MOBILE RADIO

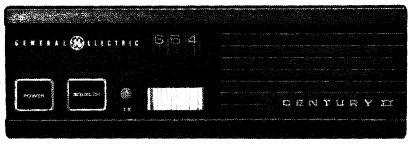
CENTURY II

MAINTENANCE MANUAL LBI 30783 A

DATAFILE FOLDER - DF9049

148–174 MHz (Domestic)
146–174 MHz (International)

10–WATT TRANSMITTER
25–WATT TRANSMITTER



MOBILE RADIO

MICROPHONE

TWO-WAY FM MOBILE COMBINATIONS

EXTERNAL SPEAKER (OPTIONAL)

GENERAL ELECTRIC

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ILLUSTRATIONS

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*

FREQUENCY RANGE	
"C" Combinations	148-174 MHz (Domestic)
"T" Combinations	146-174 MHz (International)
BATTERY DRAIN	
Receiver	
Squelched	0.20 Amperes
Unsquelched	0.65 Amperes
Transmitter	
10 Watt	3.5 Amperes
25 Watt	5.9 Amperes
FREQUENCY STABILITY	0.0005%
TEMPERATURE RANGE	-30°C (-22°F) to +60°C (140°F)
DUTY CAPABILITY	Continuous
DIMENSION, 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)

TRANSMITTER

POWER OUTPUT	
KT-171-A	3 to 10 Watt
KT-172-A	8 to 25 Watt
CONDUCTED SPURIOUS	-60 dB
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 Specifications	1 dB Degradation
148-174 MHz	2.5 MHz	3.5 MHz

RF OUTPUT IMPEDANCE	50 ohms

RECEIVER (ER-111-A)

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)	0.30 µV
20 dB Quieting Method	0.35 µV
20 dB SINAD (CEPT**)	0.75 µV
SELECTIVITY	
EIA Two-Signal Method	-85 dB @ ±30 kHz (EIA) -75 dB (CEPT)
SPURIOUS RESPONSE	-85 dB
INTERMODULATION	-70 dB
MODULATION ACCEPTANCE	±6.5 kHz
SQUELCH SENSITIVITY	8 dB SINAD

MAXIMUM FREQUENCY SPREAD	Full Specifications	3.3 dB Degradation
148-174	1.5 MHz	2.5 MHz

FREQUENCY RESPONSE	Within +1 and -3 dB of a standard 6 dB per octave de-emphasis curve from 300 to 3000 Hz (1000 Hz reference)
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
C FCC SPEC.	**E** +12 VDC	**4** 8-20	**3** 12.5 kHz	**A** 1-Freq.	**A** 1 Tx 1 Rx	**S** Standard	**H*** 148-174 MHz	**A** 5 PPM
T* (SEE NOTE)		**5** 21-40	**5** 25 kHz	**B** 2 Tx 1 Rx	**B** 2 Tx 1 Rx	**U** Channel Guard		**G** 10 PPM
			6 30 kHz	**C** 2-Freq.	**C** 2 Tx 2 Rx			
				F 4-Freq.	**E** 3 Tx 3 Rx			
				H 6-Freq.	**F** 4 Tx 4 Rx			
					G 5 Tx 5 Rx			
					H 6 Tx 6 Rx			
					N None			

* NOTE: Combinations with the first digit "T" are primarly for International use. These combinations have a frequency range of 146-174 MHz.

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 ±0.0005% oscillator stability.
- Channel Guard (tone squelch).

The radio consists of an effective, heat-dissapating, 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 20,000 ohms-per-volt 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 may 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 10.7 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 microphone 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.

NOISE SUPPRESSION

After completing the initial adjustment of the transmitter and receiver, the serviceman should determine whether additional noise suppression is required. The following information should assist the serviceman in identifying and eliminating undesirable noise interference.

Ignition Noise

Ignition noise sounds like a "popping" sound in the speaker, whose frequency varies with engine speed while a weak signal is being received. This type of interference is generated by the spark plugs, distributor and any poor connections in the high-voltage system which might cause arcing. Ignition noise may be identified by noting that the noise disappears as soon as the ignition switch is turned off (Refer to Figure 1).

1. If the vehicle does not have a resistance lead from the coil to the center of the distributor cap,

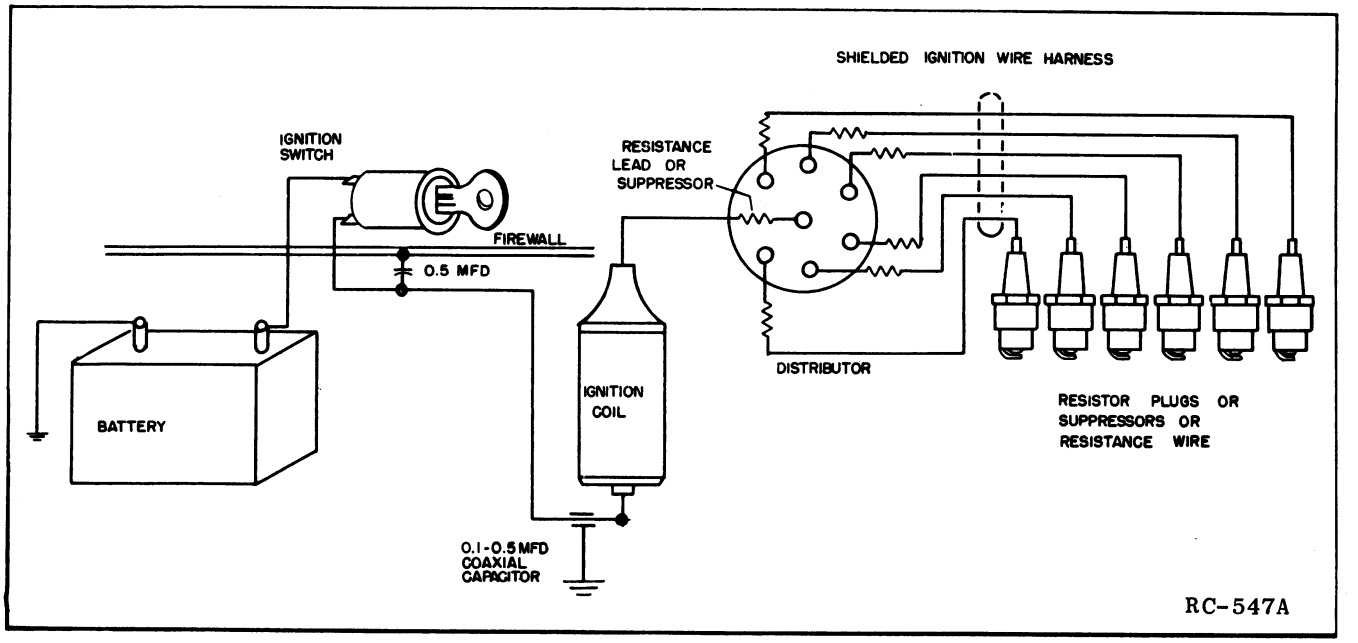


Figure 1 - Ignition Circuit with Noise Suppression Components

disconnect the lead at the distributor and cut the lead so that a Cable-Type Suppressor may be inserted in it close to the distributor. Screw the cut ends of the lead into the suppressor.

NOTE

A resistance lead operates as a very effective noise suppressor as long as there are no breaks anywhere along its length. Never cut a resistance lead to insert a suppressor. A loose knot is often tied in the lead to prevent excess flexing, which might break the conductor.

2. Check to see that:

   -- the distributor points and condenser are in good condition.

   -- the high-voltage leads from the distributor are not broken and are making good contact at each end.

   -- the spark plugs have clean, dry insulators and their electrodes are clean and properly adjusted.

   -- the timing has been properly adjusted.

3. Use a 0.5 mfd by-pass capacitor to by-pass the battery lead to the ignition coil. Mount the capacitor under a screw which will provide a good ground and connect the capacitor lead to the terminal of the coil which is connected to the ignition.

4. Remove the ignition coil and its mounting bracket. Clean paint from coil (where the bracket mounts), from the bracket and from the engine block. Remount the coil so as to obtain a good ground for the coil case.

5. If the vehicle has been driven 30,000 or 40,000 miles or more, the cap and rotor of the distributor will probably need replacing. This will not only reduce ignition noise, but also improve the overall performance of the engine.

6. High-voltage ignition wires can become capacitively coupled to the low-voltage systems, causing ignition noise to appear in the low-voltage system. This coupling can be minimized by separating the high- and low-voltage leads, or if necessary, separately shielding the leads.

7. If one of the ignition leads happens to have the critical length for radiating at the receiver's frequency, the noise can be reduced by changing the length of the lead. A noise source of this type is not common and can only be found by using a noise meter or by trial and error.

8. If the preceding steps fail to reduce ignition noise to a satisfactory level, it may be necessary to install resistance-type spark plugs, individual suppressors on each spark plug, or a shielded ignition wire harness.

Alternator Noise

Alternator noise shows up as a high-pitched "whine", whose pitch varies with engine speed. To check for this type of noise, run the engine at a moderate speed and then shut off the engine, while listening to the noise on the receiver. Alternator noise will continue as long as the engine turns, lowering in pitch as the engine slows down.

It may be necessary to install a coaxial type, 0.5 mfd filter capacitor from the ungrounded alternator terminal to ground.

CAUTION

Do not install this capacitor on alternators that are equipped with a factory-supplied capacitor for protecting the rectifiers and suppressing noise.

NOTE

It is recommended that the radio power leads be connected directly to the battery, since alternator noise levels are lowest at the battery. If ignition switch control is required, a special lead is required (refer to Installation Instructions). The high current transmitter should always be connected to the battery.

Generator Noise

Generator noise shows up as a high-pitched "whine", whose pitch varies with engine speed. To check for this type of noise, run the engine at a moderate speed and then shut off the engine, while listening to the noise on the receiver. Generator noise will continue as long as the engine turns, lowering in pitch as the engine slows down.

By-pass the armature terminal on the generator to ground with a 0.5 mfd, 40 or 50 amp coaxial capacitor. Be sure to scrape the area where the capacitor is to be mounted, so that its case will be well grounded.

CAUTION

Do not by-pass the field terminal (F), as this will damage the voltage regulator contacts.

Generator Regulator Noise

Generator regulator Noise shows up as a "raspy" sound which is generated by the contacts in the regulator and radiated by the leads coming out to the regulator. If suppression of regulator noise is necessary, connect a 5 ohm resistor in series with a .002 mfd capacitor from the field terminal (F) of the regulator to ground. If possible, these components should be mounted inside regulator case. The battery terminal (BAT) and armature terminal (ARM) can be bypassed to ground with 0.5 mfd capacitors (Refer to Figure 2).

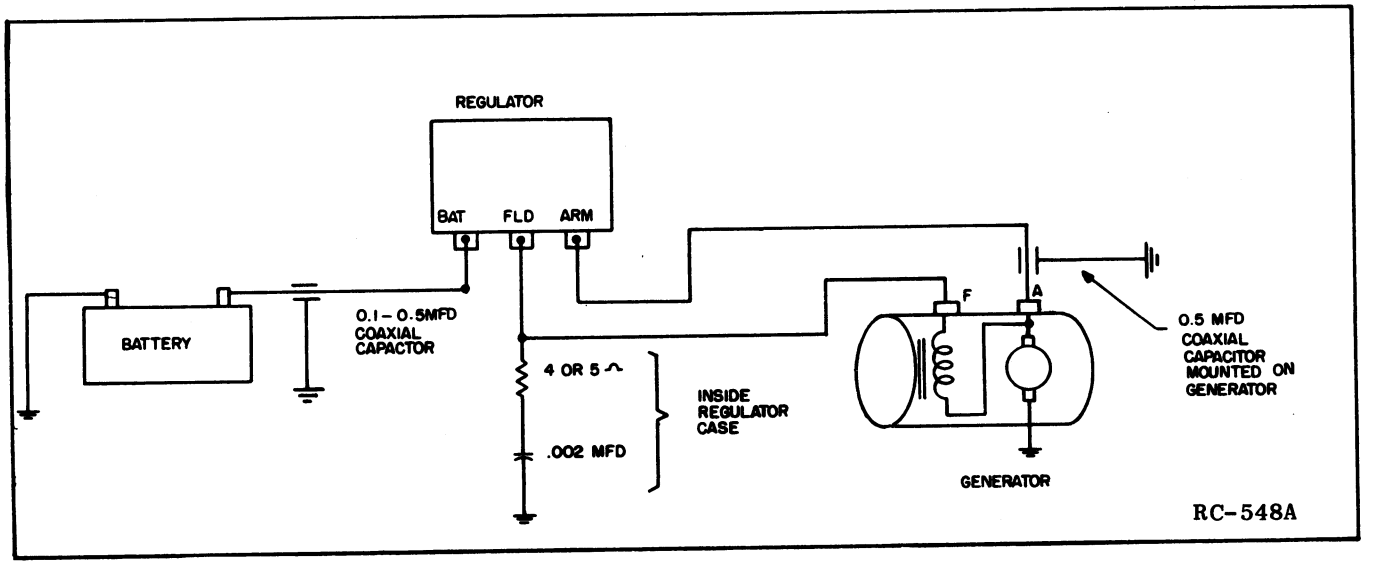


Figure 2 - Generator Circuit with Noise Suppression Components

CAUTION

If the regulator is opened to install the capacitor or resistor, remember that one wrong connection or shorted wire can damage the regulator or generator.

Gauge noise produces a "hissing" or "crackling" sound. Tapping the face of each gauge while the engine is running usually shows up which gauge is at fault. By-pass the gauge lead to ground with a 0.5 mfd capacitor, connected close to the sensing element.

Static and Arcing Noise

The following suggestions may help to cure other unusual types of interference:

1. Use bonding braid to electrically bond the hood and each corner of the engine block to the vehicle's frame. Scrape paint and dirt from bonding points to obtain a good ground.
2. Treat noisy tires with anti-static powder.
3. Use front-wheel static collectors for irregular "popping" noise which disappears when the brakes are applied.
4. Use heavily graphited penetrating oil on the exhaust pipe and muffler supports if they are producing noise.

CIRCUIT ANALYSIS

TRANSMITTER

Century II transmitters utilize a crystal controlled frequency modulated exciter, for 1 through 6 frequency operation in the 148-174 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 250 milliwatts modulated RF to the PA which provides rated output power of either 10 or 25 watts. Figure 3 is a block diagram of the Century II radio showing both the transmitter and receiver.

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 +8.5 V 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-2 through P101-2. 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 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.

NOTE

In radios having ±10 PPM oscillator stability, diode D152, in the temperature compensating network is removed.

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 buffer/amplifier Q201 and Q202. The output of the buffer/amplifier can be monitored at TP201. The voltage at TP201 is typically 1.0 Vrms.

EXCITER AMPLIFIERS

The output of Q202 is coupled through a 2nd tuned circuit L204 and L205 to the base of amplifier Q203. L204 and L205 are tuned to the operating frequency. The output of Q203 can be monitored at TP202 and typically is 0.4 Vrms. The amplifier output is taken from the collector of Q203 and coupled to the base of a class C amplifier Q204 through a double tuned circuit L208 and L209. L208 and L209 are tuned to the operating frequency. The output of the exciter is taken from the collector of Q204 and coupled through an impedance matching network (L213, C222, C223 and C224), a 50 ohm micro-strip W201 and a second impedance matching network (T201, L222, C233) that matches the impedance of the micro-strip to the base of PA driver Q205.

The 250 milliwatt output of the exciter is monitored at TP203 using the RF detector probe. The meter reading at TP203 is typically 0.5 VDC. The output frequency may also be monitored here.

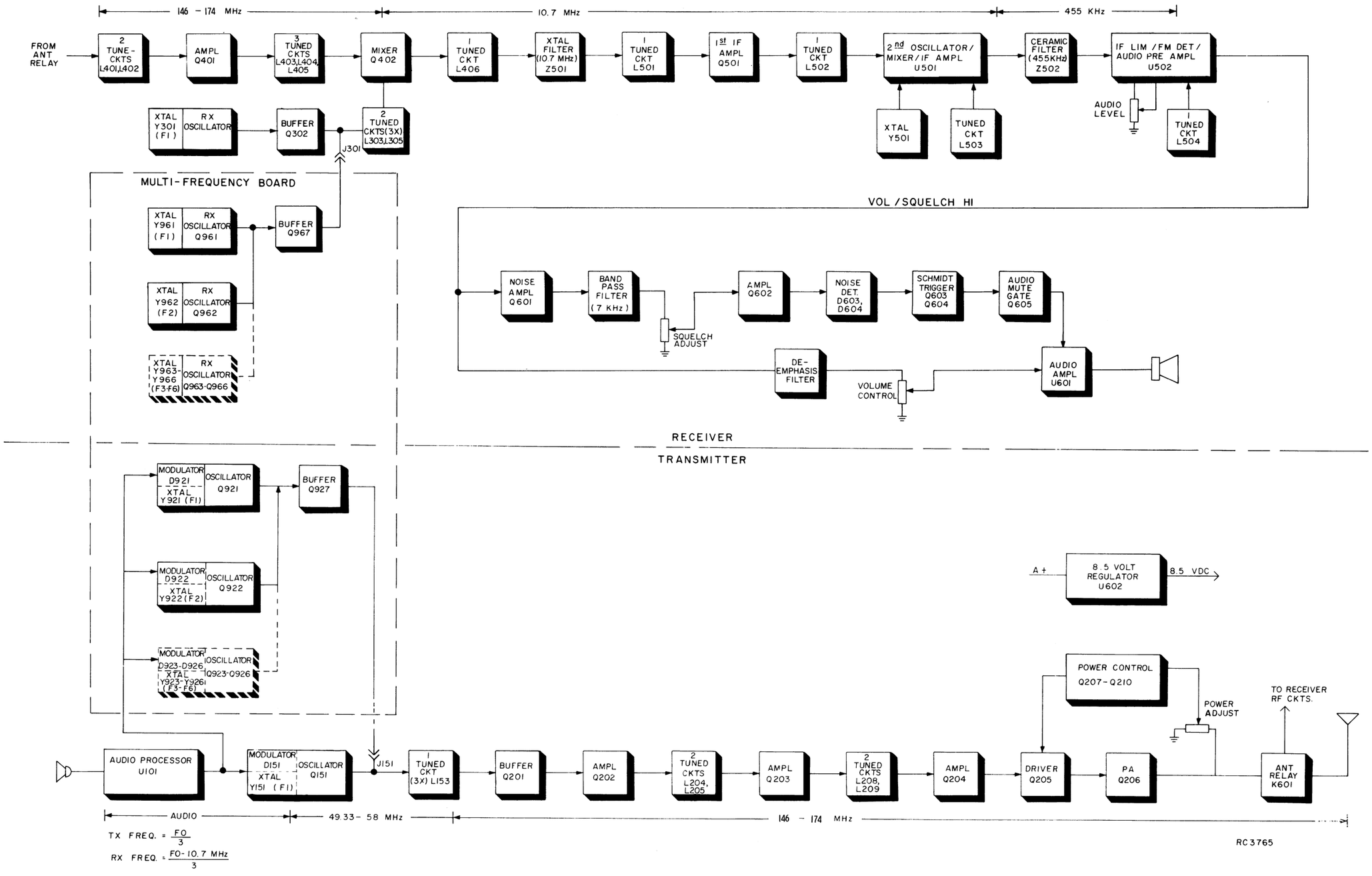
POWER AMPLIFIER

The two stage power amplifier consists of driver Q205 and power amplifier Q206 and associated circuitry. The output of driver Q205 is coupled to the base of Power Amplifier Q206 through an impedance matching network consisting of C238-C242, L225-L226. 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 10 watts for Transmit/Receive board 19D429451G2 and 25 watts for 19D429451G1.

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 Q210 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 Q707 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.



TRANSMITTER/RECEIVER BLOCK DIAGRAM

Figure 3

MULTI-FREQUENCY BOARDS

One of two multi-frequency boards is required when a radio is equipped with more than one channel. A four frequency board has space to accommodate 4 transmit and 4 receive oscillators and the channel selector. In radios having 2-transmit and 1 receive channel, the two transmit oscillators are located on the multi-frequency board and the single receive oscillator is located on the Tx/Rx board. 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.

NOTE

A ground lead through J910-6 is connected to chassis ground through a fusable printed wiring path which will open in case the ground wire is accidently 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 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 selection by the Channel Selector switch.

RECEIVER

Century II receivers are dual conversion, superheterodyne FM receivers designed for one through six frequency operation in the 148-174 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 10.7 MHz and 455 kHz. Adjacent channel selectivity is obtained by using two bandpass filters: 10.7 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
- 10.7 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 two tuned circuits (L401-C401 and L402-C402) to the base of RF amplifier Q401. The output of Q401 is coupled through three more tuned circuits consisting of L403-C406-C407, L404-C408 and L405-C411 to the gate of 1st Mixer Q402. The front end selectivity is provided by the five tuned circuits.

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 third 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 by two tuned circuits consisting of L303-C307 and L305-C310-C311. The oscillator output frequency and power can be metered at TP401. The output is normally greater than four milliwatts.

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 10.7 MHz mixer 1st IF output signal is coupled from the drain of Q402 through an impedance matching network (L406-C413-C414-C415) 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 FET. 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 a 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 10.245 MHz for low side injection (11.155 for high side injection). This frequency is mixed with the 10.7 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.

This 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 (D602 and D604). This circuit has a high source impedance and provides the function of a 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 pushbutton on the front of the radio grounds the base of Q601 and disables the squelch function (and Channel Guard if present).

SUPPLY VOLTAGE DISTRIBUTION SYSTEM

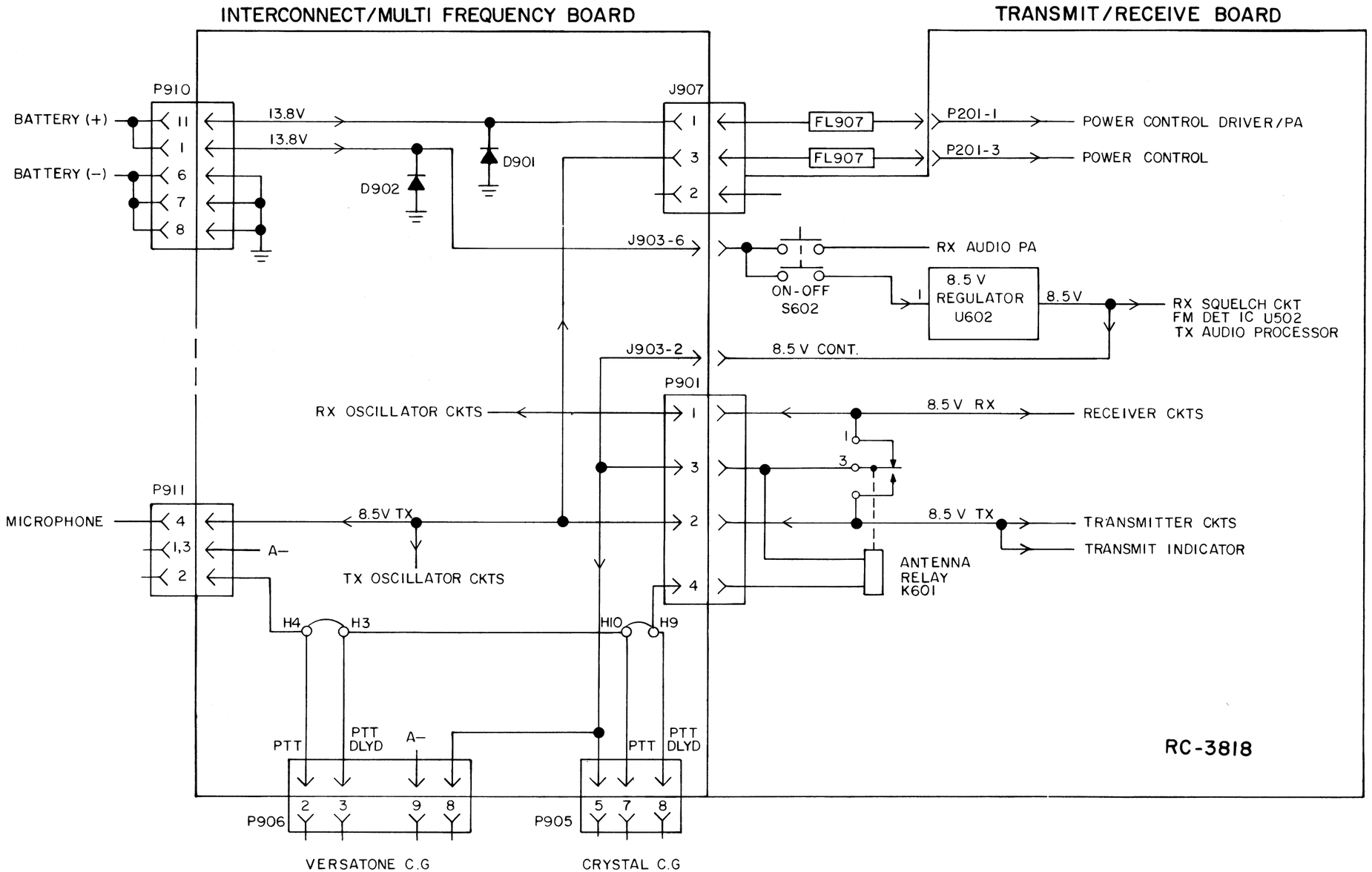
The battery voltage (A+) connects to the radio through J910-1 and J910-11 at the rear system connector to the interconnect board. Both inputs are connected to reverse polarity protection diodes D901 and D902. The ground lead comes through the same connector and is connected to chassis ground through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

One battery input goes directly from the interconnect board through a feedthrough 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 10.7 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.



POWER DISTRIBUTION

Figure 4

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 become 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 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 panel.
  3. Remove the six screws securing the RF shield.
  4. Remove the four screws securing transistors Q205 and Q206.
  5. Remove the 8 screws securing the Tx-Rx board and carefully lift up the board off of the interconnections pins.

- To remove the interconnect/ multifrequency board:

  1. Remove the top cover.

2. In multi-frequency units, remove the five screws securing the RF shield (if present).

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

PA TRANSISTOR REPLACEMENT

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. 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.

2. 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.

3. 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 Figure 4).

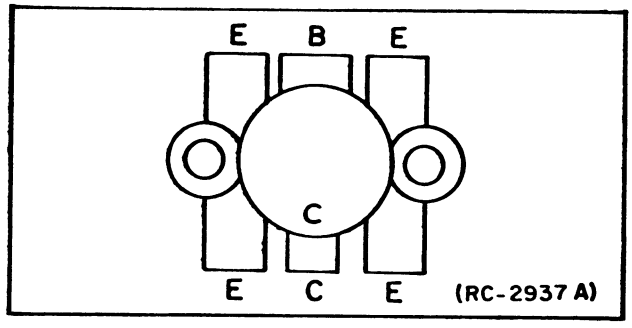


Figure 5 - Lead Identification

4. Apply a coat of silicon grease to the transistor mounting surface. 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). A torque wrench must be used for this adjustment since transistor damage can result if too little or too much torque is used.

5. 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 before applying power.

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.

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: CG 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 TP203, 1st receiver injection at TP401 and the 2nd IF at TP501. An RF signal probe also is available to monitor the transmitter frequency.

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

They are as follows:

TRANSMITTER		RECEIVER	
TP201	Transmitter Oscillator/Exciter Ampl-1	TP401	Receiver 1st oscillator injection
TP202	Exciter Ampl-2	TP501	455 kHz IF
TP203	Exciter Output		

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.

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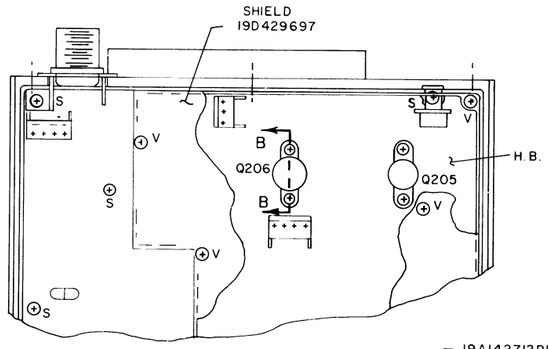
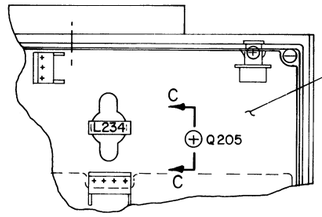
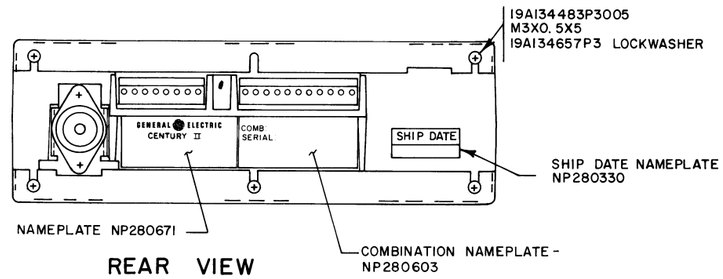
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 USA

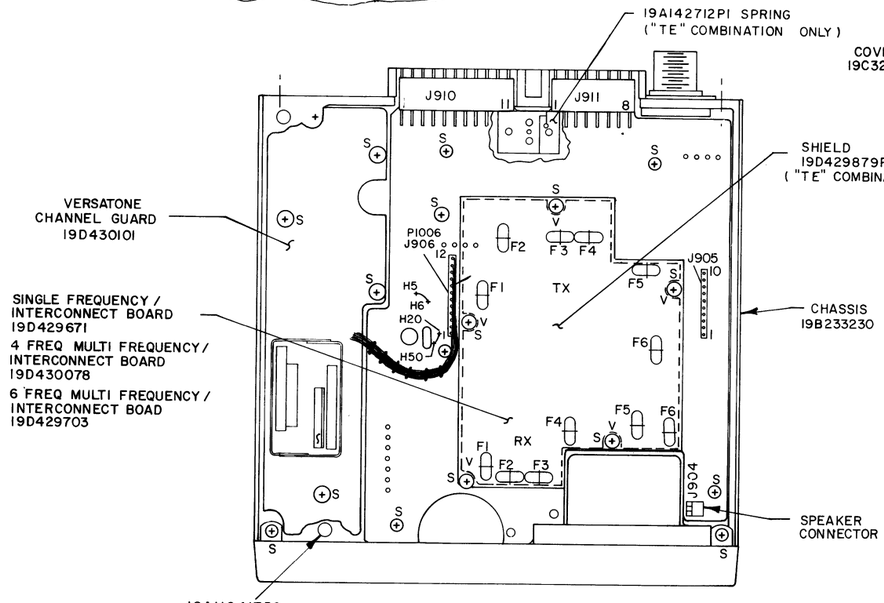
GENERAL ELECTRIC



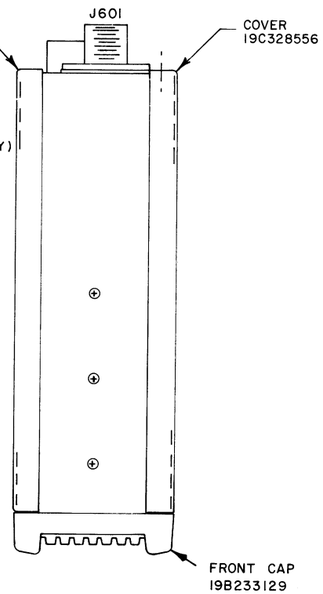


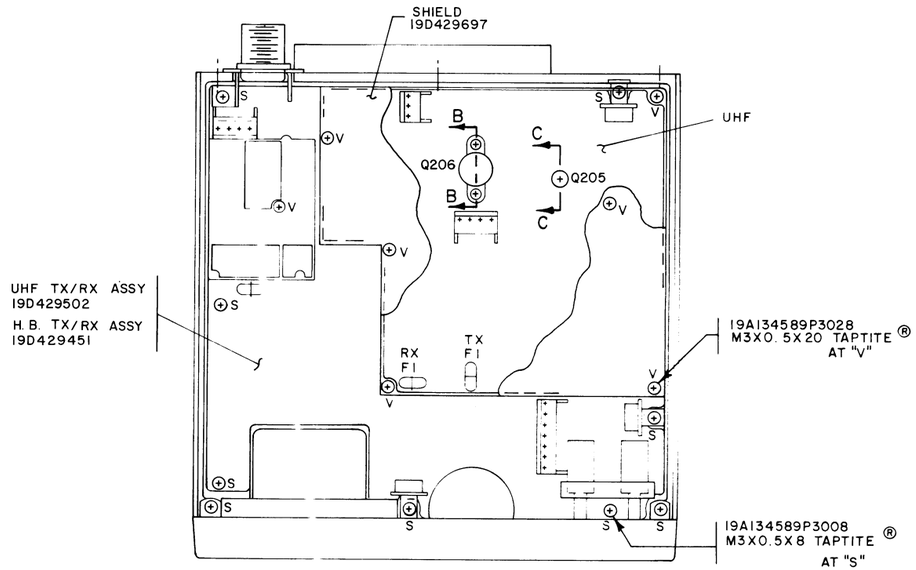


REAR VIEW

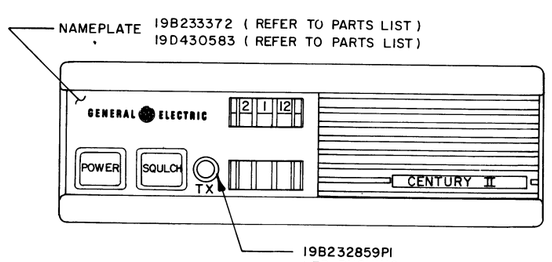


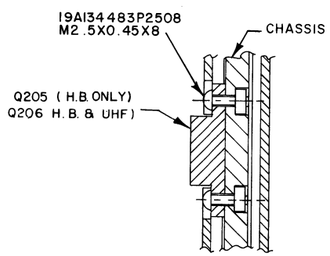
TOP VIEW
COVER REMOVED



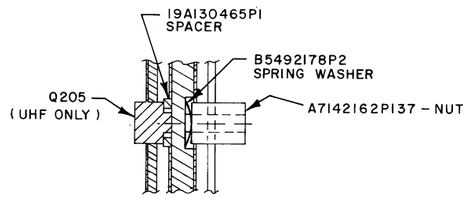


BOTTOM VIEW
COVER REMOVED





SECTION B-B
ENLARGED



SECTION C-C
ENLARGED

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 ±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 L301 for the assigned receiver frequency -10.7 MHz.

MODULATION LEVEL ADJUSTMENT

CG ENCODE DISABLE

The 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.

CAUTION

DO NOT remove microphone from hanger and place CG Mon switch to MON position. DAMAGE to equipment will result.

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 Channal Guard modulation level adjustment should be repeated every 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 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.

NOTE

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

2. For 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.
3. For multi-frequency transmitters, set the deviation as described above for each channel. Refer to multi-frequency diagram for MOD ADJUST designations control.

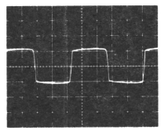
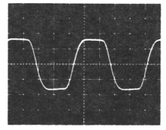
AUDIO CHECKS

TEST EQUIPMENT REQUIRED

- Audio Oscillator
- AC Voltmeter
- Oscilloscope
- Deviation Monitor

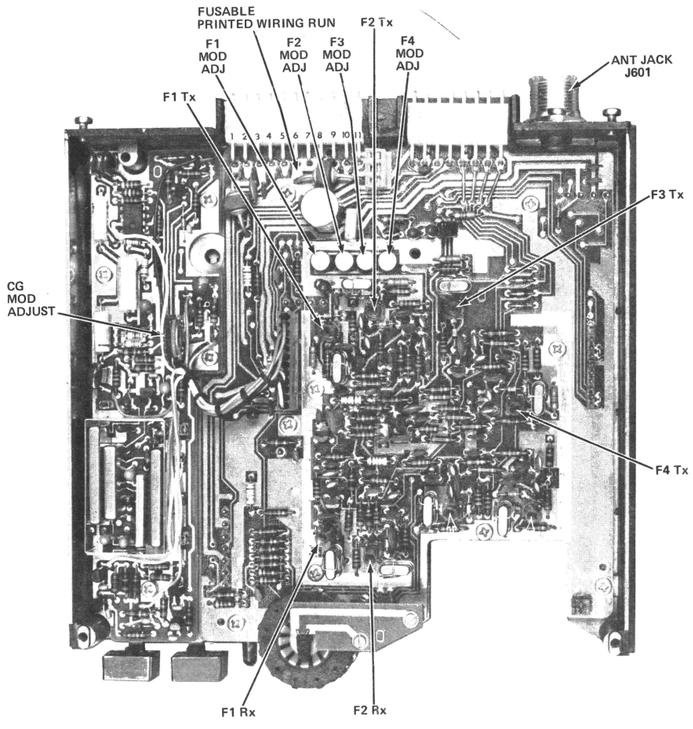
AUDIO AC VOLTAGES

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

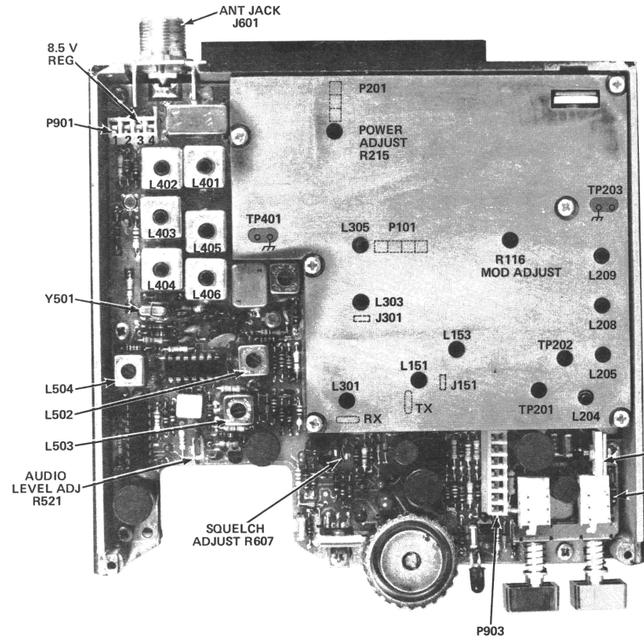
		U101-7	C110 (+)
SCOPE SETTING	HORIZONTAL	200 U SEC/DIV	200 U SEC/DIV
	VERTICAL	2 VOLTS/DIV	2 VOLTS/DIV
SET AUDIO OSCILLATOR AT 1000 Hz WITH OUTPUT OF 1.0 VRMS. R116 ADJUSTED FOR 4.5 kHz DEVIATION. NOTE: AN RMS OR PEAK READING VOLT METER WILL READ 1/2 TO 1/3 OF PEAK-TO-PEAK READINGS.			

AUDIO SENSITIVITY

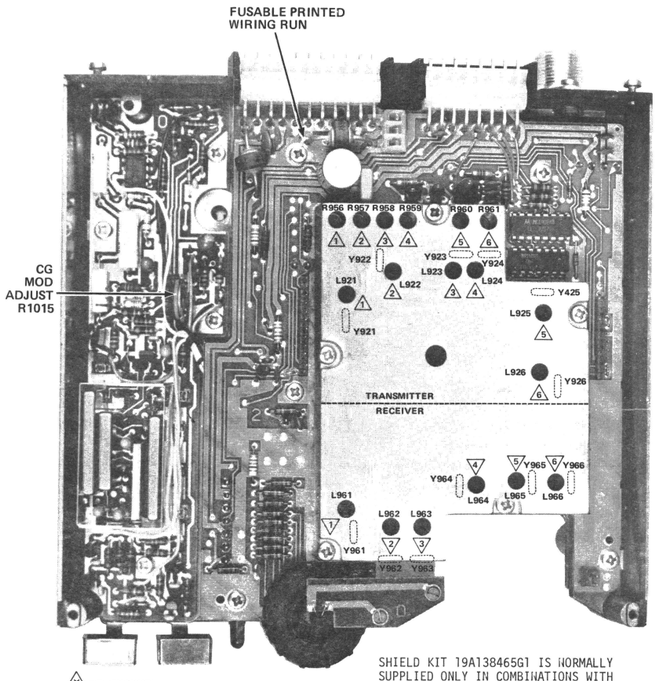
1. Connect audio oscillator output across J911-4 (Mic Hi) and J911-3 (Mic Lo). Adjust output for 1000 Hz at 1.0 VRMS.
2. Reduce generator output until deviation falls to 3.0 kHz for radios without Channel Guard or to 2.25 kHz for radios with Channel Guard. Voltage should be less than 120 millivolts.



4 FREQUENCY INTERCONNECT BOARD



Tx/Rx BOARD



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

SHIELD KIT 19A138465G1 IS NORMALLY SUPPLIED ONLY IN COMBINATIONS WITH THE FIRST DIGIT "T".

MULTI-FREQUENCY BOARD

TRANSMITTER ALIGNMENT

TEST EQUIPMENT

1. 50 ohm Wattmeter
2. RF Detector Probe
3. Voltmeter
4. Power Supply 13.8 V Regulated
5. 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 1.25 MHz but less than 2.5 MHz, the transmitter must be aligned to the center frequency. 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. These limits can be extended to 3.5 MHz with 1 dB degradation.
2. For a large change in frequency or a badly misaligned transmitter, preset all slugs to the top of the coil form.
3. Set power adjust control R215 to minimum - fully counter-clockwise.
4. All adjustments are made with transmitter keyed. Unkey the transmitter between steps to avoid overheatting.
5. A Voltmeter is used on TP201 and a DC probe on TP202 when monitoring or aligning the transmitter. The Transmit RF Detector probe connected to an VOM is used to monitor TP203.

ALIGNMENT PROCEDURE

STEP	TEST POINT	TUNING CONTROL	METER READING	PROCEDURE
1.	TP201	L151, L153	PEAK	Tune L151 then L153 for peak meter reading.
2.	TP201	L204	DIP	Tune L204 for a dip in the meter reading.
3.	TP202	L205, L204	PEAK	Tune L205 then L204 for peak meter reading.
				NOTE: A better peak can sometimes be obtained by detuning L153 slightly. Repeak L153 before proceeding to Step 4.
4.	TP202	L208	DIP	Tune L208 for a dip in the meter reading.
5.	TP203	L209, L208	PEAK	Tune L209 then L208 for a peak in the meter reading.
6.	WATTMETER	R215		Set R215 for rated power output.
7.	TP203	L151		Connect RF signal probe to TP203 and set L151 for assigned operating frequency. Refer to Oscillator Frequency Adjustment section to determine actual frequency setting.
8.	TP201	L153		Repeak L153 for MAXIMUM meter reading.
9.	TP202	L204, L205		Repeak L204 then L205 for MAXIMUM meter reading.
10.	TP203	L208, L209		Repeak L208 then L209 for MAXIMUM meter reading.
11.	WATTMETER	R215		If necessary, readjust R215 for rated power output.

NOTE

Normal voltage readings at TP201 through TP203 for a properly aligned and operating transmitter are given below:

TP201	1.0 V	(DC Probe)
TP203	0.4 V	(DC Probe)
TP203	0.5 Volts	(Transmit RF Detector Probe)

TRANSMITTER QUICK CHECKS

TEST POINT	NORMAL METER READING	PROBABLE DEFECTIVE STAGE		
		HIGH METER READING	LOW METER READING	ZERO METER READING
TP201	1.0 V	Q202	Q151, Q201 Q202	Q202, Q201 Q151
TP202	0.4 V	Q203	Q203	Q203
TP203	1.5 V		Q204	Q204

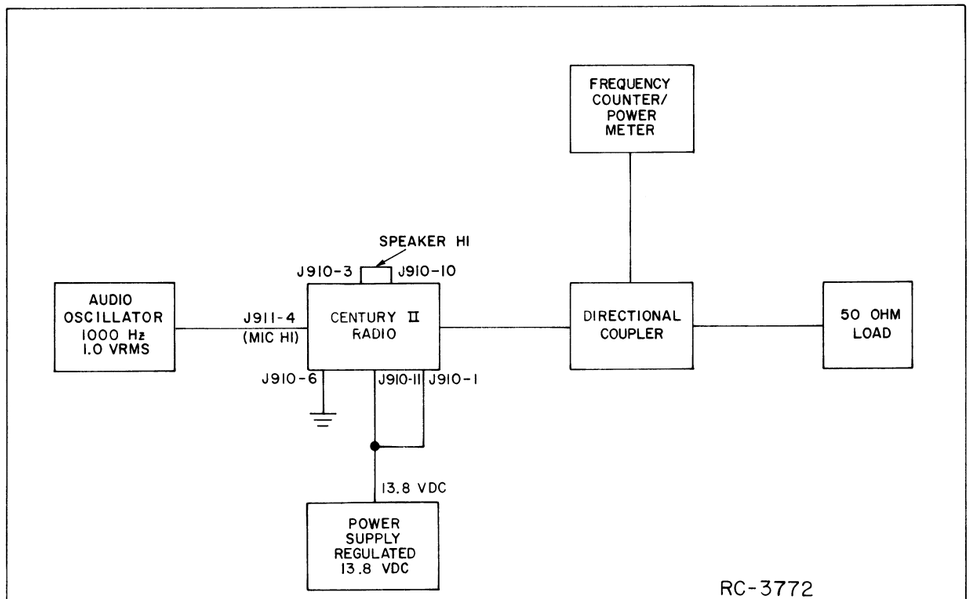


Figure 7 - Test Equipment Set Up

RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. RF Signal Generator (148-174 MHz)
2. DC Voltmeter
3. AC Voltmeter
4. Receiver RF Detector Probe
5. RF Signal Probe

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 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 750 kHz and less than 1.5 MHz, the receiver must be tuned to the center frequency. 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. These limits can be extended to 2.5 MHz with 3 dB degradation.
3. Disable Channel Guard by removing microphone from hookswitch or by connecting ground to J910-5.

ALIGNMENT PROCEDURE

STEP	METERING TEST POINT	PROBE	TUNING CONTROL(S)	PROCEDURE
			1ST OSCILLATOR MULTIPLIER	
1.	TP401	RF DETECTOR	L301	With voltmeter on lowest range adjust L301 (In Multi-Frequency units L961-L966 for channels 1-6) for maximum meter reading. NOTE If no meter indication can be obtained at TP401, connect positive lead of 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 recconnect to TP401.
2.	TP401	RF DETECTOR	L303, L305	Adjust L303 then L305 for maximum meter reading.
3.	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 -10.7 MHz.
4.	TP401	RF DETECTOR	L303, L305	Adjust L303, then L305 for maximum meter reading.
			IF ALIGNMENT	
5.	TP401, TP501	RF Signal RF DETECTOR	L503	Connect RF signal generator to TP401 using RF Signal Probe. Connect RF DETECTOR (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.
6.	Same as Step 5	Same as Step 5	L502, L501, L406	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 L406 respectively for maximum indication on meter. Alternately adjust L406 and L501 to obtain maximum meter reading. Disconnect RF Signal Generator from TP401.
7.	TP501	RF DETECTOR	--	Connect signal generator to Antenna input jack J601. Verify 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.
8.	TP501	RF DETECTOR	L403, L404, L405	Detune L403 and L405 as much as possible. Adjust L404 for maximum meter reading. DO NOT readjust. Alternately readjust L405 and L403 for maximum VOM reading.
9.	TP501	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.
10.	TP501	RF DETECTOR	L305	Carefully adjust L305 (±1/2 turn) for maximum meter reading.
11.	TP501	RF DETECTOR	L406, L405	Alternately adjust L406 and L405 for maximum meter reading.
12.	--	--	--	Remove all test equipment. Replace center frequency crystal if used.
			DETECTOR/AUDIO ALIGNMENT	
13.	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.
14.		--	L501, L406	Adjust volume control for a level of 2.0 VRMS on AC voltmeter. Note the position of tuning slugs in L501 and L406. Slowly adjust L501 and L406 ±1/4 turn for minimum distortion on distortion analyzer. If no improvement is noted return slugs to original position.
15.	P903-3	--	R521	Connect AC Voltmeter having a minimum input impedance of 1 megohm (Do NOT use the AC scale of a VOM.) to P903-3. Adjust audio level control R521 for a meter reading of 300 ±5 mV.
16.				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).
17.				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 circuit opens with an input signal level corresponding to 8 dB SINAD ±1 dBs.

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 ±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 0.3 µV. 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.

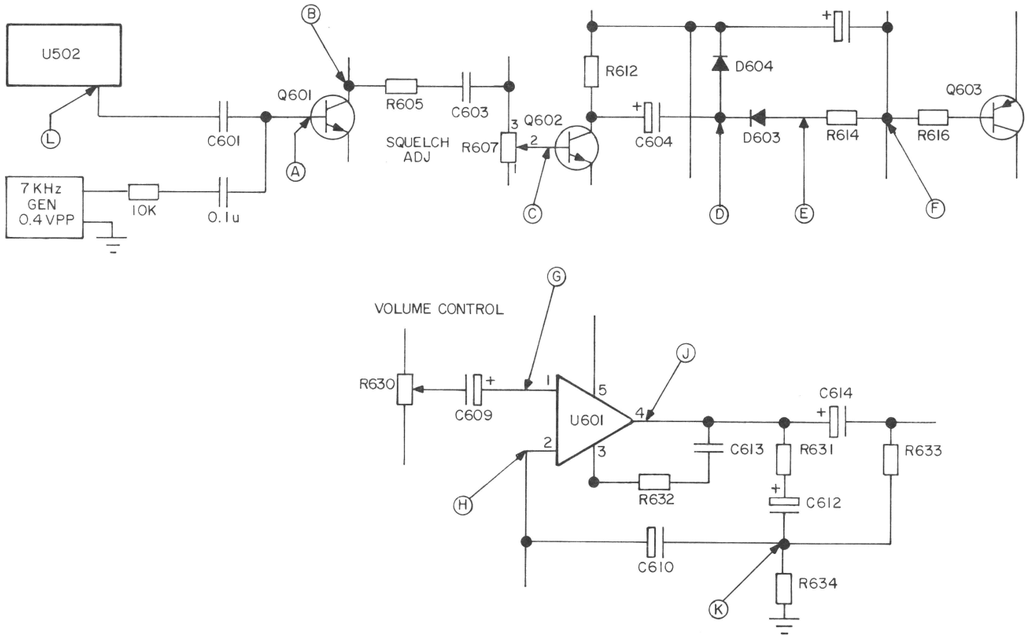
C. While increasing the deviation of the Signal Generator, switch the RANGE control from SET LEVEL to distortion range until a 12 dB difference is obtained between the SET LEVEL and distortion range readings (from +2 dB to -10 dB).

D. The deviation control reading for the 12 dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±6.5 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



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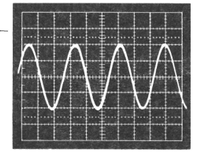
SQUELCH CIRCUIT TEST WITH 7 kHz SIGNAL

PRELIMINARY STEPS

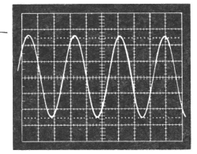
1. Quiet receiver with 1000 uV unmodulated signal.
2. Squelch Adjust R607 to maximum (Rotate control toward rear of radio.)
3. Squelch pushbutton in OUT position.
4. Use 10 megohm probe.

A



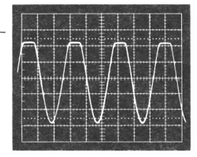
HOR. 50 µSEC/DIV
VERT. 0.1 V/DIV
(0.4 V P-P)

B



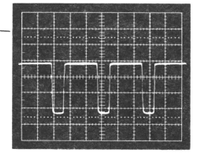
HOR. 50 µSEC/DIV
VERT. 2 V/DIV
(10 V P-P)

C



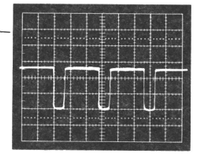
HOR. 50 µSEC/DIV
VERT. 1 V/DIV
(5 V P-P)

D



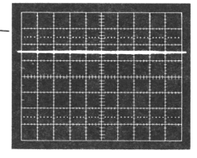
HOR. 50 µSEC/DIV
VERT. 2 V/DIV
(6.2 V P-P)

E



HOR. 50 µSEC/DIV
VERT. 1 V/DIV
(2.5 V P-P)

F



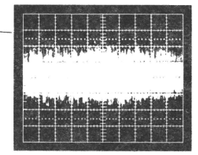
HOR. 50 µSEC/DIV
VERT. 1 V/DIV
(5.5 VDC)

SQUELCH CIRCUIT CHECKS WITH NOISE

PRELIMINARY STEPS

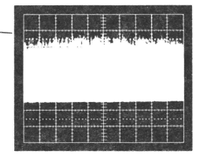
1. No input signal applied.
2. Squelch Adjust R607 to maximum (Rotate toward rear of radio.)
3. Squelch pushbutton in OUT position.
4. Use 10 megohm probe.

A



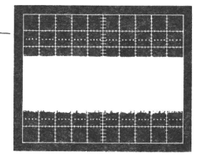
HOR. 1 MS/DIV
VERT. 0.5 V/DIV
(≈ 2 V P-P)

B



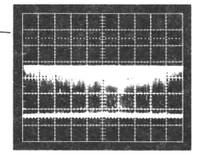
HOR. 1 MS/DIV
VERT. 5 V/DIV
(≈ 20 V P-P)

C



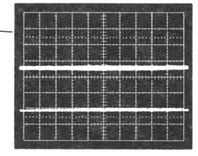
HOR. 1 MS/DIV
VERT. 2 V/DIV
(6.8 V P-P)

D



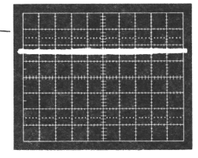
HOR. 1 MS/DIV
VERT. 2 V/DIV
(6.2 V P-P)

E



HOR. 1 MS/DIV
VERT 1 V/DIV
(2.6 V P-P)

F



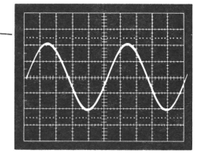
HOR. 1 MS/DIV
VERT. 1 V/DIV
(5.6 VDC)

AUDIO CIRCUIT CHECKS

PRELIMINARY STEPS

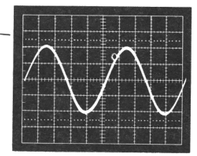
1. Apply 1000 uV on frequency signal with 1000 Hz modulation and 3 kHz deviation to antenna jack J601.
2. Squelch pushbutton "IN".
3. Output set for 3-Watts (3.46 VRMS) into 4-ohm load.
4. Use 1 megohm probe.

G



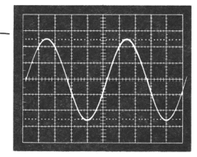
HOR. 0.2 MS/DIV
VERT. 20 MV/DIV
(84 MV P-P)

H



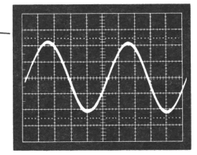
HOR. 0.2 MS/DIV
VERT. 20 MV/DIV
(84 MV P-P)

J



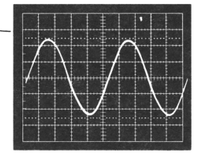
HOR. 0.2 MS/DIV
VERT. 2 V/DIV
(9.8 V P-P)

K



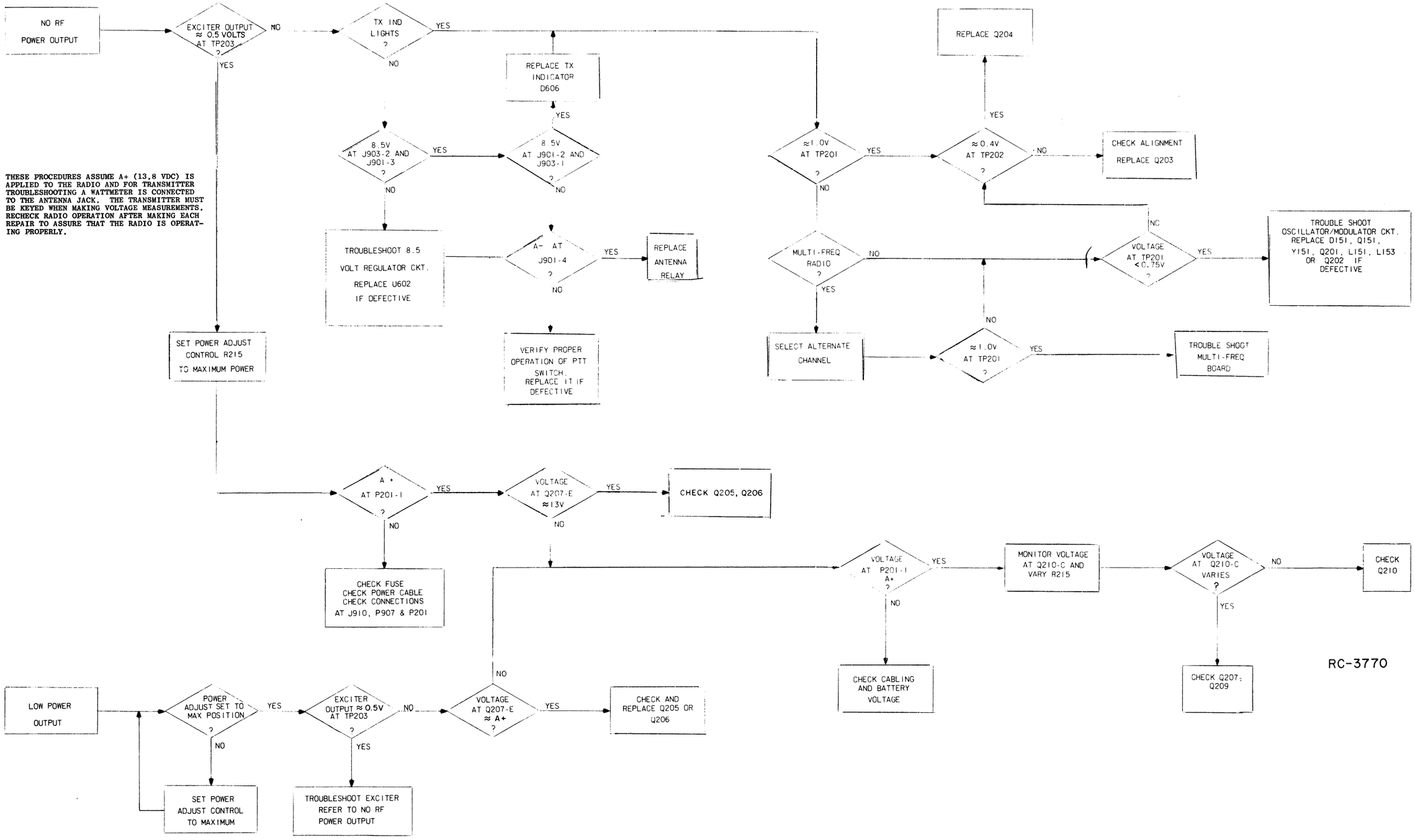
HOR. 0.2 MS/DIV
VERT. 20 MV/DIV
(86 MV P-P)

L



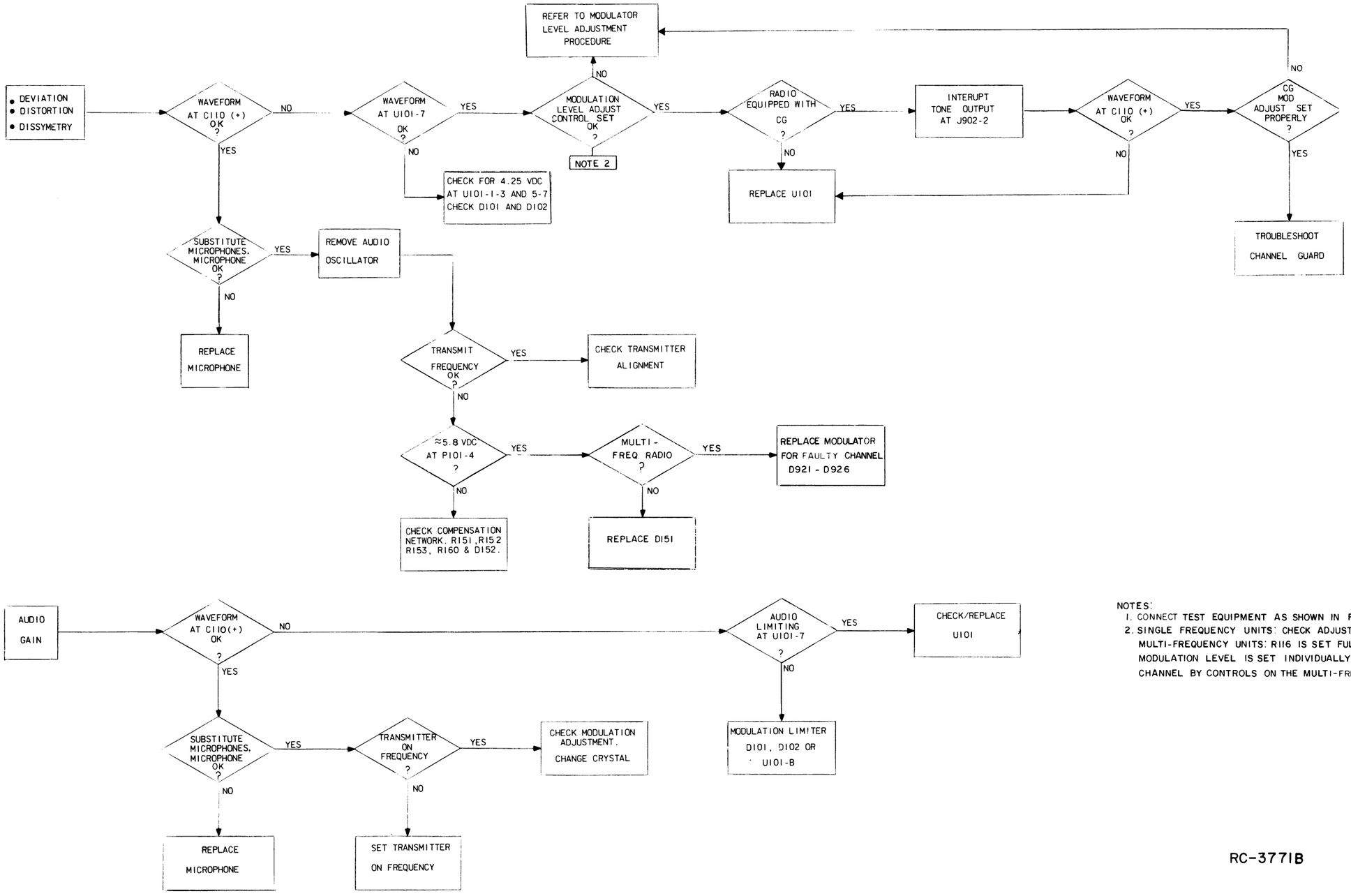
HOR. 0.2 MS/DIV
VERT. 0.2 V/DIV
(0.92 V P-P)

RECEIVER AUDIO AND SQUELCH WAVEFORM CHECKS



TRANSMITTER TROUBLESHOOTING FLOW CHART

Figure 8 (Sheet 1)

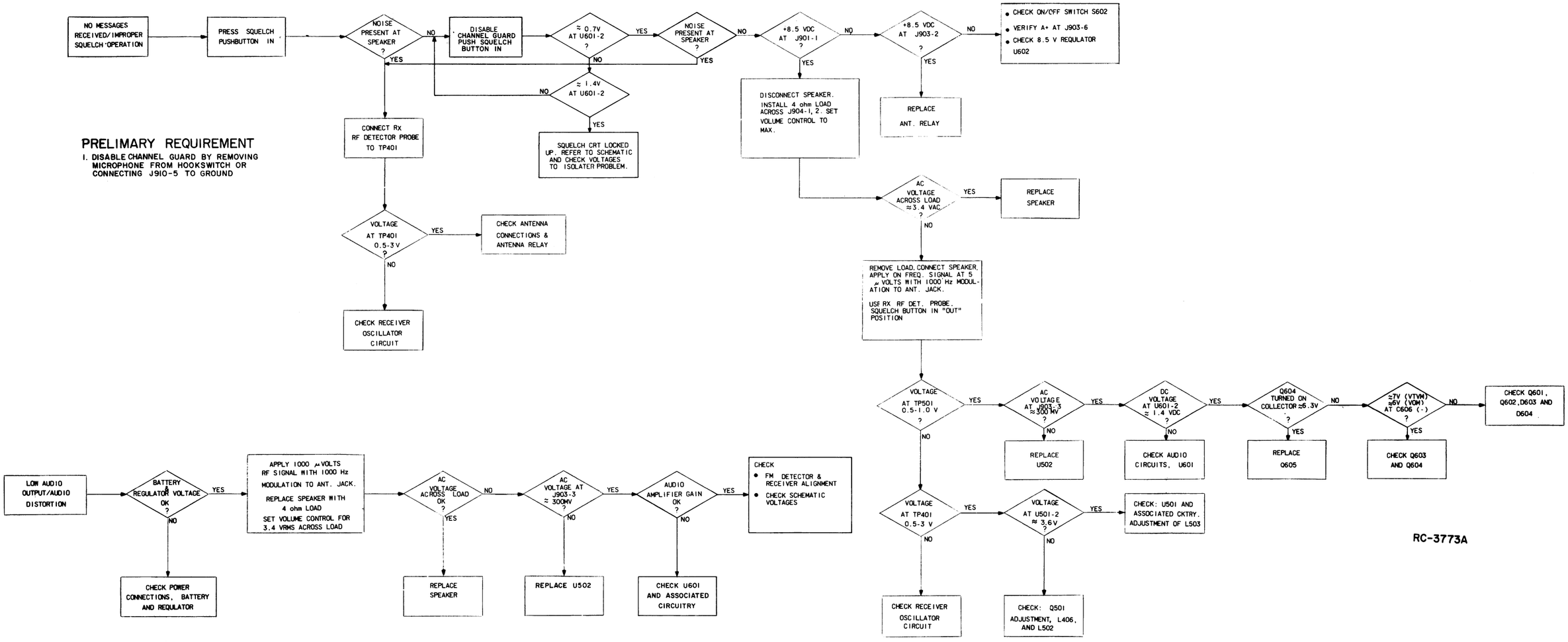


NOTES:
1. CONNECT TEST EQUIPMENT AS SHOWN IN FIGURE 7.
2. SINGLE FREQUENCY UNITS: CHECK ADJUSTMENT OF R116. MULTI-FREQUENCY UNITS: R116 IS SET FULL CLOCKWISE. MODULATION LEVEL IS SET INDIVIDUALLY FOR EACH CHANNEL BY CONTROLS ON THE MULTI-FREQUENCY BOARD.

RC-3771B

TRANSMITTER TROUBLESHOOTING FLOW CHART

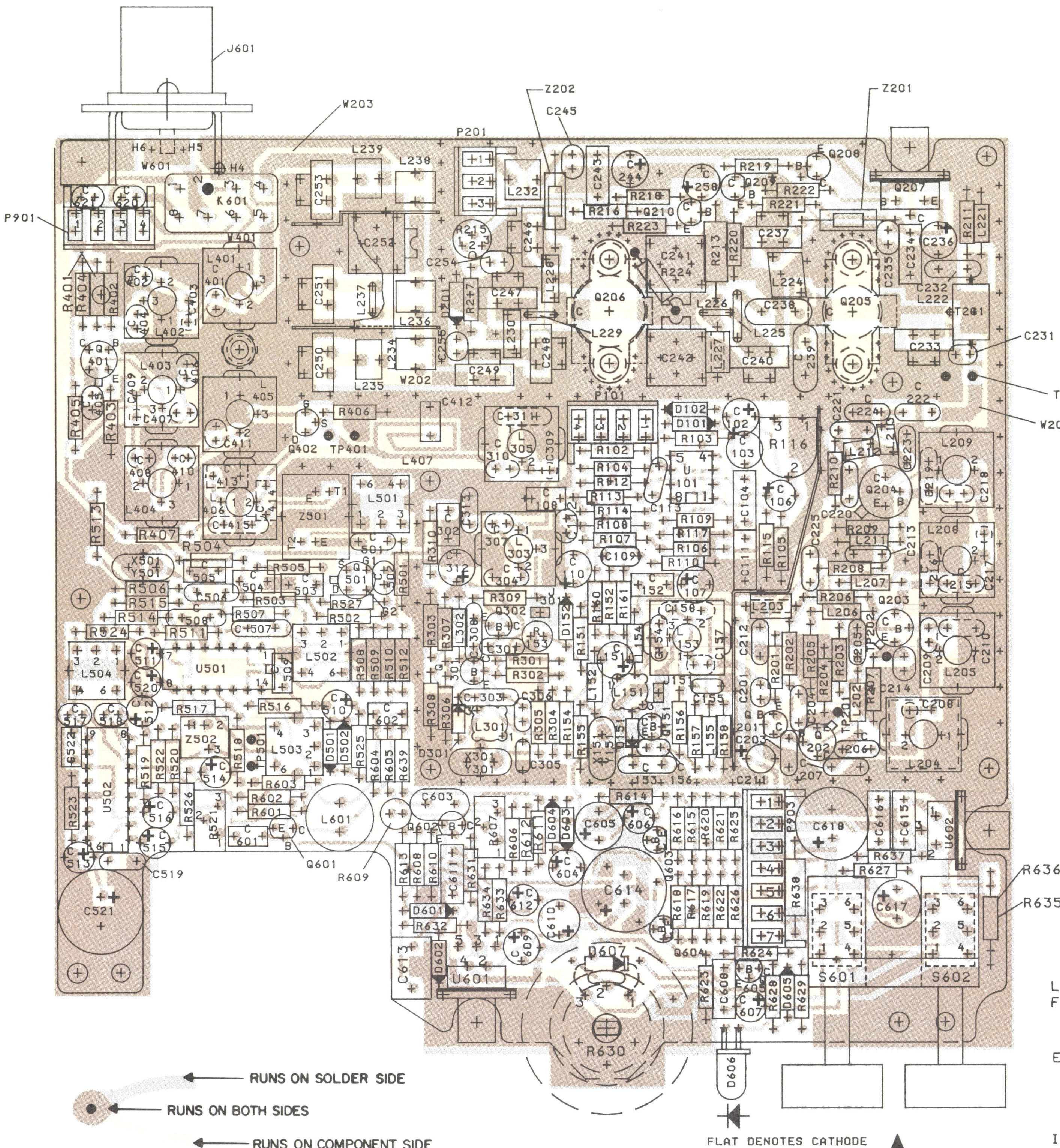
 (Sheet 2) Figure 8



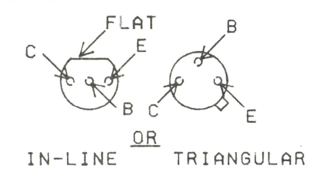
RC-3773A

RECEIVER TROUBLESHOOTING FLOW CHART

Figure 9

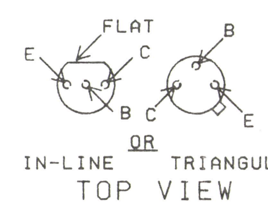


LEAD IDENTIFICATION
FOR Q151, Q301, Q302, Q201, Q202, Q203, Q204, Q208, Q209, Q210, Q601, & Q602



TOP VIEW

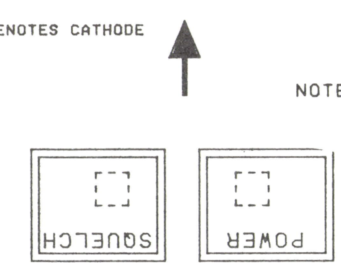
LEAD IDENTIFICATION
FOR Q603, Q604 & Q605



TOP VIEW

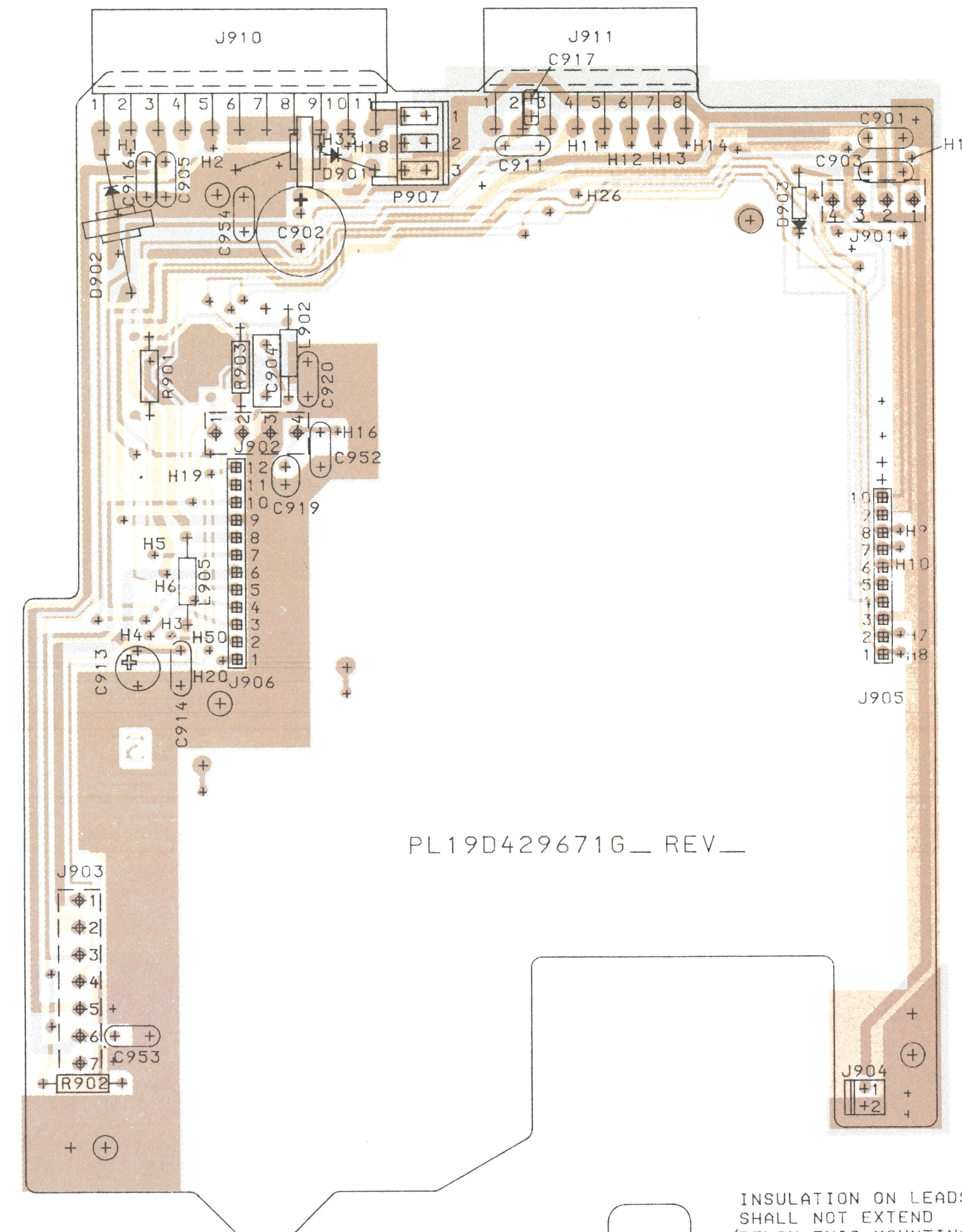
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

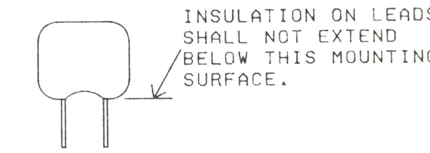
(19D430320, Rev. 3)
(19B232598, Sh. 1, Rev. 2)
(19B232598, Sh. 2, Rev. 3)



OUTLINE DIAGRAM

148—174 MHz HIGH BAND TRANSMITTER/RECEIVER BOARD





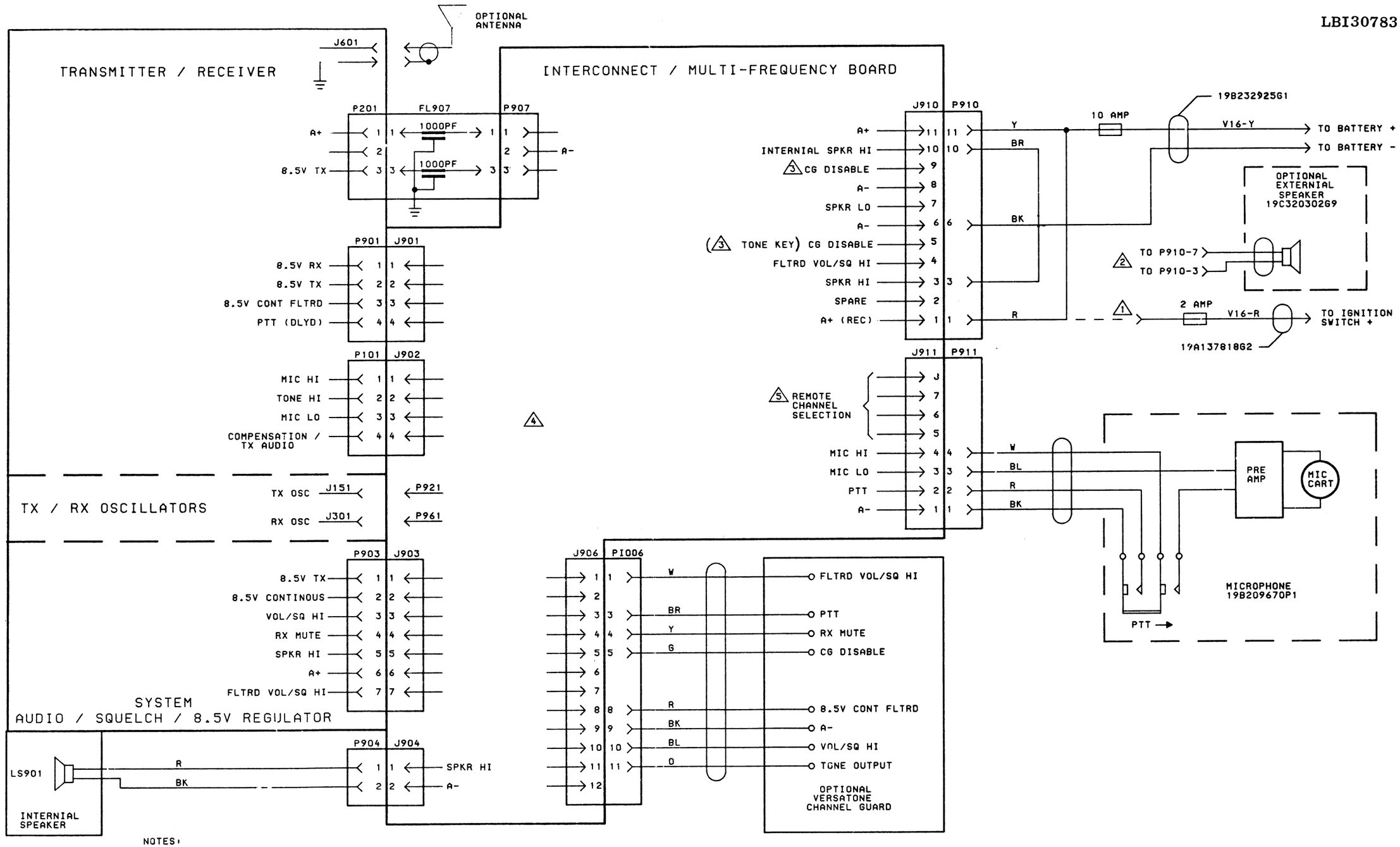
TYP. LEAD CLEANING OF CAPACITORS AS REQUIRED

CONNECTIONS CHART		
FROM	TO	WIRE SIZE
H3	H4	DA
H5	H6	DA
H7	H8	DA
H9	H10	DA
H20	H50	DA

(19D430344, Rev. 0)
(19B232793, Sh. 1, Rev. 2)
(19B232793, Sh. 2, Rev. 3)

OUTLINE DIAGRAM

INTERCONNECT BOARD (SINGLE FREQUENCY)



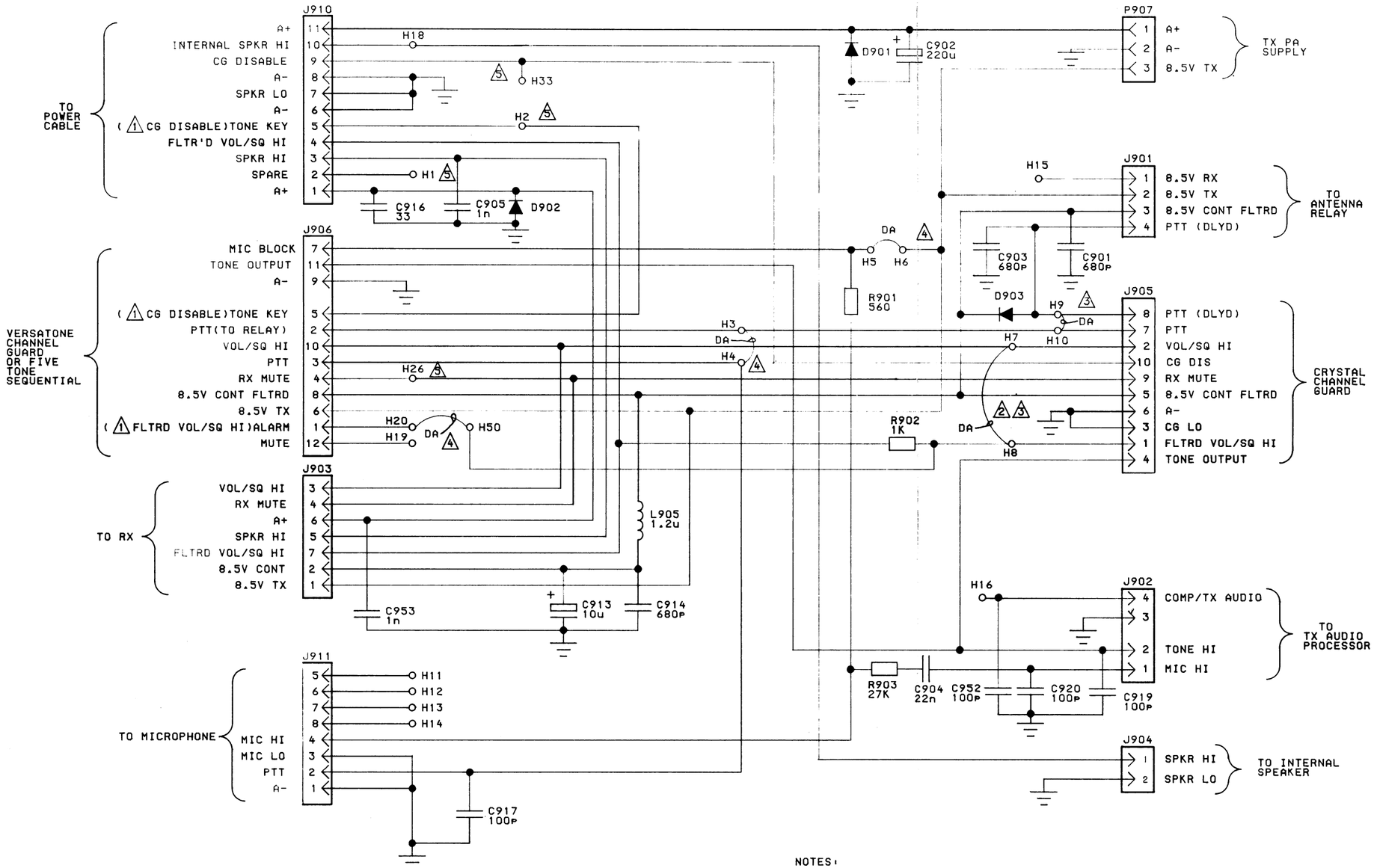
NOTES:

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



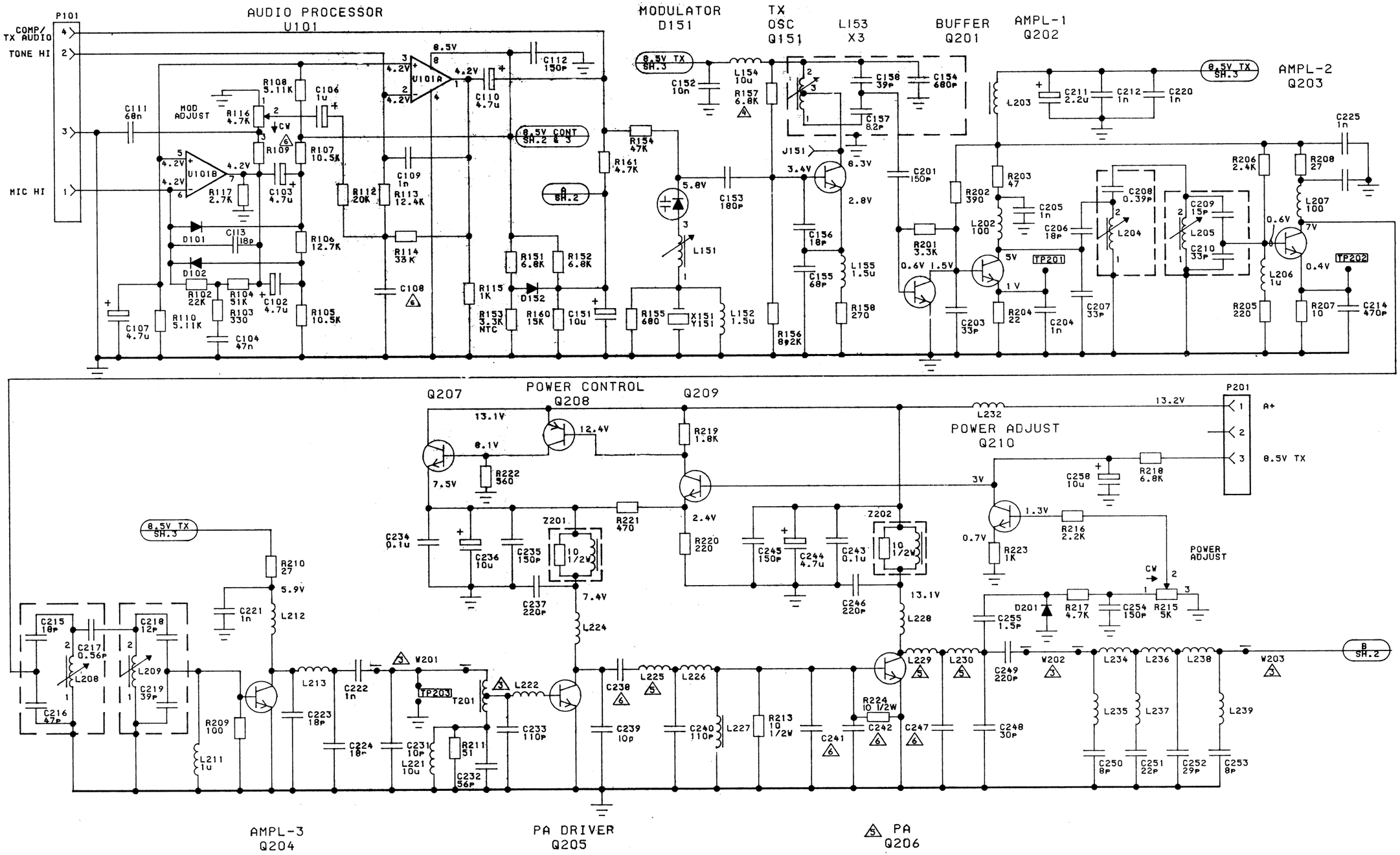
NOTES:

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.

SCHEMATIC DIAGRAM

INTERCONNECT BOARD
(SINGLE FREQUENCY)

(19D430546, Rev. 2)

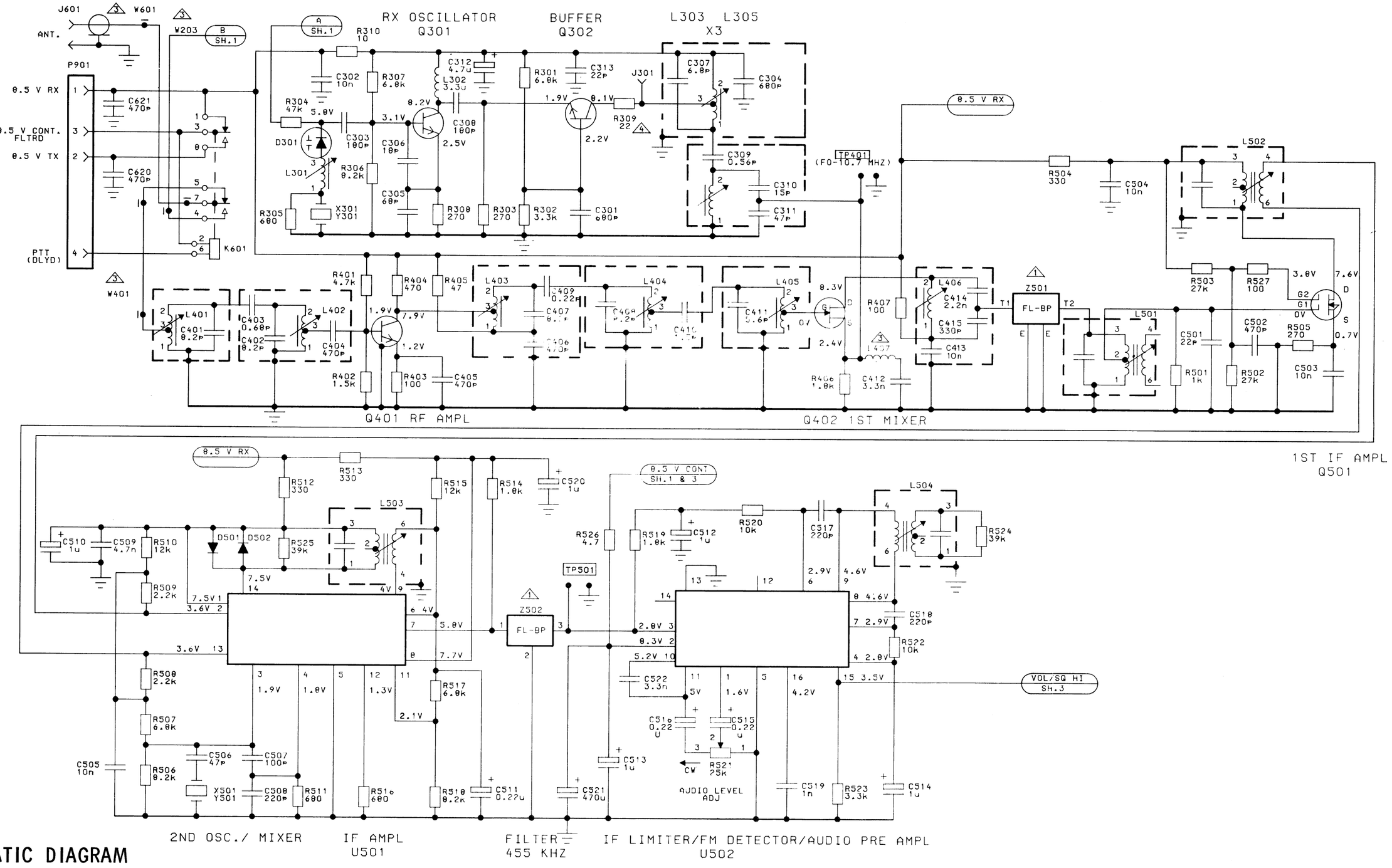


(19D430475, Sh. 1, Rev. 4)

SCHEMATIC DIAGRAM

148—174 MHz HIGH BAND TRANSMITTER

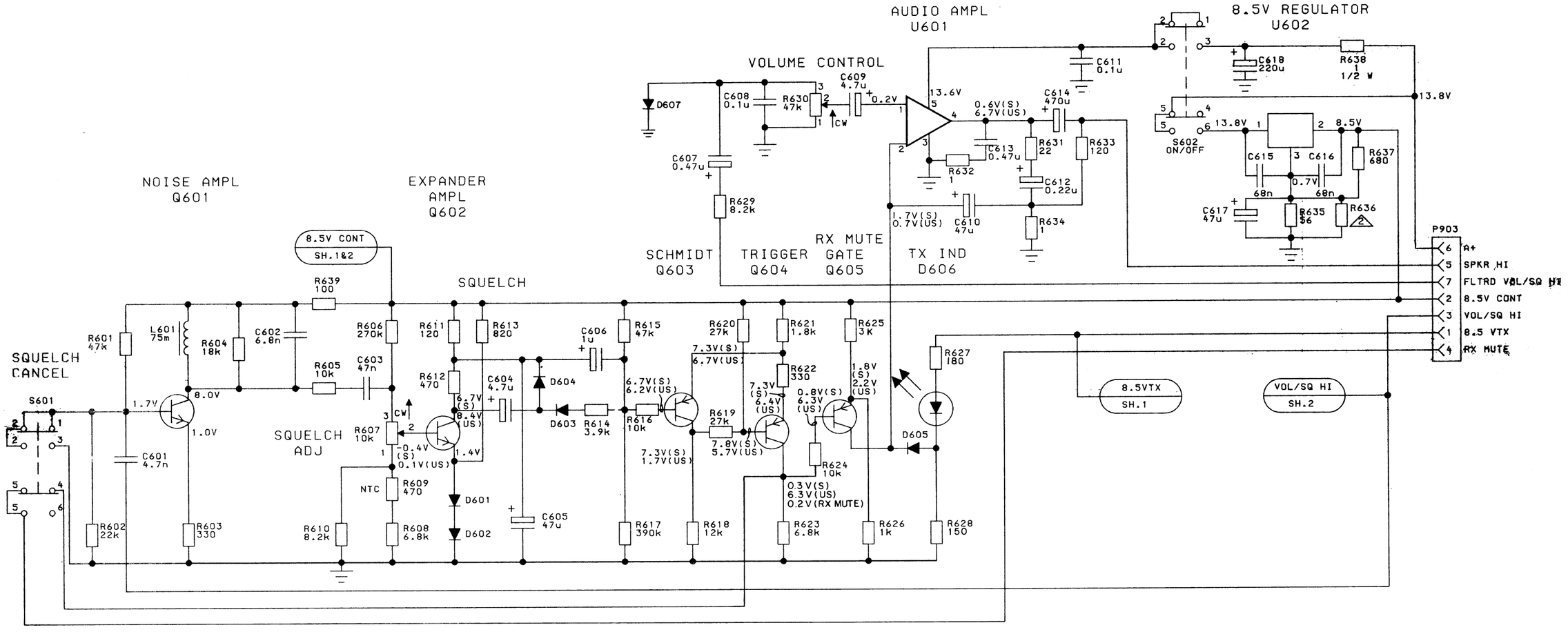
Issue 2



SCHEMATIC DIAGRAM

148—174 MHz HIGH BAND RECEIVER

(19D430475, Sh. 2, Rev. 2)



NOTES:

1. Z501A, Z502A - 25kHz CHANNEL SPACING (G1,G2)
   Z501B, Z502B - 12.5kHz CHANNEL SPACING (G3,G4)

2. VALUE OF R636 DEPENDS ON COLOR CODE ON U602.

U602 COLOR CODE	R636 VALUE Ω
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).

5. FOR 25W TRANSMITTER (GP 1,3) USE L225A, L229A, L230A, & Q206A
   FOR 10W TRANSMITTER (GP 2,4) USE L225B, L229B, L230B, & Q206B

6. COMPONENT VALUES

COMP	GROUPS 1 & 3 (25 W)	GROUPS 2 & 4 (10 W)
C238	100 P	68 P
C241	240 P	150 P
C242	240 P	150 P
C247	130 P	82 P
	GROUPS 1 & 2 (25 KHZ CHANNEL SPACING)	GROUPS 3 & 4 (12.5 KHZ CHANNEL SPACING)
C108	6.8n	10n
R109	1.3K	1.8K

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω 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.

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE WITH A 20,000 OHMS-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)

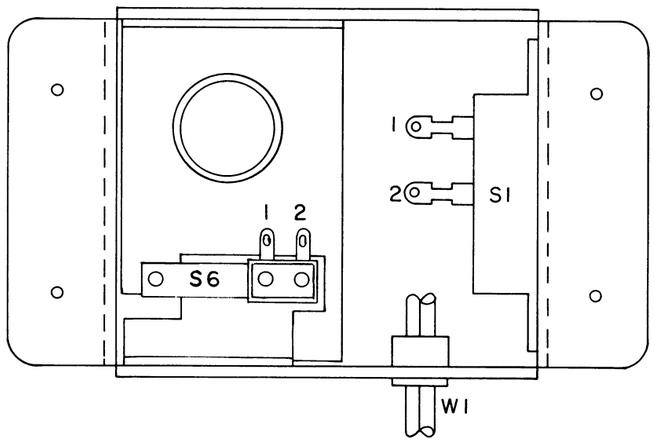
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
19D429451G1	B
19D429451G2	B
19D429451G3	B
19D429451G4	B

(19D430475, Sh. 3, Rev. 5)

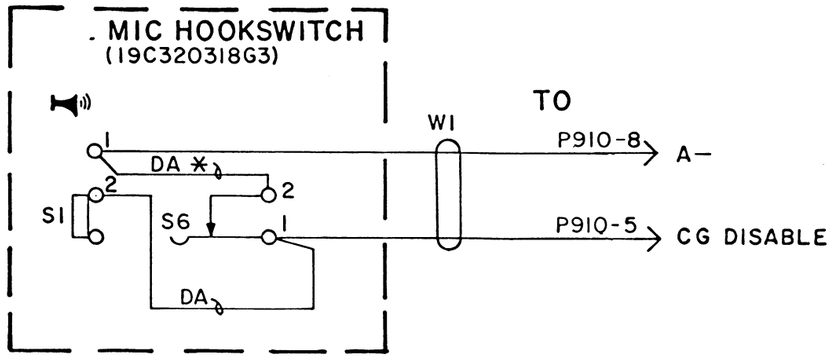
SCHEMATIC DIAGRAM

148—174 MHz HIGH BAND RECEIVER

Issue 2



(19B227626, Rev. 0)



* REMOVE DA JUMPER TO DISABLE AUTOMATIC CHANNEL GUARD MONITOR

S6- SHOWN OFF HOOK

S1- SHOWN OFF MONITOR

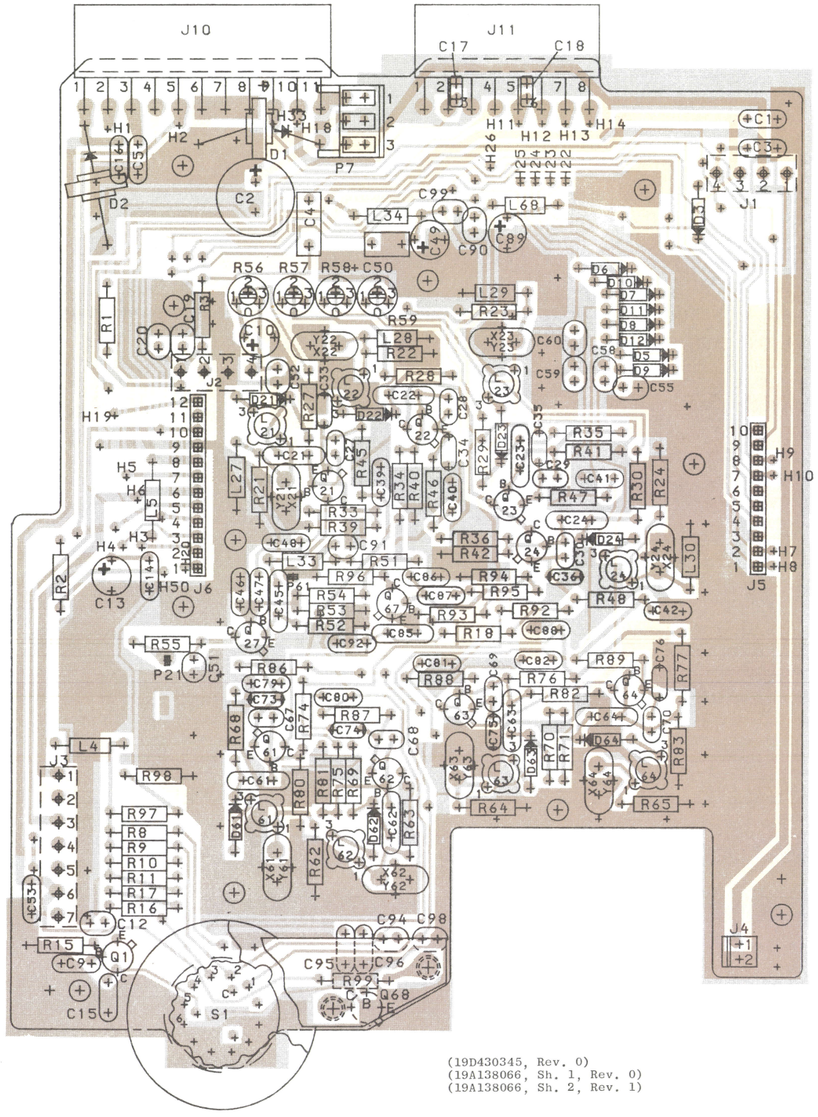
● CONNECT TO P910-9 FOR CRYSTAL CHANNEL GUARD

(19A142809, Rev. 0)

SERVICE SHEET

HOOKSWITCH 19C320318

30 Issue 1

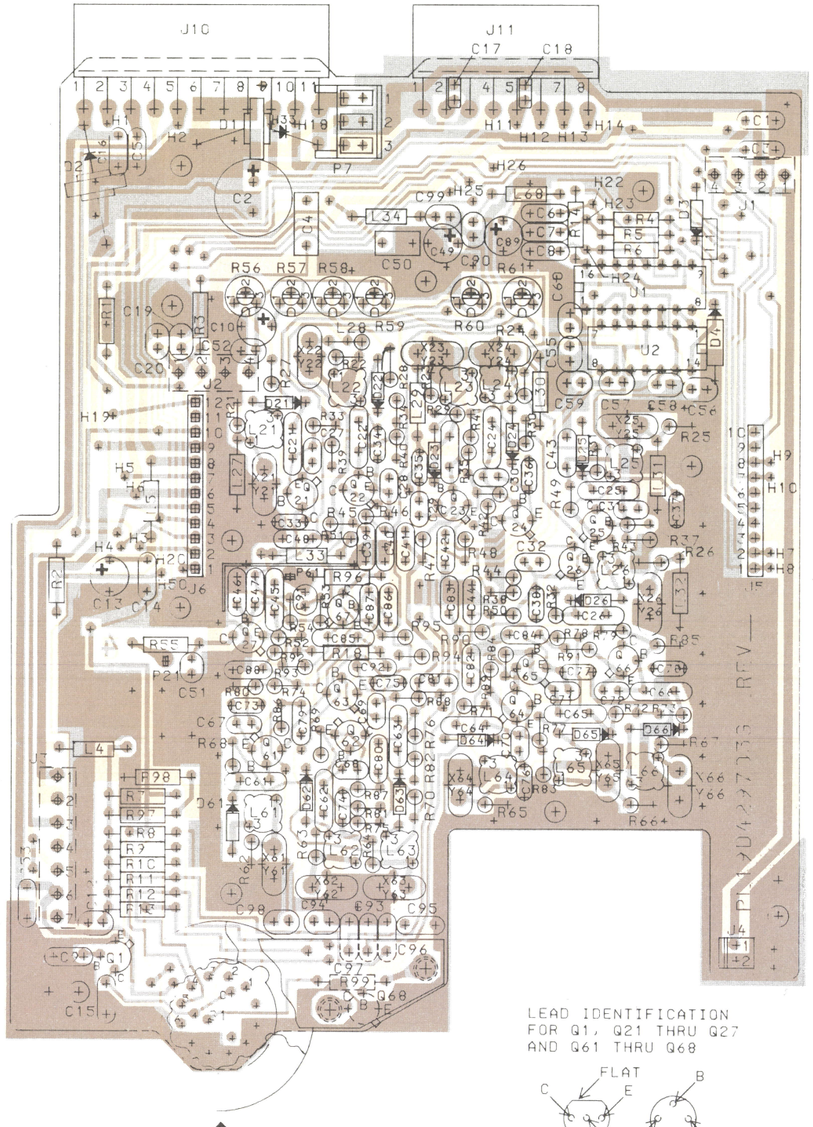


(19D430345, Rev. 0)
(19A138066, Sh. 1, Rev. 0)
(19A138066, Sh. 2, Rev. 1)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM

FOUR FREQUENCY MULTI-FREQUENCY BOARD



VIEW IN DIRECTION OF ARROW "A"

LEAD IDENTIFICATION
FOR Q1, Q21 THRU Q27
AND Q61 THRU Q68

OR

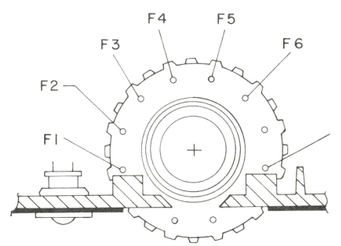
IN-LINE TRIANGULAR

TOP VIEW

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

(19D430209, Rev. 1)
(19B232812, Sh. 1, Rev. 5)
(19B232812, Sh. 2, Rev. 4)

MULTI-FREQ SWITCH STOP SETTINGS



MULTI-FREQ KNOB VIEWED FROM TOP

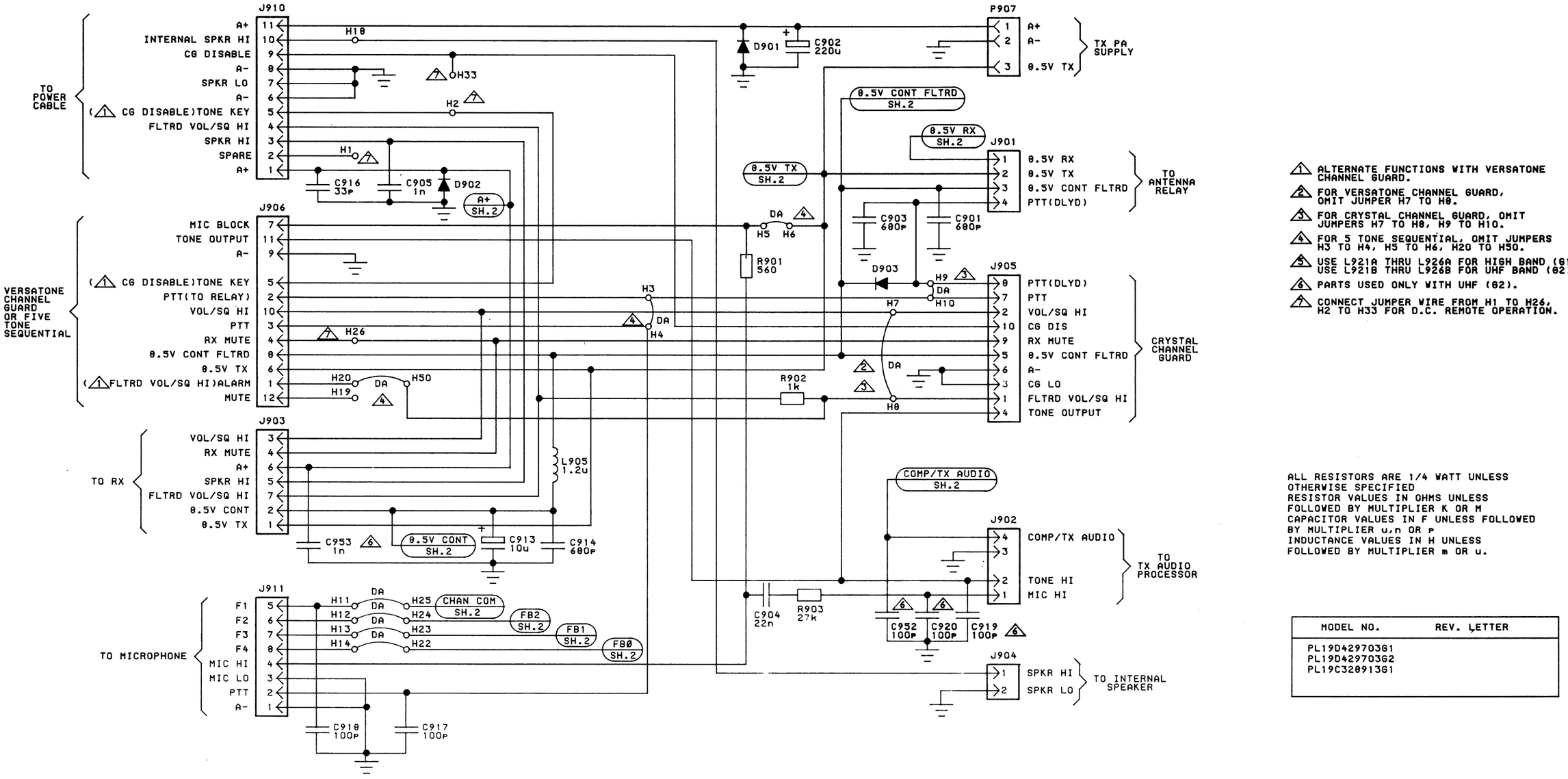
RC3769

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

CONNECTIONS CHART			
FROM	TO	WIRE SIZE	COMMENTS
H14	H22	DA	SLEEVE
H12	H24	↑	↕
H13	H23		↓
H11	H25		SLEEVE
H3	H4		
H5	H6		
H7	H8		
H9	H10		
H20	H50	↓	SLEEVE
R56-1	R56-3	DA	GR.4,8 ONLY

OUTLINE DIAGRAM

INTERCONNECT/MULTI-FREQUENCY BOARD (SIX FREQUENCY)



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 (61). USE L921B THRU L926B FOR UHF BAND (62).
6. PARTS USED ONLY WITH UHF (62).
7. CONNECT JUMPER WIRE FROM H1 TO H26, H2 TO H33 FOR D.C. REMOTE OPERATION.

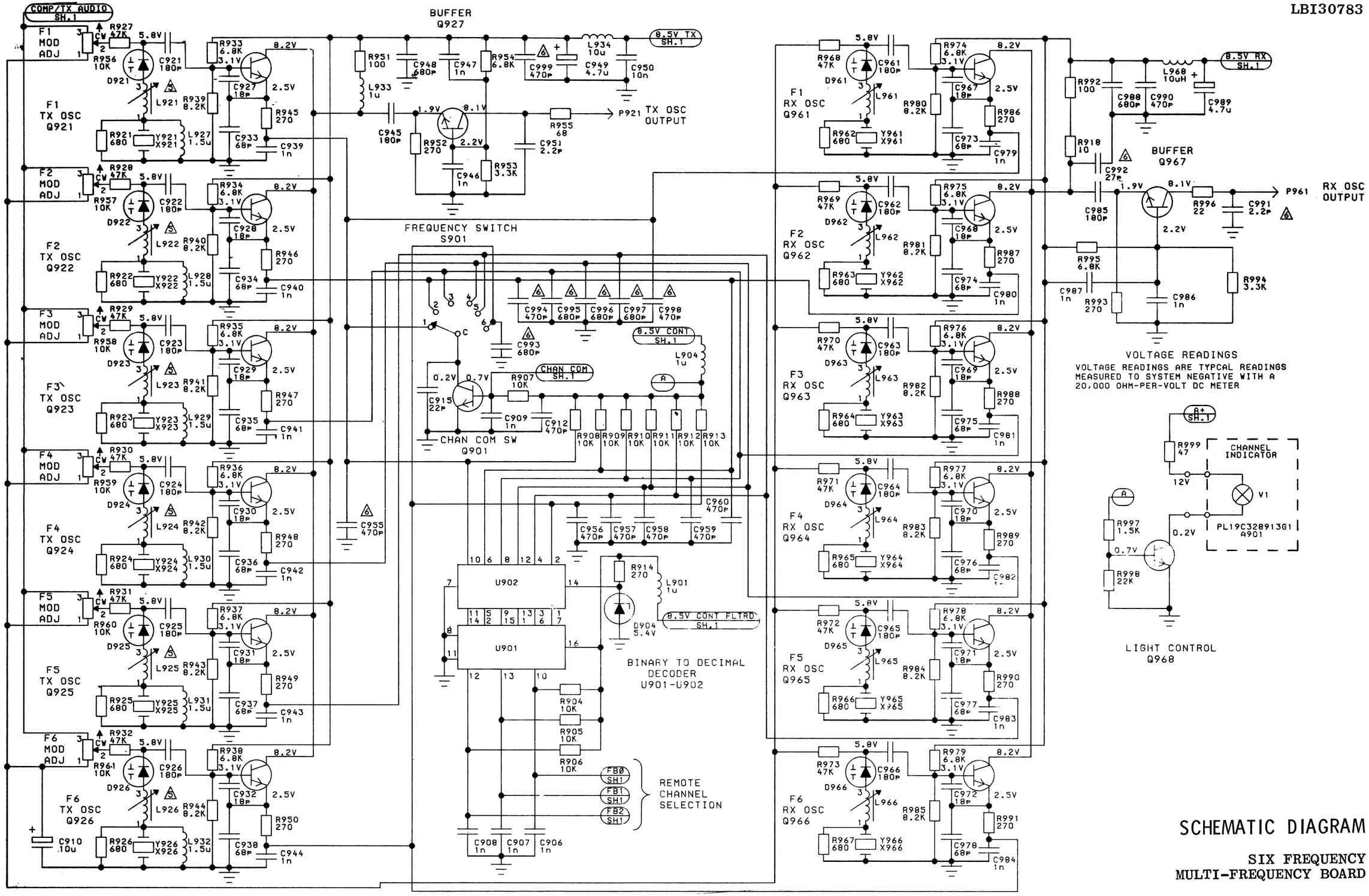
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u,n OR p
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

MODEL NO.	REV. LETTER
PL19D42970361	
PL19D42970362	
PL19C32891361	

SCHEMATIC DIAGRAM

SIX FREQUENCY INTERCONNECT BOARD

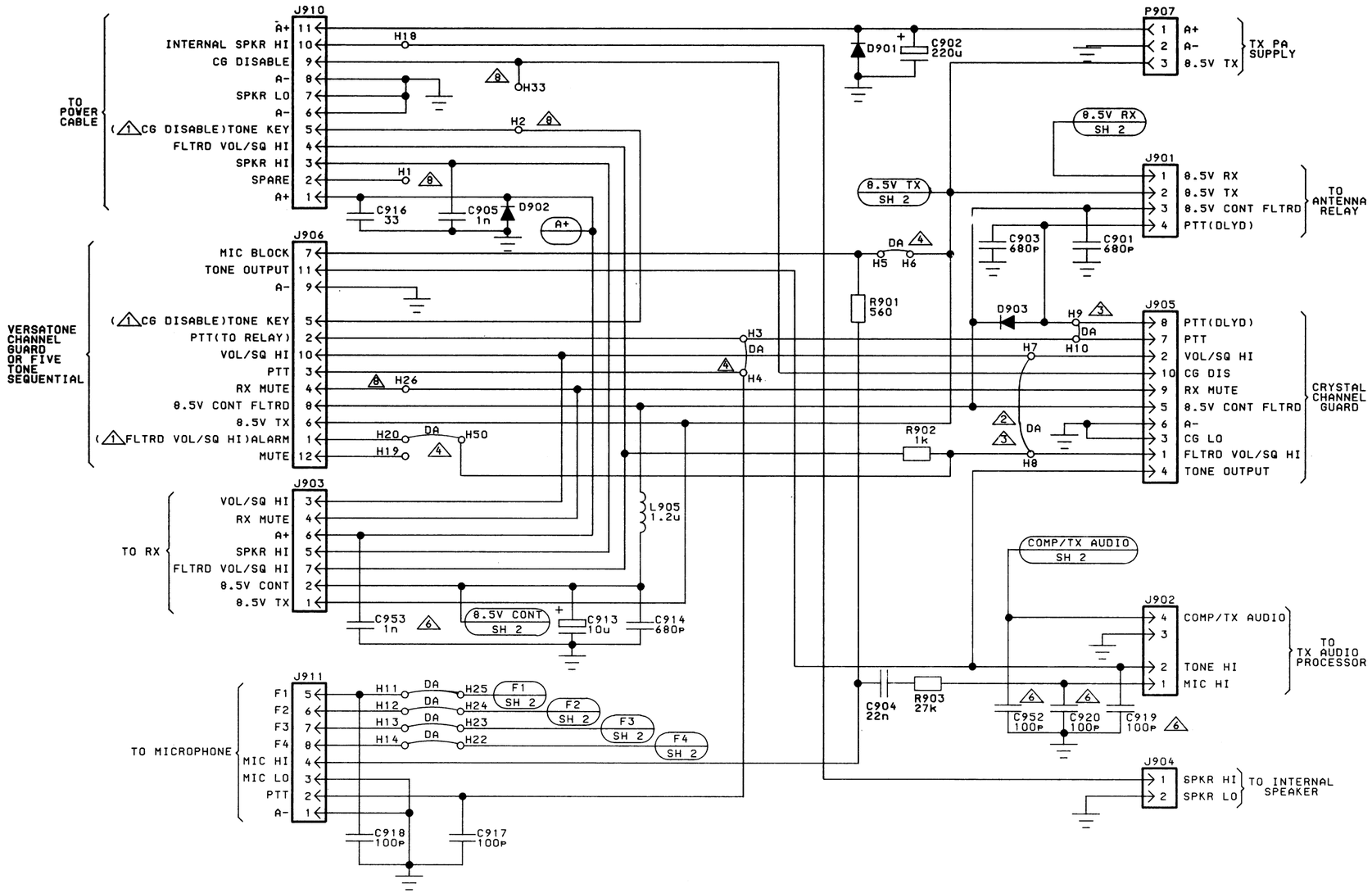
(19D430340, Sh. 1, Rev. 1)



(19D430340, Sh. 2, Rev. 1)

SCHEMATIC DIAGRAM

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.

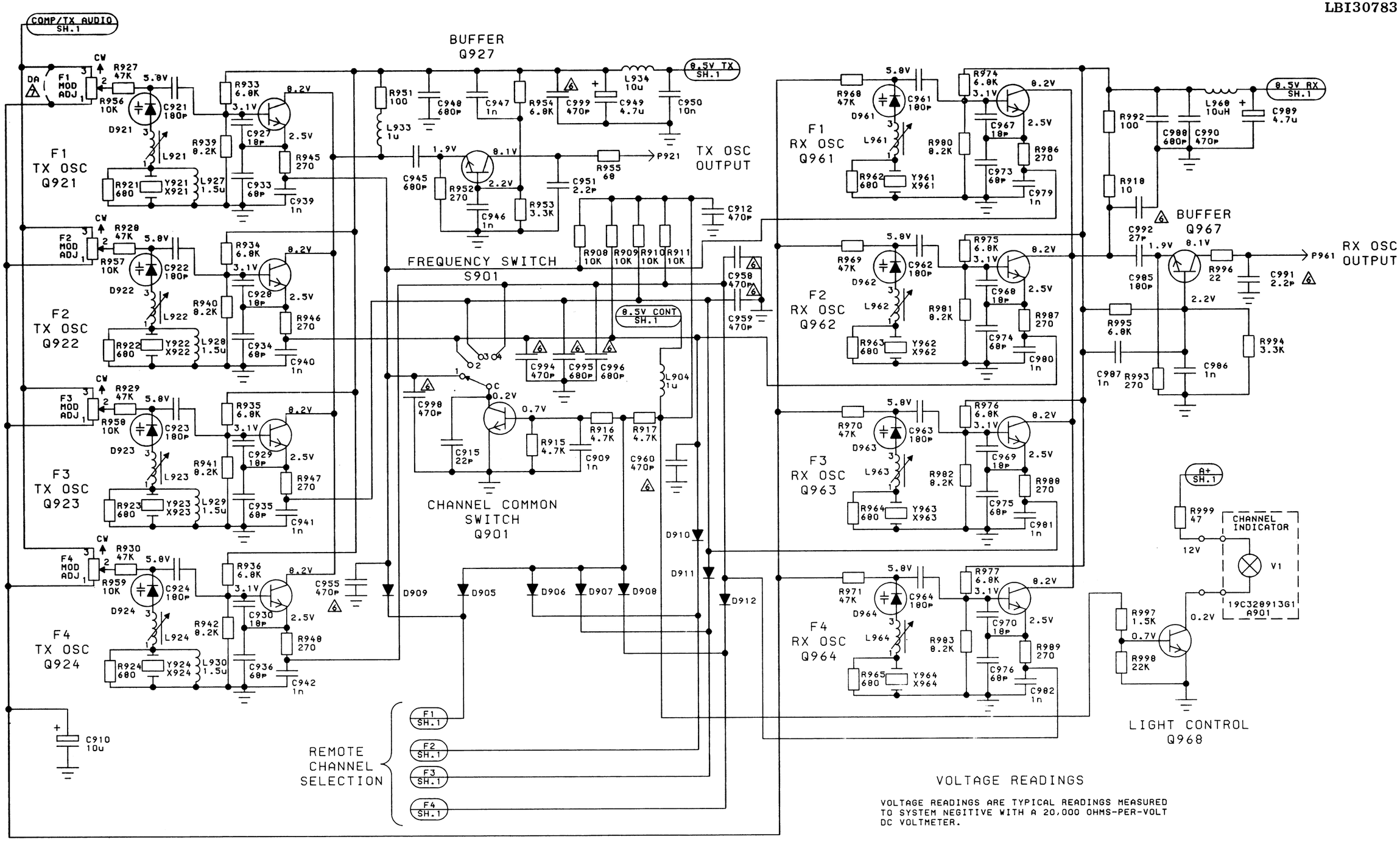
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M. CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u, n OR p. INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

MODEL NO.	REV. LETTER
19D43007861	
19D43007862	
19D43007863	
19D43007864	
19D43007865	
19D43007866	
19D43007867	
19D43007868	
19C32891361	

SCHEMATIC DIAGRAM

FOUR FREQUENCY INTERCONNECT BOARD

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



(19D430341, Sh. 2, Rev. 1)

SCHEMATIC DIAGRAM

FOUR FREQUENCY MULTI-FREQUENCY BOARD

Issue 2

PARTS LIST

148-174 MHz CENTURY II RADIO
(10/25 WATT TRANSMITTER)
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		TRANSMIT/RECEIVE ASSEMBLY 19D429451G1 thru G4 (See Transmit/Receive Assembly Parts List shown separately)
		FRONT CAP ASSEMBLY 19B233129G1
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS901	19A138181G1	Permanent magnet: 4 ohms ±10% imp, resonant frequency 400 Hz at 1 VRMS, 3 watt max.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	4034221P1	Nut, push-on: sim to Tinnerman C1617-010-27.
	19D429825P2	Grille.
	19B209683P1	Nameplate. (CENTURY II).
		CHASSIS 19B233230G2
		CAPACITOR ASSEMBLY 19A138190G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A116699P2	Ceramic, feed-thru: 1000 pf ±20%, 250 VDCW; sim to Aerovox Style 7405.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19D429801G1	Frame.
	19C328666P1	Insulator. (Locates under Transmit/Receive Board).
	19A134661P3	Nut, hex (Metric): M2.5. (Secures Q205 & Q206 on Transmit/Receive Board).
	19A134748P2004	Screw, machine, (Pozidriv, Metric): M2 x 0.4 x 4. (Secures capacitor assembly 19A138190G1).
	19A134657P1	Lockwasher, internal tooth, Metric: M2.2. (Secures capacitor assembly 19A138190G1).
		POWER CABLE 19B232925G1
P910	19A116659P143	Connector, printed wiring; sim to Molex 09-50-3111.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A137818G1	Fused lead. (Red).
	19A137818G3	Fused lead. (Black).
	19A137818G4	Fused lead. (Brown).
		MIKE HANGER/HOOKSWITCH 19C320318G3
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S6	19A134398P1	Push: sim to Chicago Switch S-1527-1.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19A129414G1	Cable: approx 5 feet. (Includes (2) contacts 19A116781P5).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
S1	19B209261P18	Switch, slide: 1 pole, 2 positions, 0.5 amp VDC or 3 amp VAC at 125 v; sim to Switchcraft 46202LH.
	19B219694P1	Base plate.
	19B219698G4	Housing.
	19B219693P2	Spring.
	19A116768P6	Strain relief. (W1).
	N193P1410C	Tap screw, phillip head: No. 8-18 x 5/8. (Secures assembly to mounting surface).
	19A134398P101	Plate. (Located on S6).
		MOUNTING HARDWARE KIT 19A138051G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A134653P4008	Bolt, machine, hex: Metric, 8MM (Secures radio to mounting bracket).
	19A134657P5	Lockwasher, internal tooth: No. M2.2 (Metric). (Secures radio to mounting bracket).
	N193P1210C	Tap screw, phillip head: No. 6-20 x 5/8. (Secures mounting bracket to mounting surface- with thin mounting surface).
	N193P1216C	Tap screw, phillip head: No. 6-20 x 1. (Secures mounting bracket to mounting surface- when thick carpet is on mounting surface).
	5490407P17	Rubber grommet: neoprene. (Located in fire wall).
	19A115185P9	Retaining strap: sim to Dennison BAR-LOK 08471. (Secures power leads under dash).
	4036835P11	Terminal, solder: sim to Shakeproof 505 ZIEICK. (Used with positive battery lead).
		MECHANICAL PARTS
	19B232859P1	Bushing. (Secures Transmit LED Light).
	19A137825P1	Insulator. (Band Pass Filter).
	19C328661P1	Insulator. (Receiver - L Shape).
	19B232964P1	Insulator. (MULTI-FREQ).
	19B232927P1	Insulator. (P.A.).
	19B232962P1	Insulator. (Interconnect assembly).
	19B232928P1	Insulator. (Exciter).
	19A134589P3028	Tap screw, Metric: No. size 3-28MM. (Secures P.A. shield).
	19A134483P3005	Screw, machine, Metric: No. size 3-5MM. (Secures top & bottom covers).
	19A134589P3008	Tap screw, Metric: No. size 3-8MM. (Secures front cap & Transmit/Receive assembly).
	19A134657P3	Lockwasher, internal tooth: No. M3. (Secures top & bottom covers).
	19A134483P2508	Screw, machine, Metric: No. size 2.5-8MM. (Secures Q205 & Q206).
	19A138241P1	Pin. (Used with Multi-Freq. Knob).
	4038831P5	Alignment tool.
	19D429697P1	Transmit/Receive Shield.
	19C328556P1	Cover. (Top & Bottom).
	19B233372G1	Faceplate, standard. (Includes GENERAL ELECTRIC nameplate- 19B209572P3).
	19D430583P5	Faceplate, Multi-Frequency.
	19B209687P1	Mounting bracket. (Standard).
	19B209687P2	Mounting bracket. (Front Access- includes installation tool 19B209687P6).
	19B209687P3	Mounting bracket. (DESK).
	19B209687P6	Allen wrench. (Used with 19B209687P2 mounting bracket).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

CENTURY II EXTERNAL SPEAKER OPTION
19C320302G9
ISSUE 1

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

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

HIGH BAND TRANSMIT/RECEIVE BOARD
19D429451G1 25 WATT (25 KHz)
19D429451G2 10 WATT (25 KHz)
19D429451G3 25 WATT (12.5 KHz)
19D429451G4 10 WATT (12.5 KHz)
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C102 and C103	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C104	19A116080P205	Polyester: 0.047 µf ±5%, 50 VDCW.
C106	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.
C107	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C108*	19A116080P216	Polyester: 0.0068 µf ±5%, 50 VDCW. Deleted by REV A.
C108A*	19A116080P216	Polyester: 0.0068 µf ±5%, 50 VDCW. Added by REV A.
C108B*	19A116080P201	Polyester: 0.01 µf ±5%, 50 VDCW. Added by REV A.
C109*	19A116080P218	Polyester: 0.001 µf ±5%, 50 VDCW.
		Earlier than REV A:
	19A700001P7	Ceramic, high dielectric, disc: 1000 pf, ±20%, 50 VDCW.
C110	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C111	19A116080P206	Polyester: 0.068 µf ±5%, 50 VDCW.
C112	19A700001P2	Ceramic, high dielectric, disc: 150 pf, ±20%, 50 VDCW.
C113*	19A700002P16	Ceramic, temp compensating, disc: 18 pf ±5%, 50 VDCW. Added by REV A.
C151	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C152	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C153	19A700002P28	Ceramic, temp compensating, disc: 180 pf ±5%, 50 VDCW.
C154	19A700001P6	Ceramic, high dielectric, disc: 680 pf, ±20%, 50 VDCW.
C155	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C156	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C157*	19A700002P12	Ceramic, temp compensating, disc: 8.2 pf ±0.25 pf, 50 VDCW.
		Earlier than REV A:
	19A700002P13	Ceramic, temp compensating, disc: 10 pf ±5%, 50 VDCW.
C158	19A700002P20	Ceramic, temp compensating, disc: 39 pf ±5%, 50 VDCW.
C201*	19A700001P2	Ceramic, high dielectric, disc: 150 pf, ±20%, 50 VDCW.
		Earlier than REV A:
	19A700002P13	Ceramic, temp compensating, disc: 10 pf ±5%, 50 VDCW.
C203	19A700002P19	Ceramic, temp compensating, disc: 33 pf ±5%, 50 VDCW.
C204 and C205	19A700001P7	Ceramic, high dielectric, disc: 1000 pf, ±20%, 50 VDCW.
C206	19A700002P16	Ceramic, temp compensating, disc: 18 pf ±5%, 50 VDCW.
C207	19A700002P19	Ceramic, temp compensating, disc: 33 pf, ±20%, 50 VDCW.
C208	5491601P111	Phenolic: 0.39 pf ±5%, 500 VDCW.
C209	19A700002P15	Ceramic, temp compensating, disc: 15 pf ±5%, 50 VDCW.
C210	19A700002P19	Ceramic, temp compensating, disc: 33 pf, ±20%, 50 VDCW.
C211	19A700003P5	Tantalum: 2.2 µf ±20%, 35 VDCW.
C212 and C213	19A700001P7	Ceramic, high dielectric, disc: 1000 pf, ±20%, 50 VDCW.
C214	19A700001P5	Ceramic, high dielectric, disc: 470 pf ±20%, 50 VDCW.
C215	19A700002P16	Ceramic, temp compensating, disc: 18 pf ±5%, 50 VDCW.
C216	19A700002P21	Ceramic, temp compensating, disc: 47 pf ±5%, 50 VDCW.
C217	5491601P115	Phenolic: 0.56 pf ±5%, 500 VDCW.
C218	19A700002P14	Ceramic, temp compensating, disc: 12 pf ±5%, 50 VDCW.
C219	19A700002P20	Ceramic, temp compensating, disc: 39 pf ±5%, 50 VDCW.
C220 thru C222	19A700001P7	Ceramic, high dielectric, disc: 1000 pf, ±20%, 50 VDCW.
C223 and C224	19A700002P16	Ceramic, temp compensating, disc: 18 pf ±5%, 50 VDCW.
C225	19A700001P7	Ceramic, high dielectric, disc: 1000 pf, ±20%, 50 VDCW.
C231	19A700002P13	Ceramic, temp compensating, disc: 10 pf ±5%, 50 VDCW.
C232	19A700002P22	Ceramic, temp compensating, disc: 56 pf ±5%, 50 VDCW.
C233	19A116679P110J	Silver mica: 110 pf ±5%, 250 VDCW.
C234	19A700004P2	Metallized polyester: 0.1 µf ±10%, 63 VDCW.
C235	19A700001P2	Ceramic, high dielectric, disc: 150 µf ±20%, 50 VDCW.
C236	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C237	19A116679P220J	Silver mica: 220 pf ±5%, 250 VDCW.
C238A	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C238B	7489162P23	Silver mica: 68 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C239A	7489162P6	Silver mica: 10 pf ±.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C239B	7489162P101	Silver mica: 5 pf ±.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C240	19A116679P110J	Silver mica: 110 pf ±5%, 250 VDCW.
C241A	19A116952P240	Silver mica: 240 pf ±5%, 250 VDCW; sim to Underwood Type J1HF.
C241B	19A116952P150	Silver mica: 150 pf ±5%, 250 VDCW; sim to Underwood Type J1HF.
C242A	19A116952P240	Silver mica: 240 pf ±5%, 250 VDCW; sim to Underwood Type J1HF.
C242B	19A116952P150	Silver mica: 150 pf ±5%, 250 VDCW; sim to Underwood Type J1HF.
C243	19A700004P2	Metallized polyester: 0.1 µf ±10%, 63 VDCW.
C244	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C245	19A700001P2	Ceramic, high dielectric, disc: 150 µf ±20%, 50 VDCW.
C246	19A116679P220J	Silver mica: 220 pf ±5%, 250 VDCW.
C247A	19A116679P130J	Silver mica: 130 pf ±5%, 250 VDCW.
C247B	19A116679P82J	Silver mica: 82 pf ±5%, 250 VDCW.
C248	19A116679P30J	Metallized teflon: 30 pf ±5%, 250 VDCW.
C249	19A116679P220J	Silver mica: 220 pf ±5%, 250 VDCW.
C250	19A116679P8D	Metallized teflon: 8 pf ±.5 pf, 250 VDCW.
C251	19A116679P22J	Metallized teflon: 22 pf ±5%, 250 VDCW.
C252	19A116952P29	Metallized teflon: 29 pf ±2%, 250 VDCW; sim to Underwood Type J1HF.
C253	19A116679P8D	Metallized teflon: 8 pf ±.5 pf, 250 VDCW.
C254	19A700001P2	Ceramic, high dielectric, disc: 150 µf ±20%, 50 VDCW.
C255	19A700002P3	Ceramic, temp compensating, disc: 1.5 pf ±0.25 pf, 50 VDCW.
C258	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C301	19A700001P6	Ceramic, high dielectric, disc: 680 µf ±20%, 50 VDCW.
C302	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C303	19A700002P28	Ceramic, temp compensating, disc: 180 pf ±5%, 50 VDCW.
C304	19A700001P6	Ceramic, high dielectric, disc: 680 µf ±20%, 50 VDCW.
C305	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C306	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C307	19A700002P11	Ceramic, temp compensating, disc: 6.8 pf ±0.25 pf, 50 VDCW.
C308	19A700002P28	Ceramic, temp compensating, disc: 180 pf ±5%, 50 VDCW.
C309	5491601P115	Phenolic: 0.56 pf ±5%, 500 VDCW.
C310	19A700002P15	Ceramic, temp compensating, disc: 15 pf ±5%, 50 VDCW.
C311	19A700002P21	Ceramic, temp compensating, disc: 47 pf ±5%, 50 VDCW.
C312	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C313	19A700002P17	Ceramic, temp compensating, disc: 22 pf ±5%, 50 VDCW.
C31401 and C402	19A700002P12	Ceramic, temp compensating, disc: 8.2 pf ±0.25 pf, 50 VDCW.
C403	5491601P117	Phenolic: 0.68 pf ±5%, 500 VDCW.
C404 thru C406	19A700001P5	Ceramic, high dielectric, disc: 470 µf ±20%, 50 VDCW.
C407 and C408	19A700002P12	Ceramic, temp compensating, disc: 8.2 pf ±0.25 pf, 50 VDCW.
C409	5491601P105	Phenolic: 0.22 pf ±5%, 500 VDCW.
C410	19A700002P3	Ceramic, temp compensating, disc: 1.5 pf ±0.25 pf, 50 VDCW.
C411	19A700002P10	Ceramic, temp compensating, disc: 5.6 pf ±0.25 pf, 50 VDCW.
C412	19A700005P4	Polyester: 3300 pf ±10%, 50 VDCW.
C413	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C414	19A700005P3	Polyester: 2200 pf ±10%, 50 VDCW.
C415	19A700002P31	Ceramic, temp compensating, disc: 330 pf ±5%, 50 VDCW.
C501	19A700002P17	Ceramic, temp compensating, disc: 22 pf ±5%, 50 VDCW.
C502	19A700001P5	Ceramic, high dielectric, disc: 470 µf ±20%, 50 VDCW.
C503 thru C505	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C506	19A700002P21	Ceramic, temp compensating, disc: 47 pf ±5%, 50 VDCW.
C507	19A700002P25	Ceramic, temp compensating, disc: 100 pf ±5%, 50 VDCW.
C508	19A700002P29	Ceramic, temp compensating, disc: 220 pf ±5%, 50 VDCW.
C509	19A700005P5	Polyester: 4700 pf ±10%, 50 VDCW.
C510	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.
C511	19A700003P2	Tantalum: 0.22 µf ±20%, 35 VDCW.
C512 thru C514	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.
C515 and C516	19A700003P2	Tantalum: 0.22 µf ±20%, 35 VDCW.
C517 and C518	19A700001P3	Ceramic, high dielectric, disc: 220 pf ±20%, 50 VDCW.
C519	19A700001P7	Ceramic, high dielectric, disc: 41000 pf ±20%, 50 VDCW.
C520	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.
C521	19A134730P3	Electrolytic: 470 µf +100% -10%, 16 VDCW.
C522	19A700005P4	Polyester: 3300 pf ±10%, 50 VDCW.
C601	19A700005P5	Polyester: 4700 pf ±10%, 50 VDCW.
C602	19A700005P6	Polyester: 6800 pf ±10%, 50 VDCW.
C603	19A700005P11	Polyester: 0.047 µf ±10%, 50 VDCW.
C604	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C605	19A134730P1	Electrolytic: 47 µf +100% -10%, 16 VDCW.
C606	19A700003P4	Tantalum: 1 µf ±20%, 35 VDCW.
C607	19A700003P3	Tantalum: 0.47 µf ±20%, 35 VDCW.
C608	19A700004P2	Metallized polyester: 0.1 µf ±10%, 63 VDCW.
C609	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C610	19A700003P9	Tantalum: 47 µf ±20%, 6.3 VDCW.
C611	19A700004P2	Metallized polyester: 0.1 µf ±10%, 63 VDCW.
C612	19A700003P2	Tantalum: 0.22 µf ±20%, 35 VDCW.
C613	19A700004P6	Metallized polyester: 0.47 µf ±10%, 63 VDCW.
C614	19A134730P3	Electrolytic: 470 µf +100% -10%, 16 VDCW.
C615 and C616	19A700004P1	Metallized polyester: 0.068 µf ±10%, 63 VDCW.
C617	19A134730P1	Electrolytic: 47 µf +100% -10%, 16 VDCW.
C618	19A134730P2	Electrolytic: 220 µf +100% -10%, 25 VDCW.
C620 and C621	19A700001P5	Ceramic, high dielectric, disc: 470 pf, ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
D101 and D102	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D151	19A116785P2	Silicon, capacitive.
D152	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D201	19A115775P1	Silicon, fast recovery, 225 mA, 50 PIV.
D301	19A116785P2	Silicon, capacitive.
D501 and D502	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D601 thru D605	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D606	19A134738P1	Diode, optoelectronic: red: sim to Siemans LD41/11.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J151	19A116428P4	Contact, electrical: sim to AMP 86031-1.
J301	19A116428P4	Contact, electrical: sim to AMP 86031-1.
J601	4029493P2	Connector, receptacle: sim to Amphenol 83-876-1002
		- - - - - - - - - - RELAYS - - - - - - - - - -
K601	19B209558P1	Hermetic sealed: 180 to 341 ohms coil res, 2 form C contacts, 8.0 to 16.3 VDC; sim to GE 3SAV1760A2.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L151	19A134728P1	Coil, RF: variable.
L152	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2K.
L153	19A134727P6	Coil, RF: variable.
L154	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L155	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2K.
L202	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L203	19A129773G1	Coil.
L204 and L205	19A134727P3	Coil, RF: variable.
L206	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L207	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L208 and L209	19A134727P3	Coil, RF: variable.
L211	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L212 and L213	19A138299P1	Coil.
L221	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4K.

(Cont'd on Page 38)

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
L222		(Part of printed board 19D429450P1).
L224	19A138304P1	Coil.
L225A	19A138302P1	Coil.
L225B	19A138302P2	Coil.
L226	19A138296P1	Coil.
L227	19A129773G1	Coil.
L228	19A138303P1	Coil.
L229A	19A138296P1	Coil.
L229B	19A138300P1	Coil.
L230A*	19A138301P3	Coil.
		In REV A & earlier:
	19A138301P2	Coil.
L230B	19A138303P1	Coil.
L232	19A138298P1	Coil.
L234	19A138298P1	Coil.
L235	19A138297P1	Coil.
L236	19A138298P1	Coil.
L237	19A138296P1	Coil.
L238	19A138298P1	Coil.
L239	19A138297P1	Coil.
L301	19A134728P2	Coil.
L302	19B209420P119	Coil, RF: 3.30 µh ±10%, 0.80 ohms DC res max; sim to Jeffers 4436-6K.
L303	19A134727P6	Coil, RF: variable.
L305	19A134727P2	Coil, RF: variable.
L401 thru L404	19A134727P4	Coil, RF: variable.
L405	19A134727P5	Coil, RF: variable.
L406*	19A134729P2	Coil, RF: variable.
		Earlier than REV A:
	19A134729P1	Coil, RF: variable.
L407		(Part of printed board 19D429450P1).
L501	19A134747P2	Transformer, intermediate Freq: 10.7 MHz, sim to Toko Inc. 154 PC-470073N3.
L502		
L503 and L504	19A134747P1	Transformer, intermediate Freq: 455 KHz; sim to Toko Inc. 452252NO.
L601	19A134741P1	Reactor, Audio Freq; sim to Festinduktivitaten No. DR 275/5K 75 mH ±10% 37.0.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101	19A116659P15	Connector, printed board: 4 contacts; sim to Molex 09-52-3042.
P201	19A116659P1	Connector, printed board: 3 contacts; sim to Molex 09-52-3032.
P901	19A116659P15	Connector, printed board: 4 contacts; sim to Molex 09-52-3042.
P903	19A116659P83	Connector, printed board: 7 contacts; sim to Molex 09-52-3072 (SPECIAL).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q151	19A115330P1	Silicon, NPN.
Q201	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q202 and Q203	19A116201P1	Silicon, NPN.
Q204	19A116868P1	Silicon, NPN; sim to Type 2N4427.
Q205	19A134340P1	Silicon, NPN: VHF Amplifier, 4 watts, 12.5 v.
Q206A	19A134340P2	Silicon, NPN: VHF Amplifier, 25 watts, 12.5 v.
Q206B	19A134340P3	Silicon, NPN: VHF Amplifier, 12 watts.
Q207	19A116742P1	Silicon, NPN.
Q208	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q209 and Q210	19A115910P1	Silicon, NPN; sim to Type 2N3904.

SYMBOL	GE PART NO.	DESCRIPTION
Q301 and Q302	19A115330P1	Silicon, NPN.
Q401	19A134758P1	Silicon, NPN, UHF Amplifier: sim to BFX89.
Q402	19A116154P1	N Channel, field effect.
Q501	19A134760P1	N Channel, field effect: sim to 3N205.
Q601 and Q602	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q603 thru Q605	19A134749P1	Silicon, PNP; sim to Type 2N5087.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R102	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R103	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R104	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R105	19C314256P21052	Metal film: 10.5K ohms ±1%, 1/4 w.
R106	19C314256P21272	Metal film: 12.7K ohms ±1%, 1/4 w.
R107	19C314256P21052	Metal film: 10.5K ohms ±1%, 1/4 w.
R108	19C314256P25111	Metal film: 5.1K ohms ±1%, 1/4 w.
R109*	3R152P132J	Composition: 1.3K ohms ±5%, 1/4 w. Deleted by REV A.
R109A*	3R152P132J	Composition: 1.3K ohms ±5%, 1/4 w. Added by REV A.
R109B*	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w. Added by REV A.
R110	19C314256P25111	Metal film: 5.1K ohms ±1%, 1/4 w.
R112	19C314256P22002	Metal film: 20K ohms ±1%, 1/4 w.
R113	19C314256P21242	Metal film: 12.4K ohms ±1%, 1/4 w.
R114*	3R152P333J	Composition: 33K ohms ±5%, 1/4 w.
		Earlier than REV A:
	19C314256P23242	Metal film: 32.4K ohms ±1%, 1/4 w.
R115	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R116	19A134752P1	Variable, carbon film: 4.7K ohms ±20%, 0.1 watt; sim to Phillips 2322410033.
R117	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
R151 and R152	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R153	19A134732P1	Thermistor: 3.3K ohms ±10% at 0 Power, color code red; sim to Philips No. 2322-642-12332.
R154	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R155	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R156	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R157	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R158	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R160	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R161	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R201	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R202	3R152P391J	Composition: 390 ohms ±5%, 1/4 w.
R203	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R204	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R205	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R206	3R152P242J	Composition: 2.4K ohms ±5%, 1/4 w.
R207	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R208	3R152P270J	Composition: 27 ohms ±5%, 1/4 w.
R209	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R210	3R152P270J	Composition: 27 ohms ±5%, 1/4 w.
R211	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R213	3R77P100J	Composition: 10 ohms ±5%, 1/2 w.
R215	19A116412P3	Variable, cermet: 5K ohms ±10%, 1/2 w; sim to Helipot Model 62 PR.
R216	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R217	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R218	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R219	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R220	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R221	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R222	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R223	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R224*	3R77P100J	Composition: 10 ohms ±5%, 1/2 w. Added by REV B.
R301	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R302	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R303	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R304	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R305	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R306	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R307	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R308	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R309	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R310	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R401	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R402	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R403	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R404	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R405	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R406	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R407	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R501	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R502 and R503	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.
R504	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R505	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R506	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R507	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R508 and R509	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R510	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R511	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R512 and R513	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R514	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R515	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R516	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R517	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R518	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R519	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R520	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R521	19A134755P2	Variable, carbon film: 25K ohms ±20%, 0.1 w; sim to Ruwido Type 0052-300.
R522	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R523	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R524 and R525	3R152P393J	Composition: 39K ohms ±5%, 1/4 w.
R526	19A116670P16	Composition: 4.7 ohms ±5%, 1/4 w.
R527	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R601	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R602	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R603	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R604	3R152P183J	Composition: 18K ohms ±5%, 1/4 w.
R605	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R606	3R152P274J	Composition: 270K ohms ±5%, 1/4 w.
R607	19A134755P1	Variable, carbon film: 10K ohms ±20%, 0.1 w; sim to Ruwido Type 0052-300.

SYMBOL	GE PART NO.	DESCRIPTION
R608	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R609	19A134732P2	Thermistor: 470 ohms ±20% at 0 Power, color code brown; sim to Philips No. 2322-642-11471.
R610	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R611	3R152P121J	Composition: 120 ohms ±5%, 1/4 w.
R612	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R613	3R152P821J	Composition: 820 ohms ±5%, 1/4 w.
R614	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R615	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R616	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R617	3R152P394J	Composition: 390K ohms ±5%, 1/4 w.
R618	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R619 and R620	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.
R621	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R622	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R623	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R624	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R625	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R626	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R627*	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R628*	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R629	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R630	19A134753P1	Variable, carbon film: 47K ohms ±20%, 0.1 w.
R631	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R632	19A116216P1R0J	Deposited carbon: 1.0 ohms ±5%, .25 w; sim to Mepco Electra Type CR25.
R633	3R152P121J	Composition: 120 ohms ±5%, 1/4 w.
R634	19A116216P1R0J	Deposited carbon: 1.0 ohms ±5%, .25 w; sim to Mepco Electra Type CR25.
R635	3R152P560J	Composition: 56 ohms ±5%, 1/4 w.
R636A	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R636B	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R636C	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R636D	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R636E	19A116216P6R8J	Deposited carbon: 6.8 ohms ±5%, .25 w; sim to Mepco Electra Type CR25.
R637	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R638	7147161P19	Composition: 1.0 ohms ±5%, 1/2 w.
R639	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
		- - - - - - - - - SWITCHES - - - - - - - - - -
S601	19A138273G1	Push: DPDT, 2 station, push-push with latch; sim to Isostat MA 2171. (Includes S602).
S602		(Part of S601).
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T201	19A129564G1	Transformer.
		- - - - - - - - TEST POINTS - - - - - - - - - -
TP201 and TP202	19A138242P1	Contact. (Quantity 1 each).
TP203	19A138242P1	Contact. (Quantity 2).
TP401	19A138242P1	Contact. (Quantity 2).
TP501	19A138242P1	Contact. (Quantity 2).

(Cont'd on Page 39)

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U101*	19A116297P6	Linear, Dual OP Amp, 8 Pin Minidip Package; sim to Raytheon.
		Earlier than REV A:
	19A134511P2	Linear, Dual OP Amp, 8 Pin Minidip Package; sim to LM258N.
U501	19A134759P1	Linear, Dual Differential Amplifier: 14 pin dip.
U502	19A134766P1	Linear, IF Amplifier & Detector: sim to Amperex TBA 750.
U601	19A134769P2	Linear, Audio Amplifier.
U602	19A138414G1	Linear, Positive Voltage Regulator: 8.5 v; sim to μA7808U.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W201 thru W203		(Part of printed board 19D429450P1).
W401		(Part of printed board 19D429450P1).
W601		(Part of printed board 19D429450P1).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
X151		Socket. Includes:
	19A134806P1	Pin. (Quantity 2).
	19B232322P1	Spring. (Quantity 1).
X301		Socket. Includes:
	19A134806P1	Pin. (Quantity 2).
	19B232322P1	Spring. (Quantity 1).
X501		Socket. Includes:
	19A134806P1	Pin. (Quantity 2).
	19B232322P1	Spring. (Quantity 1).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
Y151	19B233066G1	Transmitter: 5 PPM. Crystal Freq= Operating Freq / 3
	19B233066G3	Transmitter: 10 PPM. Crystal Freq= Operating Freq / 3
Y301	19B233066G2	Receiver: 5 PPM. Crystal Freq= Fo -10.7 / 3
	19B233066G4	Receiver: 10 PPM. Crystal Freq: Fo -10.7 / 3
Y501	19A134802G1	Crystal unit, Quartz: 5600 to 22000 KHz freq range.
		- - - - - - - - - - - FILTERS - - - - - - - - - -
Z201 and		FILTER ASSEMBLY 19A138228G1
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A129773G1	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P100J	Composition: 10 ohms ±5%, 1/2 w.
Z501A	19A134745P2	Filter, bandpass: freq. 10.7 MHz; sim to ITT No. 033CA without Transformers.
Z501B	19A134745P3	Filter, bandpass: freq. 10.7 MHz; sim to ITT No. 033DD without Transformers.
Z502A	19A134742P1	Filter, bandpass: freq. 455 ± 1.5 KHz; sim to Murata No. CFU455D2 or Matsushita No. EFC-L455K41EA.
Z502B	19A134742P2	Filter, bandpass: freq. 455 ± 1.5 KHz; sim to Murata No. CFU455F2 or Matsushita No. EFC-L455K41C.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232914P1	Shield. (Shield center located at L203).
	19A137813P1	Shield. (Located at C252).
	19B232901P1	Support. (Used with Q207, U601, U602).
	19A116023P3	Insulator. (Used with Q207, U602).
	19A134016P1	Insulator. (Used with Q207, U602).

SYMBOL	GE PART NO.	DESCRIPTION
	19A134656P4	Flat washer. M2.5. (Used with Q207, U602).
	19A134661P3	Hex nut. M2.5. (Used with Q207, U601, U602).
	19A134483P2508	Machine screw. M2.5 x 8 MM. (Used with Q207, U601, U602).
	19A134657P2	Lockwasher. M2.5. (Used with Q207, U601, U602).
	19A134772P1	Can. (Used with L153, L204, L205, L208, L209, L303, L305, L401, L402, L403, L405, L408).
	19A138274P1	Insulator. (Used with L153, L204, L205, L208, L209, L303, L305, L401, L402, L403, L405, L408).
	N330P1905F22	Eyelet. (Located in corner of printed board at J601).
	19B232830P1	Support. (J601).
	19A134589P3006	Tap screw. M3 x 6MM.
	19B232918P1	Spacer. (Used with S601, S602).
	19C328587P1	Push button. (Used with S601, S602).
	NP280612P1	Label. (S601 - SQUELCH).
	NP280612P2	Label. (S602 - POWER).
	19D429826P2	Knob. (R630 - VOLUME).
	19A138389P1	Insulator. (Located on back side of VOLUME knob - R630).
	4036555P1	Insulator, washer: nylon. (Used with Q204).
	4035656P45	Spacer. (Located between L401 & L405).

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 - Transmitter/Receiver Board 19D429451G1-G4

To incorporate Channel Guard Disable function. Rx Mute lead rerouted through Squelch Monitor Switch.

To improve operation. Changed C108, C109, C157, C201, L406, R109, R114, R625, R627, R628 and U101. Added C113 and D607.

REV. B - Transmitter/Receiver Board 19D429451G1, G3

To improve transmitter performance. Changed L230. Added R224.

PARTS LIST

TRANSISTORIZED MICROPHONE
19B209670P1

SYMBOL	GE PART NO.	DESCRIPTION
	19A116659P20	Cable connector shell; sim to Molex 09-50-3081.
	19A116781P6	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 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C901	19A700001P6	Ceramic, high dielectric disc: 100 pf ±20%, 50 VDCW.
C902	19A134730P2	Electrolytic: 220 μf +100% -10%, 25 VDCW.
C903	19A700001P6	Ceramic, high dielectric disc: 100 pf ±20%, 50 VDCW.
C904	19A700005P9	Polyester: 0.022 μf ±10%, 50 VDCW.
C905	19A700001P7	Ceramic, high dielectric disc: 1000 pf ±20%, 50 VDCW.
C911	19A700001P7	Ceramic, high dielectric disc: 1000 pf ±20%, 50 VDCW.
C913	19A700003P7	Tantalum: 10 μf ±20%, 16 VDCW.
C914	19A700001P6	Ceramic, high dielectric disc: 680 pf ±20%, 50 VDCW.
C916	19A700002P19	Ceramic, temperature compensating disc: 33 pf ±5%, 50 VDCW.
C917	19A116114P7065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -750 PPM.
C919 and C920	19A700001P1	Ceramic, high dielectric disc: 100 pf ±20%, 50 VDCW.
C952	19A700001P1	Ceramic, high dielectric disc: 100 pf ±20%, 50 VDCW.
C953	19A700001P7	Ceramic, high dielectric disc: 1000 pf ±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 μh ±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 ±5%, 1/4 w.
R902	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R903	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

MULTI-FREQUENCY BOARD - 6 FREQ
19D429703G1

SYMBOL	GE PART NO.	DESCRIPTION
A901		CHANNEL LIGHT BOARD 19C328913G1
		- - - - - - - INDICATING DEVICES - - - - - - - -
V1	19A116455P2	Lamp, incandescent; sim to Chicago Miniature Lamp No. CM78097.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C901	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C902	19A134730P2	Electrolytic: 220 µf +100% -10%, 25 VDCW.
C903	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C904	19A700005P9	Polyester: 0.022 µf ±10%, 50 VDCW.
C905 thru C909	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C910	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C912	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.
C913	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C914	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C915	19A700002P17	Ceramic, compensating disc: 22 pf ±5%, 50 VDCW.
C916	19A700002P19	Ceramic, compensating disc: 33 pf ±5%, 50 VDCW.
C917 and C918	19A116114P7065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -750 PPM.
C921 thru C926	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C927 thru C932	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C933 thru C938	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C939 thru C944	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C945	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C946 and C947	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C948	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C949	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C950	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C951	19A700002P5	Ceramic, compensating disc: 2.2 pf ±5%, 50 VDCW.
C961 thru C966	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C967 thru C972	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C973 thru C978	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C979 thru C984	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C985	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C986 and C987	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C988	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C989	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C990	19A700001P5	Ceramic, disc: 470 pf ±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 BBi17.
D961 thru D966	19A116785P2	Silicon, capacitive, low frequency; sim to Hypera-Brut BBi17.
		- - - - - - - 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 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L904	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L905	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L921A	19A134728P1	Coil, RF: variable.
L922A	19A134728P1	Coil, RF: variable.
L923A	19A134728P1	Coil, RF: variable.
L924A	19A134728P1	Coil, RF: variable.
L925A	19A134728P1	Coil, RF: variable.
L926A	19A134728P1	Coil, RF: variable.
L927 thru L932	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2.
L933	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L934	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L961 thru L966	19A134728P2	Coil, RF: variable.
L968	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P907	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3032.
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 Q927	19A115330P1	Silicon, NPN.
Q961 thru Q967	19A115330P1	Silicon, NPN.
Q968	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - RESISTORS - - - - - - - - - -
R901	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R902	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R903	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.
R904 thru R913	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R914	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R918	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R921 thru R926	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R927 thru R932	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R933 thru R938	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R939 thru R944	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R945 thru R950	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R951	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R952	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R953	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R954	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R955	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R956 thru R961	19A116412P5	Variable, cermet: 10K ohms ±10%, 1/2 w; sim to Helipot Model 62 PR.
R962 thru R967	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R968 thru R973	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R974 thru R979	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R980 thru R985	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R986 thru R991	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R992	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R993	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R994	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R995	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R996	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R997	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R998	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R999	3R152P470J	Composition: 47 ohms ±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 12F1X12.
		- - - - - - - 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		Socket. Includes:
	19A134806P1	Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
X961 thru X966		Socket. Includes:
	19A134806P1	Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
		- - - - - - - - - CRYSTALS - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
		Crystal freq = Operating Freq. / 3
Y921 thru Y926	19B233066G1	Transmitter: 5 PPM.
	19B233066G3	Transmitter: 10 PPM.
		Crystal freq = Operating Freq -10.7 / 3
Y961 thru Y966	19B233066G2	Receiver: 5 PPM.
	19B233066G4	Receiver: 10 PPM.
		- - - - - - - - - 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).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

MULTI-FREQUENCY BOARD
19D430078G1 4 TRANSMIT 4 RECEIVE
19D430078G2 2 TRANSMIT 2 RECEIVE
19D430078G3 2 TRANSMIT 1 RECEIVE
19D430078G4 1 TRANSMIT 2 RECEIVE

SYMBOL	GE PART NO.	DESCRIPTION
A901		CHANNEL LIGHT BOARD 19C328913G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
V1	19A116455P2	Lamp, incandescent; sim to Chicago Miniature Lamp No. CM78097.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C901	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C902	19A134730P2	Electrolytic: 220 µf +100% -10%, 25 VDCW.
C903	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C904	19A700005P9	Polyester: 0.022 µf ±10%, 50 VDCW.
C905	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C909	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C910	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C912	19A700001P5	Ceramic, disc: 470 pf ±20%, 50 VDCW.
C913	19A700003P7	Tantalum: 10 µf ±20%, 16 VDCW.
C914	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C915	19A700002P17	Ceramic, compensating disc: 22 pf ±5%, 50 VDCW.
C916	19A700002P19	Ceramic, compensating disc: 33 pf ±5%, 50 VDCW.
C917 and C918	19A116114P7065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -750 PPM.
C921 thru C924	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C927 thru C930	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C933 thru C936	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C939 thru C942	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C945	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C946 and C947	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C948	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C949	19A700003P6	Tantalum: 4.7 µf ±20%, 35 VDCW.
C950	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C951	19A700002P5	Ceramic, compensating disc: 2.2 pf ±5%, 50 VDCW.
C961 thru C964	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C967 thru C970	19A134725P1	Ceramic, disc: 18 pf ±5%, 50 VDCW.
C973 thru C976	19A134725P2	Ceramic, disc: 68 pf ±5%, 50 VDCW.
C979 thru C982	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C985	19A700002P28	Ceramic, compensating disc: 180 pf ±5%, 50 VDCW.
C986 and C987	19A700001P7	Ceramic, disc: 1000 pf ±20%, 50 VDCW.
C988	19A700001P6	Ceramic, disc: 680 pf ±20%, 50 VDCW.
C989	19A700005P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C990	19A700001P5	Ceramic, disc: 470 pf ±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 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L905	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L9021A	19A134728P1	Coil, RF: variable.
L922A	19A134728P1	Coil, RF: variable.
L923A	19A134728P1	Coil, RF: variable.
L924A	19A134728P1	Coil, RF: variable.
L927 thru L930	19B209420P115	Coil, RF: 1.50 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4436-2.
L933	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6K.
L934	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L961 thru L964	19A134728P2	Coil, RF: variable.
L968	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P907	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3032.
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.

(Cont'd on Page 42)

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
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 ±5%, 1/4 w.
R902	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R903	3R152P273J	Composition: 27K ohms ±5%, 1/4 w.
R908 thru R911	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R915 thru R917	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R918	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R921 thru R924	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R927 thru R930	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R933 thru R936	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R939 thru R942	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R945 thru R948	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R951	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R952	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R953	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R954	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R955	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R956 thru R959	19A116412P5	Variable, cermet: 10K ohms ±10%, 1/2 w; sim to Helipot Model 62 PR.
R962 thru R965	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R968 thru R971	3R152P473J	Composition: 47K ohms ±5%, 1/4 w.
R974 thru R977	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R980 thru R983	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R986 thru R989	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R992	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R993	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R994	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R995	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R996	3R152P220J	Composition: 22 ohms ±5%, 1/4 w.
R997	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R998	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R999	3R152P470J	Composition: 47 ohms ±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 12F1X12.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SOCKETS - - - - - - - - - -
X921 thru X924		Socket. Includes:
	19A134806P1	Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
X961 thru X964		Socket. Includes:
	19A134806P1	Pin. (Quantity 2 each).
	19B232322P1	Spring. (Quantity 1 each).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
		Crystal freq = Operating Freq. / 3
Y921 thru Y924	19B233066G1	Transmitter: 5 PPM.
	19B233066G3	Transmitter: 10 PPM.
		Crystal freq = (Operating Freq -10.7) / 3
Y961 thru Y964	19B233066G2	Receiver: 5 PPM.
	19B233066G4	Receiver: 10 PPM.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	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).

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.