MOBILE RADIO

MAINTENANCE MANUAL

806—825 MHz CUSTOM MVP EXCITER BOARD 19D424793G1 AND OSCILLATOR BOARD 19C327782G1

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DESCRIPTION

The exciter is a crystal controlled, frequency modulated exciter designed for one through four frequency operation in the 806-825 MHz frequency band. Both integrated circuits and discreet components are used to provide a nominal 65 milliwatts of RF Power to the PA assembly or 15 milliwatts to the receiver. In the receive mode the exciter provides the injection frequency for the local oscillator input to the 1st IF mixer stage.

The exciter includes the audio processor, oscillator board(s) with up to four ICOMs and 3 frequency multipliers. The FM ICOMs plug into the oscillator board which, in turn, plugs into the exciter.

The operating frequency is selected by the position of the channel selector switch on the control unit and is determined by the FM ICOM associated with the selected channel. The crystal frequencies range from approximately 16.7 to 17.2 MHz and are multiplied 48 times to generate the RF carrier frequency. Oscillator stability is maintained within ±0.0002% by individual temperature compensating circuits in each ICOM.

Audio, power supply voltage, and control functions are connected from the SAS board to the exciter through P902/J902.

Centralized metering jack J103 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The Test Set meters all multiplier stages and the relative receiver L.O. RF output power.

CIRCUIT ANALYSIS

References to symbol numbers mentioned in the text are found on the schematic diagram, outline diagram and parts list.

OSCILLATOR BOARD

Depending on the number of operating frequencies, either one or two Oscillator boards may be present. Each Oscillator board contains space for two FM ICOMs and plugs into J104 on the exciter. When two Oscillator Boards are required, they are mounted piggy back fashion - one atop the other - and are plugged into J104 on the exciter. ICOMs for Channels 1 and 2 plug into the lower Oscillator Board. ICOMs for Channels 3 and 4 plug into the upper Oscillator Board.

In single frequency applications one Oscillator Board, equipped with one FM ICOM, is supplied. A DA jumper connected between H1 and H2 connects A- to the frequency select lead at XY2601-8. Since the exciter output is used as the 1st IF injection frequency for the receiver, the oscillator associated with the selected operating frequency is always operating.

In multi-frequency radios the DA jumper is removed. Frequency selection is then controlled by the FREQUENCY selector switch with A- being applied from the switch to the appropriate frequency select lead through J2601.

A voltage divider consisting of R2601 and R2602 applies approximately 6.2 Volts to pin 6 of the FM ICOM to operate the crystal. L2601 and C2605 provide additional filtering of the +10 Volt line.

The output of the Oscillator Board is applied to a tuned circuit consisting of T101, C113 and C114 on the exciter board. The 4th harmonic is selected and applied to FET Amplifier Q102.

FM ICOMs (Frequency Modulated)

Each ICOM is enclosed in an RF shielded can with the type ICOM 92C-FM ICOM) printed

on the top of the can. These FM ICOMs are not interchangeable with other type ICOMs. Each 2C-FM ICOM contains a crystal controlled Colpitts oscillator and a 2 PPM (±0.0002%) compensator IC.

Frequency selection is accomplished by switching the ICOM keying lead (terminal 8) to A- by means of the channel selector switch on the control unit. In single-frequency radios, a jumper from H1 to H2 on the Oscillator Board permanently connects terminal 8 of the F1 FM ICOM to A-. The selected oscillator is on all the time.

The audio output from the audio processor is applied to the FM ICOMs through J104-5 and modulates the crystal frequency. A tuned circuit, consisting of T101, C113 and C114, on the exciter board selects the 4th harmonic of the crystal frequency (approximately 67.16 MHz to 68.75 MHz) and applies the harmonic frequency to FET amplifier Q102 on the exciter board through J104-2.

CAUTION

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

The 2C-FM ICOMs are individually temperature compensated and will maintain 2 PPM frequency stability from -30°C to +60°C (-22°F to 140°F).

Oscillator Circuit

Quartz crystals used in ICOMs exhibit the traditional "S" curve characteristic 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 for by choosing a parallel compensation capacitor with a temperature coefficient approximately equal to and opposite that of the crystal.

Figure 1 shows the typical performance of an uncompensated crystal as well as the typical performance of a crystal that has been matched with a properly chosen compensation capacitor.

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) connected in parallel with the crystal. Refer to Figure 2 for a simplified diagram of the FM ICOM.

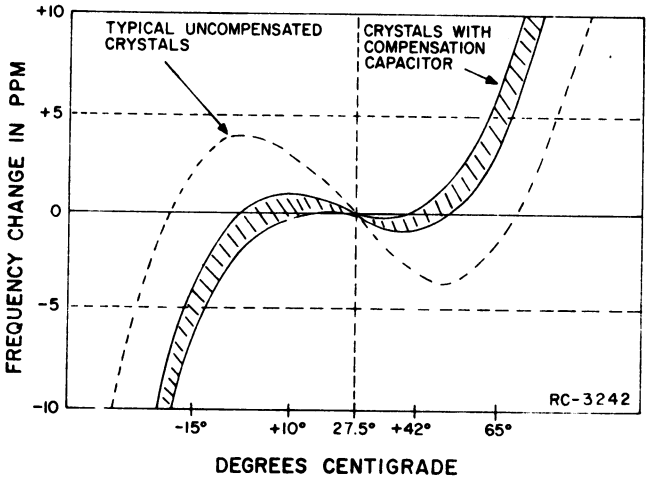


Figure 1 - Typical Crystal Characteristics

Modulation is accomplished with a hyperabrupt varicap connected in series with the crystal feedback capacitors. The varicap impedance is the dominant impedance in the loop. This allows large swings of load capacity with modulation, therefore, large frequency shifts are achieved for the modulated input. Biasing for the modulation varicap is provided by a voltage divider, R2601 and R2602 connected across the 10 volt regulator input on the Oscillator Board. A bias voltage of 6.2 volts is applied to pin 6 of all ICOMs.

Compensator Circuits

The 2C-FM ICOMs are temperature compensated at both ends of the temperature range to provide instant frequency compensation.

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.

An increase in compensation voltage decreases the capacitance of the varactor in the oscillator, thereby compensating for the cold crystal characteristics and maintains a constant output frequency from the ICOM.

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 decreses. The decrease in compensation voltage increases the capacity of the varactor, compensating

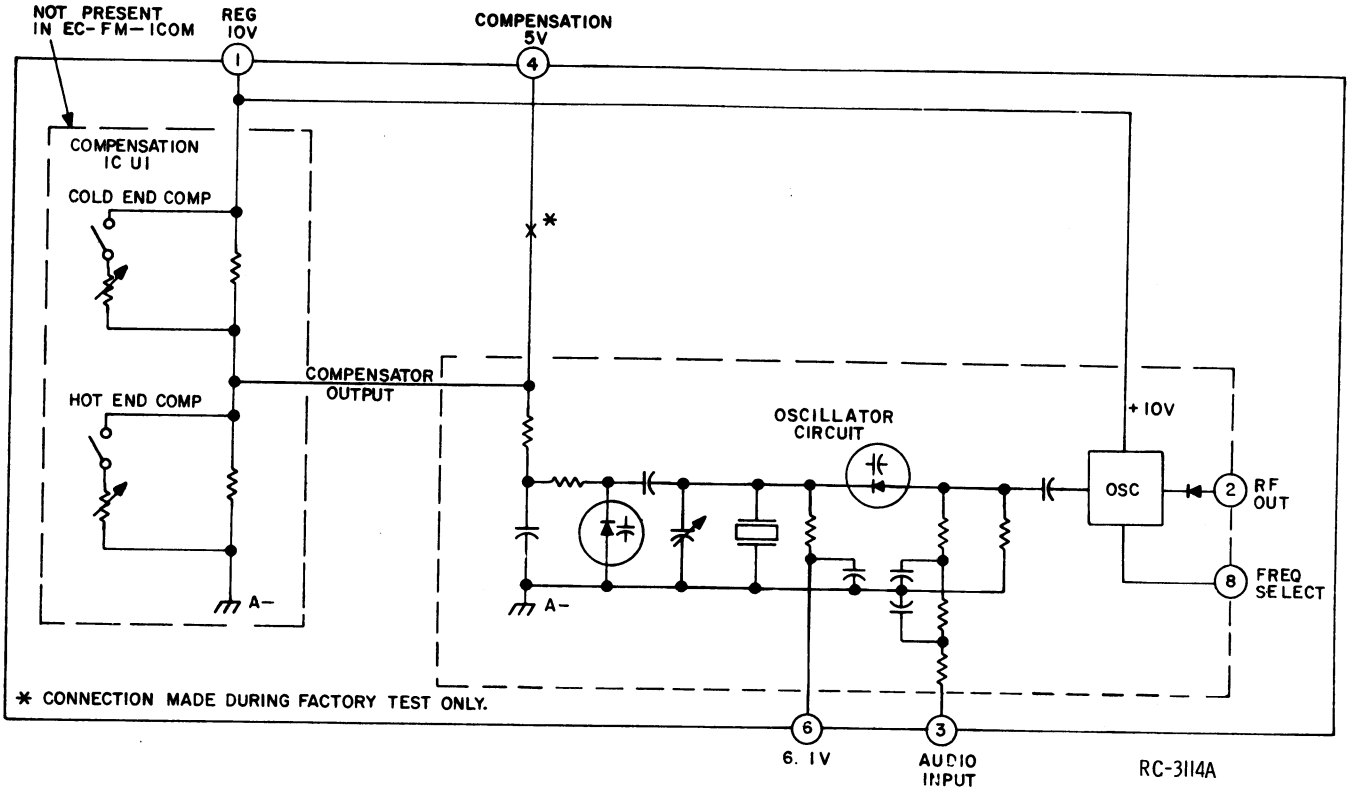


Figure 2 - Equivalent FM-ICOM Circuit

for the hot crystal characteristics and maintains a constant output frequency from the ICOM.

SERVICE NOTE

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

AUDIO PROCESSOR A101

The transmitter audio processor contains audio circuitry consisting of two operational amplifiers, AR101-A and -B, a pre-emphasis circuit with amplitude limiting and a post limiter filter. A total gain of approximately 24 dB is realized through the audio processor. Twenty dB is provided by AR101-B and 4 dB by AR101-A.

The 10-Volt regulator supplies power to the audio processor and applies regulated +10 V through XA101-6 to a voltage divider consisting of R108 and R110 in the audio processor. The +5 V output from the voltage divider establishes the operating reference point for both operational amplifiers. C107 provides decoupling to remove any noise transients from the 10-Volt regulator output.

Resistors R105, R106, and R107 and diodes CR101 and CR102 provide limiting for AR101-B. Diodes CR101 and CR102 are reverse biased by +5 VDC on AR101B-6 and voltage divider network R105, R106 and R107. The voltage divider network provides +7 VDC at the cathode of CR101 and +3 VDC at the anode of CR102. C102 and C103 permit a DC level change between AR101B-7 and the voltage divider network for diode biasing.

When the input signal to AR101B-1 is of a magnitude such that the amplifier output at AR101B-7 does not exceed 4 volts PP, the amplifier provides a nominal 20 dB gain. When the audio signal level at AR101B-7 exceeds 4 volts PP, diodes CR101 and CR102 conduct on the positive and negative half cycles providing 100% negative feedback to reduce the amplifier gain to 1. This limits the audio amplitude at AR101B-7 to 5 volts PP.

Resistors R102, R103 and R104 and C104 comprise the audio pre-emphasis network that enhances the signal to noise ratio. R104 and C104 control the pre-emphasis curve below limiting. R103 and C104 control the cut-off point for high frequency pre-emphasis. As high frequencies are attenuated, the gain of AR101 is increased.

Audio from the microphone is applied

to the audio processor at XA101-1 and coupled to the input of operational amplifier AR101-B through R101 and C101.

The amplified output of AR101-B is coupled through XA101-4 audio MOD ADJ control R103, XA101-3, C106, R112 and R113 to a second operational amplifier AR101-A. Audio MOD ADJ control is set for a deviation of 4.5 kHz.

The Channel Guard tone input is applied to the audio processor through J902-9 and a filter consisting of R101 and C104 and then through CG MOD ADJ R104 to A101-5. The CG tone is then coupled through C105 and R111 to AR101A-2 where it is combined with the microphone audio. AR101-A provides a signal gain of approximately 4 dB.

A post limiter filter consisting of AR101A, R112-R114, C108 and C109 provides 12 dB per octave roll off. R109 and C111 provide an additional 6 dB per octave roll off for a total of 18 dB.

SERVICE NOTE

R112-R114 are 1% resistors. This tolerance must be maintained to assure proper operation of the post limiter filter. Use exact replacements.

The output of the post limiter filter is coupled through C110 and XA101-9 to temperature compensating network RT101 and R107 to the input of the oscillator board at J104-5 on the exciter board.

FREQUENCY MULTIPLIERS

The fourth harmonic of the crystal frequency is applied to gate 1 of input of FET amplifier Q102 from the oscillator module through J104-2 and a tuned circuit consisting of T101, C113 and C114. Voltage for Q102 is supplied by the 10-volt regulator through J902-8. Q102 is metered through R116 with test set on position B.

The output of Q102 is coupled through tuned circuits T102, T103 and C124 to the base of first doubler Q103. T102 and T103 are tuned to four times the crystal frequency. Collector voltage for Q103 is supplied through collector feed network L102, R123, C130 and R124. Q103 is metered through R122 with test set on position D.

The output of first doubler Q103 is coupled through tuned circuits T104, T105 and C134 to the base of second doubler Q104. T104 and T105 are tuned to eight times the crystal frequency. Collector voltage for Q104 is supplied through collector feed network L103 and R126. Q104 is metered through R126 with test set on position F.

The output of second doubler Q104 is coupled to the base of tripler Q105 through impedance matching circuitry and a double tuned circuit tuned to the 16th harmonic of the crystal frequency (267.2-275.2 MHz). These circuits also contribute to the rejection of spurious and harmonic output and consist of L103-L105, C141 and C143-C146.

C141 and L104 form a high pass filter that matches the collector impedance of Q104 to the impedance of the first tuned circuit consisting of L104 and C143. Coupling capacitor C145 couples the signal to the second tuned circuit consisting of L105 and C146. The signal from the second tuned circuit is applied to the base of tripler Q105 through a second high pass filter consisting of L105 and C147. L105 and C147 match the impedance of the second tuned circuit to the input impedance of Q105. Bias for Q105 is supplied from the 10-Volt line through a biasing network consisting of R129, C160 and CR103. C160 provides decoupling. CR103 establishes the quiescent biasing level of Q105 at approximately 0.6 VDC through R131. The emitter current of Q105 is metered through R232 with the test set in position G.

SERVICE NOTE

The values of the coupling capacitors and certain decoupling capacitors are critical to proper equipment operation. When replacing these components, be sure to use exact value replacement parts. The following capacitors are especially critical: C124, C134, C130, C131, C136, C139, C141, C145, C147 and C152.

The output of tripler Q107 is coupled to the antenna through iris coupled, double tuned helical resonators, Z101 and Z102, relay K101, and output jack J101 when transmitting or to output jack J102 when receiving. Z101 and Z102 are tuned to the operating frequency. Collector voltage for Q107 is supplied through L107, R134 and Z101 pins 1 & 3.

Relative power output of the exciter is metered through a metering network consisting of CR102, R138, R139, C161 and C162 and is metered on position A of the test set. Relative power out (position A) is metered only in the receive mode.

OUTPUT CONTROL RELAY

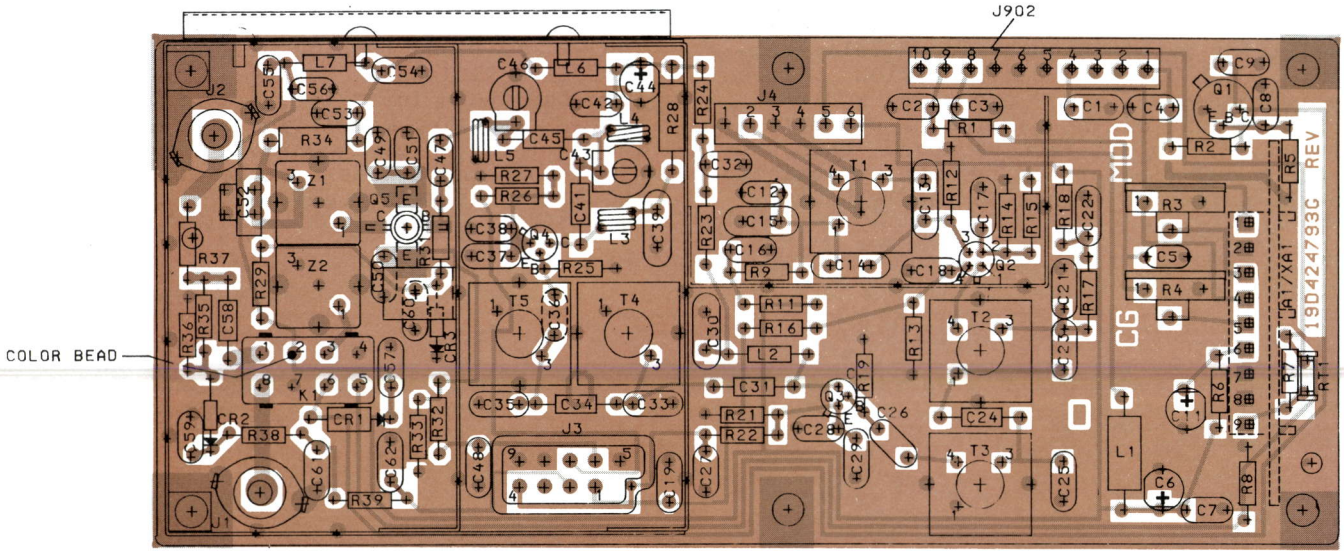
The output control relay steers the exciter output to the PA in the transmit mode and to the receiver first mixer when in the receive mode. This circuit consists of relay control transistor Q101 and output control relay K101.

When operating in the receive mode, Q101 is turned off and relay K101 is

de-energized. The exciter output is applied to the receiver first mixer as the local oscillator input through closed relay contacts 1 and 3, C158, R137 and J102. Closed relay contacts 5 and 7 short the audio input circuit of the oscillator board to ground (A-) in the receive mode. This prevents modulation of the FM ICOM and quietens the LO injection signal to the 1st mixer.

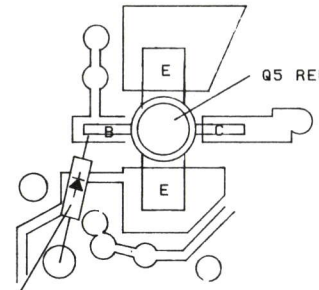
When operating in the transmit mode, +10 V is applied to the base of Q101 through J902-1 and R102, turning Q101 on. Q101 energizes K101 which removes the audio short from the audio input to the oscillator board, restoring modulation capability to the FM ICOM. Closed contacts 3 and 8 of K101 apply the exciter output directly to the PA assembly through J101.

EXCITER



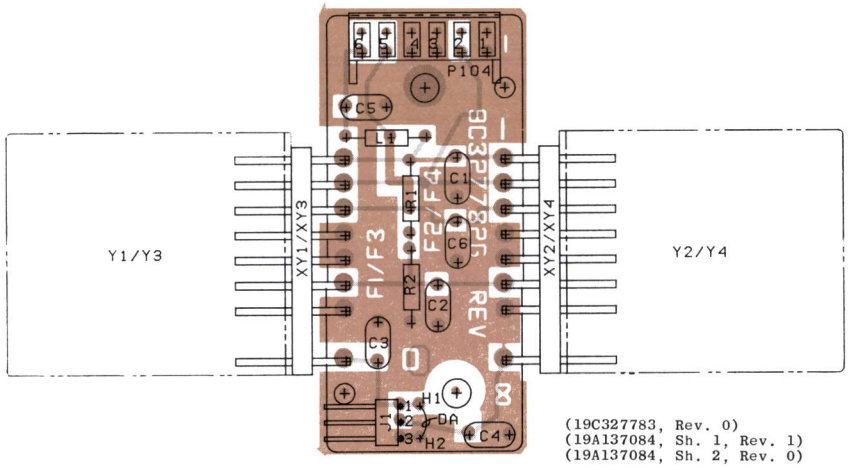
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS, PREFIX WITH 100 SERIES.
EXAMPLE: C1-C101, R1-R101, ETC. EXCEPT P902.

(19D424795, Rev. 1)
(19B227982, Sh. 1, Rev. 0)
(19B227982, Sh. 2, Rev. 0)



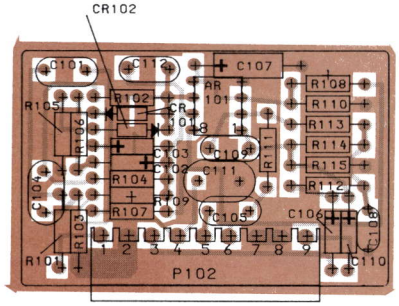
CR104 TO BE SOLDERED TO PATTERN AS SHOWN AND FLUSH TO BOARD ON SOLDER SIDE

OSCILLATOR BOARD



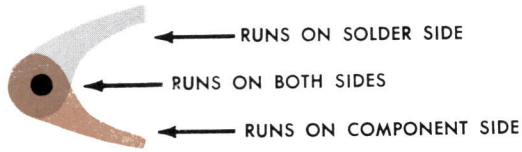
(19C327783, Rev. 0)
(19A137084, Sh. 1, Rev. 1)
(19A137084, Sh. 2, Rev. 0)

AUDIO PROCESSER



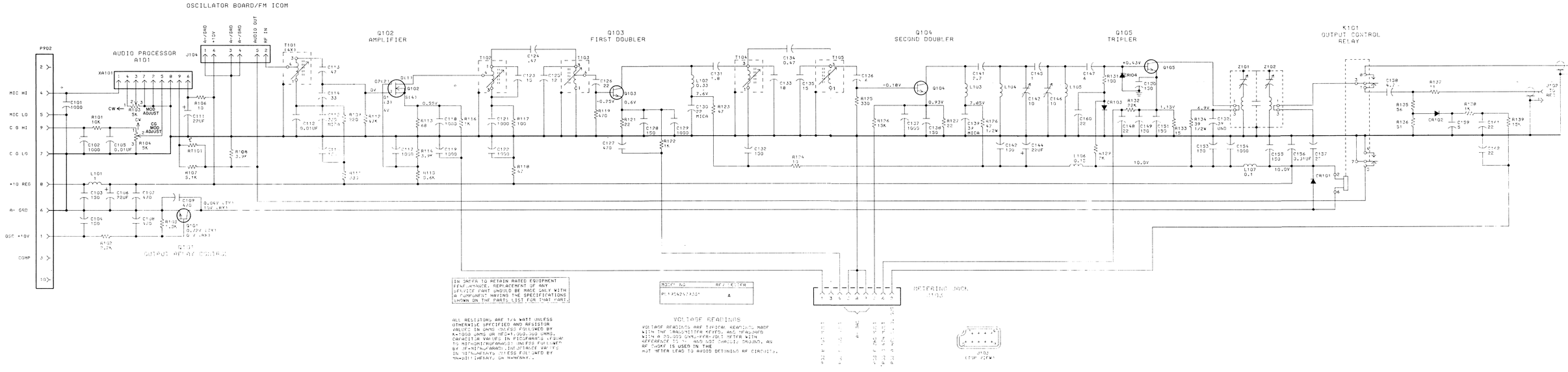
(19C327048, Rev. 2)
(19A130538, Sh. 1, Rev. 1)
(19A130538, Sh. 2, Rev. 1)

PARTIAL REFERENCE DESIGNATION ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH 2600 SERIES
EXAMPLE: C1-C2601, R1-R2601, ETC. EXCEPT P104.



OUTLINE DIAGRAMS

806—825 MHz EXCITER



SCHEMATIC DIAGRAM

806—825 MHz EXCITER

Issue 2

PARTS LIST

LBI30597A

806-825 MHz EXCITER BOARD
19D624793G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101 and C102	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C103 and C104	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C105	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C106	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C107 thru C109	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C111	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C112	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C113	19A116656M4728	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C114	19A116656P3328	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C115	7489162P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C116	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C117 thru C119	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C121 and C122	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C123	19A116656P5122	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -220 PPM.
C124	5491601P13	Phenolic: 0.47 pf ±10%, 500 VDCW.
C125	19A116656P1222	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -220 PPM.
C126	19A116656P2220	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C127	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C128	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C129	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C130	19A134666P3	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM1562A.
C131	5491601P124	Phenolic: 1.8 pf ±5%, 500 VDCW.
C132	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C133	19A116656P1828	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C134	5491601P113	Phenolic: 0.47 pf ±5%, 500 VDCW.
C135	19A116656P1528	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C136	19A116656P6J0	Ceramic disc: 6 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C137	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C138	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C139	7489162P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C141	5491601P128	Phenolic: 2.7 pf ±5%, 500 VDCW.
C142	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C143	19B209544P2	Variable, air: 2.04 to 9.8 pf, 250 v; sim to E.F. Johnson Type T 187-0106-005.
C144	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C145	5491601P120	Phenolic: 1.0 pf ±5%, 500 VDCW.
C146	19B209544P2	Variable, air: 2.04 to 9.8 pf, 250 v; sim to E.F. Johnson Type T 187-0106-005.
C147	19A116656P6J0	Ceramic disc: 6 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C148	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C149 thru C151	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC T ype JF Discap.
C152	19A116679P39J	Metallized teflon: 39 pf ±5%, 250 VDCW.
C153	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C154	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C155	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C156	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C157	19A116-56P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C158	5491601P132	Phenolic: 4.7 pf ±5%, 500 VDCW.
C159	19A116656P5J0	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C160 thru C162	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR101	4037822P1	Silicon, 1000 mA, 400 PIV.
CR103	19A116052P2	Silicon, hot carrier: Fwd drop .410 v. max.
CR103	19A133775P1	Silicon.
CR104	19A116052P2	Silicon, hot carrier: Fwd drop .410 v. max. Added by REV A.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J101 and J102	19A130924G1	Connector, receptacle: coaxial, jack type; sim to Cinch 14S1361J.
J103	19B219374G1	Connector: 9 contacts.
J104	19A116659P126	Connector, printed wiring: 6 contacts; sim to Molex 09-64-1096.
J902	19A116659P27	Connector, printed wiring: 10 contacts; sim to Molex 09-64-1101.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K101	19B209558P1	Hermetic sealed: 180 to 340 ohms coil res, 2 form C contacts, 8.0 to 16.3 VDC; sim to GE 3SAV1760A2.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L101	7488079P6	Choke, RF: 1.00 µh ±10%, 0.30 ohms DC res max; sim to Jeffers 4611-8.
L102	19B209420P7	Coil, RF: 0.33 µh ±5%, 0.22 ohms DC res max; sim to Jeffers 4416-7K.
L103	19A130255P4	Coil.
L104	19A136842P2	Coil.
L105	19A136842P1	Coil.
L106	19B209420P103	Coil, RF: 0.15 µh ±10%, 0.10 ohms DC res max; sim to Jeffers 4416-3K.
L107	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q101	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q102	19A116818P1	N Channel, field effect; sim to 3N187.
Q103 and Q104	19A116201P3	Silicon, NPN.
Q105	19A134430P1	Silicon, NPN.
R101	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R102	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R103 and R104	19B209538P105	Variable, carbon film: approx 200 to 5K ohms ±10%, 0.25 w; sim to CTS Type X-201.
R105	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R106	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R107	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R108	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R109	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R111	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R112	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R113	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R114	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R115	3R152P562J	Composition: 5.6K ohms ±5%, 1/4 w.
R116	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R117	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R118	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R119	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R121	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R122	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R123	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R124	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R125	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R126	3R152P752J	Composition: 7.5K ohms ±5%, 1/4 w.
R127	19A116310P39	Composition: 22 ohms ±5%, 0.25 w; sim to Allen-Bradley CB.
R128	3R779470J	Composition: 47 ohms ±5%, 1/2 w.
R129	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R131	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R132	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R133	19A116310P37	Composition: 15 ohms ±5%, 0.25 w; sim to Allen-Bradley CB.
R134	3R779390J	Composition: 39 ohms ±5%, 1/2 w.
R135	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.
R136	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R137	3R152P110J	Composition: 11 ohms ±5%, 1/4 w.
R138	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R139	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT101	5490828P55	2.2K ohms ±5%, color code yellow; sim to Carborundum Type 0323-F5-144.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T101	19C307170P311	Coil, RF: wire size No. 20 AWG; sim to Paul Smith 100375-DS-1.
T102 and T103	19C307170P309	Coil, RF: wire size No. 20 AWG; sim to Paul Smith 100375-DS-3.
T104 and T105	19C302189P204	Coil, RF: wire size No. 20 AWG; sim to Paul Smith 100374-DS-8.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XA101	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 9).
		- - - - - - - - - - NET-WORKS - - - - - - - - - -
Z101 and Z102	19D424303G2	Helical Resonator.
A101		ASSOCIATED ASSEMBLIES AUDIO PROCESSOR 19C321543G1
AR101*	19A116754P2	Linear Amplifier. In REV A:
	19A116754P1	Linear Amplifier.
C101	19A116080P204	- - - - - - - - - - CAPACITORS - - - - - - - - - - Polyester: 0.033 µf ±5%, 50 VDCW.
C102 and C103	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDC+; sim to Sprague Type 162D.
C104	19A116080P205	Polyester: 0.047 µf ±5%, 50 VDCW.
C105	19A116080P204	Polyester: 0.033 µf ±5%, 50 VDCW.
C106	5491674P28	Tantalum: 1.0 µf ±20%, 25 VDC+; sim to Sprague Type 162D.
C107	5496202P9	Tantalum: 3.3 µf ±20%, 15 VDC+; sim to Sprague Type 150D.
C108	19A116080P216	Polyester: 0.0068 µf ±5%, 50 VDCW.
C109	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDC+; sim to RMC Type JF Discap.
C110	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDC+; sim to Sprague Type 162D.
C111	19A116080P206	Polyester: 0.068 µf ±5%, 50 VDCW.
C112*	5496218P37	Ceramic disc: 6.0 pf ±0.25 pf, 500 VDC+, temp coef 0 PPM. Added by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR101 and CR102	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P102	19A116659P76	Connector, printed wiring: 9 contacts; sim to Molex 09-52-3091.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	19A134231P233J	Deposited carbon: 22K ohms ±5%, 1.6 w; sim to Mepco/Electra Type CR16.
R102	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R103*	3R152P471J	Composition: 470 ohms ±5%, 1/4 w. In REV A & earlier:
	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R104	19C314256P2512	Metal film: 51.1K ohms ±1%, 1/4 w.
R105	19C314256P1052	Metal film: 10.50K ohms ±1%, 1/4 w.
R106	19C314256P2772	Metal film: 12.70K ohms ±1%, 1/4 w.
R107	19C314256P1052	Metal film: 10.50K ohms ±1%, 1/4 w.
R108	19C314256P2511	Metal film: 5.11K ohms ±1%, 1/4 w.
R109	3R152P132J	Composition: 1.3K ohms ±5%, 1/4 w.
R110	19C314256P2511	Metal film: 5.11K ohms ±1%, 1/4 w.
R111	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R112	19C314256P2492	Metal film: 24.90K ohms ±1%, 1/4 w.
R113	19C314256P2152	Metal film: 11.50K ohms ±1%, 1/4 w.
R114	19C314256P3012	Metal film: 30.10K ohms ±1%, 1/4 w.
R115	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
		OSCILLATOR BOARD 19C321778G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2601 thru C2604	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDC+; sim to RMC Type JF Discap.
C2605	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDC+; sim to RMC Type JF Discap.
C2606	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDC+; sim to RMC Type JF Discap.
J2602	19A134668P1	- - - - - - - - - - JACKS AND RECEPTACLES - - - - - - - - - - Contact, electrical: sim to AMP 87233-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2601	19B209420P117	Coil, RF: 2.20 µh ±10%, 0.38 ohms DC res max; sim to Jeffers 4436-4K.
P104	19A116659P4	- - - - - - - - - - PLUGS - - - - - - - - - - Connector, printed wiring: 6 contacts; sim to Molex 09-52-3062.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2601	19C314256P23831	Metal film: 3.83K ohms ±1%, 1/4 w.
R2602	19C314256P26191	Metal film: 6.19K ohms ±1%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2601	19B227986G1	Connector: 8 contacts.
XY2602	19B227986G2	Connector: 8 contacts.
		- - - - - - - - - - OSCILLATORS - - - - - - - - - - NOTE: When reordering specify FM ICOM Frequency. FM ICOM = Operating Frequency 4.8
Y2601 thru Y2604	19A130605G7	Internally Compensated: ±2 PPM, 806-825 MHz.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19C332750G2	Shield. (Located by J103).
	19C327900P1	Exciter shield.
	4036555P1	Insulator, washer: nylon. (Used with Q101, Q2601).
	19A116707P3	Insulator. (Used with Q102-Q104).
	19A129424G2	Can. (Used with Z101-Z105).
	19B227024G1	Can. (Used with Z101, Z102).
	19B201074P203	Tap screw, Phillips POZIDRIV®: No. 4-40 x 3/16. (Located on 19B227831P1 shield- Quantity 3).
	19B232266G1	Oscillator Cover.
	19A134814P1	Plate nut.

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 19D624793G1
Incorporate reverse voltage clamping diode for Q105.
Added CR104.

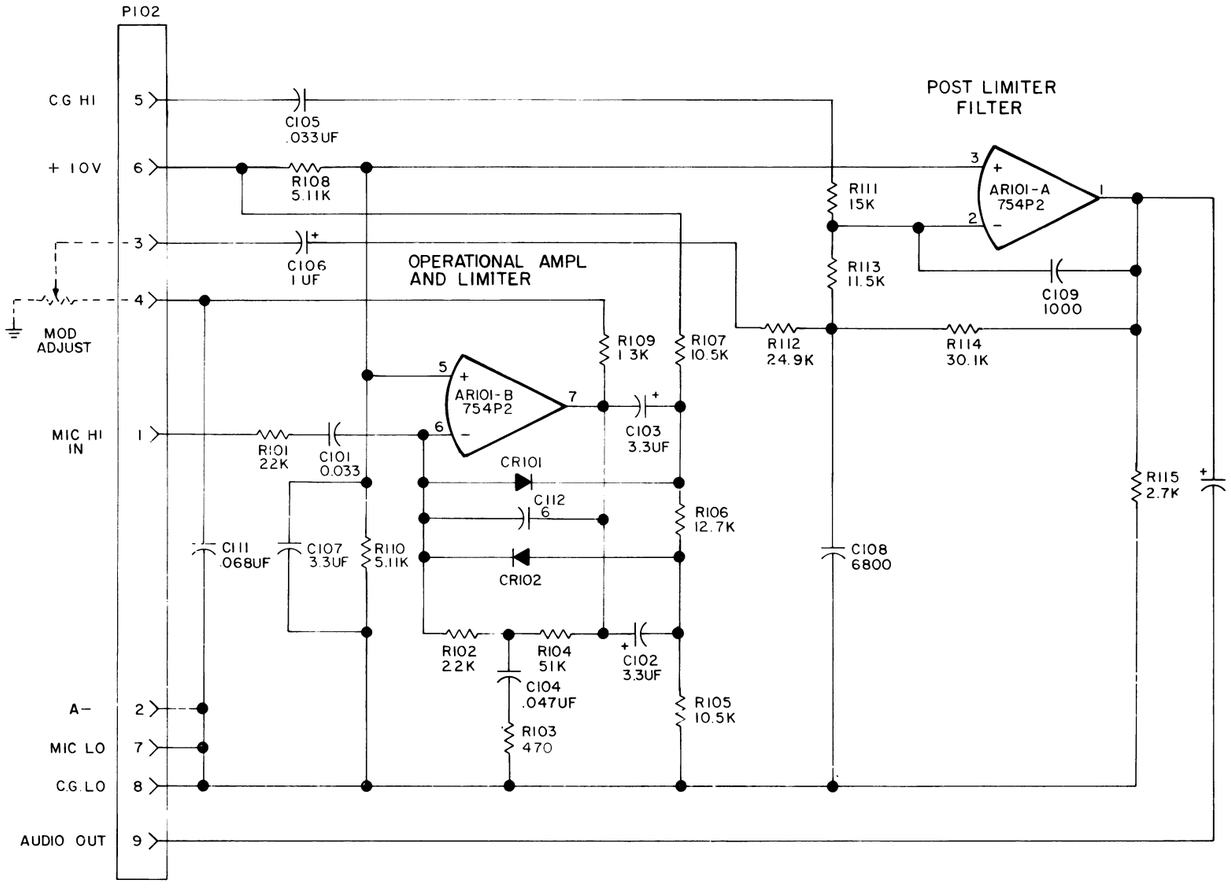
REV. A - Audio Processor 19C321543G1
Incorporated in initial shipment.

REV. B - To improve audio response. Changed AR101 and R103.
Added C112.

REV. C - To improve operation. Changed R103 and AR101.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

AUDIO PROCESSOR



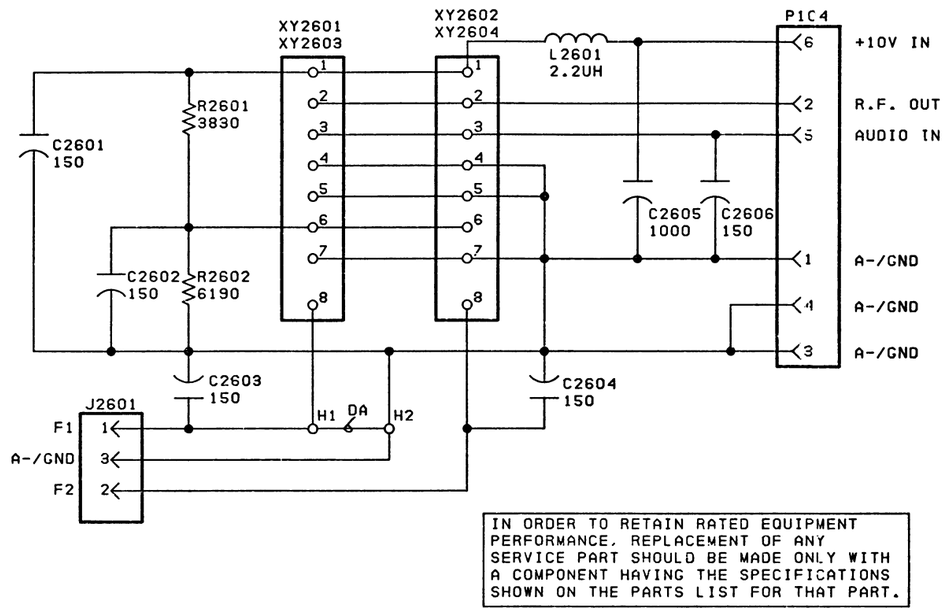
MODEL NO	REV LETTER
PL19C321542G1	C

NOTES:
1. CONNECT GRD TO PIN 4 ON AR101, CONNECT VCC (+10V) TO PIN 8 ON AR101.

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.

(19C321854, Rev. 5)

OSCILLATOR BOARD



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 1/2 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.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C327782G1	

NOTES:
1. DA JUMPER WIRE CONNECTED BETWEEN H1 AND H2 IS REMOVED IN MULTI-FREQUENCY UNITS.

(19C327796, Rev. 1)

SCHEMATIC DIAGRAMS

AUDIO PROCESSOR
AND OSCILLATOR BOARD