Interconnecting Box J-668/GR

c. Radio Set AN/GRC-19, Teletypewriter Set TT-98B/FG, and Teletypewriter Reperforator Transmitter TT-76(\*)/GGC, used in the AN/

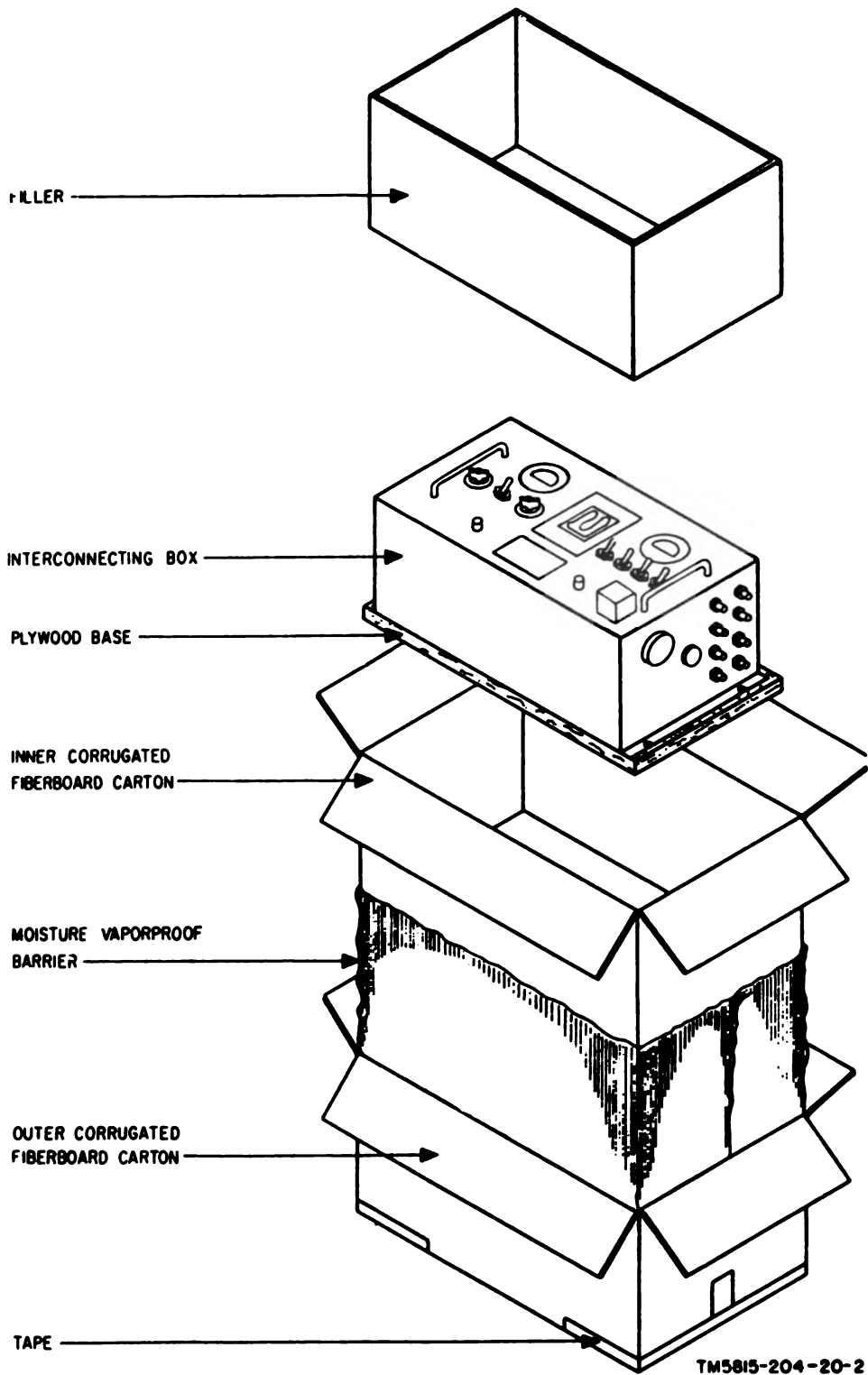
VRC-29, are packaged separately. For packaging information on these equipments see the appropriate technical manual.



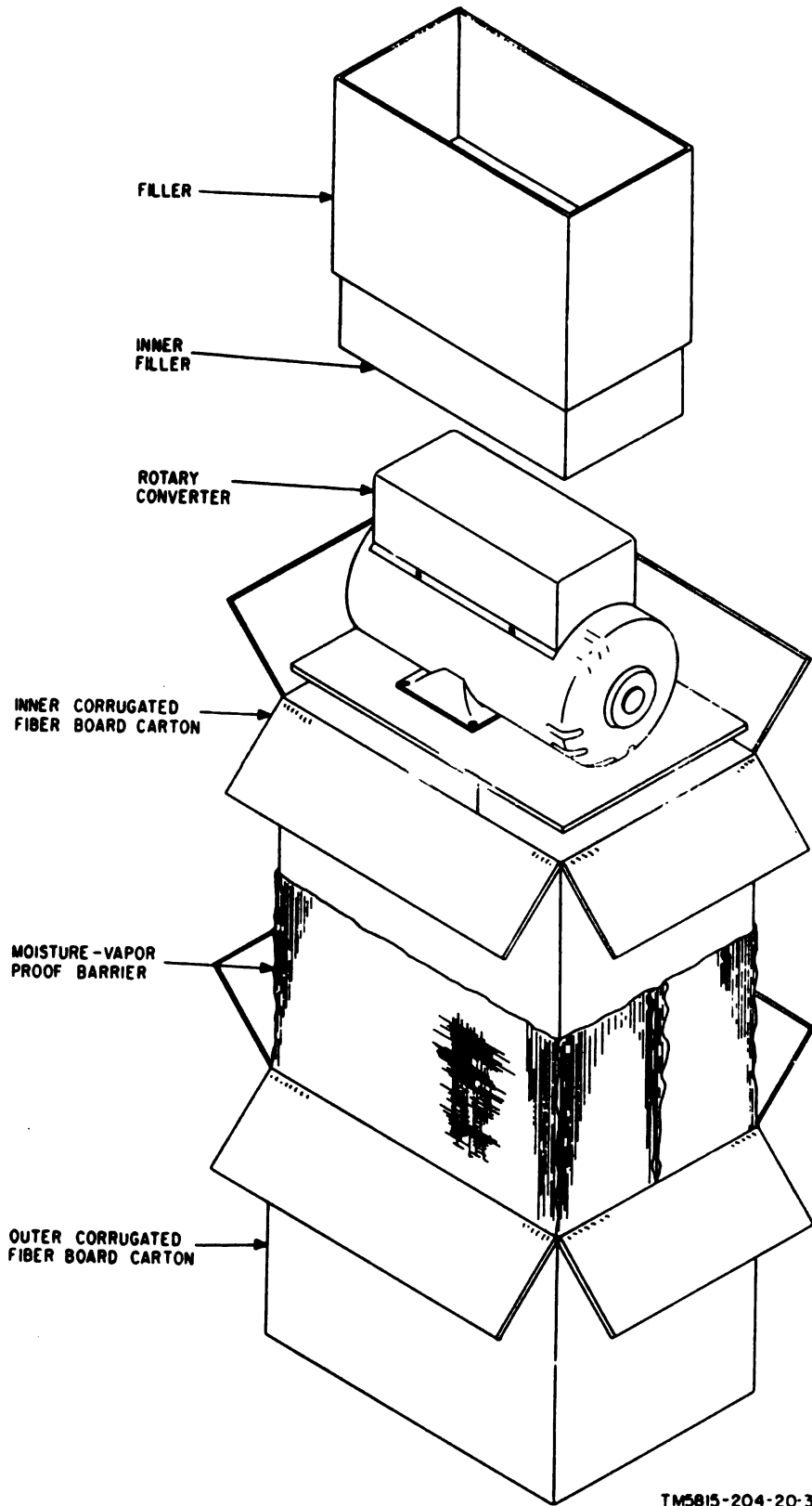
- NOTES
1. S-89C/Q SHIPPED WITH ONE ADJUSTABLE HOLD-DOWN BAR FOR EACH CORNER (3 NOT SHOWN)
  2. S-144(1)/Q SHIPPED WITH FOUR ADJUSTABLE WIRE ROPES (2 NOT SHOWN)

TM585-204-20-1

**Figure 1. Radio Teletypewriter Set AN/GRC-46 crated for shipment.**



*Figure 2. Packaging, interconnecting box.*



TM5815-204-20-3

*Figure 3. Packaging, rotary converter.*

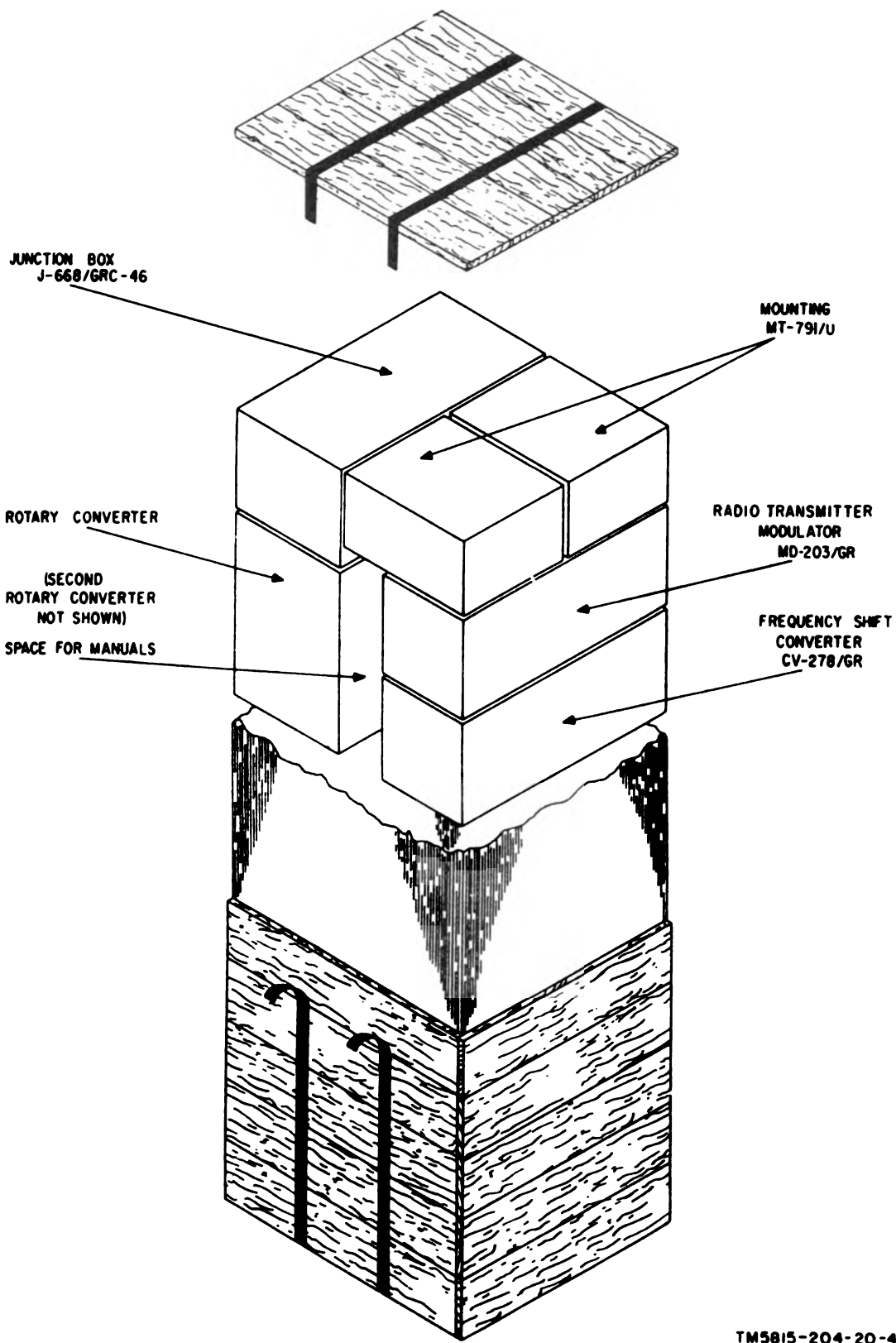


Figure 4. Packaging components, Radio Teletypewriter Set AN/VRC-29.

## 5. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2, TM 11-5815-204-10.

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check it against the table of components in TM 11-5815-204-10.

c. If the equipment has been used or reconditioned, check for any change made by a modification work order (MWO). If modified, the MWO number will appear near the nomenclature plate.

## 6. Siting

Refer to the applicable manual for Radio Set AN/GRC-19 for siting data.

## 7. Tools and Test Equipment

No special tools or test equipment is required for installation of the AN/GRC-46 or AN/VRC-29.

## 8. Installation of Radio Teletypewriter Set AN/GRC-46 in Cargo Truck M-37

a. *General.* The components of Radio Teletypewriter Set AN/GRC-46 are installed in Shelter S-89C at the factory. When the shelter is installed on Cargo Truck M-37, the following modifications to the truck are necessary:

- (1) The spare tire must be moved.
- (2) The truck must have a 28-volt direct current (dc), 100-ampere generator system.
- (3) The truck bows may have to be extended.
- (4) The tail gate *must* remain in the horizontal position when the shelter heater is operating to allow the heater exhaust gases to escape.

**Warning:** Operating the shelter heater with the tail gate up will cause dangerous gas to back up into the shelter.

b. The various components of Radio Teletypewriter Set AN/GRC-46 are fastened into the shelter and do not require any special packaging. However, precautions have been taken

to make certain there are no loose objects to rattle or jar loose. Before using, remove any cord and/or packing which has been used to hold the seats, accessories box, stakes, and other loose objects in place.

c. *Main Power Cable.* Pull the main power cable through the opening in the shelter wall, into the cab over the seat back, then down, and attach the wires to the truck storage battery.

## 9. Additional Installation Instructions

a. *Antenna Installation.* The installation of the antenna is described in TM 11-274, Radio Set AN/GRC-19.

b. *Fuel Tank.* Install the fuel tank as follows:

- (1) Remove the end of the fuel line (figure 10, TM 11-5815-204-10) from the dummy fitting on the shelter.
- (2) Loosen the three wing nuts that hold the fuel tank to the inside of the shelter door.
- (3) Install the fuel tank on the outside of the shelter to the left of the door. Slide the back of the fuel tank up and under the outside bracket and then down into the groove in the mounting. Tighten the three wing nuts.
- (4) Install the exhaust pipe elbow, exhaust pipe extension, and flexible exhaust pipe on the space heater.

**Warning:** When operating the shelter heater, make certain that the truck tail gate is in a horizontal position. Operating the heater with the tail gate up will cause harmful fumes to back up into the shelter.

- (5) Install the fuel line on the fuel filter. To clear the line of air, temporarily disconnect the fuel line and allow some gas to flow into a container. Reconnect the fuel line.

c. *Ground Strap.* The ground strap provides an electrical bond between the shelter and the truck. One end of the ground strap connects to the ground terminal post on the outside of the shelter. The ground terminal post is located to the left of the shelter door. The other end of the ground strap is connected to a suitable ground on the frame of the truck. Make certain that the ground points are clean and free of dirt and grease.

d. *Ground Rod.* When operating the radio teletypewriter set at a fixed site, it is advisable to use an earth ground. Select a point near the truck and drive the ground rod into the ground. Connect a ground strap between the ground rod and the frame of the truck.

#### 10. Installation of Radio Teletypewriter Set AN/VRC-29

The components which make up an AN/VRC-29 are shipped to a depot in wooden crates (par. 4b, c), where they are installed in an armored vehicle. Armored Personnel Carrier M59 is a typical vehicle. Installation instructions are contained in the installation and hardware kits for the AN/VRC-29.

#### 11. Cable Connections

Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29 may be operated with or without security equipment. The type of operation is accomplished by cable connections. Details on cabling, installation, and operation of the security equipment will be found in the manuals covering the specific security equipment used. The following chart indicates the cable lengths, nomenclature, and the equipment connections for simplex (one way reversible) operation. The cables are identified by the nomenclature number stamped on a metal band which is fastened around the cable.

Cable nomenclature	AN/GRC-46 cable length (in.)	AN/VRC-29 cable length (in.)	Connects	
			From	To
CX-4542/U	107	98	Junction box POWER INPUT (on top).	Vehicular electrical system
CX-4543/U	123	Not required	Junction box BLOWER receptacle (on top).	Blower
CX-4545/U	77	77	Junction box LIGHTS receptacle (on top).	Lights and door switch on AN/GRC-46. Lights on AN/VRC-29.
CX-4540/U	38	22	Junction box CV-278 receptacle (on top).	Frequency-shift converter 27.5 VOLTS DC receptacle.
CX-4540/U	54	22	Junction box MD-203 receptacle (on top).	Modulator 27.5 VOLTS DC receptacle.
CX-4540/U	152	Not required	Junction box HEATER receptacle (on top).	Heater
CX-4539/U	57	62	Junction box T-195 receptacle (on top).	Transmitter 24 VOLTS DC receptacle.
CX-4549/U	53	39	Junction box BATTERY receptacle (left side).	Teletypewriter RED plug to positive jack, BLACK plug to negative jack.
CG-409C/U	51	39	Junction box MD-203 receptacle (left side).	Modulator KEYING INPUT receptacle.
CX-4546/U	45	76	Junction box TRANS CONTROL receptacle (left side).	Receiver AUDIO receptacle
CX-4547/U	66	42	Junction box CV-278 receptacle (left side).	Frequency-shift converter PRINTER receptacle.
CX-4541/U	83	37	Junction box ROTARY CONVERTER POWER INPUT TTY receptacle (right side).	Teletypewriter rotary converter dc terminals.
CX-4541/U	83	37	Junction box ROTARY CONVERTER POWER INPUT CRYPT receptacle (right side).	CRYPT rotary converter dc terminals.
CX-4551/U	89	83	Junction box TTY SIGNAL LINE receptacle (looking directly at right side of junction box, use receptacle on the extreme left).	Teletypewriter (black lead to terminal 1, white lead to terminal 2).

Cable nomenclature	AN/GRC-46 cable length (in.)	AN/VRC-29 cable length (in.)	Connects	
			From	To
CX-4551/U	111	76	Reperforator REC receptacle	Teletypewriter (black lead to terminal 3, white lead to terminal 4).
CG-580B/U	35	17	Transmitter MO OUT receptacle.	Modulator MO INPUT receptacle.
CG-580B/U	35	17	Modulator FSK OUTPUT receptacle.	Transmitter FSK INPUT receptacle.
CG-1127/U	30	19	Receiver IF OUT receptacle	Frequency-shift converter INPUT receptacle.
Part of Teletypewriter Reperforator Transmitter TT-76(*)/GGC.			Reperforator (red plug)	Junction box TTY SIGNAL LINE KW9 INPUT receptacle.
Part of Teletypewriter Reperforator Transmitter TT-76(*)/GGC.			Reperforator (gray plug)	Junction box TTY SIGNAL LINE receptacle adjacent to the KW9 input receptacle.
Part of Teletypewriter TT-98B/FG.			Teletypewriter	Teletypewriter rotary converter AC receptacle.
Part of Teletypewriter Reperforator Transmitter TT-76(*)/GGC.			Reperforator	Teletypewriter rotary converter AC receptacle.
CG-1127/U	10	10	Transmitter RECEIVER ANTENNA receptacle.	Receiver ANT receptacle
Part of Radio Set AN/GRC-19.				
CX-1599/U	9	9	Transmitter RECEIVER CONT receptacle.	Receiver POWER INPUT receptacle.
Part of Radio Set AN/GRC-19.				
CX-1573/U or CX-1852/U	72	72	Transmitter AUDIO receptacle	Microphone or telegraph key
Part of Radio Set AN/GRC-19.				
CX-1334/U	39	39	Receiver AUDIO receptacle	Headset or loudspeaker
Part of Radio Set AN/GRC-19.				

## 12. Initial Adjustment of Equipment

Detailed initial adjustment instructions for each of the units of the radio teletypewriter set are covered in individual technical manuals. A

list of these manuals is given in appendix I. Preliminary operating and starting procedures for Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29 are covered in TM 11-5815-204-10.



## CHAPTER 2

### MAINTENANCE INSTRUCTIONS

#### Section I. GENERAL

#### 13. Scope

The second echelon maintenance of Radio Teletypewriter Sets AN/GRC-46 and AN/GRC-29 consists of the following:

- (1) Preventive maintenance (par. 15).
- (2) Lubrication (par. 16).
- (3) Visual inspection (par. 17).
- (4) Equipment performance checklist (par. 18).

#### 14. Tools, Materials, and Test Equipment Required

A list of parts normally stocked for unit repairman maintenance is contained in appendix III. The tools, materials, and test equipment required for unit repairman maintenance are listed below.

- a. *Tools.* Tool Equipment TE-41.
- b. *Materials.*
  - (1) Cleaning Compound (Federal stock No. 7930-395-9542).
  - (2) Cleaning cloth.
  - (3) Special Preservative Lubricating Oil (PL Special).
  - (4) Grease Aircraft and Instrument (GL).
  - (5) Fine sandpaper.
  - (6) Graphite, U. S. Army Specification 2-64A (Amend 1).

#### c. *Test Equipment.*

- (1) Electron Tube Test Set TV-7/U.
- (2) Multimeter TS-352/U.

#### 15. Preventive Maintenance

a. *DA Form 11-238.* DA Form 11-238 (figs. 7 and 8) is a preventive maintenance checklist to be used by the unit repairman. Items not applicable to the equipment are lined out in the figures. References in the ITEM block in the figures are to paragraphs that contain additional maintenance information pertinent to the particular item. Additional preventive maintenance information concerning items 2, 3, 6, and 7 on DA Form 11-238 will be found in the preventive maintenance portion of TM 11-5815-204-10. Instructions for the use of the form appear on the form.

b. *Items.* The information shown below is supplementary to DA Form 11-238. The item numbers correspond to the ITEM numbers on the form.

**Warning:** Obtain permission to disconnect all power before performing the following operations. When power to the equipment is disconnected, some capacitors still may retain voltage of dangerous potential. Before touching exposed electrical parts, short-circuit the part to ground. When maintenance is completed, replace the equipment in its case, reconnect the power, and check for satisfactory operation.

Item	Maintenance procedures
5	Use a clean cloth to remove dust, dirt, moisture, and grease from the antenna mount, microphone headset, and front panel controls. If necessary, wet the cloth with Cleaning Compound and then wipe the parts dry with a clean cloth. Use a soft-bristled brush to clean the teletypewriter mechanism.
6	Remove all rust from components and touch up bare spots with paint.

<b>ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS</b> 26 INSPECT ANTENNA <del>.....</del> CORROSION LOOSE FIT DAMAGED INSULATOR <del>.....</del>		CONDITION	
27 CHECK FOR NORMAL OPERATION <del>.....</del>			✓
28 <del>.....</del>			✓
IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION  <b>ITEM 10. CONNECTOR THREAD DAMAGED ON CABLE CX-4540/U. REPORTED TO 3D ECHELON FOR REPLACEMENT.</b>			
<b>MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT</b> SOUND EQUIPMENT, RADIO, DIRECTION FINDING RADAR, CARRIER, RADIOSONDE AND TELEVISION (AR 730-623)		EQUIPMENT NOMENCLATURE <b>RADIO TELETYPEWRITER SET AN/GRC-46</b>	
EQUIPMENT SERIAL NUMBER <b>100</b>		<b>INSTRUCTIONS</b>  This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.	
<b>1 For detailed Preventive Maintenance instructions see:</b> a The Technical Manual (in TM 11 series) for the equipment (See DA Pamphlet Number 310-4) b The Supply Bulletin (SB 11-100 series) for the equipment (See DA Pamphlet Number 310-4) c The Department of the Army Lubrication Order (See DA Pamphlet Number 310-4)			
<b>2 The following action will be taken by either the Communications Officer Chief for 1st echelon, or the Inspector for higher echelon:</b> a Enter Equipment Nomenclature and Serial Number. b Strike out items that do not apply to the equipment.			
<b>3 Operator Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under I.E.F.E.N.D.</b>			
<b>4 After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.</b>			
TYPE OF INSPECTION			
OPERATOR	3D ECHELON	DATE	SIGNATURE
	✓	29 MAY 1959	<i>Arnold C. Ficht</i>
<b>DA FORM 11-238</b> 11-244, 11-245, 11-246, 11-249, 11-250, 11-251, 11-252, 11-253, 11-254, 11-255, 11-256, 11-257, 11-258, 11-259, 11-260, 11-261, 11-262, 11-263, 11-264, 11-265, 11-266, 11-267, 11-268, 11-269, 11-270, 11-271, 11-272, 11-273, 11-274, 11-275, 11-276, 11-277, 11-278, 11-279, 11-280, 11-281, 11-282, 11-283, 11-284, 11-285, 11-286, 11-287, 11-288, 11-289, 11-290, 11-291, 11-292, 11-293, 11-294, 11-295, 11-296, 11-297, 11-298, 11-299, 11-300, 11-301, 11-302, 11-303, 11-304, 11-305, 11-306, 11-307, 11-308, 11-309, 11-310, 11-311, 11-312, 11-313, 11-314, 11-315, 11-316, 11-317, 11-318, 11-319, 11-320, 11-321, 11-322, 11-323, 11-324, 11-325, 11-326, 11-327, 11-328, 11-329, 11-330, 11-331, 11-332, 11-333, 11-334, 11-335, 11-336, 11-337, 11-338, 11-339, 11-340, 11-341, 11-342, 11-343, 11-344, 11-345, 11-346, 11-347, 11-348, 11-349, 11-350, 11-351, 11-352, 11-353, 11-354, 11-355, 11-356, 11-357, 11-358, 11-359, 11-360, 11-361, 11-362, 11-363, 11-364, 11-365, 11-366, 11-367, 11-368, 11-369, 11-370, 11-371, 11-372, 11-373, 11-374, 11-375, 11-376, 11-377, 11-378, 11-379, 11-380, 11-381, 11-382, 11-383, 11-384, 11-385, 11-386, 11-387, 11-388, 11-389, 11-390, 11-391, 11-392, 11-393, 11-394, 11-395, 11-396, 11-397, 11-398, 11-399, 11-400, 11-401, 11-402, 11-403, 11-404, 11-405, 11-406, 11-407, 11-408, 11-409, 11-410, 11-411, 11-412, 11-413, 11-414, 11-415, 11-416, 11-417, 11-418, 11-419, 11-420, 11-421, 11-422, 11-423, 11-424, 11-425, 11-426, 11-427, 11-428, 11-429, 11-430, 11-431, 11-432, 11-433, 11-434, 11-435, 11-436, 11-437, 11-438, 11-439, 11-440, 11-441, 11-442, 11-443, 11-444, 11-445, 11-446, 11-447, 11-448, 11-449, 11-450, 11-451, 11-452, 11-453, 11-454, 11-455, 11-456, 11-457, 11-458, 11-459, 11-460, 11-461, 11-462, 11-463, 11-464, 11-465, 11-466, 11-467, 11-468, 11-469, 11-470, 11-471, 11-472, 11-473, 11-474, 11-475, 11-476, 11-477, 11-478, 11-479, 11-480, 11-481, 11-482, 11-483, 11-484, 11-485, 11-486, 11-487, 11-488, 11-489, 11-490, 11-491, 11-492, 11-493, 11-494, 11-495, 11-496, 11-497, 11-498, 11-499, 11-500, 11-501, 11-502, 11-503, 11-504, 11-505, 11-506, 11-507, 11-508, 11-509, 11-510, 11-511, 11-512, 11-513, 11-514, 11-515, 11-516, 11-517, 11-518, 11-519, 11-520, 11-521, 11-522, 11-523, 11-524, 11-525, 11-526, 11-527, 11-528, 11-529, 11-530, 11-531, 11-532, 11-533, 11-534, 11-535, 11-536, 11-537, 11-538, 11-539, 11-540, 11-541, 11-542, 11-543, 11-544, 11-545, 11-546, 11-547, 11-548, 11-549, 11-550, 11-551, 11-552, 11-553, 11-554, 11-555, 11-556, 11-557, 11-558, 11-559, 11-560, 11-561, 11-562, 11-563, 11-564, 11-565, 11-566, 11-567, 11-568, 11-569, 11-570, 11-571, 11-572, 11-573, 11-574, 11-575, 11-576, 11-577, 11-578, 11-579, 11-580, 11-581, 11-582, 11-583, 11-584, 11-585, 11-586, 11-587, 11-588, 11-589, 11-590, 11-591, 11-592, 11-593, 11-594, 11-595, 11-596, 11-597, 11-598, 11-599, 11-600, 11-601, 11-602, 11-603, 11-604, 11-605, 11-606, 11-607, 11-608, 11-609, 11-610, 11-611, 11-612, 11-613, 11-614, 11-615, 11-616, 11-617, 11-618, 11-619, 11-620, 11-621, 11-622, 11-623, 11-624, 11-625, 11-626, 11-627, 11-628, 11-629, 11-630, 11-631, 11-632, 11-633, 11-634, 11-635, 11-636, 11-637, 11-638, 11-639, 11-640, 11-641, 11-642, 11-643, 11-644, 11-645, 11-646, 11-647, 11-648, 11-649, 11-650, 11-651, 11-652, 11-653, 11-654, 11-655, 11-656, 11-657, 11-658, 11-659, 11-660, 11-661, 11-662, 11-663, 11-664, 11-665, 11-666, 11-667, 11-668, 11-669, 11-670, 11-671, 11-672, 11-673, 11-674, 11-675, 11-676, 11-677, 11-678, 11-679, 11-680, 11-681, 11-682, 11-683, 11-684, 11-685, 11-686, 11-687, 11-688, 11-689, 11-690, 11-691, 11-692, 11-693, 11-694, 11-695, 11-696, 11-697, 11-698, 11-699, 11-700, 11-701, 11-702, 11-703, 11-704, 11-705, 11-706, 11-707, 11-708, 11-709, 11-710, 11-711, 11-712, 11-713, 11-714, 11-715, 11-716, 11-717, 11-718, 11-719, 11-720, 11-721, 11-722, 11-723, 11-724, 11-725, 11-726, 11-727, 11-728, 11-729, 11-730, 11-731, 11-732, 11-733, 11-734, 11-735, 11-736, 11-737, 11-738, 11-739, 11-740, 11-741, 11-742, 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11-993, 11-994, 11-995, 11-996, 11-997, 11-998, 11-999, 1200			

Figure 7. DA Form 11-238, pages 1 and 4.

**DAILY CONDITION FOR MONTH OF**  
**MAY 1959**

NO.	DAILY ITEM	CONDITION FOR MONTH OF MAY 1959												CONDITION																					
		1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
	<b>LEGEND for marking conditions:</b> Satisfactory, ✓ Adjustment, Repair or Replacement required, X. Defect corrected, ⊗																																		
	1. COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (Transmitters, receivers, communication, wire, cables, microphones, tubes, spare parts, technical manuals).																					✓													
	2. CLEAN DIRT AND MOISTURE FROM ANTENNA, MICRO-PHONES, HEADSETS, KEYS, JACKS, PLUS COMPONENT PANELS																					✓													
	3. INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS.																					✓													
	4. CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION. BE																					✓													
	<b>WEEKLY</b>	CONDITION EACH WEEK												CONDITION																					
		1ST	2D	3D	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH		13TH	14TH	15TH	16TH	17TH	18TH	19TH	20TH	21ST	22ND	23RD	24TH	25TH	26TH	27TH	28TH	29TH	30TH	31ST		
5.	CLEAN AND TIGHTEN EXTERIORS OF CASES, RACKS, MOUNTS, TRANSMISSION LINES. PAR 15(6)																																		
6.	INSPECT CASES, MOUNTS, ANTENNA ARMS AND EXPOSED METAL SURFACES FOR RUST, CORROSION. PAR 15(6)																																		
7.	INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUO STRAIN. PAR 15(7)																																		
8.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																																		
9.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																																		
10.	INSPECT ACCESSIBLE ITEMS FOR LOOSE NUTS, BUSHES, KNOBS, JACKS, CONNECTORS, RELAYS, TRANSFORMERS, MOTORS, PILOT LIGHTS, GLOWERS, ETC.																																		⊗
11.	CLEAN AND/OR INSPECT AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS																																		✓
12.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																																		✓
ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS		ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS												CONDITION																					
13.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																					✓													
14.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																					✓													
15.	<del>INSPECT INTERNALS OF EQUIPMENT FOR CORROSION, DISCOLORATION, AND UNUSUAL OPERATION OR CONDITION.</del>																					✓													
		CONTINUED ON PAGE 4																																	

3

3

Figure 8. DA Form 11-238, pages 2 and 3.

Item	Maintenance procedures
7	Cover any cuts in the insulation with rubber tape and then with friction tape. Replace or repair all broken cords and cables.
10	All control knobs should work smoothly, and be tight on the shaft. Tighten all loose knobs; make sure that they do not rub against the panel.
19	Check to see that the blackout switch on door frames operates properly. Check ventilation fan blower; make sure that it is clean and tightly fastened.

**Warning:** Cleaning Compound is flammable and its fumes are toxic. Do not use near a flame. Provide adequate ventilation.

## 16. Lubrication

*a. Lubrication of Shelter.* Under ordinary conditions of temperature and humidity, lubricate the following points at monthly intervals. In excessively hot, humid, or dusty areas, more frequent lubrication may be required.

- (1) *Locks and latches.* Lubricate the door and window locks and latches sparingly with graphite.
- (2) *Hinges.* Lubricate the hinges of the vent flaps, spare parts box, heater grill, and the slides of the doors and windows sparingly with light machine oil. Oil (PL Special) is suitable.

(3) *Blackout covers.* Lubricate the slides of the blackout covers with a light grease.

*b. Lubrication of Rotary Converters.* The rotary converter and the heater motor are equipped with ball bearings which are sealed and lubricated during manufacture. In normal use, no lubrication is necessary for the life of the converter. The sealed bearings cannot be relubricated; they must be replaced if they become noisy or rough.

*c. Additional Lubrication Instructions.* The components and their associated technical manuals, which cover the lubrication instructions for the components, are listed below.

Component	Technical manual
Radio Set AN/GRC-19.....	TM 11-274
Frequency Shift Converter CU-278/GR.....	TM 11-5820-205-20
Radio Transmitter Modulator MD-203/GR.....	TM 11-5805-210-20
Teletypewriter Repeater-Transmitter TT-76 (*)/GGC.....	TM 11-2225
Teletypewriter TT-98B/FG.....	TM 11-2230

## Section II. TROUBLESHOOTING

### 17. Visual Inspection

Before operating the equipment, inspect it. This will save repair time and also avoid further damage to the equipment. Inspect the following for obvious defects:

- a. Proper settings of switches and controls.*
- b. Proper cables and cords making good contact in the correct jack or connectors.*
- c. Fuses.* (A burned-out fuse usually indicates some other defect.)

- d. Bad ground connections.*
- e. Low voltage.*
- f. Defective tubes.*

### 18. Equipment Performance Checklist

*a. General.* The equipment performance checklist is a procedure for systematically checking equipment performance. All corrective measures which the unit repairman can perform are given in the *Corrective measures* column. When using the checklist, start at the

beginning and follow each step in order. If the corrective measures indicated do not fix the equipment, troubleshooting is required by higher echelon. Note on the repair tag how the

equipment performed and what corrective measures were taken.

*b. Procedure.* Place the set in operation as shown in the checklist in *c* below.

c. Equipment Performance Checklist.

Step No.	Unit	Action or condition	Normal indication	Corrective measure
1	<i>Interconnecting Box J-668/GR</i>			
2	MAIN POWER circuit breakers	Set to OFF.		
3	LIGHTS switch	Set to OFF.		
4	BLOWER switch	Set to OFF.		
5	TTY switch	Set to OFF.		
6	CRYPTO switch	Set to OFF.		
	Cables	Refer to paragraph 11, cable connections.		
		Check to see that all cables are connected and that they are connected to the proper points.		
7	<i>Radio Transmitter T-195/GRC-19</i>			
8	SERVICE SELECTOR control	Turn to OFF.		
	Antenna	Connect doublet to 50 OHMS OUTPUT or whip to WHIP. ANTENNA receptacle.		
9	Ground wire	Connect between GROUND binding post and a good ground if transmitter is not installed on Mounting MT-851/GRC-19 or MT-925/GRC-19 in vehicle.		
10	Telegraph key or microphone	Connect to AUDIO receptacle.		
11	RECEIVER ANTENNA receptacle	Connects through Cable CG-1127/U to the ANT receptacle on the receiver.		
12	RELAY-NORMAL-DUPLEX control.	Turn to NORMAL.		
13	BAND SELECTOR control	Tighten locking control.		
14	TUNING CONTROL	Tighten locking bar.		
15	TEST METER switch	Turn to BATT.		
16	DIAL DIM switch	Turn to FULL.		
17	Blower port covers	Each cover in open position.		
18	<i>Radio Receiver R-99g/URR</i>			
19	Function switch	Set to OFF.		
	Speaker cable	Connected between either of the two AUDIO receptacles and the speaker.		

PREPARATORY

Step No.	Unit	Action or condition	Normal indication	Corrective measures
20	Electrical Special Purpose Cable Assembly CX-1599/U.	Connected between POWER INPUT receptacle on the receiver and the RECEIVER CONT receptacle on the transmitter.		
21	BAND WIDTH switch	Set to 2KC.		
22	RF GAIN SQUELCH THRESH control.	Set to full-clockwise position.		
23	AF GAIN control	Set to midposition.		
24	AGC switch	Set to CAL.		
25	BFO switch	Set to ON.		
26	DIAL DIM switch	Set to ON.		
	Radio Transmitter Modulator MD-203/GR.			
27	POWER switch	Set to OFF.		
28	MO INPUT cable (W205)	Connect between the MO INPUT receptacle on the modulator and the MO OUT receptacle on the transmitter.		
29	FSK output cable (W203)	Connect between the FSK OUTPUT receptacle on the modulator and the FSK IN receptacle on the transmitter.		
30	MCS BAND SELECTOR switch Frequency Shift Converter CV-278/GR.	Set to 1.5-1.7.		
31	POWER switch	Set to OFF.		
32	If input cable (W211)	Connect between the INPUT receptacle on the frequency-shift converter and the IF OUT receptacle on the receiver.		
33	SERVICE switch Teletypewriter TT-98B/FG	Set to NOR.		
34	MOTOR switch	Set to OFF.		
35	LIGHT switch	Set to OFF.		
36	Ground	Check connections at teletypewriter terminals.		
37	Ac power cable	Connected to the AC receptacle on the rotary converter.		
38	Typing unit	Paper and ribbon properly installed	Visible -----	Consult the teletypewriter manual.

PREPARATORY

PERFORMANCE

39	Teletypewriter Reperforator Transmitter TT-76(°)/GGC. Teletypewriter receive cable (W237).	Connected between the REC connector on the reperforator and terminals 3 and 4 of the teletypewriter. (The black lead must be connected to terminal 3 and the white lead to terminal 4 on the teletypewriter.) Set to OFF. Set to OFF. Set to OFF. Check connections. Be sure all power connections are in OFF position while checking. Power cord plugged in to the AC receptacle on the rotary converter.
40	POWER switch -----	Set to OFF.
41	MOTOR switch -----	Set to OFF.
42	LIGHT switch -----	Set to OFF.
43	Ground -----	Check connections. Be sure all power connections are in OFF position while checking.
44	Power cord -----	Power cord plugged in to the AC receptacle on the rotary converter.
45	Internal ac POWER switch -----	In ON position.
46	Paper tape -----	Check for adequate supply; be sure that paper tape is positioned correctly through its guides, under type wheel, and through pun and die assembly.
47	Inking ribbon -----	In proper position around spools and rollers, and passed through guide slots.

Step No.	Unit	Action or condition	Normal indication	Corrective measure
48	Interconnecting Box J-668/GB	Set for BIAS reading.	Lights light.....	Check lamps.
49	BIAS 30 MA-LINE 60 MA switch	Set to ON.....	Blower starts.....	Check fuse F1.
50	LIGHTS switch	Set to ON.....	DC VOLTS meter indicates 27.5 volts.	
51	BLOWER switch	Set to ON.....		
52	MAIN POWER circuit breakers	Turn to STANDBY.....	Test meter indicates normal (mid-point BATTERY scale).	If there is no meter indication, check FUSE 15 AMP 24 VOLT and/or power cable and connections.
52	Radio Transmitter T-195/GRC-19			
52	SERVICE SELECTOR switch			



EQUIPMENT PERFORMANCE

Step No.	Unit	Action or condition	Normal indication	Corrective measures
53	Radio Receiver R-392/URR Function switch	Turn to NORMAL	Air intake and exhaust blowers operate (feel for movement of air). Low-voltage dynamotor starts within 40 seconds (can be heard). Dial lamps light	If fuse continues to blow, refer to the transmitter manual. If meter indication is abnormal, use an external voltmeter to check the power source. 28 volts dc is required for proper operation. If above corrective measures do not remedy the trouble, refer to the transmitter manual (Appendix II). Refer to the transmitter manual.
54	Radio Transmitter Modulator MD-208/GR. POWER switch	Set to ON	Rushing sound heard in headphones or over speaker. Power indicator lamp lights	Check power cable. Check vehicular battery. Check fuses and dial lamps. The 10 screws securing the frequency indicator dial window (on the front panel) must be removed to replace or check dial lamps. Check tubes and connectors between subchassis.
55	Frequency Shift Converter CV-378/GR. POWER switch	Set to ON	Power indicator lamp lights	If indicator lamp does not light, check fuse and lamps. Check connection to junction box. If indicator lamp does not light, check fuse and lamp. Check connection to junction box.

EQUIPMENT PERFORMANCE

56	<p><i>Radio Receiver R-992/URR</i> MEGACYCLES and KILOCYCLES controls.</p>	<p>Set MEGACYCLES control at any desired band. Tune through band by rotating KILOCYCLES control.</p>	<p>Signals are heard in headphones or loud speaker.</p>	<p>If signals are weak, adjust ANT TRIM control for stronger signal. If no signals are heard, check connections at ANT connector. Check tubes in receiver. Refer to receiver manual.</p>
57	<p>RF GAIN SQUELCH THRESH control. (AGC switch at ON.).</p>	<p>Tune in a station; then rotate the control in one direction and then the other.</p>	<p>Strength of signal increases and decreases.</p>	<p>Refer to receiver manual.</p>
58	<p>AF GAIN control -----</p>	<p>Rotate control in one direction and then in the other.</p>	<p>Strength of signal increases and decreases.</p>	<p>Check V603. Refer to receiver manual.</p>
59	<p>Function switch -----</p>	<p>Turn to LIMITER</p>	<p>Noise peaks are reduced in amplitude.</p>	<p>Check V602, V605, and V609. Refer to receiver manual.</p>
60	<p>AGC switch (FUNCTION switch at NORMAL).</p>	<p>Turn to SQ. TUNE in several stations in turn. With AGC switch set to ON, tune to a station giving a strong indication on the CARRIER LEVEL meter. Turn AGC switch to OFF. Turn switch to CAL and vary KILOCYCLES control over its complete range.</p>	<p>No noise heard between stations</p>	<p>Check V601, V602, and V609. Refer to the receiver manual.</p>
61	<p>BFO PITCH control -----</p>	<p>Tune in a cw carrier with KILOCYCLES control. Rotate BFO PITCH control to either side of zero.</p>	<p>Indication on CARRIER LEVEL meter decreases to a zero reading when switch is turned to OFF. Calibration signal heard every 100KC throughout the band.</p>	<p>Check V701, V702, and V703. Refer to receiver manual. Refer to the receiver manual.</p>
62	<p>BAND WIDTH switch -----</p>	<p>Turn BFO switch to OFF. Tune receiver to a modulated signal; then place BAND WIDTH switch in each position, 8KC, 4KC, and 2KC.</p>	<p>Change in pitch of audio tone</p>	<p>Refer to receiver manual.</p>
63	<p><i>Frequency Shift Converter CV-278/GR.</i> SIGNAL INPUT meter -----</p>	<p>Tune receiver to a teletypewriter signal.</p>	<p>Selectivity becomes sharper and noise decreases as bandwidth decreases. Only low-frequency audio is heard when switch is at 2KC position.</p>	<p>Refer to receiver manual.</p>
64	<p>DISCRIMINATOR meter -----</p>	<p>As the teletypewriter signal in step 63 above, is tuned for maximum on the SIGNAL INPUT meter, observe the DISCRIMINATOR meter.</p>	<p>As signal is properly tuned in, SIGNAL INPUT meter indicates maximum. DISCRIMINATOR meter pointer should oscillate about the zero point.</p>	<p>Check cabling. Refer to frequency-shift converter manual. Refer to frequency-shift converter manual.</p>

Before checking the remainder of the equipment, the receiver must be calibrated as follows:

## EQUIPMENT PERFORMANCE

Step No.	Unit	Action or condition	Normal indication	Corrective measure
65	BFO switch	At ON.		
66	AGC switch	Set to CAL.		
67	RF GAIN	Set full clockwise.		
68	AUDIO GAIN	Set halfway.		
69	BFO PITCH	Set to zero.		
70	MEGACYCLES control	Set to assigned band	Desired band appears in window.	Refer to receiver manual.
71	BAND WIDTH switch	Set to 2KC.		
72	KILOCYCLES control	Set to 100KC point nearest the assigned frequency. Adjust control so that scale markings are aligned.	The zero beat may or may not occur when the scale markings are aligned. If they are off a space or less refer to steps 72 and 74 to correct the error.	Refer to receiver manual.
73	DIAL ZERO	Lock.		
74	KILOCYCLES control	Turn very slightly so that zero beat and dial scale coincide.	With the DIAL ZERO locked, do not turn KILOCYCLES control too far; a slight adjustment should be adequate.	Refer to receiver manual.
75	DIAL ZERO	Unlock.		
76	BAND WIDTH switch	Set to 4KC or 8KC.		
77	KILOCYCLES control	Set to assigned frequency.		
78	AGC switch	Set to AGC.		
79	Function switch <i>Radio Transmitter Modulator MD-208/GR.</i>	Set to NET.		
80	MCS BAND SELECTOR switch	This switch must be set at the same frequency band that the receiver and transmitter are calibrated for.		
81	<i>Radio Transmitter T-195/GRC-19</i> PRESET CHANNELS switch	Set to position 1 through 7, in turn	For each position of the PRESET CHANNELS switch, the auto-tune circuit will automatically tune the transmitter to the proper frequency indicated in the chart on the front panel.	Refer to transmitter manual.
82	PRESET CHANNELS switch	Set to M (manual) position.		
83	BAND SELECTOR control	Loosen locking bar and turn to band available for test purposes. Loosen locking bar and turn to frequency available for test purposes. Frequency must be within the band limits appearing in the band indicator window.		
84	TUNING CONTROL			

EQUIPMENT PERFORMANCE

85	SERVICE SELECTOR switch -----	Turn to VOICE/FSK position.	Radio Transmitter Modulator
86	TEST METER switch -----	Turn to PA GRID.	MD-203/GR must be turned
87	TEST KEY -----	Hold in ON position.	ON. The MCS BAND SELEC-
			TOR switch must be set to the
			same frequency range as the
			transmitter. Refer to modulator
			manual. If modulator is found
			to be operating properly, refer
			to transmitter manual.
88	TEST METER switch -----	Release TEST KEY.	High-voltage dynamotor stops.
89	TEST KEY -----	Turn to PA CATHODE.	Test meter indicates zero.
		Hold in ON position.	Same as step 87 except test meter
90	Hand microphone -----	Release TEST KEY.	indicates PA cathode current
		Press button on microphone and	within the shaded area.
		speak in a normal voice into mi-	Same as step 87.
		crophone (hold about 2 inches	Cathode current should be indi-
		from lips).	cated within shaded area marked
91	BAND SELECTOR control -----	Tighten locking bar.	PA CATHODE on test meter.
92	TUNING CONTROL -----	Tighten locking bar.	The indication should fluctuate
93	RELAY - NORMAL - DUPLEX	Set to DUPLX.	slightly while speaking. Voice
	switch.		peaks produce 88% or -2VU
94	SERVICE SELECTOR switch -----	Set to CALIBRATE.	indication on audio level meter.
95	PRESET CHANNELS switch -----	Set to position 1.	The autotune mechanism will set
			the transmitter to the frequency
			for which position 1 was pre-
			viously adjusted.
96	BAND SELECTOR control -----	Loosen locking bar. Adjust BAND	As the TUNING CONTROL is
		SELECTOR so that the assigned	adjusted to the assigned fre-
		band appears in the window.	quency, zero beat is heard.
		<i>Note.</i> For purpose of this check list,	When exact zero beat is ob-
		the assigned frequency should be the same	
		as that used to calibrate receiver. Step 66	
		through 79.	
97	TUNING CONTROL -----	Tighten locking bar.	
		Loosen locking bar. Adjust so that	
		assigned frequency appears in	
		window. Adjust for zero beat as	
		heard on receiver speaker.	

## EQUIPMENT PERFORMANCE

Step No.	Unit	Action or condition	Normal indication	Corrective measure
98	RELAY - NORMAL - DUPLEX switch. <i>Interconnecting Dox J-668/GR</i>	<i>Note.</i> The assigned frequency for this checklist is the same as the frequency to which the receiver is calibrated in Step 66 through 79. Place in NORMAL position.	tained the receiver and transmitter are both calibrated to the same frequency.	
99	TTY switch <i>Teletypewriter Reperforator Transmitter TT-76(*)/GGC.</i>	Set to ON.	TTY rotary converter starts	Check cables and check fuse.
100	SELECTOR switch	Place in position 3. LOCAL PUNCH.		
101	Reperforator keyboard	Punch an RY test tape Refer to reperforator manual for detailed instructions for punching test tape.	As the reperforator keyboard is struck, punched tape feeds out of machine at the left.	Refer to the reperforator manual.
102	SELECTOR switch	Place in position 2. TD SEND LOCAL PUNCH.		
103	Transmitter distributor	Insert the test tape in the transmitter distributor.	Make sure tape is inserted properly. Tape is polarized to fit in transmitter distributor one way only.	Refer to reperforator manual.
104	SEND-REC-MARK HOLD switch on shelf between teletypewriters.	Place in the SEND position.		
105	Transmitter distributor START-STOP-FEED RETRACT switch.	Place in the START position	Tape is fed through the transmitter distributor.	Refer to reperforator manual.
106	Transmitter TUNING CONTROL	Tune for a maximum indication on Frequency Shift Converter CV-278/GR SIGNAL INPUT meter and for a fluctuation about zero on the DISCRIMINATOR meter. This places the transmitter on the same frequency as the receiver.	As the transmitter is tuned to the receiver frequency, a maximum indication is observed on the SIGNAL INPUT meter, and the DISCRIMINATOR meter fluctuates about zero.	Check to see that the frequency shift converter is turned on. Check to see that the modulator is turned on.
107	SERVICE SELECTOR switch	Tighten locking bar.		
108	Receiver function switch	Place in VOICE/FSK.		
109	BFO switch <i>Teletypewriter TT-98B/FG</i>	Place in the OFF position.		
110	Typing unit and keyboard	With all switches set to ON equipment lined up, type at least 5 consecutive copies of a test message.	Teletypewriter runs closed (quiet) on steady marking current when not sending or receiving. Receives good copy when distant	Check and clean transmitter and contacts, line cords, and plugs. Consult teletypewriter manual.

111	Space bar -----	Pressed down momentarily-----	station sends; receives good copy from local machine sending if operation is half duplex. Inserts single space as between words.	Refer to teletypewriter manual.
112	REPEAT key -----	Press the REPEAT key and any letter of the alphabet.	Continues to send the letter transmitted as long as the two keys are depressed. Motor should stop.	Refer to teletypewriter manual.
113	H (STOP) key -----	Depress FIGS, then H (STOP) keys.	Motor should start when line is closed by releasing switch.	Refer to teletypewriter manual.
114	LINE BREAK switch -----	With POWER and MOTOR switches at ON, operate the switch to BREAK.	Should ring on 66th character on left in standard circuit, on 70th character in weather circuits, and on 64th character in British circuits.	Refer to teletypewriter manual.
115	Margin bell -----	-----	Ribbon should be fed and lifted each time a character is typed. Signal bell should ring-----	Check seating of ribbon spools and driving collar. Check bell clapper and function punch bar.
116	Ribbon-feed mechanism -----	-----	Platen should rise to upper case when FIGS key is depressed, and return to lower case when LTRS key is depressed.	Adjust platen shift; clean function punch bars.
117	Signal bell -----	Press FIGS key, then S key-----	Type bar carriage returns to left line (should also work from any part of typed line).	Check CAR. RET. link adjustment. Refer to the teletypewriter manual.
118	LTRS and FIGS keys -----	Press FIGS, then LTRS keys (alternately) several times.	Paper rolls up one or two spaces as adjusted.	Examine line-feed sensing lever spring, and replace if necessary; check lever adjustment.
119	CAR. RET -----	Type bar carriage at end of typed line (should also work from any part of typed line). Press LINE FEED key (usually operated after CAR. RET. to give sufficient time for carriage-return operation).	Message typed on keyboard-transmitter will punch tape. Paper tape should feed properly-----	Check switch.
120	LINE FEED -----	-----	Lamp should light on operation of 66th character. When depressed, END OF LINE INDICATOR lamp should extinguish; indicator mechanism should return to zero position.	Check paper tape reel guides. Check lamp and contacts.
	<i>Teletypewriter Reperforator Transmitter TT-76 (*)/GGC.</i>			
121	KEYBOARD switch -----	Place in SEND position. (SELECTOR switch in position 3). Depress space bar and hold REPEAT key depressed.		Refer to the reperforator manual.
122	Tape feed (reperforator) -----	Depress R and Y alternately-----		
123	END OF LINE INDICATOR lamp -----	-----		
124	CAR. RET. key -----	-----		

A D V I S O R Y I N F O R M A T I O N

Step No.	Unit	Action or condition	Normal indication	Corrective measure
125	REPEAT key	Repress and hold any key and the REPEAT key.	Selected character should repeat as long as both keys are held depressed.	Refer to the reperforator manual.
126	BREAK key	Depress key	Opens signal line.	Check key.
127	Type wheel	Receive test message	Should be projected and restored for each operation and should shift to figures position properly.	Check bell crank assemblies and operation of the type wheel drive lever. Refer to the reperforator manual.
128	Inking ribbon feed mechanism	Receive test message	Inking ribbon should feed as every other character is typed.	Check inking ribbon in guides and ribbon feed pawl action. Refer to the reperforator manual.
129	Code and feed punches	Strike R and Y keys on keyboard	Tape with R's and Y's punched out of reperforator.	Check punch arm, code punch lever, and code hole punches. Refer to the reperforator manual.
130	Manual tape feed-out lever	Move lever to left	Paper tape should feed-out; BLANK symbol will print on paper tape.	Check transfer lever trip latch, and manual tape feed-out linkage. Refer to the reperforator manual.
131	Signal bell mechanism	Depress S key	Bell will ring when the machine is in the figures position and the S code group is received or sent.	Check signal bell sensing lever, clapper, and bell. Refer to the reperforator manual.
132	Back-space lever	Operate lever	Paper tape should back space one space for each operation.	Check back-space pawl and spring. Refer to the reperforator manual.
133	KEYBOARD switch	Operate to LOCK	No transmission possible from keyboard-transmitter.	Check switch.
134	Transmitter-distributor	Test paper tape in position. STOP-START lever at START.	Transmitter-distributor should transmit from tape.	Check tight-tape and tape-out linkage and power supply. Refer to the reperforator manual.
135	Tight-tape lever (on transmitter-distributor).	Raise lever	Transmitter-distributor should stop.	Check tight-tape and tape-out linkage. Refer to the reperforator manual.
136	Tape-out lever	End of message tape passes over tape-out lever.	Transmitter-distributor should stop.	Check tape-out lever, tape-out linkage, and switch. Refer to the reperforator manual.

## EQUIPMENT PERFORMANCE

Shop No.	Unit	Action or condition	Normal indication	Corrective measure
137	Teletypewriter Repeater Transmitter TT-76(*)/GGC	Turn to OFF	Motor should stop	Check action of switch.
138	MOTOR switch	Turn to OFF	Light should be extinguished	Check switch.
139	LIGHT switch	Turn to OFF	Supply of power to power supply and terminal unit is cut off.	Check switch.
140	Teletypewriter TT-98B/SG	Turn to OFF	Motor should stop	Check switch action.
141	MOTOR switch	Turn to OFF	Lights extinguish	Check switch action.
142	LIGHT switch	Turn to OFF	All power removed from equipment.	Check switch action.
143	Frequency Shift Converter CV-278/GR. SERVICE switch	Turn to OFF	Indicator light should extinguish	Check SERVICE switch.
144	Radio Transmitter Modulator MD-203/GR. POWER switch	Turn to OFF	Indicator light should extinguish	Check POWER switch.
145	Radio Receiver R-292/URR Function switch	Turn to STANDBY	Receiver is silent. Dial lamps remain lighted.	Refer to the receiver manual.
146	Function switch	Turn to OFF	Dial lamps not lighted.	
147	Radio Transmitter T-195/GRC-19 SERVICE SELECTOR switch	Turn to OFF	Dial lamps off. Dynamotors and blowers stop.	Refer to the transmitter manual.
148	Interconnecting Box J-666/GR CRYPT switch	Set at OFF	Crypt rotary converter stops	
149	TTY switch	Set at OFF	TTY rotary converter stops.	
150	BLOWER switch	Set at OFF	Blower stops.	
151	MAIN POWER circuit breakers	Set at OFF	DC VOLTS meter falls off to 0.	
152	LIGHTS switch	Set at OFF	Lights extinguish.	

A O E 9



## 19. Heater Troubleshooting

The repair of a defective heater is to be performed at a higher echelon. If heater is inoperative, replace with new heater and forward the defective heater to a higher echelon for repair.

## 20. Tube Testing Techniques

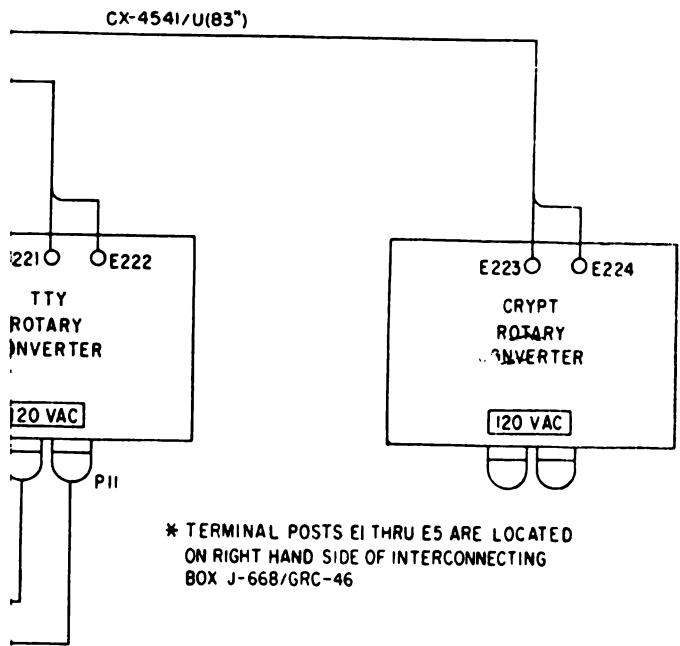
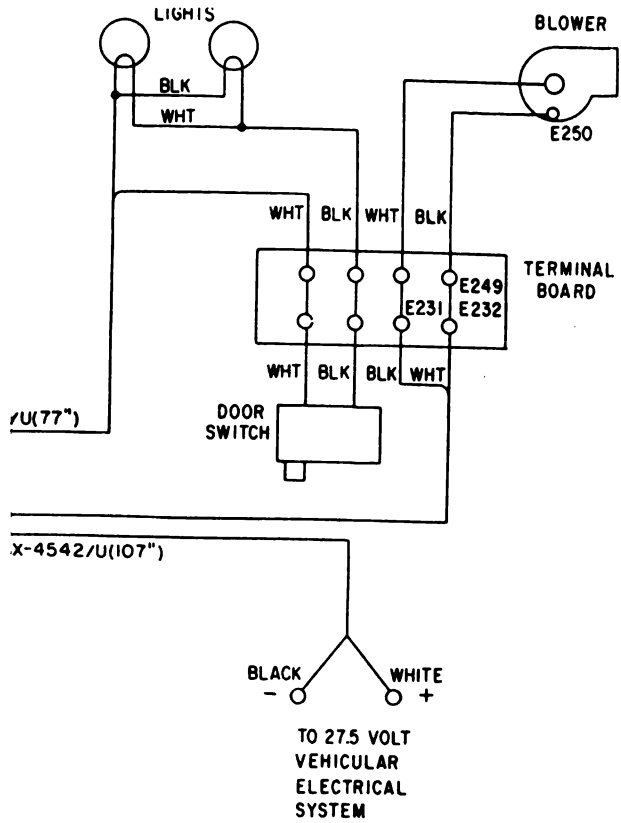
When trouble occurs, check the fuses, all cabling, connections, and batteries before removing any tubes. Try to localize the trouble to a component or stage. If tube failure is suspected, use the applicable procedure to check the tubes. Check the tubes visually for obvious troubles such as open heaters.

**Caution:** Do not rock or rotate a tube when removing it from a socket; pull it straight out with a tube puller.

*a. Use of Tube Tester.* Remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester. Put back the original tube, or insert a new one if required, before testing the next one.

*b. Tube Substitution Method.* Replace a suspected tube with a new tube. If the equipment remains inoperative, remove the new tube and put back the original tube. Repeat this procedure with each suspected tube until the defective tube is located.

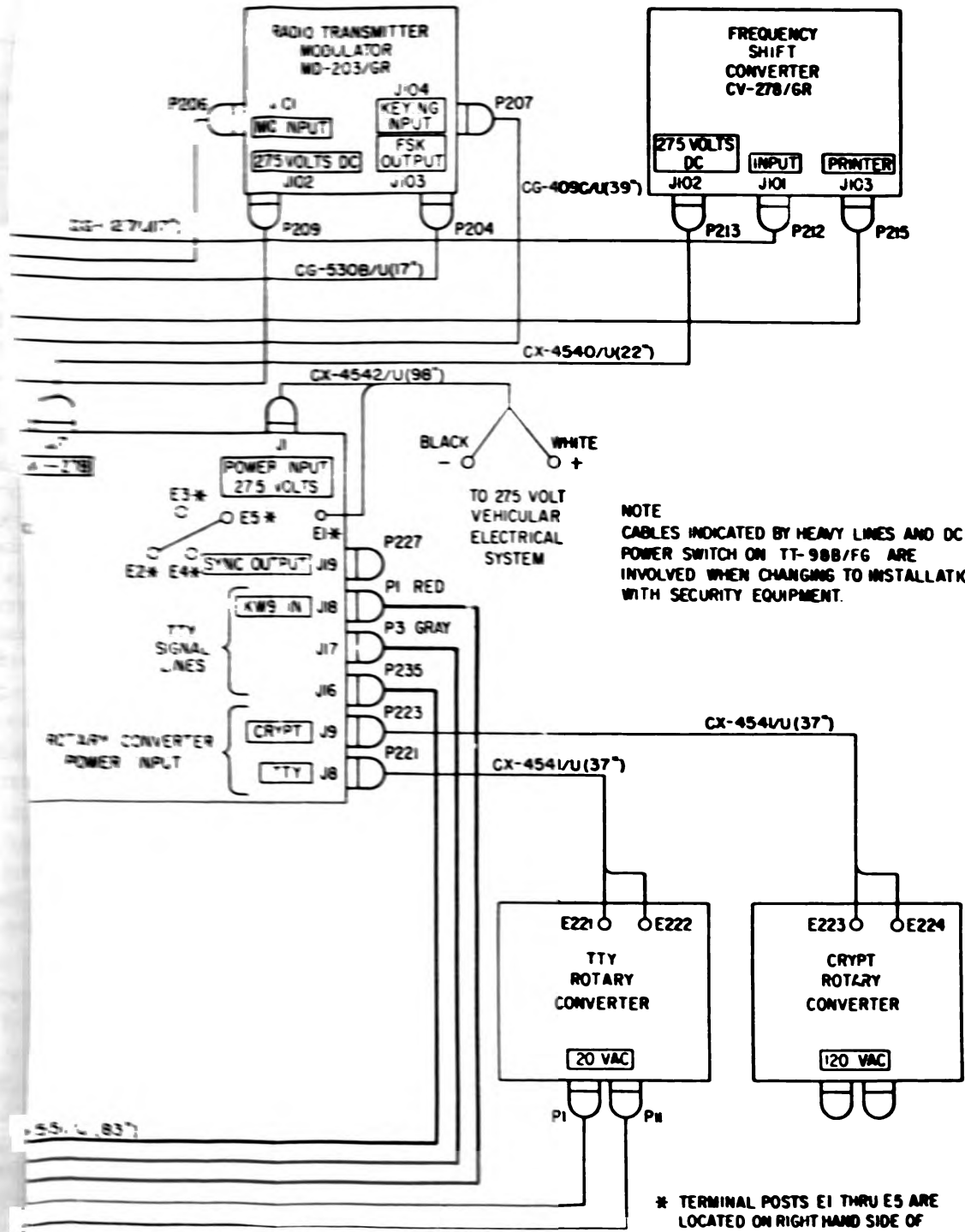
*c. Tube Replacement.* For detailed instructions on tube replacement refer to the technical manual covering the equipment in question.



TM5815-204-20-7



WDC  
LINE  
48/11



NOTE  
CABLES INDICATED BY HEAVY LINES AND DC  
POWER SWITCH ON TT-98B/FG ARE  
INVOLVED WHEN CHANGING TO INSTALLATION  
WITH SECURITY EQUIPMENT.

\* TERMINAL POSTS E1 THRU E5 ARE  
LOCATED ON RIGHT HAND SIDE OF  
INTERCONNECTING BOX J-668/GRC-4

Change diagram for simplex connections.

TM5815-204-20



## CHAPTER 3

### SHIPMENT AND LIMITED STORAGE

#### 21. Disassembly of Equipment

The following instructions are recommended as a guide for preparing the Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29 for shipment and storage:

##### a. Radio Teletypewriter Set AN/GRC-46.

- (1) Turn all the power switches off.
- (2) Remove the main power cable from the truck battery and pull it into the shelter; replace the cap on the opening.
- (3) Tighten all the shock mounts and equipment mounting bolts.
- (4) Remove the inlet and outlet air ducts from the transmitter. Replace the covers to seal the air vents in the transmitter.
- (5) Remove the whip antenna sections, rope, mast base, antenna lead, mast base bracket, and store them in the shelter.
- (6) Remove the exhaust pipe from the heater, and store it in the shelter.
- (7) Remove the ground strap and store it in the shelter.
- (8) Empty the chad cup.
- (9) Turn the two captivating hooks to lock the carriage in Teletypewriter TT-98B/FG. (See the applicable technical manual.)

##### b. Radio Teletypewriter Set AN/VRC-29.

- (1) Perform procedures given in a(1) through (9) above.
- (2) Remove all cables from the equipment.
- (3) Remove the teletypewriter, reperforator, frequency-shift converter, modulator, junction box, receiver, and transmitter from the armored vehicle.
- (4) Remove all components of the AN/VRC-29 from the vehicle.

#### 22. Repackaging 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 possible. For information concerning the original packaging, refer to paragraph 4.

a. *Material Required for AN/GRC-46.* The following materials are required for packaging Radio Teletypewriter Set AN/GRC-46. For stock numbers of materials, refer to SB 38-100.

Material	Quantity
Twine (heavy) -----	215"
Waterproof bag (for manuals) -----	As required
Neutral paper -----	119"
Neutral envelopes (large size) -----	25"
Single face corrugated paper -----	135"
Kraft tape -----	As required
Pressure-sensitive tape -----	80"
Cloth bag -----	As required
Box (6 3/4" x 6 3/4" x 6 3/4" approx) ----	1
Wadding (Kimpack) -----	As required
Grade A paper -----	45"
Fiberglass Filament tape (1/2") -----	80"
Reverse tuck box (1" x 1" x 2 1/4" approx).	5
Reverse tuck box (1 1/2" x 1 1/2" x 2 1/2" approx).	2
Reverse tuck box (6 3/4" x 6 3/4" x 6 3/4" approx).	1
Cellulose wadding -----	As required
Tissue -----	As required

##### b. Material Requirements for AN/VRC-29.

Material	Quantity
Wooden box (25" x 20 1/8" x 24 1/4") --	1
Strapping (5/8" x 91") -----	1
Strapping seals -----	2
Filler material -----	As required
No. 8 nails -----	As required
Staples -----	As required

*c. Material Requirements for Rotary Converter.*

Material	Quantity
Corrugated carton (15 1/4 x 9 1/2 x 11 1/2)	1
Corrugated carton (14 1/2 x 8 3/4 x 10 1/2)	1
Filler (9 3/4 x 39 1/2)	1
Filler (9 3/4 x 46)	1
Foil bag (22 1/2 x 28 1/2)	1
Plywood base (14 1/2 x 8 3/4 x 1/4)	1
Kraft tape (3" x 70")	1
Neutral paper (18" x 36")	1
Carriage bolt (1/4"-20 x 1")	4
Hexagonal nut (1/4"-20)	4
Plain washer (1/4" ID)	4
Pressure-sensitive tape (2" x 115 1/2")	1
Desiccant bags (16 unit)	3
Humidity indicator	1

*d. Material Requirements for Mounting MT-791/U.*

Material	Quantity
Corrugated carton (13 1/4" x 9" x 4")	1
Filler (3 1/2" x 43 3/4")	1
Filler (8 1/2" x 12 1/2")	1
Neutral paper (28" x 30")	1
Pressure-sensitive tape (2" x 102")	1

*e. Material Requirements for Junction Box.*

Material	Quantity
Corrugated carton (18" x 10 1/4" x 7 3/4")	1
Filler (7 3/4" x 55 3/4")	1
Foil bag (21 1/4 x 31)	1
Corrugated carton (18 3/4" x 10 3/4" x 9")	1
Neutral paper (50" x 18")	1
Kraft tape (3" x 80")	1
Carriage bolts (1/4"-20" x 1")	4
Hexagonal nuts (1/4"-20")	4
Flat washer	4
Plywood base (18" x 10 1/4" x 1/4")	1
Pressure-sensitive tape (2" x 124")	1
Desiccant bag (16 unit)	3
Humidity indicator	1
(Front panel protector plywood) (18" x 10 1/4" x 1/4").	1

*f. Material Requirements for Frequency-shift Converter.*

Material	Quantity
Corrugated carton (19 1/2" x 9 1/2" x 8 1/2").	1
Corrugated carton (9 1/2" x 8 1/4" x 4")	1
Filler (32 1/2" x 12 1/2")	1
Filler (31 1/2" x 14 1/2")	1
Filler (9 1/2" x 17")	1
Pressure-sensitive tape, 2 inches wide	205"
Grade A paper (24" x 37")	1
Foil bag (22 1/2" x 28 1/2")	1
(1/4-inch plywood front panel protector) (9 3/4" x 7 3/4" x 1/4").	1

*g. Material Requirements for Modulator.*

Material	Quantity
Corrugated carton (19 1/2" x 9 1/2" x 8 1/2").	1
Corrugated carton 9 1/2" x 8 1/4" x 4")	1
Filler (32 1/2" x 12 1/2")	1
Filler (31 1/2" x 14 1/2")	1
Filler (9 1/2" x 17")	1
Pressure-sensitive tape, 2 inches wide	205"
Grade A paper (24" x 37")	1
Foil bag (22 1/2" x 28 1/2")	1
(1/4-inch plywood front panel protector) (9 3/4" x 7 3/4" x 1/4").	1

*h. Bulk Material for AN/VRC-29.*

(1) *Rotary Converters.* The following list of bulk material is required for packaging the two rotary converters:

Material	Quantity
Fiberboard	50 sq ft
Grade A paper	14 sq ft
3" wide tape	400"
1/4" thick plywood	2 sq ft

(2) *Mountings MT-791/U.* The following list of bulk material is required for packaging the two Mountings MT-791/U:

Material	Quantity
Fiberboard	12 sq ft
Grade A paper	6 sq ft
3" wide tape	188"

- (3) *Radio Transmitter Modulator MD-208/GR and Frequency-Shift Converter CV-278/GR.* The modulator and frequency-shift converter have the same outside dimensions. The bulk material for packaging two units is given in the following list:

Material	Quantity
Fiberboard .....	33 sq ft
Grade A paper .....	24 sq ft
3" wide tape .....	288"
( $\frac{1}{4}$ "-thick plywood front panel protector).	1 sq ft

- (4) *Junction box.* The following list of material is for packaging one interconnecting box:

Material	Quantity
Fiberboard .....	17 sq ft
Grade A paper .....	7 $\frac{1}{2}$ sq ft
3" wide tape .....	225"
$\frac{1}{4}$ " thick plywood .....	1 $\frac{1}{2}$ sq ft
( $\frac{1}{4}$ "-thick plywood front panel protector).	1 $\frac{1}{2}$ sq ft

### 23. Packaging Radio Teletypewriter Set AN/GRC-46

Follow the procedure below for preparing the radio teletypewriter set for shipment and limited storage. The original packing list will be useful.

- a. Disconnect exhaust hoses from Radio Transmitter T-195/GRC-19 and replace covers on the exhaust and intake to closed position.
- b. Place the exhaust hoses in an envelope or bag and tie them with 45 inches of twine to the third mounting clamp of the transmitter.
- c. Lock the slide shelves in position.
- d. Clean out the chad bin.
- e. In Electrical Equipment Shelter S-89C/G, close and secure the windows and blackout blinds. Clean the window glass.
- f. Tighten the cable outlet caps.
- g. Secure the covers on the ventilators.

h. Cover the holes of the exhaust port with one 8 $\frac{1}{2}$ -inch strip of 1-inch pressure-sensitive tape and 28-inch strip of 3-inch pressure-sensitive tape around the edge.

i. Cover the heater exhaust elbow with two 4-inch pieces of pressure-sensitive tape, 3 inches wide.

j. Cover the heater louver with one 5-inch strip of 3-inch pressure-sensitive tape.

k. Cover the ventilation fan outlet with a 10-inch strip of pressure-sensitive tape, 3 inches wide. Place 1 inch on the edge and fold it over to the sides and bottom. Place a 12-inch strip over the bottom and sides to make a complete closure.

l. Cover the antenna plate opening with a 3-inch strip of pressure-sensitive tape, 3 inches wide.

m. Pack the spare parts into the wooden spare parts box.

n. Touch up scratched paint on the shelter with pretreatment coating followed with olive-drab paint.

o. Clean the floor and walls with soap and water.

p. Secure the packaged wooden stakes to box No. 3 of the AN/GRC-19 with two bands of fiberglass filament tape.

q. Tie two 20-inch lengths of twine to each operator's seat support, positioned left and right toward the door, with the bottom twine placed on the floor toward the door.

r. Position the accessories box and wooden stakes between the heater compartment and place the seat supports over the twine. Tie the two ends on each side as tight as possible.

s. Tie the seat supports on each side with a 25-inch piece of heavy twine to avoid support rattle.

t. With a 50-inch piece of heavy twine, tie the seats across, from the left seat frame to the right seat frame; secure them as tight as possible.

u. Close the wooden box cover with the hook.

v. Close the door and lock the padlock. Place the two keys in the cloth bag and secure them to the handle with wire.



**24. Packing Radio Teletypewriter Set AN/GRC-46**

Radio Teletypewriter Set AN/GRC-46 is to be protected by an open wooden crate. Construct the crate as shown in figure 1. Drain the fuel tank.

Material	Quantity
Wood crate MIL-C-132A, (87½" x 64½" x 62½") (ID) (7'9" long x ¾" wide x 6'1" high).	1
6 penny nails -----	As required
7 penny nails -----	As required
10 penny nails -----	As required
Strapping (nailed) -----	As required

**25. Packaging Radio Teletypewriter Set AN/VRC-29**

Package the components of Radio Teletypewriter Set AN/VRC-29 as outlined below if the original packaging is not available. (Refer to the applicable technical manuals and par. 23.)

*a. Components.* Cushion the component on

all surfaces with pads of filler material. Place the cushioned unit within a wrap of corrugated cardboard. Secure the wrap with gummed tape.

*b. Spares, Cables, etc.* Wind each cable assembly into a coil of convenient dimension and tie it with cotton twine. Package the antenna mast, connectors, and adapters to insure mechanical and physical protection. Use filler material to cushion each item as required. Consolidate the miscellaneous components within a wrap of corrugated cardboard.

**26. Packing Radio Teletypewriter Set AN/VRC-29**

Pack each of the consolidated packages in a large nailed wooden box.

Material	Quantity
Wooden box (25" x 20½" x 24½") (ID).	1
Strapping (¾") -----	91"
No. 8 nails -----	As required
Staples -----	As required

## APPENDIX I REFERENCES

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Following is a list of applicable references that are available to the unit repairman of Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29:

SB 38-100	Preservation, Packaging and Packing Materials, Supplies and Equipment Used in the Army.
TM 11-274	Radio Set AN/GRC-19.
TM 11-806	Radio Transmitter T-195/GRC-19.
TM 11-858	Radio Receiver R-392/URR.
TM 11-2225	Teletypewriter Sets AN/GGC-3 and AN/GGC-3A and Teletypewriter Reproforator-Transmitters TT-76/GGC, TT-76A/GGC, and TT-76B/GGC.
TM 11-2230	Teletypewriter Sets AN/FGC-20, AN/FGC-20X, and AN/UGC-4.
TM 11-5805-210-10	Operator's Manual: Frequency Shift Converter CV-278/GR.
TM 11-5805-210-20	Organizational Maintenance, Second Echelon: Frequency Shift Converter CV-278/GR.
TM 11-5815-204-10	Operator's Manual: Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29.
TM 11-5820-205-10	Operator's Manual: Radio Transmitter Modulator MD-203/GR.
TM 11-5820-205-20	Organizational Maintenance, Second Echelon: Radio Transmitter Modulator MD-203/GR.

**APPENDIX II**  
**MAINTENANCE ALLOCATION CHARTS**

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The maintenance allocation charts for Radio Teletypewriter Set AN/GRC-46 and Radio Teletypewriter Set AN/VRC-29 are bound separately. They are identified as follows:

Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Radio Tele-

typewriter Set AN/GRC-46: TM 11-5815-224-20P.

Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Radio Teletypewriter Set AN/VRC-29: TM 11-5815-223-20P.

[AG 413.48 (20 Aug 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

**L. L. LEMNITZER,**  
*General, United States Army,*  
*Chief of Staff.*

Official:

**R. V. LEE,**  
*Major General, United States Army,*  
*The Adjutant General.*

Distribution:

*Active Army:*

Def Atomic Spt Agcy (5)  
USASA (2)  
CNGB (1)  
Tech Stf, DA (1) except  
  CSigO (18)  
Tech Stf Bd (1)  
USA Arty Bd (1)  
USA Armor Bd (1)  
USA Inf Bd (1)  
USA AD Bd (1)  
USA Abn & Elet Bd (1)  
USA Avn Bd (1)  
USA ATB (1)  
USCONARC (5)  
US ARADCOM (2)  
US ARADCOM Rgn (2)  
OS Maj Comd (5)  
OS Base Comd (5)  
Log Comd (5)  
MDW (1)  
Armies (5) except  
  First US Army (7)  
Corps (2)  
Div (2)  
USATC (2)  
Svc Colleges (5)

Br Svc Sch (5) except  
  USASCS (29)  
GENDEP (2) except  
  Atlanta GENDEP (None)  
Sig Sec, GENDEP (10)  
Sig Dep (17)  
Army Pictorial Cen (2)  
Engr Maint Cen (1)  
USA Ord Mal Comd (3)  
USASSA (15)  
USASSAMRO (1)  
USA Sig Pub Agcy (8)  
USA Sig Engr Agcy (1)  
USA Comm Agcy (2)  
USA Sig Eqp Spt Agcy (2)  
USA Sig Mal Spt Agcy (18)  
WRAMC (1)  
AFIP (1)  
AMS (1)  
Ports of Emb (OS) (2)  
Trans Terminal Comd (1)  
Army Terminals (1)  
OS Sup Agcy (1)  
Yuma Test Sta (2)  
USA Elet PG (1)  
Sig Lab (5)

<b>Sig Fld Maint Shops (3)</b>		<b>10-22 (2)</b>	<b>17-77 (2)</b>
<b>Mil Dist (1)</b>		<b>10-45 (2)</b>	<b>29-51 (2)</b>
<b>USA Corps (Res) (1)</b>		<b>10-46 (2)</b>	<b>29-61 (2)</b>
<b>Sector Comd, USA Corps (Res) (1)</b>		<b>10-157 (2)</b>	<b>29-71 (2)</b>
<b>JBUSMC (2)</b>		<b>10-347 (2)</b>	<b>29-72 (2)</b>
<b>Units org under fol TOE:</b>		<b>10-348 (2)</b>	<b>44-12 (2)</b>
1-57 (2)	0-536 (2)	10-536 (2)	44-15 (2)
5-15 (2)	6-545 (2)	11-5 (2)	44-16 (2)
5-16 (2)	6-585 (2)	11-7 (2)	44-25 (2)
5-215 (2)	6-634 (2)	11-16 (2)	44-36 (2)
5-216 (2)	6-635 (2)	11-37 (2)	44-36 (2)
5-464 (2)	7-11 (2)	11-39 (2)	44-36 (2)
0-100 (2)	7-12 (2)	11-55 (2)	44-115 (2)
6-101 (2)	7-25 (2)	11-57 (2)	44-116 (2)
6-125 (2)	7-26 (2)	11-97 (2)	44-145 (2)
0-126 (2)	7-31 (2)	11-98 (2)	44-146 (2)
6-200 (2)	7-32 (2)	11-117 (2)	44-147 (2)
6-201 (2)	7-52 (2)	11-155 (2)	44-445 (2)
6-200 (2)	8-15 (2)	11-500 (AA-AE)	44-447 (2)
6-301 (2)	8-16 (2)	(2)	44-448 (2)
6-315 (2)	8-75 (2)	11-555 (2)	44-535 (2)
6-316 (2)	8-76 (2)	11-557 (2)	44-536 (2)
6-325 (2)	9-17 (2)	11-557 (2)	44-537 (2)
6-325 (2)	9-25 (2)	11-592 (2)	44-545 (2)
6-401 (2)	9-26 (2)	11-597 (2)	44-547 (2)
6-415 (2)	9-47 (2)	17-2 (2)	44-549 (2)
6-416 (2)	9-65 (2)	17-22 (2)	55-46 (2)
6-425 (2)	9-66 (2)	17-25 (2)	55-116 (2)
6-500 (2)	9-66 (2)	17-26 (2)	55-500 (AA-AE)
6-501 (2)	9-217 (2)	17-45 (2)	(2)
6-525 (2)	9-377 (2)	17-46 (2)	57-5 (2)
6-535 (2)	10-17 (2)		

**NG:** State AG (3); units—same as Active Army except allowance is one copy to each unit.

**USAR:** None.

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







