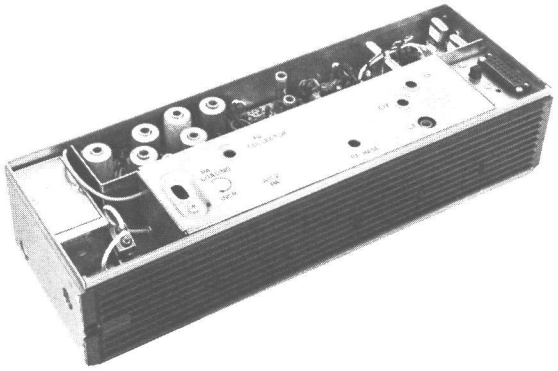
MOBILE RADIO

MASTR® Progress Line

25—50 MHz, 50-WATT TRANSMITTER MODELS 4ET84A10-27 & 4ET84A31-47



SPECIFICATIONS *

FCC Filing Designation	**ET-84-A**
Frequency Range	25-50 MHz
Power Output	50 watts
Crystal Multiplication Factor	12
Frequency Stability	0.0005% (-30°C to +60°C)
Spurious and Harmonic Radiation	At least 85 dB below rated power output
Modulation	Adjustable from 0 to ±5 kHz 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 3%
Deviation Symmetry	0.5 kHz maximum
Maximum Frequency Spacing	0.4%
Duty Capability	Continuous

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

ET-84-A

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

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

DESCRIPTION

Transmitter Type ET-84-A is a crystal controlled, phase modulated transmitter designed for one-, two- or four-frequency operation in the 25—50 megahertz band. The transmitter consists of the following assemblies:

- Transistorized Exciter Board
  Audio, modulator, amplifier and multiplier stages.
- Transistorized PA Assembly
  Multiplier, amplifiers, driver, power amplifier, power detector, filters and antenna switch or relay.
- Optional Channel Guard Board Encoder and tone network

Transmitter Models 4ET84A10-27 have an Antenna Switching Relay while Models 4ET84A31-47 have a Solid State Antenna Switch.

CIRCUIT ANALYSIS

The Transmitter uses a total of 18 transistors to provide a minimum power output of 50 watts. The crystals range from approximately 2.08 to 4.17 megahertz, and the crystal frequency is multiplied 12 times.

A centralized metering jack (J102) is provided for use with GE Test Set Models 4EX3A10 (Rev. A or later) or 4EX8K11. The test set meters the amplifiers, multipliers and PA stage, as well as the relative power output, reflected power and PA supply voltages. The metering jack also provides access to receiver audio, microphone and push-to-talk leads.

All input leads to the transmitter are individually filtered by the 20-pin feed-through by-pass connector J101. Supply voltage, metering and control functions for the exciter board are connected from the PA assembly to jacks J1 through J18 on the exciter board.

EXCITER

OSCILLATOR

The transmitter uses a transistorized Colpitts oscillator (Q4). The oscillator provides a frequency stability of +0.0005% without crystal ovens or warmers. Feedback for the oscillator is developed across C24.

In single-frequency transmitters, a jumper connects the F1 crystal keying lead to ground and the crystal frequency is applied to the base of oscillator Q4. The oscillator frequency is adjusted by trimmer C5. The oscillator output is applied to the anode of phase modulator CV1.

In Multi-frequency transmitters, the single oscillator transistor is used, and up to three crystal circuits that are identical to the F1 crystal circuit are 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. This forward biases the diode in the crystal circuit, reducing its impedance, so that the selected crystal frequency is applied to the base of oscillator Q4.

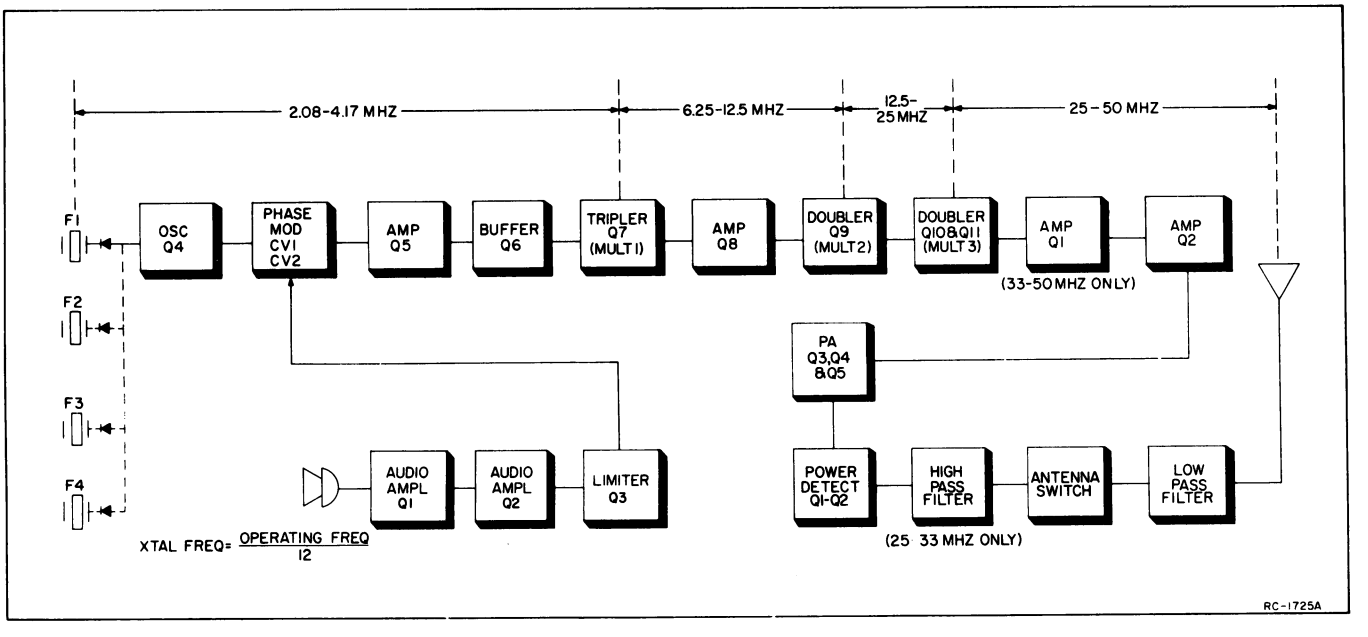


Figure 1 - Transmitter Block Diagram

AUDIO AMPLIFIERS AND LIMITER

The audio section of the transmitter consists of DC-coupled feed-back amplifiers Q1, Q2 and Q3. Q3 also acts at a limiter at high audio input levels. Audio from the microphone is coupled through an input network (C2 and R1) to the audio stages. The input network, in conjunction with the feed-back circuit, provides the audio gain and a 6-dB/octave pre-emphasis.

The output of limiter Q3 is connected through modulation adjust potentiometer R8 to a de-emphasis network for 6-dB/octave de-emphasis and post limiter roll-off. The network consists of C12, C13, R12 and R13. Modulation adjust R8 determines the maximum signal level applied to the modulator circuit, and is normally set for ±4.5 kHz (narrow band).

PHASE MODULATOR

The phase modulator uses varactors CV1 and CV2 (voltage-variable capacitors) in two cascoded R-L-C networks (R31-L2 and R32-L3). An audio signal applied to the modulator through L2 and L3 varies the capacitance of CV1 and CV2, resulting in a phase modulated output. The modulator output is applied to the base of emitter-follower Q5.

In Channel Guard applications, tone from the encoder-decoder board (on the receiver) is coupled to the modulator circuit through Channel Guard Mod Adjust potentiometer R35. This control is normally set for ±0.75 kHz deviation as described in the transmitter Modulation Adjustment Procedure.

NOTE

If Channel Guard decode only is desired, disconnect the CHAN GD TONE HI lead from J8 of the transmitter exciter board.

EMITTER-FOLLOWER AND BUFFER-AMPLIFIER

Emitter-follower Q5 and buffer-amplifier Q6 isolates the modulator from the loading effects of the tripler stage, and provides some amplification. The output of Q6 is direct-coupled to the base of the tripler.

AMPLIFIER AND MULTIPLIERS

Q7 operates as a tripler (MULT-1) with collector tank T1 tuned to three times the crystal frequency. This stage is metered at Centralized Metering Jack J102 through R52. Following the tripler is amplifier Q8. This stage is metered at J102 through R62. The output of Q8 is capacitive-coupled from T2 to T3, and applied to the base of Q9.

Q9 operates as a doubler (MULT-2) the output of Q9 is capacitive-coupled from T4 to T5 to the base of Q10 and Q11, with both coils tuned to six times the crystal frequency. The stage is metered at J102 through R72.

Q10 and Q11 operate as a Class C, push-push doubler (MULT-3) with collector tank T6 tuned to 12 times the crystal frequency. The doubler is metered at J102 through R82.

PA ASSEMBLY

AMPLIFIERS AND PA

The exciter output is coupled thru a series-tuned circuit to the base of amplifier A102-Q1 in 33 to 50-MHz transmitters, or base of amplifier A102-Q2 in 25 to 33-MHz transmitters.

When Q1 is used, the base voltage is metered at J102 through metering network CR1, R1 and R2. Q2 is metered at J102 through metering network CR2, R10 and R11 in 25 to 33-MHz transmitters.

Collector current for Q2 is metered across metering resistor R105 and J102 (Driver Ic). The reading is taken on the 1-volt scale (3 amperes full scale) with the GE Test Set in Position F. The amplifier output is coupled through a series-tuned circuit to base-balancing inductors L19-L27, and then to the bases of the power amplifiers.

Q3, Q4 and Q5 operate as parallel-connected, common-emitter power amplifiers to provide a minimum power output of 50 watts. Collector current for the PA transistors is metered across metering resistor R102 at J102 (PA Ic). The reading is taken on the 1-volt scale (10 amperes full scale) with the GE Test Set in Position G, and with the HIGH SENSITIVITY button pressed.

Thermistor RT1 is mounted on the PA board next to the PA transistors. The thermistor, in conjunction with a control circuit on the power regulator board, protects the PA stages against excessively high temperatures. If the temperature of the heat-sink starts to rise excessively, RT1 activates the temperature control circuit which reduces the supply voltage to the PA board. The control circuit keeps the supply voltage reduced until the temperature returns to normal.

The PA output is coupled through a series-tuned circuit to power detector assembly A103.

POWER DETECTOR

Power detector A103 consists of the detector circuitry enclosed in a shielded

casting, and a differential amplifier mounted on a printed wiring board. The detector circuit samples both the forward and reflected power on the antenna line, and applies the outputs to the bases of differential amplifier transistors Q1 and Q2. The output of the differential amplifier is proportional to the net power output (forward power minus reflected power). The differential amplifier is connected to a control circuit on the power regulator board which controls the supply voltage applied to the transmitter PA board (see Figure 2).

With normal power output into a 50-ohm load, Q1 conducts and Q2 is turned off. This keeps the power control circuit on the power regulator board turned off. A drop in power output reduces the drive to Q1, which activates the power control circuit and reduces the supply voltage to the transmitter (Vcc).

An increase in the VSWR increases the input to the base of Q2, causing Q2 to start conducting. This causes Q1 to conduct less due to the emitter bias developed by Q2 across R5. Q1 conducting less activates the power control circuit on the power regulator board, reducing the Vcc.

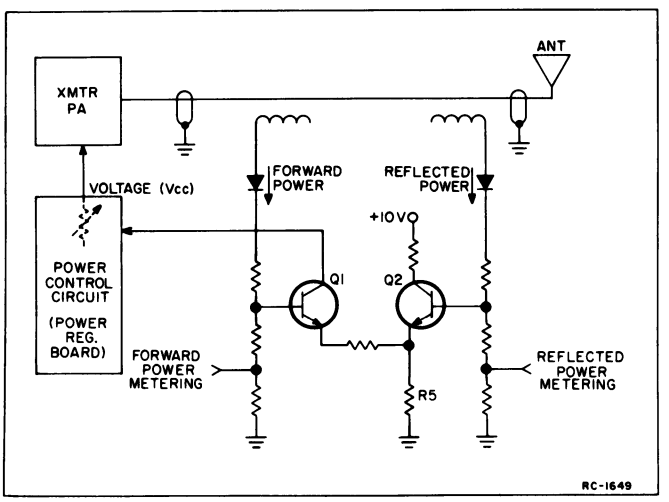


Figure 2 - Power Detector Circuit

The output of the power detector is applied to high-pass filter FL102 (in 25-33 MHz transmitters) and coupled through antenna changeover relay K101 or solid state antenna switch A104/A105 to low-pass filter FL102. The output of FL102 is applied to the antenna.

SOLID STATE ANTENNA SWITCH

The Solid State Antenna Switch automatically provides antenna changeover for transmitter and receiver operation. During the service mode of operation, the switch isolates the transmitter from the antenna. Application of RF from the transmitter causes the switch to operate, connecting the antenna to the transmitter and isolating the receiver. A continuous external bias voltage (+10 volts) is applied to the switch to prevent spurious antenna power from operating the switch during the receive mode.

When the transmitter is off, signals picked up by the antenna are connected to the receiver through Low Pass Filter FL101 and the filter network in the antenna switch. A parallel LC circuit (collector to base capacitance of Q1 and L2/L3) which is resonant near the receiver frequency provides isolation from transmitter loading.

When the transmitter is keyed and the peak RF voltage exceeds the +10 volt bias voltage, Q1 conducts. This connects RF voltage from the transmitter through Low Pass Filter FL101 to the antenna. Q2 and CR1 are biased on during transmit to isolate the receiver from the transmitter output. While Q2 is conducting, its collector is near ground potential. This places L4/L5 in parallel with C5/C6 forming a parallel resonant circuit near the transmitter frequency to isolate the receiver. CR1 provides additional isolation.

CHANNEL GUARD ENCODER OPTION

Channel Guard Encoder Model 4EH18A10 is a fully transistorized encoder for use with Royal Professional combinations in encode only applications, or where different encode and decode tones are desired. The tone frequencies are controlled by plug-in tone networks that are made with precision components for excellent stability and reliability. The tone frequencies range from 71.9 to 203.5 Hz.

The encoder board and tone network mount on the underside on the transmitter chassis. Power, ground and tone output connections are made to transmitter exciter board A101 by means of a cable (19B216186-G1).

The encoder tone is provided by selective oscillators Q1 and Q2, which oscillate continuously at a frequency determined by the tone network (FL1). Negative feedback, applied through the tone network to the base of Q1, prevents any gain in the stage except at the desired encode frequency. The oscillator output is applied to the base of emitter-follower Q3.

Thermistor-resistor combination R1 and RT1 provides temperature compensation for the oscillator output. Limiter diodes CR1 and CR2 keep the tone amplitude constant.

The output of emitter-follower Q5 is applied to the phase modulator on the transmitter exciter board through Channel Guard MOD ADJUST R35. Instructions for setting R35 are contained in the Modulation Adjustment section of the Transmitter Alignment Procedure.

CARRIER CONTROL TIMER

The Carrier Control Timer option shuts off the transmitter on each transmission after a one-minute timing cycle, and alerts the operator that the transmitter is off by means of an alarm tone in the speaker. The transmitter can be turned on again by releasing and rekeying the push-to-talk switch on the microphone.

The timing cycle (transmitter keyed time) is normally set at the factory for a duration of one minute. An optional potentiometer is available that permits the timing cycle to be adjusted from 15 seconds to 5 minutes. Complete instructions for the Carrier Control Timer are contained in Maintenance Manual LBI-4138.

MAINTENANCE

DISASSEMBLY

To service the transmitter from the top (Fig. 3):

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 (Fig. 4):

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

To remove transmitter from system frame -

1. Loosen the two retaining screws in the front casting (see Figure 3) 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 plug and receiver plug 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.

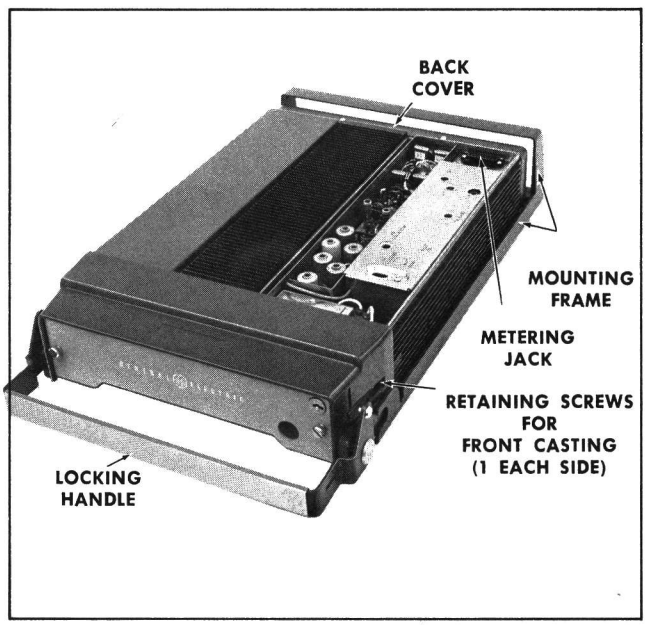


Figure 3 - Top Cover Removed

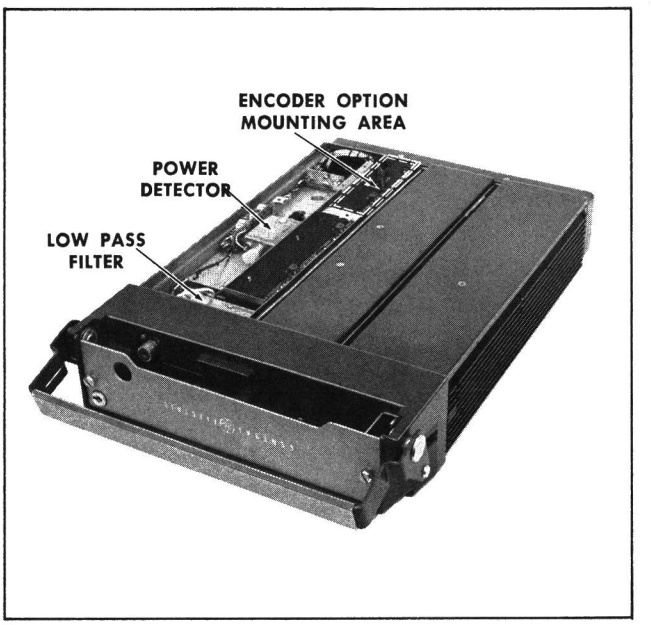


Figure 4 - Bottom Cover Removed

WARNING

The stud mounted RF Power Transistors used in the transmitter contain Berryllium Oxide, a TOXIC substance. If the ceramic or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Use care in replacing transistors of this type.

To replace the PA transistors (Q2 through Q6):

1. Unsolder one lead at a time with a 50-watt soldering iron. Use a scribe to hold the lead away from the printed circuit board until the solder cools.

2. Turn the transmitter over and remove the unpainted Phillips-head screws holding the multiplier-filter, power detector, and output filter mounting assembly to the transmitter heatsink. Then swing the entire assembly away from the heatsink to expose transistor mounting holes.

3. Hold the body of the transistor to prevent it from turning. Next, remove the transistor hold-down nut and springwasher through the hole in the heatsink with an 11/32-inch nut-driver. Lift out the transistor, and remove the old solder from the printed circuit board.

4. Trim the new transistor leads (if required) to approximately 3/8-inch lengths (3/16-inch lengths for Q3, Q4 and Q5 on 25-50 MHz transmitters). Cut the collector lead at a 45° angle for future identification (see Fig. 5). The letter "C" on the top of the transistor indicates the collector.

5. Apply a coating of silicone grease around the transistor mounting surface, and place the transistor in the mounting hole. Align the leads as shown in the Outline Diagram. Then hold the body of the transistor and replace the hold-down nut and spring washer, using moderate torque (10 inch-pounds maximum).

6. Make sure that the transistor leads are formed as shown in Figure 6 so that the leads can be soldered to the printed circuit pattern, starting from the inner edge of the mounting hold.

7. Solder the leads to the printed circuit pattern. Start at the inner edge of mounting hole and solder the remaining length of transistor lead to the board.

CAUTION

Failure to solder the transistor leads as directed may result in the generation of RF loops that could damage the transistor.

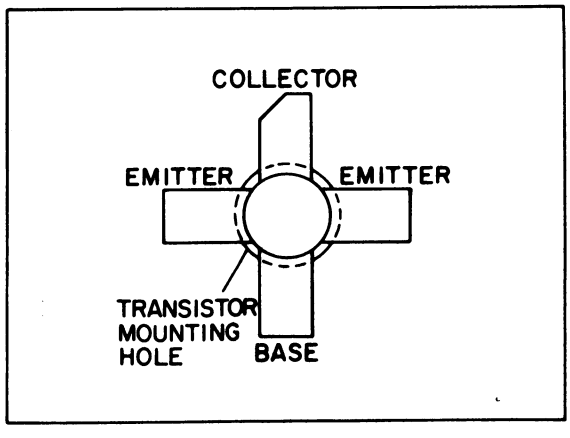


Figure 5 - Lead Identification

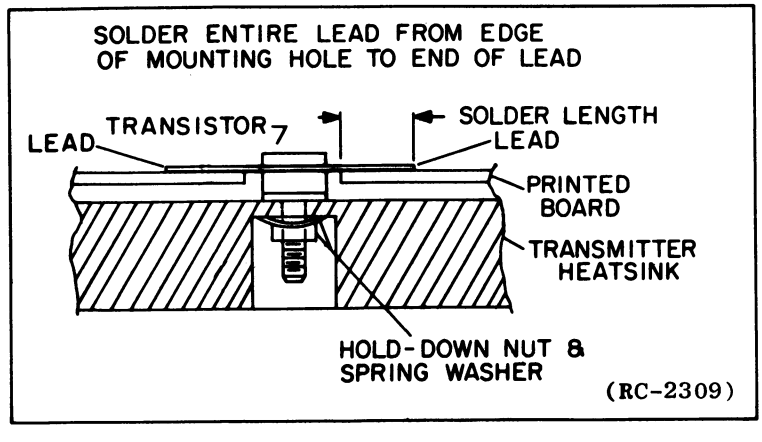


Figure 6 - Lead Forming

MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R8) 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 (GE Model 4EX6A10)
2. A frequency modulation monitor
3. An output meter of a VTVM
4. GE Test Set Models 4EX3A10 or 4EX8K10,11

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 J5 (Mike High) and J6 (Mike Low) on the Exciter Board.
2. Apply a 0.75-volt signal at 1000 Hz to Test Set or across J5 and J6 on Exciter Board.
3. For transmitters without Channel Guard, set the MOD ADJUST (R8) for a 4.5-kilohertz swing 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 (R35) for 0.75 kHz tone 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 0.75-volt signal at 1000 Hz and set MOD ADJUST (R8) for a 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 and 4 on the channel producing the largest amount of deviation.

PA POWER INPUT

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

P_i = PA voltage x PA current

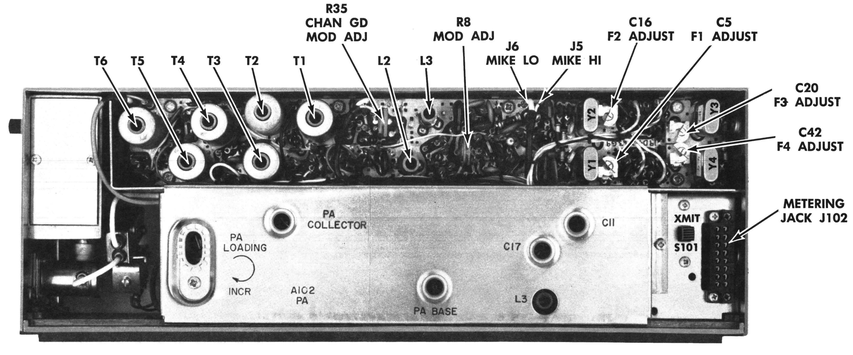
where

P_i is the power input in watts,

PA voltage is measured with the GE Test Set in Position G on the 15 volt scale, and polarity switch in the (-) position.

PA current is measured with the Test Set in Position G in the Test 1 position, and with the HIGH SENSITIVITY button pressed (10 amperes full scale).

Example: P_i = 12.5 volts x 7 amperes = 87.5 watts



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Model 4EX3A10 (Revision A or later), or Model 4EX8K11.
2. A 50-ohm wattmeter connected to J204.
3. A frequency counter.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Place crystal(s) in crystal socket (crystal frequency = operating frequency ÷12).
2. For a large change in frequency or a badly mis-aligned transmitter, set crystal trimmer C5 to mid-capacity. In multi-frequency transmitters, set all trimmers to mid-capacity and set the channel selector switch to the F1 position.
3. For a large change in frequency or a badly mis-aligned transmitter, turn the slugs in exciter coils L2, L3, T1 thru T6 and L3 on PA board (if present) so that the top of the slug is approximately even with the bottom of the coil winding or until the slugs hit the board (whichever comes first). Next, turn mica compression capacitors C11, C17, PA BASE, PA COLLECTOR, and PA LOADING (on PA board) all the way to the right (clockwise). Then set each capacitor 1-1/2 turns counterclockwise.
4. Connect the GE Test Set to receiver metering jack J442 and check for +10 volts at Position J. If reading is not 10 volts, refer to the power regulator Outline Diagram and set R19 for +10 volts.
5. Connect GE Test Set to metering jack J102. Set the test polarity to + and set the range to the Test 1 (or 1-volt position for 4EX8K11) for all adjustments. Voltage readings at Position "F" may be converted to driver collector current by multiplying the reading by 3 (3 amperes full scale). Voltage readings at Position "G" (with HIGH SENSITIVITY button pressed) may be converted to PA collector current by multiplying the reading by 10 (10 amperes full scale). Readings at Position I indicate relative forward power, and reading at Position J indicate relative reflected power (VSWR).
6. All adjustments are made with the transmitter keyed. Unkey the transmitter between steps to avoid unnecessary heating.

TRANSMITTER ALIGNMENT PROCEDURE

STEP	METER POSITION	TUNING CONTROL	TYPICAL METER READING	PROCEDURE
				EXCITER BOARD
1.	A MULT-1	L2 and L3	Maximum	Carefully tune L2 and L3 for maximum meter reading.
2.	A MULT-1	T1	Minimum	Tune T1 for a small dip in meter reading.
3.	B AMP-1	T1 and T2	See Procedure	Tune T1 for maximum meter reading and then tune T2 for a small dip or movement of meter indicator.
4.	C MULT-2	T2, T2 and T4	See Procedure	Tune T2 and then T2 for maximum meter reading. Then tune T4 for a small dip or movement of meter indicator.
5.	D MULT-3	T5, T4 and T6	See Procedure	Tune T5 and then T4 for maximum meter reading. Then tune T6 for minimum meter reading.
				PA BOARD
6.	E AMP-2/3	L3 (PA) and T6 (Exciter)	Maximum	In 33 to 50 MHz transmitters tune L3 and T6 for maximum meter reading. In 25-33 MHz transmitters, tune C17 and then T6 for maximum meter reading.
7.	F DRIVER Ic	C17, C11	Maximum	Tune C17 for maximum meter reading. If no indication on meter, adjust C11 slightly clockwise and re-tune C17 for maximum meter reading.
8.	F DRIVER Ic	PA BASE	Maximum	Tune PA BASE for maximum power output on wattmeter.
9.	G PA Ic		See Procedure	With the HIGH SENSITIVITY switch pressed, check meter reading for 0.7-Volt. If reading exceeds 0.7-Volt, adjust PA POADING for a meter reading of 0.6-Volt.
10.	G PA Ic	PA COLLECTOR	Maximum	Tune PA Collector for maximum power output on wattmeter.
11.	F		See Procedure	Repeat Steps 7 & 8 for maximum readings as shown in the following chart:

PA Board Frequency Range:	METER READING FROM:	METER READING TO:
25 — 33 MHz	0.17 V at 25 MHz	0.4 V at 33 MHz
33 — 42 MHz	0.3 V at 33 MHz	0.5 V at 42 MHz
42 — 50 MHz	0.5 V at 42 MHz	0.65V at 50 MHz

12.	G	PA LOADING & PA Collector	0.73 Volts Maximum	Press the HIGH SENSITIVITY switch. Then adjust PA LOADING slightly clockwise and tune PA COLLECTOR for maximum power output. Repeat until the meter reads 0.73 Volts maximum. —NOTE— Reading will increase only when PA COLLECTOR is re-tuned for maximum power output following each slight clockwise adjustment for PA LOADING.
13.	G	C17, PA BASE & PA COLLECTOR	Maximum	Tune C17, PA BASE AND PA COLLECTOR for maximum power output on wattmeter.
14.	F		See Procedure	Check for readings obtained in Step 11. If necessary, repeat Steps 7 and 8 until proper readings are obtained.
15.	G		0.73 Volts Maximum	Press HIGH SENSITIVITY switch and check for meter reading of 0.73 Volts maximum. If necessary, repeat Step 12 until proper reading is obtained.
				FREQUENCY ADJUSTMENT
16.		C5 (C16 in 2-freq. units, and C20 or C42 in multi-freq. units).		Loosely couple frequency counter to output and adjust C5 for proper frequency output. (Switch to F2 and adjust C16 on 2-frequency units. In 3- or 4-frequency units, adjust C20 or C42 as required). —NOTE— For proper frequency control of the transmitter, it is recommended that all frequency adjustments be made when the equipment is at a temp. of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temp. range of 50° to 90°F.

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 modulator 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:

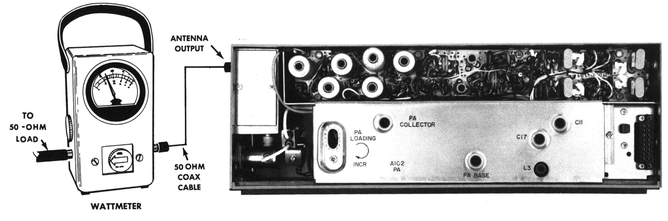
1. Wattmeter similar to:
   - Bird # 43
   - Jones # 711N
2. VTVM similar to:
   - Triplett # 850
   - Heath # 1M-21
3. Audio Generator similar to:
   - GE Model 4EX6A10 or
   - Heath # 1G-72
4. Deviation Meter (with a .75 kHz scale) similar to:
   - Measurements # 140
   - Lampkin # 205A
5. Multimeter similar to:
   - GE TEST SET MODEL 4EX3A10,
   - MODEL 4EX8K11 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 50 watts.

SERVICE CHECK

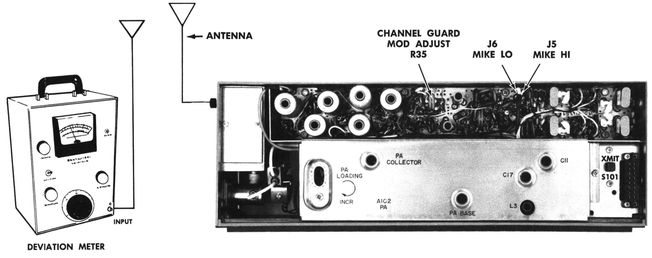
Refer to Service Hints on Transmitter Troubleshooting Procedure.

STEP 2

TONE DEVIATION WITH CHANNEL GUARD

TEST PROCEDURE

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



2. Unplug the MIC HI terminal from J5 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 (R35) for a reading of 0.75-kHz.

NOTES: --The Channel Guard MOD ADJUST (R35) may be adjusted for deviations up to 1.0 kHz maximum for all tone frequencies.

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

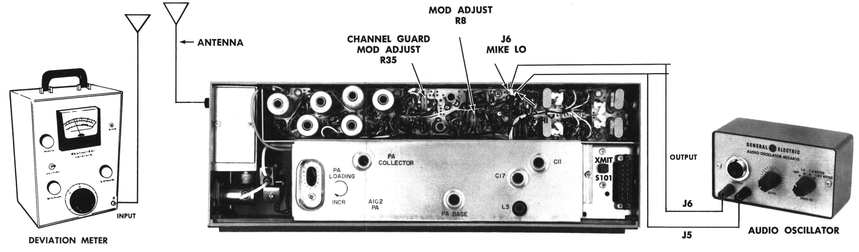
DEVIATION METER

STEP 3

VOICE DEVIATION AND SYMMETRY

TEST PROCEDURE

1. Unplug the High and Low Mike leads from the Exciter Board Jacks J5 and J6.
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.
6. Adjust Modulation Adjust Control R8 until deviation reads 4.5 kHz 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 deviation at the factory. The factory adjustment will prevent the transmitter from deviating more than 5.0 kHz under the worst conditions of frequency, voltage and temperature.

If the deviation reading plus (+) or minus (-) differs by more than 0.5 kHz, 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 3.0 kHz. Voltage should be LESS than 100 millivolts.

METER

STEP 1 - QUICK CHECKS

Meter Position GE Test Set	Probable Defective Stage		
	High Meter Reading	Low Meter Reading	Zero Meter Reading
"A" (MULT-1)	Q6, Q7, 10-Volt Regulator	Q4, Q5, Q6, Q7 L2, L3. 10-Volt Regulator	Q4, Q5, Q6, Q7, Crystal, 10-Volt, Gnd to Osc Ch.
"B" (AMP)	Q8, R60, R61, T2. 10-Volt Regulator	T1, Q8, R60, C60, R61. 10-Volt Reg.	Q8, R61, C60, R62, T2. 10-Volt Reg.
"C" (MULT-2)	T2, T3, Q8, R68, R71, T4	T2, T3, Q8, R68, C70, R71 T4	Q8, T3, T4, R70, R72, C71
"D" (MULT-3)	T4, T5, Q10, R80, R83	T4, T5, Q10, C80, R83, C82, Q11	T4, T5, Q10, Q11, R83, C82, T6
"E" (AMP 1 DRIVE)	Q10, Q11, L3B, L3C, Check Transmitter Alignment	Q10, Q11, L3B, L3C, Check Transmitter Alignment	Q10, Q11, L3B, L3C, CR1/CR2, C11, C17, Check Transmitter Alignment
"F" (DRIVER)	Check Transmitter Alignment, Power Regulator	Check Transmitter Alignment, Power Regulator Q1, Q2	Check Transmitter Alignment, Power Regulator Q1, Q2
"G" (Power Amp.) Current Reading	Check Transmitter Alignment, Q3, Q4, Q5, Antenna	Check Transmitter Alignment, Q3, Q4, Q5, Antenna, Power Regulator	Check Transmitter Alignment Q1, Q2, Q3, Q4, Q5 Antenna Power Regulator
"G" (Power Amp.) Voltage Reading	Power Regulator	Power Regulator	Short/Fuse Blown
"I" (Forward Pwr.)	Power Regulator Check Transmitter Alignment, Antenna	High VSWR; Power Regulator Power Detector Defective, Check Transmitter Alignment, Antenna	Power Detector Defective Power Regulator, PA, Check Transmitter Alignment
"J" (Reflected Pwr.)	High VSWR; Antenna, Coax, Filter, Antenna Switch	Low VSWR (Normal)	

STEP 2
CHECK TYPICAL DC VOLTAGES
EQUIPMENT REQUIRED
● G.E. TEST MODEL 4EX3A10 OR
● 20,000 OHM-PER-VOLT METER

V-DC	V-DC	V-DC
WITH TRANSMITTER KEYED, READING AT COLLECTOR OF Q1 SHOULD BE APPROX 0.4 VDC	WITH TRANSMITTER KEYED, READING AT COLLECTOR OF Q2 SHOULD BE APPROX 0.4 VDC	WITH TRANSMITTER KEYED, READING AT COLLECTOR OF Q3 SHOULD BE APPROX 4 VDC

STEP 3
CHECK AUDIO AC VOLTAGES
EQUIPMENT REQUIRED
● AUDIO OSCILLATOR
● AC VTVM

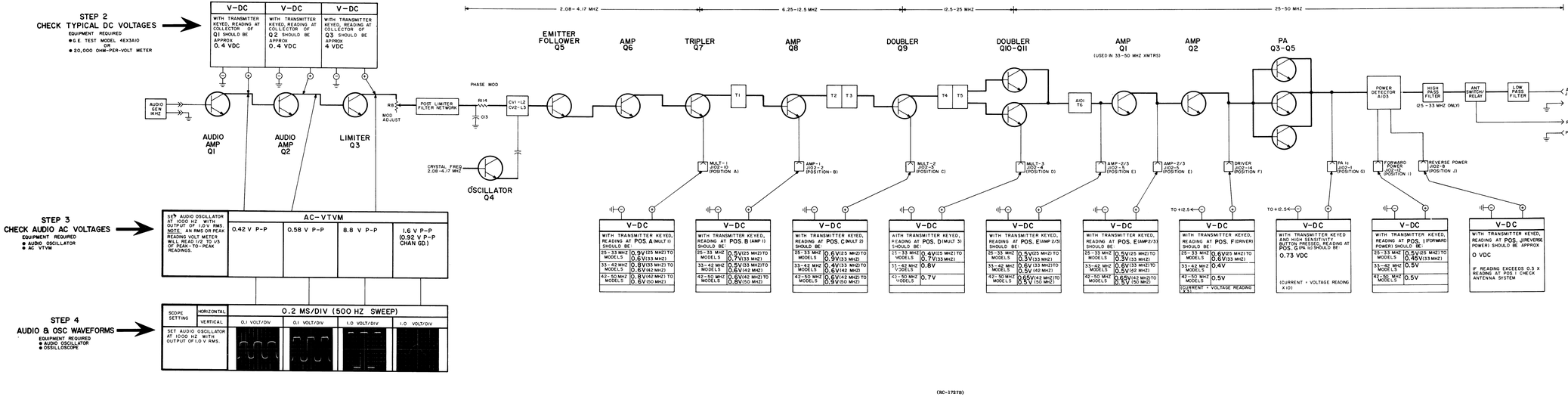
SET AUDIO OSCILLATOR AT 1000 HZ WITH OUTPUT OF 1.0 V RMS. NOTE: AN RMS OR PEAK READING VOLT METER WILL READ 1/2 TO 1/3 OF PEAK-TO-PEAK READINGS.

AC-VTVM			
0.42 V P-P	0.58 V P-P	8.8 V P-P	1.6 V P-P (0.92 V P-P CHAN GD.)

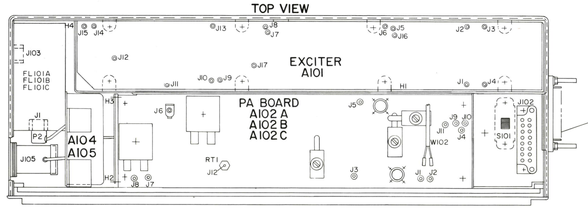
STEP 4
AUDIO & OSC WAVEFORMS
EQUIPMENT REQUIRED
● AUDIO OSCILLATOR
● OSSILLOSCOPE

SET AUDIO OSCILLATOR AT 1000 HZ WITH OUTPUT OF 1.0 V RMS.

SCOPE SETTING	HORIZONTAL	0.2 MS/DIV (500 HZ SWEEP)			
	VERTICAL	0.1 VOLT/DIV	0.1 VOLT/DIV	1.0 VOLT/DIV	1.0 VOLT/DIV

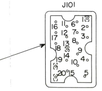


(RC-1727B)

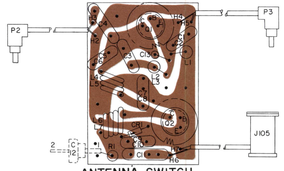


OUTLINE DIAGRAM

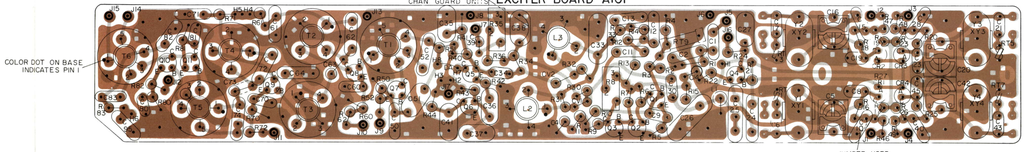
25—50 MHz, 50-WATT TRANSMITTER
MODELS 4ET84A10-27 & 4ET84A31-47



MODEL NO	FREQ RANGE	NO OF FREQ	CHANNEL GUARD	ANT RELAY	ANT SWITCH
4ET84A10	25-33 MHZ	1		X	
4ET84A11	33-42 MHZ	1		X	
4ET84A12	42-50 MHZ	1		X	
4ET84A13	25-33 MHZ	2		X	
4ET84A14	33-42 MHZ	2		X	
4ET84A15	42-50 MHZ	2		X	
4ET84A16	25-33 MHZ	4		X	
4ET84A17	33-42 MHZ	4		X	
4ET84A18	42-50 MHZ	4		X	
4ET84A19	25-33 MHZ	1	X	X	
4ET84A20	33-42 MHZ	1	X	X	
4ET84A21	42-50 MHZ	1	X	X	
4ET84A22	25-33 MHZ	2	X	X	
4ET84A23	33-42 MHZ	2	X	X	
4ET84A24	42-50 MHZ	2	X	X	
4ET84A25	25-33 MHZ	4	X	X	
4ET84A26	33-42 MHZ	4	X	X	
4ET84A27	42-50 MHZ	4	X	X	
4ET84A31	33-42 MHZ	1			X
4ET84A32	42-50 MHZ	1			X
4ET84A34	33-42 MHZ	2			X
4ET84A35	42-50 MHZ	2			X
4ET84A37	33-42 MHZ	4			X
4ET84A38	42-50 MHZ	4			X
4ET84A40	33-42 MHZ	1	X		X
4ET84A41	42-50 MHZ	1	X		X
4ET84A43	33-42 MHZ	2	X		X
4ET84A44	42-50 MHZ	2	X		X
4ET84A46	33-42 MHZ	4	X		X
4ET84A47	42-50 MHZ	4	X		X

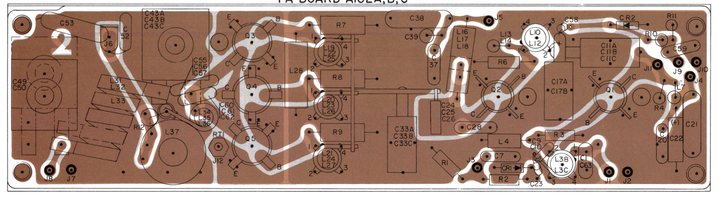


(19B216511, Sh. 1, Rev. 1)
(19B216511, Sh. 2, Rev. 1)



(19D413028, Sh. 1, Rev. 0)
(19D413028, Sh. 2, Rev. 0)

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

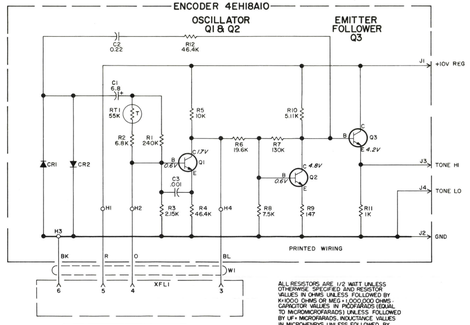


(19C311783, Sh. 1, Rev. 2)
(19C311783, Sh. 2, Rev. 3)

(19B621238, Rev. 7)

CHANNEL GUARD ENCODER MODEL 4EH18A10

SCHEMATIC DIAGRAM



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION 8 FOR CHANGES AND A DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.
THIS ELEM DIAG APPLIES TO
MODEL NO 4EH18A10 — REV LETTER

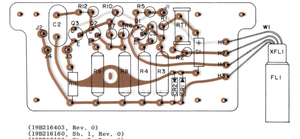
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES R OHMS UNLESS FOLLOWED BY K KILOHMS OR M MEGOHMS. ALL CAPACITOR VALUES IN MICROFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF MICROFARADS, INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH MILLIHENRYS OR H HENRYS.

VOLTAGE READINGS

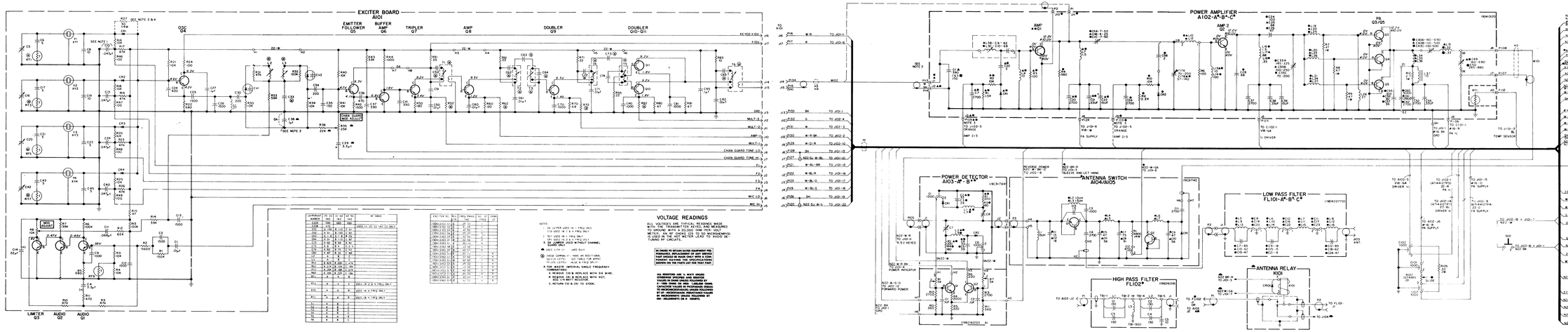
READINGS MEASURED FROM TRANSISTOR PIN TO GROUND WITH A 20,000 OHM-PER-VOLT METER.

(19C311817, Rev. 1)

OUTLINE DIAGRAM



(19B216403, Rev. 0)
(19B216160, Sh. 1, Rev. 0)
(19B216160, Sh. 2, Rev. 0)



(19B621245, Rev. 8)

(19B621247, Rev. 9)

PARTS LIST

LBI-3954E

25-50 KHz TRANSMITTER
MODELS 4ET84A10-27, 31-47
19D413173G1 25-33 MHz (WITH ANTENNA RELAY)
19D413173G2 33-42 MHz (WITH ANTENNA RELAY)
19D413173G3 42-50 MHz (WITH ANTENNA RELAY)
19D413173G4 42-50 MHz (WITH ANTENNA SWITCH)
19D413173G5 33-42 MHz (WITH ANTENNA SWITCH)

SYMBOL	GE PART NO.	DESCRIPTION
A101		EXCITER BOARD 19D413163G1 THRU G8 G1 (4ET84A10,20,41) 1 Freq 25-33 MHz G2 (4ET84A11,20,21,40) 1 Freq 33-42 MHz G3 (4ET84A12,21,32,41) 1 Freq 42-50 MHz G4 (4ET84A13,22) 2 Freq 25-33 MHz G5 (4ET84A14,23,34,43) 2 Freq 33-42 MHz G6 (4ET84A15,24,35,44) 2 Freq 42-50 MHz G7 (4ET84A16,25,36) 4 Freq 25-33 MHz G8 (4ET84A17,26,37,46) 4 Freq 33-42 MHz (4ET84A18,27,38,47) 4 Freq 42-50 MHz
		- - - - - - - CAPACITORS - - - - - - - -
C1	19A116080P1	Polyester: 0.01 µF ±20%, 50 VDC.
C2	7491395P111	Ceramic disc: 1500 pF ±10%, 500 VDCW; sim to RMC Type JL.
C4	5496267P9	Tantalum: 3.3 µF ±20%, 15 VDCW; sim to Sprague Type 150D.
C5	5491271P105	Variable, sub-miniature: approx 1.9-10.5 pf, 750 v peak; sim to EF Johnson 189.
C6	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM.
C7*	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM. Deleted in 19D413163G1,2,4,5,7,8 by REC C. Deleted in 19D413163G3,6,9 by REV D.
C8	5496219P41	Ceramic disc: 10 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C9	5494481P111	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C10	19A116080P5	Polyester: 0.047 µF ±20%, 50 VDC.
C11	19A116080P6	Polyester: 0.068 µF ±20%, 50 VDC.
C12 and C13	7491395P111	Ceramic disc: 1500 pF ±10%, 500 VDCW; sim to RMC Type JL.
C14	5496267P10	Tantalum: 22 µF ±20%, 15 VDCW; sim to Sprague Type 150D.
C15	19A116080P5	Polyester: 0.047 µF ±20%, 50 VDC.
C16	5491271P105	Variable, sub-miniature: approx 1.9-10.5 pf, 750 v peak; sim to EF Johnson 189.
C17	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM.
C18*	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM. Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
C19	5496219P41	Ceramic disc: 10 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C20	5491271P105	Variable, sub-miniature: approx 1.9-10.5 pf, 750 v peak; sim to EF Johnson 189.
C21	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM.
C22*	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW; temp coef 0 PPM. Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
C23	5496219P36	Ceramic disc: 5 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C24	5496372P177	Ceramic disc: 820 pF ±10%, 500 VDCW, temp coef -3300 PPM.
C25 and C26	5493367P1500K	Mica: 1500 pF ±10%, 100 VDCW; sim to Electro Motive Type DM-20.
C27	19A116080P7	Polyester: 0.1 µF ±20%, 50 VDCW.
C28	19A116080P5	Polyester: 0.047 µF ±20%, 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C30	5496372P349	Ceramic disc: 220 pF ±10%, 500 VDCW, temp coef -4700 PPM.
C30A	7147203P4	Silver mica: 680 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C33B	5490008P143	Silver mica: 470 pF ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C34	5496372P349	Ceramic disc: 220 pF ±10%, 500 VDCW, temp coef -4700 PPM.
C35	5490008P131	Silver mica: 150 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C36	5490008P143	Silver mica: 470 pF ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C37	5490008P141	Silver mica: 390 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C40	19A116080P5	Polyester: 0.047 µF ±20%, 50 VDC.
C41	5490008P139	Silver mica: 330 pF ±10%, 500 VDCW; sim to Electro Motive DM-15.
C42	5491271P105	Variable, sub-miniature: approx 1.9-10.5 pf, 750 v peak; sim to EF Johnson 189.
C43	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW, temp coef 0 PPM.
C44*	19C300685P93	Ceramic disc: 5 pF ±25%, 500 VDCW, temp coef 0 PPM. Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
C45	5496219P36	Ceramic disc: 5 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C50	19A116080P1	Polyester: 0.01 µF ±20%, 50 VDC.
C51	19A116080P7	Polyester: 0.1 µF ±20%, 50 VDC.
C52A	5496219P263	Ceramic disc: 100 pF ±5%, 500 VDCW, temp coef -80 PPM.
C52B	5496219P264	Ceramic disc: 110 pF ±5%, 500 VDCW, temp coef -80 PPM.
C52C	5496219P262	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C60 and C61	19A116080P1	Polyester: 0.01 µF ±20%, 50 VDC.
C62A	5496219P262	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C62B	5496219P263	Ceramic disc: 100 pF ±5%, 500 VDCW, temp coef -80 PPM.
C62C	5496219P261	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -80 PPM.
C63A	5491601P124	Phenolic: 1.8 pF ±5%, 500 VDCW.
C63B	5491601P127	Phenolic: 2.4 pF ±5%, 500 VDCW.
C64A	5496219P262	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C64B	5496219P264	Ceramic disc: 110 pF ±5%, 500 VDCW, temp coef -80 PPM.
C64C	5496219P261	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -80 PPM.
C70	5494481P111	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C71	19A116080P1	Polyester: 0.01 µF ±20%, 50 VDC.
C72A	5496219P261	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -80 PPM.
C72B	5496219P259	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef -80 PPM.
C73A	5496219P39	Ceramic disc: 8 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C73B	5496219P35	Ceramic disc: 4 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C73C	5491601P127	Phenolic: 2.4 pF ±5%, 500 VDCW.
C74A	5496219P261	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -80 PPM.
C74B	5496219P260	Ceramic disc: 75 pF ±5%, 500 VDCW, temp coef -80 PPM.
C74C	5496219P254	Ceramic disc: 43 pF ±5%, 500 VDCW, temp coef -80 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C80* and C81*	5494481P11	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV B:
	5494481P107	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C82	19A116080P1	Polyester: 0.01 µF ±20%, 50 VDC.
C83A	5496219P255	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef -80 PPM.
C83B	5496219P250	Ceramic disc: 30 pF ±5%, 500 VDCW, temp coef -80 PPM.
C83C*	5496219P250	Ceramic disc: 30 pF ±5%, 500 VDCW, temp coef -80 PPM. In REV B and earlier:
	5496219P252	Ceramic disc: 36 pF ±5%, 500 VDCW, temp coef -80 PPM.
C95	19A116080P7	Polyester: 0.1 µF ±20%, 50 VDC.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR4	19A115603P1	Silicon.
CV1 and CV2	5495769P8	Varactor, silicon: 33 pF ±20% at 4 VDC; sim to Pacific Semiconductors Varicap Type V-365.
		- - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J17	4033513P4	Contact, electrical: sim to Bead Chain LS3-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	7488079P48	Choke, RF: 27 µh ±10%, 1.40 ohms DC res max; sim to Jeffers 4422-8K.
L2A	19D402809G15	Coil. Includes tuning slug 5491798P1.
L2B	19D402809G16	Coil. Includes tuning slug 5491798P1.
L2C	19D402809G17	Coil. Includes tuning slug 5491798P1.
L3A	19D402809G15	Coil. Includes tuning slug 5491798P1.
L3B	19D402809G16	Coil. Includes tuning slug 5491798P1.
L3C	19D402809G17	Coil. Includes tuning slug 5491798P1.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q3	19A115889P1	Silicon, NPN.
Q4	19A115530P1	Silicon, NPN.
Q5	19A115123P1	Silicon, NPN.
Q6 thru Q9	19A115530P1	Silicon, NPN.
Q10* and Q11*	19A116201P1	Silicon, NPN. Earlier than REV A:
	19A116059P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	38779154K	Composition: 0.15 megohm ±10%, 1/2 w.
R2	3877952K	Composition: 5600 ohms ±10%, 1/2 w.
R3 and R4	3877P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R5	3877D681K	Composition: 680 ohms ±10%, 1/2 w.
R6	3877P104K	Composition: 0.10 megohm ±10%, 1/2 w.
R7	3877P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R8	19D209358P106	Variable, carbon film: approx 300 to 10,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R9 and R10	3877P473J	Composition: 47,000 ohms ±5%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
R11	3877P471J	Composition: 470 ohms ±5%, 1/2 w.
R12	3877P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R13	3877P124K	Composition: 0.12 megohm ±10%, 1/2 w.
R14	3877P393J	Composition: 39,000 ohms ±5%, 1/2 w.
R15	3877P470K	Composition: 47 ohms ±10%, 1/2 w.
R16	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R17	3877P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R18	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R19	3877P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R20 and R21	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R22	3877P681K	Composition: 680 ohms ±10%, 1/2 w.
R23	3877P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R24	3877P101K	Composition: 100 ohms ±10%, 1/2 w.
R25	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R26	3877P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R27	3815Z900J	Composition: 30 ohms ±5%, 1/4 w.
R30	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R31	3877P473J	Composition: 47,000 ohms ±5%, 1/2 w.
R32	3877P124J	Composition: 0.12 megohm ±5%, 1/2 w.
R33	3877P563K	Composition: 56,000 ohms ±10%, 1/2 w.
R34	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R40 and R41	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R42	3877P152K	Composition: 1500 ohms ±10%, 1/2 w.
R43	3877P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R44	3877P102K	Composition: 1000 ohms ±10%, 1/2 w.
R45 thru R49	3877P101K	Composition: 100 ohms ±10%, 1/2 w.
R50	3877P181K	Composition: 180 ohms ±10%, 1/2 w.
R51	3877P330K	Composition: 33 ohms ±10%, 1/2 w.
R52A	3877P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R52B	3877P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R52C	3877P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R60	3877P121K	Composition: 120 ohms ±10%, 1/2 w.
R61	3877P220K	Composition: 22 ohms ±10%, 1/2 w.
R62A	3877P273K	Composition: 27,000 ohms ±10%, 1/2 w.
R62B	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R62C	3877P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R70	3877P680K	Composition: 68 ohms ±10%, 1/2 w.
R71	3877P220K	Composition: 22 ohms ±10%, 1/2 w.
R72A	3877P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R72B	3877P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R72C	3877P273K	Composition: 27,000 ohms ±10%, 1/2 w.
R80 and R81	3877P470K	Composition: 47 ohms ±10%, 1/2 w.
R82A	3877P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R82B	3877P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R82C	3877P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R83	3877P100K	Composition: 10 ohms ±10%, 1/2 w.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1A	19B209284P12	Disc: 600 ohms DC res; sim to GE 16D2134.
RT1B	19B209284P9	Disc: 330 ohms DC res; sim to GE 16D3119.

SYMBOL	G-E PART NO	DESCRIPTION
RT2*	19B209284P13	Rod: 3200 ohms DC res; sim to GE 181126, Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
RT3A	19B209284P12	Disc: 600 ohms DC res; sim to GE 16D2134.
RT3B	19B209284P9	Disc: 330 ohms DC res; sim to GE 16D3119.
RT4*	19B209284P13	Rod: 3200 ohms DC res; sim to GE 181126, Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
RT5A	19B209284P12	Disc: 600 ohms DC res; sim to GE 16D2134.
RT5B	19B209284P9	Disc: 330 ohms DC res; sim to GE 16D3119.
RT6*	19B209284P13	Rod: 3200 ohms DC res; sim to GE 181126, Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
RT7A	19B209284P12	Disc: 600 ohms DC res; sim to GE 16D2134.
RT7B	19B209284P9	Disc: 330 ohms DC res; sim to GE 16D3119.
RT8*	19B209284P13	Rod: 3200 ohms DC res; sim to GE 181126. Deleted in 19D413163G1,2,4,5,7,8 by REV C. Deleted in 19D413163G3,6,9 by REV D.
RT9	5490828P40	Thermistor: 10,000 ohms ±10%, color code red and white; sim to Global Type 783E.
		- - - - - - - - TRANSFORMERS - - - - - - - -
T1A	19D402809G1	Coil. Includes tuning slug 5491798P2.
T1B	19D402809G2	Coil. Includes tuning slug 5491798P2.
T1C	19D402809G3	Coil. Includes tuning slug 5491798P2.
T2A	19D402809G4	Coil. Includes tuning slug 5491798P2.
T2B	19D402809G5	Coil. Includes tuning slug 5491798P2.
T2C	19D402809G6	Coil. Includes tuning slug 5491798P2.
T3A	19D402809G7	Coil. Includes tuning slug 5491798P2.
T3B	19D402809G8	Coil. Includes tuning slug 5491798P2.
T3C	19D402809G9	Coil. Includes tuning slug 5491798P2.
T4A	19D402809G10	Coil. Includes tuning slug 5491798P2.
T4B	19D402809G11	Coil. Includes tuning slug 5491798P2.
T4C	19D402809G12	Coil. Includes tuning slug 5491798P2.
T5A thru R95	19D402809G13 3815Z922K	Coil. Includes tuning slug 5491798P2. Composition: 22 ohms ±10%, 1/4 w.
T5B thru R95	19D402809K14 3815Z922K	Coil. Includes tuning slug 5491798P2. Composition: 22 ohms ±10%, 1/4 w.
T6A	19D402809G18	Coil. Includes tuning slug 5491798P2.
T6B	19D402809G19	Coil. Includes tuning slug 5491798P2.
T6C	19D402809G20	Coil. Includes tuning slug 5491798P2.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XT1 thru XT4		(See Mechanical Parts- EC-1759).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
		Crystal Freq. = Operating Freq. - 10
Y1 thru Y4	19B206175P1	Quartz: freq range 2083 to 2750 KHz, temp range -30°C to +85°C. (25-33 MHz)
Y1 thru Y4	19B206175P2	Quartz: freq range 2750 to 3500 KHz, temp range -30°C to +85°C. (33-42 MHz)
Y1 thru Y4	19B206175P3	Quartz: freq range 3500 to 4500 KHz, temp range -30°C to +85°C. (42-50 MHz)
A102A thru A102C		COMPONENT BOARD A102A 19D413139G1 (25-33 MHz) A102B 19D413139G2 (33-42 MHz) A102C 19D413139G3 (42-50 MHz)
		- - - - - - - - CAPACITORS - - - - - - - -
C1*	7489162P141	Silver mica: 390 pF ±10%, 500 VDCW; sim to Electro Motive Type DM-15. Deleted to 4ET84A12, 15, 18, 21, 24, 27, by REV A; 4ET84A32, 35, 38, 41, 44, 47, by REV B.
	5490008P141	Silver mica: 390 pF ±10%, 500 VDCW; sim to Electro Motive Type DM-15.

SYMBOL	G-E PART NO	DESCRIPTION
C7	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C9		(Part of L3B).
C10		(Part of L3C).
C11A	19B209408P103	Variable, mica: 7-50 pf, 400 VDCW.
C11B	19B209408P102	Variable, mica: 4-25 pf, 400 VDCW.
C11C	19B209408P103	Variable, mica: 7-50 pf, 400 VDCW.
C17A	19B209408P108	Variable, mica: 70-200 pF, 400 VDCW.
C17B	19B209408P106	Variable, mica: 37-140 pF, 400 VDCW.
C20	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C21	19A116080P10	Polyester: 0.33 µF ±20%, 50 VDC.
C22	5496267P14	Tantalum: 15 µF ±20%, 20 VDCW; sim to Sprague Type 150D.
C24	5496161P25	Phenolic: 2.0 pF ±10%, 500 VDCW.
C25	5494398P11	Mica: 100 pF ±10%, 500 VDCW; sim to Underwood J-1-BY.
C26	5494398P10	Mica: 68 pF ±10%, 500 VDCW; sim to Underwood J-1-BY.
C27	5494398P9	Mica: 47 pF ±10%, 500 VDCW; sim to Underwood J-1-BY.
C28	19A116655P63K60	Ceramic disc: 68 pF ±10%, 500 VDCW, temp coef 0 PPM.
C33A	19B209408P113	Variable, mica: 145-325 pF, 400 VDCW.
C33B	19B209408P110	Variable, mica: 100-250 pF, 400 VDCW.
C33C	19B209408P105	Variable, mica: 70-200 pF, 400 VDCW.
C37	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C38	19A116080P10	Polyester: 0.33 µF ±20%, 50 VDC.
C39	5496267P14	Tantalum: 15 µF ±20%, 20 VDCW; sim to Sprague Type 150D.
C43A	19A115917P203	Variable, compression mica: 180-690 pF, 500 VDCW; sim to Electro Motive Type 30 N.
C43B and C43C	19A115917P204	Variable, compression mica: 100-500 pF, 500 VDCW; sim to Electro Motive Type 30 N.
C48	19A115917P205	Variable, compression mica: 180-690 pF, 500 VDCW; sim to Electro Motive Type 30 N.
C49	19A115917P206	Variable, compression mica: 265-880 pF, 500 VDCW; sim to Electro Motive Type 30 N.
C50	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C52	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C53	19A116080P10	Polyester: 0.33 µF ±20%, 50 VDC.
C55	5496218P21	Ceramic disc: 100 pF ±10%, 500 VDCW, temp coef 0 PPM.
C56	5496218P20	Ceramic disc: 82 pF ±10%, 500 VDCW, temp coef 0 PPM.
C57	5496218P52	Ceramic disc: 36 pF ±10%, 500 VDCW, temp coef 0 PPM.
C58	5491601P25	Ceramic: 2.0 pF ±10%, 500 VDCW.
C59	19A116655P21	Ceramic disc: 3700 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C60	5494481P26	Ceramic disc: 5000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C61	5494481P30	Ceramic disc: 3900 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C62	5494481P28	Ceramic disc: 2700 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C63*	5490008P131	Silver mica: 150 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15. Added to 4ET84A12, 15, 18, 21, 24, 27, by REV A; 4ET84A32, 35, 38, 41, 44, 47, by REV B.
CR1 and CR2	19A115250P1	Silicon.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115250P1	Silicon.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J5	4033513P4	Contact, electrical: sim to Bead Chain LS3-3,
J6	4033284P2	Support.
J7 thru J11	4033513P4	Contact, electrical: sim to Bead Chain LS3-3,
J12		Part of RT1.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3B		COIL ASSEMBLY 19D413131G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C9	7489162P25	Silver mica: 82 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
	5491798P2	Tuning slug.
L3C		COIL ASSEMBLY 19D413131G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C10	7489162P23	Silver mica: 68 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
	5491798P2	Tuning slug.
L4	7488079P16	Choke, RF: 10 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7K.
L7	7488079P7	Choke, RF: 1.50 µh ±10%, 0.50 ohms DC res max; sim to Jeffers 4411-10K.
L10	19D413121G3	Coil.
L12	19D413121G4	Coil.
L13	7488079P16	Choke, RF: 10 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7K.
L14	7491382P101	Coil, RF: 100 µh ±10%, 4 ohms DC res max; sim to Electro Motive Series 3500.
L16	7488079P52	Choke, RF: 1.50 µh ±10%, 0.10 ohms DC res max; sim to Jeffers 4414-2K.
L17	7488079P32	Choke, RF: 0.68 µh ±10%, 0.10 ohms DC res max; sim to Jeffers 4412-3K.
L18	7488079P3	Choke, RF: 0.33 µh ±20%, 0.07 ohms DC res max; sim to Jeffers 4411-3K.
L19 thru L21	19D413121G5	Coil.
L22 thru L24	19D413121G6	Coil.
L25 thru L27	19D413121G7	Coil.
L28	7488079P66	Choke, RF: 27.0 µh ±10%, 0.36 ohms DC res max; sim to Jeffers 4424-2K.
L31	19B216108P1	Coil.
L32	19B216108P2	Coil.
L33	19B216108P9	Coil.
L34	19A122813P1	Coil.
L35	19A122813P2	Coil.
L36	19A122813P3	Coil.
L37	19B216365G1	Coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116028P1	Silicon, NPN.
Q3 thru Q5	19A116060P1	Silicon, NPN.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3877P152K	Composition: 1500 ohms ±10%, 1/2 w.
R2	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R3	3877P101K	Composition: 100 ohms ±10%, 1/2 w.
R4	3877P561K	Composition: 560 ohms ±10%, 1/2 w.
R5	3877P101K	Composition: 100 ohms ±10%, 1/2 w.
R7 thru R9	3878P470K	Composition: 47 ohms ±10%, 1 w.
R10	3877P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R11	3877P223K	Composition: 2200 ohms ±10%, 1/2 w.
R12	5490205P15	Composition: 2.7 ohms ±10%, 1 w.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1	19A122844G1	Thermistor assembly. Includes:
	4033513P14	Contact, electrical.
	19C300048P9	Resistor. Disc: 600 ohms ±10%; sim to GE 16D.
A103A and A103B		POWER DETECTOR A103A 19C311784G2 (25-33 MHz) A103B 19C311784G1 (33-50 MHz)
		(Includes Differential Amplifier Board, A1 which is Factory Calibrated).
		ANTENNA SWITCH A104 19C317142G1 A105 19C317142G2
A104 and A105		
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496219P244	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496219P245	Ceramic disc: 18 pF ±5%, 500 VDCW, temp coef -80 PPM.
C3	5494481P112	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C4	19A116655P22	Ceramic disc: 2700 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5	19A116656P47G8	Ceramic disc: 47 pF ±2%, 500 VDCW, temp coef -80 PPM.
C6	19A116656P56G8	Ceramic disc: 56 pF ±2%, 500 VDCW, temp coef -80 PPM.
C7	19A116656P75G1	Ceramic disc: 75 pF ±2%, 500 VDCW, temp coef -150 PPM.
C8	19A116656P91G3	Ceramic disc: 91 pF ±2%, 500 VDCW, temp coef -150 PPM.
C9	19A116656P47G8	Ceramic disc: 47 pF ±2%, 500 VDCW, temp coef -80 PPM.
C10	19A116656P56G8	Ceramic disc: 56 pF ±2%, 500 VDCW, temp coef -80 PPM.
C11	19A116655P22	Ceramic disc: 2700 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C13*	5491601P123	Phenolic: 1.5 pF ±5%, 500 VDCW. Added by REV A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115250P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	7488079P18	Coil, RF: 15.0 µH ±10%; sim to Jeffers 4421-9K.
L2	7488079P6	Coil, RF: 1.00 µH ±10%; sim to Jeffers 4411-8K.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
L3	7488079P7	Coil, RF: 1.50 µf ±10%, 0.50 ohms DC res max; sim to Jeffers 4411-10K.
L4	19B216005P11	Coil.
L5	19B216005P12	Coil.
L6	19B216005P11	Coil.
L7	19B216005P12	Coil.
J105		CONNECTOR ASSEMBLY 19B216515G1
	7104941P16	Receptacle.
	19A121436P1	Cap.
	19B204398P1	Can.
	19A127228P1	Hood.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P2 and P3	5491689P56	Cable, RF: approx 12 inches long.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A116179P2	Silicon, NPN.
		- - - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P682K	Composition: 6800 ohms ±10%, 1/4 w.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101 thru C103	5493392P7	Ceramic, feed-thru: 1000 pf +100% -0%, 500 VDCW; sim to Allen Bradley Type FA5C.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR101	4037822P1	Silicon.
		- - - - - - - - - - - FILTERS - - - - - - - - - - -
FL101A	19D402770G2	Low Pass Filter.
FL101B	19D402770G3	Low Pass Filter.
FL101C	19D402770G4	Low Pass Filter.
FL102	19B216319G1	High Pass Filter.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J101	19C303426G1	Connector: 20 pin contacts.
J102	19B205689G1	Connector: 18 pin contacts.
J103		(Part of FL101).
J104		(Part of K101).
		- - - - - - - - - - RELAYS - - - - - - - - - - -
K101	19B205631G1	Relay assembly. Includes J104.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P106	19B209151P1	Terminal, solderless.
P109	4029840P2	Contact, electrical; sim to Amp 42827-2.
P112	4029840P6	Contact, electrical; sim to Amp 12080-0.
P116 and P117	4029840P2	Contact, electrical: sim to Amp 42827-2.
P119 thru P123	4029840P2	Contact, electrical: sim to Amp 42827-2.
P124 thru P126	4029840P1	Contact, electrical: sim to AMP 41854.
P127	4029840P2	Contact, electrical: sim to Amp 42827-2.
P128	4029840P1	Contact, electrical: sim to AMP 41854.
P129 thru P133	4029840P2	Contact, electrical: sim to Amp 42827-2.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R102		(See RC-1759 items 14, 15).
R105	19B209022P3	Wirewound: .33 ohms ±5%, 2 w; sim to IRC Type BWH.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S101	4031922P1	Push: SPST, normally open push type, momentary contact, .50 amp at 12 VDC; sim to Stackpole Type SS-15.
		- - - - - - - - - - CABLES - - - - - - - - - -
W101		CABLE ASSEMBLY 19A121948G5
		- - - - - - - - - - PLUGS - - - - - - - - - -
P105	5491689P56	RF Cable assembly with molded phono plug on one end. Approx 11.50 inches long.
P107	4029840P1	Contact, electrical: sim to Amp 41854.
P108	4029840P2	Contact, electrical: sim to Amp 42827-2.
W102		CABLE ASSEMBLY 19A127143G3
		- - - - - - - - - - PLUGS - - - - - - - - - -
P113	4029840P2	Contact, electrical: sim to Amp 42827-2.
P114 and P115	4029840P1	Contact, electrical: sim to Amp 41854.
P134	4029840P2	Contact, electrical: sim to Amp 42827-2.
	19B209044P19	RF Cable: approx 16 inches long.
		HARNESS ASSEMBLY 19D413174G6 25-33 MHz 19D413174G7 33-50 MHz (Includes J101, J102, P106, P109, P112, P116, P117, P119-P133)
		MECHANICAL PARTS (SEE RC-1759)
1	19C311781P1	Heat sink.
2	19B216290G1	Cover (A102).
3	7160861P16	Nut, sheet spring.
4	19A122805G2	Support.
5	4033089P1	Clip, spring tension (Part of XY1-XY4).
6	19C311172P2	Socket (Part of XY1-XY4).
7	19A115793P1	Contact (Part of XY1-XY4).
8	19B200525P9	Rivet (Part of XY1-XY4).
9	19C303396G1	Top cover.
10	19A121676P1	Guide pin.
11	19C311816G1	Heat sink (A102).
12	19A127296P1	Support.
13	7160861P4	Nut, sheet spring.
14	19A127071P1	Strap (Part of R102).
15	19A127073P1	Slide (Part of R102).
16	19C303396G3	Bottom cover.
17	19B205206G2	Chassis.
18	19A116065P1	Spring (Ground for A102 heat sink).
19	4035439P4	Heat sink. (Used with Q1 and Q2 in A104 and A105).
20	4036555P1	Insulator, disc. (Used with Q1 and Q2 in A104 and A105).
21	4035656P9	Spacer.

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.

Exciter Board (19D413163-G1 thru -G9)

REV. A - To incorporate new transistor. Changed Q10 and Q11.

REV. B - To make the exciter more stable. Changed C80, C81 and T5.

REV. A - Power Amplifier Board (19D413174G4,5)
To center the pass-band of the circuit.
Added C13.

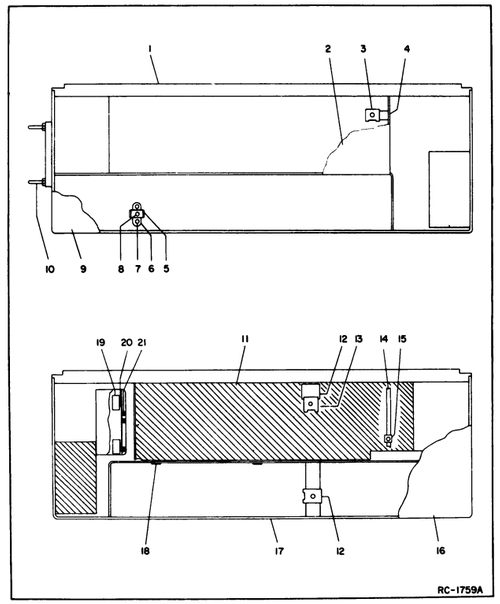
REV. A - Power Amplifier Board (19D413174G3)
To improve tuning at the high end of the band.
Deleted C1 and added C63.

REV. B - Power Amplifier Board (19D413174G4)
To improve tuning at the high end of the board.
Deleted C1 and added C63.

REV. C - Exciter Board (19D413163G3, 6, 9, 12)
To improve band-ending.

REV. C - Exciter Board (19D413163G1, 2, 4, 5, 7, 8, 10, 11, 13 thru 18)
To improve temperature compensation.

REV. D - Exciter Board (19D413163G3, 6, 9, 12)
To improve temperature compensation.



4ET84A10-27

PARTS LIST

LBI-3938C

CHANNEL GUARD ENCODER
MODEL 4EH18A10
19B216161G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496267P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C2	19B209243P15	Polyester: 0.22 µf ±20%, 250 VDCW.
C3	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 and CR2	5494922P1	Silicon.
		- - - - - - - - - TONE NETWORKS - - - - - - - - -
FL1	19B205280	Tone Detector. (Check group numbers for desired frequency).
	G1	71.9 Hz
	G2	77.0 Hz
	G3	82.5 Hz
	G4	88.5 Hz
	G5	94.8 Hz
	G6	100.0 Hz
	G7	103.5 Hz
	G8	107.2 Hz
	G9	110.9 Hz
	G10	114.8 Hz
	G11	118.8 Hz
	G12	123.0 Hz
	G13	127.3 Hz
	G14	131.8 Hz
	G15	136.5 Hz
	G16	141.3 Hz
	G17	146.2 Hz
	G18	151.4 Hz
	G19	156.7 Hz
	G20	162.2 Hz
	G21	167.9 Hz
	G22	173.8 Hz
	G23	179.9 Hz
	G24	186.2 Hz
	G25	192.8 Hz
	G26	203.5 Hz
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J4	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q3	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P244J	Composition: .24 megohm ±5%, 1/2 w.
R2	3R77P682J	Composition: 6800 ohms ±5%, 1/2 w.
R3	19A116278P233	Metal film: 2150 ohms ±2%, 1/2 w.
R4	19A116278P65	Metal film: 46.4 ohms ±2%, 1/2 w.
R5	19A116278P301	Metal film: 10,000 ohms ±2%, 1/2 w.
R6	19A116278P329	Metal film: 19,600 ohms ±2%, 1/2 w.
R7	19A116278P412	Metal film: 0.13 megohm ±2%, 1/2 w.
R8	19A116278P285	Metal film: 7500 ohms ±2%, 1/2 w.
R9	19A116278P117	Metal film: 147 ohms ±2%, 1/2 w.
R10	19A116278P269	Metal film: 5110 ohms ±2%, 1/2 w.
R11	3R77P102J	Composition: 1000 ohms ±5%, 1/2 w.
R12	19A116278P365	Metal film: 46,400 ohms ±2%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1	5490828P36	Thermistor: 55,000 ohms ±10%, color code black/red; sim to Globar Type 723-B.
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W1	19A121920G3	Cable assembly. Includes socket (XFL1), approx 4.25 inches long.
		- - - - - - - - - - SOCKETS - - - - - - - - - - -
XFL1		(Part of W1).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B216186G1	Cable assembly. (Connects to J1 thru J4).
	4029840P2	Contact, electrical: sim to Amp 42827-2. (Connects to J1, J3, J4).
	4029840P1	Contact, electrical: sim to AMP 41854. (Connects to J2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES