C3 Posted 8 March 78 GEL
C4 Posted 8 March 78 GEL

TM 11-5805-210-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

FREQUENCY SHIFT CONVERTER CV-278/GR

HEADQUARTERS, DEPARTMENT OF THE ARMY
NOVEMBER 1958

Posted 8 Mar. 78 GEL

Changes in force: C 3 and C 4

TM 11–5805–210–10
C 4

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *19 December 1973*

Operator's Manual
FREQUENCY SHIFT CONVERTER
CV–278/GR

TM 11–5805–210–10, 6 November 1958, is changed as follows:

Page 3. Delete paragraph 1.1 and substitute:

1.1. Indexes of Publications

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

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

Delete paragraph 2 and substitute:

2. Forms and Records

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

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700–58 (Army)/NAVSUP PUB 378 (Navy)/AFR 71–4 (Air Force)/and MCO P4030.29 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55–38 (Army)/NAVSUP PUB 459 (Navy)/AFM 75–34 (Air Force)/and MCO P4610.19 (Marine Corps).

2.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Command US Army Electronics Command, ATTN: AMSEL–MA–C Fort Monmouth, NJ 07703.

Page 4, paragraph 5. In subparagraph *a*, change title to "Components and Dimensions." After subparagraph *b* add:

c. Component Comprising the Operable End Item.

NOTE

The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708–42 and used to identify manufacturer, distributor, or Government agency, etc.

5935–303–0691 ---- 1 ----Dummy Relay, octal plug for use when K 101 is not used, 86–CP8, 02660

Page 18. Delete appendix II.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
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, Operator maintenance requirements for AN/GRC–46, AN/VRC–29 and AN/VSC–1.

* U.S. GOVERNMENT PRINTING OFFICE: 1973 O—540–856/3387A

Posted 8 Mar. 78 NSL

Changes in force: C 3

TM 11-5805-210-10
* C 3

TECHNICAL MANUAL

Operator's Manual
FREQUENCY SHIFT CONVERTER CV-278/GR

TM 11-5805-210-10
CHANGE No. 3

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *20 September 1963*

TM 11-5805-210-10, 6 November 1958, is changed as follows:

Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Subst. TuTe C4P5

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment. DA Pam 310-4 is an index of current 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, -35P, etc.) and the latest changes to and revisions of each equipment publication.

Paragraph 2. Delete paragraph 2 and substitute:

2. Forms and Records

Subst. TuTe C4P5

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

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

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

Add 2, C4P5

Page 11. Delete paragraphs 15 and 16 and substitute:

15. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the CV-278/GR are listed below, together with a reference to the paragraph covering the specific maintenance function. The duties assigned do not require special tools or test equipment.

a. Daily preventive maintenance checks and services (par. 16.2).

b. Weekly preventive maintenance checks and services (par. 16.3).

c. Visual inspection (par. 17).

16. Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraphs 16.2 and 16.3 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (pars. 16.2 and 16.3) outlines functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is,

* This change supersedes C 2, 18 November 1960.

in good general condition (physical) and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal conditions are. The *references* column lists the illustrations, paragraphs, or manuals that contain supplementary information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38–750.

Add paragraphs 16.1, 16.2, and 16.3 after paragraph 16.

16.1. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the CV–278/GR are required on a daily and weekly basis.

a. Paragraph 16.2 specifies checks and services that must be accomplished daily and under the conditions listed below.

(1) When the equipment is initially installed.
(2) When the equipment is reinstalled for any reason.
(3) At least once each week if the equipment is maintained in a standby condition.

b. Paragraph 16.3 specifies *additional* checks and services that must be performed *once* each week.

16.2. Daily Preventive Maintenance Checks and Services Chart

Note. The daily preventive maintenance checks and services items are performed during an *authorized* downtime or interruption of system service.

Sequence No.	Item	Procedure	References
1	End item equipment.....	Check equipment for completeness.....	App. II.
2	Equipment exterior	***Warning:* Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.** Check exterior for cleanliness and remove dust and dirt with a lint-free cloth. Dampen cloth (not wet) with cleaning compound (FSN 7930–395–9542) as necessary.	Fig. 1.
3	External cables and connectors.	Check for proper seating of cables and connectors.....	Figs. 1 and 4.
4	Meter	Check for sticking meter needle, loose mounting, broken glass, and other damages. Adjust zero setting of meter needle.	Figs. 1 and 5.
5	Knobs, controls, and switches.	While checking for normal operation (Sequence No. 6), observe that mechanical action of each switch, control, and knob is smooth and free of binding.	Fig. 5.
6	Operation	Check for normal operation.....	Par. 18.

16.3. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Exterior case and front panel catches.	Check for loose screws, bolts, and nuts.....	Fig. 1.
2	Mounting	Check for looseness, improper case seating, and missing parts.	Fig. 3.
3	Exterior accessible items...	Check for looseness of switches, knobs, jacks, connectors, indicator, and fuseholder.	Fig. 5.

Page 12. Delete figure 6.

Page 13. Delete figure 7.

Page 17, appendix I. Add the following references to appendix I:

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 38–750	The Army Equipment Record Systems and Procedures.

Page 18, appendix II (as changed by C 2, 18 Nov. 60). Delete appendix II and substitute:

APPENDIX II

BASIC ISSUE ITEMS LIST

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes parts and material issued as *part of* the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by Model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

e. Unit of Issue. The unit of issue is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Expendable items are indicated by the letter X; nonexpendable items are indicated by NX.

g. Quantity Authorized. Under Items Comprising an Operable Equipment, the column lists the quantity of items supplied for the initial operation of the equipment. Under Running Spares and Accessory Items, and quantities listed are those issued initially with the equipment as spare parts. No quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

h. Illustration. The Item No. column lists the reference designations that appear on the part in the equipment. These same designations are used on any illustrations of the equipment.

BASIC ISSUE ITEMS LIST

(1) Source, maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	(8) Illustrations: Figure No.	(9) Illustrations: Item No.
			ITEMS COMPRISING AN OPERABLE EQUIPMENT CONVERTER, FREQUENCY SHIFT CV–278/GR					
	5815–543–1728		CONVERTER, FREQUENCY SHIFT CV–278/GR	ea	NX	1		
	Order through AGC		TECHNICAL MANUAL TM 11–5805–210–10	ea	X	2		
	5935–303–0691		ø DUMMY RELAY: octal plug for use when K101 is not used; Amphenol part 86–CP8.	ea	X	1		P101
	5960–577–6135		SHIELD, ELECTRON TUBE: Shield f/V101; SWED part 99X202262	ea	X	9		E105 through E113
			RUNNING SPARES AND ACCESSORY ITEMS CONVERTER, FREQUENCY SHIFT CV–278/GR					
	5960–296–4124		ø CRYSTAL UNIT, RECTIFYING: germanium xtal; B and W dwg B–16152.	ea	X	1		V109
	5960–100–7111		ø ELECTRON TUBE: MIL type 26A7	ea	X	1		V108 V112
	5960–188–0827		ø ELECTRON TUBE: MIL type 26A6	ea	X	2		V101 through V107 V110 V111
	5920–280–5039		ø FUSE, CARTRIDGE: 3 amp MIL type F03G3R00B	ea	X	4		F101
	6240–155–8714		LAMP, INCANDESCENT: MIL Std MS25231–313	ea	X	2		I101
	5945–615–1457		ø RELAY, ARMATURE: SPDT Keying relay; Sigma Instr part 72A0Z160TS-TCP.	ea	X	1		K101
	5960–284–6516		ø SEMI-CONDUCTOR DEVICE, DIODE: MIL type IN198	ea	X	2		CR101 CR102

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

To be distributed in accordance with DA Form 12–32, Section II (Unclas) requirements for Redstone, Honest John, Sergeant, Corporal, Lacrosse, Nike-Hercules, Pershing, Nike-Ajax, Hawk, Improved Nike-Hercules and Target Missile—TM—Teletypewriter.

☆U.S. GOVERNMENT PRINTING OFFICE: 1968—342-010/695

TECHNICAL MANUAL
No. 11-5805-210-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *6 November 1958*

FREQUENCY SHIFT CONVERTER CV-278/GR

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Figure 1. Frequency Shift Converter CV-278/GR, less mounting and cables.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Frequency Shift Converter CV-278/GR (fig. 1) and its operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to first echelon maintenance.

b. For information on the operation of the frequency shift converter as part of a complete system, refer to TM 11-5815-204-10, Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, Operator's Manual.

c. The maintenance allocation chart will be published in TM 11-5805-210-20.

2. Forms and Records

a. Unsatisfactory Equipment Reports.

(1) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700-38.

(2) Fill out and forward AF TO Form 29 (Unsatisfactory Report), to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, as prescribed in AF TO 00-35D-54.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment), as prescribed in AR 700-58 (Army); Navy Shipping Guide, Article 1850-4 (Navy); and AFR 71-4 (Air Force).

c. Preventive Maintenance Forms. Prepare DA Form 11-238 (fig. 6 and 7) (Maintenance Check List for Signal Equipment (Sound Equipment, Radio, Direction Finding, Radar, Carrier, Radiosonde and Television)), in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, and 9), direct to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., for comments on parts listings in appendix II.

e. Comments. Forward all other comments on this manual direct to the Commanding Officer, U. S. Army Signal Publications Agency, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. The purpose of Frequency Shift Converter CV-278/GR is to convert frequency shift signals to neutral or polal marking or spacing dc impulses. The frequency-shift-keyed (fsk) radio signals are received from the intermediate-frequency (if) output receptacle of Radio Receiver R-392/URR, and are converted into the direct current impluses. These impulses are used for the operation of teletypewriter or reperforator machines.

b. Although Frequency Shift Converter CV-278/GR is designed for use in a system with Radio Receiver R-392/URR, it may be used with any radio receiver that is capable of receiving frequency-shift-keyed radio signals, and has an if range of 450 to 500 kilocycles, and a suitable if output receptacle.

c. Frequency Shift Converter CV-278/GR is used primarily in conjunction with Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, which are transportable, vehicular equipments. Figure 2 is a simplified block diagram of the frequency shift converter and associated equipment.

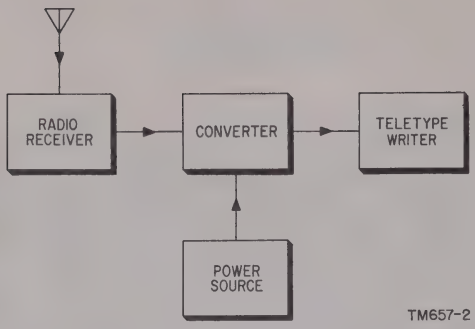


Figure 2. Frequency Shift Converter CV-278/GR, functional system block diagram.

4. Technical Characteristics

Number of tubes ..... 11.
Input frequency range ..... 450 to 500 kc (normally adjusted for 455 kc).
Input signal level ..... 200 microvolts to 1.0 volt.
Input impedance ..... 50 ±5 ohms at 455 kc.
Frequency shift range ..... 300 to 1,000 cps.
Input signal ..... Frequency-shift keyed.
Converter circuit ..... Superheterodyne.
Converter if ..... 29,300 ±5 cps.
Frequency control ..... Quartz crystal.
Converter bandwidth ..... 1,500 cps (at 29.3 kc).
Remote control ..... Mark hold function can be controlled by a remote switch.
Radio receiver if bandwidth ..... Not greater than 8 kc.
Outputs:
Neutral ..... Keying relay in converter provides keying for output loops (loops require external dc supply for 60 ma line currents).
Polal ..... Keying relay is not used. The polal output is taken directly from the plates of the second dc amplifier, V112. The output loop currents are 20 millamperes (through resistance of 120 ohms).
Power requirements ..... 2.0 amperes at 27.5 to 28 volts dc.

5. Components of Frequency Shift Converter CV-278/GR

a. Components. The components of frequency shift converter are listed in the following table:

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
1	Frequency Shift Converter CV-278/GR including:	9⅛	13¾	7¼	19½
2	Mounting MT-791/U	3¾	12½	8½	15
	Crystal, quartz, type CR-25/U				
1	Electrical Power Cable Assembly CX-4540/U (4 ft. 6 in.)				
1	Radio Frequency Cable Assembly CG-1127/U (2 ft. 5 in.)				
1	Electrical Special Purpose Cable Assembly CX-4547/U (5 ft. 5 in.).				
	Adapter UG-306/U				
	Keying relay (Sigma 72AO4Z 160TCP)				
2	TM 11-5805-210-10				
1 set	Running spares (*b* below)				

b. Running Spares. The following running spares are stored in the carton with the frequency shift converter:

Item	Quantity
Fuse, 3AG, 3-ampere, Slo-Blo	4
Tube type 26A6	2
Tube type 26A7/GT	1
Lamp, GE 313 or equivalent, 28 volts, .7 ampere	2
Germanium Crystal diodes (type 1N63)	1
Germanium crystal diodes (type 1N69)	2

Add c. Pg 4 C1

6. Nomenclature and Common Names

A list of the nomenclature assignments for the components of Frequency Shift Converter CV-278/GR is given below. A common name is indicated after each item.

Nomenclature	Common Name
Frequency Shift Converter CV-278/GR	Converter.
Mounting MT-791/U	Mount.
Electrical Power Cable Assembly CX-4540/U (4 ft. 6 in.).	Power cable.
Radio Frequency Cable Assembly CG-1127/U (2 ft. 5 in.).	Signal cable.
Electrical Special Purpose Cable Assembly CX-4547/U (5 ft. 5 in.).	Output cable.

7. Description of Frequency Shift Converter CV-278/GR

a. The coverter (fig. 1) consists of a chassis, which is housed in a sturdy, aluminum, waterproof case. The case is designed to withstand conditions encountered in mobile (vehicular) military service, and is mounted on a shockproof mounting base. The chassis and wraparound are assembled in one unit, and are attached to the front panel with four machine screws. The chassis and front panel, assembly is fastened in the case by six fasteners, which are mounted around the edge of the front panel. A watertight seal between the panel and the case maintains the immersionproof feature of the assembled converter, allowing it to withstand immersion in 3 feet of water for 2 hours.

b. When the converter is used in Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, cable connections are made between the converter, a junction box, and a radio receiver. The interconnecting box controls the primary power supplied to the converter, and has rheostats for setting the values of the currents in the signal output circuits from the converter to the automatic recording equipment. The radio receiver supplies the frequency-shifted radio signals to the converter. The receptacles, meters, and all the operating controls are located on the front panel, which is recessed so that no control knob extends beyond the raised edges of the panel.

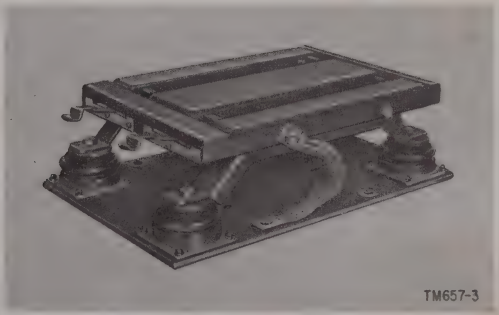


Figure 3. Mounting MT-791/U.

8. Description of Mounting MT-791/U (fig. 3)

The mounting is made of steel and consists of an upper and a lower platform separated by four shock mounts. The lower platform has holes drilled to accommodate bolts for fastening the mounting rigidly to a vehicle. The upper platform has four hooks to secure the converter to the mounting; the hooks are moved by two levers on the front of the mounting so that they

engage four pins in the bottom of the case of the converter. The levers are locked in detents when in the closed position. A ground strap is attached to the upper and lower platforms.

9. Description of Minor Components

The following minor components of the Frequency Shift Converter CV-278/GR are illustrated in figure 4:

a. Electrical Power Cable Assembly CX-4540/U (4 ft. 6 in.).

b. Radio Frequency Cable Assembly CG-1127/U (2 ft. 5 in.).

c. Electrical Special Purpose Cable Assembly CX-4547/U (5 ft. 5 in.).

d. Adapter UG-306/U (two).

e. Carton with running spares.

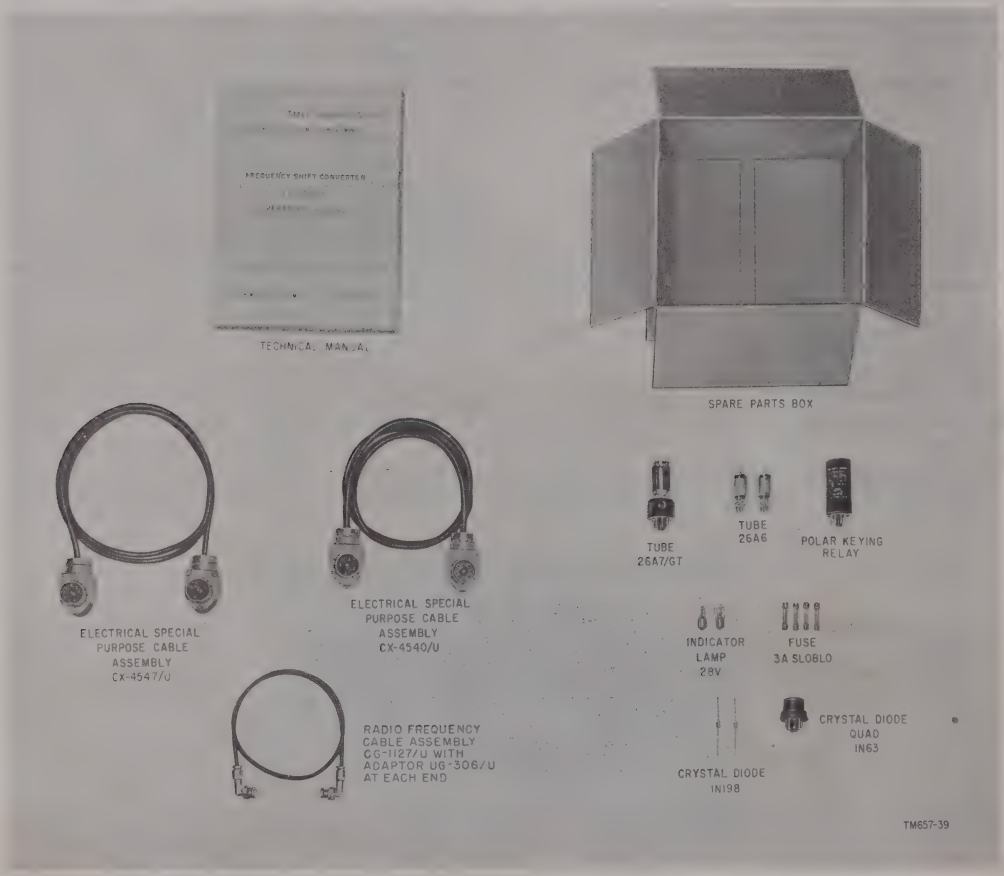


Figure 4. Minor Components and Running Spares.

10. Additional Equipment Required

The following equipment is not supplied as part of Frequency Shift Converter CV-278/GR, but is needed for use with the converter in order to receive radioteletype signals:

a. Radio Receiver R-392/URR. This receiver

must be used, or another one with a similar if output receptacle (par. 3). For characteristics of the receiver see paragraph 4.

b. Interconnecting Box J-668/GR. The interconnecting box is required in order to control the power to the converter and to control the current in the output loops of the converter.

c. Teletypewriter TT-98B/FG. This teletypewriter or a similar unit is required to convert the dc impulses to printed intelligence.

Note. Teletypewriter Reperforator Transmitter TT-76/GGC and TT-76A/GGC may be used in place of Teletypewriter TT-98B/FG.

d. Primary Power Source. The primary power source voltage is 27.5 to 28 volts dc.

e. Power Supply PP-978/FG. Power Supply PP-978/FG is needed in the Teletypewriter TT-98/SG to supply the voltage for the output loops of the converter.

CHAPTER 2
OPERATING INSTRUCTIONS

11. Operating Controls and Instruments (fig. 5)

The following table lists the operating controls, indicator, and meters of the converter, and describes their functions:

Control or instrument	Functions
POWER switch	Turns the power on and off in the converter.
SERVICE switch	Controls the output of the converter, and switches the DISCRIMINATOR meter. The switch positions and functions are as follows: *Position* — *Function* NOR — In the NOR position, connects mark output to mark output loop, and space output to space output loop. (The type of loop depends on whether neutral or polal output is used.) Connects the DISCRIMINATOR meter to the second signal channel. MARK HOLD — In MARK HOLD position, energizes the mark output loop to place the output loop in a constant mark condition. DISCRIMINATOR meter stays connected to the second signal channel. REV — In REV position, connects the mark output to the space output loop, and the space output to the mark output loop. Connects the DISCRIMINATOR meter to the first signal channel.
SIGNAL INPUT meter	Indicates the input signal level. The scale divisions represent arbitrary values.
DISCRIMINATOR meter	Shows the direction and the approximate amount of the frequency shift of the radio signal. Each division corresponds to 100 cycles of frequency shift. Used for indicating the proper tuning of the radio teletype signal on the radio receiver. Meter indications corresponding to SERVICE switch positions are as follows: *Position* — *Indication* NOR or MARK HOLD. — A mark signal deflects the pointer to the right of center, and a space signal deflects the pointer to the left of center. REV — A mark signal deflects the pointer to the left of center, and a space signal deflects the pointer to the right of center. Any of the three positions. — A steady input signal of exactly 455 kc does not deflect the pointer appreciably from zero.
Power on indicator	Indicates when power is on. Does not indicate when fuse is blown, or power fails. Protects the equipment from damage caused by electrical shorts.

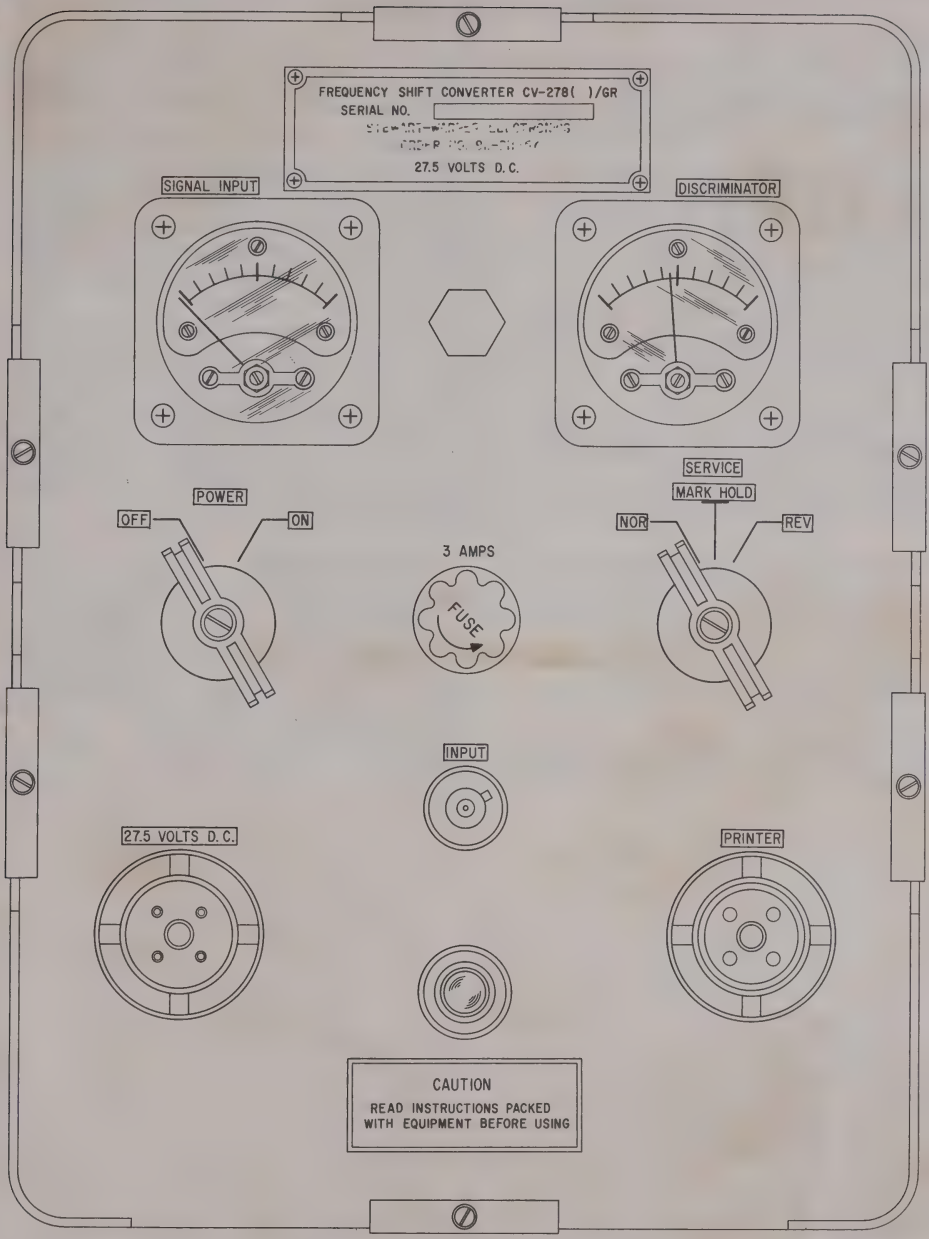


Figure 5. Frequency Shift Converter CV-278/GR, operating controls.

Note. The converter is installed as part of a radio teletypewriter set by higher echelon personnel.

12. Operating Procedures

Start the associated equipment as instructed in the appropriate technical manuals.

a. Turn the SERVICE switch to the MARK HOLD position.

b. Turn the POWER switch to ON. The indicator lamp should light. Allow approximately 5 minutes for warm-up.

c. Tune the associated radio receiver to any fsk radio signal, with BFO ON.

d. Adjust the radio frequency (rf) gain control of the radio receiver to obtain nearly full scale reading on the SIGNAL INPUT meter.

e. The discriminator meter pointer should oscillate about zero when the fsk signal is tuned in properly.

f. Turn the receiver BFO switch to the OFF position.

g. Check to see that the external bias and line currents are at the correct value in the output loops of the converter (bias 30 ma, line 60 ma). When the converter is used with Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, the meter is located on the junction box.

h. When the SERVICE switch is moved to the NOR position, the teleprinter should start printing. Turn the switch to the REV position if readable copy is not received in the NOR position.

i. In the AN/GRC-46 and AN/VRC-29 equipments, readable copy should be received with the SERVICE switch in the NOR position.

13. Remote Control Operation of Converter

a. In Radio Teletypewriter Set AN/GRC-46 and AN/VRC-29 the converter is switched to a mark hold condition by the SEND-REC-MARK HOLD switch on the front of the equipment shelf, when this switch is in the SEND or MARK HOLD positions.

b. In Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29 the converter receives its power through Interconnecting Box J-668/GR. In these installations, the power supply for the line current for neutral operation comes from the PP-978/FG power supply in the Teletypewriter TT-98B/FG teletypewriter unit through the interconnecting box wiring.

14. Stopping Procedure

The frequency shift converter may be placed in a standby condition, or shut down, independently of the other equipment in the system:

a. Standby. Turn the SERVICE switch to the MARK HOLD position. The teletypewriter should stop printing.

b. Stopping. Turn the POWER switch to OFF.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Subst. TuTc C3 P3 1

15. Scope of Operator's Maintenance

a. The following is a list of maintenance duties normally performed by the operator of Frequency Shift Converter CV-278/GR. These procedures do not require special tools or test equipment.

b. Operator's maintenance for the converter consists of the following:

(1) Preventive maintenance (par. 16).

(2) Visual inspection (par. 17).

(3) Operational checklist (par. 18).

(4) Checking cable connections.

16. Preventive Maintenance

a. DA Form 11-238. DA Form 238 (figs. 6 and 7) is a preventive maintenance checklist to be used by the operator. Items not applicable to the converter are lined out in the figures. References in the item block shown on the figures are to paragraphs that contain additional maintenance information pertinent to that particular item. Instructions for the use of the form appear on the form.

b. Items. The information shown in this paragraph is supplementary to DA Form 11-238. The item numbers correspond to the item numbers on the form.

Add 16.1, 16.2, 16.3 C3 P5 2

Item	Maintenance procedures
1	Visually check the converter for completeness; particularly all minor components such as cables and adapters.
2	Use a clean cloth to remove dust, dirt, moisture, and grease from connectors, cables, and front-panel controls. If necessary, wet the cloth with cleaning compound (Federal stock No. 7930-395-9542); then wipe the parts with a dry clean cloth.
3	The control knobs should work smoothly, be tight on their shafts, and should not bind. Tighten all loose knobs and be sure that the knobs do not rub against the panel.
6	Remove rust from components and touch up bare spots with paint.
7	Repair any cuts in the insulation by covering them with rubber tape and then with friction tape.
	Replace or repair all broken cords or cables.

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

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
26. ~~INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.~~	
27. ~~CHECK FOR NORMAL OPERATION.~~	
28. ~~BEFORE SHIPPING OR STORING, REMOVE BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

ITEM 10 INDICATOR LAMP DOES NOT LIGHT.
REPORTED TO 2D ECHELON MAINTENANCE FOR REPAIR.

FOLD

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING RADAR, CARRIER, RADIOSONDE AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE: FREQUENCY SHIFT CONVERTER CV-278/GR

EQUIPMENT SERIAL NUMBER: 117

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.

TYPE OF INSPECTION

OPERATOR	2/3 ECHELON	DATE	SIGNATURE
✓		30 SEPT '58	James Williams

4

DA FORM 1 MAY 57 11-238

REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-246, 11-249, 11-250 AND 11-251; WHICH ARE OBSOLETE.

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Figure 6. DA Form 11-238, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF

NO.	DAILY ITEM	1 JW 17	2 JW 18	3 JW 19	4 JW 20	5 JW 21	6 JW 22	7 JW 23	8 24	9 25	10 26	11 27	12 28	13 29	14 30	15 31	16	2D 3D ECHELON
1.	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (~~Transmitter, receiver, carrying cases, wire, cables, microphones, tubes~~, spare parts, technical manuals). PAR. 16b	✓	✓	✓	✓	✓	✓	✓										
2.	CLEAN DIRT AND MOISTURE FROM ~~ANTENNA, MICRO-PHONES, HEADSETS, KEYS~~, JACKS, PLUGS, COMPONENT PANELS~~.~~ PAR. 16b	✓	✓	✓	✓	✓	✓	✓										
3.	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS. PAR. 16b	✓	(X)	✓	✓	✓	✓	✓										
4.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.	✓	✓	✓	(X)	✓	✓	✓										

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. CLEAN AND TIGHTEN EXTERIOR~~S~~ OF CASE~~S~~, RACK~~S~~, MOUNT~~S~~, ~~TRANSMISSION LINES~~.	✓					
6. INSPECT CASE~~S~~, MOUNT~~S~~, ~~ANTENNA TOWERS~~ AND EXPOSED METAL SURFACES FOR RUST, CORROSION. PAR. 16b	✓					
7. INSPECT ~~CORDS~~, CABLE, ~~WIRE~~, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN. PAR. 16b	✓					
8. ~~CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.~~						
9. ~~INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING.~~						
10. INSPECT ACCESSIBLE ITEMS FOR LOOSE-NESS: SWITCHES, KNOBS, JACKS, CONNECTORS, ~~RELAYS, TRANSFORMERS, MOTORS~~, PILOT LIGHTS, ~~BLOWERS~~, ETC.	X					
11. CLEAN AND/OR INSPECT ~~AIR FILTERS~~, BRASS NAME PLATES, DIAL AND METER WINDOWS.	✓					
12. ~~INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.~~						

~~ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS~~	CONDITION
13. ~~INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER PROOFING, TEARS, FRAYING.~~	
14. ~~CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE.~~	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. ~~INSPECT SEATING OF READILY ACCESSIBLE PLUG-IN ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, VIBRATORS, PLUG-IN COILS.~~	
16. ~~INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MIS-ALINEMENT OF CON-TACTS AND SPRINGS, PROPER SPRING TENSION.~~	
17. ~~INSPECT VARIABLE CAPACITORS FOR DIRT, MIS-ALINEMENT OF PLATES, LOOSE MOUNTINGS, MOISTURE.~~	
18. ~~INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION.~~	
19. ~~CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE.~~	
20. ~~INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.~~	
21. ~~INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS.~~	
22. ~~INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING AND OIL LEAKAGE.~~	
23. ~~INSPECT GENERATORS, AMPLIDYNES, DYNA-MOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR.~~	
24. ~~INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.~~	
25. ~~INSPECT WATERPROOF GASKETS FOR LEAKS, WORN OR LOOSE PARTS.~~	

CONTINUED ON PAGE 4

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Figure 7. DA Form 11-238, pages 2 and 3.

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17. Visual Inspection

a. When the converter fails to perform properly, turn off the power and check all the items listed below. *Do not check any item with the power on.*

(1) Wrong settings of controls (par. 11).
(2) Cables and connectors poorly connected.
(3) Disconnected cables or connectors.
(4) Poor ground connection.
(5) Burned out fuse (usually indicates some other fault).

b. If the above checks do not locate the trouble, follow up with the operational checklist (par. 18).

18. Operational Checklist

a. General. The operational checklist helps the operator to locate the trouble quickly. The corrective measures are used to repair this trouble. If the measures suggested do not restore normal equipment performance, troubleshooting is required by a higher echelon repairman. Note on the repair tag what corrective measures were taken and how the converter performed at the time of failure.

b. Procedure. Place the set in operation (par. 12), and perform the steps in *c* below, in the order given. Observe the equipment and perform any corrective measures necessary.

c. Equipment Performance Checklist

Step	Action	Normal indication	Corrective measures
1	Turn SERVICE switch to MARK HOLD.		
2	Turn POWER switch to ON	Indicator lamp lights	Check fuse F101. Check indicator lamp. Replace defective items. If fuse blows again, unit is shorted (see par 19*b*). Check power cable.
3	Tune the radio receiver to a teletype or fsk transmission	Signal strength indication on SIGNAL INPUT meter reaches a maximum reading.	Higher echelon repair required.
4	Tune the radio receiver carefully until the DISCRIMINATOR meter pointer oscillates around the zero mark on the scale.	The Teletypewriter should not print copy. The pointer of the DISCRIMINATOR meter should vibrate in both directions from the zero scale division.	Higher echelon repair required.
5	With the same signal input as in step 4, turn the SERVICE switch to NOR.	DISCRIMINATOR meter should read as in step 4. The teletypewriter should print accurate copy.	Higher echelon repair required.
6	With the same signal input as in step 4, turn the SERVICE switch to REV.	Pointer of DISCRIMINATOR meter should vibrate as indicated in step 4. Teletypewriter should print garbled copy, on radio signals from AN/GRC-46 and AN/VRC-29 equipments.	Higher echelon repair required.
7	With a steady radio signal (not modulated), tune the radio receiver until the pointer of the DISCRIMINATOR meter is at zero on the scale.	Pointer of DISCRIMINATOR meter should stay on or near zero when the SERVICE switch is turned to any of its three positions.	Higher echelon repair required.
8	Turn SERVICE switch to NOR. Apply a steady mark signal to the receiver.	Pointer of DISCRIMINATOR meter should stay at the right hand fourth scale division approx).	Higher echelon repair required.

Step	Action	Normal indication	Corrective measures
9	With the same signal input as in step 8, turn the SERVICE switch to REV.	Pointer of DISCRIMINATOR meter should stay at the left hand fourth scale division (approx).	Higher echelon repair required.
10	With the same signal input as in step 8, turn the SERVICE switch to MARK HOLD.	Pointer of DISCRIMINATOR meter should stay at the right hand fourth scale division (approx).	Higher echelon repair required.
11	Turn the external MARK HOLD switch to the MARK HOLD position.	Pointer of DISCRIMINATOR meter should stay at the right hand fourth scale division (approx).	Higher echelon repair required.
12	With a steady space signal applied to the radio receiver, turn the SERVICE switch to NOR. The space signal is obtained by removing the cable connector from the KEYING INPUT receptacle on MODULATOR MD-203/GR while transmitting FSK radio signals with the AN/GRC-46 and AN/VRC-29 equipments.	Pointer of DISCRIMINATOR meter should stay at the left hand fourth scale division (approx).	Higher echelon repair required.
13	With the same signal input as in step 12, turn the SERVICE switch to REV.	Pointer of DISCRIMINATOR meter should stay at the right hand fourth scale division (approx).	Higher echelon repair required.
14	Turn SERVICE switch to OFF.	Indicator light should extinguish.	Higher echelon repair required.

19. Repairs

a. Replacement of Power On Indicator Lamp.

(1) To remove indicator lamp I 101, unscrew the jewel, press down on the lamp, turn it counterclockwise, and pull out.

(2) To replace, push the replacement lamp in and twist it clockwise to lock.

b. Replacement of 3-Ampere Fuse.

(1) To remove the fuse, push in on the fuse cap, turn it counterclockwise ¼ turn, and pull out the cap and fuse.

(2) Plug the new fuse into the fuse cap, push the fuse and cap in and twist the fuse clockwise to lock.

Caution: Never replace a fuse with one of higher rating. If the fuse burns out immediately after replacement, do not replace it a second time until the cause of the failure has been corrected by a higher echelon repairman.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

20. Disassembly of Equipment

The following instructions are recommended as a guide for preparing Frequency Shift Converter CV-278/GR for shipment and storage.

a. Removal of Converter.

(1) Disconnect the cables from the front panel of the converter.

(2) Remove the converter from its mounting, by lifting the two levers at the front of the mounting, to clear the detents, and moving them all the way to the left. Then lift the converter from the mounting.

b. Removal of Mount. Remove the four mounting bolts to remove Mounting MT-791/U.

21. Repackaging for Shipment or Limited Storage

Repackaging of the converter is described in TM 11-5805-210-20, Frequency Shift Converter CV-278, Organizational Maintenance.

Section II. DEMOLITION OF MATERIEL

22. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. Demolition procedures outlined in paragraph 23 will be used to prevent further use of the equipment.

23. Methods of Destruction

Use the following methods to destroy the converter:

a. Smash. Smash the controls, tubes, coils, switches, capacitors, transformers, crystals, and meters; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut all internal and external cords, cables and wiring; use axes, handaxes, or machetes.

c. Burn. Burn cords, technical manuals, wiring and parts; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

b. Bend. Bend panel, case, and chassis.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

APPENDIX I
REFERENCES

Following is a list of references applicable and available to the operator of Frequency Shift Converter CV-278/GR:

TM 11-274 ..... Radio Set AN/GRC-19.

TM 11-806 ..... Radio Transmitter T-195/GRC-19.

TM 11-858 ..... Radio Receiver R-392/URR.

TM 11-2225 ..... Teletypewriter Sets AN/GGC-3 and AN/GGC-3A and Teletypewriter Reperforator. Transmitters TT-76/GGC, TT-76A/GGC and TT-76B/GGC.

TM 11-5815-204-10 ..... Radio Teletypewriter Sets AN/GRC-46 and AN/VRC-29, Operator's Manual.

TM 11-5820-205-10 ..... Radio Modulator MD-203/GR, Operator's Manual.

3 Pgs 3 DA Pam 310-4 Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, And Modification Work Orders.

TM-38-750 The Army Equipment Record Systems And Procedures.

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APPENDIX II

OPERATOR MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST FOR CONVERTER, FREQUENCY SHIFT CV-278/GR

Section I. INTRODUCTION

1. Scope

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, and all running spares issued as part of the major end item. However, all running spares issued with the equipment are not authorized for operator replacement. Check the maintenance allocation chart (available at organizational maintenance facilities) for maintenance functions authorized at first echelon. This portion includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. The columns are defined as follows:

(1) *Federal or technical service stock number.* The stock number column lists the 11-digit Federal stock number.

(2) *Repair parts source, maintenance, and recoverability code.* (Not used.)

(3) *Designation by model.* (Not used.)

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item is listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

(5) *Unit of issue.* The unit of issue is the supply term applied to the smallest quantity by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Expendable items are indicated by the letter X; nonexpendable items are indicated by NX.

(7) *Quantity authorized.* Under items comprising an operable equipment the column lists the quantity of items supplied for the initial operation of the equipment. Under running spares and accessories the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

(8) *Illustration.* The item No. lists the reference designations that appear on parts in the equipment.

2. Abbreviations

excl	exclusive
mtg	mounting
opr	operate
SWED	Stewart-Warner Electronics Division
term.	terminal

3. Comments or Suggestions

Any comments concerning omissions and discrepancies in this appendix will be prepared on DA Form 2028 and forwarded direct to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., ATTN: SIGFM/ES-ML.

Section II. FIRST ECHELON REPAIR PARTS AND SPECIAL TOOLS LIST

(1) FEDERAL OR TECHNICAL SERVICE STOCK NUMBER	(2) REPAIR PARTS SOURCE, MAINTENANCE AND RECOVERABILITY CODE	(3) DESIGNATION BY MODEL	(4) DESCRIPTION ITEMS COMPRISING AN OPERABLE EQUIPMENT	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATION FIGURE NO.	(9) ILLUSTRATION ITEM NO.
			CONVERTER, FREQUENCY SHIFT CV-278/GR					
			†† NOTE: AN APPLICABLE STOCK NUMBER IS IN THE PROCESS OF ASSIGNMENT: IN APPROXIMATELY 90 DAYS A CHANGE WILL BE ISSUED INDICATING THE APPROPRIATE STOCK NUMBERS FOR REQUISITIONING PURPOSES: AN INTERIM NUMBER WHICH APPEARS IN THE DESCRIPTION COLUMN HAS BEEN INCLUDED AND MAY BE USED TO IDENTIFY ITEMS FOR EMERGENCY USE.					
			CONVERTER, FREQUENCY SHIFT CV-278/GR: 450 to 500 kc freq; 27.5 v oper pwr; 50 ohm input impedance; SWED part No. 01X200085 †† L8Ra41B-43	ea	NX	1		
			BARE UNIT FOR CONVERTER, FREQUENCY SHIFT CV-278/GR	ea	NX	1		
			CABINET, ELECTRICAL EQUIPMENT: holds Frequency Shift, Converter CV-278/GR; 13-1/4 in lg x 7.267 in w x 8.187 in h o/a; SWED part No. 15P200357 †† L8Ra41B-3	ea	NX	1		A104
5955-667-0217			CRYSTAL, QUARTZ: 484.3 kc; MIL type CR-25/U	ea	NX	1		V101
			DUMMY RELAY: octal plug; 1-1/4 in od x 7/16 in h; Amphenol part No. 86-CP8 †† L8Ra41B-14	ea	X	1		P101
5960-198-0827			ELECTRON TUBE: MIL type 26A6	ea	X	9		V101 thru V107 V110 V111
5960-100-7111			ELECTRON TUBE: MIL type 26A7	ea	X	2		V112 V108
5920-280-5039			FUSE, CARTRIDGE: MIL type FO3G3R00B	ea	X	1		F101
			LAMP, INCANDESCENT: 28 v, T3-1/4 type bayonet base; MIL Std MS25231-313 †† L8Ra41B-20	ea	X	1		I101
			LENS, INDICATOR LIGHT: front panel indicator lens; 1/2 in dia, red; 27/32 in lg x 5/8 in dia o/a; Johnson EF part No. 23.623-62 †† L8Ra41B-21	ea	X	1		E104
			RELAY, ARMATURE: 2 wnd, dc; 160 ohm resistance; 27.5 v oper voltage; 3-1/32 in lg x 1-15/16 in dia o/a; SWED part No. 80P200049 †† L8Ra41B-28	ea	X	1		K101

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(1) FEDERAL OR TECHNICAL SERVICE STOCK NUMBER	(2) REPAIR PARTS SOURCE, MAINTENANCE AND RECOVERABILITY CODE	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATION FIGURE NO.	(9) ILLUSTRATION ITEM NO.
			CV-278/GR (continued)					
			RETAINER, ELECTRON TUBE: 1-1/2 in between mtg holes, 2-1/16 in lg; Ippalito part No. BL-16786 †† L8Ra41B-30	ea	X	5		MP130 thru MP134
5960-194-9408			SEMI-CONDUCTOR DEVICE, DIODE: MIL type 1N69	ea	X	2		CR101 CR102
			SEMI-CONDUCTOR DEVICE, DIODE ASSEMBLY: disc rect; 1-9/32 in od x 1-1/8 in h o/a excl term pins; SWED part No. 48P200061 †† L8Ra41B-32	ea	X	1		V109
			SHIELD, ELECTRON TUBE: 1-3/4 in lg x 0.828 in dia o/a; SWED part No. 26X202262 †† L8Ra41B-34	ea	X	9		E105 thru E113
			RUNNING SPARES AND ACCESSORY ITEMS					
			CONVERTER, FREQUENCY SHIFT CV-278/GR					
5960-188-0827			ELECTRON TUBE: MIL type 26A6	ea	X	2		V101 thru V107 V110 V111
5960-100-7111			ELECTRON TUBE: MIL type 26A7	ea	X	1		V112 V108
5920-280-5039			FUSE, CARTRIDGE: MIL type FO3G3R00B	ea	X	4		F101
			LAMP, INCANDESCENT: 28 v, T3-1/4 type bayonet base; MIL Std MS25231-313 †† L8Ra41B-20	ea	X	2		I101
			RELAY, ARMATURE: 2 wnd, dc, 160 ohm resistance; 27.5 v oper voltage; 3-1/32 in lg x 1-15/16 in dia o/a; SWED part No. 80P200049 †† L8Ra41B-28	ea	X	1		K101
5960-194-9408			SEMI-CONDUCTOR DEVICE, DIODE: MIL type 1N69	ea	X	2		CR101 CR102
			SEMI-CONDUCTOR DEVICE, DIODE ASSEMBLY: disc rect; 1-9/32 in od x 1-1/8 in h o/a excl term pins; SWED part No. 48P200061 †† L8Ra41B-32	ea	X	1		V109

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[AG 413.44 (27 Oct 58)]

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

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

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

Distribution:

Active Army:

ASA (2)
CNGB (1)
Technical Stf, DA (1) except
CSigO (30)
Technical Stf Bd (1)
USCONARC (5)
USA Arty Bd (1)
USA Armor Bd (1)
USA Inf Bd (1)
USA Air Def Bd (1)
USA Abn & Elct Bd (1)
USA Avn Bd (1)
USA Armor Bd Test Sec (1)
USA Air Def Bd Test Sec (1)
USA Arctic Test Bd (1)
US ARADCOM (2)
US ARADCOM Rgn (2)
OS Maj Comd (5)
Log Comd (5)
MDW (1)
Armies (5)
Corps (2)
Div (2)
USATC (2)
Svc Colleges (5)
Br Svc Sch (6) except
USASCS (25)
Gen Depots (2) except
Atlanta Gen Depot (None)
Sig Sec, Gen Depots (10)
Sig Depots (17)
Army Pictorial Cen (2)
Engr Maint Cen (1)
TASSA (15)
Mid-Western Rgn Ofc (TASSA) (1)
USA Sig Pub Agcy (8)
USA Sig Engr Agcy (1)
USA Comm Agcy (2)
USA Sig Eqp Spt Agcy (2)
USA Sig Msl Spt Agcy (13)
WRAMC (1)
AFIP (1)
AMS (1)
Ports of Emb (OS) (2)
Trans Terminal Comd (2)
Army Terminals (2)
OS Sup Agcy (2)
Yuma Test Sta (2)
USA Elct PG (1)
Sig Lab (5)
Sig Fld Maint Shops (3)
Fld Comd, AFSWP (5)
Mil Dist (1)
Sector Comd, USA Corps (Res) (1)
USA Corps (Res) (1)
JBUSMC (2)

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7-26 (2)
7-95 (2)
8-15 (2)
8-16 (2)
8-17 (2)
8-18 (2)
8-75 (2)
8-76 (2)
8-77 (2)
9-47 (2)
9-87 (2)
9-217 (2)
9-377 (2)
11-5 (2)
11-6 (2)
11-7 (2)
11-15 (2)
11-16 (2)
11-18 (2)
11-37 (2)
11-55 (2)
11-57 (2)
11-117 (2)
11-500 (TM AA-AE) (2)
11-557 (2)
11-587 (2)
11-592 (2)
11-597 (2)
17-2 (2)
17-22 (2)
17-25 (2)
17-26 (2)
17-35 (2)
17-36 (2)
17-45 (2)
17-46 (2)
17-51 (2)
17-52 (2)
17-55 (2)
17-56 (2)
17-57 (2)
17-62 (2)
17-87 (2)
32-55 (2)
32-56 (2)
32-57 (2)
32-500 (2)
39-51 (2)
39-61 (2)
39-71 (2)
44-12 (2)
44-15 (2)
44-16 (2)
44-17 (2)
44-25 (2)
44-26 (2)
44-35 (2)
44-36 (2)
44-37 (2)
44-101 (2)
44-115 (2)
44-116 (2)
44-145 (2)
44-146 (2)
44-147 (2)
44-275 (2)
44-276 (2)
44-277 (2)
57-57 (2)

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

USAR: None.

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

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