

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR'S MANUAL  
RADIO TRANSMITTING SET AN/GRT-3

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

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HEADQUARTERS, DEPARTMENT OF THE ARMY

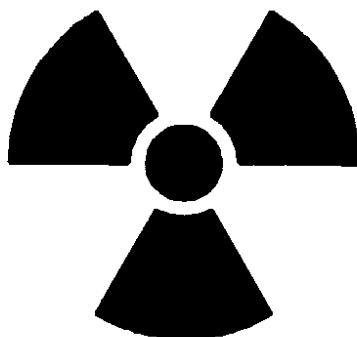
MARCH 1968

**WARNING!**

**DANGEROUS VOLTAGES EXIST IN RADIO TRANSMITTING  
SET AN/GRT-3**

Be extremely careful of the high radio frequency (RF) voltages when working around the antenna or antenna terminals. 115 or 230 volts exist in the ac power cables; 860, 390, and 19n volts exist in the interconnecting cables. Be sure that the equipment is grounded before it is connected to the ac power source.

**WARNING  
RADIATION HAZARD**



STD-RW-2

Tube type OB2WA use, in this equipment contains a small amount of radioactive material. This tube is potentially dangerous when broken: see qualified medical personnel and the Safety Director if you are exposed to or cut by tubes. For further instructions, refer to TB SIG, 225.



**Operator's Manual**  
**RADIO TRANSMITTING SET AN/GRT-3**

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\*This manual supersedes TM 11-5820-27-10, 6 January 1959, including all changes.

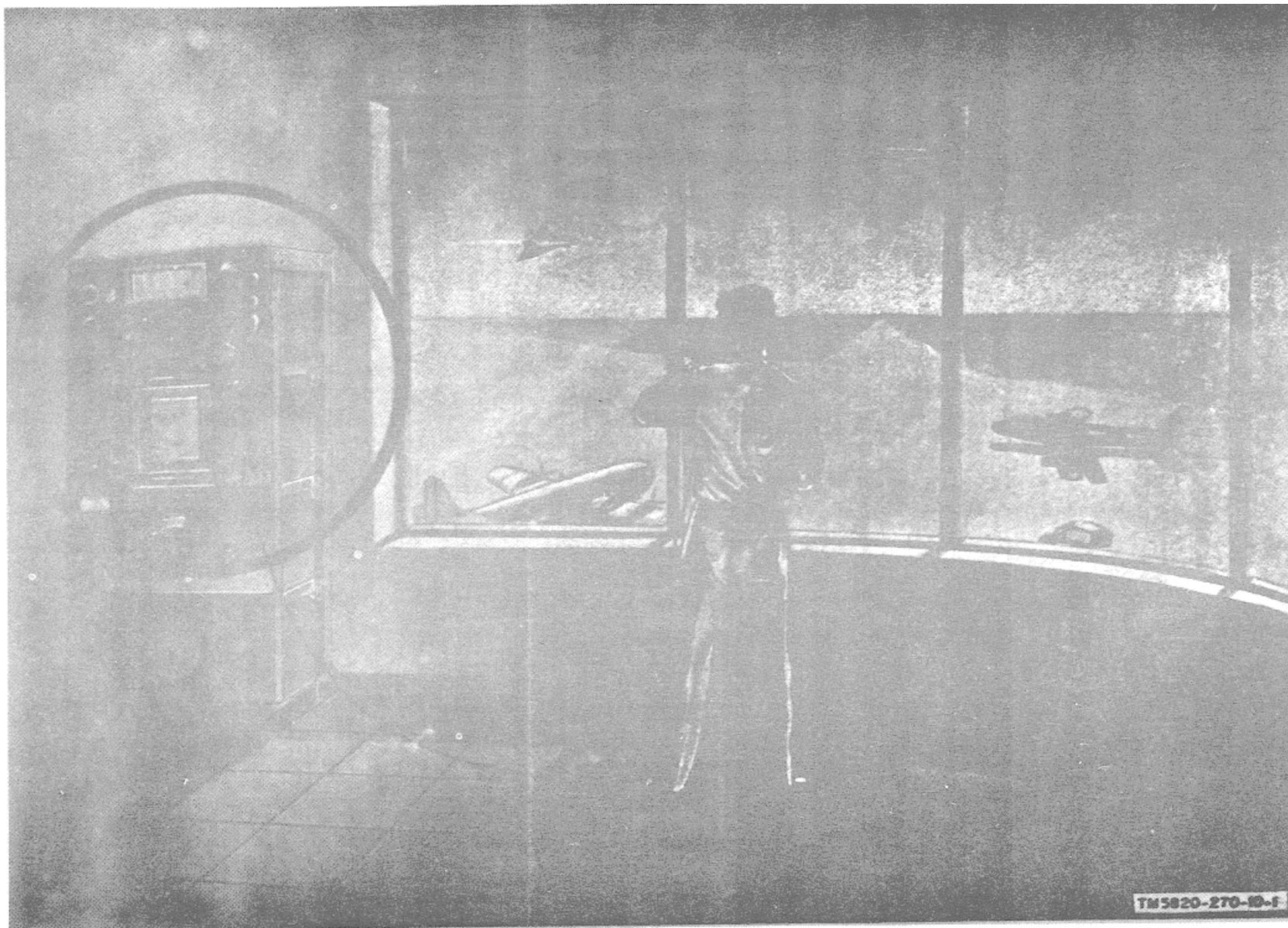


Figure 1-1. Radio Transmitting Set AN/GRT-3 in operation.

## CHAPTER 1

## INTRODUCTION

## Section I. GENERAL

**1-1. Scope**

a. This manual describes Radio Transmitting Set AN GRT-3 and covers its operation and operator's maintenance. It includes operation under usual and emergency conditions, local and remote operation, cleaning and inspection of the equipment, and replacement of parts available to the operator crew.

b. The maintenance allocation chart (MAC) appears in TM 11-5820-270-24.

c. Official nomenclature followed by (\*) is used to indicate all models of the equipment item covered in this manual. Thus, Radio Transmitter T-282(\*)/GR represents Radio Transmitters T-282/GR, T-282B/GR, T-282C/GR, and T-604A/GR. Modulator-Power Supply MO-141(\*)/GR represents Modulator-Power Supplies ME-141/GR and MR-141A/GR.

**NOTE**

**Installation of Radio Transmitting Set AN/GRT-3 involves procedures that call for techniques and operations beyond the capabilities of operator personnel; therefore, installation instructions are not included in this manual but are given in TM 11-5820-207-24.**

**1-2. Indexes of Publications**

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

**1-4. Purpose and Use**

a. *Purpose.* Radio Transmitting Set AN, GRT-3 provides facilities for transmitting amplitude-modulated (am), single-channel, continuous-wave (cw), or modulated-continuous-wave (mcw) signals in the

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

**1-3. Forms and Records**

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

b. *Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (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).

**1-3.1. Reporting of Equipment Publication Improvements**

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

## Section II. DESCRIPTION AND DATA

ultrahigh-frequency (UHF) range from ground to air, or from ground to ground.

b. *Use.* The AN/GRT-3 is normally used as the transmitting equipment of a UHF communications system used in control towers or airway stations. A typical application of the AN GRT-3 used in a UHF communications system is shown in figure 1-2.

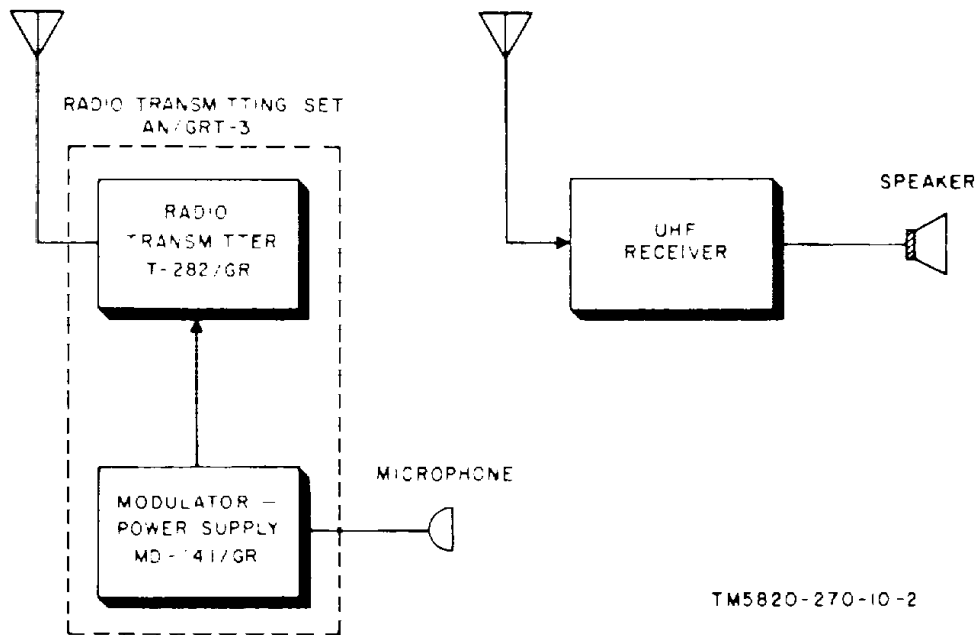


Figure 1-2. Typical application of Radio Transmitting Set AN GRT-3 used in UHF communications system.

**1-5. Technical Characteristics**

*a. Radio Transmitter T-282(\*)/GR.*

- Number of tubes..... 13.
- Channel frequency separation..... 100 kilocycles.
- Frequency range ..... 225 through 399.9 me.
- Frequency stability..... ±10 kilocycles.
- Types of transmission Voice or tone, narrow or broadband.
- Type of control..... Crystal.
- Distance range ..... Line of sight.
- Power output ..... 100 watts.
- Output impedance ..... 52 ohms.
- Weight ..... 70 pounds.

*b. Modulator-Power Supply MD-141(\*)/GR.*

- Number of tubes..... 14.
- Audio response:
  - Narrow band..... 400 to 3,000 cps.
  - Broadband..... 200 to 20,000 cps.
- Type of modulation ..... Amplitude modulation.
- Modulation sensitivity..... 45 dbm for 95% modulation
- Distortion ..... 10% (maximum).
- Input impedance..... 50 or 600 ohms.
- Power requirements:
  - Voltage ..... 105 to 125, or 210 to 250 volts ac, 50 to 60 cps, single phase.
  - Watts (maximum) ..... 380.
- Weight ..... 170 pounds.
- Dutycycle:

- Modulator-Power..... Carrier-on to carrier-off ratio is 1 to 5 minutes at temperatures exceeding +86° F. (+30° C.).
- Supply MD-141 GR
- Modulator-Power..... Continuous duty at temperatures ranging from -20° F. (-29° C.) to +131° F. (-55° C.).
- Supply MID-141A GR

**1-6. Comprising an Operable Radio Transmitting Set AN/GRT-3**

*FSN Qty Nomenclature, part No., and mfr code*

**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.

- 5995-577-3391 1 Cable Assembly Radio frequency CG-390A/U: (6 ft 4 in.)
- 5995-617-0455 2 Cable Assembly, Radiofrequency CG-693/U: (This item is nonexpendable)
- 5995-669-6779 1 Cable Assembly, Power, Electrical CK-2017/U: (28 in.); D-458-1404, 05828; (This item is nonexpendable)
- 5820-501-1020 1 Modulator MD-141A/GR: (This item is nonexpendable)
- 5820-556-1992 1 Transmitter, Radio T-282C GR, T-282D/GR: (This item is nonexpendable)

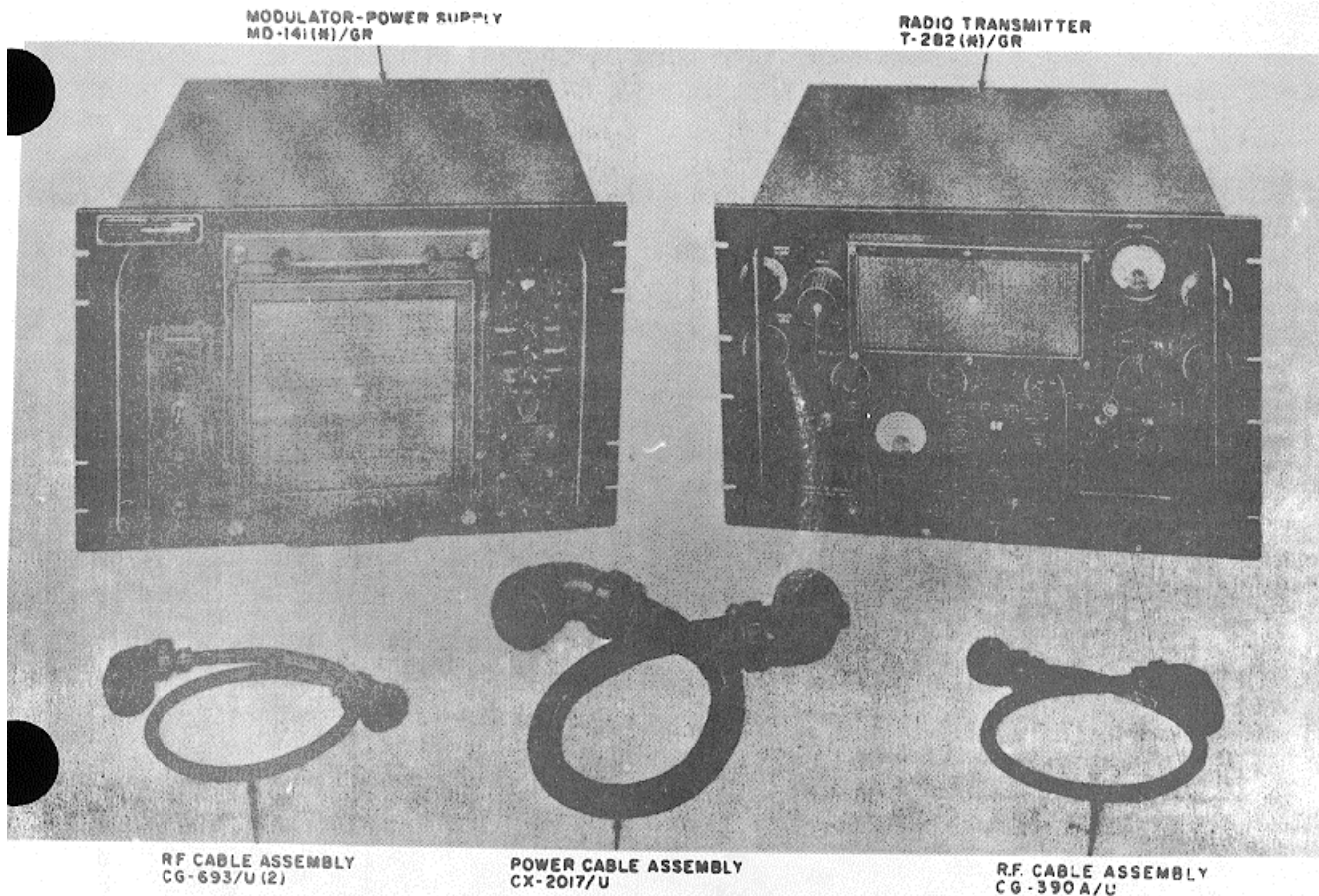
<i>FSN</i>	<i>Qty</i>	<i>Nomenclature, part No., and mfr code</i>
5995-583-9867	1	Cable Assembly, Radio frequency; 458-1408, 05828
5995-557-7603	1	Cable Assembly, Radio frequency; 458-1408, 05828
5995-583-9867	1	Cable Assembly, Radiofrequency; 8-1.4540 0582

**1-7. Description of Radio Transmitting Set AN/GRT-3**  
(fig. 1-3)

a. Radio Transmitting Set AN/GRT-3 consists of Radio Transmitter T-282(\*)/GR Modulator-Power Supply MD-141 (\*)/GR and interconnecting cables. Both the T-282(\*)/GR and the MD-141 (\*) GR are normally mounted in rack MT-686, GR (not part of the AN/GRT-3).

**1-6.1. Running Spares**

The running spares for the AN/GRT-3 are illustrated in figure 1-4.



TM 5820-270-10-7

Figure 1-3. Radio Transmitting Set AN/GRT-3, less running spares.

b. The MD-141(\*)/GR provides all operating power for the T-282(\*)/GR. Also, it provides audio-frequency (AF) modulating signals to the T-282(\*)/GR. The T-282(\*)/GR generates the UHF carrier signal. Interconnections between the T-282(\*)/GR and the MD-141(\*)/GR are provided by three interconnecting cables, connected between connectors at the rear of each unit. The antenna interconnecting cable connects to a connector at the rear of the T-282(\*)/GR; ac input power is applied to a connector at the rear of the MD-141(\*)/GR from Distribution Panel J-390/GR (not part of the AN/GRT-3).

c. An antenna switching relay in the T-282(\*)/GR permits use of the same antenna for both transmitting and receiving (the receiver is not part of the AN/GRT-3). Keying and modulating of the output UHF signal can be

done from a distance of 5 miles, maximum, through a telephone line connected to terminals at the rear of the MD-141(\*)/GR.

#### 1-8. Description of Radio Transmitter T-282(\*)/GR

The T-282(\*)/GR consists of a front panel and four major subassemblies which are protected by a dust cover. An internal blower provides forced-air ventilation through dust filters at the front and rear of the unit. Interlock switches cut off power from the T



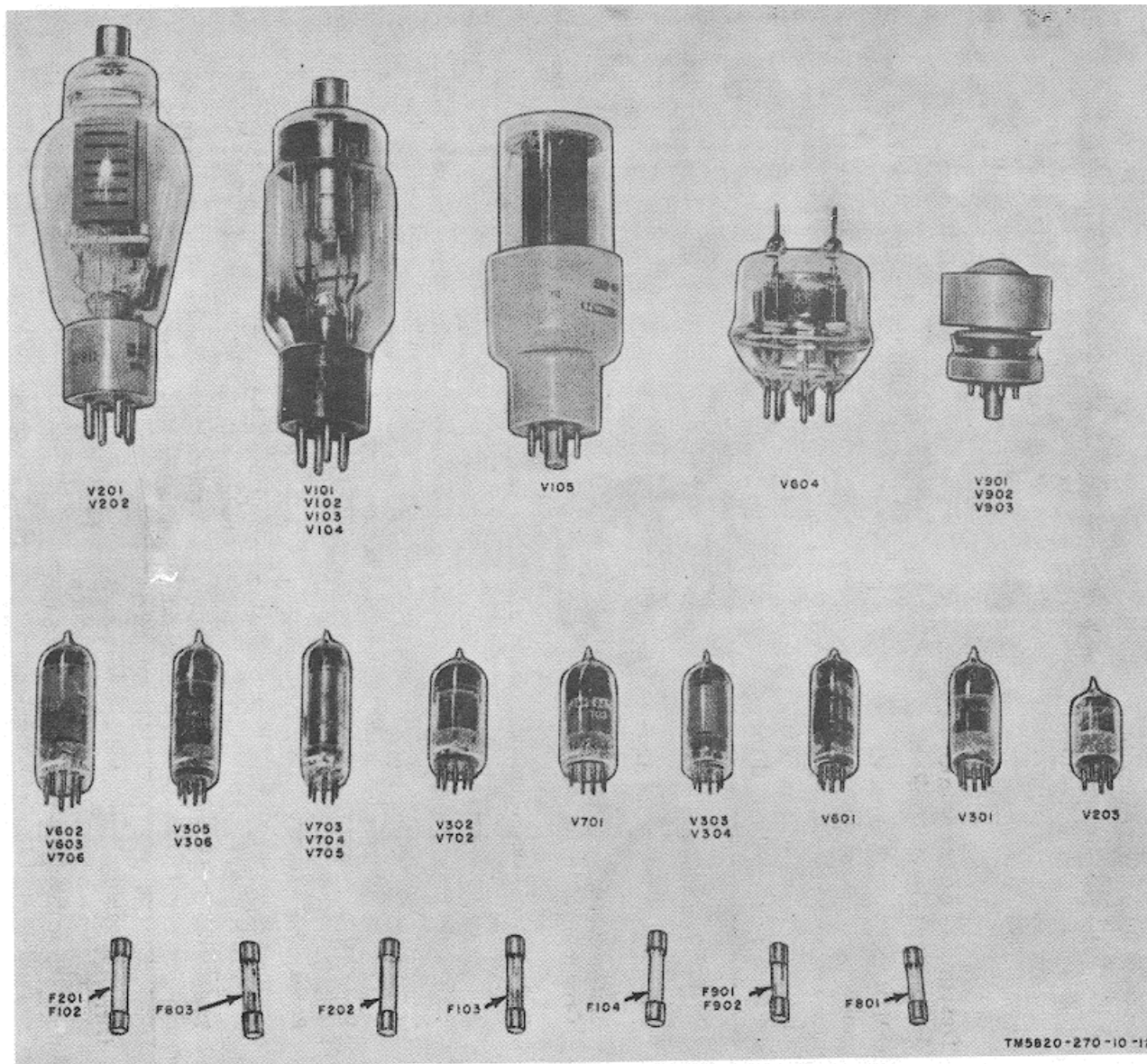


Figure 1-4. Running spares for Radio Transmitting Set AN/GRT-3.

282(\*)/GR circuits if the air filters are removed, in order to protect maintenance personnel from exposed high-voltage points. Air-operated interlock switches interrupt power if the flow of cooling air is inadequate. The front panel of the T-282(\*)/GR is slotted for rack mounting. All connectors and terminals required for external connections are located at the rear of the unit; the crystal, which must be selected for the authorized operating frequency, and all operating controls are located on the front panel.

**1-9. Description of Modulator-Power Supply MD-141(\*)/GR**

The MID-141(\*)/GR consists of front and rear panels and three major subassemblies which are protected by a dust cover. A blower, mounted at the front of the MD-

141(\*)/GR, provides forced-air cooling through dust filters at the front and rear of the unit. Air-operated interlock switches interrupt power if the flow of cooling air is inadequate. Additional interlock switches interrupt power if the dust filters are removed, in order to protect maintenance personnel from exposed high-voltage points. The rear panel contains all connectors and terminals required for external connections. Also, one seldom-used control, a power BUCK-BOOST switch, is located on the rear panel (para 2-1f(2)). All other operating controls are located on the front panel.

**1-10. Additional Equipment Required**

The equipment listed in the chart below is not supplied as part of Radio Transmitting Set AN/CRT-3 but is required for use with the equipment.

<i>Quantity</i>	<i>Nomenclature</i>	<i>Function</i>
1	Antenna AT-197/GR, or Antenna AS-505/GR.	For transmission or reception.
1	Mast AB-15S/GR -----	Antenna support.
1	Crystal Unit, Quartz CR-27/U-----	Transmitting frequency control (frequency range of 6.250000 to 11.111111 mc).
set		
1	Rack MT-486/GR, or equivalent -----	Equipment mounting.
1	Microphone T-17 -----	Push-to-talk voice communication.
1	Headphone Set CW-49507, or equivalent --	Sidetone monitoring.
1	Distribution Panel J-390,/GR -----	Power and audio interunit distribution.
1	RF Cable Assembly CG-597/U -----	RF transmission line.
1	RF Cable Assembly CG-707/U -----	Connection between antenna jack and RF Cable Assembly CG-597, 'U.
1	Power Cable Assembly CX-1541/U-----	Ac power line between Distribution Panel J-390/GR and power connector on MD-41 (*),/GR.
1	Power cable assembly-----	Connects Distribution Panel J-390 GR to ac power source.
1	Antenna transfer cable-----	Connects antenna to receiver through T-282(*)/GR antenna relay.
5 miles	Field Wire W-100-B-----	Telephone line for remote operation and muting connection to receiver.

**1-11. Differences in Models**

a. Radio Transmitters T-282/GR, T-282B/GR, and T-282C/GR are identical except for minor electrical differences which do not affect any of the data in this manual.

b. Radio Transmitter T-604A/GR is identical with Radio Transmitter T-282C/GR except for cabinet finish

and the addition of one resistor.

c. Modulator-Power Supply MD-141/GR (Intermittant duty) is similar to Modulator-Power Supply MD-141 A/GR (continuous duty) except for the duty cycle indicated (para 1-5).

**CHAPTER 2  
OPERATING INSTRUCTIONS**

**Section I. OPERATOR'S CONTROLS AND INDICATORS**

**2-1. Damage from mproper Settings and Connectors**

Take the precautions given below when setting the controls.

- a. To prevent blown power fuses, check the voltage designation plate (fig. 2-1) before operation to see that it indicates the same voltage as that of the power source being used.
- b. Be sure that the equipment is properly grounded before turning the power on.
- c. Do not tune or operate the equipment unless an antenna or a dummy load is connected to the TO ANTENNA connector (fig. 2-3) on the T-282(\*)/GR real panel.
- d. Set all operating controls to the positions listed in the preliminary starting procedure (para 2-5).
- e. Operate all controls in the exact sequence listed in the starting procedure (para 2-6).
- f. When the ac power source is known to have poor voltage regulation, an ac voltmeter is permanently

connected across the power terminals of Distribution Panel J-390/GR during installation. Check the ac voltage at least once an hour, and follow the instructions given in (1) below for 115-volt power sources, or (2) below for 230-volt power sources.

- (1) If the normal ac line voltage is 115 volts, and the voltage indicated on the ac voltmeter is less than 115 volts, set the BUCK-BOOST switch (at the rear of the -.ID-141(\*)/GR, fig. 2-4) to BOOST. If the indicated voltage is more than 115 volts, set the BUCK-BOOST switch to BUCK.
- (2) If the normal ac line voltage is 230 volts, and the indicated voltage is less than 230 volts, set the BUCK-BOOST s-witch to BOOST. If the indicated voltage is more than 230 volts, set the BU-CK-BOOST switch to BUCK.

**2-2. Modulator-Power Supply MD-141(\*)/GR, Controls and Indicators**

(fig. 2-1)

Control or indicator	Function
POWER switch-----	Turns ac power input on or off.
PLATE switch-----	Turns high and low dc power supplies on or off.
Green light-----	Indicates that ac power is on when lighted.
Red light-----	Indicates that high voltage is on when lighted.
MIKE jack-----	Microphone input jack.
GAIN control-----	Controls modulation percentage.
NARROW-BROAD switch-----	Sets bandwidth for either narrow-band or broadband operation.
EMER-NORMAL switch-----	Sets AN,/GRT-3 for either normal or emergency operation (para 2-9 and 2-10).
PUSH TO TALK-CARRTT'R ON switch-----	Permits microphone push-to-talk switch to control RF carrier, or locks RF carrier on.
LIMITER THRESHOLD control-----	Sets level at which modulation limiting begins.
BUCK-BOOST switch (fig. 2-4)-----	Raises or lowers ac input voltage when ac line voltage is too low or too high.

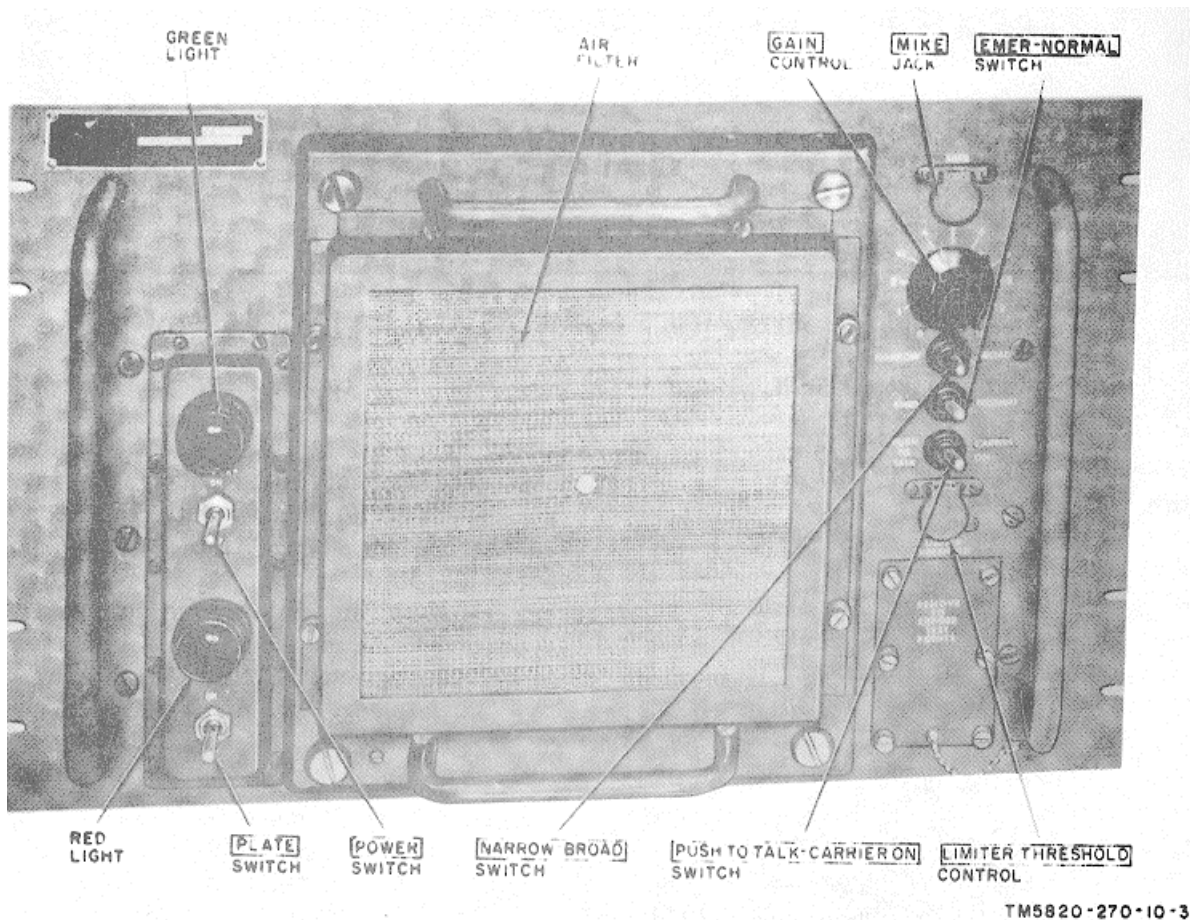


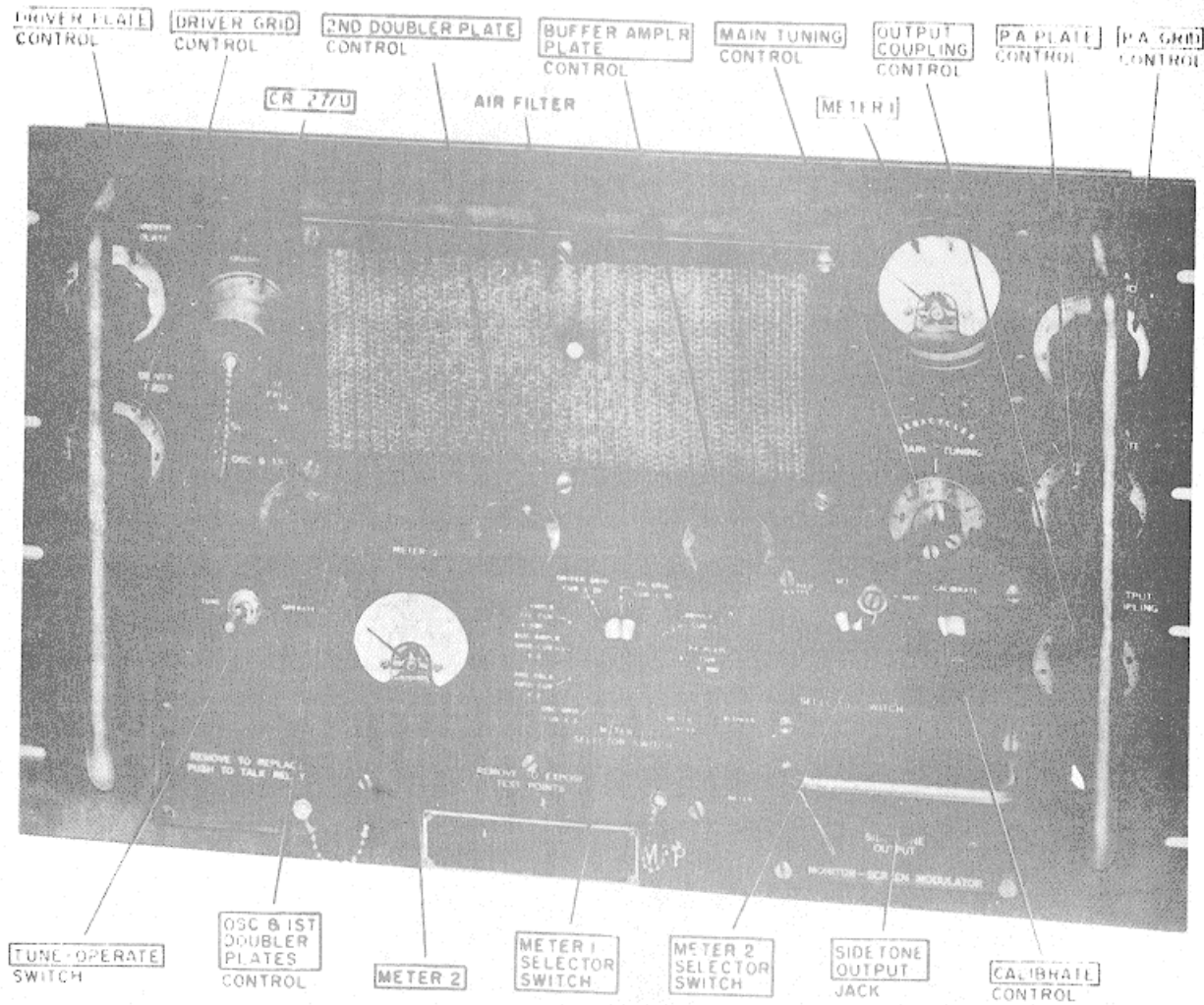
Figure 2-1. Modulator-Power Supply MD-141(\*)/GR, front panel.

**2-3. Radio Transmitter T-282(\*)/GR, Controls and Indicators**

(fig. 2-2)

Control or indicator	Function	
DRIVER PLATE control -----	Tunes driver plate circuit.	
DRIVER GRID control -----	Tunes driver grid circuit.	
CR-27/U -----	Controls operating frequency of T-282(*)/GR.	
TUNE-OPERATE switch -----	Reduces T-282(*)/GR output power for tuning, or permits full power operation.	
OSC & 1ST DOUBLER PLATES control -----	Tunes oscillator and first doubler plate.	
METER 2 -----	Monitors circuits selected by METER 2 SELECTOR SWITCH.	
2ND DOUBLER PLATE control -----	Tunes second doubler plate circuit.	
METER 1 SELECTOR SWITCH -----	Switches .METER : into one of nine circuits:	
	Sw pos	Causes meter to read
	1. OSC GRID CUTR X 2.	Oscillator grid current.
	2. 2ND DBLR GRID CUR X 2.	Second doubler grid current.
	3. BUF AMPLR GRID CUR X 5.	Buffer amplifier grid current.
	4. BFR AMPLR PLATE CUR X 100.	Buffer amplifier plate current.

Control or indicator	Function	
	Sw pos	Causes meter to read
	5. DRIVER GRID CUR X 20.	Driver grid current.
	6. PA GRID CUR X 50.	Power amplifier grid current.
	7. DRIVER PLATE OUR X 200.	Driver plate current.
	8. P.A. PLATE CUR X 500.	Power amplifier plate current.
	9. METER 1 JACKS	Connects METER 1 to test jacks.
BUFFER AMPLR PLATE control .....	Tunes buffer amplifier plate circuit.	
METER 2 Selector SWITCH .....	Connects METER 2 into one of three circuits:	
	Sw pos	Causes meter to read
	CARRIER WATTS ---- -----	RF carrier output in watts
	SET CAL ----- -----	Calibration of METER 2.
	% MOD ----- -----	Percentage of modula- tion.
SIDETONE OUTPUT jack -----	Aural output for monitoring transmission.	
CALIBRATE control -----	Calibrates METER 2.	
MAIN TUNING control -----	Tunes T-282(*)/GR to desired frequency.	
OUTPUT COUPLING control -----	Adjusts antenna coupling.	
P.A. plate control -----	Tunes power amplifier plate circuit.	
P.A. GRID control -----	Tunes power amplifier grid circuit	
METER 1 -----	Monitors circuits selected by METER 1 SELECTOR SWITCH.	



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Figure 2-2. Radio Transmitter T-282(\*)/GR, front panel.

**Section II. OPERATION UNDER USUAL CONDITIONS**

**2-4. Types of Operation**

a. Radio Transmitting Set AN/GRT-3 may be operated either locally or from a remote point up to 5 miles away. When operated either locally or remotely, voice or modulated continuous wave operation is possible. During normal remote operation, the RF carrier is on continuously and only the modulating signal is controlled from the remote operating position. During emergency remote operation, the rf carrier is controlled by the Microphone T-17 push-to-talk button at the remote operating position.

b. To operate the equipment for any particular type of operation, perform procedures as follow:

- (1) Preliminary starting procedure (para 2-5).
- (2) Starting procedure (para 2-6).
- (3) Tuning procedure (para 2-7).
- (4) Procedure for the desired type of operation (para 2-8, 2-9, or 2-10).
- (5) Stopping procedure (para 2-12).

## 2-5. Preliminary Starting Procedure

Perform the preliminary operations listed below before starting the equipment as described in paragraph 2-6.

**Caution:**

**Make sure that the equipment is properly grounded.**

- a. *Modulator-Power Supply MD-141(\*)/GR.*
  - (1) Set the POWER switch to OFF.
  - (2) Set the PLATE switch to OFF.
  - (3) Set the LIMITER THRESHOLD control to midposition.
  - (4) Set the GAIN control to 5.
  - (5) Set the NARROW-BROAD switch to NARROW.
  - (6) Set the EMER-NORMAL switch to NOR-MAL.
  - (7) Set the PUSH TO TALK CARRIER ON switch to PUSH TO TALK.
- b. *Radio Transmitter T-282(\*)/GR.*
  - (1) Set the TUNE-OPERATE switch to OPERATE.
  - (2) Turn the METER 1 SELECTOR SWITCH to 8 (PA PLATE CUR X 500).
  - (3) Turn the METER 2 SELECTOR SWITCH to CARRIER WATTS.

## 2-6. Starting Procedure

When the AN,/GRT-3 is being used for the first time, or a change of frequency is necessary, the T-282(\*)/GR must be tuned (para 2-7) before performing the starting procedure. If an abnormal indication is obtained during the starting procedure, refer to the troubleshooting procedures (para 3-6) for corrective measures. With the controls set as described in the preliminary starting procedure (para 2-5), perform the procedure described in a through p below.

**Caution: Do not operate the equipment unless an antenna or a dummy load is connected to the TO ANTENNA connector on the rear panel of the T-282(\*)/GR (fig. 2-3).**

- a. Insert the Microphone T-17 plug into the MIKE jack.
- b. Set the PON-WER switch to ON; the green light above the POWER switch should light.

- c. Set the PLATE switch to ON and wait approximately 15 minutes.

**Note.**

**Immediate operation is possible, but the equipment may be slightly off frequency until it reaches operating temperature.**

- d. Press the T-17 push-to-talk button; the red light above the PLATE switch should light.
- e. Note the indications on METER 1 and METER 2; release the T-17 push-to-talk button.
- f. A normal METER 1 indication is between 0.49 and 0.63. (The actual current is 500 times the indications, or between 245 and 315 milliamperes.)
- g. A normal METER 2 indication is at least 90 watts.
- h. If abnormal indications were obtained (values other than those given in f and g above), retune the T-282(\*)/GR (para 2-7). If normal indications were obtained (f and g above), proceed with the procedures given in i below.
- i. Insert Headphone Set CW-49507 into the SIDETONE-OUTPUT jack.
- j. Turn the METER 2 SELECTOR SWITCH to SET CAL.
- k. Depress the T-17 push-to-talk button.

**Note.**

**Cover the T-17 mouthpiece; you are transmitting.**

- l. Turn the CALIBRATE control until the pointer of METER 2 indicates CAL at the right-hand end of the bottom scale.
- m. Turn the METER 2 SELECTOR SWITCH to % MOD.
- n. Hold the T--17 2 to 6 inches away from the mouth and speak into the mouthpiece at a normal conversational level; voice will be heard in the CW-49507.
  - (1) Adjust the GAIN control to obtain 85 to 95 percent modulation on voice peaks, as indicated on the bottom scale of METER 2.
  - (2) Adjust the LIMITER THRESHOLD control until speaking at a very loud level will not increase the percentage to modulation.
- o. Release the T-17 push-to-talk button.
- p. The AN/GRT-3 is now ready for operation.



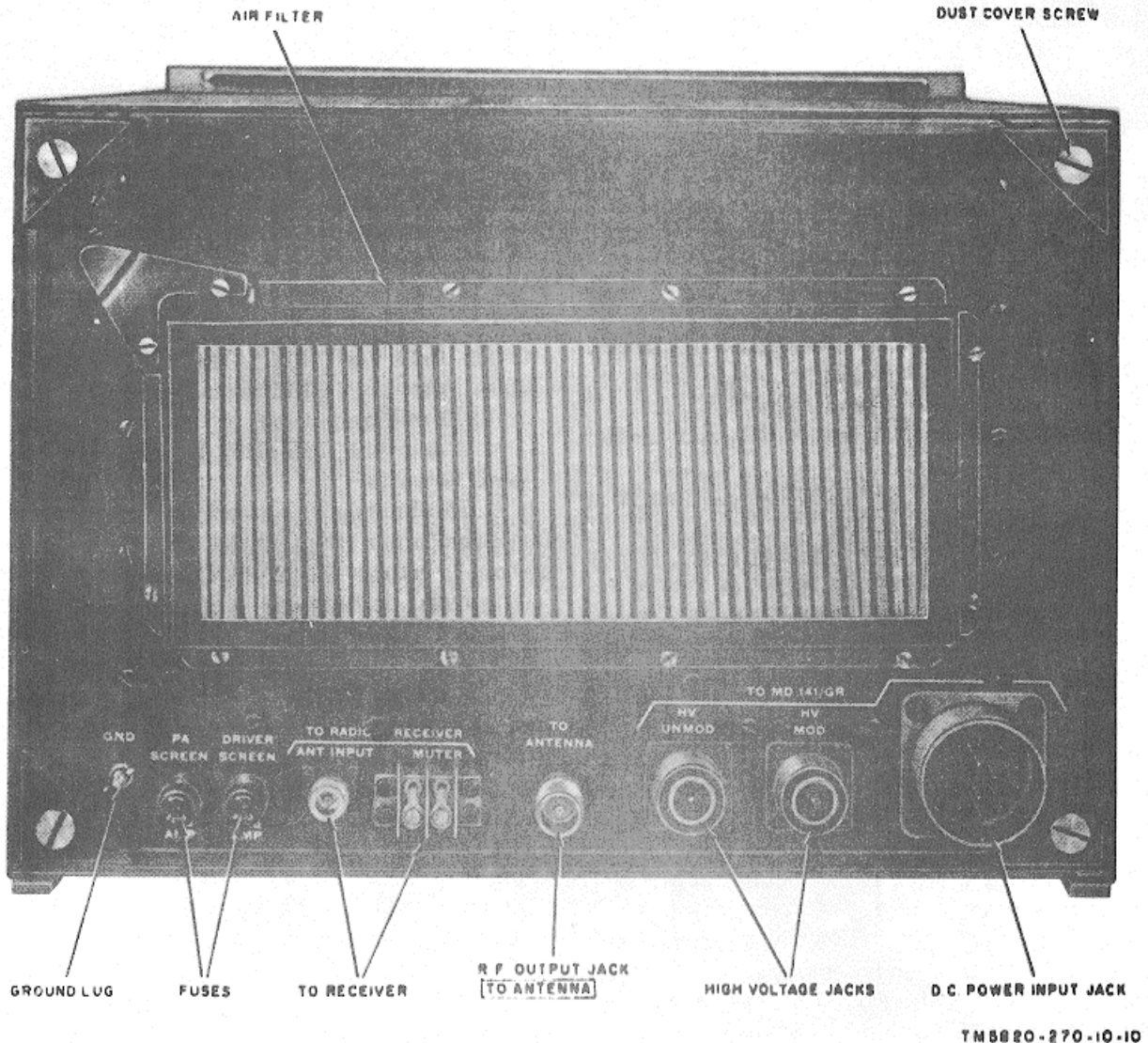


Figure 2-3. Radio Transmitter T-282(\*)/GR, rear panel.

**2-7. Tuning Procedure**

The AN,/GRT--3 must be tuned when the equipment is used for the first time, when it is necessary to change the operating frequency, or when the indications listed in paragraphs 2-6f and g cannot be obtained. To change the operating frequency, follow the instructions given in a through x below. To retune the equipment Without changing the operating frequency, omit the procedures given in b through f below.

a. Perform the preliminary starting procedure (para 2-5).

b. Unscrew the crystal oven access cover (fig, 2-2) and let it hang by its chain.

c. Unplug the crystal oven from its socket on the front panel.

d. There are two types of crystal ovens that may be used. To change the crystal, follow the instructions given in (1) below for Crystal Oven JKO-2R, or the instructions in (2) below for Crystal Oven TCO-2G.



- (1) Remove the three screws near the bottom of the JKO-2R; hold the base and slide the cover off, and continue to hold the base while unplugging the heating element. Unplug the crystal.
- (2) Loosen the three screws near the bottom of the TCO-2G; twist and pull the base from the cover. Unplug the crystal.

e. Determine the correct crystal frequency by dividing the desired operating frequency by 36.

f. Insert a crystal of the correct frequency. Reassemble and replace the crystal oven and the crystal oven access cover.

g. Set the TUNE-OPERATE switch (fig. 2-2) to TUNE.

h. Set the PUSH TO TALK-CARRIER ON switch to CARRIER ON.

i. Turn the METER 1 SELECTOR SWITCH to 1.

**Caution:** Make sure that the antenna is connected to the TO ANTENNA connector on the T-282(\*)/GR rear panel.

j. Set the POWER switch to ON and allow at least 5 minutes warmup time.

**Note:** If the temperature is below 32° F. (0° C.), allow at least 20 minutes warmup time.

k. Loosen all tuning control dial locks.

l. Turn the MAIN TUNING control to the desired operating frequency, as indicated in the MAIN TUNING control window, and tighten the MAIN TUNING control dial lock.

m. Turn the OUTPUT COUPLING control to its extreme clockwise position.

n. Set the PLATE switch (fig. 2-1) to ON and wait until the red light above the switch lights (about 1 minute). An indication of approximately 0.04 milliampere (ma) should be observed on METER 1.

o. Turn the METER 1 SELECTOR SWITCH (fig. 2-2) to 2, tune the OSC & 1ST DOUBLER PLATES control for a maximum METER 1 indication, and lock the OSC & 1ST DOUBLER PLATES control.

**Note.**

**Use the METER 1 indications as a guide to prevent disturbing settings when locking the tuning controls.**

p. Turn the METER 1 SELECTOR SWITCH to 3, tune the 2ND DOUBLER PLATE control for a maximum METER 1 indication, and lock the 2ND DOUBLER PLATE control.

q. Turn the METER 1 SELECTOR SWITCH to 4 and tune the BUFFER AMPLR PLATE control for a minimum METER 1 indication.

r. Turn the METER 1 SELECTOR SWITCH to 5 and tune the DRIVER GRID control for a maximum METER 1 indication.

s. Readjust the BUFFER AMPLR PLATE and DRIVER GRID controls, repeating procedures given in q and r- above until no further increase in the METER 1 indication can be obtained; lock both controls.

t. Turn the METER 1 SELECTOR SWITCH to 7 and tune the DRIVER PLATE control for a minimum METER 1 indication. If a dip (minimum) in the METER 1 indication cannot be obtained, turn the METER 1 SELECTOR SWITCH to 6 and tune the PA GRID control for a maximum METER 1 indication.

u. With the METER 1 SELECTOR SWITCH still set to 6, readjust the PA. GRID and DRIVER PLATE controls until no further increase (maximum) in the METER 1 indication can be obtained. If the final METER 1 indication is greater than 0.4, detune the PA GRID control until the indication is 0.4. Lock both controls.

v. Tune the PA PLATE control for a maximum METER 2 indication.

w. Turn the METER 1 SELECTOR SWITCH to 8. Set the TUNE-OPERATOR switch to OPERATE and tune the P.A.. PLATE control for a maximum METER 2 indication.

x. If a 100-watt output indication cannot be obtained with the OUTPUT COUPLING control in the extreme clock-wise position, adjust the P.A.. PLATE and OUTPUT COUPLING controls for a METER 2 indication of at least 100 watts. The normal METER 1 indication is between 0.50 and 0.62. Lock both controls.

## 2-8. Local Voice Operation

Start the equipment as instructed in paragraph 2-6 and perform the procedures given below for local voice operation (para 2-11).

- a. Depress the T-17 push-to-talk button.
- b. Hold the T-17 2 to 6 inches away from the mouth and speak into the mouthpiece at a normal conversational level.
- c. Release the T-17 push-to-talk button at the end of each message.

## 2-9. Normal Remote Voice Operation

For normal remote voice operation, the AN/GRT-3 is connected to the remote operating point through a suitable length of line, Field Wire W-110-B or equivalent. At the remote operating point, the line is connected to a T-17. During this type of operation, the rf carrier is on continuously (para 2-1a). Start the equipment as instructed in paragraph 2-6 and perform the procedures given below for normal remote voice operation.

- a. Remove the local T-17 plug from the MIKE jack.
- b. Check to make sure that the line from the remote operating point is connected to the LINE terminals at the rear of the MID-141(\*)/GR (fig. 2-4).
- c. If extended range modulation (200 to 20,000 cycles per second (cps)) is to be used, set the NARROW-BROAD switch to BROAD, otherwise, set the NARROW-BROAD switch to NARROW.
- d. Check to make sure that the EMER-NORMAL switch is set to NORMAL.
- e. Set the PUSH TO TALK-CARRIER ON switch to CARRIER ON.
- f. Signal the operator at the remote position to start transmitting.
- g. Adjust GAIN control for 85 to 95 percent modulation while the operator at the remote location is transmitting.
- h. The AN/GRT-3 is now ready for normal remote voice operation. To transmit, depress the remote T-17 push-to-talk button and speak into the mouthpiece.

## 2-10. Emergency Remote Voice Operation

For emergency remote voice operation, the AN/GRT-3 is connected to the remote operating point the same way as for normal remote voice operation (para 2-9). During emergency remote voice operation, the RF carrier is on only when the T-17 push-to-talk button is pressed. Start the equipment as instructed in paragraph 2-6 and perform the procedures given below for emergency remote voice operation.

- a. Remove the local T-17 plug from the MIKE jack.
- b. Check to make sure that the line from the remote operating point is connected to the LINE terminals at the rear of the MID-141(\*)/GR (fig. 2-4).
- c. If extended range modulation (200 to 20,000 cps) is to be used, set the NARROW-BROAD switch to BROAD, otherwise, set it to NARROW.
- d. Set the EMER-NORMAL switch to
- e. Set the PUSH TO TALK-CARRIER ON switch to PUSH TO TALK.
- f. Signal the operator at the remote position to start transmitting.
- g. Adjust the GAIN control for 85 to 95 percent modulation while the operator at the remote point is transmitting.
- h. The AN/GRT-3 is now ready for emergency remote voice operation. To transmit, depress the remote T-17 push-to-talk button at the remote operating point and speak into the mouthpiece.

## 2-11. Operating Precautions

- a. Modulator-Power Supply MD-141(\*)/GR may be permanently damaged if continuously operated at temperatures above 30°C. (86° F.). If the MD-141(\*)/GR is used as part of the AN/GRT-3, maintain a carrier-on-to-carrier-off ratio of 1 minute on to 5 minutes off for all types of operation at temperatures exceeding 300C. (86° F.).
- b. Do not operate the equipment unless an antenna is connected to the TO ANTENNA

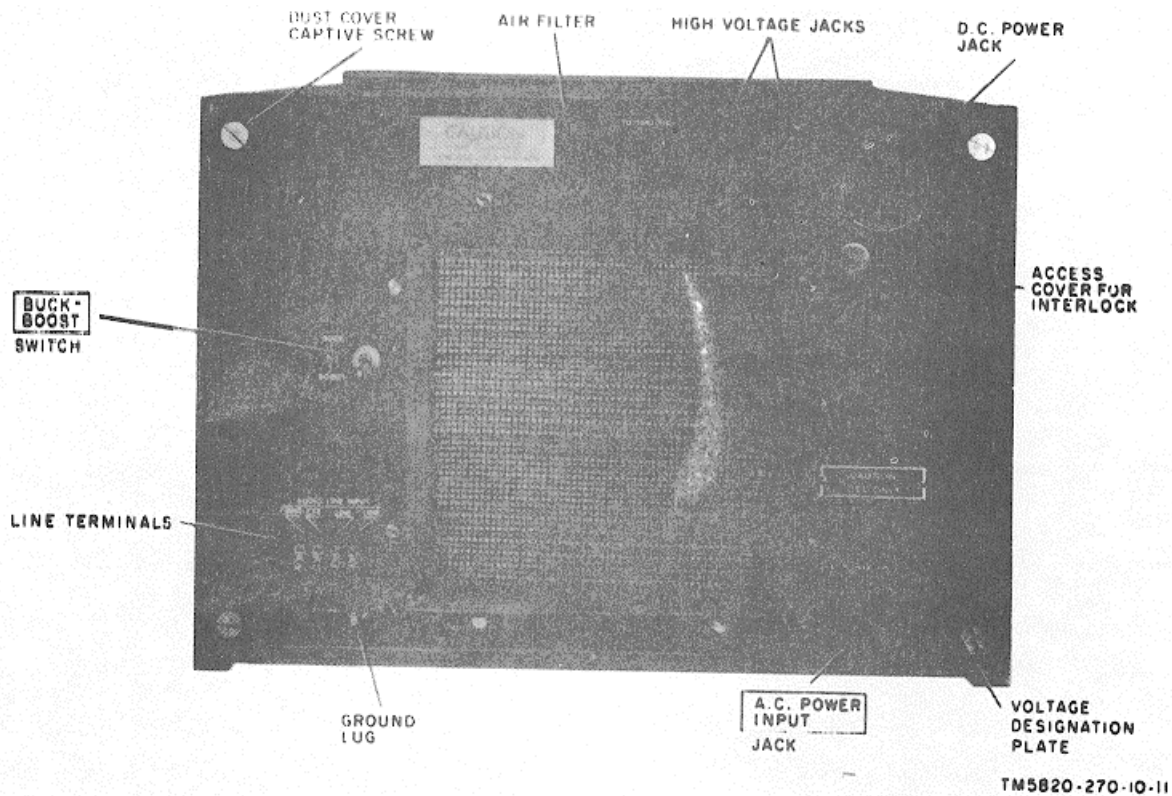


Figure 2-4. Modulator-Power Supply M-141(\*)/GR, rear panel

connector on the rear panel of the T-282(\*)/ GR.

b. Set the POWER switch to OFF.

**2-12. Stopping Procedure**

Stop the equipment as follows:

a. Set the PLATE switch to OFF.

**Note.:** To stop the equipment during an emergency, set the POWER switch to OFF.

## CHAPTER 3

## MAINTENANCE INSTRUCTIONS

**3-1. Scope of Maintenance**

The maintenance duties assigned to the operator of Radio Transmitting Set AN/GRT-3 are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties assigned do not require tools or test equipment.

- a. Operator's daily preventive maintenance checks and services (para 3-2, 3-3, and 3-4).
- b. Cleaning (para 3-5).
- c. Troubleshooting (para 3-6).
- d. Replacement of dial lamps (para 3-7).

**3-2. Operator's Preventive Maintenance**

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

a. **Systematic Care.** The procedures given in paragraphs 3-4 and 3-5 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 (para 3-4) 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, in good general (physical) condition 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.

**3-3. Operator's Preventive Maintenance Checks and Services**

Preventive maintenance checks and services of the AN/GRT-3 are required on a daily basis. Paragraph 3-4 specifies checks and services that must be accomplished daily and under the special conditions listed below.

- a. When the equipment is initially installed.
- b. When the equipment is reinstalled after removal for any reason.
- c. At least once each week if the equipment is maintained in standby condition.

**3-4. Operator's Daily Preventive Maintenance Checks and Services Chart**

<b>Sequence No.</b>	<b>Item to be Inspected</b>	<b>Procedure</b>	<b>References</b>
1	Exterior surfaces	Clean exterior surfaces of T-282(*)/GR and MD-141(*)/GR.	Fig. 1-3 and para 3-5.
2	Intercabling and connectors.	Check all interconnecting cables and connectors for cracks and breaks. Replace cables that have cracks or broken connectors.	None.
3	Completeness	Check AN/GRT-3 for completeness	Figure 1-3

<i>Sequence No.</i>	<i>Item to be Inspected</i>	<i>Procedure</i>	<i>References</i>
4	Antenna	Check antenna used with T-282(*)/GR for evidence of damage, corrosion, or incorrect installation.	
5	Meter faces (glass)	Check to see that meter faces (glass) are not loose, broken, or missing.	None.
6	Knobs and switches	While making operating checks (item 7), observe that mechanical action of each knob and switch is smooth and free of external or internal binding.	None.
7	Operational test	Operate equipment on authorized frequencies to verify its capabilities.	Para 2-5 through 2- 1.
8	Indicator lights	Check to see that green and red indicator lights are on when Para 3-7. AN, GRT-3 is operated; replace defective lights.	

**3-5. Cleaning**

Inspect the exterior of the T-282(\*)/GR and the MD-141(\*)/GR. The exterior surfaces should be free of dust, dirt, grease, and fungus.

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

**Warning:** Prolonged breathing of cleaning compound fumes is dangerous; make sure adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on the hands.

- b. Remove grease, fungus, and ground-in dirt from the panels; use a cloth dampened (not wet) with the cleaning compound.

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

**Caution:** Do not press on the meter faces (glass) when cleaning; the meter may become damaged.

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

**3-6. Troubleshooting**

The troubleshooting procedures given below are to be

used by the operator to correct malfunctions observed during the performance of operational tests. If the specified corrective measures do not restore the equipment to normal operation, organizational or higher category maintenance is required.

- a. If the green light above the POWER switch fails to light when the POWER switch is set to ON, check the power source, the power cable connections, and the indicator lamp.

- b. If the red light above the POWER switch fails to light with the PLATE switch set to ON and the T-17 push-to-talk button pressed, check the T-17 and the indicator lamp by substitution.,

- c. If the METER 1 indication is not within the range of 0.49 to 0.63 (with METER 1 SELECTOR SWITCH set to 8), and the METER 2 indication is below 90 (with METER 2 SELECTOR SWITCH set to CARRIER WATTS), retune the equipment (para 2-7). Also, check the antenna and the cable connections to the antenna.

**3-7. Replacement of Indicator Lamps**

Replace either of the indicator lamps on the MD-141(\*)/GR as follows:

- a. Remove the indicator lamp lens by turning it counterclockwise. Be careful not to lose the gasket that will come free with the lens.

*b.* Press in on the indicator lamp and turn it counterclockwise a fraction of a turn; then, extract the indicator lamp.

*c.* Insert the replacement indicator lamp in the lamp

socket; press in on the indicator lamp and turn it clockwise until it locks in place.

*d.* Replace the gasket and the indicator lamp lens. Tighten the indicator lamp lens by turning it clockwise.

**CHAPTER 4**  
**SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO**  
**PREVENT ENEMY USE**

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**Section I. SHIPMENT AND LIMITED STORAGE**

**4-1. Disassembly of Equipment**

Disassembly of the equipment by the operator is restricted to the disconnecting of the cables at the rear of the MID-141(\*)/GR and the T-282(\*)/GR. For all other required disassembly, refer the equipment to organizational category of maintenance repair.

**4-2. Protecting Transported Equipment**

Equipment that is to be removed from service for periods exceeding approximately 2 weeks, or equipment that is to be shipped for use by other personnel or activities, should be referred to a higher category of maintenance for repackaging.

**Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE**

**4-3. Authority for Demolition**

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 4-4 will be used to prevent further use of the equipment.

**4-4. Methods of Destruction**

Use any of the methods given below to destroy the equipment.

*a. Smash.* Smash the crystals, the tuning indicator, the antenna, the microphone, the controls, the meters, and the connectors with the heaviest tool at hand. If time does not permit the removal of the T-282(\*)/GR or the MD-141(\*)/GR covers, use axes, sledges, crowbars, hammers, or any other heavy tools available to smash the interior of the equipment.

*b. Cut.* Cut all cords and cables in a number of places; use axes, machetes, or similar tools to cut the cabling, the cording, and the wiring. If time permits, slash the interior cabling and the wiring.

*c. Burn.* Burn the instruction literature first. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrower, or similar items. Pour gasoline on the cut cables and the internal wiring and ignite; use incendiary grenades to complete the destruction of the equipment interior.

**Warning:**

**Be extremely careful with explosives and incendiary devices; use these items only when the need is urgent.**

*d. Explode.* Use explosives to complete the demolition, or cause maximum destruction, when time does not permit complete demolition by other means. Powder charges or fragmentation grenades may be used. Incendiary grenades usually are most effective for destruction of small parts.

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

By Order of the Secretary of the Army:

Official:

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

HAROLD K. JOHNSON,  
*General, United States Army,  
Chief of Staff.*

Distribution:

To be distributed in accordance with DA Form 12-51 requirements for operator maintenance literature for AN/GRT-3  
Radio Transmitting Set




## APPENDIX A REFERENCES

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Following is a list of references available to the operator of the AN/GRT-3.

DA Pam 3104	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, Lubrication Orders.
DA Pam 310-7	Modification Work Orders.
TB SIG 225	Identification and Handling of Radioactive Signal Items.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 11-5820-201-12P	Operator and Organizational Maintenance Repair Parts and Special Tool Lists, Radio Set AN/GRR-7.
TM 38-750	Army Equipment Record and Procedures.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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