

 **MOBILE RADIO**

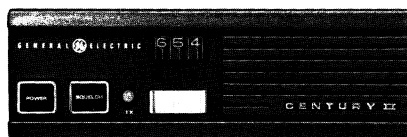
# **CENTURY II**

**MAINTENANCE MANUAL LBI30864**

**420-470 MHz**

**5-WATT TRANSMITTER  
20-WATT TRANSMITTER**

**DATAFILE FOLDER - DF9049**

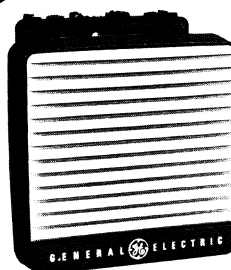


**MOBILE RADIO**



**MICROPHONE**

**TWO-WAY FM  
MOBILE  
COMBINATIONS**



**EXTERNAL  
SPEAKER  
(OPTIONAL)**

**GENERAL  ELECTRIC**

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## WARNING

Although the highest DC voltage in CENTURY II Mobile Equipment is supplied by the vehicle battery, 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 circuits when the transmitter is energized!

# SYSTEM SPECIFICATIONS\* (EIA AND CEPT UNLESS OTHERWISE NOTED)

FREQUENCY RANGE	420-470 MHz
BATTERY DRAIN	
Receiver	
Squelched	200 milliamperes
Unsquelched	650 milliamperes
Transmitter	
5 Watt	1.8 Amperes @ 13.8 Volts
20 Watt	5.5 Amperes @ 13.8 Volts
FREQUENCY STABILITY	0.0005%
TEMPERATURE RANGE	-30°C (-22°F) to +60°C (140°F)
DUTY CYCLE	20% Transmit, 80% Receive
DIMENSIONS, LESS ACCESSORIES (H x W x D)	60 mm x 180 mm x 190 mm (2.3 x 7.3 x 7.4 inches)
WEIGHT, LESS ACCESSORIES	1.7 kg (3.7 pounds)

<u>TRANSMITTER</u>		
POWER OUTPUT		
KT-179-A	2 to 5 Watts	
KT-180-A	7 to 20 Watts	
SPURIOUS AND HARMONIC EMISSION		
	-50 dB (5 Watts) (FCC)	
	-56 dB (20 Watts) (FCC)	
MODULATION	±4.5 kHz	
AUDIO SENSITIVITY	65 to 120 Millivolts	
AUDIO FREQUENCY CHARACTERISTICS	Within +1 dB to -3 dB of a 6 dB/octave pre-emphasis from 300 to 3000 Hz per EIA standards. Post limiter filter per FCC and EIA.	
DISTORTION		
	Less than 3% (1000 Hz)	
	Less than 5% (300 to 3000 Hz)	
DEVIATION SYMMETRY	0.5 kHz maximum	
MAXIMUM FREQUENCY SPREAD:	Full	1 dB
	<u>Specifi-</u>	<u>Degra-</u>
	<u>cations</u>	<u>dation</u>
420-470 MHz	5.5 MHz	10.5 MHz
RF OUTPUT IMPEDANCE	50 ohms	

<u>RECEIVER (ER-116-A)</u>		
AUDIO OUTPUT (to 4.0 ohms speaker)	3 Watts (less than 5% distortion) EIA 1.5 Watts (less than 5% distortion) CEPT	
SENSITIVITY		
12 dB SINAD (EIA Method)	0.40 µV	
20 dB Quieting Method	0.45 µV	
20 dB SINAD (CEPT**)	0.75 µV	
SELECTIVITY		
EIA Two-Signal Method	-85 dB @ ±25 kHz (EIA) -75 dB (CEPT)	
SPURIOUS RESPONSE	-85 dB	
INTERMODULATION	-70 dB	
MODULATION ACCEPTANCE	±7.0 kHz	
SQUELCH SENSITIVITY	<8 dB SINAD	
MAXIMUM FREQUENCY SPREAD	Full	3.0 dB
	<u>Specifi-</u>	<u>Degra-</u>
	<u>cations</u>	<u>dation</u>
420-470 MHz	2.0 MHz	3.0 MHz
FREQUENCY RESPONSE	Within +1 and -1.5 dB of a standard CEPT 6 dB per octave de-emphasis curve from 400 to 2700 Hz (1000 Hz reference) Also fits +1 -3 from 300 to 3000 EIA	
RF INPUT IMPEDANCE	50 ohms	

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

\*\*ΔF 60% x ΔF Max. F mod = 1 kHz. Measured with psophometric filter.

## COMBINATION NOMENCLATURE

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th Digit	9th Digit
Mechanical Package	SYSTEM Voltage	RF Power Output Range	Channel Spacing	Freq. Cap.	Number of Freq.	Options	Frequency Range	Oscillator Stability
<b>C</b> FCC SPEC.	<b>E</b> +12 VDC (NEG GND)	<b>4</b> 4-7 Watts	<b>5</b> 25 kHz	<b>A</b> 1 Tx 1 Rx	<b>A</b> 1 Tx 1 Rx	<b>S</b> Standard	<b>U</b> 420-450 MHz	<b>A</b> 5 PPM
<b>T*</b>		<b>3</b> 8-20 Watts		<b>B</b> 2 Tx 1 Rx	<b>B</b> 2 Tx 1 Rx	<b>U</b> Channel Guard	<b>W</b> 440-470 MHz	
				<b>C</b> 2 Tx 2 Rx	<b>C</b> 2 Tx 2 Rx			
				<b>F</b> 4 Tx 4 Rx	<b>E</b> 3 Tx 3 Rx			
				<b>H</b> 6 Tx 6 Rx	<b>F</b> 4 Tx 4 Rx			
					<b>G</b> 5 Tx 5 Rx			
					<b>H</b> 6 Tx 6 Rx			
					<b>N</b> None			

\* Combinations with the first digit "T" are for International use.

## DESCRIPTION

General Electric Century II mobile combinations are fully transistored -- utilizing both discrete components and integrated circuits (IC's) for high reliability. The radio is a self-contained, FM transmitter/receiver with built-in controls and speaker. Its small size makes it ideal for front mounting in conventional vehicles. The standard combinations may be equipped with the following:

- One through six frequencies.
- Plug-in crystals for  $\pm 0.0005\%$  oscillator stability.
- Channel Guard (tone squelch).

The radio consists of an effective, heat-dissipating, aluminum die cast "H" frame on which two circuit boards are mounted. The main transmitter/receiver board is mounted on the bottom of the "H" frame and includes the complete RF and audio circuitry for a single frequency radio. The top board contains all interconnections, and the multi-frequency oscillator circuits when present. In radios equipped with Channel Guard, the Channel Guard option also mounts in the top section of the "H" frame. All external connectors, controls and indicators are mounted directly on the two boards for reliability and ease of disassembly.

The boards plug into each other, eliminating the need for interconnecting wires. In a standard model, the only wires used are for the plug-in leads on the internal speaker. Interchangeable top and bottom steel covers enclose the "H" frame and provide optimum protection for the radio.

The front control panel is made of highly durable plastic and houses the speaker. It has rounded corners and recessed controls for passenger safety requirements.

The panel provides access to three standard operator controls: A POWER On/Off pushbutton, a SQUELCH pushbutton (fixed squelch monitor), and a rotary, edge mounted Volume control. A red Transmit indicator LED (Light Emitting Diode) is provided.

When more than one frequency is ordered, a multi-position Channel Selector switch is included. This switch has lighted channel numbers for easy use at night.

No power supply is required since the highest supply voltage used in the radio is provided by the vehicle battery. The radio is designed for operation only in 12 Volt, negative ground vehicle systems.

The radio is of modular construction. All major modules and tuning adjustments are easily accessible. Removal of two screws in the rear of the top cover provides access to the interconnect or multi-frequency/interconnect board. Removal of three screws in the rear of the bottom cover provides access to the transmitter/receiver board. An optional set of test probes can be plugged onto the test pins on the board for alignment and troubleshooting. Measurements can be made using GE Test Set 4EX3A11 or a Multimeter.

## TRANSMITTER

The transmitter consists of an FM exciter with an audio processor and a broadband, fixed-tuned power amplifier. The RF power output level is internally adjustable from 1/3 to rated power. Once the level is set, a sensing control circuit holds it constant as temperature and/or voltage vary within specified limits.

Frequency stability for both the transmitter and receiver is maintained by an electronic compensation network.

## RECEIVER

The dual conversion receiver consists of a front end section and two mixer/IF sections operating at 21.4 MHz and 455 kHz. The receiver also contains a squelch and audio section. The audio section provides a 3 Watt audio output into a 4 ohm load.

## AC POWER SUPPLY OPTION

To use the radio as a base station, an optional 121 Volt AC, 60 Hertz power supply is available. A six foot cable connects the power supply to the radio. The cable length permits the power supply to be located away from the radio. A red Power On LED is located on the front panel of the power supply.

## MICROPHONE

Century II mobile combinations use a dynamic microphone with a built-in transistorized pre-amplifier. The microphone is housed in a sturdy case, and the extendable coiled cord plugs into a jack at the back of the radio. The plug is secured to the radio by means of a strain relief hook on the microphone cable.

## HOOKSWITCH

In Channel Guard applications, a microphone hookswitch is supplied with the radio. The hookswitch is equipped with a Channel Guard disable switch.

Placing the switch in the "up" position (towards the small speaker symbol) disables the receive Channel Guard. With the switch in the "down" position, the Channel Guard is disabled when the microphone is removed from the hookswitch.

## EXTERNAL SPEAKER (OPTIONAL)

A five-inch speaker, contained in a LEXAN® housing, provides an audio output of 3 Watts. The speaker impedance is 4 ohms. The speaker leads are connected to pins 3 and 7 of Systems Plug P910. When the External Speaker is used, the brown wire connected between P910-3 and P910-7 is removed to disconnect the built in speaker from the audio output circuit. A LEXAN® mounting bracket is supplied for mounting convenience.

## OPERATION

Complete operating instructions for the Two-Way Radio are provided in the separate OPERATOR'S MANUAL. The basic procedures for receiving and transmitting messages follows:

## TO RECEIVE A MESSAGE

1. Turn the radio on by pushing in the POWER pushbutton.
2. Push in the Squelch button. If the radio is equipped with Channel Guard, also remove the microphone from its holder or slide the Channel Guard switch up. Adjust the Volume control for a comfortable listening level and then push the SQUELCH button in again and release it for normal operation.

The radio is now ready to receive messages from other radios in the system.

## TO TRANSMIT A MESSAGE

1. Turn the radio on as directed in the "To Receive a Message" section.
2. Press the push-to-talk button on the microphone and speak across the face of the microphone in a normal voice. Release the button as soon as the message has been given. The red indicator light on the control panel will glow each time the microphone button is pressed, indicating that the transmitter is on the air. The receiver is muted whenever the transmitter is keyed.

## INITIAL ADJUSTMENT

After the radio has been installed (as described in the Installation Manual), the following adjustments should be made by an electronics technician who holds a First or Second Class FCC Radiotelephone license (where required).

## TRANSMITTER ADJUSTMENT

The adjustment for the transmitter includes measuring the forward and reflected power and adjusting the antenna length for optimum ratio, then setting the transmitter to rated power output (or to the specific output or input which may be required by the FCC station authorization or other authority). Next, measuring the frequency and modulation and entering these measurements on the FCC required station records. For the complete transmitter adjustment, refer to the ALIGNMENT PROCEDURE (see Table of Contents).

## RECEIVER ADJUSTMENT

The initial adjustment for the receiver includes tuning the input circuit to match the antenna. For the Receiver Adjustment Procedure, refer to the ALIGNMENT PROCEDURE (see Table of Contents).

## RE-INSTALLATION

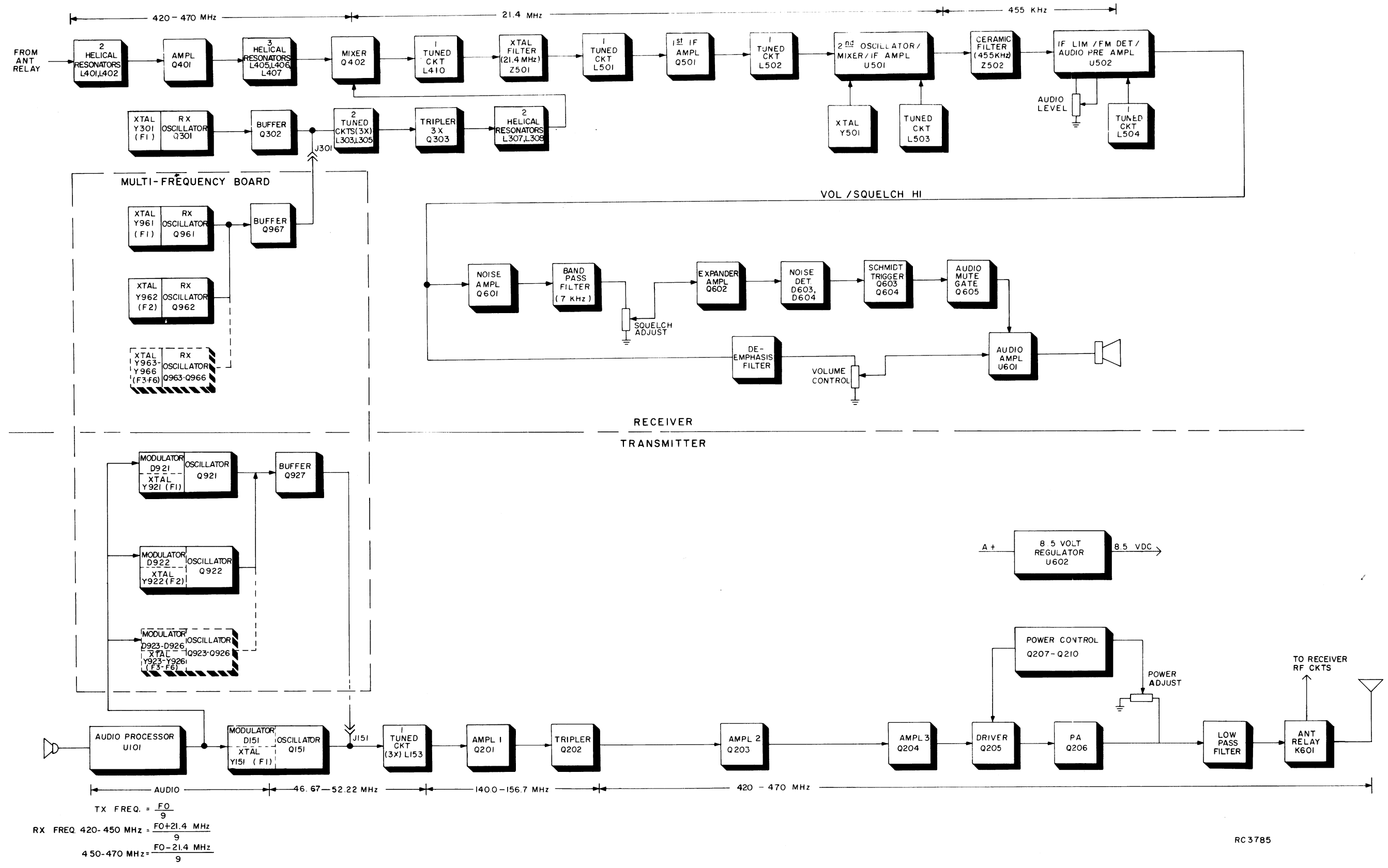
If the mobile combination is ever moved to a different vehicle, always check the battery polarity of the new system.

## CIRCUIT ANALYSIS

## TRANSMITTER

Century II transmitters utilize a crystal controlled frequency modulated exciter, for 1 through 6 frequency operation in the 420-470 MHz frequency band. The solid state transmitter uses integrated circuits and discrete components for increased reliability. The transmitter consists of audio

processor U101; oscillator Q151; exciter Q201 through Q204; PA Q205 and Q206, and power control circuit Q207 through Q210. The exciter provides approximately 100 milliwatts modulated RF to the PA which provides rated output power of either 5 or 20 watts. Figure 1 is a block diagram of the Century II radio showing both the transmitter and receiver.



TRANSMITTER/RECEIVER BLOCK DIAGRAM

Figure 1

AUDIO PROCESSOR U101

The audio processor provides audio pre-emphasis with amplitude limiting and post limiter filtering. A total gain of approximately 24 dB is realized through the audio processor. 20 dB is provided by U101B and 4 dB by U101A.

The 8.5 Volt regulator powers the audio processor and applies regulated +8.5V through P903-2 to a voltage divider consisting of R108 and R110. The +4.25 output from the voltage divider establishes the operating reference point for both operational amplifiers. C107 provides an AC ground at the summing input of both operational amplifiers.

Resistors R105, R106 and R107 and diodes D101 and D102 provide limiting for U101B. Diodes D101 and D102 are reverse biased at +1.7 VDC. Voltage divider network R105, R106 and R107, provides +5.9 VDC at the cathode of D101 and +2.6 VDC at the anode of D102. The voltage at the junction of D101 and D102 is 4.25 V. C102 and C103 permit a DC level change between U101B-7 and the voltage divider network for diode biasing.

When the input signal to U101B-6 is of a magnitude such that the amplifier output at U101B-7 does not exceed 4 volts P-P, the amplifier provides a nominal 20 dB gain. When the audio signal level at U101B-7 exceeds 4 volts PP, diodes D101 and D102 conduct on the positive and negative half cycles providing 100% negative feedback to reduce the amplifier gain to 1. This limits the audio amplitude at U101B-7 to 5 volts PP.

Resistors R102, R103 and R104 and C104 comprise the audio pre-emphasis network that enhances the signal to noise ratio. R104 and C104 control the pre-emphasis curve below limiting. R103 and C104 control the cut-off point for high frequency pre-emphasis. As high frequencies are attenuated, the gain of U101 is increased.

Audio from the microphone is coupled to the audio processor through C904 and R903 on the interconnect board to the input of operational amplifier U101B-6.

The amplified output of U101B is coupled through audio MOD ADJ control R116, C106, R112 and R113 to a second operational amplifier U101A. Audio MOD ADJ control R116 is set for a deviation of 4.5 kHz in single frequency transmitters. In multi-frequency transmitters R116 is set full clockwise.

Deviation is then adjusted individually for each channel using MOD adjust potentiometers R956-R961 on the multi-frequency board.

The Channel Guard tone input is applied to U101A-6 through P101-2 and R113 to P102-5. The CG tone is then combined with the microphone audio. U101A provides a signal gain of approximately 4 dB.

A post limiter filter consisting of U101A, R112-R114, C108 and C109 provide 12 dB per octave roll-off. R109 and C111 provide an additional 6 dB per octave roll-off for a total of 18 dB.

SERVICE NOTE

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

The output of the post limiter filter is coupled through C110 to the temperature compensated transmitter oscillator Q151, or through P101-4 to the multi-frequency board.

TRANSMIT OSCILLATOR

The output of the audio processor is coupled to transmit oscillator Q151 through R154 and C153. A temperature compensating network consisting of R151, R152, R153, R160, D152 and C151 maintains oscillator frequency over a temperature range of -30°C to +60°C. The temperature compensating DC voltage and audio is applied to FM modulator D151 through R154. The modulator varactor D151 varies the transmit frequency at the audio rate applied from the audio processor.

Q151, Y151 and associated circuitry comprise a Colpitts oscillator which generates the third subharmonic of the RF carrier frequency. The Transmit oscillator frequency is adjusted to the assigned operating frequency by L151. A tuned circuit, L153, C157 and C158, selects the 3rd harmonic of the crystal frequency which is coupled through C201 to amplifier Q201.

EXCITER AMPLIFIERS

The output of amplifier Q201 is coupled to tripler Q202 through two tuned circuits, L203 and L204, and can be monitored at TP201. The voltage at TP201 is typically 0.2 VDC.

The output of tripler Q202 is coupled through two tuned circuits (L208 and C213, L209 and C215) and coupling capacitors C214 and C216 to the base of amplifier Q203. C213 and C215 are tuned to the operating frequency. The output of Q202 can be monitored at TP202 and typically is 0.65 VDC. The exciter output is taken from the collector of Q203 and coupled to the base of a class C amplifier Q204 through an impedance matching network, a 50 ohm microstrip W201

and a second impedance matching network. The exciter output is a nominal 100 milliwatts. The first impedance matching network consisting of L211, L212, C219 and C221 through C225 matches the collector impedance of Q203 to microstrip W201. The second impedance matching network consisting of C230-C232 and L216 and L217 matches the 50 ohm microstrip to the base of amplifier Q204. The RF input to Q204 can be monitored at TP204 and typically is 0.5 volts using the Tx RF Detector probe. TP204 may also be used to monitor the transmitter operating frequency. The output of amplifier Q203 can be monitored at TP203 and is typically 0.6 VDC. C221 and C223 are tuned to the operating frequency. The output is taken from the collector of Q204 and coupled through an impedance matching network consisting of L219-L222 and C234-C237 to the base of PA driver Q205.

#### POWER AMPLIFIER

The three stage power amplifier consists of Amplifier Q204, driver Q205 and power amplifier Q206 and associated circuitry. Collector voltage for driver Q205 is applied from A+ through power control transistor Q207 and Z201. The collector voltage for Q205 is a result of the output power setting and voltage variations at any given time. The output of driver Q205 is coupled to the base of Power Amplifier Q206 through an impedance matching network consisting of C241-C243, L225-L227. The output of the power amplifier is coupled to the antenna through a low pass filter and antenna Tx/Rx relay K601. The output of the power amplifier is 5 watts for Transmit/Receive board 19D430934G2 and 20 watts for 19D430934G1. Collector voltage for Q206 is provided from A+ through Z102. In the 5 Watt PA, Q206 and associated circuitry are removed. L234 is added.

#### POWER ADJUST CIRCUIT

The power adjust circuit allows the output power to be set over a 3:1 range from rated to 1/3 of rated output power. The power adjustment is attained by controlling the DC collector voltage to driver Q205 through pass transistor Q207. The pass transistor is controlled by a feedback loop consisting of Q208-Q210. The power is set by potentiometer R215.

A change in output power is sensed by D201 causing the base voltage of Q210 to change accordingly. For example, if the output power increases, the base of Q210 goes more positive, causing it to increase conduction which lowers its collector voltage. Q210 controls Q209, therefore as Q210 increases conduction Q209 decreases conduction and raises the voltage applied to the base of Q208. The conduction of Q208

decreases accordingly, lowering the base voltage of pass transistor Q207. The resulting decrease in conduction of Q207 lowers the collector voltage of driver Q205, thereby lowering the output power in proportion to the excessive power originally sensed by the base circuit of Q210.

#### MULTI-FREQUENCY BOARDS

A multi-frequency board is required when a radio is equipped with more than one channel. A four frequency board has space to accommodate up to 4 transmit and 4 receive oscillators and the channel selector switch.

In those applications where 2 transmit and 1 receive channel are used, the two transmit oscillators are located on the multi-frequency board and the receive oscillator is located on the transmit/receive board as in single frequency radios. Likewise, the six frequency board can accommodate up to six transmit and receive oscillators. Both boards contain circuitry for remote channel selection which may be used in station applications.

In addition to the Tx Rx oscillators the multi-frequency board contains two buffer amplifiers to drive the transmitter and receiver multipliers. Q927 serves as the common buffer amplifier for the transmitter oscillators and Q967 serves as the common buffer amplifier for the receiver oscillators.

#### NOTE

A ground lead through J910-6 is connected to chassis ground through a fusible printed wiring path which will open in case the ground wire is accidentally connected to A+. Should this occur, the board can be repaired by soldering a jumper wire from J910-6 to the anode (A-) of diode D901.

#### TRANSMIT/RECEIVE OSCILLATORS

Except for component designations the transmit and receive oscillators are identical to that described in the transmitter/receiver sections above. In addition, a buffer stage (Q927 transmit and Q967 receive) is provided between the oscillator and tripler stages.

The output of transmitter buffer Q927 is connected to tripler L153 by a jumper from P921 on the multi-frequency board to J151 on the Transmit/Receive board. Likewise the output of receive oscillator Q967 is connected through P961 to tripler L303 through J301 on the transmit/receive board.

In multi-frequency applications the transmit and receive oscillators on the transmit/receive board are disabled - only the oscillators on the multi-frequency board are active. The single frequency transmit oscillator is disabled by removing R157; the receive oscillator is disabled by removing R309. Both resistors are located on the transmit/receive board.

#### MODULATION LEVEL ADJUSTMENT

The audio modulation level is individually set for each channel. Audio from the audio processor is superimposed on the temperature compensation bus and applied to each modulator. The modulator deviation is set by R956 through R961 respectively.

#### CHANNEL SELECTION

Channel selection is accomplished using the Channel Selector switch S901 and control transistor Q901. Q901 controls the application of A- to the transmit and receive oscillator through S901. In non-remote applications Q901 is on continuously, allowing channel selector by the Channel Selector switch.

#### RECEIVER

Century II receivers are dual conversion, superheterodyne FM receivers designed for one through six frequency operation in the 420-470 MHz frequency range. A regulated 8.5 volts is used for all receiver stages except for the audio PA IC, which operates from the A+ supply.

The receiver is a double conversion superheterodyne using intermediate frequencies of 21.4 MHz and 455 kHz. Adjacent channel selectivity is obtained by using two bandpass filters: 21.4 MHz crystal filter and a 455 kHz ceramic filter.

All of the receiver circuitry is mounted on the transmitter/receiver (Tx/Rx) board. The receiver consists of:

- Receiver Front End
- 21.4 MHz 1st IF circuitry
- 1st and 2nd Oscillators
- 455 kHz 2nd IF circuitry with FM Detector
- Audio PA Circuit
- Squelch Circuit

#### RECEIVER FRONT END

An RF signal from the antenna is coupled through antenna relay K601 and two helical resonators (L401 and L402) to the base of RF amplifier Q401. The output of Q401 is coupled through three more helical resonators consisting of L405-L407 to the gate of 1st Mixer Q402. The front end selectivity is provided by the five helical resonators.

#### OSCILLATOR & MULTIPLIER

In single frequency radios, Q301, Y301 and associated circuitry make up a Colpitts oscillator. The frequency is controlled by a third mode crystal operated at one ninth of the required output frequency. Voltage-variable capacitor D301, L301 and Y301 are connected in series to provide compensation capability. A compensated voltage from the transmitter audio processor is applied to D301 for greater stability. L301 is adjustable to set the oscillator frequency. R305 is in parallel with Y301 to insure operation on the third overtone of the crystal.

The output of Q301 is coupled through C308 to the emitter of buffer Q302. The output of Q302 is tuned to the third harmonic of the crystal oscillator frequency and coupled to the base of tripler Q303 by two tuned circuits consisting of L303-C307 and L305-C310-C311. The output of tripler Q303 is coupled to the source input of mixer Q402 through two helical resonators consisting of L307 and L308 and coupling capacitors C316 and C414. L307 and L308 are tuned to the operating frequency minus 21.4 MHz in the 450-470 MHz band (+21.4 MHz in the 420-450 MHz band) which is the ninth multiple of the crystal frequency.

The DC level of the oscillator/multiplier chain can be monitored at TP301. The meter reading at this point is typically 0.8 VDC. The RF frequency from the oscillator/multiplier chain and input level to the mixer can be measured at TP401. The meter reading at TP401 is typically 1-3 volts as measured using the Rx RF Detector Probe.

For multi-frequency applications, R309 in the collector circuit of Q302 is removed to disconnect the oscillator circuit on the Tx/Rx board. The output from the multi-frequency oscillator board connects to J301 on the Tx/Rx board.

#### 1ST MIXER

The 1st mixer uses a FET (Q402) as the active device. The FET mixer provides a high input impedance, high power gain and an output relatively free of harmonics (low in intermodulation products).

In the mixer stage, RF from the tuned circuits is applied to the gate of the mixer. Injection voltage from the oscillator and multiplier stages is applied to the source of the mixer. The 21.4 MHz mixer 1st IF output signal is coupled from the drain of Q402 through an impedance matching network (L410 and C410-C413) to crystal filter Z501.

The highly-selective crystal filter provides the first portion of the receiver IF selectivity. The output of the filter is coupled through impedance-matching network L501 to the 1st IF amplifier.

#### 1ST & 2ND IF & DETECTOR STAGES

1st IF Amplifier Q501 is a dual-gate MOSFET. The filter output is applied to Gate 1 of the amplifier, and the output is taken from the drain. The biasing on Gate 2 and the drain load determines the gain of the stage. The amplifier provides approximately 20 dB of IF gain. The output of Q501 is coupled through an impedance matching network (L502) that matches the amplifier output to the input of IC U501.

U501 and associated circuitry consists of the 2nd oscillator, mixer and 2nd IF amplifier. The crystal for the oscillator is Y501, and the oscillator operates at 20.945 MHz for low side injection (21.855 for high side injection). This frequency is mixed with the 21.4 MHz input. The output of the mixer is limited by D501 and D502. L503 is tuned for the 455 kHz 2nd IF frequency.

The output of U501 is coupled through ceramic filter Z502 which provides the 455 kHz selectivity, and applied to U502. Test Point TP501 is used in aligning the receiver, and can be used to check the output of U501.

U502 and associated circuitry consists of a 455 kHz limiter, a quadrature type FM detector and an audio pre-amplifier. L504 is the quadrature detector coil. Audio Level potentiometer R521 is used to set the audio output level to the audio amplifier.

#### AUDIO AND SQUELCH CIRCUITS

##### Audio

In radios without Channel Guard, audio (VOL/SQ HI) is coupled through P903-3 to the interconnect board and then back to P903-7. The audio passes through the de-emphasis network (R902 on the interconnect board, R629, C607 and C608) to Volume Control R630. In radios with Channel Guard, audio is applied to the Channel Guard tone reject filter through P903-3 and back to the de-emphasis network through P903-7.

The audio amplifier IC (U601) drives the speaker at the desired audio level (up to three watts). The feedback loop containing R633, R634 and C610 determines the amplifiers closed loop gain. R631 and C612 provide the high audio frequency roll-off above 6 kHz.

The audio amplifier can be muted by a DC voltage from the receiver mute gate (Q605) which uses different logic inputs. These inputs are 8.5V Tx, Squelch Cancel or a squelch signal. In Channel Guard applications, the Rx MUTE function from the Channel Guard board is applied through P903-4.

##### Squelch

The squelch circuit operates on the noise components contained in the FM detector output. The output of U502 is applied to frequency selective noise amplifier Q601 that has a resonant circuit (L601, R604 and C602) as the collector load. The output is noise in a band around 7 kHz.

The noise output is coupled through Squelch control R607 to expander amplifier Q602 which improves the level discrimination characteristics of the circuit. The output of Q602 is applied to a passive voltage doubler circuit (D603 and D604). This circuit has a high source impedance and provides the function of an average value rectifier.

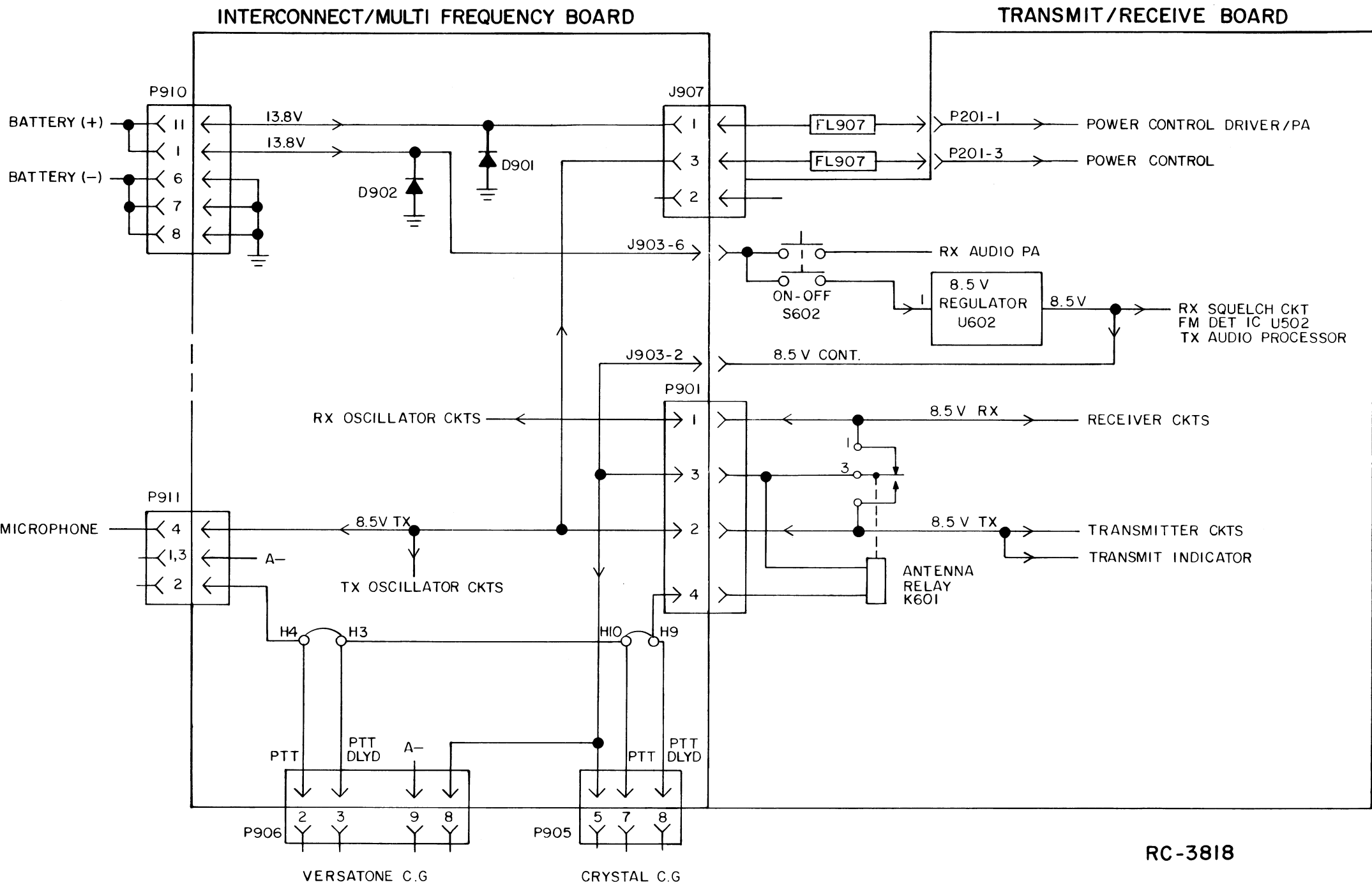
Following the voltage doubler is a Schmidt Trigger (Q603 and Q604). The Schmidt Trigger provides the necessary hysteresis and a well-defined output signal for Rx mute gate Q605.

With no RF signal present, the detected noise at the voltage doubler output turns on Q603, turning off Q604. This causes Q605 to turn on, applying +1.4 volts to pin 2 of audio amplifier U601. This voltage turns off U601 and mutes the receiver.

When an RF signal is received, the noise at the output of Q601 decreases and drive to Q603 is removed. This turns off Q603 and allows Q604 to turn on. With Q604 turned on, Rx mute gate Q605 turns off. This turns on U601 so that audio is heard at the speaker.

The squelch sensitivity is adjusted by R607 in the base circuit of expander amplifier Q602.

Pressing in the SQUELCH Cancel push-button on the front of the radio grounds the base of Q601 and disables the squelch function.



## POWER DISTRIBUTION

The battery voltage (A+) connects to the radio through J910-1 and J910-11 at the rear system connector to the interconnect board. Both inputs are connected to reverse polarity protection diodes D901 and D902. The ground lead comes through the same connector and is connected to chassis ground through a fusible printed wiring path which will open in case the ground wire is accidentally connected to A+.

One battery input goes directly from the interconnect board through a feed-through capacitor in FL907 to the transmitter PA stages. The other input feeds through P903 to the main board for two functions. One branch for the audio amplifier passes through an RC-ripple filter (R638, and C618) and one of the sections of POWER On/Off switch S602. The other section of the POWER On/Off switch controls the A+ to

voltage regulator U602. The regulator output is fixed at 8.5V by means of a selected resistor (R636). Refer to the Receiver Schematic Diagram for selection instructions.

Regulated 8.5 Volts is switched to either the receiver or the transmitter by the antenna relay. The antenna relay is also powered by the 8.5 Volt regulated supply. The non-latching relay is operated by the PTT switch on the microphone, completing the path to A-.

The squelch circuit, the modulation processor and parts of the IF amplifier U502 are supplied directly from the continuous 8.5V supply.

The receiver front-end, the receiver oscillator, the 21.4 MHz IF stages and the second oscillator are supplied from 8.5V Rx. The transmitter oscillator and the exciter are supplied from 8.5V Tx.

## MAINTENANCE

## PREVENTIVE MAINTENANCE

To insure high operating efficiency and to prevent mechanical and electrical failures from interrupting system operations, routine checks should be made of all mechanical and electrical parts at regular intervals. This preventive maintenance should include the checks as listed in the table of Maintenance Checks.

MAINTENANCE CHECKS	INTERVAL	
	6 Months	As Required
CONNECTIONS - Ground connections and connections to the voltage source should be periodically checked for tightness. Loose or poor connections to the power source will cause excessive voltage drops and faulty operation. When ground connections are not made directly to the battery, the connection from the battery to vehicle chassis must be checked for low impedance. A high impedance may cause excessive voltage drop and alternator noise problems.	X	
ELECTRICAL SYSTEM - Check the voltage regulator and alternator or generator periodically to keep the electrical system within safe and economical operating limits. Over-voltage is indicated when the battery loses water rapidly. Usage of 1 or 2 ounces of water per cell per week is acceptable for batteries in continuous operation. A weak battery will often cause excessive noise or faulty operation.		X
MECHANICAL INSPECTION - Since mobile units are subject to constant shock and vibration, check for loose plugs, nuts, screws and parts to make sure that nothing is working loose.	X	
ANTENNA - The antenna, antenna base and all contacts should be kept clean and free from dirt or corrosion. If the antenna or its base should be come coated or poorly grounded, loss of radiation and a weak signal will result.	X	
ALIGNMENT - The transmitter and receiver meter readings should be checked periodically, and the alignment "touched up" when necessary. Refer to the applicable ALIGNMENT PROCEDURE and troubleshooting sheet for typical voltage readings.		X
FREQUENCY CHECK - Check transmitter frequency and deviation as required by FCC or other authority. Normally, these checks are made when the unit is first put into operation, after the first six months and once a year thereafter.		X

## DISASSEMBLY

- To service the transmitter/receiver (Tx-Rx) board, remove the three screws securing the bottom cover at the rear of the radio. Then slide the cover out from under the edge of the front control panel and lift off.
- To service the interconnect/multi-frequency board, remove the two screws at the rear of the radio and slide the cover out from the edge of the front control panel and lift off.
- To remove the Tx-Rx board:
  1. Remove the top and bottom covers.
  2. Remove the four screws securing the front panel to the "H" frame. Disconnect the speaker plug and remove the front panel.
  3. Remove the six screws securing the RF shield.
  4. Remove the two screws in PA transistor Q206.
  5. Turn the radio over and remove the hex screw post and washer from the stud of Driver transistor Q205.
  6. Remove the 7 screws securing the Tx-Rx board and carefully lift up the board off of the interconnections pins.
- To remove the interconnect/multi-frequency board:
  1. Remove the top cover.
  2. In multi-frequency units, remove the five screws securing the RF shield.

3. Remove the five screws securing the board and carefully lift the board up to disconnect the interconnection pins.

## DRIVER AND PA TRANSISTOR REPLACEMENT (Q205, Q206)

## WARNING

The stud mounted RF Power Transistors used in the transmitter contain Beryllium Oxide, a TOXIC substance. If the ceramic or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Use care in replacing transistors of this type.

To replace PA RF transistors Q205 and Q206:

1. Remove Tx/Rx board.
2. Unsolder one lead at a time with a 50 watt soldering iron. Use a scribe or X-acto® knife to hold the lead away from the printed circuit board until the solder cools.
3. Lift out the transistor, and remove the old solder from the printed circuit board with a de-soldering tool such as a SOLDA PULLT®. Special care should be taken to prevent damage to the printed circuit board runs because part of the matching network is included in the base and collector runs.
4. Trim the new transistor leads (if required) to the lead length of the removed transistor. The letter "C" on the top of the transistor also indicates the collector (See Figures 3 and 4 for transistor lead identification).

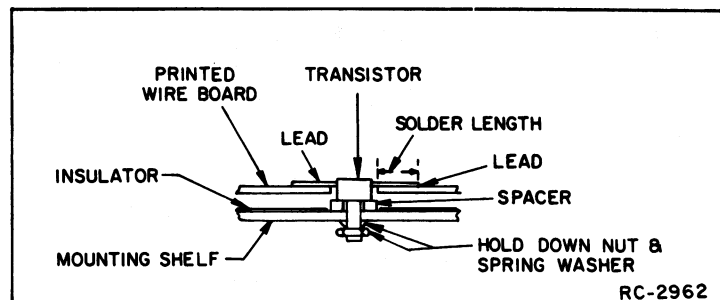
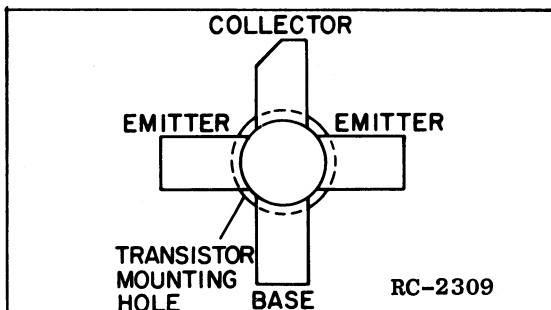


Figure 3 - Q205 Lead Identification

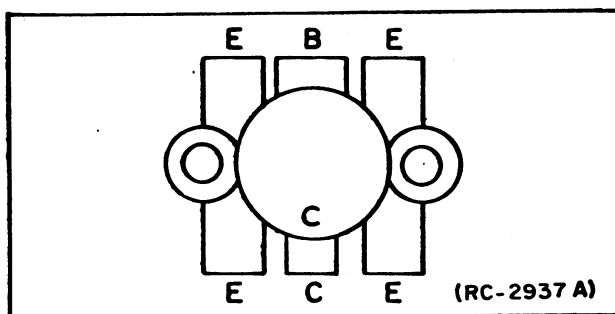


Figure 4 - Q206 Lead Identification

5. Apply a coat of silicon grease between the mounting surfaces of the spacer and to both sides of the insulator of Q205 and between the mounting surfaces of Q206 and the heat sink. Place the transistor in the mounting hole. Align the leads as shown on the Outline Diagram. Then hold the body of the transistor and replace the transistor mounting hardware, using moderate torque of 0.678 Newton meters (N.m) or 6 inch pounds) for No. 4 screw size or 0.9 N.m (8 inch pounds) for 8-32 nut. A torque wrench must be used for this adjustment since transistor damage can result if too little or too much torque is used.
6. Solder the leads to the printed circuit pattern. Start at the inner edge of mounting hole and solder the remaining length of transistor lead to the board. Use care not to use excessive heat that causes the printed wire board runs to lift up from the board. Check for shorts and solder bridges.

## CAUTION

Failure to solder the transistor leads as directed may result in the generation of RF loops that could damage the transistor or may cause low power output.

7. Replace Tx/Rx board and reassemble radio.

## REMOVING IC'S

Removing IC's (and all other soldered-in components) can be easily accomplished by using a de-soldering tool such as a SOLDA PULLT® or equivalent. To remove an

IC, heat each lead separately on the solder side and remove the old solder with the de-soldering tool.

An alternate method is to use a special soldering tip that heats all of the pins simultaneously.

## TEST AND TROUBLESHOOTING PROCEDURES

Maintenance of your Century II radio is facilitated by use of the Troubleshooting Flow Charts and servicing techniques unique to this radio. The Troubleshooting Chart is designed to lead you rapidly to the defective component or circuit. Typical voltage readings are provided on the Schematic Diagram for your reference when troubleshooting.

Troubleshooting charts are provided for most major problems that might arise in the Transmitter/Receiver section of the radio. Refer to Figure 6 when servicing the transmitter and to Figure 7 when servicing the receiver.

## SERVICING TECHNIQUES

The high density plug-in design of the modular radio lends itself well to rapid isolation of malfunctions in the voltage and signal paths. Due to the modular construction of the radio i.e., Tx/Rx board, interconnect/multi-frequency board, Channel Guard board etc., a majority of the signals and voltages go through the connectors on the interconnect/multi-frequency board.

To isolate a signal or voltage path to determine loading effects, locate short circuits, etc. carefully insert an insulator (plastic wand, toothpick) between the appropriate pins of the related molex connector to create an open circuit. Signals paths that may be isolated include: GC Tone, Volume SQ HI, filtered volume squelch HI PTT, Rx MUTE, CG DISABLE, SPKR HI and Tx/Rx oscillator compensation voltage on multi-frequency radios.

## TEST POINTS

RF Detector probes for the transmitter and receiver section are available for alignment purposes and to monitor the exciter output at TP204, 1st receiver injection at TP401 and the 2nd IF at TP501. An RF signal probe also is available to monitor the transmitter frequency.

Seven test points are provided at critical circuit locations to monitor operation.

They are as follows:

TRANSMITTER		RECEIVER	
TP201	Transmitter Oscillator/Exciter Ampl-1	TP301	Tripler Output - Q303
TP202	Tripler	TP401	Receiver 1st oscillator injection
TP203	Exciter Ampl-2	TP501	455 kHz IF
TP204	Exciter RF Input to Ampl-3		

## CAUTION

Before bench testing the radio, be sure of the output voltage characteristics of your bench power supply.

To protect the transmitter power output transistors from possible instant destruction, the following input voltages must not be exceeded:

Transmitter unkeyed: 20 Volts

Transmitter keyed (50 ohm resistive load): 18 Volts

Transmitter keyed (no load or non-resistive load): 15.5 Volts

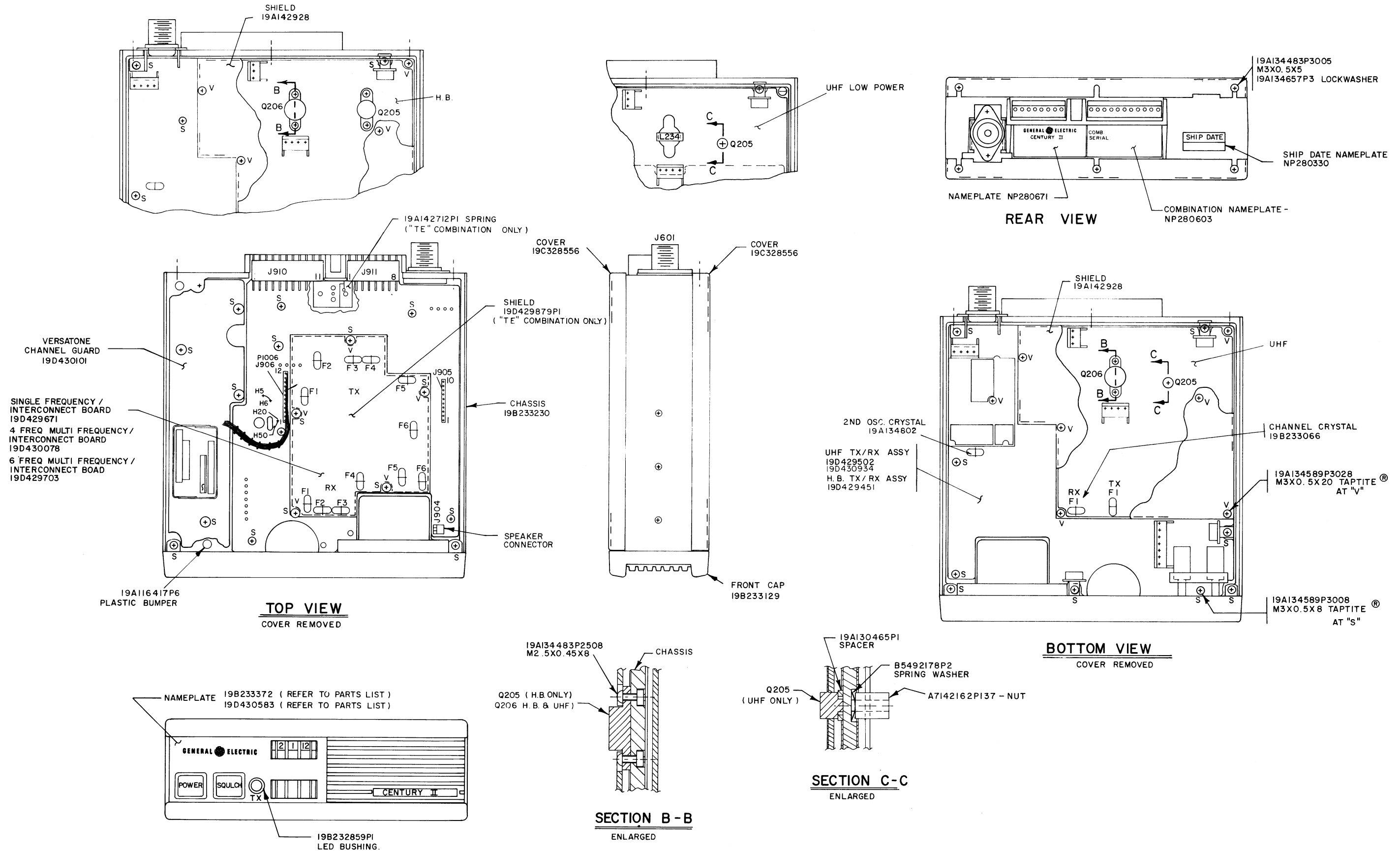
These voltages are specified at the normal vehicle battery terminals of the radio and take the voltage drop of standard cables into account. The voltage limits shown for a non-optimum load is for "worst case" conditions. For antenna mismatches likely to be encountered in practice, the actual limit will approach the 18 Volt figure.

Routine transmitter tests should be performed at EIA Standard Test Voltages (13.8 VDC for loads of 0 to 6 amperes: Input voltages must not exceed the limits shown, even for transient peaks of short duration.

Many commonly used bench power supplies cannot meet these requirements for load regulation and transient voltage suppression. Bench supplies which employ "brute force" regulation and filtering may be usable when operated in parallel with a 12 Volt automotive storage battery.

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

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TEST EQUIPMENT

- 1. Audio Oscillator
- 2. Deviation Monitor
- 3. Voltmeter
- 4. Wattmeter, 50 ohm
- 5. Frequency Counter
- 6. RF Detector Probe (Transmitter)
- 7. RF Detector Probe (Receiver)
- 8. RF Signal Probe

OSCILLATOR FREQUENCY ADJUSTMENT

First, check the frequency to determine if any adjustment is required. The frequency should be set using a frequency meter or counter with an absolute accuracy that is 5 to 10 times better than the tolerance to be maintained at room temperature. The oscillator should be reset only when the frequency error is greater than  $\pm 5$  PPM at room temperature.

When setting the transmitter oscillator frequency, adjust L151 (single frequency unit) or L921-L926 (multi-frequency units) to the assigned operating frequency.

To set the frequency of the receiver 1st injection oscillator, connect the RF signal probe to TP401 and adjust L501 for the assigned receiver frequency -21.4 MHz (low side injection) or +21.4 MHz (high side injection).

MODULATION LEVEL ADJUSTMENT

CAUTION

DO NOT remove microphone from hanger or place CG Mon switch to MON position when making this adjustment. DAMAGE to equipment will result.

A Channel Guard Encode Disable circuit has been incorporated as a maintenance aid to allow the service technician to make transmitter distortion and modulation checks without removing the cover from the radio. To disable the CG Encode circuit apply a positive voltage (+8.5 to 14.0 VDC) to molex connector J910-5. (This can easily be accomplished by temporarily connecting a jumper between P910-5 and P910-11 on rear of radio.)

MOD ADJUST Control R116 has been adjusted to the proper setting before shipment and normally does not require readjustment. This setting permits approximately 75% modulation for the average voice level.

NOTE

The Channel Guard modulation level adjustment should be repeated each time the tone frequency is changed.

PROCEDURE

1. Connect the audio oscillator and the AC voltmeter across audio input terminals J911-4 (Hi) and J911-3 (Lo) on the interconnect/multi-frequency board.
2. Adjust the audio oscillator for 1 Volt RMS at 1000 Hz.

DEVIATION ADJUSTMENT

1. For single frequency transmitters without Channel Guard, set MOD ADJUST R116 for a 4.5 kHz swing with the deviation polarity which gives the highest reading as indicated on the deviation monitor.
2. For multi-frequency transmitter set R956-R961 to maximum then adjust R116 for 5.0 kHz deviation on channel with lowest deviation. Now, step through each channel and adjust R956-R951 to produce 4.5 kHz deviation on each channel.

NOTE

If the deviation reading plus (+) or minus (-) differs more than 0.5 kHz, recheck Step 1 as shown in the Transmitter Alignment Chart.

3. For single frequency transmitters with Channel Guard, set CHANNEL GUARD MOD ADJUST R1015 for zero tone deviation. Next, with the 1 Volt signal at 1000 Hz applied, set MOD ADJUST R116 for 3.75 kHz deviation. Then remove the signal from the audio oscillator and set Channel Guard MOD ADJUST R1015 for 0.75 kHz tone deviation.
4. For multi-frequency transmitters, set the deviation as described above for each channel. Refer to multi-frequency diagram for MOD ADJUST control designations. Refer to the Outline Diagram for control location.

AUDIO CHECKS

TEST EQUIPMENT REQUIRED

- Audio Oscillator
- AC Voltmeter
- Oscilloscope
- Deviation Monitor

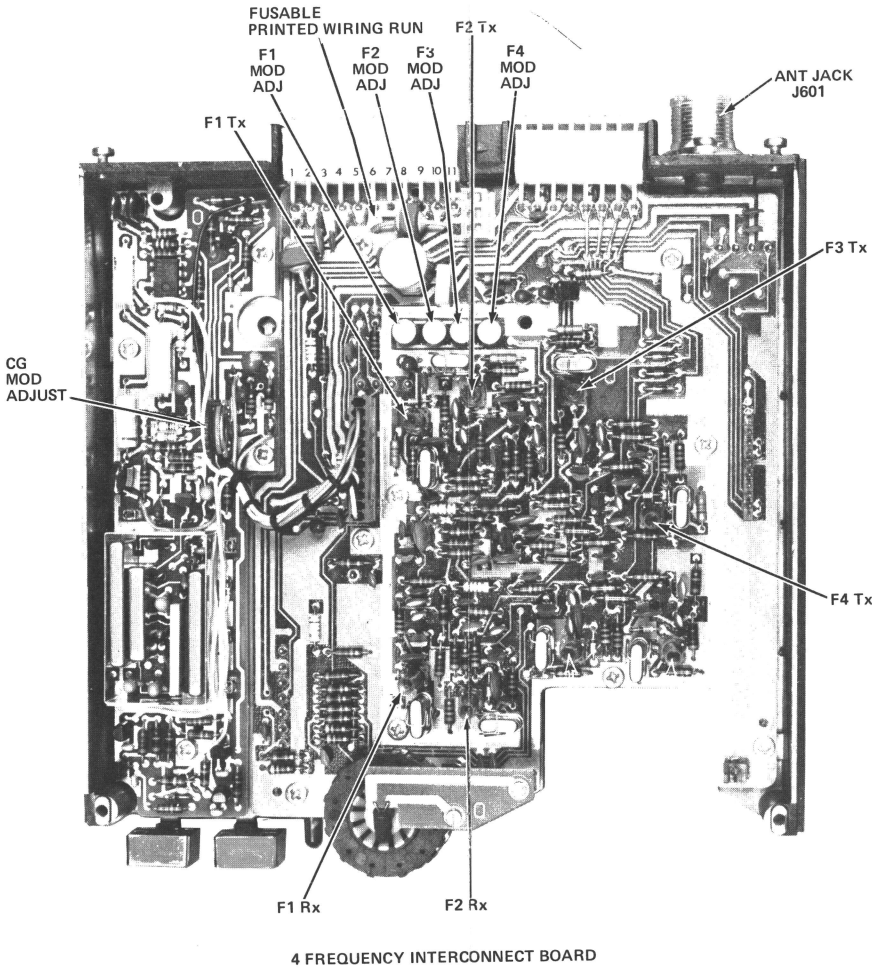
AUDIO AC VOLTAGES

1. Connect audio oscillator output across J911-4 (Mic Hi) and J911-3 (Mic Lo).

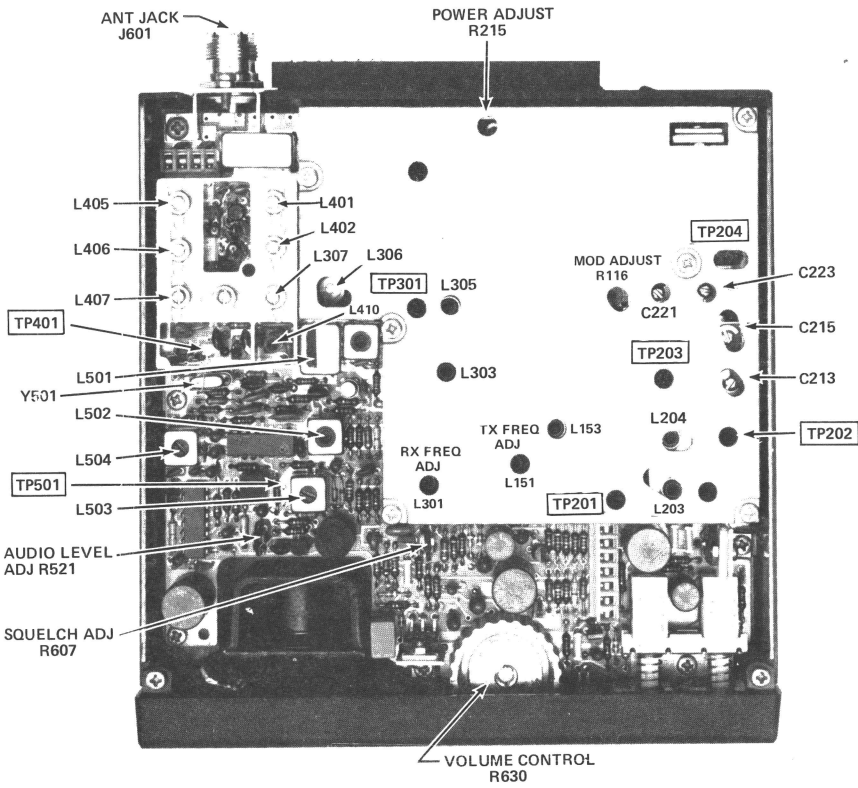
SCOPE SETTING		U101-7	C110 (+)
	HORIZONTAL	200 U SEC/DIV	200 U SEC/DIV
	VERTICAL	2 VOLTS/DIV	2 VOLTS/DIV
SET AUDIO OSCILLATOR AT 1000 Hz WITH OUTPUT OF 1.0 VRMS. R116 ADJUSTED FOR 4.5 kHz DEVIATION.			
NOTE: AN RMS OR PEAK READING VOLT METER WILL READ 1/2 TO 1/3 OF PEAK-TO-PEAK READINGS.			

AUDIO SENSITIVITY

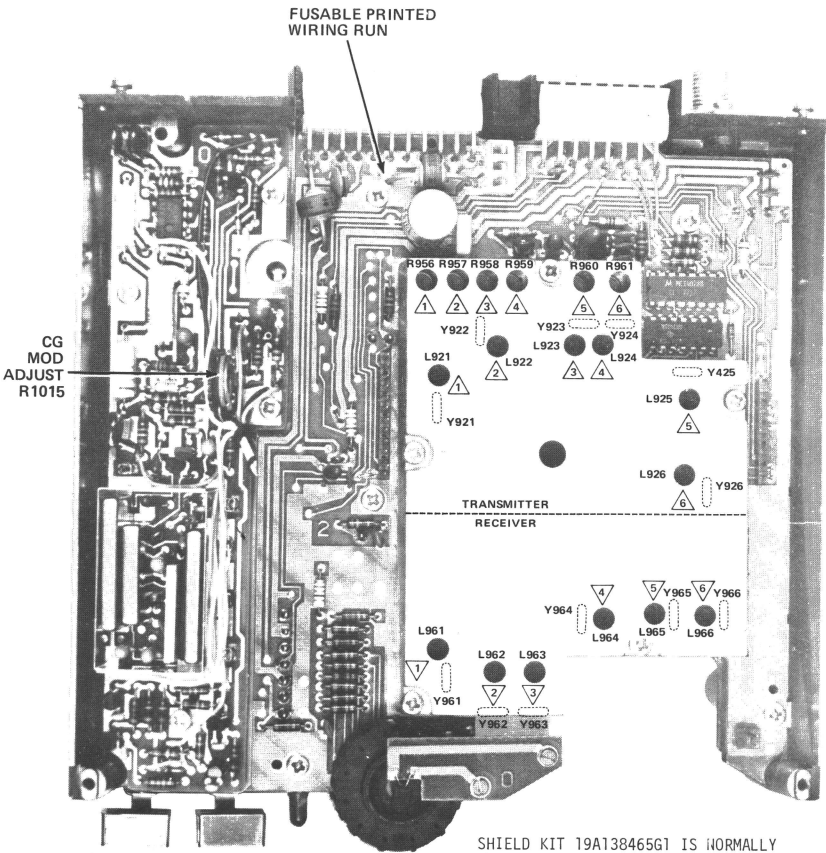
1. Connect audio oscillator output across J911-4 (Mic Hi) and J911-3 (Mic Lo). Adjust output for 1000 Hz at 1.0 VRMS.
2. Reduce generator output until deviation falls to 3.0 kHz for radios without Channel Guard or to 2.25 kHz for radios with Channel Guard. Voltage should be less than 120 millivolts.



4 FREQUENCY INTERCONNECT BOARD



Tx/Rx BOARD



△ = Tx CHANNEL  
▽ = Rx CHANNEL  
R956-R961 = MOD ADJUST CONTROLS FOR F1-F6

MULTI-FREQUENCY BOARD

TRANSMITTER ALIGNMENT PROCEDURE

TRANSMITTER ALIGNMENT

TEST EQUIPMENT

- 1. 50 ohm Wattmeter
- 2. Tx RF Detector Probe (19C330130G1)
- 3. RF Signal Probe
- 4. DC Probe
- 5. Voltmeter
- 6. Power Supply 13.8V Regulated
- 7. Audio Signal Generator

PRELIMINARY CHECK AND ADJUSTMENTS

NOTE

Refer to photographs to locate CONTROLS, TEST POINTS and CRYSTALS.

- 1. Place crystal for single frequency units on Transmitter/Receiver board. For multi-frequency units, all transmitter crystals are installed on the multi-frequency board. In multi-frequency transmitters with a Channel spacing greater than 2.75 MHz but less than 5.5 MHz, the

transmitter must be aligned to the center frequency. These limits can be extended to 10.5 MHz with 1 dB degradation. If a center frequency is available on an existing channel, use it. If not, a center frequency crystal must be installed to properly align the transmitter.

- 2. For a large change in frequency or a badly misaligned transmitter, preset all slugs to the top of the coil form, and all variable capacitors for minimum capacitance (open).
- 3. Set power adjust control R215 to minimum - fully counterclockwise.
- 4. All adjustments are made with transmitter keyed. Unkey the transmitter between steps to avoid overheating.
- 5. The DC Probe and voltmeter set on the 1 Volt DC scale is used to monitor TP201 - TP203 when aligning the transmitter. The Transmit RF Detector probe connected to a VOM is used to monitor TP204.
- 6. Transmit Frequency is set by L151 with the RF Signal Probe connected to TP204 and a frequency counter. See Step 6.

ALIGNMENT PROCEDURE

STEP	TEST POINT	TUNING CONTROL	PROCEDURE
1.	TP201	L151, L153, L203	Tune L151 then L153 for peak meter reading. Then tune L203 for a dip. In multi-frequency units tune L921-L926 for max. meter reading.
2.	TP202	L204, L151, L153, L203-C213	Tune L204 for maximum meter reading. Repeak L203, L153 and L151. Tune C213 for a dip in meter reading.
3.	TP203	C215, C213, L204, C221	Tune C215 for maximum meter reading. Repeak C213 and L204. Tune C221 for a dip in meter reading.
4.	TP204	C221, C223	Tune C221 and C223 for maximum meter reading.
5.	WATTMETER	R215	Set R215 for maximum power output. Repeak all adjustments and then adjust R215 for rated output power.
6.	TP204	L151	Connect RF signal probe to TP204 and set L151 for assigned operating frequency (L921-L926 in multi-frequency radios). Repeak all adjustments.
7.	WATTMETER	R215	If necessary, readjust R215 for rated power output.

TRANSMITTER QUICK CHECKS

TEST POINT	PROBE	TYPICAL METER READING	PROBABLE DEFECTIVE STAGE		
			HIGH METER READING	LOW METER READING	ZERO METER READING
TP201	DC	0.15 Volts	Q201	Q151, Q201 Q202, Y151	Q201, Q151
TP202	DC	0.45 Volts	Q202	Q203, Q202	Q203
TP203	DC	0.35 Volts	Q203	Q202, Q203	Q203
TP204	Tx RF DET Probe	0.25 Volts		Q203	Q203

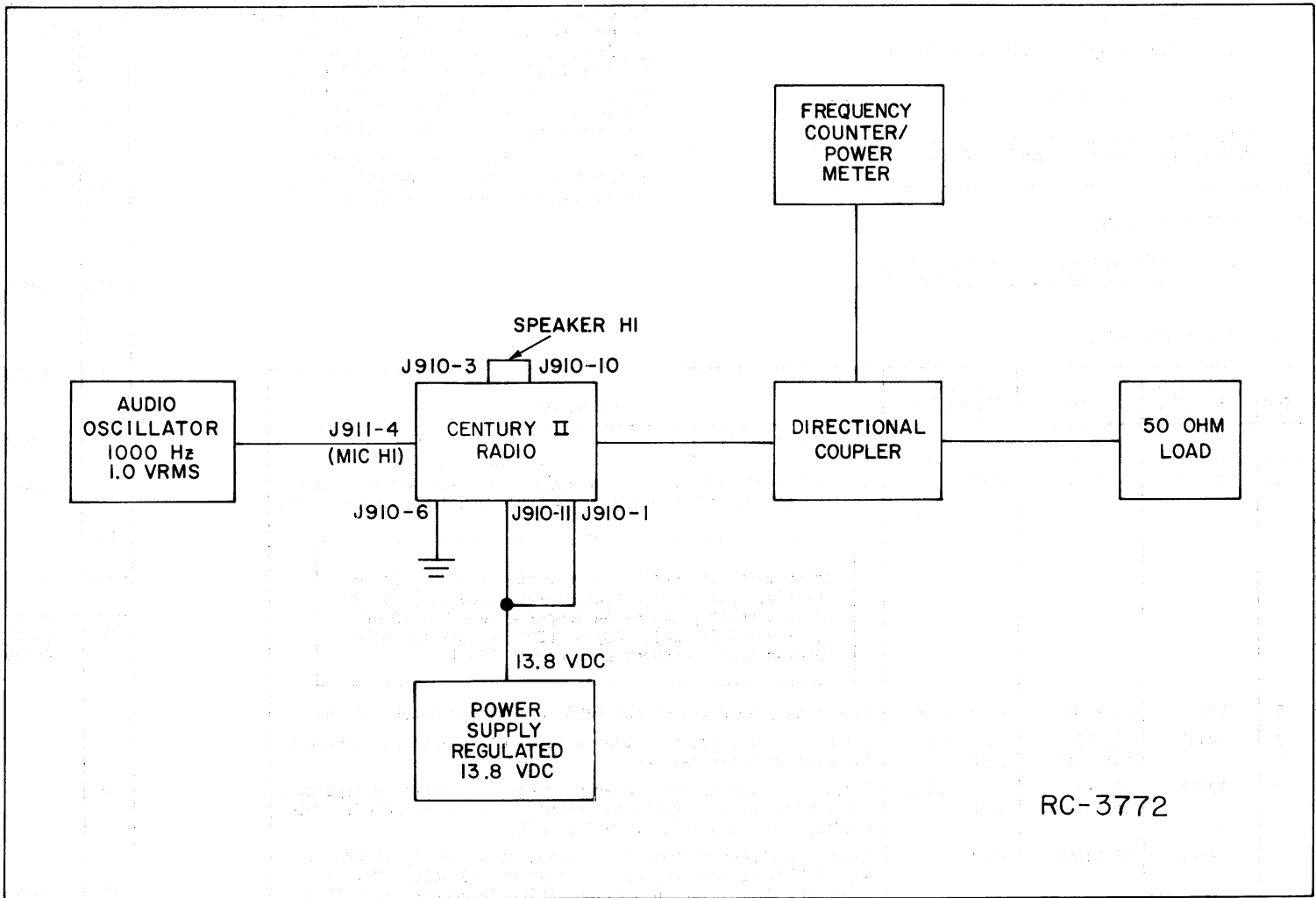


Figure 6 - Test Equipment Set Up

RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

- 1. RF Signal Generator (420-470 MHz)
- 2. DC Voltmeter
- 3. AC Voltmeter
- 4. Receiver RF Detector Probe
- 5. RF Signal Probe
- 6. Power Supply 13.8V Regulated

NOTE

Refer to photographs to locate CONTROLS, TEST POINTS and CRYSTALS.

PRELIMINARY CHECKS

- 1. Verify all crystals are in place. In single frequency radios the

ALIGNMENT PROCEDURE

STEP	METERING TEST POINT	PROBE	TUNING CONTROLS(s)	PROCEDURE
1ST OSCILLATOR MULTIPLIER				
1.	TP301	DC Probe	L301	With voltmeter on lowest range adjust L301 for maximum meter reading (In Multi-Frequency units L961-L966 for channels 1-6). <div>NOTE If no meter indication is observed at TP301, connect positive lead of RF Detector probe (red dot) to J301 using a short piece of DA jumper wire (AWG #18 or smaller - 1.024 mm). Adjust L301 for maximum meter reading then reconnect DC Probe to TP301.</div>
2.	TP301	DC Probe	L303, L305	Alternately adjust L303 and L305 for maximum meter reading.
3.	TP401	Rx RF Detector	C314, L307, L308	Set C314 to mid position then alternately adjust L307 and L308 for maximum meter reading.
4.	TP401	Rx Rf Detector	C314, L307, L308	Adjust C314 for maximum meter reading, then continue repeaking L307, L308 and C314 until no further increase is noted. Meter reading must be greater than 1.0 volts.
5.	TP401	RF Signal	L301	Connect a FREQUENCY COUNTER to TP401 using RF Signal Probe. Adjust L301 (Single Frequency Units) or L961-L966 (Multi-Frequency Units) for channel operating frequency minus 21.4 MHz (For radios using high side injection set frequency controls to Rx operating frequency +21.4 MHz). <div>NOTE It may be necessary to monitor TP301 with DC Probe and individually peak L961-L966 before setting frequency. If a peak cannot be obtained disconnect probe from TP301 and connect Rx RF Detector Probe to J301 using a short piece of solid hook up wire. Individually peak L961-L966. Set frequency for each channel as directed in Step 5.</div>
6.	TP301	DC Probe	L303, L305	Alternately adjust L303, and L305 for maximum meter reading.

- crystal (Y301) is located on the Transmitter/Receiver board. In multi-frequency radios all crystals for the 1st mixer injection oscillator are located on the multi-frequency board.
- 2. In multi-frequency receivers with a channel spacing greater than 1 MHz and less than 3 MHz, the receiver must be tuned to the center frequency. These limits can be extended to 3.0 MHz with 3 dB degradation. If a center frequency is available on an existing channel, use it. If not, a center frequency crystal must be installed to properly align the receiver.
  - 3. Disable Channel Guard by removing microphone from hookswitch or by connecting ground to J910-5.

STEP	METERING TEST POINT	PROBE	TUNING CONTROL(S)	PROCEDURE
IF ALIGNMENT				
7.	TP401, TP501	RF Signal RF DETECTOR	L503	Connect RF signal generator to TP401 using RF Signal Probe. Connect RF DETECTOR Probe and VOM to TP501. Use 0.5 or 1.0 V scale. Set RF signal generator output to channel frequency at the minimum level sufficient to provide a mid scale meter indication. Adjust L503 for maximum indication.
8.	Same as Step 5	Same as Step 5	L502, L501, L410	Reduce the output of the signal generator as required to keep the detected RF level within the 0.5 to 1.0 volt range. Adjust L502, L501 and L410 respectively for maximum indication on meter. Alternately adjust L410 and L501 to obtain maximum meter reading. Disconnect RF Signal Generator from TP401.
FRONT END ALIGNMENT				
9.	TP501	Rx RF DETECTOR	---	Connect signal generator to Antenna input jack J601. Verify Rx RF Detector Probe is connected to TP501 and VOM. Adjust signal generator to RF channel frequency or to center frequency. Adjust output level of signal generator for a VOM reading between 0.5 and 1.0 Volts.
10.	TP501	Rx RF DETECTOR	L405, L406, L407	Detune L405 and L407 as much as possible. Tune L406 through entire range while noting peak readings on VOM. Adjust L406 for maximum meter reading. DO NOT readjust. Alternately readjust L407 and L405 for maximum VOM reading.
11.	TP501	Rx RF DETECTOR	L402, L401	Alternately adjust L402 and L401 for maximum VOM reading. Reduce generator output to maintain a VOM reading of 0.5 to 1.0 Volts.
12.	TP501	Rx RF DETECTOR	L308	Carefully adjust L308 (±1/4 turn) for maximum meter reading.
13.	TP501	Rx RF DETECTOR	L405, L410, L407, L402	Alternately adjust L410, L407 and L405 and L402 for maximum meter reading.
14.	---	---	---	Remove all test equipment. Replace center frequency crystal if used.
DETECTOR/AUDIO ALIGNMENT				
15.	Audio Output	---	L504	Apply a 1000 µV RF signal modulated with 1000 Hz to antenna input jack J601. Connect external speaker leads J910-3, J910-7 to a four ohm resistive load. Set audio level control R521 and volume control R630 to mid position. Connect AC Voltmeter/distortion analyzer across four ohm load.  Adjust L504 for maximum meter reading. Reduce volume control as necessary to keep output voltage from exceeding 2.0 VRMS.
16.		---	L501, L406	Adjust volume control for a level of 2.0 VRMS on AC voltmeter. Note the position of tuning slugs in L501 and L410. Slowly adjust L501 and L410 ±1/4 turn for minimum distortion on distortion analyzer. If no improvement is noted return slugs to original position.
17.	P903-3	---	R521	Connect AC Voltmeter having a minimum input impedance of 1 megohm (don't use the AC scale of a VOM!) to P903-3. Adjust audio level control R521 for a meter reading of 300 ±5 mV.
18.				Reconnect AC Voltmeter across external speaker leads, J910-3 (SPKR HI) and J910-7 (SPEAKER LO). Adjust volume control for 3 Watts (3.46 VRMS across 4 ohm load).
19.				Measure audio distortion using Distortion Analyzer. Distortion should be less than 5%.

FIXED SQUELCH ADJUSTMENT

- 1. Connect a signal generator to antenna jack J601 and adjust for a nominal 9 dB SINAD signal.
- 2. Set SQUELCH CONTROL pushbutton to its "out" position.
- 3. Adjust squelch control R607 to maximum squelch. Receiver must be muted.
- 4. Adjust squelch control R607 slowly until receiver unmutes.
- 5. Check that the squelch opens at an input signal level corresponding to 8 dB SINAD (±1 dBS).

RECEIVER ALIGNMENT PROCEDURES

## TEST PROCEDURES

These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect can be quickly localized. Once the defective stage is pin-pointed, refer to the "Service Check" listed to correct the problem. Additional corrective measures are included in the Troubleshooting Procedure. Before starting with the Receiver Test Procedures, be sure the receiver is tuned and aligned to the proper operating frequency.

### TEST EQUIPMENT REQUIRED

- Distortion Analyzer
- Signal Generator
- 6 dB attenuation pad, and 4.0 ohm, 5 Watt resistor

### PRELIMINARY ADJUSTMENTS

#### NOTE

These procedures are written around the Heathkit Distortion Analyzer. If a Distortion Analyzer other than the Heath IM-12 is used, measure the sensitivity and modulation acceptance bandwidth in accordance with manufacturer's instructions.

1. PUSH SQUELCH PUSHBUTTON "in" to defeat Squelch Circuit. Do not adjust squelch control.

## STEP 1

### AUDIO POWER OUTPUT AND DISTORTION

#### TEST PROCEDURE

Measure Audio Power Output as follows:

- A. Apply a 1000 microvolt, on-frequency test signal modulated by 1,000 hertz with  $\pm 3.0$  kHz deviation to antenna jack J601.

- B. With 3 Watt Speaker

Disconnect speaker J904.

Connect a 4.0 ohm, 5 Watt load resistor across J904-1 & 2.

Connect the Distortion Analyzer input across the resistor as shown.

- C. Adjust the VOLUME control for 3 Watt output 3.46 VRMS using the Distortion Analyzer as a voltmeter.
- D. Make distortion measurements according to manufacturer's instructions. Reading should be less than 5%. If the receiver sensitivity is to be measured, leave all controls and equipment as they are.

#### SERVICE CHECK

If the distortion is more than 5%, or maximum audio output is less than 3 Watts, make the following checks:

- E. Battery and regulator voltage---low voltage will cause distortion. (Refer to Receiver Schematic Diagram for voltages.)
- F. Audio Gain (Refer to Receiver Troubleshooting Procedure).
- G. FM Detector Alignment (Refer to Receiver Alignment).

## STEP 2

### USABLE SENSITIVITY (12 DB SINAD)

If STEP 1 checks out properly, measure the receiver sensitivity as follows:

- A. Apply a 1000 microvolt, on-frequency signal modulated by 1000 Hz with 3.0 kHz deviation to J601.
- B. Place the RANGE switch on the Distortion Analyzer in the 200 to 2000 Hz distortion range position (1000 Hz filter in the circuit). Tune the filter for minimum reading or null on the lowest possible scale (100%, 30%, etc.).
- C. Place the RANGE switch to the SET LEVEL position (filter out of the circuit) and adjust the input LEVEL control for a +2 dB reading on a mid range (30%).
- D. Set signal generator output to 0.4  $\mu$ V. Switch the RANGE control from SET LEVEL to the distortion range. Readjust Distortion Analyzer SET LEVEL as required until a 12 dB difference (+2 dB to -10 dB) is obtained between the SET LEVEL and distortion range positions (filter out and filter in).
- E. The 12 dB difference (Signal plus Noise and Distortion to noise plus distortion ratio) is the "usable" sensitivity level. The sensitivity should be less than rated 12 dB SINAD specifications with an audio output of at least 1.5 Watts (0.56 Volts RMS across the 4.0 ohm receiver load using the Distortion Analyzer as a Voltmeter).
- F. Leave all controls as they are and all equipment connected if the Modulation Acceptance Bandwidth test is to be performed.

#### SERVICE CHECK

If the sensitivity level is more than rated 12 dB SINAD, check the alignment of the RF stages as directed in the Alignment Procedure.

## STEP 3

### MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

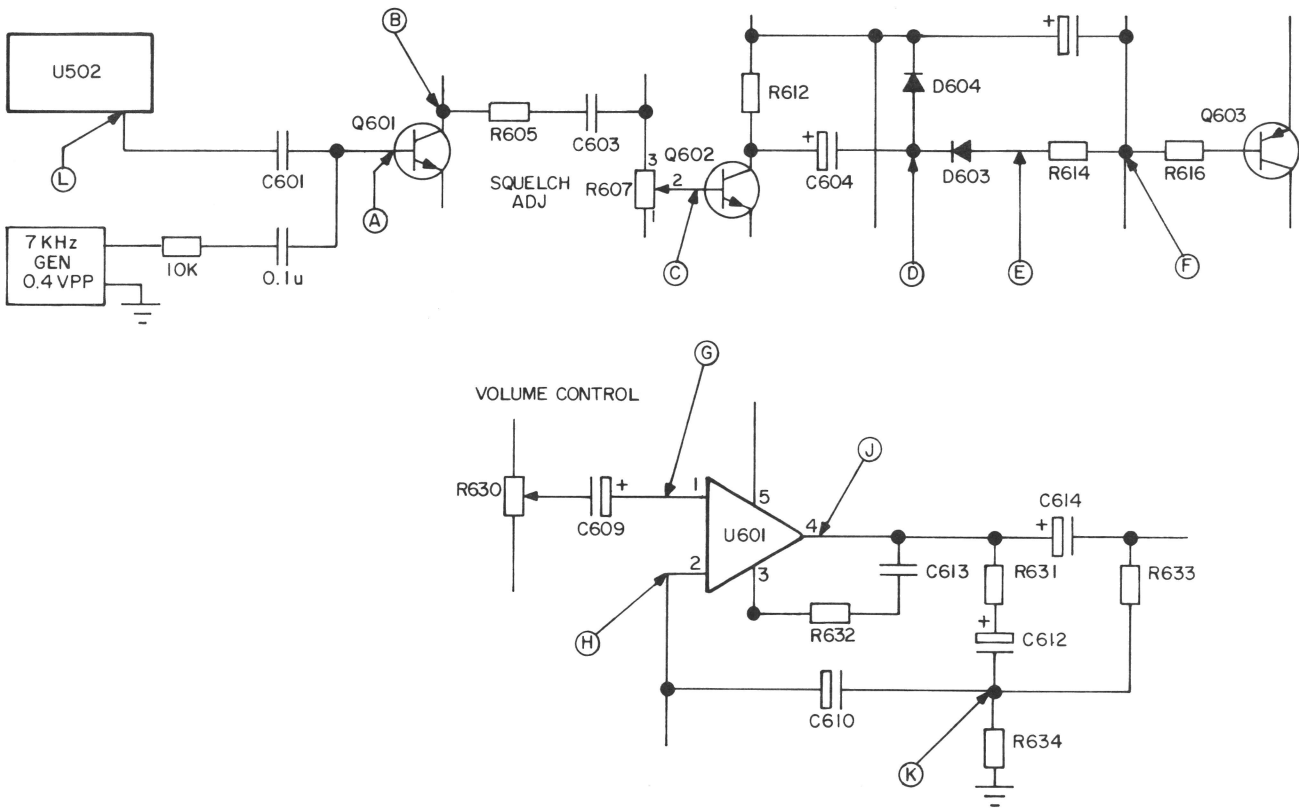
If STEPS 1 and 2 check out properly, measure the bandwidth as follows:

- A. Set the Signal Generator output for twice the microvolt reading obtained in the 12 dB SINAD measurement.
- B. Set the RANGE control on the Distortion Analyzer in the SET LEVEL position (1000 Hz filter out of the circuit), and adjust the input LEVEL control for a +2 dB reading on the 30% range.
- C. While increasing the deviation of the Signal Generator, switch the RANGE control from SET LEVEL to distortion range until a 12 dB difference is obtained between the SET LEVEL and distortion range readings (from +2 dB to -10 dB).
- D. The deviation control reading for the 12 dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than  $\pm 7$  kHz.

#### SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, refer to the Receiver Troubleshooting Procedure.

AUDIO AND SQUELCH WAVEFORMS

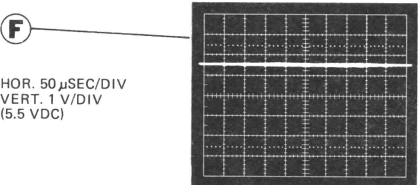
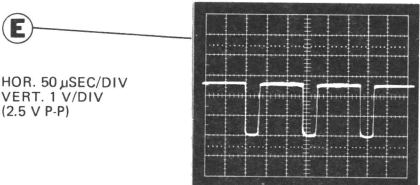
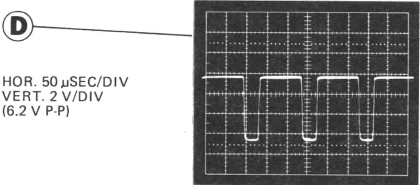
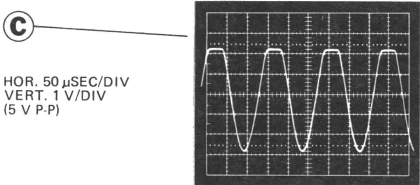
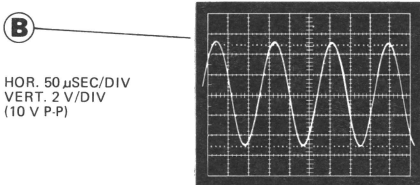
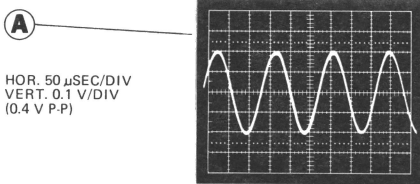


RC-3774

SQUELCH CIRCUIT TEST WITH 7 kHz SIGNAL

PRELIMINARY STEPS

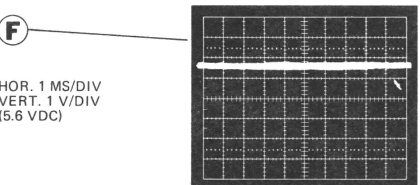
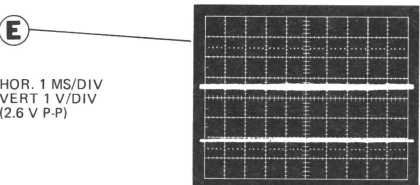
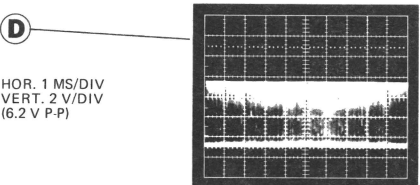
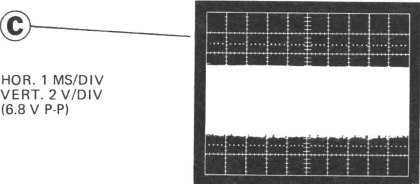
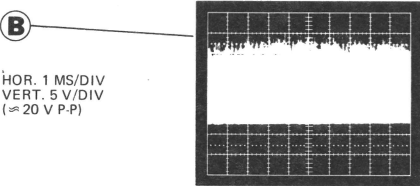
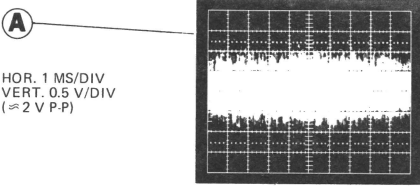
1. Quiet receiver with 1000 uV unmodulated signal.
2. Squelch Adjust R607 to maximum (Rotate control toward rear of radio.)
3. Squelch pushbutton in OUT position.
4. Use 10 megohm probe.



SQUELCH CIRCUIT CHECKS WITH NOISE

PRELIMINARY STEPS

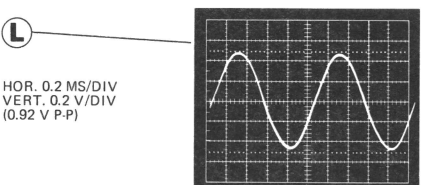
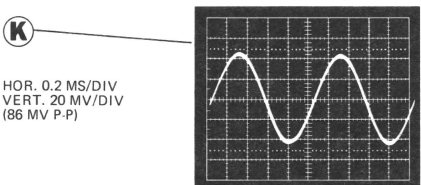
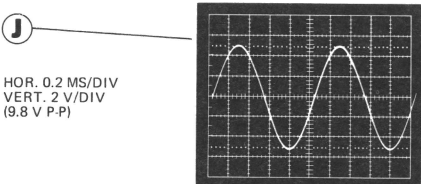
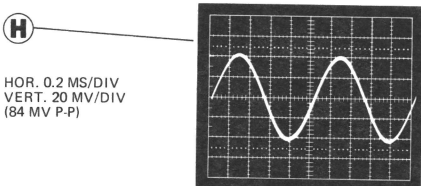
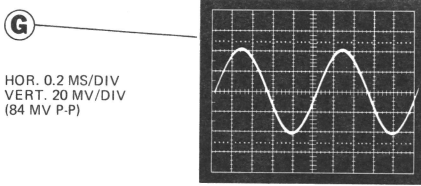
1. No input signal applied.
2. Squelch Adjust R607 to maximum (Rotate toward rear of radio.)
3. Squelch pushbutton in OUT position.
4. Use 10 megohm probe.

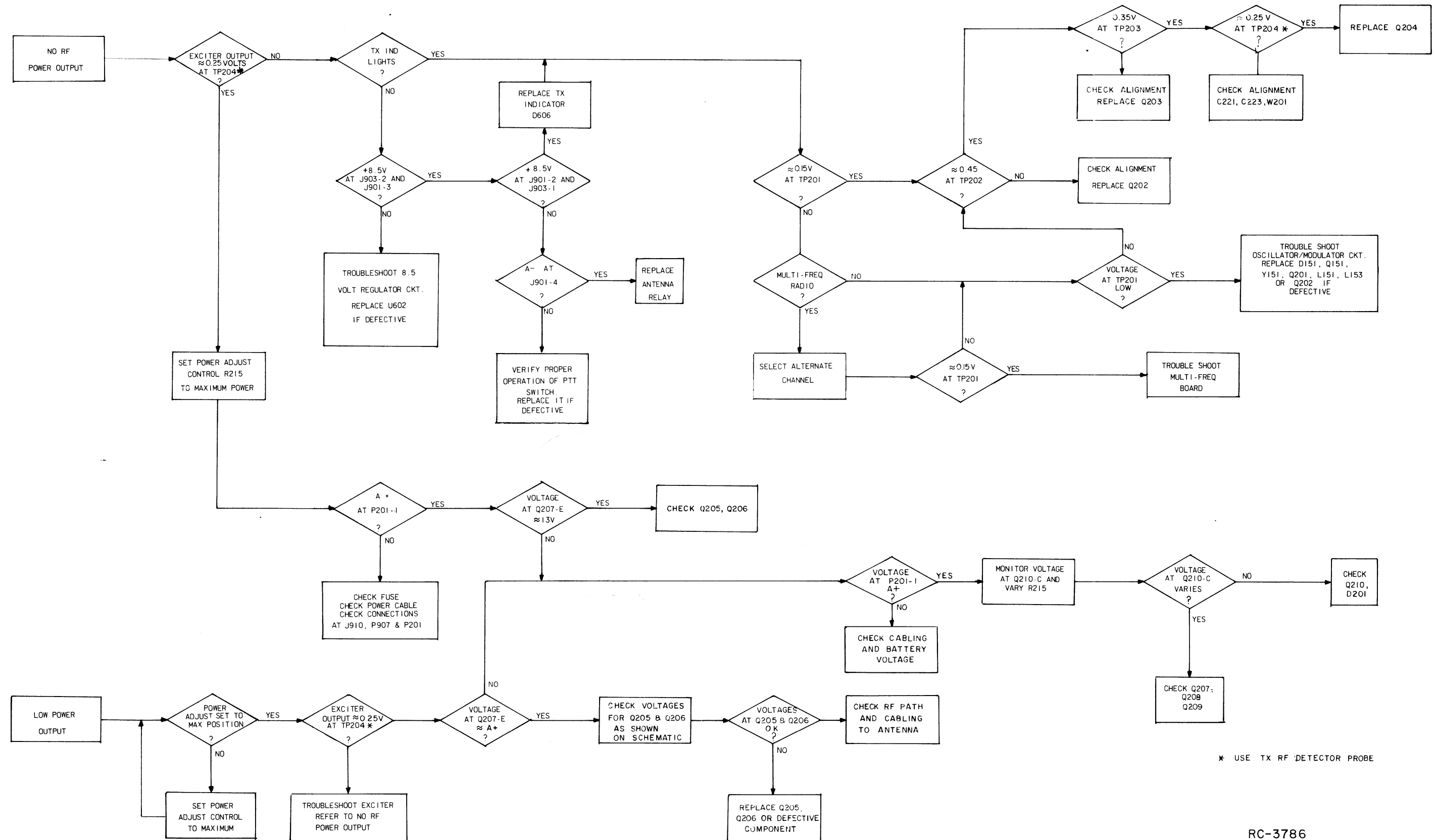


AUDIO CIRCUIT CHECKS

PRELIMINARY STEPS

1. Apply 1000 uV on frequency signal with 1000 Hz modulation and 3 kHz deviation to antenna jack J601.
2. Squelch pushbutton "IN".
3. Output set for 3-Watts (3.46 VRMS) into 4-ohm load.
4. Use 1 megohm probe.

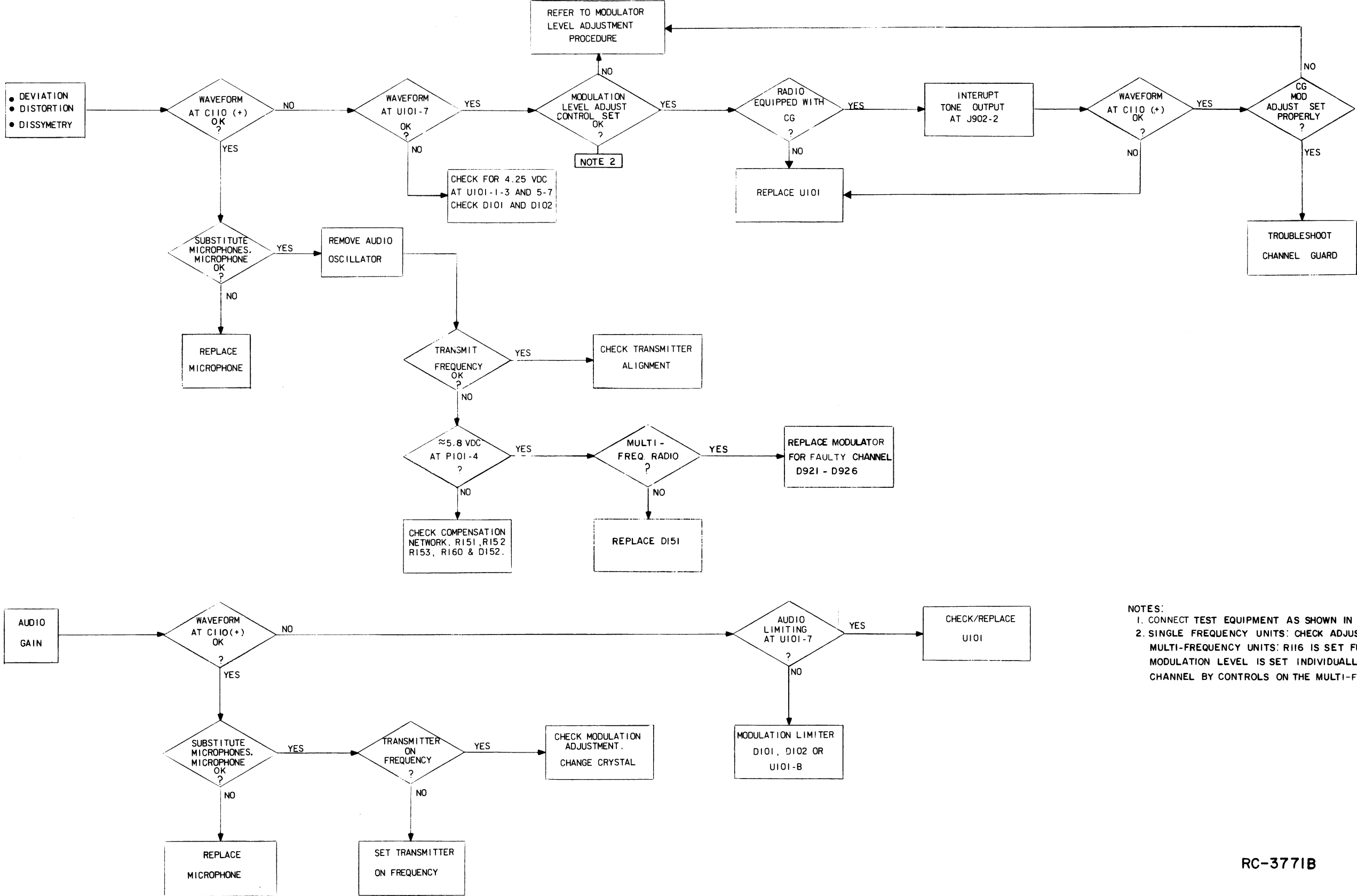




RC-3786

## TRANSMITTER TROUBLESHOOTING FLOW CHART

Figure 7 (Sheet 1)



NOTES:  
1. CONNECT TEST EQUIPMENT AS SHOWN IN FIGURE 6.  
2. SINGLE FREQUENCY UNITS: CHECK ADJUSTMENT OF R116.  
MULTI-FREQUENCY UNITS: R116 IS SET FULL CLOCKWISE.  
MODULATION LEVEL IS SET INDIVIDUALLY FOR EACH CHANNEL BY CONTROLS ON THE MULTI-FREQUENCY BOARD.

RC-3771B

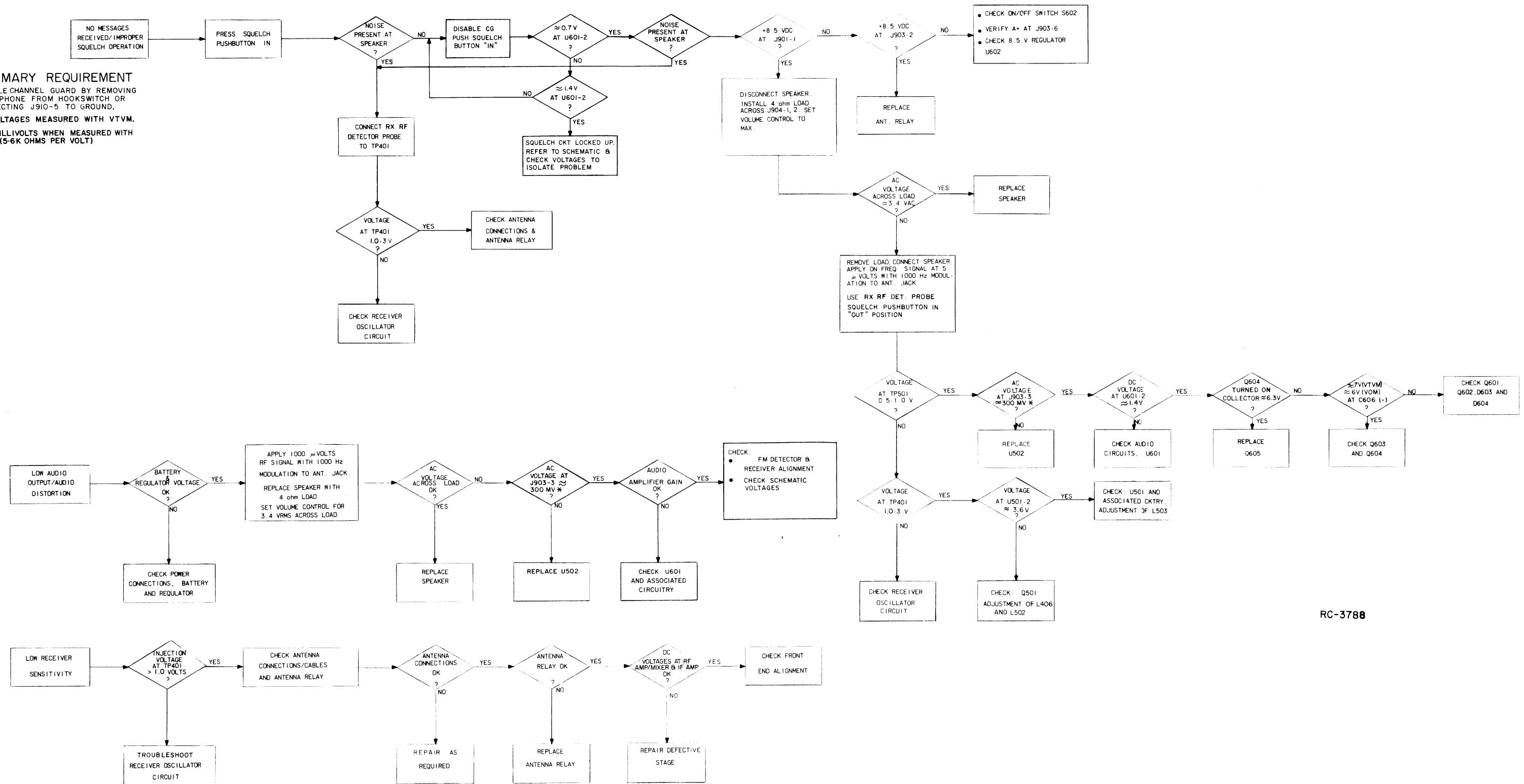
TRANSMITTER TROUBLESHOOTING FLOW CHART

## PRELIMINARY REQUIREMENT

1. DISABLE CHANNEL GUARD BY REMOVING MICROPHONE FROM HOOKSWITCH OR CONNECTING J910-5 TO GROUND.

2. AC VOLTAGES MEASURED WITH VTVM.

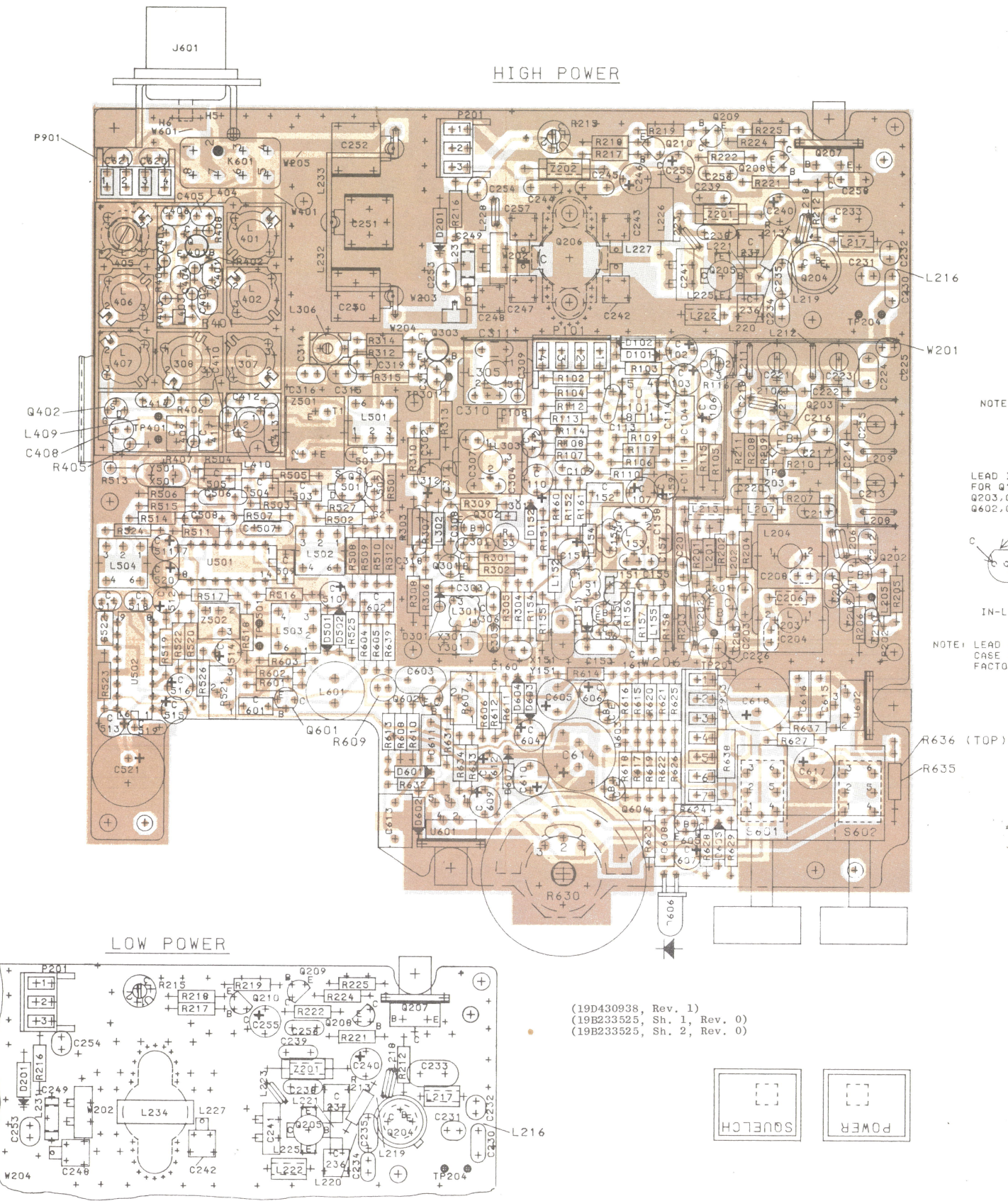
\* 200 MILLIVOLTS WHEN MEASURED WITH VOM (5-6K OHMS PER VOLT)



RC-3788

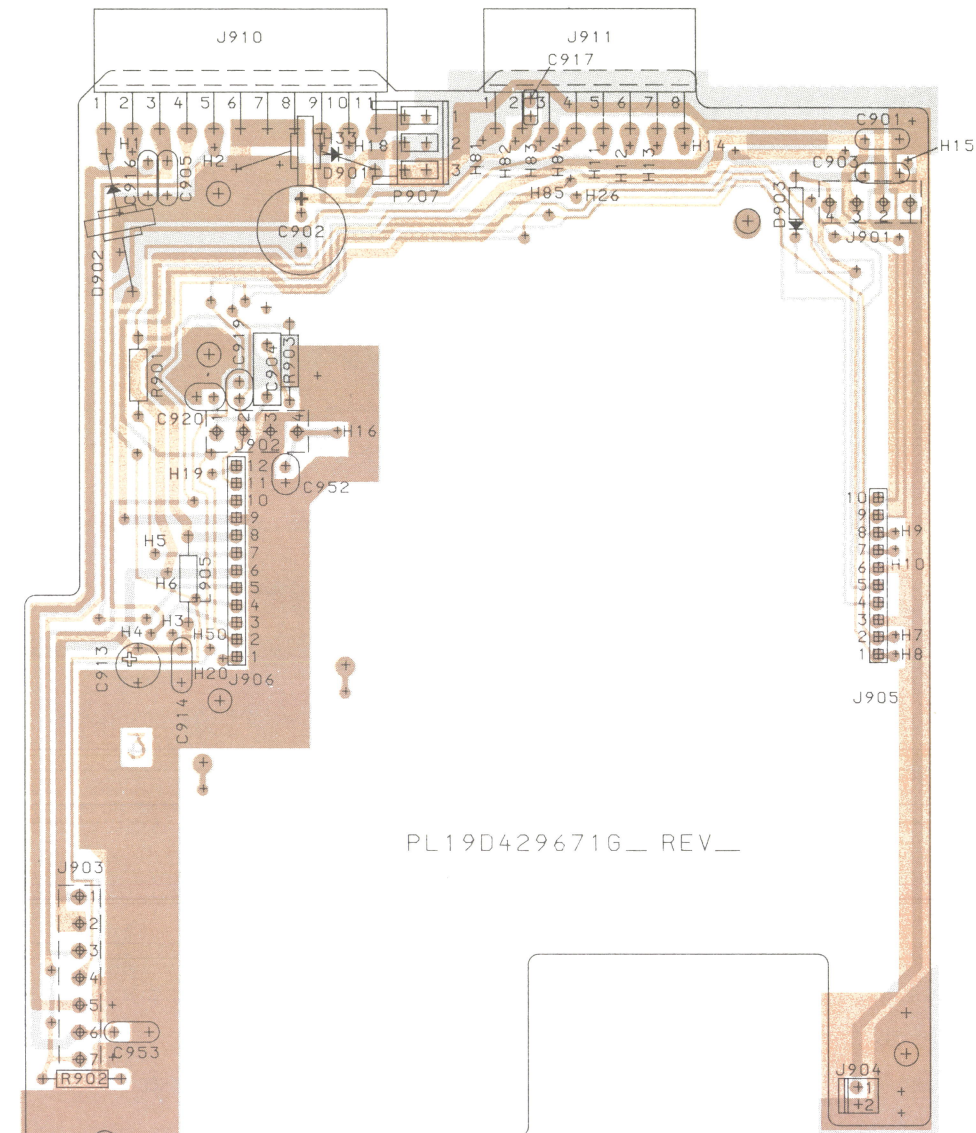
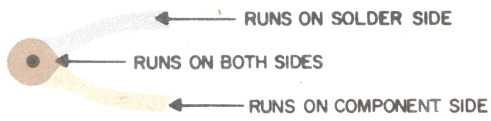
RECEIVER TROUBLESHOOTING FLOW CHART

Figure 8



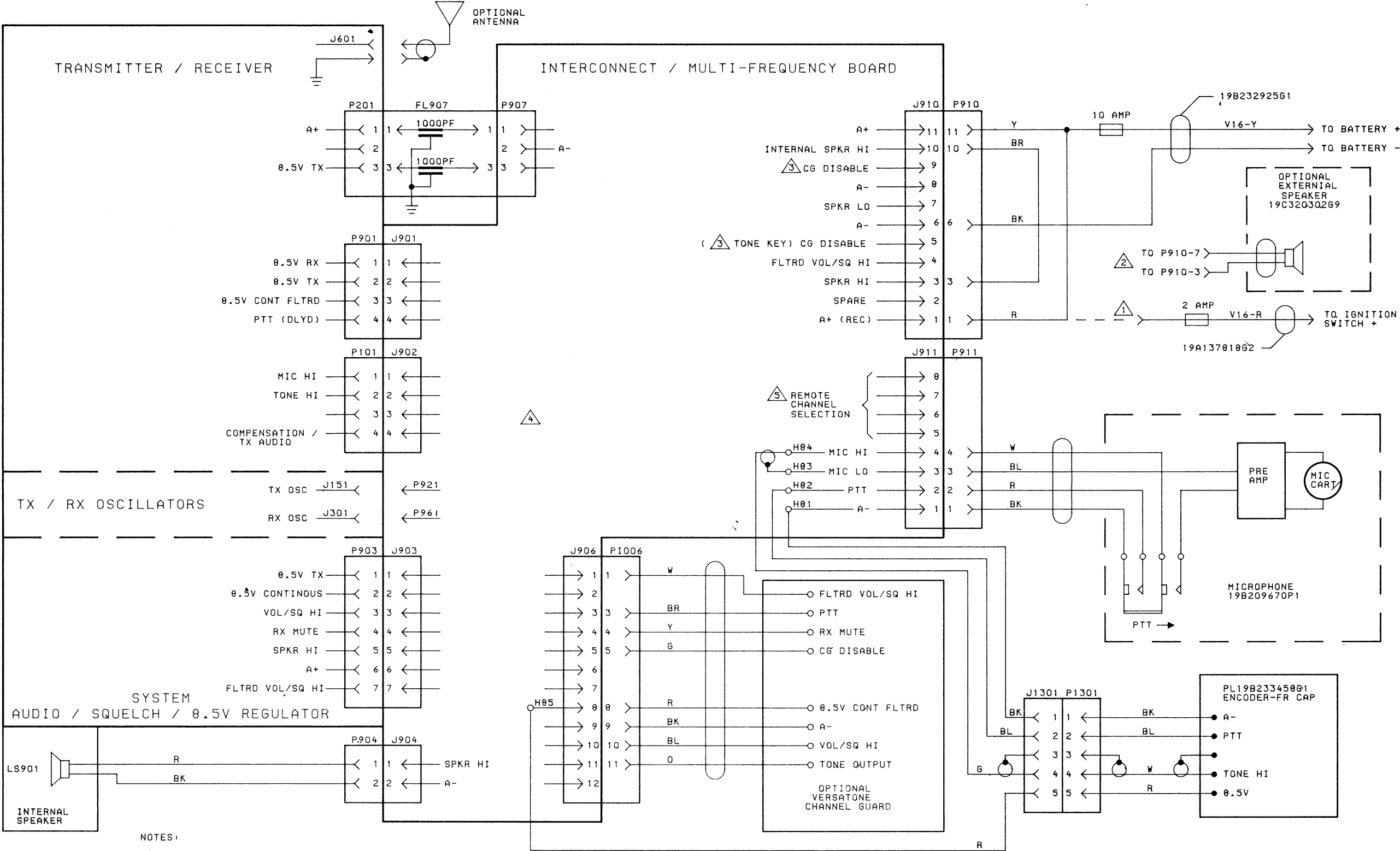
OUTLINE DIAGRAM

420—470 MHz UHF TRANSMITTER/RECEIVER BOARD



OUTLINE DIAGRAM

INTERCONNECT BOARD (SINGLE FREQUENCY)



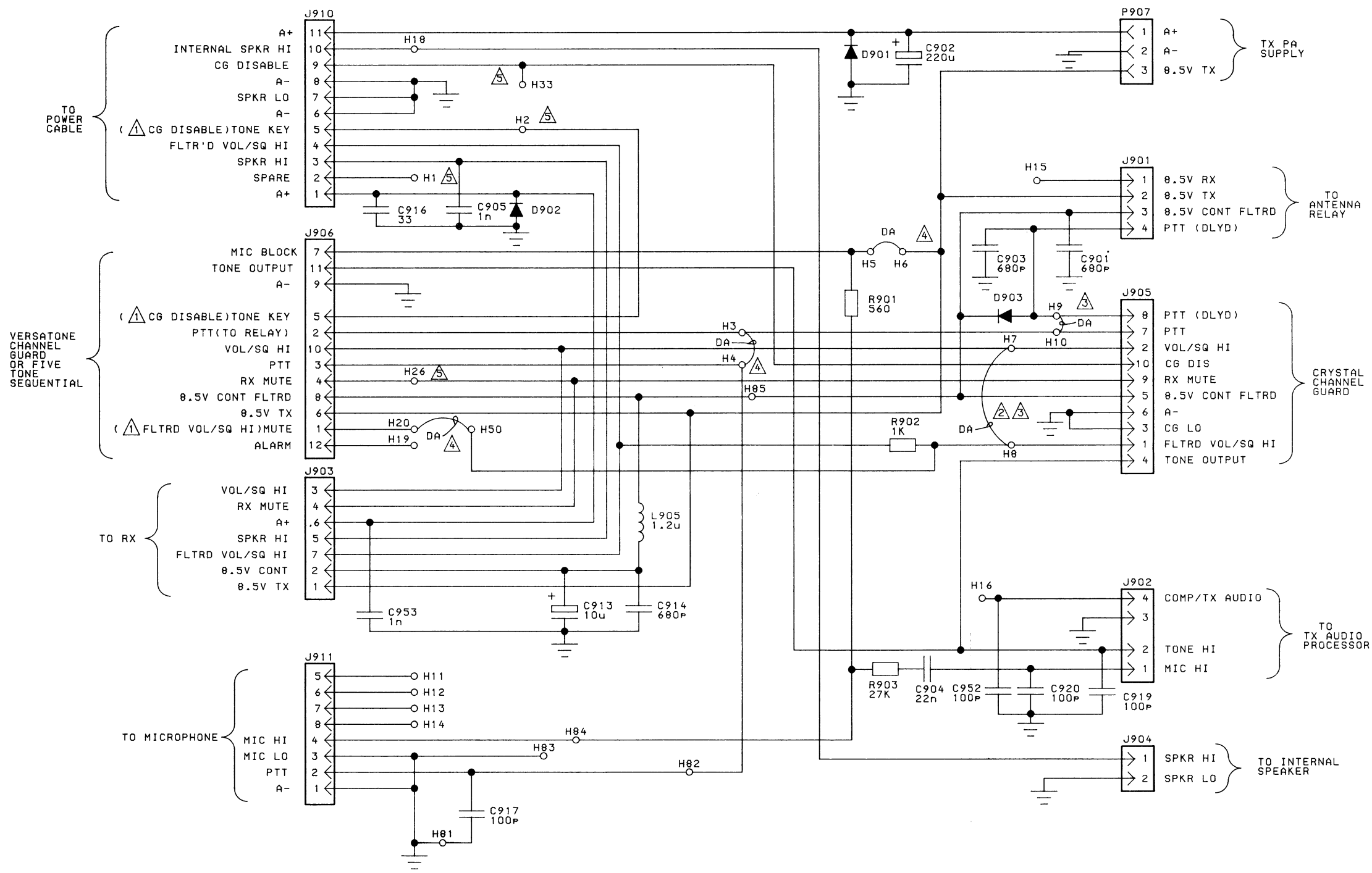
- NOTES:
- 1 FOR IGNITION SWITCH CONTROL OPTION, CUT RED WIRE AT SPLICE AND REMOVE FROM P910-1. PLUG IN RED FUSED LEAD TO P910-1.
  - 2 FOR REMOTE SPEAKER OPTION, REMOVE BROWN WIRE FROM P910-3 AND P910-10. PLUG SPEAKER WIRES TO P910-3 AND P910-7.
  - 3 FUNCTION NOT USED WITH VERSATONE CHANNEL GUARD.
  - 4 TO APPLY VERSATONE CHANNEL GUARD, CUT JUMPER H7 TO H8 ON INTERCONNECT BOARD AND ADD JUMPER H20 TO H50.

5 SPARE LEADS FOR SINGLE FREQUENCY CAPABILITY RADIOS. FUNCTIONS ARE AS FOLLOWS FOR 2, 4, AND 6 FREQUENCY CAPABILITY RADIOS.

	UP TO 4 FREQ	6 FREQ
J911-5	F1	CHANNEL COMMON
J911-6	F2	FREQ BIT 2
J911-7	F3	FREQ BIT 1
J911-8	F4	FREQ BIT 0

SYSTEM INTERCONNECTION DIAGRAM

CENTURY II STANDARD COMBINATIONS



- NOTES:
- 1 ALTERNATE FUNCTIONS WITH VERSATONE CHANNEL GUARD.
  - 2 FOR VERSATONE CHANNEL GUARD, OMIT JUMPER H7 TO H8.
  - 3 FOR CRYSTAL CHANNEL GUARD, OMIT JUMPERS H7 TO H8, H9 TO H10.
  - 4 FOR 5 TONE SEQUENTIAL, OMIT JUMPERS H3 TO H4, H5 TO H6, H20 TO H50.
  - 5 ADD JUMPER H1 TO H26, H2 TO H33 FOR DC REMOTE.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED  
RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M  
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u, n OR p  
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

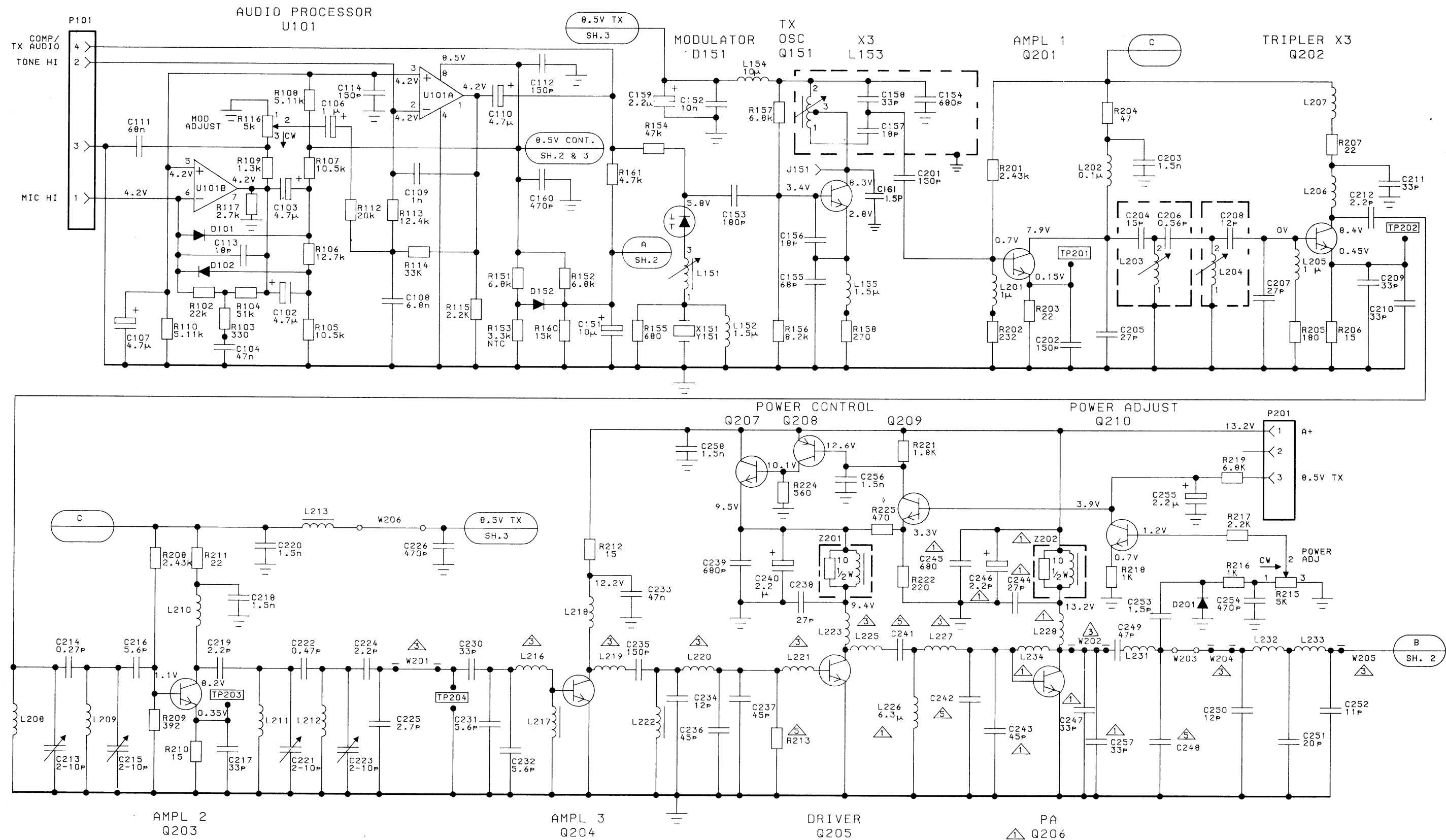
MODEL NO.	REV LTR.
19D429671G1	

SCHEMATIC DIAGRAM

INTERCONNECT BOARD

(SINGLE FREQUENCY)

(19D430546, Rev. 3)

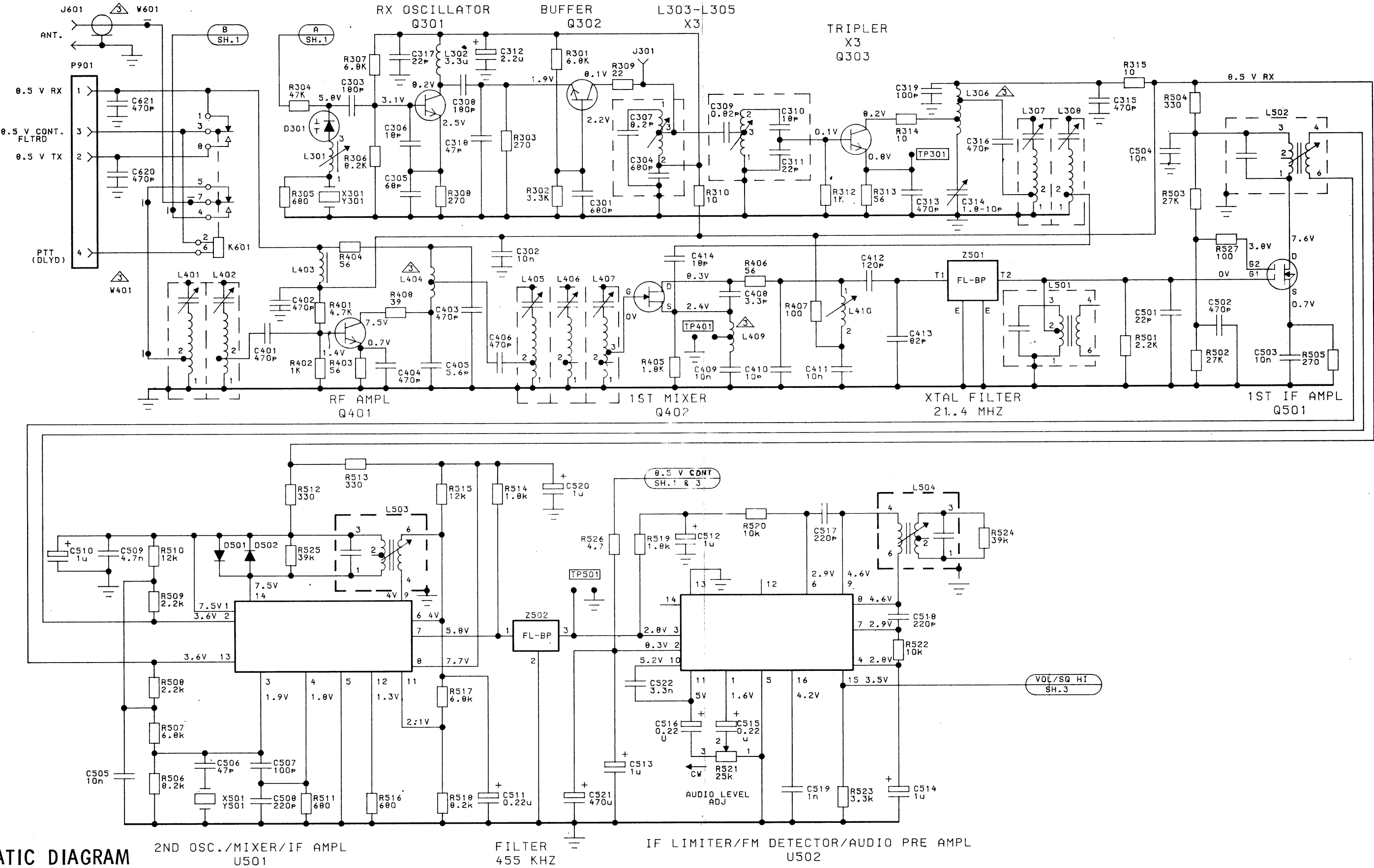


## SCHEMATIC DIAGRAM

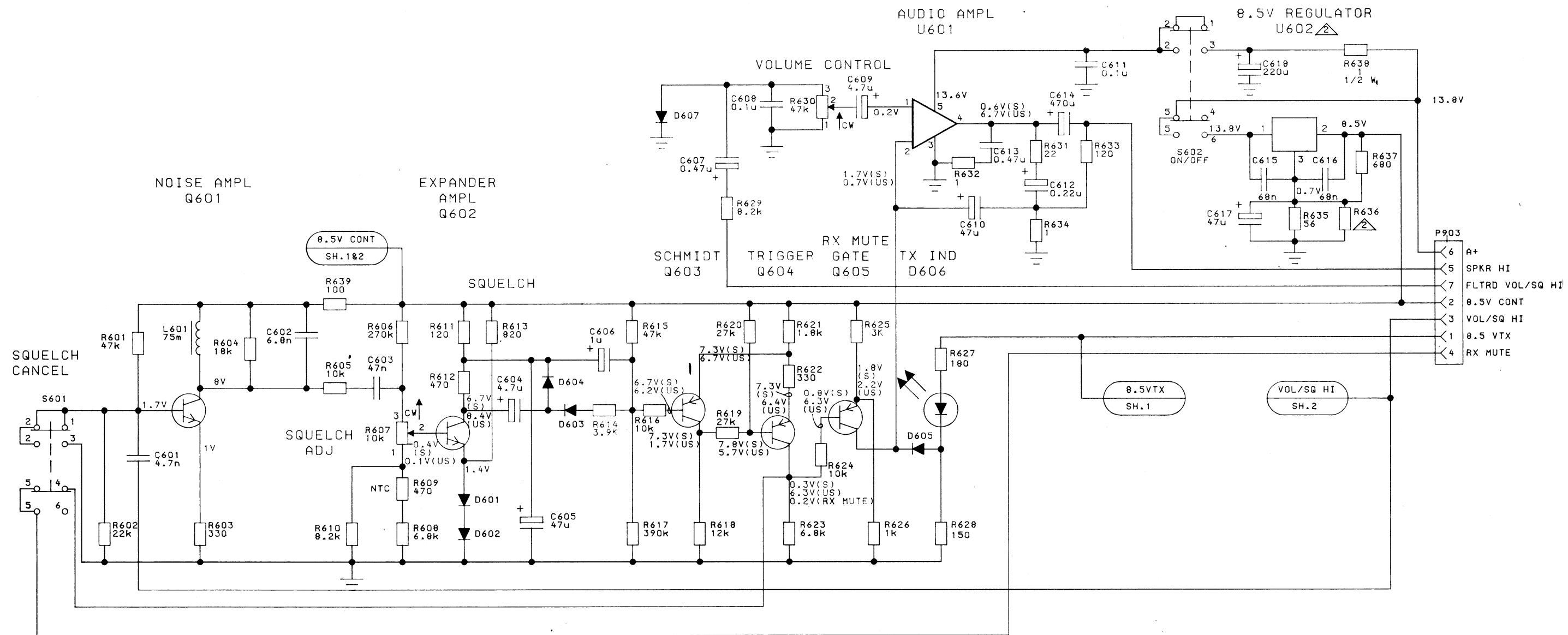
420-470 MHz UHF TRANSMITTER

Issue 1

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SCHEMATIC DIAGRAM  
420—470 MHz UHF RECEIVER



NOTES:

- 1 FOR 5 W TRANSMITTER (Q2) REMOVE C243, C244, C245, C246, C247, C257, L226, L228, Q206 & Z202 AND ADD L234.
- 2 VALUE OF R636 DEPENDS ON COLOR CODE ON U602.

U602 COLOR CODE	R636 VALUE $\Omega$
BROWN	OMIT R636
RED	270
ORANGE	100
YELLOW	47
GREEN	22
BLUE	6.8

- 3 PART OF PRINTED CIRCUIT BOARD.
- 4 TO MODIFY FOR MULTIFREQUENCY, REMOVE R157 (DISABLES TX OSC) AND/OR R309 (DISABLES RX OSC).

COMPONENT VALUES

COMP	GROUP 1 (20 W)	GROUP 2 (5 W)
C248	13 P	10 P
C242	39 P	27 P
C241	30 P	56 P
R213	27 $\Omega$	56 $\Omega$

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.  
RESISTOR VALUES IN  $\Omega$  UNLESS FOLLOWED BY MULTIPLIER K OR M.  
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER  $\mu$ , n OR p.  
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR  $\mu$ .

VOLTAGE READINGS  
VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE WITH A 20,000 OHM-PER-VOLT DC VOLTMETER UNDER THE FOLLOWING CONDITIONS:  
1. NO SIGNAL INPUT  
2. VOLUME CONTROL (R630) SET TO MINIMUM  
3. SQUELCH CANCEL (S601) SWITCHED OFF  
4. UNSQUELCHED (US)-SQUELCH ADJUST (R607) SET TO MINIMUM (CCW)  
5. SQUELCHED (S)-SQUELCH ADJUST (R607) SET TO MAXIMUM (CW)

THIS ELEM DIAG APPLIES TO

MODEL NO  
19D430934G1  
19D430934G2

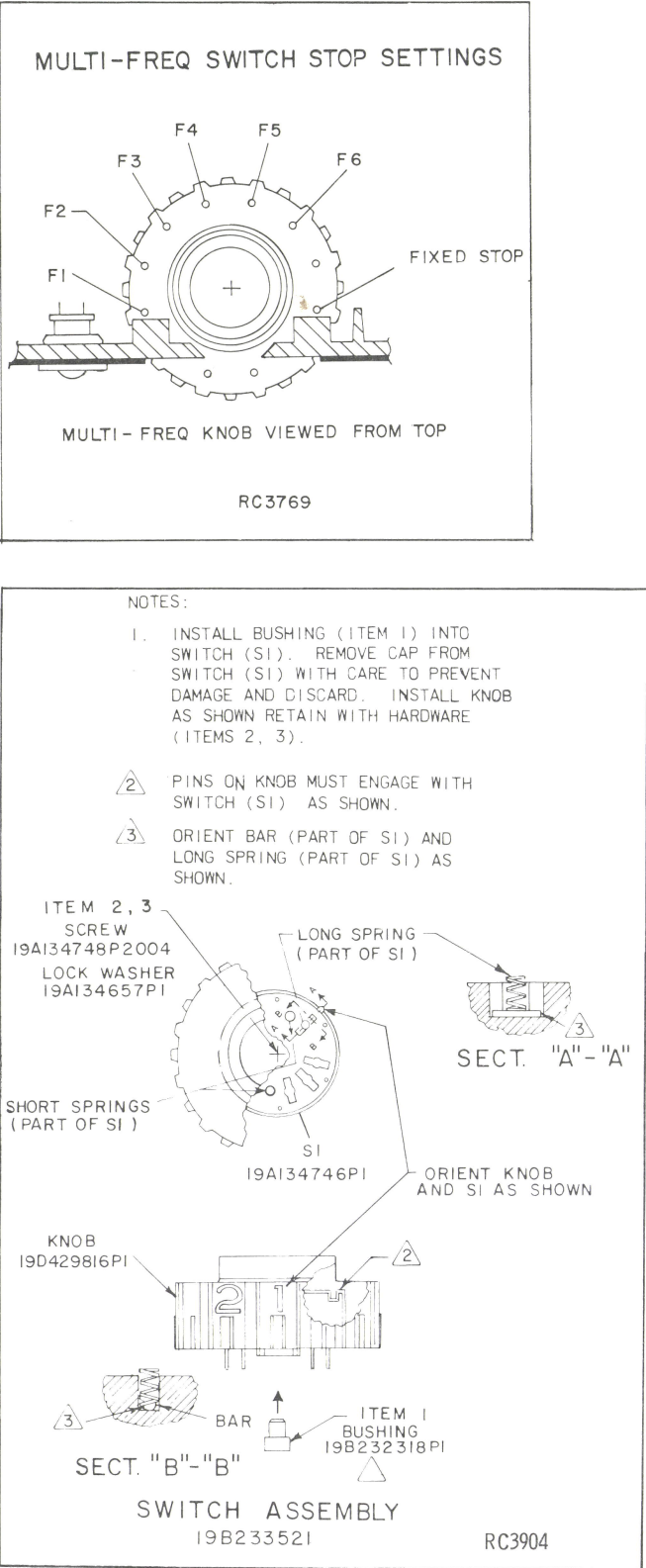
REV LETTER

SCHEMATIC DIAGRAM

420-470 MHz UHF RECEIVER

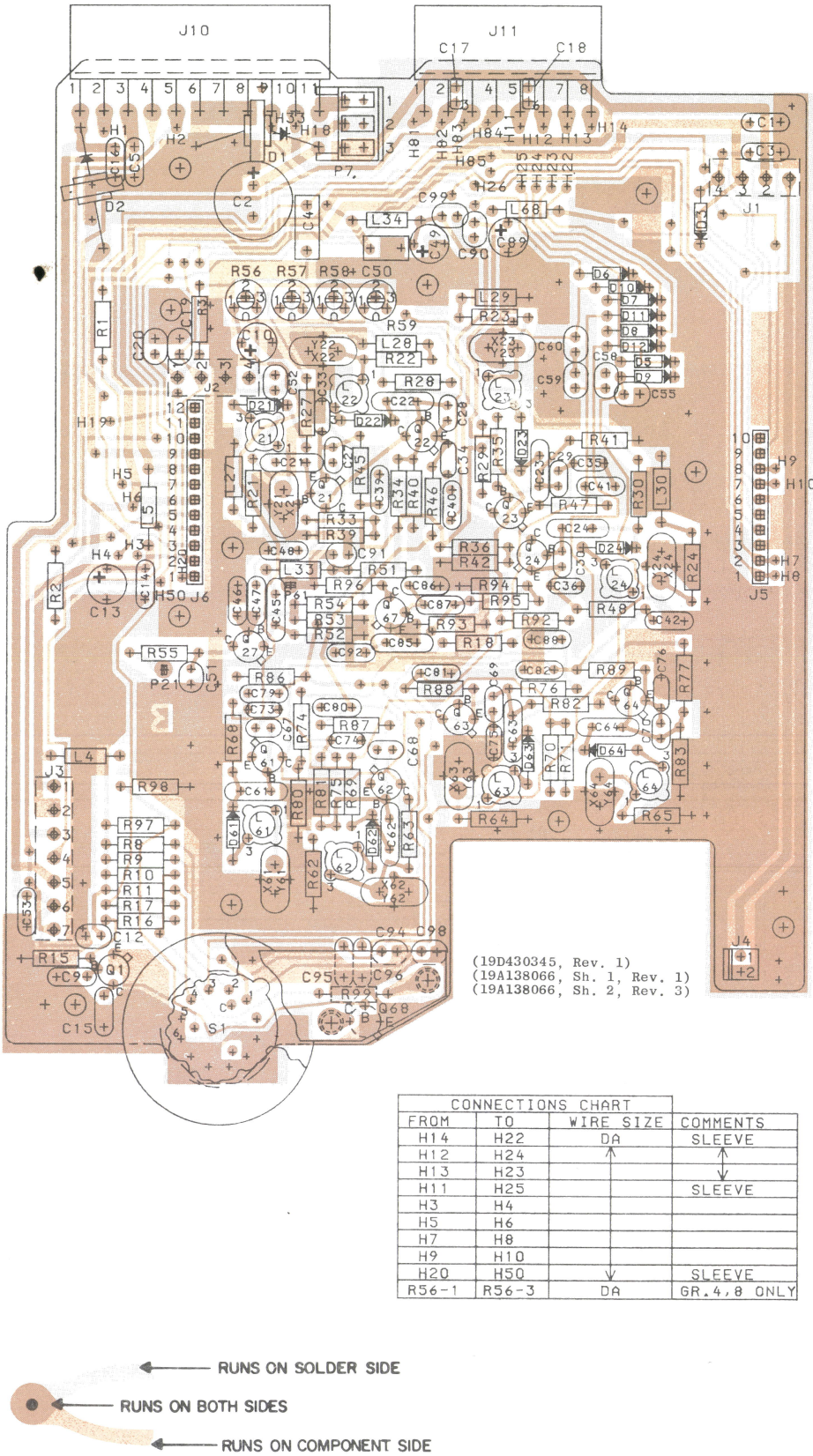
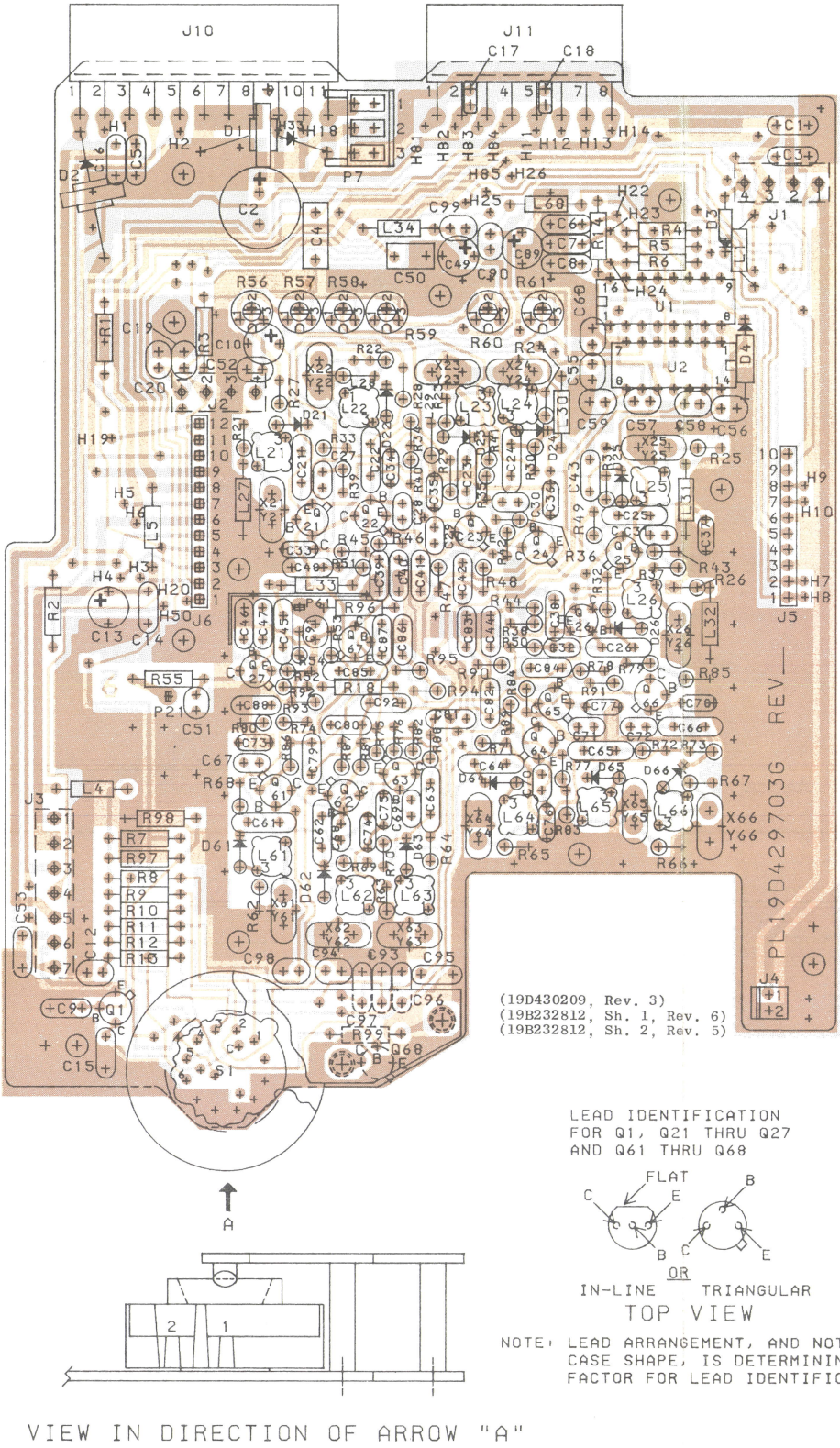
Issue 1

27



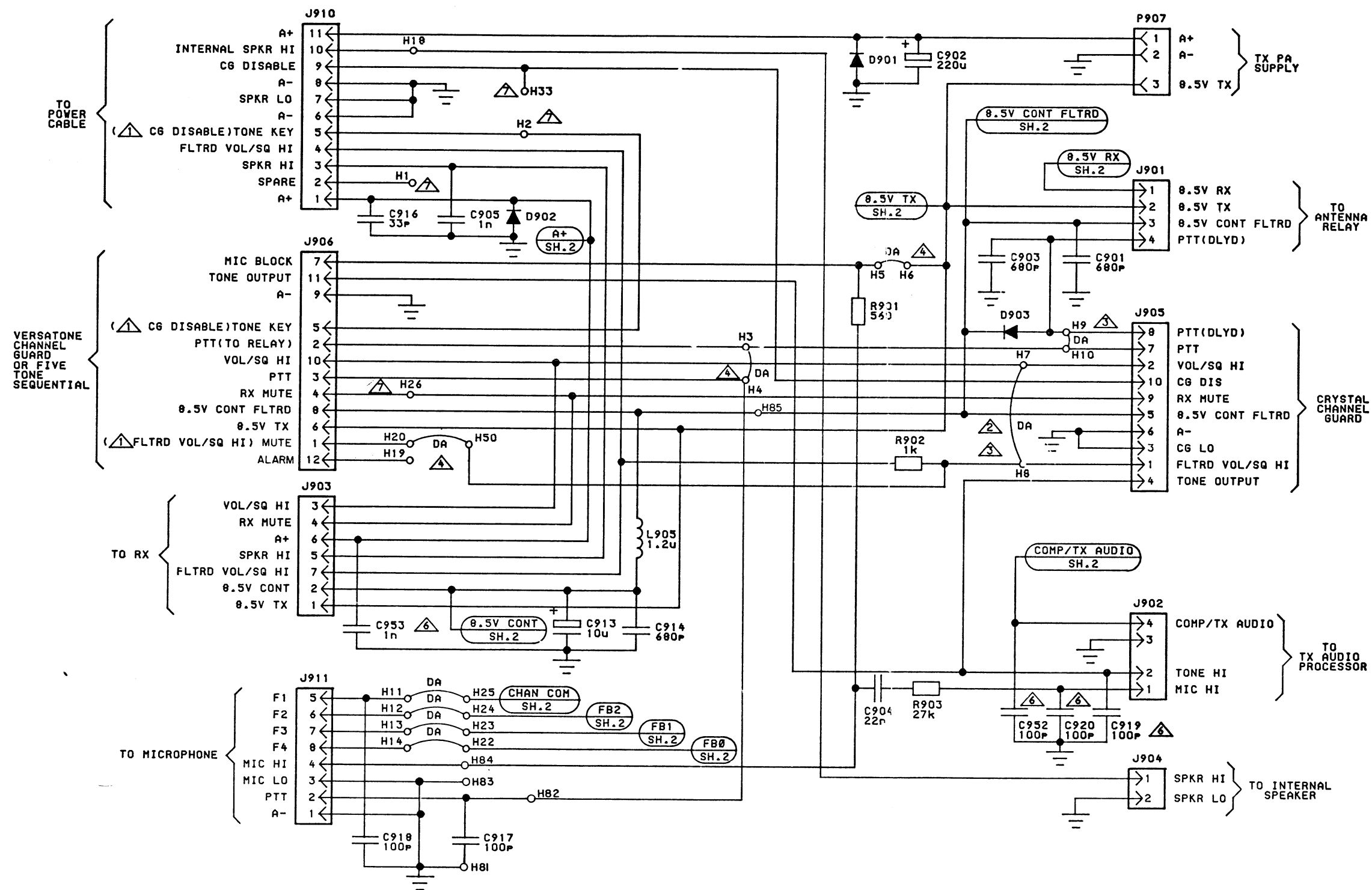
OUTLINE DIAGRAM

INTERCONNECT/MULTI-FREQUENCY BOARD  
(SIX FREQUENCY)



OUTLINE DIAGRAM

FOUR FREQUENCY MULTI-FREQUENCY BOARD



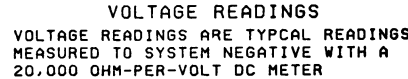
- ① ALTERNATE FUNCTIONS WITH VERSATONE CHANNEL GUARD.
- ② FOR VERSATONE CHANNEL GUARD, OMIT JUMPER H7 TO H8.
- ③ FOR CRYSTAL CHANNEL GUARD, OMIT JUMPERS H7 TO H8, H9 TO H10.
- ④ FOR 5 TONE SEQUENTIAL, OMIT JUMPERS H3 TO H4, H5 TO H6, H20 TO H50.
- ⑤ USE L921A THRU L926A FOR HIGH BAND (G1).  
USE L921B THRU L926B FOR UHF BAND (G2).
- ⑥ PARTS USED ONLY WITH UHF (G2).
- ⑦ CONNECT JUMPER WIRE FROM H1 TO H26, H2 TO H33 FOR D.C. REMOTE OPERATION.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED  
RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M  
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER  $\mu$ , n OR p  
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR  $\mu$ .

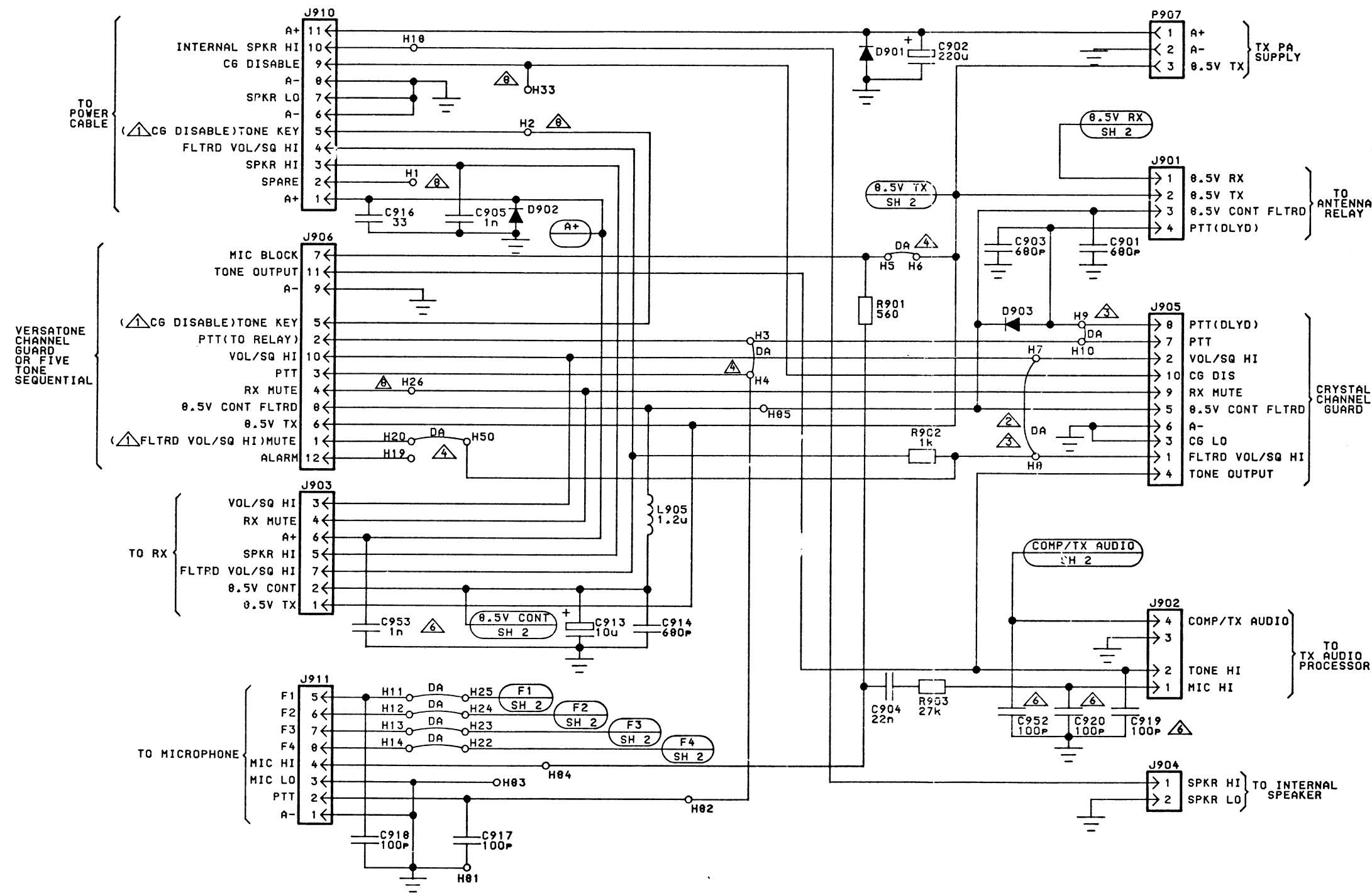
MODEL NO.	REV. LETTER
PL19D42970361	B
PL19D42970362	B
PL19C32891361	A

## SCHEMATIC DIAGRAM

## SIX FREQUENCY INTERCONNECT BOARD



## SIX FREQUENCY MULTI-FREQUENCY BOARD



- NOTES:
- 1 ALTERNATE FUNCTIONS WITH VERSATONE CHANNEL GUARD.
  - 2 FOR VERSATONE CHANNEL GUARD, OMIT JUMPER H7 TO H8.
  - 3 FOR CRYSTAL CHANNEL GUARD, OMIT JUMPERS H7 TO H8, H9 TO H10.
  - 4 FOR 5 TONE SEQUENTIAL, OMIT JUMPERS H3 TO H4, H5 TO H6, H20 TO H50.
  - 5 USE L921A THRU L924A FOR HIGH BAND (G1-G4). USE L921B THRU L924B FOR UHF BAND (G5-G8).
  - 6 PARTS USED ONLY WITH UHF (G5-G8).
  - 7 JUMPER REQUIRED FOR 1 FREQ. TX/2 FREQ. RX (G4,G8) FOR OSCILLATOR COMPENSATION.
  - 8 CONNECT JUMPER WIRE FROM H1 TO H26, H2 TO H33 FOR D.C. REMOTE OPERATION.

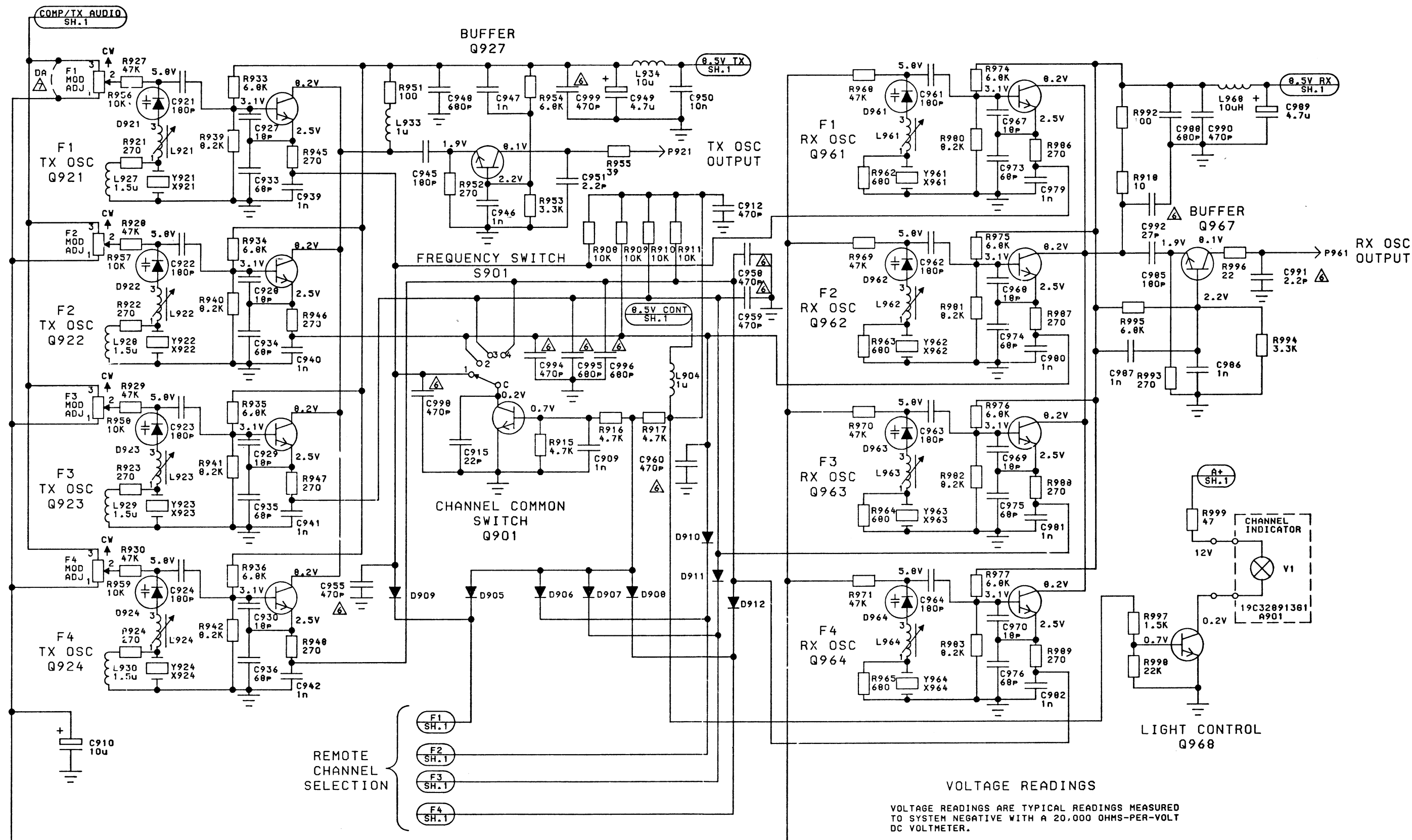
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN  $\Omega$  UNLESS FOLLOWED BY MULTIPLIER k OR M. CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u, n OR p. INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

MODEL NO.	REV. LETTER
19D43007831	B
19D43007862	B
19D43007863	B
19D43007864	B
19D43007865	B
19D43007866	B
19D43007867	B
19D43007868	B
19C32891361	A

(19D430341, Sh. 1, Rev. 4)

## SCHEMATIC DIAGRAM

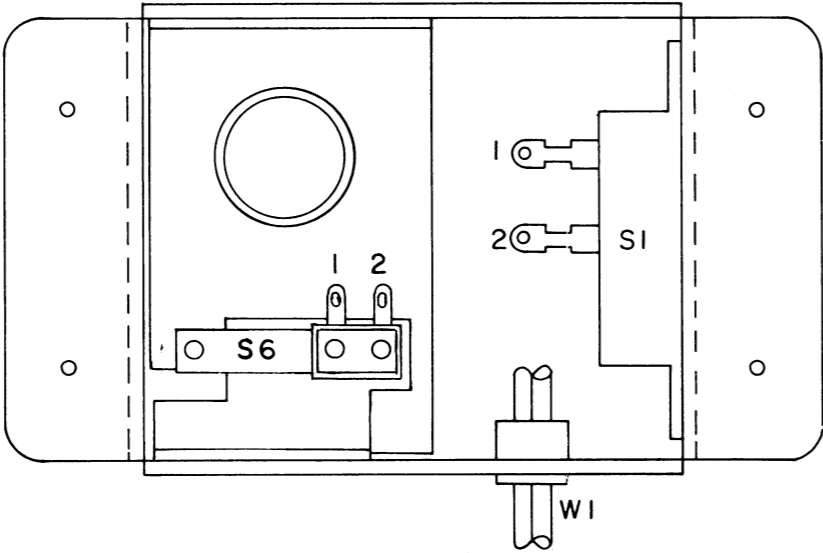
FOUR FREQUENCY INTERCONNECT BOARD



SCHEMATIC DIAGRAM

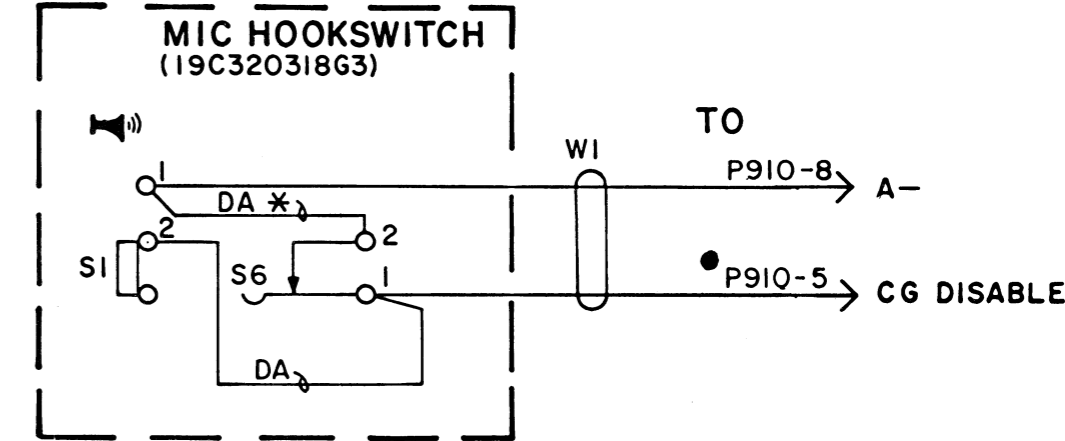
FOUR FREQUENCY MULTI-FREQUENCY BOARD

OUTLINE DIAGRAM



(19B227626, Rev. 0)

SCHEMATIC DIAGRAM



- \* REMOVE DA JUMPER TO DISABLE AUTOMATIC CHANNEL GUARD MONITOR
- S6- SHOWN OFF HOOK
- S1- SHOWN OFF MONITOR
- CONNECT TO P910-9 FOR CRYSTAL CHANNEL GUARD

(19A142809, Rev. 0)

PARTS LIST

CENTURY II RADIO  
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
LS901	19A138181G1	TRANSMIT/RECEIVE ASSEMBLY 19D429451G1 thru G4 (See Transmit/Receive Assembly Parts List shown separately)
		FRONT CAP ASSEMBLY 19B233129G1
		----- LOUDSPEAKERS -----
		Permanent magnet: 4 ohms ±10% imp, resonant frequency 400 Hz at 1 VRMS, 3 watt max.
		----- MISCELLANEOUS -----
		Nut, push-on: sim to Tinnerman C1617-010-27.
		Grille.
		Nameplate. (CENTURY II).
		CHASSIS 19B233230G1 420-470 MHz 19B233230G2 148-174 MHz
		CAPACITOR ASSEMBLY 19A138190G1
C1 and C2	19A116699P2	----- CAPACITORS -----
		Ceramic, feed-thru: 1000 pf ±20%, 250 VDCW; sim to Aerovox Style 7405.
		----- MISCELLANEOUS -----
		Frame.
		Insulator. (Locates under Transmit/Receive Board).
		Nut, hex (Metric): M2.5. (Secures Q205 & Q206 on Transmit/Receive Board).
		Screw, machine, (Pozidriv, Metric): M2 x 0.4 x 4. (Secures capacitor assembly 19A138190G1).
		Lockwasher, internal tooth, Metric: M2.2. (Secures capacitor assembly 19A138190G1).
		POWER CABLE 19B232925G1
		Connector, printed wiring; sim to Molex 09-50-3111.
P910	19A116659P143	----- MISCELLANEOUS -----
		Fused lead. (Red).
		Fused lead. (Black).
		Fused lead. (Brown).
		MIKE HANGER/HOOKSWITCH 19C320318G3
		----- SWITCHES -----
		Push: sim to Chicago Switch S-1527-1.
		----- CABLES -----
		Cable: approx 5 feet. (Includes (2) contacts 19A116781P5).
		----- MISCELLANEOUS -----
S6	19A134398P1	Switch, slide: 1 pole, 2 positions, 0.5 amp VDC or 3 amp VAC at 125 v; sim to Switchcraft 46202LH.
		Base plate.
W1	19A129414G1	
S1	19B209261P18 19B219694P1	

SYMBOL	GE PART NO.	DESCRIPTION
	19B219698G4 19B219693P2 19A116768P6 N193P1410C 19A134398P101	Housing. Spring. Strain relief. (W1). Tap screw, phillip head: No. 8-18 x 5/8. (Secures assembly to mounting surface). Plate. (Located on S6).
		MOUNTING HARDWARE KIT 19A138051G1
		----- MISCELLANEOUS -----
	19A134653P4008 19A134657P5 N193P1210C N193P1216C 5490407P17 19A115185P9 4036835P11	Bolt, machine, hex: Metric, 8MM (Secures radio to mounting bracket). Lockwasher, internal tooth: No. M2.2 (Metric). (Secures radio to mounting bracket). Tap screw, phillip head: No. 6-20 x 5/8. (Secures mounting bracket to mounting surface- with thin mounting surface). Tap screw, phillip head: No. 6-20 x 1. (Secures mounting bracket to mounting surface- when thick carpet is on mounting surface). Rubber grommet: neoprene. (Located in fire wall). Retaining strap: sim to Dennison BAR-LOK 09471. (Secures power leads under dash). Terminal, solder: sim to Shakeproof 505 ZIRICK. (Used with positive battery lead).
		MECHANICAL PARTS
	19B232859P1 19A137825P1 19C328661P1 19B232964P1 19B232927P1 19B232962P1 19B232928P1 19A134589P3028 19A134483P3005 19A134589P3008 19A134657P3 19A134483P2508 19A138241P1 4038831P5 19A142928G1 19C328556P1 19B233372G1 19D430583P5 19B209687P1 19B209687P2 19B209687P3 19B209687P6	Bushing. (Secures Transmit LED Light). Insulator. (Band Pass Filter). Insulator. (Receiver - L Shape). Insulator. (MULTI-FREQ). Insulator. (P.A.). Insulator. (Interconnect assembly). Insulator. (Exciter). Tap screw, Metric: No. size 3-28MM. (Secures P.A. shield). Screw, machine, Metric: No. size 3-5MM. (Secures top & bottom covers). Tap screw, Metric: No. size 3-8MM. (Secures front cap & Transmit/Receive assembly). Lockwasher, internal tooth: No. M3. (Secures top & bottom covers). Screw, machine, Metric: No. size 2.5-8MM. (Secures Q205 & Q206). Pin. (Used with Multi-Freq. Knob). Alignment tool. Transmit/Receive Shield. Cover. (Top & Bottom). Faceplate, standard. (Includes GENERAL ELECTRIC nameplate- 19B209572P3). Faceplate, Multi-Frequency. Mounting bracket. (Standard). Mounting bracket. (Front Access- includes installation tool 19A134652P17). Mounting bracket. (DESK). Allen wrench. (Used with 19B209687P2 mounting bracket).

PARTS LIST

CENTURY II EXTERNAL SPEAKER OPTION  
19C320302G9  
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
LS2	19A116910P1	----- LOUDSPEAKERS ----- Permanent magnet: 5 inch, 3.2 ohms ±15% imp, 5 w max operating; sim to Pioneer 002009.
W1	19A129414G1	----- CABLES ----- 2 conductor cable: approx 5 feet long, includes (2) 19A116781P3 contacts.
		----- MISCELLANEOUS -----
	19B227593G2 19B219692G2 19C320016P2 N187P16010C6 N403P19C6 N402P39C6 N130P1610C6 19A116986P108 19A116986P112	Housing. Grille. Mounting bracket. (Mounts speaker to mounting surface). Machine screw: No. 10-32 x 5/8. (Secures speaker to mounting bracket). Lockwasher, external tooth: No. 10. (Secures speaker to mounting bracket). Flatwasher: No. 10. (Secures speaker to mounting bracket). Tap screw, thread forming: No. 10-16 x 5/8. (Secures mounting bracket to mounting surface). Tap screw, with lockwasher: No. 7-19 x 1/2. (Secures speaker to grille). Tap screw, with lockwasher: No. 7-19 x 3/4. (Secures housing to grille).

PARTS LIST			SYMBOL	GE PART NO.	DESCRIPTION	SYMBOL	GE PART NO.	DESCRIPTION	SYMBOL	GE PART NO.	DESCRIPTION
420-470 MHz TRANSMITTER/RECEIVER BOARD 19D430934G1 20 WATT 19D430934G2 5 WATT ISSUE 1											
SYMBOL	GE PART NO.	DESCRIPTION									
C102 and C103	19A700003P6	----- CAPACITORS -----	C221	19B209544P2	Variable, air: 2.04 to 9.9 pf, 250 v; sim to E.F. Johnson (Type T) 187-0106-005.	C313	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	C617	19A134730P1	Electrolytic: 47 µf +100-10%, 16 VDCW.
		Tantalum: 4.7 µf ±20%, 35 VDCW.	C222	5491601P113	Phenolic: 0.47 pf ±5%, 500 VDCW.	C314	19A134756P1	Variable, teflon: 1.8 to 10 pf, 300 VDCW, temp coef 0 ±150 Parts/M/°C.	C618	19A134730P2	Electrolytic: 220 µf +100-10%, 25 VDCW.
C104	19A116080P205	Polyester: 0.047 µf ±5%, 50 VDCW.	C223	19B209544P2	Variable, air: 2.04 to 9.9 pf, 250 v; sim to E.F. Johnson (Type T) 187-0106-005.	C315 and C316	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	C620 and C621	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.
C106	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.	C224	19A134100P20	Ceramic disc: 2.2 pf ±0.1 pf, 100 VDCW, temp coef 0 ±120 PPM/°C.	C317	19A700002P17	Ceramic, disc: 22 pf ±5%, 50 VDCW.	D101 and D102	19A115100P1	----- DIODES AND RECTIFIERS ----- Silicon; sim to Type 1N458A.
C107	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.	C225	19A700002P6	Ceramic, disc: 2.7 pf ±0.25 pf, 50 VDCW.	C318	19A700002P21	Ceramic, disc: 47 pf ±5%, 50 VDCW.	D151	19A116785P2	Silicon, capacitive.
C108	19A116080P216	Polyester: 0.0068 µf ±5%, 50 VDCW.	C226	19A700001P5	Ceramic, disc: 470 pf ±5%, 50 VDCW.	C319	19A700001P1	Ceramic, disc: 100 pf ±20%, 50 VDCW.	D152	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
C109	19A116080P218	Polyester: 0.001 µf ±5%, 50 VDCW.	C230	19A700002P19	Ceramic, disc: 33 pf ±5%, 50 VDCW.	C401 thru C404	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	D201	19A115775P1	Silicon, fast recovery, 225 mA, 50 PIV.
C110	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.	C231 and C232	19A700002P10	Ceramic, disc: 5.6 pf ±0.25 pf, 50 VDCW.	C405	19A700032P10	Ceramic, disc: 5.6 pf ±0.25 pf, 50 VDCW.	D301	19A116785P2	Silicon, capacitive.
C111	19A116080P206	Polyester: 0.068 µf ±5%, 50 VDCW.	C233	19A700005P11	Polyester: 0.047 µf ±10%, 50 VDCW.	C406	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	D501 and D502	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
C112	19A700001P2	Ceramic, disc: 150 pf ±20%, 50 VDCW.	C234	19A700002P14	Ceramic, disc: 12 pf ±5%, 50 VDCW.	C408	19A700002P7	Ceramic, disc: 3.3 pf ±0.25 pf, 50 VDCW.	D601 thru D605	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
C113	19A700002P16	Ceramic, disc: 18 pf ±5%, 50 VDCW.	C235	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.	C409	19A700005P7	Polyester: 0.010 µf ±10%, 50 VDCW.	D606	19A134738P1	Optoelectronic, red: sim to Siemens LD41/11.
C114	19A700001P2	Ceramic, disc: 150 pf ±20%, 50 VDCW.	C236 and C237	19A134688P45	Mica: 45 pf ±5%, 250 VDC.	C410	19A700002P13	Ceramic, disc: 10 pf ±5%, 50 VDCW.	D607	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
C151	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.	C238	19A700002P18	Ceramic, disc: 27 pf ±5%, 50 VDCW.	C411	19A700005P7	Polyester: 0.010 µf ±10%, 50 VDCW.	J151	19A116428P4	----- JACKS AND RECEPTACLES ----- Contact, electrical: sim to AMP 86031-1 (Strip Form).
C152	19A700005P7	Polyester: 0.010 µf ±10%, 50 VDCW.	C239	19A700001P6	Ceramic, disc: 680 pf ±5%, 50 VDCW.	C412	19A700002P25	Ceramic, disc: 100 pf ±5%, 50 VDCW.	J301	19A116428P4	Contact, electrical: sim to AMP 86031-1 (Strip Form).
C153	19A700002P28	Ceramic, disc: 180 pf ±5%, 50 VDCW.	C240	19A700003P5	Tantalum: 2.2 µf, ±20%, 35 VDCW.	C413	19A700002P23	Ceramic, disc: 68 pf ±5%, 50 VDCW.	J601	4029493P2	Connector, receptacle, coaxial: sim to Amphenol 83-876-1002.
C154	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.	C241A	19A700015P16	Teflon/Mica: 30 pf ±5%, 250 VDCW.	C414	19A700002P16	Ceramic, disc: 18 pf ±5%, 50 VDCW.	K601	19B209558P1	----- RELAYS ----- Hermetic sealed: 180 to 341 ohms coil res, 2 form C contacts, 8.0 to 16.3 VDC; sim to GE 3SAV1760A2.
C155	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.	C241B	19A700015P23	Teflon/Mica: 56 pf ±5%, 250 VDCW.	C501	19A700002P17	Ceramic, disc: 22 pf ±5%, 50 VDCW.	L151	19A134728P2	----- INDUCTORS ----- Coil, RF: variable.
C156	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.	C242A	19A700006P23	Teflon/Mica: 39 pf ±5%, 250 VDCW.	C502	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	L152	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2K.
C157	19A700002P16	Ceramic, disc: 18 pf ±5%, 50 VDCW.	C242B	19A700006P19	Teflon/Mica: 27 pf ±5%, 250 VDCW.	C503 thru C505	19A700005P7	Polyester: 0.010 µf ±10%, 50 VDCW.	L153	19A134727P1	Coil, RF: variable.
C158	19A700002P19	Ceramic, disc: 33 pf ±5%, 50 VDCW.	C243	19A700006P25	Teflon/Mica: 45 pf ±5%, 250 VDCW.	C506	19A700002P21	Ceramic, disc: 47 pf ±5%, 50 VDCW.	L154	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4K.
C159	19A700003P5	Tantalum: 2.2 µf ±20%, 35 VDCW.	C244	19A700002P18	Ceramic, disc: 27 pf ±5%, 50 VDCW.	C507	19A700002P25	Ceramic, disc: 100 pf ±5%, 50 VDCW.	L155	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2K.
C160	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	C245	19A700001P6	Ceramic, disc: 680 pf ±5%, 50 VDCW.	C508	19A700002P29	Ceramic, disc: 220 pf ±5%, 50 VDCW.	L201	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6K.
C161	19A700002P3	Ceramic, disc: 1.5 pf ±0.25 pf, 50 VDCW.	C246	19A700003P5	Tantalum: 2.2 µf, ±20%, 35 VDCW.	C509	19A700005P5	Polyester: 4700 pf ±10%, 50 VDCW.	L202	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
C201	19A700001P2	Ceramic, disc: 150 pf ±5%, 50 VDCW.	C247	19A700006P21	Teflon/Mica: 33 pf ±5%, 250 VDCW.	C510	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.	L203 and L204	19A134727P2	Coil, RF: variable.
C202	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.	C248A	19A700006P9	Teflon/Mica: 13 pf ±5%, 250 VDCW.	C511	19A700003P2	Tantalum: 0.22 µf ±20%, 35 VDCW.	L205	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6K.
C203	19A700001P8	Ceramic, disc: 1500 pf ±5%, 50 VDCW.	C248B	19A700006P6	Teflon/Mica: 10 pf ±5%, 250 VDCW.	C512 thru C514	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.	L206	19A138195P1	Coil.
C204	19A700002P15	Ceramic, disc: 15 pf ±5%, 50 VDCW.	C249	19A700015P21	Teflon/Mica: 47 pf ±5%, 250 VDCW.	C515 and C516	19A700003P2	Tantalum: 0.22 µf ±20%, 35 VDCW.	L207	19A129773G1	Coil.
C205	19A700002P18	Ceramic, disc: 27 pf ±5%, 50 VDCW.	C250	19A116952P12	Metallized teflon: 12 pf ±0.5 pf, 250 VDCW; sim to Underwood Type J1HF.	C517 and C518	19A700001P3	Ceramic, disc: 220 pf ±20%, 50 VDCW.	L208	19A138193P2	Coil.
C206	5491601P115	Phenolic: 0.56 pf ±5%, 500 VDCW.	C251	19A116952P20	Metallized teflon: 20 pf ±0.5 pf, 250 VDCW; sim to Underwood Type J1HF.	C519	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.	L209	19A138193P4	Coil.
C207	19A700002P18	Ceramic, disc: 27 pf ±5%, 50 VDCW.	C252	19A116952P11	Metallized teflon: 11 pf ±0.5 pf, 250 VDCW; sim to Underwood Type J1HF.	C520	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.	L210	19A138196P3	Coil.
C208	19A700002P14	Ceramic, disc: 12 pf ±5%, 50 VDCW.	C253	19A700002P3	Ceramic, disc: 1.5 pf ±0.25 pf, 50 VDCW.	C521	19A134730P3	Electrolytic: 470 µf +100% -10%, 16 VDCW.	L211 and L212	19A138193P2	Coil.
C209 thru C211	19A700002P19	Ceramic, disc: 33 pf ±5%, 50 VDCW.	C254	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.	C522	19A700005P4	Polyester: 3300 pf ±10%, 50 VDCW.	L213	19A129773G1	Coil.
C212	19A134100P20	Ceramic disc: 2.2 pf ±0.1 pf, 100 VDCW, temp coef 0 ±120 PPM/°C.	C255	19A700003P5	Tantalum: 2.2 µf ±20%, 35 VDCW.	C601	19A700005P5	Polyester: 4700 pf ±10%, 50 VDCW.	L216	19A129773G1	(Part of printed board 19D430937P1).
C213	19B209544P2	Variable, air: 2.04 to 9.9 pf, 250 v; sim to E.F. Johnson Type T No. 187-0106-005.	C256	19A700001P8	Ceramic, disc: 1500 pf ±20%, 50 VDCW.	C602	19A700005P6	Polyester: 6800 pf ±10%, 50 VDCW.	L217	19A129773G1	Coil.
C214	5491601P107	Phenolic: 0.57 pf ±5%, 500 VDCW.	C257	19A700006P21	Teflon/Mica: 33 pf ±5%, 250 VDCW.	C603	19A700005P11	Polyester: 0.047 pf ±10%, 50 VDCW.	L218	19A138196P3	Coil.
C215	19B209544P2	Variable, air: 2.04 to 9.9 pf, 250 v; sim to E.F. Johnson Type T No. 187-0106-005.	C258	19A700001P8	Ceramic, disc: 1500 pf ±20%, 50 VDCW.	C604	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.	L219 and L221	19A138196P3	(Part of printed board 19D430937P1).
C216	19A700002P10	Ceramic, disc: 5.6 pf ±0.25 pf 50 VDCW.	C301	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.	C605	19A134730P1	Electrolytic: 47 µf +100-10%, 16 VDCW.	(Cont'd on Page 36)		
C217	19A700002P19	Ceramic, disc: 33 pf ±5%, 50 VDCW.	C302	19A700005P7	Polyester: 0.010 µf ±10%, 50 VDCW.	C606	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.			
C218	19A700001P8	Ceramic, disc: 1500 pf ±20%, 50 VDCW.	C303	19A700002P28	Ceramic, disc: 180 pf ±5%, 50 VDCW.	C607	19A700003P3	Tantalum: 0.47 µf ±20%, 35 VDCW.			
C219	19A134100P20	Ceramic disc: 2.2 pf ±0.1 pf, 100 VDCW, temp coef 0 ±120 PPM/°C.	C304	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.	C608	19A700004P2	Polyester: 0.1 µf ±10%, 63 VDCW.			
C220	19A700001P8	Ceramic, disc: 1500 pf ±5%, 50 VDCW.	C305	19A134725P2	Ceramic, disc: 18 pf ±5%, 50 VDCW.	C609	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.			
			C306	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.	C610	19A700003P9	Tantalum: 47 µf ±20%, 6.3 VDCW.			
			C307	19A700002P12	Ceramic, disc: 8.2 pf ±0.25 pf, 50 VDCW.	C611	19A700004P2	Polyester: 0.1 µf ±10%, 63 VDCW.			

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION	SYMBOL	GE PART NO.	DESCRIPTION	SYMBOL	GE PART NO.	DESCRIPTION	SYMBOL	GE PART NO.	DESCRIPTION
L222	19A129773G1	Coil.	Q303	19A134774P1	Silicon, NPN.	R219	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R601	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
L223	19A138196P1	Coil.	Q401	19A134775P1	Silicon, NPN.	R221	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.	R602	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
L225		(Part of printed board 19D430937P1).	Q402	19A116154P1	N Type, field effect.	R222	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.	R603	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
L226	19A134740P1	Coil, RF.	Q501	19A134760P1	N Channel, field effect.	R224	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.	R604	3R152P183J	Composition: 18K ohms ±5%, 1/4 w.
L227		(Part of printed board 19D430937P1).	Q601 and Q602	19A116774P1	Silicon, NPN; sim to Type 2N5210.	R225	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.	R605	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
L228	19A138196P1	Coil.	Q603 thru Q605	19A134749P1	Silicon, PNP; sim to Type 2N5087.	R301	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R606	3R152P274J	Composition: 270K ohms ±5%, 1/4 w.
L231	19A138191P2	Strap.				R302	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.	R607	19A134755P1	Variable, carbon film: 10K ohms ±20%, 0.1 w.
L232 and L233		(Part of jumper 19B233135P1).			----- RESISTORS -----	R303	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.	R608	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
L234	19A138192P1	Strap.	R102	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.	R304	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.	R609	19A134732P2	Thermistor: 470 ohms ±20% at 0 power; sim to Phillips 2322-642-11471.
L301	19A134728P2	Coil, RF.	R103	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.	R305	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.	R610	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
L302	19B209420P119	Coil, RF: 3.30 μh ±10%, 0.80 ohms DC res max; sim to Jeffers 4436-6K.	R104	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.	R306	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.	R611	3R152P121J	Composition: 120 ohms ±5%, 1/4 w.
L303	19A134727P8	Coil, RF: variable.	R105	19C314256P21052	Metal film: 10.5K ohms ±1%, 1/4 w.	R307	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R612	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
L305	19A134727P7	Coil, RF: variable.	R106	19C314256P21272	Metal film: 12.7K ohms ±1%, 1/4 w.	R308	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.	R613	3R152P821J	Composition: 820 ohms ±5%, 1/4 w.
L306		(Part of printed board 19D430937P1).	R107	19C314256P21052	Metal film: 10.5K ohms ±1%, 1/4 w.	R309	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.	R614	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
L307 and L308	19B209729P1	Coil, helical: sim to Paul Smith SK 802-1.	R108	19C314256P25111	Metal film: 5.1K ohms ±1%, 1/4 w.	R310	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.	R615	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
L401 and L402	19B209729P1	Coil, helical: sim to Paul Smith SK 802-1.	R109	3R152P132J	Composition: 1.3K ohms ±5%, 1/4 w.	R312	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.	R616	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
L403	19A138400G1	Coil.	R110	19C314256P25111	Metal film: 5.1K ohms ±1%, 1/4 w.	R313	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.	R617	3R152P394J	Composition: 390K ohms ±5%, 1/4 w.
L404		(Part of printed board 19D430937P1).	R112	19C314256P22002	Metal film: 20K ohms ±1%, 1/4 w.	R314 and R315	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.	R618	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
L405 and L406	19B209729P1	Coil, helical: sim to Paul Smith SK 802-1.	R113	19C314256P21242	Metal film: 12.4K ohms ±1%, 1/4 w.	R401	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.	R619 and R620	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.
L407	19B209728P1	Coil, helical: sim to Paul Smith SK801-1.	R114	3R152P333J	Composition: 33K ohms ±5%, 1/4 w.	R402	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.	R621	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
L409		(Part of printed board 19D430937P1).	R115	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.	R403 and R404	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.	R622	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
L501 and L502	19A134747P3	Coil, RF.	R116	19A116412P3	Variable, cermet: 5K ohms ±10%, 1/2 w;	R405	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.	R623	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
L503 and L504	19A134747P1	Coil, RF.	R117	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.	R406	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.	R624	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
L601	19A134741P1	Reactor.	R151 and R152	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R407	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.	R625	3R152P302J	Composition: 3K ohms ±5%, 1/4 w.
		----- PLUGS -----	R153	19A134732P1	Thermal: 3300 ohms ±10% at 0 power; sim to Phillips 2322-642-12332.	R408	3R152P390J	Composition: 39 ohms ±5%, 1/4 w.	R626	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
P101	19A116659P15	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3042.	R154	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.	R501	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.	R627	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
P201	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3032.	R155	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.	R502 and R503	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.	R628	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
P801	19A116659P15	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3042.	R156	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.	R504	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.	R629	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
P903	19A116659P83	Connector, printed wiring: 7 contacts; sim to Molex 09-52-3072 (Special).	R157	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R505	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.	R630	19A134753P1	Variable, carbon film: 47K ±20%, 0.1 w.
		----- TRANSISTORS -----	R158	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.	R506	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.	R631	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
Q151	19A115330P1	Silicon, NPN.	R160	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.	R507	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R632	19A116216P1R0J	Deposited carbon: 1.0 ohms ±5%, 1/4 w; sim to Mepco Electra Type CR25.
Q201	19A116201P1	Silicon, NPN.	R161	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.	R508 and R509	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.	R633	3R152P121J	Composition: 120 ohms ±5%, 1/4 w.
Q202	19A116201P3	Silicon, NPN.	R201	19C314256P22431	Metal film: 2.4K ohms ±1%, 1/4 w.	R510	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.	R634	19A116216P1R0J	Deposited carbon: 1.0 ohms ±5%, 1/4 w; sim to Mepco Electra Type CR25.
Q203	19A116201P1	Silicon, NPN.	R202	19C314256P22320	Metal film: 2.3K ohms ±1%, 1/4 w.	R511	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.	R635	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.
Q204	19A134237P1	Silicon, NPN.	R203	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.	R512 and R513	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.	R636A	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
Q205	19A134164P2	Silicon, NPN.	R204	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.	R514	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.	R636B	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
Q206	19A134239P3	Silicon, NPN.	R205	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.	R515	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.	R636C	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
Q207	19A116742P1	Silicon, NPN.	R206	3R152P150J	Composition: 15 ohms ±5%, 1/4 w.	R516	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.	R636D	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
Q208	19A115852P1	Silicon, PNP; sim to Type 2N3906.	R211	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.	R517	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.	R636E	19A116216P6R8J	Deposited carbon: 6.8 ohms ±5%, 1/4 w; sim to Mepco Electra Type CR25.
Q209 and Q210	19A115910P1	Silicon, NPN; sim to Type 2N3904.	R212	3R152P150J	Composition: 15 ohms ±5%, 1/4 w.	R518	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.	R637	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
Q301 and Q302	19A115330P1	Silicon, NPN.	R213A	3R152P270J	Composition: 27 ohms ±5%, 1/4 w.	R519	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.	R638	7147161P19	Composition: 1.0 ohms ±5%, 1/2 w.
			R213B	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.	R520	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.	R639	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
			R215	19A116412P3	Variable, cermet: 5K ohms ±10%, 1/2 w; sim to Helipot Model 62 PR.	R521	19A134755P2	Variable, carbon film: 25K ohms ±20%, 0.1 w.			----- SWITCHES -----
			R216	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.	R522	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.	S601	19A138273G1	Push: DPDT, 2 stations, push-push with latch action; sim to Isostat MA 2171.
			R217	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.	R523	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.			----- TEST POINTS -----
			R218	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.	R524 and R525	3R152P393J	Composition: 39K ohms ±5%, 1/4 w.	TP201 thru TP204	19A138242P1	Contact. (Part of S601).
						R526	19A116670P16	Composition: 4.7 ohms ±5%, 1/4 w.	TP401	19A138242P1	Contact.
						R527	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.	TP501	19A138242P1	Contact.

(Cont'd on Page 37)

SYMBOL	GE PART NO.	DESCRIPTION
----- INTEGRATED CIRCUITS -----		
U101	19A134511P2	Linear, Dual OP Amp; sim to LM258N.
U501	19A134759P1	Linear, Dual Differential Amplifier.
U502	19A134766P1	Linear, IF Amplifier & Detector; sim to AMPEREX TBA 750.
U601	19A134769P2	Linear, Audio Amplifier: sim to TDA 2002.
U602	19A138414G1	Regulator, 8.5 v.
----- CABLES -----		
W201 and W202		(Part of printed board 19D430937P1).
W203	19A129571P2	Strap.
W204 and W205		(Part of printed board 19D430937P1).
W206	19A138194P1	Strap.
W401		(Part of printed board 19D430937P1).
W601		(Part of printed board 19D430937P1).
----- SOCKETS -----		
X151		Socket, crystal. Includes:
	19A134806P1	Pin.
	19B232322P1	Spring.
X301		Socket, crystal. Includes:
	19A134806P1	Pin.
	19B232322P1	Spring.
X501		Socket, crystal. Includes:
	19A134806P1	Pin.
	19B232322P1	Spring.
----- CRYSTALS -----		
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
Y151	19B233066G5	Crystal: 5 PPM. $F_x = \frac{F_o}{9}$
Y301	19B233066G6	Crystal: 420-450 MHz. $F_x = \frac{F_o + 21.4}{9}$
	19B233066G7	Crystal: 450-470 MHz. $F_x = \frac{F_o - 21.4}{9}$
Y501	19A134802P3	Crystal, Quarty: 20945.0 KHz.
----- FILTERS -----		
Z201 and Z202	19A138228G1	Filter. Includes:
L1	19A129773G1	Coil.
R1	3R77P100J	Resistor, composition: 10 ohms $\pm 5\%$ , 1/2 w.
Z501	19A134797P2	Filter, bandpass: freq. 21.4 MHz; sim to TOYO 21J3E5.
Z502	19A134742P1	Filter, bandpass: center freq. 455 $\pm 1.5$ KHz; sim to Murata CFU455D2 or Matsushita EFC-L455K41EA.
----- MISCELLANEOUS -----		
	19B233524G1	Shield. (Located at L211 & R203).
	19B233136P1	Shield. (Located at C215 & L208).
	19D429946P1	Cover. (Located over L307, L308, L401, L402, L405-L407).
	19A134748P2006	Machine screw, Pozidriv, Metric: No. 2-0.4 x 6. (Secures cover over L307, L308, L308, L401, L402, L405-L407).
	19A138451P1	Tuning slug. (Used with L307, L308, L401, L402, L405-L407).
	19A138452P1	Spring. (Used with L307, L308, L401, L402, L405-L407).

SYMBOL	GE PART NO.	DESCRIPTION
	19A134772P1	Can. (Located over L153, L203, L204, L303 & L305).
	19A138274P1	Insulator. (Used with L153, L203, L204, L303, L305).
	19A134656P4	Flatwasher, Metric: 2.6(2.5) MM. dia. (Used with Q207 & U602).
	19A134657P2	Lockwasher, tooth, Metric: No. 2.5. (Used with Q207, U601, U602).
	19A134661P3	Hex nut, Metric: M2.5 x 0.45. (Used with Q207, U601 & U602).
	19A134483P2508	Machine screw, Metric: 2.5 -.45 x 8 MM. (Secures Q207, U601, U602).
	19B232901P1	Support. (Used with Q207, U601, U602).
	19A116023P3	Insulator, plate. (Used with Q207 & U602).
	19A134016P1	Insulator, bushing. (Used with Q207, U602).
	N330P1905F22	Metallic eyelet. (Located on corner of board at J601).
	19B232830P1	Cover. (Used with J601).
	19A134589P3006	Tap screw, thd forming, Metric: 3 -0.5 x 6MM. (Secures J601).
	19B232918P1	Spacer. (Used with S601 & S602).
	19C328587P1	Push button. (Used with S601 & S602- POWER, SQUELCH).
	NP280612P2	Nameplate. (POWER- Located on S602 knob).
	NP280612P1	Nameplate. (SQUELCH- Located on S601 knob).
	4036555P1	Insulator, washer: nylon. (Used with Q204).
	19B209502P1	Stud terminal. (Used with C250-C252).
	19D429826P2	Knob. (R630).
	19A138389P1	Insulator. (Located under R630 knob).
	19A134753P3	Screw. (Secures R630).
	19A134751P1	Lockwasher. (Secures R630).
	19A134753P2	Flatwasher. (Secures R630).
	19B233135P1	Jumper. (Located between W202 & W203).
	19B233285P1	Spring, ground. (Located on edge of printed board).

PARTS LIST

TRANSISTORIZED MICROPHONE  
19B209670P1

SYMBOL	GE PART NO.	DESCRIPTION
	19A116659P20	Cable connector shell; sim to Molex 09-50-3081.
	19A116781P3	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 4- Used with 19A116659P20 connector shell).
	NP280575	Faceplate. (GENERAL ELECTRIC).
	4033271G1	Strain relief. (Located on cable 10 inches from connector).

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

INTERCONNECT BOARD  
19D429671G1  
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
----- CAPACITORS -----		
C901	19A700001P6	Ceramic, high dielectric disc: 100 pf $\pm 20\%$ , 50 VDCW.
C902	19A134730P2	Electrolytic: 220 $\mu$ f $\pm 100\%$ -10%, 25 VDCW.
C903	19A700001P6	Ceramic, high dielectric disc: 100 pf $\pm 20\%$ , 50 VDCW.
C904	19A700005P9	Polyester: 0.022 $\mu$ f $\pm 10\%$ , 50 VDCW.
C905	19A700001P7	Ceramic, high dielectric disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C913	19A700003P7	Tantalum: 10 $\mu$ f $\pm 20\%$ , 16 VDCW.
C914	19A700001P6	Ceramic, high dielectric disc: 680 pf $\pm 20\%$ , 50 VDCW.
C916	19A700002P19	Ceramic, temperature compensating disc: 33 pf $\pm 5\%$ , 50 VDCW.
C917	19A116114P7065	Ceramic: 100 pf $\pm 5\%$ , 100 VDCW; temp coef -750 PPM.
C919 and C920	19A700001P1	Ceramic, high dielectric disc: 100 pf $\pm 20\%$ , 50 VDCW.
C952	19A700001P1	Ceramic, high dielectric disc: 100 pf $\pm 20\%$ , 50 VDCW.
C953	19A700001P7	Ceramic, high dielectric disc: 1000 pf $\pm 20\%$ , 50 VDCW.
----- DIODES AND RECTIFIERS -----		
D901 and D902	19A116783P1	Rectifier, silicon: 100 VDC blocking, 6 amps.
D903	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
----- JACKS AND RECEPTACLES -----		
J901 and J902	19A134734P1	Contact, electrical: sim to Molex A 2461 (09-67-1042).
J903	19A134735P1	Contact, electrical: sim to Molex A 2461 (09-67-1072).
J904	19A134736P1	Contact, electrical: sim to Molex 6410 (22-27-2021).
J905	19A134152P26	Connector, printed wiring: sim to Molex 22-03-2101.
J906	19A134733P1	Contact, electrical: sim to Molex A4030 (22-03-2121).
J910	19A116659P151	Connector, printed wiring: sim to Molex 09-75-1111.
J911	19A116659P145	Connector, printed wiring: sim to Molex 09-75-1081.
----- INDUCTORS -----		
L905	19B209420P114	Coil, RF: 1.20 $\mu$ h $\pm 10\%$ , 0.18 ohms DC res max; sim to Jeffers 4436-1K.
----- PLUGS -----		
P907	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3032.
----- RESISTORS -----		
R901	3R152P561J	Composition: 560 ohms $\pm 5\%$ , 1/4 w.
R902	3R152P102J	Composition: 1K ohms $\pm 5\%$ , 1/4 w.
R903	3R152P273J	Composition: 27K ohms $\pm 5\%$ , 1/4 w.

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MULTI-FREQUENCY BOARD - 6 FREQ  
19D429703G2  
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
C979 thru C984	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C985	19A700002P28	Ceramic, compensating disc: 180 pf $\pm 5\%$ , 50 VDCW.
C986 and C987	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C988	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C989	19A700003P6	Tantalum: 4.7 $\mu$ f $\pm 20\%$ , 35 VDCW.
C990	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
C991	19A700002P5	Ceramic, compensating disc: 2.2 pf $\pm 5\%$ , 50 VDCW.
C992	19A700002P18	Ceramic, compensating disc: 27 pf $\pm 5\%$ , 50 VDCW.
C993	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C994	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
C995 thru C997	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C998 and C999	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
		- - - - - DIODES AND RECTIFIERS - - - - -
D901 and D902	19A116783P1	Rectifier, silicon: 6 amps, 100 VDC blocking.
D903	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D904	4036887P5	Silicon, Zener: 500 mW, 5.4 v. nominal.
D921 thru D926	19A116785P2	Silicon, capacitive, low frequency; sim to Hypera-Brut BB117.
D961 thru D966	19A116785P2	Silicon, capacitive, low frequency; sim to Hypera-Brut BB117.
		- - - - - JACKS AND RECEPTACLES - - - - -
J901 and J902	19A134734P1	Contact, electric: 4 terminal; sim to Molex A2461.
J903	19A134735P1	Contact, electric: 7 terminal; sim to Molex A2461.
J904	19A134736P1	Contact, electric: 2 terminal; sim to Molex 6410.
J905	19A134152P26	Connector, printed wiring, two part; sim to Molex 22-03-2101.
J906	19A134733P1	Contact, electric: 12 terminal; sim to Molex A4030.
J910	19A116659P151	Connector, printed wiring: 11 contacts; sim to Molex 09-75-1111.
J911	19A116659P145	Connector, printed wiring: 8 contacts; sim to Molex 09-75-1081.
		- - - - - INDUCTORS - - - - -
L901	19B209420P113	Coil, RF: 1.00 $\mu$ h $\pm 10\%$ , 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L904	19B209420P113	Coil, RF: 1.00 $\mu$ h $\pm 10\%$ , 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L905	19B209420P114	Coil, RF: 1.20 $\mu$ h $\pm 10\%$ , 0.18 ohms DC res max; sim to Jeffers 4436-1K.
L9021A	19A134728P1	Coil, RF: variable.
L9021B	19A134728P2	Coil, RF: variable.
L922A	19A134728P1	Coil, RF: variable.
L922B	19A134728P2	Coil, RF: variable.
L923A	19A134728P1	Coil, RF: variable.
L923B	19A134728P2	Coil, RF: variable.
L924A	19A134728P1	Coil, RF: variable.
L924B	19A134728P2	Coil, RF: variable.
L925A	19A134728P1	Coil, RF: variable.
L925B	19A134728P2	Coil, RF: variable.
L926A	19A134728P1	Coil, RF: variable.
L926B	19A134728P2	Coil, RF: variable.

SYMBOL	GE PART NO.	DESCRIPTION
R986 thru R991	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R992	3R152P101J	Composition: 100 ohms $\pm 5\%$ , 1/4 w.
R993	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R994	3R152P332J	Composition: 3.3K ohms $\pm 5\%$ , 1/4 w.
R995	3R152P682J	Composition: 6.8K ohms $\pm 5\%$ , 1/4 w.
R996	3R152P220J	Composition: 22 ohms $\pm 5\%$ , 1/4 w.
R997	3R152P152J	Composition: 1.5K ohms $\pm 5\%$ , 1/4 w.
R998	3R152P223J	Composition: 22K ohms $\pm 5\%$ , 1/4 w.
R999	3R152P470J	Composition: 47 ohms $\pm 5\%$ , 1/4 w.
- - - - - SWITCHES - - - - -		
S901	19A134746P1	Rotary: 1 pole, 12 positions, non-shorting contacts, 1 volt amp at 150 VRMS; sim to Jeanrenaud RBP 12FLX12.
- - - - - INTEGRATED CIRCUITS - - - - -		
U901	19A134097P24	Digital, BCD-TO-Decimal Decoder: Identification No. 4028.
U902	19A116180P22	Digital, Hex Inverter (Open Collector): Identification No. 7405.
- - - - - SOCKETS - - - - -		
X921 thru X926	19A134806P1	Socket. Includes: Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
X961 thru X966	19A134806P1	Socket. Includes: Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
- - - - - CRYSTALS - - - - -		
NOTE: When reordering give GE Part Number and specify exact frequency needed.		
Crystal freq = $\frac{\text{Operating Freq.}}{g}$		
Y921 thru Y926	19B233066G5	Transmitter: 5 PPM.  420-450 STD. Crystal freq = $\frac{\text{Operating Freq} + 21.4}{g}$  420-470 Hi Side Injection. Crystal freq = $\frac{\text{Operating Freq} + 21.4}{g}$  440-470 STD $\frac{Fo - 21.4}{g}$
Y961 thru Y966	19B233066G6	Receiver: 5 PPM. (420-450)
	19B233066G7	Receiver: 5 PPM. (440-470)
- - - - - MISCELLANEOUS - - - - -		
	19A138239P1	Shield. (Located near center of printed wire board).
	19D429816P1	Knob. (S1).
	19B232318P1	Bushing. (Located between S1 & printed wire board)
	19A134748P2004	Machine, Pozidriv, Metric screw: M2 x 0.4 x 4. (Secures A901 to printed wire board).
	19A134657P1	Lockwasher, internal tooth, Metric: M2.2. (Secures A901 to printed wire board).
	19B232321P1	Spacer. (Located on A901).

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

## PARTS LIST

MULTI-FREQUENCY BOARD  
 19D430078G5 4 TRANSMIT 4 RECEIVE  
 19D430078G6 2 TRANSMIT 2 RECEIVE  
 19D430078G7 2 TRANSMIT 1 RECEIVE  
 19D430078G8 1 TRANSMIT 2 RECEIVE  
 ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
A901		CHANNEL LIGHT BOARD 19C328913G1
		----- INDICATING DEVICES -----
V1	19A116455P3	Lamp, incandescent; sim to Albrecht KG NO B1-PIN-T1-5/1 NO 069.
		----- CAPACITORS -----
C901	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C902	19A134730P2	Electrolytic: 220 $\mu f$ $\pm 100\%$ -10%, 25 VDCW.
C903	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C904	19A700005P9	Polyester: 0.022 $\mu f$ $\pm 10\%$ , 50 VDCW.
C905	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C909	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C910	19A700003P7	Tantalum: 10 $\mu f$ $\pm 20\%$ , 16 VDCW.
C912	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
C913	19A700003P7	Tantalum: 10 $\mu f$ $\pm 20\%$ , 16 VDCW.
C914	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C915	19A700002P17	Ceramic, compensating disc: 22 pf $\pm 5\%$ , 50 VDCW.
C916	19A700002P19	Ceramic, compensating disc: 33 pf $\pm 5\%$ , 50 VDCW.
C917 and C918	19A116114P7065	Ceramic: 100 pf $\pm 5\%$ , 100 VDCW; temp coef -750 PPM.
C919 and C920	19A700001P1	Ceramic, disc: 100 pf $\pm 20\%$ , 50 VDCW.
C921 thru C924	19A700002P28	Ceramic, compensating disc: 180 pf $\pm 5\%$ , 50 VDCW.
C927 thru C930	19A134725P1	Ceramic, disc: 18 pf $\pm 5\%$ , 50 VDCW.
C933 thru C936	19A134725P2	Ceramic, disc: 68 pf $\pm 5\%$ , 50 VDCW.
C939 thru C942	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C945	19A700002P28	Ceramic, compensating disc: 180 pf $\pm 5\%$ , 50 VDCW.
C946 and C947	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C948	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C949	19A700003P6	Tantalum: 4.7 $\mu f$ $\pm 20\%$ , 35 VDCW.
C950	19A700005P7	Polyester: 0.01 $\mu f$ $\pm 10\%$ , 50 VDCW.
C951	19A700002P5	Ceramic, compensating disc: 2.2 pf $\pm 5\%$ , 50 VDCW.
C952	19A700001P1	Ceramic, disc: 100 pf $\pm 20\%$ , 50 VDCW.
C953	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C955	19A700001P5	Ceramic, disc: 450 pf $\pm 20\%$ , 50 VDCW.
C958 thru C960	19A700001P5	Ceramic, disc: 450 pf $\pm 20\%$ , 50 VDCW.
C961 thru C964	19A700002P28	Ceramic, compensating disc: 180 pf $\pm 5\%$ , 50 VDCW.
C967 thru C970	19A134725P1	Ceramic, disc: 18 pf $\pm 5\%$ , 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C973 thru C976	19A134725P2	Ceramic, disc: 68 pf $\pm 5\%$ , 50 VDCW.
C979 thru C982	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C985	19A700002P28	Ceramic, compensating disc: 180 pf $\pm 5\%$ , 50 VDCW.
C986 and C987	19A700001P7	Ceramic, disc: 1000 pf $\pm 20\%$ , 50 VDCW.
C988	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C989	19A700003P6	Tantalum: 4.7 $\mu f$ $\pm 20\%$ , 35 VDCW.
C990	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
C991	19A700002P5	Ceramic, compensating disc: 2.2 pf $\pm 5\%$ , 50 VDCW.
C992	19A700002P18	Ceramic, compensating disc: 27 pf $\pm 5\%$ , 50 VDCW.
C994	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
C995 and C996	19A700001P6	Ceramic, disc: 680 pf $\pm 20\%$ , 50 VDCW.
C998 and C999	19A700001P5	Ceramic, disc: 470 pf $\pm 20\%$ , 50 VDCW.
		----- DIODES AND RECTIFIERS -----
D901 and D902	19A116783P1	Rectifier, silicon: 6 amps, 100 VDC blocking.
D903	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D905 thru D908	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D909 thru D912	19A116052P2	Diode, hot carrier: Fwd. drop .410 volts max.
D921 thru D924	19A116785P2	Silicon, capacitive, low frequency; sim to Hypera-Brut BB117.
D961 thru D964	19A116785P2	Silicon, capacitive, low frequency; sim to Hypera-Brut BB117.
		----- JACKS AND RECEPTACLES -----
J901 and J902	19A134734P1	Contact, electric: 4 terminal; sim to Molex A2461.
J903	19A134735P1	Contact, electric: 7 terminal; sim to Molex A2461.
J904	19A134736P1	Contact, electric: 2 terminal; sim to Molex 6410.
J905	19A134152P26	Connector, printed wiring, two part; sim to Molex 22-03-2101.
J906	19A134733P1	Contact, electric: 12 terminal; sim to Molex A4030.
J910	19A116659P151	Connector, printed wiring: 11 contacts; sim to Molex 09-75-1111.
J911	19A116659P145	Connector, printed wiring: 8 contacts; sim to Molex 09-75-1081.
		----- INDUCTORS -----
L904	19B209420P113	Coil, RF: 1.00 $\mu h$ $\pm 10\%$ , 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L905	19B209420P114	Coil, RF: 1.20 $\mu h$ $\pm 10\%$ , 0.18 ohms DC res max; sim to Jeffers 4436-1K.
L921A	19A134728P1	Coil, RF: variable.
L921B	19A134728P2	Coil, RF: variable.
L922A	19A134728P1	Coil, RF: variable.
L922B	19A134728P2	Coil, RF: variable.
L923A	19A134728P1	Coil, RF: variable.
L923B	19A134728P2	Coil, RF: variable.
L924A	19A134728P1	Coil, RF: variable.
L924B	19A134728P2	Coil, RF: variable.
L927 thru L930	19B209420P115	Coil, RF: 1.50 $\mu h$ $\pm 10\%$ , 0.22 ohms DC res max; sim to Jeffers 4436-2K.

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
L933	19B209420P113	Coil, RF: 1.00 $\mu$ h $\pm 10\%$ , 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L934	19B209420P125	Coil, RF: 10.0 $\mu$ h $\pm 10\%$ , 3.10 ohms DC res max; sim to Jeffers 4446-4K.
L961 thru L964	19A134728P2	Coil, RF: variable.
L968	19B209420P125	Coil, RF: 10.0 $\mu$ h $\pm 10\%$ , 3.10 ohms DC res max; sim to Jeffers 4446-4K.
		----- PLUGS -----
P907	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-0032.
P921	19A134731P1	Contact, electrical: sim to AMP 1-86182-7.
P961	19A134731P1	Contact, electrical: sim to AMP 1-86182-7.
		----- TRANSISTORS -----
Q901	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q921 thru Q924	19A115330P1	Silicon, NPN.
Q927	19A115330P1	Silicon, NPN.
Q961 thru Q964	19A115330P1	Silicon, NPN.
Q967	19A115330P1	Silicon, NPN.
Q968	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		----- RESISTORS -----
R901	3R152P561J	Composition: 560 ohms $\pm 5\%$ , 1/4 w.
R902	3R152P102J	Composition: 1K ohms $\pm 5\%$ , 1/4 w.
R903	3R152P273J	Composition: 27K ohms $\pm 5\%$ , 1/4 w.
R908 thru R911	3R152P103J	Composition: 10K ohms $\pm 5\%$ , 1/4 w.
R915 thru R917	3R152P472J	Composition: 4.7K ohms $\pm 5\%$ , 1/4 w.
R918	3R152P100J	Composition: 10 ohms $\pm 5\%$ , 1/4 w.
R921	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R922	3R152P681J	Composition: 680 ohms $\pm 5\%$ , 1/4 w.
R923 and R924	3R152P271J	Composition: 47K ohms $\pm 5\%$ , 1/4 w.
R927 thru R930	3R152P473J	Composition: 47K ohms $\pm 5\%$ , 1/4 w.
R933 thru R936	3R152P682J	Composition: 6.8K ohms $\pm 5\%$ , 1/4 w.
R939 thru R942	3R152P822J	Composition: 8.2K ohms $\pm 5\%$ , 1/4 w.
R945 thru R948	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R951	3R152P101J	Composition: 100 ohms $\pm 5\%$ , 1/4 w.
R952	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R953	3R152P332J	Composition: 3.3K ohms $\pm 5\%$ , 1/4 w.
R954	3R152P682J	Composition: 6.8K ohms $\pm 5\%$ , 1/4 w.
R955	3R152P390J	Composition: 39 ohms $\pm 5\%$ , 1/4 w.
R956 thru R959	19A116412P5	Variable, cermet: 10K ohms $\pm 10\%$ , 1/2 w; sim to Helipot Model 62 PR.
R962 thru R965	3R152P681J	Composition: 680 ohms $\pm 5\%$ , 1/4 w.
R968 thru R971	3R152P473J	Composition: 47K ohms $\pm 5\%$ , 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R974 thru R977	3R152P682J	Composition: 6.8K ohms $\pm 5\%$ , 1/4 w.
R980 thru R983	3R152P822J	Composition: 8.2K ohms $\pm 5\%$ , 1/4 w.
R986 thru R989	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R992	3R152P101J	Composition: 100 ohms $\pm 5\%$ , 1/4 w.
R993	3R152P271J	Composition: 270 ohms $\pm 5\%$ , 1/4 w.
R994	3R152P332J	Composition: 3.3K ohms $\pm 5\%$ , 1/4 w.
R995	3R152P682J	Composition: 6.8K ohms $\pm 5\%$ , 1/4 w.
R996	3R152P220J	Composition: 22 ohms $\pm 5\%$ , 1/4 w.
R997	3R152P152J	Composition: 1.5K ohms $\pm 5\%$ , 1/4 w.
R998	3R152P223J	Composition: 22K ohms $\pm 5\%$ , 1/4 w.
R999	3R152P470J	Composition: 47 ohms $\pm 5\%$ , 1/4 w.
		----- SWITCHES -----
S901	19B233521G1	Rotary: 1 pole, 12 positions, non-shorting contacts, 1 volt amp at 150 VRMS; sim to Jeanrenaud RBP 12F1X12.
		----- SOCKETS -----
X921 thru X924	19A134806P1	Socket. Includes: Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
X961 thru X964	19A134806P1	Socket. Includes: Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
		----- CRYSTALS -----
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
		Crystal freq = $\frac{\text{Operating Freq.}}{9}$
Y921 thru Y924	19B233066G5	Transmitter: 5 PPM.
		420-470 Hi Side Injection. Crystal Freq = $\frac{\text{Operating Freq} + 21.4}{9}$
		440-470 STD = $\frac{\text{Operating Freq} - 21.4}{9}$
Y961 thru Y964	19B233066G6	Receiver: 5 PPM.
	19B233066G7	Receiver: 5 PPM.
		----- MISCELLANEOUS -----
	19A134748P2004	Machine, Pozidriv, Metric screw: M2 x 0.4 x 4. (Secures A901 to printed wire board).
	19A134657P1	Lockwasher, internal tooth, Metric: M2.2. (Secures A901 to printed wire board).

## PARTS LIST

132-512 MHz ANTENNA  
19B209568P1

SYMBOL	GE PART NO.	DESCRIPTION
		Whip assembly. 068110-001.
		Whip nut assembly. 068047-001.
		Base nut assembly. 068048-001.
		"O" Ring (LARGE). 007059-122.
		Stud assembly. 068046-001.
		RG58/U Cable, 15 feet. 068115-001.

## 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 - Four Frequency Board 19D430078G1-G8

Six Frequency Board 19D429073G1 & G2

To increase transmit oscillator drive to exciter. Changed R955.

REV. B - To improve operation of transmit oscillator. Changed Parts Layout and PWB.  
Changed R921-R924 on Four Frequency Board and R921-R926 on Six Frequency Board.

REV. A - Channel Light Indicator Board Assembly 19C328913G1

To increase light level. Changed V1. Deleted sleeving.

ADDENDUM TO LBI30864

The following revision letter change has been made to the Century II Transmitter/Receiver board to improve operation.

Transmitter/Receiver Board 19D430931G1 and G2

REV. C - To improve oscillator start time at low temperatures.  
Changed Q151 and Q301 from 19A115330 to 19A701351P1.

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