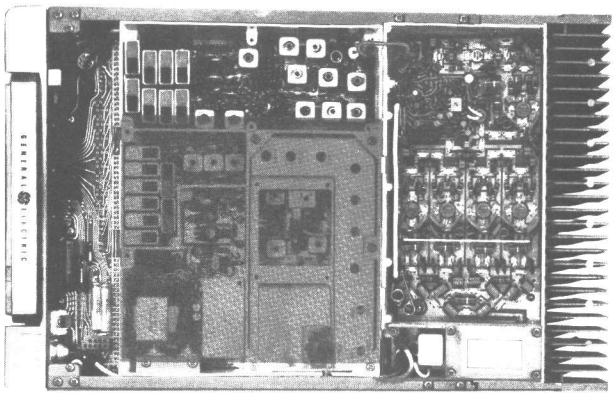
MOBILE RADIO

MASTR II MAINTENANCE MANUAL

25-50 MHz, 100-WATT TRANSMITTER

Maintenance Manual LBI4898J
DATAFILE FOLDER DF3155
(Supersedes LBI4600)

25-50 MHz EXCITER 19D416659G1-8
100-WATT PA ASSEMBLY 19C321295G5-8



SPECIFICATIONS *

Frequency Range	25-50 MHz
Power Output	100 Watts (Adjustable from 50 to 100 Watts at 30 to 50 MHz, and from 75 to 100 Watts at 25 to 30 MHz)
Crystal Multiplication Factor	3
Frequency Stability	
5C-ICOM with EC-ICOM	±0.0005% (-40°C to +70°C)
5C-ICOM or EC-ICOM	±0.0002% (0°C to +55°C)
2C-ICOMS	±0.0002% (-40°C to +70°C)
Spurious and Harmonic Emission	At least 85 dB below full rated power output
Modulation	Adjustable from 0 to ±5 kHz swing with instantaneous modulation limiting.
Modulation Sensitivity	80 to 120 Millivolts
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 2% (1000 Hz) Less than 3% (300 to 3000 Hz)
Deviation Symmetry	0.5 kHz maximum
Duty Cycle	EIA 20% Intermittent

Maximum Frequency Spread: (2 to 8 channels)	Full Specifications	1 dB Degradation
25-30 MHz	.160 MHz	.320 MHz
30-36 MHz	.200 MHz	.400 MHz
36-42 MHz	.240 MHz	.470 MHz
42-50 MHz	.280 MHz	.540 MHz

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

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

Although the highest DC voltage in MASTR II Mobile Equipment is supplied by the vehicle battery, high currents may be drawn under short circuit conditions. These currents can possibly heat metal objects such as tools, rings, watchbands, etc., enough to cause burns. Be careful when working near energized circuits!

High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns upon contact. KEEP AWAY FROM THESE CIRCUITS WHEN THE TRANSMITTER IS ENERGIZED!

DESCRIPTION

MASTR II transmitters are crystal-controlled phase modulated and designed for one- through eight-frequency operation in the 25 to 50 megahertz band. The solid state transmitter utilizes both integrated circuits (ICs) and discrete components, and consists of the following assemblies:

- Exciter Board; with audio, modulator, amplifier and multiplier stages.
- Power Amplifier Assembly; with amplifier, driver, PA, power control, filter and antenna switch.

CIRCUIT ANALYSIS

EXCITER

The exciter uses nine transistors and two integrated circuits to drive the PA assembly. The exciter can be equipped with up to eight Integrated Circuit Oscillator Modules (ICOMs). The ICOM crystal frequency ranges from approximately 8.33 to 16.67 megahertz, and the crystal frequency is multiplied three times (divided by four and multiplied by 12 for a multiplication factor of three).

Audio, supply voltages and control functions are connected from the system board to the exciter board through P902.

Centralized metering jack J103 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The test set meters the modulator, multiplier and amplifier stages.

ICOMS

Three different types of ICOMs are available for use in the exciter. Each of the ICOMs contains a crystal-controlled Colpitts oscillator, and two of the ICOMs contain compensator ICs. The different ICOMs are:

- 5C-ICOM - contains an oscillator and a 5 part-per-million (±0.0005%) compensator IC. Provides compensation for EC-ICOMs.
- EC-ICOM - contains an oscillator only. Requires external compensation from a 5C-ICOM.
- 2C-ICOM - contains an oscillator and a 2 PPM (±0.0002%) compensator IC. Will not provide compensation for an EC-ICOM.

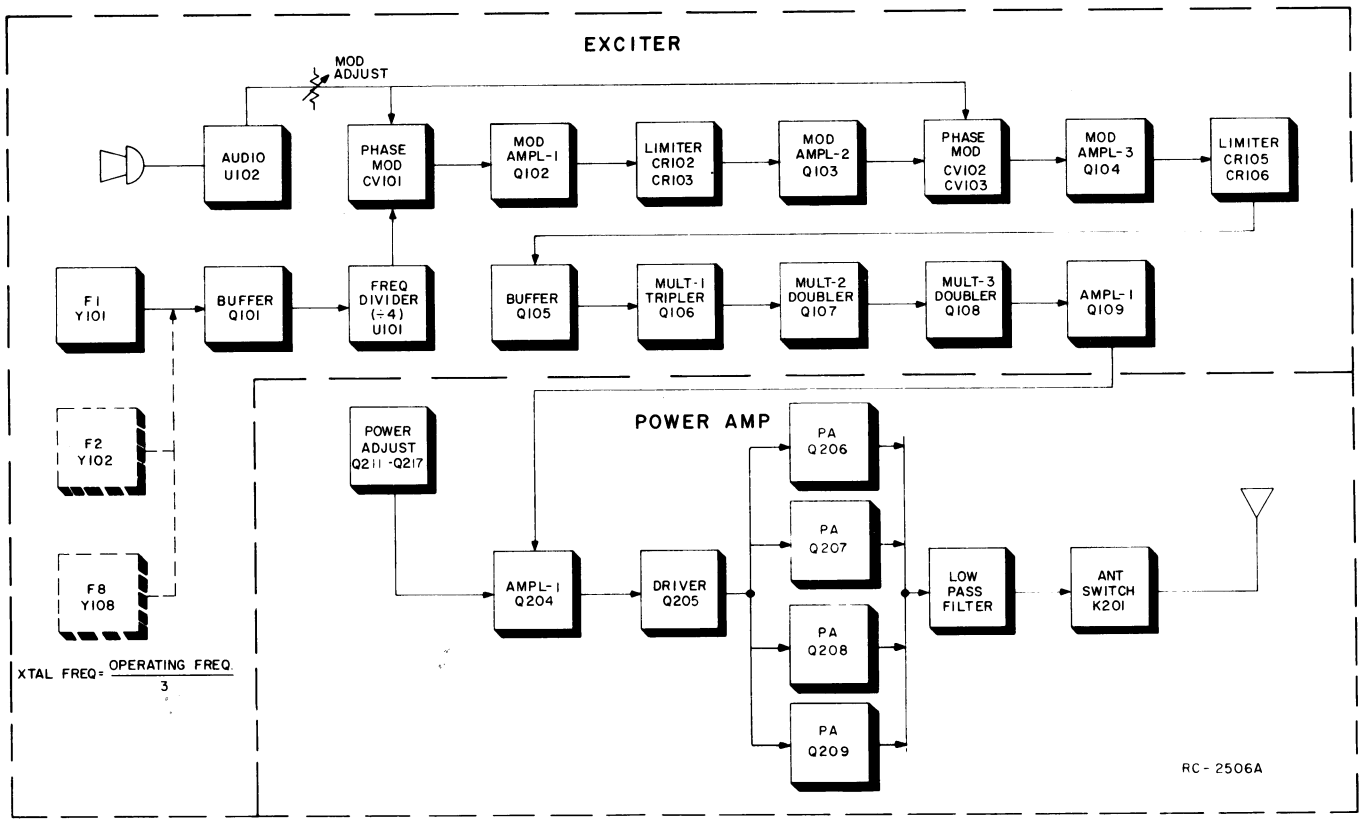

Figure 1 - Transmitter Block Diagram

The ICOMs are enclosed in an RF shielded can with the type ICOM (5C-ICOM, EC-ICOM or 2C-ICOM) printed on the top of the can. Access to the oscillator trimmer is obtained through a hole on the top of the can.

Frequency selection is accomplished by switching the ICOM keying lead (terminal 6) to A- by means of the frequency selector switch on the control unit. In single-frequency radios, a jumper from H9 to H10 in the control unit connects terminal 6 of the ICOM to A-. The oscillator is turned on by applying a keyed +10 Volts to the external oscillator load resistor. RF bypassing is provided for all unused keying loads in eight frequency radios. In two frequency radios the six unused keying leads are shorted to ground.

CAUTION

All ICOMs are individually compensated at the factory and cannot be repaired in the field. Any attempt to repair or change an ICOM frequency will void the warranty.

In standard 5 PPM radios using EC-ICOMs, at least one 5C-ICOM must be used. The 5C-ICOM is normally used in the receiver F1 position, but can be used in any transmit or receive position. One 5C-ICOM can provide compensation for up to 15 EC-ICOMs in the transmit and receiver. Should the 5C-ICOM compensator fail in the open mode, the EC-ICOMs will still maintain 2 PPM frequency stability from 0°C to 55°C (+32°F to 131°F) due to the regulated compensation voltage (5 Volts) from the 10-Volt regulator IC. If desired, up to 16 5C-ICOMs may be used in the radio.

The 2C-ICOMs are self-compensated at 2 PPM and will not provide compensation for EC-ICOMs.

Oscillator Circuit

The quartz crystals used in ICOMs exhibit the traditional "S" curve characteristics of output frequency versus operating temperature.

At both the coldest and hottest temperatures, the frequency increases with increasing temperature. In the middle temperature range (approximately 0°C to +55°C), frequency decreases with increasing temperature.

Since the rate of change is nearly linear over the mid-temperature range, the output frequency change can be compensated by choosing a parallel compensation capacitor with a temperature coefficient approximately equal and opposite that of the crystal.

Figure 2 shows the typical performance of an uncompensated crystal as well as the typical performance of a crystal which has been matched with a properly chosen compensation capacitor.

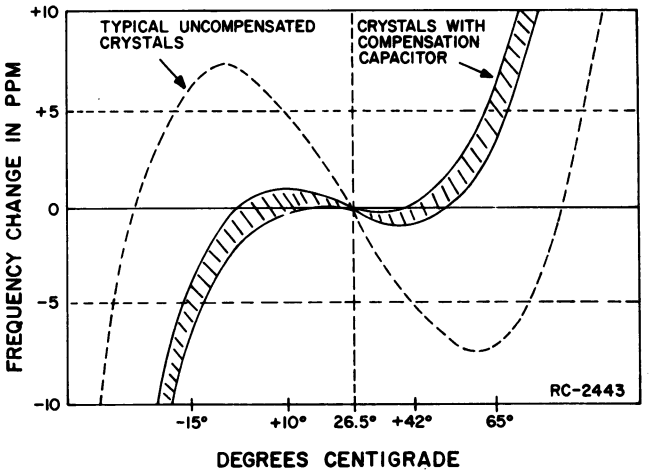

Figure 2 - Typical Crystal Characteristics

At temperatures above and below the mid-range, additional compensation must be introduced. An externally generated compensation voltage is applied to a varactor (voltage-variable capacitor) which is in parallel with the crystal.

A constant bias of 5 Volts (provided from Regulator IC U901 in parallel with the compensator) establishes the varactor capacity at a constant value over the entire mid-temperature range. With no additional compensation, all of the oscillators will provide 2 PPM frequency stability from 0°C to 55°C (+32°F to 131°F).

Compensator Circuits

Both the 5C-ICOMs and 2C-ICOMs are temperature compensated at both ends of the temperature range to provide instant frequency compensation. An equivalent ICOM circuit is shown in Figure 3.

The cold end compensation circuit does not operate at temperatures above 0°C. When the temperature drops below 0°C, the circuit is activated. As the temperature decreases, the equivalent resistance decreases and the compensation voltage increases.

The increase in compensation voltage decreases the capacity of the varactor in the oscillator, increasing the output frequency of the ICOM.

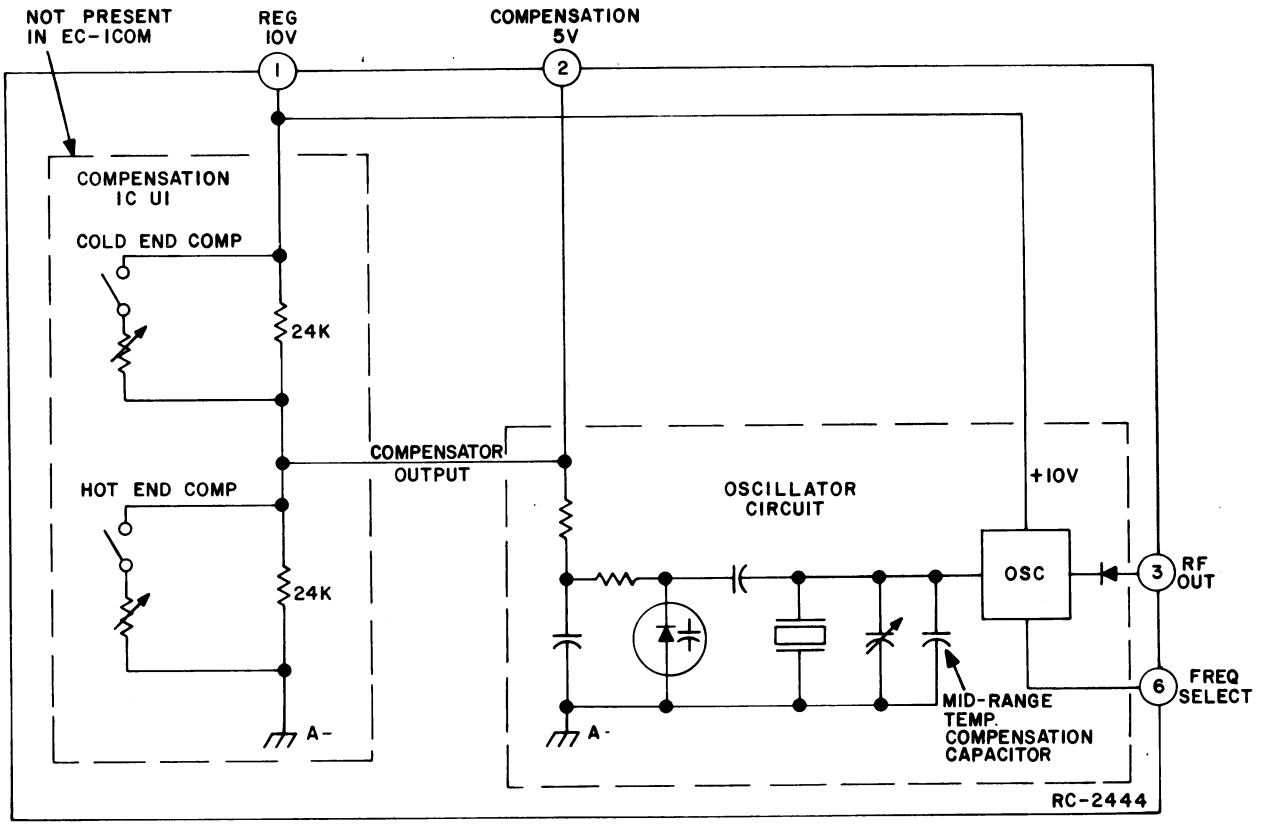

Figure 3 - Equivalent ICOM Circuit

The hot end compensation circuit does not operate at temperatures below +55°C. When the temperature rises above +55°C, the circuit is activated. As the temperature increases, the equivalent resistance decreases and the compensation voltage decreases. The decrease in compensation voltage increases the capacity of the varactor, decreasing the output frequency of the ICOM.

SERVICE NOTE: Proper ICOM operation is dependent on the closely-controlled input voltages from the 10-Volt regulator. Should all of the ICOMs shift off frequency, check the 10-Volt regulator module.

AUDIO IC

The transmitter audio circuitry is contained in audio IC U102. A simplified drawing of the audio IC is shown in Figure 4.

Audio from the microphone at pin 12 is coupled through pre-emphasis capacitor C1 to the base of Q1 in the operational amplifier-limiter circuit. Collector voltage for the transistorized microphone preamplifier is supplied from pin 11 through microphone collector load resistor R18 to pin 12.

The operational amplifier-limiter circuit consists of Q1, Q2 and Q3. Q3 provides limiting at high signal levels. The gain of the operational amplifier circuit is fixed by negative feedback through R19, R20 and the resistance in the network (pin 9).

The output of Q3 is coupled through a de-emphasis network (R10 and C3) to an active post-limiter filter consisting of C4, C5, C6, R11, R12, R13, R15, R17, and Q4.

Following the post-limiter filter is class A amplifier Q5. The output of Q5 is coupled through MOD ADJUST potentiometer R127 to the phase modulators.

SERVICE NOTE: If the DC voltages to the Audio IC are correct and no audio output can be obtained, replace U102.

For radios equipped with Channel Guard, tone from the encoder is applied to the phase modulators through CHANNEL GUARD MOD ADJUST potentiometer R128, and resistors R110, R121 and R124. Instructions for setting R128 are contained in the modulation adjustment section of the Transmitter Alignment Procedure.

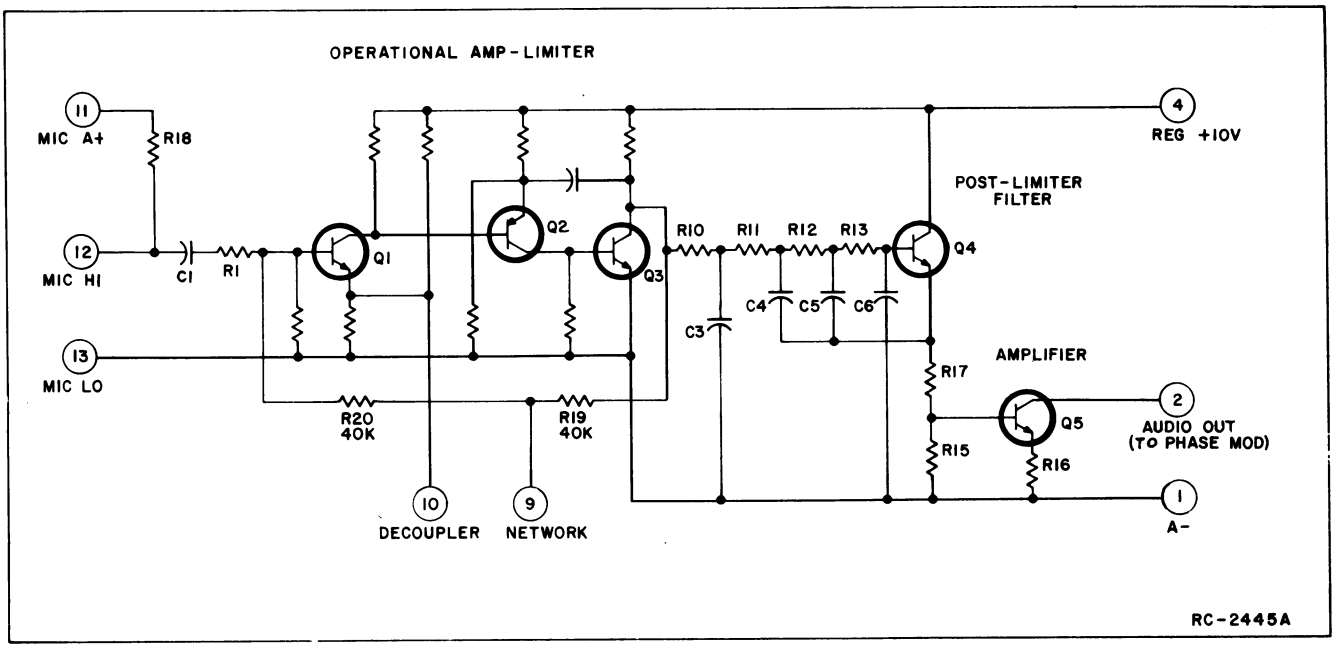

Figure 4 - Simplified Audio IC

FREQUENCY DIVIDER IC

The output at pin 3 of the selected ICOM is coupled through buffer amplifier Q101 to frequency divider U101, which divides the oscillator frequency by 4. The divider consists of two J-K flip-flops connected as a binary counter.

When the transmitter is not keyed (no ICOMs on), Q101 is saturated (turned on) with its collector voltage near zero. Keying the transmitter starts one of the ICOMs, and its output cuts Q101 on and off once each cycle. As Q101 turns off during each cycle, the drop in collector voltage causes the left flip-flop to change state. Assume the flip-flop was in the "0" state (the output at "Q" near A-). The first cycle of the oscillator output causes it to switch to the "1" stage (output at "Q" approximately 5 Volts). The second cycle will cause the flip-flop to switch back to the "0" state. Therefore, it requires two oscillator cycles to switch the left flip-flop through one complete cycle from "0" to "1" and back to "0".

When the left flip-flop switches from "1" to "0", it causes the right flip-flop to change state. It requires two cycles of the left flip-flop to switch the right flip-flop from "0" to "1" and back to "0". Therefore, four cycles of the oscillator output are required for each cycle of output from pin 9 of U101.

If U101 was operating into a pure resistive load, its output would be a square wave. However, the modulator circuit presents a tuned load to the IC, so that harmonics are filtered out and the waveform at the junction of C102 and C103 (modulator input) is essentially a sine wave at one-fourth the oscillator frequency. The output of the frequency divider is coupled through DC blocking capacitor C102 to the first modulator stage.

PHASE MODULATORS, AMPLIFIER & MULTIPLIERS

The first phase modulator is varactor (voltage-variable capacitor) CV101 in series with tunable coil L101. This network appears as a series-resonant circuit to the RF output of the oscillator. An audio signal applied to the modulator circuit through blocking capacitor C115 varies the bias of CV101, resulting in a phase modulated output. A voltage divider network (R108 and R109) provides the proper bias for varactors CV101, CV102 and CV103.

The output of the first modulator is coupled through blocking capacitor C106 to the base of Class A amplifier Q102. The first modulator stage is metered through a metering network consisting of R115, R150, C107 and CR101. Diodes CR102 and CR103 remove any amplitude modulation in the modulator output.

Following Q102 is another Class A Amplifier, Q103. The output of Q103 is applied to the second modulator stage. The second modulator consists of two cascaded modulator circuits consisting of CV102, L102, L103 and CV103. Following the second modulator is a Class A amplifier Q104. The output of the second modulator stage is metered through R133, R145, C117 and CR104, and is applied to the base of buffer Q105. Diodes CR105 and CR106 remove any amplitude modulation in the second modulator output.

Buffer Q105 is saturated when no RF signal is present. Applying an RF signal to Q105 provides a sawtooth waveform at its collector to drive the class C tripler, Q106. The tripler stage is metered through R146. The output of Q106 is coupled through tuned circuits T101, T102 and T103 to the base of doubler Q107. T101, T102 and T103 are tuned to one-fourth of the operating frequency. The doubler stage is metered through R147.

The output of Q107 is coupled through tuned circuits T104 and T105 to the base of second doubler Q108. T104 and T105 are tuned to one-half the operating frequency. Q108 is metered through R148.

The output of Q108 is coupled through three tuned circuits (T106, T107 and T108) to the base of amplifier Q109. The circuits are tuned to the transmitter operating frequency.

Q109 is a class C amplifier with a collector feed network consisting of C139, C141, L104, L108 and R143. The stage is metered through R149. The amplifier collector circuit consists of C142, C143, C146 and L105, and matches the amplifier output to the input of the power amplifier assembly.

POWER AMPLIFIER

The PA assembly uses six RF power transistors and seven transistors in the Power Control circuitry to provide a power output of 100 Watts. The broadband PA has no adjustments other than Power Control potentiometer R261.

Supply voltage for the PA is connected through power leads from the system board to feedthrough capacitors C297 and C298 on the bottom of the PA assembly. C297, C298 and C299, L297 and L298 prevent RF from getting on the Power leads. Diode CR295 will cause the main fuse in the fuse assembly to blow if the polarity of the power leads is reversed.

Centralized metering jack J205 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The Test Set meters the Ampl-1 drive (exciter output), Ampl-1 power control, Driver and PA current. L251 through L257 in conjunction with bypass capacitors C4210 through C4216 keep RF off of the metering leads.

RF AMPLIFIERS

The exciter output is coupled through an RF cable to PA input jack J201. RF from the exciter is coupled through DC blocking capacitor C201 to the base of Class C amplifier Q204 through a matching network. The network matches 50-ohm input to the base of Q204, and consists of C205, C206, C207, L201 and L202. R203 and R204 lower the gain of the amplifier stage.

Part of the RF input is rectified by CR201 and used to activate the Power Control circuit. Another portion of the rectified RF is applied to voltage dividers R201 and R202 for metering the Ampl-1 drive at J205.

Collector voltage to Q204 (Ampl-1) is controlled by the Power Control Circuit, and is applied through a collector stabilizing network consisting of L258 and R272 and collector feed network L205 and C213. The collector voltage of Q204 is metered through R271 at J205.

Following Q204 is a matching network (C208 through C212, L204 and L206) to a resistive pad (R207, R208 and R209). The output of the resistor network is applied to the base of the Class C driver (Q205) through a matching network consisting of C218, C219, C220, L207 and L208. Resistors R207 through R215 lower the gain of driver Q205.

Collector voltage to Q205 is coupled through a collector stabilizing network consisting of L259 and R273 and collector feed network L211 and C226. Collector current for Q205 is metered across tapped manganin resistor R249 at J205 (DRIVER CURRENT). The reading is taken on the one-Volt scale with the High Sensitivity button pressed, and read as 10 amperes full scale.

Following Q205 is a matching network (C221 through C225, L210 and L214) that matches the driver output to the input of the first power divider circuit (C230, C231, L214, L215 and L216).

The power amplifier stages consist of four identical paralleled Class C amplifiers (Q206 through Q209). The output of the first power divider circuit is applied to four additional power dividers. C234-L217 and C235-L218 provide drive for Q206 and Q207, while C236-L219 and C237-L220 provide drive for Q208 and Q209.

The output of C234-L217 is applied to the base of Q206 an impedance-matching network (L217, L221, C238, C242 and C243). Resistors R220 through R223, R236 and R237 lower the gain of Q206. Supply voltage for Q206 is coupled through a collector-stabilizing network consisting of L260 and R274 and collector feed network L223 and C270.

Collector current for Q206 through Q209 is metered across tapped maganin resistors R250 and R251 at J205 (PA CURRENT). The

reading is taken on the one-Volt scale with the High Sensitivity button pressed, and read as 30 amperes full scale.

The output of Q206 is coupled through a matching network (C250, C251, L229, C258, C259, C266 and L237), applied to a lumped-constant combiner circuit (C280, L237 and L241), and added to the output of Q207. The outputs of Q206 and Q207 are added to the outputs of Q208 and Q209 through lumped-constant power combiner circuit C284, L249, C294, L250 and C285. The combined PA output is applied to 50-ohm microstrip W205, and then to an M-derived, constant K low-pass filter. The filter output is applied to the antenna through antenna switch K201.

Capacitors C286 through C293, C217, C228 and C233 provide ground isolation for ± ground operation.

WARNING

The stud mounted RF Power Transistors used in the transmitter contain Beryllium 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.

POWER CONTROL CIRCUIT

When the transmitter is keyed, rectified RF from CR201 is applied to the base of switch Q211, turning it on. Turning on Q211 turns on voltage regulator Q212 which supplies a constant voltage to Power Adjust potentiometer R261.

Q215, Q216 and Q217 operate as an amplifier chain to supply voltage to the collector of Q204 (Ampl-1). The setting of R261 determines the voltage applied to the base of Q215. The higher the voltage at the base of Q215, the harder the amplifiers conduct, supplying more collector voltage to Q204. The lower the voltage at the base of Q215, the less collector voltage is supplied to Q204. Reducing the supply voltage to Q204 reduces the drive to Q205, thereby reducing the power output of the PA. The power output can be adjusted by R261 from approximately 50 to 100 Watts (75 to 100 Watts at 25-30 MHz).

Temperature protection is provided by Q213, Q214, and thermistor RT201 which is mounted in the PA heatsink. Under normal operating conditions, the circuit is inactive (Q213 is on and Q214 is off). When the heatsink temperature reaches approximately 100°C, the resistance of RT201 decreases. This increases the base voltage applied to Q213, turning it off. Turning off Q213 allows Q214 to turn on, decreasing the voltage at Power Adjust potentiometer R261. This reduces the base voltage to Q215 which causes Q216 and Q217 to conduct less, reducing the collector voltage to Q204 (Ampl-1). This reduces the transmitter output power, keeping the heatsink at a maximum of approximately 100°C. When the heatsink temperature decreases below 100°C, the temperature control circuit turns off, allowing the normal transmitter power output.

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 keying 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. A potentiometer permits the timing cycle to be adjusted from approximately 15 seconds to 3 minutes.

MAINTENANCE

DISASSEMBLY

To service the transmitter from the top:

1. Pull the locking handle down, then pry up the top cover at the front notch and lift off the cover.

To service the transmitter from the bottom:

1. Pull the locking handle down and pull the radio out of the mounting frame.
2. Remove the top cover, then loosen the two bottom cover retaining screws and remove the bottom cover (see Figure 5).
3. To gain access to the bottom of the exciter board, remove the six screws (A) holding the exciter board and its bottom cover to the module mounting frame, and remove the bottom cover.

To remove the exciter board from the radio:

1. Unplug the exciter/PA cable (B) .
2. Remove the six screws (A) holding the exciter board and its bottom cover to the module mounting frame (see Figure 6).
3. Press straight down on the plug-in exciter from the top to avoid bending the pins when unplugging the board from the system board jack.

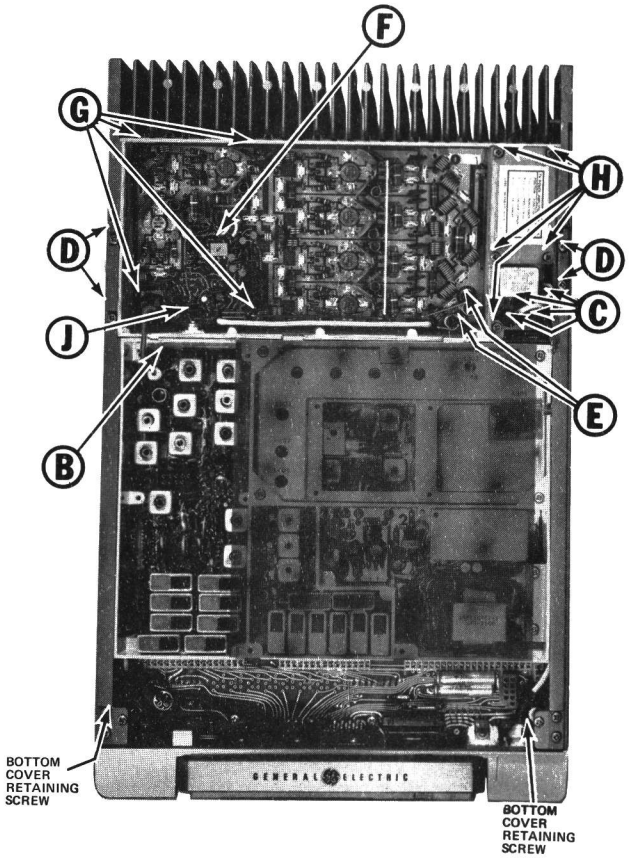

Figure 5 - Disassembly Procedure-Top View

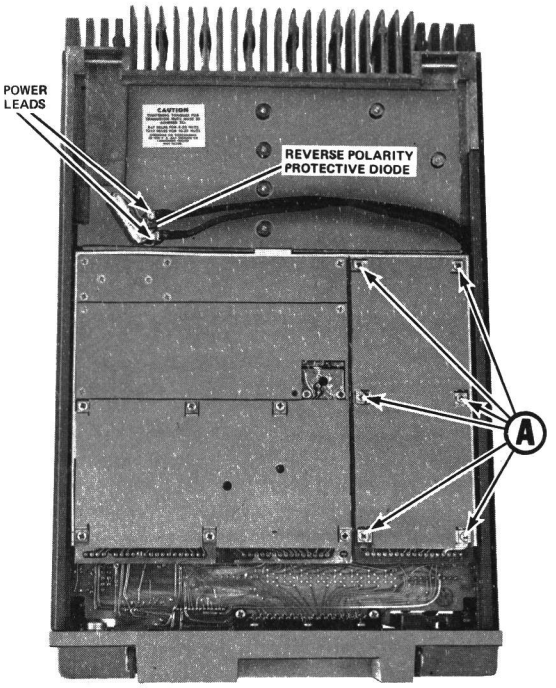

Figure 6 - Disassembly Procedure-Bottom View

To remove the PA assembly:

1. Remove the PA top cover and unplug the exciter/PA cable (B), the antenna, receiver and PTT cables (C).

2. Remove the four side-rail screws (D), and unsolder the power cables from the bottom of the PA assembly if desired.

To remove the PA board:

1. Remove the PA top cover and unplug the exciter/PA cable (B).

2. Unsolder the two feedthrough coils (E) and the thermistor leads (F).

3. Remove the PA transistor hold-down nuts and spring washers on the bottom of the PA assembly.

4. Remove the four PA board mounting screws (G), the five screws in the filter casting (H), and the retaining screw in Q210 (J), and lift the board out.

PA TRANSISTOR REPLACEMENT

WARNING

The stud mounted RF Power Transistors used in the transmitter contain Beryllium 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 RF transistors:

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.

3. Hold the body of the transistor to prevent it from turning. Remove the transistor hold-down nut and spring washer 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 with a de-soldering tool such as a SOLDA PULLT®. Special care should be taken to prevent damage to the printed circuit board runs.

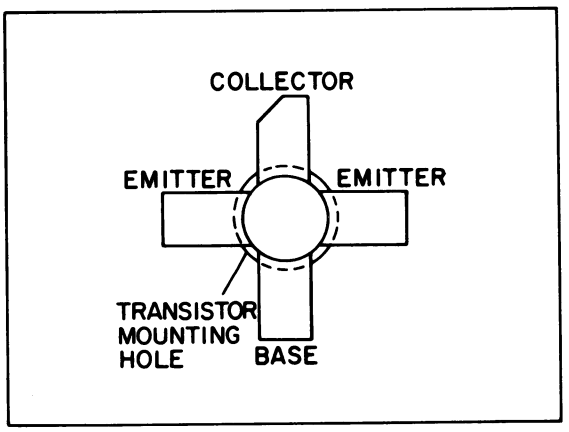

Figure 7 - Lead Identification

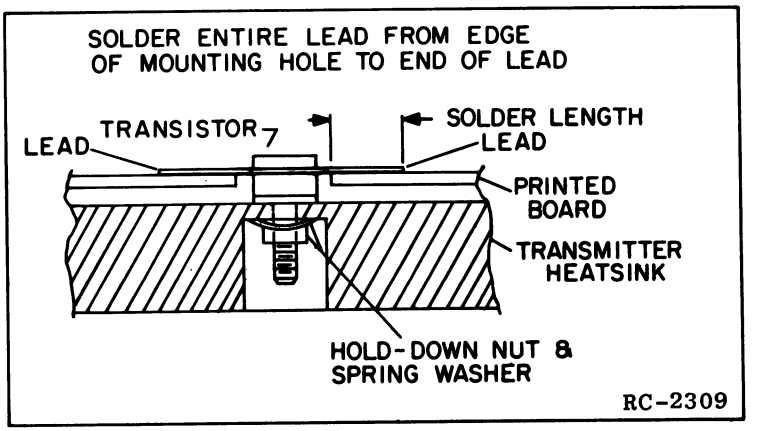

Figure 8 - Lead Forming

4. Trim the new transistor leads (if required) to the lead length of the removed transistor. Cut the collector lead at a 45° angle for future identification (see Figure 7). The letter "C" on the top of the transistor indicates the collector.

5. Apply a coating of silicon 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 holding-down nut and spring-washer using moderate torque (8 inch-pounds). A torque wrench must be used for this adjustment since transistor damage can result if too little or too much torque is used.

6. Make sure that the transistor leads are formed as shown in Figure 8 so that the leads can be soldered to the printed circuit pattern, starting from the inner edge of the mounting hole.

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. Use care not to use excessive heat that causes the printed wire board runs to lift up from the board. Check for shorts and solder bridges before applying power.

CAUTION

Failure to solder the transistor leads as directed may result in the generation of RF loops that could damage the transistor or may cause low power output.

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WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

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MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R127) 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 or a VTVM
4. GE Test Set Models 4EX3A11 or 4EX8K12

PROCEDURE

1. Connect the audio oscillator and the meter across audio input terminals J10 (Green-Hi) and J11 (Black-Lo) on GE Test Set, or across P902-6 (Mike High) through a 0.5 microfarad (or larger) DC blocking capacitor, and P902-5 (Mike-Low) on the System Board.
2. Adjust the audio oscillator for 1-Volt RMS at 1000 Hz.
3. For transmitters without Channel Guard, set MOD ADJUST R127 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 Channel Guard MOD ADJUST R128 for zero tone deviation. Next, with the 1-Volt signal at 1000 Hz applied, set MOD ADJUST R127 for a 3.75 kHz deviation. Then remove the signal from the audio oscillator and set Channel Guard MOD ADJUST R128 for 0.75 kHz tone deviation.
5. For multi-frequency transmitters, set the deviation as described in Steps 3 or 4 on the channel producing the largest amount of deviation.

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:

$$P_i = \text{PA voltage} \times \text{PA current}$$

where:

P_i is the power input in Watts,

PA voltage is measured with Test Set Model 4EX3A11 in Position G on the 15-Volt range (read as 15 Volts full scale), and with the polarity switch in the (-) position. With Test Set Model 4EX8K12, use the B+ position and the 1-Volt range (read as 15 Volts full scale), with the HIGH SENSITIVITY button pressed and the 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 (30 amperes full scale).

Example:

P_i = 12.4 Volts x 8.5 amperes = 105.4 Watts

ICOM FREQUENCY ADJUSTMENT

First, check the frequency to determine if any adjustment is required. The frequency should be set with a frequency meter or counter with an absolute accuracy that is 5 to 10 times better than the tolerance to be maintained, and with the entire radio as near as possible to an ambient temperature of 26.5°C (79.8°F).

MASTR II ICOMs should be reset only when the frequency shows deviations in excess of the following limits:

A. ±0.5 PPM, when the radio is at 26.5°C (79.8°F).

B. ±2 PPM at any other temperature within the range of -5°C to +55°C (+23°F to +131°F).

C. The specification limit (±2 PPM or ±5 PPM) at any temperature within the ranges of -40°C to -5°C (-40°F to +23°F) or +55°C to +70°C (+131°F to +158°F).

If an adjustment is required, pry up the cover on the top of the ICOM to expose the trimmer, and use one of the following procedures:

If the radio is at an ambient temperature of 26.5°C (79.8°F), set the oscillator for the correct operating frequency.

If the radio is not at an ambient temperature of 26.5°C, setting errors can be minimized as follows:

A. To hold setting error to ±0.6 PPM (which is considered reasonable for 5 PPM ICOMS):

1. Maintain the radio at 26.5°C (±5°C) and set the oscillator to desired frequency, or-
2. Maintain the radio at 26.5°C (±10°C) and offset the oscillator, as a function of actual temperature, by the amount shown in Figure 9.

B. To hold setting error to ±0.35 PPM (which is considered reasonable for 2 PPM ICOMs): Maintain unit at 26.5°C (±5°C) and offset the oscillator, as a function of actual temperature, by the amount shown in Figure 9.

For example: Assume the ambient temperature of the radio is 18.5°C (65.4°F). At that temperature, the curve shows a correction factor of 0.3 PPM. (At 25 MHz, 1 PPM is 25 Hz. At 50 MHz, 1 PPM is 50 Hz).

With an operating frequency of 50 MHz, set the oscillator for a reading of 15 Hz (0.3 x 50 Hz) higher than the licensed operating frequency. If a negative correction factor is obtained (at temperatures above 26.5°C), set the oscillator for the indicated PPM lower than the licensed operating frequency.

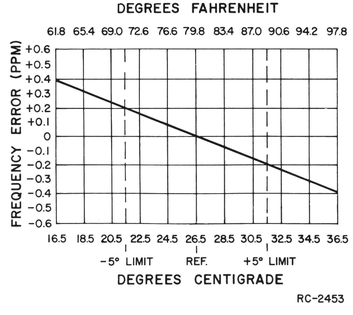
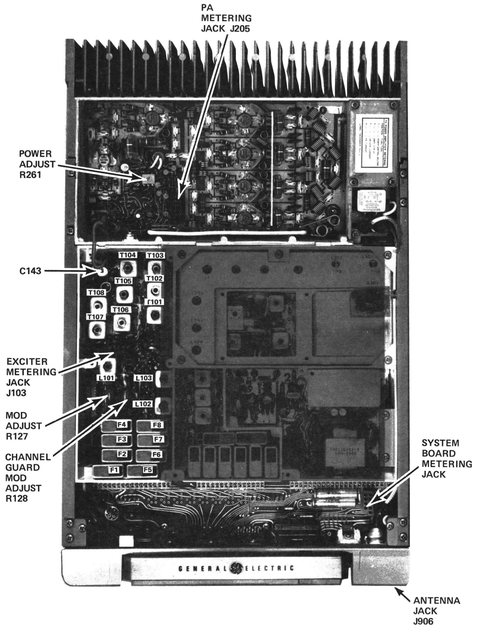


Figure 9 - Frequency Characteristics Vs. Temperature



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Model 4EX3A11 or Test Kit 4EX8K12.
2. A 50-ohm wattmeter connected to antenna jack J906.
3. A frequency counter.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Place ICOMs on Exciter Board (crystal frequency = operating frequency ± 3).
2. For a large change in frequency or a badly mis-aligned transmitter, pre-set the slugs in T101 through T108, and L101, L102 and L103 to the bottom of the coil form.

NOTE

The tuning frequency for multi-frequency transmitters is determined by the operating frequency and the frequency spread between transmitters. Refer to the table below for maximum frequency spread.

3. For multi-frequency transmitters with a frequency spread less than that specified in column (1), tune the transmitters to the lowest frequency.

   For frequency spread exceeding the limits specified in column (1), tune the transmitters using a center frequency tune up ICOM. Except the maximum frequency spread can be extended to the limits specified in column (3) with 1 dB degradation.

   For tuning L101, L102, L103, Always tune L101, L102, L103 on the lowest frequency.

Multi-frequency Transmitter Tuning

Transmitter Frequency Range	MAXIMUM FREQUENCY SPREAD		
	(1) without center tuning	with center tuning	with center tuning (1dB degradation)
25 - 30 MHz	.080 MHz	.160 MHz	.320 MHz
30 - 36 MHz	.100 MHz	.200 MHz	.400 MHz
36 - 42 MHz	.120 MHz	.240 MHz	.470 MHz
42 - 50 MHz	.140 MHz	.280 MHz	.540 MHz

4. Connect the red plug on the GE Test Set to the System Board metering jack, and the black plug to the Exciter metering jack. Set the polarity to +, and set the range to the Test 1 position (1-Volt position for 4EX8K12) for all adjustments. NOTE: With the Test Set connected to the PA metering jack, the voltage reading at position "F" with the HIGH SENSITIVITY button pressed may be converted to driver collector current by reading the current as 10 amperes full scale. The voltage reading at position "G" with the HIGH SENSITIVITY button pressed may be converted to PA collector current by reading the current as 30 amperes full scale.
5. All adjustments are made with the transmitter keyed. Unkey the transmitter between steps to avoid unnecessary heating.

STEP	METER POSITION	TUNING CONTROL	METER READING	PROCEDURE
1.	A MOD-1	L101	Maximum	Tune L101 for maximum meter reading.
2.	B	L102 & L103	Maximum	Tune L102 and then L103 for the maximum meter reading.
3.	C MULT-1	T101 & T102	See Procedure	Tune L101 for maximum dip meter reading, and then tune T102 for maximum meter reading.
4.	D MULT-2	T103, T102, T101 & T104	See Procedure	Tune T103 for maximum meter reading and re-adjust T102 and T101 for maximum meter reading. Then tune T104 for a dip in meter reading.
5.	F MULT-3	T105, T104, T106 & T107	See Procedure	Tune T105 for maximum meter reading and re-adjust T104 for maximum meter reading. Then tune T106 for a dip in meter reading and T107 for maximum meter reading.
6.	G AMPL-1	T108, T107 & T106	See Procedure	Tune T108 for maximum meter reading, and then re-adjust T107 and T106 for maximum meter reading.
7.	D AMPL-1 (DRIVE (on PA)	C143, C156	Maximum	Move the black metering plug to the Power Amplifier metering jack and tune C143 and C156 for maximum meter reading.
8.		R261		With the battery voltage at 13.4 Volts or the PA collector voltage at 12.4 Volts, set Power Adjust potentiometer R261 on the PA board for the desired power output (from 50 to 100 Watts at 30-50 MHz, or from 75 to 100 Watts at 25-30 MHz). If the battery voltage is not at 13.4 Volts or the collector voltage at 12.4 Volts and full rated output is desired (50 to 100 Watts at 30-50 MHz, or from 75 to 100 Watts at 25-30 MHz), set R261 for the output power according to the battery voltage or collector voltage shown in Figure 10. NOTE The PA collector voltage is measured as described in the PA POWER INPUT section.

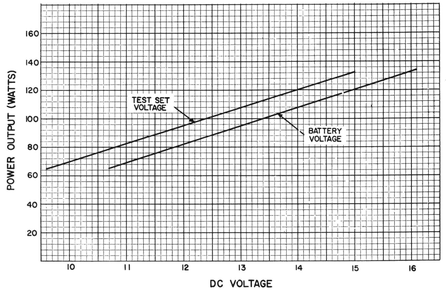


Figure 10 - Power Output Setting Chart

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, tone and voice deviation, defective audio sensitivity, and modulator adjust control set too high. 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.

CAUTION

Before bench testing the MASTR II Mobile Radio, be sure of the output voltage characteristics of your bench power supply.

To protect the transmitter power output transistors from possible instant destruction, the following input voltages must not be exceeded:

Transmitter unkeyed: 20 Volts
Transmitter keyed (50 ohm resistive load): 18 Volts
Transmitter keyed (no load or non-resistive load): 15.5 Volts

These voltages are specified at the normal vehicle battery terminals of the radio and take the voltage drop of standard cables into account. The voltage limit shown for a non-optimum load is for "worst case" conditions. For antenna mismatches likely to be encountered in practice, the actual limit will approach the 18 Volt figure.

Routine transmitter tests should be performed at EIA Standard Test Voltages (13.6 VDC for loads of 6 to 16 amperes; 13.4 VDC for loads of 16 to 36 amperes). Input voltages must not exceed the limits shown, even for transient peaks of short duration.

Many commonly used bench power supplies cannot meet these requirements for load regulation and transient voltage suppression. Bench supplies which employ "brute force" regulation and filtering (such as Lapp Model 73) may be usable when operated in parallel with a 12-Volt automotive storage battery.

TEST EQUIPMENT REQUIRED

for test hookup as shown:

1. Wattmeter similar to:
   Bird # 43
   Jones # 711N
2. VTVM similar to:
   Triplett # 850
   Heath # IM-21
3. Audio Generator similar to:
   GE Model 4EX6A10
4. Deviation Meter (with a .75 kHz scale) similar to:
   Measurements # 720
5. Multimeter similar to:
   GE TEST SET MODEL 4EX3A11,
   MODEL 4EX8K12 or
   20,000 ohms-per-Volt voltmeter

POWER MEASUREMENT

TEST PROCEDURE

1. Connect transmitter output from the antenna jack to the wattmeter through a 50-ohm coaxial cable. Make sure the wattmeter is terminated into a 50-ohm load.
2. Key the transmitter and check the wattmeter for the desired power output.

SERVICE CHECK

Check the setting of the Power Adjust Control (R261).

Refer to the QUICK CHECKS on the Transmitter Troubleshooting Procedure.

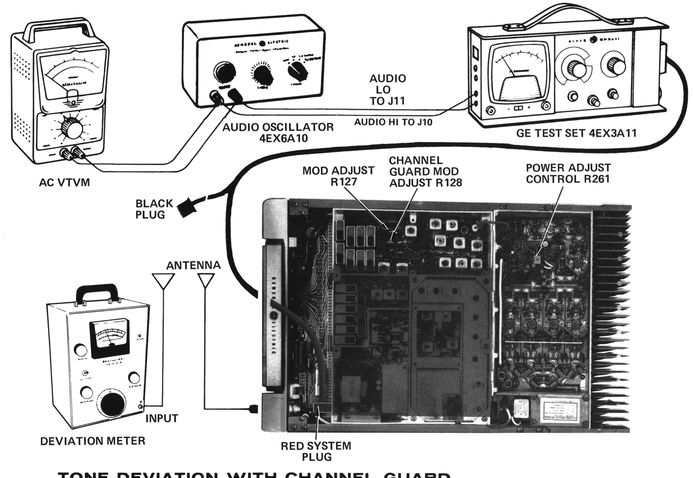
VOICE DEVIATION, SYMMETRY AND AUDIO SENSITIVITY

TEST PROCEDURE

1. Connect the test equipment to the transmitter as shown.
2. In radios with Channel Guard, set Channel Guard Mod Adjust R128 for zero tone deviation.
3. Set the Audio 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 in radios without Channel Guard, and ±3.75 kHz in radios with Channel Guard.
6. If necessary, adjust MOD ADJUST control R127 for the proper deviation on plus (+) or minus (-) deviation, whichever is greater.

NOTES:-- MASTR II 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.

7. If the deviation reading plus (+) or minus (-) differs by more than 0.5 kHz, recheck Steps 1 and 2 as shown in the Transmitter Alignment Chart.
8. Check Audio Sensitivity by reducing generator output until deviation falls to 3.0 kHz for radios without Channel Guard, or 2.25 kHz for radios with Channel Guard. Voltage should be LESS than 120 millivolts. If not, refer to the Transmitter Troubleshooting Procedure.



TONE DEVIATION WITH CHANNEL GUARD

TEST PROCEDURE

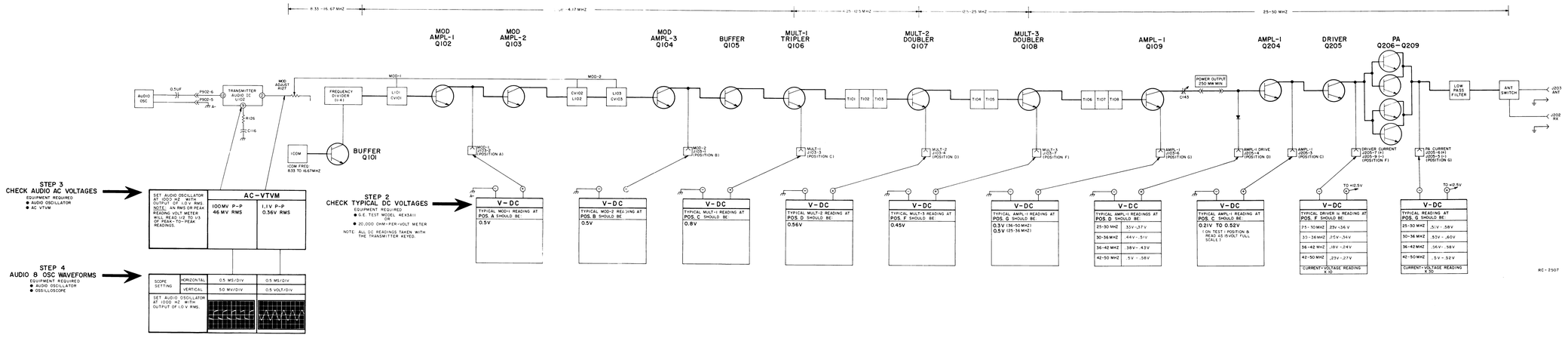
1. Set up the Deviation Meter and monitor the output of the transmitter.
2. Remove the 1000 Hz signal from the audio generator.
3. Key the transmitter and check for 0.75 kHz deviation. If the reading is low or high, adjust Channel Guard MOD ADJUST R128 for a reading of 0.75 kHz.

NOTES:

1. On units supplied with Channel Guard, the Phase Modulator Tuning should be adjusted 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.

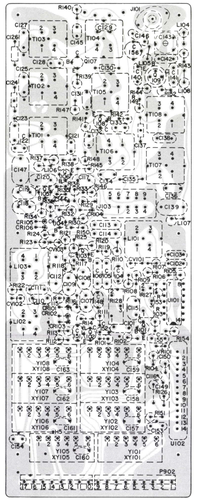
STEP I - QUICK CHECKS

METER POSITION GE TEST SET	PROBABLE DEFECTIVE STAGE		
	HIGH METER READING	LOW METER READING	ZERO METER READING
EXCITER			
A (MOD-1)	Q102, 10-Volt regulator	Q102, CV101, L101, 10-Volt regulator	ICOM, Q101, U101, L101, Q102, CR101, 10-Volt regulator or Channel Selector switch ground.
B (MOD-2)	Q104, 10-Volt regulator	Q103, L102, L103, CV102, CV103, Q104	Q103, L102, CV102, L103, CV103, CR104, Q104
C (MULT-1)	Q105, Q106 T101	Q105, Q106	Q105, Q106, T101
D (MULT-2)	Q107, T104	T101, T102, T103, Q107, T104	T101, T102, T103, Q107, T104
F (MULT-3)	Q108, T106	T104, T105, Q108	T104, T105, Q108, T106
G (AMPL-1)	Q109, C146, R144	T106, T107, T108, Q109, L108	T106, T107, T108, Q109, L104, L107
POWER AMPLIFIER			
"D" (AMPL-1 DRIVE)		Low Output from Exciter	No output from Exciter, CR201
"C" (AMPL-1 CONTROL VOLTAGE)	Q217	Q217	No Exciter output, Q217, Q211, CR201
"F" (DRIVER CURRENT)	Q205	Q205, Low Output from Q204	Q205, Q204, Check Pos. D & C
"G" (PA CURRENT)	Q206, Q207 Q208, Q209	Q204, Q205, Q206—Q209	Q204, Q205, Q206—Q209 ANTENNA SWITCH K301



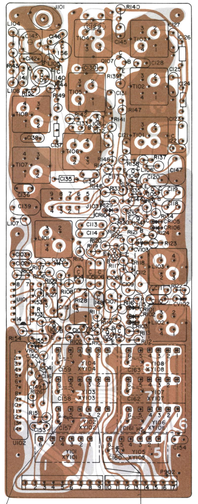
EXCITER BOARD

SOLDER SIDE



(190423107, Sh. 2, Rev. 3)

COMPONENT SIDE



(190423107, Sh. 2, Rev. 3)
(190423107, Sh. 3, Rev. 3)

LEAD IDENTIFICATION FOR Q101-Q105

IN-LINE TRIANGULAR
VIEW FROM LEAD END

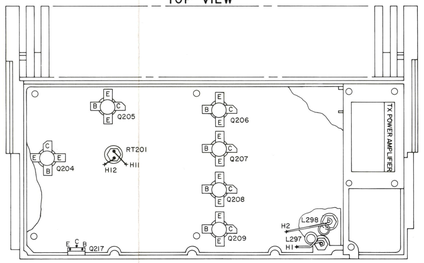
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

IN EIGHT-FREQUENCY EXCITERS (GROUPS 5-8) CAPACITORS C157-C163 ARE CLIPPED OUT AS REQUIRED TO MEET THE CUSTOMER'S FREQUENCY REQUIREMENTS. FOR EXAMPLE, IF CUSTOMER WANTS 150MC FOR F1, F2, F5, F7, THEN CAPACITORS C157, C160, AND C162 ARE CLIPPED OUT. C158, C159, C161, C163 ARE LEFT IN.

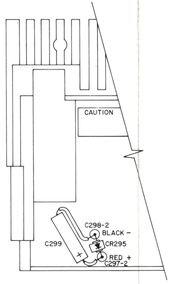
IN TWO-FREQUENCY EXCITERS (GROUPS 1-4) C157 IS CLIPPED OUT FOR COMBINATIONS WITH 2 TRANSMIT ICOMS. OA JUMPERS ARE PRESENT ON FREQUENCY SWITCHING LINES OF OTHER SIX ICOM CIRCUITS AS SHOWN.

(190423334, Rev. 3)

PA ASSEMBLY
TOP VIEW



BOTTOM VIEW



LEAD IDENTIFICATION FOR Q211 & Q215

IN-LINE
VIEW FROM LEAD END

LEAD IDENTIFICATION FOR Q212, Q213, Q214, & Q216

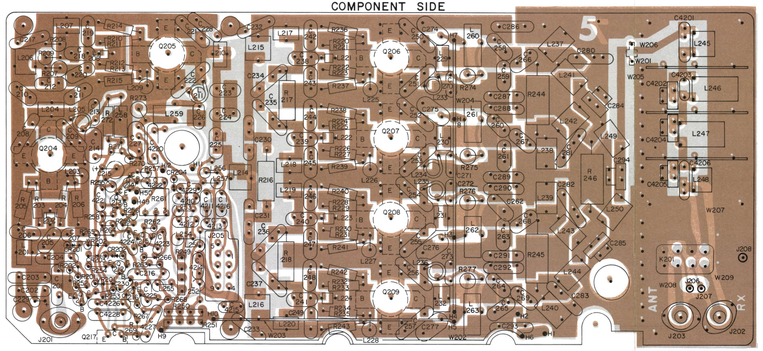
IN-LINE TRIANGULAR
VIEW FROM LEAD END

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

(198623110, Rev. 7)

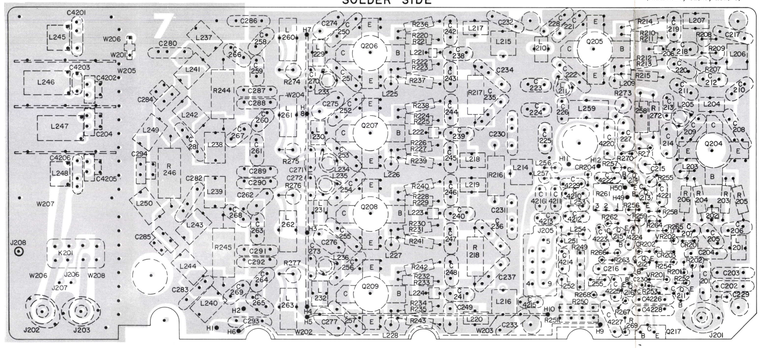
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

PA BOARD
COMPONENT SIDE



(190417923, Sh. 2, Rev. ?)
(190417923, Sh. 3, Rev. 5)

SOLDER SIDE



(190417923, Sh. 2, Rev. ?)

OUTLINE DIAGRAM

25—50 MHz, 100-WATT TRANSMITTER

PARTS LIST

LBI4449N

25-50 MHz EXCITER
19D416650G1-GR

SYMBOL	GE PART NO.	DESCRIPTION
		19D416650G1 2 FREQ 25-30 MHz (LL) 19D416650G2 2 FREQ 30-36 MHz (L) 19D416650G3 2 FREQ 36-42 MHz (M) - REV K 19D416650G4 2 FREQ 42-50 MHz (H) 19D416650G5 4 FREQ 25-30 MHz (LL) 19D416650G6 4 FREQ 30-36 MHz (L) 19D416650G7 4 FREQ 36-42 MHz (M) - REV K 19D416650G8 4 FREQ 42-50 MHz (H)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C102	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C103	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C104	54944819105	Ceramic disc: 330 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C105 and C106	19A116655P21	Ceramic disc: 2700 pF ±20%, 1000 VDCW; sim to RMC Type JN Discap.
C107 thru C109	19A116080P105	Polyester: 0.047 uF ±10%, 50 VDCW.
C110 and C111	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C112L	4029003P104	Silver mica: 680 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-20.
C112L	4029003P104	Silver mica: 680 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-20.
C112M	54933679100OK	Mica: 1000 pF ±10%, sim to Electro Motive Type DM-20.
C112N	54933679100OK	Mica: 1000 pF ±10%, sim to Electro Motive Type DM-20.
C113 and C114	19A116655P21	Ceramic disc: 2700 pF ±20%, 1000 VDCW; sim to RMC Type JN Discap.
C115	19A116080P105	Polyester: 0.047 uF ±10%, 50 VDCW.
C116	54926279P9	Tantalum: 3.3 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C117 thru C119	19A116080P105	Polyester: 0.047 uF ±10%, 50 VDCW.
C120	5490008P139	Silver mica: 330 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-15.
C121 and C122	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C123LL	54962192P62	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C123L	54962192P58	Ceramic disc: 62 pF ±5%, 500 VDCW, temp coef -80 PPM.
C123M	54962192P57	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef -80 PPM.
C123H	54962192P54	Ceramic disc: 43 pF ±5%, 500 VDCW, temp coef -80 PPM.
C124LL	19A700013P15	Phenolic: 1.50 pF ±5%, 500 VDCW.
C124L	19A700013P13	Phenolic: 1.00 pF ±5%, 500 VDCW.
C124M	19A700013P13	Phenolic: 1.00 pF ±5%, 500 VDCW.
C124H	19A700013P12	Phenolic: 0.82 pF ±5%, 500 VDCW.
C125LL	54962192P62	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C125L	54962192P58	Ceramic disc: 62 pF ±5%, 500 VDCW, temp coef -80 PPM.
C125M	54962192P57	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef -80 PPM.
C125H	54962192P54	Ceramic disc: 43 pF ±5%, 500 VDCW, temp coef -80 PPM.
C126LL	54916012P24	Phenolic: 1.8 pF ±5%, 500 VDCW.
C126L	54916012P24	Phenolic: 1.8 pF ±5%, 500 VDCW.
C126M	19A700013P14	Phenolic: 1.20 pF ±5%, 500 VDCW.
C126H	19A700013P14	Phenolic: 1.20 pF ±5%, 500 VDCW.
C127LL	54962192P62	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -80 PPM.
C127L	54962192P58	Ceramic disc: 62 pF ±5%, 500 VDCW, temp coef -80 PPM.
C127M	54962192P57	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef -80 PPM.
C127H	54962192P54	Ceramic disc: 43 pF ±5%, 500 VDCW, temp coef -80 PPM.
C129LL*	54962192P55	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef -80 PPM. Deleted by REV F.
C129L*	54962192P51	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -80 PPM. Deleted by REV F.
C129M*	54962192P47	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM. Deleted by REV F.
C129H*	54962192P44	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef -80 PPM.
C130LL	19A700013P9	Phenolic: 0.47 pF ±5%, 500 VDCW.
C130L	54916019110	Phenolic: 0.36 pF ±5%, 500 VDCW.
C130M*	19A700013P7	Phenolic: 0.33 pF ±5%, 500 VDCW.
C130H	54916019107	In REV F & earlier: Phenolic: 0.27 pF ±5%, 500 VDCW.
C130H8	19A700013P6	Phenolic: 0.27 pF ±5%, 500 VDCW. In REV F & earlier: Phenolic: 0.22 pF ±5%, 500 VDCW.
C131LL	54962192P55	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef -80 PPM.
C131L	54962192P51	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -80 PPM.
C131M	54962192P47	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM.
C131H	54962192P44	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef -80 PPM.
C132 and C133	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C134LL	54962192P43	Ceramic disc: 13 pF ±5%, 500 VDCW, temp coef -80 PPM.
C134L	54962192P40	Ceramic disc: 9.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C134M	54962192P42	Ceramic disc: 12 pF ±5%, 500 VDCW, temp coef -80 PPM.
C134H	54962192P38	Ceramic disc: 7.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C135LL	19A700013P11	Phenolic: 0.68 pF ±5%, 500 VDCW.
C135L	54916019114	Phenolic: 0.51 pF ±5%, 500 VDCW.
C135M	19A700013P10	Phenolic: 0.56 pF ±5%, 500 VDCW.
C135H	19A700013P9	Phenolic: 0.47 pF ±5%, 500 VDCW.
C136LL	54962192P43	Ceramic disc: 13 pF ±5%, 500 VDCW, temp coef -80 PPM.
C136L	54962192P40	Ceramic disc: 9.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C136M	54962192P42	Ceramic disc: 12 pF ±5%, 500 VDCW, temp coef -80 PPM.
C136H	54962192P38	Ceramic disc: 7.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C137LL	54916019114	Phenolic: 0.51 pF ±5%, 500 VDCW.
C137L	54916019114	Phenolic: 0.51 pF ±5%, 500 VDCW.
C137M	19A700013P8	Phenolic: 0.39 pF ±5%, 500 VDCW.
C137H	19A700013P8	Phenolic: 0.39 pF ±5%, 500 VDCW.
C138LL	54962192P43	Ceramic disc: 13 pF ±5%, 500 VDCW, temp coef -80 PPM.
C138L	54962192P40	Ceramic disc: 9.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C138M	54962192P42	Ceramic disc: 12 pF ±5%, 500 VDCW, temp coef -80 PPM.
C138H	54962192P38	Ceramic disc: 7.0 pF ±5%, 500 VDCW, temp coef -80 PPM.
C139	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C140	19A116655P18	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C141LL	54900088P127	Silver mica: 100 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-15.
C141L	54900088P125	Silver mica: 82 pF ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C141M*	54900088P127	Silver mica: 100 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-15. In REV G & earlier:
C141H	54900088P123	Silver mica: 68 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-15.
C142LL	54900088P27	Silver mica: 100 pF ±10%, 500 VDCW, sim to Electro Motive Type DM-15.
C142L	54900088P25	Silver mica: 82 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C142M	54900088P25	Silver mica: 82 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C142H	54900088P24	Silver mica: 75 pF ±5%, 500 VDCW, sim to Electro Motive Type DM-15.
C143	19A116163P5	Variable: approx. 5-60 pF, 250 VDCW; sim to Wepco Electric 5-60-250-08003.
C144	54944819105	Ceramic disc: 330 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C145	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C146*	54983019P238	Ceramic disc: 7.0 pF ±0.25 pF, 500 VDCW, temp coef -80 PPM. Added by REV B.
C146LL*	19A116656P12J8	Ceramic: 12 pF ±5%, 500 VDCW; temp coef -80 PPM. Deleted by REV B.
C146L*	19A116656P12J8	Ceramic: 12 pF ±5%, 500 VDCW; temp coef -80 PPM. Deleted by REV B.
C146M*	19A116656P13J8	Ceramic: 13 pF ±5%, 500 VDCW; temp coef -80 PPM. Deleted by REV B.
C146H*	19A116656P12J8	Ceramic: 12 pF ±5%, 500 VDCW; temp coef -80 PPM. Deleted by REV B.
C147	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C148	54944819105	Ceramic disc: 330 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C149	54926279P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C150	54926279P14	Tantalum: 15 uF ±20%, 20 VDCW; sim to Sprague Type 150D.
C151	54944819105	Ceramic disc: 330 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C152 thru C155	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C156*	19A116866791	Variable: 2.5-6 pF, 160 VDCW; sim to 75-THKO-02. Added by REV B.
C157* thru C163*	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW. Added by REV C.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR101 thru CR106	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CV101 thru CV103	5495769P12	Diode, silicon.
J101	19A130924G1	- - - - - - - - JACKS AND RECEPTACLES - - - - - - - - Connector, receptacle: coastal, jack type; sim to Cinch 16S11813.
J103	19821937AG1	Connector, Includes:
	19A116651P1	Contact, electrical; sim to Malco XO-2864.
L101LL	19D416635G9	- - - - - - - - TRANSFORMERS - - - - - - - - Coil.
L101L	19D416635G17	Coil.
L101M	19D416635G1	Coil.
L101H	19D416635G18	Coil.
L102LL	19D416635G9	Coil.
L102L	19D416635G17	Coil.
L102M	19D416635G1	Coil.
L102H	19D416635G18	Coil.
L103LL	19D416635G9	Coil.
L103L	19D416635G17	Coil.
L103M	19D416635G1	Coil.
L103H	19D416635G18	Coil.
L104LL	19A700000P16	Coil, RF: 2.7 uH +-10%; sim to Jeffers 4411-13K.
L104L	19A700000P15	Coil, RF: 2.2 uH ±10%; sim to Jeffers 4411-12K.
L104M*	19A700000P14	Coil, RF: 1.5 uH ±10%; sim to Jeffers 4411-10K. In REV G & earlier:
	7488079P7	Coil, RF: 1.5 uH 10%, 50 ohms DC res. max; sim. to Jeffers 4411-10.
L104H	19A700000P14	Coil, RF: 1.5 uH ±10%; sim to Jeffers 4411-10K.
L105LL	19A700000P12	Coil, RF: 1.0 uH ±10%; sim to Jeffers 4411-8K.
L105L	19A700000P10	Coil, RF: 680 uH ±10%; sim to Jeffers 4411-6K.
L105M	19A700000P8	Coil, RF: 470 uH ±10%; sim to Jeffers 4411-4K.
L105H	19A700000P6	Coil, RF: 330 uH ±10%; sim to Jeffers411-3.
L106 and L107	19A700000P23	Coil, RF: 10 uH ±10%; sim to Jeffers 4421-7K.
L108	7488079P50	Coil, RF: 39 uH 10%, 2.0 ohms DC res. max; sim. to Jeffers 4423-11.
P902		- - - - - - - - - - PLUGS - - - - - - - - - -
	19821959AP2	Includes: Contact, electrical: 8 pins.
	19821959AP3	Contact, electrical: 9 pins.
Q101*	19A115330P1	- - - - - - - - - - TRANSISTORS - - - - - - - - - - Silicon, NPN. In REV C & earlier:
	19A115810P1	Silicon, NPN; sim to Type 2N3904.
Q102 thru Q106	19A115330P1	Silicon, NPN.
Q107*	19A115328P1	Silicon, NPN. Earlier than REV A:
	19A115330P1	Silicon, NPN.
Q108	19A115328P1	Silicon, NPN.
Q109*	19A116869P1	Silicon, NPN; sim to Type 2N4427. In G1, G2, G5, G6 of REV F & earlier: In G3, G7 of REV H & earlier: In G4, G8 REV G & earlier:
	19A115329P2	Silicon, NPN.
R101	19A700113P57	- - - - - - - - - - RESISTORS - - - - - - - - - - Composition: 560 ohms ±5%, 1/2 W.
R102*	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w. In REV C & earlier:
	3B77P393K	Composition: 39K ohms ±10%, 1/2 w.
R103	19A700113P55	Composition: 470 ohms ±5%, 1/2 w.
R104	19A700113P35	Composition: 68 ohms ±5%, 1/2 w.
R105	19A700113P47	Composition: 220 ohms ±5%, 1/2 w.
R106	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R107*	3B77P153K	Composition: 15K ohms ±10%, 1/2 w. Deleted by REV B.
R107LL*	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. In REV H:
	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. Added by REV H
R107L	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R107M	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R107H	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R108	3B77P474J	Composition: 470K ohms ±5%, 1/2 w.
R109	3B77P104K	Composition: 0.10 megohm ±10%, 1/2 w.
R110	19A700113P95	Composition: 22K ohms ±5%, 1/2 w.
R111	19A700113P36	Composition: 75 ohms ±5%, 1/2 w.
R112	19A700113P59	Composition: 680 ohms ±5%, 1/2 w.
R113	19A700113P75	Composition: 3.3K ohms ±5%, 1/2 w.
R114	3B77P511J	Composition: 510 ohms ±5%, 1/2 w.
R115	3B77P473K	Composition: 47K ohms ±10%, 1/2 w.
R116	19A700113P57	Composition: 560 ohms ±5%, 1/2 w.
R117	19A700113P61	Composition: 820 ohms ±5%, 1/2 w.
R118	3B77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R119	19A700113P59	Composition: 680 ohms ±5%, 1/2 w.
R120	3B77P511J	Composition: 510 ohms ±5%, 1/2 w.
R121	19A700113P95	Composition: 22K ohms ±5%, 1/2 w.
R122*	3B77P153K	Composition: 15K ohms ±10%, 1/2 w. Deleted by REV B.
R122LL*	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. In REV H:
	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. Added by REV H
R122L	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R122M	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R122H	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R123*	3B77P153K	Composition: 15K ohms ±10%, 1/2 w. Deleted by REV H.
R123LL*	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. In REV H:
	3B77P303J	Composition: 30K ohms ±5%, 1/2 w. Added by REV H
R123L	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R123M	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R123H	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R124	19A700113P95	Composition: 22K ohms ±5%, 1/2 w.
R125	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R126*	3B77P431J	Composition: 430 ohms ±5%, 1/2 w. In REV D & earlier:
	3B77P391K	Composition: 390 ohms ±10%, 1/2 w.
R127	19B209358P106	Variable, carbon film: approx 300 to 10K ohms ±10%, 1/4 w; sim to CTS Type X-201.
R128	19B209358P108	Variable, carbon film: approx 2K to 50K ohms ±10%, 1/4 w; sim to CTS Type X-201.
R129	19A700113P36	Composition: 75 ohms ±5%, 1/2 w.
R130	19A700113P59	Composition: 680 ohms ±5%, 1/2 w.
R131	19A700113P75	Composition: 3.3K ohms ±5%, 1/2 w.
R132	3B77P511J	Composition: 510 ohms ±5%, 1/2 w.
R133	3B77P473K	Composition: 47K ohms ±10%, 1/2 w.
R134	19A700113P57	Composition: 560 ohms ±5%, 1/2 w.
R135	19A700113P95	Composition: 22K ohms ±5%, 1/2 w.
R136	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R137	19A700113P27	Composition: 33 ohms ±5%, 1/2 w.
R138	3B77P181K	Composition: 180 ohms ±10%, 1/2 w.
R139	19A700113P41	Composition: 120 ohms ±5%, 1/2 w.
R140	19A700113P23	Composition: 22 ohms ±5%, 1/2 w.
R141	19A700113P35	Composition: 68 ohms ±5%, 1/2 w.
R142	19A700113P23	Composition: 22 ohms ±5%, 1/2 w.
R143LL	3B77P101K	Composition: 100 ohms ±10%, 1/2 w.
R143L	3B77P101K	Composition: 100 ohms ±10%, 1/2 w.
R143M*	19A700113P37	Composition: 82 ohms ±5%, 1/2 w. In REV G & earlier:
	3B77P820K	Composition: 82 ohms ±10%, 1/2 w.
R143H	19A700113P37	Composition: 82 ohms ±5%, 1/2 w.
R144LL	19A700113P19	Composition: 15 ohms ±5%, 1/2 w.
R144L	19A700113P19	Composition: 15 ohms ±5%, 1/2 w.
R144M	19A700113P21	Composition: 18 ohms ±5%, 1/2 w.
R144H	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R145	19A700113P99	Composition: 33K ohms ±5%, 1/2 w.
R146	19A700113P107	Composition: 68K ohms ±5%, 1/2 w.
R147 thru R150	19A700113P99	Composition: 33K ohms ±5%, 1/2 w.
R151	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R152	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R153 and R154	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T101LL	19D416635G10	Coil. Includes:
	5493185P13	Tuning slug.
R101L	19D416635G10	Coil. Includes:
	5493185P13	Tuning slug.
T101M	19D416635G15	Coil. Includes:
	5493185P13	Tuning slug.
T101H	19D416635G2	Coil. Includes:
	5493185P13	Tuning slug.
T102LL	19D416635G11	Coil. Includes:
	5493185P13	Tuning slug.
T102L	19D416635G11	Coil. Includes:
	5493185P13	Tuning slug.
T102M	19D416653G3	Coil. Includes:
	5493185P13	Tuning slug.
T102H	19D416653G3	Coil. Includes:
	5493185P13	Tuning slug.
T103LL	19D416635G12	Coil. Includes:
	5493185P13	Tuning slug.
T103L	19D416635G12	Coil. Includes:
	5493185P13	Tuning slug.
T103M	19D416653G4	Coil. Includes:
	5493185P13	Tuning slug.
T103H	19D416653G4	Coil. Includes:
	5493185P13	Tuning slug.
T104LL*	19D416635G19	Coil. In REV E & earlier:
	19D416635G13	Coil. Includes:
	5493185P13	Tuning slug.
T104L*	19D416635G20	Coil. In REV E & earlier:
	19D416635G15	Coil. Includes:
	5493185P13	Tuning slug.
T104M*	19D416635G21	Coil. In REV E & earlier:
	19D416653G5	Coil. Includes:
	5493185P13	Tuning slug.
T104H*	19D416653G22	Coil. In REV E & earlier:
	19D416653G5	Coil. Includes:
	5493185P13	Tuning slug.
T105LL	19D416635G13	Coil. Includes:
	5493185P13	Tuning slug.
T105L	19D416635P13	Coil. Includes:
	5493185P13	Tuning slug.
T105M	19D416653G5	Coil. Includes:
	5493185P13	Tuning slug.
T105H	19D416653G5	Coil. Includes:
	5493185P13	Tuning slug.
T106LL	19D416635G15	Coil. Includes:
	5493185P13	Tuning slug.
T106L	19D416653G14	Coil. Includes:
	5493185P13	Tuning slug.
T106M	19D416653G6	Coil. Includes:
	5493185P13	Tuning slug.
T106H	19D416653G6	Coil. Includes:
	5493185P13	Tuning slug.
T107LL	19D416635G15	Coil. Includes:
	5493185P13	Tuning slug.
T107L	19D416653G15	Coil. Includes:
	5493185P13	Tuning slug.
T107M	19D416653G7	Coil. Includes:
	5493185P13	Tuning slug.
T107H	19D416653G7	Coil. Includes:
	5493185P13	Tuning slug.
T108LL	19D416653G16	Coil. Includes:
	5493185P13	Tuning slug.
T108L	19D416653G16	Coil. Includes:
	5493185P13	Tuning slug.
T108M	19D416653G8	Coil. Includes:
	5493185P13	Tuning slug.
T108H	19D416636G8	Coil.
	5493185P13	Tuning slug.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U101	19A116842P1	Digital, High Speed TTL, Dual J-K Master-Slave Flip Flop; sim to SN54H72W.
U102	19A702868G2	Audio Amplifier.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR101	4036887P56	Zener: 500 mW, 5.0 v. nominal.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SOCKETS - - - - - - - - - - NOTE: When reordering, specify quantity.
XY101 thru XY108	19A701785P1	Contact, electrical; sim to Molex 08-50-0404.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A701887P1	Heat sink. (Used with Q109).
	19A701544P10	Can. (Used with T101-T108 & L101-L103).
	19A701332P4	Insulator, washer: nylon. (Used with Q109).
	19A701990P2	Clip, compression: sim to Tinnerman Products C3428-014-24. (Used with Q109).
		ASSOCIATED ASSEMBLIES
		- - - - - - - - - - OSCILLATORS - - - - - - - - - -
		NOTE: When reordering, specify ICOM Frequency.
		ICOM Freq = (Operating Freq) / 3
Y101 thru Y108	19A129393G13	Compensated: 2 PPM, 25-50 MHz.
Y101 thru Y108	19A129393G16	Externally Compensated: 5 PPM, 25-50 MHz.

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 - 19D416650G1-GR
To incorporate an improved transistor, Changed Q107.

REV. B - To increase power output. Changed C146* and added C156.

REV. C - To increase drive to modulator. Changed Q101 and R102.

REV. D - To provide RF bypassing on unused frequency selection leads. Added C157 thru C162.

REV. E - To increase audio sensitivity. Changed R126.

REV. F - To eliminate possible shorting of shield to wire runs on printed wire board. Changed T104LL, T104L, T104M and T104H. Deleted shield (19B209189P1). C129LL, C129L, C129M and C129H.

REV. G - 19D416650G4 & GR
To improve multi-frequency spread performance with high humidity. Changed C150.

REV. H - To improve spurious and stability performance. Physically changed (swapped) positions of L201 and CR50.

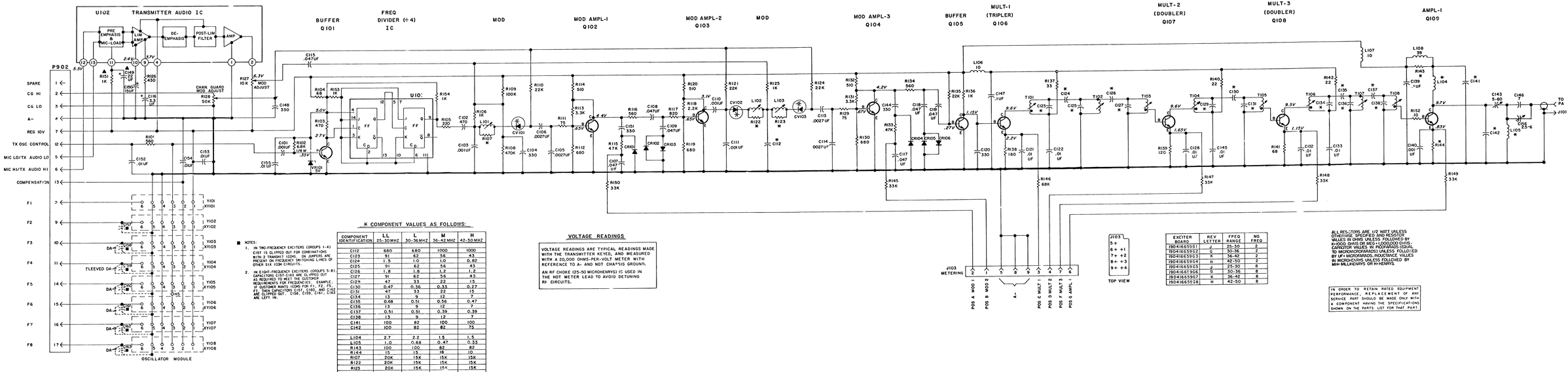
REV. G - 19D416650G1, G2, G5, G6
REV. J - 19D416650G3, G7
REV. H - 19D416650G4, G8
To increase exciter output. Changed Q109.

REV. H - 19D416650G1, G5
To increase Channel Guard deviation at the low end of the split. Deleted R107, R122 and R123. Added R107LL and R123LL.

REV. J - 19D416650G1, G5
To meet symmetry specs. Changed R107LL, R122LL and R123LL.

REV. K - 19D416650G3, G7
To improve operation and impedance matching. Changed C141, R143, C141M and C141H.
C141M was: 19A700000P131, Silver mica: 150 pF ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
L104M was: 19A700000P96, Choke, RF: 0.33 uh ±10%, 0.07 ohms DC res max. L108 was: 19A700000P14, Choke, RF: 1.50 uh ±10%, 0.48 ohms DC res max. R143M was: 19A700113P19, Composition: 15 ohms ±5%, 1/2 W. R144 was: 19A700113P15, Composition: 10 ohms ±5%, 1/2 W.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



SCHEMATIC DIAGRAM

25—50 MHz, EXCITER BOARD 19D416659G1-G8

* COMPONENT VALUES AS FOLLOWS:

COMPONENT IDENTIFICATION	LL 25-30 MHZ	L 30-36 MHZ	M 36-42 MHZ	H 42-50 MHZ
C112	680	680	1000	1000
C123	91	62	56	43
C124	1.5	1.0	1.0	0.82
C125	91	62	56	43
C126	1.8	1.8	1.2	1.2
C127	91	62	56	43
C129	47	33	22	15
C130	0.47	0.36	0.33	0.27
C131	47	33	22	15
C134	13	9	12	7
C135	0.68	0.51	0.56	0.47
C136	13	9	12	7
C137	0.51	0.51	0.39	0.39
C138	13	9	12	7
C141	100	82	100	100
C142	100	82	82	75
L104	2.7	2.2	1.5	1.5
L105	1.0	0.68	0.47	0.33
R143	100	100	82	82
R144	15	15	18	10
R107	20K	15K	15K	15K
R122	20K	15K	15K	15K
R123	20K	15K	15K	15K

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND.

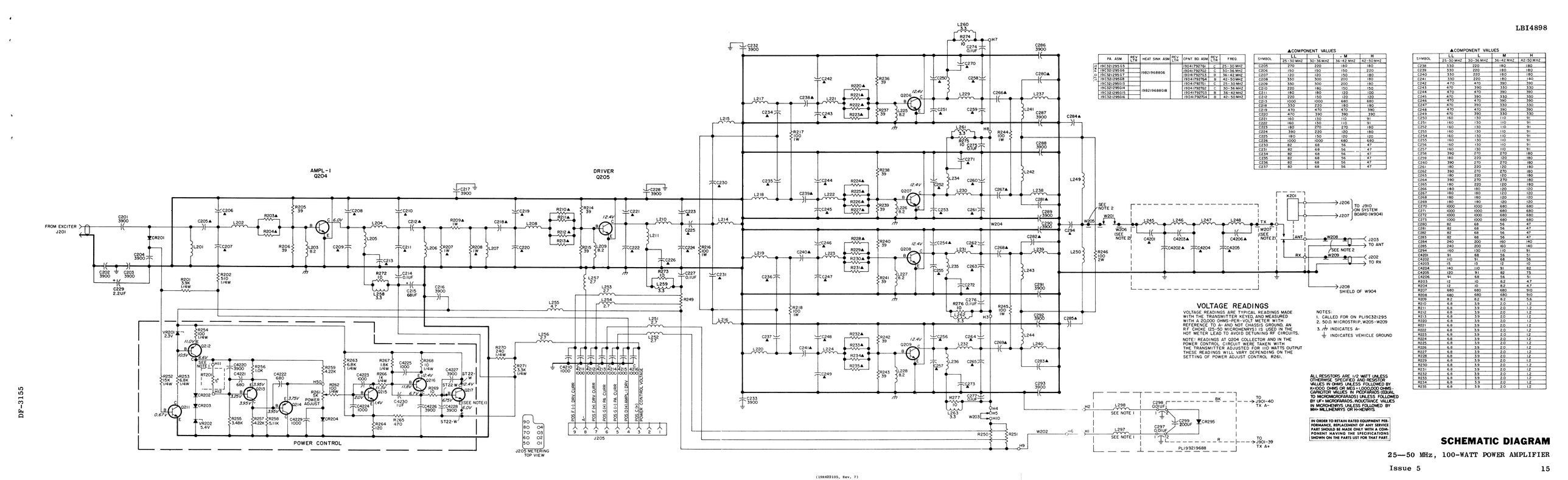
AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

EXCITER BOARD	REV LETTER	FREQ RANGE	NO FREQ
19D416659G1	J	25-30	2
19D416659G2	G	30-36	2
19D416659G3	K	36-42	2
19D416659G4	H	42-50	2
19D416659G5	J	25-30	6
19D416659G6	G	30-36	6
19D416659G7	K	36-42	6
19D416659G8	H	42-50	6

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

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

(19D621827, Rev. 21)



PA ASM	REV LTR	HEAT SINK ASM	REV LTR	CPNT BD ASM	REV LTR	FREQ
19C321295555				19D417927G1	C	25-30 MHZ
19C321295556		19B219688G6		19D417927G2	C	30-36 MHZ
19C321295557				19D417927G3	B	36-42 MHZ
19C321295558				19D417927G4	B	42-50 MHZ
19C321295613				19D417927G1	C	25-30 MHZ
19C321295614		19B219688G18		19D417927G2	C	30-36 MHZ
19C321295615				19D417927G3	B	36-42 MHZ
19C321295616				19D417927G4	B	42-50 MHZ

▲COMPONENT VALUES

SYMBOL	LL 25-30 MHZ	L 30-36 MHZ	M 36-42 MHZ	H 42-50 MHZ
C205	270	220	180	180
C206	150	150	150	220
C207	120	120	150	180
C208	330	300	200	180
C209	330	300	200	180
C210	220	180	150	150
C211	180	180	120	100
C212	220	150	120	120
C213	1000	1000	680	680
C218	330	220	180	180
C219	470	470	390	390
C220	470	390	390	390
C221	160	130	110	91
C222	160	130	110	91
C223	180	270	270	180
C224	390	220	120	180
C225	180	150	120	120
C226	1000	1000	680	680
C230	82	68	56	47
C231	82	68	56	47
C234	82	68	56	47
C235	82	68	56	47
C236	82	68	56	47
C237	82	68	56	47

▲COMPONENT VALUES

SYMBOL	LL 25-30 MHZ	L 30-36 MHZ	M 36-42 MHZ	H 42-50 MHZ
C238	330	220	180	180
C239	330	220	180	180
C240	330	220	180	180
C241	330	220	180	180
C242	470	470	390	390
C243	470	390	330	330
C244	470	470	390	390
C245	470	390	330	330
C246	470	390	330	330
C247	470	390	330	330
C248	470	470	390	390
C249	470	390	330	330
C250	160	130	110	91
C251	160	130	110	91
C252	160	130	110	91
C253	160	130	110	91
C254	160	130	110	91
C255	160	130	110	91
C256	160	130	110	91
C257	160	130	110	91
C258	390	270	270	180
C259	180	270	120	180
C260	390	270	270	180
C261	180	270	120	180
C262	390	270	270	180
C263	180	270	120	180
C264	390	270	270	180
C265	180	270	120	180
C266	180	180	120	120
C267	180	180	120	120
C268	180	180	120	120
C269	180	180	120	120
C270	1000	1000	680	680
C271	1000	1000	680	680
C272	1000	1000	680	680
C273	1000	1000	680	680
C280	82	68	56	47
C281	82	68	56	47
C282	82	68	56	47
C283	82	68	56	47
C284	240	200	160	140
C285	240	200	160	140
C294	160	130	110	91
C4201	91	68	56	51
C4202	110	91	68	56
C4203	15	15	12	10
C4204	140	110	91	82
C4205	120	91	82	75
C4206	91	68	56	51
R203	12	10	8.2	4.7
R204	12	10	8.2	4.7
R207	680	680	680	910
R208	680	680	680	910
R209	8.2	8.2	8.2	5.6
R210	6.8	3.9	2.0	1.2
R211	6.8	3.9	2.0	1.2
R212	6.8	3.9	2.0	1.2
R213	6.8	3.9	2.0	1.2
R220	6.8	3.9	2.0	1.2
R221	6.8	3.9	2.0	1.2
R222	6.8	3.9	2.0	1.2
R223	6.8	3.9	2.0	1.2
R224	6.8	3.9	2.0	1.2
R225	6.8	3.9	2.0	1.2
R226	6.8	3.9	2.0	1.2
R227	6.8	3.9	2.0	1.2
R228	6.8	3.9	2.0	1.2
R229	6.8	3.9	2.0	1.2
R230	6.8	3.9	2.0	1.2
R231	6.8	3.9	2.0	1.2
R232	6.8	3.9	2.0	1.2
R233	6.8	3.9	2.0	1.2
R234	6.8	3.9	2.0	1.2
R235	6.8	3.9	2.0	1.2

(19B622105, Rev. 7)

SCHEMATIC DIAGRAM

25—50 MHz, 100-WATT POWER AMPLIFIER

Issue 5

PARTS LIST

LBI4898

25-50 MHz, 100 WATT
POWER AMPLIFIER
19C321295G5 - G8
19C321295G13 - G16

SYMBOL	GE PART NO.	DESCRIPTION
		19C321295G5, G13 25-30 MHz (LL) - REV A 19C321295G6, G14 30-36 MHz (L) - REV A 19C321295G7, G15 36-42 MHz (M) - REV A 19C321295G8, G16 42-50 MHz (H) - REV A
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L297	19B219999791	Coil.
L298	19B219999792	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q204	19A116696591	Silicon, NPN.
Q205 and Q209	19A134104P1	Silicon, NPN.
Q217	19A116742P1	Silicon, NPN.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT201	19A129379G1	Thermistor: 40K ohms ±20%, color code white; sim to Carborundum Type WC80G82-5.
		POWER AMPLIFIER BOARD 19D417927G1 25-30 MHz (LL) - REV D 19D417927G2 30-36 MHz (L) - REV D 19D417927G3 36-42 MHz (M) - REV C 19D417927G4 42-50 MHz (H) - REV C
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C201 thru C204	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim. to RMC Type JF Discap.
C205LL	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C205L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C205M and C205H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C206LL	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C206L	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C206M	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C206H	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C207LL, C206L and C207L	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C207M	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C207H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C208LL	19A116656P303J15	Ceramic disc: 330 pF ±5%, 500 VDCW, temp coef -1500 PPM.
C208L	19A116656P300J15	Ceramic disc: 300 pF ±5%, 500 VDCW, temp coef -1500 PPM.
C208M	19A116656P200J4	Ceramic disc: 200 pF ±5%, 500 VDCW; temp coef -470 PPM.
C208H	19A116656P180J4	Ceramic disc: 180 pF ±5%, 500 VDCW; temp coef -470 PPM.
C209LL	19A116656P330J15	Ceramic disc: 330 pF ±5%, 500 VDCW, temp coef -1500 PPM.
C209L	19A116656P300J15	Ceramic disc: 300 pF ±5%, 500 VDCW, temp coef -1500 PPM.
C209M	19A116656P200J4	Ceramic disc: 200 pF ±5%, 500 VDCW; temp coef -470 PPM.
C209H	19A116656P180J4	Ceramic disc: 180 pF ±5%, 500 VDCW; temp coef -470 PPM.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
C210LL	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C210L	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C210M and C210H	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C211LL and C211L	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C211M	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C211H	19A700105P34	Mica: 100 pF ±5%, 500 VDCW.
C212LL	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C212L	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C212M and C212H	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C213LL and C213L	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C213M and C213H	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C214	19A116966P107	Metallized Polyester: 0.1 uF ±10%, 50 VDCW.
C215	5490267P11	Tantalum: 68 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C216 and C217	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C218LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C218L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C218M and C218H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C219LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C219L	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C219M	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C219H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C220LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C220L	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C220M	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C220H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C221LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C221L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -80 PPM.
C221M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C221H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C222LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C222L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C222M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C222H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C223LL	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C223L	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C223M	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C223H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C224LL	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C224L	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C224M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C224H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C225LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C225L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C225M and C225H	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C225H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C226LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C226L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C226M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C226H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C227LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C227L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C227M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C227H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C228LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.

SYMBOL	GE PART NO.	DESCRIPTION
C228L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C228M and C228H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C229LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C229L	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C229M	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C229H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C230LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C230L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C230M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW; temp coef 0 PPM.
C230H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C231LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C231L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C231M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C231H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C232 and C233	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C234LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C234L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C234M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C234H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C235LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C235L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C235M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C235H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C236LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C236L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C236M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C236H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C237LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C237L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C237M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C237H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW, temp coef 0 PPM.
C238LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.

SYMBOL	GE PART NO.	DESCRIPTION
C238L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C238M and C238H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C239LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C239L	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C239M	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C239H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C240LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C240L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C240M and C240H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C241LL	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C241L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C241M and C241H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C242LL and C243LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C242M and C242H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C243LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C243L	19A700105P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C243M and C243H	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C244LL and C245LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C244M and C244H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C245LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C245L	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C245M and C245H	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C246LL and C247LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C246M and C246H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C247LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C247L	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C247M and C247H	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C248LL and C248L	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C248M and C248H	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C249LL	7489162P43	Silver mica: 470 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C249L	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C249M and C249H	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C250LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C250L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C250M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C250H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C251LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C251L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C251M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C251H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C252LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C252L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C252M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C252H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C253LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C253L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C253M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C253H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C254LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C254L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C254M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C254H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C255LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C255L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C255M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C255H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C256LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C256L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C256M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C256H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C257LL	19A116656P160J3	Ceramic disc: 160 pF ±5%, 500 VDCW, temp coef -330 PPM.
C257L	19A116656P130J1	Ceramic disc: 130 pF ±5%, 500 VDCW, temp coef -150 PPM.
C257M	19A116656P110J8	Ceramic disc: 110 pF ±5%, 500 VDCW; temp coef -80 PPM.
C257H	19A116656P91J0	Ceramic disc: 91 pF ±5%, 500 VDCW; temp coef 0 PPM.
C258LL and C258M	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C258L and C259LL	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C258H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C259L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C259M	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C259H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C260LL	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C260L and C260M	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C260H and C261LL	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C261L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C261M	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C261H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C262LL	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C262L and C262M	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C262H and C263LL	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C263L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C263M	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C263H	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C264LL	7489162P41	Silver mica: 390 pF ±5%, 500 VDCW; sim to Sprague Type 119.
C264L and C264M	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C264H and C265LL	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C265L	19A700105P44	Mica: 220 pF ±5%, 500 VDCW.
C265M	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C265H and C266LL	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C266L	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C266M and C266H	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C267LL and C267L	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C267M and C267H	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C268LL and C268L	19A700105P41	Mica: 180 pF ±5%, 500 VDCW.
C268M and C268H	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C269LL and C269L	19A700105P041	Mica: 180 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-1S.
C269M and C269H	19A700105P36	Mica: 120 pF ±5%, 500 VDCW.
C270LL and C270L	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C270M and C270H	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C271LL and C271L	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C271M and C271H	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C272LL and C272L	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C272M and C272H	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.

SYMBOL	GE PART NO.	DESCRIPTION
C273LL and C273L	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C273M and C273H	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C274 thru C277	19A116966P107	Metallized Polyester: 0.1 uF ±10%, 50 VDCW.
C280LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C280L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C280M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW; temp coef 0 PPM.
C280H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C281LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C281L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C281M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW; temp coef 0 PPM.
C281H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C282LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C282L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C282M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW, temp coef 0 PPM.
C282H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C283LL	19A116656P82J0	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef 0 PPM.
C283L	19A116656P68J0	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef 0 PPM.
C283M	19A116656P56J0	Ceramic disc: 56 pF ±5%, 500 VDCW; temp coef 0 PPM.
C283H	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C284LL	19A700031P38	Teflon/Mica: 240 pF ±5%, 250 VDCW.
C284L	19A700031P36	Teflon/Mica: 200 pF ±5%, 250 VDCW.
C284M	19A700031P34	Teflon/Mica: 160 pF ±5%, 250 VDCW.
C284H	19A116675P140J	Silver Mica: 140 pF ±5%, 250 VDCW.
C285LL	19A700031P38	Teflon/Mica: 240 pF ±5%, 250 VDCW.
C285L	19A700031P36	Teflon/Mica: 200 pF ±5%, 250 VDCW.
C285M	19A700031P34	Teflon/Mica: 160 pF ±5%, 250 VDCW.
C285H	19A116679P140J	Silver Mica: 140 pF ±5%, 250 VDCW.
C286 thru C289	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C294LL	19A700031P34	Teflon/Mica: 160 pF ±5%, 250 VDCW.
C294L	19A700031P32	Teflon/Mica: 130 pF ±5%, 250 VDCW.
C294M	19A700031P30	Silver mica: 110 pF ±5%, 250 VDCW.
C294H	19A700031P28	Teflon/Mica: 91 pF ±5%, 250 VDCW.
C295	5490267P19	Tantalum: 22 uF ±20%, 35 VDCW; sim to Sprague Type 150D.
C420LL*	19A116656P91J2	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -150 PPM. In REV A & A earlier:
	19A116656P82J1	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -150 PPM.
C420L*	19A116655P28	Teflon/Mica: 91 pF ±5%, 250 VDCW. In REV B & earlier:
	19A116679P100J	Mica: 100 pF ±5%, 250 VDCW.
C420M	19A700015P27	Silver Mica: 82 pF ±5%, 250 VDCW.
C420H	19A700015P26	Teflon/Mica: 75 pF ±5%, 250 VDCW.
C420LL*	19A116656P91J2	Ceramic disc: 91 pF ±5%, 500 VDCW, temp coef -220 PPM. In REV A & earlier:
	19A116656P82J1	Ceramic disc: 82 pF ±5%, 500 VDCW, temp coef -150 PPM.
C420L	19A116656P68J1	Ceramic disc: 68 pF ±5%, 500 VDCW, temp coef -150 PPM.
C420M	19A116656P56J1	Ceramic disc: 56 pF ±5%, 500 VDCW; temp coef -150 PPM.
C420H	19A116656P51J1	Ceramic disc: 51 pF ±5%, 500 VDCW; temp coef -150 PPM.
C4210 thru C4216	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4220	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4221 and C4222	19A116655P17	Ceramic disc: 680 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4223 thru C4225	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW, sim toRMC Type JF Discap.
C4226 thru C4228	19A116655P23	Ceramic disc: 3900 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4229	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4230*	19A116192P14	Ceramic: 0.1 uF ±20%, 50 VDCW; sim to Erie USCC CK05C104-MZ. Added to G1 by REV C. Added to G2-G4 by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR201*	19A116025P22	Silicon, fast recovery; sim to Hewlett Packard 5082-2811. Earlier than REV A:
	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR202 thru CR204	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J201 thru J203	19A13092461	Connector, receptacle: coaxial, jack type; sim to Cinch 14611613.

SYMBOL	GE PART NO.	DESCRIPTION
J205	19B219374G1	Connector, Includes: Shell.
J206 and J207	19A134263P2	Contact, electrical: sim to Selectro 229-1071.
J208	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - - - RELAYS - - - - - - - - - - - -
K201	19A700061P1	Hermetic sealed: 180 to 341 ohms coil res, 8-16.3 VDC; sim to GE 3SAV1760A2, CPClare HFW-1201558, or Potter-Brumfield HCM6160.
		- - - - - - - - - - - - INDUCTORS - - - - - - - - - - - -
L201LL	19C320617P1	Coil.
L201L	19C320617P23	Coil.
L201M	19C320617P24	Coil.
L201H	19C320617P2	Coil.
L202LL	19C320617P3	Coil.
L202L	19C320617P5	Coil.
L202M	19C320617P25	Coil.
L202H	19C320617P4	Coil.
L203	19A700000P122	Coil, RF: 8.2 uH ±10%; sim to Jeffers 4422-3K.
L204LL	19C320617P5	Coil.
L204L	19C320617P26	Coil.
L204M	19C320617P27	Coil.
L204H	19C320617P6	Coil.
L205LL	19C320618P2	Coil.
L205L and L205M	19C310618P6	Coil.
L205H	19C320618P1	Coil.
L206LL	19C320617P7	Coil.
L206L	19C320617P28	Coil.
L206M	19C320617P29	Coil.
L206H	19C320617P8	Coil.
L207LL	19C320617P9	Coil.
L207L	19C320617P30	Coil.
L207M	19C320617P31	Coil.
L207H	19C320617P10	Coil.
L208LL	19C320619P1	Coil.
L208L	19C320618P7	Coil.
L208M	19C320619P5	Coil.
L208H	19C320619P6	Coil.
L209	19A700000P122	Coil, RF: 8.2 uH ±10%; sim to Jeffers 4422-3K.
L210LL	19C320617P11	Coil.
L210L and L210M	19C320617P4	Coil.
L210H	19C320617P12	Coil.
L211LL	19C320618P2	Coil.
L211L and L211M	19C320618P6	Coil.
L211H	19C320618P1	Coil.
L214LL	19C320617P13	Coil.
L214L	19C320617P32	Coil.
L214M	19C320617P18	Coil.
L214H	19C320617P14	Coil.
L215LL	19C320617P13	Coil.
L215L	19C320617P33	Coil.
L216M	19C320617P34	Coil.

SYMBOL	GE PART NO.	DESCRIPTION
L215H	19C320617P18	Coil.
L216LL	19C320617P13	Coil.
L216L	19C320617P33	Coil.
L216M	19C320617P34	Coil.
L216H	19C320617P18	Coil.
L217LL	19C320617P15	Coil.
L217L	19C320617P5	Coil.
L217M	19C320617P26	Coil.
L217H	19C320617P6	Coil.
L218LL	19C320617P25	Coil.
L218L	19C320617P5	Coil.
L218M	19C320617P26	Coil.
L218H	19C320617P6	Coil.
L219LL	19C320617P15	Coil.
L219L	19C320617P5	Coil.
L219M	19C320617P26	Coil.
L219H	19C320617P6	Coil.
L220LL	19C320617P15	Coil.
L220L	19C320617P5	Coil.
L220M	19C320617P26	Coil.
L220H	19C320617P6	Coil.
L221LL	19C320619P1	Coil.
L221L	19C320618P7	Coil.
L221M	19C320619P5	Coil.
L221H	19C320619P6	Coil.
L222LL	19C320619P1	Coil.
L222L	19C320618P7	Coil.
L222M	19C320619P5	Coil.
L222H	19C320619P6	Coil.
L223LL	19C320619P1	Coil.
L223L	19C320618P7	Coil.
L223M	19C320619P5	Coil.
L223H	19C320619P6	Coil.
L224LL	19C320619P1	Coil.
L224L	19C320618P7	Coil.
L224M	19C320619P5	Coil.
L224H	19C320619P6	Coil.
L225 thru L228	19A700000P122	Coil, RF: 8.2 uH ±10%; sim to Jeffers 4422-3K.
L229LL	19C320617P16	Coil.
L229L	19C320617P35	Coil.
L229M	19C320617P12	Coil.
L229H	19C320617P17	Coil.
L230LL	19C320617P16	Coil.
L230L	19C320617P35	Coil.
L230M	19C320617P12	Coil.
L230H	19C320617P17	Coil.
L231LL	19C320617P16	Coil.
L231L	19C320617P35	Coil.
L231M	19C320617P12	Coil.
L231H	19C320617P17	Coil.
L232LL	19C320617P17	Coil.
L232L	19C320617P35	Coil.
L232M	19C320617P12	Coil.

SYMBOL	GE PART NO.	DESCRIPTION
L232H	19C320617P17	Coil.
L233LL	19C320618P2	Coil.
L233L and L233M	19C320618P6	Coil.
L233H	19C320618P1	Coil.
L234LL	19C320618P2	Coil.
L234L and L234M	19C320618P6	Coil.
L234H	19C320618P1	Coil.
L235LL	19C320618P2	Coil.
L235L and L235M	19C320618P6	Coil.
L235H	19C320618P1	Coil.
L236LL	19C320618P2	Coil.
L236L and L236M	19C320618P6	Coil.
L236H	19C320618P1	Coil.
L237LL	19C320617P37	Coil.
L237L	19C320617P38	Coil.
L237M	19C320617P39	Coil.
L237H	19C320617P40	Coil.
L238LL	19C320617P37	Coil.
L238L	19C320617P38	Coil.
L238M	19C320617P39	Coil.
L238H	19C320617P40	Coil.
L239LL	19C320617P37	Coil.
L239L	19C320617P38	Coil.
L239M	19C320617P39	Coil.
L239H	19C320617P40	Coil.
L240LL	19C320617P37	Coil.
L240L	19C320617P38	Coil.
L240M	19C320617P39	Coil.
L240H	19C320617P40	Coil.
L241LL	19C320617P41	Coil.
L241L	19C320617P42	Coil.
L241M	19C320617P43	Coil.
L241H	19C320617P44	Coil.
L242LL	19C320617P41	Coil.
L242L	19C320617P42	Coil.
L242M	19C320617P43	Coil.
L242H	19C320617P44	Coil.
L243LL	19C320617P41	Coil.
L243L	19C320617P42	Coil.
L243M	19C320617P43	Coil.
L243H	19C320617P44	Coil.
L244LL	19C320617P41	Coil.
L244L	19C320617P42	Coil.
L244M	19C320617P43	Coil.
L244H	19C320617P44	Coil.
L245LL	19A129360P9	Coil.
L245L	19A129360P6	Coil.
L245M	19A129360P4	Coil.
L245H	19A129360P1	Coil.
L246LL	19A129360P10	Coil.

SYMBOL	GE PART NO.	DESCRIPTION
L246L	19A129360P7	Coil.
L246M	19A129360P3	Coil.
L246H	19A129360P2	Coil.
L247LL	19A129360P11	Coil.
L247L	19A129360P8	Coil.
L247M	19A129360P5	Coil.
L247H	19A129360P3	Coil.
L248LL	19A129360P9	Coil.
L248L	19A129360P6	Coil.
L248M	19A129360P4	Coil.
L248H	19A129360P1	Coil.
L249LL	19C320617P41	Coil.
L249L	19C320617P42	Coil.
L249M	19C320617P43	Coil.
L249H	19C320617P44	Coil.
L250LL	19C320617P41	Coil.
L250L	19C320617P42	Coil.
L250M	19C320617P43	Coil.
L250H	19C320617P44	Coil.
L251 thru L254	19A700000P16	Coil, RF: 2.7 uH +-10%; sim to Jeffers 4411-13K.
L255	19A700000P19	Coil, RF: 4.7 uH ±10%; sim to Jeffers 4421-3K.
L256 and L257	19A700000P16	Coil, RF: 2.7 uH +-10%; sim to Jeffers 4411-13K.
L258	19A700000P17	Coil, RF: 3.3 uH ±10%; sim to Jeffers 4421-1K.
L259 thru L263	19A129346G1	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q211	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q212 thru Q214	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q215	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q216	19A115779P1	Silicon, PNP; sim to Type 2N3251.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R202	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R203LL	19A700113P17	Composition: 12 ohms ±5%, 1/2 w.
R203L	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R203M	19A700113P13	Composition: 8.2 ohms ±5%, 1/2 w.
R203H	19A700113P7	Composition: 4.7 ohms ±5%, 1/2 w.
R204LL	19A700113P17	Composition: 12 ohms ±5%, 1/2 w.
R204L	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R204M	19A700113P13	Composition: 8.2 ohms ±5%, 1/2 w.
R204H	19A700113P7	Composition: 4.7 ohms ±5%, 1/2 w.
R205 and R206	19A700113P29	Composition: 39 ohms ±5%, 1/2 w.
R207LL	19A700112P59	Composition: 680 ohms ±5%, 1 w.
R207L	19A700112P59	Composition: 680 ohms ±5%, 1 w.
R207M	19A700112P59	Composition: 680 ohms ±5%, 1 w.
R207H	3R78P911J	Composition: 910 ohms ±5%, 1 w.
R208LL	19A700112P59	Composition: 680 ohms ±5%, 1 w.
R208L	19A700112P59	Composition: 680 ohms ±5%, 1 w.
R208M	19A700112P59	Composition: 680 ohms ±5%, 1 w.

SYMBOL	GE PART NO.	DESCRIPTION
R208H	3R78P911J	Composition: 910 ohms ±5%, 1 w.
R209LL	19A700112P13	Composition: 8.2 ohms ±5%, 1 w.
R209L	19A700112P13	Composition: 8.2 ohms ±5%, 1 w.
R209M	19A700112P13	Composition: 8.2 ohms ±5%, 1 w.
R209H	19A700112P9	Composition: 5.6 ohms ±5%, 1 w.
R210LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R210L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R210M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R210H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R211LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R211L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R211M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R211H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R212LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R212L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R212M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R212H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R213LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R213L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R213M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R213H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R214 and R215	19A700113P29	Composition: 39 ohms ±5%, 1/2 w.
R216 thru R218	19A700112P39	Composition: 100 ohms ±5%, 1 w.
R220LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R220L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R220M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R220H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R221LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R221L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R221M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R221H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R222LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R222L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R222M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R222H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R223LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R223L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R223M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R223H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R224LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R224L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R224M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R224H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R225LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R225L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R225M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R225H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R226LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R226L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R226M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R226H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R227LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R227L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R227M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R227H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R228LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R228L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R228M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R228H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R229LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R229L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R229M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R229H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R230LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R230L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R230M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R230H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R231LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R231L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R231M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R231H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R232LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R232L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R232M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R232H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R233LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R233L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R233M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R233H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R234LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R234L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R234M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R234H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R235LL	19A700113P11	Composition: 6.8 ohms ±5%, 1/2 w.
R235L	19A700113P5	Composition: 3.9 ohms ±5%, 1/2 w.
R235M	7147161P27	Composition: 2 ohms ±5%, 1/2 w.
R235H	7147161P22	Composition: 1.2 ohms ±5%, 1/2 w.
R236 thru R243	19A700113P29	Composition: 39 ohms ±5%, 1/2 w.
R244 thru R246	19A700111P39	Composition: 100 ohms ±5%, 2 w.
R249	19C850605P2	Shunt resistor.
R250 and R251	19C850605P1	Shunt resistor.
R252	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R253	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w.
R254	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R255	19A116278P253	Metal film: 3480 ohms ±2%, 1/2 w.
R256	19A116278P201	Metal film: 1000 ohms ±2%, 1/2 w.
R257	19A116278P261	Metal film: 4220 ohms ±2%, 1/2 w.
R258	19A116278P269	Metal film: 5110 ohms ±2%, 1/2 w.
R259	19A116278P261	Metal film: 4220 ohms ±2%, 1/2 w.
R261	19A116559P102	Variable cermet: 5000 ohms ±20%, 1/2 w; sim to CTS Series 360.
R262	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R263	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w.
R264	19A700113P41	Composition: 120 ohms ±5%, 1/2 w.
R265	19A700113P55	Composition: 470 ohms ±5%, 1/2 w.
R266	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R267	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R268	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R269	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R270	3R152P241J	Composition: 240 ohms ±5%, 1/4 w.
R271	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R27	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R273 thru R277	19A700112P5	Composition: 3.9 ohms ±5%, 1 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR201	4036887P1	Zener: 500 mW, 2.3 v. nominal.
VR202	4036887P5	Zener: 500 mW, 5.4 v. nominal.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W201	19A129571P1	Strap.
W202	19B219998P2	Jumper.
W203	19B219998P1	Jumper.
W204	19C320624G1	Strip, connector.
W205 thru W209		(Part of printed wiring board 19D417923P1).
		HEAT SINK ASSEMBLY 19B219688G6 M MODEL & INTERMITTANT DUTY STATION 19B219688G18 E MODEL
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C297 and C298	19A116708P1	Ceramic: 0.01 uF -0 +100%, 500 VDCW, rated 20 amps; sim to Erie 327050X5W0103P.
C299	19A115680P10	Electrolytic: 200 uF +150-10%, 18 VDCW; sim to Mallory Type TTX.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR295	19A116783P1	Rectifier, silicon: 100 VDC blocking, 6 amp; sim to MR751.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A129361P1	Shield. (Located between L246 & L247, L247 & L248).
	19A129361P2	Shield. (Located between L245 & L246).
	19D416275P2	Filter casting.
	19A700068P1	Insulator, bushing. (Used with Q217).
	19A116023P1	Insulator, plate. (Used with Q217).
	19D416712P6	Insulator. (Located under Power Amplifier Board).
	19A129661P1	Insulator. (Located at L298).
	19B201074P312	Tap screw, Phillips POZIDRIV®: No. 6-32 x 3/4. (Secures Filter Casting).
	5492178P2	Washer, spring tension: sim to Wallace Barnes 375-20. (Used with Q204-Q209).
	19A702782P5	Nut, hex, brass: No. 8-32. (Used with Q204).
	19A129434P1	Washer. (Used with C297, C298).
	N207P16C6	Hex nut: No. 10-32. (Used with Q205-Q209).

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 - Power Amplifier Board 19D417927G1-G4
To improve operation. Changed CR201.

REV. B - Power Amplifier Board 19D417927G1
To improve stopband attenuation (25-30 MHz range)
Changed C4201LL and C4206LL.

REV. B - Power Amplifier Board 19D417927G2-G4
REV. C - Power Amplifier Board 19D417927G1
To improve operation of power control circuit. Added C4230.

REV. C - Power Amplifier Board 19D417927G2
To re-center the passband of the low pass filter. Changed C4205L.

REV. D - Power Amplifier Board 19D417927G1, G2
REV. C - Power Amplifier Board 19D417927G3, G4
REV. A - 100 Watt Power Amplifier Assembly 19C321295G5-G8, G13-G16
To improve operation of power control circuit. Added C295.