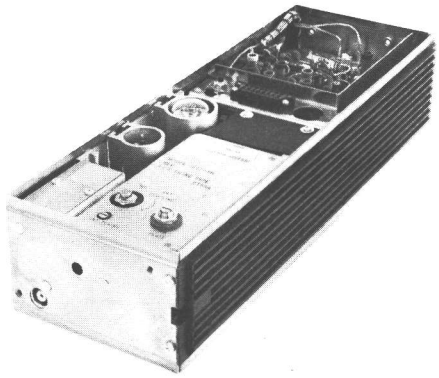
COMMUNICATIONS

MASTR Progress Line

132-174 MHZ, 80-WATT TRANSMITTER MODEL 4ET58A10-21 & 4ET58B10-15

Maintenance Manual LBI-3547F

ET-58-A & B



SPECIFICATIONS *

FCC filing Designation:	**ET-58A (Narrow Band)** **ET-58-B (Wide Band)**
Frequency Range:	132 - 174 MHz
Power Output:	80 watts minimum
Crystal Multiplication Factor:	12
Frequency Stability:	±.0005% (-30°C to +60°C)
Spurious & Harmonic Radiation:	At least 85 db below rated power output
Modulation:	Adjustable from 0 to ±5 KHz (Narrow Band) and 0 to ±15 KHz (Wide Band) swing with instantaneous modulation limiting
Audio Frequency Characteristics:	Within +1 db to -3 db of a 6 db/octave pre-emphasis from 300 to 3000 Hz per EIA standards. Post limiter filter per FCC and EIA
Distortion:	Less than 5%
Deviation Symmetry: Narrow Band - Wide Band -	 0.5 KHz maximum 1.5 KHz maximum
Tubes & Transistors:	80-watt Transmitter with no Options: 3 tubes 8 transistors 4 diodes
Maximum Frequency Spacing	0.4%
Duty Cycle: Mobile -	20% transmit (one minute transmit, four minutes off)
Station -	Continuous

3/25

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL ELECTRIC

TABLE OF CONTENTS

SPECIFICATIONS . . . . . Cover

DESCRIPTION. 1

CIRCUIT ANALYSIS 1

- Power Inputs. 2
- Oscillator. 2
- Audio Amplifiers and Limiter. 2
- Phase Modulator 3
- Amplifiers and 1st and 2nd Multipliers. 3
- 3rd Multiplier. 3
- Amplifier 4 4
- Power Amplifier 4
- Channel Guard Encoder 4

REDUCED POWER OPERATION. 5

MAINTENANCE

- Disassembly 8
- Alignment Procedure 9
- Test Procedures 10
  - Power Output 10
  - Tone Deviation 10
  - Voice Deviation. 10
- Troubleshooting 11

OUTLINE DIAGRAM. 12

SCHEMATIC DIAGRAM. 13

PARTS LIST 14

PRODUCTION CHANGES 16

ILLUSTRATIONS

Figure 1 Block Diagram 1

Figure 2 120-Watt PA Plate Input Loading Curve 7

Figure 3 Top Cover Removed for Servicing 8

Figure 4 Bottom Cover Removed for Servicing. 8

WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

DESCRIPTION

The MASTR Progress Line FM Transmitter Types ET-58-A and B are crystal-controlled, phase-modulated transmitters designed for one-, two-, or four-frequency operation within the 132-174 megahertz band. The transmitter consists of the following modules:

- Transistorized Exciter Board, with audio, oscillator, modulator, amplifier and multiplier stages,
- Tubed multipliers and power amplifier stages,
- Optional transistorized Channel Guard Board. (ET-58-A only)

All input leads to the transmitter are individually filtered by the 20-pin feed-through by-pass connector J101. The output passes through a four-section, low-pass filter that features good shielding between sections, and Teflon® capacitors for fail-free operation with an open or shorted antenna.

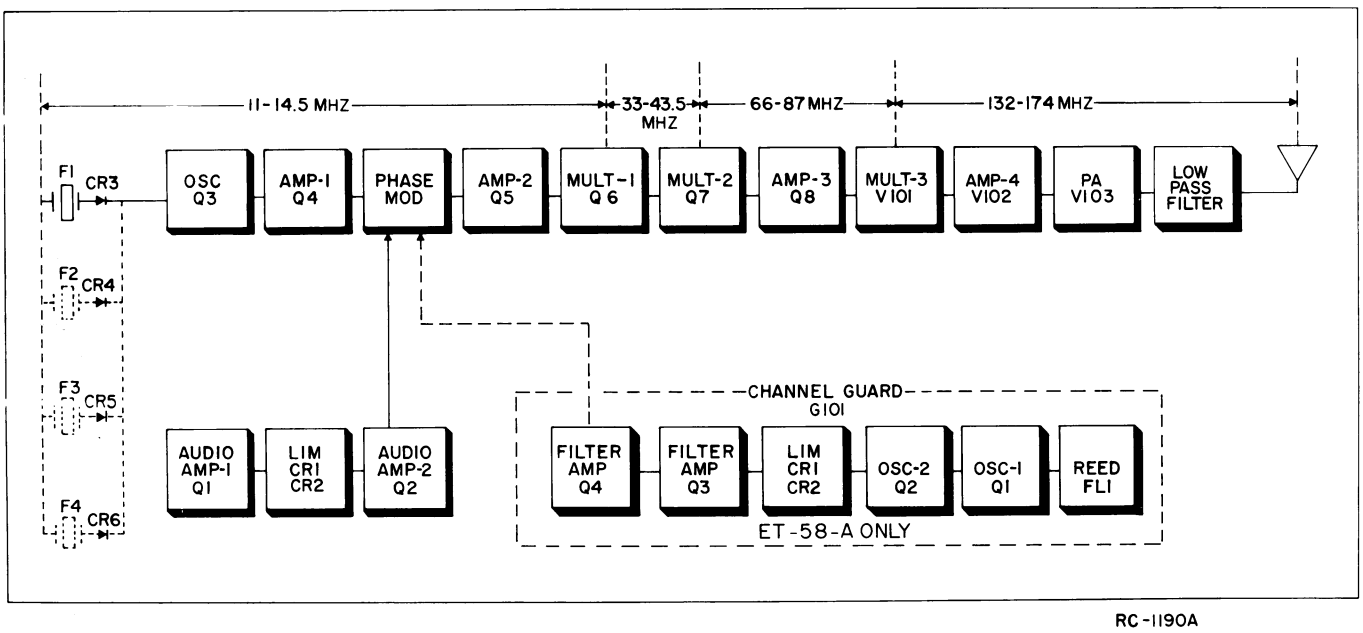


Figure 1 - Transmitter Block Diagram

CIRCUIT ANALYSIS

Eight silicon transistors and only three tubes are used in the transmitter. The frequency of the crystals used ranges from 11 to 14.5 megahertz, and the crystal frequency is multiplied twelve times.

A centralized metering jack (J102) is provided for use with General Electric Test Set 4EX3A10. The Test Set meters the multiplier, amplifier and PA stages as well as filament and regulated supply voltages.

The metering jack also provides access to receiver audio, microphone and push-to-talk leads.

POWER INPUTS

The following supply voltages are connected from the power supply to the transmitter through the 20-pin by-pass connector J101:

- Pin 3 — Filament voltage
- Pin 4 — +300 volts MULT B+
- Pin 5 — +650 volts PA B+
- Pin 8 — -45 volts bias
- Pin 14 — +10 volts for Channel Guard option (ET-58-A only)
- Pin 15 — -20 volts for Exciter Board

OSCILLATOR

A transistorized Colpitts oscillator (Q3) is used in the transmitter. The oscillator crystal is thermistor-compensated at both ends of the temperature range to provide instant frequency compensation, with a frequency stability of ±.0005% without crystal ovens or warmers.

In single-frequency transmitters, a jumper (from H1 to H2) connects the F1 crystal keying lead to ground to forward bias diode CR3. Forward biasing the diode reduces its impedance, and the crystal frequency is applied to the base of oscillator Q3. Feedback for the oscillator is developed across C34/C35. The oscillator output is coupled through an impedance matching emitter-follower amplifier stage (Q4) to the phase modulator.

In multi-frequency transmitters, the single oscillator transistor is used, and up to three additional crystal circuits, identical to the F1 crystal circuit, can be added. The keying jumper is removed and the proper crystal frequency is selected by switching the crystal keying lead to ground by means of a frequency selector switch on the Control Unit.

AUDIO AMPLIFIERS AND LIMITER

An audio signal from the microphone is coupled through C1 to the base of Class A audio amplifier Q1. The design of the microphone, in conjunction with C2 and R3, produces a 6-db audio pre-emphasis. RF decoupling is provided by R10 and C75.

The amplified audio signal is RC coupled to the diode limiters, CR1 and CR2. These diodes operate in series and are normally in a forward conducting state. An audio signal of sufficient amplitude to cause limiting takes the diodes out of conduction, so that one diode conducts only on positive cycles and the other conducts only on negative cycles.

Following the limiter stage is a second Class A amplifier, Q2. The output of Q2 is coupled through MOD ADJUST potentiometer R12 to a combined post-limiter filter and de-emphasis network. This network consists of R15, R16, R17, C4, C7 and C8/C9. The output of the filter and de-emphasis network is applied directly to the phase modulator

PHASE MODULATOR

The phase modulator uses varactor CV-1 (voltage variable capacitor) in series with tuneable coil L1/L2. This network appears as a series-resonant circuit to the RF output of the oscillator. An audio signal applied to the modulator varies the bias of CV-1, resulting in a phase-modulated output. The output of the modulator is coupled through blocking capacitor C41/C45 to the base of the second amplifier. For Channel Guard and wide band transmitters, a second modulator stage (L3/L4 and CV-2) is cascaded with the first modulator. The output of the Channel Guard encoder is fed through CHANNEL GUARD MOD ADJUST R34 to the modulator stages. The voice audio is also applied to both modulator stages.

AMPLIFIERS AND 1st AND 2nd MULTIPLIERS

The second amplifier (Q5) isolates the modulator from the loading effects of the first multiplier and provides amplification. The output is DC coupled to the first multiplier.

Following Q5 are two inductively coupled Class C, common-emitter multiplier stages (Q6 and Q7). Q6 is a tripler, with collector tank T1 tuned to three times the crystal frequency. Metering resistor R37 is for metering the MULT-1 stage at centralized metering jack J102.

Q7 operates as a doubler stage, with collector tank T3 tuned to six times the crystal frequncy. Resistor R39 is for metering the MULT-2 stage at J102. The output of Q7 is inductively coupled through T3 and T4 to amplifier Q8. In 150.8 - 174 megahertz transmitters, capacitor C58 provides some high-side capacitive coupling.

Third amplifier Q8 is a neutralized straight-through amplifier. Feedback through C65 from the output link on T5 provides neutralization. This stage is metered at J102-3 across R43. The output is coupled to the grid tank of multiplier V101.

3rd MULTIPLIER

The output of the transistorized Exciter is coupled by a short length of RF cable to the grid tank (Z101/Z102) of beam pentode V101. This stage operates as a doubler with the plate tank tuned to twelve times the crystal frequency. The plate tank is tuned by C106.

The grid of V101 is metered through metering resistor R102 at J102-4. R101 drops the bias voltage to approximately -18 volts to protect V101 against loss of drive. Plate voltage is supplied though L101.

When measuring grid current to V101, there will be a residual reading of approximately 0.18 volts without any drive. This is caused by the presence of fixed bias voltage to the grid of the tube.

AMPLIFIER 4

The output of the MULT-3 stage is coupled to the grid of the compactron beam power amplifier (V102) by a pi-network consisting of C106, L102/L103 and C107. The grid is metered at J102-5 through metering resistor R106. Bias voltage is supplied through R105 and L114.

When measuring the grid voltage, there will be a residual reading of approximately 0.45 volt without any drive to the stage. Neutralization is provided by C121. The plate tank is series-tuned by C111.

POWER AMPLIFIER

Drive from 4th amplifier V102 is inductively coupled to the grid of power amplifier V103 through L104/L105 and L106/L107. For large changes in frequency (over ±0.2%), the physical spacing between the two coils must be adjusted by bending L104/L105. The coil should be adjusted for maximum coupling for the high end of the frequency range, and for minimum coupling for the low end of the frequency range.

The PA grid is metered at J102-6 through metering resistors R3 and R5. Bias voltage is applied to the control grids through R3 and R4.

Power amplifier V103 is a dual tetrode operating in a push-pull circuit. The PA plate is parallel-tuned by "butterfly" capacitor C112. High B-plus is applied through L113 to a center tap on the plate tank coil, L108/L109. C113 is a mechanical high-voltage by-pass capacitor.

The screen grid dropping resistors are R7 and R8. Plate current is metered from J102-1 to J102-9 across metering resistor R108.

WARNING

The meter leads are at plate potential (high B-plus) when metering the PA plate.

Placing the TUNE-OPERATE switch (S102) in the OPERATE position applies 300 volts to A119-J8 and -J10. The 300 volts appearing on each side of R8 effectively shorts the resistor out of the circuit, and the screen voltage is applied through R7 for normal operation of V102. With S102 in the TUNE position, the screen voltage is applied to A119-J8 only. Now, dropping resistors R7 and R8 are in series, to reduce the screen voltage. This reduces the plate dissipation of V103 while tuning the power amplifier stage.

Antenna coupling is achieved by varying the coupling between L108/L109 and L110/L111. C114 tunes the antenna circuit.

The RF output from the antenna coil is fed to low-pass filter FL101. This filter has a low insertion loss and a harmonic attenuation of at least -50 db through all harmonics. The filter output is fed to the antenna changeover relay located on the front of the system frame.

CHANNEL GUARD ENCODER (G101)

The Channel Guard Encoder (G101) is assembled on a printed wiring board that mounts on the underside of the MASTR transmitter. The Chan-

nel Guard Encoder is supplied by a regulated +10 volts and a regulated -20 volts. The 10-volt supply is applied to Q1 and Q2 continuously (even in STANDBY position), and the 20 volts is applied to Q3 and Q4 only when the transmitter is keyed.

Transistors Q1 and Q2 with reed FL1 are the tone oscillator portion of the circuit. The reed is resonant at the desired tone frequency. Clipping diodes CR1 and CR2 shape the output of the oscillator circuit into a square wave, which is coupled through the Channel Guard TONE ADJUST (R12) to the base of Q3. R12 will not require adjustment unless the Channel Guard tone frequency is changed. Then R12 must be set to the reed frequency.

Q3 and Q4 form a two-section low-pass filter that removes the distortion in the square wave and produces a sine wave output. The square wave oscillator output is a constant amplitude, which makes the encoder less sensitive to shock and vibration. The encoder tone is fed to the tone modulator on the Exciter Board through Channel Guard MOD ADJ R34.

The channel can be monitored by moving the CHANNEL GUARD-OFF switch on the Control Unit to the OFF positon (or by removing the microphone or handset from the optional hang-up bracket).

NOTE

If the Two-Way Radio is mounted vertically or at an angle of over 45°, rotate the encoder reed 90° in its mounting bracket so that the label with the G-E Drawing and Part Number is facing the rear of the Two-Way Radio. See Figure 3 for location of the encoder reed.

REDUCED POWER OPERATION

STATION APPLICATION

The station transmitter with Type EP-38-A power supply may be modified to operate at reduced power using the following procedure.

Transmitter Modification

(Required only on Models 4ET58A10-15 and 4ET58B10-15 prior to REV. B and on Models 4ET58A16-21 prior to REV. D).

Remove the transmitter's 3.9K-ohm PA screen resistor R7 on component board A119. In its place, connect two 8.2K-ohm, 2-watt resistors in parallel.

Power Supply Modification

Be sure that the station transmitter has been modified (if necessary) as described in the preceding paragraph. Select one of the four modification ("A" thru "D") below which meets the desired power limitations. Modify the power supply (Model 4EP38A10) as specified.

	PA POWER OUTPUT LIMIT	MODIFICATION OF POWER SUPPLY	TYPICAL PA PLATE VOLTAGE	MAX. PA PLATE POWER INPUT	MAX. EFFI-CIENCY
A	65 watts	Interchange white wire at TB8-3 and green wire at H4 (on board A501).	467 VDC	109 watts	60%
B	40-58 watts	a) Remove jumper from TB8-4 to TB8-5. b) Add jumper from TB8-3 to TB8-5. c) Remove jumper from TB7-3 to TB7-4. d) Add jumper from TB7-2 to TB7-3.	415-435 VDC	101 watts	60%
C	35-40 watts	Remove fuse F502.	297-300	70 watts	60%
D	30-38 watts	a) Remove fuse F502 b) Remove jumper from TB7-3 to TB7-4. c) Add jumper from TB7-2 to TB7-3.	275-280 VDC	65 watts	60%

* Modification "A" is required for operation under Part 93 (Land Transportation Radio Services) of FCC rules. If Option 7044 is ordered, this modification is made prior to shipment from the factory.

Transmitter Alignment Procedure

To tune the modified transmitter, follow the standard Alignment procedure, but adjust the ANT COUPLING control by one of the two following methods:

CAUTION -- Do not allow the PA PLATE reading to exceed 0.7 volts.

Method 1 - Measure the power output directly, using an RF wattmeter, and adjust the ANT COUPLING control for the required power output.

Method 2 - The efficiency of the power amplifier in the modified transmitter will vary from about 47% to 60%. Use the highest anticipated efficiency (60%) and adjust the ANT COUPLING control for the following PA PLATE reading:

$$\text{"PA PLATE" reading} = \frac{3 \times \text{desired power output}}{\text{efficiency} \times \text{PA plate voltage}}$$

Follow the standard transmitter Alignment Procedure for measuring the PA PLATE voltage.

MOBILE APPLICATIONS

The mobile transmitter with a type EP-37-A power supply may be operated at reduced power (120-watt plate input limitation) as required by Part 93 (Land Transportation Radio Services) and Part 21 (Domestic Public Radio Services) of FCC rules by using the following procedure.

Transmitter Modification (Required only on Models 4ET58A10-15 and 4ET58B10-15 prior to REV. B and Models 4ET58A16-21 prior to REV. D)

Remove the transmitter's 3.9K-ohm PA screen resistor R7 on component board A119. In its place, connect two 8.2K-ohm, 2-watt resistors in parallel.

PA. Plate Power Input Reduction

Reduce the PA plate Power input by decreasing the antenna coupling. While alternately metering the PA plate voltage and PA plate current, adjust the ANT COUPLING control to obtain the appropriate plate voltage and plate current indication as shown in Figure 2.

NOTE

Meter the PA plate voltage with GE Test Set 4EX3A10 in position G, using the 1000-volt scale (or with a multimeter connected across J102-1 and -16). Meter the PA plate current indication with GE Test Set in position G, using the TEST 1 scale (or with a multimeter connected across J102-1 and -9).

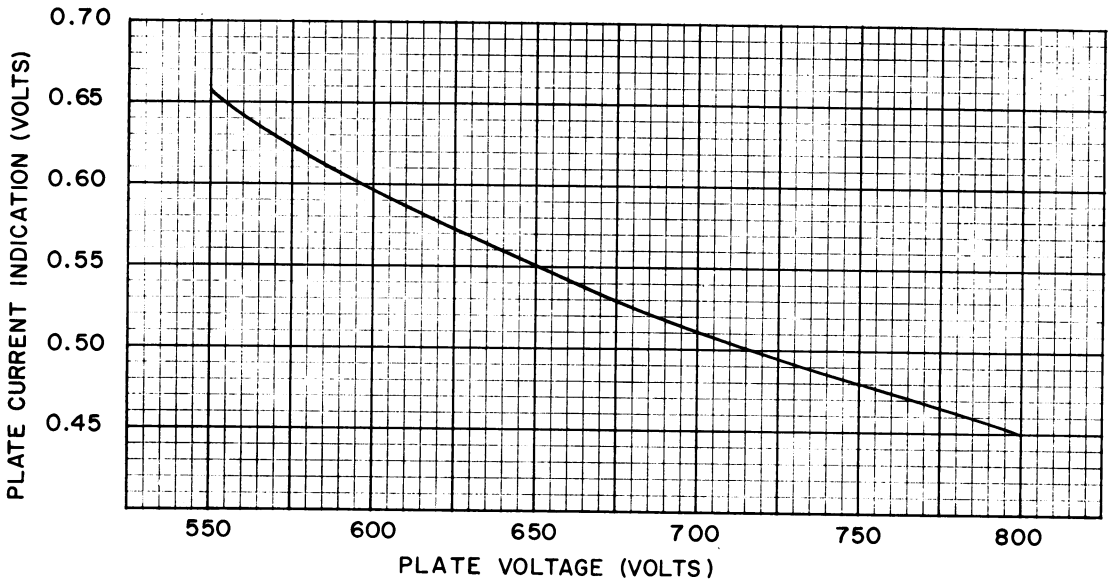


Figure 2 - 120-watt PA Plate Input Loading Curve

TYPICAL OPERATION

RF Power Output	60 Watts
PA Plate Voltage	700 Volts
PA Plate Current	170 MA
PA Plate Current Indication	0.51 Volts
PA Plate Power Input	120 Watts
Efficiency	50%

MAINTENANCE

DISASSEMBLY

To service the transmitter from the top —

1. Pull locking handle down and pull radio about one inch out of mounting frame.
2. Pry up cover at rear of transmitter.
3. Slide cover back and lift off.

To service the transmitter from the bottom —

1. Pull locking handle down and pull radio out of mounting frame.
2. Remove the two screws in bottom cover, and pry up at back of transmitter.
3. Slide cover back and lift off.

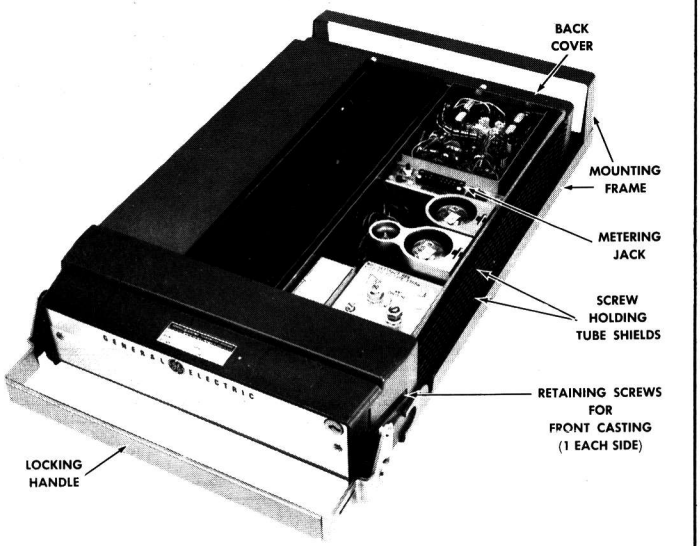


Figure 3 - Top Cover Removed

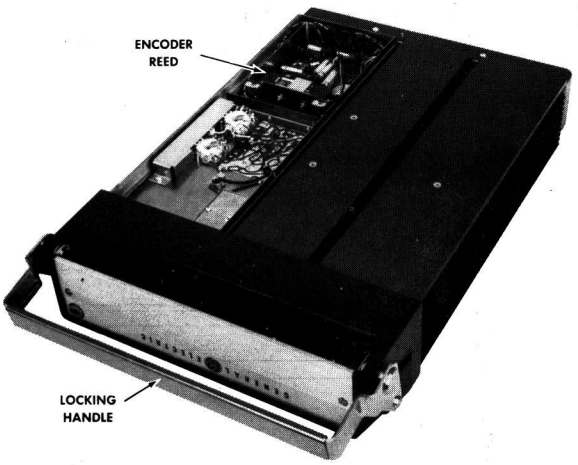


Figure 4 - Bottom Cover Removed

NOTE

The tube shields for the 80-watt transmitter are spring-loaded, and can be pulled off of the tube.

To remove transmitter from system frame —

1. Loosen the two retaining screws in the front casting (see Figure 2) and pull casting away from the system frame.
2. Remove the four screws in the back cover.
3. Remove the two screws holding the transmitter at each end of the system frame.
4. Disconnect the antenna jack in front of the transmitter and the 20-pin feed-thru connector at the back of the transmitter, and slide the unit out of the system frame.

MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R12) was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the average voice level. The audio peaks which would cause overmodulation are clipped by the modulation limiter. The limiter, in conjunction with the de-emphasis network, instantaneously limits the slope of the audio wave to the modulator, thereby preventing overmodulation while preserving intelligibility.

TEST EQUIPMENT

1. An audio oscillator
2. A frequency modulation monitor
3. An output meter or a VTVM
4. GE Test Set, Model 4EX3A1

PROCEDURE

1. Connect the audio oscillator and the meter across audio input terminals J5 (Green-Hi) and J6 (Black-Lo) on GE Test Set or across J1 (Mike High) and J2 (Mike Low) on the Exciter Board.
2. Apply a 1.0-volt signal at 1000 Hz to Test Set or across J1 and J2 on Exciter Board.
3. For transmitters without Channel Guard, set the MOD ADJUST (R12) for a 4.5-kilohertz swing (13.5 KHz) for wide band) with the deviation polarity which gives the highest reading as indicated on the frequency modulation monitor.
4. For transmitters with Channel Guard, set the Channel Guard MOD ADJUST (R34) for 0.75 KHz tone deviation. Then repeak L1/L2 and L3/L4 as shown in Step 1 of Transmitter Alignment Procedure. Reset tone deviation to 0.75 KHz deviation. Remove the tone to the transmitter by unplugging leads to J7 and J8 on Exciter Board, or by switching to a non-Channel Guard frequency in multifrequency units. Next, apply a 1.0 volt signal at 1000 Hz and set MOD ADJUST (R12) for 3.75 KHz deviation (4.5 KHz minus 0.75-KHz tone deviation).
5. For multi-frequency transmitters, set the deviation as described in Steps 3 or 4 on the channel producing the largest amount of deviation.

PLATE POWER INPUT

For FCC purposes, the PA Plate power input can be determined by measuring the PA Plate voltage and the plate current indication, and using the following formula:

$$\text{ET-58-A \& B:}\quad P_i = \frac{\text{Plate Voltage} \times \text{Plate Current Indication}}{3.0}$$

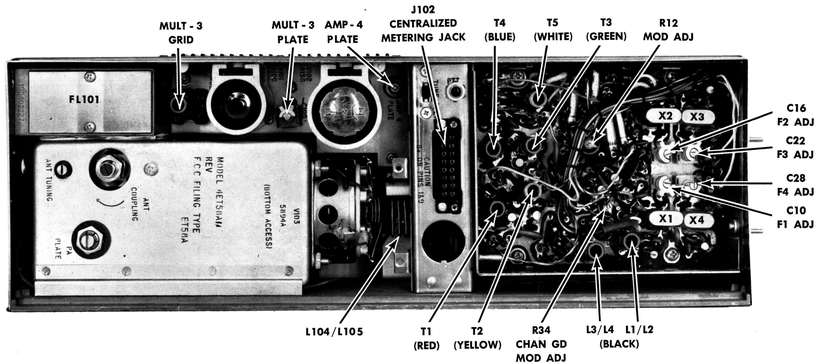
Where:

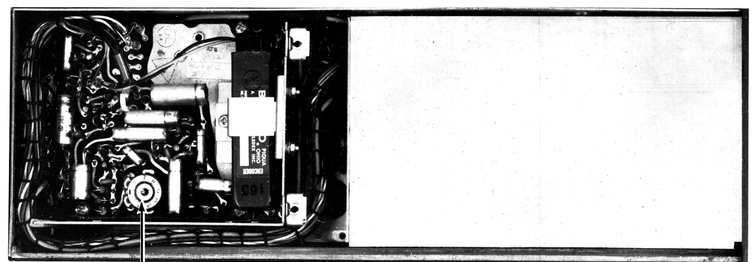
P_i is the power input in watts.

Plate voltage is measured with GE Test Set in position G, using the 1000-volt scale (or measured from J102-1 to -16 with multimeter).

Plate current indication is measured with GE Test Set in Position G, using the TEST 1 scale (or measured from J102-1 to -9 with multimeter).

3.0 is the value of the plate current metering resistor in ohms.





TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. General Electric Centralized Metering Test Set Model 4EX3A10 or a 20,000 ohms-per-volt Multimeter with a 1-volt scale.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Place crystal (operating frequency ÷ 12) in crystal socket XY1.
2. Set crystal trimmer C10 to mid-capacity. If multi-frequency transmitter, set all trimmers to mid-capacity and tune transmitter on channel with the highest frequency (except for Step 12).
3. Place the TUNE-OPERATE switch (S102) in the TUNE position.
4. Connect Test Set Model 4EX3A10 to the Transmitter Centralized Metering Jack J102. If using Multimeter, connect the positive lead to J102-16 (Ground) except for Steps 6 through 16.
5. For a large change in frequency or a badly misaligned transmitter, se: the slugs in the Exciter coils at the bottom of the coil form, and the slug of MULT-3 GRID (Z101/Z102) at the top of the coil form.
6. All adjustments are made with the transmitter keyed.

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter - at J102	TUNING CONTROL	TYPICAL METER READING	PROCEDURE
			EXCITER BOARD		
1.	A (MULT-1)	Pin 10	L1/L2 (and L3/L4 with Channel Guard)	0.8 v (0.5 v Minimum)	Tuning the modulator is a critical adjustment. Carefully tune L1/L2 for maximum meter reading. For channel guard or wideband transmitters, alternately tune L1/L2 and L3/L4 for maximum meter reading.
2.	A (MULT-1)	Pin 10	T1	See Procedure	Tune T1 for a small peak in meter reading (not required unless changing frequency).
3.	B (MULT-2)	Pin 2	T2, T1 and T3	0.65 v (0.5 v Minimum	Tune T2 and then T1 for maximum meter reading. Then tune T3 for minimum meter reading (not required unless changing frequency).
4.	C (AMPL-3)	Pin 3	T4, T3 and T5	0.6 v (0.5 v Minimum	Tune T4 and then T3 for a maximum meter reading. Then tune T5 for minimum meter reading (not required unless changing frequency).
			MULT-3 AND POWER AMPLIFIER		
5.	D (MULT-3)	Pin 4	MULT-3 GRID (Z101/Z102)	0.6 v (0.45 v Minimum)	Tune MULT-3 GRID for maximum meter reading.
6.	E (AMPL-4)	Pin 5	MULT-3 PLATE (C106)	0.55 v (0.45 v Minimum)	Tune MULT-3 PLATE for maximum meter reading.
7.	F (PA GRID)	Pin 14(+) and Pin 6 (-)	AMPL-4 PLATE (C111) and L104/L105	1.0 v Maximum (0.65 v Minimum)	Alternately tune AMPL-4 PLATE and adjust interstage coupling (L104/L105) for maximum meter reading (not over 1 volt). ——— NOTE ——— Adjusting L104/L105 may not be required if there is no change in frequency. If adjustment is required, bend the mounting leads on L104/L105 to pivot the coil.
8.					Rotate ANT COUPLING fully counterclockwise.
9.	G (PA PLATE)	WARNING High B-plus on Pins 1 and 9.		Minimum	Carefully tune PA PLATE for minimum meter reading.
		Pin 1(+) and Pin 9(-)	PA PLATE (C112)		
10.					Place S102 (TUNE-OPERATE) switch in OPERATE position.
11.	G (PA PLATE)	Pin 1(+) and Pin 9(-)	ANT COUPLING	Minimum	Adjust ANT COUPLING clockwise for minimum meter reading.

FOR SINGLE-FREQUENCY TRANSMITTERS

12.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)	PA PLATE (C112)	Minimum	Tune C112 (PA PLATE) for minimum meter reading.
13.	"	"	ANT TUNING and ANT COUPLING	0.55 v	Alternately tune ANT TUNING for maximum meter reading, and adjust ANT COUPLING clockwise for a meter reading of 0.55 volts.
14.	"	"	PA PLATE (C112)	Minimum	Retune PA PLATE for a minimum meter reading.
15.	"	"	ANT COUPLING	0.7 v	Adjust ANT COUPLING for a meter reading of 0.7 volts.
16.	F (PA GRID)	"	AMP-4 PLATE (C111)	Maximum	Retune AMP-4 PLATE for maximum meter reading.
			FREQUENCY ADJUSTMENT		
17.					With no modulation, adjust crystal trimmer C10 (or C16, C22, C28 as required) for proper oscillator frequency. Next, refer to the MODULATION ADJUSTMENT. ——— NOTE ——— For proper frequency control of the transmitter, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approx. 75° F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90° F.

FOR MULTI-FREQUENCY TRANSMITTERS

12.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)	PA PLATE (C112)	Minimum	Switch to the lowest frequency and tune PA PLATE for minimum meter reading.
13.	"	"	ANT TUNING (C114) and ANT COUPLING	0.7 v	Switch back to the highest frequency. Alternately tune ANT TUNING and adjust ANT COUPLING clockwise for a meter reading of 0.7 volts.
14.	E (AMPL-4)	Pin 5	MULT-3 PLATE (C106)	Maximum	Tune MULT-3 PLATE for maximum meter reading.
15.	F (PA GRID)	Pin 14 (+) and Pin 6 (-)	AMP-4 PLATE (C111)	Maximum	Tune AMP-4 PLATE for maximum meter reading
16.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)		0.7 v Minimum	The PA PLATE reading should be approximately 0.7 volts on both frequencies. AMP-4 PLATE may be retuned slightly until this reading is obtained.
			FREQUENCY ADJUSTMENT		
17.					With no modulation, adjust crystal trimmers C10 (C16, C22, or C28 as required) for proper oscillator frequency. Next, refer to the MODULATION ADJUSTMENT. ——— NOTE ——— For proper frequency control of the transmitter, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approx. 75° F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90° F.

ALIGNMENT PROCEDURE

132 — 174 MHZ, 80-WATT MASTR TRANSMITTER
MODELS 4ET58A10-21 & 4ET58B10-15

TEST PROCEDURES

These Test Procedures are designed to assist you in servicing a transmitter that is operating--but not properly. Problems encountered could be low power output, low B plus, tone and voice deviation, defective audio sensitivity and modulation adjust control set too high. By following the sequence of test steps starting with Step 1, the defect can be quickly localized. Once a defect is pin-pointed, refer to the "Service Check" and the additional corrective measures included in the Transmitter Troubleshooting Procedure. Before starting with the Transmitter Test Procedures, be sure the transmitter is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

for test hookup as shown:

1. Wattmeter similar to:
   - Bird #43
   - Jones #711N
2. VTVM similar to:
   - Triplett #850
   - Heath #1M-21
3. Audio Generator similar to:
   - GE Model 4EX6A10 or
   - Heath #1G-72
4. Deviation Meter (with a .75 KHz scale) similar to:
   - Measurements #140
   - Lampkin #205A
5. Multipmeter similar to:

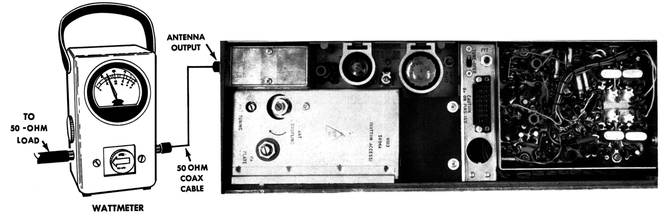
   GE METERING TEST SET MODEL 4EX3A10 or
   Triplett #631 or
   20,000 ohms-per-volt voltmeter

STEP 1

POWER MEASUREMENT

TEST PROCEDURE

1. Connect transmitter output to wattmeter as shown below:



2. Key transmitter and check wattmeter for minimum reading of 80 watts.

SERVICE CHECK

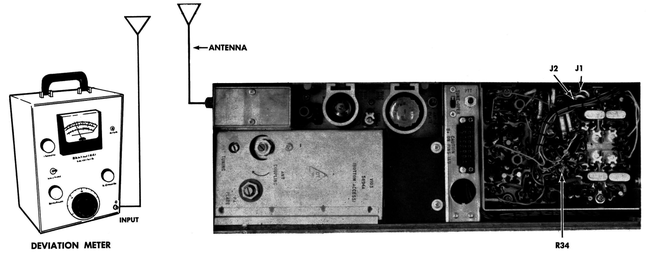
Refer to Service Hints on Transmitter Troubleshooting Procedure.

STEP 2

TONE DEVIATION WITH CHANNEL GUARD

TEST PROCEDURE

1. Setup Deviation Meter and monitor output of transmitter as shown below:



2. Unplug the MIC HI terminal from J1 on Transmitter Exciter Board.
3. Key transmitter and check for 0.75 KHz deviation. If reading is low or high, adjust Channel Guard MOD ADJUST (R34) for a reading of 0.75 KHz.

NOTES:

The Channel Guard MOD ADJUST (R34) may be adjusted for deviations up to 0.80 KHz for tone frequencies from 71.9 Hz to 82.5 Hz and deviations up to 1.0 KHz for all tone frequencies above 82.5 Hz.

DEVIATION METER

NOTES:

1. On units supplied with Channel Guard, the Phase Modulator Tuning should be peaked carefully to insure proper performance. (Refer to Steps 1 and 2 in the Transmitter Alignment Chart).
2. The tone Deviation Test Procedures should be repeated everytime the Tone Frequency is changed.

SERVICE CHECK

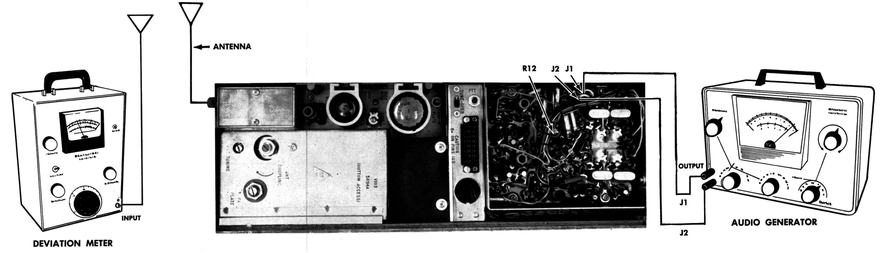
If the 0.75 KHz deviation is not obtainable when adjusting R34, replace the Tone Transmitter reed.

STEP 3

VOICE DEVIATION AND SYMMETRY

TEST PROCEDURE

1. Unplug the High and Low Mike leads from the Exciter Board Jacks J1 and J2.
2. Connect test equipment to transmitter as shown below:



3. Set the generator output to 1.0 VOLTS RMS and frequency to 1 KHz.
4. Key the transmitter and adjust Deviation Meter to carrier frequency
5. Deviation reading should be ±4.5 KHz. (±13.5 KHz wide band).
6. Adjust "Modulation Adjust Control" R12 until deviation reads 4.5 KHz (13.5 KHz wide band) on plus (+) or minus (-) deviation, whichever is greater. This adjustment should be made with the correct level of tone applied on Channel Guard transmitters.

DEVIATION METER

NOTES: --MASTR transmitters are adjusted for 4.5 KHz (13.5 KHz wide band) deviation at the factory. The factory adjustment will prevent the transmitter from deviating more than 5.0 KHz (15 KHz wide band) under the worst conditions of frequency, voltage and temperature.

If the deviation reading plus (+) and minus (-) differs by more than 0.5 KHz, (1.5 KHz wide band) check the following:

1. Recheck Step 1 as shown in the Transmitter Alignment Chart.
2. Check Audio Sensitivity by reducing generator output until deviation falls to 3.3 KHz (10 KHz wide band). Voltage should be LESS than 90 millivolts.

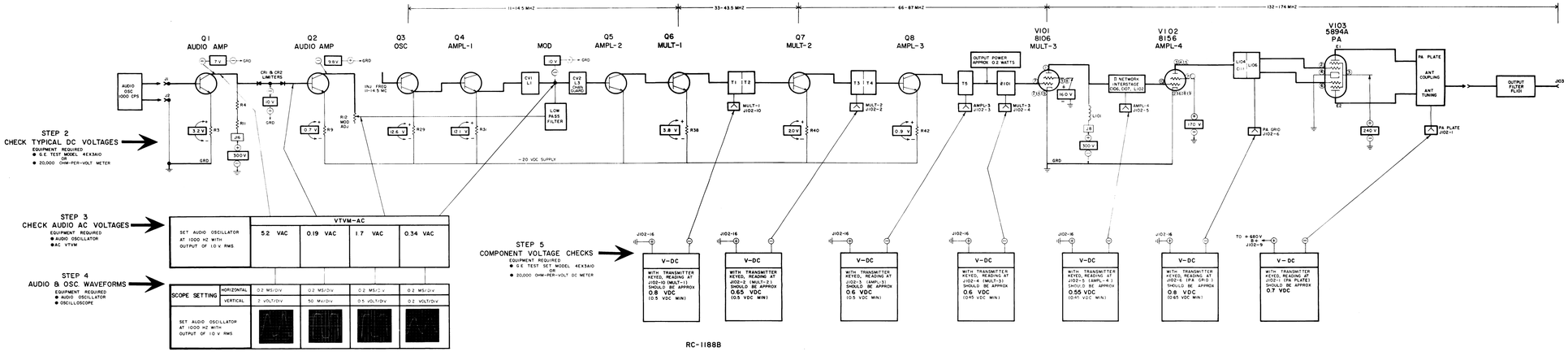
METER

STEP 1 — QUICK CHECKS

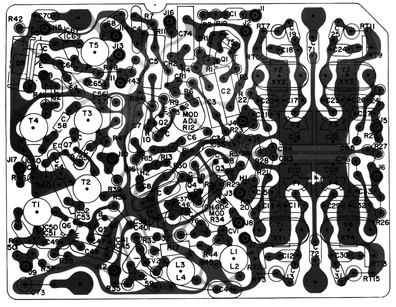
POWER OUTPUT	CHECK VOLTAGES AT CENTRALIZED METERING JACK J102 Multimeter- pin numbers GE Test Set- A-G positions							PROBABLE DEFECT
	Pins 10 & 16 A	Pins 2 & 16 B	Pins 3 & 16 C	Pins 4 & 16 D	Pins 5 & 16 E	Pins 6 & 14 F	Pins 1 & 9 G	
Low	0.8 v	0.65 v	0.6 v	0.6 v	0.55 v	Low	0.7 v	Weak 5894A or Loose Hardware in output tank circuit, or bad filter.
0	0.8 v	0.65 v	0.6 v	0.6 v	0.55 v	.37 v	0	Open 5894A
Low	0.8 v	0.65 v	0.6 v	0.6 v	0.55 v	Low	0.7 v	Weak 8156
0	0.8 v	0.65 v	0.6 v	0.6 v	.37 v	.37 v	0	Open Filament on 8156
0	0.8 v	0.65 v	Low	.18 v	.37 v	.37 v	0	Open Filament on 8106
0	0.8 v	0.65 v	0 or over 1.0 v	.18 v	.37 v	.37 v	0	Defective Q8
0	0.8 v	0 or over 1.0 v	0	.18 v	.77 v	.37 v	0	Defective Q7
0	over 1.2 v	0	0	.18 v	.37 v	.37 v	0	Shorted Q6 or Open Q5
0	0	0	0	.18 v	.37 v	.37 v	0	Defective Q3-Q6 or Modulator (see Note A)

NOTE A --- Localize trouble by checking:--

1.	-20 volt DC supply at J102-12-16.
2.	Measure 12.1 VDC across Q4 emitter resistor R31 (1500 ohms), then:
(a)	Remove crystal- a slight variation in R31 voltage reading indicates Q3 and Q4 stages operating properly.
(b)	If no voltage is measured, check keying leads CR3-CR6, Q3, Q4.
(c)	With crystal removed, short Q5 base to emitter. A voltage reading above 1.0 volt indicates Q5 and Q6 are operating properly. Defect may be in Modulator.
(d)	If modulator is defective, check voltage variable diodes CV1 and CV2.

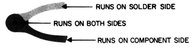


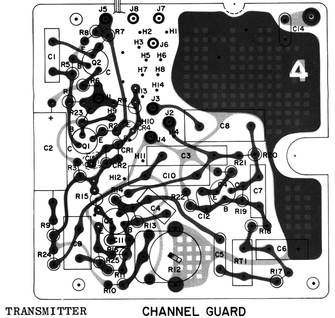
EXCITER
A101-A112



TO CHANNEL GUARD REED

(19C303483, Sh. 1, Rev. 4)
(19C303483, Sh. 2, Rev. 4)





EXCITER READINGS TAKEN TO CHASSIS GROUND						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	−	+	−	+
Q1	6.5K	6.8K	240K	12K	50K	20K
Q2	6.2K	14K	70K	10K	9.8K	12K
Q3	9K	2.7K	9K	2.7K	100	100
Q4	7K	5K	5K	2.7K	100	100
Q5	5K	2.7K	70K	6.8K	3.7K	2.3K
Q6	14K	3.2K	3.7K	2.3K	175	175
Q7	5.3K	2.2K	5K	2.7K	165	165
Q8	5K	2.7K	5K	2.7K	67	67

EXCITER READINGS TAKEN TO -20 VOLT LINE (J15 BLUE LEAD)						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	−	+	−	+
Q1	11K	14K	240K	30K	60K	85K
Q2	1K	1K	70K	14.3K	14K	18K
Q3	2.6K	2.7K	10K	1.5K	2.7K	15.1K
Q4	1.5K	1.5K	2.6K	2.5K	2.7K	5.1K
Q5	0	0	70K	3.2K	8.2K	3.8K
Q6	340	300	84	3.8K	3K	15.1K
Q7	60	180	0	0	2.3K	5.5K
Q8	27	27	67	47	2.6K	5K

RESISTANCE READINGS

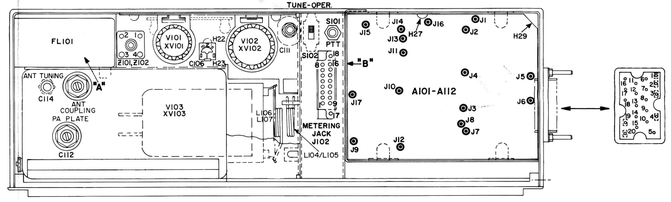
ALL READINGS ARE TYPICAL READINGS MEASURED WITH A 20,000 OHM-PER-VOLT METER AND J101 DISCONNECTED. + OR − SIGNS SHOW METER LEAD GROUNDED.

FOR READINGS OF:	USE SCALE:
1-100Ω	X 1
100-1KΩ	X 10
1K-50KΩ	X 1,000
50-∞Ω	X 100,000

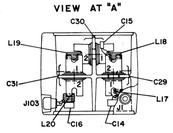
CHANNEL GUARD READINGS MEASURED TO CHASSIS GROUND						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+	−	+	−	+	−
Q1	∞	∞	∞	∞	∞	∞
Q2	∞	∞	∞	∞	∞	∞
Q3	2.7K	4.9K	9.5K	30K	8.4K	7.5K
Q4	2.7K	4.9K	5K	2K4	2.5K	7.5K

CHANNEL GUARD READINGS MEASURED TO −10 VOLT LINE (J5 ORANGE LEAD)						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+	−	+	−	+	−
Q1	200	200	9K	14K	2.7K	25K
Q2	1.3K	1.3K	2.4K	6.3K	15K	8.7K
Q3	∞	∞	∞	∞	∞	∞
Q4	∞	∞	∞	∞	∞	∞

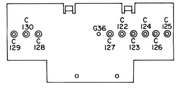
TOP VIEW



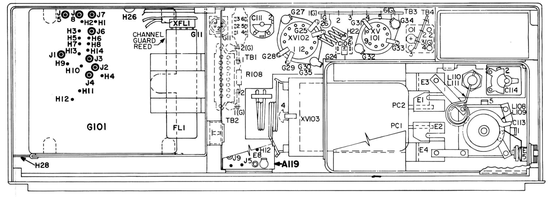
VIEW AT "A"



VIEW AT "B"



BOTTOM VIEW



READINGS TAKEN FROM TUBE SOCKET PINS TO CHASSIS GROUND

PIN	1	2	3	4	5	6	7	8	9	10	11	12
XV101	550K	0	583K	0	1.4Ω	0	30K	583K	0			
XV102	0	0	550K	550K	550K	0	83K	0	0	60K	83K	1.4Ω
XV103	1.4Ω	50K	550K	0	0.9Ω	50K	0					

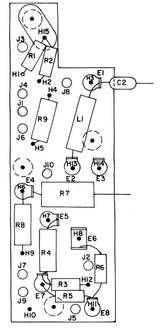
(19B620739, Rev. 7)

READINGS AT J101 TAKEN TO CHASSIS GROUND.

PIN	−	+
1	0	0
2	∞	∞
3	1.4Ω	1.4Ω
4	550K	500K
5	∞	∞
6	∞	∞
7	∞	∞
8	50K	50K
9	∞	∞
10	∞	∞
11	∞	∞
12	0/30K	0/15K
13	∞	∞
* 14	∞	∞
15	49K	27K
16	∞/30K	∞/15K
17	∞/30K	∞/15K
* 18	∞/30K	∞/15K
* 19	0	0
* 20	∞	∞

* 1ST READING FOR SINGLE FREQ. 2ND READING FOR MULTI-FREQ.

A119



OUTLINE DIAGRAM

132 — 174 MHZ, 80-WATT MASTR TRANSMITTER
MODELS 4ET58A10-21 & 4ET58B10-15

(19C303456, Sh. 1, Rev. 4)
(19C303456, Sh. 2, Rev. 4)

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART

MODEL NO.	REV	FREQ RANGE	NO. OF FREQ	CHAN GD	
4ET58A10	D	132-150.8 MC	1		
4ET58A11	D	150.8-174 MC	1		
4ET58A12	D	132-150.8 MC	2		
4ET58A13	D	150.8-174 MC	2		
4ET58A14	D	132-150.8 MC	4		
4ET58A15	D	150.8-174 MC	4		
4ET58A16	H	132-150.8 MC	1	X	
4ET58A17	H	150.8-174 MC	1	X	
4ET58A18	H	132-150.8 MC	2	X	
4ET58A19	H	150.8-174 MC	2	X	
4ET58A20	H	132-150.8 MC	4	X	
4ET58A21	H	150.8-174 MC	4	X	

■ USED WITH CHAN GD ONLY
◓ USED WITH WIDE BAND ONLY
● USED WITH 132-150.8 MC ONLY
▲ USED WITH 150.8-174 MC ONLY

NOTE:

1. ALL WIRES N22 UNLESS OTHERWISE SPECIFIED.
2. CONNECT TO PIN 6 ON GROUPS 16,17
   CONNECT TO PIN 14 ON GROUPS 18,19,20,21

MODEL NO.	REV	FREQ RANGE	NO. OF FREQ
4ET58B10	D	132-150.8 MC	1
4ET58B11	D	150.8-174 MC	1
4ET58B12	D	132-150.8 MC	2
4ET58B13	D	150.8-174 MC	2
4ET58B14	D	132-150.8 MC	4
4ET58B15	D	150.8-174 MC	4

(19B620724, Rev. 26)

SCHEMATIC DIAGRAM

132 — 174 MHZ, 80-WATT MASTR TRANSMITTER
MODELS 4et58A10-21 & 4ET58B10-15

PARTS LIST

LBI-3534D

132-174 MHz TRANSMITTER
MODELS 4ET58A10 - 4ET58A21 and 4ET58B10 - 4ET58B15

4ET58A10 - 15 (PL-19E500811-G10 - 15) STANDARD
4ET58A16 - 21 (PL-19E500811-G16 - 21) CHANNEL GUARD
4ET58B10 - 15 (PL-19E500811-G28 - 33)

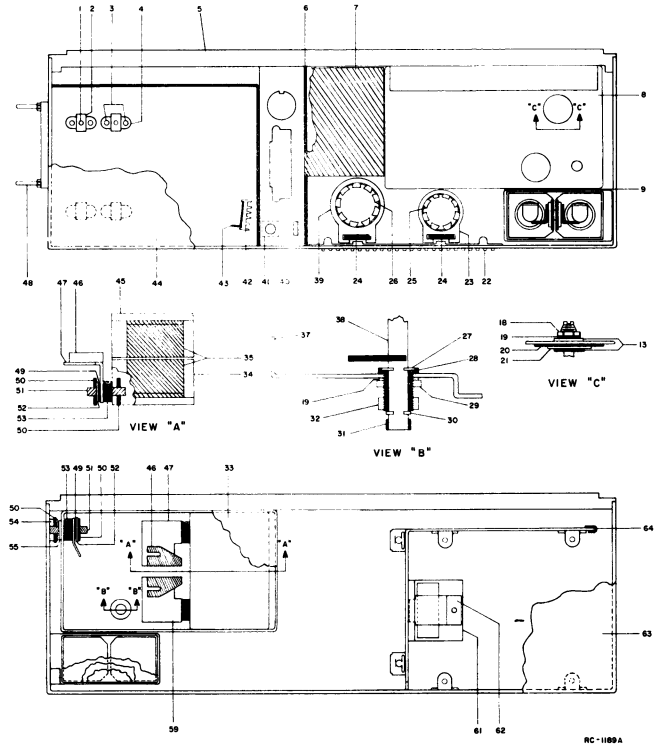
SYMBOL	G-E PART NO.	DESCRIPTION
A101 thru A112 A121 thru A126		EXCITER BOARD ASSEMBLY A101 Model 4ET58A10 PL-19D402308-G1 A102 Model 4ET58A11 PL-19D402308-G1 A103 Model 4ET58A12 PL-19D402308-G3 A104 Model 4ET58A13 PL-19D402308-G4 A105 Model 4ET58A14 PL-19D402308-G5 A106 Model 4ET58A15 PL-19D402308-G6 A107 Model 4ET58A16 PL-19D402308-G7 A108 Model 4ET58A17 PL-19D402308-G8 A109 Model 4ET58A18 PL-19D402308-G9 A110 Model 4ET58A19 PL-19D402308-G10 A111 Model 4ET58A20 PL-19D402308-G11 A112 Model 4ET58A21 PL-19D402308-G12 A121 Model 4ET58B10 PL-19D402308-G13 A122 Model 4ET58B11 PL-19D402308-G14 A123 Model 4ET58B12 PL-19D402308-G15 A124 Model 4ET58B13 PL-19D402308-G16 A125 Model 4ET58B14 PL-19D402308-G17 A126 Model 4ET58B15 PL-19D402308-G18
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5491189-P302	Polyester: .022 µf ±5%, 50 VDCW; sim to Good-All Type 601PE.
C2*	19B209243-P4	Polyester: .033 µf ±20%, 40 VDCW.
	19B209243-P3	In Models 4ET58A10-15 and 4ET58B10-15 of Rev B and earlier and in Models 4ET58A16-21 of Rev D and earlier. Polyester: .022 µf ±20%, 40 VDCW; sim to Amperex C280AA/P22K.
C3	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW; sim to Amperex C280AA/P100K.
C4	7491395-P114	Ceramic disc: .0022 µf ±10%, 500 VDCW.
C5	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW; sim to Amperex C280AA/P100K.
C6	19B209243-P5	Polyester: .047 µf ±20%, 40 VDCW; sim to Amperex C280AA/P47K.
C7*	7491395-P111	Ceramic disc: .0015 µf ±10%, 500 VDCW; sim to RMC Type JL. In Models 4ET58A10-15 and B10-15 of REV. C and earlier: In Models 4ET58A16-21 of REV. G and earlier:
	7491395-P114	Ceramic disc: .0022 µf ±10%, 500 VDCW.
C8*	5493367-P1000K	Silver mica: .001 µf ±10%, 100 VDCW, sim to Electro Motive Type DM-20. Added to 4ET58A10-15 and B10-15 by REV. D; Added to 4ET58A16-21 by REV. H.
C9*	5493367-P1500K	Silver mica: .0015 µf ±10%, 100 VDCW; sim to Electro Motive Type DM-20. Deleted in 4ET58A10-15 and B10-15 by REV. D; deleted in 4ET58A16-21 by REV. H.
C10	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C11	5496219-P7	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C12 and C13	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C14	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C15	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C16	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C17	5496219-P7	Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C18 and C19	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C20	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C21	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C22	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C23	5496219-P7	Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C24 and C25	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C26	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C27	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C28	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C29	5496219-P7	Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C30 and C31	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C32	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C33	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C34	5496372-P50	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -2200 PPM.
C35	5496372-P54	Ceramic disc: 270 pf ±5%, 500 VDCW, temp coef -2200 PPM.
C36	5496219-P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C37	5496372-P327	Ceramic disc: 75 pf ±10%, 500 VDCW, temp coef -4700 PPM.
C38	5494481-P120	Ceramic disc: .006 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C39	5496372-P145	Ceramic disc: 180 pf ±10%, 500 VDCW, temp coef -3300 PPM.
C40	5496372-P345	Ceramic disc: 180 pf ±10%, 500 VDCW, temp coef -4700 PPM.
C41	5490008-P133	Silver mica: 180 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C44	5493366-P470J	Silver mica: 470 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C45	5496372-P45	Ceramic disc: 180 pf ±10%, 500 VDCW, temp coef -2200 PPM.
C46	5496372-P347	Ceramic disc: 200 pf ±10%, 500 VDCW, temp coef -4700 PPM.
C47	5496219-P749	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -750 PPM.
C48	5494481-P118	Ceramic disc: .004 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C49	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C50	5496219-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C51	5496219-P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C52	5496219-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C53	5496219-P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C54 and C55	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C56	5496219-P440	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef -220 PPM.
C57	5496219-P343	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -150 PPM.
C58	5491601-P35	Tubular: 0.15 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C59	5493366-P220K	Silver mica: 220 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C60	5496219-P241	Ceramic disc: 10 pf ±5%, 500 VDCW, temp coef -80 PPM.
C61	5496219-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C62	5496219-P51	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef 0 PPM.
C64	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C65	5496219-P35	Ceramic disc: 4 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C66	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C67	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C68	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C69	5496219-P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
C70 thru C72	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C73*	5496267-P18	Tubular: 6.8 µf ±20%, 35 VDCW.
	19B209243-P7	In Models earlier than Rev C. Polyester: 0.1 µf ±20%, 40 VDCW; sim to Amperex C280AA/P100K.
C74	19A115414-P13	Tubular, polyester: 0.1 µf ±20%, 200 VDCW.
C75	5494481-P108	Ceramic disc: 470 pf ±10%, 500 VDCW; sim to RM Type JF Discap.
C76	5490008-P143	Silver mica: 470 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-15.
C77*	5493366-P270K	Silver mica: 270 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15. Added to 4ET58A10-15 and B10-15 by REV. D; added to 4ET58A16-21.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115331-P1	Silicon.
CR3 thru CR6	19A115348-P1	Silicon.
CV1 and CV2	5495769-P8	Silicon, capacitive.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	PL-19B204526-G2	Coil. Includes tuning slug 5491798-P2.
L2	PL-19B204526-G1	Coil. Includes tuning slug 5491798-P2.
L3	PL-19B204526-G4	Coil. Includes tuning slug 5491798-P2.
R1	3R152-P333J	Composition: 33,000 ohms ±5%, 1/4 w.
L4	PL-19B204526-G3	Coil. Includes tuning slug 5491798-P2.
R1	3R152-P333J	Composition: 33,000 ohms ±5%, 1/4 w.
L5	7488079-P48	Choke, RF: 27 µh ±10%, 1.4 ohms DC res; sim to Jeffers 4422-9.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q3 thru Q5	19A115330-P1	Silicon, NPN.
Q6 and Q7	19A115328-P1	Silicon, NPN.
Q8	19A115329-P1	Silicon, NPN.
Q9	19A115362-P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R2	3R77-P105K	Composition: 1 megohm ±10%, 1/2 w.
R3*	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
	3R77-P682K	In Models 4ET58A10-15 and 4ET58B10-15 of Rev B and earlier: In Models 4ET58A16-21 of Rev D and earlier: Composition: 6800 ohms ±10%, 1/2 w.
R4	3R77-P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R5	3R77-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R6	3R77-P684J	Composition: 0.68 megohm ±5%, 1/2 w.
R7	3R77-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R8	3R77-P823J	Composition: 82,000 ohms ±5%, 1/2 w.
R9	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R10	3R77-P274J	Composition: 0.27 megohm ±5%, 1/2 w.
R11	3R77-P274K	Composition: 0.27 megohm ±10%, 1/2 w.
R12	19B201969-P6	Variable, carbon film: .01 megohm ±20%, 0.1 w, sim to Centralab Series 4.
R13 and R14	3R77-P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R15*	3R77-P333K	Composition: 33,000 ohms ±10%, ½w. In Models 4ET58A10-15 and B10-15 of REV. C earlier: In Models 4ET58A16-21 of REV. G and earlier.
	3R77-P393K	Composition: 62 ohms ±10%, ½w.
R16*	3R77-P683K	Composition: 68,000 ohms ±10%, ½ w. In Models 4ET58A10-15 and B10-15 of REV. C and earlier: In Models 4ET58A16-21 of REV. G and earlier:
	3R77-P433K	Composition: 24,00 ohms ±10% ½w.
R17*	3R77-P823K	Composition: 82,000 ohms ±10%, ½w. In Models 4ET58A10-15 and B10-15 of REV. C and earlier: In Models 4ET58A16-21 of REV. G and earlier:
	3R77-P332K	Composition: 15,000 ohms ±10%, ½w.
R18	3R77-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R19	3R77-P222K	Composition: 2200 ohms ±10%, 1/2 w.
R20	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R21	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R22	3R77-P682K	Composition: 6800 ohms ±10%, 1/2 w.
R23	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R24	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R25	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R26	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R27	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R28	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R29	3R77-P272J	Composition: 2700 ohms ±5%, 1/2 w.
R30	3R77-P101J	Composition: 100 ohms ±5%, 1/2 w.
R31	3R77-P152K	Composition: 1500 ohms ±10%, 1/2 w.
R32 and R33	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R34*	19B201969-P7	Variable, carbon film: 25,000 ohms ±20%, 0.1 w. (Used in Models 4ET58A16-21).
	19B201969-P6	In Models 4ET58A16-21 earlier than Rev A: Variable, carbon film: .01 megohm ±20%, 0.1 w; sim to Centralab Series 4.
R35	3R77-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R36	3R77-P392K	Composition: 3900 ohms ±10%, 1/2 w.
R37	3R77-P750J	Composition: 75 ohms ±5%, 1/2 w.
R38	3R77-P391J	Composition: 390 ohms ±5%, 1/2 w.
R39	3R77-P620J	Composition: 62 ohms ±5%, 1/2 w.
R40	3R77-P181J	Composition: 180 ohms ±5%, 1/2 w.
R41	3R77-P470J	Composition: 47 ohms ±5%, 1/2 w.
R42	3R77-P270J	Composition: 27 ohms ±5%, 1/2 w.
R43	3R77-P200J	Composition: 20 ohms ±5%, 1/2 w.
R44	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R45	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R46	5495948-P474	Deposited carbon: 576,000 ohms ±1%, 1/2 w; sim to Texas Instruments Type CD1/2MR.
R47	3R77-P391J	Composition: 390 ohms ±5%, 1/2 w.
R48	3R77-P470J	Composition: 47 ohms ±5%, 1/2 w.
R50	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R51	3R77-P511J	Composition: 510 ohms ±5%, 1/2 w.
R52	3R77-P364J	Composition: 0.36 megohm ±5%, 1/2 w.
R53*	3R152-P472K	Composition: 4700 ohms ±10%, ½w. Added to Models 4ET58A10-15 and B10-15 by REV. D: Added to Models 4ET58A16-21 by REV. H.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1	19B209284-P6	Disc: 75 ohms res nominal at 25°C, color code blue.
RT3	19B209284-P2	Rod: 21,400 ohms res nominal at 25°C, color code red.
RT5	19B209284-P6	Disc: 75 ohms res nominal at 25°C, color code blue.
RT7	19B209284-P2	Rod: 21,400 ohms res nominal at 25°C, color code red.
RT9	19B209284-P6	Disc: 75 ohms res nominal at 25°C, color code blue.
RT11	19B209284-P2	Rod: 21,400 ohms res nominal at 25°C, color code red.
RT13	19B209284-P6	Disc: 75 ohms res nominal at 25°C, color code blue.
RT15	19B209284-P2	Rod: 21,400 ohms res nominal at 25°C, color code red.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	PL-19B204534-G1	Coil. Includes tuning slug 5491798-P4.
T2	PL-19B204531-G1	Coil. Includes tuning slug 5491798-P4.
T3	PL-19B204535-G1	Coil. Includes tuning slug 5491798-P4.
T4	PL-19B204535-G2	Coil. Includes tuning slug 5491798-P4.
T5	PL-19B204537-G1	Coil. Includes tuning slug 5491798-P4.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC-1165).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		When reordering give G-E Part No. and specify exact freq needed. Crystal Freq = (OF ÷ 12).
Y1 thru Y4	19B206175-P6	Quartz: freq range 11,000 to 12,566 KC, temp range -30°C to +85°C. (132-150.8 MC Transmitter).
Y1 thru Y4	19B206175-P7	Quartz: freq range 12,566 to 14,500 KC, temp range -30°C to +85°C. (150.8-174 MC Transmitter).
		BOARD ASSEMBLY PL-19B204541-G1 (Used in PL-19D402308-G1 - G12)
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J17	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
A119		COMPONENT BOARD ASSEMBLY PL-19C303615-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	7488079-P34	Choke, RF: 1.5 µh ±10%, 0.28 ohm DC res; sim to Jeffers 4412-7.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P431J	Composition: 430 ohms ±5%, 1/2 w.
R2	3R77-P182J	Composition: 1800 ohms ±5%, 1/2 w.
R3	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R4	3R78-P512J	Composition: 5100 ohms ±5%, 1 w.
R5	3R77-P184J	Composition: 0.18 megohm ±5%, 1/2 w.
R6	3R77-P182J	Composition: 1800 ohms ±5%, 1/2 w.
R7*	3R79-P822K	Composition: 8200 ohms ±10%, 1/2 w.
	3R79-P392K	In Models 4ET58A10-15, 4ET58B10-15 Rev A and earlier: In Models 4ET58A16-21 Rev B and earlier: Composition: 3900 ohms ±10%, 2 w.
R8	3R78-P473K	Composition: 47,000 ohms ±10%, 1 w.
R9	5495948-P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Instruments Type CD1/2MR.
R10*	3R79-P822K	Composition: 8200 ohms ±10%, 2 w. Added in Models 4ET58A10-15, 4ET58B10-15 by Rev B. Added in Models 4ET58A16-21 by Rev D.
		BOARD ASSEMBLY PL-19C303600-G1 (Used in PL-19C303615-G1)
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J9	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C102 and C103	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C104	5496203-P446	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -5600 PPM.
C105	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C106	5491271-P6	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6.
C107	5490008-P107	Silver mica: 12 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C109 and C110	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C111	7481115-P3	Variable: approx 2.53-12.78 pf, 1250 v peak; sim to Johnson 160-107-43.
C112	19B200391-P2	Variable: approx 3-7 pf, 2100 v peak.
C113		Refer to Mechanical Parts (RC-1189).
C114	7491398-P4	Variable: 4-17 pf; sim to Teleradio T-9974.
C115 thru C119	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C121	7130348-P6	Tubular: 2 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers JM-5/32.
C122 thru C129	5493392-P7	Ceramic, feed-thru: .001 µf +100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C.
C130	19B209282-P1	Ceramic, feed thru: 680 pf ±20%, 1000 VDCW; sim to Sprague Type 544C.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1		Reed, governor: coil - 600 ohms ±10%, standard 7-pin tube socket mounting. (Used in Models 4ET58A16-21).
	3R161-P719 3R161-P770 3R161-P825 3R161-P885 3R161-P948 3R161-P1000 3R161-P1035 3R161-P1072 3R161-P1109 3R161-P1148 3R161-P1188 3R161-P1230 3R161-P1273 3R161-P1318 3R161-P1365 3R161-P1413 3R161-P1462 3R161-P1514 3R161-P1567 3R161-P1622 3R161-P1679 3R161-P1738 3R161-P1799 3R161-P1862 3R161-P1928 3R161-P2035	71.9 cps 77.0 cps 82.5 cps 88.5 cps 94.8 cps 100.0 cps 103.5 cps 107.2 cps 110.9 cps 114.8 cps 118.8 cps 123.0 cps 127.3 cps 131.8 cps 136.5 cps 141.3 cps 146.2 cps 151.4 cps 156.7 cps 162.2 cps 167.9 cps 173.8 cps 179.9 cps 186.2 cps 192.8 cps 203.5 cps
FL101		LOW PASS FILTER ASSEMBLY PL-19D402233-G5 The low pass filter is factory tuned. If it is found to be defective it is recommended that the entire filter assembly be replaced to maintain rated power output and spurious attenuation.
		- - - - - - - - - OSCILLATORS - - - - - - - - -
G101		TONE OSCILLATOR ENCODER ASSEMBLY PL-19C303466-G2 (Used in Models 4ET58A16 - A21)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19B209243-P6	Polyester: .068 µf ±20%, 40 VDCW; sim to Amperex C280AA/P68K.
C2	7489483-P17	Tubular: 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C3	19A115414-P216	Tubular, polyester: 0.33 µf ±5%, 100 VDCW.
C4	19B209243-P2	Polyester: .015 µf ±20%, 40 VDCW; sim to Amperex C280AA/P15K.
C5	19B209243-P9	Polyester: 0.22 µf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C6	19B209243-P8	Polyester: 0.15 µf ±20%, 40 VDCW; sim to Amperex C280AA/P150K.
C7	19B209243-P3	Polyester: .022 µf ±20%, 40 VDCW; sim to Amperex C280AA/P22K.
C8	19A115414-P17	Tubular, polyester: 0.47 µf ±20%, 100 VDCW.
C9	19B209243-P9	Polyester: 0.22 µf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C10	19A115414-P216	Tubular, polyester: 0.33 µf ±5%, 100 VDCW.
C11 and C12	5494481-P107	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C14*	5494481-P111	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap. (Added by Rev A).
C16*	5496219-P21	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef 0 PPM. Added by Rev F.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1* and CR2*	19A115250-P1	Silicon.
	4036936-P1	In Models earlier than Rev A. Silicon.
CR3*	19A115250-P1	Silicon. (Deleted by Rev F).
	4036936-P1	In Models earlier than Rev A. Silicon.
CR4*	19A115123-P1	Silicon, NPN; sim to Type 2N2712. Added by Rev F.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q4	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P562K	Composition: 5600 ohms ±10%, 1/2 w.
R2	3R77-P201K	Composition: 200 ohms ±10%, 1/2 w.
R3*	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
	3R77-P682J	In Models earlier than Rev G. Composition: 6800 ohms ±5%, 1/2 w.
R4*	3R77-P512K	Composition: 5100 ohms ±10%, 1/2 w.
	3R77-P912K	In Models earlier than Rev A. Composition: 9100 ohms ±10%, 1/2 w.
R5	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w.
R6	3R77-P512K	Composition: 5100 ohms ±10%, 1/2 w.
R7	3R77-P132K	Composition: 1300 ohms ±10%, 1/2 w.
R8	3R77-P622K	Composition: 6200 ohms ±10%, 1/2 w.
R9	3R77-P122K	Composition: 1200 ohms ±10%, 1/2 w.
R10	3R77-P302J	Composition: 3000 ohms ±5%, 1/2 w.
R11	3R77-P273J	Composition: 27,000 ohms ±5%, 1/2 w.
R12	7491365-P220	Variable, carbon film: .01 megohm ±10%, .08 w; sim to CTS Type UPE-70.
R13	3R77-P274K	Composition: 0.27 megohm ±10%, 1/2 w.
R14	3R77-P822K	Composition: 8200 ohms ±10%, 1/2 w.
R15	3R77-P620K	Composition: 62 ohms ±10%, 1/2 w.
R16	3R77-P243K	Composition: 24,000 ohms ±10%, 1/2 w.
R17	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R18	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R19	3R77-P184K	Composition: 0.18 megohm ±10%, 1/2 w.
R20	3R77-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R21	3R77-P330K	Composition: 33 ohms ±10%, 1/2 w.
R22	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R23	3R77-P623K	Composition: 62,000 ohms ±10%, 1/2 w.
R24	3R77-P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R25	3R77-P393K	Composition: 39,000 ohms ±10%, 1/2 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1	5490828-P30	Rod: 0.33 megohm ±10% res, 1 w max; sim to Globar Type 783H-3.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	PL-19A121920-G1	Reed, mica-filled phen: 7 pins rated at 1 amp at 500 VRMS with 4-1/2 inches of cable.
		BOARD ASSEMBLY PL-19B204542-G2 (Used in Models 4ET58A16 - A21)
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J8	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J101	PL-19C303426-G1	Connector: 20 pin contacts.
J102	PL-19B205689-G1	Connector: 18 contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L101	7488079-P8	Choke, RF: 2.2 µh ±10%, 1 ohm DC res; sim to Jeffers 4411-12.
L102	19B204814-P1	Coil.
L103	19B204814-P2	Coil.
L104	PL-19B204364-G1	Coil.
L105	PL-19B204364-G2	Coil.
L106	19B204523-P1	Coil.
L107	19B204813-P1	Coil.
L108	PL-19B204718-G2	Coil.
L109	PL-19B204718-G1	Coil.
L110	PL-19B204797-G2	Coil.
L111	PL-19B204797-G1	Coil.
L112	7488079-P7	Choke, RF: 1.5 µh ±10%, 0.5 ohm DC res; sim to Jeffers 4411-10.
L113	7488079-P34	Choke, RF: 1.5 µh ±10%, 0.28 ohm DC res; sim to Jeffers 4412-7.
L114	7488079-P8	Choke, RF: 2.2 µh ±10%, 1 ohm DC res; sim to Jeffers 4411-12.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P101	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P102	4029840-P1	Contact, electrical; simto Amp 41854.
P103 thru P106	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P107	4029840-P1	Contact, electrical; sim to Amp 41854.
P108	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P109 thru P113	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P114	4029840-P1	Contact, electrical; sim to Amp 41854.
P115 thru P118	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P119	4029840-P1	Contact, electrical; sim to Amp 41854.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
P120 thru P122	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P123	4033513-P17	Contact, electrical; sim to Bead Chain R125-19.
P125	4029840-P1	Contact, electrical; sim to Amp 41854.
P126 thru P137	4029840-P2	Contact, electrical; sim to Amp 42827-2.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	3R77-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R102	3R77-P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R103	3R79-P333K	Composition: 33,000 ohms ±10%, 2 w.
R104	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R105	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R106	3R77-P184J	Composition: 0.18 megohm ±5%, 1/2 w.
R107	3R79-P333K	Composition: 33,000 ohms ±10%, 2 w.
R108	19A115416-P7	Precision, wirewound: 3 ohms ±1%, 2 w; sim to Dale Type RS-2B.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S101	4031922-P1	Push: single pole, single throw, normally open, 1/2 amp at 12 VDC; sim to Stackpole Type SS-15.
S102	19B209040-P1	Slide: DPDT, 0.5 amp at 125 v; sim to Continental Wirt Type 126.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P2	Miniature, phen: 1 terminal.
TB2	7487424-P1	Miniature, phen: 1 terminal.
TB3	PL-19B204789-G1	Terminal strip: 6 lug terminals.
		- - - - - - - - - - - TUBES - - - - - - - - - - -
V101		Type 8106.
V102		Type 8156.
V103		Type 5894A.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XV101	7480532-P11	Tube, mica-filled phen: 9 pins rated at 1 amp at 500 VRMS; sim to Elco 04-902-27.
XV102	19C301007-P5	Tube, plastic: 12 pins rated at 5 amps max; sim to Alcon Metal Products 371G bottom mount.
XV103	7489471-P3	Tube, ceramic or steatite: 7 pins.
		- - - - - - - - - - - COILS - - - - - - - - - -
Z101	PL-19B204543-G1	Coil. Includes:
	5491798-P4	Tuning slug.
C1	5496203-P468	Ceramic disc: 510 pf ±5%, 500 VDCW, temp coef -5600 PPM.
Z102	PL-19B204543-G2	Coil. Includes:
	5491798-P4	Tuning slug.
C1	5496203-P468	Ceramic disc: 510 pf ±5%, 500 VDCW, temp coef -5600 PPM.
		MECHANICAL PARTS (SEE RC-1189)
1	19B200525-P9	Rivet. (Part of XY1, XY2, XY3 and XY4).
2	4033089-P1	Clip. (Part of XY1, XY2, XY3 and XY4).
3	19A115793-P1	Electrical contact; sim to Malco 2700. (Part of XY1, XY2, XY3 and XY4).
4	19C311172-P2	Crystal socket. (Part of XY1, XY2, XY3 and XY4).
5	PL-19C303395-G4	Chassis heat sink.
6	19C303602-P1	Shield. (Used with shield assembly, PL-19A121520-G1).

SYMBOL	G-E PART NO	DESCRIPTION
7	19A121571-P1	Insulator.
8	PL-19C303613-G1	Tuning chassis.
9	19A121527-P1	Plate.
13	7120754-P1	Fiber washer; sim to Mallory 203. (Used with C112 and part of C113).
18	7165075-P2	Hex nut: 3/8-32. (Used with C112).
19	7115130-P9	Lockwasher; sim to Shakeproof 1220-2. (Part of post assembly and C112).
20	19A121516-P1	Teflon® insulator. (Used with C112 and part of C113).
21	19A121520-P1	Plate. (Used with C112 and part of C113).
22	19C303599-P1	Heat sink.
23	19A121523-P1	Heat sink. (Used with V101).
24	19B204790-P1	Spring. (Used with V101 and V102).
25	7165167-P5	Tube shield insert; sim to Atlas 106-332-5. (Used with V101).
26	7165167-P9	Tube shield insert. (Used with V102).
27	4031532-P1	Cup washer. (Part of post assembly).
28	4031530-P1	Bearing: No. 32. (Part of post assembly).
29	7893936-P1	Nut: No. 32. (Part of post assembly).
30	N910P18C13	Retaining ring. (Part of post assembly).
31	4031527-P2	Collar. (Part of post assembly).
32	4031531-P1	Locknut: No.32. (Part of post assembly).
33	19C303605-P1	Tuning cover.
34	19B204792-P1	Heat sink. (Used with V103).
35	7165167-P3	Tube shield insert. (Used with V103).
36	N509P612C13	Dowel pin. (Part of post assembly).
37	19B204791-P1	Post assembly bracket: (Used with C114).
38	19A121189-P3	Post. (Part of post assembly).
39	19A121523-P2	Heat sink. (Used with V102).
40	PL-19B204395-G3	Chassis.
41	4036835-P3	Terminal, solder: sim to Shakeproof 2149-14-000. (Used with S101).
42	19B204393-P1	Heat sink. (Used with Q8).
43	19B204394-P1	Support. (Used with Q8).
44	19C303495-G8	Station top cover (except Repeaters and VM).
	19C303673-G3	Station top cover (Repeaters and VM only).
	19C303396-G1	Mobile top cover.
45	19B204793-P1	Heat sink. (Used with V103).
46	19A121529-P1	Contact. (Used with V103).
47	19B204435-P2	Plate line. (Used with V103).
48	19A121676-P1	Pin guide: 4-40 thread, approx 5/8 inch pin. (Used with J101).
49	5493361-P5	Spring washer: approx 1/2 inch dia; sim to Shakeproof 3502-10-58.
50	N509P608C13	Dowel pin, spring: approx 1/2 x 1/16 inches dia.
51	19A121465-P1	Post: approx 7/8 x 3/16 inches dia.
52	N402P39C13	Washer: approx 3/16 inches dia. No. 10.
53	19B204756-P1	Insulator: approx 1/4 x 1/2 inches dia, ceramic. (Part of post assembly).

SYMBOL	G-E PART NO	DESCRIPTION
54	19B204776-P1	Angle support: approx 5/8 x 1/4 x 1/2 inches wide. (Part of post assembly).
55	19A121547-P1	Plate: approx 13/16 x 1/2 x 3/32 inches thick. (Part of post assembly).
59	19B204435-P1	Plate line. (Used with V103).
60	4032591-P26	Pad, rubber: approx 1-1/2 x 3/4 x 1/8 inches thick, adhesive back.
61	PL-19A121257-G1	Angle. (Used with FL1 and XFL1).
62	19A121065-P1	Support: (Used with FL1 and XFL1).
63	19C303495-G7	Station Bottom Cover.
	19C303396-G3	Mobile Bottom Cover.
64	4029030-P10	Channel, rubber: approx 1-1/4 inches long.



TRANSMITTER - MODELS 4ET58A10-A27
4ET87A10, B10

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - (4ET58A16-21) To reduce Channel Guard distortion. Changed CR1, CR2, CR3, R4 and added C14 on Channel Guard Board G101.

REV. B - (4ET58A16-21) To reduce Channel Guard distortion at low tone frequencies. Changed R34 on Exciter Board A101-A112.

REV. A - (4ET58A10-15 & 4ET58B10-15)
REV. C - (4ET58A16-21)
To eliminate adjacent channel interference. Changed C73 on Exciter Board A101-A112.

REV. B - (4ET58A10-15 & 4ET58B10-15)
REV. D - (4ET58A16-21)
To improve reliability of final amplifier stage. Changed R7 and added R10 on Component Board Assembly A119.

REV. C - (4ET58A10-15 & 4ET58B10-15)
REV. E - (4ET58A16-21)
To improve sensitivity of the audio input. Changed C2 and R3 on the Exciter Board.

REV. F - (4ET58A16-21)
To protect Channel Guard Encoder from RF fields. Added C16 and replaced CR3 with CR4 on Encoder Assembly (G101).

REV. G - (4ET58A16-21)
To reduce tone distortion. Changed R3 on Encoder Assembly (G101).

REV. D - (4ET58A10-15 & 4ET58B10-15)
REV. H - (4ET58A16-21)
To increase audio high frequency roll-off and reduce sideband radiation in adjacent channel. Changed C7, R15, R16, & R17 on A101-A112. Added C8, C77, R53 and deleted C9 on A101-A106.

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and G-E Part Number.

Service Parts may be obtained from Authorized G-E Communication Equipment Service Stations or through any G-E Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. G-E Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-3547

Progress Is Our Most Important Product

GENERAL ELECTRIC

COMMUNICATION PRODUCTS DEPARTMENT LYNCHBURG, VIRGINIA

(In Canada, Canadian General Electric Company, Ltd., 830 Lansdowne Rd., Toronto, Ontario)

PRINTED IN U.S.A.

DF-3039