MAINTENANCE MANUAL

29.7—50 MHz EXCITER BOARD 19D423355G1-G3

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DESCRIPTION

The exciter uses seven transistors, a crystal module and two integrated circuits to drive the PA assembly. The crystal module determines the (F1) transmitting frequency in single frequency applications. In addition, the exciter also provides temperature compensation voltage to all crystal modules.

In multi-frequency transmitters, the crystal modules for additional frequencies are located on the multi-frequency board.

The crystal frequency ranges from approximately 10.0 to 16.67 megahertz, and 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-audio-squelch (SAS) 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 multipliers, amplifier and the relative power out.

CIRCUIT ANALYSIS

OSCILLATOR CIRCUIT

A Colpitts oscillator consisting of Q102, a plug-in crystal module and associated components provides the fundamental operating frequency for the transmitter. The crystal module in the collector base circuit of Q102 is temperature compensated to maintain frequency stability within ±5 PPM over an ambient temperature range of -30°C to +60°C. Compensation voltage is applied from compensator circuit Q101. The output of the oscillator is taken from the collector of Q102, buffered by Q103 and applied to frequency divider U102.

SERVICE NOTE

> Y1 and C2 are not field replaceable items. C2 is factory selected to complement the temperature/frequency characteristics of each individual crystal. Should it become necessary to replace either Y1 or C2, the entire crystal module must be replaced.

In single frequency radios, the F1 keying lead is connected directly to A- by a DA jumper connected between H12 and H31 on the SAS board. This assures F1 oscillator operation each time the PTT switch is pressed. When the PTT switch is operated, +10 Volts is present on the transmitter oscillator lead at P902-1 and the emitter of Q102. R104 and R105 form a voltage voltage divider network to establish the base voltage for Q102.

In multi-frequency radios the jumper connected between H12 and H31 is removed to allow F1 frequency selection via the frequency selector switch on the control unit.

When frequencies F2 thru F4 are selected the oscillator frequency from the multi-frequency board is supplied to J102-1 on the exciter through cable W2601.

COMPENSATOR CIRCUITS

The crystal modules are temperature compensated at both ends of the temperature range to provide instant frequency compensation. The temperature compensator consists of Q101, VR102, RT101, RT102 and associated components. Zener diode VR102 provides a constant +8.5 V reference voltage for compensator Q101.

The cold end compensation circuit does not operate at temperatures above -10°C (+14°F). When the temperature drops below -10°C, the circuit is activated. As the temperature decreases, the resistance of

GENERAL ELECTRIC

RT101 increases and the compensation voltage increases.

An increase in compensation voltage decreases the capacitance of the varactor in the oscillator, thereby increasing the output frequency of the crystal module.

The hot end compensation circuit does not operate at temperatures below +50°C (122°F). When the temperature rises above +50°C, the circuit is activated. As the temperature increases, the resistance of RT102 decreases and the compensation voltage decreases. The decrease in compensation voltage increases the capacity of the varactor, decreasing the output frequency of the crystal module.

Listed below are typical minimum and maximum voltage readings to be expected at pin 4 of the crystal modules. Voltages should be measured using a high impedance meter.

TEMPERATURE RANGE	OUTPUT VOLTAGE MINIMUM	OUTPUT VOLTAGE MAXIMUM
-30°C	4.9 Volts	6.0 Volts
-10° to 50°C	3.7 Volts	4.3 Volts
+75°C	3.3 Volts	3.8 Volts

AUDIO IC

The transmitter audio circuitry is contained in audio IC U101. A simplified drawing of the audio IC is shown in Figure 1.

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 pre-amplifier is supplied from the 10-volt regulator on the SAS board through R979 & R980 to J901A-14 in MASTR® Executive II radios.

In Custom MVP radios, collector voltage for the transistorized microphone pre-amplifier is supplied from the 10-Volt regulator on the SAS board through R928, R929 and J913 to the microphone.

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 R108 and resistor R119 to the phase modulators.

SERVICE NOTE: If the DC voltages applied to the audio IC are correct and there is no audio output, replace U101.

For radios equipped with Channel Guard, tone from the encoder is applied to the phase modulators through P902-9, (CG H1) and resistors R117 and R121. Instructions for setting Channel Guard modulation are located in the Transmitter Alignment procedures.

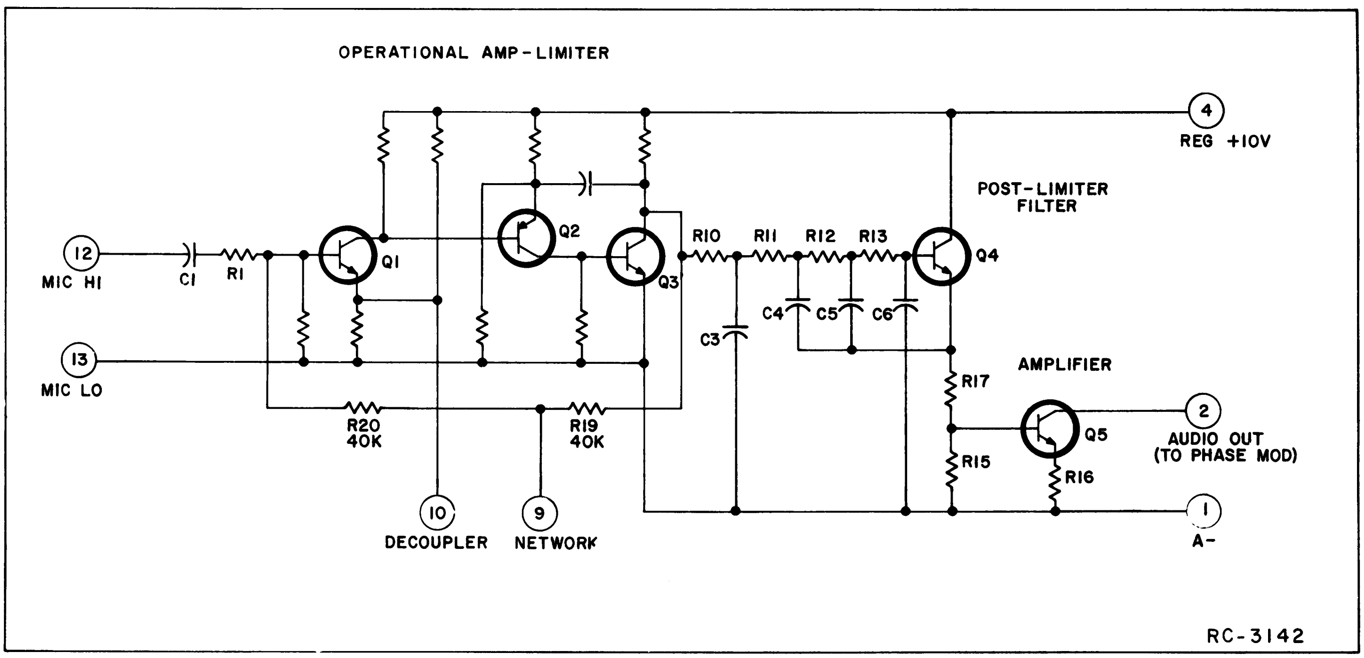

Figure 1 - Simplified Audio IC

FREQUENCY DIVIDER IC

The output at pin 3 of the selected crystal module is coupled through buffer amplifier Q103 to frequency divider U102. U102 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 crystal modules on), Q103 is saturated (turned on) with its collector voltage near zero. Keying the transmitter starts one of the crystal modules and its output turns Q103 off and on once each cycle. As Q103 turns on 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" state (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 U102.

If U102 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 C117 and C118 (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 C117 to the first modulator stage.

BUFFER & PHASE MODULATOR

The divider output is coupled to the first phase modulator. The first phase modulator is varactor (voltage-variable capacitor) CR101 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 CR101 and CR102 resulting in a phase modulated output. A voltage divider network (R110 and R113) provides the proper bias for varactors CR101 and CR102.

The output of the modulator is coupled through blocking capacitor C120 to the base of buffer Q104.

MULTIPLIERS & AMPLIFIER

Buffer Q104 is saturated when no RF signal is present. Applying an RF signal to Q104 provides a sawtooth waveform at its collector to drive class C tripler, Q105. The tripler stage is metered through R124. The output of Q105 is coupled through tuned circuits T101 and T102 to the base of doubler Q106. T101 and T102 are tuned to one-fourth of the operating frequency. The doubler stage is metered through R127.

The output of Q106 is coupled through tuned circuits T103 and T104 to the base of second doubler Q107. T103 and T104 are tuned to one-half the operating frequency. Q107 is metered through R130.

The ouput of Q107 is coupled through two tuned circuits (T105 and T106) to the base of amplifier Q108. These circuits are tuned to the transmitter operating frequency.

Q108 is a class C amplifier and is metered through R135. The amplifier collector circuit consists of L107 and C143 through C146 and matches the amplifier output to the input of the power amplifier assembly. The exciter provides a minimum of 250 milliwatts of RF power to the power amplifier through J101 and cable W216. The relative power output is metered through a metering circuit consisting of C147, CR103, R136 and R137.

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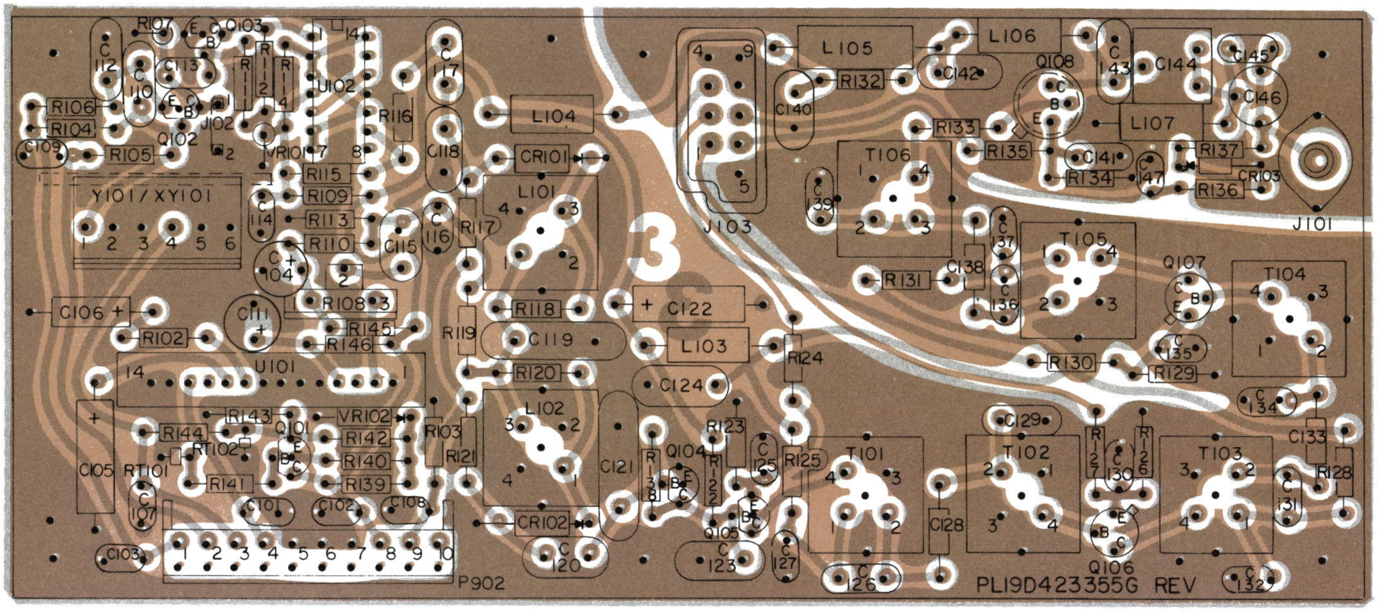

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(19D423331, Sh. 2, Rev. 3)
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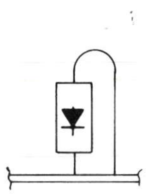
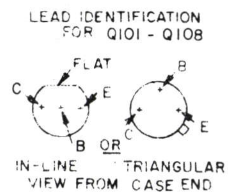
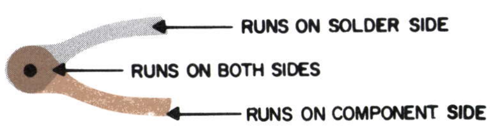


POLARITY FOR VR101



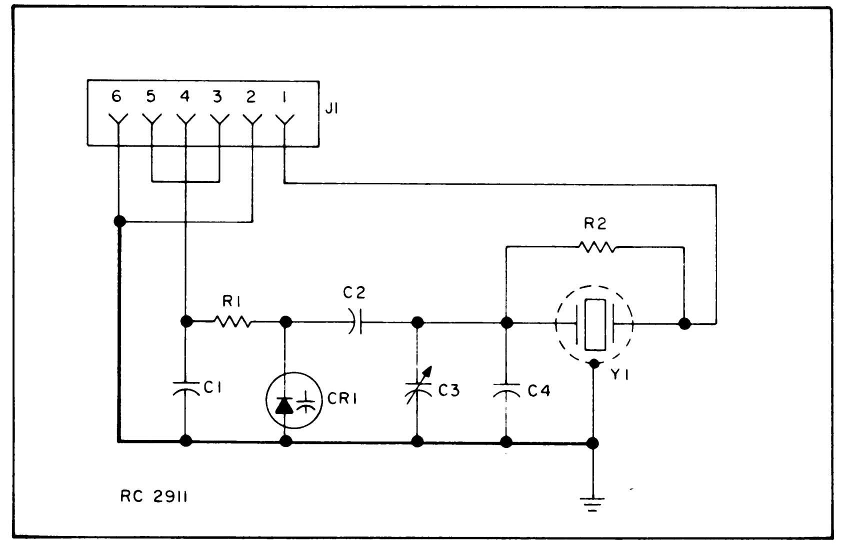
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION. TAB INDICATES EMITTER LEAD.

NOTE:
1. COLOR DOT ON BASE OF COIL IDENTIFIES PIN 1 ON L101, L102 AND T101-T106.



OUTLINE DIAGRAM

29.7—50 MHz EXCITER BOARD
19D423355G1-G3



CRYSTAL MODULE (TYPICAL)

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.

ALL RESISTORS ARE 1/4 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.

EXCITER BOARD	REV LETTER	FREQUENCY
19D423355G1	B	30-36 MHz
19D423355G2	B	36-42 MHz
19D423355G3	B	42-50 MHz

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 TO CHASSIS GROUND.

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

* SEE CHART BELOW FOR VALUE

COMPONENT IDENTIFICATION	L 30-36	M 36-42	H 42-50
C126	68	56	43
C128	1.0	1.0	.82
C129	62	56	43
C131	33	24	18
C133	.36	.27	.22
C134	33	24	18
C136	9	12	7
C138	.51	.56	.47
C139	9	12	7
C142	82	68	100
C143	82	82	75
L106	2.2	1.5	1.5
L107	.56	.47	.33
R132	100	82	82
R134	15	10	10
C121	1500	1000	1000
C145	9	6	7

(19R622182, Rev. 4)

SCHEMATIC DIAGRAM

29.7—50 MHz EXCITER BOARD
19D423355G1-G3

Issue 3

PARTS LIST

LB130093A

EXCITER BOARD
19D423355G1 30-36 MHz
19D423355G2 36-42 MHz
19D423355G3 42-50 MHz

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	19A143481P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C102 and C103	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C104	19A701534P8	Tantalum: 22 µf ±20%, 16 VDCW.
C105	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C106	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C107 thru C109	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C110	19A143491P100J7	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -750 PPM.
C111	19A701534P8	Tantalum: 22 µf ±20%, 16 VDCW.
C112	19A700105P38	Silver mica: 150 pf ±5%, 500 VDCW.
C113	19A143481P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C114	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C115	19A700234P11	Polyester: 0.047 µf ±10%, 50 VDCW.
C116	19A700233P4	Ceramic disc: 330 pf ±20%, 50 VDCW.
C117	5490008P43	Silver mica: 470 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C118	5493366P680J	Mica: 680 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C119	4029003P116	Silver mica: 2200 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C120	5493366P1000J	Mica: 1000 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C121L	4029003P112	Silver mica: 1500 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C121M and C121H	5493366P1000J	Mica: 1000 pf ±5%, 100 VDCW; sim to Electro Motive Type DM-15.
C122	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C123	5490008P135	Silver mica: 220 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C124	19A143477P27	Polyester: 0.1 µf ±10%, 50 VDCW.
C125	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C126L	5496219P359	Ceramic disc: 68 pf ±5%, 500 VDCW, temp coef -150 PPM.
C126M	5496219P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C126H	5496219P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C127	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C128L and C128M	19A700013P13	Phenolic: 1.0 pf ±5%, 500 VDCW.
C128H	19A700013P12	Phenolic: 0.82 pf ±5%, 500 VDCW.
C129L	5496219P258	Ceramic disc: 62 pf ±5%, 500 VDCW, temp coef -80 PPM.
C129M	5496219P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C129H	5496219P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C130	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C131L	19A143491P33J8	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C131M	19A143491P24J8	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C131H	19A143491P18J8	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C132	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C133L	5491601P110	Phenolic: 0.36 pf ±5%, 500 VDCW.
C133M	19A700013P6	Phenolic: 0.27 pf ±5%, 500 VDCW.
C133H	19A700013P5	Phenolic: 0.22 pf ±5%, 500 VDCW.
C134L	19A143491P33J8	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C134M	19A143491P24J8	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C134H	19A143491P18J8	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C135	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C136L	19A143491P9J8	Ceramic disc: 9.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C136M	19A143491P12J8	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -80 PPM.
C136H	19A143491P7J8	Ceramic disc: 7.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C137	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C138L	5491601P114	Phenolic: 0.51 pf ±5%, 500 VDCW.
C138M	19A700013P10	Phenolic: 0.56 pf ±5%, 500 VDCW.
C138H	19A700013P9	Phenolic: 0.47 pf ±5%, 500 VDCW.
C139L	19A143491P9J8	Ceramic disc: 9.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C139M	19A143491P12J8	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -80 PPM.
C139H	19A143491P7J8	Ceramic disc: 7.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C140	19A143477P27	Polyester: 0.1 µf ±10%, 50 VDCW.
C141	19A143481P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C142L	5490008P125	Silver mica: 82 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C142M	5490008P123	Silver mica: 68 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C142H	5490008P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C143L and C143M	5490008P25	Silver mica: 82 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C143H	5490008P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C144	19A116163P5	Variable: approx 5 to 60 pf, 50 VDCW; sim to Amperex 2222-809-08003.
C145L	19A143491P9J8	Ceramic disc: 9.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C145M	19A143491P6J8	Ceramic disc: 6.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C145H	19A143491P7J8	Ceramic disc: 7.0 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C146	19A116867P2	Variable: 3-8 pf, 160 VDCW; sim to 7-S-TRIKO-02.
C147	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR101 and CR102	5495769P12	Silicon, variable capacitance, 100 pf nominal.
CR103	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J101	19A130924G1	Connector, receptacle: coaxial, jack type; sim to Cinch 14H11613.
J102	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 2).
J103	19B219374G1	Connector: 9 contacts.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - - -
L101L	19D416635G17	Coil. Includes:
	5493185P8	Tuning slug.
L101M	19D416635G1	Coil. Includes:
	5493185P8	Tuning slug.
L101H	19D416635G18	Coil. Includes:
	5493185P8	Tuning slug.
L102L	19D416635G17	Coil. Includes:
	5493185P8	Tuning slug.
L102M	19D416635G1	Coil. Includes:
	5493185P8	Tuning slug.
L102H	19D416635G18	Coil. Includes:
	5493185P8	Tuning slug.
L103 and L104	19A700000P23	Coil, RF: 10.0 µh ±10%, 0.605 ohms DC res max.
L105	7488079P50	Choke, RF: 39.0 µh ±10%, 2.00 ohms DC res max; sim to Jeffers 4422-11K.
L106L	19A700000P15	Coil, RF: 2.2 µh ±10%, 0.970 ohms DC res max.
L106M and L106H	19A700000P14	Coil, RF: 1.5 µh ±10%, 0.485 ohms DC res max.
L107L	7488079P75	Choke, RF: 0.56 µh ±10%, 0.125 ohms DC res max; sim to Jeffers 4411-5K.
L107M	19A700000P8	Coil, RF: 0.47 µf ±20%, 0.085 ohms DC res max.
L107H	19A700000P6	Coil, RF: 0.33 µf ±20%, 0.065 ohms DC res max.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P902	19A116659P2	Connector, printed wiring: 10 contacts; sim to Molex 09-52-3102.
		- - - - - - - - - - - TRANSISTORS - - - - - - - -
Q101	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q102	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q103*	19A115330P1	Silicon, NPN.
		Earlier than REV A:
	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q104 and Q105	19A115330P1	Silicon, NPN.
Q106 and Q107	19A115328P1	Silicon, NPN.
Q108*	19A116868P1	Silicon, NPN; sim to Type 2N4427.
		In REV A & earlier:
	19A115329P2	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R102	19A700106P53	Composition: 390 ohms ±5%, 1/4 w.
R103	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R104	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R105	19A700106P97	Composition: 27K ohms ±5%, 1/4 w.
R106	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R107	19A700106P57	Composition: 560 ohms ±5%, 1/4 w.
R108	19B209358P106	Variable, carbon film: approx 300 to 10,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R109	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R110	3R152P104K	Composition: 100K ohms ±10%, 1/4 w.
R111*	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P393K	Composition: 39K ohms ±10%, 1/4 w.
R112	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
R113	3R152P474K	Composition: 470K ohms ±10%, 1/4 w.
R114 and R115	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R116	19A700106P47	Composition: 220 ohms ±5%, 1/4 w.
R117	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R118	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R119	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R120	3R152P683K	Composition: 68K ohms ±10%, 1/4 w.
R121	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R122	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R123	19A700106P45	Composition: 180 ohms ±5%, 1/4 w.
R124	3R152P683K	Composition: 68,000 ohms ±10%, 1/4 w.
R125	3R152P330K	Composition: 33 ohms ±10%, 1/4 w.
R126	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R127	3R152P333K	Composition: 33K ohms ±10%, 1/4 w.
R128	19A700106P23	Composition: 22 ohms ±5%, 1/4 w.
R129	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R130	3R152P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R131	19A700106P23	Composition: 22 ohms ±5%, 1/4 w.
R132L	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R132M and R132H	3R152P820K	Composition: 82 ohms ±10%, 1/4 w.
R133	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R134L	19A700106P19	Composition: 15 ohms ±5%, 1/4 w.
R134M and R134H	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R135	3R152P333K	Composition: 33K ohms ±10%, 1/4 w.
R136	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R137	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R138	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R139	3R152P241J	Composition: 240 ohms ±5%, 1/4 w.
R140	19C314256P23162	Metal film: 31.6K ohms ±1%, 1/4 w.
R141	19C314256P21212	Metal film: 12.1K ohms ±1%, 1/4 w.
R142	19C314256P27871	Metal film: 7.87K ohms ±1%, 1/4 w.
R143	19C314256P27151	Metal film: 7.15 ohms ±1%, 1/4 w.
R144	19A700106P105	Composition: 56K ohms ±5%, 1/4 w.
R145 and R146	19A700106P46	Composition: 200 ohms ±5%, 1/4 w.
		- - - - - - - - - - - THERMISTORS - - - - - - - -
RT101	19C300048P7	Disc: 5000 ohms ±10%; sim to NL 1D103.
RT102	19C300048P5	Disc: 200,000 ohms ±10%; sim to NL 4D051.
		- - - - - - - - - - - TRANSFORMERS - - - - - - -
T101L	19D416635G10	Coil. Includes:
	5493185P13	Tuning slug.
T101M and T101H	19D416635G2	Coil. Includes:
	5493185P13	Tuning slug.
T102L	19D416635G12	Coil. Includes:
	5493185P13	Tuning slug.
T102M and T102H	19D416635G4	Coil. Includes:
	5493185P13	Tuning slug.
T103L	19D416635G13	Coil. Includes:
	5493185P13	Tuning slug.
T103M and T103H	19D416635G5	Coil. Includes:
	5493185P13	Tuning slug.
T104L	19D416635G13	Coil. Includes:
	5493185P13	Tuning slug.
T104M and T104H	19D416635G5	Coil. Includes:
	5493185P13	Tuning slug.
T105L	19D416635G14	Coil. Includes:
	5493185P13	Tuning slug.
T105M and T105H	19D416635G6	Coil. Includes:
	5493185P13	Tuning slug.
T106L	19D416635G16	Coil. Includes:
	5493185P13	Tuning slug.
T106M and T106H	19D416635G8	Coil. Includes:
	5493185P13	Tuning slug.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - -
U101	19D416542G2	Transmitter, Audio.
U102	19A116842P1	Digital, Dual J-K Master-Slave Flip Flop: Identification No. 54H73 or 64H73.
		- - - - - - - VOLTAGE REGULATORS - - - - - - -
VR101	4036887P56	Zener: 500 mW, 5.0 v. nominal.
VR102	4036887P9	Zener: 500 mW, 8.5 v. nominal.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XY101	19A116659P50	Connector, printed wiring: 6 contacts; sim to Molex 09-65-1061.
		ASSOCIATED ASSEMBLIES
		- - - - - - - - - - CRYSTAL MODULES - - - - - - -
		NOTE: When reordering, give GE Part Number and specify exact operating frequency needed.
Y101	19B226962G1	Crystal module: 5 PPM, 30-36 MHz.
	19B226962G2	Crystal module: 5 PPM, 36-42 MHz.
	19B226962G3	Crystal module: 5 PPM, 42-50 MHz.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A129424G2	Can. (Used with L101, L102, T101-T106).
	4036555P1	Insulator, washer: nylon. (Used with Q108).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

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 - Exciter Board 19D423355G1-G3
To improve drive to modulator stage. Changed R111 and Q103.

REV. B - To incorporate new transistor. Changed Q108.

ADDENDUM TO LBI30045D

This addendum describes Revision Letter changes that are not yet included in the publication.

REV.C- <u>19D4423355G1-3 29.7-30 MHZ EXCITER BOARD</u>
TO INCORPORATE A NEW INTEGRATED CIRCUIT. REPLACED U101. OLD AND NEW COMPONENTS ARE INTERCHANGEABLE. NEW PART NUMBER FOR U101 IS: 19A700037P34 DUAL J/K FF WITH CLEAR.