

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TM 11-5820-256-20

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TO 31R2-2GRC26-132

**ORGANIZATIONAL
MAINTENANCE MANUAL**

RADIO SET AN/GRC-26D

This copy is a reprint which includes current pages from Changes 1 through 5.

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

5 JANUARY 1962

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the power supply circuits, the 115-volt ac line connections, or the 240-volt plate circuits in Receiver, Radio R-390(*)/URR. Turn off power when working on the transmitting antenna or the transmitting antenna terminals; high radio frequency voltages exist at these points.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES

EXIST IN THE FOLLOWING UNITS:

TRANSMITTER, RADIO T-368(*)/URT	2,400-volt circuits
CONVERTER, FREQUENCY SHIFT CV-116(*)/URR	620-volt circuits

WARNING

VENTILATION

The shelter must be ventilated when occupied. Be sure to open the vents, window shutters, or door when the equipment is operated. Keep the shelter air intake fan closed during transportation. The truck exhaust stack is near the air intake vent and danger from carbon monoxide poisoning exists. When the vehicle is moving, adequate air circulation exists through the shelter windows.

CHANGE }
No.5 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 6 June 1975

**Organizational Maintenance Manual
RADIO SET AN/GRC-2**

TM 11-5820-356-20, 5 January 1962, is changed as follows:

General. Change the words "second echelon" wherever they appear in the technical manual to "organizational".

Page 1. Paragraph 1a. Delete paragraph designation "a".

Paragraph 1b and c are superseded as follows:

NOTE

**For applicable forms and records,
see paragraph 2, TM 11-5820-256-10**

1.1. Indexes of Publications

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

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

1.2. Reporting of Equipment Publications 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 Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: -AMSEL-MA-Q, Fort Monmouth, NJ 07703.

Page 11. Paragraph 11d(1) change PU-294/G to read "PU-474/M or PU-619/M."

Paragraph 12a. Step 1, corrective measurements column, change to read, "Refer to TM 11-6115-230-15 or TM 11-6115 275-15"

Page 15. Paragraph 12d. Step 1, Corrective measures column, change to read, "Refer to TM 11-6115-230-15 or TM 11-6115-275-15."

Page 24. Add the following references in proper numerical order.

TM 5-2805-259-14 Operator's Organizational, Direct Support, General Support Maintenance Manual: Engine, Gasoline, 20HP; Military Standard Models (Model 4A084-2) FSN 2805-985-3926 (Model 4A084-3) FSN 2805-872-5972

TM 5-6115-275-15 Operator's Organizational, Direct Support, General Support, and Depot Maintenance Manual: Generator Set, Gasoline Engine 10KW, AC, 120/208 V, 3 Phase, 60HZ Skid Mounted (Less Engine).

Page 25. Delete the last item

Page 30. Section II, Part or Component column, second item, change Generator PU-294/G to read "Generator PU-474/M or PU-619/M."

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

To be distributed in accordance with DA form 12-51, (qty rqr block no. 98) Organizational maintenance requirements for AN/GRC-26

Changes in force: C 1, C 2, C 3, and C 4

TM 11-5820-256-20
C 4

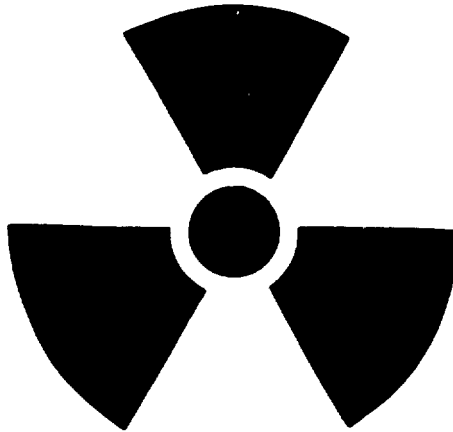
CHANGE }
NO. 4 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 9 April 1975

Organizational Maintenance Manual
RADIO SET AN/GRC-26D

TM 11-5820-25620, 5 January 1962, 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

Audio level meter.....	Ra 226	0.69uCi	6625-00-669-0769
Audio level meter.....	Ra 226	0.40uCi	6625-00-669-0770
	Electron Tube CC3W		5960-00-188-0968
Sylvania.....	Co 60	1.0uCi	
	Electron Tube OA2WA.....		5960-00-503-4880
EEVC.....	U 238	0.1uCi	
CBS Hytron.....	Ni 63	0.5uCi	
Raytheon	Co 60	0.2uCi	
	Electron Tube OA2WA		
EEVC.....	U 238	0.1uCi	
CBS Hytron.....	Ni 62	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 Set AN/GRC-26D. Hazardous radioactive materials are present in the above listed components of the MD-239A/GR, R-390/URR, C-632/GRC-10, R-125/GRC-10, and T-235/GRC-10.

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:

FRED C. WEYHAND
General, United States Army
Chief of Staff

Official:

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

Distribution:

To be distributed in accordance with DA Form 12-51, (qty block No. 98). Organizational maintenance requirements for AN/GRC-26.

CHANGE }
No. 3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 4 June 1969

Organizational Maintenance Manual

RADIO SET AN/GRC-26D

TM 11-5820-256-20, 5 January 1962 Is changed as follows:

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

Page 2, paragraph 1. Delete subparagraph *b* (page 1 of C 2) and substitute:

b. The reporting of errors, omissions and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-ME-NMP-AD, Fort Monmouth, N. J. 07703.

Delete subparagraph *c* (page 1 of C 1) and substitute:

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

Paragraph 2, line 5. After "components" add: and the addition of cryptographic equipment.

Page 3, paragraph 5e, line 1. Delete "W-128" and substitute: W-126.

Page 4, figure 1. On the left side of the illustration, delete callout "WIRE W-128" and substitute: WIRE W-146.

Page 11, paragraph 11d(1), line 2. After "PU-294/G" add: or Generator Set, Gasoline Engine, Trailer Mounted PU-474/M.

Paragraph 12c, chart, step 1, *Corrective measures* column. Delete "Refer to TM 11-940A" and substitute: Refer to TM 11-6115-204-10 or TM 11-6115-230-15.

Page 13, step 9, Corrective measures column, line 19. Delete "W-128" and substitute: W-146.

Lines 32 and 33. Delete "CX-1200/U and CX-1201/U" and substitute: CX-11411/U and CX-9996A/U.

Page 14, step 10, Corrective measures column, last two lines.

Delete "Refer to TM 11-2225" and substitute: Refer to TM 11-5815-238-12.

Step 12, *Corrective measures* column, line 8.. Delete "Refer to TM 11-2225" and substitute: Refer to TM 11-5815-238-12.

Page 20, paragraph 18. After subparagraph *a*(1), add (1.1):

(1.1) When fsk operation is used in a Radio Set AN/GRC-26D which has been modified to use security equipment, signals are routed to Electronic Switch SA-1253/GRC through Junction Box J-2597/GRC and then to Control, Radio Set C-1123/GRC. From Control, Radio Set C-1123/GRC, signals follow the same path as a plain text transmission, except that the signals pass through Polar Relay F-1084/GRC before being applied to Modulator, Radio MD239(*)/GR.

Delete subparagraph *b*, and substitute:

b. Remote Control Unit. Control, Remote Switching C-1474/GRC, together with Interconnecting Boxes J-2623/GRC and J2624/GRC, provides routing facilities from a remote location. All signals initiated by the remote equipment are routed through interconnecting boxes to Control, Radio Set C-1123/GRC.

Page 24, appendix I (page 1 of C 2).
Delete appendix I and substitute:

APPENDIX I

REFERENCES

Following is a list of applicable references available to organizational maintenance personnel of Radio Set AN/GRC-26D.

AR 380 5	Military Security.
D-A Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.
SB 38-100	Preservation, Packaging and Packing Materials, Supplies, and Equipment Used by the Army.
TB 746-10	Field Instructions for Painting and Preserving and Electronics Command Equipment.
TM 9-213	Painting Instructions for Field Use.
TM 11-337	Telephone Sets TA-43/PT and TA-263/PT.
TM 11-809-20	Organizational Maintenance; Radio Transmitters T-368/URT, T-368A/URT, T-368B/URT, T-368C/URT, T-368D/URT, and T-368E/URT; Antenna Tuning Unit BC-939-B; Radio Frequency Tuner TN-399/GR; and Standing Wave Ratio-Power Meter ME-165/G.
TM 11-2155	Telephone Set TA-312/PT.
TM 11-2241	Frequency Shift Converters CV-116/URR, CV-116A/URR, CV-116B/URR and CV-116C/URR.
TM 11-3895-201-13P	Operator, Organizational, and Field (Third Echelon) Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Axles RL-27-B, RL-27-C, and RL-27-D.
TM 11-4140-200-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Blower Assembly, Electrical HD-223/G.
TM 11-5410-200-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Shelters S-56/G and S-56A/G.
TM 11-5805-201-12	Organizational Maintenance Manual: Telephone Set TA-312/PT.

TM 11-5805-201-20P	Organizational Maintenance Repair Parts and Special Tools Lists: Telephone Set TA-312/PT.
TM 11-5805-256-12P	Operator's Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Telephone Service TA-43/PT.
TM 11-5815-200-12	Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Teletypewriter Sets AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-64, AN/FGC-66, AN/FGC-67, AN/FGC-67X, AN/UGC-4, AN/UGC-29, AN/UGC-29X, and Teleprinter TT-259/FG.
TM 11-5815-221-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Frequency Shift Converters CV-116/ URR, CV-116A/URR, CV-116B/URR, CV-116C/URR.
TM 11-5815-238-12	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List and Maintenance Allocation Chart: Teletypewriter Sets AN/GGC-3, AN/GGC-3A and Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GCC, and TT76C/GGC.
TM 11-5820-251-20P	Organizational Maintenance Repair Parts and Special Tools and Maintenance Allocation Chart, Mast AB-155/U, AB-155A/U, and AB-155B/U.
TM 11-5820-256-10	Operator's Manual: Radio Set AN/GRC-26D.
TM 11-5820-256-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Radio Set AN/GRC-26D.
TM 11-5820-257-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Antenna Tuning Unit BC-939A, BC-939-B and Tuner, Radio Frequency TN-339/GR.
TM 11-5820-321-20P	Organizational Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart for Modulators, Radio MD-239/GR and MD239A/GR.
TM 11-5820-357-20	Organizational Maintenance Manual: Radio Receiver R-390/URR.
TM 11-5820-357-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Radio Receiver R-390/URR.
TM 11-5820-358-20	Organizational Maintenance Manual: Radio Receiver R-390A/URR.
TM 11-5820-358-20P	Organizational Maintenance Repair Parts and Special Tools List: Radio Receiver R-390A/URR.
TM 11-5930-201-15P	Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Switch Box SA-331/U.
TM 11-5965-201-12P	Operator's and Organizational Maintenance Repair Parts and Special Tool List and Maintenance Allocation Chart for Loudspeaker Assembly LS-206/U.
TM 11-5965-224-15P	Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Handsets H-60/PT and H-165/U.
TM 11-5965-231-15P	Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Headset, Electrical H-113/U.
TM 11-6115-202-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Generator Set, Gasoline Engine PU-286/G and Power Unit PE-197.

TM 11-6115-204-10	Operator's Manual: Generator Sets, Gasoline Engine PU-286A/G and PU-286B/G.
TM 11-6115-204-20	Organizational Maintenance Manual: Generator Sets, Gasoline Engine PU-286A/G and PU-286B/G.
TM 11-6115-223-15P	Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tool Lists and Maintenance Allocation Chart: Generator Set, Gasoline Engine, Trailer Mounted PU-294/G.
TM 11-6115-230-15	Operator, Organizational, Field and Depot Maintenance Manual: Generator Set, Gasoline Engine, Trailer Mounted PU-474/M.
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 11-6625-333-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Standing Wave Ratio-Power Meter ME-165/G.
TM 38-750	Army Equipment Record Procedures.

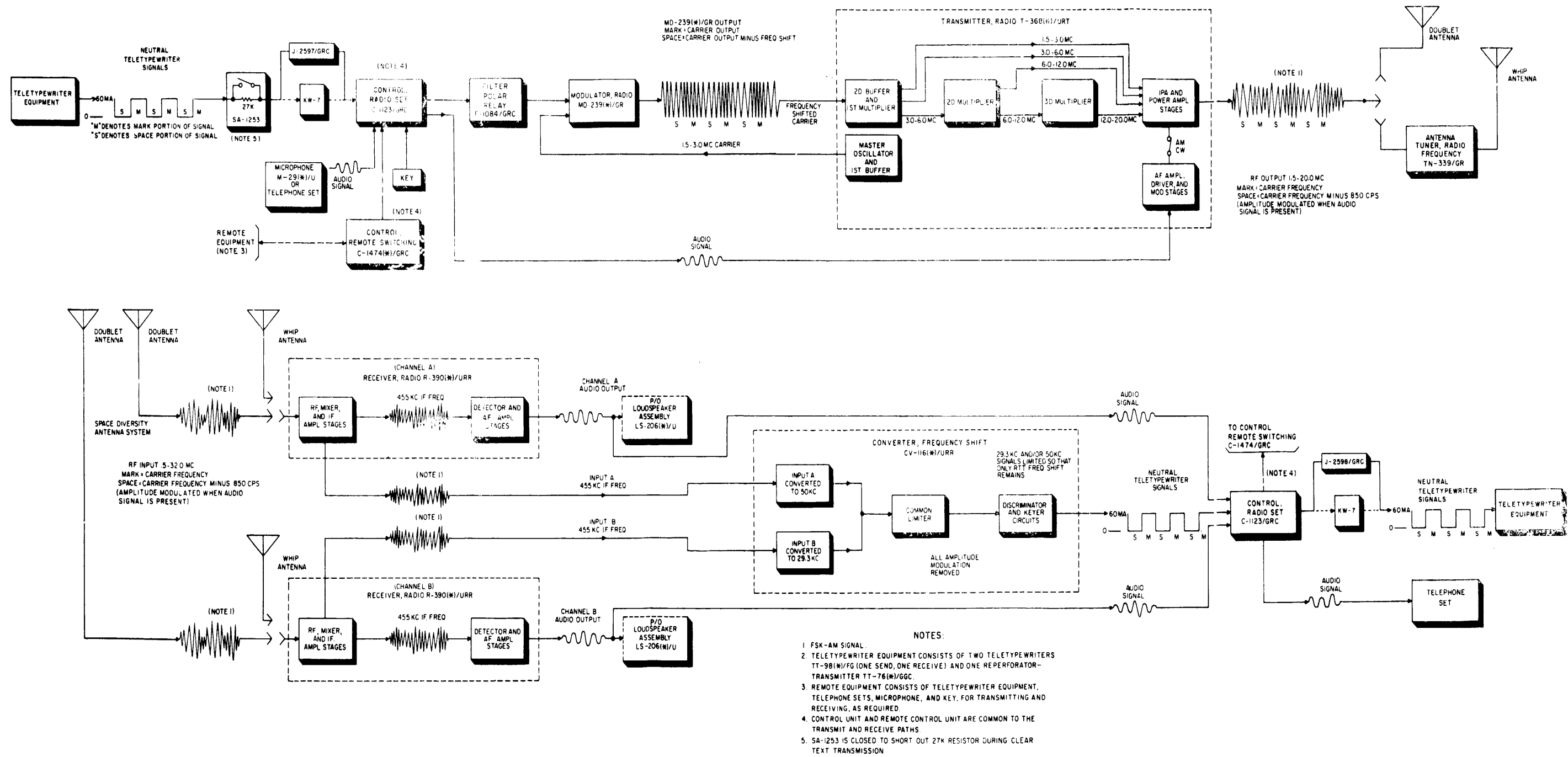


Figure 8. Radio Set AN/GRC-26D, block diagram, local operation

Ad figure 9 after figure 8:

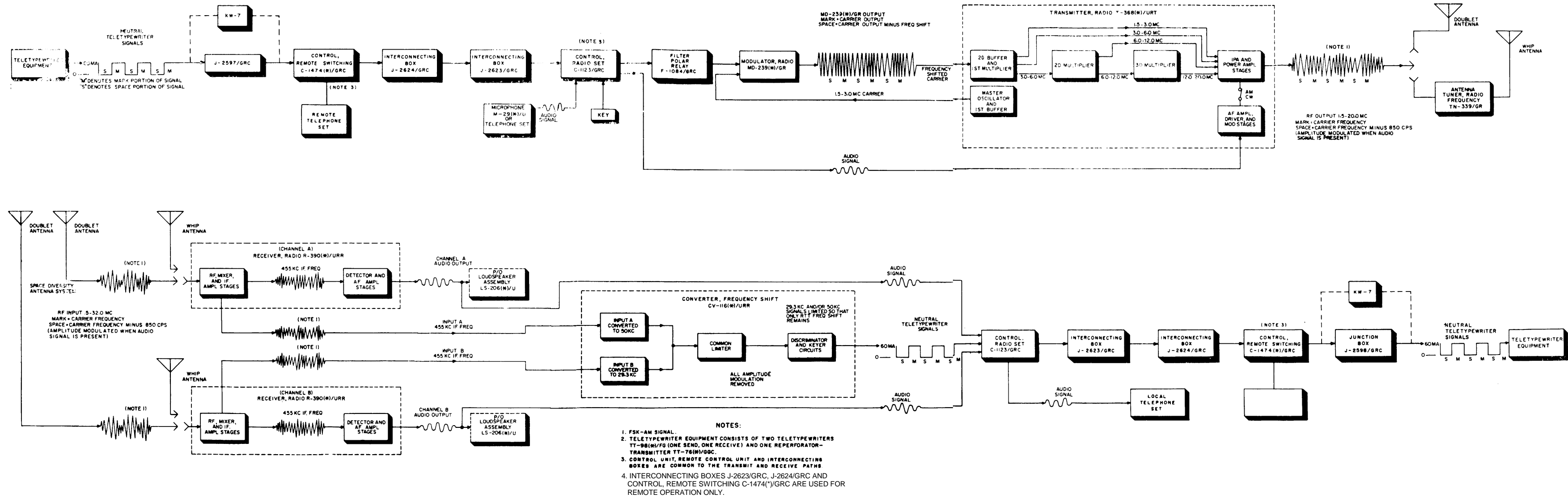


Figure 9. Radio Set AN/GRC 26D, block diagram, remote operation.

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
*Major General, United States Army,
The Adjutant General.*

W.C. WEST MORELAND,
*General, United States Army,
Chief of Staff.*

Distribution:

To be distributed in accordance with DA Form 12-51, (qty rqr block No. 98) Organizational Maintenance requirements for the AN/GRC-26 Radio Set.

CHANGE }
No.2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 10 June 1964

Organizational Maintenance Manual

RADIO SET AN/GRC-26D

TM 11-5320-256-20, 5 January 1962, is changed as follows:

Note. The parenthetical reference to previous changes example: "page 1 of C1") indicates that pertinent materiel was published in that change.

Page 2. paragraph 1b (page 1 of C1). Delete subparagraph *b* and substitute:

b. The direct reporting by the individual user, of errors, omissions, and recommendations for involving this manual is authorized and encouraged. DA Form 2028 (Recommend 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, N.J. 07703. One information copy will be furnished to

the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc.).

(Page 4 of C 1) Paragraph 10.2, last sentence. Change "TM 9-2851" to TM 9-213.

Page 26, Appendix I (page 4 of C 1). Make the following changes:

Change TM 38-750 to TM 9-213.

Delete TM 9-213, Operator's Manual Record Set AN/GRC-26D.

Change TM 11-5820-256-10 to TM 38-750.

Page 29, Appendix II, section II, heading. After the word chart, add (AN/GRC-26D).

Page 31, section III, heading. After the word functions, add (AN/GRC-26D).

After section III, add sections IV and V.

SECTION IV. MAINTENANCE ALLOCATION CHART (C-1123/GRC)

PART OR COMPONENT	MAINT. FUNCTION	1 ST ECH.	2 ND ECH.	3 RD ECH.	4 TH ECH.	5 TH ECH.	TOOLS REQUIRED	REMARKS
CONTROL, RADIO SET C-1123/GRC	service		x				none	Plus shop facilities
	Inspect		x				none	
				x			5	
	test		x				1	
	replace			x			2,3	
	repair		x				5	
			x			4		
				x		5		
overhaul					x	5		

SECTION V. ALLOCATION OF PARTS FOR MAINTENANCE FUNCTIONS (C-1123/GRC)

PART OR COMPONENT	ECHELON					TOOL CODE	REMARKS
	1	2	3	4	5		
MULTIMETER AN/URM-105		†				1	
MULTIMETER TS-352/U			†	†	†	2	
MULTIMETER ME-26/U			†	†	†	3	
TOOL KIT, RADIO REPAIR TK-115/G		†				4	
TOOL KIT, RADAR AND RADIO REPAIRMAN TK-87/U			†	†	†	5	

SELMS 005 TF
1 Jun 63

C-1123/GRC

Army - Ft Monmouth, NJ-MON 21 35-63

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:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
CSigO (7)
CofT (1)
CofEngrs (1)
CofSptS (1)
TSG (1)
USA CD Agcy (2)
USAMC (5)
USCONARC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
Base Comd (2)
LOGCOMD (2)
USAECOM (7)
USAMICOM (4)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
Instl (2) except
 Ft Monmouth (63)
 Ft Hancock (4)
GENDEP (OS) (2)
Sig Sec, GENDEP (5)
Sig Dep (OS) (12)
A Dep (2) except
 Lexington (12)
 Sacramento (28)
 Tobyhanna (12)
 Ft Worth (8)
Svc Colleges (2)
Br Svc Sch (2)
USMA (2)
WRAMC (2)
USASMCOM (2)
USARSOUTHCOM Sig Agcy (1)
USAPRDC (5)
USA Trans Tml Comd (1)
Army Tml (1)
USAOSA (1)

POE (1)
AMS (1)
Army Pictorial Cen (2)
USA Mbl Spt Cen (1)
USA Elct Mat Agcy (12)
Chicago Proc Dist (1)
Sig Fld Maint Shops (3)
USA Elct RD Acty
 Ft Huachuca (2)
 White Sands (13)
WSMR (5)
Yuma PG (2)
USA Corps (3)
Letterkenny A Dep (5)
Sharpe A Dep (3)
11th Air Assault Div (3)
USASESCS (100)
USAAMS (40)
USAARMS (40)
USASA Tng Cen & Sch (20)
Oakland A Tml (5)
Ft Gordon (5)
Ft Huachuca (10)
Savanna A Dep (5)
Navajo A Dep (3)
Umatilla A Dep (8)
USAARMBD (2)
USATCDA (2)
USAARTYBD (2)
USAAESWBD (2)
USAERDL (2)
URREL (2)
Rock Island Arsenal (5)
1st GM Bde (5)
ARMISH (5)
MAAG: Iran (5)
KMAG (5)
507th USASA Gr (5)
508th USASA Gr (5)
318th USASA Bn (5)
319th USASA Bn (5)
320th USASA Bn (5)
321st USASA Bn (5)
177th USASA Co (5)
782nd USASA Co (5)
183rd USASA Co (5)
184th USASA Co (5)
226th USASA Co (5)

251st USASA Co (5)	11-57
252nd USASA Co (5)	11-95
600th USASA Co (5)	11-98
77th USASA Unit (5)	11-99
1st USASA Fld Sta (5)	11-117
4th USASA Fld Sta (5)	11-155
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9-87	30-25
11-5	30-29
11-7	30-500
11-15	32-52
11-16	32-56
11-18	32-57
11-32	32-67
11-35	32-68
11-37	32-500
11-38	37
11-39	39-51
11-55	39-401

NG: State AG (3); units-same as active Army except allowance is one copy.

USAR: None.

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

TM 11-5820-256-20
TO 31R2-2GRC26-132
CHANGES No. 1 }
}

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., 11 April 1963

Organizational Maintenance Manual

RADIO SET AN/GRG-26D

TM 11-5820-256-20/TO 31R2-2GRC26-132, 5 January 1962, is changed as follows:

Page 2, paragraph 1. Delete subparagraphs *b* and *c* and substitute:

b. Forward all comments on this publication direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N.J. (DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.)

Note. For applicable forms and records, see paragraph 2.1, TM 11-5820-256-10.

Page 8. Delete section I and substitute:

c. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes or additional publications pertaining to your equipment. DA Pam 310-4 is a current index of technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, 46P, etc.) and the latest changes and revisions of each equipment publication.

Section I. GENERAL

8. Scope of Organizational Maintenance

a. This paragraph contains instructions covering second echelon maintenance of Radio Set AN/GRC-26D. It includes instructions for performing preventive and periodic maintenance services and repair functions to be accomplished by the organizational repairman. Operating instructions are contained in TM 11-5820-256-10.

b. Second echelon maintenance of Radio Set AN/GRC26D includes the following:

- (1) Preventive maintenance (par. 9).
- (2) Quarterly maintenance service and inspection (par. 10.1).
- (3) Cleaning and touchup painting instructions (par. 10.2).
- (4) Sectionalization checks (par. 11).
- (5) Troubleshooting (par. 12).
- (6) Replacement of defective fuses (par. 7*b*(1)).

- (7) Replacement of cables.
- (8) Replacement of major components (par. 13).
- (9) Replacement of defective tubes (par. 14).
- (10) Replacement of crystals in Modulator, Radio MD-239(*)/GR (par. 16).

9. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance service includes inspection of

Radio Set AN/GRC-26D at the second echelon level are made at monthly intervals unless otherwise directed by the commanding officer. The maintenance services should be scheduled concurrently with the periodic service schedule of the carrying vehicle for all vehicular installations.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750. Paragraph 2.1, TM 11-5820-256-10, contains additional information concerning submission of specific forms.

10. Monthly Maintenance

a. Perform the maintenance functions in the monthly maintenance and inspection chart (par. 10.1) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly maintenance should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for

immediate operation) condition must have monthly maintenance performed on it. Equipment in limited storage (requires service before operation) does not require monthly maintenance.

b. Monthly maintenance will be scheduled in accordance with the requirements of TM 38-750. If the equipment is part of a vehicular installation, the monthly maintenance should be scheduled concurrently with the periodic service schedule of the carrying vehicle to reduce out-of-service time to a minimum. All deficiencies or shortcomings will be recorded, and those not corrected during the inspection and service will be immediately reported to higher echelon by the use of forms and procedures specified by TM 38-750. Equipment with a deficiency that cannot be corrected by second echelon should be deadlined in accordance with TM 38-750. Perform all the services listed in the monthly maintenance and inspection chart (par. 10.1) in the sequence listed. Whenever a *normal condition or result* is not observed, take corrective action in accordance with the paragraph listed under the *references* column.

10.1. Monthly Maintenance Service and Inspection Chart

Item No.	Procedure		References
	Item	Normal condition or result	
1	COMPLETENESS: Inspect the equipment for completeness.	Equipment must be complete (appx II, TM 11-5820-256-10).	
2	PROPER INSTALLATION: Inspect for proper installation.	Installation is in accordance with paragraphs 25 through 34, TM 11-5820-256-10.	
3	CLEANLINESS: Check the equipment for cleanliness.	Units must be clean and dry inside and out, and free of grease, dirt, rust, corrosion, and fungus.	Par. 52.5, TM 11-5820-256-10.
4	PRESERVATION: Inspect the set for preservation.	Painted surfaces must be free of bare spots, rust, and corrosion.	Par. 10.2.
5	PUBLICATIONS: Check to see that pertinent publications are available (appx I, TM 11-5820-256-10).	a. Operator's manual must be complete and in usable condition, without missing pages. b. All Changes pertinent to the equipment are on hand (DA Pam 310-4). c. Organizational maintenance manual is complete and in usable condition.	a. None. b. DA Pam 310-4 for requirements. c. None.
6	MODIFICATION WORK ORDERS: Check DA Pam 310-4 to determine if new applicable MWO's have been published.	All URGENT MWO's have been applied to the equipment. All ROUTINE MWO's have been scheduled.	
7	GASKETS: Inspect waterproof gaskets for leaks and worn or loose edges.	Gaskets are clean, flexible, and in apparently good condition.	Refer to basic equipment manual.

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Item No.	Procedure		References
	Item	Normal condition or result	
8	LUBRICATION: Perform a complete lubrication of the equipment as directed by lubrication instructions.	Mechanisms should not show signs of overlubrication or underlubrication.	Par. 53, TM 11-5820-256-10, and the lubrication order for the power unit.
9	PLUCKOUT ITEMS: Inspect the seating of pluckout items, such as tubes, crystals, plug-in coils, turning units, and fuses.	All items should be properly seated, and clamps in proper position and correctly tightened.	
10	INTERLOCKS: Inspect the interlocks for evidence of failure or malfunction.	Interlocks are in good operating condition.	Par. 31, TM 11-5820-256-10.
11	FUSES: Check for proper fuses	The fuses in use should be of the indicated value and located as follows: a. Transmitter front panel: 1 ea. 6-amp. 1 ea. 3-amp. b. Modulator front panel: 2 ea. 1 1/2-amp. c. Teletypewriter: 1 ea. 2-amp. 2 ea. 1/4-amp. 1 ea. 1/16-amp. d. Reperforator-Transmitter Teletypewriter: 1 ea. 1.6-amp. (TT-76/GGC). or 2 ea. 1.6-amp (TT-76A/GGC). or 2 ea. 2-amp (TT-76B/GGC). e. Receiver Radio: 1 ea. 3-amp. 1 ea. 3/8-amp.	
12	CABLES: Inspect cables for cuts, cracked or gouged jackets, fraying, or kinks.	All cables should be free of cuts, cracked or gouged jackets, and fraying or kinks.	
13	KNOBS, DIALS, AND SWITCHES: Check for proper mechanical action by setting each control to each of its possible settings.	Action is positive, without backlash, binding, or scraping. <i>Note.</i> Knots that require frequent tightening should have setscrews replaced.	Refer to basic equipment manual.
14	METERS: Inspect meters for chipped, cracked, or broken glass, and for bent pointers.	Meters should not have chipped, cracked, or broken glass. Pointers must not be bent.	Refer to basic equipment manual.
15	MOUNTINGS: Inspect seating and stability of mountings. Check for loose or missing hardware.	All bolts, nuts, and washers are present and properly tightened. Mountings show no evidence of weakness or deformity.	
16	ANTENNA: Inspect the antenna system in use (whip or doublet) for condition.	Insulators are free of cracks, dirt, and fungus. Mast sections are not bent. Guy wires and transmission lines are not kinked, and do not show signs of fraying.	Pars. 29 and 30, (TM 11-5820-256-10.
17	HARDWARE: Inspect for broken, missing, or loose catches, latches, handles, hinges, and for breakage or other damage.	All items should be in good condition, without loose, missing, or broken components.	Refer to basic equipment manual.
18	PLUGS AND RECEPTACLES: Inspect external plugs and receptacles for breakage and seating.	Items should be firmly seated and without chipped or broken insulation.	Refer to basic equipment manual.

Item No.	Procedure		References
	Item	Normal condition or result	
19	CONTROLS: Tap controls lightly, while set is in operation, for evidence of cutout from loose contacts.	Equipment should not cut out when controls are lightly tapped	Refer to higher echelon maintenance. Refer to higher echelon maintenance. Refer to basic equipment manual.
20	CANVAS AND LEATHER: Insect for mildew, tears, and fraying.	Item should be free from mildew, tears, and fraying.	
21	AIR FILTERS: Clean and/or inspect air filters.	Air filters should be clean	
22	STORAGE BATTERIES. Inspect the storage batteries in the power units for dirt, loose terminals, specific gravity, and damaged cases.	Items should be clean; terminals tight, and cases not damaged.	Appendix II, TM 11-5820-256-10.
23	SHELTER: Inspect for weatherproofing.	Items should be in good condition and free from water leaks.	
24	RELAYS AND CIRCUIT BREAKERS: Inspect for loose mountings, bad contacts, misalignment of contacts and springs, and proper spring tension.	Items should be securely mounted. Contacts are free of pits and corrosion; contacts and springs are properly aligned.	
25	VARIABLE CAPACITORS: Inspect for dirt, moisture, and loose mountings.	Items should be clean, and free of moisture. Capacitor mountings are secure.	
26	RESISTORS: Inspect for blistering and discoloration.	Items should be free from blistering and discoloration.	
27	TERMINAL BLOCKS: Inspect for loose connections, cracks, breaks.	Items should be free of cracks and breaks.	
28	CAPACITORS: Inspect large capacitors for leakage, loose connections, dirt, and insecure mountings.	Items should be securely mounted and free from dirt and leakage.	
29	TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS: Inspect for overheating.	Items should not show signs of overheating.	
30	GENERATORS AND MOTORS: Inspect for brush wear, brush spring tension, and excessive arcing.	Brushes should be properly seated, with adequate spring tension applied. Commutators should not be pitted.	
31	OPERATING CHECK: Refer to paragraph 12.	Refer to paragraph 12.	
32	SPARE PARTS: Check all spare parts for general condition and method of storage.	All spare parts must be in good condition and properly stored. There should be no evidence of overstock, and all shortages will be on valid requisitions.	

10.2. Cleaning and Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9-2851.

Page 9. Delete figure 5.

Page 10. Delete figure 6.

Page 24, appendix I. Add the following references to appendix I:

TM 38-750

Painting Instructions for Field Use.

TM 9-213

Operator's Manual: Record Set AN/GRC-26D.

TM 11-5820-256-10

The Army Equipment Record System and Procedures.

AGO 8765A

By Order of the Secretaries of the Army and the Air Force:

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

Official:

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

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R. J. PUGH,
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Director of Administrative Services.

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ARADCOM Rgn (2)	Units org under fol'TOE:
OS Maj Comd (3)	(2 copies each UNOINDC)
OS Base Comd (2)	7
LOGCOMD (2)	7-52
MDW (1)	9-12
Armies (2)	9-22
Corps (2)	9-86
USA Corps (3)	11-5
Instls (2) except	11-7
Fort Monmouth (63)	11-15
USATC AD (2)	11-16
USATC Armor (2)	11-17
USATC Engr (2)	11-18
USATC Inf (2)	11-32
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Svc Colleges (2)	11-38
Br Svc Sch (2)	11-39
GENDEP (OS) (2)	11-55
Sig Dep (OS) (12)	11-57
Army Dep (2) except	11-85
Fort Worth Army Dep (8)	11-87
Lexington Army Dep (12)	11-95
Sacramento Army Dep (17)	11-97
Tobyhanna Army Dep (12)	11-98
Sig Sec, GENDEP (OS) (5)	11-99
USA Elct RD Actv (Ft Huachuca) (2)	11-117
USA Elct RD Actv (White Sands) (13)	11-155
WRAMC (1)	11-157
Army Pictorial Cen (2)	11-237

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11-500 (AA-AC) (4)	32-51
11-557	32-52
11-592	32-55
11-597	32-57
17	32-67
17-51	32-68
17-55	37
20-45	39-51
30-25	39-401
30-29	44-12
30-500 (AA-AE)	57

NG: State AG (3); units-same as active Army except allowance is one copy for each unit.

USAR: None.

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

Technical Manual
 No. 11-5820-256-20
 Technical Order
 No. 31R2-2GRC26-132

DEPARTMENTS OF THE ARMY
 AND THE AIR FORCE

WASHINGTON 25, D.C., 5 January 1962

RADIO SET AN/GRC-26D

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*This manual supersedes so much of TM 11-264B, 7 May 1957; including C1, 7 June 1957; C2, 5 December 1957; C3, 27 August 1959; and C4, 7 November 1960 as pertains to organizational maintenance; and so much of TM 11-5820-256-20P, 1 August 1958; including C2, 16 February 1961 as pertains to maintenance allocation chart.

CHAPTER 1

INTRODUCTION

1. Scope

a. This manual covers second echelon maintenance of Radio Set AN/GRC-26D. Modulator, Radio MD-239(*)/GR is discussed in detail. Detailed information pertaining to the second echelon maintenance of the remainder of the components comprising Radio Set AN/GRC-26D is contained in the technical manuals listed in appendix I. The operating instructions for this equipment are contained in TM 11-5820-256-10.

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

c. Refer to DA Pamphlet 310-4 to determine what changes to or revisions of this publication are current.

Note: For applicable forms and records, see paragraph 2, TM 11-5820-256-10.

2. Internal Differences in Models of Radio Set AN/GRC-26D

All the radio sets are similar in purpose, operation, and appearance. The main differences of concern to second echelon maintenance personnel are the model designations of the major components. When second

echelon maintenance is performed, any model of the major components maybe substituted for the model used in the radio set. When a different model is substituted, different operating and maintenance procedures may be necessary. Refer to the *Differences in models* paragraph in TM 11-5820-256-10 for more information.

3. Internal Differences in Models of Modulator, Radio MD-239(*)/GR

This paragraph covers only items that second echelon maintenance personnel replace. The basic and A-model frequency-shift keying (fsk) modulators are similar, except for the location of the crystals (fig. 3 and 4), and the stages. Differences in stages that concern second echelon maintenance are listed below.

Item	MD-239/GR	MD239A/GR
If. amplifier 6AH6WA	V2	V3
2d mixer 6BA7	V3	V4
1st rf amplifier 6AH6WA	V4	V6
Shift oscillator 6AU6WB	V5	V2
Fixed oscillator 6AU6WB	V6	V5
Voltage regulator OC3	V10	V11
Voltage regulator OD3	V11	V10

CHAPTER 2

INSTALLATION

4. Tools Required for Installation

The tools required for installation of Mast Base Bracket MT-657/GRC (para 5) and Mast Bracket MP-50- (*) (para 6) are contained in Tool Equipments TE-41 and TE-50B.

5. Installation of Mast Base Bracket MT-657/GRC (fig. 1)

a. The transmitting whip antenna bracket assembly is disassembled and stored in the shelter during shipment of the radio set. Remove the antenna bracket assembly from its package. Be careful not to lose the mounting hardware in the attached cloth bag.

b. Mount the MT-657/GRC on the rear wall of the shelter, use the materials provided. Secure the MT-657/GRC to the shelter wall with the four 3/8- by 2-3/4-inch carriage bolts and matching nuts and lockwashers.

c. Place a neoprene gasket on the end of the insulator bowl. Align the insulator bowl and neoprene gasket, from inside the shelter, with the predrilled hole in the shelter wall. Use the six No. 8 by 1-1/4-inch wood screws and washers to secure the insulator bowl to the shelter wall.

d. Place a neoprene gasket over the bottom of mast base MP-76. Insert the MP-76 into the MT-657/GRC and fasten it in place with the six 3/8- by 3/4-inch carriage bolts, nuts, and lockwashers.

e. Insert the 2-foot cable (Wire W-128 attached to the base of the MP-76) through the hole of the insulator bowl.

6. Installation of Mast Bracket MP-50- (*) (fig. 2)

a. The two receiving whip antenna bracket assemblies are disassembled and stored in the shelter during shipment of the radio set. Remove the antenna bracket assembly from its package. Be careful not

to lose the mounting hardware in the attached cloth bag.

b. Each Mast Bracket MP-50- (*) is supplied with a predrilled wooden spacer. Mount the MP-50- (*) and the wooden spacer, to the front wall of the shelter; use the four 5/16- by 3-1/2-inch carriage bolts, lockwashers, and nuts.

c. Place a neoprene washer on the top of the MP-50- (*). Place the metal ring, with braid and clamp attached, on the bottom of the MP-50- (*). Place a neoprene washer over the metal ring and screw the bottom of the MP-65-B into the top through the hole in the MP-50- (*).

d. Place the neoprene gasket behind the feedthrough receptacle. Secure the feedthrough receptacle to the wooden spacer with the four No. 10 by 1-1/4-inch wood screws and flat washers.

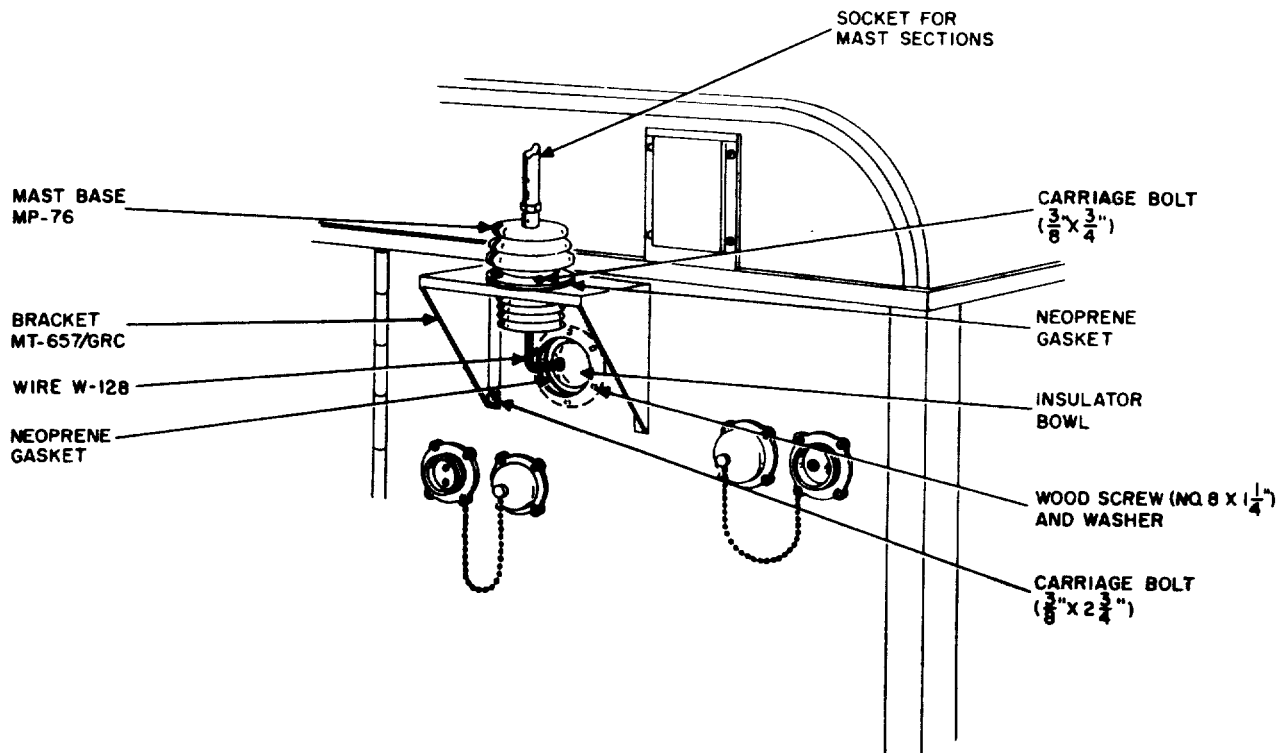
e. Screw Connector, Adapter, Electrical UG-637/U into the bottom of the MP-65-B and connect Cable Assembly, Radio Frequency CG-718A/U (8 ft) to the UG-637/U. Clamp the UG-637/U securely after the CG-718A/U has been installed. Mount one Mast Bracket MP-50- (*) and Mast Base MP-65-B for each receiver.

Note. Some radio sets are equipped with Connector, Adapter, Electrical UG-573A/U to be used in place of Connector, Adapter, Electrical UG-637/U.

7. Installation of Operating Equipment

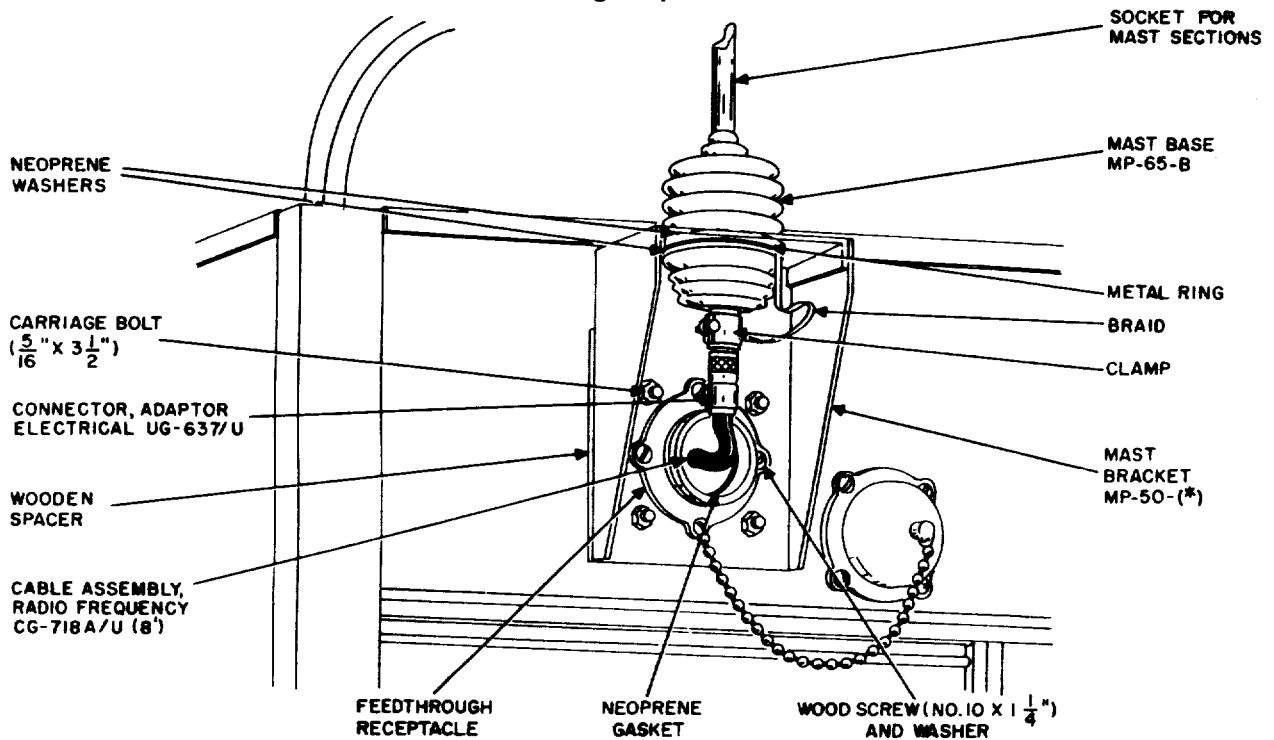
a. The operating equipment is installed within the shelter by the manufacturer. Check to see that all the equipment is firmly mounted in place. Location of tubes in the MD-239/GR and MD-239A/GR are shown in figures 3 and 4, respectively. Tube location for the remaining components of the radio set is shown in the components associated technical manuals (appx I).

b. Be sure the correct fuses and crystals are installed in the equipment. The equipment may fail or be damaged if fuses other than those specified are used.



TM5820-256-20-1

Figure 1. Assembly of Mast Base Bracket MT-657/GRC and Mast Base MP-76, for transmitting whip antenna.



TM5820-256-20-2

Figure 2. Assembly of Mast Bracket MP-50-(*) and Mast Base MP-65-B, for receiving whip antenna.

(1) The chart below lists the fuses used in the receivers. All fuses are rated at 250 volts.

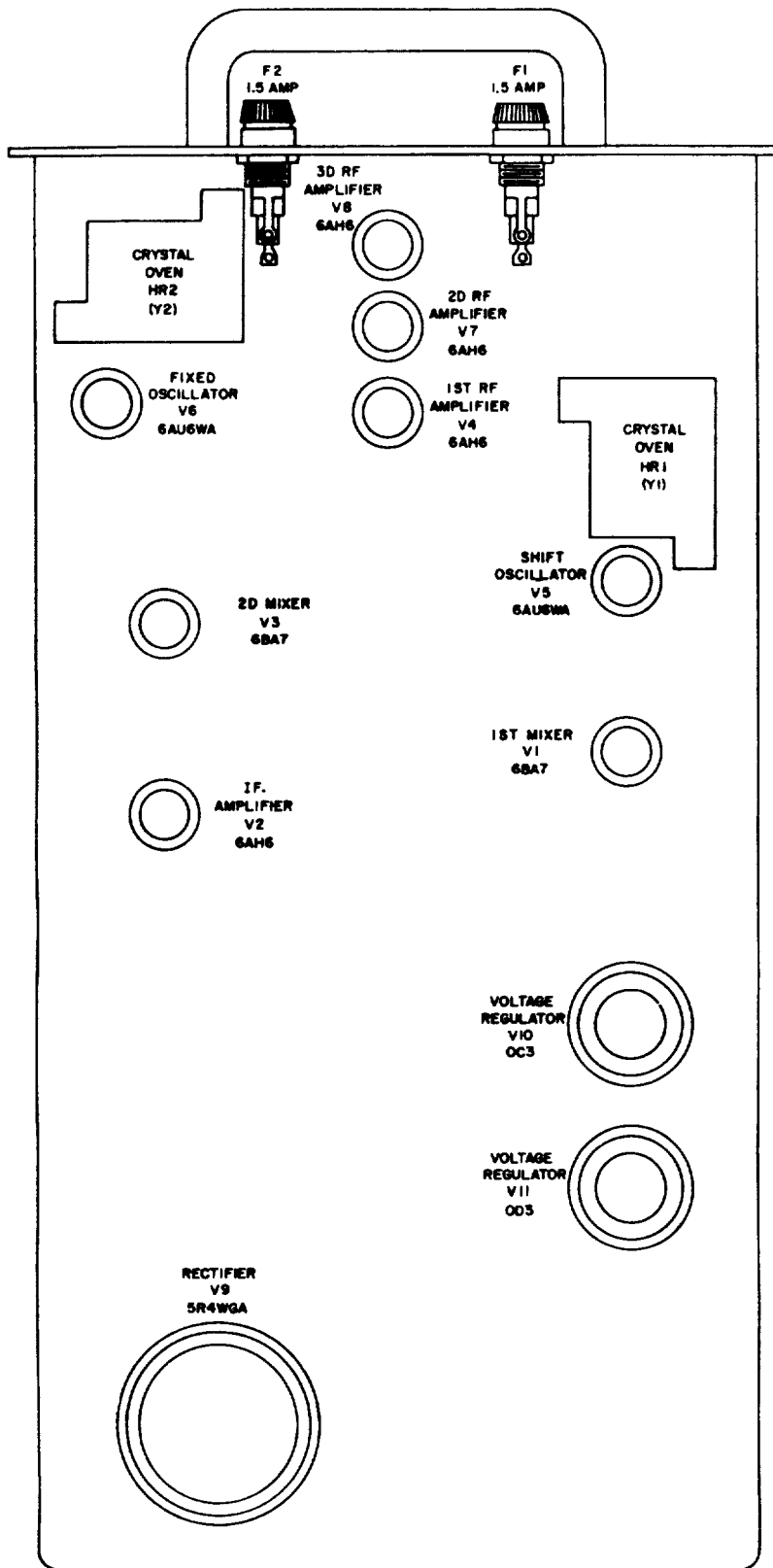
Refer to TM 11-5820-256-10 for a list of fuses in the remaining components.

Equipment	Fuse	Rating (amp)	Location
Receiver, Radio R-390/URR	AC	3	Rear panel.
Receiver, Radio R-390A/URR	H. V.	3/8	Rear panel.
	AC	3	
	B+	1/4	
	F102 ^a		
	B+	1/8	
	F103 ^a		

^a Fuses F102 and F103 are not used in some receivers (TM 11-5820-358-10).

(2) The fsk-modulator contains crystals Y1 and Y2. Each crystal frequency is 12,000

kc. Each crystal is enclosed in a crystal oven located on the top of the chassis.



TM5820-256-20-3

Figure 3. Modulator, radio MD-239/GR, tube, fuse, and crystal location.

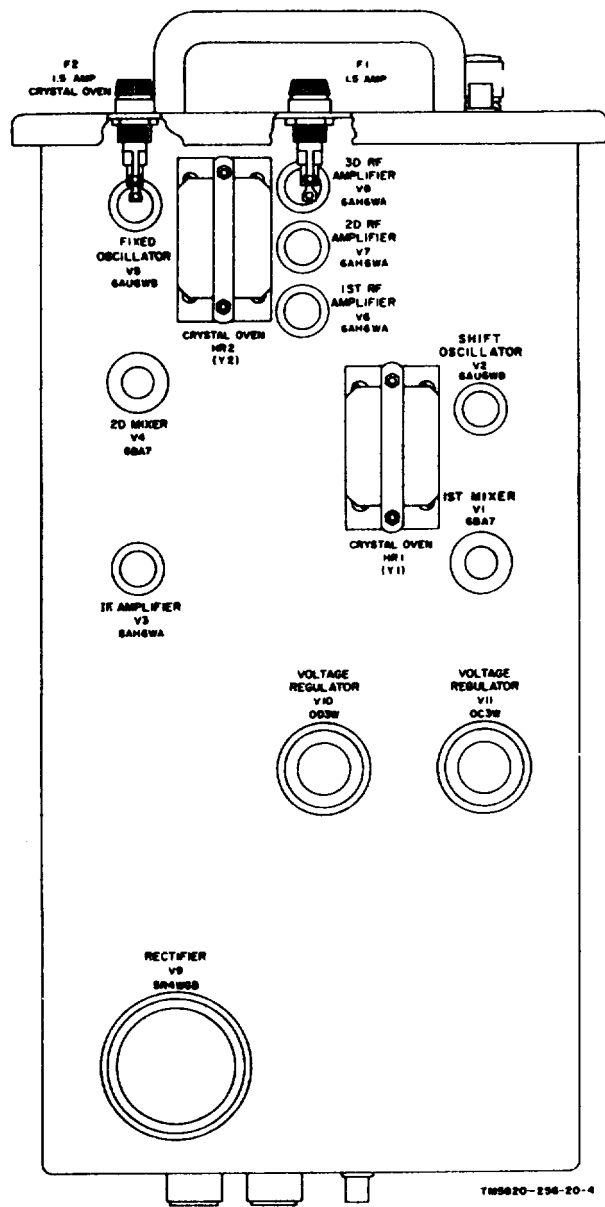


Figure 4. Modulator, Radio MD-239A/GR, tube, fuse, and crystal location.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE

8. Scope of Second Echelon Maintenance

Second echelon maintenance of Radio Set AN/GRC-26D consists of the following:

- a. Preventive maintenance (para 10).
- b. Sectionalization checks (para 11).
- c. Troubleshooting (para 12).
- d. Replacement of defective fuses (para 7b(1)).
- e. Replacement of cables.
- f. Replacement of major components (para 13).
- g. Replacement of defective tubes (para 14).
- h. Replacement of crystals in Modulator, Radio MD-239(*)/GR (para 15).

9. Tools, Materials, and Test Equipment Required

A list of parts normally stocked for second echelon maintenance is contained in TM 11-5820-256-20P. The tools, materials, and test equipment required for second echelon maintenance are listed below.

- a. *Tools.* The tools required for second echelon maintenance are Tool Equipments TE-41 and TE-50B.
- b. *Materials.*
 - (1) Cleaning Compound (Federal stock No. 7930-395-9542).

Warning. Cleaning compound is flammable and its fumes are toxic. Do not use near flame and provide adequate ventilation.

- (2) Cleaning cloth.
- (3) Fine sandpaper.

c. *Test Equipment.* Multimeter AN/URM-105, or equal, is required for second echelon maintenance.

10. Preventive Maintenance Forms

a. *DA Form 11-238.* DA Form 11-238 (fig. 5 and 6) is a preventive maintenance checklist to be used by second echelon maintenance personnel for all components that make up the radio set and are not covered by their respective technical manuals (appx I). Items not applicable to the equipment are lined out in the figures. Additional preventive maintenance information concerning items on DA Form 11-238 will be found in the preventive maintenance portion of TM 11-5820-256-10. Instructions for the use of the form appear on the form.

b. *Other Forms.* Records of the maintenance and inspection of unlike components (such as the PU-294/G) that make up the radio set should be maintained on other forms for the individual components. Specific instructions on the preparation of these are contained in their respective technical manuals (appx I).

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS		CONDITION	MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT SOUND EQUIPMENT, RADIO, DIRECTION FINDING RADAR, CARRIER, RADIOSONDE AND TELEVISION (AR 750-623)				
26. INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.		✓	EQUIPMENT NOMENCLATURE RADIO SET AN/GRC-26D				
27. CHECK FOR NORMAL OPERATION.	PARA 12	✓					
28. BEFORE SHIPPING OR STORING, REMOVE BATTERIES		✓					
IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.			EQUIPMENT SERIAL NUMBER 476	INSTRUCTIONS 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. 1. For detailed Preventive Maintenance instructions see: 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) 2. The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon: a. Enter Equipment Nomenclature and Serial Number. b. Strike out items that do not apply to the equipment. 3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND. 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.			
ITEM 7. RF CABLE ASSEMBLY CG-530B/U BROKEN, REPLACED; REPORTED TO HIGHER ECHELON MAINTENANCE FOR REPAIR.			TYPE OF INSPECTION				
			OPER- ATOR		2/3 ECHELON	DATE	SIGNATURE
					✓	31 OCT	G. R. Conn

DA FORM 11-238
MAY 57

REPLACES DA FORMS 11-238, 1 NOV 56; 11-239, 11-244, 11-245, 11-249, 11-249, 11-250, AND 11-251; WHICH ARE OBSOLETE.

TM5820-256-20-5

Figure 5. DA Form 11-238, pages 1 and 4.

LEGEND for marking conditions: Satisfactory, ✓ Adjustment, Repair or Replacement required, X Defect corrected, ⊗							DAILY CONDITION FOR MONTH OF <i>NOVEMBER 1961</i>																																				
DAILY							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																	
NO. ITEM							17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2D ECH- ELON																					
1. COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (Transmitter, receiver, carrying cases, wire, cables, microphones, tubes, spare parts, technical manuals).							/																✓																				
2. CLEAN DIRT AND MOISTURE FROM ANTENNA, MICRO-PHONES, HEADSETS, KEYS, JACKS, PLUGS, 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.																							/																				
WEEKLY					CONDITION EACH WEEK					2D ECH	ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS																												CONDITION				
					1ST	2D	3D	4TH	5TH																																		
5. CLEAN AND TIGHTEN EXTERIORS OF CASES, RACKS, MOUNTS, TRANSMISSION LINES.												⊗	15. INSPECT SEATING OF READILY ACCESSIBLE PLUCK-OUT ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, ROTATORS, PLUG-IN COILS.																✓														
6. INSPECT CASES, MOUNTS, ANTENNA TOWERS AND EXPOSED METAL SURFACES FOR RUST, CORROSION.												✓	16. INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MISALIGNMENT OF CONTACTS AND SPRINGS, REVERSE POLARITY CONNECTION.																														
7. INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUCE STRAIN.												⊗	17. INSPECT ACCESSIBLE CAPACITORS FOR DIRT, MISALIGNMENT OF LAMPS, LOOSE MOUNTINGS, MOISTURE.																														
8. CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.												✓	18. INSPECT EXISTING, BUSHINGS AND INSULATORS FOR CRACKS, SWELLING, SLIPPING, MOISTURE, DISCOLORATION.																														
9. INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING.												✓	19. CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS AND READILY ACCESSIBLE.																														
10. INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, RELAYS, TRANSFORMERS, MOTORS, PILOT LIGHTS, BLOWERS, ETC.												✓	20. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.																														
11. CLEAN AND/OR INSPECT AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS.												✓	21. INSPECT TERMINALS OF LARGE FILLED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS.																														
12. INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.													22. INSPECT TRANSFORMERS, CHOKES, RESISTORS AND THERMOSTATS FOR OVERHEATING AND OIL LEAKAGE.																														
ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS													23. INSPECT GENERATORS, AMPLIFIERS, DYNAMOS FOR GRASS BEARY, GRASS CONNECTION, WAXING AND FITTING OF COMMUTATOR.																														
13. INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER-PROOFING, TEARS, FRAYING.												✓	24. INSPECT CATHODE RAY TUBES FOR BURN-SCREEN SPOTS.																														
14. CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, CRACKS.													25. INSPECT WATERPROOF GASKETS FOR LEAKS, WORN OR LOOSE PARTS.																✓														

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Figure 6. DA Form 11-238, pages 2 and 3.

Section II. TROUBLESHOOTING

11. Sectionalization Checks

a. Many of the faults appearing in the radio set may be detected by a visual inspection of the system components. Pilot lamps are used to indicate that power has been applied to a component. If pilot lamps fail to light, check to see that the power cords are connected to the proper receptacles and that their plugs are properly inserted.

b. Improper setting of controls and switches could result in faulty operation of the radio set. Check the control and switch settings for each type of operation used (TM 11-5820-256-10).

c. Other faults may be found by a visual inspection of the paths within the system, such as power input, received signal, and transmitted signal. Refer to the block diagram analysis for the theory of the radio set (para 16 through 19).

d. Complete failure of the system can be caused by trouble in the power unit, shelter power connections, Switch Box SA-331/U, or a faulty input power cable. Partial deenergizing of the radio set can be caused by faulty circuit breakers or broken or loose wires in the alternating current (ac) distribution circuit. Check the following items:

- (1) Generator Set, Gasoline Engine, Trailer Mounted PU-294/G for proper power output.
- (2) Power input cables for breaks or loose cable connections.
- (3) Circuit breakers for positive contact.
- (4) Ac cords of components for breaks or improper plug seating.

12. Equipment Performance Checklist

a. *General.* The equipment performance checklist

is a procedure to systematically check equipment performance. All corrective measures which the second echelon maintenance repairman can perform are given and referenced in the *Corrective measures* column. If the corrective measures indicated do not correct the fault, troubleshooting is required by higher echelon. Note on the repair tag how the equipment performed and what corrective measures were taken.

b. *Procedure.*

- (1) Check with the operator to determine what the conditions were when the equipment failed.
- (2) Determine from the operator what steps were taken to disable (turnoff) the equipments suspected of being in trouble.
 - (a) If the initial adjustments have been changed on the various components of the radio set, retune and adjust the equipment as described in TM 11-5820-256-10.
 - (b) If the equipment has been completely shut-down, using the stopping procedure described in TM 11-5820-256-10, perform complete checklist procedures described in c or d below, as applicable.
 - (c) If only certain selected components were turned-off by the operator, restart these units as described in the checklist for these particular components. Check for proper operation by observing the meter indications or other normal indications listed in the chart.

c. *Transmitted Signal Path.*

Step	Unit	Action	Normal indication	Corrective measure
1	Power unit	Press START button. Set circuit breaker to ON.	Gasoline engine starts.	Refer to TM 11-940A.
2	Shelter	Set circuit breaker to ON.	Shelter lamps light.	Check power unit or shelter circuit breakers. Check Cable Assembly CX-2254/U from the power unit to the SA-331/U.

Step	Unit	Action	Normal indication	Corrective measure
3	Transmitter	Set SERVICE SELECTOR switch to FSK. Set FILAMENT POWER circuit breaker to ON. Set OPERATE-TUNE switch (TUNE-NORMAL switch on some models) to TUNE. Set PLATE RELAY switch to on (up). Set PLATE POWER circuit breaker to ON.	FILAMENT POWER pilot lamp illuminates; blower operates; FIL VOLTAGE meter indicates 5 volts. If KEYING switch is set to CONTINUOUS and EXCITATION METER SWITCH is set to IT AMP PLATE X10 or PA GRID X2, EXCITATION meter indicates current. PLATE POWER pilot lamp illuminates approximately 25 seconds after circuit breaker is set to ON. PA PLATE meter indicates amount of current.	Check Power Cable Assembly CX-6485/U between the SA-331/U and the shelter power input receptacle. Check Power Cable Assembly CX-1165/U and Power Cable Assembly CX-1166/U (if used) when the J-85/G is used with the power unit. Check the shelter power input receptacle. Check 3 AMP and 6 AMP fuses. Check FILAMENT POWER indicator lamp. Check ac line cord and plug (CD-763). Refer to TM 11-809-20. Check PLATE POWER indicator lamp. Refer to TM 11-809-20.
4	Fsk-modulator	Set POWER switch to ON.	Pilot lamp illuminates; blower operates.	Check fuse F1. Check pilot lamp. Check ac line cord and plug (CX-2491/U). Check switch.
5	Transmitter	Set EXCITATION METER SWITCH to PA GRID X2. Set KEYING switch to CONTINUOUS.	EXCITATION METER and PA PLATE meters indicate amount of current.	Check Rf Cable Assemblies CG-530B/U, Adapters UG-636A/U between the transmitter and fsk-modulator. If the cable assemblies and adapters are not defective, set the KEYING switch to NORMAL and disconnect the CG-530B/U at the UG306A/U on the EXCITATION INPUT receptacle on the transmitter. Disconnect the CG-530B/U from the UG-306A/U on the FSK OUT receptacle on the fsk-modulator and connect it to the UG-306A/U of the EXCITATION INPUT receptacle on the transmitter. Set the KEYING switch to CONTINUOUS and if no current is indicated on the PA PLATE meter, refer to TM 11-809-20.

Step	Unit	Action	Normal indication	Corrective measure
6	Matching unit	Set the control switch to POWER.	Meter on matching unit indicates amount of power from transmitter.	if current is indicated on the PA PLATE meter, reconnect the cables and test the tubes in the fsk-modulator (para 14). If the tubes are good, replace the fsk-modulator. Check Cord CG-55E/U and Radio Frequency Adapters UG-27C/U. Refer to TM 11-809-20.
7	Transmitter	Set the control switch to OPERATE. Set KEYING switch to NORMAL.	EXCITATION meter indicates no current.	
8	Control unit	Set TELETYPE switch to NORMAL DX. Set power switch to ON.	Pilot lamp illuminates.	Check pilot lamp. Check ac line cord and plug. Check switch.
9	Send page printer	Set MOTOR and LIGHT switches to ON. Set SEND-LOCK switch to SEND.	Motor operates; light illuminates. PA PLATE meter on transmitter indicates amount of current.	Check fuse F1. Check ac line cord and plug. Refer to TM 11-5815-22-10. Check Cord Assembly, Electrical CX-3270/U between the send page printer and control unit. Check Cable Assembly, Special Purpose, Electrical CX-3267/U between the control unit and transmitter. Check SEND-LOCK switch. Check Radio Frequency Adapter UG-27C/U and Cable Assembly, Radio Frequency CG-1333/U between the matching unit and tuning unit. Check Wire W-128 from the tuning unit to Mast Base MP-76. Check antenna. If doublet antenna is used, check Radio Frequency Adapter UG-27C/U and RF Cable Assembly CG-692/U between the matching unit and antenna; check the antenna. Refer to TM 11-809-20.
10	Reperforator	Type on keyboard. Set START-STOP-FEED RETRACT lever to STOP. Set SEND-LOCK switch to SEND. Set POWER, LIGHT, and MOTOR switches to ON.	Page copy prepared. Motor operates; light illuminates.	Check Special Purpose Cable Assemblies CX-1200/U and CX-1201/U between the send page printer and control unit. Refer to TM 11-5815-200-10. Check fuse F1 on TT-76/GGC or fuses F1 and F2 on TT-76A/GGC and TT-76B/GGC.

Step	Unit	Action	Normal indication	Corrective measure
				Check ac line cord and plug. Refer to TM 11-2225.
11	Control unit	Set SELECTOR switch to 3. Type test message.	Tape copy of test message prepared.	Refer to TM 11-2225.
12	Reperforator	Remove red receive cord from RED DX jack and insert into red ONE WAY OR SEND DX jack. Set SELECTOR switch to 1. Insert test tape into transmitter-distributor. Set START-STOP-FEED RETRACT switch to START.	Page and tape copies of test message are prepared by send page printer and reperforator respectively.	Check receive cord (red plug) between reperforator and control unit. Check transmitter-distributor cord (gray plug) between reperforator and control unit. Refer to TM 11-2225. Check Cork CG-409E/U (8 ft) between control unit and fsk-modulator.
13	Send page printer	Set START-STOP-FEED RETRACT lever to STOP. Set POWER, MOTOR, and LIGHT switches to OFF. Set MOTOR and LIGHT switches to OFF. Set SEND-LOCK switch to LOCK.	Transmission of test message stops. Motor stops, light extinguishes. Motor stops, light extinguishes.	
14	Microphone	Connect to CARBON MICROPHONE receptacle on transmitter.		
15	Transmitter	Set SERVICE SELECTOR switch to AM.		
16	Microphone	Press push-to-talk switch and speak normally into microphone. Disconnect microphone from CARBON MICROPHONE receptacle on transmitter and connect it to MIC OR KEY receptacle on control unit.	Small variations in PA PLATE meter reading on transmitter.	Check microphone and cord. Refer to TM 11-809-20.
17	Transmitter	Press push-to-talk switch and speak normally into microphone. unit and transmitter. Set KEYING switch to CONTINUOUS.	Small variations in PA PLATE meter reading on transmitter.	Check Cable Assembly, Special Purpose, Electrical CX-3267/U between control
18	Telephone Set TA-43/PT or TA-312/PT.	Press push-to-talk switch on handset and speak normally into mouthpiece.	Small variations in PA PLATE meter reading on transmitter.	Check telephone cord between the TA-43/PT or TA-312/PT and control unit. Check Cable Assembly, Special Purpose, Electrical CX-3267/U between control unit and transmitter. Refer to TM 11-337 for TA-43/PT and to TM 11-2155 for TA-312/PT.

Step	Unit	Action	Normal indication	Corrective measure
19	Transmitter	Set KEYING switch to NORMAL.		
20	Key	Connect to CARBON MICROPHONE receptacle on transmitter.		
21	Transmitter	Set SERVICE SELECTOR switch to CW.		
22	Key	Operate key to transmit a message. Disconnect key from CARBON MICROPHONE receptacle on transmitter and connect to MIC OR KEY receptacle on control unit. Operate key.	Small variations in PA PLATE meter reading on transmitter. Small variations in PA PLATE meter reading on transmitter.	Check key cord. Refer to TM 11-809-20. Check Cable Assembly, Special Purpose, Electrical CX-3267/U between control unit and transmitter.
23	Remote control unit	Connect CONTROL binding posts on remote control unit to CONTROL binding posts on control unit. Set XMTR ON switch to on.	PA PLATE meter on transmitter indicates amount of current.	Check connections between remote control unit and control unit. Check switch.

d. Received Signal Path.

Step	Unit	Action	Normal indication	Corrective measure
1	Power unit	Press START button. Set circuit breaker to ON.	Gasoline engine starts.	Refer to TM 11-940A.
2	Shelter	Set circuit breakers to ON.	Shelter lamps light.	Check power unit or shelter circuit breakers Check Cable Assembly CX-2254/U from the power unit to the SA-331/U. Check Power Cable Assembly CX-6485/U between the SA-331/U and the shelter power input receptacle. Check Power Cable Assembly CX-1165/U and Power Cable Assembly CX-1166/U (if used) when the J-85/G is used with the power unit. Check the shelter power input receptacle.
3	Blower Assembly, Electrical HD-223/G.	Set Power switch to ON.	Blower operates; pilot lamp illuminates.	Check pilot lamp. Check ac line cord and plug. Replace the HD-223/G.
4	Receivers	Set AGC switches to MED. Set BANDWIDTH KC switches to 16.		

Step	Unit	Action	Normal indication	Corrective measure
5	Speaker assembly	Set MEGACYCLE CHANGE and KILOCYCLE CHANGE controls to transmitter frequency.		
6	Control unit	Set ON CHANNEL A and ON CHANNEL B switches to on (up). Set SIDETONE switch to REC A.	CW sidetone to heard in speaker A as key is operated (steps 19 through 22 (c above)).	Check Cord Assembly, Electrical CX-3271/U between receiver A and speaker Check Cable Assembly, Special Purpose, Electrical CX-3267/U between the transmitter and the control unit. Check Cable Assembly, Special Purpose, Electrical CX-3268/U between the control unit and receiver A. Refer to TM 11-5820-357-20 for R-390/URR and to TM 11-5820-358-20 for R-390A/URR.
7	Control unit	Set SIDETONE switch to REC B.	CW sidetone is beard in speaker B as key is operated.	Check Cord Assembly, Electrical CX-3271/U between receiver B and speaker assembly. Check Cable Assembly, Special Purpose Electrical CX-3268/U between control unit and receiver B.
8	Receivers	Set each BFO switch to ON. Adjust BFO PITCH control for a comfortable pitch from speaker assembly.	Transmitted message is heard in speaker assembly.	Refer to TM 11-5820-357-20 for R-390/URR and to TM 11-5820-358-20 for R-390A/URR.
9	Receivers	Set FUNCTION switches to STAND BY.	Dial lamps illuminate.	Check AC fuses. Check ac line cords and plugs. Refer to TM 11-5820-357-20 for R-390/URR and to TM 11-5820-358-20 for R-390A/URR.
10	Receiver A	Adjust to receive a tone keyed signal (FUNCTION switch in MGC position).	CARREER LEVEL meter indicates strength of received signal. Tone keyed signal heard in speaker assembly.	If a whip antenna is used, check antenna, check Adapter Connector UG-637/U and Cable Assembly, Radio Frequency CG-718A/U (8 ft) between Mast Base MP-65-B and receiver. If a doublet antenna is used, check antenna; check Cable Assembly, Radio Frequency CG-1334/U between antenna and receiver. Check Cord Assembly, Electrical CX-3271/U between receiver and speaker assembly. Refer to TM 11-5820-357-20 for R-390/URR and to TM 11-5820-358-20 for R-390A/URR.
11	Receiver B	Adjust to receive a tone keyed signal.	Same as step 10.	Same as step 10.

Step	Unit	Action	Normal indication	Corrective measure
12	Headset	Insert plug of headset into PHONES jack on receiver.	Tone keyed signal heard in headset.	Check headset and cord.
13	Converter	Set POWER switch to ON.	Pilot lamp illuminates; fan operates.	Check fuses F1 and F2. Check pilot lamp. Check ac line cord and plug (CX-2491/U). Check Cord CG-409E/U (6 ft) between receiver and converter. Refer to TM 11-2241.
14	Control unit	Set TELETYPE switch to NORMAL DX.		
15	Receive page printer.	Set MOTOR and LIGHT switches to ON.	Motor operates; light illuminates.	Check fuse F1. Check ac line cord and plug. Refer to TM 11-5815-200-10.
16	Converter	Adjust converter and receiver for afc operation.	Receive page printer prepares page copy of received message.	Check Cord Assembly, Electrical CX-3269/U between converter and control unit. Check Special Purpose Cable Assembly CX-1200/U between control unit and receive page printer. Refer to TM 11-2241 and TM 11-5815-200-10.
17	Receive page printer.	Set MOTOR and LIGHT switches to OFF.		
18	Receiver A	Adjust to receive an am. signal.	Voice signal heard in speaker assembly.	
19	Control unit	Set REMOTE TEL switch to REC A.	Voice signal heard in Telephone Set TA-43/PT or TA-312/PT. Signal may be varied by LINE GAIN control on receiver A.	Check Cable Assembly, Special Purpose, Electrical CX-3268/U between receiver A and control unit. Check telephone cord between control unit and Telephones Set TA-43/PT or TA-312/PT. Refer to TM 11-5820-357-20 for R-390/URR and TM 11-5820-358-20 for R-390A/URR. Refer to TM 11-337 for TA-43/PT and TM 11-2155 for TA-312/PT.
20	Receiver B	Adjust to receive an am. signal.	Voice signal heard in speaker assembly.	
21	Control unit	Set REMOTE TEL switch to REC B.	Voice signal heard in Telephone Set TA-43/PT or TA-312/PT. Signal may be varied by LINE GAIN control on receiver B.	Check Cable Assembly, Special Purpose, Electrical CX-3268/U between receiver B and control unit. Refer to TM 11-5820-357-20 for R-390/URR and TM 11-5820-358-20 for R-390A/URR.
22	Control unit	Set TELETYPE switch to NORMAL OW.		
23	Receiver A	Set BREAK IN switch to ON.	CARRIER LEVEL meter reads 0; no signal heard in speaker assembly.	Check Cable Assembly, Special Purpose, Electrical CX-3267/U between transmitter and control unit. Check Cable Assembly, Special Purpose, Electrical CX-3268/U between the control unit and receiver A. Refer to TM 11-5820-357-20 for R-390/URR and TM 11-5820-358-20 for R-390A/URR.
		Set BREAK IN switch to OFF.		

Step	Unit	Action	Normal indication	Corrective measure
24	Receiver B	Set BREAK IN switch to ON.	CARRIER LEVEL meter reads 0; no signal heard in speaker assembly.	Check Cable Assembly, Special Purpose, Electrical CX-3268/U between control unit and receiver B. Refer to TM 11-5820-357-20 for R-390/URR and TM 11-5820-358-20 for R-390A/URR.

13. Replacement of Major Components

All the major components that require replacement at organizational maintenance level use standard mounting devices. No special knowledge is required for removal and replacement of these components. Remove all interunit cabling to the major component that requires replacement. Refer to TM 11-5820-256-10 for interunit cabling information.

14. Tube Testing Techniques

When trouble has been sectionalized to a component (receiver, transmitter, etc), the trouble usually can be localized by a systematic check of the component. Inspect all cables, connections, fuses, and batteries before removing any electron tubes. Tube location diagrams for the MD-239(*)/GR are shown in figures 3 and 4. Tube location diagrams for the remaining components are contained in the associated technical manuals (appx I). Try to isolate the trouble to a stage. If tube failure is suspected, use the applicable procedure below to check the tubes.

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. Substitute new tubes only for those that are defective.

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. Preferred-Type Tubes. The chart below lists the preferred-type for each tube. Do not use a nonpreferred-type tube to replace a preferred-type tube.

Nonpre-ferred-type tube	Preferred-type tube	Modulator, Radio MD-239(*)/GR stage designation
6AU6 6AH6	6AU6WB 6AH6WA	Shift oscillator and fixed oscillator. If amplifier, first rf amplifier, second rf amplifier, and third rf amplifier.
5R4	5R4WGB	Rectifier.

15. Replacement of Crystals in Modulator, Radio MD-239(*)/GR

(fig. 7)

Replace crystals Y1 and Y2 as follows:

a. Remove the holddown assembly that secures the crystal oven in place by removing the two nuts and washers from the mounting studs.

b. Remove the oven housing from the oven mounting bracket.

c. Remove the cover from the oven housing by grasping firmly with the thumb and forefinger and pulling loose.

d. Remove the padding from around Crystal Holder HC-6/U.

e. Grasp the protruding stud and remove the HC-6/U from the oven housing.

f. Remove the two screws and lockwashers that hold Crystal Unit, Quartz CR-27/U in the HC-6/U.

g. Remove the CR-27/U from the HC6/U.

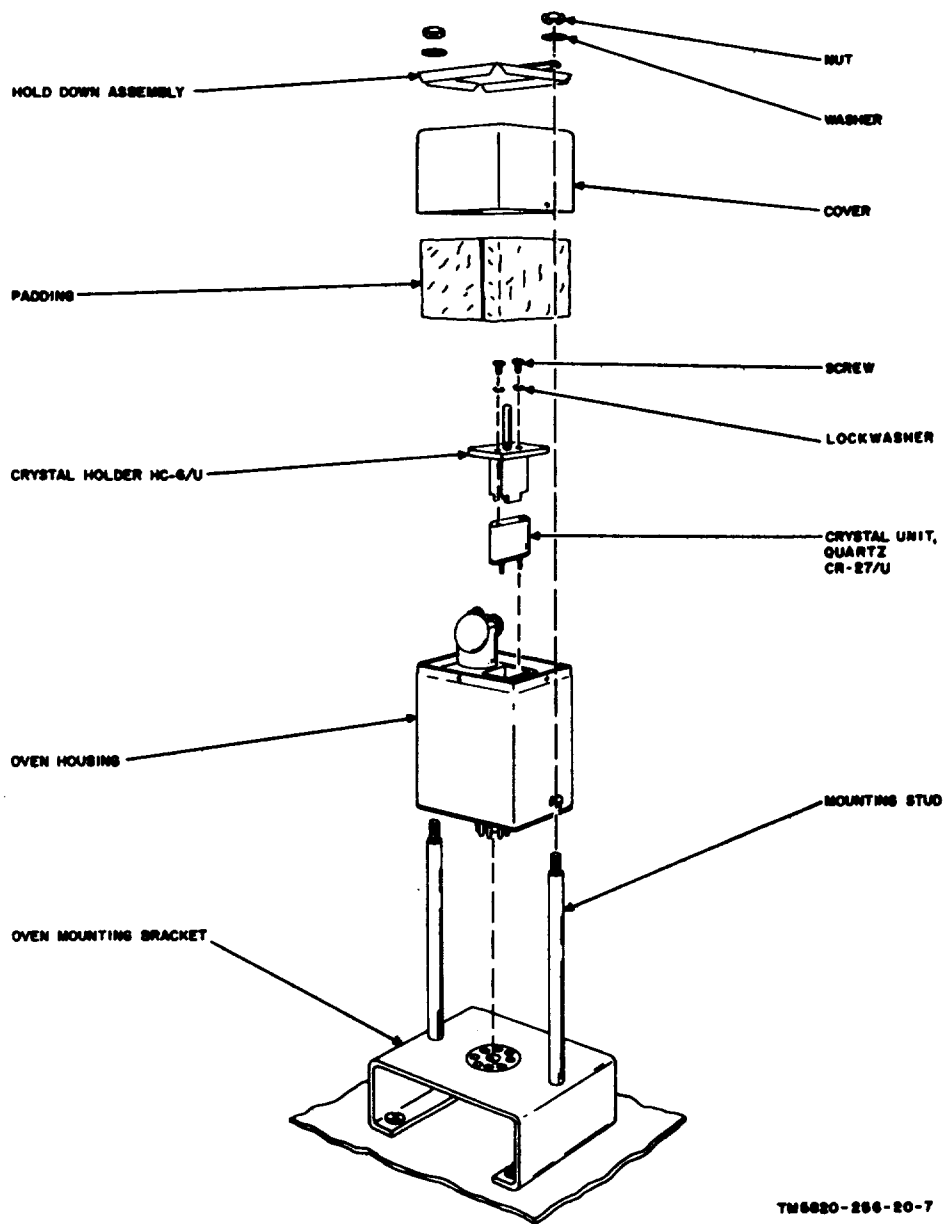


Figure 7. Crystal Unit, Quart CR-27/U, removal from crystal oven.

CHAPTER 4

BLOCK DIAGRAM ANALYSIS

16. General

a. This chapter describes the general and system theory of Radio Set AN/GRC-26D. The information provided is intended to aid organizational maintenance personnel in maintaining the equipment. The system theory of the major components of the radio set is given in paragraphs 17 through 19.

b. The radio set consists of wire and radio equipments operating as a unit. Since the primary use of the radio set is for radio teletypewriter communications, emphasis is placed on the adaptability of the equipment to this mode of operation.

17. System Analysis

a. *Transmission.* The transmitter radio frequency (rf) carrier is frequency shift keyed for teletypewriter operation, keyed on and off for continuous-wave (cw) operation, and amplitude modulated (am.) for voice operation. The rf carrier is modulated by both teletypewriter and voice signals simultaneously for fsk-am. operation. When only one frequency is available for communication, one-way reversible operation must be used; the transmitter is disabled during reception and the receiver is disabled during transmission. However, when two frequencies are available, duplex operation may be used and neither the transmitter nor the receiver need be disabled.

b. *Reception.* Each receiver in the radio set will accept cw signals and signals that are either frequency-shift keyed by teletypewriter signals, amplitude modulated by audio signals, or both fsk-am. simultaneously (a above). Normally, space diversity reception is used.

18. Transmitting Path

The waveforms and signal paths from the signal initiating equipment to the transmitting antenna are shown in the upper portion of figure 8. The transmitting units of the radio set include teletypewriter equipment

(one Reperforator-Transmitter, Teletypewriter TT-76(*)/GGC, and two Teletypewriters TT-98(*)/FG (one send and one receive)), Microphone M-29(*), two telephone sets (Telephone Set TA-43/PT or Telephone Set TA-312/PT), one key (Key, Telegraph KY-116/U or Key J-45), one Control, Radio Set C-1123/GRC, one Modulator, Radio MD-239(*)/GR, one Transmitter, Radio T-368(*)/URT, one Tuner, Radio Frequency TN-339/GR, and a doublet or whip antenna. The remote equipment is identical with the signal initiating equipment used within the shelter (a below). However, when remote operation is used, the initiated signals are first applied through Control, Remote Switching C-1474(GRC (b below) and then to the control unit (c below). The transmitting path from the control unit is described in d through f below.

Note. The control unit, remote control unit, telephone sets, and teletypewriter equipment are common to the transmitting and receiving paths (para 19).

a. Signal Initiating Equipment.

- (1) When fsk operation is used, neutral signals from the teletypewriter equipment are applied directly to the C-1123/GRC.
- (2) When am. operation is used, audio signals from the M-29(*)/GR or telephone set are applied directly to the C-1123/GRC.
- (3) When cw operation is used, the transmitter is keyed on and off by the KY-116/U or J-45 through the C-1123/GRC.

b. *Remote Control Unit.* The C-1474/GRC provides routing facilities for duplex or one-way operation from a remote location. All signals initiated by the remote equipment are routed through the remote control unit to the control unit (c below).

c. *Control Unit.* The C-1123/GRC routes all initiated (a above) and received signals (para 19d) to their proper destinations.

Neutral signals from the teletypewriter equipment are directed to the fsk-modulator and audio signals are directed to the transmitter. Operation of the telegraph key controls the transmitter (e(3) below) through the control unit. Also, remote or local operation is selected by the appropriate switch settings at the control unit and the remote control unit (b above) for the type of operation involved.

d. *Fsk-modulator.* The master oscillator of the transmitter applies a 1.5- to 3.0-megacycle (mc) carrier signal to the MD-239(*)/GR. The fsk-modulator shifts the carrier signal in accordance with the neutral signals from the teletypewriter equipment through the control unit. When the transmitting frequency is higher than 3.0 mc, frequency multiplication is required in the transmitter. Four different frequency shifts are available in the fsk modulator to compensate for the amount of frequency multiplication required in the transmitter.

- (1) When a neutral mark signal is received by the fsk-modulator, the radio frequency output of the fsk modulator is the assigned carrier frequency (no frequency shift occurs).
- (2) When a neutral space signal is received by the fsk-modulator, the carrier frequency is shifted down. The amount of the frequency shift ((3) below) is determined by the position of the BAND SELECTOR switch on the fsk-modulator. The switch setting corresponds to the transmitter BAND SELECTOR switch setting. The final transmitted frequency, when shifted, deviates exactly 850 cps below the carrier frequency.
- (3) The fsk-modulator output is applied to the transmitter second buffer and frequency multiplier stages as required. The chart below lists the amount of frequency shift incurred at the fsk-modulator for the transmitter band of frequencies available.

Transmitter frequency band (mc)	Multiplication factor	Fsk-modulator frequency shift (cps)
1.5 to 3.0	1	850
3.0 to 6.0	2	425
6.0 to 12.0	4	212.5
12.0 to 20.0	8	106.25

e. *Transmitter.*

- (1) The frequency-shifted carrier output of the fsk-modulator is applied to the second buffer in the T-368(*)/URT. When the transmitting frequency is to be multiplied by the factor two, four, or eight, the frequency-shifted carrier is passed through the first, second, or third multiplier stage, respectively. When no multiplication is involved, the output of the second buffer amplifier is applied directly to the intermediate power amplifier (ipa). The ipa supplies the proper excitation to the class C power amplifier stage.
- (2) The transmitter rf carrier signal may be amplitude modulated by the audio signals from the M-29(*)/U or telephone set (a(2) above). The rf carrier signal maybe amplitude modulated the same time it is frequency-shift keyed by the teletypewriter equipment ((1) above). In either case, the audio signals are routed directly from the control unit to the transmitter, and amplified by the audio frequency (af) amplifier stages and driver to a level suitable for modulating the power amplifier stage.
- (3) The transmitter rf signal is keyed for cw operation by removing a cutoff bias voltage from the grids of several stages of the transmitter through the control unit.

f. *Tuning Unit and Transmitting Antenna.* The output of the power amplifier in the transmitter is link-coupled to the balanced doublet antenna system for radiation. When a whip (or long wire antenna) is used, the TN-339/GR is used to provide the proper impedance match between the transmitter and antenna.

19. Receiving Path

The waveforms and the signals from the receiving antennas to the receiving units are shown in the lower portion of figure 8. The receiving units of the radio set include two doublet or whip antennas, two Receivers, Radio R-390(*)/URR, Loudspeaker Assembly LS-206(*)/U, Converter, Frequency Shift CV-116(*)/URR, the control unit (para 18c), teletypewriter equipment, and telephone sets (para 18). Two Headsets Electrical H-113/U (not shown) may be used with the receivers for private listening (such as for cw reception). When remote operation is involved, the remote control unit (para 18b) and remote equipment are used.

a. Receiving Antennas.

- (1) The space diversity doublet antennas are similar to the transmitting doublet antenna in construction and directivity.
- (2) When the whip antennas are used (as in mobile operation), the distance over which satisfactory reception can be achieved is shorter than with the doublet antennas.
- (3) The rf signals picked up by the antennas are applied to the input circuits of the receivers. When diversity reception is not used, either antenna and receiver may be used.

b. *Receivers.* The incoming rf signals consist of a carrier frequency which has been frequency shifted (carrier frequency for mark, carrier frequency minus 850 cps for space) by the teletypewriter signals, and, when required, amplitude modulated by voice signals. For cw transmission (waveforms not shown), the carrier frequency is keyed on and off.

- (1) The rf signals are amplified and heterodyned in the receiver rf amplifier and mixer stages. The difference

frequency from the mixer stages is applied to the intermediate-frequency (if.) amplifier for amplification.

Note. The rf stage of the receiver is tuned so that the input signals are approximately the carrier frequency plus 425 cps for mark and approximately the carrier frequency minus 425 for space.

- (2) The if. signals are coupled to the detector stage. The audio component is amplified by the audio amplifiers and applied to the long-speakers in the LS-206(*)/U and to the control unit. When the H-113/U (not shown) is used, the audio component from the receiver is applied to the H-113/U.
- (3) The frequency-shifted if. signals which contain the mark-space information are applied directly to the converter from the if. stages in the receiver.

c. *Converter.* The frequency-shifted if. signals are applied to two identical input circuits in the converter. These signals are converted to lower if. signals (50 and 29.3 kc) and are coupled to a common limiter, which removes all amplitude modulation. The discriminator stage converts the mark and space if. signals into mark and space direct-current (dc) signals. These signals are coupled to the keyer circuits and amplified. Neutral output signals are provided by the converter.

d. *Control Unit.* The control unit routes signals in the transmitting path (para 18b) and routes the neutral dc signals from the converter to the teletypewriter equipment. Also, the audio signals from the receiver are routed through the control unit to the telephone set.

Note. When remote operation is used, the control unit routes the neutral dc and audio signals through the remote control unit to the remote teletypewriter equipment and telephone set.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE

20. Disassembly of Equipment

The following instructions are recommended to organizational maintenance as a guide for preparing the radio set for shipment and storage. Refer to TM 1158-5820-256-10 for additional disassembly information.

a. Disassemble Mast Base Bracket MT-657/GRC by reversing the procedure in paragraph 5.

b. Disassemble Mast Brackets MP-50(*) by reversing the procedure in paragraph 6.

21. 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 below whenever possible. The information concerning the original packaging (TM 11-5820-256-10) will also be helpful.

a. *Material Requirements.* The following materials are required for packaging Radio Set AN/GRC-26D. For stock numbers of materials, consult SB 38-100.

Material	Quantity
Paper, wrapping, waterproof, Kraft	20 sq ft
Bag, mailing (cotton), drawstring	12
Tape, pressure-sensitive, adhesive, waterproof, for packaging and sealing (3 inches wide)	1 roll
Fiberboard, corrugated, single-faced (flexible)	750 sq ft
Tape, paper, gummed	2 rolls
Cord, sash, cotton, No. 8	5 lb
Cord, sash, cotton, No. 24	5 lb
Strapping, flat, steel, and seals	50 ft
Wooden box (39 in x 23 in x 23 in) ^a	1

^a Approximately 32 board feet of lumber required for fabrication.

b. *Packaging.* Package the items of Radio Set AN/GRC-26D as outlined below.

(1) *Technical manuals.* Package each technical manual within a close fitting bag fabricated of waterproof wrapping paper. Seal the bag securely with waterproof, pressure sensitive tape.

(2) *Shelter and contents.*

(a) Wind the cables, if not provided with reels, into coils of the smallest proportionate dimensions and tie in three places with heavy cord. Secure the cable connectors to the coils with the ties. Enclose all fastenings, bolts, nuts, and washers that were removed in the disassembly of each individual component in a cotton drawstring bag. Secure each bag of fastenings to the items from which they were removed. Cushion the accessories and spare parts in wrappings of flexible corrugated fiberboard and secure it with gummed paper tape. Fill the voids of the compartments in the storage cabinet with flexible corrugated fiberboard to prevent shifting or movement of the contents. Close the storage cabinet draws securely. The overflow items which cannot be stored on the shelves or in the cabinet drawers should be consolidated in the wooden box.

(b) After all items have been packaged and properly located and secured within the shelter, close the shelter door and secure it with the locking devices provided. Secure the shelter holddown rods to the sides of the shelter with strips of waterproof pressure-sensitive tape.

APPENDIX I

REFERENCES

Following is a list of applicable references available to organizational maintenance personnel of Radio Set AN/GRC-26D.

AR 380-5	Military Security.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 11-178	Replacement of Audio Accessories with Modern Types, Chest Set Group AN/GSA-6; Headset-Microphone H-63/U; Microphones M-29/U.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
SIG 7 & 8	Control, Radio Set C-1123/GRC.
SIG 7 & 8	Microphone M-29/U; M-29A/U.
TM 11-337	Telephone Sets TA-43/PT and TA-263/PT.
TM 11-809-20	Organizational Maintenance; Radio Transmitters T-368/URT, T-368A/URT, T-368B/URT, T-368C/URT, T-368D/URT, and T-368E/URT; Antenna Tuning Unit BC-939-B; Radio Frequency Tuner TN-399/GR; and Standing Wave Ratio-Power Meter ME-165/G.
TM 11-940A	Gasoline Engine Generator Sets PU-286/G and PU-286A/G.
TM 11-2155	Telephone Set TA-312/PT.
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 11-2241	Frequency Shift Converters CV-116/URR, CV-116A/URR, CV-116B/URR and CV-116C/URR.
TM 11-3895-201-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Axles RL-27-C and RL-27-D.
TM 11-4140-200-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Blower Assembly, Electrical HD-223/G.
TM 11-5410-200-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Shelters S-56/G and S-56A/G.
TM 11-5805-201-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Telephone Set TA-312/PT.
TM 11-5805-256-12P	Operator's, Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Telephone Set TA-43/PT.
TM 11-5805-257-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Generators, Ringing Hand G-42/PT and G-42A/PT.
TM 11-5815-200-10	Operator's Manual: Teletypewriter Sets AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-64, 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 Set AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/UGC-4, and Teleprinter TT-259/FG.

TM 11-5815-221-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Frequency Shift Converter CV-116/URR, CV-116A, B, C/URR.

TM 11-5815-238-12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Teletypewriter Sets AN/GGC-3, AN/GGC-3A and Repeater-Transmitters Teletypewriter TT-76/GGC, -76A/GGC, -76B/GGC.

TM 11-5820-251-20P Organizational Maintenance Repair Parts and Special Tools and Maintenance Allocation Chart, Mast AB-155/U, -155A/U, and -155B/U.

TM 11-5820-256-10 Operator's Manual, Radio Set AN/GRC-26D.

TM 11-5820-256-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Radio Set AN/GRC-26D.

TM 11-5820-257-12P Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Antenna Tuning Unit BC-939-A, -939-B and Tuner, Radio Frequency TN-339/GR.

TM 11-5820-321-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Modulator, Radio MD-239/GR, MD-239A/GR.

TM 11-5820-357-20 Organizational Maintenance Manual, Radio Receiver R-390/URR.

TM 11-5820-357-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Receiver-Radio R-390/URR.

TM 11-5820-358-20 Organizational Maintenance Manual, Radio Receiver R-390A/URR.

TM 11-5820-358-20P Organizational Maintenance Repair Parts and Special Tools List: Receiver, Radio R-390A/URR.

TM 11-5930-201-15P Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Switch Box SA-331/U.

TM 11-5965-201-12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Loudspeaker Assembly LS-206/U.

TM 11-5965-224-12P Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Handsets H-60/PT and H-165/U.

TM 11-5965-231-12P Operator's Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Headset, Electrical H-113/U.

TM 11-6115-202-20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Generator Set, Gasoline Engine PU-286/G and Power Unit PE-197.

TM 11-6115-223-15P Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Generator Set, Gasoline Engine, Trailer Mounted PU-294/G.

TM 11-6625-274-12

Operator's and Organizational Maintenance Manual, Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.

TM 11-6625-333-12P

Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Standing Wave Ratio-Power Meter ME-165/G.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance echelon.

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

- (1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.
- (2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.
 - (a) *Service.* To clean, to preserve, and to replenish lubricants.
 - (b) *Adjust.* To regulate periodically to prevent malfunction.
 - (c) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.
 - (d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.
 - (e) *Replace.* To substitute serviceable components, assemblies, or subassemblies for unserviceable components, assemblies, or subassemblies.
 - (f) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.
 - (g) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.
 - (h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.
 - (i) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.
- (3) *1st, 2d, 3d, 4th, 5th echelons.* 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 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 echelons.* The dagger (†) symbol in these columns indicates the echelons normally allocated the facility.

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

(4) *Remarks.* Entries in this column are used for explanatory notes.

2. Maintenance by Using Organizations

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

Section II. MAINTENANCE ALLOCATION CHART

(1) Parts or component	(2) Maintenance function	(3) 1 st ech.	(4) 2 nd ech.	(5) 3 rd ech.	(6) 4 th ech.	(7) 5 th ech.	(8) Tools required	(9) Remarks
RADIO SET AN/GRC-26D	service	x						Preventive Maintenance Preventive Maintenance Preventive Maintenance Continuity Voltage, Resistance. Sensitivity, Power Output All other tests All other tests
	adjust	x					12	
	inspect	x					1,4,6,7,11,13,15 16,19,20,22,23,24	
	test		x	x			1,2,3,5,6,7,8,9 10,13,14,16,17. 19,20,22,23,24	
	repair			x			x	
align				x			21,24 22,23,24	
calibrate					x		6,7,11,15,16 3,6,7,b,9,10, 14, 16	
rebuild						x	22.23.24 22,23,24	
TUNER, RADIO FREQUENCY TN-339/GR	service replace		x					Separate MAC
BLOWER HD-223/G	service replace		x					Separate MAC
CABINET CY-1807/G	replace rebuild					x x		
CABLE OR CORD ASSEMBLIES	replace repair		x	x				
CONTROL, RADIO SET C-1123/U	service replace		x					SEPARATE MAC
CONTROL, REMOTE SWITCHING C-1474/U	replace repair		x	x				

AN/GRC-26D 2

(1) Parts or component	(2) Maintenance function	(3) 1 st ech.	(4) 2 nd ech.	(5) 3 rd ech.	(6) 4 th ech.	(7) 5 th ech.	(8) Tools required	(9) Remarks
AN/GRC-26D (continued)								
FREQUENCY SHIFT CONVERTER CV-116/URR	service replace		x					Separate MAC
GENERATOR PU-294/G	service replace		x					Separate MAC
HEADSET H-113/U	service replace		x					Separate MAC
LOUDSPEAKER ASSEMBLY LS-206/U	service replete		x					Separate MAC
MAST AB-155/U	service replace		x					Separate MAC
MAST BASE MP-65	service replace		x					Separate MAC
MAST BASE MP-76	service replace		x					Separate MAC
MICROPHONE M-29/U	service replace		x					Separate MAC
MODULATOR, RADIO TRANSMITTER MD-239/GR	service replace		x					Separate MAC
RADIO RECEIVER R-390/URR	service replace		x					Separate MAC
REPERFORATOR, TRANSMITTER TT-76/GCC	service replace		x					Separate MAC
SHELTER S-56/G	service replace					x		Separate MAC
SWITCH BOX SA-331/V	service replace		x					Separate MAC
TELEPHONE SET TA-312/PT	service replace		x					Separate MAC
TELETYPEWRITER SET AN/UGC-4	service replace		x					Separate MAC
TRANSMITTER, RADIO T-368/URT	service replace		x					Separate MAC

AN/GRC-26D

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tools Required For Maintenance Functions	1 st ech.	2 nd ech.	3 rd ech.	4 th ech.	5 th ech.	Tool code	Remarks
AN/GRC-26D (continued)							
ACCESSORY KIT MK-288/URM			†	†	†	1	
ANALYZER, SPECTRUM TS-723/U				†	†	2	
AUDIO OSCILLATOR TS-382/U				†	†	3	
DISTORTION TEST SET TS-2/G			†			4	
DISTORTION TEST SET TS-383, GG				†	†	5	
VOLTMETER, METER ME-30/U			†	†	†	6	
ELECTRONIC MULTIMETER TS-505/U			†	†	†	7	
FREQUENCY METER AN/URM-79				†	†	8	
FREQUENCY METER AN/USM-26				†	†	9	
FREQUENCY METER AN/TSM-16				†	†	10	
FREQUENCY METER AN/URM-32			†			11	
MULTIMETER AN/URM-105		†				12	
MULTIMETER TS-352/U			†	†	†	13	
OSCILLOSCOPE: AN/USM-50				†	†	14	
POWER SUPPLY PP-1243/U			†			15	
SIGNAL GENERATOR AN/URM-25			†	†	†	16	
TEST SET, RELAY 1-181-B				†	†	17	
TEST SET, ELECTRON TUBE: TV-2/U					†	18	
TEST SET, ELECTRON TUBE TV-7/U		†	†	†		19	
TEST SET, TELEPHONE TS-140/PCM			†	†	†	20	
TOOL EQUIPMENT TE-41		†				21	
TOOL EQUIPMENT TE-87/U			†	†	†	22	
TOOL EQUIPMENT TE-111			†	†	†	23	
TOOL EQUIPMENT TE-508		†	†	†	†	24	Plus shop support

AN/GRC-26D

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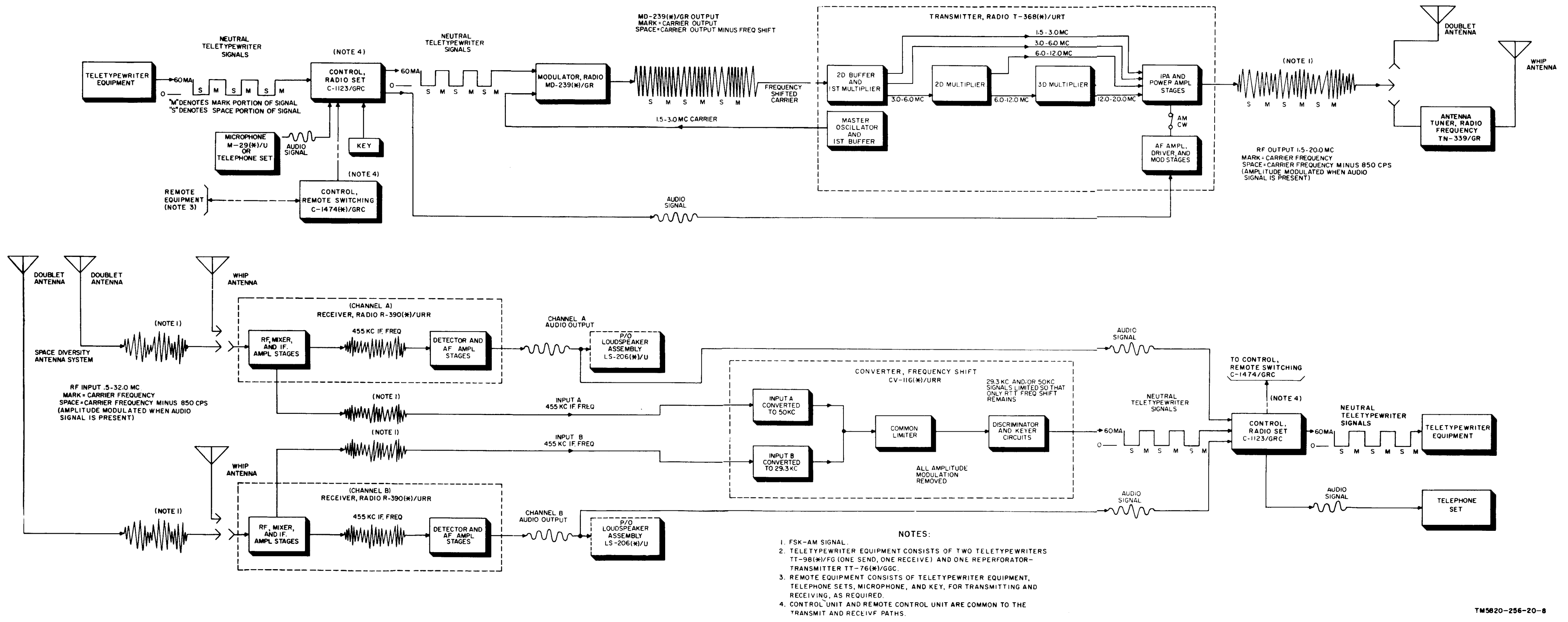


Figure 8. Radio Set AN/GRC-26D, block diagram.

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Svc Colleges (2)	(2 Copies each UNOINDC):		
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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.

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F Fahrenheit temperature 5/9 (after subtracting 32) Celsius temperature °C

PIN: 010150-000