

CUSTOM **MVP** MAINTENANCE MANUAL

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

SPECIFICATIONS *

| | |
|--|--|
| INPUT VOLTAGE | 13.0 Volts DC $\pm 20\%$ (RX) 13.2 Volts DC $\pm 20\%$ (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.

TABLE OF CONTENTS

| | |
|--|---------|
| SPECIFICATIONS | Cover |
| DESCRIPTION | 1 |
| CIRCUIT ANALYSIS | 1 |
| OUTLINE DIAGRAMS | |
| System-Audio-Squelch Board 19C321920G1 | 5 |
| Control Panel 19D423840G1 | 6 |
| Multi-Frequency Kit 19C321954G1 & G2 | 7 |
| 2 PPM Oscillator Board 19C327107G1 | 8 |
| SCHMATIC DIAGRAMS (Includes Parts List and Production Changes) | |
| System-Audio-Squelch Board 19C321920G1 | 9 - 10 |
| Crystal Module | 11 - 12 |
| Multi-Frequency Kit 19C321954G1 & G2 | 13 - 14 |
| 2 PPM Oscillator Board 19C327107G1 | 15 - 16 |
| INTERCONNECTION DIAGRAM (Includes Control Panel and Associated Assemblies) | 17 - 18 |
| SERVICE SHEETS | |
| Speaker 19C320302G7 | 19 |
| Transistorized Dynamic Microphone 19C320270G1 | 20 |
| Transistorized Dynamic Handset 19C320478G1, G3 | 21 |
| INSTALLATION INSTRUCTION | |
| Multi-Frequency Kit and Channel Guard | 22 |

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 by 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 (un-squelches), 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.

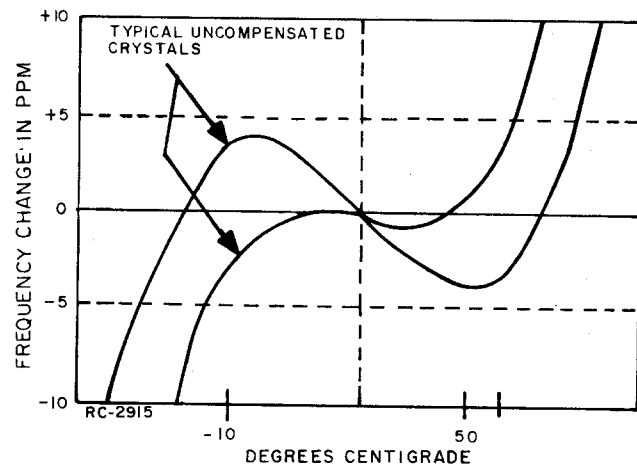


Figure 1 - Crystal Characteristics

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 $+60^{\circ}\text{C}$.

— 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.

| TEMPERATURE RANGE | OUTPUT VOLTAGE | |
|--|----------------|-----------|
| | MINIMUM | MAXIMUM |
| -30°C | 4.9 Volts | 6.0 Volts |
| -10° to $+50^{\circ}\text{C}$ | 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 accommodates 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 ($\pm 0.0002\%$) 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.

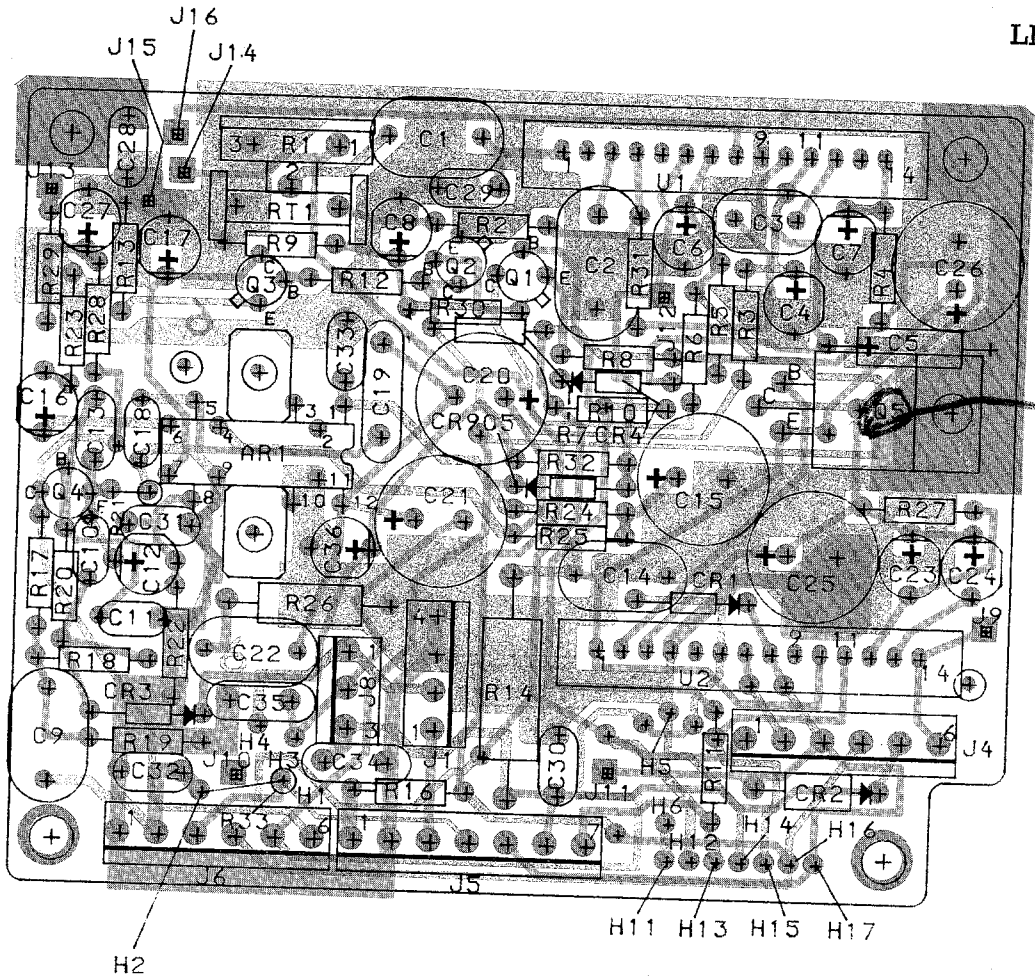
SERVICE NOTE

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.

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

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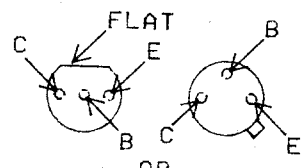
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(19C327101, Rev. 10)
 (19B227189, Sh. 1, Rev. 6)
 (19B227189, Sh. 2, Rev. 6)

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

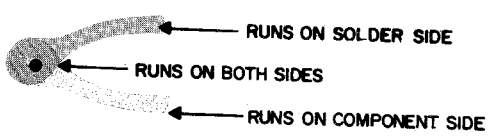
LEAD IDENTIFICATION
 FOR Q1-Q4



IN-LINE OR TRIANGULAR
 TOP VIEW

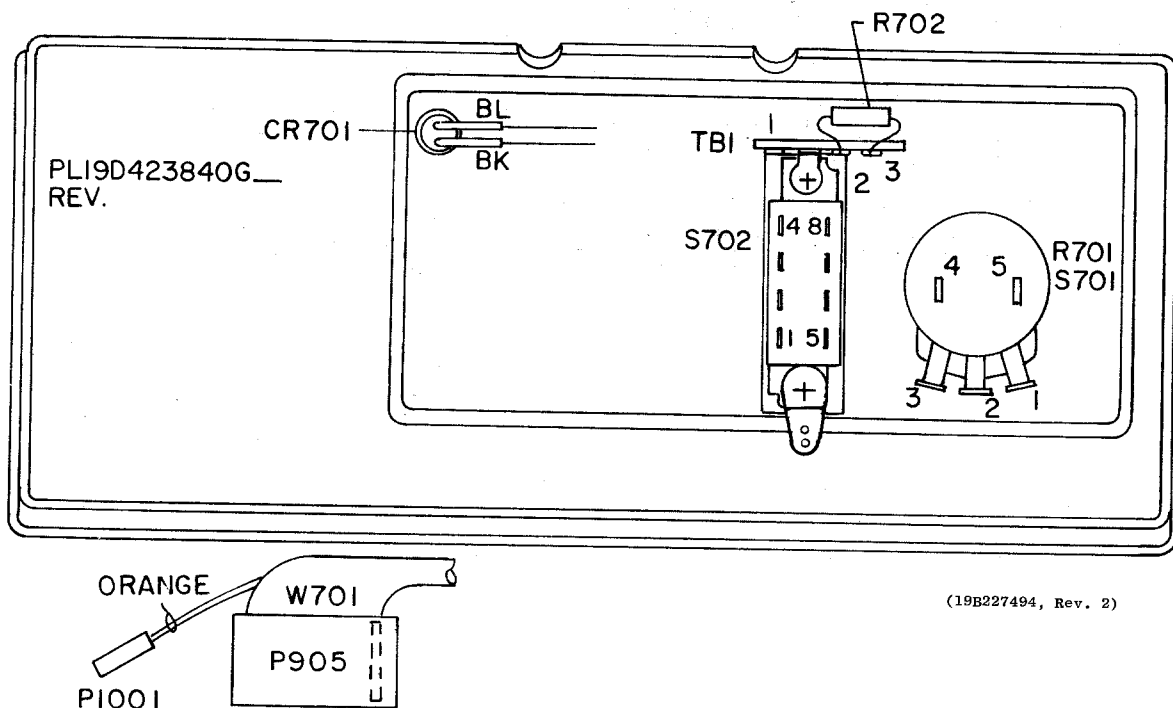
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

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



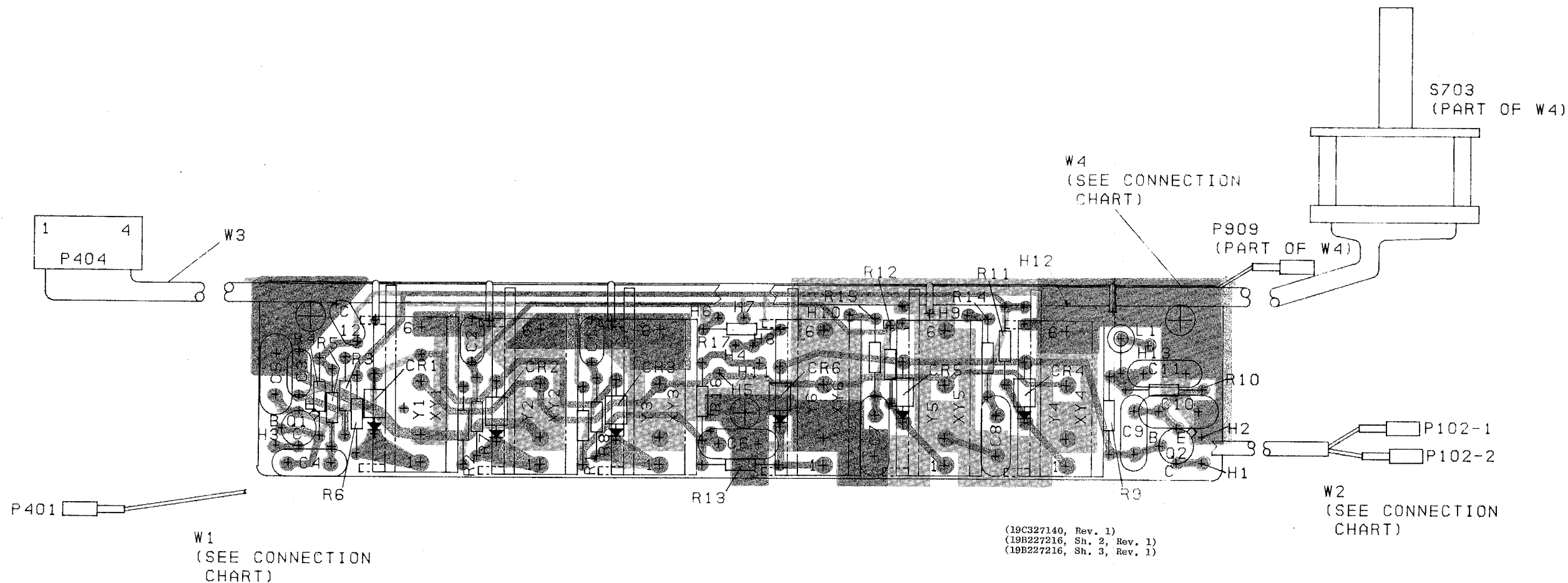
OUTLINE DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD
 19C321920G1



OUTLINE DIAGRAM

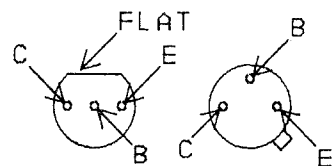
CUSTOM MVP CONTROL PANEL,
SINGLE FREQUENCY 19D423840G3



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

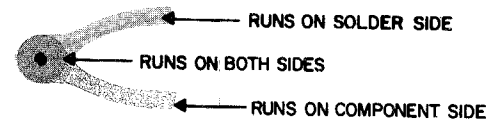
| CONNECTION CHART | | |
|------------------|-----|-------------|
| WIRE | TO | REMARKS |
| W1 | H3 | |
| W2 | H1 | CENTER COND |
| W2 | H2 | SHIELD |
| W3-W | H7 | |
| W3-R | H6 | |
| W3-BL | H5 | |
| W3-BR | H4 | |
| W4-BR | H8 | |
| W4-R | H9 | |
| W4-O | H10 | |
| W4-Y | H11 | |
| W4-BK | H12 | |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

LEAD IDENTIFICATION FOR Q1 AND Q2



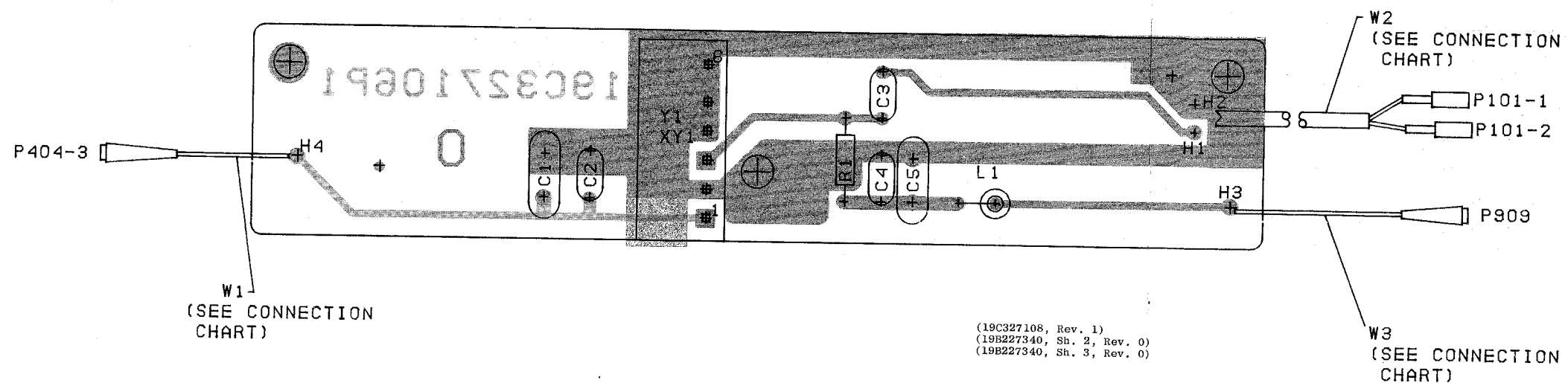
IN-LINE OR TRIANGULAR TOP VIEW

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



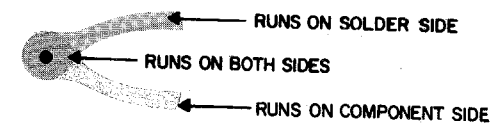
OUTLINE DIAGRAM

MULTI-FREQUENCY KIT
19C321954G1 & G2



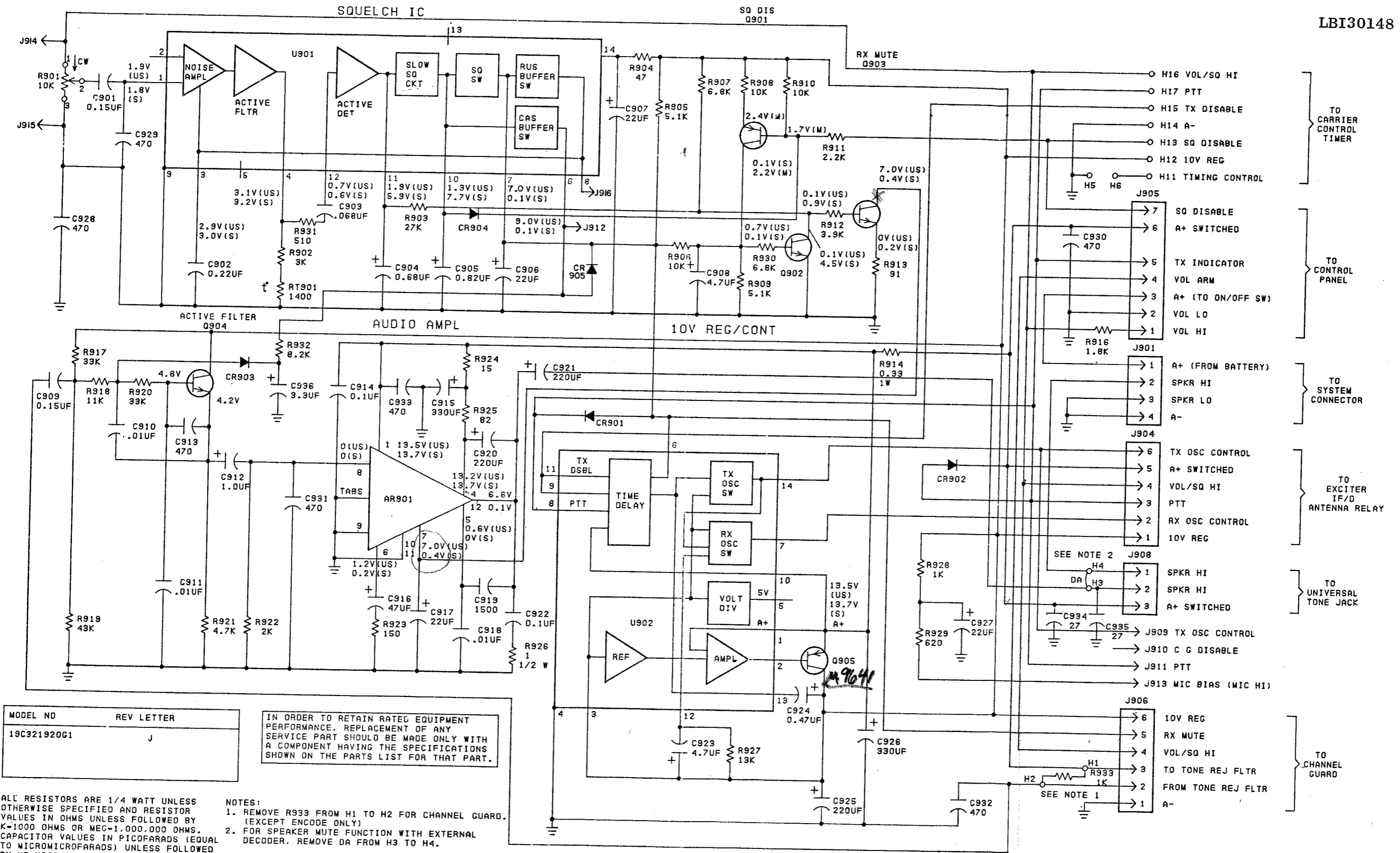
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH 2100 SERIES. EXAMPLE: C1-C2101, R1-R2101...ETC.

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



OUTLINE DIAGRAM

2 PPM OSCILLATOR BOARD
19C327107G1



SCHEMATIC DIAGRAM

**SYSTEM-AUDIO-SQUELCH BOARD
 19C321920G1**

PARTS LIST

LBI30136G
CUSTOM MVP
SYSTEM - AUDIO - SQUELCH BOARD
19C321920G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|-----------------------------------|----------------|---|
| AR901 | 19A134339P2 | Integrated circuit, linear: sim to SGS-ATES TBA810ACH. |
| ----- CAPACITORS ----- | | |
| C901 | 19A116080P108 | Polyester: 0.15 μ f \pm 10%, 50 VDCW. |
| C902 | 19A116080P109 | Polyester: 0.22 μ f \pm 10%, 50 VDCW. |
| C903 | 19A116080P106 | Polyester: 0.068 μ f \pm 10%, 50 VDCW. |
| C904 | 19A134202P13 | Tantalum: 0.68 μ f \pm 20%, 35 VDCW. |
| C905 | 5496267P230 | Tantalum: 0.82 μ f \pm 10%, 35 VDCW; sim to Sprague Type 150D. |
| C906 and C907 | 19A134202P6 | Tantalum: 22 μ f \pm 20%, 15 VDCW. |
| C908 | 19A134202P3 | Tantalum: 4.7 μ f \pm 20%, 10 VDCW. |
| C909 | 19A116080P108 | Polyester: 0.15 μ f \pm 10%, 50 VDCW. |
| C910 and C911 | 19A116080P101 | Polyester: 0.01 μ f \pm 10%, 50 VDCW. |
| C912 | 19A134202P14 | Tantalum: 1 μ f \pm 20%, 35 VDCW. |
| C913 | 5494481P107 | Ceramic disc: 470 pf \pm 20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C914 | 19A116080P107 | Polyester: 0.1 μ f \pm 10%, 50 VDCW. |
| C915 | 19A134319P2 | Electrolytic: 330 μ f +75% -10%, 25 VDCW; sim to Sprague 502D189. |
| C916 | 19A134202P2 | Tantalum: 47 μ f \pm 20%, 6 VDCW. |
| C917* | 19A134202P6 | Tantalum: 22 μ f \pm 20%, 15 VDCW. Earlier than REV A: |
| | 5496267P11 | Tantalum: 68 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D. |
| C918 | 19A116080P101 | Polyester: 0.01 μ f \pm 10%, 50 VDCW. |
| C919 | 19A116655P30 | Ceramic disc: 1500 pf \pm 10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C920 and C921 | 19A134319P1 | Electrolytic: 220 μ f +75% -10%, 25 VDCW; sim to Sprague 502D182. |
| C922 | 19A116080P107 | Polyester: 0.1 μ f \pm 10%, 50 VDCW. |
| C923 | 19A134202P3 | Tantalum: 4.7 μ f \pm 20%, 10 VDCW. |
| C924 | 19A134202P12 | Tantalum: 0.47 μ f \pm 20%, 35 VDCW. |
| C925 | 19A134319P1 | Electrolytic: 220 μ f +75% -10%, 25 VDCW; sim to Sprague 502D182. |
| C926 | 19A134319P2 | Electrolytic: 330 μ f +75% -10%, 25 VDCW; sim to Sprague 502D189. |
| C927 | 19A134202P6 | Tantalum: 22 μ f \pm 20%, 15 VDCW. |
| C928 thru C933 | 5494481P107 | Ceramic disc: 470 pf \pm 20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C934 and C935 | 19A116655P27J0 | Ceramic disc: 27 pf \pm 5%, 500 VDCW, temp coef 0 PPM. |
| C936* | 19A134202P5 | Tantalum: 3.3 μ f \pm 20%, 15 VDCW. Added by REV A. |
| C937* | 5491674P34 | Tantalum: 15 μ f \pm 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. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|-----------------------------------|---------------|--|
| 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 10,000 ohms \pm 10%, 0.25 w; sim to CTS Type X-201. |
| R902 | 3R152P302J | Composition: 3K ohms \pm 5%, 1/4 w. |
| R903 | 19A700106P97 | Composition: 27K ohms \pm 5%, 1/4 w. |
| R904 | 19A700106P31 | Composition: 47 ohms \pm 5%, 1/4 w. |
| R905 | 3R152P512J | Composition: 5.2K ohms \pm 5%, 1/4 w. |
| R906 | 19A700106P87 | Composition: 10K ohms \pm 5%, 1/4 w. |
| R907 | 19A700106P83 | Composition: 6.8K ohms \pm 5%, 1/4 w. |
| R908 | 19A700106P87 | Composition: 10K ohms \pm 5%, 1/4 w. |
| R909 | 3R152P512J | Composition: 5.1K ohms \pm 5%, 1/4 w. |
| R910 | 19A700106P87 | Composition: 10K ohms \pm 5%, 1/4 w. |
| R911 | 19A700106P71 | Composition: 2.2K ohms \pm 10%, 1/4 w. |
| R912 | 19A700106P77 | Composition: 3.9K ohms \pm 5%, 1/4 w. |
| R913 | 3R152P910J | Composition: 91 ohms \pm 5%, 1/4 w. |
| R914 | 19A700050P7 | Wirewound: 0.33 ohms \pm 10%, 2 w; sim to IRC/TRW Type BWH. |
| R916* | 19A700106P69 | Composition: 1.8K ohms \pm 5%, 1/4 w. In REV D: Composition: 2.7K ohms \pm 5%, 1/4 w. In REV C & earlier: Composition: 470 ohms \pm 5%, 1/4 w. |
| R917 | 19A700106P99 | Composition: 33K ohms \pm 5%, 1/4 w. |
| R918 | 3R152P113J | Composition: 11K ohms \pm 5%, 1/4 w. |
| R919 | 3R152P433J | Composition: 43K ohms \pm 5%, 1/4 w. |
| R920 | 19A700106P99 | Composition: 33K ohms \pm 5%, 1/4 w. |
| R921 | 19A700106P79 | Composition: 4.7K ohms \pm 5%, 1/4 w. |
| R922 | 3R152P202J | Composition: 2K ohms \pm 5%, 1/4 w. |
| R923 | 19A700106P43 | Composition: 150 ohms \pm 5%, 1/4 w. |
| R924 | 19A700106P19 | Composition: 15 ohms \pm 10%, 1/4 w. |
| R925 | 3R152P820K | Composition: 82 ohms \pm 10%, 1/4 w. |
| R926 | 7147161P19 | Composition: 1 ohm \pm 5%, 1/2 w. |
| R927 | 3R152P133J | Composition: 13K ohms \pm 5%, 1/4 w. |
| R928 | 19A700106P63 | Composition: 1K ohms \pm 5%, 1/4 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---------------------------------|--------------|---|
| R929 | 3R152P621J | Composition: 620 ohms \pm 5%, 1/4 w. |
| R930 | 19A700106P83 | Composition: 6.8K ohms \pm 10%, 1/4 w. |
| R931* | 3R152P511J | Composition: 510 ohms \pm 5%, 1/4 w. Earlier than REV A: Composition: 10 ohms \pm 5%, 1/4 w. |
| R932* | 3R152P100J | Composition: 10 ohms \pm 5%, 1/4 w. |
| R933* | 19A700106P85 | Composition: 8.2K ohms \pm 5%, 1/4 w. Added by REV A. |
| | 19A700106P63 | Composition: 1K ohms \pm 5%, 1/4 w. Added by REV E. |
| ----- THERMISTORS ----- | | |
| RT901 | 5490828P38 | Thermistor: 1400 ohms \pm 5%, color code green and white; sim to Carborundum Type 723H-2. |
| ----- INTEGRATED CIRCUITS ----- | | |
| U901* | 19D416560G3 | Hybrid Squelch. In REV B: Hybrid Squelch. Earlier than REV A: Hybrid Squelch. |
| | 19D416560G2 | Hybrid Squelch. |
| | 19D416560G1 | Hybrid Squelch. |
| U902* | 19D416564G4 | Regulator, 10 volt. In REV F: Regulator, 10 volt. In REV E and earlier: Regulator, 10 volt. |
| | 19D416564G2 | Regulator, 10 volt. |
| | 19D416564G3 | Regulator, 10 volt. |

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.

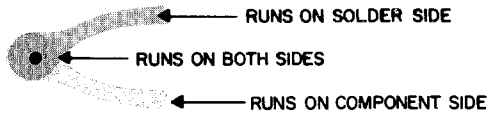
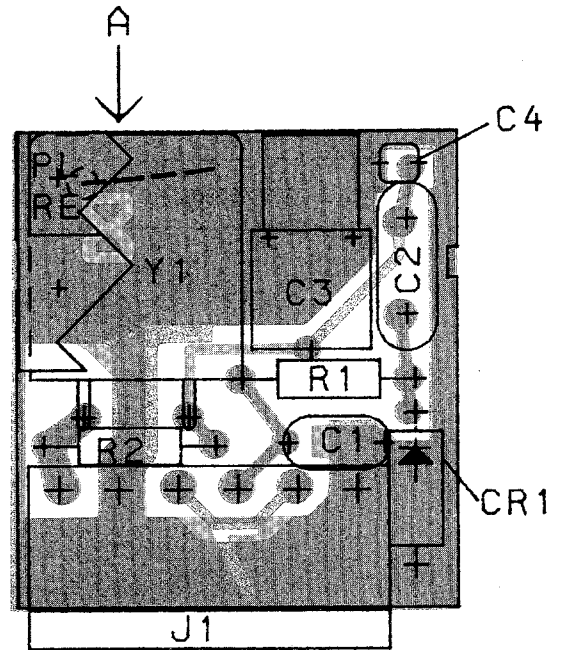
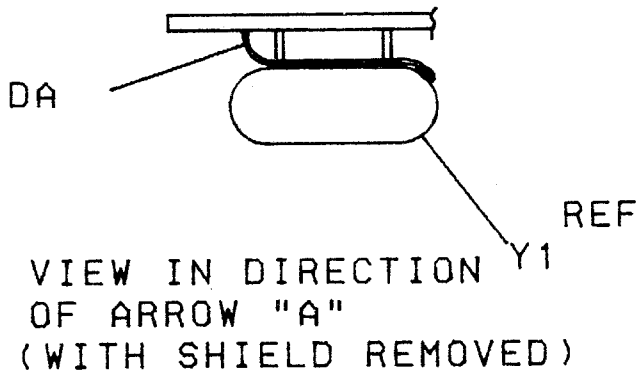
Rev. E. - To increase audio output. Changed R916 and added R933.

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.

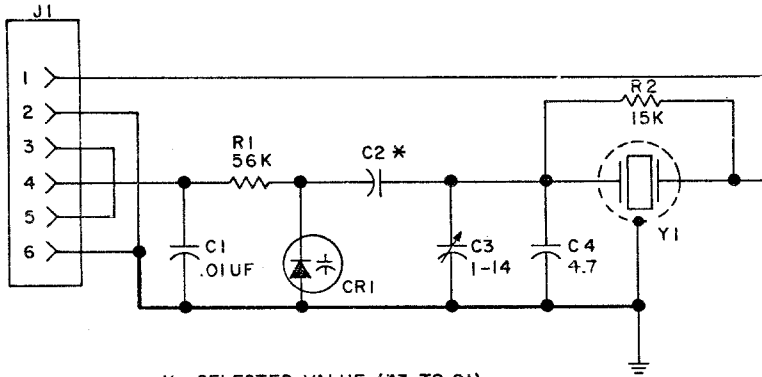
Rev. H. - To permit Local/DC Remote operation. Added J914, J915 and J916.

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



(19B227337, Rev. 7)
(19B226851, Sh. 1, Rev. 8)
(19B226851, Sh. 2, Rev. 7)

SCHEMATIC DIAGRAM



* SELECTED VALUE (43 TO 91)

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.

| MODEL NO | REV LETTER |
|------------------|------------|
| PL19B226962GI-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.

(19B226951, Rev. 5)

SCHEMATIC & OUTLINE DIAGRAM

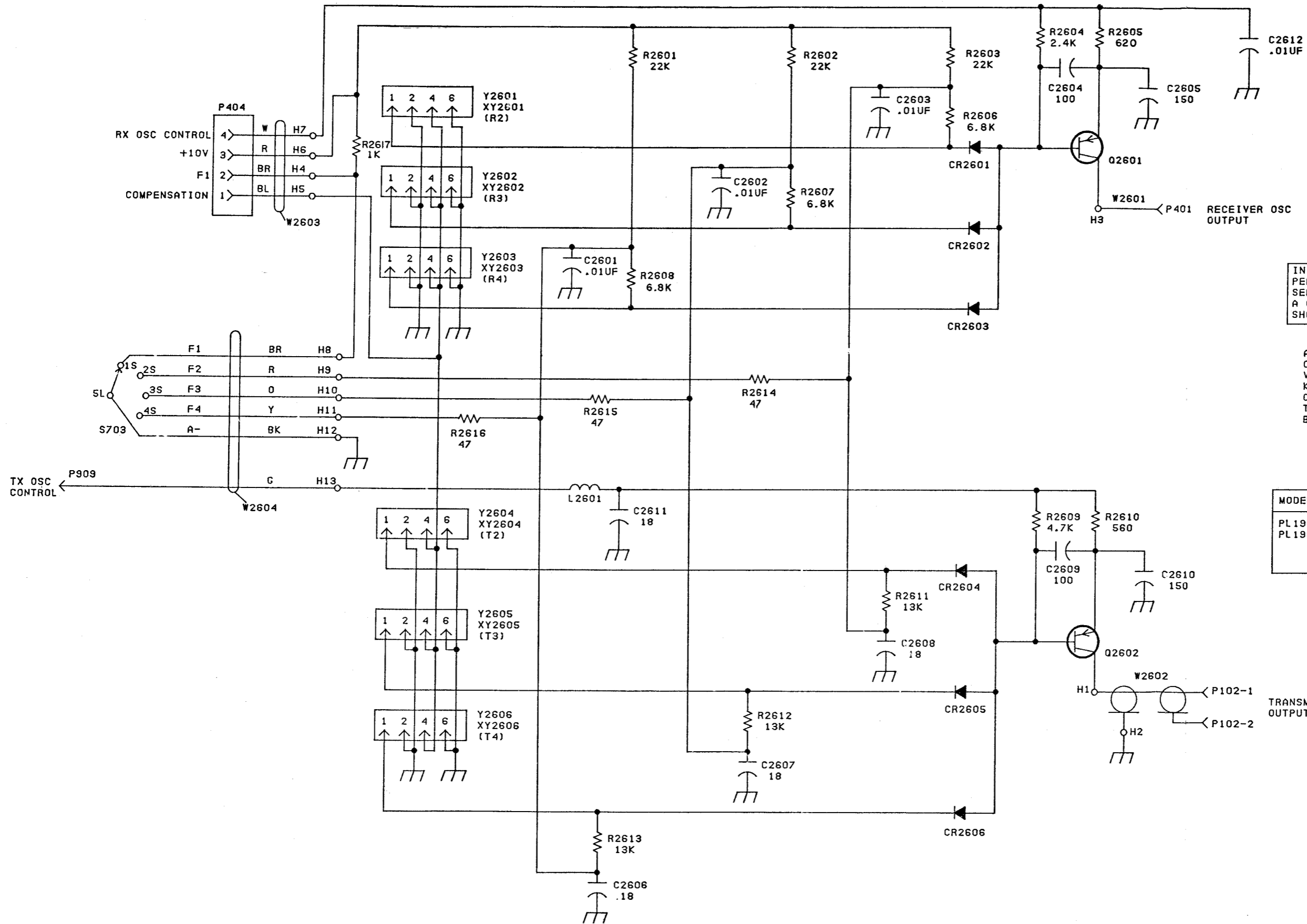
CRYSTAL MODULE

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 μ f \pm 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 \pm 5%, 1/4 w. |
| R2 | 3R152P153J | Composition: 15K ohms \pm 5%, 1/4 w. |
| | | ----- MISCELLANEOUS ----- |
| | 19B227397P1 | Shield. (Y1). |
| | 19A121175P39 | Insulator, plate. (Used with C4). |



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| MODEL NO | REV LETTER |
|---------------|------------|
| PL19C321954G1 | B |
| PL19C321954G2 | B |

SCHEMATIC DIAGRAM

MULTI-FREQUENCY KIT
19C321954G1 & G2

PARTS LIST

LBI30180D

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

| SYMBOL | GE PART NO. | DESCRIPTION |
|-----------------------------------|----------------|---|
| ----- CAPACITORS ----- | | |
| C2601 thru C2603 | 19A116080P101 | Polyester: 0.01 μ f \pm 10%, 50 VDCW. |
| C2604 | 5496218P763 | Ceramic disc: 100 pf \pm 5%, 500 VDCW, temp coef -750 PPM. |
| C2605 | 7489162P31 | Silver mica: 150 pf \pm 5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C2606* thru C2608* | 19A116656P18J0 | Ceramic disc: 18 pf \pm 5%, 500 VDCW, temp coef 0 PPM. In REV A & earlier: |
| | 7489162P9 | Silver mica: 18 pf \pm 5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C2609 | 5496218P763 | Ceramic disc: 100 pf \pm 5%, 500 VDCW, temp coef -750 PPM. |
| C2610 | 7489162P31 | Silver mica: 150 pf \pm 5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C2611* | 19A116656P18J0 | Ceramic disc: 18 pf \pm 5%, 500 VDCW, temp coef 0 PPM. In REV A & earlier: |
| | 7489162P9 | Silver mica: 18 pf \pm 5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C2612 | 19A116080P101 | Polyester: 0.01 μ f \pm 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 \pm 5%, 1/4 w. |
| R2604* | 3R152P242J | Composition: 2.4K ohms \pm 5%, 1/4 w. Earlier than REV A: |
| | 3R152P472J | Composition: 4.7K ohms \pm 5%, 1/4 w. |
| R2605* | 3R152P621J | Composition: 620 ohms \pm 5%, 1/4 w. Earlier than REV A: |
| | 3R152P681J | Composition: 680 ohms \pm 5%, 1/4 w. |
| R2606* thru R2608* | 3R152P682J | Composition: 6.8K ohms \pm 5%, 1/4 w. Earlier than REV A: |
| | 3R152P133J | Composition: 13K ohms \pm 5%, 1/4 w. |

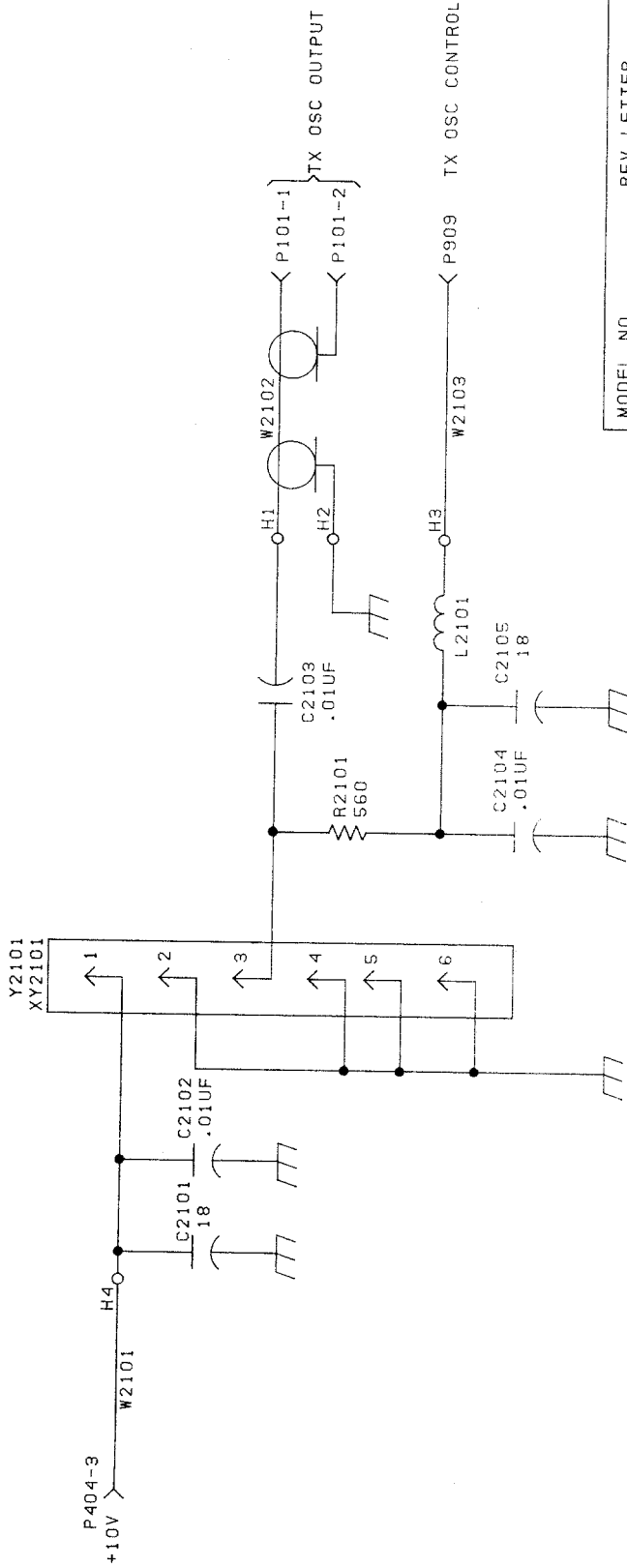
| SYMBOL | GE PART NO. | DESCRIPTION |
|---------------------------|---------------|--|
| R2609 | 3R152P472J | Composition: 4.7K ohms \pm 5%, 1/4 w. |
| R2610 | 3R152P561J | Composition: 560 ohms \pm 5%, 1/4 w. |
| R2611 thru R2613 | 3R152P133J | Composition: 13K ohms \pm 5%, 1/4 w. |
| R2614 thru R2616 | 3R152P470J | Composition: 47 ohms \pm 5%, 1/4 w. |
| R2617 | 3R152P102J | Composition: 1K ohms \pm 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). |

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.



| | |
|---------------|------------|
| MODEL NO | REV LETTER |
| PL19C327107G1 | |

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 PICO FARADS (EQUAL TO MICROFARADS) 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.

(19C327147, Rev. 1)

SCHEMATIC DIAGRAM

**2 PPM OSCILLATOR BOARD
19C327107G1**

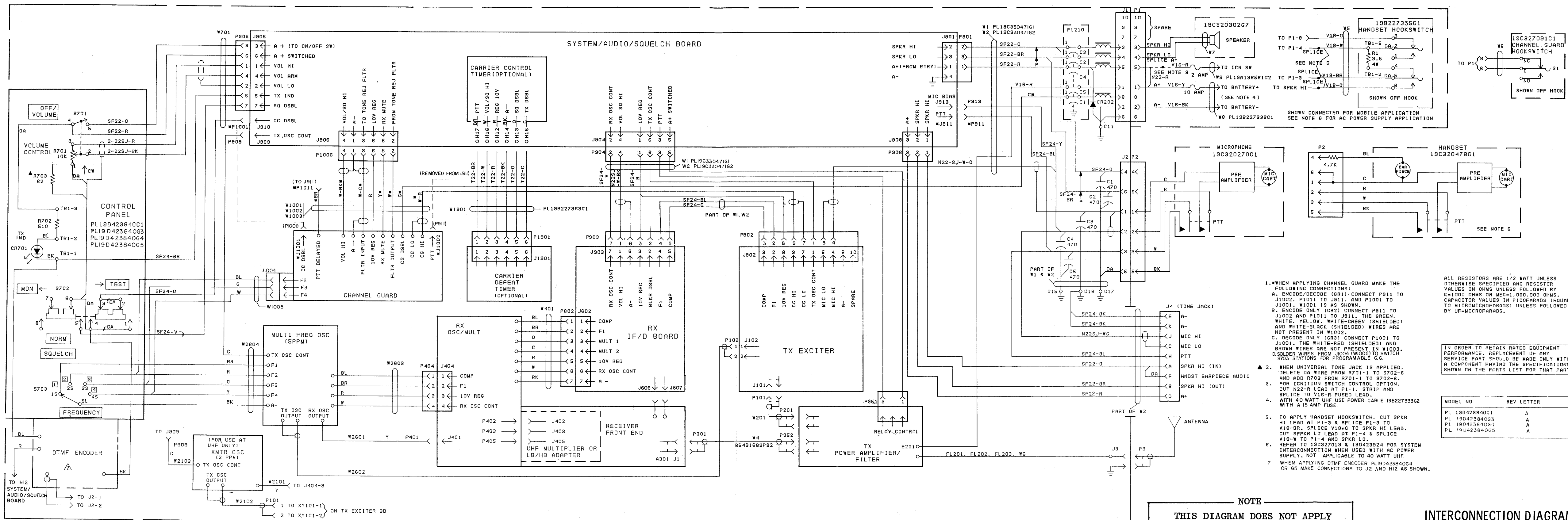
PARTS LIST

LBI30179C

2 PPM OSCILLATOR BOARD
19C327107G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|---------------------------|---------------|--|
| ----- CAPACITORS ----- | | |
| C2101 | 7489162P9 | Silver mica: 18 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15. |
| C2102 thru C2104 | 19A116080P101 | Polyester: 0.01 μ f $\pm 10\%$, 50 VDCW. |
| C2105 | 7489162P9 | Silver mica: 18 pf $\pm 5\%$, 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 $\pm 5\%$, 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. = $\frac{\text{Operating Freq.}}{36}$ |
| 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 (CR1) CONNECT P911 TO J1002, P1011 TO J911, AND P1001 TO J1001. W1001 IS AS SHOWN.
 - B. ENCODE ONLY (CR2) 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 (CR3) CONNECT P1001 TO J1001. THE WHITE-RED (SHIELDED) AND BROWN WIRES ARE NOT PRESENT IN W1003.
 - D. SOLDER WIRES FROM J1004 (W1005) TO SWITCH S703 STATIONS FOR PROGRAMMABLE C.G.
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 19B22733362 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-C TO SPKR HI LEAD. CUT SPKR 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 PL19D423840G4 OR G5 MAKE CONNECTIONS TO J2 AND H12 AS SHOWN.

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

PARTS LIST

LBI30181G
CUSTOM MVP
AND
ASSOCIATED ASSEMBLIES

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|---|
| | | CONTROL PANEL 19D423840G1 MULTI FREQ. 19D423840G3 SINGLE FREQ. 19D423840G4 MULTI FREQ & DTMF ENC. 19D423840G5 SINGLE FREQ & DTMF ENC. |
| | | DIODES AND RECTIFIERS Diode, red light emitting. |
| | | PLUGS Connector. Includes: Shell. |
| | | CONTACT, ELECTRICAL: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 7). |
| | | Terminal, solderless: sim to Malco 12093-10. |
| | | RESISTORS (Part of S701). |
| | | Composition: 510 ohms ±5%, 1/2 w. |
| | | SWITCHES Variable, carbon film: 10K ohms ±20%; sim to Mallory LC(10K) FAC. (Includes R701). |
| | | Switch, slide: 2 poles, 3 positions, spring return; sim to Switchcraft 11D-1154. |
| | | TERMINAL BOARD Miniature, phen: 3 terminals. |
| | | CABLES HARNESSE ASSEMBLY 19D423840G2 (Includes P905, P1001, R701, S701, S702) |
| | | ASSOCIATED ASSEMBLIES POWER CABLE 19B227333G1 |
| | | PLUGS Connector. Includes: Shell. |
| | | Contact, female: wire range No. 14-20 AWG; sim to AMP 60527-4. |
| | | MISCELLANEOUS Contact, female: wire range No. 22-30 AWG; sim to AMP 60909-4. |
| | | Fused lead. |
| | | Lead. |
| | | Fuse, quick blowing: 10 amp at 250 v; sim to Littelfuse 314010 or Bussmann ABC-10. |
| | | Fuse, quick blowing: 15 amp at 250 v; sim to Littelfuse 314015 or Bussmann ABC-15. (Used with 35 watt UHF Tx). |

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|--|
| | | TRANSMIT/RECEIVE SYSTEM HARNES 19C330471G1 STANDARD 19C330471G2 WITH TONE |
| | | CAPACITORS Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | TERMINALS Terminal, solder: sim to Zierick Mfg Corp 505. |
| | | Terminal, solder: sim to Shakeproof 2102-06-00. |
| | | JACKS AND RECEPTACLES Connector: 6 contacts. |
| | | Plug: 9 contacts rated at 7.5 amps max; sim to Winchester MFP-LS-119CS. |
| | | PLUGS Connector. Includes: Shell. |
| | | Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 1). |
| | | Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0108. (Quantity 2). |
| | | Connector. Includes: Shell. |
| | | Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 4). |
| | | Connector. Includes: Shell. |
| | | Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 5). |
| | | Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0108. (Quantity 2). |
| | | Connector. Includes: Shell. |
| | | Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 3). |
| | | Terminal, solderless: sim to Malco 12093-10. |
| | | Terminal, solderless: sim to Malco 12093-10. |
| | | Connector. Includes: Shell. |
| | | Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 2). |
| | | RESISTORS Composition: 62 ohms ±5%, 1/2 w. |
| | | MISCELLANEOUS Terminal, solder: sim to Shakeproof 2140-20-04-2520N. (Hung in wiring from P901-1 thru P901-3). |
| | | Front cap. (G1 & G3). |
| | | Front cap. (G4 & G5). |
| | | Faceplate. (4 Freq.). |
| | | Faceplate. (1 Freq.). |
| | | Dummy support. (Not Used). |
| | | Knob. (Used with S701 & dummy support). |

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|---|
| | | Plain washer. (Used with dummy support). (Not Used). |
| | | Retainer ring. (Used with dummy support). (Not Used). |
| | | Hex nut, brass: thd. size No. 3/8-32. (Secures S701). |
| | | Knob, push-on. (Used with S702). |
| | | Bushing: sim to Hewlett-Packard No. 5082-4707. (Used with CR701). |
| | | Machine screw, Phillips: No. 4-40 x 7/16. (Secures S702). |
| | | Lockwasher, internal: No. 4. (Secures S702). |
| | | Hex nut: No. 4-40. (Secures S702). |

PARTS LIST

LBI30175C
CHANNEL GUARD HOOKSWITCH
19C327091G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|--|
| | | SWITCHES Sensitive: 10.1 amps at 125 VAC, or .5 amp at 12 VDC; sim to Cherry Electrical Products E62-13AB SPDT. |
| | | HARNESSE ASSEMBLY 19C327091G2 Power cable. 2 conductor, approx 4 feet long. Connector, plug: sim to AMP 60527-1. (Located on cable end). |
| | | MISCELLANEOUS Actuator spring. Tap screw: No. 8-18 x 1/2. (Quantity 2). Hex nut: No. 8-18. (Quantity 2). Support, front. Support, rear. Rivet, tubular. (Secures S1). Spacer. |

PARTS LIST

LBI30607B
W6
806-870 MHz CUSTOM MVP
4 FREQUENCY CABLE ASSEMBLY
19B232147G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|--|
| | | PLUGS Connector. Includes: Shell. |
| | | Contact, electrical: sim to Molex 08-50-0113. (P1-1 thru P1-3, P2-1, P2-2). |
| | | SWITCHES 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 Spacer, threaded. (Quantity 2). Hex nut, brass: thd. size No. 3/8-32. (Secures S703 to mounting surface). Knob, push on. (Used with S703 switch). |

PARTS LIST

LBI30174B
HANDSET HOOKSWITCH
19B227333G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|---|
| | | RESISTORS Wirewound: 3.5 ohms ±5%, 5 w; sim to Hamilton Hall Type HR. |
| | | SWITCHES Handset, holder: 1 amp at 125 v; sim to Telephone Components Inc. Brook-Tel No. 10108. |
| | | TERMINAL BOARD Phen: 2 insulated, 1 grounded terminal. |
| | | CABLES 4 conductor, approx 30 inches long. |
| | | MISCELLANEOUS Clip loop. (Used with W1). Mounting plate. Bumper. Tap screw, Phillips POZIDRIV®: No. 7-19 x 3/8. (Secures clip loop). Tap screw: No. 8-18 x 5/8. (Secures hookswitch). Cut screw: No. 6. (Secures bottom of housing to back plate). Machine screw, flat head: No. 6-32 x 3/4. (Secures upper housing to back plate). Machine screw: No. 8-32 x 1. (Secures rubber bumpers to housing). |

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.
- REV. A - Control Panel 19D423840G4, G5
To prevent alternator noise from being transmitted while using DTMF encoder. Changed location of power connection to regulated +10 Volts.

PARTS LIST

LBI30148

LBI-30194A

SPEAKER
19C320302G7

| SYMBOL | GE PART NO. | DESCRIPTION |
|--------|-------------|--|
| LS2 | 19A116910P1 | <p>----- LOUDSPEAKERS -----</p> <p>Permanent magnet: 5 inch, 3.2 ohms \pm15% imp, 5 w max operating; sim to Pioneer 002009.</p> |
| W5 | 19A136574G1 | <p>----- CABLES -----</p> <p>Power: 2 conductor. (Includes 2- 19A115884P8 contacts).</p> |
| | | <p>----- MISCELLANEOUS -----</p> <p>Grille.</p> <p>Housing.</p> <p>Mounting bracket. (Located between housing and retaining bracket).</p> <p>19B219692G1</p> <p>19B227593G1</p> <p>19C320016P1</p> <p>19A116986P108</p> <p>19A116986P112</p> <p>19A116985P1</p> <p>N130P1610C6</p> <p>Tap screw, with lockwasher: No. 7-19 x 1/2. (Secures speaker to housing).</p> <p>Tap screw, with lockwasher: No. 7-19 x 3/4. (Secures grille to housing).</p> <p>Tap screw, with lockwasher: No. 13-16 x 3/4.</p> <p>Screw, thread forming: No. 10-16 x 5/8. (Secures mounting bracket to mounting surface).</p> |

SERVICE SHEET

SPEAKER 19C320302G7

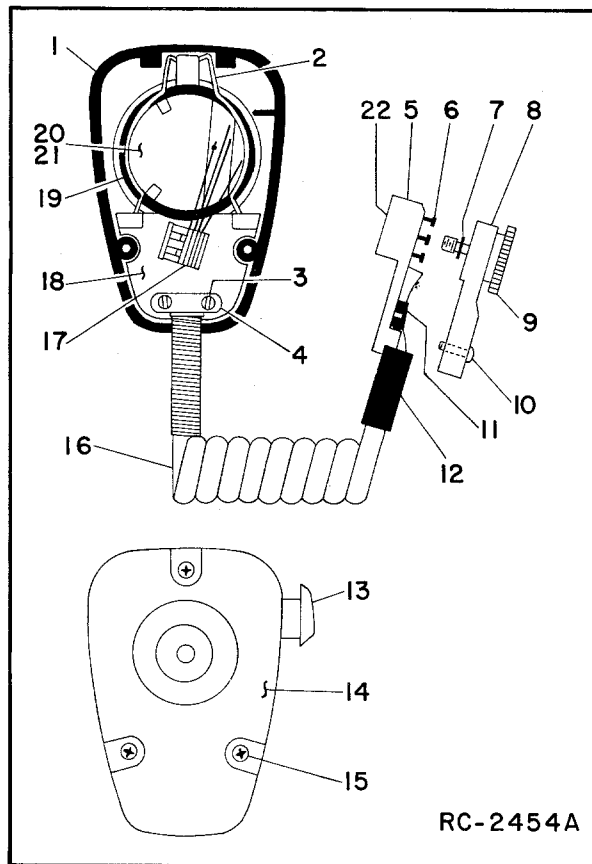
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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

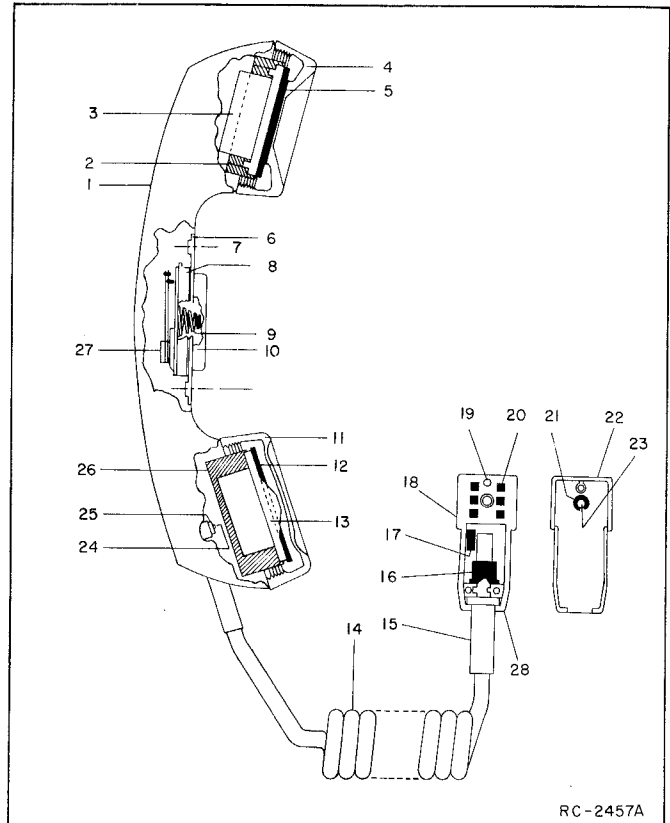
DYNAMIC MICROPHONE
19C320270G1

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 RP138. |
| 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. |



PRODUCTION CHANGES

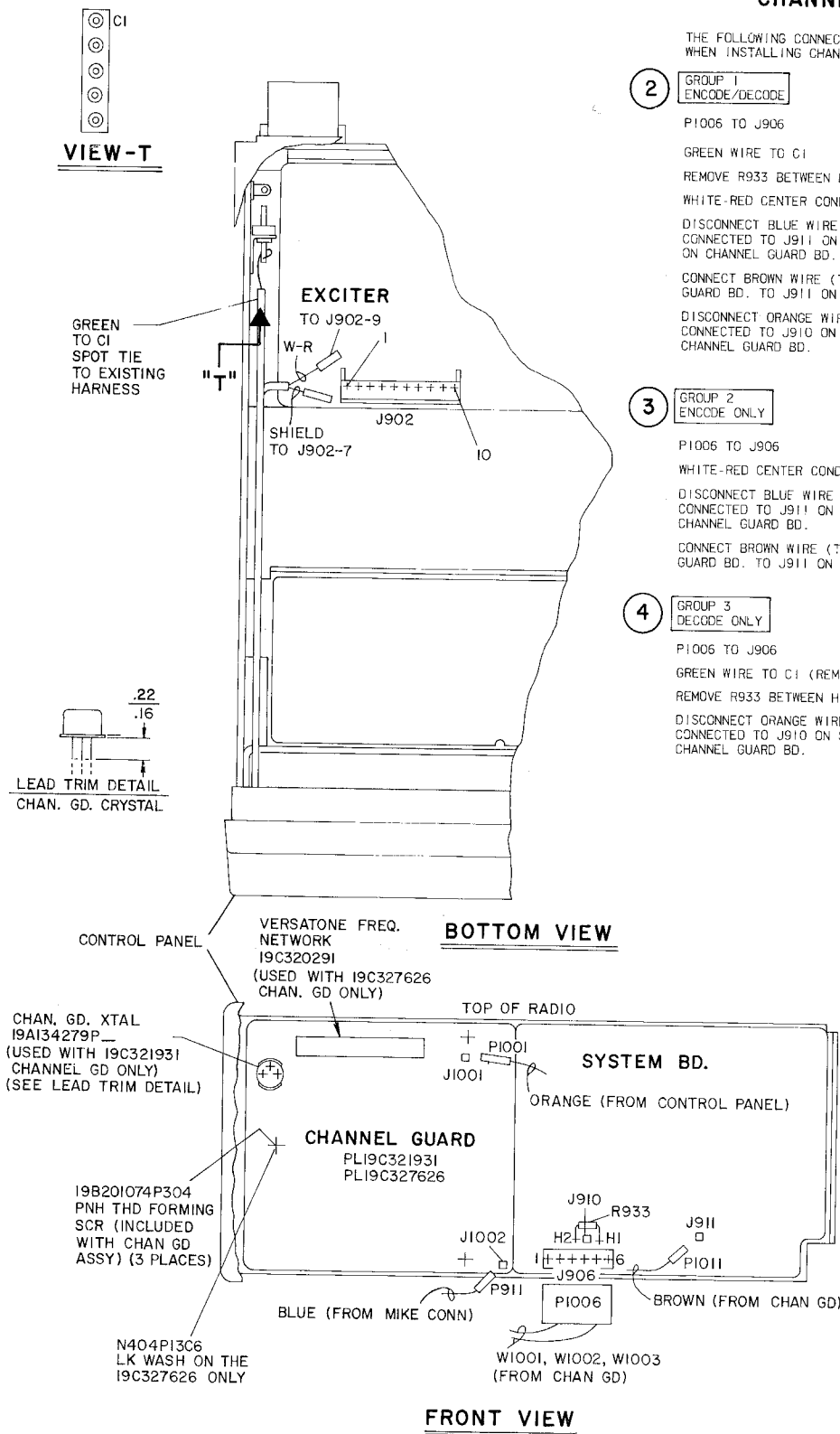
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - Incorporated into initial shipment.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SERVICE SHEET

DYNAMIC HANDSET
19C320478G1

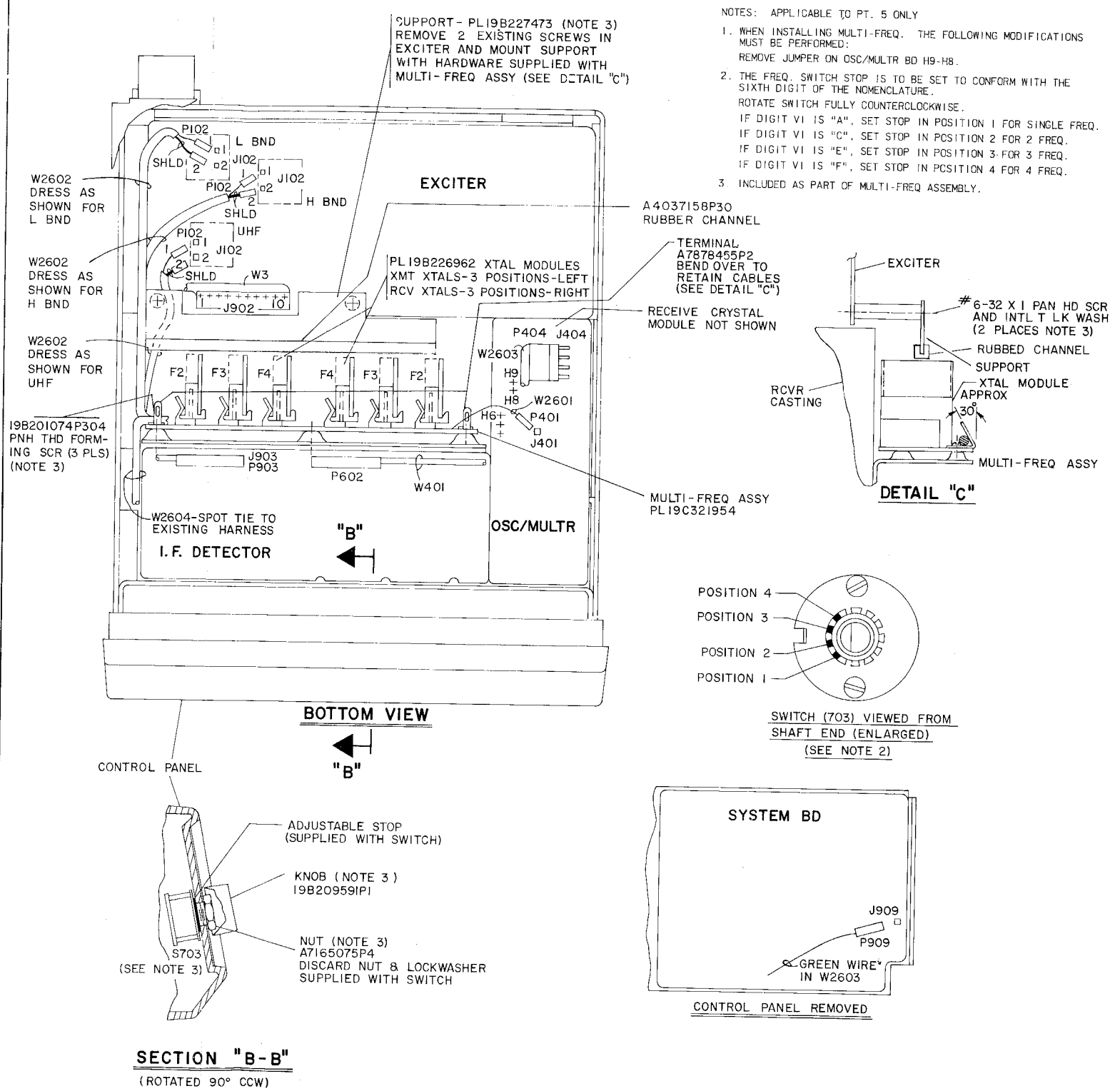


CHANNEL GUARD

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

- 2** GROUP 1 ENCODE/DECODE
P1006 TO J906
GREEN WIRE TO CI
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.
- 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 CI (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.

INSTALLATION INSTRUCTIONS
MULTI-FREQUENCY KIT & CHANNEL GUARD

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