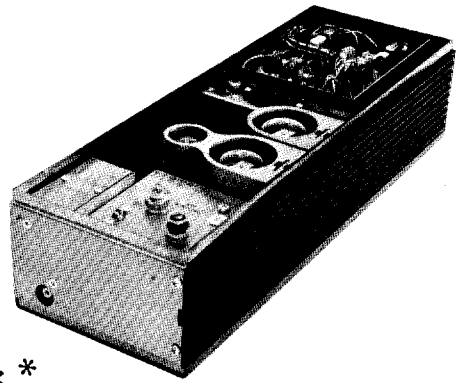
COMMUNICATIONS

MASTR Progress Line

25—50 MHz 100-WATT TRANSMITTER MODELS 4ET55A40-57 & 4ET55B10-18



SPECIFICATIONS *

FCC Filing Designation:	**ET-55-A (Narrow Band)** **ET-55-B (Wide Band)**
Frequency Range:	25-50 MHz
Power Output:	100 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 ±13.5 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:	100-Watt Transmitter with no Options: 3 tubes 6 transistors 4 diodes
Maximum Frequency Spacing:	0.4%
Duty Cycle: Mobile-	20% transmit (one minute transmit, four minutes off).
Station-	Continuous

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

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ILLUSTRATIONS

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-55-A and ET-55-B are crystal-controlled, phase-modulated transmitters designed for one-, two- or four-frequency operation within the 25-50 megahertz band. The transmitter consists of the following modules:

- Transistorized Exciter Board, with audio, oscillator modulator, amplifier and multiplier stages,
- Tubed multiplier and power amplifier stages,
- Optional Channel Guard Low-Pass Filter (ET-55-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.

CIRCUIT ANALYSIS

Six silicon transistors and only three tubes are used in the transmitter to provide a minimum power output of 100 watts. The frequency of the crystals used ranges from 2 to 4.2 megahertz, and the crystal frequency is multiplied 12 times.

A centralized metering jack (J102) is provided for use with General Electric Test Set 4EX3A10 or 4EX8K10, 11. 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.

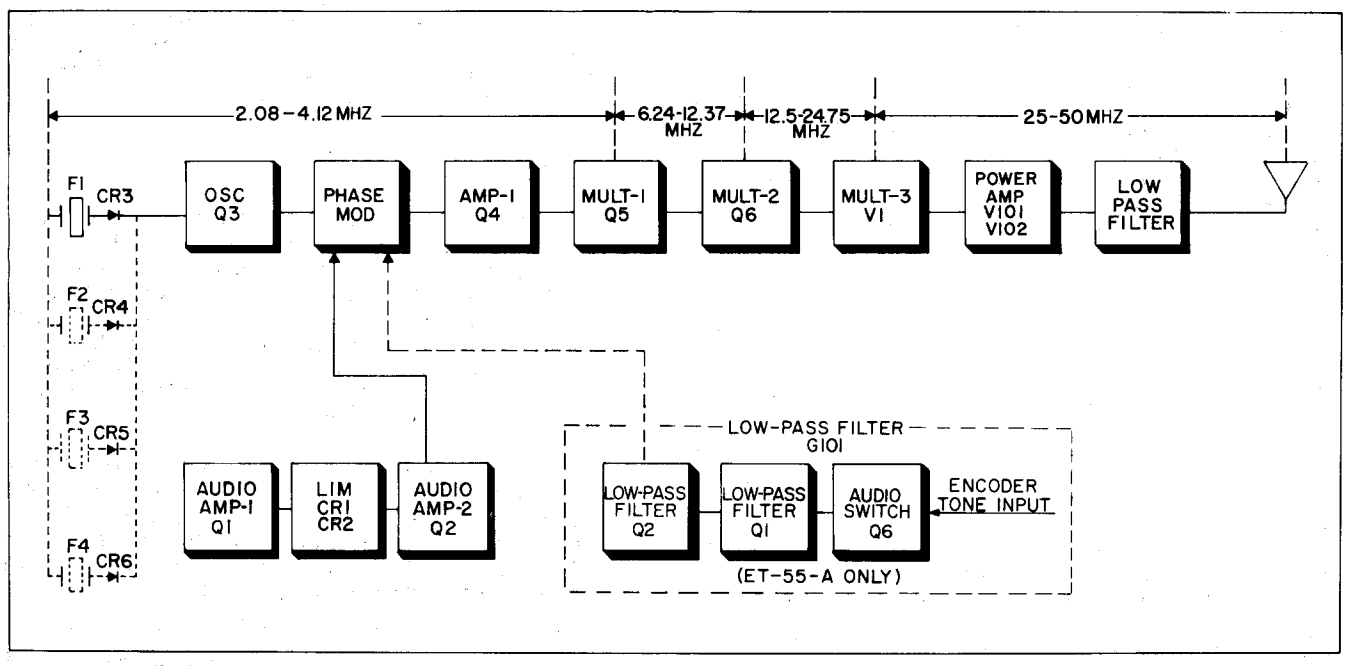
POWER INPUTS

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-55-A only)
Pin 15— -20 volts for Exciter Board

OSCILLATOR

A transistorized Colpitts oscillator (Q3) is used in the transmitter. The



RC-1689

Figure 1 - Transmitter Block Diagram

oscillator crystal is thermistor compensated at both ends of the temperature range to provide instant frequency compensation with a frequency stability of ±0.0005% 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 C41/C42. The oscillator output is coupled directly 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 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. R48 and C74 provide RF de-coupling.

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 stage. 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 R14 to a combined post-limiter filter and de-emphasis network. This network consists of R17, R18, R19, C5, C8, C9 and C49. The output of the filter and de-emphasis network is applied directly to the phase modulator.

PHASE MODULATOR

The phase modulator is a varactor (voltage-variable capacitor) CV1 in series with tuneable coil L1. 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 CV1, resulting in a phase modulated output. The output of the modulator is coupled through blocking capacitor C51 to the base of the first amplifier. For Channel Guard and Wide Band transmitters, a second modulator stage (L2 and CV2) is cascaded with the first modulator. The output of the Channel Guard encoder is fed through CHANNEL GUARD MOD ADJUST R20 to the modulator stages. The voice audio is also applied to both modulator stages.

AMPLIFIERS, 1ST AND 2ND MULTIPLIERS

The first amplifier (Q4) isolates the modulator from the loading effects of the first multiplier and provides amplification. The output is DC-coupled to the first multiplier. Metering resistor R41 permits the MULT-1 stage to be metered at centralized metering jack J102-10.

Following Q4 are two inductively coupled Class C, common-emitter multiplier stages (Q5 and Q6). Q5 is a tripler, with collector tank L3 tuned to three times the crystal frequency.

Q6 operates as a doubler stage, with collector tank T1 tuned to six times the crystal frequency. Resistor R43 is for metering the MULT-2 stage at J102-2.

THIRD MULTIPLIER

The output of the transistorized Exciter is coupled by a short length of RF cable to the grid tank (L9/L10/L11) of beam pentode V1. This stage operates as a doubler with the plate tank tuned to 12 times the crystal frequency.

The grid of V1 is metered through metering resistors R1 and R2 at J102-4. The combination of R1, R2 and R3 drops the bias voltage to approximately -11 volts to protect V1 against loss of drive. Plate voltage is supplied through R7 and L1/L2.

When measuring grid current to V1, there will be a residual reading of approximately 0.16 volts without any drive. This is caused by the presence of fixed voltage to the grid of the tube.

POWER AMPLIFIER

The output of the MULT-3 stage is coupled through L1/L2 and L6/L7 to the grids of the two compactron beam power amplifiers (V101 and V102) operating in parallel. PA grid drive is metered at J102-6 and J102-14 by measuring voltage drop across R11. Bias voltage (-45) volts is applied to the PA grids through R8, R11 and L6/L7. There is no residual reading on the PA.

Plate current is metered from J102-1 to J102-9 across metering resistor R102. Plate voltage is supplied through L101. The PA plate tank is shunt-tuned by capacitor C110/C112. R18, R19, R21 and R22 are the screen grid dropping resistors.

WARNING

The meter leads are at plate potential (high B+) when metering the PA plate at J102-1 and J102-9.

Placing the TUNE-OPERATE switch (S102) in the OPERATE position applies 300 volts to A145/A146/A147-J3 and J7. The 300 volts appearing on each side of R17 effectively shorts the resistor out of the circuit, and R18 and R19 (for V101) and R21 and R22 (for V102) are in series for normal operation of V101 and V102. When S102 is in the TUNE position, the screen voltage is applied to J3 only. Now, dropping resistors R17, R18 and R19 (for V101) and R11, R21 and R22 (for V102) are in series to reduce the screen voltage. This reduces the plate dissipation of V101 and V102 while tuning the power amplifier stage. Feedback through C122 neutralizes the stage.

Antenna coupling is achieved by varying the coupling between L115, L116, L117 and L110/L111/L112. The antenna circuit is tuned by C111.

The RF output from the antenna coil is fed to low-pass filter FL101/FL102/FL103. 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

Low Pass Filter (G101)

In encode-decode combinations, low-pass filter G101 is assembled on a printed wiring board that mounts on the underside of the MASTR transmitters. The filter is supplied by a regulated +10 volts and a regulated -20 volts. The +10 volts is applied continuously (even in the STANDBY position), and the -20 volts is applied only when the transmitter is keyed.

Keying the transmitter applies the encoder tone (from the receiver) to low-pass filter G101. Transistors Q1 and Q2 form a two-section, active low-pass filter that reduces tone distortion and power supply ripple. Q6 operates as a tone switch, applying the tone input to the filter whenever +10 volts is applied to J1 (Q6 base). Thermistor RT1 keeps the output constant over wide variations in temperature. The filter output is coupled to the tone modulator on the transmitter exciter board through Channel Guard MOD ADJUST R20 Instructions for setting R20 are contained in the Modulation Adjustment section of the Transmitter Alignment Procedure.

The channel can be monitored before transmitting a message by moving the CG-OFF switch on the Control Unit to the OFF position, or by removing the microphone or handset from the operational hang-up bracket.

Encoder Model 4EH17A10 (Optional)

In encode only combinations, encoder Model 4EH17A10 mounts on the underside of the MASTR transmitter. The encoder is supplied by a regulated +10 volts and a regulated -20 volts. The +10 volts is applied to Q3, Q4 and Q5 continuously (even in the STANDBY position). The -20 volts is applied to Q1 and Q2 only when the transmitter is keyed.

The encoder tone is provided by selective oscillators Q3 and Q4, which oscillate continuously at a frequency determined by the tone network (FL1). Negative feedback, applied through the tone network to the base of Q3, prevents any gain in the stage except at the desired encode frequency.

Thermistor-resistor combination R14 and RT2 provides temperature compensation for the oscillator output. Limiter diodes CR1 and CR2 keep the tone amplitude constant.

Keying the transmitter applies -20 volts to the two-stage, active low-pass filter (Q1 and Q2) turning them on. The oscillator output is then coupled through emitter-follower Q5 to the low-pass filter. Thermistor RT1 keeps the filter output constant over wide variations in temperatures.

The output of the filter is applied to the tone modulator on the transmitter exciter board through Channel Guard MOD ADJUST R20. Instructions for setting R20 are contained in the Modulation Adjustment section of the Transmitter Alignment Procedure.

The channel can be monitored before transmitting a message by moving the CG-OFF switch on the Control Unit to the OFF position, or by removing the microphone or handset from the operational hang-up bracket.

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. 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.

NOTE

To replace tubes, loosen screws holding tube shields and slide shields off.

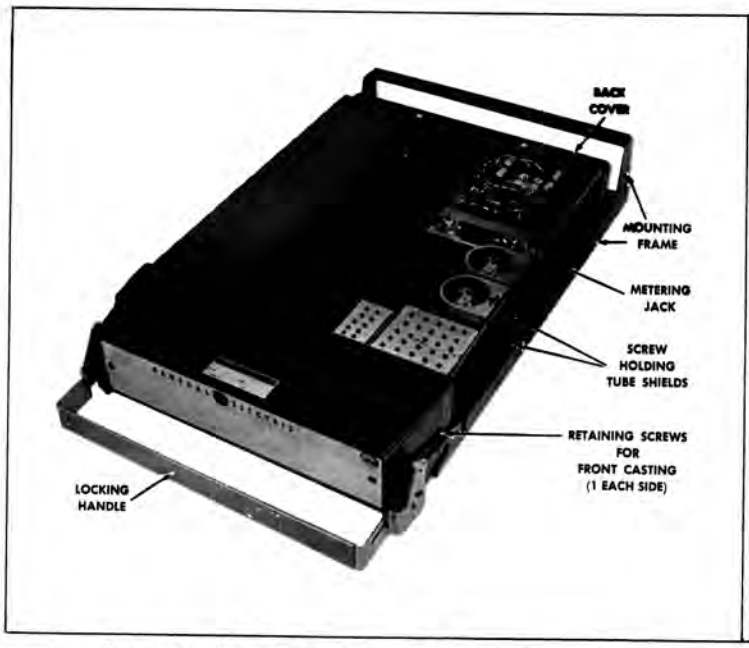


Figure 2 - Top Cover Removed

Figure 3 - Bottom Cover Removed

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-through connector at the back of the transmitter, and slide the unit out of the system frame.

MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R14) was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the averate 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. Audio oscillator Model 4EX6A10
2. A frequency modulation monitor
3. An output meter of a VTVM
4. GE Test Set Model 4EX3A10

PROCEDURE

1. Connect the audio oscillator and the meter across audio input terminals J5 (Green-Hi) and J6 (Black-Lo) and 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 (R14) 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 (R20) for 0.75-kHz tone deviation. The 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 lrads to J7 and J8 on Exciter Board, or by switching to a non-Channel Guard frequency in multi-frequency units. Next, apply a 1.0 volt signal at 1000 Hz and set MOD ADJUST (R14) for 3.75-kHz deviation (4.5 kHz minus 0.75 kHz tone deviation).
5. For multifrequency transmitters, set the deviation as described in Steps 3 or 4 on the channel producting the largest amount of deviation.

PA POWER INPUT

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

$$P_i = \frac{\text{Plate Voltage X Plate Current Indication}}{2.5}$$

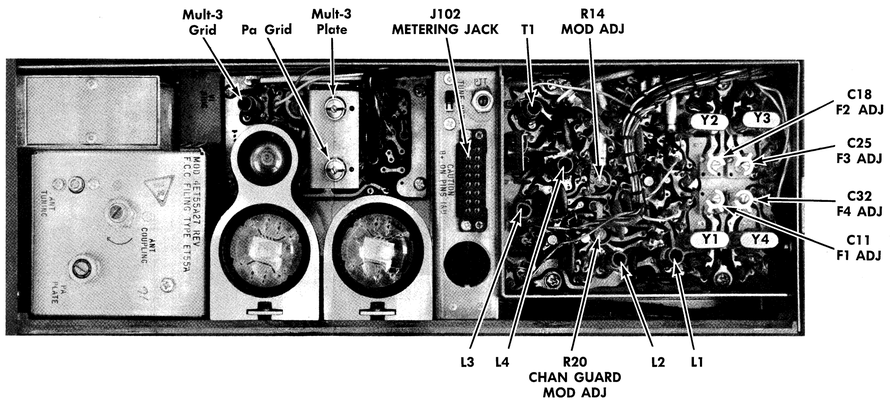
where:

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).

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



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. General Electric Test Set Model 4EX3A10, 4EX8K10 or 11, Station Metering Switching Panel 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. For a large change in frequency or a badly mis-aligned transmitter, set crystal trimmer C11 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 7).
3. Place the TUNE-OPERATE switch (S102) in the TUNE position.
4. Connect GE Test Set to the Transmitter Centralized Metering Jack J102. If using Multimeter, connect the positive lead to J102-16 (Ground) except for Steps 6 through 14.
5. For a large change in frequency or a badly misaligned transmitter, set the slugs in all slug-tuned coils in the center of the coil form. All slugs will then tune clockwise, except MULT-3 PLATE and PA GRID slugs which tune counterclockwise.
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 (and L2 with Channel Guard)	0.6 v (0.4 v Minimum)	Tuning the modulator is a critical adjustment. Carefully tune L1 for maximum meter reading. For Channel Guard or Wide Band transmitters, alternately tune L1 and L2 for maximum meter reading.
2.	A (MULT-1)	Pin 10	L3	See procedure	Tune L3 for a small dip in meter reading (not required unless changing frequency).
3.	B (MULT-2)	Pin 2	L4 and L3	0.65 v (0.4 v Minimum)	Tune L4 and then L3 for maximum meter reading. Then tune T1 for minimum meter reading (not required unless changing frequency). —— NOTE —— Misalignment of this coil may result in the remainder of the transmitter being tuned off frequency. Always start with the slug in the center of the coil form (at maximum inductance) and tune for the first peak.
			MULT-3 AND POWER AMPLIFIER		
4.	D (MULT-3)	Pin 4	MULT-3 GRID and T2 (on Exciter)	0.55 v (0.4 v Minimum)	Alternately tune MULT-3 GRID and T2 (on Exciter) for maximum meter reading. Then tune MULT-3 PLATE for slight change in meter reading (not required unless changing frequency).
5.	F (PA GRID)	Pin 14 (+) and Pin 6 (-)	PA GRID and MULT-3 PLATE	0.45 v (0.4 v Minimum)	Alternately tune PA GRID and MULT-3 PLATE for maximum meter reading.
6.					Rotate ANT COUPLING fully counterclockwise.
7.	G (PA PLATE)	WARNING High B-plus on Pins 1 and 9.		Minimum	For single-frequency transmitters, carefully tune PA PLATE for minimum meter reading.
		Pin 1 (+) and Pin 9 (-)	PA PLATE		For multi-frequency transmitters, switch to the lowest frequency and adjust PA PLATE for minimum meter reading.
8.					Place S102 in the OPERATE position.
9.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)	ANT COUPLING	See procedure	Rotate ANT COUPLING clockwise until meter reading rises slightly. In multi-frequency transmitters, switch back to the highest frequency before tuning ANT COUPLING.
10.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)	ANT TUNING	Maximum	Adjust ANT TUNING for maximum meter reading.
11.	G (PA PLATE)	Pin 1 (+) and Pin 9 (-)	ANT COUPLING	0.7 v	Adjust ANT COUPLING for metering reading of 0.7 volts.
12.	F (PA GRID)	Pin 14 (+) and Pin 6 (-)	PA GRID	Maximum	Readjust PA GRID for maximum meter reading.
			FREQUENCY ADJUSTMENT		
13.			C11, (C18, C25 and C32 in multi-frequency units)		With no modulation, adjust crystal trimmer C11 (on Exciter) for proper oscillator frequency. In multi-frequency units, adjust C18, C25 and C32 as required. 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

25—50 MHZ, 100-WATT TRANSMITTER
MODELS 4ET55A40-57 & 4ET55B10-18

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:

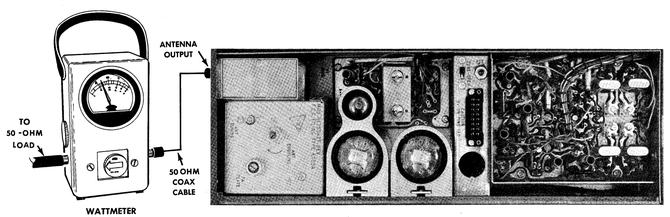
1. Wattmeter similar to:
   Bird #43
   Jones #711N
2. VTVM similar to:
   Triplett #850
   Heath #1M-21
3. Audio Generator similar to:
   GE Model 4EX6A10
   or Heath #1G-72
4. Deviation Meter (with a .75 kHz scale) similar to:
   Measurements #140
   Lampkin #205A
5. Multimeter similar to:
   GE METERING TEST SET MODEL 4EX3A10, 4EX8K10, 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 100 watts.

SERVICE CHECK

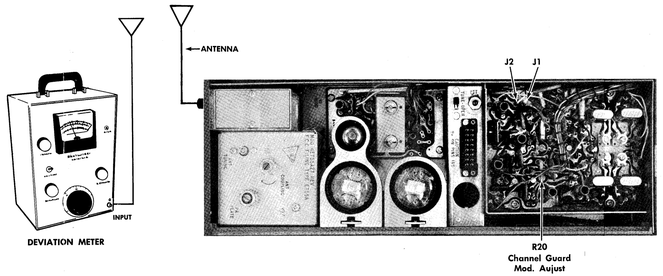
Refer to Service Hints on Transmitter Troubleshooting Procedure.

STEP 2

TONE DEVIATION WITH CHANNEL GUARD (ET-55-A)

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 (R20) for a reading of 0.75 kHz.

NOTES:

The Channel Guard MOD ADJUST (R20) 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

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 every time the Tone Frequency is changed.

SERVICE CHECK

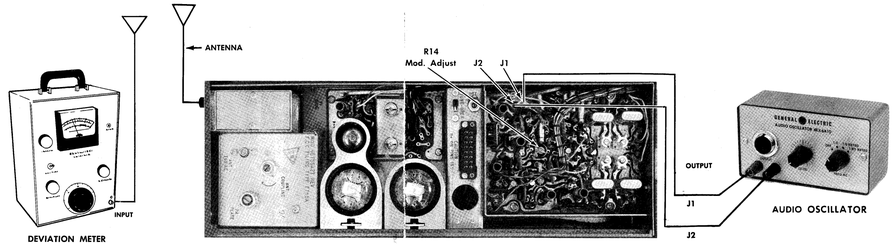
If the 0.75 kHz deviation is not obtainable when adjusting R20, replace the Tone Transmitter reed.

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 transfer 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" R14 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.

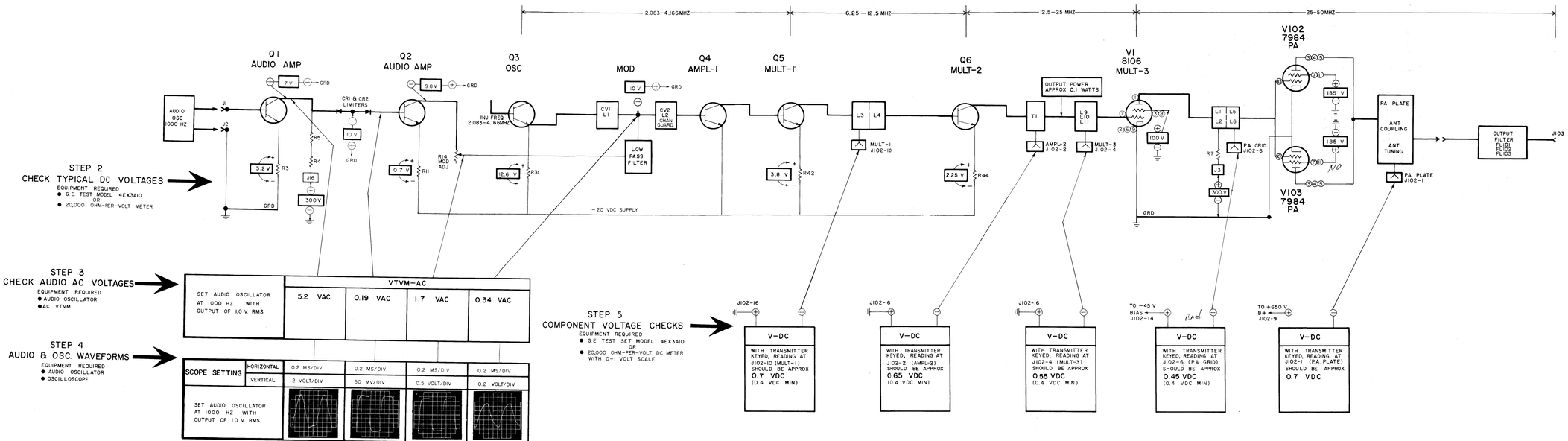
If the deviation reading plus (+) and minus (-) differs by more than 0.5 kHz (1.5 kHz wide band), check the following:

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.

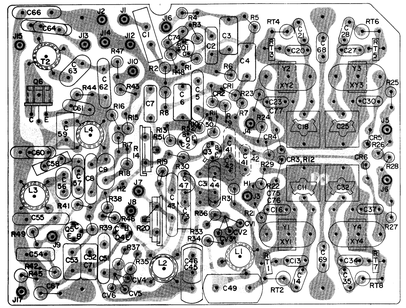
METER

STEP 1 — QUICK CHECKS

CHECK VOLTAGES AT CENTRALIZED METERING JACK J102 Multimeter - pin numbers GE Test Set - A thru G positions						
POWER OUTPUT	Pins 10 & 16 A	Pins 2 & 16 B	Pins 4 & 16 D	Pins 6 & 14 F	Pins 1 & 9 G	PROBABLE DEFECT
Low	0.7 v	0.65 v	0.6 v	0.4 v	0.7 v	Weak 7984
0	0.7 v	0.65 v	0.6 v	0	0	Open 7984
Low	0.7 v	0.65 v	0.6 v	Low or neg.	--	Weak 8106
0	0.7 v	0.65 v	0.15 v	0	0.4 v	8106 Fil. open
0	0.7 v	0.65 v	0.15 v	0	0	Open Fil. Fuse
0	0.7 v	0 or over 1.0 v	0.15 v	0	0.4 v	Defective Q6
0	Over 1.0 v	0	0.15 v	0	0.4 v	Shorted Q5 or Open Q4
0	0	0	0.15 v	0	0.4 v	Defective Q3- or Modulator (See note A)
NOTE A --- Localize trouble by checking:--						
1.	-20 volt DC supply at J102-12-16.					
2.	Measure 12.6 VDC across Q3 emitter resistor R31, then:					
(a)	Remove crystal - a slight variation in R31 voltage reading indicates Q3 stage operating properly.					
(b)	If no voltage is measured, check keying leads CR3-CR6, Q3.					
(c)	With crystal removed, short Q4 base to emitter. A voltage reading above 1.0 volt indicates Q4 and Q5 are operating properly. Defect may be in Modulator.					
(d)	If modulator is defective, check voltage variable diodes CV1 and CV2.					



EXCITER



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EXCITER READINGS TAKEN TO CHASSIS GROUND						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	+	−	+	
Q1	6.4K	6.8K	200K	12K	65K	22K
Q2	8.5K	5K	70K	13K	10K	10K
Q3	10K	6.5K	20K	2.9K	100	100
Q4	6.5K	3.1K	80K	8K	4.2K	1.5K
Q5	74.3	8K	4.2K	2.5K	470Ω	110Ω
Q6	6.7K	3.3K	6.5K	3.1K	70	70

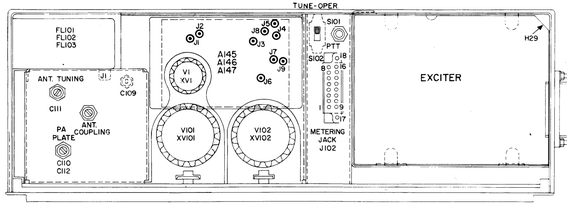
EXCITER READINGS TAKEN TO 20V LINE (J_ BLUE)						
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	−	+	−	+
Q1	13K	12K	220K	95K	3.1K	6.5K
Q2	1.2K	1.2K	65K	4.7K	16K	22K
Q3	2.0K	2K	6.2K	5.5K	3.3K	6.6K
Q4	C	0	3.3K	3.9K	10K	9.1K
Q5	360	390	10K	9.1K	3.3K	6.8K
Q6	60	120	0	0	3K	6.6K

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.

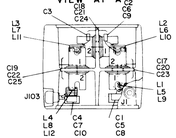
FOR READINGS OF:	USE SCALE:
1−100Ω	X 1
100 1K Ω	X 10
1K 50KΩ	X 1 000
50 ∞Ω	X 100 000

TOP VIEW

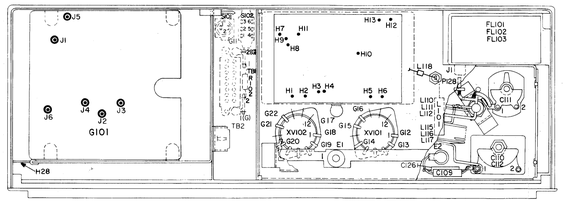


READINGS AT J101 TAKEN TO CHASSIS GROUND		
PIN	−	+
1	0	0
2	∞	∞
3	1.3Ω	1.3Ω
4	27K	27K
5	∞	∞
6	∞	∞
7	∞	∞
8	70K	70K
9	∞	∞
10	∞	∞
11	∞	∞
12	30K	16K
13	∞	∞
14	∞	∞
15	6.5K	3.1K
16	∞ 30K	∞ 16K
17	∞ 30K	∞ 16K
18	∞ 30K	∞ 16K
19	∞	∞
20	∞	∞

VIEW AT "A"



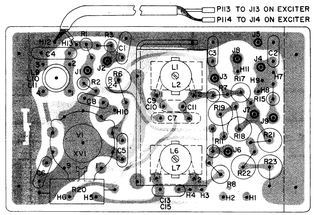
BOTTOM VIEW



READINGS FROM TUBE SOCKET PINS TO CHASSIS GROUND

PIN	1	2	3	4	5	6	7	8	9	10	11	12
XVI	27K	0	82K	1.2Ω	0	0	15K	82K	0			
XVI01	0	0	∞	∞	0	27K	0	0	75K	27K	1.3Ω	
XVI02	0	0	∞	∞	0	27K	0	0	75K	27K	1.3Ω	

(19B621250, Rev. 2)

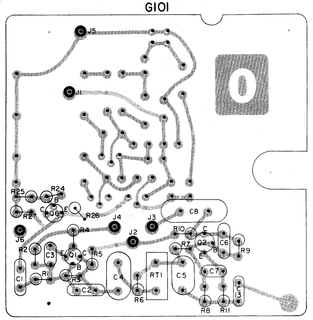


A145 - A147

(19B204613, Sh. 1, Rev. 1)
(19B204613, Sh. 2, Rev. 1)

LOW-PASS FILTER G101

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE



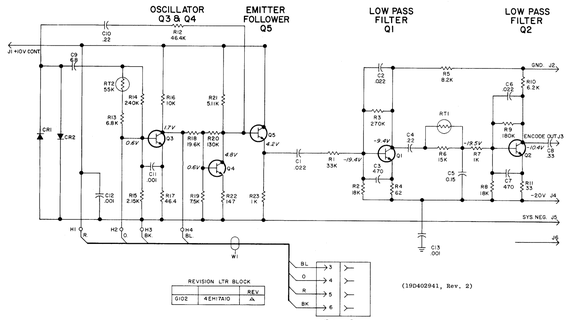
(19C311800, Sh. 1, Rev. 1)
(19C311800, Sh. 2, Rev. 1)

OUTLINE DIAGRAM

25—50 MHZ, 100-WATT TRANSMITTER
MODELS 4ET55A40-57 & 4ET55B10-18

CHANNEL GUARD ENCODER MODEL 4EH17A10

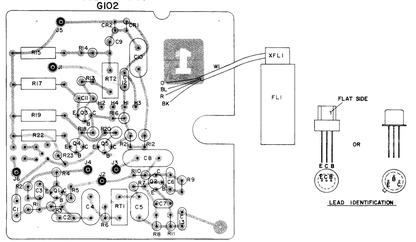
SCHEMATIC DIAGRAM



(19D402941, Rev. 2)

OUTLINE DIAGRAM

ENCODER
MODEL 4EH17A10
G102



(19C311861, Rev. 3)
(19C311800, Sh. 1, Rev. 1)
(19C311800, Sh. 2, Rev. 1)

✱ A101–A130 & A151–A165
REFER TO PARTS LIST FOR COMPONENTS WITH NO VALUE LISTED

COMPONENT NUMBER	25-33MHZ	33-42MHZ	42-50MHZ	COMPONENT NUMBER	25-33MHZ	33-42MHZ	42-50MHZ
RT1	A	A	B	C41	A820	E1000▲ A820	B390
RT2	A	A	B	C42			A680
RT3	A	A	B	C44	A150	A150	B820
RT4	A	A	B	C45	A 2200	B 1500	B 1500
RT5	A	A	B	C46	A 1500	B 1000	B 1000
RT6	A	A	B				
RT7	A	A	B	C52	A 470	A 470	B 390
RT8	A	A	B	C53	A 270	B 220	C 180
				C56	A 1000	A 1000	B 680
				C57	A 150	B 75	C 47
				C58	A 10	B 7	C 5
C31			A820	C59	A 1000	A 1000	B 680
				C60	A 150	B 75	C 47
				C63	A 270	B 150	C 82
				C64	A 240	B 180	C 100
				R31	A2.7K	A2.7K	B2.0K
				R33	A39K	B27K	C22K
				R34	A22K	B15K	C10K
				R35	A47K	A47K	B33K
				L1	A	B	C
				L2	A	B	C
				L3	A	F	B
				L4	A	B	B
				C71	A 680	A 680	B 470
				C73	A 100	A 100	B 82

▲ USED IN UNITS WITHOUT CHANNEL GUARD

MODEL NO.	FREQ. RANGE	NO. OF FREQ	CHAN. GD.	WIDE BAND
4ET55A40	25-33 MHZ	1		
4ET55A41	33-42 MHZ	1		
4ET55A42	42-50 MHZ	1		
4ET55A43	25-33 MHZ	2		
4ET55A44	33-42 MHZ	2		
4ET55A45	42-50 MHZ	2		
4ET55A46	25-33 MHZ	4		
4ET55A47	33-42 MHZ	4		
4ET55A48	42-50 MHZ	4		
4ET55A49	25-33 MHZ	1	X	
4ET55A50	33-42 MHZ	1	X	
4ET55A51	42-50 MHZ	1	X	
4ET55A52	25-33 MHZ	2	X	
4ET55A53	33-42 MHZ	2	X	
4ET55A54	42-50 MHZ	2	X	
4ET55A55	25-33 MHZ	4	X	
4ET55A56	33-42 MHZ	4	X	
4ET55A57	42-50 MHZ	4	X	
4ET55B10	25-33 MHZ	1		X
4ET55B11	33-42 MHZ	1		X
4ET55B12	42-50 MHZ	1		X
4ET55B13	25-33 MHZ	2		X
4ET55B14	33-42 MHZ	2		X
4ET55B15	42-50 MHZ	2		X
4ET55B16	25-33 MHZ	4		X
4ET55B17	33-42 MHZ	4		X
4ET55B18	42-50 MHZ	4		X

		REV.
	PL19E500877G4	
	PL19E500877G5	
	PL19E500877G6	
A101	PL19D402385G1	D
A102	PL19D402385G2	E
A103	PL19D402385G3	F
A106	PL19D402385G6	D
A107	PL19D402385G7	E
A108	PL19D402385G8	F
A111	PL19D402385G11	D
A112	PL19D402385G12	D
A113	PL19D402385G13	E
A116	PL19D402385G16	E
A117	PL19D402385G17	E
A118	PL19D402385G18	G
A121	PL19D402385G21	E
A122	PL19D402385G22	E
A123	PL19D402385G23	G
A126	PL19D402385G26	E
A127	PL19D402385G27	D
A128	PL19D402385G28	F
A151	PL19D402385G31	A
A152	PL19D402385G32	A
A153	PL19D402385G33	B
A156	PL19D402385G36	A
A157	PL19D402385G37	A
A158	PL19D402385G38	B
A161	PL19D402385G41	A
A162	PL19D402385G42	A
A163	PL19D402385G43	B

(19R621230, Rev. 3)

SCHEMATIC DIAGRAM

25—50 MHZ, 100-WATT TRANSMITTER
MODELS 4ET55A40-57 & 4ET55B10-18

PARTS LIST

LBI-3917B

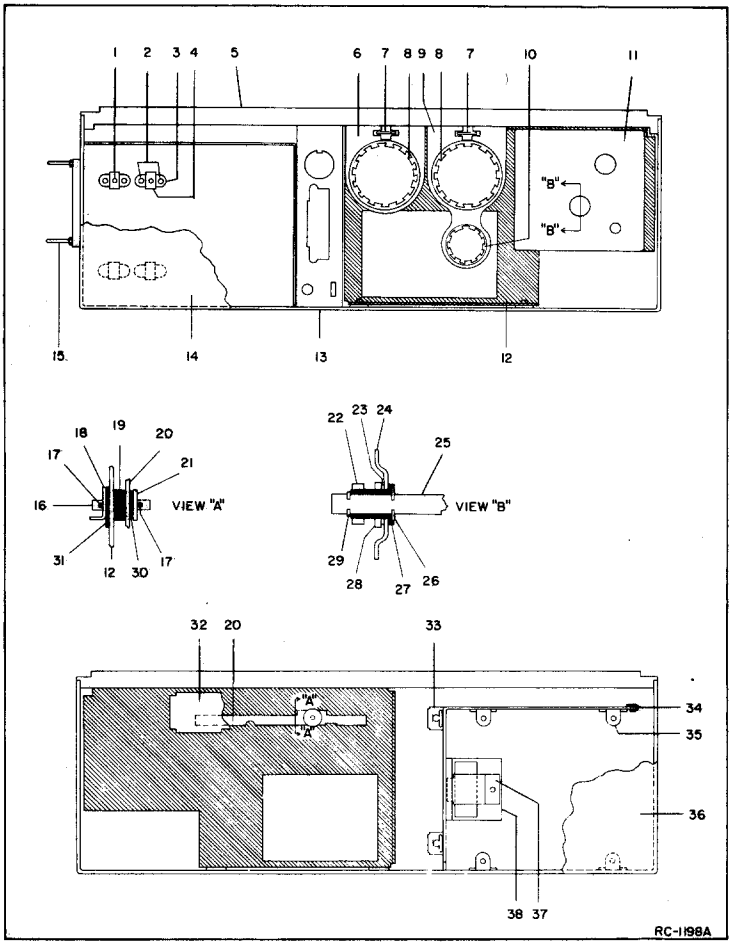
25-50 MHz TRANSMITTER

MODELS 4ET55A40-48 STANDARD
MODELS 4ET55A49-57 CHANNEL GUARD
MODELS 4ET55B10-18

SYMBOL	G-E PART NO.	DESCRIPTION
		EXCITER BOARD ASSEMBLY
A101-103, A106-108, A111-113, A116-118, A121-123, A126-128, A131-133, A136-158, A161-163		A101-103 (19D403285 GL-3) (4ET55A40-42) A106-108 (19D403285 GH-3) (4ET55A43-45) A111-113 (19D403285 G1J-13) (4ET55A46-48) A116-118 (19D403285 G2H-13) (4ET55A49-51) A121-123 (19D403285 G2J-13) (4ET55A52-54) A126-128 (19D403285 G2R-28) (4ET55A55-57) A131-133 (19D403285 G3J-33) (4ET55B10-12) A136-158 (19D403285 G3G-38) (4ET55B13-15) A161-163 (19D403285 G4J-45) (4ET55B16-18)
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19B209243-P3	Polyester: .022 uf ±20%, 50 VDCW.
C2	19B209243-P4	Polyester: 0.033 uf ±20%, 50 VDCW.
C3	19B209243-P13	Polyester: 0.1 uf ±20%, 50 VDCW.
C4	19B209243-P7	Polyester: 0.1 uf ±20%, 50 VDCW.
C5	7491395-P114	Ceramic disc: .0022 uf ±10%, 500 VDCW.
C6	19B209243-P7	Polyester: 0.1 uf ±20%, 50 VDCW.
C7	19B209243-P5	Polyester: .047 uf ±20%, 50 VDCW.
C8	7491395-P114	Ceramic disc: .0022 uf ±10%, 500 VDCW.
C9	5493366-P470K	Silver mica: 470 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C11	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C13 and C42	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C16	5496210-P343	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -150 PPM.
C18	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C20 and C21	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C23	5496219-P343	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -150 PPM.
C25	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C27 and C28	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C30	5496219-P343	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -150 PPM.
C31	5496372-P178	Ceramic disc: 820 pf ±5%, 500 VDCW, temp coef -3300 PPM.
C32	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C34 and C35	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C37	5496219-P343	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -150 PPM.
C41A*	5496372-P178	Ceramic disc: 820 pf ±5%, 500 VDCW, temp coef -3300 PPM. Deleted in Models 4ET55A41, 4ET55A44 by Rev E. Deleted in Models 4ET55A47 by Rev D.
C41B	5496372-P62	Ceramic disc: 390 pf ±5%, 500 VDCW, temp coef -2200 PPM.
C41E*	5493367-P1000K	Mica: 1000 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-20. Added in Models 4ET55A41, 4ET55A44 by Rev E. Added in Model 4ET55A47 by Rev D.
C42A	5493367-P680J	Mica: 680 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-20.
C43	5494481-P131	Ceramic disc: 6800 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C44A	5493367-P510J	Mica: 510 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-20.
C44B	5493367-P620J	Mica: 820 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-20.
C45A	5493367-P2200K	Mica: 2200 pf ±10%, 100 VDCW; sim to Electro Motive Type DM20.
C45B	5493367-P1500K	Mica: 1500 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-20.
C46A	5493367-P1500K	Mica: 1500 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-20.
C46B	5493367-P1000K	Mica: 1000 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-20.
C47	5496372-P174	Ceramic disc: 680 pf ±5%, 500 VDCW, temp coef -3300 PPM.
C49	5493367-P1000J	Mica: .001 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-20.
C51	5496372-P66	Ceramic disc: 470 pf ±5%, 500 VDCW, temp coef -2200 PPM.
C52A	5493366-P470K	Silver mica: 470 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C52B	5493366-P390K	Silver mica: 390 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C53A	5493366-P270K	Silver mica: 270 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C53B	5493366-P220K	Silver mica: 220 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C53C	5493366-P180K	Silver mica: 180 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C54	19B209243-P1	Polyester: .01 pf ±20%, 40 VDCW.
C55	7491827-P5	Ceramic disc: 0.1 pf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C56A	5493366-P1000J	Silver mica: 100 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C56B	5493366-P680J	Silver mica: 680 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C57A	5496219-P767	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -750 PPM.
C57B	5496219-P660	Ceramic disc: 75 pf ±5%, 500 VDCW, temp coef -1500 PPM.
C57C	5496219-P655	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -1500 PPM.
C58A	5496219-P10	Ceramic disc: 10 pf ±10%, 500 VDCW, temp coef 0 PPM.
C58B	5496219-P7	Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C58C	5496219-P5	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C59A	5493366-P1000J	Silver mica: .001 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C59B	5493366-P680J	Silver mica: 680 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C60A	5496219-P767	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -750 PPM.
C60B	5496219-P660	Ceramic disc: 75 pf ±5%, 500 VDCW, temp coef -1500 PPM.
C60C	5496219-P655	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -1500 PPM.
C61A	5494481-P111	Ceramic disc: .001 uf ±20%, 1000 VDCW;sim to RMC Type JF Discap.
C62	5494481-P129	Ceramic disc: .0039 uf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C63A	5493366-P270J	Silver mica: 270 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C63B	5493366-P150J	Silver mica: 150 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C63C	5493366-P82J	Silver mica: 82 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C64A	5496219-P772	Ceramic disc: 240 pf ±5%, 500 VDCW, temp coef -750 PPM.
C64B	5496219-P724	Ceramic disc: 180 pf ±10%, 500 VDCW, temp coef -750 PPM.
C64C	5496219-P721	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -750 PPM.
C66	5494481-P129	Ceramic disc: .0039 uf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C67	5496267-P18	Tantalum: 6.8 uf ±20%, 35 VDCW; sim to Sprague 150D.
C68 and C69	7491827-P2	Ceramic disc: .01 pf +80% -30%, 50 VDCW; sim to Sprague 19C.
C71A	5493366-P680K	Silver mica: 680 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C71B	5493366-P470K	Silver mica: 470 pf ±10%, 100 VDCW; sim to Electro Motive Type DM-15.
C73A	5493366-P100J	Silver mica: 100 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C73B	5493366-P82J	Silver mica: 82 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C74	5494481-P111	Ceramic disc: .001 uf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C75	5496219-P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C76 and C77	5496219-P35	Ceramic disc: 4 fp ±0.25 pf, 500 VDCW, temp coef 0 PPM.
CR1 and CR2	19A115331-P1	Silicon.
CR3 thru CR5	19A115603-P1	Silicon.
CR6 thru CR8	5495769-P8	Varactor, silicon: 33 pf ±20%, 4 VDC; sim to Pacific Semiconductors Varicap Type V-885.
J1 thru J10	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J12 thru J17	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
L1A	19C303946-G1	Coil. Includes tuning slug 5491798-P2.
L1B	19C303946-G2	Coil. Includes tuning slug 5491798-P2.
L1C	19C303946-G3	Coil. Includes tuning slug 5491798-P2.
L2A	19C303946-G1	Coil. Includes tuning slug 5491798-P2.
L2B	19C303946-G2	Coil. Includes tuning slug 5491798-P2.
L2C	19C303946-G3	Coil. Includes tuning slug 5491798-P2.
L3A	19B204649-G1	Coil. Includes tuning slug 5491798-P4.
L3B	19B204650-G2	Coil. Includes tuning slug 5491798-P4.
L4A	19B204649-G2	Coil. Includes tuning slug 5491798-P4.
L4B	19B204650-G3	Coil. Includes tuning slug 5491798-P4.
Q1 and Q2	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q3 and Q4	19A115330-P1	Silicon, NPN.
Q5 and Q6	19A115328-P1	Silicon, NPN.
R1	3877-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R2	3877-P105K	Composition: 1 megohm ±10%, 1/2 w.
R3	3877-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R4	3877-P274K	Composition: 0.27 megohm ±10%, 1/2 w.
R5	3877-P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R6	3877-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R7	3877-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R8	3877-P684K	Composition: 0.68 megohm ±10%, 1/2 w.
R9	3877-P334K	Composition: 0.33 megohm ±10%, 1/2 w.
R10	3877-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R11	3877-P122K	Composition: 1200 ohms ±10%, 1/2 w.
R12	38152-P100K	Composition: 10 ohms ±10%, 1/4 w.
R13	3877-P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R14	19B209358-P106	Variable, carbon film: approx 75-10,000 ohms ±20%, 0.20 w.
R15 and R16	3877-P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R17	3877-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R18	3877-P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R19	3877-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R20	19B209358-P107	Variable, carbon film: approx 75-25,000 ohms ±20%, 0.20 w.
R21	3877-P683K	Composition: 68K ohms ±5%, 1/2 w.
R22	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R23	3877-P683K	Composition: 68K ohms ±10%, 1/2 w.
R24	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R25	3877-P683K	Composition: 68K ohms ±10%, 1/2 w.
R26	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R27	3877-P683K	Composition: 68K ohms ±10%, 1/2 w.
R28 and R29	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R30	3877-P101K	Composition: 100 ohms ±10%, 1/2 w.
R31A	3877-P272K	Composition: 2700 ohms ±10%, 1/2 w.
R31B	3877-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R33A	3877-P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R33B	3877-P273K	Composition: 27,000 ohms ±10%, 1/2 w.
R33C	3877-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R34A	3877-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R34B	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R34C	3877-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R35A	3877-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R35B	3877-P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R36 and R37	3877-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R38	3877-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R39	3877-P392K	Composition: 3900 ohms ±10%, 1/2 w.
R41	3877-P750J	Composition: 75 ohms ±5%, 1/2 w.
R42	3877-P391K	Composition: 390 ohms ±10%, 1/2 w.
R43	3877-P360J	Composition: 36 ohms ±5%, 1/2 w.
R44	3877-P121K	Composition: 120 ohms ±10%, 1/2 w.
R45	5495948-P474	Deposited carbon: 0.5?E megohm ?1%, 1/2 w; sim to Texas Instruments Type CDL/ZBL.
R46	3877-P100K	Composition: 10 ohms ±10%, 1/2 w.
R47	3877-P330K	Composition: 33 ohms ±10%, 1/2 w.
R48	3877-P222K	Composition: 2200 ohms ±10%, 1/2 w.
R49	3877-P101K	Composition: 100 ohms ±10%, 1/2 w.
R50	3877-P511J	Composition: 510 ohms ±5%, 1/2 w.
R51	3877-P474J	Composition: 0.47 megohm ±5%, 1/2 w.
R52	3877-P104K	Composition: 0.1 megohm ±10%, 1/2 w.
RT1A	19B209284-P10	Disc: 830 ohms DC res; sim to GE 16G0129.
RT1B	19B209284-P9	Disc: 330 ohms DC res; sim to GE 16D0119.
RT2A	19B209284-P3	Rod: 41,500 ohms DC res; sim to GE 18J123.
RT2B*	19B209284-P1	Rod: 32,000 ohms DC res; sim to GE 18J122. In Models 4ET55A42, 45, 57 of Rev E and earlier: In Models 4ET55A48 of Rev D and earlier; In Models 4ET55A51, 54 of Rev F and earlier; In Models 4ET55B13, 16 of Rev A and earlier; Rod: 41,500 ohms DC res; sim to GE 18J123.
J1 thru J9	4033513-P4	Contact, electrical; sim to Bead Chain L93-3.
RT3A	19B209284-P10	Disc: 830 ohms DC res; sim to GE 16G0129.
RT3B	19B209284-P9	Disc: 330 ohms DC res; sim to GE 16D0119.
RT4A	19B209284-P3	Rod: 41,500 ohms DC res; sim to GE 18J123.
RT4B*	19B209284-P1	Rod: 32,000 ohms DC res; sim to GE 18J122. In Models 4ET55A45, 57 of Rev E and earlier; In Models 4ET55A48 of Rev D and earlier; In Models 4ET55A54 of Rev F and earlier; In Models 4ET55B15, 18 of Rev A and earlier; Rod: 41,500 ohms DC res; sim to GE 18J123.
L5	19B209284-P3	Coil. Includes tuning slug 7142014-P16. Speed clip.
L6	19B209351-G5 7127634-P2	Coil. Includes tuning slug 7142014-P16. Speed clip.
L7	19B209351-G7 7127634-P2	Coil. Includes tuning slug 7142014-P16. Speed clip.
L9	19B204614-G1	Coil. Includes tuning slug 5491798-P4.
L10	19B204614-G2	Coil. Includes tuning slug 5491798-P4.
L11	19B204614-G3	Coil. Includes tuning slug 5491798-P4.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R2	3877-P221K	Composition: 220 ohms ±10%, 1/2 w.
R3	3877-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R5	3879-P473K	Composition: 47,000 ohms ±10%, 2 w.
R7	3877-P221K	Composition: 220 ohms ±10%, 1/2 w.
R8	3878-P432J	Composition: 4300 ohms ±5%, 1 w.
R11	3877-P680J	Composition: 68 ohms ±5%, 1/2 w.
R15	5495948-P444	Deposited carbon: 0.2? megohm ?1%, 1/2 w; sim to Texas Instruments Type CDL/ZBL.
R17	3878-P683K	Composition: 68,000 ohms ±10%, 1 w.
R18 and R19	3879-P432J	Composition: 4300 ohms ±5%, 2 w.
R20	3879-P473K	Composition: 47,000 ohms ±10%, 2 w.
R21 and R22	3879-P432J	Composition: 4300 ohms ±5%, 2 w.
R23	3879-P473K	Composition: 47,000 ohms ±10%, 2 w.
R24	3879-P333K	Composition: 33,000 ohms ±10%, 2 w.
		- - - - - - - - - - TUBES - - - - - - - - - -
V1		Type 8106.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XV1	7489470-P2	Tube, mica-filled phen: 8 pins rated at 1 amp.
		CHASSIS AND PA ASSEMBLY 19D500877-G6 25-33 MHz 19D500877-G5 33-42 MHz 19D500877-G6 42-50 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C105 and C106	5494481-P111	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C107	7485975-P17	Ceramic, feed-thru: 470 pf ±20%, 750 VDCW; sim to Eric Style 327.
C109	7478981-P2	Silver mica: 470 pf ±10%, 1500 VDCW, temp coef ±500 PPM.
C110	5491498-P3	Variable: approx 2.8-50 pf, 1700 v peak.
C111	19B209123-P1	Variable: approx 6.5-50 pf; sim to Hammarlund Type APC.
C112	5491498-P4	Variable: approx 5.8-75 pf, 1700 v peak.
C117 and C118	5494481-P11	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C119,	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C122	5492304-P8	Ceramic disc: 3 pf ±0.25 pf, 2000 VDCW, temp coef -0 TO 30 PPM.
C124 and C125	5494481-P11	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C126	7478981-P2	Mica: 470 pf ±10%, 1500 VDCW, temp coef ±500 PPM.
		- - - - - - - - - - FILTERS - - - - - - - - - -
		LOW PASS FILTER ASSEMBLY 19D500480-G2 The low pass filters are factory tuned. If a filter component is found to be defective, it is recommended that the entire filter assembly be replaced to maintain rated power output and spurious attenuation.
FL101	19D402233-G1	25-33 MHz.
FL102	19D402233-G2	33-42 MHz.
FL103	19D402233-G3	42-50 MHz.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
G101		- - - - - - - - - - OSCILLATORS - - - - - - - - - - LOW PASS FILTER ASSEMBLY 19C311903-G1 REV B
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1*	19B209243-P103	Polyester: .022 uf ±20%, 50 VDCW. In Models earlier than Rev A: Polyester: 0.015 uf ±20%, 50 VDCW.
C2	19B209243-P102 19B209243-P3	Polyester: 0.022 uf ±20%, 50 VDCW.
C3	5494481-P107	Deposited carbon: 0.02 megohm ?1%, 1/2 w; sim to Texas Instrum Type CDL/ZBL.
C4	19B209243-P9	Polyester: 0.22 uf ±20%, 50 VDCW.
C5	19B209243-P8	Polyester: 0.15 uf ±20%, 50 VDCW.
C6	19B209243-P3	Polyester: .022 uf ±20%, 50 VDCW.
C7	5494481-P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19B209243-P14	Polyester: 0.33 uf ±20%, 250 VDCW.
C13	5494481-P111	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J8	4033513-P4	Contact, electrical; sim to Bead Chain L93-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q5	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3877-P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R2	3877-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R3	3877-P274K	Composition: 0.27 megohm ±10%, 1/2 w.
R4	3877-P620J	Composition: 62 ohms ±5%, 1/2 w.
R5	3877-P822K	Composition: 8200 ohms ±10%, 1/2 w.
R6	3877-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R7	3877-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R8	3877-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R9	3877-P184K	Composition: 0.18 megohm ±10%, 1/2 w.
R10	3877-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R11	3877-P330K	Composition: 33 ohms ±10%, 1/2 w.
R24	3877-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R25	3877-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R26	3877-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R27*	3877-P512K	Composition: 5100 ohms ±10%, 1/2 w. Added by Rev B.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	5490828-P30	Rod: 0.33 megohm ±10% res, 1 w max; sim to Global Type 743A-3.
		CHANNEL GUARD INSTALLATION KIT 19A127174-G2
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B201074-P304	Tap screw, 6-32 x 1/4, (4)
	19B200480-G2	Harness, Includes:
P130 thru P135	4029840-P2	Contact, electrical; sim to Amp 42827-2.
		- - - - - - - - - - JACKS AND RECEPTACLES - - - -
J101	19C303426-G1	Connector: 20 pin contacts.
J102	19B203689-G1	Connector: 18 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L101	7772834-P4	Choke, RF: 7 uh, approx freq range 35 to 110 mc; sim to Ohmite Z-50.
L110	1941217B-P1	Coil.
L111	1941217B-P2	Coil.
L112	1941217B-P1	Coil.
L115	1941217?-P2	Coil.
L116	1941217B-P2	Coil.
L117	1941217?-P1	Coil.
L118	19A115700-P2	RF Choke.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P102	4029840-P3	Contact, electrical; sim to Amp 41854.
P103 thru P106	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P107	4029840-P1	Contact, electrical; sim to Amp 41854.
P108 thru P110	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P112 thru P117	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P120 and P121	4029840-P1	Contact, electrical; sim to Amp 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
P122 thru P127	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P128	4033513-P17	Contact, electrical; sim to Bead Chain M125-19.
P129 thru P132	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P133	4029840-P1	Contact, electrical; sim to Amp 41854.
P134 thru P137	4029840-P2	Contact, electrical; sim to Amp 42827-2.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R102	19A115416-P2	Wirewound: 2.5 ohms ±1%, 2 w; sim to Dale Type RS-2B.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S101	4031922-P1	Pushbutton: single pole, single throw, normally open, .50 amp at 12 VDC; sim to Stackpole Type SS-15.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
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.
		- - - - - - - - - - - TUBES - - - - - - - - - -
V101 and V102		Type 7984.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XV101 and XV102	19C301007-P5	Tube, plastic: 12 pins rated at 5 amps max; sim to Alcon Metal Products 371G bottom mount.
		MECHANICAL PARTS (SEE RC-1198)
1	19B200525-P9	Rivet. (Part of XY1-4).
2	19A115793-P1	Contact, electrical; sim to Malco 2700. (Part of XY1-4).
3	19C311172-P2	Crystal socket. (Part of XY1-4).
4	4033089-P1	Clip. (Part of XY1-4).
5	19C303395-G2	Heat sink.
6	19B204571-P1	Tube heat sink. (Used with V102).
7	19A121195-P2	Support. (Used with V101 and V102).
8	7165167-P7	Tube shield insert; sim to Atlas 106-332-18. (Used with V101 and V102).
9	19B204702-P1	Tube heat sink. (Used with V1).
10	7165167-P5	Tube shield insert; sim to Atlas 106-332-5. (Used with V1).
11	19B204490-G1	Can.
12	19B204708-G1	Chassis.
13	19B204395-G1	Chassis.
14	19C303396-G1	Mobile top cover.
	19C303495-G8	Station top cover. (Except Repeaters and VM).
	19C303673-G3	Station top cover. (Repeaters and VM only).
15	19A121676-P1	Pin guide: 4-40 thread, approx 5/8 inch pin. (Used with J101).
16	19A122724-P1	Post.
17	N509P608C13	Dowel pin, spring.
18	19B204776-P1	Angle support. (Part of post assembly).
19	19B204756-P1	Ceramic insulator. (Part of post assembly).
20	19C303666-P1	Plate line. (Used with V101 and V102).
21	N402P38C13	Washer, no. 10.
22	4031531-P1	Locknut, No. 32.
23	7115130-P9	Lockwasher; sim to Shakeproof 1220-2.
24	19B205023-P1	Support.
25	19A121189-P2	Post.
26	4031532-P1	Cup washer.
27	4031530-P1	Bearing, No. 32.
28	7893938-P1	Nut, No. 32.
29	N010P18C	Retaining ring.
30	5493361-P6	Spring washer; sim to Shakeproof 3502-10-79.
31	19A121547-P1	Plate. (Part of post assembly).
32	19B204640-P1	Shield. (Used with V101 and V102 line plate).
33	4036921-P1	Mounting support, bottom cover; sim to Tinnerma C17600-8A-67.
34	4029030-P10	Rubber channel.
35	19B204366-P1	Support.
36	19C303396-G3	Mobile bottom cover.
	19C303495-G7	Station bottom cover.
37	19A121065-P1	Support. (Used with FL1).
38	19A121257-G1	Angle. (Used with FL1).



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 thru D - Exciters A101, A102, A106, A107, A111, A113 and A127:
REV. A thru E - Exciters A103, A108, A116, A117, A121, A122, A126 and A128:
REV. A - Exciters A151 thru A163:

These revisions were incorporated into initial shipments.

REV. E - Exciters A102 and A107:
REV. D - Exciter A112:

To improve stability when using transistors from different vendors. Replaced C41A with C41E.

REV. A - Channel Guard Filter G101:
To improve operation. Changed C1.

REV. B - Channel Guard Filter G101:
To provide a sine wave output. Added R27.

REV. F - Exciters A103, A108 and A128
REV. E - Exciter A113
REV. G - Exciters A118 and A123
REV. B - Exciters A133, A138 and A143

To improve high temperature compensation. Changed RT2B, RT4B, RT6B and RT8B.

PARTS LIST

LBI-3936B

CHANNEL GUARD ENCODER G103
4EH17A10 19C311802-G2
REV A

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1*	19B209243-P103	Polyester: 0.022 µf ±10%, 50 VDCW.
	19B209243-P2	In Models earlier than Rev A: Polyester: 0.015 µf ±20%, 50 VDCW.
C2	19B209243-P3	Polyester: 0.022 µf ±20%, 50 VDCW.
C3	5494481-P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4	19B209243-P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C5	19B209243-P6	Polyester: 0.15 µf ±20%, 50 VDCW.
C6	19B209243-P3	Polyester: 0.022 µf ±20%, 50 VDCW.
C7	5494481-P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19B209243-P14	Polyester: 0.33 µf ±20%, 250 VDCW.
C9	5496367-P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C10	19B209243-P115	Polyester: 0.22 µf ±10%, 250 VDCW.
C11 thru C13	5494481-P111	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 and CR2	19A115250-P1	Silicon.
		- - - - - - - - - - TONE NETWORKS - - - - - - - - - -
FL1		TONE FREQUENCY NETWORK 19B205280
	19B205280-G1	71.9 Hz
	19B205280-G2	77.0 Hz
	19B205280-G3	82.5 Hz
	19B205280-G4	88.5 Hz
	19B205280-G5	94.8 Hz
	19B205280-G6	100.0 Hz
	19B205280-G7	103.5 Hz
	19B205280-G8	107.2 Hz
	19B205280-G9	110.9 Hz
	19B205280-G10	114.8 Hz
	19B205280-G11	118.8 Hz
	19B205280-G12	123.0 Hz
	19B205280-G13	127.3 Hz
	19B205280-G14	127.3 Hz
	19B205280-G15	131.8 Hz
	19B205280-G16	141.3 Hz
	19B205280-G17	146.2 Hz
	19B205280-G18	151.4 Hz
	19B205280-G19	156.7 Hz
	19B205280-G20	162.2 Hz
	19B205280-G21	167.9 Hz
	19B205280-G22	173.8 Hz
	19B205280-G23	179.9 Hz
	19B205280-G24	186.2 Hz
	19B205280-G25	192.8 Hz
	19B205280-G26	203.5 Hz
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 thru J6	4033513-P4	Contact, electrical; sim to Bead Chain LS3-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q3 thru Q6	19A115362-P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R2	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R3	3R77-P274K	Composition: 0.27 megohms ±10%, 1/2 w.
R4	3R77-P620J	Composition: 62 ohms ±5%, 1/2 w.
R5	3R77-P822K	Composition: 8200 ohms ±10%, 1/2 w.
R6	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R7	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R8	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R9	3R77-P184K	Composition: 0.18 megohms ±10%, 1/2 w.
R10	3R77-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R11	3R77-P330K	Composition: 33 ohms ±10%, 1/2 w.
R12	5495948-P365	Deposited carbon: 46,400 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R13	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R14	3R77-P244J	Composition: 0.24 megohms ±5%, 1/2 w.
R15	5495948-P233	Deposited carbon: 2150 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R16	5495948-P301	Deposited carbon: 10,000 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R17	5495948-P65	Deposited carbon: 46.4 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R18	5495948-P329	Deposited carbon: 19,600 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R19	5495948-P285	Deposited carbon: 7500 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R20	5495948-P413	Deposited carbon: 130,000 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R21	5495948-P269	Deposited carbon: 5110 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R22	5495948-P117	Deposited carbon: 147 ohms ±1%, 1/2 w; sim to Texas Instrument CD1/2MR.
R23	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	5490828-P30	Thermistor: 330,000 ohms ±10%, color code black and gray; sim to Globar Type 783E-3.
RT2	5490828-P36	Thermistor: 55,000 ohms ±10%, color code black and red; sim to Globar Type 723E.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1		(Part of XFL1).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	19A121920-G3	Reed, mica-filled phen: 7 pins rated at 1 amp at 500 VRMS with 4-1/4 inches of cable.
		ENCODER INSTALLATION KIT 19A127174-G1
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	N404P13C13	Lockwasher, no. 6.
	N60P13005C13	Machine screw, no. 6-32 x 5/16.
	19B201074-P304	Tap screw, no. 6-32 x 1/4.
	N210P13C13	Nut, no. 6-32.
	19B205480-G2	Harness. Includes:
P130 thru P135	4029840-P2	Contact, electrical; sim to Amp 42827-2.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

END OF DOCUMENT