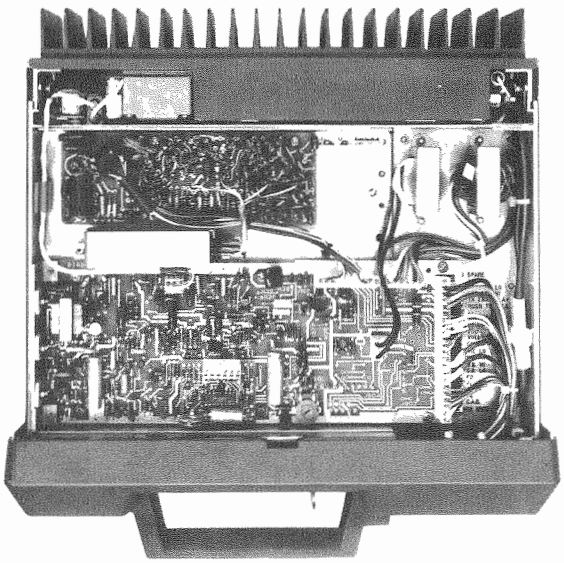
MOBILE RADIO

MASTR® *Executive II*
MAINTENANCE MANUAL

SYSTEM-AUDIO & SQUELCH BOARD, MULTI-FREQUENCY BOARD, CRYSTAL MODULES & ANTENNA RELAYS

Maintenance Manual LBI30043G
DATAFILE FOLDER - DF4101

SYSTEM-AUDIO & SQUELCH BOARD
19D423191G1, 2, 3



SPECIFICATIONS *

INPUT VOLTAGE	13.8 Volts DC
OUTPUT VOLTAGE	Regulated 10 Volts DC at 0.1 to 0.5 Amperes
MAXIMUM CURRENT DRAIN	0.30 Amperes (Squelched) 1.40 Amperes (Unsquelched)
AUDIO OUTPUT	5 Watts
CAS OUTPUT	0.4 Volts DC (Squelched) 10 Volts DC (Unsquelched)

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

GENERAL ELECTRIC

TABLE OF CONTENTS

WARNING

Although the highest DC Voltage in MASTR Executive II Mobile Equipment is +12 Volts DC, 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 burns upon contact. Keep away from these circuits when the transmitter is energized!

DESCRIPTION

The system-audio-squelch (SAS) board for MASTR®Executive II provides interconnections between the control cable from the control unit and the transmitter and receiver RF boards that plug into it. It also provides interconnections to the Channel Guard and Carrier Control Timer (CCT) option boards.

Mounted on the underside of the radio chassis, the SAS board is accessible by removing the radio chassis from the mounting frame. Molex pins on the board protude through slots on the radio chassis to make connections with the exciter, IF-Detector (IF-DET), and multi-frequency boards. Molex pins on top of the board provide harness connections to system jack J1, Channel Guard (optional), audio output transformer T1901, power supply filter L1901 and the antenna transfer relay. The optional Carrier Control Timer plugs into P908 on the system board.

Centralized metering jack J910 is accessible from the top of the radio, and is provided for use with General Electric Test Set 4EX3A11 or Test Kit 4EX8K12. The red metering plug provides continuous access to the regulated 10 Volts, A+, transmitter and receiver audio, and PTT.

The black metering plug on the Test Set is used for metering the transmitter and receiver circuits.

SAS boards 19D423191G1 or G2 are used with "RT" and "RX" Combinations.

SAS board 19D423191G3 is used in "ST" and "SX" Combinations.

The SAS board contains the +10 Volt Regulator, system control circuits, and the receiver audio and squelch circuits.

CIRCUIT ANALYSIS

+10 VOLT REGULATOR

The +10 Volt Regulator provides a closely-controlled supply voltage for the transmitter exciter, the receiver, Channel Guard, the Carrier Control Timer and multi-frequency boards. The 13.8 VDC is applied to the choke input composed of L1901 and C920. The output of this filter is then applied to the regulator circuit which consists of Q901, Q902, Q903 and zener diode VR901.

When the output of the regulator starts to increase, Q903 conducts harder and Q902 conducts less, causing Q901 to conduct less. This increases the voltage drop across Q901, keeping the output constant. Potentiometer R906 is used to set the base voltage of Q903 for the desired 10-Volt output.

Diodes CR901 and CR902 provide reverse battery polarity protection, and will cause the in-line fuse in the yellow lead to blow if the polarity is reversed.

SYSTEM CONTROL

Operating the PTT switch pulls the base of Q904 low in the receiver muting and delay circuit, turning Q904 on. When Q904 conducts, Q905 turns on, causing its collector voltage to drop. When Q905 is in the "on" condition, the receiver squelch and audio control circuits are turned off, muting the receiver.

With the PTT switch operated, C925 changes to +10-Volts. When the PTT switch is released, C925 discharges through R909, keeping Q904 and Q905 on for approximately 75 milliseconds as the capacitor discharges. This delays the turn-on of the receiver audio for 75 milliseconds after transmitting.

Transmitter Keying and Delay

Operating the PTT switch on the microphone forward biases diodes CR908 and CR909 connecting the emitter of Q906 to A-. Capacitor C926 charges through R916. In approximately 30 milliseconds, the voltage on C926 is high enough to turn on time delay switch Q906. This causes transmitter oscillator control switch Q907 to turn on. Operation of Q907 applies voltage to the transmitter oscillator and applies an RF signal to the transmitter. The collector voltage of Q907 turns off Q908, removing the supply voltage from the receiver oscillator on the OSC-MULT and multi-frequency boards.

The 30 millisecond time delay in the transmitter oscillator keying circuit allows the antenna relay to energize before RF is applied to the delay.

When the radio is in the receive mode (transmitter unkeyed), the transmitter oscillator control switch Q907 is off and receiver control switch Q908 is conducting. The voltage at the collector of Q908 is applied to the receiver oscillator circuits on the OSC-MULT and multi-frequency boards.

Transmitter Disable

When the radio is equipped with a Carrier Control Timer, the TX DISABLE lead from the Carrier Control Timer Board is connected to the base of Q906. When the timing cycle on the Carrier Control Timer times out, the base of Q906 is switched to A-, turning off the transmitter oscillator control voltage and disabling the transmitter.

Audio Amplifier and Driver

The audio signal from the volume control arm is fed through the de-emphasis network (C933, C935, R931 and R932) to the audio amplifiers Q914 and Q915. Q915 provides push-pull drive for the PA through transformer T901. Output from the Class AB PA stage, Q916 and Q917, is coupled through transformer T1901 to the speaker. A tertiary winding of T1901 supplies feedback to Q915 through J906-1.

Audio Bias Adjust potentiometer R945 is used to set the PA bias current through J906 to 20 milliamperes.

SQUELCH CIRCUIT

Noise from Volume Hi is used to operate the squelch circuits. The setting of Squelch Adjust control R953 determines the squelch opening sensitivity. High-pass filter R981 and C946 reduce effects of audio signals on high settings of the Squelch Adjust R953. Diodes CR914 and CR915 and amplifier Q920 prevent audio squelching with large audio signals (squelch clipping).

To keep the receiver squelched with temperature changes, fixed squelch circuit Q918, RT902, and RT903 is used. This circuit compensates for gain changes by shunting less of the noise to ground with temperature changes. Below approximately 40°C, RT902 keeps Q918 on causing the impedance of RT903 to increase and shunt less noise to ground. Above 40°C, RT902 turns Q918 off, removing the shunting effect of RT903.

Q919 and Q920 provide noise gain. Q921 maintains a high load impedance for limiter/amplifier Q920.

C953, C954, and L901 form a second high pass filter to prevent audio signals from reaching the detector (CR916 and CR917) and squelching the receiver. Positive filtered DC from the detector is fed to the base of Q909 which turns on, causing the collector of Q909 to drop to near zero volts. This voltage drop turns Q913 off and in turn removes the forward bias from audio amplifiers Q914 and Q915, squelching the receiver.

A hysteresis action is provided by the positive DC feedback from the collector of Q909 through R970 to the emitter of Q920 and also from the collector of audio amplifier Q914 through Q940 to the base of Q909. When Q909 and Q914 turn on and off, they vary the gain of noise amplifier Q902 in such a way as to assist the hysteresis action and provide positive switching.

Squelch Monitor & CAS

In radios equipped with SAS board 19D423191G1, unsquelching the receiver applies ground to the output of the noise detector at the junction of R975 and R976. This turns off squelch switch Q909 and allows receiver mute switch Q913 to turn on. With Q913 turned on a positive voltage is applied to the base of audio amplifier transistors Q914 and Q915, turning both transistors on and passing audio through to the speaker.

In radios equipped with SAS board 19D423191G2, unsquelching the receiver applies ground to the base of Q910, turning the Q910 off. With Q910 off, Q909 and Q911 are both prevented from conducting. Q913 is now allowed to conduct, turning on Q914 and Q915 and passing the receiver audio through to the speaker.

In addition to turning the audio amplifiers on, the positive voltage at the collector of Q909, turns off the Carrier Activity Sensor (CAS) switch Q922 and Q923. This removes ground from J901B-7.

When the receiver is squelched, a positive voltage from the squelch circuit is applied to the base of Q909 turning it on. This applies a low to the base of CAS switch Q922, turning Q922 and Q923 on. When turned on, Q923 applies A- to the CAS line.

CARRIER CONTROL TIMER

In radios equipped with a Carrier Control Timer (CCT), interconnections to the SAS board are made through P908. The CCT determines the maximum length of each transmission. When the preset transmission time has elapsed, a squelch disable signal (A-) is applied to the base of squelch disable switch Q912. Q912 turns on and applies regulated 10 Volts to audio amplifiers Q914 and Q915, allowing an alerting tone to be heard in the speaker.

In addition, a transmitter disable signal (A-) is applied to the base of transmitter oscillator keying transistor Q906, turning Q906 and Q907 off. This removes the Tx OSC control voltage from the exciter and multi-frequency to remove the RF drive to the transmitter. In units equipped with Channel Guard, the Tx CG control voltage is also removed.

CHANNEL GUARD

In radios equipped with Channel Guard, interconnections to the SAS board are made through J907. The Channel Guard board contains a tone reject filter to prevent the tone from being heard in the speaker. The output of the tone reject filter is applied directly to the audio de-emphasis network (junction of R932, C936 and C935) in the base circuit of audio amplifier Q914.

CYRSTAL MODULE

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

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

In the mid-temperature range (-10°C to +50°C), the raw crystal characteristic is 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 characteristic. The crystals whose temperature characteristic lie toward the high limit of +4PPM shown in Figure 1 are rotated slightly. All others have little or no rotation.

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 characteristic of the crystal.

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

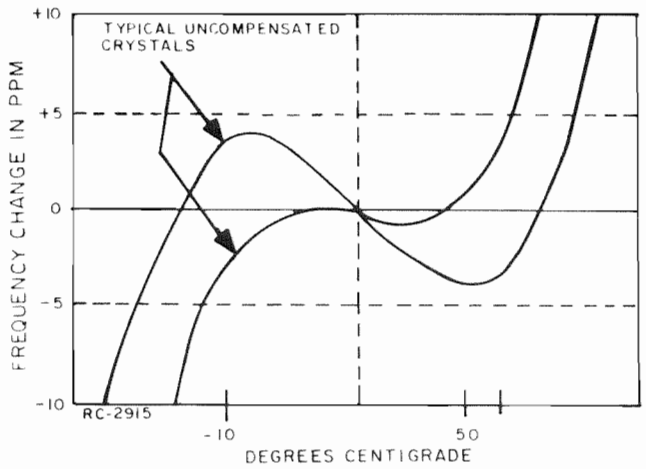


Figure 1 - Typical Crystal Characteristics

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.

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

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°C 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 OSC Control circuit on the SAS board or through the forward biased pin diode on the multi-frequency board to pin 1 of the selected crystal module.

MULTI-FREQUENCY BOARD

The multi-frequency board 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 plugs into J904 on the SAS board and utilizes crystal modules to determine the exact operating frequencies.

In multi-frequency radios, the DA jumper wire connected between H12 and H31 on the SAS board is removed. This removes the fixed ground from the F1 keying lead and allows frequency selection of F1-F4 by the frequency selector switch on the control unit.

When frequencies other than F1 are selected, A- is removed from the F1 select lead. The F1 oscillator turns off due to a rising base voltage applied through pull-up resistor R983 on the SAS board.

OSCILLATOR CIRCUITS (F2-F4)

Separate oscillator circuits are used for transmit and receive 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 unit. PIN diodes are used to switch the output of the selected crystal module to the base of the appropriate transistor, Q2601 (transmit) or Q2602 (receive).

Since the oscillator circuits are identical, only the F2 transmit circuit is described here.

When F2 is selected on the control unit, A- is applied to the junction of R2601 and R2606 through P904-9 and a jumper connected between pins 3 and 5 of crystal module socket XY2601. PIN diode CR2601 now is forward biased applying the output of the crystal module (pin 1) to the base of common oscillator transistor Q2601. The selected crystal module and the transistor circuit comprise a Colpitts oscillator.

The oscillator control voltage, required for oscillator operation, is controlled by the transmit keying and delay circuits on the SAS board.

Pressing the PTT switch applies the Tx OSC Control voltage (+10V) to the emitter/base circuit of Q2601 causing it to oscillate at the assigned F2 crystal frequency. A short plug-in coaxial cable (W2601) connects the output of the oscillator to J102 on the exciter board. When the PTT switch is released, the transmitter oscillator control voltage is removed from Q2601 and the anode of PIN diode CR2601. Q2601 stops oscillating and therefore, does not provide an input to the exciter. With the PTT switch released, the receiver oscillator control voltage from the transmit keying and delay circuit on the SAS board is applied to the emitter base circuit of Q2602. Since the transmit and receive modules are selected simultaneously, (on SAS board) Q2602 now oscillates at the F2 receive crystal frequency and provides an output to J401 on the receiver Osc-Mult board through cable W2602.

When a different frequency is selected A- is removed from the junction of pull-up resistors R2601 and R2606. This reverse biases PIN diode CR2601 and removes the crystal module from the base circuit of Q2601.

ANTENNA TRANSFER RELAY (Medium Power)

Two types of antenna transfer relays may be used in MASTR Executive II radios. In earlier model radios an external antenna relay is used. In later model radios (including high power) an integral antenna relay is used and is located on the Transmitter PA Assembly.

MODIFICATION FOR ALTERNATE CONTROL UNITS ("S" Series Combinations)

MASTR Executive II mobile radios may be used with other control units. For this type of application, one or more of the following modifications may be required. For complete details, refer to the applicable Modification Instructions as listed in the Table of Contents.

Transistorized Microphone Kit

This modification changes the SAS board to provide impedance matching and supply voltage for a transistorized microphone. The modification also includes a change in the receiver audio feedback loop to permit the use of an 8-ohm speaker.

Variable Squelch Kit

This modification changes the squelch monitor circuit on the SAS board from a fixed squelch function to an operator controlled variable squelch in the control units.

External Channel Guard Encoder Kit

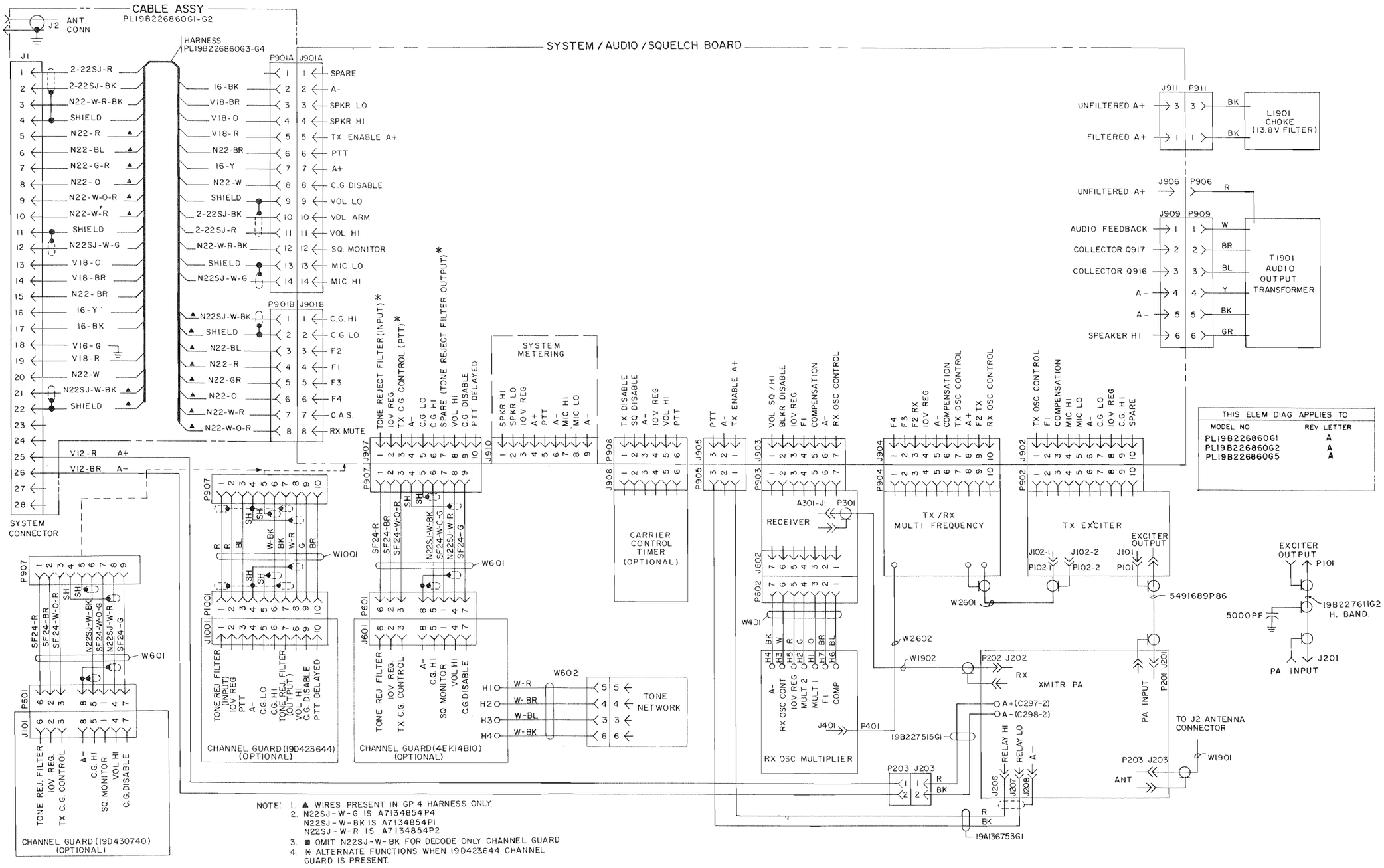
This modification adds a potentiometer to the SAS board for setting the Channel Guard tone deviation to the transmitter.

Channel Guard Monitor Isolation Kit

This modification adds two diodes to the SAS board to disable the Channel Guard decoder when control unit mounted Type 90 or Type 99 tone is present in radios equipped with Channel Guard.

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

GENERAL ELECTRIC*
U.S.A.

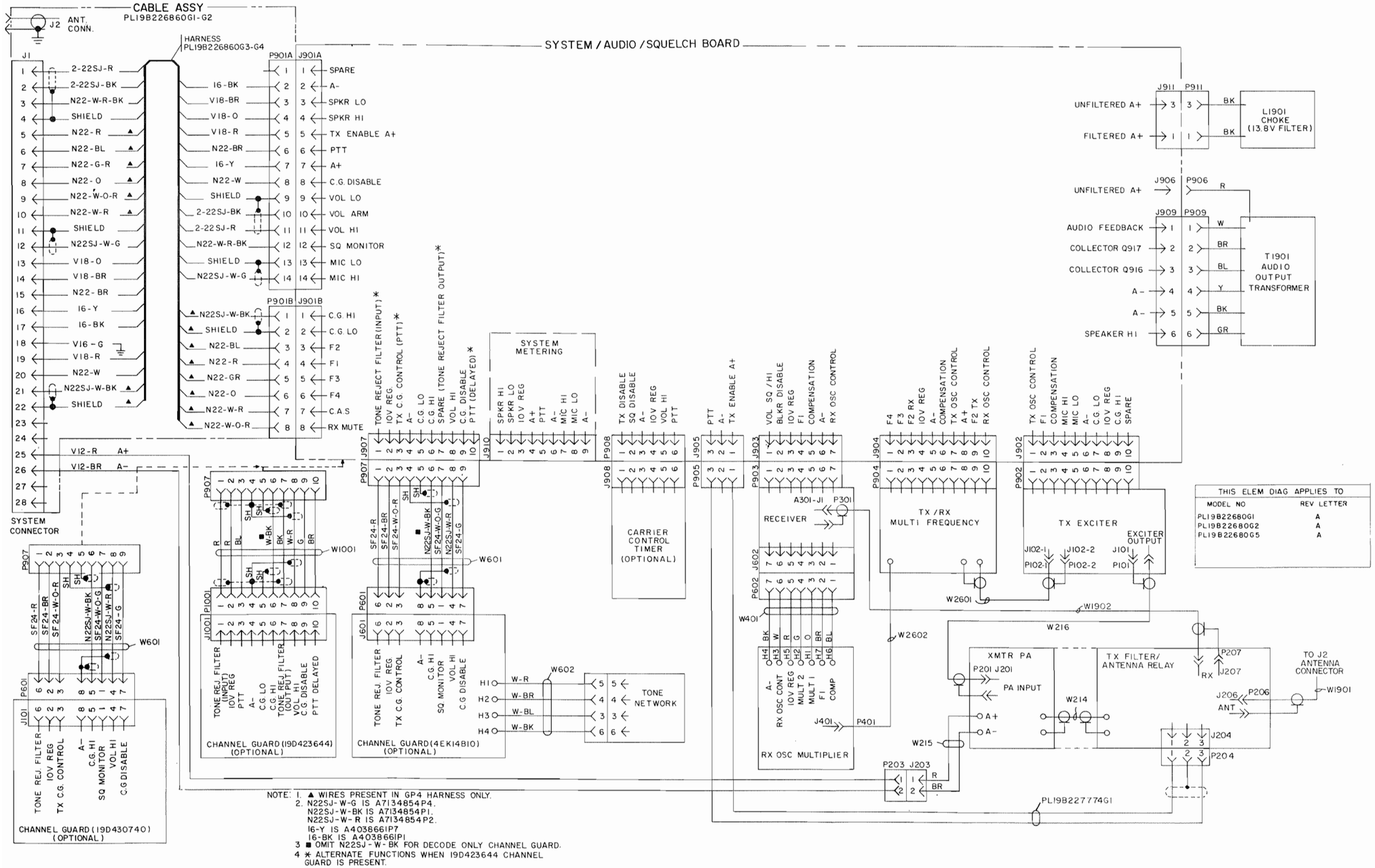


NOTE:
1. ▲ WIRES PRESENT IN GP 4 HARNESS ONLY.
2. N22SJ-W-G IS A7134854P4
   N22SJ-W-BK IS A7134854P1
   N22SJ-W-R IS A7134854P2
3. ■ OMIT N22SJ-W-BK FOR DECODE ONLY CHANNEL GUARD
4. * ALTERNATE FUNCTIONS WHEN 19D423644 CHANNEL GUARD IS PRESENT.

(19D424114, Rev. 5)

INTERCONNECTION DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD (HIGH POWER)

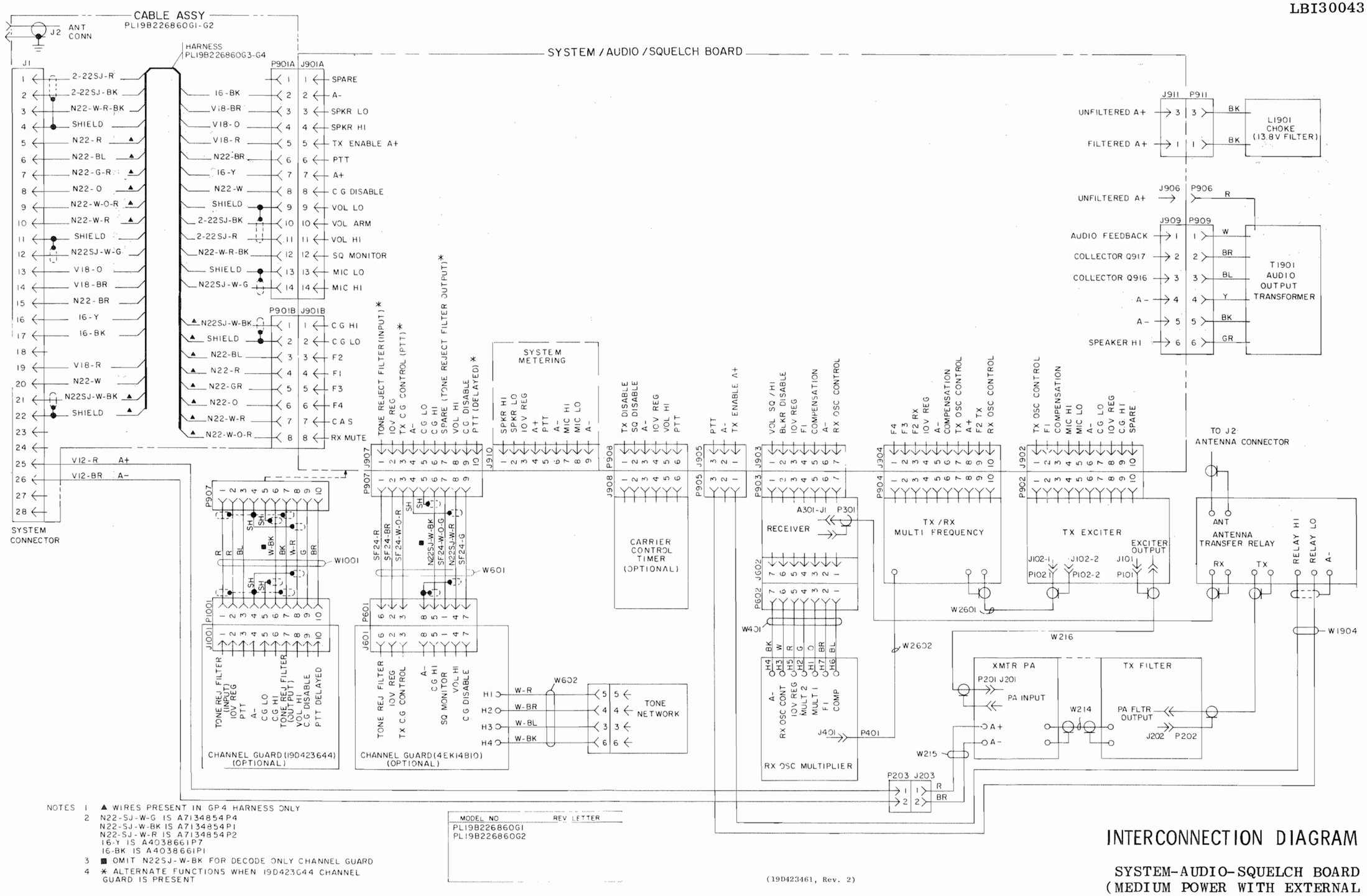


NOTE: 1. ▲ WIRES PRESENT IN GP4 HARNESS ONLY.
2. N22SJ-W-G IS A7134854P4.
N22SJ-W-BK IS A7134854P1.
N22SJ-W-R IS A7134854P2.
16-Y IS A4038661P7
16-BK IS A4038661P1
3. ■ OMIT N22SJ-W-BK FOR DECODE ONLY CHANNEL GUARD.
4. * ALTERNATE FUNCTIONS WHEN 19D423644 CHANNEL GUARD IS PRESENT.

INTERCONNECTION DIAGRAM

(19D423461, Rev. 6)

SYSTEM-AUDIO-SQUELCH BOARD (MEDIUM POWER WITH INTEGRAL ANTENNA RELAY)



NOTES
1. ▲ WIRES PRESENT IN GP4 HARNESS ONLY
2. N22-SJ-W-G IS A7134854P4
   N22-SJ-W-BK IS A7134854P1
   N22-SJ-W-R IS A7134854P2
   16-Y IS A4038661P7
   16-BK IS A4038661P1
3. ■ OMIT N22SJ-W-BK FOR DECODE ONLY CHANNEL GUARD
4. * ALTERNATE FUNCTIONS WHEN 19D423644 CHANNEL GUARD IS PRESENT

MODEL NO	REV LETTER
PLI9B226860GI	
PLI9B226860G2	

(19D423461, Rev. 2)

INTERCONNECTION DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD
(MEDIUM POWER WITH EXTERNAL ANTENNA RELAY)

Issue 2
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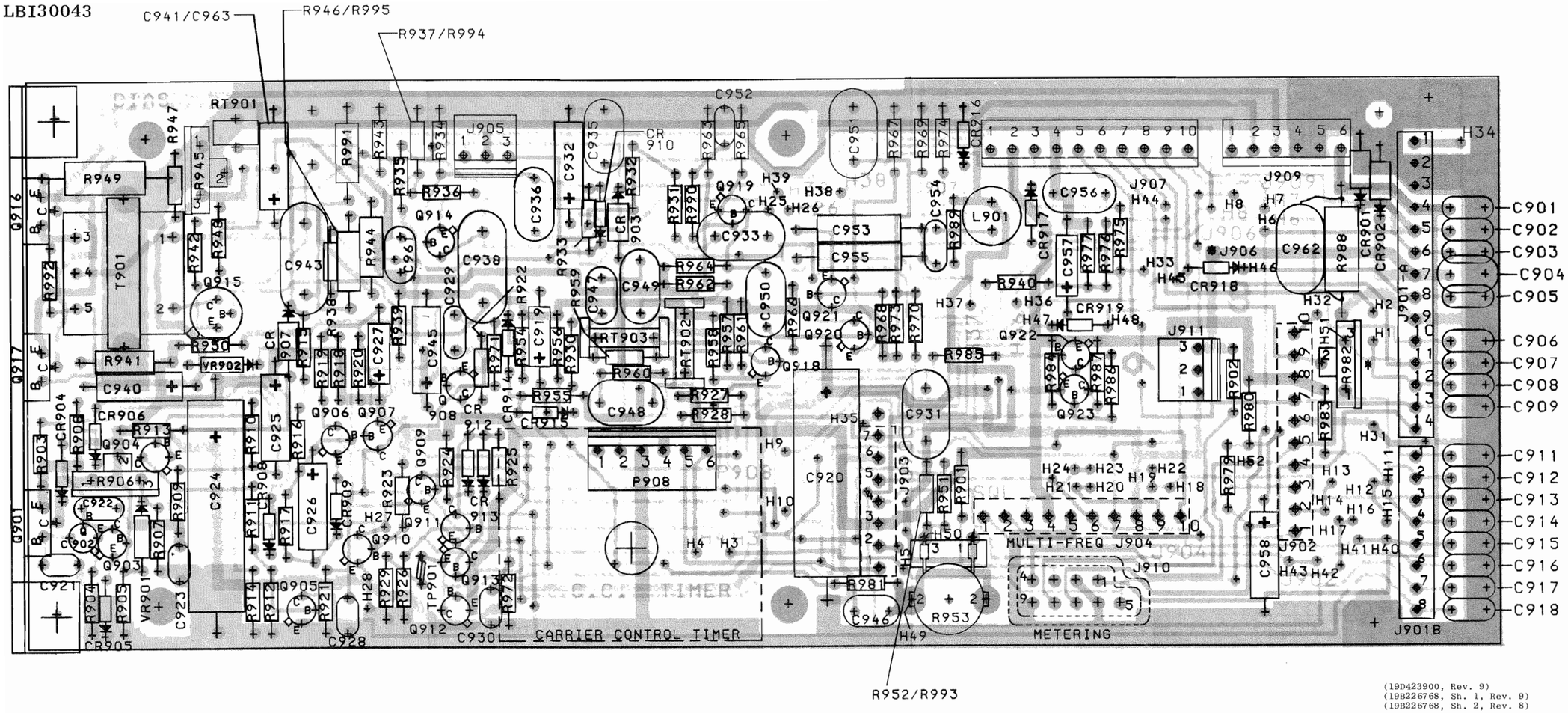
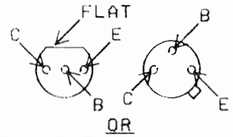


(19D423900, Rev. 9)
(19B226768, Sh. 1, Rev. 9)
(19B226768, Sh. 2, Rev. 8)

LEAD IDENTIFICATION
FOR Q902-Q915
Q918-Q923



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

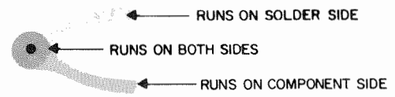
CONNECTIONS CHART

FROM	TO	WIRE	GP.1	GP.2	GP.3	GP.4
H3	H4	DA	USE	USE	USE	——
H7	H8	DA	USE	USE	USE	——
H11	H31	DA	USE	USE	USE	——
H25	H26	DA	——	USE	USE	USE
H26	H33	DA	USE	——	——	——
H27	H28	DA	USE	——	——	——
H36	H37	DA	USE	USE	USE	——
H38	H39	DA	USE	USE	USE	——
H1	H2	DA	USE	USE	——	——
H9	H10	DA	USE	USE	——	USE
H10	H1	NOTE 6	——	——	USE	——
H12	H13	DA	USE	USE	USE	——

CONNECTIONS CHART

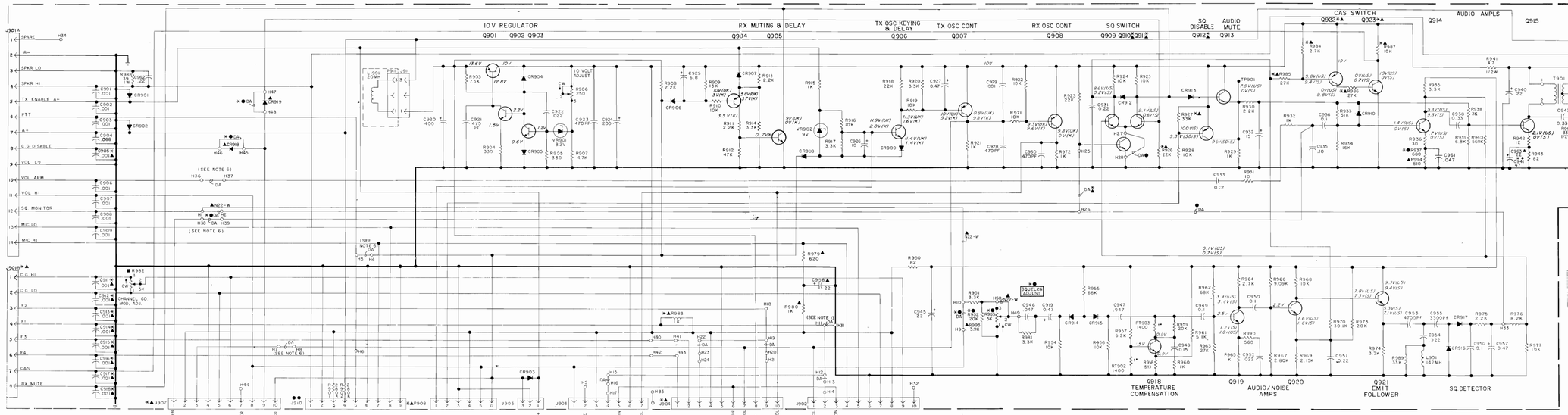
FROM	TO	WIRE	GP.1	GP.2	GP.3	GP.4
H15	H16	DA	USE	USE	USE	——
H19	H20	DA	USE	USE	USE	——
H22	H23	DA	USE	USE	USE	——
H45	H46	DA	USE	USE	——	USE
H47	H48	DA	USE	USE	——	——
H49	H50	NOTE 6	——	——	USE	——
H36	H38	ST24-W	——	——	——	USE
H37	H44	ST24-W	——	——	——	USE
H1	H4	ST24-W	——	——	——	USE
H6	H7	DA	——	——	——	USE
H51	H52	ST24-W	——	——	——	USE

NOTES:
1. N22W JUMPER
2. R982 IDENTIFIED THUS (•) IS PART OF A SEPERATE MODIFICATION KIT.



OUTLINE DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD



NOTES

1. FOR MULTI-FREQUENCY, REMOVE DA JUMPER H31-H51.
2. ▲ COMPONENTS PRESENT IN GROUP 3 ONLY.
3. ■ PART OF EXTERNAL CHANNEL GUARD ENCODER KIT.
4. ★ COMPONENTS PRESENT IN GROUP 2 ONLY (MULTI-FREQUENCY OR FOR USE WITH OPTIONS).
5. ● COMPONENTS PRESENT IN GROUP 1 ONLY.
6. ALTERNATE FUNCTION IN BRACKETS WHEN: [ ] = DECODE CHANNEL GUARD IS USED. WHEN, ENCODE/DECODE CHANNEL GUARD IS USED, REMOVE DA JUMPERS H3 TO H4, H7 TO H9, H34 TO H37 & H38 TO H39, ADD JUMPER H6 TO H7, H36 TO H37 & H38 TO H39; ADD JUMPERS H6 TO H36 & H37 TO H46. WHEN DECODE ONLY CHANNEL GUARD IS USED REMOVE JUMPERS H7 TO H6, H36 TO H37 & H38 TO H39, ADD JUMPERS H7 TO H38 & H37 TO H46.
7. ● ● SYSTEM METERING PLUG NOT PRESENT ON 8 FREQUENCY MOBILE.

MODEL NO	REV LETTER
PLI904231915	G
PLI904231916	G
PLI904231903	G

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 RESISTOR VALUES 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 MICROFARADS UNLESS FOLLOWED BY P=PICOFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS

S= WITH NO SIGNAL IN (SQUELCHED)
US= WITH SIGNAL IN (UNSQUELCHED)
K= TRANSMITTER KEYED
UK= TRANSMITTER UNKEYED

VOLTAGE READINGS

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

SCHEMATIC DIAGRAM

SYSTEM-AUDIO-SQUELCH BOARD

Issue 5

(19B622193, Rev. 15)

PARTS LIST

LBI30074E

SYSTEM-AUDIO AND SQUELCH BOARD
AND
ASSOCIATED ASSEMBLIES

SYMBOL	GE PART NO.	DESCRIPTION
		SYSTEM-AUDIO AND SQUELCH BOARD 19D423191G1-G3
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C911 thru C913	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C904	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW.
C905 thru C909	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C911 thru C914	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C910	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C920	19A115080P24	Electrolytic: 400 µf +150% -10%, 18 VDCW; sim to Mallory Type TTL.
C921	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C922	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C923	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C924	19A115080P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTL.
C925	5496267P218	Tantalum: 8.8 µf ±10%, 35 VDCW; sim to Sprague Type 150D.
C926	19B200240P10	Tantalum: 10 µf ±5%, 15 VDCW.
C927	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type150D.
C928	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C929	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C930	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C931	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C932	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C933	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C933*	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
		In KEY B is earlier:
	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW.
C936	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C937*	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Deleted by REV C.
C938	19A116080P110	Polyester: 0.33 µf ±10%, 50 VDCW.
C939*	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D. Deleted by REV C.
C940	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C941	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C943	19A116080P110	Polyester: 0.33 µf ±10%, 50 VDCW.
C945	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C946 and C947	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C948	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C949 and C950	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
C951	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C952	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C953	5491656946	Polyester: .0047 µf ±5%, 100 VDCW; sim to GE Type 617.
C954	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C955	5491656P73	Polyester: .0033 µf ±5%, 100 VDCW; sim to GE Type 617.
C956	19A116080P107	Polyester: 0.1 µf ±1%, 50 VDCW.
C957	5496267P228	Tantalum: 0.47 µf ±10%, 35 VDCW; sim to Sprague Type 150D.
C958	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C959* and C960*	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW. Added by REV A. Deleted by REV B.
C961*	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW. Added by REV D.
C962*	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW. Added to G1, G2 by REV E.
C963	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR901 thru CR903	4037822P1	Silicon, 1000 ma, 400 PIV.
CR904 thru CR906	19A115250P1	Silicon, fast recovery, 225 ma, 50 PIV.
CR907	4037822P1	Silicon, 1000 ma, 400 PIV.
CR908 thru CR909	19A115250P1	Silicon, fast recovery, 225 ma, 50 PIV.
CR910*	19A115250P1	Silicon, fast recovery, 225 ma, 50 PIV. Added by REV A.
CR912 thru CR919	19A115250P1	Silicon, fast recovery, 225 ma 50 PIV.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J901A	19A116699P87	Connector, printed wiring: 14 contacts; sim to Molex 09-64-1142.
J901B	19A116699P40	Connector, printed wiring: sim to Molex 09-64-1082.
J902	19A116699P29	Connector, printed wiring: sim to Molex 09-64-1101.
J903	19B219094P1	Contact, electrical: 7 pins.
J904	19A116699P29	Connector, printed wiring: sim to Molex 09-64-1101.
J905	19A116699P53	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.
J906	19A116779P1	Contact, electrical: sim to Molex 08-50-0404.
J907	19A116699P109	Connector, printed wiring: 10 contacts; sim to Molex 09-65-1101.
J909	19A116699P105	Connector, printed wiring: 6 contacts; sim to Molex 09-60-1061.
J910	19B219374G2	Connector: 9 contacts.
J911	19A116699P53	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L901	19B209405P1	Reactor, audio freq: 142 mh ±5%, at 0.1 v thru 0.27 v; sim to Aladdin 400-101.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P908	19A116699P50	Connector, printed wiring: 6 contacts; sim to Molex 09-65-1061.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q901	19A116375P1	Silicon, PNP.
Q902 and Q903	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q904	19A115852P1	Silicon, PNP; sim to Type 2N3906.

SYMBOL	GE PART NO.	DESCRIPTION
Q905 and Q906	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q907 and Q908	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q909 thru Q911	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q912	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q913 and Q914	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q915	19A115300P4	Silicon, NPN.
Q916 and Q917	19A116741P2	Silicon, NPN.
Q918 thru Q921	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q922	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q923	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R901 and R902	19C314256P22803	Metal film: 280K ohms ±1%, 1/4 w.
R903	3B152975SJ	Composition: 7.5k ohms ±5%, 1/4 w.
R904 and R905	3B152933SJ	Composition: 330 ohms ±5%, 1/4 w.
R906	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R907	3B152947SJ	Composition: 4.7K ohms ±5%, 1/4 w.
R908	3B152922SK	Composition: 2.2K ohms ±10%, 1/4 w.
R909	3B152913SJ	Composition: 13K ohms ±5%, 1/4 w.
R910	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R911	3B152922SK	Composition: 2.2K ohms ±10%, 1/4 w.
R912	3B152947SK	Composition: 47K ohms ±10%, 1/4 w.
R913	3B152922SK	Composition: 2.2K ohms ±10%, 1/4 w.
R914	3B152933SK	Composition: 33K ohms ±10%, 1/4 w.
R915	3B152910SK	Composition: 1K ohms ±10%, 1/4 w.
R916	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R917	3B152933SK	Composition: 33K ohms ±10%, 1/4 w.
R918	3B152922SK	Composition: 22K ohms ±10%, 1/4 w.
R919	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R920	3B152933SK	Composition: 33K ohms ±10%, 1/4 w.
R921	3B152910SK	Composition: 1K ohms ±10%, 1/4 w.
R922	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R923	3B152922SK	Composition: 22K ohms ±10%, 1/4 w.
R924 and R925	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R926	3B152922SK	Composition: 22K ohms ±10%, 1/4 w.
R927	3B152933SK	Composition: 33K ohms ±10%, 1/4 w.
R928	3B152910SK	Composition: 10K ohms ±10%, 1/4 w.
R929	3B152910QK	Composition: 1K ohms ±10%, 1/4 w.
R930	3B152922SJ	Composition: 2.2K ohms ±5%, 1/4 w.
R931	3B152910QJ	Composition: 10 ohms ±5%, 1/4 w.
R932*	3B152910SJ	Composition: 1K ohms ±5%, 1/4 w.
		In KEY B and earlier:
	3B152922SJ	Composition: 2.2K ohms ±5%, 1/4 w.
R933	3B152913SJ	Composition: 51K ohms ±5%, 1/4 w.
R934	3B152916SJ	Composition: 16K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R935	3B152933SJ	Composition: 3.3K ohms ±5%, 1/4 w.
R936	3B152900GJ	Composition: 30 ohms ±5%, 1/4 w. Added by REV B.
R937	3B152985SJ	Composition: 680 ohms ±5%, 1/4 w.
R938*	3B152990SJ	Composition: 3K ohms ±5%, 1/4 w.
		In REV C and earlier:
	3B152993SJ	Composition: 3.9K ohms ±5%, 1/4 w.
R939	3B152968SJ	Composition: 6.8K ohms ±5%, 1/4 w.
R940	3B152956AJ	Composition: 560K ohms ±5%, 1/4 w.
R941	3147191P32	Composition: 4.7 ohms ±10%, 1/2 w.
R942	3B152912GJ	Composition: 12 ohms ±5%, 1/4 w.
R943	3B152982GJ	Composition: 82 ohms ±5%, 1/4 w.
R944	3B77P221J	Composition: 220 ohms ±5%, 1/2 w.
R945	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R946	3B77P75GJ	Composition: 75 ohms ±5%, 1/2 w.
R947	3B152982GJ	Composition: 24 ohms ±5%, 1/4 w.
R948	3B152990GJ	Composition: 20 ohms ±5%, 1/4 w.
R949	19B209092P101	Wirewound: .27 ohms ±10%, 2 w; sim to IRC Type BWH.
R950	3B152982GJ	Composition: 82 ohms ±5%, 1/4 w.
R951	3B152933SJ	Composition: 3.3K ohms ±5%, 1/4 w.
R952	3B152P003J	Composition: 20K ohms ±5%, 1/4 w.
R953	19B209358P95	Variable, carbon film: approx 200 to 5K ohms ±20%, 0.25 w; sim to CTS Type X-201.
R954	3B152P103J	Composition: 10K ohms ±5%, 1/4 w.
R955	3B152P968J	Composition: 68K ohms ±5%, 1/4 w.
R956	3B152P103J	Composition: 10K ohms ±5%, 1/4 w.
R957	3B152P622J	Composition: 6.2K ohms ±5%, 1/4 w.
R958	3B152P511J	Composition: 510 ohms ±5%, 1/4 w.
R959	3B152P203J	Composition: 20K ohms ±5%, 1/4 w.
R960	3B152P102J	Composition: 1K ohms ±5%, 1/4 w.
R961	3B152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R962	3B152P968J	Composition: 68K ohms ±5%, 1/4 w.
R963	3B152P273J	Composition: 27K ohms ±5%, 1/4 w.
R964	3B152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
R965	3B152P102J	Composition: 1K ohms ±5%, 1/4 w.
R966	19C314256P29091	Metal film: 9.09K ohms ±1%, 1/4 w.
R967	19C314256P22801	Metal film: 2.8K ohms ±1%, 1/4 w.
R968	3B152P103J	Composition: 10K ohms ±5%, 1/4 w.
R969	19C314256P21151	Metal film: 2.15K ohms ±1%, 1/4 w.
R970	19C314256P29312	Metal film: 30.1K ohms ±1%, 1/4 w.
R971	3B152P103K	Composition: 10K ohms ±10%, 1/4 w.
R972	3B152P102K	Composition: 1K ohms ±10%, 1/4 w.
R973	19C314256P22002	Metal film: 20K ohms ±1%, 1/4 w.
R974	3B152P333J	Composition: 3.3K ohms ±5%, 1/4 w.
R975	3B152P223J	Composition: 2.2K ohms ±5%, 1/4 w.
R976	3B152P823J	Composition: 8.2K ohms ±5%, 1/4 w.
R977	3B152P103J	Composition: 10K ohms ±5%, 1/4 w.
R979	3B152M621J	Composition: 620 ohms ±5%, 1/4 w.
R980	3B152P102J	Composition: 1K ohms ±5%, 1/4 w.
R981	3B152P933J	Composition: 3.3K ohms ±5%, 1/4 w.
R983	3B152P103K	Composition: 10K ohms ±10%, 1/4 w.
R984	3B152P273J	Composition: 2.7K ohms ±5%, 1/4 w.
R985 and R986	3B152P273J	Composition: 27K ohms ±5%, 1/4 w.
R987	3B152P103K	Composition: 10K ohms ±10%, 1/4 w.
R988	3B78P390K	Composition: 39 ohms ±10%, 1 w.
R989	3B152P333K	Composition: 33K ohms ±10%, 1/4 w.
R990	3B152P561K	Composition: 560 ohms ±10%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R991	3B77P331J	Composition: 330 ohms ±5%, 1 /2 w.
R992*	3B152P331K	Composition: 330 ohms ±10%, 1/4 w. Added by REV B.
R993	3B152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R994	3B152P511J	Composition: 510 ohms ±5%, 1/4 w.
R995	3B77P121K	Composition: 120 ohms ±10%, 1/2 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT901	5490828M41	Thermistor: 30 ohms ±10%, color code black/white; sim to Carborundum Type B2211J-4.
RT902 and RT903	5490828P38	Thermistor: 1.4K ohms ±5%, color code green/white sim to Carborundum Type T236-2.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T901	19A116040P1	Audio freq: 300-4000 Hz, response: +0.3 dB - 0.75 dB at 20 ma, ±1dB, 0.2 w sim to CTS Type X-203. +0.5 dB - 0.9 dB at 20 Ma.
		- - - - - - - - - - VOLTAGE REGULATORS - - - - - - - - - -
VR901	4036887P40	Zener: 50C mW, 3.0 PIV.
VR902	4036887P7	Zener: 500 mW, 7.0 PIV.
		ASSOCIATED ASSEMBLIES
		CHASSIS 19C321165G1
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
		REACTOR ASSEMBLY 19A130864G1
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1901	19B209343P1	Reactor: 0.30 mh min, 0.5 ohms DC res max, 15 VDC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P911		Includes:
	19A116699P14	Shell: sim to Molex 09-50-3031.
	19A116779P1	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106. (Quantity 2).
		TRANSFORMER ASSEMBLY 19B220884G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P906	19A127042P2	Terminal, solderless: sim to Waleo 12093-10.
P909		Includes:
	19A116699P60	Shell: sim to Molex 09-50-7061.
	19A116779P1	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1901	19A116041P2	Audio: 300-4000 Hz, ±0.5 dB, PRI: 23.5 ohms at 50 ma, Sec No. 1: 3.5 ohms at 1 KHz, Sec No. 2: 10.15 50.0 VRMS.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1901	19B227513G1	Cable, RF: approx 24 inches long. (Used to connect antenna connector to Antenna relay).
W1902	5491689P100	Cable, RF: approx 15 inches long; 350 VRMS, 500 VDC operating voltage. (Used with integral relay to connect receiver to antenna).
		EXTERNAL ANTENNA RELAY 19C321741G1 (30-50 MHz) 19C321741G2 (138-174 MHz)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1901L	19A116856P8J0	Ceramic disc: 8 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C1901H	19A116856P9J0	Ceramic disc: 3 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C1902	19A116650P50	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C1903	19A116656P60	Ceramic disc: 6 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
J2		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - - (Part of W1903).
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1901	19C307020P5	Armature: 12 VDC nominal, 2.5 W max operating, 80 ohm ±10% coil, 2 form C contacts; sim to F. A. Schema RS-440.
P202		- - - - - - - - - - PLUGS - - - - - - - - - - (Part of W1902).
P301		(Part of W1901).
P905		(Part of W1906).
		- - - - - - - - - - CABLES - - - - - - - - - -
W1901	3491689P118	Cable, RF: approx 14 inches long; 350 VRMS, 500 VDC operating voltage. (Includes P301).
W1902	19A130734G1	Cable, RF: approx 5-1/4 inches long; 350 VRMS, 500 VDC operating voltage. (Includes P202).
W1903	19B220888G1	Cable: approx 2 feet long. (Includes J2).
W1904	19A130899G1	Cable: approx 11 inches long. (Includes P905).
		EXTERNAL ANTENNA RELAY 400-512 MHz 19B227009G1
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J2		(Part of K1901).
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1901	19B209582P1	Coaxial: 13.6 VDC ±20%, 100 watts RF at 25 to 512 MHz (into 50 ohms), 1 form C contact; sim to Wagnecraft Electric Co. 123C-36.
P202		- - - - - - - - - - PLUGS - - - - - - - - - - (Part of W1901).
P301		(Part of W1901).
P905		(Part of W1906).
		- - - - - - - - - - CABLES - - - - - - - - - - (Part of K1901).
W1901 thru W1903		
W1904	19A130899G1	Cable: approx 11 inches long. Includes:
	19A116699P14	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
		CABLE ASSEMBLY 19B220886G1 (1 FREQ) 19B220886G2 (1-4 FREQ AND OPTIONS)
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1	19C303715P1	Connector, plug: 28 terminals.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P203		Connector. Includes:
	19A134281P1	Shell.
	19A134282P2	Contact, electrical: sim to AMP 350200-2.
P901A		Connector. Includes:
	19A116699P125	Shell.
	19A116781P5	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106. (P901A-1, 8-13, 14).
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (P901A-2-7, 15).

SYMBOL	GE PART NO.	DESCRIPTION
P903B		Connector. Includes:
	19A116659P20	Connector, printed wiring: sim to Molex 09-50-3081.
	19A116781P5	Contact, electrical: wire range No. 18-24 AWG; sim to Molex 08-50-0106. (P903B-2).
J2	19A134282P2	Contact, electrical: sim to AMP 350200-2. (P903B-1, 3-8).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B216889P1	Connector support.
	19A115185P5	Retainer strap: sim to Panduit Corp, SST-1. (Used with cables to P903A, P903B, P903J).
	19D201074P606	Tap screw, Phillips POZIDRIV®: No. 4-40 x 3/8. (Secures J1 to Support).
	7141225P2	Hex nut: No. 4-40. (Secures J1 to Support).
	X404P1IC6	Lockwasher, internal tooth: No. 4. (Secures J1 to Support).
		FIXED SQUELCH KIT 19A130863G4
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R952	3B122P203J	Composition: 20K ohms ±5%, 1/4 w.
R953	19B209358P95	Variable, carbon film: approx 200 to 5K ohms ±20%, 0.25 w; sim to CTS Type X-201.
		EXTERNAL CHANNEL GUARD ENCODE KIT 19A130863G3
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R982	19B209358P105	Variable, carbon film: approx 500 to 5K ohms ±10%, 0.25 w; sim to CTS Type X-201.

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 - System/Audio/Squelch Board 19D423191G1/G2
To improve high volume operation of audio PA and to improve frequency stability. Added diode CR910 and capacitors C930 and C960.

REV. B - To improve audio PA operation. Removed capacitors C939 and C960 and added resistor R980.

REV. C - To improve audio frequency response. Changed resistors R933 and R935 and removed capacitors C937 and C939.

REV. D - To improve high frequency audio response. Changed resistor R938 and added capacitor C961.

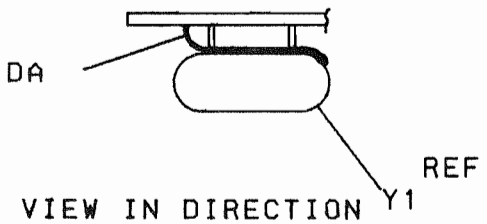
REV. E - To improve performance of audio driver. Added C962.

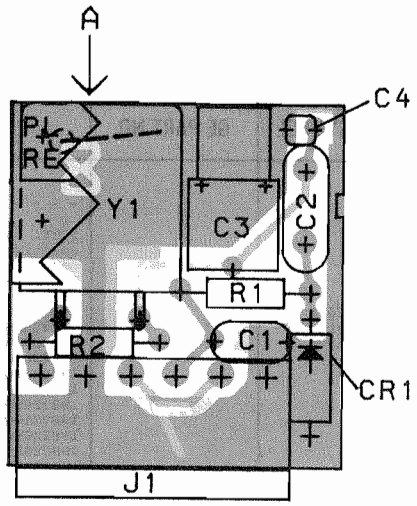
REV. F - To provide a new System Board for use with "ST" and "ST" Bonito Combinations. Added 19D423191G3.

REV. A - Cable Assembly 19B220886G1 & G2
To improve selectivity by reducing frequency select line noise. Added ground to J1-18.

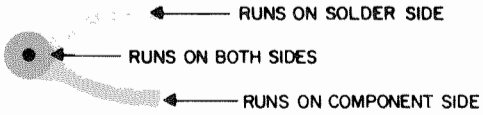
REV. G - To improve audio performance. Relocated C962 across R988. Relocated C961 across R990.

OUTLINE DIAGRAM

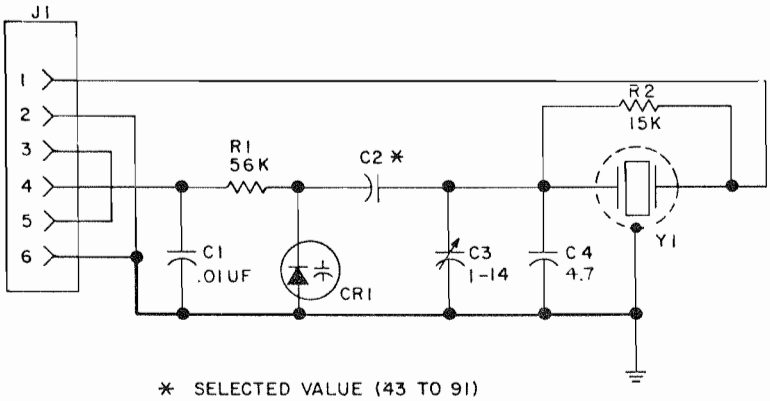




(19B227337, Rev. 7)
(19B226851, Sh. 1, Rev. 8)
(19B226851, Sh. 2, Rev. 7)



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

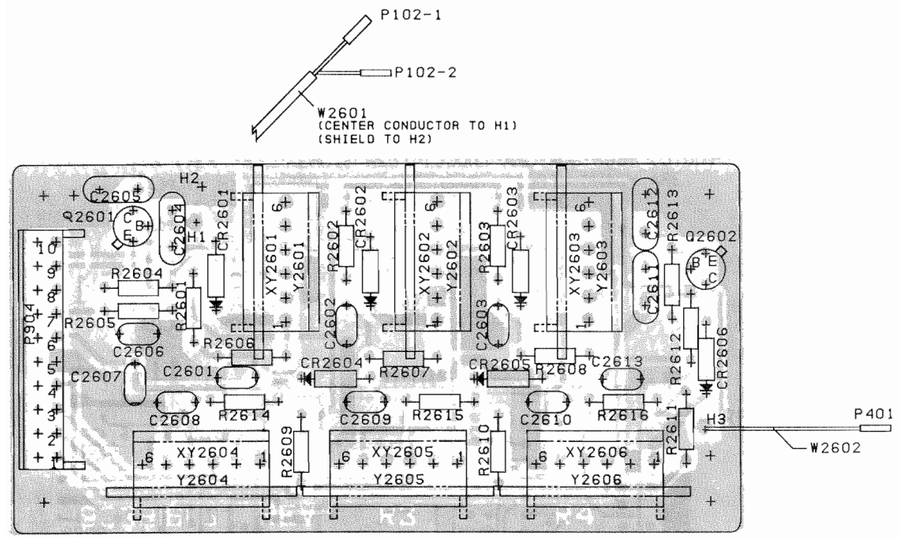
LBI30069E

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).

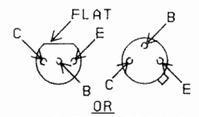
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

OUTLINE DIAGRAM



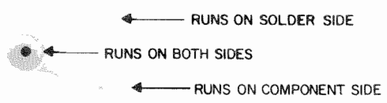
(19C327100, Rev. 1)
(19C321612, Sh. 1, Rev. 1)
(19C321612, Sh. 2, Rev. 1)

LEAD IDENTIFICATION
FOR Q2601 & Q2602

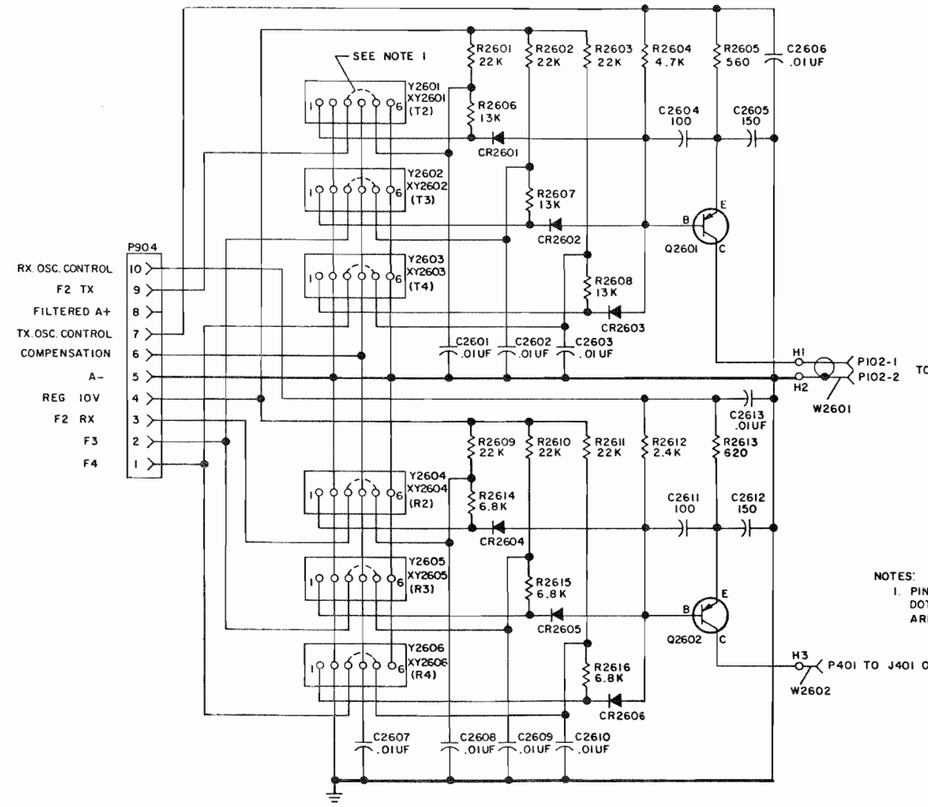


TOP VIEW

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



SCHEMATIC DIAGRAM



(19C321756, Rev. 3)

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
PLI9C321611G1	A

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.

NOTES:
1. PIN 3 TO PIN 5 CONNECTIONS, SHOWN DOTTED, ARE MADE WHEN XTAL MODULES ARE USED.

SCHEMATIC & OUTLINE DIAGRAM

5 PPM MULTI-FREQUENCY BOARD

Issue 3

PARTS LIST

LB130075D

MULTI-FREQUENCY BOARD
19C321611G1

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 C2610	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C2611	5496218P763	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -750 PPM.
C2612	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2613	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR2601 thru CR2606	19A116925P4	Silicon, pin: 50 volt Reverse Breakdown, 400 mw.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P102	19A127042P2	Terminal, solderless: sim to Malco 12093-10. (Part of W2601).
P401	19A127042P2	Terminal, solderless: sim to Malco 12093-10. (Part of W2602).
P904	19A116659P2	Connector, printed wiring: 10 contacts; sim to Molex 09-52-3102.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q2601 and Q2602	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2601 thru R2603	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R2604	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R2605	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R2606 thru R2608	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R2609 thru R2611	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R2612	3R152P242J	Composition: 2.4K ohms ±5%, 1/4 w.
R2613*	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R2614 thru R2616	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W2601	19A130744G1	Cable: approx 5 inches long. (Includes P102).
W2602	19A129947G2	Cable: approx 3 inches long. (Includes P401).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2601 thru XY2606	19A116659P50	Connector, printed wiring: 6 contacts; sim to Molex 09-65-1061.

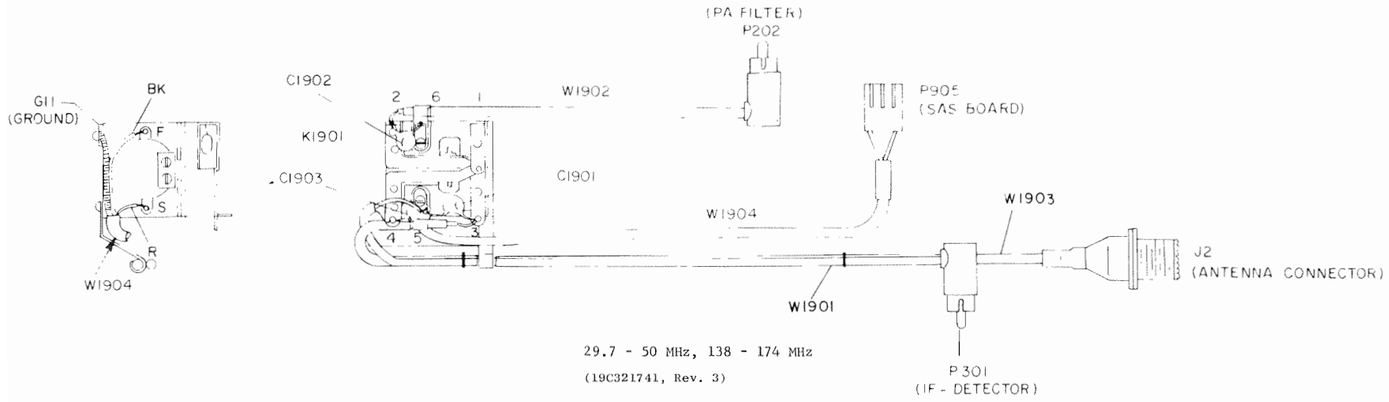
PRODUCTION CHANGES

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 - To improve operation.
Changed R2613.

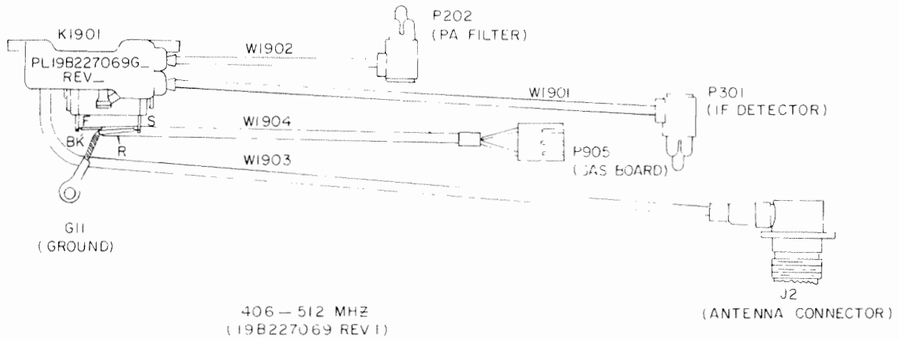
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

OUTLINE DIAGRAM



29.7 - 50 MHz, 138 - 174 MHz

(19C321741, Rev. 3)

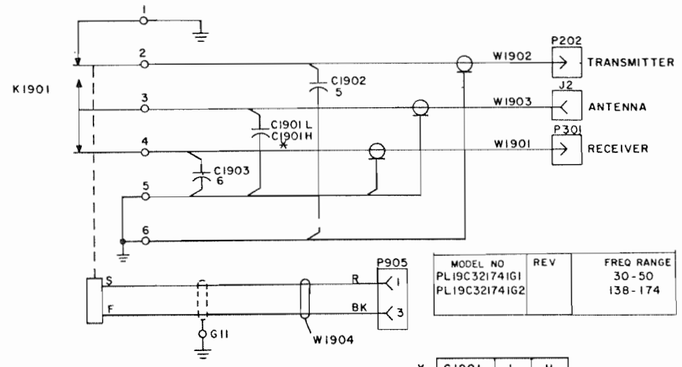


406—512 MHZ
(19B227069 REV I)

(19C327142, Rev. 1)

SCHEMATIC DIAGRAM

29.7 - 50/138 - 174 MHz ANTENNA TRANSFER RELAY



MODEL NO	REV	FREQ RANGE
PL19C321741G1		30-50
PL19C321741G2		138-174

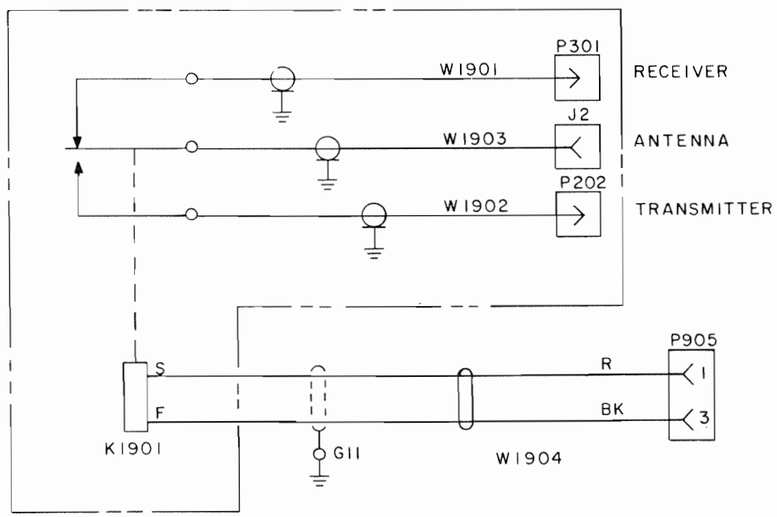
* C1901	L	H
VALUE	8	3

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 MMFD/MICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

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

(19B227131, Rev. 2)

406—512 MHz ANTENNA TRANSFER RELAY



MODEL NO	REV LETTER
PL19B227069G1	

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.

(19B227133, Rev. 2)

SCHEMATIC & OUTLINE DIAGRAM

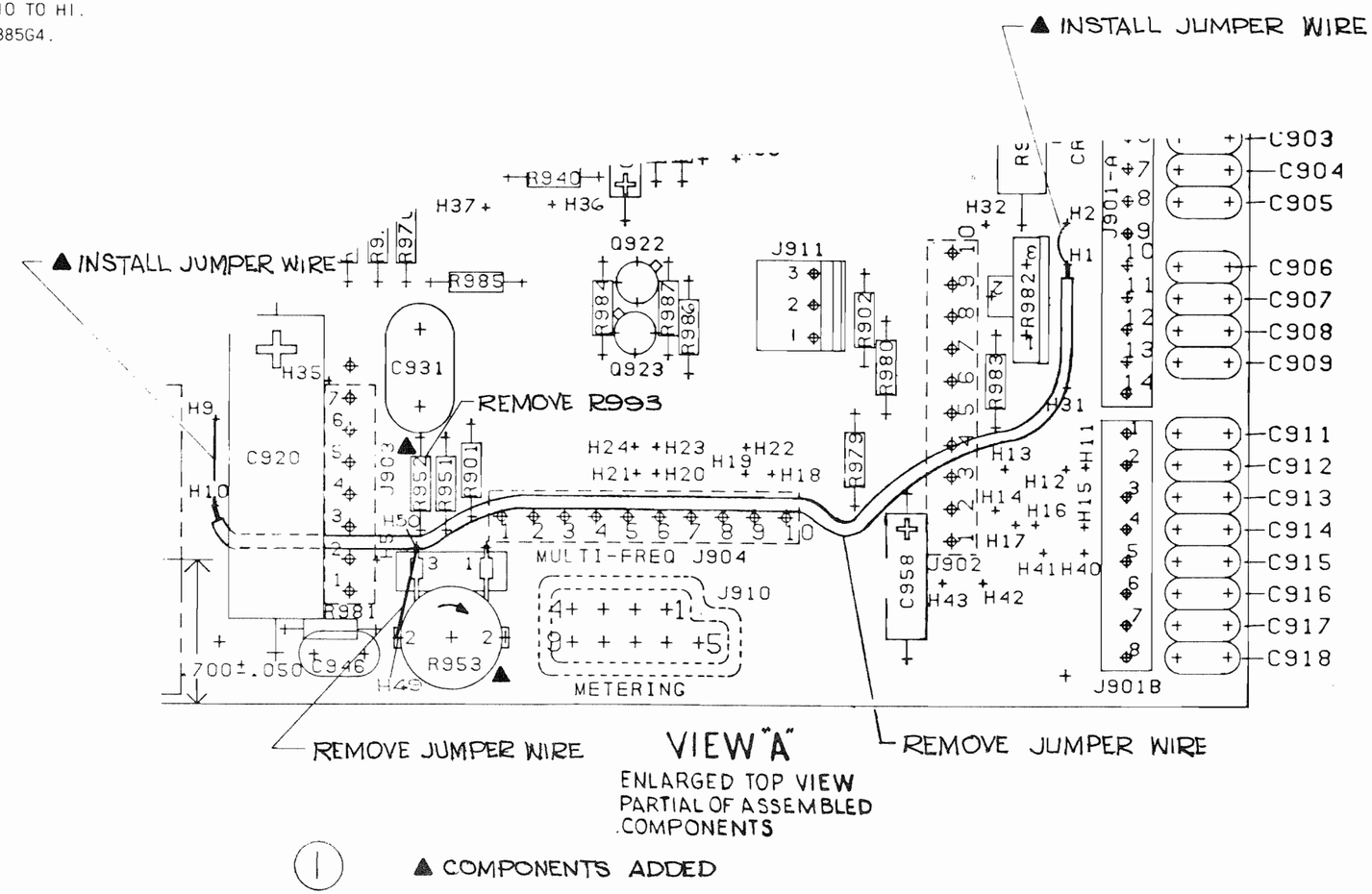
EXTERNAL ANTENNA TRANSFER RELAY

PURPOSE: THIS MODIFICATION IS APPLIED TO MASTR EXECUTIVE II MOBILE COMBINATIONS EQUIPPED FOR THE OPTIONAL MASTR II CONTROL SYSTEM (ST/SX COMBINATIONS) TO PROVIDE FIXED SQUELCH (OPTION 1709).

REQUIRED PARTS: PLI9AI30885G4 FIXED SQUELCH MOD KIT

INSTALLATION: REMOVE THE TOP AND BOTTOM COVERS OF THE RADIO. ON THE SYSTEM/AUDIO/SQUELCH MODULE, PERFORM THE FOLLOWING.

1. REMOVE R993 (3.9KΩ) RESISTOR AND REPLACE WITH R952 (20KΩ) WHICH IS PART OF PLI9AI30885G4.
2. REMOVE N22W JUMPER BETWEEN H49 TO H50, AND H10 TO H1.
3. ADD R953 (5KΩ POT) WHICH IS PART OF PLI9AI30885G4.
4. ADD DA JUMPER BETWEEN H1 AND H2.
5. ADD DA JUMPER BETWEEN H9 AND H10.



VIEW "A"
ENLARGED TOP VIEW
PARTIAL OF ASSEMBLED
COMPONENTS

(1) ▲ COMPONENTS ADDED

(19C328123, Rev. 0)

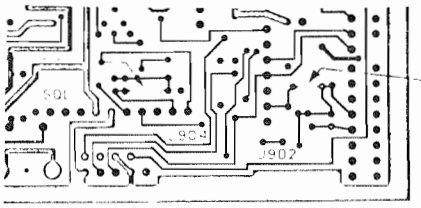
MODIFICATION INSTRUCTIONS

FIXED SQUELCH

PURPOSE: THIS MODIFICATION IS APPLIED TO MASTR EXECUTIVE II MOBILE COMBINATIONS WHICH ARE ORDERED AS ONE FREQUENCY TRANSMIT, TWO FREQUENCY RECEIVE (THE SIXTH COMBINATION DIGIT IS "D"). DIODES AND A JUMPER ARE INSTALLED IN ORDER TO ELIMINATE THE NEED FOR AN OSCILLATOR MODULE IN THE T-F2 POSITION WHICH WOULD BE IDENTICAL IN FREQUENCY TO T-F1.

REQUIRED PARTS: DA WIRE AND SLEEVING, 19A115250P1 DIODES (19A129881G1 KIT).

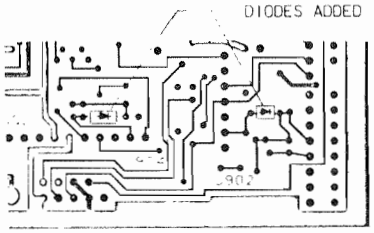
INSTALLATION: REMOVE THE TOP AND BOTTOM COVERS OF THE RADIO SET. ON THE TOP OF THE SYSTEM/AUDIO/SQUELCH BOARD REMOVE THE DA JUMPERS BETWEEN H12 - H13 AND BETWEEN H19 - H20. SEE VIEW A & C.



VIEW "A"
TOP VIEW PARTIAL

COMPONENT SIDE

NEXT, INSTALL DIODES IN PLACE OF THE REMOVED RUNS WITH THEIR CATHODES TOWARD THE FREQUENCY LEAD (AT J901B). SEE VIEW "B".



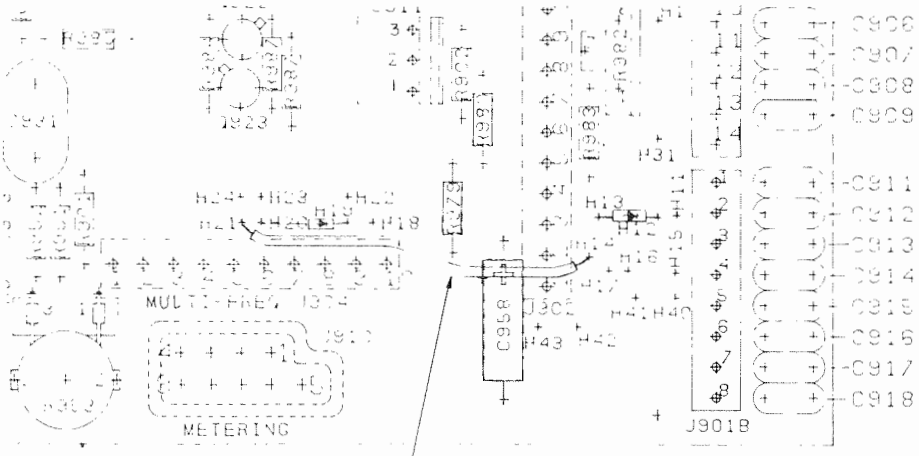
VIEW "B"
TOP VIEW PARTIAL

TEST: CHECK FOR CONTINUITY BETWEEN J902-2 (T-F1) AND J901B-4 (F1) WITH THE POSITIVE PROBE OF THE OHMMETER AT J901. REVERSE THE OHMMETER AND IT SHOULD NOT SHOW CONTINUITY. REPEAT THIS TEST BETWEEN J904-9 (T-F2) AND J901B-3 (F2).

CHECK THAT THERE IS CONTINUITY BETWEEN J903-4 (R-F1) AND J901B-4 (F1), AND ALSO BETWEEN J904-3 (R-F2) AND J901B-3 (F2). THERE SHOULD BE CONTINUITY WITH BOTH POLARITIES OF THE OHMMETER.

REASSEMBLE THE BOTTOM AND TOP COVER OF THE RADIO SET

FINALLY, INSTALL A SLEEVED "DA" WIRE JUMPER BETWEEN H14 - H21. SEE VIEW "C".



VIEW "C"

ENLARGED TOP VIEW PARTIAL OF ASSEMBLED COMPONENTS

INSTALL A SLEEVED "DA" WIRE JUMPER BETWEEN H14 - H21

(19C321901, Rev. 2)

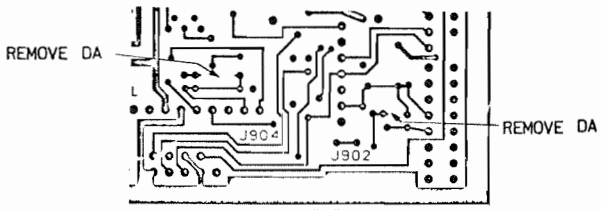
MODIFICATION INSTRUCTIONS

1-FREQUENCY TRANSMIT,
2-FREQUENCY RECEIVE

PURPOSE: THIS MODIFICATION IS APPLIED TO MASTR EXECUTIVE II MOBILE COMBINATIONS WHICH ARE ORDERED AS TWO FREQUENCY TRANSMIT, ONE FREQUENCY RECEIVE (THE SIXTH COMBINATION DIGIT IS "B"). A JUMPER IS INSTALLED IN ORDER TO ELIMINATE THE NEED FOR AN OSCILLATOR MODULE IN THE R-F2 POSITION WHICH WOULD BE IDENTICAL IN FREQUENCY TO R-F1.

REQUIRED PARTS: DA WIRE AND SLEEVING, 19A115250P1 DIODES (19A129881G1 KIT)

INSTALLATION: REMOVE THE TOP AND BOTTOM COVERS OF THE RADIO SET. ON THE TOP OF THE SYSTEM/AUDIO/SQUELCH BOARD REMOVE THE DA JUMPERS BETWEEN H15-H16 AND BETWEEN H22-H23. SEE VIEW "A" AND "C".



VIEW "A"
TOP VIEW PARTIAL

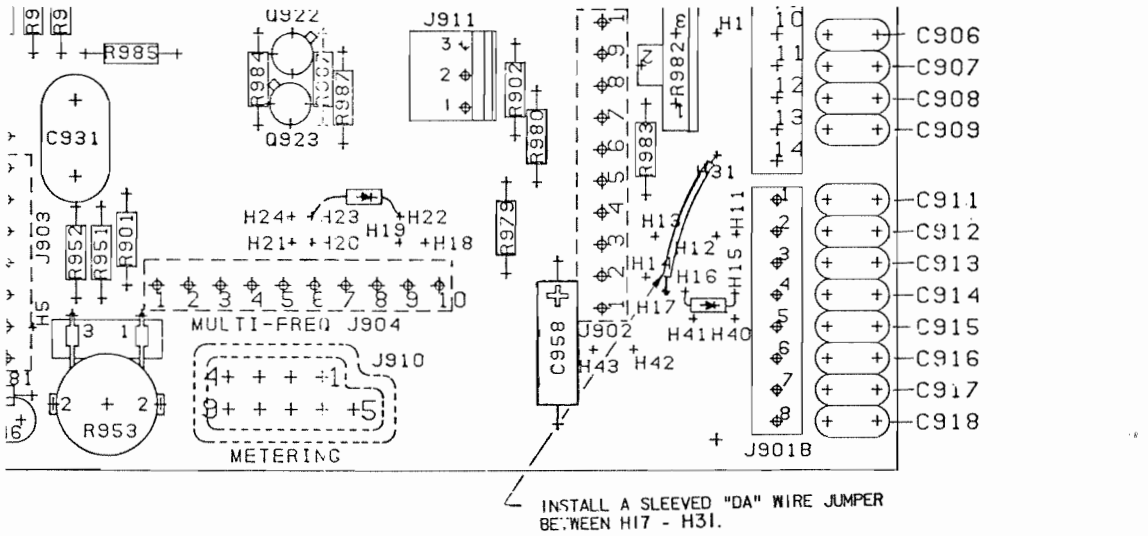
COMPONENT SIDE

TEST: CHECK FOR CONTINUITY BETWEEN J903-4 (R-F1) AND J901B-4 (F1) WITH THE POSITIVE PROBE OF THE OHMMETER AT J901. REVERSE THE OHMMETER AND IT SHOULD NOT SHOW CONTINUITY. REPEAT THIS TEST BETWEEN J904-3 (R-F2) AND J901B-3 (F2).

CHECK THAT THERE IS CONTINUITY BETWEEN J902-2 (T-F1) AND J901B-4 (F1), AND ALSO BETWEEN J904-9 (T-F2) AND J901B-3 (F2), THERE SHOULD BE CONTINUITY WITH BOTH POLARITIES OF THE OHMMETER.

REASSEMBLE THE BOTTOM AND TOP COVER OF THE RADIO SET.

FINALLY, INSTALL A SLEEVED "DA" WIRE JUMPER BETWEEN H17 - H31. SEE VIEW "C".



INSTALL A SLEEVED "DA" WIRE JUMPER BETWEEN H17 - H31.

VIEW "C"

ENLARGED TOP VIEW PARTIAL OF ASSEMBLED COMPONENTS

(19C321902, Rev. 3)

MODIFICATION INSTRUCTIONS

2-FREQUENCY TRANSMIT,
1-FREQUENCY RECEIVE

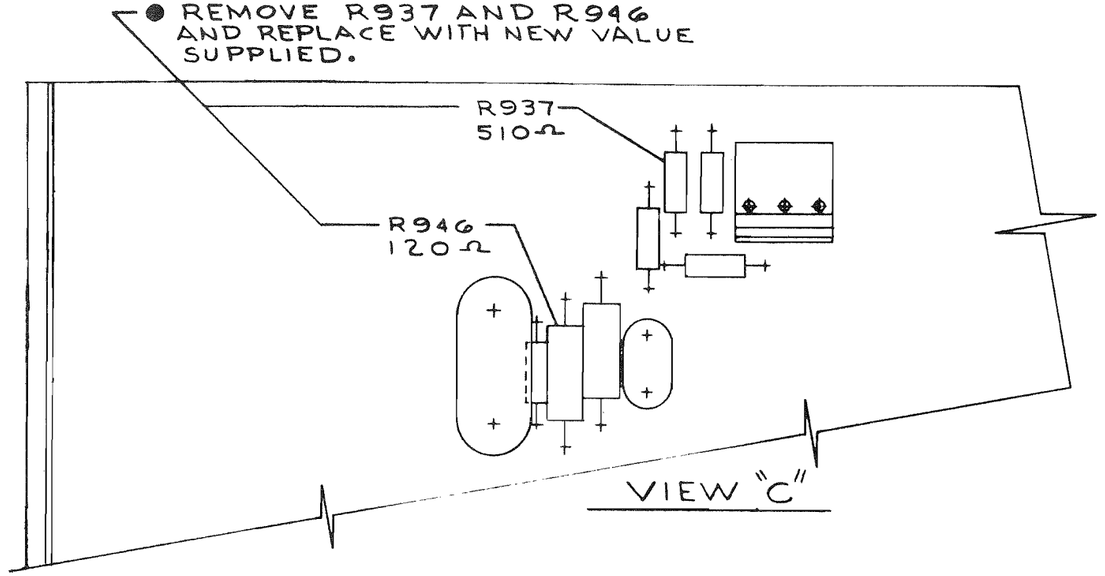
PURPOSE: THIS MODIFICATION IS APPLIED TO THE MASTR EXECUTIVE II MOBILE WHEN USED WITH MASTR II CONTROL FOR USE WITH A 8Ω MASTR II SPEAKER, A TRANSISTORIZED MICROPHONE & WITH VARIABLE SQUELCH.

REQUIRED PARTS: A TOOL TO CUT PWB RUNS (KNIFE OR ROTARY GRINDER)
PLI9AI30885GI TRANSISTORIZED MIC KIT
PLI9AI30885G2 VARIABLE SQUELCH KIT

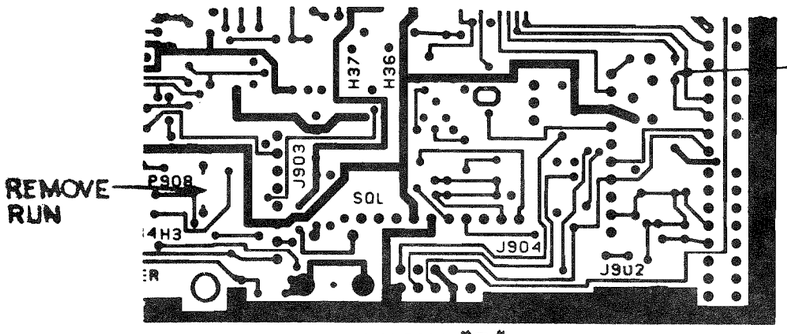
INSTALLATION: REMOVE THE TOP & BOTTOM COVERS OF THE RADIO. ON THE SYSTEM/AUDIO/SQUELCH MODULE 19D423191 PERFORM THE FOLLOWING:

● 1. ADD C958 (22UF), R979 (620Ω) AND R980 (1K) WHICH ARE PART OF PLI9AI30885GI KIT, ASSEMBLE AS SHOWN IN VIEW "A". REMOVE R937 (680Ω) AND ADD R937 (510Ω) REMOVE R946 (75Ω) AND ADD R946 (120Ω), WHICH ARE PART OF PLI9AI30885GI KIT, PER VIEW "C".

▲ 2. TO APPLY VARIABLE SQUELCH CUT PWB RUNS BETWEEN H1-H2 AND H9-H10 (SEE VIEW "A" & "B" FOR LOCATION) ADD JUMPER WIRE (SUPPLIED IN PLI9AI30885G2 KIT) BETWEEN H1 AND H10 (SEE VIEW "A" FOR LOCATION). ADJUST R953 FULLY CLOCKWISE (SEE VIEW "A").

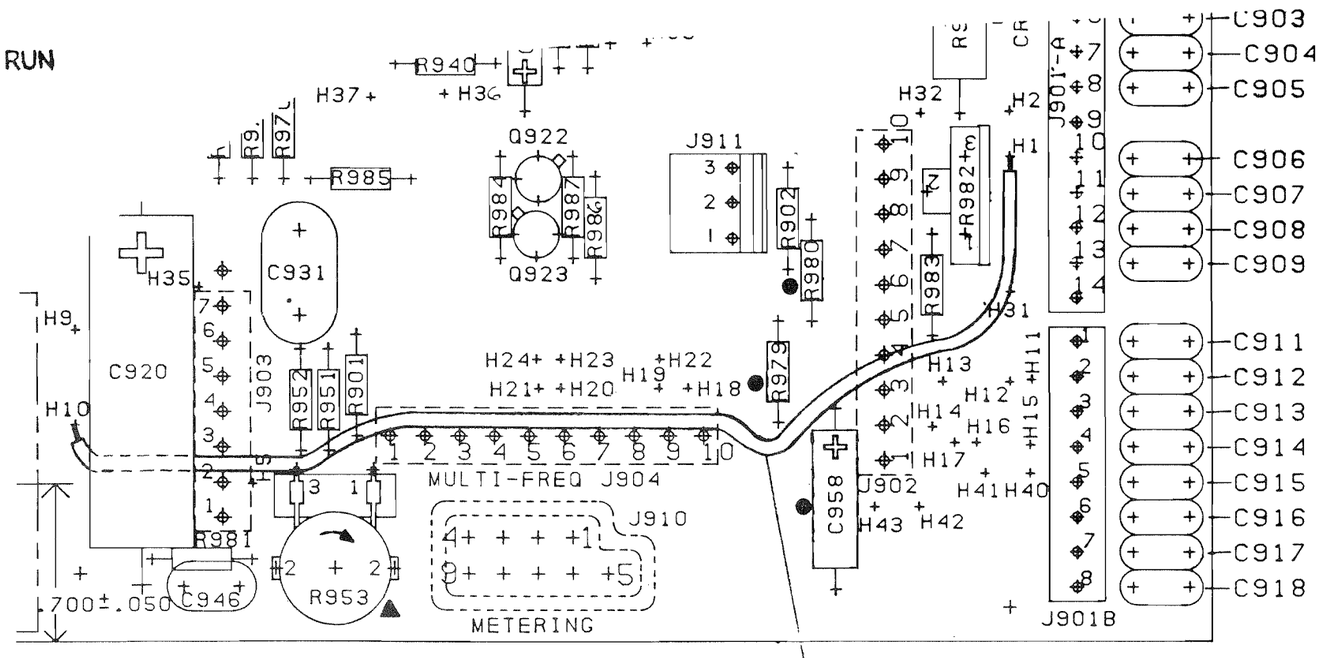


VIEW "C"



VIEW-"B"
COMPONENT SIDE

▲ WHEN FIXED SQUELCH OPTION 1709 IS CALLED FOR, OMIT STEP 2. (OPTION 1709 DELETES PLI9AI30885G2 MOD KIT)



VIEW "A"
ENLARGED TOP VIEW
PARTIAL OF ASSEMBLED COMPONENTS

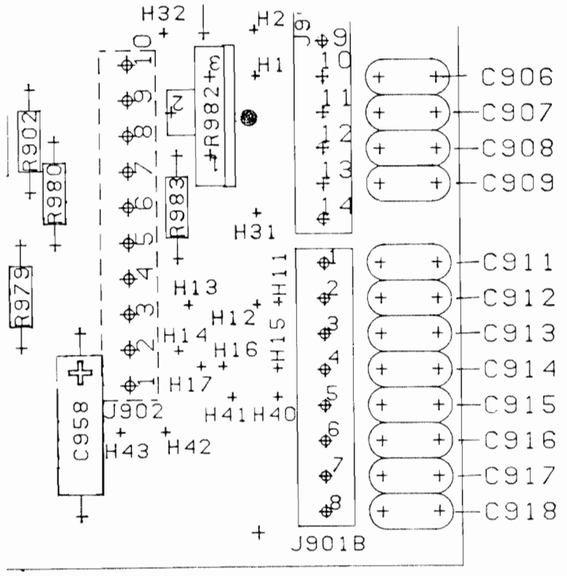
(19C321917, Rev. 3)

PURPOSE: THIS MODIFICATION IS APPLIED TO THE MASTR EXECUTIVE II MOBILE WHEN USED WITH MASTR II CONTROL AND AN EXTERNAL CHANNEL GUARD ENCODER.

REQUIRED PARTS: PLI9AI30885G3 EXTERNAL CG ENCODE KIT.

INSTALLATION: REMOVE THE TOP & BOTTOM COVERS OF THE RADIO. ON THE SYSTEM/AUDIO/SQUELCH MODULE 19D423191 PERFORM THE FOLLOWING:

● 1. ADD R982 (5K POT.) AS SHOWN IN VIEW "A".



VIEW A

ENLARGED TOP VIEW PARTIAL OF ASSEMBLED COMPONENTS

(19B227184, Rev. 1)

MODIFICATION INSTRUCTIONS