MOBILE RADIO

CUSTOM MVP

MAINTENANCE MANUAL

SYSTEM-AUDIO-SQUELCH BOARD, CONTROL PANEL, MULTI-FREQ. KIT

Maintenance Manual LBI30148F
DATAFILE FOLDER - DF4101

SYSTEM-AUDIO-SQUELCH, CONTROL & MULTI-FREQ.

SPECIFICATIONS *

INPUT VOLTAGE	13.0 Volts DC ±20% (RX) 13.2 Volts DC ±20% (TX)
OUTPUT VOLTAGE	Regulated 10 Volts DC ±0.1 VDC at 0.1 to 0.5 Amperes
MAXIMUM CURRENT DRAIN (at 13.8 VDC)	0.25 Amperes (Squelched) 0.70 Amperes (Unsquelched)
AUDIO OUTPUT	3.0 Watts at less than 5% Distortion

*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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WARNING

Although the highest DC voltage in Custom MVP radio is +12 VDC, 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 live circuits when the transmitter is energized!

DESCRIPTION

The System-Audio-Squelch Board for the Custom MVP radio mounts on the front of the system frame behind the front control panel assembly. Molex connectors are provided on the board to provide interconnection with other modules and options. The microphone jack connects into the system harness between the System-Audio-Squelch (SAS) Board and the system connector (J1) at the rear of the radio. The Carrier Control Timer (option 1907) connects directly to the SAS board. The Channel Guard board or Carrier Defeat Timer (Option 1908) connects to the SAS board be means of a harness.

The SAS board contains a hybrid 10-Volt Regulator IC, a hybrid Squelch Module IC and a monolithic 3-Watt audio amplifier circuit. An active filter de-emphasis network is also provided in the audio circuit.

The Control Panel assembly is located on the front cap of the radio. An ON-OFF-VOLUME control, a squelch and Channel Guard MONITOR slide switch, a red transmit indicator Light Emitting Diode (LED), and a frequency control switch (on multi-frequency radios) are provided on the Control Panel. A harness, terminated with a 7-pin connector, connects these controls to the System-Audio-Squelch Board.

CIRCUIT ANALYSIS

10-Volt Regulator IC

The 10-Volt Regulator IC contains the following circuits:

- 10-Volt Regulator Reference Amplifiers
- Receiver Muting and Delay
- Transmitter Keying and Delay
- Receiver Oscillator Control
- Transmitter Disable

The 10-Volt Regulator includes regulator amplifier transistors in the IC (U902) and regulator pass transistor Q905. The regulator circuit provides a closely-controlled supply voltage for the transmitter exciter and the receiver, as well as for Channel Guard and Carrier Control Timer options when used.

Turning on the radio with ON-OFF switch S701 applies voltage (A+) from the battery (in mobile combinations) or the AC power supply (when the station option is used) to pin 1 of IC U902. The regulator amplifier output at pin 2 of U902 is applied to the base of Q905, causing Q905 to conduct. The voltage at the collector of Q905 and pin 3 of U902 is the regulated 10 Volts output.

Receive Function

When the radio is in the receive mode, the transmitter oscillator control switch in the regulator IC U902 is turned off and the receiver oscillator control switch is turned on. The 10-Volt output of this switch is connected through pin 7 of U902 to the receiver oscillator control circuits.

VOLUME/SQUELCH HI from the IF/DETECT module is connected via the VOLUME control (R701) to the audio amplifier on the SAS board. The active filter (Q904) and de-emphasis network provide a 6 dB/Octave frequency response. The audio from the filter is applied to the monolithic amplifier AR901. This amplifier is supplied in a modified 16 lead quad-in-line package with wing-tab heat sinks. The amplifier provides 3-Watts output to the speaker.

When Channel Guard is used, the filter located on the Channel Guard module connects in series with the VOLUME control arm (by removing the jumper between H1 and H2 on the SAS board) and the input to the de-emphasis network. The Channel Guard filter provides a minimum of 17 dB attenuation of the CG tone frequencies.

Squelch Control Circuit

The hybrid squelch IC (U901) uses a custom flip-chip monolithic integrated circuit. The squelch IC contains the noise amplifier, active noise filter, detector, and the slow squelch circuit.

Noise from the IF/DET is coupled through the fixed squelch adjust control R901 to pin 1 of U901. This signal is applied to the noise amplifier and then to the active filter circuit.

The noise amplifier and active filter provide the gain and selectivity to distinguish between noise and audio. The filter output drives the active detector circuit to provide the squelch switching functions. Thermistor RT901 keeps the input to the active detector constant over wide variations in temperature. The slow squelch circuit provides a 200 millisecond squelch operation to prevent rapid squelch opening and closing in weak signal areas.

The squelch switch output at pin 7 of U901 is connected to the receiver mute control circuit. When the receiver is squelched, the output at pin 7 is near A-. This keeps Q902 turned off, allowing Q903 to conduct. Conduction of Q903 applies a low to pin 7 of AR901, turning the amplifier off and muting the receiver. When the receiver is quieted by an on-frequency signal (unsquelches), the voltage at pin 7 of U901 rises to approximately +7 Volts. This turns on Q902, preventing Q903 from conducting. The resulting high at pin 7 of AR901 turns on the amplifier and audio is heard at the speaker.

With the receiver unsquelched, the output of the squelch switch turns on the RUS switch. The output of the RUS switch is connected to the noise amplifier, providing a hysteresis loop in the squelch circuit. The RUS output increases the gain of the noise amplifier, preventing squelch closing on weak signals.

NOTE

In Channel Guard radios, the squelch circuit will operate only when an on-frequency signal with the correct Channel Guard tone is applied to the receiver.

Squelch Disable

Placing the Squelch switch S702 (located on the Control Panel) in the TEST position applies bias to the base of Q901 on the SAS board. The transistor is operated. Conduction of Q901 operates Q902, grounding the base of Q903 and preventing it from operating. As long as this condition remains, the squelch circuit is disabled. In Channel Guard radios, moving the Squelch switch S702 to the MON position applies ground to the CG DISABLE circuit on the Channel Guard board. This results in removing the low on the RX MUTE lead at J906-5 and the base of Q902, enabling the squelch circuit.

Transmitter Keying and Delay

Pressing the PTT (TRANSMIT) switch on the microphone connects pin 8 of U902 to A-. Capacitor C924 starts to charge. In 20 milliseconds C924 is charged to a voltage high enough to allow the time delay switch in U902 to turn on. This causes the transmitter oscillator control switch in U902 to turn on. +10 Volts is applied via pin 14 of U902 to the transmitter oscillator, keying the transmitter. The voltage at pin 7 of U902 goes low under these conditions, removing the receiver oscillator control voltage.

The 20 millisecond time delay in the transmitter oscillator keying circuit allows the antenna relay to energize before RF is applied to the relay.

Operating the PTT switch turns on the receiver muting and delay circuit in U902, applying A- to pin 6. Q902 is now prevented from operating, muting the receiver. C923 starts to charge from the +10-Volt line. When the PTT switch is released, C923 keeps the A- voltage at pin 6 for approximately 50 milliseconds. This delays the turn-on of the receiver audio at the end of a transmission.

Transmitter Disable

In radios equipped with a Carrier Control Timer, pin 11 of U902 connects to the TX DISABLE lead of the Carrier Control Timer. When the timing cycle on the timer runs out, A- is applied to pin 11, turning off the transmitter oscillator control voltage which turns off the transmitter.

CRYSTAL MODULE (5 PPM Oscillator)

Crystal modules determine the operating frequency of the transmitter and receiver. The plug-in module contains a crystal, a trimmer capacitor and a varicap for temperature compensation.

The quartz crystal used in the crystal module exhibits the traditional "S" curve characteristics of output frequency versus operating temperature as shown in Figure 1. In the mid-temperature range (-10°C to +50°C), the raw crystal characteristics are maintained. The compensation voltage which drives the crystal module varicap is approximately constant over this temperature range; consequently, the crystal almost solely determines the temperature characteristics. The crystals whose temperature characteristics lie toward the high limit of +4 parts per million (PPM) are rotated slightly. All others have little to no rotation.

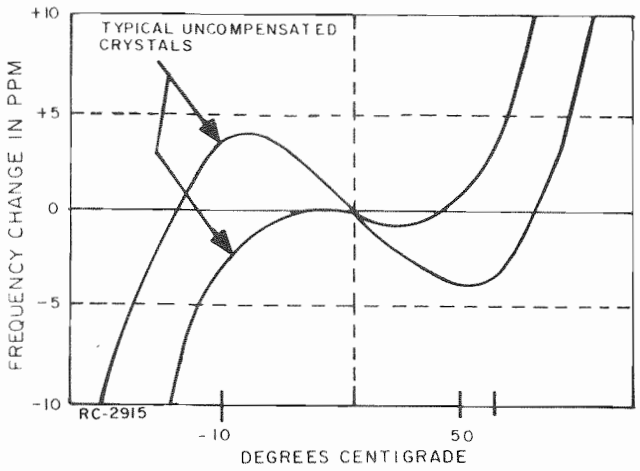

Figure 1 - Crystal Characteristics

The cold end temperature characteristic is "lifted" by a temperature-dependent increasing voltage. The compensator which drives the crystal module varicap produces a voltage which increases linearly from -10°C to -30°C. This voltage decreases the varicap capacity which, in turn, increases the module tuned circuit frequency to compensate for the decreasing frequency characteristics of the crystal.

The hot end crystal temperature characteristic shown in Figure 1 is increasing with temperature. Above 50°C, the hot end crystal characteristic is compensated for by a decreasing voltage from the compensator. This results in added capacity from the varicap, decreasing the module frequency to counteract the increasing frequency response of the crystal.

Compensation voltage from the exciter is applied to pin 4 of the crystal modules to maintain frequency stability within 5 parts-per-million (PPM) over a temperature range of -30°C to +60°C.

SERVICE NOTE

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

The compensation voltage varies non-linearly with temperature to complement the temperature/frequency characteristics of the crystal. Listed below are typical minimum and maximum voltage readings to be expected at pin 4 of the crystal modules, as measured with a high impedance meter.

	OUTPUT VOLTAGE	
TEMPERATURE RANGE	MINIMUM	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

Trimmer capacitor C3 is used to adjust the radio for the exact operating frequency. Refer to the applicable Alignment Procedure for details.

Operating voltage for the crystal module is supplied from the Tx or Rx OSC control circuit on the SAS board or through the biased PIN diode on the multi-frequency board to pin 1 of the selected crystal module.

Multi-Frequency Kit (5 PPM Oscillators)

The Multi-Frequency Kit is provided in radios with more than one operating frequency. It contains the necessary circuitry to provide three additional transmit and three additional receive frequencies to the standard radio. The multi-frequency board utilizes crystal modules to determine the exact operating frequencies.

The transmit and receive oscillator circuits are identical, each using a single transistor in conjunction with the selected crystal module to comprise the oscillator circuit. Crystal modules are selected for operation by the frequency select lead from the control panel. PIN diodes are used to switch the output of the selected crystal module to the base of the appropriate transistor, Q2601 (receive) and Q2602 (transmit).

Since the oscillator circuits are identical, only the F2 circuits are described here. When F2 is selected by S703 at the control panel, A- is applied to the junction of R2603 and R2606 and to the junction of C2608 and R2611. PIN diodes CR2601 and CR2604 are now forward biased, applying the output of the crystal modules (pin 1) to the base of the common oscillator transistors Q2601 and Q2602. The selected crystal modules (Y2601 and Y2604) and transistor circuits comprise two Colpitts oscillators.

The oscillator control voltage, required for transmit oscillator operation, is controlled by the transmit keying and delay circuits on the SAS board. Pressing the PTT switch applies the transmit oscillator control voltage (+10 VDC) to the emitter-base circuit of Q2602, causing it to oscillate at the assigned F2 crystal frequency.

A plug-in coaxial cable (W2602) connects the output of the oscillator to J102 on the exciter board. When the PTT switch is released, the transmit oscillator control voltage is removed from Q2602 and the anode of CR2604. Q2602 stops oscillating, removing the input to the exciter.

When the PTT switch is released, the receive oscillator control voltage from the keying and delay circuit on the SAS board is applied to the emitter-base circuit of Q2601. Since the transmit and receive modules are selected simultaneously, Q2601 now oscillates at the F2 receive crystal frequency and provides an output to J401 on the receive OSC/MULT board through cable W2601.

When a different frequency is selected, A- is removed from the junction of R2603-R2606 and the junction of R2611-C2608. This reverse biases PIN diodes CR2601 and CR2604, removing the crystal module outputs from the base circuits of the oscillators.

Compensator Circuit

The crystal modules on the Multi-Frequency Board are temperature compensated at both ends of the temperature range to provide instant frequency compensation. The temperature compensator is located on the transmitter exciter.

2 PPM UHF Transmit Oscillator Board

In those applications requiring 2 PPM UHF transmitter frequency stability, the 19C327107G1 Oscillator Board is required. This board accomodates one Integrated Circuit Oscillator Module (ICOM). The ICOM is enclosed in a dustproof, RF shielded can with the type (2C-ICOM) printed on top of the can. The 2C-ICOM contains an oscillator and a 2 PPM (±0.0002%) compensator IC.

Access to the oscillator trimmer is accomplished by prying up the plastic tab on the top of the can. The tabs can also be used to pull the ICOM out of the radio.

The output of the ICOM oscillator is connected through cable W2102 to the XY101 position on the transmitter exciter board.

The 2C-ICOM is 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.

The increase in compensation voltage decreases the capacity of the varactor in the oscillator, increasing the output frequency of 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 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 the ICOM shift off frequency, check the 10-Volt regulator or the output of the ICOM.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U S A

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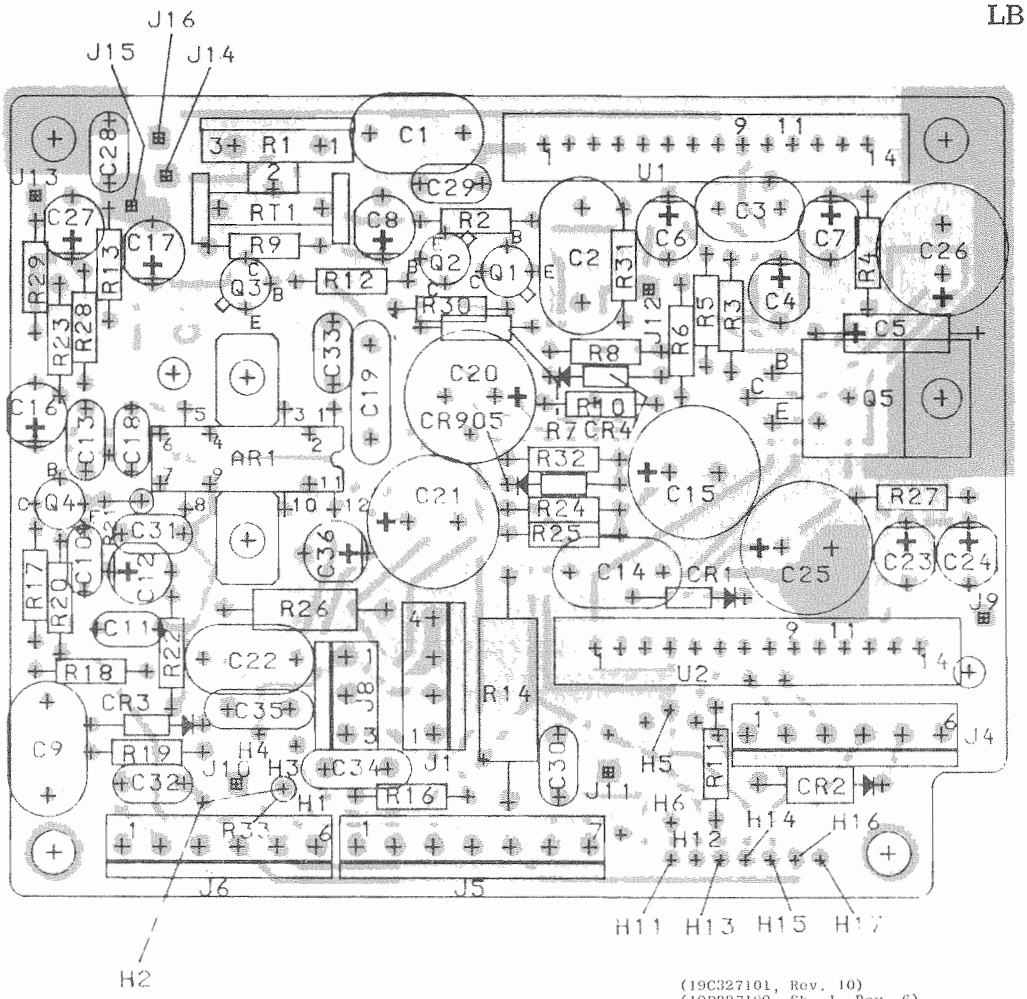
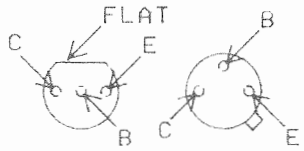
U.S.A.



(19C327101, Rev. 10)
(19B227189, Sh. 1, Rev. 6)
(19B227189, Sh. 2, Rev. 6)

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN.
FOR COMPLETE DESIGNATION PREFIX WITH 900 SERIES.
EXAMPLE: C1-C901 , R1-R901 , ETC.

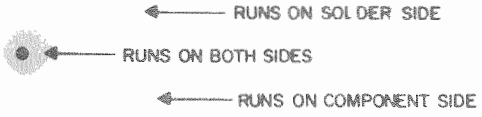
LEAD IDENTIFICATION
FOR Q1-Q4



TOP VIEW

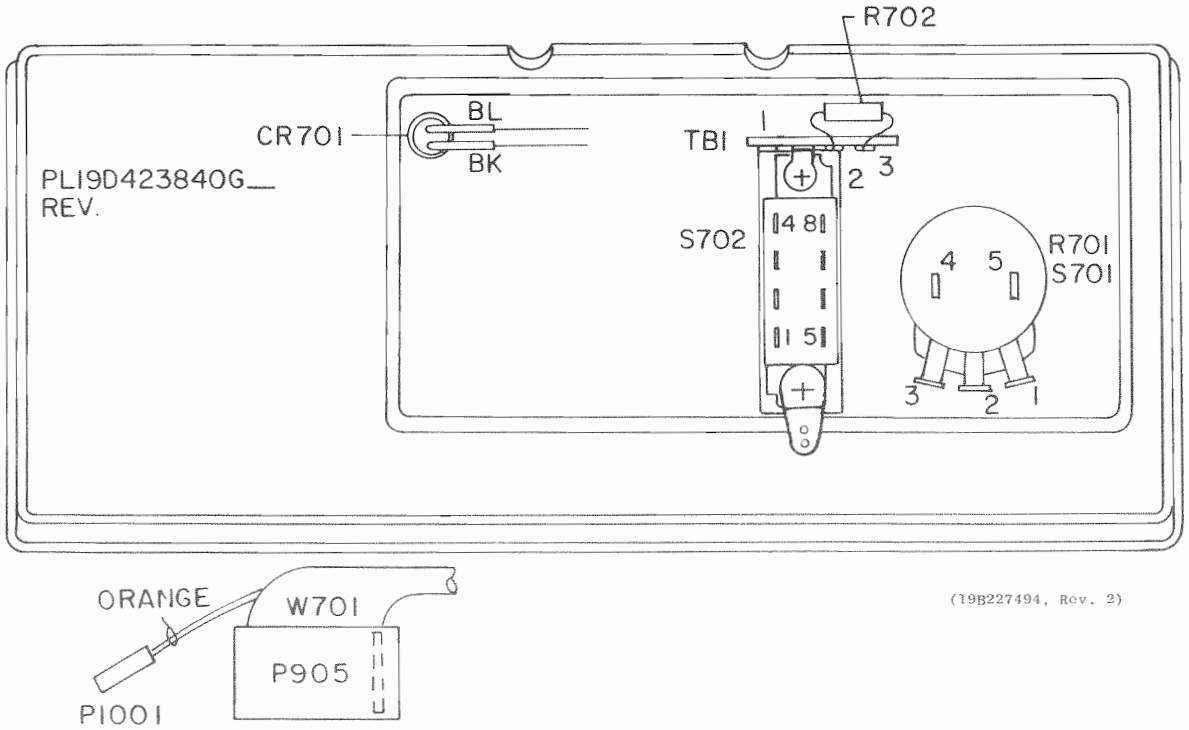
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

REFER TO WIRING DIAGRAM 19D423734 FOR THE FOLLOWING CONNECTIONS	
FROM	TO
H3	H4



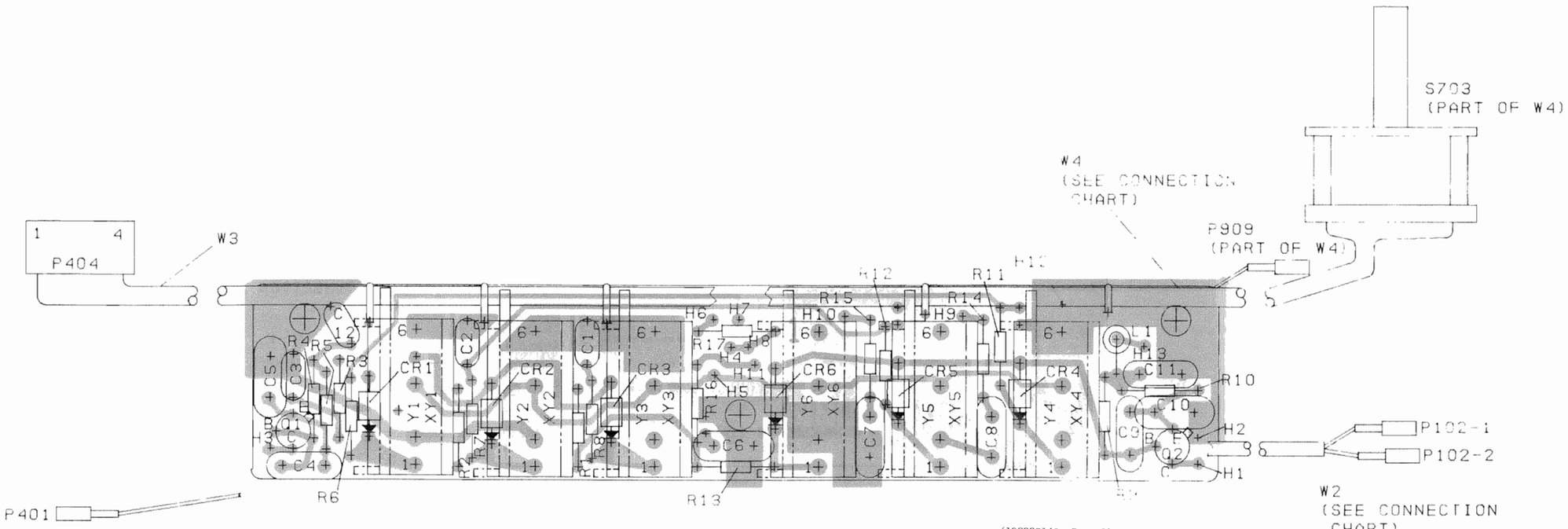
OUTLINE DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD
19C321920G1



OUTLINE DIAGRAM

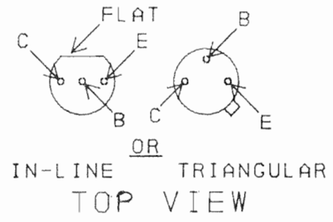
CUSTOM MVP CONTROL PANEL,
SINGLE FREQUENCY 19D423840G3



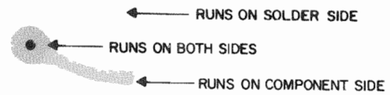
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH 2600 SERIES
EXAMPLE: C1=C2601, R1=R2601..., ETC.

CONNECTION CHART		
WIRE	TO	REMARKS
W1	H3	
W2	H1	CENTER COND
W2	H2	SHIELD
W3-W	H7	
W3-R	H6	
W3-BL	H5	
W3-BR	H4	
W4-BR	H8	
W4-R	H9	
W4-O	H10	
W4-Y	H11	
W4-BK	H12	
W4-G	H13	

LEAD IDENTIFICATION
FOR Q1 AND Q2

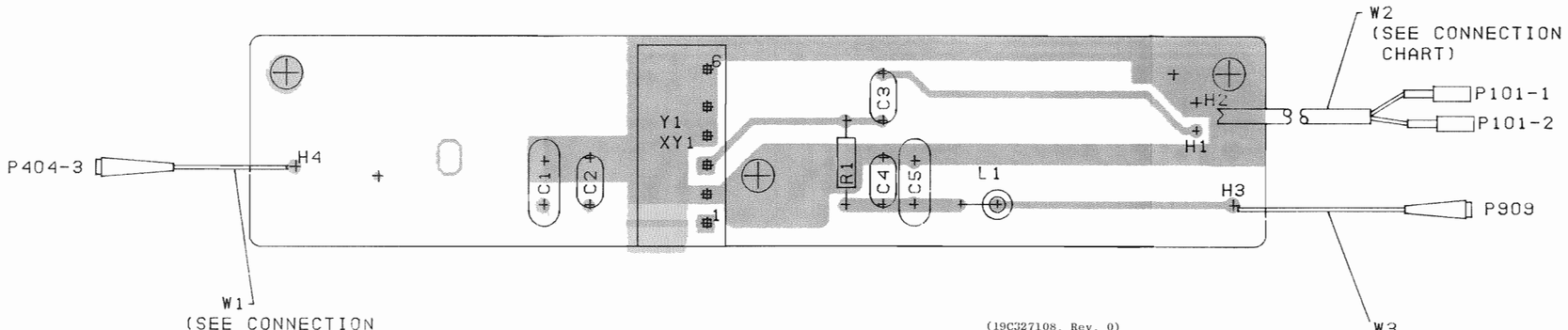


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



OUTLINE DIAGRAM

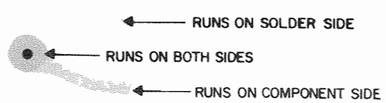
MULTI-FREQUENCY KIT
19C321954G1 & G2



(19C327108, Rev. 0)
(19B227340, Sh. 2, Rev. 0)
(19B227340, Sh. 3, Rev. 0)

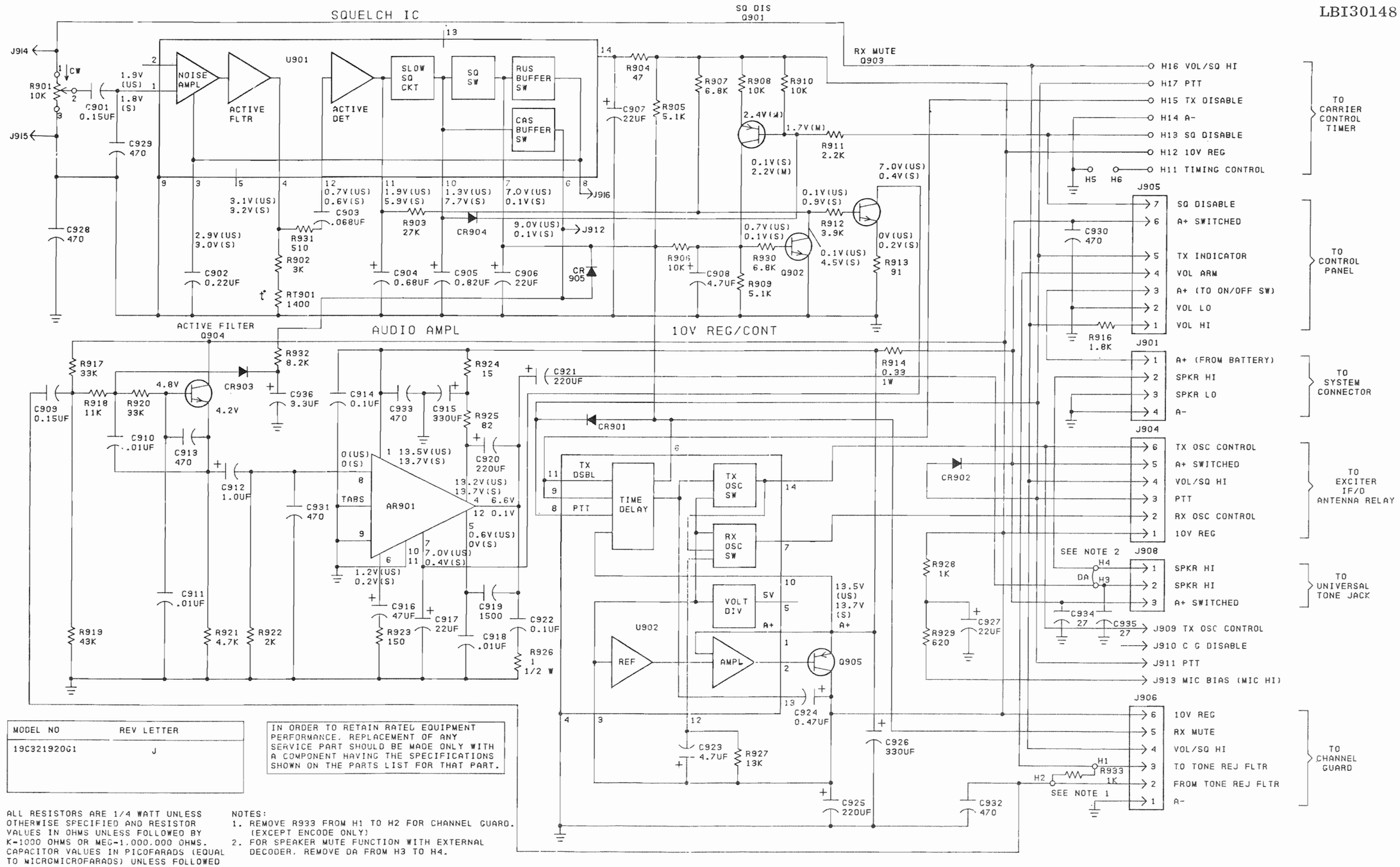
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH 2100 SERIES
EXAMPLE: C1-C2101, R1-R2101...ETC.

CONNECTION CHART		
WIRE	TO	REMARKS
W1	H4	
W2	H1	CENTER COND
W2	H2	SHIELD
W3	H3	



OUTLINE DIAGRAM

2 PPM OSCILLATOR BOARD
19C327107G1



MODEL NO	REV LETTER
19C321920G1	J

IN ORDER TO RETAIN RATEL 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.

NOTES:
1. REMOVE R933 FROM H1 TO H2 FOR CHANNEL GUARD. (EXCEPT ENCODE ONLY)
2. FOR SPEAKER MUTE FUNCTION WITH EXTERNAL DECODER, REMOVE DA FROM H3 TO H4.

(19D423734, Rev. 10)

SCHEMATIC DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD
19C321920G1

PARTS LIST

LBI30136F

CUSTOM MVP
SYSTEM - AUDIO - SQUELCH BOARD
19C321920G1

SYMBOL	GE PART NO.	DESCRIPTION
AR901	19A134339P2	Integrated circuit, linear: sim to SGS-ATES TBA810ACB.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C901	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C902	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C903	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW.
C904	19A134202P13	Tantalum: 0.68 µf ±20%, 35 VDCW.
C905	5496267P230	Tantalum: 0.82 µf ±10%, 35 VDCW; sim to Sprague Type 150D.
C906 and C907	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C908	19A134202P3	Tantalum: 4.7 µf ±20%, 10 VDCW.
C909	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C910 and C911	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C912	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C913	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C914	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C915	19A134319P2	Electrolytic: 330 µf +75% -10%, 25 VDCW; sim to Sprague 502D189.
C916	19A134202P2	Tantalum: 47 µf ±20%, 6 VDCW.
C917*	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
		Earlier than REV A:
	5496267P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C918	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C919	19A116655P30	Ceramic disc: 1500 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C920 and C921	19A134319P1	Electrolytic: 220 µf +75% -10%, 25 VDCW; sim to Sprague 502D182.
C922	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C923	19A134202P3	Tantalum: 4.7 µf ±20%, 10 VDCW.
C924	19A134202P12	Tantalum: 0.47 µf ±20%, 35 VDCW.
C925	19A134319P1	Electrolytic: 220 µf +75% -10%, 25 VDCW; sim t Sprague 502D182.
C926	19A134319P2	Electrolytic: 330 µf +75% -10%, 25 VDCW; sim to Sprague 502D189.
C927	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C928 thru C933	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C934 and C935	19A116656P27J0	Ceramic disc: 27 pf 5%, 500 VDCW, temp coef 0 PPM.
C936*	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW. Added by REV A.
C937*	5491674P34	Tantalum: 15 µf ±20%, 6 VDCW; sim to Sprague Type 162D. Added by REV F. Deleted by REV G.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR901	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR902	4037822P1	Silicon, 1000 mA, 400 PIV.
CR903*	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV. Added by REV A.
CR904*	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV. Added by REV B.
CR905*	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV. Added by REV J.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J901	19A116659P103	Connector, printed wiring: 4 contacts; sim to Molex 09-60-1041.
J904	19A116659P105	Connector, printed wiring: 6 contacts; sim to Molex 09-60-1061.
J905	19A116659P106	Connector, printed wiring: 7 contacts; sim to Molex 09-60-1071.
J906	19A116659P105	Connector, printed wiring: 6 contacts; sim to Molex 09-60-1061.
J908	19A116659P101	Connector, printed wiring: 3 contacts; sim to Molex 09-60-1031.
J909 thru J913	19A116779P1	Contact, electrical: sim to Molex 08-50-0404.
J914* thru J916*	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. Added by REV H.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q901	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q902 thru Q904	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q905	19A116375P1	Silicon, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R901	19B209358P106	Variable, carbon film: approx 300 to 10K ohms ±10%, 0.25 w; sim to CTS Type X-201.
R902	3R152P302J	Composition: 3K ohms 5%, 1/4 w.
R903	3R152P273J	Composition: 27K ohms 5%, 1/4 w.
R904	3R152P470J	Composition: 47 ohms 5%, 1/4 w.
R905	3R152P512J	Composition: 5.2K ohms 5%, 1/4 w.
R906	3R152P103J	Composition: 10K ohms 5%, 1/4 w.
R907	3R152P	Composition: 6.8K ohms 5%, 1/4 w.
R908	3R152P103J	Composition: 10K ohms 5%, 1/4 w.
R909	3R152P512J	Composition: 5.1K ohms 5%, 1/4 w.
R910	3R152P103J	Composition: 10K ohms 5%, 1/4 w.
R911	3R152P222K	Composition: 2.2K ohms ±10%, 1/4 w.
R912	3R152P392J	Composition: 3.9K ohms 5%, 1/4 w.
R913	3R152P910J	Composition: 91 ohms 5%, 1/4 w.
R914	19B209022P103	Wirewound: 0.33 ohms ±10%, 2 w; sim to IRC Type B8H.
R916*	3R152P182J	Composition: 1.8K ohms 5%, 1/4 w.
		In REV D:
	3R152P272J	Composition: 2.7K ohms 5%, 1/4 w.
		In REV C and earlier:
	3R152P471J	Composition: 470 ohms 5%, 1/4 w.
R917	3R152P333J	Composition: 33K ohms 5%, 1/4 w.
R918	3R152P113J	Composition: 11K ohms 5%, 1/4 w.
R919	3R152P433J	Composition: 43K ohms 5%, 1/4 w.
R920	3R152P333J	Composition: 33K ohms 5%, 1/4 w.
R921	3R152P472J	Composition: 4.7K ohms 5%, 1/4 w.
R922	3R152P202J	Composition: 2K ohms 5%, 1/4 w.
R923	3R152P151J	Composition: 150 ohms 5%, 1/4 w.
R924	3R152P150K	Composition: 15 ohms ±10%, 1/4 w.
R925	3R152P820K	Composition: 82 ohms ±10%, 1/4 w.
R926	7147161P19	Composition: 1 ohm 5%, 1/2 w.
R927	3R152P133J	Composition: 13K ohms 5%, 1/4 w.
R928	3R152P102J	Composition: 1K ohms 5%, 1/4 w.
R929	3R152P621J	Composition: 620 ohms 5%, 1/4 w.
R930	3R152P682K	Composition: 6.8K ohms ±10%, 1/4 w.
R931*	3R152P511J	Composition: 510 ohms 5%, 1/4 w.
		Earlier than REV A:
	3R152P100J	Composition: 10 ohms 5%, 1/4 w.
R932*	3R152P822J	Composition: 8.2K ohms 5%, 1/4 w. Added by REV A.
R933*	3R152P102J	Composition: 1K ohms 5%, 1/4 w. Added by REV E.
		- - - - - - - - - - THERMISTORS - - - - - - - -
RT901	5490828P38	Thermistor: 1400 ohms 5%, color code green and white; sim to Carborundum Type 723H-2.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U901*	19D416560G3	Hybrid Squelch.
		In REV B:
	19D416560G2	Hybrid Squelch.
		Earlier than REV A:
	19D416560G1	Hybrid Squelch.
U902*	19D416564G4	Regulator, 10 volt.
		In REV F:
	19D416564G2	Regulator, 10 volt.
		In REV E & earlier:
	19D416564G3	Regulator, 10 volt.

*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 description of parts affected by these revisions.

Rev. A - To improve performance. Added C936, CR903, R932. Changed C917, R931, U901.

Rev. B. - To allow proper squelch monitor function. Added CR904.

Rev. C. - To improve squelch operation. Changed U901.

Rev. D. - To eliminate audio pops when receiver is squelched. Changed R916.

Rev. E. - To increase audio output. Changed R916 and added R933.

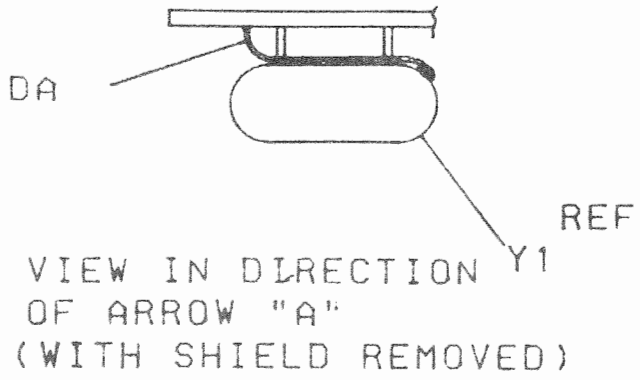
Rev. F. - To permit operation with 19D416564G2 10-volt regulator U902. Added C937 and changed U902.

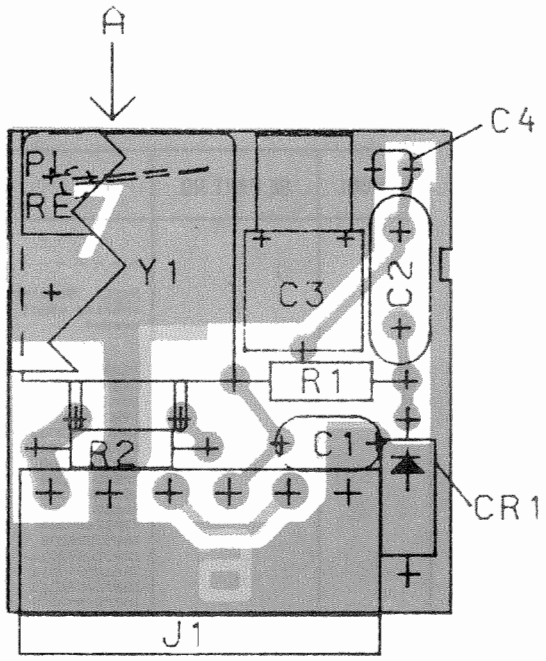
Rev. G. - To improve transmitter operation. Replaced U902 and deleted C937.

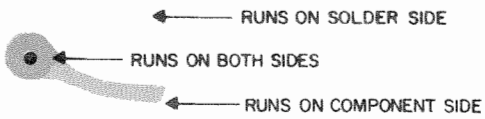
Rev. H. - To permit Local/DC Remote operation. Added J914, J915 and J916.

Rev. J - To improve Channel Guard Squelch operation. Added CR905.

OUTLINE DIAGRAM

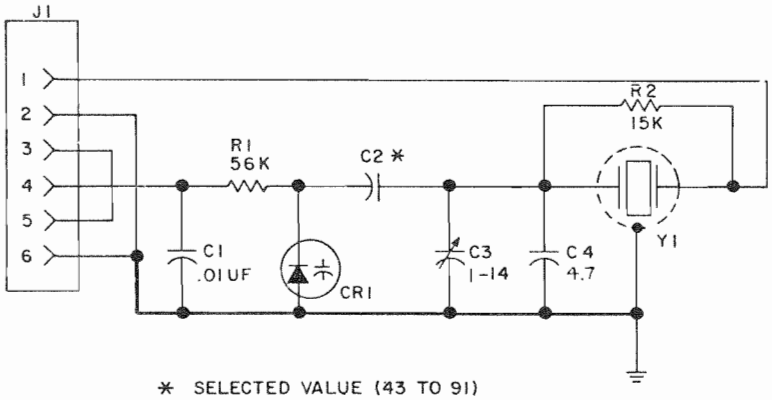






(19B227337, Rev. 6)
(19B226851, Sh. 1, Rev. 7)
(19B226851, Sh. 2, Rev. 6)

SCHEMATIC DIAGRAM



* SELECTED VALUE (43 TO 91)

MODEL NO	REV LETTER
PLI9B226962G1-27	

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.

(19B226951, Rev. 5)

SCHEMATIC & OUTLINE DIAGRAM

CRYSTAL MODULE

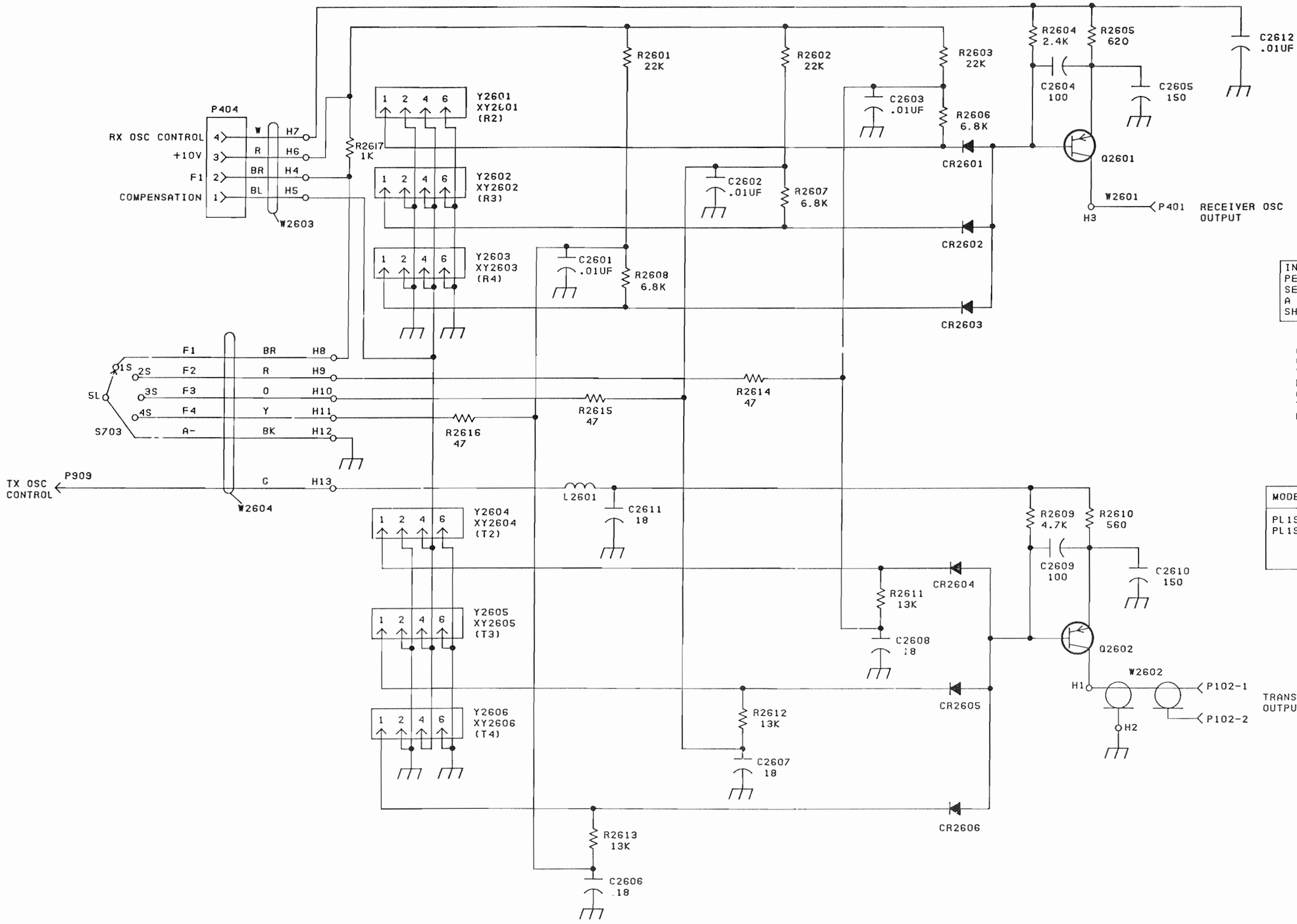
PARTS LIST

LBI30069E

CRYSTAL MODULE (5 PPM)
19B226962G1-G29, 31-34, 36

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - CRYSTAL MODULES - - - - - - - -
		NOTE: When reordering, give GE Part Number and specify exact transmitter or receiver frequency needed.
Y2601 thru Y2606		19B226962G1 Tx 29.7-36 MHz 19B226962G2 Tx 36-42 MHz 19B226962G3 Tx 42-50 MHz 19B226962G31 Tx 66-78 MHz 19B226962G32 Tx 77-88 MHz 19B226962G4 Tx 138-155 MHz 19B226962G5 Tx 150.8-174 MHz 19B226962G6 Tx 406-420 MHz 19B226962G28 Tx 420-450 MHz 19B226962G7 Tx 450-470 MHz 19B226962G8 Tx 470-494 MHz 19B226962G9 Tx 494-512 MHz 19B226962G10 Rx 29.7-36 MHz 19B226962G11 Rx 36-42 MHz 19B226962G12 Rx 42-50 MHz 19B226962G33 Rx 66-78 MHz 19B226962G34 Rx 77-88 MHz 19B226962G13 Rx 138-155 MHz 19B226962G14 Rx 150.8-174 MHz 19B226962G15 Rx 406-420 MHz 19B226962G29 Rx 420-450 MHz 19B226962G16 Rx 450-470 MHz 19B226962G17 Rx 470-494 MHz 19B226962G18 Rx 494-512 MHz 19B226962G19 Rx 138-155 MHz HIGH SIDE INJECT 19B226962G20 Rx 150.8-174 MHz HIGH SIDE INJECT 19B226962G21 Rx 406-420 MHz HIGH SIDE INJECT 19B226962G36 Rx 420-450 MHz HIGH SIDE INJECT 19B226962G22 Rx 450-470 MHz HIGH SIDE INJECT 19B226962G23 Rx 470-494 MHz HIGH SIDE INJECT 19B226962G24 Rx 494-512 MHz HIGH SIDE INJECT 19B226962G25 Rx 29.7-36 MHz ALTERNATE IF 19B226962G26 Rx 36-42 MHz ALTERNATE IF 19B226962G27 Rx 42-50 MHz ALTERNATE IF
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2		Capacitor, compensating. (Factory selected to match crystal characteristics).
C3	19A134633P1	Variable, glass: 2 to 14 pf, 500 VDCW; sim to Sprague-Goodman GSG185A.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1		Crystal. (Not Field replaceable).
		COMPONENT BOARD 19B226849G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C4		(Part of printed board 19B226850P1).
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	5495769P19	Silicon, variable capacitance, 34 pf nominal.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	19A116659P6	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3061.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P563J	Composition: 56K ohms ±5%, 1/4 w.
R2	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B227397P1	Shield. (Y1).
	19A121175P39	Insulator, plate. (Used with C4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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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.

MODEL NO	REV LETTER
PL19C321954G1	B
PL19C321954G2	B

(19D423778, Rev. 4)

SCHEMATIC DIAGRAM

MULTI-FREQUENCY KIT
19C321954G1 & G2

PARTS LIST

LB130180D

MULTI-FREQUENCY BOARD
19C321954G1 HIGH BAND/LOW BAND
19C321954G2 UHF BAND

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2601 thru C2603	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C2604	5496218P763	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -750 PPM.
C2605	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2606* thru C2608*	19A116656P18J0	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV A & earlier:
	7489162P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2609	5496218P763	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -750 PPM.
C2610	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2611*	19A116656P18J0	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV A & earlier:
	7489162P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2612	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR2601 thru CR2606	19A116925P4	Silicon, pin: 50 volt Reverse Breakdown, 400 mW.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2601	19A129773G3	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P102	19A127042P2	Terminal, solderless: sim to Malco 12093-10. (Part of W2603A, W2602B).
P401	19A127042P2	Terminal, solderless: sim to Malco 12093-10. (Part of W2601).
P404	19A116659P84	Connector, printed wiring: 4 contacts; sim to Molex 09-50-7041. (Part of W2603).
P909		(Part of W2604).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2601 and Q2602	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2601 thru R2603	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R2604*	3R152P242J	Composition: 2.4K ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R2605*	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R2606* thru R2608*	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R2609	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R2610	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R2611 thru R2613	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R2614 thru R2616	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R2617	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S703		(Part of W2604).
		- - - - - - - - - - CABLES - - - - - - - - - -
W2601	19A129947G2	Single conductor: approx 3 inches long. (Includes P401).
W2602A	19A130744G5	2 conductor: approx 7 inches long. (Includes P102).
W2602B	19A130744G1	2 conductor: approx 5 inches long. (Includes P102).
W2603	19B226965G3	2 conductor: approx 5.5 inches long. (Includes P404).
W2604		CABLE ASSEMBLY 19B227315G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P909	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S703	5495454P45	Rotary: 1 section, 1 pole, 2 to 4 positions (adj. stop), non-shorting contacts, 2 amps at 25 VDC or 1 amp at 110 VAC; sim to Oak Type "A".
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2601 thru XY2606	19A130958G1	Connector, printed wiring: 6 contacts; sim to Molex 09-65-1061.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4.
	N80P13020C6	Screw, panhead: No. 6-32 x 1-1/4.
	7165075P4	Hex nut, brass: thd. size No. 3/8-32.
	N404P13C6	Lockwasher, internal tooth: No. 6.
	19B227473G1	Support.
	7878455P2	Solderless terminal.
	19B209591P1	Knob, push-on. (S703).

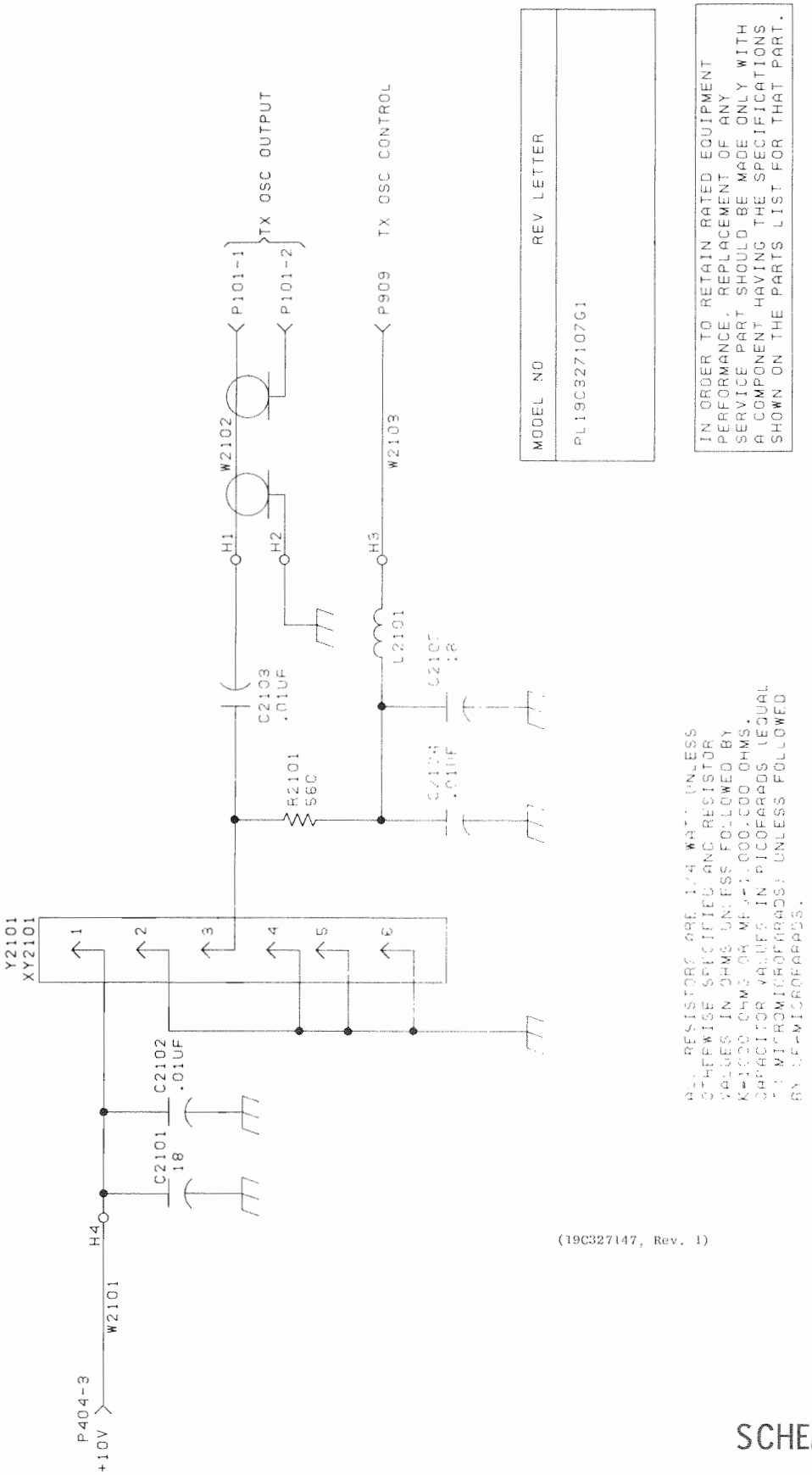
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 description of parts affected by these revisions.

Rev. A - To improve operation. Changed R2604 through R2608.

REV. B - To incorporate new capacitors. Changed C2606 - C2608 and C2611.



(19C327147, Rev. 1)

SCHEMATIC DIAGRAM

2 PPM OSCILLATOR BOARD
19C327107G1

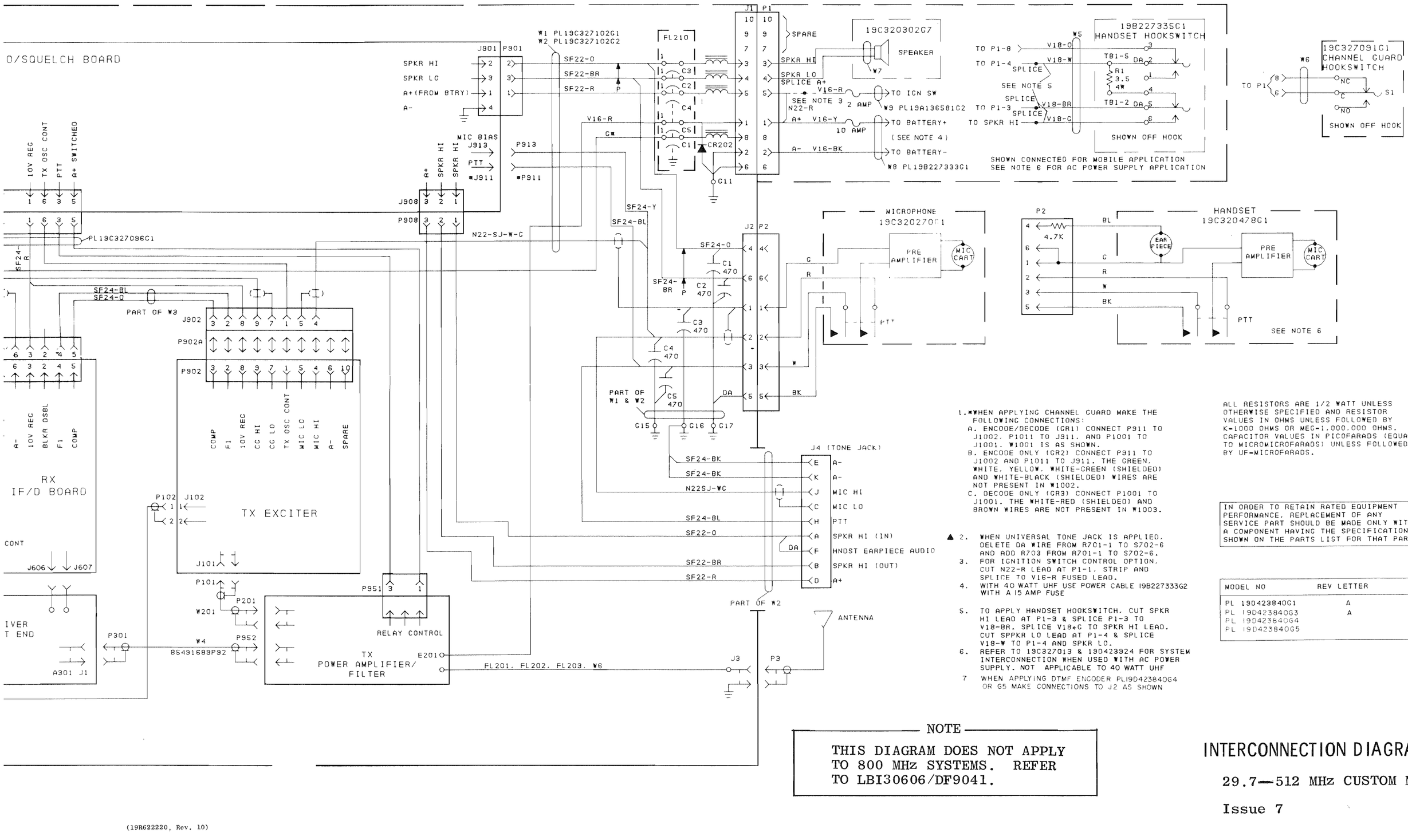
PARTS LIST

LBI30179C

2 PPM OSCILLATOR BOARD
19C327107G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - CAPACITORS - - - - - - - -
C2101	7489162P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2102 thru C2104	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C2105	7489162P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2101	19A129773G3	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101	4036634P1	Contact, electrical; sim to AMP 42428-2.
P404-3	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
P909	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2101	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - -
W2101	19A129947G9	Single conductor: approx 3 inches long.
W2102	19A130744G4	2 conductor: approx 4 inches long.
W2103	19A129947G5	Single conductor.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2101	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 6).
		- - - - - - - - - - Tx ICOMS - - - - - - - - - -
		NOTE: When reordering specify ICOM Frequency
		For STANDARD LOW SIDE INJECTION FREQUENCY.
		ICOM FREQ. = Operating Freq. / 36
Y2101	19A129393G15	Compensated: ±2 PPM, 406-512 MHz.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4.
	19B201074P305	Tap screw, Phillips POZIDRIV®: No. 6-32 x 5/16. (Secures 19A136706P1 support).
	19A136706P1	Support.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



1.*WHEN APPLYING CHANNEL GUARD MAKE THE FOLLOWING CONNECTIONS:
A. ENCODE/DECODE (GR1) CONNECT P911 TO J1002, P1011 TO J911, AND P1001 TO J1001. W1001 IS AS SHOWN.
B. ENCODE ONLY (GR2) CONNECT P911 TO J1002 AND P1011 TO J911. THE GREEN, WHITE, YELLOW, WHITE-GREEN (SHIELDED) AND WHITE-BLACK (SHIELDED) WIRES ARE NOT PRESENT IN W1002.
C. DECODE ONLY (GR3) CONNECT P1001 TO J1001. THE WHITE-RED (SHIELDED) AND BROWN WIRES ARE NOT PRESENT IN W1003.

▲ 2. WHEN UNIVERSAL TONE JACK IS APPLIED, DELETE DA WIRE FROM R701-1 TO S702-6 AND ADD R703 FROM R701-1 TO S702-6.
3. FOR IGNITION SWITCH CONTROL OPTION, CUT N22-R LEAD AT P1-1. STRIP AND SPLICE TO V16-R FUSED LEAD.
4. WITH 40 WATT UHF USE POWER CABLE 19B227333G2 WITH A 15 AMP FUSE
5. TO APPLY HANDSET HOOKSWITCH, CUT SPKR HI LEAD AT P1-3 & SPLICE P1-3 TO V18-BR. SPLICE V18+G TO SPKR HI LEAD. CUT SPPKR LO LEAD AT P1-4 & SPLICE V18-W TO P1-4 AND SPKR LO.
6. REFER TO 19C327013 & 19D423924 FOR SYSTEM INTERCONNECTION WHEN USED WITH AC POWER SUPPLY. NOT APPLICABLE TO 40 WATT UHF
7 WHEN APPLYING DTMF ENCODER PLI9D423840G4 OR G5 MAKE CONNECTIONS TO J2 AS SHOWN

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.

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.

MODEL NO	REV LETTER
PL 19D423840G1	A
PL 19D423840G3	A
PL 19D423840G4	
PL 19D423840G5	

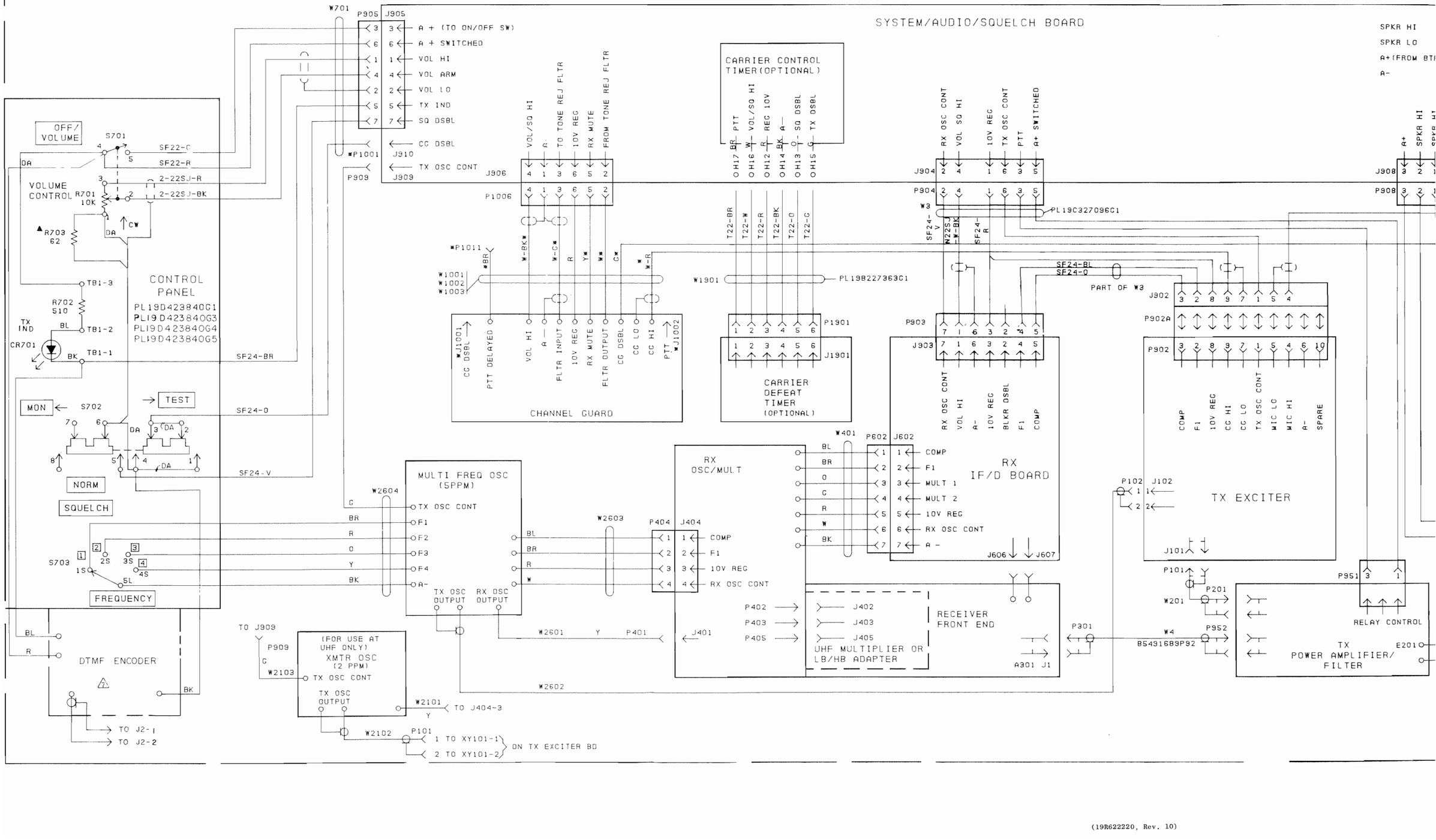
NOTE

THIS DIAGRAM DOES NOT APPLY TO 800 MHz SYSTEMS. REFER TO LBI30606/DF9041.

INTERCONNECTION DIAGRAM

29.7—512 MHz CUSTOM MVP

(19R622220, Rev. 10)



(19R622220, Rev. 10)

PARTS LIST

LBI30181E

CUSTOM MVP
AND
ASSOCIATED ASSEMBLIES

SYMBOL	GE PART NO.	DESCRIPTION
		CONTROL PANEL 19D423840G1 MULTI FREQ. 19D423840G3 SINGLE FREQ.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR701	19B219800G4	Diode, red light emitting.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P905		Connector. Includes:
	19A116659P82	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 7).
P1001	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701		(Part of S701).
R702	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701	5496870P35	Variable, carbon film: 10K ohms ±20%; sim to Mallory LC(10K) FAC. (Includes R701).
S702	19A136564G1	Switch, slide: 2 poles, 3 positions, spring return; sim to Switchcraft 11D-1154.
		- - - - - - - - TERMINAL BOARD - - - - - - - - -
TB1	7487424P6	Miniature, phen: 3 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W701		HARNESS ASSEMBLY 19D423840G2 (Includes P905, P1001, R701, S701, S702)
		ASSOCIATED ASSEMBLIES
		POWER CABLE 19B227333G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1		Connector. Includes:
	19A115884P11	Shell.
	19A136581G1	Fused lead.
	19A136580G1	Lead.
	19A115884P8	Contact, female: wire range No. 14-20 AWG; sim to AMP 60527-4.
	19A115884P10	Contact, female: wire range No. 22-30 AWG; sim to AMP 60909-4.
	7484390P1	Fuse, quick blowing: 10 amp at 250 v; sim to Littelfuse 314010 or Bussmann ABC-10.
	7484390P3	Fuse, quick blowing: 15 amp at 250 v; sim to Littelfuse 314015 or Bussmann ABC-15. (Used with 35 watt UHF Tx).
		TRANSMIT/RECEIVE HARNESS 19C327096G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J902		Connector. Includes:
	19A116659P81	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 4).
P903		Connector. Includes:
	19A116659P82	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 6).
P904		Connector. Includes:
	19A116659P80	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 6).
P951		Connector. Includes:
	19A116659P14	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 2).
		SYSTEM HARNESS 19C327102G1 STANDARD 19C327102G2 WITH TONE
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C5	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1		(Part of Transmitter PA assembly).
J2	19B219627G1	Connector: 6 contacts.
J4	7489183P7	Receptacle: 9 contacts rated at 7.5 amps max; sim to Winchester M9S-LR-H19C.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P901		Connector. Includes:
	19A116659P84	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
	19A116781P5	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106.
P908		Connector. Includes:
	19A116659P16	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
P911	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
P913	19A127042P2	Terminal, solderless: sim to Malco 12093-10.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R703	3R77P620J	Composition: 62 ohms ±5%, 1/2 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	4036835P6	Terminal, solder: sim to Shakeproof 2102-06-00. (Located between G15 & G16).
	19B227467G1	Front cap.
	NP280149	Faceplate. (4 Freq.).
	NP280237	Faceplate. (1 Freq.).
	19A136561P1	Dummy support. (Not Used).
	19B209591P1	Knob. (Used with S701 & dummy support).
	N402P13C13	Plain washer. (Used with dummy support). (Not Used).
	4035007P4	Retainer ring. (Used with dummy support). (Not Used).
	7165075P4	Hex nut, brass: thd. size No. 3/8-32. (Secures S701).
	19A134330P1	Knob, push-on. (Used with S702).
	19A116677P2	Bushing; sim to Opcoa, Inc. OC-1. (Used with CR701).
	N84P9007C6	Machine screw, phillips: No. 4-40 x 7/16. (Secures S702).
	N404P11C6	Lockwasher, internal: No. 4. (Secures S702).
	7141225P2	Hex nut: No. 4-40. (Secures S702).
	4036994P1	Solderless terminal. (Located at J2).

PARTS LIST

LBI30175B

CHANNEL GUARD HOOKSWITCH
19C327091G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B209099P1	Sensitive: 10.1 amps at 125 VAC, or .5 amp at 12 VDC; sim to Cherry Electrical Products E62-10A. SPDT.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B204721P1	Actuator spring.
	4033802P1	Power cable. 2 conductor, approx 4 feet long.
	19A115884P8	Connector, plug: sim to AMP 60527-1. (Located on cable end).
	N193P1408C13	Tap screw: No. 8-18 x 1/2. (Quantity 2).
	7878243P11	Hex nut: No. 8-18. (Quantity 2).
	19B204726P1	Support, front.
	19A121416G1	Support, rear.
	19A115398P1	Rivet, tubular. (Secures S1).
	19A121419P2	Spacer.

PARTS LIST

LBI30607A

W6
806-870 MHz CUSTOM MVP
4 FREQUENCY CABLE ASSEMBLY
19B232147G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2601		Connector. Includes:
	19A134152P1	Shell. (Quantity 2).
	19A134152P11	Contact, electrical: sim to Molex 08-50-0113. (Quantity 5).
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S703	5495454P45	Rotary: 1 section, 1 pole, 2 to 4 with adj stop positions, non-shorting contacts, 2 amps at 25 VDC or 1 amp at 110 VAC; sim to Oak Type "A".
		- - - - - - - - - - MISCELLANEOUS - - - - - - -
	19B201955P1	Spacer, threaded. (Quantity 2).
	7165075P4	Hex nut, brass: thd. size No. 3/8-32. (Secures S703 to mounting surface).
	19B209591P1	Knob, push on. (Used with S703 switch).

PARTS LIST

LBI30174B

HANDSET HOOKSWITCH
19B227335G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5493035P10	Wirewound: 3.5 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A136584G1	Handset, holder: 1 amp at 125 v; sim to Telephone Components Inc. Brook-Tel No. 1010S.
		- - - - - - - - - - TERMINAL BOARD - - - - - - - - -
TB1	7775500P55	Phen: 2 insulated, 1 grounded terminal.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19B227334G1	4 conductor, approx 30 inches long.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	4029851P18	Clip loop. (Used with W1).
	19B219852P1	Mounting plate.
	19A129586G1	Bumper.
	19A116773P106	Tap screw, Phillips POZIDRIV®: No. 7-19 x 3/8. (Secures clip loop).
	N193P1410P2	Tap screw: No. 8-18 x 5/8. (Secures hookswitch).
	N190P1312C6	Cut screw: No. 6. (Secures bottom of housing to back plate).
	N84P13012C6	Machine screw, flat head: No. 6-32 x 3/4. (Secures upper housing to back plate).
	N80P15016C6	Machine screw: No. 8-32 x 1. (Secures rubber bumpers to housing).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

E PART NO.	DESCRIPTION
	- - - - - - - - - - - PLUGS - - - - - - - - - - -
	Connector. Includes:
116659P82	Shell.
116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 6).
	Connector. Includes:
116659P80	Shell.
116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 6).
	Connector. Includes:
116659P14	Shell.
116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 2).
	SYSTEM HARNESS 19C327102G1 STANDARD 19C327102G2 WITH TONE
	- - - - - - - - - - CAPACITORS - - - - - - - -
481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
	- - - - - - - - JACKS AND RECEPTACLES - - - - - -
	(Part of Transmitter PA assembly).
19627G1	Connector: 6 contacts.
183P7	Receptacle: 9 contacts rated at 7.5 amps max; sim to Winchester M9S-LR-H19C.
	- - - - - - - - - - - PLUGS - - - - - - - - - - -
	Connector. Includes:
16659P84	Shell.
16781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
16781P5	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106.
	Connector. Includes:
16659P16	Shell.
16781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
27042P2	Terminal, solderless: sim to Malco 12093-10.
27042P2	Terminal, solderless: sim to Malco 12093-10.
	- - - - - - - - - - RESISTORS - - - - - - - - - -
P620J	Composition: 62 ohms ±5%, 1/2 w.
	- - - - - - - - - MISCELLANEOUS - - - - - - - - -
335P6	Terminal, solder: sim to Shakeproof 2102-06-00. (Located between G15 & G16).
27467G1	Front cap.
0149	Faceplate. (4 Freq.).
0237	Faceplate. (1 Freq.).
36561P1	Dummy support. (Not Used).
09591P1	Knob. (Used with S701 & dummy support).
913C13	Plain washer. (Used with dummy support). (Not Used).
007P4	Retainer ring. (Used with dummy support). (Not Used).
075P4	Hex nut, brass: thd. size No. 3/8-32. (Secures S701).
34330P1	Knob, push-on. (Used with S702).
36677P2	Bushing; sim to Opcoa, Inc. OC-1. (Used with CR701).
0007C6	Machine screw, phillips: No. 4-40 x 7/16. (Secures S702).
911C6	Lockwasher, internal: No. 4. (Secures S702).
225P2	Hex nut: No. 4-40. (Secures S702).
094P1	Solderless terminal. (Located at J2).

PARTS LIST

LB130175B

CHANNEL GUARD HOOKSWITCH
19C327091G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B209099P1	Sensitive: 10.1 amps at 125 VAC, or .5 amp at 12 VDC; sim to Cherry Electrical Products E62-10A. SPDT.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B204721P1	Actuator spring.
	4033802P1	Power cable. 2 conductor, approx 4 feet long.
	19A115884P8	Connector, plug: sim to AMP 60527-1. (Located on cable end).
	N193P1408C13	Tap screw: No. 8-18 x 1/2. (Quantity 2).
	7878243P11	Hex nut: No. 8-18. (Quantity 2).
	19B204726P1	Support, front.
	19A121416G1	Support, rear.
	19A115398P1	Rivet, tubular. (Secures S1).
	19A121419P2	Spacer.

PARTS LIST

LB130607A

W6
806-870 MHz CUSTOM MVP
4 FREQUENCY CABLE ASSEMBLY
19B232147G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2601		Connector. Includes:
	19A134152P1	Shell. (Quantity 2).
	19A134152P11	Contact, electrical: sim to Molex 08-50-0113. (Quantity 5).
		- - - - - - - - - SWITCHES - - - - - - - - -
S703	5495454P45	Rotary: 1 section, 1 pole, 2 to 4 with adj stop positions, non-shorting contacts, 2 amps at 25 VDC or 1 amp at 110 VAC; sim to Oak Type "A".
		- - - - - - - - - MISCELLANEOUS - - - - - - -
	19B201955P1	Spacer, threaded. (Quantity 2).
	7165075P4	Hex nut, brass: thd. size No. 3/8-32. (Secures S703 to mounting surface).
	19B209591P1	Knob, push on. (Used with S703 switch).

PARTS LIST

LB130174B

HANDSET HOOKSWITCH
19B227335G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5493035P16	Wirewound: 3.5 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A136584G1	Handset, holder: 1 amp at 125 v; sim to Telephone Components Inc. Brook-Tel No. 1010S.
		- - - - - - - - - TERMINAL BOARD - - - - - - - -
TB1	7775500P55	Phen: 2 insulated, 1 grounded terminal.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19B227334G1	4 conductor, approx 30 inches long.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4029851P18	Clip loop. (Used with W1).
	19B219852P1	Mounting plate.
	19A129586G1	Bumper.
	19A116773P106	Tap screw, Phillips POZIDRIV®: No. 7-19 x 3/8. (Secures clip loop).
	N193P1410P2	Tap screw: No. 8-18 x 5/8. (Secures hookswitch).
	N190P1312C6	Cut screw: No. 6. (Secures bottom of housing to back plate).
	N84P13012C6	Machine screw, flat head: No. 6-32 x 3/4. (Secures upper housing to back plate).
	N80P15016C6	Machine screw: No. 8-32 x 1. (Secures rubber bumpers to housing).

*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 - Control Panel 19D423840G1, 3

To improve Channel Guard Squelch operation. Add jumper wire between S702-2 and S702-3.

PARTS LIST

LBI-30194A

SPEAKER
19C320302G7

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS2	19A116910P1	Permanent magnet: 5 inch, 3.2 ohms ±15% imp, 5 w max operating: sim to Pioneer 002009.
		- - - - - - - - - - CABLES - - - - - - - - - -
W5	19A136574G1	Power: 2 conductor. (Includes 2- 19A115884P8 contacts).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B219692G1	Grille.
	19B227593G1	Housing.
	19C320016P1	Mounting bracket. (Located between housing and retaining bracket).
	19A116986P108	Tap screw, with lockwasher: No. 7-19 x 1/2. (Secures speaker to housing).
	19A116986P112	Tap screw, with lockwasher: No. 7-19 x 3/4. (Secures grille to housing).
	19A116985P1	Tap screw, with lockwasher: No. 13-16 x 3/4.
	N130P1610C6	Screw, thread forming: No. 10-16 x 5/8. (Secures mounting bracket to mounting surface).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

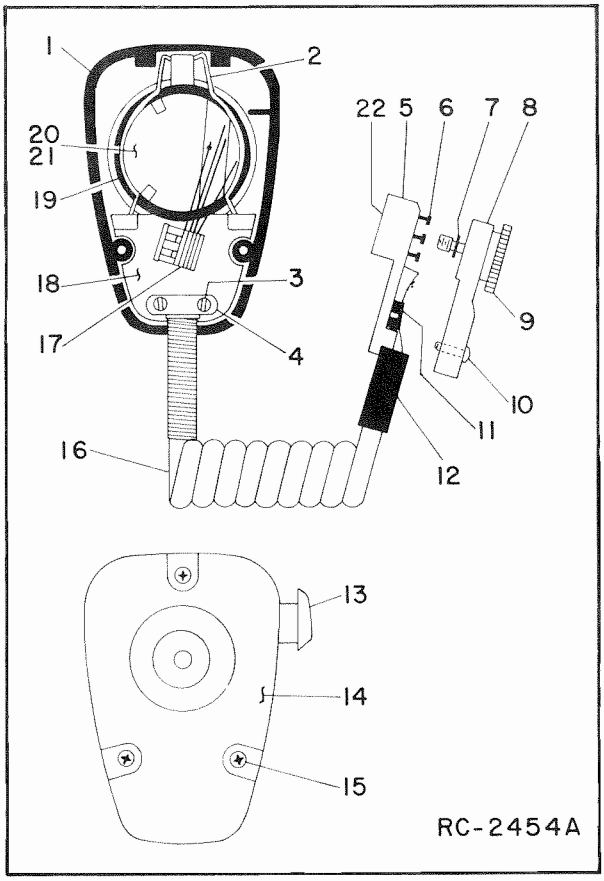
PARTS LIST

LBI-4481A

TRANSISTORIZED DYNAMIC MICROPHONE
19C320270G1
(SEE RC-2454)

SYMBOL	GE PART NO.	DESCRIPTION
1		Front Case Assembly. RP127. (includes items 14, 15).
2		Retaining spring. (Part of item 18).
3		Tap screw, phillips. (Part of item 16).
4		Retaining bar. (Part of item 16).
5	19D416766P1	Connector base.
6	19A129435P1	Contact.
7	7109043P1	Retaining ring.
8	19D416767P1	Connector cover.
9	19B219723G1	Screw.
10	N136AP905C	Tap screw, phillips: No. 4 x 5/16.
11	19A116937P1	Cable clip.
12	19B219749P1	Strain relief.
13		Switch button kit. RP126.
14		Rear Case Assembly. (Part of item 1).
15		Tap screw, phillips. (Part of item 1).
16	19C321016G1	Cable assembly: Includes items 3-12 and cable RP129.
17		Switch Assembly. RP128.
18		Grille Assembly. RP130. (includes items 2, 19, 21).
19		"O" Ring. (Part of item 18).
20		Transistorized Cartridge. RP117.
21		Washer. (Located under cartridge- part of item 18).
22	19C321016G3	Connector assembly: Includes items 5-12.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



SERVICE SHEET

DYNAMIC MICROPHONE
19C320270G1

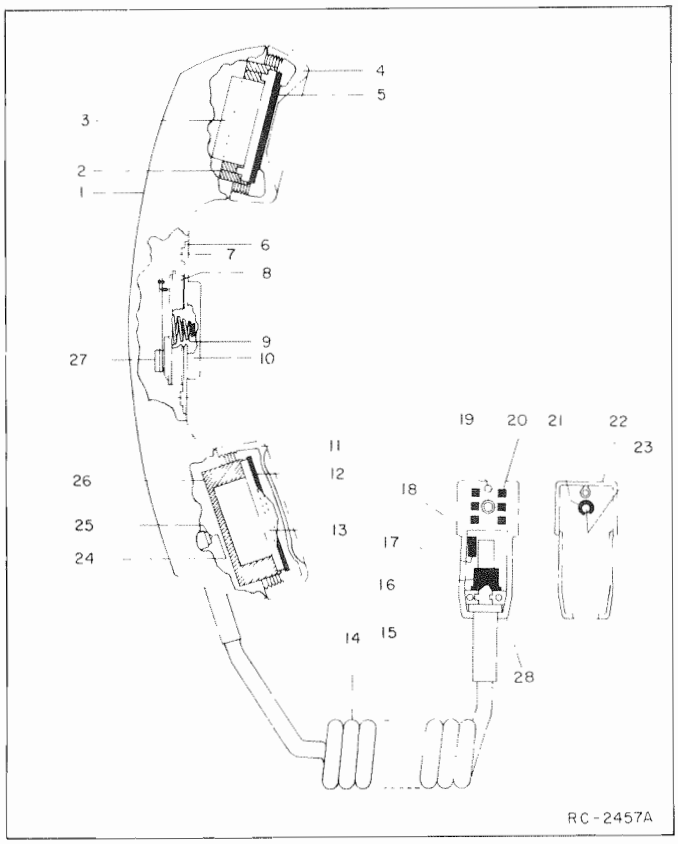
PARTS LIST

LBI-4482A

TRANSISTORIZED DYNAMIC HANDSET
19C320478G1

SYMBOL	GE PART NO.	DESCRIPTION
1		Case Assembly. Includes items 1, 2, 4, 5, 11, 12, 26. Shure Brothers RP142.
2		Adapter. Part of item 1.
3		Receiver Cartridge. Shure Brothers RP140.
4		Receiver Cap. Part of item 1.
5		Washer. Part of item 1.
6		Escutcheon. Part of item 27.
7		Flat head screw, socket cap: No. 4-40 x 1/4. Part of item 27.
8		Actuator. Part of item 27.
9		Spring. Part of item 27.
10		Plunger bar. Part of item 27.
11		Transmitter cap. Part of item 1.
12		Washer. Part of item 1.
13		Transmitter cartridge. Shure Brothers RP139.
14	19C321016G2	Cable assembly: Includes items 14-23 and cable RP141.
15	19B219749P1	Flex relief.
16	19A116937P1	Cable clamp: sim to Malco 21012-3.
17	3R77P472K	Resistor, (R1) Composition, 4700 ohms ±10%, 1/2 w.
18	19D416766P1	Connector case.
19	N136AP905C	Screw.
20	19A129435P1	Pin contact.
21	7109043P1	Retaining ring. 3/16 inch, sim to National Lockwasher WA 510.
22	19D416767P1	Connector Cover.
23	19B219723G1	Screw. (Secures cover, item 22 to case, item 18).
24		Screw. Part of item 14.
25		Cable clamp. Part of item 14.
26		Shield. Part of item 1.
27		Switch Assembly. Includes items 6-10. Shure Brothers RP143.
28	19C321016G3	Connector assembly: Includes items 15, 16, 18-23. Does not include resistor, item 17.

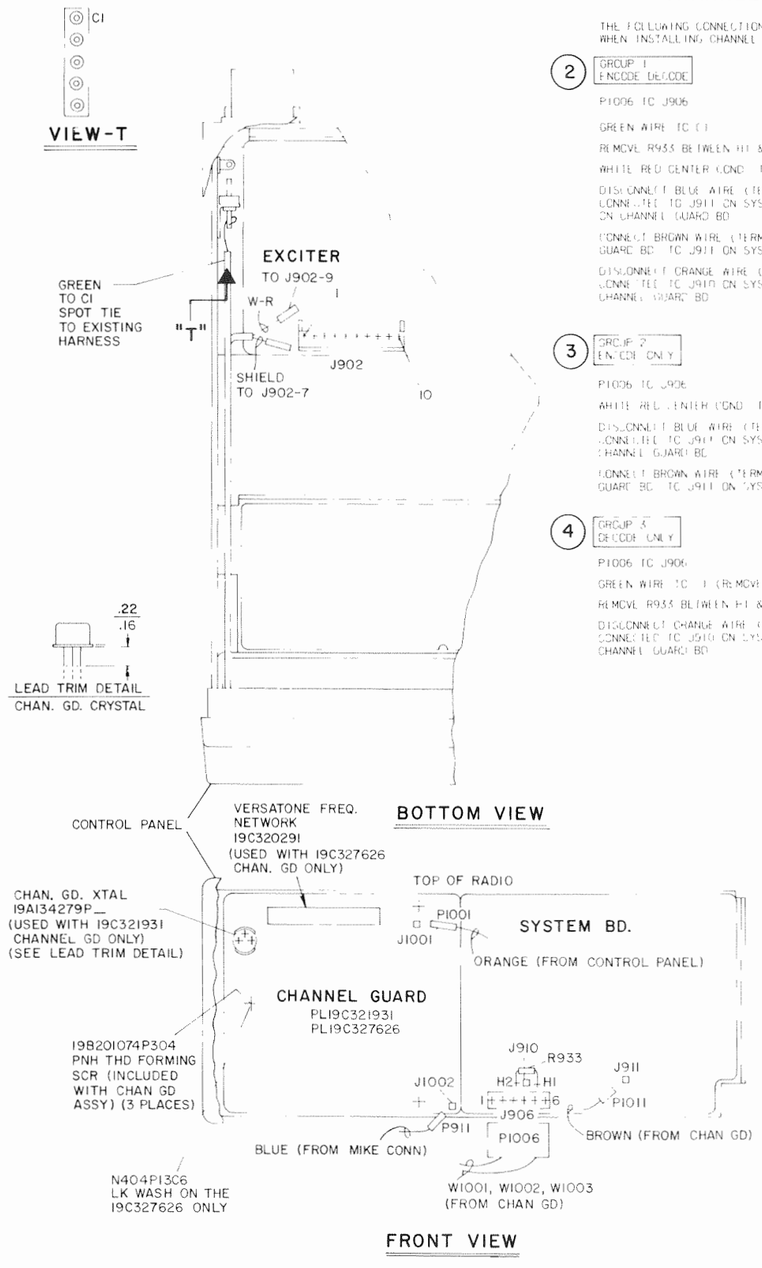
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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 - Incorporated into initial shipment.



CHANNEL GUARD

THE FOLLOWING CONNECTIONS AND MODIFICATIONS MUST BE MADE WHEN INSTALLING CHANNEL GUARD

(2) GROUP 1 ENCODE DECODE

P1006 TO J906

GREEN WIRE TO C1

REMOVE R933 BETWEEN H1 & H2 ON SYSTEM BD

WHITE RED CENTER COND TO J902-9 SHIELD TO J902-7

DISCONNECT BLUE WIRE (TERMINATED WITH P911) WHICH IS CONNECTED TO J911 ON SYSTEM BD AND CONNECT TO J1002 ON CHANNEL GUARD BD

CONNECT BROWN WIRE (TERMINATED WITH P1011) FROM CHANNEL GUARD BD TO J911 ON SYSTEM BD

DISCONNECT ORANGE WIRE (TERMINATED WITH P1001) WHICH IS CONNECTED TO J910 ON SYSTEM BD AND CONNECT TO J1001 ON CHANNEL GUARD BD

(3) GROUP 2 ENCODE ONLY

P1006 TO J906

WHITE RED CENTER COND TO J902-9 SHIELD TO J902-7

DISCONNECT BLUE WIRE (TERMINATED WITH P911) WHICH IS CONNECTED TO J911 ON SYSTEM BD AND CONNECT TO J1002 ON CHANNEL GUARD BD

CONNECT BROWN WIRE (TERMINATED WITH P1011) FROM CHANNEL GUARD BD TO J911 ON SYSTEM BD

(4) GROUP 3 DECODE ONLY

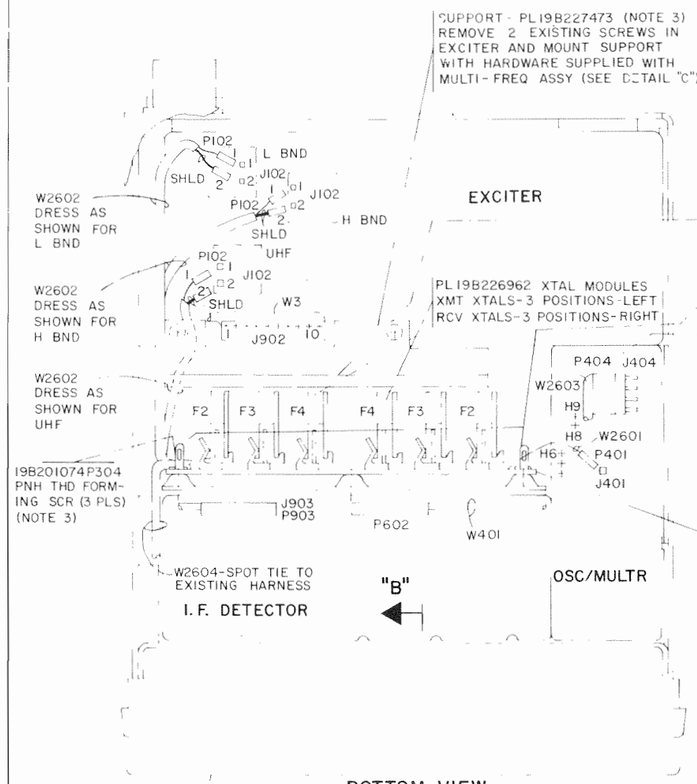
P1006 TO J906

GREEN WIRE TO C1 (REMOVE TERMINAL STRIP & TIN)

REMOVE R933 BETWEEN H1 & H2 ON SYSTEM BD

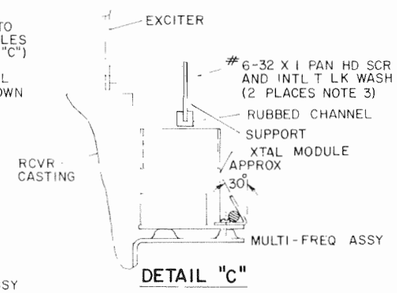
DISCONNECT ORANGE WIRE (TERMINATED WITH P1001) WHICH IS CONNECTED TO J910 ON SYSTEM BD AND CONNECT TO J1001 ON CHANNEL GUARD BD

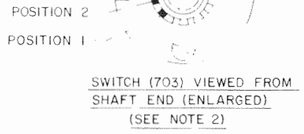
(5) 5 PPM MULTI-FREQ



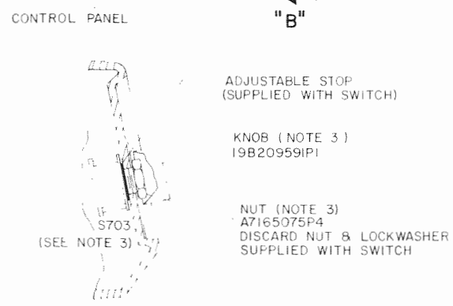
NOTES APPLICABLE TO PT 5 ONLY

1. WHEN INSTALLING MULTI FREQ THE FOLLOWING MODIFICATIONS MUST BE PERFORMED.
   REMOVE JUMPER ON OSC MULTR BD H9 H8
2. THE FREQ SWITCH STOP IS TO BE SET TO CONFORM WITH THE SIXTH DIGIT OF THE NOMENCLATURE
   ROTATE SWITCH FULLY COUNTERCLOCKWISE
   IF DIGIT VI IS "A", SET STOP IN POSITION 1 FOR SINGLE FREQ.
   IF DIGIT VI IS "C", SET STOP IN POSITION 2 FOR 2 FREQ.
   IF DIGIT VI IS "E", SET STOP IN POSITION 3 FOR 3 FREQ
   IF DIGIT VI IS "F", SET STOP IN POSITION 4 FOR 4 FREQ
3. INCLUDED AS PART OF MULTI FREQ ASSEMBLY

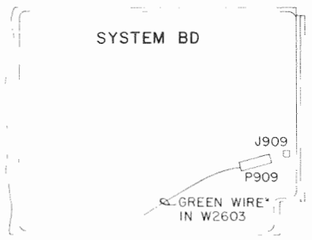




SWITCH (703) VIEWED FROM SHAFT END (ENLARGED) (SEE NOTE 2)



SECTION "B-B"
(ROTATED 90° CCW)



CONTROL PANEL REMOVED

(19D423962, Sh. 2, Rev. 15)

INSTALLATION INSTRUCTIONS

MULTI-FREQUENCY KIT & CHANNEL GUARD